



**Compliance Certification Services Inc.**

Report No: 90930203-RP1

FCC ID: EUNEASEL

Date of Issue: October 14, 2009

**FCC 47 CFR PART 15 SUBPART C**

**TEST REPORT**

**For**

**Notebook**

**Model: easel**

**Trade Name: litl**

*Issued to*

**First International Computer Inc.  
No. 300, Yang Guang St., NeiHu, Taipei, Taiwan, 114**

*Issued by*

**Compliance Certification Services Inc.  
No. 81-1, Lane 210, Pa-De 2nd Rd., Luchu Hsiang,  
Taoyuan Shien, (338) Taiwan, R.O.C.**

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**Revision History**

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	October 14, 2009	Initial Issue	ALL	Jill Shiau



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# 1 TEST RESULT CERTIFICATION

**Applicant:** **First International Computer Inc.**  
No. 300, Yang Guang St., NeiHu, Taipei, Taiwan, 114

**Manufacturer:** **First International Computer (SuZhou). Inc.**  
Export Processing Zone, No.200 Central Suhong Road,  
SuZhou Industrial Park, China

**Equipment Under Test:** Notebook

**Trade Name:** litl

**Model:** ease1

**Date of Test:** October 6 ~ 9, 2009

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:**

David Wang  
Director

**Reviewed by:**

Ethan Huang  
Section Manager



## 2 EUT DESCRIPTION

<b>Product</b>	Notebook
<b>Trade Name</b>	litl
<b>Model Number</b>	easel
<b>EUT Power Rating</b>	20VDC, 2A
<b>Power Adapter</b>	litl / dilithium I/P: 100-240VAC, 50-60Hz, 1A O/P: 20VDC, 2A
<b>Operating Frequency Range</b>	2412 ~ 2462 MHz
<b>Transmit Power</b>	IEEE 802.11b: 19.58 dBm IEEE 802.11g: 19.54 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, 9, 6 Mbps
<b>Number of Channels</b>	11 Channels
<b>Channels Spacing</b>	5MHz
<b>Antenna Specification</b>	PIFA Antenna / Gain: 0.67dBi

**Remark:**

1. The sample selected for test was production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **EUNEASEL** 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 (2003) and FCC CFR 47 Part 2, 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 (2003) 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 (2003).



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:

Table with 4 columns: MHz, MHz, MHz, GHz. It lists various frequency ranges such as 0.090 - 0.110, 16.42 - 16.423, 399.9 - 410, and 4.5 - 5.15.

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

2 Above 38.6

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



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

Flat position and Vertical position of the EUT have been pre-scanned during the test, and the model vertical position was selected as the worst case for final test.

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

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

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

IEEE802.11b: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate were chosen for full testing.

IEEE802.11g: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate were chosen for full testing.





## 4 INSTRUMENT CALIBRATION

### 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	Agilent	E4446A	MY48250064	10/28/2009
Spectrum Analyzer	R&S	FSEB	825829/011	10/29/2009
USB Power Sensor	BOONTON	52012	2061194	06/08/2010

3M Chamber Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY48250064	10/28/2009
Spectrum Analyzer	R&S	FSEB	825829/011	10/29/2009
Pre-Amplifier	HP	8447D	2944A06530	12/31/2009
Pre-Amplifier	HP	8449B	3008A01738	04/17/2010
EMI Test Receiver	SCHAFFNER	SCR 3501	436	01/21/2010
Loop Antenna	EMCO	6502	2356	05/28/2010
Bilog Antenna	SCHWAZBECK	VULB9160	3084	09/11/2010
Horn Antenna	EMCO	3115	00022250	05/08/2010
Turn Table	CCS	CC-T-1F	N/A	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R
Test S/W	LabVIEW 6.1 (Wugu Chamber EMI Teat V1_4.5.3)			



Powerline Conducted Emissions Test Site #3				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
TEST RECEIVER	R&S	ESHS10	843743/015	03/29/2010
LISN (EUT)	FCC	FCC-LISN-50-3 2-2	08009	03/29/2010
LISN	EMCO	3825/2	1382	01/05/2010
BNC CABLE	Huber+Suhner	RG 223/U	BNC B2	01/12/2010
Pulse Limiter	R&S	ESH3-Z2	100374	08/23/2010
THERMO- HYGRO METER	TOP	HA-202	9303-3	02/04/2010
Test S/W	EMI 32.exe			

### 4.3. MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
Powerline Conducted Emission	± 1.7366
3M Semi Anechoic Chamber / 30MHz ~ 1GHz	±4.0235
3M Semi Anechoic Chamber / Above 1GHz	±3.87318

**Remark:** This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



## **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 (2003) and CISPR Publication 22.

### **5.2 EQUIPMENT**


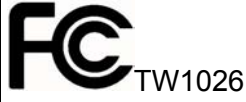


Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

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	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

#### Conducted Emission & Radiated Emission Above 1GHz Measurement:

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.

#### Radiated Emission 30MHz ~ 1GHz Measurement:

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	LCD Monitor	DELL	2407WFPb	CN-0FC255-46633-675-22TJS	FCC DoC	HDMI Cable: Shielded, 1.8m	Unshielded, 1.8m
2.	USB Mouse	HP	M-UV69a	N/A	FCC DoC	Unshielded, 1.8m	N/A
3.	Multimedia Headset	Logitech	ClearChat	N/A	FCC DoC	Unshielded, 1.8m	N/A

#### PowerLine Conducted Emission Measurement:

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	LCD Monitor	DELL	2408WFP	N/A	FCC DoC	HDMI Cable: Shielded, 1.8m	Unshielded, 1.8m
2.	USB HDD	TeraSys	F12-U	N/A	FCC DoC	Shielded, 1.8m	N/A
3.	Multimedia Headset	e-Sense	MSB301	N/A	N/A	Unshielded, 2.0m	N/A

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



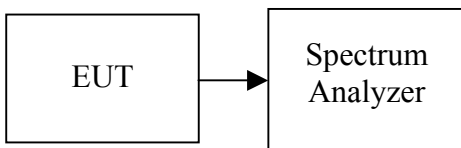
## 7 FCC PART 15.247 REQUIREMENTS

### 7.1. 6dB BANDWIDTH

#### LIMIT

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB 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 = 100kHz, VBW = 300MHz, 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

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	12150	>500	PASS
Mid	2437	12150		PASS
High	2462	12250		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	16550	>500	PASS
Mid	2437	16550		PASS
High	2462	16550		PASS



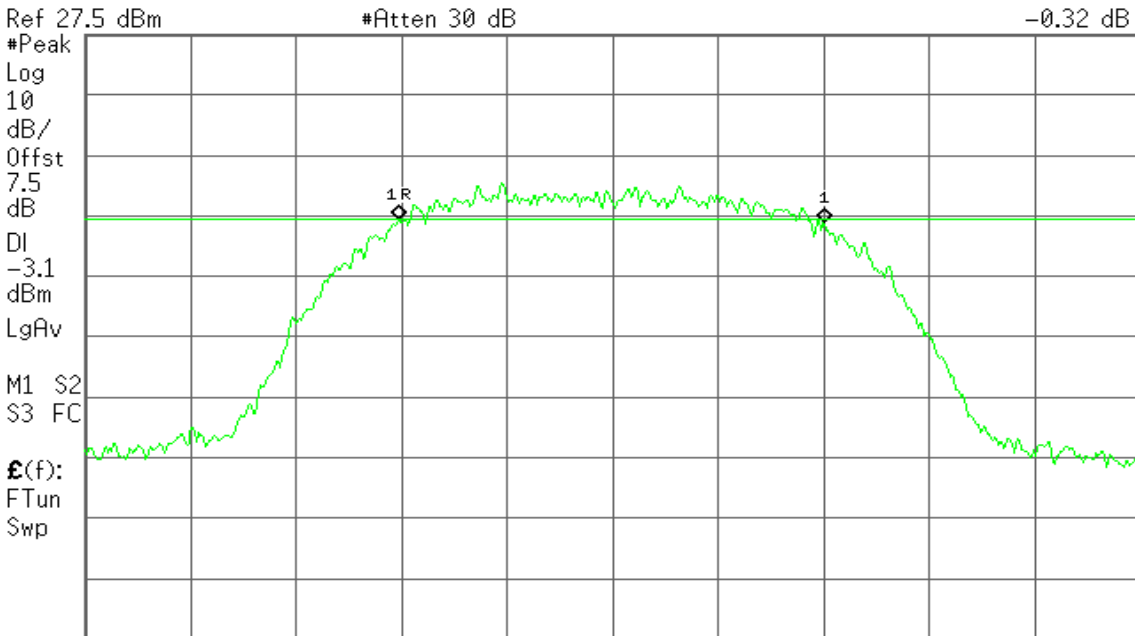
**Test Plot**

**6dB Bandwidth (IEEE 802.11b / CH Low)**

Agilent 16:11:01 Oct 6, 2009

R T

Mkr1 12.15 MHz  
-0.32 dB



Center 2.412 00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Span 30 MHz

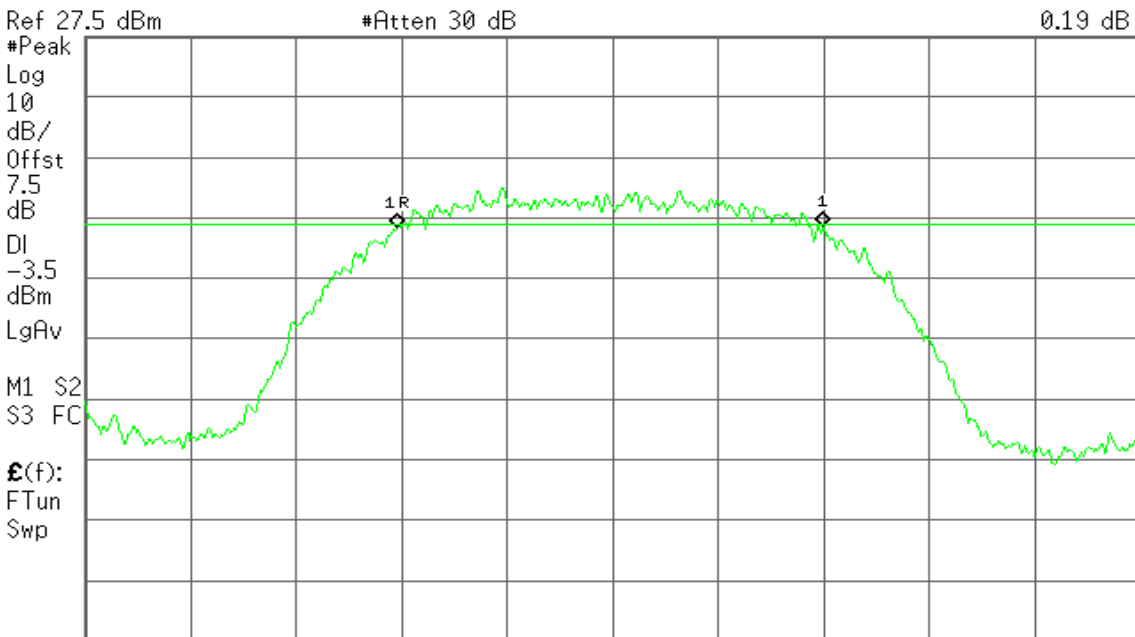
Sweep 2.88 ms (601 pts)

**6dB Bandwidth (IEEE 802.11b / CH Mid)**

Agilent 16:13:04 Oct 6, 2009

R T

Mkr1 12.15 MHz  
0.19 dB



Center 2.437 00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Span 30 MHz

Sweep 2.88 ms (601 pts)

