



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

802.11 b/g/n Wireless USB Mini card

Model: AW-NU706H, AW-NU706

Trade Name: AzureWave

Issued to

**AzureWave Technologies, Inc.
8F., No.94, Baozhong Rd., Xindian,
Taipei, Taiwan**

Issued by

**Compliance Certification Services Inc.
No. 11, Wu-Gong 6th Rd., Wugu Industrial Park,
Taipei Hsien 248, Taiwan (R.O.C.)
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1. TEST RESULT CERTIFICATION

Applicant: AzureWave Technologies, Inc.
8F., No.94, Baozhong Rd., Xindian, Taipei, Taiwan

Equipment Under Test: 802.11 b/g/n Wireless USB Mini card

Trade Name: AzureWave

Model: AW-NU706H, AW-NU706

Date of Test: August 28 ~ September 8, 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:

Rex Lai
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Amanda Wu
Section Manager
Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	802.11 b/g/n Wireless USB Mini card
Trade Name	AzureWave
Model Number	AW-NU706H, AW-NU706
Model Discrepancy	AW-NU706 is for full length boards, AW-NU706H is for half length boards.
Power Supply	Powered by host device
Frequency Range	2412 ~ 2462 MHz
Transmit Power	IEEE 802.11b mode: 16.66 dBm IEEE 802.11g mode: 17.58 dBm draft 802.11n Standard-20 MHz Channel mode: 16.35 dBm draft 802.11n Wide-40 MHz Channel mode: 14.29 dBm
Modulation Technique	IEEE 802.11b mode: DSSS (1, 2, 5.5 and 11 Mbps) IEEE 802.11g mode: OFDM (6, 9, 12, 18, 24, 36, 48 and 54 Mbps) draft 802.11n Standard-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 Wide-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)
Number of Channels	IEEE 802.11b/g mode: 11 Channels draft 802.11n Standard-20 MHz Channel mode: 11 Channels draft 802.11n Wide-40 MHz Channel mode: 7 Channels
Antenna Specification	1. ARISTOILE / PIFA Antenna P/N: RFA-02-G05-70B-300/ Gain: 2 dBi 2. YAGEO / PIFA Antenna P/N: Main: CAN4313 820 012701B / Gain: 0.41 dBi P/N: Aux: CAN4313 820 022701B/ Gain: -0.23 dBi 3. ASUS / PIFA Antenna P/N: Main: 14G152209000 / Gain: 0.71 dBi P/N: AUX: 14G152209100 / Gain: -0.22 dBi

Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **TLZ-NU706** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.



3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

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

² Above 38.6

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



3.5 DESCRIPTION OF TEST MODES

The EUT (model: AW-NU706H) is a 1x1SISO module and had been tested under operating condition.

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

Both half length and full length boards were evaluated on conducted and radiated emissions tests to find the worst case. AW-NU706H is the worst case.

The EUT comes with three different antennas (ARISTOILE & YAGEO & ASUS) for sale. After the preliminary test, the antenna with trade name ARISTOILE was found to emit the worst emissions and therefore had been tested under operating condition.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, 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 were chosen for full testing.

IEEE 802.11g mode:

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

draft 802.11n Standard-20 MHz Channel mode:

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6.5Mbps data rate were chosen for full testing.

draft 802.11n Wide-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	Agilent	E4446A	MY43360131	02/24/2009

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	09/10/2009
Test Receiver	Rohde&Schwarz	ESCI	100064	11/30/2009
Switch Controller	TRC	Switch Controller	SC94050010	05/03/2009
4 Port Switch	TRC	4 Port Switch	SC94050020	05/03/2009
Horn-Antenna	TRC	HA-0502	06	06/04/2009
Horn-Antenna	TRC	HA-0801	04	06/18/2009
Horn-Antenna	TRC	HA-1201A	01	08/10/2009
Horn-Antenna	TRC	HA-1301A	01	08/11/2009
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/28/2009
Turn Table	Max-Full	MFT-120S	T120S940302	N.C.R.
Antenna Tower	Max-Full	MFA-430	A440940302	N.C.R.
Controller	Max-Full	MF-CM886	CC-C-1F-13	N.C.R.
Site NSA	CCS	N/A	FCC: 965860 IC: IC 6106	09/24/2009
Test S/W	LABVIEW (V 6.1)			

Remark: The measurement uncertainty is less than $\pm 3.7046\text{dB}$ (30MHz ~ 1GHz), $\pm 3.0958\text{dB}$ (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 9kHz-30MHz	ROHDE & SCHWARZ	ESHS30	828144/003	11/18/2009
TWO-LINE V-NETWORK 9kHz-30MHz	SCHAFFNER	NNB41	03/10013	06/11/2009
LISN 10kHz-100MHz	EMCO	3825/2	9106-1809	04/09/2009
Test S/W	LABVIEW (V 6.1)			

Remark: The measurement uncertainty is less than $\pm 2.81\text{dB}$, 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.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

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 TESTING CERT #0824.01
USA	FCC	3M Semi Anechoic Chamber (965860 and 898658) to perform FCC Part 15/18 measurements	 965860, 898658
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method -47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	 Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 6106 & IC 6106A-2) to perform RSS 212 Issue 1	 IC 6106 IC 6106A-2

* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

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

6.2 SUPPORT EQUIPMENT

No	Equipment	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Notebook PC	DELL	PP05L	7T390 A03	E2K5HCKT	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

Remark:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*



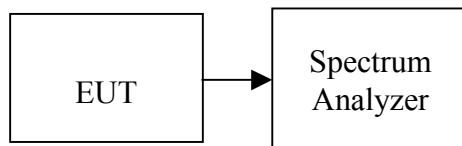
7. FCC PART 15.247 REQUIREMENTS

7.1 6DB BANDWIDTH

LIMIT

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 = RBW, Span = 50 MHz, Sweep = auto.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

TEST RESULTS

No non-compliance noted

**Test Data****Test mode: IEEE 802.11b mode**

Channel	Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low	2412	12500	>500	PASS
Mid	2437	11170		PASS
High	2462	10250		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low	2412	16330	>500	PASS
Mid	2437	16580		PASS
High	2462	16500		PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode

Channel	Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low	2412	17580	>500	PASS
Mid	2437	16830		PASS
High	2462	17500		PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode

Channel	Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low	2422	35500	>500	PASS
Mid	2437	35080		PASS
High	2452	35580		PASS



Test Plot

IEEE 802.11b mode

6dB Bandwidth (CH Low)

Agilent 10:24:39 Sep 4, 2008

R T

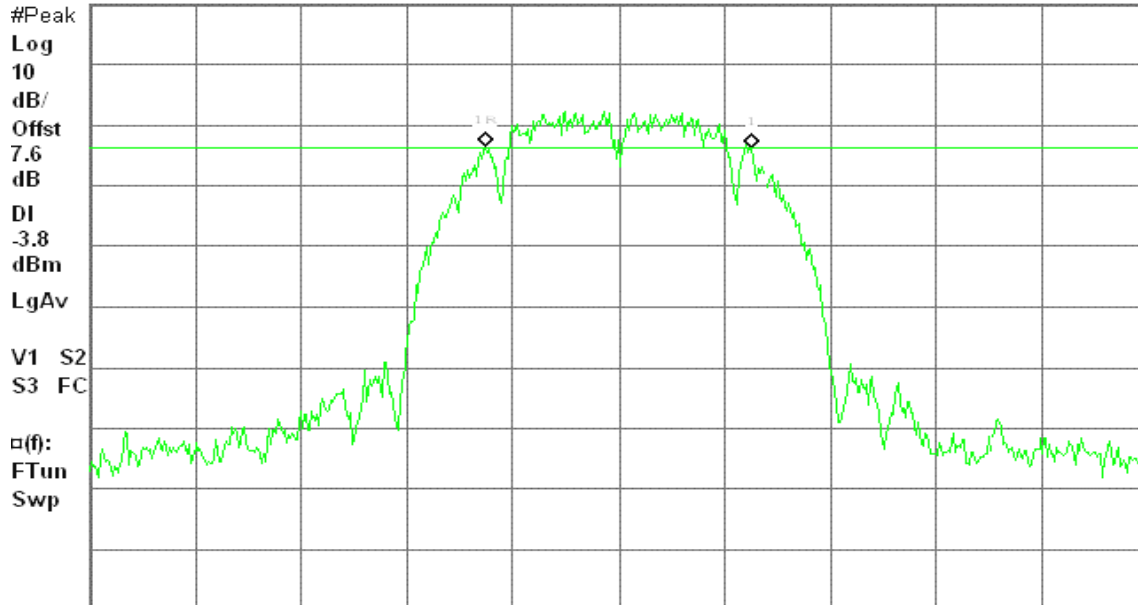
6dB BW, b Mode Low Ch.

 Δ Mkr1 12.50 MHz

Ref 20 dBm

Atten 30 dB

-0.11 dB



Center 2.412 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

6dB Bandwidth (CH Mid)

Agilent 10:53:56 Sep 4, 2008

R T

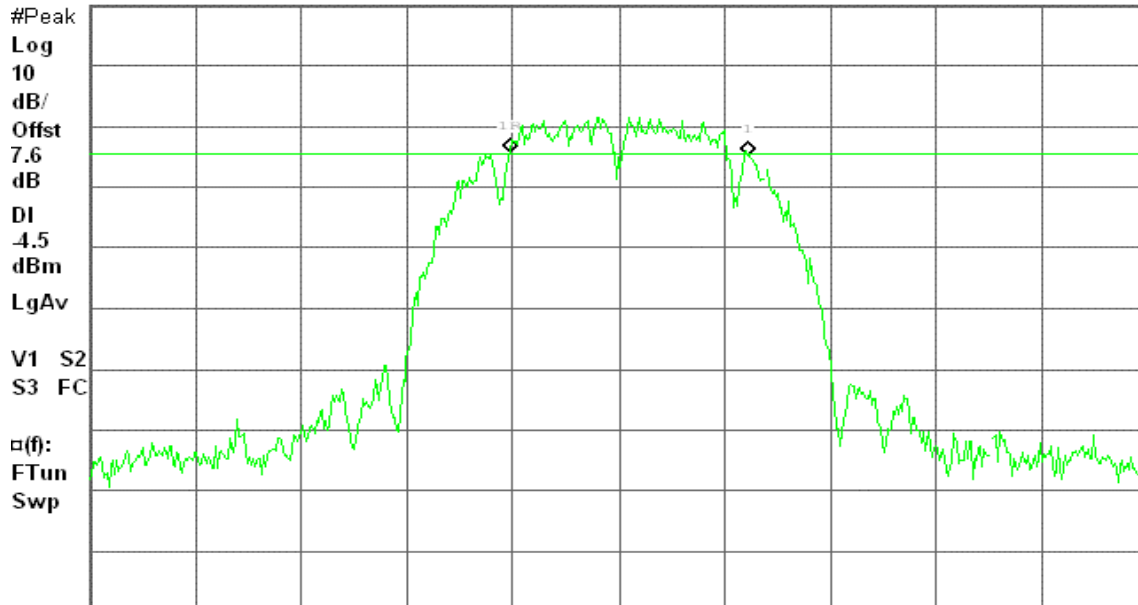
6dB BW, b Mode Mid Ch.

 Δ Mkr1 11.17 MHz

Ref 20 dBm

Atten 30 dB

-0.53 dB



Center 2.437 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

**6dB Bandwidth (CH High)**

* Agilent 11:21:58 Sep 4, 2008

R T

6dB BW, b Mode High Ch.

 Δ Mkr1 10.25 MHz

Ref 20 dBm

Atten 30 dB

1.93 dB

#Peak

Log

10

dB/

Offst

7.6

dB

DI

-4.6

dBm

LgAv

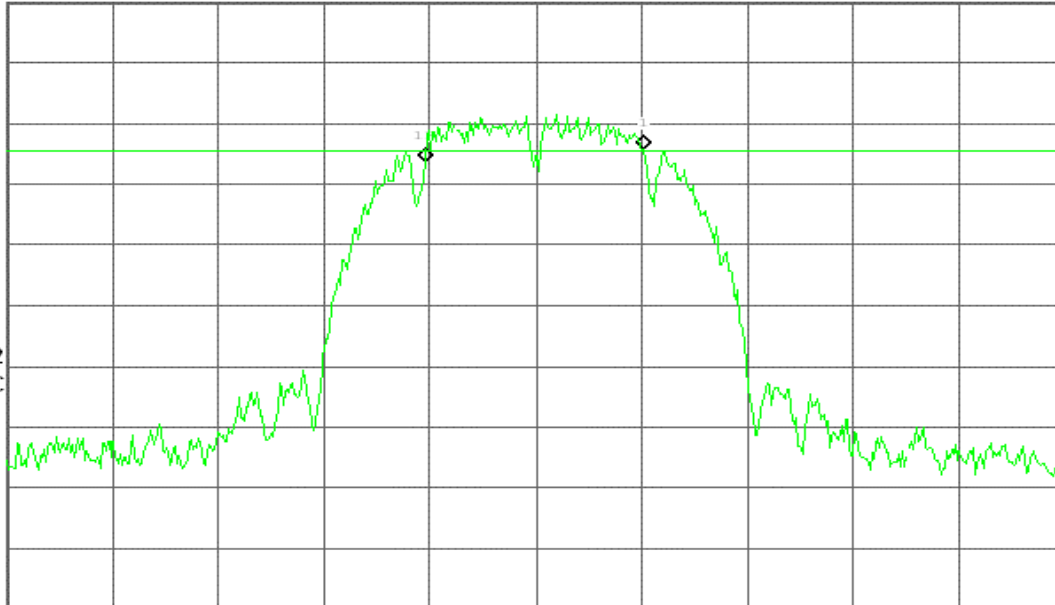
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.462 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

IEEE 802.11g mode**6dB Bandwidth (CH Low)**

* Agilent 13:41:56 Sep 4, 2008

R T

6dB BW, g Mode Low Ch.

 Δ Mkr1 16.33 MHz

Ref 20 dBm

Atten 30 dB

0.41 dB

#Peak

Log

10

dB/

Offst

7.6

dB

DI

-4.6

dBm

LgAv

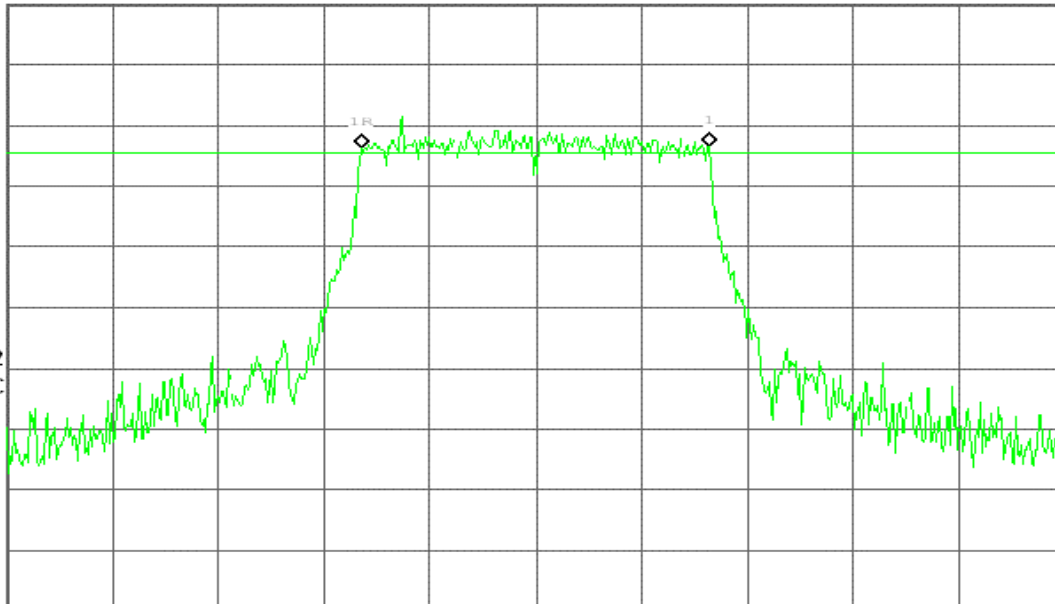
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.412 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

**6dB Bandwidth (CH Mid)**

* Agilent 13:50:42 Sep 4, 2008

R T

6dB BW, g Mode Mid Ch.

 Δ Mkr1 16.58 MHz

Ref 20 dBm

Atten 30 dB

-1.46 dB

#Peak

Log

10

dB/

Offst

7.6

dB

DI

-6.8

dBm

LgAv

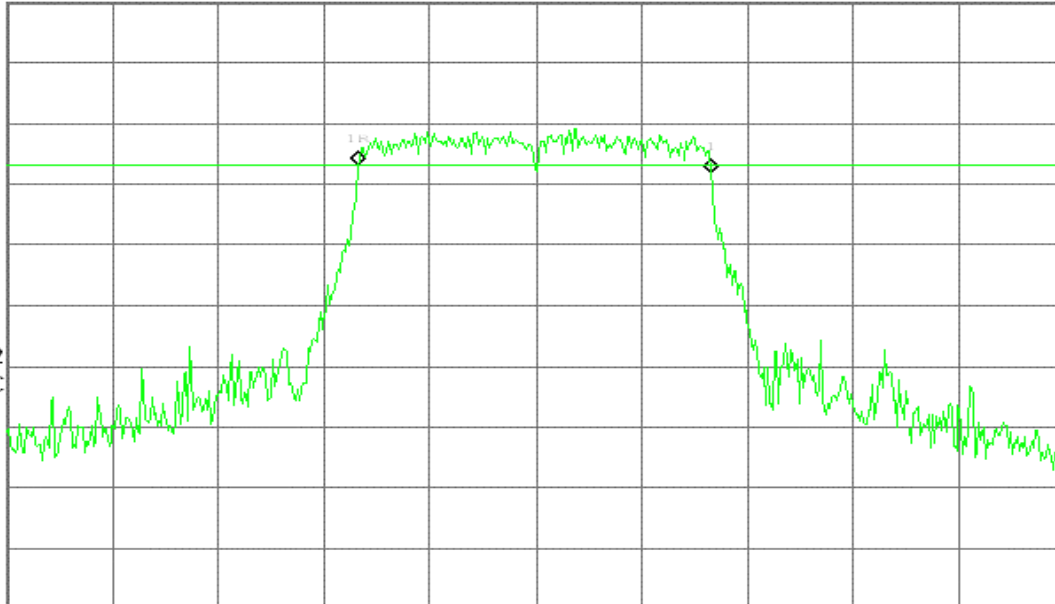
V1 S2

S3 FC

 $\square(f)$:

FTun

Swp



Center 2.437 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

6dB Bandwidth (CH High)

* Agilent 13:59:43 Sep 4, 2008

R T

6dB BW, g Mode High Ch.

 Δ Mkr1 16.50 MHz

Ref 20 dBm

Atten 30 dB

-1.77 dB

#Peak

Log

10

dB/

Offst

7.6

dB

DI

-6.9

dBm

LgAv

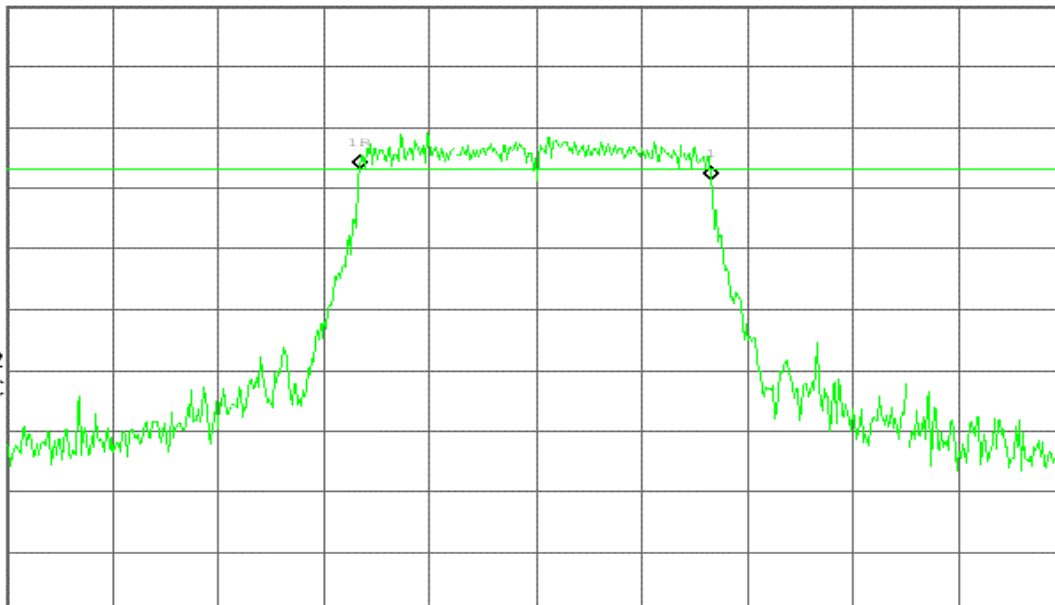
V1 S2

S3 FC

 $\square(f)$:

FTun

Swp



Center 2.462 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

**draft 802.11n Standard-20 MHz Channel mode****6dB Bandwidth (CH Low)**

* Agilent 14:26:33 Sep 4, 2008

R T

6dB BW, g Mode Low Ch.

 Δ Mkr1 17.58 MHz

Ref 20 dBm

Atten 30 dB

-1.85 dB

#Peak

Log

10

dB/

Offst

7.6

dB

DI

-6.8

dBm

LgAv

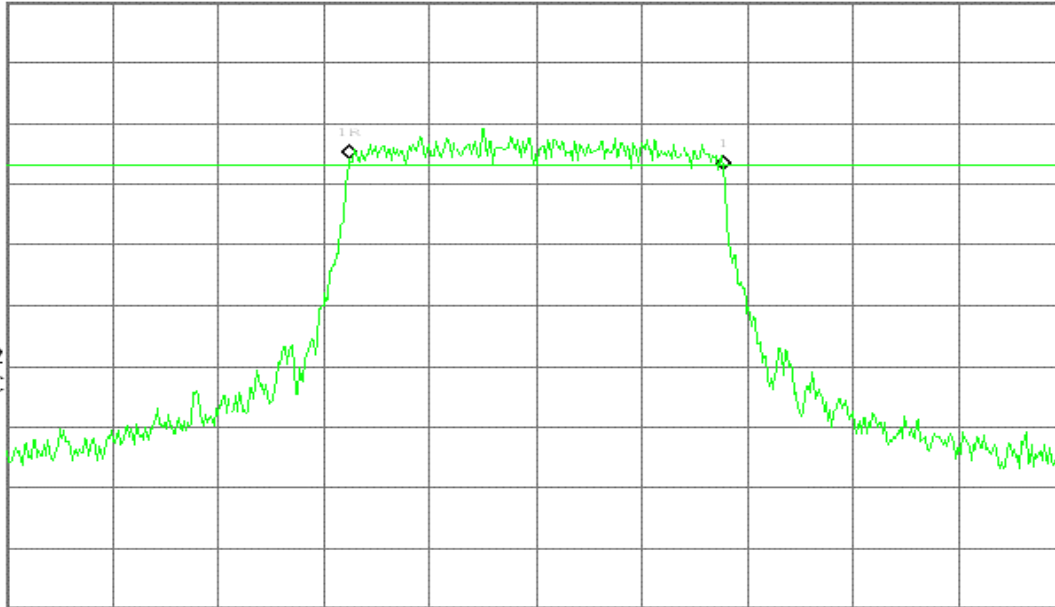
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.412 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

6dB Bandwidth (CH Mid)

* Agilent 14:40:50 Sep 4, 2008

R T

6dB BW, g Mode Mid Ch.

