FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

802.11 b/g Wireless LAN mini-card

Model: DWBT3

Trade Name: DELL

Issued to

Dell Computer Corporation
ONE DELL WAY, ROUND ROCK, TEXAS 78682, U.S.A.

Issued by

Compliance Certification Services Inc.
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Testing Laboratory
0363

Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		March 3, 2010		Initial Issue	ALL	Jill Shiau

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1 TEST RESULT CERTIFICATION

Applicant:	**Dell Computer Corporation** ONE DELL WAY, ROUND ROCK, TEXAS 78682, U.S.A.
Equipment Under Test:	802.11 b/g Wireless LAN mini-card
Trade Name:	DELL
Model:	DWBT3
Date of Test:	December 18, 2009 ~ February 26, 2010

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

Approved by: ***Reviewed by:***

Ethan Huang
Section Manager

Stan Lin
Supervisor

2 EUT DESCRIPTION

Product	802.11 b/g Wireless LAN mini-card
Trade Name	DELL
Model Number	DWBT3
Power Supply	Powered form DC Source
Operating Frequency Range	2412 ~ 2462 MHz
Transmit Power	IEEE 802.11b: 16.64 dBm IEEE 802.11g: 20.77 dBm
Modulation Technique	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: DSSS (CCK, DQPSK, DBPSK) + OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
Transmit Data Rate	IEEE 802.11b: 11, 5.5, 2, 1 Mbps IEEE 802.11g: 54, 48, 36, 24, 18, 12, 9, 6Mbps
Number of Channels	11 Channels
Channels Spacing	5MHz
Antenna Specification	PIFA Antenna / Gain: 2.82dBi (Max)
Temperature Range	0°C ~ +55°C

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: **E2K-DWBT3** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*

Antenna List:

Manufacturer	*Model*	*Gain (peak)*
Amphenol	*RB5043-11-001-R*	*0.57dBi*
	RB5119-11-001-C	*1.19dBi*
Smart Approach	*SE-013C0-ECL60*	*2.82dBi*
	SE-0131B0-ECL60	*2.82dBi*

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:

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 Notebook Computer (DELL / P05G) included the Wireless LAN Module (model: DWBT3) 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	11/05/2010
Spectrum Analyzer	R&S	FSEB	825829/011	11/02/2010
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	11/05/2010
Spectrum Analyzer	R&S	FSEB	825829/011	11/02/2010
Pre-Amplifier	HP	8447D	2944A06530	01/02/2011
Pre-Amplifier	HP	8449B	3008A01738	04/17/2010
EMI Test Receiver	SCHAFFNER	SCR 3501	436	01/26/2011
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				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver	R&S	ESCS30	845552/030	05/18/2010
LISN	R&S	ENV216	100069	01/27/2011
LISN	FCC	FCC-LISN-50/ 250-16-2-07	06013	10/13/2010
Test S/W	LabVIEW 6.1 (CCS Conduction Test SW Version_01)			

4.3. MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
Powerline Conducted Emission	± 1.7983
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 FACILTIES

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	TW1026
Japan	VCCI	3/10 meter Open Area Test Sites and conducted test sites to perform radiated/conducted measurements	VCCI 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	ilac-MRA 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

For Radiated Emission (Above 1GHz) and Conducted Emission Measurement

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

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

For Radiated Emission (30 MHz ~ 1GHz) and Powerline Conducted Emission test

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1	Docking	DELL	PR02X	N/A	FCC DoC	N/A	N/A
2	LCD Monitor	DELL	2408WFB	CN-0NN792-74261-849-15GS	FCC DoC	DVI Cable: Shielded, 1.8m with two cores Display Cable: Unshielded, 1.8m with two cores	Unshielded, 1.8m
3	LCD Monitor	DELL	2408WFB	CN-0G293H-74261-874-2CWS	FCC DoC	D-Sub Cable: Shielded, 1.8m with two cores	Unshielded, 1.8m
4	Modem	ACEEX	DM-1414	304012261	IFAXDM1414	Unshielded, 1.8m	Unshielded, 1.8m
5	Printer	EPSON	STYLUS C60	DR3K041511	FCC DoC	Unshielded, 1.8m	Unshielded, 1.8m
6	PS/2 Keyboard	SK-8110	N/A	FCC DoC	DELL	Unshielded, 1.8m	N/A
7	PS/2 Mouse	M-S34	LNA10834424	FCC DoC	DELL	Unshielded, 1.8m	N/A
8	E-SATA External HDD	Onnto	ST-M10	A01869-E48-0004	FCC DoC	Unshielded, 1.8m	Unshielded, 1.8m
9	E-SATA External HDD	Onnto	ST-M10	A01869-E48-0004	FCC DoC	Unshielded, 1.8m	Unshielded, 1.8m
10	Traveling Disk	PQI	U172	C072001301649	FCC DoC	Unshielded, 1.8m	N/A
11	Traveling Disk	PQI	U172	C072001303246	FCC DoC	Unshielded, 1.8m	N/A
12	Traveling Disk	PQI	U172	C072001301616	FCC DoC	Unshielded, 1.8m	N/A
13	Traveling Disk	PQI	U172	C072001301669	FCC DoC	Unshielded, 1.8m	N/A
14	Traveling Disk	PQI	U172	C07200131674	FCC DoC	Unshielded, 1.8m	N/A
15	Traveling Disk	PQI	U172	C072001301711	FCC DoC	Unshielded, 1.8m	N/A
16	Multimedia Headset	Logitech	ClearChat	N/A	FCC DoC	Unshielded, 1.8m	N/A
17	Notebook PC (Remote)	SONY	PDG-6GFP	J000YXJM	FCC DoC	LAN Cable: Unshielded, 10M	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

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

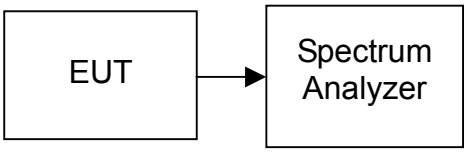
7 FCC PART 15.247 REQUIREMENTS

7.1. 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 = 300kHz, Span = 30MHz, Sweep = auto.
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

TEST RESULTS

No non-compliance noted

TEST DATA

Test mode: IEEE 802.11b

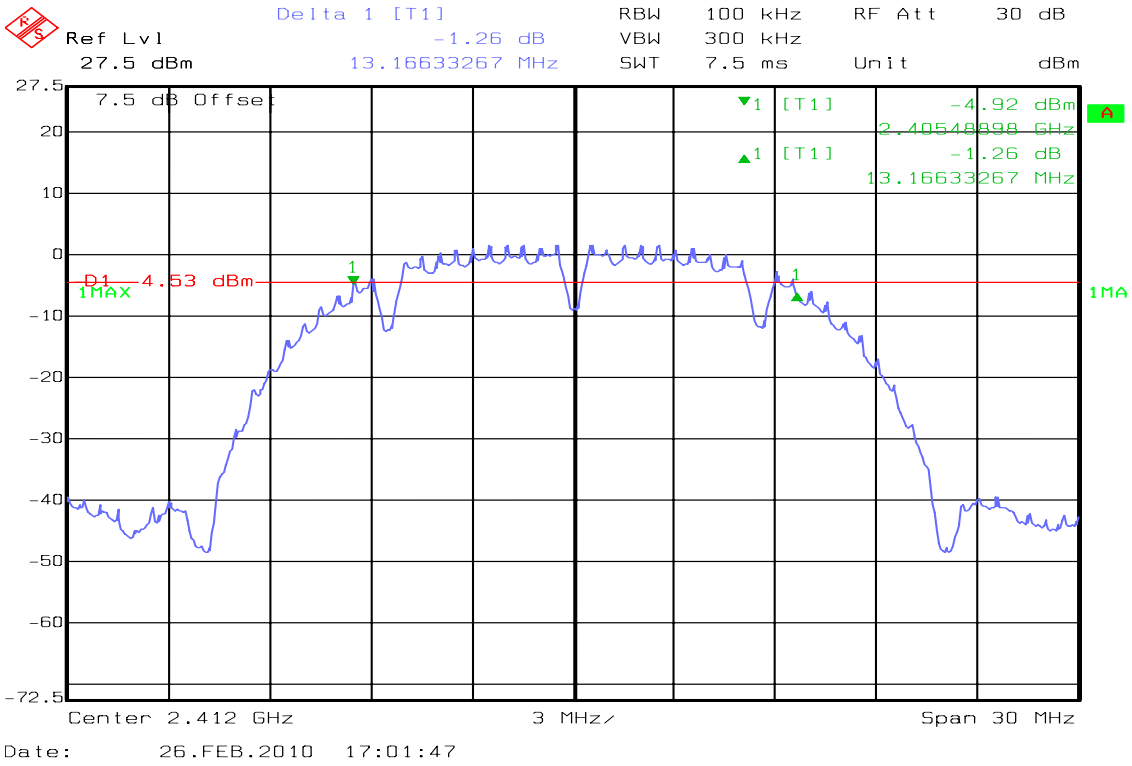
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Margin (kHz)
Low	2412	13.166	>500	PASS
Mid	2437	13.122		PASS
High	2462	12.637		PASS

Test mode: IEEE 802.11g

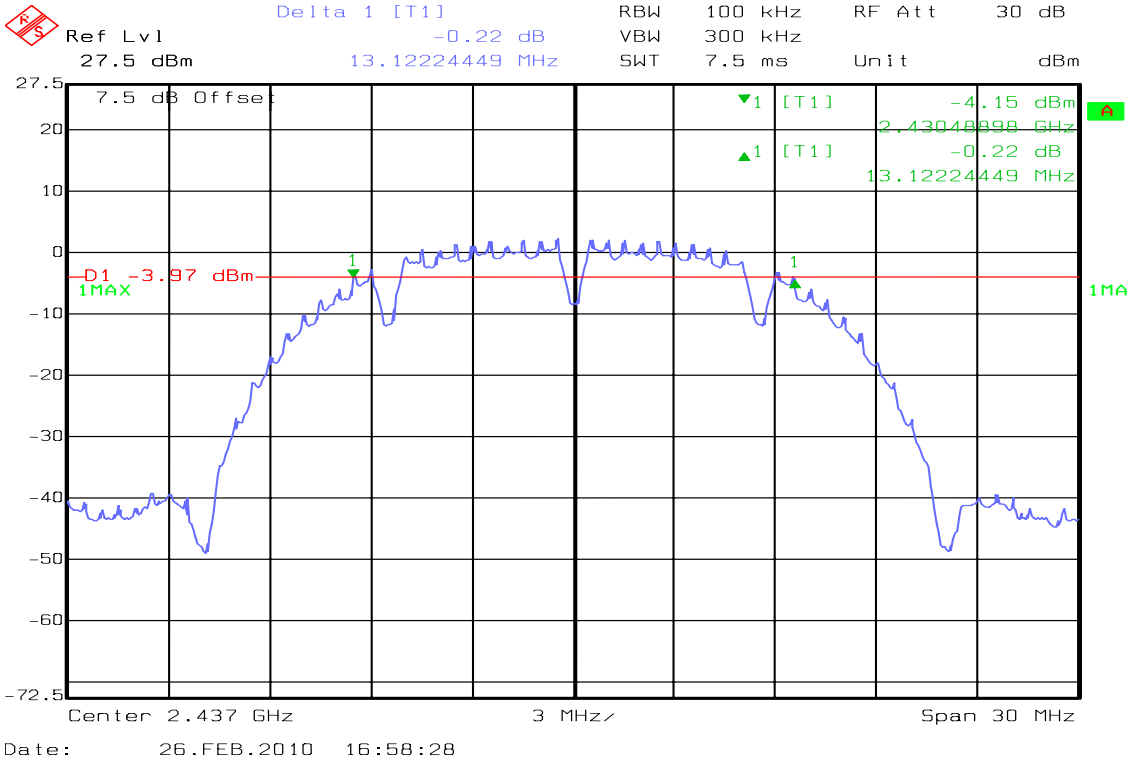
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Margin (kHz)
Low	2412	16.449	>500	PASS
Mid	2437	16.461		PASS
High	2462	16.491		PASS

Test Plot

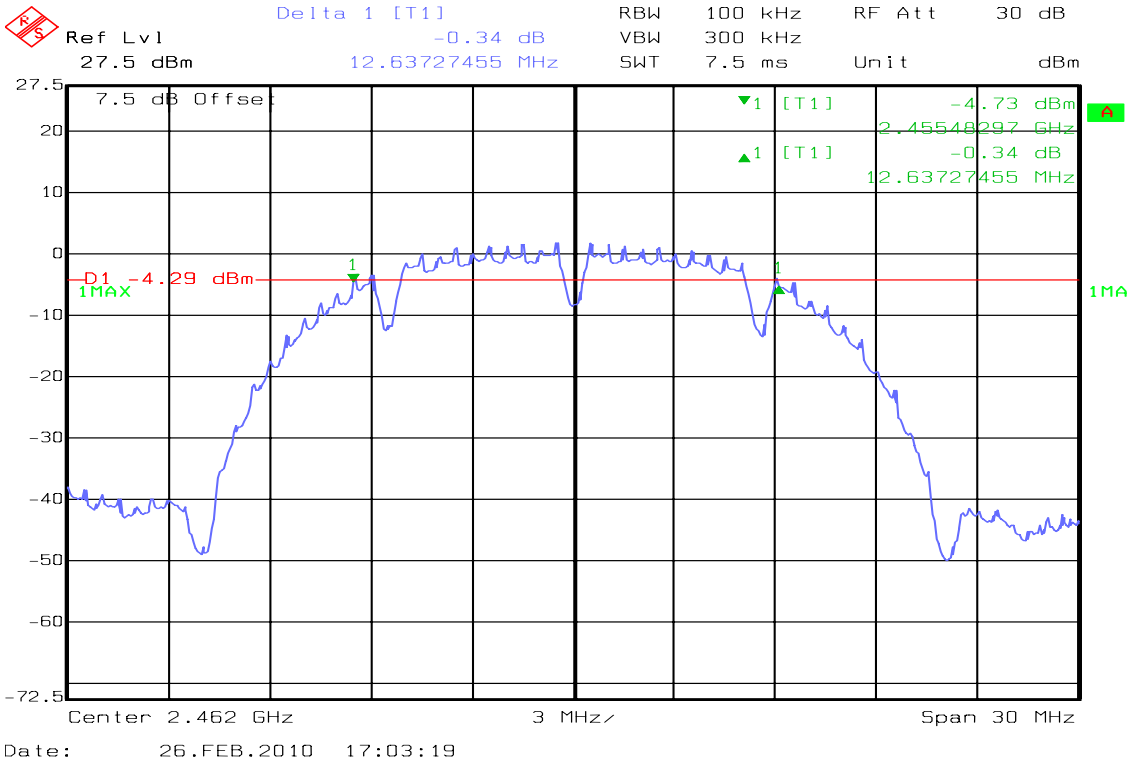
6dB Bandwidth (IEEE 802.11b / CH Low)



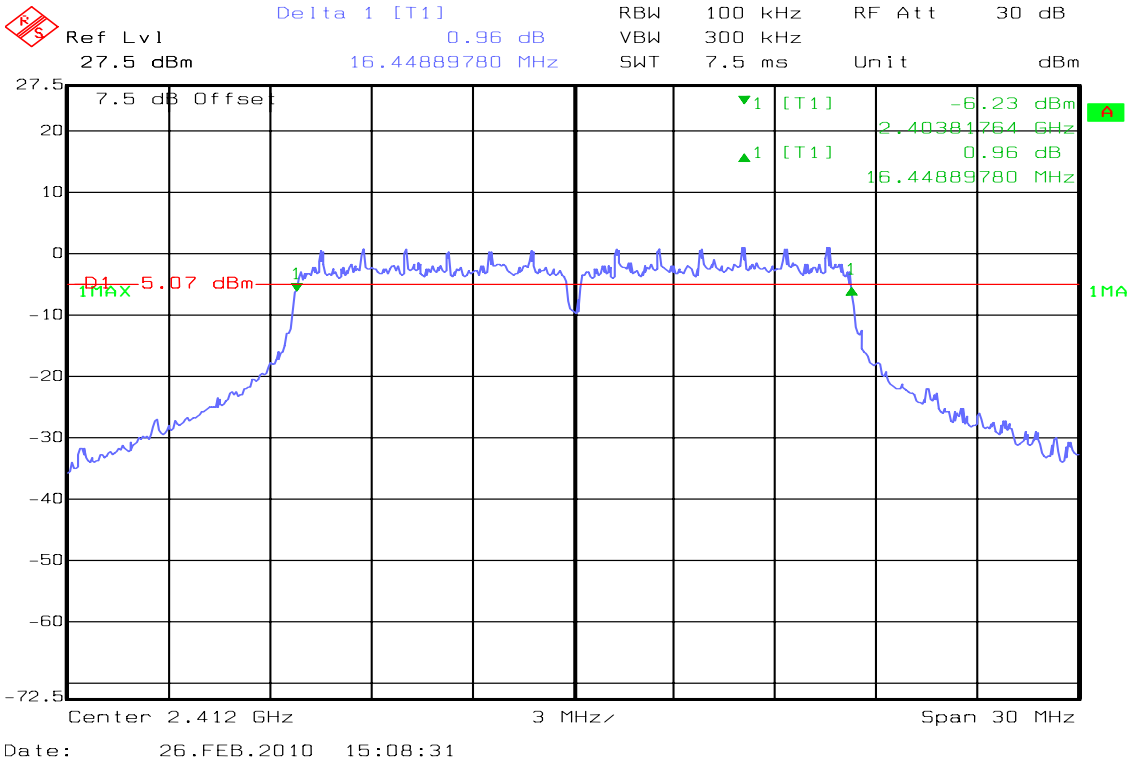
6dB Bandwidth (IEEE 802.11b / CH Mid)



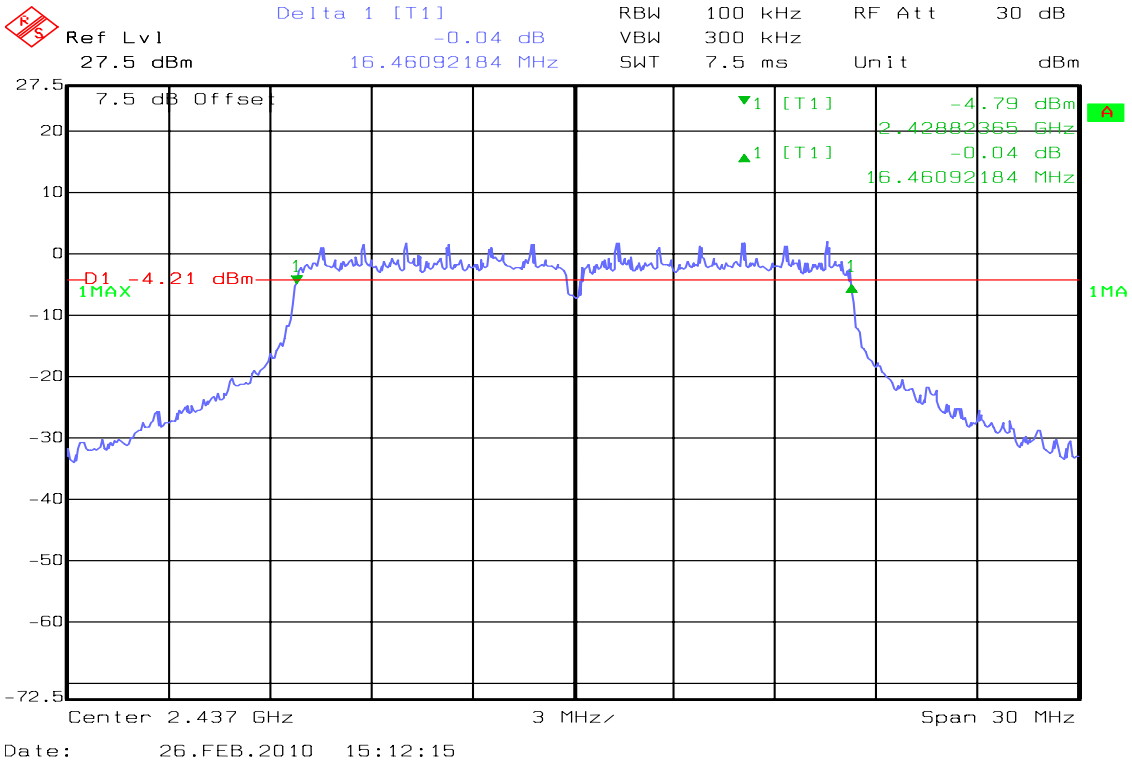
6dB Bandwidth (IEEE 802.11b / CH High)



