FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Network Music Player

Model: MCX-P200

Trade Name: YAMAHA

Issued to

Yamaha Corporation
10-1 Nakazawa-cho Naka-ku Hamamatsu 430-8650 Japan

Issued by

Compliance Certification Services Inc.
No. 81-1, Lane 210, Pa-De 2nd Rd., Luchu Hsiang,
Taoyuan Shien, (338) Taiwan, R.O.C.
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Testing Laboratory
0363

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Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		March 11, 2009		Initial Issue	ALL	Celine Chou

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1. TEST RESULT CERTIFICATION

Applicant:	**Yamaha Corporation** 10-1 Nakazawa-cho Naka-ku Hamamatsu 430-8650 Japan
Equipment Under Test:	Network Music Player
Trade Name:	YAMAHA
Model:	MCX-P200
Date of Test:	January 7 ~ April 9, 2009

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

We hereby certify that:

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

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

Approved by:

Ethan Huang
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Julia Wei
Senior Specialist
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	Network Music Player		
Trade Name	YAMAHA		
Model Number	MCX-P200		
EUT Power Rating	19VDC, 3.4A		
Power Adapter Manufacturer	YAMAHA	**Model**	NB-65B19
Power Adapter Power Rating	I/P: 100-240VAC, 50-60Hz, 1.6A O/P: 19VDC, 3.42A		
Operating Frequency Range	2412 ~ 2462 MHz		
Transmit Power	IEEE 802.11b: 22.21 dBm IEEE 802.11g: 20.73 dBm		
Modulation Technique	DSSS, OFDM, DBPSK, DQPSK, CCK, 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, 6 Mbps		
Number of Channels	11 Channels		
Channels Spacing	5MHz		
Antenna Specification	PCB Antenna / Gain: 3.1 dBi		
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: **A6RMCXP200A** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4(2003) and FCC CFR 47 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(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 EUT (model: MCX-P200) 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**
EMI Test Receiver	R&S	ESCS30	845552/030	04/08/2010
LISN	R&S	ENV216	100074	12/09/2009
LISN	FCC	FCC-LISN-50/2 50-16-2-07	06013	10/12/2009
Test S/W	LabVIEW 6.1 (CCS Conduction Test SW Version_01)			

3M Semi Anechoic Chamber				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	ADVANTEST	R3271A	85060321	10/22/2009
Bilog Antenna	SCHWAZBECK	VULB9160	3084	N.C.R.
EMI Test Receiver	R&S	ESVS10	834468/006	04/17/2009
Pre-Amplifier	HP	8447D	2944A06530	12/09/2009
Antenna Tower	HD	MA240	240/443	N.C.R
Controller	HD	HD100	100/529	N.C.R
Turn Table	HD	HD320	N/A	N.C.R
Site NSA	SIDT EUROPE	9x6x6	N/A	05/16/2009
Turn Table	HD	DT-K312	N/A	N.C.R
Test S/W	LabVIEW 6.1 (Wugu Chamber EMI Teat V1_4.5.3)			

Remark: *The measurement uncertainty is less than +/-4.0235dB (30MHz ~ 1GHz), +/-3.0958dB (Above 1GHz) which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.*

Powerline Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver	R&S	ESCS30	845552/030	04/08/2010
LISN	R&S	ENV216	100074	12/09/2009
LISN	FCC	FCC-LISN-50/2 50-16-2-07	06013	10/12/2009
Test S/W	LabVIEW 6.1 (CCS Conduction Test SW Version_01)			

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

5. FACILITIES AND ACCREDITATIONS

5.1 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 test only

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

For Conducted Emission test only

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Notebook PC	HP	COMPAQ NC 4010	CNU441F8LV	FCC DOC	USB Cable: Unshielded, 0.3m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
2.	Test Jig	N/A	N/A	N/A	N/A	USB Cable: Unshielded, 0.3m	N/A

For Powerline Conducted Emissions test only

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Subwoofer	JS	J9918	N/A	N/A	Unshielded, 1.8m	Unshielded, 1.8m
2.	Speaker	Logitech	Z-640	100310-0415R	FCC DoC	Unshielded, 1.8m	N/A
3.	Speaker	Logitech	Z-640	100310-0415R	FCC DoC	Unshielded, 1.8m	N/A
4.	IR	N/A	N/A	N/A	N/A	Unshielded, 3.0m	N/A
5.	IR	N/A	N/A	N/A	N/A	Unshielded, 3.0m	N/A
6.	IR	N/A	N/A	N/A	N/A	Unshielded, 3.0m	N/A
7.	iPod	Apple	M9804TA/A	N/A	N/A	N/A	N/A
8.	iPod Docking	YAMAHY	YDS-11	N/A	N/A	Shielded, 2.0m	N/A
9.	Notebook PC (Remote)	HP	COMPAQ NC 4010	CNU441F8LV	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.*

6.3 SUPPORT EQUIPMENT

For Radiated Emission test only		
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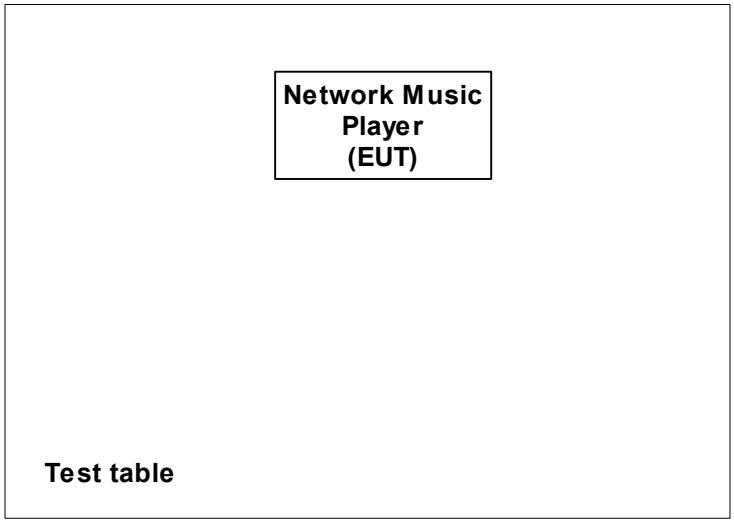
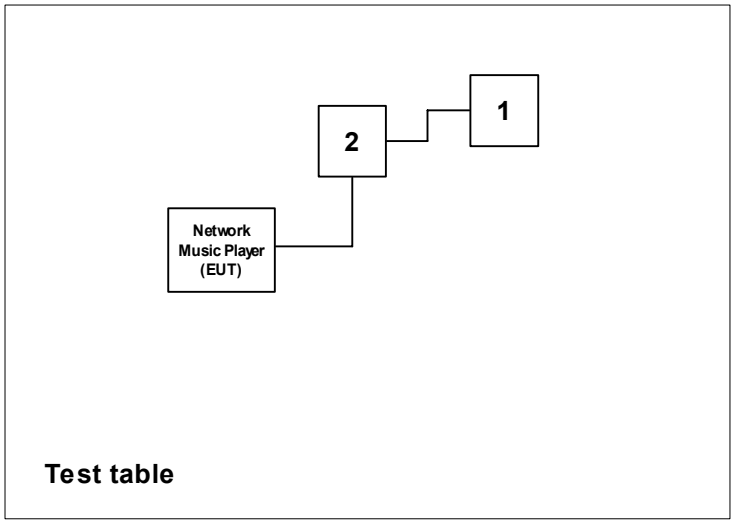
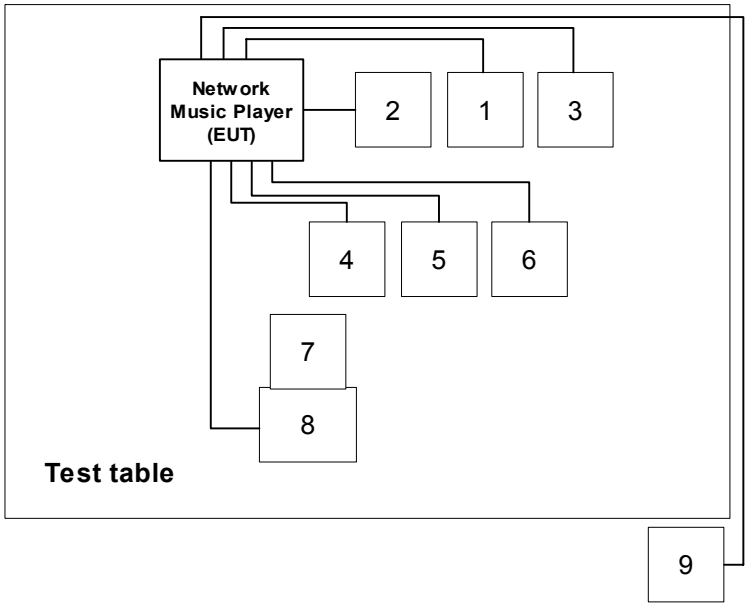


For Conducted Emission test only		
1. Notebook PC	2. Test Jig	---



For Powerline Conducted Emissions test only		
1. Subwoofer	2. Speaker	3. Speaker
4. IR	5. IR	6. IR
7. iPod	8. iPod Docking	9. Notebook PC



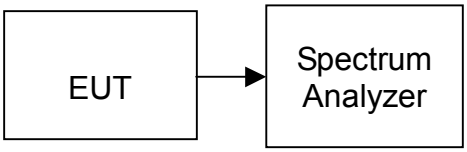
7. FCC PART 15.247 REQUIREMENTS

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

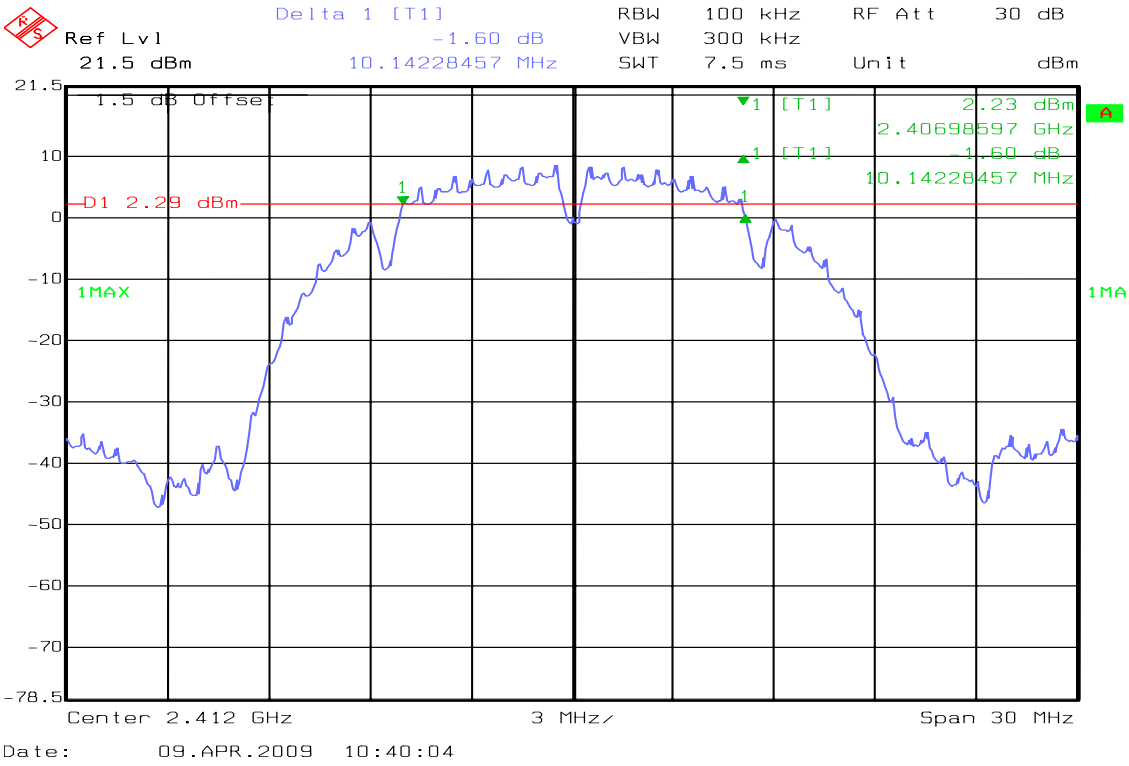
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	10142	>500	PASS
Mid	2437	10076		PASS
High	2462	10112		PASS

Test mode: IEEE 802.11g

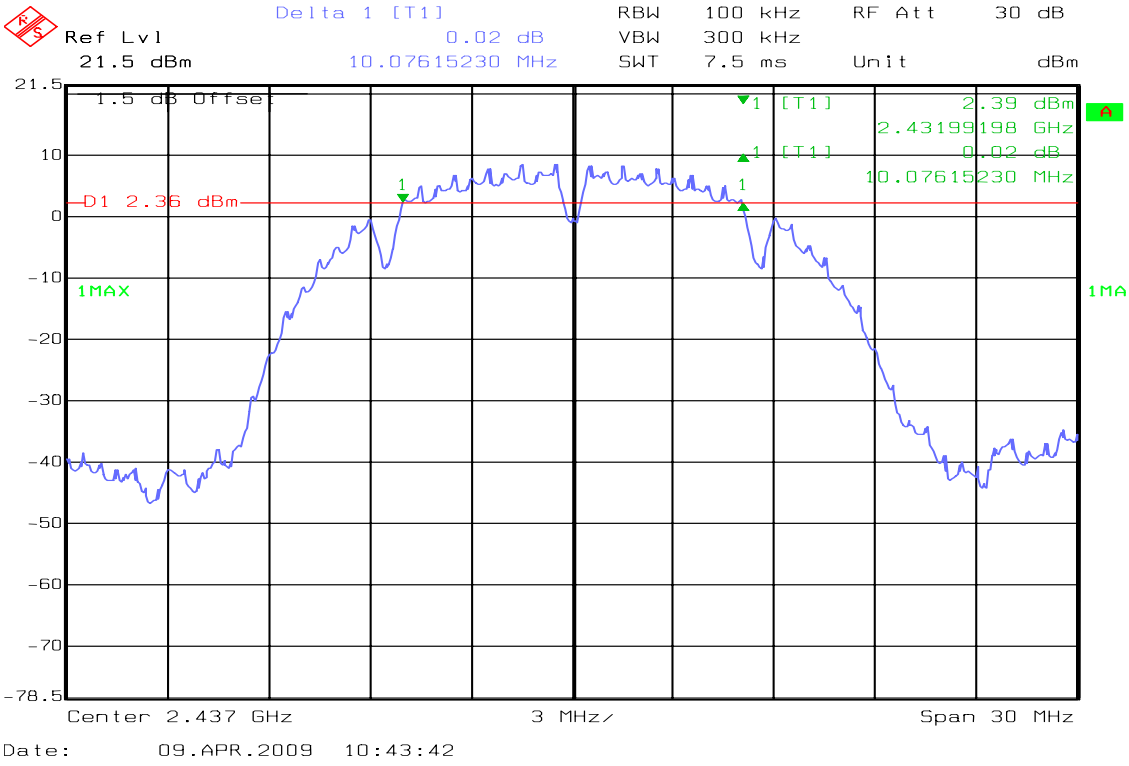
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	16563	>500	PASS
Mid	2437	16569		PASS
High	2462	16563		PASS

Test Plot

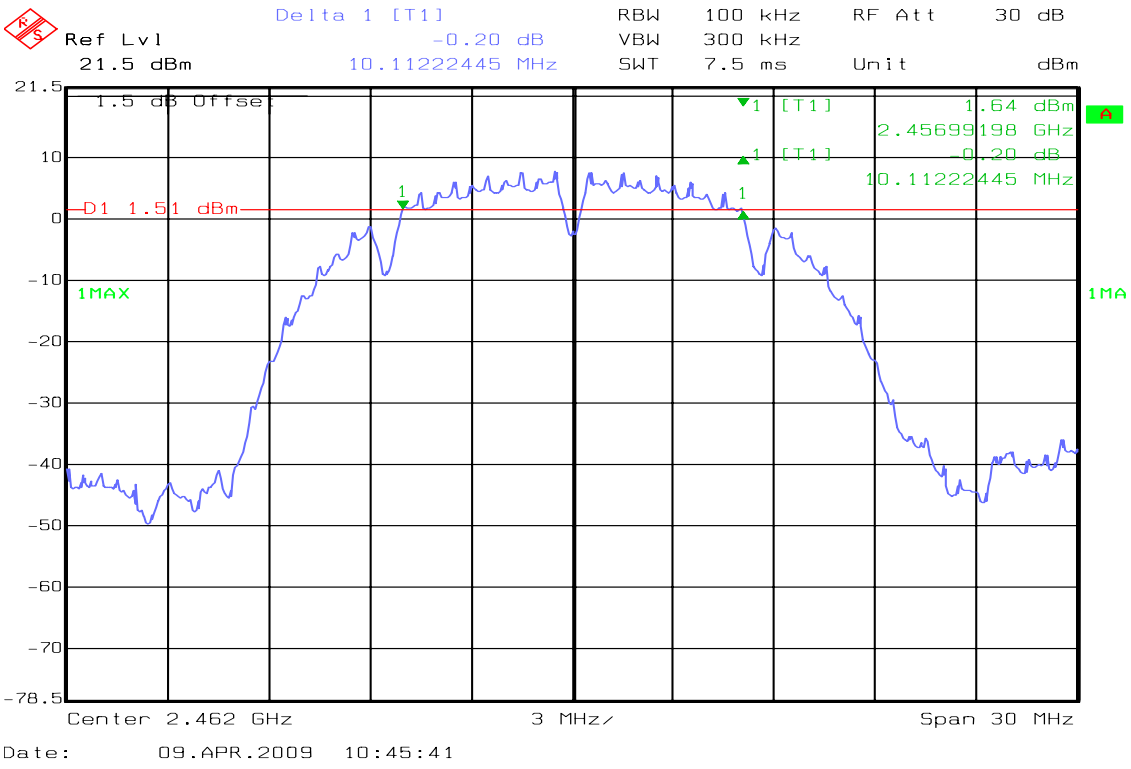
6dB Bandwidth (IEEE 802.11b / CH Low)



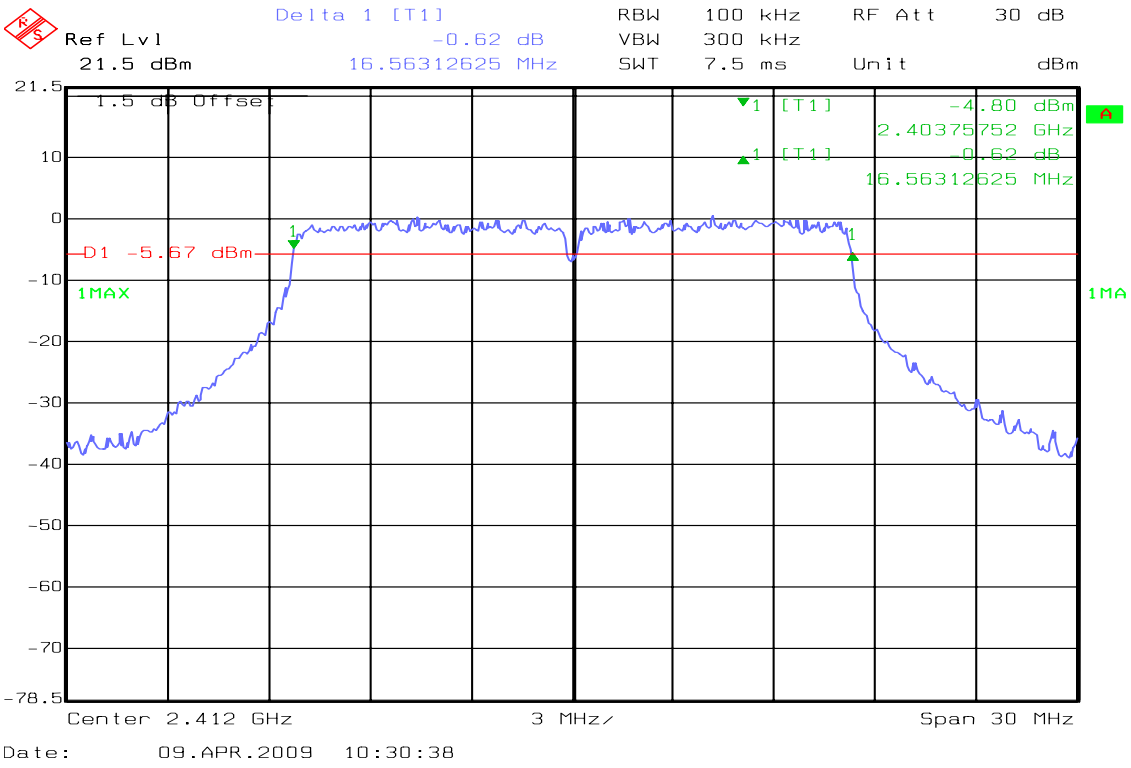
6dB Bandwidth (IEEE 802.11b / CH Mid)



