FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Network Video Server

Model: NV812D

Trade Name: Sercomm

Issued to

SerComm Corporation
8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C.

Issued by

Compliance Certification Services Inc.
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Testing Laboratory
1309

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Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		Nov. 11, 2010		Initial Issue	ALL	Jill Shiau

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1. TEST RESULT CERTIFICATION

Applicant:	**SerComm Corporation** 8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C.
Manufacturer:	**SerComm Corporation** 8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C.
Equipment Under Test:	Network Video Server
Trade Name:	Sercomm
Model:	NV812D
Date of Test:	October 21 ~ November 9, 2010

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

We hereby certify that:

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

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

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

Stan Lin
Supervisor

Jack Chang
Engineer

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2. EUT DESCRIPTION

Product	Network Video Server		
Trade Name	Sercomm		
Model Number	NV812D		
Model Discrepancy	N/A		
EUT Power Rating	12VDC, 1A		
Power Adapter	LEADER	**Model**	MU12-G120100-A1
Operating Frequency Range	2412 ~ 2462 MHz		
Transmit Power	IEEE 802.11b mode: 21.64 dBm IEEE 802.11g mode: 26.32 dBm draft 802.11n 20 MHz Channel mode: 27.22 dBm draft 802.11n 40 MHz Channel mode: 26.23 dBm		
Modulation Technique	IEEE 802.11b mode: DSSS (1, 2, 5.5 and 11 Mpbs) IEEE 802.11g mode: OFDM (6, 9, 12, 18, 24, 36, 48 and 54 Mpbs) draft 802.11n 20 MHz Channel mode: OFDM (6.5, 7.2, 13, 14.4, 14.44, 19.5, 21.7, 26, 28.89, 28.9, 39, 43.3, 43.33 52, 57.78, 57.8, 58.5, 65.0, 72.2, 78, 86.67, 104, 115.56, 117, 130, 144.44 Mbps) draft 802.11n 40 MHz Channel mode: OFDM (13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150, 162, 180, 216, 240, 243, 270, 300 Mbps)		
Number of Channels	IEEE 802.11b/g mode: 11 Channels draft 802.11n 20 MHz Channel mode: 11 Channels draft 802.11n 40 MHz Channel mode: 7 Channels		
Antenna Specification	Dipole Antenna / Gain: 2.0dBi		

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: **P27NV812D** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*

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3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4: 2003 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: 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.

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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.

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3.5 DESCRIPTION OF TEST MODES

The EUT is a 2Tx2R 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.

draft 802.11n 20 MHz Channel mode:

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

draft 802.11n 40 MHz Channel mode:

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

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4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

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

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: *Each piece of equipment is scheduled for calibration once a year.*

Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY48250064	11/04/2011
Spectrum Analyzer	R&S	FSEB	825829/011	11/01/2011
Power meter	Anritsu	MA2411B	917221	08/24/2011

3M Semi Anechoic Chamber				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY48250064	11/04/2011
Spectrum Analyzer	R&S	FSEB	825829/011	11/01/2011
Pre-Amplifier	HP	8447D	2944A06530	01/02/2011
Pre-Amplifier	HP	8449B	3008A01738	04/17/2011
EMI Test Receiver	SCHAFFNER	SCR 3501	436	01/26/2011
Loop Antenna	EMCO	6502	2356	06/11/2013
Bilog Antenna	SCHWAZBECK	VULB9160	3084	10/07/2011
Horn Antenna	EMCO	3115	00022250	05/09/2011
Turn Table	CCS	CC-T-1F	N/A	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R
Test S/W	LabVIEW 6.1 (Wugu Chamber EMI Teat V1_4.5.3)			

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Powerline Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
TEST RECEIVER	R&S	ESCI	100234	06/13/2011
LISN (EUT)	FCC	FCC-LISN-50-32-2	08009	03/25/2011
LISN	EMCO	3825/2	1382	01/11/2011
BNC CABLE	MIYAZAKI	5D-FB	BNC B3	08/10/2011
Pulse Limiter	R&S	ESH3-Z2	100374	08/19/2011
THERMO-HYGRO METER	TOP	HA-202	9303-3	01/31/2011
Test S/W	EZ-EMC			

4.3 MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
Powerline Conducted Emission	±1.29
3M Semi Anechoic Chamber / 30MHz ~ 1GHz	±3.8856
3M Semi Anechoic Chamber / Above 1GHz	±3.8721

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

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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.”

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5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	FCC MRA: TW1039
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12,2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method –47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	TAF Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	Canada IC 2324G-1 IC 2324G-2

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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 and Conducted Measurement Below 1GHz							
No.	**Device Type**	**Brand**	**Model**	**Series No.**	**FCC ID**	**Data Cable**	**Power Cord**
1	Multimedia Headset	Logitech	ClearChat	N/A	FCC DoC	Unshielded, 1.8m*2	N/A
2	Notebook PC (Remote)	HP	COMPAQ NC 4010	CNU441F8LV	FCC DoC	Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a Core
3	LCD Monitor (Remote)	DELL	2408WFB	CN-0NN792-74261-849-15GS	FCC DoC	Unshielded, 10m	Unshielded, 1.8m
4	CCD Camera (Remote)	TOPICA	3NW	N/A	N/A	Unshielded, 10m	N/A

For Radiated and Conducted Measurement Above 1GHz							
No.	**Device Type**	**Brand**	**Model**	**Series No.**	**FCC ID**	**Data Cable**	**Power Cord**
	N/A						

For Powerline Measurement							
No.	**Device Type**	**Brand**	**Model**	**Series No.**	**FCC ID**	**Data Cable**	**Power Cord**
1.	Multimedia Headset	e-Sense	MSB301	N/A	N/A	Unshielded, 1.7m	N/A
2	Server PC (Remote)	HP	HD075AV	SGH948QGVW	FCC Doc	Unshielded, 20m	Unshielded, 1.8m
3.	LCD Monitor (Remote)	Dell	2408WFPb	N/A	FCC Doc	Shielded, 2.0m	Unshielded, 1.8m
4.	CCD Camera (Remote)	AVTECH	KPD6788	N/A	FCC Doc	Shielded, 20m	N/A

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

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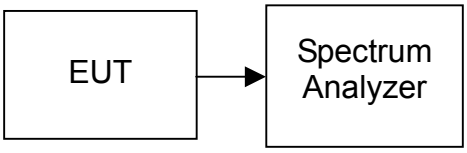
7. FCC PART 15.247 REQUIREMENTS

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

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TEST DATA

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	12.05	>500	PASS
Mid	2437	12.05		PASS
High	2462	12.05		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.60	>500	PASS
Mid	2437	16.55		PASS
High	2462	16.60		PASS

Test mode: draft 802.11n 20 MHz Channel mode

Channel	Frequency (MHz)	Bandwidth (MHz)		Limit (kHz)	Result
		Chain 0	Chain		
Low	2412	17.65	17.65	>500	PASS
Mid	2437	17.70	17.65		PASS
High	2462	17.65	17.65		PASS

Test mode: draft 802.11n 40 MHz Channel mode

Channel	Frequency (MHz)	Bandwidth (MHz)		Limit (kHz)	Result
		Chain 0	Chain		
Low	2422	36.50	36.42	>500	PASS
Mid	2437	36.33	36.42		PASS
High	2452	36.50	36.50		PASS

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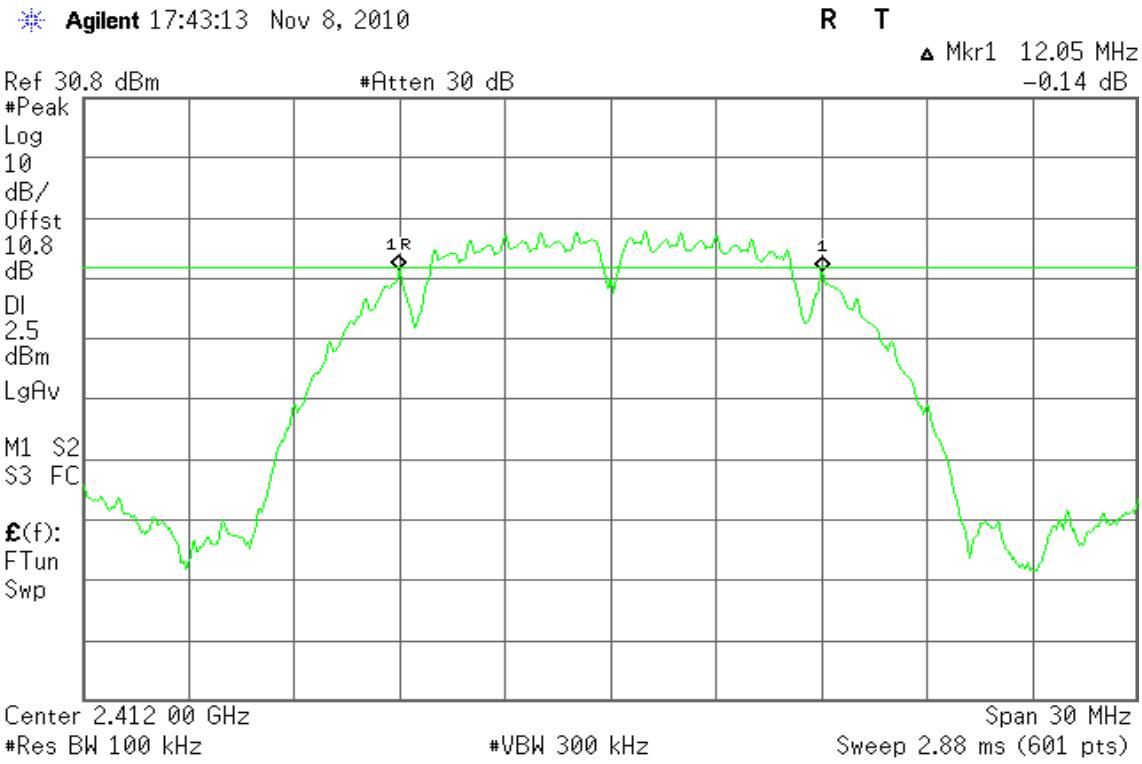
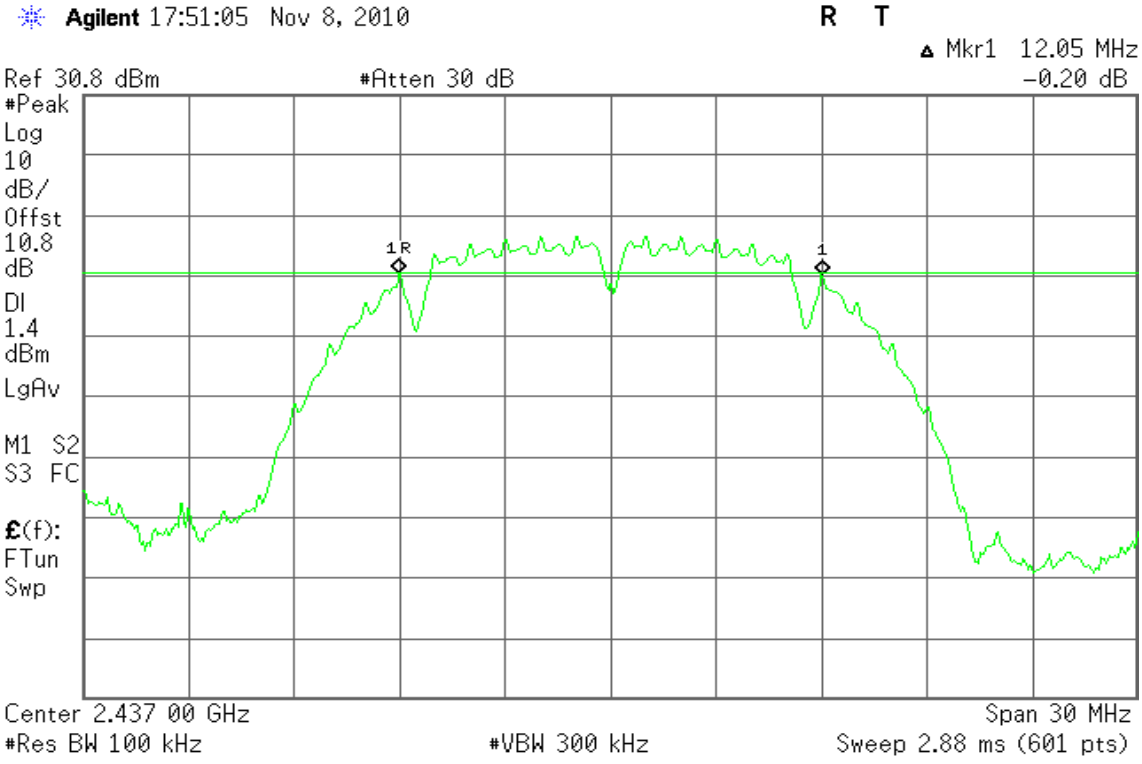
Test Plot

IEEE 802.11b mode

6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)



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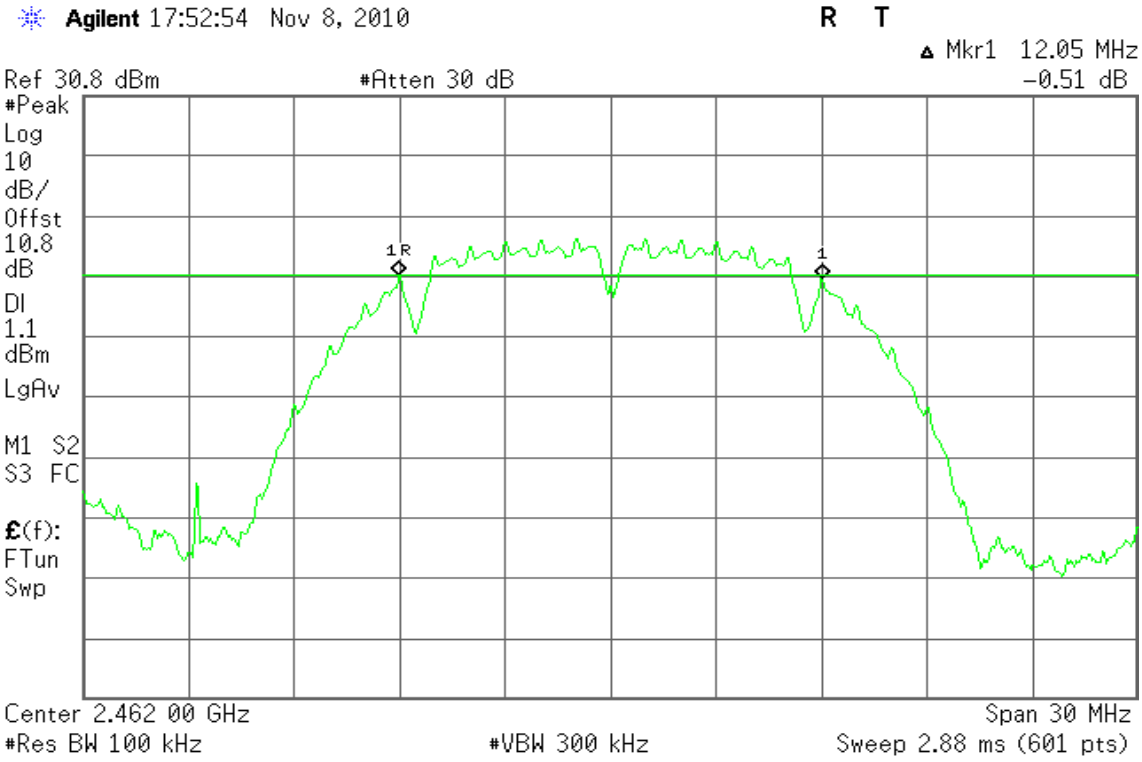
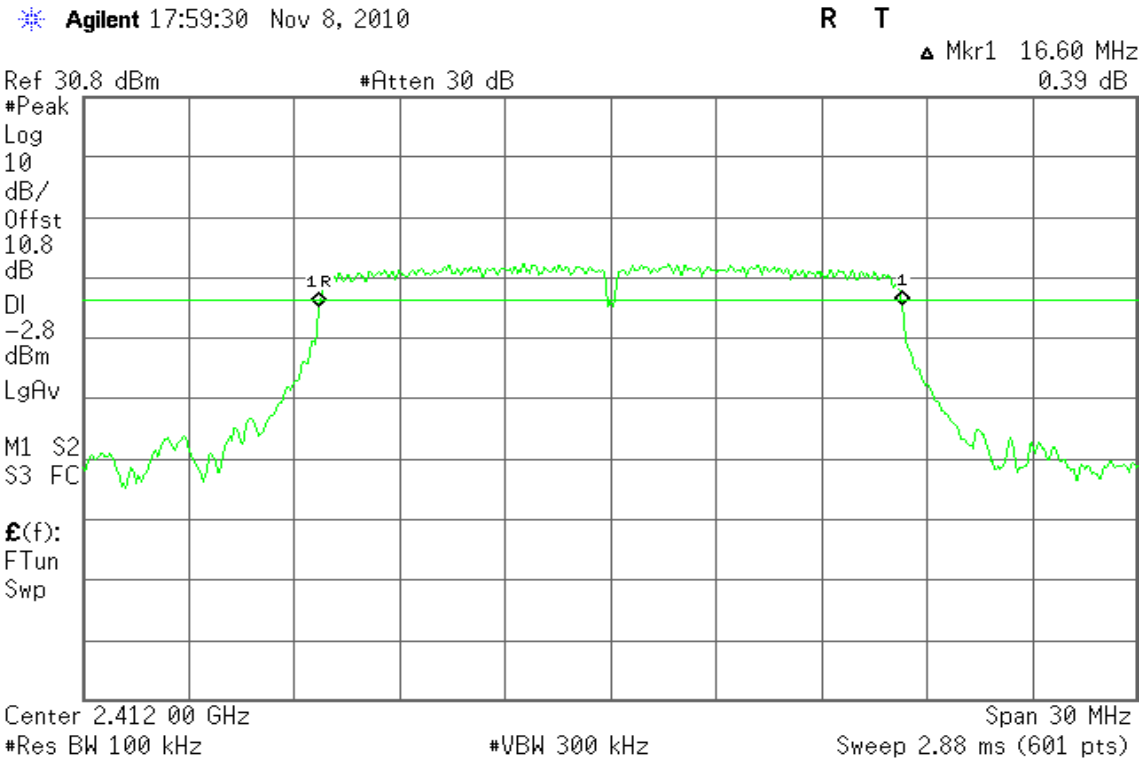
6dB Bandwidth (CH High)



IEEE 802.11g mode

6dB Bandwidth (CH Low)



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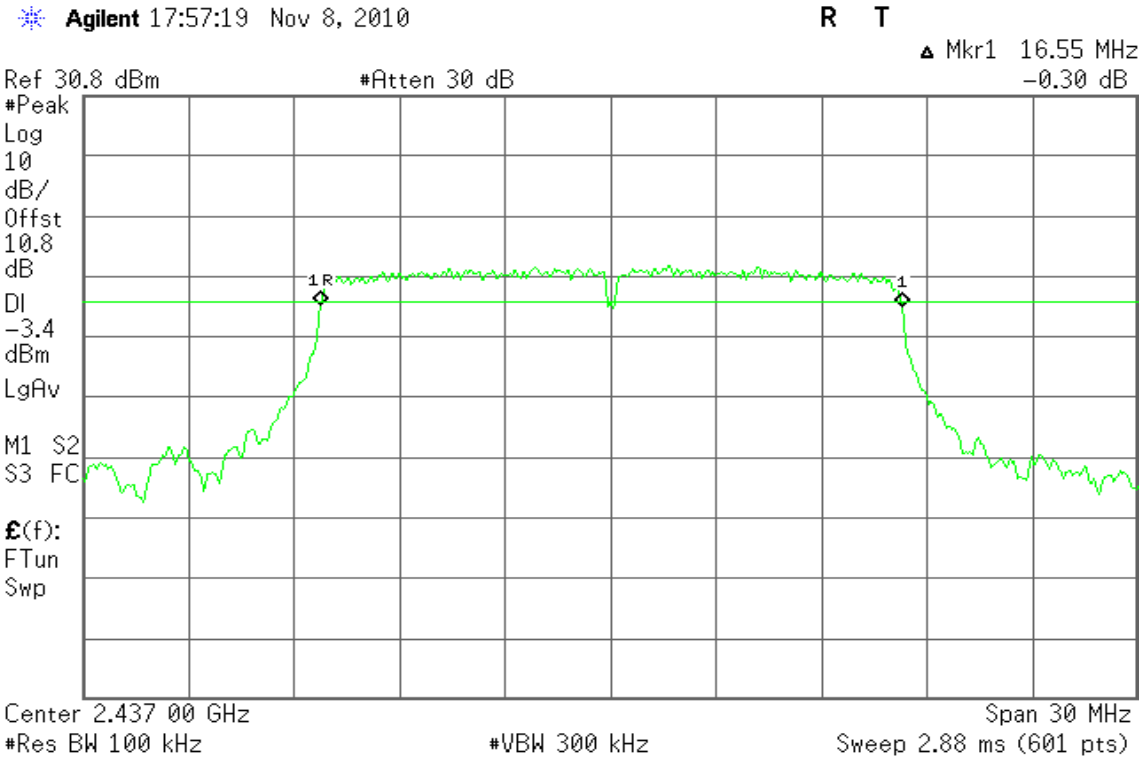
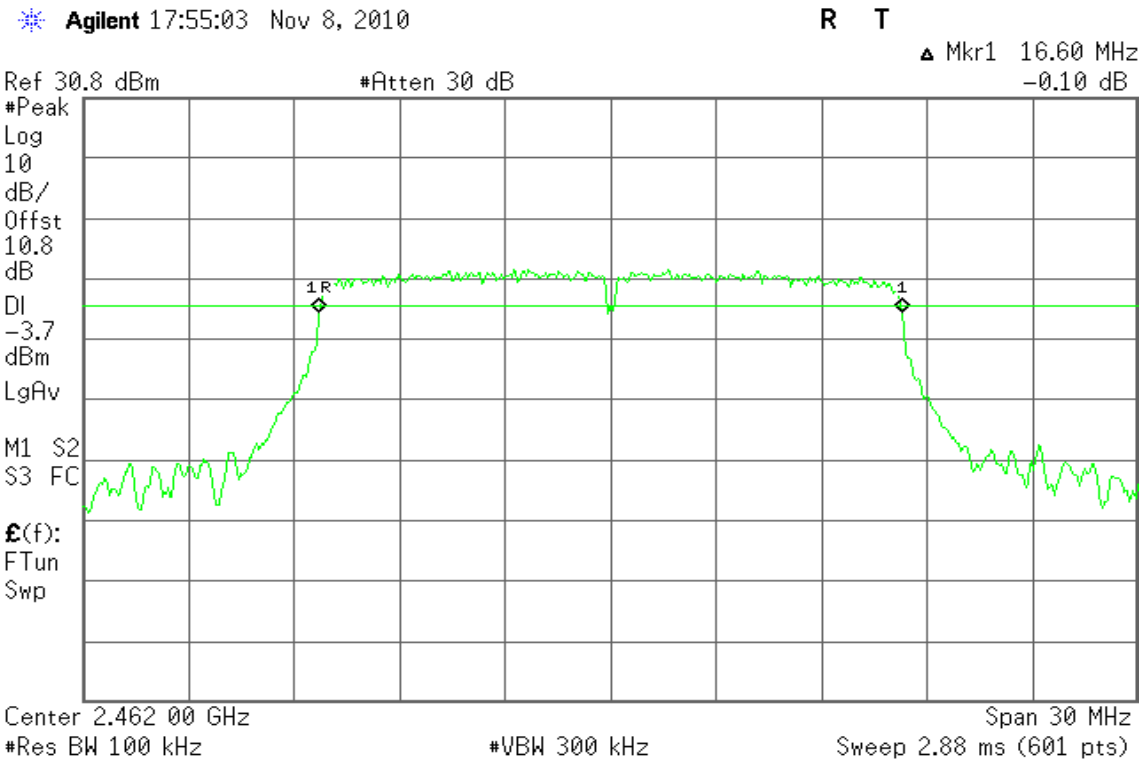
6dB Bandwidth (CH Mid)



6dB Bandwidth (CH High)



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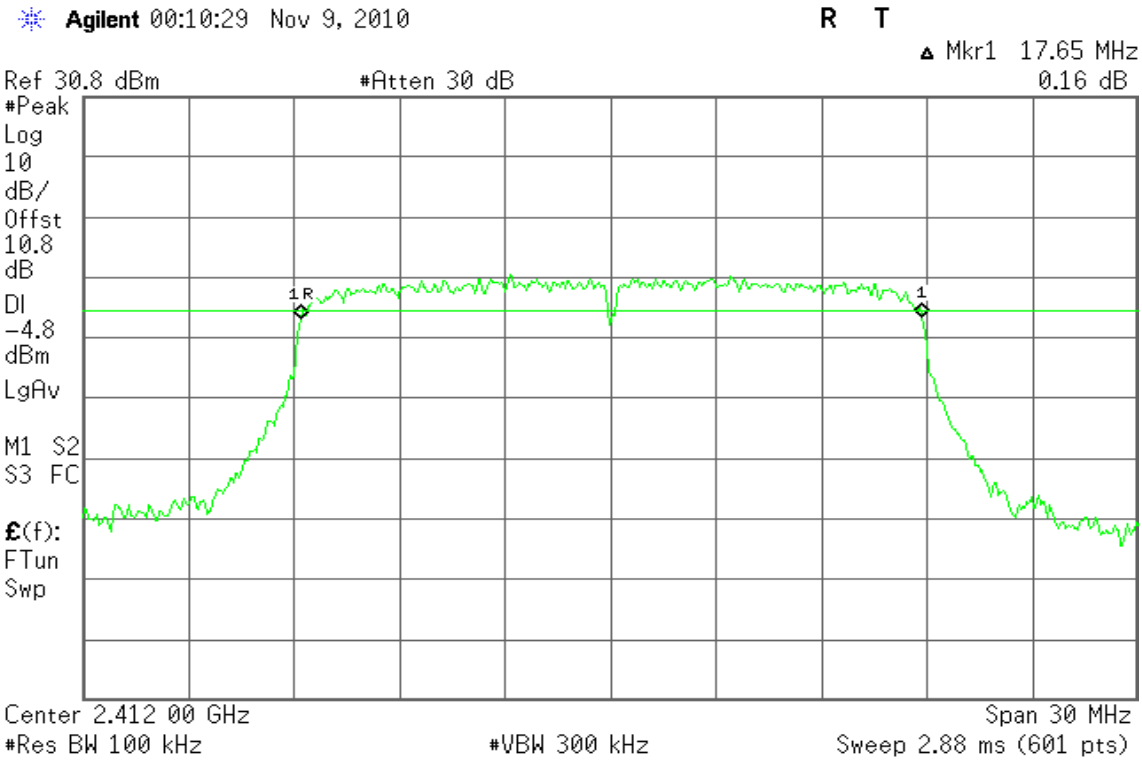
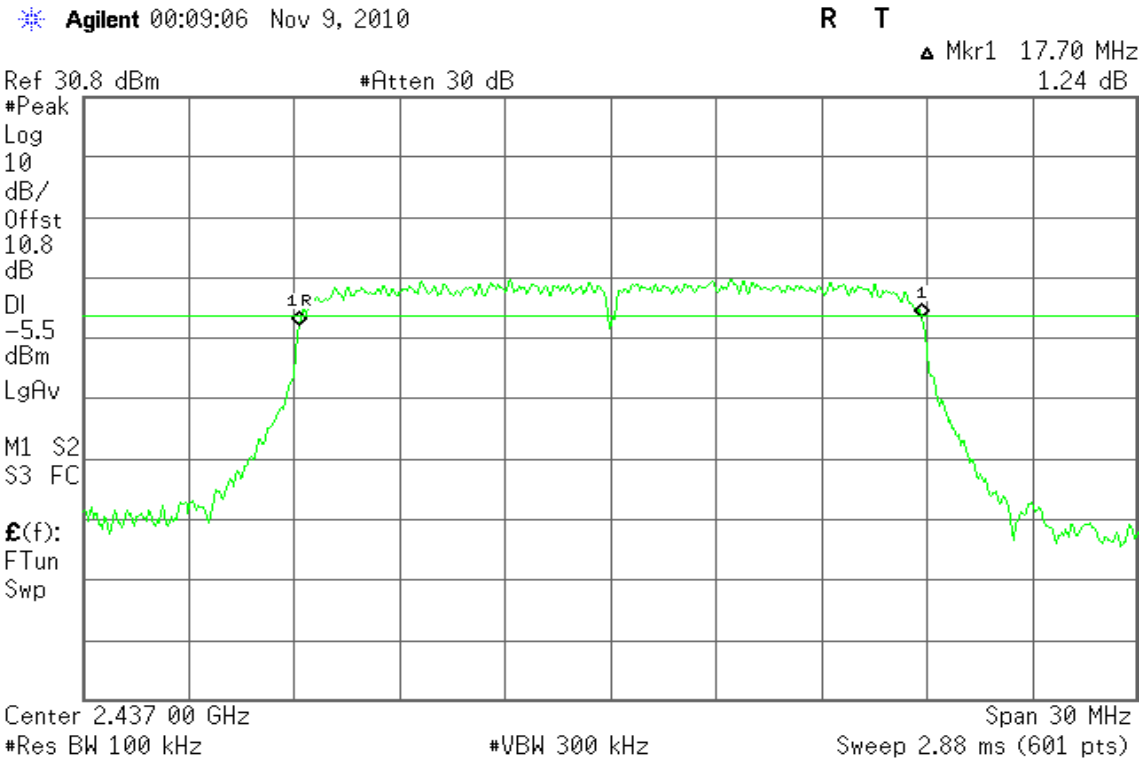
draft 802.11n 20 MHz Channel mode / Chain 0

6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)



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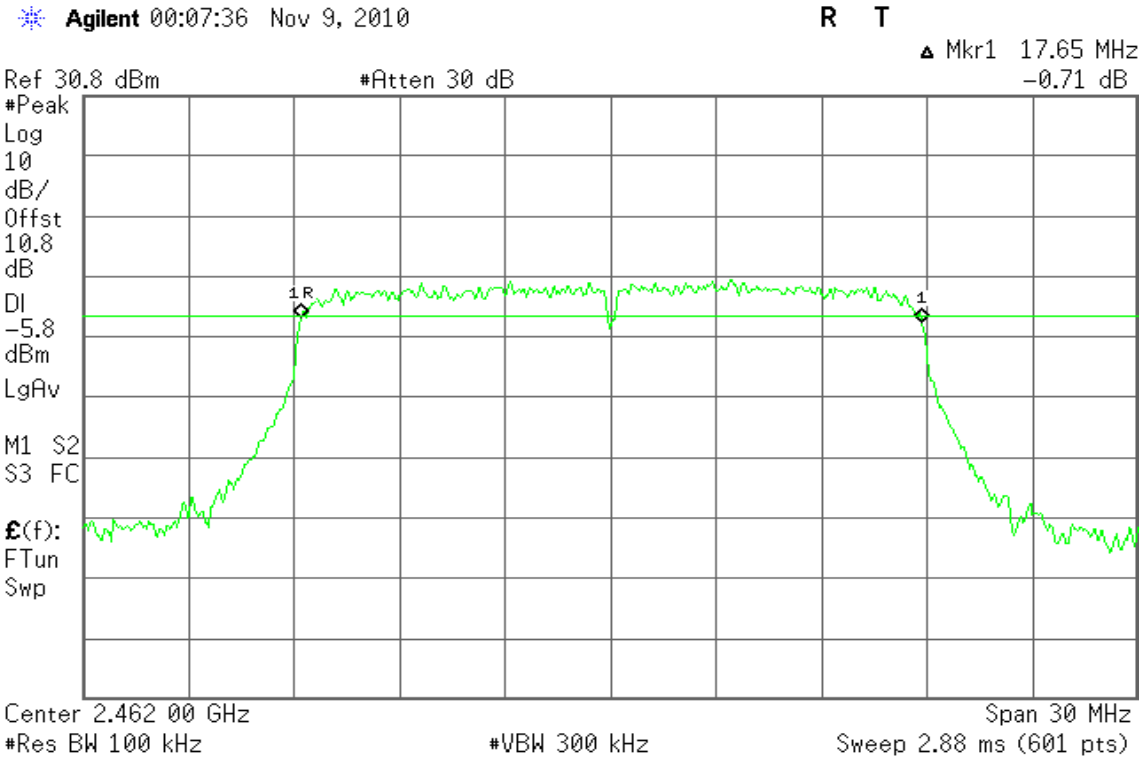
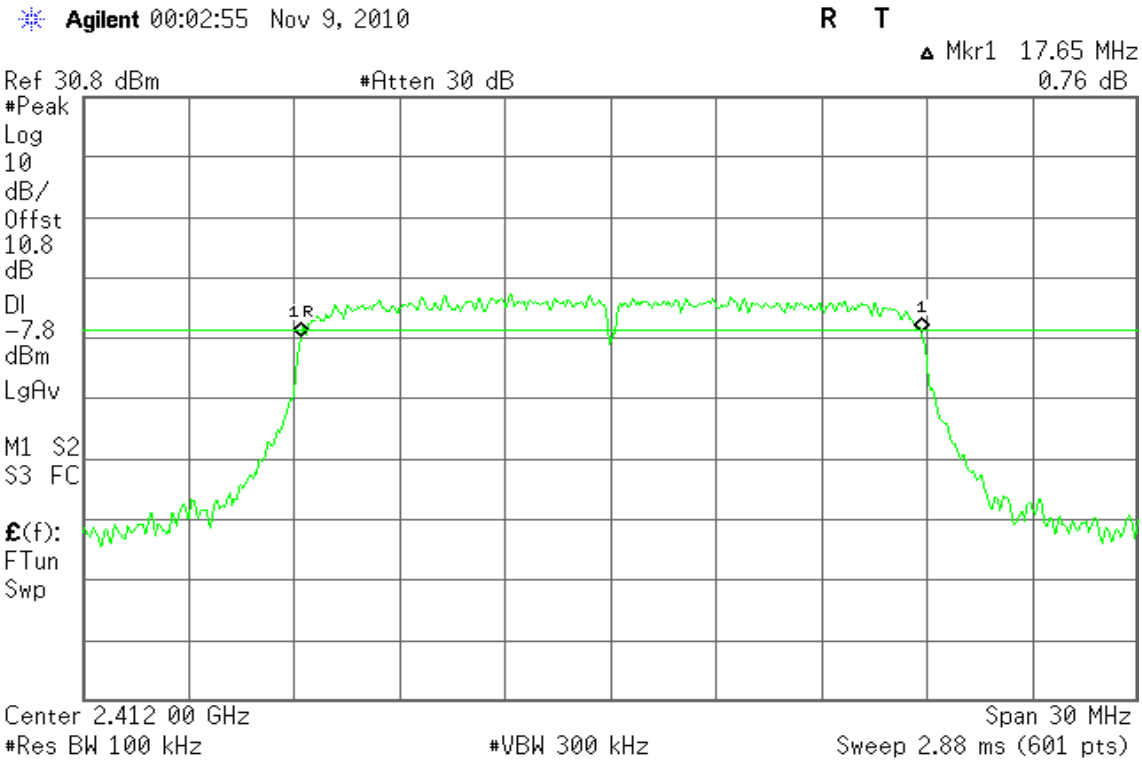
6dB Bandwidth (CH High)



draft 802.11n 20 MHz Channel mode / Chain 1

6dB Bandwidth (CH Low)



