FCC 47 CFR PART 15 SUBPART C AND ANSI C63.4:2009 TEST REPORT

For

Wireless N Router

Model : DIR-515

Trade Name : D-Link

Issued for

D-Link Corporation

No.289, Sinhu 3rd Rd., Neihu District,
Taipei City 114, Taiwan, R.O.C.

Issued by

Compliance Certification Services Inc.
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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	08/09/2010	Initial Issue	All Page 135	Elly Duan

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1. TEST REPORT CERTIFICATION

Applicant	：	D-Link Corporation
Address	：	No.289, Sinhu 3rd Rd., Neihu District, Taipei City 114, Taiwan, R.O.C.
Equipment Under Test	：	Wireless N Router
Model	：	DIR-515
Trade Name	：	D-Link
Tested Date	：	June 02, ~ August 09, 2010

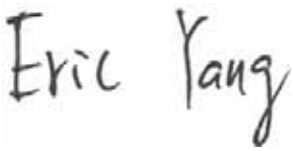
APPLICABLE STANDARD	
Standard	**Test Result**
FCC Part 15 Subpart C AND ANSI C63.4:2009	PASS

WE HEREBY CERTIFY THAT: The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:

Jeter Wu
Section Manager

Reviewed by:



Eric Yang
Senior Engineer

2. EUT DESCRIPTION

2.1 DESCRIPTION OF EUT & POWER

Product Name	Wireless N Router
Model Number	DIR-515
Received Date	June 02, 2010
Frequency Range	IEEE 802.11b/g, 802.11n HT20 : 2412MHz～2462MHz IEEE 802.11n HT40 : 2422MHz～2452MHz
Transmit Power	IEEE 802.11b : 21.19 dBm (0.1315W) IEEE 802.11g : 21.97 dBm (0.1574W) IEEE 802.11n HT20 : 22.23 dBm (0.1672W) IEEE 802.11n HT40 : 21.48 dBm (0.1406W)
Channel Spacing	IEEE 802.11b/g, 802.11n HT20/HT40 : 5MHz
Channel Number	IEEE 802.11b/g : 11 Channels IEEE 802.11n HT40 : 7 Channels
Transmit Data Rate	IEEE 802.11b : 11, 5.5, 2, 1 Mbps IEEE 802.11g : 54, 48, 36, 24, 18, 12, 9, 6 Mbps IEEE 802.11n HT20: 144.4, 130, 117, 115.6, 104, 86.7, 78, 72.2, 65, 58.5, 57.8, 52, 43.3, 39, 28.9, 26, 21.7, 19.5, 14.4, 13, 7.2, 6.5 Mbps IEEE 802.11n HT40: 300, 270, 243, 240, 216, 180, 162, 150, 135, 121.5, 120, 108, 90, 81, 60, 54, 45, 40.5, 30, 27, 15, 13.5 Mbps
Type of Modulation	IEEE 802.11b : DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g : OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20/40 : OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Type	Dipole Antenna × 2 , Antenna Gain 4dBi
DC Power Cord Type	Unshielded cable 1.5 m (no detachable)
Power Source	5VDC, 1.0A(From Power Adapter)
I/O Port	WAN port × 1、LAN port × 4、Power port × 1

Power Adapter :

No.	Manufacturer	Model No.	Power Input	Power Output
1	D-Link	MU05-P050100-A1	100-240VAC, 50/60Hz , 0.15A	5V, 1.0A
2	AMIGO	AMS47-0501000FU	100-240VAC, 50/60Hz , 0.2A	5V, 1.0A
3	D-Link	AMS47-0501000FU	100-240VAC, 50/60Hz , 0.2A	5V, 1.0A

Remark :

1. *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
2. *For more details, please refer to the User's manual of the EUT.*
3. *This submittal(s) (test report) is intended for FCC ID: KA2IR515A1 filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*

3. DESCRIPTION OF TEST MODES

The difference between AMIGO:AMS47-0501000FU & & D-LINk MS47-0501000FU , two adaptors are the same except for the labelling.

IEEE 802.11b, 802.11g, 802.11n HT20 mode

The EUT is an 802.11n MIMO transceiver in Wireless N Router form factor. It has two transmitter chains and two receive chains (2×2 configurations).
11b/g mode, only Chain 1 transmitter.

The EUT had been tested under operating condition.
There are three channels have been tested as following :

Channel	Frequency (MHz)
Low	2412
Middle	2437
High	2462

IEEE 802.11b mode : 1Mbps data rate (worst case) were chosen for full testing.
IEEE 802.11g mode : 6Mbps data rate (worst case) were chosen for full testing.
IEEE 802.11n HT20 mode : 6.5Mbps data rate (worst case) were chosen for full testing.

IEEE 802.11n HT40 mode

The EUT had been tested under operating condition.
There are three channels have been tested as following :

Channel	Frequency (MHz)
Low	2422
Middle	2437
High	2452

IEEE 802.11n HT40 mode : 13.5Mbps data rate (worst case) were chosen for full testing.

4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4: 2009 and FCC CFR 47, 15.207, 15.209 and 15.247.

5. FACILITIES AND ACCREDITATION

5.1 FACILITIES

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

No. 8, Jiu Cheng Ling, Jiaokeng Village,Sinhua Township, Tainan Hsien 712, Taiwan R.O.C.

The sites are constructed in conformance with the requirements of ANSI C63.4:2009 and CISPR 22. All receiving equipment conforms to CISPR 16-1-1, CISPR 16-1-2, CISPR 16-1-3, CISPR 16-1-4, CISPR 16-1-5.

5.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

Taiwan	TAF

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	INDUSTRY CANADA
Germany	TÜV NORD
Japan	VCCI
Taiwan	BSMI
USA	FCC MRA

Copies of granted accreditation certificates are available for downloading from our web site, http:///www.ccsrf.com

5.3 MEASUREMENT UNCERTAINTY

The following table is for the measurement uncertainty, which is calculated as per the document CISPR 16-4-2.

PARAMETER	UNCERTAINTY
Open Area Test Site (OATS No.3) / Radiated Emission, 30 to 200 MHz	+/- 3.9267
Open Area Test Site (OATS No.3) / Radiated Emission, 200 to 1000 MHz	+/- 3.6899
Semi Anechoic Chamber (966 Chamber) / Radiated Emission, 30 to 200 MHz	+/- 3.6878
Semi Anechoic Chamber (966 Chamber) / Radiated Emission, 200 to 1000 MHz	+/- 3.0885
Semi Anechoic Chamber (966 Chamber) / Radiated Emission, 1 to 26.5GHz	+/- 3.2000
Conducted Emission, 9kHz to 30MHz	+/- 1.7468

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
Consistent with industry standard (e.g. CISPR 22: 2006, clause 11, Measurement Uncertainty) determining compliance with the limits shall be base on the results of the compliance measurement. Consequently the measure emissions being less than the maximum allowed emission result in this be a compliant test or passing test.
The acceptable measurement uncertainty value without requiring revision of the compliance statement is base on conducted and radiated emissions being less than U_{CISPR} which is 3.6dB and 5.2dB respectively. CCS values (called U_{Lab} in CISPR 16-4-2) is less than U_{CISPR} as shown in the table above. Therefore, MU need not be considered for compliance.

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	Serial No.	FCC ID
1	Notebook PC	DELL	Latitude D610	CN-0XD762-48643 -637-1743	E2K24BNHM
2	Notebook PC	Lenovo ideaPad	S10e_4068-RZ1	L3CEV2D	HFS-FL
3	Notebook PC	IBM	ThinkPad T61 7663-AS6	L3F3864	-----
4	Ethernet Switch	ASUS	GX1008B	90-Q872AN1N0NAM A0-88QSA1003522	---

No.	Signal Cable Description
1	Unshielded RJ-45 cable, 12m × 2
2	Unshielded RJ-45 cable, 1m × 3

SETUP DIAGRAM FOR TESTS

EUT & peripherals setup diagram is shown in appendix setup photos.

EUT OPERATING CONDITION

RF Mode

1. Set up all computers like the setup diagram.

(1) **TX Mode:**

⇨ **Tx Data Rate:** 1Mbps Bandwidth 20 (IEEE 802.11b mode)
6Mbps Bandwidth 20 (IEEE 802.11g mode)
MCS=8 Bandwidth 20 (IEEE 802.11n HT20 mode)
MCS=8 Bandwidth 40 (IEEE 802.11n HT40 mode)

⇨ **Power control**

IEEE 802.11b Channel Low (2412MHz) TX 1 Power=46 (only chain1 TX)
IEEE 802.11b Channel Mid (2437MHz) TX 1 Power=41 (only chain1 TX)
IEEE 802.11b Channel High (2462MHz) TX 1 Power=39 (only chain1 TX)
IEEE 802.11g Channel Low (2412MHz) TX 1 Power=53 (only chain1 TX)
IEEE 802.11g Channel Mid (2437MHz) TX 1 Power=55 (only chain1 TX)
IEEE 802.11g Channel High (2462MHz) TX 1 Power=49 (only chain1 TX)

IEEE 802.11n HT20 Channel Low (2412MHz) TX 1 Power=51 / TX 2 Power=53
IEEE 802.11n HT20 Channel Mid (2437MHz) TX 1 Power=52 / TX 2 Power=54
IEEE 802.11n HT20 Channel High (2462MHz) TX 1 Power=48 / TX 2 Power=51
IEEE 802.11n HT40 Channel Low (2422MHz) TX 1 Power=48 / TX 2 Power=50
IEEE 802.11n HT40 Channel Mid (2437MHz) TX 1 Power=50 / TX 2 Power=52
IEEE 802.11n HT40 Channel High (2452MHz) TX 1 Power=49 / TX 2 Power=51

2. All of the function are under run.
3. Start test.

Normal Mode

1. Setup whole system for test as shown on diagram.
2. Power on all equipments.
3. Notebook PC_ping EUT IP 192.168.1.100 through WAN connected by RJ45 cable.
4. Notebook PC_ping EUT IP 192.168.0.1 through LAN connected by RJ45 cable.
5. Notebook PC_ping EUT IP 192.168.0.1 through wireless LAN.
6. LAN 2~3 port link ethernet switch load.
7. All of the function are under run.
8. Start test.

7. FCC PART 15.247 REQUIREMENTS

7.1 6dB BANDWIDTH

LIMITS

§ 15.247(a) (2) For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	AGILENT	E4446A	MY43360132	06/20/2011
Spectrum Analyzer	AGILENT	E4446A	MY46180323	05/02/2011

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

TEST SETUP

TEST PROCEDURE

The transmitter output was connected to a spectrum analyzer. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

TEST RESULTS

IEEE 802.11b Mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	9.75	500	PASS
Middle	2437	9.75	500	PASS
High	2462	9.25	500	PASS

IEEE 802.11g Mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	16.58	500	PASS
Middle	2437	16.50	500	PASS
High	2462	16.58	500	PASS

IEEE 802.11n HT20 mode (Two TX)

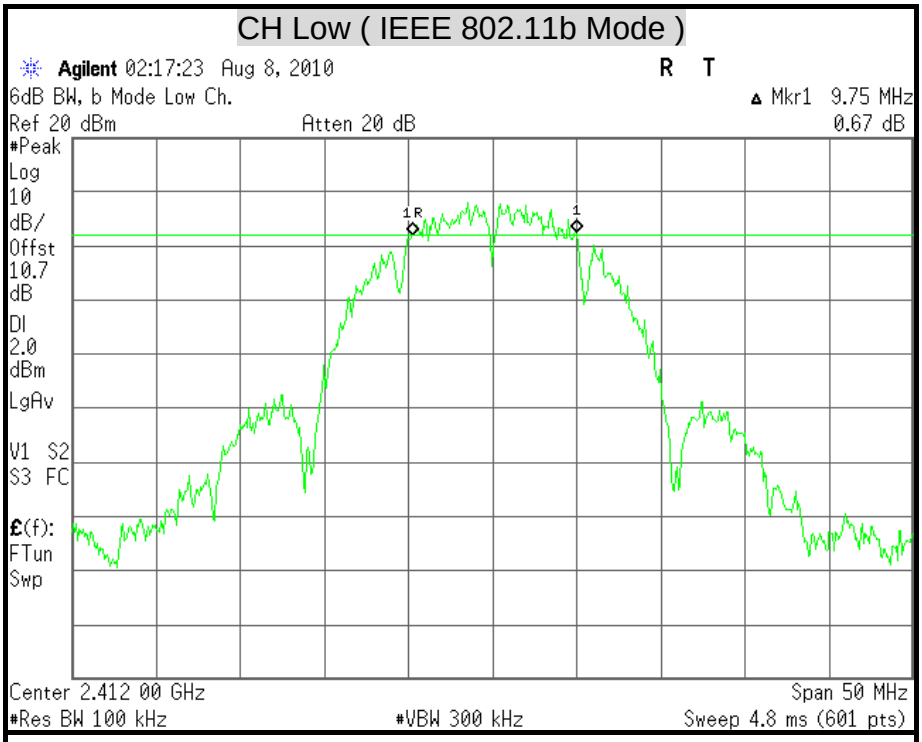
Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (kHz)	Pass / Fail
		Chain 1	Chain 2		
Low	2412	17.75	17.67	500	PASS
Middle	2437	17.83	17.75	500	PASS
High	2462	17.83	17.75	500	PASS

IEEE 802.11n HT40 Mode (Two TX)

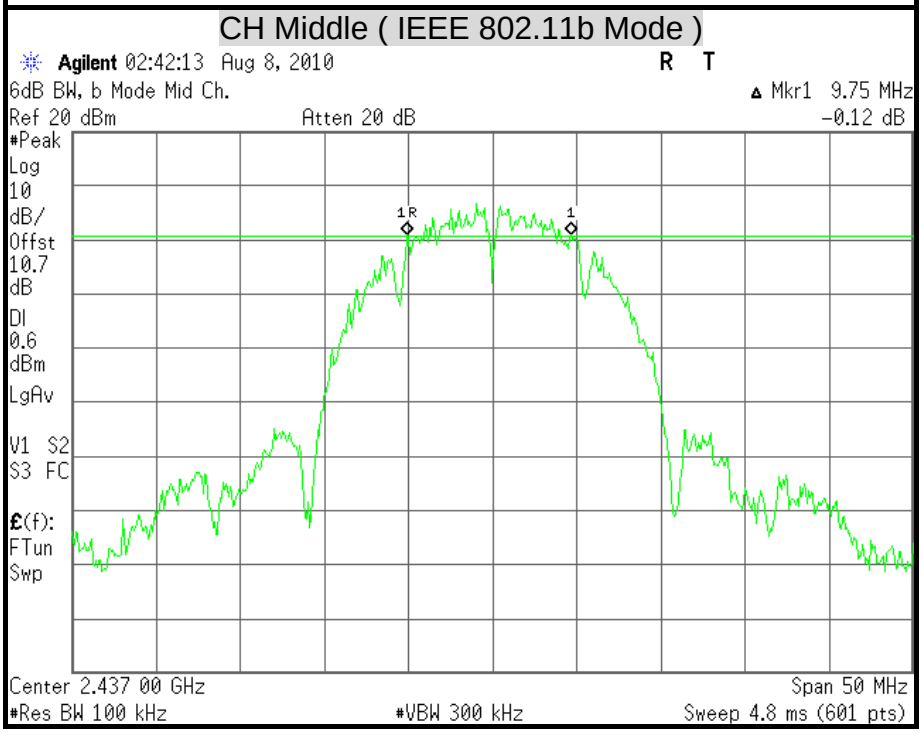
Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (kHz)	Pass / Fail
		Chain 1	Chain 2		
Low	2422	36.50	36.50	500	PASS
Middle	2437	36.17	36.17	500	PASS
High	2452	36.33	36.33	500	PASS

6dB BANDWIDTH

CH Low (IEEE 802.11b Mode)



CH Middle (IEEE 802.11b Mode)



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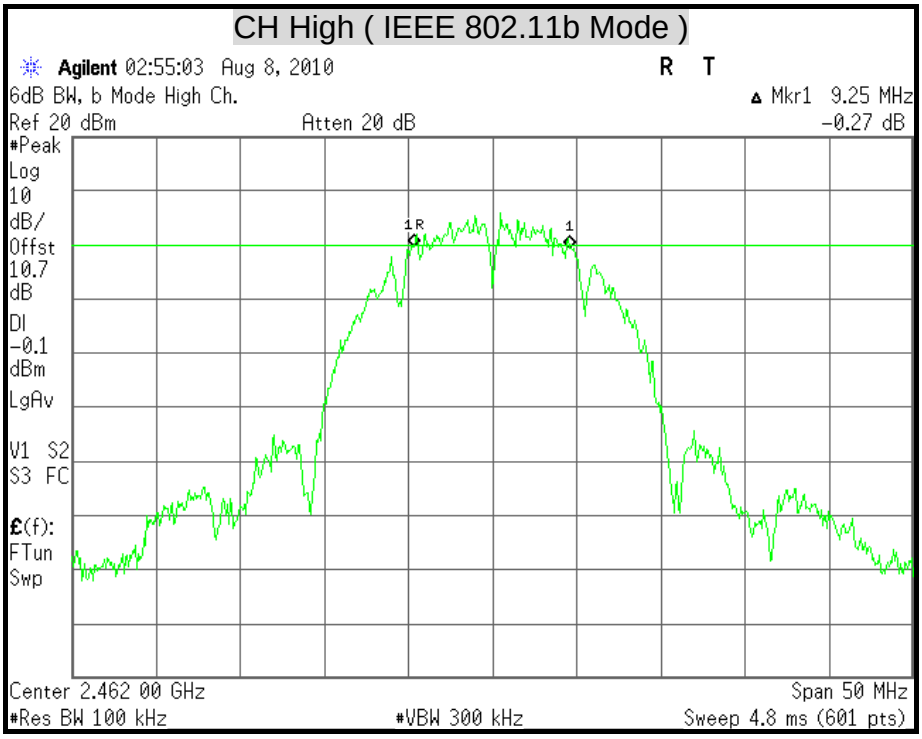
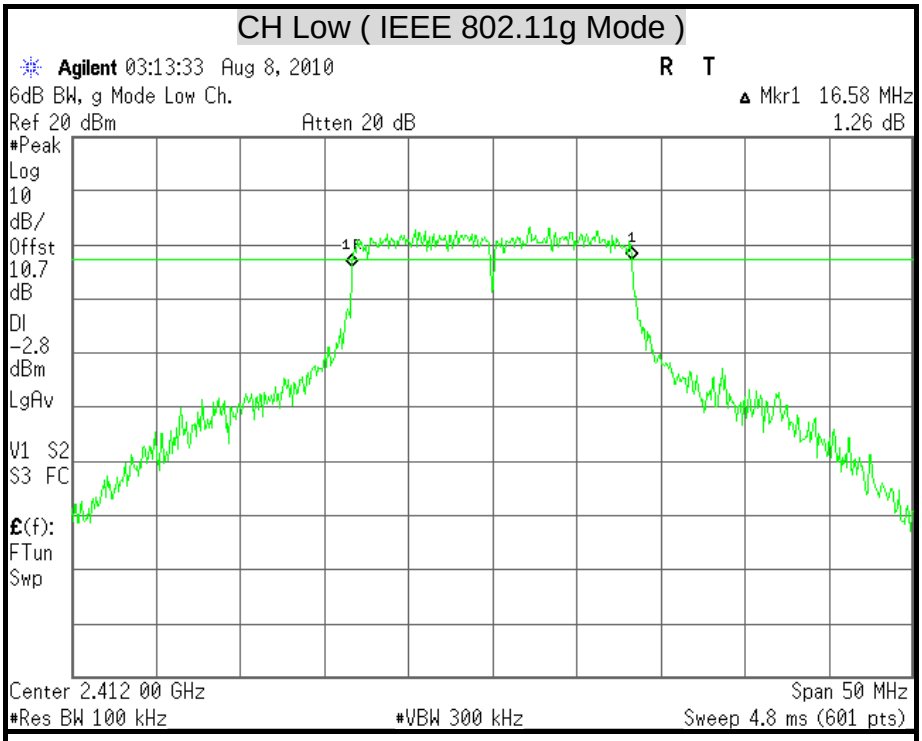
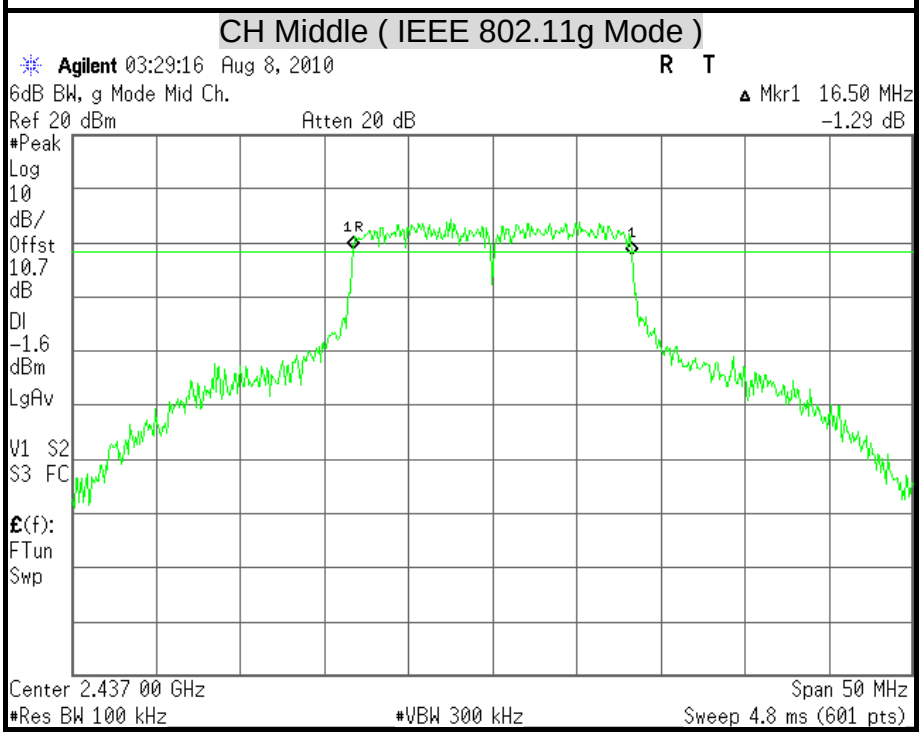


CH Low (IEEE 802.11g Mode)



CH Middle (IEEE 802.11g Mode)



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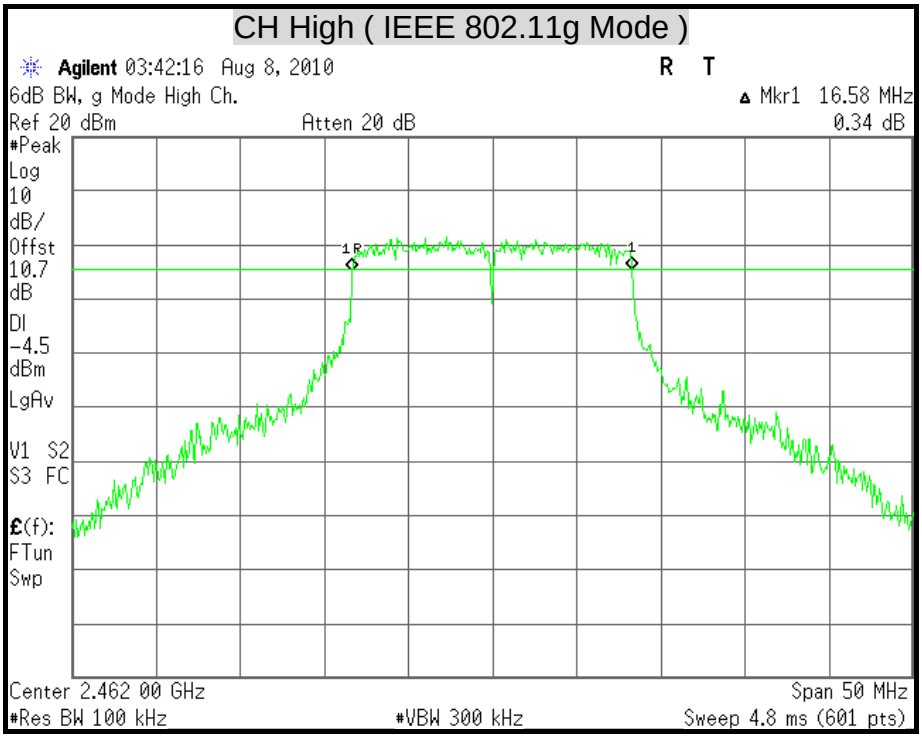
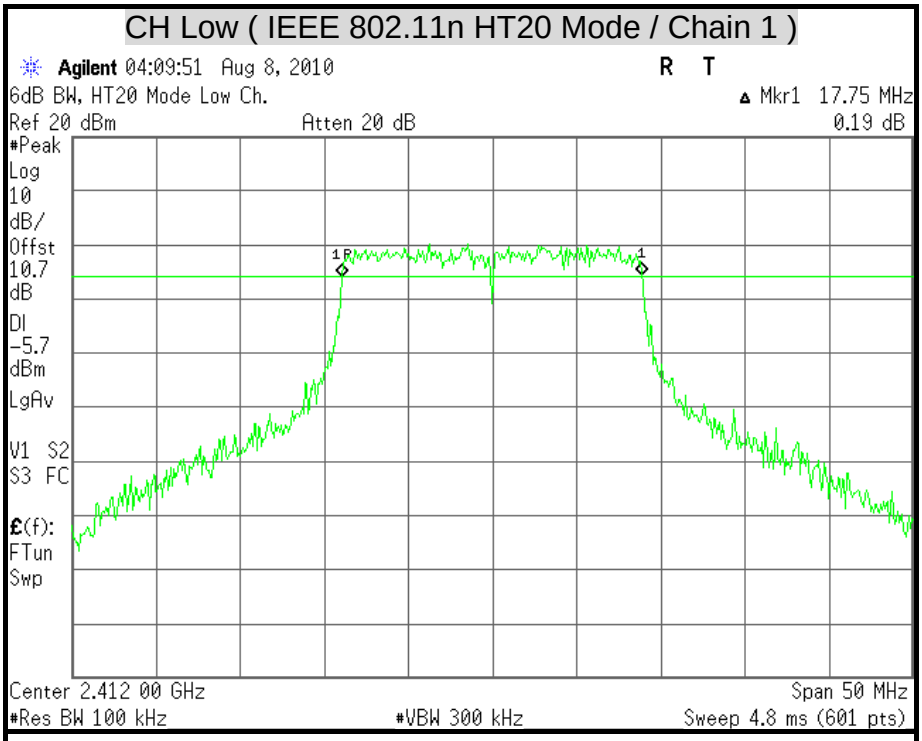
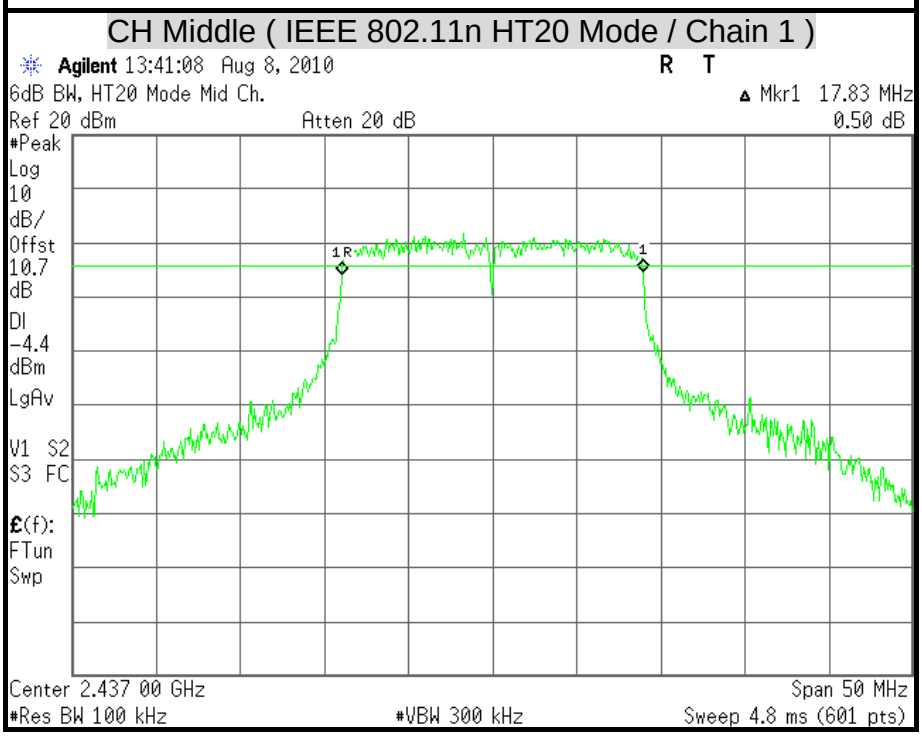


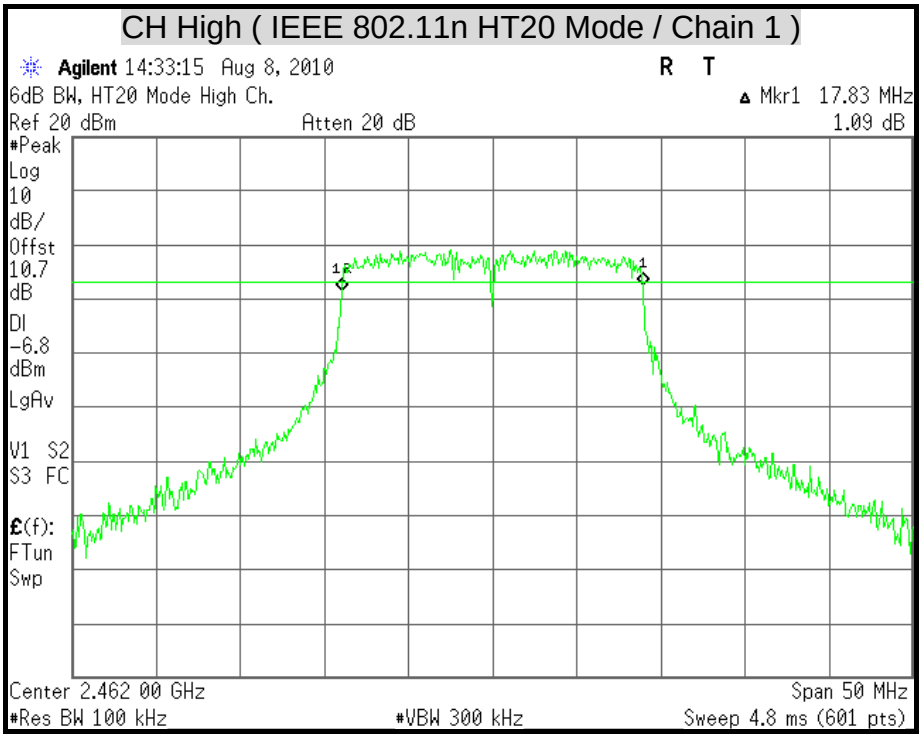
CH Low (IEEE 802.11n HT20 Mode / Chain 1)



CH Middle (IEEE 802.11n HT20 Mode / Chain 1)



CH High (IEEE 802.11n HT20 Mode / Chain 1)



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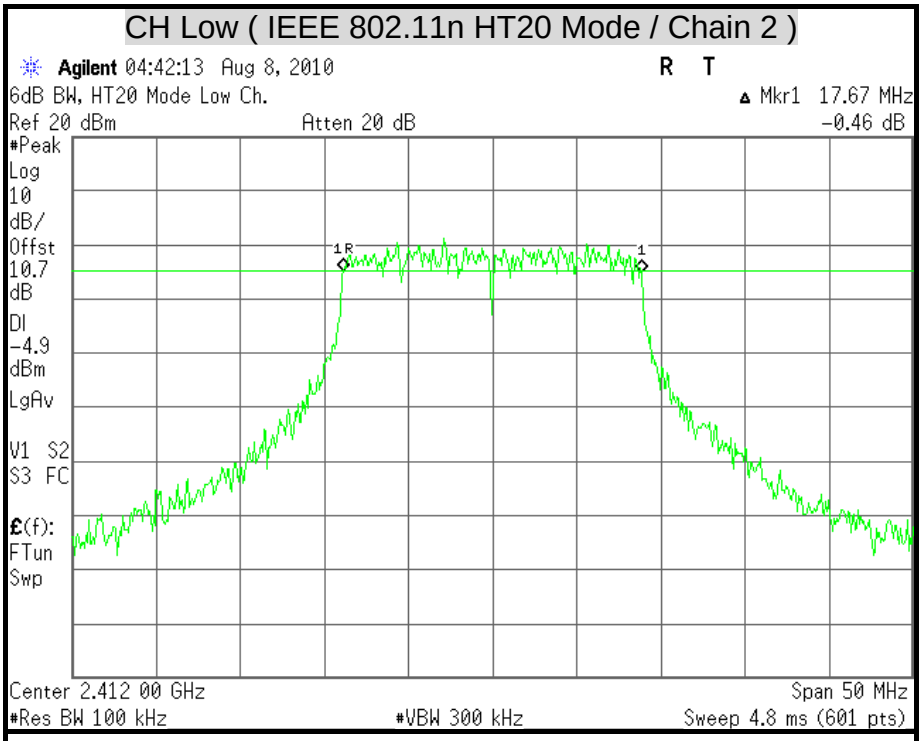
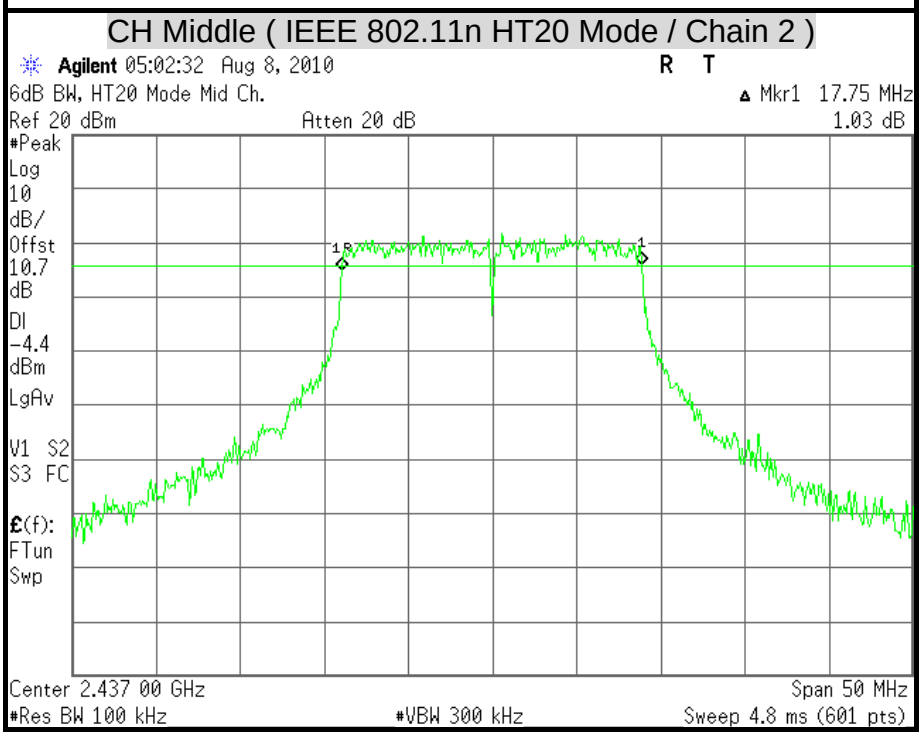
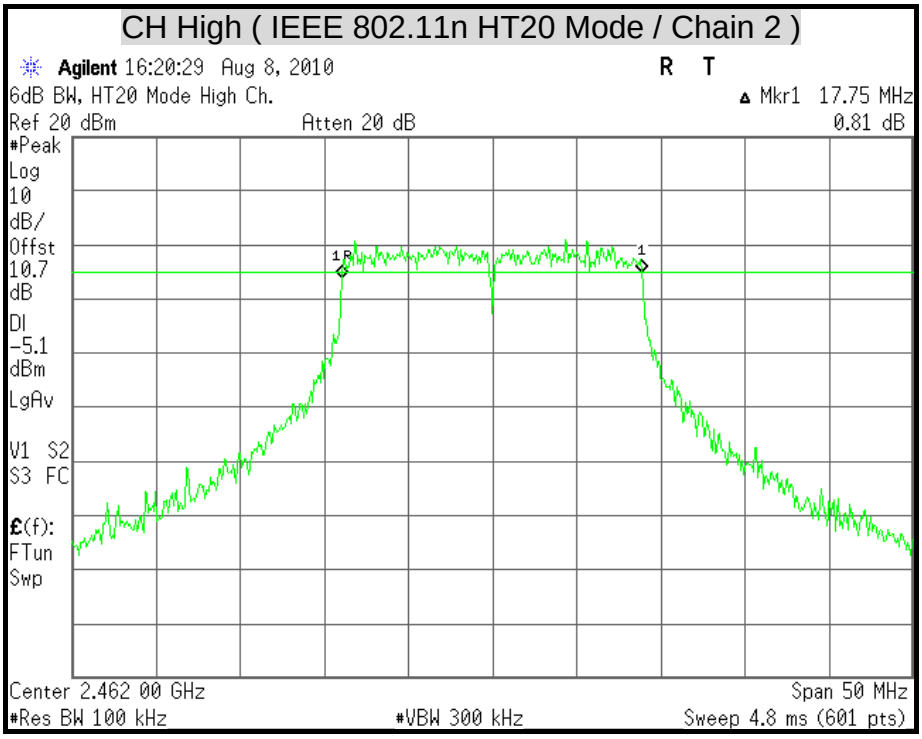


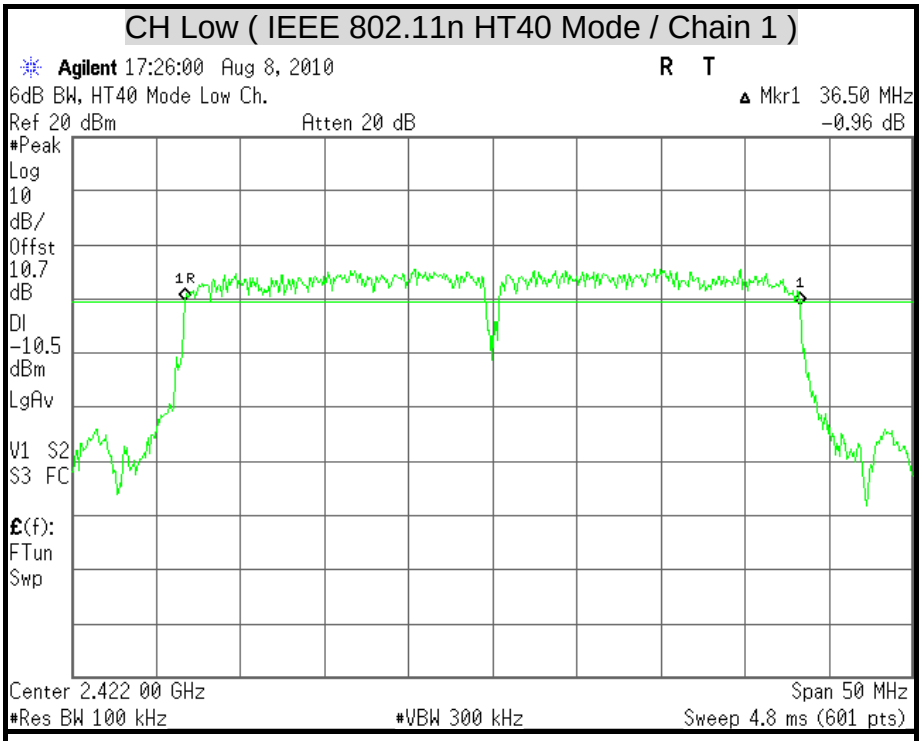
CH Middle (IEEE 802.11n HT20 Mode / Chain 2)



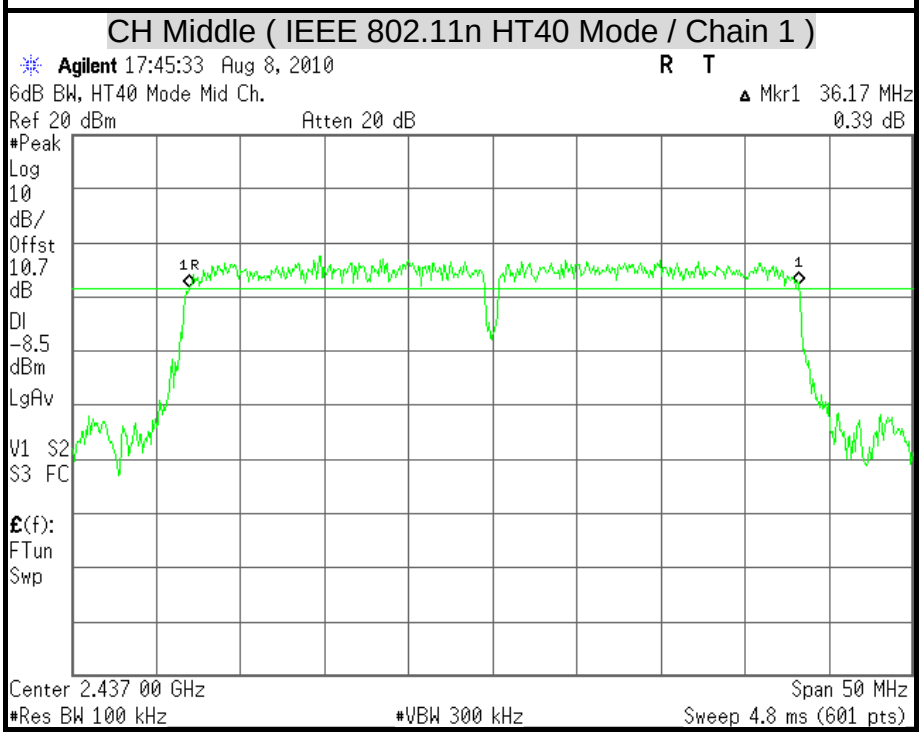
CH High (IEEE 802.11n HT20 Mode / Chain 2)



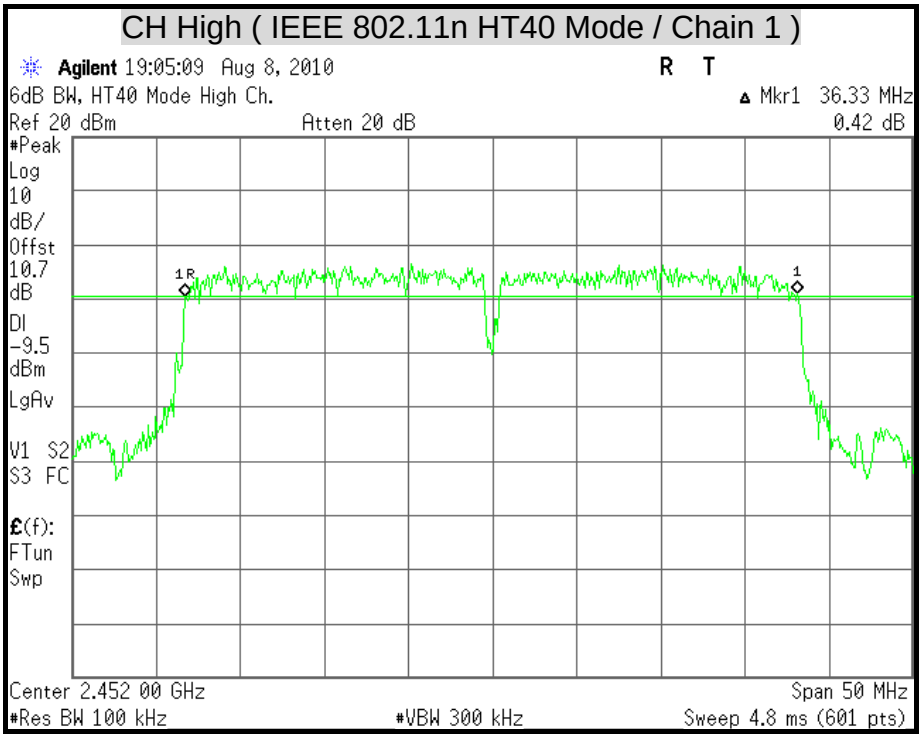
CH Low (IEEE 802.11n HT40 Mode / Chain 1)



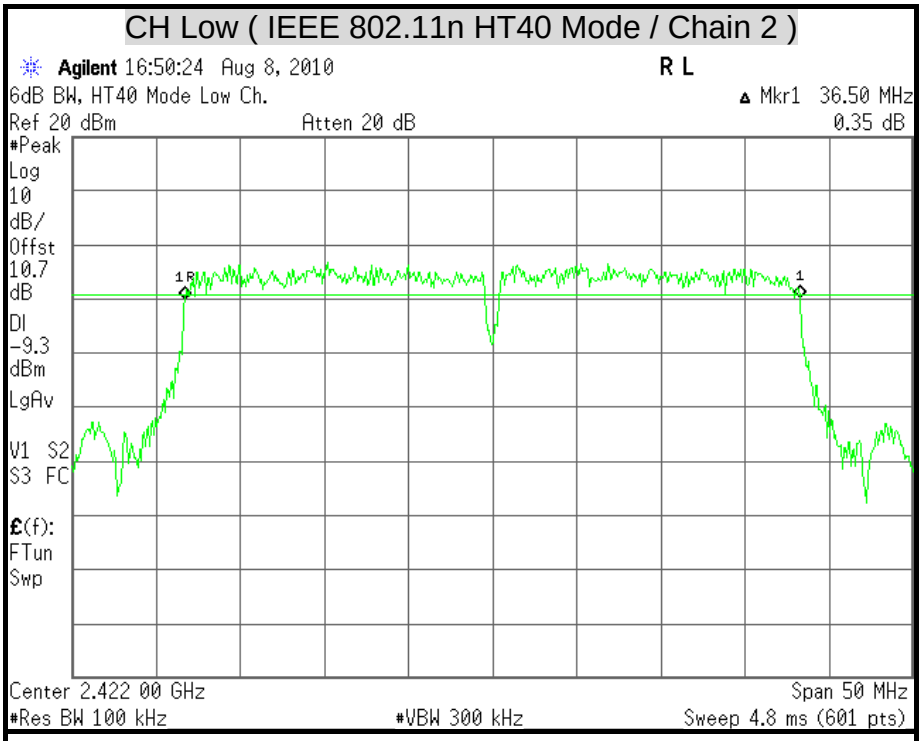
CH Middle (IEEE 802.11n HT40 Mode / Chain 1)



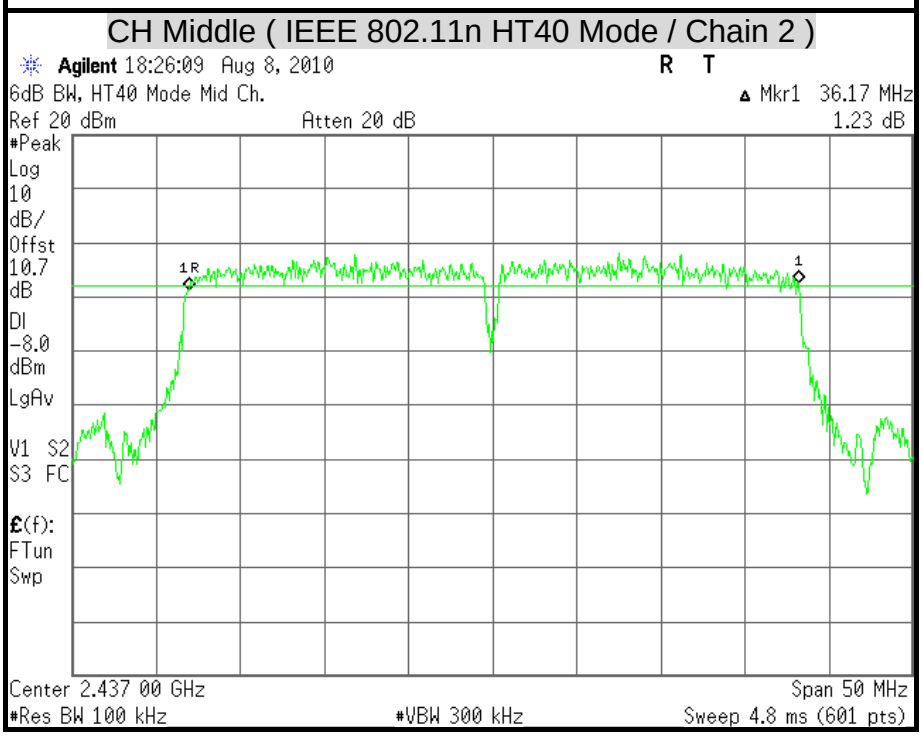
CH High (IEEE 802.11n HT40 Mode / Chain 1)



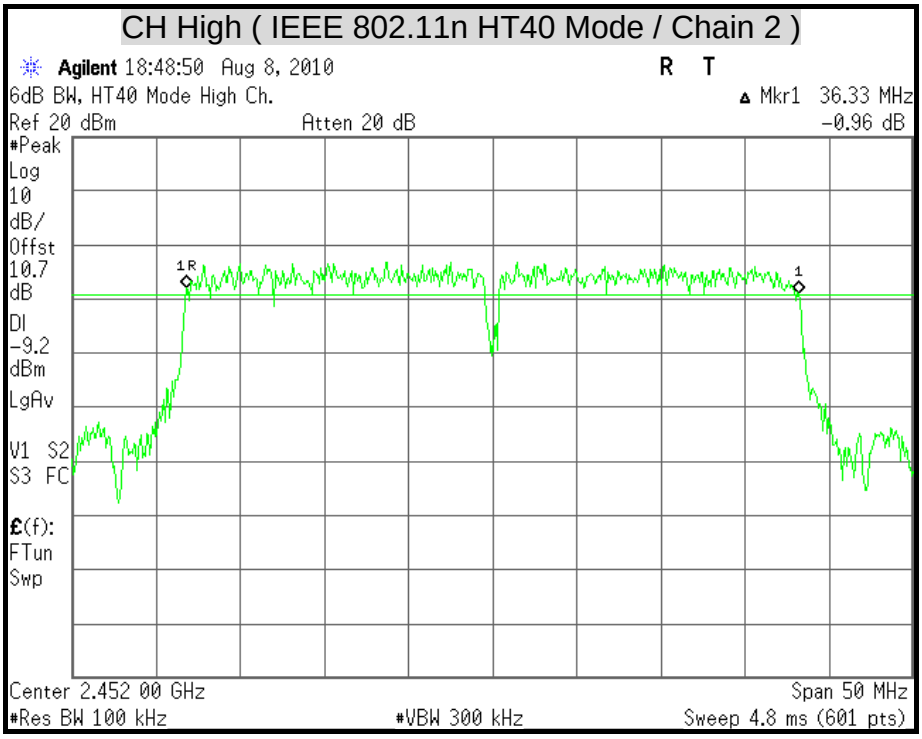
CH Low (IEEE 802.11n HT40 Mode / Chain 2)



CH Middle (IEEE 802.11n HT40 Mode / Chain 2)



CH High (IEEE 802.11n HT40 Mode / Chain 2)



7.2 MAXIMUM PEAK OUTPUT POWER

LIMITS

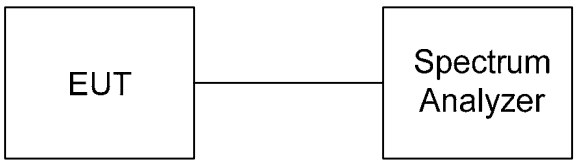
§ 15.247(b) The maximum peak output power of the intentional radiator shall not exceed the following :
§ 15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands : 1 watt.
§ 15.247(b) (4) Except as shown in paragraphs (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (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 EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	AGILENT	E4446A	MY43360132	06/20/2011
Spectrum Analyzer	AGILENT	E4446A	MY46180323	05/02/2011

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

TEST SETUP



TEST PROCEDURE

1. The spectrum shall be set as follows :
   Span : 1.5 times channel integration bandwidth.
   RBW : 1MHz
   VBW : 3MHz
   Detector : Peak
   Sweep : Single trace
2. Compute the combined power of all signal responses contained in the trace by covering all the data points.
3. The peak output power is the channel power integrated over 26dB bandwidth.