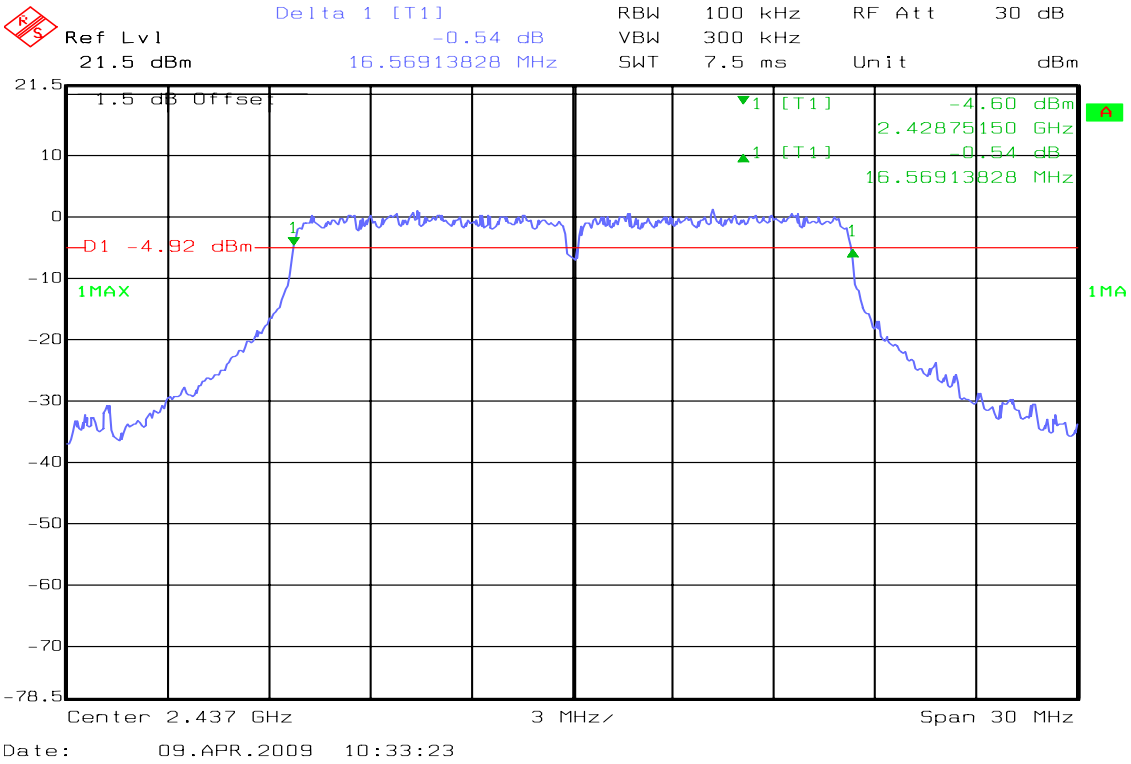
6dB Bandwidth (IEEE 802.11b / CH High)



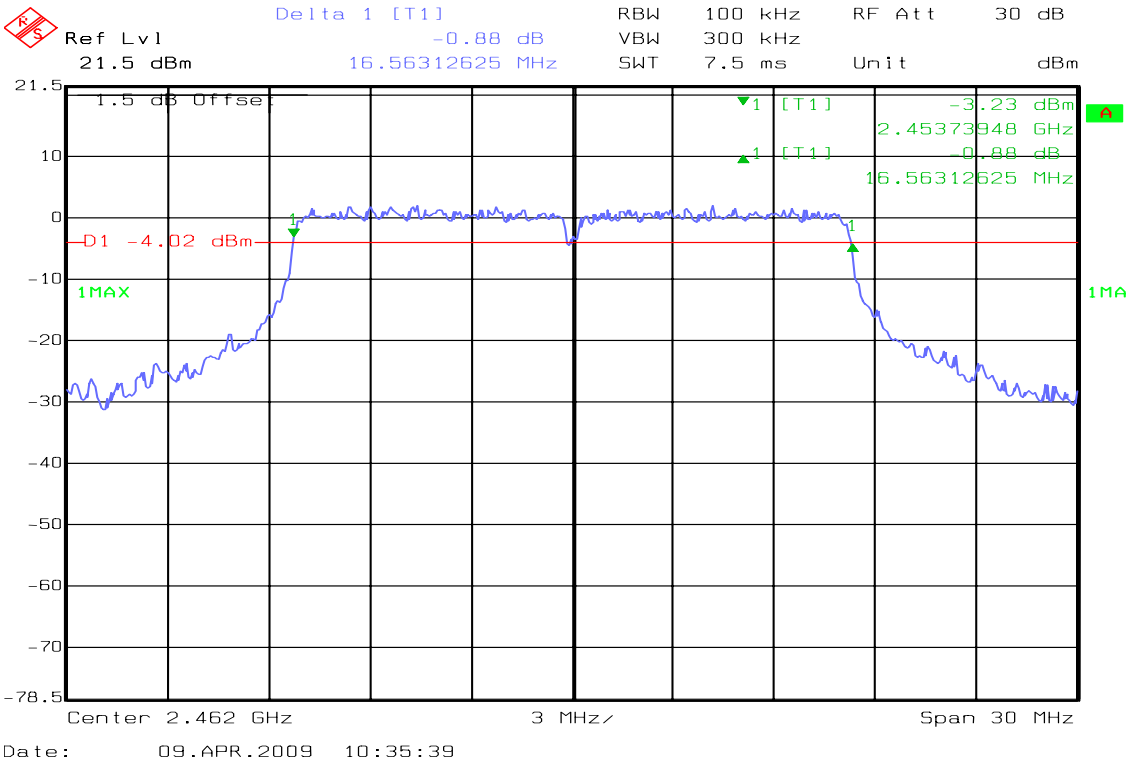
6dB Bandwidth (IEEE 802.11g / CH Low)



6dB Bandwidth (IEEE 802.11g / CH Mid)



6dB Bandwidth (IEEE 802.11g / CH High)



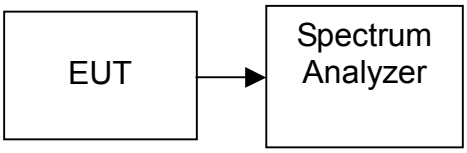
7.2 PEAK POWER

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.

Remark: 1. Result = Reading Value + Cable Loss + Attenuator Loss
2. Cable Loss =0.5 dB；Attenuator Loss=1 dB

TEST RESULTS

No non-compliance noted

TEST DATA

IEEE 802.11b

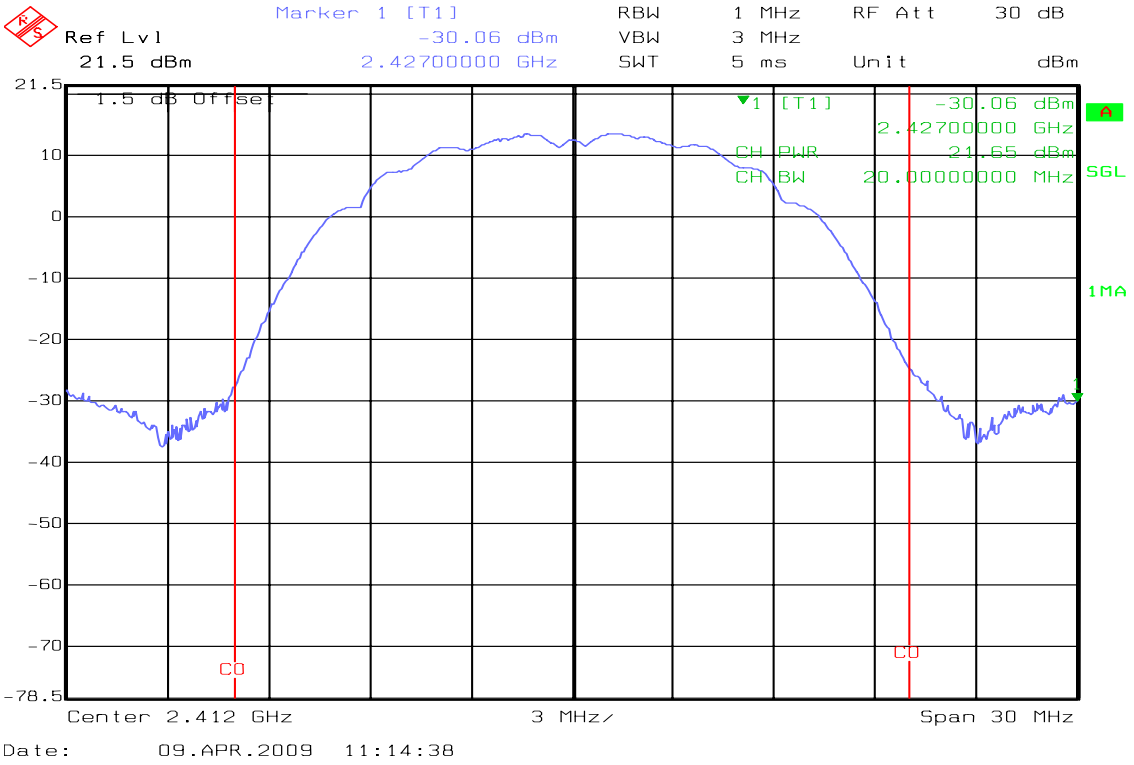
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	21.65	0.14622	1	PASS
Mid	2437	22.21	0.16634		PASS
High	2462	21.97	0.15740		PASS

IEEE 802.11g

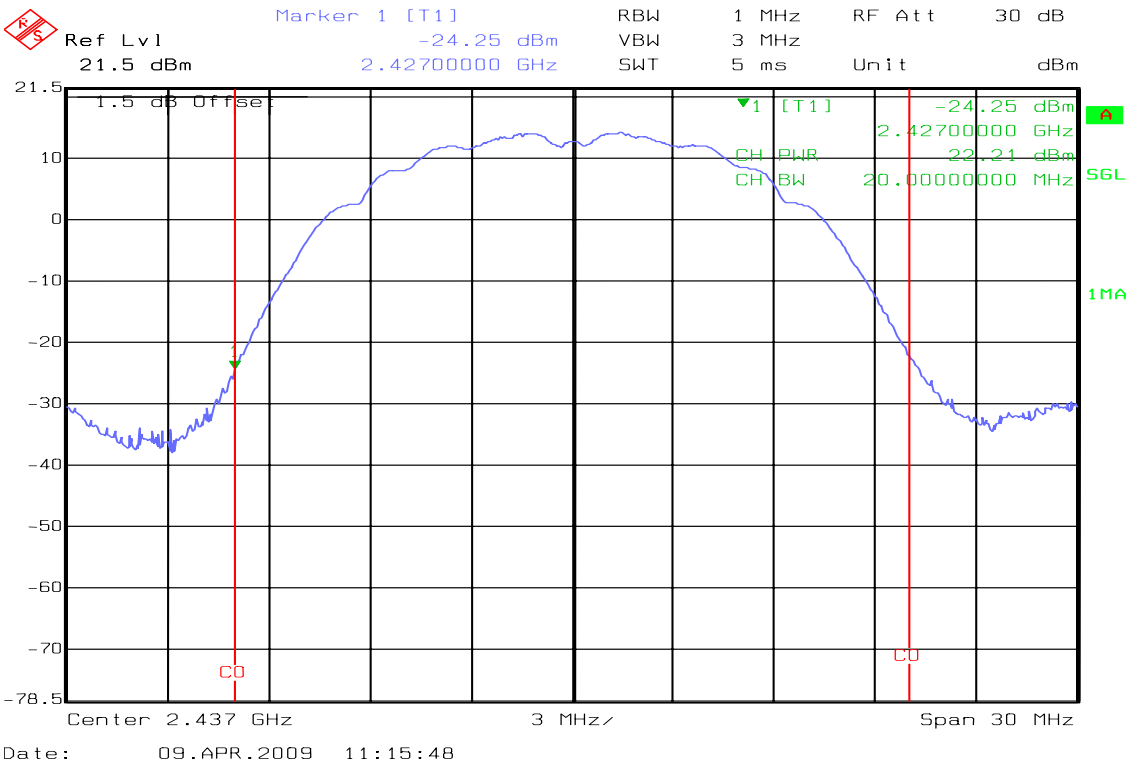
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	20.73	0.11830	1	PASS
Mid	2437	19.42	0.08750		PASS
High	2462	20.12	0.10280		PASS

Test Plot

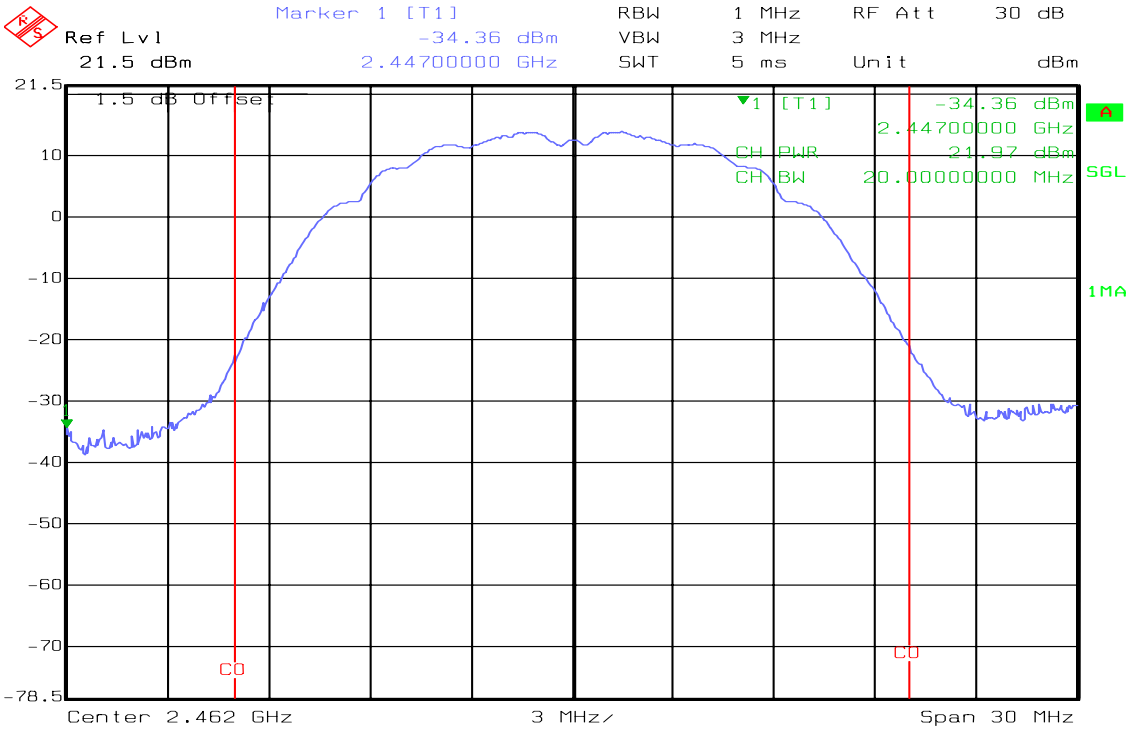
Peak Power (IEEE 802.11b / CH Low)



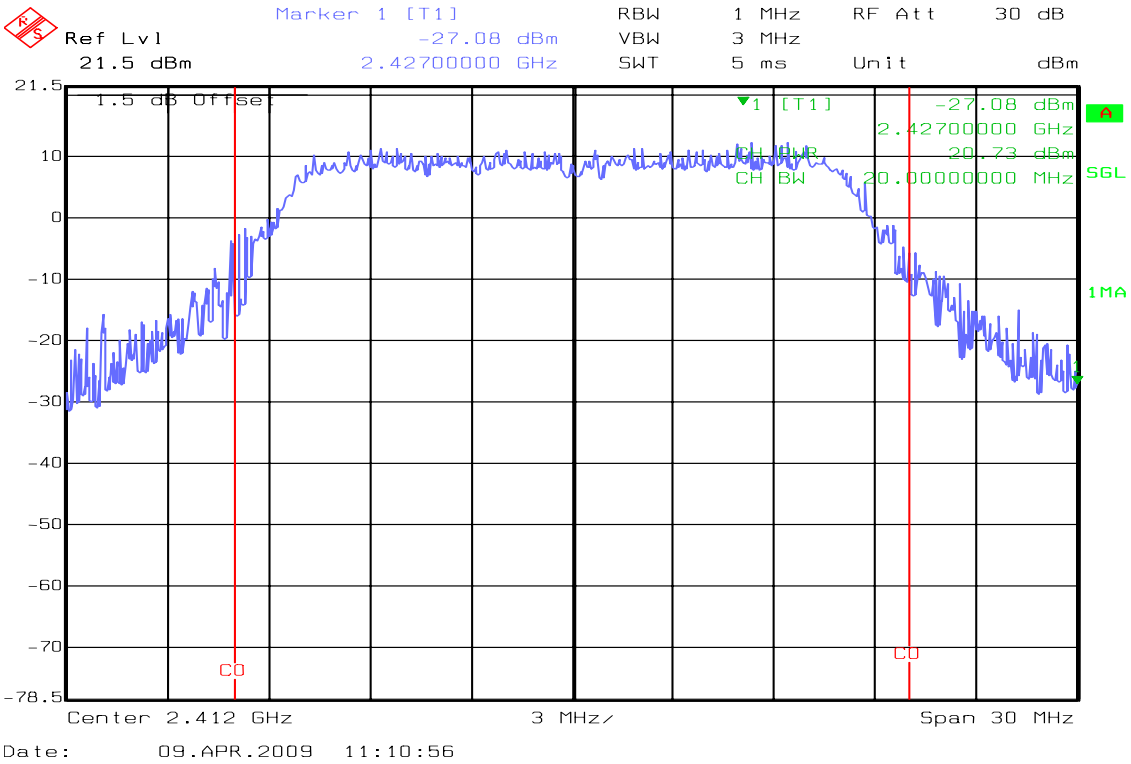
Peak Power (IEEE 802.11b / CH Mid)



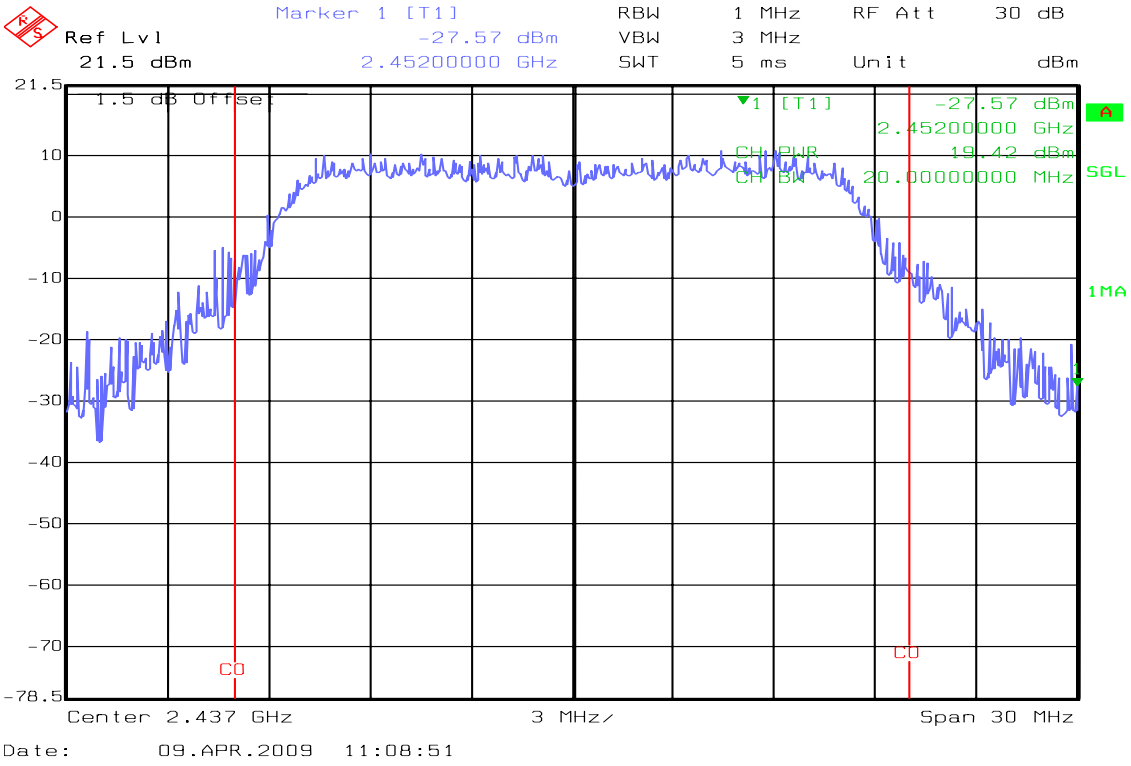
Peak Power (IEEE 802.11b / CH High)