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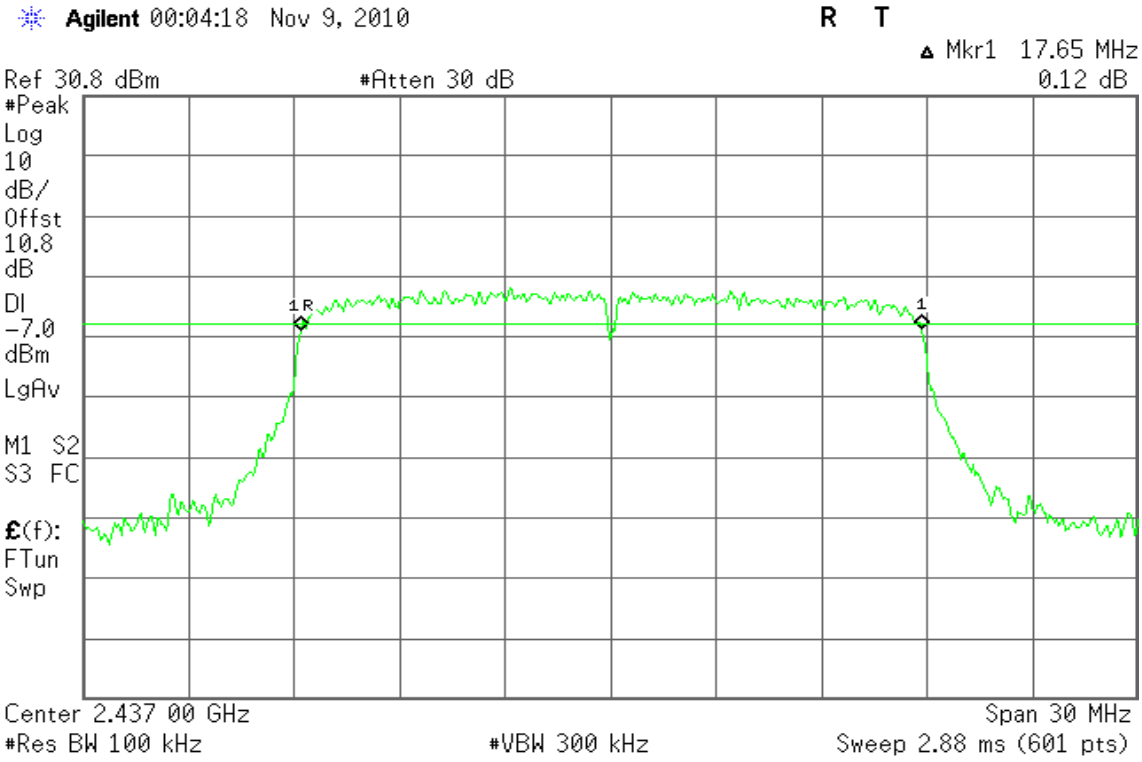
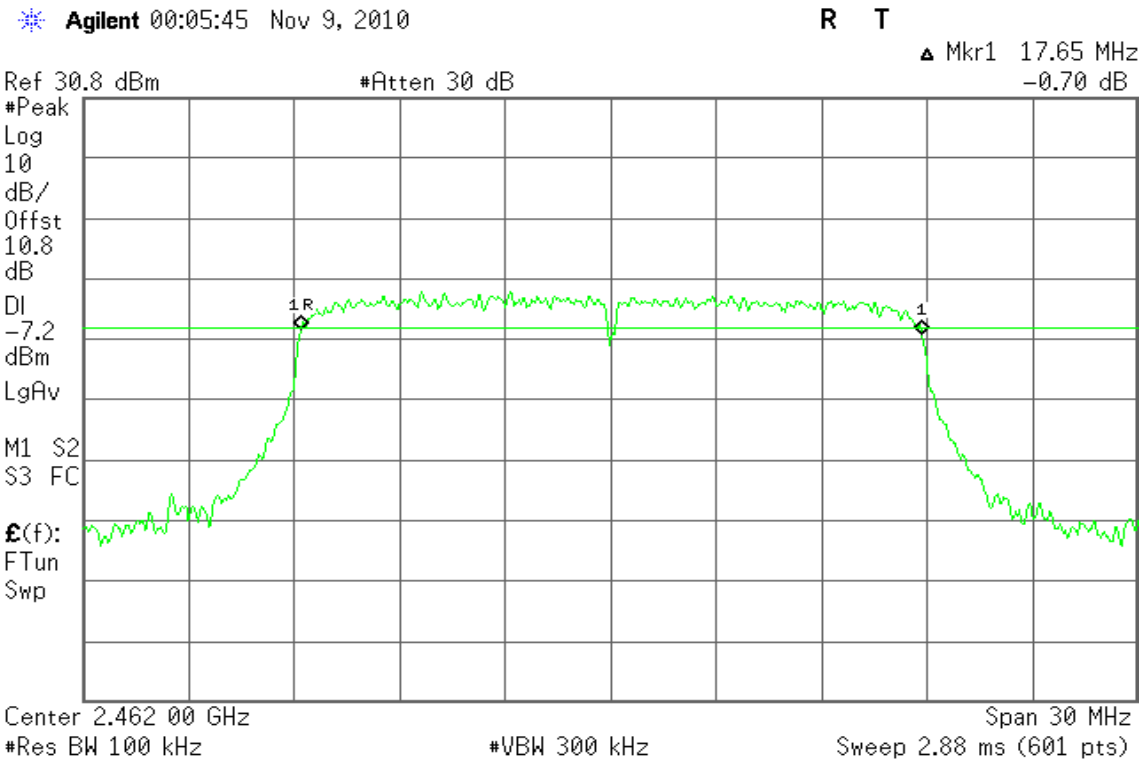
6dB Bandwidth (CH Mid)



6dB Bandwidth (CH High)



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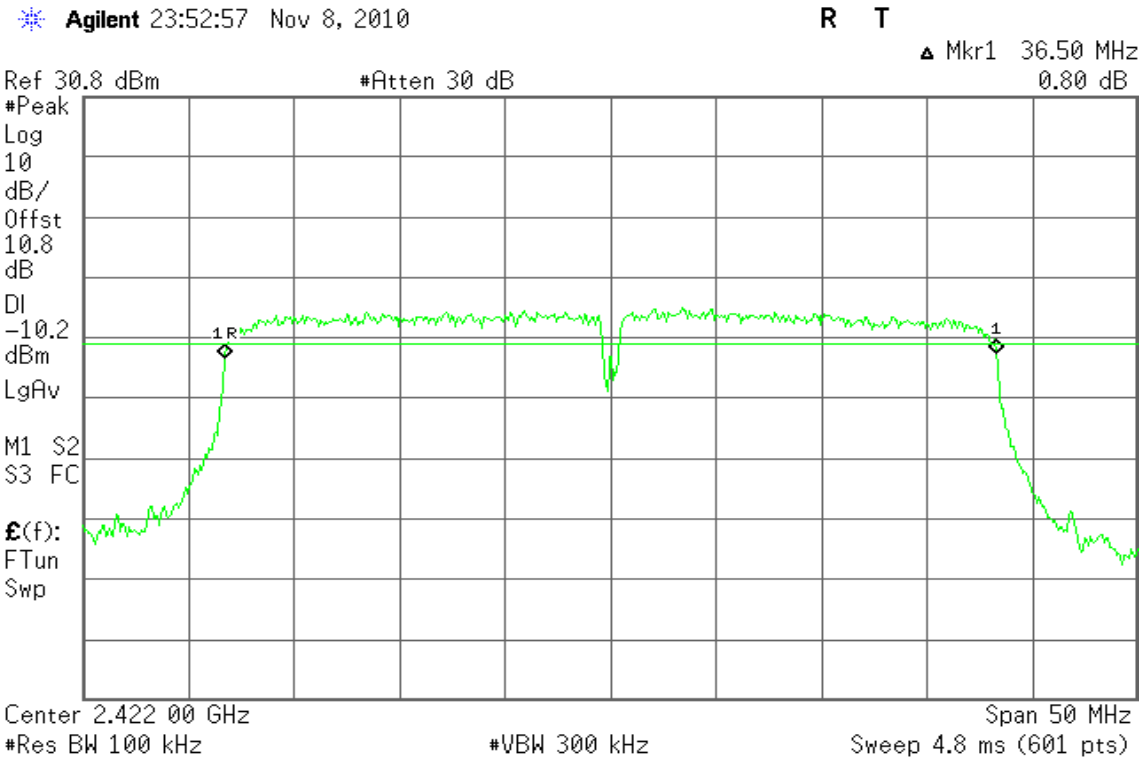
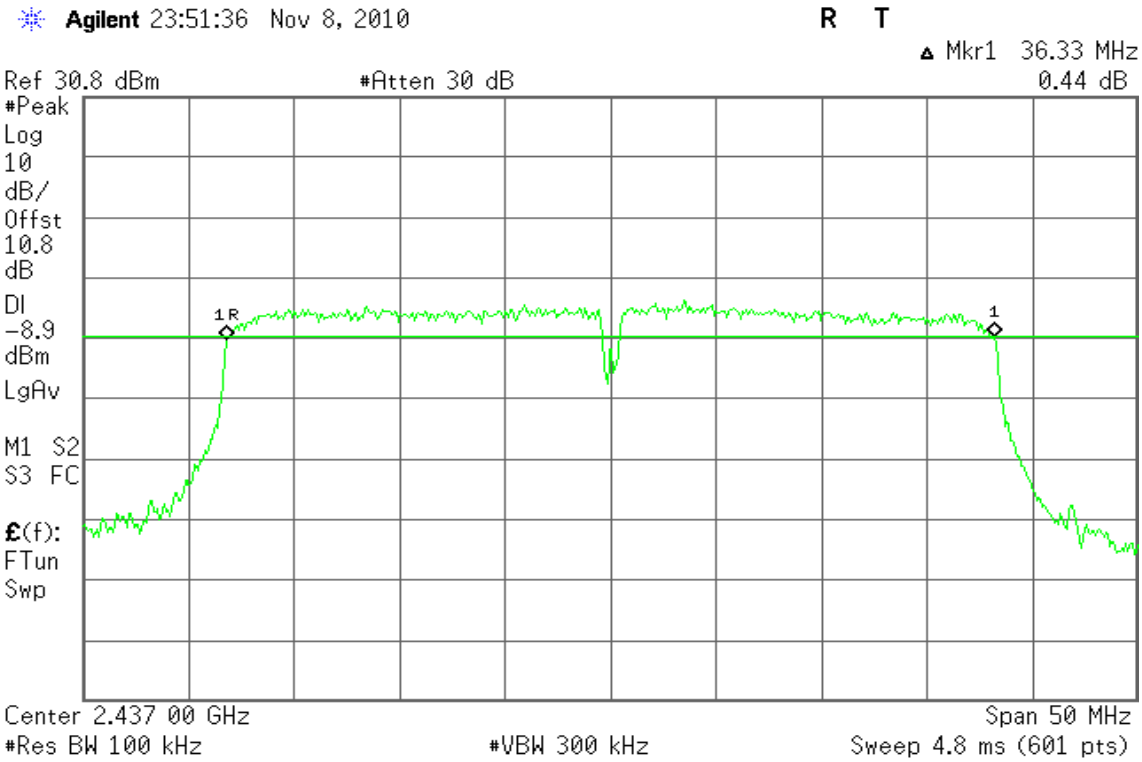
draft 802.11n 40 MHz Channel mode / Chain 0

6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)



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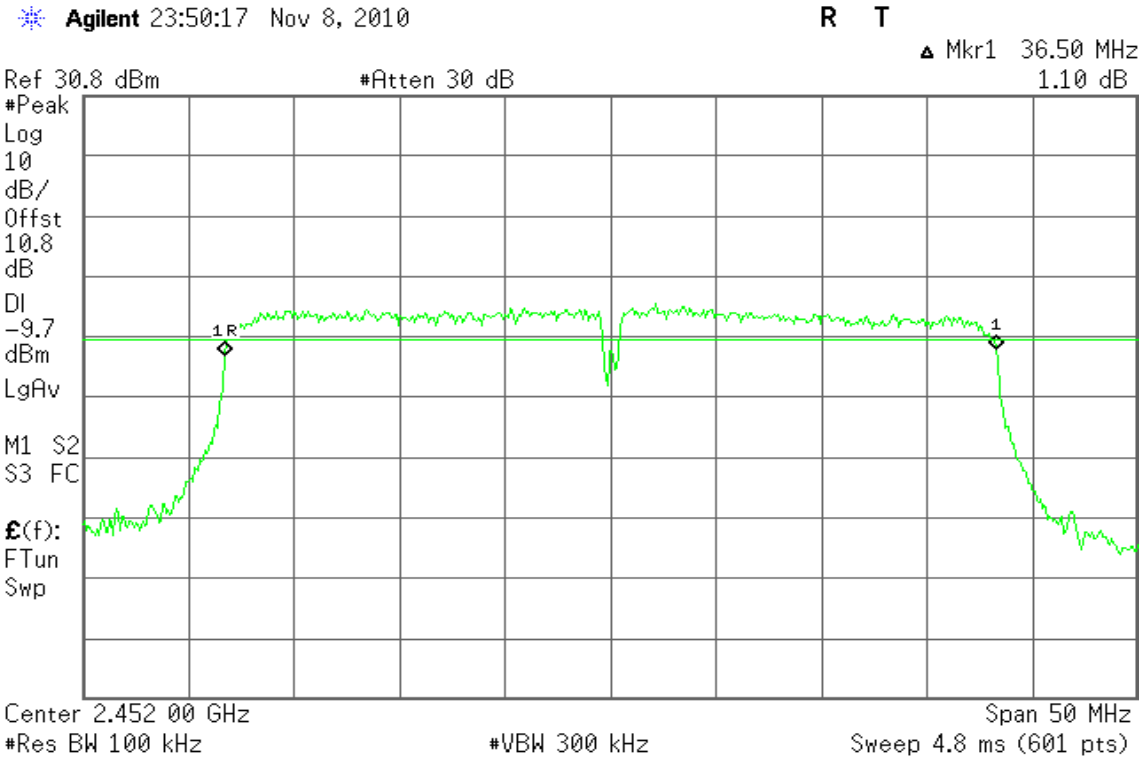
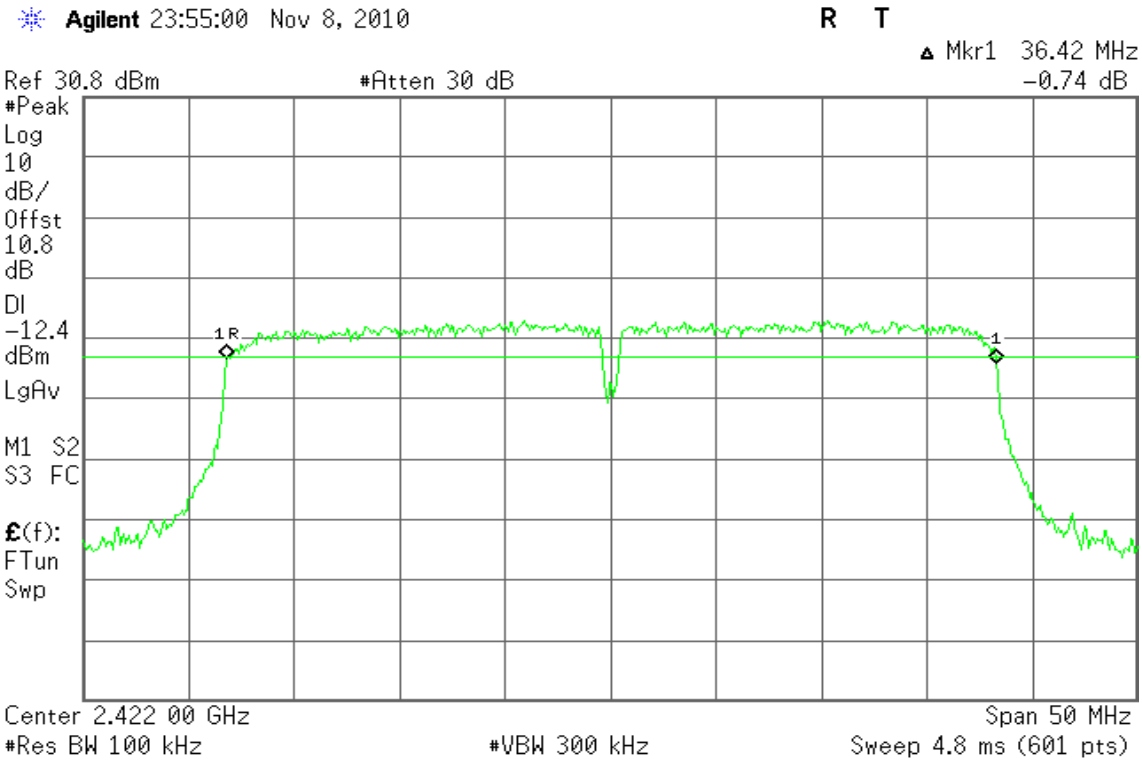
6dB Bandwidth (CH High)



draft 802.11n 40 MHz Channel mode / Chain 1

6dB Bandwidth (CH Low)



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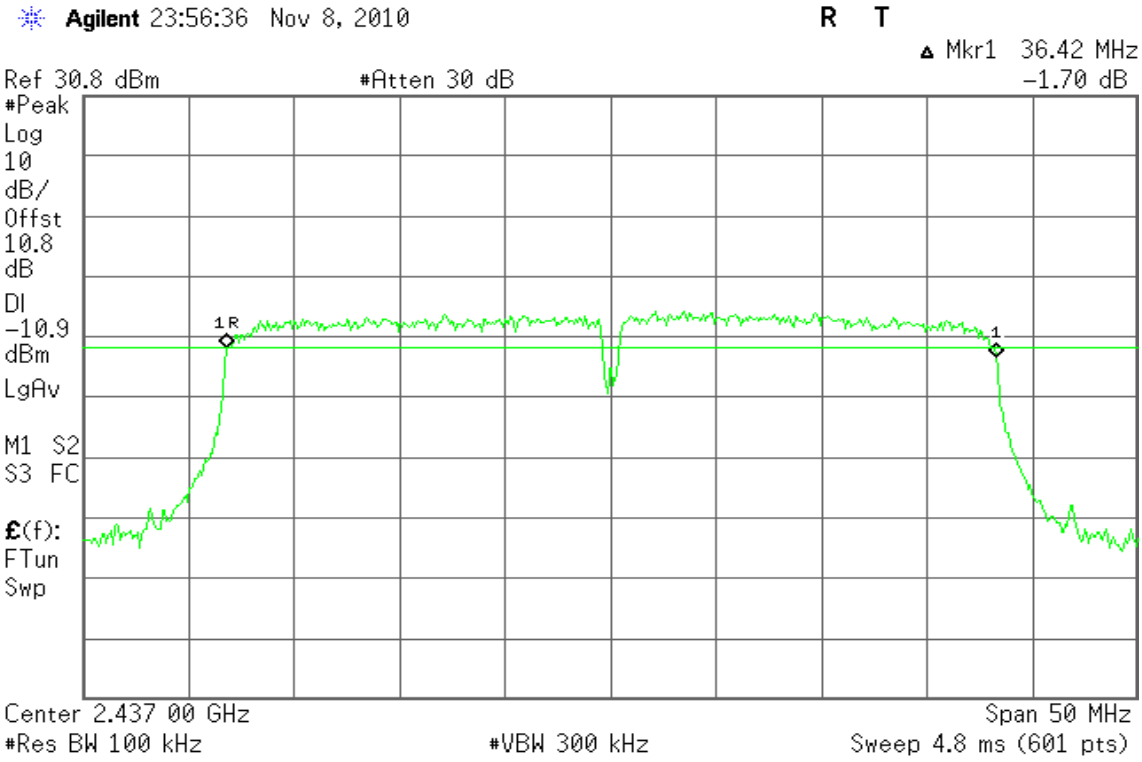
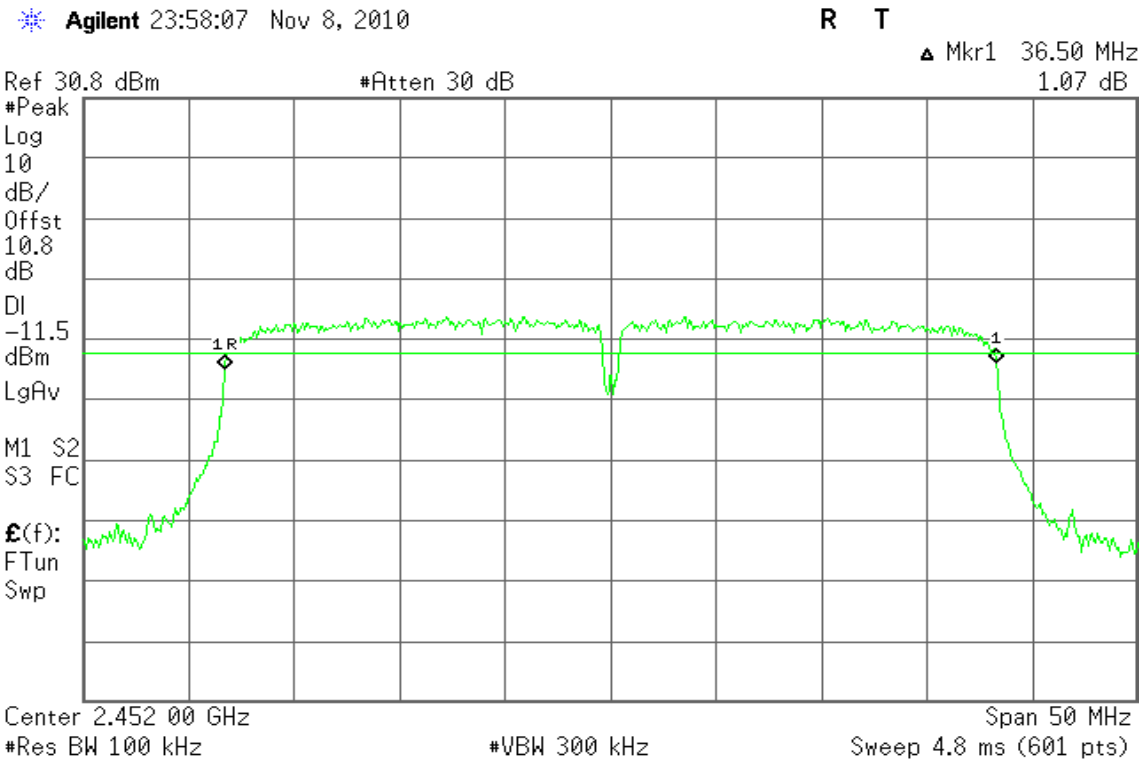
6dB Bandwidth (CH Mid)



6dB Bandwidth (CH High)



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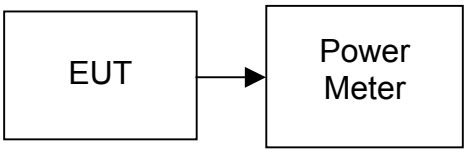
7.2 PEAK POWER

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 Power Meter. The Power Meter is set to the peak power detection.

TEST RESULTS

No non-compliance noted

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TEST DATA

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	21.57	0.14355	1.00	PASS
Mid	2437	21.64	0.14588		PASS
High	2462	21.47	0.14028		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	26.32	0.42855	1.00	PASS
Mid	2437	25.94	0.39264		PASS
High	2462	25.44	0.34995		PASS

Test mode: draft 802.11n 20 MHz Channel mode

Channel	Frequency (MHz)	Output Power (dBm)			Output Power (W)			Limit (W)	Result
		Chain 0	Chain 1	Combination	Chain 0	Chain 1	Combination		
Low	2412	25.14	21.85	26.81	0.32659	0.15311	0.47970	1.00	PASS
Mid	2437	25.61	22.13	27.22	0.36392	0.15414	0.52722		PASS
High	2462	24.67	22.31	26.66	0.29309	0.15518	0.46331		PASS

Test mode: draft 802.11n 40 MHz Channel mode

Channel	Frequency (MHz)	Output Power (dBm)			Output Power (W)			Limit (W)	Result
		Chain 0	Chain 1	Combination	Chain 0	Chain 1	Combination		
Low	2422	24.13	20.18	25.60	0.25882	0.10423	0.36305	1.00	PASS
Mid	2437	24.54	21.32	26.23	0.28445	0.13552	0.41997		PASS
High	2452	23.73	21.26	25.68	0.23605	0.13366	0.36971		PASS

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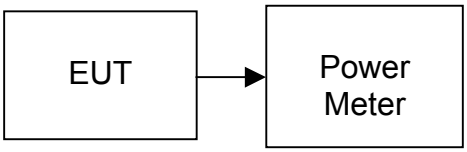
7.3 AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output is connected to the Power Meter. The Power Meter is set to the average power detection.

TEST RESULTS

No non-compliance noted

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TEST DATA

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	18.73	0.07464
Mid	2437	18.87	0.07709
High	2462	18.56	0.07178

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	18.84	0.07656
Mid	2437	18.46	0.07015
High	2462	17.82	0.06053

Test mode: draft 802.11n 20 MHz Channel mode

Channel	Frequency (MHz)	Output Power (dBm)			Output Power (W)		
		Chain 0	Chain 1	Combination	Chain 0	Chain 1	Combination
Low	2412	16.05	13.39	17.93	0.04027	0.02183	0.06210
Mid	2437	17.51	13.38	18.93	0.05636	0.02178	0.07814
High	2462	15.02	13.18	17.21	0.03177	0.02080	0.05257

Test mode: draft 802.11n 40 MHz Channel mode

Channel	Frequency (MHz)	Output Power (dBm)			Output Power (W)		
		Chain 0	Chain 1	Combination	Chain 0	Chain 1	Combination
Low	2422	14.71	11.24	16.32	0.02958	0.01330	0.04288
Mid	2437	15.31	12.45	17.12	0.03396	0.01758	0.05154
High	2452	14.49	12.39	16.58	0.02812	0.01734	0.04546

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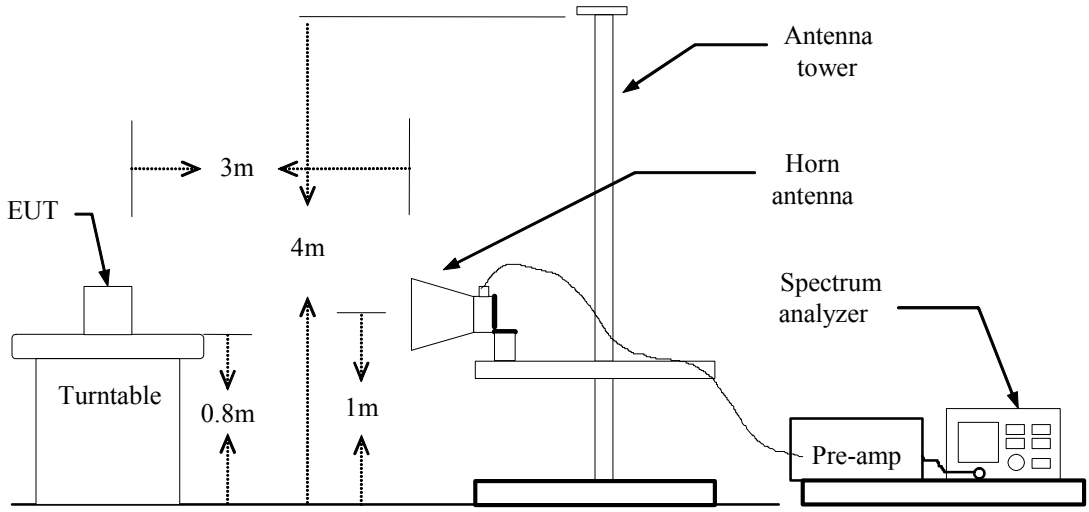
7.4 BAND EDGES MEASUREMENT

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.

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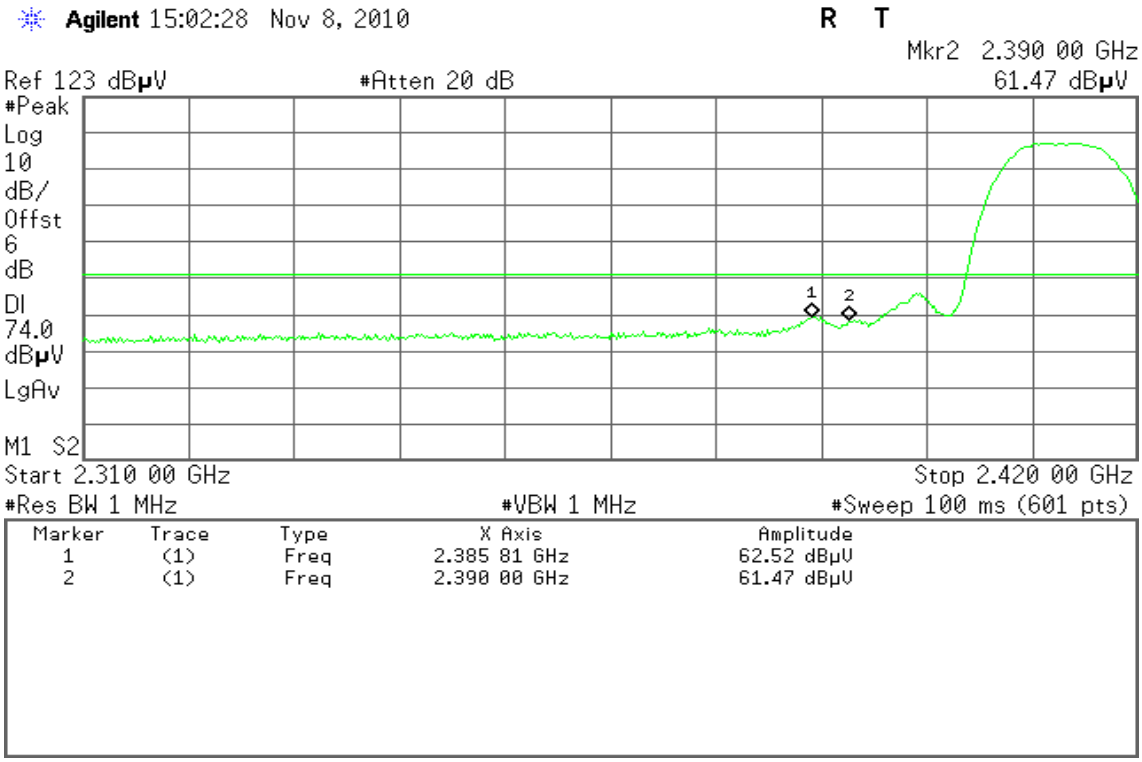
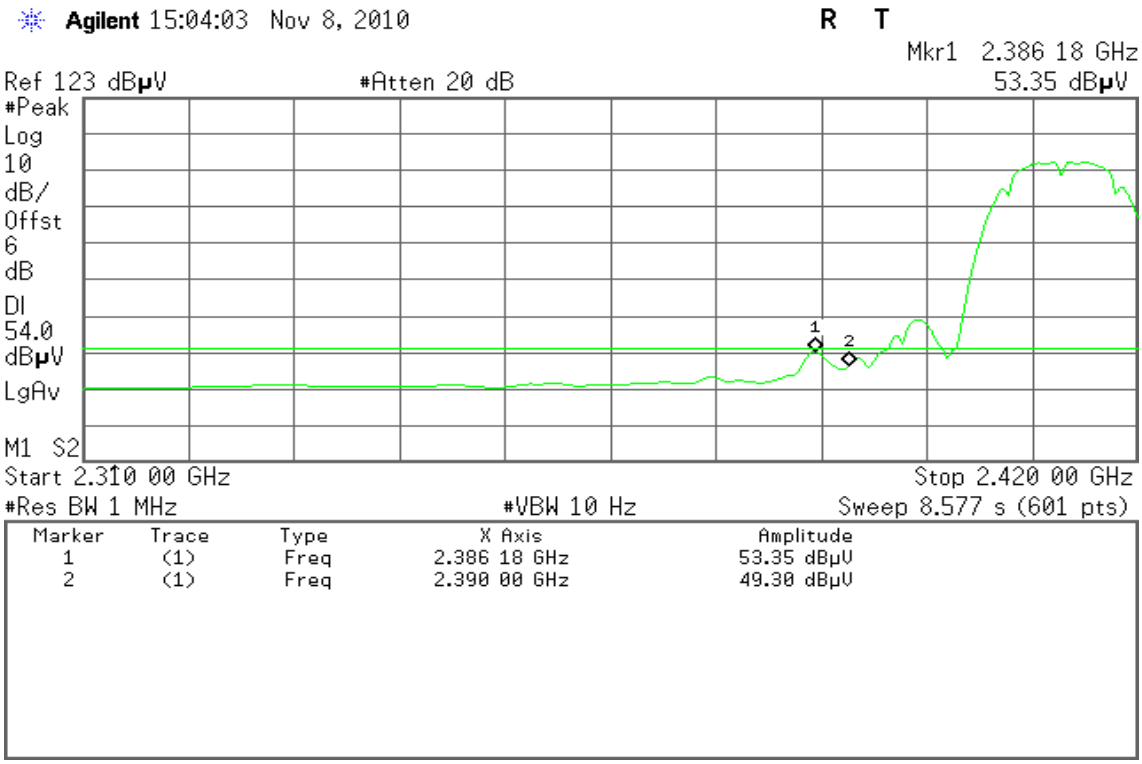
Test Plot

Band Edges (IEEE 802.11b mode / CH Low)

Detector mode: Peak **Polarity: Vertical**



Detector mode: Average **Polarity: Vertical**



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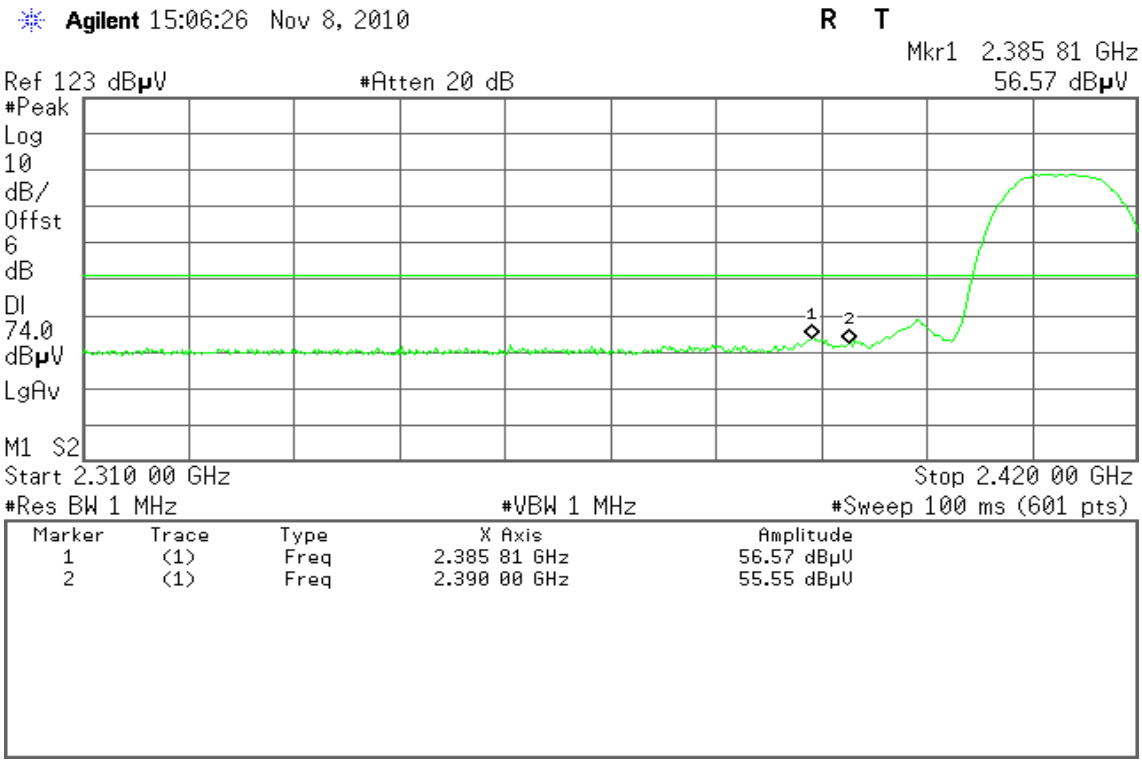
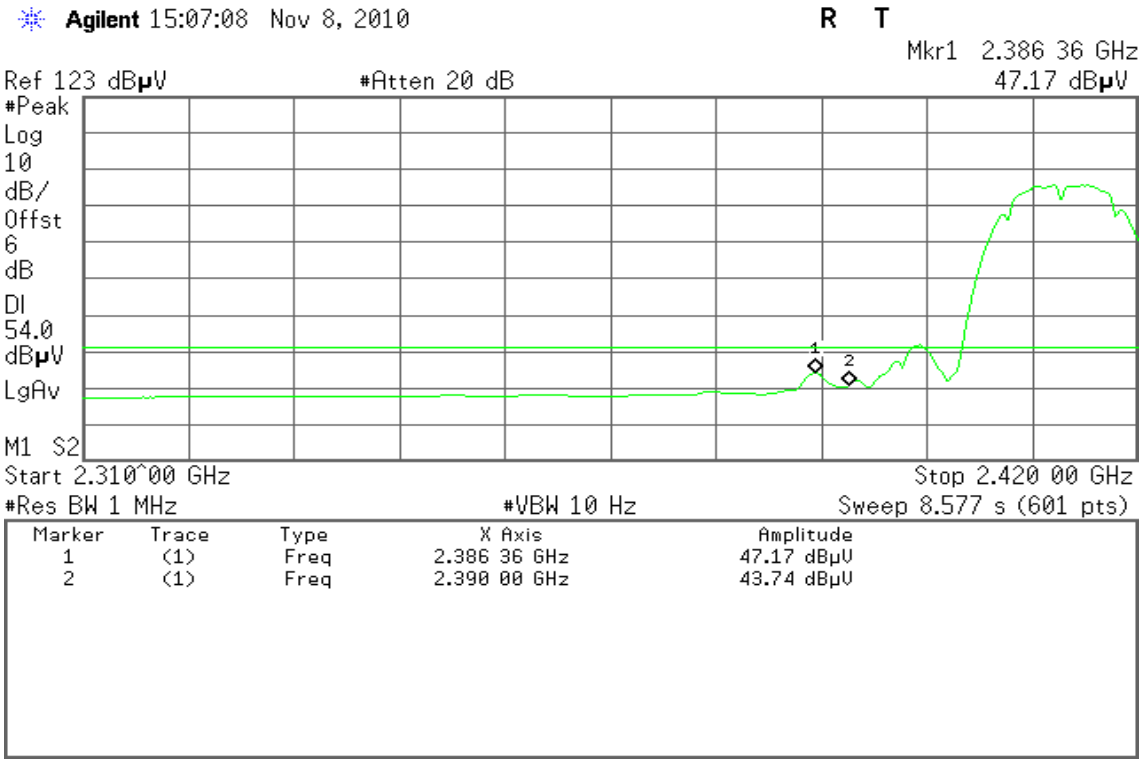
Detector mode: Peak Polarity: Horizontal