TEST RESULTS

Total peak power calculation formula:
10 log (10^ (Chain 1 Power / 10) + 10^ (Chain 2 Power / 10)).

The maximum antenna gain is 4 dBi, therefore the limit is 30 dBm.
In the legacy mode, the effective antenna gain is 4 + 10 × Log (2) = 7.01 dBi.

IEEE 802.11b Mode

Channel	Channel Frequency (MHz)	Peak Power		Peak Power Limit		Pass / Fail
		(dBm)	(W)	(dBm)	(W)	
Low	2412	21.19	0.1315	30	1	PASS
Middle	2437	19.32	0.0855	30	1	PASS
High	2462	18.52	0.0711	30	1	PASS

Remark:
1. *At finial test to get the worst-case emission at 1Mbps.*
2. *The cable assembly insertion loss of 10.7dB (including 10 dB pad and 0.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

IEEE 802.11g Mode

Channel	Channel Frequency (MHz)	Peak Power		Peak Power Limit		Pass / Fail
		(dBm)	(W)	(dBm)	(W)	
Low	2412	20.62	0.1153	30	1	PASS
Middle	2437	21.97	0.1574	30	1	PASS
High	2462	19.37	0.0865	30	1	PASS

Remark:
1. *At finial test to get the worst-case emission at 6Mbps.*
2. *The cable assembly insertion loss of 10.7dB (including 10 dB pad and 0.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

IEEE 802.11n HT20 Mode (Two TX)

Channel	Channel Frequency (MHz)	Peak Power (dBm)		Peak Power Total		Peak Power Limit		Pass / Fail
		Chain 1	Chain 2	(dBm)	(W)	(dBm)	(W)	
Low	2412	18.92	19.36	22.16	0.1643	28.99	0.7925	PASS
Middle	2437	19.08	19.36	22.23	0.1672	28.99	0.7925	PASS
High	2462	18.05	18.81	21.46	0.1399	28.99	0.7925	PASS

Remark:

1. At finial test to get the worst-case emission at 6.5Mbps.

2. The cable assembly insertion loss of 10.7dB (including 10 dB pad and 0.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT40 Mode (Two TX)

Channel	Channel Frequency (MHz)	Peak Power (dBm)		Peak Power Total		Peak Power Limit		Pass / Fail
		Chain 1	Chain 2	(dBm)	(W)	(dBm)	(W)	
Low	2422	17.09	17.97	20.56	0.1138	28.99	0.7925	PASS
Middle	2437	17.48	18.13	20.83	0.1210	28.99	0.7925	PASS
High	2452	17.97	18.92	21.48	0.1406	28.99	0.7925	PASS

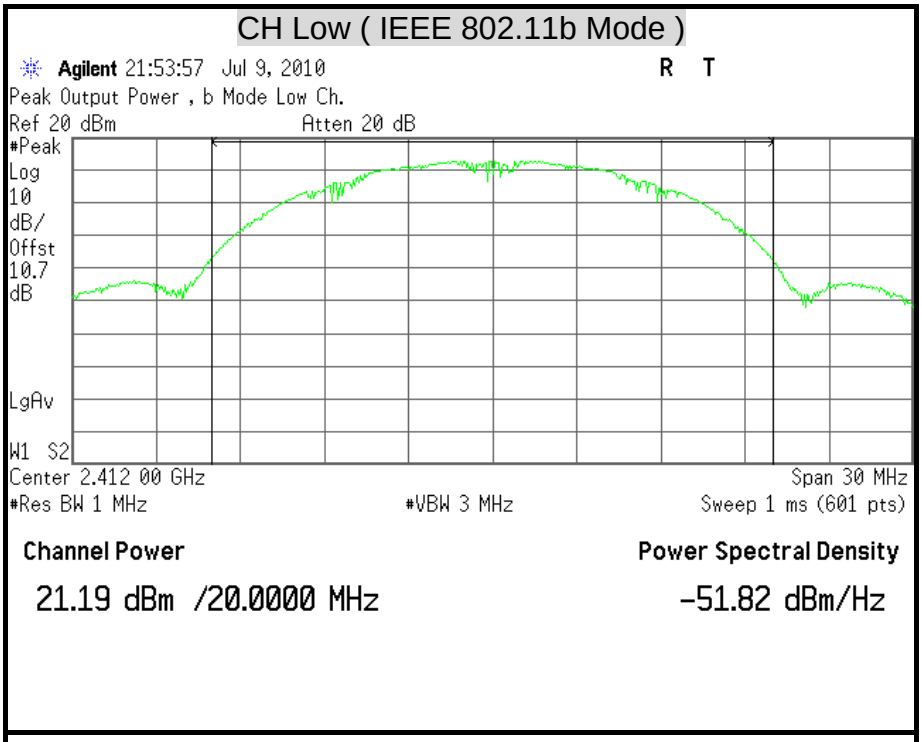
Remark:

1. At finial test to get the worst-case emission at 13.5Mbps.

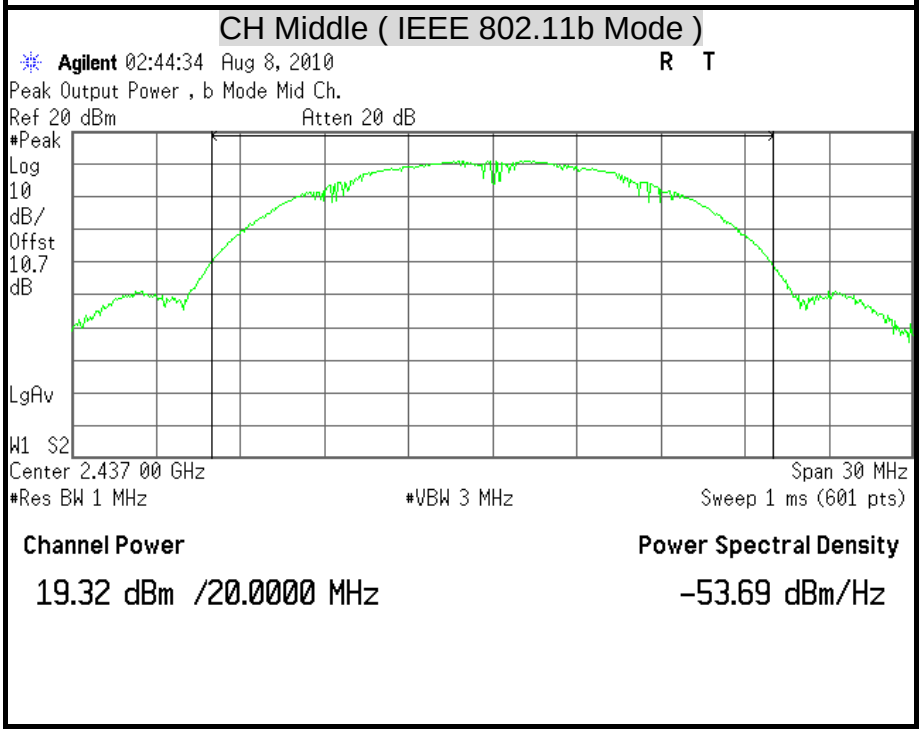
2. The cable assembly insertion loss of 10.7dB (including 10 dB pad and 0.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

MAXIMUM PEAK OUTPUT POWER

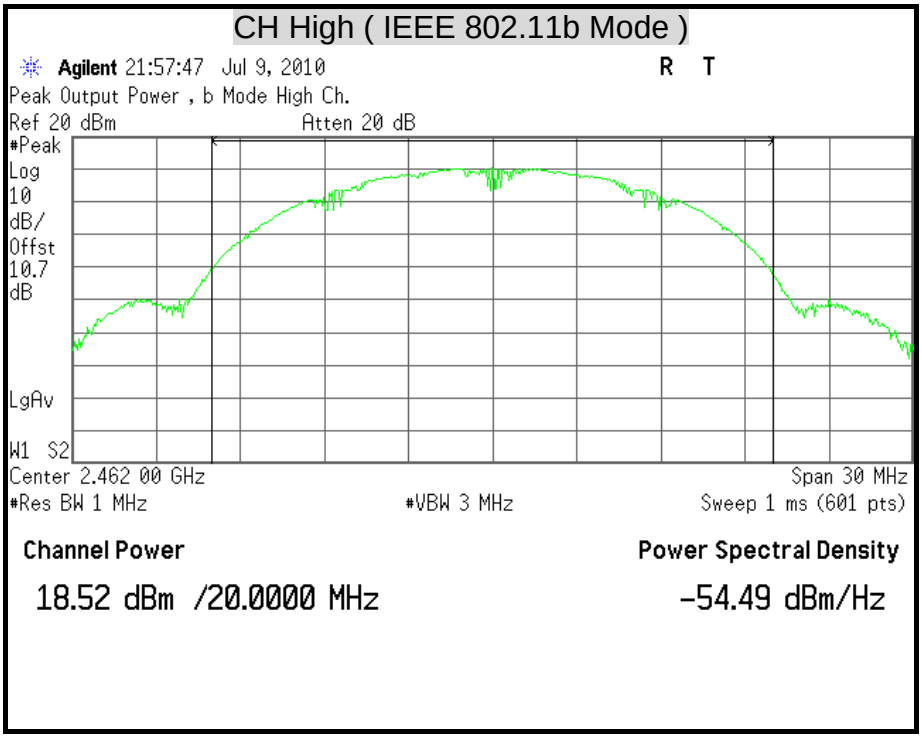
CH Low (IEEE 802.11b Mode)



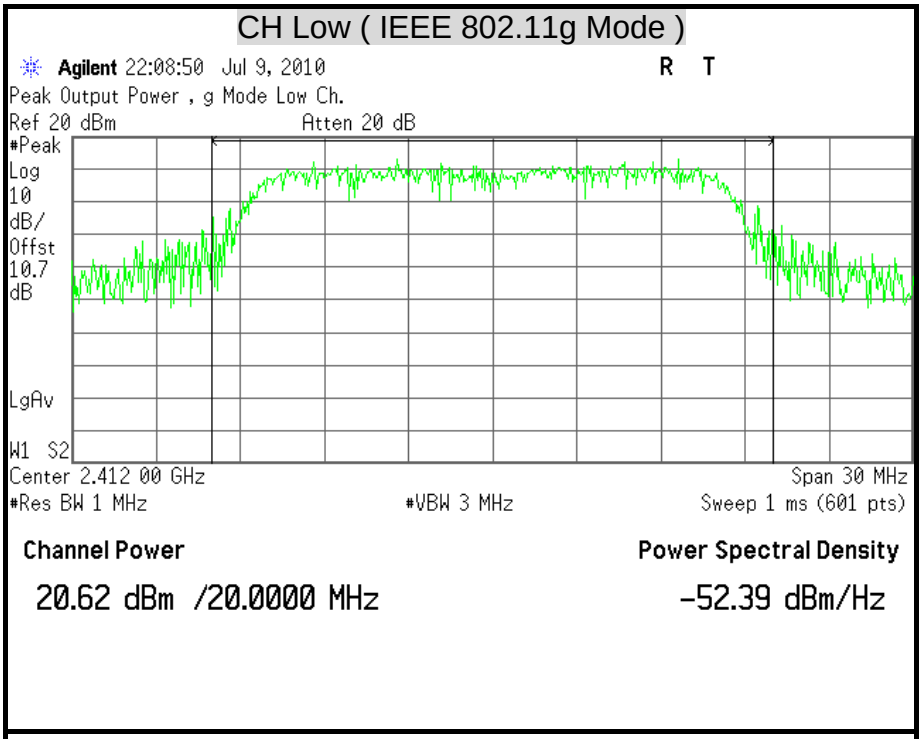
CH Middle (IEEE 802.11b Mode)



CH High (IEEE 802.11b Mode)



CH Low (IEEE 802.11g Mode)



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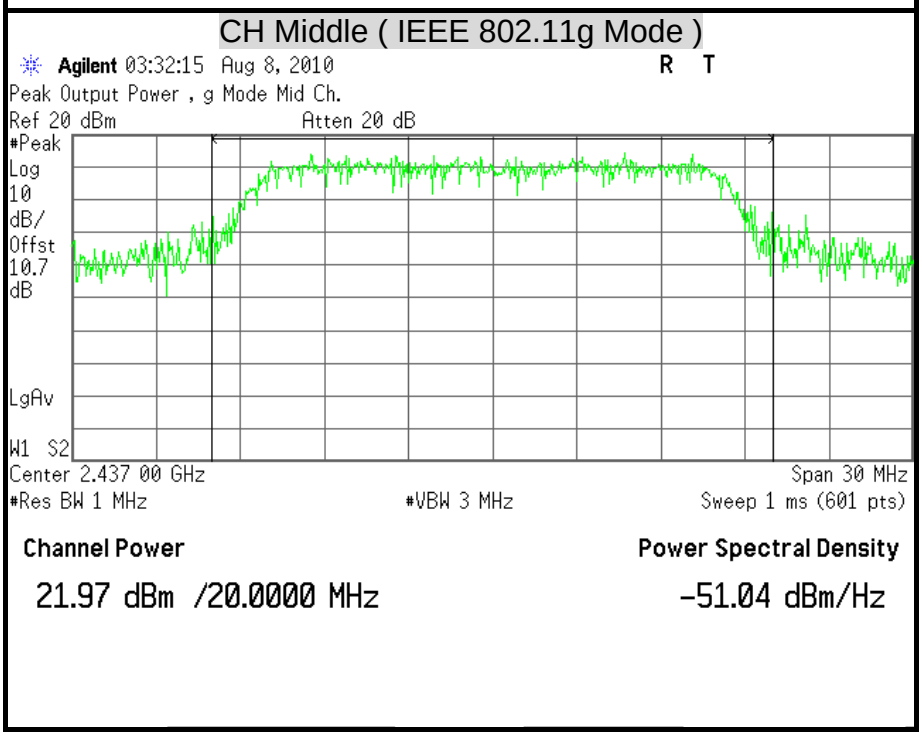
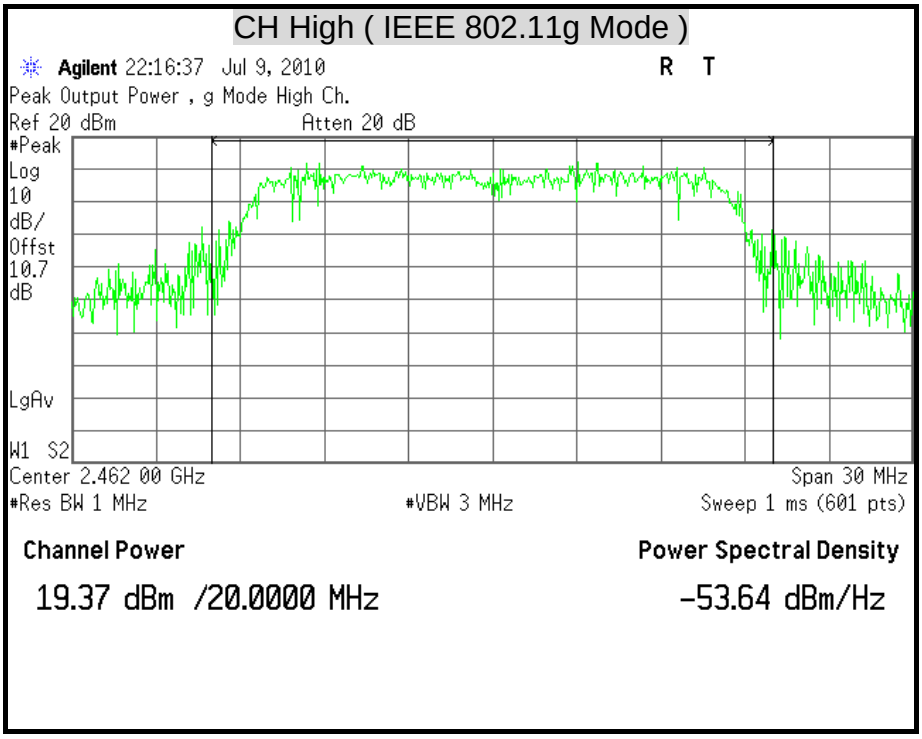
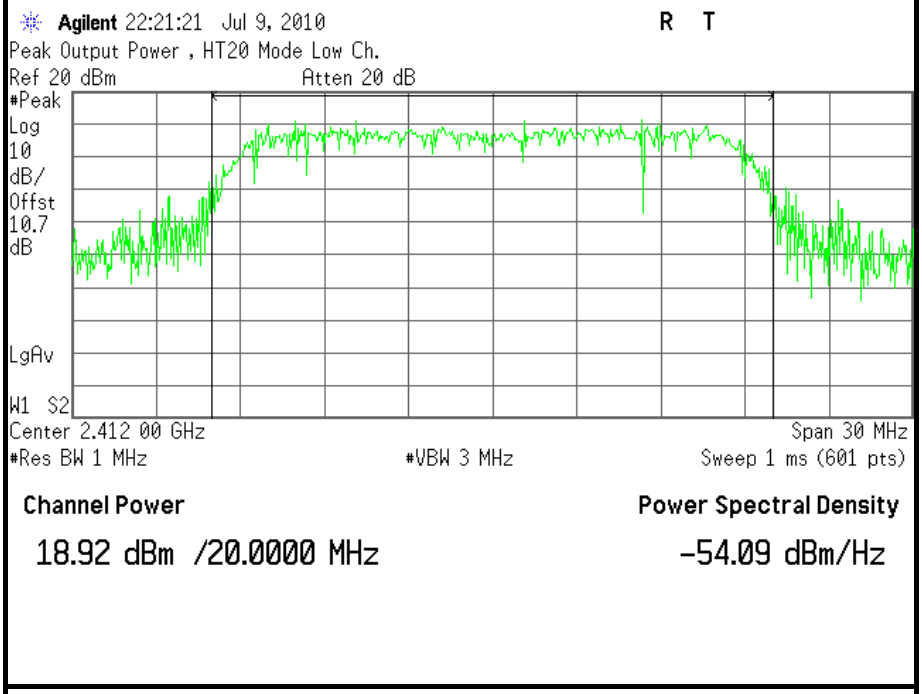


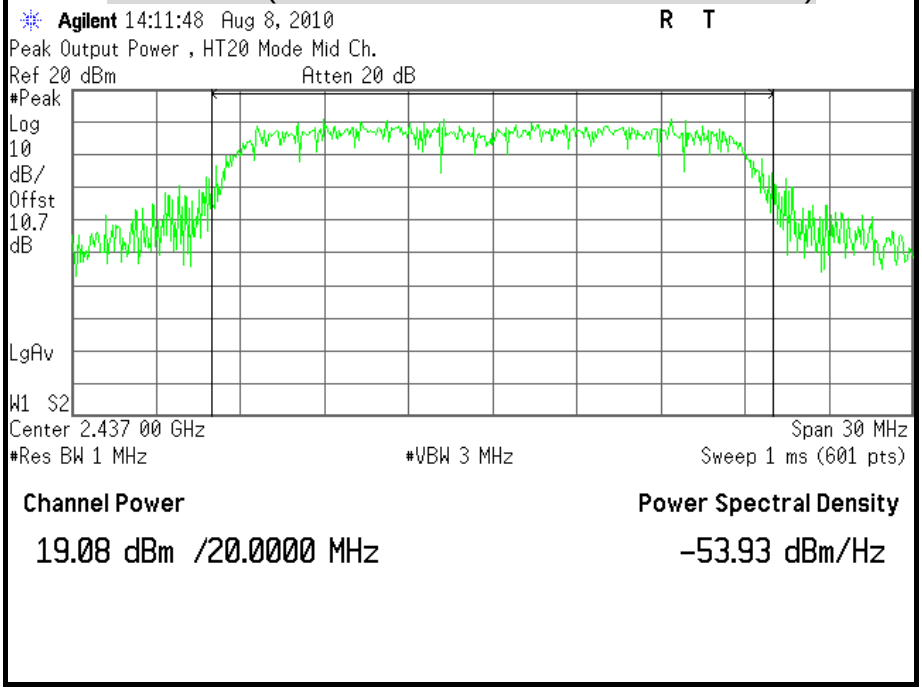
CH High (IEEE 802.11g Mode)



CH Low (IEEE 802.11n HT20 Mode / Chain 1)



CH Middle (IEEE 802.11n HT20 Mode / Chain 1)



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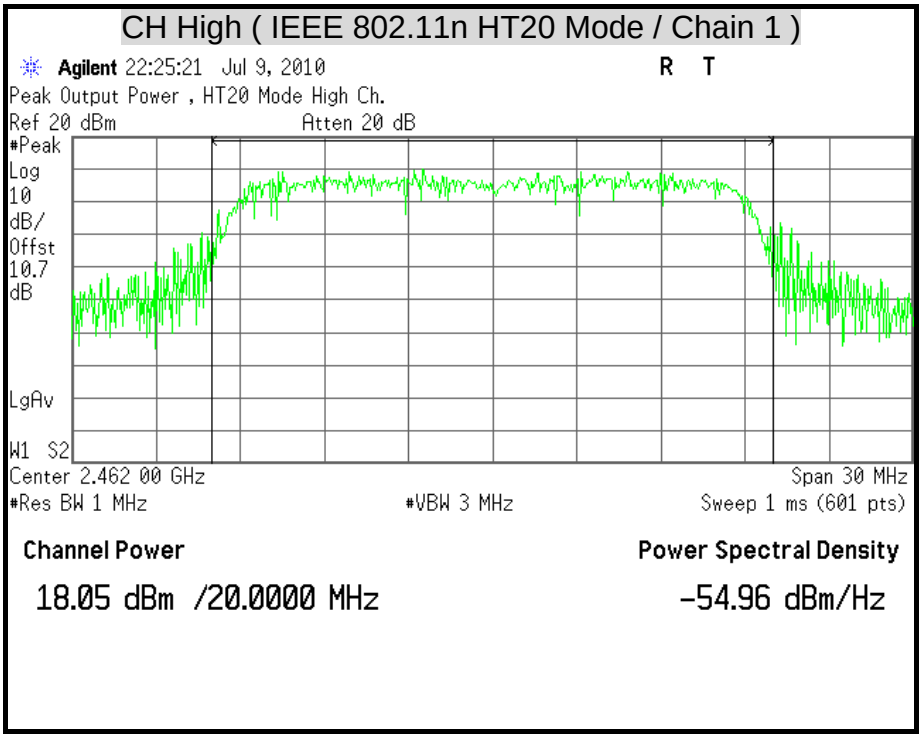

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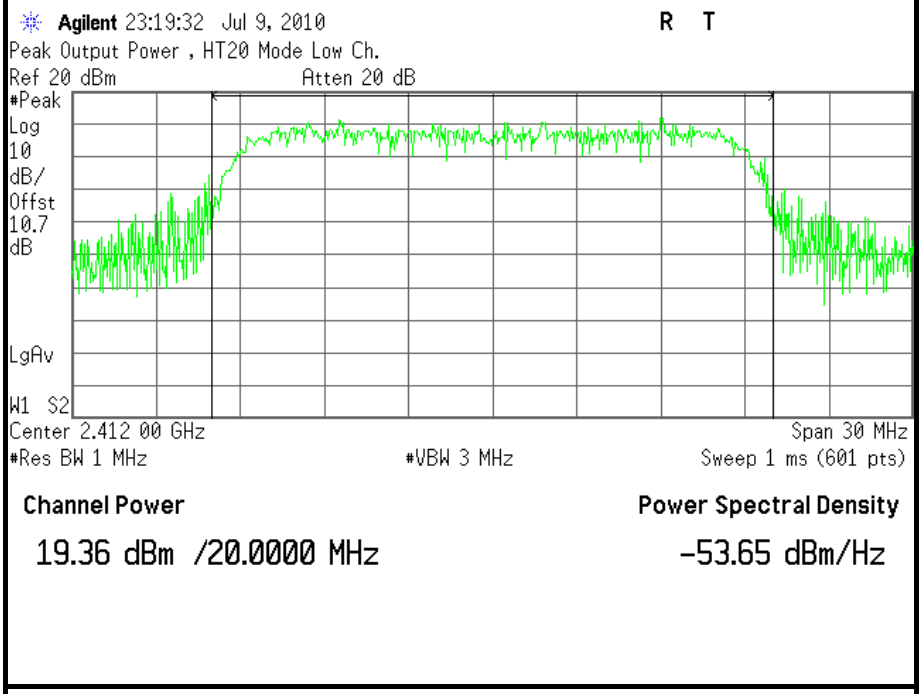
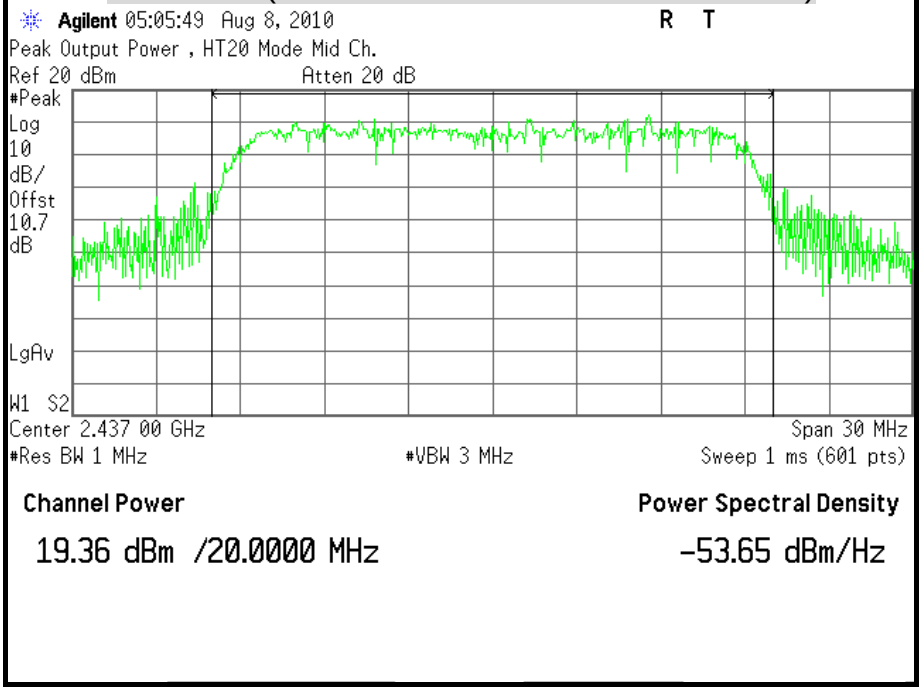
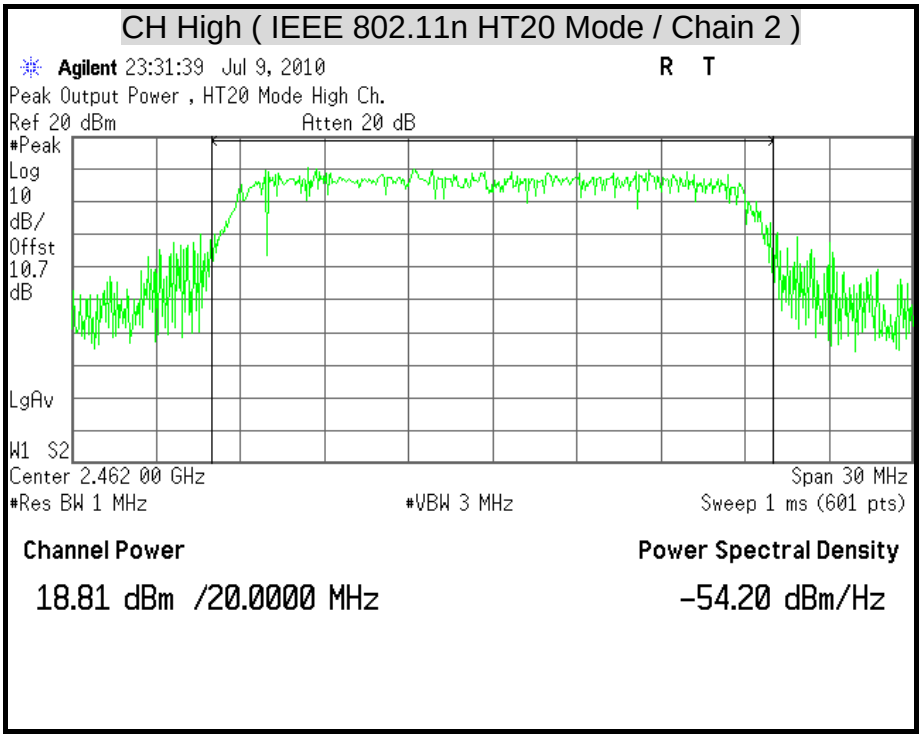


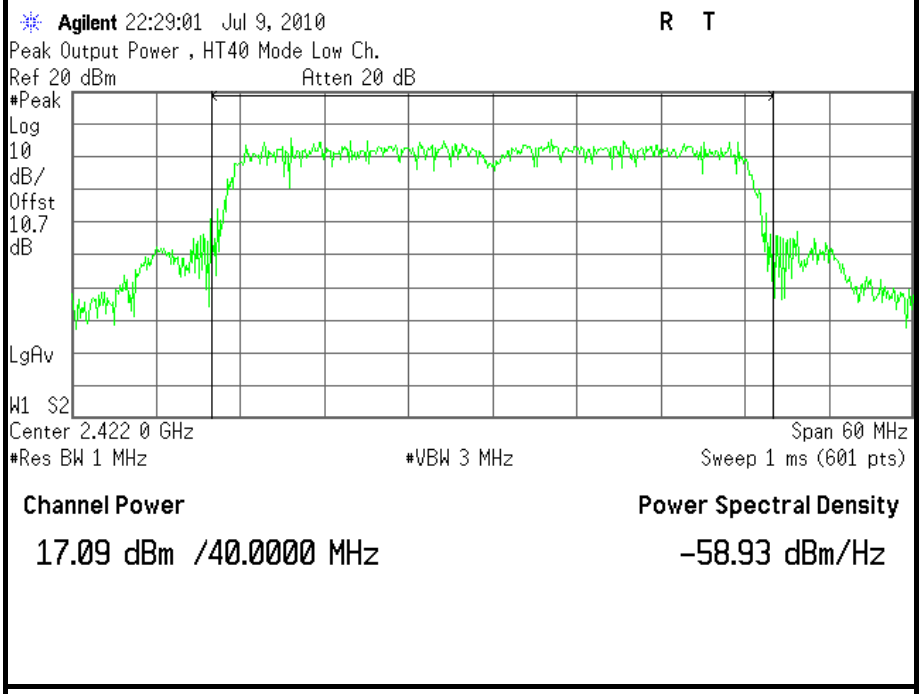
CH Middle (IEEE 802.11n HT20 Mode / Chain 2)



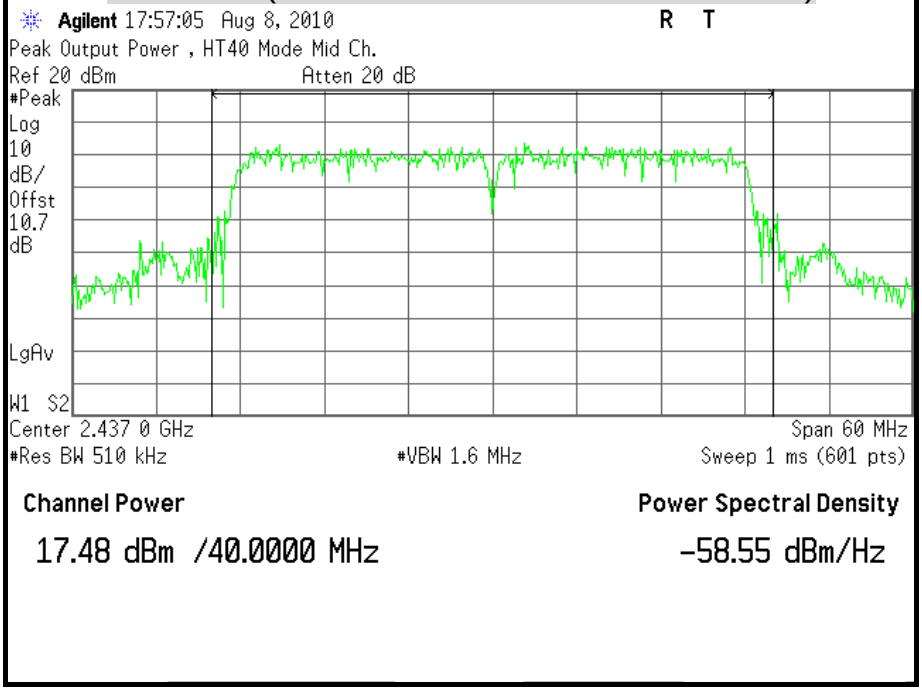
CH High (IEEE 802.11n HT20 Mode / Chain 2)



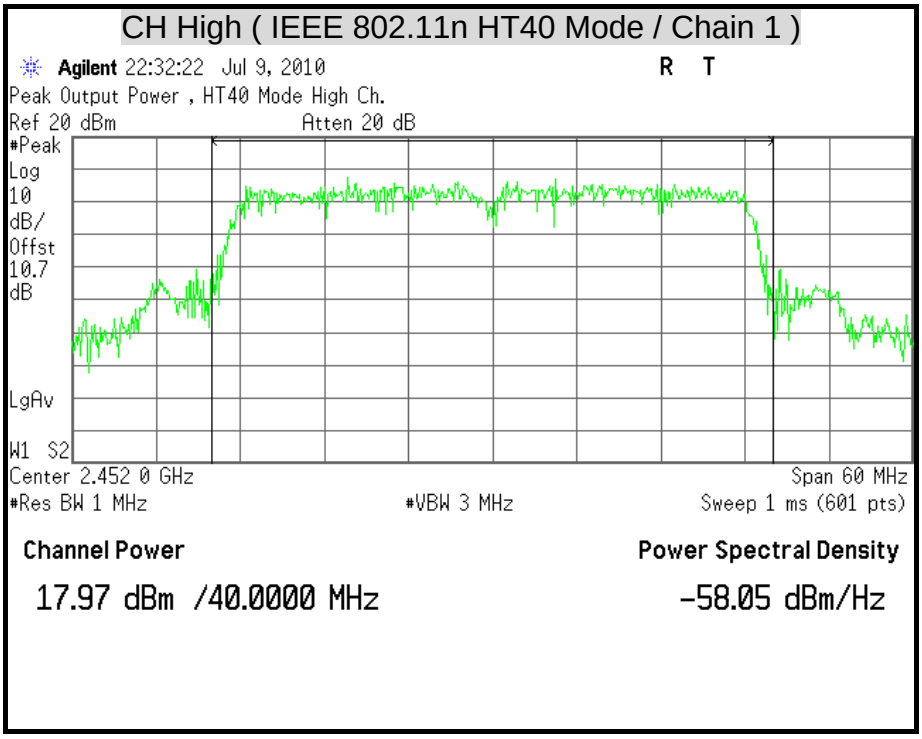
CH Low (IEEE 802.11n HT40 Mode / Chain 1)



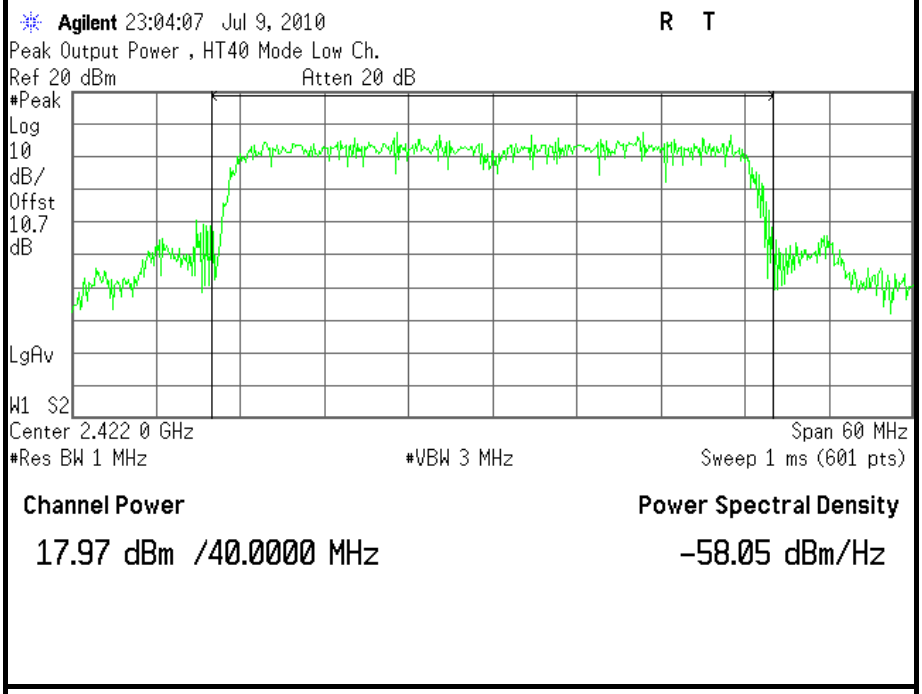
CH Middle (IEEE 802.11n HT40 Mode / Chain 1)



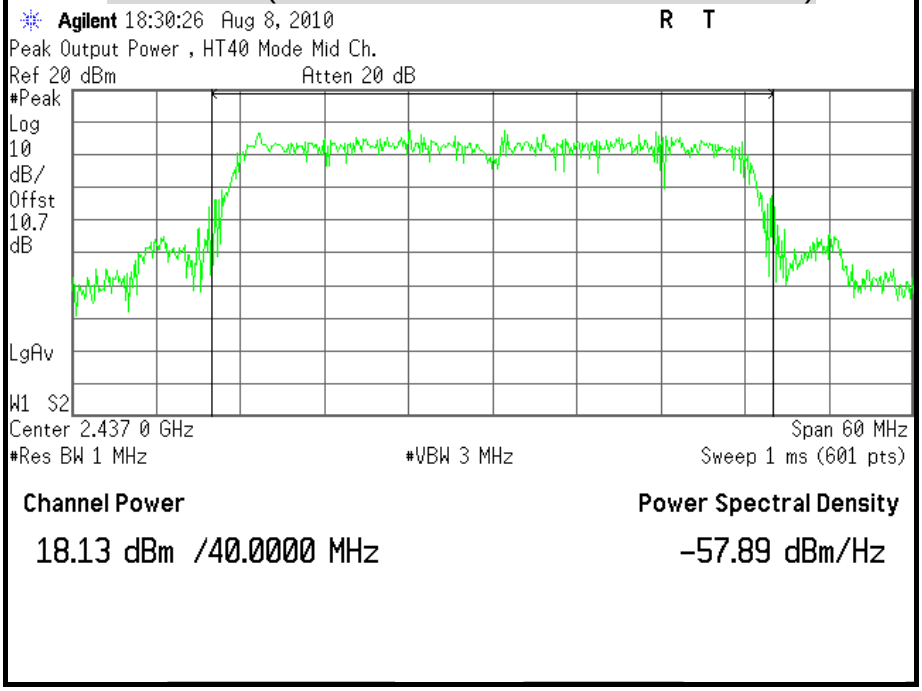
CH High (IEEE 802.11n HT40 Mode / Chain 1)



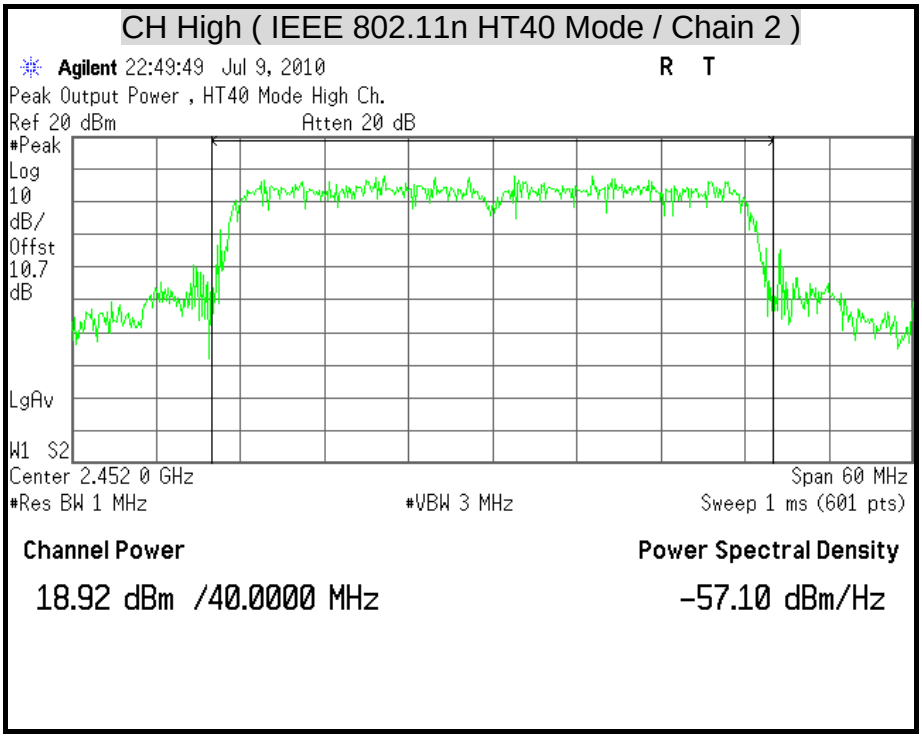
CH Low (IEEE 802.11n HT40 Mode / Chain 2)



CH Middle (IEEE 802.11n HT40 Mode / Chain 2)



CH High (IEEE 802.11n HT40 Mode / Chain 2)



7.3 AVERAGE POWER

LIMITS

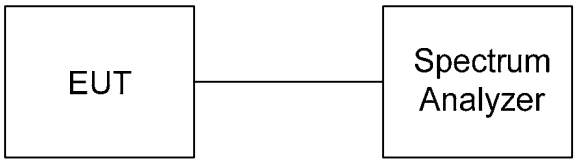
None; for reporting purposes only.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	AGILENT	E4446A	MY43360132	06/20/2011
Spectrum Analyzer	AGILENT	E4446A	MY46180323	05/02/2011

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

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer.

TEST RESULTS

Total peak power calculation formula:
10 log (10^ (Chain 1 Power / 10) + 10^ (Chain 2 Power / 10)).