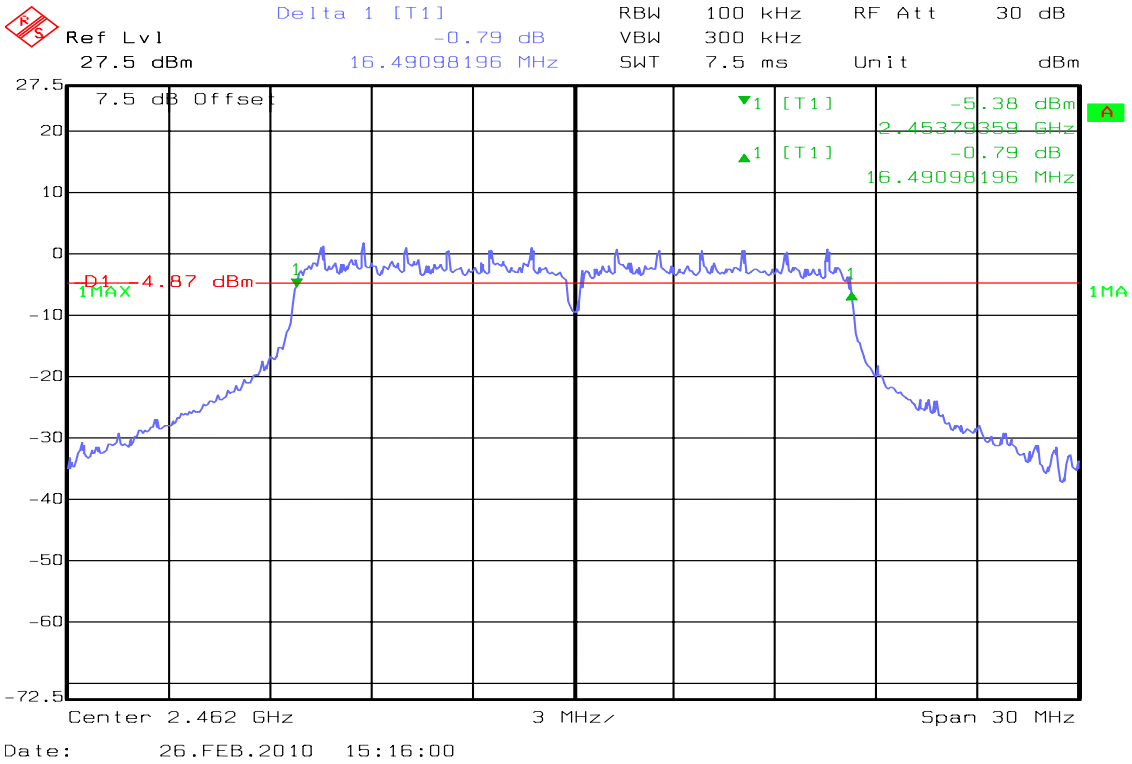
6dB Bandwidth (IEEE 802.11g / CH Low)



6dB Bandwidth (IEEE 802.11g / CH Mid)



6dB Bandwidth (IEEE 802.11g / CH High)



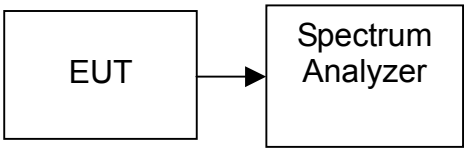
7.2. PEAK POWER

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

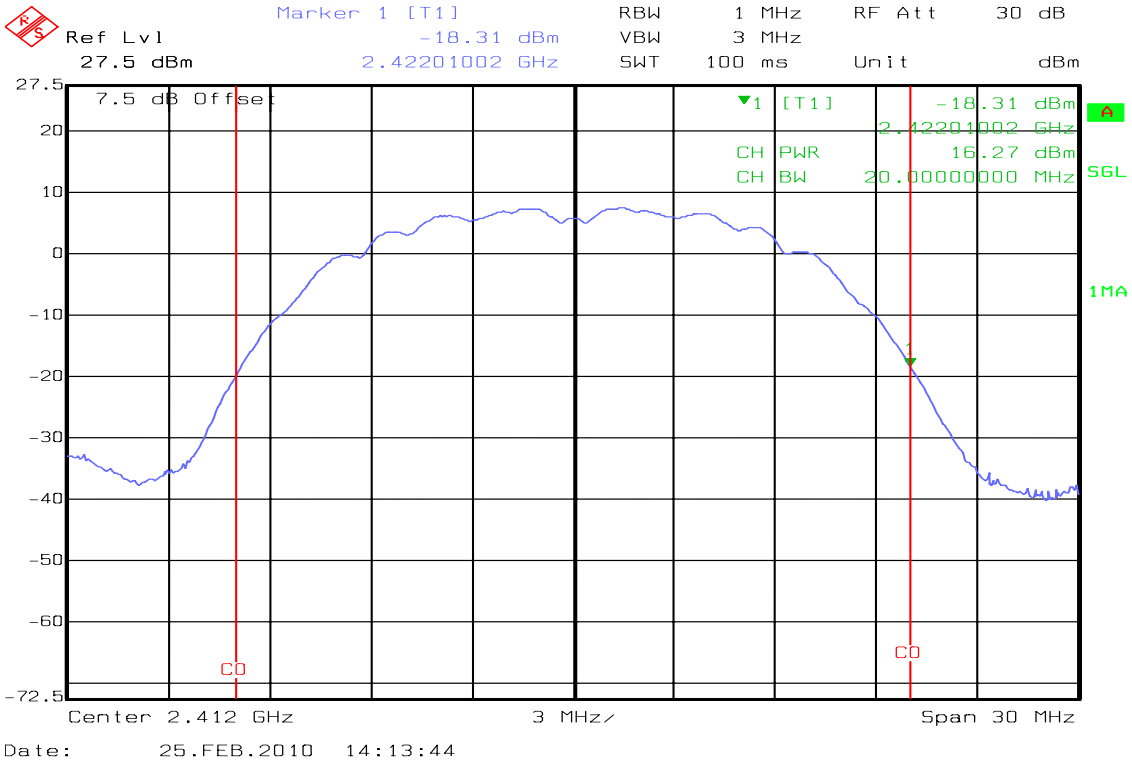
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	16.27	0.04236	1	PASS
Mid	2437	16.64	0.04613		PASS
High	2462	16.01	0.03990		PASS

IEEE 802.11g

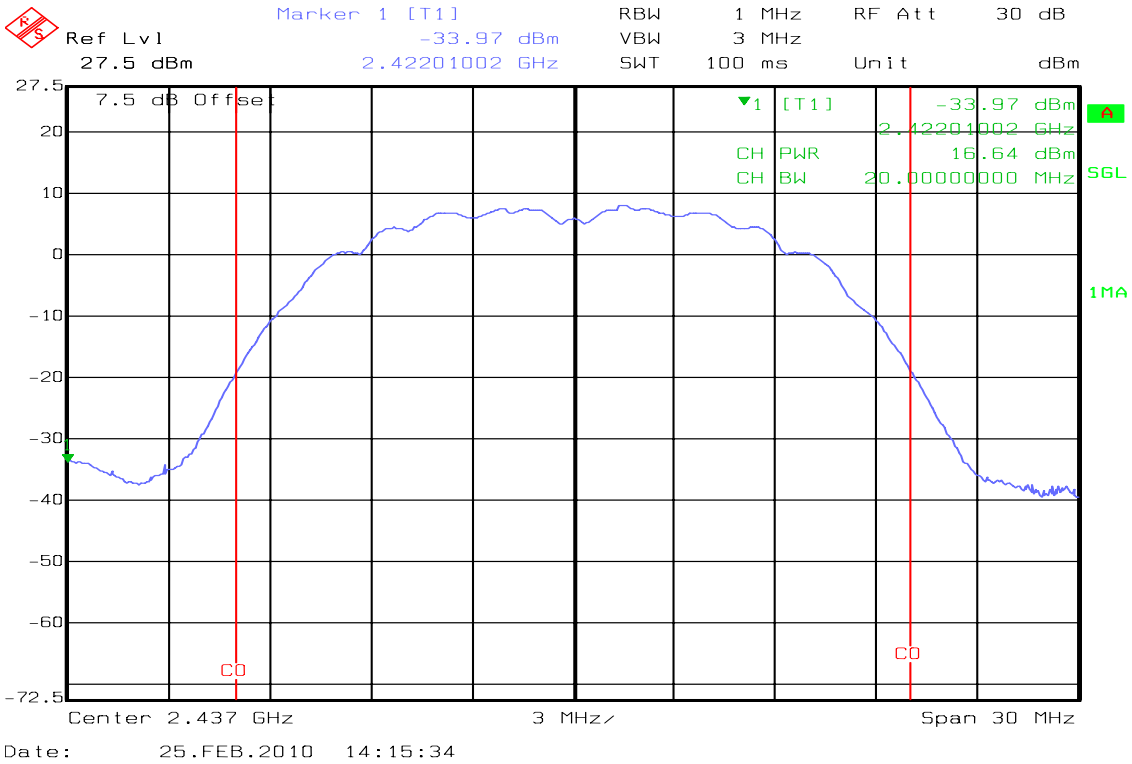
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	20.53	0.11298	1	PASS
Mid	2437	20.77	0.11940		PASS
High	2462	20.34	0.10814		PASS

Test Plot

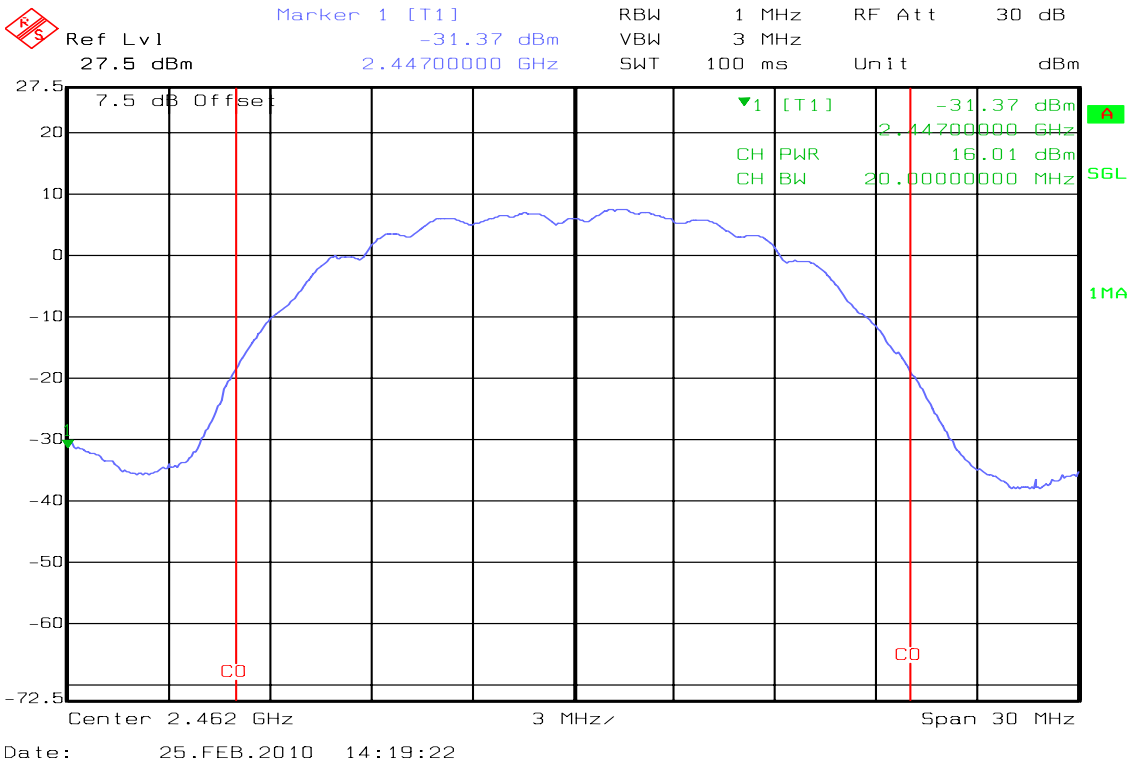
Peak Power (IEEE 802.11b / CH Low)



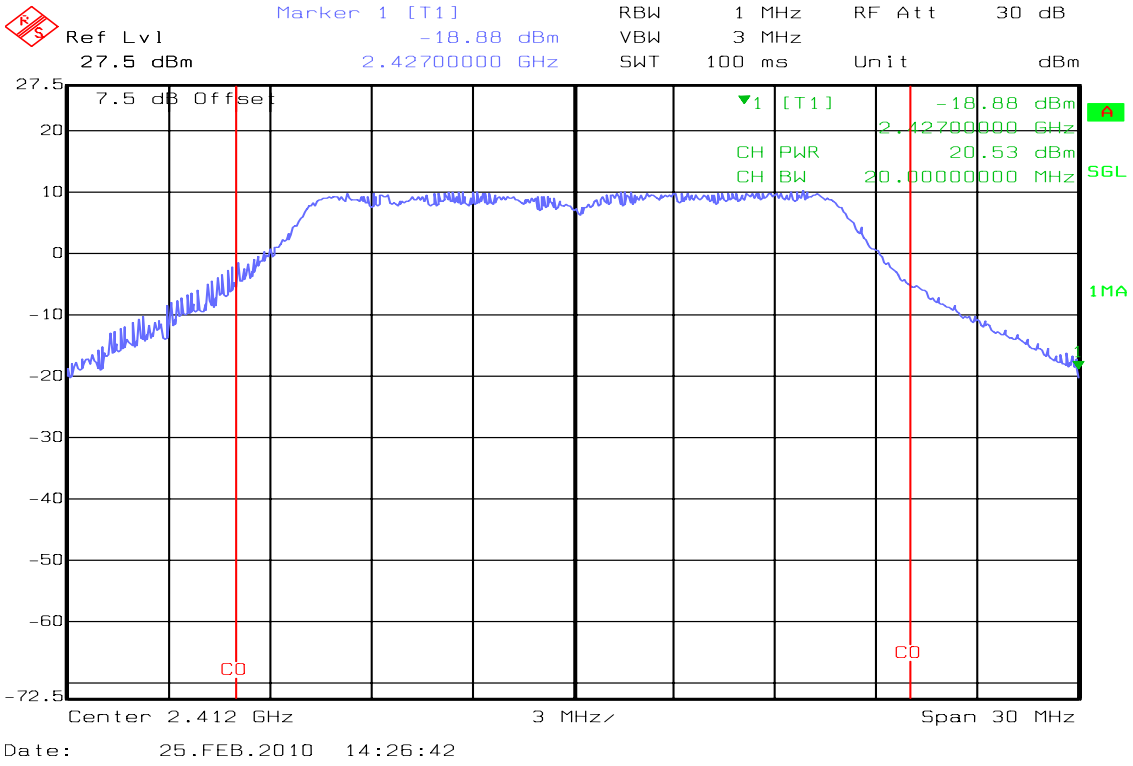
Peak Power (IEEE 802.11b / CH Mid)



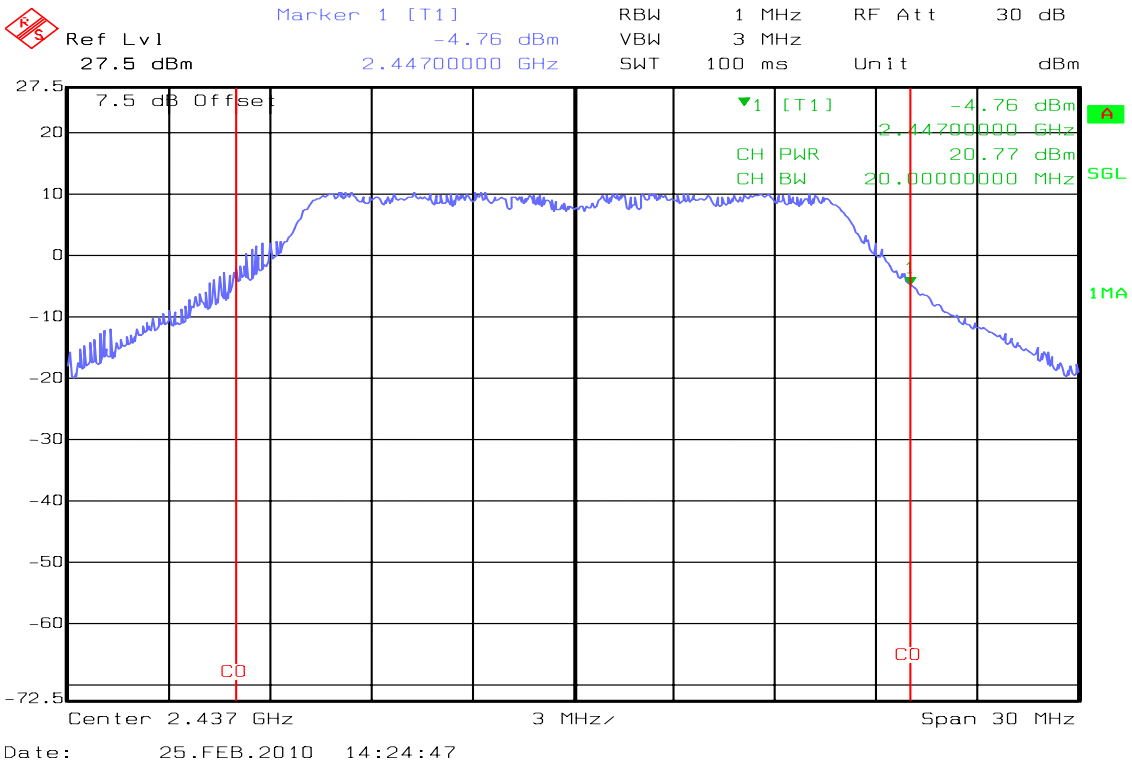
Peak Power (IEEE 802.11b / CH High)



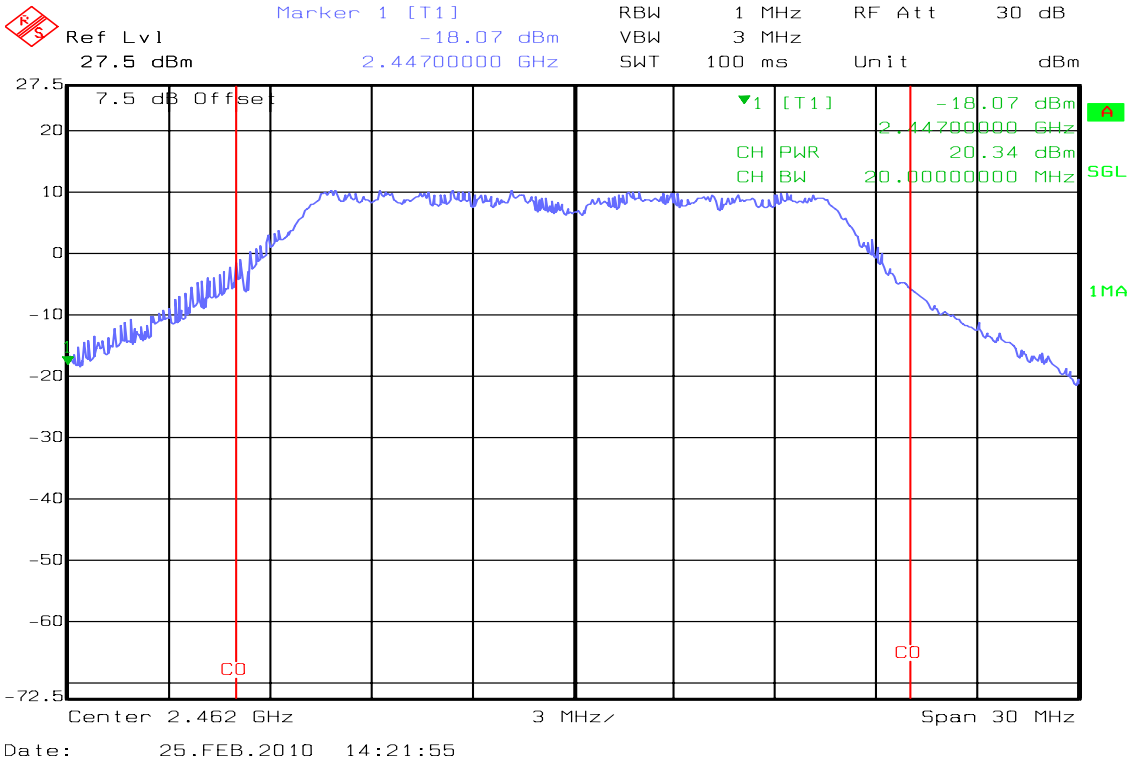
Peak Power (IEEE 802.11g / CH Low)