 Δ Mkr1 16.83 MHz

Ref 20 dBm

Atten 30 dB

0.16 dB

#Peak

Log

10

dB/

Offst

7.6

dB

DI

-5.9

dBm

LgAv

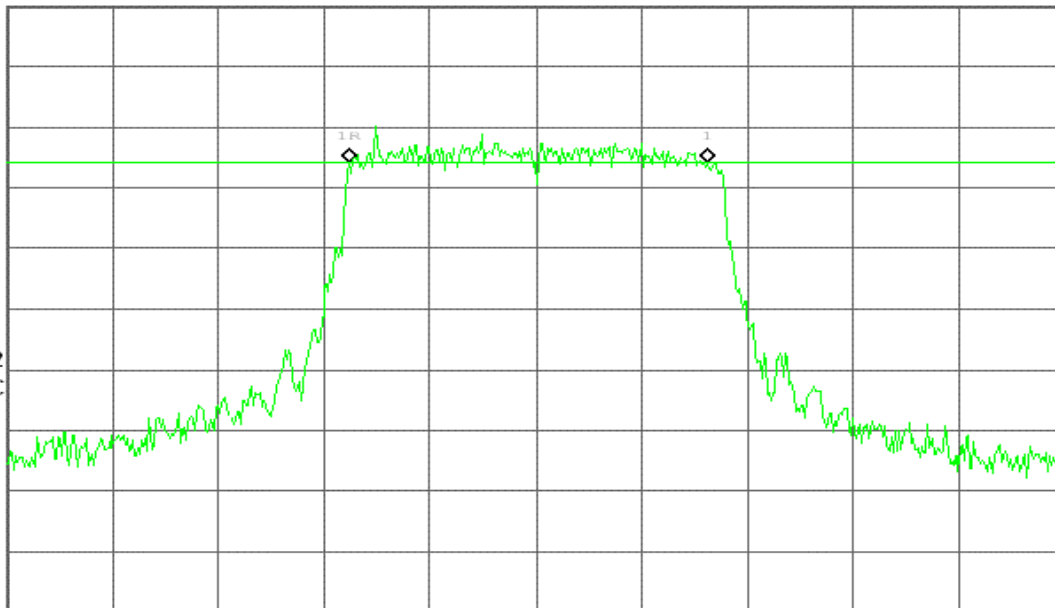
V1 S2

S3 FC

 $\alpha(f)$:

FTun

Swp



Center 2.437 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

**6dB Bandwidth (CH High)**

* Agilent 14:59:14 Sep 4, 2008

R T

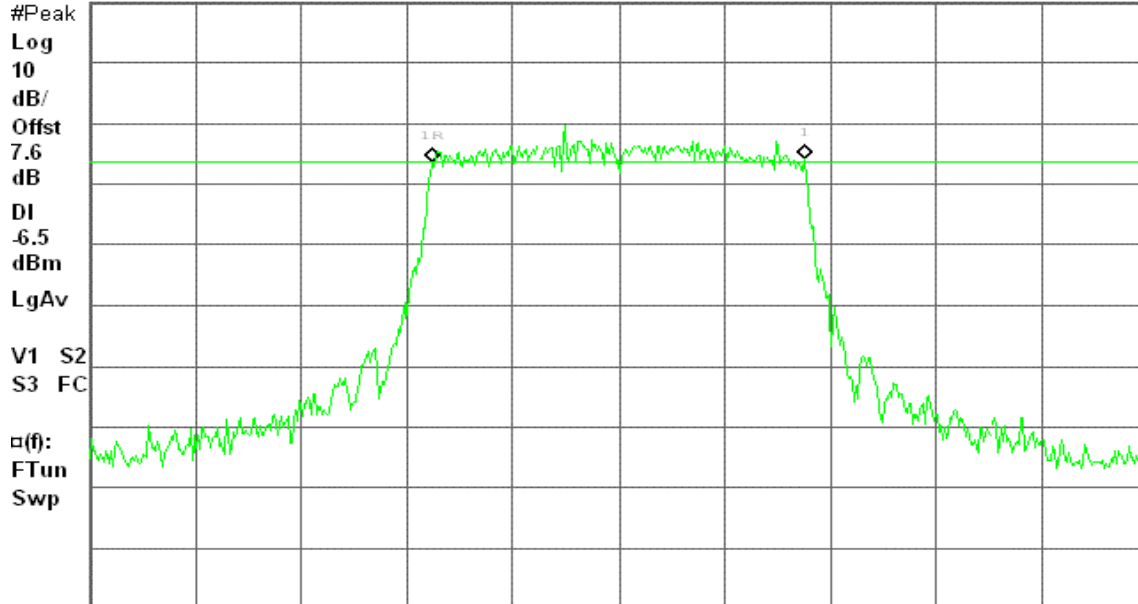
6dB BW, g Mode High Ch.

 Δ Mkr1 17.50 MHz

Ref 20 dBm

Atten 30 dB

0.49 dB



Center 2.462 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

draft 802.11n Wide-40 MHz Channel mode**6dB Bandwidth (CH Low)**

* Agilent 16:20:57 Sep 4, 2008

R T

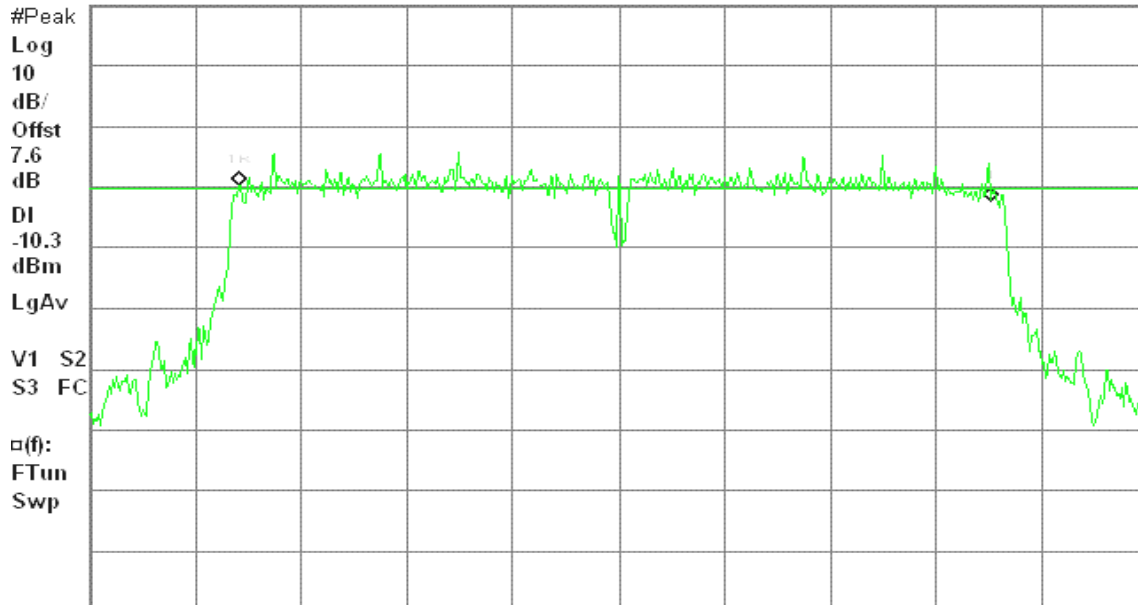
6dB BW, g Mode Low Ch.

 Δ Mkr1 35.50 MHz

Ref 20 dBm

Atten 30 dB

-2.57 dB



Center 2.422 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)



6dB Bandwidth (CH Mid)

Agilent 16:31:32 Sep 4, 2008

R T

6dB BW, g Mode Mid Ch.

 Δ Mkr1 35.08 MHz

Ref 20 dBm

Atten 30 dB

-0.09 dB

#Peak

Log

10

dB/

Offst

7.6

dB

DI

-10.2

dBm

LgAv

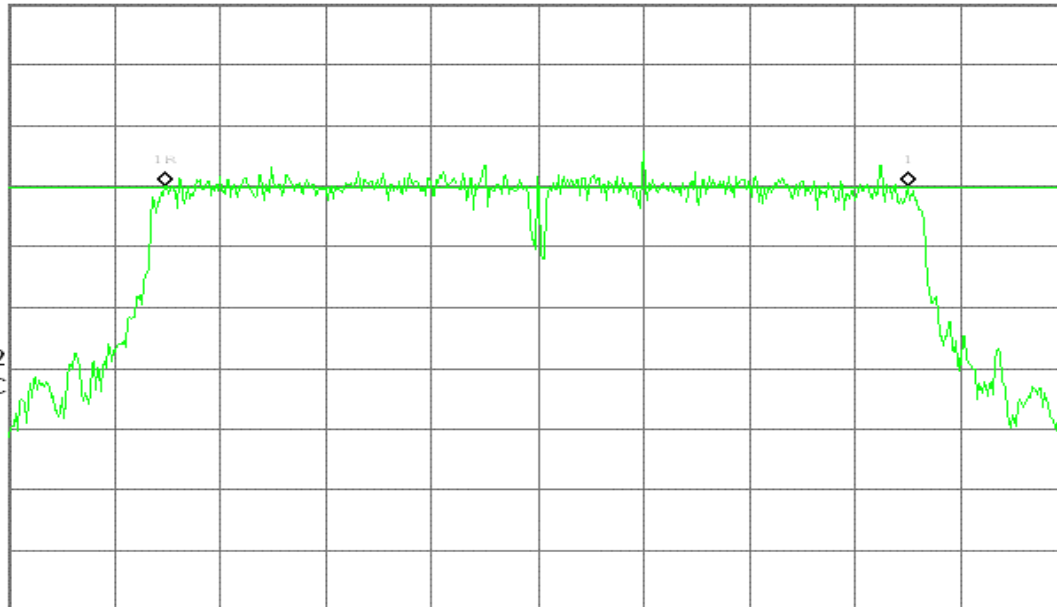
V1 S2

S3 FC

 $\square(f)$:

FTun

Swp



Center 2.437 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

6dB Bandwidth (CH High)

Agilent 16:47:14 Sep 4, 2008

R T

6dB BW, g Mode High Ch.

 Δ Mkr1 35.58 MHz

Ref 20 dBm

Atten 30 dB

1.01 dB

#Peak

Log

10

dB/

Offst

7.6

dB

DI

-12.1

dBm

LgAv

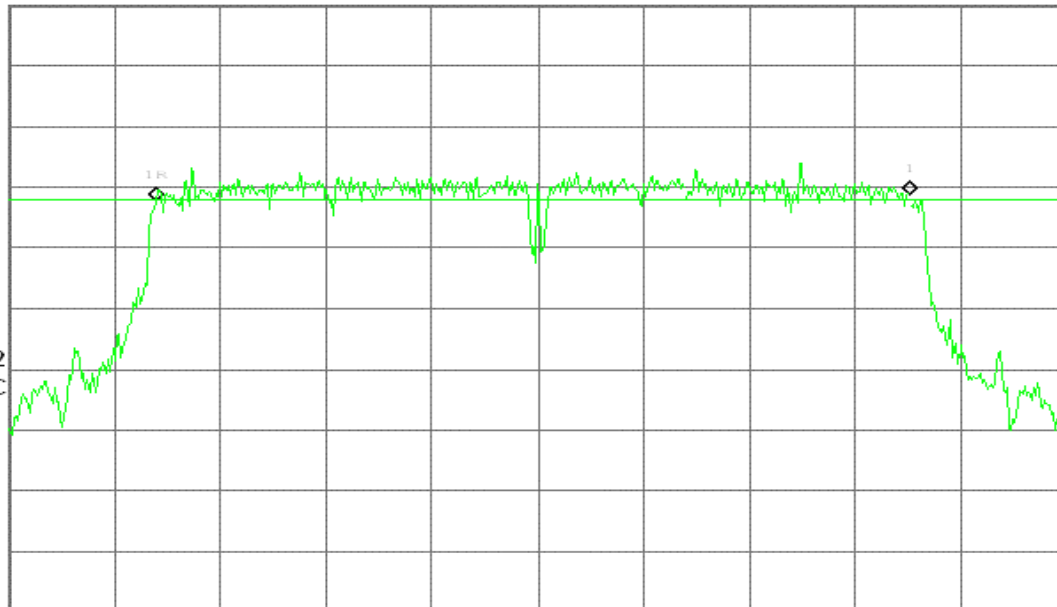
V1 S2

S3 FC

 $\square(f)$:

FTun

Swp



Center 2.452 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)



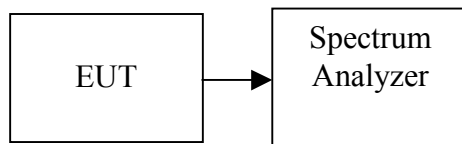
7.2 PEAK POWER

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

1. Peak power is measured using the spectrum analyzer's internal channel power integration function.
2. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

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	16.66	0.04634	1.00	PASS
Mid	2437	16.25	0.04217		PASS
High	2462	15.73	0.03741		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	17.58	0.05728	1.00	PASS
Mid	2437	17.37	0.05458		PASS
High	2462	16.68	0.04656		PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	16.31	0.04276	1.00	PASS
Mid	2437	16.26	0.04227		PASS
High	2462	15.80	0.03802		PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	14.24	0.02655	1.00	PASS
Mid	2437	14.11	0.02576		PASS
High	2452	13.28	0.02128		PASS

**Test Plot****IEEE 802.11b mode****Peak Power (CH Low)**

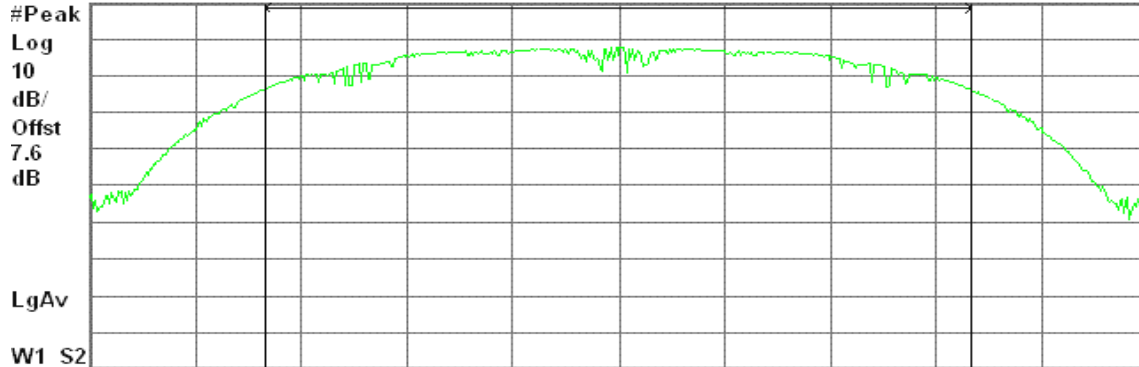
* Agilent 10:29:02 Sep 4, 2008

R T

Peak Output Power , b Mode Low Ch.

Ref 20 dBm

Atten 30 dB



Center 2.412 00 GHz

Span 22.48 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

16.66 dBm / 14.9850 MHz

-55.09 dBm/Hz

Peak Power (CH Mid)

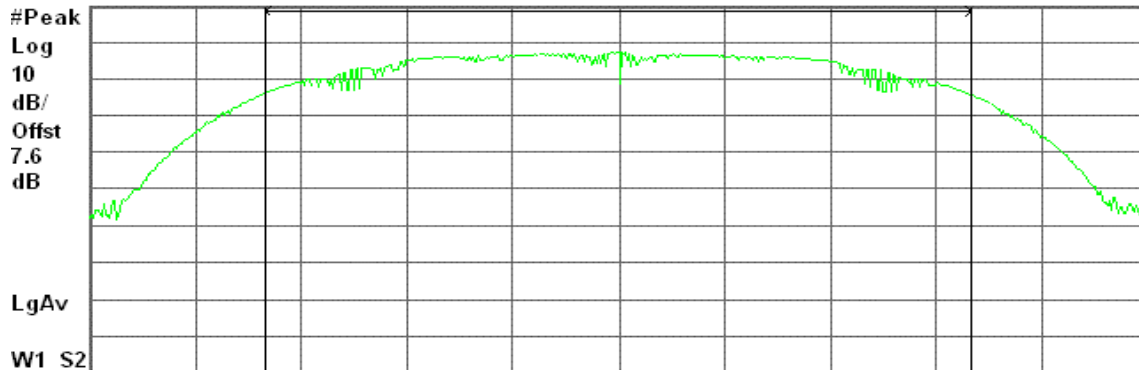
* Agilent 10:56:30 Sep 4, 2008

R T

Peak Output Power , b Mode Mid Ch.

Ref 20 dBm

Atten 30 dB



Center 2.437 00 GHz

Span 22.47 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

16.25 dBm / 14.9820 MHz

-55.51 dBm/Hz

**Peak Power (CH High)**

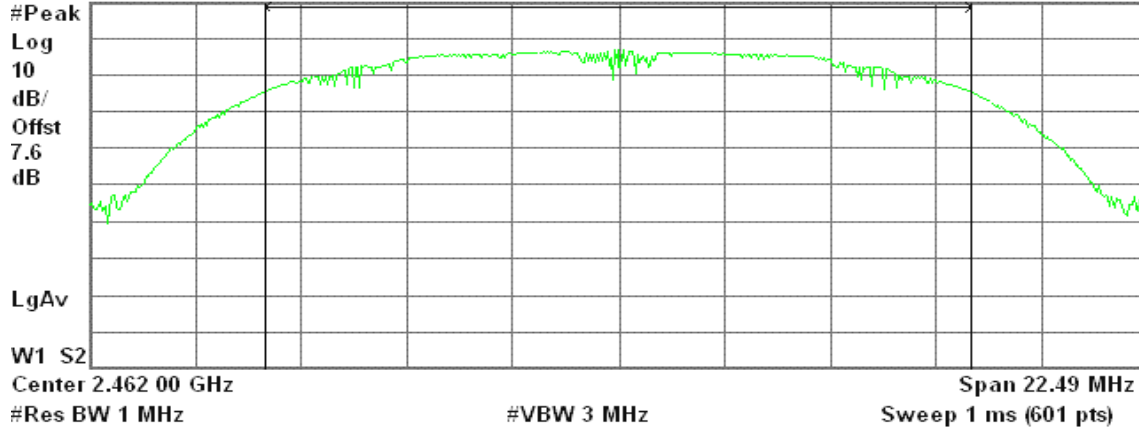
* Agilent 11:25:13 Sep 4, 2008

R T

Peak Output Power , b Mode High Ch.

Ref 20 dBm

Atten 30 dB



Channel Power

15.73 dBm / 14.9920 MHz

Power Spectral Density

-56.03 dBm/Hz

IEEE 802.11g mode**Peak Power (CH Low)**

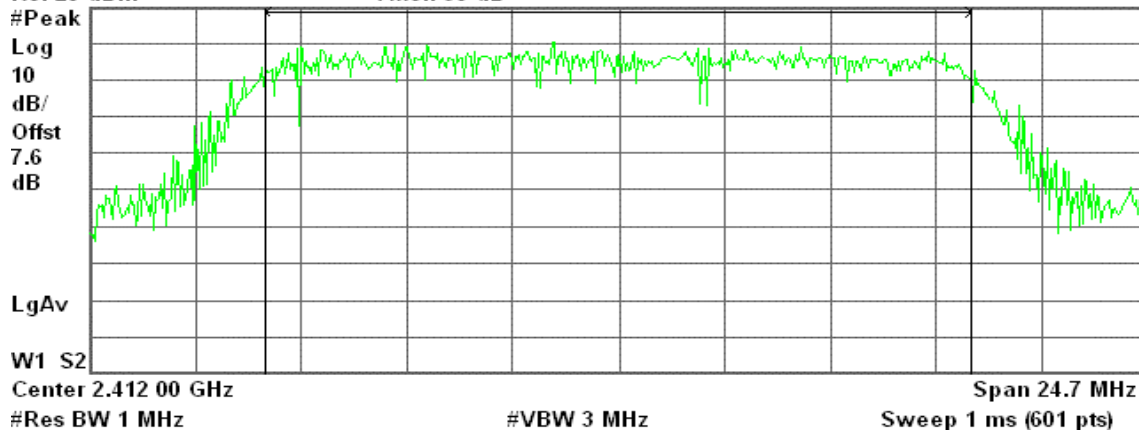
* Agilent 13:44:06 Sep 4, 2008

R T

Peak Output Power , g Mode Low Ch.

Ref 20 dBm

Atten 30 dB



Channel Power

17.58 dBm / 16.4690 MHz

Power Spectral Density

-54.58 dBm/Hz

**Peak Power (CH Mid)**

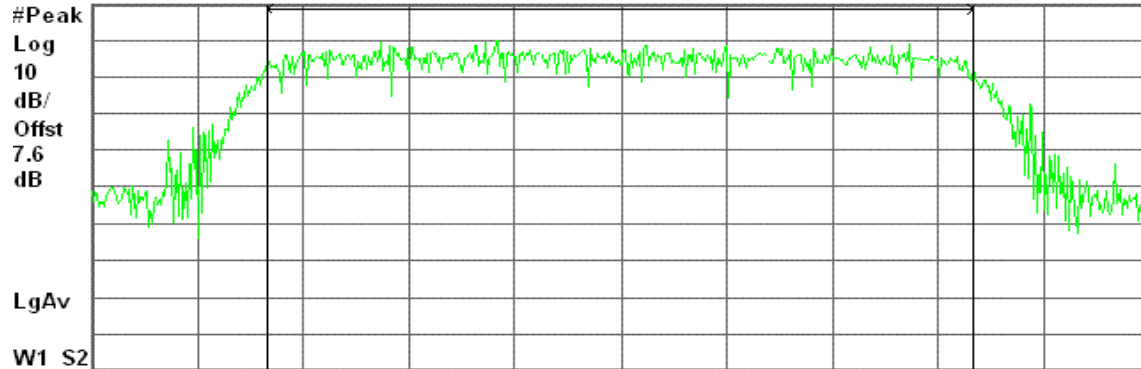
* Agilent 13:52:54 Sep 4, 2008

R T

Peak Output Power , g Mode Mid Ch.

Ref 20 dBm

Atten 30 dB



Center 2.437 00 GHz

Span 24.8 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

17.37 dBm / 16.5330 MHz

-54.81 dBm/Hz

Peak Power (CH High)

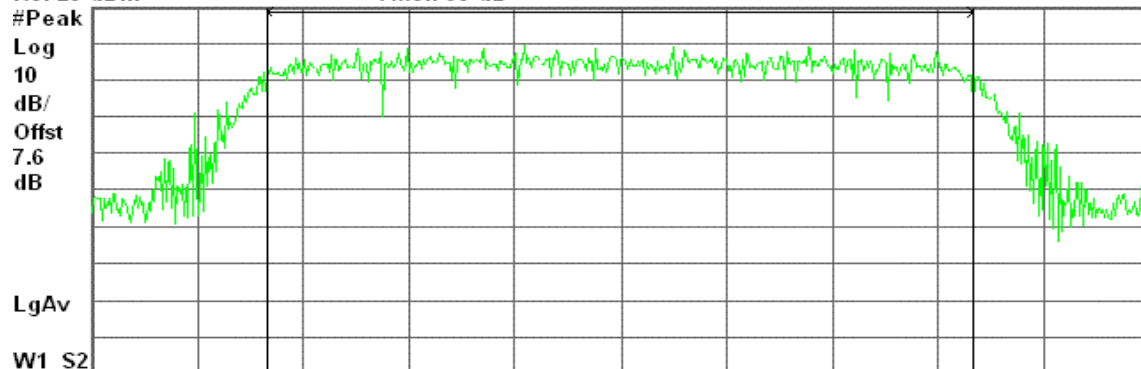
* Agilent 14:04:30 Sep 4, 2008

R T

Peak Output Power , g Mode High Ch.