IEEE 802.11b Mode

Channel	Channel Frequency (MHz)	Average Power Output (dBm)
Low	2412	18.33
Middle	2437	16.66
High	2462	15.68

Remark:
1. *At finial test to get the worst-case emission at 1Mbps.*
2. *The cable assembly insertion loss of 10.7dB (including 10 dB pad and 0.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

IEEE 802.11g Mode

Channel	Channel Frequency (MHz)	Average Power Output (dBm)
Low	2412	17.29
Middle	2437	18.37
High	2462	15.89

Remark:
1. *At finial test to get the worst-case emission at 6Mbps.*
2. *The cable assembly insertion loss of 10.7dB (including 10 dB pad and 0.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

IEEE 802.11n HT20 Mode (Two TX)

Channel	Channel Frequency (MHz)	Average Power Output (dBm)		Peak Power Total (dBm)
		Chain 1	Chain 2	
Low	2412	15.42	15.87	18.66
Middle	2437	15.69	15.83	18.77
High	2462	14.45	15.09	17.79

Remark:

1. At finial test to get the worst-case emission at 6.5Mbps.

2. The cable assembly insertion loss of 10.7dB (including 10 dB pad and 0.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT40 Mode (Two TX)

Channel	Channel Frequency (MHz)	Average Power Output (dBm)		Peak Power Total (dBm)
		Chain 1	Chain 2	
Low	2422	13.52	14.30	16.94
Middle	2437	14.83	14.57	17.71
High	2452	14.45	15.04	17.77

Remark:

1. At finial test to get the worst-case emission at 13.5Mbps.

2. The cable assembly insertion loss of 10.7dB (including 10 dB pad and 0.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

7.4 POWER SPECTRAL DENSITY

LIMITS

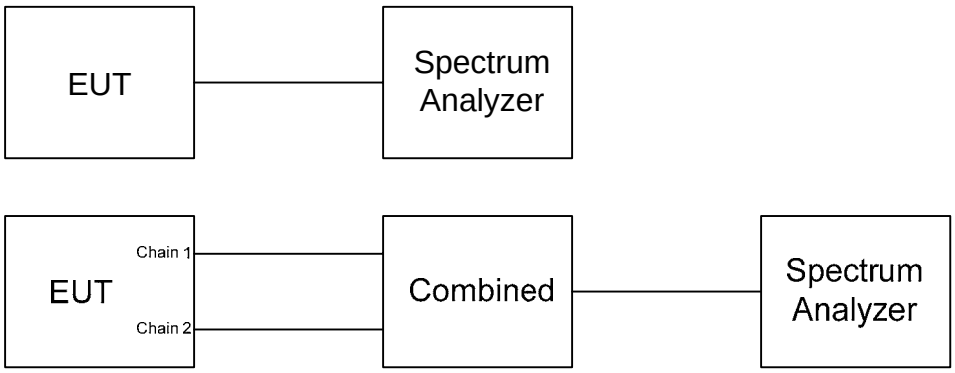
§ 15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	AGILENT	E4446A	MY43360132	06/20/2011
Spectrum Analyzer	AGILENT	E4446A	MY46180323	05/02/2011

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

TEST SETUP



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW＝3KHz and VBW≧RBW, set sweep time＝span / 3KHz.

The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span / 3KHz for a full response of the mixer in the spectrum analyzer.

TEST RESULTS

Total power spectral density calculation formula:

10 log (10^ (Chain 1 PPSD / 10) + 10^ (Chain 2 PPSD / 10)).

IEEE 802.11b Mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Minimum Limit (dBm)	Pass / Fail
Low	2412	-11.55	8	PASS
Middle	2437	-13.71	8	PASS
High	2462	-14.68	8	PASS

Remark:

1. *At finial test to get the worst-case emission at 1Mbps.*
2. *The cable assembly insertion loss of 10.7dB (including 10 dB pad and 0.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

IEEE 802.11g Mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Minimum Limit (dBm)	Pass / Fail
Low	2412	-11.57	8	PASS
Middle	2437	-9.98	8	PASS
High	2462	-12.84	8	PASS

Remark:

1. *At finial test to get the worst-case emission at 6Mbps.*
2. *The cable assembly insertion loss of 10.7dB (including 10 dB pad and 0.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

IEEE 802.11n HT20 Mode (Two TX)

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)		PPSD Total (dBm)	Minimum Limit (dBm)	Pass / Fail
		Chain 1	Chain 2			
Low	2412	-13.04	-12.65	-9.83	6.99	PASS
Middle	2437	-12.57	-12.10	-9.32	6.99	PASS
High	2462	-13.46	-13.76	-10.60	6.99	PASS

Remark:

1. At finial test to get the worst-case emission at 6.5Mbps.

2. The cable assembly insertion loss of 10.7dB (including 10 dB pad and 0.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 Combined Mode (Two TX)

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Minimum Limit (dBm)	Pass / Fail
Low	2412	-9.97	6.99	PASS
Middle	2437	-9.73	6.99	PASS
High	2462	-11.44	6.99	PASS

Remark:

1. At finial test to get the worst-case emission at 6.5Mbps.

2. The cable assembly insertion loss of 13.9dB (including 10 dB pad and 3.9 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT40 Mode (Two TX)

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)		PPSD Total (dBm)	Minimum Limit (dBm)	Pass / Fail
		Chain 1	Chain 2			
Low	2422	-15.20	-17.76	-13.28	6.99	PASS
Middle	2437	-13.94	-16.71	-12.10	6.99	PASS
High	2452	-14.44	-17.31	-12.63	6.99	PASS

Remark:

1. At finial test to get the worst-case emission at 13.5Mbps.

2. The cable assembly insertion loss of 10.7dB (including 10 dB pad and 0.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT40 Combined Mode (Two TX)

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Minimum Limit (dBm)	Pass / Fail
Low	2422	-12.91	6.99	PASS
Middle	2437	-11.93	6.99	PASS
High	2452	-11.89	6.99	PASS

Remark:

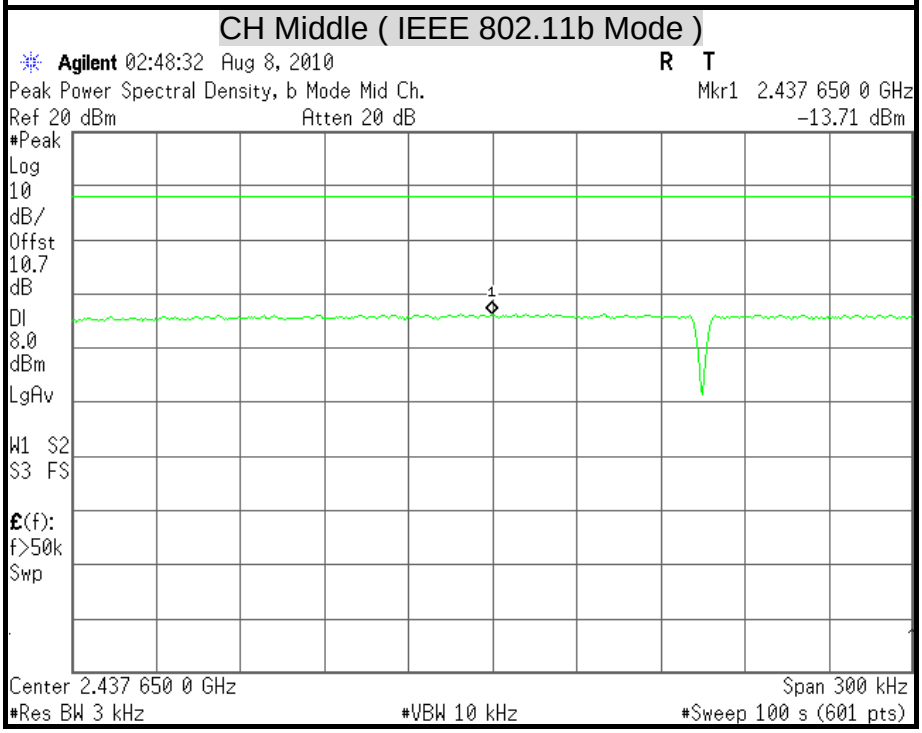
1. At finial test to get the worst-case emission at 13.5Mbps.

2. The cable assembly insertion loss of 13.9dB (including 10 dB pad and 3.9 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

POWER SPECTRAL DENSITY

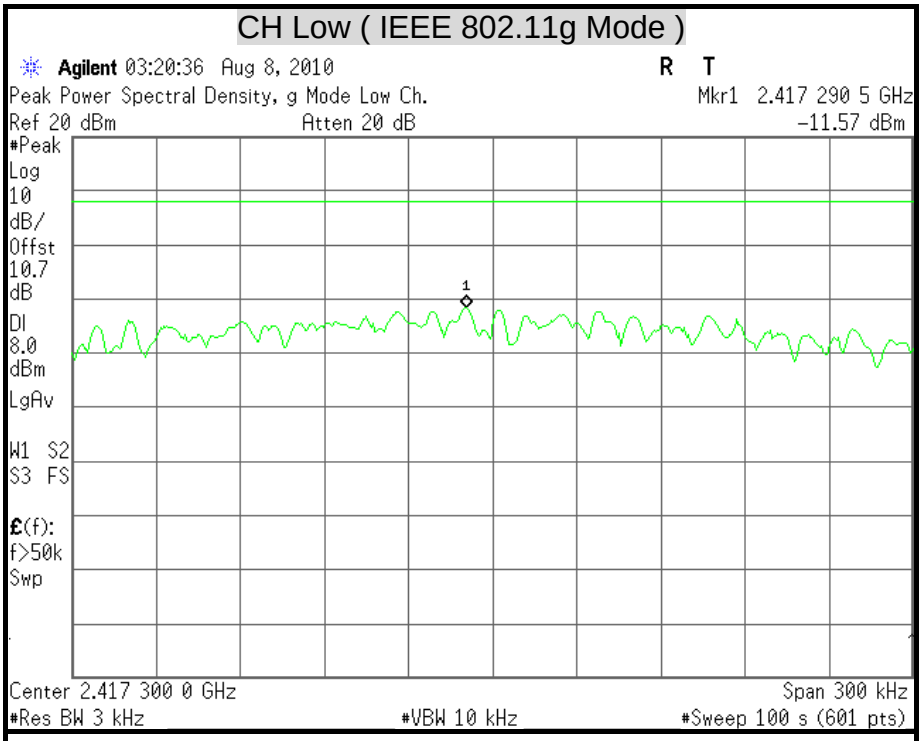
CH Low (IEEE 802.11b Mode)

CH Middle (IEEE 802.11b Mode)

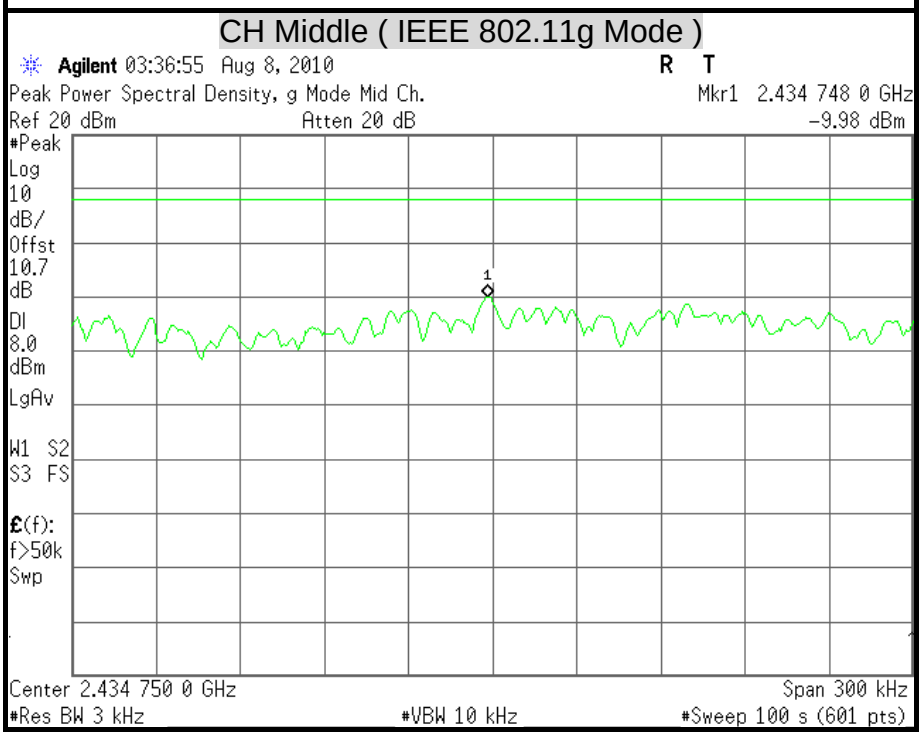


CH High (IEEE 802.11b Mode)

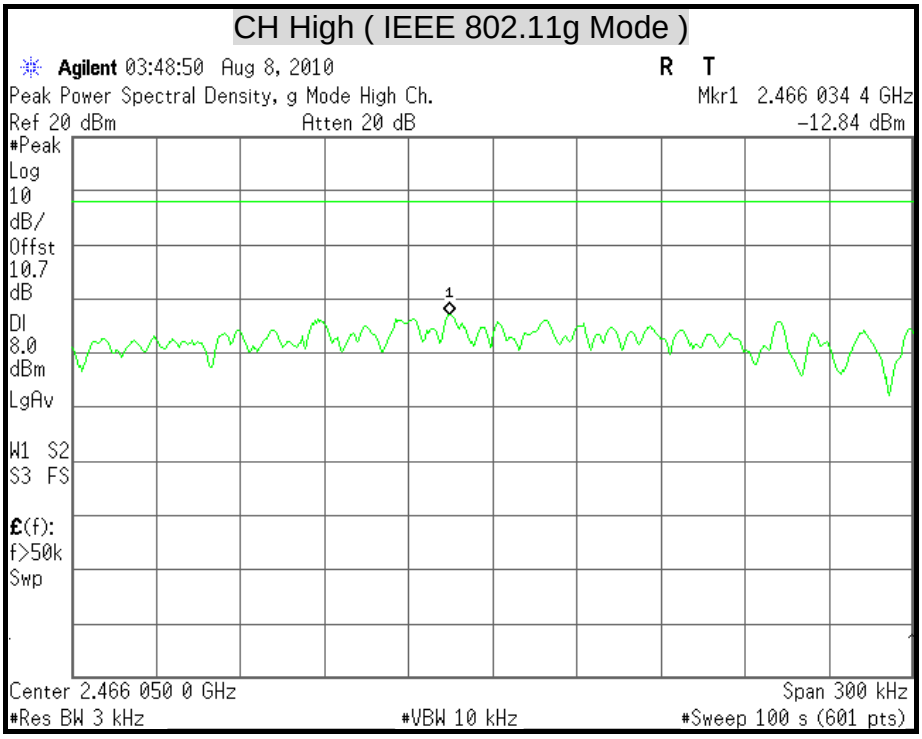
CH Low (IEEE 802.11g Mode)



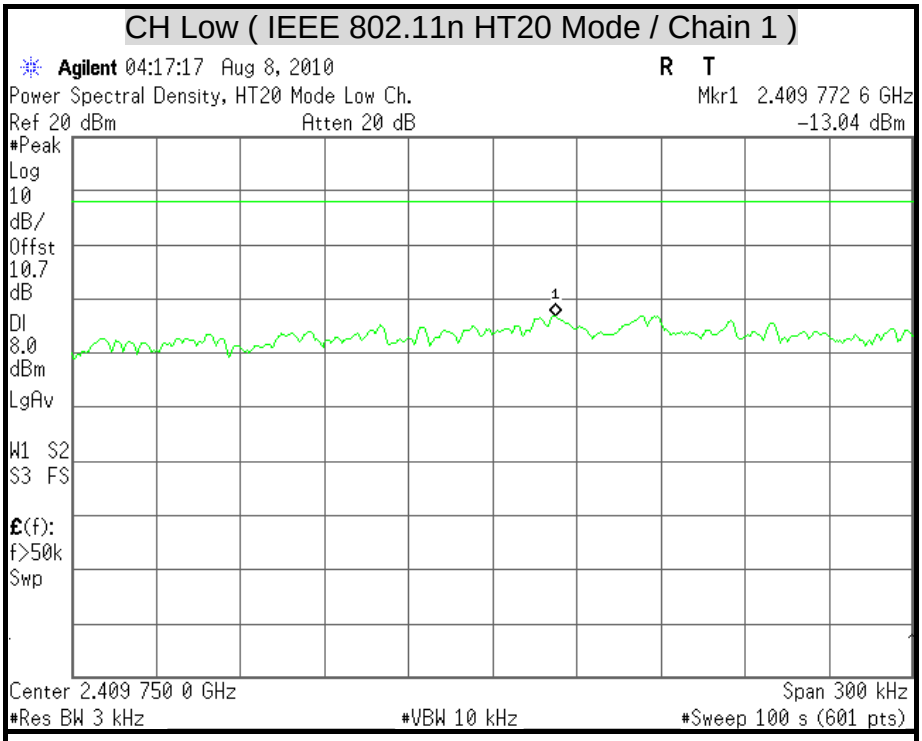
CH Middle (IEEE 802.11g Mode)



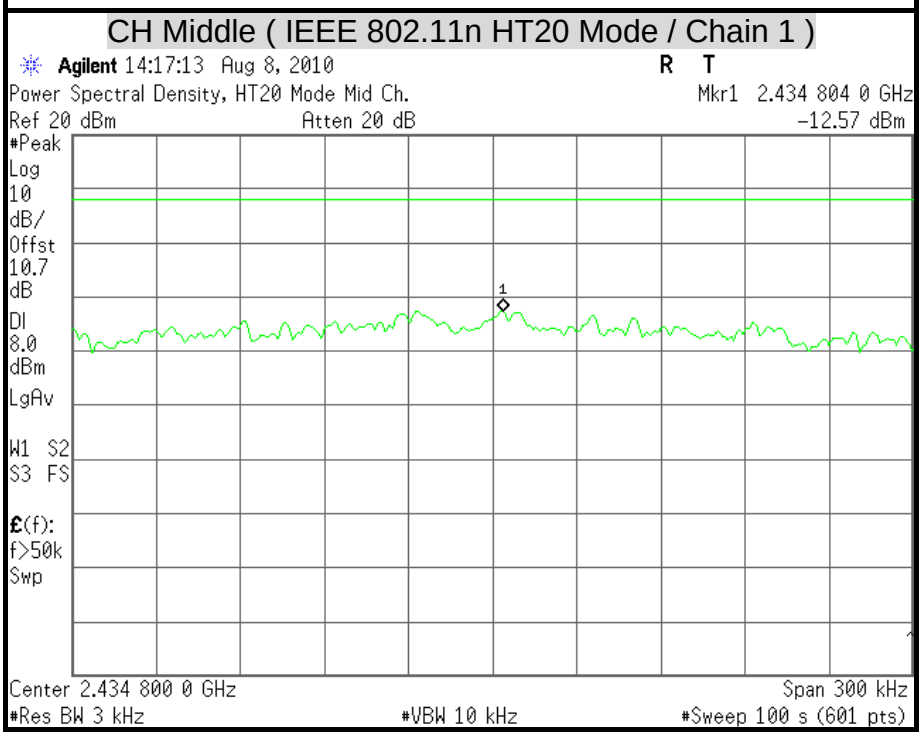
CH High (IEEE 802.11g Mode)



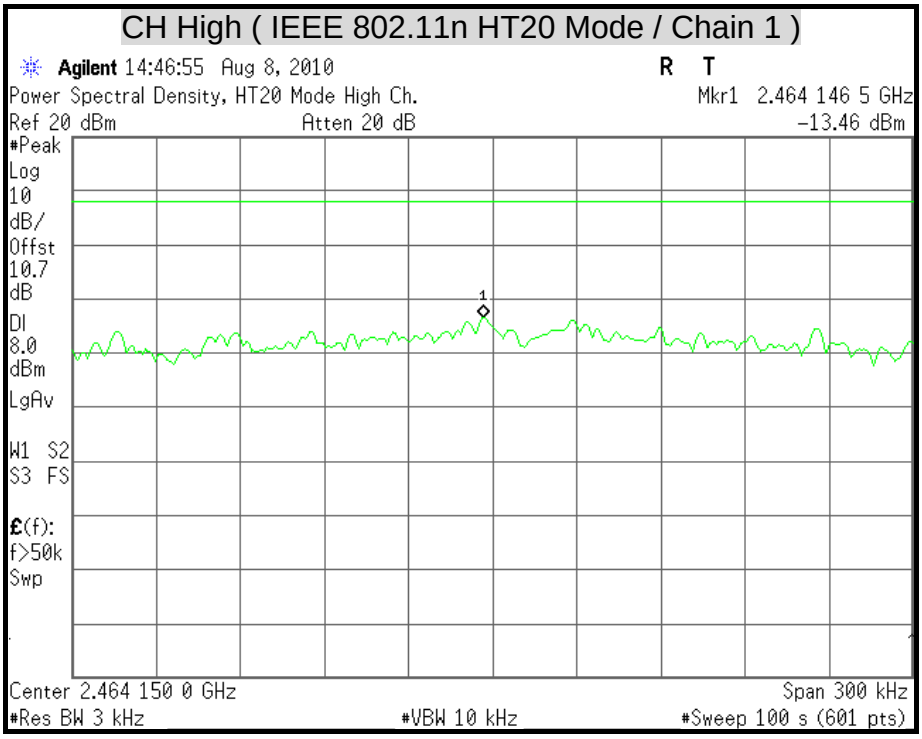
CH Low (IEEE 802.11n HT20 Mode / Chain 1)



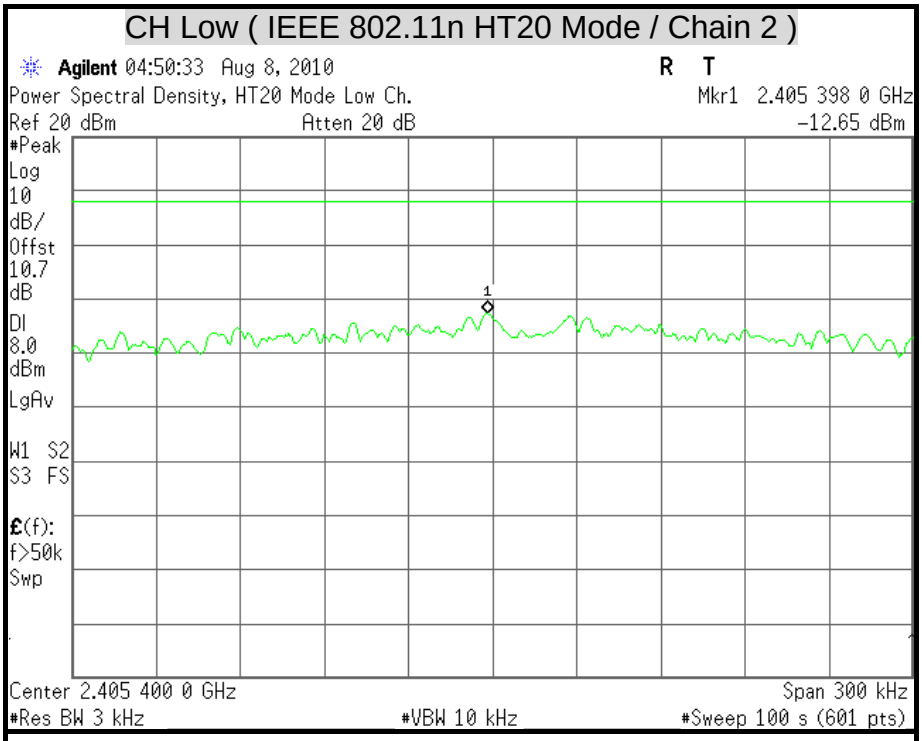
CH Middle (IEEE 802.11n HT20 Mode / Chain 1)



CH High (IEEE 802.11n HT20 Mode / Chain 1)



CH Low (IEEE 802.11n HT20 Mode / Chain 2)



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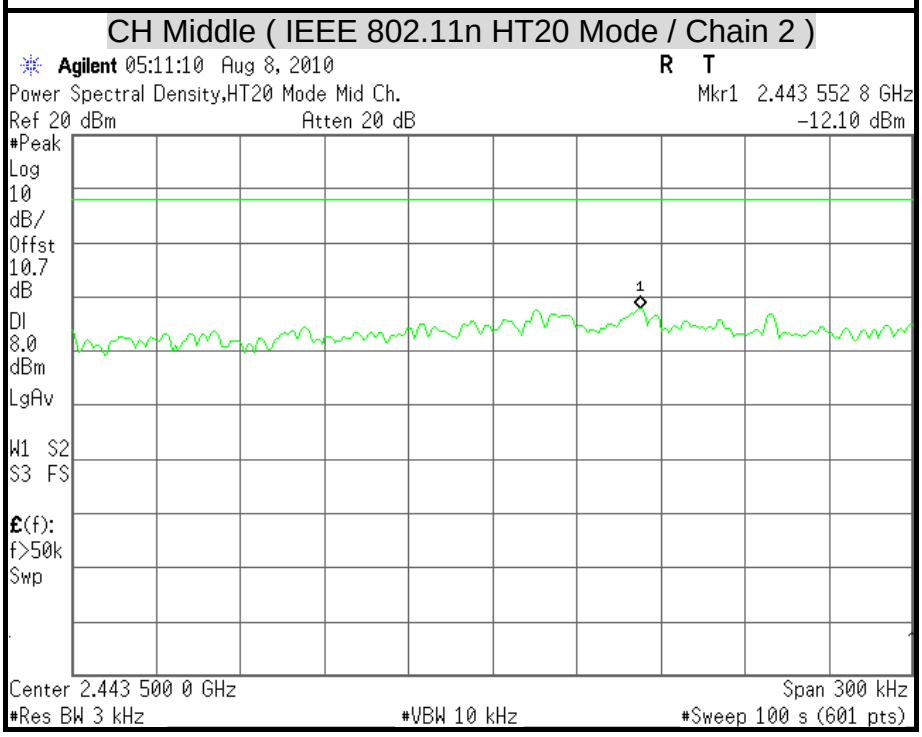
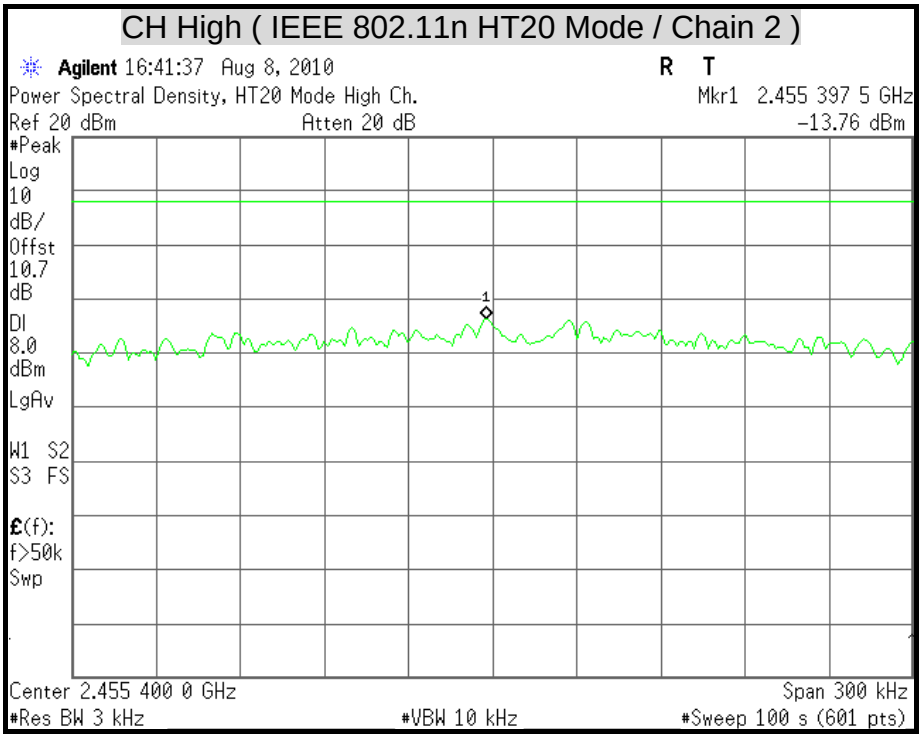
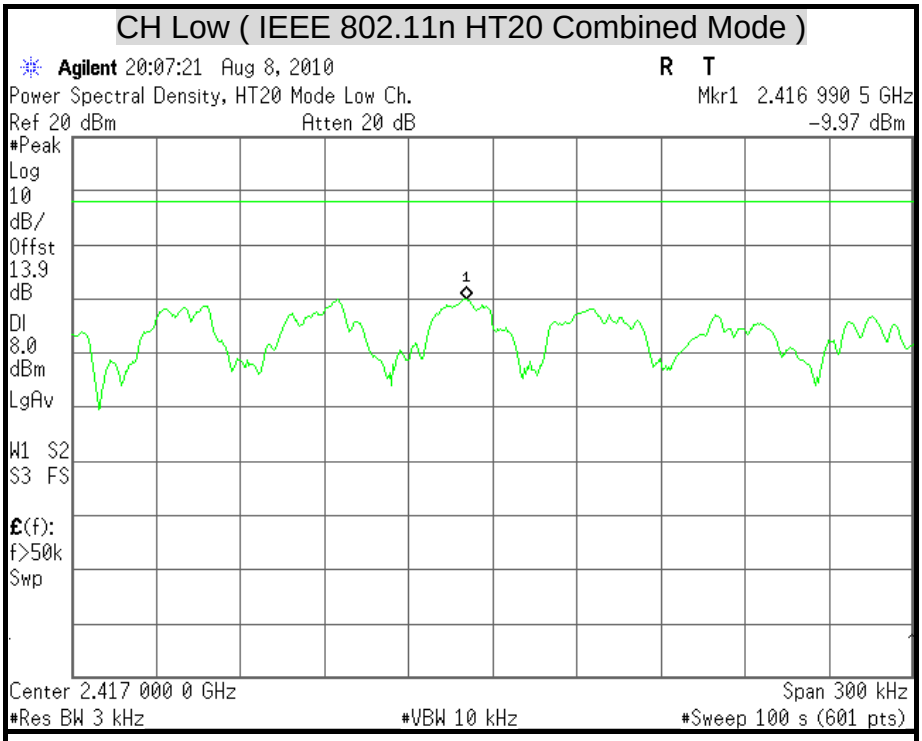


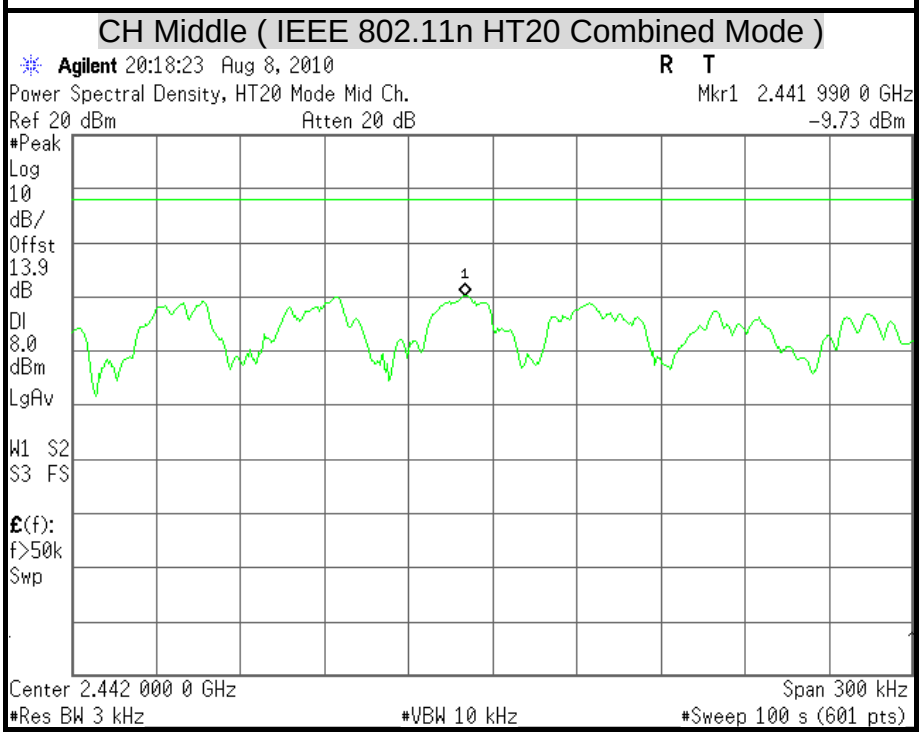
CH High (IEEE 802.11n HT20 Mode / Chain 2)



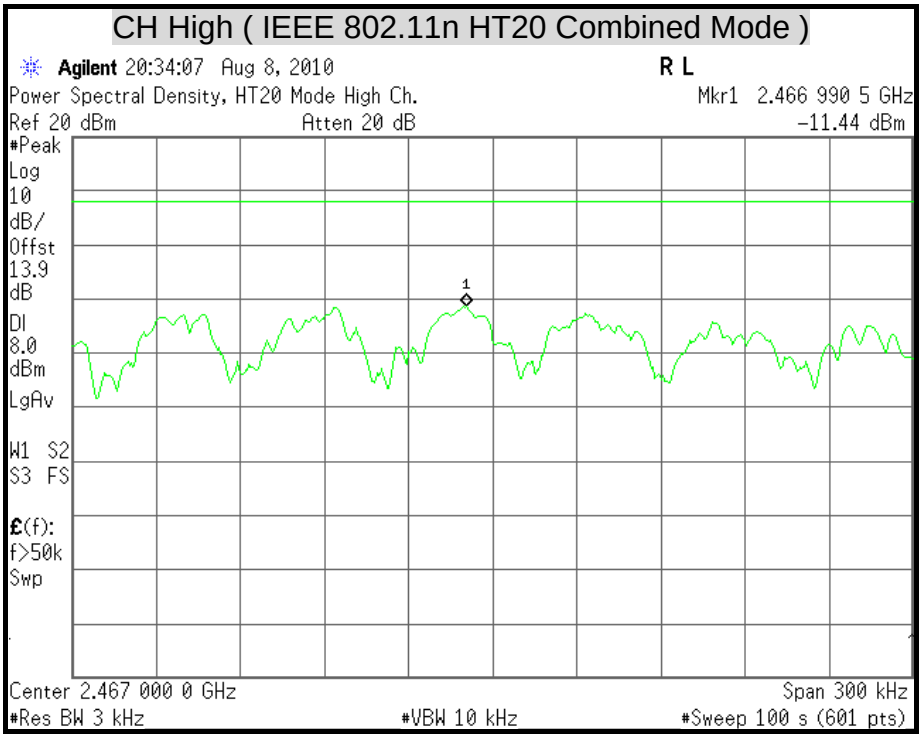
CH Low (IEEE 802.11n HT20 Combined Mode)



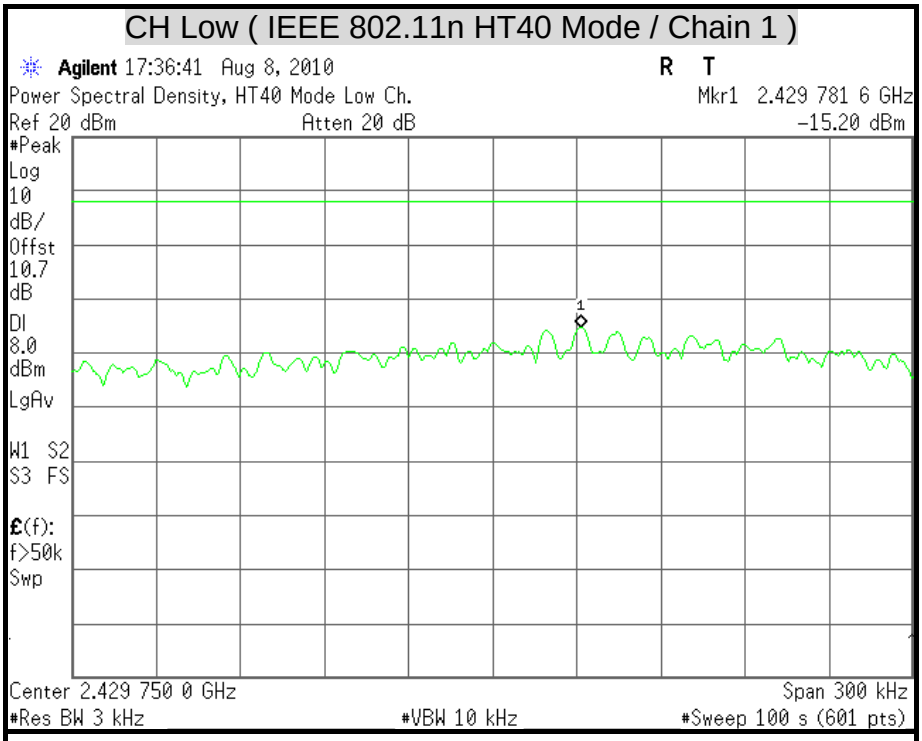
CH Middle (IEEE 802.11n HT20 Combined Mode)



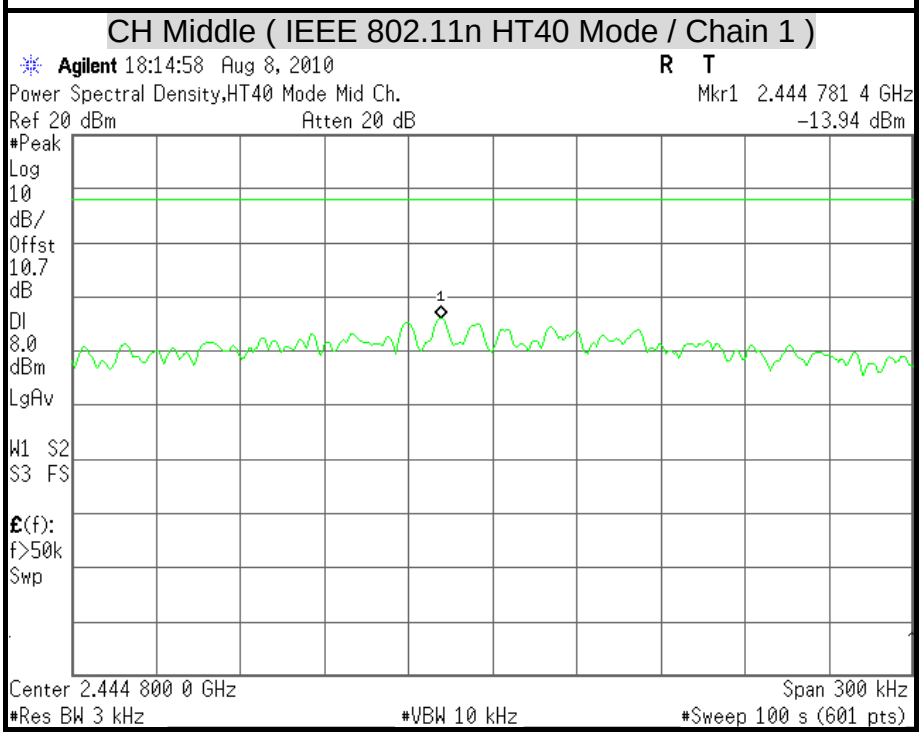
CH High (IEEE 802.11n HT20 Combined Mode)



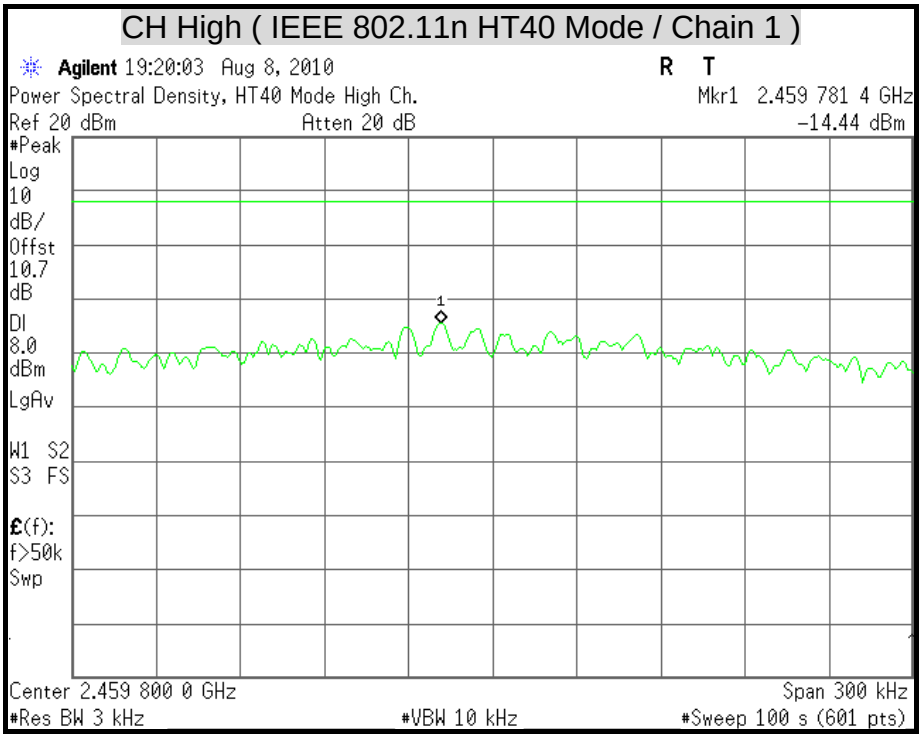
CH Low (IEEE 802.11n HT40 Mode / Chain 1)



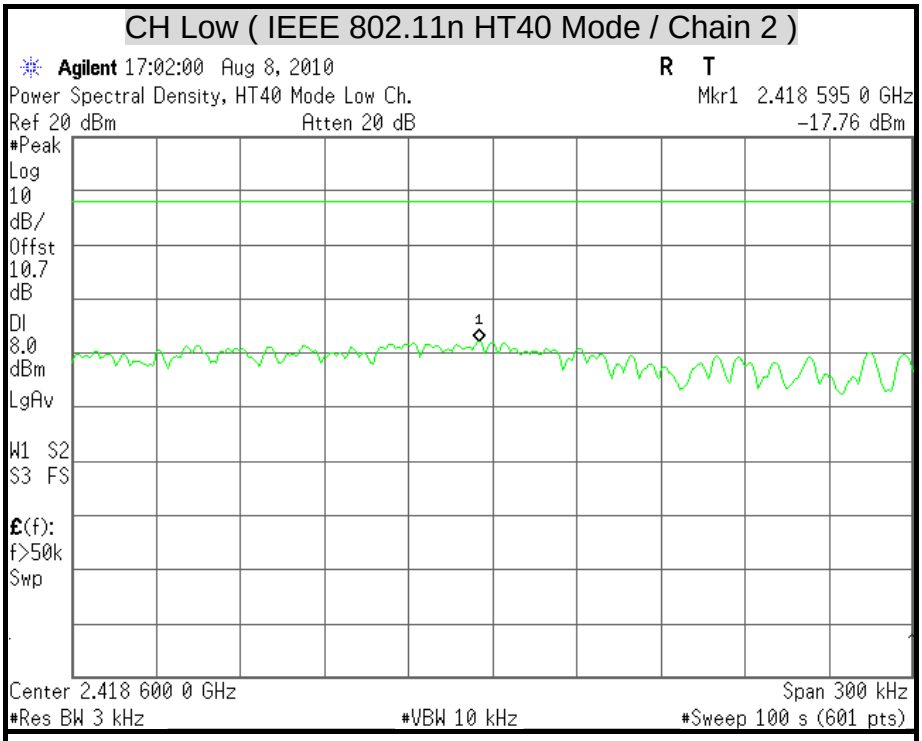
CH Middle (IEEE 802.11n HT40 Mode / Chain 1)



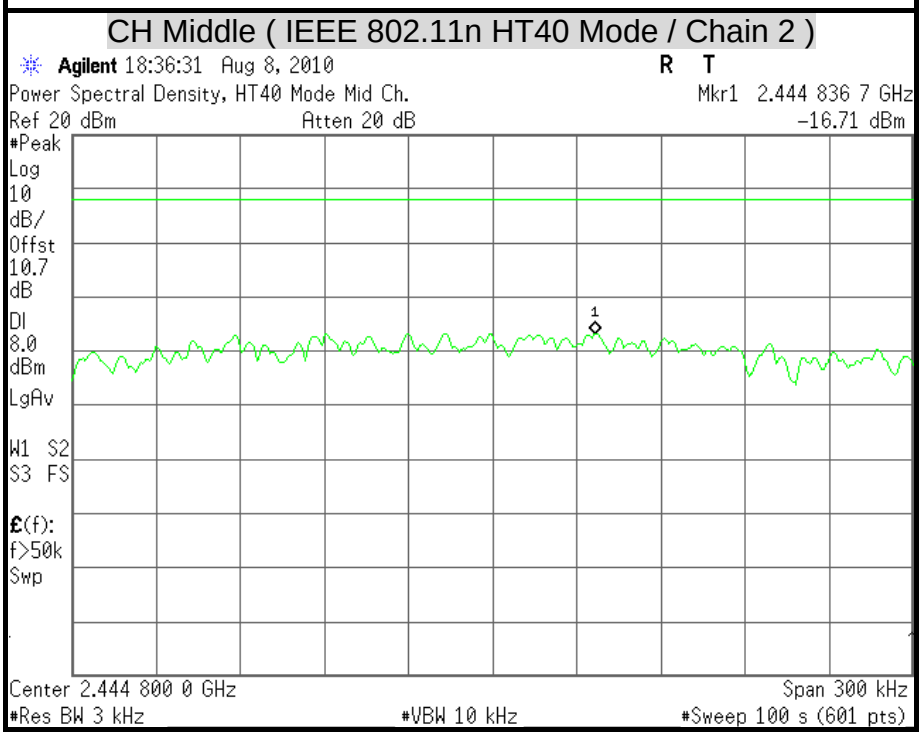
CH High (IEEE 802.11n HT40 Mode / Chain 1)



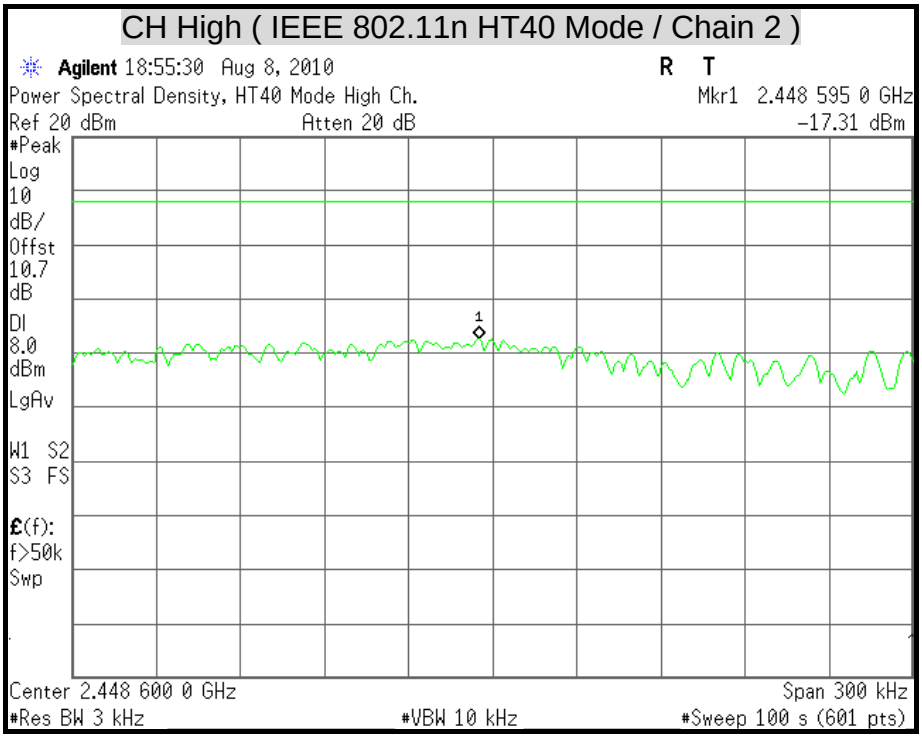
CH Low (IEEE 802.11n HT40 Mode / Chain 2)