Peak Power (IEEE 802.11g / CH Mid)



Peak Power (IEEE 802.11g / CH High)

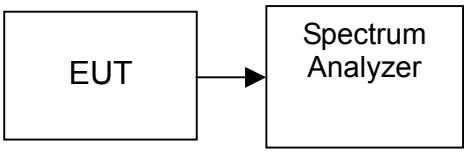


7.3. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST CONFIGURATION



TEST PROCEDURE

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

TEST RESULTS

No non-compliance noted

TEST DATA

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	13.34	0.02158
Mid	2437	13.36	0.02168
High	2462	13.76	0.02377

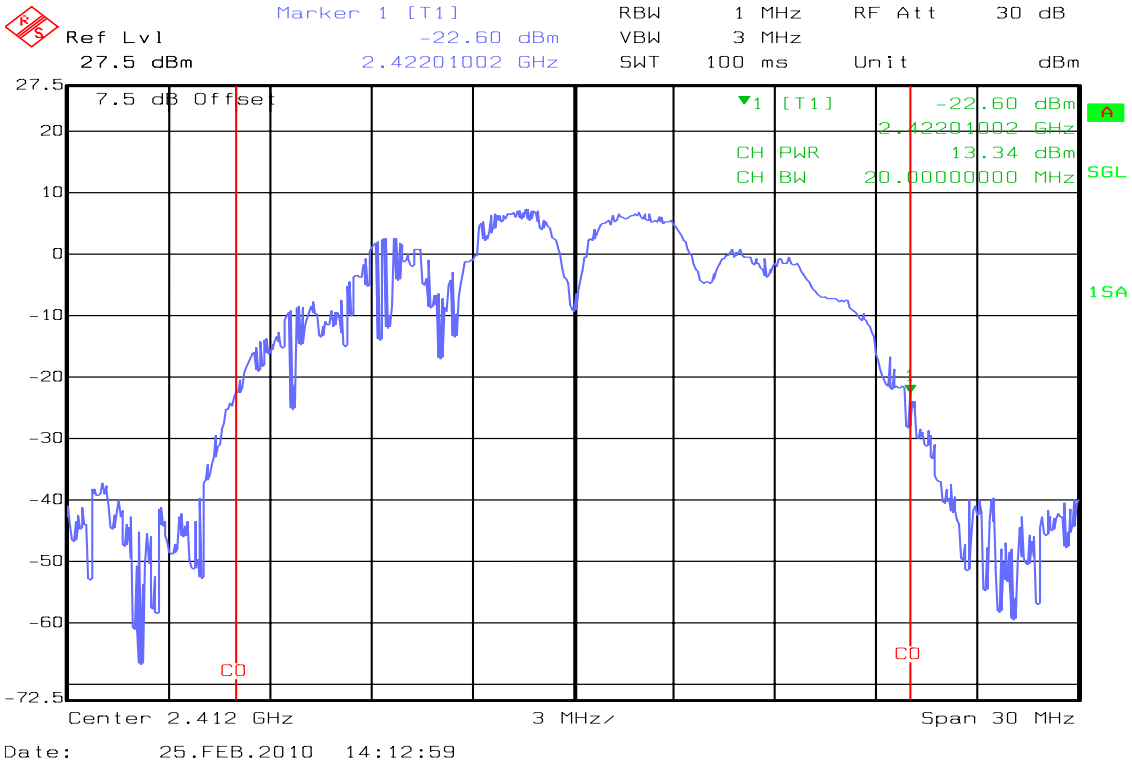
Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	13.16	0.02070
Mid	2437	13.33	0.02153
High	2462	13.23	0.02104

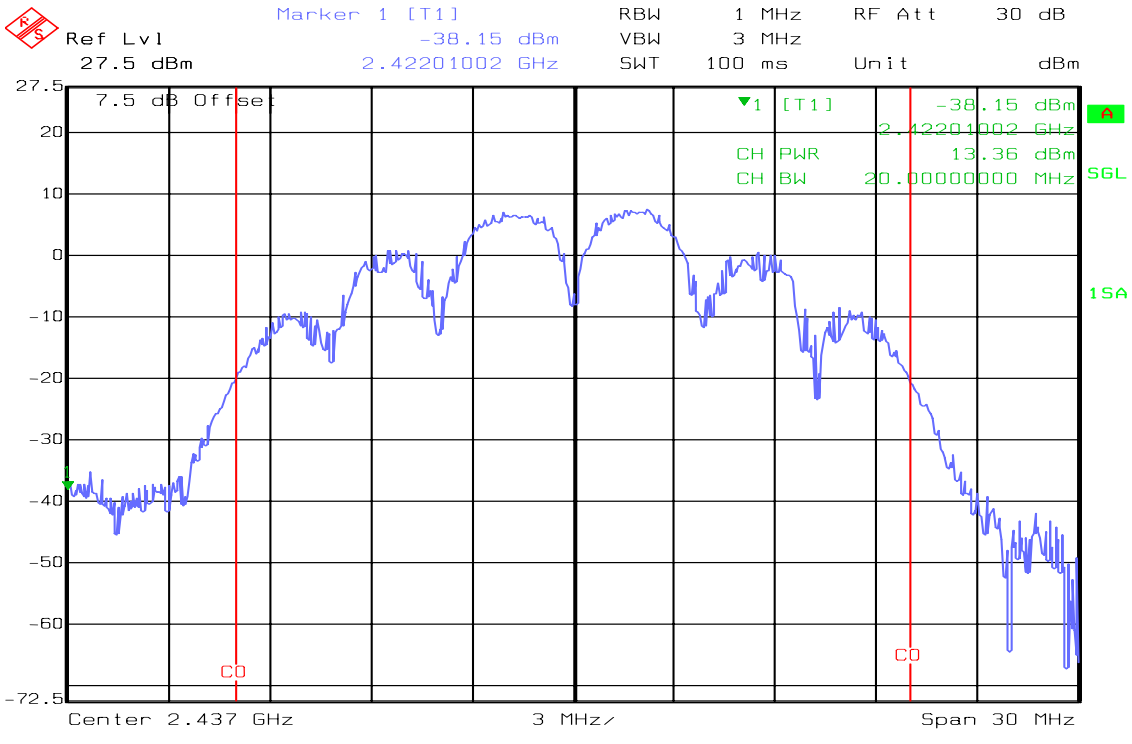
Test Plot

IEEE 802.11b

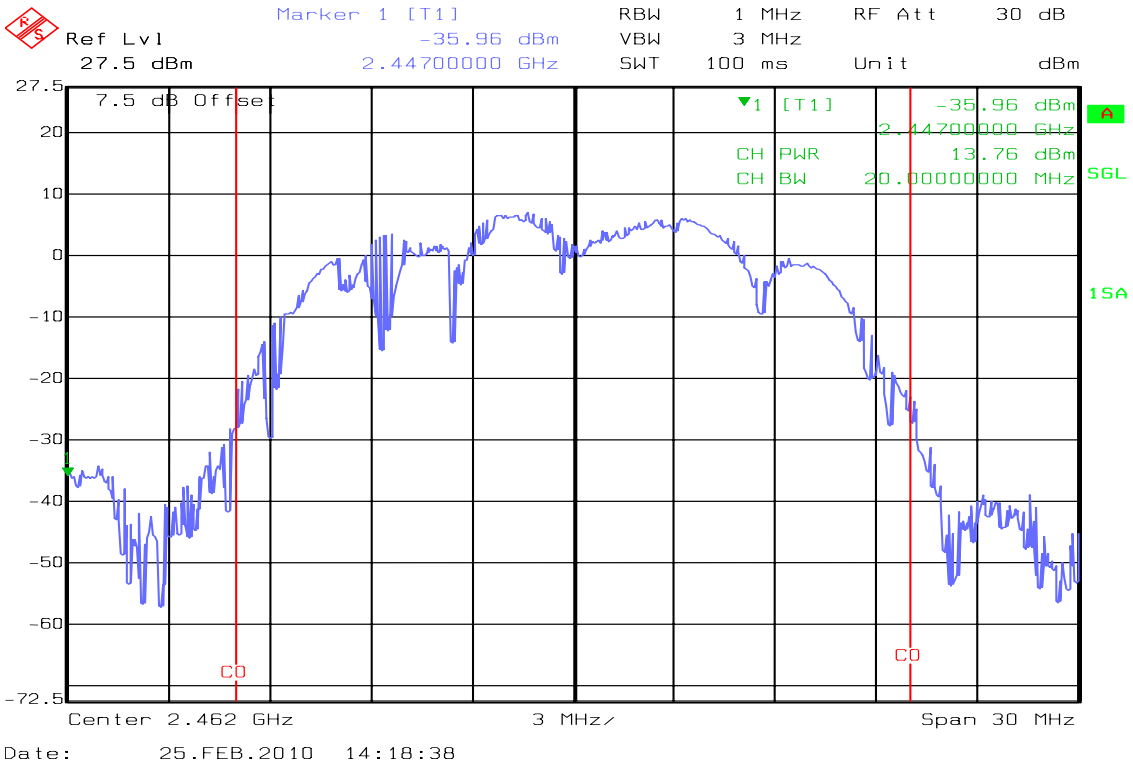
Average Power (CH Low)



Average Power (CH Mid)

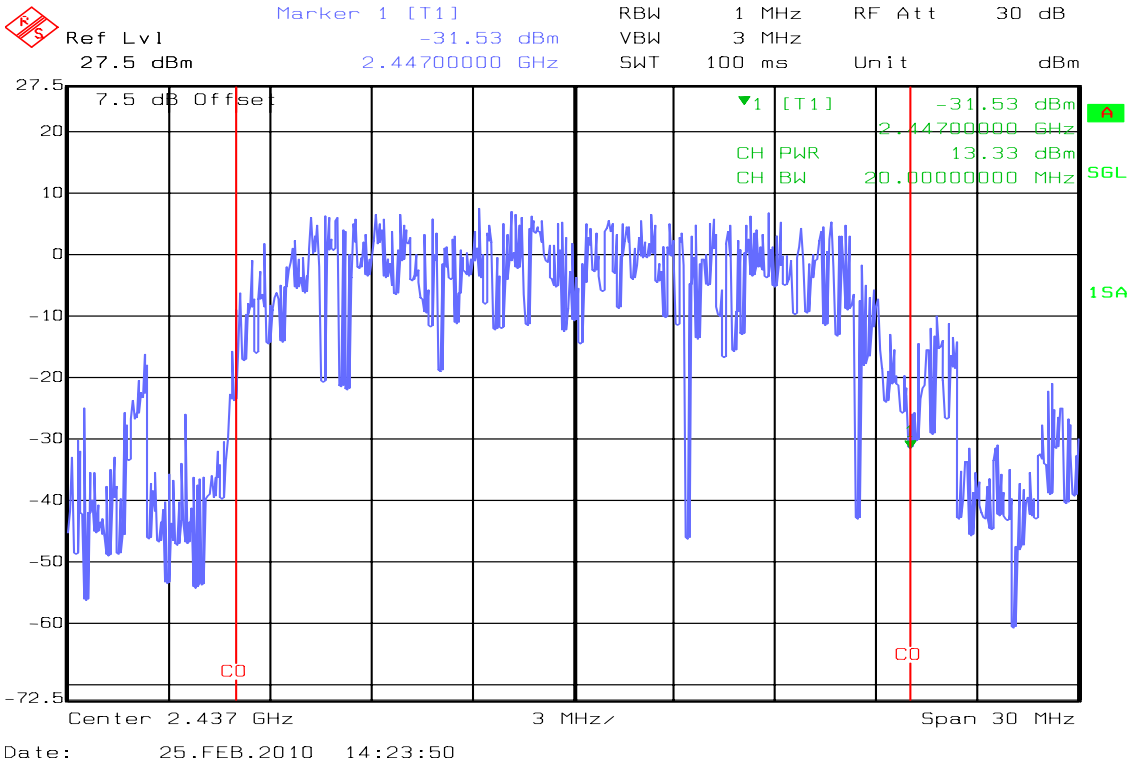


Average Power (CH High)

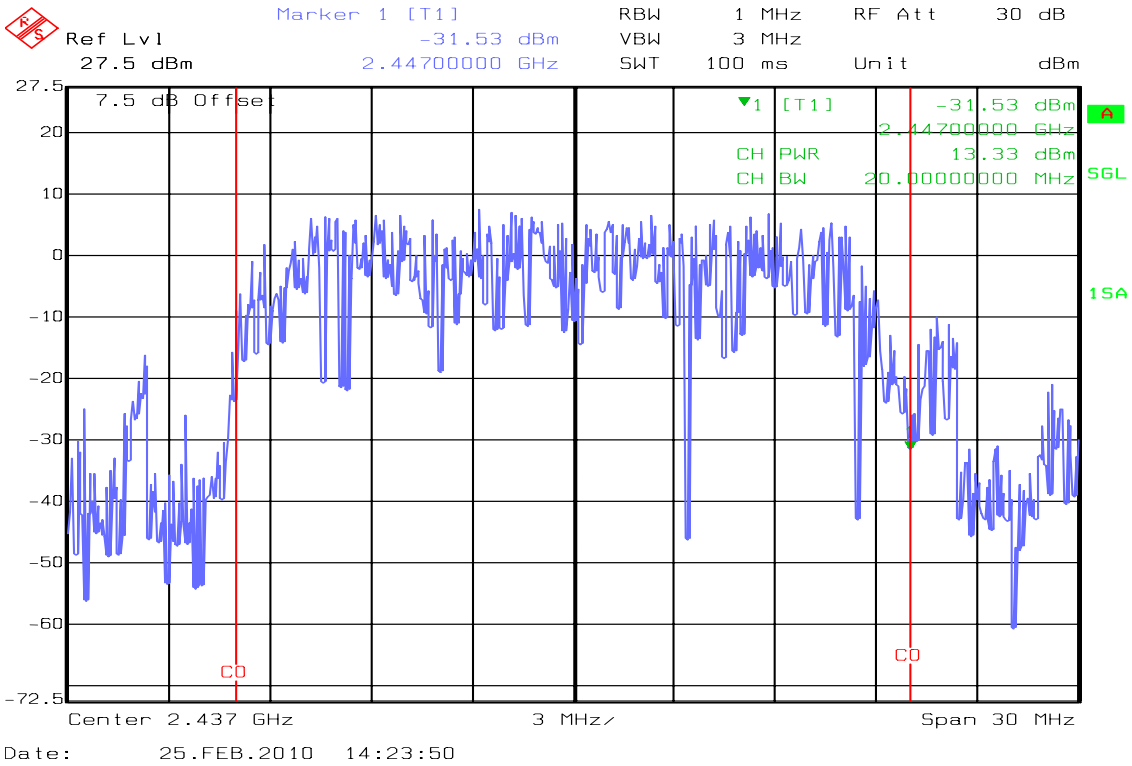


IEEE 802.11g

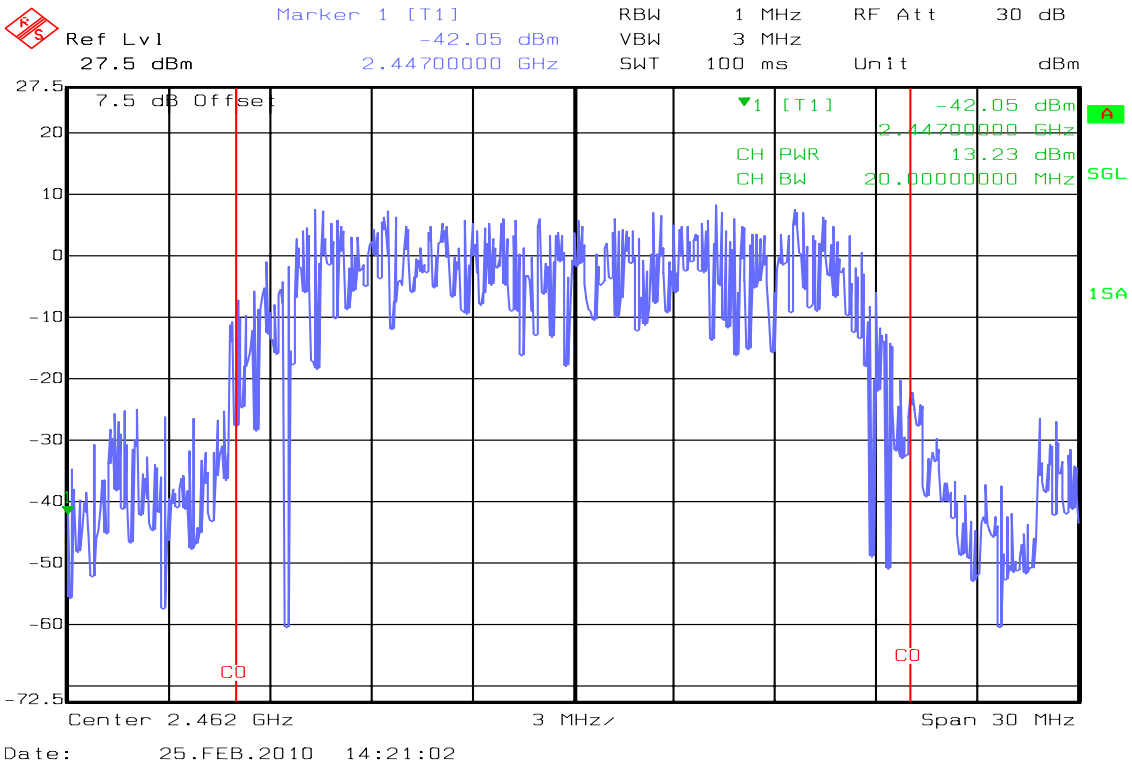
Average Power (CH Low)



Average Power (CH Mid)



Average Power (CH High)

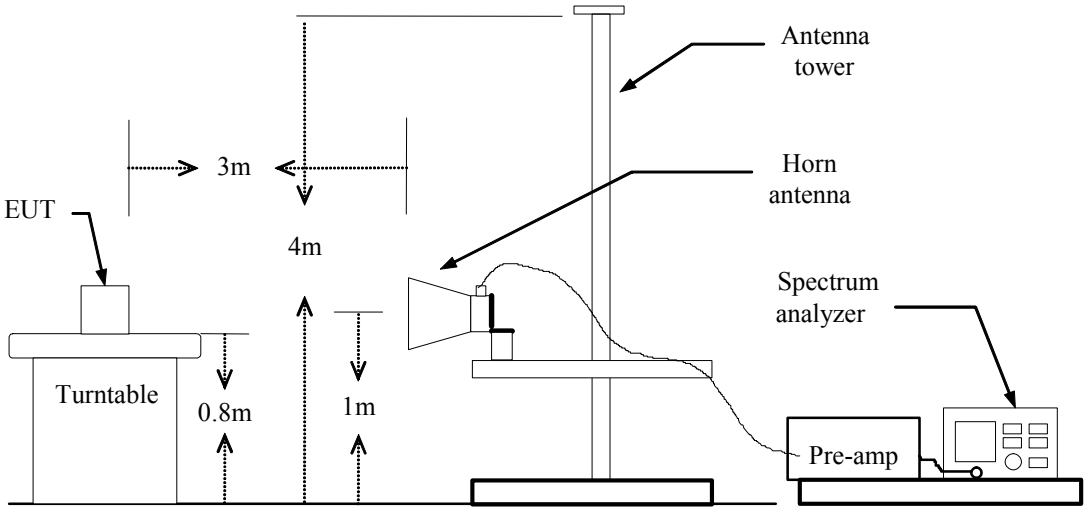


7.4. BAND EDGES MEASUREMENT

LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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.

