



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

HD Wireless N Cube Network Camera

Model: DCS-2132L

Trade Name: D-Link

Issued to

D Link Corporation

17595 Mt. Herrmann, Fountain Valley, California 92708, United States

Issued by

Compliance Certification Services Inc.

No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township,

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	June 4, 2012	Initial Issue	ALL	Jill Shiao



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1. TEST RESULT CERTIFICATION

Applicant: **D Link Corporation**
17595 Mt. Herrmann, Fountain Valley, California 92708, United States

Manufacturer: **Appro Technology Inc.**
13F, No. 66, Zhongzheng Rd., Xinzhuang District, New Taipei City, Taiwan, R.O.C.

Equipment Under Test: HD Wireless N Cube Network Camera

Trade Name: D-Link

Model: DCS-2132L

Date of Test: March 10 ~ June 4, 2012

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 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:

Stan Lin
Section Manager

Jill Shiau
Section Manager



2. EUT DESCRIPTION

Product	HD Wireless N Cube Network Camera		
Trade Name	D-Link		
Model Number	DCS-2132L		
Model Discrepancy	N/A		
EUT Power Rating	5VDC, 1.2A		
Power Adapter	D-Link	Model	AMS1-0501200FU
RF Module Manufacturer	Realtek	Model	RTL8188CUS
Operating Frequency Range	IEEE 802.11 b/g/HT 20MHz: 2412 ~ 2462 MHz IEEE 802.11 HT 40MHz: 2422 ~ 2452 MHz		
Transmit Power	IEEE 802.11b mode: 19.75 dBm (0.0966W) IEEE 802.11g mode: 21.86 dBm (0.1535W) IEEE 802.11n HT20 mode: 21.88 dBm (0.1542W) IEEE 802.11n HT40 mode: 21.76 dBm (0.1500W)		
Modulation Technique	IEEE 802.11b mode: DSSS (1, 2, 5.5 and 11 Mbps) IEEE 802.11g mode: OFDM (6, 9, 12, 18, 24, 36, 48 and 54 Mbps) IEEE 802.11n HT20 mode: OFDM (6.5, 7.2, 13, 14.4, 14.44, 19.5, 21.7, 26, 28.89, 28.9, 39, 43.3, 43.33 52, 57.78, 57.8, 58.5, 65.0, 72.2, 78, 86.67, 104, 115.56, 117, 130, 144.44 Mbps) IEEE 802.11n HT40 mode: OFDM (13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150, 162, 180, 216, 240, 243, 270, 300 Mbps)		
Number of Channels	IEEE 802.11b/g mode: 11 Channels IEEE 802.11n HT20 mode: 11 Channels IEEE 802.11n HT40 mode: 7 Channels		
Antenna Specification	Multilayer Chip Antenna / Gain: 0.5dBi		

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: **KA2CS2132LA1** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 Part 2, Part 15.207, 15.209 and 15.247.

3.1 EUT CONFIGURATION

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

3.2 EUT EXERCISE

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

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

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

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

Radiated Emissions

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



3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

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

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

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

² Above 38.6

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



3.5 DESCRIPTION OF TEST MODES

The EUT is a 1Tx1R SISO transmitter.

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

The worst case data rate is determined as the data rate with highest output power. After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

IEEE 802.11b mode:

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate was chosen for full testing.

IEEE 802.11g mode:

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

IEEE 802.11n HT20 mode:

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 13.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT40 mode:

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



4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

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

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year and Loop Antenna is scheduled for calibration once three years.

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY48250064	12/25/2012
Spectrum Analyzer	R&S	FSEB	825829/011	12/18/2012
Power meter	Anritsu	ML2495A	1033009	08/18/2012

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY48250064	12/25/2012
Pre-Amplifier	HP	8447D	2944A06530	01/03/2013
Pre-Amplifier	HP	8449B	3008A01738	04/17/2013
EMI Test Receiver	SCHAFFNER	SCR 3501	430	01/11/2013
Loop Antenna	EMCO	6502	2356	06/11/2013
Bilog Antenna	SCHWAZBECK	VULB9160	3084	10/03/2012
Horn Antenna	EMCO	3115	9602-4659	05/19/2012
Horn Antenna	EMCO	3116	00026370	10/12/2012
Turn Table	CCS	CC-T-1F	N/A	N.C.R
Antenna Tower	CCS	CC-A-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	ESCI	100782	06/13/2012
LISN	R&S	ENV216	100066	08/30/2012
LISN	R&S	ENV 4200	830326/016	05/09/2012
Test S/W	EZ-EMC			



4.3 MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
Powerline Conducted Emission	± 2.2450
3M Semi Anechoic Chamber / 30MHz ~ 1GHz	± 3.7046
3M Semi Anechoic Chamber / Above 1GHz	± 3.0958

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



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

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

No. 163-1, Jhongsheng Rd., Sindien District, Taipei City 23151, Taiwan

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

No 11, Wugong 6th Rd, Wugu District, New Taipei City 24891, Taiwan (R.O.C)

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

No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, Taiwan

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

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





Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	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	 TESTING CERT #0824.01
USA	FCC MRA	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	
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-1930/1646
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	
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	RSS-Gen Issue 3	

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 Conducted & Radiated Emission(Above 1GHz) measurement:							
No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1	Micro SD (2GB)	Kingmax	N/A	N/A	N/A	N/A	N/A
2	Notebook PC (Remote)	DELL	D400	0932RY	E2K24GBRL	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

For Power line conducted & Radiated Emission(Below 1GHz) emission measurement:							
No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1	Test jig	N/A	N/A	N/A	FCC DoC	Unshielded, 3.5m	N/A
2	Notebook Computer (Remote)	HP	CNU5191L58	FCC DoC	N/A	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
3	Micro SD (2GB)	Kingmax	N/A	N/A	FCC DoC	N/A	N/A

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



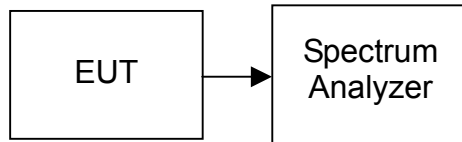
7. FCC PART 15.247 REQUIREMENTS

7.1 6dB BANDWIDTH

LIMIT

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

TEST CONFIGURATION



TEST PROCEDURE

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

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	10.208	>500	PASS
Mid	2437	10.142		PASS
High	2462	10.202		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.503	>500	PASS
Mid	2437	16.599		PASS
High	2462	16.599		PASS

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.766	>500	PASS
Mid	2437	17.820		PASS
High	2462	17.723		PASS

Test mode: IEEE 802.11n HT40 mode

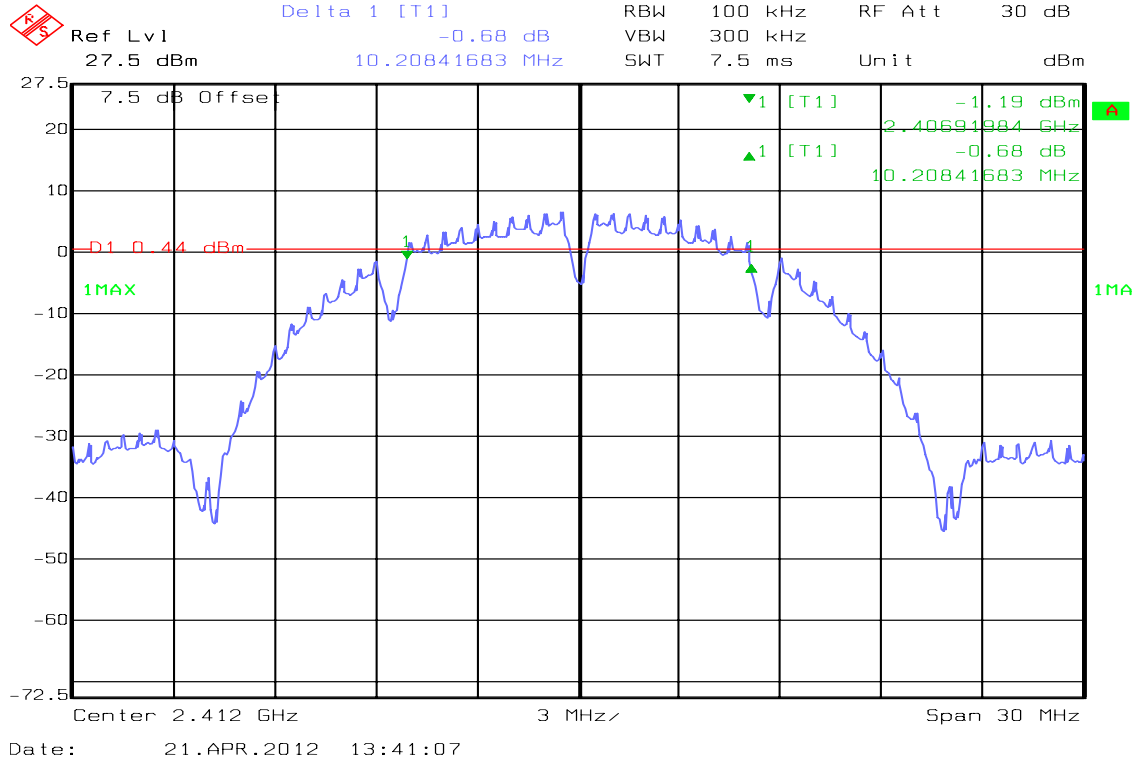
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.593	>500	PASS
Mid	2437	36.513		PASS
High	2452	36.513		PASS



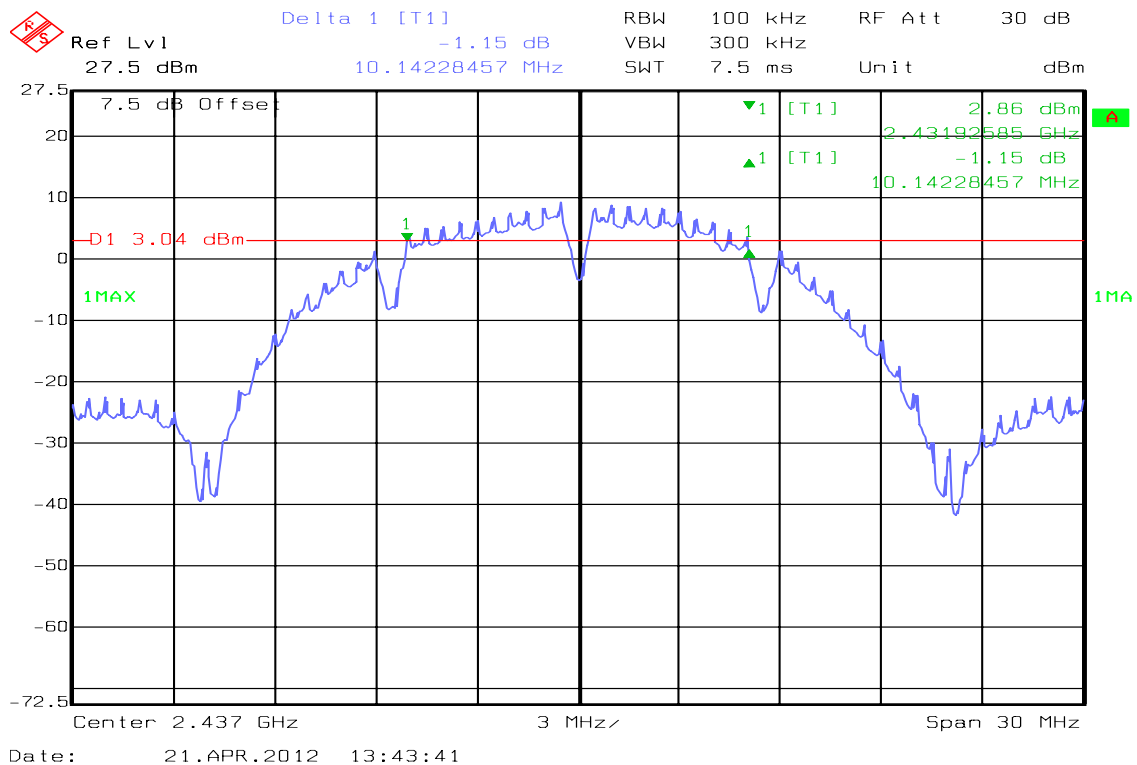
Test Plot

IEEE 802.11b mode

6dB Bandwidth (CH Low)

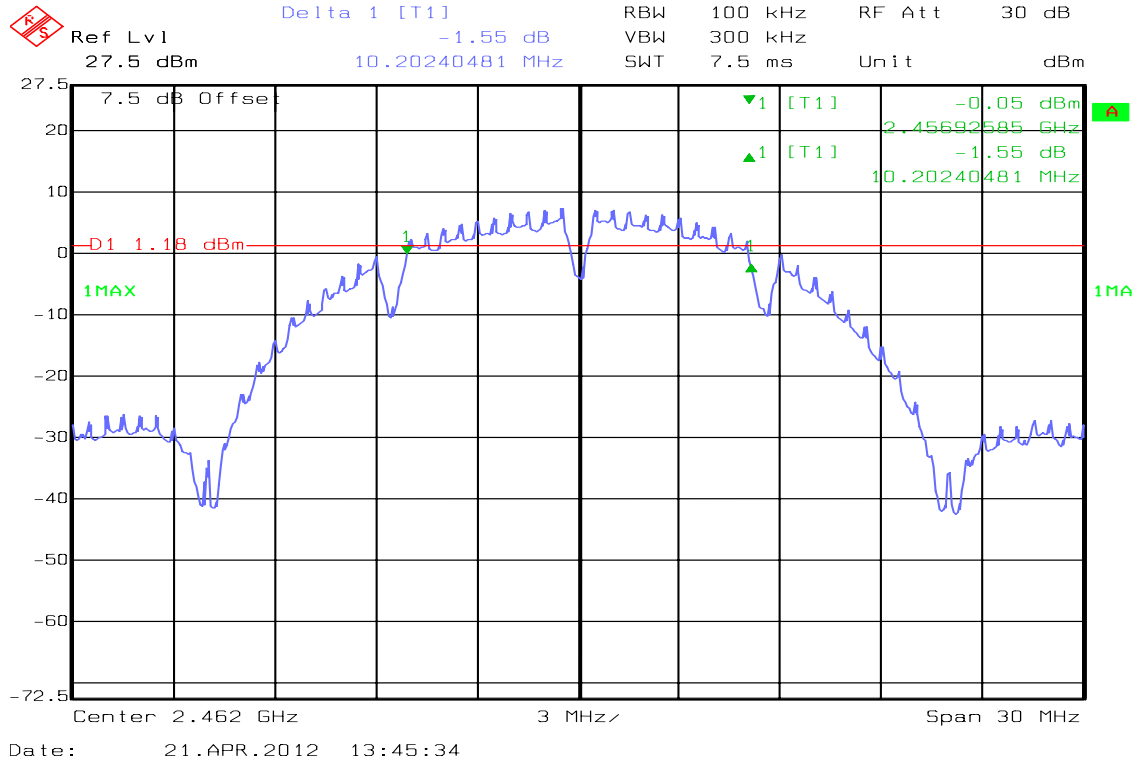


6dB Bandwidth (CH Mid)



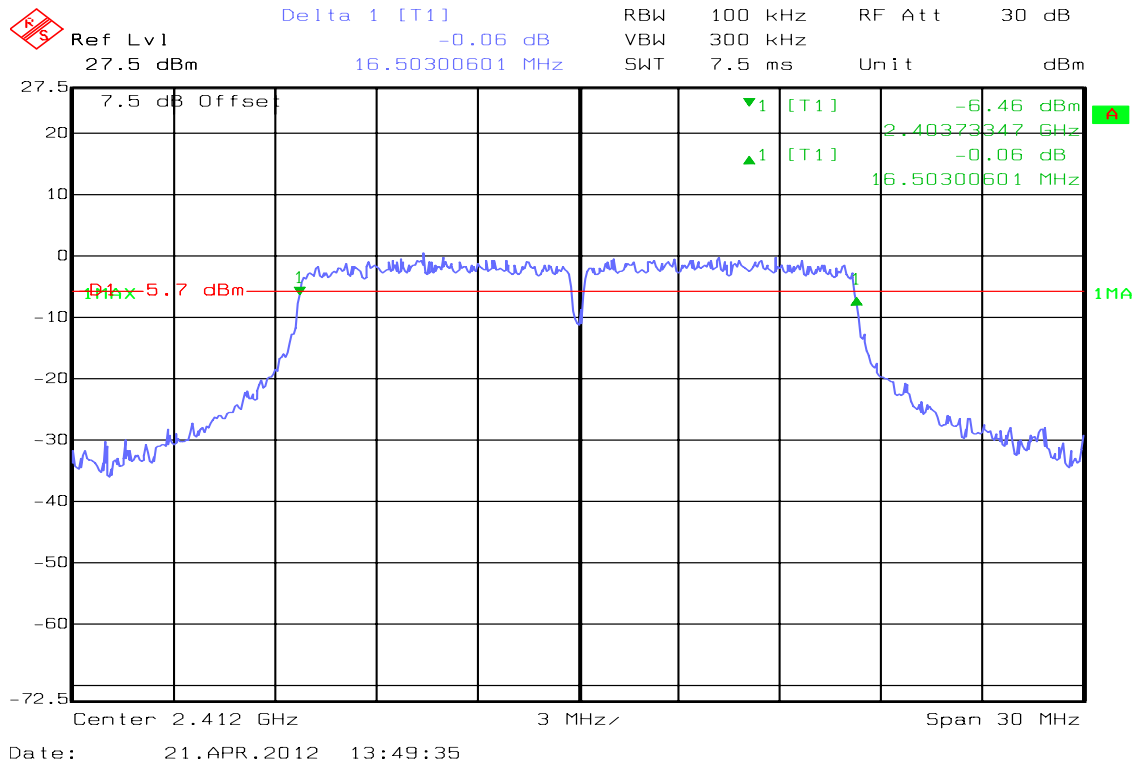


6dB Bandwidth (CH High)



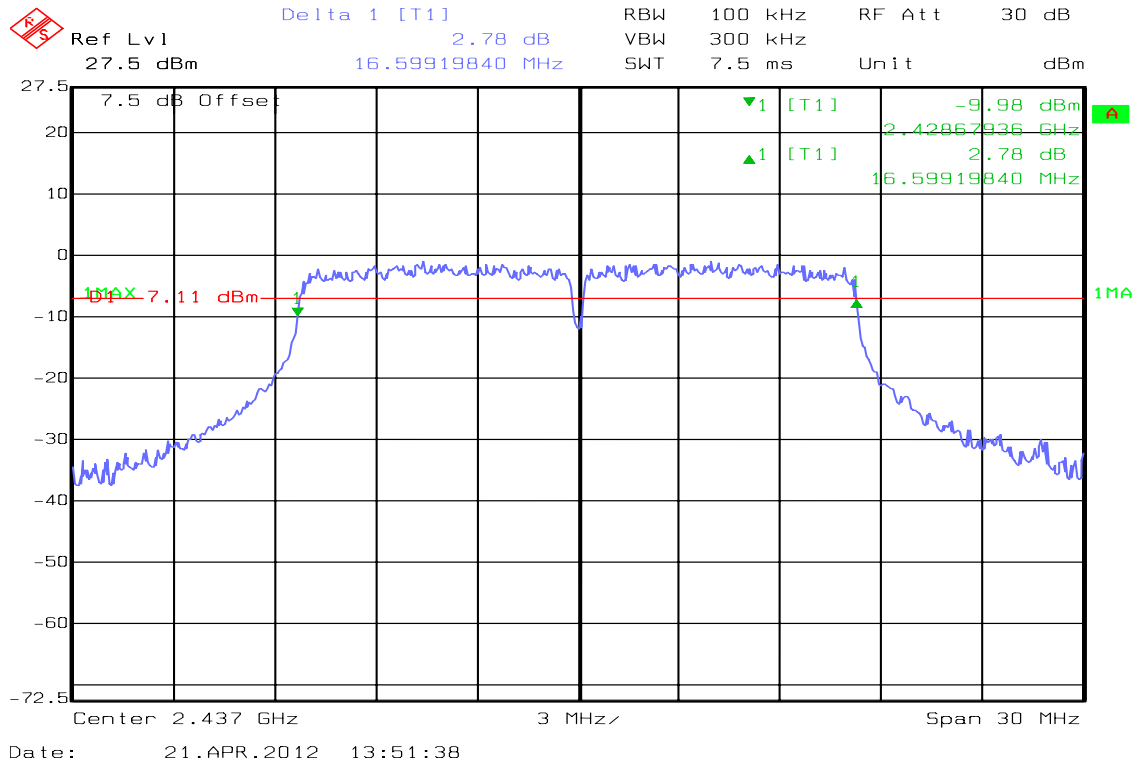
IEEE 802.11g mode

6dB Bandwidth (CH Low)

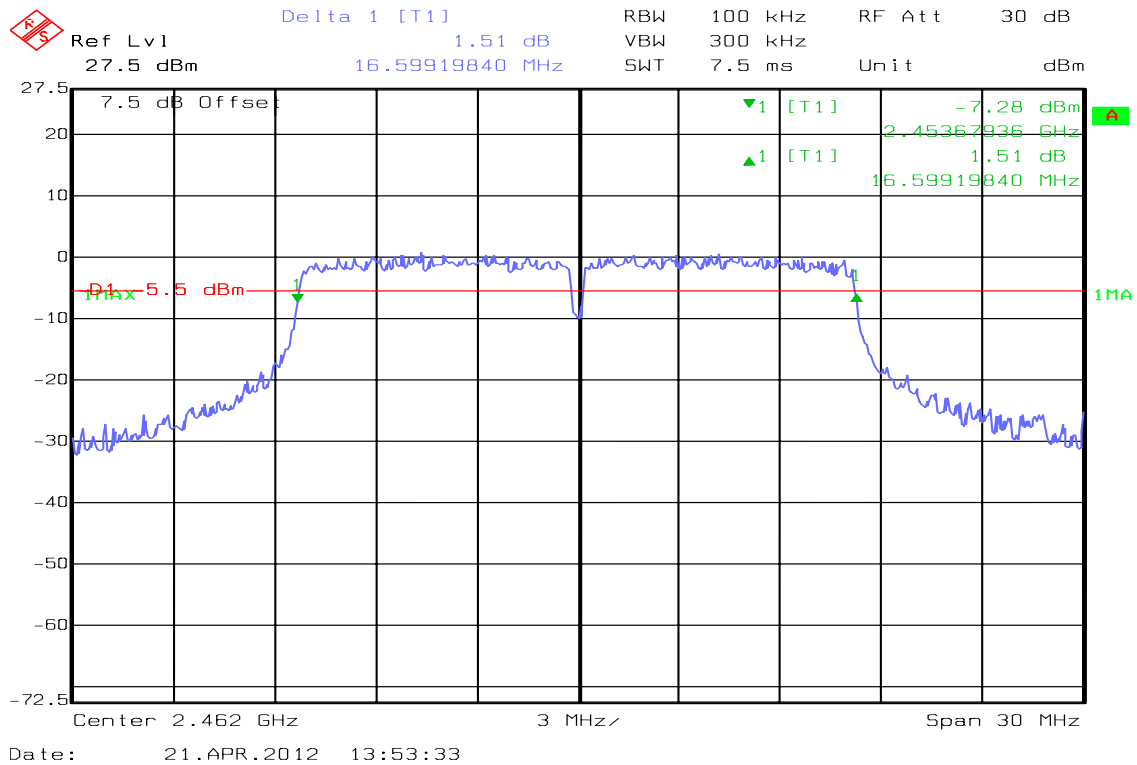




6dB Bandwidth (CH Mid)



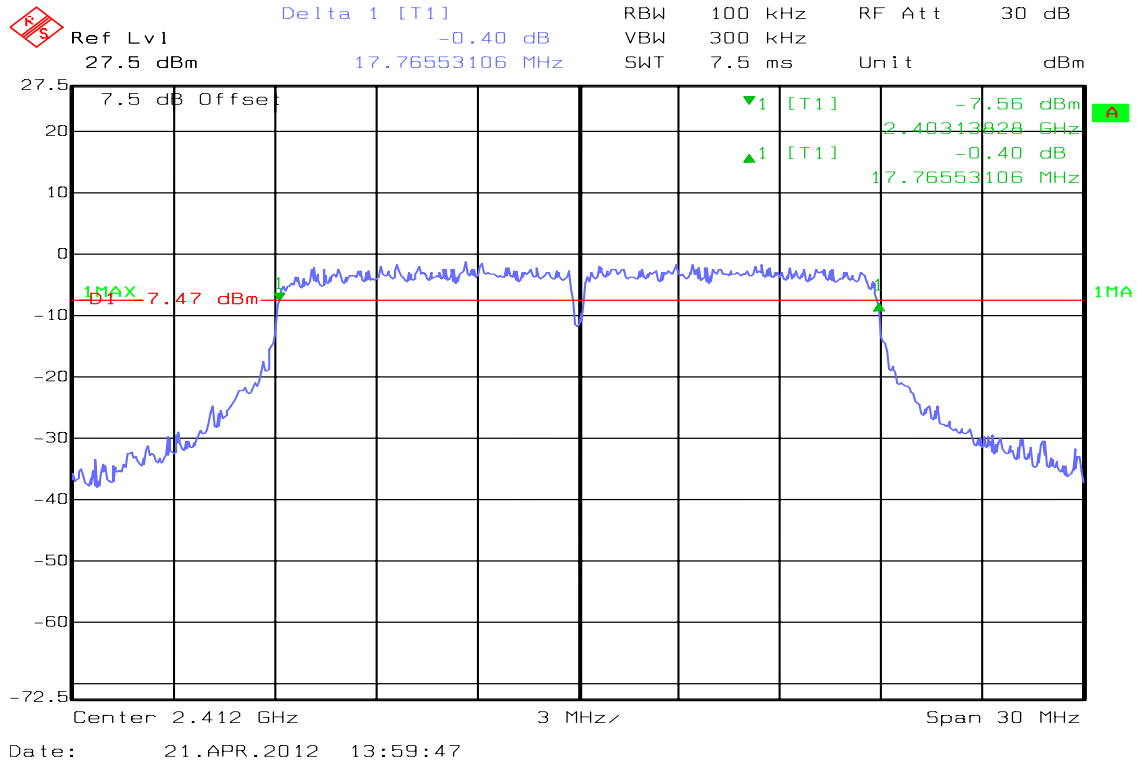
6dB Bandwidth (CH High)



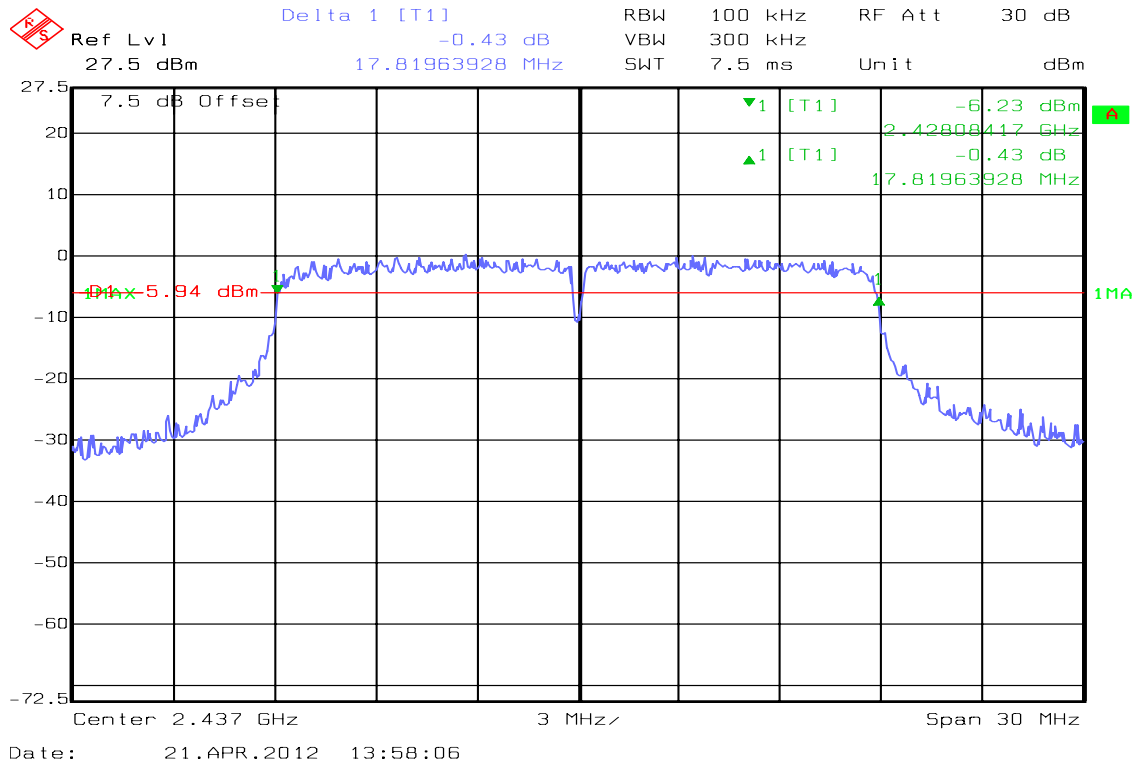


IEEE 802.11n HT20 mode

6dB Bandwidth (CH Low)

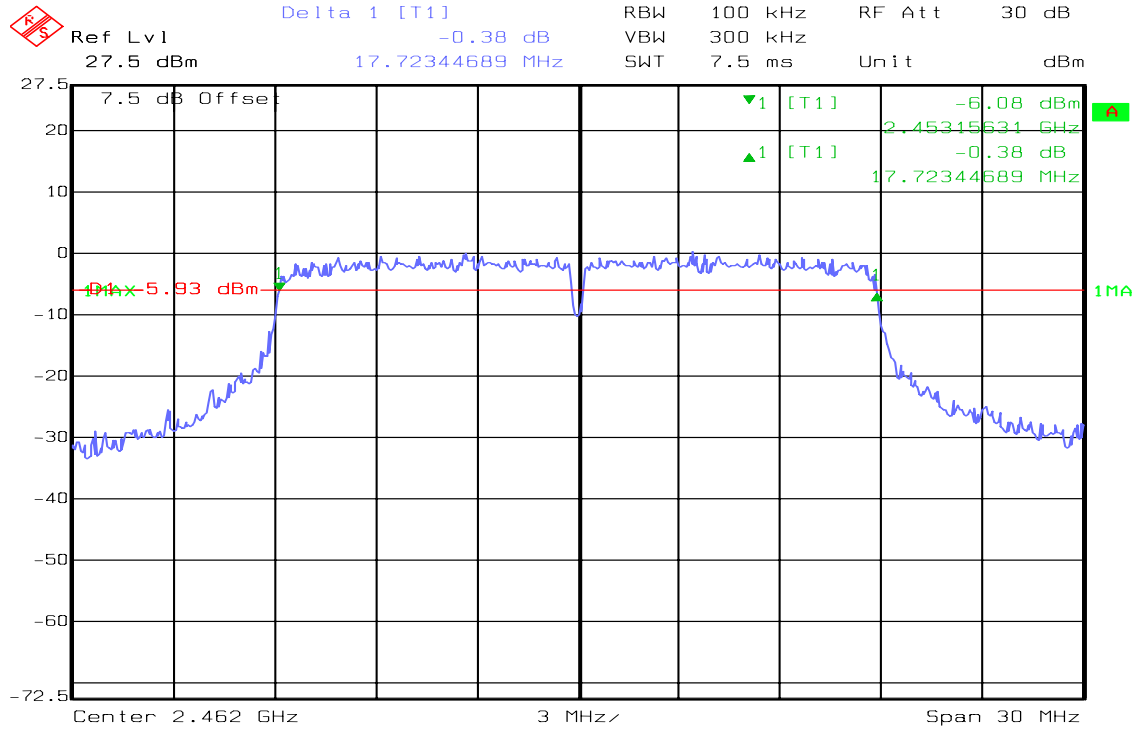


6dB Bandwidth (CH Mid)