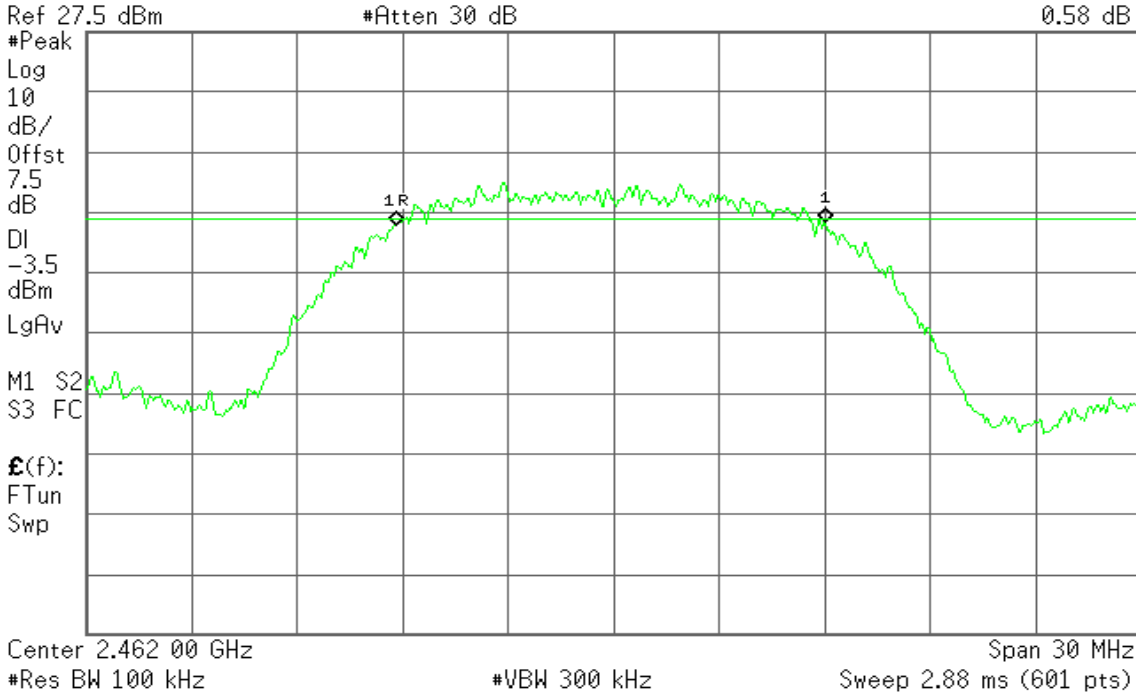


## 6dB Bandwidth (IEEE 802.11b / CH High)

Agilent 16:15:33 Oct 6, 2009

R T

Mkr1 12.25 MHz  
0.58 dB

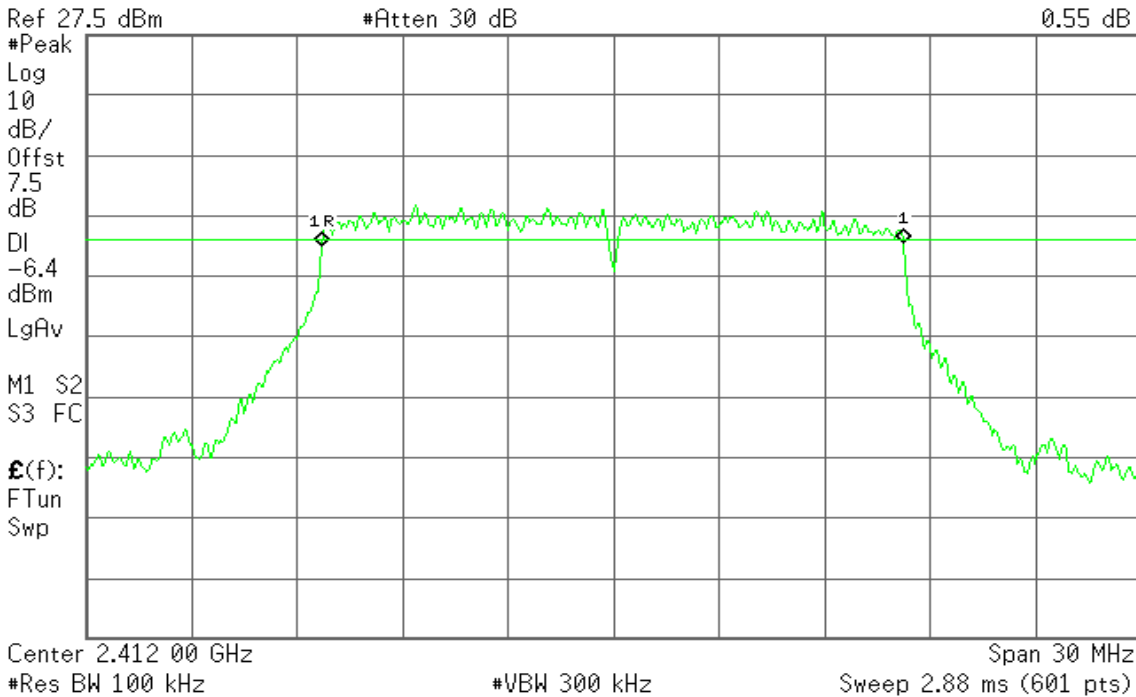


## 6dB Bandwidth (IEEE 802.11g / CH Low)

Agilent 16:08:10 Oct 6, 2009

R T

Mkr1 16.55 MHz  
0.55 dB





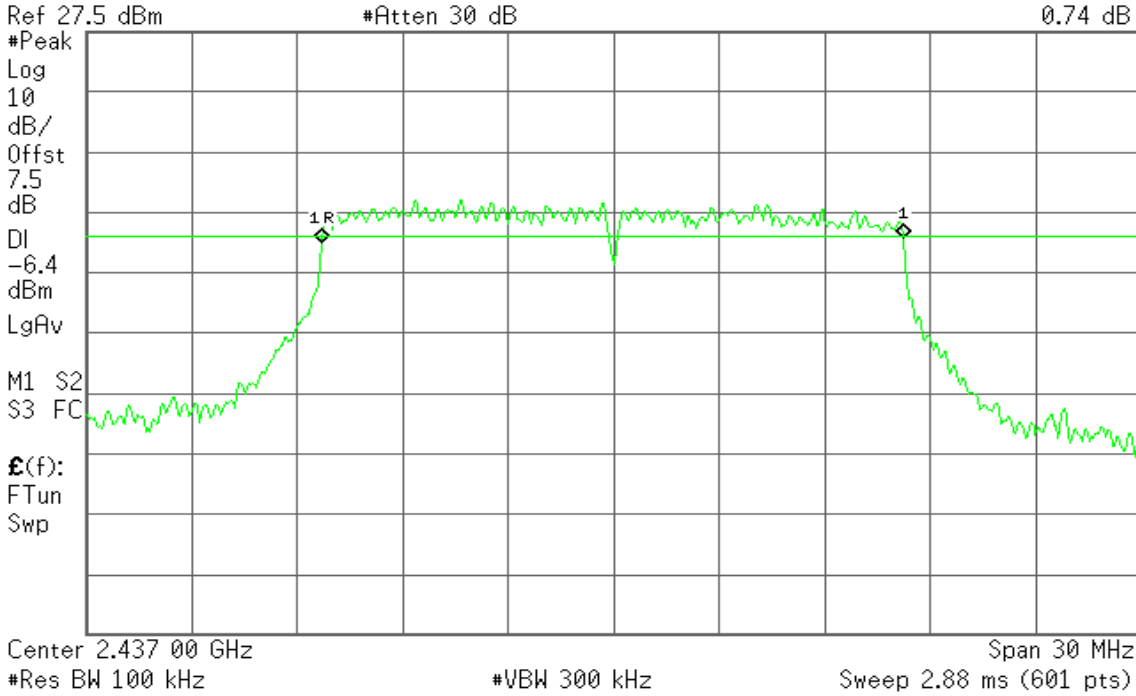


## 6dB Bandwidth (IEEE 802.11g / CH Mid)

Agilent 16:04:29 Oct 6, 2009

R T

Mkr1 16.55 MHz  
0.74 dB

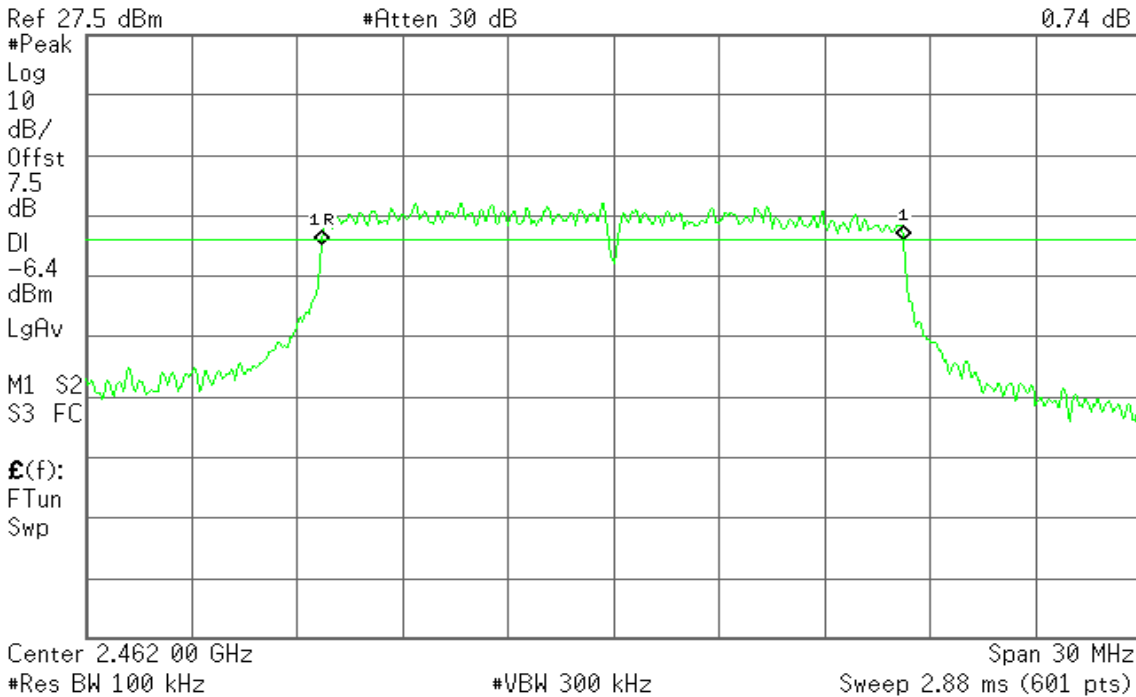


## 6dB Bandwidth (IEEE 802.11g / CH High)

Agilent 16:01:57 Oct 6, 2009

R T

Mkr1 16.55 MHz  
0.74 dB





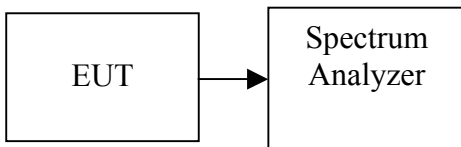
## 7.2. PEAK POWER

### LIMIT

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

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

### TEST CONFIGURATION



### TEST PROCEDURE

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

### TEST RESULTS

*No non-compliance noted*

### TEST DATA

#### IEEE 802.11b

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	19.58	0.0908	1	PASS
Mid	2437	19.16	0.0824		PASS
High	2462	19.22	0.0836		PASS

#### IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	19.21	0.0834	1	PASS
Mid	2437	19.44	0.0879		PASS
High	2462	19.54	0.0899		PASS

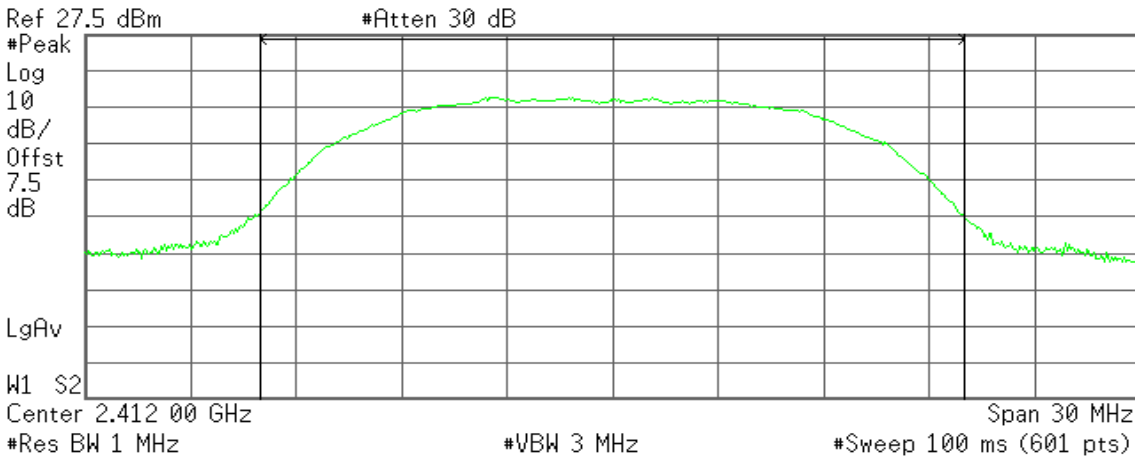


Test Plot

Peak Power (IEEE 802.11b / CH Low)

Agilent 15:45:44 Oct 6, 2009

R T



Channel Power

19.58 dBm /20.0000 MHz

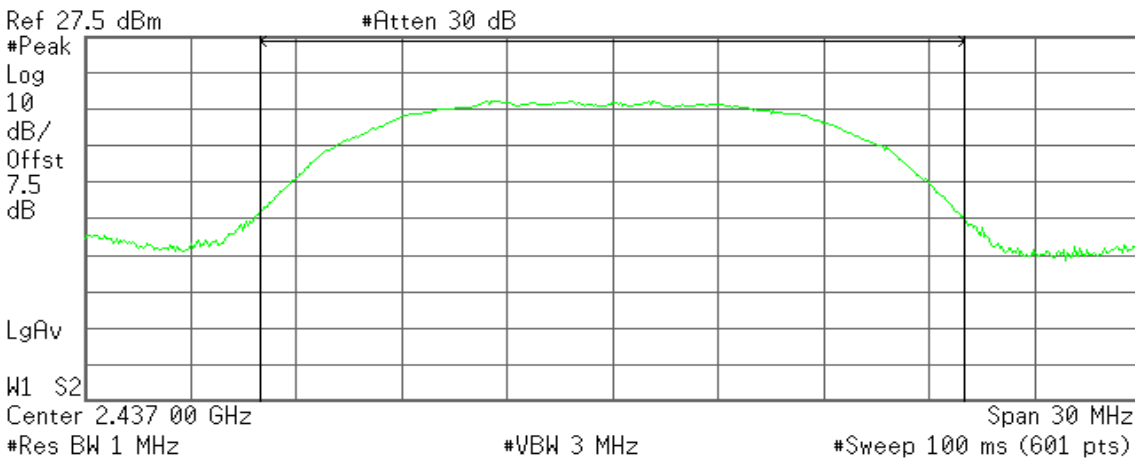
Power Spectral Density

-53.43 dBm/Hz

Peak Power (IEEE 802.11b / CH Mid)

Agilent 15:52:53 Oct 6, 2009

R T



Channel Power

19.16 dBm /20.0000 MHz

Power Spectral Density

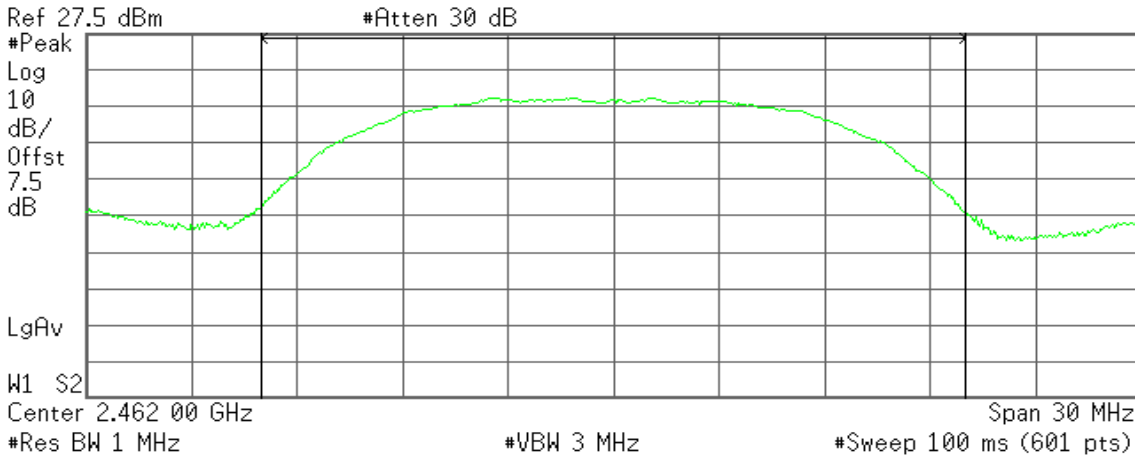
-53.85 dBm/Hz



Peak Power (IEEE 802.11b / CH High)

Agilent 15:54:54 Oct 6, 2009

R T



Channel Power

19.22 dBm /20.0000 MHz

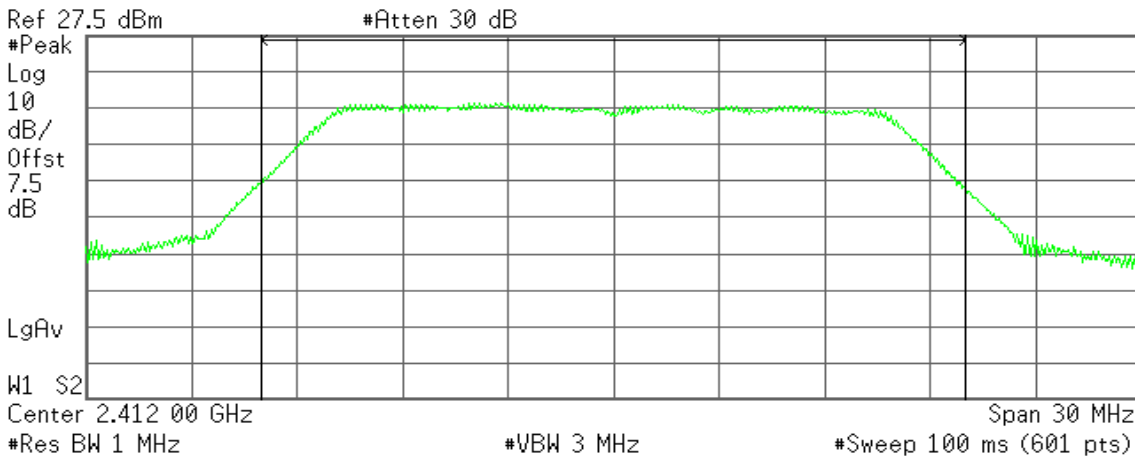
Power Spectral Density

-53.79 dBm/Hz

Peak Power (IEEE 802.11g / CH Low)

Agilent 15:48:32 Oct 6, 2009

R T



Channel Power

19.21 dBm /20.0000 MHz

Power Spectral Density

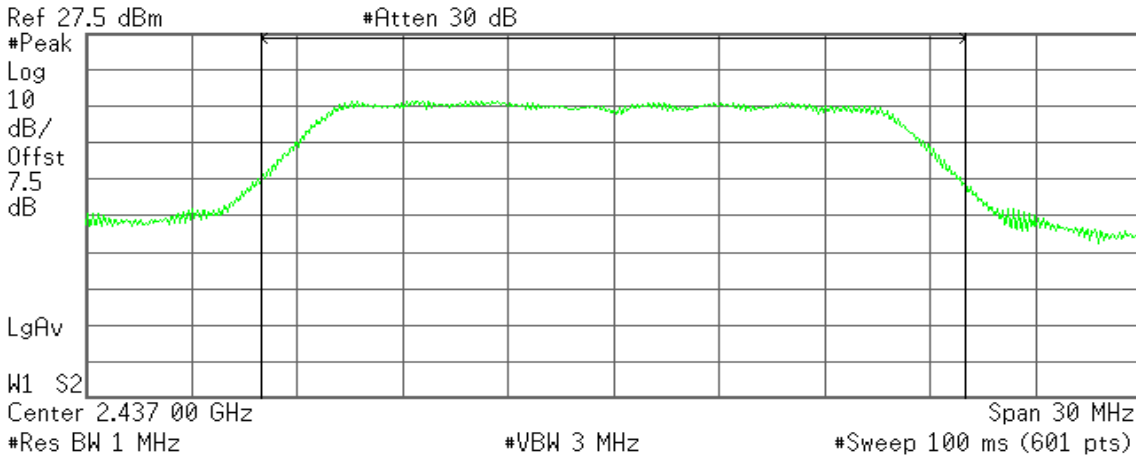
-53.80 dBm/Hz



Peak Power (IEEE 802.11g / CH Mid)

Agilent 15:49:49 Oct 6, 2009

R T



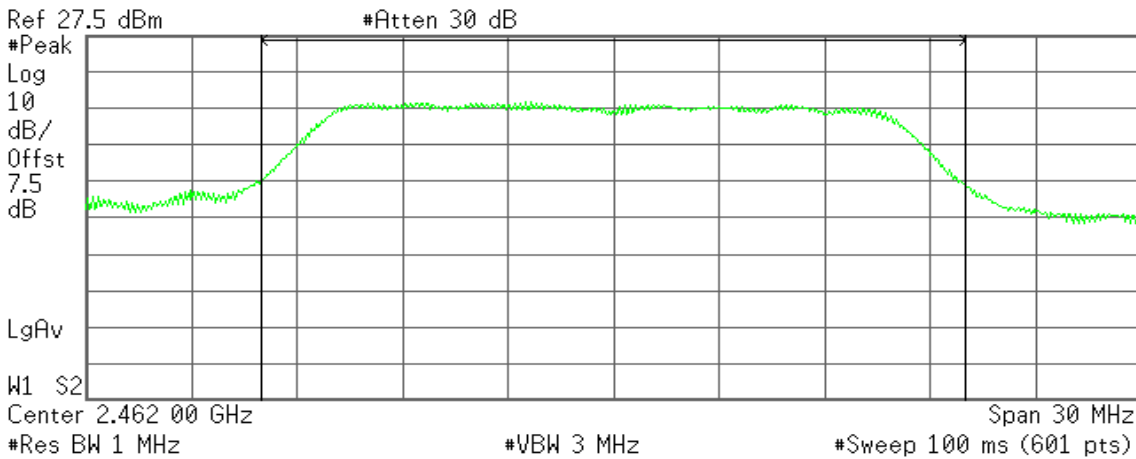
Channel Power 19.44 dBm /20.0000 MHz

Power Spectral Density -53.57 dBm/Hz

Peak Power (IEEE 802.11g / CH High)

Agilent 15:58:25 Oct 6, 2009

R T



Channel Power 19.54 dBm /20.0000 MHz

Power Spectral Density -53.47 dBm/Hz

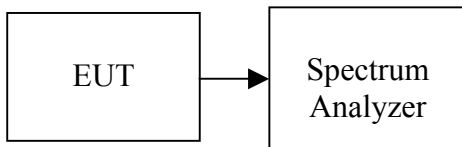


### 7.3. AVERAGE POWER

#### 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	13.54	0.0226
Mid	2437	13.41	0.0219
High	2462	13.40	0.0219

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

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	11.54	0.0143
Mid	2437	11.84	0.0153
High	2462	11.83	0.0152



