



## FCC 47 CFR PART 15 SUBPART C

### TEST REPORT

For

**Wireless USB Dongle**

**Model: WU71RL**

**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*

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## 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 USB Dongle

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

**Model:** WU71RL

**Date of Test:** September 18 ~ November 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>	Wireless USB Dongle
<b>Trade Name</b>	PRO-NETS; Speed Com+; Jet Com
<b>Model Number</b>	WU71RL
<b>Model Discrepancy</b>	N/A
<b>EUT Power Rating</b>	5VDC
<b>Frequency Range</b>	2412 ~ 2462 MHz
<b>Transmit Power</b>	IEEE 802.11b mode: 13.80 dBm IEEE 802.11g mode: 13.82 dBm draft 802.11n 20 MHz Channel mode: 13.15 dBm draft 802.11n 40 MHz Channel mode: 13.82 dBm
<b>Modulation Technique</b>	IEEE 802.11b mode: DSSS (1, 2, 5.5 and 11 Mpbs) IEEE 802.11g mode: OFDM (6, 9, 12, 18, 24, 36, 48 and 54 Mpbs) draft 802.11n 20 MHz Channel mode: OFDM (6.5, 7.2, 13, 14.4, 14.44, 19.5, 21.7, 26, 28.89, 28.9, 39, 43.3, 43.33 52, 57.78, 57.8, 58.5, 65.0, 72.2, 78, 86.67, 104, 115.56, 117, 130, 144.44 Mbps) draft 802.11n 40 MHz Channel mode: OFDM (13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150, 162, 180, 216, 240, 243, 270, 300 Mbps)
<b>Number of Channels</b>	IEEE 802.11b/g mode: 11 Channels draft 802.11n 20 MHz Channel mode: 11 Channels draft 802.11n 40 MHz Channel mode: 7 Channels
<b>Antenna Specification</b>	Printed Antenna / Gain: 2.65dBi

**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-WU71RL** 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: WU71RL) 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.

#### **draft 802.11n 40 MHz Channel mode:**

Channel Low (2422MHz), Channel Mid (2437MHz) and Channel High (2452MHz) with 13.5Mbps data rate were chosen for full testing.



## 4. INSTRUMENT CALIBRATION

### 4.1 MEASURING instrument calibration

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

### 4.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

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

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

3M Semi Anechoic Chamber				
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	A031905	10/03/2009
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 V2.7)			

*Remark: The measurement uncertainty is less than +/- 2.0065dB (30MHz ~ 1GHz), +/- 3.0958dB (Above 1GHz) which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.*

Powerline Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCS30	845552/030	04/08/2009
LISN	R&S	ENV216	100074	12/03/2008
LISN	FCC	FCC-LISN-50/250-1 6-2-07	06013	10/16/2008
Test S/W	CCS-3A1-CE			

*Remark: The measurement uncertainty is less than +/- 1.7806dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.*



## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

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

- No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.  
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029
- No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan  
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045
- No. 81-1, Lane 210, 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 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 II for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

#### For Conducted Measurement

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

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

#### For Radiated Measurement

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1	Notebook PC	COMPAQ NC 4010	CNU5191L58	FCC DOC	HP	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

#### For Powerline Measurement

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	Notebook PC	COMPAQ NC 4010	CNU5191L58	FCC DOC	HP	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
2	LCD Monitor	2408WFB	CN-0G293H-74261-874-2CWS	FCC DoC	DELL	Shielded, 1.8m	Unshielded, 1.8m
3	PS/2 Mouse	M-S34	HCA25200078	DZL211029	Logitech	Unshielded, 1.8m	N/A
4	Multimedia Headset	CJC-5258MV	0507106322	FCC DoC	CJC	Unshielded, 1.8m	N/A
5	Notebook PC (Remote)	COMPAQ NC 4010	CNU441F8LV	FCC DOC	HP	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

**Remark:** Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

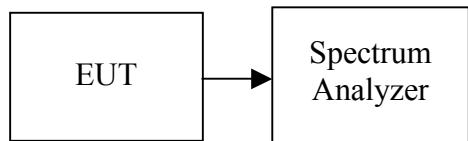
## 7. FCC PART 15.247 REQUIREMENTS

### 7.16db BANDWIDTH

#### LIMIT

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

#### TEST CONFIGURATION



#### TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100 kHz, VBW = 300 kHz, Span = 20 MHz, Sweep = atuo.
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**

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	12.16	>500	PASS
Mid	2437	12.12		PASS
High	2462	12.20		PASS

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

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.45	>500	PASS
Mid	2437	16.44		PASS
High	2462	16.48		PASS

### **Test mode: draft 802.11n 20 MHz Channel mode**

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.68	>500	PASS
Mid	2437	17.72		PASS
High	2462	17.68		PASS

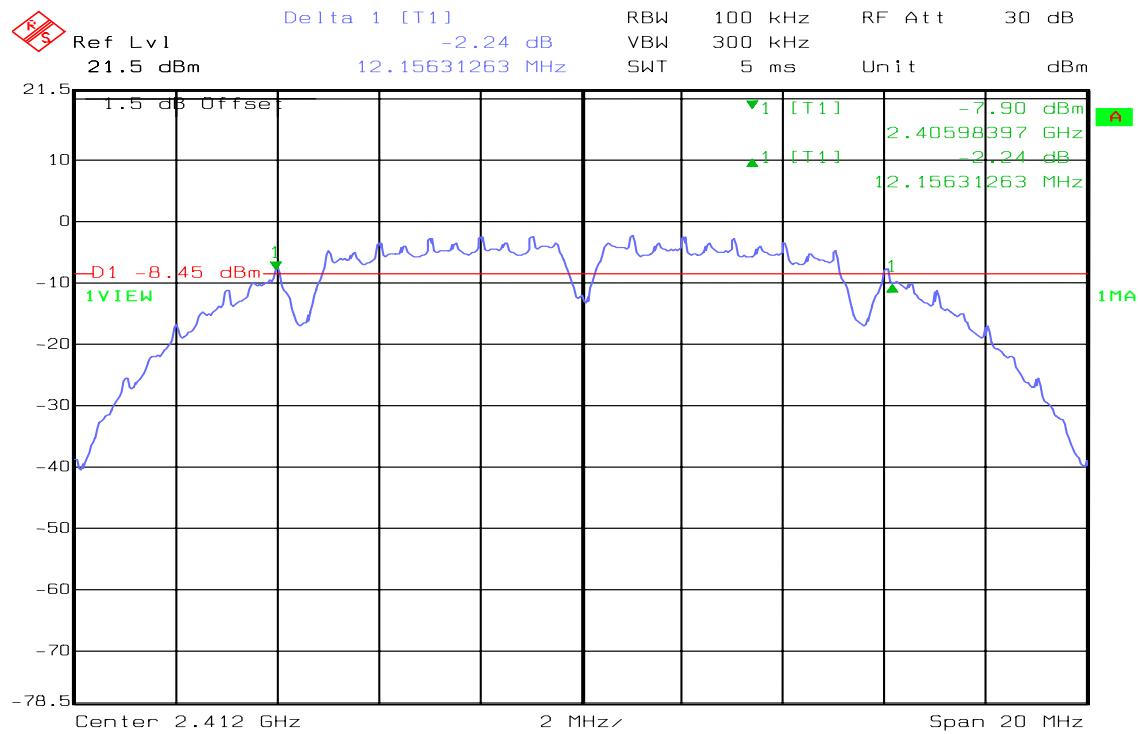
### **Test mode: draft 802.11n 40 MHz Channel mode**

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.51	>500	PASS
Mid	2437	36.48		PASS
High	2452	36.51		PASS

## TEST PLOT

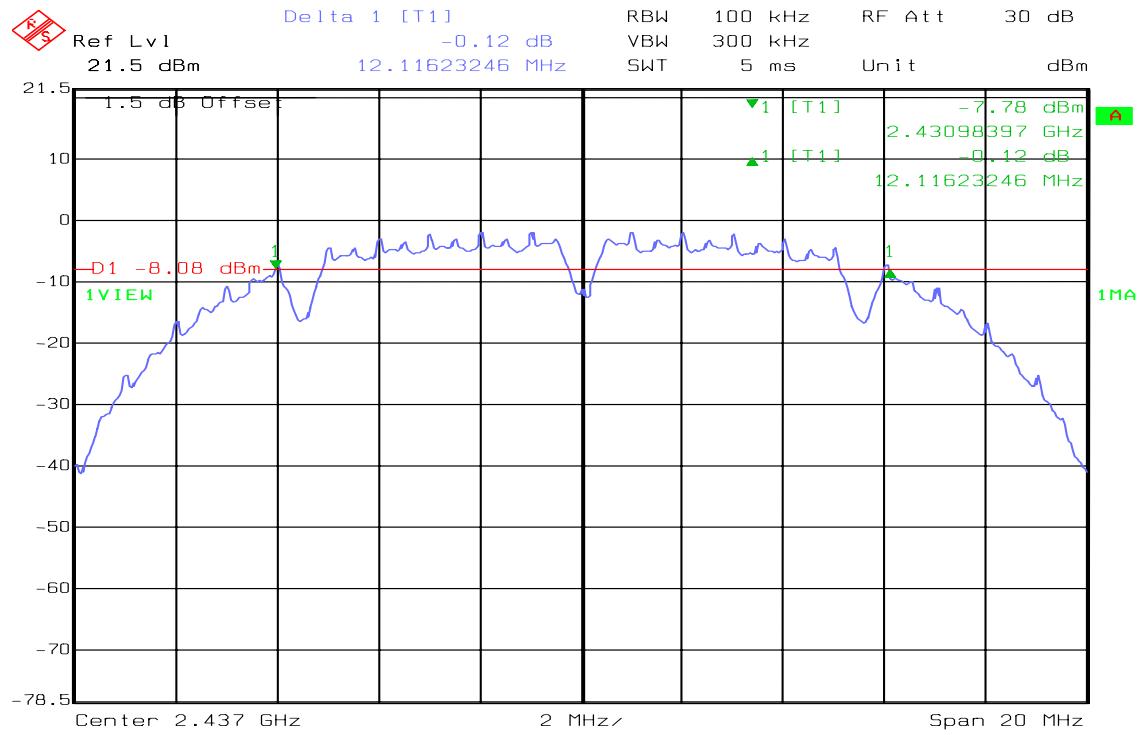
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## &lt;div[]({"label": "Section-Header", "text": "6dB Bandwidth (CH Low)"}



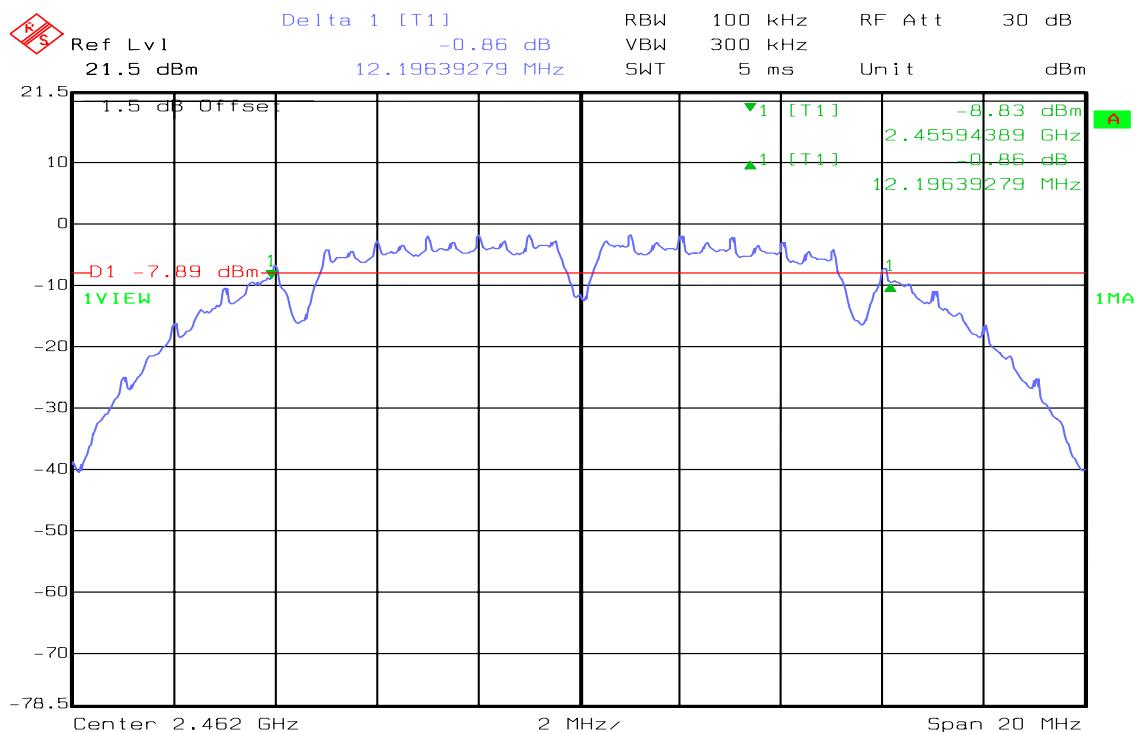
Date: 14.OCT.2008 23:54:18

### 6dB Bandwidth (CH Mid)



Date: 14.OCT.2008 23:52:24

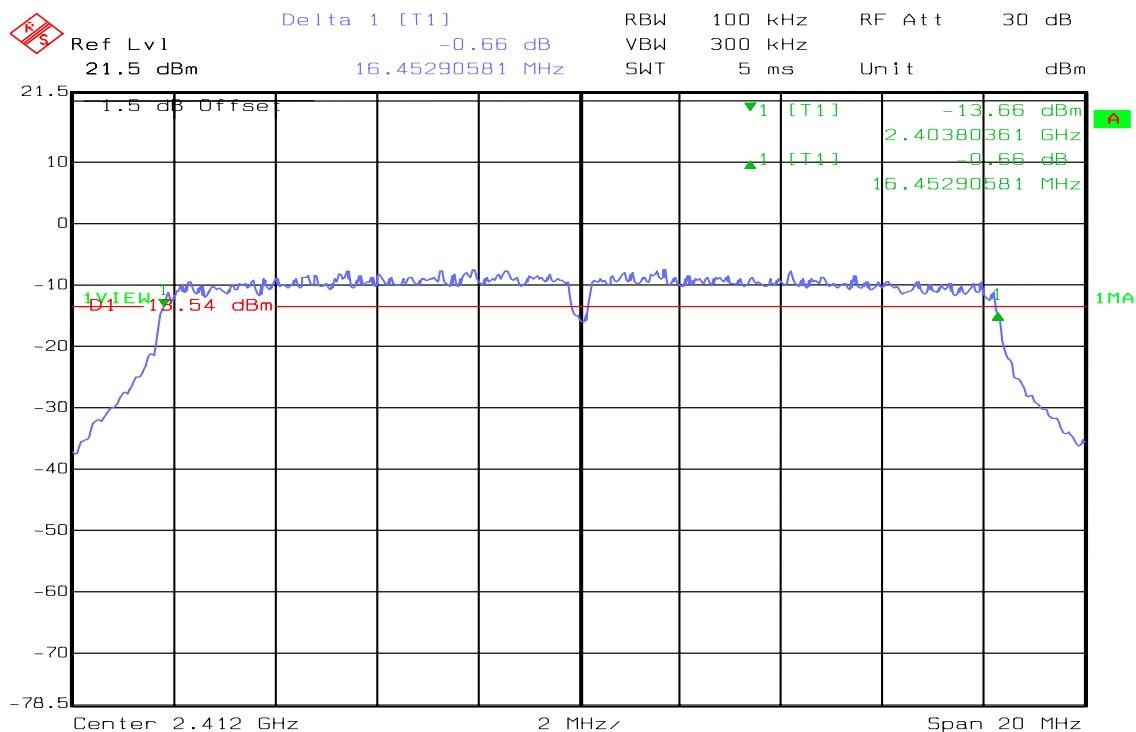
### 6dB Bandwidth (CH High)



Date: 14.OCT.2008 23:50:49

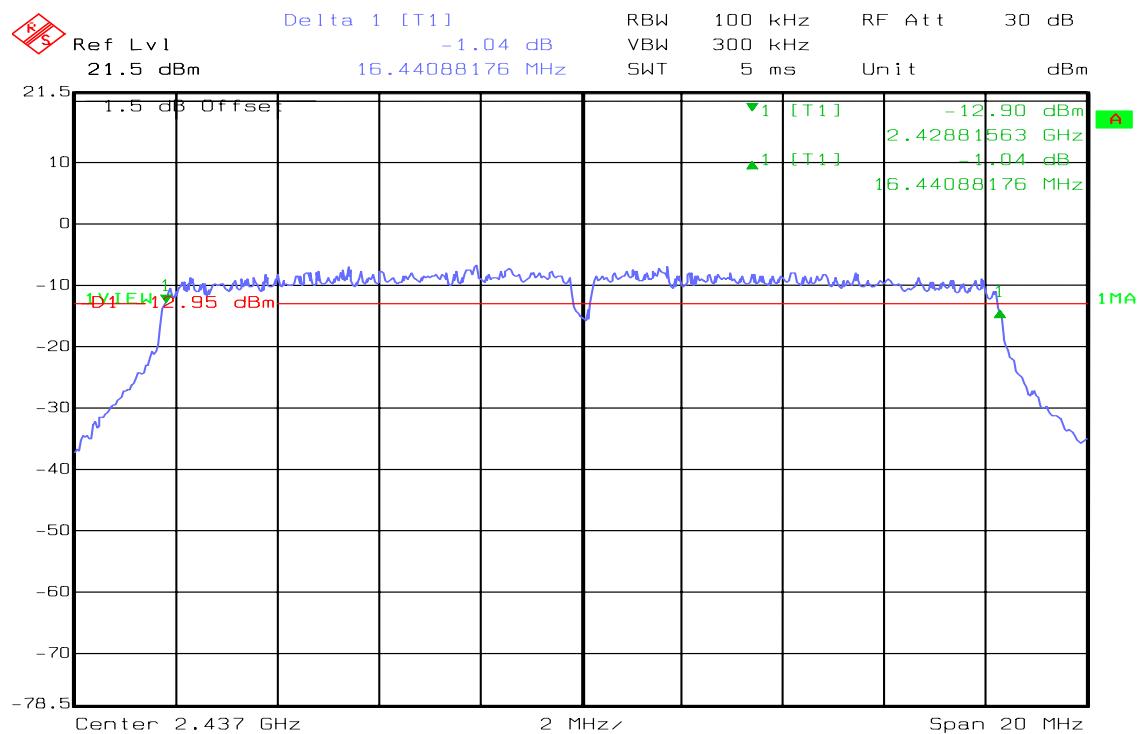
### IEEE 802.11g mode

### 6dB Bandwidth (CH Low)

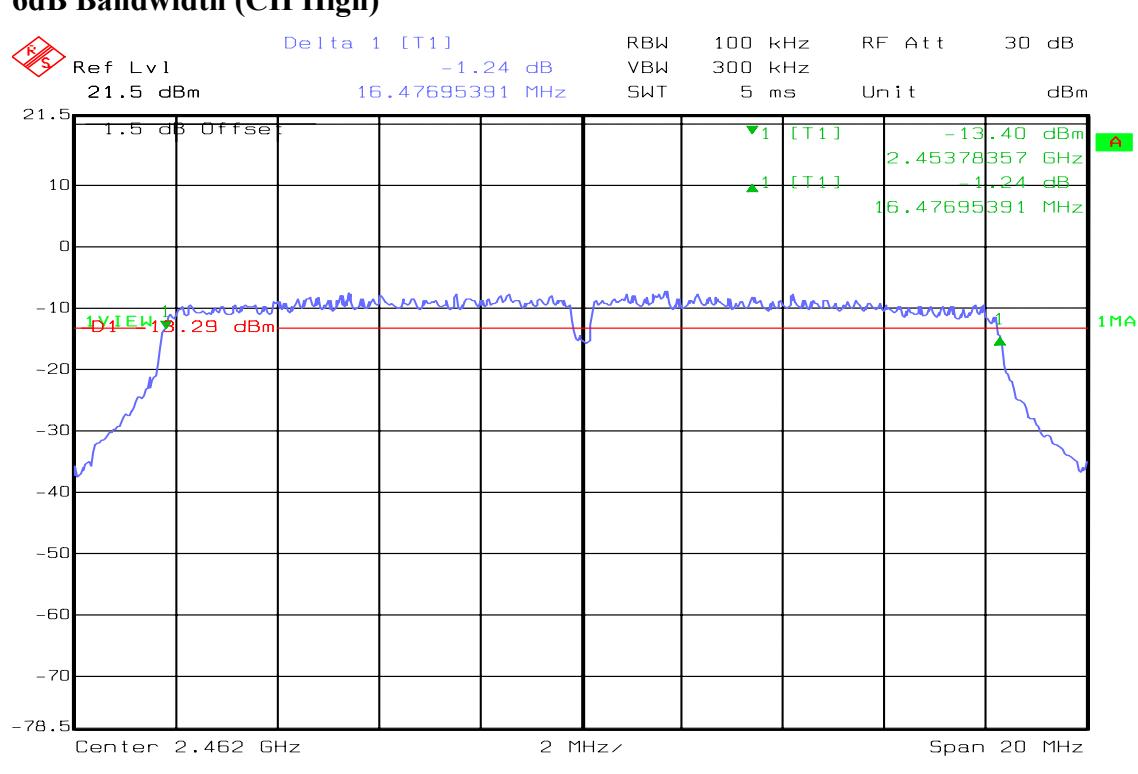


Date: 14.OCT.2008 23:43:24

### 6dB Bandwidth (CH Mid)

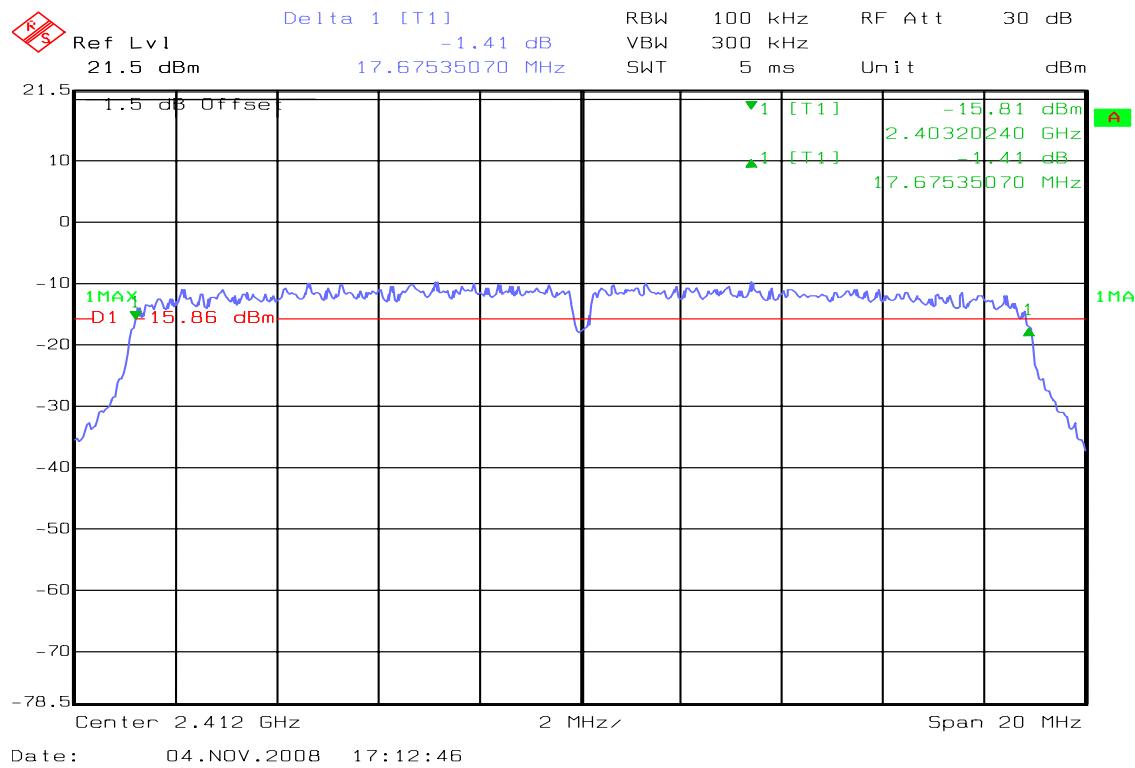


### 6dB Bandwidth (CH High)

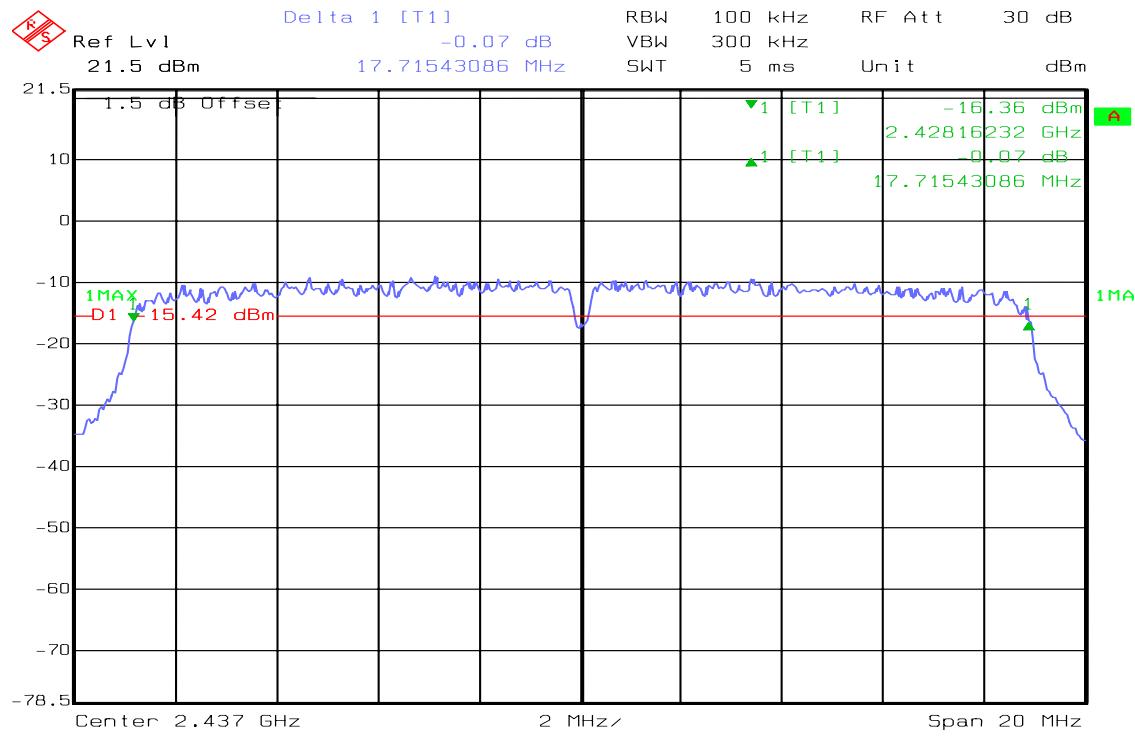


## draft 802.11n 20 MHz Channel mode

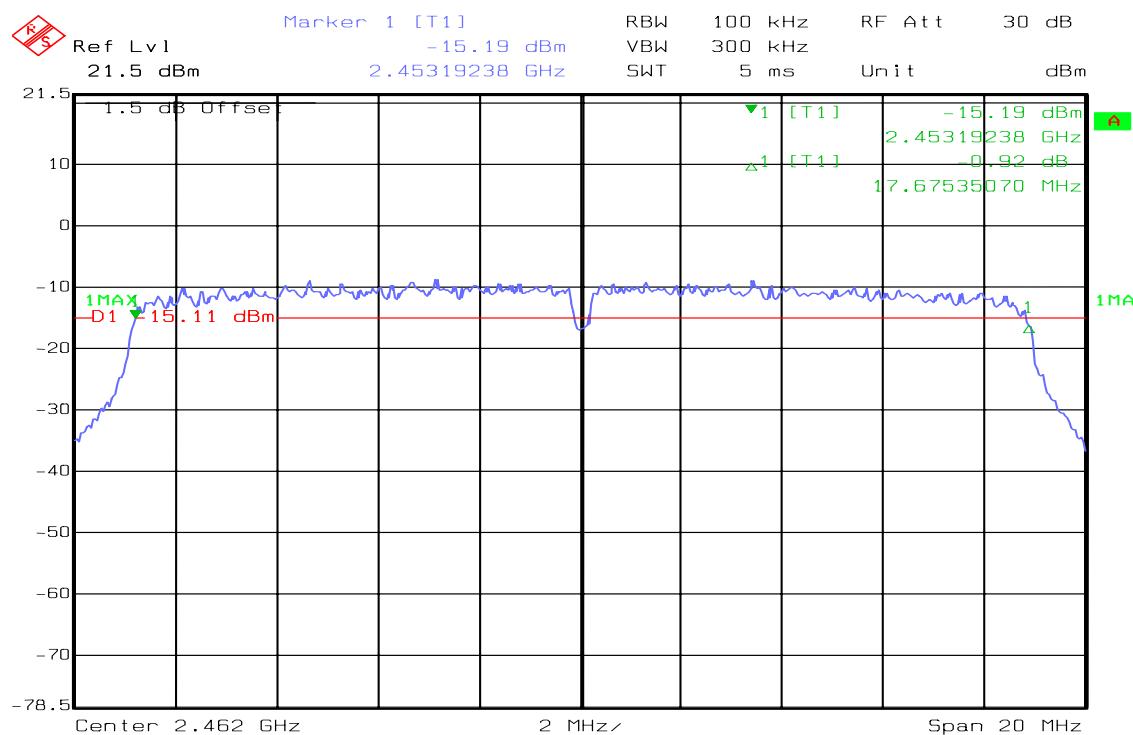
### 6dB Bandwidth (CH Low)



### 6dB Bandwidth (CH Mid)



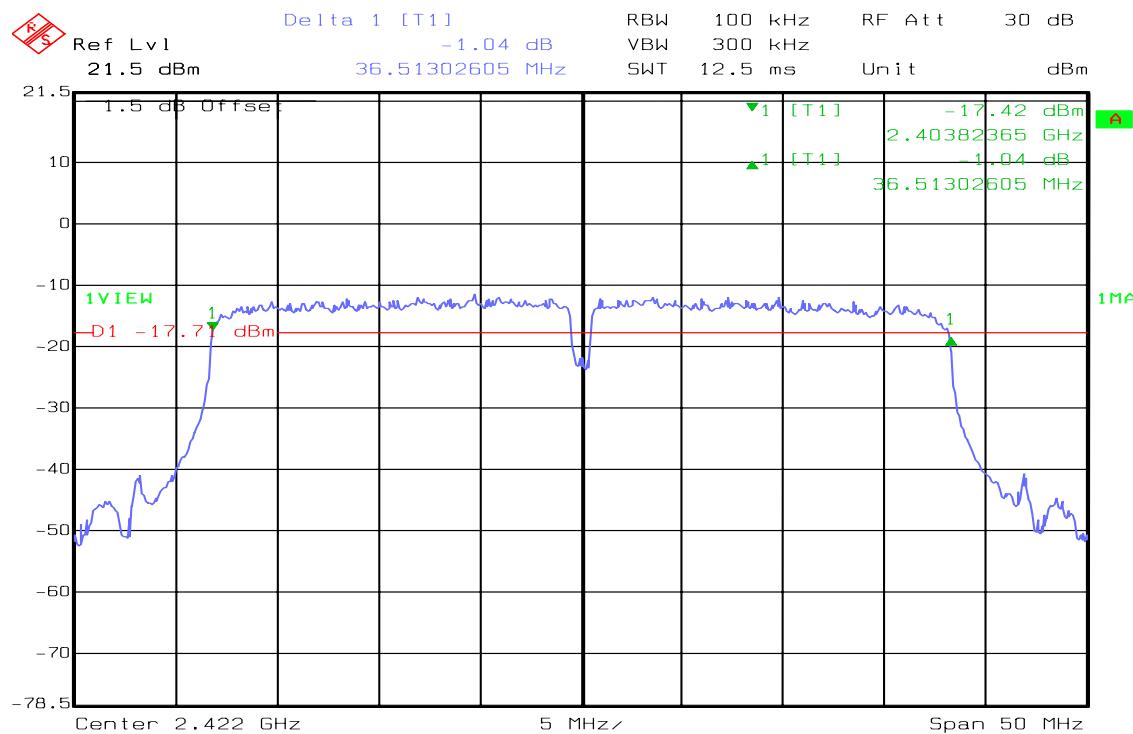
### 6dB Bandwidth (CH High)