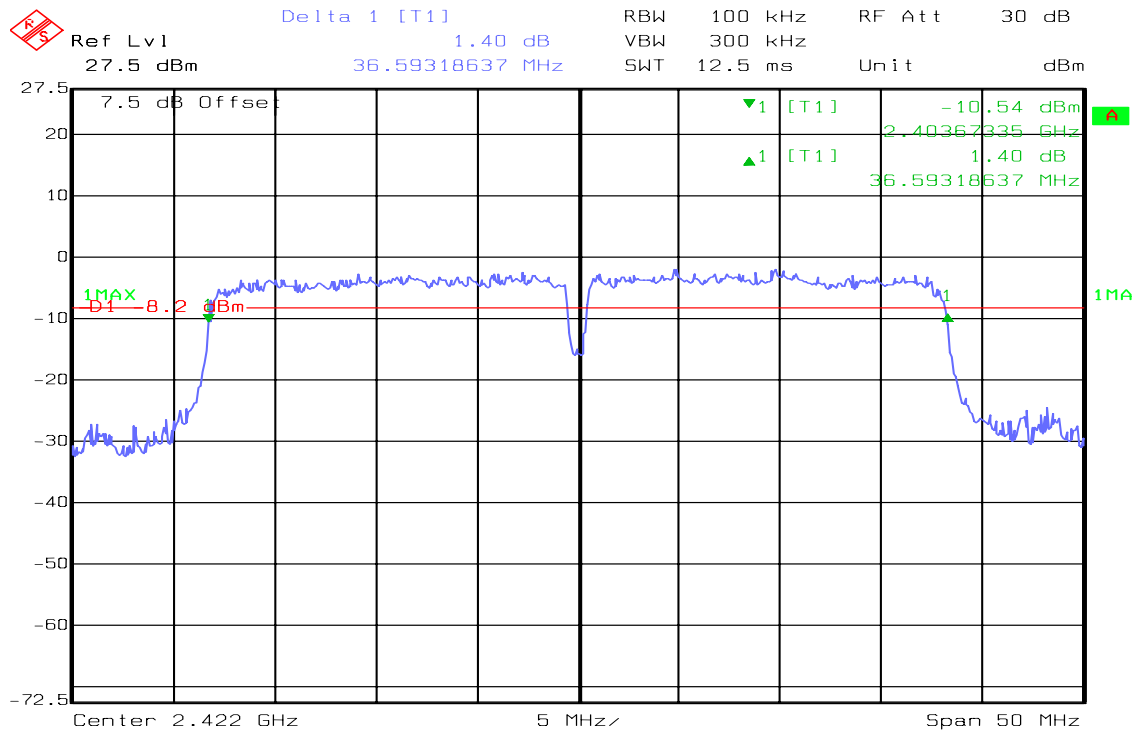
6dB Bandwidth (CH High)



Date: 21.APR.2012 13:56:32

IEEE 802.11n HT40 mode

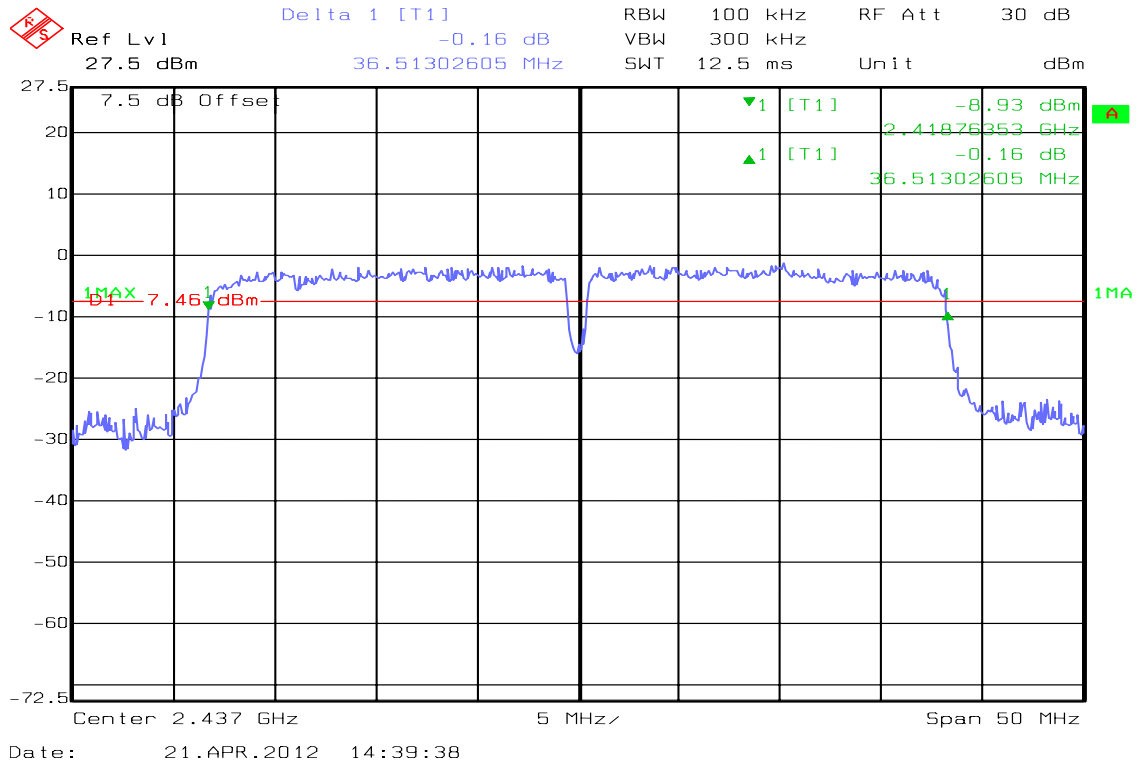
6dB Bandwidth (CH Low)



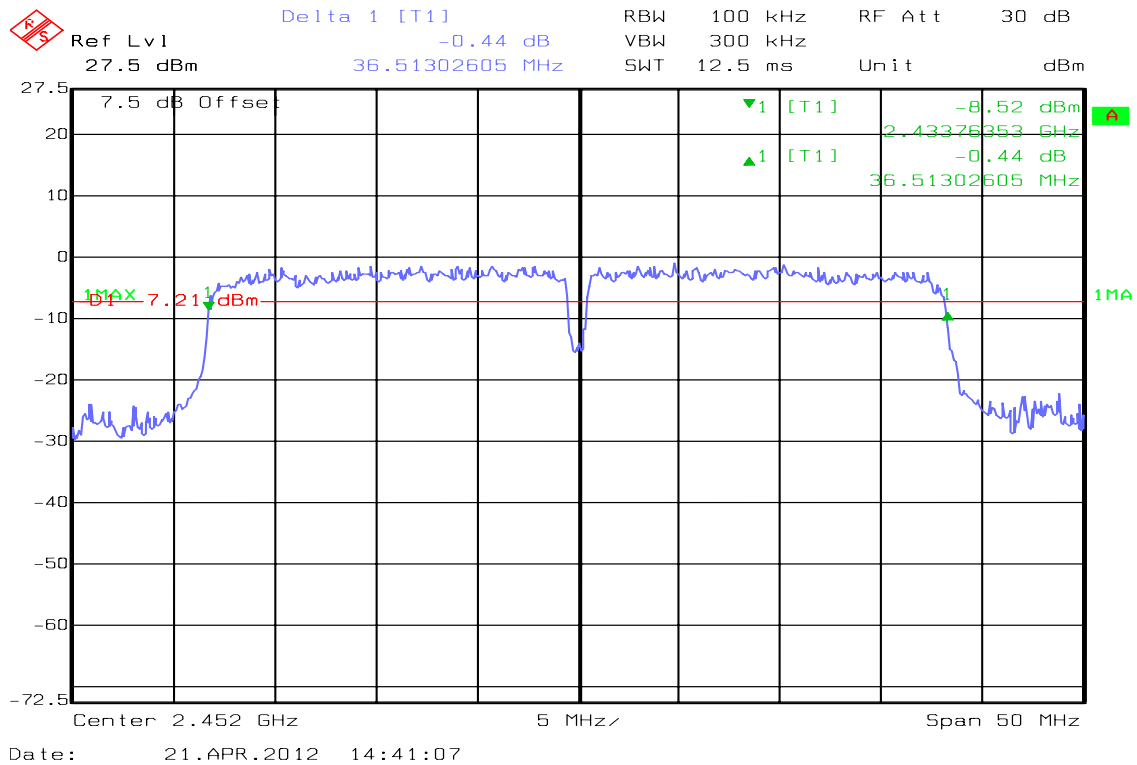
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6dB Bandwidth (CH Mid)



6dB Bandwidth (CH High)





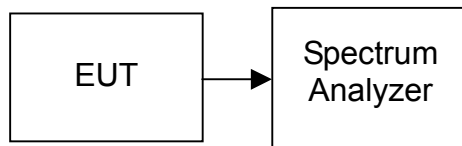
7.2 PEAK POWER

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

Per KDB 558074 5.2.1.2/ or 5.2.2.1.

The transmitter output is connected to the spectrum analyzer. Set the RBW = 1MHz, VBW = 3MHz, Detector = Peak, Trace mode = max hold, Sweep = auto couple. Record the max reading.

Repeat the above procedure until the measurements for all frequencies are completed.

TEST RESULTS

No non-compliance noted



TEST DATA

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	19.02	0.0798	1.00	PASS
Mid	2437	19.85	0.0966		PASS
High	2462	19.65	0.0923		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	21.86	0.1535	1.00	PASS
Mid	2437	22.37	0.1726		PASS
High	2462	22.46	0.1762		PASS

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	21.88	0.1542	1.00	PASS
Mid	2437	21.82	0.1521		PASS
High	2462	21.78	0.1507		PASS

Test mode: IEEE 802.11n HT40 mode

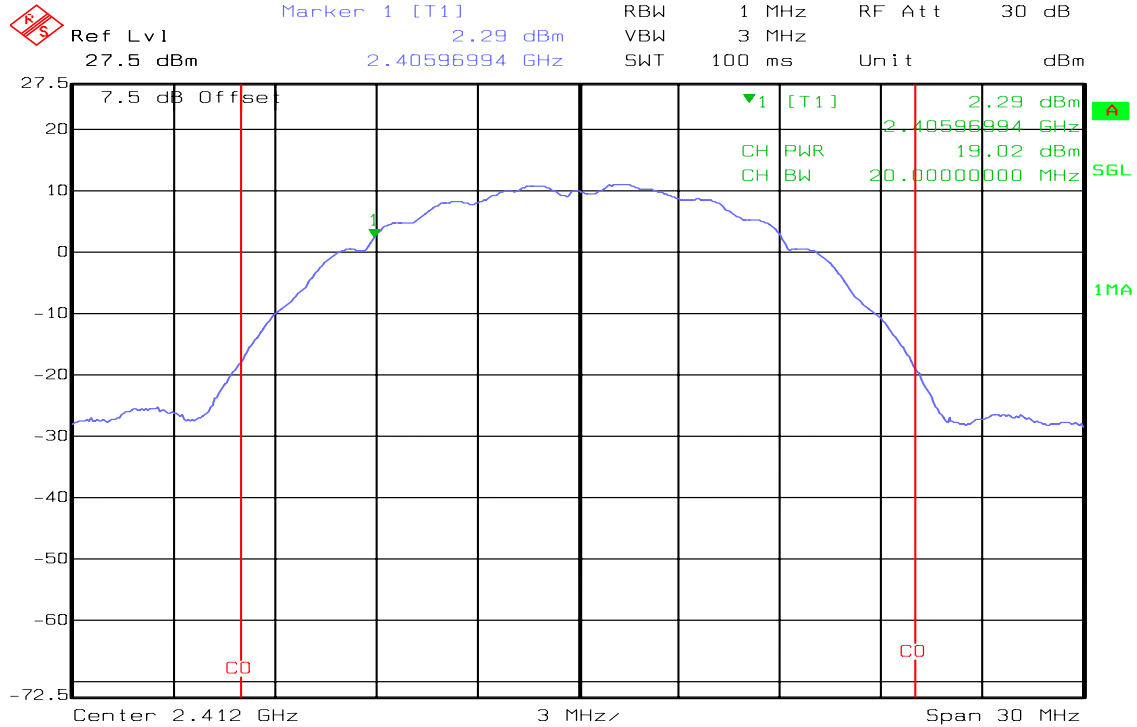
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	21.68	0.1472	1.00	PASS
Mid	2437	21.76	0.1500		PASS
High	2452	21.71	0.1483		PASS