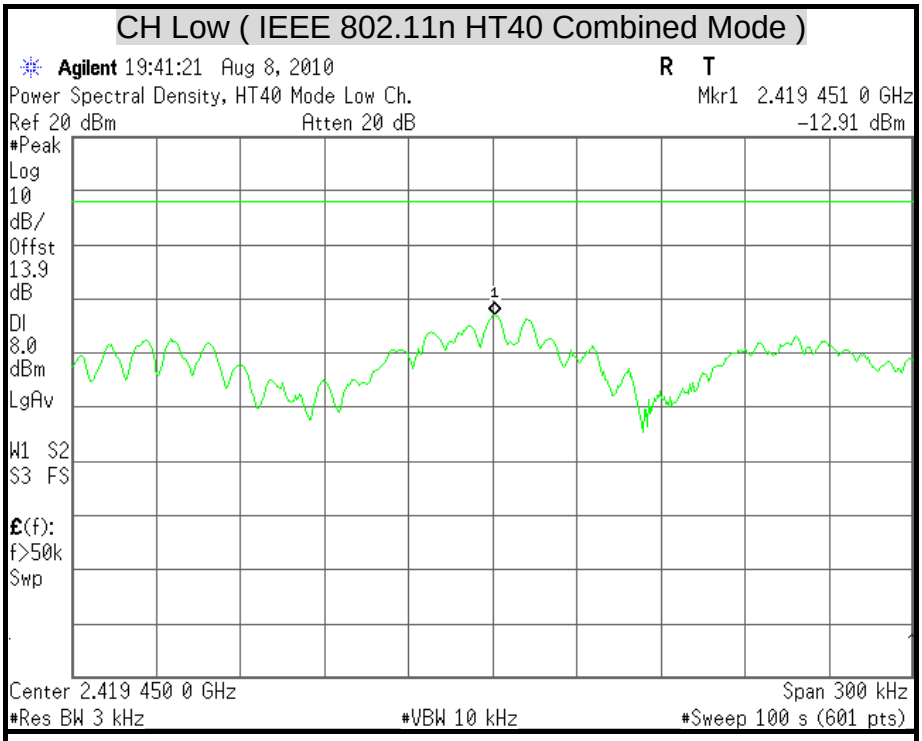
CH Middle (IEEE 802.11n HT40 Mode / Chain 2)



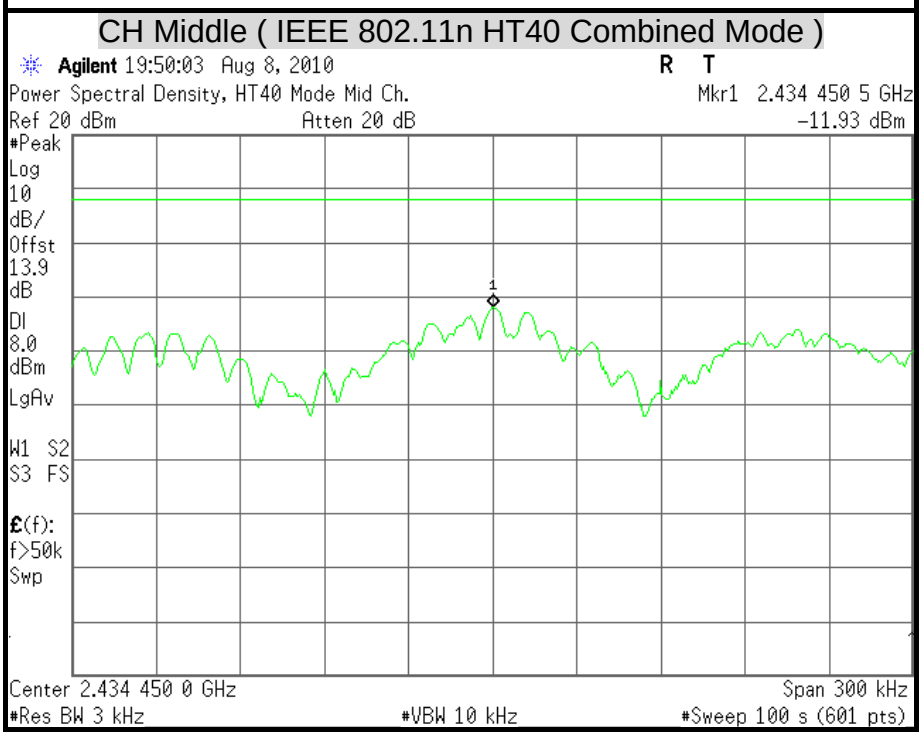
CH High (IEEE 802.11n HT40 Mode / Chain 2)



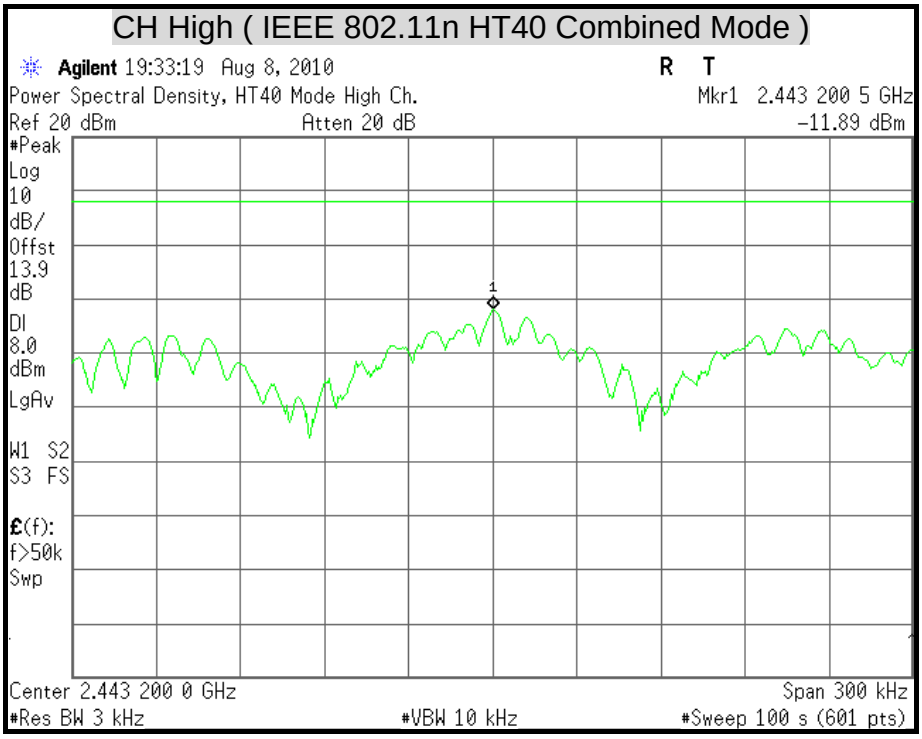
CH Low (IEEE 802.11n HT40 Combined Mode)



CH Middle (IEEE 802.11n HT40 Combined Mode)



CH High (IEEE 802.11n HT40 Combined Mode)



7.5 CONDUCTED SPURIOUS EMISSION

LIMITS

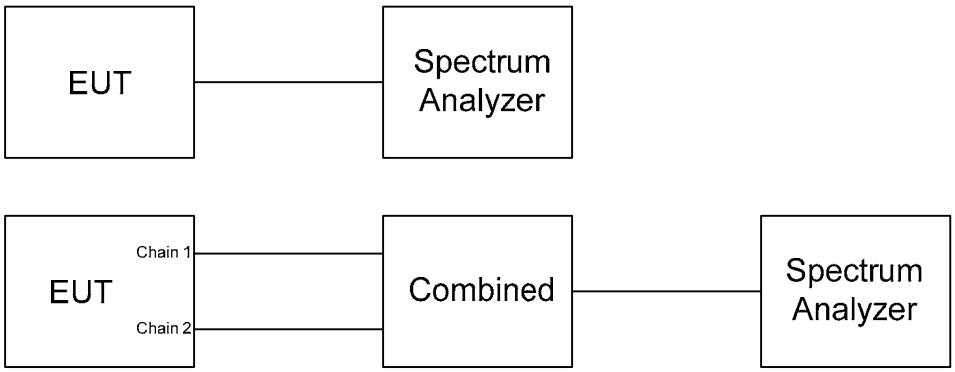
§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the and that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. 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 § 15.205(c)).

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	AGILENT	E4446A	MY43360132	06/20/2011
Spectrum Analyzer	AGILENT	E4446A	MY46180323	05/02/2011

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

TEST SETUP



TEST PROCEDURE

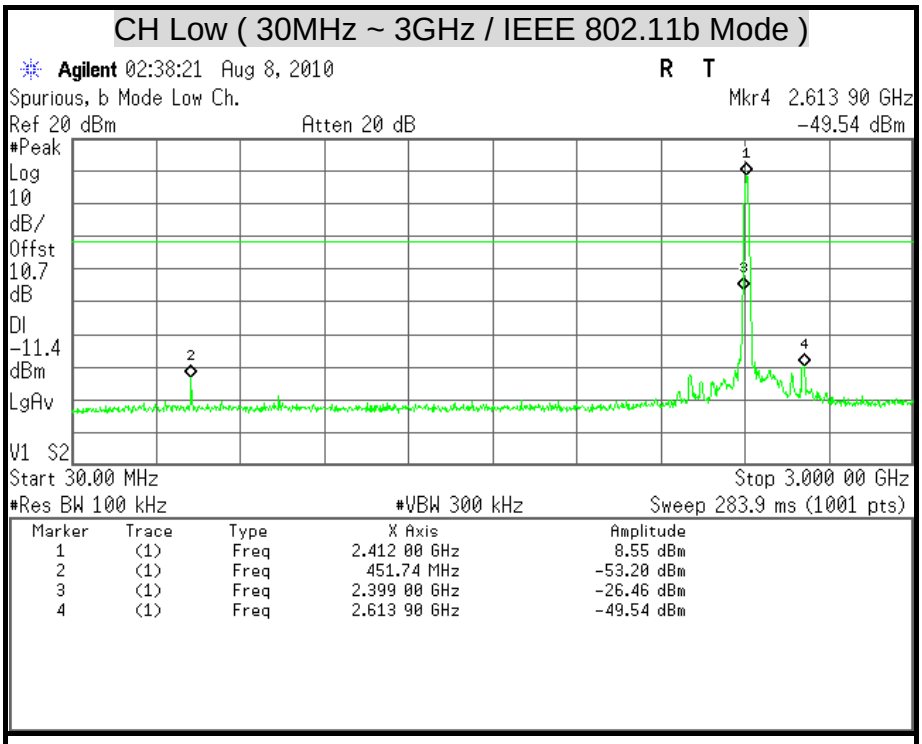
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

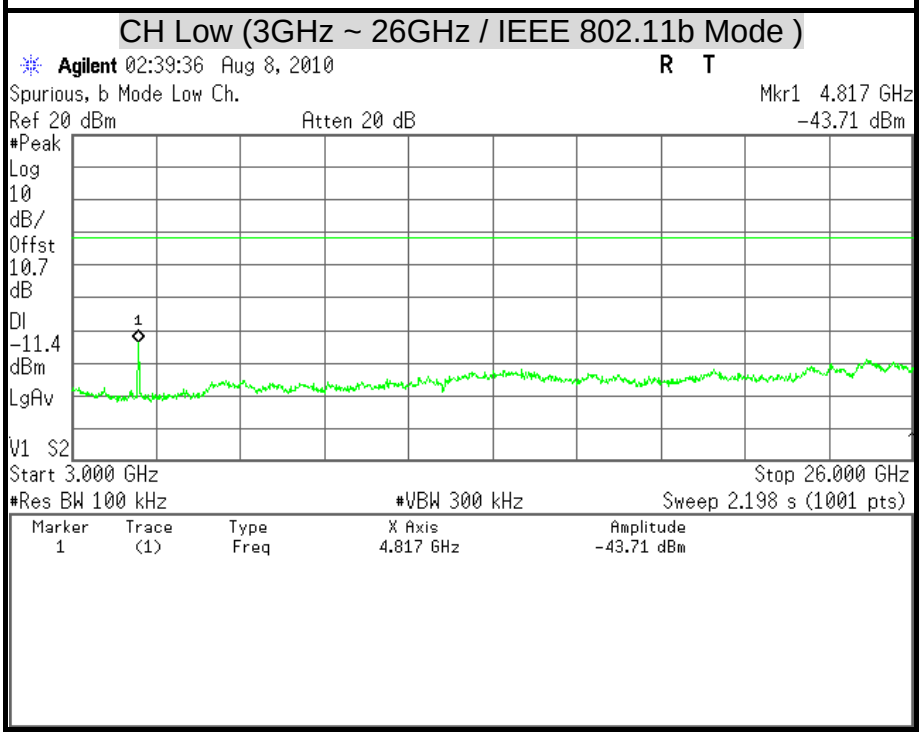
TEST RESULTS

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

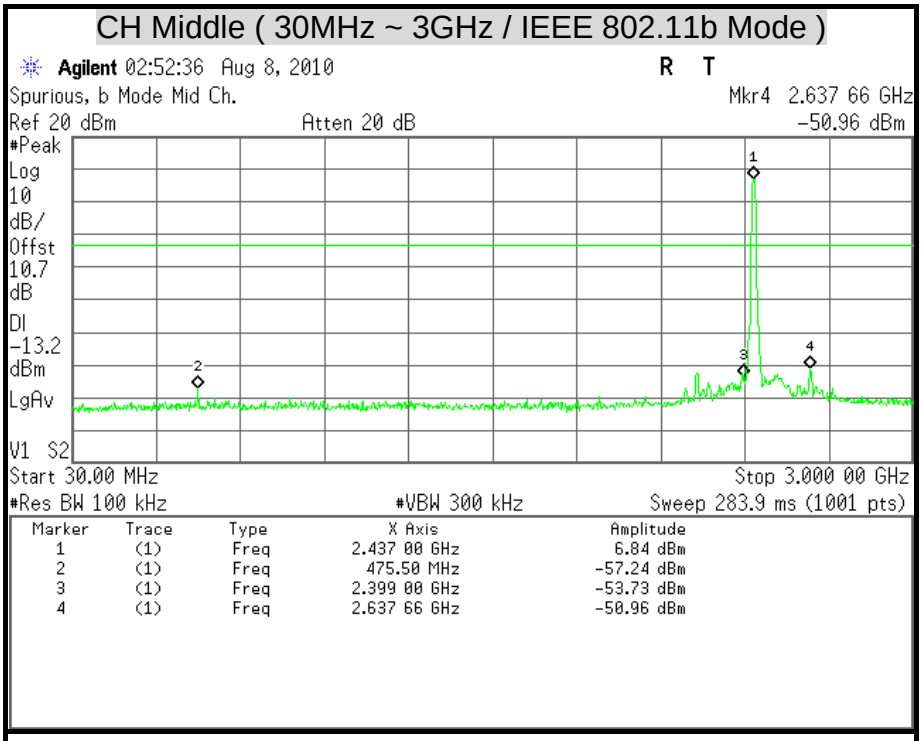
CH Low (30MHz ~ 3GHz / IEEE 802.11b Mode)



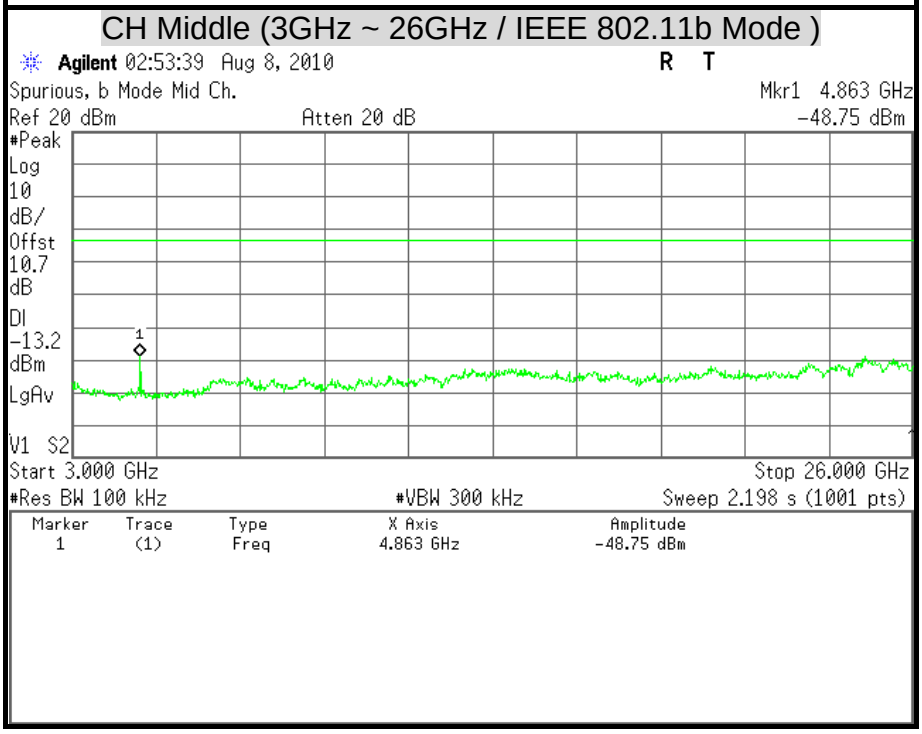
CH Low (3GHz ~ 26GHz / IEEE 802.11b Mode)



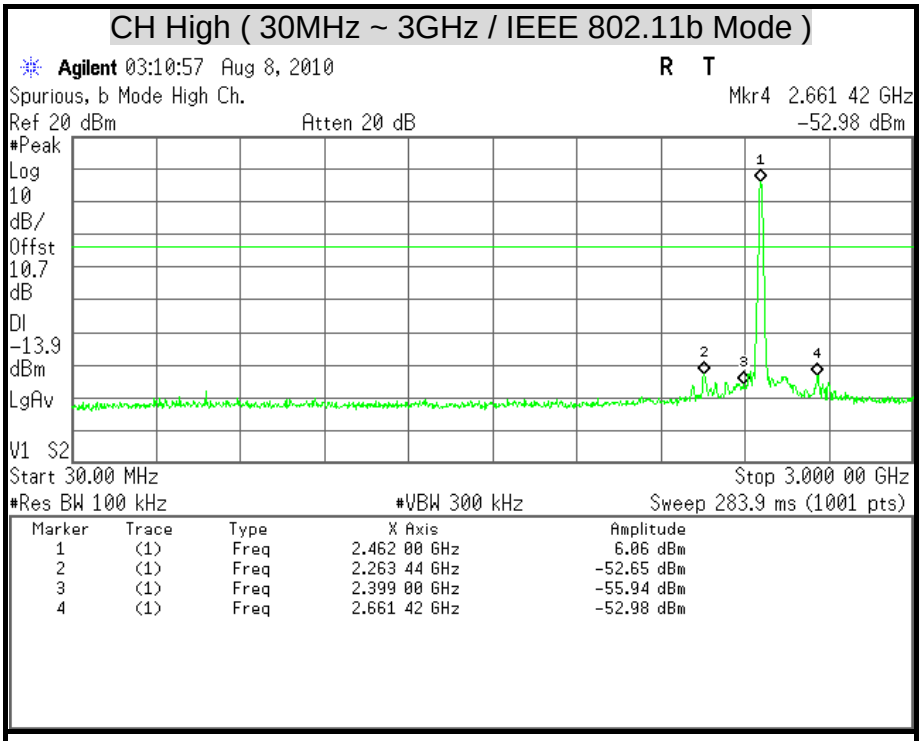
CH Middle (30MHz ~ 3GHz / IEEE 802.11b Mode)



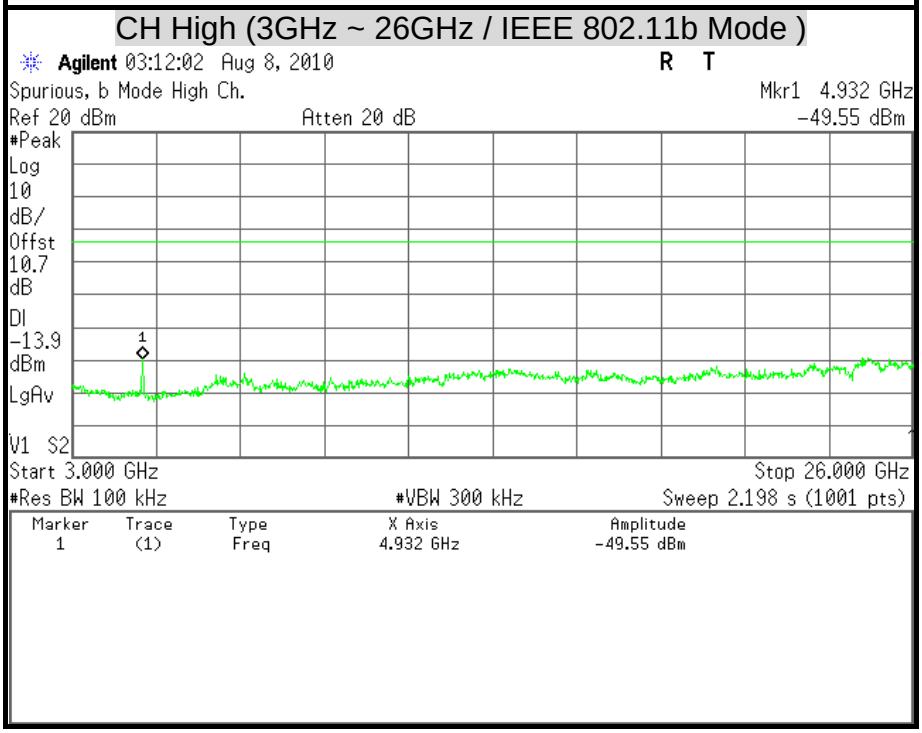
CH Middle (3GHz ~ 26GHz / IEEE 802.11b Mode)



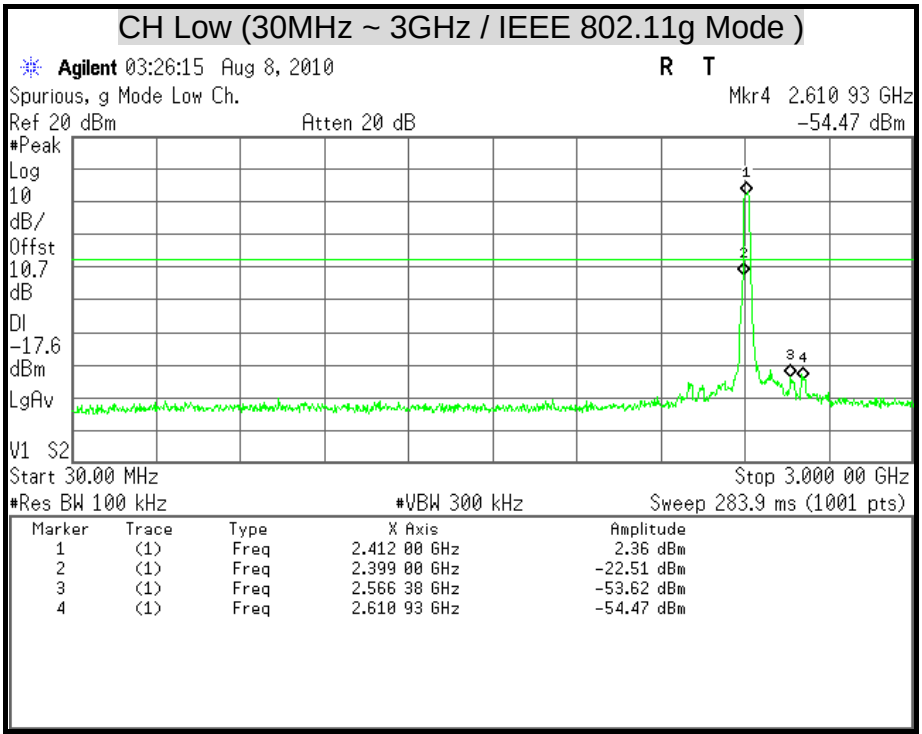
CH High (30MHz ~ 3GHz / IEEE 802.11b Mode)



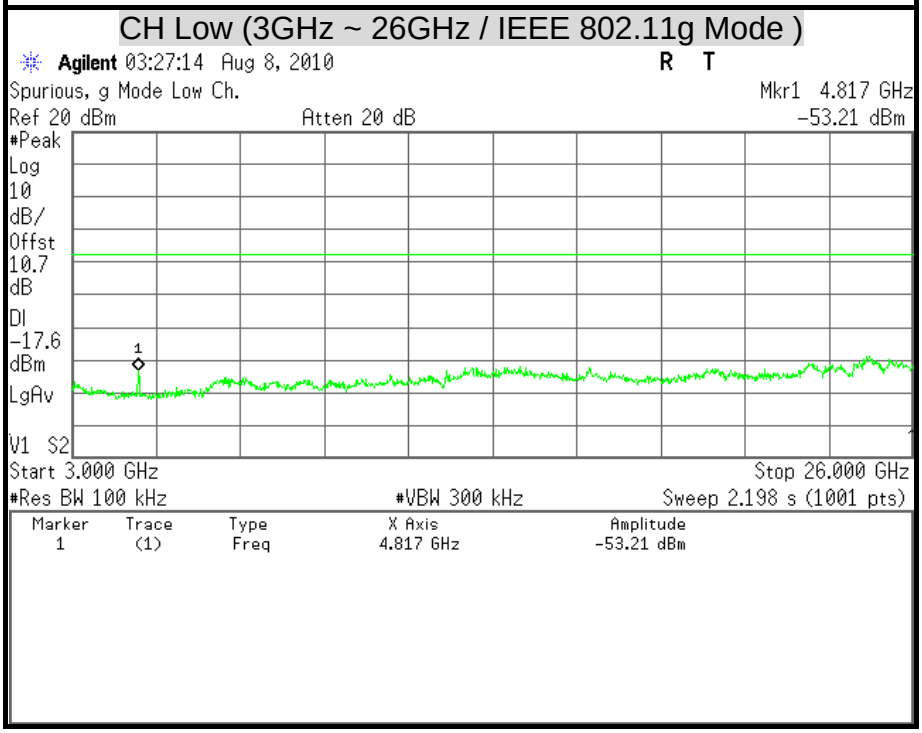
CH High (3GHz ~ 26GHz / IEEE 802.11b Mode)



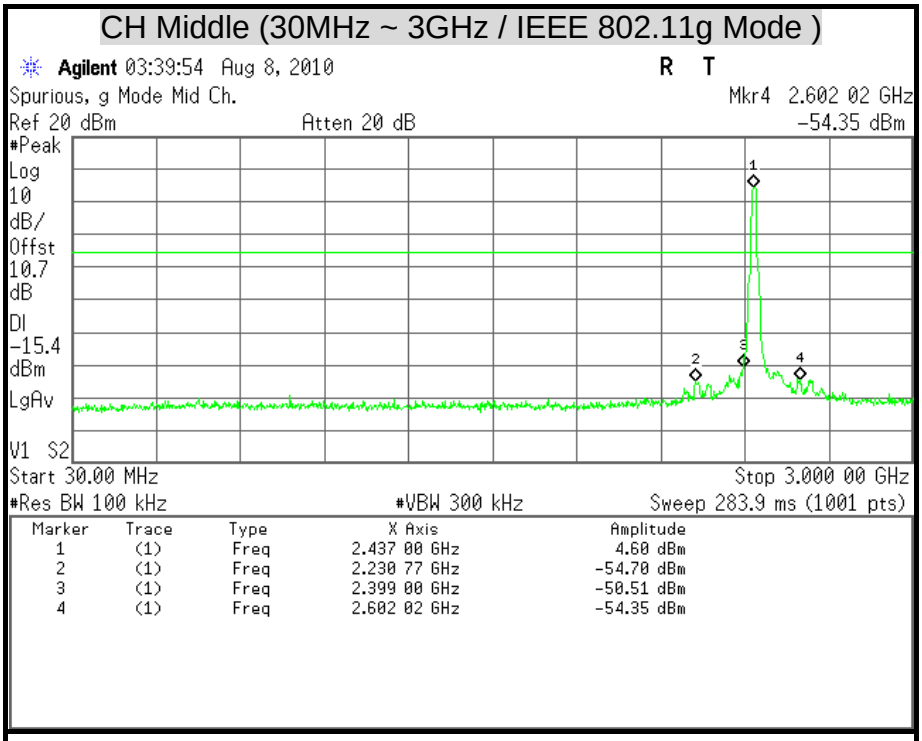
CH Low (30MHz ~ 3GHz / IEEE 802.11g Mode)



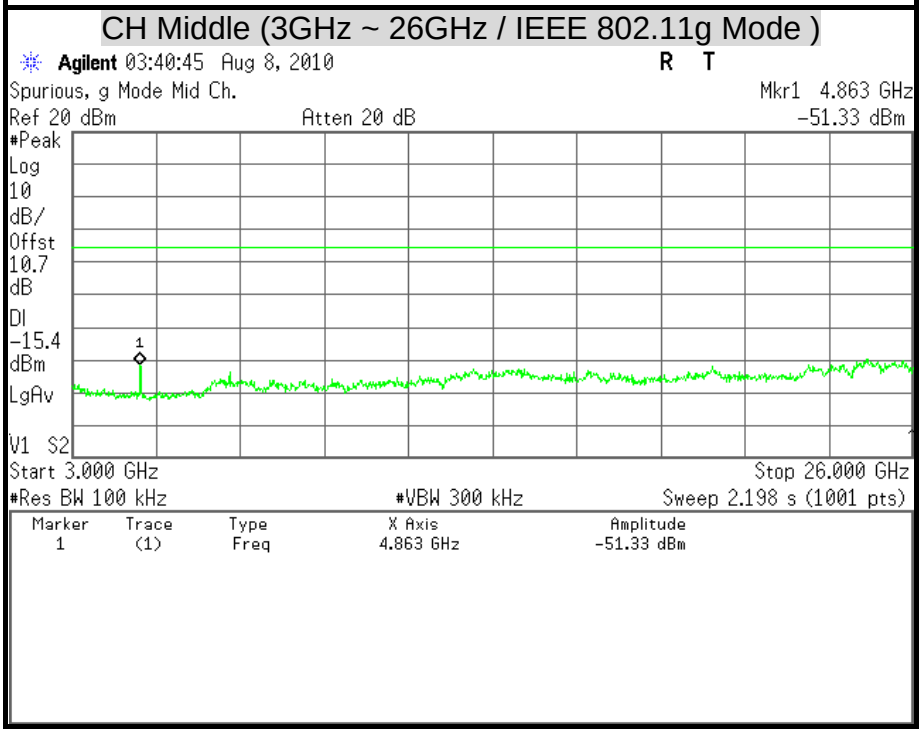
CH Low (3GHz ~ 26GHz / IEEE 802.11g Mode)



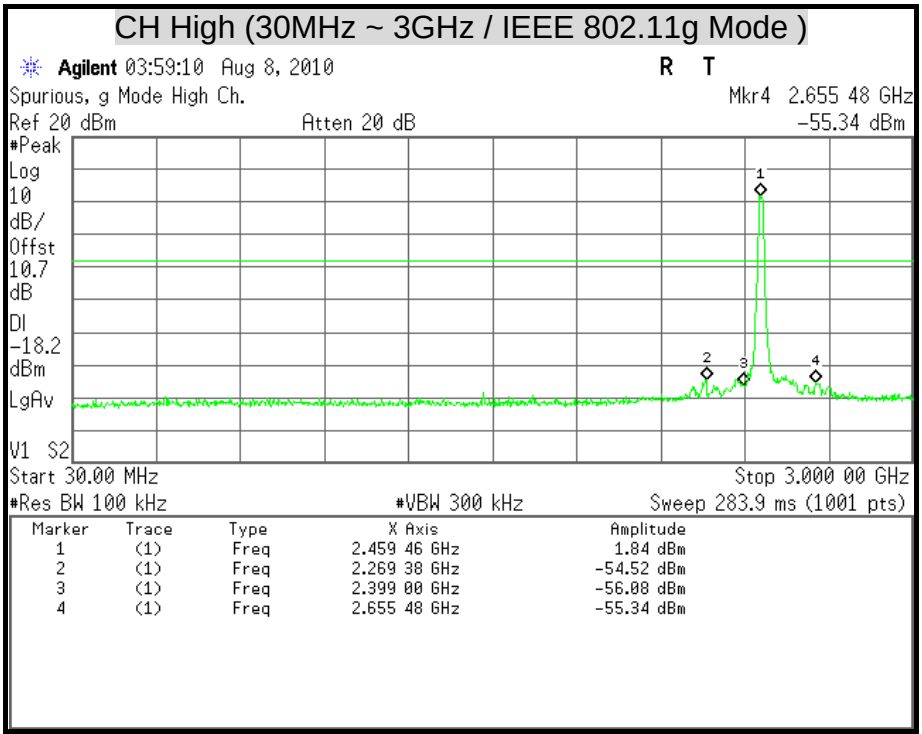
CH Middle (30MHz ~ 3GHz / IEEE 802.11g Mode)



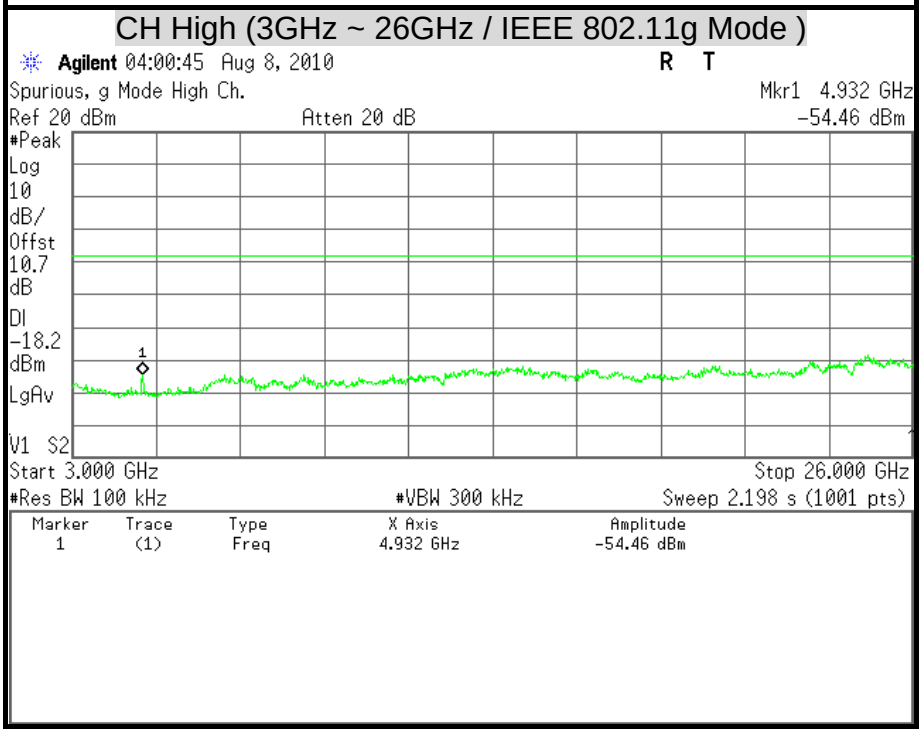
CH Middle (3GHz ~ 26GHz / IEEE 802.11g Mode)



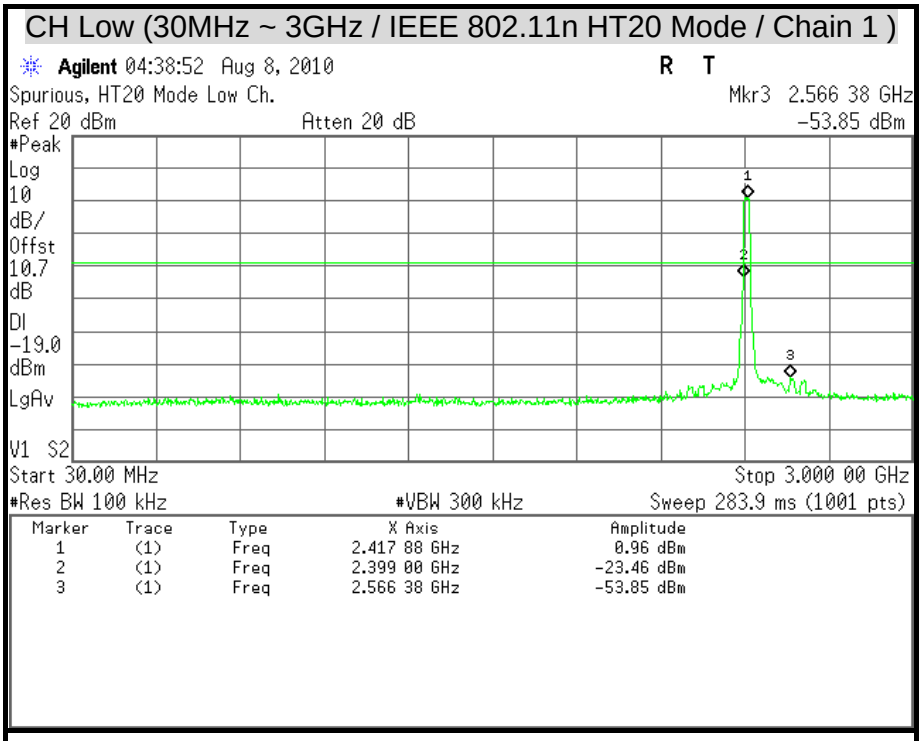
CH High (30MHz ~ 3GHz / IEEE 802.11g Mode)



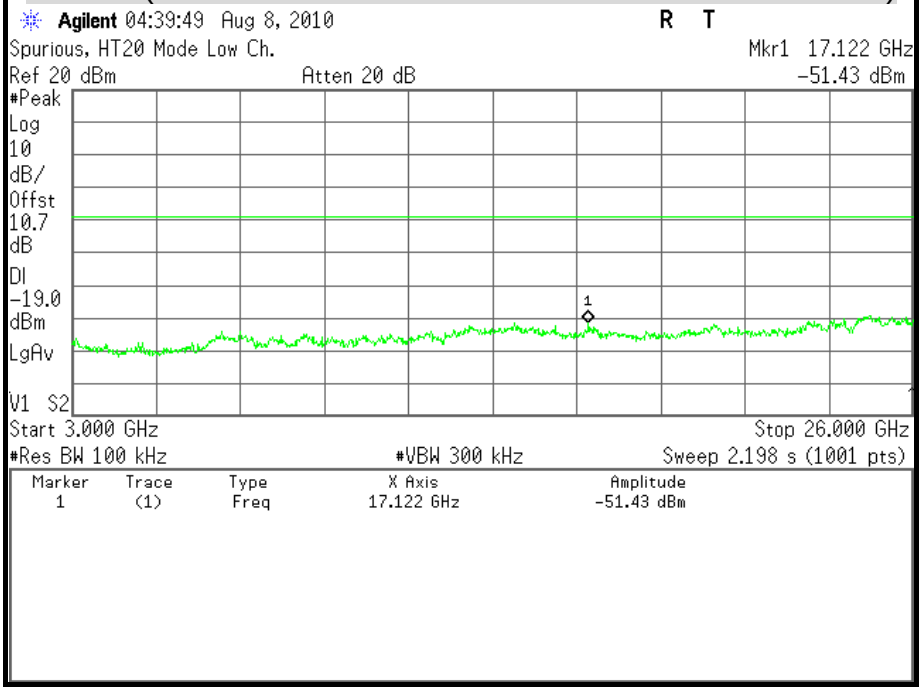
CH High (3GHz ~ 26GHz / IEEE 802.11g Mode)



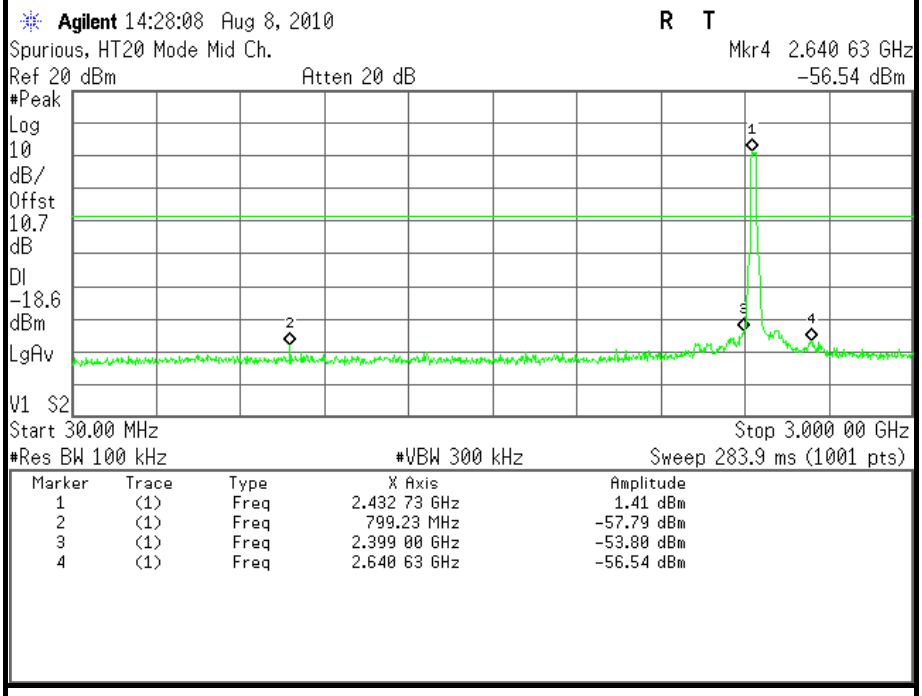
CH Low (30MHz ~ 3GHz / IEEE 802.11n HT20 Mode / Chain 1)



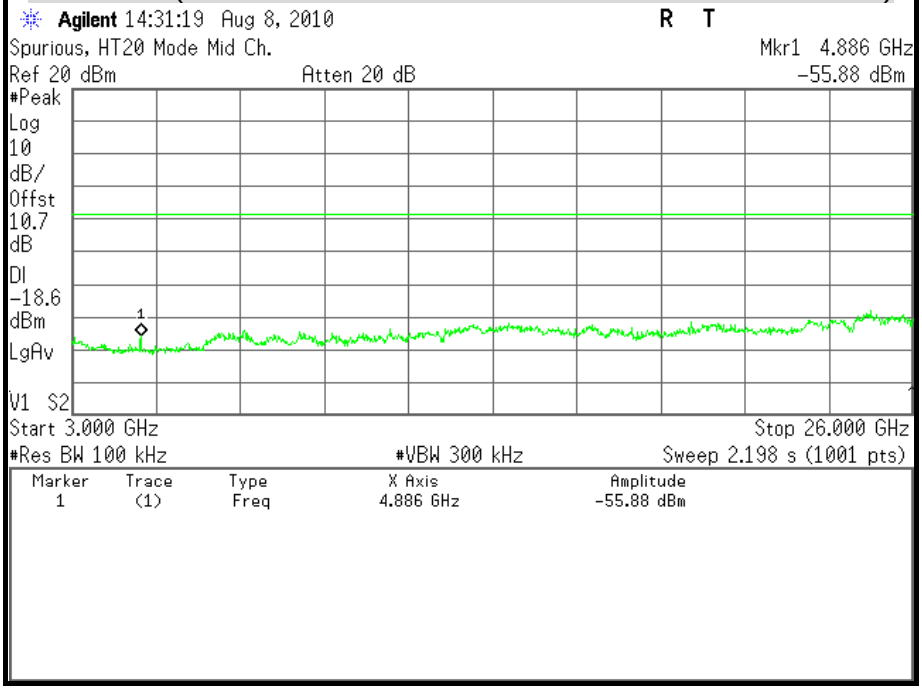
CH Low (3GHz ~ 26GHz / IEEE 802.11n HT20 Mode / Chain 1)



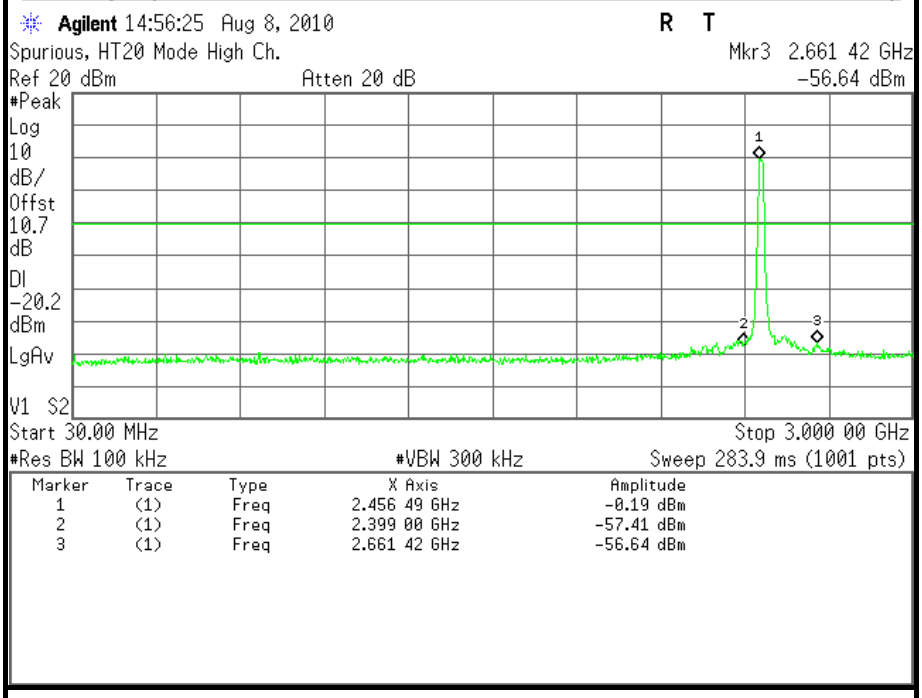
CH Middle (30MHz ~ 3GHz / IEEE 802.11n HT20 Mode / Chain 1)



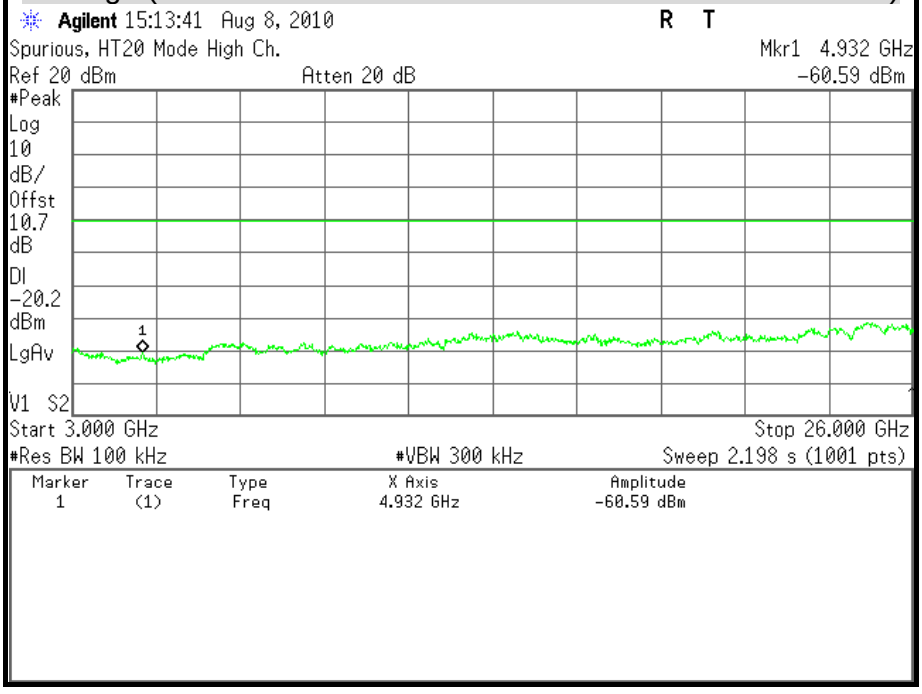
CH Middle (3GHz ~ 26GHz / IEEE 802.11n HT20 Mode / Chain 1)