Ref 20 dBm

Atten 30 dB



Center 2.462 00 GHz

Span 24.74 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

16.68 dBm / 16.4950 MHz

-55.49 dBm/Hz

**draft 802.11n Standard-20 MHz Channel mode****Peak Power (CH Low)**

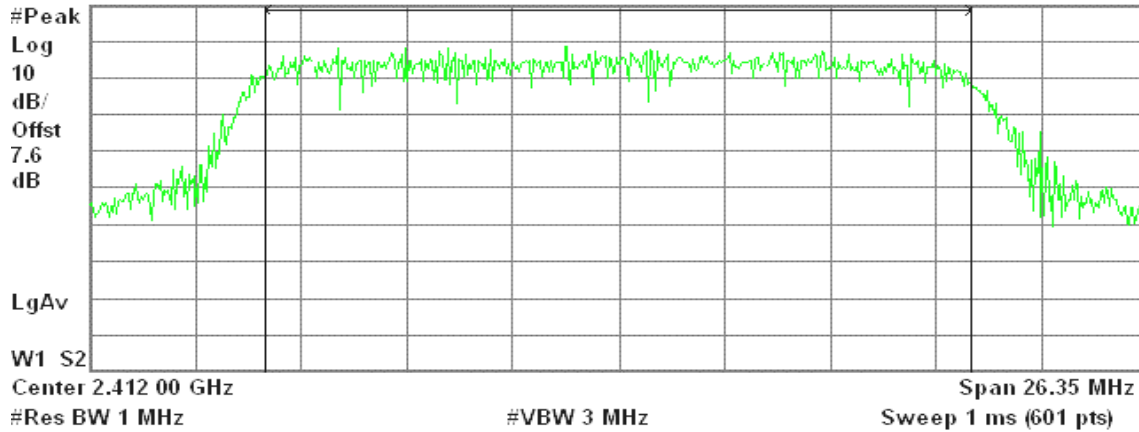
* Agilent 14:28:53 Sep 4, 2008

R T

Peak Output Power , g Mode Low Ch.

Ref 20 dBm

Atten 30 dB



Channel Power

Power Spectral Density

16.31 dBm / 17.5640 MHz

-56.13 dBm/Hz

Peak Power (CH Mid)

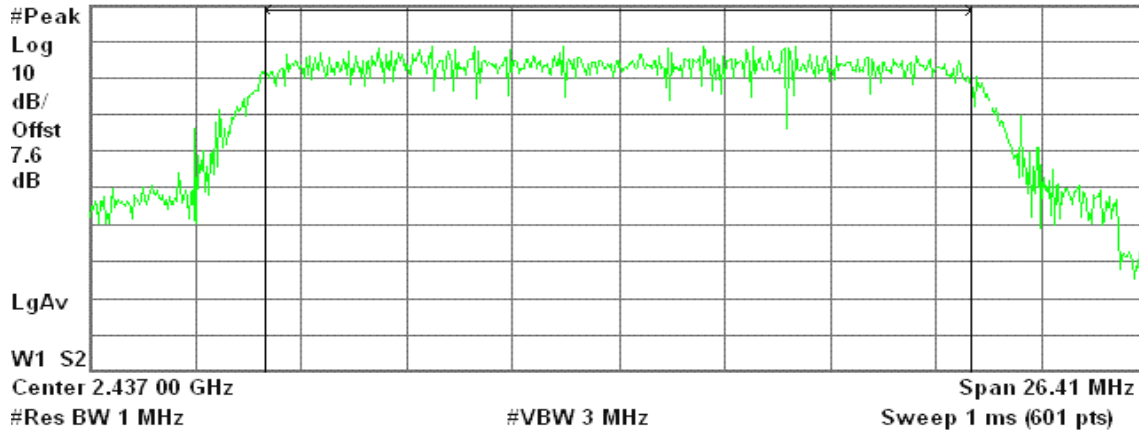
* Agilent 14:43:54 Sep 4, 2008

R T

Peak Output Power , g Mode Mid Ch.

Ref 20 dBm

Atten 30 dB



Channel Power

Power Spectral Density

16.26 dBm / 17.6080 MHz

-56.19 dBm/Hz

**Peak Power (CH High)**

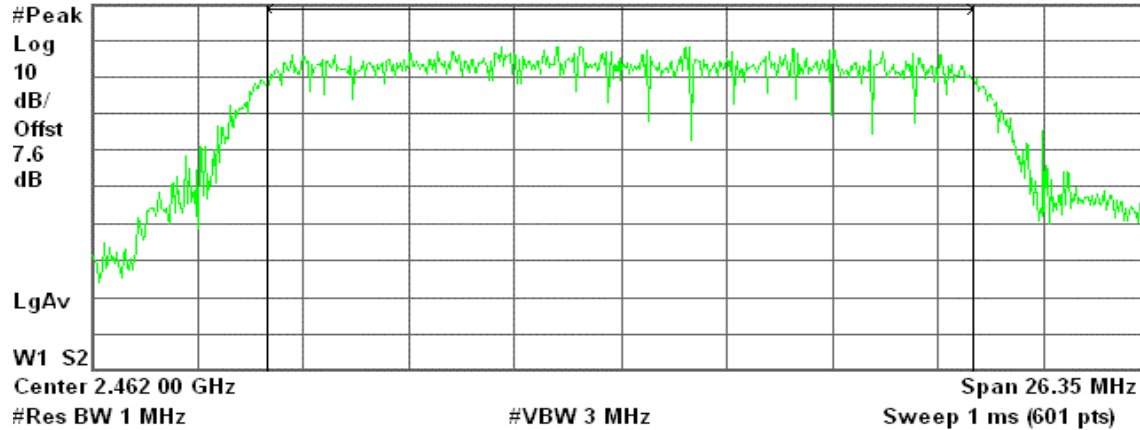
* Agilent 15:02:05 Sep 4, 2008

R T

Peak Output Power , g Mode High Ch.

Ref 20 dBm

Atten 30 dB



Channel Power

Power Spectral Density

15.80 dBm / 17.5680 MHz

-56.65 dBm/Hz

draft 802.11n Wide-40 MHz Channel mode**Peak Power (CH Low)**

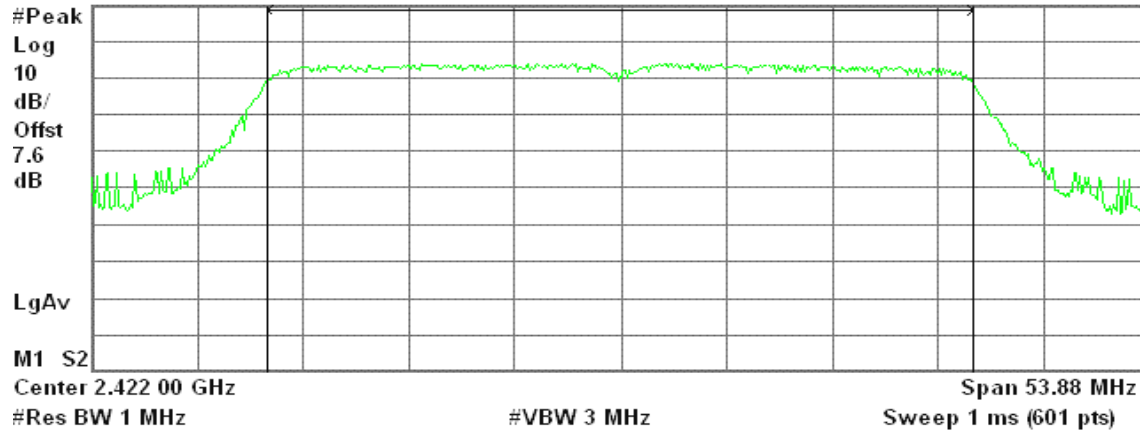
* Agilent 16:45:43 Sep 4, 2008

R T

Peak Output Power , g Mode Low Ch.

Ref 20 dBm

Atten 30 dB



Channel Power

Power Spectral Density

14.24 dBm / 35.9180 MHz

-61.31 dBm/Hz

**Peak Power (CH Mid)**

* Agilent 16:33:29 Sep 4, 2008

R T

Peak Output Power , g Mode Mid Ch.

Ref 20 dBm

Atten 30 dB



Center 2.437 00 GHz

Span 53.9 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

14.11 dBm / 35.9320 MHz

-61.44 dBm/Hz

Peak Power (CH High)

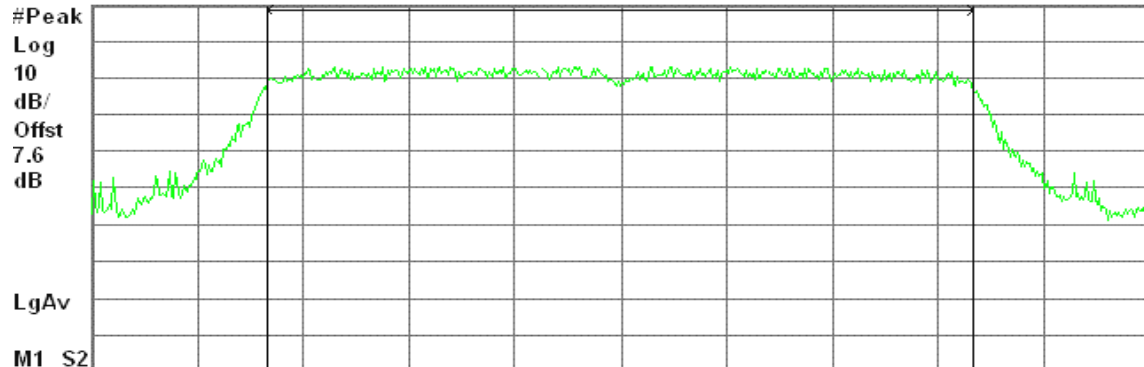
* Agilent 16:49:03 Sep 4, 2008

R T

Peak Output Power , g Mode High Ch.

Ref 20 dBm

Atten 30 dB



Center 2.452 00 GHz

Span 53.85 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

13.28 dBm / 35.9020 MHz

-62.27 dBm/Hz

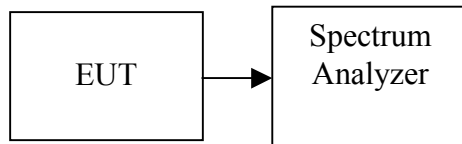


7.3 AVERAGE POWER

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	14.15	0.02600
Mid	2437	13.76	0.02377
High	2462	13.11	0.02046

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	14.06	0.02547
Mid	2437	14.07	0.02553
High	2462	13.51	0.02244

Test mode: draft 802.11n Standard-20 MHz Channel mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	13.04	0.02014
Mid	2437	13.28	0.02128
High	2462	12.47	0.01766

Test mode: draft 802.11n Wide-40 MHz Channel mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2422	10.93	0.01239
Mid	2437	10.63	0.01156
High	2452	10.13	0.01030



Test Plot

IEEE 802.11b mode

Average Power (CH Low)

* Agilent 10:31:42 Sep 4, 2008

R T

AVG Output Power , b Mode Low Ch.

Ref 30 dBm

Atten 40 dB

#Samp

Log

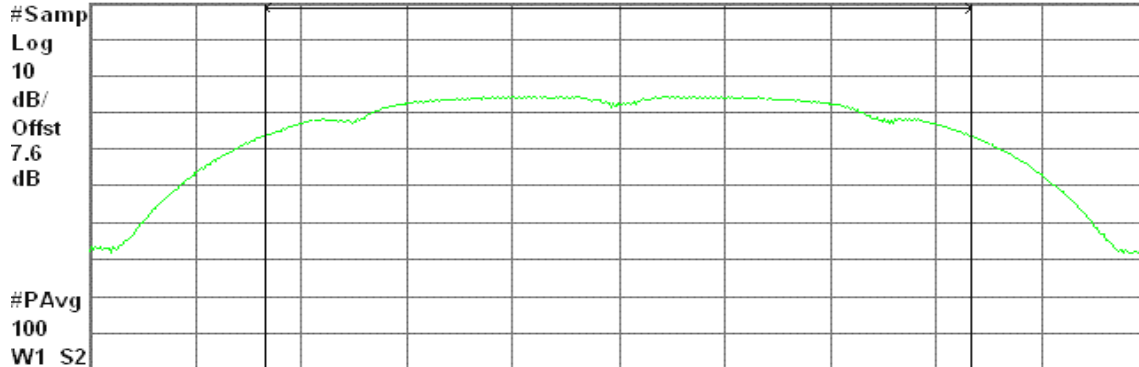
10

dB/

Offst

7.6

dB



Center 2.412 00 GHz

Span 22.48 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

14.15 dBm / 14.9850 MHz

-57.61 dBm/Hz

Average Power (CH Mid)

* Agilent 11:10:59 Sep 4, 2008

R T

AVG Output Power , b Mode Mid Ch.

Ref 30 dBm

Atten 40 dB

#Samp

Log

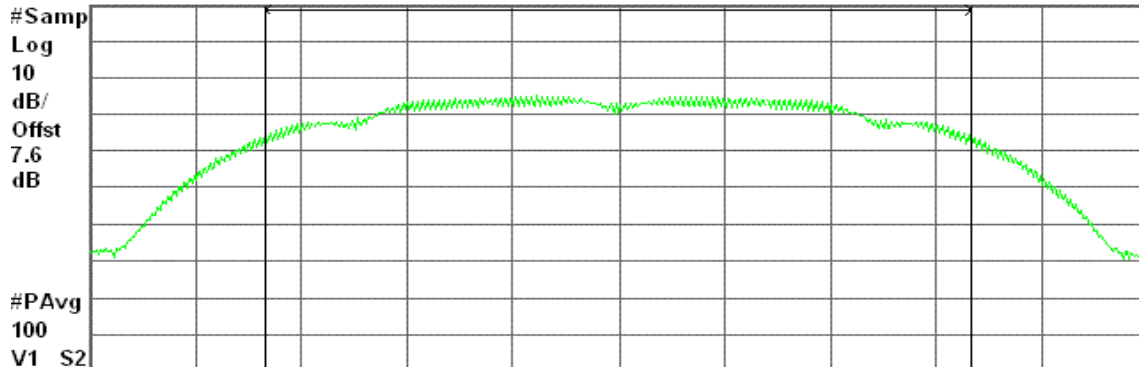
10

dB/

Offst

7.6

dB



Center 2.437 00 GHz

Span 22.47 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

13.76 dBm / 14.9820 MHz

-58.00 dBm/Hz

**Average Power (CH High)**

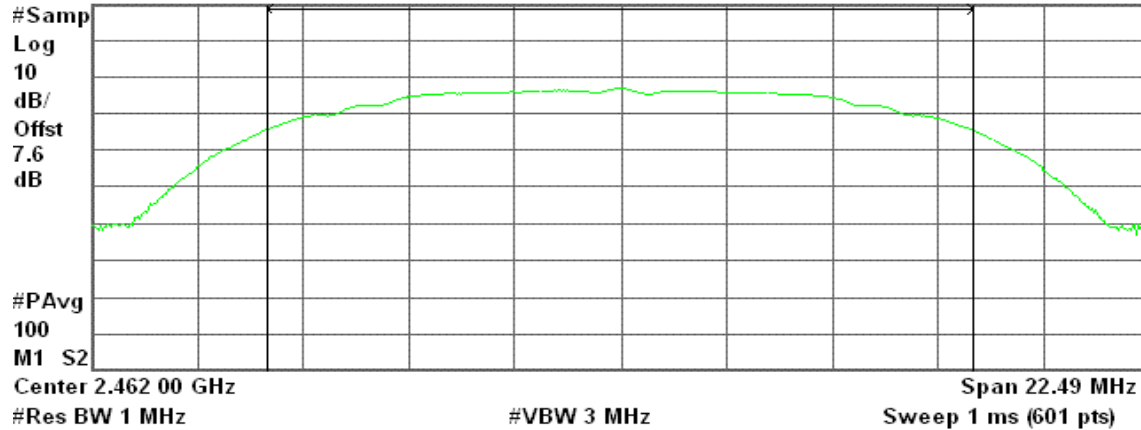
* Agilent 12:05:11 Sep 4, 2008

R T

AVG Output Power , b Mode High Ch.

Ref 30 dBm

Atten 40 dB



Channel Power

13.11 dBm / 14.9920 MHz

Power Spectral Density

-58.64 dBm/Hz

IEEE 802.11g mode**Average Power (CH Low)**

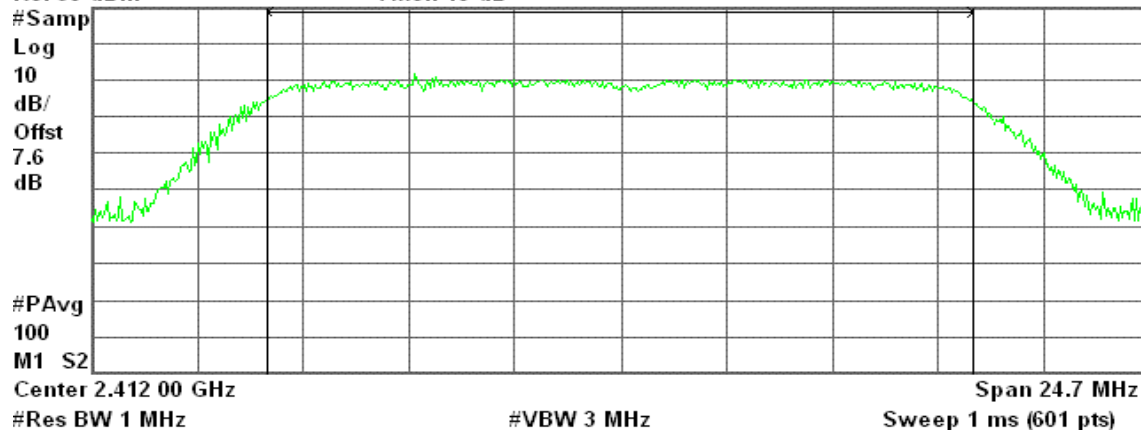
* Agilent 13:45:24 Sep 4, 2008

R T

AVG Output Power , g Mode Low Ch.

Ref 30 dBm

Atten 40 dB



Channel Power

14.06 dBm / 16.4690 MHz

Power Spectral Density

-58.11 dBm/Hz

**Average Power (CH Mid)**

* Agilent 13:54:38 Sep 4, 2008

R T

AVG Output Power , g Mode Mid Ch.

Ref 30 dBm

Atten 40 dB

#Samp

Log

10

dB/

Offst

7.6

dB

#PAvg

100

W1 S2

Center 2.437 00 GHz

#VBW 3 MHz

Span 24.8 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

14.07 dBm / 16.5330 MHz

-58.12 dBm/Hz

Average Power (CH High)

* Agilent 14:20:36 Sep 4, 2008

R T

AVG Output Power , g Mode High Ch.

Ref 30 dBm

Atten 40 dB

#Samp

Log

10

dB/

Offst

7.6

dB

#PAvg

100

W1 S2

Center 2.462 00 GHz

#VBW 3 MHz

Span 24.74 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

13.51 dBm / 16.4950 MHz

-58.66 dBm/Hz

**draft 802.11n Standard-20 MHz Channel mode****Average Power (CH Low)**

* Agilent 14:31:26 Sep 4, 2008

R T

AVG Output Power , g Mode Low Ch.

Ref 30 dBm

Atten 40 dB

#Samp

Log

10

dB/

Offst

7.6

dB

#PAvg

100

V1 S2

Center 2.412 00 GHz

Span 26.35 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

13.04 dBm / 17.5640 MHz

-59.40 dBm/Hz

Average Power (CH Mid)

* Agilent 14:57:32 Sep 4, 2008

R T

AVG Output Power , g Mode Mid Ch.

Ref 30 dBm

Atten 40 dB

#Samp

Log

10

dB/

Offst

7.6

dB

#PAvg

100

W1 S2

Center 2.437 00 GHz

Span 26.41 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

13.28 dBm / 17.6080 MHz

-59.18 dBm/Hz

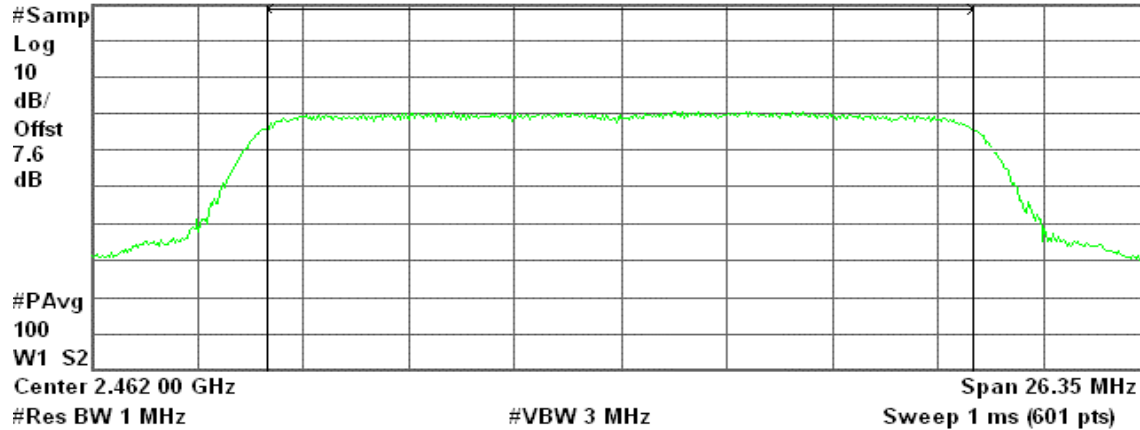
**Average Power (CH High)**

✱ Agilent 15:04:01 Sep 4, 2008
AVG Output Power , g Mode High Ch.

R T

Ref 30 dBm

Atten 40 dB



Channel Power

12.47 dBm / 17.5680 MHz

Power Spectral Density

-59.97 dBm/Hz

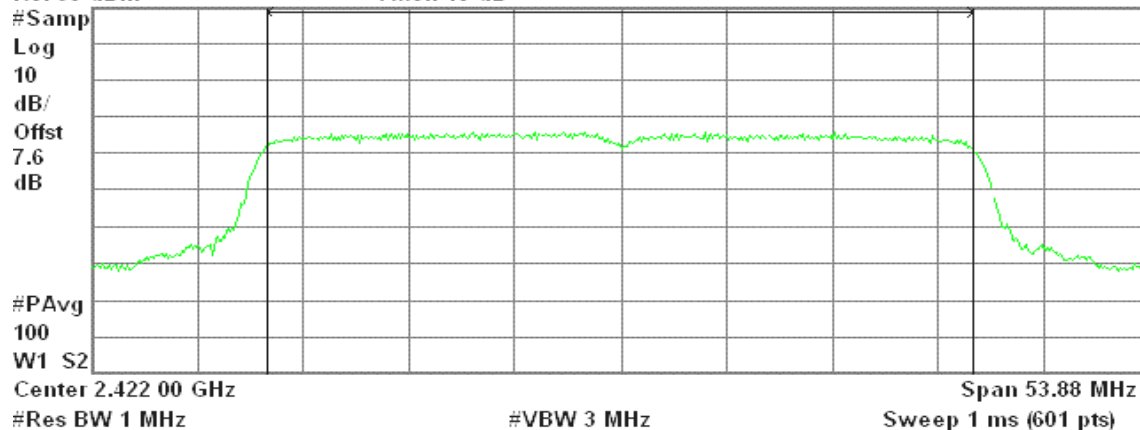
draft 802.11n Wide-40 MHz Channel mode**Average Power (CH Low)**

✱ Agilent 16:25:42 Sep 4, 2008
AVG Output Power , g Mode Low Ch.