Date: 04.NOV.2008 17:09:13

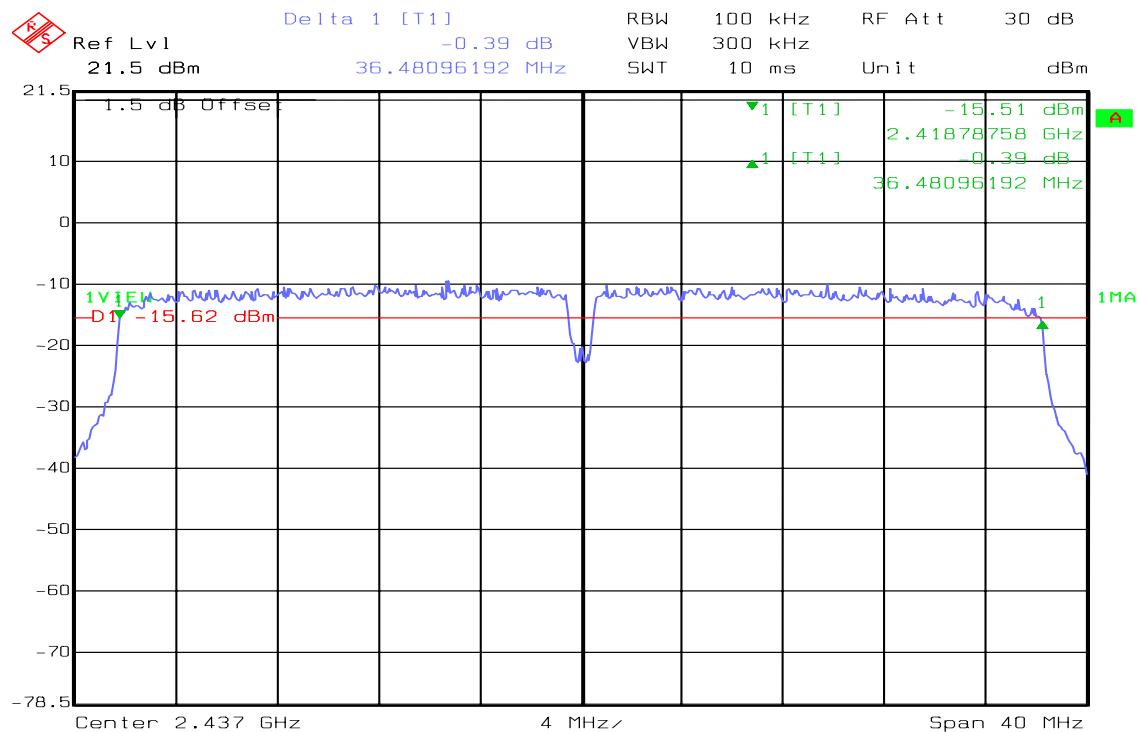
### draft 802.11n 40 MHz Channel mode

#### 6dB Bandwidth (CH Low)



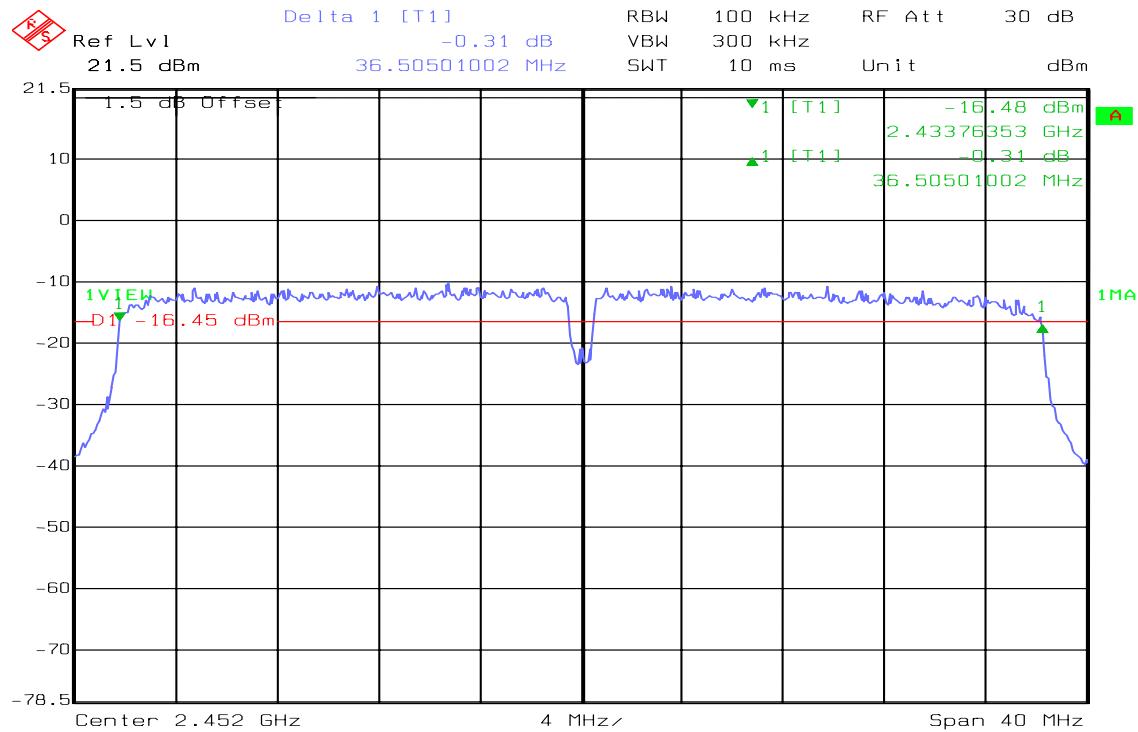
Date: 14.OCT.2008 21:55:32

### 6dB Bandwidth (CH Mid)



Date: 14.OCT.2008 23:58:04

### 6dB Bandwidth (CH High)



Date: 14.OCT.2008 23:59:28

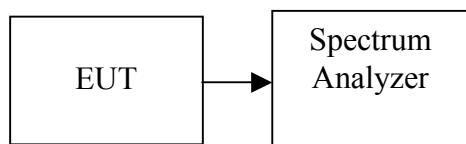
## 7.2 PEAK POWER

### 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.

### TEST CONFIGURATION



### TEST PROCEDURE

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



## TEST RESULTS

*No non-compliance noted*

### Test Data

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

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	13.80	0.02399	1.00	PASS
Mid	2437	13.66	0.02323		PASS
High	2462	13.49	0.02234		PASS

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

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	13.70	0.02344	1.00	PASS
Mid	2437	13.82	0.02410		PASS
High	2462	13.72	0.02355		PASS

#### **Test mode: draft 802.11n 20 MHz Channel mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	12.96	0.01977	1.00	PASS
Mid	2437	13.09	0.02037		PASS
High	2462	13.15	0.02065		PASS

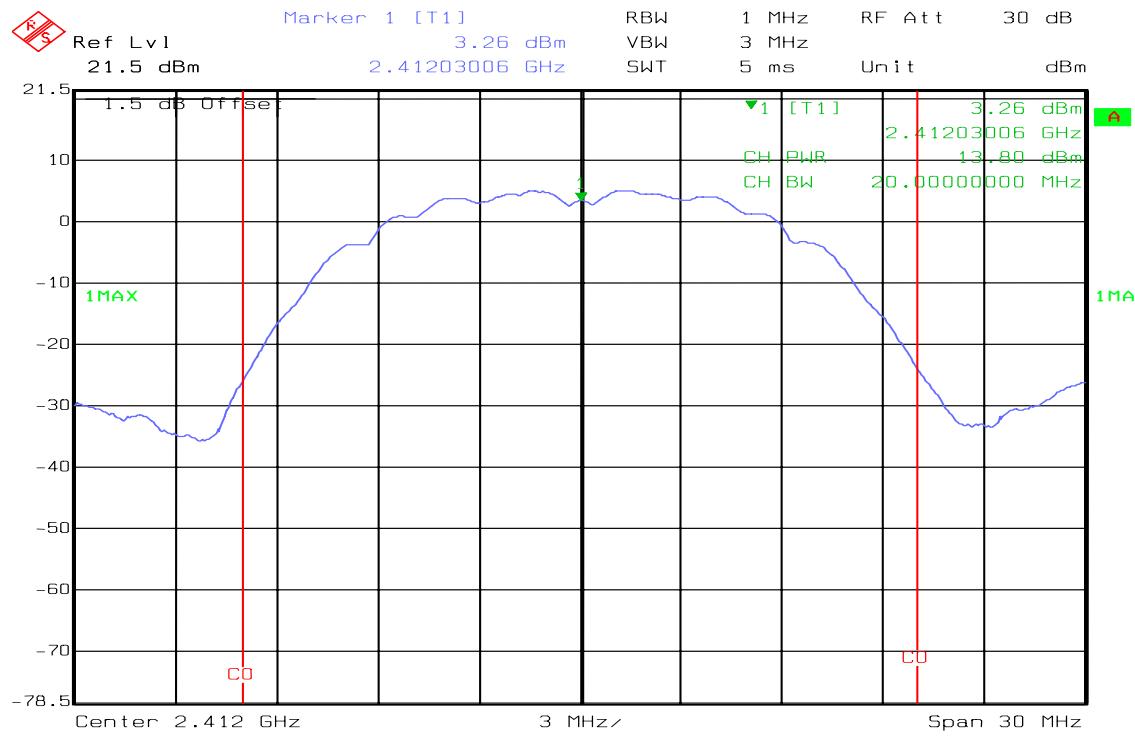
#### **Test mode: draft 802.11n 40 MHz Channel mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	13.43	0.02203	1.00	PASS
Mid	2437	13.82	0.02410		PASS
High	2452	13.61	0.02296		PASS

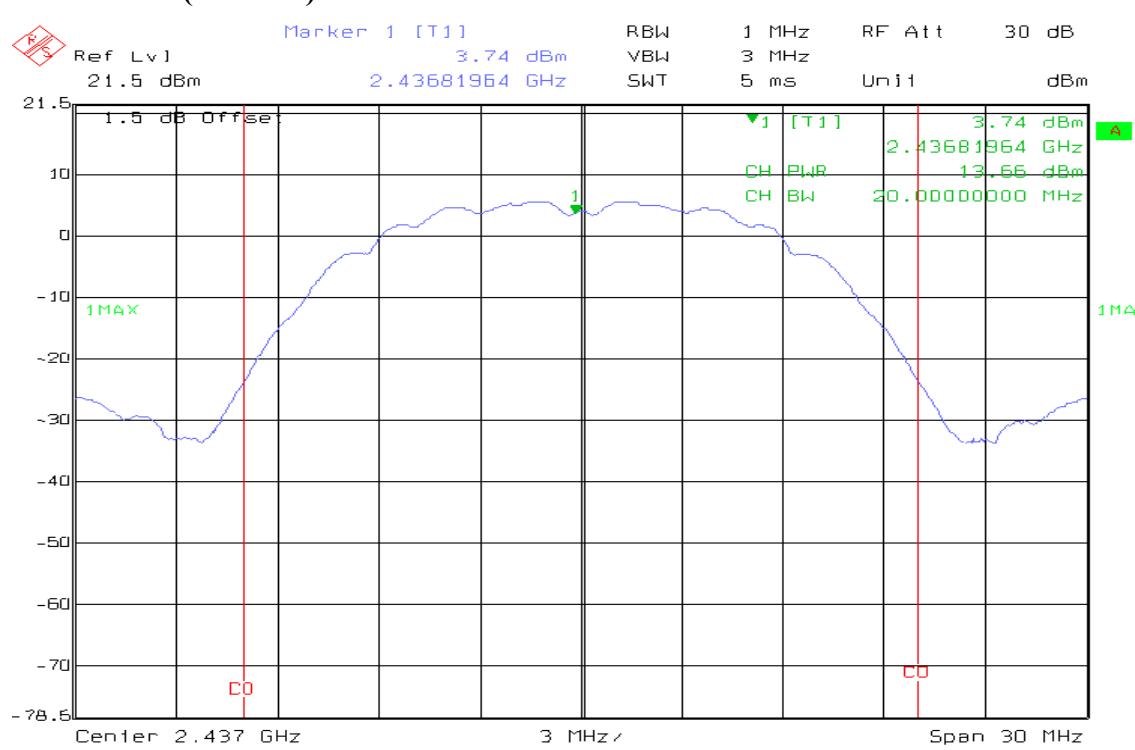
## TEST PLOT

### IEEE 802.11b mode

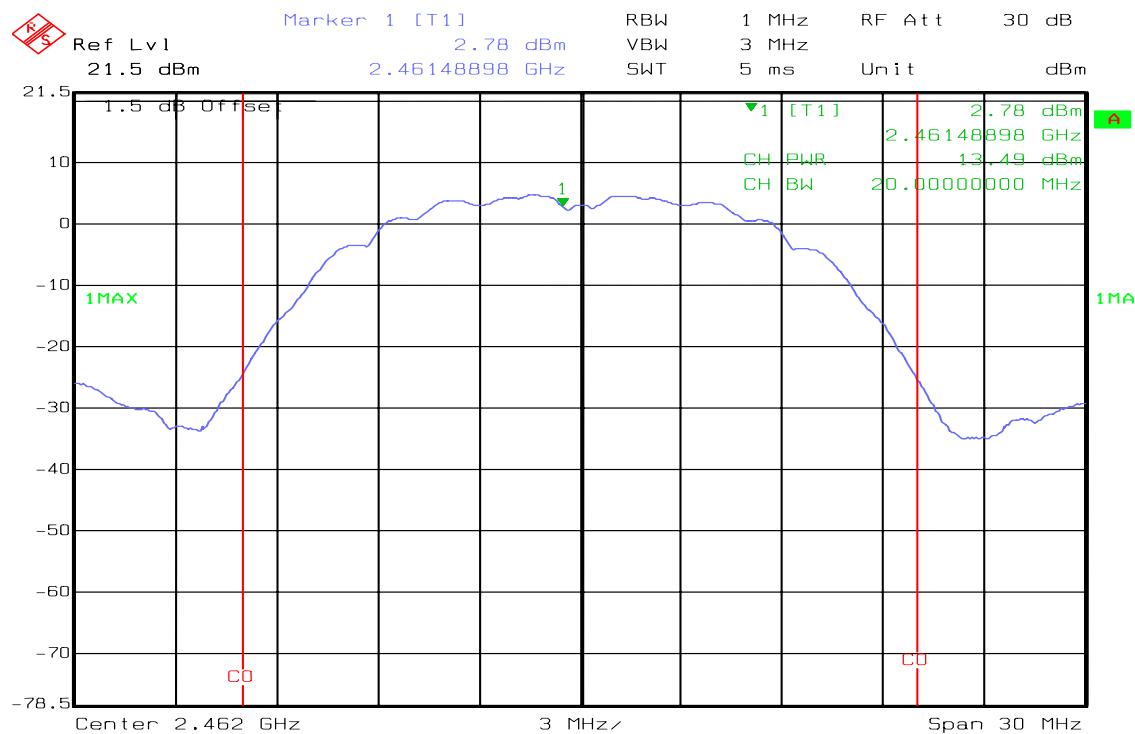
#### **Peak Power (CH Low)**



#### **Peak Power (CH Mid)**



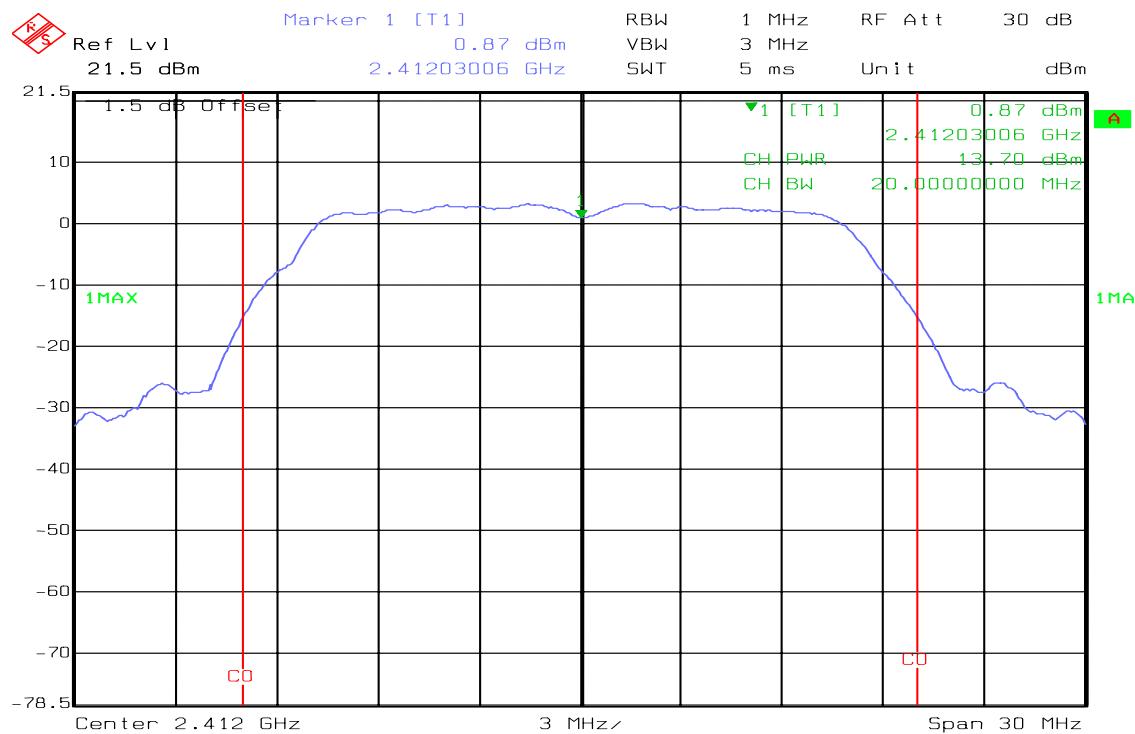
### Peak Power (CH High)



Date: 14.OCT.2008 17:57:56

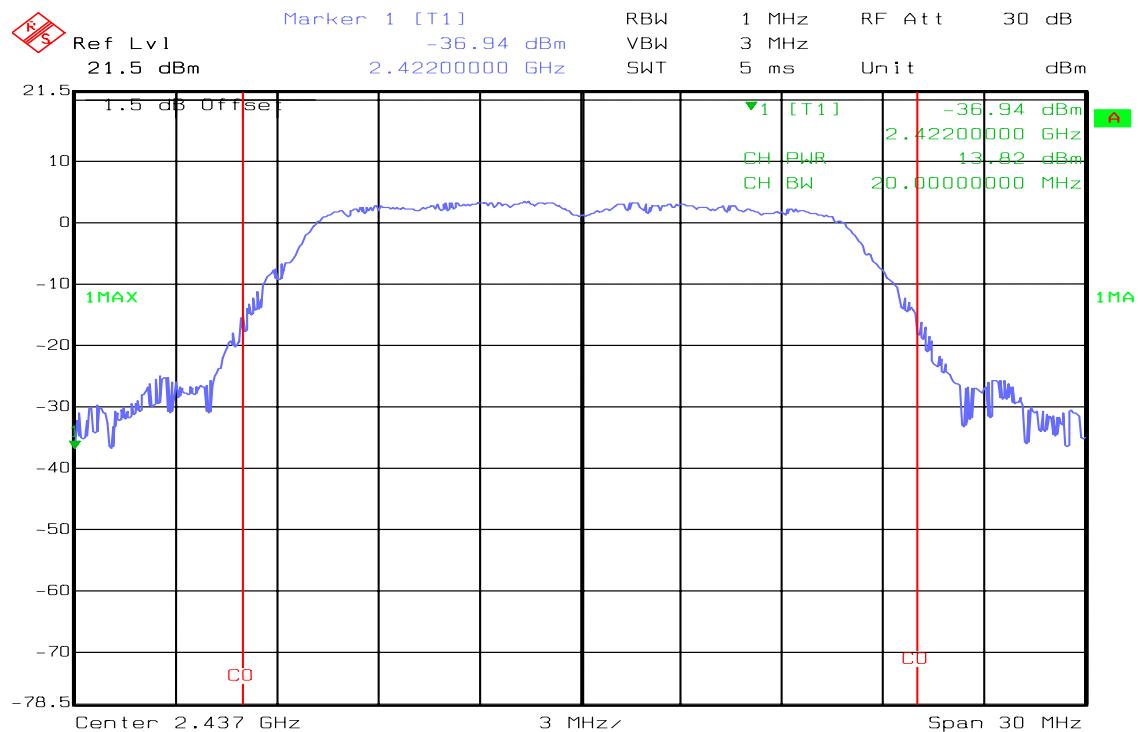
### IEEE 802.11g mode

### Peak Power (CH Low)

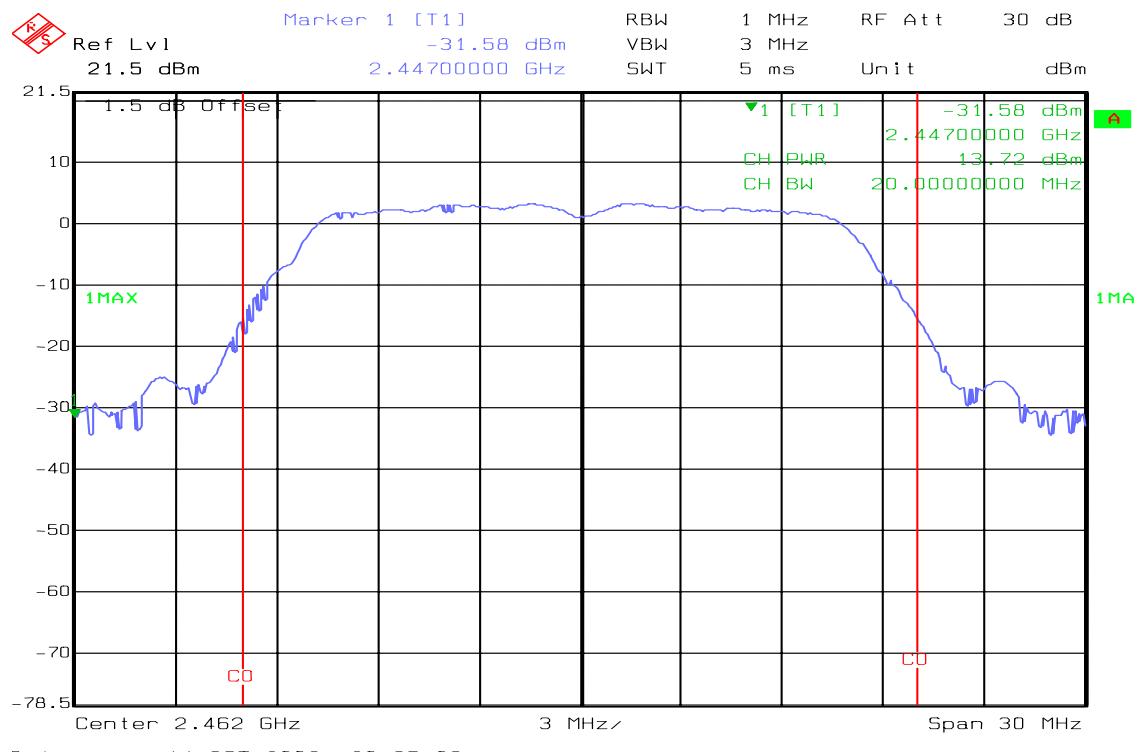


Date: 14.OCT.2008 20:07:12

### Peak Power (CH Mid)

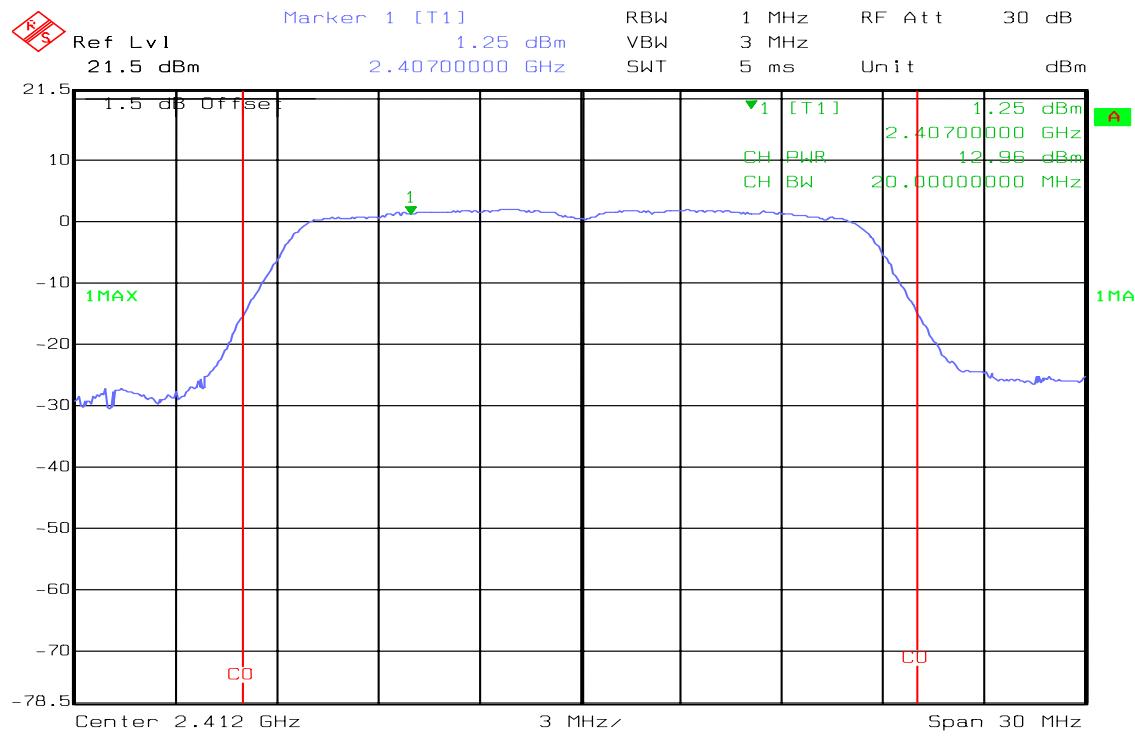


### Peak Power (CH High)

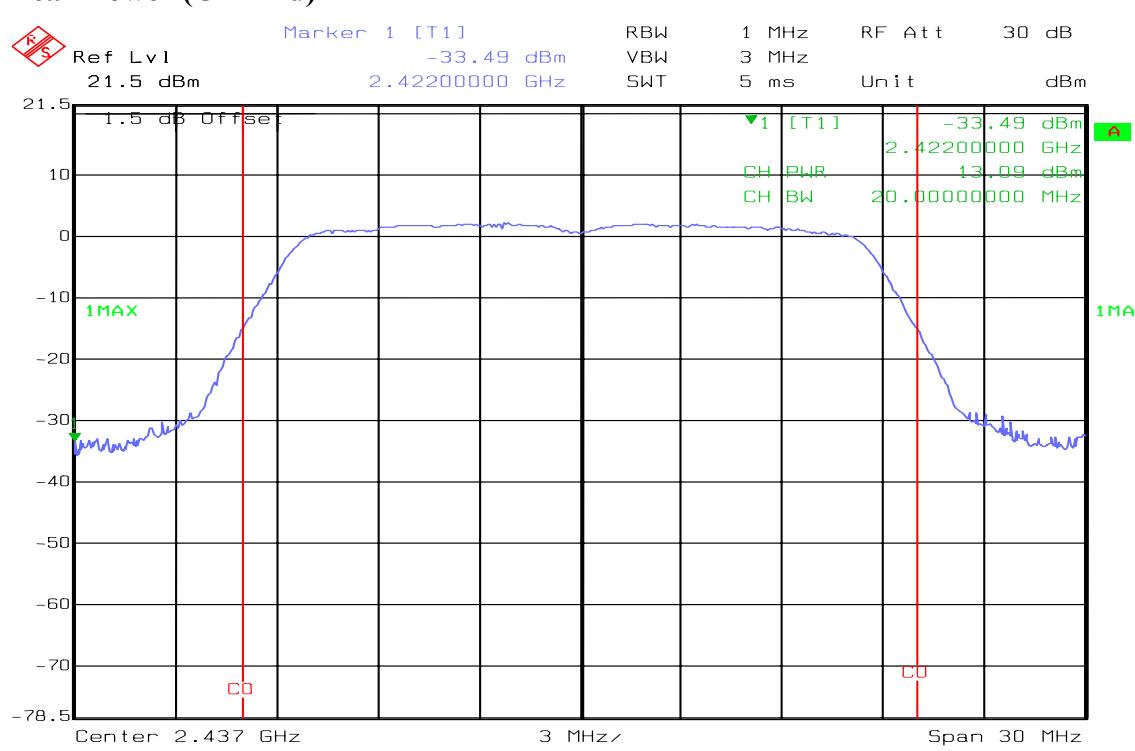


### draft 802.11n 20 MHz Channel mode

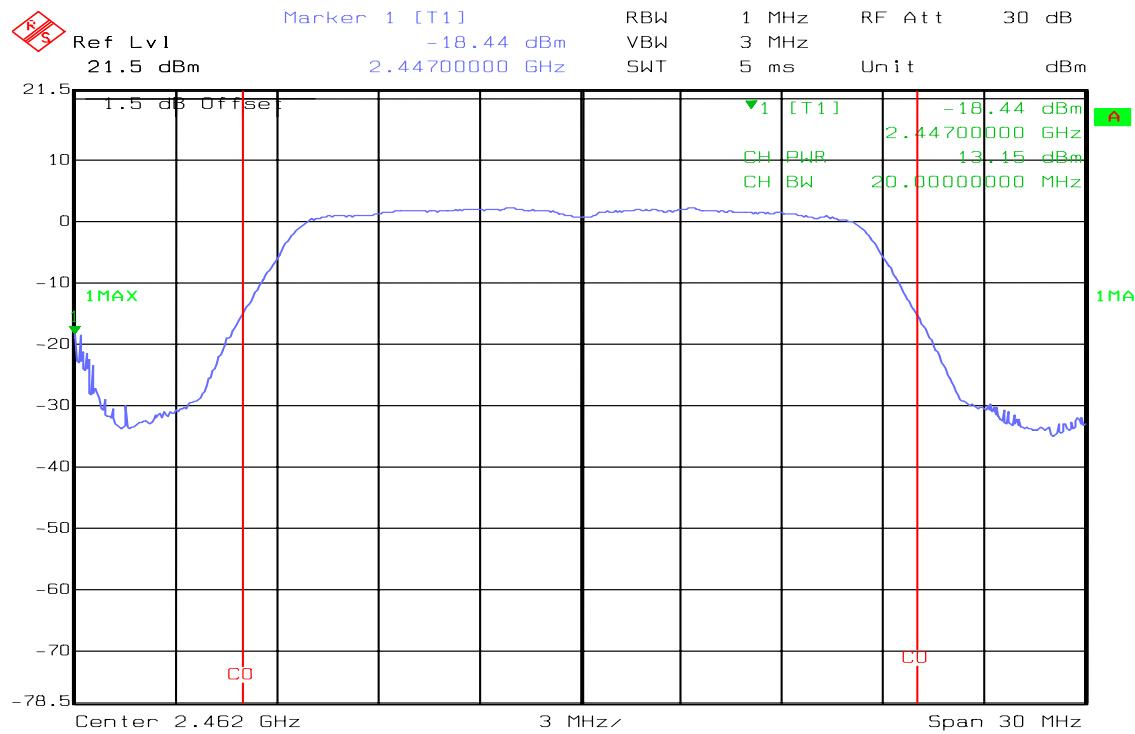
#### Peak Power (CH Low)



#### Peak Power (CH Mid)

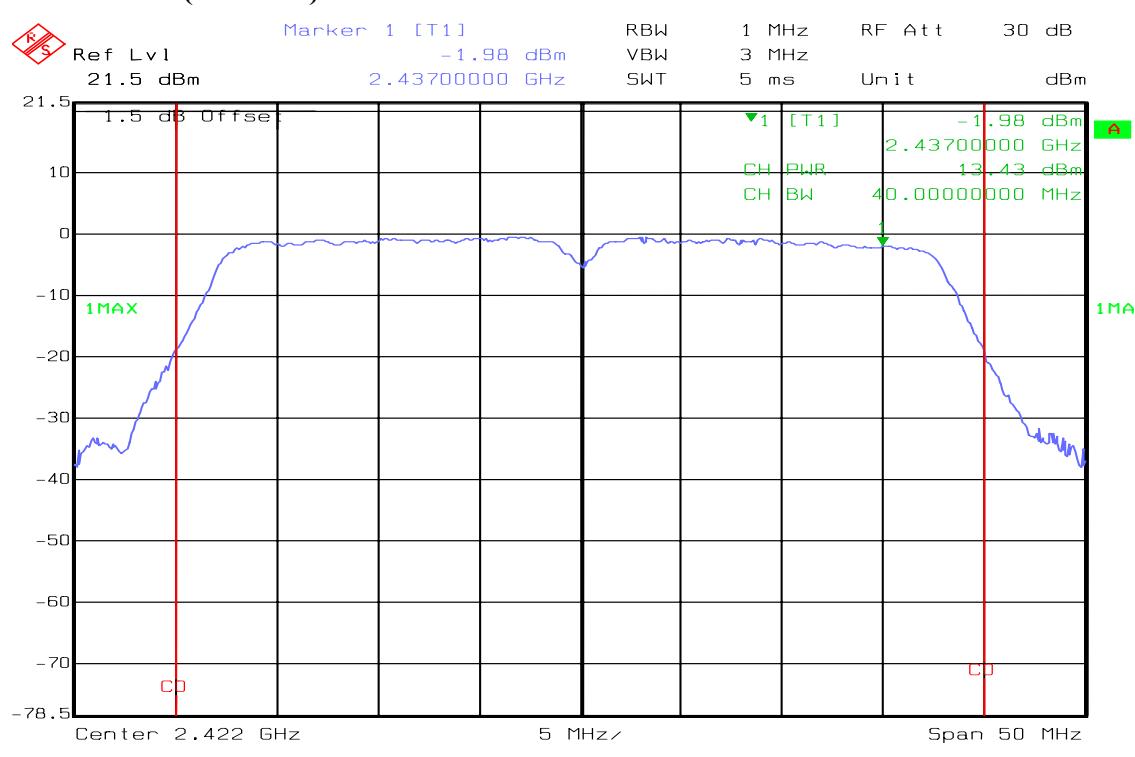


### Peak Power (CH High)

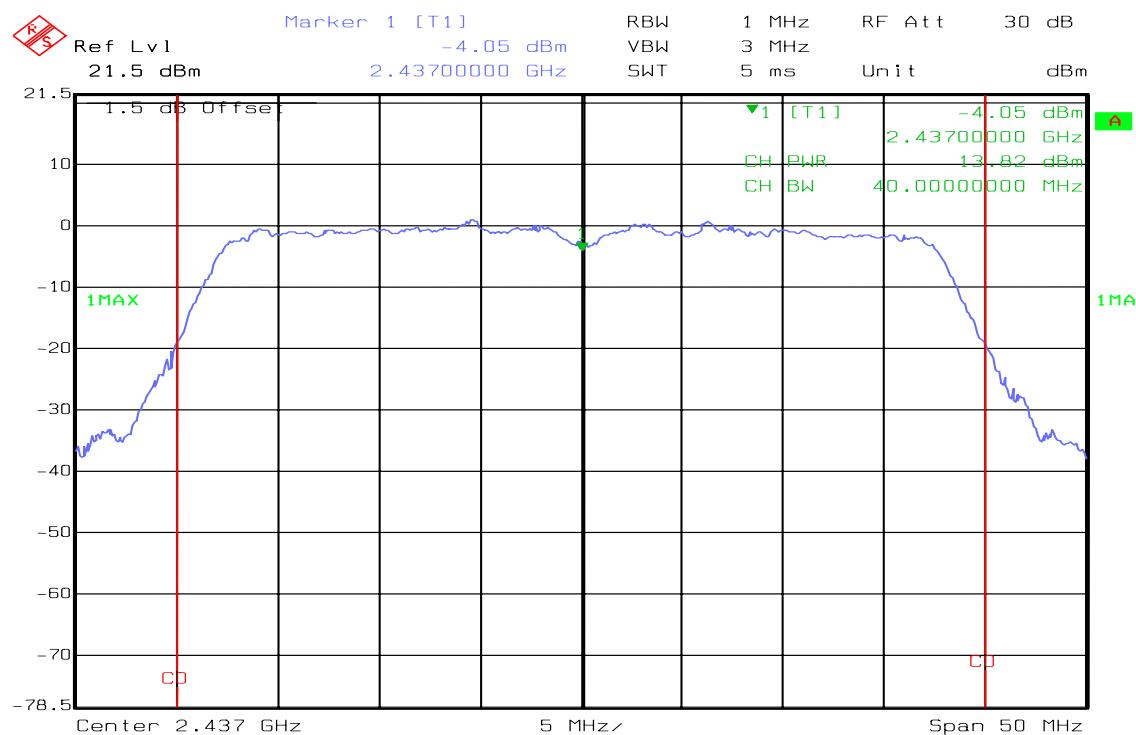


### draft 802.11n 40 MHz Channel mode

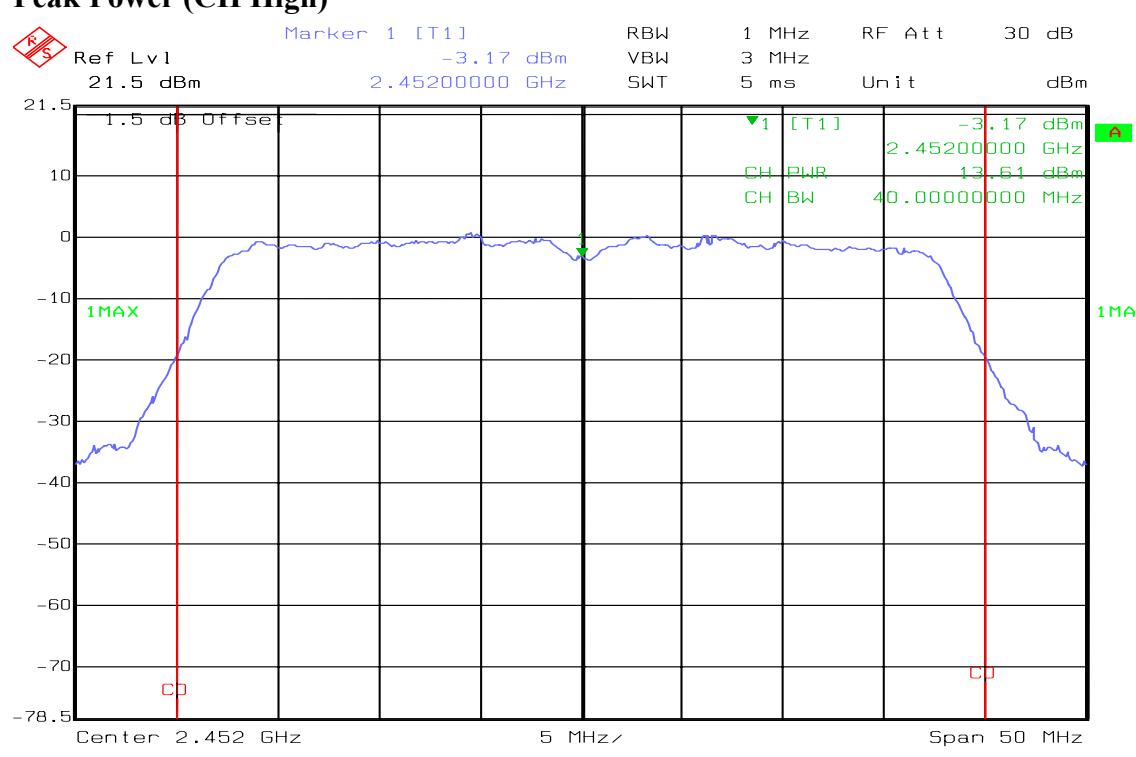
#### Peak Power (CH Low)