Test Plot

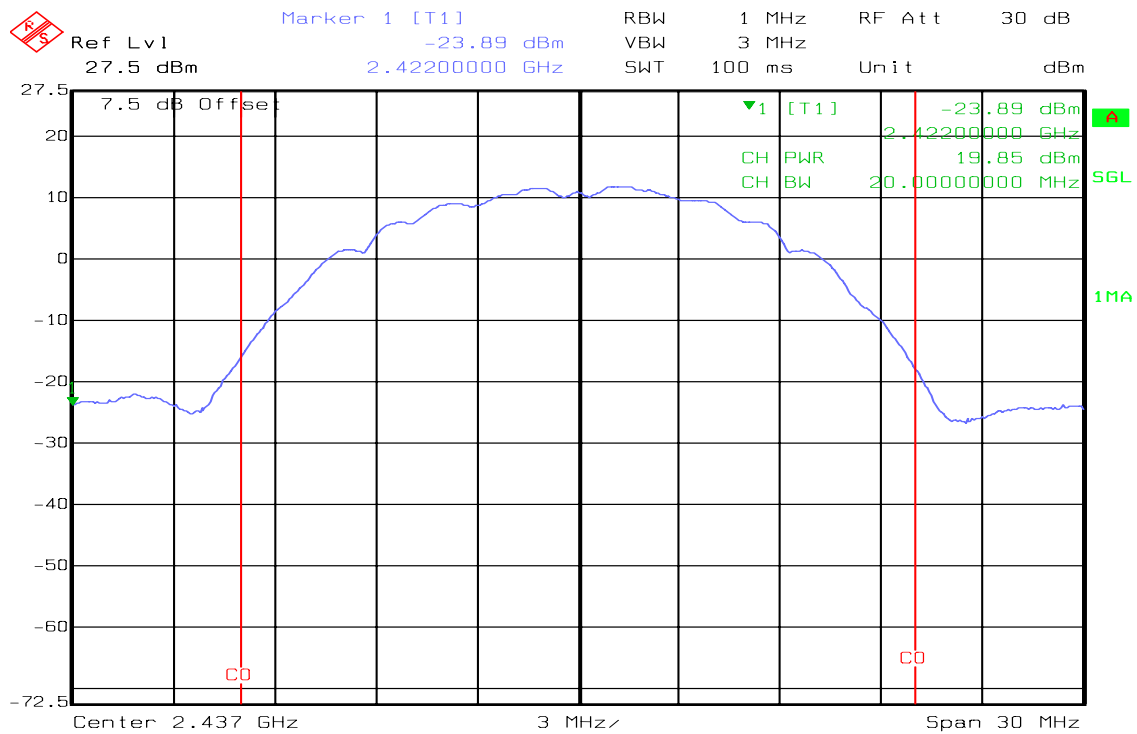
IEEE 802.11b mode

CH Low



Date: 04.JUN.2012 15:28:12

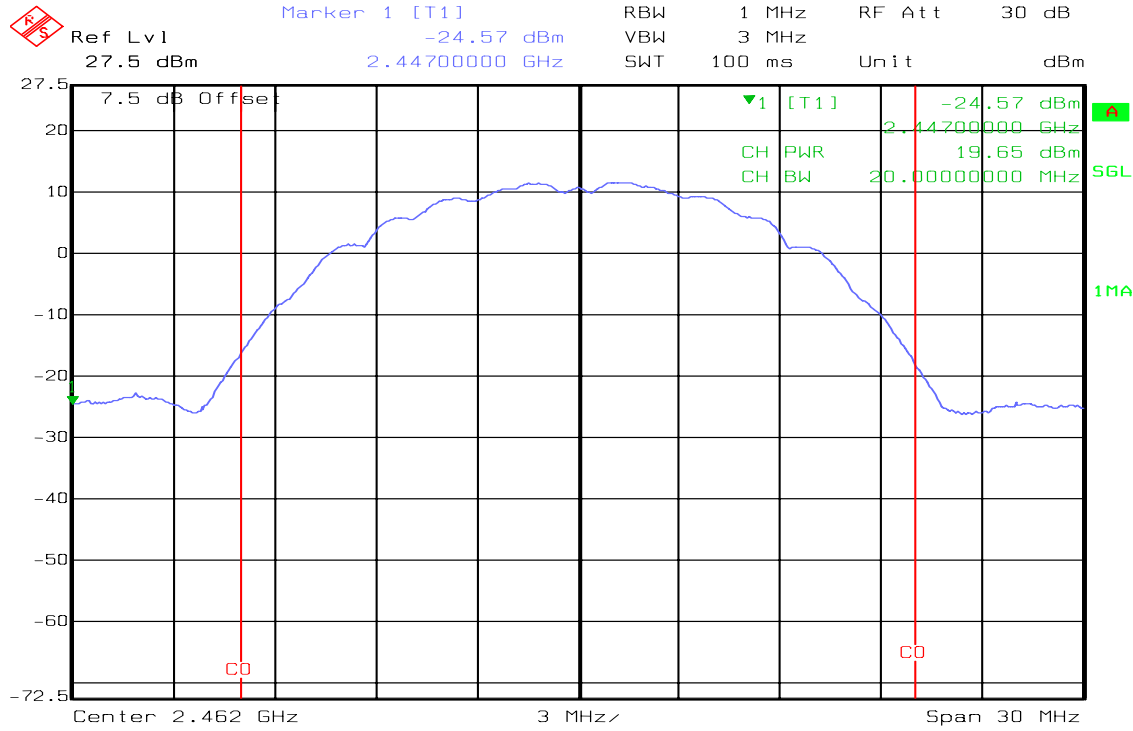
CH Mid



Date: 04.JUN.2012 15:32:01



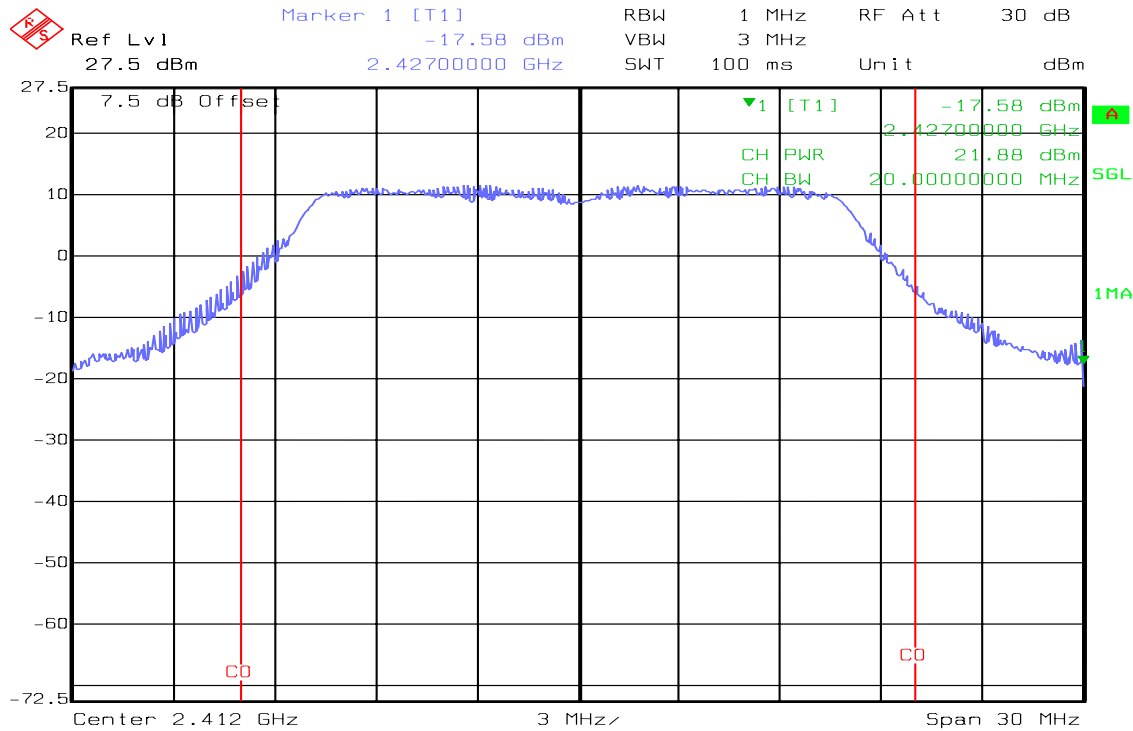
CH High



Date: 04.JUN.2012 15:34:34

IEEE 802.11g mode

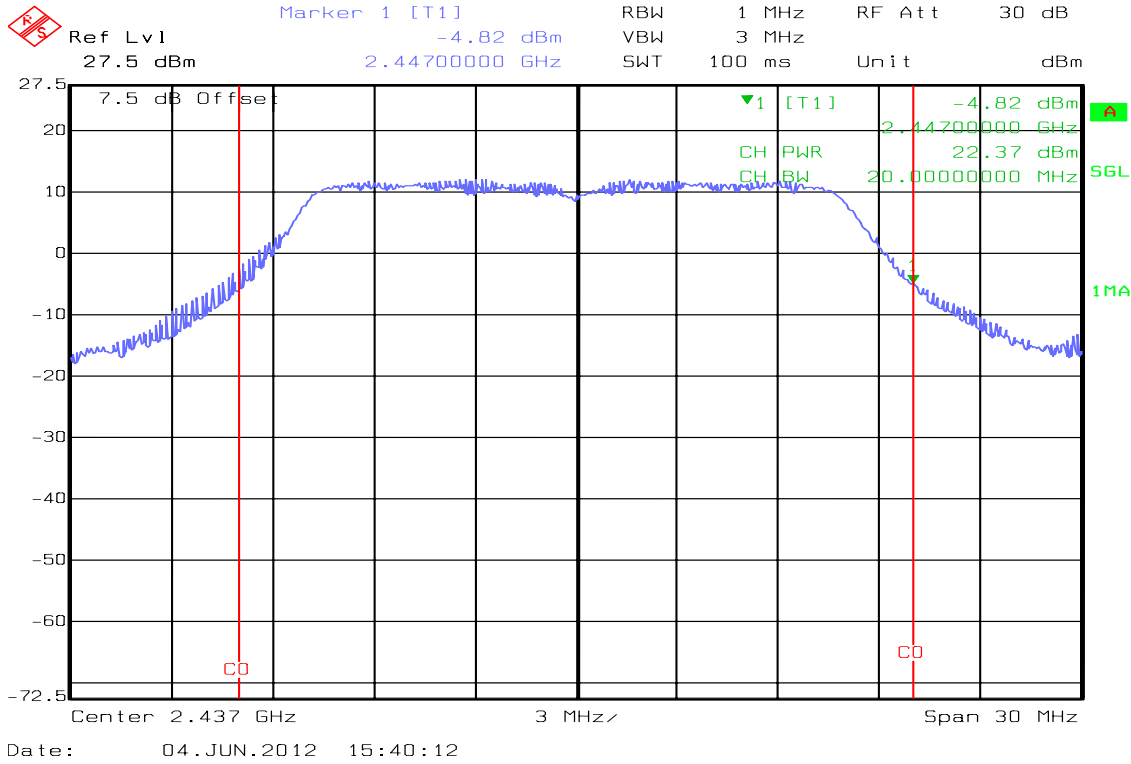
CH Low



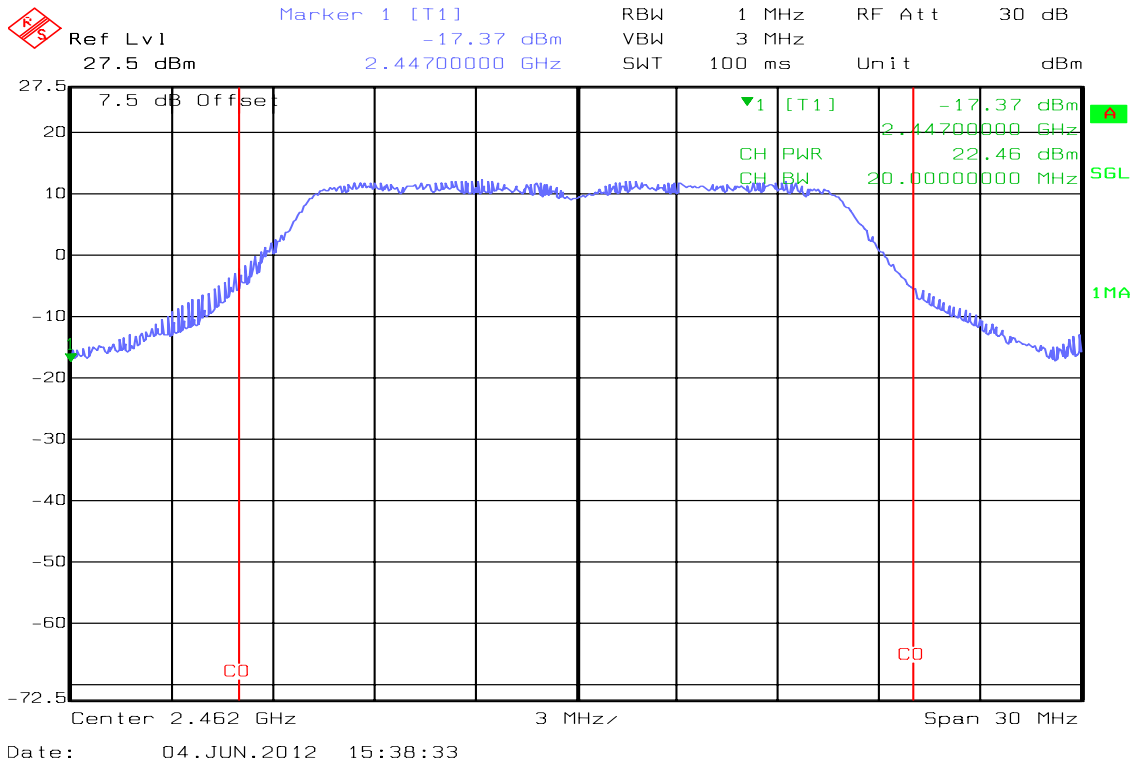
Date: 04.JUN.2012 15:42:07



CH Mid



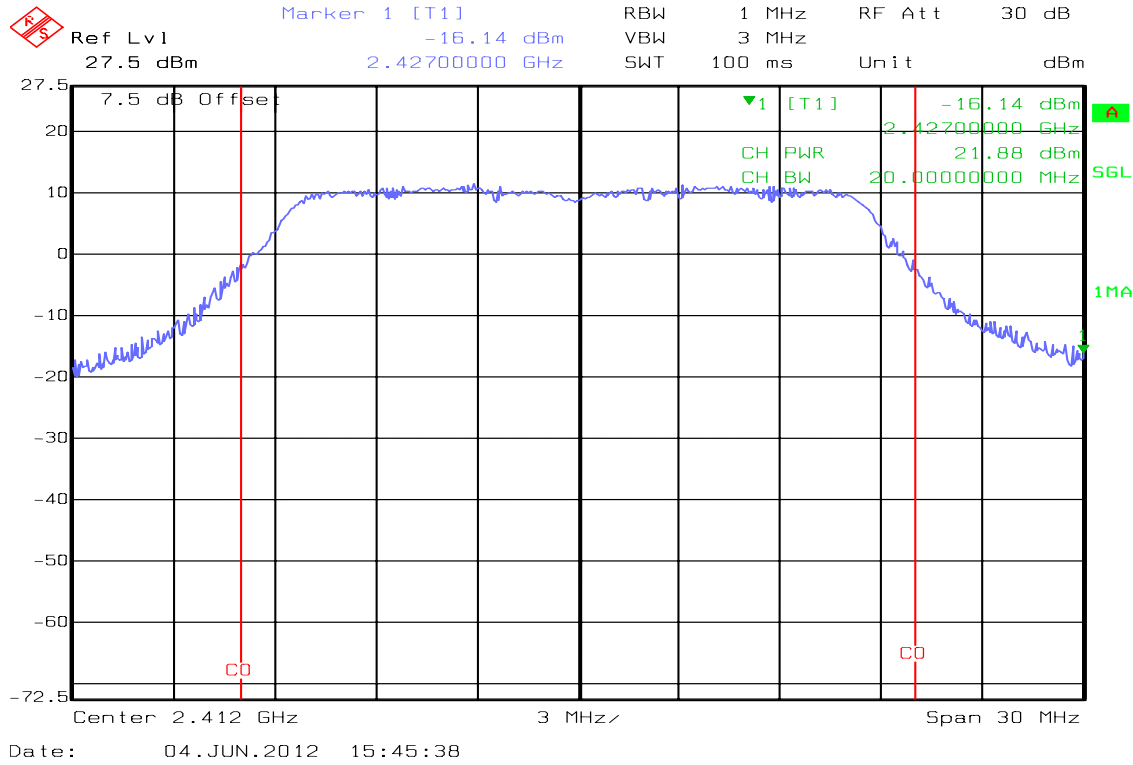
CH High



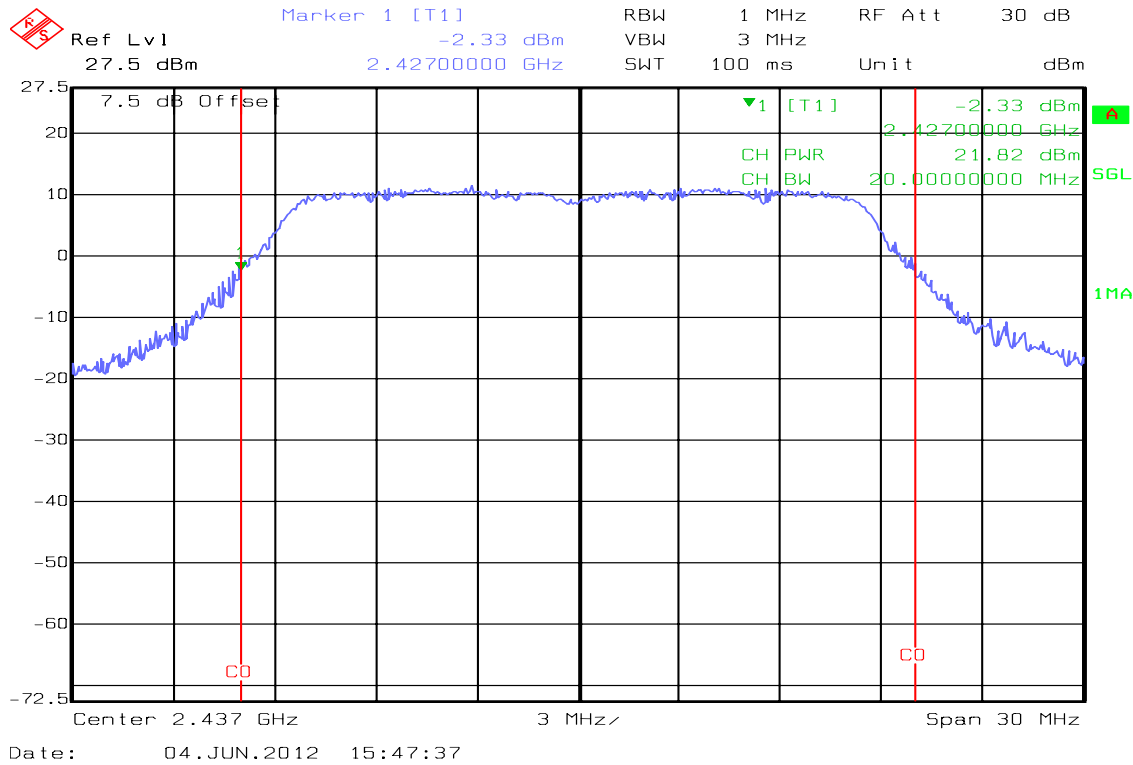


IEEE 802.11n HT20 mode

CH Low

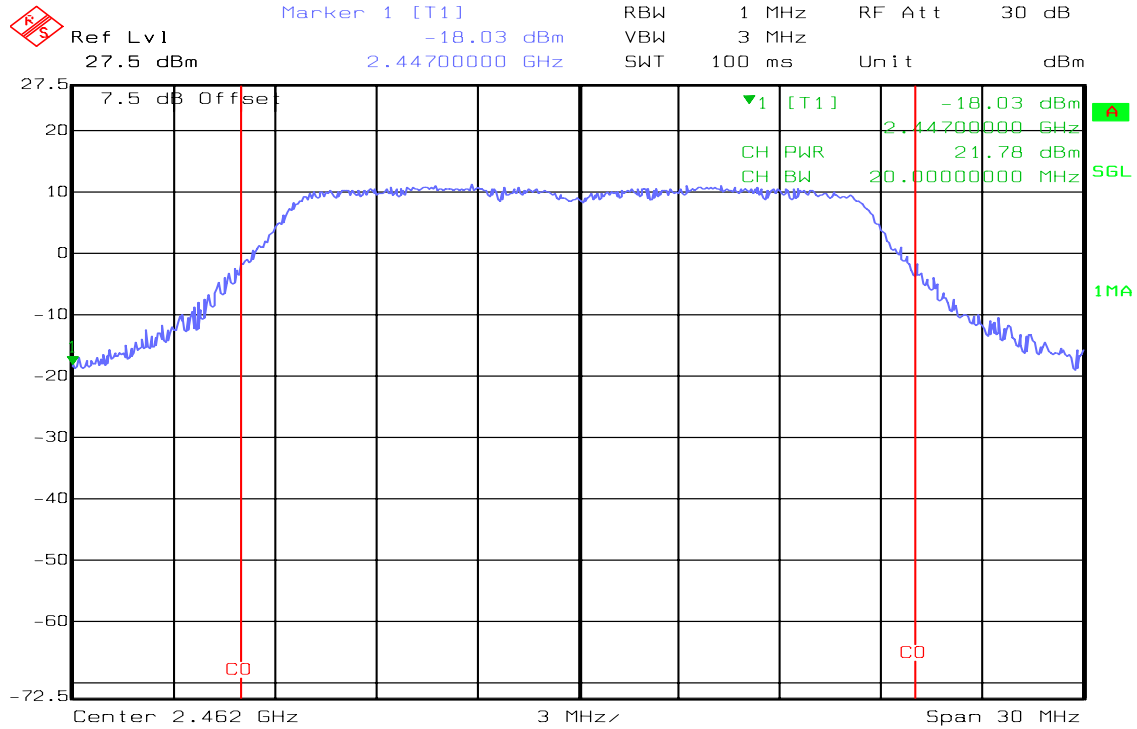


CH Mid





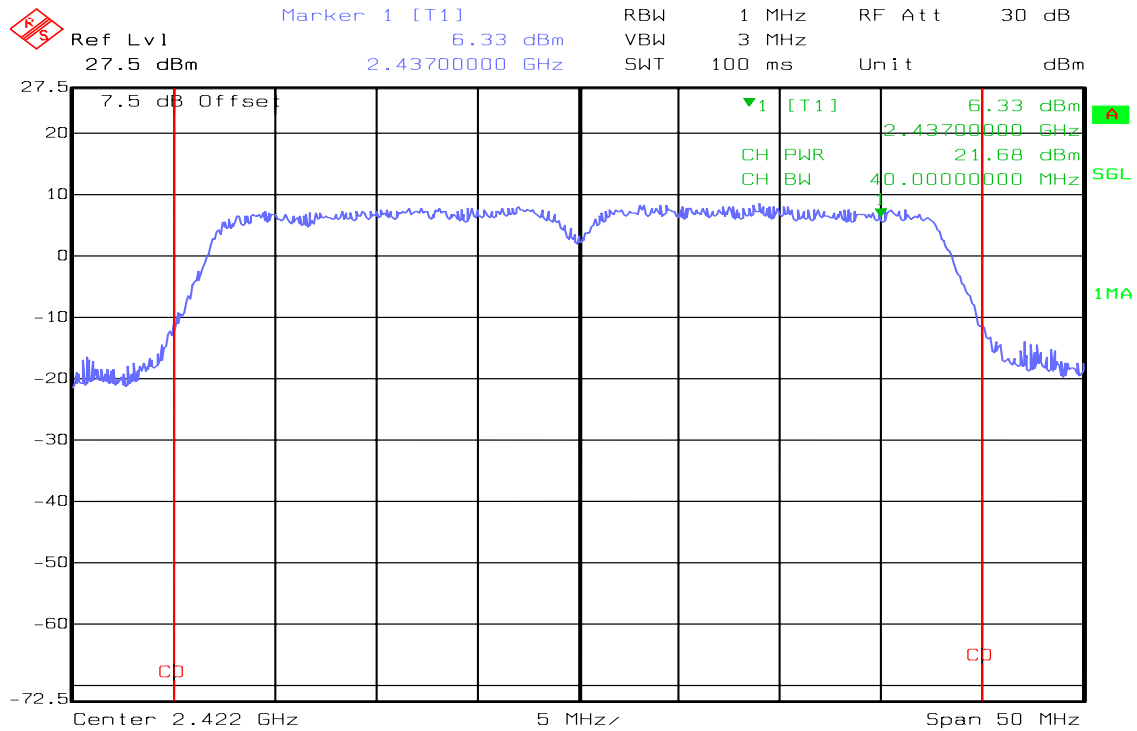
CH High



Date: 04.JUN.2012 15:50:19

IEEE 802.11n HT40 mode

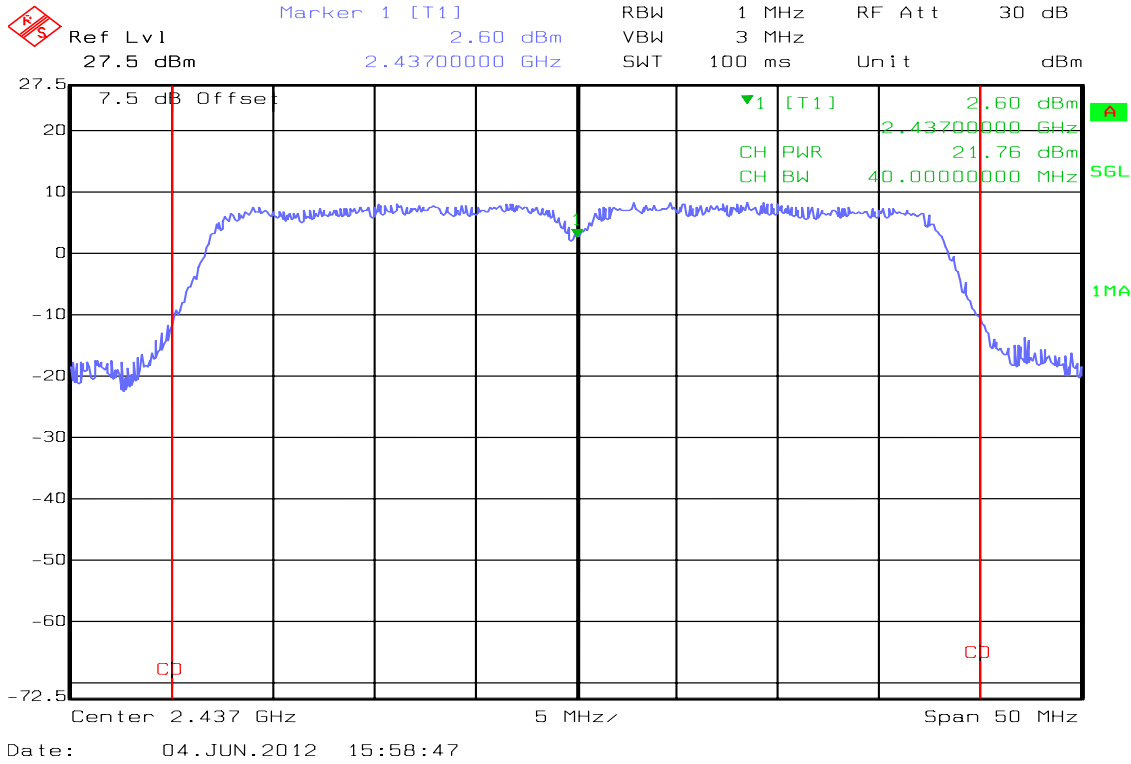
CH Low



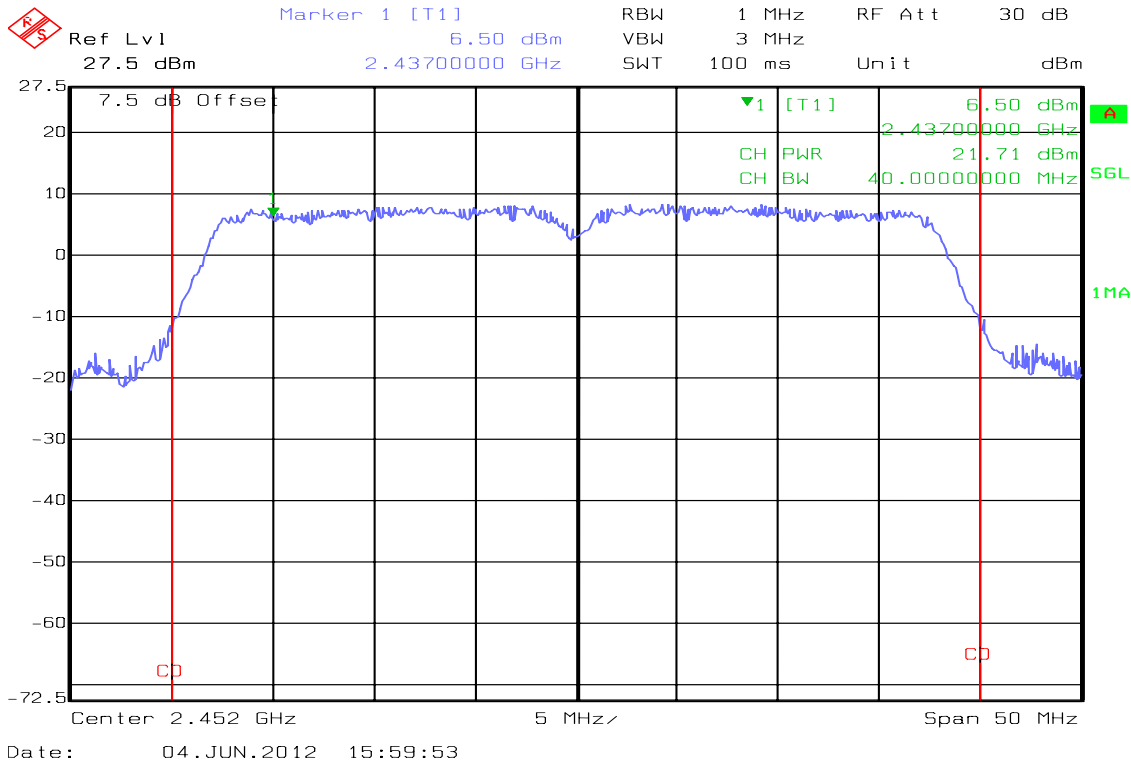
Date: 04.JUN.2012 15:53:14



CH Mid



CH High



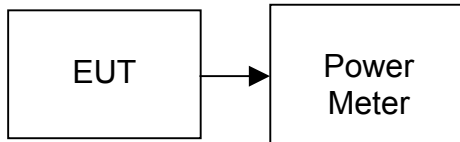


7.3 AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST CONFIGURATION



TEST PROCEDURE

Per KDB 558074 5.2.1.2/ or 5.2.2.1.

The transmitter output is connected to the spectrum analyzer. Set the RBW = 1MHz, VBW = 3MHz, Detector = Peak, Trace mode = max hold, Sweep = auto couple. Record the max reading.

Repeat the above procedure until the measurements for all frequencies are completed.

TEST RESULTS

No non-compliance noted



TEST DATA

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	15.69	0.0371
Mid	2437	16.22	0.0419
High	2462	16.16	0.0413

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	13.63	0.0231
Mid	2437	13.75	0.0237
High	2462	13.81	0.0240

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	13.64	0.0231
Mid	2437	13.67	0.0233
High	2462	13.97	0.0249

Test mode: IEEE 802.11n HT40 mode

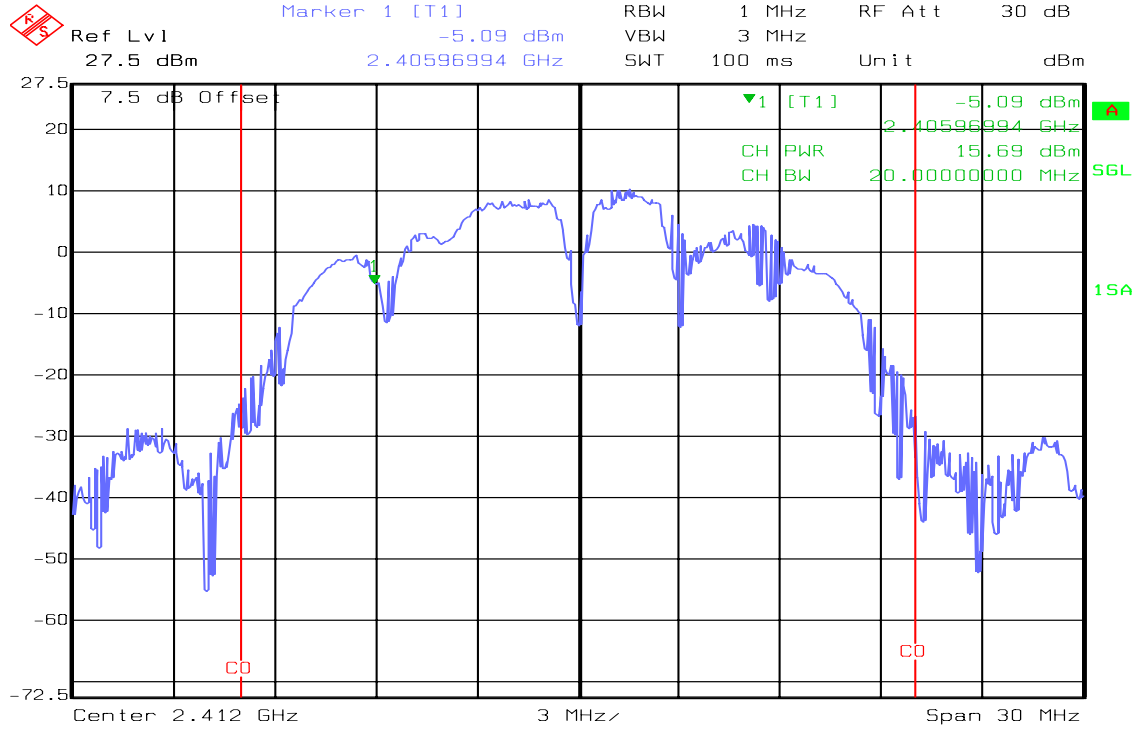
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2422	13.56	0.0227
Mid	2437	13.68	0.0233
High	2452	13.30	0.0214