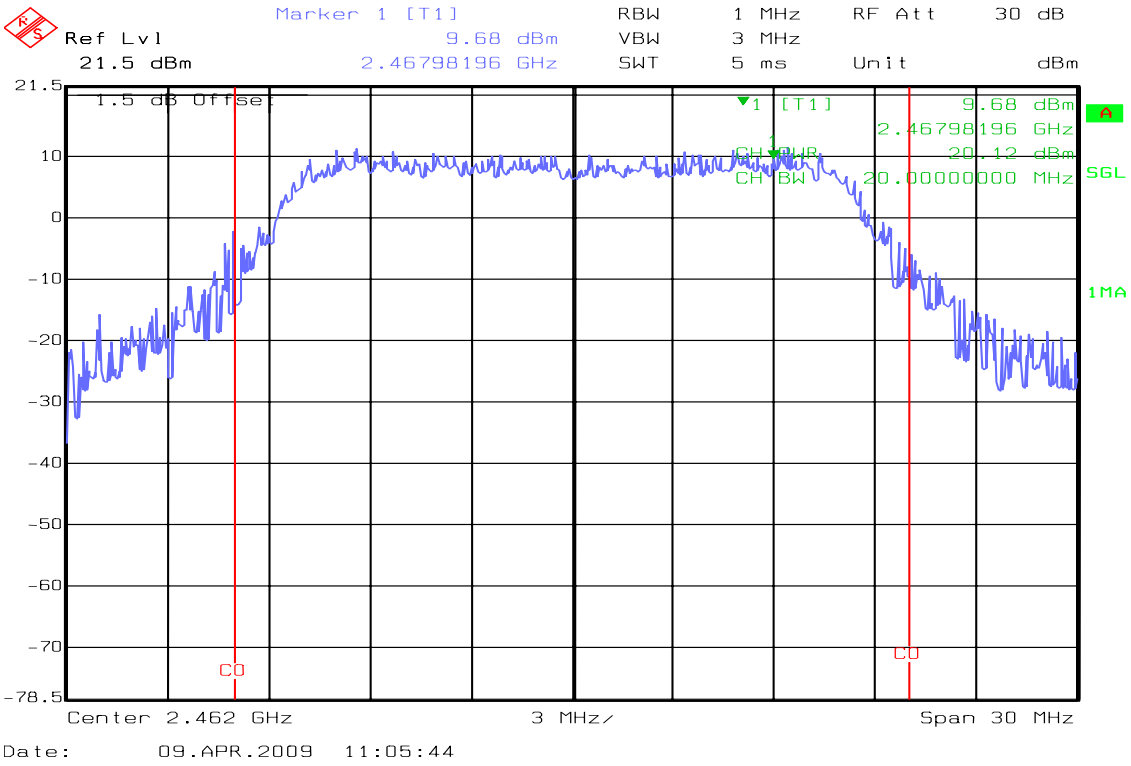
Peak Power (IEEE 802.11g / CH Low)



Peak Power (IEEE 802.11g / CH Mid)



Peak Power (IEEE 802.11g / CH High)

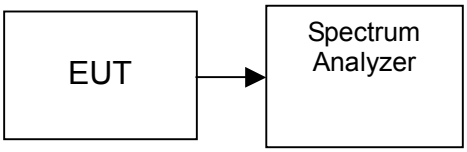


7.3 AVERAGE POWER

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)
Low	2412	18.72
Mid	2437	19.28
High	2462	18.91

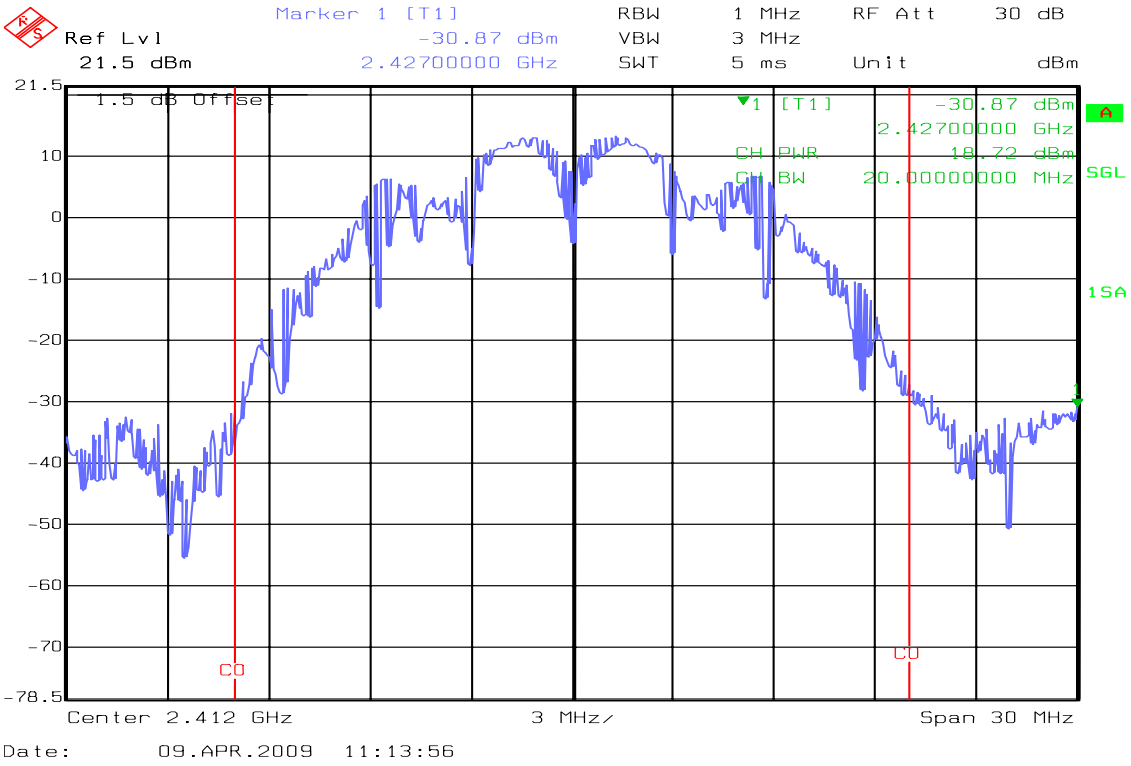
Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)
Low	2412	15.36
Mid	2437	14.08
High	2462	14.65

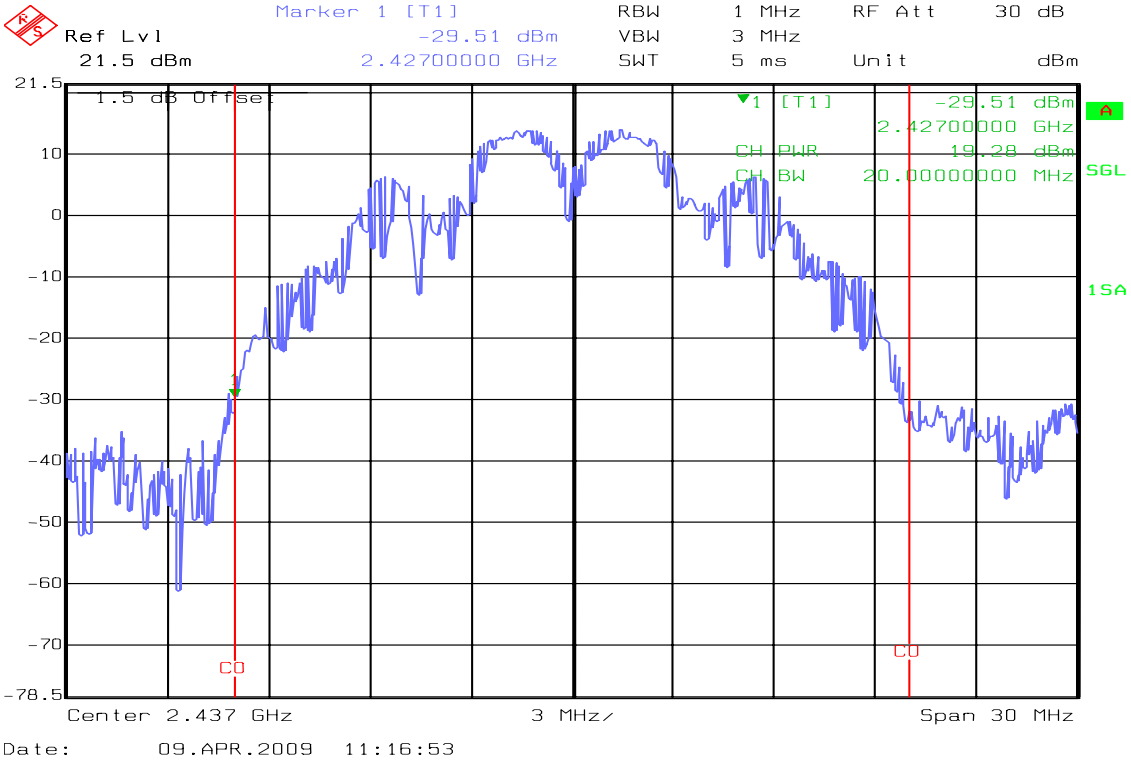
Test Plot

IEEE 802.11b

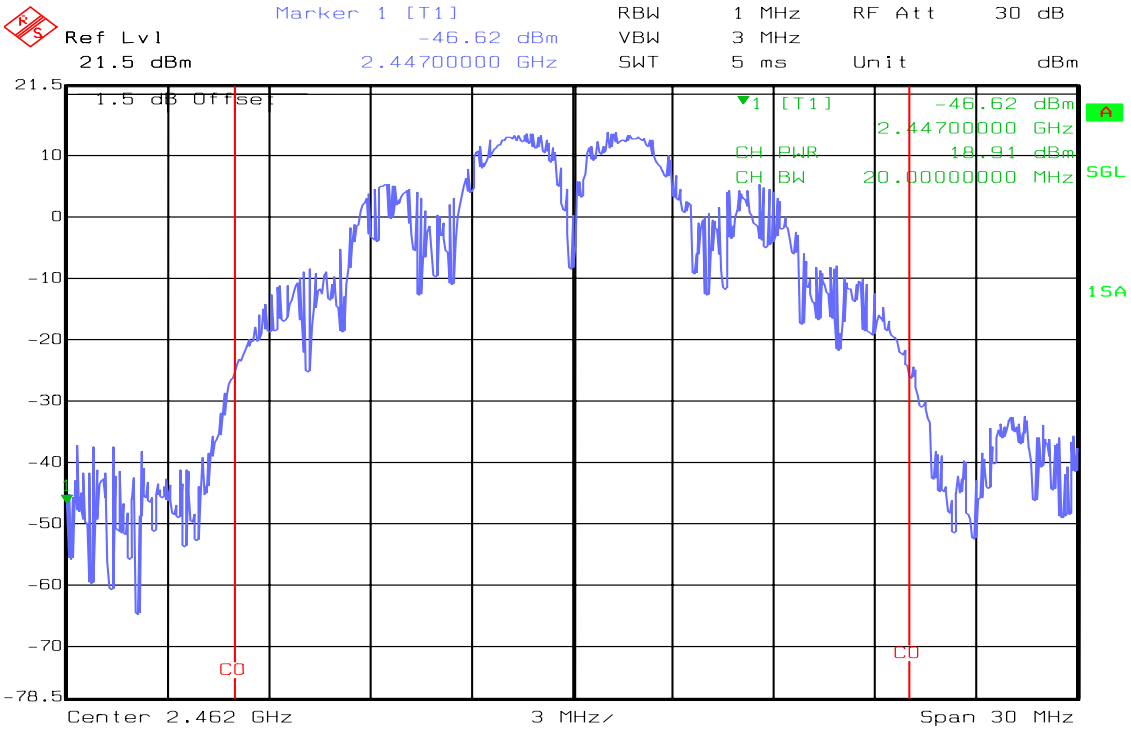
Average Power (CH Low)



Average Power (CH Mid)

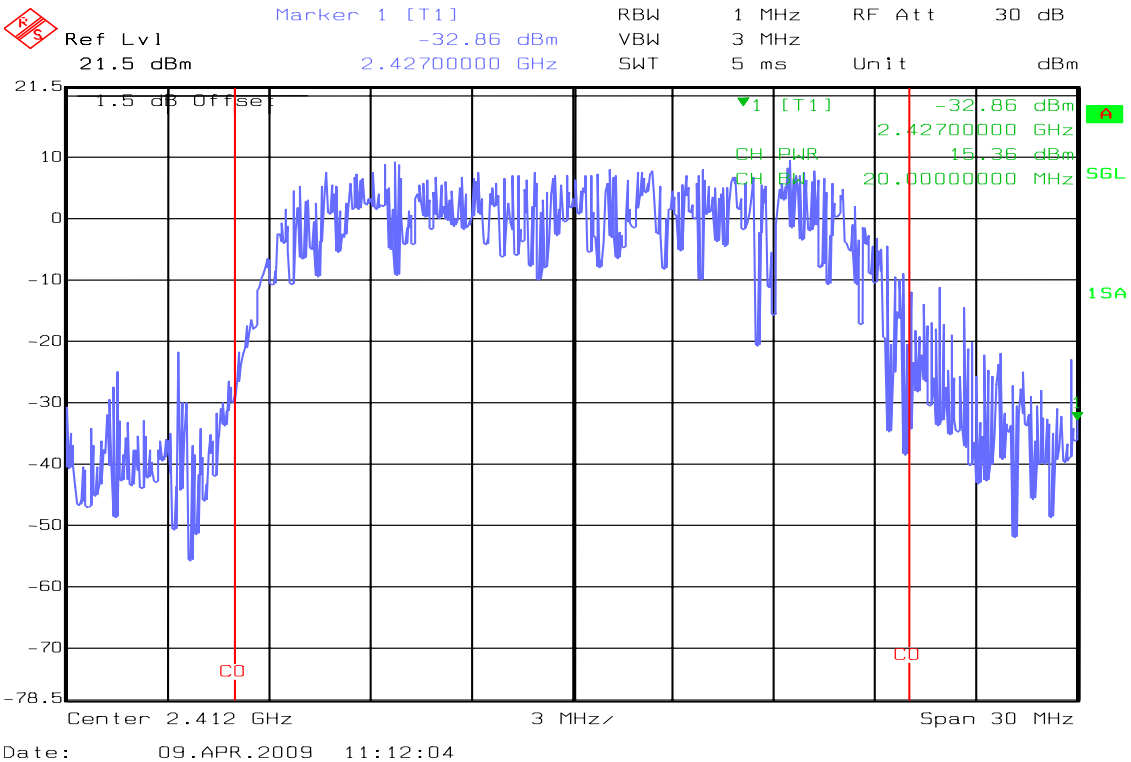


Average Power (CH High)

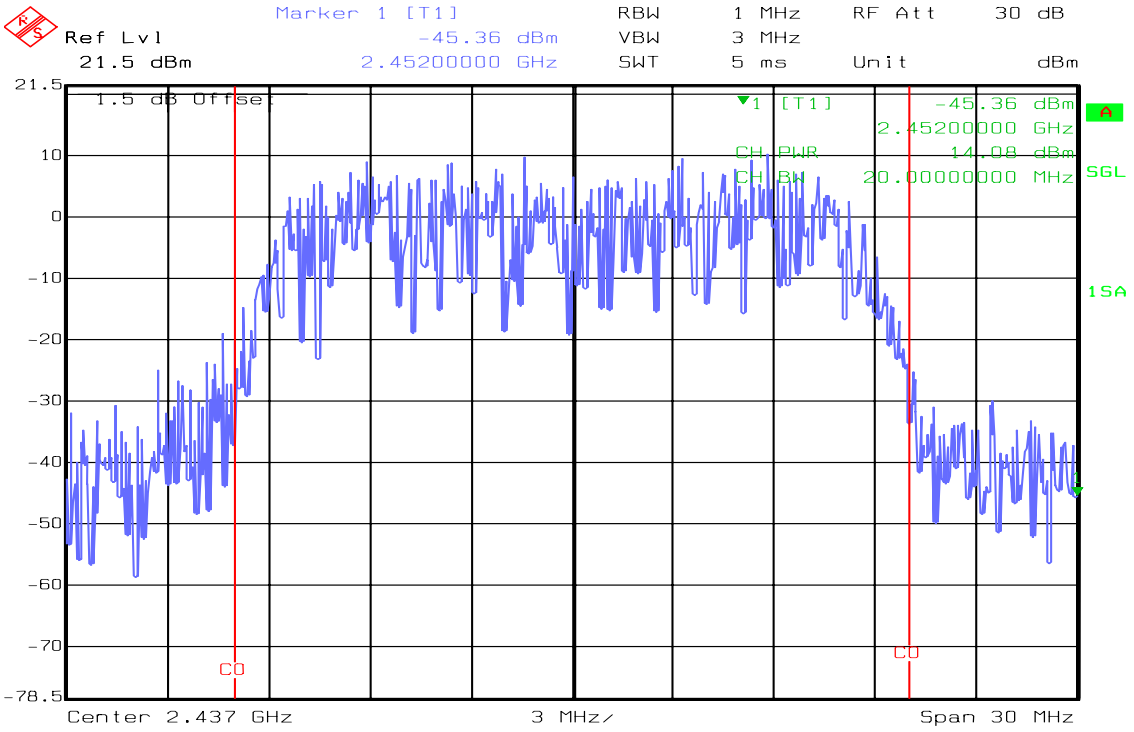


IEEE 802.11g

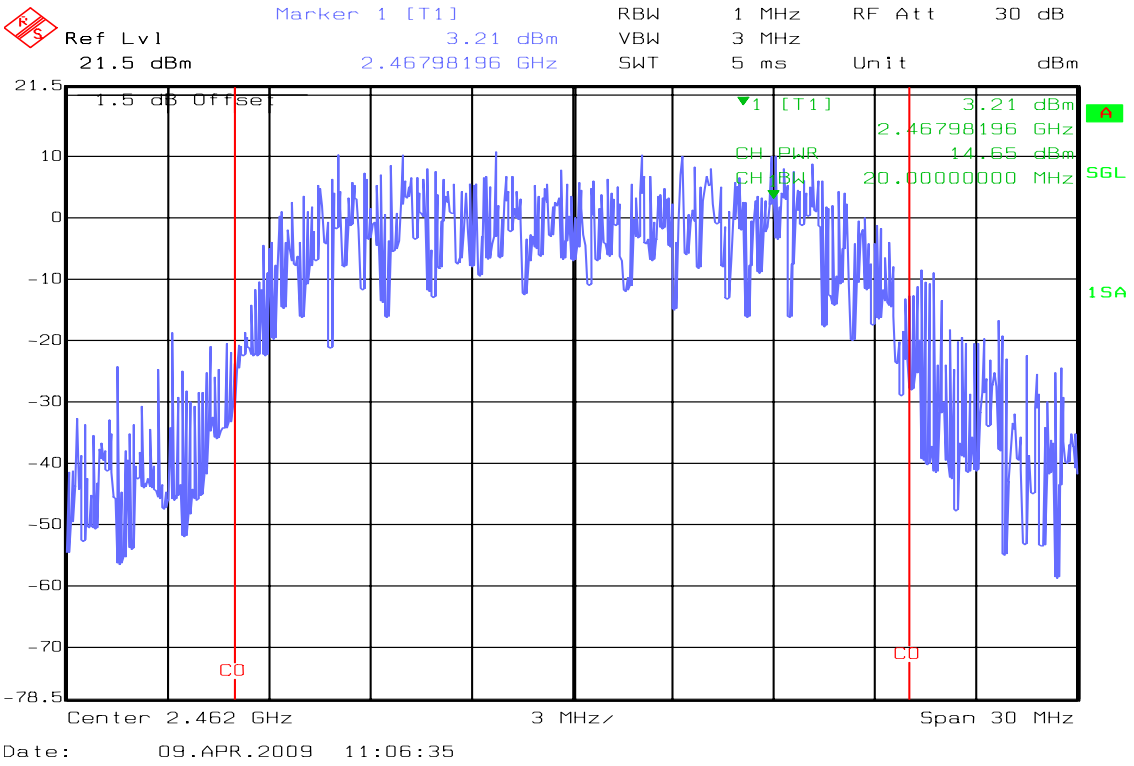
Average Power (CH Low)



Average Power (CH Mid)



Average Power (CH High)

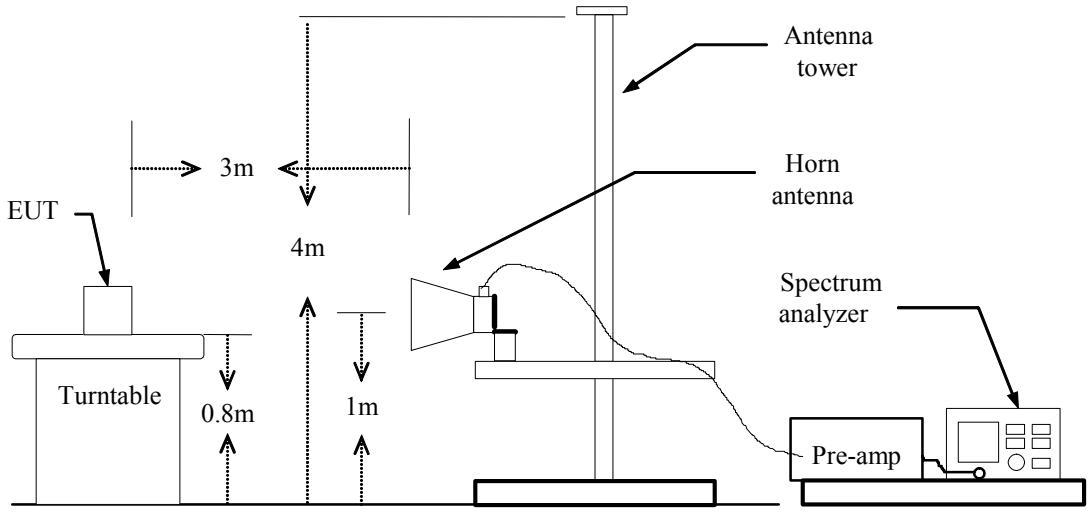


7.4 BAND EDGES MEASUREMENT

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.