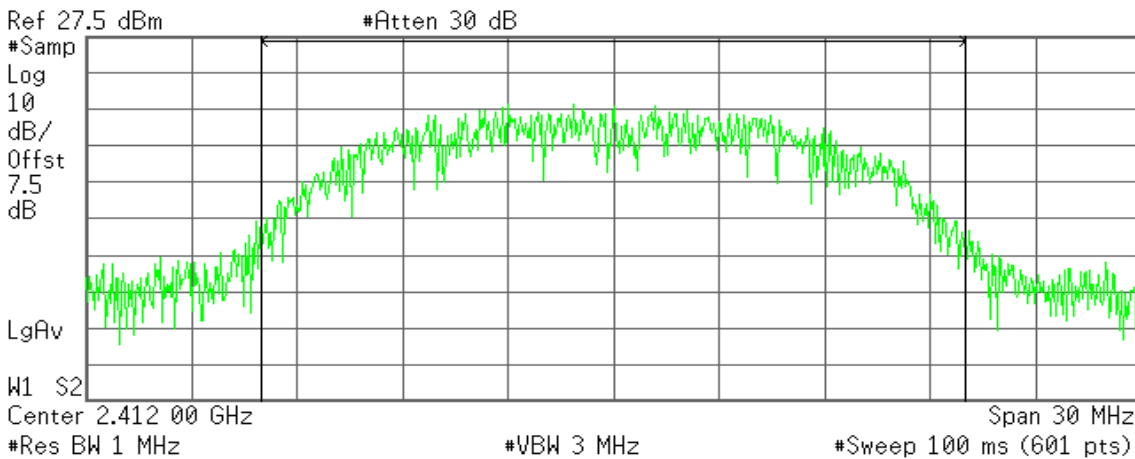
**Test Plot**

**IEEE 802.11b**

**Average Power (CH Low)**

Agilent 15:46:31 Oct 6, 2009

R T



**Channel Power**

13.54 dBm /20.0000 MHz

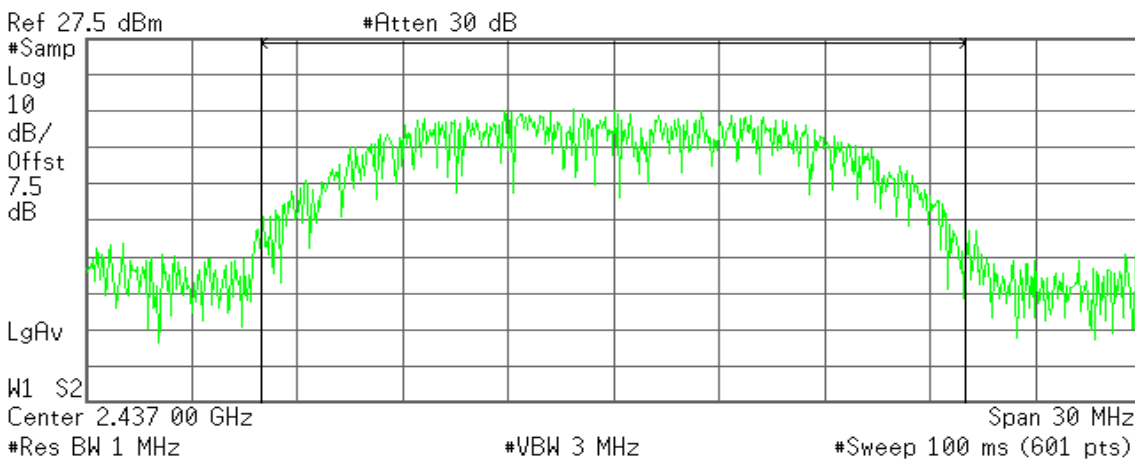
**Power Spectral Density**

-59.47 dBm/Hz

**Average Power (CH Mid)**

Agilent 15:52:26 Oct 6, 2009

R T



**Channel Power**

13.41 dBm /20.0000 MHz

**Power Spectral Density**

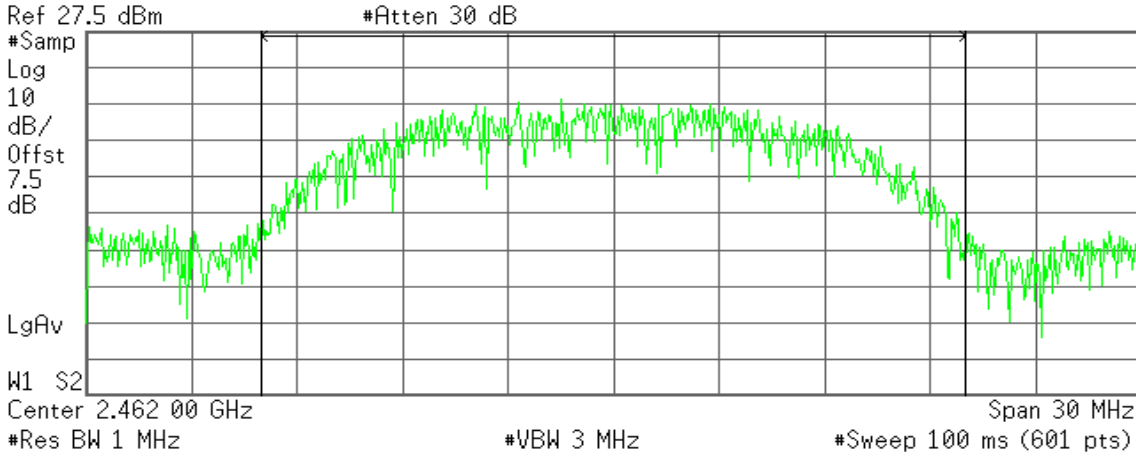
-59.60 dBm/Hz



Average Power (CH High)

Agilent 15:55:44 Oct 6, 2009

R T



Channel Power

13.40 dBm /20.0000 MHz

Power Spectral Density

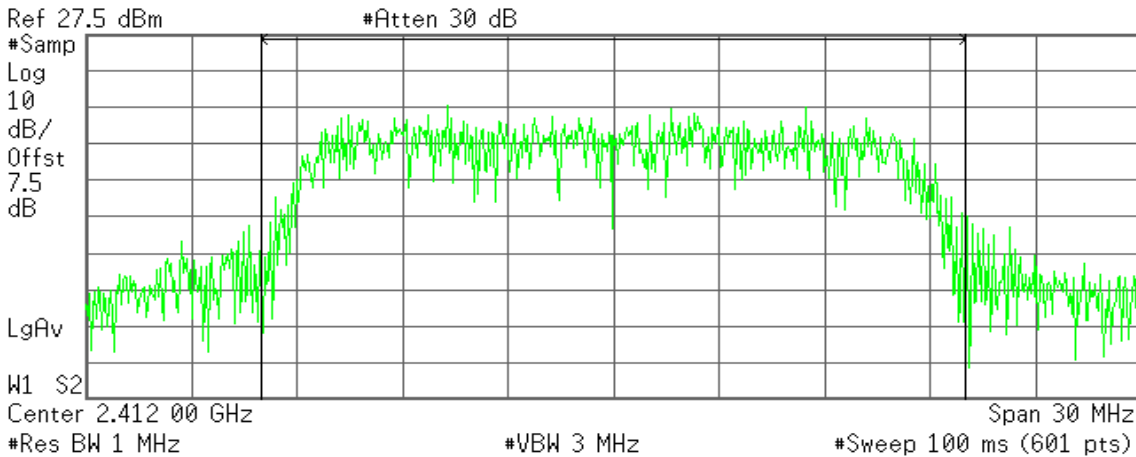
-59.61 dBm/Hz

IEEE 802.11g

Average Power (CH Low)

Agilent 15:47:46 Oct 6, 2009

R T



Channel Power

11.54 dBm /20.0000 MHz

Power Spectral Density

-61.47 dBm/Hz

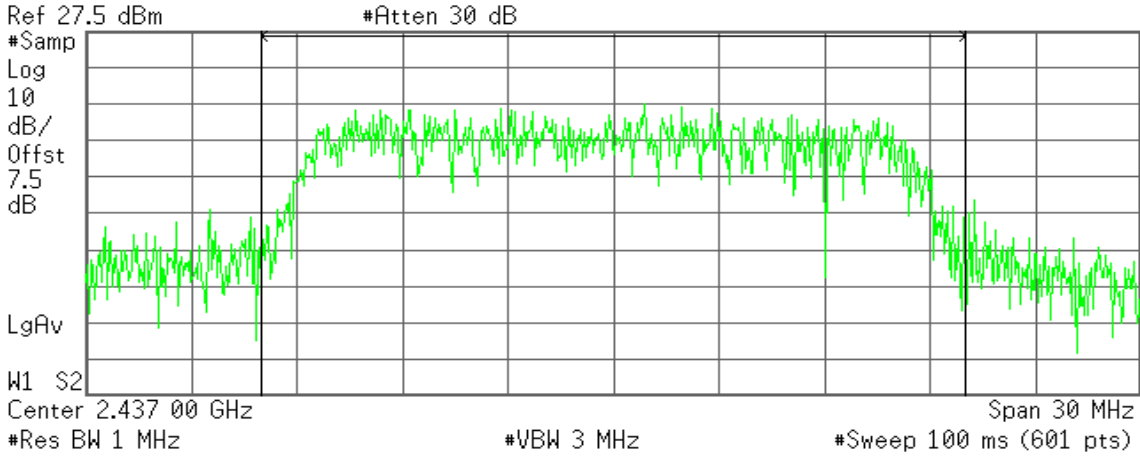




### Average Power (CH Mid)

Agilent 15:50:30 Oct 6, 2009

R T



Channel Power

11.84 dBm /20.0000 MHz

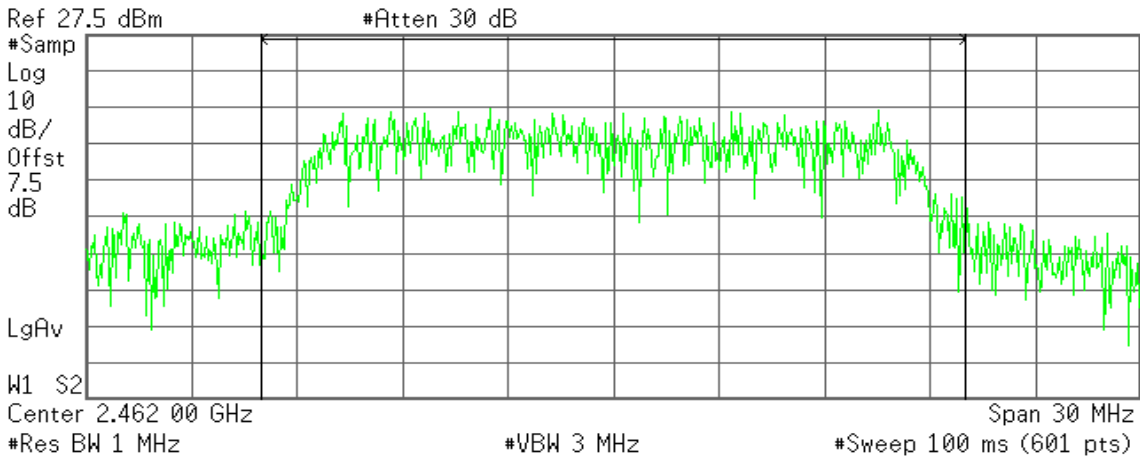
Power Spectral Density

-61.17 dBm/Hz

### Average Power (CH High)

Agilent 15:58:58 Oct 6, 2009

R T



Channel Power

11.83 dBm /20.0000 MHz

Power Spectral Density

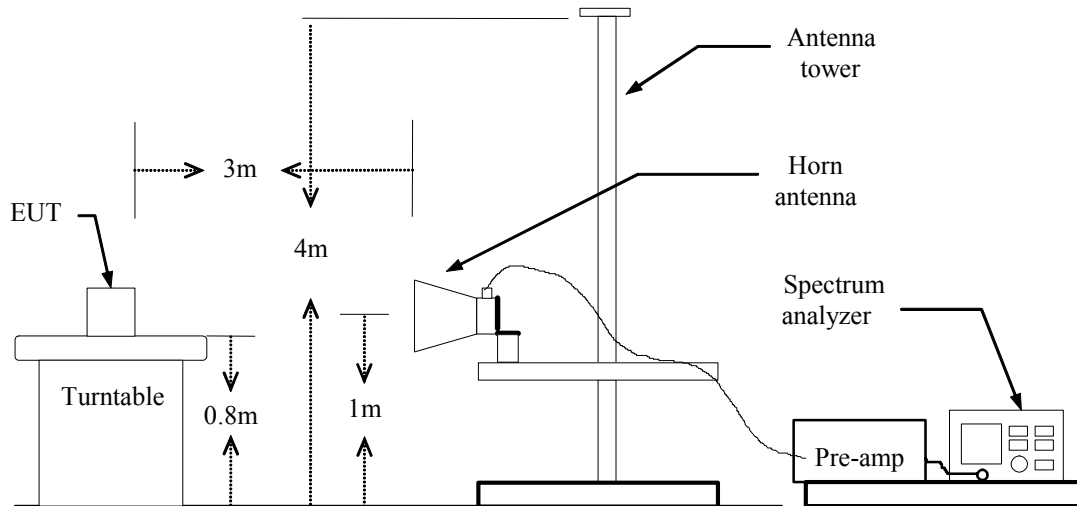
-61.18 dBm/Hz

## 7.4. BAND EDGES MEASUREMENT

### LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

### TEST CONFIGURATION



### TEST PROCEDURE

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

### TEST RESULTS

Refer to attach spectrum analyzer data chart.



**Test Plot**

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

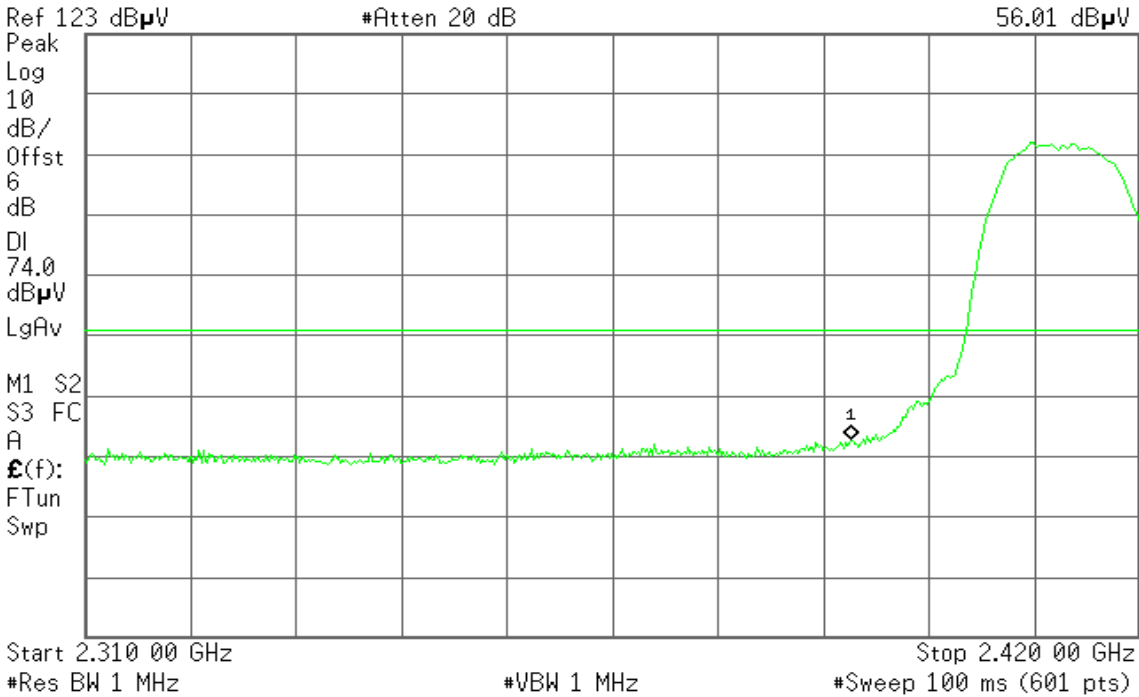
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 10:06:40 Oct 6, 2009