R T

Ref 30 dBm

Atten 40 dB



Channel Power

10.93 dBm / 35.9180 MHz

Power Spectral Density

-64.62 dBm/Hz

**Average Power (CH Mid)**

* Agilent 16:36:39 Sep 4, 2008

R T

AVG Output Power , g Mode Mid Ch.

Ref 30 dBm

Atten 40 dB

#Samp

Log

10

dB/

Offst

7.6

dB

#PAvg

100

W1 S2

Center 2.437 00 GHz

VBW 3 MHz

Span 53.9 MHz

Sweep 1 ms (601 pts)

Channel Power

10.63 dBm / 35.9320 MHz

Power Spectral Density

-64.93 dBm/Hz

Average Power (CH High)

* Agilent 16:50:43 Sep 4, 2008

R T

AVG Output Power , g Mode High Ch.

Ref 30 dBm

Atten 40 dB

#Samp

Log

10

dB/

Offst

7.6

dB

#PAvg

100

W1 S2

Center 2.452 00 GHz

#VBW 3 MHz

Span 53.85 MHz

Sweep 1 ms (601 pts)

Channel Power

10.13 dBm / 35.9020 MHz

Power Spectral Density

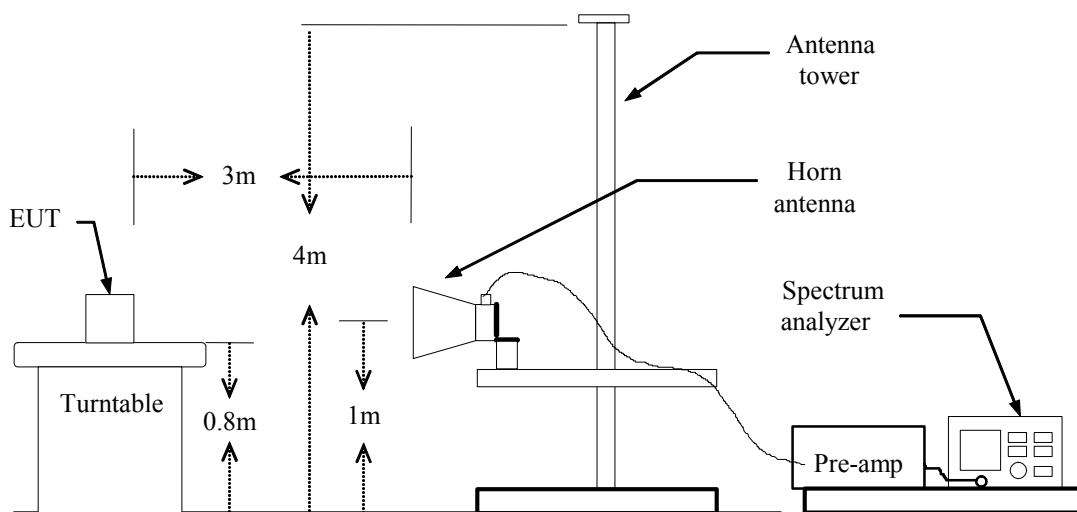
-65.42 dBm/Hz

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

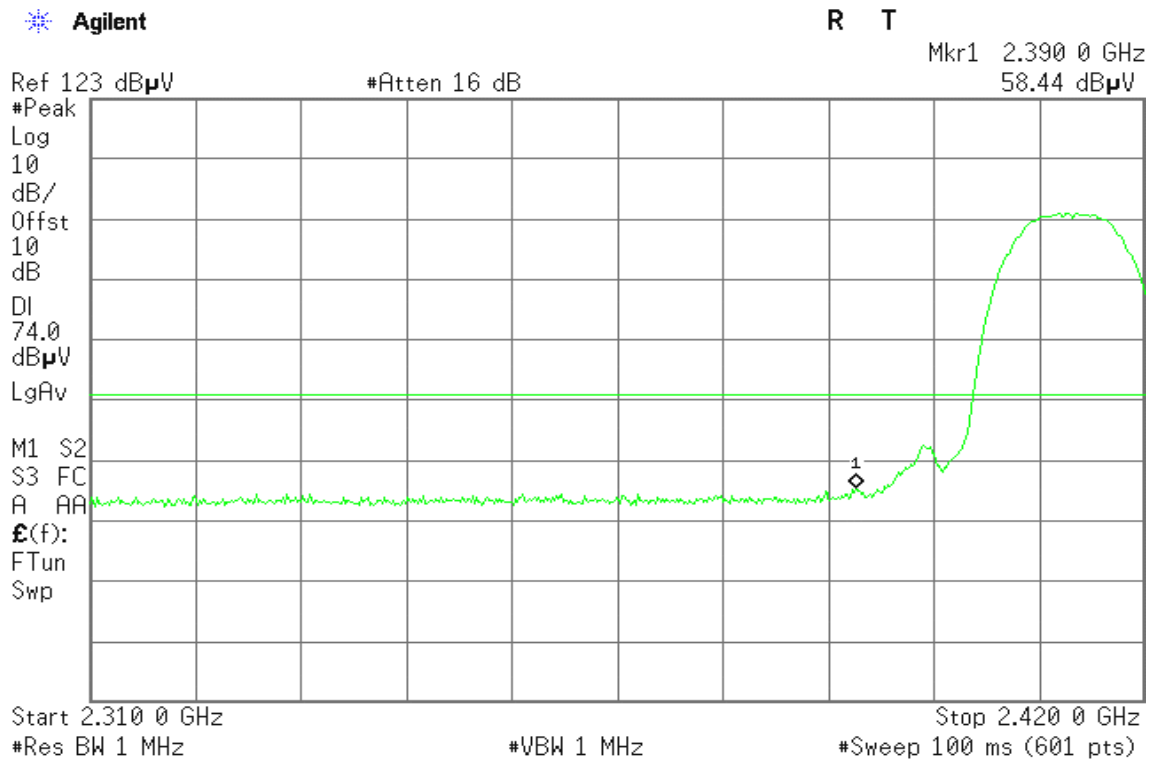
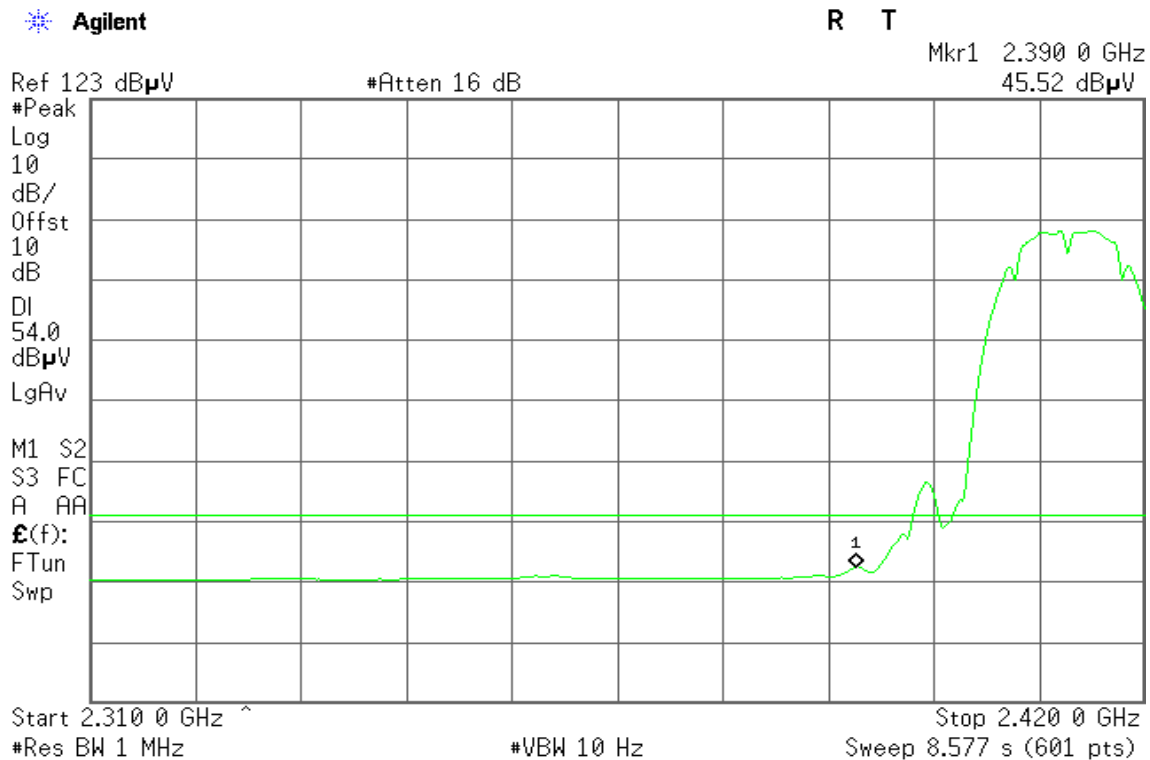


TEST PROCEDURE

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.

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

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

* Agilent

R T

Mkr1 2.390 0 GHz
56.31 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.310 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.420 0 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Horizontal**

* Agilent

R T

Mkr1 2.390 0 GHz
43.894 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.310 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.420 0 GHz

Sweep 8.577 s (601 pts)

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

Agilent

R T

Mkr1 2.483 50 GHz
58.16 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

 $\mathcal{E}(f)$:

FTun

Swp

Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Vertical**

Agilent

R T

Mkr1 2.483 50 GHz
45.71 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

 $\mathcal{E}(f)$:

FTun

Swp

Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 3.119 s (601 pts)



Detector mode: Peak

Polarity: Horizontal

Agilent

R T

Mkr1 2.483 50 GHz
55.94 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

Agilent

R T

Mkr1 2.483 50 GHz
44.336 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

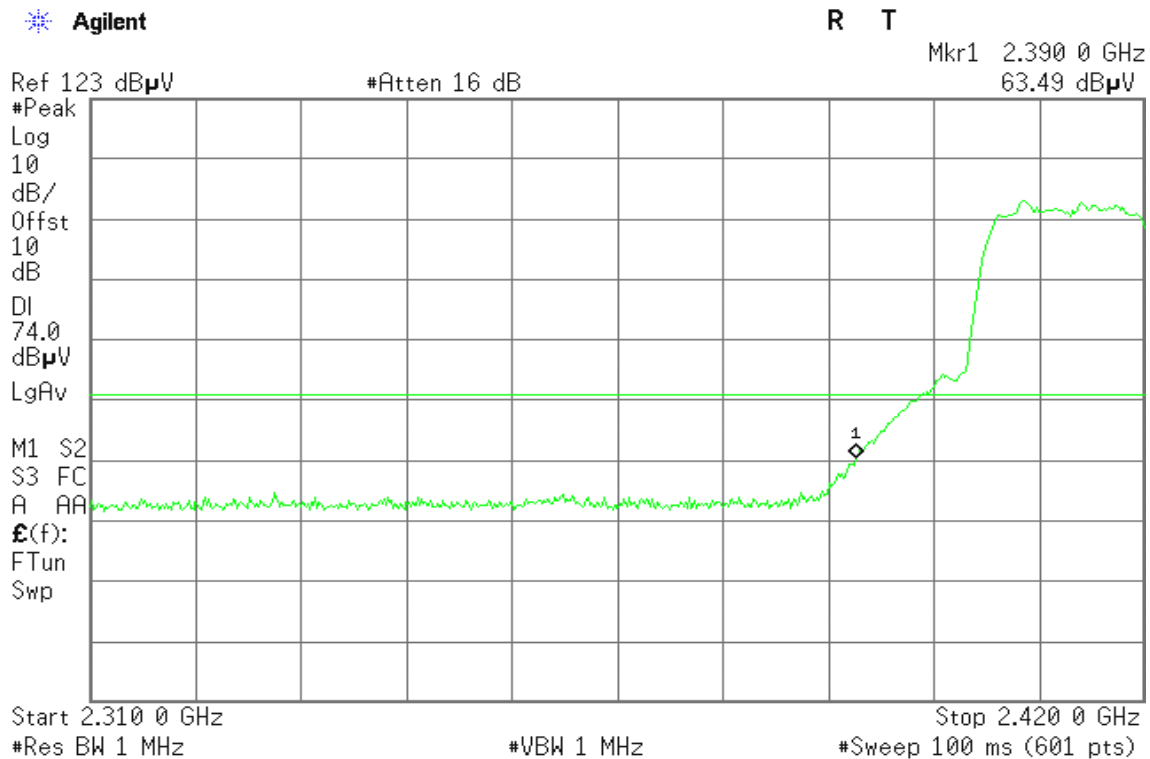
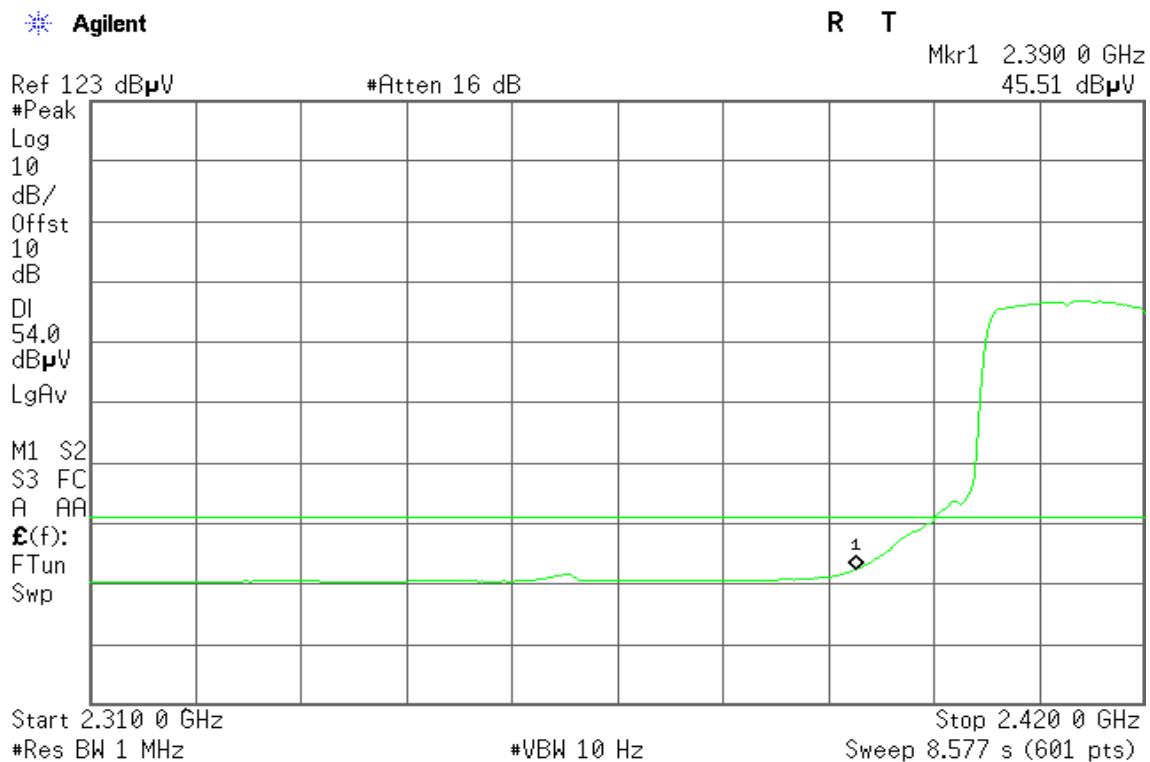
Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 3.119 s (601 pts)

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



Detector mode: Peak

Polarity: Horizontal

Agilent

R T

Mkr1 2.390 0 GHz
58.68 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.310 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.420 0 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

Agilent

R T

Mkr1 2.390 0 GHz
43.94 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.310 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.420 0 GHz

Sweep 8.577 s (601 pts)

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

* Agilent

R T

Mkr1 2.483 57 GHz
72.04 dB μ VRef 117 dB μ V

#Atten 10 dB

Peak

Log

10

dB/

Offst

10

dB

DI

74.0

dB μ V

LgAv

M1 S2

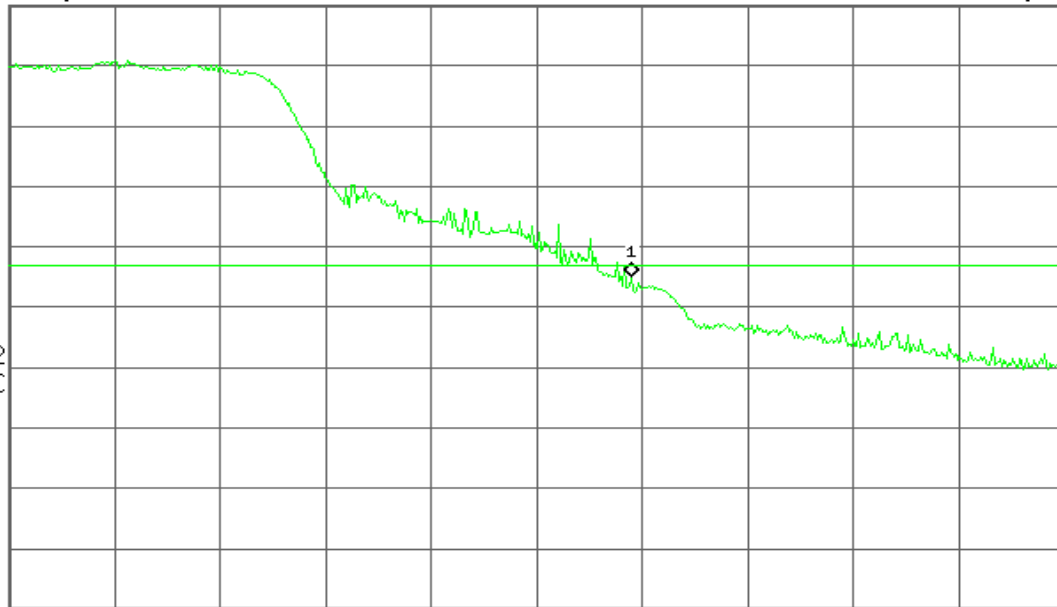
S3 FC

A

 $\mathcal{E}(f)$:

FTun

Swp



Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Vertical**

* Agilent

R T

Mkr1 2.483 50 GHz
50.88 dB μ VRef 117 dB μ V

#Atten 10 dB

Peak

Log

10

dB/

Offst

10

dB

DI

54.0

dB μ V

LgAv

M1 S2

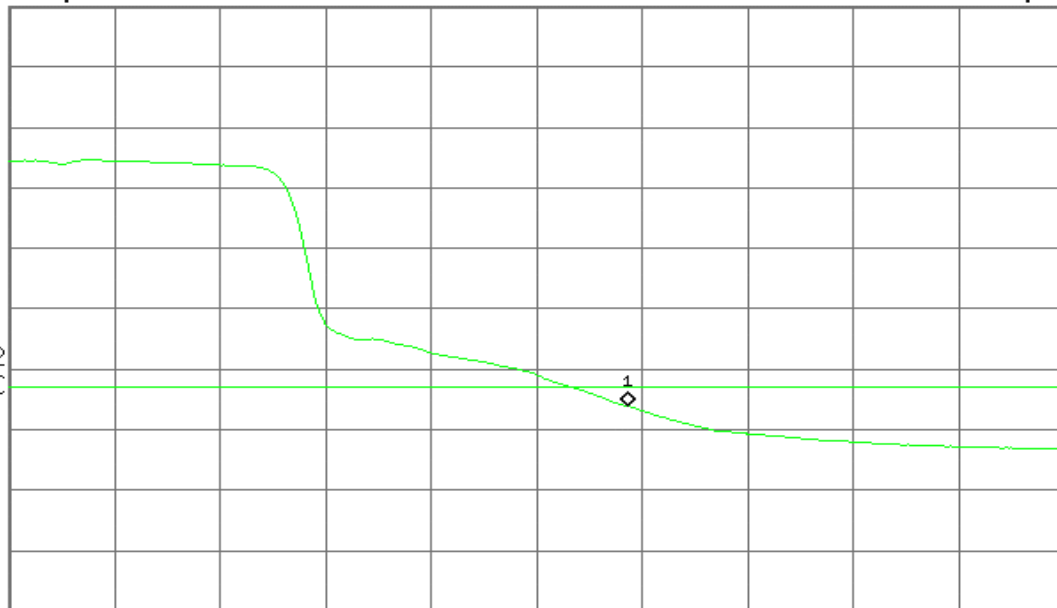
S3 FC

A

 $\mathcal{E}(f)$:

FTun

Swp



Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 3.119 s (601 pts)