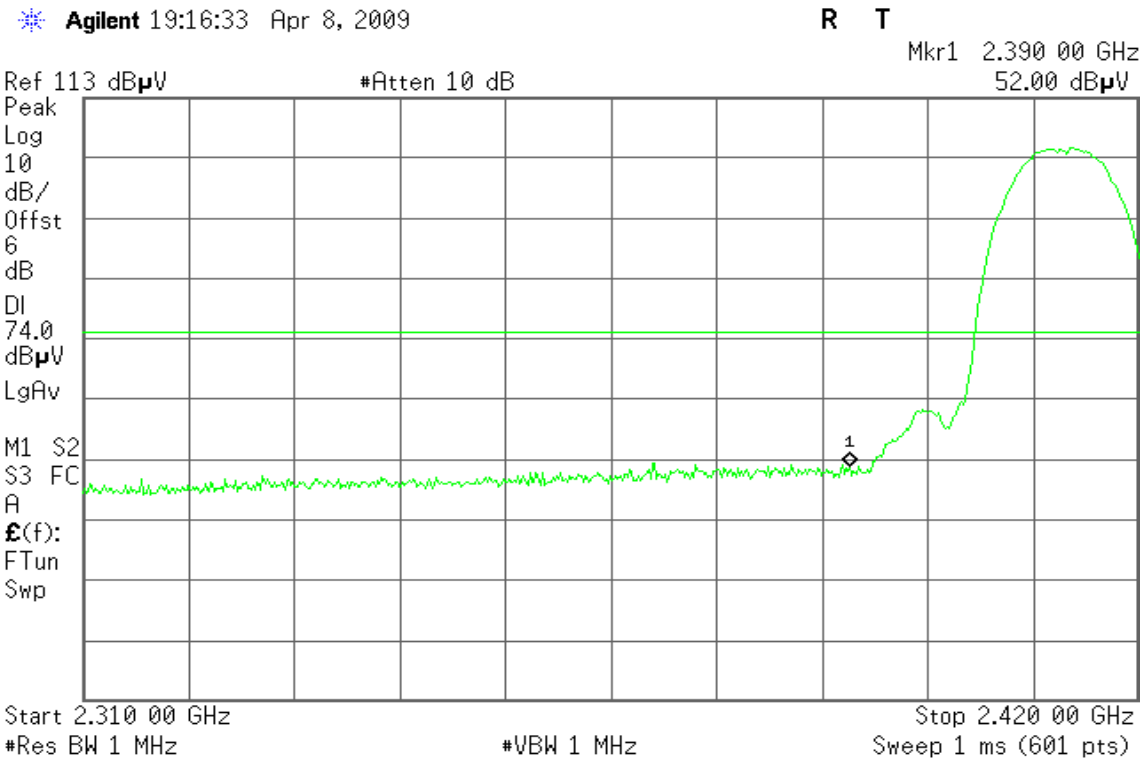
TEST RESULTS

Refer to attach spectrum analyzer data chart.

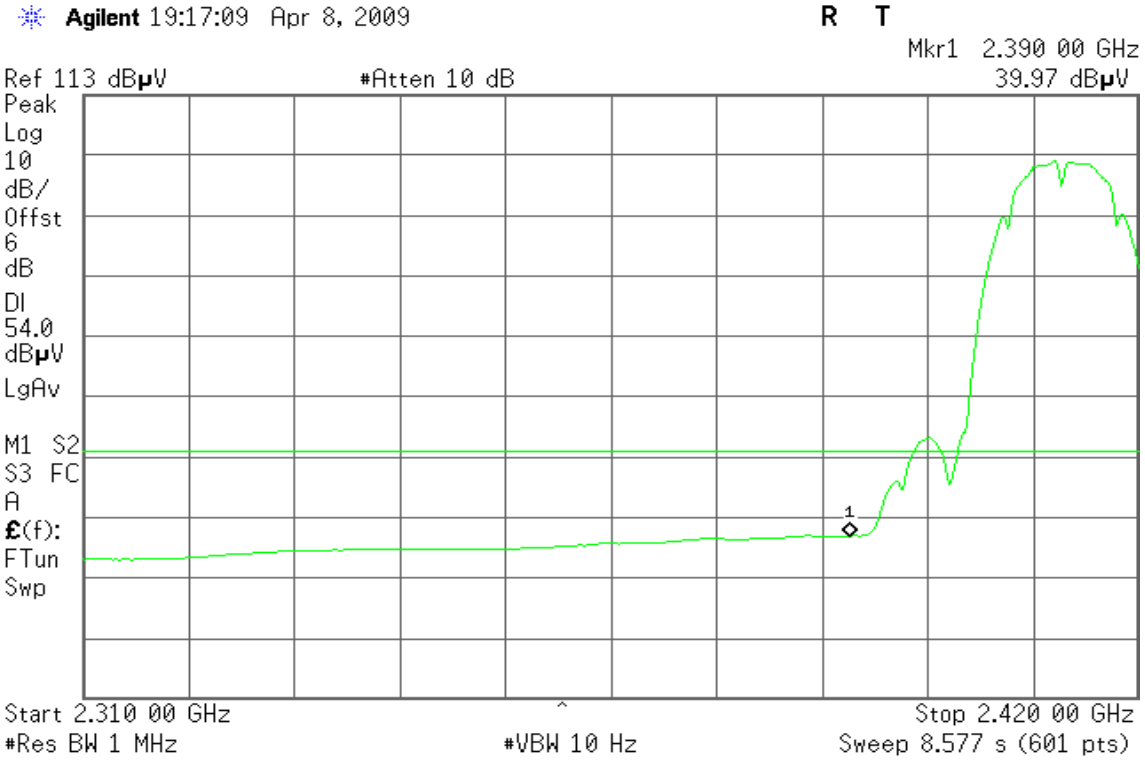
Test Plot

Band Edges (IEEE 802.11b / CH Low)

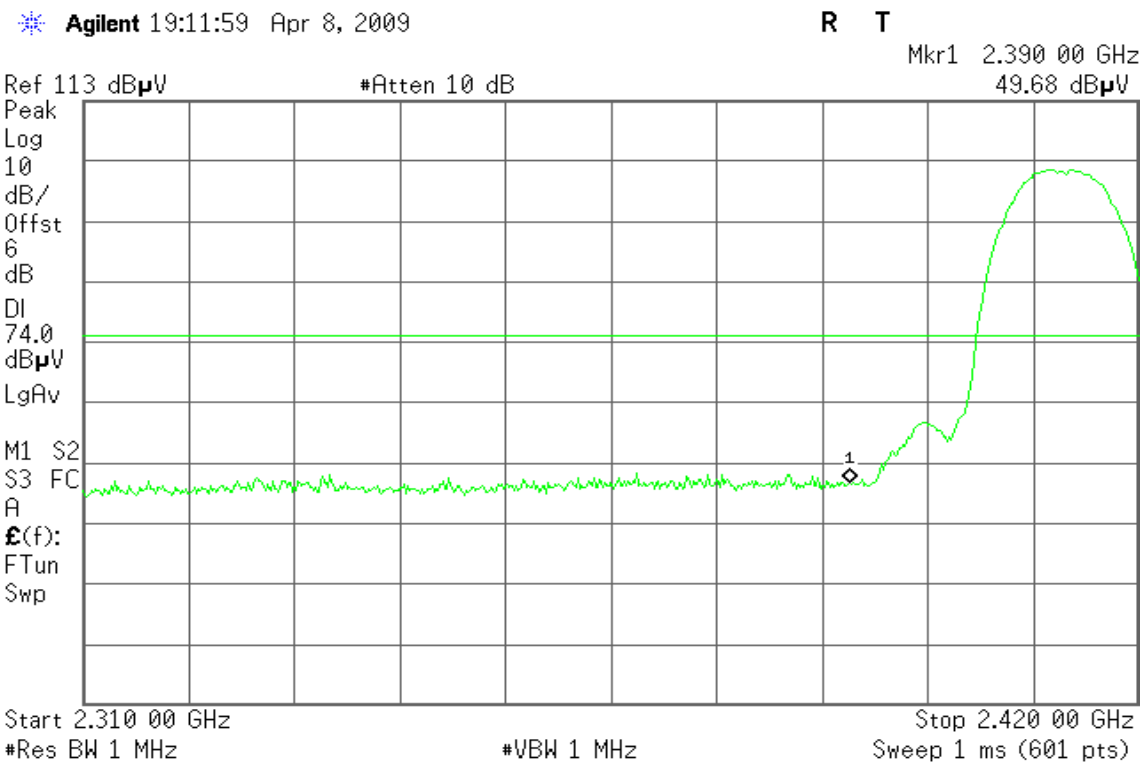
Detector mode: Peak **Polarity: Vertical**



Detector mode: Average **Polarity: Vertical**



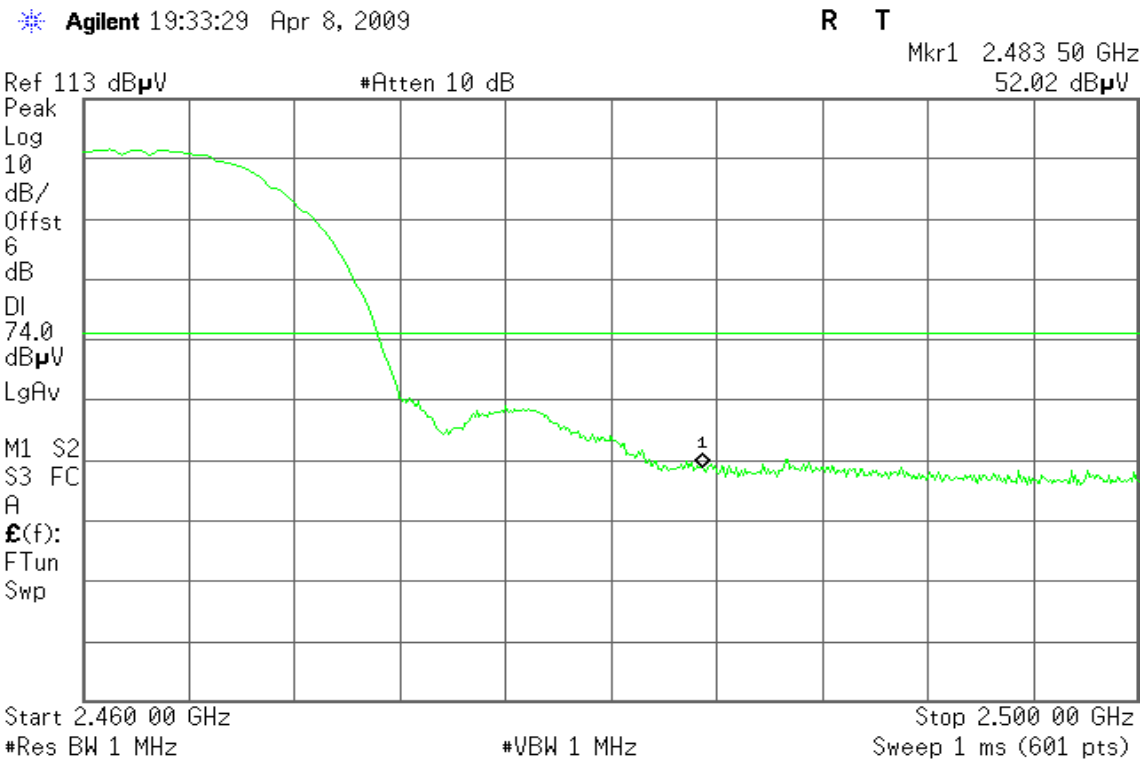
Detector mode: Peak **Polarity: Horizontal**



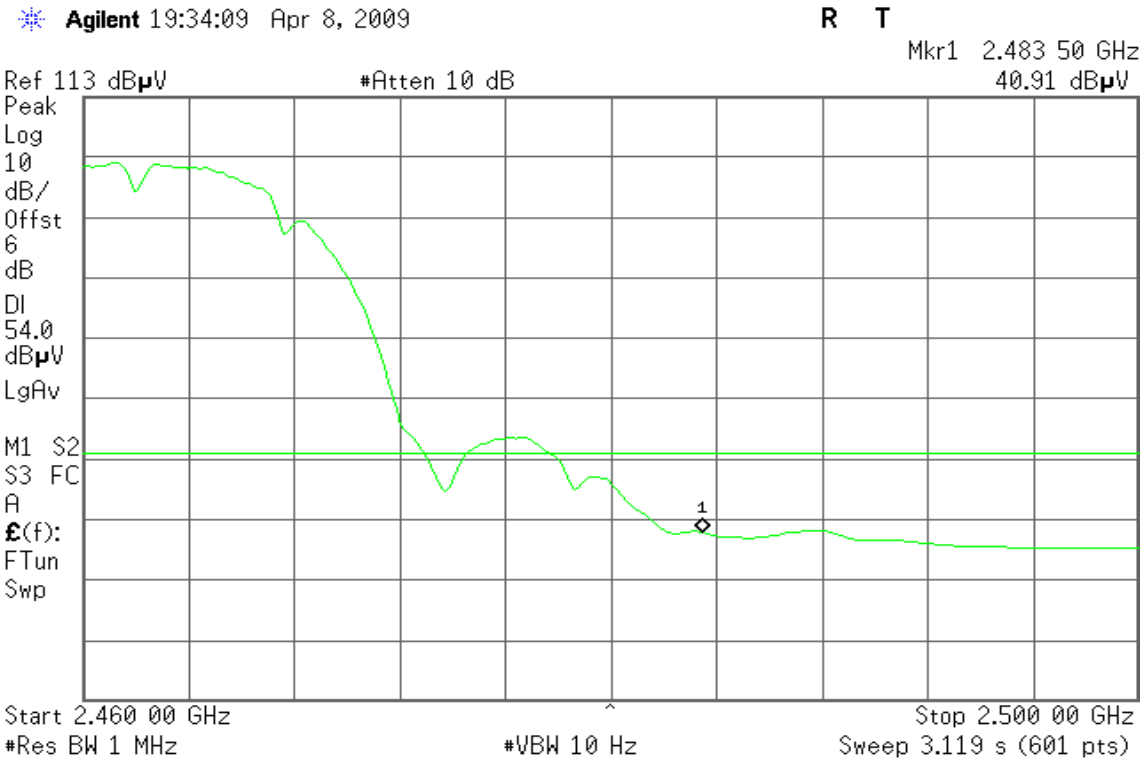
Detector mode: Average **Polarity: Horizontal**

Band Edges (IEEE 802.11b / CH High)

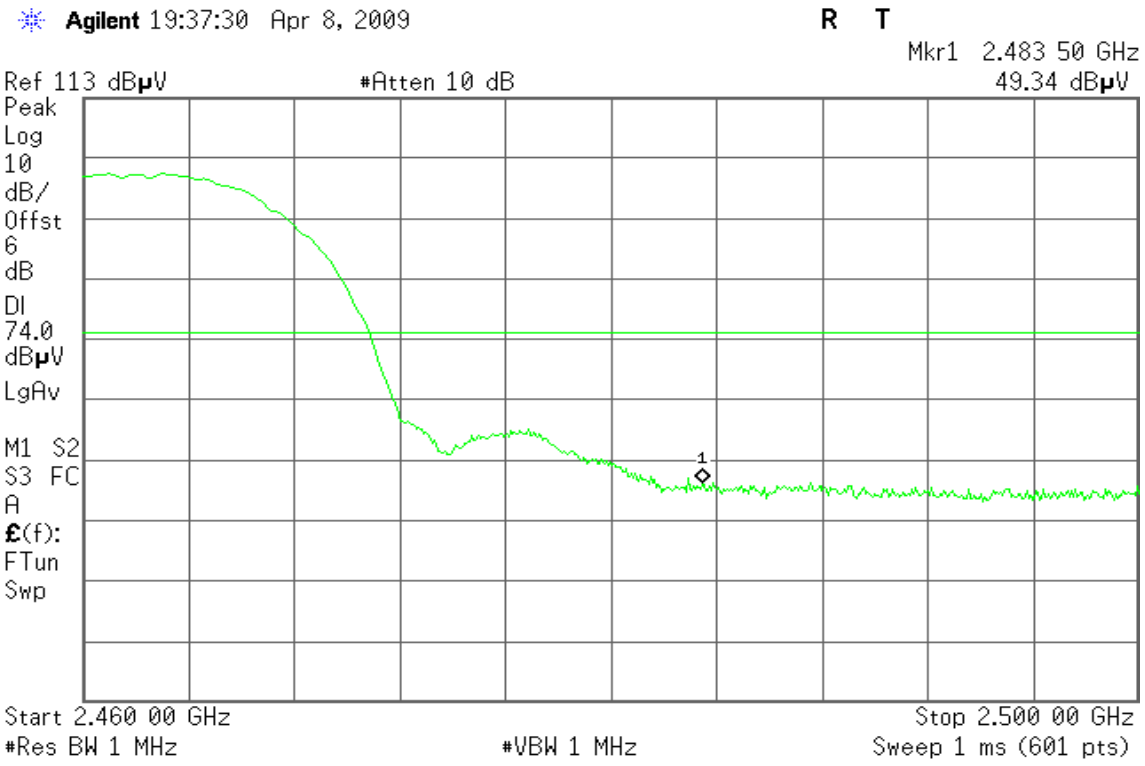
Detector mode: Peak Polarity: Vertical



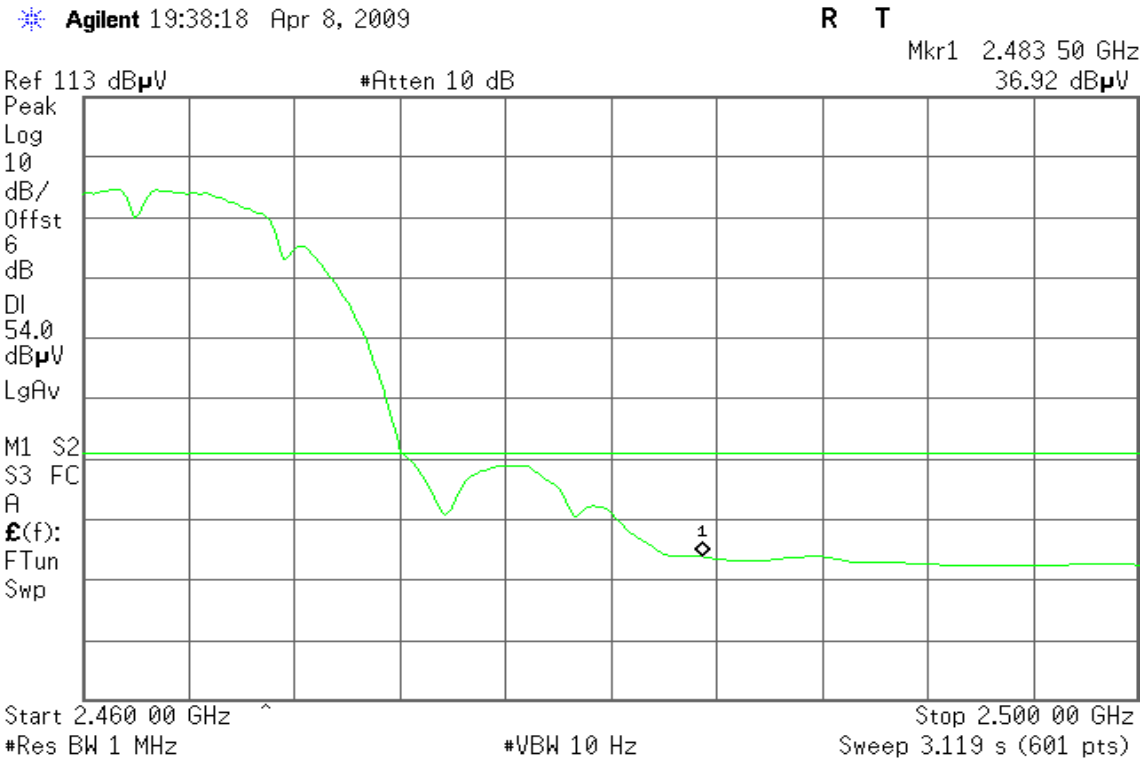
Detector mode: Average Polarity: Vertical