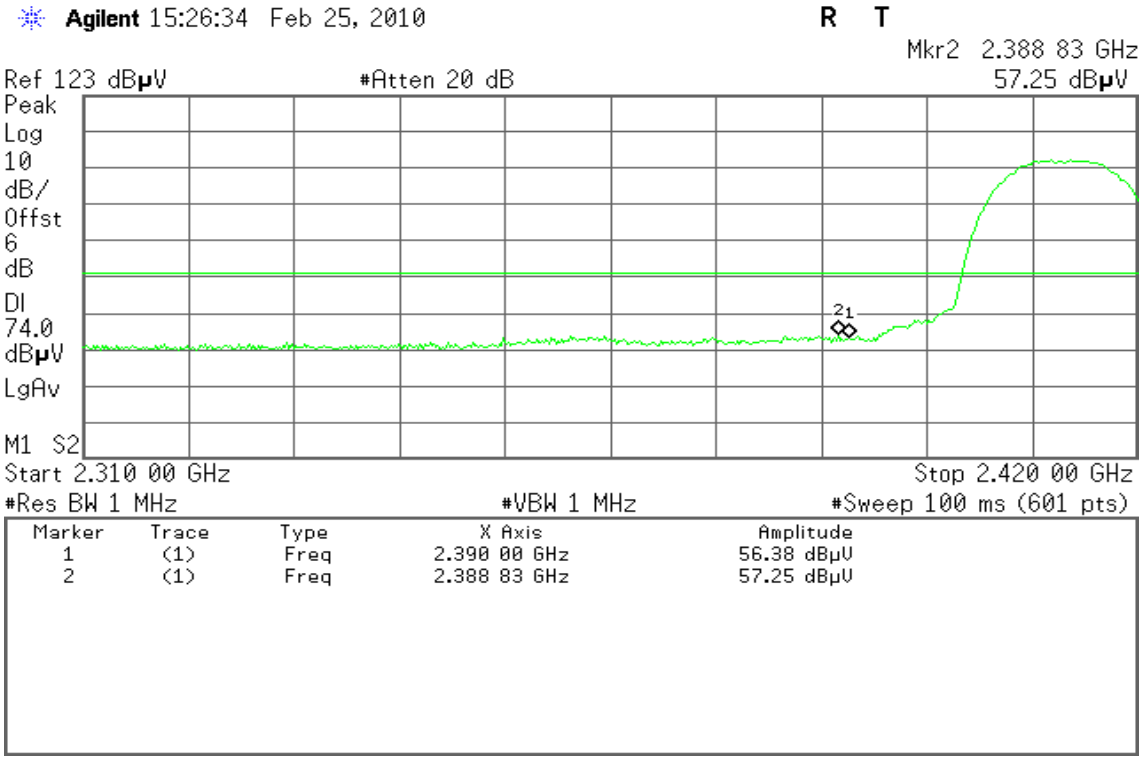
TEST RESULTS

Refer to attach spectrum analyzer data chart.

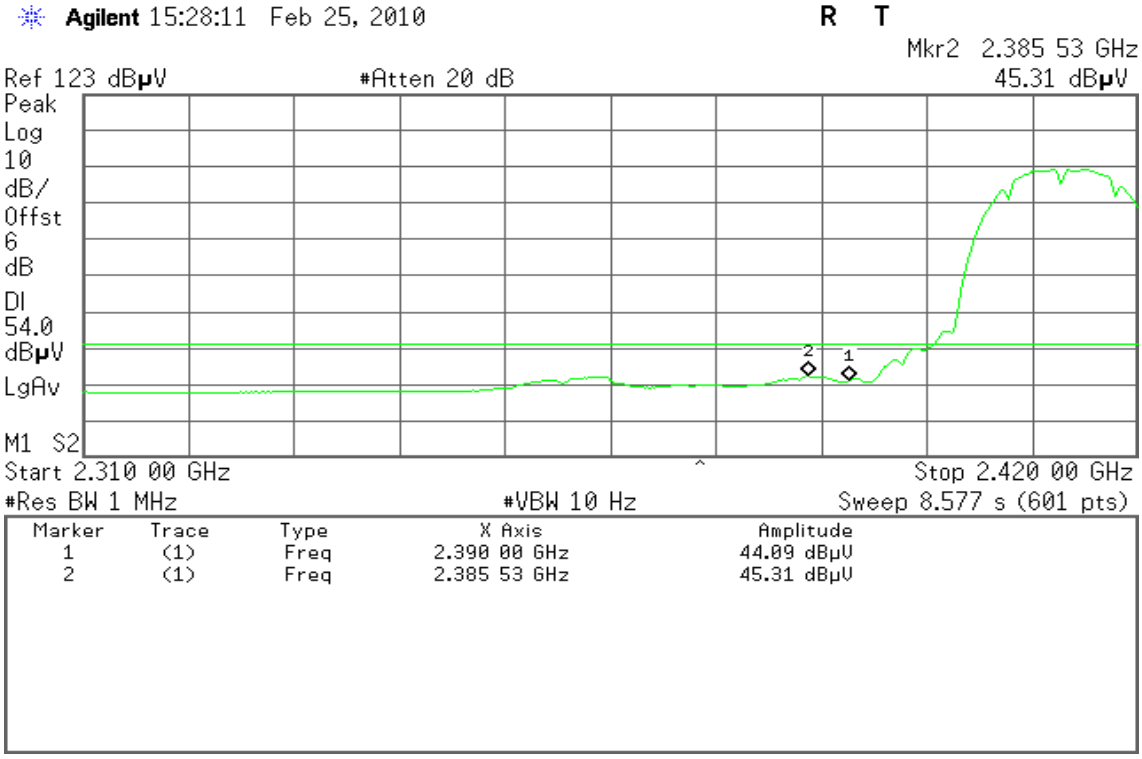
Test Plot

Band Edges (IEEE 802.11b / CH Low)

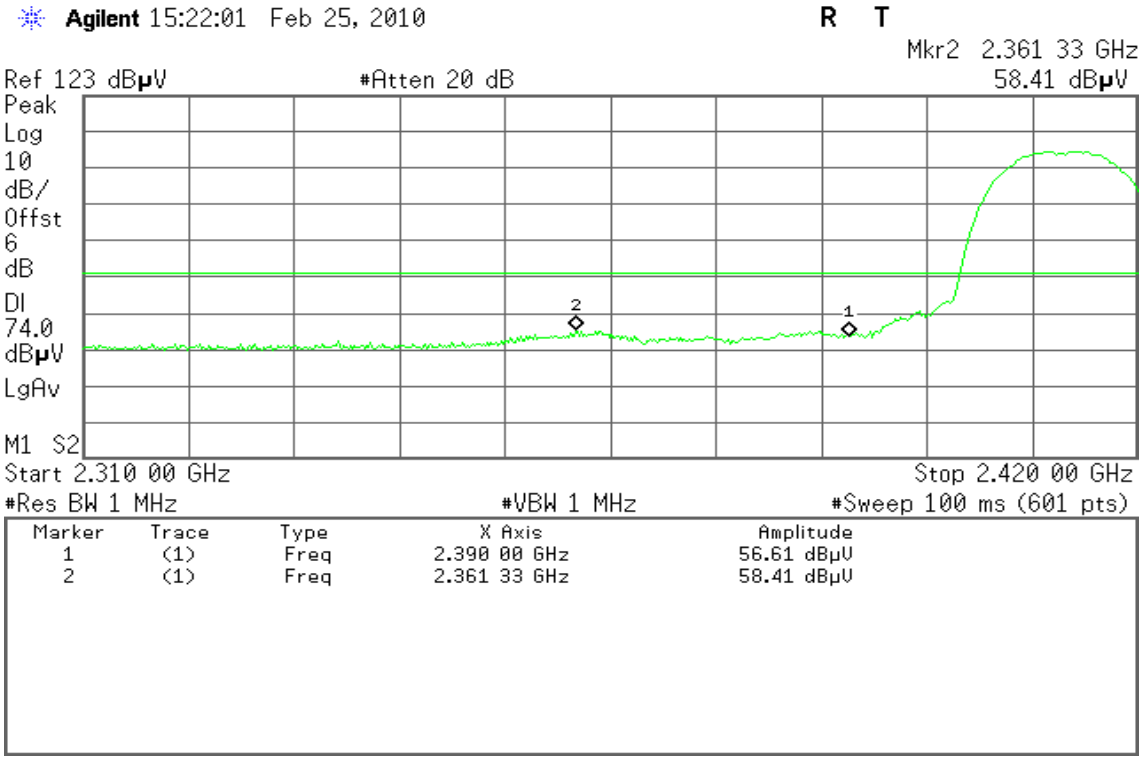
Detector mode: Peak **Polarity: Vertical**



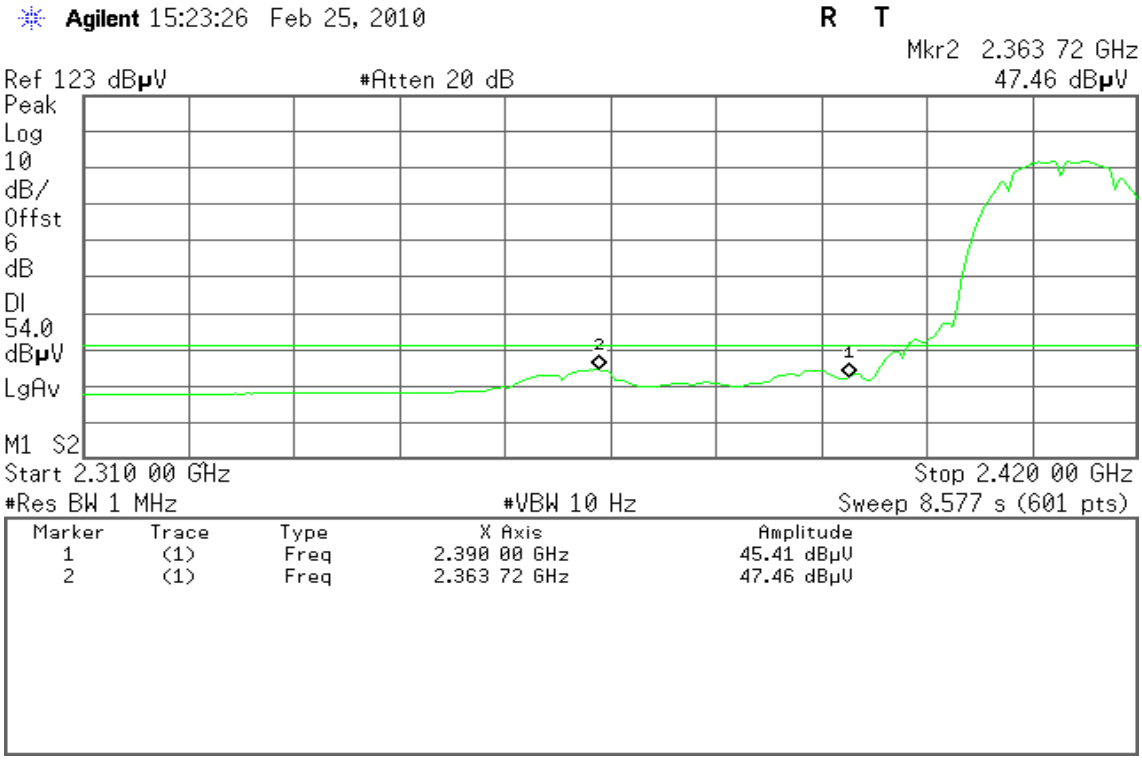
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**



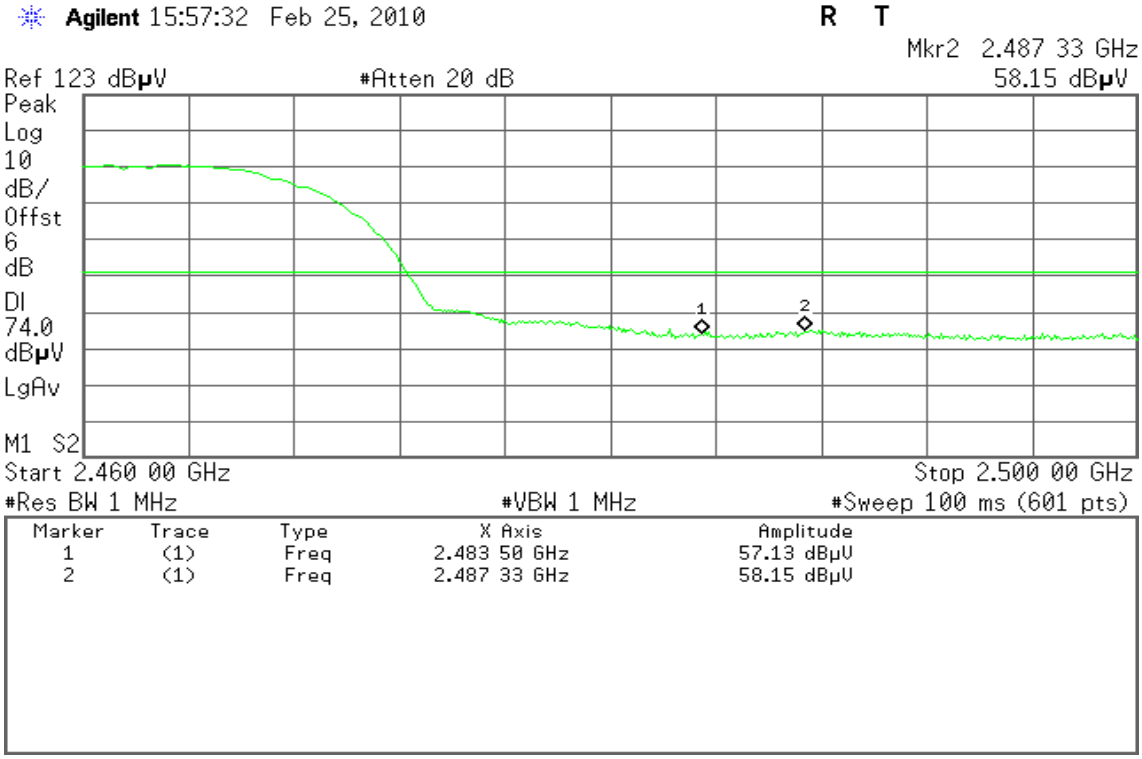
Detector mode: Average **Polarity: Horizontal**



Band Edges (IEEE 802.11b / CH High)