Test Plot

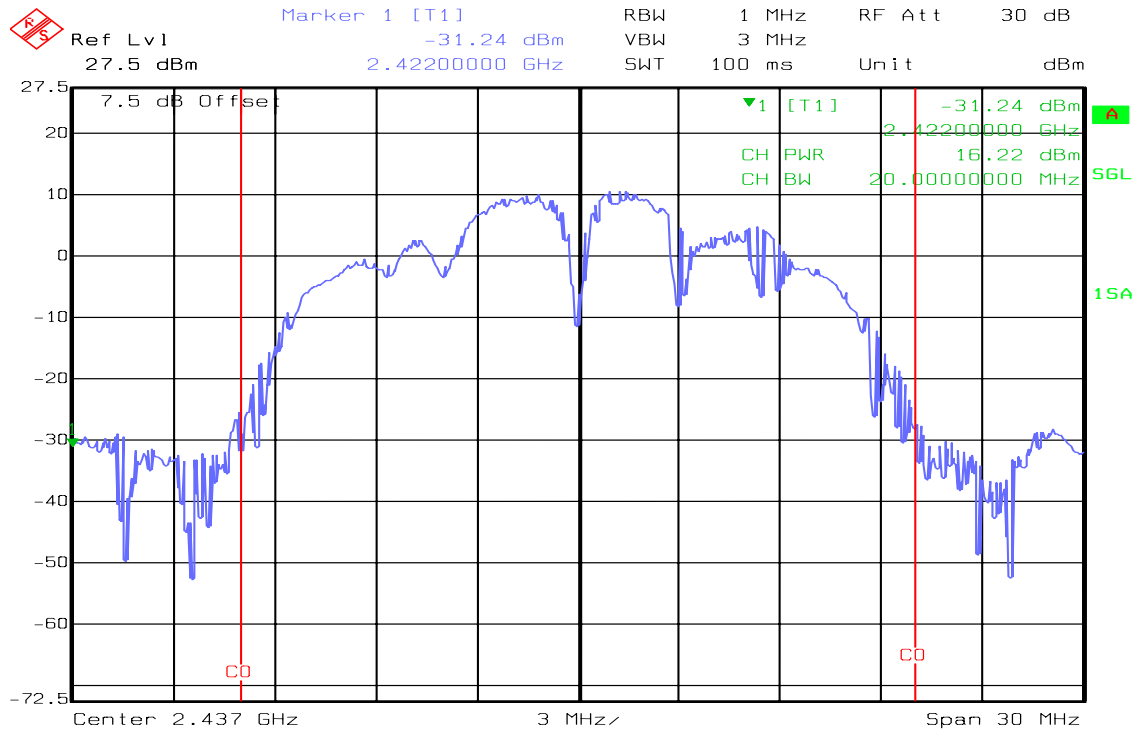
IEEE 802.11b mode

CH Low



Date: 04.JUN.2012 15:30:13

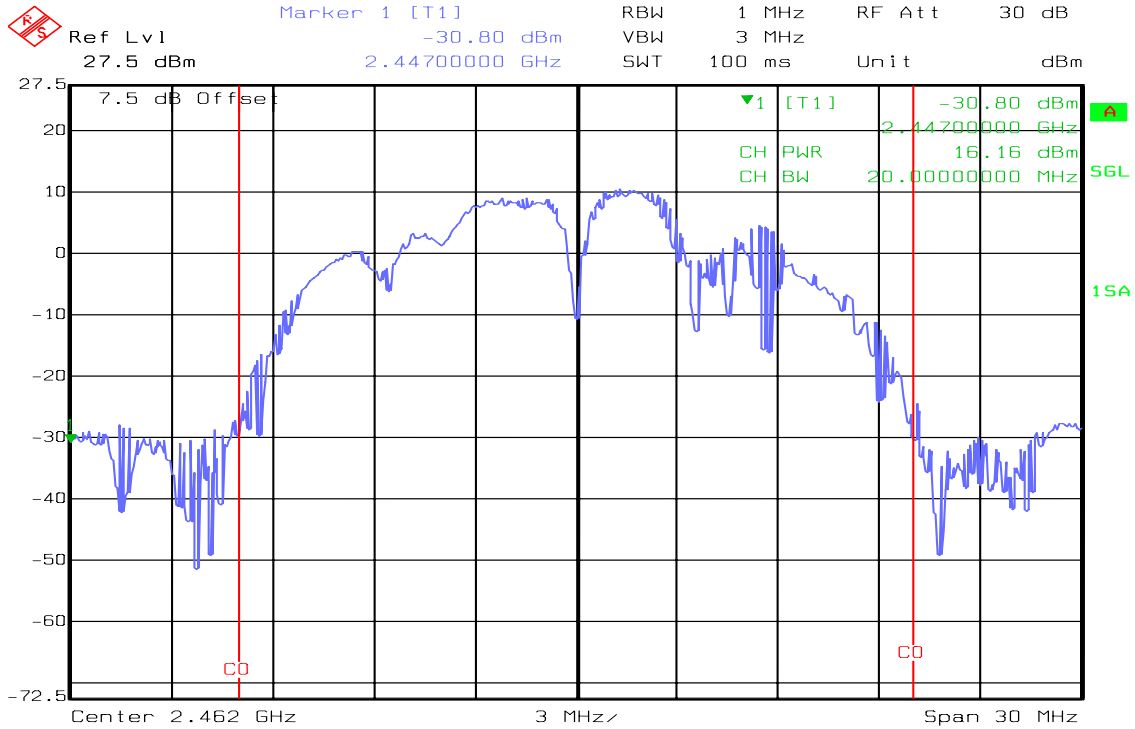
CH Mid



Date: 04.JUN.2012 15:33:20



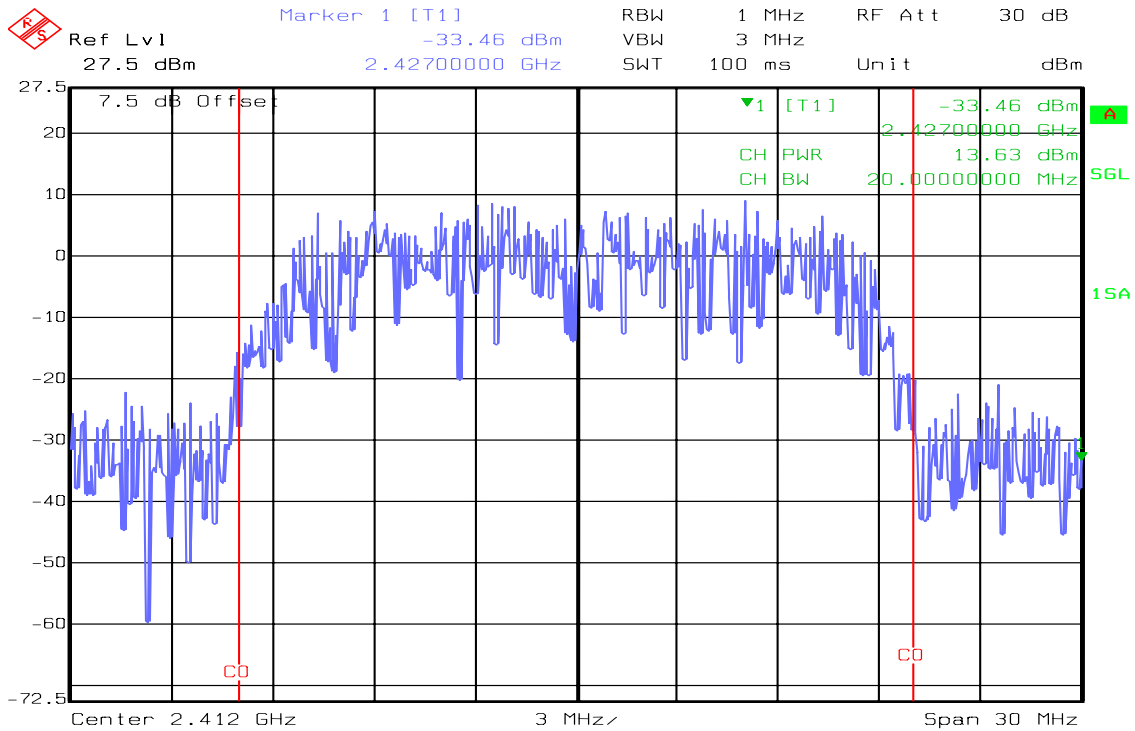
CH High



Date: 04.JUN.2012 15:35:13

IEEE 802.11g mode

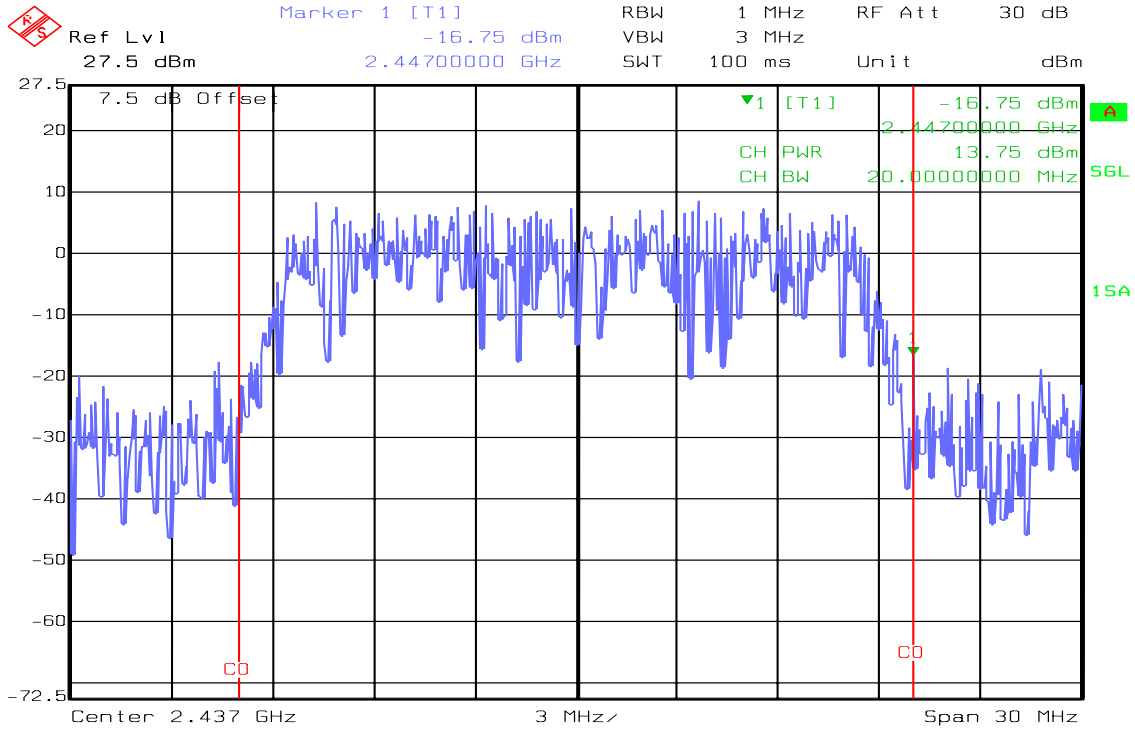
CH Low



Date: 04.JUN.2012 15:42:33

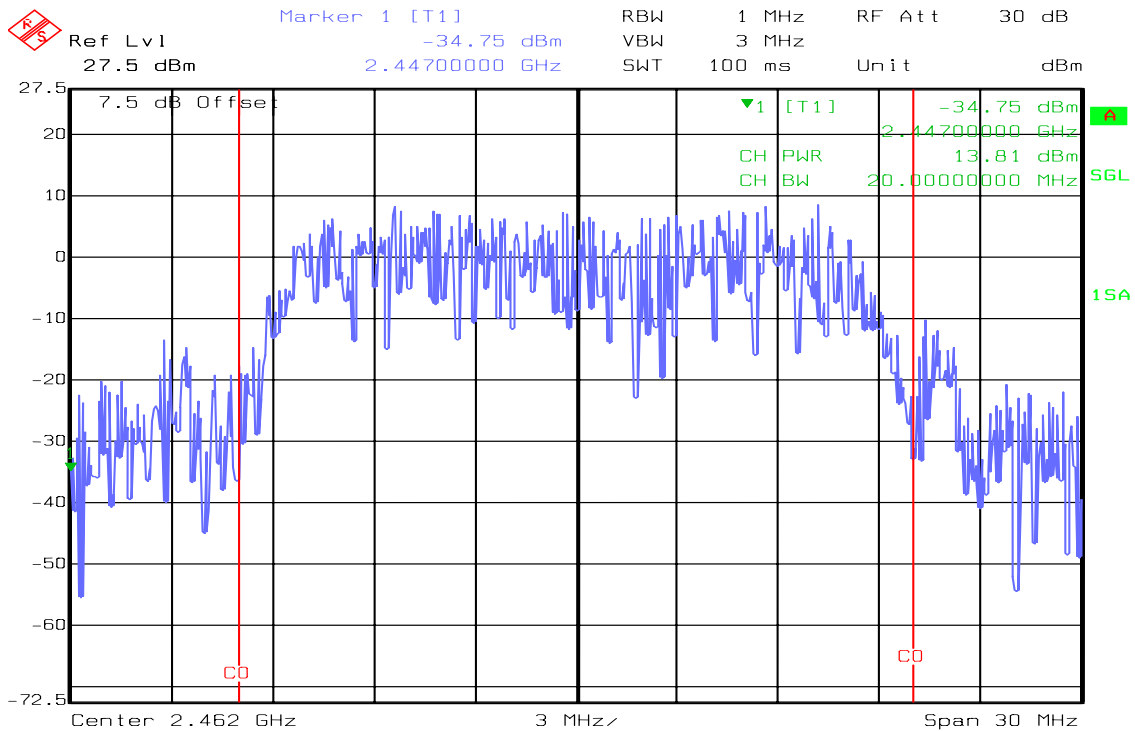


CH Mid



Date: 04.JUN.2012 15:40:42

CH High

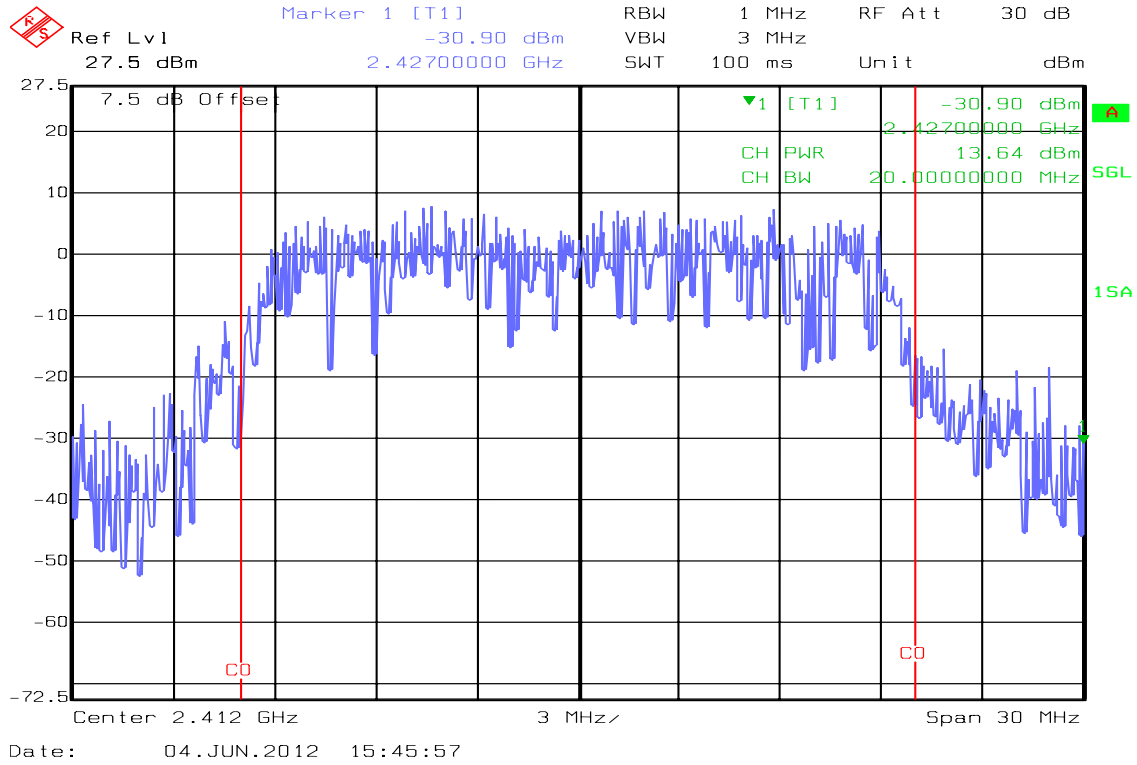


Date: 04.JUN.2012 15:39:08

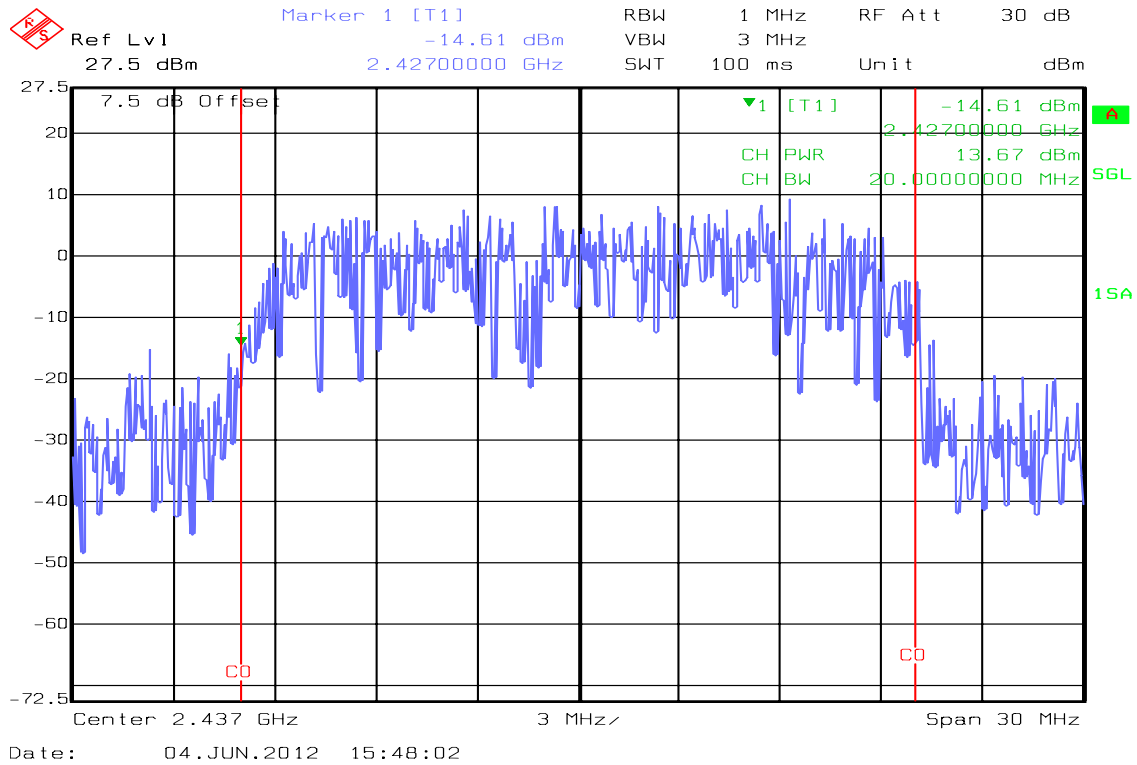


IEEE 802.11n HT20 mode

CH Low

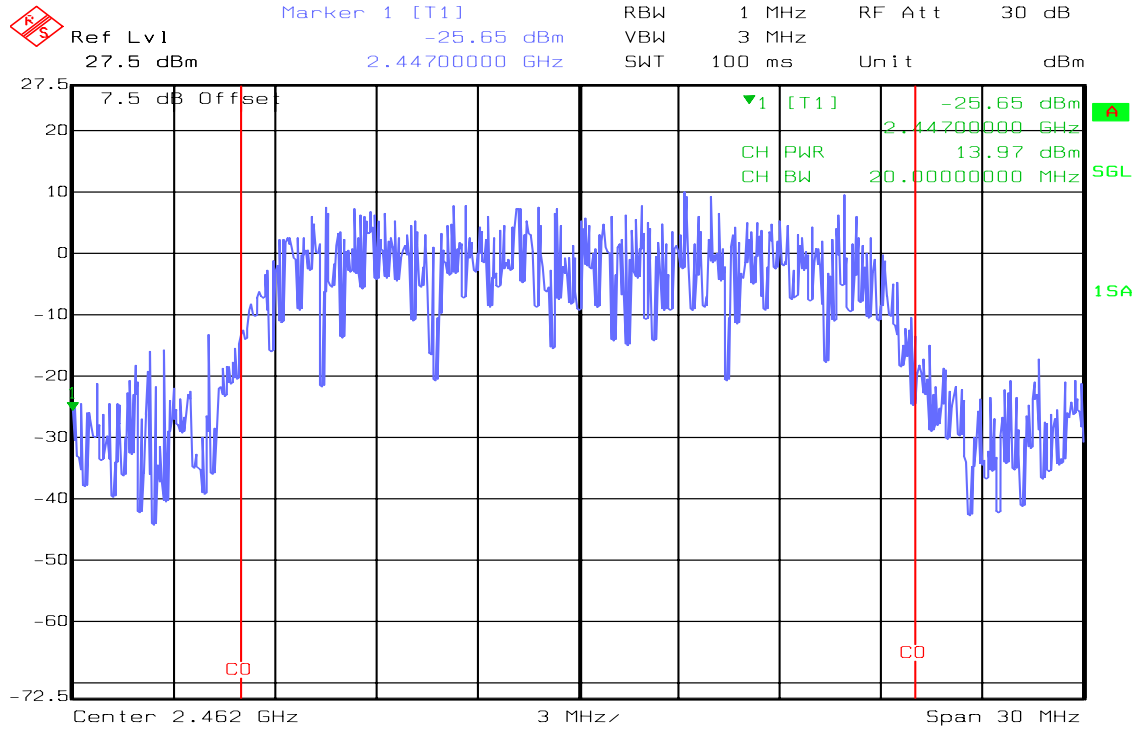


CH Mid





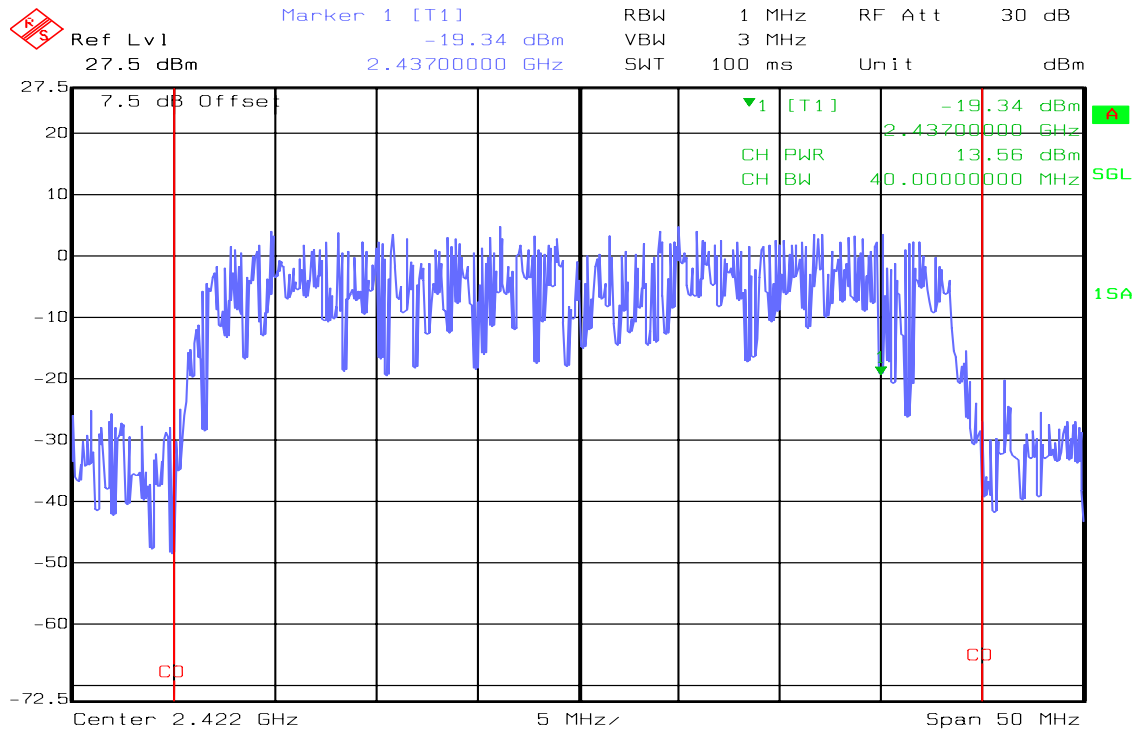
CH High



Date: 04.JUN.2012 15:51:20

IEEE 802.11n HT40 mode

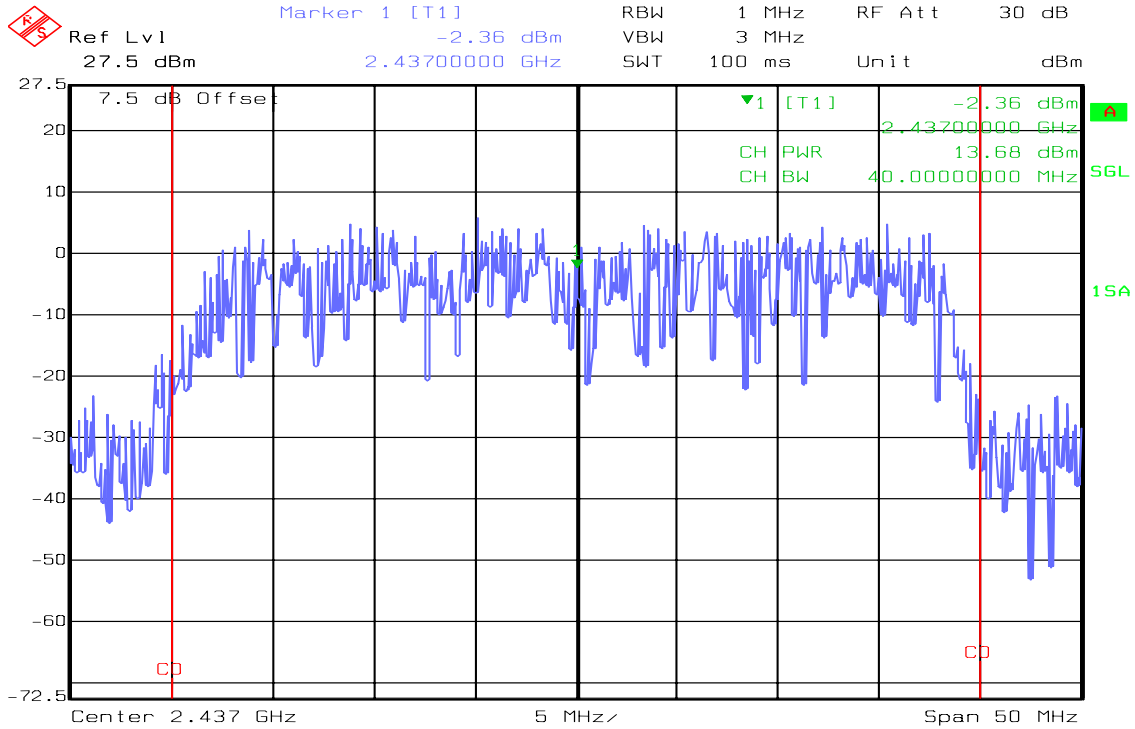
CH Low



Date: 04.JUN.2012 15:54:10

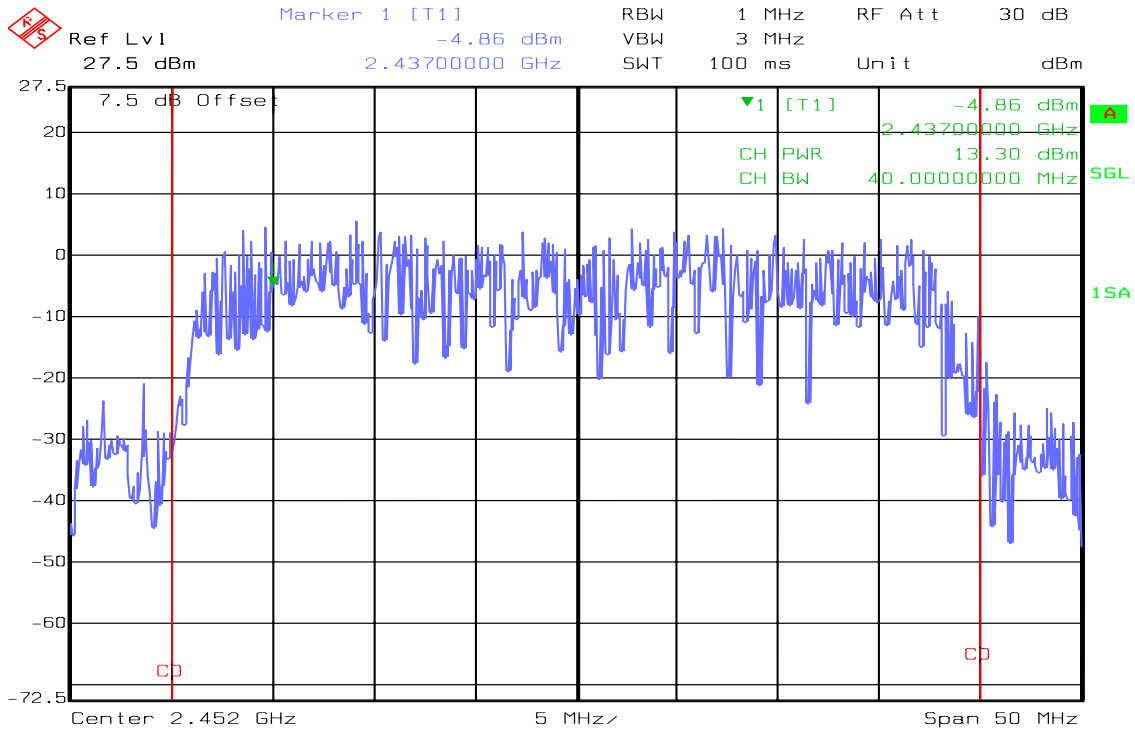


CH Mid



Date: 04.JUN.2012 15:59:00

CH High



Date: 04.JUN.2012 16:00:20

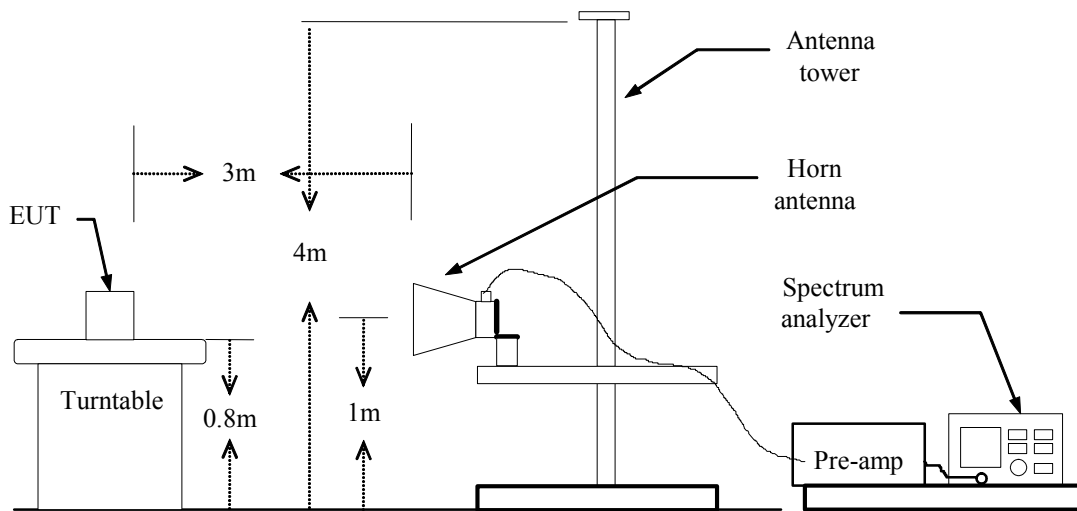


7.4 BAND EDGES MEASUREMENT

LIMIT

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

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=100ms
 - (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 mode / CH Low)

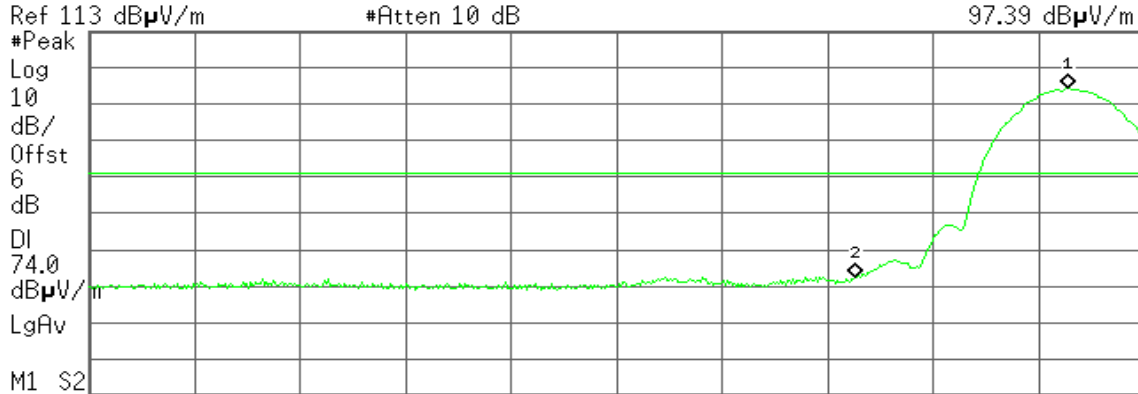
Detector mode: Peak

Polarity: Vertical

Agilent 15:15:36 Mar 13, 2012

R L

Mkr1 2.412 12 GHz
97.39 dBµV/m



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.412 12 GHz	97.39 dBµV/m
2	(1)	Freq	2.390 00 GHz	45.41 dBµV/m

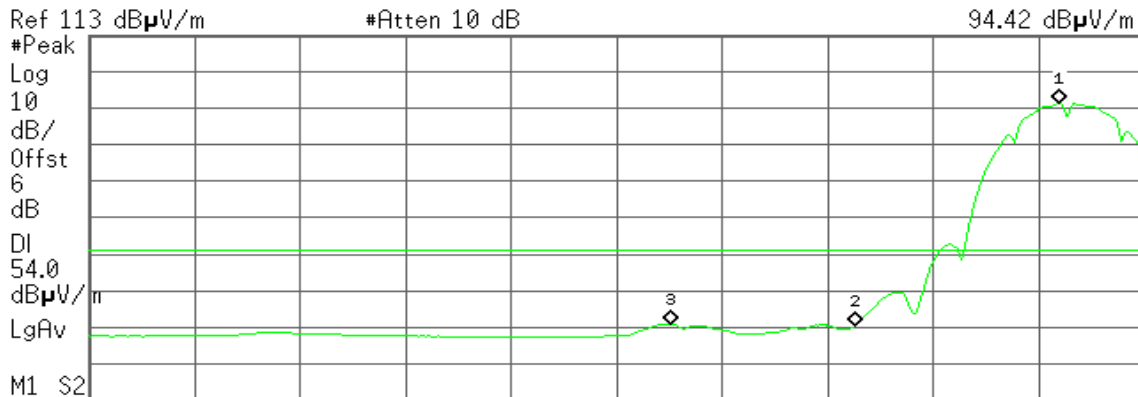
Detector mode: Average

Polarity: Vertical

Agilent 15:17:28 Mar 13, 2012

R L

Mkr1 2.411 20 GHz
94.42 dBµV/m



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.411 20 GHz	94.42 dBµV/m
2	(1)	Freq	2.390 00 GHz	33.34 dBµV/m
3	(1)	Freq	2.370 68 GHz	33.87 dBµV/m



Detector mode: Peak

Polarity: Horizontal

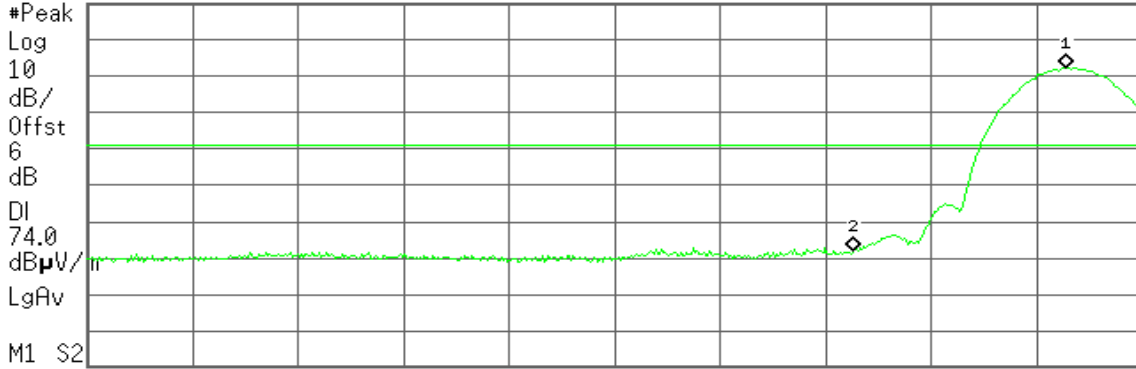
Agilent 15:04:52 Mar 13, 2012

R L

Mkr1 2.412 12 GHz
95.43 dBμV/m

Ref 113 dBμV/m

#Atten 10 dB



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.412 12 GHz	95.43 dBμV/m
2	(1)	Freq	2.390 00 GHz	45.16 dBμV/m

Detector mode: Average

Polarity: Horizontal

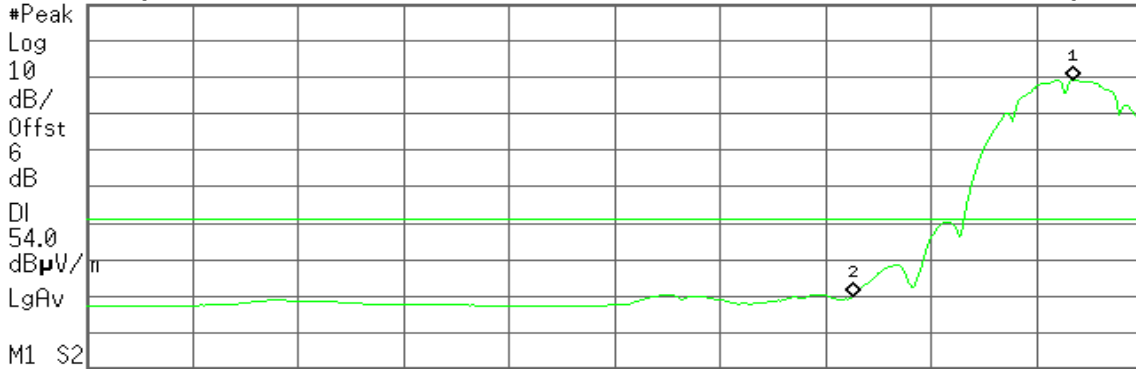
Agilent 15:06:28 Mar 13, 2012

R L

Mkr1 2.412 85 GHz
92.41 dBμV/m

Ref 113 dBμV/m

#Atten 10 dB



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.412 85 GHz	92.41 dBμV/m
2	(1)	Freq	2.390 00 GHz	32.88 dBμV/m



Band Edges (IEEE 802.11b mode / CH High)

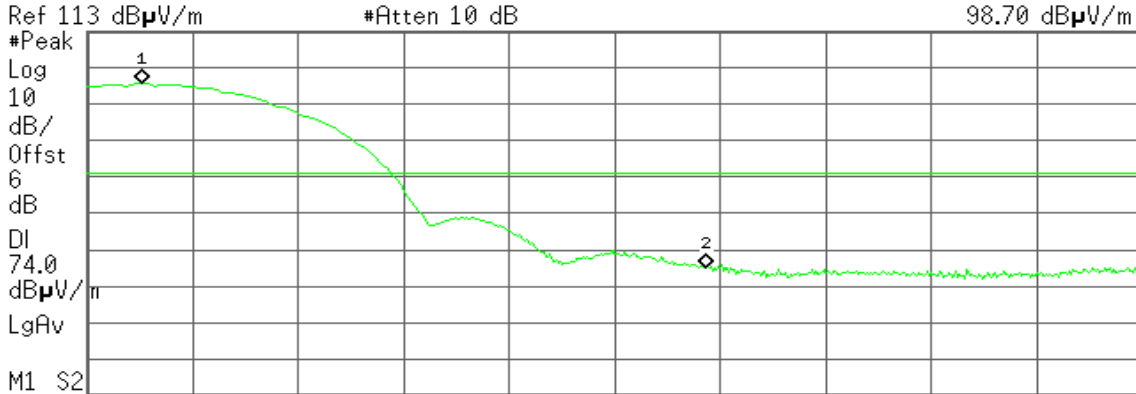
Detector mode: Peak

Polarity: Vertical

Agilent 15:33:50 Mar 13, 2012

R L

Mkr1 2.462 07 GHz
98.70 dBµV/m



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.462 07 GHz	98.70 dBµV/m
2	(1)	Freq	2.483 58 GHz	47.95 dBµV/m

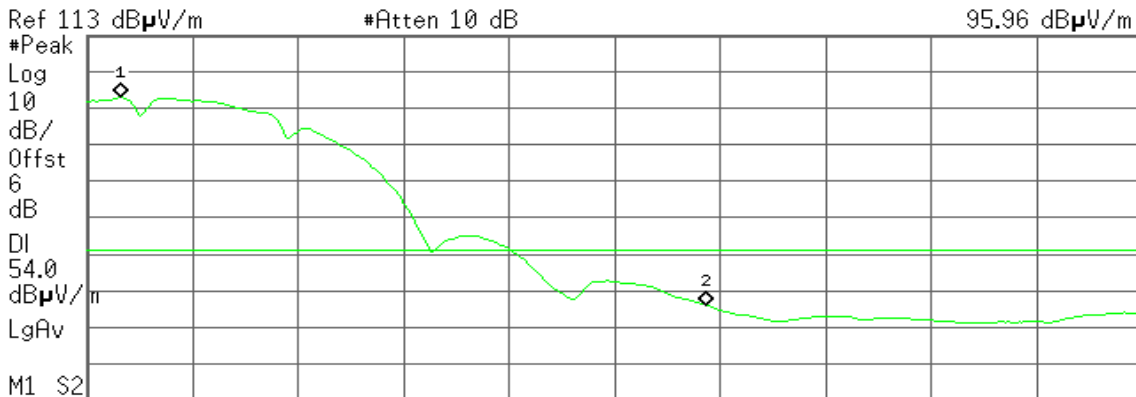
Detector mode: Average

Polarity: Vertical

Agilent 15:35:15 Mar 13, 2012

R L

Mkr1 2.461 27 GHz
95.96 dBµV/m



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 27 GHz	95.96 dBµV/m
2	(1)	Freq	2.483 58 GHz	39.16 dBµV/m



Detector mode: Peak

Polarity: Horizontal

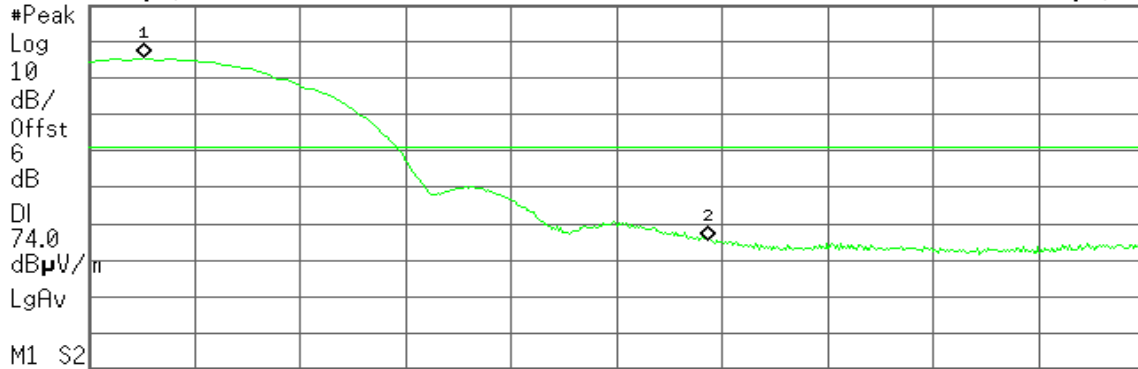
Agilent 15:41:34 Mar 13, 2012

R L

Mkr1 2.462 07 GHz
98.51 dBµV/m

Ref 113 dBµV/m

#Atten 10 dB



M1 S2

Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.462 07 GHz	98.51 dBµV/m
2	(1)	Freq	2.483 50 GHz	48.42 dBµV/m

Detector mode: Average

Polarity: Horizontal

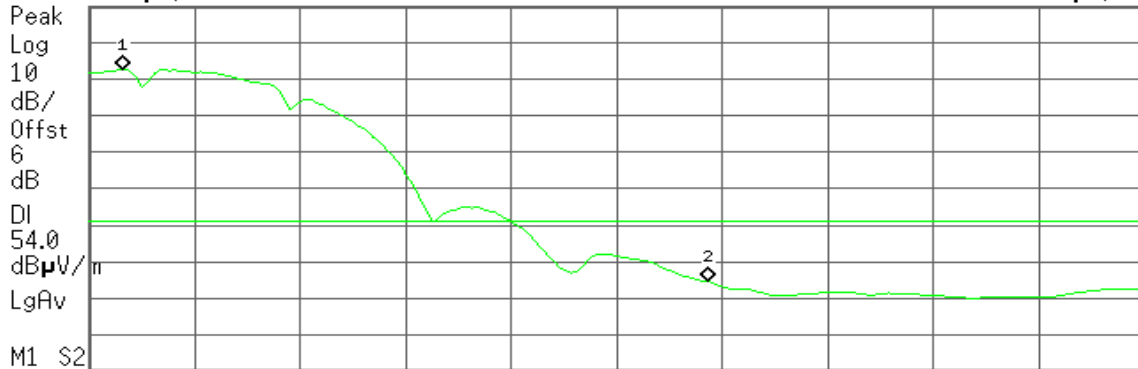
Agilent 19:25:09 Mar 13, 2012

R T

Mkr1 2.461 27 GHz
95.82 dBµV/m

Ref 113 dBµV/m

Atten 10 dB



M1 S2

Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 3.119 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 27 GHz	95.82 dBµV/m
2	(1)	Freq	2.483 50 GHz	37.62 dBµV/m



Band Edges (IEEE 802.11g mode / CH Low)

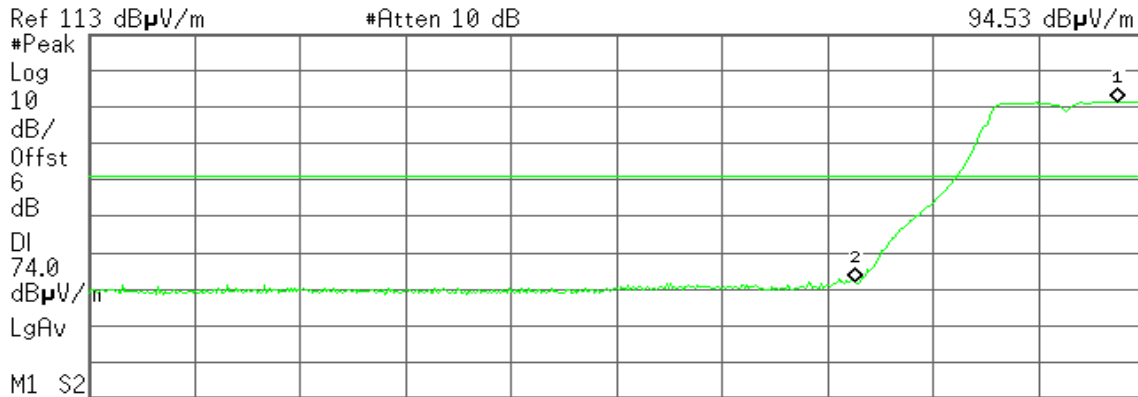
Detector mode: Peak

Polarity: Vertical

Agilent 15:56:25 Mar 13, 2012

R L

Mkr1 2.417 25 GHz
94.53 dBµV/m



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.417 25 GHz	94.53 dBµV/m
2	(1)	Freq	2.390 00 GHz	45.20 dBµV/m

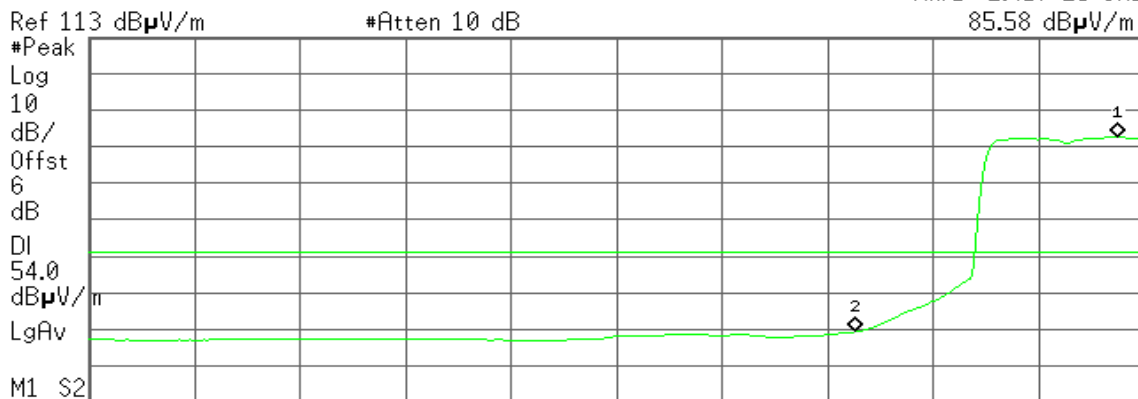
Detector mode: Average

Polarity: Vertical

Agilent 16:03:27 Mar 13, 2012

R L

Mkr1 2.417 25 GHz
85.58 dBµV/m



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.417 25 GHz	85.58 dBµV/m
2	(1)	Freq	2.390 00 GHz	32.31 dBµV/m