### Peak Power (CH Mid)



### Peak Power (CH High)

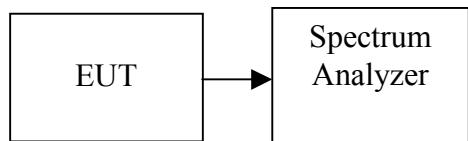


### 7.3 AVERAGE POWER

#### 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 peak power detection.

#### TEST RESULTS

*No non-compliance noted*



## TEST DATA

### IEEE 802.11b

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	10.54	0.011324
Mid	2437	10.80	0.012023
High	2462	10.25	0.015593

### IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	11.89	0.015453
Mid	2437	10.51	0.011246
High	2462	9.82	0.009594

### draft 802.11n 20 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	11.44	0.01393
Mid	2437	11.25	0.01334
High	2462	11.08	0.01282

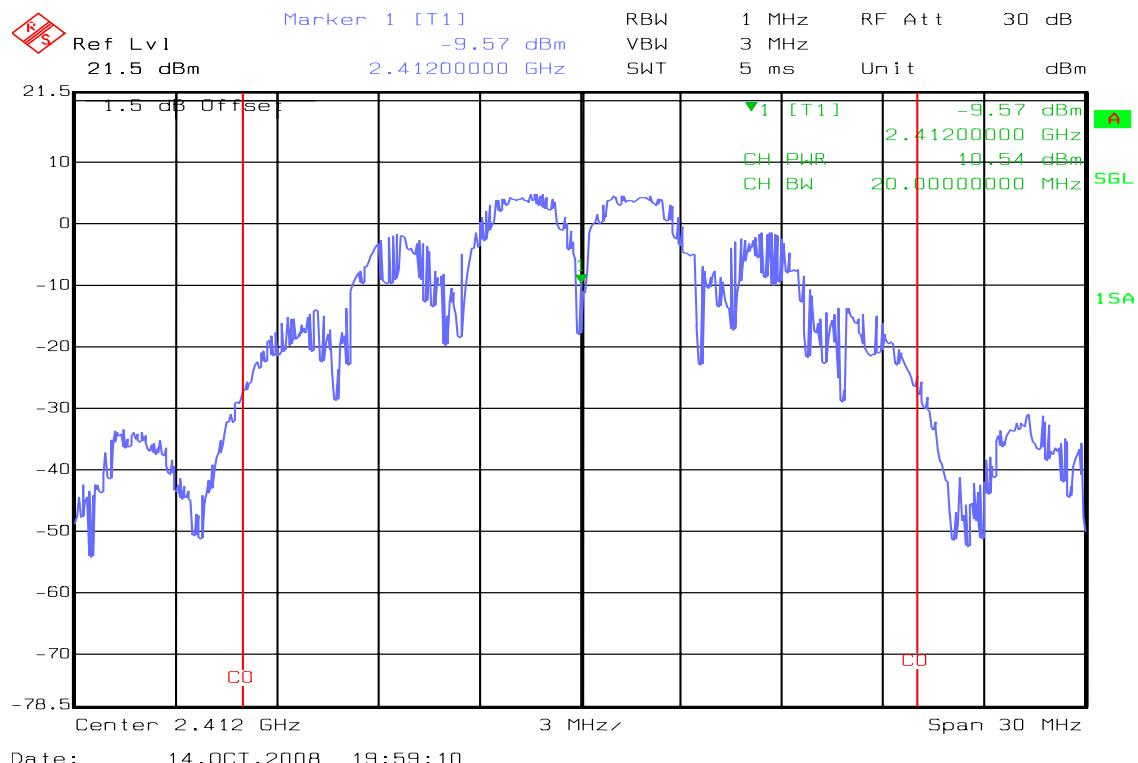
### draft 802.11n 40 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2422	10.32	0.010765
Mid	2437	10.83	0.012106
High	2452	10.43	0.011041

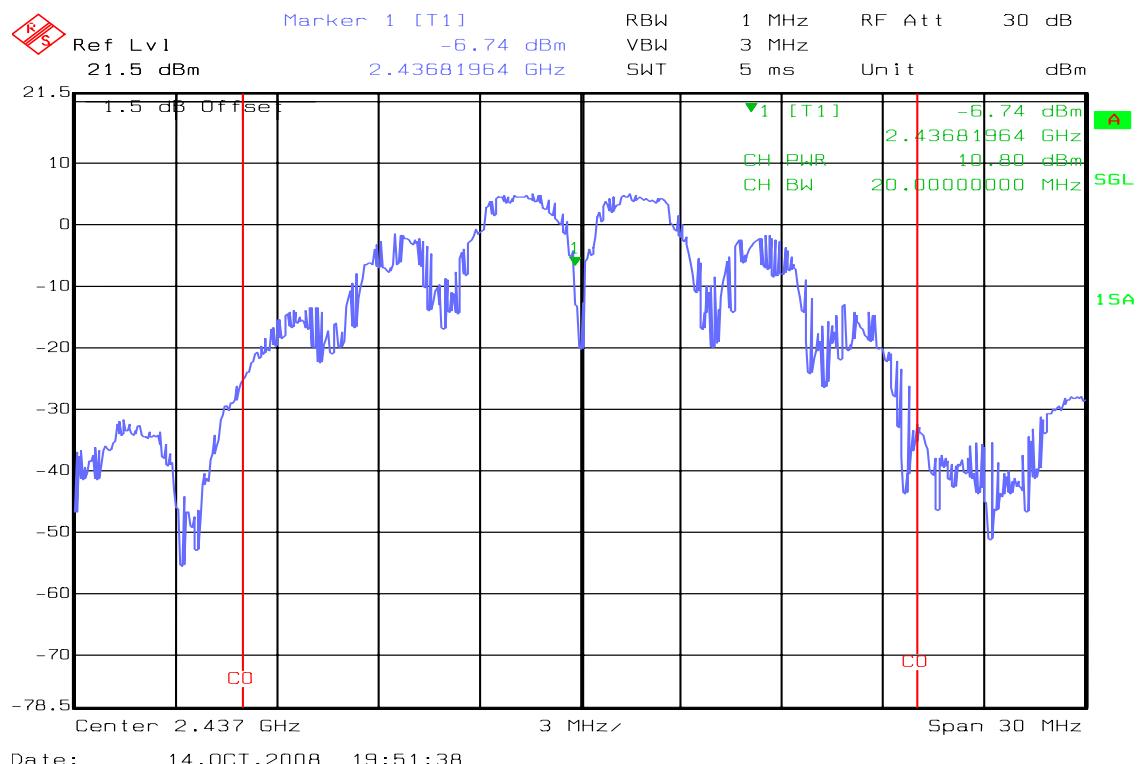
## TEST PLOT

### IEEE 802.11b mode

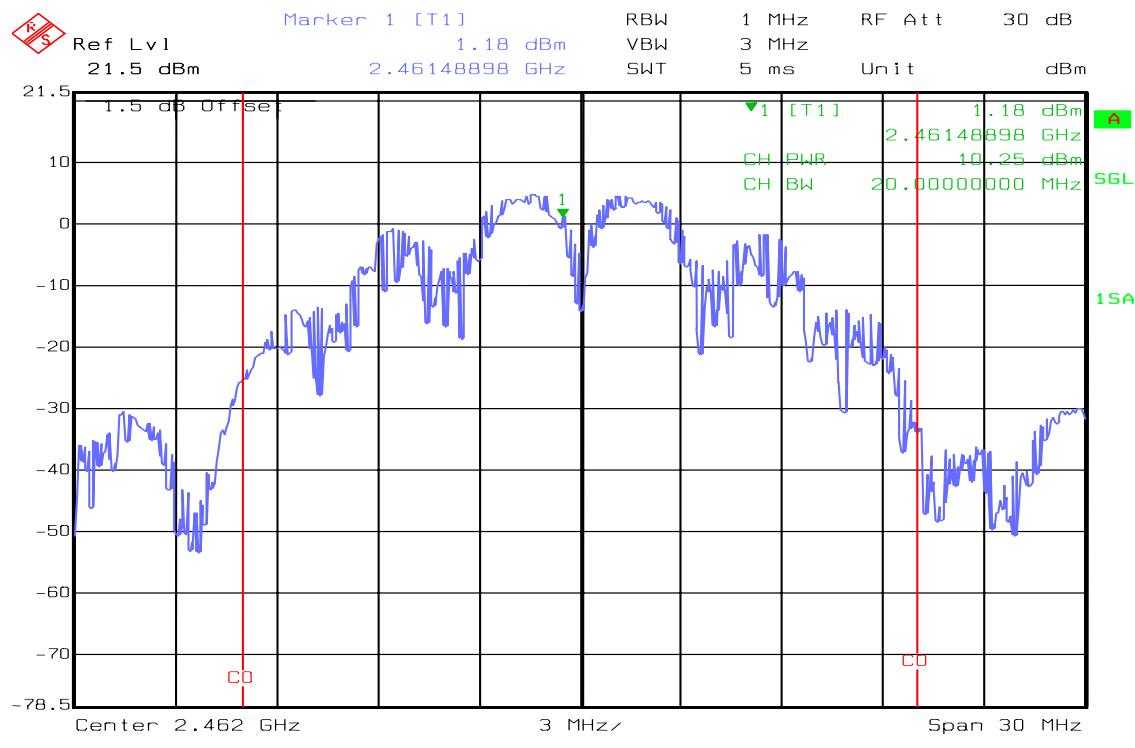
#### Average power (CH Low)



#### Average power (CH Mid)



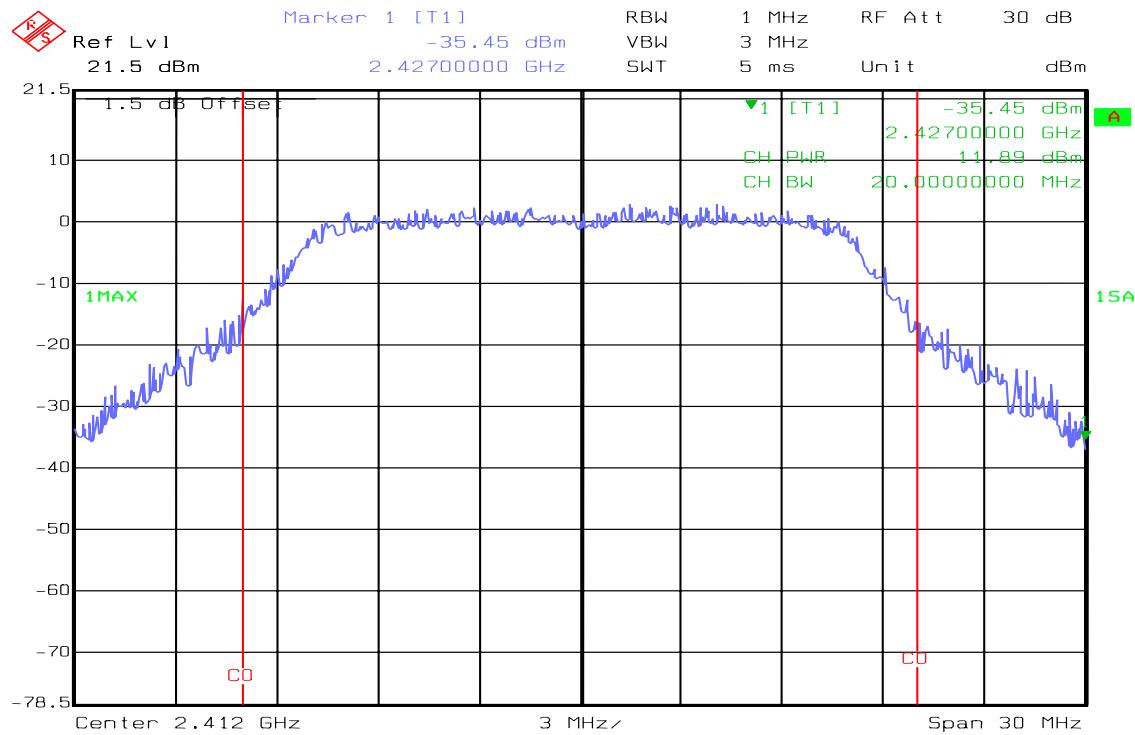
### Average power (CH High)



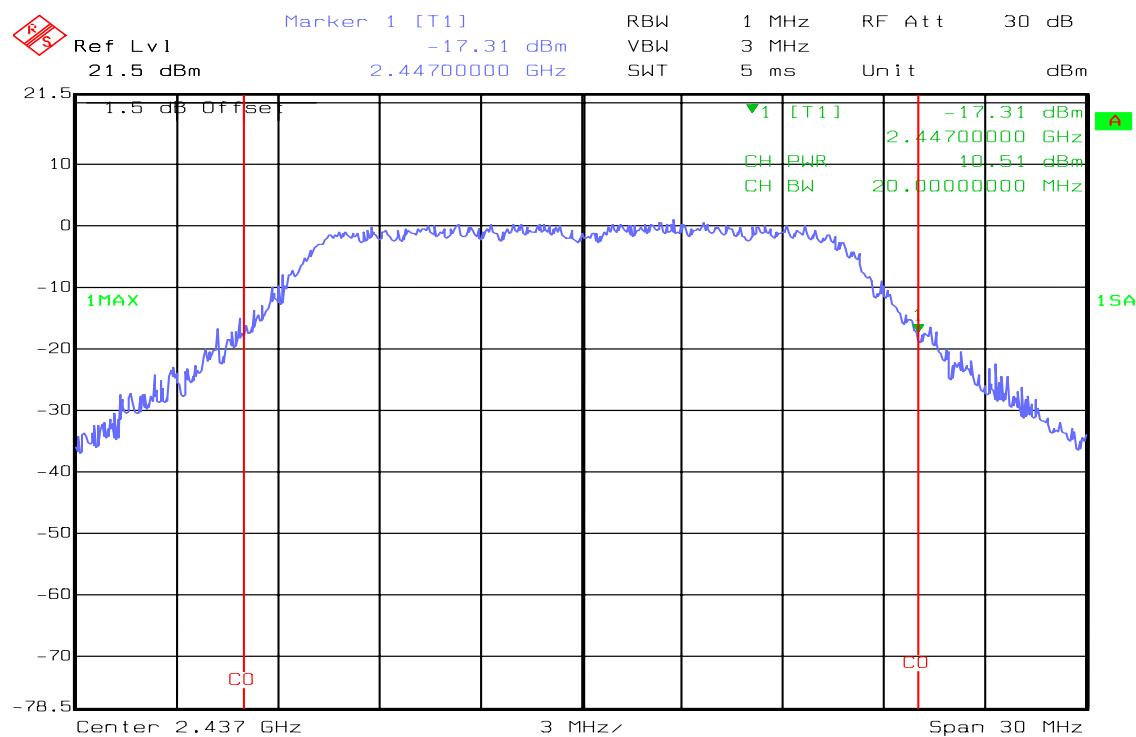
Date: 14.OCT.2008 19:30:05

### IEEE 802.11g mode

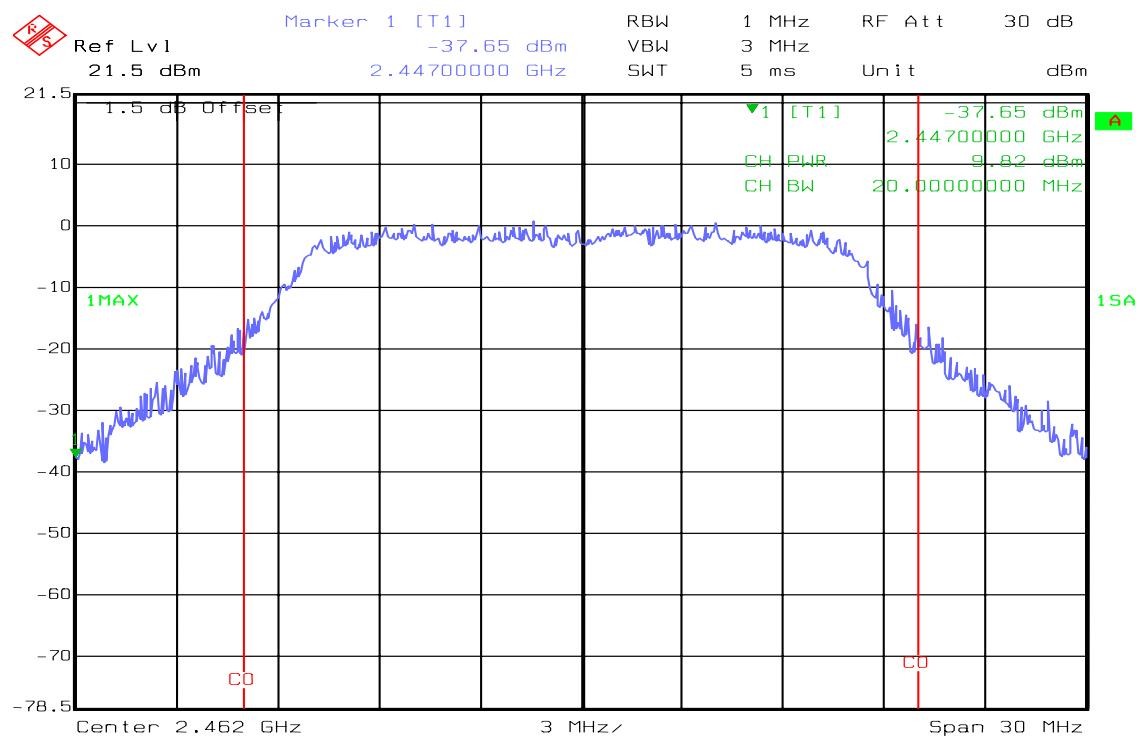
#### Average power (CH Low)



Date: 23.OCT.2008 19:57:52

**Average power (CH Mid)**


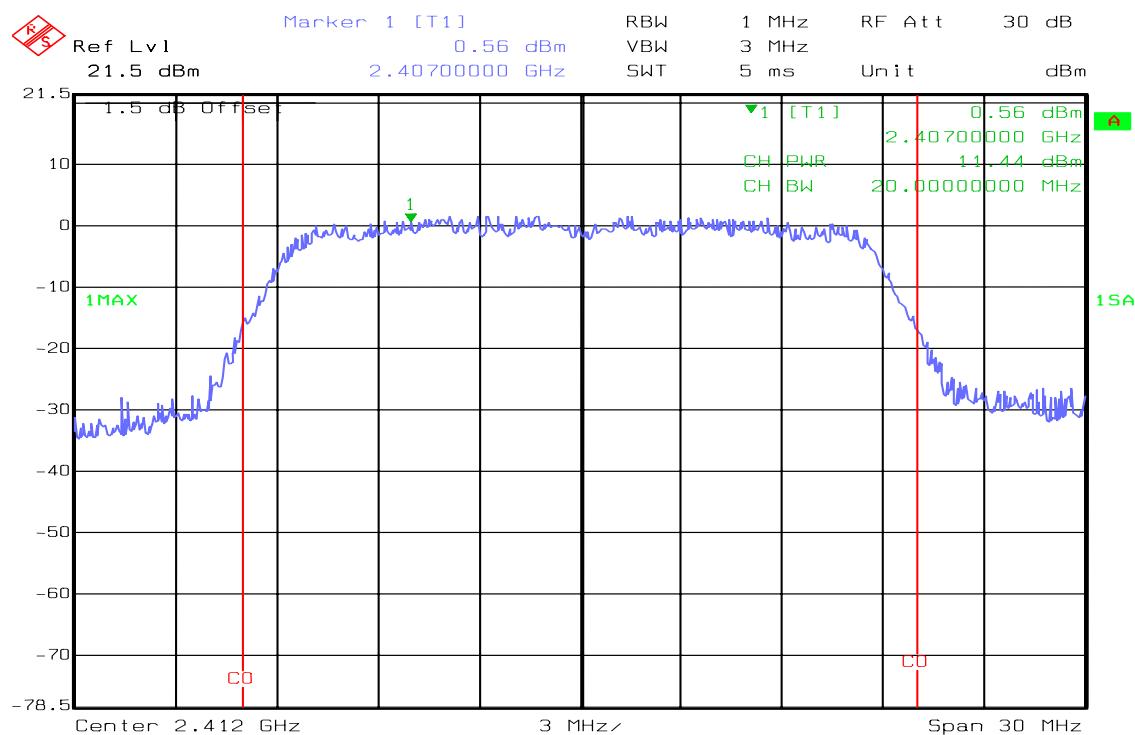
Date: 23.OCT.2008 19:56:37

**Average power (CH High)**


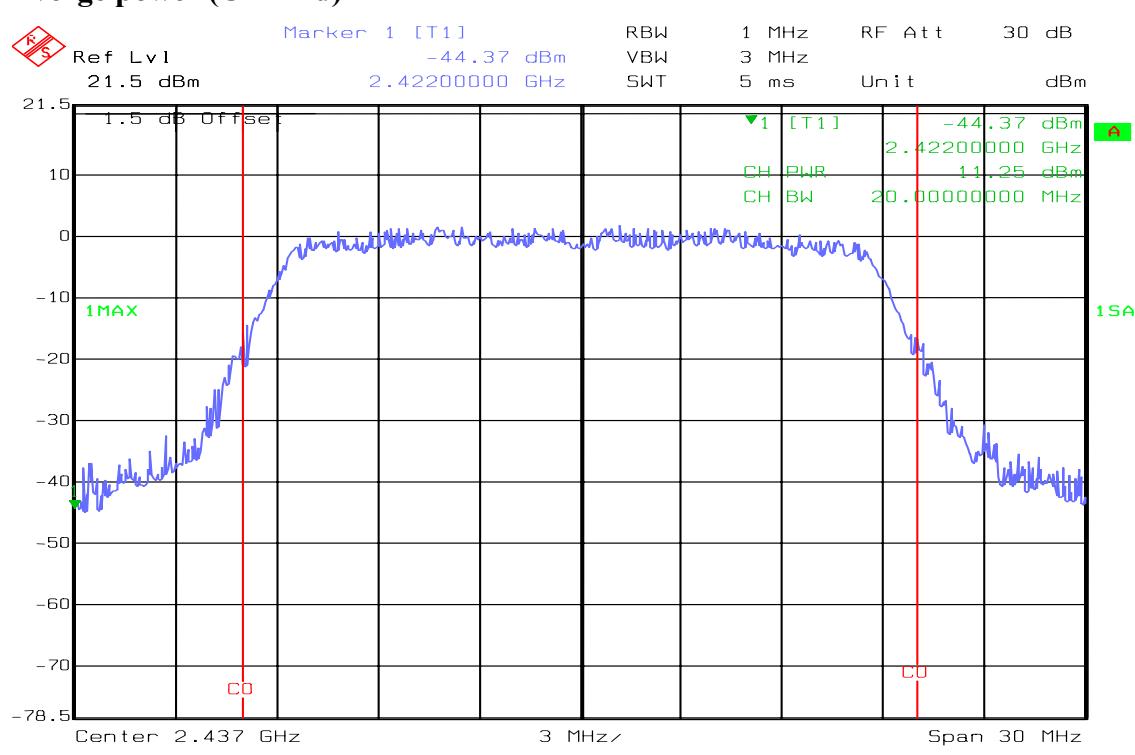
Date: 23.OCT.2008 19:54:04

### draft 802.11n 20 MHz Channel mode

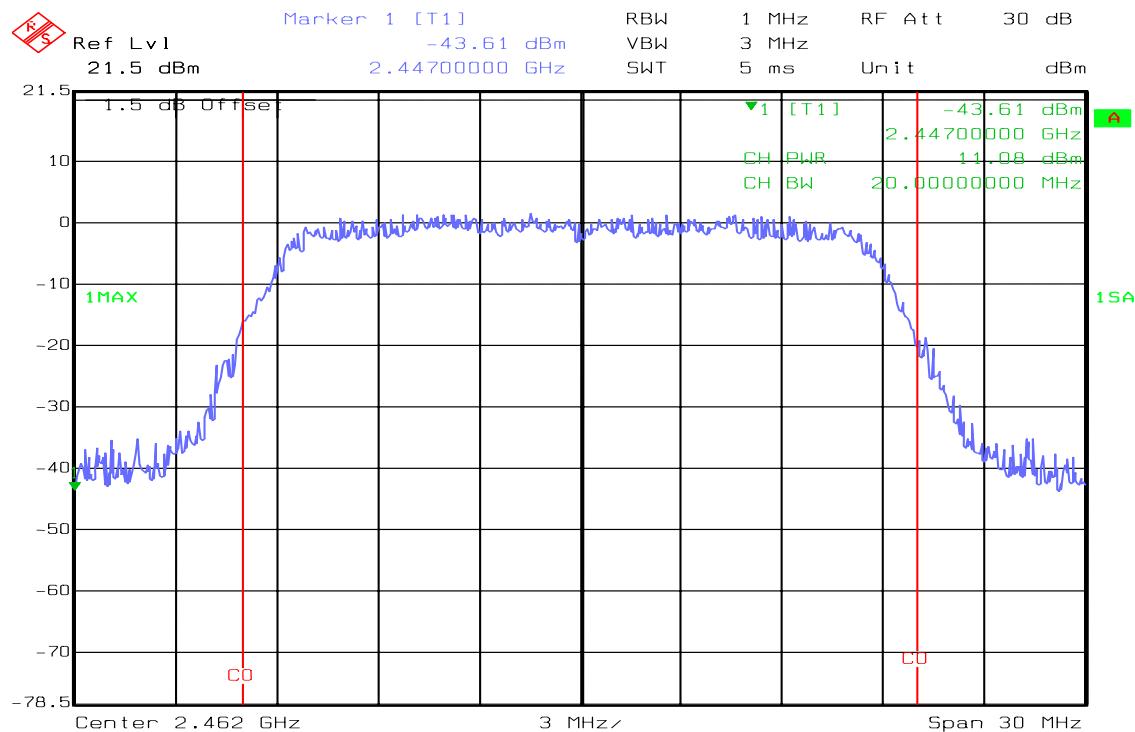
#### Average power (CH Low)



#### Average power (CH Mid)

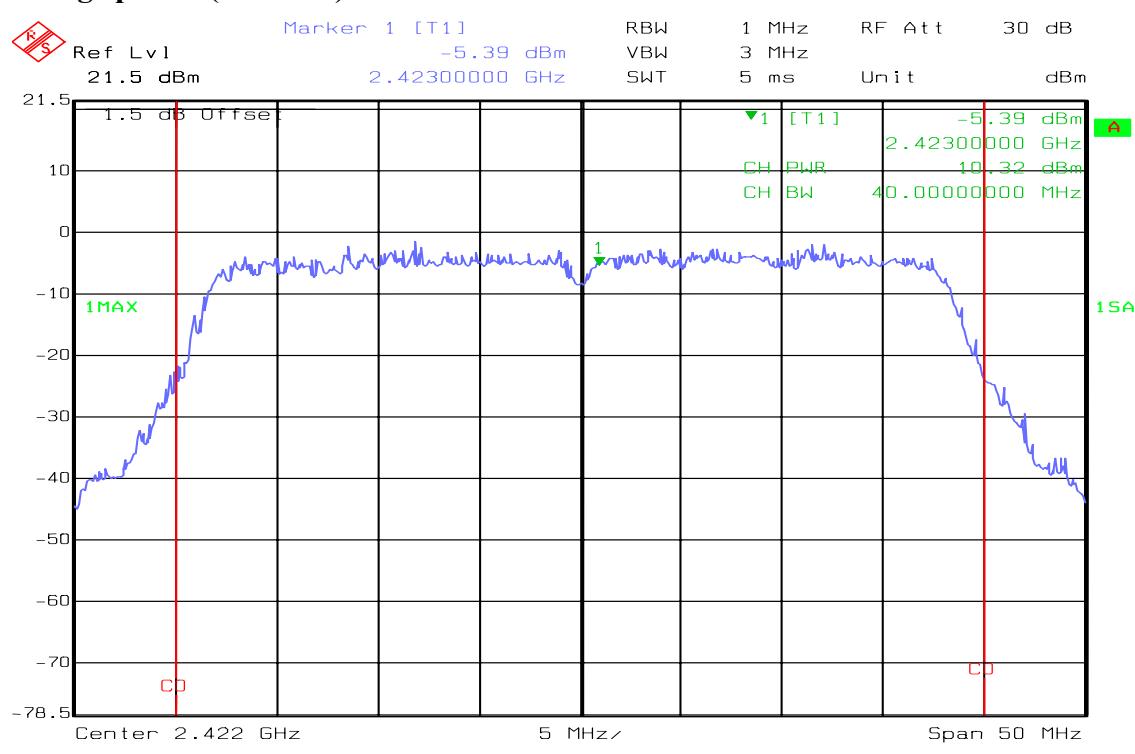


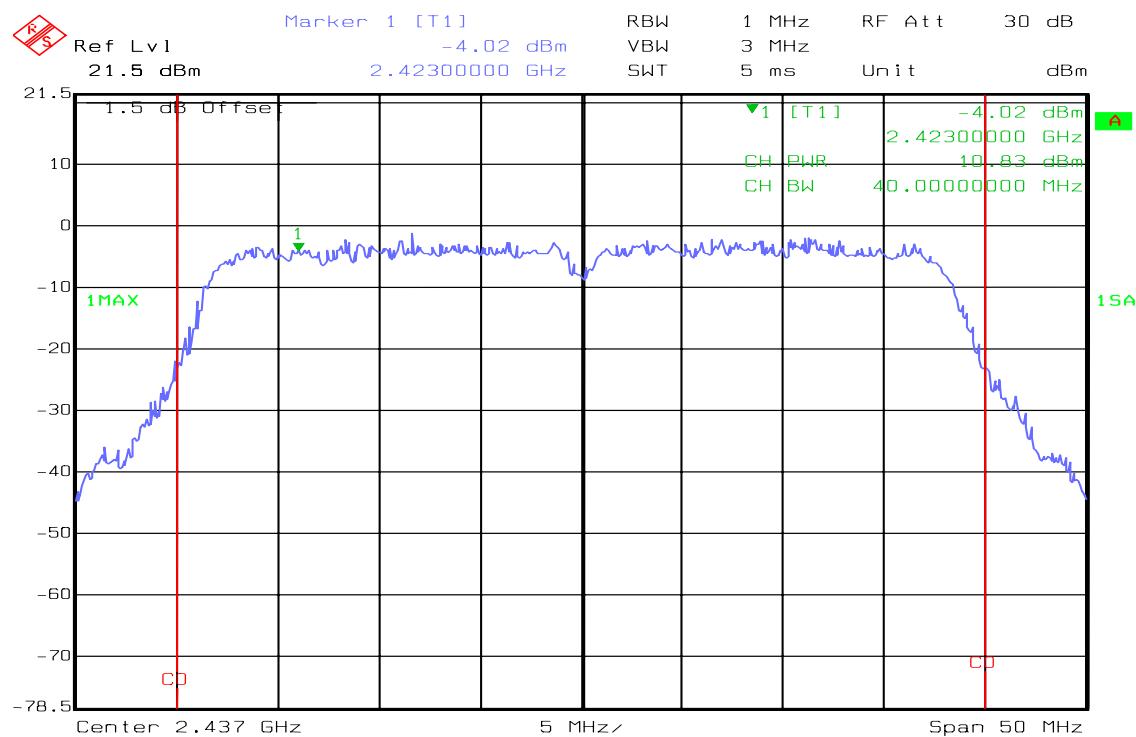
### Average power (CH High)