Detector mode: Average Polarity: Horizontal



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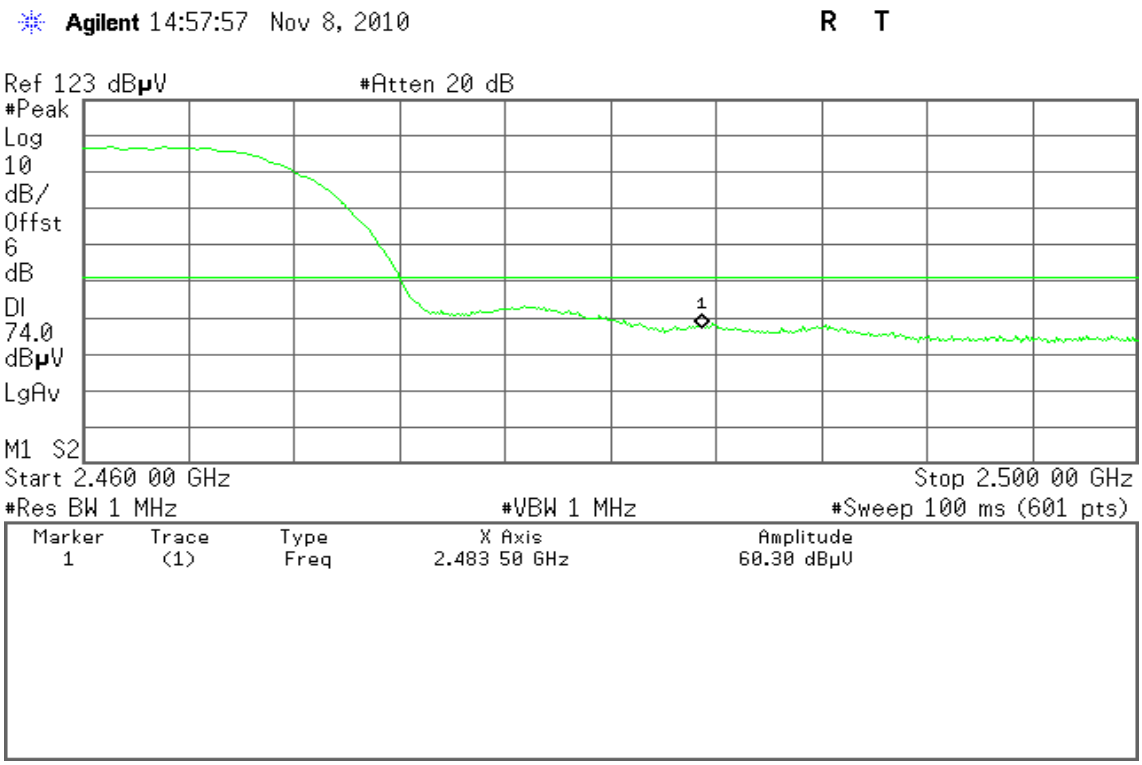
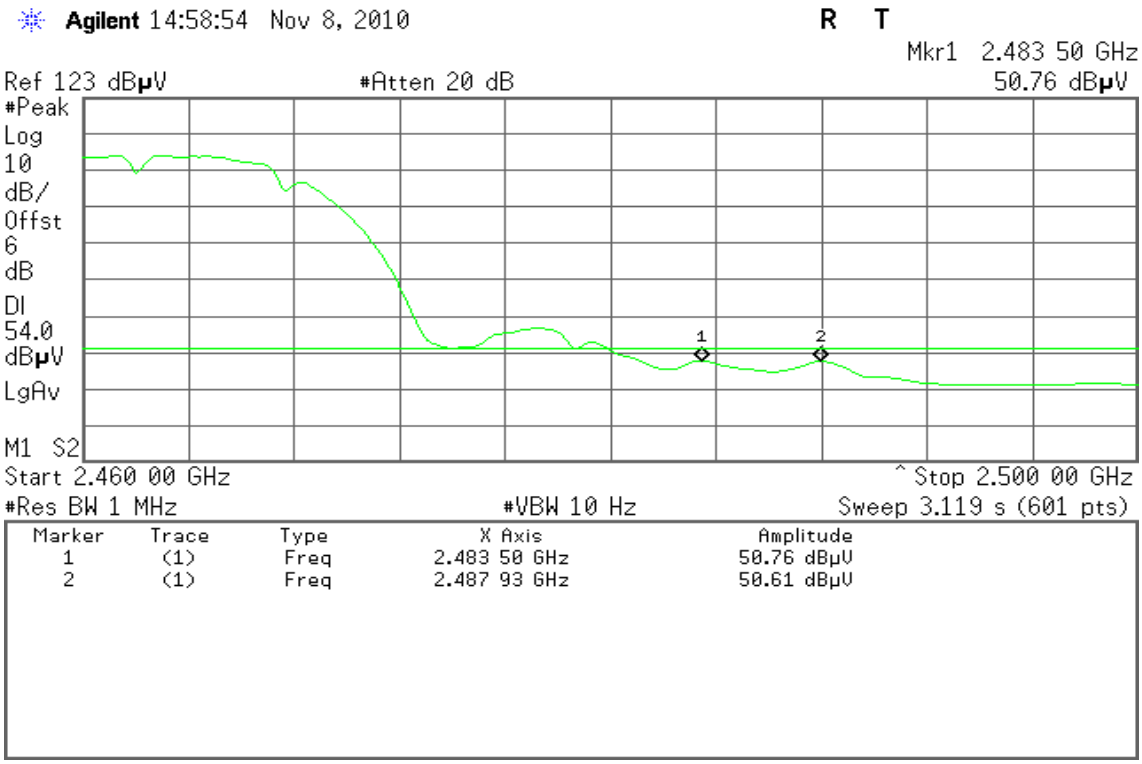
Band Edges (IEEE 802.11b mode / CH High)

Detector mode: Peak Polarity: Vertical

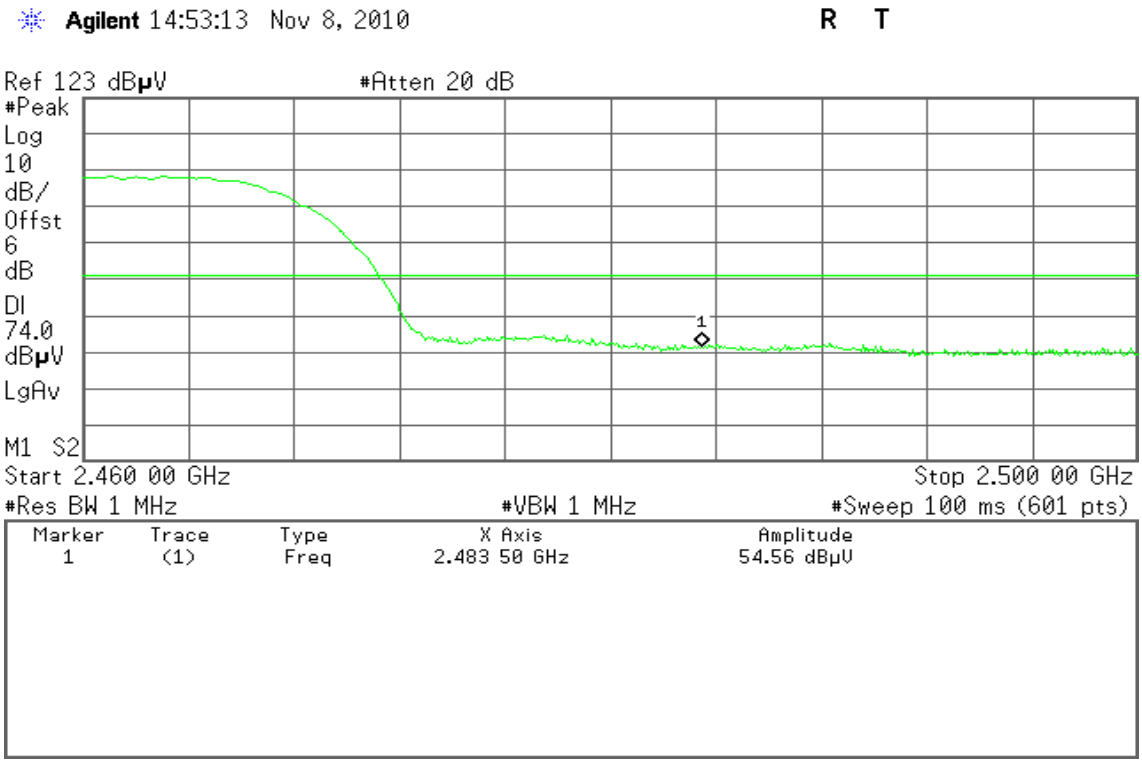


Detector mode: Average Polarity: Vertical

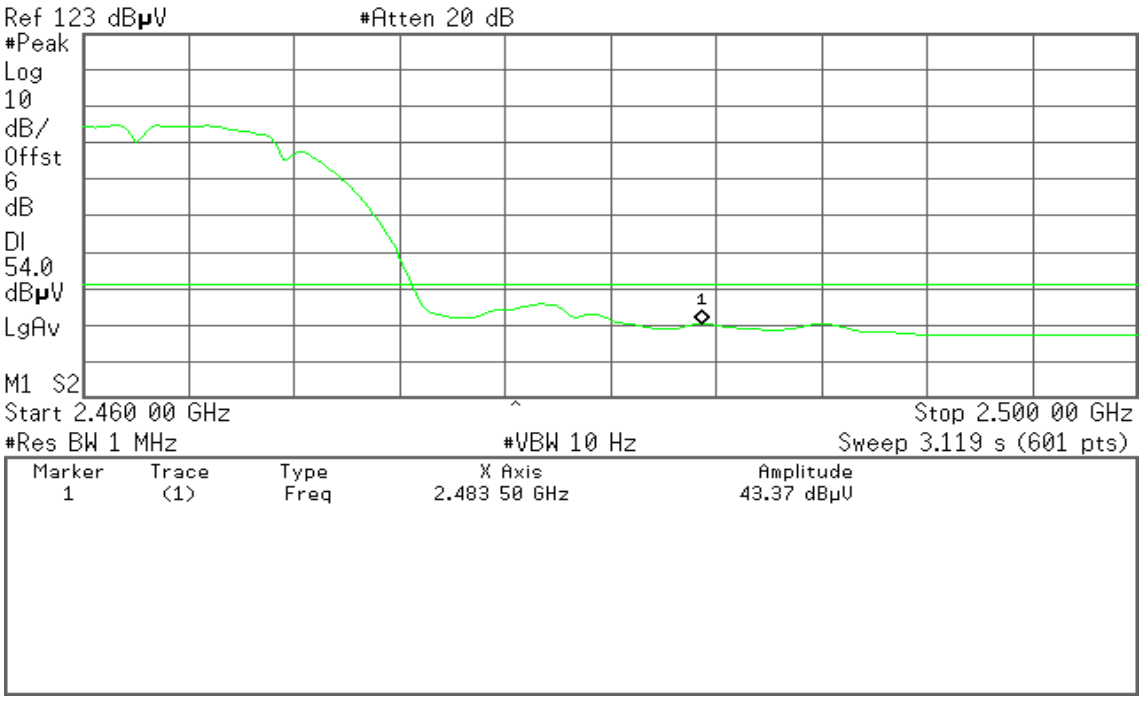


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Detector mode: Peak Polarity: Horizontal



Detector mode: Average Polarity: Horizontal



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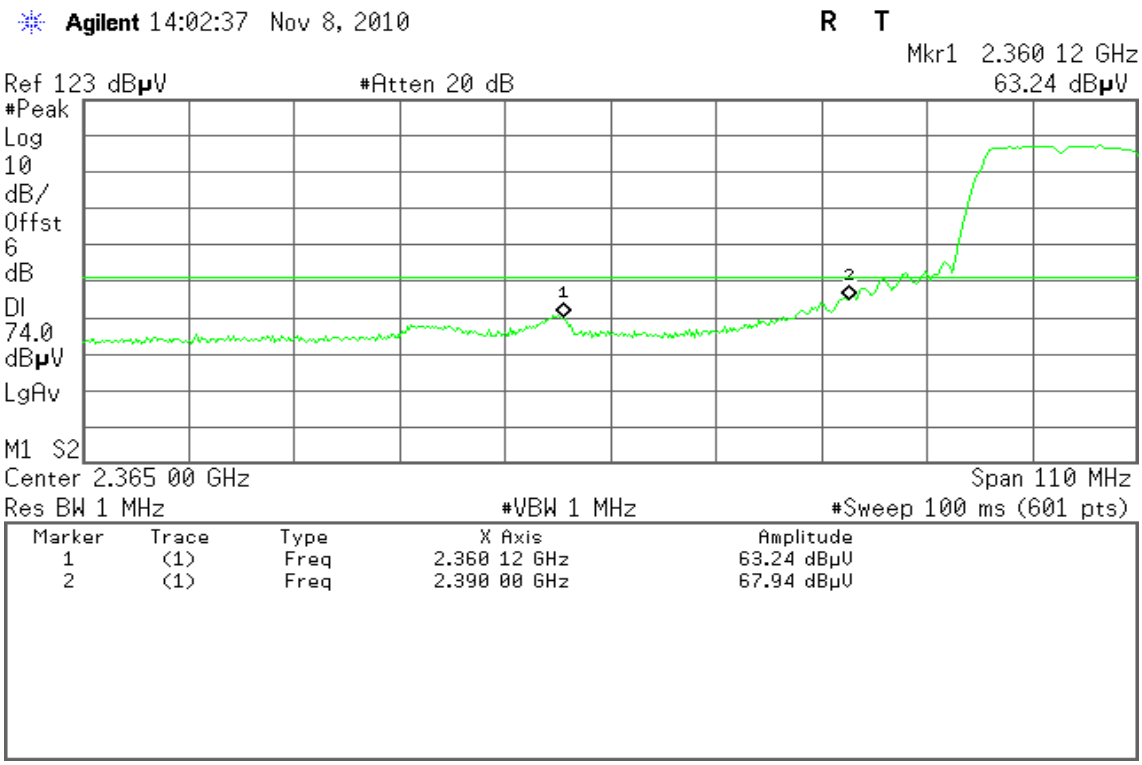
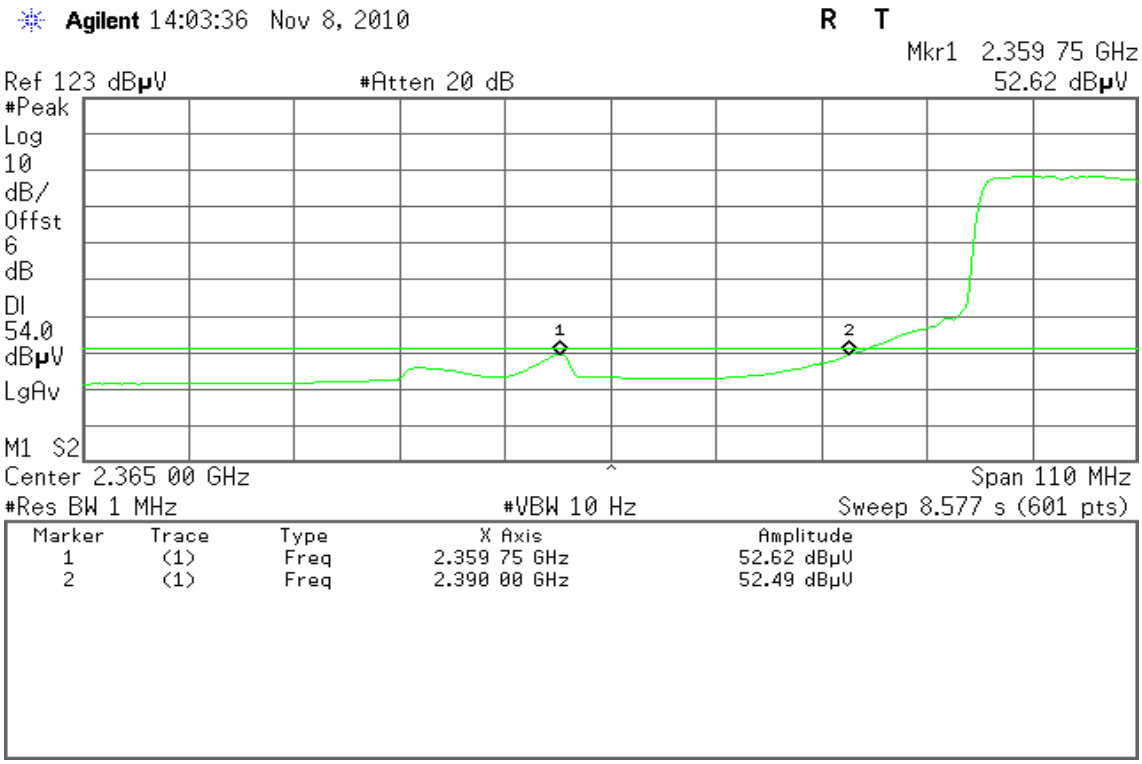
Band Edges (IEEE 802.11g mode / CH Low)

Detector mode: Peak Polarity: Vertical

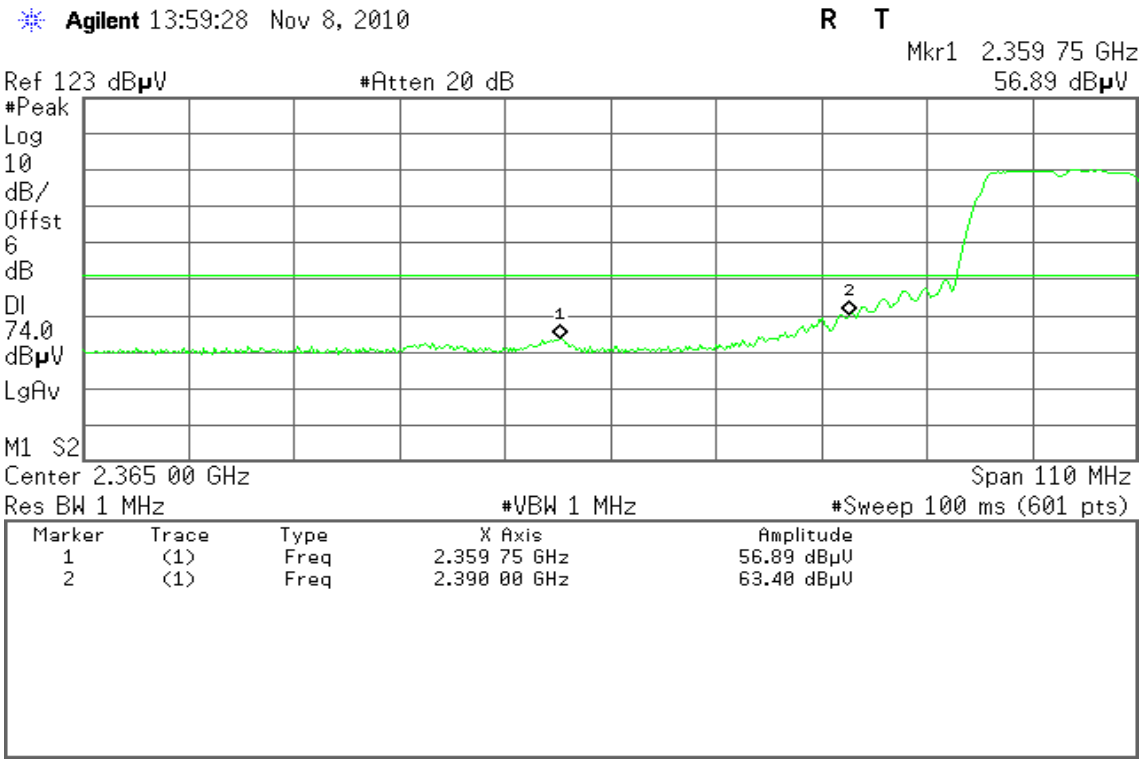


Detector mode: Average Polarity: Vertical

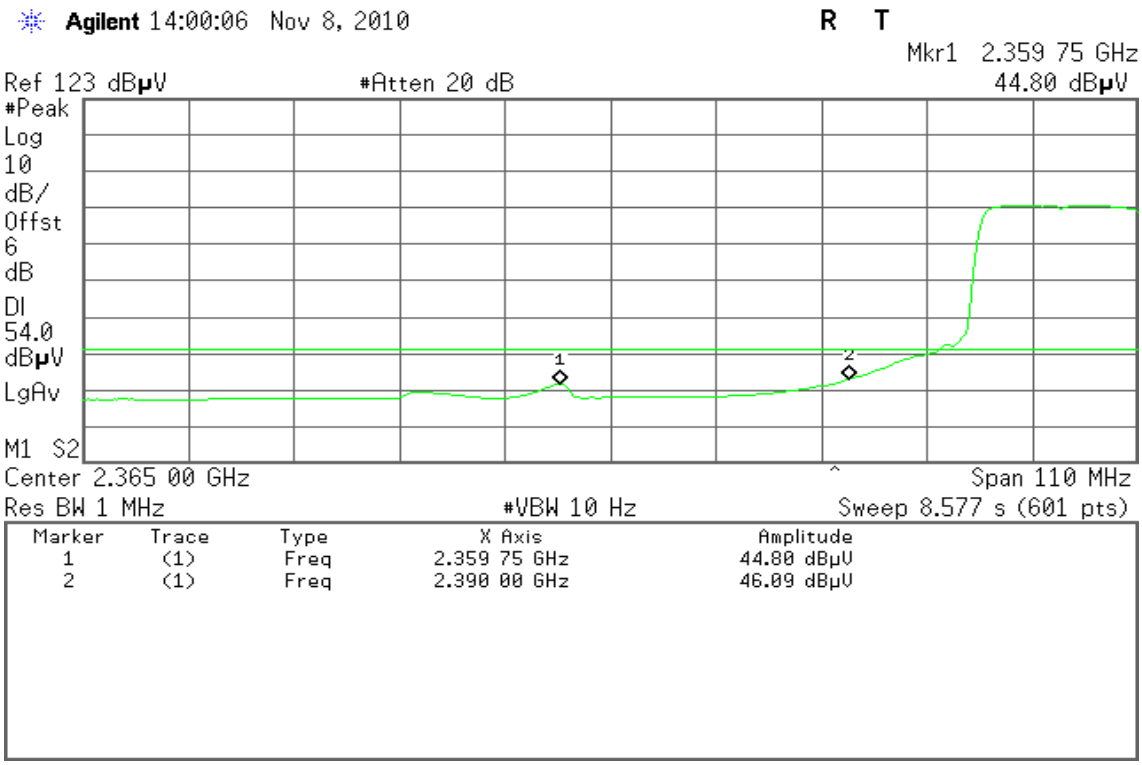


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Detector mode: Peak Polarity: Horizontal



Detector mode: Average Polarity: Horizontal



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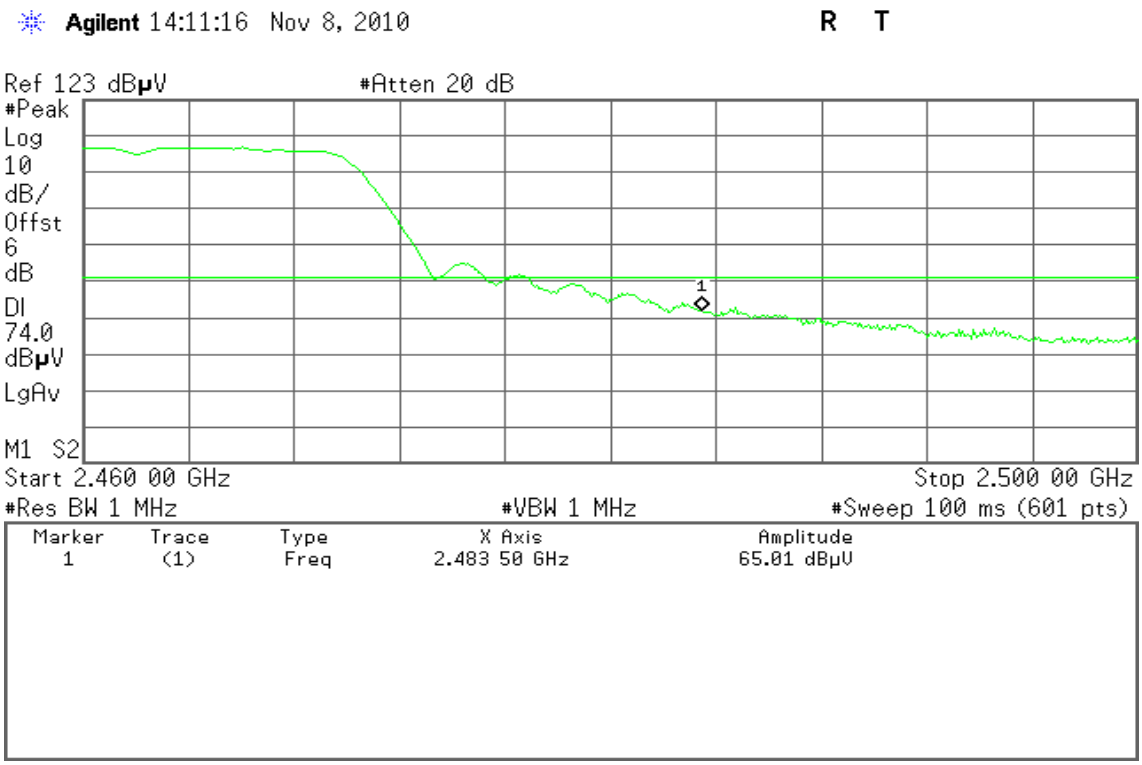
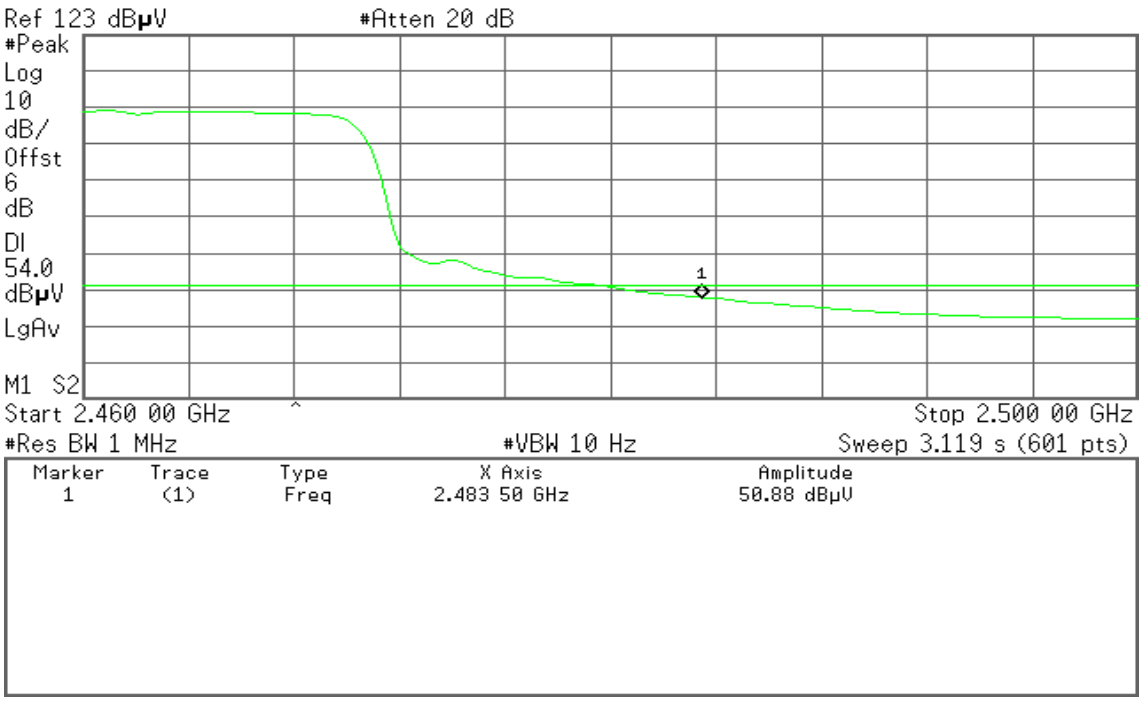
Band Edges (IEEE 802.11g mode / CH High)

Detector mode: Peak Polarity: Vertical

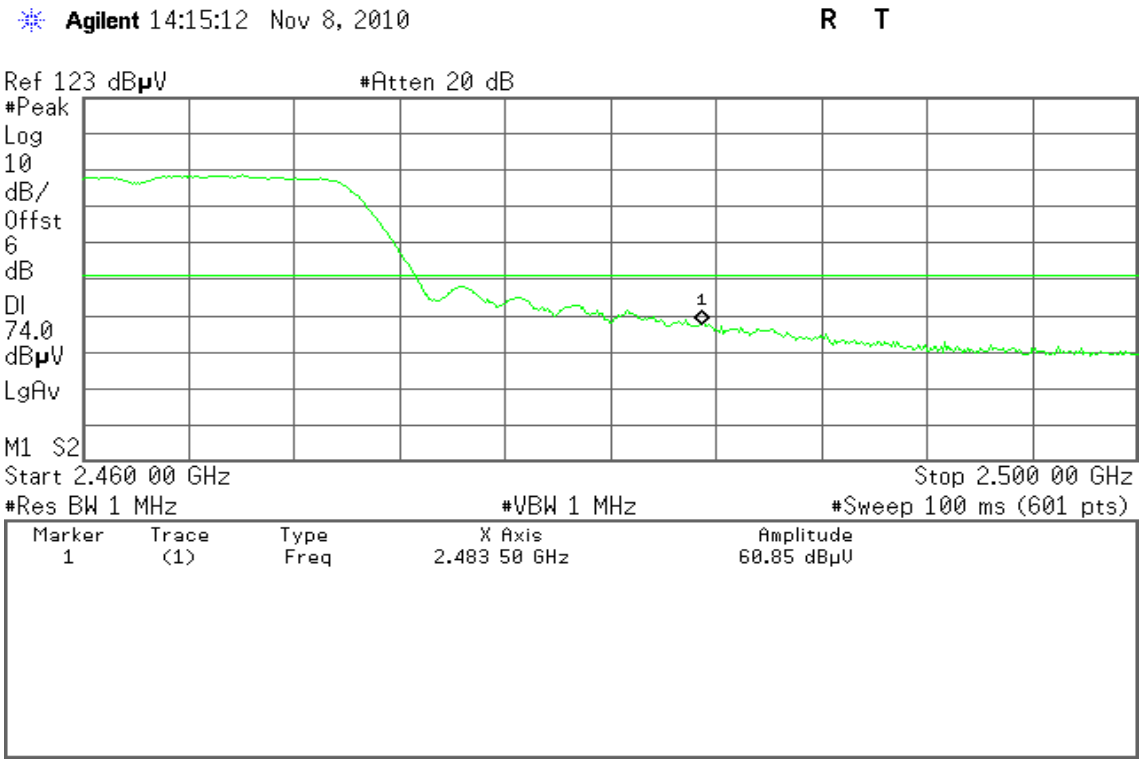


Detector mode: Average Polarity: Vertical

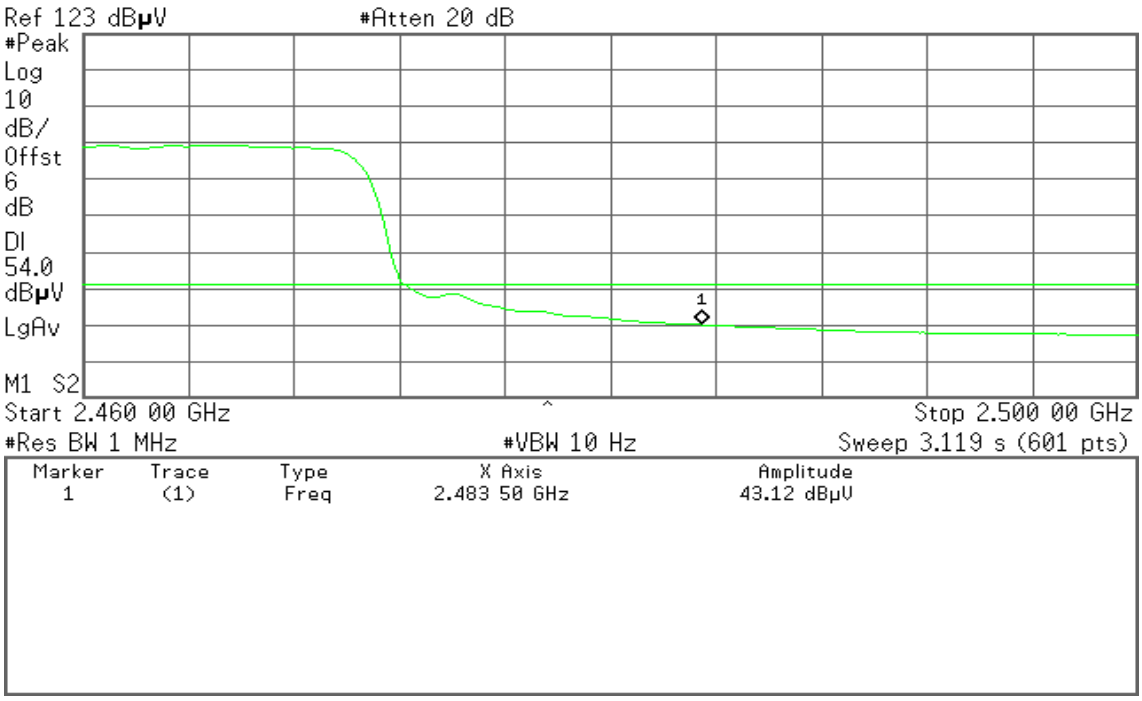


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Detector mode: Peak Polarity: Horizontal



Detector mode: Average Polarity: Horizontal



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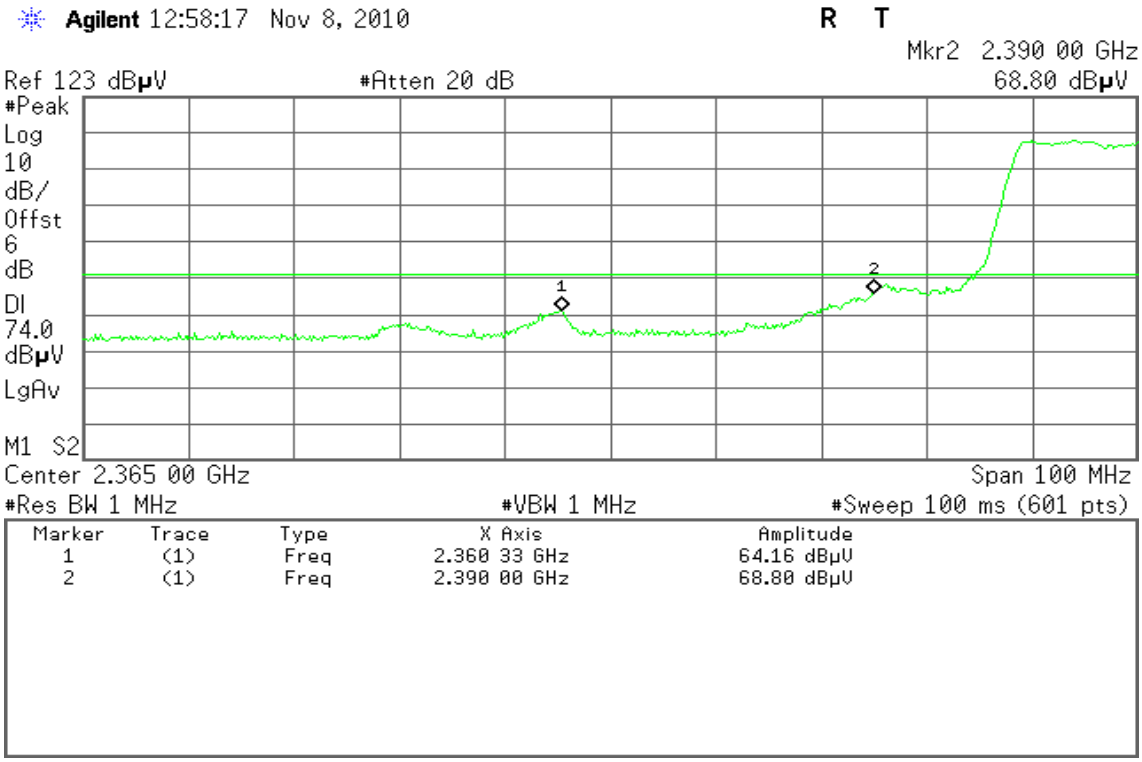
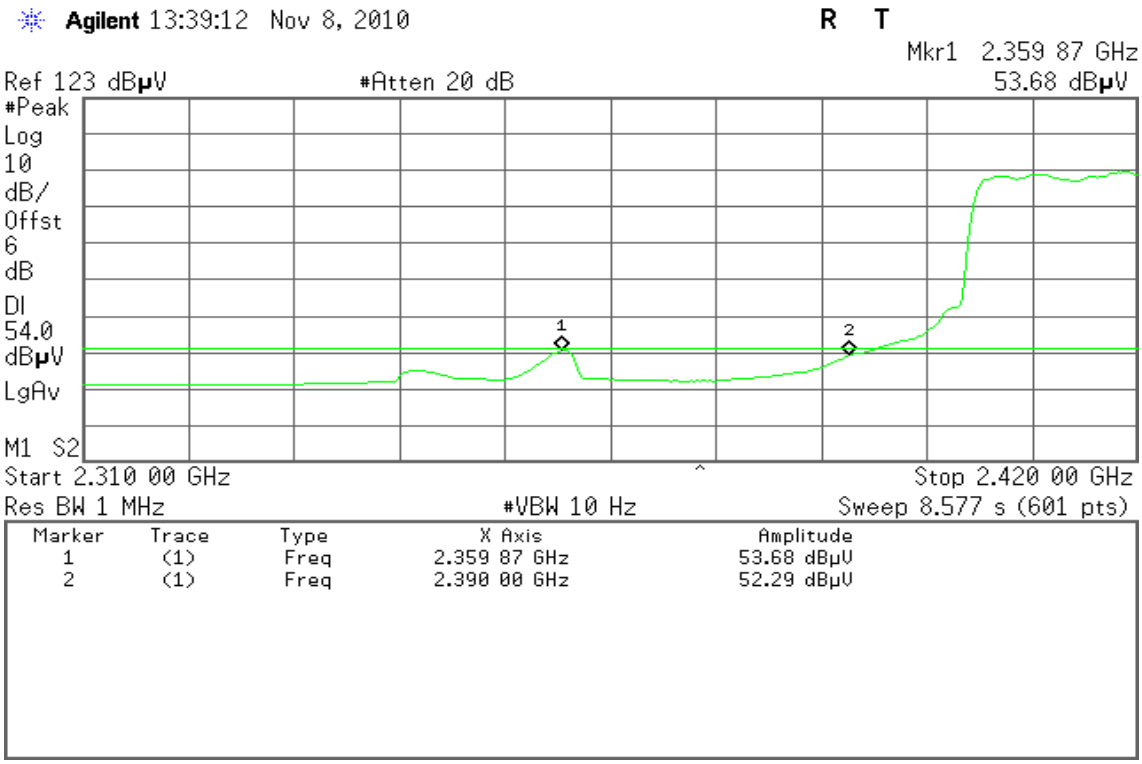
Band Edges (draft 802.11n 20 MHz Channel mode / CH Low)