R T

Mkr1 2.390 00 GHz  
56.01 dB $\mu$ V



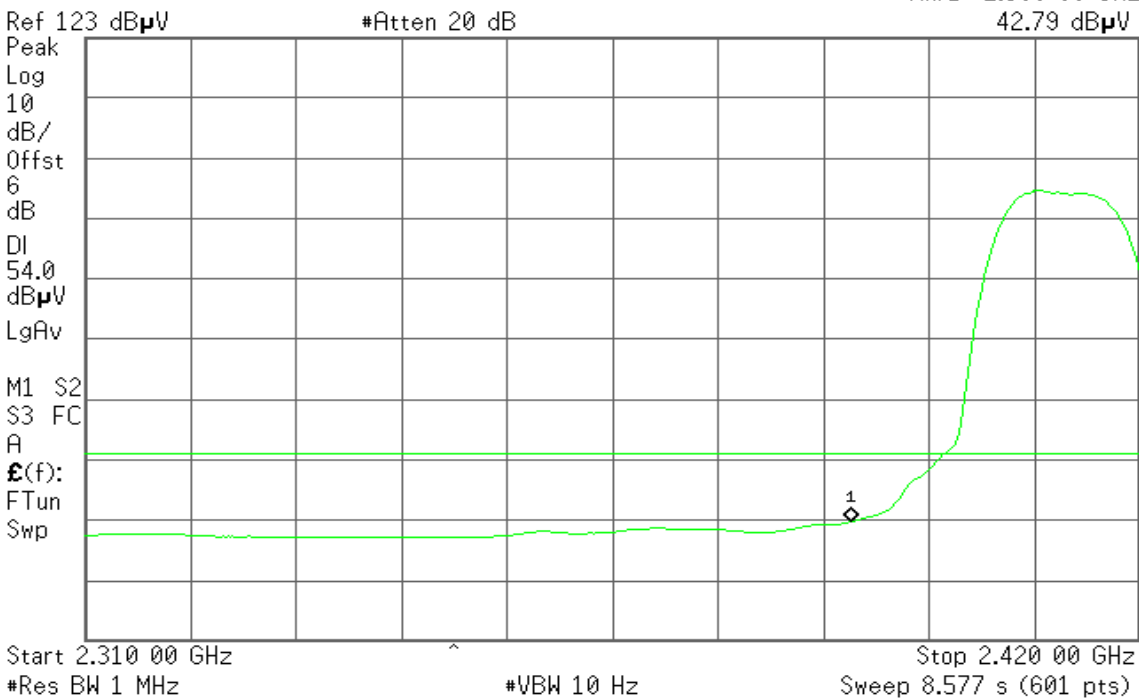
**Detector mode: Average**

**Polarity: Vertical**

Agilent 10:07:13 Oct 6, 2009

R T

Mkr1 2.390 00 GHz  
42.79 dB $\mu$ V





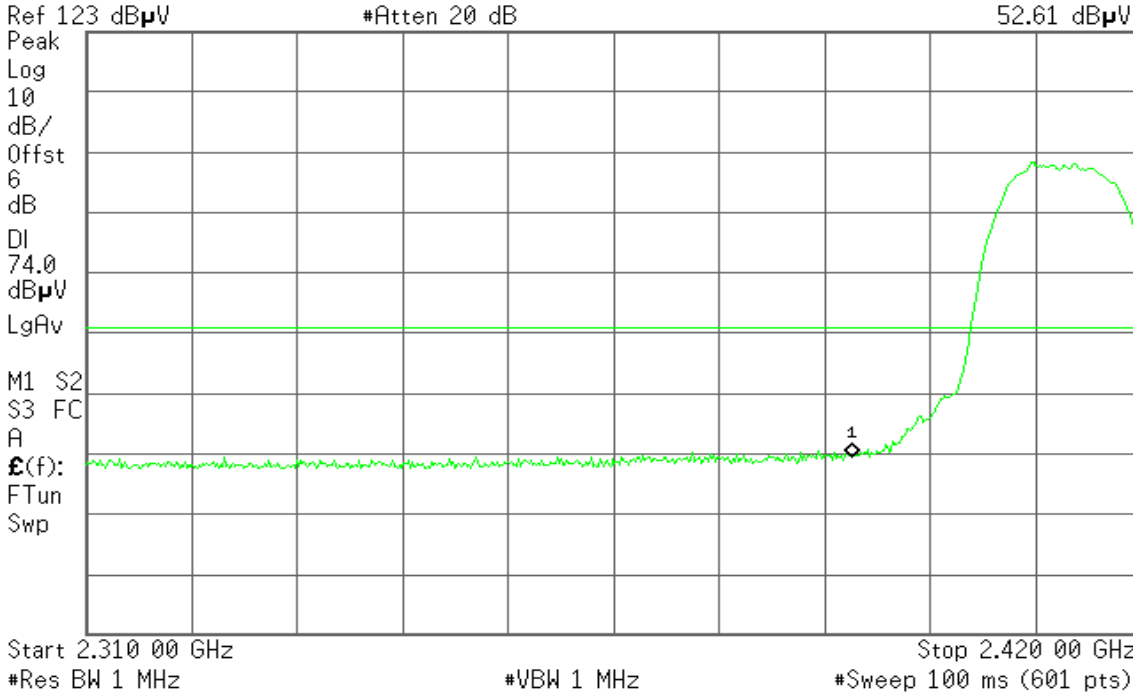
Detector mode: Peak

Polarity: Horizontal

Agilent 09:58:32 Oct 6, 2009

R L

Mkr1 2.390 00 GHz  
52.61 dBμV



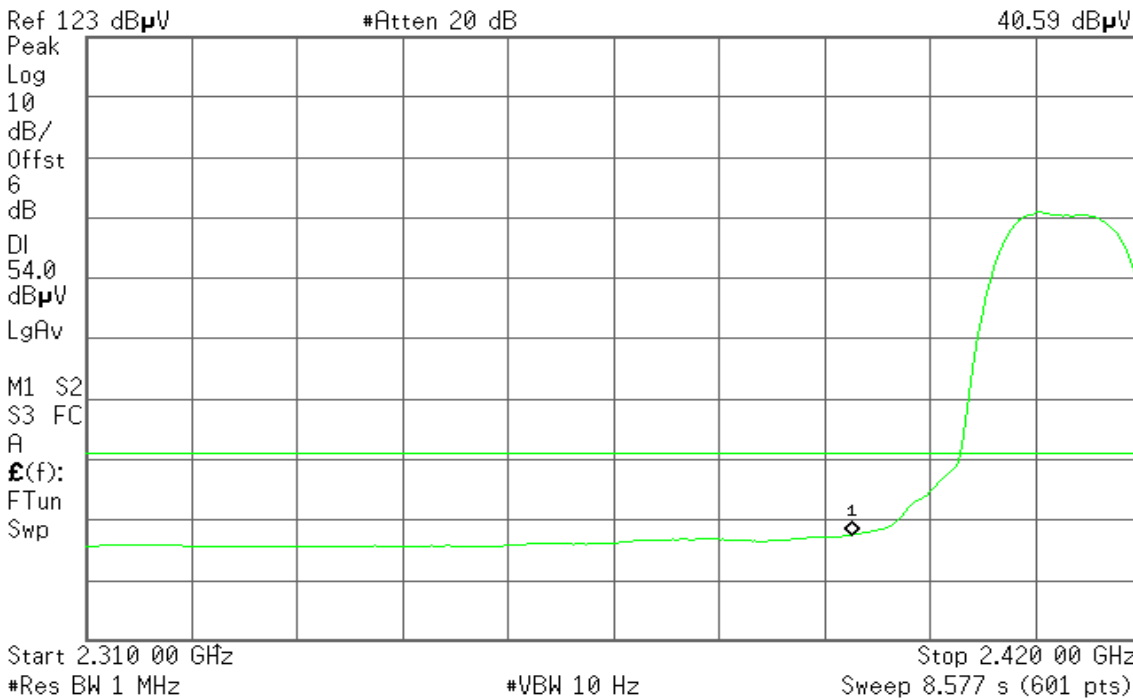
Detector mode: Average

Polarity: Horizontal

Agilent 10:00:40 Oct 6, 2009

R T

Mkr1 2.390 00 GHz  
40.59 dBμV





Band Edges (IEEE 802.11b / CH High)

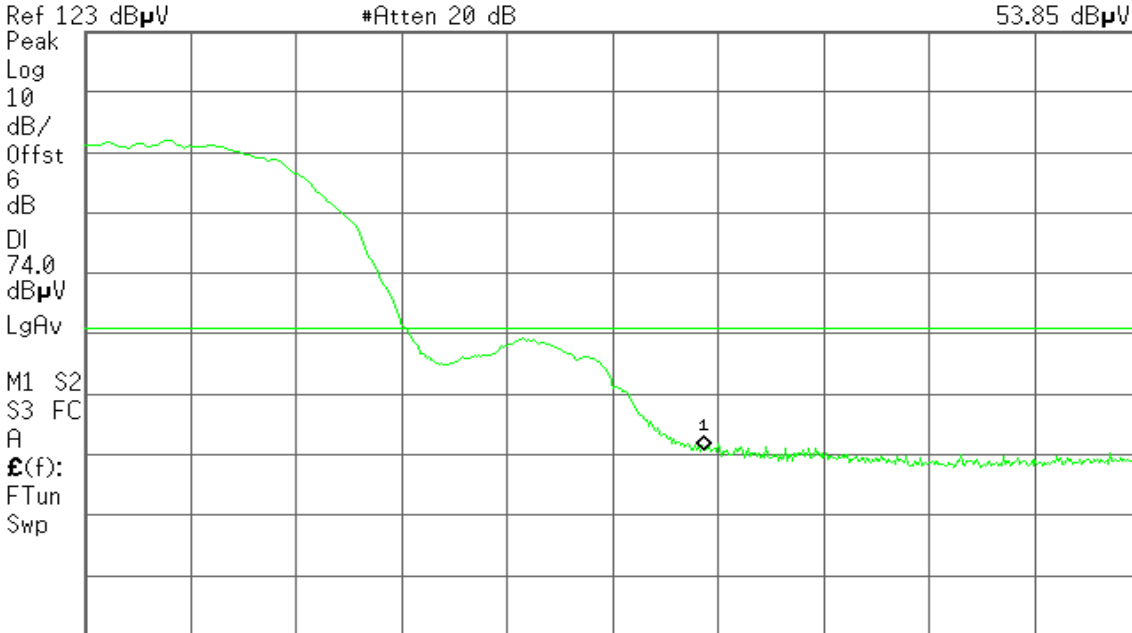
Detector mode: Peak

Polarity: Vertical

Agilent 11:22:50 Oct 6, 2009

R T

Mkr1 2.483 50 GHz  
53.85 dBµV



Start 2.460 00 GHz Stop 2.500 00 GHz  
#Res BW 1 MHz #VBW 1 MHz #Sweep 100 ms (601 pts)

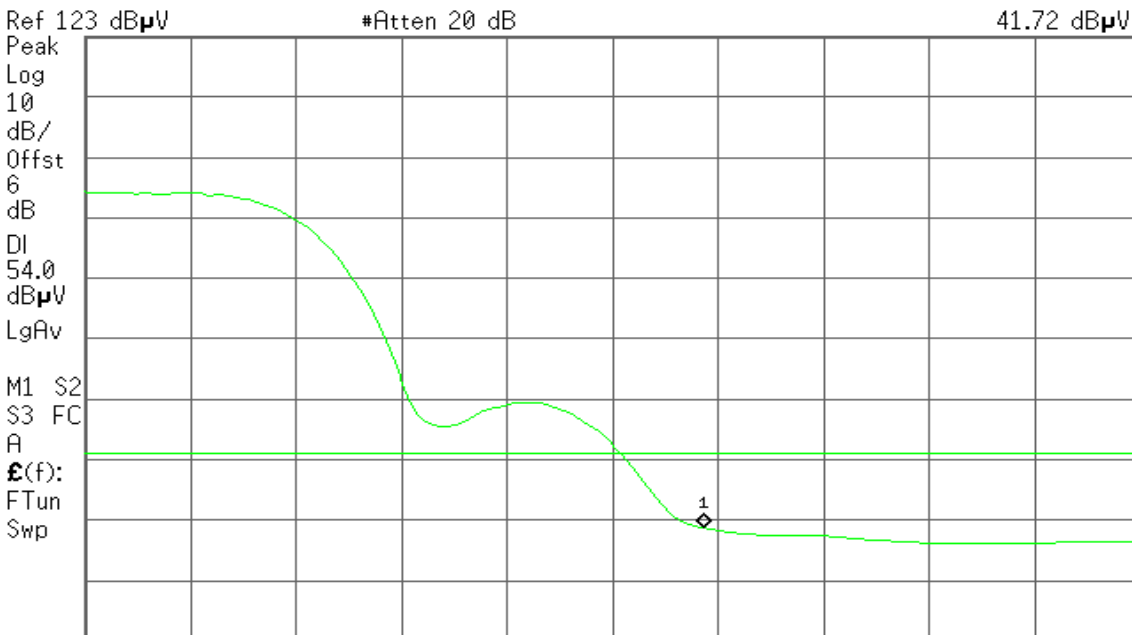
Detector mode: Average

Polarity: Vertical

Agilent 11:23:35 Oct 6, 2009

R T

Mkr1 2.483 50 GHz  
41.72 dBµV



Start 2.460 00 GHz Stop 2.500 00 GHz  
#Res BW 1 MHz #VBW 10 Hz Sweep 3.119 s (601 pts)



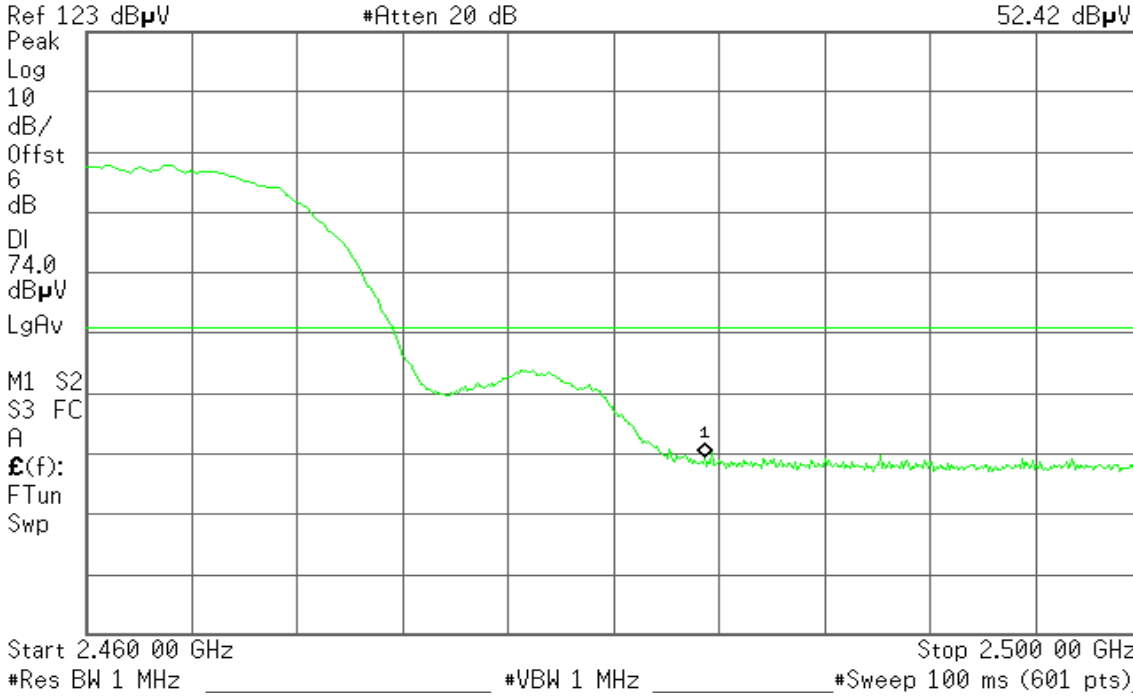
Detector mode: Peak

Polarity: Horizontal

Agilent 11:25:57 Oct 6, 2009

R T

Mkr1 2.483 50 GHz  
52.42 dBμV



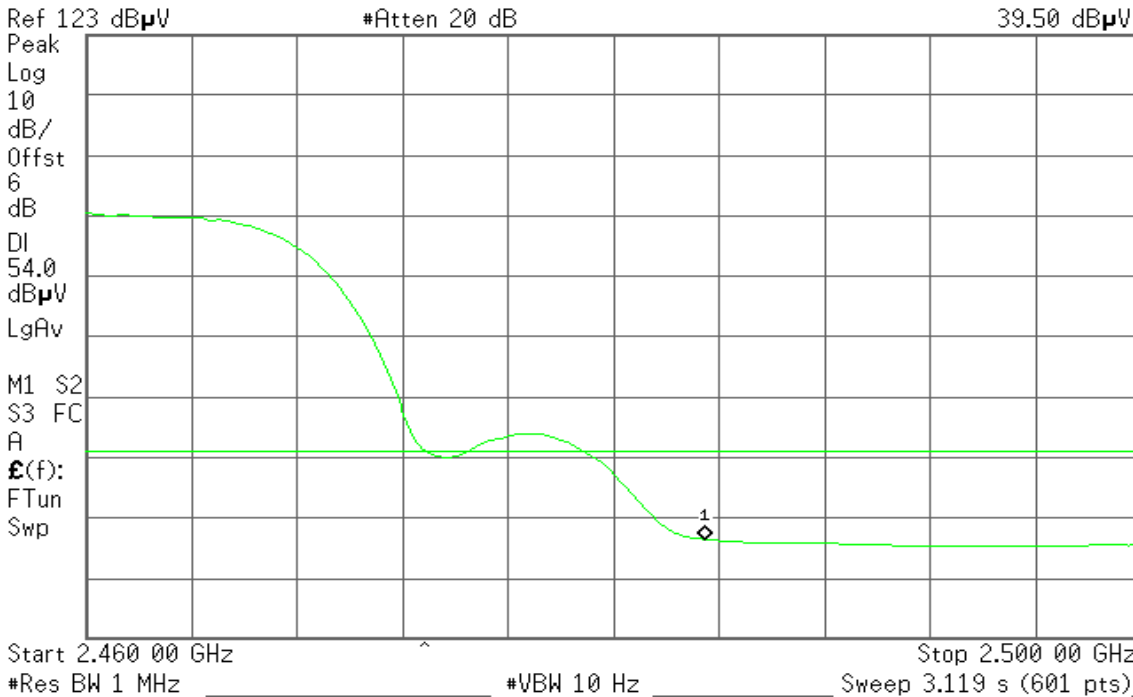
Detector mode: Average

Polarity: Horizontal

Agilent 11:26:31 Oct 6, 2009

R T

Mkr1 2.483 50 GHz  
39.50 dBμV





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

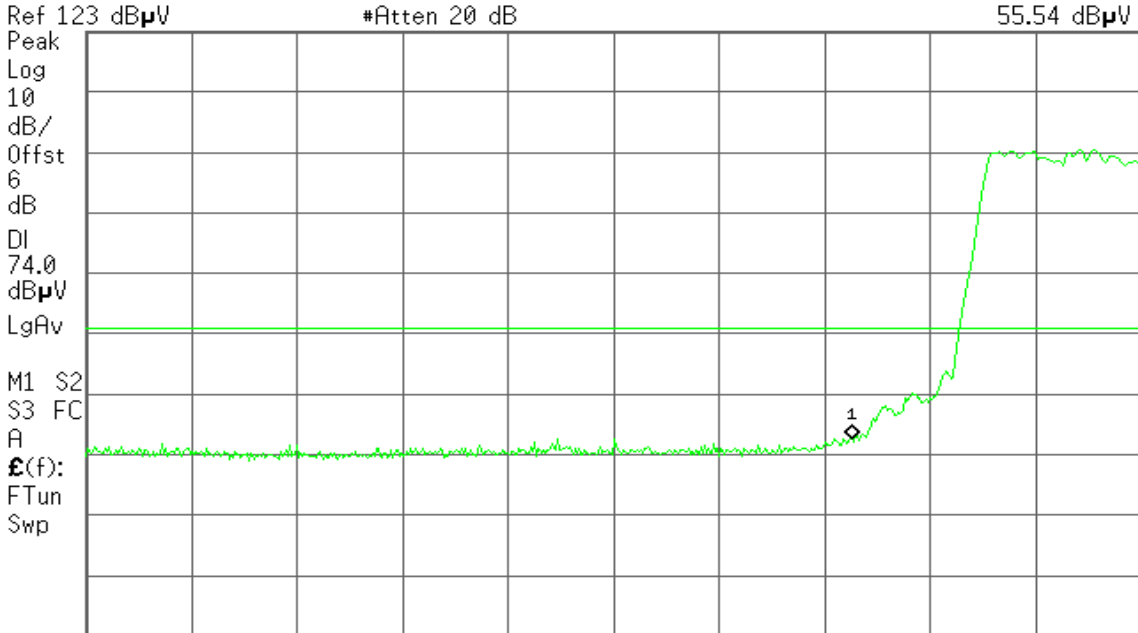
Detector mode: Peak

Polarity: Vertical

Agilent 10:13:02 Oct 6, 2009

R T

Mkr1 2.390 00 GHz  
55.54 dBμV



Start 2.310 00 GHz Stop 2.420 00 GHz  
#Res BW 1 MHz #VBW 1 MHz #Sweep 100 ms (601 pts)

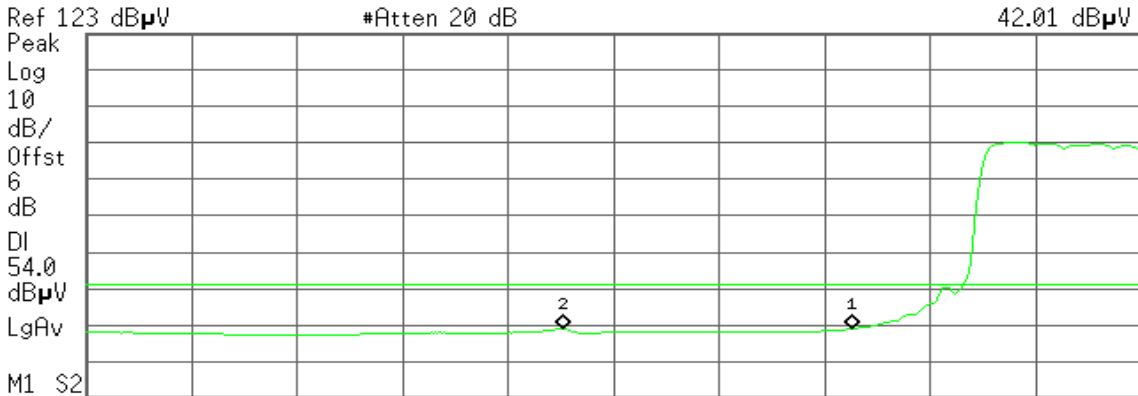
Detector mode: Average

Polarity: Vertical

Agilent 10:14:15 Oct 6, 2009

R T

Mkr2 2.359 68 GHz  
42.01 dBμV



Start 2.310 00 GHz Stop 2.420 00 GHz  
#Res BW 1 MHz #VBW 10 Hz Sweep 8.577 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.390 00 GHz	42.06 dBμV
2	(1)	Freq	2.359 68 GHz	42.01 dBμV