Detector mode: Peak **Polarity: Horizontal**

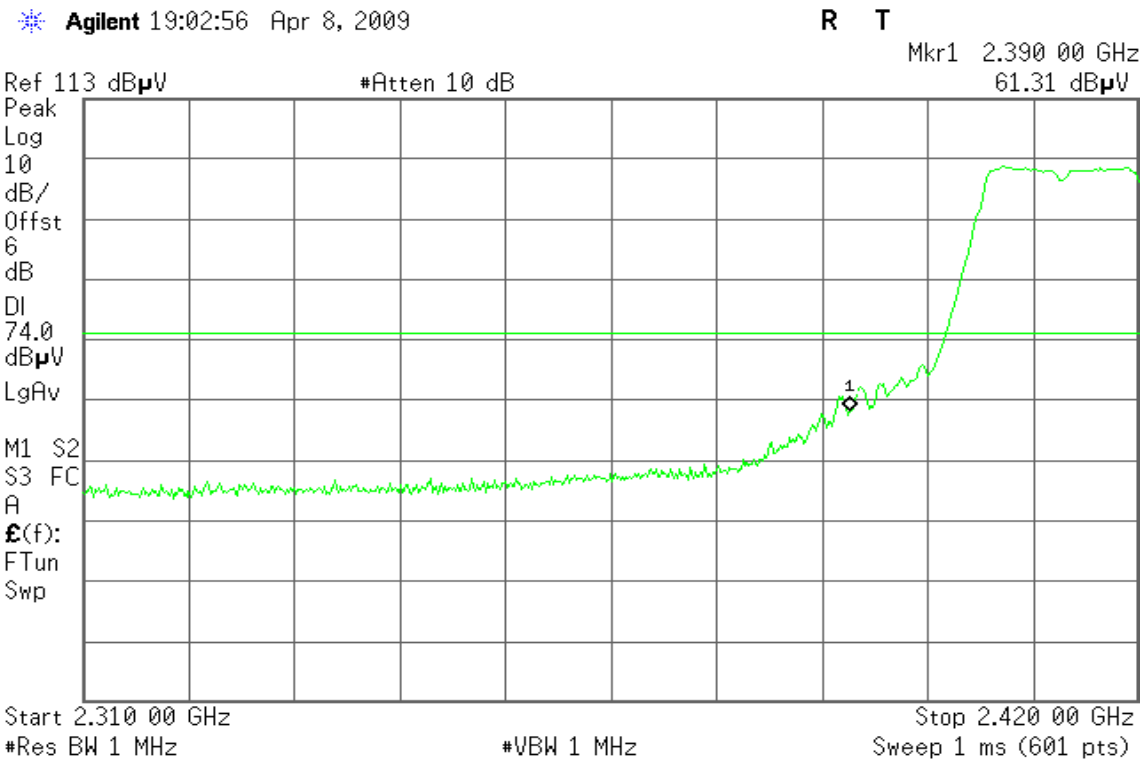


Detector mode: Average **Polarity: Horizontal**

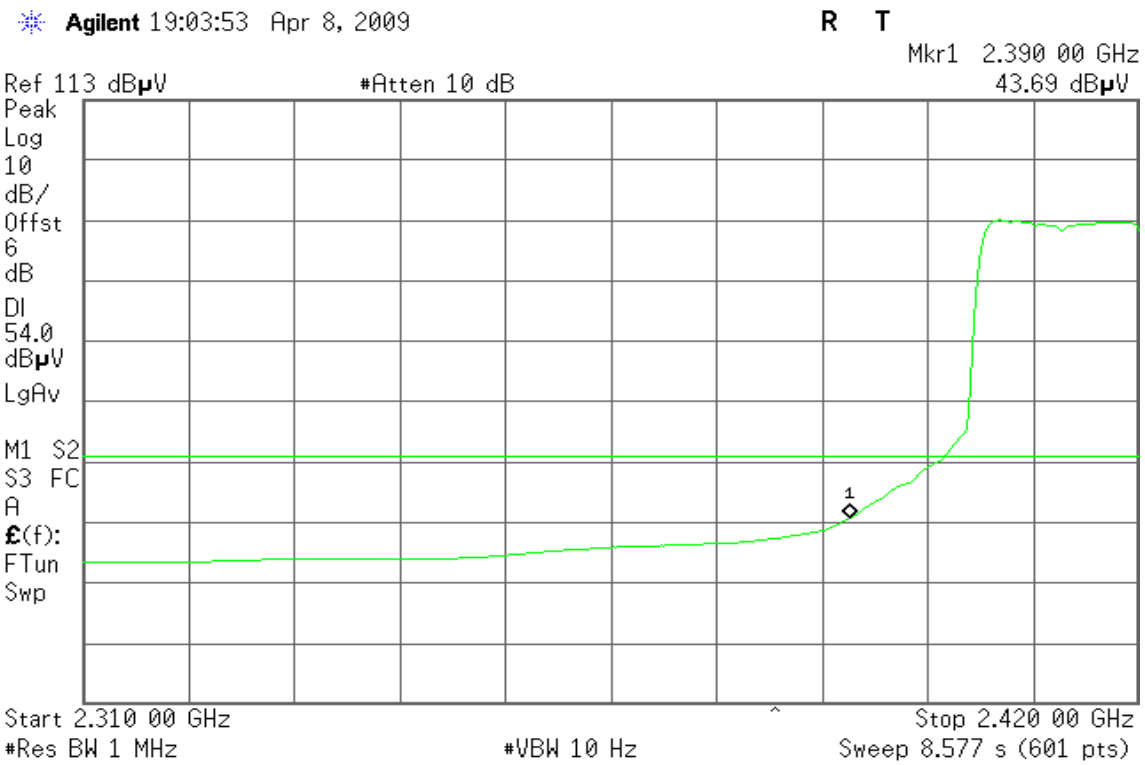


Band Edges (IEEE 802.11g / CH Low)

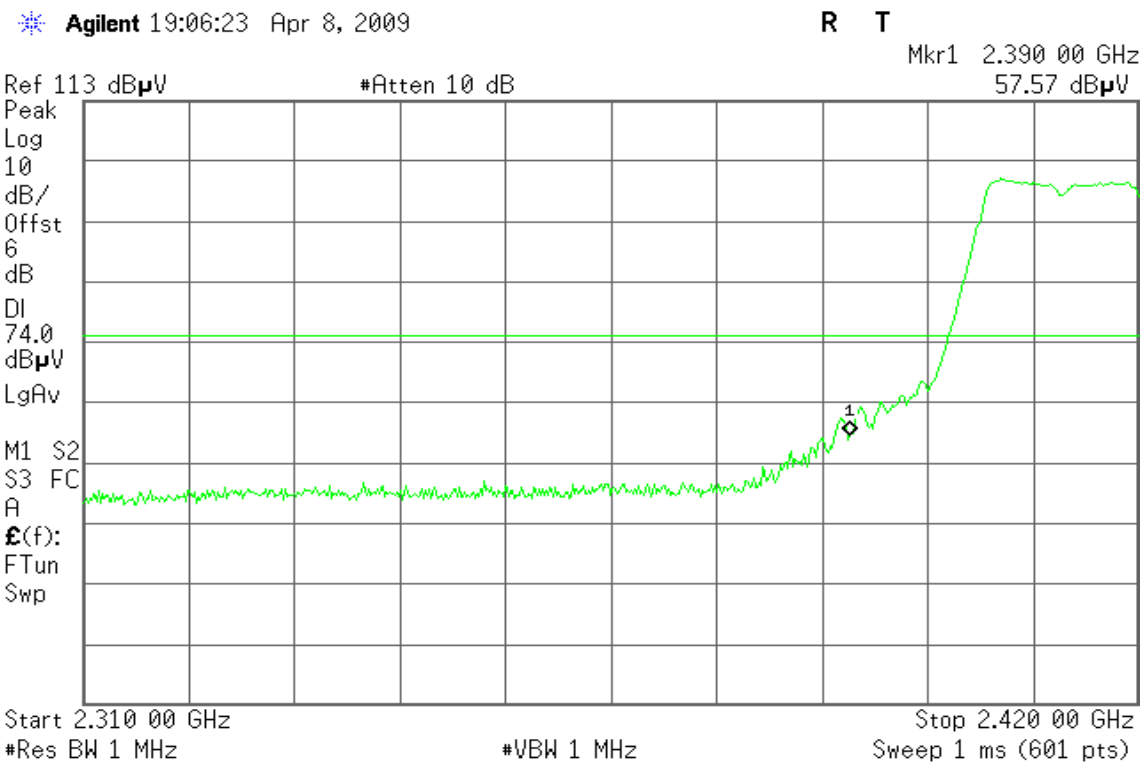
Detector mode: Peak Polarity: Vertical



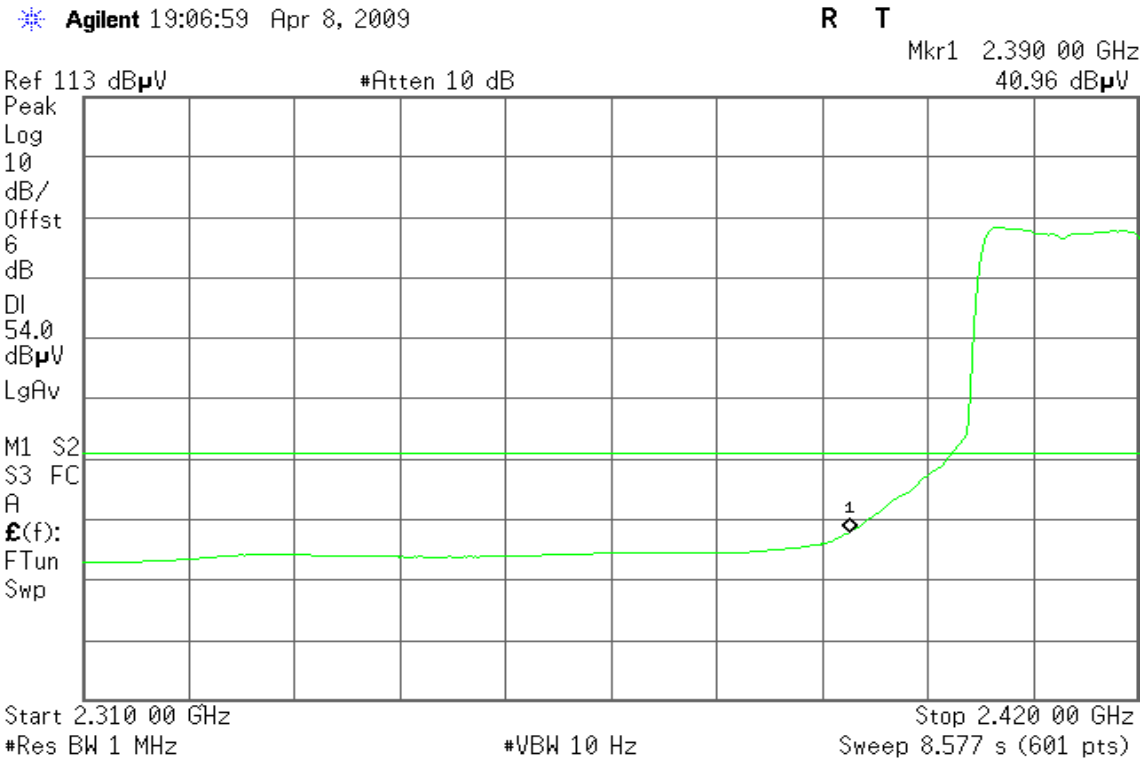
Detector mode: Average Polarity: Vertical



Detector mode: Peak **Polarity: Horizontal**

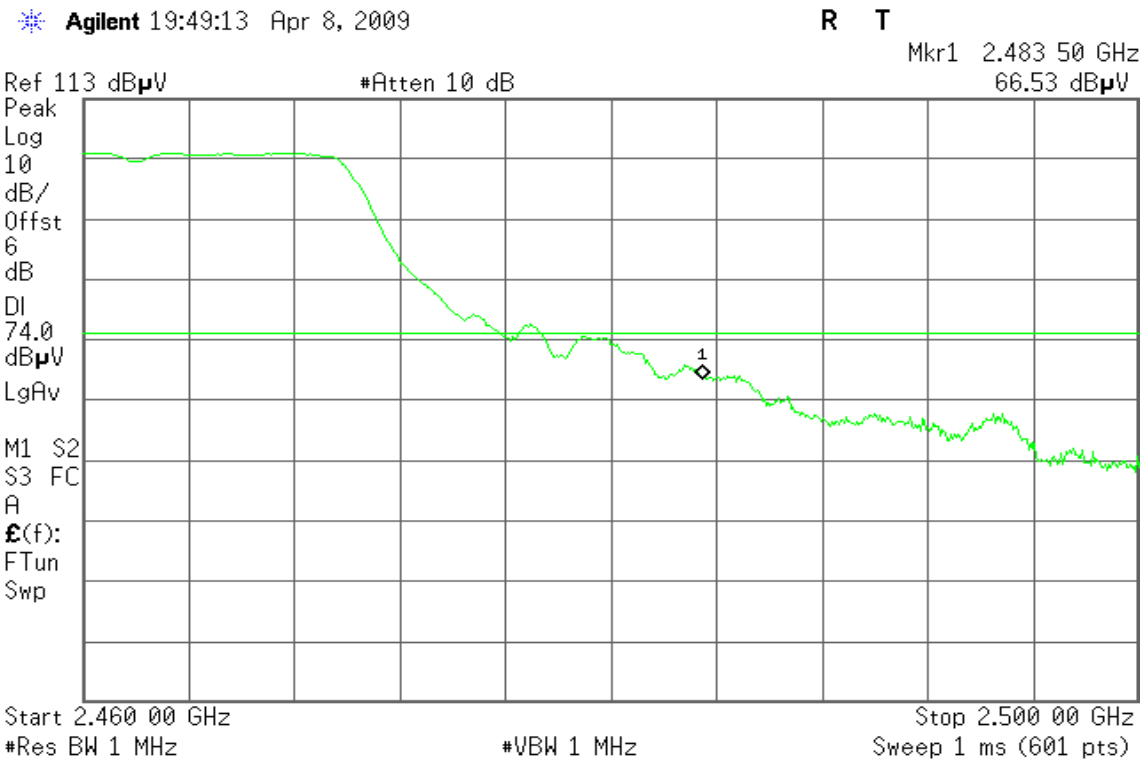


Detector mode: Average **Polarity: Horizontal**

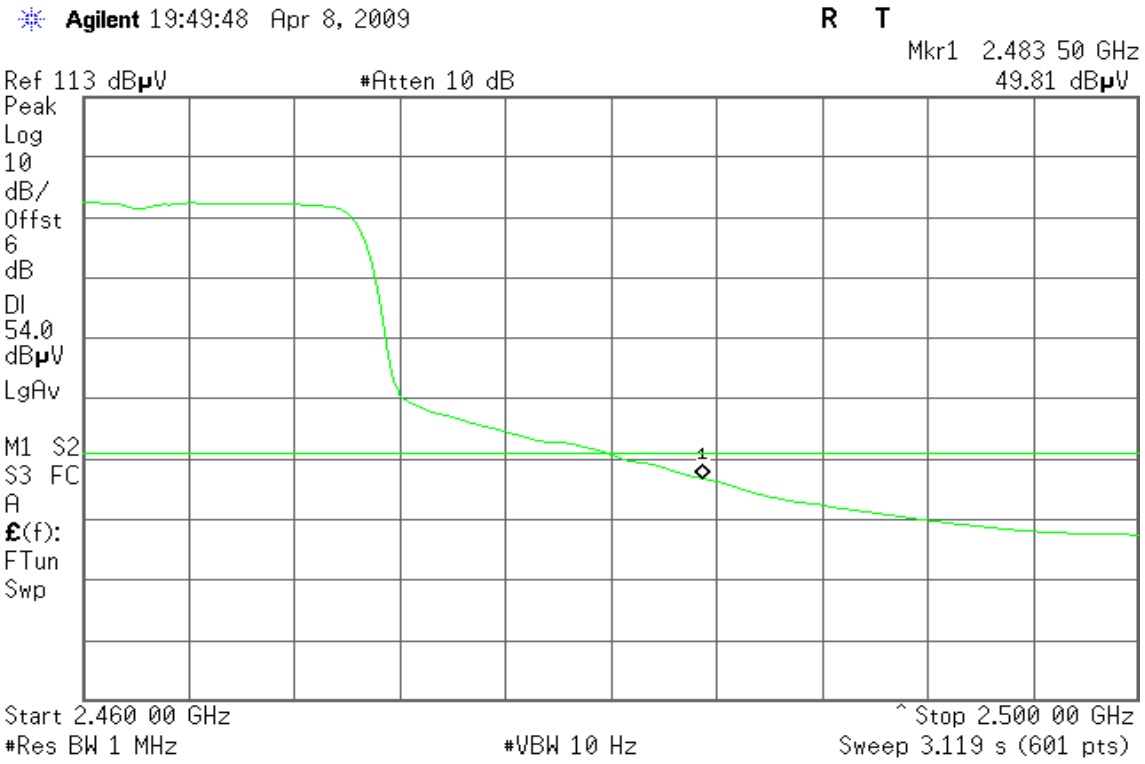


Band Edges (IEEE 802.11g / CH High)