Detector mode: Peak Polarity: Vertical



Detector mode: Average Polarity: Vertical



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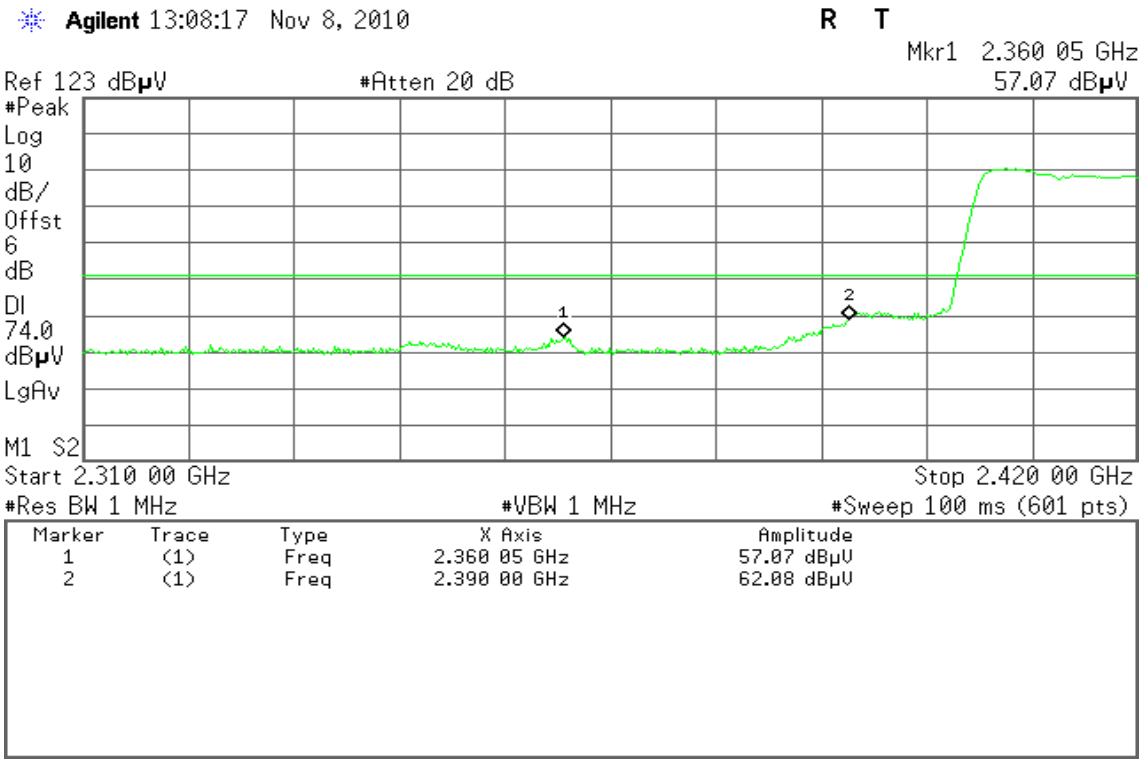
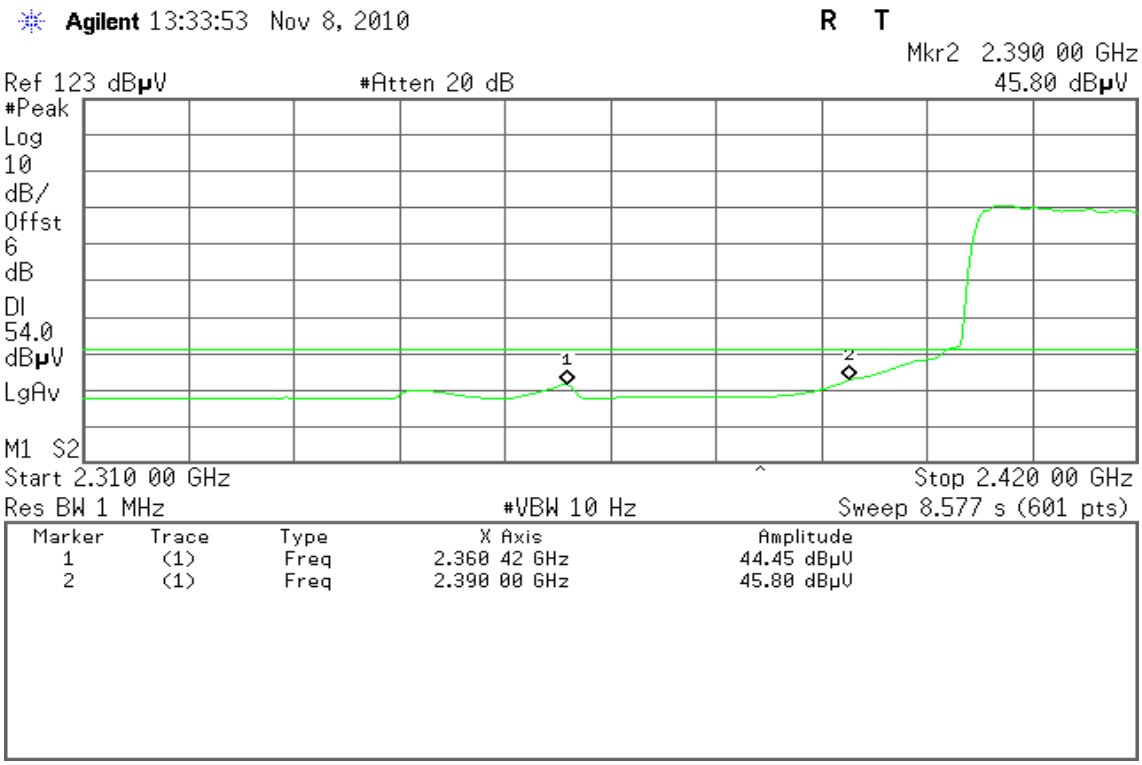
Detector mode: Peak Polarity: Horizontal



Detector mode: Average Polarity: Horizontal



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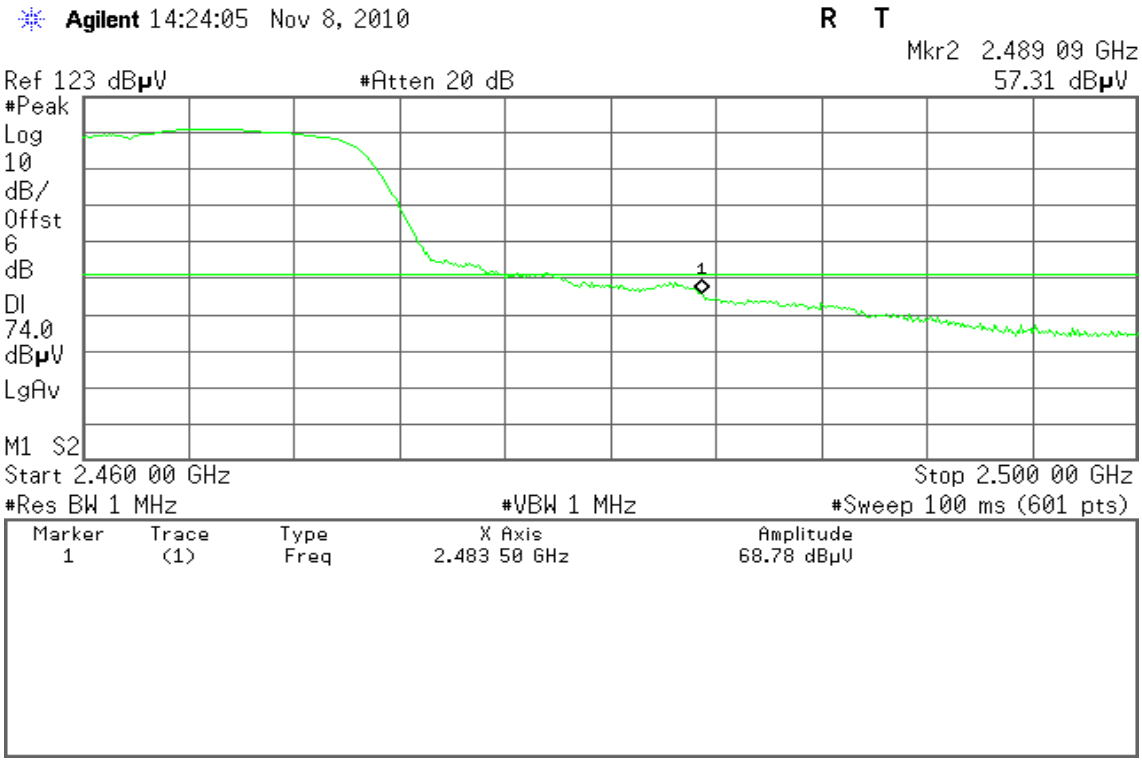
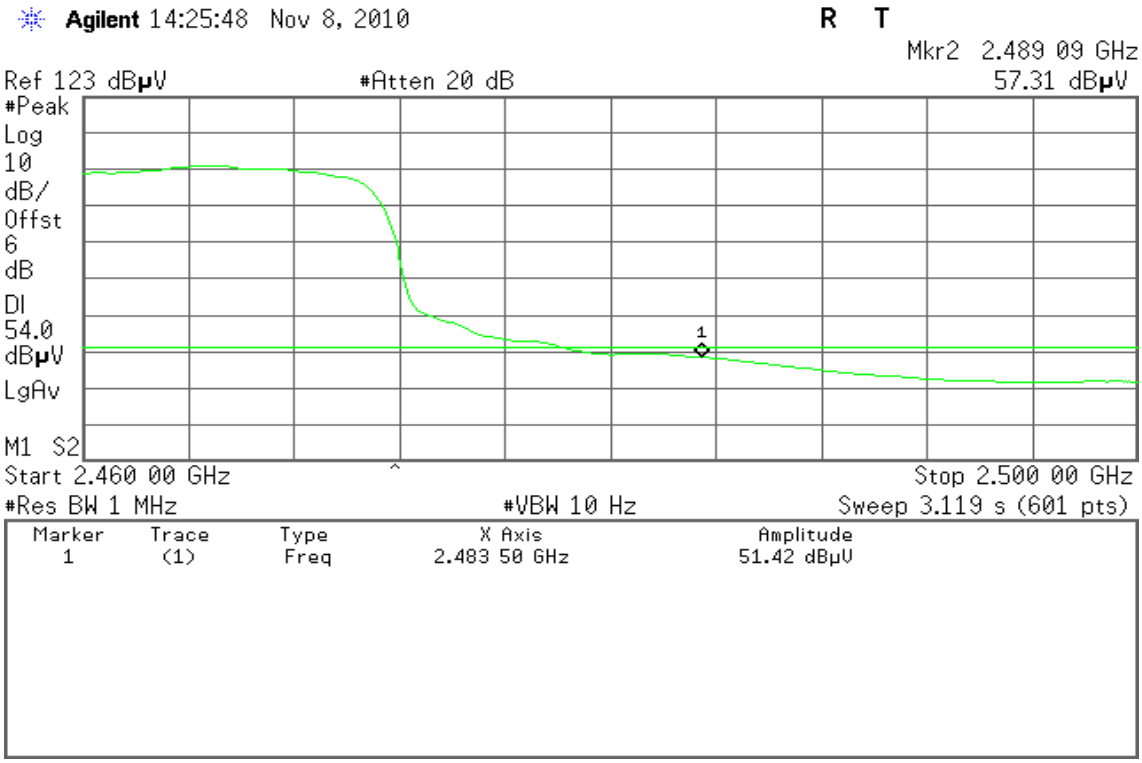
Band Edges (draft 802.11n 20 MHz Channel mode / CH High)

Detector mode: Peak Polarity: Vertical



Detector mode: Average Polarity: Vertical



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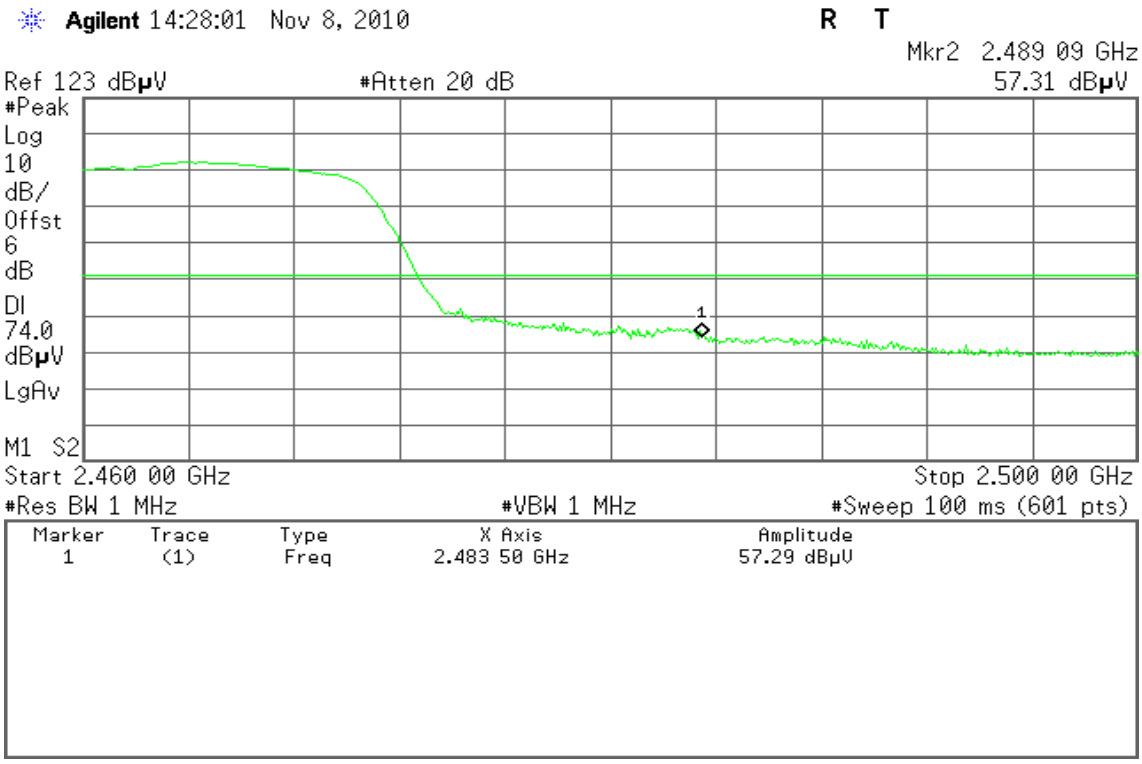
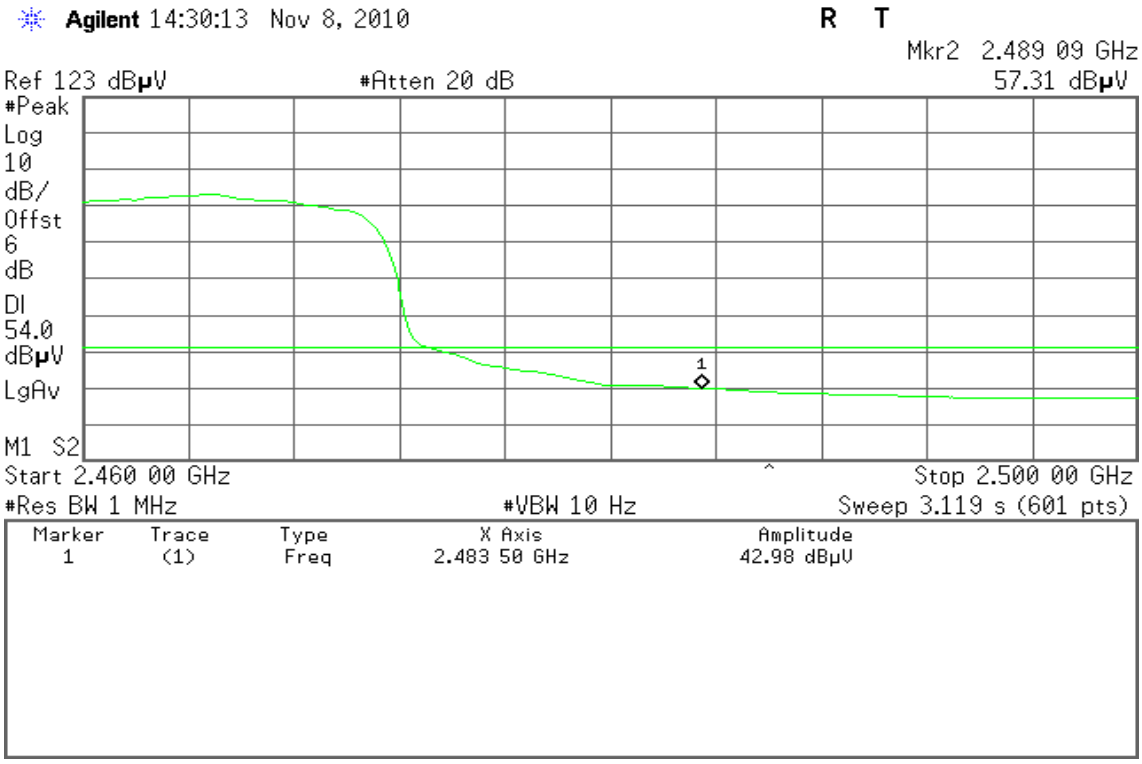
Detector mode: Peak Polarity: Horizontal



Detector mode: Average Polarity: Horizontal



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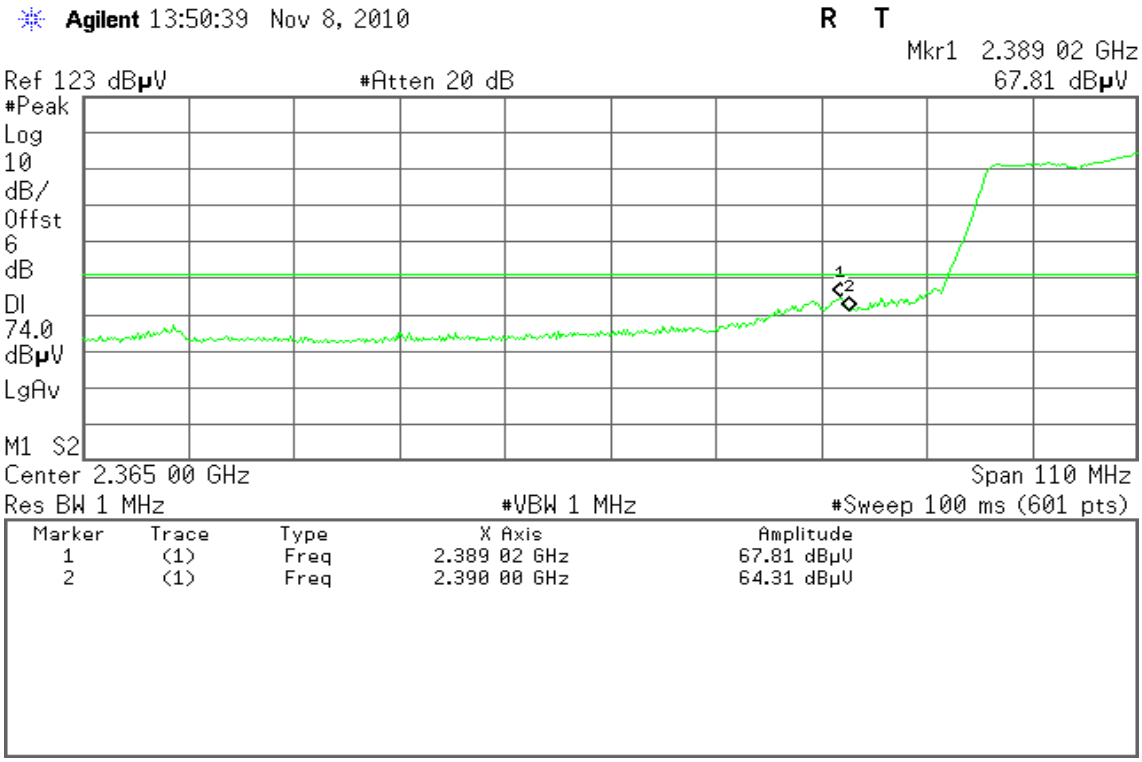
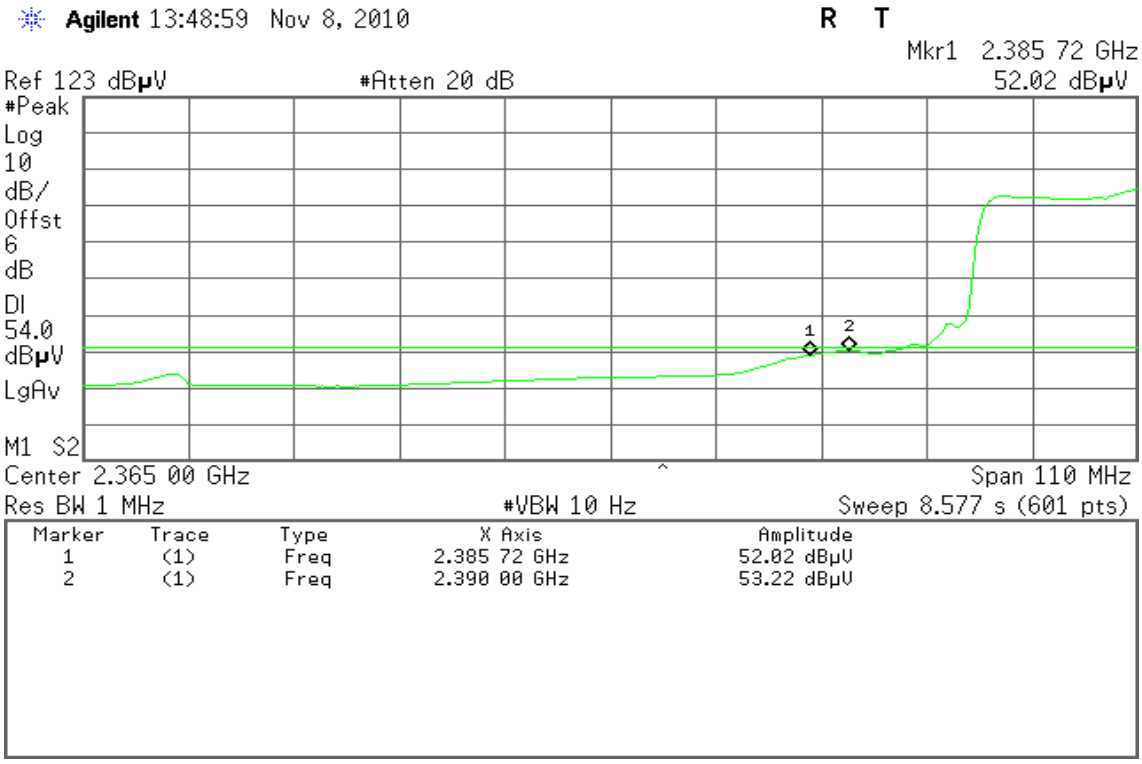
Band Edges (draft 802.11n 40 MHz Channel mode / CH Low)

Detector mode: Peak Polarity: Vertical



Detector mode: Average Polarity: Vertical



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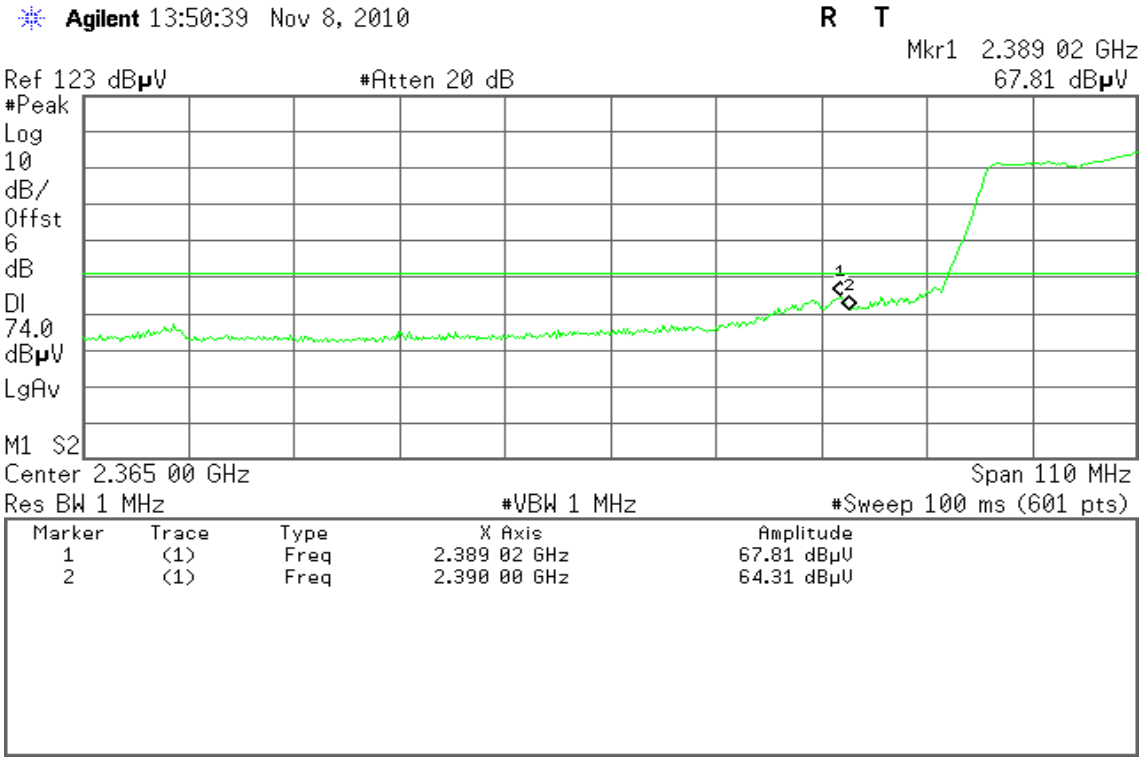
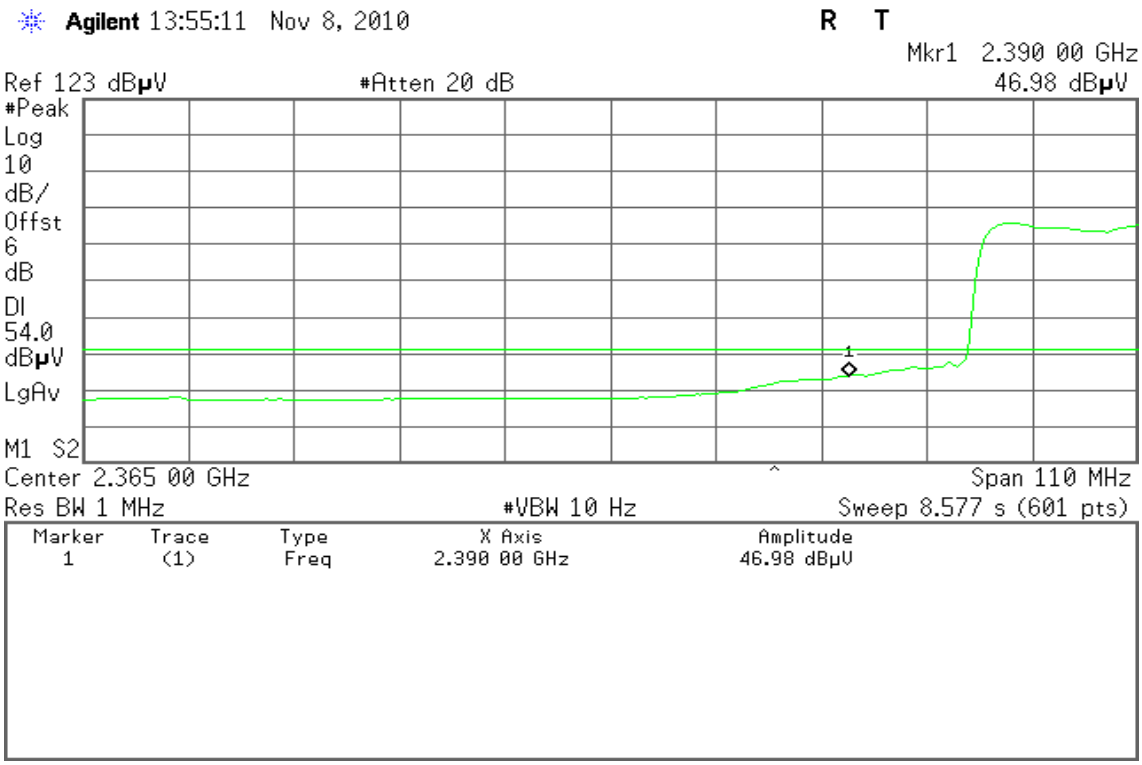
Detector mode: Peak Polarity: Horizontal



Detector mode: Average Polarity: Horizontal



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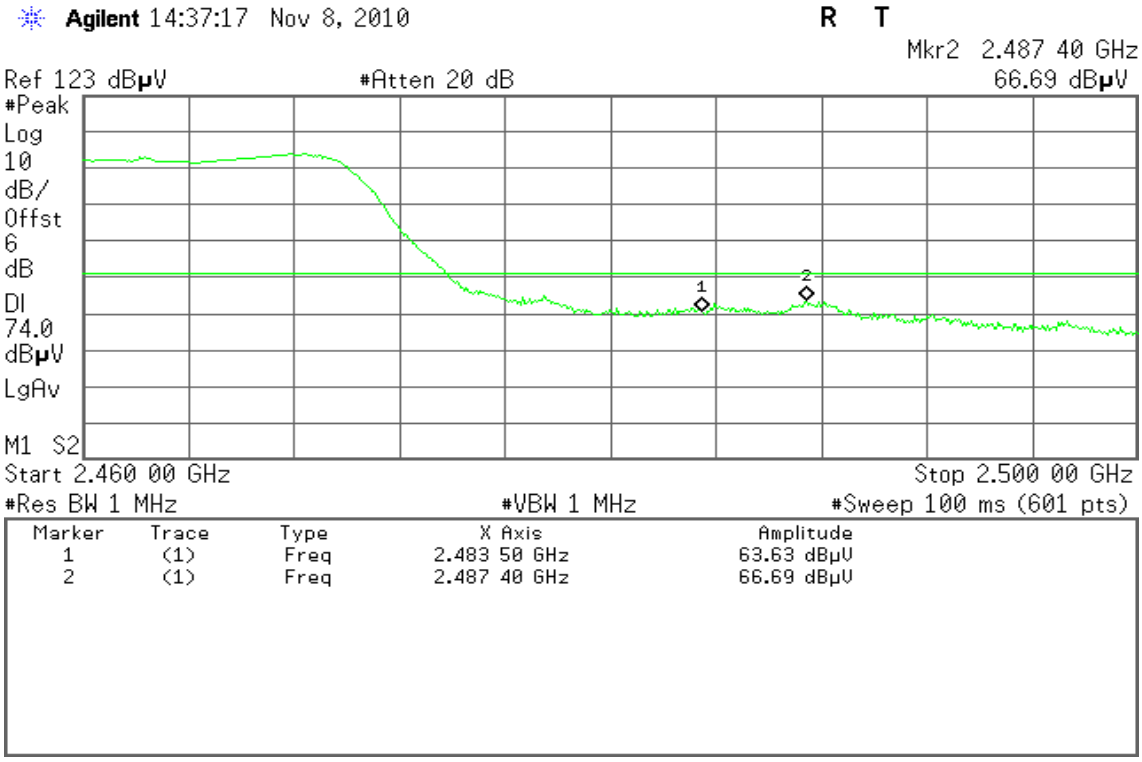
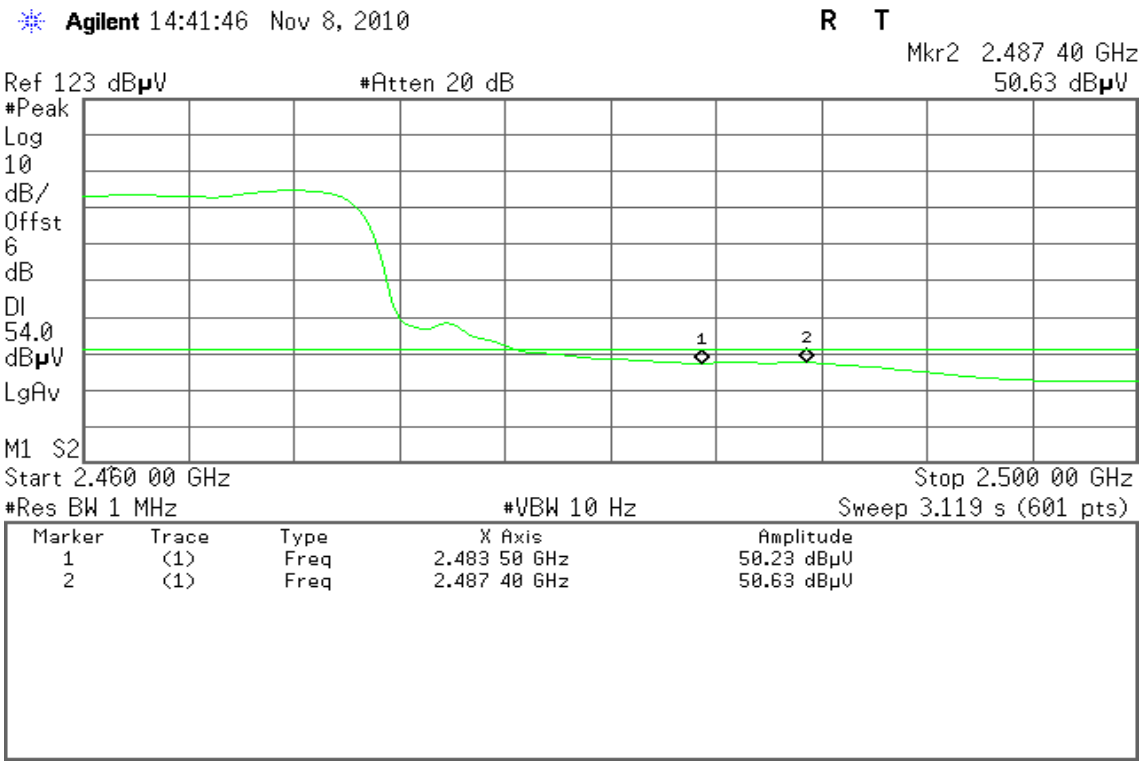
Band Edges (draft 802.11n 40 MHz Channel mode / CH High)