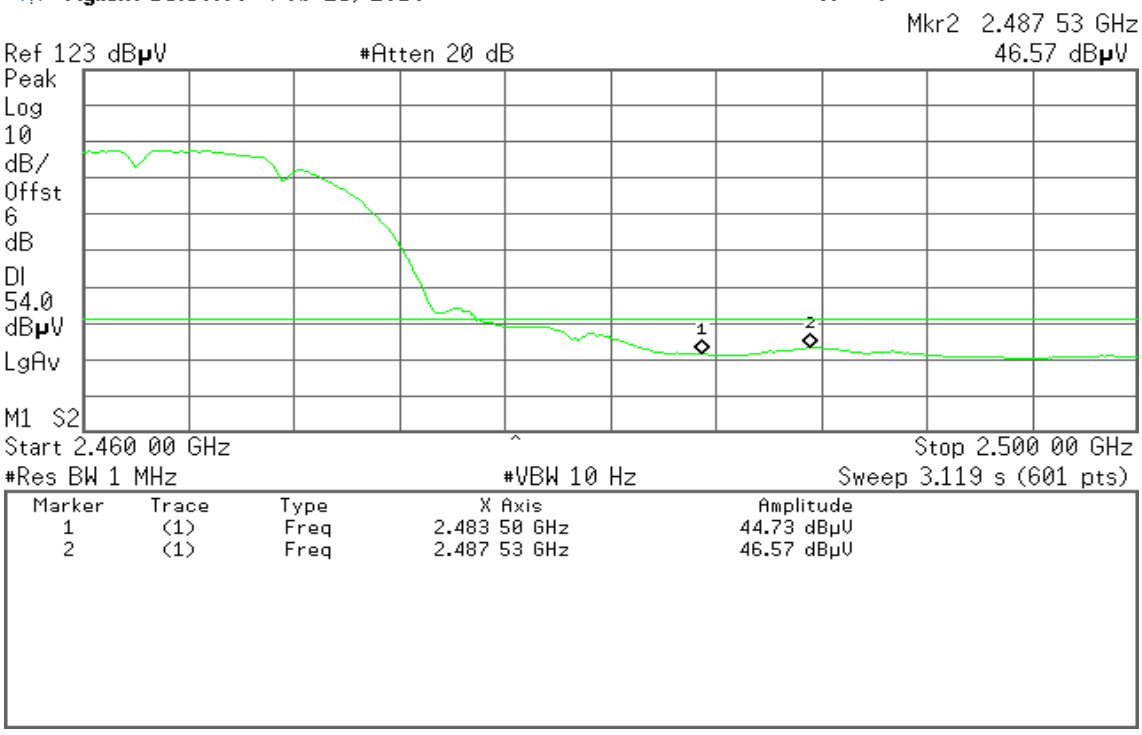
Detector mode: Peak

Polarity: Vertical

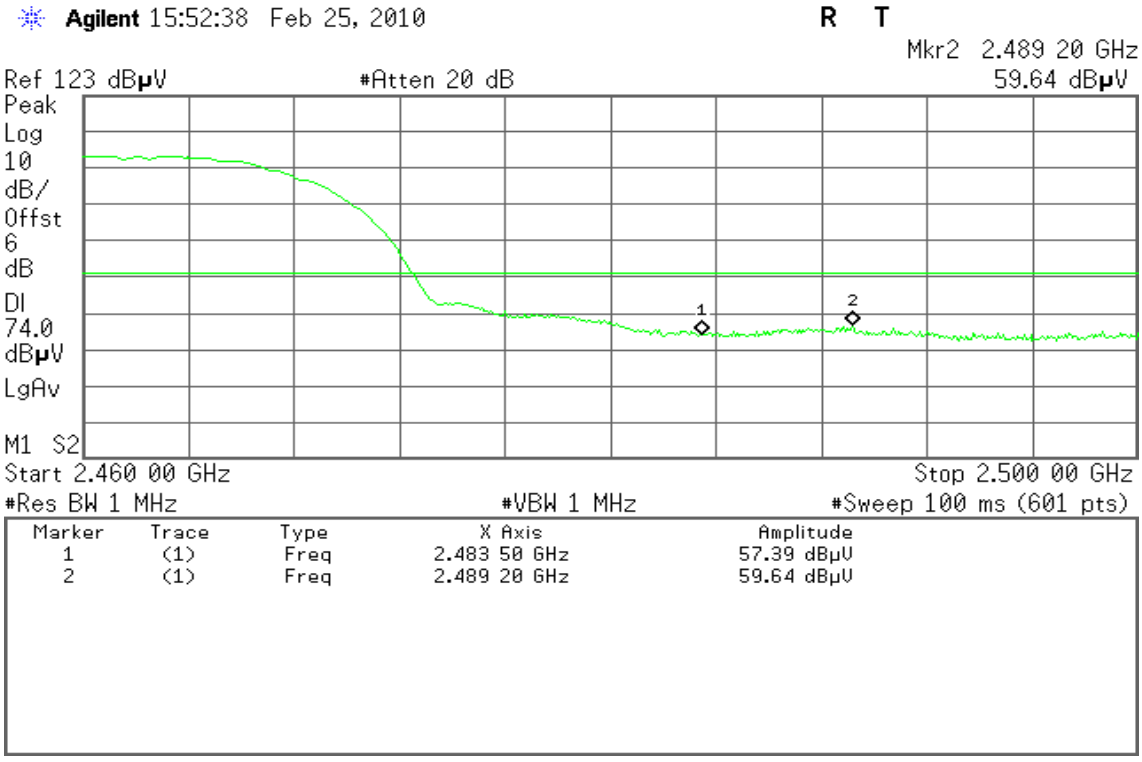


Detector mode: Average

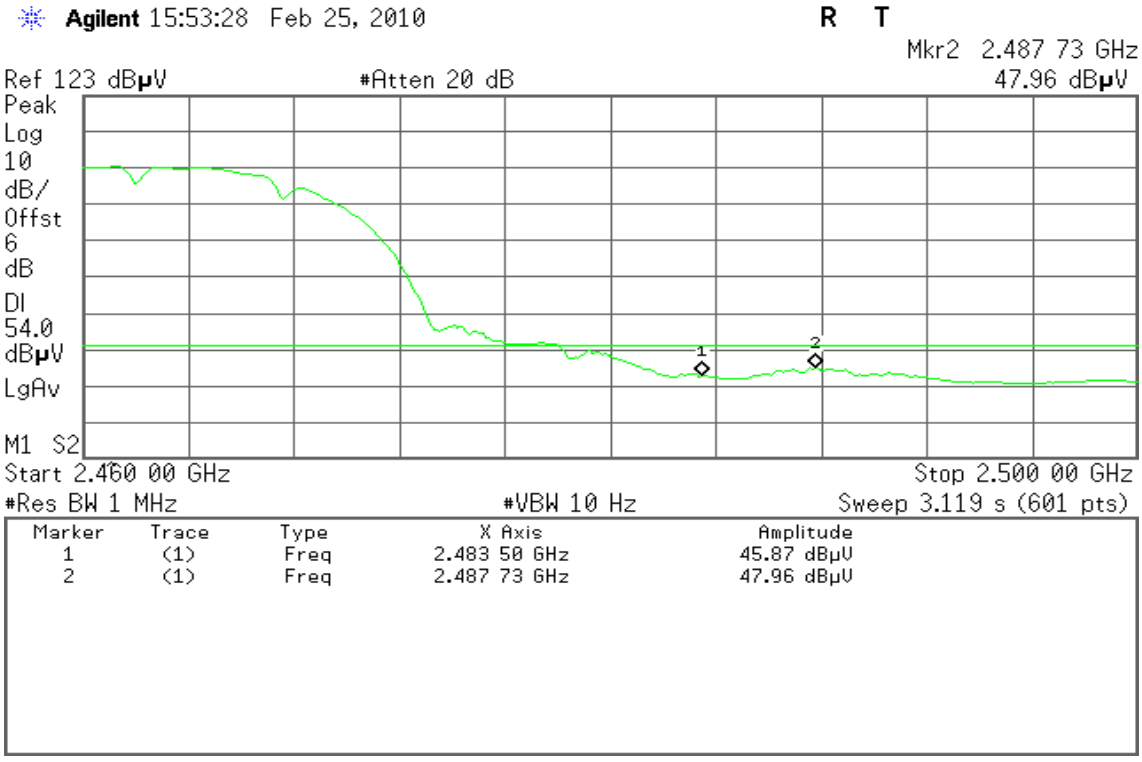
Polarity: Vertical



Detector mode: Peak **Polarity: Horizontal**



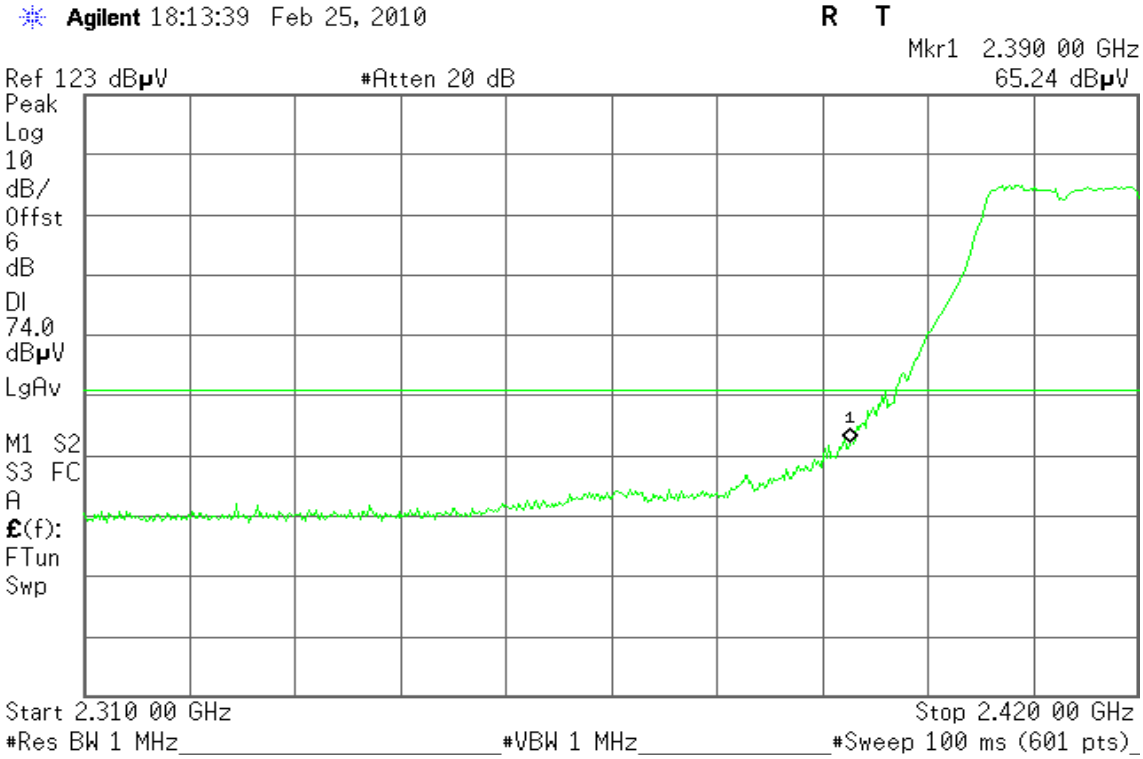
Detector mode: Average **Polarity: Horizontal**



Band Edges (IEEE 802.11g / CH Low)

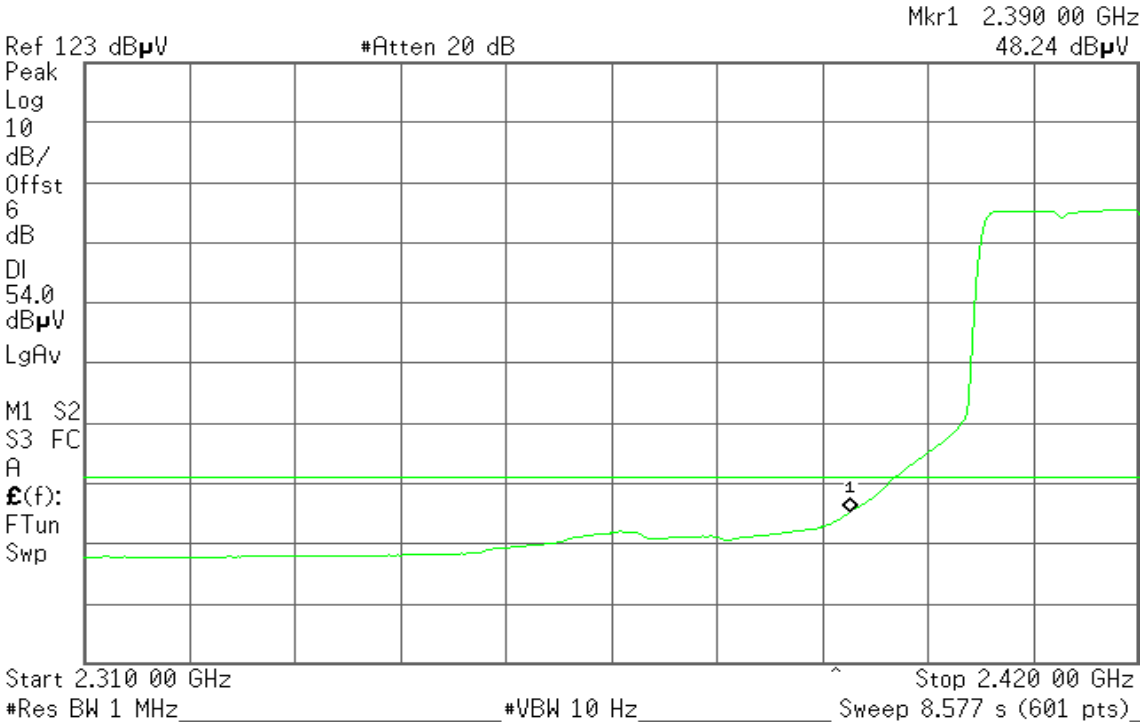
Detector mode: Peak

Polarity: Vertical

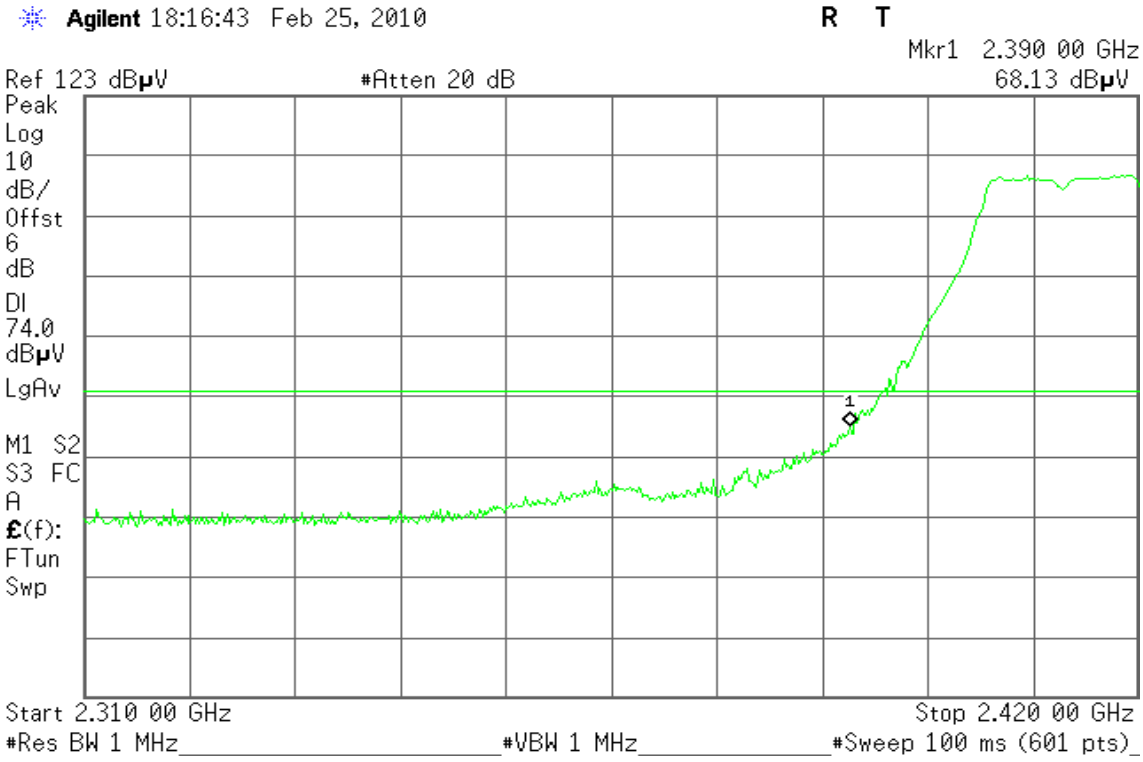


Detector mode: Average

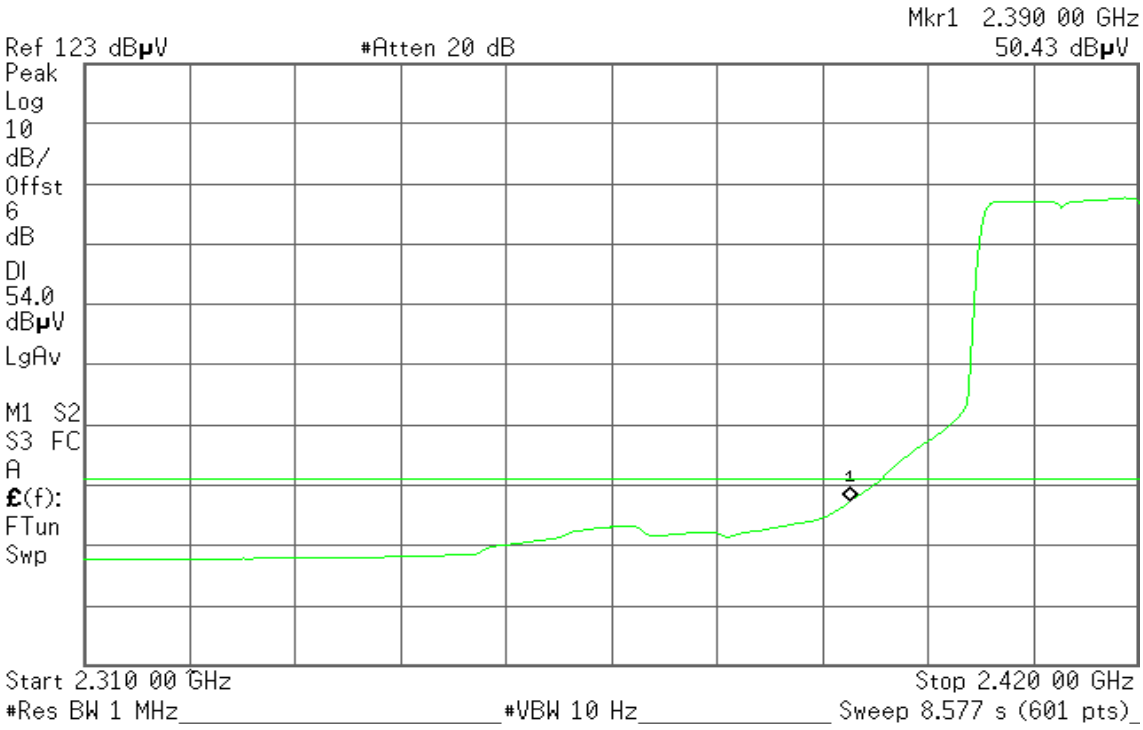
Polarity: Vertical



Detector mode: Peak **Polarity: Horizontal**



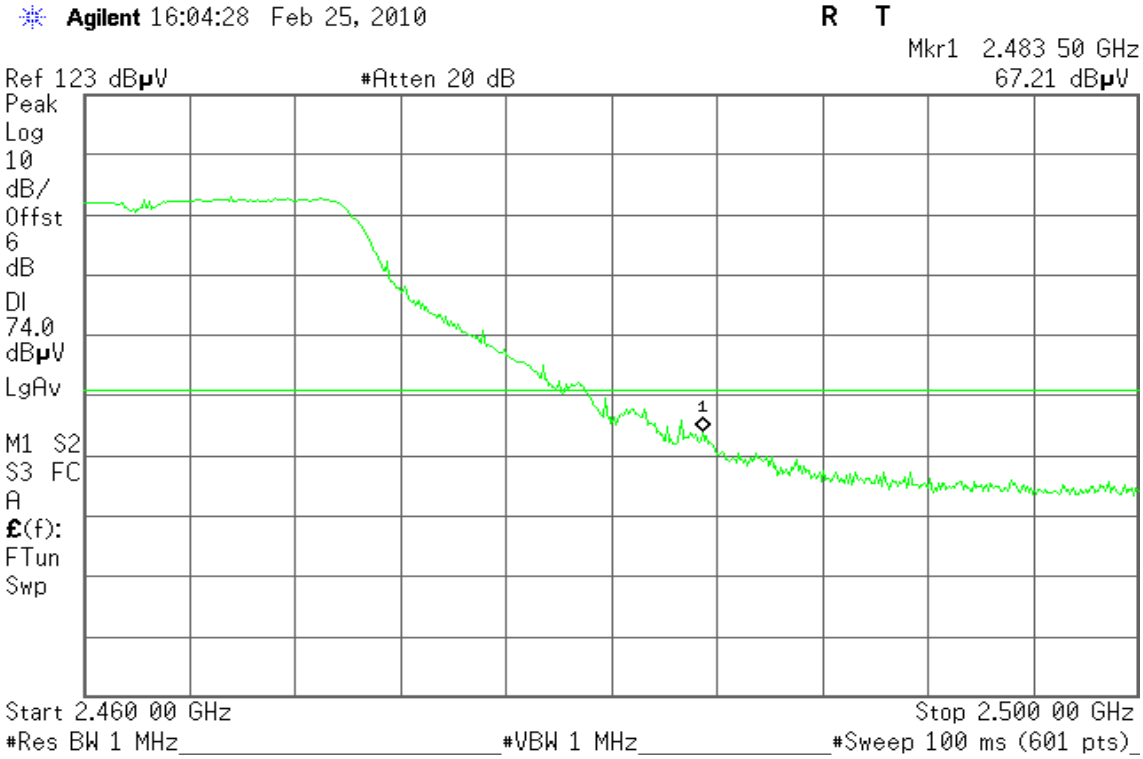
Detector mode: Average **Polarity: Horizontal**



Band Edges (IEEE 802.11g / CH High)