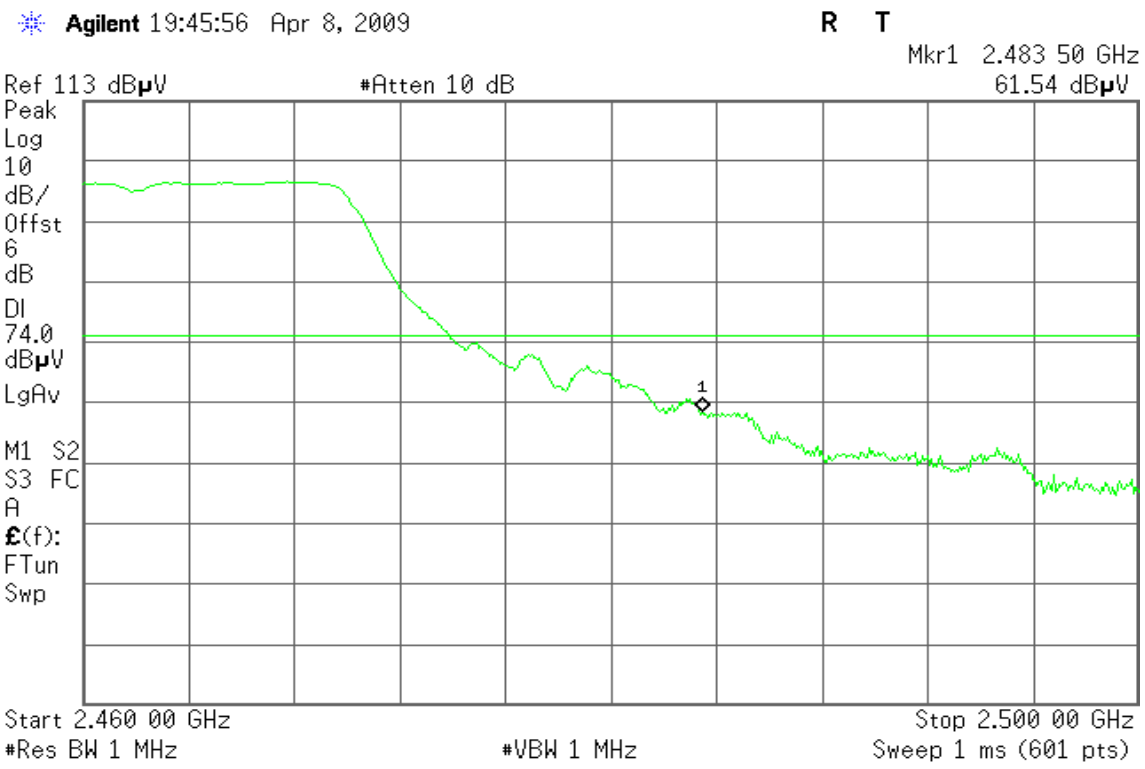
Detector mode: Peak Polarity: Vertical



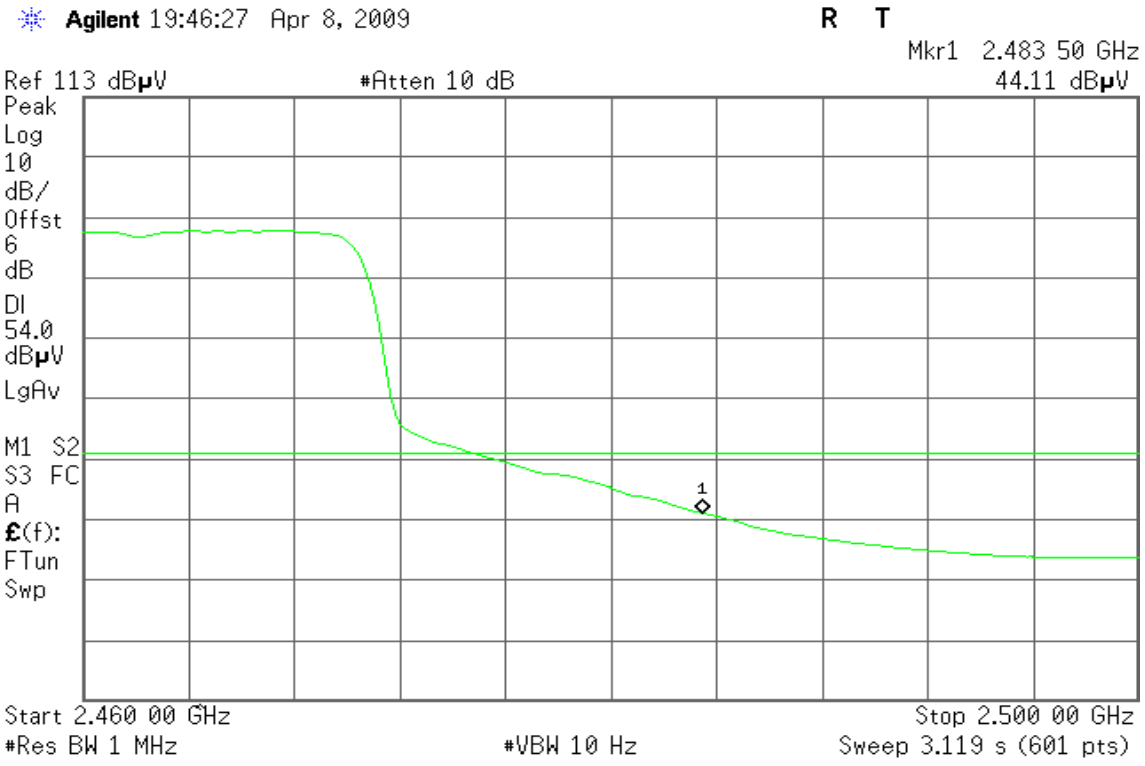
Detector mode: Average Polarity: Vertical



Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**

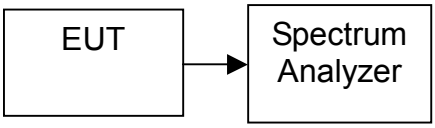


7.5 PEAK POWER SPECTRAL DENSITY

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.

Remark: 1. Result = Reading Value + Cable Loss + Attenuator Loss
2. Cable Loss =0.5 dB；Attenuator Loss=1 dB

TEST RESULTS

No non-compliance noted

TEST DATA

IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-10.09	8.00	PASS
Mid	2437	-11.24		PASS
High	2462	-10.44		PASS

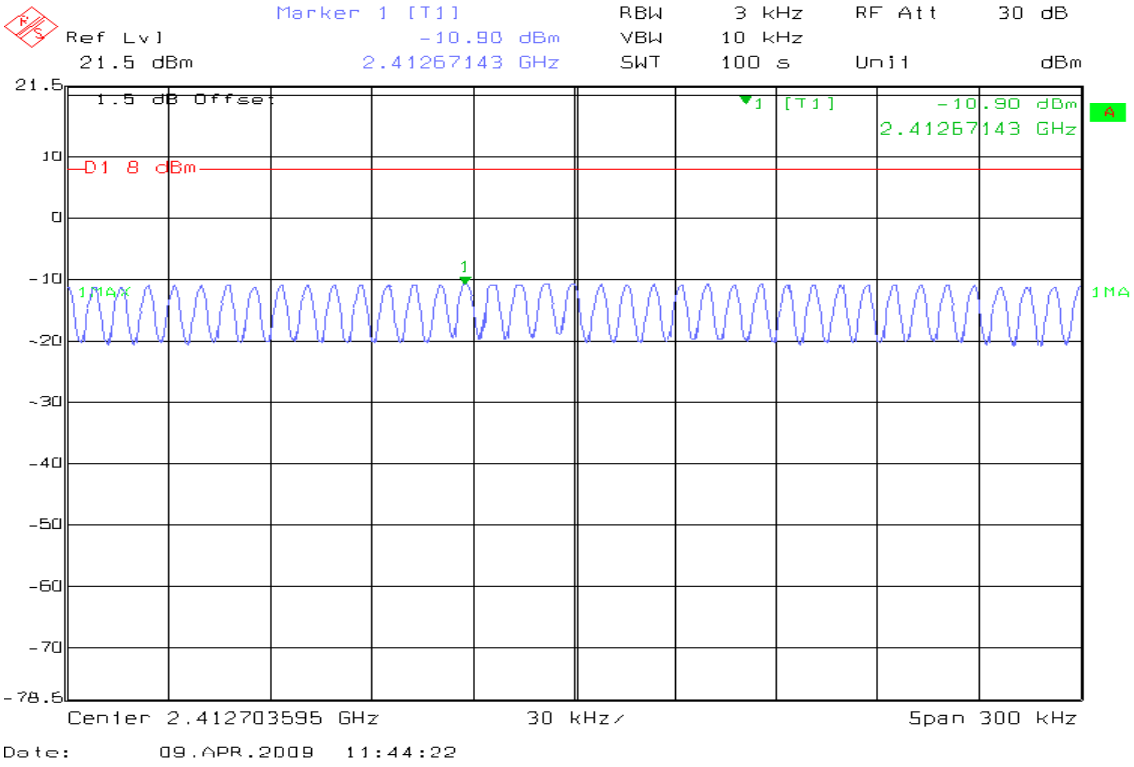
IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-9.55	8.00	PASS
Mid	2437	-13.99		PASS
High	2462	-11.10		PASS

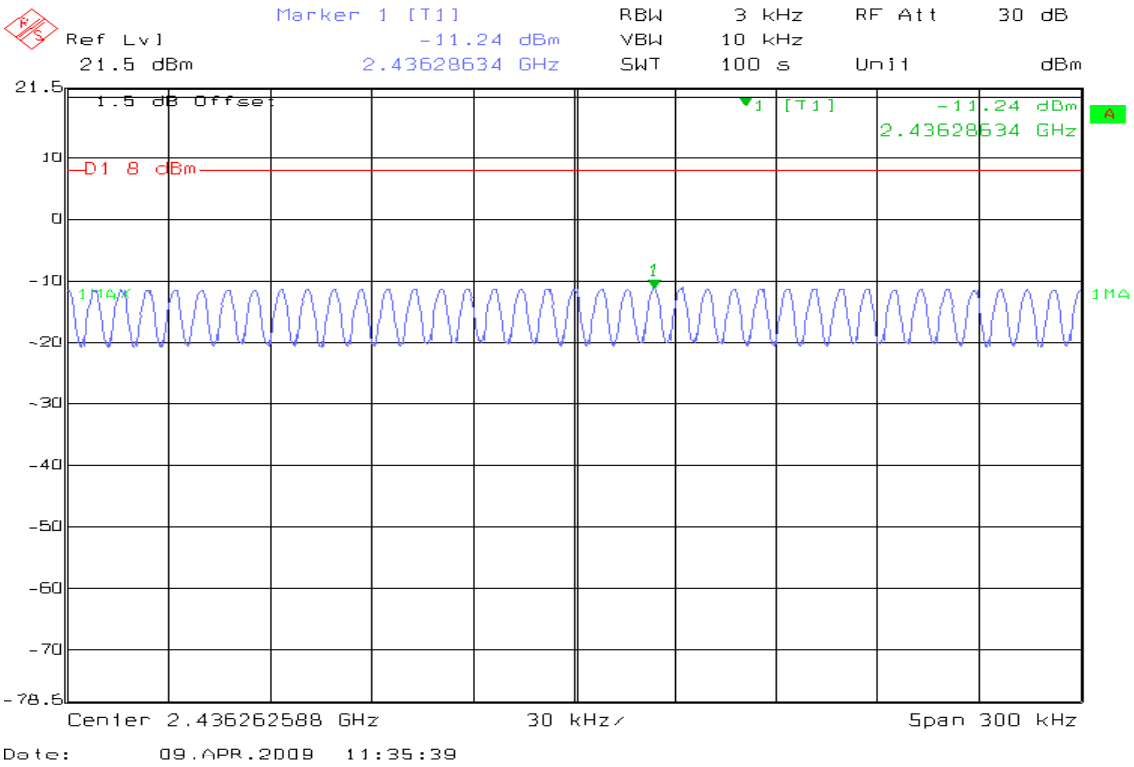
Test Plot

IEEE 802.11b

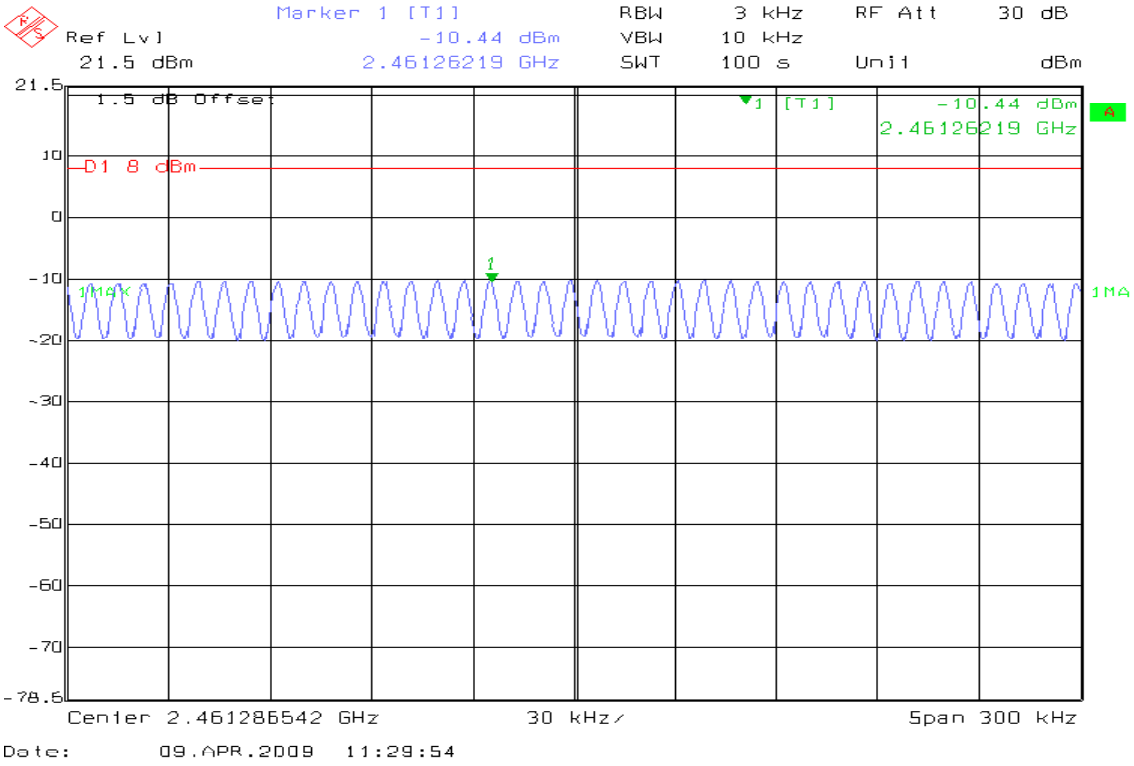
PPSD (CH Low)



PPSD (CH Mid)

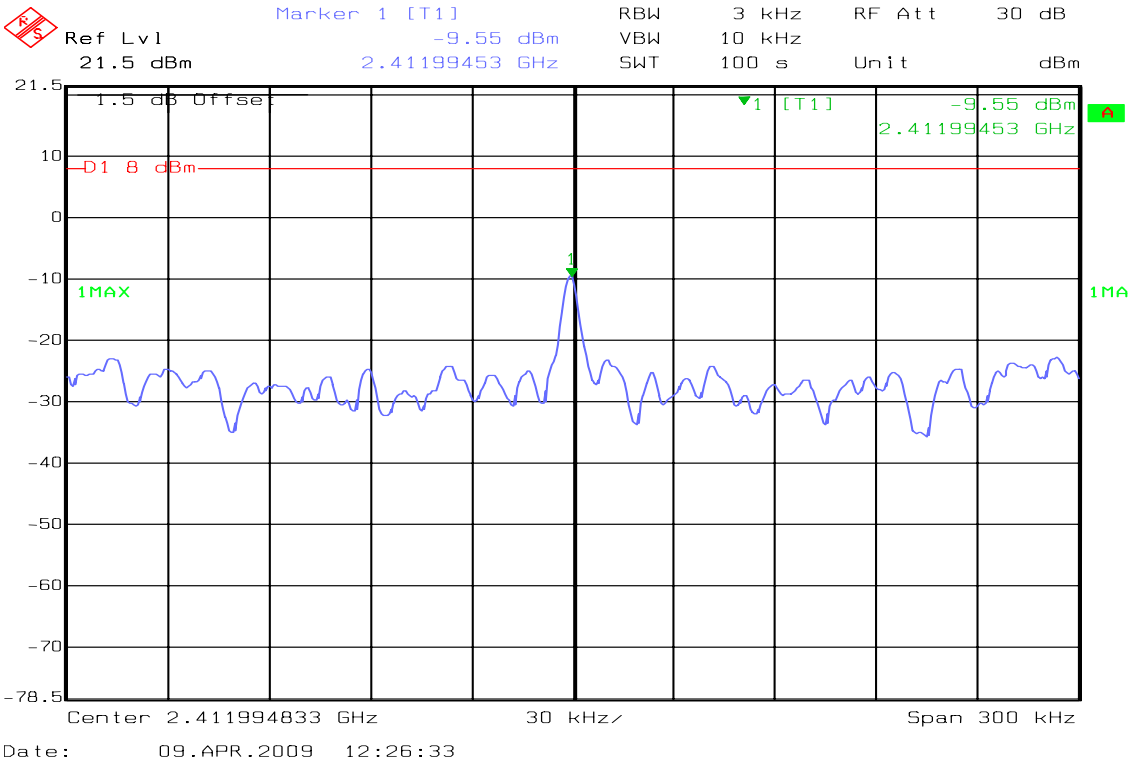


PPSD (CH High)

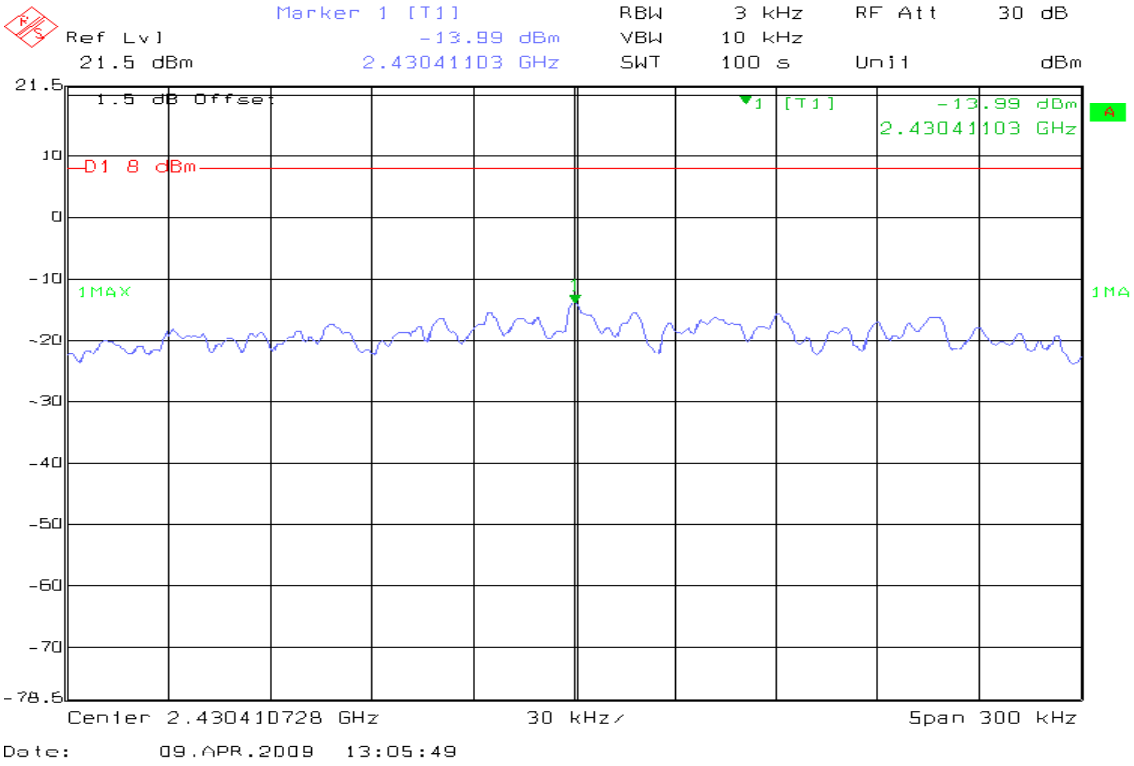


IEEE 802.11g

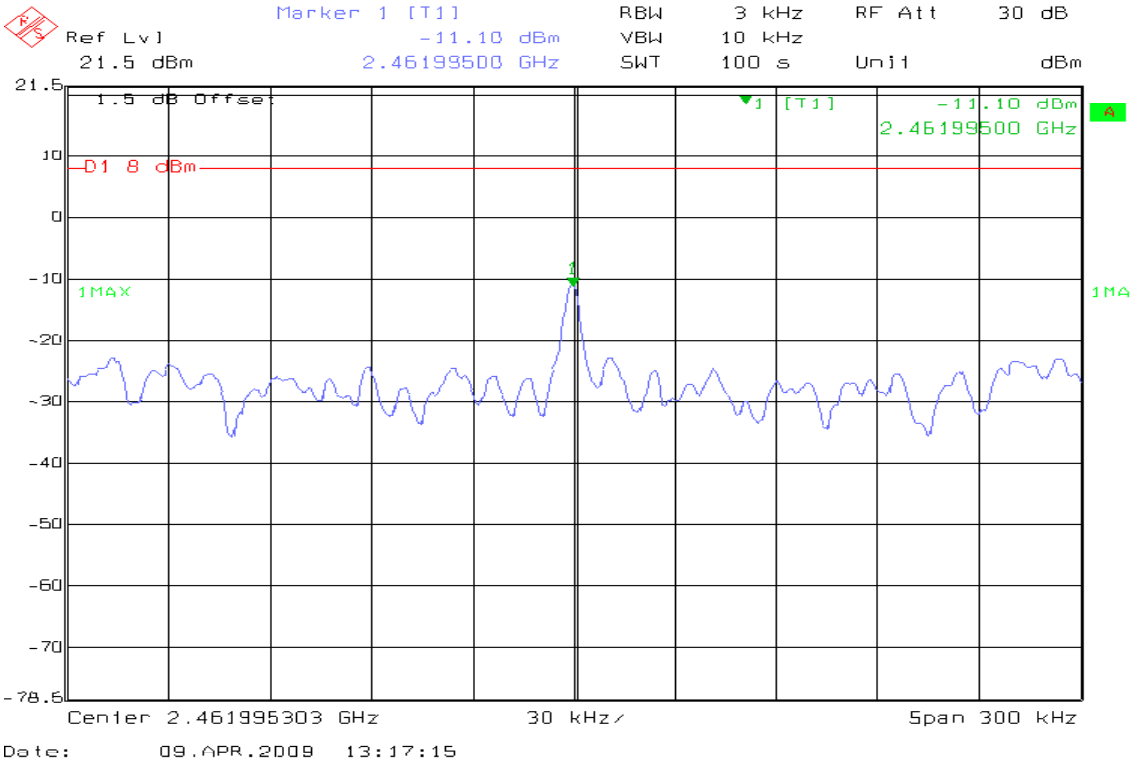
PPSD (CH Low)



PPSD (CH Mid)



PPSD (CH High)



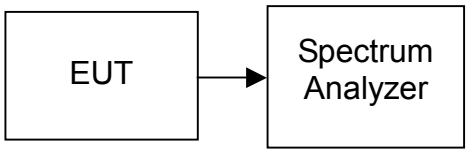
7.6 SPURIOUS EMISSIONS

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.