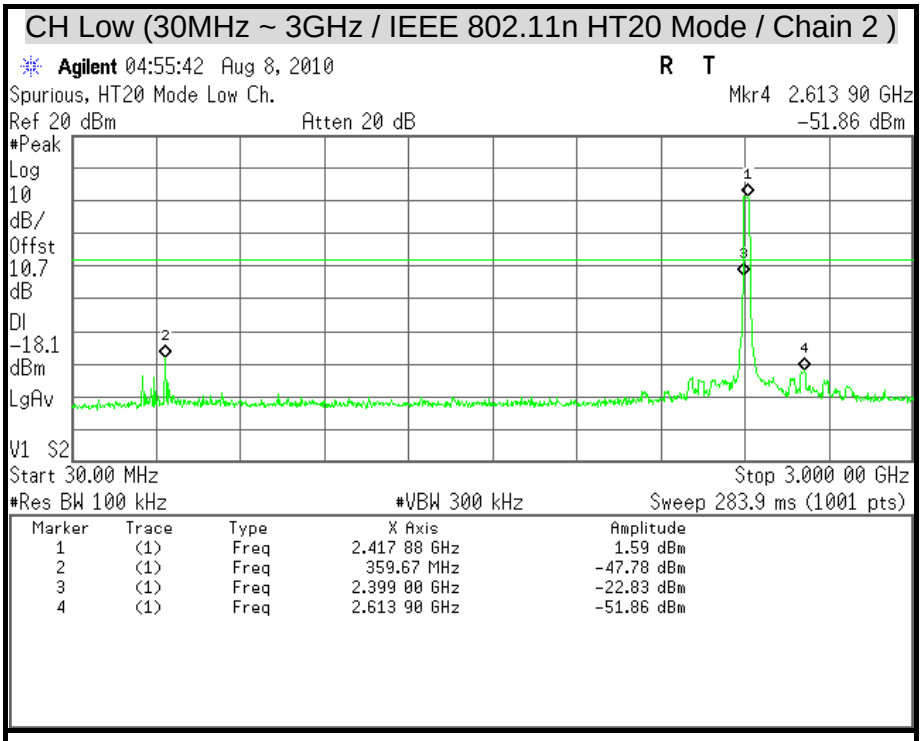
CH High (30MHz ~ 3GHz / IEEE 802.11n HT20 Mode / Chain 1)



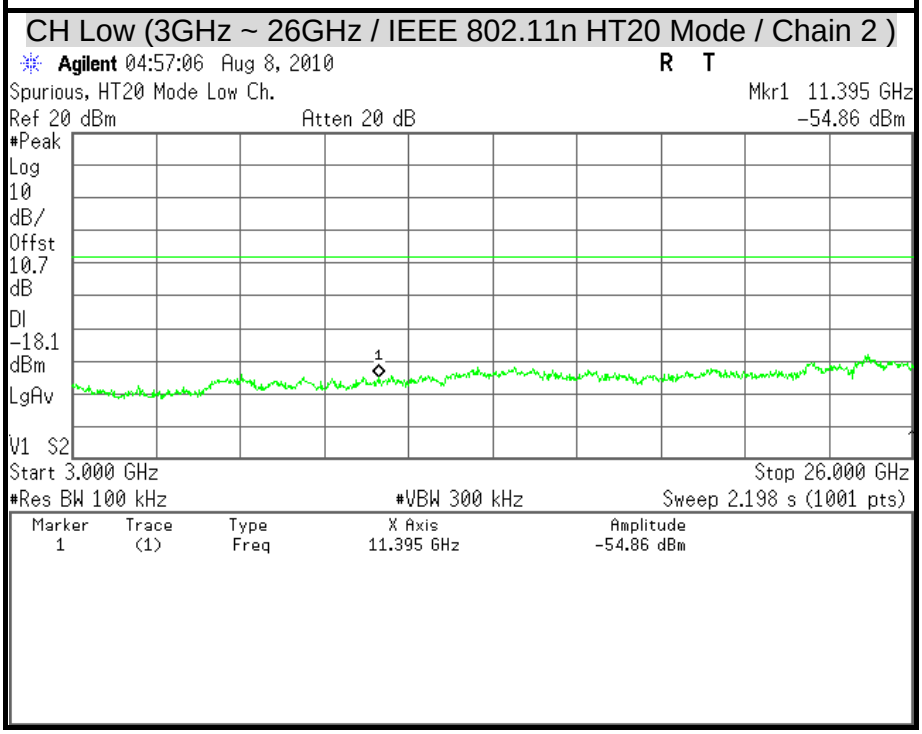
CH High (3GHz ~ 26GHz / IEEE 802.11n HT20 Mode / Chain 1)



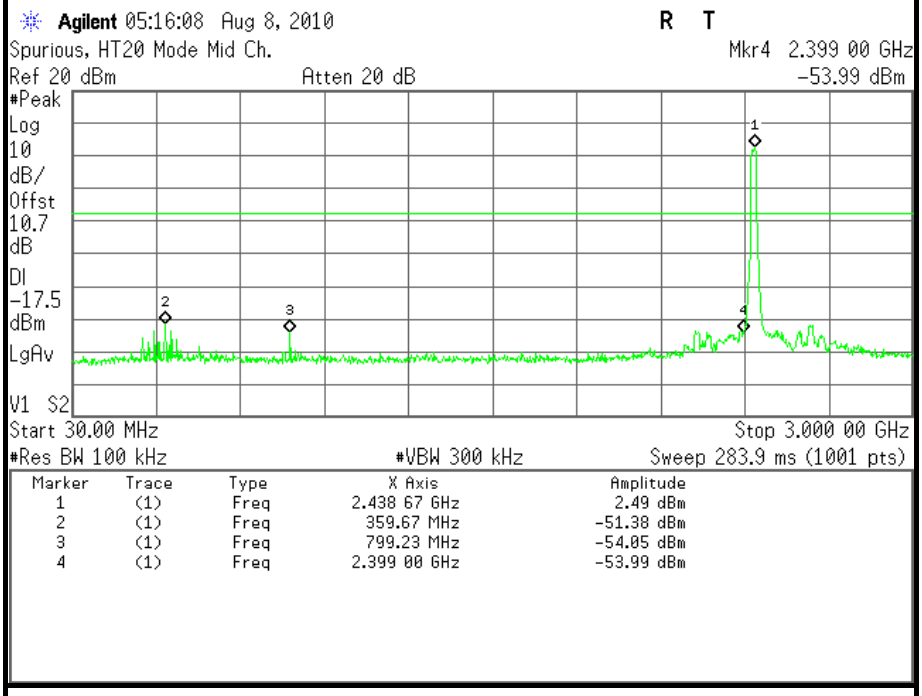
CH Low (30MHz ~ 3GHz / IEEE 802.11n HT20 Mode / Chain 2)



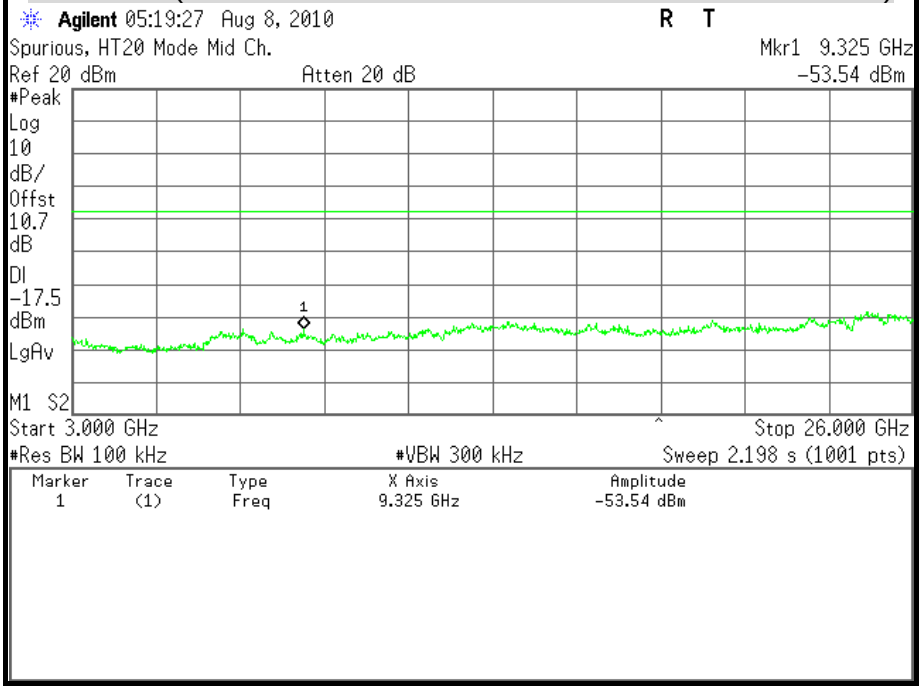
CH Low (3GHz ~ 26GHz / IEEE 802.11n HT20 Mode / Chain 2)



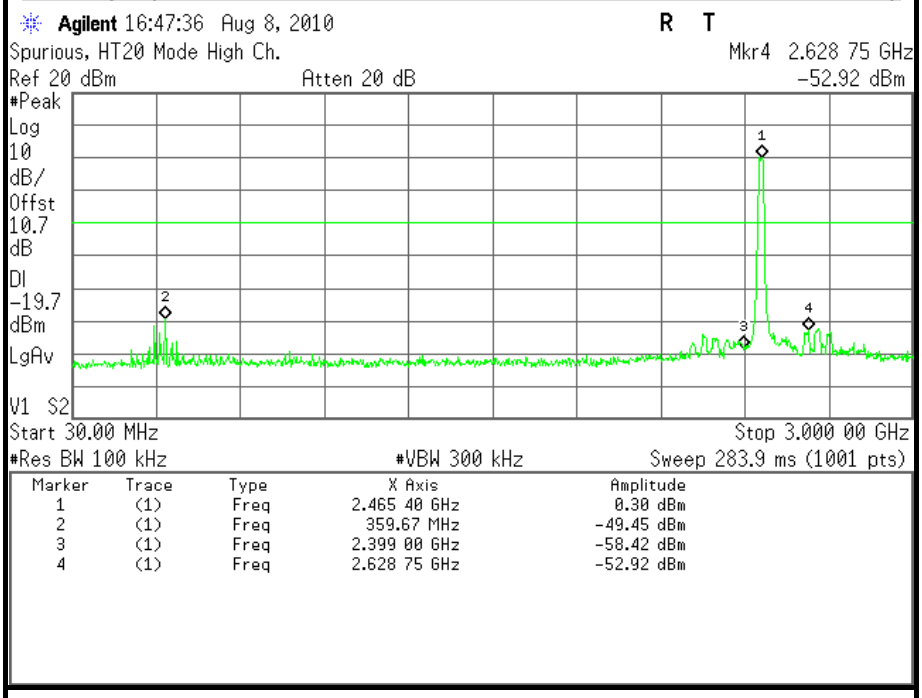
CH Middle (30MHz ~ 3GHz / IEEE 802.11n HT20 Mode / Chain 2)



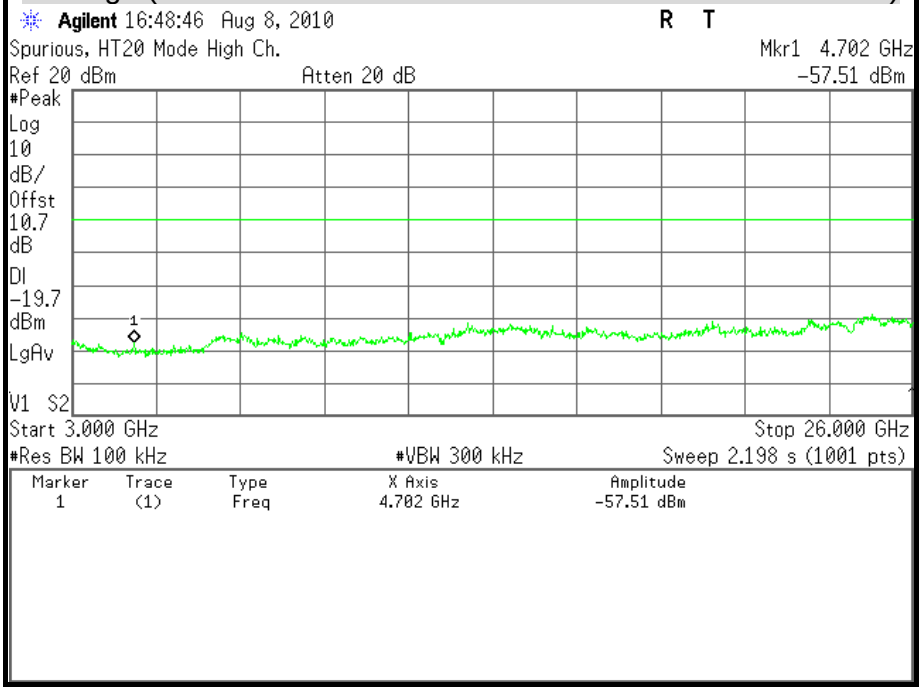
CH Middle (3GHz ~ 26GHz / IEEE 802.11n HT20 Mode / Chain 2)



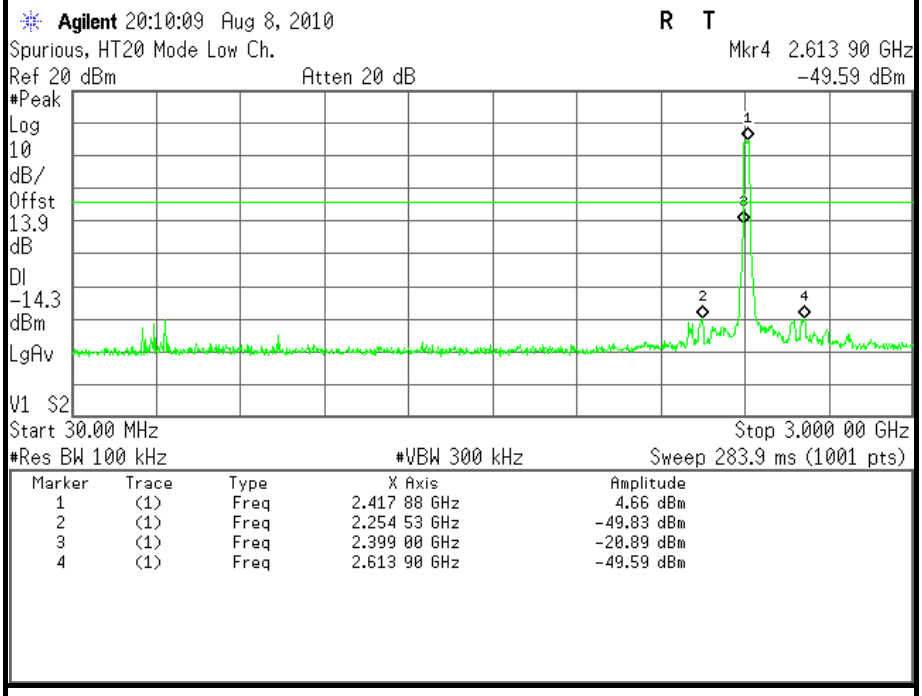
CH High (30MHz ~ 3GHz / IEEE 802.11n HT20 Mode / Chain 2)



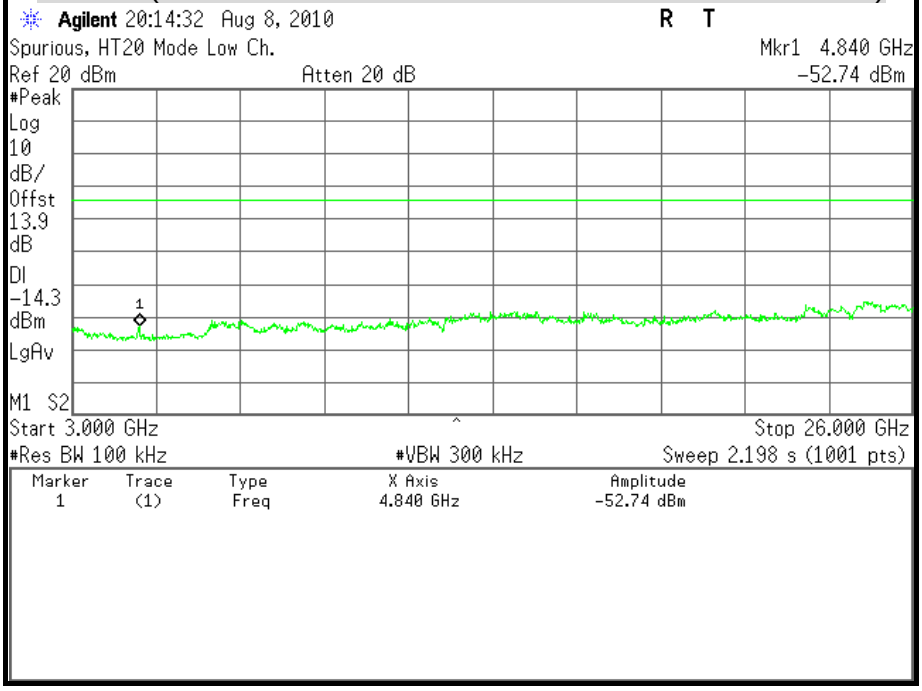
CH High (3GHz ~ 26GHz / IEEE 802.11n HT20 Mode / Chain 2)



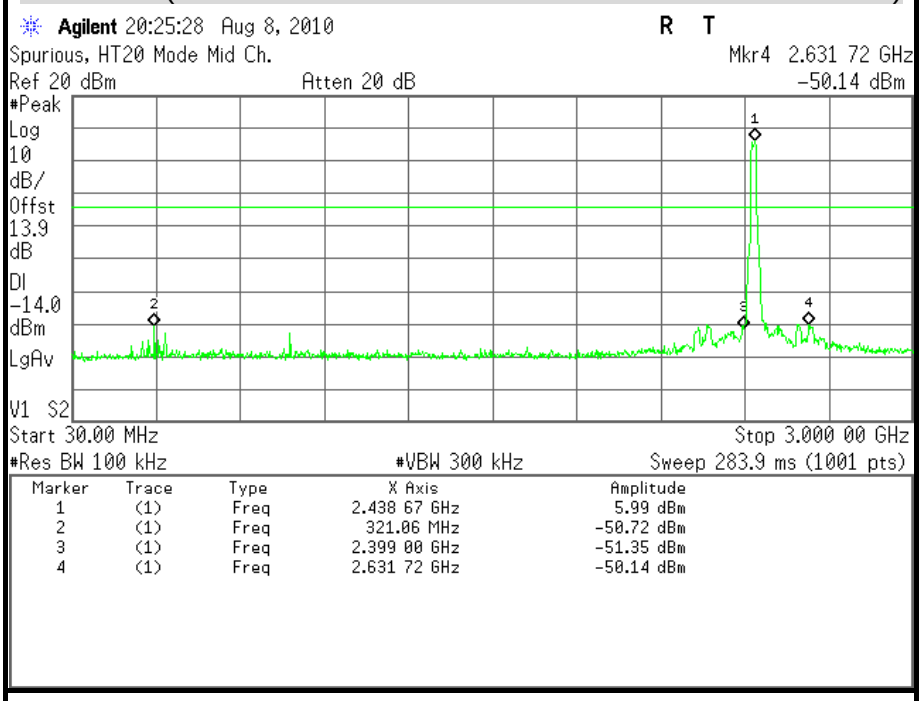
CH Low (30MHz ~ 3GHz / IEEE 802.11n HT20 Combined Mode)



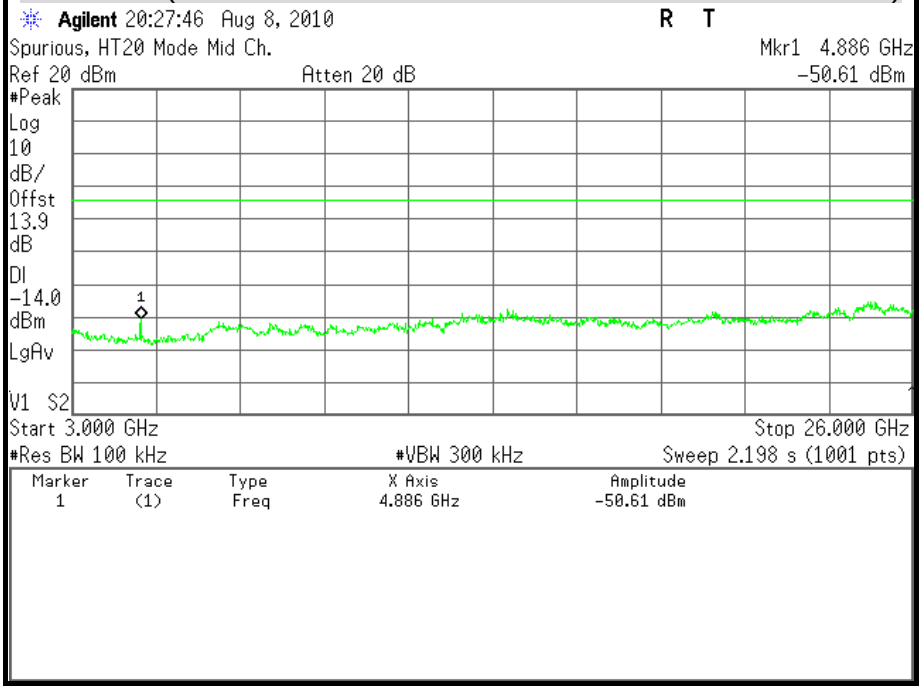
CH Low (3GHz ~ 26GHz / IEEE 802.11n HT20 Combined Mode)



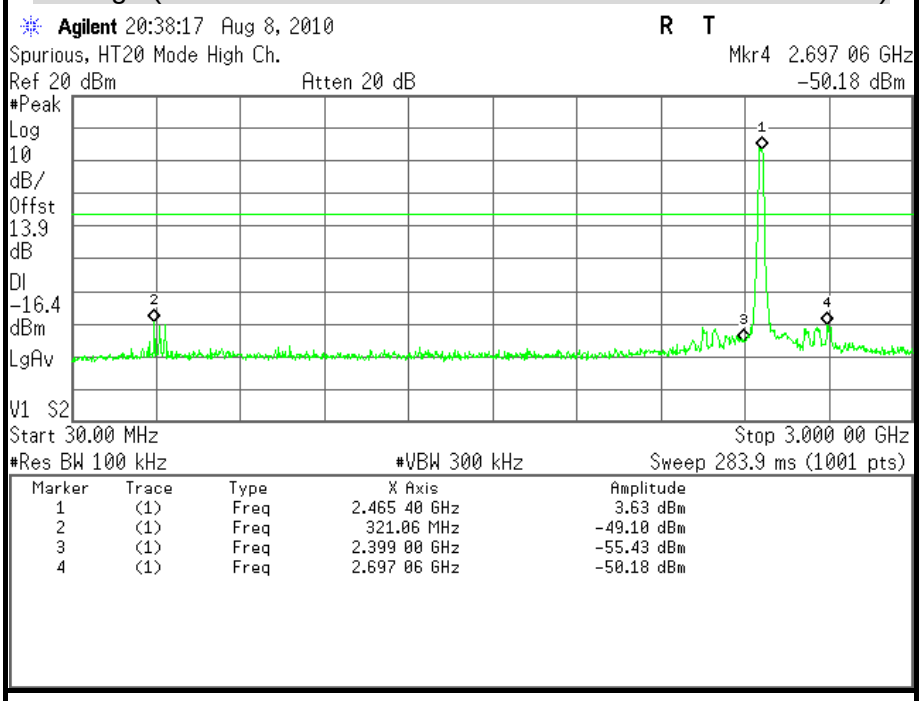
CH Middle (30MHz ~ 3GHz / IEEE 802.11n HT20 Combined Mode)



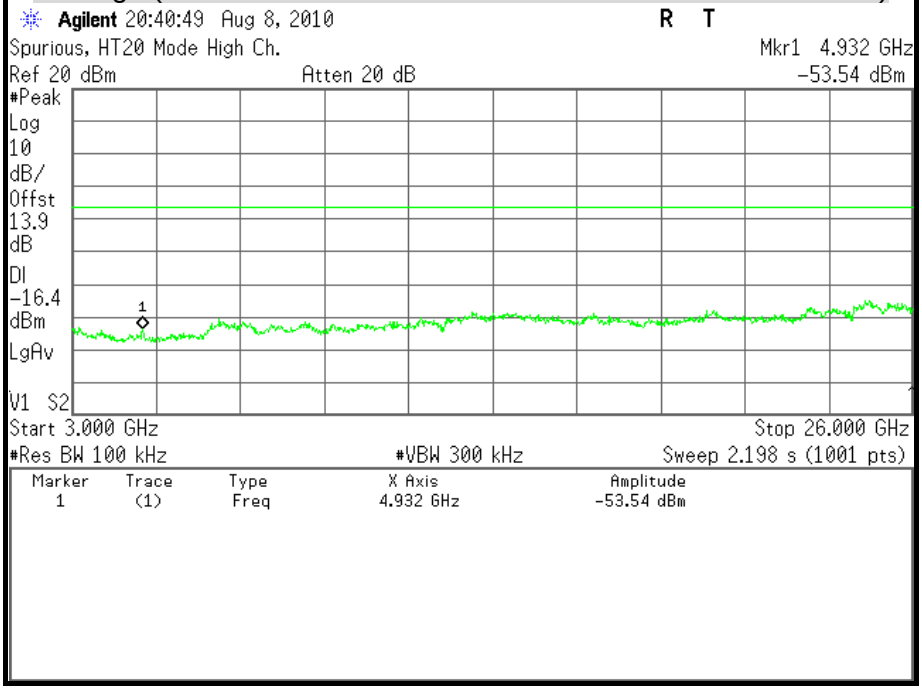
CH Middle (3GHz ~ 26GHz / IEEE 802.11n HT20 Combined Mode)



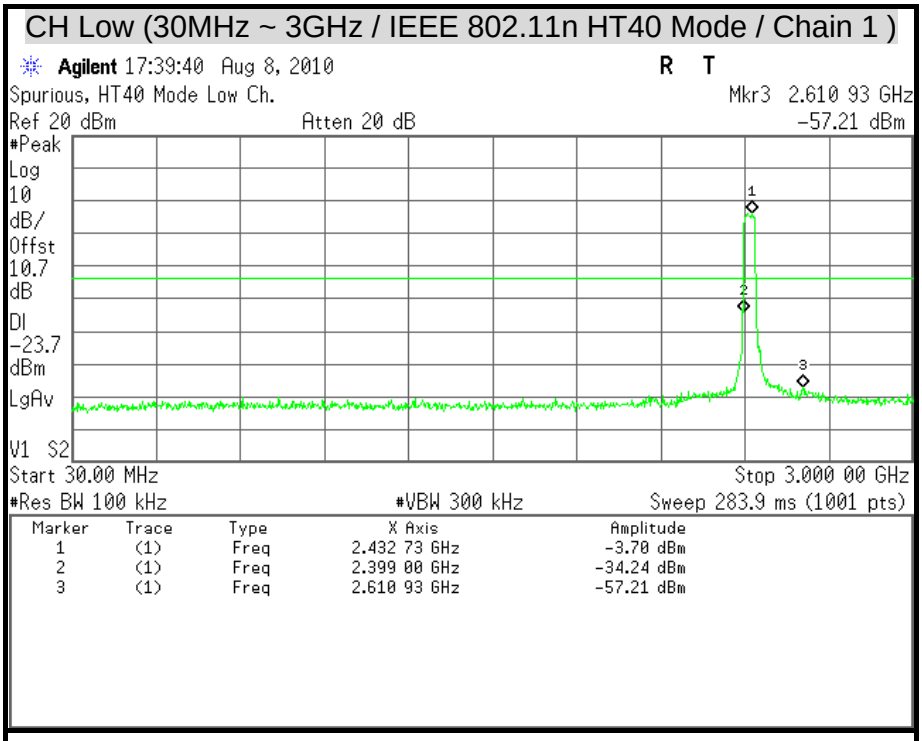
CH High (30MHz ~ 3GHz / IEEE 802.11n HT20 Combined Mode)



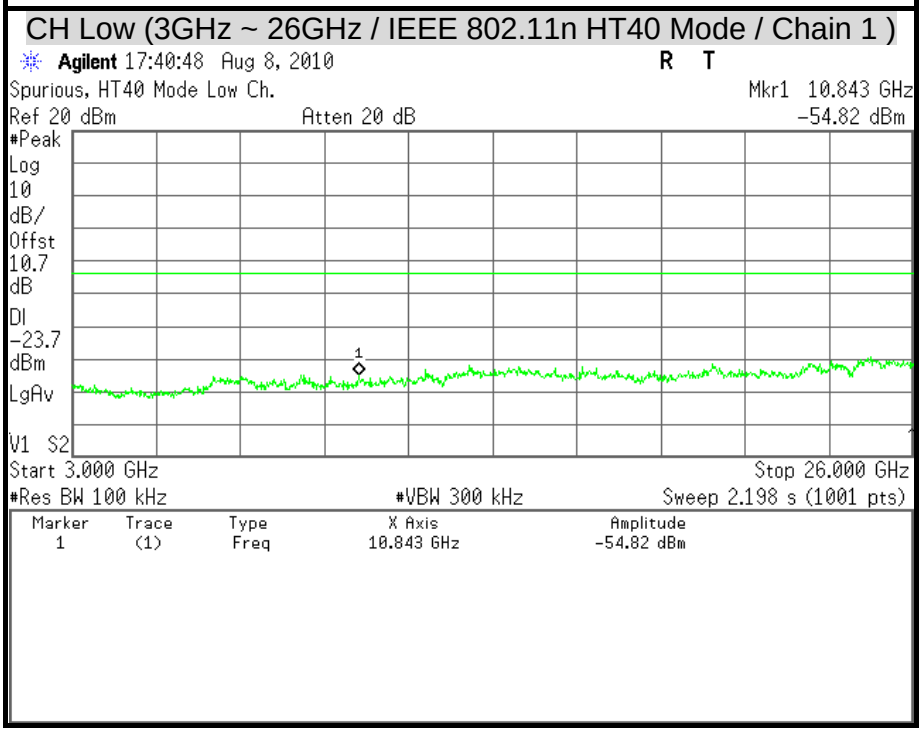
CH High (3GHz ~ 26GHz / IEEE 802.11n HT20 Combined Mode)



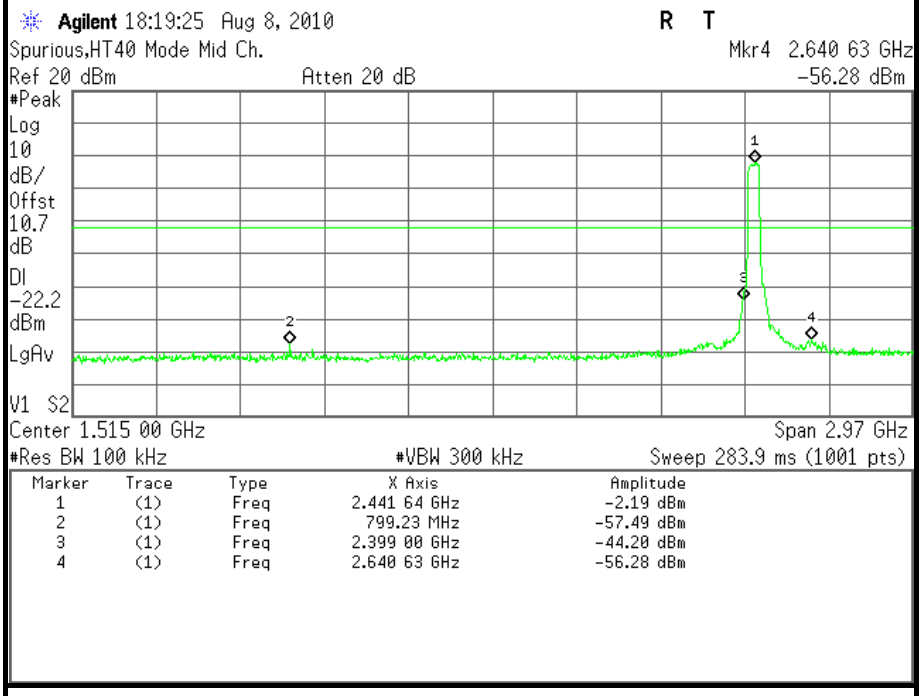
CH Low (30MHz ~ 3GHz / IEEE 802.11n HT40 Mode / Chain 1)



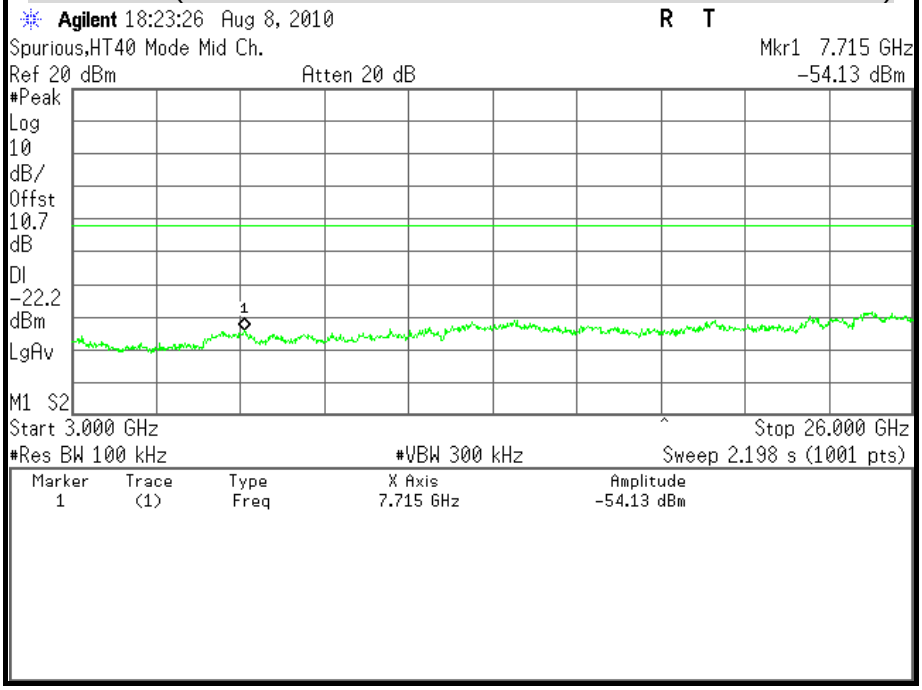
CH Low (3GHz ~ 26GHz / IEEE 802.11n HT40 Mode / Chain 1)



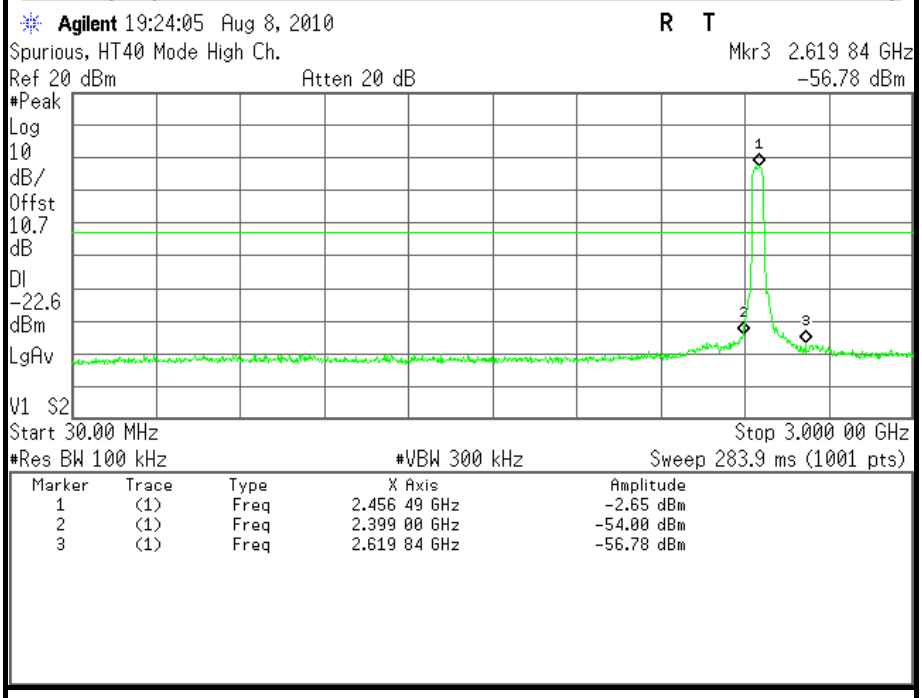
CH Middle (30MHz ~ 3GHz / IEEE 802.11n HT40 Mode / Chain 1)



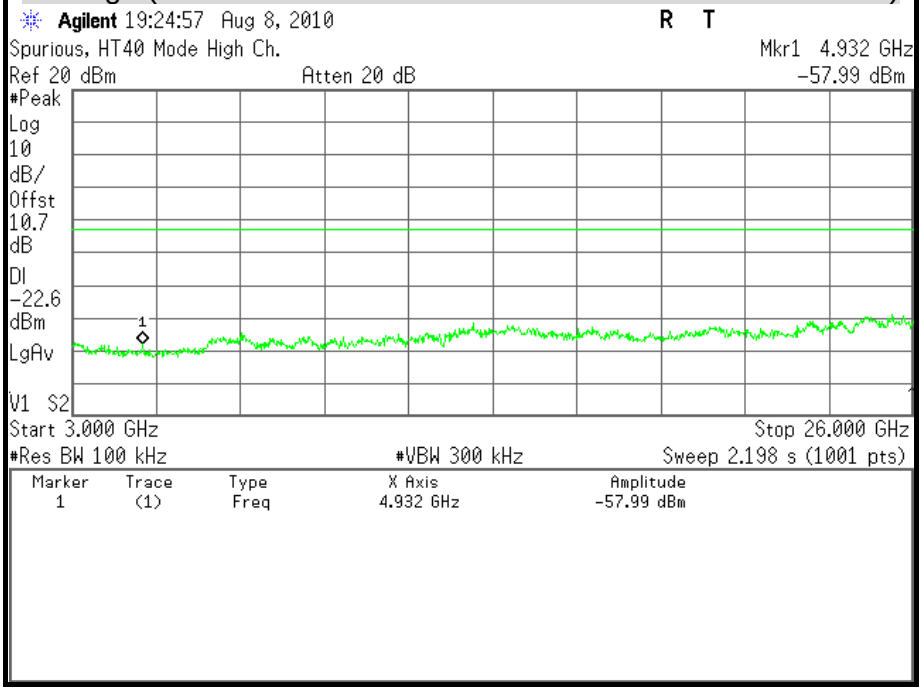
CH Middle (3GHz ~ 26GHz / IEEE 802.11n HT40 Mode / Chain 1)



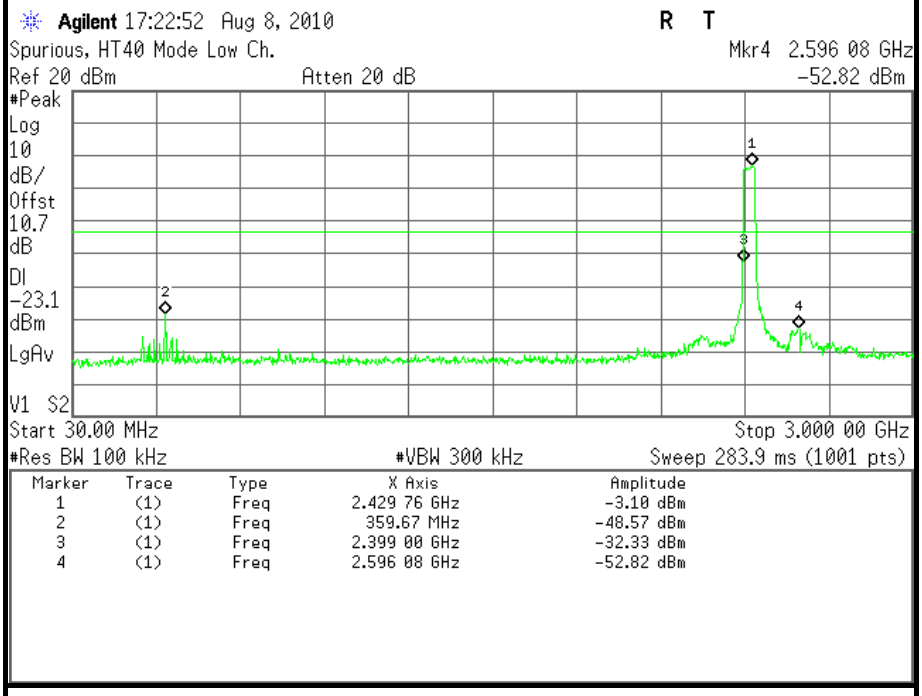
CH High (30MHz ~ 3GHz / IEEE 802.11n HT40 Mode / Chain 1)



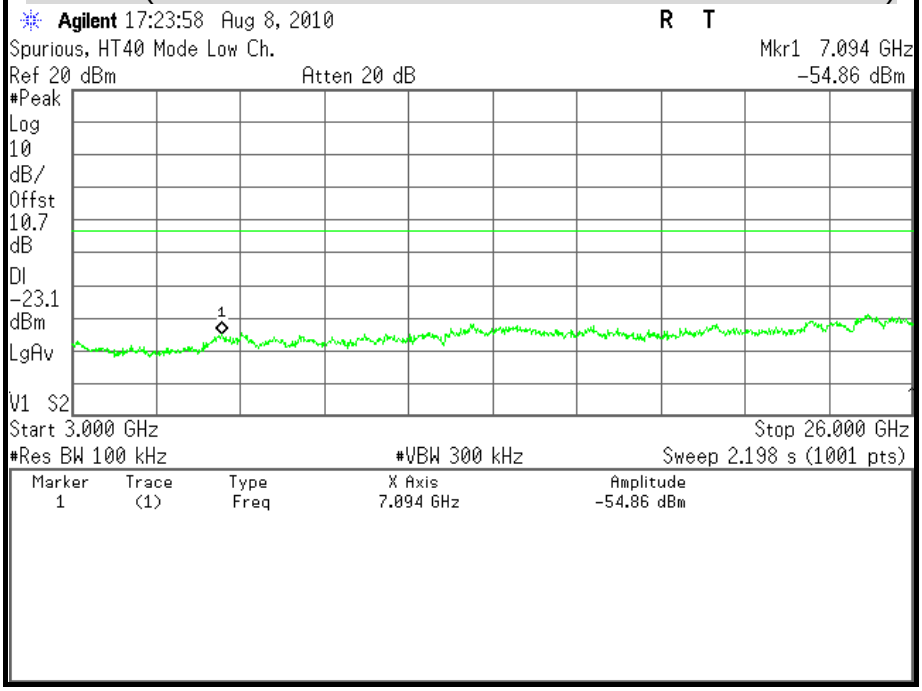
CH High (3GHz ~ 26GHz / IEEE 802.11n HT40 Mode / Chain 1)



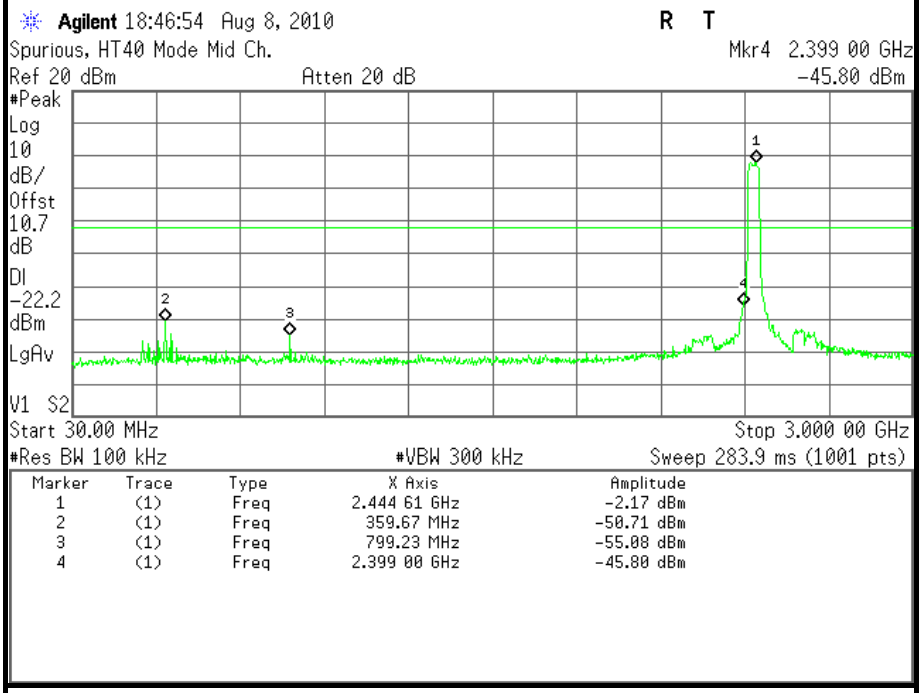
CH Low (30MHz ~ 3GHz / IEEE 802.11n HT40 Mode / Chain 2)



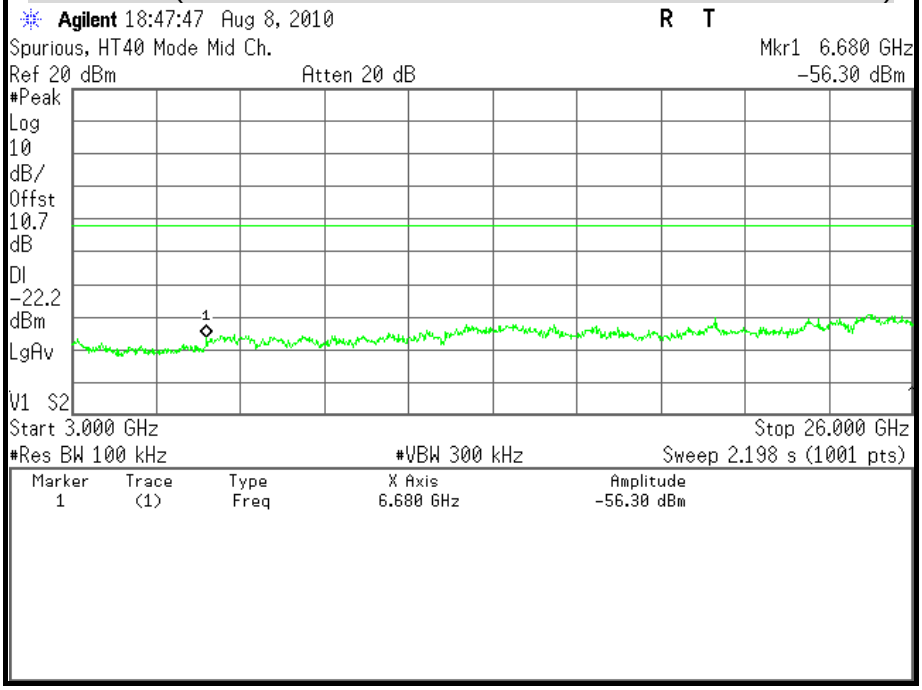
CH Low (3GHz ~ 26GHz / IEEE 802.11n HT40 Mode / Chain 2)