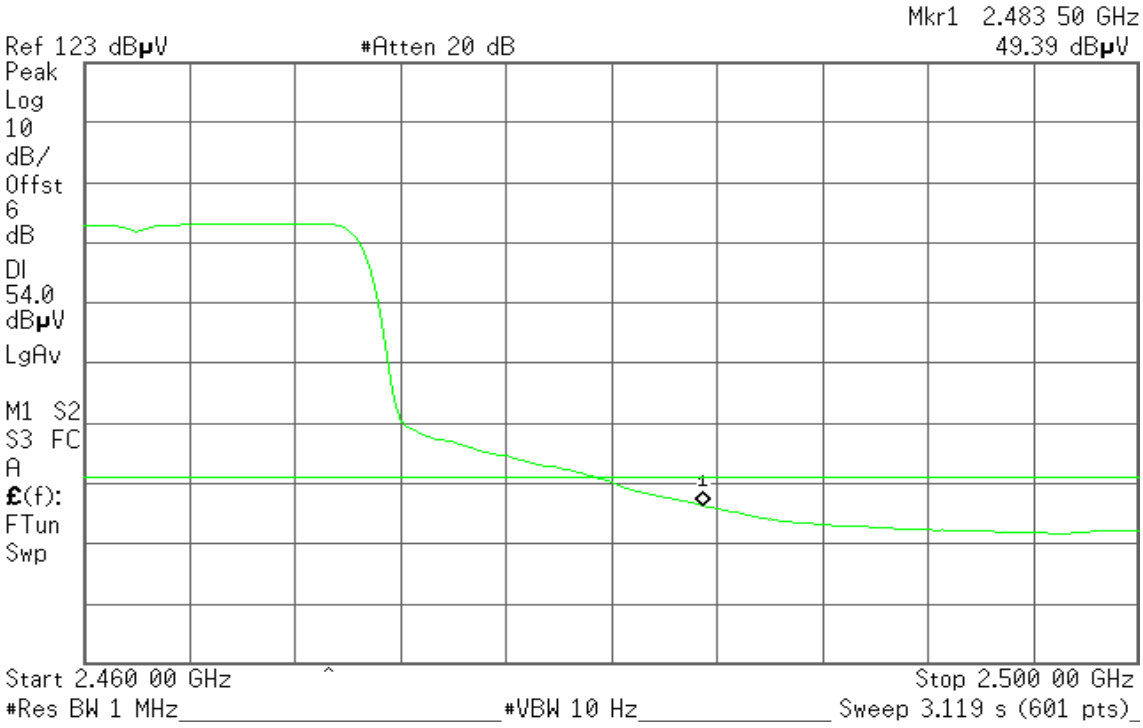
Detector mode: Peak

Polarity: Vertical

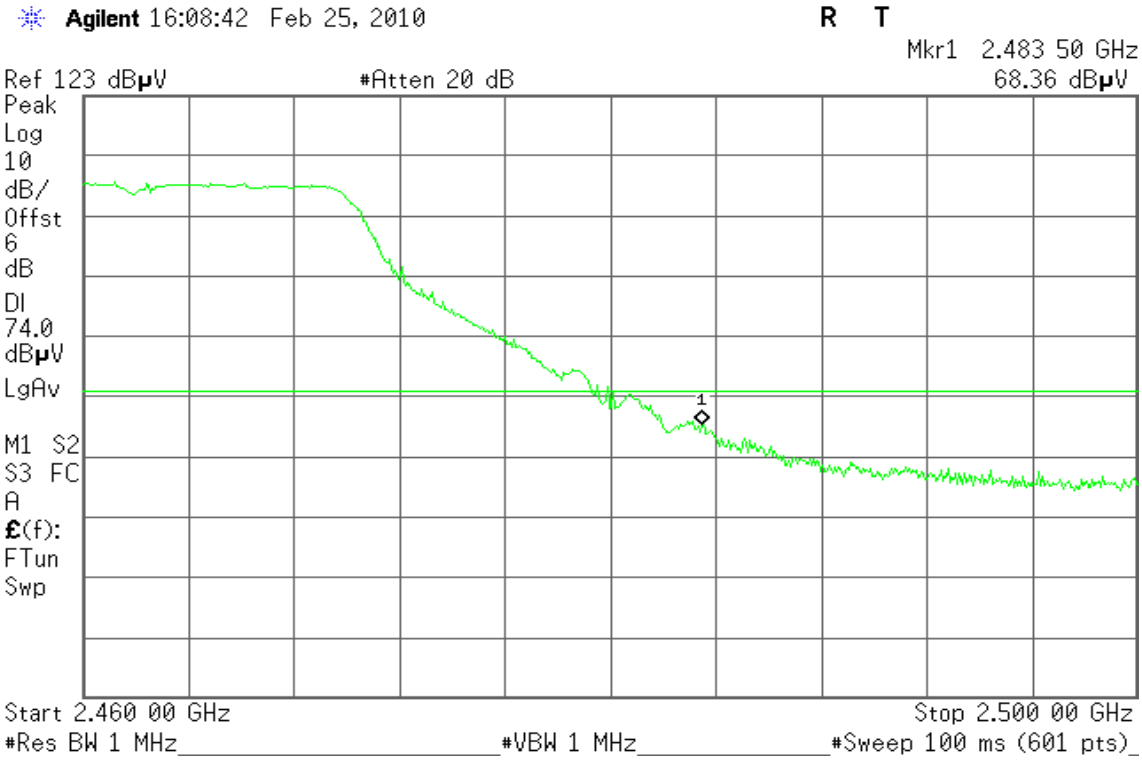


Detector mode: Average

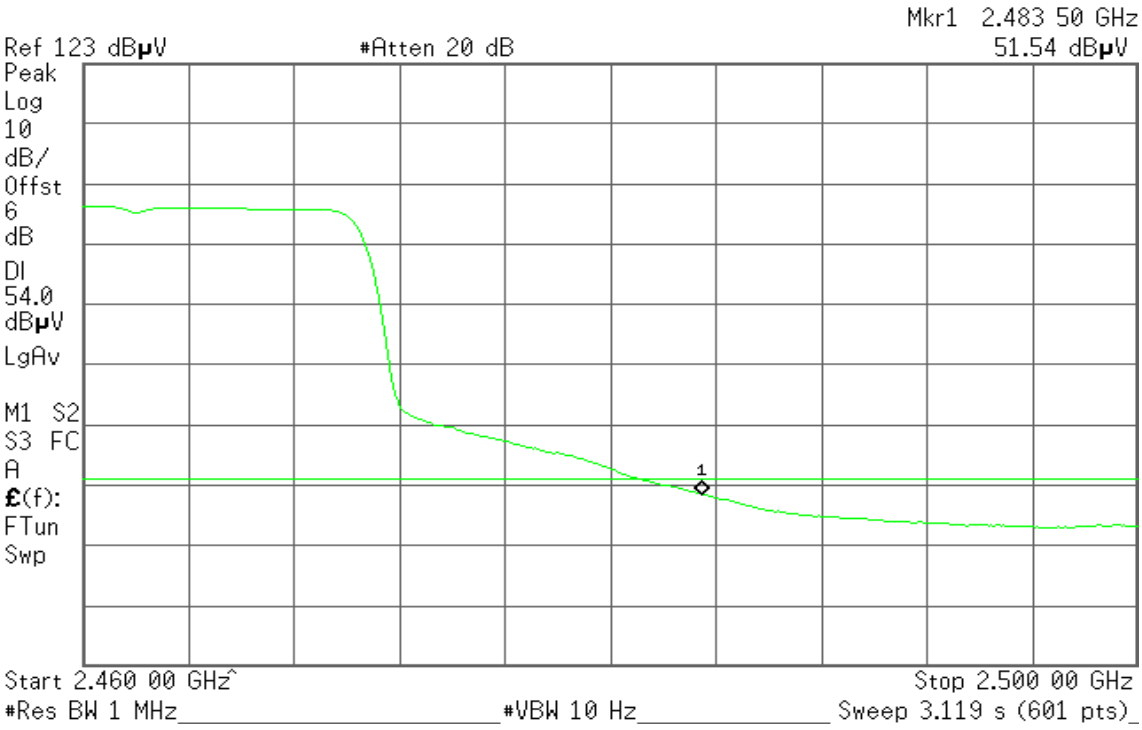
Polarity: Vertical



Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**

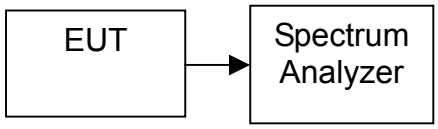


7.5. PEAK POWER SPECTRAL DENSITY

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	-13.61	8.00	PASS
Mid	2437	-13.07		PASS
High	2462	-13.61		PASS

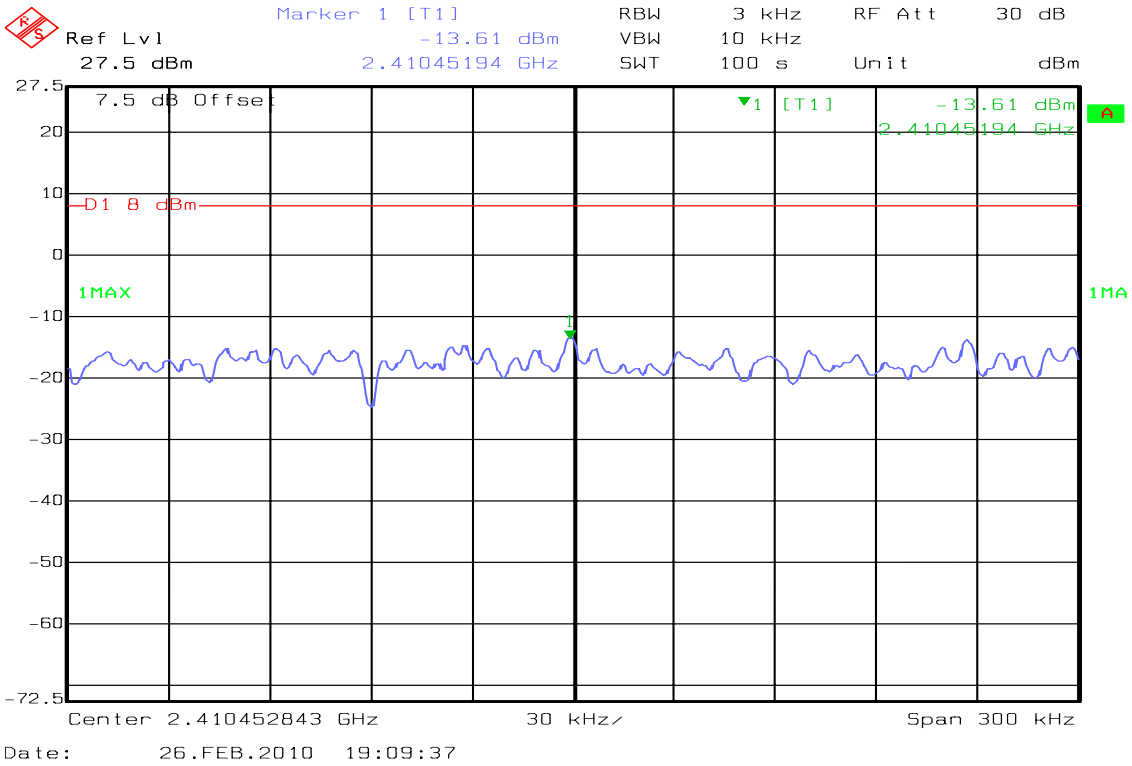
IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-12.81	8.00	PASS
Mid	2437	-14.61		PASS
High	2462	-13.44		PASS

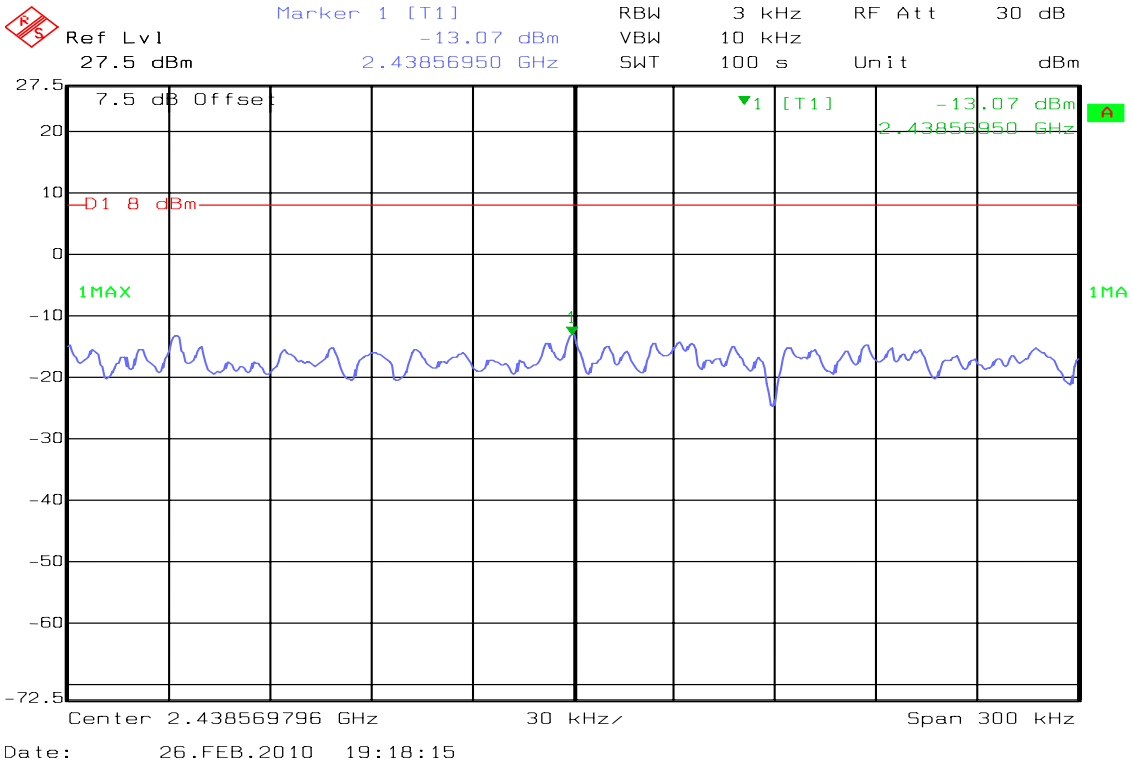
Test Plot

IEEE 802.11b

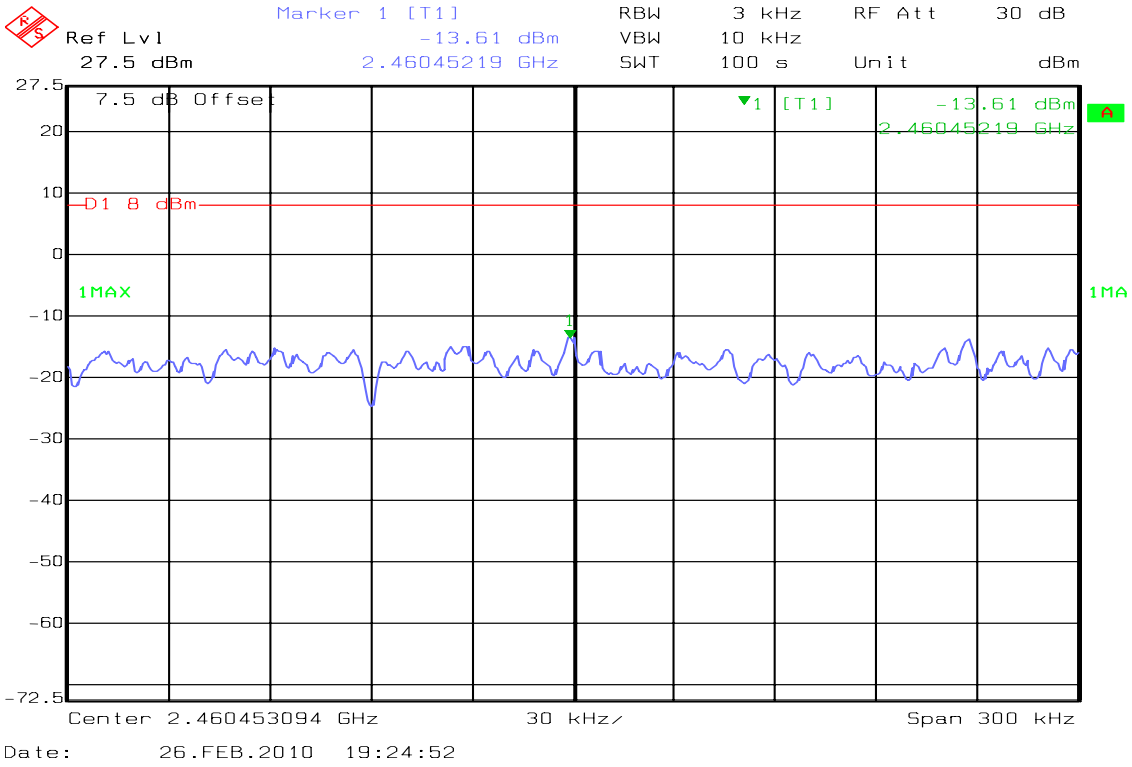
PPSD (CH Low)



PPSD (CH Mid)

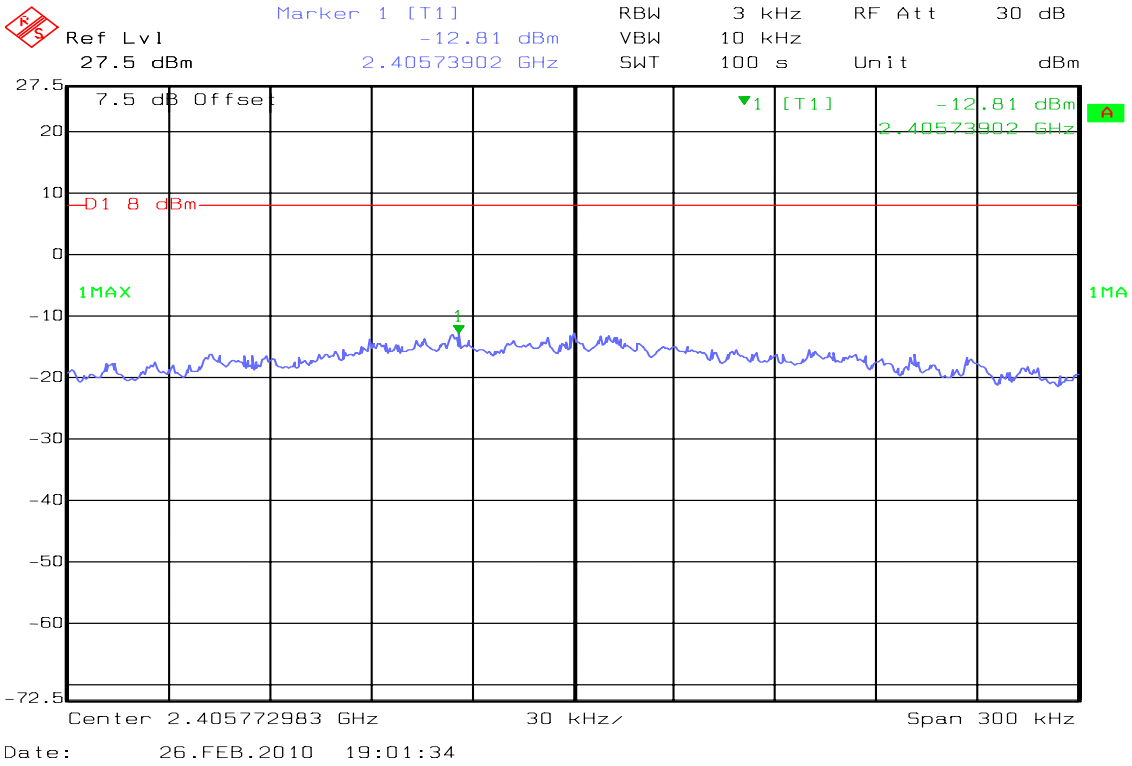


PPSD (CH High)

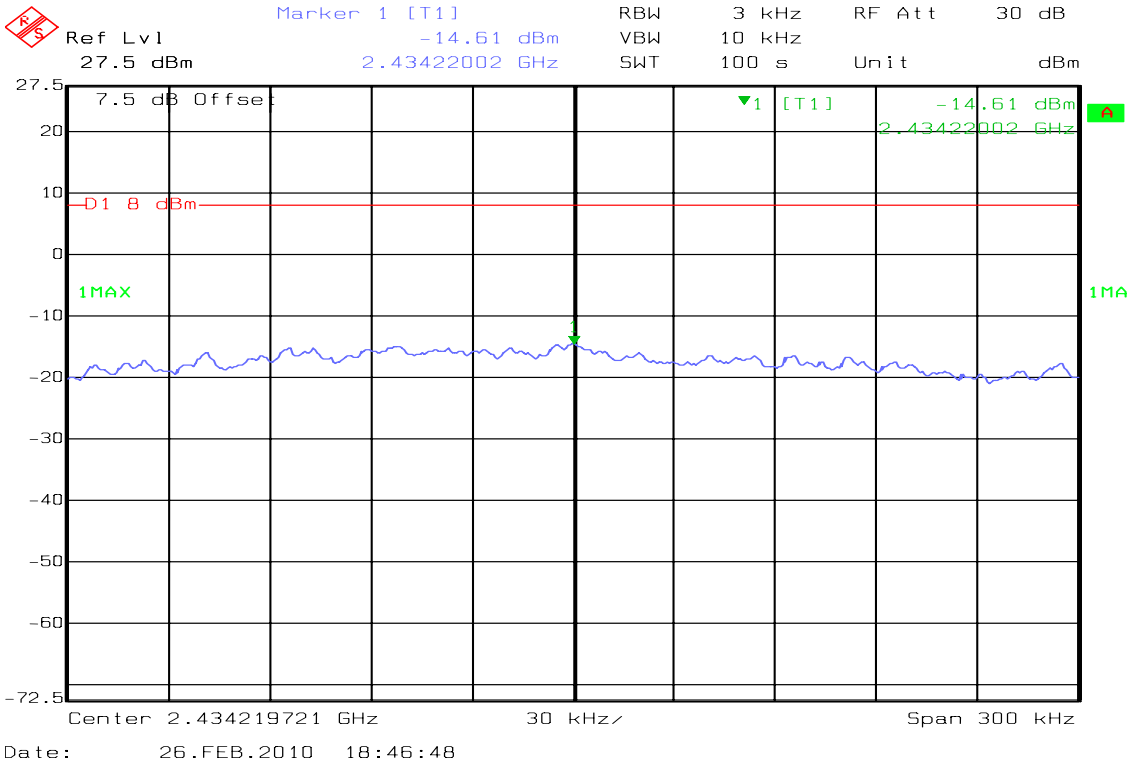


IEEE 802.11g

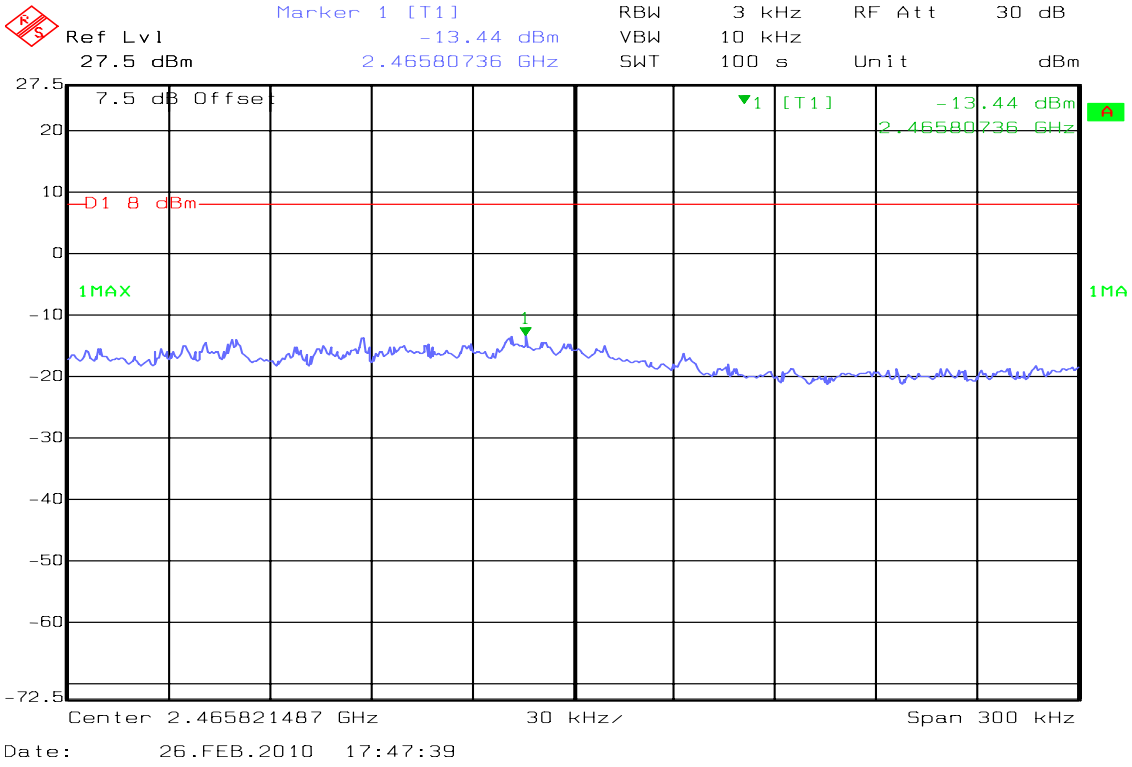
PPSD (CH Low)



PPSD (CH Mid)



PPSD (CH High)



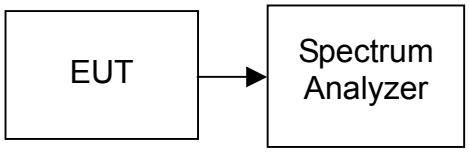
7.6. SPURIOUS EMISSIONS

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 in 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.