Detector mode: Peak

Polarity: Horizontal

Agilent

R T

Mkr1 2.483 50 GHz
62.12 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

Agilent

R T

Mkr1 2.483 50 GHz
46.10 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

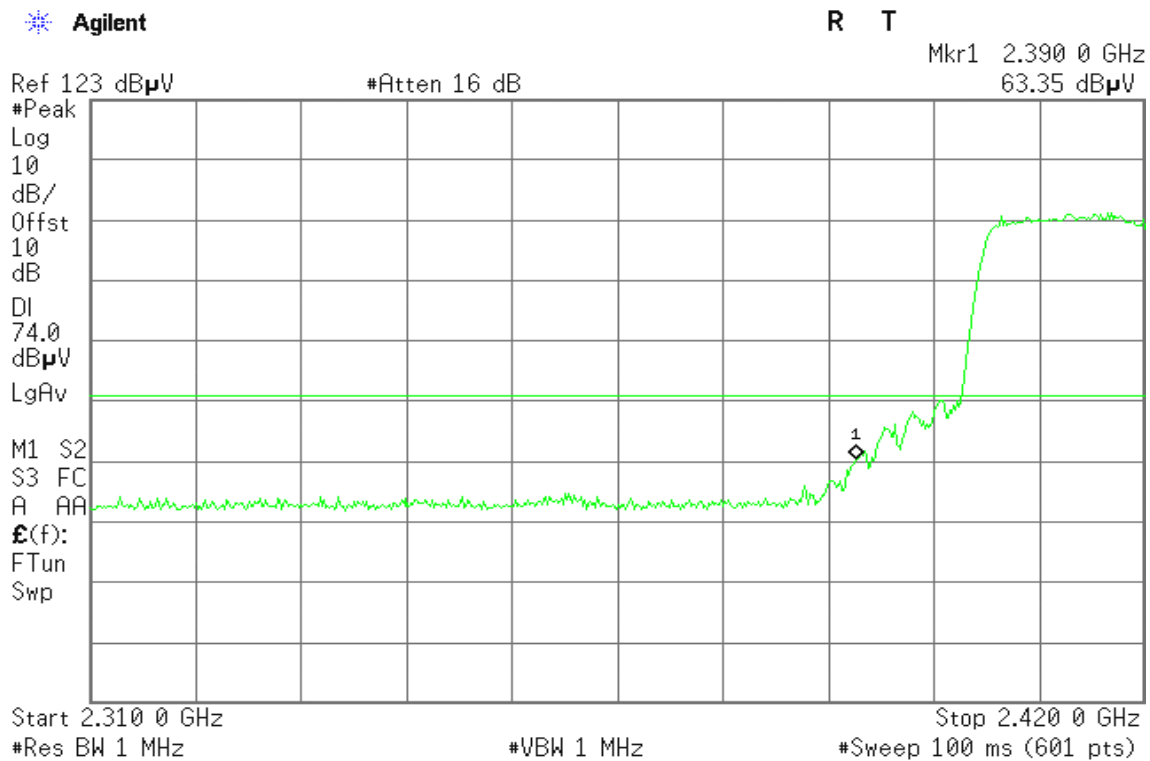
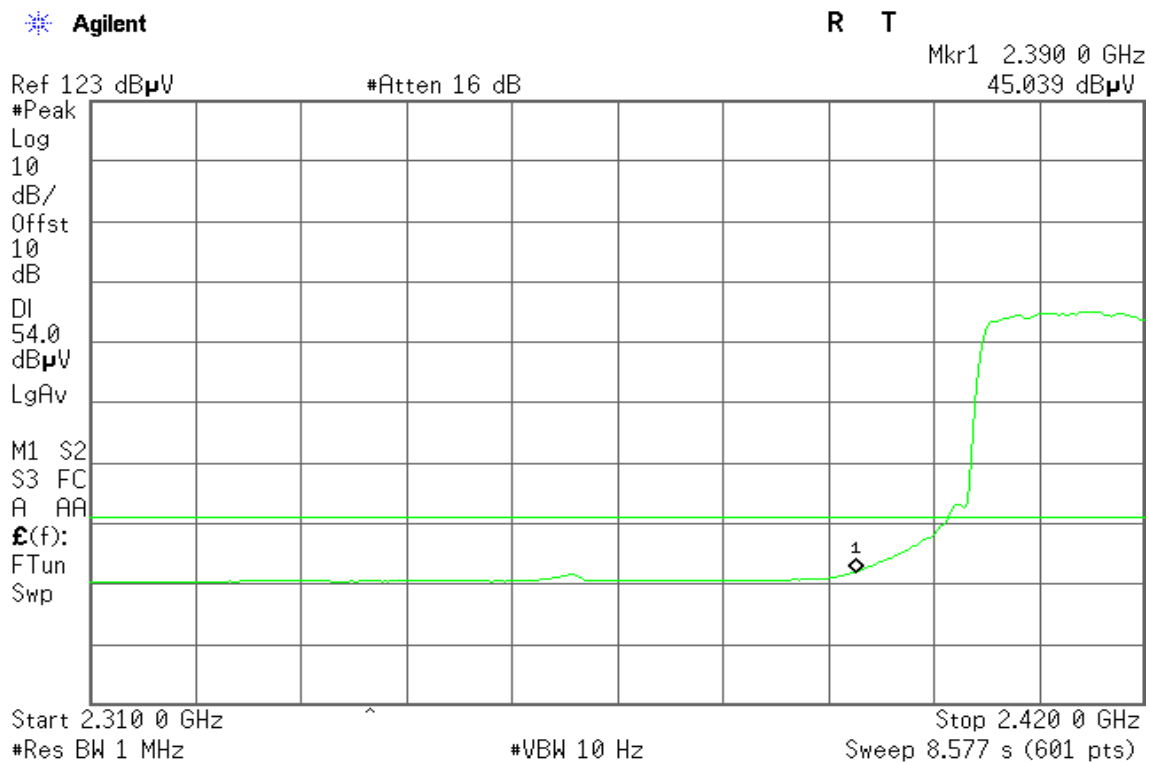
Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 3.119 s (601 pts)

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



Detector mode: Peak

Polarity: Horizontal

Agilent

R T

Mkr1 2.390 0 GHz
57.81 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.310 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.420 0 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

Agilent

R T

Mkr1 2.390 0 GHz
43.77 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.310 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.420 0 GHz

Sweep 8.577 s (601 pts)

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

* Agilent

R T

Mkr1 2.483 50 GHz

69.99 dB μ VRef 117 dB μ V

#Atten 10 dB

Peak

Log

10

dB/

Offst

10

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A

E(f):

FTun

Swp

Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Vertical**

* Agilent

R T

Mkr1 2.483 50 GHz

48.97 dB μ VRef 117 dB μ V

#Atten 10 dB

Peak

Log

10

dB/

Offst

10

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A

E(f):

FTun

Swp

Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 3.119 s (601 pts)



Detector mode: Peak

Polarity: Horizontal

Agilent

R T

Mkr1 2.483 50 GHz
62.60 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

Agilent

R T

Mkr1 2.483 50 GHz
45.32 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.460 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

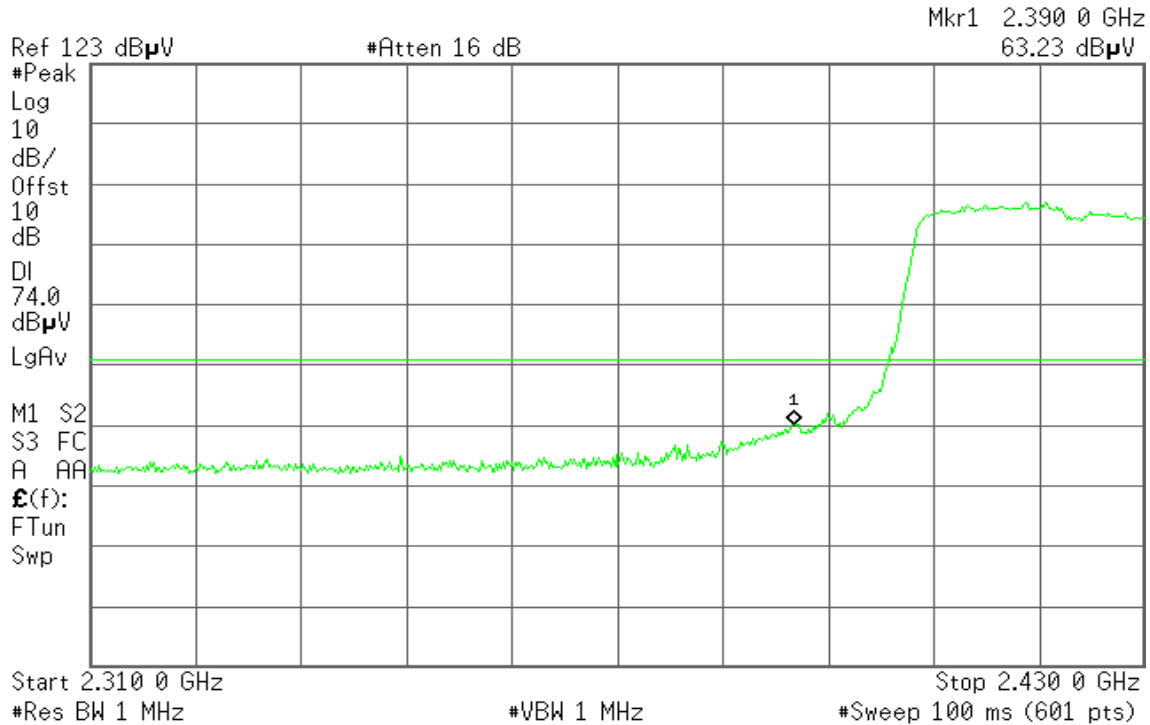
Stop 2.500 00 GHz

Sweep 3.119 s (601 pts)

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

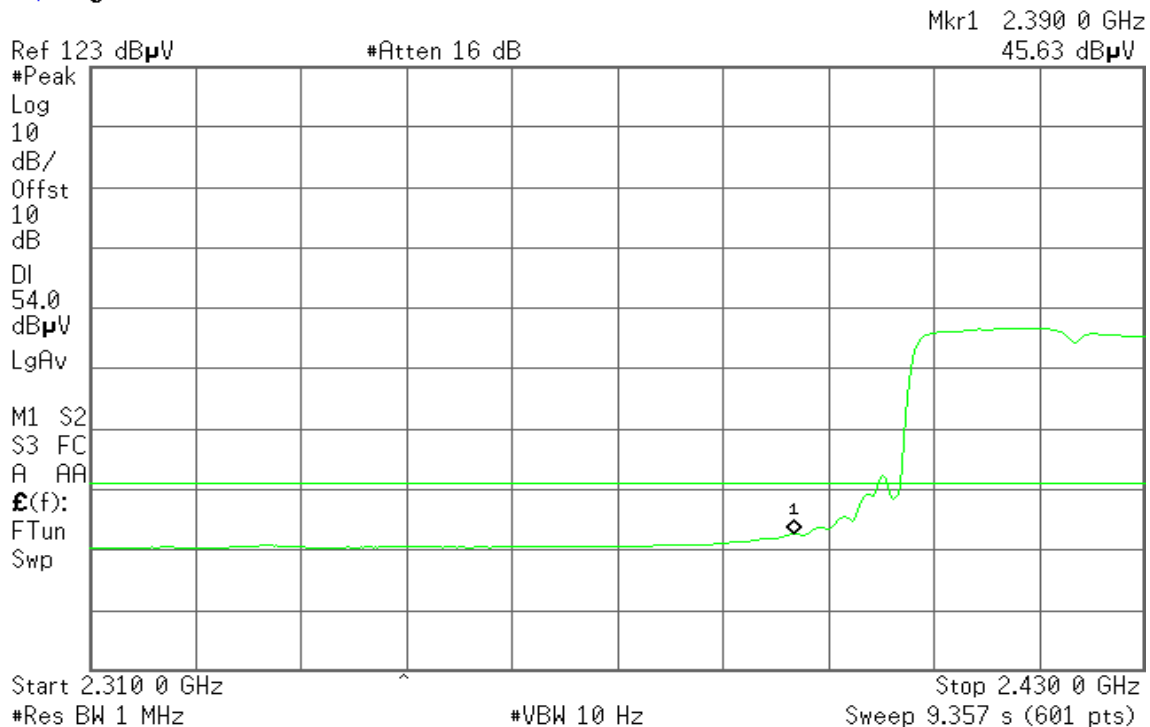
* Agilent

R T

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

* Agilent

R T





Detector mode: Peak

Polarity: Horizontal

Agilent

R T

Mkr1 2.390 0 GHz
56.17 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

74.0

dB μ V

LgAv

M1 S2

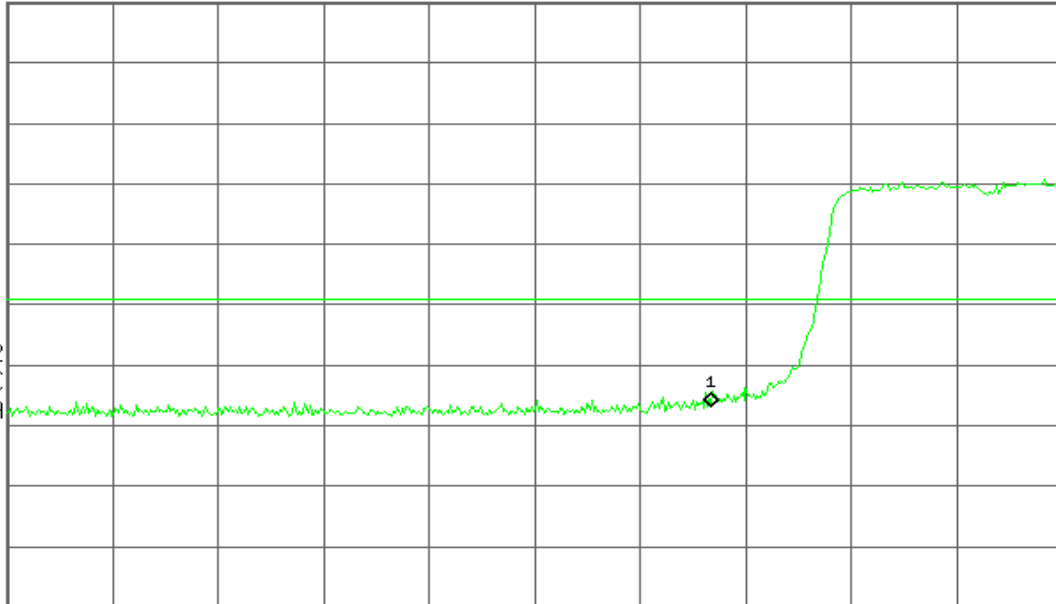
S3 FC

A AA

E(f):

FTun

Swp



Start 2.310 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.430 0 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

Agilent

R T

Mkr1 2.390 0 GHz
43.80 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

54.0

dB μ V

LgAv

M1 S2

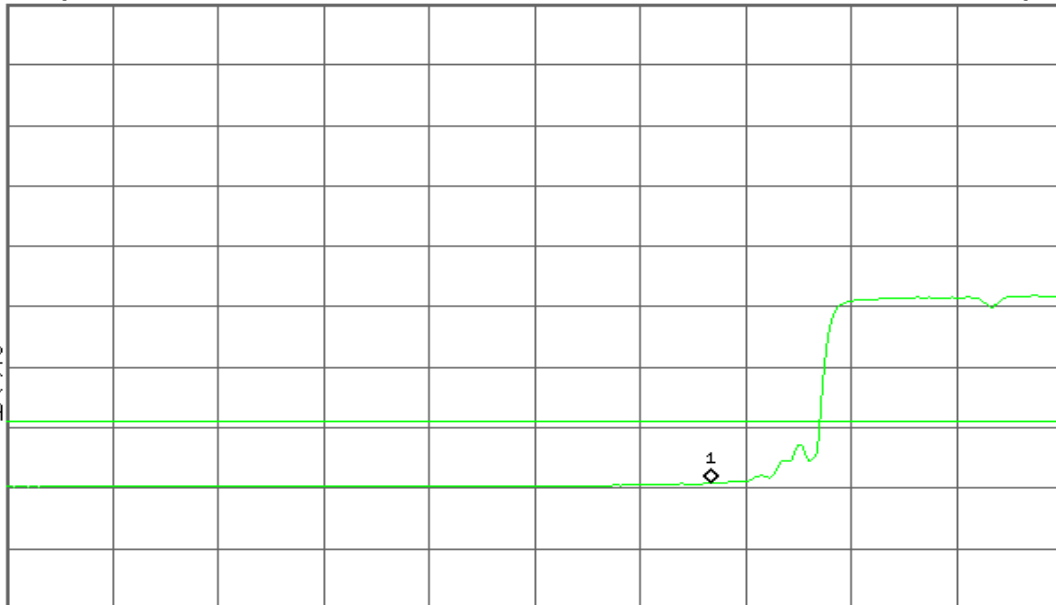
S3 FC

A AA

E(f):

FTun

Swp



Start 2.310 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.430 0 GHz

Sweep 9.357 s (601 pts)

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

* Agilent

R T

Mkr1 2.483 50 GHz
64.99 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.450 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Vertical**

* Agilent

R T

Mkr1 2.483 50 GHz
45.76 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.450 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 3.899 s (601 pts)

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

* Agilent

R T

Mkr1 2.483 50 GHz
60.58 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

74.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.450 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average**Polarity: Horizontal**

* Agilent

R T

Mkr1 2.483 50 GHz
44.31 dB μ VRef 123 dB μ V

#Atten 16 dB

#Peak

Log

10

dB/

Offst

10

dB

DI

54.0

dB μ V

LgAv

M1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.450 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

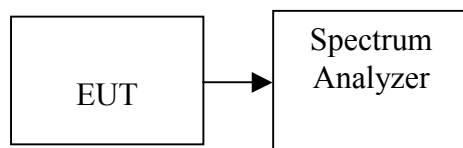
Sweep 3.899 s (601 pts)

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 = 3 kHz, VBW = 10 kHz, Span = 300 kHz, Sweep time = 100 s
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	0.87	8.00	PASS
Mid	2437	1.33		PASS
High	2462	1.02		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-8.35	8.00	PASS
Mid	2437	-8.79		PASS
High	2462	-9.35		PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-8.68	8.00	PASS
Mid	2437	-9.08		PASS
High	2462	-9.55		PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode

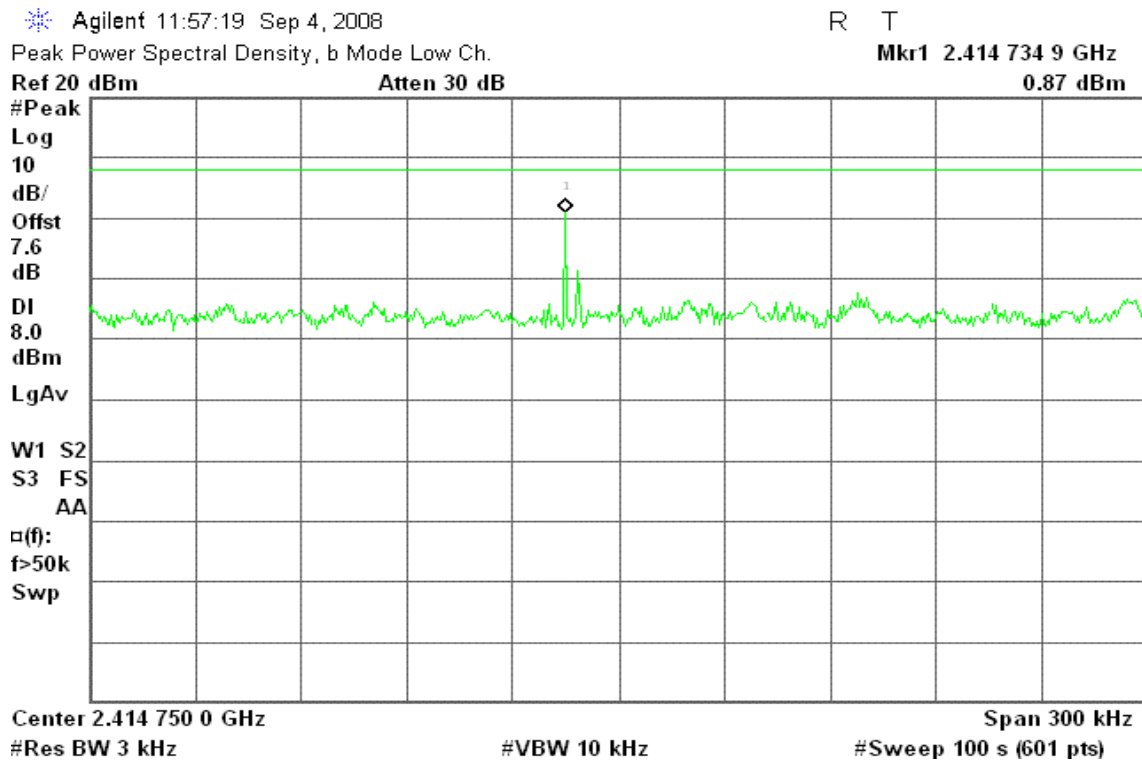
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2422	-9.45	8.00	PASS
Mid	2437	-9.73		PASS
High	2452	-10.42		PASS



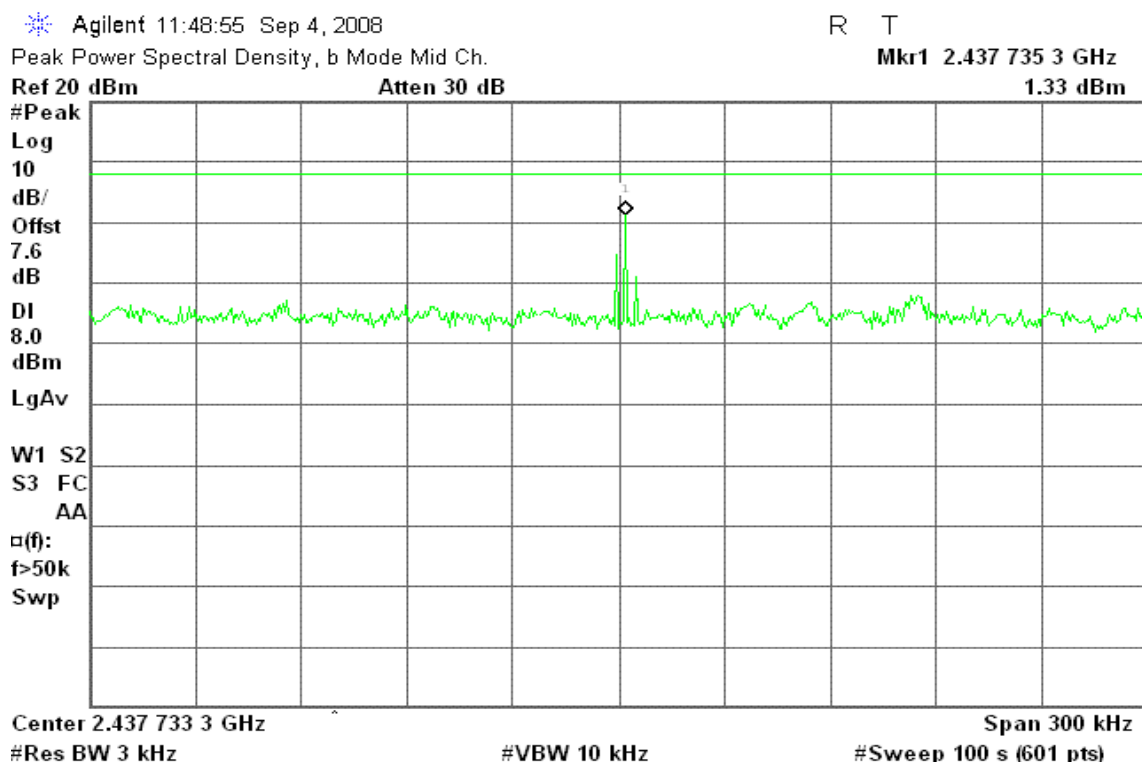
Test Plot

IEEE 802.11b mode

PPSD (CH Low)



PPSD (CH Mid)



**PPSD (CH High)**

* Agilent 11:44:31 Sep 4, 2008

R T

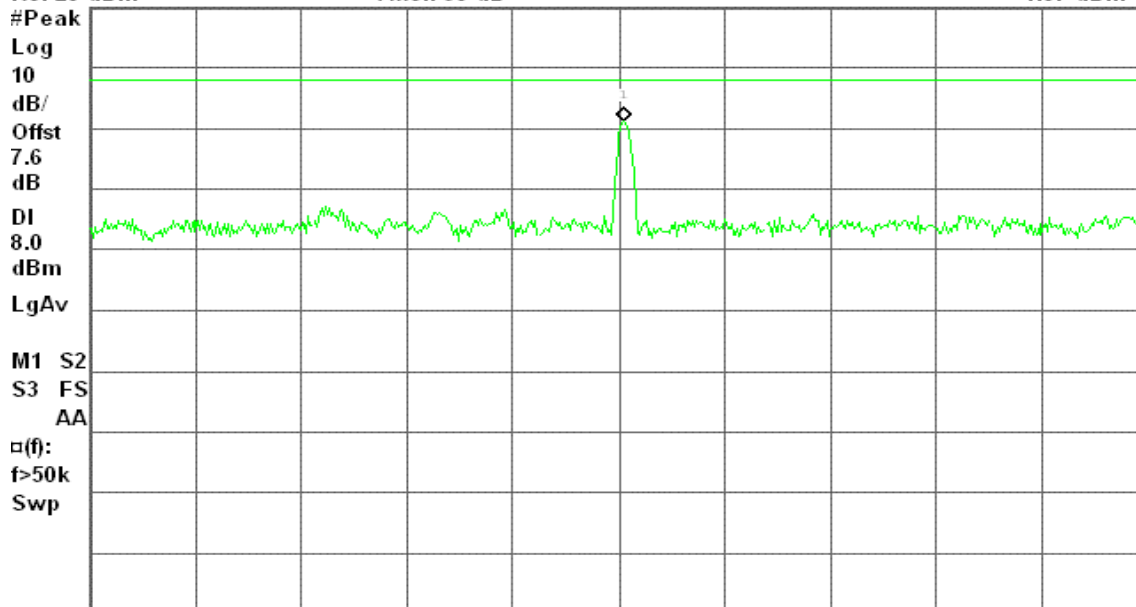
Peak Power Spectral Density, b Mode High Ch.