Detector mode: Peak Polarity: Vertical

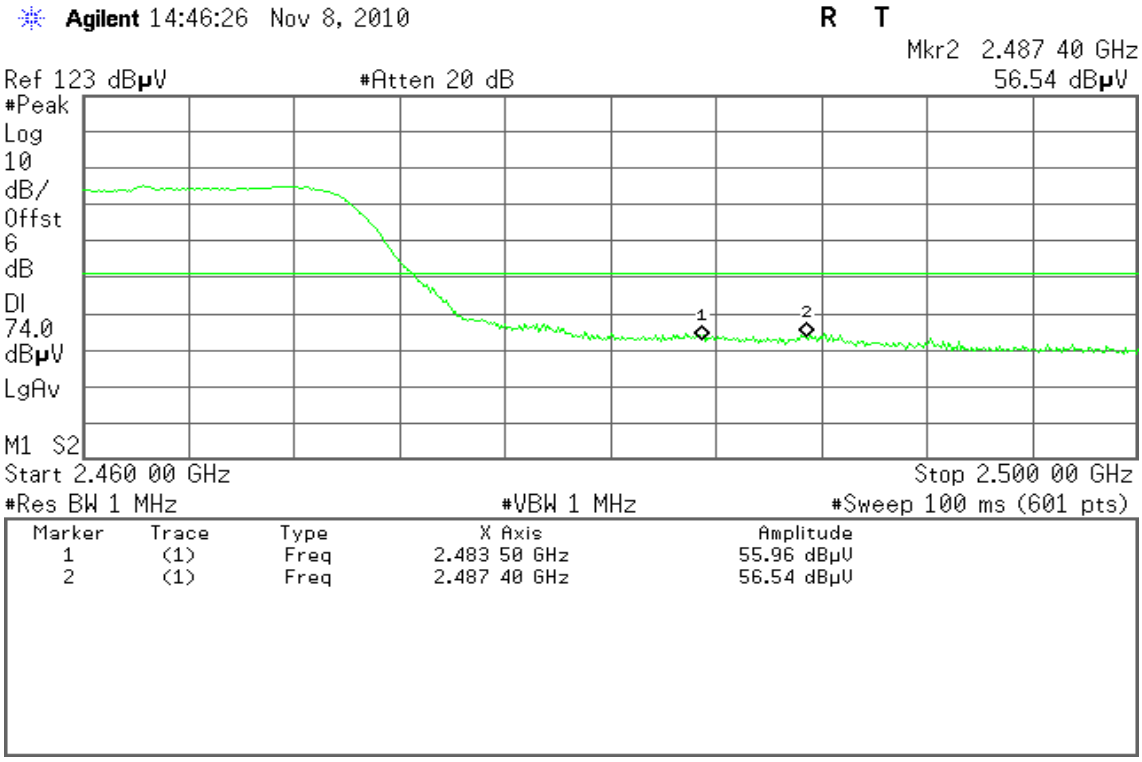


Detector mode: Average Polarity: Vertical

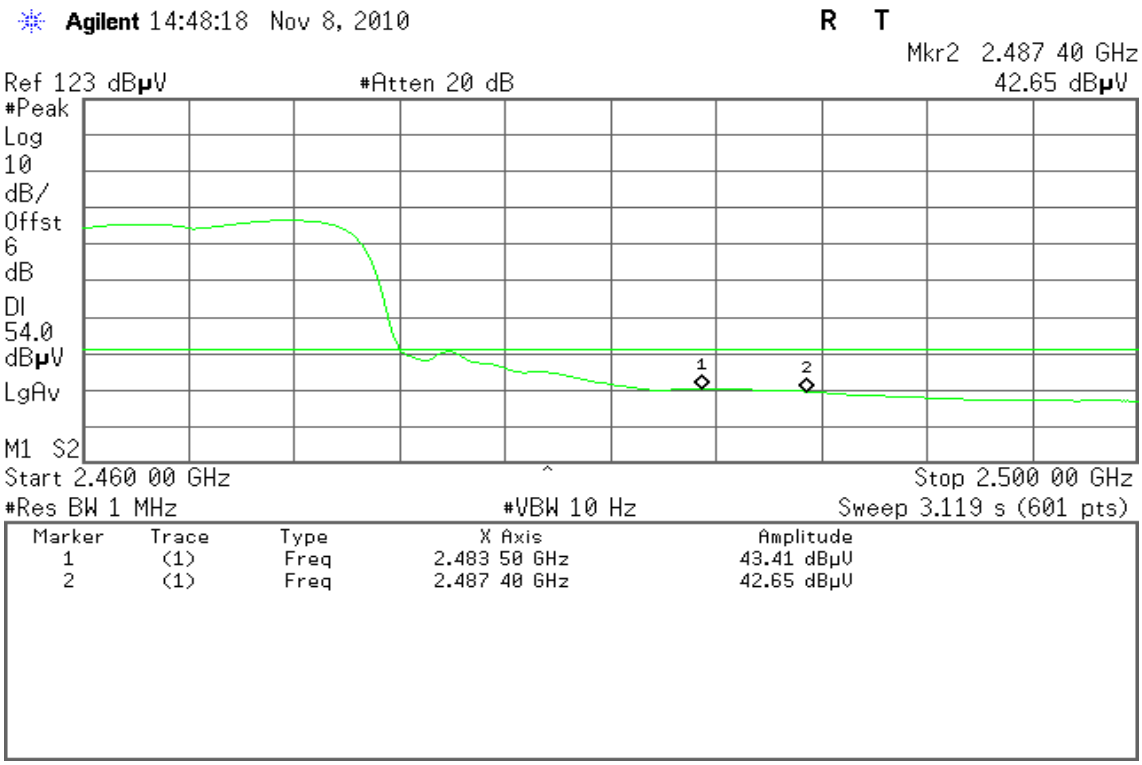


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Detector mode: Peak Polarity: Horizontal



Detector mode: Average Polarity: Horizontal



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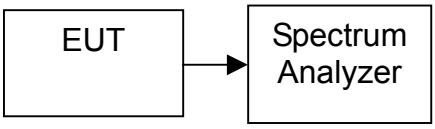
7.5 PEAK POWER SPECTRAL DENSITY

LIMIT

1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

TEST CONFIGURATION



TEST PROCEDURE

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

TEST RESULTS

No non-compliance noted

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TEST DATA

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-7.27	8.00	PASS
Mid	2437	-7.39		PASS
High	2462	-7.72		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-13.10	8.00	PASS
Mid	2437	-12.95		PASS
High	2462	-12.64		PASS

Test mode: draft 802.11n 20 MHz Channel mode

Channel	Frequency (MHz)	PPSD (dBm)			Limit (dBm)	Result
		Chain 0	Chain 1	Combination		
Low	2412	-13.73	-15.83	-9.10	8.00	PASS
Mid	2437	-13.94	-15.59	-8.55		PASS
High	2462	-14.55	-15.97	-9.50		PASS

Test mode: draft 802.11n 40 MHz Channel mode

Channel	Frequency (MHz)	PPSD (dBm)			Limit (dBm)	Result
		Chain 0	Chain 1	Combination		
Low	2422	-17.61	-19.57	-13.43	8.00	PASS
Mid	2437	-15.51	-17.42	-12.09		PASS
High	2452	-15.94	-17.78	-11.73		PASS

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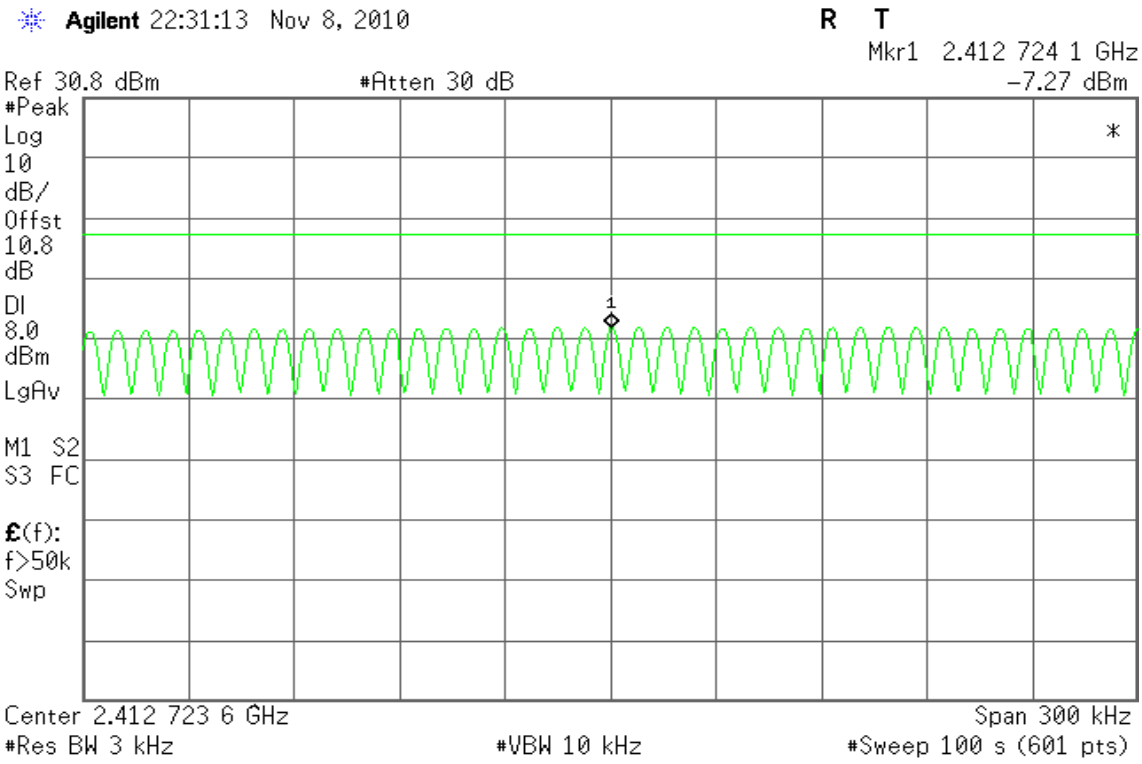
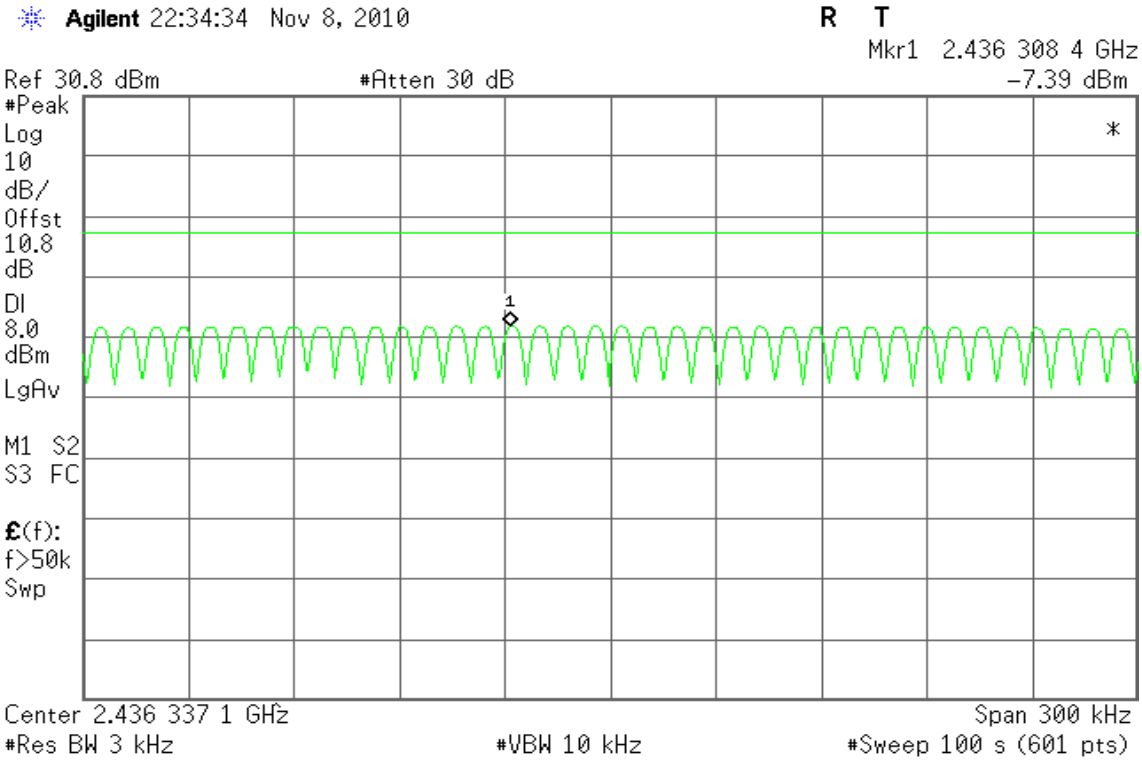
Test Plot

IEEE 802.11b mode

PPSD (CH Low)



PPSD (CH Mid)



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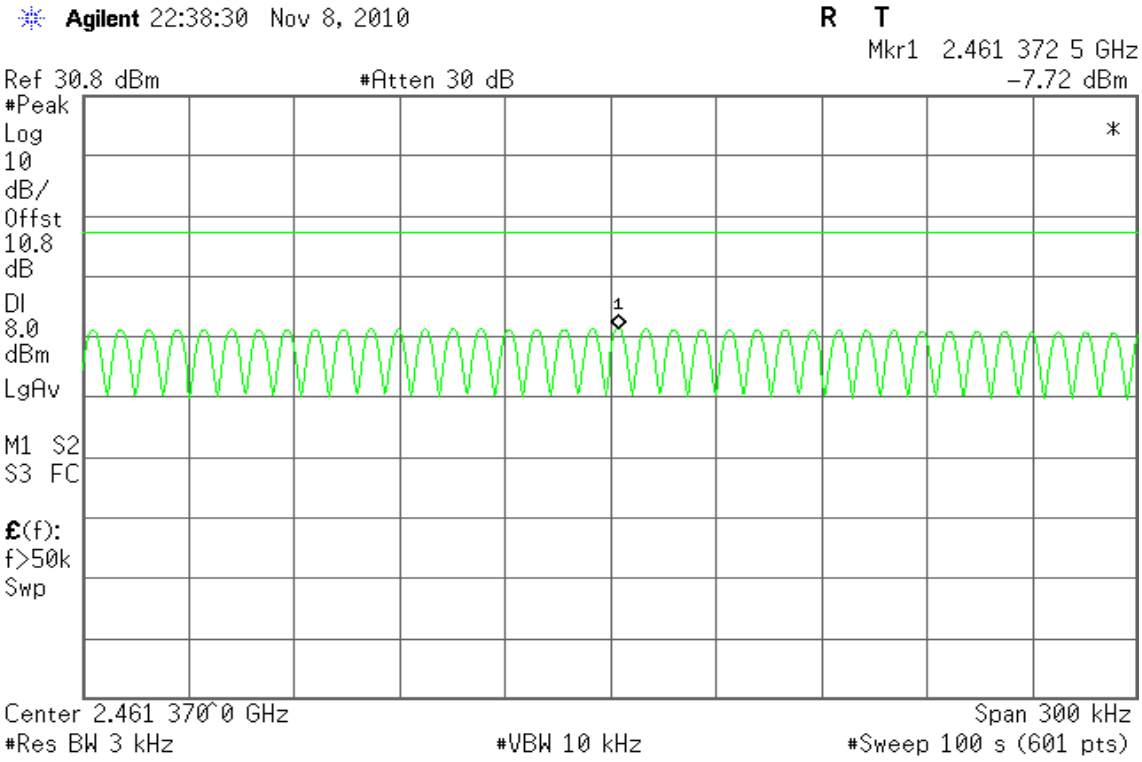
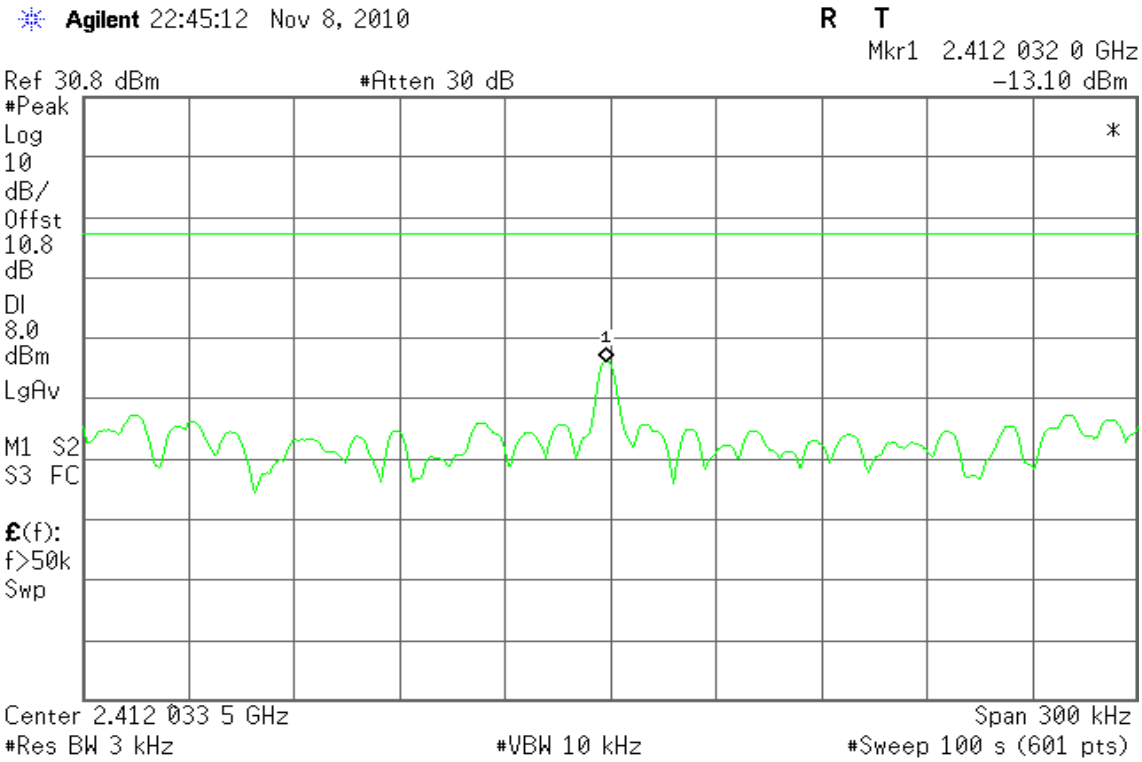
PPSD (CH High)



IEEE 802.11g mode

PPSD (CH Low)



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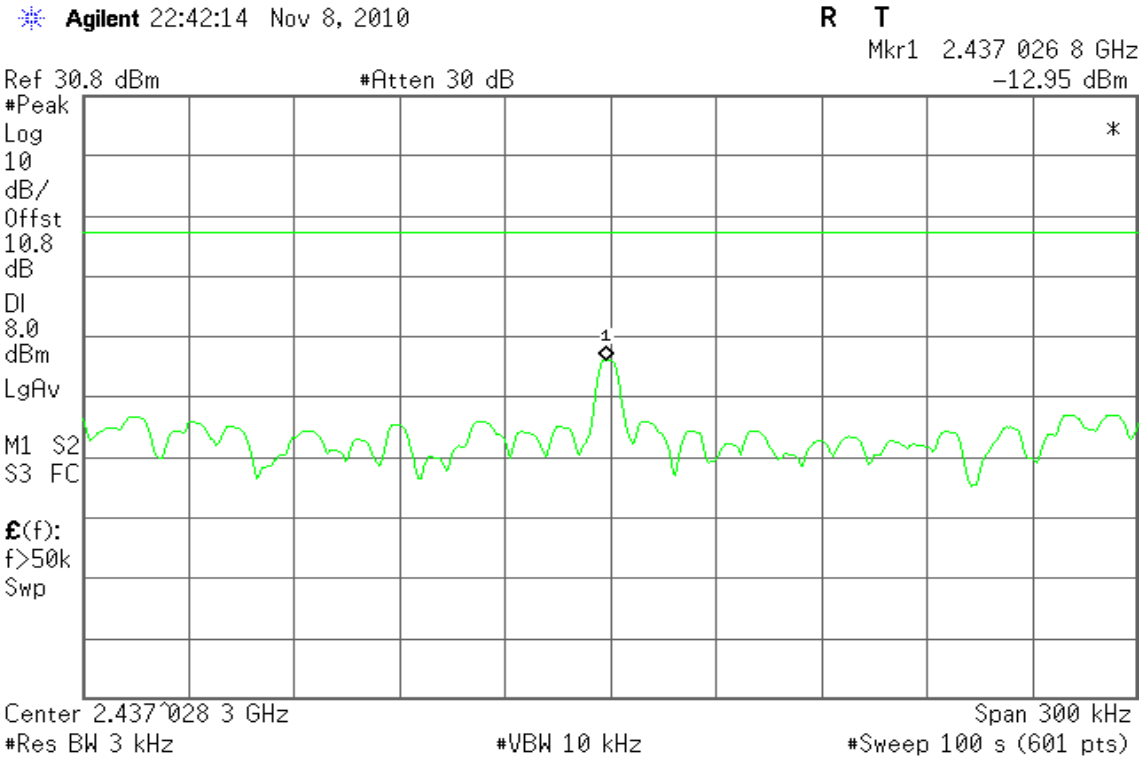
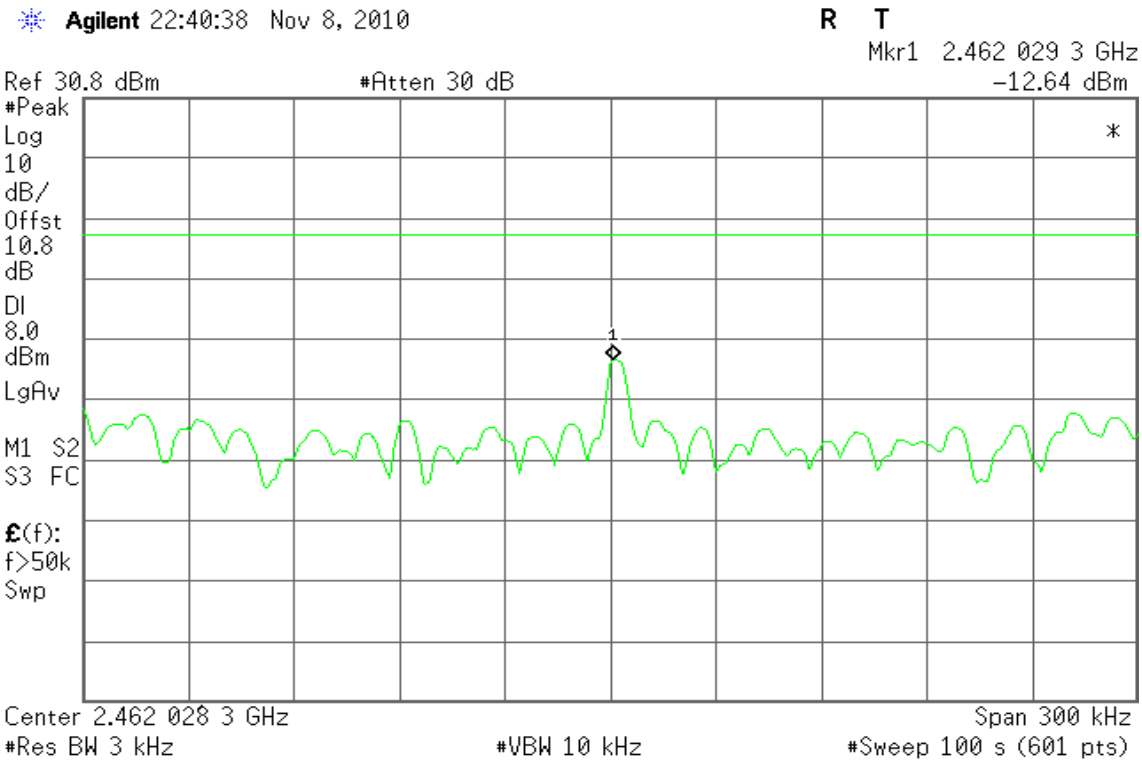
PPSD (CH Mid)



PPSD (CH High)



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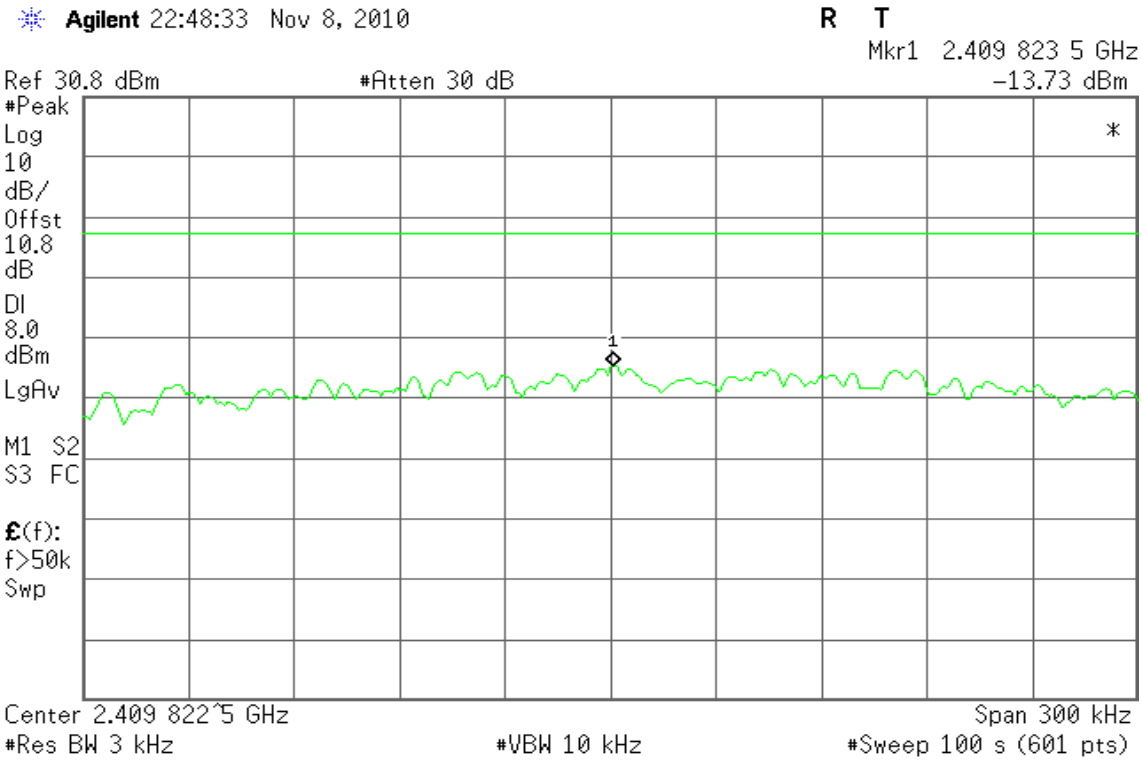
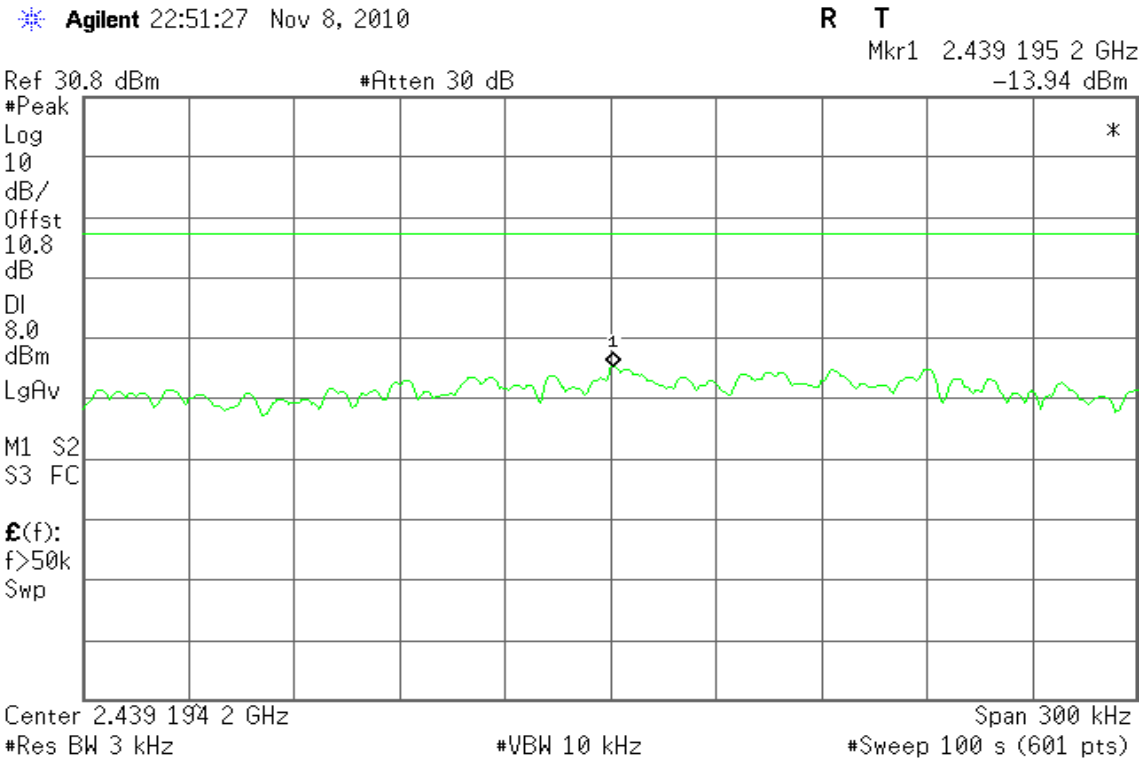
draft 802.11n 20 MHz Channel mode / Chain 0

PPSD (CH Low)



PPSD (CH Mid)



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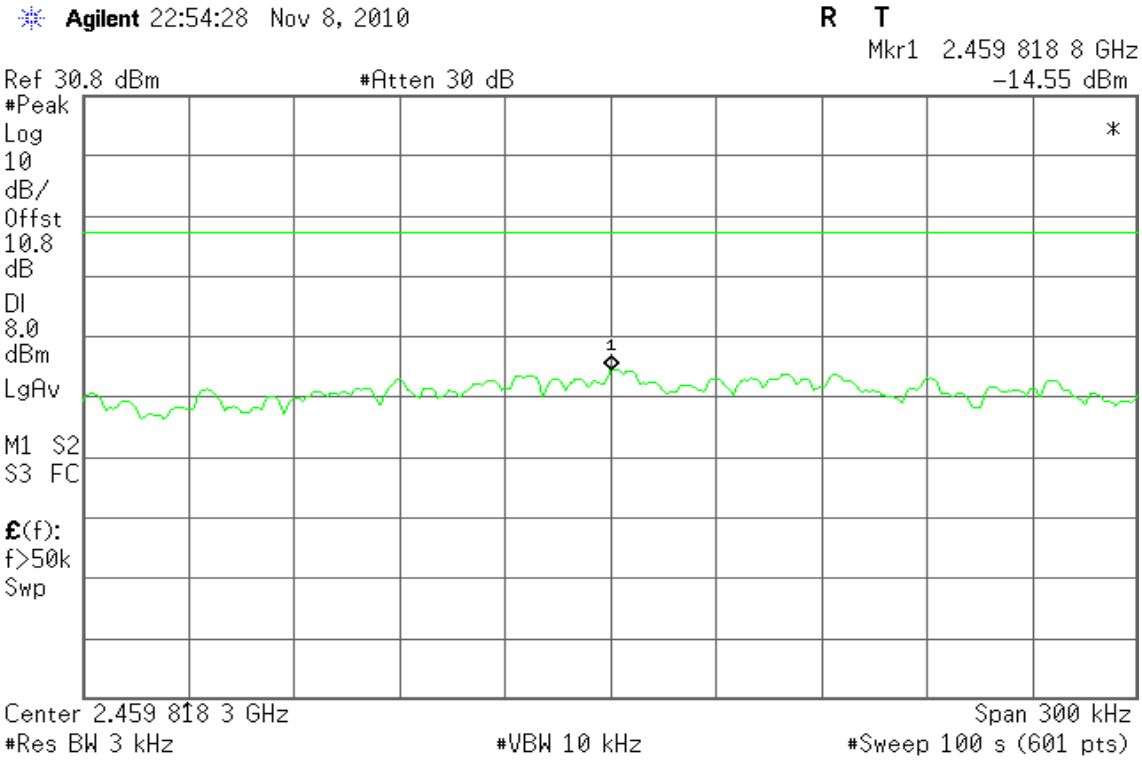
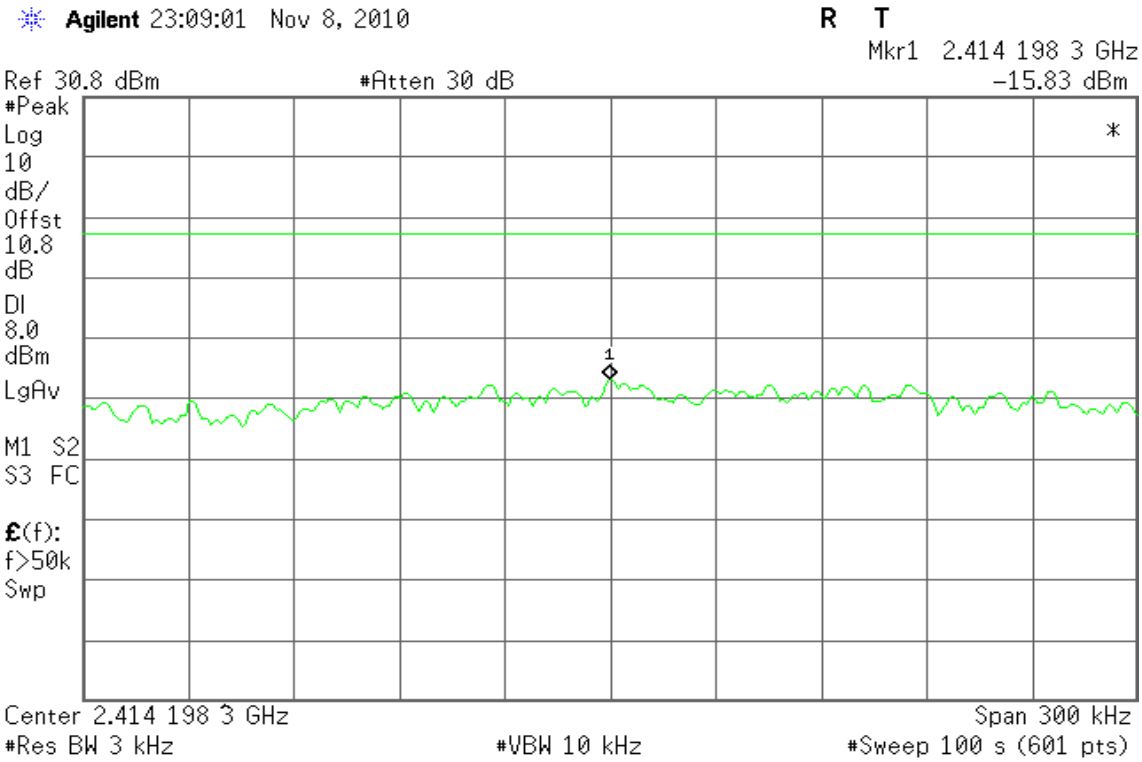
PPSD (CH High)



draft 802.11n 20 MHz Channel mode / Chain 1

PPSD (CH Low)



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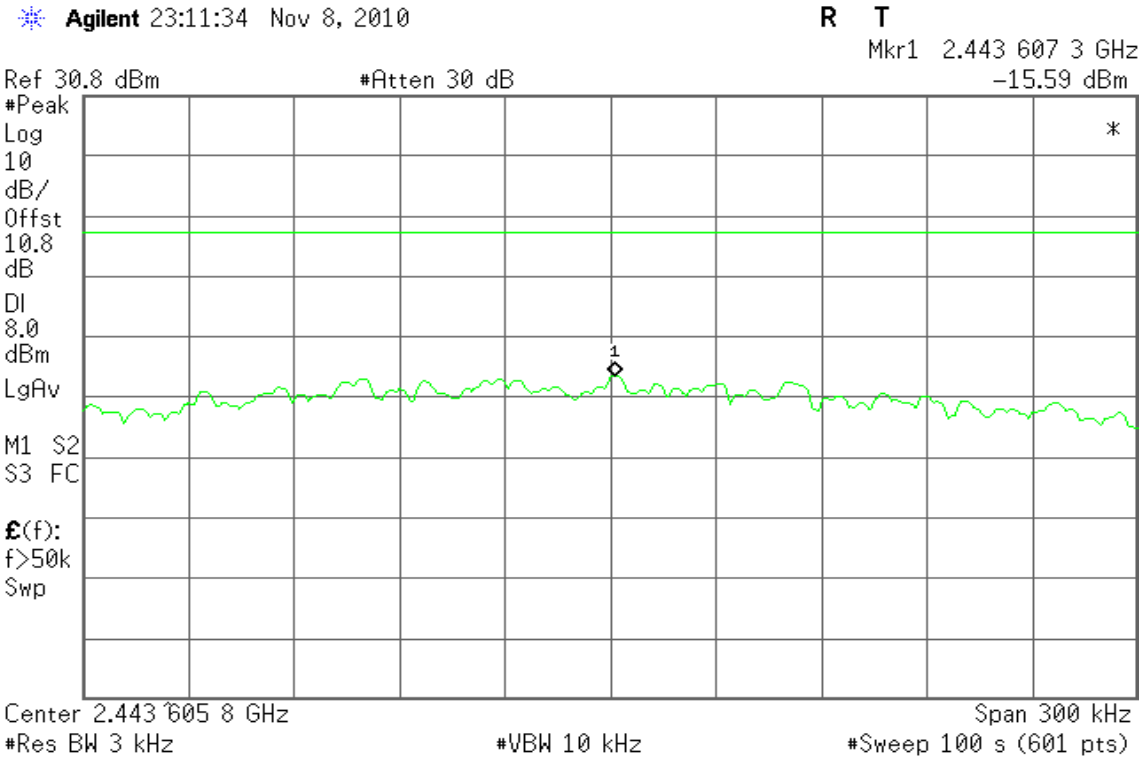
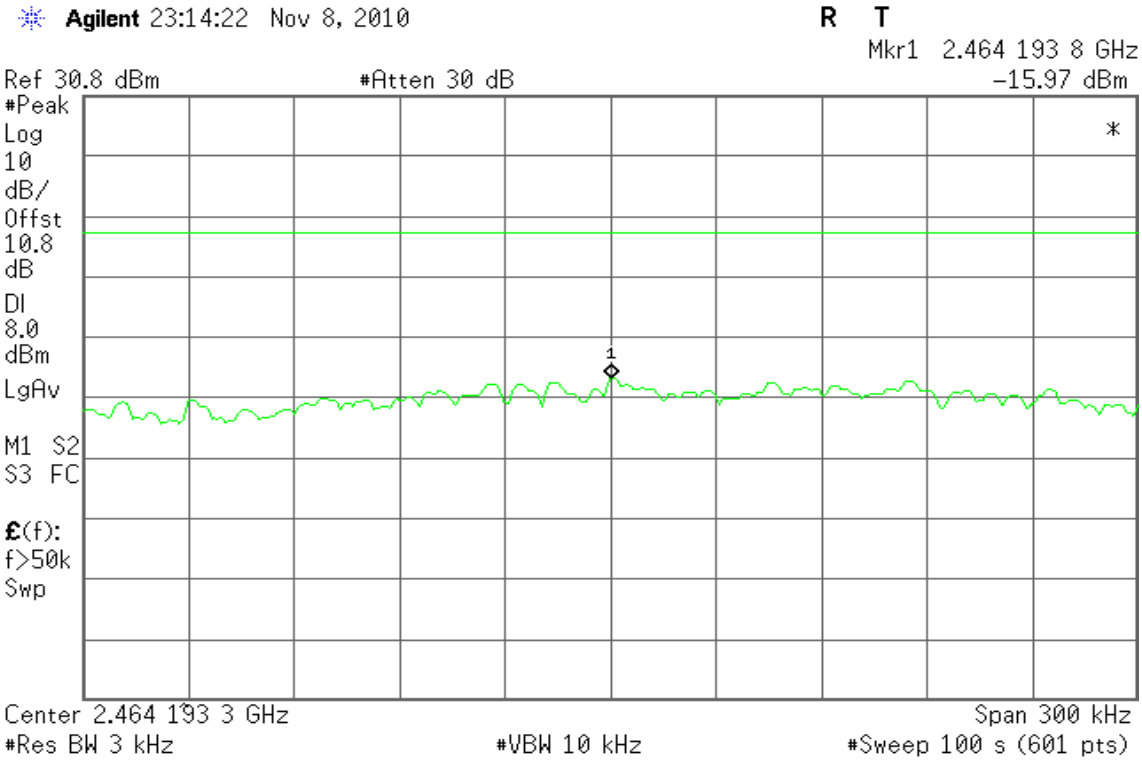
PPSD (CH Mid)