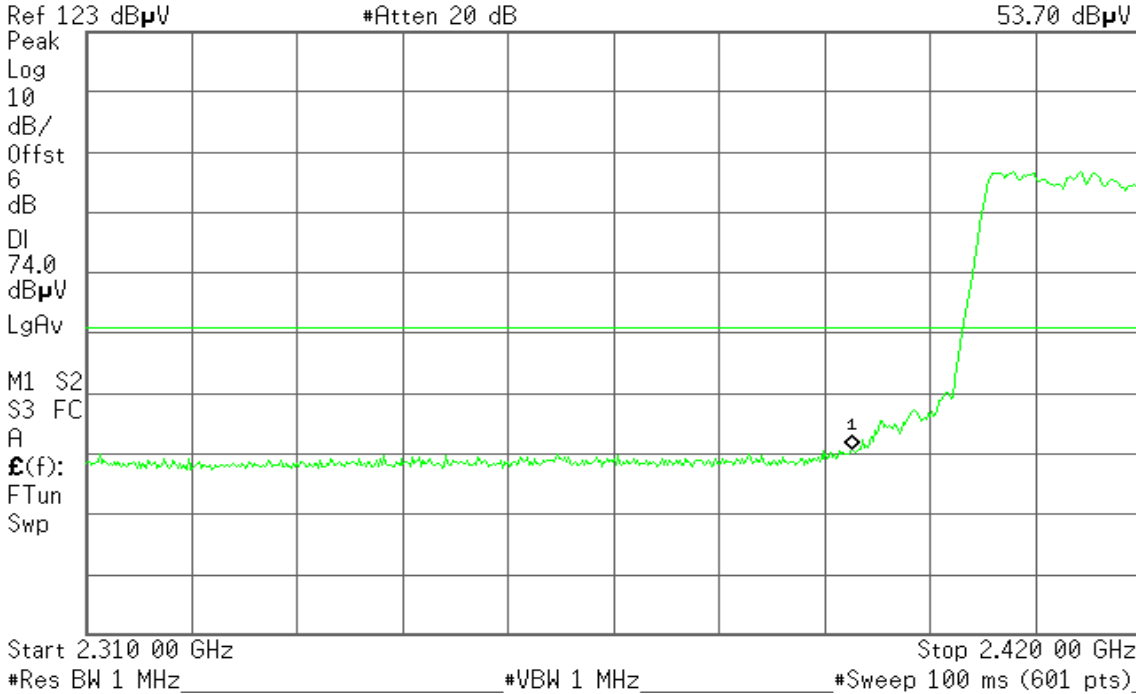
**Detector mode: Peak**

**Polarity: Horizontal**

\* Agilent 10:16:16 Oct 6, 2009

R T

Mkr1 2.390 00 GHz  
53.70 dB $\mu$ V



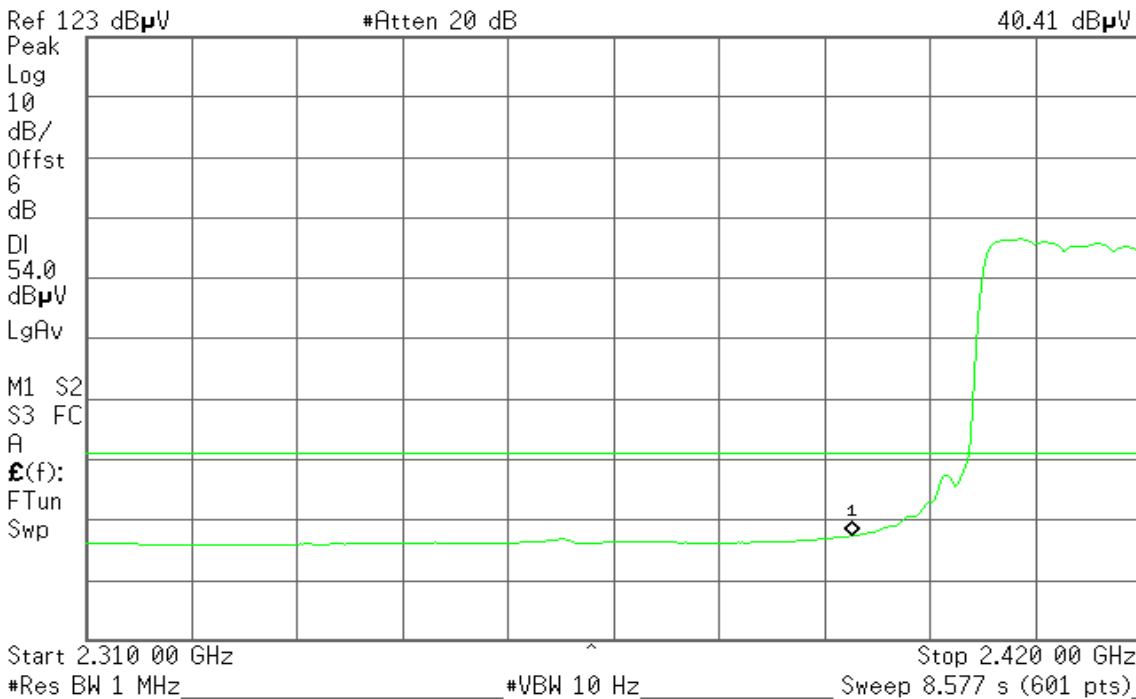
**Detector mode: Average**

**Polarity: Horizontal**

\* Agilent 10:17:08 Oct 6, 2009

R T

Mkr1 2.390 00 GHz  
40.41 dB $\mu$ V







Band Edges (IEEE 802.11g / CH High)

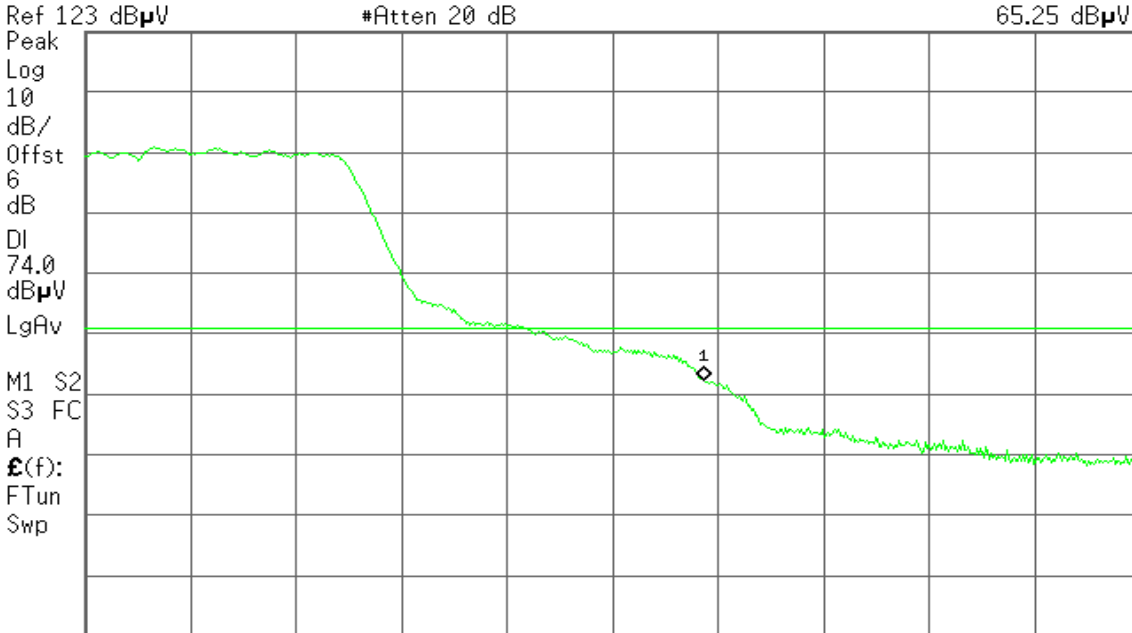
Detector mode: Peak

Polarity: Vertical

Agilent 11:18:10 Oct 6, 2009

R T

Mkr1 2.483 50 GHz  
65.25 dBµV



Start 2.460 00 GHz Stop 2.500 00 GHz  
#Res BW 1 MHz #VBW 1 MHz #Sweep 100 ms (601 pts)

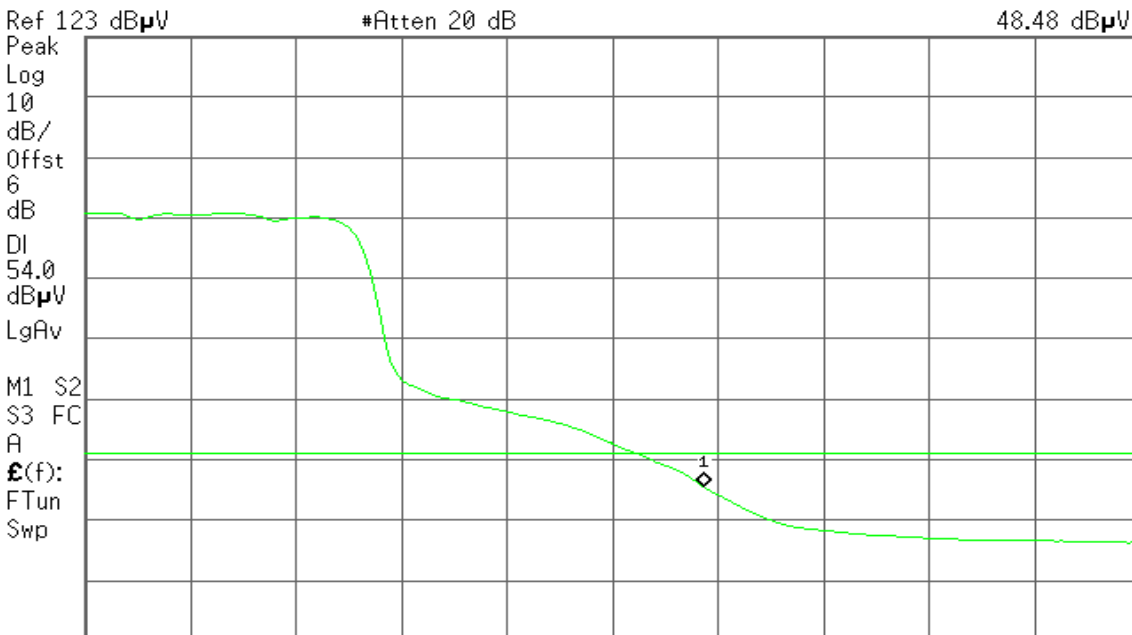
Detector mode: Average

Polarity: Vertical

Agilent 11:18:39 Oct 6, 2009

R T

Mkr1 2.483 50 GHz  
48.48 dBµV



Start 2.460 00 GHz Stop 2.500 00 GHz  
#Res BW 1 MHz #VBW 10 Hz Sweep 3.119 s (601 pts)



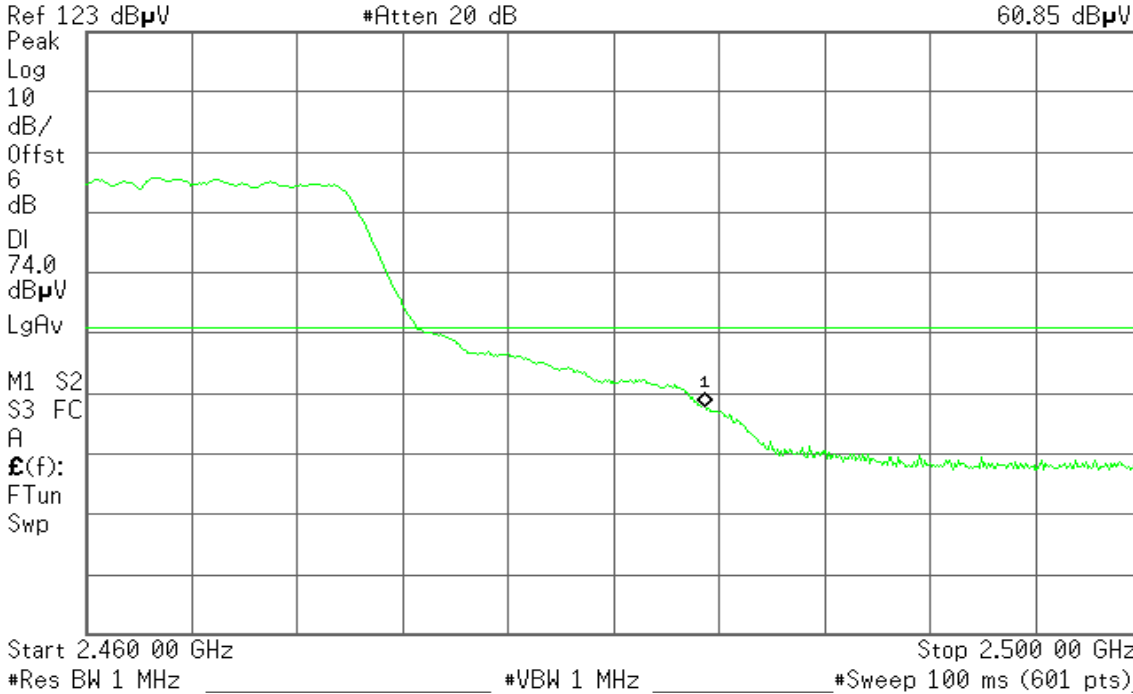
**Detector mode: Peak**

**Polarity: Horizontal**

\* Agilent 11:13:59 Oct 6, 2009

R T

Mkr1 2.483 50 GHz  
60.85 dB $\mu$ V



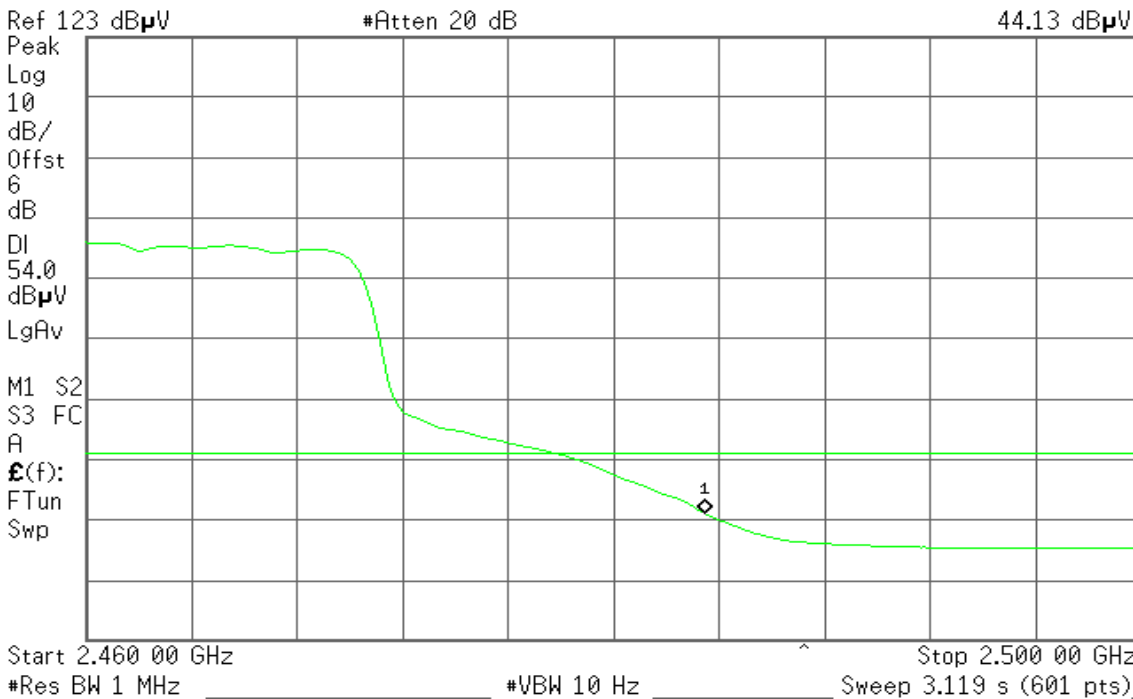
**Detector mode: Average**

**Polarity: Horizontal**

\* Agilent 11:14:29 Oct 6, 2009

R T

Mkr1 2.483 50 GHz  
44.13 dB $\mu$ V



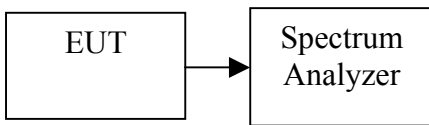


### 7.5. PEAK POWER SPECTRAL DENSITY

#### 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. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

#### TEST CONFIGURATION



#### TEST PROCEDURE

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

#### TEST RESULTS

No non-compliance noted

#### TEST DATA

##### IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-11.65	8.00	PASS
Mid	2437	-11.97		PASS
High	2462	-13.80		PASS

##### IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-15.71	8.00	PASS
Mid	2437	-15.32		PASS
High	2462	-14.82		PASS