Mkr1 2.461 234 8 GHz

Ref 20 dBm

Atten 30 dB

1.07 dBm



Center 2.461 233 3 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

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

* Agilent 13:48:17 Sep 4, 2008

R T

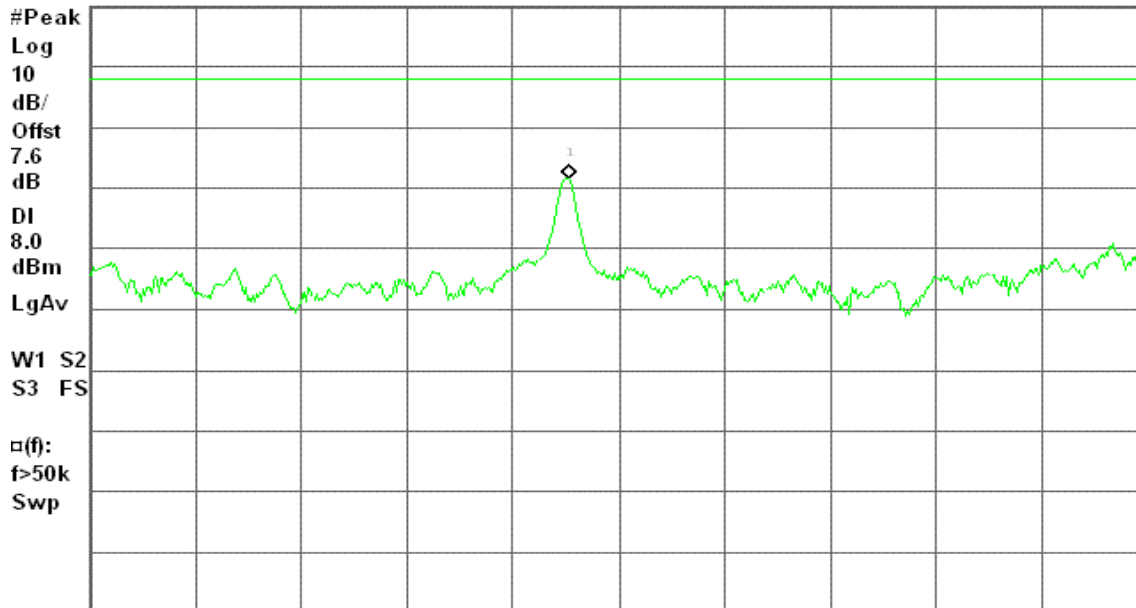
Peak Power Spectral Density, g Mode Low Ch.

Mkr1 2.411 985 9 GHz

Ref 20 dBm

Atten 30 dB

-8.35 dBm



Center 2.412 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)



PPSD (CH Mid)

* Agilent 13:57:21 Sep 4, 2008

R T

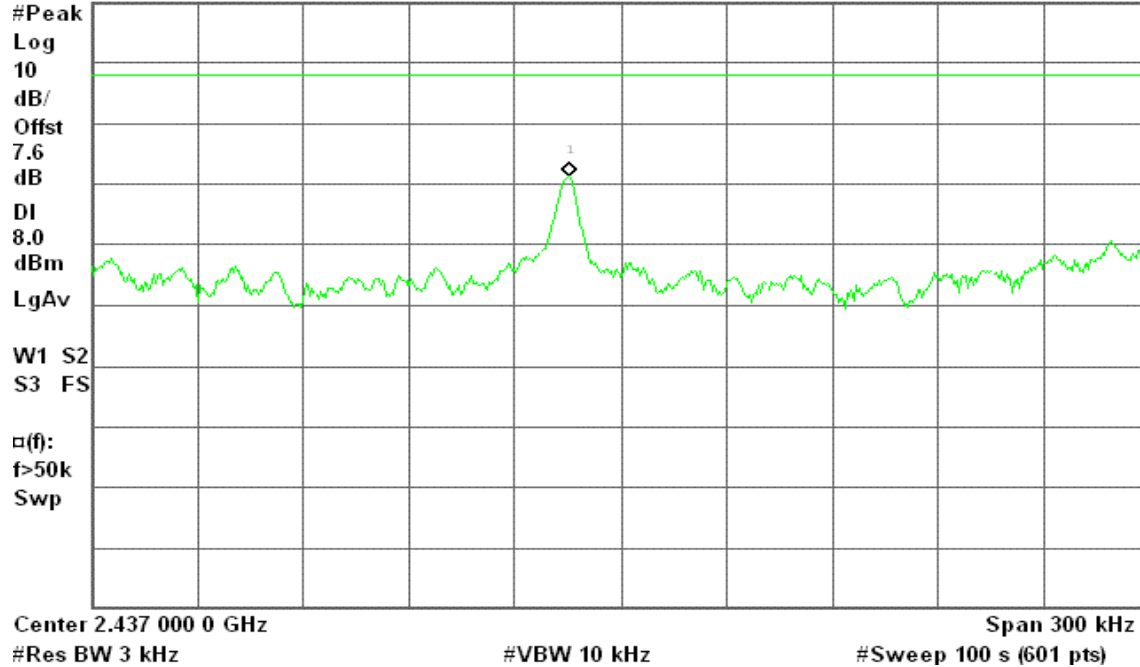
Peak Power Spectral Density, g Mode Mid Ch.

Mkr1 2.436 985 4 GHz

Ref 20 dBm

Atten 30 dB

-8.79 dBm



PPSD (CH High)

* Agilent 14:10:41 Sep 4, 2008

R T

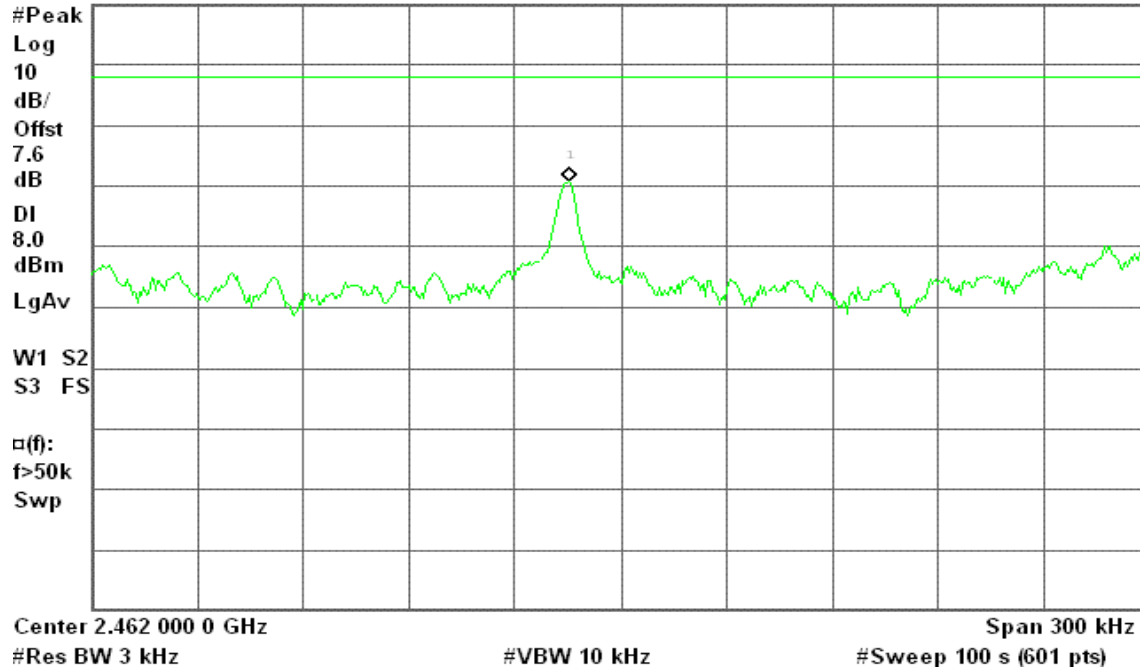
Peak Power Spectral Density, g Mode High Ch.

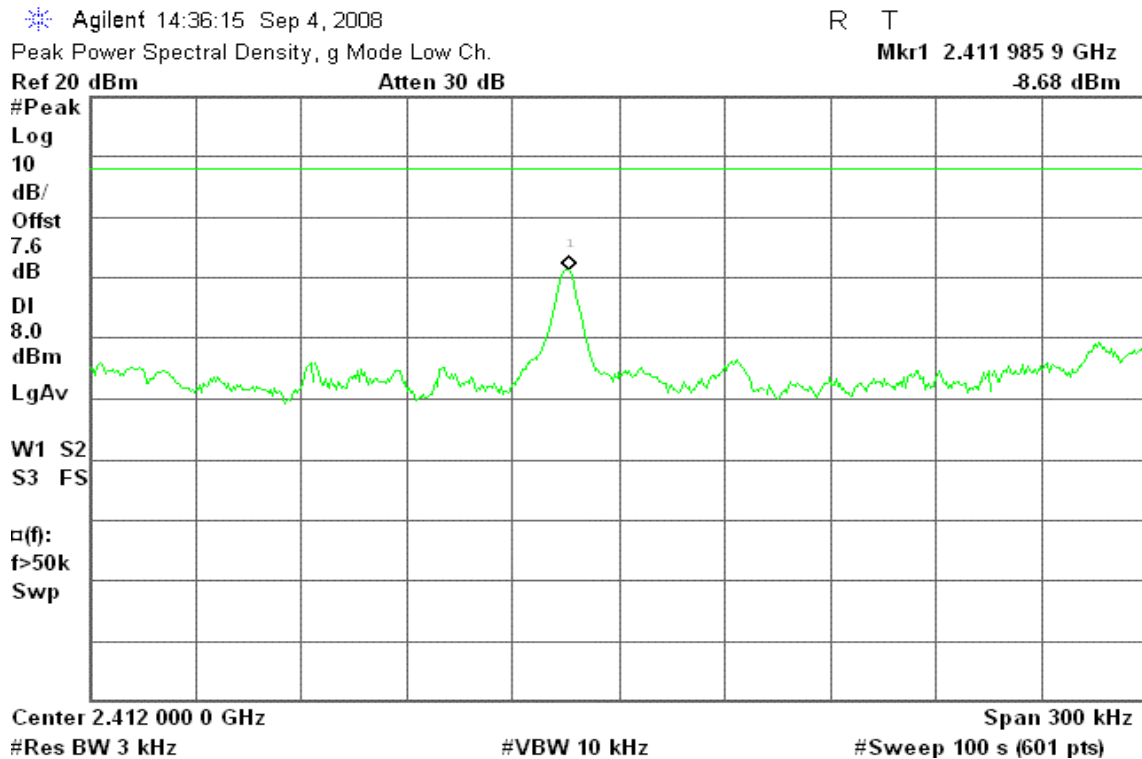
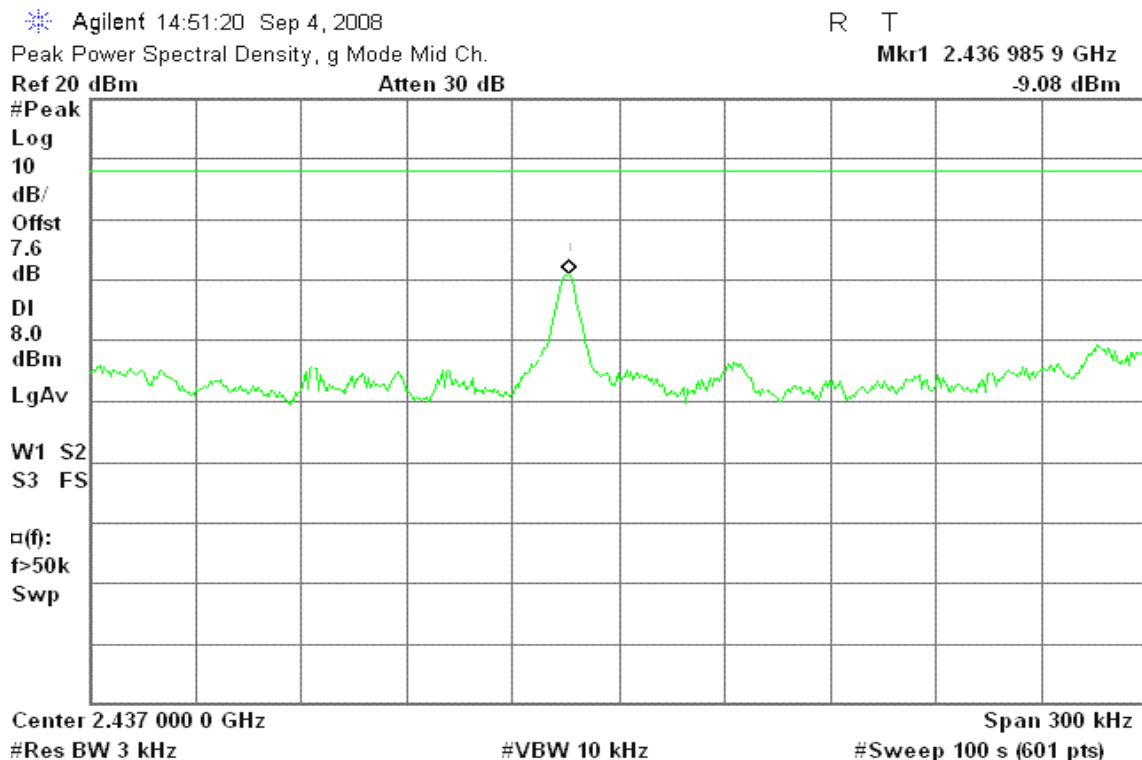
Mkr1 2.461 985 4 GHz

Ref 20 dBm

Atten 30 dB

-9.35 dBm



**draft 802.11n Standard-20 MHz Channel mode****PPSD (CH Low)****PPSD (CH Mid)**

**PPSD (CH High)**

* Agilent 15:07:08 Sep 4, 2008

R T

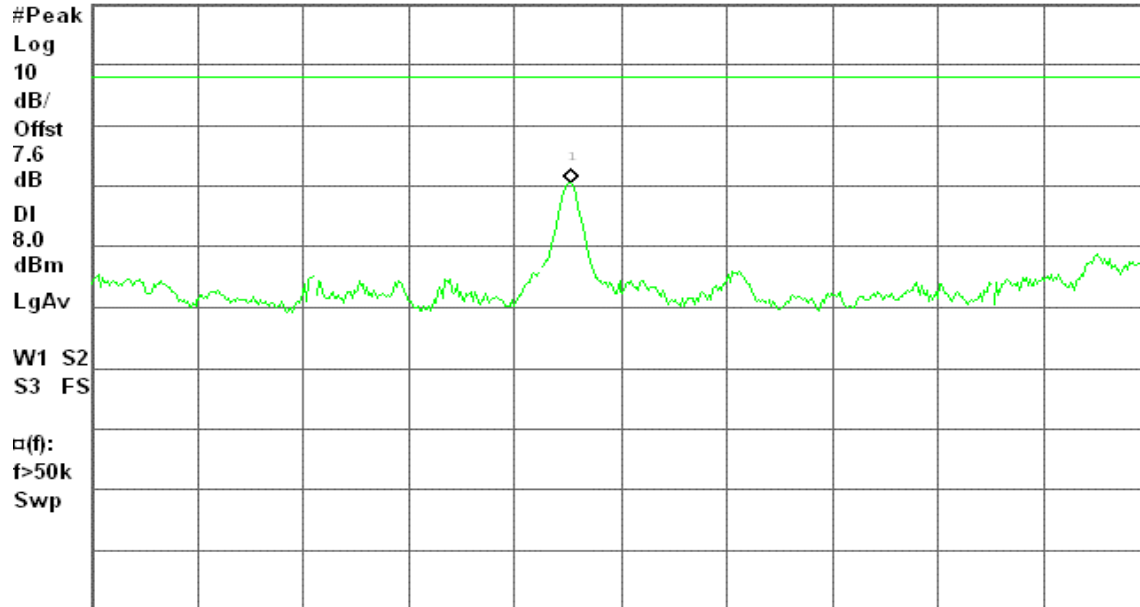
Peak Power Spectral Density, g Mode High Ch.

Mkr1 2.461 985 9 GHz

Ref 20 dBm

Atten 30 dB

-9.55 dBm



Center 2.462 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

draft 802.11n Wide-40 MHz Channel mode**PPSD (CH Low)**

* Agilent 16:29:21 Sep 4, 2008

R T

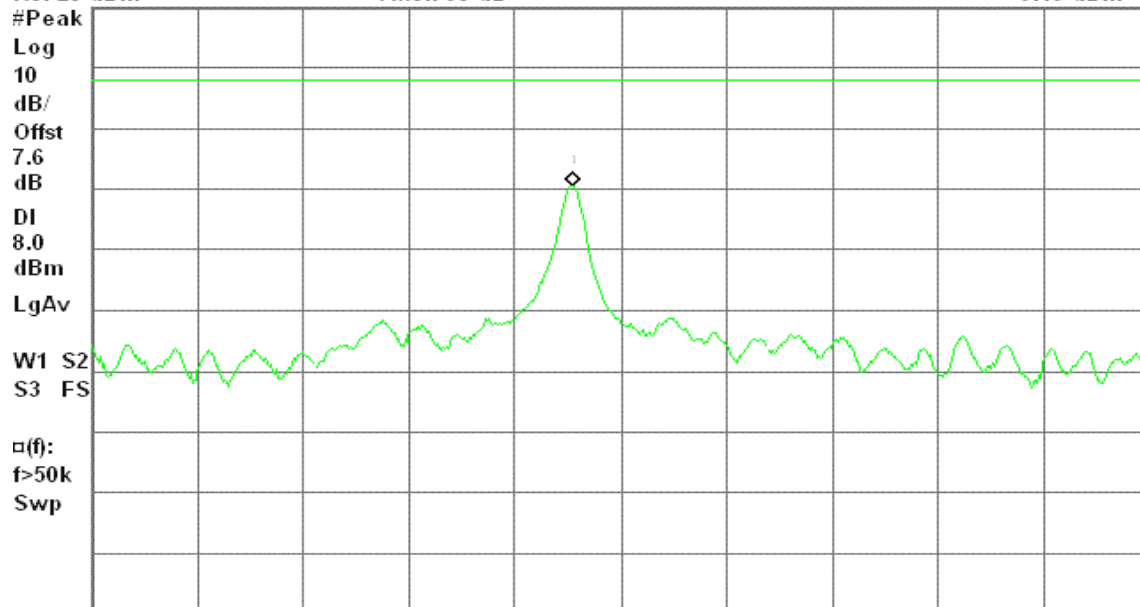
Peak Power Spectral Density, g Mode Low Ch.

Mkr1 2.411 986 4 GHz

Ref 20 dBm

Atten 30 dB

-9.45 dBm



Center 2.412 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

**PPSD (CH Mid)**

* Agilent 16:39:19 Sep 4, 2008

R T

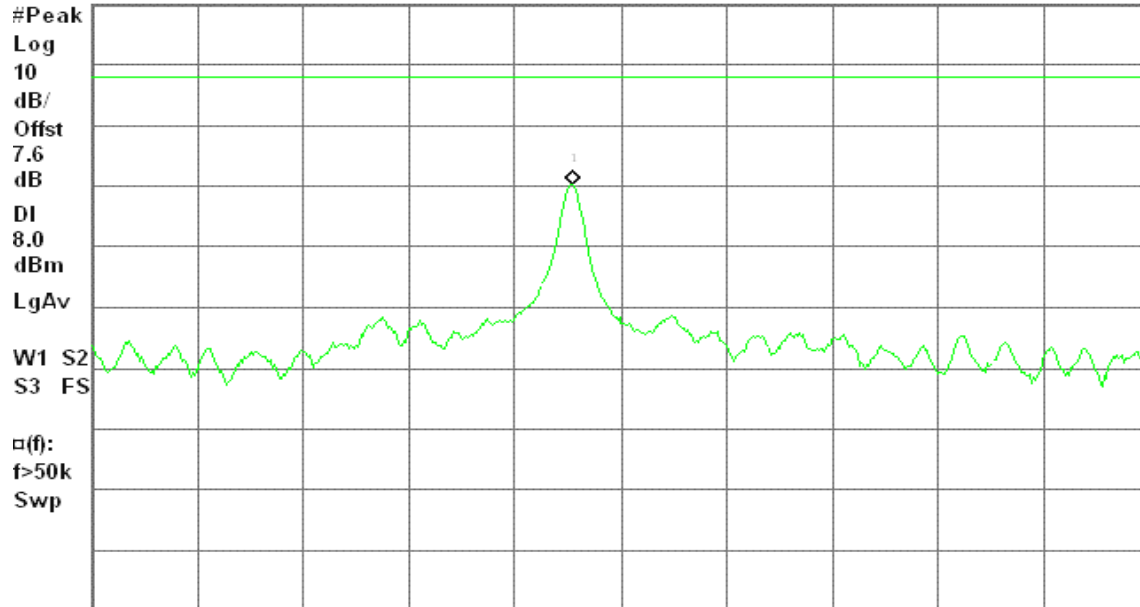
Peak Power Spectral Density, g Mode Mid Ch.

Mkr1 2.436 986 4 GHz

Ref 20 dBm

Atten 30 dB

-9.73 dBm



Center 2.437 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

PPSD (CH High)

* Agilent 16:53:04 Sep 4, 2008

R T

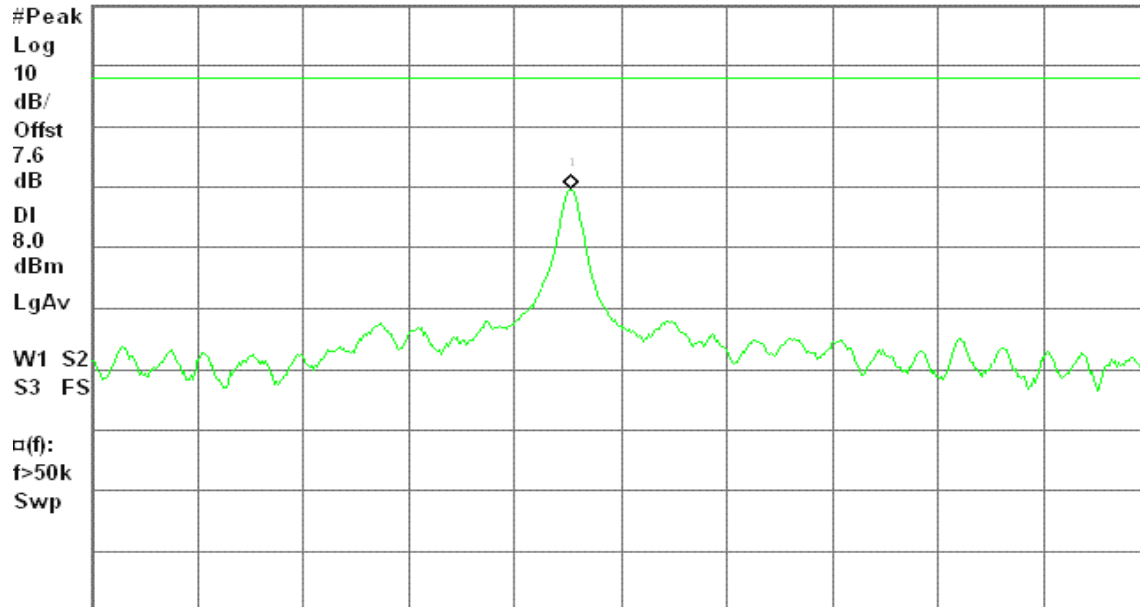
Peak Power Spectral Density, g Mode High Ch.