PPSD (CH High)



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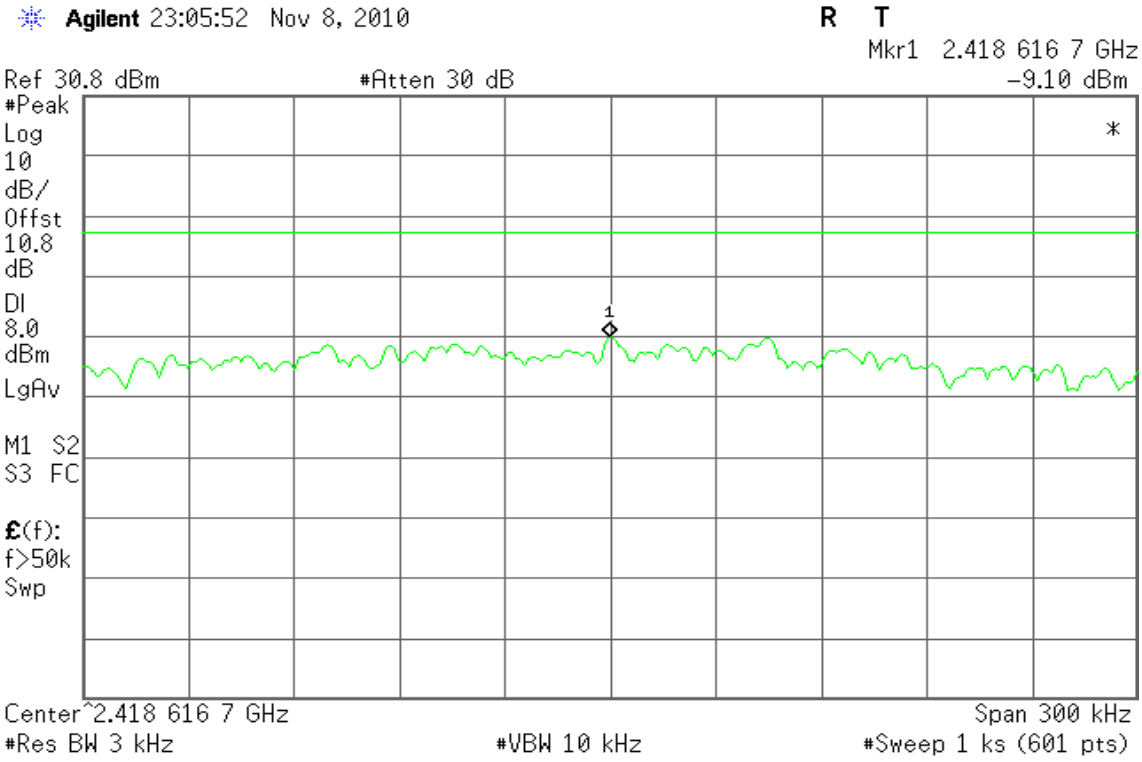
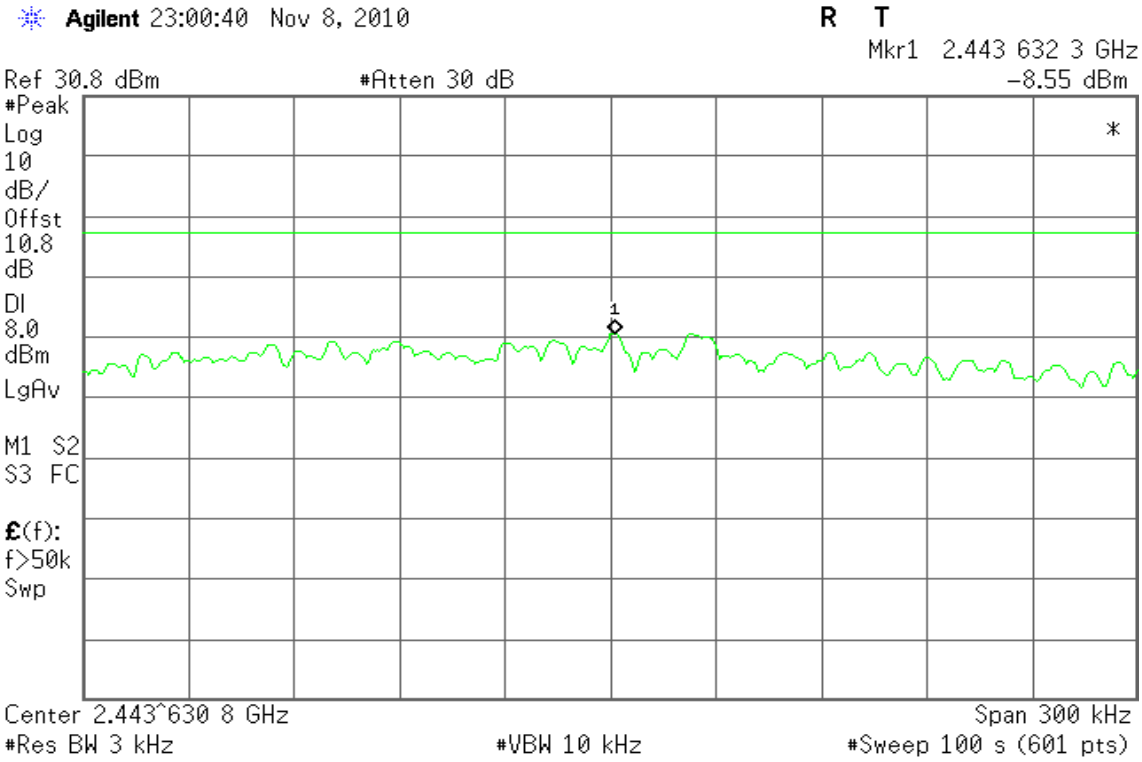
draft 802.11n 20 MHz Channel mode / Combination

PPSD (CH Low)



PPSD (CH Mid)



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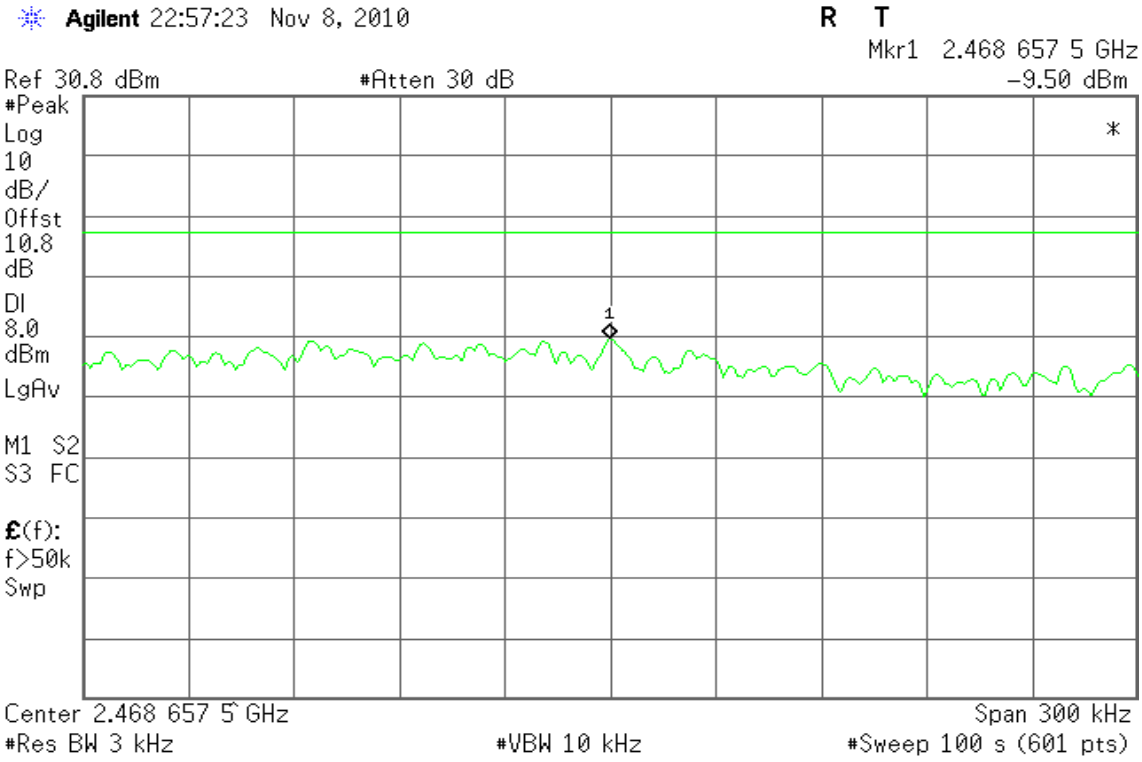
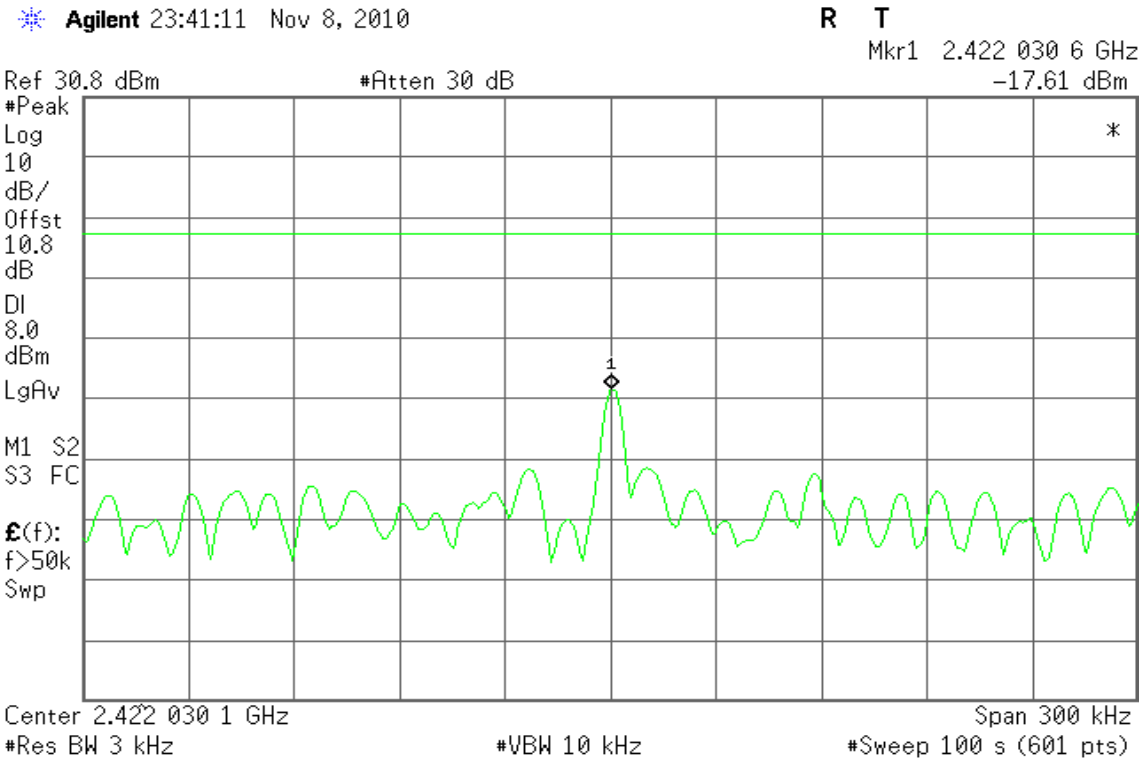
PPSD (CH High)



draft 802.11n 40 MHz Channel mode / Chain 0

PPSD (CH Low)



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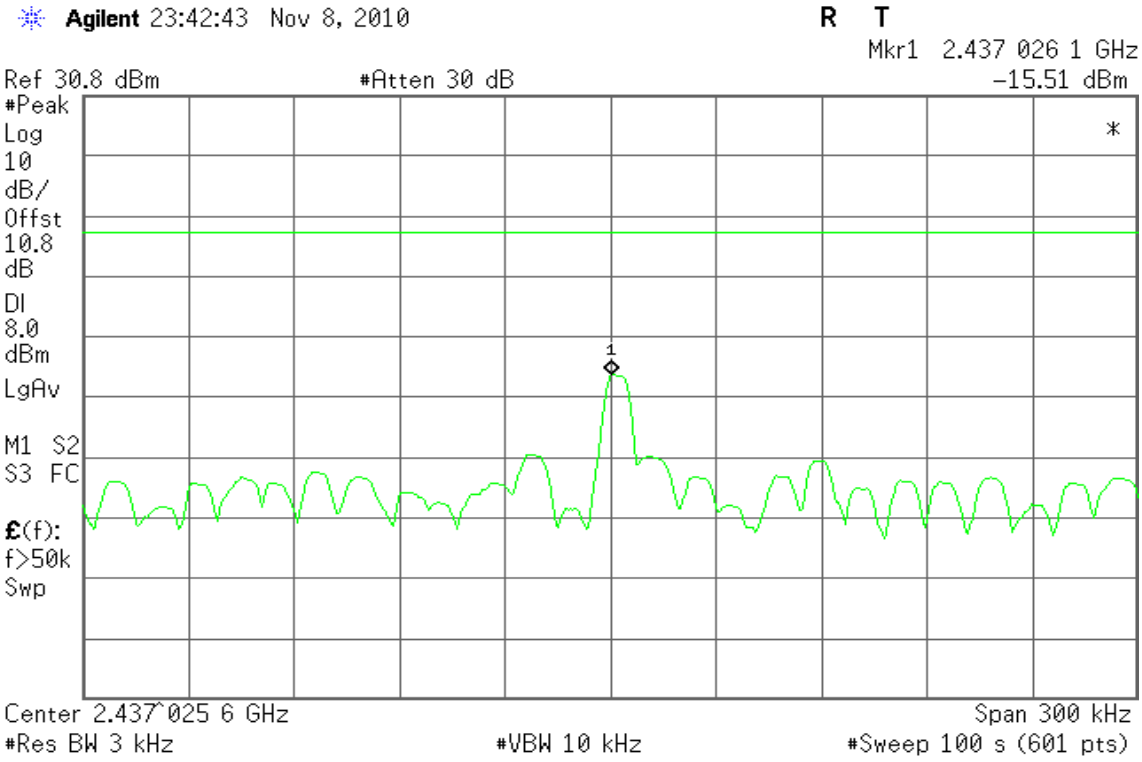
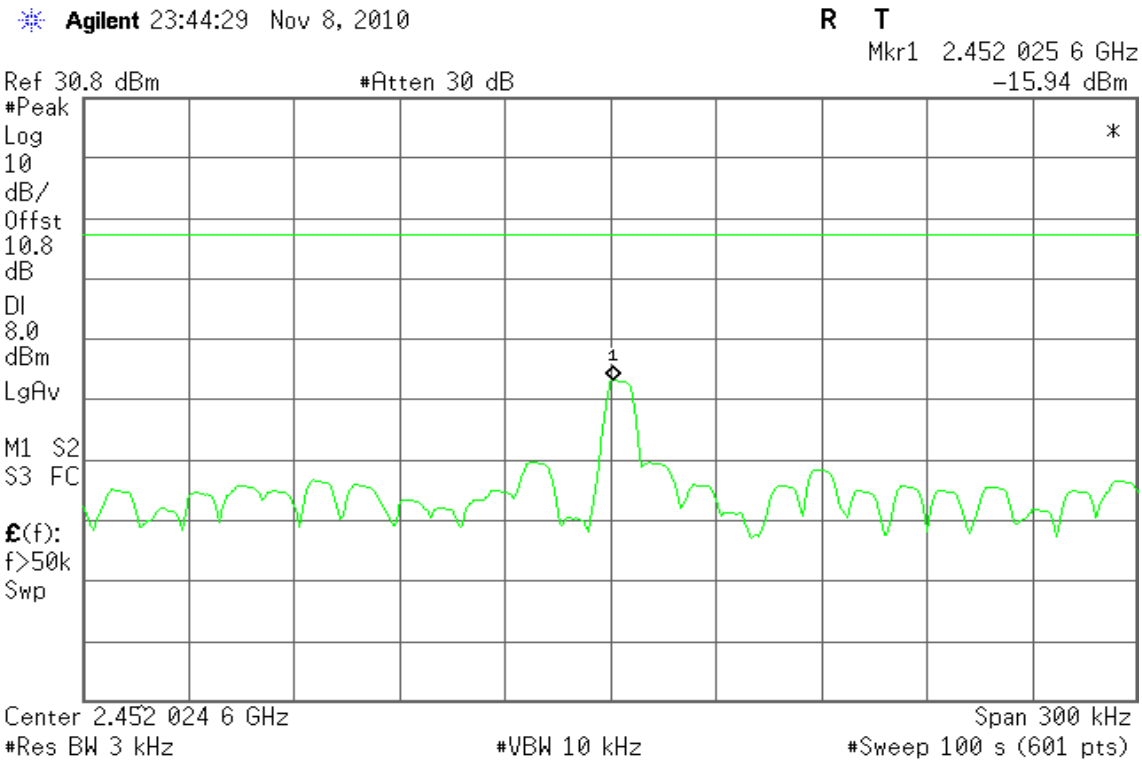
PPSD (CH Mid)



PPSD (CH High)



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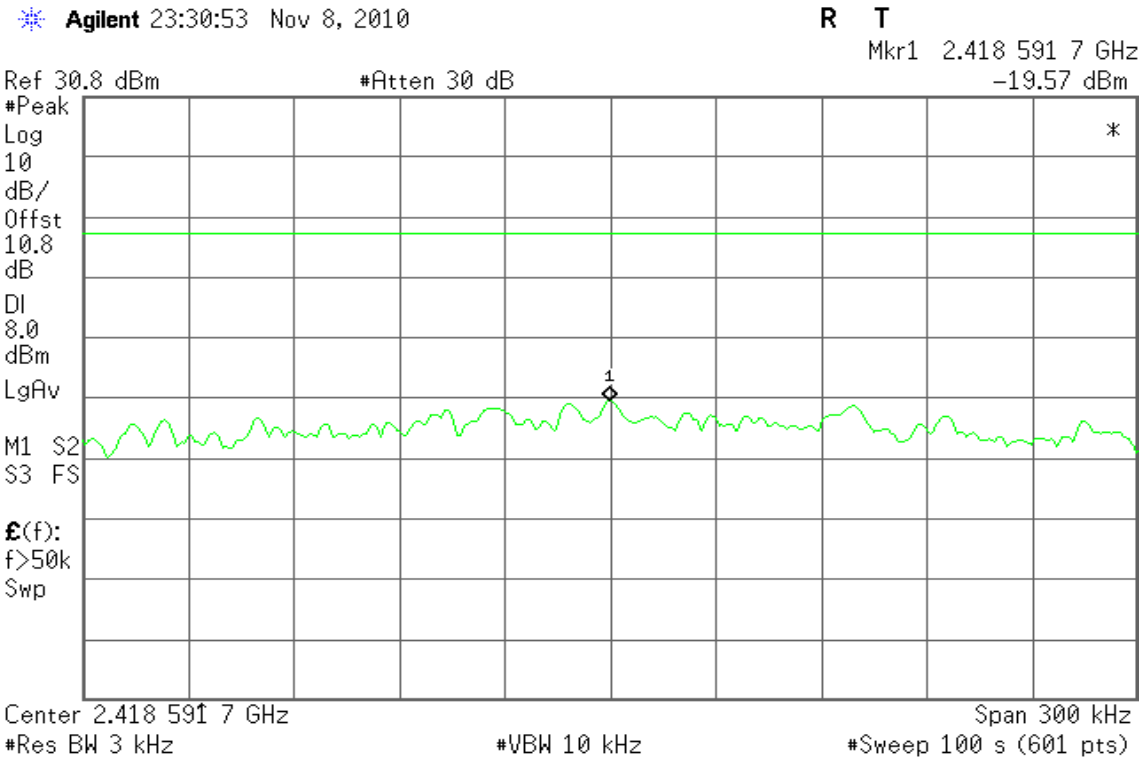
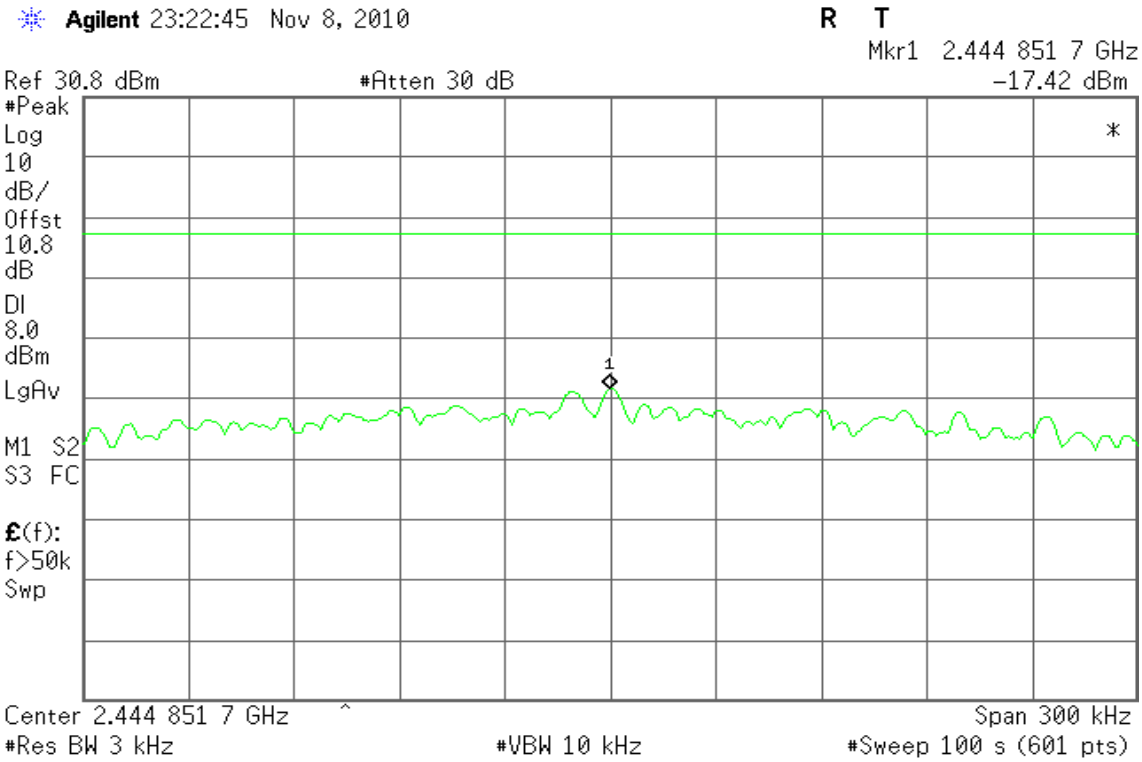
draft 802.11n 40 MHz Channel mode / Chain 1

PPSD (CH Low)



PPSD (CH Mid)



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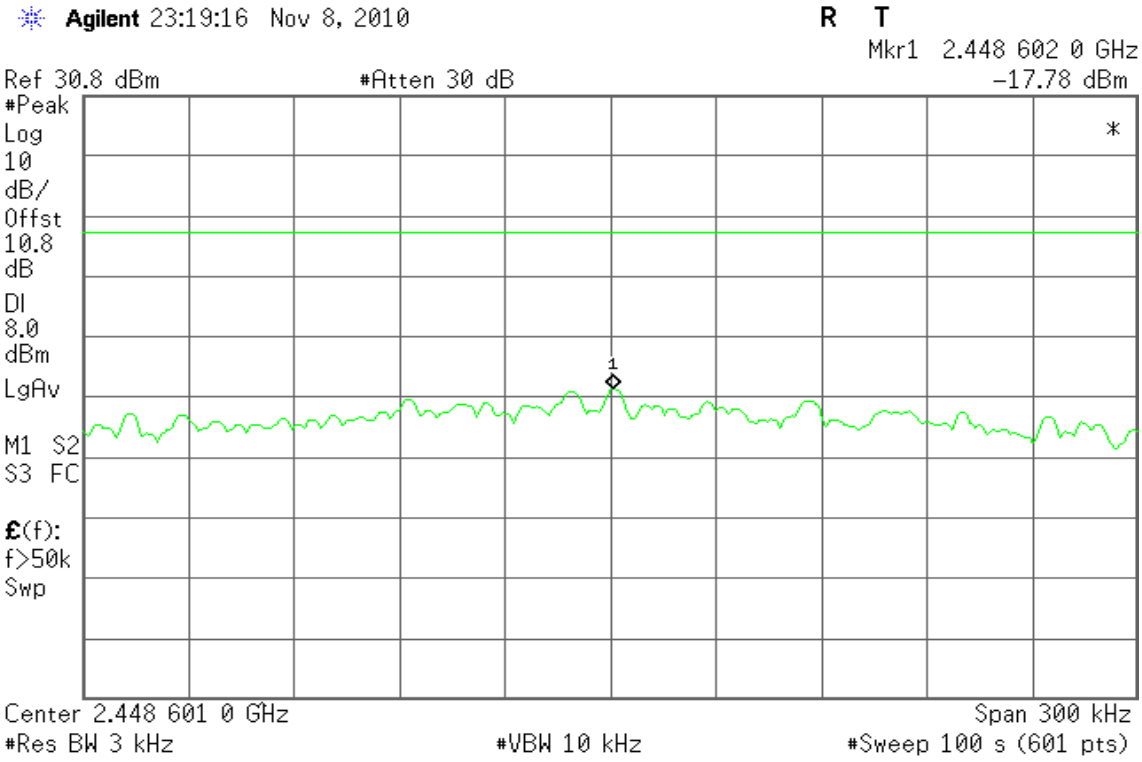
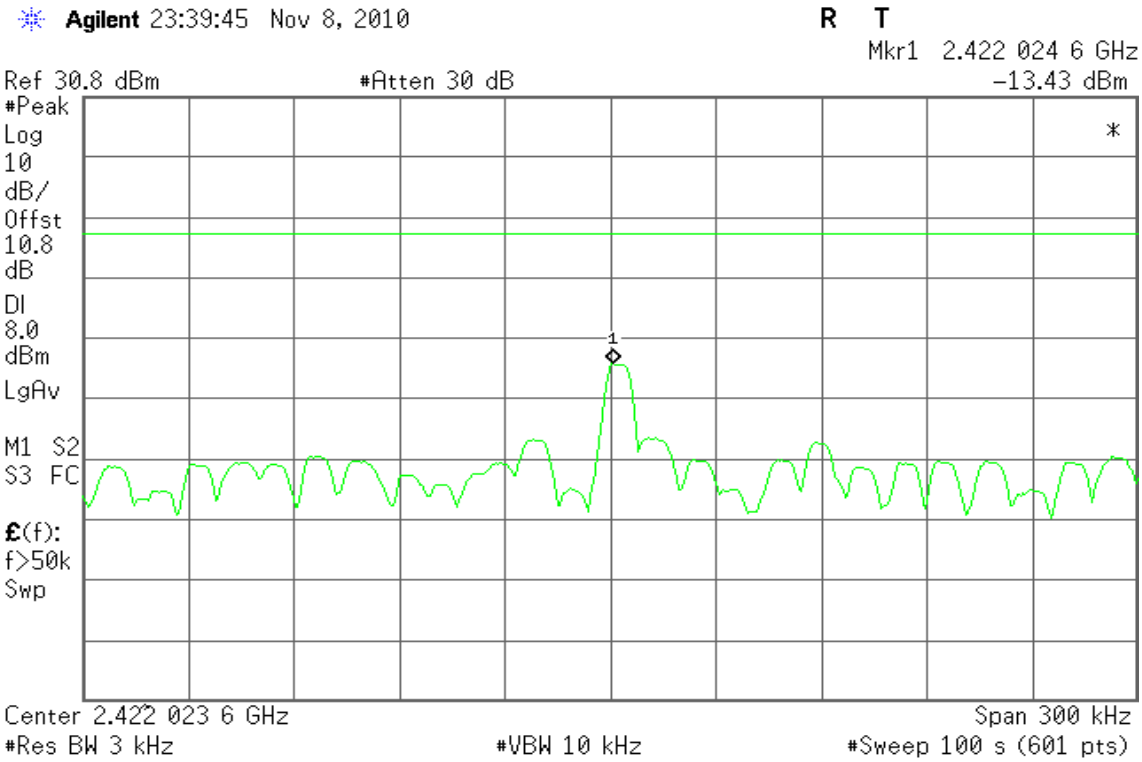
PPSD (CH High)



draft 802.11n 40 MHz Channel mode / Combination

PPSD (CH Low)



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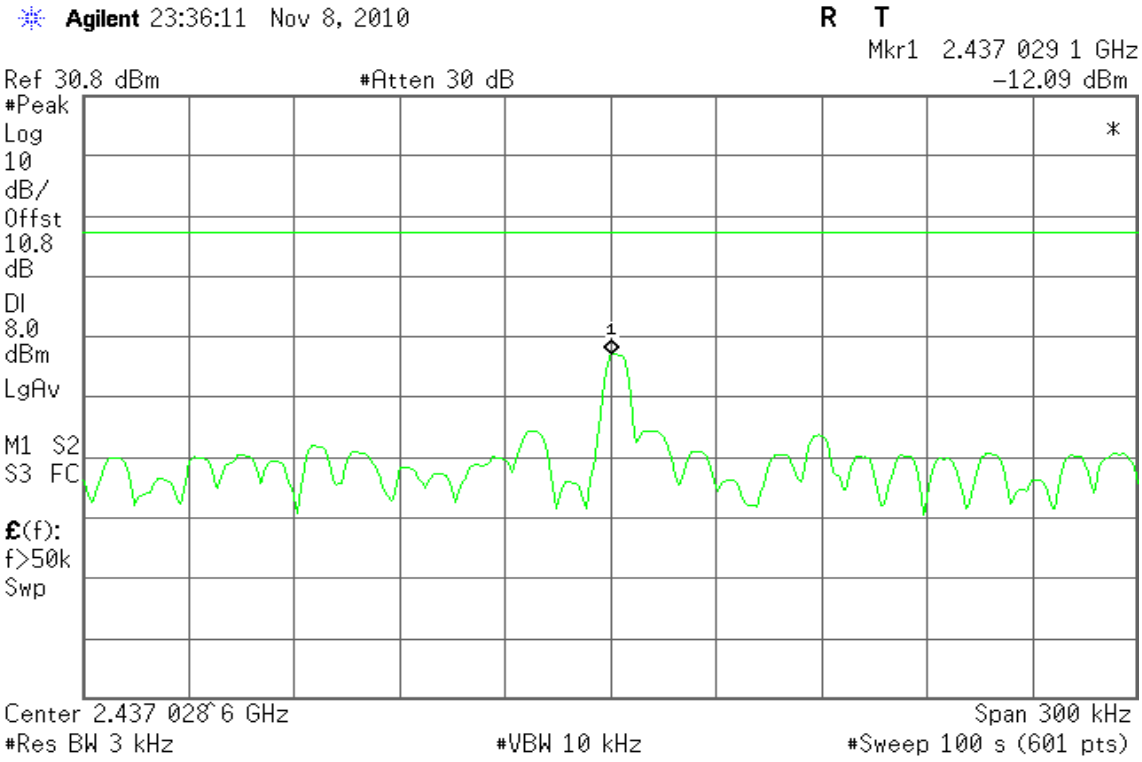
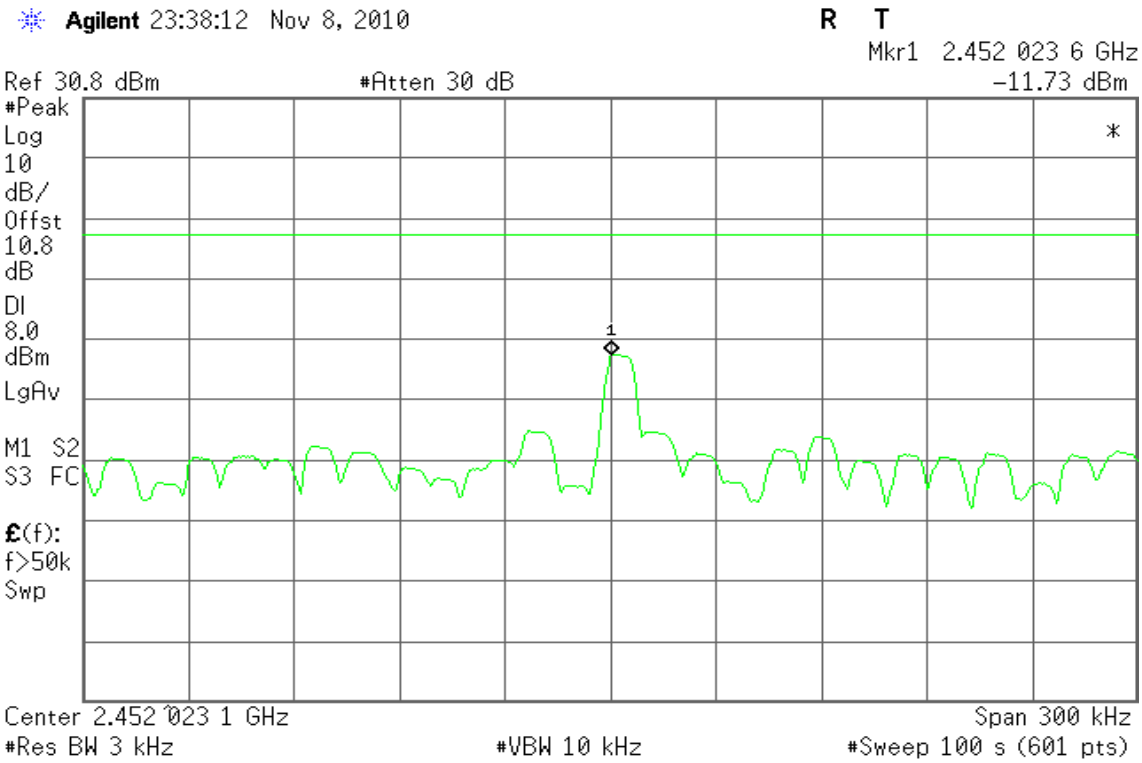
PPSD (CH Mid)



PPSD (CH High)



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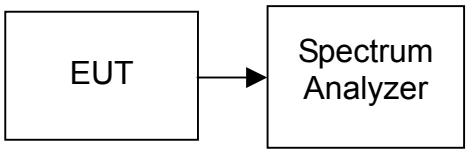
7.6 SPURIOUS EMISSIONS

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.