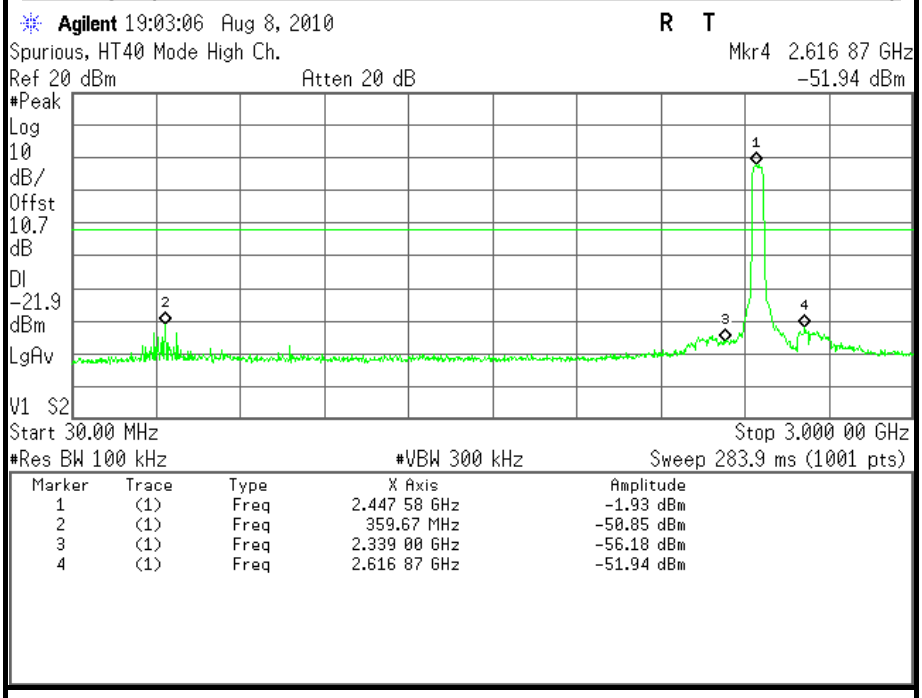
CH Middle (30MHz ~ 3GHz / IEEE 802.11n HT40 Mode / Chain 2)



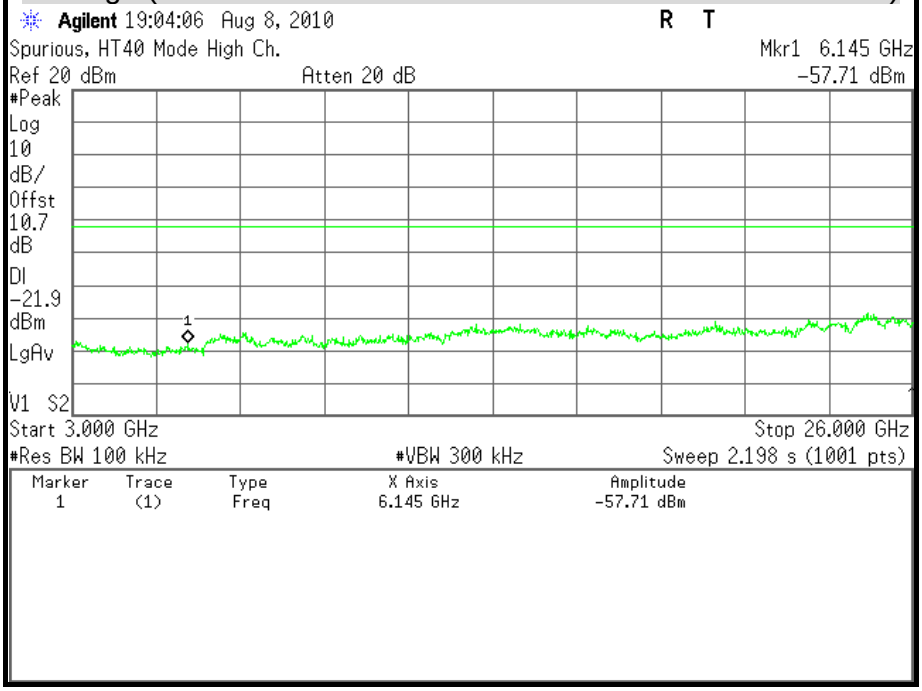
CH Middle (3GHz ~ 26GHz / IEEE 802.11n HT40 Mode / Chain 2)



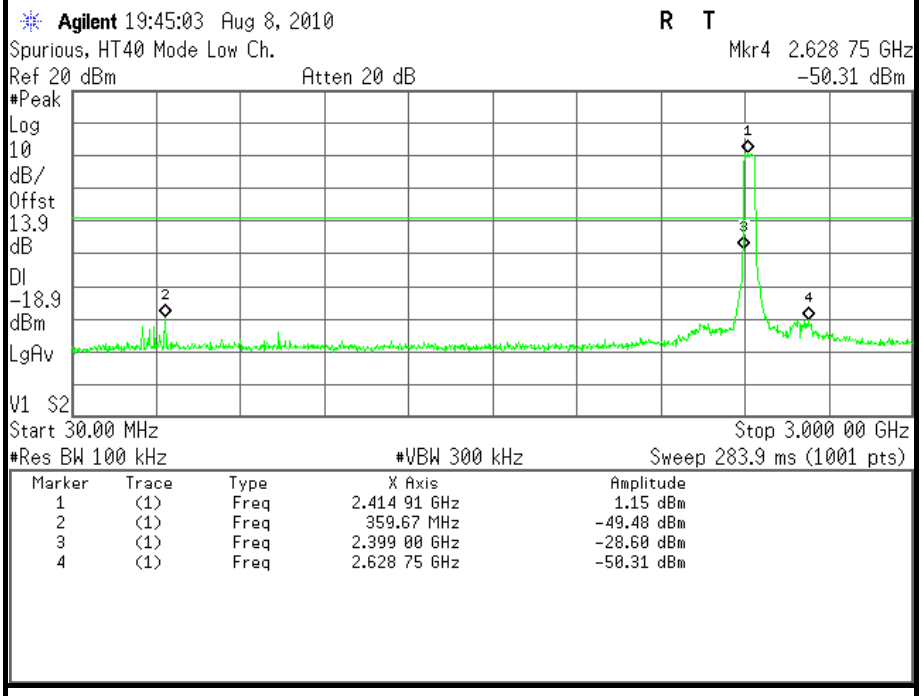
CH High (30MHz ~ 3GHz / IEEE 802.11n HT40 Mode / Chain 2)



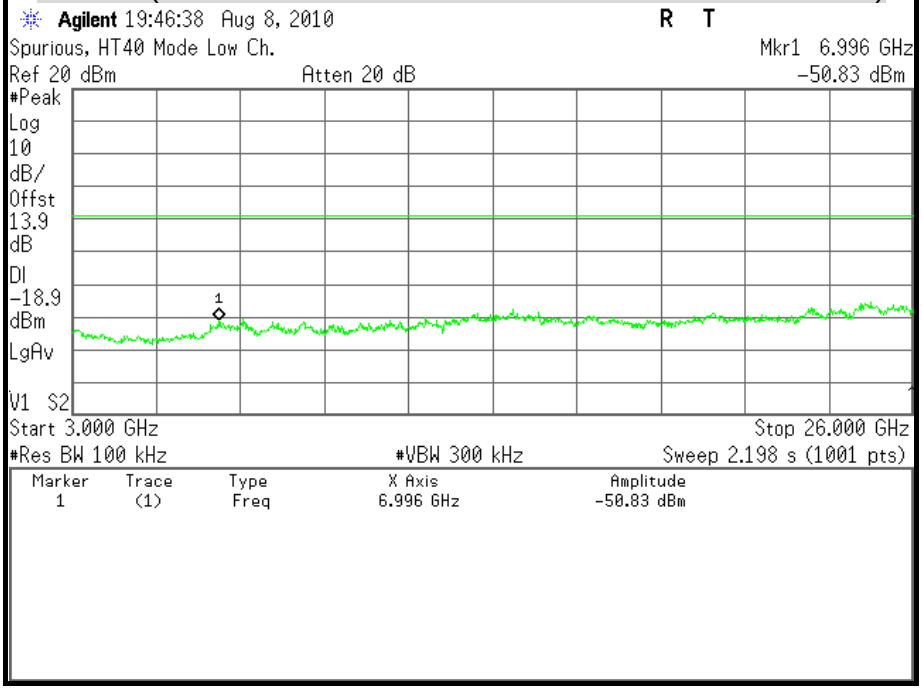
CH High (3GHz ~ 26GHz / IEEE 802.11n HT40 Mode / Chain 2)



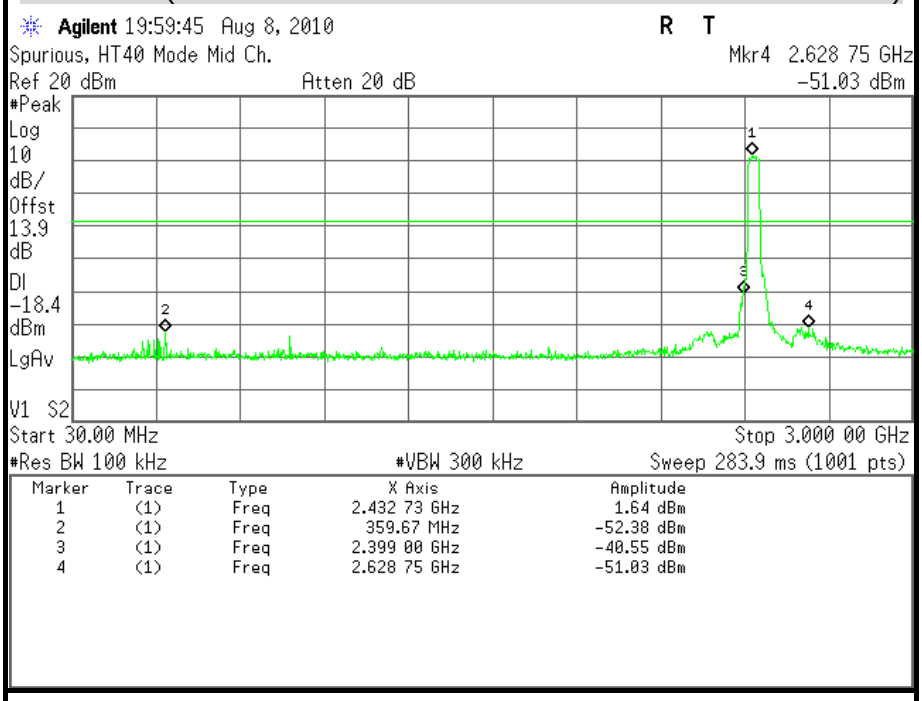
CH Low (30MHz ~ 3GHz / IEEE 802.11n HT40 Combined Mode)



CH Low (3GHz ~ 26GHz / IEEE 802.11n HT40 Combined Mode)

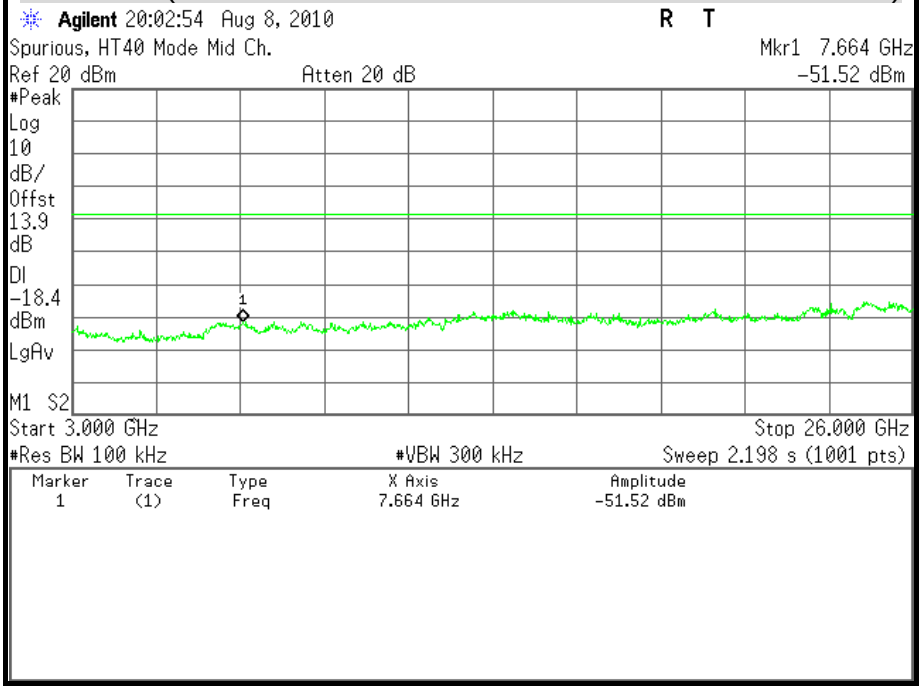


CH Middle (30MHz ~ 3GHz / IEEE 802.11n HT40 Combined Mode)



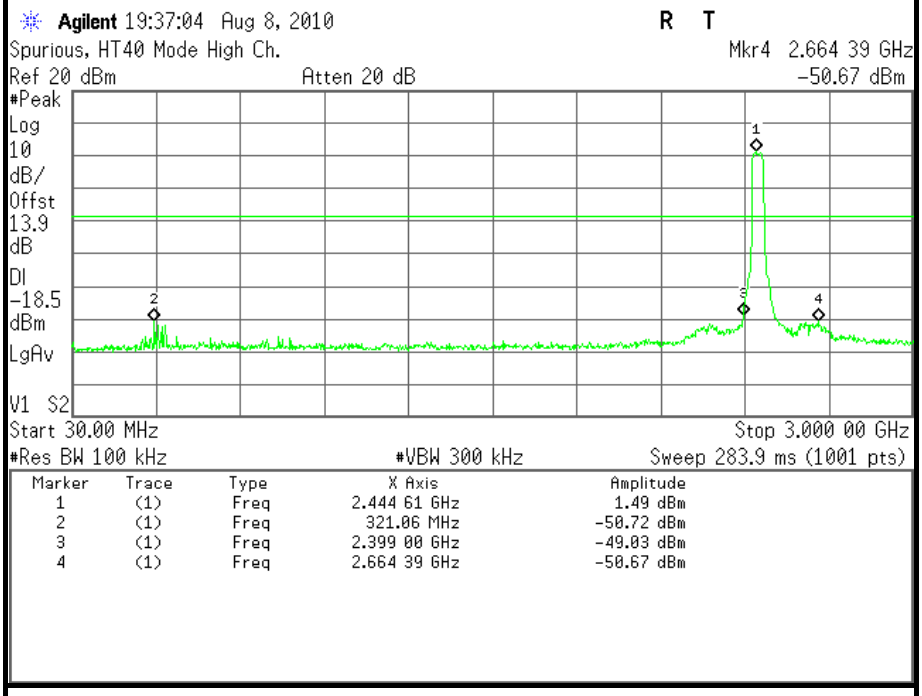
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.432 73 GHz	1.64 dBm
2	(1)	Freq	359.67 MHz	-52.38 dBm
3	(1)	Freq	2.399 00 GHz	-40.55 dBm
4	(1)	Freq	2.628 75 GHz	-51.03 dBm

CH Middle (3GHz ~ 26GHz / IEEE 802.11n HT40 Combined Mode)

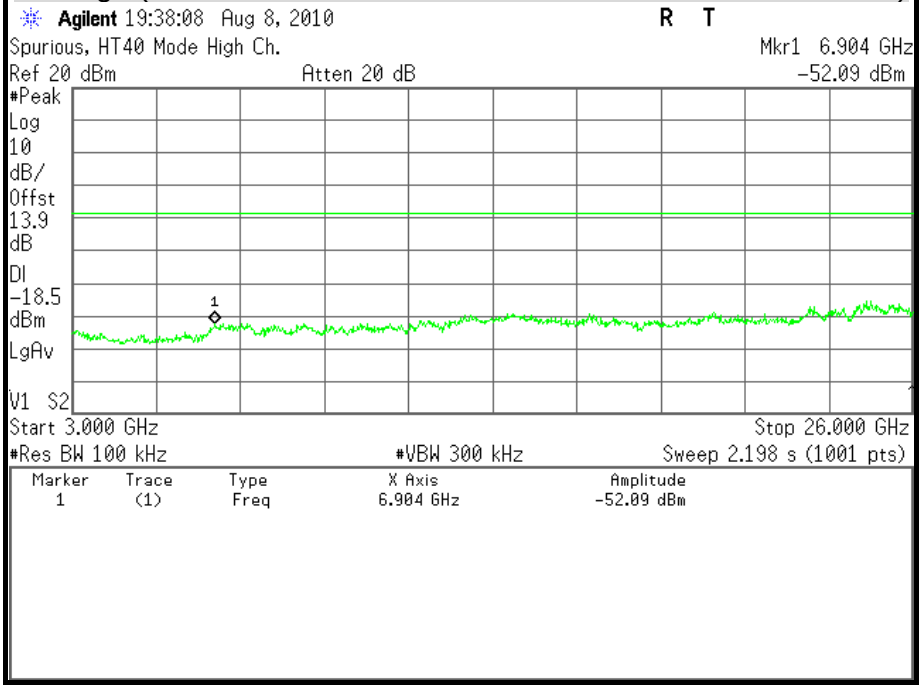


Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	7.664 GHz	-51.52 dBm

CH High (30MHz ~ 3GHz / IEEE 802.11n HT40 Combined Mode)



CH High (3GHz ~ 26GHz / IEEE 802.11n HT40 Combined Mode)



7.6 RADIATED EMISSION

LIMITS

(1) § 15.205 (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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	([2])
13.36 - 13.41			

Remark:
1. [1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
2. [2] Above 38.6

(2) § 15.205 (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 is 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) 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 (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(KHz)	300
0.490 – 1.705	24000/F(KHz)	30
1.705 – 30.0	30	30
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.*

(4) According to § 15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST EQUIPMENT

966Chamber_A

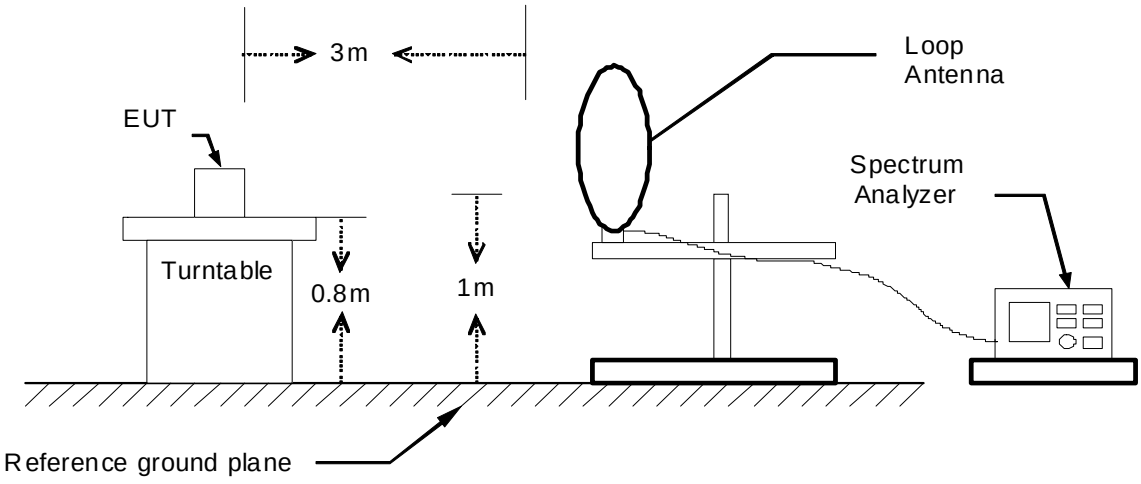
Name of Equipment	Manufacture	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360132	06/20/2011
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100221	05/03/2011
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-249	11/12/2010
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00078732	07/05/2011
Pre-Amplifier	Agilent	8449B	3008A01471	08/02/2011
Pre-Amplifier	HP	8447F	2944A03748	09/24/2010
RF Coaxial Cable	HUBER-SUHNER	SUCOFLEX 104PEA	SN31347	07/21/2011
RF Coaxial Cable	HUBER-SUHNER	SUCOFLEX 104PEA	SN31350	07/21/2011
RF Coaxial Cable	HUBER-SUHNER	SUCOFLEX 104PEA	SN31355	07/21/2011
LOOP Antenna	EMCO	6502	8905-2356	06/09/2011
Notch Filters Band Reject	Micro-Tronics	BRM05702-01	009	N.C.R

Remark: *1. Each piece of equipment is scheduled for calibration once a year.*
2. N.C.R = No Calibration Request.

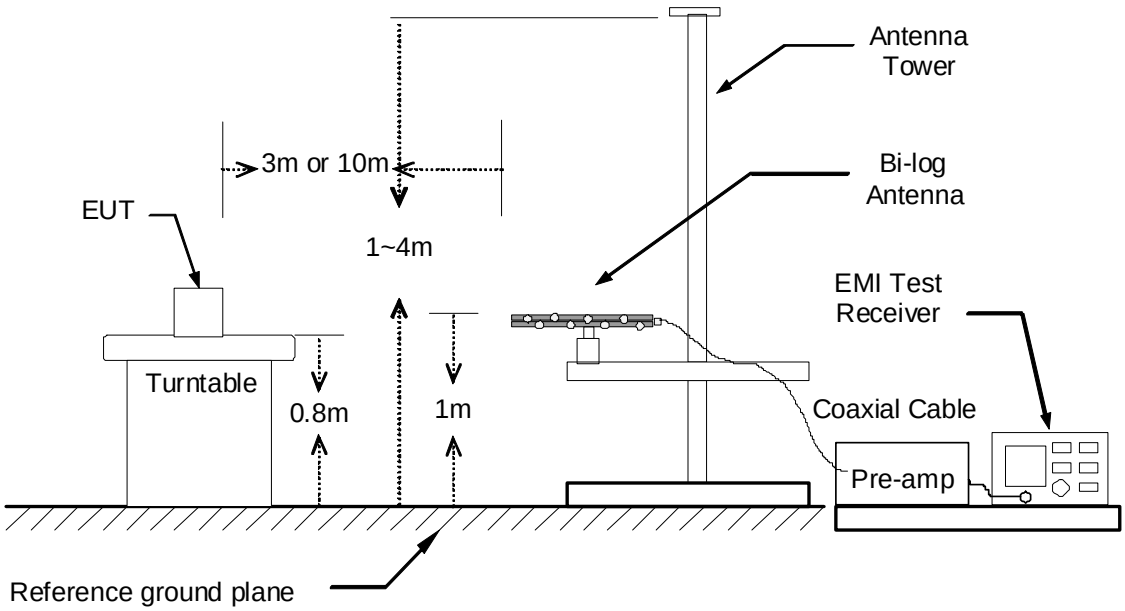
TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission from below 1GHz.

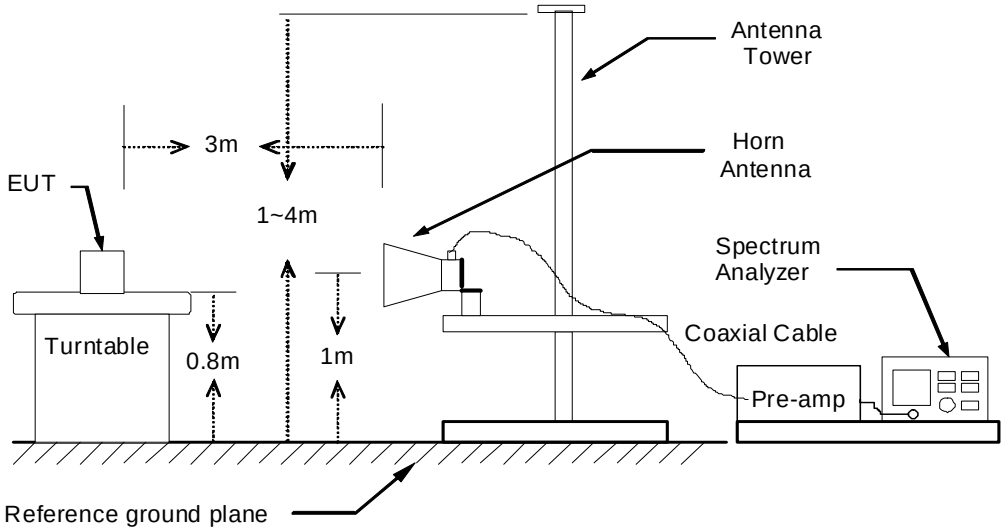
9kHz ~ 30MHz



30MHz ~ 1GHz



The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



TEST PROCEDURE

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. White measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. White measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Remark：

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.

3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

TEST RESULTS

Below 1 GHz (9kHz ~ 30MHz)

No emission found between lowest internal used/generated frequency to 30MHz.

Below 1 GHz (30MHz ~ 1GHz)

Product Name	Wireless N Router	Test By	Rueyyan Lin
Model	DIR-515	Test Date	2010/07/30
Test Mode	Normal operating (worst-case) / Power Adapter (2)	TEMP & Humidity	25.1°C, 51%

966 Chamber_A at 3Meter / Horizontal						
Frequency (MHz)	Reading (dBμV)	Correction Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
106.63	42.58	-13.91	28.67	43.50	-14.83	Peak
153.19	42.21	-10.17	32.05	43.50	-11.45	Peak
214.30	42.10	-11.89	30.21	43.50	-13.29	Peak
266.68	43.19	-10.07	33.11	46.00	-12.89	Peak
305.48	47.00	-8.70	38.30	46.00	-7.70	Peak
319.06	45.98	-8.29	37.69	46.00	-8.31	Peak
346.22	40.39	-7.46	32.93	46.00	-13.07	Peak
500.45	43.68	-3.69	39.98	46.00	-6.02	Peak

966 Chamber_A at 3Meter / Vertical						
Frequency (MHz)	Reading (dBμV)	Correction Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
38.73	47.00	-10.32	36.68	40.00	-3.32	QP
53.28	44.74	-9.70	35.04	40.00	-4.96	Peak
143.49	47.78	-10.41	37.37	43.50	-6.13	Peak
319.06	41.77	-8.29	33.48	46.00	-12.52	Peak
500.45	41.32	-3.69	37.63	46.00	-8.37	Peak
555.74	36.01	-2.37	33.64	46.00	-12.36	Peak
749.74	34.91	1.13	36.04	46.00	-9.96	Peak
800.18	33.64	2.04	35.68	46.00	-10.32	Peak

Remark:

1. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.*
2. *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.*
3. *Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) – PreAmp.Gain (dB)*
4. *Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)*
5. *Margin (dB) = Remark result (dBuV/m) - Quasi-peak limit (dBuV/m).*

Above 1 GHz

Product Name	Wireless N Router	Test By	Rueyyan Lin
Model	DIR-515	Test Date	2010/08/07
Test Mode	IEEE 802.11b TX / CH Low	TEMP & Humidity	26.3°C, 53%

966 Chamber_A at 3Meter / Horizontal									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1024.00	54.54	---	-4.60	49.94	---	74.00	54.00	-4.06	Peak
1426.00	53.93	---	-3.40	50.54	---	74.00	54.00	-3.46	Peak
*2399.00	61.94	57.06	2.24	64.18	59.30	78.74	74.85	-15.55	20dBc AVG Fundamental
2412.00	96.47	92.58	2.27	98.74	94.85	---	---	---	Carrier
3772.50	42.42	---	4.61	47.03	---	74.00	54.00	-6.97	Peak
4522.50	41.45	---	6.66	48.11	---	74.00	54.00	-5.89	Peak
4822.50	49.39	44.93	7.24	56.63	52.17	74.00	54.00	-1.83	AVG

966 Chamber_A at 3Meter / Vertical									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
*2399.00	72.38	67.68	2.24	74.62	69.92	90.78	88.02	-18.10	20dBc AVG Fundamental
2412.00	108.51	105.75	2.27	110.78	108.02	---	---	---	Carrier
2476.00	57.34	45.25	2.39	59.73	47.64	74.00	54.00	-6.36	AVG
2614.00	57.23	48.79	2.65	59.88	51.44	74.00	54.00	-2.56	AVG
3810.00	41.79	---	4.71	46.50	---	74.00	54.00	-7.50	Peak
4822.50	49.61	45.70	7.24	56.85	52.94	74.00	54.00	-1.06	AVG
7237.50	47.22	40.03	9.49	56.71	49.52	74.00	54.00	-4.48	AVG

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *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.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Wireless N Router	Test By	Rueyyan Lin
Model	DIR-515	Test Date	2010/08/07
Test Mode	IEEE 802.11b TX / CH Middle	TEMP & Humidity	26.3°C, 53%

966 Chamber_A at 3Meter / Horizontal									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1044.00	54.76	---	-4.54	50.22	---	74.00	54.00	-3.78	Peak
1346.00	54.92	---	-3.64	51.29	---	74.00	54.00	-2.71	Peak
1570.00	52.68	---	-2.52	50.16	---	74.00	54.00	-3.84	Peak
2437.00	94.78	---	2.31	97.10	---	---	---	---	Carrier
3210.00	43.66	---	3.58	47.24	---	74.00	54.00	-6.76	Peak
4170.00	41.81	---	5.69	47.50	---	74.00	54.00	-6.50	Peak
4875.00	43.06	---	7.34	50.40	---	74.00	54.00	-3.60	Peak

966 Chamber_A at 3Meter / Vertical									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1046.00	54.42	---	-4.53	49.88	---	74.00	54.00	-4.12	Peak
1354.00	53.57	---	-3.61	49.96	---	74.00	54.00	-4.04	Peak
2437.00	107.87	104.50	2.31	110.19	106.81	---	---	---	Carrier
2518.00	56.07	44.22	2.47	58.54	46.69	74.00	54.00	-7.31	AVG
3112.50	43.17	---	3.48	46.65	---	74.00	54.00	-7.35	Peak
4875.00	48.92	45.18	7.34	56.26	52.52	74.00	54.00	-1.48	AVG
7312.50	44.95	35.68	9.31	54.26	44.99	74.00	54.00	-9.01	AVG

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *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.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Wireless N Router	Test By	Rueyyan Lin
Model	DIR-515	Test Date	2010/08/07
Test Mode	IEEE 802.11b TX / CH High	TEMP & Humidity	26.3°C, 53%

966 Chamber_A at 3Meter / Horizontal									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1036.00	55.10	---	-4.56	50.54	---	74.00	54.00	-3.46	Peak
1206.00	54.53	---	-4.05	50.47	---	74.00	54.00	-3.53	Peak
1580.00	52.26	---	-2.43	49.83	---	74.00	54.00	-4.17	Peak
2462.00	95.37	---	2.36	97.73	---	---	---	---	Carrier
3135.00	42.70	---	3.51	46.21	---	74.00	54.00	-7.79	Peak
3877.50	41.38	---	4.89	46.27	---	74.00	54.00	-7.73	Peak
4927.50	48.66	43.78	7.44	56.10	51.22	74.00	54.00	-2.78	AVG

966 Chamber_A at 3Meter / Vertical									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1060.00	54.25	---	-4.49	49.76	---	74.00	54.00	-4.24	Peak
1286.00	53.85	---	-3.82	50.03	---	74.00	54.00	-3.97	Peak
1462.00	53.30	---	-3.29	50.01	---	74.00	54.00	-3.99	Peak
2462.00	105.58	---	2.37	107.95	---	---	---	---	Carrier
4140.00	42.27	---	5.61	47.88	---	74.00	54.00	-6.12	Peak
4927.50	48.93	45.25	7.44	56.37	52.69	74.00	54.00	-1.31	AVG
7320.00	41.29	---	9.30	50.59	---	74.00	54.00	-3.41	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *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.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Wireless N Router	Test By	Rueyyan Lin
Model	DIR-515	Test Date	2010/08/07
Test Mode	IEEE 802.11g TX / CH Low	TEMP & Humidity	26.3°C, 53%

966 Chamber_A at 3Meter / Horizontal									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1026.00	54.36	---	-4.59	49.77	---	74.00	54.00	-4.23	Peak
1312.00	53.76	---	-3.74	50.03	---	74.00	54.00	-3.97	Peak
*2399.00	71.97	53.00	2.24	74.21	55.24	78.81	70.24	-15.00	20dBc AVG Fundamental
2412.00	96.53	87.96	2.28	98.81	90.24	---	---	---	Carrier
4132.50	42.10	---	5.59	47.69	---	74.00	54.00	-6.31	Peak
4830.00	42.17	---	7.25	49.42	---	74.00	54.00	-4.58	Peak
5632.50	41.37	---	8.21	49.57	---	74.00	54.00	-4.43	Peak

966 Chamber_A at 3Meter / Vertical									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1038.00	54.84	---	-4.56	50.28	---	74.00	54.00	-3.72	Peak
*2399.00	83.21	63.86	2.24	85.45	66.10	90.49	80.80	-14.70	20dBc AVG Fundamental
2412.00	108.21	98.52	2.28	110.49	100.80	---	---	---	Carrier
2500.00	56.53	43.39	2.43	58.96	45.82	74.00	54.00	-8.18	AVG
4830.00	50.26	35.12	7.25	57.51	42.37	74.00	54.00	-11.63	AVG
6142.50	41.47	---	9.06	50.53	---	74.00	54.00	-3.47	Peak
7245.00	49.13	34.28	9.47	58.60	43.75	74.00	54.00	-10.25	AVG

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *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.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Wireless N Router	Test By	Rueyyan Lin
Model	DIR-515	Test Date	2010/08/07
Test Mode	IEEE 802.11g TX / CH Middle	TEMP & Humidity	26.3°C, 53%

966 Chamber_A at 3Meter / Horizontal									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1022.00	54.90	---	-4.61	50.30	---	74.00	54.00	-3.70	Peak
1238.00	53.51	---	-3.96	49.55	---	74.00	54.00	-4.45	Peak
1612.00	53.12	---	-2.13	50.99	---	74.00	54.00	-3.01	Peak
2437.00	98.97	---	2.30	101.27	---	---	---	---	Carrier
3097.50	43.41	---	3.47	46.87	---	74.00	54.00	-7.13	Peak
3952.50	40.96	---	5.09	46.06	---	74.00	54.00	-7.94	Peak
4875.00	52.59	39.12	7.34	59.93	46.46	74.00	54.00	-7.54	AVG

966 Chamber_A at 3Meter / Vertical									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1014.00	54.54	---	-4.63	49.91	---	74.00	54.00	-4.09	Peak
1204.00	53.90	---	-4.06	49.84	---	74.00	54.00	-4.16	Peak
2437.00	110.05	101.33	2.31	112.36	103.64	---	---	---	Carrier
2522.00	57.27	44.52	2.47	59.74	46.99	74.00	54.00	-7.01	AVG
3277.50	42.56	---	3.65	46.22	---	74.00	54.00	-7.78	Peak
4875.00	55.18	41.22	7.34	62.52	48.56	74.00	54.00	-5.44	AVG
7305.00	54.40	39.44	9.33	63.73	48.77	74.00	54.00	-5.23	AVG

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *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.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Wireless N Router	Test By	Rueyyan Lin
Model	DIR-515	Test Date	2010/08/07
Test Mode	IEEE 802.11g TX / CH High	TEMP & Humidity	26.3°C, 53%

966 Chamber_A at 3Meter / Horizontal									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1072.00	54.39	---	-4.46	49.93	---	74.00	54.00	-4.07	Peak
1324.00	53.88	---	-3.70	50.18	---	74.00	54.00	-3.82	Peak
1600.00	53.71	---	-2.24	51.47	---	74.00	54.00	-2.53	Peak
2462.00	96.87	---	2.37	99.24	---	---	---	---	Carrier
3232.50	43.15	---	3.61	46.76	---	74.00	54.00	-7.24	Peak
4912.50	49.40	34.82	7.41	56.81	42.23	74.00	54.00	-11.77	AVG
5745.00	40.92	---	8.40	49.33	---	74.00	54.00	-4.67	Peak

966 Chamber_A at 3Meter / Vertical									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1086.00	54.44	---	-4.41	50.03	---	74.00	54.00	-3.97	Peak
1380.00	54.27	---	-3.53	50.74	---	74.00	54.00	-3.26	Peak
1506.00	54.05	---	-3.12	50.93	---	74.00	54.00	-3.07	Peak
2462.00	106.53	---	2.37	108.90	---	---	---	---	Carrier
3172.50	43.13	---	3.54	46.68	---	74.00	54.00	-7.32	Peak
4920.00	51.73	37.02	7.42	59.15	44.44	74.00	54.00	-9.56	AVG
7387.50	49.25	33.56	9.14	58.39	42.70	74.00	54.00	-11.30	AVG

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *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.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Wireless N Router	Test By	Rueyyan Lin
Model	DIR-515	Test Date	2010/08/07
Test Mode	IEEE 802.11n HT20 TX / CH Low	TEMP & Humidity	26.3°C, 53%

966 Chamber_A at 3Meter / Horizontal

Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1028.00	54.22	---	-4.59	49.63	---	74.00	54.00	-4.37	Peak
1306.00	53.70	---	-3.76	49.94	---	74.00	54.00	-4.06	Peak
2399.00	69.05	48.90	2.24	71.29	51.14	74.00	54.00	-2.86	AVG
2412.00	97.07	85.96	2.28	99.35	88.24	---	---	---	Carrier
3105.00	42.88	---	3.47	46.35	---	74.00	54.00	-7.65	Peak
4815.00	41.94	---	7.22	49.16	---	74.00	54.00	-4.84	Peak
6675.00	40.82	---	9.75	50.57	---	74.00	54.00	-3.43	Peak

966 Chamber_A at 3Meter / Vertical

Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1088.00	54.02	---	-4.41	49.61	---	74.00	54.00	-4.39	Peak
2256.00	56.82	44.87	1.98	58.80	46.85	74.00	54.00	-7.15	AVG
*2399.00	81.34	59.80	2.24	83.58	62.04	92.53	81.62	-19.58	20dBc AVG Fundamental
2412.00	110.26	99.35	2.27	112.53	101.62	---	---	---	Carrier
2572.00	58.42	45.52	2.57	60.99	48.09	74.00	54.00	-5.91	AVG
3120.00	42.83	---	3.49	46.32	---	74.00	54.00	-7.68	Peak
4822.50	48.18	35.06	7.24	55.42	42.30	74.00	54.00	-11.70	AVG
7230.00	46.12	33.62	9.50	55.62	43.12	74.00	54.00	-10.88	AVG

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *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.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Wireless N Router	Test By	Rueyyan Lin
Model	DIR-515	Test Date	2010/08/02
Test Mode	IEEE 802.11n HT20 TX / CH Middle	TEMP & Humidity	27°C, 56%

966 Chamber_A at 3Meter / Horizontal									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1068.00	54.00	---	-4.47	49.53	---	74.00	54.00	-4.47	Peak
1260.00	53.98	---	-3.89	50.08	---	74.00	54.00	-3.92	Peak
1478.00	52.44	---	-3.24	49.20	---	74.00	54.00	-4.80	Peak
2437.00	97.31	---	2.31	99.62	---	---	---	---	Carrier
3435.00	42.92	---	3.82	46.74	---	74.00	54.00	-7.26	Peak
4875.00	43.50	---	7.34	50.84	---	74.00	54.00	-3.16	Peak
6037.50	40.02	---	8.91	48.93	---	74.00	54.00	-5.07	Peak

966 Chamber_A at 3Meter / Vertical									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
2232.00	56.24	44.06	1.93	58.17	45.99	74.00	54.00	-8.01	AVG
2437.00	111.79	---	2.32	114.11	---	---	---	---	Carrier
2516.00	59.16	45.72	2.46	61.62	48.18	74.00	54.00	-5.82	AVG
2596.00	55.93	43.91	2.61	58.54	46.52	74.00	54.00	-7.48	AVG
3540.00	42.50	---	3.99	46.49	---	74.00	54.00	-7.51	Peak
4882.50	49.48	36.46	7.35	56.83	43.81	74.00	54.00	-10.19	AVG
7305.00	50.89	35.07	9.33	60.22	44.40	74.00	54.00	-9.60	AVG

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *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.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Wireless N Router	Test By	Rueyyan Lin
Model	DIR-515	Test Date	2010/08/07
Test Mode	IEEE 802.11n HT20 TX / CH High	TEMP & Humidity	26.3°C, 53%

966 Chamber_A at 3Meter / Horizontal

Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1060.00	54.07	---	-4.49	49.57	---	74.00	54.00	-4.43	Peak
1256.00	53.73	---	-3.91	49.83	---	74.00	54.00	-4.17	Peak
1550.00	54.05	---	-2.71	51.35	---	74.00	54.00	-2.65	Peak
2462.00	95.73	---	2.37	98.11	---	---	---	---	Carrier
3855.00	42.16	---	4.83	46.99	---	74.00	54.00	-7.01	Peak
4927.50	43.30	---	7.44	50.74	---	74.00	54.00	-3.26	Peak
6142.50	40.50	---	9.06	49.56	---	74.00	54.00	-4.44	Peak

966 Chamber_A at 3Meter / Vertical

Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1522.00	54.21	---	-2.97	51.24	---	74.00	54.00	-2.76	Peak
2256.00	56.02	43.81	1.98	58.00	45.79	74.00	54.00	-8.21	AVG
2462.00	109.53	---	2.36	111.89	---	---	---	---	Carrier
2654.00	56.06	44.20	2.72	58.78	46.92	74.00	54.00	-7.08	AVG
3457.50	42.65	---	3.84	46.49	---	74.00	54.00	-7.51	Peak
4920.00	42.42	---	7.42	49.85	---	74.00	54.00	-4.15	Peak
7372.50	48.96	34.61	9.18	58.14	43.79	74.00	54.00	-10.21	AVG

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *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.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Wireless N Router	Test By	Rueyyan Lin
Model	DIR-515	Test Date	2010/08/07
Test Mode	IEEE 802.11n HT40 TX / CH Low	TEMP & Humidity	26.3°C, 53%

966 Chamber_A at 3Meter / Horizontal

Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1076.00	54.67	---	-4.44	50.23	---	74.00	54.00	-3.77	Peak
1246.00	53.01	---	-3.93	49.08	---	74.00	54.00	-4.92	Peak
*2399.00	63.96	53.97	2.24	66.20	56.21	75.13	66.60	-10.39	20dBc AVG Fundamental
2422.00	92.82	84.30	2.30	95.13	86.60	---	---	---	Carrier
3247.50	43.39	---	3.62	47.02	---	74.00	54.00	-6.98	Peak
4860.00	41.66	---	7.31	48.97	---	74.00	54.00	-5.03	Peak
6757.50	41.18	---	9.82	51.01	---	74.00	54.00	-2.99	Peak

966 Chamber_A at 3Meter / Vertical

Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1048.00	55.22	---	-4.53	50.69	---	74.00	54.00	-3.31	Peak
2232.00	55.27	43.23	1.93	57.20	45.16	74.00	54.00	-8.84	AVG
*2399.00	75.07	64.48	2.24	77.31	66.72	88.73	77.70	-10.98	20dBc AVG Fundamental
2422.00	106.43	95.40	2.30	108.73	97.70	---	---	---	Carrier
3285.00	42.50	---	3.66	46.16	---	74.00	54.00	-7.84	Peak
4852.50	41.71	---	7.29	49.00	---	74.00	54.00	-5.00	Peak
6112.50	40.45	---	9.02	49.47	---	74.00	54.00	-4.53	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *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.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Wireless N Router	Test By	Rueyyan Lin
Model	DIR-515	Test Date	2010/08/07
Test Mode	IEEE 802.11n HT40 TX / CH Middle	TEMP & Humidity	26.3°C, 53%

966 Chamber_A at 3Meter / Horizontal									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1090.00	54.25	---	-4.40	49.85	---	74.00	54.00	-4.15	Peak
1232.00	52.83	---	-3.98	48.86	---	74.00	54.00	-5.14	Peak
1506.00	53.67	---	-3.12	50.55	---	74.00	54.00	-3.45	Peak
2437.00	93.97	---	2.34	96.31	---	---	---	---	Carrier
3262.50	43.19	---	3.64	46.83	---	74.00	54.00	-7.17	Peak
4905.00	41.17	---	7.40	48.56	---	74.00	54.00	-5.44	Peak
6660.00	41.08	---	9.74	50.82	---	74.00	54.00	-3.18	Peak

966 Chamber_A at 3Meter / Vertical									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1096.00	54.27	---	-4.38	49.88	---	74.00	54.00	-4.12	Peak
1332.00	54.37	---	-3.68	50.69	---	74.00	54.00	-3.31	Peak
1554.00	53.05	---	-2.67	50.38	---	74.00	54.00	-3.62	Peak
2437.00	106.70	---	2.30	109.00	---	---	---	---	Carrier
3240.00	43.23	---	3.61	46.84	---	74.00	54.00	-7.16	Peak
4882.50	41.92	---	7.35	49.27	---	74.00	54.00	-4.73	Peak
6240.00	40.74	---	9.21	49.95	---	74.00	54.00	-4.05	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *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.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	Wireless N Router	Test By	Rueyyan Lin
Model	DIR-515	Test Date	2010/08/07
Test Mode	IEEE 802.11n HT40 TX / CH High	TEMP & Humidity	26.3°C, 53%

966 Chamber_A at 3Meter / Horizontal

Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1042.00	54.73	---	-4.55	50.18	---	74.00	54.00	-3.82	Peak
1346.00	52.97	---	-3.64	49.33	---	74.00	54.00	-4.67	Peak
1634.00	52.47	---	-1.92	50.55	---	74.00	54.00	-3.45	Peak
2452.00	92.16	---	2.36	94.52	---	---	---	---	Carrier
3187.50	41.38	---	3.56	44.94	---	74.00	54.00	-9.06	Peak
4605.00	41.65	---	6.82	48.47	---	74.00	54.00	-5.53	Peak
6225.00	41.09	---	9.19	50.28	---	74.00	54.00	-3.72	Peak