Mkr1 2.461 985 9 GHz

Ref 20 dBm

Atten 30 dB

-10.42 dBm



Center 2.462 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)



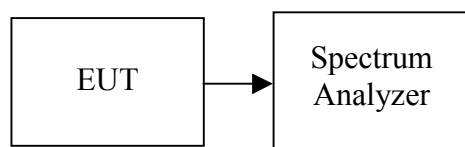
7.6 SPURIOUS EMISSIONS

7.6.1 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 mode

CH Low

* Agilent 10:42:09 Sep 4, 2008

R T

Spurious, b Mode Low Ch.

Mkr1 2.42 GHz

Ref 20 dBm

Atten 30 dB

1.46 dBm

#Peak

Log

10

dB/

Offst

7.6

dB

DI

-18.5

dBm

LgAv

V1 S2

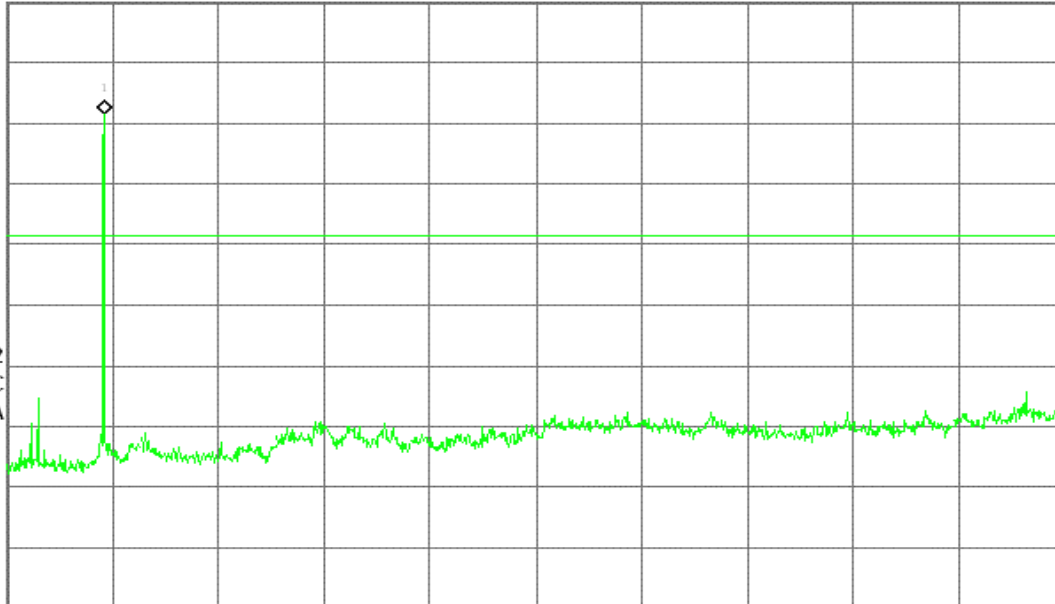
S3 FC

AA

□(f):

FTun

Swp



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

CH Mid

* Agilent 11:18:33 Sep 4, 2008

R T

Spurious, b Mode Mid Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 30 dB

1.69 dBm

#Peak

Log

10

dB/

Offst

7.6

dB

DI

-18.3

dBm

LgAv

V1 S2

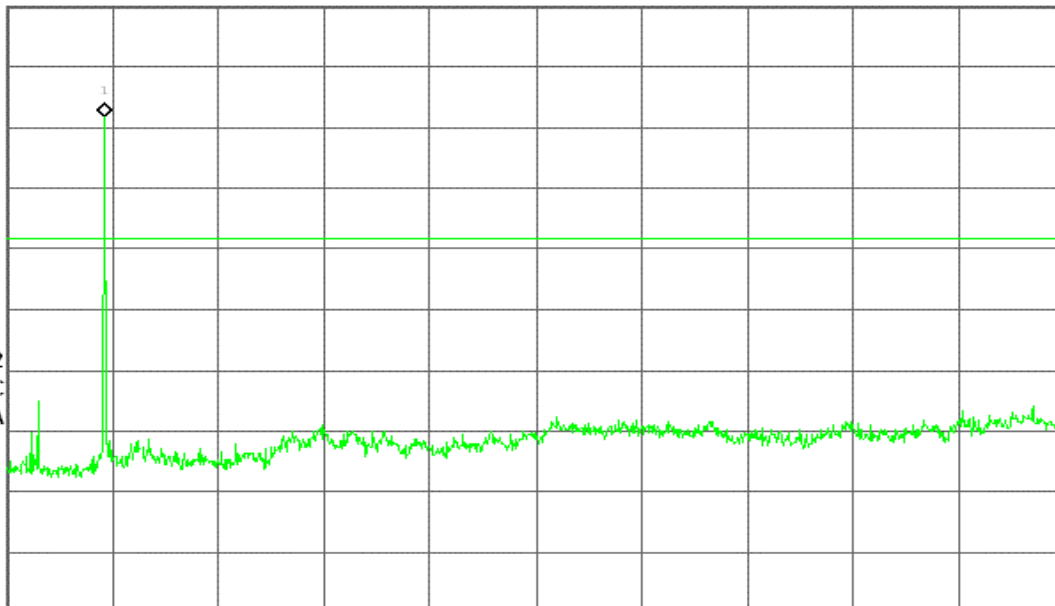
S3 FC

AA

□(f):

FTun

Swp



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

**CH High**

* Agilent 11:33:05 Sep 4, 2008

R T

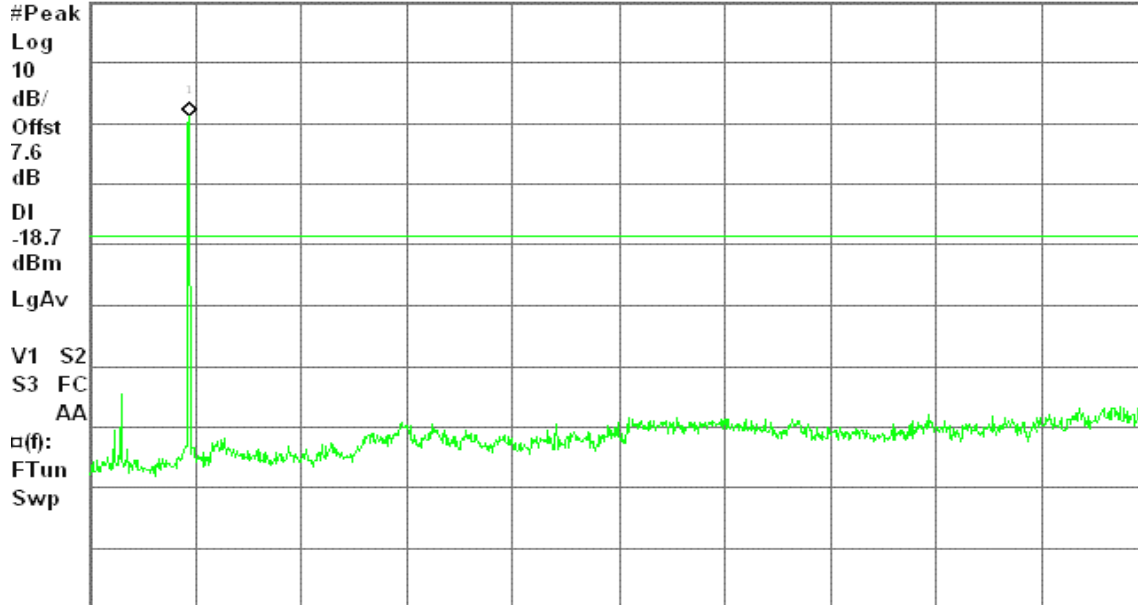
Spurious, b Mode High Ch.

Mkr1 2.47 GHz

Ref 20 dBm

Atten 30 dB

1.28 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

IEEE 802.11g mode**CH Low**

* Agilent 13:49:21 Sep 4, 2008

R T

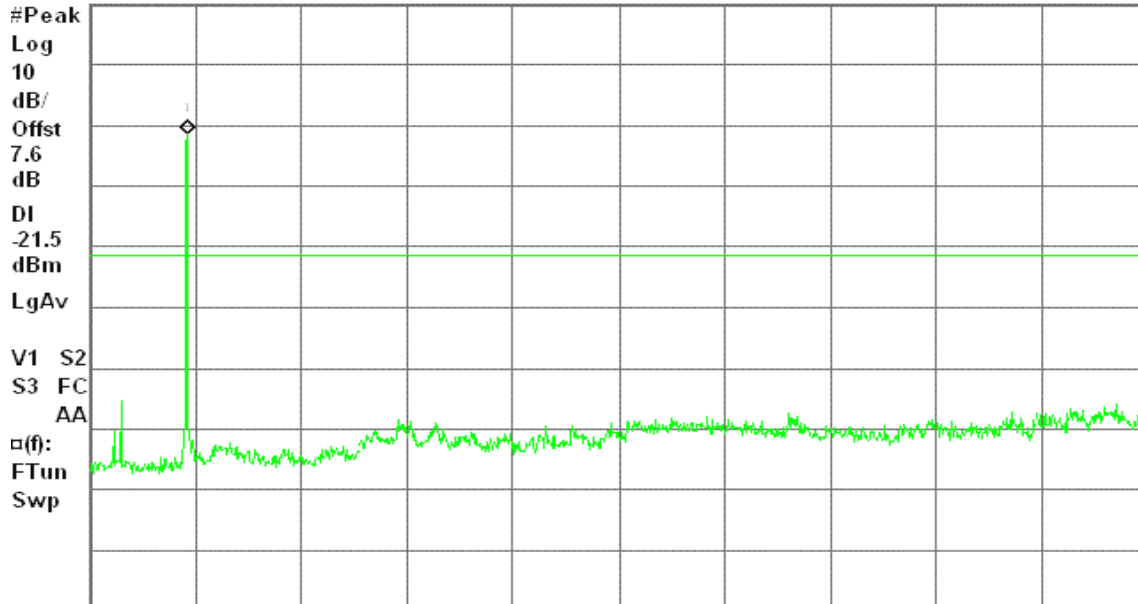
Spurious, g Mode Low Ch.

Mkr1 2.42 GHz

Ref 20 dBm

Atten 30 dB

-1.51 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)



CH Mid

* Agilent 13:58:36 Sep 4, 2008

R T

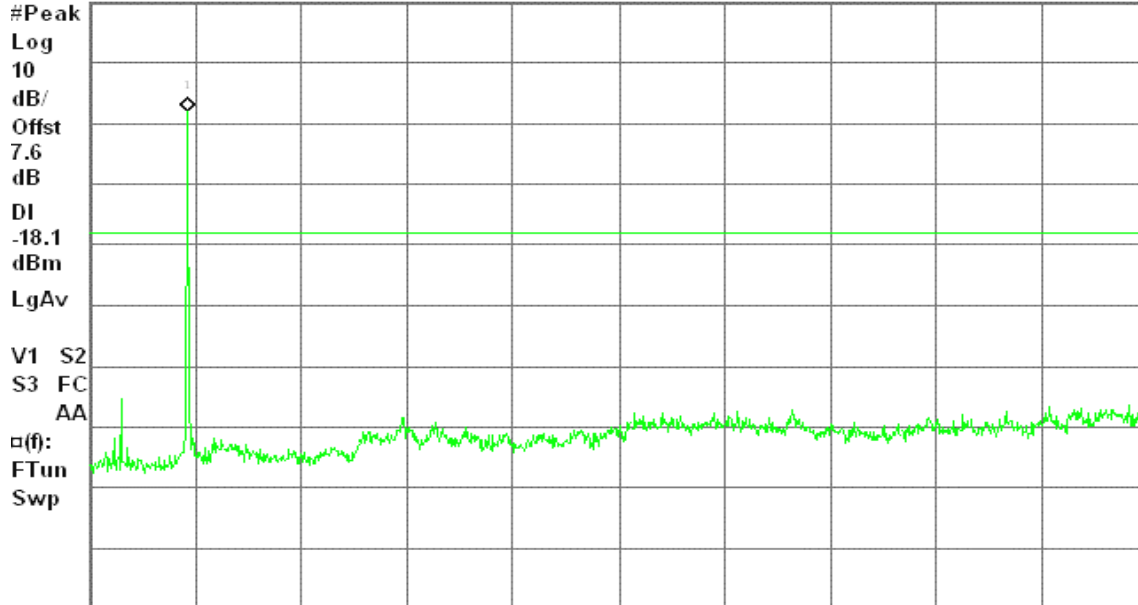
Spurious, g Mode Mid Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 30 dB

1.88 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

CH High

* Agilent 14:12:44 Sep 4, 2008

R T

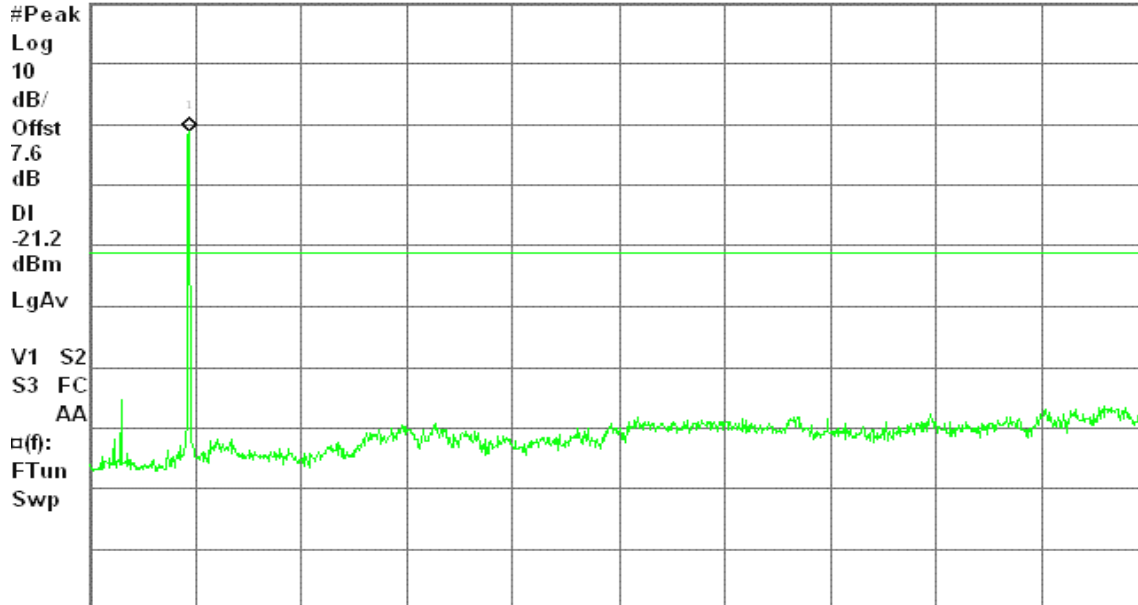
Spurious, g Mode High Ch.

Mkr1 2.47 GHz

Ref 20 dBm

Atten 30 dB

-1.16 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

**draft 802.11n Standard-20 MHz Channel mode****CH Low**

* Agilent 14:37:36 Sep 4, 2008

R T

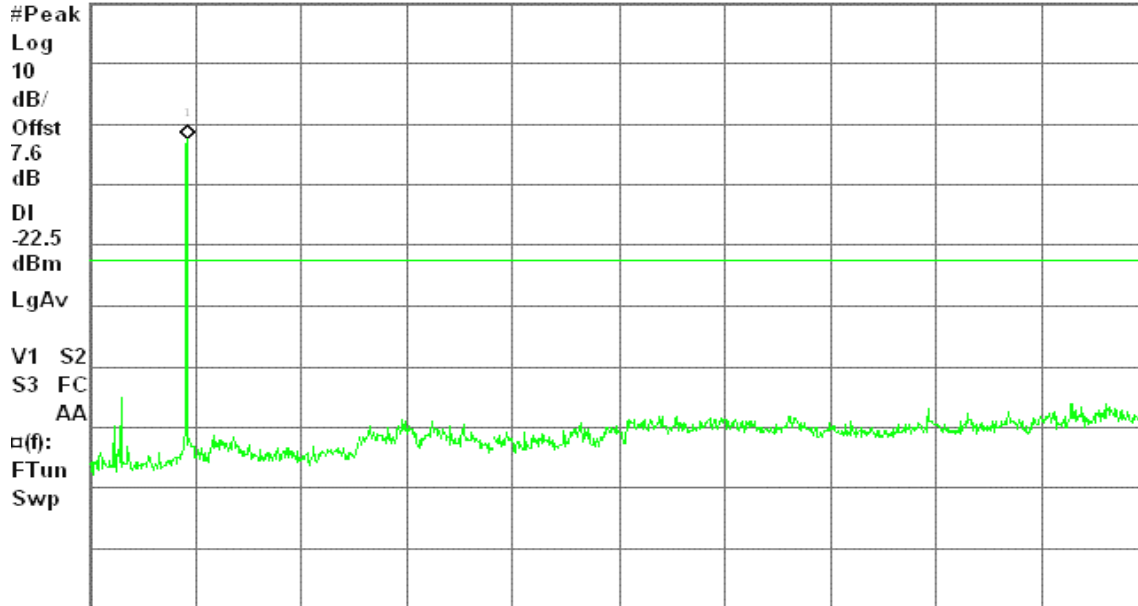
Spurious, g Mode Low Ch.

Mkr1 2.42 GHz

Ref 20 dBm

Atten 30 dB

-2.49 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

CH Mid

* Agilent 14:53:10 Sep 4, 2008

R T

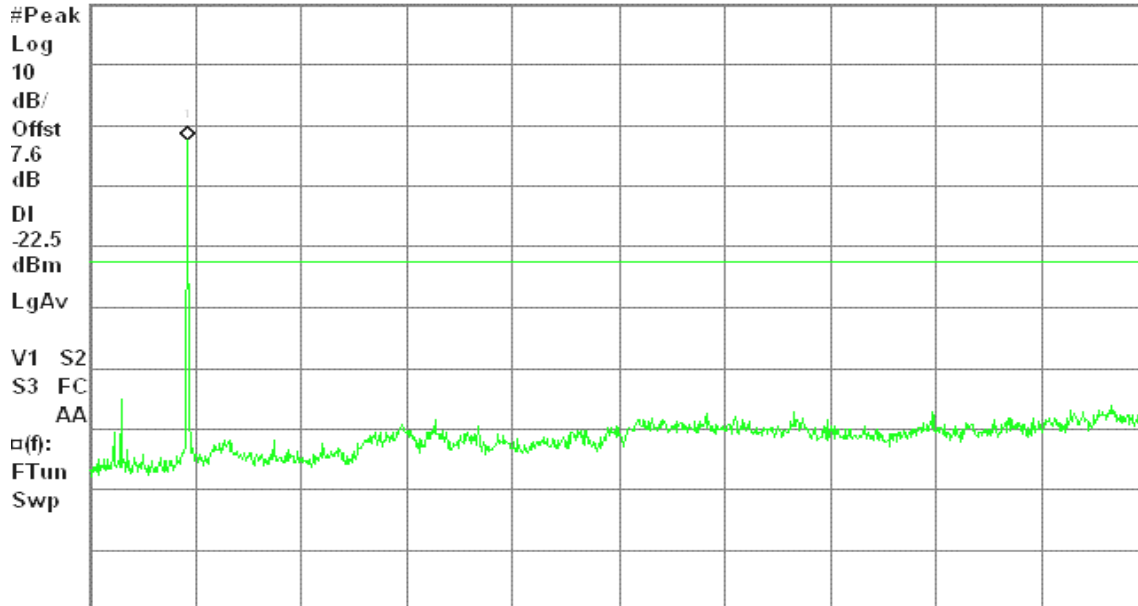
Spurious, g Mode Mid Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 30 dB

-2.54 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

**CH High**

* Agilent 15:08:04 Sep 4, 2008

R T

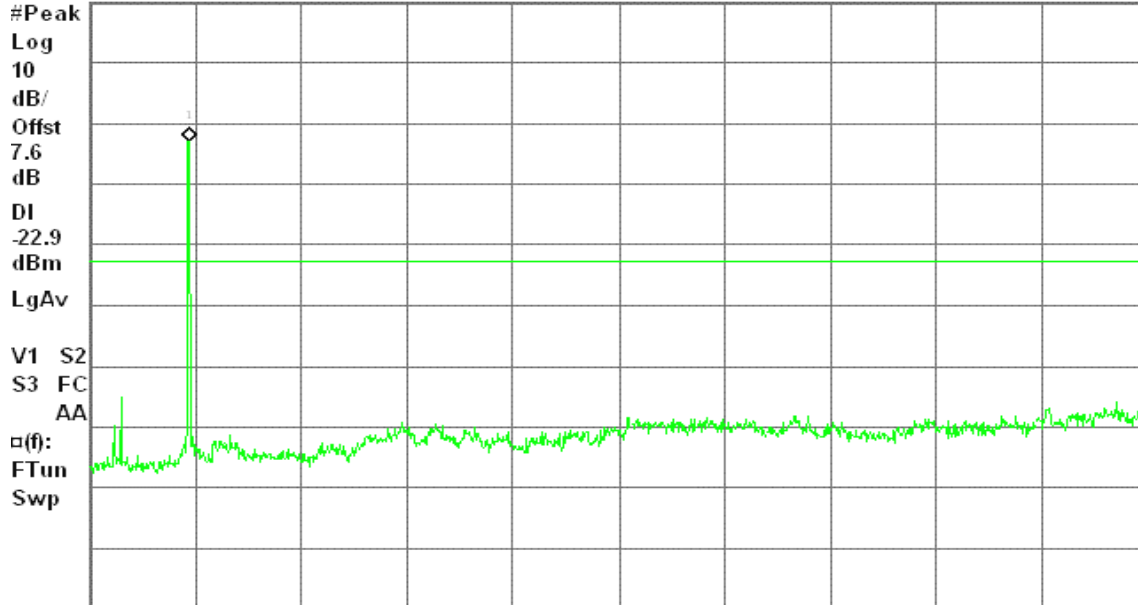
Spurious, g Mode High Ch.

Mkr1 2.47 GHz

Ref 20 dBm

Atten 30 dB

-2.94 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

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

* Agilent 16:30:23 Sep 4, 2008

R T

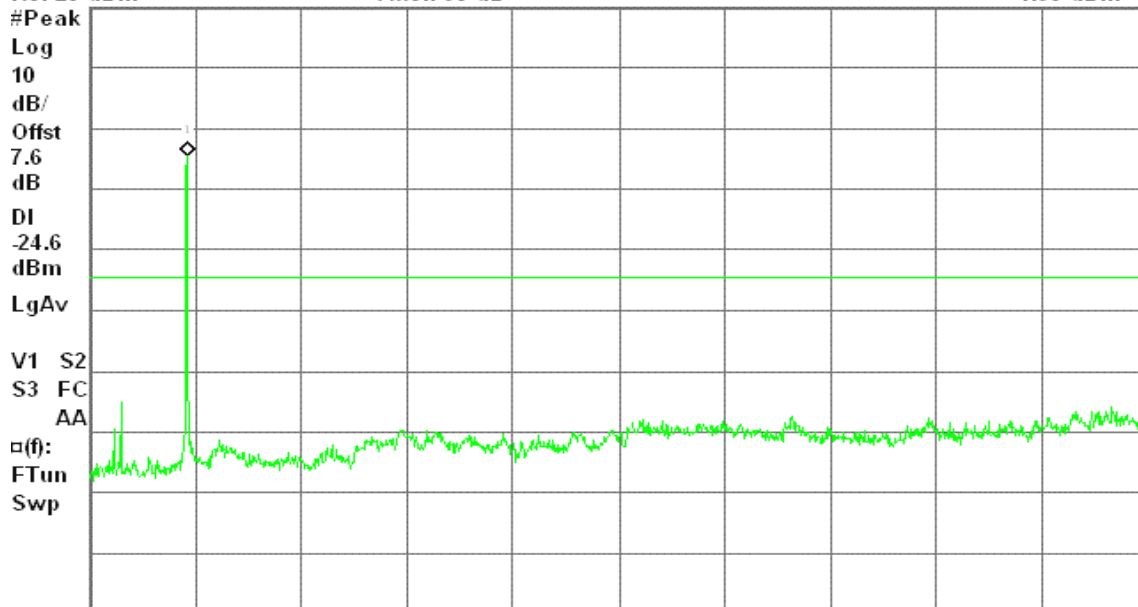
Spurious, g Mode Low Ch.