Test Plot

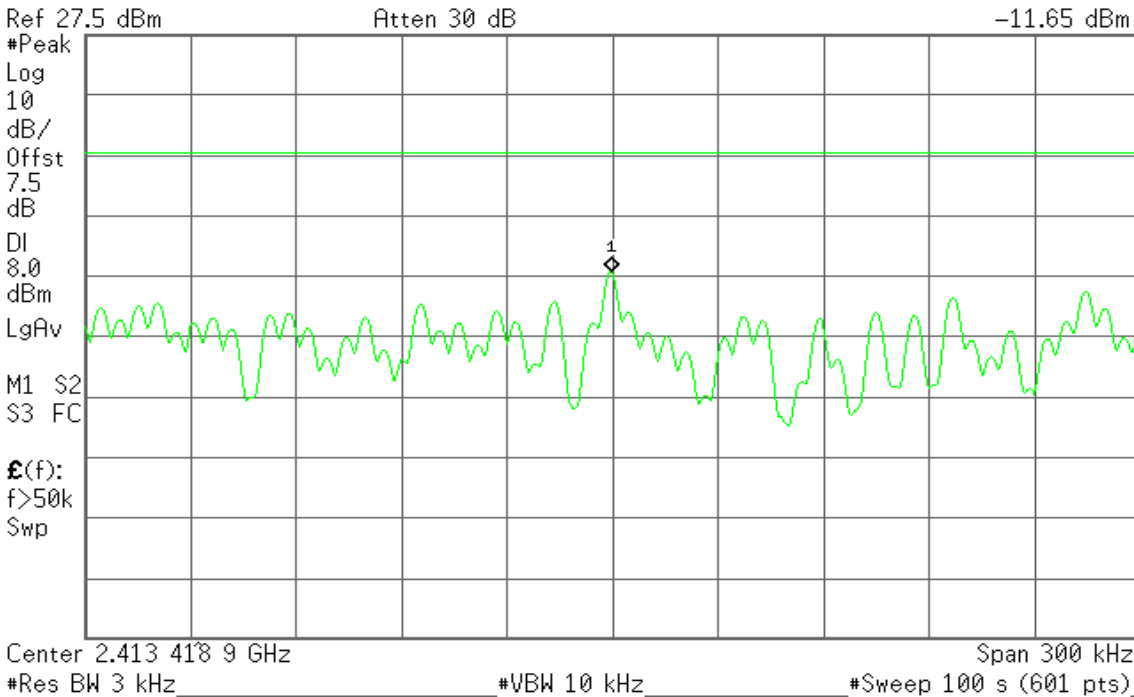
IEEE 802.11b

PPSD (CH Low)

Agilent 17:07:20 Oct 6, 2009

R T

Mkr1 2.413 418 4 GHz  
-11.65 dBm

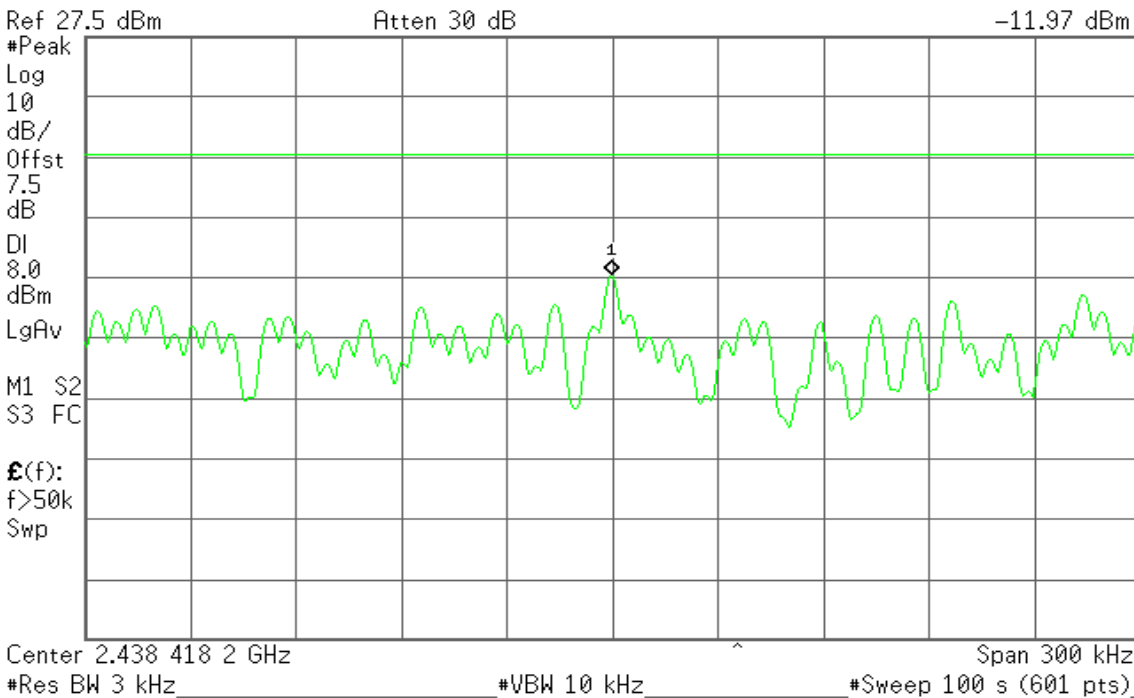


PPSD (CH Mid)

Agilent 17:02:08 Oct 6, 2009

R T

Mkr1 2.438 418 2 GHz  
-11.97 dBm



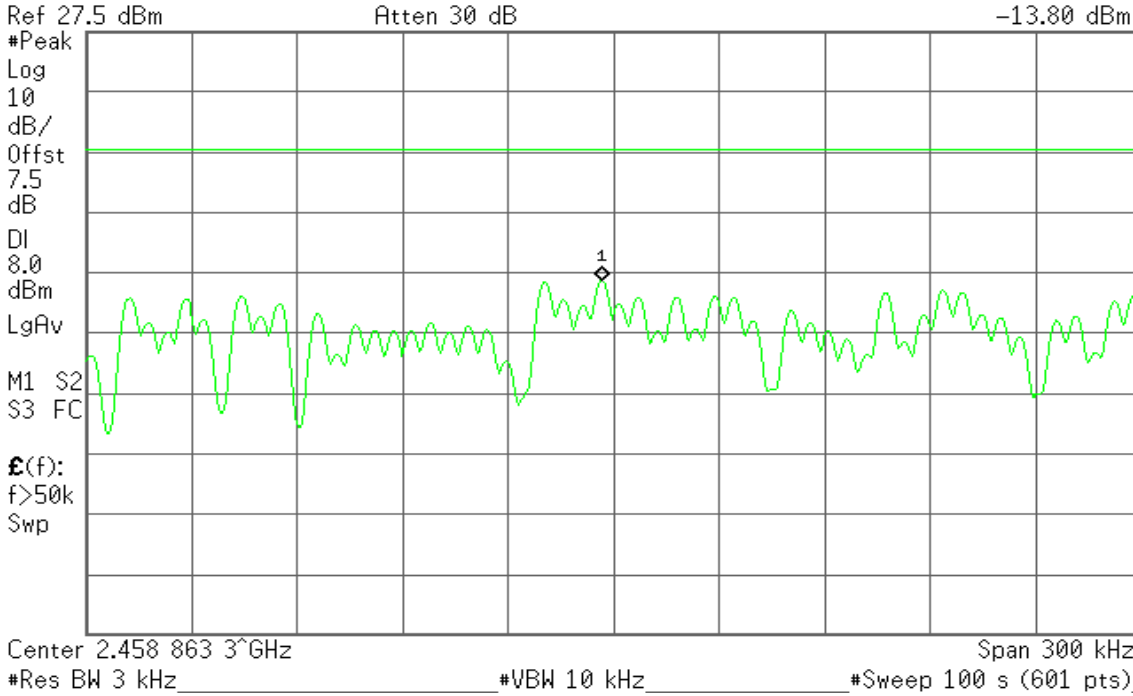


**PPSD (CH High)**

Agilent 16:52:33 Oct 6, 2009

R T

Mkr1 2.458 859 8 GHz  
-13.80 dBm



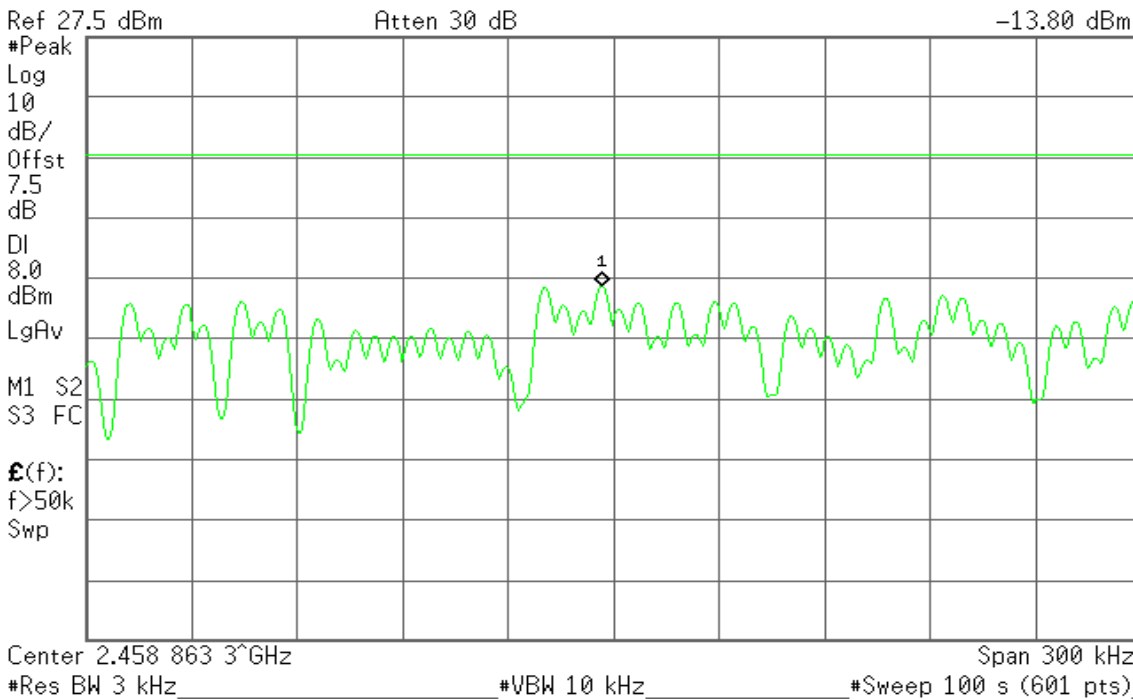
**IEEE 802.11g**

**PPSD (CH Low)**

Agilent 16:52:33 Oct 6, 2009

R T

Mkr1 2.458 859 8 GHz  
-13.80 dBm



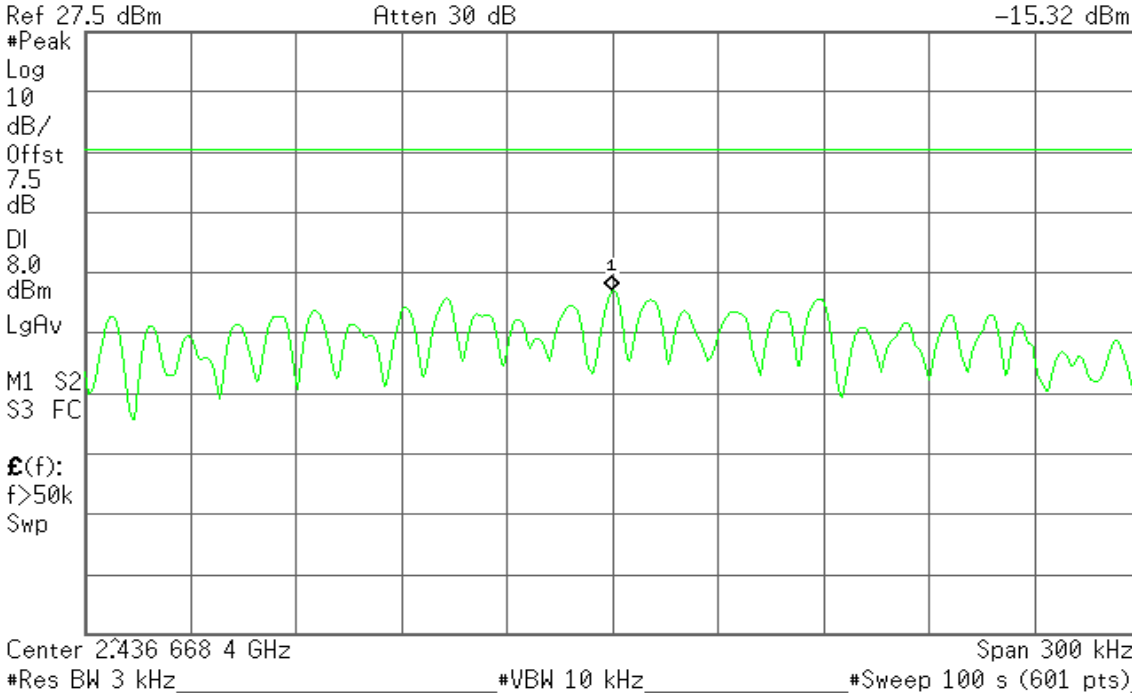


PPSD (CH Mid)

Agilent 17:19:56 Oct 6, 2009

R T

Mkr1 2.436 668 4 GHz  
-15.32 dBm

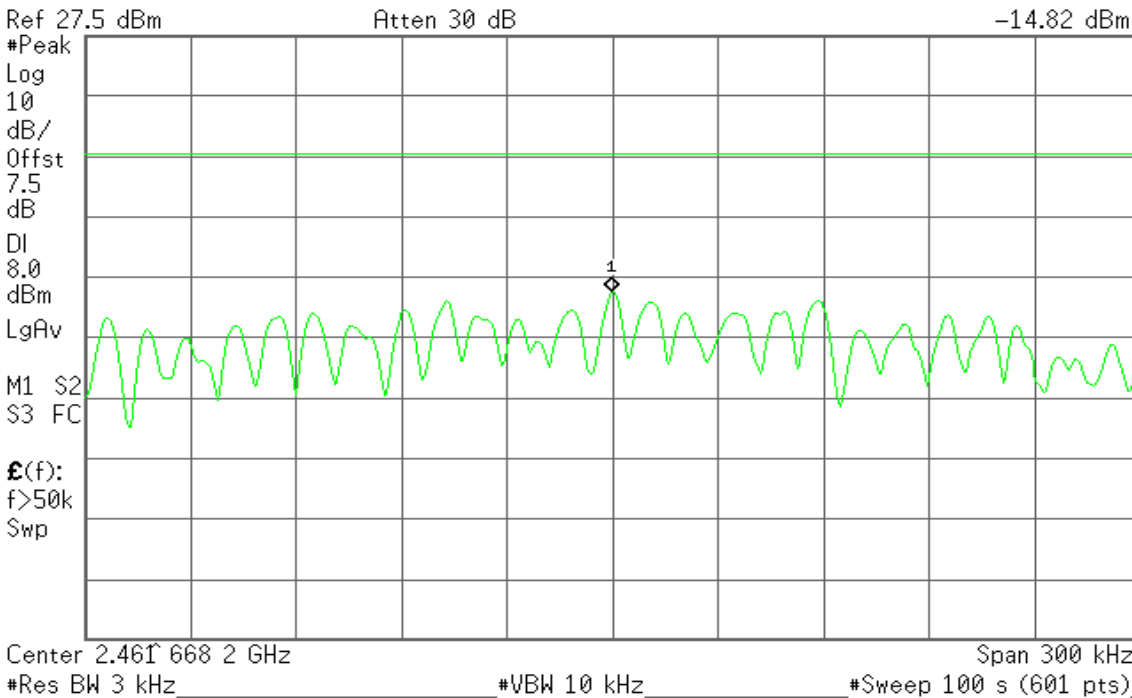


PPSD (CH High)