Detector mode: Peak

Polarity: Horizontal

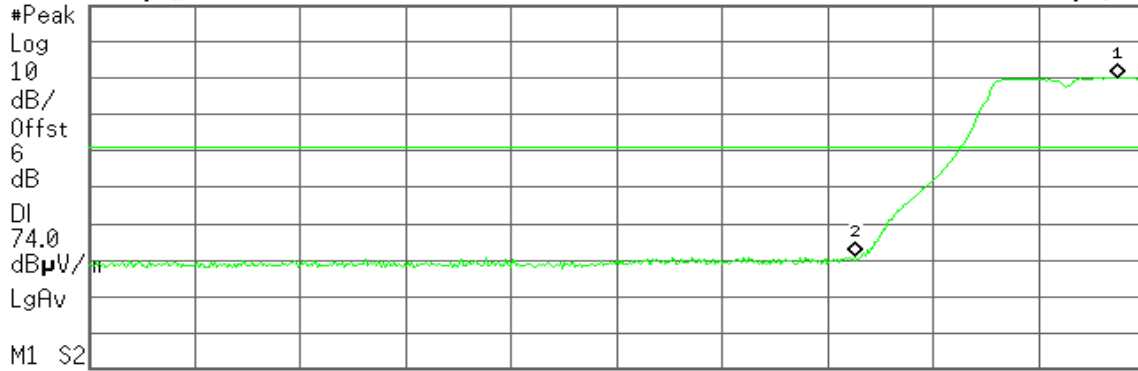
Agilent 15:59:35 Mar 13, 2012

R L

Mkr1 2.417 25 GHz
93.10 dBµV/m

Ref 113 dBµV/m

#Atten 10 dB



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.417 25 GHz	93.10 dBµV/m
2	(1)	Freq	2.390 00 GHz	44.85 dBµV/m

Detector mode: Average

Polarity: Horizontal

Agilent 16:01:15 Mar 13, 2012

R L

Mkr1 2.417 25 GHz
84.51 dBµV/m

Ref 113 dBµV/m

#Atten 10 dB



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 8.577 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.417 25 GHz	84.51 dBµV/m
2	(1)	Freq	2.390 00 GHz	31.19 dBµV/m



Band Edges (IEEE 802.11g mode / CH High)

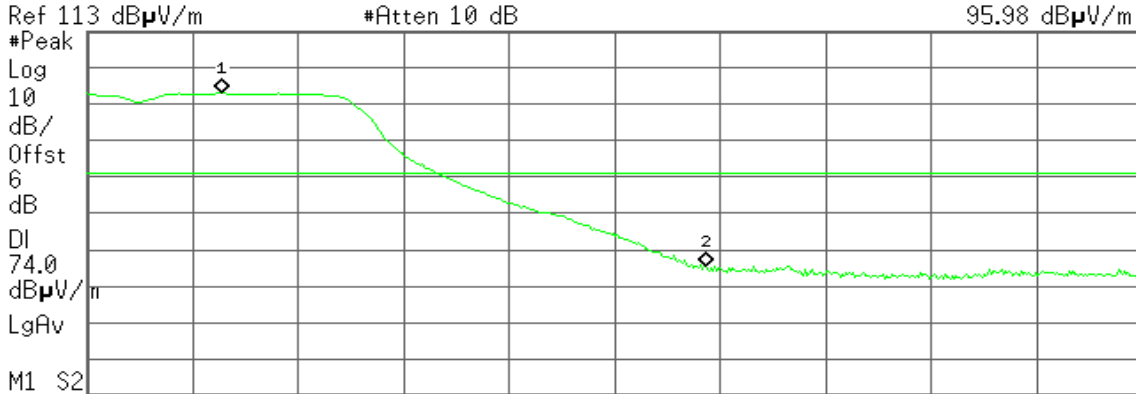
Detector mode: Peak

Polarity: Vertical

Agilent 15:51:14 Mar 13, 2012

R T

Mkr1 2.465 13 GHz
95.98 dBµV/m



Ref 113 dBµV/m #Atten 10 dB

Start 2.460 00 GHz Stop 2.500 00 GHz

#Res BW 1 MHz #VBW 1 MHz #Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.465 13 GHz	95.98 dBµV/m
2	(1)	Freq	2.483 58 GHz	48.54 dBµV/m

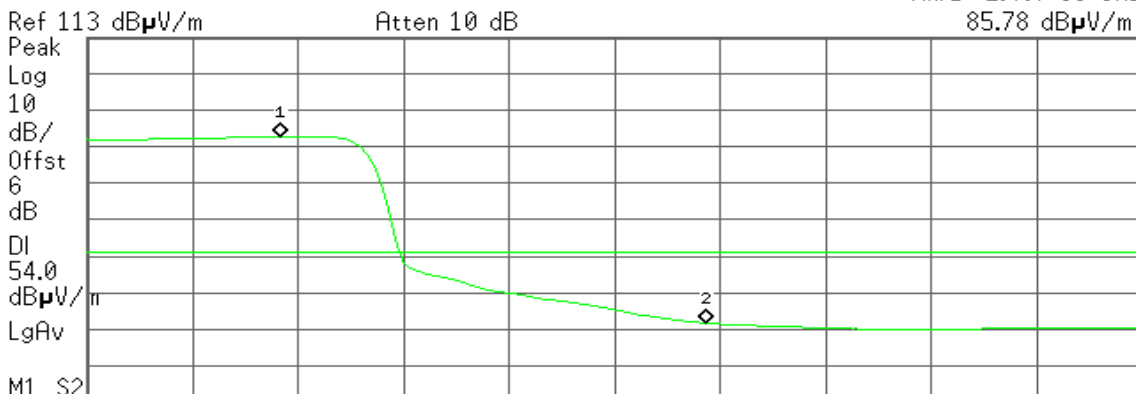
Detector mode: Average

Polarity: Vertical

Agilent 19:29:54 Mar 13, 2012

R L

Mkr1 2.467 33 GHz
85.78 dBµV/m



Ref 113 dBµV/m Atten 10 dB

Start 2.460 00 GHz Stop 2.500 00 GHz

#Res BW 1 MHz #VBW 10 Hz Sweep 3.119 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.467 33 GHz	85.78 dBµV/m
2	(1)	Freq	2.483 58 GHz	34.70 dBµV/m



Detector mode: Peak

Polarity: Horizontal

Agilent 15:47:32 Mar 13, 2012

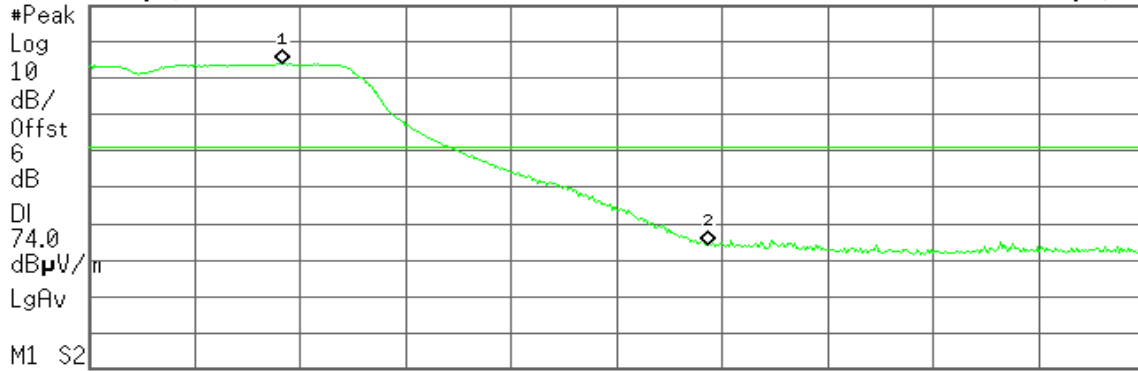
R L

Mkr1 2.467 33 GHz

96.89 dBμV/m

Ref 113 dBμV/m

#Atten 10 dB



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.467 33 GHz	96.89 dBμV/m
2	(1)	Freq	2.483 50 GHz	47.15 dBμV/m

Detector mode: Average

Polarity: Horizontal

Agilent 19:28:13 Mar 13, 2012

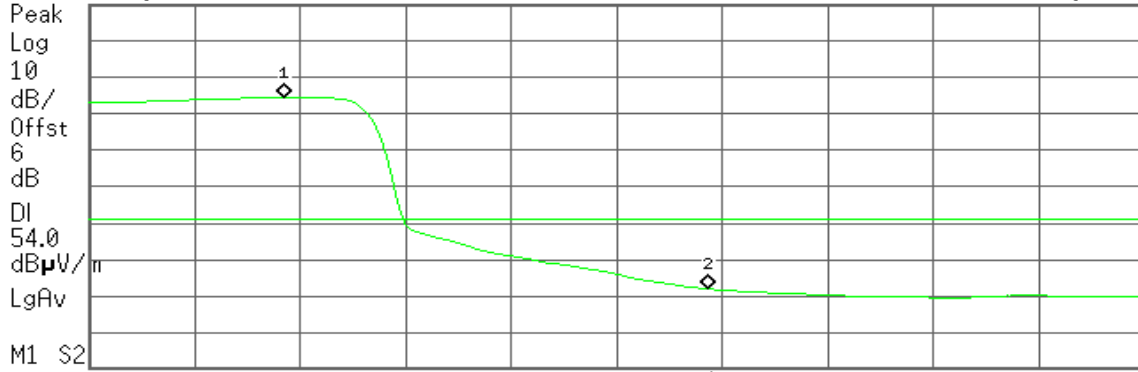
R L

Mkr1 2.467 40 GHz

87.41 dBμV/m

Ref 113 dBμV/m

Atten 10 dB



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.467 40 GHz	87.41 dBμV/m
2	(1)	Freq	2.483 50 GHz	35.00 dBμV/m



Band Edges (IEEE 802.11n HT20 mode / CH Low)

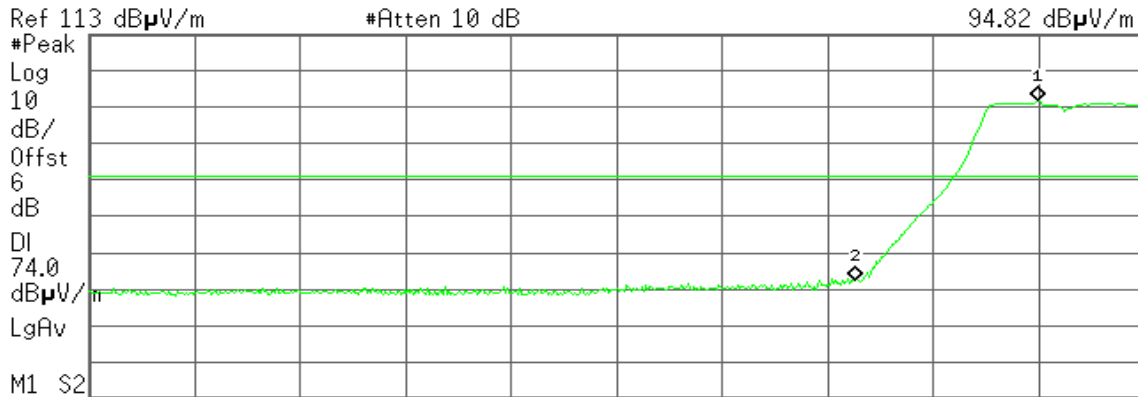
Detector mode: Peak

Polarity: Vertical

Agilent 16:07:06 Mar 13, 2012

R L

Mkr1 2.408 82 GHz
94.82 dBμV/m



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.408 82 GHz	94.82 dBμV/m
2	(1)	Freq	2.398 00 GHz	45.34 dBμV/m

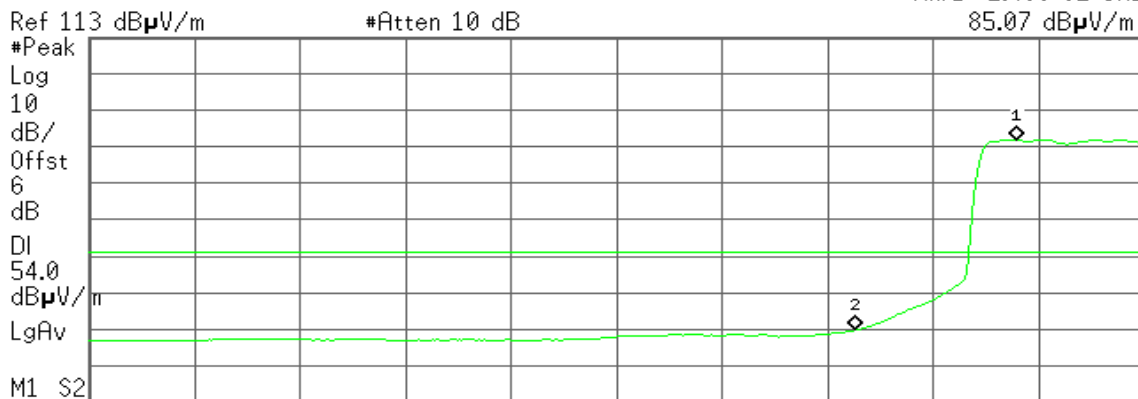
Detector mode: Average

Polarity: Vertical

Agilent 16:07:59 Mar 13, 2012

R L

Mkr1 2.406 62 GHz
85.07 dBμV/m



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.406 62 GHz	85.07 dBμV/m
2	(1)	Freq	2.398 00 GHz	32.88 dBμV/m



Detector mode: Peak

Polarity: Horizontal

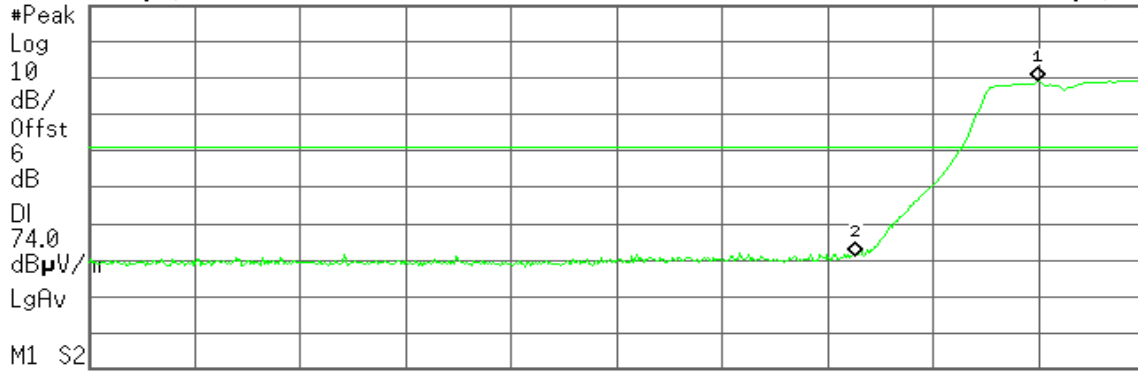
Agilent 16:09:46 Mar 13, 2012

R L

Mkr1 2.409 00 GHz
92.23 dBµV/m

Ref 113 dBµV/m

#Atten 10 dB



M1 S2
Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.409 00 GHz	92.23 dBµV/m
2	(1)	Freq	2.390 00 GHz	44.18 dBµV/m

Detector mode: Average

Polarity: Horizontal

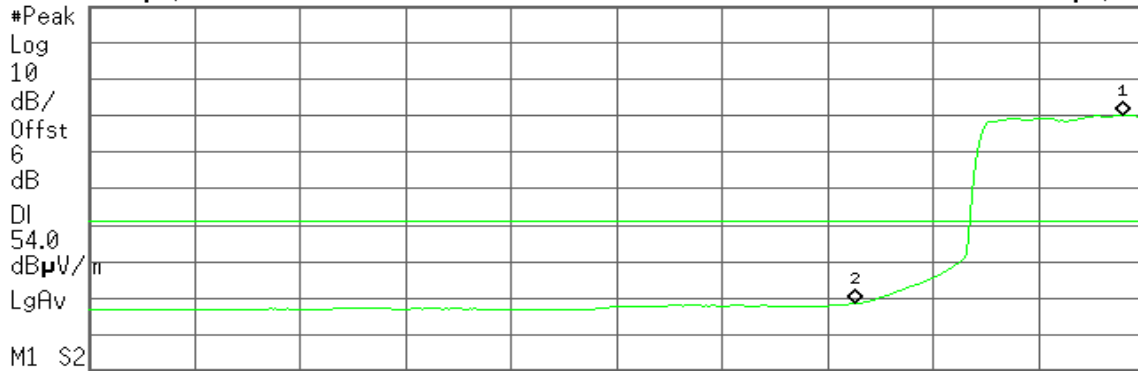
Agilent 16:10:36 Mar 13, 2012

R L

Mkr1 2.417 80 GHz
83.31 dBµV/m

Ref 113 dBµV/m

#Atten 10 dB



M1 S2
Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 8.577 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.417 80 GHz	83.31 dBµV/m
2	(1)	Freq	2.390 00 GHz	31.56 dBµV/m



Band Edges (IEEE 802.11n HT20 mode / CH High)

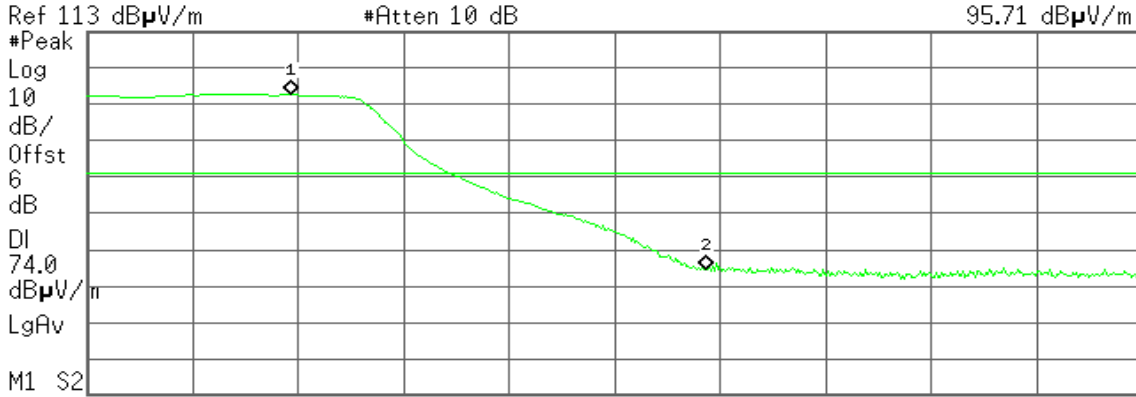
Detector mode: Peak

Polarity: Vertical

Agilent 16:16:28 Mar 13, 2012

R L

Mkr1 2.467 73 GHz
95.71 dBµV/m



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.467 73 GHz	95.71 dBµV/m
2	(1)	Freq	2.483 50 GHz	47.51 dBµV/m

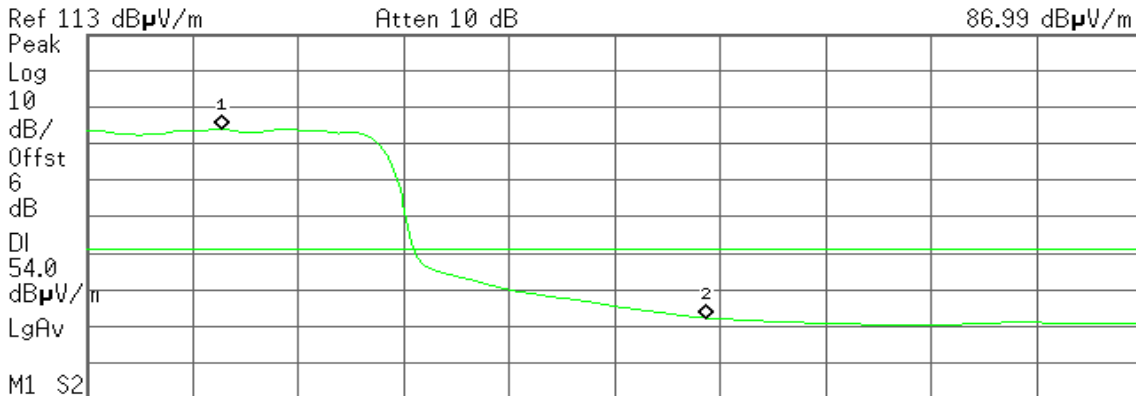
Detector mode: Average

Polarity: Vertical

Agilent 19:32:29 Mar 13, 2012

R L

Mkr1 2.465 13 GHz
86.99 dBµV/m



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.465 13 GHz	86.99 dBµV/m
2	(1)	Freq	2.483 50 GHz	35.26 dBµV/m



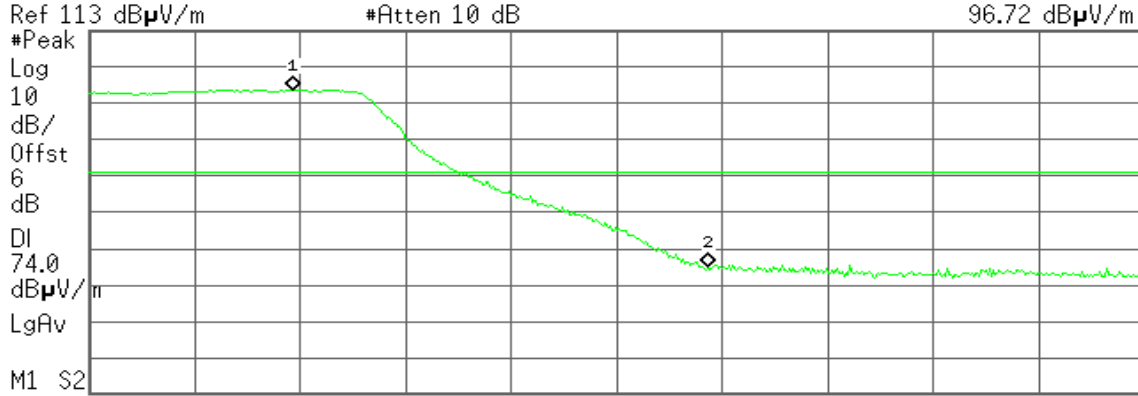
Detector mode: Peak

Polarity: Horizontal

Agilent 16:13:32 Mar 13, 2012

R L

Mkr1 2.467 73 GHz
96.72 dBµV/m



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.467 73 GHz	96.72 dBµV/m
2	(1)	Freq	2.483 50 GHz	47.98 dBµV/m

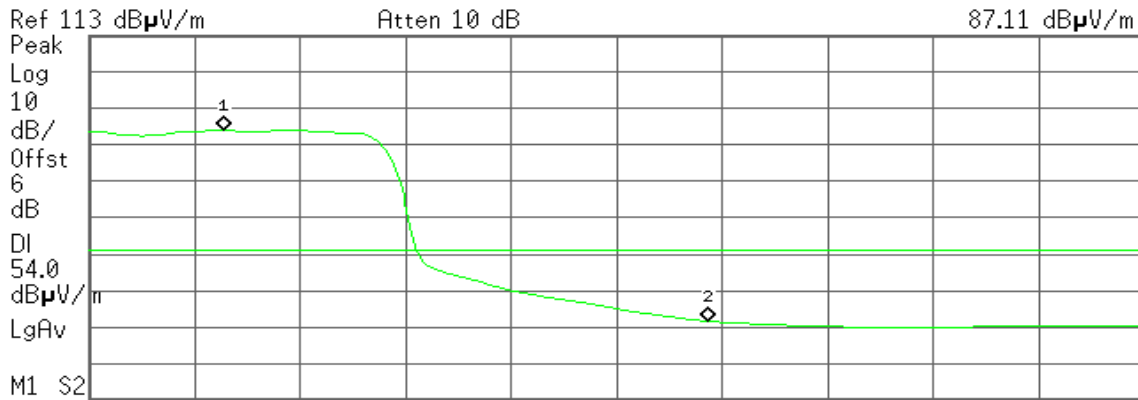
Detector mode: Average

Polarity: Horizontal

Agilent 19:38:23 Mar 13, 2012

R L

Mkr1 2.465 13 GHz
87.11 dBµV/m



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.465 13 GHz	87.11 dBµV/m
2	(1)	Freq	2.483 50 GHz	34.61 dBµV/m



Band Edges (IEEE 802.11n HT40 mode / CH Low)

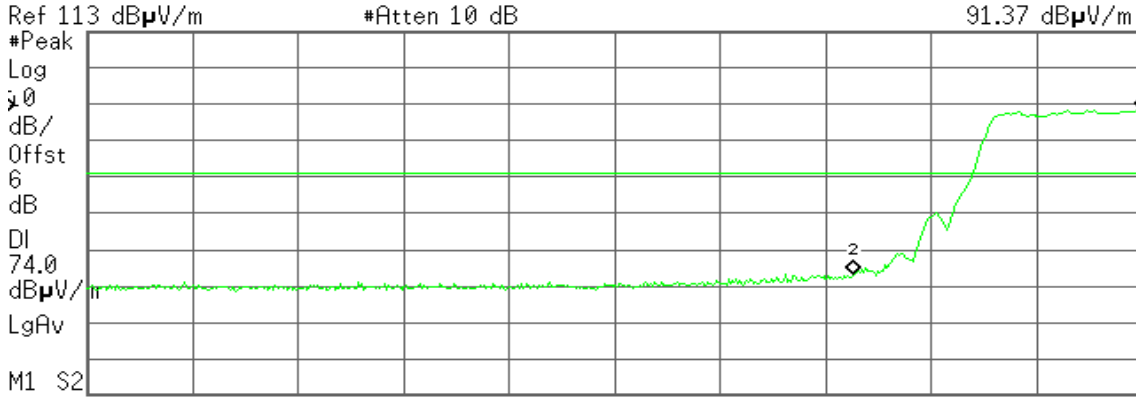
Detector mode: Peak

Polarity: Vertical

Agilent 16:41:05 Mar 13, 2012

R L

Mkr1 2.420 00 GHz
91.37 dBµV/m



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.420 00 GHz	91.37 dBµV/m
2	(1)	Freq	2.390 00 GHz	46.25 dBµV/m

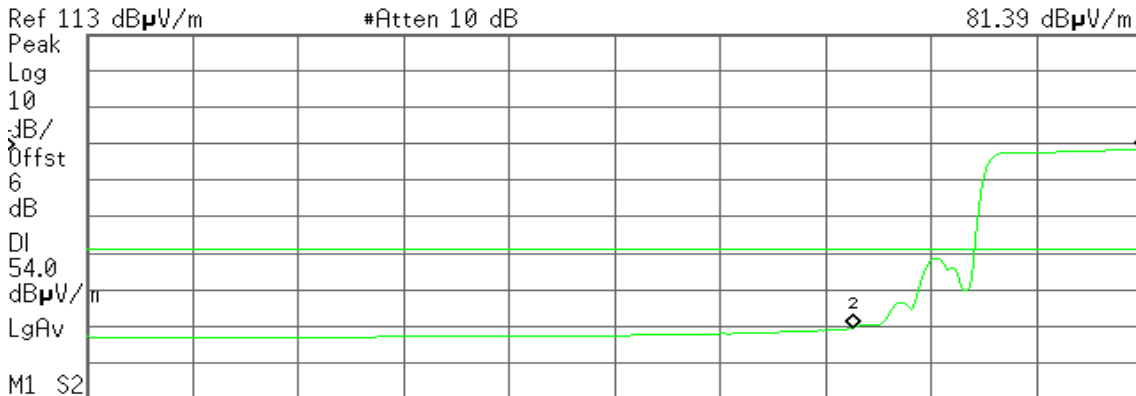
Detector mode: Average

Polarity: Vertical

Agilent 18:56:55 Mar 13, 2012

R L

Mkr1 2.420 00 GHz
81.39 dBµV/m



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.420 00 GHz	81.39 dBµV/m
2	(1)	Freq	2.390 00 GHz	32.61 dBµV/m

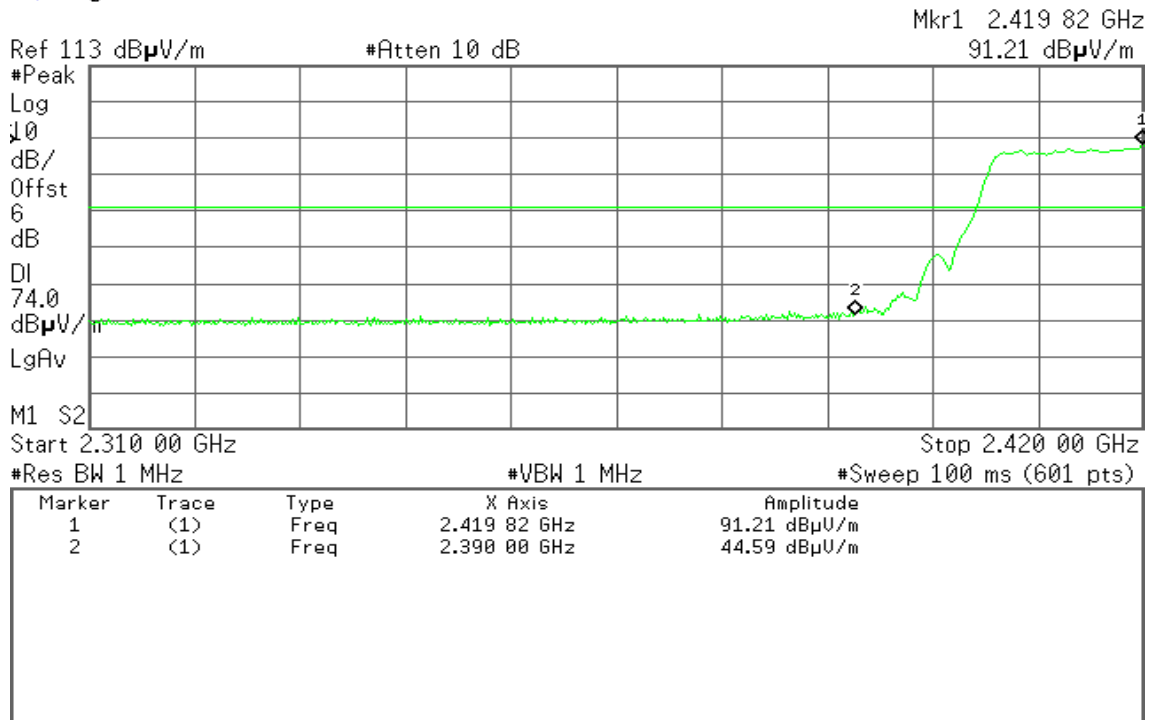


Detector mode: Peak

Polarity: Horizontal

Agilent 16:48:25 Mar 13, 2012

R L

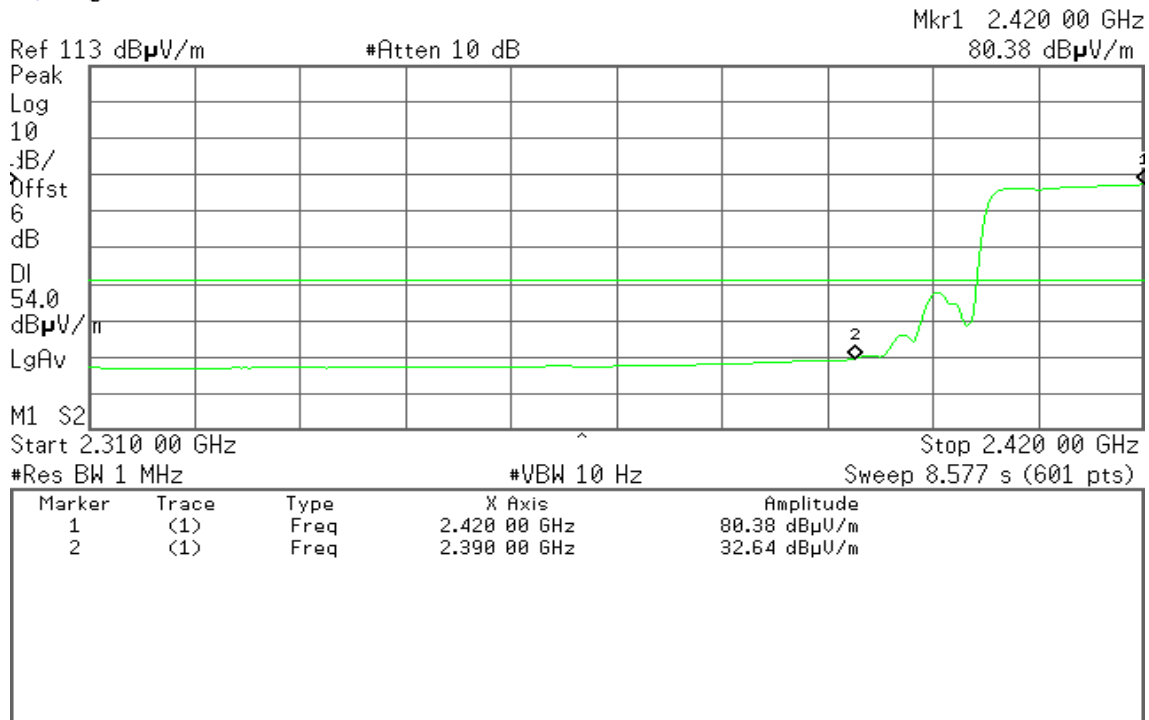


Detector mode: Average

Polarity: Horizontal

Agilent 19:01:40 Mar 13, 2012

R L





Band Edges (IEEE 802.11n HT40 mode / CH High)