Mkr1 2.42 GHz

Ref 20 dBm

Atten 30 dB

-4.58 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)



CH Mid

* Agilent 16:42:49 Sep 4, 2008

R T

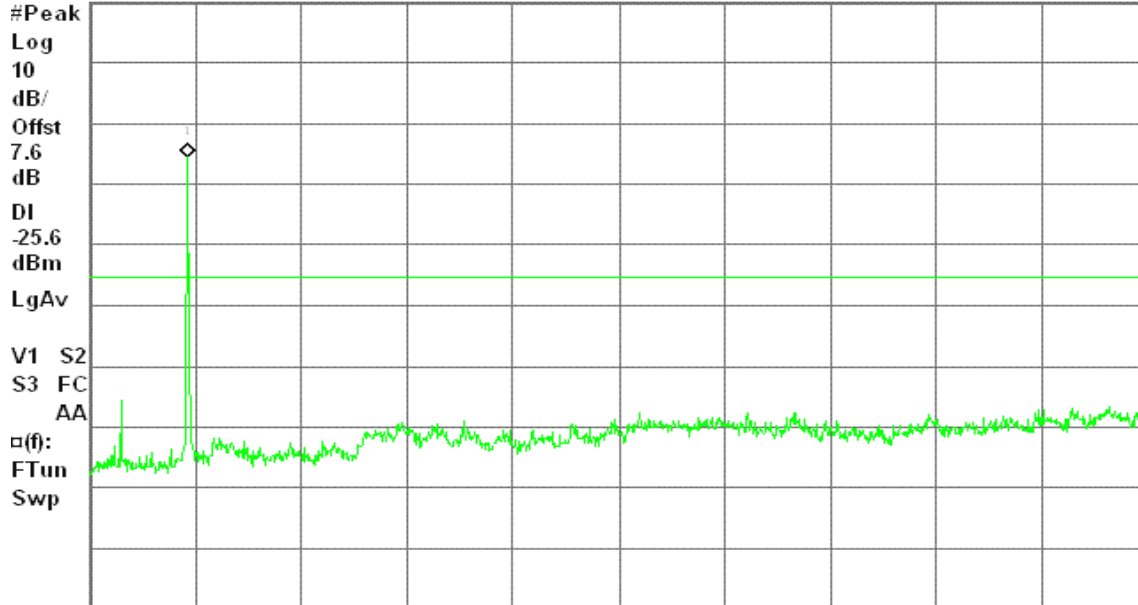
Spurious, g Mode Mid Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 30 dB

-5.56 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

CH High

* Agilent 16:54:06 Sep 4, 2008

R T

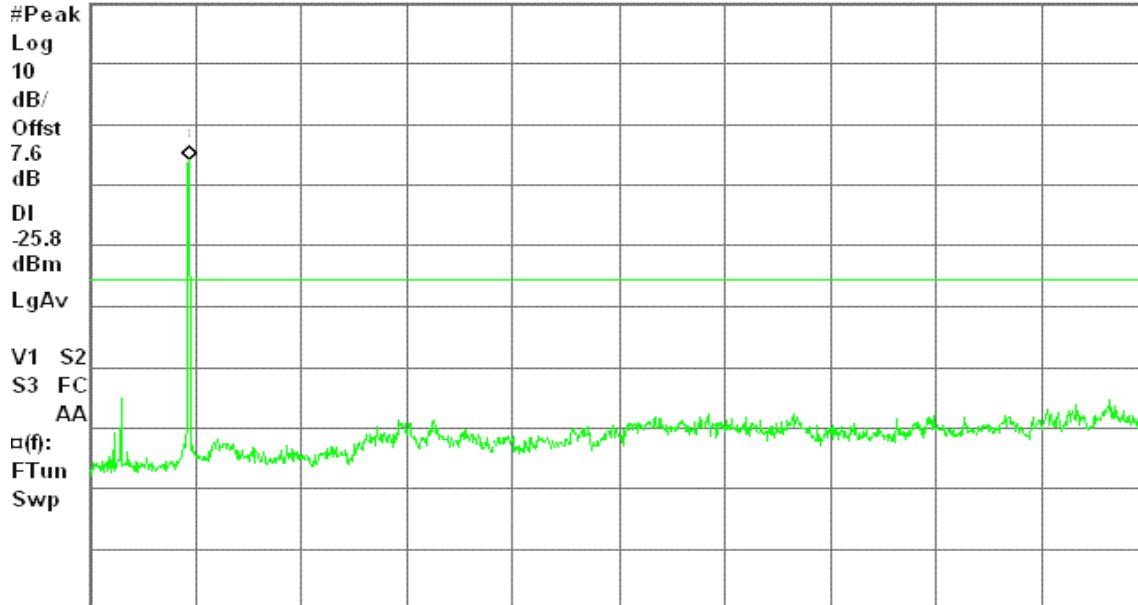
Spurious, g Mode High Ch.

Mkr1 2.47 GHz

Ref 20 dBm

Atten 30 dB

-5.80 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)



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 ($\mu\text{V/m}$)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

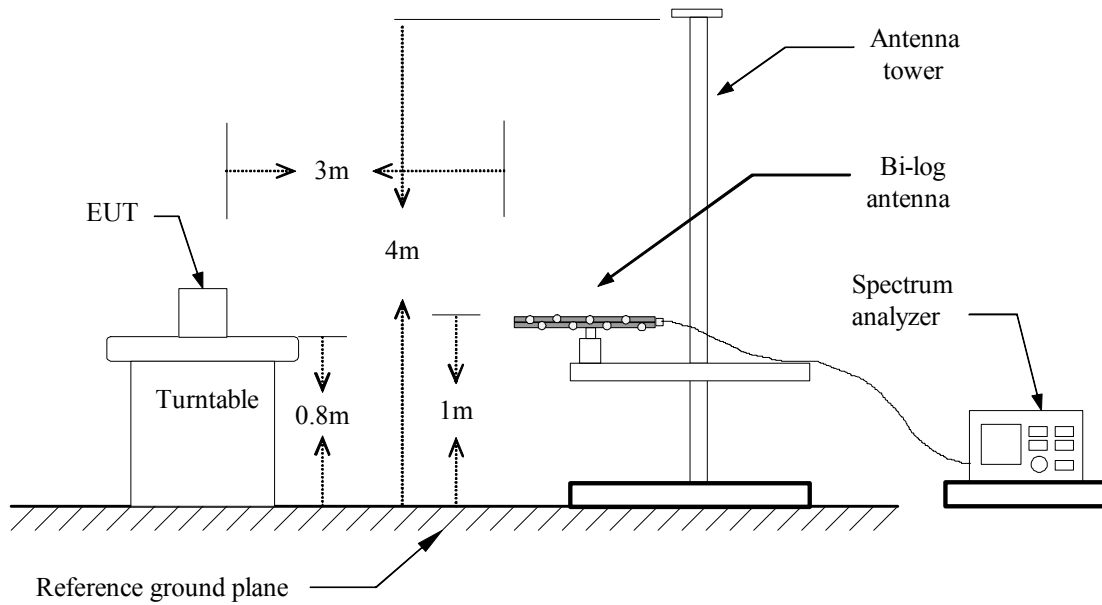
Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of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

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

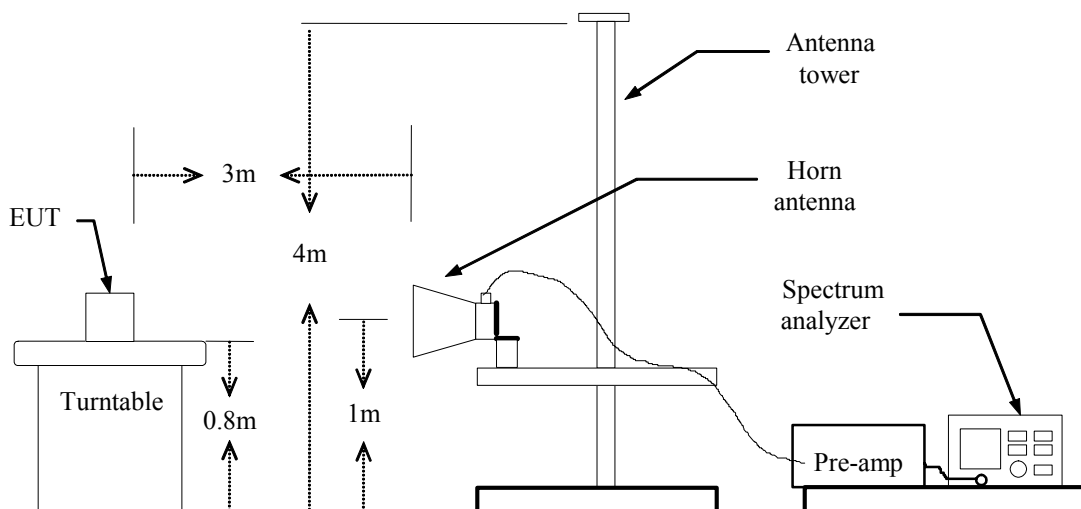
Frequency (MHz)	Field Strength ($\mu\text{V/m}$ at 3-meter)	Field Strength (dB $\mu\text{V/m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

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.

**Below 1GHz****Operation Mode:** Normal Link**Test Date:** August 28, 2008**Temperature:** 23°C**Tested by:** Mimic Yang**Humidity:** 53% 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
120.53	V	45.75	-11.02	34.73	43.50	-8.77	Peak
364.65	V	41.23	-9.42	31.81	46.00	-14.19	Peak
600.68	V	39.14	-4.85	34.29	46.00	-11.71	Peak
663.73	V	39.31	-4.38	34.93	46.00	-11.07	Peak
799.53	V	35.99	-1.70	34.28	46.00	-11.72	Peak
972.52	V	37.57	0.26	37.83	54.00	-16.17	Peak
120.53	H	47.67	-11.02	36.65	43.50	-6.85	QP
240.17	H	48.98	-12.01	36.97	46.00	-9.03	Peak
366.27	H	48.80	-9.37	39.43	46.00	-6.57	Peak
600.68	H	43.56	-4.85	38.70	46.00	-7.30	Peak
663.73	H	40.10	-4.38	35.72	46.00	-10.28	Peak
799.53	H	39.73	-1.70	38.03	46.00	-7.97	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. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. 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.
5. $\text{Margin (dB)} = \text{Result (dBuV/m)} - \text{Limit (dBuV/m)}$.

**Above 1 GHz****Operation Mode:** TX / IEEE 802.11b / CH Low**Test Date:** September 4, 2008**Temperature:** 25°C**Tested by:** Wolf Huang**Humidity:** 53 % 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
N/A										
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:** September 4, 2008**Temperature:** 25°C**Tested by:** Wolf Huang**Humidity:** 53 % 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
N/A										
1333.33	H	61.70	---	-8.75	52.95	---	74.00	54.00	-1.05	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 / IEEE 802.11b / CH High**Test Date:** September 4, 2008**Temperature:** 20°C**Tested by:** Wolf Huang**Humidity:** 51 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
4925.00	V	51.44	---	0.13	51.57	---	74.00	54.00	-2.43	Peak
N/A										
4925.00	H	49.73	---	0.13	49.86	---	74.00	54.00	-4.14	Peak
N/A										

Remark:

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

**Operation Mode:** TX / IEEE 802.11g / CH Low**Test Date:** September 4, 2008**Temperature:** 25°C**Tested by:** Wolf Huang**Humidity:** 53 % 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
N/A										
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:** September 4, 2008**Temperature:** 25°C**Tested by:** Wolf Huang**Humidity:** 53 % 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
5716.67	V	49.22	---	0.72	49.94	---	74.00	54.00	-4.06	Peak
N/A										
5250.00	H	49.02	---	0.17	49.19	---	74.00	54.00	-4.81	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:** September 4, 2008**Temperature:** 25°C**Tested by:** Wolf Huang**Humidity:** 53 % 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
1400.00	V	58.76	---	-8.60	50.16	---	74.00	54.00	-3.84	Peak
4091.67	V	47.82	---	0.84	48.66	---	74.00	54.00	-5.34	Peak
N/A										
1416.67	H	59.26	---	-8.56	50.71	---	74.00	54.00	-3.29	Peak
4741.67	H	48.20	---	0.53	48.74	---	74.00	54.00	-5.26	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 Standard-20 MHz Channel mode / CH Low

Test Date: September 4, 2008

Temperature: 25°C

Tested by: Wolf Huang

Humidity: 53 % 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
4658.33	V	48.83	---	0.72	49.54	---	74.00	54.00	-4.46	Peak
5616.67	V	49.94	---	0.56	50.50	---	74.00	54.00	-3.50	Peak
N/A										
5133.33	H	49.76	---	0.07	49.83	---	74.00	54.00	-4.17	Peak
6333.33	H	49.48	---	1.56	51.04	---	74.00	54.00	-2.96	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 Standard-20 MHz Channel mode / CH Mid

Test Date: September 4, 2008

Temperature: 25°C

Tested by: Wolf Huang

Humidity: 53 % 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
6150.00	V	49.12	---	1.34	50.46	---	74.00	54.00	-3.54	Peak
N/A										
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 Standard-20 MHz Channel mode / CH High

Test Date: September 4, 2008

Temperature: 25°C

Tested by: Wolf Huang

Humidity: 53 % 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
1400.00	V	59.19	---	-8.60	50.59	---	74.00	54.00	-3.41	Peak
5650.00	V	49.34	---	0.62	49.96	---	74.00	54.00	-4.04	Peak
N/A										
1416.67	H	59.31	---	-8.56	50.75	---	74.00	54.00	-3.25	Peak
5933.33	H	49.71	---	1.06	50.78	---	74.00	54.00	-3.22	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 Wide-40 MHz Channel mode
/ CH Low

Test Date: September 4, 2008

Temperature: 25°C

Tested by: Wolf Huang

Humidity: 53 % 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
5566.67	V	49.11	---	0.48	49.60	---	74.00	54.00	-4.40	Peak
N/A										
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 Wide-40 MHz Channel mode
/ CH Mid

Test Date: September 4, 2008

Temperature: 25°C

Tested by: Wolf Huang

Humidity: 53 % 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
4608.33	V	49.11	---	0.83	49.94	---	74.00	54.00	-4.06	Peak
6158.33	V	49.52	---	1.35	50.88	---	74.00	54.00	-3.12	Peak
N/A										
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 Wide-40 MHz Channel mode
/ CH High

Test Date: September 4, 2008

Temperature: 25°C

Tested by: Wolf Huang

Humidity: 53 % 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
4241.67	V	48.89	---	0.92	49.81	---	74.00	54.00	-4.19	Peak
7783.33	V	48.83	---	3.61	52.44	---	74.00	54.00	-1.56	Peak
N/A										
3266.67	H	52.10	---	-0.81	51.29	---	74.00	54.00	-2.71	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 μ 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 μ 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

Operation Mode: Normal Link **Test Date:** September 8, 2008
Temperature: 22°C **Tested by:** Ming Chen
Humidity: 45% 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
0.1741	52.22	44.12	0.18	52.40	44.30	64.76	54.76	-12.36	-10.46	L1
0.1745	52.32	44.12	0.18	52.50	44.30	64.74	54.74	-12.24	-10.44	L1
0.2340	44.25	36.75	0.15	44.40	36.90	62.31	52.31	-17.91	-15.41	L1
2.3368	41.35	38.65	0.05	41.40	38.70	56.00	46.00	-14.60	-7.30	L1
3.8800	32.74	22.64	0.16	32.90	22.80	56.00	46.00	-23.10	-23.20	L1
4.1100	32.43	22.93	0.17	32.60	23.10	56.00	46.00	-23.40	-22.90	L1
0.1600	36.61	13.31	0.19	36.80	13.50	65.46	55.46	-28.66	-41.96	L2
0.1736	50.32	42.12	0.18	50.50	42.30	64.79	54.79	-14.29	-12.49	L2
0.2300	43.05	37.55	0.15	43.20	37.70	62.45	52.45	-19.25	-14.75	L2
2.0250	43.57	40.27	0.03	43.60	40.30	56.00	46.00	-12.40	-5.70	L2
2.3150	43.45	37.65	0.05	43.50	37.70	56.00	46.00	-12.50	-8.30	L2
3.7050	42.36	32.86	0.14	42.50	33.00	56.00	46.00	-13.50	-13.00	L2

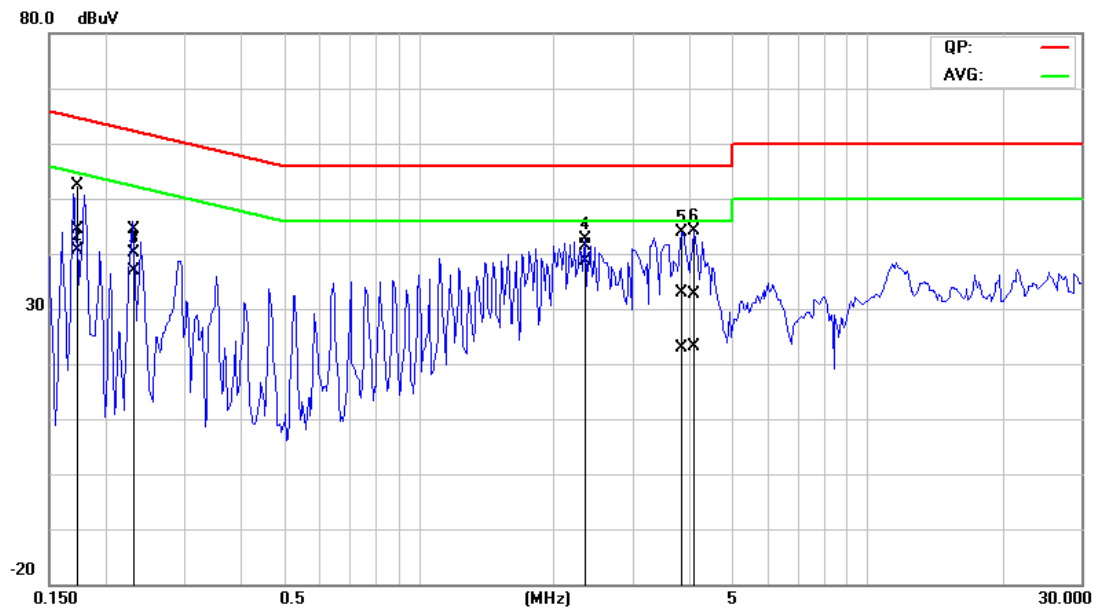
Remark:

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)

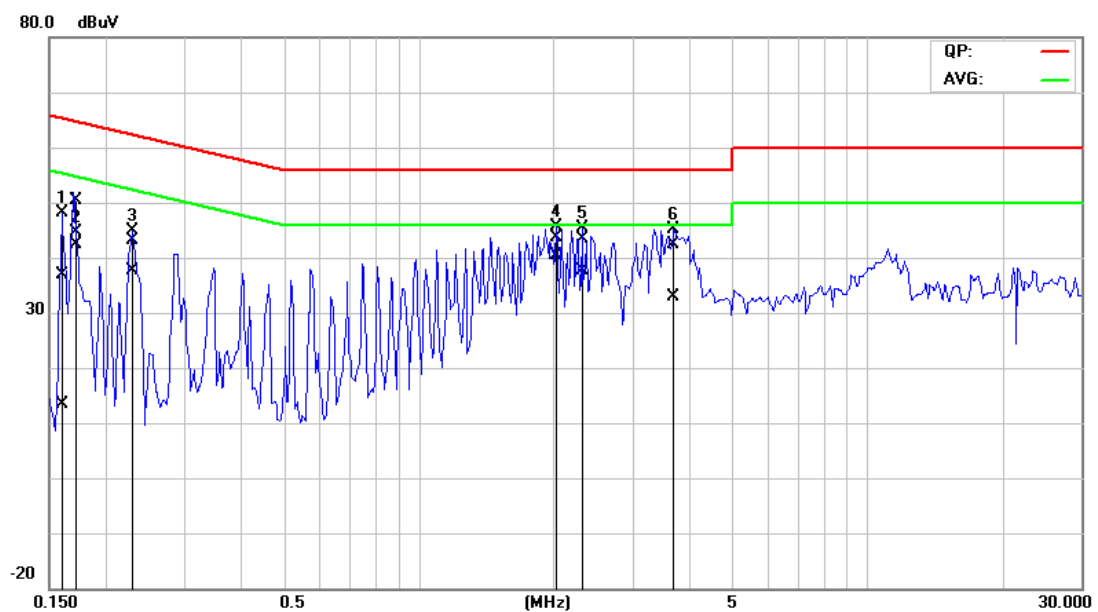


Test Plots

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

EUT	802.11 b/g/n Wireless USB Mini card
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz ☐ WLAN: 5.745GHz ~ 5.825GHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure ($S = 5\text{mW}/\text{cm}^2$) ☒ General Population/Uncontrolled exposure ($S=1\text{mW}/\text{cm}^2$)
Antenna diversity	☐ Single antenna ☒ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☒ Tx/Rx diversity
Max. output power	IEEE 802.11b mode: 16.66 dBm (46.3446 mW) IEEE 802.11g mode: 17.58 dBm (57.27 mW) draft 802.11n Standard-20 MHz Channel mode: 16.35 dBm (43.15 mW) draft 802.11n Wide-40 MHz Channel mode: 14.29 dBm (26.85 mW)
Antenna gain (Max)	2dBi (Numeric gain: 1.58)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:

1. The maximum output power is 17.58dBm (57.27mW) at 2412MHz (with 1.58 numeric antenna gain.)
2. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.
3. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.

TEST RESULTS

No non-compliance noted.

**Calculation**

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

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

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

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

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 / cm²

Maximum Permissible Exposure

Substituting the MPE safe distance using $d = 20$ cm into Equation 1:

Yields

$$S = 0.000199 \times P \times G$$

Where P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²



IEEE 802.11b mode:

EUT output power = 46.34mW

Numeric Antenna gain = 1.58

→ Power density = 0.013911 mW / cm²

IEEE 802.11g mode:

EUT output power = 57.27 mW

Numeric Antenna gain = 1.58

→ Power density = 0.017192 mW / cm²

draft 802.11n Standard-20 MHz Channel mode:

EUT output power = 43.15 mW

Numeric Antenna gain = 1.58

→ Power density = 0.012954mW / cm²

draft 802.11n Wide-40 MHz Channel mode:

EUT output power = 26.85 mW

Numeric Antenna gain = 1.58

→ Power density = 0.00806 mW / cm²

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