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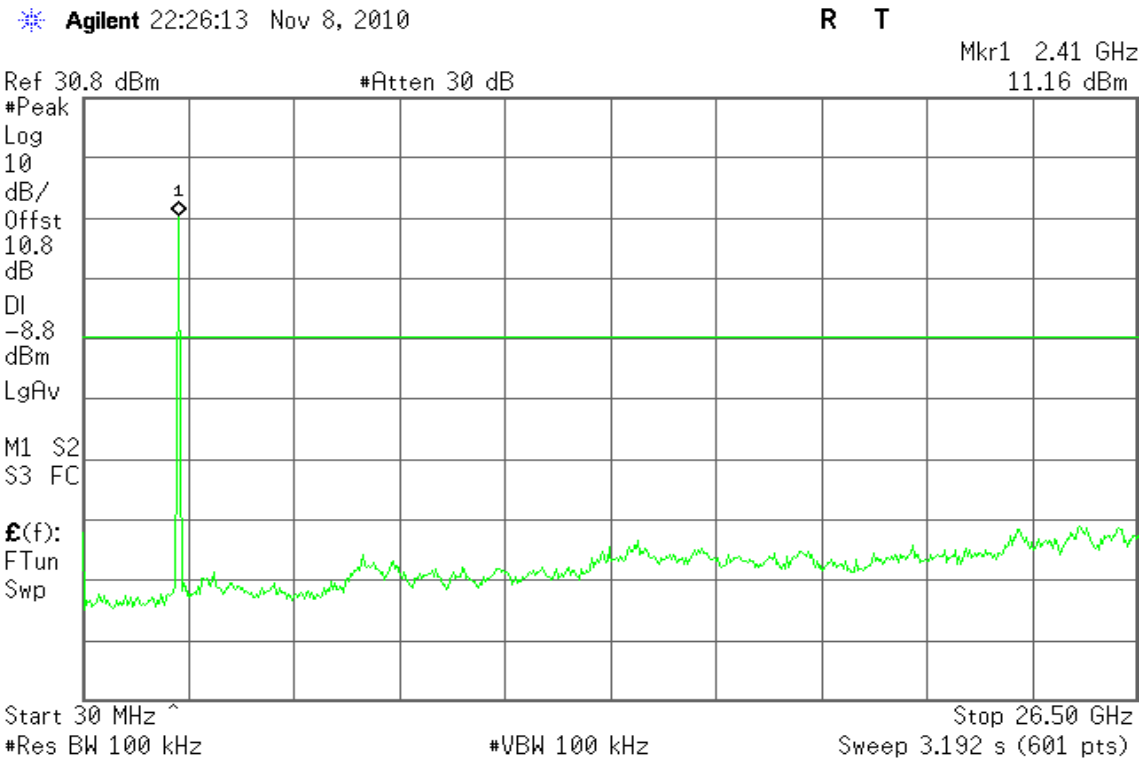
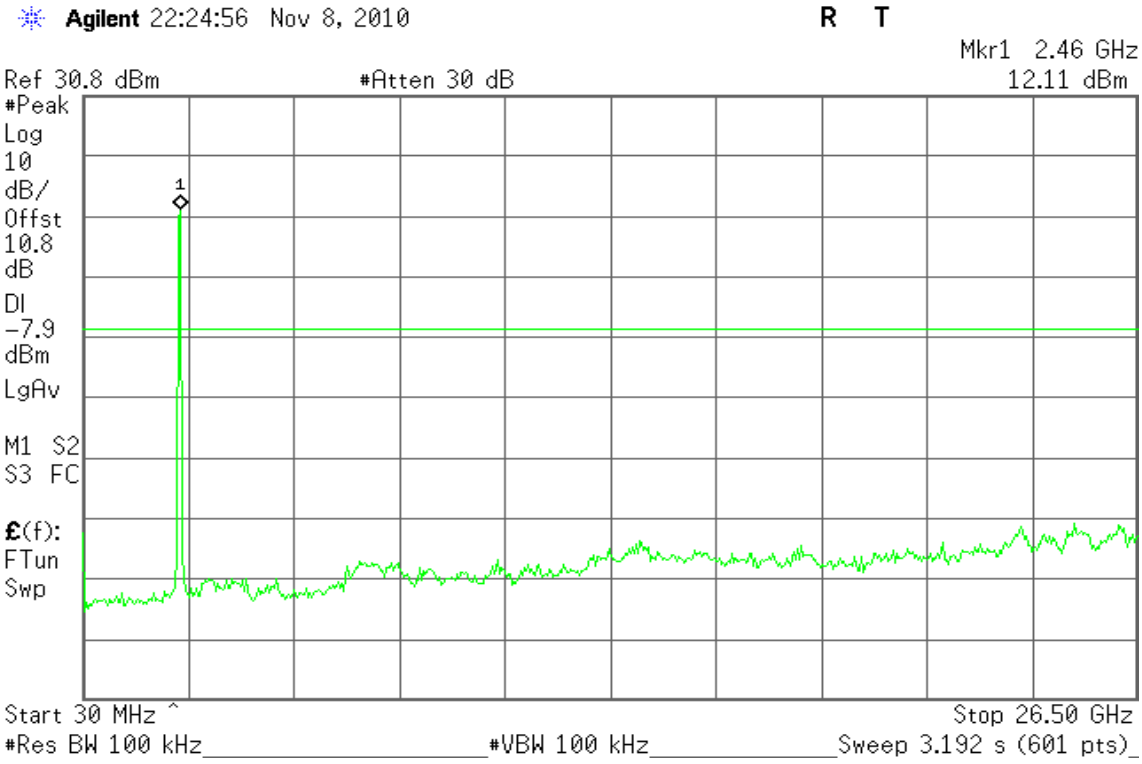
Test Plot

IEEE 802.11b mode / CH Low



IEEE 802.11b mode / CH Mid



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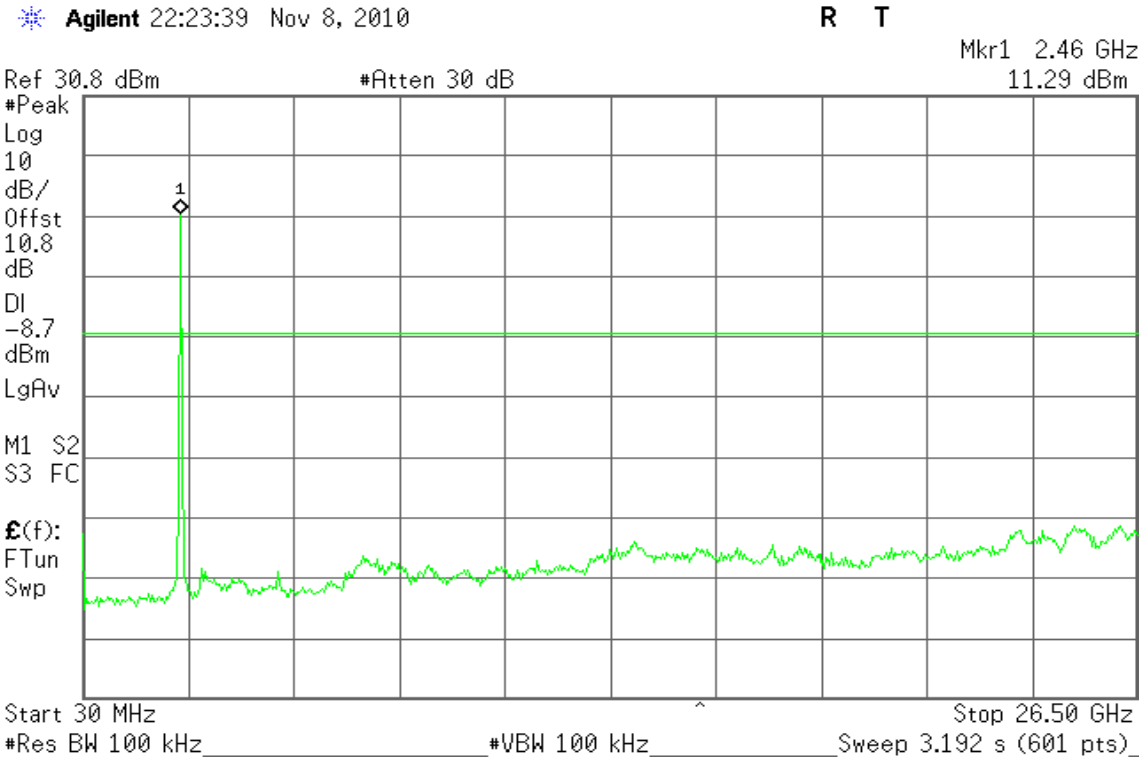
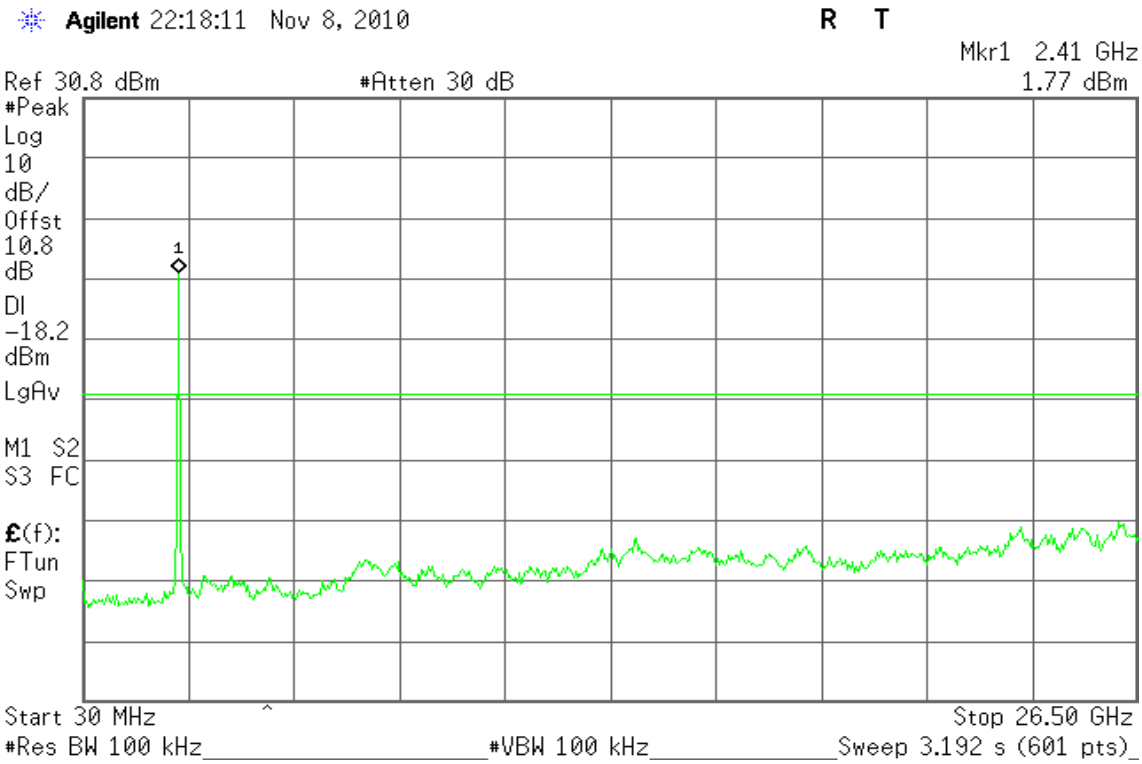
IEEE 802.11b mode / CH High



IEEE 802.11g mode / Low



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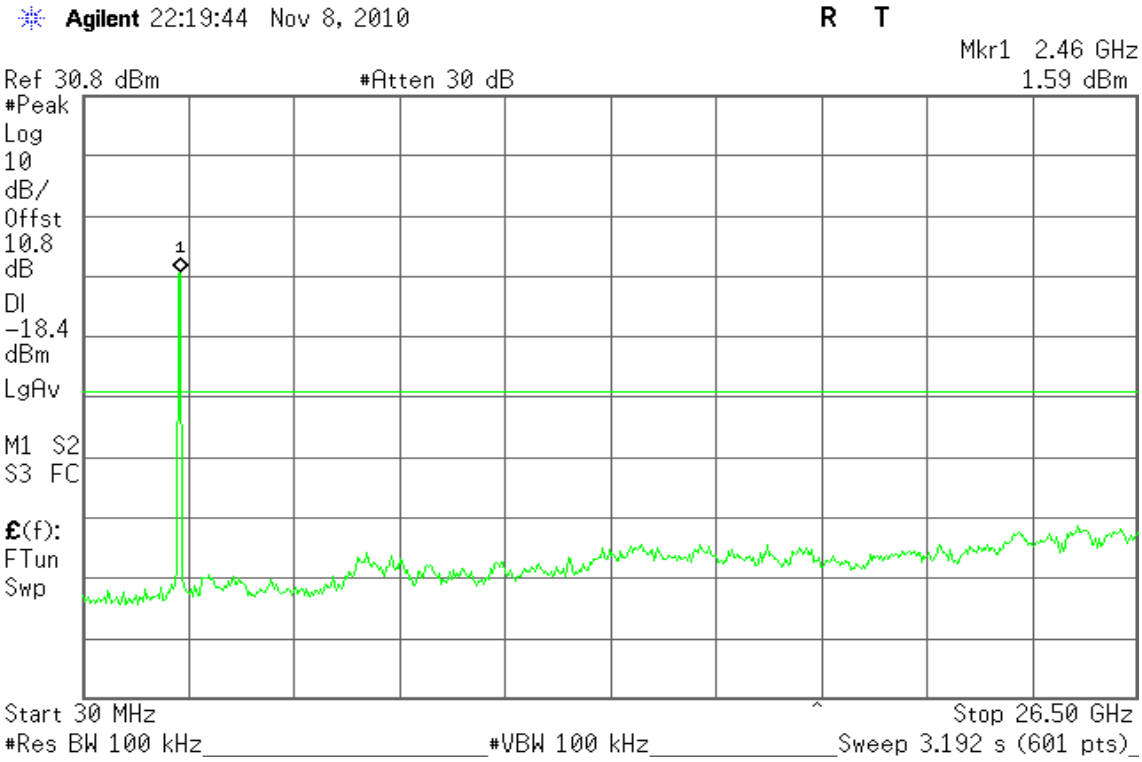
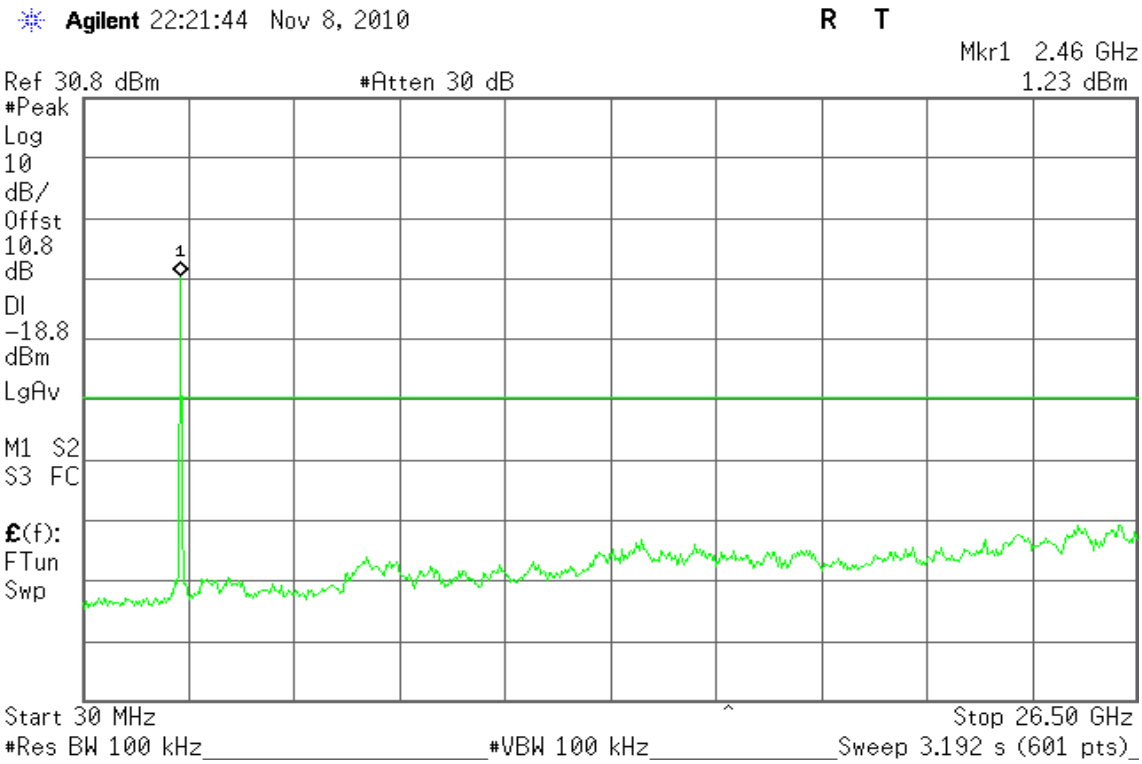
IEEE 802.11g mode / CH Mid



IEEE 802.11g mode / High



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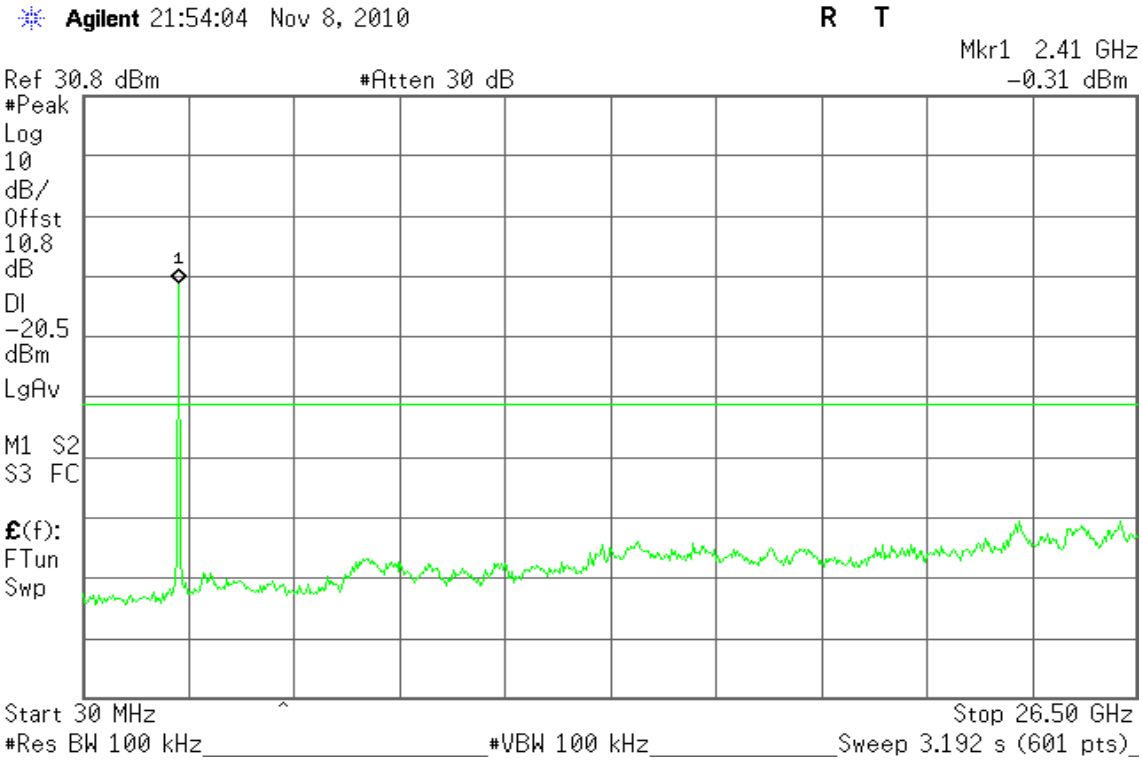
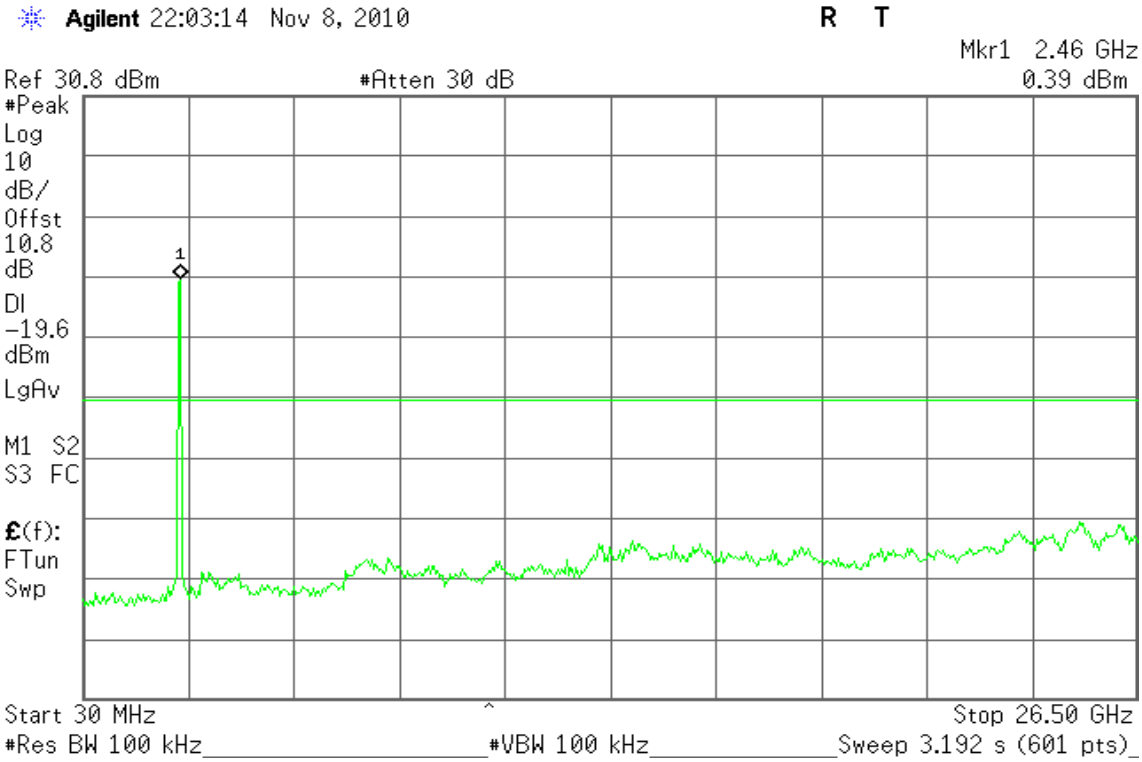
draft 802.11n 20 MHz Channel mode / Chain 0 / CH Low



draft 802.11n 20 MHz Channel mode / Chain 0 / CH Mid



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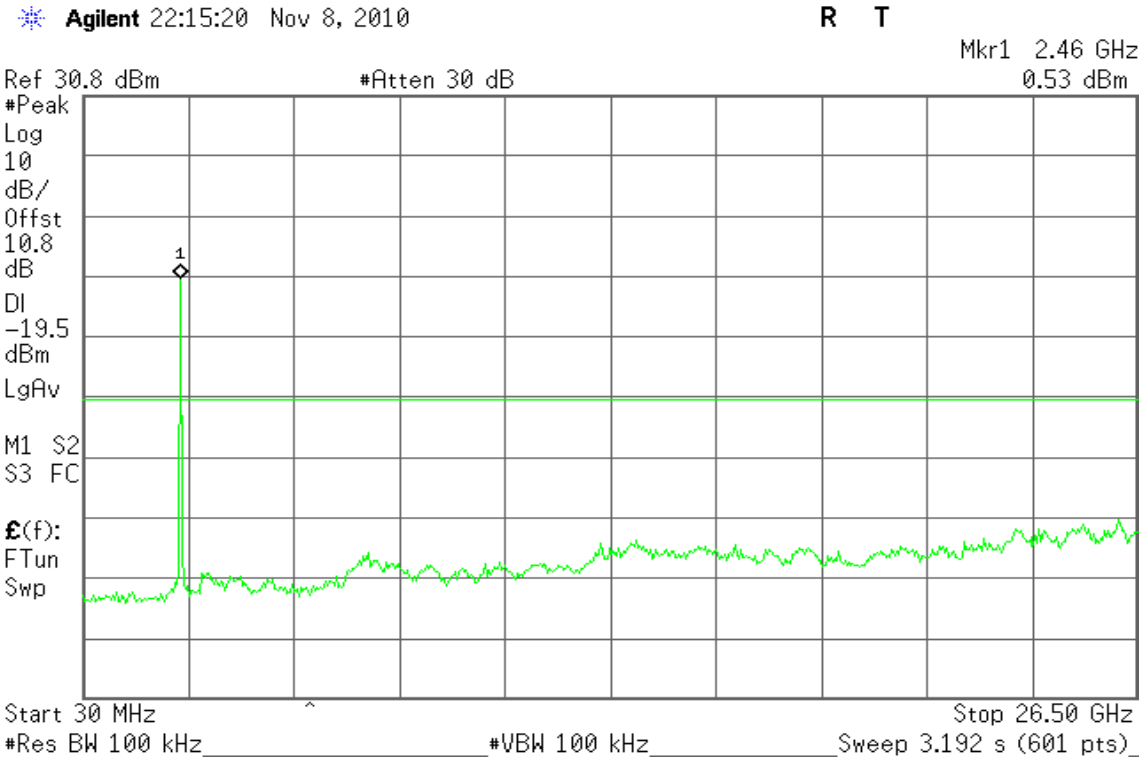
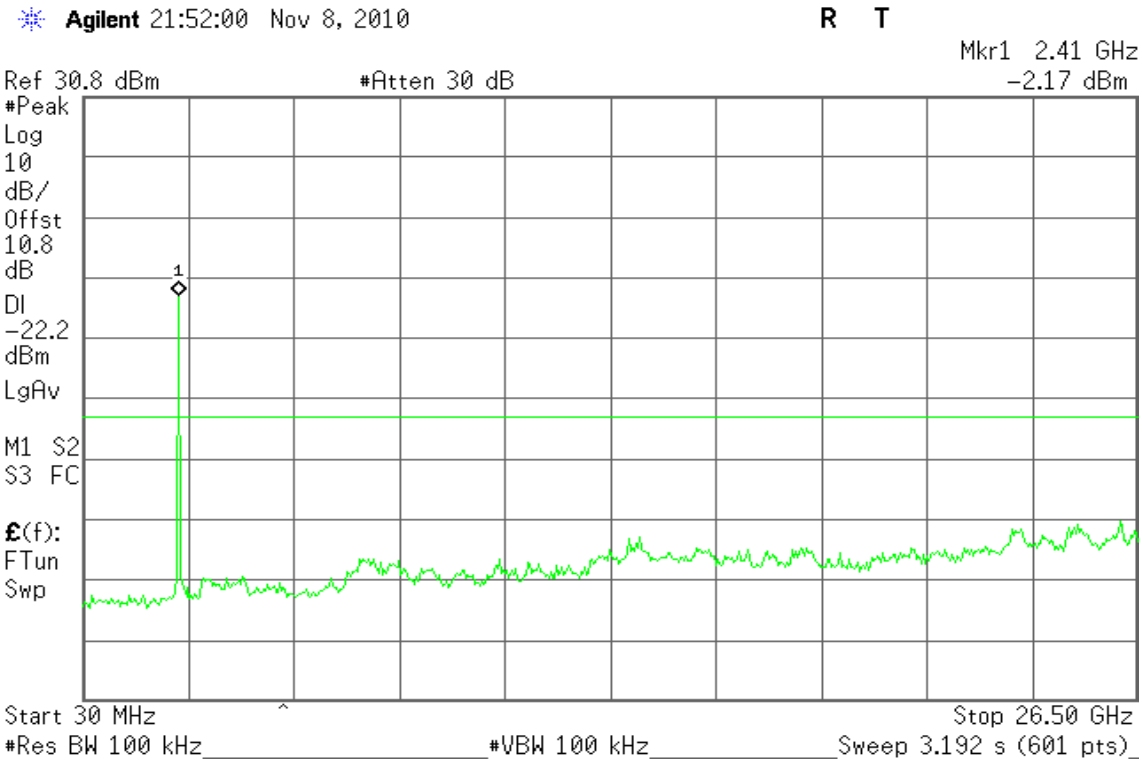
draft 802.11n 20 MHz Channel mode / Chain 0 / CH High



draft 802.11n 20 MHz Channel mode / Chain 1 / CH Low



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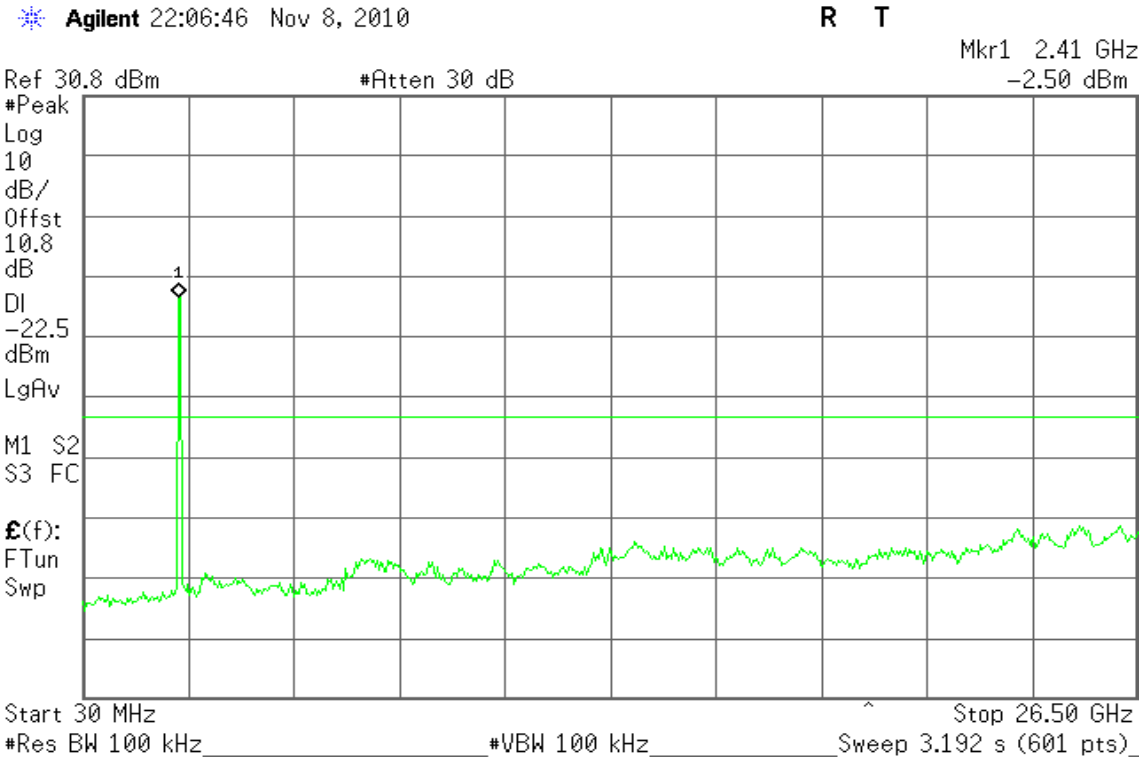
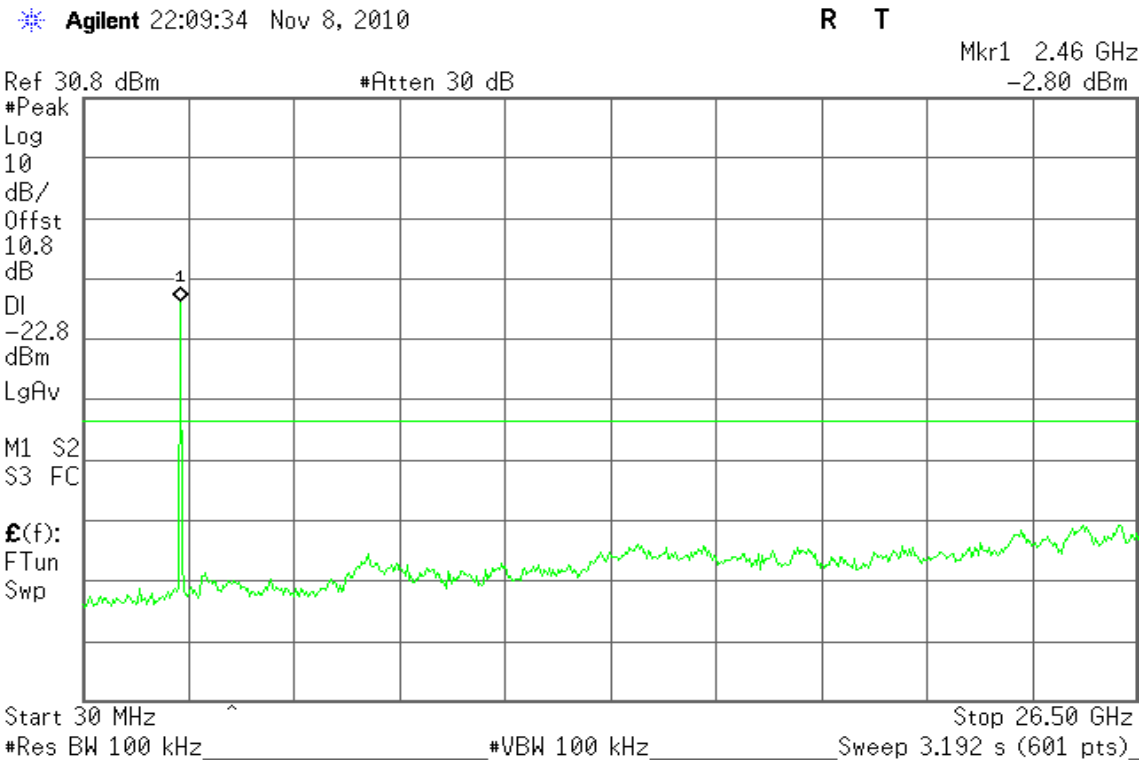
draft 802.11n 20 MHz Channel mode / Chain 1 / CH Mid



draft 802.11n 20 MHz Channel mode / Chain 1 / CH High



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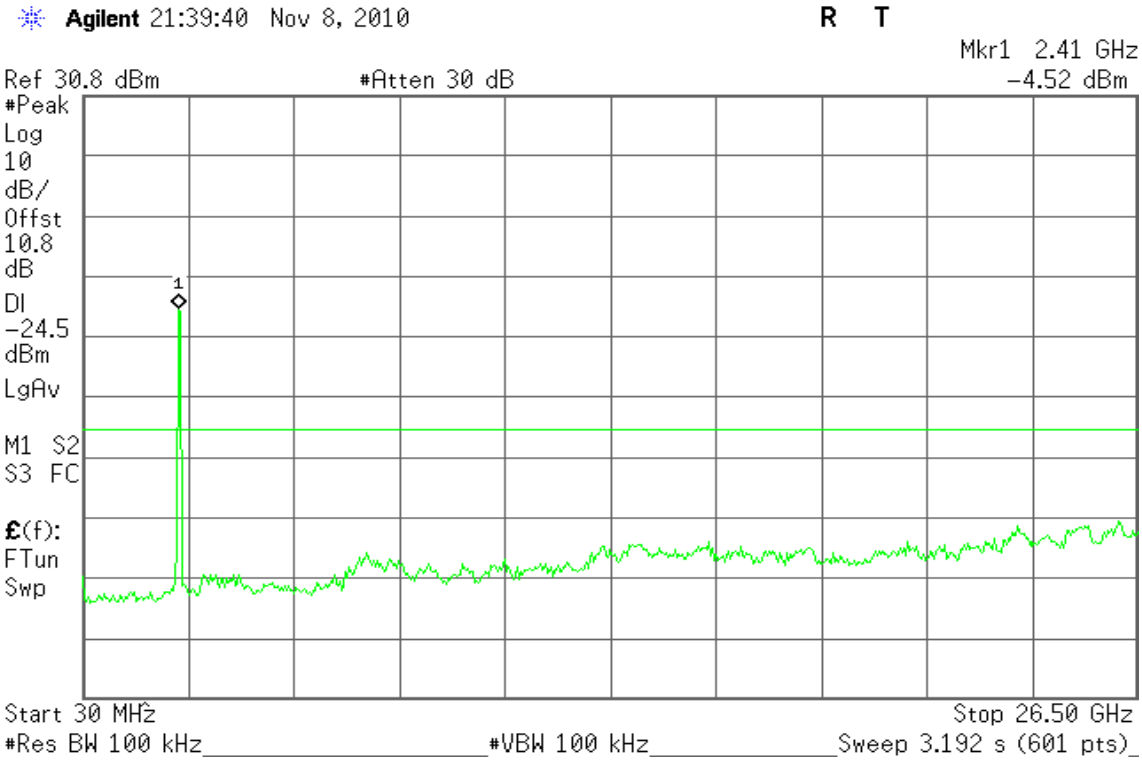
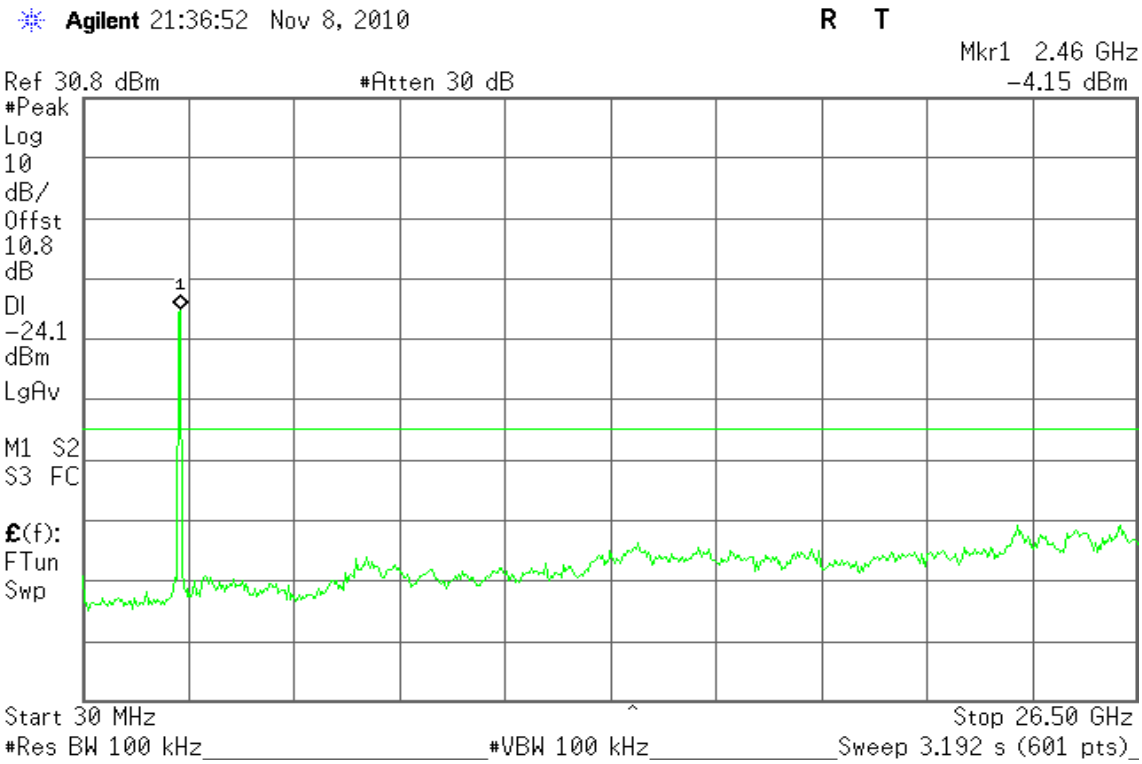
draft 802.11n 40 MHz Channel mode / Chain 0 / CH Low