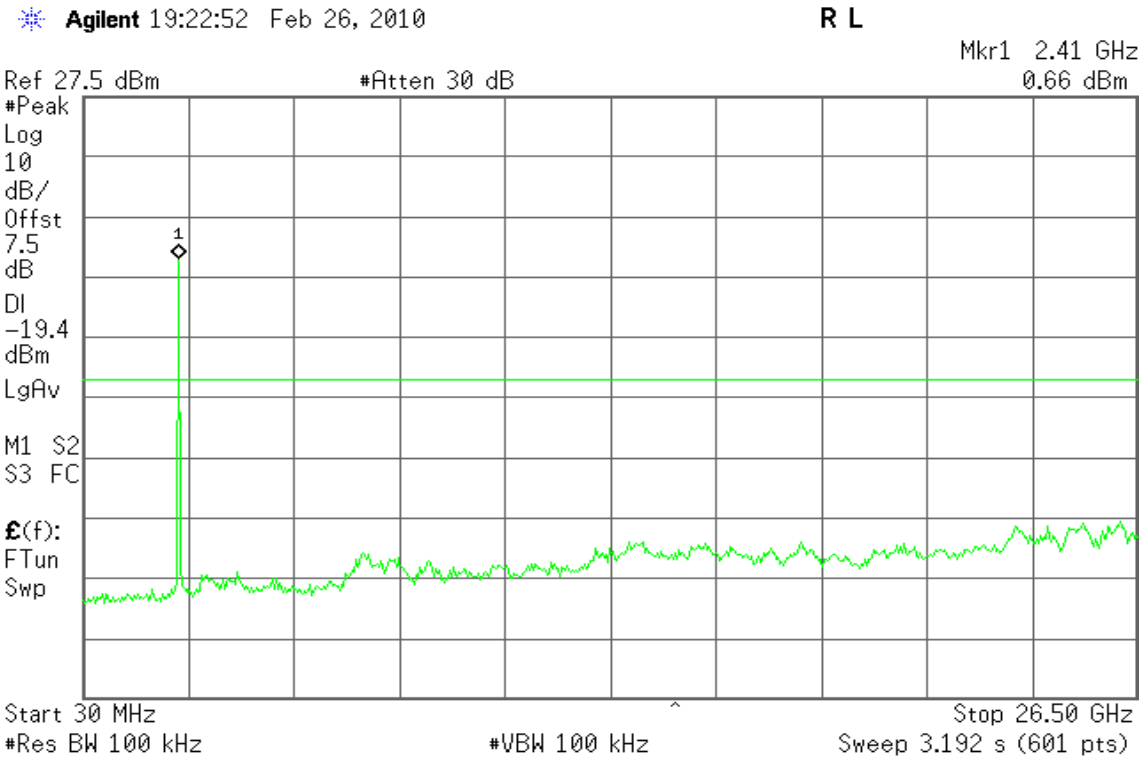
Measurements are made over the 30MHz to 26.5GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

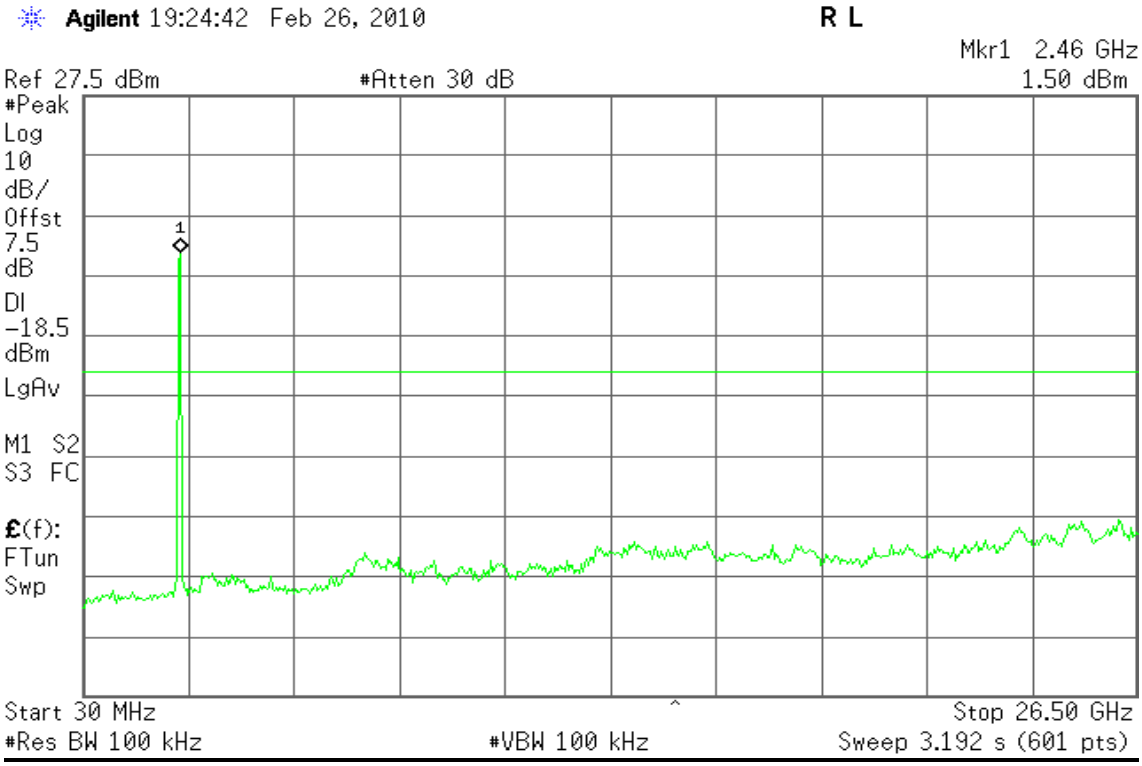
No non-compliance noted.

Test Plot

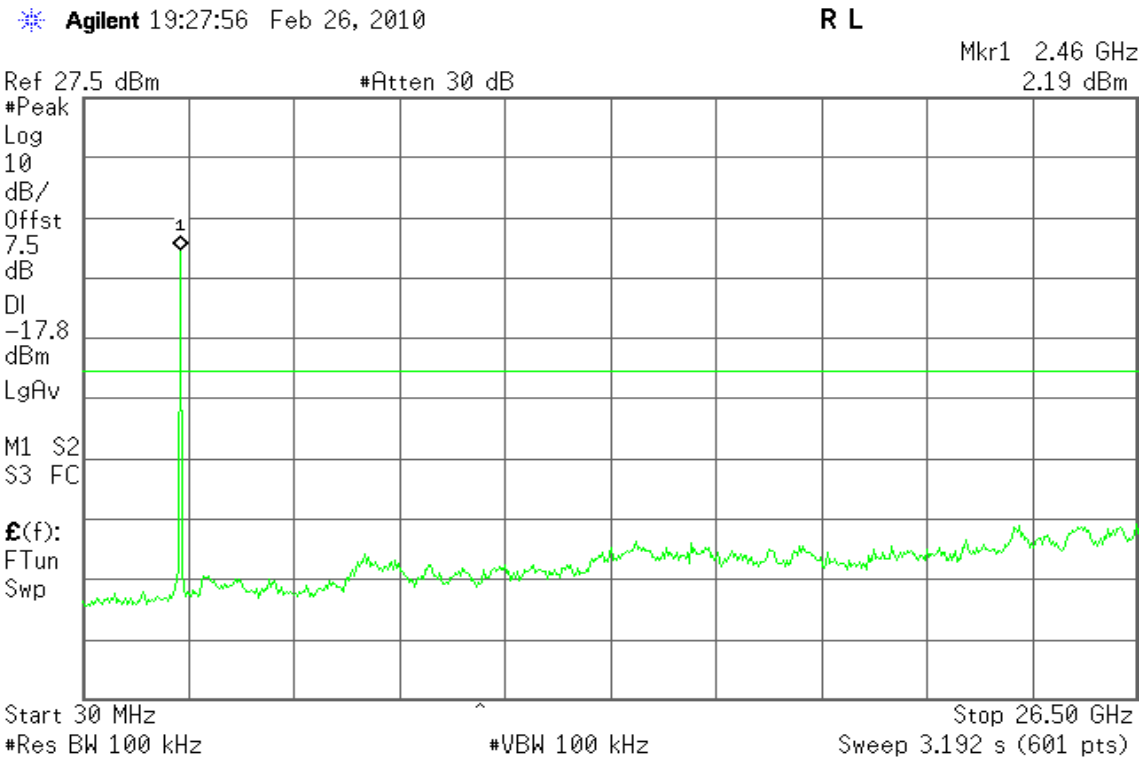
IEEE 802.11b / CH Low



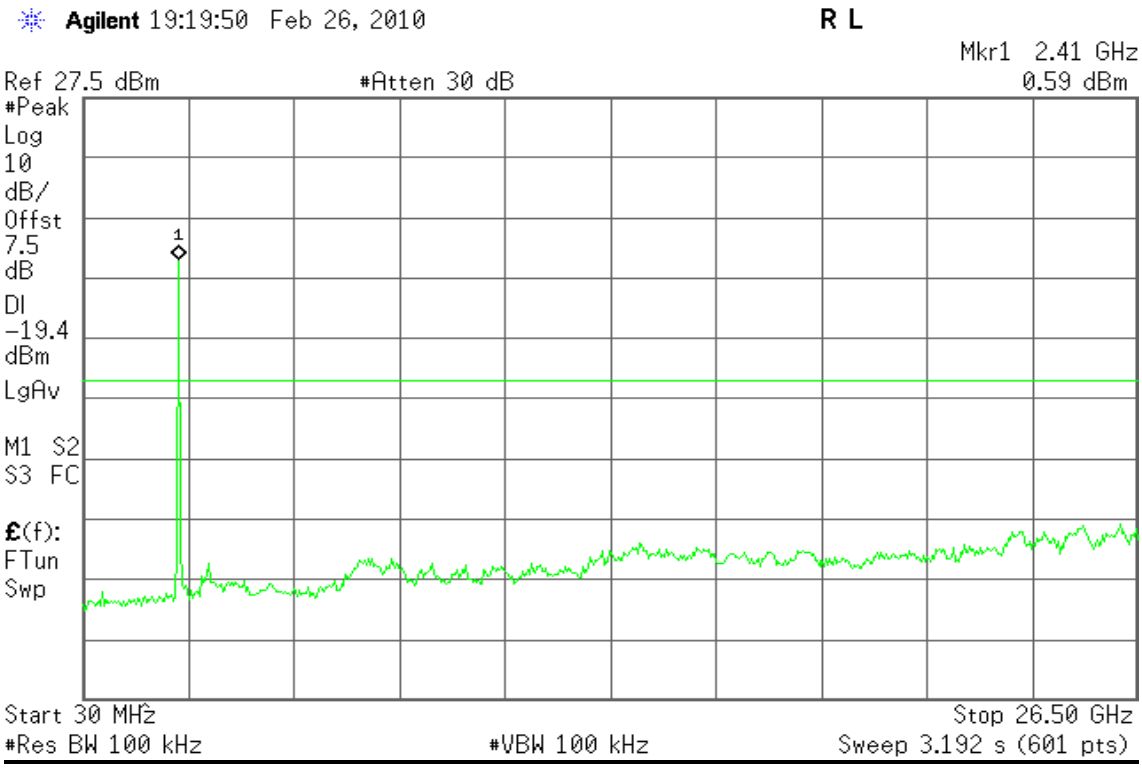
IEEE 802.11b / CH Mid



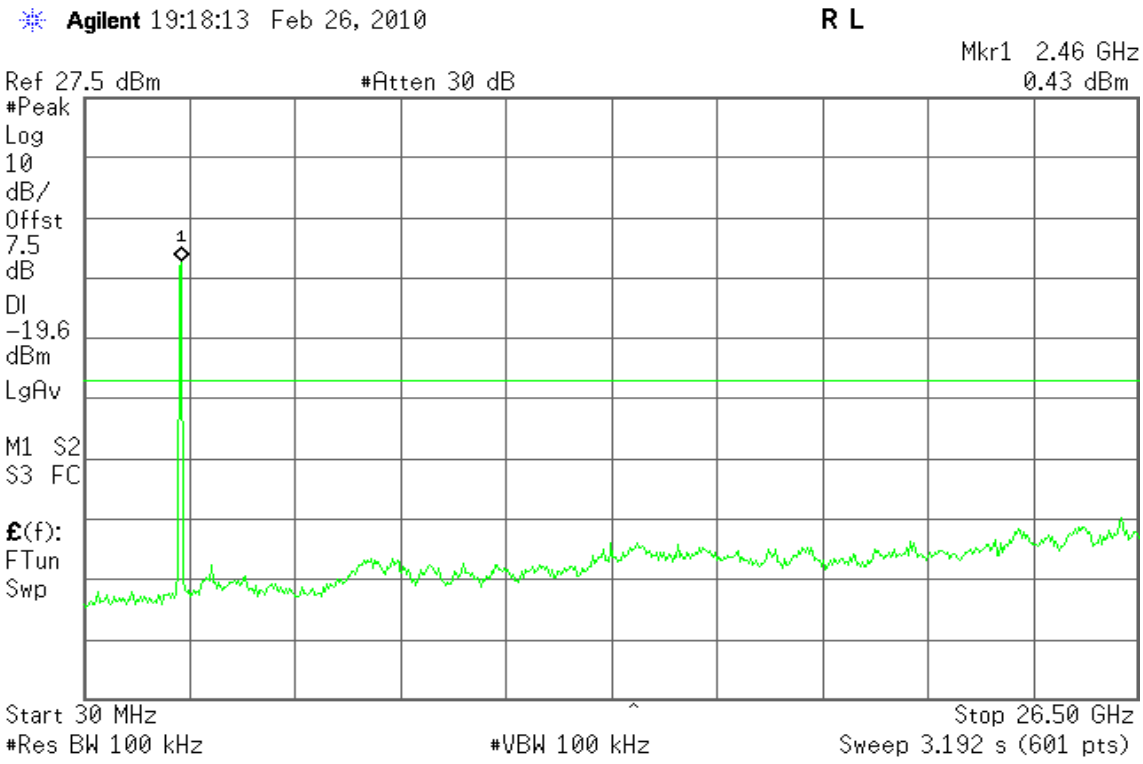
IEEE 802.11b / CH High



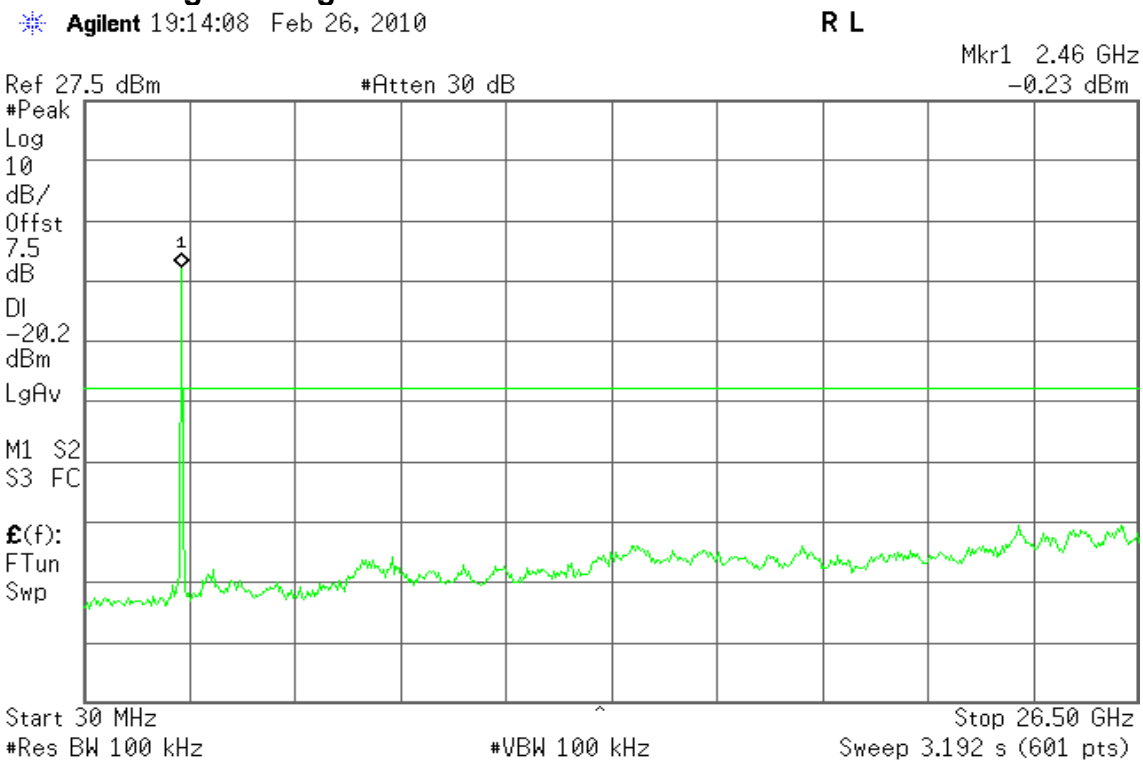
IEEE 802.11g / CH Low



IEEE 802.11g / CH Mid



IEEE 802.11g / CH High



7.6.2 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

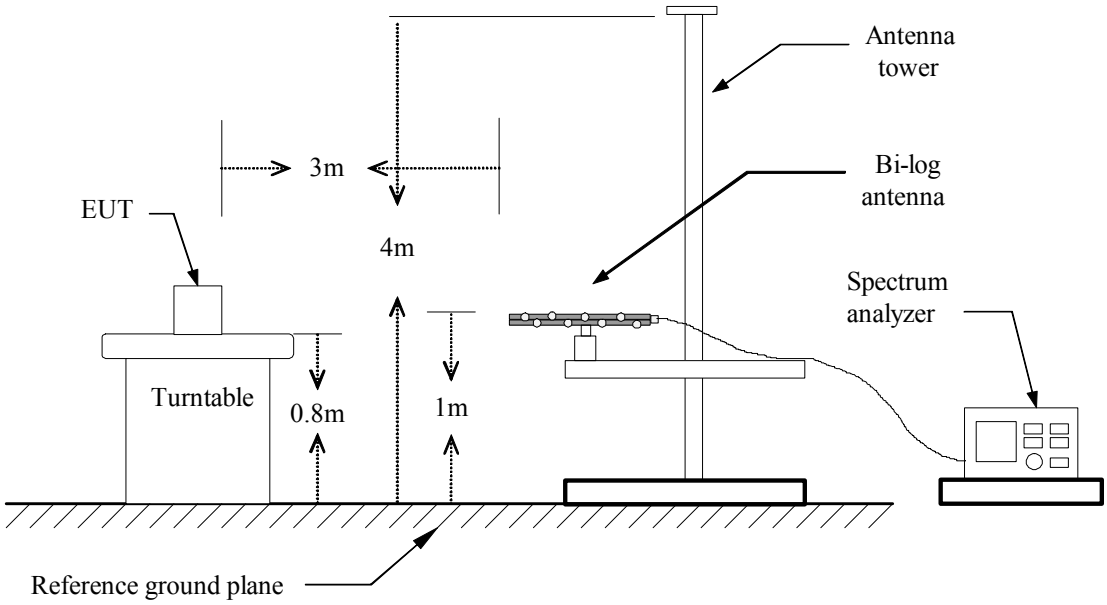
Remark: *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of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