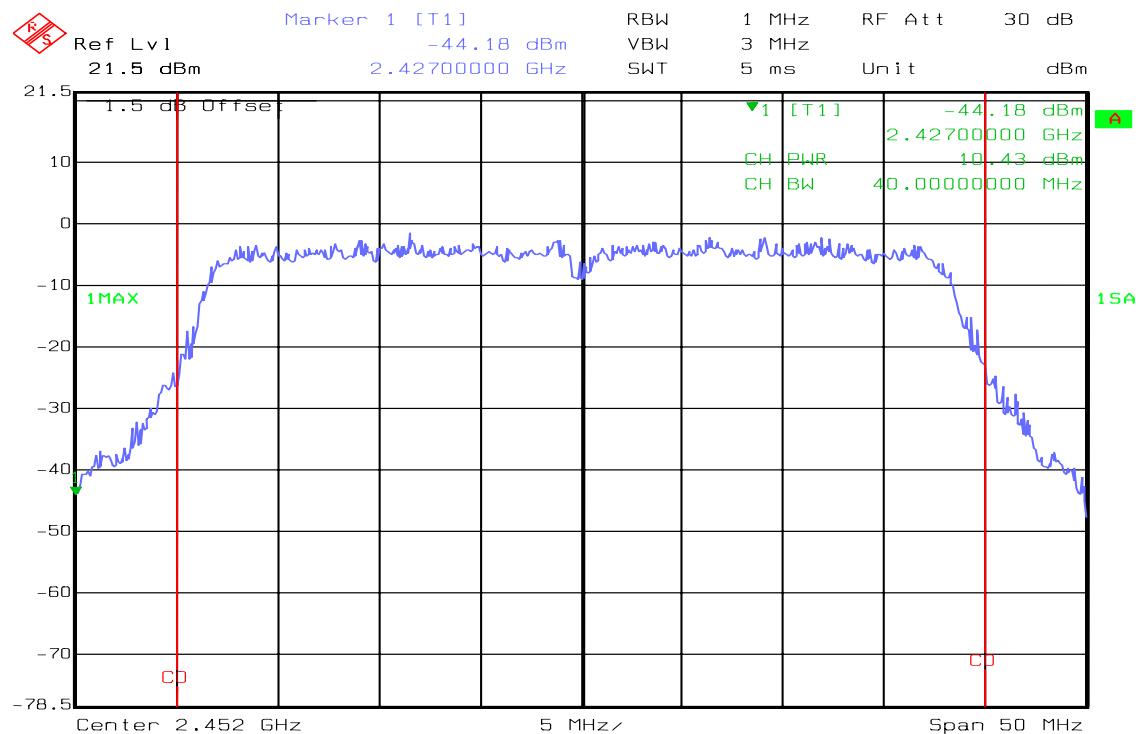
### draft 802.11n 40 MHz Channel mode

#### Average power (CH Low)



**Average power (CH Mid)**


Date: 23.OCT.2008 21:24:21

**Average power (CH High)**


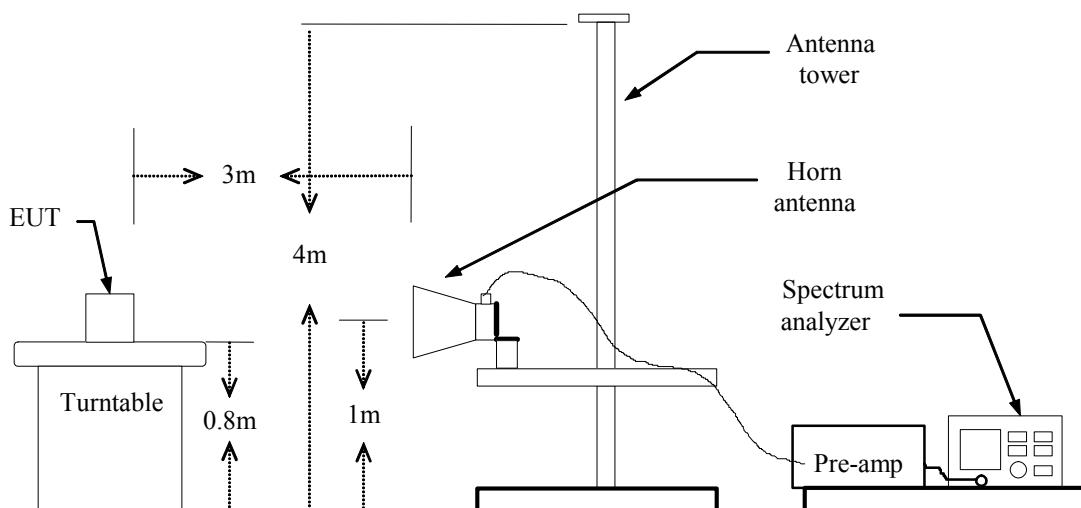
Date: 23.OCT.2008 21:25:42

## 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)).

### TEST CONFIGURATION



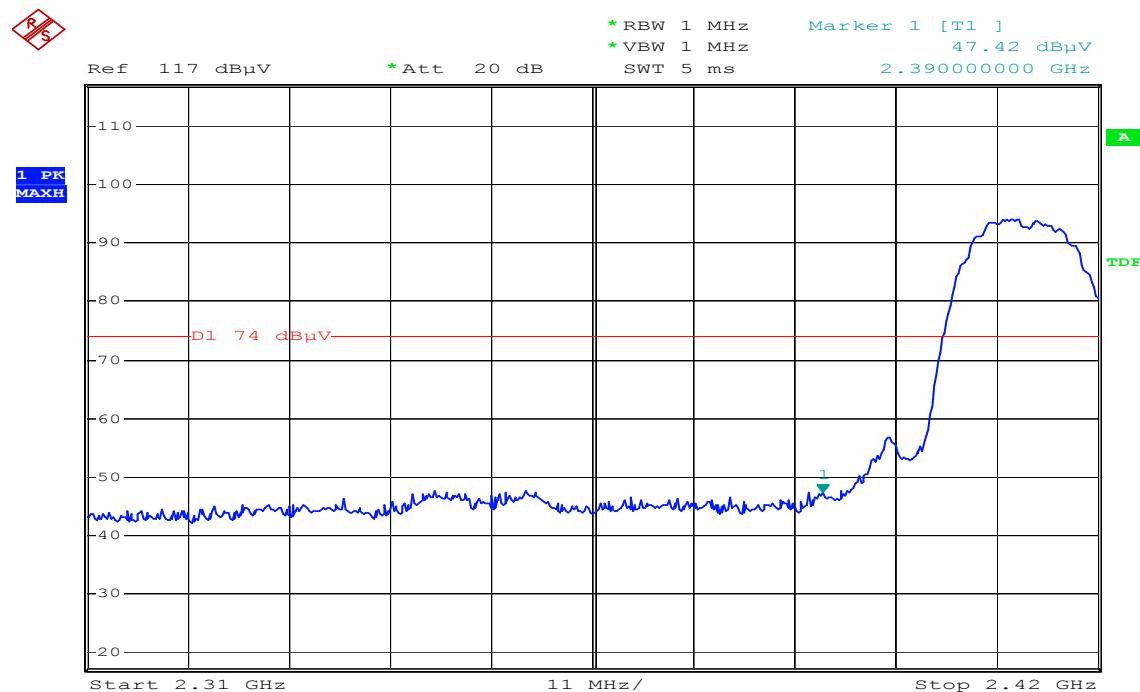
### TEST PROCEDURE

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

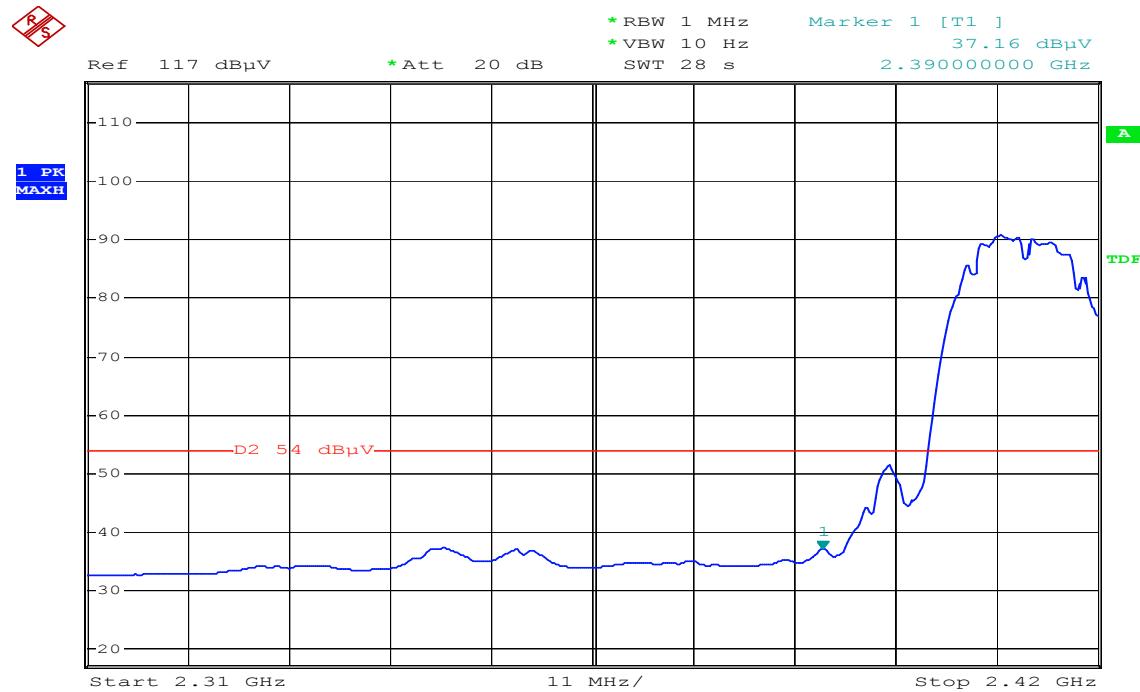
### TEST RESULTS

Refer to attach spectrum analyzer data chart.

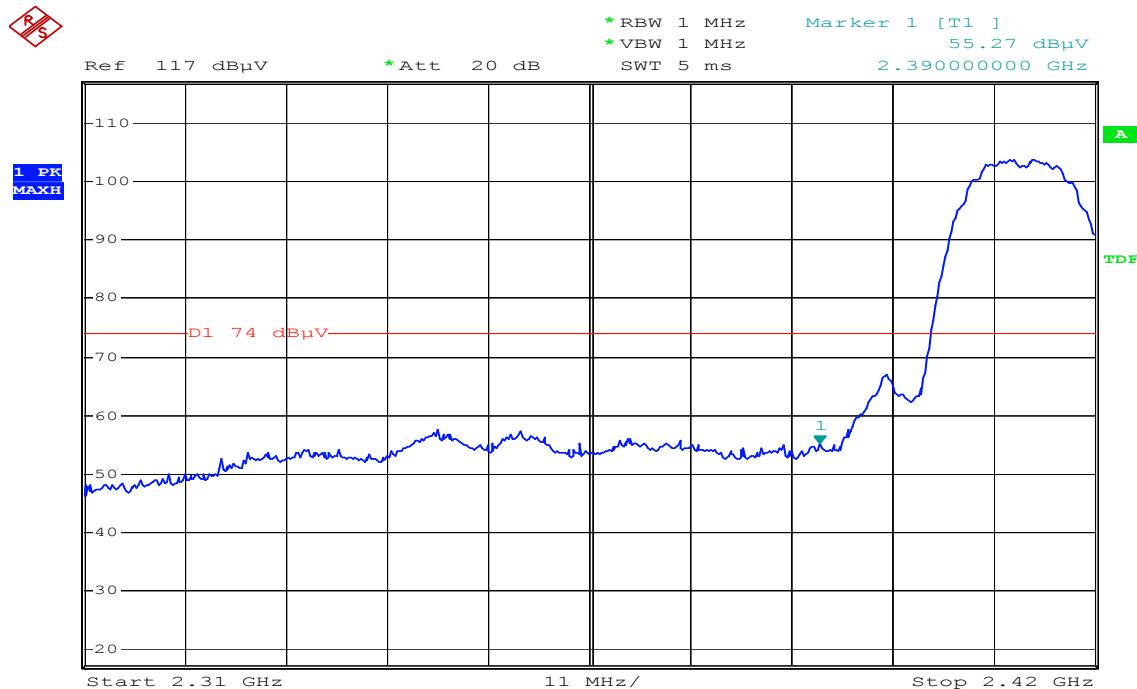
### Band Edges (IEEE 802.11b mode / CH Low)

**Detector mode: Peak**
**Polarity: Vertical**


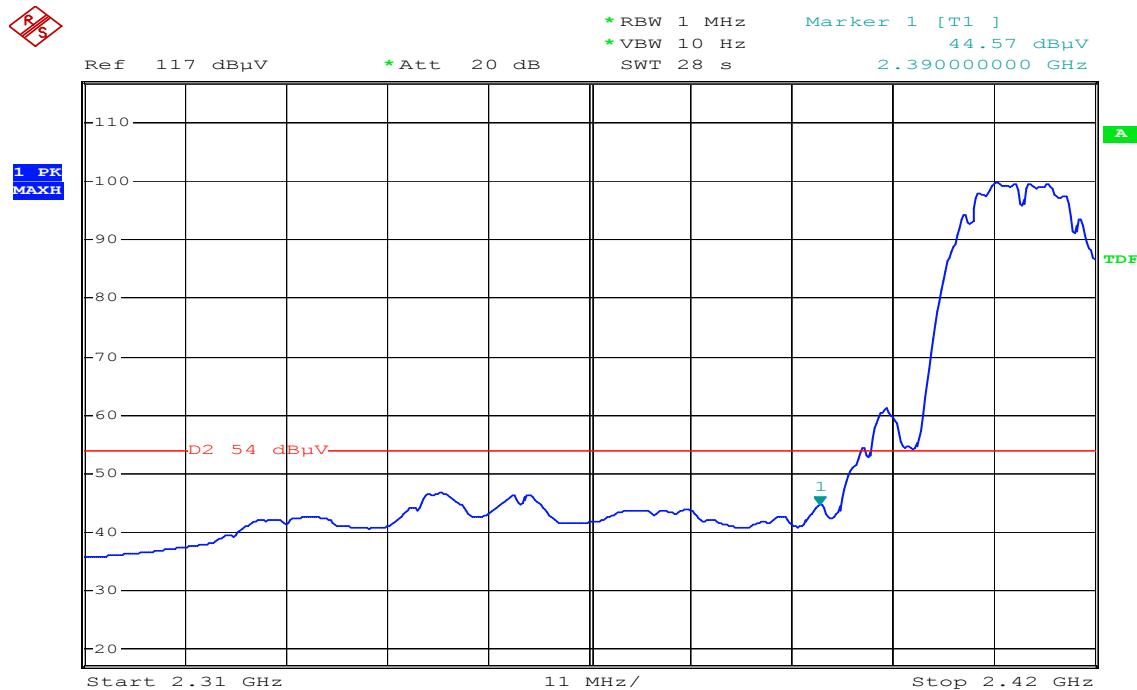
Date: 19.SEP.2008 14:49:37

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


Date: 19.SEP.2008 14:49:12

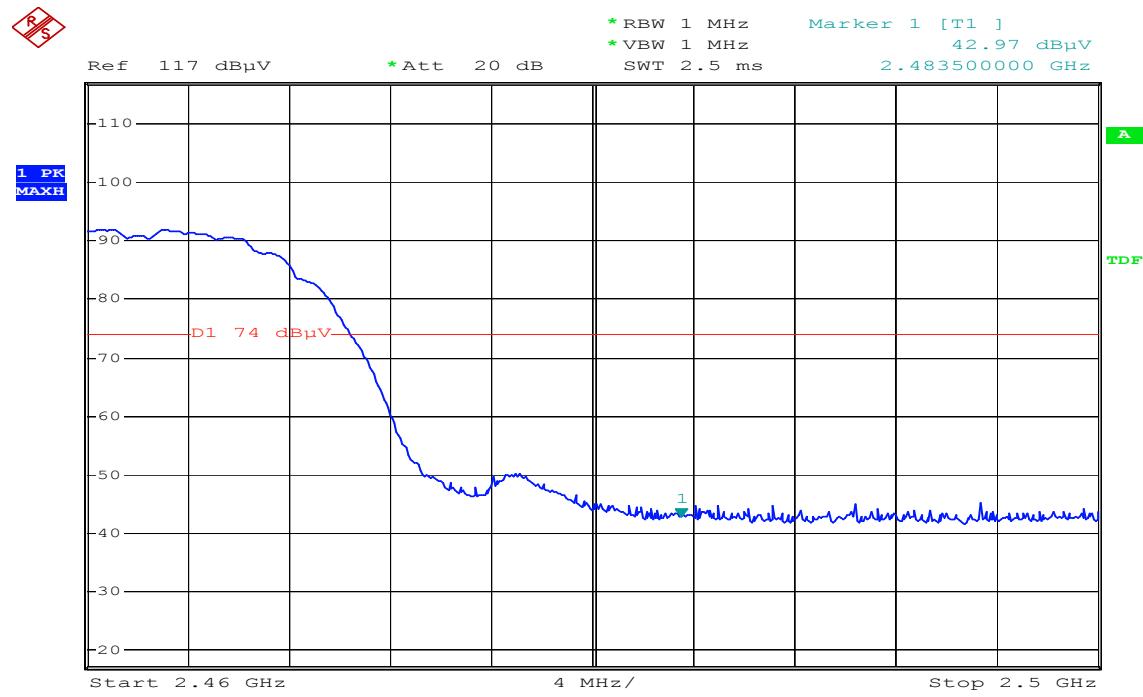
**Detector mode: Peak**
**Polarity: Horizontal**


Date: 19.SEP.2008 14:13:13

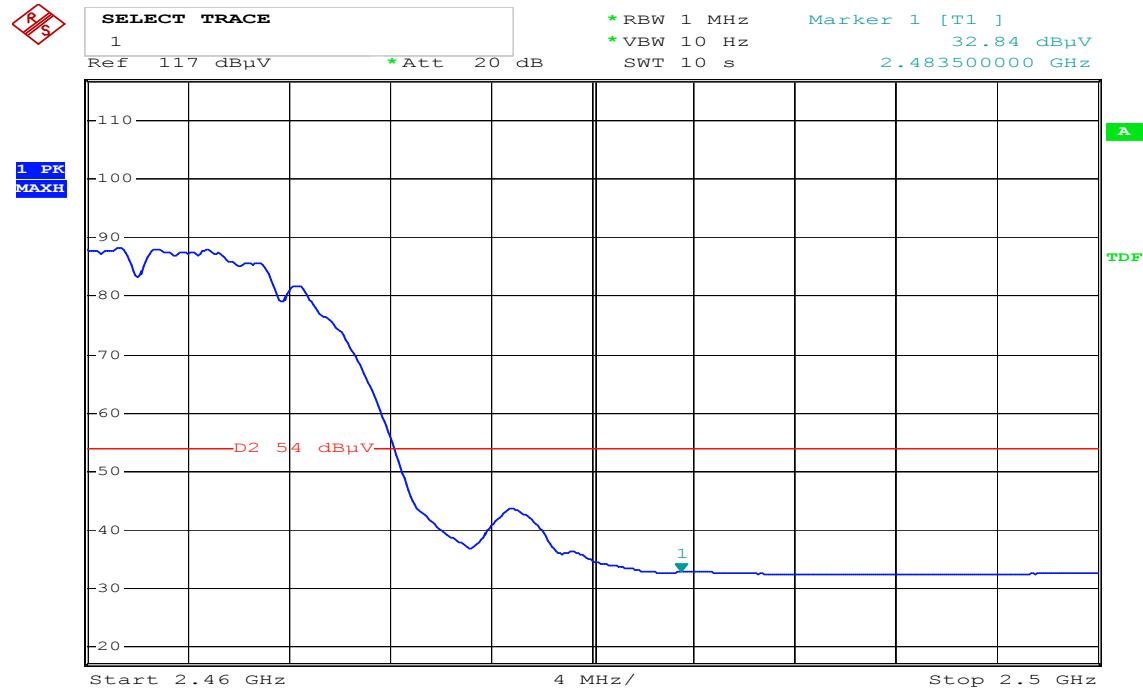
**Detector mode: Average**
**Polarity: Horizontal**


Date: 19.SEP.2008 14:14:50

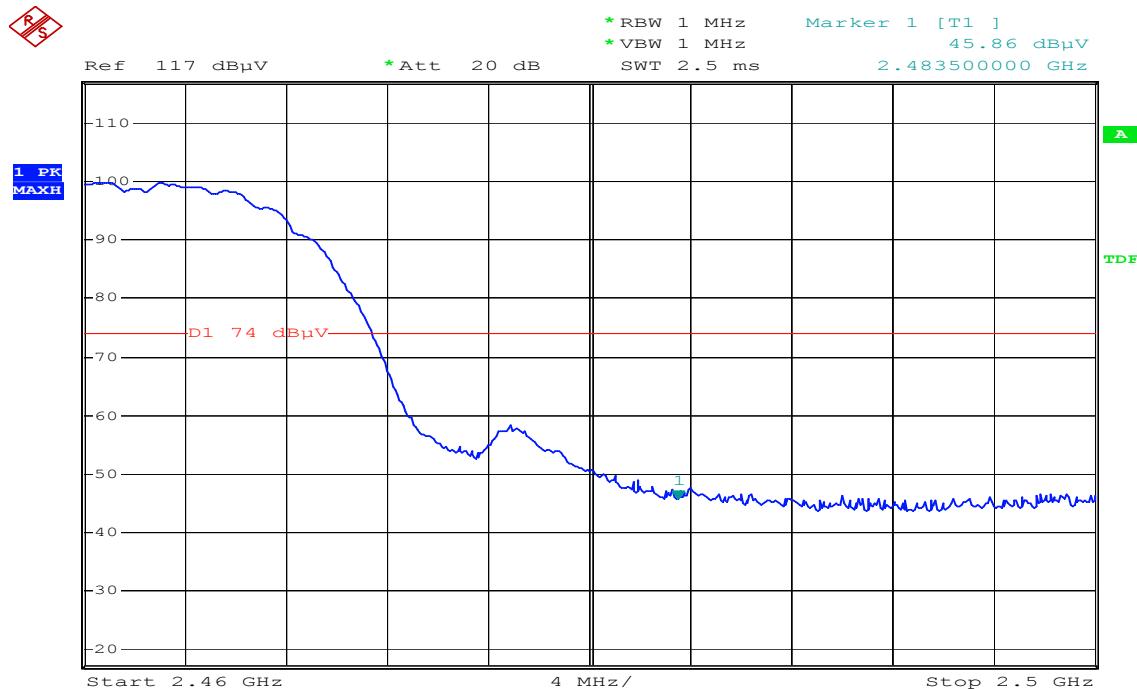
### Band Edges (IEEE 802.11b mode / CH High)

**Detector mode: Peak**
**Polarity: Vertical**


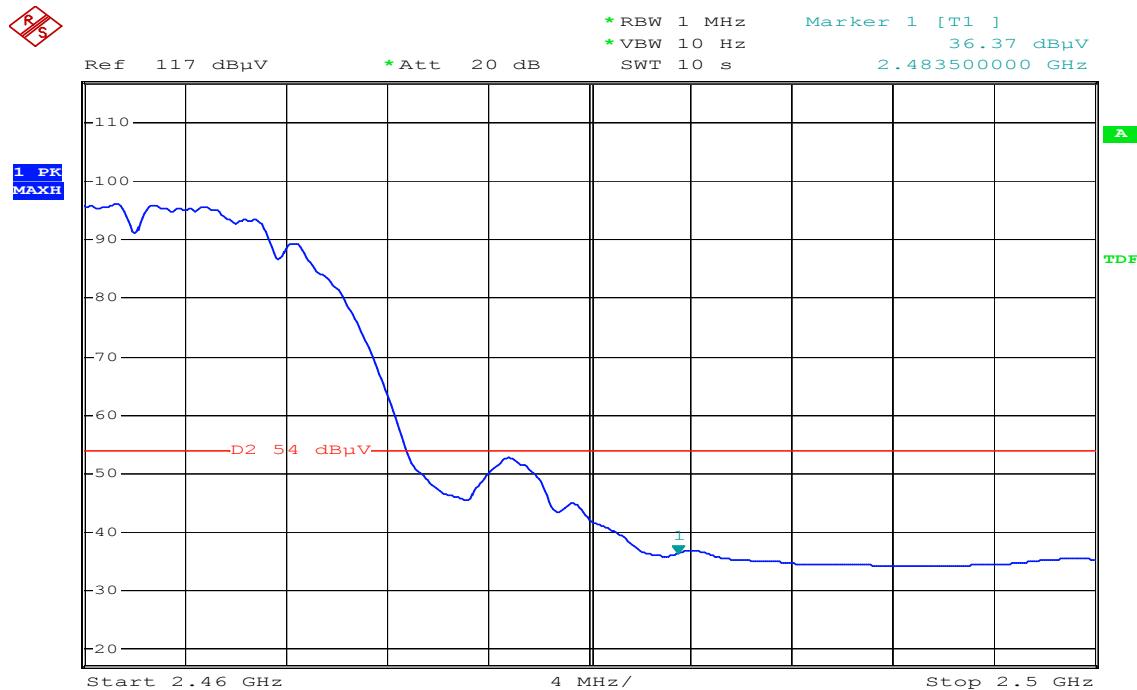
Date: 19.SEP.2008 14:45:29

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


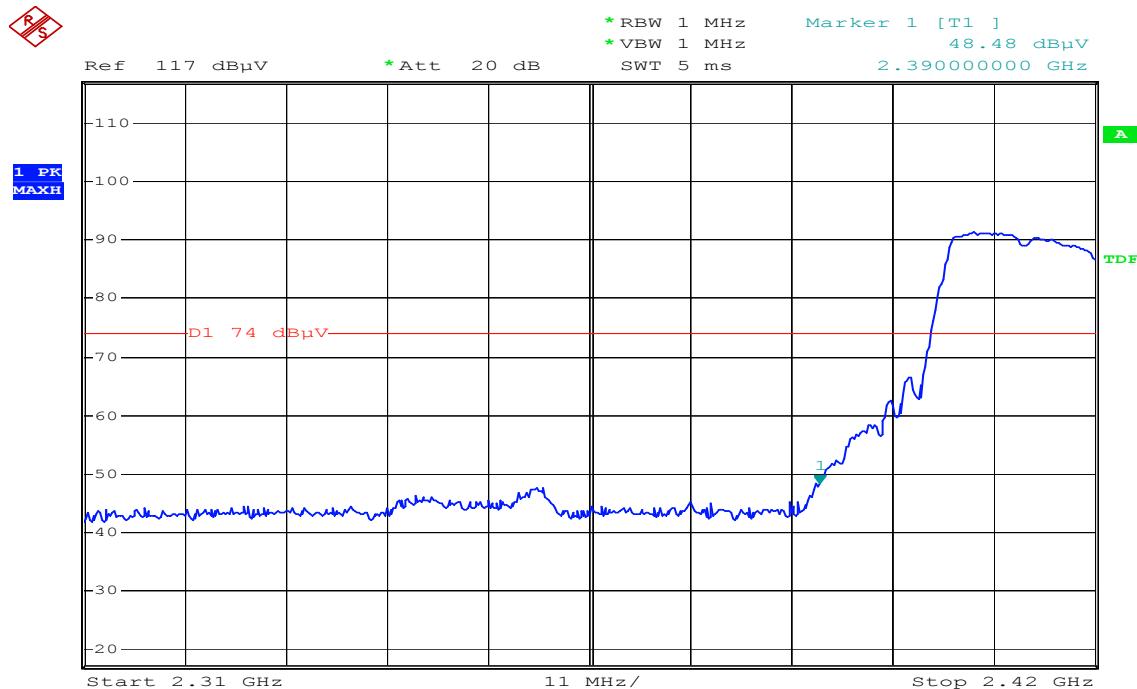
Date: 19.SEP.2008 14:46:00

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


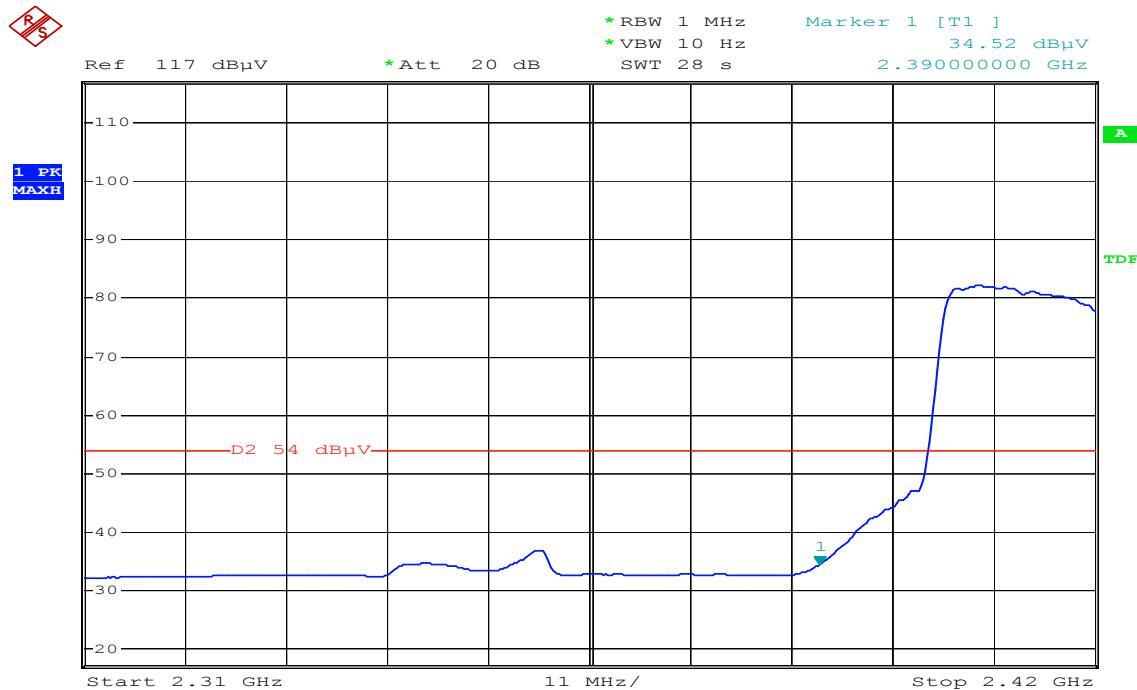
Date: 19.SEP.2008 14:44:33

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


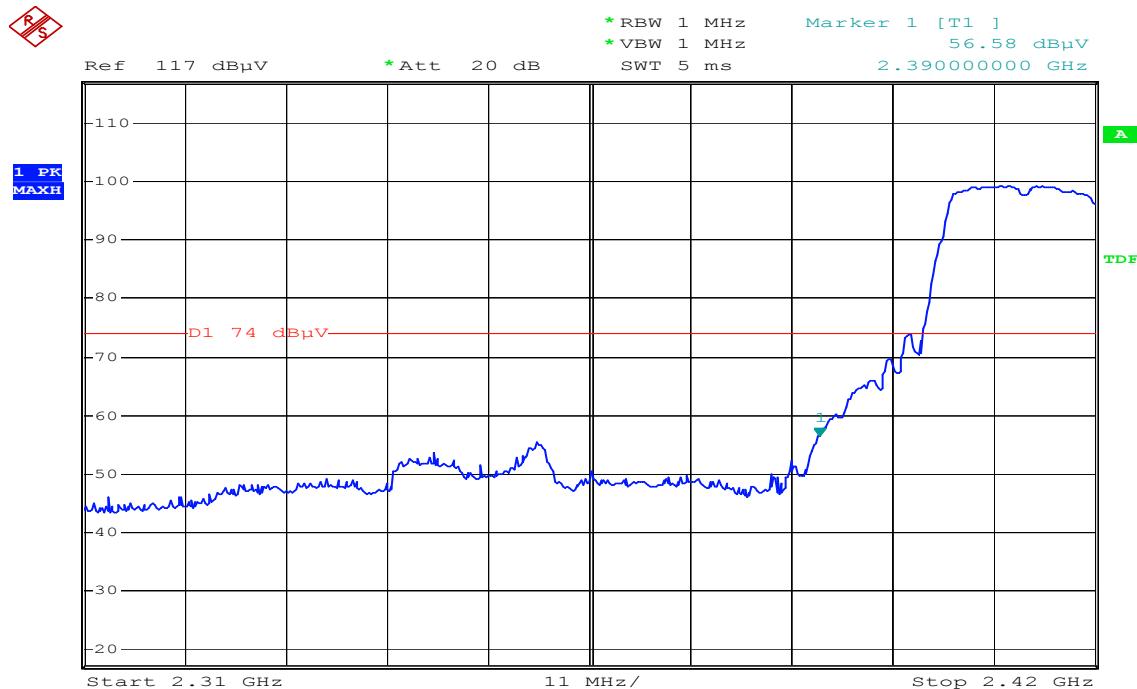
Date: 19.SEP.2008 14:43:59

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

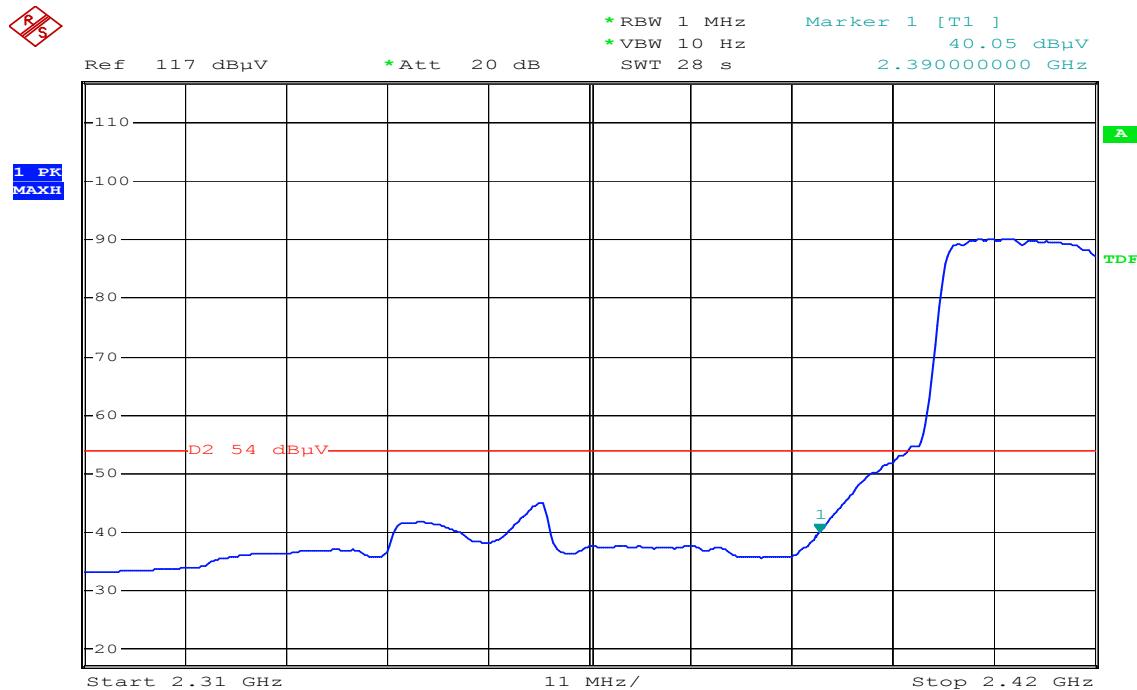
Date: 19.SEP.2008 14:22:23

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

Date: 19.SEP.2008 14:23:55

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


Date: 19.SEP.2008 14:17:50

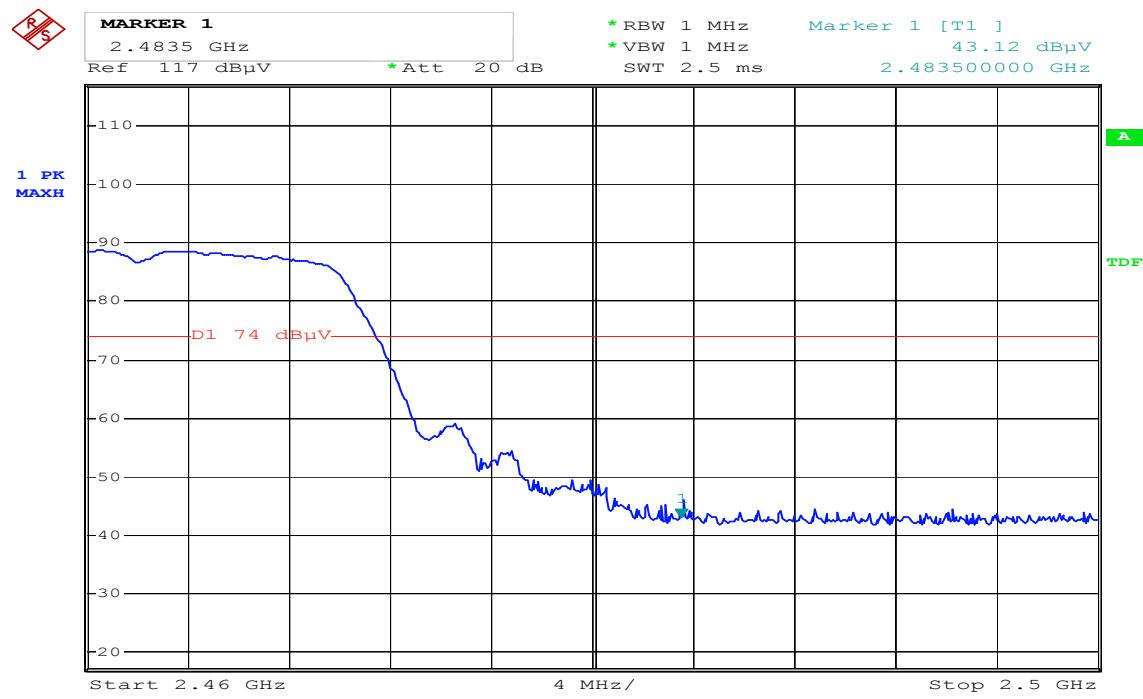
**Detector mode: Average**
**Polarity: Horizontal**