Agilent 17:24:47 Oct 6, 2009

R T

Mkr1 2.461 668 2 GHz  
-14.82 dBm





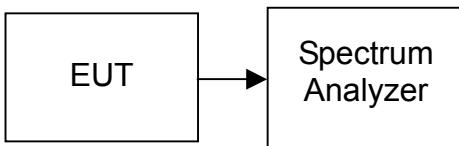
## **7.6. SPURIOUS EMISSIONS**

### **CONDUCTED MEASUREMENT**

#### **LIMIT**

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

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

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

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

#### **TEST RESULTS**

*No non-compliance noted.*



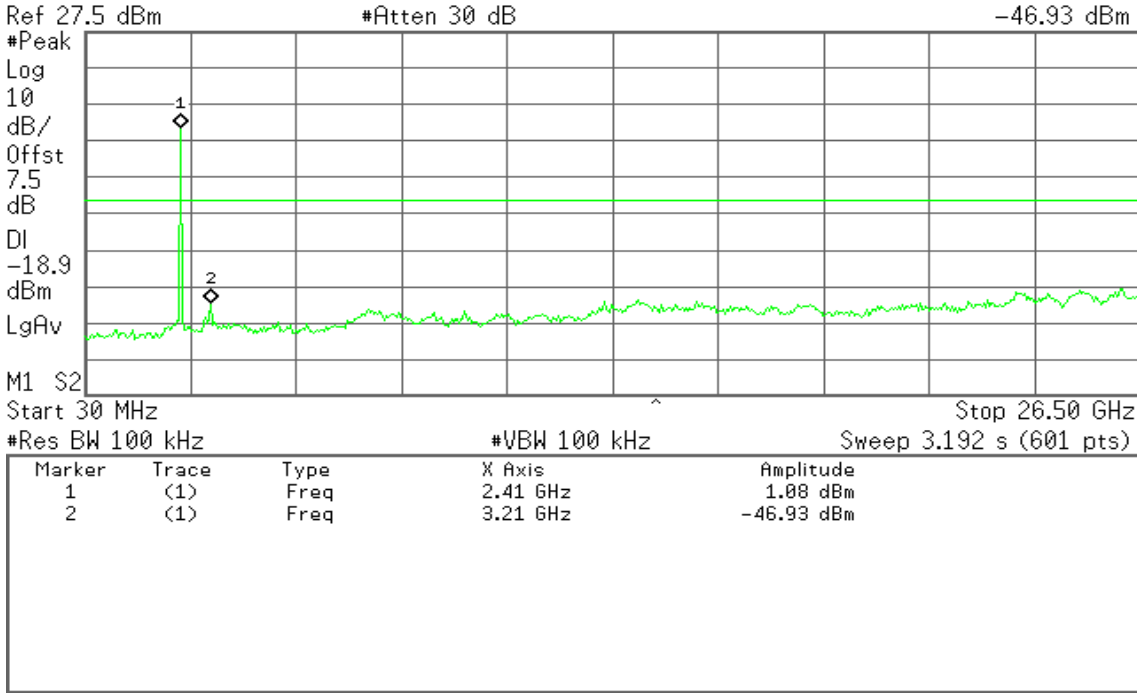
Test Plot

IEEE 802.11b / CH Low

Agilent 16:38:20 Oct 6, 2009

R T

Mkr2 3.21 GHz  
-46.93 dBm

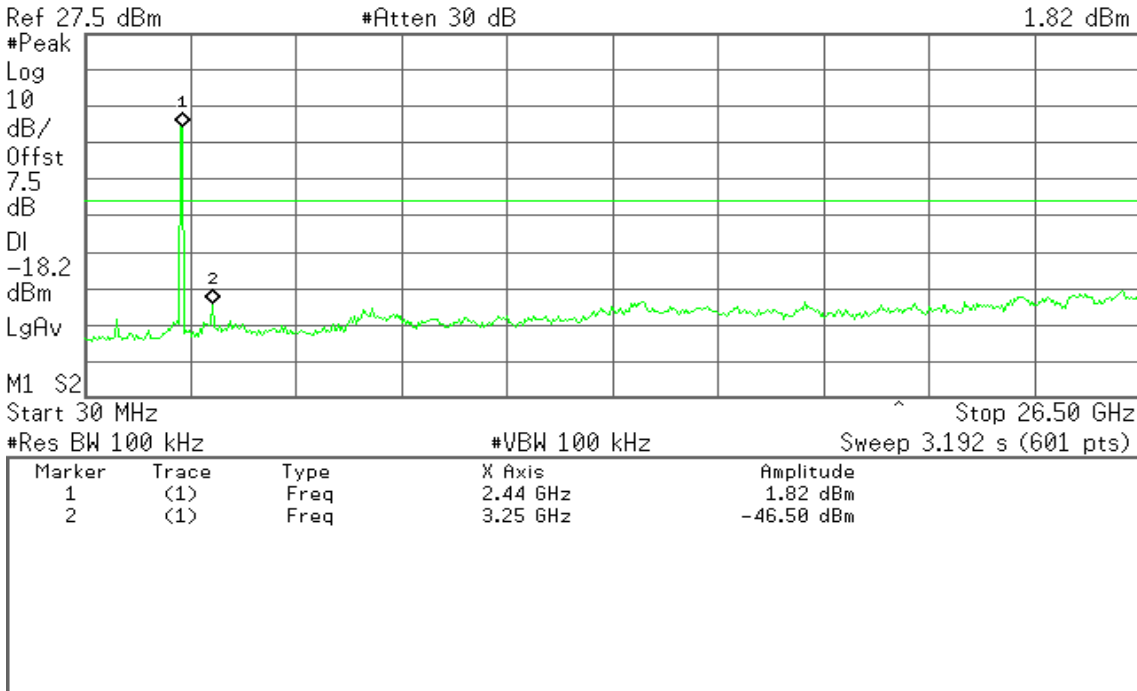


IEEE 802.11b / CH Mid

Agilent 16:40:56 Oct 6, 2009

R T

Mkr1 2.44 GHz  
1.82 dBm





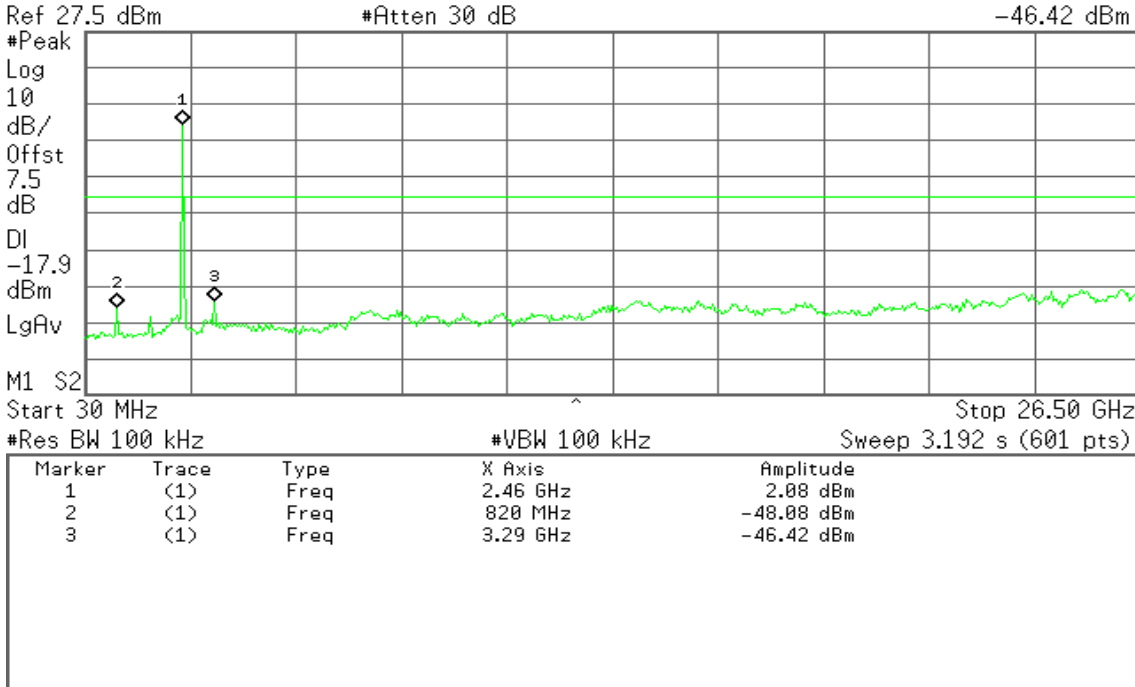


## IEEE 802.11b / CH High

Agilent 16:43:09 Oct 6, 2009

R T

Mkr3 3.29 GHz  
-46.42 dBm

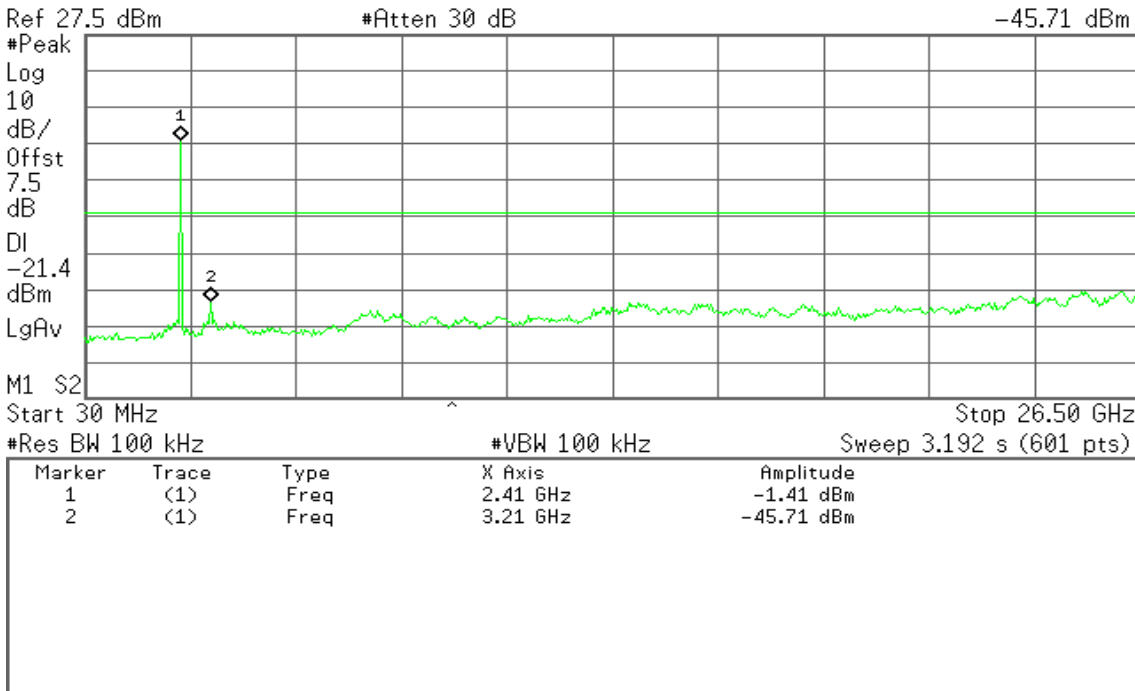


## IEEE 802.11g / CH Low

Agilent 16:35:10 Oct 6, 2009

R T

Mkr2 3.21 GHz  
-45.71 dBm



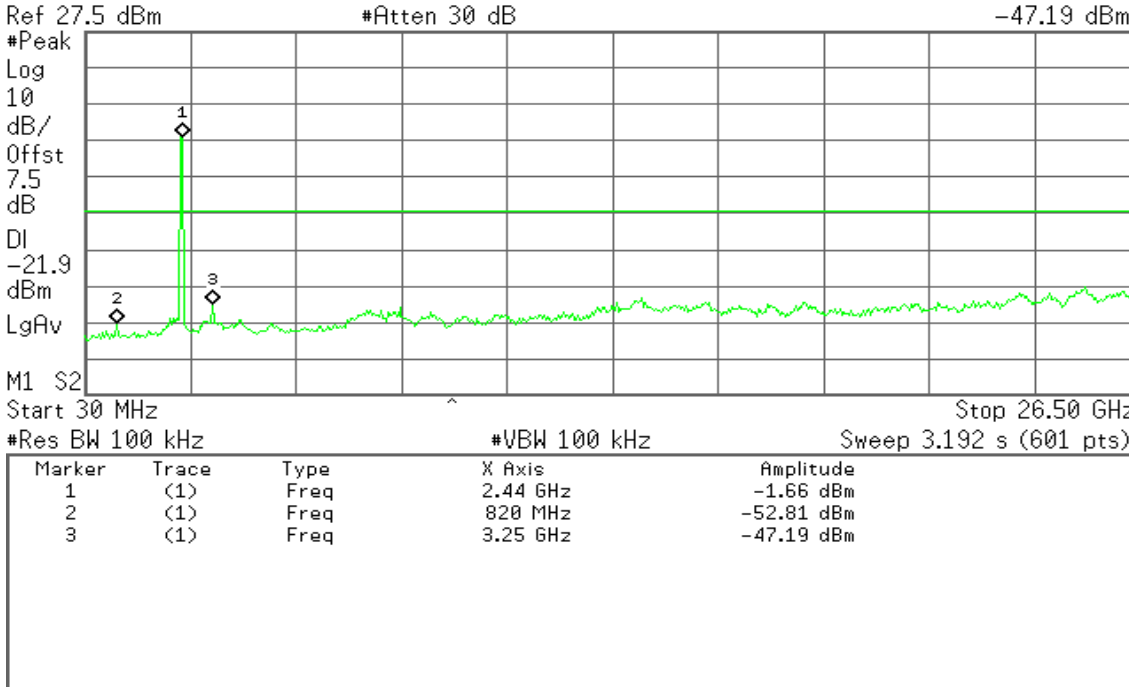


IEEE 802.11g / CH Mid

Agilent 16:31:17 Oct 6, 2009

R T

Mkr3 3.25 GHz  
-47.19 dBm

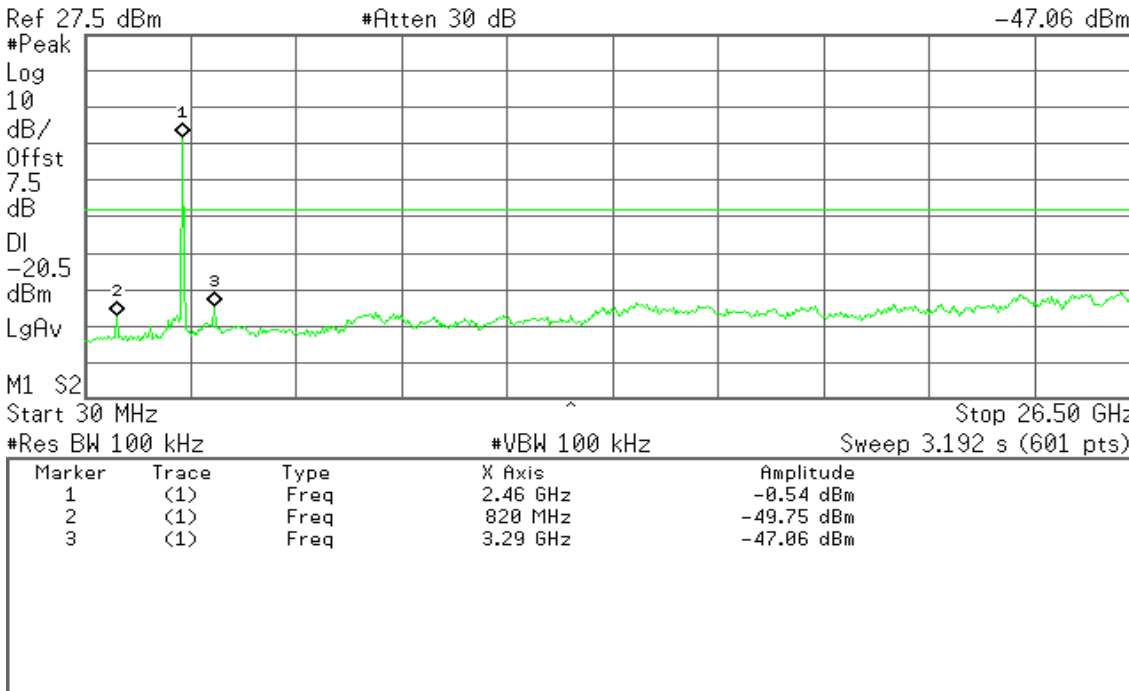


IEEE 802.11g / CH High

Agilent 16:28:26 Oct 6, 2009

R T

Mkr3 3.29 GHz  
-47.06 dBm





### RADIATED EMISSIONS

#### LIMIT

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

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

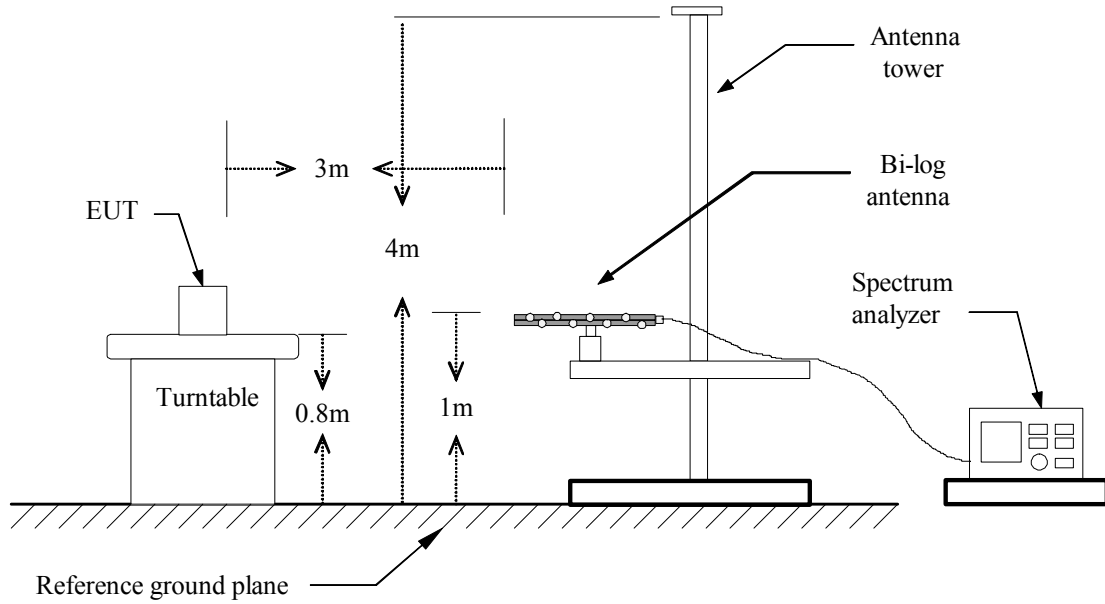
**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections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

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

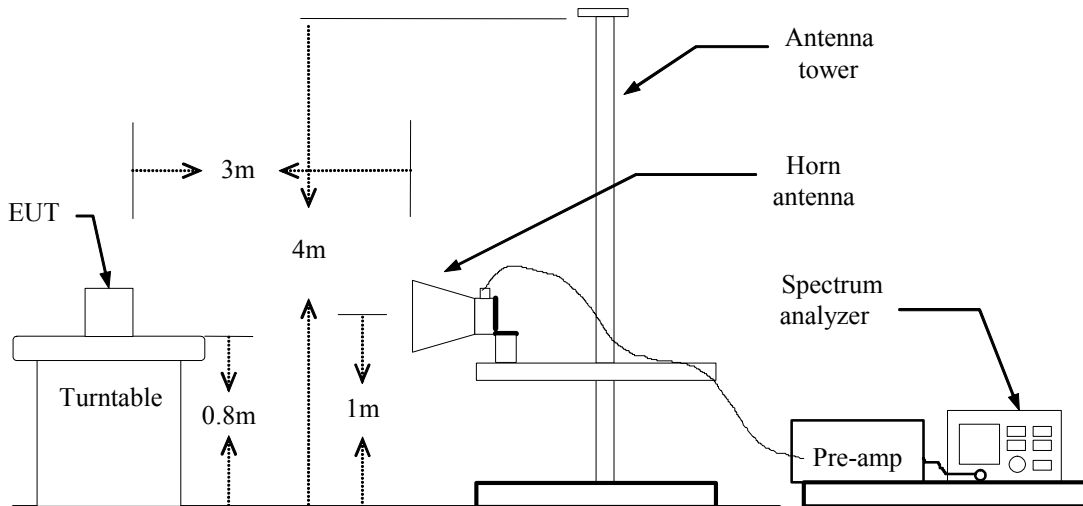
Frequency (MHz)	Field Strength (µV/m at 3-meter)	Field Strength (dBµV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

**TEST CONFIGURATION**

**Below 1 GHz**



**Above 1 GHz**





## **TEST PROCEDURE**

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

Below 1GHz:

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

Above 1GHz:

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

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

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

## **TEST RESULTS**

**No non-compliance noted.**



**TEST DATA**

**Below 1 GHz**

**Operation Mode:** Normal Link

**Test Date:** Oct. 7, 2009

**Temperature:** 18°C

**Tested by:** Alonso Lu

**Humidity:** 60% RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
34.8500	V	QP	51.40	-13.88	37.52	40.00	-2.48
148.8250	V	QP	48.31	-11.95	36.36	43.50	-7.14
156.1000	V	QP	48.38	-12.24	36.14	43.50	-7.36
481.0500	V	QP	41.76	-6.82	34.94	46.00	-11.06
541.6750	V	QP	47.21	-5.45	41.76	46.00	-4.24
587.7500	V	QP	43.58	-3.68	39.90	46.00	-6.10
757.5000	V	QP	42.64	-1.48	41.16	46.00	-4.84
54.2500	H	QP	48.20	-14.12	34.08	40.00	-5.92
78.5000	H	QP	52.98	-18.98	34.00	40.00	-6.00
107.6000	H	QP	52.16	-16.61	35.55	43.50	-7.95
267.6500	H	QP	52.70	-11.33	41.37	46.00	-4.63
323.4250	H	QP	52.06	-9.74	42.32	46.00	-3.68
367.0750	H	QP	48.98	-8.90	40.08	46.00	-5.92
757.5000	H	QP	45.40	-1.48	43.92	46.00	-2.08
973.3250	H	QP	40.05	1.96	42.01	53.90	-11.89

**Remark:**

1. No emission found between lowest internal used / generated frequency to 30 MHz. (9kHz ~ 30MHz)
2. Measuring frequencies from 30 MHz to the 1GHz.
3. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
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. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.