draft 802.11n 40 MHz Channel mode / Chain 0 / CH Mid



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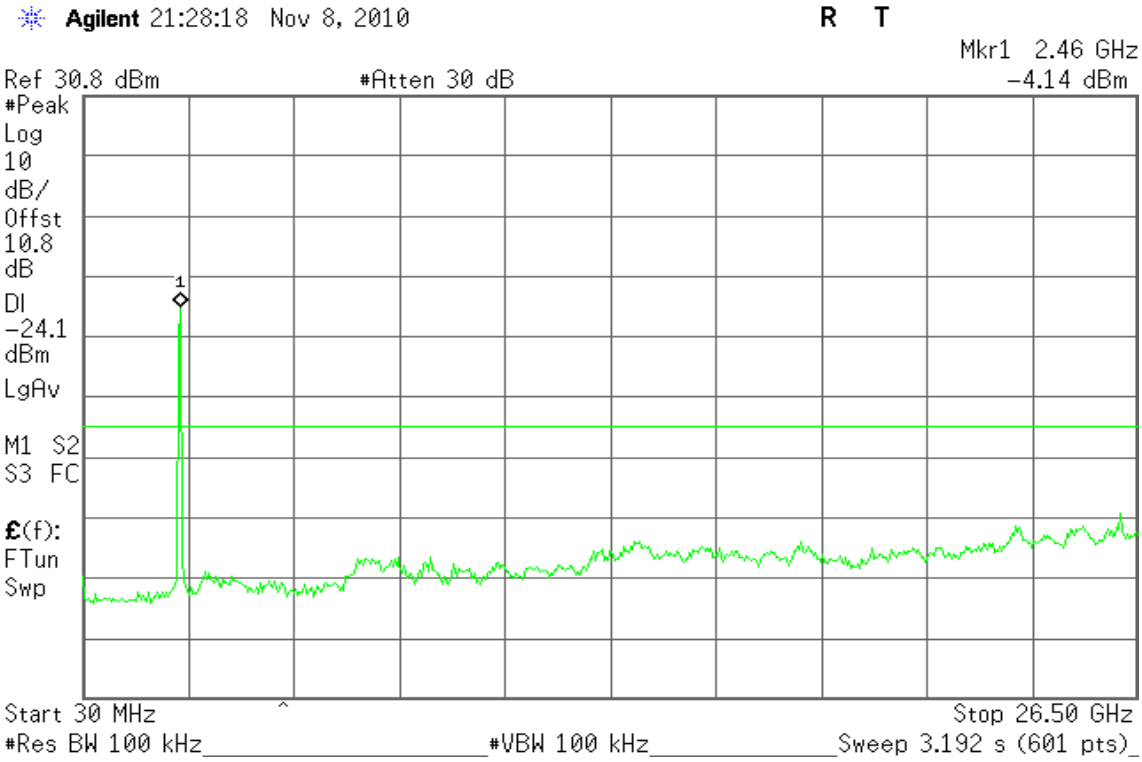
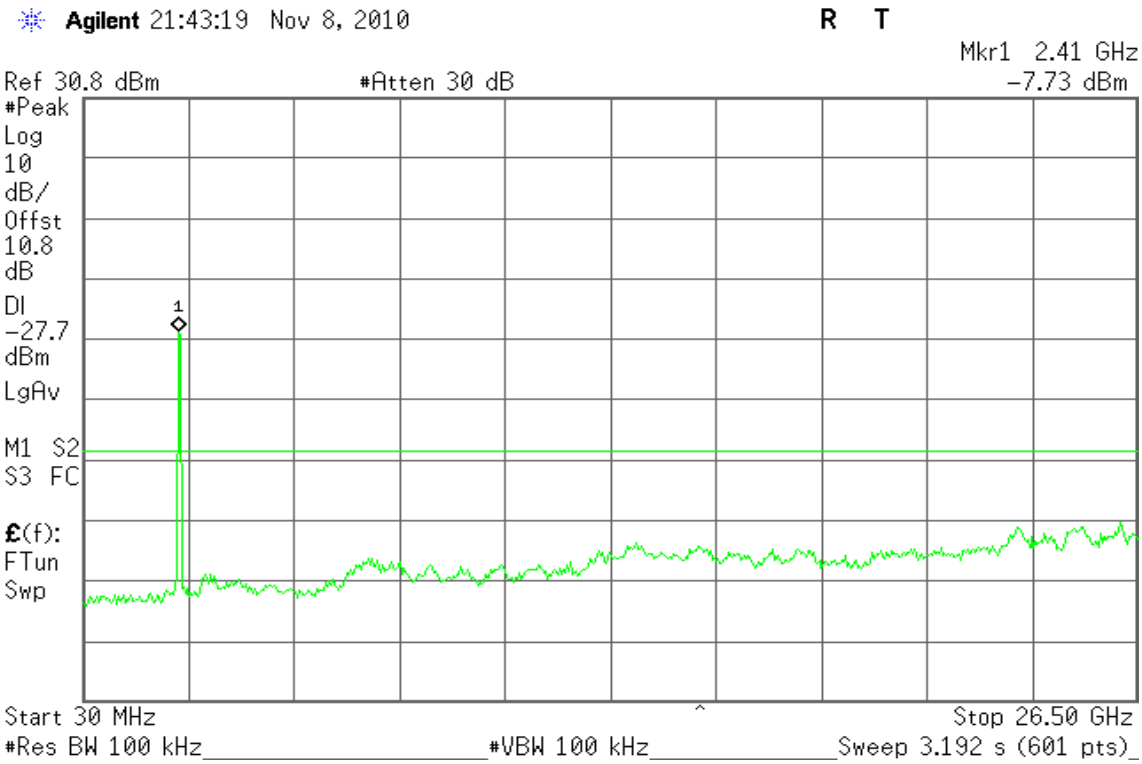
draft 802.11n 40 MHz Channel mode / Chain 0 / CH High



draft 802.11n 40 MHz Channel mode / Chain 1 / CH Low



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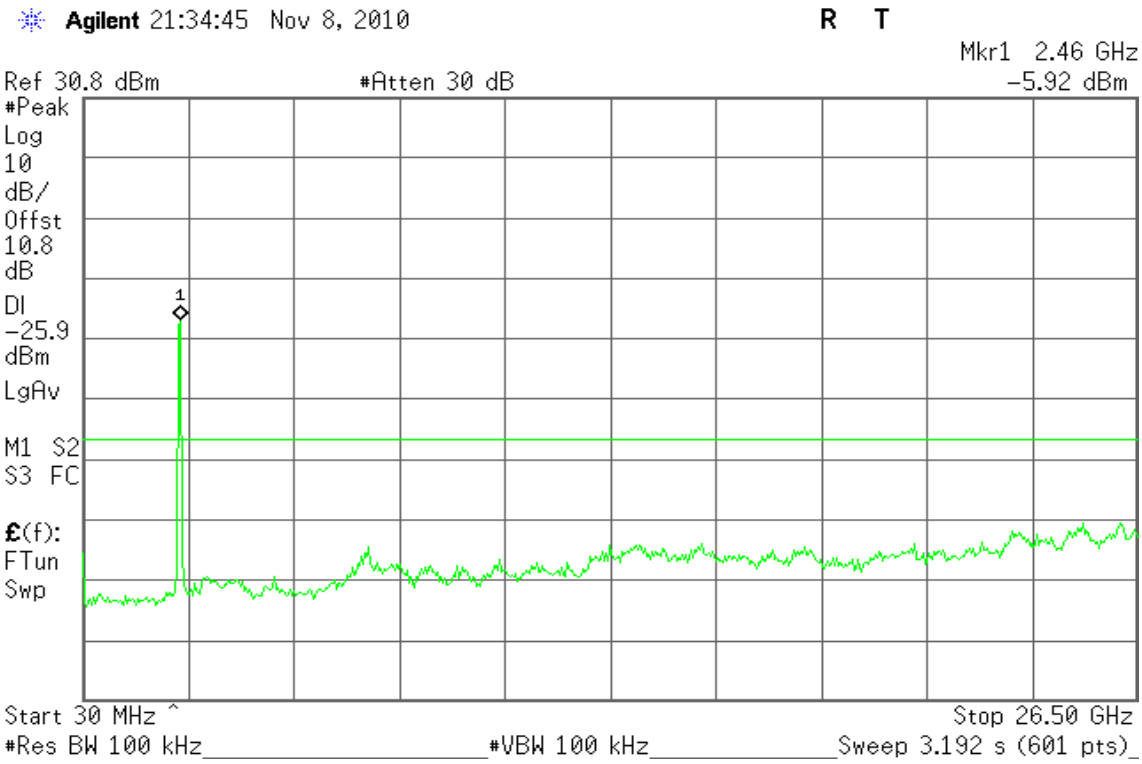
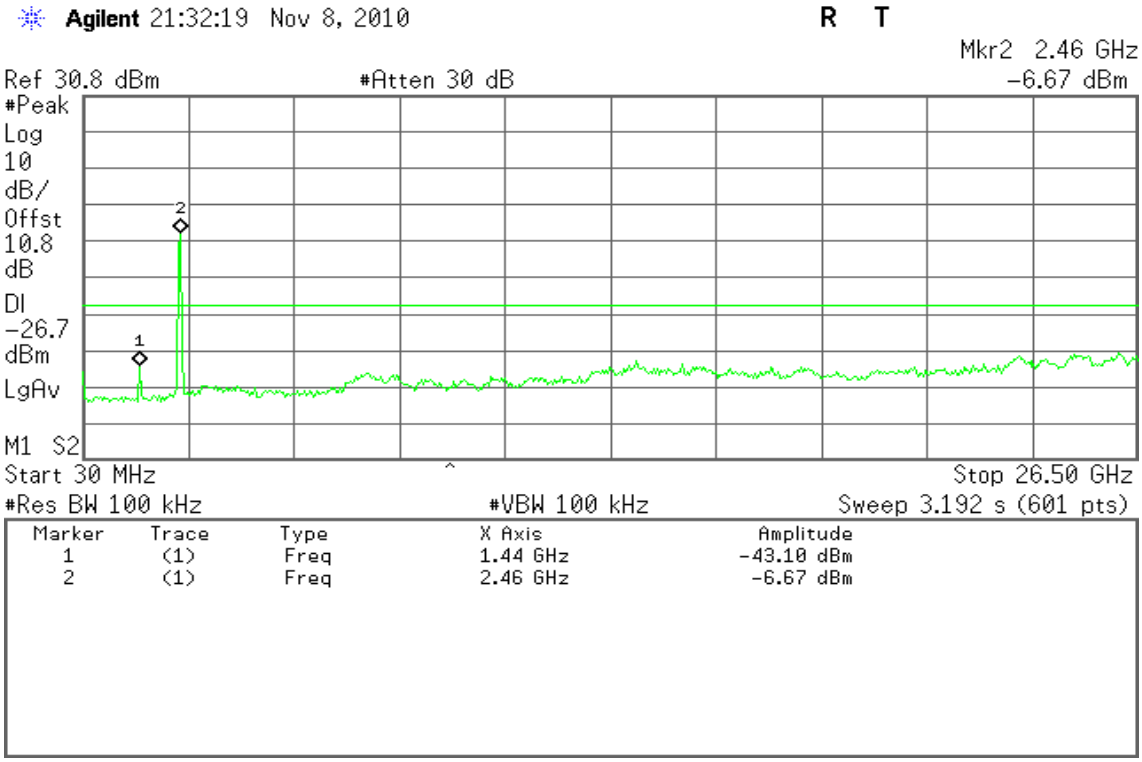
draft 802.11n 40 MHz Channel mode / Chain 1 / CH Mid



draft 802.11n 40 MHz Channel mode / Chain 1 / CH High



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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

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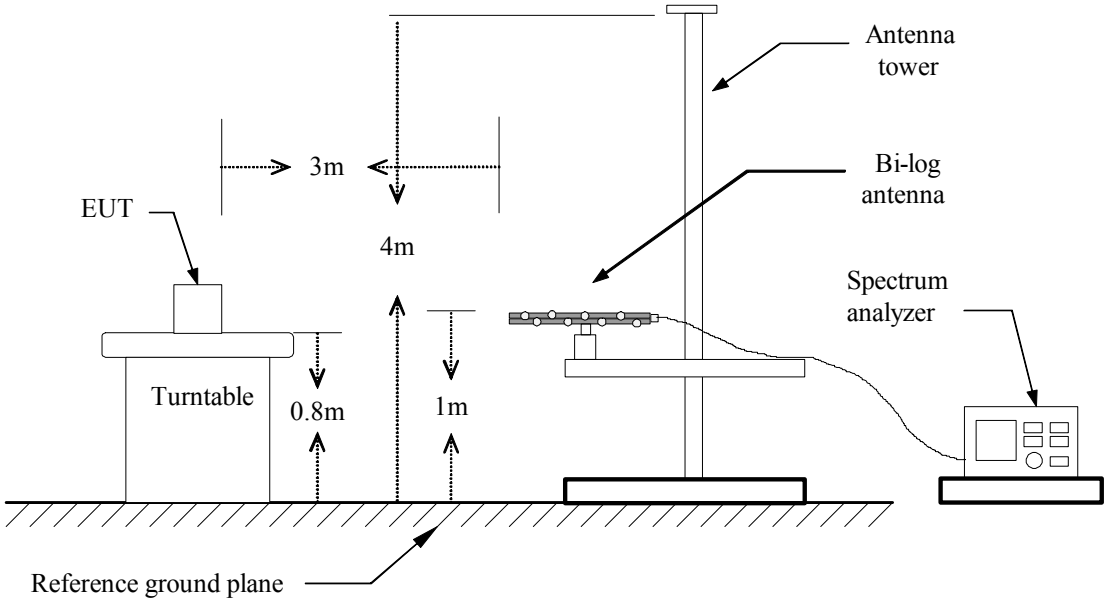
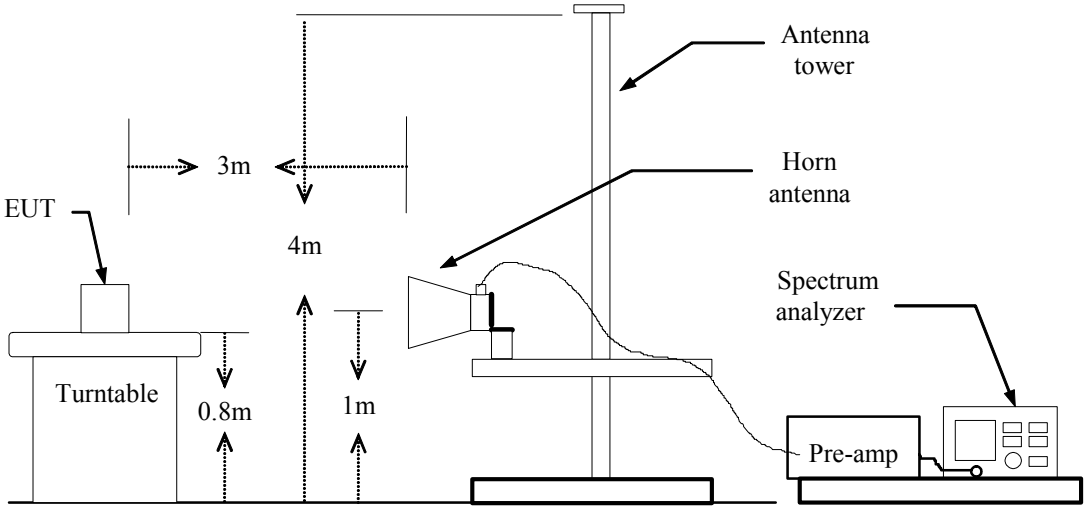
TEST CONFIGURATION

Below 1 GHz



Above 1 GHz



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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.

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TEST DATA

Below 1GHz

Operation Mode: Transmitting **Test Date:** November 2, 2010

Temperature: 18°C **Tested by:** Jack Chang

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

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
35.8200	V	51.05	-27.58	23.47	40.00	-16.53	QP
80.4400	V	52.24	-26.90	25.34	40.00	-14.66	QP
97.9000	V	49.95	-26.78	23.17	43.50	-20.33	QP
127.0000	V	48.05	-26.45	21.60	43.50	-21.90	QP
225.9400	V	45.07	-25.39	19.68	46.00	-26.32	QP
295.7800	V	45.24	-24.77	20.47	46.00	-25.53	QP
480.0800	V	56.63	-25.20	31.43	46.00	-14.57	QP
72.6800	H	43.89	-27.21	16.68	40.00	-23.32	QP
152.2200	H	44.18	-26.17	18.01	43.50	-25.49	QP
159.9800	H	46.81	-26.04	20.77	43.50	-22.73	QP
196.8400	H	45.41	-25.70	19.71	43.50	-23.79	QP
322.9400	H	46.37	-24.79	21.58	46.00	-24.42	QP
416.0600	H	46.90	-25.01	21.89	46.00	-24.11	QP
480.0800	H	59.42	-25.20	34.22	46.00	-11.78	QP
809.8800	H	43.53	-23.59	19.94	46.00	-26.06	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.*

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Above 1 GHz

Operation Mode: TX / IEEE 802.11b / CH Low **Test Date:** October 30, 2010

Temperature: 20°C **Tested by:** Jack Chang

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2352.00	V	56.62	44.78	0.87	57.49	45.65	74.00	54.00	-8.35	AVG
2552.00	V	53.50	45.02	1.77	55.27	46.79	74.00	54.00	-7.21	AVG
3216.67	V	43.86	---	4.95	48.81	---	74.00	54.00	-5.19	Peak
4825.00	V	51.23	46.60	6.51	57.75	53.11	74.00	54.00	-0.89	AVG
7233.33	V	46.40	38.65	13.67	60.07	52.32	74.00	54.00	-1.68	AVG
N/A										
1724.00	H	48.75	---	-3.85	44.90	---	74.00	54.00	-9.10	Peak
2316.00	H	52.34	---	-1.36	50.99	---	74.00	54.00	-3.01	Peak
2932.00	H	47.95	---	1.60	49.55	---	74.00	54.00	-4.45	Peak
4825.00	H	47.29	43.66	7.74	55.03	51.40	74.00	54.00	-2.60	AVG
7241.67	H	42.33	33.95	12.45	54.78	46.40	74.00	54.00	-7.60	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.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

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Operation Mode: TX / IEEE 802.11b / CH Mid **Test Date:** October 30, 2010

Temperature: 20°C **Tested by:** Jack Chang

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2332.00	V	57.60	43.64	0.70	58.30	44.34	74.00	54.00	-9.66	AVG
2720.00	V	48.74	---	1.44	50.18	---	74.00	54.00	-3.82	Peak
4875.00	V	50.50	45.83	7.30	57.80	53.13	74.00	54.00	-0.87	AVG
7308.33	V	42.13	34.30	13.01	55.14	47.31	74.00	54.00	-6.69	AVG
N/A										
1700.00	H	49.22	---	-3.69	45.53	---	74.00	54.00	-8.47	Peak
2312.00	H	50.61	---	-1.35	49.27	---	74.00	54.00	-4.73	Peak
2952.00	H	48.28	---	1.86	50.13	---	74.00	54.00	-3.87	Peak
4875.00	H	43.73	---	7.74	51.48	---	74.00	54.00	-2.52	Peak
7316.67	H	38.71	---	12.38	51.09	---	74.00	54.00	-2.91	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).*

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Operation Mode: TX / IEEE 802.11b / CH High **Test Date:** October 30, 2010

Temperature: 20°C **Tested by:** Jack Chang

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1796.00	V	49.09	---	-1.05	48.04	---	74.00	54.00	-5.96	Peak
2348.00	V	56.37	45.39	0.84	57.20	46.23	74.00	54.00	-7.77	AVG
2628.00	V	50.23	---	1.27	51.49	---	74.00	54.00	-2.51	Peak
4925.00	V	48.19	44.53	7.38	55.57	51.91	74.00	54.00	-2.09	AVG
N/A										
2336.00	H	49.51	---	-1.40	48.11	---	74.00	54.00	-5.89	Peak
2944.00	H	48.59	---	1.75	50.34	---	74.00	54.00	-3.66	Peak
4925.00	H	42.13	---	8.18	50.31	---	74.00	54.00	-3.69	Peak
7116.67	H	39.14	---	11.71	50.85	---	74.00	54.00	-3.15	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).*

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Operation Mode: TX / IEEE 802.11g / CH Low **Test Date:** October 30, 2010

Temperature: 20°C **Tested by:** Jack Chang

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1880.00	V	49.15	---	-0.92	48.22	---	74.00	54.00	-5.78	Peak
2360.00	V	59.49	47.53	0.94	60.43	48.47	74.00	54.00	-5.53	AVG
2468.00	V	61.44	49.02	2.06	63.50	51.08	74.00	54.00	-2.92	AVG
3210.00	V	43.67	---	5.03	48.69	---	74.00	54.00	-5.31	Peak
4820.00	V	49.52	38.42	6.44	55.96	44.86	74.00	54.00	-9.14	AVG
N/A										
2116.00	H	49.21	---	-1.65	47.56	---	74.00	54.00	-6.44	Peak
2360.00	H	53.36	---	-1.45	51.91	---	74.00	54.00	-2.09	Peak
2480.00	H	50.81	---	-1.52	49.29	---	74.00	54.00	-4.71	Peak
4820.00	H	48.52	34.39	7.73	56.25	42.12	74.00	54.00	-11.88	AVG
7240.00	H	46.05	31.52	12.45	58.50	43.97	74.00	54.00	-10.03	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.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

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Operation Mode: TX / IEEE 802.11g / CH Mid **Test Date:** October 30, 2010

Temperature: 20°C **Tested by:** Jack Chang

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1836.00	V	49.54	---	-0.95	48.59	---	74.00	54.00	-5.41	Peak
2388.00	V	59.95	48.13	1.18	61.13	49.31	74.00	54.00	-4.69	AVG
2492.00	V	56.29	47.64	2.34	58.63	49.98	74.00	54.00	-4.02	AVG
3250.00	V	43.54	---	4.57	48.10	---	74.00	54.00	-5.90	Peak
4870.00	V	47.98	36.42	7.23	55.21	43.65	74.00	54.00	-10.35	AVG
6340.00	V	39.78	---	10.37	50.15	---	74.00	54.00	-3.85	Peak
N/A										
2324.00	H	51.12	---	-1.37	49.75	---	74.00	54.00	-4.25	Peak
2644.00	H	49.21	---	-0.09	49.12	---	74.00	54.00	-4.88	Peak
4880.00	H	43.87	---	7.75	51.62	---	74.00	54.00	-2.38	Peak
7320.00	H	40.07	---	12.33	52.40	---	74.00	54.00	-1.60	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).*

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Operation Mode: TX / IEEE 802.11g / CH High **Test Date:** October 30, 2010

Temperature: 20°C **Tested by:** Jack Chang

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1892.00	V	49.69	---	-0.92	48.78	---	74.00	54.00	-5.22	Peak
2412.00	V	59.35	48.16	1.42	60.77	49.58	74.00	54.00	-4.42	AVG
2532.00	V	53.64	45.82	2.03	55.67	47.85	74.00	54.00	-6.15	AVG
3280.00	V	44.09	---	4.22	48.31	---	74.00	54.00	-5.69	Peak
4930.00	V	47.81	38.92	7.32	55.13	46.24	74.00	54.00	-7.76	AVG
N/A										
1704.00	H	49.20	---	-3.72	45.49	---	74.00	54.00	-8.51	Peak
2344.00	H	51.96	---	-1.42	50.55	---	74.00	54.00	-3.45	Peak
2412.00	H	55.37	44.60	-1.54	53.83	43.06	74.00	54.00	-10.94	AVG
4920.00	H	42.23	---	8.09	50.32	---	74.00	54.00	-3.68	Peak
6390.00	H	40.76	---	9.33	50.09	---	74.00	54.00	-3.91	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).*

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Operation Mode:	TX / draft 802.11n 20 MHz Channel mode / CH Low	**Test Date:**	October 30, 2010
Temperature:	20°C	**Tested by:**	Jack Chang
Humidity:	55 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2156.00	V	50.37	---	-0.53	49.83	---	74.00	54.00	-4.17	Peak
2364.00	V	58.64	47.19	0.97	59.62	48.16	74.00	54.00	-5.84	AVG
2480.00	V	58.70	49.51	2.20	60.90	51.71	74.00	54.00	-2.29	AVG
3210.00	V	43.88	---	5.03	48.91	---	74.00	54.00	-5.09	Peak
4840.00	V	49.18	34.64	6.75	55.93	41.39	74.00	54.00	-12.61	AVG
N/A										
2324.00	H	50.74	---	-1.37	49.37	---	74.00	54.00	-4.63	Peak
2468.00	H	52.23	---	-1.52	50.71	---	74.00	54.00	-3.29	Peak
4830.00	H	43.85	---	7.74	51.59	---	74.00	54.00	-2.41	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).*

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Operation Mode:	TX / draft 802.11n 20 MHz Channel mode / CH Mid	**Test Date:**	October 30, 2010
Temperature:	20°C	**Tested by:**	Jack Chang
Humidity:	55 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2388.00	V	61.41	48.14	1.18	62.59	49.32	74.00	54.00	-4.68	AVG
2540.00	V	55.03	46.13	1.93	56.96	48.06	74.00	54.00	-5.94	AVG
3250.00	V	43.46	---	4.57	48.03	---	74.00	54.00	-5.97	Peak
4890.00	V	47.24	34.67	7.54	54.78	42.21	74.00	54.00	-11.79	AVG
N/A										
2352.00	H	50.71	---	-1.43	49.27	---	74.00	54.00	-4.73	Peak
2652.00	H	48.07	---	-0.15	47.92	---	74.00	54.00	-6.08	Peak
4880.00	H	43.69	---	7.75	51.44	---	74.00	54.00	-2.56	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).*

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Operation Mode:	TX / draft 802.11n 20 MHz Channel mode / CH High	**Test Date:**	October 30, 2010
Temperature:	20°C	**Tested by:**	Jack Chang
Humidity:	55 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2404.00	V	61.76	48.88	1.33	63.09	50.21	74.00	54.00	-3.79	AVG
2516.00	V	59.65	46.99	2.23	61.88	49.22	74.00	54.00	-4.78	ACG
4940.00	V	45.34	---	7.19	52.53	---	74.00	54.00	-1.47	Peak
N/A										
2400.00	H	53.01	---	-1.54	51.47	---	74.00	54.00	-2.53	Peak
2556.00	H	50.90	---	-0.54	50.36	---	74.00	54.00	-3.64	Peak
4940.00	H	41.79	---	8.44	50.23	---	74.00	54.00	-3.77	Peak
N/A										

Remark:

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

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Operation Mode:	TX / draft 802.11n 40 MHz Channel mode / CH Low	**Test Date:**	October 30, 2010
Temperature:	20°C	**Tested by:**	Jack Chang
Humidity:	55 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2320.00	V	60.34	47.21	0.60	60.94	47.81	74.00	54.00	-6.19	AVG
2388.00	V	68.63	51.25	1.18	69.81	52.43	74.00	54.00	-1.57	AVG
2528.00	V	59.83	47.17	2.08	61.91	49.25	74.00	54.00	-4.75	AVG
4840.00	V	45.00	---	6.75	51.75	---	74.00	54.00	-2.25	Peak
N/A										
2312.00	H	51.45	---	-1.35	50.10	---	74.00	54.00	-3.90	Peak
2648.00	H	48.71	---	-0.12	48.59	---	74.00	54.00	-5.41	Peak
4850.00	H	42.33	---	7.74	50.07	---	74.00	54.00	-3.93	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).*

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Operation Mode:	TX / draft 802.11n 40 MHz Channel mode / CH Mid	**Test Date:**	October 30, 2010
Temperature:	20°C	**Tested by:**	Jack Chang
Humidity:	55 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2340.00	V	56.96	44.61	0.77	57.73	45.38	74.00	54.00	-8.62	AVG
2540.00	V	56.34	45.88	1.93	58.27	47.81	74.00	54.00	-6.19	AVG
4890.00	V	43.54	---	7.54	51.09	---	74.00	54.00	-2.91	Peak
N/A										
2336.00	H	53.24	---	-1.40	51.84	---	74.00	54.00	-2.16	Peak
2704.00	H	49.08	---	-0.51	48.57	---	74.00	54.00	-5.43	Peak
4880.00	H	42.03	---	7.75	49.77	---	74.00	54.00	-4.23	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).*

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Operation Mode:	TX / draft 802.11n 40 MHz Channel mode / CH High	**Test Date:**	October 30, 2010
Temperature:	20°C	**Tested by:**	Jack Chang
Humidity:	55 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2344.00	V	57.13	47.39	0.80	57.94	48.19	74.00	54.00	-5.81	AVG
2672.00	V	49.80	---	1.41	51.22	---	74.00	54.00	-2.78	Peak
4900.00	V	44.01	---	7.70	51.71	---	74.00	54.00	-2.29	Peak
N/A										
2348.00	H	51.20	---	-1.43	49.77	---	74.00	54.00	-4.23	Peak
2580.00	H	49.26	---	-0.12	49.14	---	74.00	54.00	-4.86	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).*

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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.

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TEST DATA

Operation Mode: Charging **Test Date:** October 21, 2010

Temperature: 24°C **Tested by:** John Yen

Humidity: 60% RH

Freq. (MHz)	QP Reading	AV Reading	Corr. factor	QP Result	AV Result	QP Limit	AV Limit	QP Margin	AV Margin	Note
0.154	48.88	37.92	10.80	59.68	48.72	65.78	55.78	-6.10	-7.06	L1
0.226	36.79	23.93	10.80	47.59	34.73	62.60	52.60	-15.01	-17.87	L1
0.386	34.15	23.37	10.71	44.86	34.08	58.15	48.15	-13.29	-14.07	L1
0.586	32.62	23.16	10.70	43.32	33.86	56.00	46.00	-12.68	-12.14	L1
2.658	21.91	15.54	10.69	32.60	26.23	56.00	46.00	-23.40	-19.77	L1
11.468	31.40	23.54	10.92	42.32	34.46	60.00	50.00	-17.68	-15.54	L1
0.151	51.43	36.80	10.62	62.05	47.42	65.94	55.94	-3.89	-8.52	L2
0.226	38.40	24.63	10.65	49.05	35.28	62.60	52.60	-13.55	-17.32	L2
0.410	33.49	22.97	10.60	44.09	33.57	57.65	47.65	-13.56	-14.08	L2
0.618	30.98	23.33	10.62	41.60	33.95	56.00	46.00	-14.40	-12.05	L2
2.686	22.30	16.40	10.62	32.92	27.02	56.00	46.00	-23.08	-18.98	L2
12.318	30.50	24.74	10.87	41.37	35.61	60.00	50.00	-18.63	-14.39	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)*

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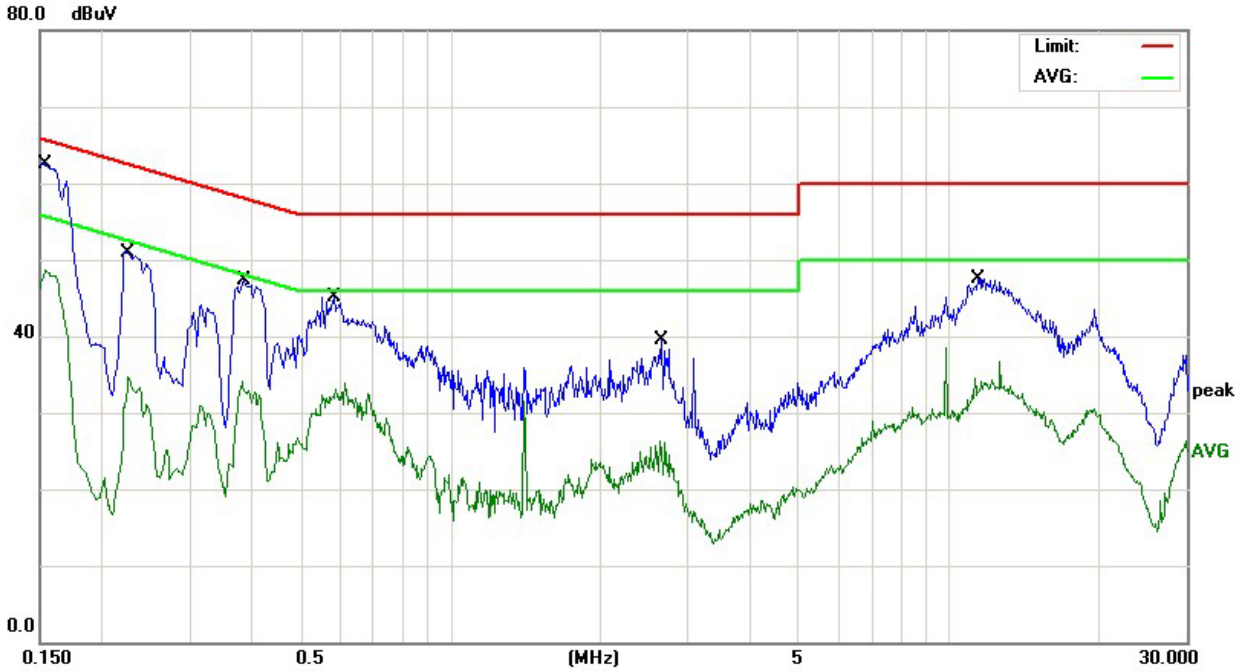
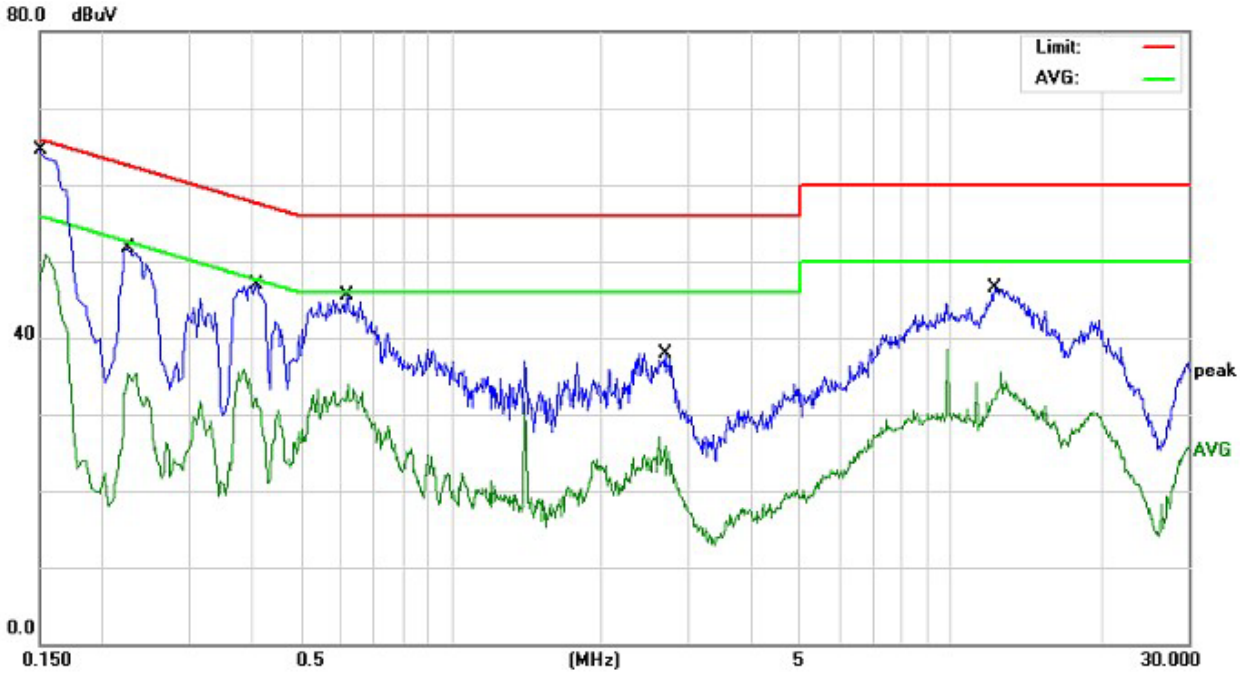
Test Plot

Conducted emissions (Line 1)



Conducted emissions (Line 2)



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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	Network Video Server
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/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)
Antenna diversity	☒ Single antenna ☐ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☒ Tx/Rx diversity
Max. output power	IEEE 802.11b mode: 21.64 dBm (145.88mW) IEEE 802.11g mode: 26.32 dBm (428.55mW) draft 802.11n 20 MHz Channel mode: 27.22 dBm (527.23mW) draft 802.11n 40 MHz Channel mode: 26.23 dBm (419.76mW)
Antenna gain (Max)	2.0dBi (including cable loss) (Numeric gain: 1.58)
Evaluation applied	☒ MPE Evaluation ☐ SAR Evaluation ☐ N/A

Remark:

1. *The maximum output power is 27.22dBm (527.23mW) at 2437MHz (with 1.58numeric antenna gain.)*
2. *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.

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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 = 527.23mW

Numeric Antenna gain = 1.58

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 = 0.166 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.)

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