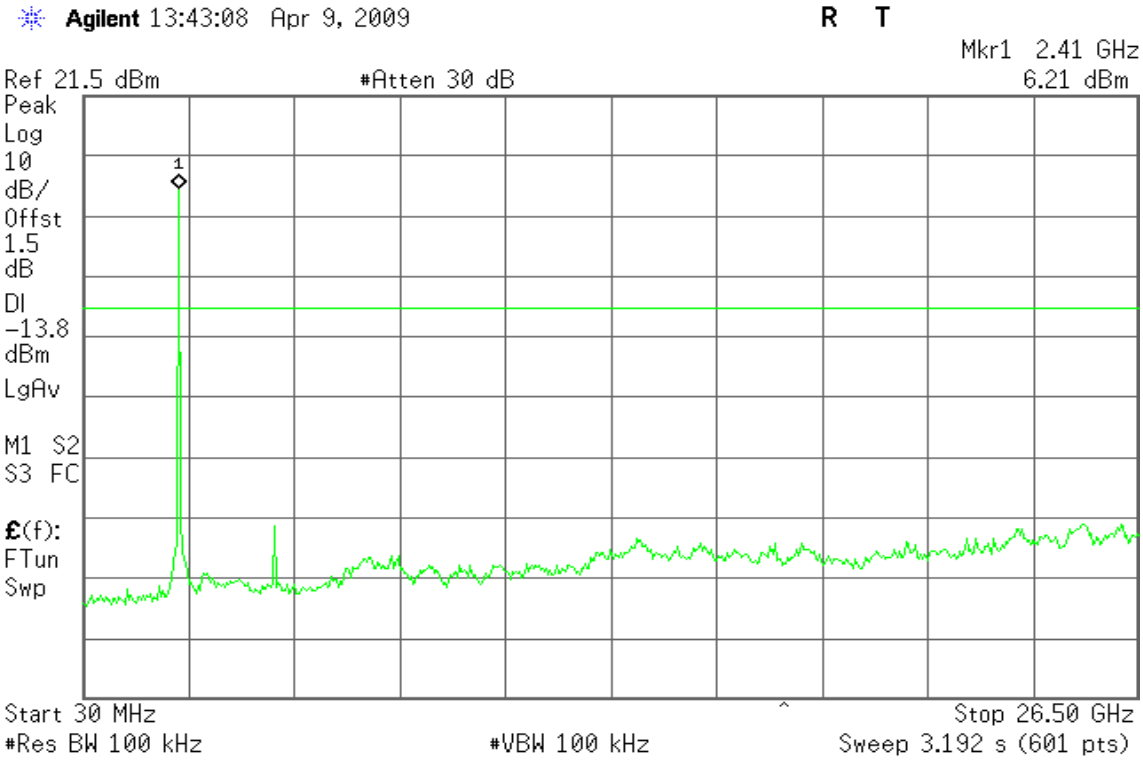
Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

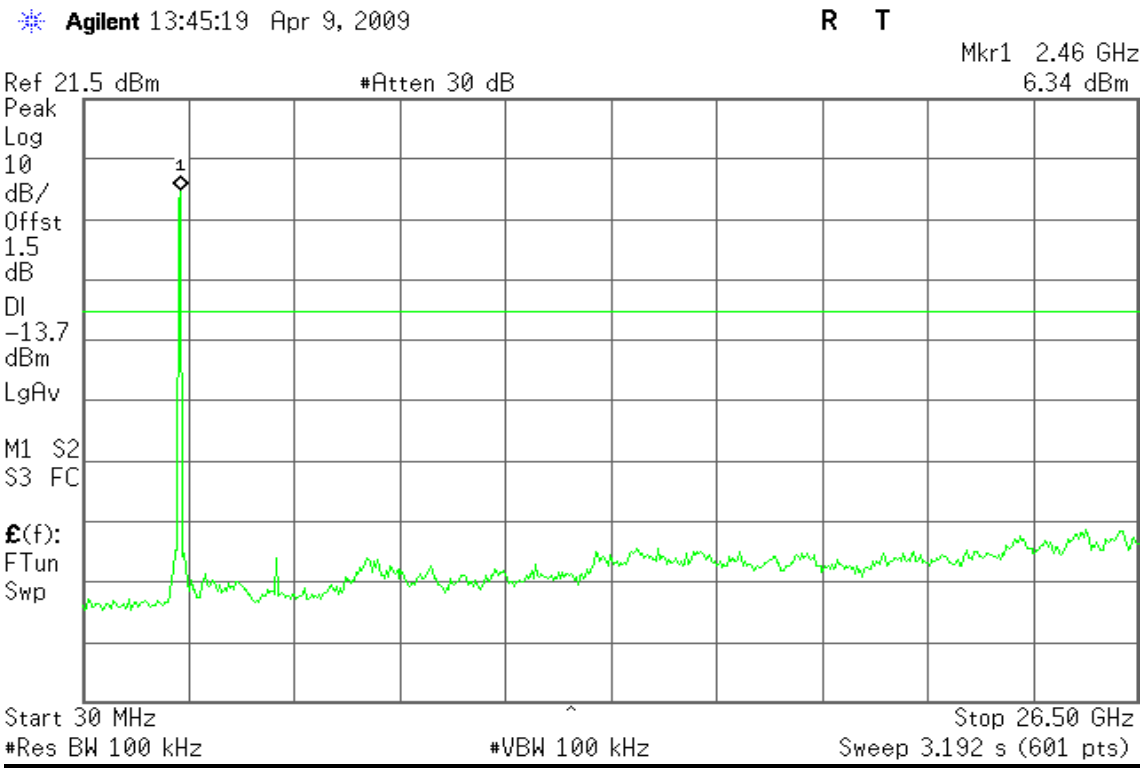
No non-compliance noted.

Test Plot

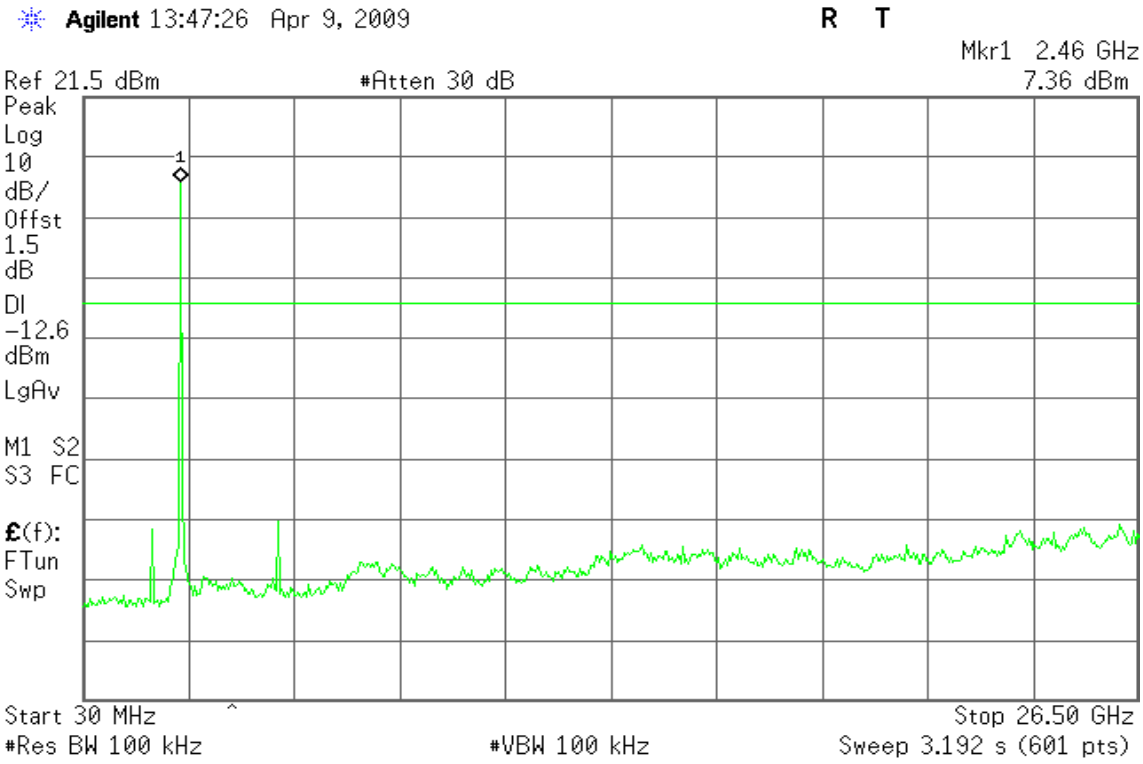
IEEE 802.11b / CH Low



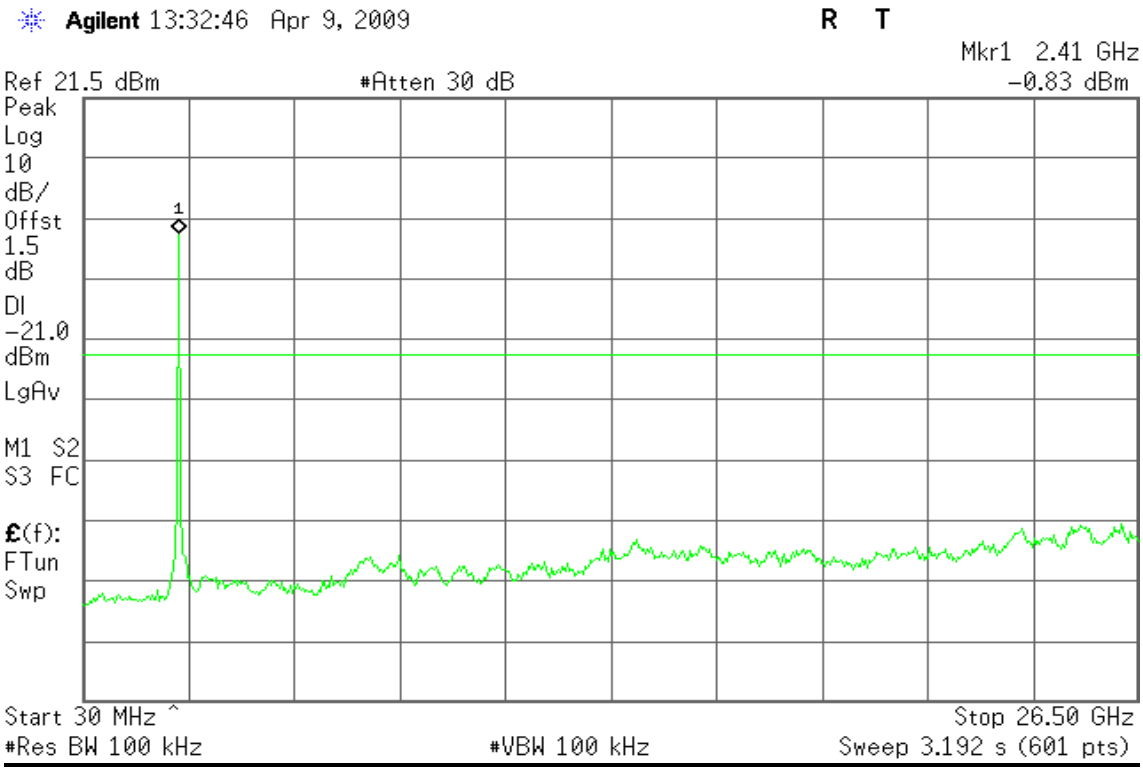
IEEE 802.11b / CH Mid



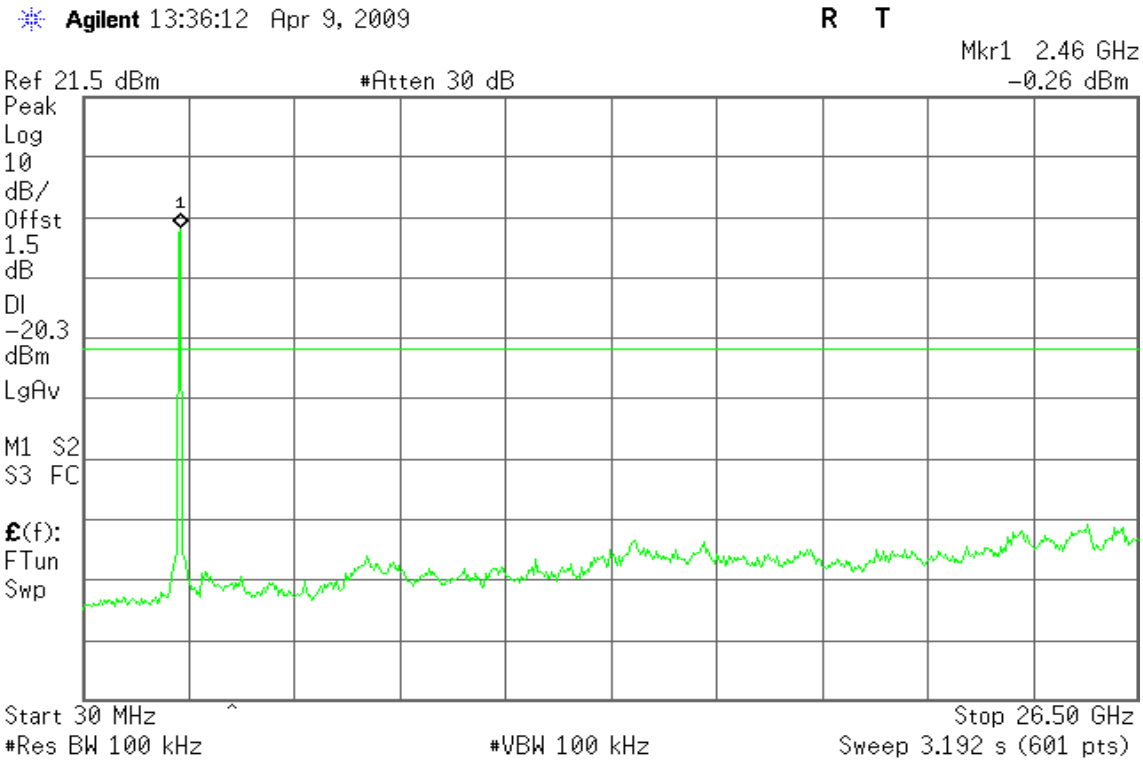
IEEE 802.11b / CH High



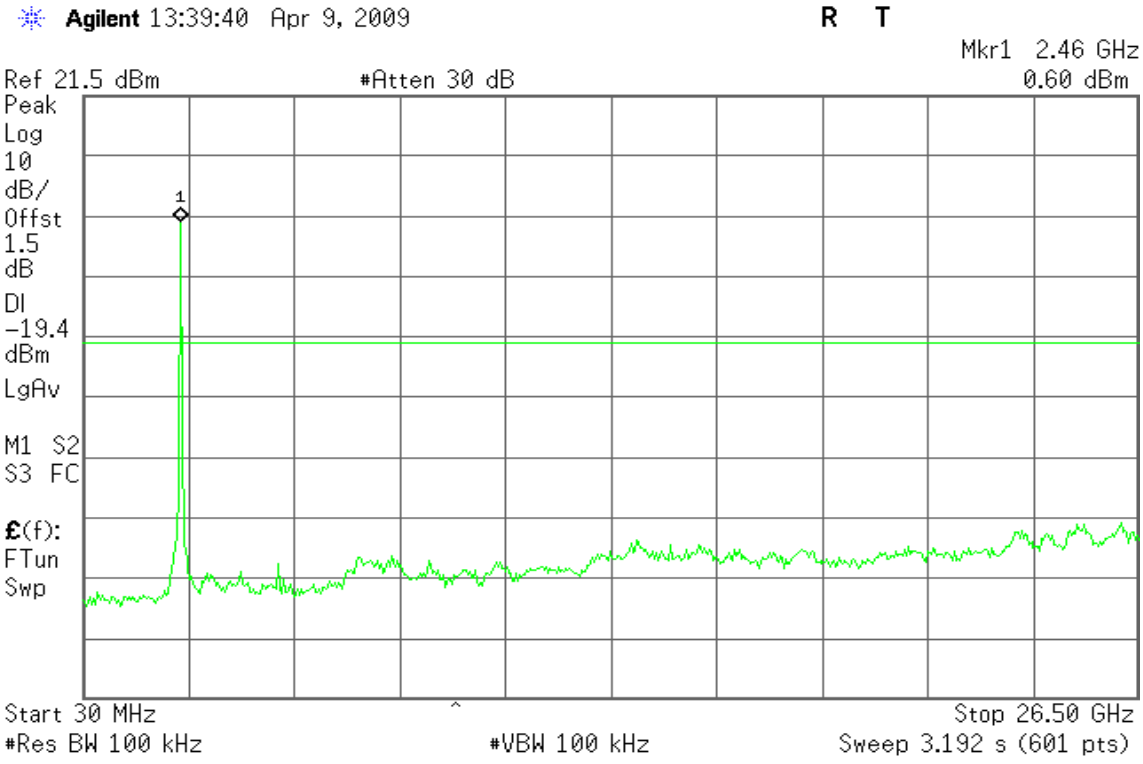
IEEE 802.11g / CH Low



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

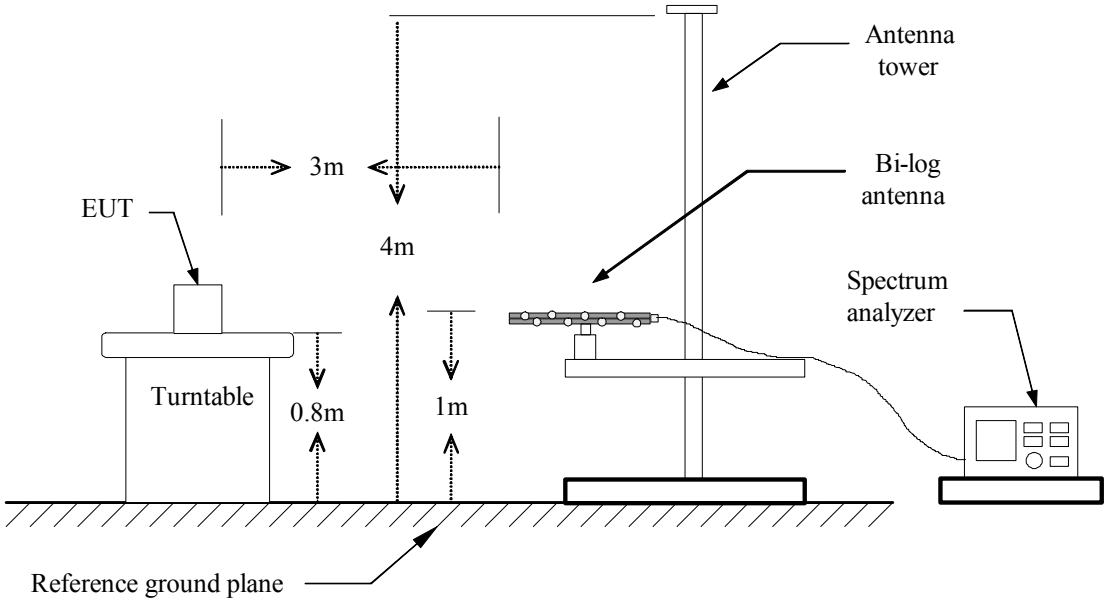
Remark: *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of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