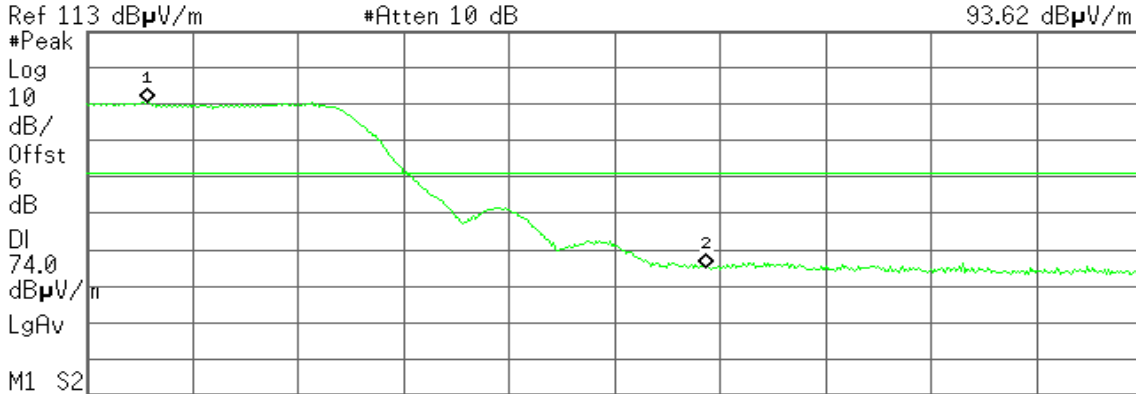
Detector mode: Peak

Polarity: Vertical

Agilent 16:26:12 Mar 13, 2012

R T

Mkr1 2.462 27 GHz
93.62 dBμV/m



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.462 27 GHz	93.62 dBμV/m
2	(1)	Freq	2.483 50 GHz	48.04 dBμV/m

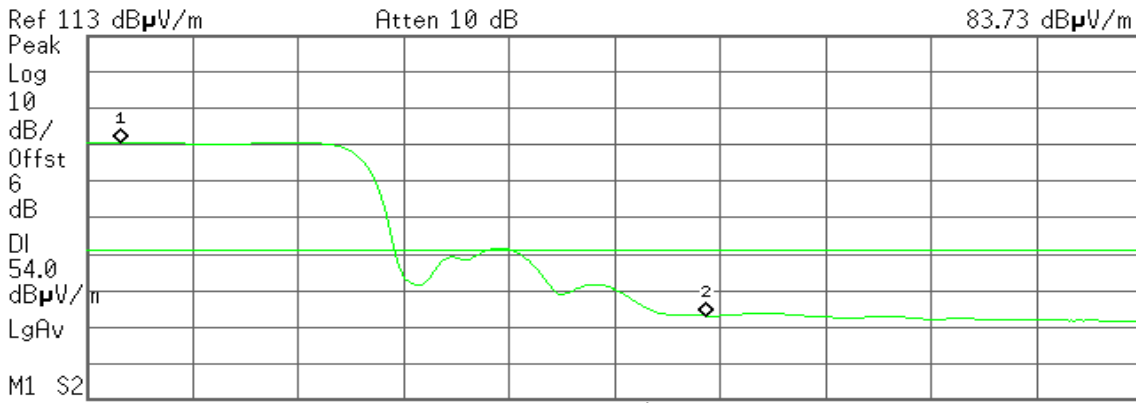
Detector mode: Average

Polarity: Vertical

Agilent 19:45:12 Mar 13, 2012

R L

Mkr1 2.461 27 GHz
83.73 dBμV/m



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 27 GHz	83.73 dBμV/m
2	(1)	Freq	2.483 50 GHz	36.13 dBμV/m



Detector mode: Peak

Polarity: Horizontal

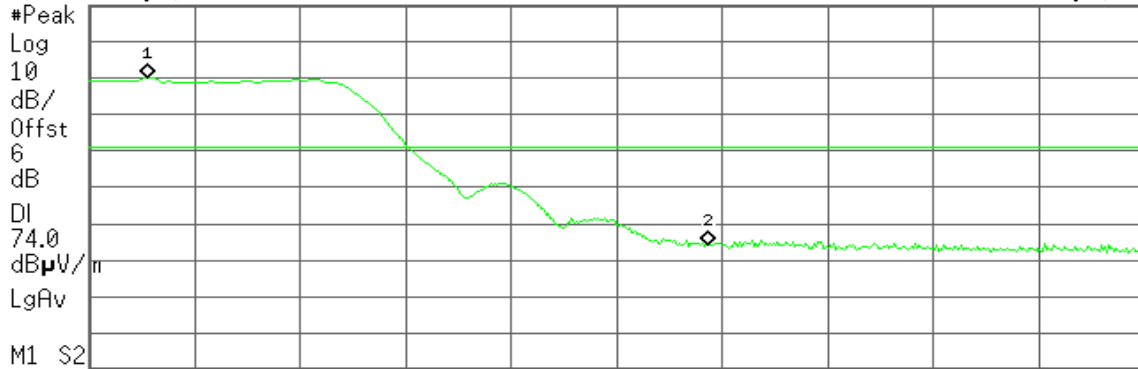
Agilent 16:30:59 Mar 13, 2012

R T

Mkr1 2.462 20 GHz
93.22 dBµV/m

Ref 113 dBµV/m

#Atten 10 dB



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.462 20 GHz	93.22 dBµV/m
2	(1)	Freq	2.483 50 GHz	47.28 dBµV/m

Detector mode: Average

Polarity: Horizontal

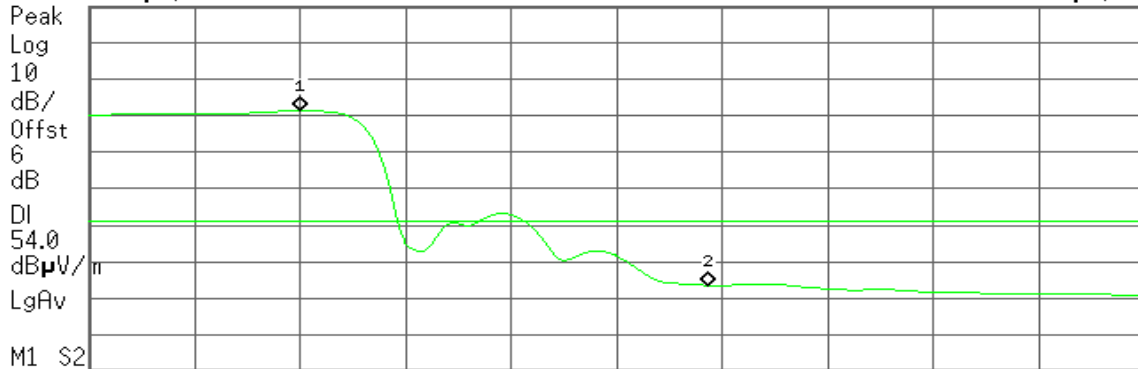
Agilent 19:42:28 Mar 13, 2012

R L

Mkr1 2.468 00 GHz
84.40 dBµV/m

Ref 113 dBµV/m

Atten 10 dB



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 3.119 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.468 00 GHz	84.40 dBµV/m
2	(1)	Freq	2.483 50 GHz	36.53 dBµV/m

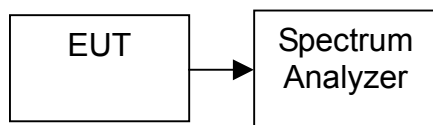


7.5 PEAK POWER SPECTRAL DENSITY

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

Per KDB 558074 5.2.1.2/ or 5.2.2.1.

The transmitter output is connected to a spectrum analyzer. Set the RBW = 100 kHz, VBW ≥ 300 kHz, span 5-30% greater than EBW, Detector = peak, Trace mode = max hold, Sweep = auto couple. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(3\text{ kHz}/100\text{ kHz} = -15.2\text{ dB})$. Record the maximum reading. Repeat the above procedure until the measurements for all frequencies are completed.

TEST RESULTS

No non-compliance noted



TEST DATA

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	100kHz PPSD (dBm)	3kHz PPSD (dBm)	Limit (dBm)	Result
Low	2412	8.12	-7.08	8.00	PASS
Mid	2437	7.70	-7.50		
High	2462	7.01	-8.19		

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	100kHz PPSD (dBm)	3kHz PPSD (dBm)	Limit (dBm)	Result
Low	2412	-0.19	-15.39	8.00	PASS
Mid	2437	0.12	-15.08		
High	2462	1.20	-14.00		

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	100kHz PPSD (dBm)	3kHz PPSD (dBm)	Limit (dBm)	Result
Low	2412	0.15	-15.05	8.00	PASS
Mid	2437	0.08	-15.12		
High	2462	1.03	-14.17		

Test mode: IEEE 802.11n HT40 mode

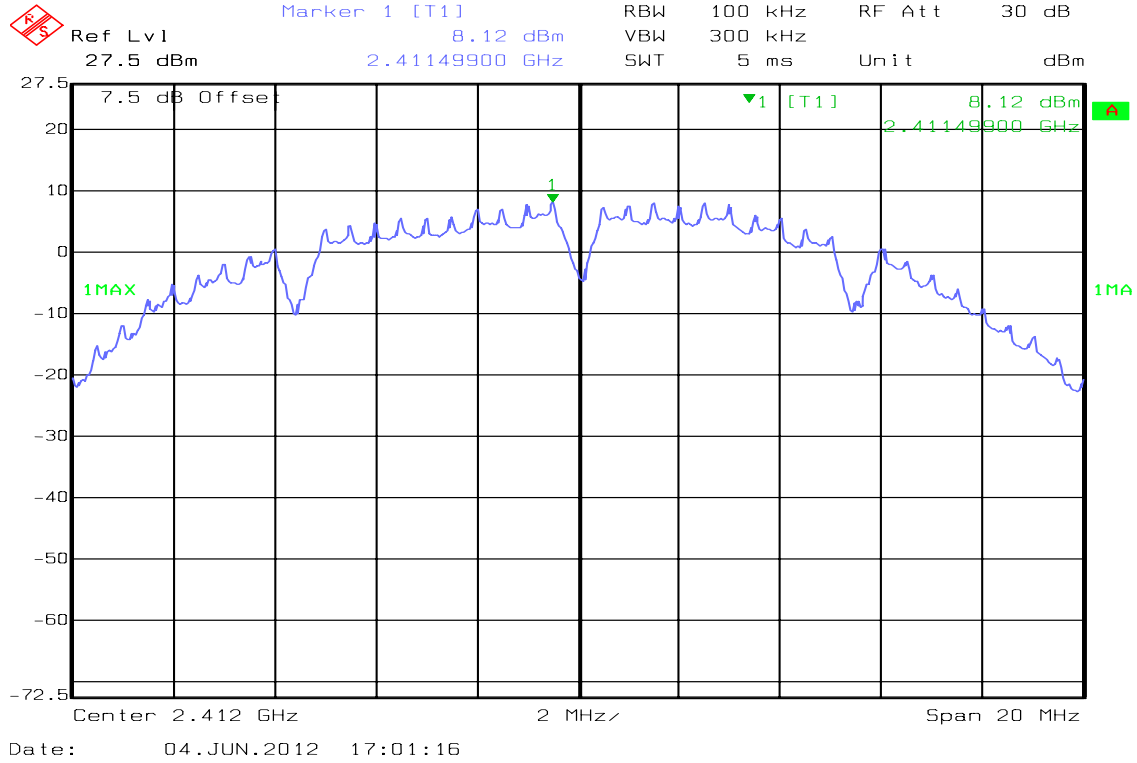
Channel	Frequency (MHz)	100kHz PPSD (dBm)	3kHz PPSD (dBm)	Limit (dBm)	Result
Low	2422	-4.21	-19.41	8.00	PASS
Mid	2437	-4.17	-19.37		
High	2452	-3.90	-19.10		



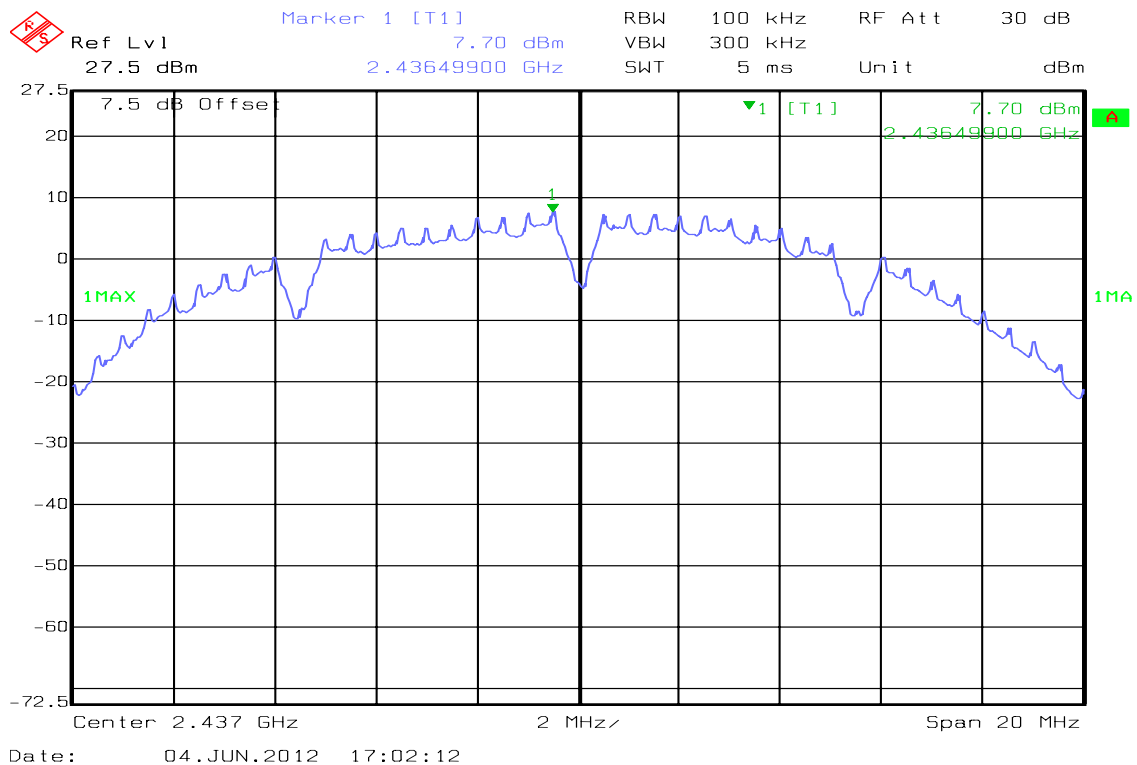
Test Plot

IEEE 802.11b mode

PPSD (CH Low)

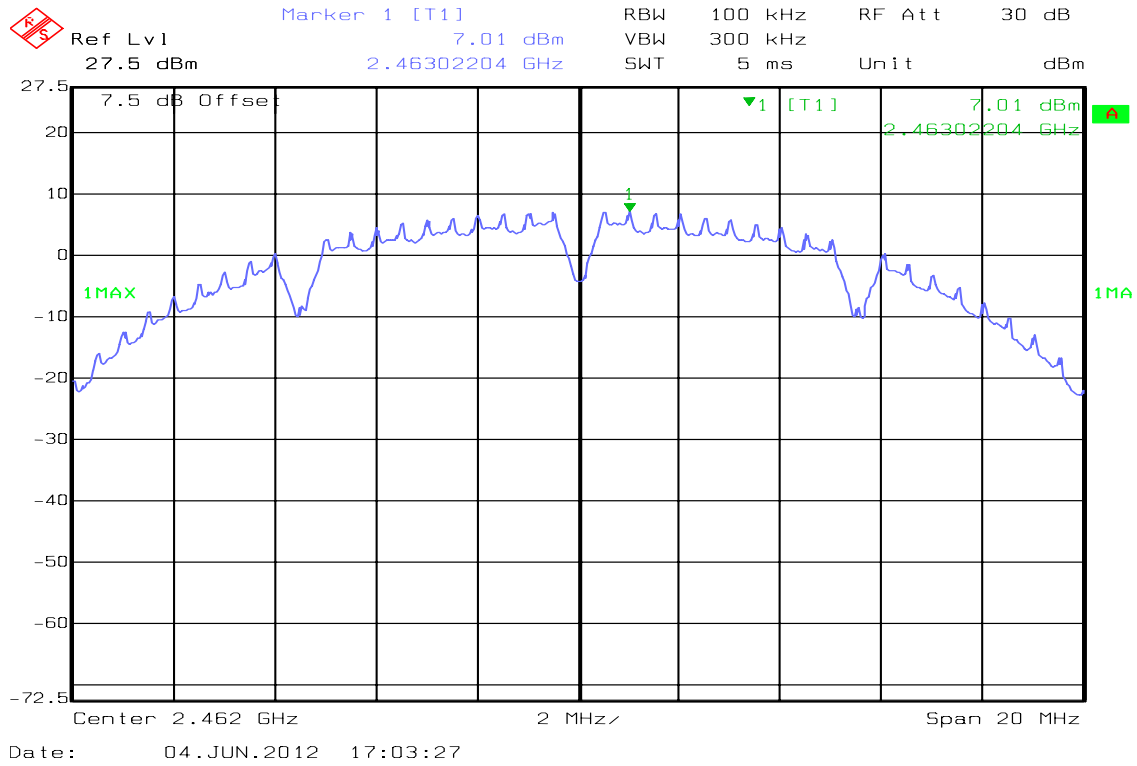


PPSD (CH Mid)



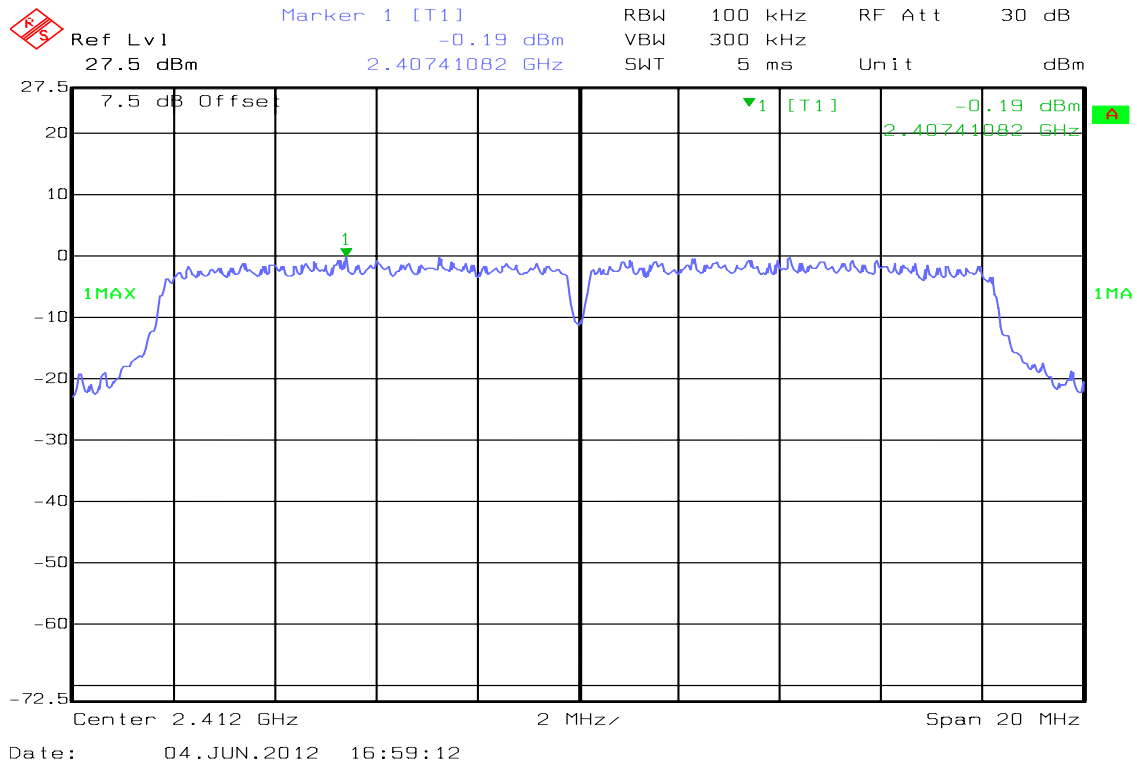


PPSD (CH High)



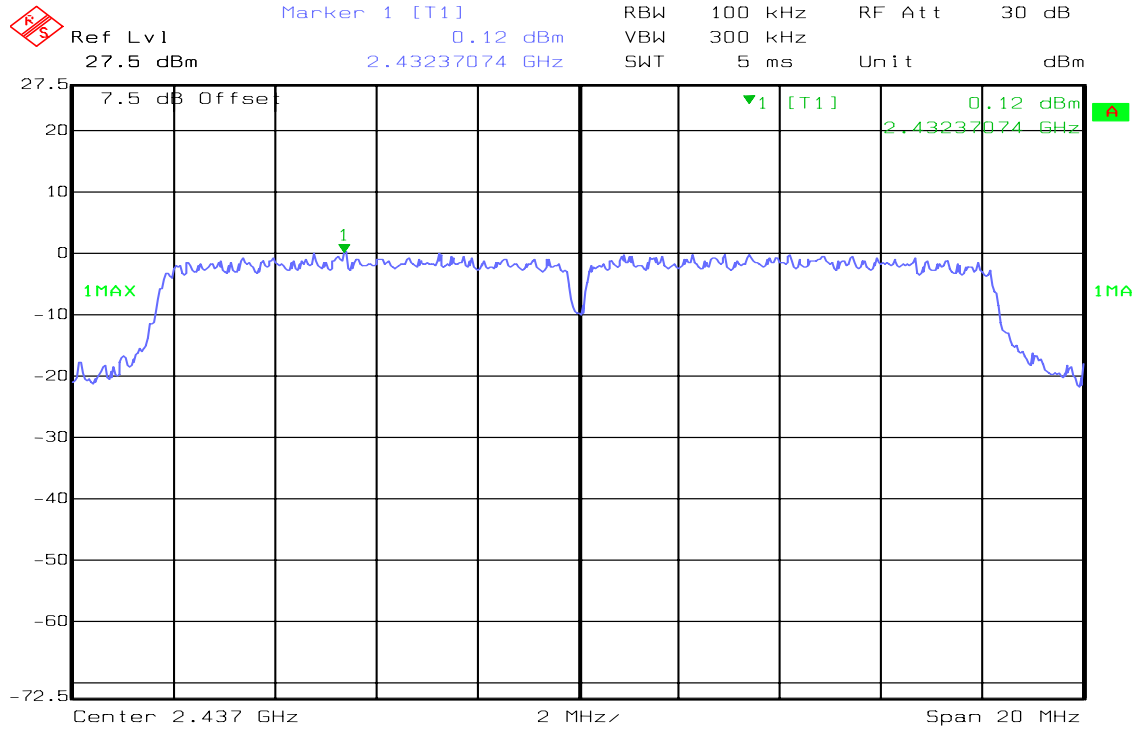
IEEE 802.11g mode

PPSD (CH Low)



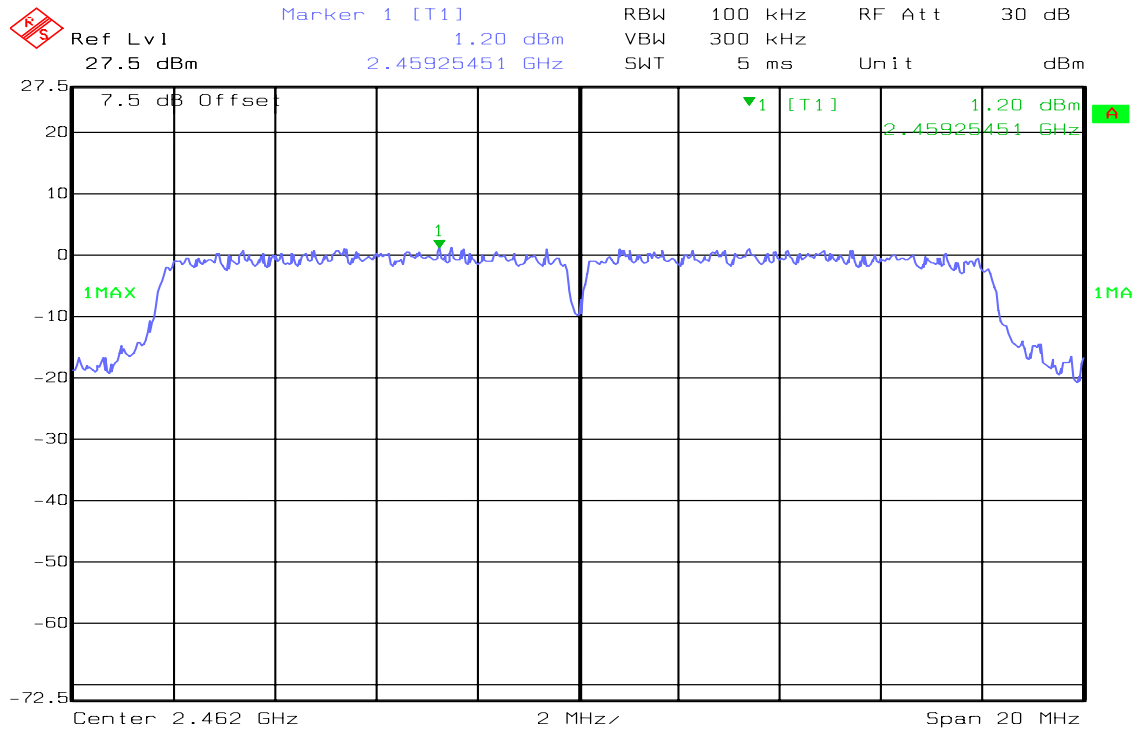


PPSD (CH Mid)



Date: 04.JUN.2012 16:58:25

PPSD (CH High)

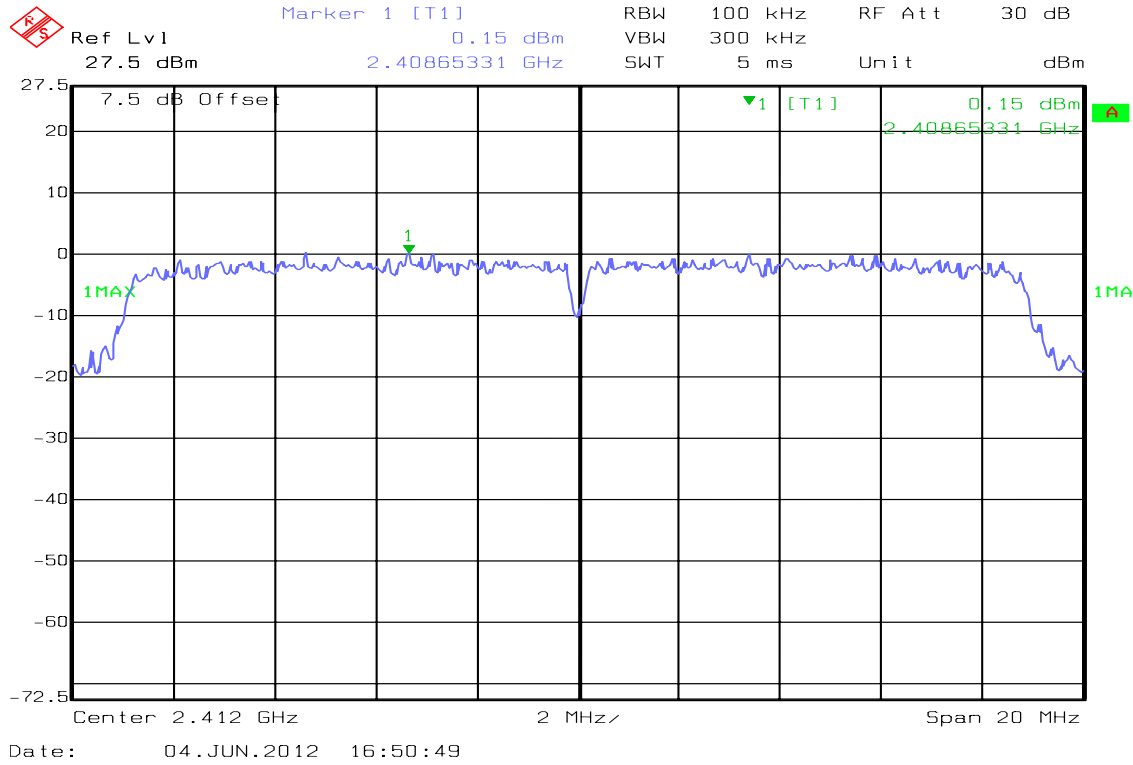


Date: 04.JUN.2012 16:56:44

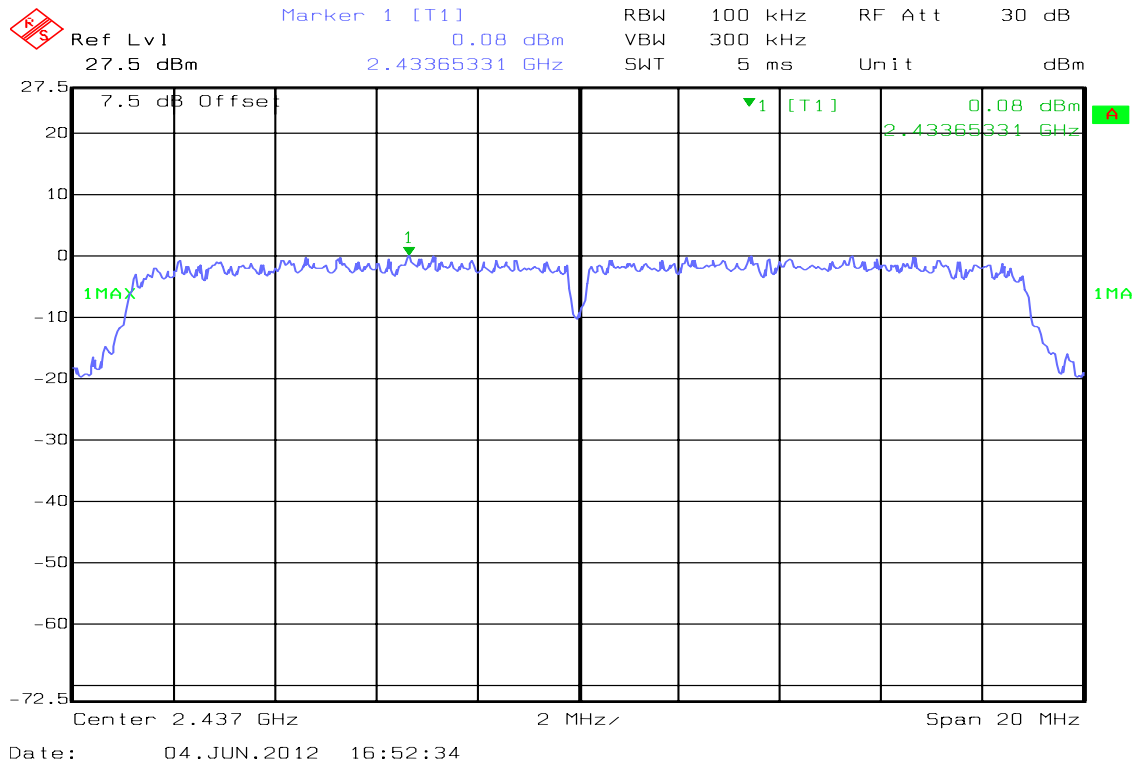


IEEE 802.11n HT20 mode

PPSD (CH Low)