Date: 19.SEP.2008 14:17:15

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

**Detector mode: Peak**

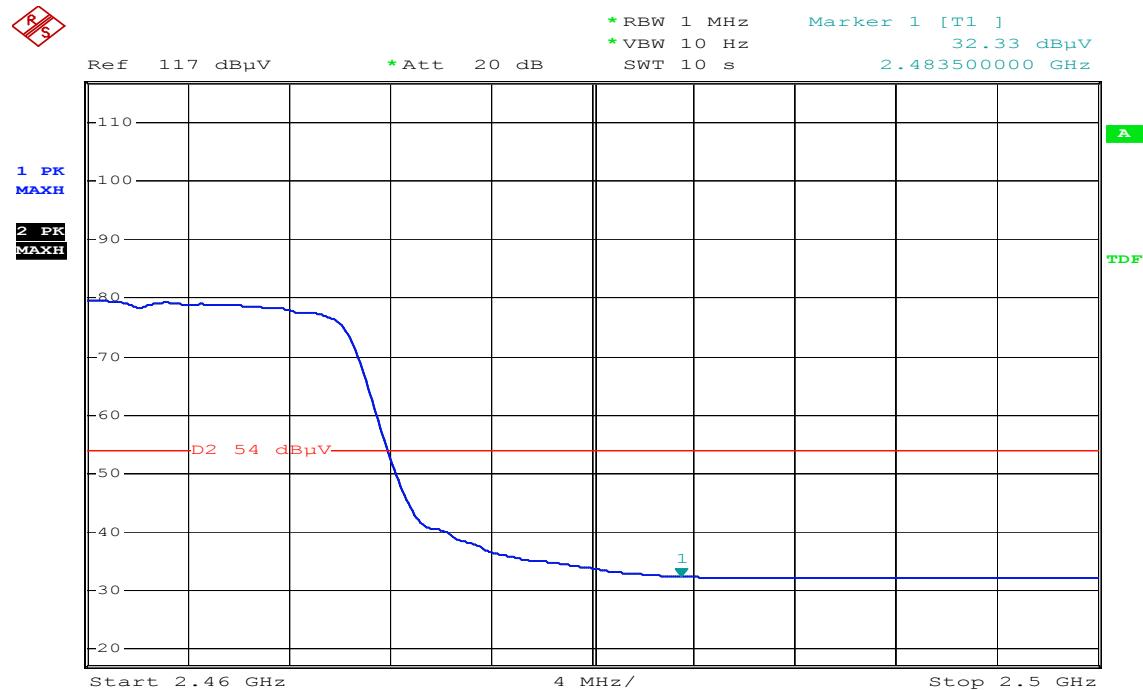
**Polarity: Vertical**



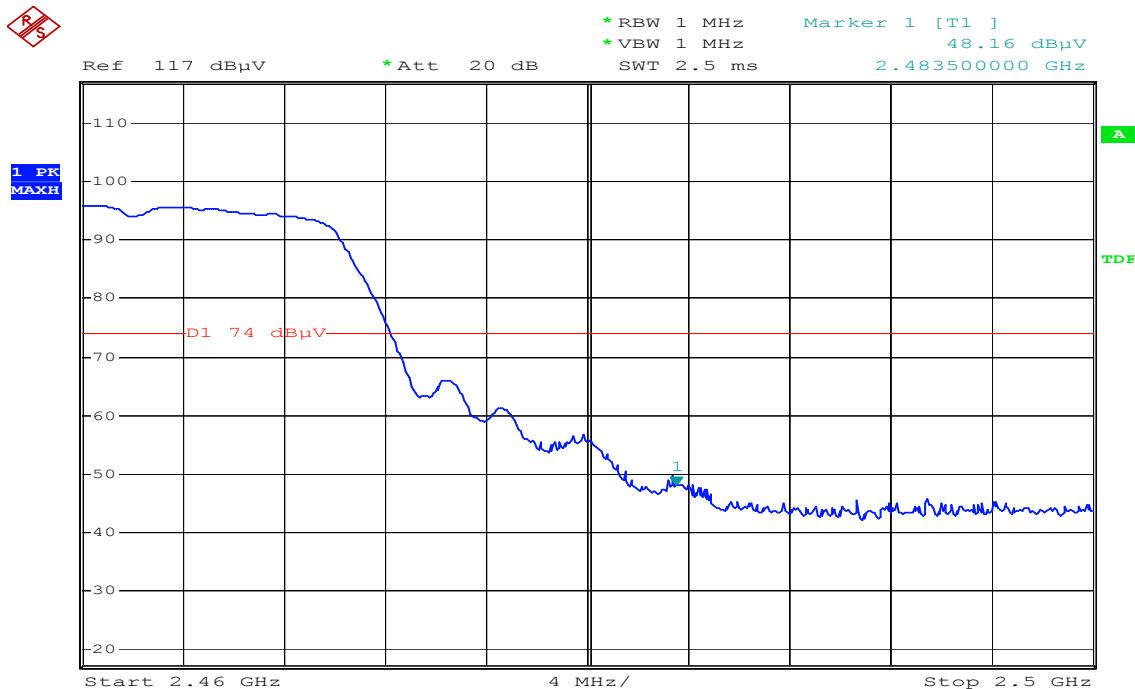
Date: 19.SEP.2008 14:27:51

**Detector mode: Average**

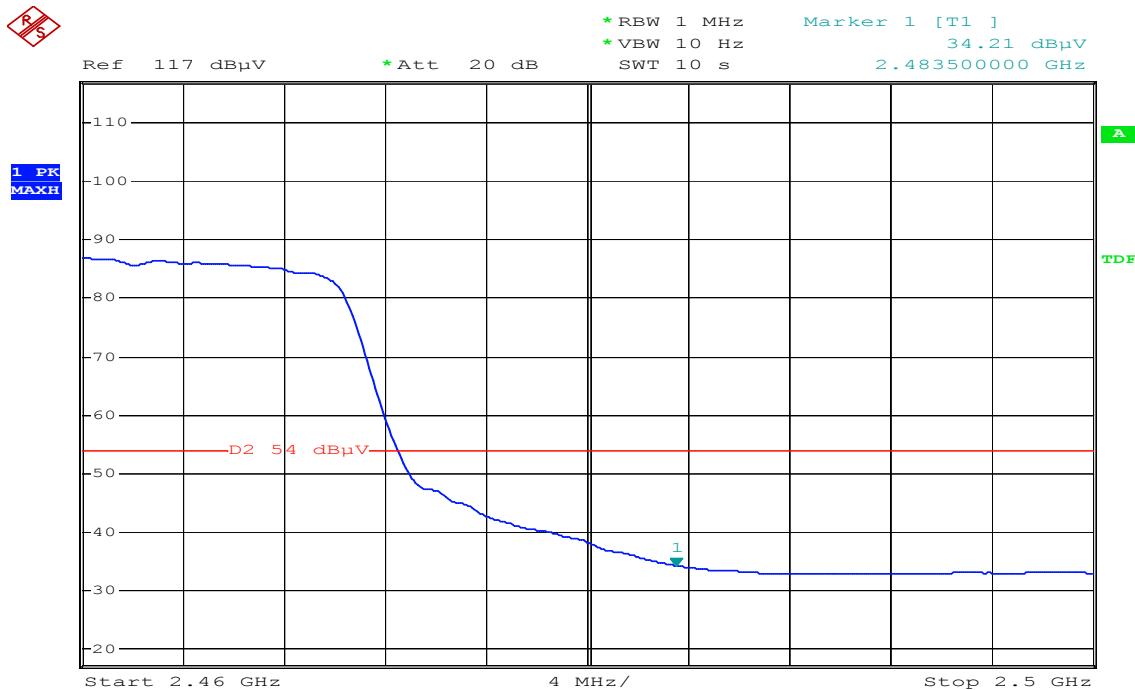
**Polarity: Vertical**



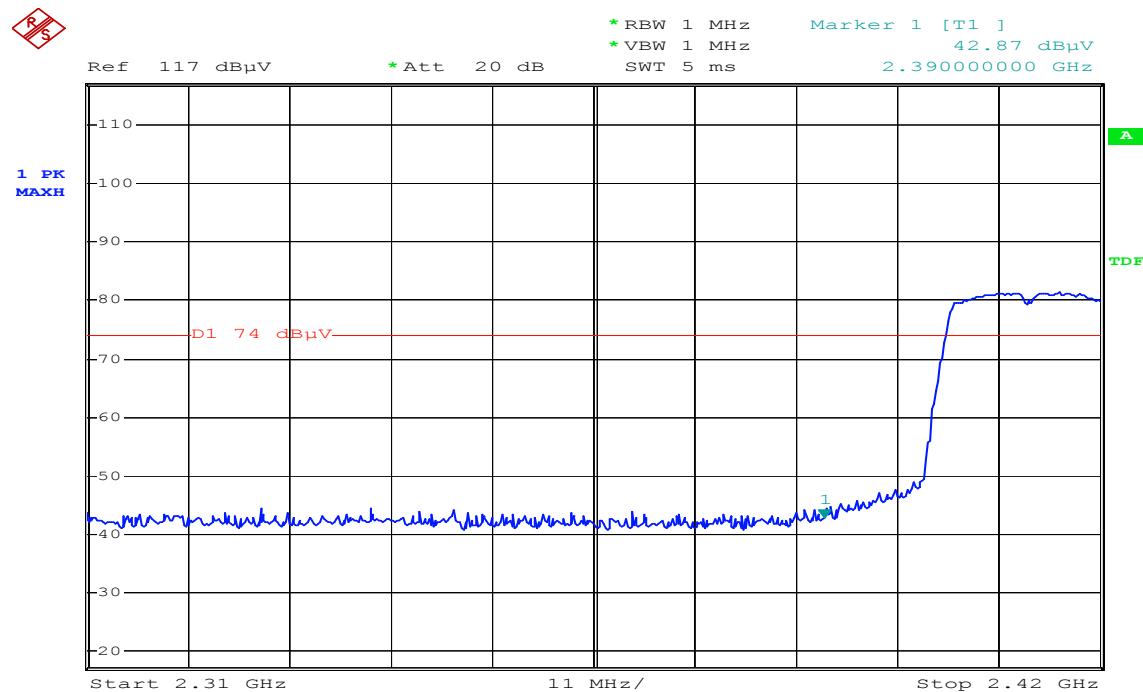
Date: 19.SEP.2008 14:32:11

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


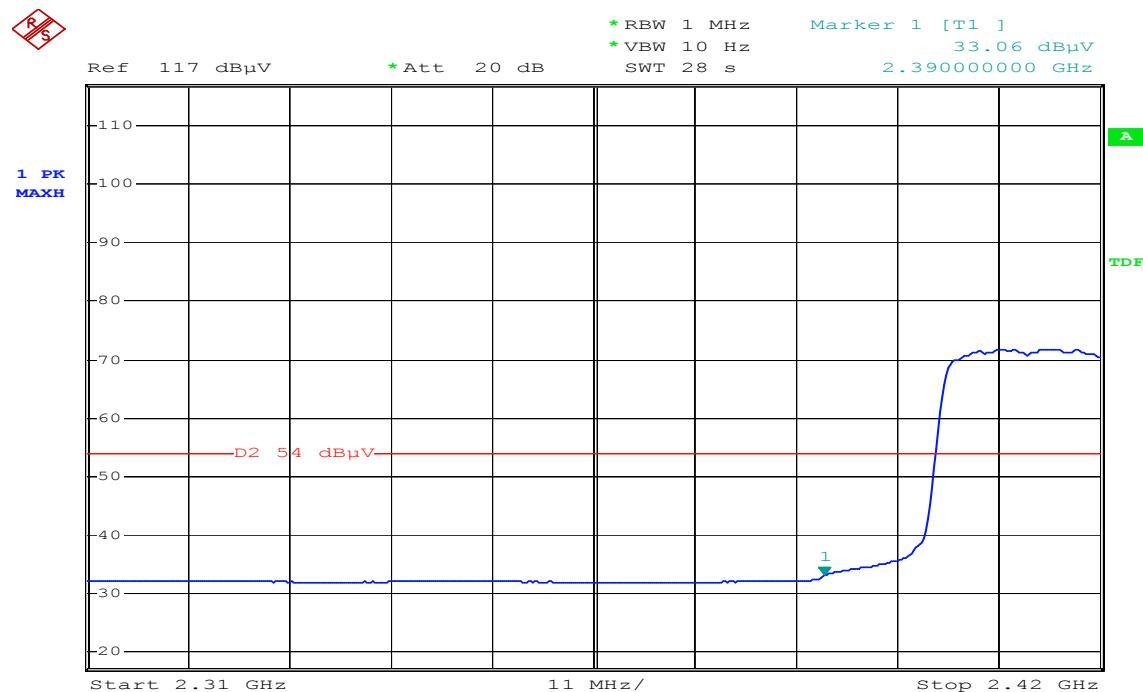
Date: 19.SEP.2008 14:34:35

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


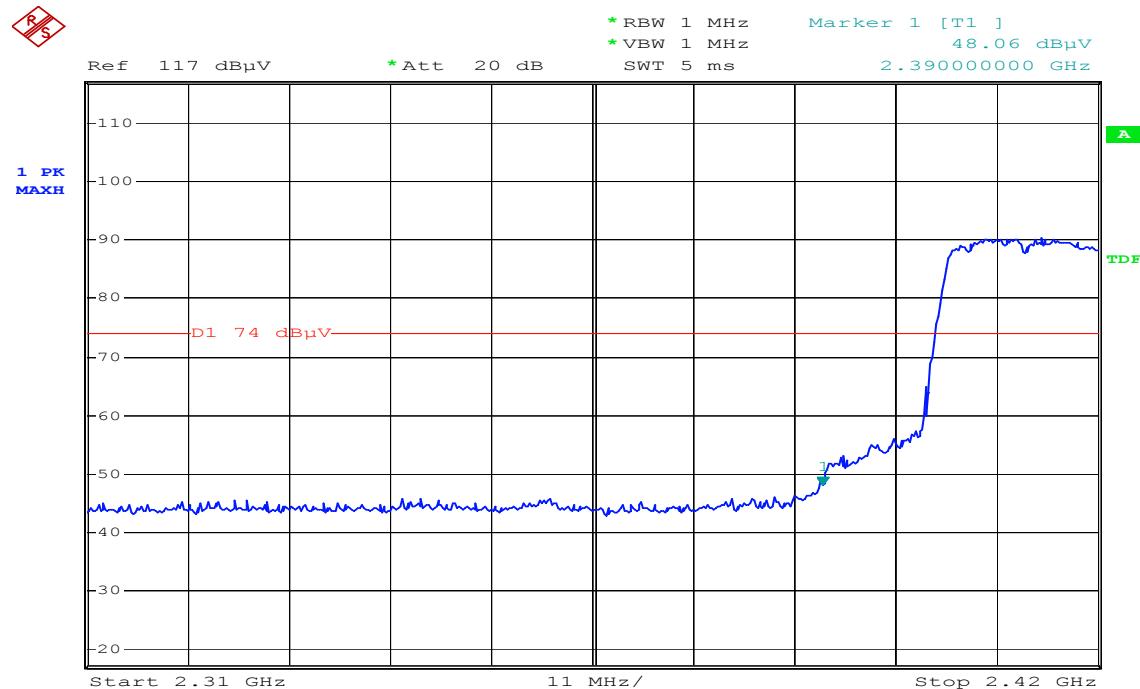
Date: 19.SEP.2008 14:35:05

**Band Edges (draft 802.11n 20 MHz Channel mode / CH Low)**
**Detector mode: Peak**
**Polarity: Vertical**


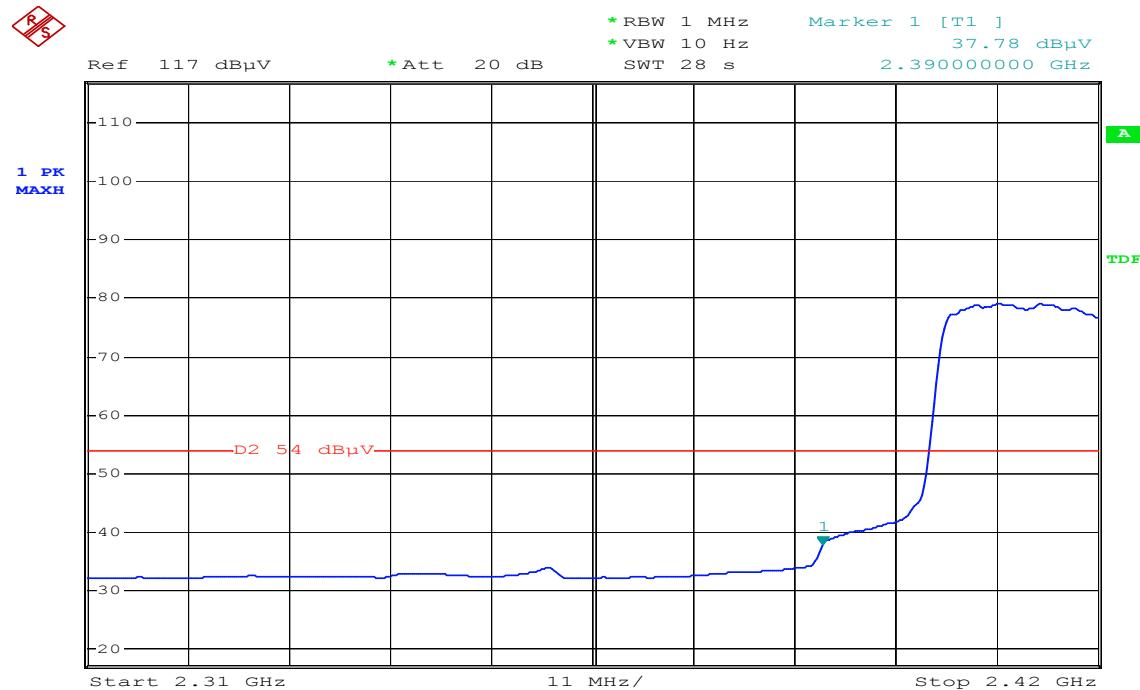
Date: 4.NOV.2008 17:34:21

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


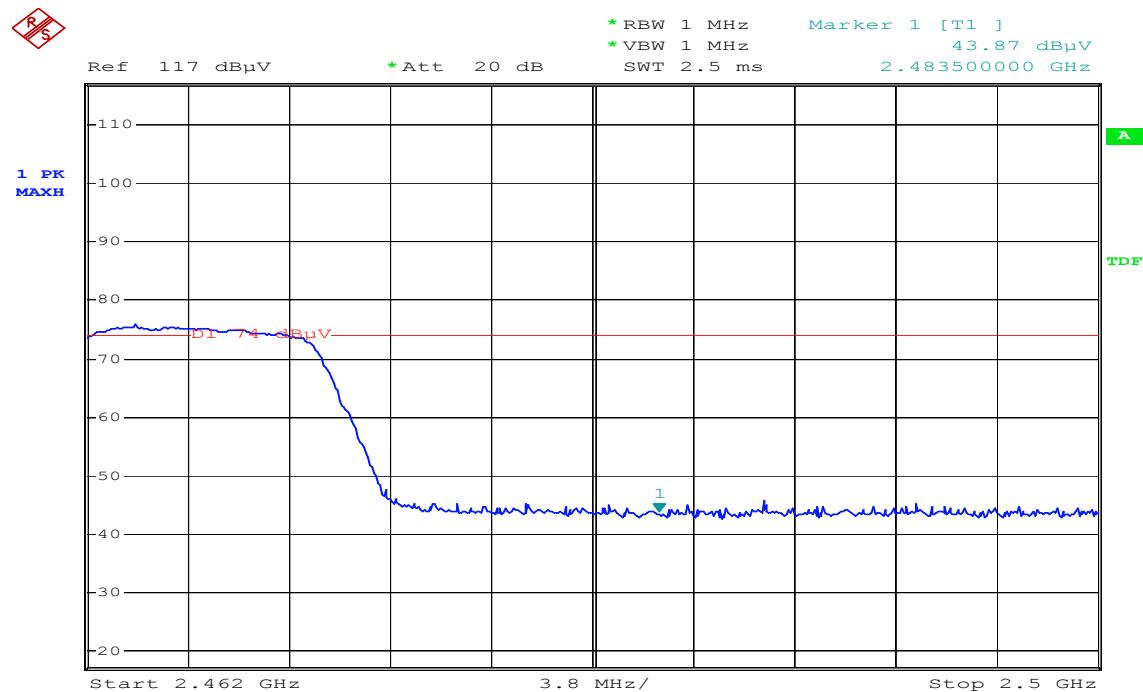
Date: 4.NOV.2008 17:36:02

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

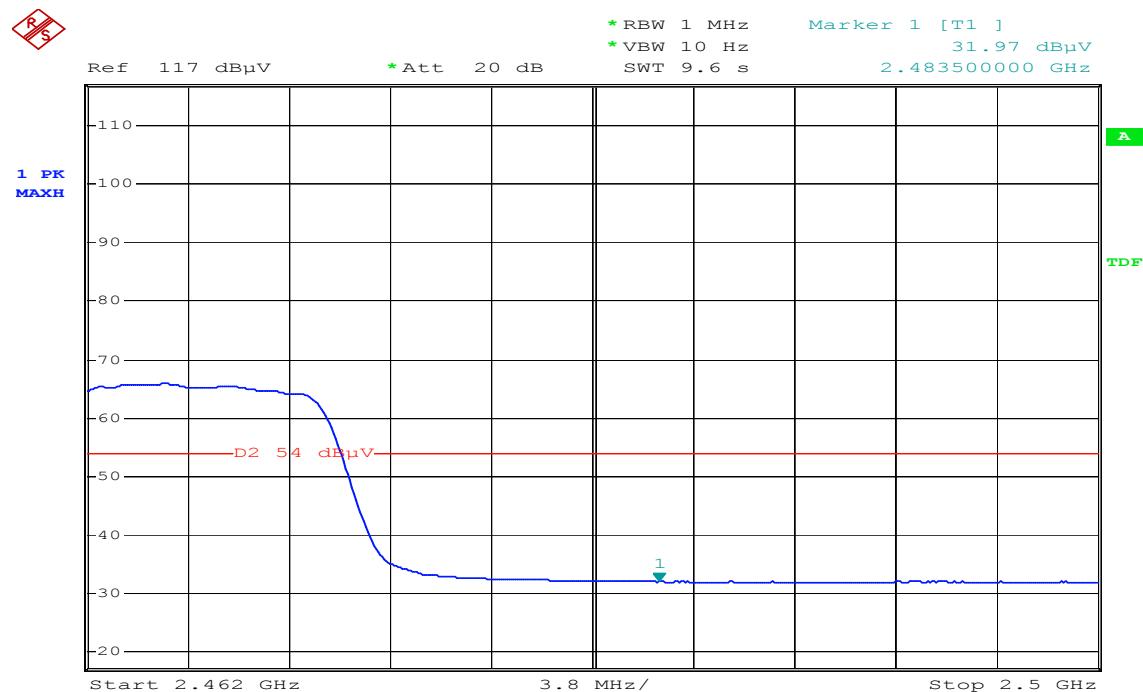
Date: 4.NOV.2008 17:40:04

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

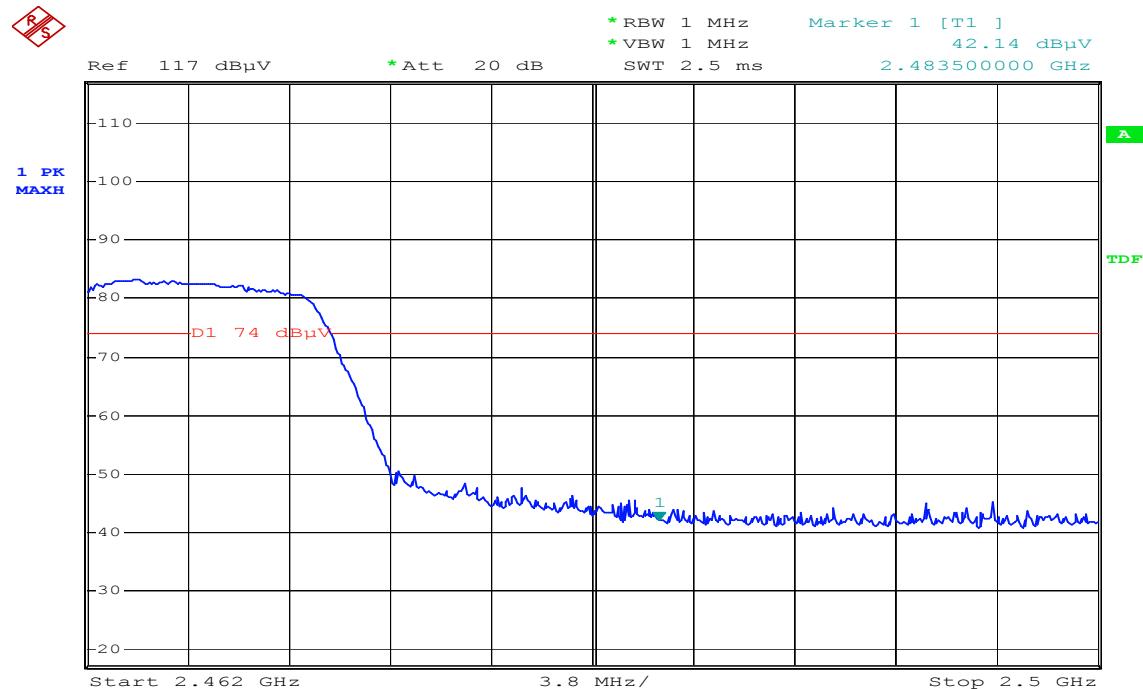
Date: 4.NOV.2008 17:42:40

**Band Edges (draft 802.11n 20 MHz Channel mode / CH High)**
**Detector mode: Peak**
**Polarity: Vertical**


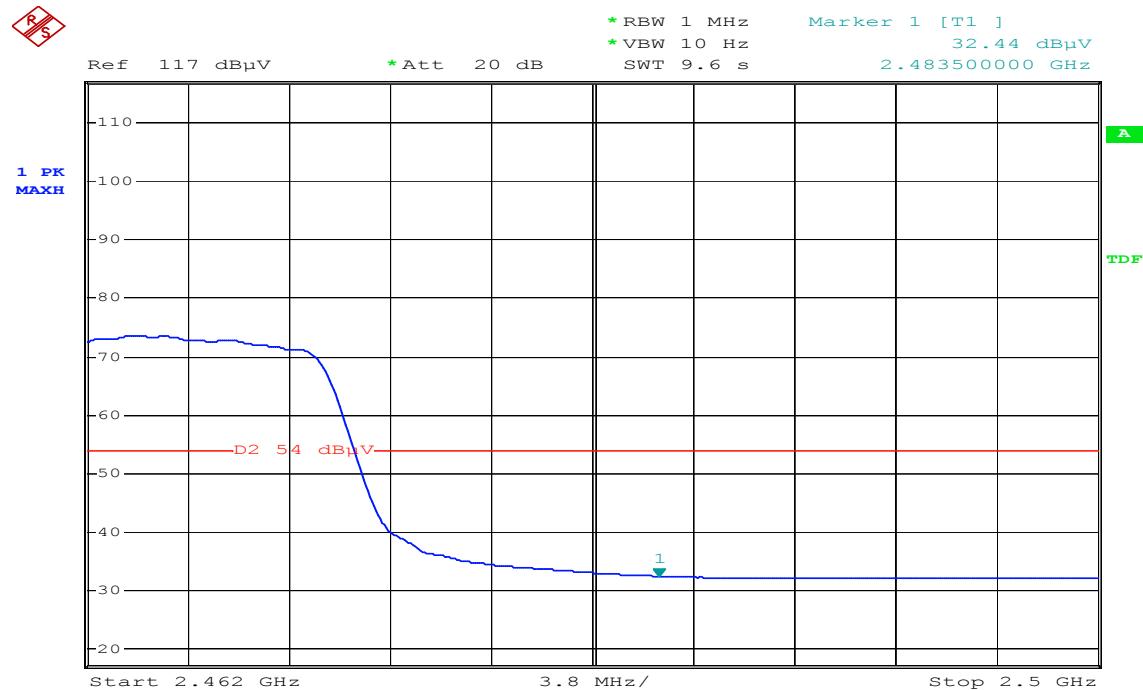
Date: 4.NOV.2008 17:55:28

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


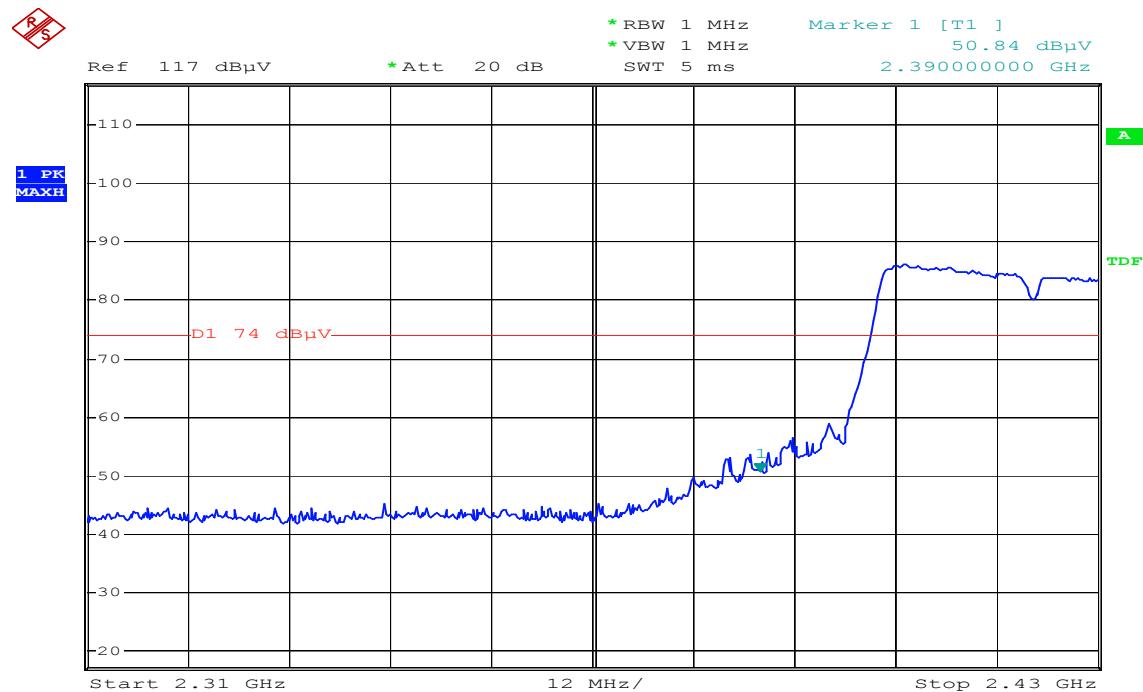
Date: 4.NOV.2008 17:55:59

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


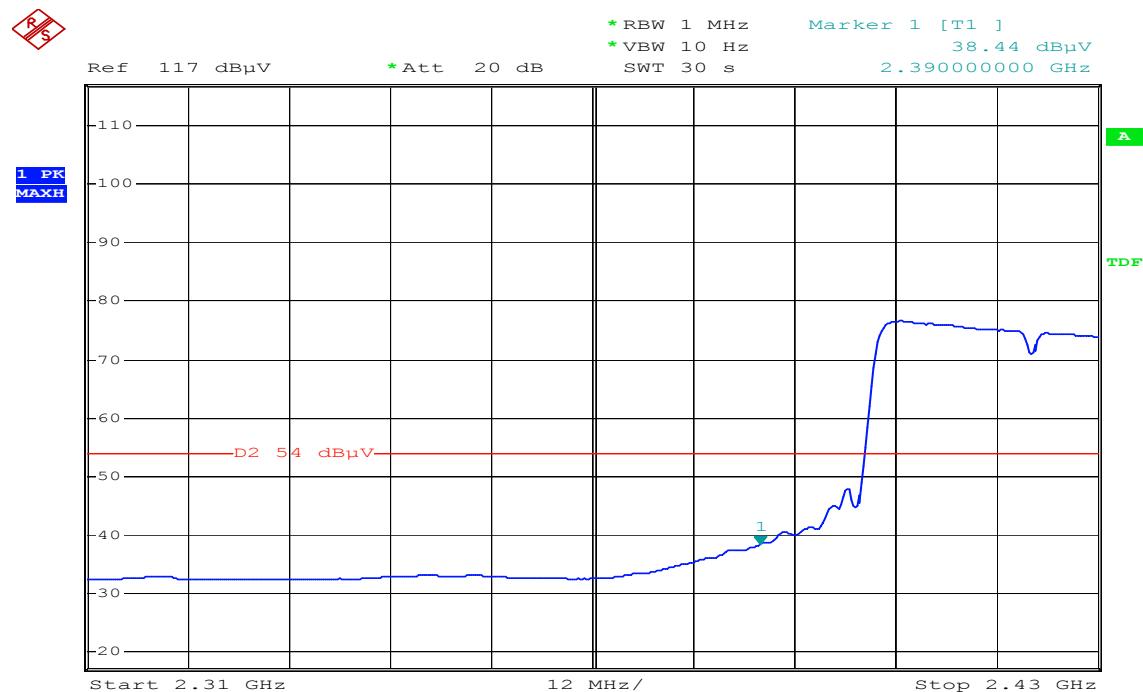
Date: 4.NOV.2008 17:48:39

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


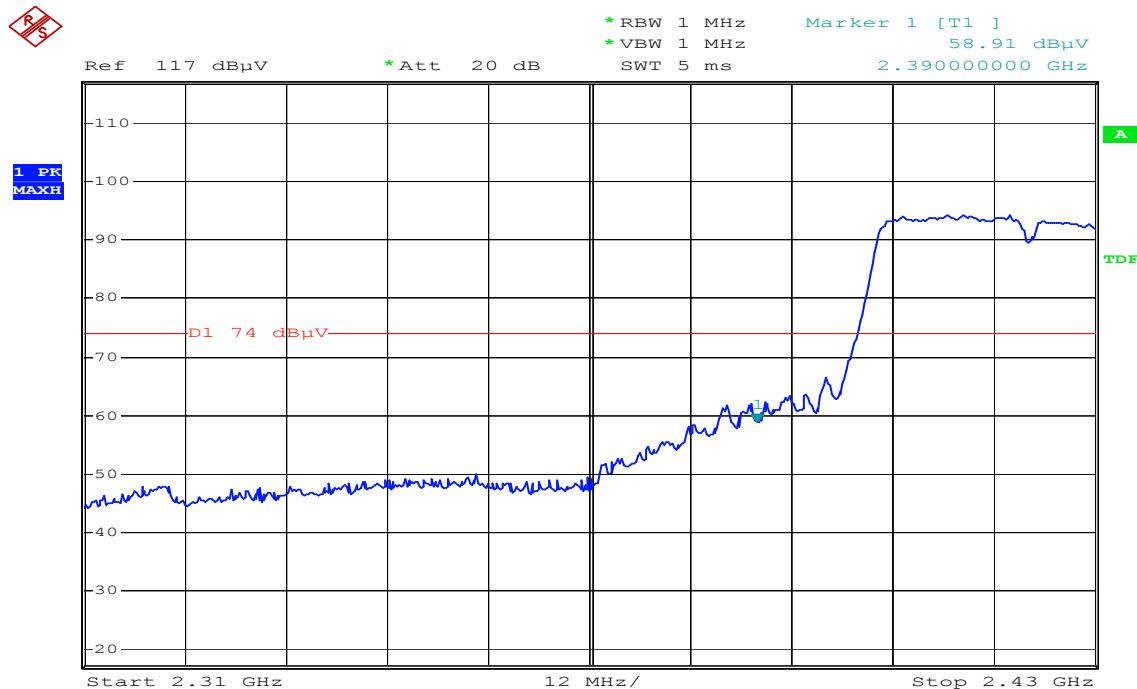
Date: 4.NOV.2008 17:51:04

**Band Edges (draft 802.11n 40 MHz Channel mode / CH Low)**
**Detector mode: Peak**
**Polarity: Vertical**


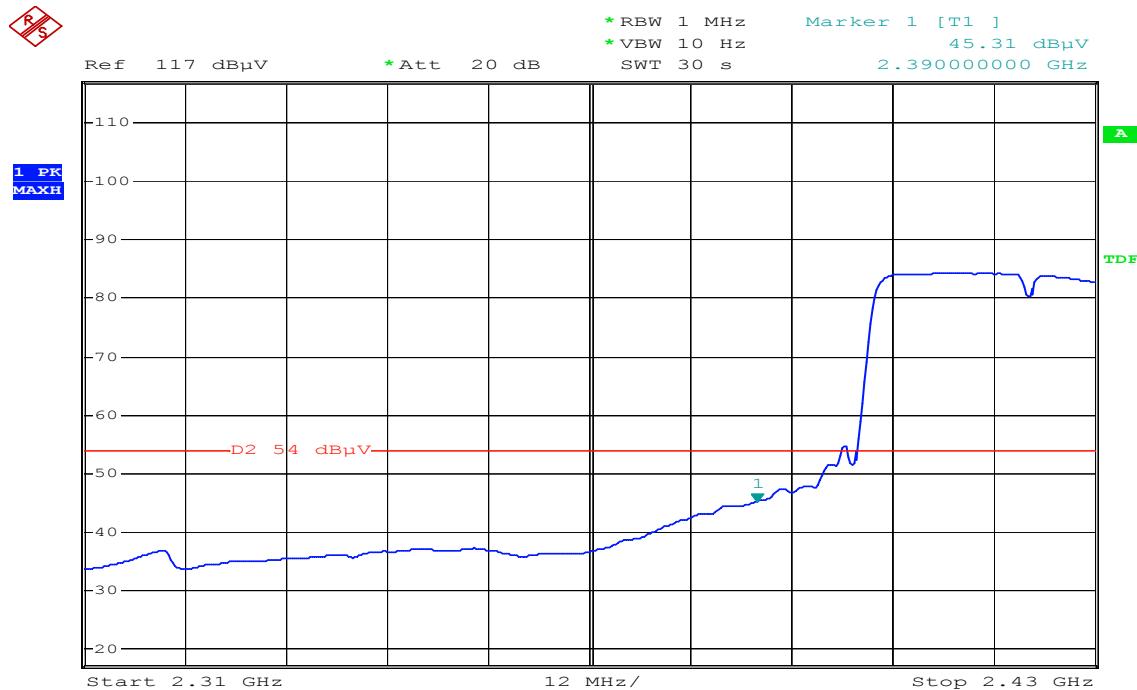