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

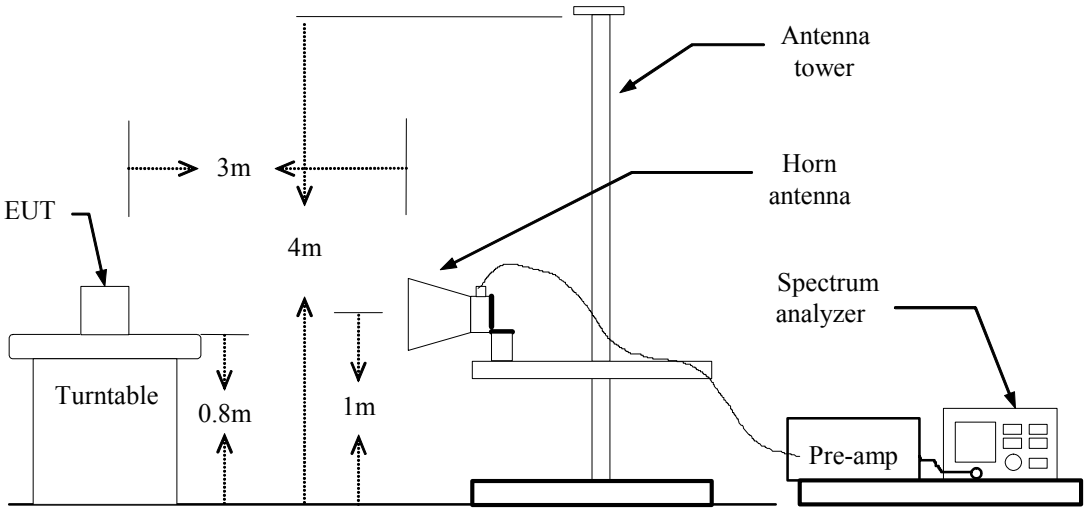
Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

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:** January 8 2009

Temperature: 26°C **Tested by:** Alonso Lu

Humidity: 60% RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
31.3857	V	44.25	-15.13	29.12	40.00	-10.88	QP
72.9571	V	45.04	-16.87	28.17	40.00	-11.83	QP
139.4714	V	47.71	-13.04	34.67	43.50	-8.83	QP
265.5714	V	41.24	-12.71	28.53	46.00	-17.47	QP
397.2143	V	40.72	-9.70	31.02	46.00	-14.98	QP
484.5143	V	42.00	-8.38	33.62	46.00	-12.38	QP
799.0714	V	36.99	-1.83	35.16	46.00	-10.84	QP
132.5429	H	41.23	-13.55	27.68	43.50	-15.82	QP
157.4857	H	40.50	-12.27	28.23	43.50	-15.27	QP
266.9571	H	51.98	-12.66	39.32	46.00	-6.68	QP
395.8286	H	49.21	-9.73	39.48	46.00	-6.52	QP
484.5143	H	46.25	-8.38	37.87	46.00	-8.13	QP
697.9143	H	43.74	-4.52	39.22	46.00	-6.78	QP
731.1714	H	43.20	-3.45	39.75	46.00	-6.25	QP
797.6857	H	46.42	-1.85	44.57	46.00	-1.43	QP

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.*
6. *Factor (dB) = Antenna factor + Cable loss – Amplifier gain*
7. *Set the spectrum analyzer as Hi-pass filter = 1 dB*

Above 1 GHz

Operation Mode: IEEE 802.11b / TX / CH Low **Test Date:** April 8, 2009

Temperature: 18°C **Tested by:** Alonso Lu

Humidity: 51% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1200.00	V	51.63	---	-9.78	41.86	---	74.00	54.00	-12.14	Peak
1456.67	V	53.37	---	-8.59	44.78	---	74.00	54.00	-9.22	Peak
2016.67	V	50.54	---	-5.49	45.05	---	74.00	54.00	-8.95	Peak
2500.00	V	53.29	---	-4.40	48.89	---	74.00	54.00	-5.11	Peak
4825.00	V	44.86	---	1.89	46.74	---	74.00	54.00	-7.26	Peak
7233.33	V	45.58	---	6.42	52.00	---	74.00	54.00	-2.00	Peak
1193.33	H	51.56	---	-9.81	41.75	---	74.00	54.00	-12.25	Peak
1576.67	H	50.50	---	-7.95	42.55	---	74.00	54.00	-11.45	Peak
2290.00	H	51.53	---	-4.87	46.66	---	74.00	54.00	-7.34	Peak
2530.00	H	49.99	---	-4.26	45.73	---	74.00	54.00	-8.27	Peak
2743.33	H	50.27	---	-3.28	46.99	---	74.00	54.00	-7.01	Peak
4825.00	H	43.20	---	1.89	45.08	---	74.00	54.00	-8.92	Peak
7233.33	H	41.76	---	6.42	48.17	---	74.00	54.00	-5.83	Peak

Remark:

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

Operation Mode: IEEE 802.11b / TX / CH Mid **Test Date:** April 8, 2009

Temperature: 18°C **Tested by:** Alonso Lu

Humidity: 51% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1200.00	V	52.05	---	-9.78	42.28	---	74.00	54.00	-11.72	Peak
1473.33	V	53.34	---	-8.51	44.83	---	74.00	54.00	-9.17	Peak
2896.67	V	48.93	---	-2.58	46.36	---	74.00	54.00	-7.64	Peak
4875.00	V	45.07	---	2.03	47.10	---	74.00	54.00	-6.90	Peak
7308.33	V	45.73	40.19	6.62	52.34	46.81	74.00	54.00	-7.19	AVG
N/A										
1203.33	H	52.10	---	-9.76	42.34	---	74.00	54.00	-11.66	Peak
1630.00	H	51.48	---	-7.65	43.83	---	74.00	54.00	-10.17	Peak
1983.33	H	50.37	---	-5.63	44.74	---	74.00	54.00	-9.26	Peak
2346.67	H	52.90	---	-4.75	48.16	---	74.00	54.00	-5.84	Peak
2783.33	H	50.21	---	-3.10	47.11	---	74.00	54.00	-6.89	Peak
4875.00	H	47.76	---	2.03	49.79	---	74.00	54.00	-4.21	Peak
7308.33	H	43.50	---	6.62	50.12	---	74.00	54.00	-3.88	Peak

Remark:

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

Operation Mode: IEEE 802.11b / TX / CH High **Test Date:** April 8, 2009

Temperature: 18°C **Tested by:** Alonso Lu

Humidity: 51% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1193.33	V	51.95	---	-9.81	42.15	---	74.00	54.00	-11.85	Peak
1473.33	V	52.73	---	-8.51	44.22	---	74.00	54.00	-9.78	Peak
1986.67	V	50.60	---	-5.61	44.99	---	74.00	54.00	-9.01	Peak
2306.67	V	52.90	---	-4.84	48.06	---	74.00	54.00	-5.94	Peak
2390.00	V	54.09	---	-4.65	49.44	---	74.00	54.00	-4.56	Peak
4925.00	V	49.73	---	2.18	51.91	---	74.00	54.00	-2.09	Peak
7383.33	V	49.97	42.85	6.82	56.79	49.67	74.00	54.00	-4.33	AVG
1206.67	H	51.92	---	-9.75	42.17	---	74.00	54.00	-11.83	Peak
2343.33	H	52.26	---	-4.75	47.50	---	74.00	54.00	-6.50	Peak
2876.67	H	49.02	---	-2.67	46.35	---	74.00	54.00	-7.65	Peak
4925.00	H	44.52	---	2.18	46.70	---	74.00	54.00	-7.30	Peak
7383.33	H	42.97	---	6.82	49.79	---	74.00	54.00	-4.21	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. *Factor (dB) = Antenna factor + Cable loss – Amplifier gain*
8. *Set the spectrum analyzer as Hi-pass filter = 1 dB*

Operation Mode: IEEE 802.11g / TX / CH Low **Test Date:** April 8, 2009

Temperature: 18°C **Tested by:** Alonso Lu

Humidity: 51% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1200.00	V	52.88	---	-9.78	43.10	---	74.00	54.00	-10.90	Peak
1476.67	V	52.74	---	-8.50	44.24	---	74.00	54.00	-9.76	Peak
2160.00	V	50.56	---	-5.17	45.39	---	74.00	54.00	-8.61	Peak
2530.00	V	53.14	---	-4.26	48.88	---	74.00	54.00	-5.12	Peak
3708.33	V	42.26	---	0.15	42.41	---	74.00	54.00	-11.59	Peak
4825.00	V	43.91	---	1.89	45.80	---	74.00	54.00	-8.20	Peak
7233.33	V	45.37	---	6.42	51.79	---	74.00	54.00	-2.21	Peak
1200.00	H	52.58	---	-9.78	42.81	---	74.00	54.00	-11.19	Peak
1873.33	H	50.73	---	-6.25	44.48	---	74.00	54.00	-9.52	Peak
2320.00	H	51.40	---	-4.81	46.59	---	74.00	54.00	-7.41	Peak
2563.33	H	49.80	---	-4.11	45.70	---	74.00	54.00	-8.30	Peak
4825.00	H	42.10	---	1.89	43.98	---	74.00	54.00	-10.02	Peak
7233.33	H	41.23	---	6.42	47.65	---	74.00	54.00	-6.35	Peak

Remark:

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

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Operation Mode: IEEE 802.11g / TX / CH Mid **Test Date:** April 8, 2009

Temperature: 18°C **Tested by:** Alonso Lu

Humidity: 51% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1200.00	V	52.10	---	-9.78	42.32	---	74.00	54.00	-11.68	Peak
1463.33	V	53.36	---	-8.56	44.80	---	74.00	54.00	-9.20	Peak
2296.67	V	53.53	---	-4.86	48.67	---	74.00	54.00	-5.33	Peak
2630.00	V	50.86	---	-3.80	47.06	---	74.00	54.00	-6.94	Peak
3216.67	V	43.71	---	-1.46	42.25	---	74.00	54.00	-11.75	Peak
4883.33	V	45.14	---	2.06	47.19	---	74.00	54.00	-6.81	Peak
7300.00	V	44.97	---	6.59	51.56	---	74.00	54.00	-2.44	Peak
1196.67	H	52.06	---	-9.79	42.26	---	74.00	54.00	-11.74	Peak
1906.67	H	49.70	---	-6.06	43.64	---	74.00	54.00	-10.36	Peak
2343.33	H	53.96	---	-4.75	49.21	---	74.00	54.00	-4.79	Peak
4866.67	H	43.39	---	2.01	45.40	---	74.00	54.00	-8.60	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. *Factor (dB) = Antenna factor + Cable loss – Amplifier gain*
8. *Set the spectrum analyzer as Hi-pass filter = 1 dB*

Operation Mode: IEEE 802.11g / TX / CH High **Test Date:** April 8, 2009

Temperature: 18°C **Tested by:** Alonso Lu

Humidity: 51% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1200.00	V	52.05	---	-9.78	42.28	---	74.00	54.00	-11.72	Peak
1470.00	V	53.07	---	-8.53	44.54	---	74.00	54.00	-9.46	Peak
2080.00	V	50.78	---	-5.35	45.43	---	74.00	54.00	-8.57	Peak
2290.00	V	53.37	---	-4.87	48.49	---	74.00	54.00	-5.51	Peak
4925.00	V	48.50	---	2.18	50.68	---	74.00	54.00	-3.32	Peak
7383.33	V	46.56	32.87	6.82	53.37	39.69	74.00	54.00	-14.31	AVG
1206.67	H	52.44	---	-9.75	42.69	---	74.00	54.00	-11.31	Peak
1733.33	H	50.43	---	-7.06	43.38	---	74.00	54.00	-10.62	Peak
2360.00	H	53.48	---	-4.72	48.76	---	74.00	54.00	-5.24	Peak
2543.33	H	50.84	---	-4.20	46.64	---	74.00	54.00	-7.36	Peak
4925.00	H	44.48	---	2.18	46.66	---	74.00	54.00	-7.34	Peak
6475.00	H	41.79	---	4.35	46.15	---	74.00	54.00	-7.85	Peak
7383.33	H	43.51	---	6.82	50.33	---	74.00	54.00	-3.67	Peak

Remark:

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

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:**	January 7, 2009
Temperature:	25°C	**Tested by:**	Alonso Lu
Humidity:	57% RH		

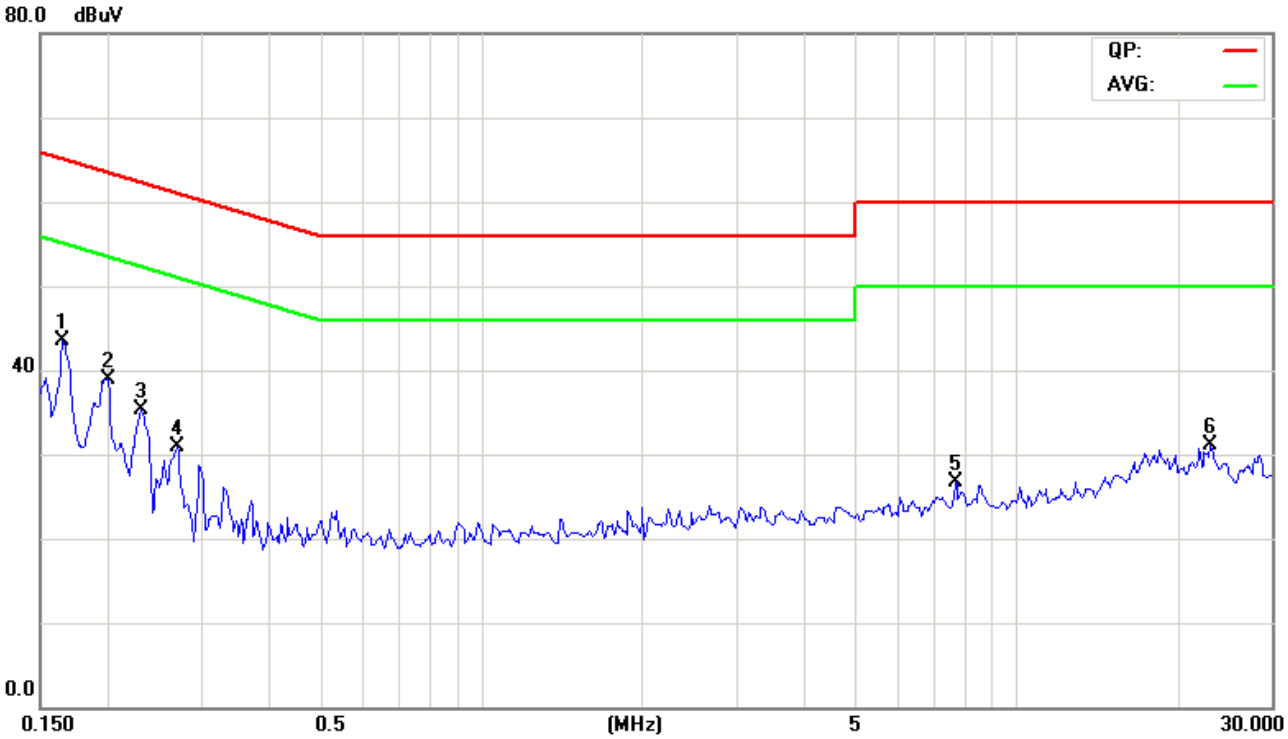
Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1656	32.82	20.12	9.68	42.50	29.80	65.18	55.18	-22.68	-25.38	L1
0.2008	28.12	15.92	9.68	37.80	25.60	63.58	53.58	-25.78	-27.98	L1
0.2320	22.52	10.02	9.68	32.20	19.70	62.38	52.38	-30.18	-32.68	L1
0.2711	19.32	8.32	9.68	29.00	18.00	61.08	51.08	-32.08	-33.08	L1
7.7203	2.99	-0.01	9.91	12.90	9.90	60.00	50.00	-47.10	-40.10	L1
23.0602	12.70	6.20	10.50	23.20	16.70	60.00	50.00	-36.80	-33.30	L1
0.1656	31.62	18.72	9.68	41.30	28.40	65.18	55.18	-23.88	-26.78	L2
0.2086	22.12	7.72	9.68	31.80	17.40	63.26	53.26	-31.46	-35.86	L2
0.2359	22.82	11.62	9.68	32.50	21.30	62.24	52.24	-29.74	-30.94	L2
0.5367	10.82	2.32	9.58	20.40	11.90	56.00	46.00	-35.60	-34.10	L2
18.8961	11.75	5.95	10.35	22.10	16.30	60.00	50.00	-37.90	-33.70	L2
23.1695	12.09	5.79	10.51	22.60	16.30	60.00	50.00	-37.40	-33.70	L2

Remark:

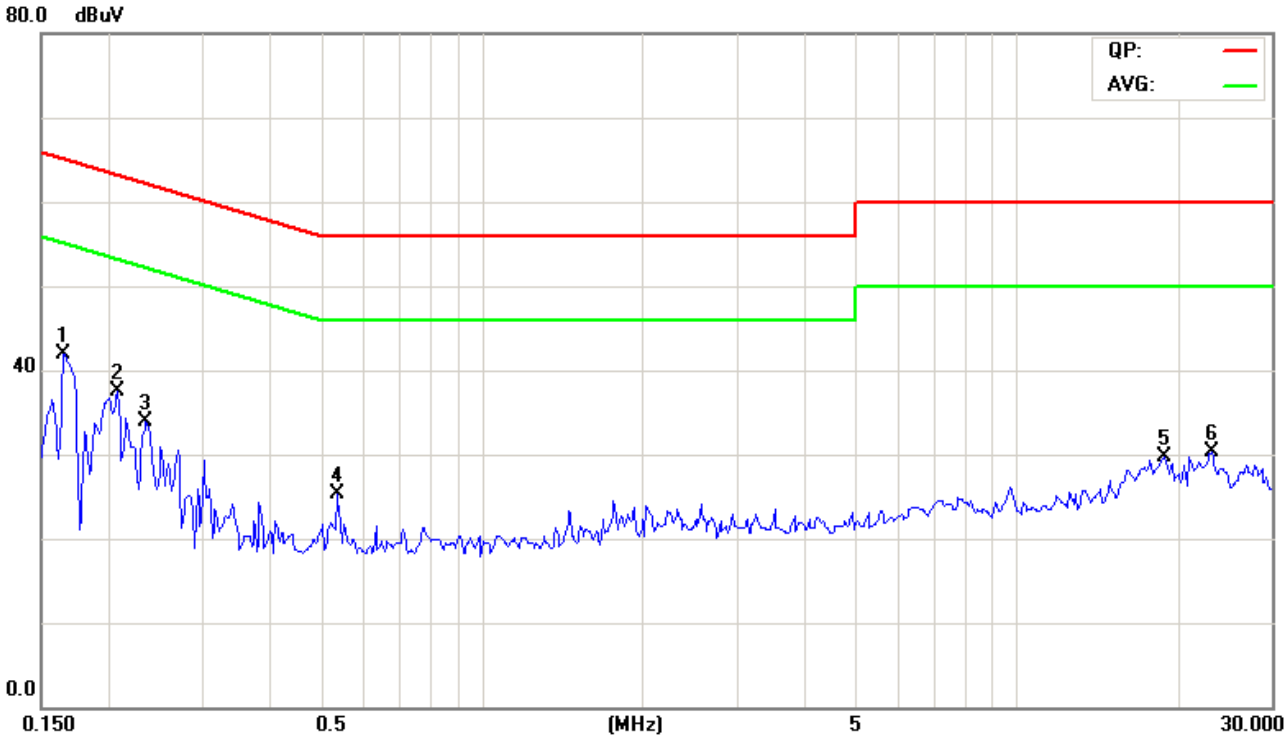
1. *The measuring frequencies range between 0.15 MHz and 30 MHz.*
2. *The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.*
3. *The IF bandwidth of SPA between 0.15MHz and 30MHz was 10kHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz.*
4. *L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)*
5. *Corr. Factor (dB) = LISN Factor + Cable loss*
6. *The Hi-pass filter is set forth on the Spectrum analyzer as 1 dB.*

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	Network Music Player
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: 22.21 dBm (166.34mW) IEEE 802.11g: 20.73 dBm (118.30mW)
Antenna gain (Max)	3.1 dBi (Numeric gain: 2.04)
Evaluation applied	☒ MPE Evaluation ☐ SAR Evaluation ☐ N/A

Remark:

1. *The maximum output power is 22.21dBm (166.34mW) at 2462MHz (with 2.04 numeric antenna gain.)*
2. *DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.*
3. *For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.*

TEST RESULTS

No non-compliance noted.

MPE EVALUATION

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 = 166.34mW

Numeric Antenna gain = 2.04

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 = 0.067527 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.)