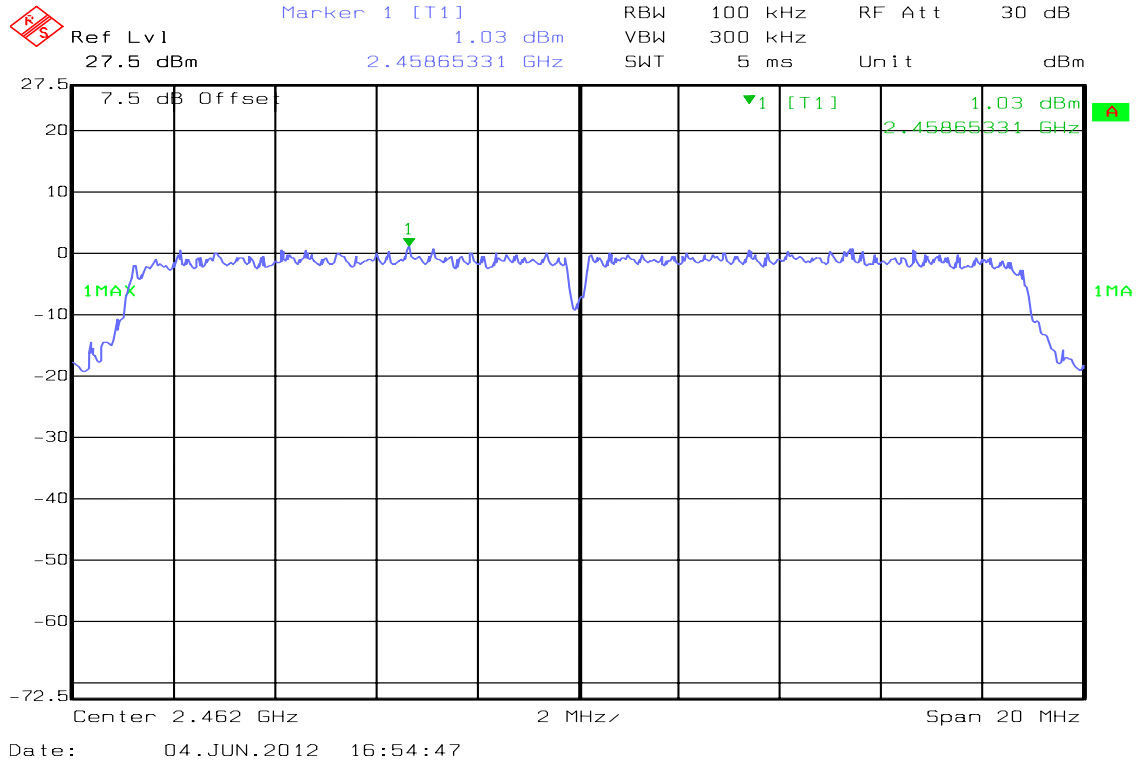


PPSD (CH Mid)



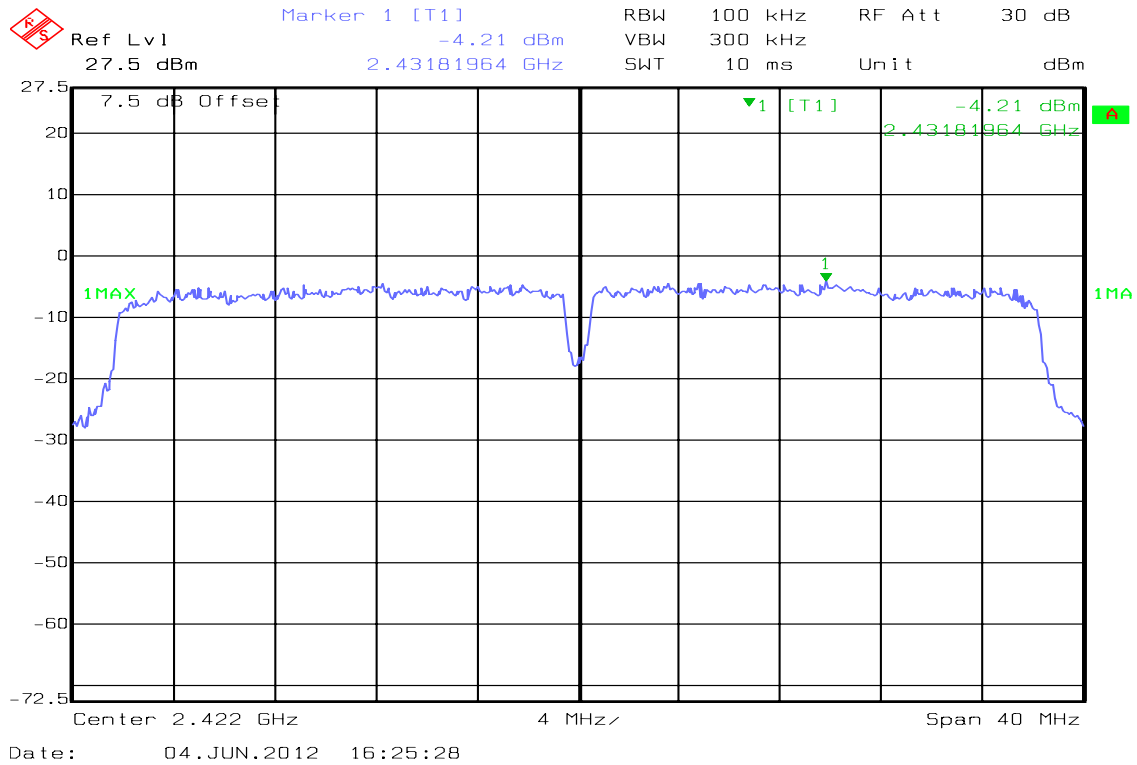


PPSD (CH High)



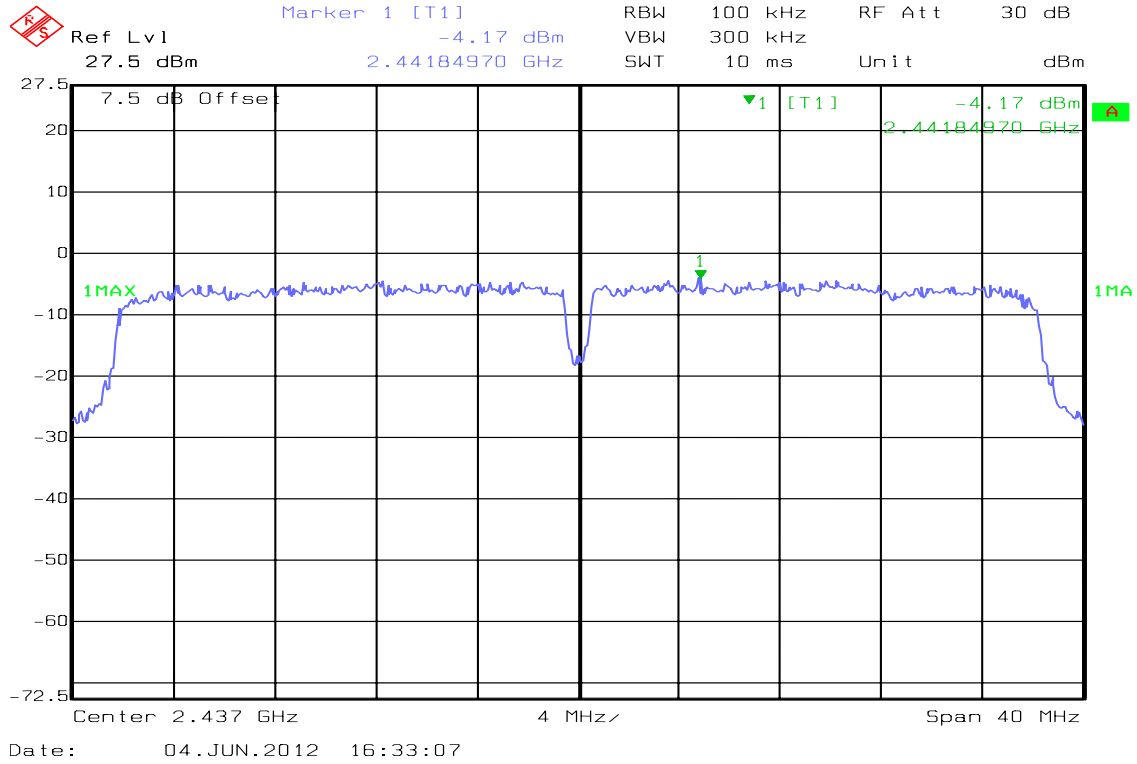
IEEE 802.11n HT40 mode

PPSD (CH Low)

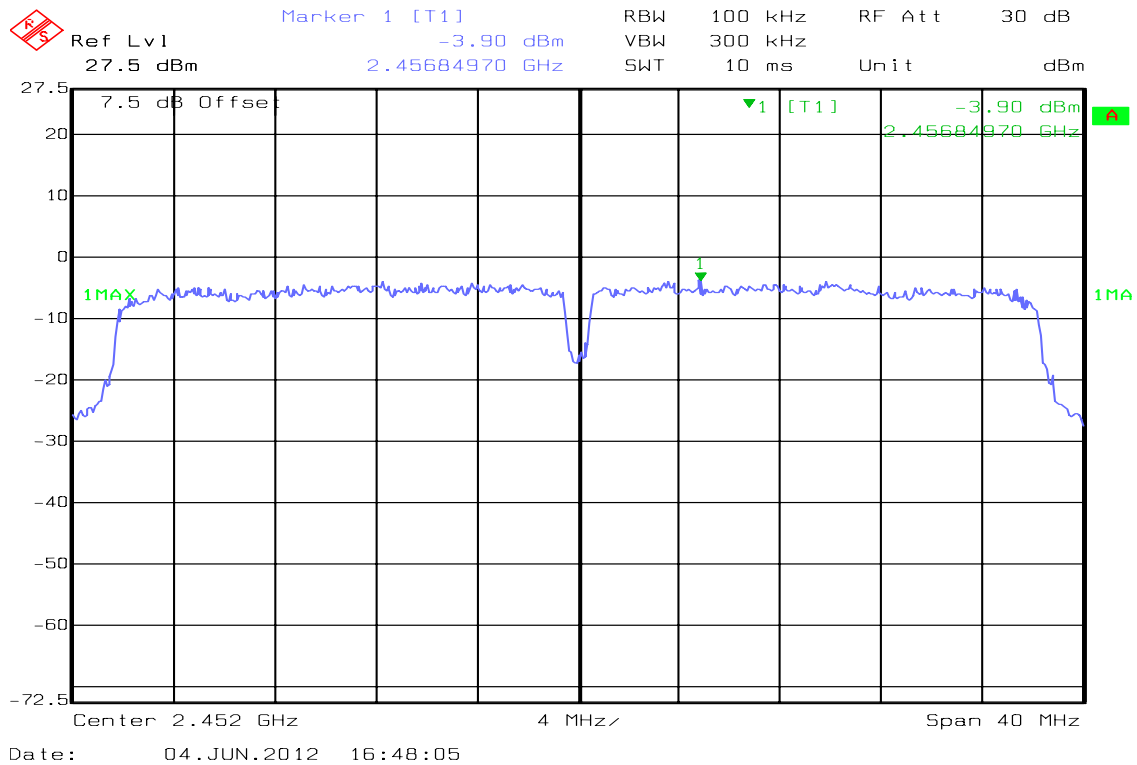




PPSD (CH Mid)



PPSD (CH High)





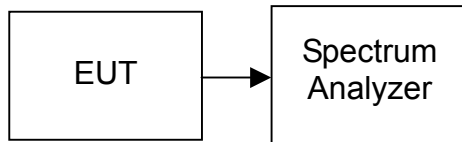
7.6 SPURIOUS EMISSIONS

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

TEST CONFIGURATION



TEST PROCEDURE

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

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

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

TEST RESULTS

No non-compliance noted.