966 Chamber_A at 3Meter / Vertical

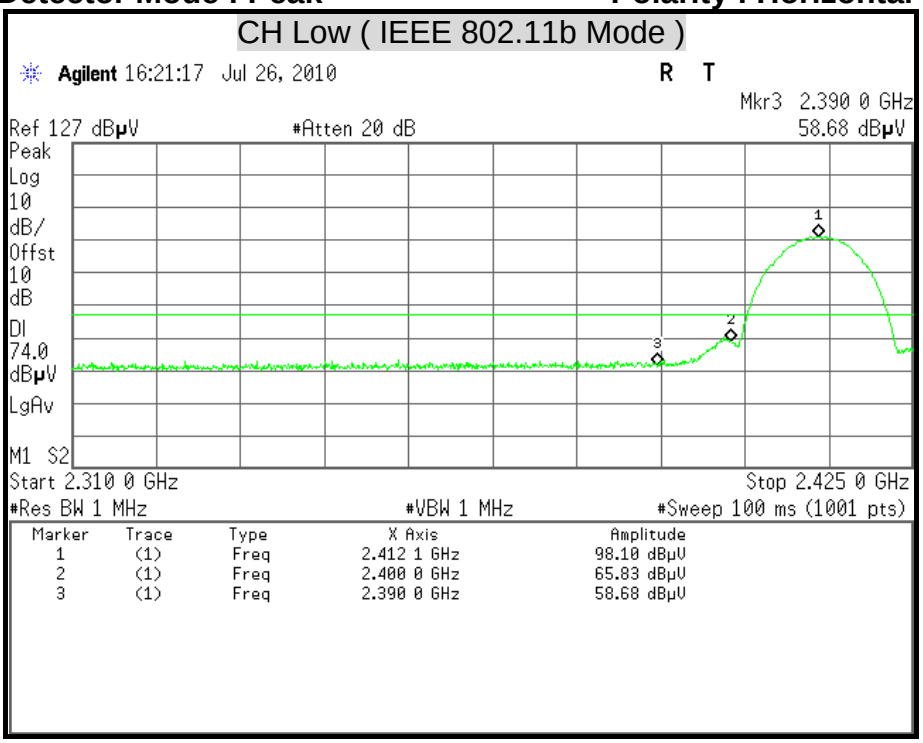
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1084.00	54.60	---	-4.42	50.18	---	74.00	54.00	-3.82	Peak
1364.00	53.15	---	-3.58	49.57	---	74.00	54.00	-4.43	Peak
2246.00	55.50	43.87	1.96	57.46	45.83	74.00	54.00	-8.17	AVG
2452.00	106.36	---	2.31	108.68	---	---	---	---	Carrier
3922.50	42.63	---	5.01	47.64	---	74.00	54.00	-6.36	Peak
4905.00	41.05	---	7.40	48.44	---	74.00	54.00	-5.56	Peak
7357.50	44.79	31.89	9.21	54.00	41.10	74.00	54.00	-12.90	AVG

Remark:

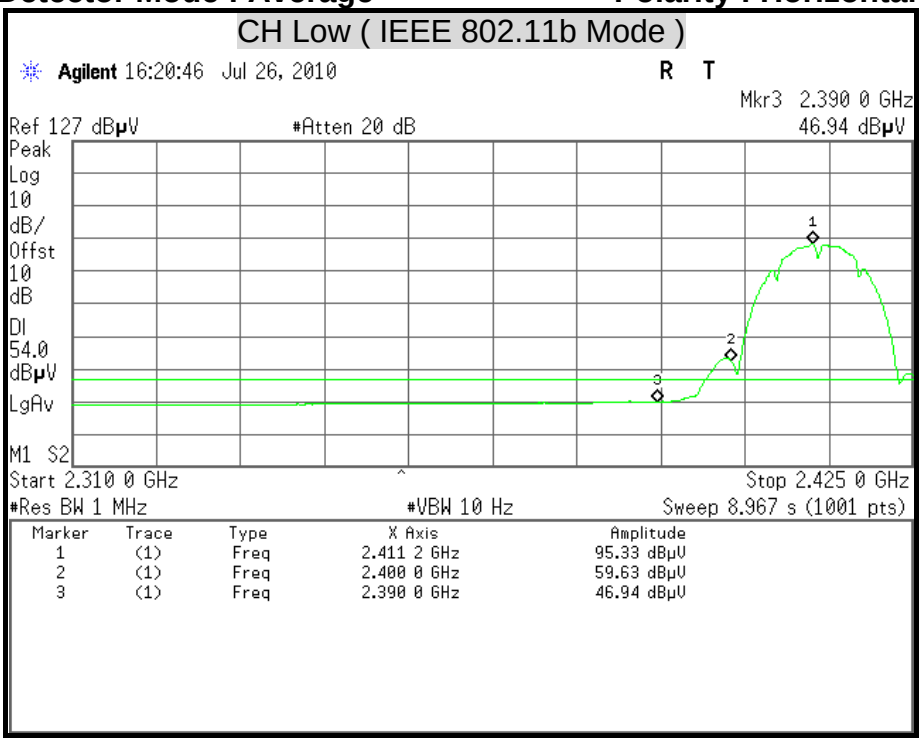
1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Restricted Band Edges

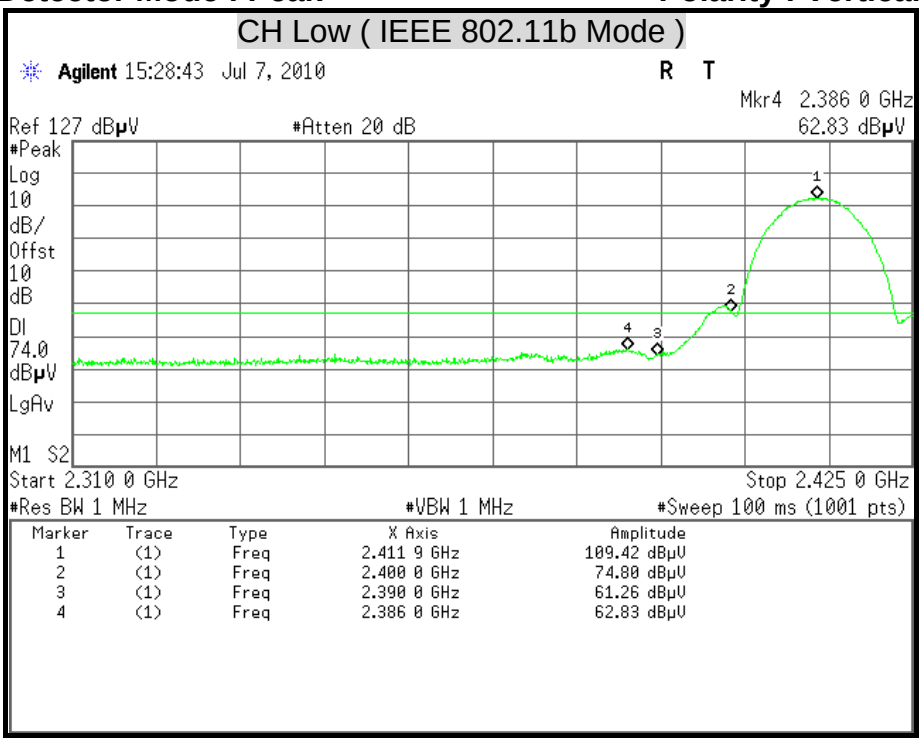
Detector Mode : Peak **Polarity : Horizontal**



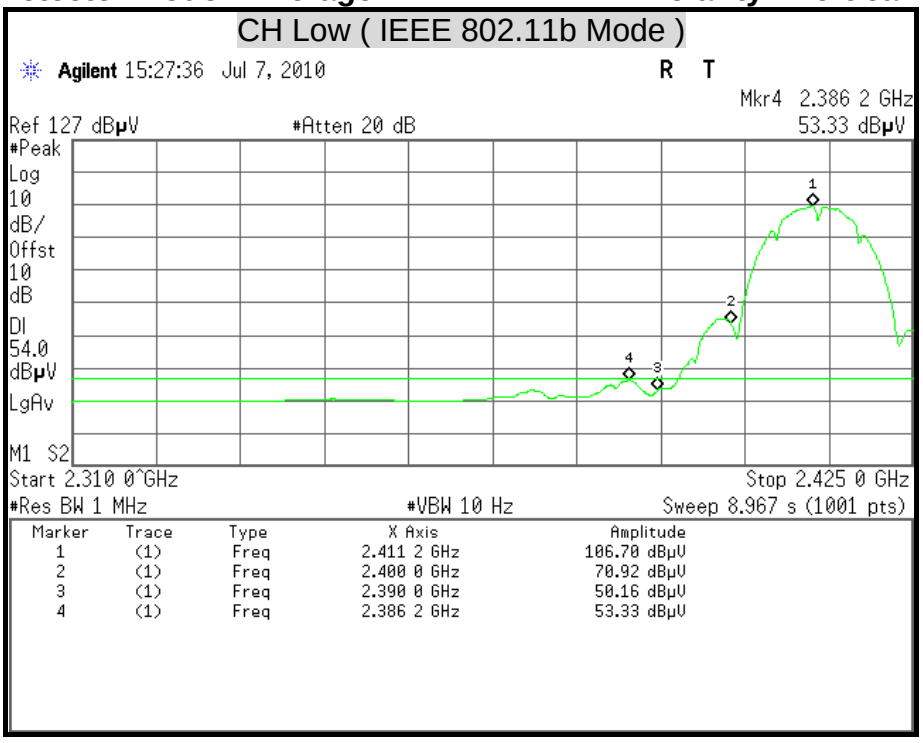
Detector Mode : Average **Polarity : Horizontal**



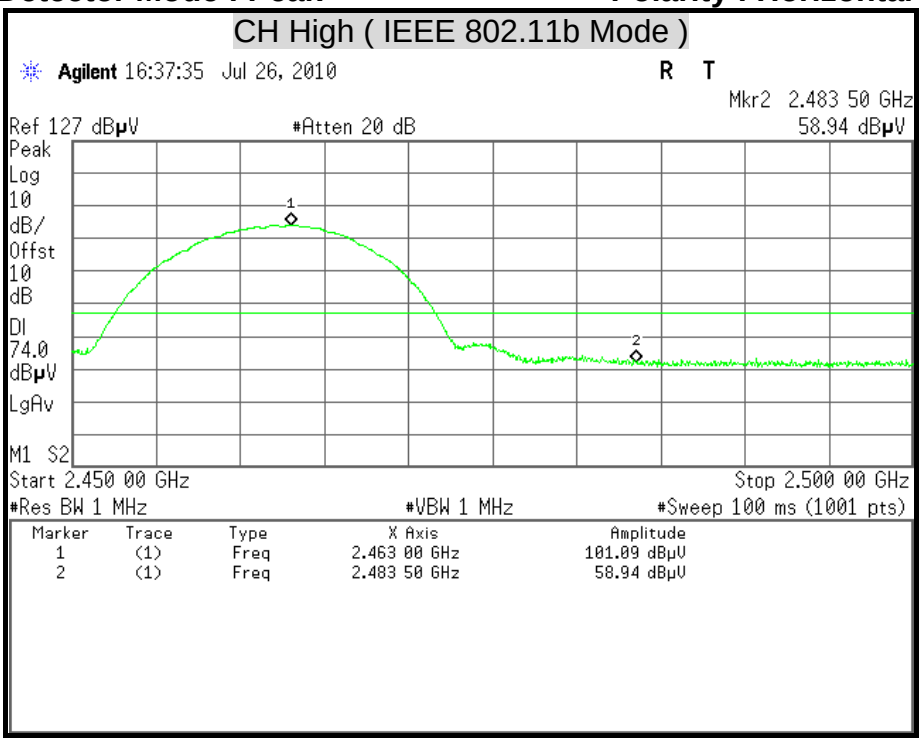
Detector Mode : Peak **Polarity : Vertical**



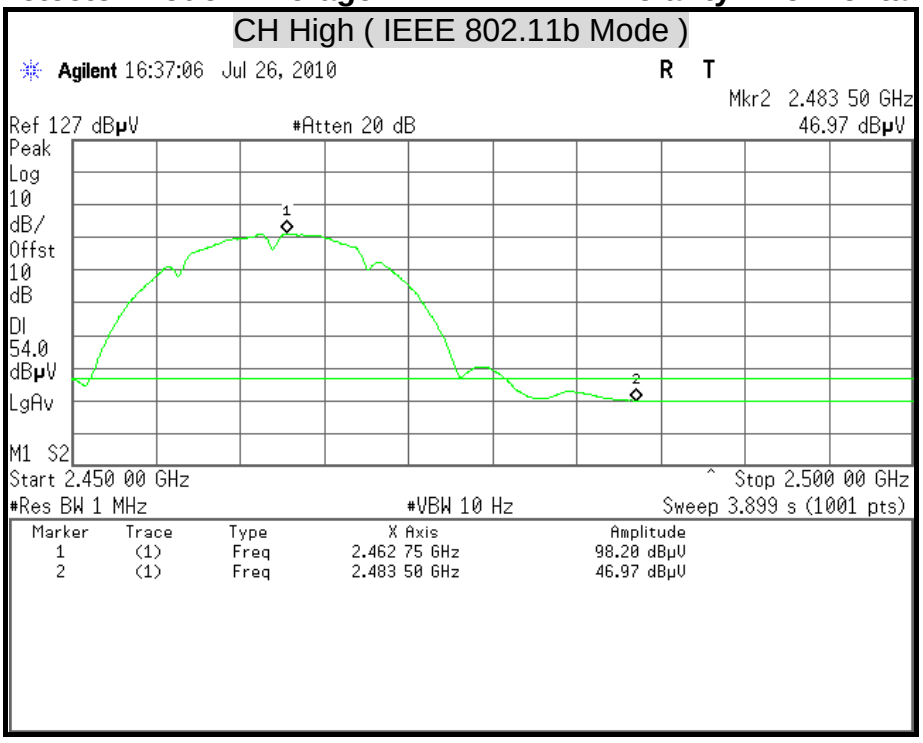
Detector Mode : Average **Polarity : Vertical**



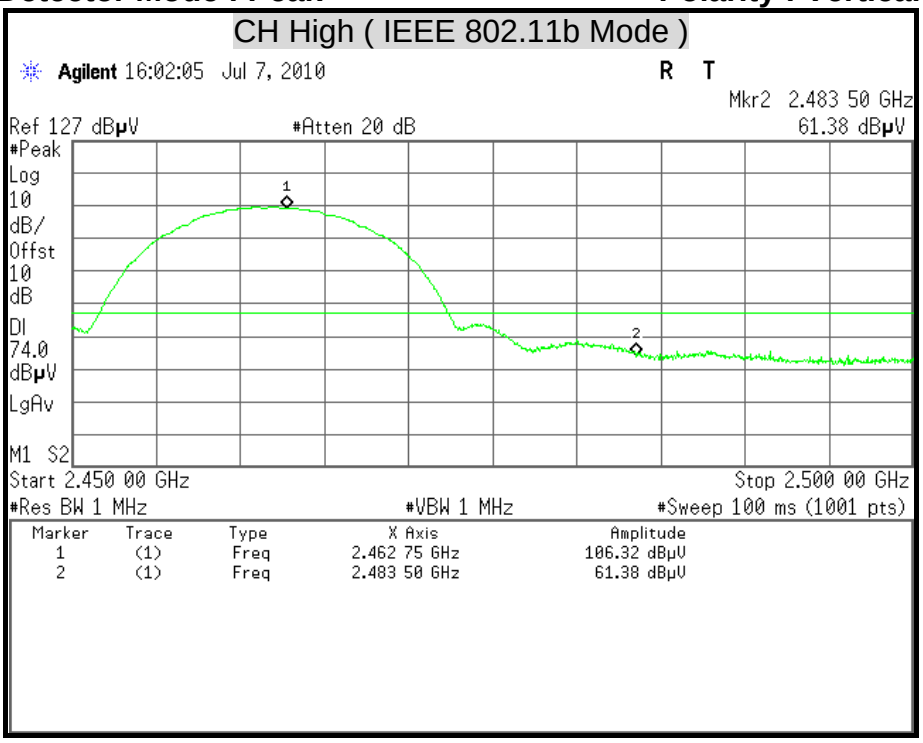
Detector Mode : Peak **Polarity : Horizontal**



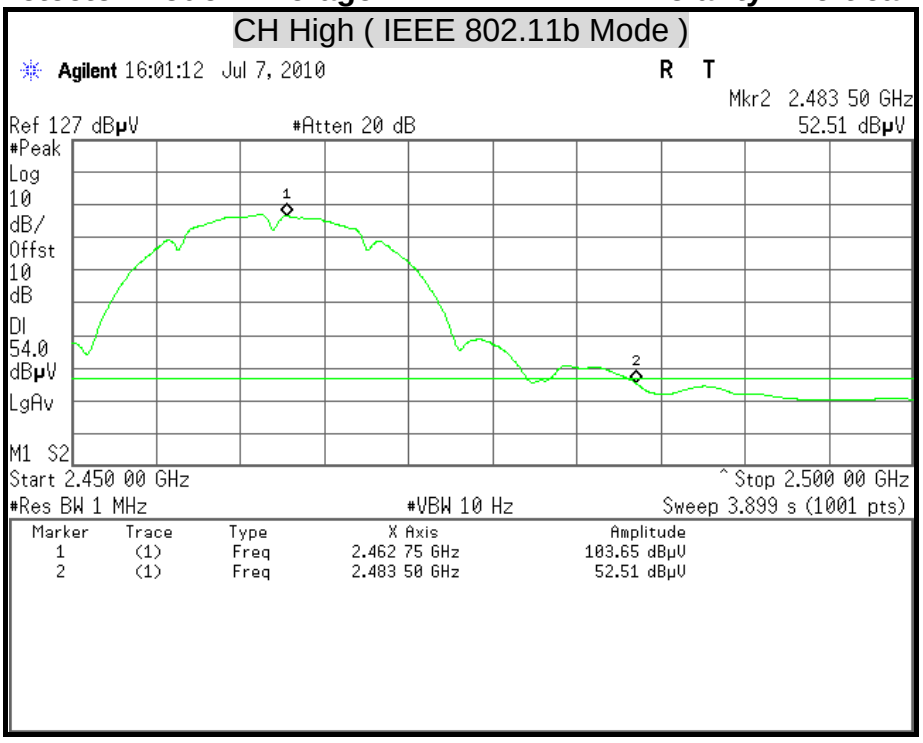
Detector Mode : Average **Polarity : Horizontal**



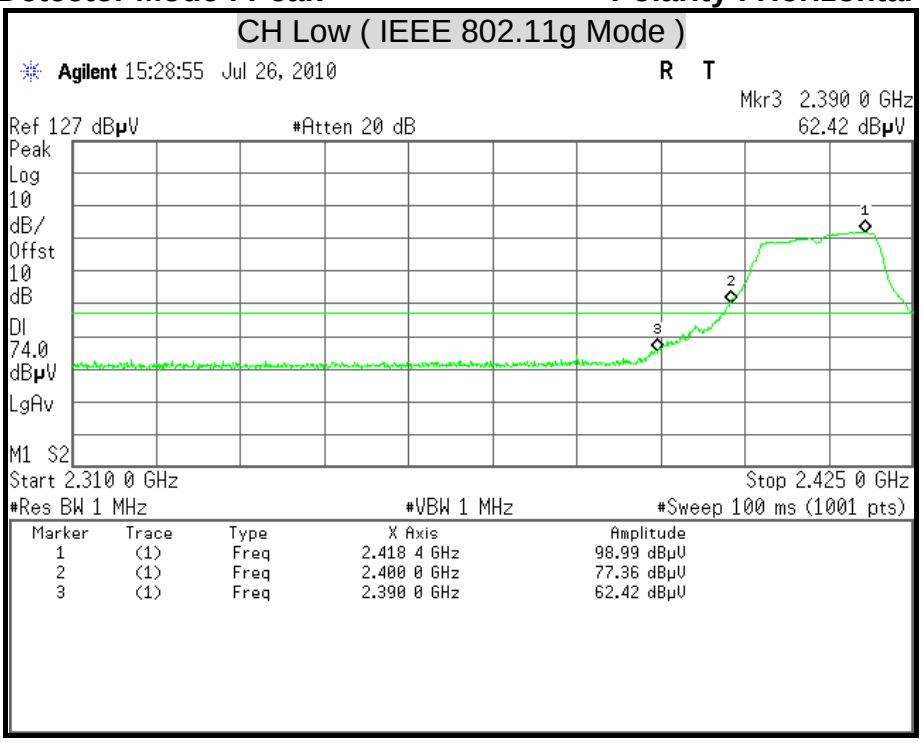
Detector Mode : Peak **Polarity : Vertical**



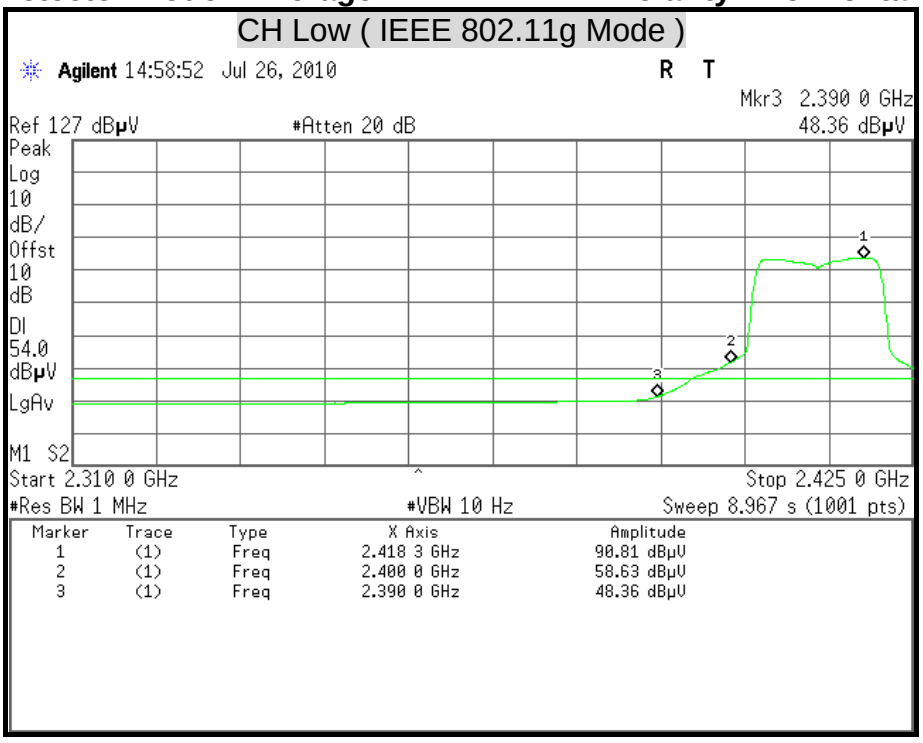
Detector Mode : Average **Polarity : Vertical**



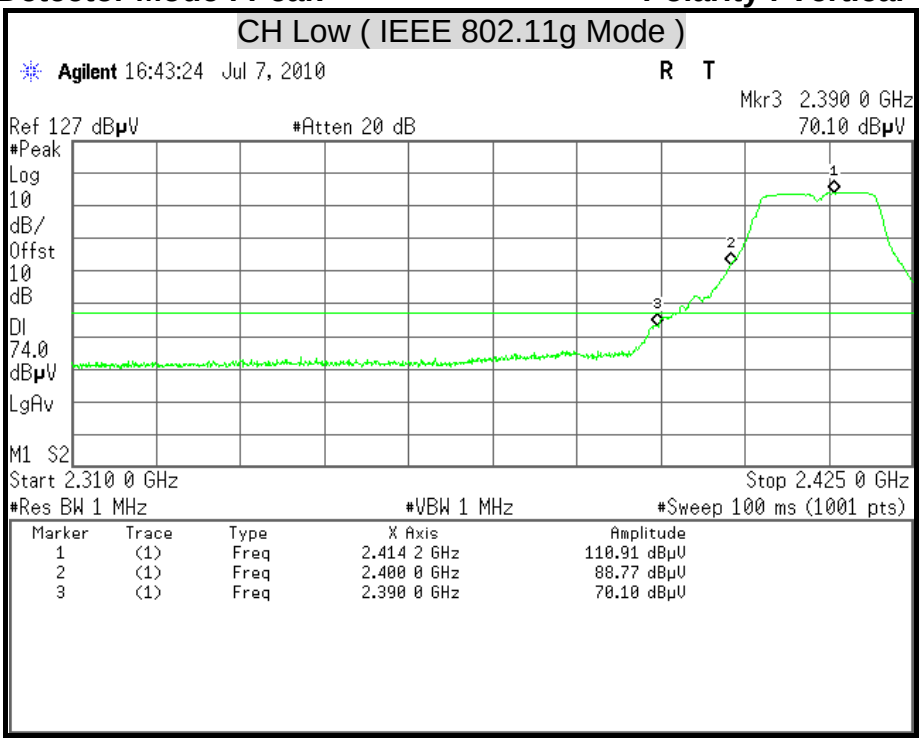
Detector Mode : Peak **Polarity : Horizontal**



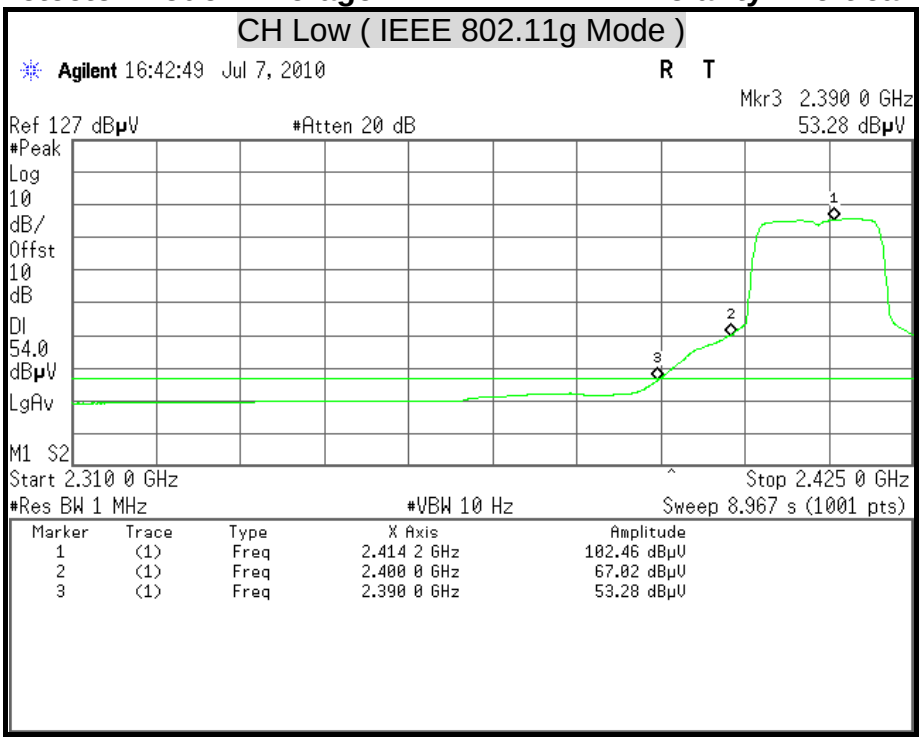
Detector Mode : Average **Polarity : Horizontal**



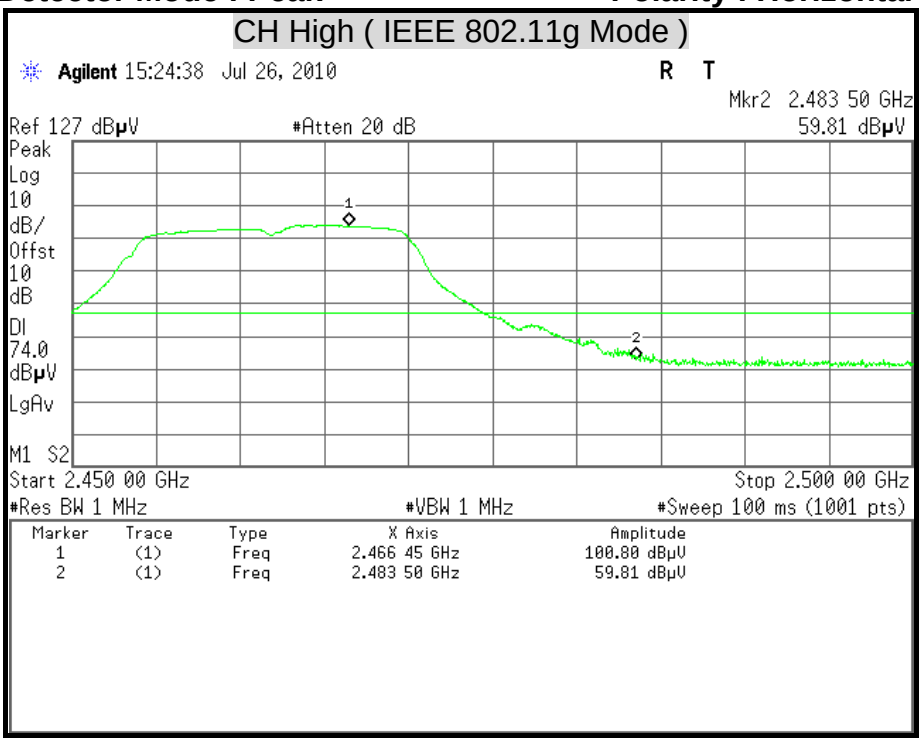
Detector Mode : Peak **Polarity : Vertical**



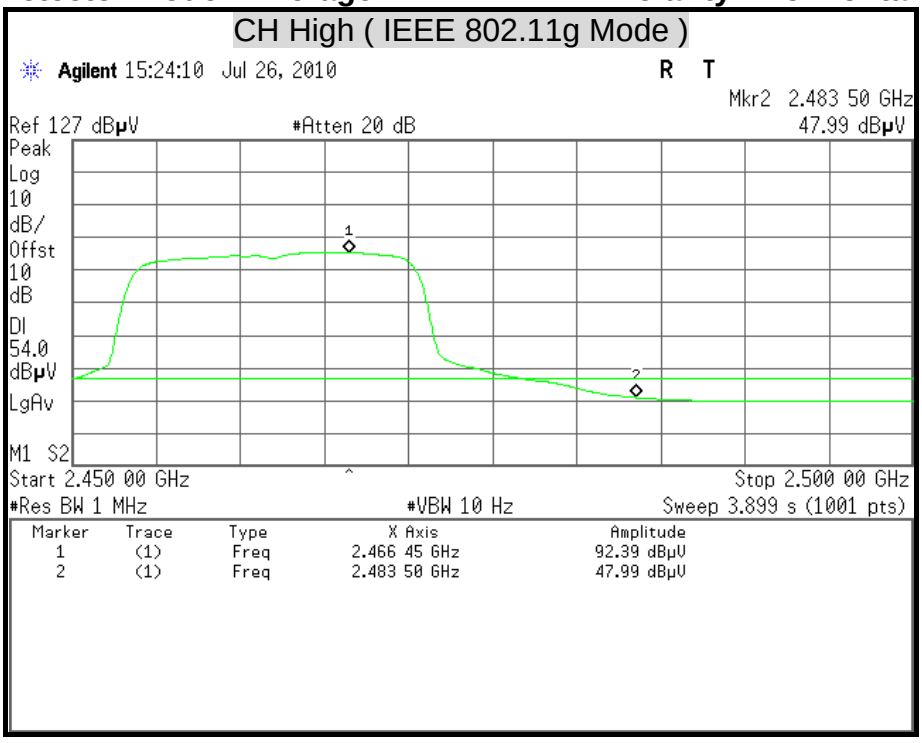
Detector Mode : Average **Polarity : Vertical**



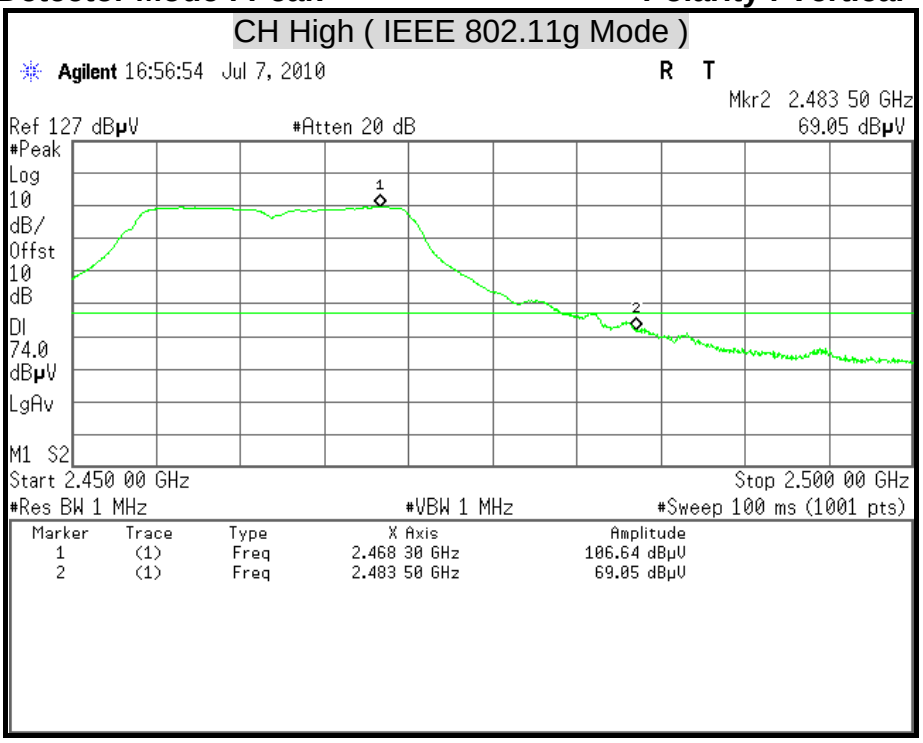
Detector Mode : Peak **Polarity : Horizontal**



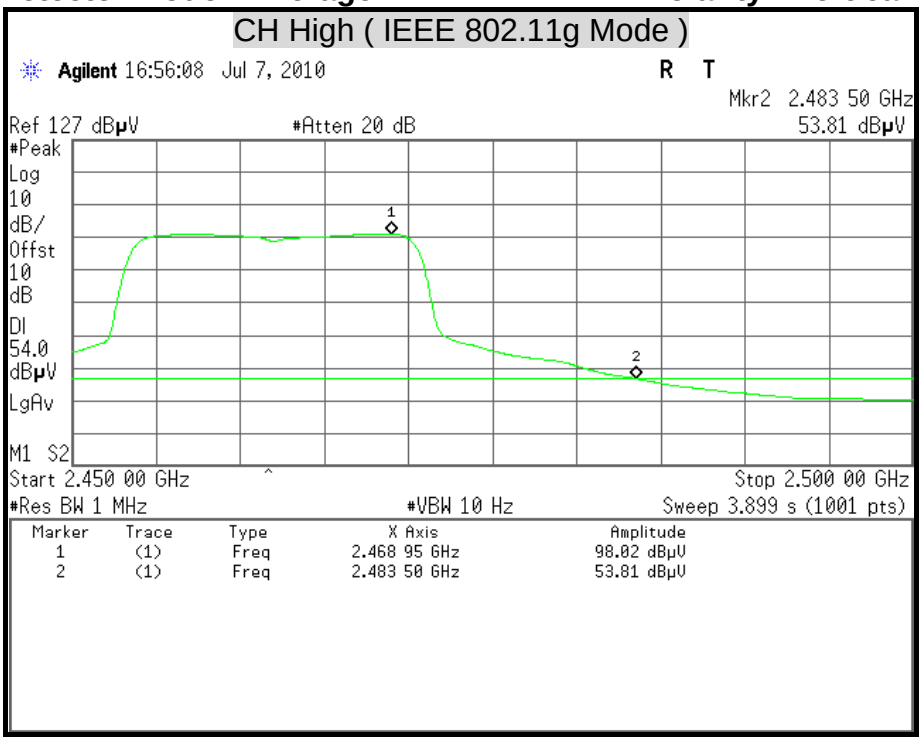
Detector Mode : Average **Polarity : Horizontal**



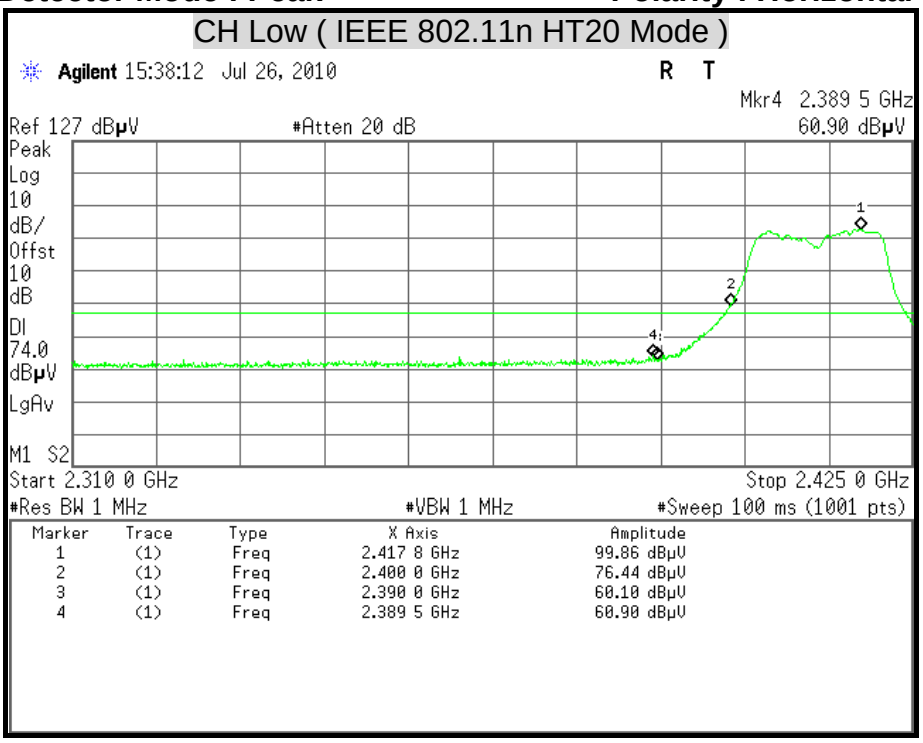
Detector Mode : Peak **Polarity : Vertical**



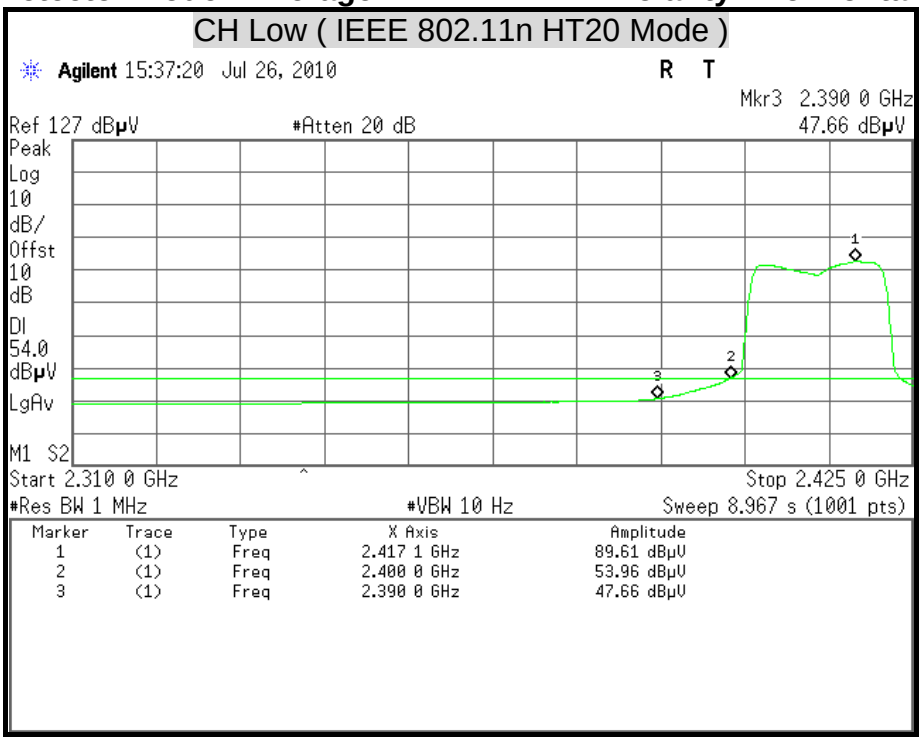
Detector Mode : Average **Polarity : Vertical**



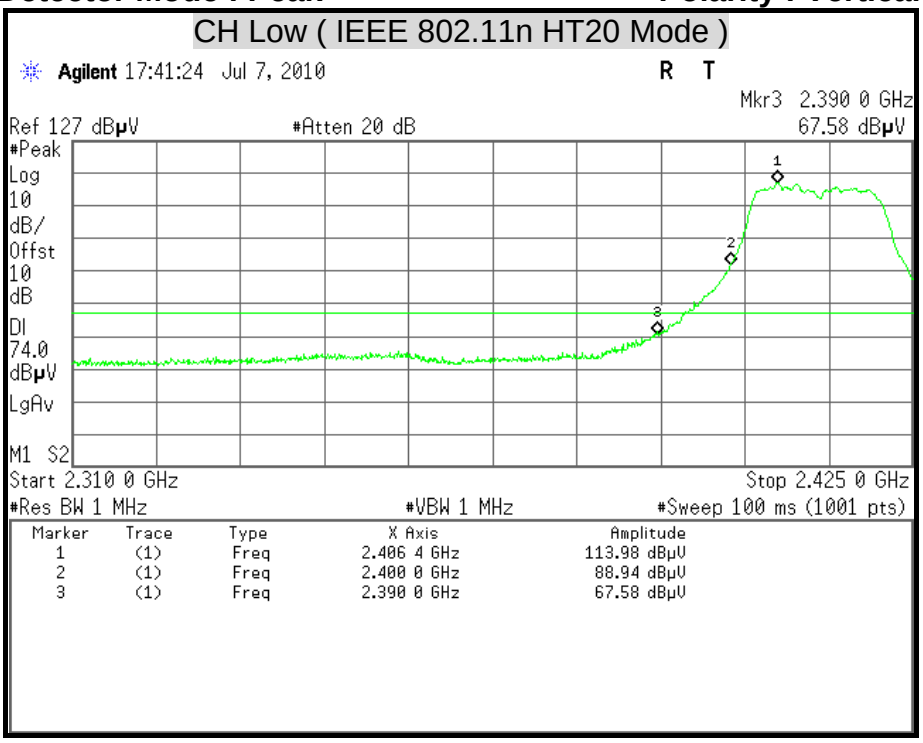
Detector Mode : Peak **Polarity : Horizontal**



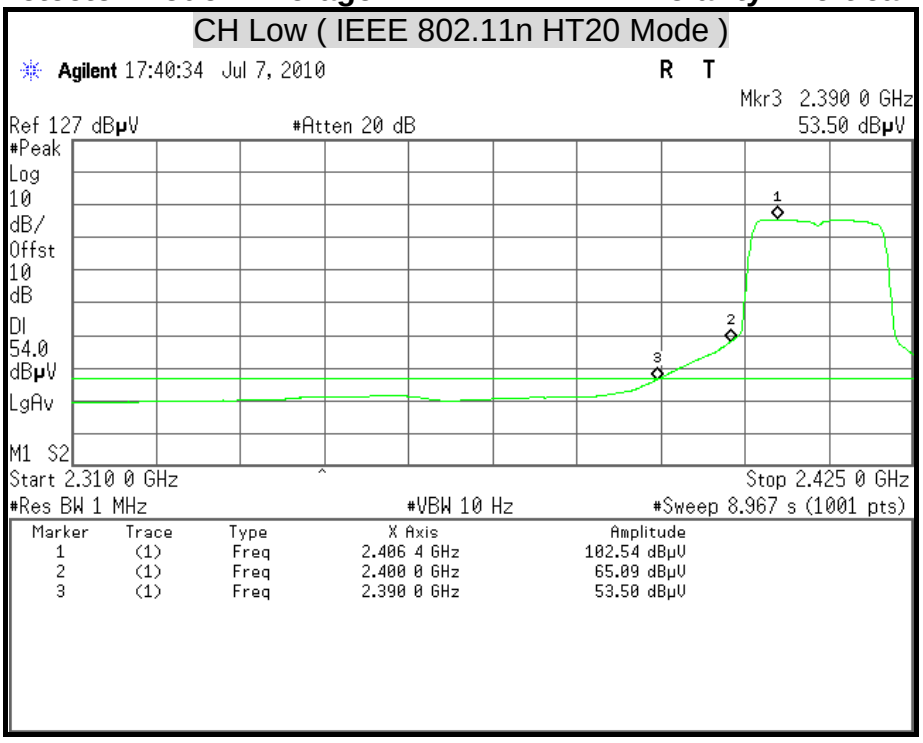
Detector Mode : Average **Polarity : Horizontal**



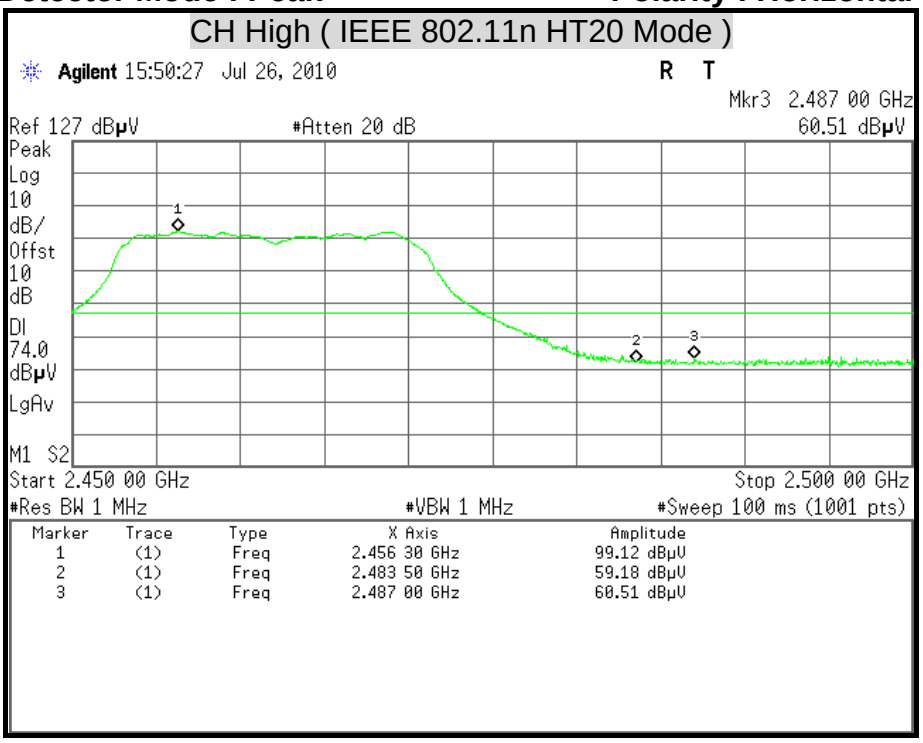
Detector Mode : Peak **Polarity : Vertical**



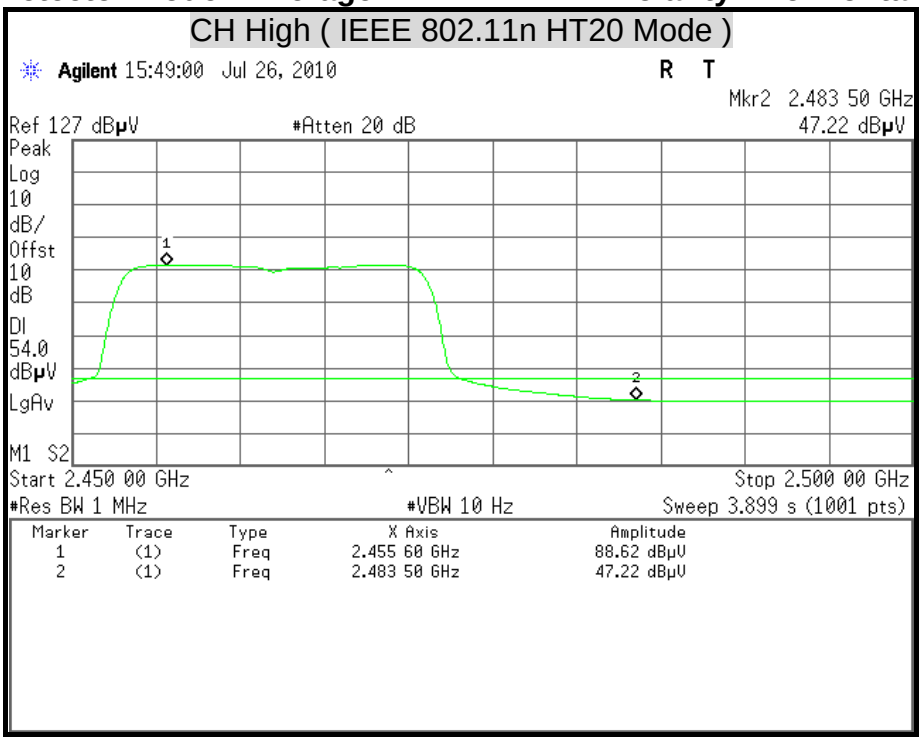
Detector Mode : Average **Polarity : Vertical**