## Above 1 GHz

Operation Mode: IEEE 802.11b / TX / CH Low

Test Date: Oct. 6, 2009

Temperature: 20°C

Tested by: Alonso Lu

Humidity: 55% 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
1326.67	V	57.77	---	-6.12	51.65	---	74.00	54.00	-2.35	Peak
2193.33	V	54.02	41.10	0.33	54.35	41.43	74.00	54.00	-12.57	AVG
2660.00	V	53.31	38.72	-0.48	52.84	38.24	74.00	54.00	-15.76	AVG
4825.00	V	40.38	---	7.72	48.11	---	74.00	54.00	-5.89	Peak
5891.67	V	40.82	---	6.30	47.11	---	74.00	54.00	-6.89	Peak
N/A										
1330.00	H	62.79	41.76	-7.41	55.38	34.35	74.00	54.00	-19.65	AVG
2653.33	H	53.96	38.27	-0.07	53.89	38.20	74.00	54.00	-15.80	AVG
4825.00	H	43.00	---	6.92	49.92	---	74.00	54.00	-4.08	Peak
6433.33	H	41.11	---	8.29	49.41	---	74.00	54.00	-4.59	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).



# Compliance Certification Services Inc.

Report No: 90930203-RP1

FCC ID: EUNEASEL

Date of Issue: October 14, 2009

**Operation Mode:** IEEE 802.11b / TX / CH Mid

**Test Date:** Oct. 6, 2009

**Temperature:** 20°C

**Tested by:** Alonso Lu

**Humidity:** 55% 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
1326.67	V	62.00	41.92	-6.12	55.88	35.80	74.00	54.00	-18.20	AVG
2323.33	V	55.52	42.96	-0.24	55.28	42.72	74.00	54.00	-11.28	AVG
2656.67	V	52.26	---	-0.49	51.77	---	74.00	54.00	-2.23	Peak
3250.00	V	45.13	---	1.62	46.75	---	74.00	54.00	-7.25	Peak
4875.00	V	43.55	---	7.95	51.51	---	74.00	54.00	-2.49	Peak
N/A										
1333.33	H	60.23	41.63	-7.47	52.77	34.16	74.00	54.00	-19.84	AVG
2300.00	H	52.54	---	-1.58	50.96	---	74.00	54.00	-3.04	Peak
2653.33	H	52.82	38.58	-0.07	52.75	38.51	74.00	54.00	-15.49	AVG
4141.67	H	40.76	---	8.22	48.98	---	74.00	54.00	-5.02	Peak
4875.00	H	41.94	---	7.35	49.29	---	74.00	54.00	-4.71	Peak
6950.00	H	40.68	---	10.66	51.34	---	74.00	54.00	-2.66	Peak

**Remark:**

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





# Compliance Certification Services Inc.

Report No: 90930203-RP1

FCC ID: EUNEASEL

Date of Issue: October 14, 2009

**Operation Mode:** IEEE 802.11b / TX / CH High

**Test Date:** Oct. 6, 2009

**Temperature:** 20°C

**Tested by:** Alonso Lu

**Humidity:** 55% 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
1333.33	V	56.28	---	-6.05	50.23	---	74.00	54.00	-3.77	Peak
2326.67	V	55.52	44.63	-0.24	55.27	44.39	74.00	54.00	-9.61	AVG
2663.33	V	52.86	38.53	-0.46	52.40	38.07	74.00	54.00	-15.93	AVG
4808.33	V	40.71	---	7.65	48.36	---	74.00	54.00	-5.64	Peak
4925.00	V	40.67	---	7.90	48.57	---	74.00	54.00	-5.43	Peak
6541.67	V	39.67	---	9.95	49.62	---	74.00	54.00	-4.38	Peak
1323.33	H	56.88	---	-7.30	49.58	---	74.00	54.00	-4.42	Peak
2306.67	H	53.17	---	-1.55	51.62	---	74.00	54.00	-2.38	Peak
2666.67	H	52.49	38.38	-0.03	52.46	38.35	74.00	54.00	-15.65	AVG
4116.67	H	41.60	---	8.25	49.85	---	74.00	54.00	-4.15	Peak
5216.67	H	39.76	---	8.60	48.35	---	74.00	54.00	-5.65	Peak
6991.67	H	39.85	---	10.64	50.50	---	74.00	54.00	-3.50	Peak

**Remark:**

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



# Compliance Certification Services Inc.

Report No: 90930203-RP1

FCC ID: EUNEASEL

Date of Issue: October 14, 2009

**Operation Mode:** IEEE 802.11g / TX / CH Low

**Test Date:** Oct. 6, 2009

**Temperature:** 20°C

**Tested by:** Alonso Lu

**Humidity:** 55% 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
1306.67	V	56.92	---	-6.34	50.58	---	74.00	54.00	-3.42	Peak
1330.00	V	60.08	41.78	-6.09	53.99	35.69	74.00	54.00	-18.31	AVG
2316.67	V	55.72	43.12	-0.23	55.50	42.89	74.00	54.00	-11.11	AVG
2660.00	V	53.33	38.59	-0.48	52.85	38.11	74.00	54.00	-15.89	AVG
4816.67	V	41.31	---	7.69	49.00	---	74.00	54.00	-5.00	Peak
6591.67	V	38.95	---	11.18	50.13	---	74.00	54.00	-3.87	Peak
1330.00	H	57.55	---	-7.41	50.14	---	74.00	54.00	-3.86	Peak
2306.67	H	52.66	---	-1.55	51.11	---	74.00	54.00	-2.89	Peak
2663.33	H	53.03	38.41	-0.04	52.99	38.37	74.00	54.00	-15.63	AVG
4166.67	H	41.83	---	8.18	50.02	---	74.00	54.00	-3.98	Peak
6433.33	H	41.19	---	8.29	49.48	---	74.00	54.00	-4.52	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)



# Compliance Certification Services Inc.

Report No: 90930203-RP1

FCC ID: EUNEASEL

Date of Issue: October 14, 2009

**Operation Mode:** IEEE 802.11g / TX / CH Mid

**Test Date:** Oct. 6, 2009

**Temperature:** 20°C

**Tested by:** Alonso Lu

**Humidity:** 55% 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
1333.33	V	58.78	41.97	-6.05	52.73	35.92	74.00	54.00	-18.08	AVG
2256.67	V	55.91	42.81	0.14	56.05	42.95	74.00	54.00	-11.05	AVG
2656.67	V	53.31	38.63	-0.49	52.82	38.14	74.00	54.00	-15.86	AVG
4366.67	V	42.97	---	4.32	47.29	---	74.00	54.00	-6.71	Peak
7233.33	V	41.36	27.49	12.84	54.20	40.33	74.00	54.00	-13.67	AVG
N/A										
1333.33	H	64.02	41.98	-7.47	56.55	34.51	74.00	54.00	-19.49	AVG
2290.00	H	53.28	---	-1.73	51.55	---	74.00	54.00	-2.45	Peak
2656.67	H	53.03	38.55	-0.06	52.97	38.49	74.00	54.00	-15.51	AVG
4950.00	H	40.98	---	7.85	48.84	---	74.00	54.00	-5.16	Peak
6950.00	H	39.58	---	10.66	50.23	---	74.00	54.00	-3.77	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).



# Compliance Certification Services Inc.

Report No: 90930203-RP1

FCC ID: EUNEASEL

Date of Issue: October 14, 2009

**Operation Mode:** IEEE 802.11g / TX / CH High

**Test Date:** Oct. 6, 2009

**Temperature:** 20°C

**Tested by:** Alonso Lu

**Humidity:** 55% 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
1330.00	V	59.76	41.75	-6.09	53.67	35.66	74.00	54.00	-18.34	AVG
2303.33	V	56.17	43.49	-0.21	55.96	43.28	74.00	54.00	-10.72	AVG
2656.67	V	53.77	38.41	-0.49	53.28	37.92	74.00	54.00	-16.08	AVG
4033.33	V	41.79	---	4.86	46.65	---	74.00	54.00	-7.35	Peak
4958.33	V	40.06	---	7.67	47.74	---	74.00	54.00	-6.26	Peak
6591.67	V	39.85	---	11.18	51.03	---	74.00	54.00	-2.97	Peak
1333.33	H	60.42	41.24	-7.47	52.95	33.77	74.00	54.00	-20.23	AVG
2333.33	H	53.17	---	-1.44	51.74	---	74.00	54.00	-2.26	Peak
2653.33	H	52.07	---	-0.07	52.00	---	74.00	54.00	-2.00	Peak
4133.33	H	40.60	---	8.23	48.82	---	74.00	54.00	-5.18	Peak
4908.33	H	41.20	---	7.61	48.81	---	74.00	54.00	-5.19	Peak
6875.00	H	40.54	---	10.09	50.63	---	74.00	54.00	-3.37	Peak

**Remark:**

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



## **7.7. 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 μH/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 (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

\* Decreases with the logarithm of the frequency.

### **TEST CONFIGURATION**

See test photographs attached in Appendix II 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: Oct. 9, 2009

Temperature: 24°C

Tested by: Benson Yang

Humidity: 55% RH

Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.151	38.73	--	11.35	50.08	--	65.96	55.96	-15.88	--	L1
0.206	38.11	--	10.94	49.05	--	63.36	53.36	-14.31	--	L1
0.286	31.16	--	10.77	41.93	--	60.63	50.63	-18.70	--	L1
0.415	27.57	--	10.59	38.16	--	57.55	47.55	-19.39	--	L1
3.454	31.96	--	10.56	42.52	--	56.00	46.00	-13.48	--	L1
3.603	32.40	--	10.56	42.96	--	56.00	46.00	-13.04	--	L1
0.150	38.68	--	11.00	49.68	--	66.00	56.00	-16.32	--	L2
0.206	38.07	--	10.62	48.69	--	63.36	53.36	-14.67	--	L2
0.274	31.78	--	10.48	42.26	--	60.98	50.98	-18.72	--	L2
2.213	29.14	--	10.23	39.37	--	56.00	46.00	-16.63	--	L2
3.454	31.86	--	10.26	42.12	--	56.00	46.00	-13.88	--	L2
3.603	31.92	--	10.27	42.96	--	56.00	46.00	-13.04	--	L2

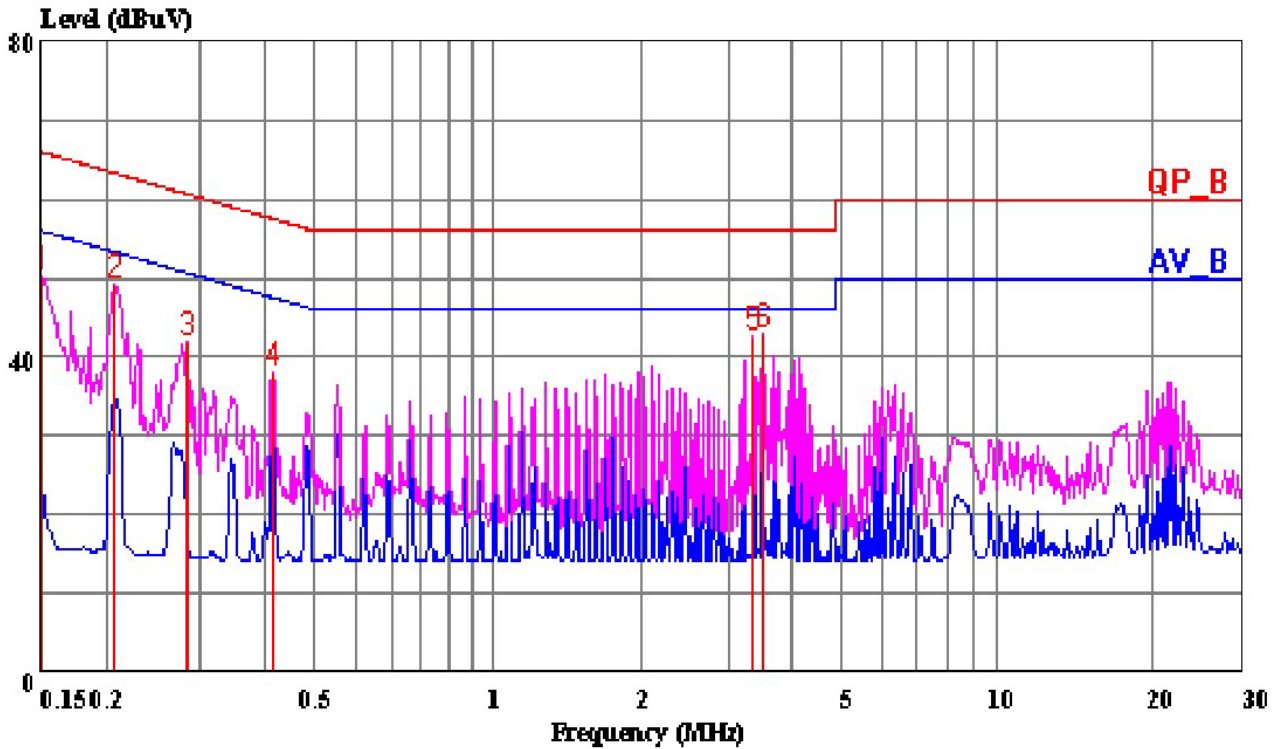
**Remark:**

1. The measuring frequencies range between 0.15 MHz and 30 MHz.
2. The emissions measured in the frequency range between 0.15 MHz and 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 10kHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz.

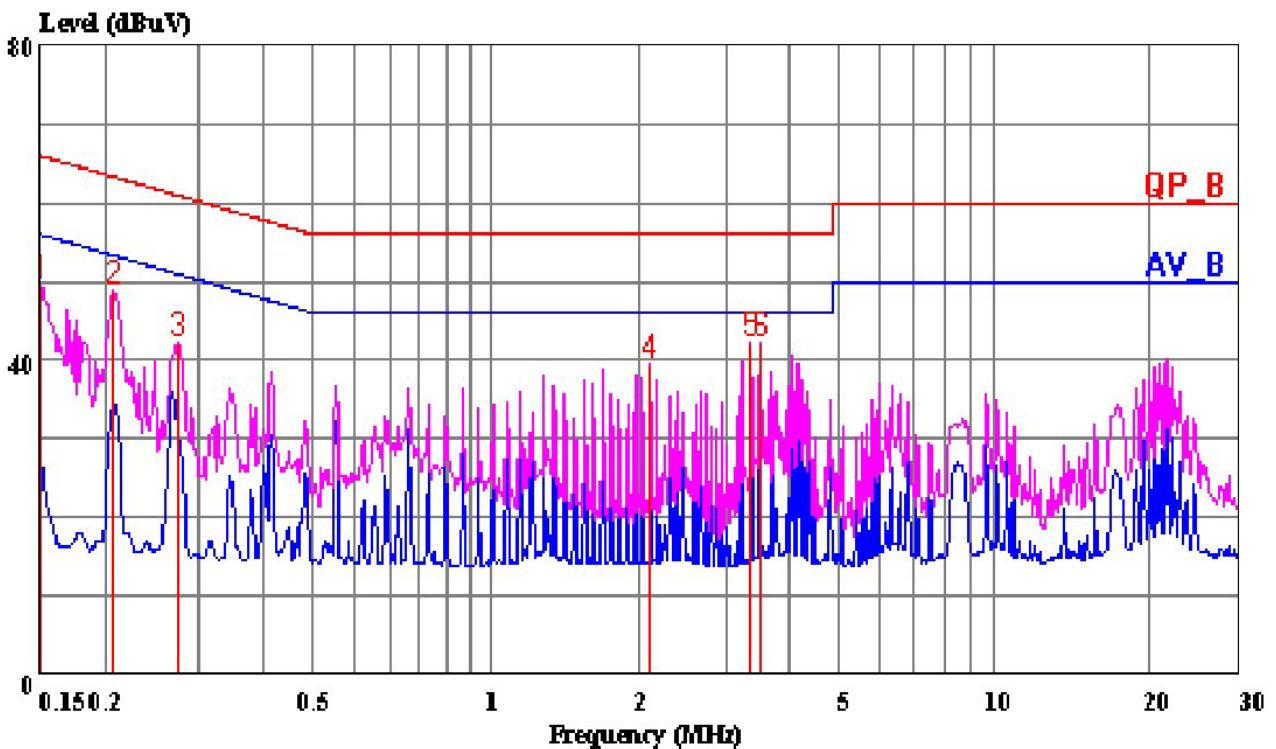


**Test Plot**

**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>	Notebook
<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 = 5mW/cm <sup>2</sup> ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )
<b>Antenna diversity</b>	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
<b>Max. output power</b>	IEEE 802.11b: 19.58 dBm (90.78mW) IEEE 802.11g: 19.54 dBm (89.95mW)
<b>Antenna gain (Max)</b>	0.67 dBi (Numeric gain: 1.17)
<b>Evaluation applied</b>	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

### Remark:

1. The maximum output power is 19.58dBm (90.78mW) at 2412MHz (with 0.67numeric 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.

(According to **RF Exposure Procedures and Equipment Authorization Policies**, SAR evaluation is not required for the PORTABLE device while its maximum average output power is lower than  $60/f_{(GHz)}=60/2.441=24.58mW$ )

**Remark:**

802.11b maximum average power is 13.54dBm = 22.59mW <(60/f); Individual SAR is not required.

802.11g maximum average power is 11.54dBm = 14.26mW <(60/f); Individual SAR is not required.

**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 = 90.78mW

Numeric Antenna gain = 0.67

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 = 0.0121 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.)*