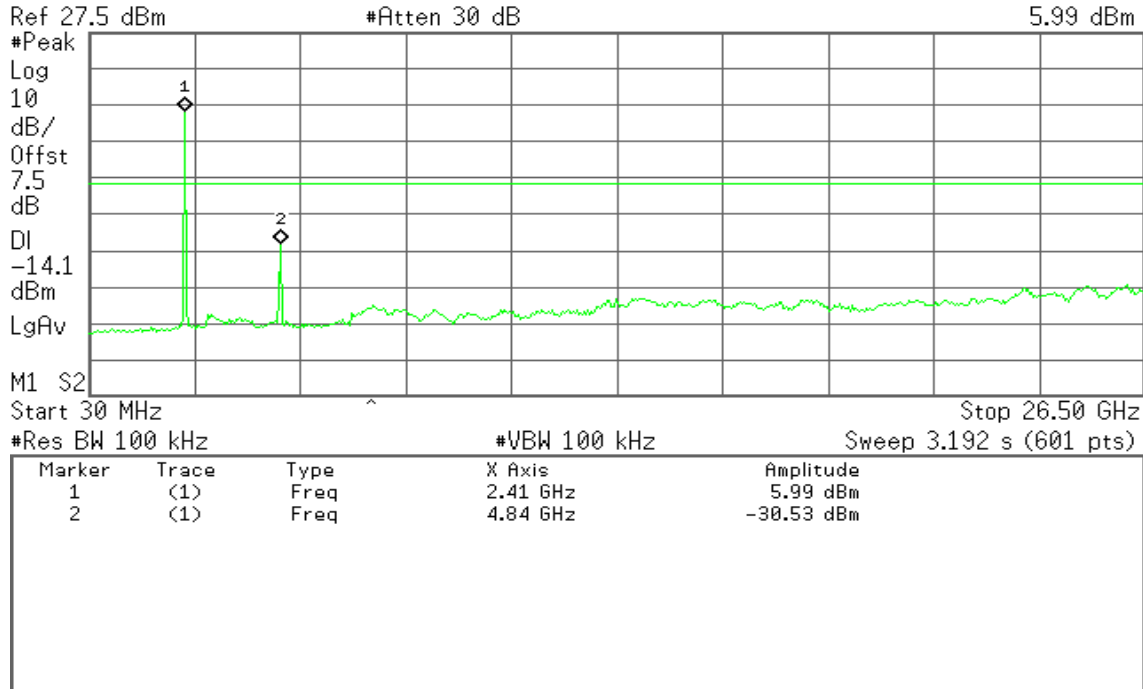
Test Plot

IEEE 802.11b mode

Agilent 14:15:38 Apr 23, 2012

R L

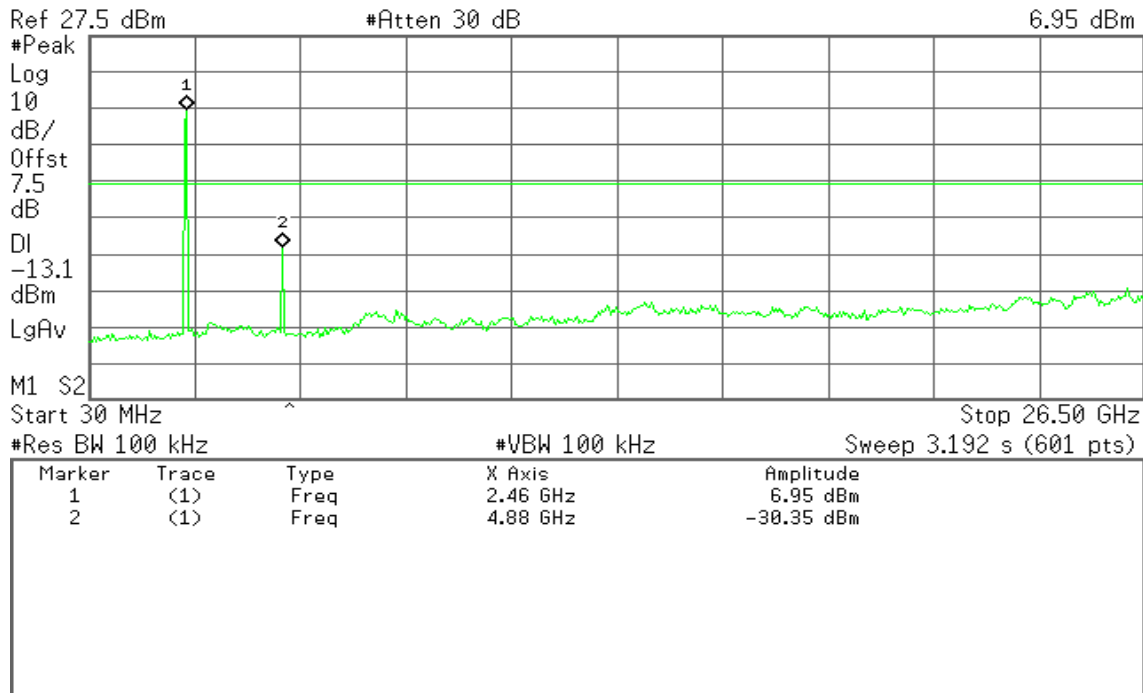
Mkr1 2.41 GHz
5.99 dBm



Agilent 14:22:14 Apr 23, 2012

R L

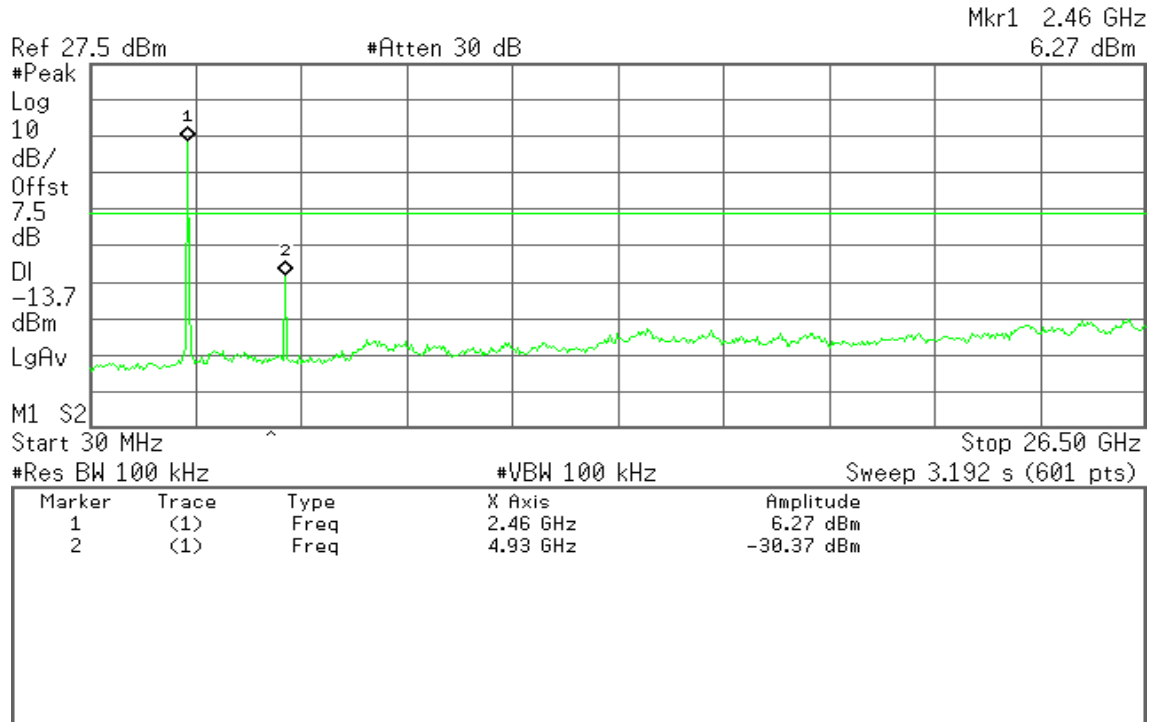
Mkr1 2.46 GHz
6.95 dBm





Agilent 14:28:19 Apr 23, 2012

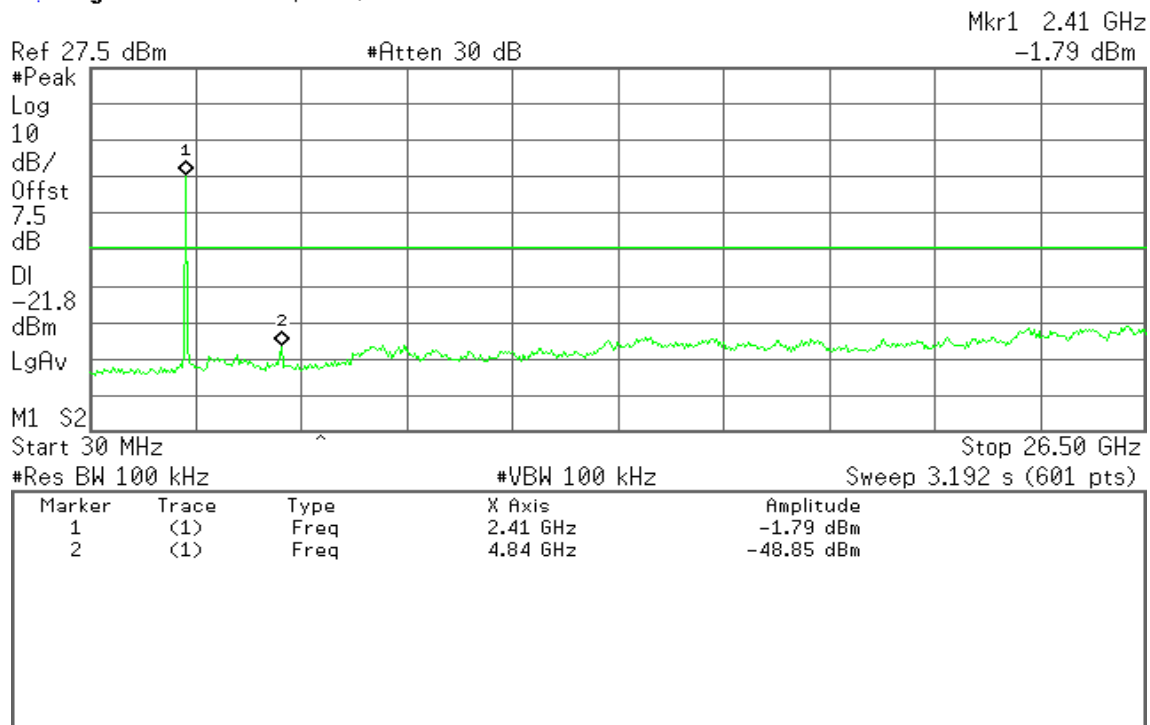
R L



IEEE 802.11g mode

Agilent 14:33:21 Apr 23, 2012

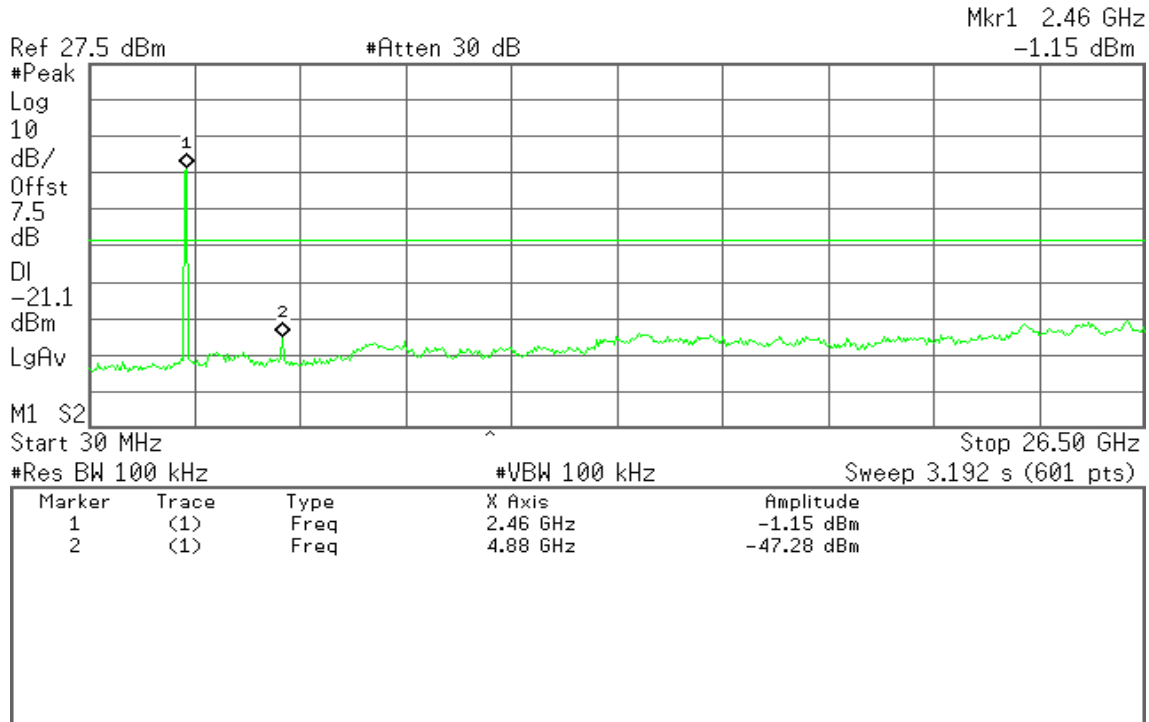
R L





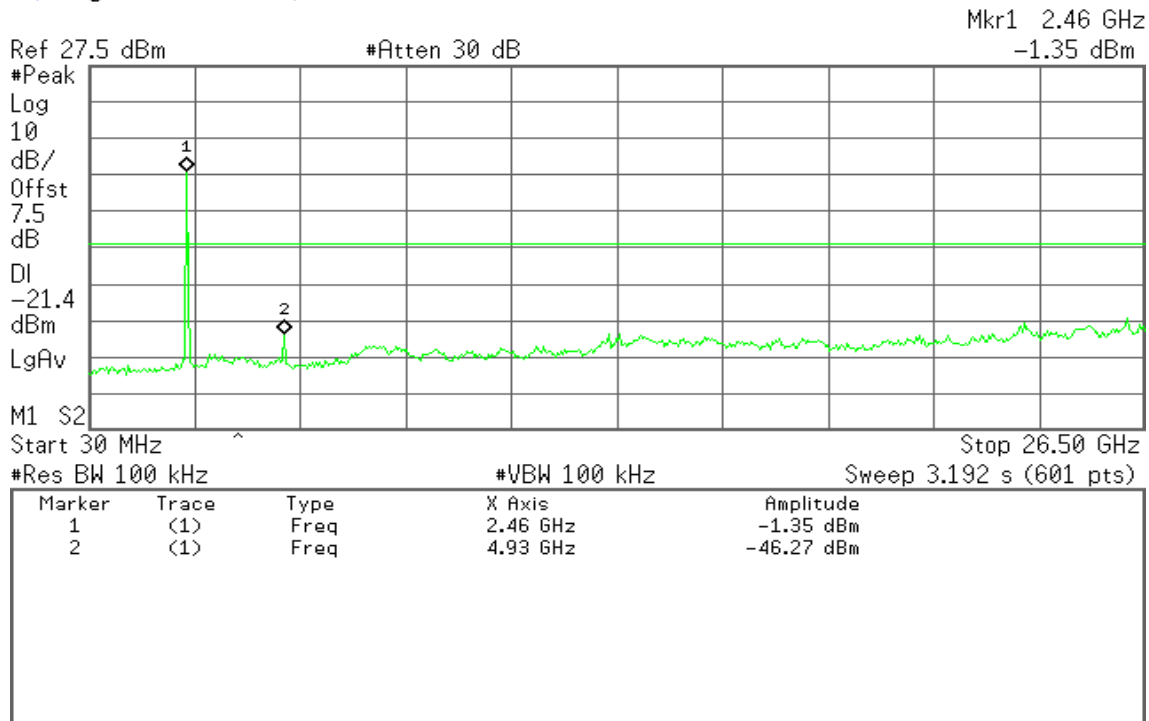
Agilent 14:35:12 Apr 23, 2012

R L



Agilent 14:38:26 Apr 23, 2012

R L



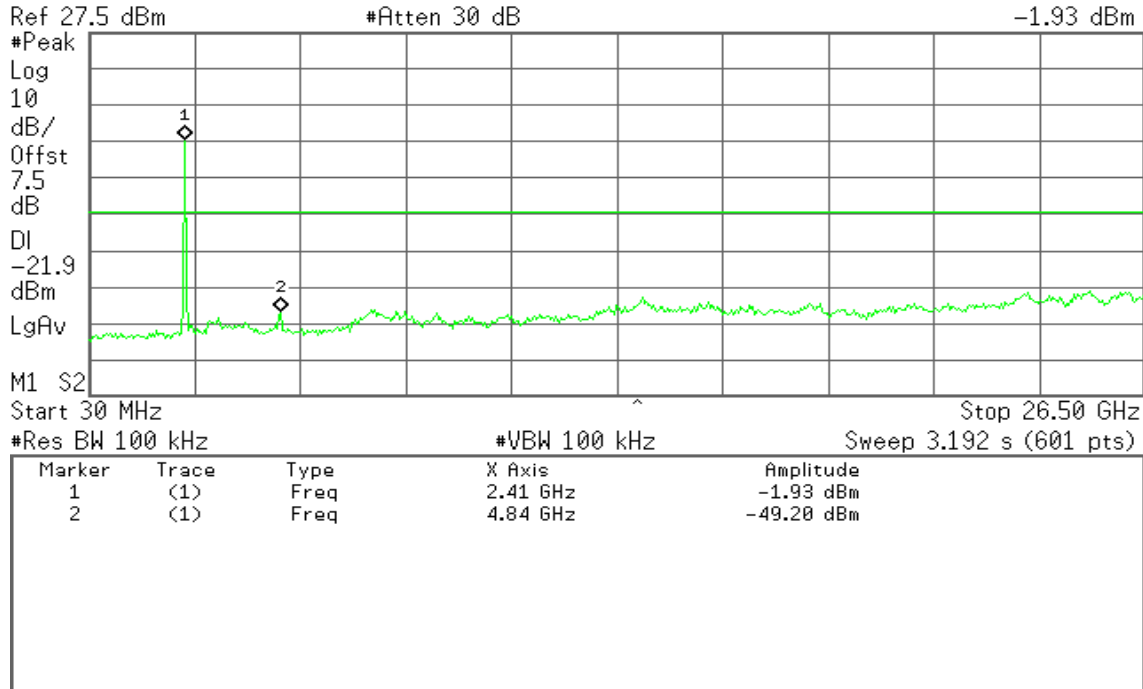


IEEE 802.11n HT20 mode

Agilent 14:41:46 Apr 23, 2012

R T

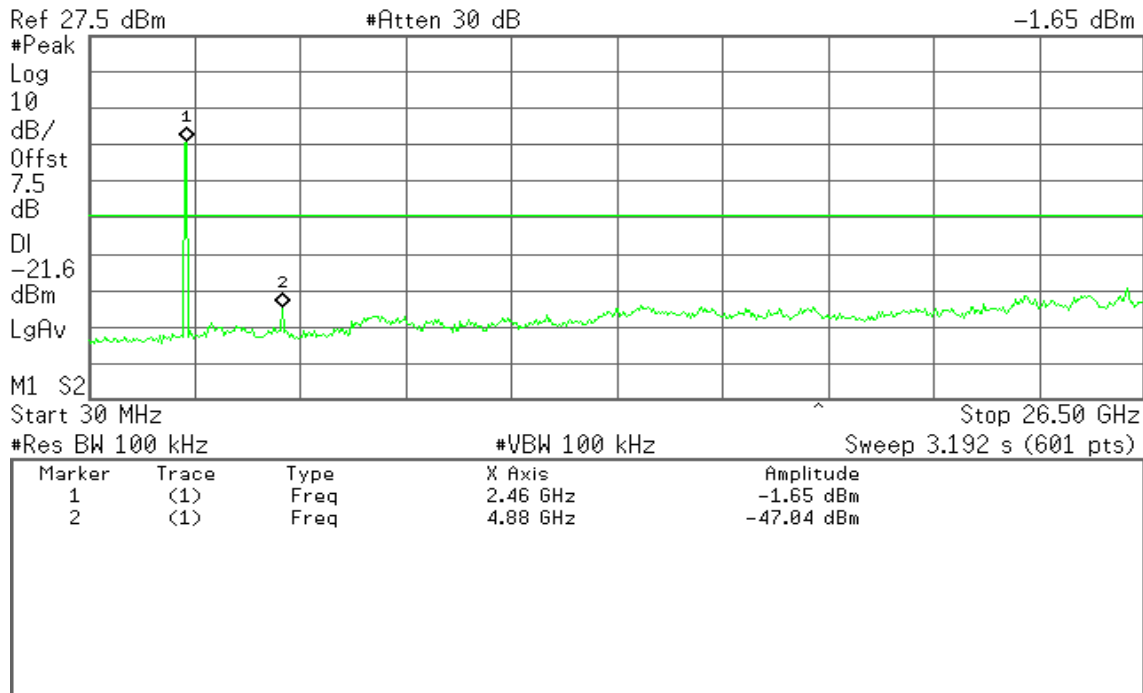
Mkr1 2.41 GHz
-1.93 dBm



Agilent 14:43:30 Apr 23, 2012

R L

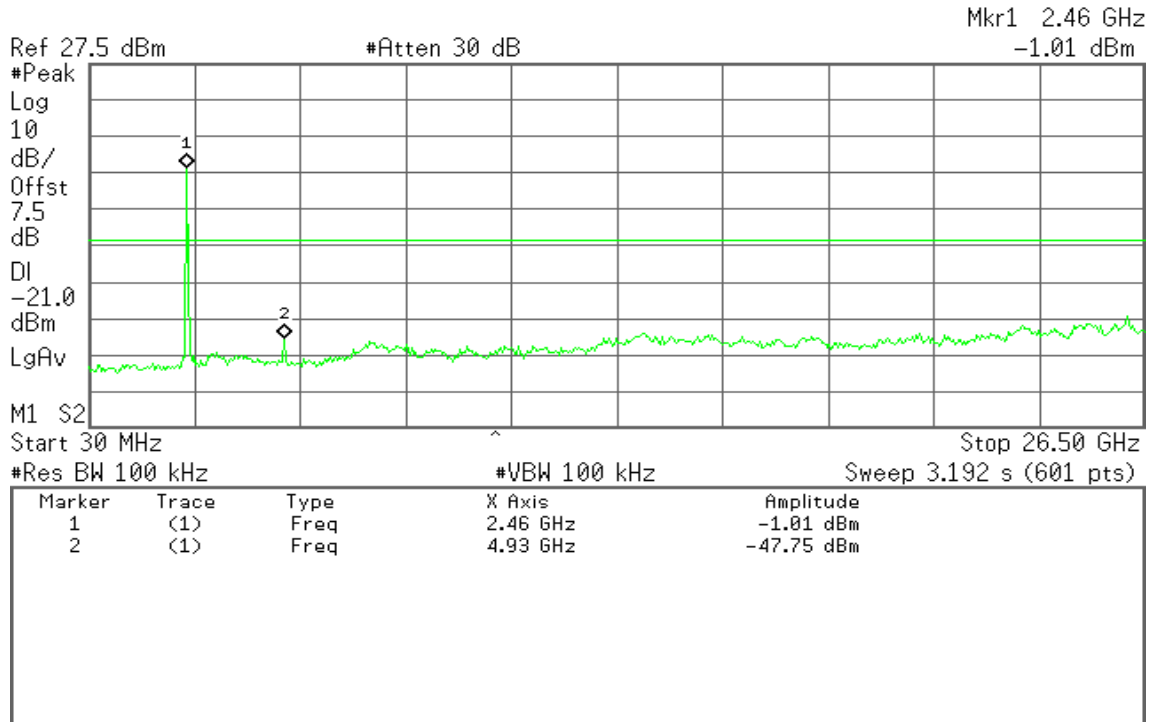
Mkr1 2.46 GHz
-1.65 dBm





Agilent 14:44:47 Apr 23, 2012

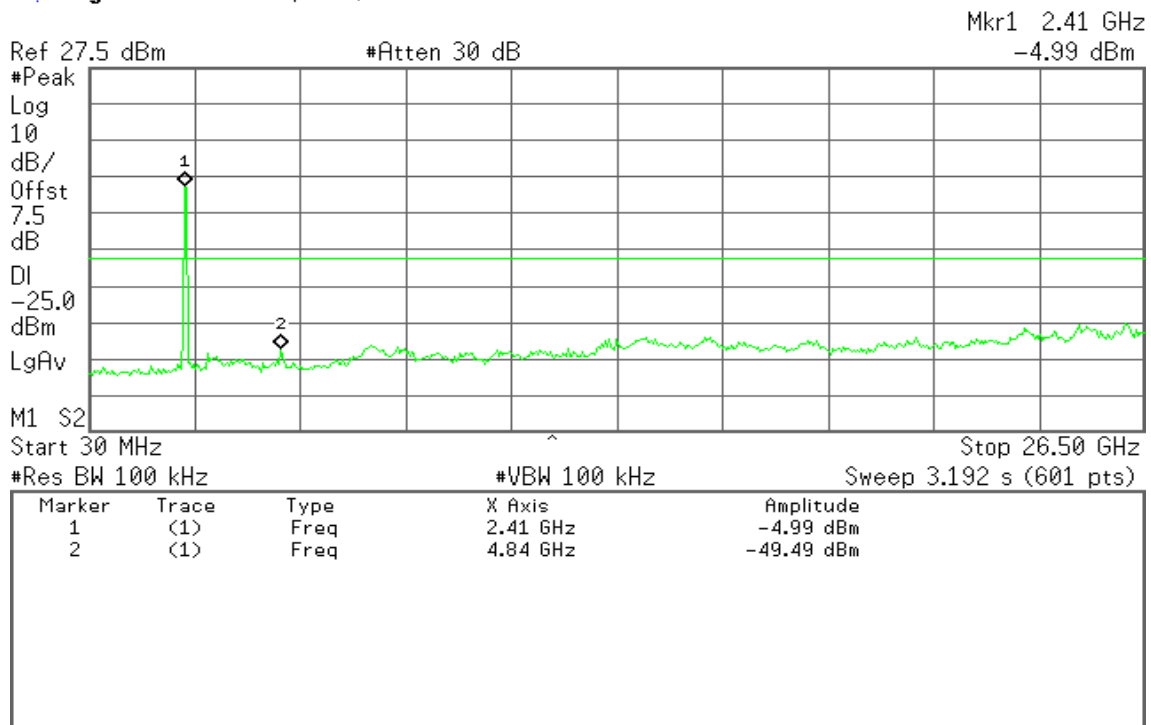
R L



IEEE 802.11n HT40 mode

Agilent 14:47:09 Apr 23, 2012

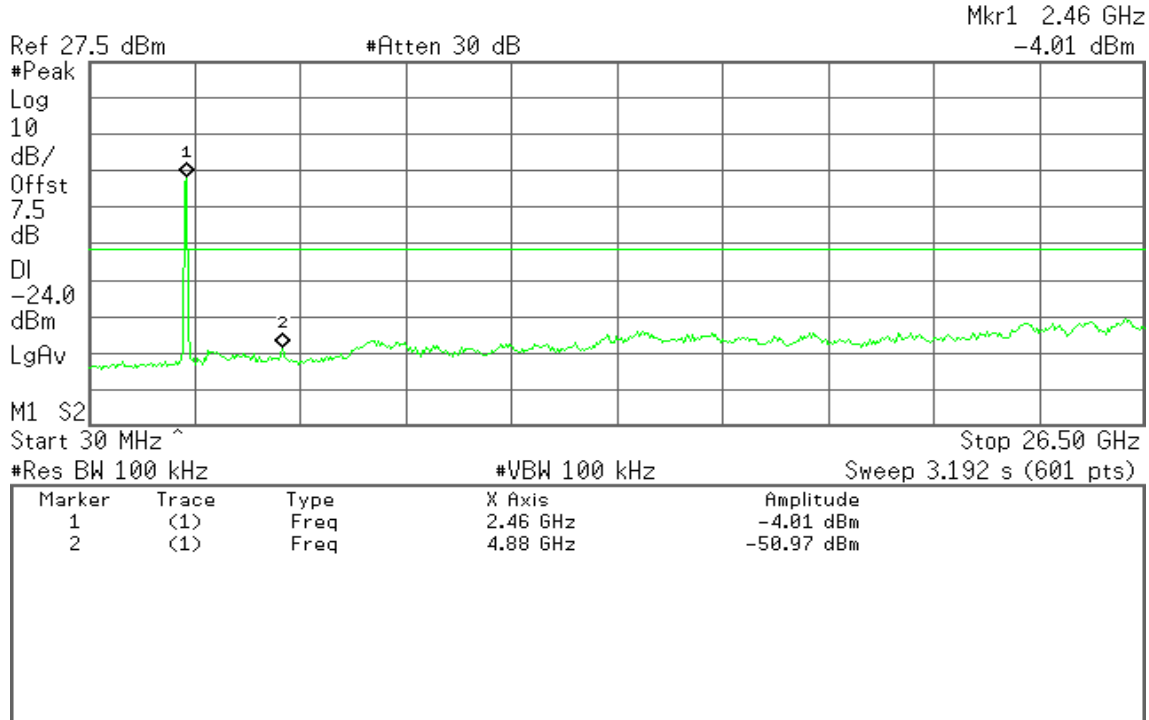
R L





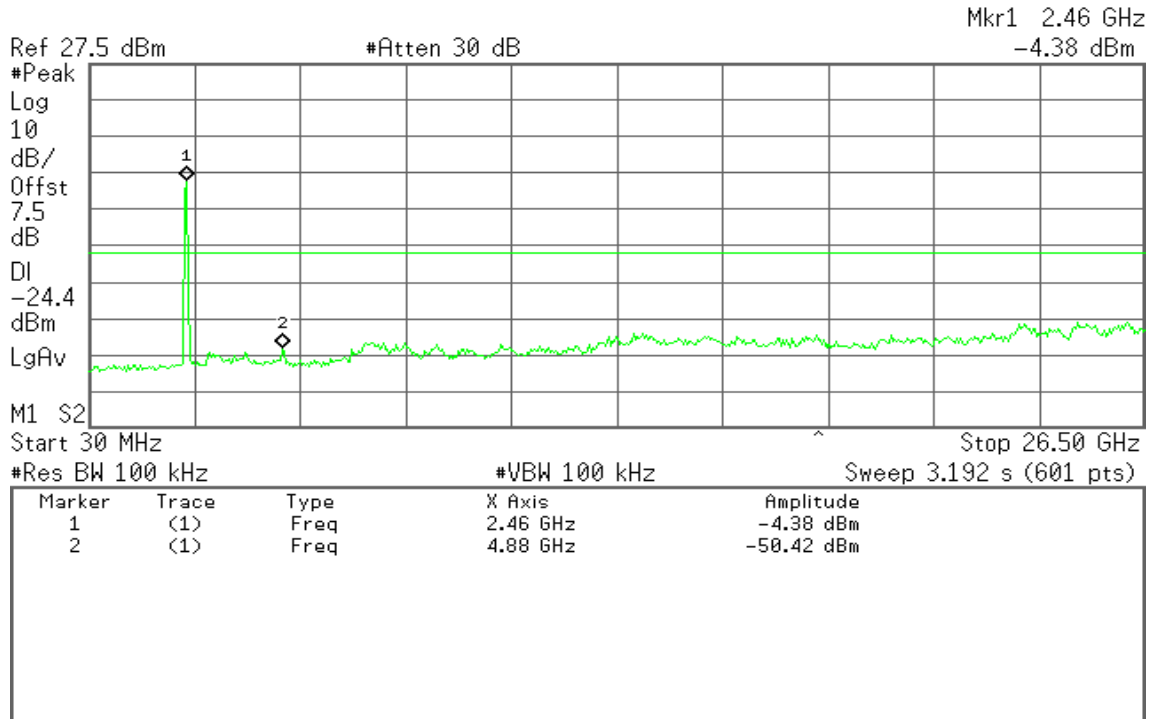
Agilent 14:50:42 Apr 23, 2012

R L



Agilent 14:52:06 Apr 23, 2012

R L





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.

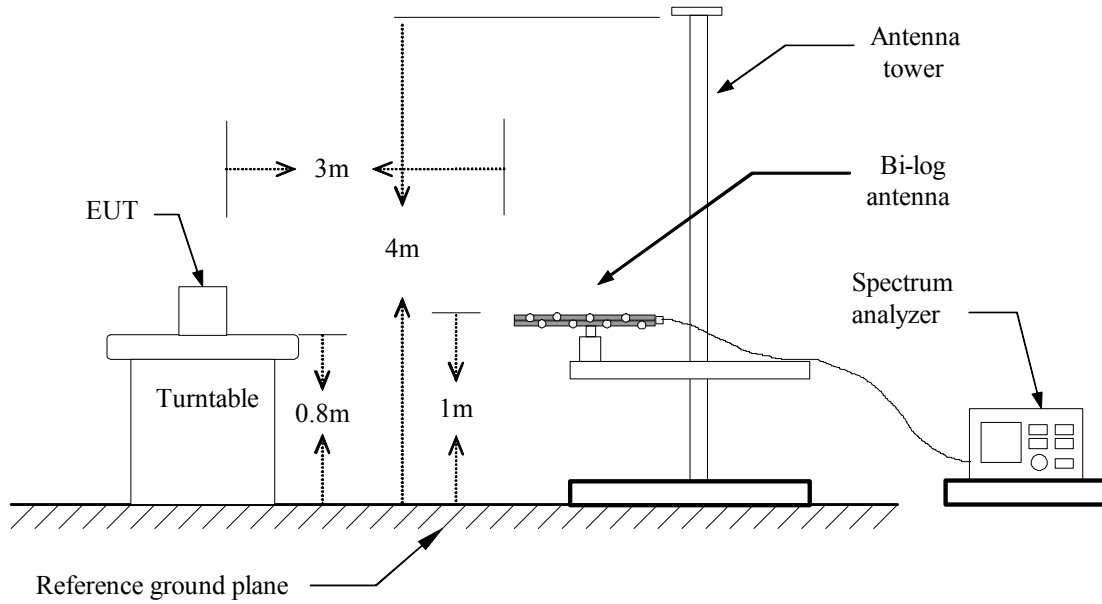
2. In the emission table above, the tighter limit applies at the band edges.

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

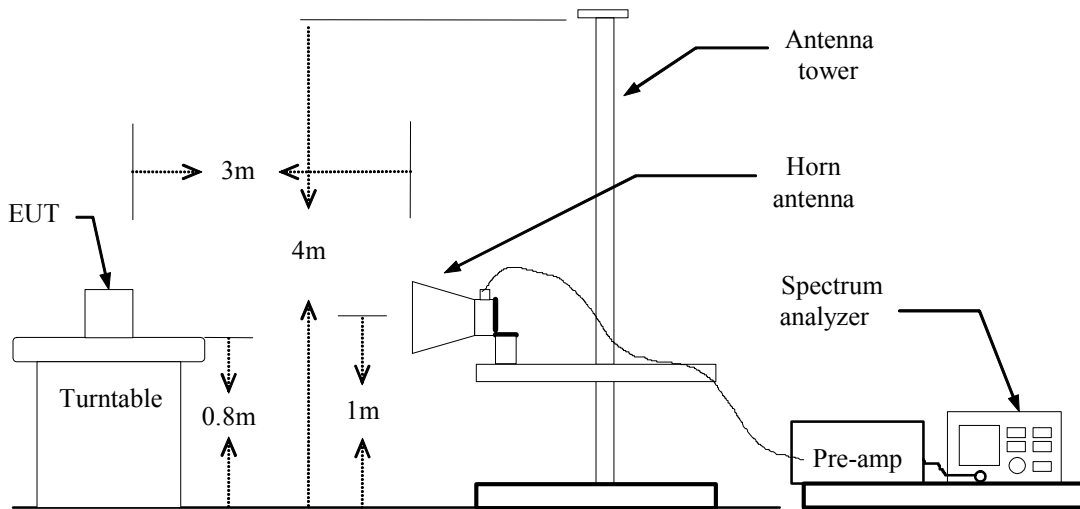


TEST CONFIGURATION

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 30MHz

RBW=9kHz / VBW=300kHz / Sweep=AUTO

30 ~ 1000MHz:

RBW=120kHz / 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 1GHz

Operation Mode: Data Link **Test Date:** March 14, 2012
Temperature: 18°C **Tested by:** Rick Lu
Humidity: 50% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol. (H/V)	Remark
77.0450	55.08	-19.23	35.85	40.00	-4.15	V	QP
168.2249	51.39	-13.60	37.79	43.50	-5.71	V	QP
250.1899	54.25	-12.49	41.76	46.00	-4.24	V	QP
374.8349	51.37	-9.57	41.80	46.00	-4.20	V	QP
665.8350	46.01	-4.37	41.64	46.00	-4.36	V	QP
824.9149	40.57	-1.21	39.36	46.00	-6.64	V	QP
77.0450	53.18	-19.23	33.95	40.00	-6.05	H	QP
250.1900	53.59	-12.49	41.10	46.00	-4.90	H	QP
374.8350	51.42	-9.57	41.85	46.00	-4.15	H	QP
599.8750	43.11	-3.99	39.12	46.00	-6.88	H	QP
662.9250	42.57	-4.47	38.10	46.00	-7.90	H	QP
898.1500	41.55	0.27	41.82	46.00	-4.18	H	QP

Remark:

1. No emission found between lowest internal used / generated frequency to 30 MHz. (9kHz ~ 30MHz)
2. Measuring frequencies from 9 kHz to the 1GHz.
3. Radiated emissions measured in the measured frequency range were made with an instrument using peak detector or quasi-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: TX / IEEE 802.11b / CH Low

Test Date: March 10, 2012

Temperature: 18°C

Tested by: Rick Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	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)	Ant. Pol. (H/V)	Remark
1990.00	50.26	---	-1.46	48.80	---	74.00	54.00	-5.20	V	Peak
2510.00	51.84	---	-1.05	50.79	---	74.00	54.00	-3.21	V	Peak
4825.00	48.00	---	2.68	50.68	---	74.00	54.00	-3.32	V	Peak
N/A										
2166.67	49.61	---	-3.63	45.97	---	74.00	54.00	-8.03	H	Peak
2923.33	49.71	---	-1.48	48.23	---	74.00	54.00	-5.77	H	Peak
4825.00	48.00	---	2.68	50.68	---	74.00	54.00	-3.32	H	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.



Operation Mode: TX / IEEE 802.11b / CH Mid

Test Date: March 10, 2012

Temperature: 18°C

Tested by: Rick Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	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)	Ant. Pol. (H/V)	Remark
1953.33	50.02	---	-2.04	47.98	---	74.00	54.00	-6.02	V	Peak
2520.00	51.60	---	-1.18	50.42	---	74.00	54.00	-3.58	V	Peak
4875.00	48.46	46.30	3.81	52.27	50.11	74.00	54.00	-3.89	V	AVG
N/A										
2130.00	49.86	---	-3.71	46.15	---	74.00	54.00	-7.85	H	Peak
2530.00	52.05	---	-3.67	48.37	---	74.00	54.00	-5.63	H	Peak
4875.00	44.86	43.32	6.72	51.59	50.04	74.00	54.00	-3.96	H	AVG
7308.33	39.10	---	11.78	50.88	---	74.00	54.00	-3.12	H	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.



Operation Mode: TX / IEEE 802.11b / CH High

Test Date: March 10, 2012

Temperature: 18°C

Tested by: Rick Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	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)	Ant. Pol. (H/V)	Remark
1923.33	50.76	---	-2.51	48.25	---	74.00	54.00	-5.75	V	Peak
2543.33	52.01	---	-1.47	50.54	---	74.00	54.00	-3.46	V	Peak
4925.00	46.36	---	4.61	50.97	---	74.00	54.00	-3.03	V	Peak
7383.33	38.94	---	11.16	50.11	---	74.00	54.00	-3.89	V	Peak
N/A										
2223.33	50.60	---	-4.21	46.39	---	74.00	54.00	-7.61	H	Peak
2580.00	50.07	---	-3.45	46.62	---	74.00	54.00	-7.38	H	Peak
4925.00	45.14	43.68	7.26	52.40	50.94	74.00	54.00	-3.06	H	AVG
7383.33	42.96	36.57	11.40	54.36	47.97	74.00	54.00	-6.03	H	AVG
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.



Operation Mode: TX / IEEE 802.11g / CH Low

Test Date: March 10, 2012

Temperature: 18°C

Tested by: Rick Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	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)	Ant. Pol. (H/V)	Remark
1966.67	50.21	---	-1.83	48.38	---	74.00	54.00	-5.62	V	Peak
2496.67	50.17	---	-0.95	49.21	---	74.00	54.00	-4.79	V	Peak
4825.00	43.85	---	2.68	46.54	---	74.00	54.00	-7.46	V	Peak
N/A										
2166.67	49.85	---	-3.63	46.21	---	74.00	54.00	-7.79	H	Peak
2840.00	48.21	---	-2.18	46.03	---	74.00	54.00	-7.97	H	Peak
3666.67	44.86	---	3.90	48.76	---	74.00	54.00	-5.24	H	Peak
4825.00	41.82	---	5.87	47.69	---	74.00	54.00	-6.31	H	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.



Operation Mode: TX / IEEE 802.11g / CH Mid

Test Date: March 10, 2012

Temperature: 18°C

Tested by: Rick Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	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)	Ant. Pol. (H/V)	Remark
2196.67	49.55	---	-1.40	48.15	---	74.00	54.00	-5.85	V	Peak
2523.33	50.62	---	-1.22	49.40	---	74.00	54.00	-4.60	V	Peak
4875.00	42.92	---	3.81	46.73	---	74.00	54.00	-7.27	V	Peak
N/A										
2160.00	49.15	---	-3.65	45.51	---	74.00	54.00	-8.49	H	Peak
2760.00	49.18	---	-2.84	46.35	---	74.00	54.00	-7.65	H	Peak
4875.00	41.74	---	6.72	48.46	---	74.00	54.00	-5.54	H	Peak
7300.00	38.87	---	11.82	50.69	---	74.00	54.00	-3.31	H	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.



Operation Mode: TX / IEEE 802.11g / CH High

Test Date: March 10, 2012

Temperature: 18°C

Tested by: Rick Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	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)	Ant. Pol. (H/V)	Remark
1926.67	50.29	---	-2.46	47.84	---	74.00	54.00	-6.16	V	Peak
2546.67	49.90	---	-1.51	48.40	---	74.00	54.00	-5.60	V	Peak
4925.00	39.92	---	4.61	44.53	---	74.00	54.00	-9.47	V	Peak
N/A										
2213.33	50.15	---	-3.93	46.22	---	74.00	54.00	-7.78	H	Peak
2593.33	49.98	---	-3.39	46.59	---	74.00	54.00	-7.41	H	Peak
4925.00	39.97	---	7.26	47.23	---	74.00	54.00	-6.77	H	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.



Operation Mode: TX / IEEE 802.11n HT20 / CH Low

Test Date: March 10, 2012

Temperature: 18°C

Tested by: Rick Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	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)	Ant. Pol. (H/V)	Remark
2030.00	50.10	---	-1.98	48.12	---	74.00	54.00	-5.88	V	Peak
2500.00	50.38	---	-0.93	49.45	---	74.00	54.00	-4.55	V	Peak
4825.00	42.41	---	2.68	45.10	---	74.00	54.00	-8.90	V	Peak
N/A										
2170.00	49.58	---	-3.63	45.95	---	74.00	54.00	-8.05	H	Peak
2863.33	48.13	---	-2.01	46.13	---	74.00	54.00	-7.87	H	Peak
4825.00	44.22	---	5.87	50.09	---	74.00	54.00	-3.91	H	Peak
7241.67	39.19	---	11.04	50.24	---	74.00	54.00	-3.76	H	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.



Operation Mode: TX / IEEE 802.11n HT20 / CH Mid

Test Date: March 10, 2012

Temperature: 18°C

Tested by: Rick Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	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)	Ant. Pol. (H/V)	Remark
1890.00	51.94	---	-3.11	48.83	---	74.00	54.00	-5.17	V	Peak
2520.00	50.72	---	-1.18	49.54	---	74.00	54.00	-4.46	V	Peak
4875.00	42.31	---	3.81	46.12	---	74.00	54.00	-7.88	V	Peak
N/A										
2200.00	49.72	---	-3.56	46.16	---	74.00	54.00	-7.84	H	Peak
2526.67	51.14	---	-3.69	47.45	---	74.00	54.00	-6.55	H	Peak
4875.00	41.68	---	6.72	48.40	---	74.00	54.00	-5.60	H	Peak
7308.33	39.16	---	11.78	50.94	---	74.00	54.00	-3.06	H	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.



Operation Mode: TX / IEEE 802.11n HT20 / CH High

Test Date: March 10, 2012

Temperature: 18°C

Tested by: Rick Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	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)	Ant. Pol. (H/V)	Remark
2160.00	50.17	---	-2.23	47.94	---	74.00	54.00	-6.06	V	Peak
2696.67	49.15	---	-1.49	47.65	---	74.00	54.00	-6.35	V	Peak
4925.00	41.40	---	4.61	46.01	---	74.00	54.00	-7.99	V	Peak
N/A										
1923.33	50.37	---	-5.95	44.42	---	74.00	54.00	-9.58	H	Peak
2766.67	48.96	---	-2.78	46.18	---	74.00	54.00	-7.82	H	Peak
4925.00	41.29	---	7.26	48.55	---	74.00	54.00	-5.45	H	Peak
7383.33	38.64	---	11.40	50.03	---	74.00	54.00	-3.97	H	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.



Operation Mode: TX / IEEE 802.11n HT40 / CH Low

Test Date: March 10, 2012

Temperature: 18°C

Tested by: Rick Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	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)	Ant. Pol. (H/V)	Remark
2000.00	49.26	---	-1.30	47.96	---	74.00	54.00	-6.04	V	Peak
2653.33	48.96	---	-1.80	47.16	---	74.00	54.00	-6.84	V	Peak
4841.67	41.83	---	3.06	44.89	---	74.00	54.00	-9.11	V	Peak
N/A										
2183.33	49.73	---	-3.60	46.14	---	74.00	54.00	-7.86	H	Peak
2626.67	49.35	---	-3.36	45.99	---	74.00	54.00	-8.01	H	Peak
4841.67	42.13	---	6.16	48.29	---	74.00	54.00	-5.71	H	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.



Operation Mode: TX / IEEE 802.11n HT40 / CH Mid

Test Date: March 10, 2012

Temperature: 18°C

Tested by: Rick Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	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)	Ant. Pol. (H/V)	Remark
1956.67	49.70	---	-1.98	47.72	---	74.00	54.00	-6.28	V	Peak
2533.33	50.63	---	-1.34	49.29	---	74.00	54.00	-4.71	V	Peak
4875.00	41.59	---	3.81	45.40	---	74.00	54.00	-8.60	V	Peak
N/A										
2096.67	49.10	---	-3.87	45.23	---	74.00	54.00	-8.77	H	Peak
2766.67	49.02	---	-2.78	46.24	---	74.00	54.00	-7.76	H	Peak
4875.00	39.95	---	6.72	46.67	---	74.00	54.00	-7.33	H	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.



Operation Mode: TX / IEEE 802.11n HT40 / CH High

Test Date: March 10, 2012

Temperature: 18°C

Tested by: Rick Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	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)	Ant. Pol. (H/V)	Remark
1983.33	49.55	---	-1.56	47.99	---	74.00	54.00	-6.01	V	Peak
2720.00	49.24	---	-1.60	47.65	---	74.00	54.00	-6.35	V	Peak
4916.67	39.33	---	4.53	43.86	---	74.00	54.00	-10.14	V	Peak
N/A										
2176.67	49.42	---	-3.61	45.81	---	74.00	54.00	-8.19	H	Peak
2540.00	50.38	---	-3.63	46.75	---	74.00	54.00	-7.25	H	Peak
4925.00	38.99	---	7.26	46.25	---	74.00	54.00	-7.75	H	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.



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: Data Link

Test Date: March 14, 2012

Temperature: 25°C

Tested by: Rick Lu

Humidity: 57% RH

Freq. (MHz)	QP Reading	AV Reading	Corr. factor	QP Result	AV Result	QP Limit	AV Limit	QP Margin	AV Margin	Note
0.1881	25.81	11.62	9.78	35.59	21.40	64.12	54.12	-28.53	-32.72	L1
0.4365	22.48	7.77	9.68	32.16	17.45	57.13	47.13	-24.97	-29.68	L1
1.8815	16.46	1.72	9.72	26.18	11.44	56.00	46.00	-29.82	-34.56	L1
3.2006	18.59	3.33	9.74	28.33	13.07	56.00	46.00	-27.67	-32.93	L1
9.2918	16.63	6.70	10.10	26.73	16.80	60.00	50.00	-33.27	-33.20	L1
25.0017	21.90	16.38	10.61	32.51	26.99	60.00	50.00	-27.49	-23.01	L1
0.2347	25.72	13.61	9.71	35.43	23.32	62.28	52.28	-26.85	-28.96	L2
3.2990	18.31	3.81	9.74	28.05	13.55	56.00	46.00	-27.95	-32.45	L2
6.2458	14.39	2.15	9.88	24.27	12.03	60.00	50.00	-35.73	-37.97	L2
9.6623	16.90	1.94	10.20	27.10	12.14	60.00	50.00	-32.90	-37.86	L2
13.1674	11.89	1.45	10.34	22.23	11.79	60.00	50.00	-37.77	-38.21	L2
25.0026	21.22	15.24	10.83	32.05	26.07	60.00	50.00	-27.95	-23.93	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)

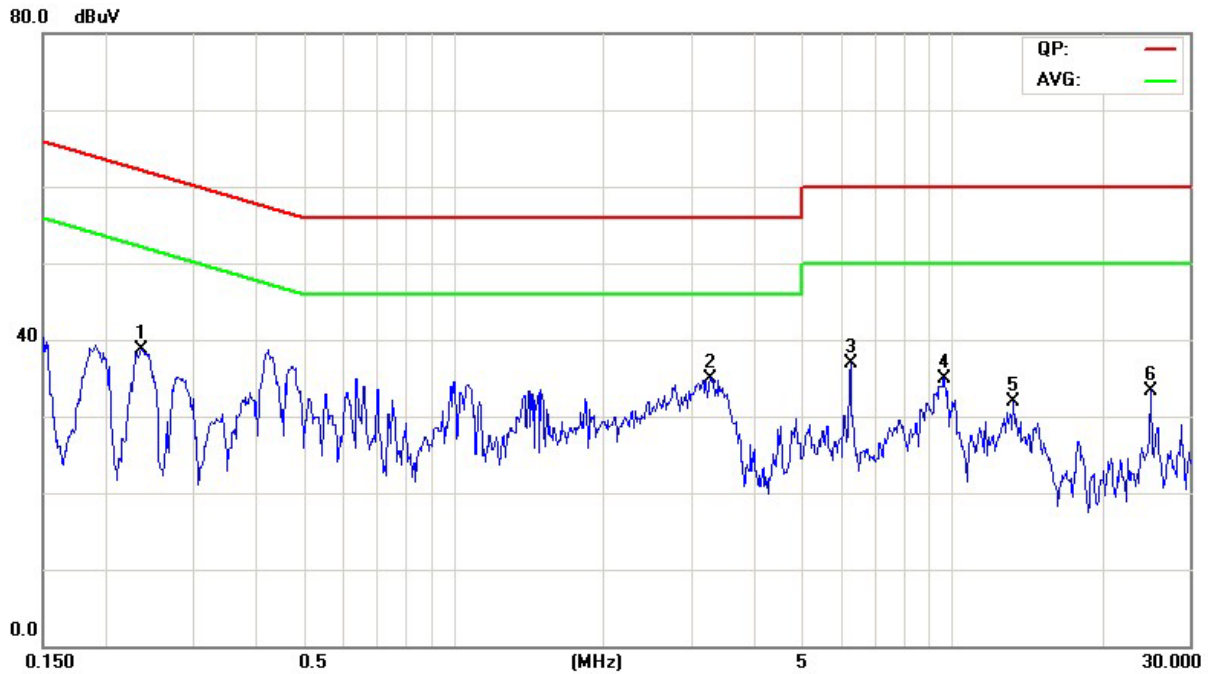


Test Plot

Conducted emissions (Line 1)



Conducted emissions (Line 2)





8. 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	HD Wireless N Cube Network Camera
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input type="checkbox"/> Others
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna diversity	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input checked="" type="checkbox"/> Tx/Rx diversity
Max. output power (AVG.)	IEEE 802.11b mode: 16.22 dBm (0.0419W) IEEE 802.11g mode: 13.81 dBm (0.0240W) IEEE 802.11n HT20 mode: 13.97 dBm (0.0249W) IEEE 802.11n HT40 mode: 13.68 dBm (0.0233W)
Antenna gain (Max)	0.5dBi (including cable loss) (Numeric gain: 1.122)
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

Remark:

1. The maximum output power is 16.22dBm (0.0419W) at 2437MHz (with 1.122numeric antenna gain.)
2. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.

TEST RESULTS

No non-compliance noted.



Calculation

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

Where $E =$ Field strength in Volts / meter

$P =$ Power in Watts

$G =$ Numeric antenna gain

$d =$ Distance in meters

$S =$ Power density in milliwatts / square centimeter

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

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

Changing to units of mW and cm, using:

$$P (mW) = P (W) / 1000 \text{ and}$$

$$d (cm) = d(m) / 100$$

Yields

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

Where $d =$ Distance in cm

$P =$ Power in mW

$G =$ Numeric antenna gain

$S =$ Power density in mW / cm²

Maximum Permissible Exposure

EUT output power = 41.88mW

Numeric Antenna gain = 1.122

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

Yields

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

Where $P =$ Power in mW

$G =$ Numeric antenna gain

$S =$ Power density in mW / cm²

→ Power density = 0.00935 mW / cm²

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