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

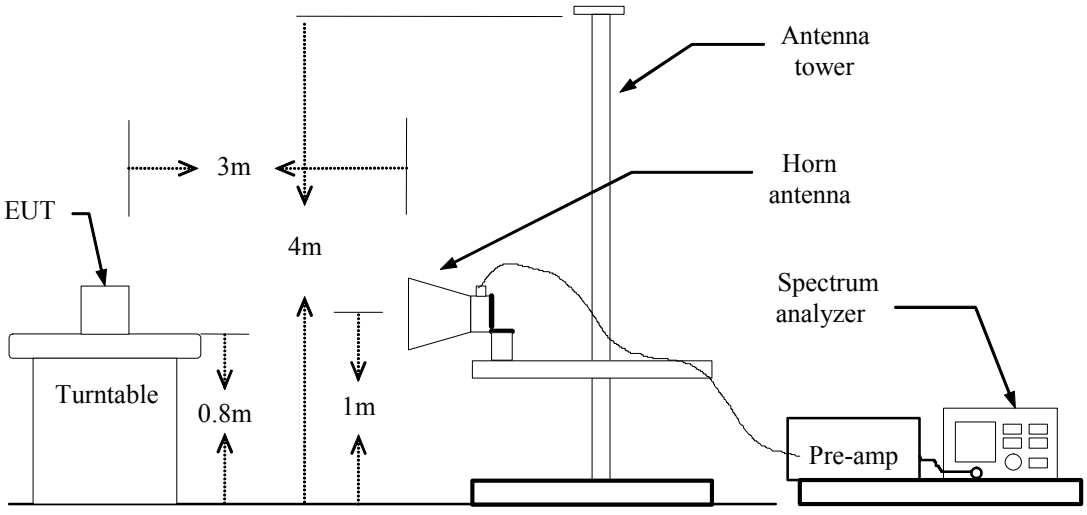
Frequency (MHz)	Field Strength (µV/m at 3-meter)	Field Strength (dBµV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

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:** Feb.

Temperature: 18°C **Tested by:** Alons, o 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	51.53	-14.30	37.23	40.00	-2.77
93.0500	V	QP	58.82	-17.99	40.83	43.50	-2.67
233.7000	V	QP	50.66	-13.99	36.67	46.00	-9.33
367.0750	V	QP	46.06	-9.60	36.46	46.00	-9.54
481.0500	V	QP	43.56	-7.53	36.03	46.00	-9.97
597.4500	V	QP	42.66	-4.10	38.56	46.00	-7.44
886.0250	V	QP	40.93	0.13	41.06	46.00	-4.94
961.2000	V	QP	41.58	1.65	43.23	53.90	-10.67
66.3750	H	QP	48.17	-17.29	30.88	40.00	-9.12
100.3250	H	QP	46.44	-17.55	28.89	43.50	-14.61
165.8000	H	QP	48.96	-13.41	35.55	43.50	-7.95
192.4750	H	QP	48.88	-15.08	33.80	43.50	-9.70
233.7000	H	QP	51.07	-13.99	37.08	46.00	-8.92
265.2250	H	QP	47.91	-12.17	35.74	46.00	-10.26
318.5750	H	QP	46.54	-10.58	35.96	46.00	-10.04
597.4500	H	QP	45.41	-4.10	41.31	46.00	-4.69
886.0250	H	QP	40.40	0.13	40.53	46.00	-5.47
961.2000	H	QP	42.38	1.65	44.03	53.90	-9.87

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
Temperature: 18°C
Humidity: 50% RH
Test Date: Feb. 25, 2010
Tested by: Alonso Lu
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
1883.33	V	49.88	---	-0.92	48.96	---	74.00	54.00	-5.04	Peak
2363.33	V	51.85	43.09	0.97	52.81	44.06	74.00	54.00	-9.94	AVG
2460.00	V	52.21	44.14	1.97	54.18	46.11	74.00	54.00	-7.89	AVG
5391.67	V	40.06	---	9.21	49.27	---	74.00	54.00	-4.73	Peak
N/A										
1856.67	H	50.63	---	-4.73	45.90	---	74.00	54.00	-8.10	Peak
2363.33	H	52.42	---	-1.46	50.96	---	74.00	54.00	-3.04	Peak
2463.33	H	53.15	---	-1.52	51.63	---	74.00	54.00	-2.37	Peak
2520.00	H	51.83	---	-1.16	50.67	---	74.00	54.00	-3.33	Peak
7200.00	H	39.55	---	12.35	51.90	---	74.00	54.00	-2.10	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: IEEE 802.11b / TX / CH Mid
Temperature: 18°C
Humidity: 50% RH
Test Date: Feb. 25, 2010
Tested by: Alonso Lu
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
1860.00	V	50.04	---	-0.94	49.10	---	74.00	54.00	-4.90	Peak
2380.00	V	52.43	44.95	1.11	53.54	46.06	74.00	54.00	-7.94	AVG
2483.33	V	51.67	43.43	2.24	53.91	45.67	74.00	54.00	-8.33	AVG
6958.33	V	39.17	---	11.47	50.64	---	74.00	54.00	-3.36	Peak
N/A										
2383.33	H	53.93	46.72	-1.50	52.43	45.22	74.00	54.00	-8.78	AVG
2486.67	H	52.25	---	-1.51	50.73	---	74.00	54.00	-3.27	Peak
2736.67	H	48.98	---	-0.60	48.39	---	74.00	54.00	-5.61	Peak
2383.33	H	53.93	46.72	-1.50	52.43	45.22	74.00	54.00	-8.78	AVG
4258.33	H	39.88	---	9.01	48.89	---	74.00	54.00	-5.11	Peak
7166.67	H	38.55	---	12.09	50.64	---	74.00	54.00	-3.36	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: IEEE 802.11b / TX / CH High
Temperature: 18°C
Humidity: 50% RH
Test Date: Feb. 25, 2010
Tested by: Alonso Lu
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
1896.67	V	50.15	---	-0.91	49.24	---	74.00	54.00	-4.76	Peak
2213.33	V	49.26	---	0.75	50.01	---	74.00	54.00	-3.99	Peak
2943.33	V	48.61	---	1.12	49.74	---	74.00	54.00	-4.26	Peak
5291.67	V	38.65	---	9.32	47.97	---	74.00	54.00	-6.03	Peak
6875.00	V	39.73	---	10.71	50.44	---	74.00	54.00	-3.56	Peak
N/A										
1680.00	H	49.55	---	-4.17	45.38	---	74.00	54.00	-8.62	Peak
2106.67	H	49.53	---	-1.59	47.94	---	74.00	54.00	-6.06	Peak
2620.00	H	49.68	---	0.08	49.77	---	74.00	54.00	-4.23	Peak
5441.67	H	38.97	---	10.72	49.69	---	74.00	54.00	-4.31	Peak
5600.00	H	40.46	---	10.00	50.46	---	74.00	54.00	-3.54	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: IEEE 802.11g / TX / CH Low
Temperature: 18°C
Humidity: 50% RH
Test Date: Feb. 25, 2010
Tested by: Alonso Lu
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
1860.00	V	49.40	---	-0.94	48.46	---	74.00	54.00	-5.54	Peak
2193.33	V	48.73	---	0.60	49.32	---	74.00	54.00	-4.68	Peak
2516.67	V	52.07	40.10	2.22	54.29	42.32	74.00	54.00	-11.68	AVG
3216.67	V	44.93	---	4.95	49.88	---	74.00	54.00	-4.12	Peak
3908.33	V	40.84	---	7.32	48.16	---	74.00	54.00	-5.84	Peak
N/A										
1713.33	H	48.60	---	-3.78	44.82	---	74.00	54.00	-9.18	Peak
2023.33	H	49.67	---	-3.42	46.25	---	74.00	54.00	-7.75	Peak
2513.33	H	50.55	---	-1.28	49.27	---	74.00	54.00	-4.73	Peak
3216.67	H	45.44	---	4.39	49.83	---	74.00	54.00	-4.17	Peak
4608.33	H	39.51	---	9.41	48.92	---	74.00	54.00	-5.08	Peak
MA										

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: IEEE 802.11g / TX / CH Mid
Temperature: 18°C
Humidity: 50% RH
Test Date: Feb. 25, 2010
Tested by: Alonso Lu
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
1360.00	V	51.90	---	-4.85	47.05	---	74.00	54.00	-6.95	Peak
1930.00	V	51.00	---	-1.44	49.55	---	74.00	54.00	-4.45	Peak
2386.67	V	54.73	43.49	1.17	55.90	44.66	74.00	54.00	-9.34	AVG
2613.33	V	48.98	---	1.22	50.19	---	74.00	54.00	-3.81	Peak
5333.33	V	38.74	---	9.39	48.13	---	74.00	54.00	-5.87	Peak
6316.67	V	38.63	---	10.54	49.17	---	74.00	54.00	-4.83	Peak
N/A										
1746.67	H	54.76	---	-4.00	50.76	---	74.00	54.00	-3.24	Peak
2110.00	H	49.21	---	-1.62	47.60	---	74.00	54.00	-6.40	Peak
2386.67	H	57.05	43.40	-1.51	55.54	41.89	74.00	54.00	-12.11	AVG
2680.00	H	49.15	---	-0.35	48.80	---	74.00	54.00	-5.20	Peak
5283.33	H	40.34	---	9.82	50.16	---	74.00	54.00	-3.84	Peak
7250.00	H	37.81	---	12.47	50.28	---	74.00	54.00	-3.72	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: IEEE 802.11g / TX / CH High
Temperature: 18°C
Humidity: 50% RH
Test Date: Feb. 25, 2010
Tested by: Alonso Lu
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
2220.00	V	49.89	---	0.73	50.62	---	74.00	54.00	-3.38	Peak
2373.33	V	52.29	41.59	1.05	53.34	42.64	74.00	54.00	-11.36	AVG
2736.67	V	49.15	---	1.37	50.52	---	74.00	54.00	-3.48	Peak
6200.00	V	39.52	---	9.96	49.48	---	74.00	54.00	-4.52	Peak
6875.00	V	40.20	---	10.71	50.91	---	74.00	54.00	-3.09	Peak
N/A										
1433.33	H	51.06	---	-6.28	44.78	---	74.00	54.00	-9.22	Peak
1700.00	H	49.75	---	-3.69	46.06	---	74.00	54.00	-7.94	Peak
2390.00	H	56.50	43.63	-1.52	54.98	42.11	74.00	54.00	-11.89	AVG
5341.67	H	39.49	---	10.31	49.81	---	74.00	54.00	-4.19	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).*

7.7. 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:** Dec. 18, 2009

Temperature: 25°C **Tested by:** Alonso Lu

Humidity: 57% RH

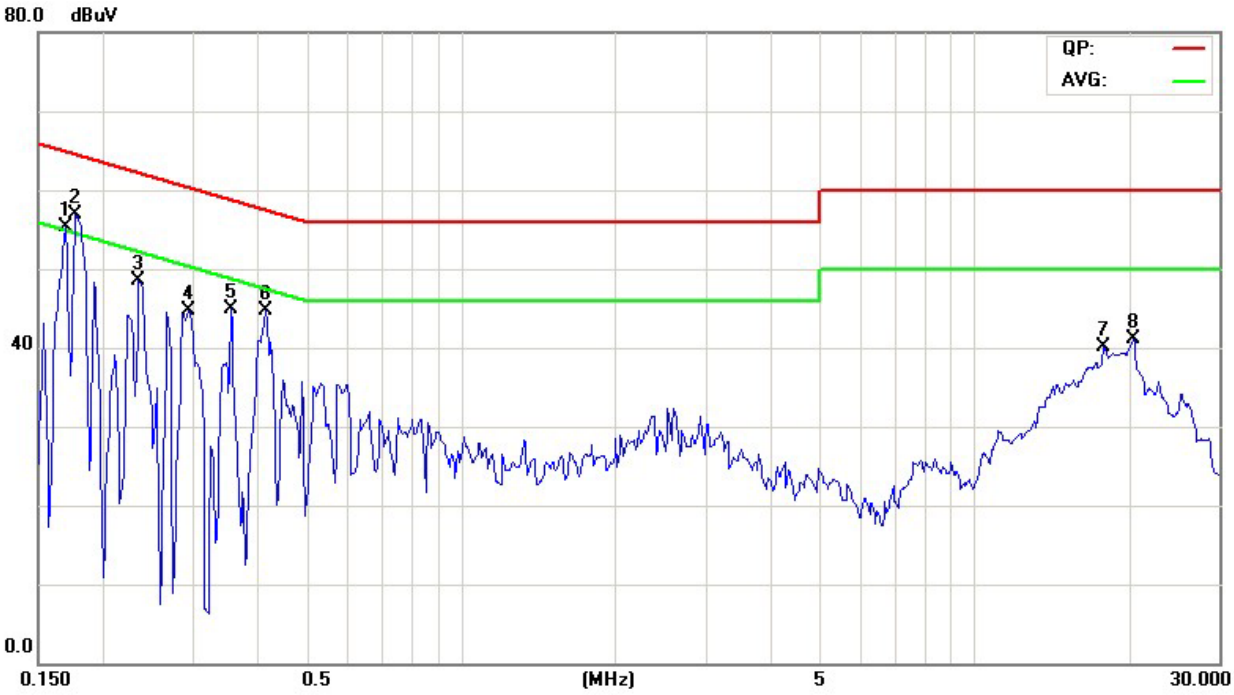
Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1695	53.74	38.64	0.16	53.90	38.80	64.98	54.98	-11.08	-16.18	L1
0.1773	56.45	46.45	0.15	56.60	46.60	64.61	54.61	-8.01	-8.01	L1
0.2359	49.87	38.67	0.13	50.00	38.80	62.24	52.24	-12.24	-13.44	L1
0.2945	42.68	34.78	0.12	42.80	34.90	60.40	50.40	-17.60	-15.50	L1
0.3570	39.19	28.69	0.11	39.30	28.80	58.80	48.80	-19.50	-20.00	L1
0.4156	41.92	33.52	0.08	42.00	33.60	57.54	47.54	-15.54	-13.94	L1
17.9273	35.03	27.83	0.77	35.80	28.60	60.00	50.00	-24.20	-21.40	L1
20.4781	35.26	30.96	0.84	36.10	31.80	60.00	50.00	-23.90	-18.20	L1
0.1773	55.00	45.10	0.10	55.10	45.20	64.61	54.61	-9.51	-9.41	L2
0.2359	46.80	36.80	0.10	46.90	36.90	62.24	52.24	-15.34	-15.34	L2
0.2984	40.40	29.20	0.10	40.50	29.30	60.29	50.29	-19.79	-20.99	L2
0.4195	38.72	29.42	0.08	38.80	29.50	57.46	47.46	-18.66	-17.96	L2
16.5406	29.57	22.87	0.63	30.20	23.50	60.00	50.00	-29.80	-26.50	L2
20.2398	30.49	25.09	0.71	31.20	25.80	60.00	50.00	-28.80	-24.20	L2

Remark:

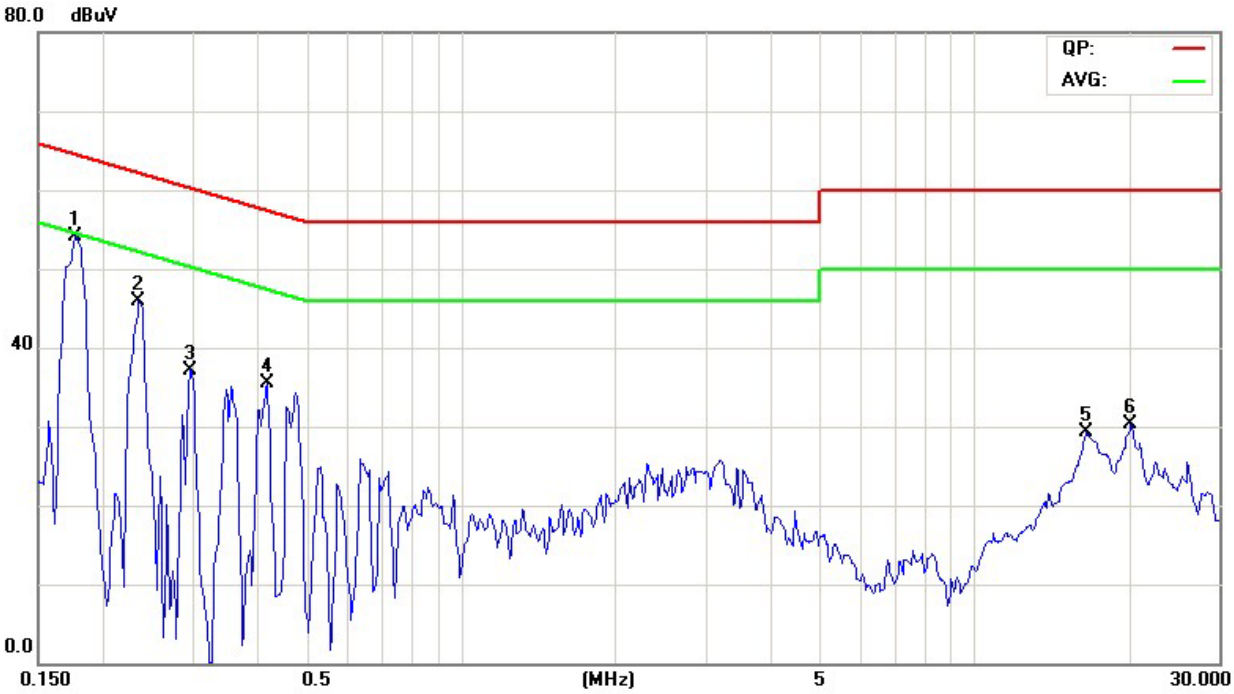
1. *The measuring frequencies range between 0.15 MHz and 30 MHz.*
2. *The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.*
3. *The IF bandwidth of SPA between 0.15MHz and 30MHz was 10kHz. The IF bandwidth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

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

EUT	802.11g Wireless Lan 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 = 5mW/cm2) ☒ General Population/Uncontrolled exposure (S=1mW/cm2)
Antenna diversity	☒ Single antenna ☐ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Max. output power	IEEE 802.11b: 16.64 dBm (46.13mW) IEEE 802.11g: 20.77 dBm (119.4mW)
Antenna gain (Max)	2.82 dBi (Numeric gain: 1.91)
Evaluation applied	☒ MPE Evaluation ☐ SAR Evaluation ☐ N/A

Remark:

1. *The maximum output power is 20.77dBm (119.4mW) at 2462MHz (with 1.91numeric 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^2 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 and

d (cm) = d(m) / 100

Yields

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

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

Maximum Permissible Exposure

EUT output power = 119.4mW

Numeric Antenna gain = 1.91

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^2

→ Power density = 0.0454 mW / cm^2

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.)