Date: 19.SEP.2008 14:53:28

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


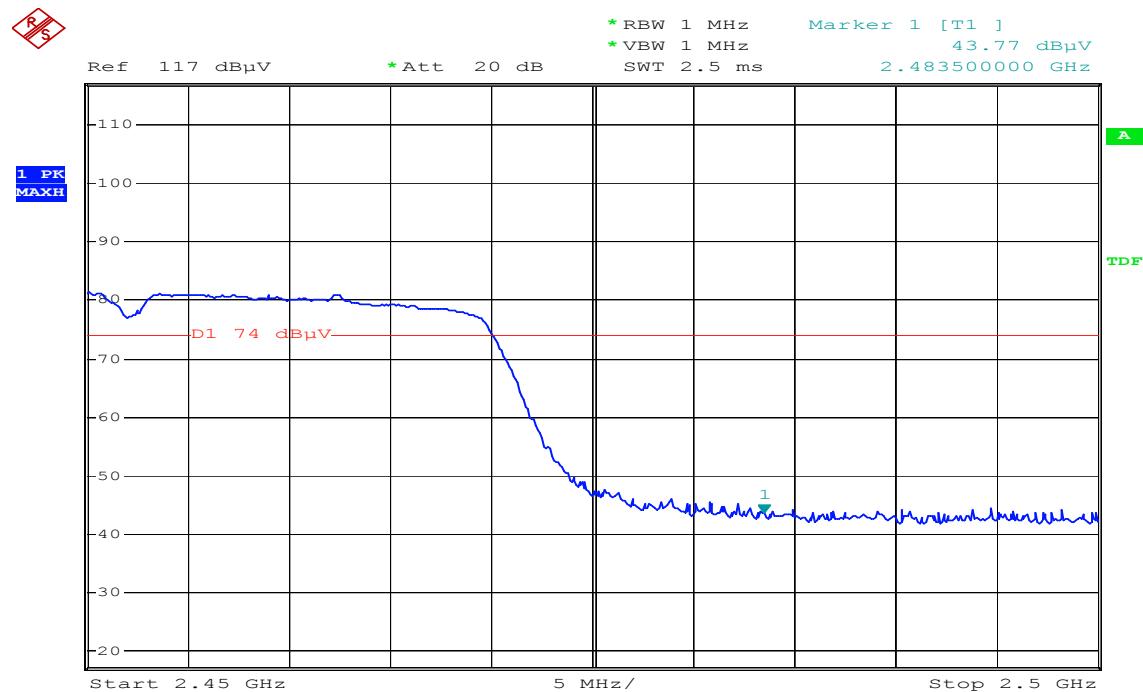
Date: 19.SEP.2008 14:55:05

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


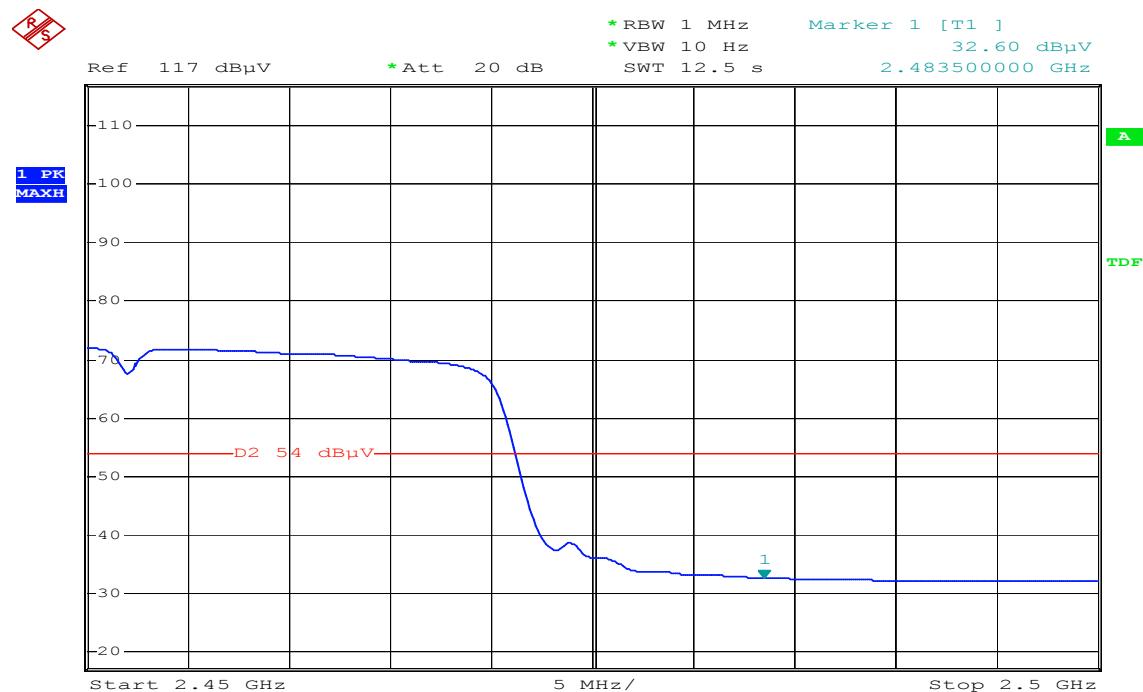
Date: 19.SEP.2008 14:59:29

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


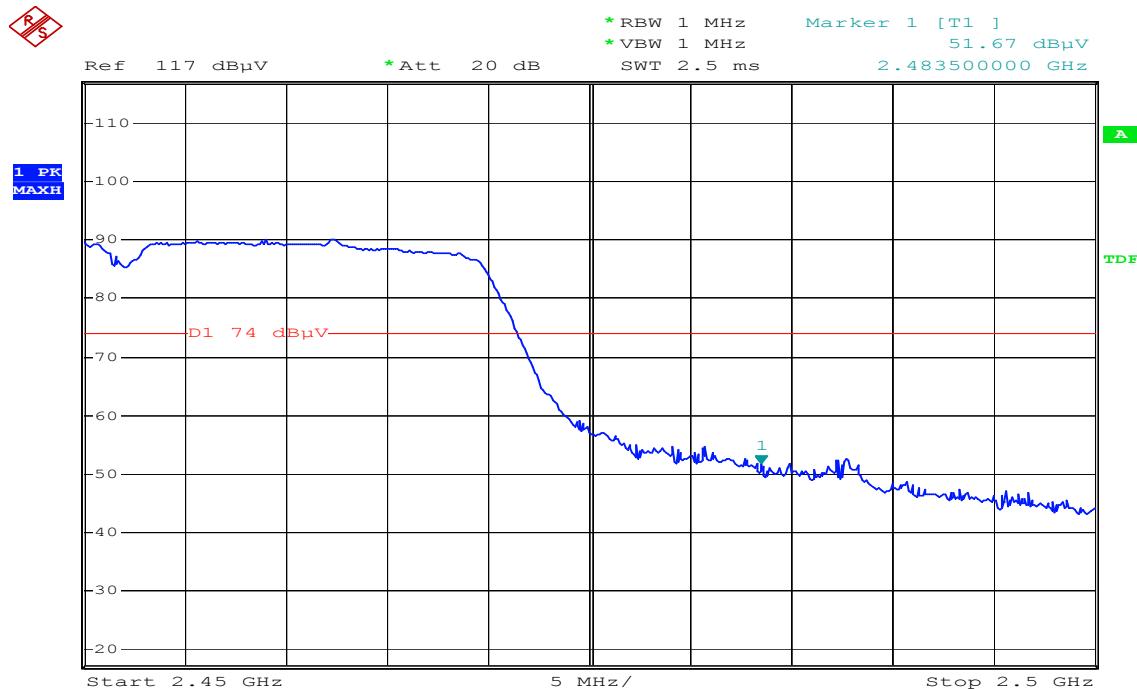
Date: 19.SEP.2008 14:58:30

**Band Edges (draft 802.11n 40 MHz Channel mode / CH High)**
**Detector mode: Peak**
**Polarity: Vertical**


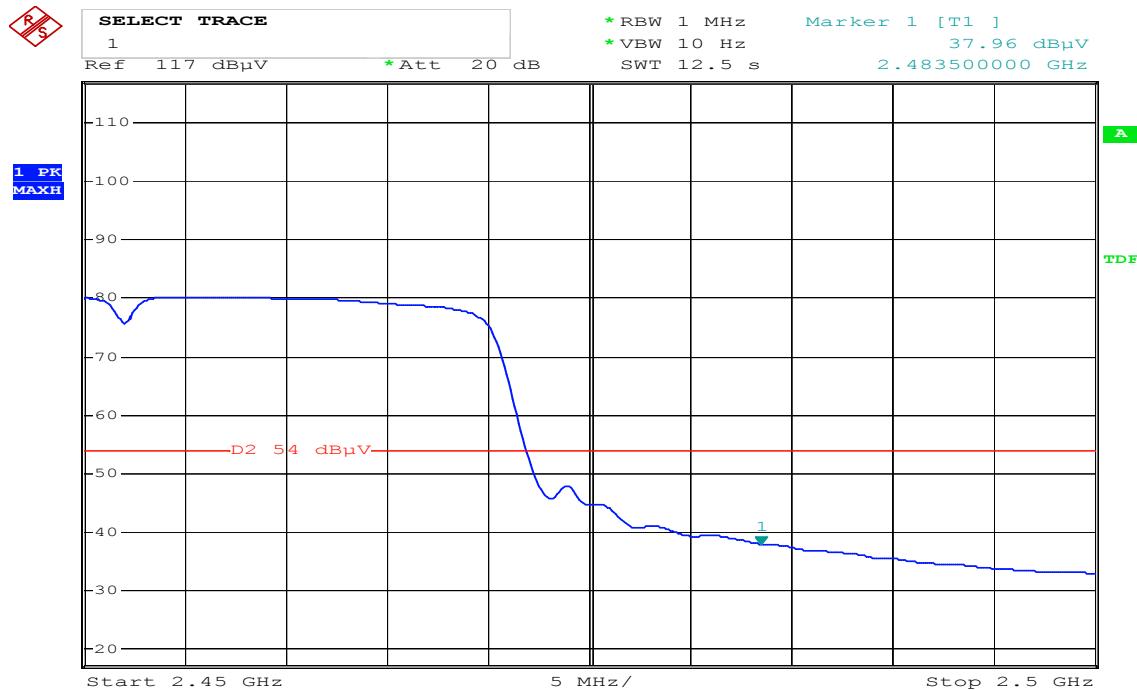
Date: 19.SEP.2008 15:03:35

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


Date: 19.SEP.2008 15:02:59

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


Date: 19.SEP.2008 15:01:00

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


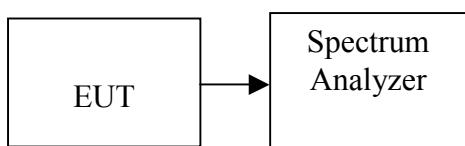
Date: 19.SEP.2008 15:01:40

## 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.

### 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

### Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-21.12	8.00	PASS
Mid	2437	-20.72		PASS
High	2462	-20.60		PASS

### Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-22.56	8.00	PASS
Mid	2437	-22.20		PASS
High	2462	-23.09		PASS

### Test mode: draft 802.11n 20 MHz Channel mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-25.09	8.00	PASS
Mid	2437	-23.79		PASS
High	2462	-23.63		PASS

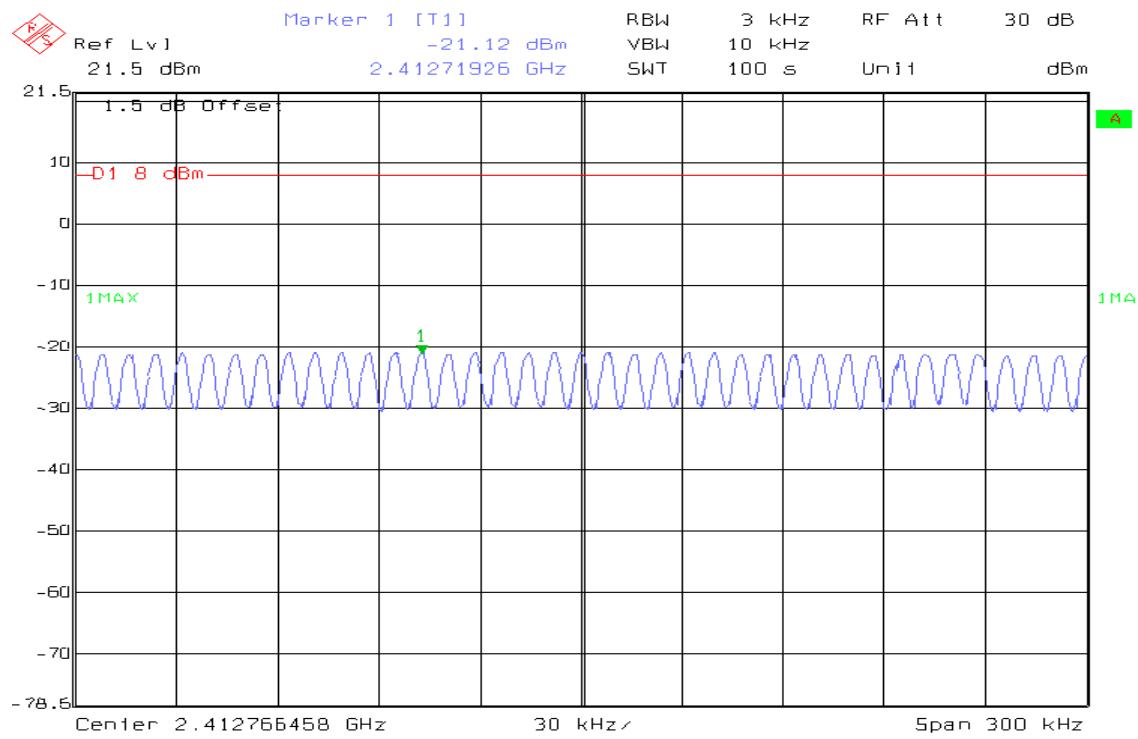
### Test mode: draft 802.11n 40 MHz Channel mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2422	-25.61	8.00	PASS
Mid	2437	-24.51		PASS
High	2452	-24.91		PASS

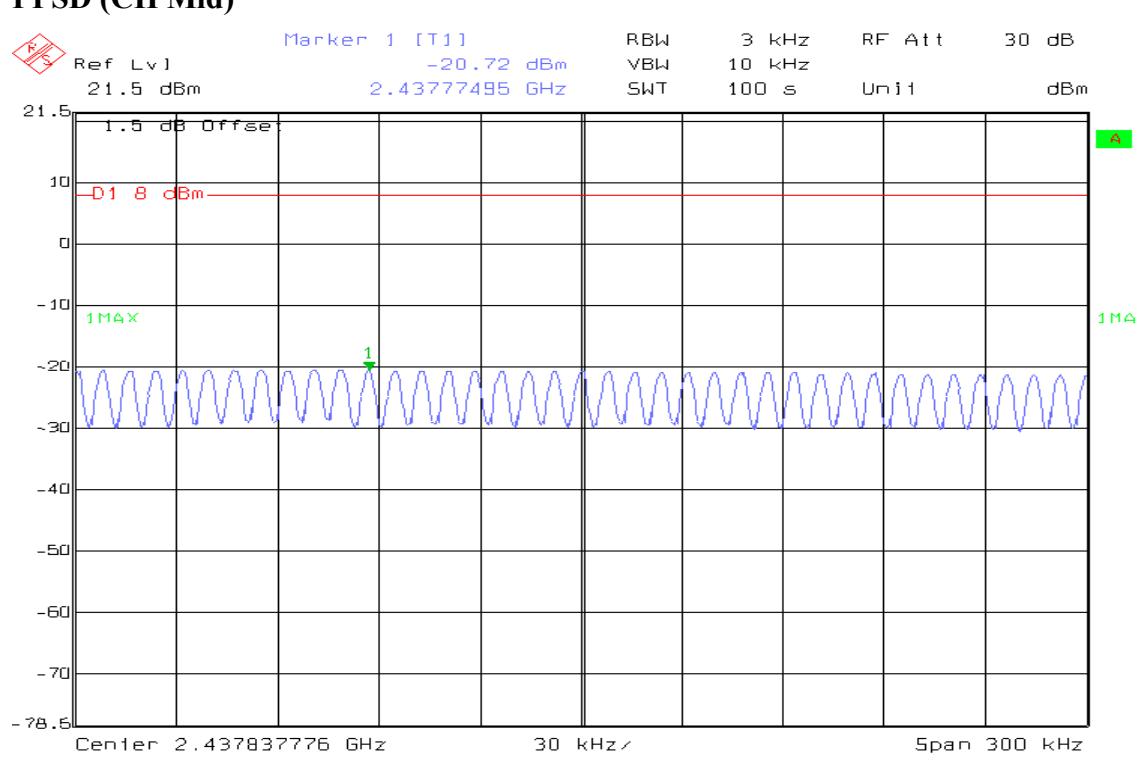
## TEST PLOT

### IEEE 802.11b mode

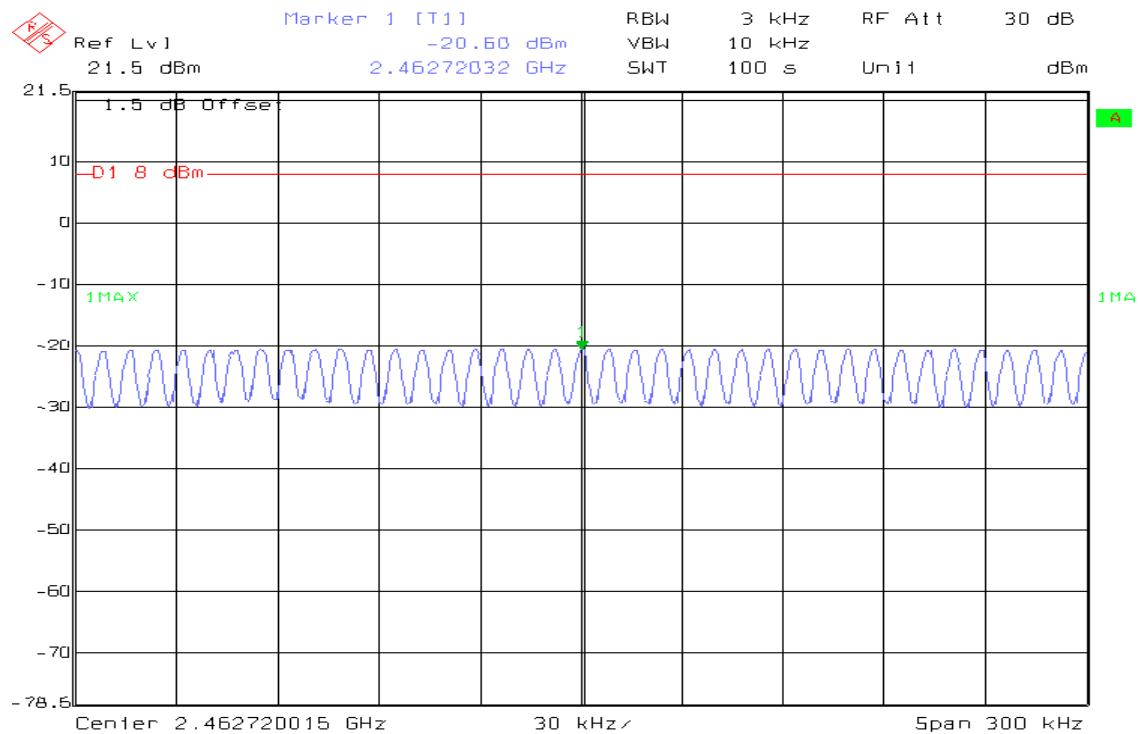
#### PPSD (CH Low)



#### PPSD (CH Mid)

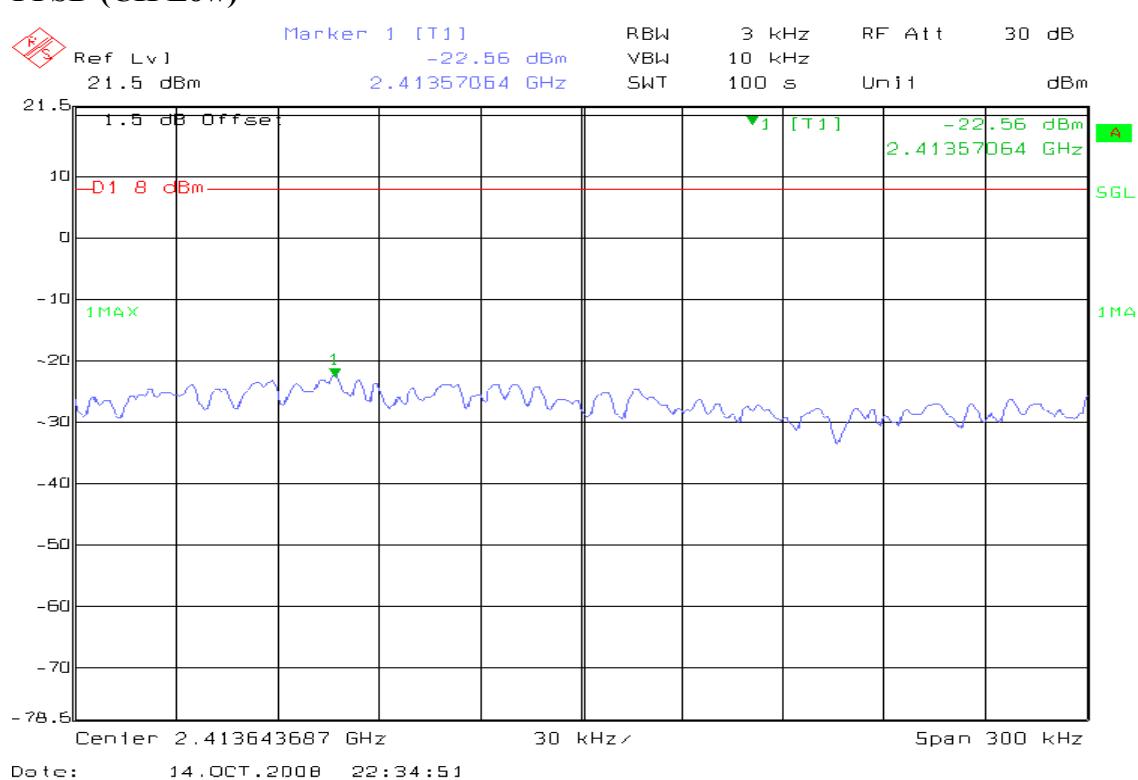


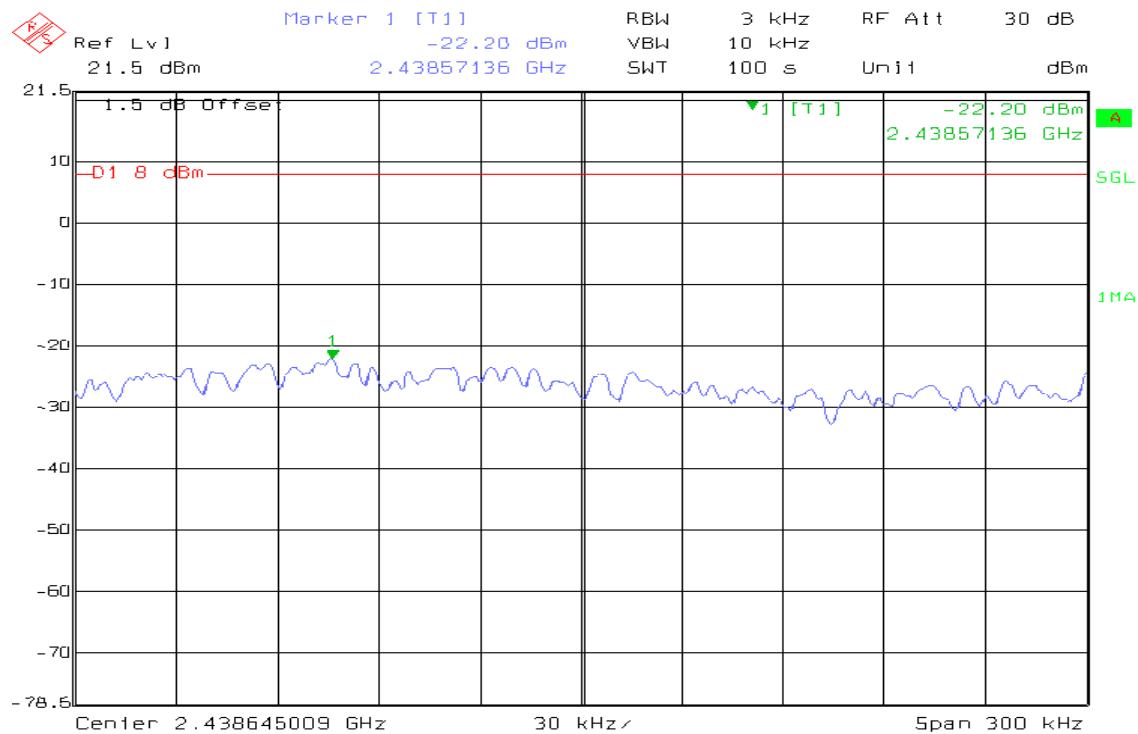
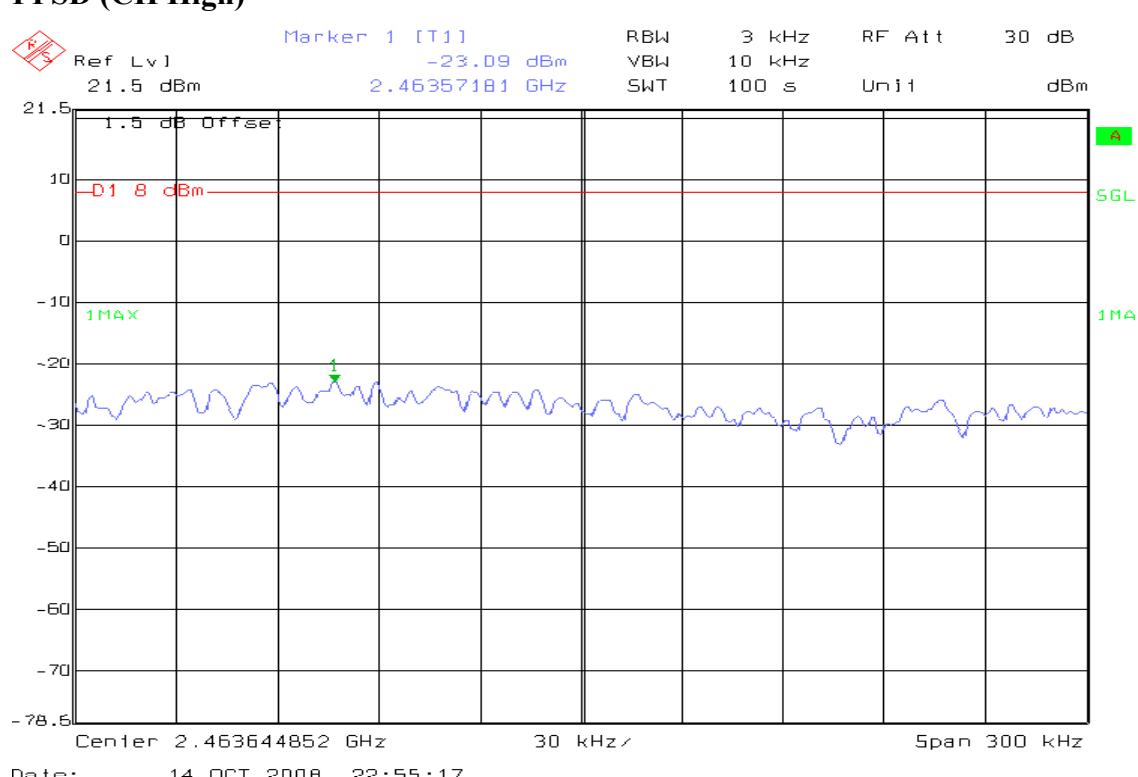
## PPSD (CH High)