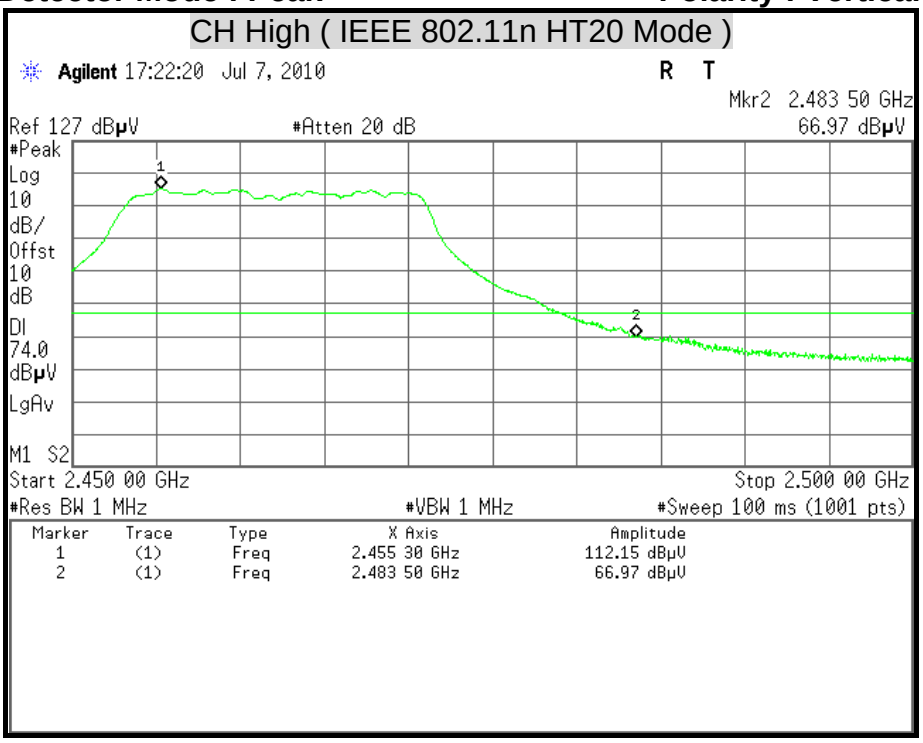
Detector Mode : Peak **Polarity : Horizontal**



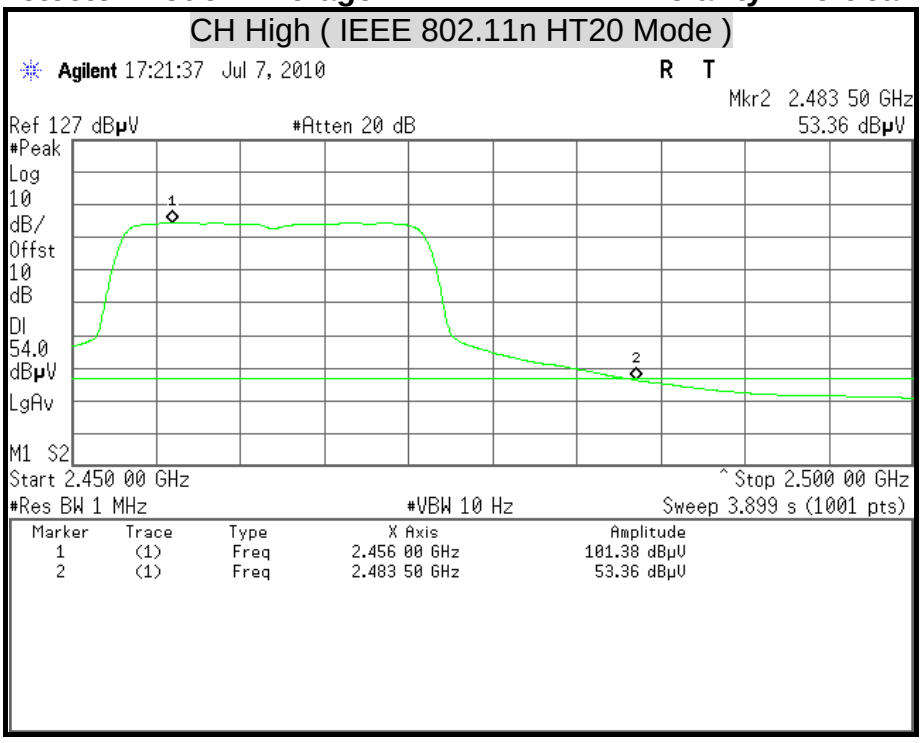
Detector Mode : Average **Polarity : Horizontal**



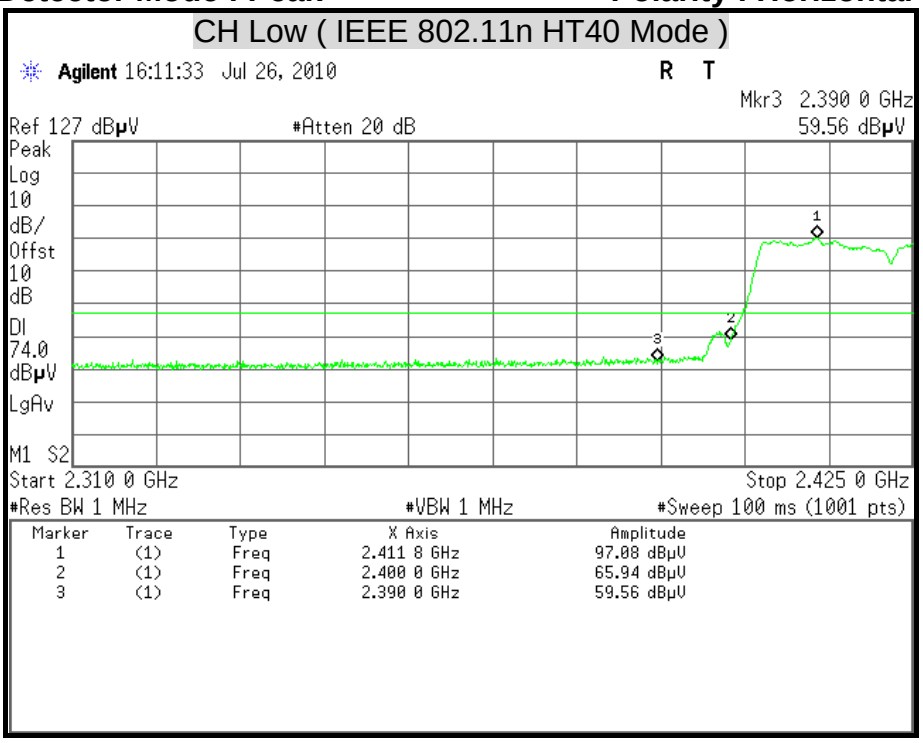
Detector Mode : Peak **Polarity : Vertical**



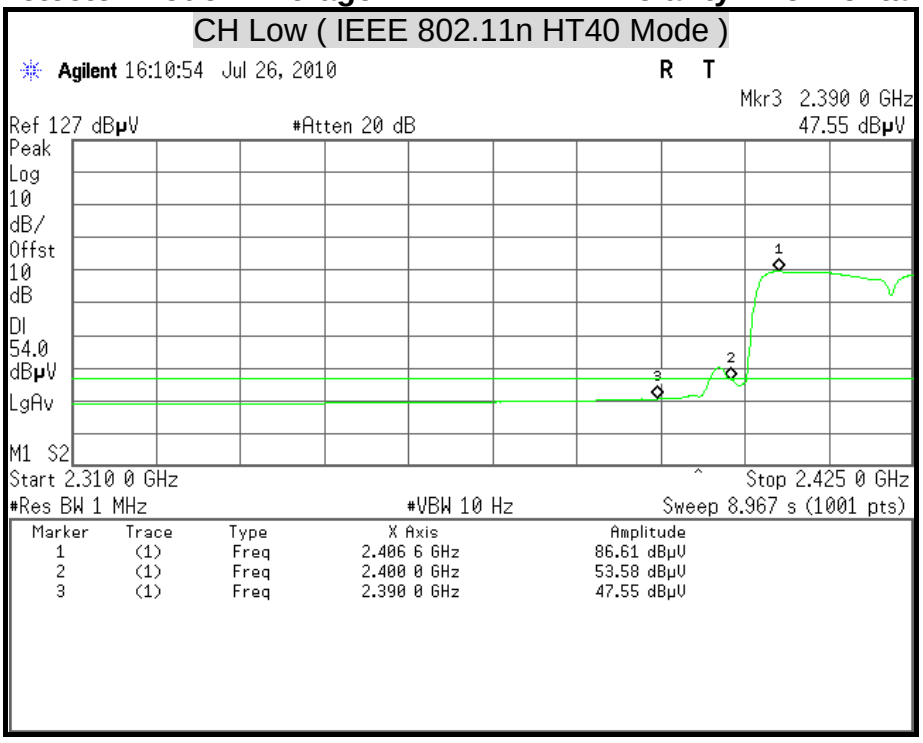
Detector Mode : Average **Polarity : Vertical**



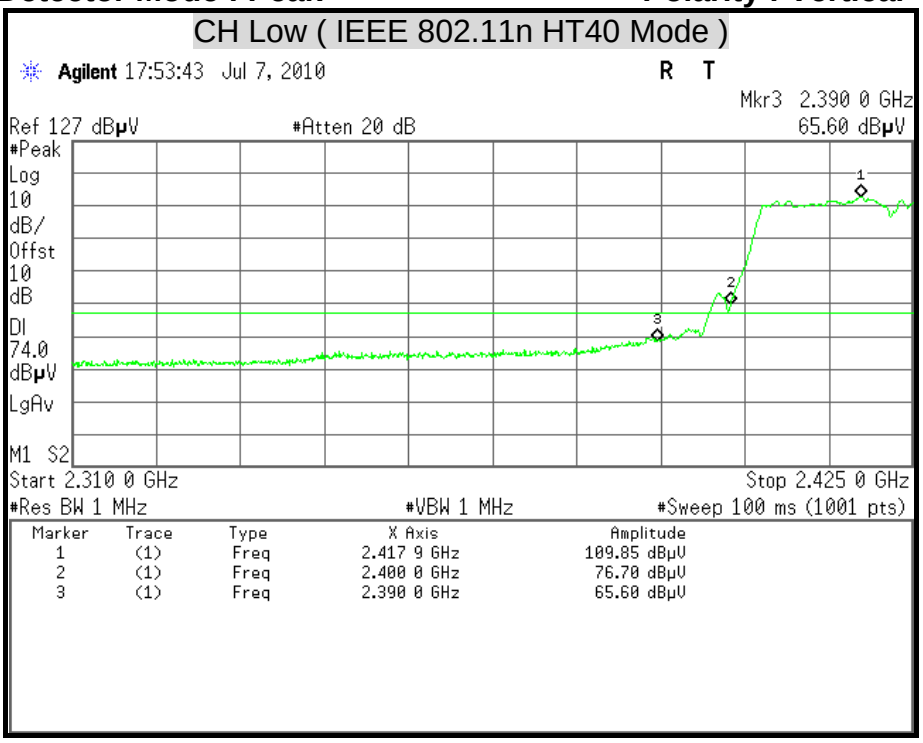
Detector Mode : Peak **Polarity : Horizontal**



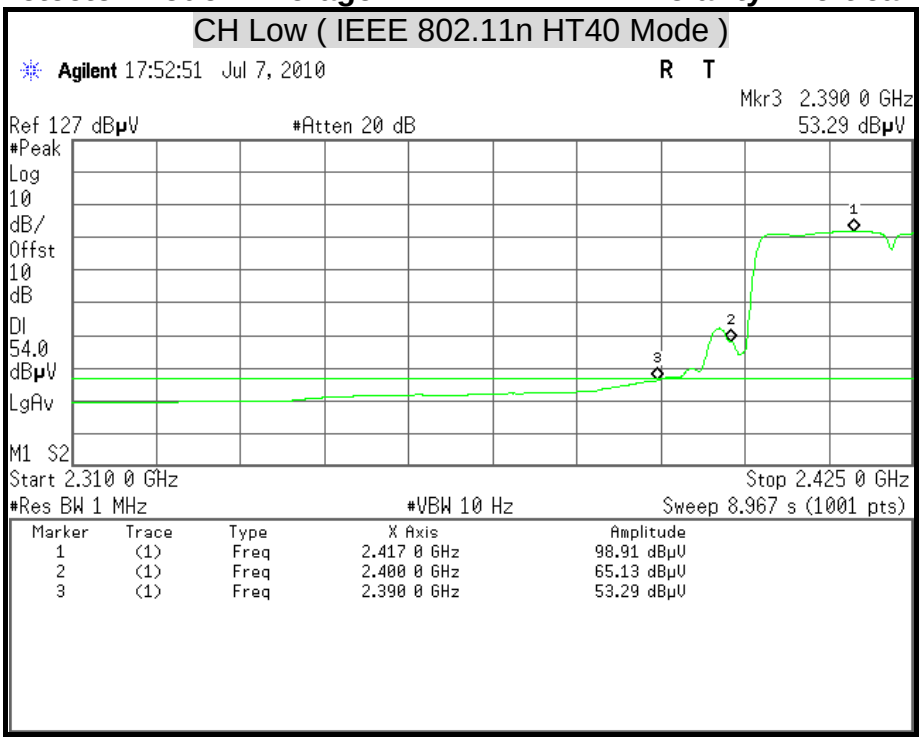
Detector Mode : Average **Polarity : Horizontal**



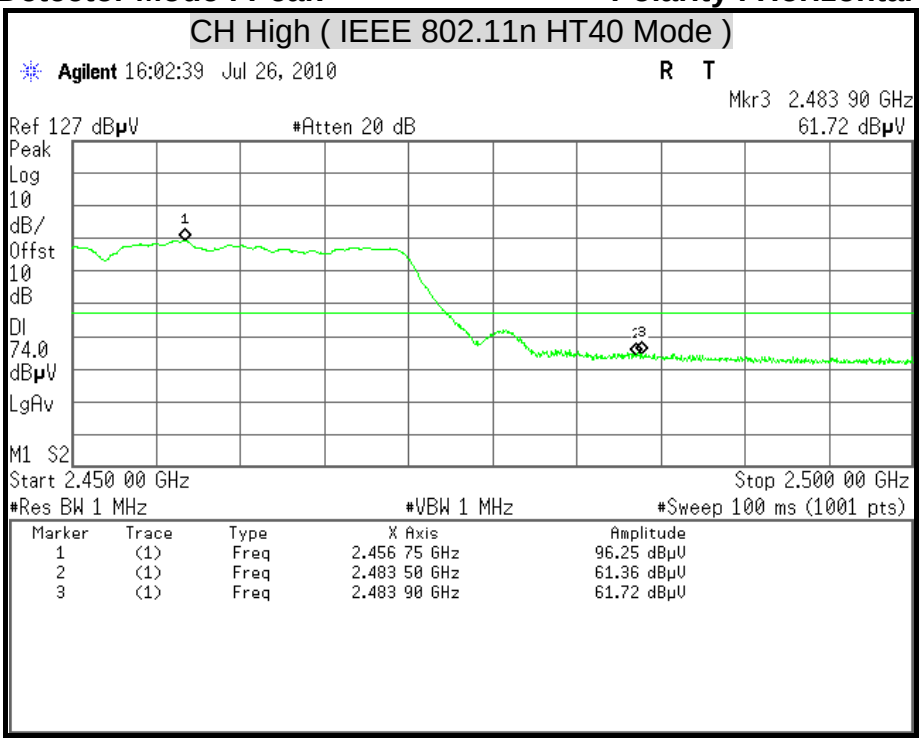
Detector Mode : Peak **Polarity : Vertical**



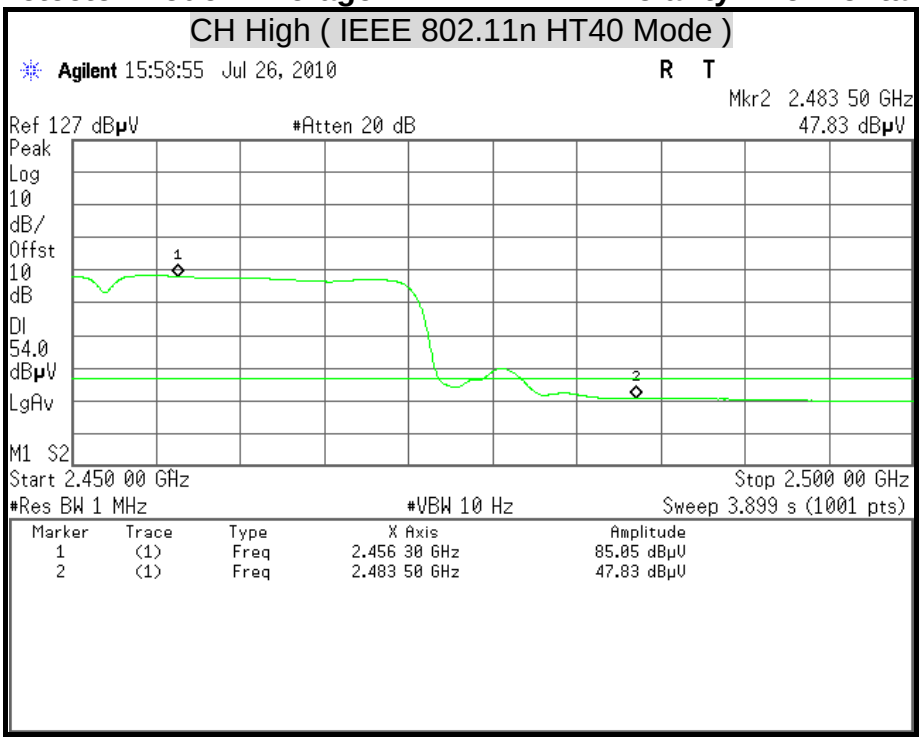
Detector Mode : Average **Polarity : Vertical**



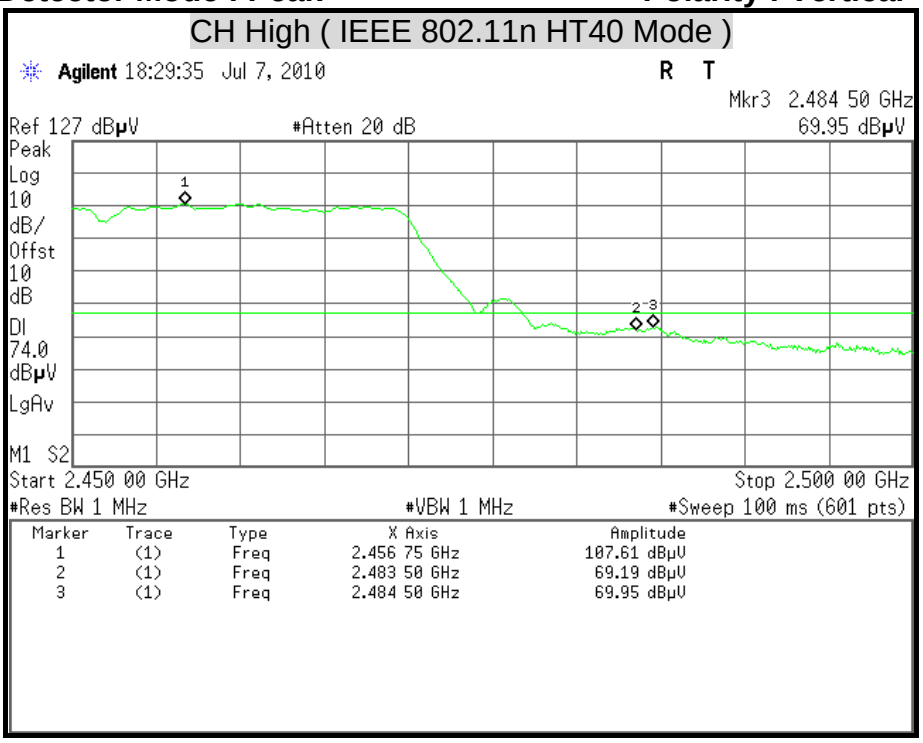
Detector Mode : Peak **Polarity : Horizontal**



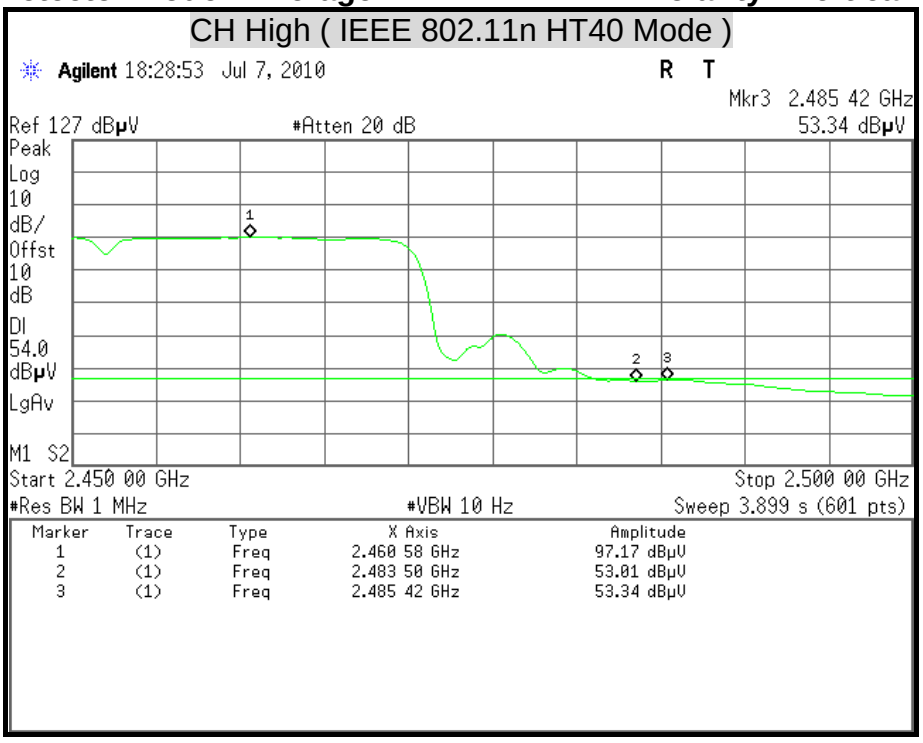
Detector Mode : Average **Polarity : Horizontal**



Detector Mode : Peak **Polarity : Vertical**



Detector Mode : Average **Polarity : Vertical**



7.7 CONDUCTED EMISSION

LIMITS

§ 15.207 (a) Except as shown in paragraph (b) and (c) 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.

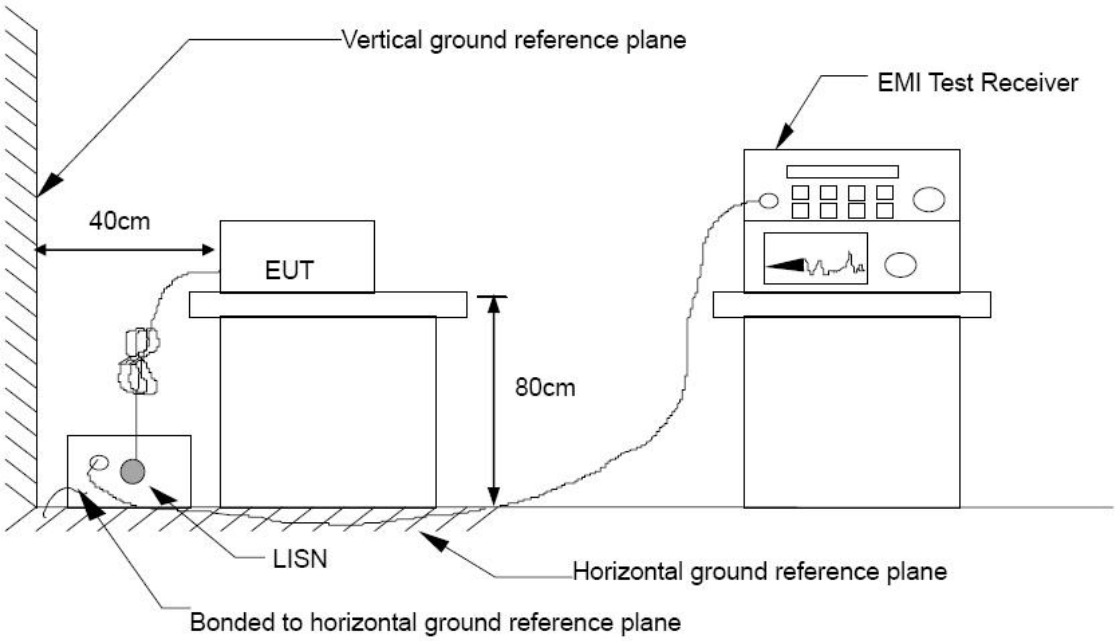
Frequency Range (MHz)	Conducted Limit (dBμv)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5.00	56	46
5.00 - 30.0	60	50

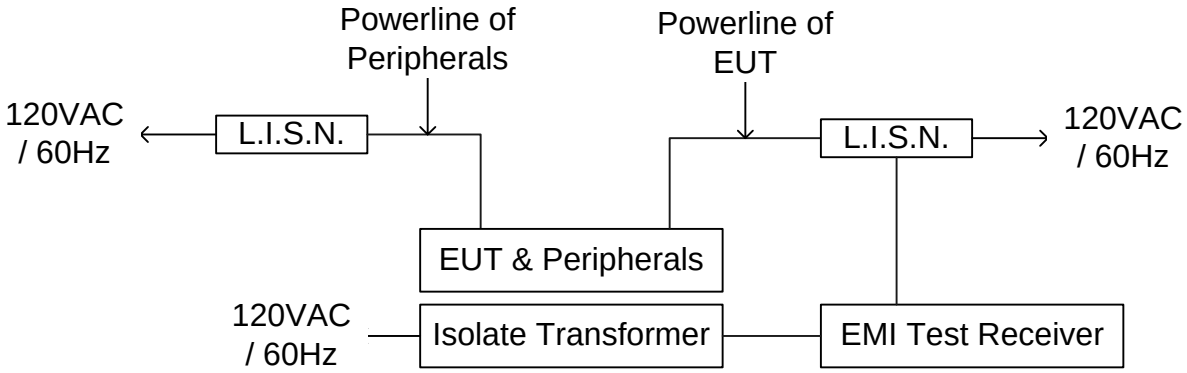
TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
L.I.S.N	SCHWARZBECK	NSLK 8127	8127-465	08/13/2010
L.I.S.N	SCHWARZBECK	NSLK 8127	8127-473	03/22/2011
EMI Test Receiver	ROHDE & SCHWARZ	ESHS 30	838550/003	01/28/2011
Pulse Limit	ROHDE & SCHWARZ	ESH3-Z2	100117	09/17/2010
N Type Coaxial Cable	BELDEN	8268 M17/164	003	07/09/2011

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

TEST SETUP





TEST PROCEDURE

The basic test procedure was in accordance with ANSI C63.4:2009.

The test procedure is performed in a 4m × 3m × 2.4m (L×W×H) shielded room.

The EUT along with its peripherals were placed on a 1.0m (W) × 1.5m (L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.

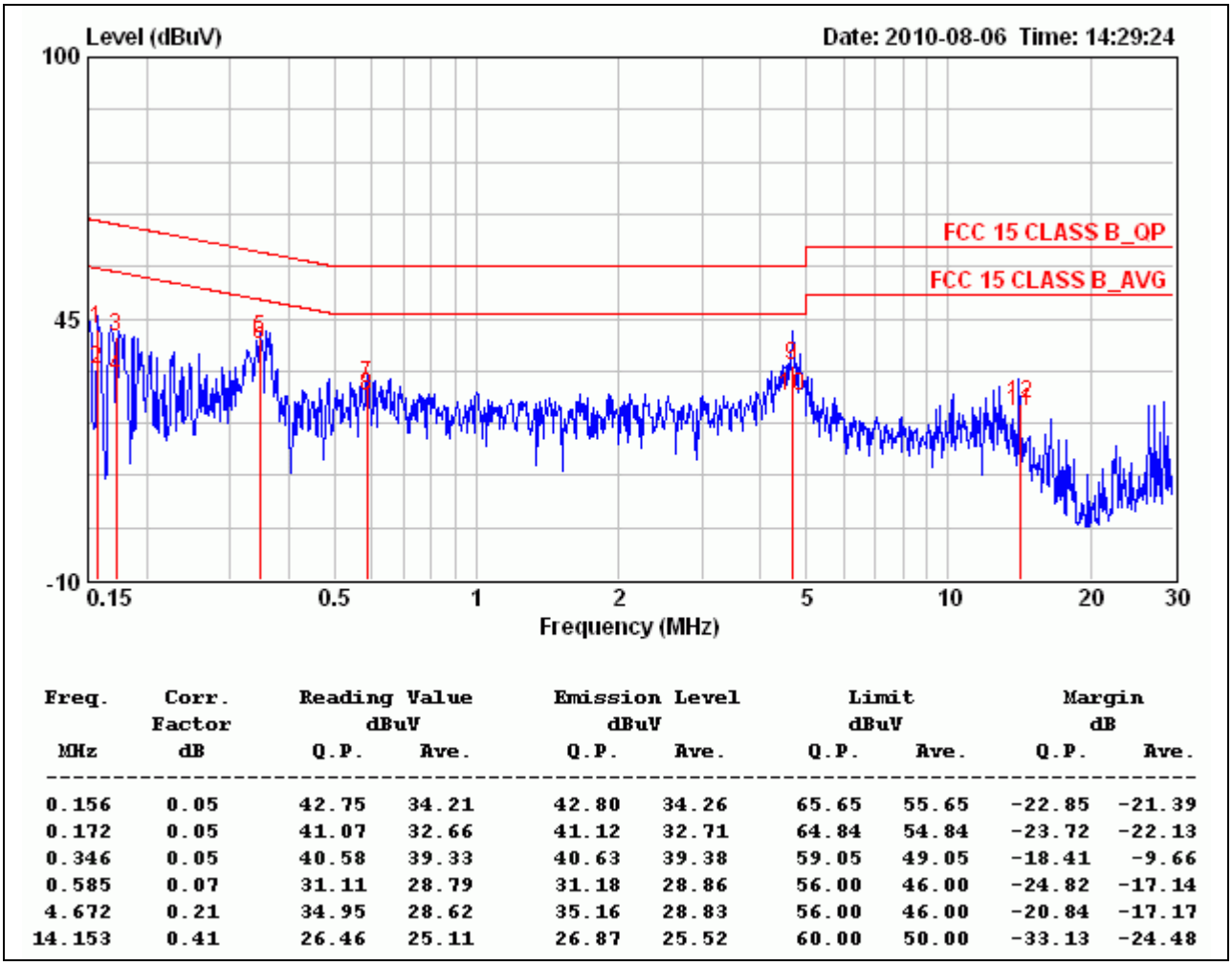
The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.

The EUT was located so that the distance between the boundary of the EUT and the closest surface of the LISN is 0.8 m. Where a mains flexible cord was provided by the manufacturer shall be 1 m long, or if in excess of 1 m, the excess cable was folded back and forth as far as possible so as to form a bundle not exceeding 0.4 m in length.

TEST RESULTS

Product Name	Wireless N Router	Test By	Benny Wu
Model	DIR-515	Test Date	2010/08/06
Test Mode	Normal operating / Power Adapter (1)	Temp. & Humidity	24.9°C, 58%

LINE



Freq.	Corr. Factor	Reading Value dBuV		Emission Level dBuV		Limit dBuV		Margin dB	
MHz	dB	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.
0.156	0.05	42.75	34.21	42.80	34.26	65.65	55.65	-22.85	-21.39
0.172	0.05	41.07	32.66	41.12	32.71	64.84	54.84	-23.72	-22.13
0.346	0.05	40.58	39.33	40.63	39.38	59.05	49.05	-18.41	-9.66
0.585	0.07	31.11	28.79	31.18	28.86	56.00	46.00	-24.82	-17.14
4.672	0.21	34.95	28.62	35.16	28.83	56.00	46.00	-20.84	-17.17
14.153	0.41	26.46	25.11	26.87	25.52	60.00	50.00	-33.13	-24.48

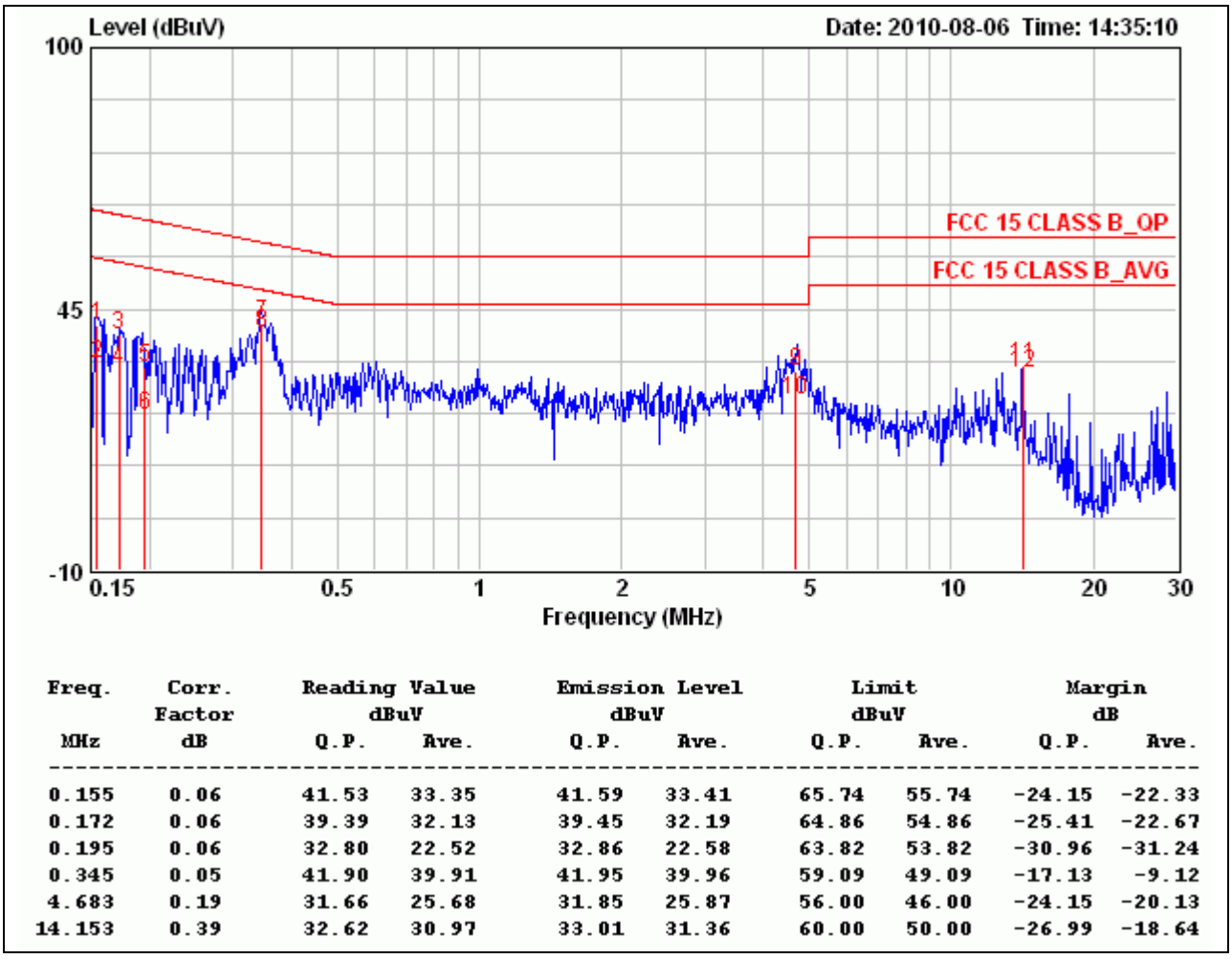
Remark:

1. Correction Factor = Insertion loss + cable loss

2. Margin value = Emission level – Limit value

Product Name	Wireless N Router	Test By	Benny Wu
Model	DIR-515	Test Date	2010/08/06
Test Mode	Normal operating / Power Adapter (1)	Temp. & Humidity	24.9°C, 58%

NEUTRAL



Freq.	Corr. Factor	Reading Value dBuV		Emission Level dBuV		Limit dBuV		Margin dB	
MHz	dB	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.
0.155	0.06	41.53	33.35	41.59	33.41	65.74	55.74	-24.15	-22.33
0.172	0.06	39.39	32.13	39.45	32.19	64.86	54.86	-25.41	-22.67
0.195	0.06	32.80	22.52	32.86	22.58	63.82	53.82	-30.96	-31.24
0.345	0.05	41.90	39.91	41.95	39.96	59.09	49.09	-17.13	-9.12
4.683	0.19	31.66	25.68	31.85	25.87	56.00	46.00	-24.15	-20.13
14.153	0.39	32.62	30.97	33.01	31.36	60.00	50.00	-26.99	-18.64

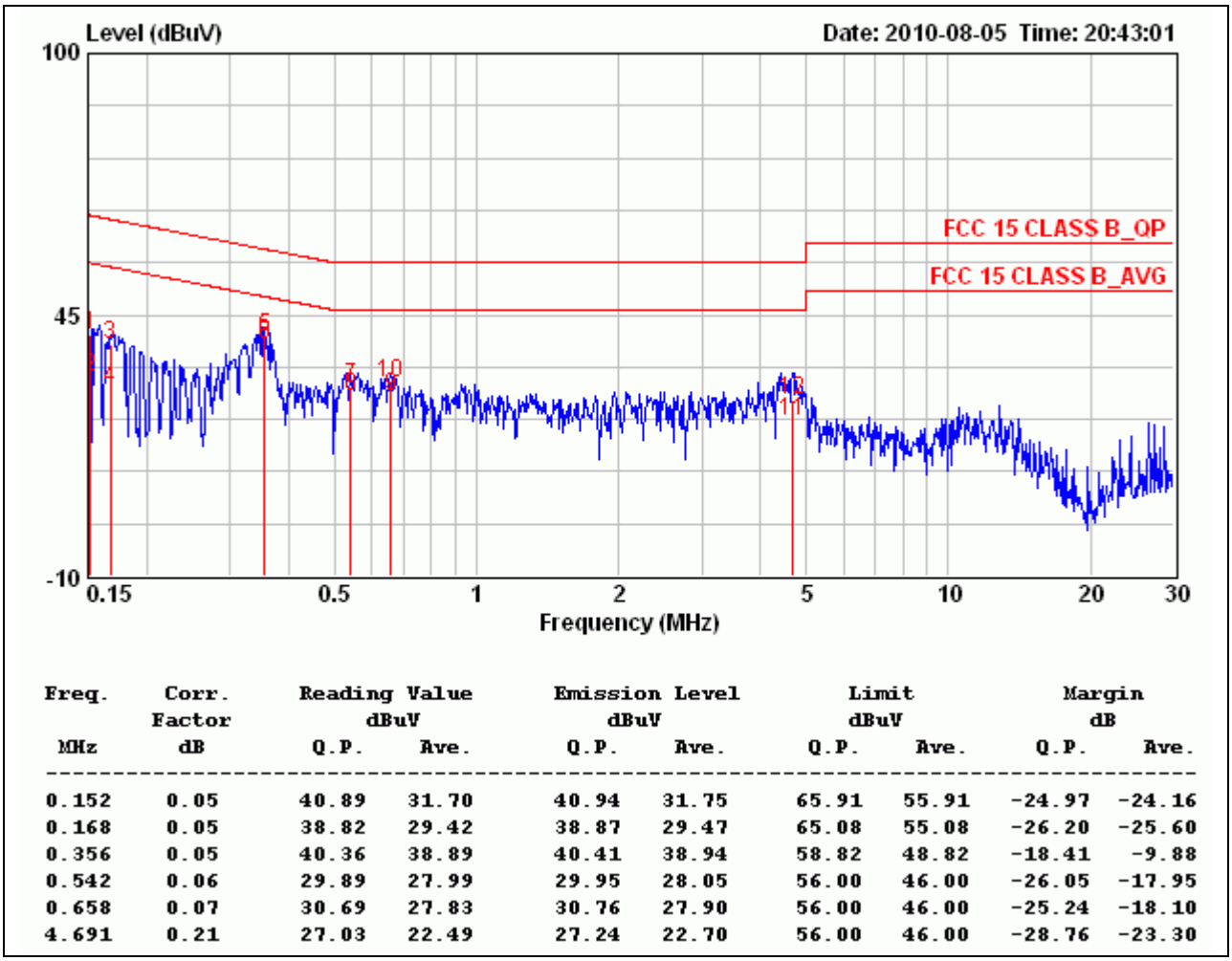
Remark:

1. Correction Factor = Insertion loss + cable loss

2. Margin value = Emission level – Limit value

Product Name	Wireless N Router	Test By	Benny Wu
Model	DIR-515	Test Date	2010/08/05
Test Mode	Normal operating / Power Adapter (2)	Temp. & Humidity	24.9°C, 58%

LINE



Freq. MHz	Corr. Factor dB	Reading Value dBuV Q.P.	Reading Value dBuV Ave.	Emission Level dBuV Q.P.	Emission Level dBuV Ave.	Limit dBuV Q.P.	Limit dBuV Ave.	Margin dB Q.P.	Margin dB Ave.
0.152	0.05	40.89	31.70	40.94	31.75	65.91	55.91	-24.97	-24.16
0.168	0.05	38.82	29.42	38.87	29.47	65.08	55.08	-26.20	-25.60
0.356	0.05	40.36	38.89	40.41	38.94	58.82	48.82	-18.41	-9.88
0.542	0.06	29.89	27.99	29.95	28.05	56.00	46.00	-26.05	-17.95
0.658	0.07	30.69	27.83	30.76	27.90	56.00	46.00	-25.24	-18.10
4.691	0.21	27.03	22.49	27.24	22.70	56.00	46.00	-28.76	-23.30

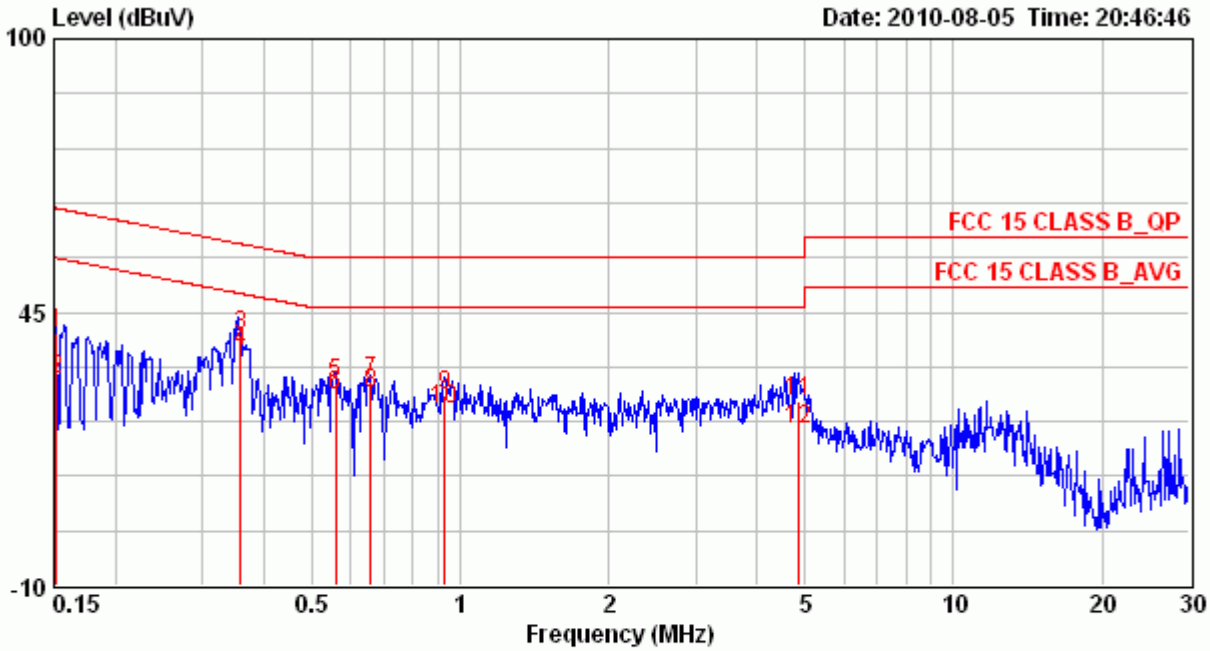
Remark:

1. Correction Factor = Insertion loss + cable loss

2. Margin value = Emission level – Limit value

Product Name	Wireless N Router	Test By	Benny Wu
Model	DIR-515	Test Date	2010/08/05
Test Mode	Normal operating / Power Adapter (2)	Temp. & Humidity	24.9°C, 58%

NEUTRAL



Freq.	Corr. Factor	Reading Value dBuV		Emission Level dBuV		Limit dBuV		Margin dB	
MHz	dB	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.
0.152	0.06	40.69	31.33	40.75	31.39	65.91	55.91	-25.16	-24.52
0.358	0.05	40.50	37.14	40.55	37.19	58.78	48.78	-18.22	-11.58
0.558	0.06	30.58	28.18	30.64	28.24	56.00	46.00	-25.36	-17.76
0.658	0.07	31.11	28.47	31.18	28.54	56.00	46.00	-24.82	-17.46
0.929	0.08	28.30	25.44	28.38	25.52	56.00	46.00	-27.62	-20.48
4.848	0.19	26.79	21.31	26.98	21.50	56.00	46.00	-29.02	-24.50

Remark:

1. Correction Factor = Insertion loss + cable loss

2. Margin value = Emission level – Limit value

APPENDIX I MAXIMUM PERMISSIBLE EXPOSURE

According to FCC 1.1310 : The criteria listed in the following table shall be used to evaluate theenvironment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time
(A) Limits for Occupational / Control Exposures				
300-1,500	--	--	F/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Population / Uncontrol Exposures				
300-1,500	--	--	F/1500	6
1,500-100,000	--	--	1	30

CALCULATIONS

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

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

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm2

LIMIT

Power Density Limit, S=1.0mW/cm^2

TEST RESULTS

Mode	Antenna Gain (dBi)	Minimum separation distance (cm)	Output Power (dBm)	Numeric antenna gain (mW)	Power Density Limit (mW/cm^2)	Power Density at 20cm (mW/cm^2)
IEEE 802.11b	4.00	20.0	21.19	2.51	1.00	0.065723
IEEE 802.11g	4.00	20.0	21.97	2.51	1.00	0.078654
IEEE 802.11n HT20	7.01	20.0	22.23	5.02	1.00	0.167001
IEEE 802.11n HT40	7.01	20.0	21.48	5.02	1.00	0.140514

Remark: *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.*