## IEEE 802.11g mode

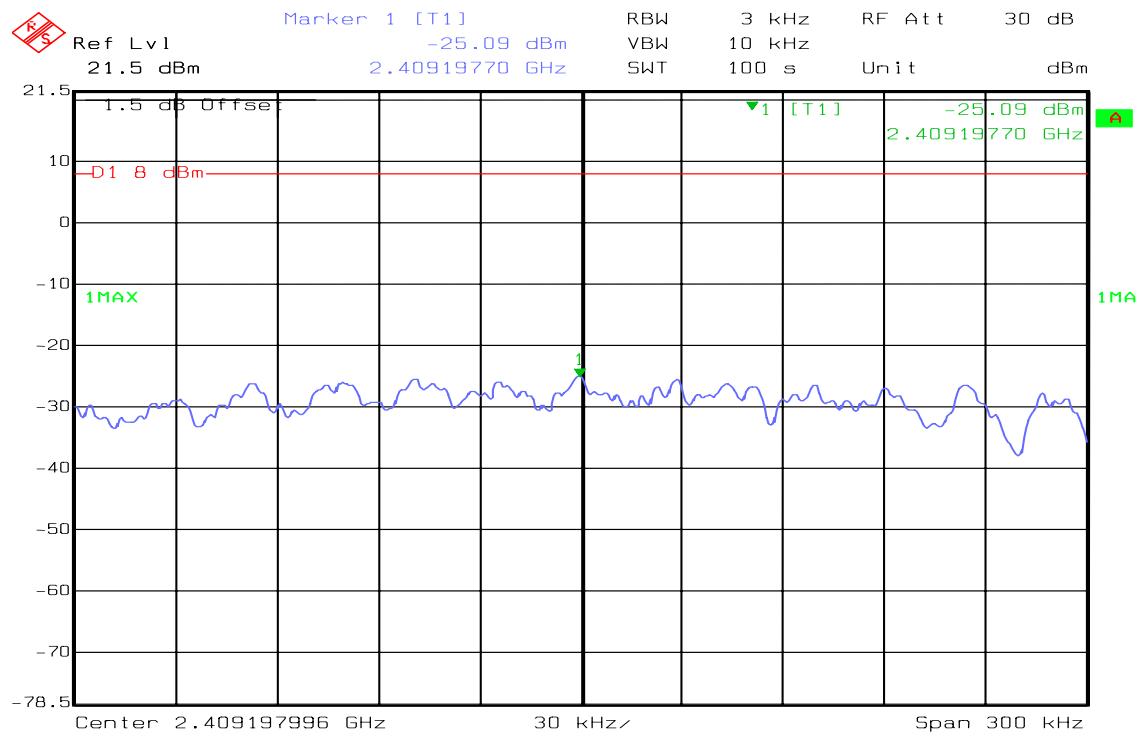
### PPSD (CH Low)



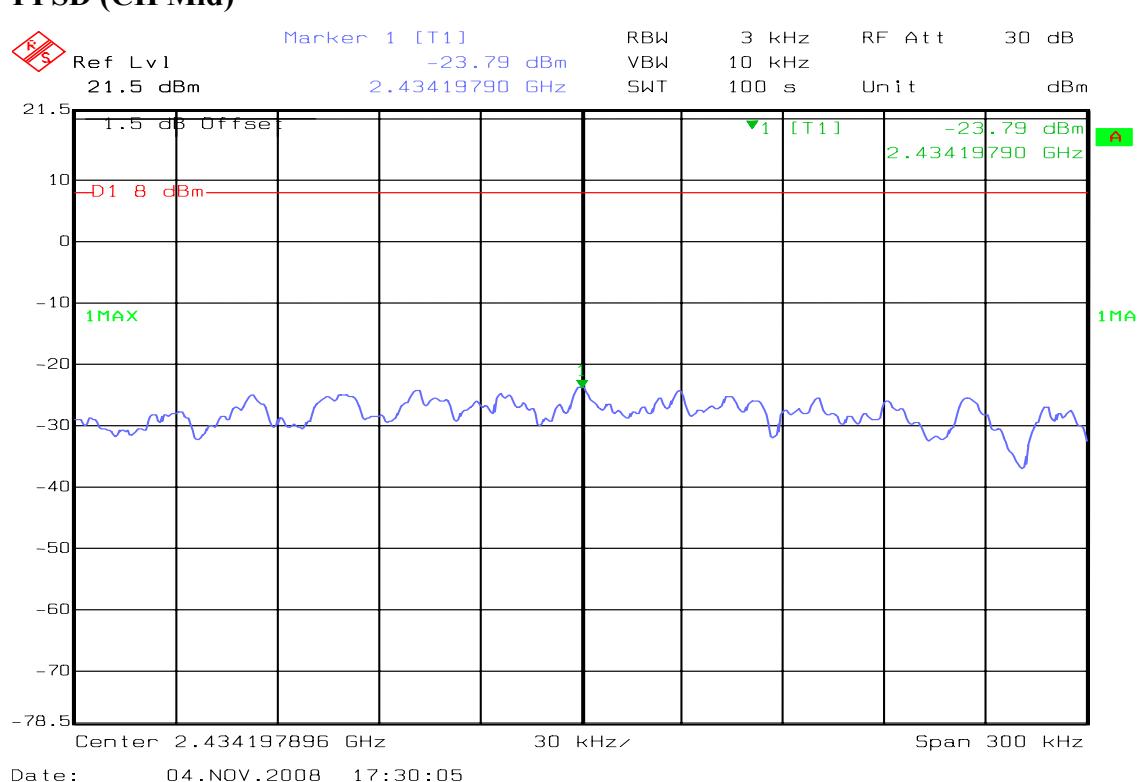
**PPSD (CH Mid)****PPSD (CH High)**

## draft 802.11n 20 MHz Channel mode

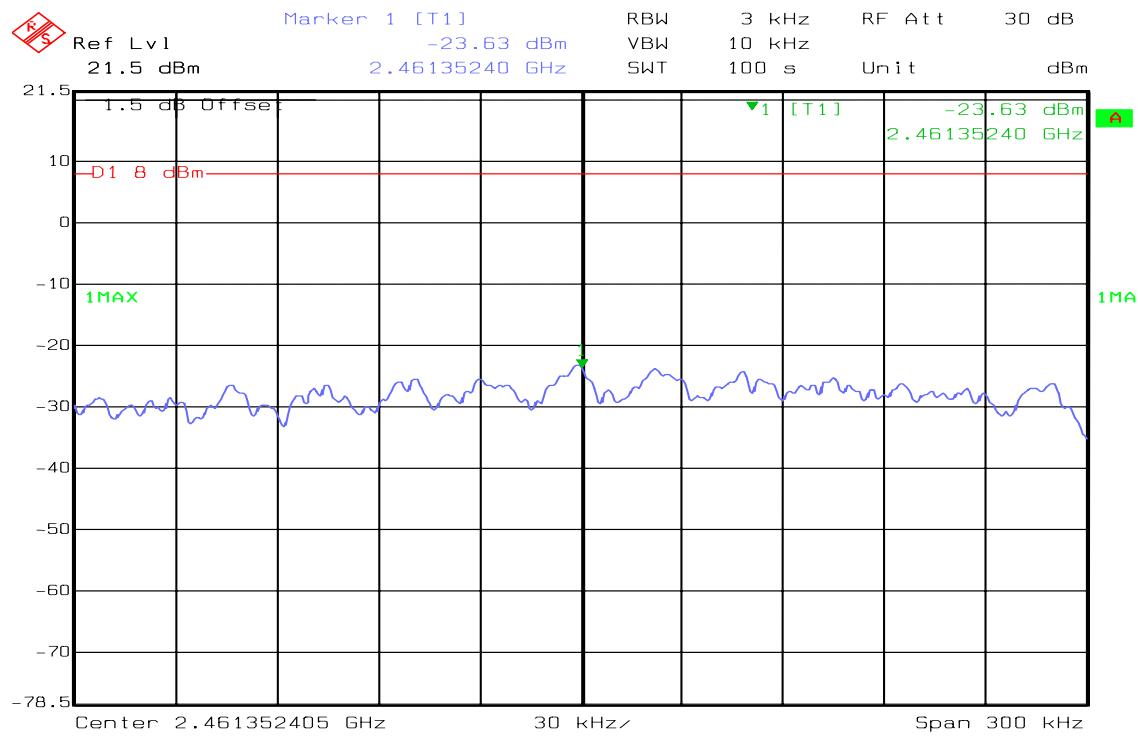
### PPSD (CH Low)



### PPSD (CH Mid)



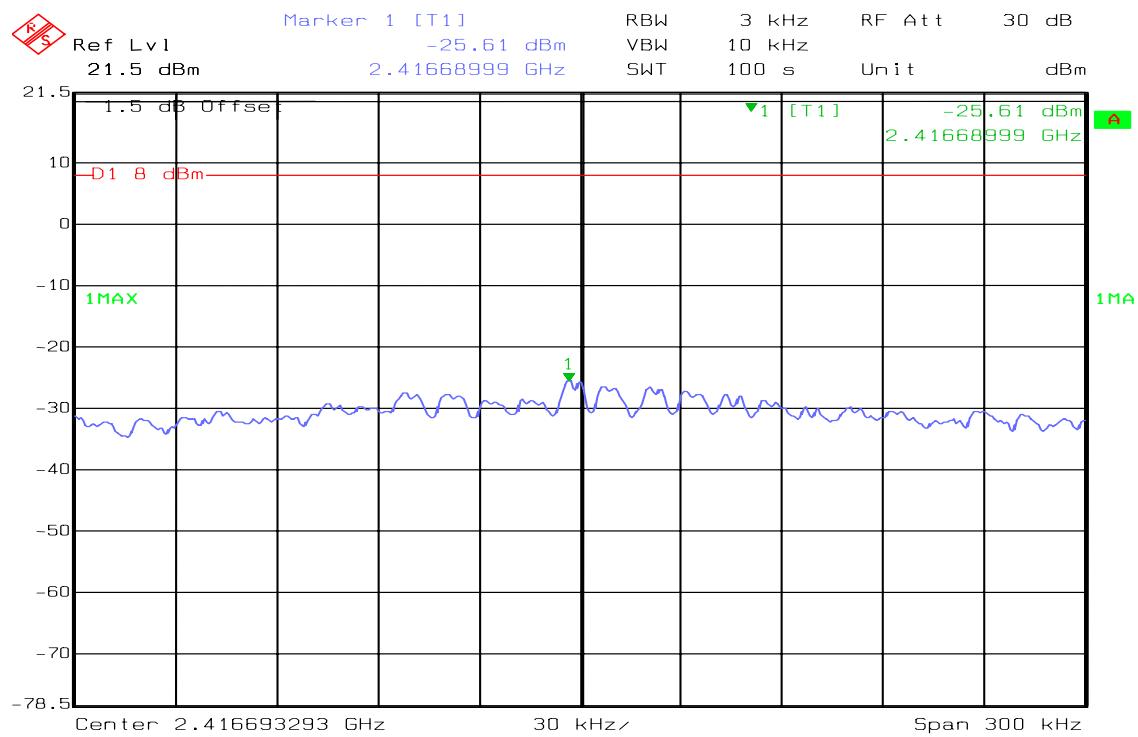
### PPSD (CH High)



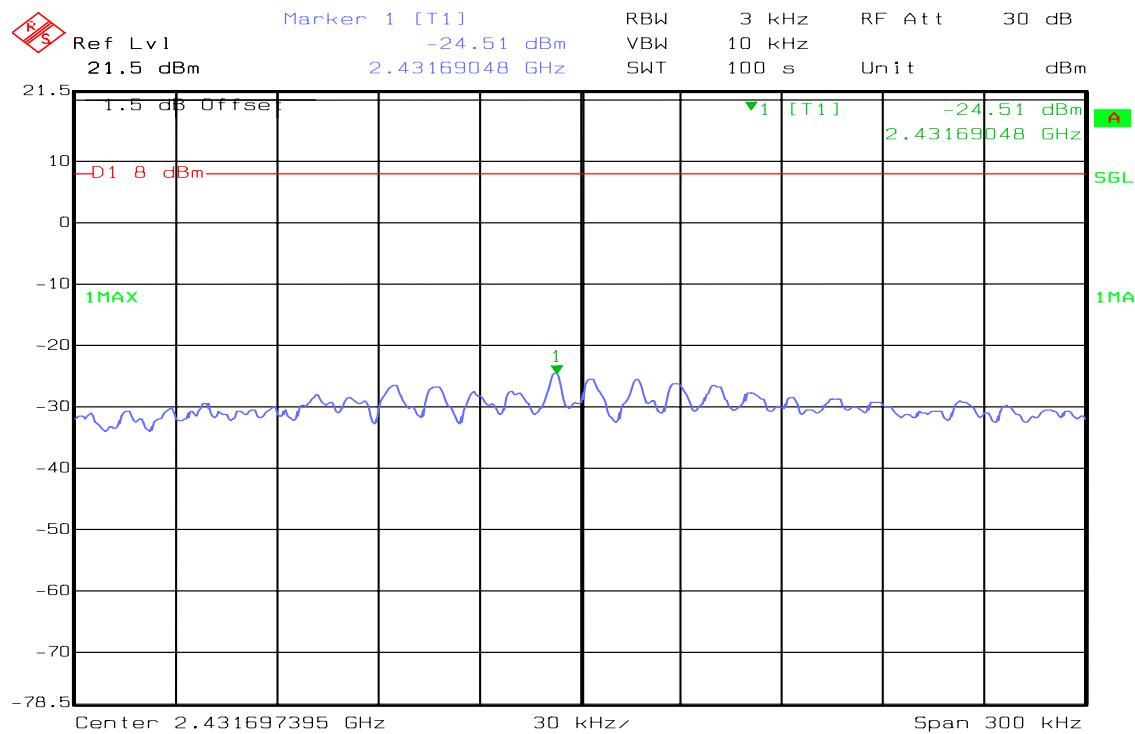
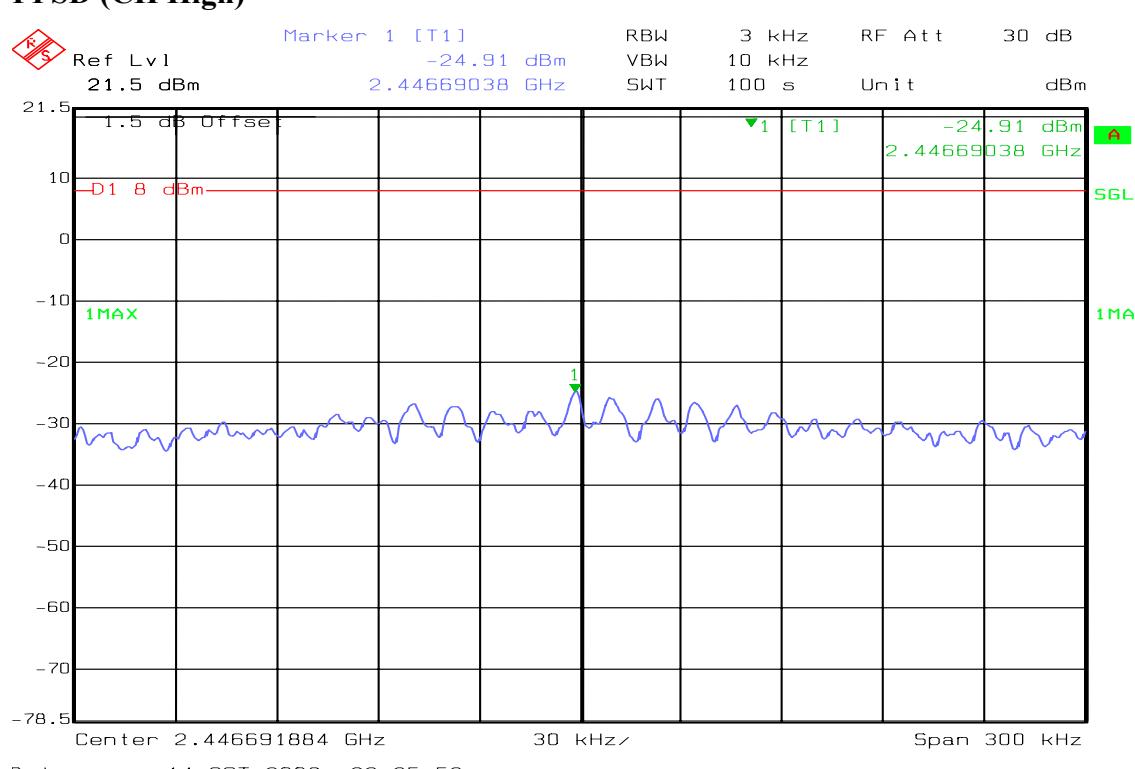
Date: 04.NOV.2008 17:26:43

### draft 802.11n 40 MHz Channel mode

#### PPSD (CH Low)



Date: 14.OCT.2008 22:03:35

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

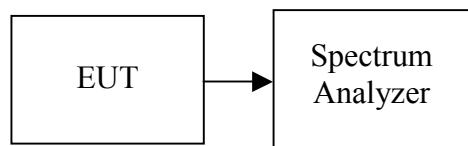
## 7.6 SPURIOUS EMISSIONS

### 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)).

#### TEST CONFIGURATION



#### TEST PROCEDURE

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

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

Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

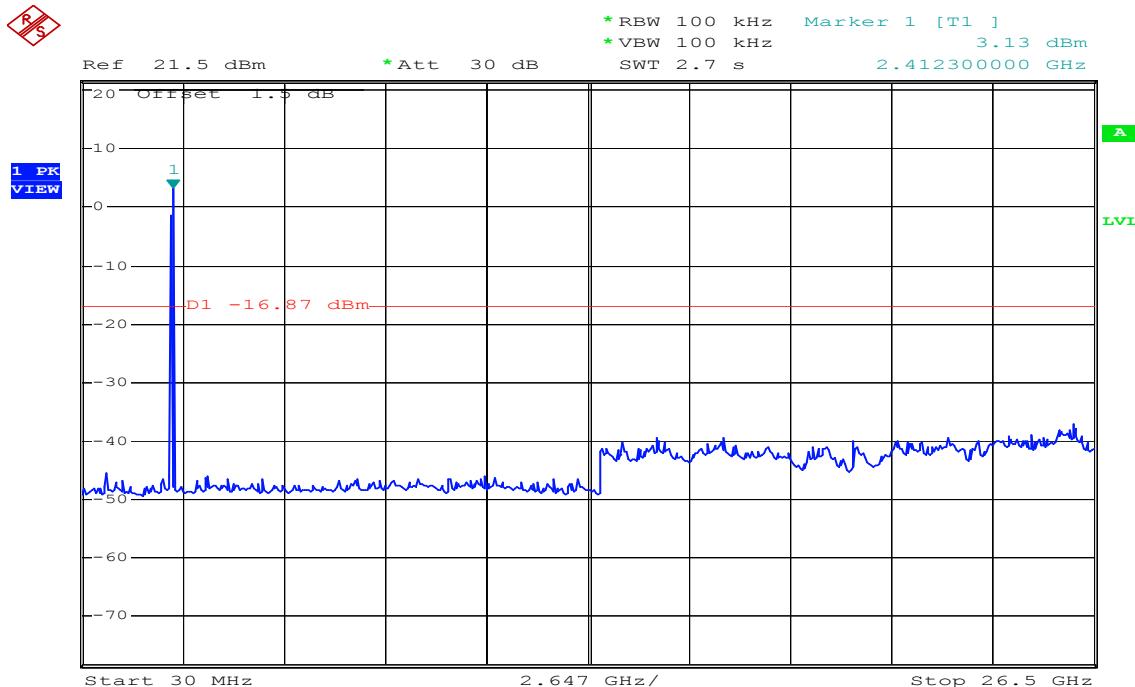
#### TEST RESULTS

*No non-compliance noted*

## TEST PLOT

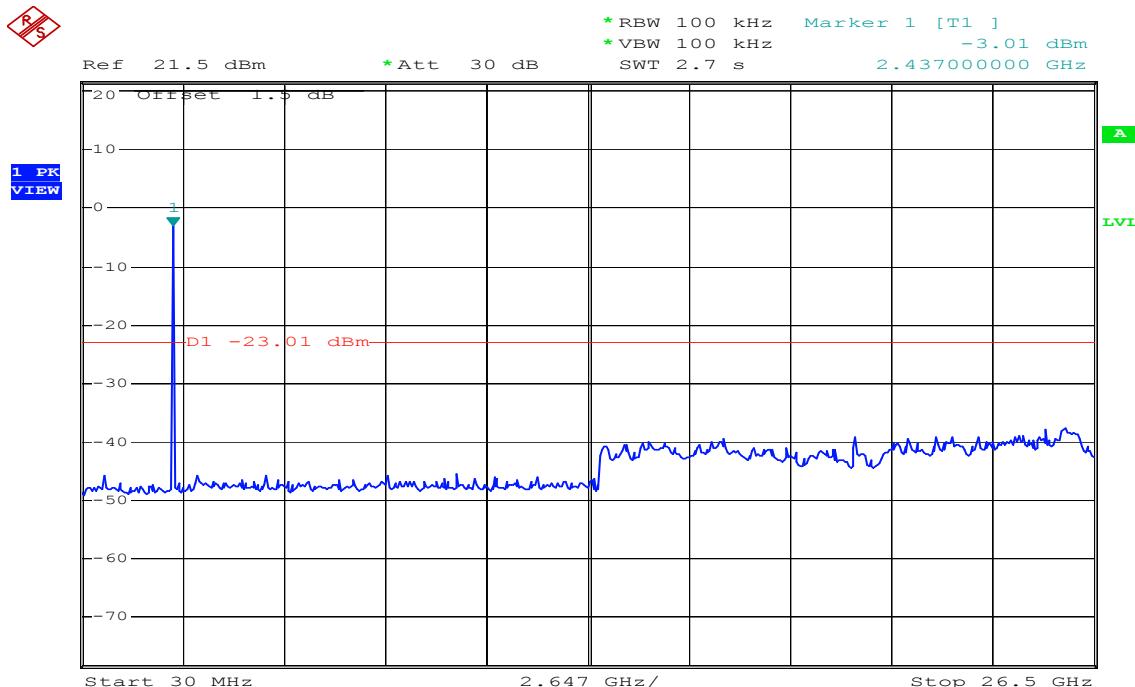
### IEEE 802.11b mode

#### CH Low



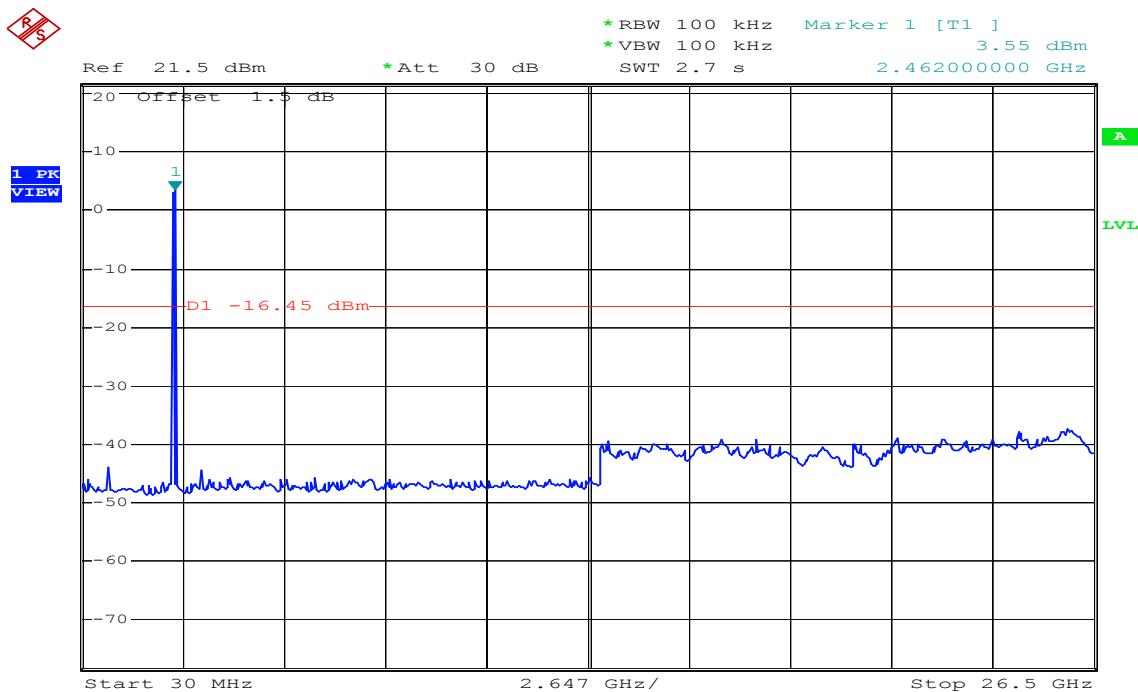
Date: 16.OCT.2008 09:05:36

#### CH Mid



Date: 16.OCT.2008 09:18:07

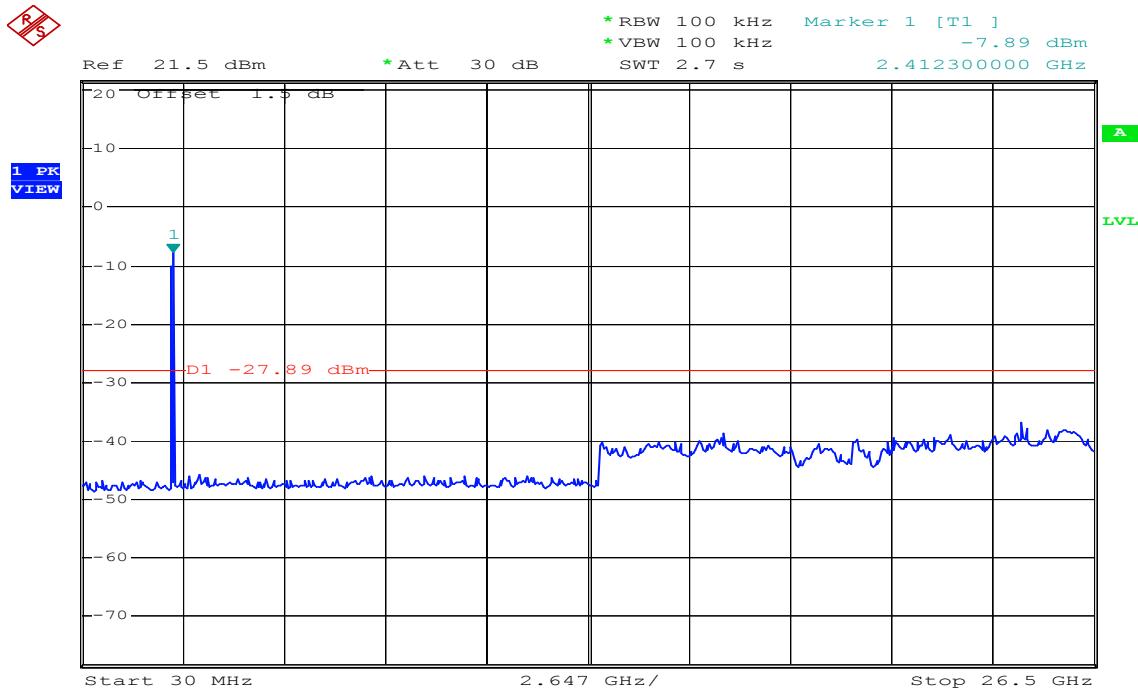
## CH High



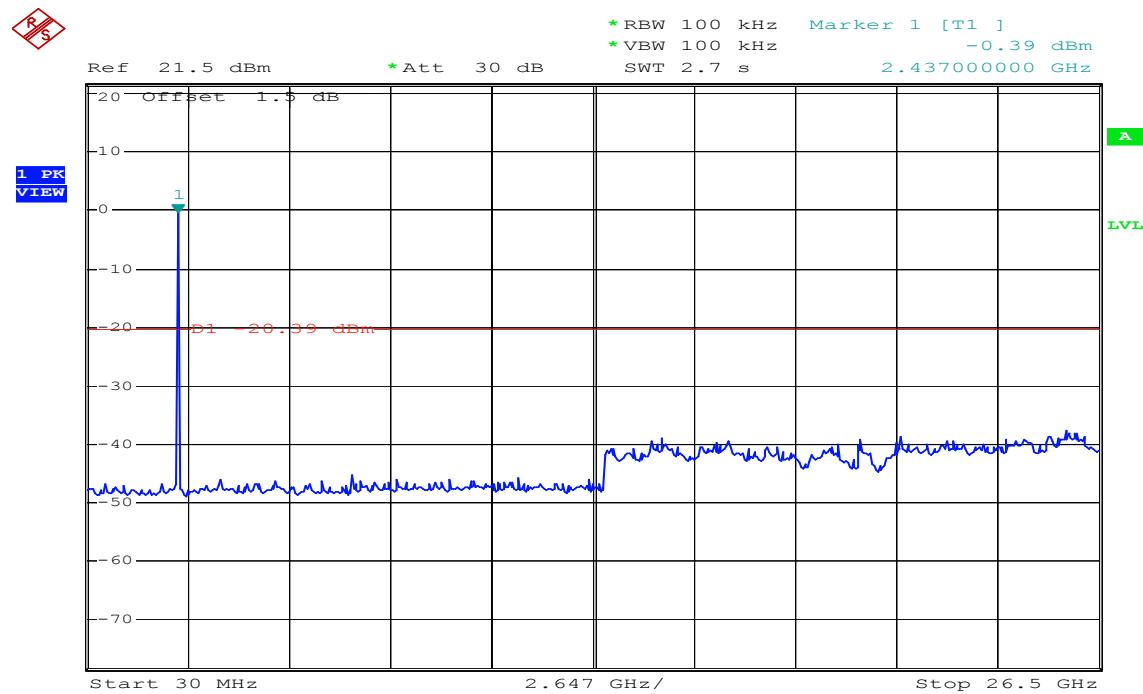
Date: 16.OCT.2008 09:16:08

## IEEE 802.11g mode

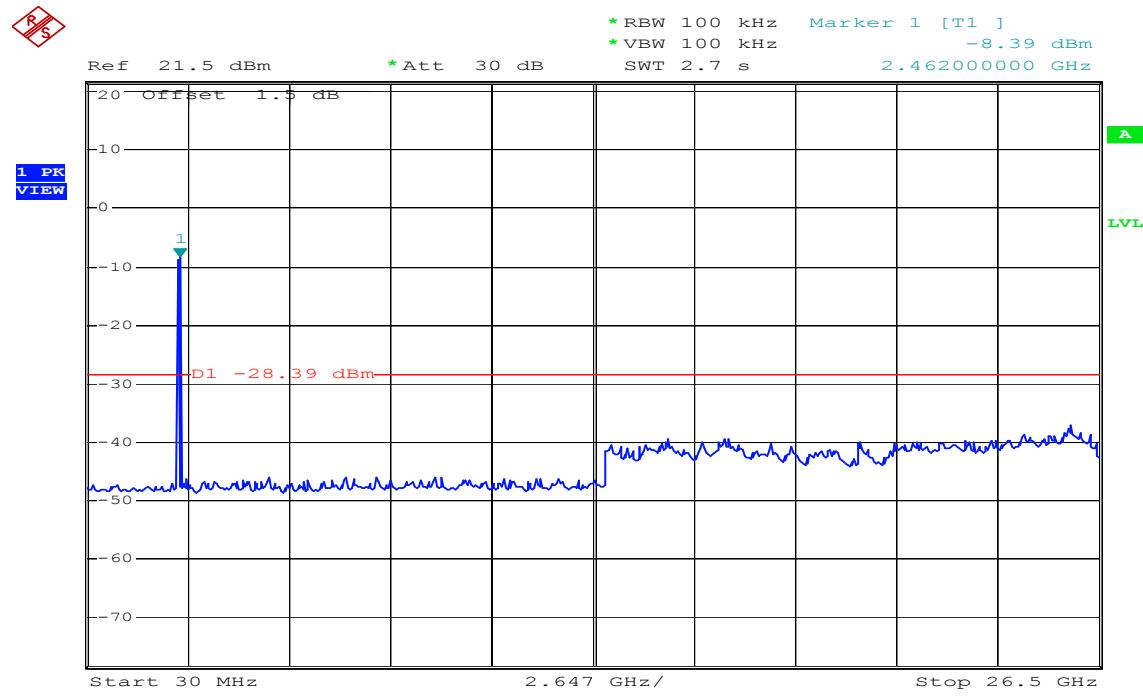
### CH Low



Date: 16.OCT.2008 09:20:20

**CH Mid**

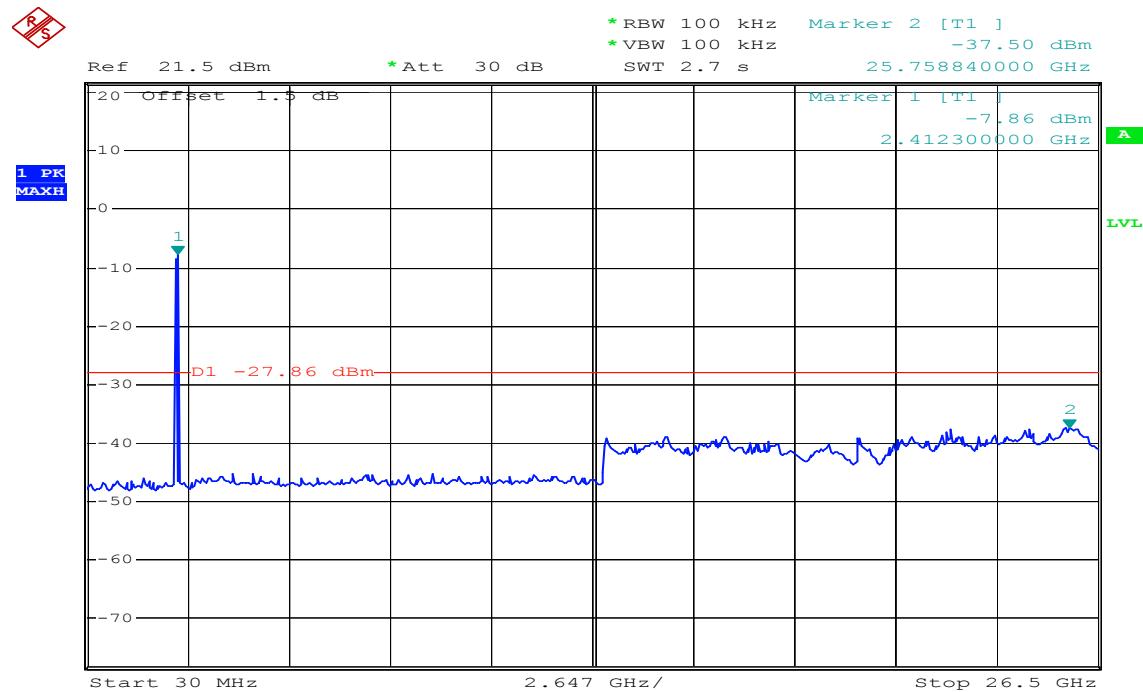
Date: 16.OCT.2008 09:22:47

**CH High**

Date: 16.OCT.2008 09:24:38

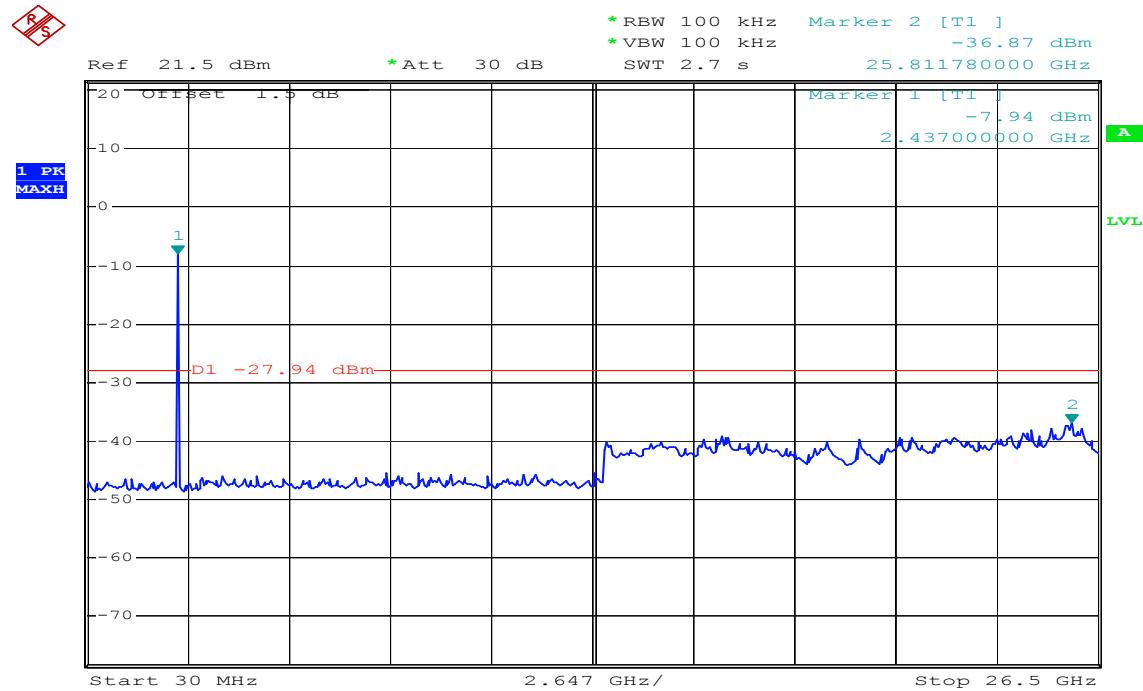
## draft 802.11n 20 MHz Channel mode

### CH Low

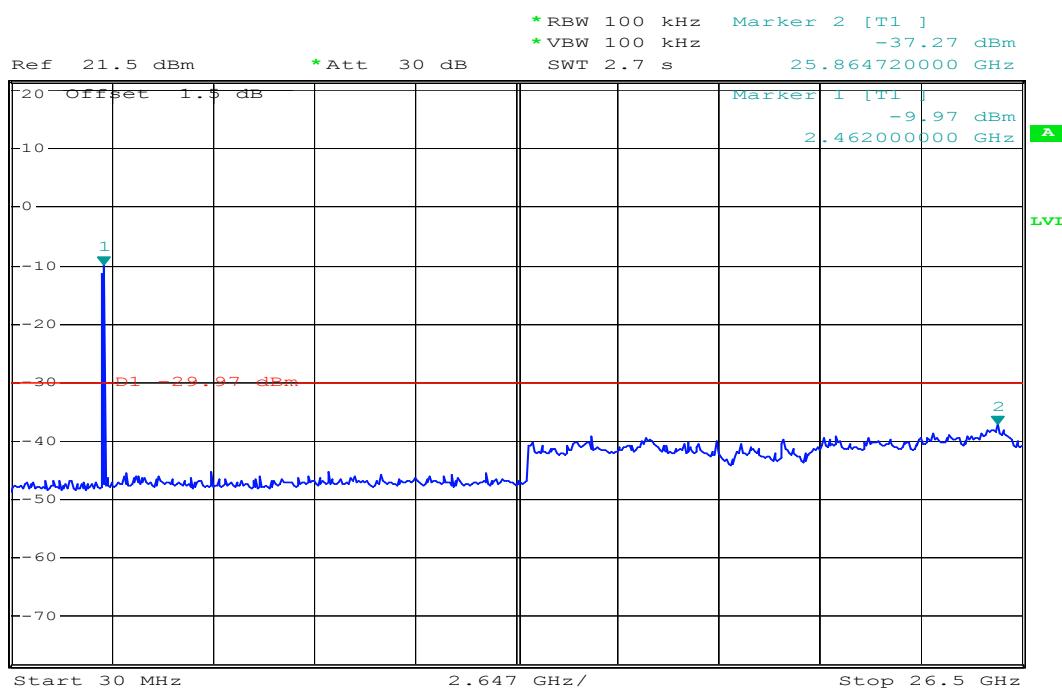


Date: 6.NOV.2008 07:54:00

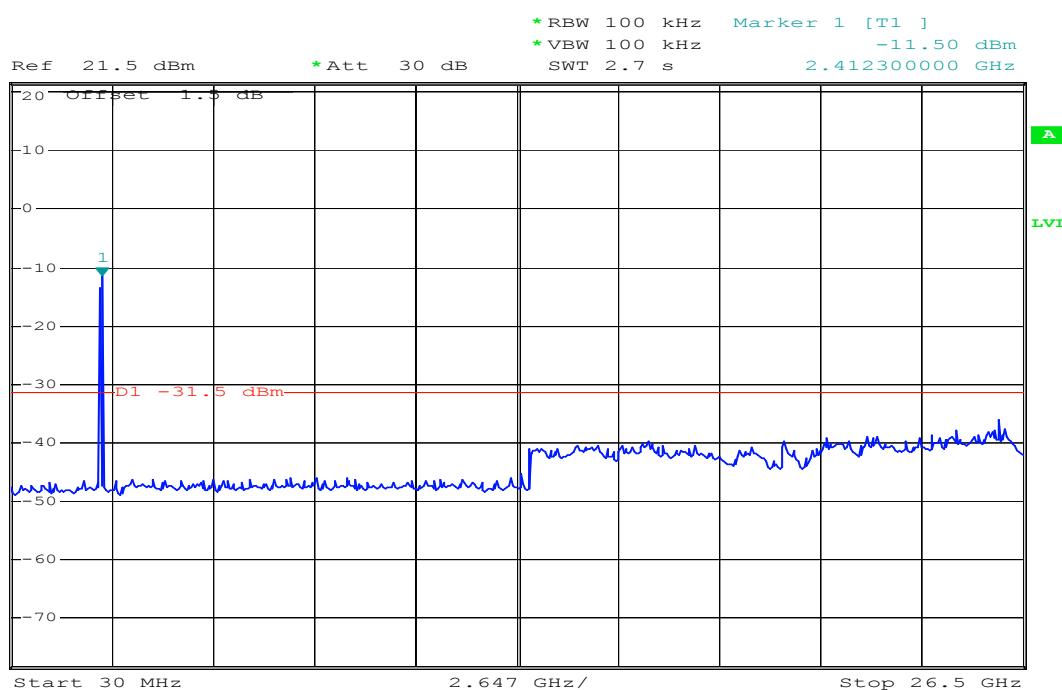
### CH Mid



Date: 6.NOV.2008 07:55:40

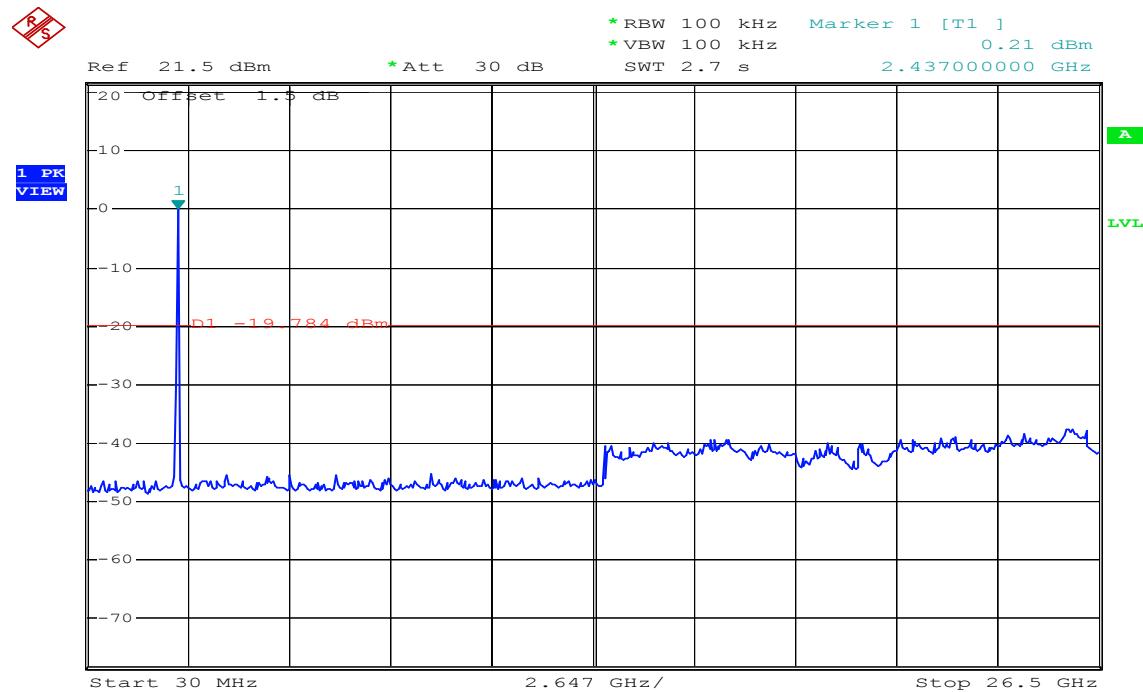
**CH High**


Date: 6.NOV.2008 07:57:28

**draft 802.11n 40 MHz Channel mode**
**CH Low**


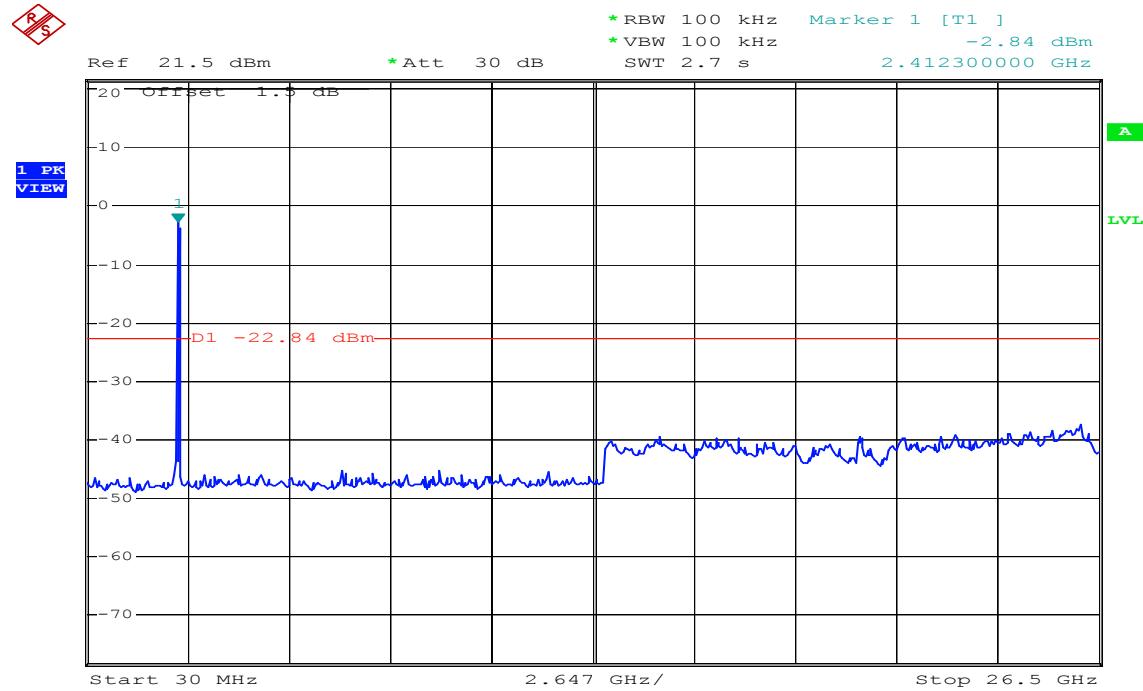
Date: 16.OCT.2008 09:36:22

## CH Mid



Date: 16.OCT.2008 09:32:57

## CH High



Date: 16.OCT.2008 09:34:27



## 7.7 RADIATED EMISSIONS

### LIMIT

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

Frequency (MHz)	Field Strength ( $\mu$ V/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

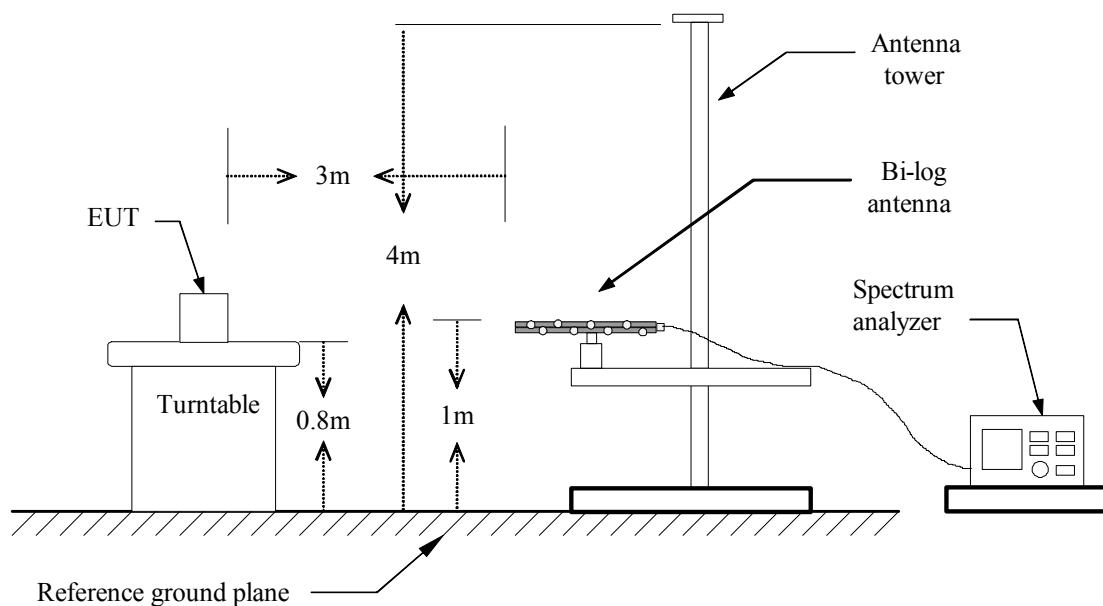
*Remark:* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections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

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

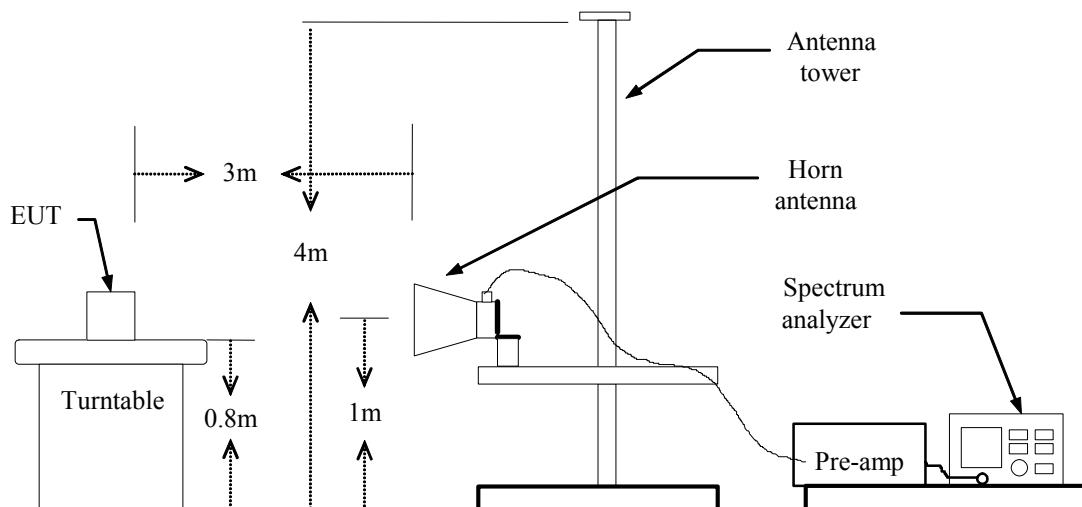
Frequency (MHz)	Field Strength ( $\mu$ V/m at 3-meter)	Field Strength (dB $\mu$ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

## **TEST CONFIGURATION**

### **Below 1 GHz**



### **Above 1 GHz**





## **TEST PROCEDURE**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

7. Repeat above procedures until the measurements for all frequencies are complete.



## TEST RESULTS

### Below 1GHz

**Operation Mode:** Normal Link

**Test Date:** September 25, 2008

**Temperature:** 30°C

**Tested by:** Nan Tsai

**Humidity:** 52% 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
123.10	V	16.87	11.50	28.37	43.50	-15.13	Peak
258.90	V	12.91	14.38	27.29	46.00	-18.71	Peak
458.70	V	12.77	18.81	31.58	46.00	-14.42	Peak
584.80	V	9.74	21.67	31.41	46.00	-14.59	Peak
714.80	V	9.85	22.91	32.76	46.00	-13.24	Peak
844.80	V	8.41	24.82	33.23	46.00	-12.77	Peak
193.00	H	16.34	12.02	28.36	43.50	-15.14	Peak
336.50	H	12.20	16.44	28.64	46.00	-17.36	Peak
454.90	H	13.33	18.71	32.04	46.00	-13.96	Peak
633.30	H	12.83	22.24	35.07	46.00	-10.93	Peak
714.80	H	10.60	22.91	33.51	46.00	-12.49	Peak
961.20	H	13.60	26.16	39.76	53.90	-14.14	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 15, 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
2460.00	V	52.92	---	-4.49	48.43	---	74.00	54.00	-5.57	Peak
7240.00	V	41.56	---	6.43	47.99	---	74.00	54.00	-6.01	Peak
N/A										
2150.00	H	47.85	---	-5.19	42.66	---	74.00	54.00	-11.34	Peak
5030.00	H	41.73	---	2.46	44.18	---	74.00	54.00	-9.82	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 15, 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
1963.33	V	47.35	---	-5.74	41.61	---	74.00	54.00	-12.39	Peak
2460.00	V	50.33	---	-4.49	45.84	---	74.00	54.00	-8.16	Peak
4870.00	V	42.51	---	2.02	44.53	---	74.00	54.00	-9.47	Peak
N/A										
2153.33	H	52.31	---	-5.18	47.13	---	74.00	54.00	-6.87	Peak
3840.00	H	43.20	---	0.63	43.83	---	74.00	54.00	-10.17	Peak
5780.00	H	41.58	---	3.86	45.44	---	74.00	54.00	-8.56	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 15, 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
2926.67	V	49.19	---	-2.44	46.75	---	74.00	54.00	-7.25	Peak
4920.00	V	42.24	---	2.16	44.41	---	74.00	54.00	-9.59	Peak
N/A										
2153.33	H	49.64	---	-5.18	44.45	---	74.00	54.00	-9.55	Peak
4330.00	H	42.67	---	1.03	43.70	---	74.00	54.00	-10.30	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 15, 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
1126.67	V	48.85	---	-10.11	38.73	---	74.00	54.00	-15.27	Peak
2093.33	V	48.20	---	-5.32	42.88	---	74.00	54.00	-11.12	Peak
N/A										
7770.00	H	42.73	---	7.08	49.80	---	74.00	54.00	-4.20	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 15, 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
1123.33	V	47.97	---	-10.13	37.84	---	74.00	54.00	-16.16	Peak
2466.67	V	50.24	---	-4.48	45.77	---	74.00	54.00	-8.23	Peak
4690.00	V	42.73	---	1.49	44.22	---	74.00	54.00	-9.78	Peak
N/A										
2153.33	H	53.35	---	-5.18	48.17	---	74.00	54.00	-5.83	Peak
5650.00	H	42.38	---	3.63	46.02	---	74.00	54.00	-7.98	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 15, 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
7730.00	V	41.86	---	7.08	48.94	---	74.00	54.00	-5.06	Peak
N/A										
2153.33	H	50.09	---	-5.18	44.91	---	74.00	54.00	-9.09	Peak
6190.00	H	41.55	---	4.29	45.84	---	74.00	54.00	-8.16	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 / draft 802.11n 20 MHz Channel mode  
/ CH Low

**Test Date:** November 3, 2008

**Temperature:** 20°C

**Tested by:** Alonso Lu

**Humidity:** 57 % 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
2640.00	V	47.47	---	-3.76	43.71	---	74.00	54.00	-10.29	Peak
5150.00	V	41.57	---	2.69	44.26	---	74.00	54.00	-9.74	Peak
6770.00	V	41.60	---	5.13	46.73	---	74.00	54.00	-7.27	Peak
N/A										
2184.00	H	46.99	---	-5.11	41.88	---	74.00	54.00	-12.12	Peak
2692.00	H	47.97	---	-3.52	44.45	---	74.00	54.00	-9.55	Peak
7260.00	H	41.86	---	6.49	48.35	---	74.00	54.00	-5.65	Peak
N/A										

**Remark:**

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



**Operation Mode:** TX / draft 802.11n 20 MHz Channel mode  
/ CH Mid

**Test Date:** November 3, 2008

**Temperature:** 20°C

**Tested by:** Alonso Lu

**Humidity:** 57 % 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
2280.00	V	48.49	---	-4.90	43.59	---	74.00	54.00	-10.41	Peak
2900.00	V	46.79	---	-2.56	44.23	---	74.00	54.00	-9.77	Peak
5400.00	V	42.25	---	3.18	45.43	---	74.00	54.00	-8.57	Peak
7680.00	V	41.55	---	7.09	48.64	---	74.00	54.00	-5.36	Peak
N/A										
1856.00	H	47.11	---	-6.35	40.76	---	74.00	54.00	-13.24	Peak
2120.00	H	46.96	---	-5.26	41.70	---	74.00	54.00	-12.30	Peak
5100.00	H	41.61	---	2.59	44.21	---	74.00	54.00	-9.79	Peak
7170.00	H	40.70	---	6.25	46.95	---	74.00	54.00	-7.05	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 / draft 802.11n 20 MHz Channel mode  
/ CH High

**Test Date:** November 3, 2008

**Temperature:** 20°C

**Tested by:** Alonso Lu

**Humidity:** 57 % 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
2128.00	V	47.91	---	-5.24	42.66	---	74.00	54.00	-11.34	Peak
2784.00	V	47.58	---	-3.09	44.49	---	74.00	54.00	-9.51	Peak
5320.00	V	41.39	---	3.02	44.41	---	74.00	54.00	-9.59	Peak
N/A										
2036.00	H	48.05	---	-5.45	42.60	---	74.00	54.00	-11.40	Peak
2816.00	H	47.62	---	-2.95	44.68	---	74.00	54.00	-9.32	Peak
5340.00	H	41.74	---	3.06	44.80	---	74.00	54.00	-9.20	Peak
7350.00	H	41.78	---	6.73	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 / draft 802.11n 40 MHz Channel mode  
/ CH Low

**Test Date:** October 15, 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
2460.00	V	51.50	---	-4.49	47.01	---	74.00	54.00	-6.99	Peak
5530.00	V	41.59	---	3.42	45.01	---	74.00	54.00	-8.99	Peak
N/A										
2150.00	H	51.98	---	-5.19	46.79	---	74.00	54.00	-7.21	Peak
4650.00	H	42.01	---	1.37	43.38	---	74.00	54.00	-10.62	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 / draft 802.11n 40 MHz Channel mode  
/ CH Mid

**Test Date:** October 15, 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
4160.00	V	42.01	---	1.13	43.14	---	74.00	54.00	-10.86	Peak
N/A										
2153.33	H	52.14	---	-5.18	46.96	---	74.00	54.00	-7.04	Peak
4260.00	H	41.59	---	1.07	42.67	---	74.00	54.00	-11.33	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 / draft 802.11n 40 MHz Channel mode  
/ CH High

**Test Date:** October 15, 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
5090.00	V	41.27	---	2.57	43.85	---	74.00	54.00	-10.15	Peak
N/A										
2150.00	H	50.33	---	-5.19	45.14	---	74.00	54.00	-8.86	Peak
4960.00	H	42.10	---	2.28	44.38	---	74.00	54.00	-9.62	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

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

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

\* Decreases with the logarithm of the frequency.

### TEST CONFIGURATION

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

### TEST PROCEDURE

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



## TEST RESULTS

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

### Test Data

<b>Operation Mode:</b>	Normal Link	<b>Test Date:</b>	October 3, 2008
<b>Temperature:</b>	25°C	<b>Tested by:</b>	Alonso Lu
<b>Humidity:</b>	57% RH		

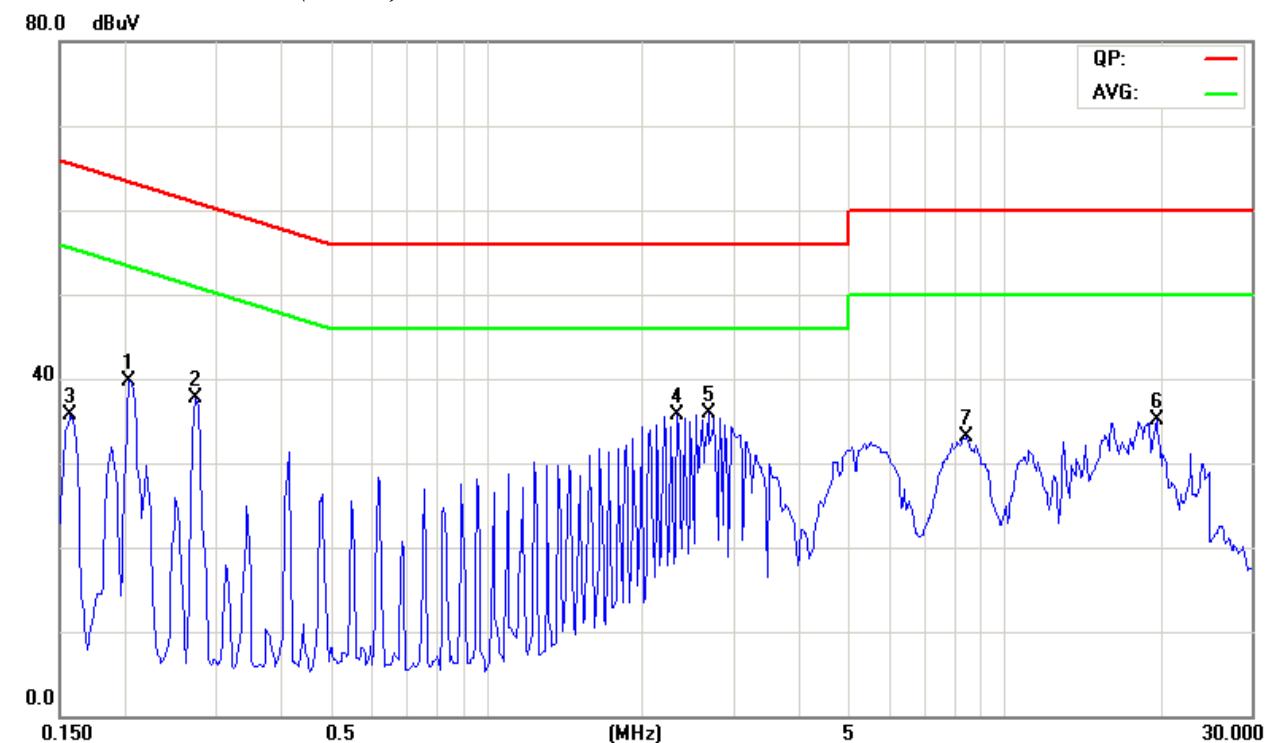
Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB/m)	QP Result (dBuV/m)	AV Result (dBuV/m)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.2046	29.90	23.90	9.70	39.60	33.60	63.42	53.42	-23.82	-19.82	L1
0.2750	29.70	25.80	9.70	39.40	35.50	60.96	50.97	-21.56	-15.47	L1
0.1577	26.29	26.09	9.71	36.00	35.80	65.58	55.58	-29.58	-19.78	L1
2.3414	25.18	24.78	9.72	34.90	34.50	56.00	46.00	-21.10	-11.50	L1
2.6890	24.27	22.67	9.73	34.00	32.40	56.00	46.00	-22.00	-13.60	L1
19.6383	20.40	11.70	10.40	30.80	22.10	60.00	50.00	-29.20	-27.90	L1
8.4741	21.77	17.87	10.03	31.80	27.90	60.00	50.00	-28.20	-22.10	L1
0.1577	23.09	22.79	9.71	32.80	32.50	65.58	55.58	-32.78	-23.08	L2
0.2750	22.90	20.00	9.70	32.60	29.70	60.96	50.97	-28.36	-21.27	L2
2.3374	24.38	23.78	9.72	34.10	33.50	56.00	46.00	-21.90	-12.50	L2
2.5445	24.27	23.27	9.73	34.00	33.00	56.00	46.00	-22.00	-13.00	L2
5.7085	20.15	16.55	9.85	30.00	26.40	60.00	50.00	-30.00	-23.60	L2
19.8022	21.19	13.49	10.41	31.60	23.90	60.00	50.00	-28.40	-26.10	L2
13.0015	25.64	19.84	10.26	35.90	30.10	60.00	50.00	-24.10	-19.90	L2

#### **Remark:**

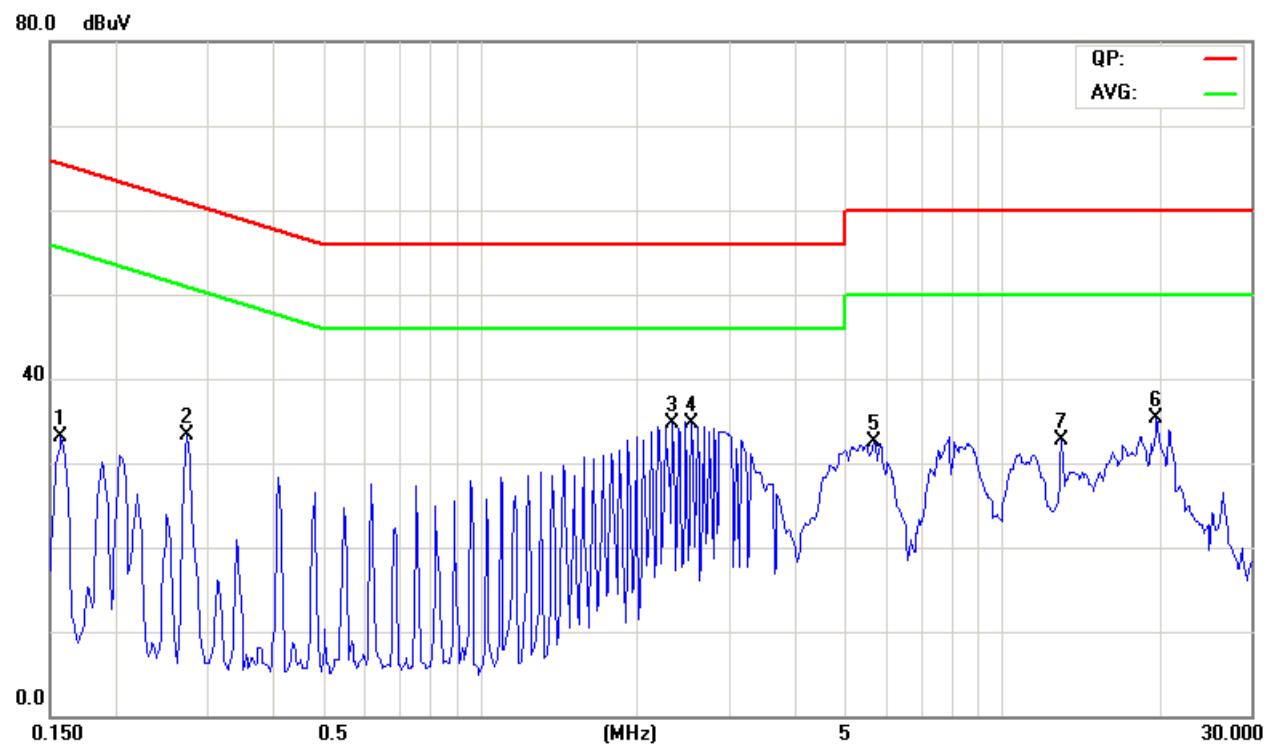
1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10 kHz; the IF bandwidth of Test Receiver between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

## Test Plots

### Conducted emissions (Line 1)



### Conducted emissions (Line 2)





## APPENDIX I

## RADIO FREQUENCY EXPOSURE

### LIMIT

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

### EUT Specification

<b>EUT</b>	Wireless USB Dongle
<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 checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
<b>Exposure classification</b>	<input type="checkbox"/> Occupational/Controlled exposure ( $S = 5\text{mW/cm}^2$ ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure ( $S=1\text{mW/cm}^2$ )
<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: 13.80 dBm (23.99 mW) IEEE 802.11g mode: 13.82dBm (24.10 mW) draft 802.11n 20 MHz Channel mode: 13.15 dBm (20.65mW) draft 802.11n 40 MHz Channel mode: 13.82 dBm (24.10mW)
<b>Antenna gain (Max)</b>	2.65dBi (including cable loss) (Numeric gain: 1.84)
<b>Evaluation applied</b>	<input type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input checked="" type="checkbox"/> N/A

### **Remark:**

1. The maximum output power is 13.82dBm (24.10mW) at 2437MHz (with 1.84 numeric antenna gain.)
2. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.
3. For mobile or fixed location transmitters, no SAR consideration applied. The 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.

(SAR evaluation is not required for the PORTABLE device while its maximum output power is lower than the general population low threshold:  $60/f(\text{GHz})=60 / 2.437\text{GHz} = 24.62\text{mW}$ )