FCC 47 CFR PART 15 SUBPART C AND ANSI C63.4: 2003

TEST REPORT

For

N150 Wireless ADSL2/2+ Modem Router

Model: TEW-718BRM5

Data Applies To: TEW-718BRM

Brand: TRENDnet

Issued for

TRENDnet , Inc.

20675 Manhattan Place , Torrance , CA 90501 , U.S.A.

Issued by

Compliance Certification Services Inc.
Tainan Lab.
No.8,Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)

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Date of Issue: November 15, 2012

Testing Laboratory
1109

REVISION HISTORY

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	November 15, 2012	Initial Issue	ALL	Eva Lin

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1. TEST REPORT CERTIFICATION

Applicant	TRENDnet , Inc.
Address	20675 Manhattan Place , Torrance , CA 90501 , U.S.A.
Equipment Under Test	N150 Wireless ADSL2/2+ Modem Router
Model	TEW-718BRM5
Data Applies To	TEW-718BRM
Brand	TRENDnet
Date of Test	September 21, 2012 ~ October 03, 2012

APPLICABLE STANDARD	
STANDARD	**TEST RESULT**
FCC Part 15 Subpart C AND ANSI C63.4 : 2003	No non-compliance noted

Approved by:

Jeter Wu
Assistant Manager

Reviewed by:

Eric Huang
Assistant Section Manager

2. EUT DESCRIPTION

Product Name	N150 Wireless ADSL2/2+ Modem Router
Model	TEW-718BRM5
Data Applies To	TEW-718BRM
Brand	TRENDnet
Received Date	September 20, 2012
Frequency Range	IEEE 802.11b/g, 802.11n HT20 (DTS Band):2412MHz~2462MHz IEEE 802.11n HT40 (DTS Band):2422MHz~2452MHz
Transmit Power (Antenna 1: 4.04 dBi)	IEEE 802.11b Mode : 19.62dBm (DTS Band) (91.622mW) IEEE 802.11g Mode : 21.28dBm (DTS Band) (134.28mW) IEEE 802.11n HT20 Mode : 21.62dBm (DTS Band) (145.21mW) IEEE 802.11n HT40 Mode : 22.17dBm (DTS Band) (164.82mW)
Transmit Power (Antenna 2: 2.0 dBi)	IEEE 802.11b Mode : 21.48dBm (DTS Band) (140.6mW) IEEE 802.11g Mode : 22.74dBm (DTS Band) (187.93mW) IEEE 802.11n HT20 Mode : 23.25dBm (DTS Band) (211.35mW) IEEE 802.11n HT40 Mode : 22.88dBm (DTS Band) (194.09mW)
Channel Spacing	IEEE 802.11b/g, 802.11n HT20/HT40: 5MHz
Channel Number	IEEE 802.11b/g, 802.11n HT20:11 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: 65, 58.5, 52, 39, 26, 19.5, 13, 6.5 Mbps IEEE 802.11n HT40: 150 ,135, 121.5, 108, 81, 54, 40.5, 27, 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/HT40：OFDM (64QAM, 16QAM, QPSK, BPSK)
Frequency Selection	By software / firmware
Antenna Type	**Antenna (1Tx1Rx)** Manufacturer: WIESON TECHNOLOGIES CO., LTD Type: Dipole **Antenna 1 (Detachable antenna)** Model: GY112HT467-010 Gain: 4.04 dBi **Antenna 2 (Detachable antenna)** Model: GY111HT467-006 Gain: 2.0 dBi
Power Source	**Powered from adapter** **Adapter:** Brand: AMIGO Model: AMS1-0501200FU I/P: 100-240Vac~50/60Hz 0.2A O/P: 5Vdc, 1.2A
Temperature Range	0 ~ +55°C

REMARK:

1. *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
2. *This submittal(s) (test report) is intended for FCC ID:* **XU8TEW718BRM** *filing to comply with Section 15.207,15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*
3. *For more details, please refer to the User's manual of the EUT.*
4. *The different of the each model is shown as below:*

Model	TEW-718BRM5	TEW-718BRM
Gain	4.04dBi	2.0dBi

3. DESCRIPTION OF TEST MODES

The EUT is a N150 Wireless ADSL2/2+ Modem Router. It has one transmitter chains and one receive chains (1x1 configurations). The 1x1 configuration is implemented with one outside chains (Chain 0).

The RF chipset is manufactured by Ralink Technology Corp.

The antenna peak gain 4.04dBi were chosen for full testing.
The antenna peak gain 2.0dBi were chosen for full testing.

IEEE 802.11 b ,802.11g ,802.11n HT20 mode (DTS Band)

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 long 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 (DTS Band)

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.

The worst-case data rates are determined according to the description above, based on the investigations by measuring the PSD, peak power and average power across all the data rates, bandwidths, modulations and spatial stream modes.

4. TEST METHODOLOGY

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

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

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

No.8,Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)

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

5.2 EQUIPMENT

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

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

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

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

5.3 LABORATORY ACCREDITATIONS LISTINGS

The test facilities used to perform radiated and conducted emissions tests are accredited by Taiwan Accreditation Foundation for the specific scope of accreditation under Lab Code: 1109 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by TAF or any agency of the Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: TW-1037 and 455173)..

5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Our laboratories are accredited and approved by the following accreditation body 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	TUV NORD
Taiwan	BSMI
USA	FCC

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

6. CALIBRATION AND UNCERTAINTY

6.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

6.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

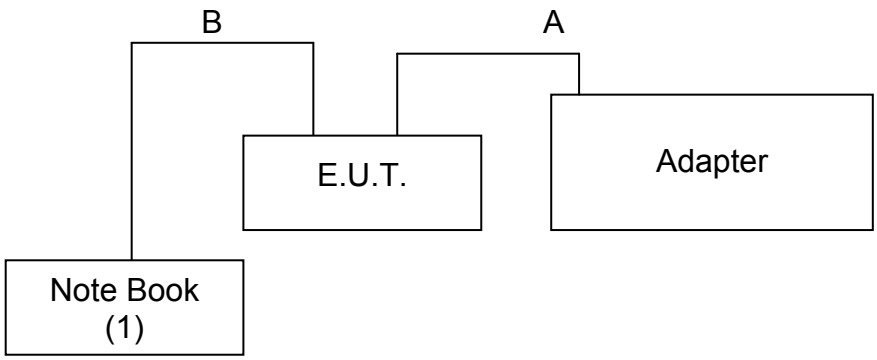
PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz Test Site : OATS-6	±3.38dB
Radiated Emission, 200 to 1000 MHz Test Site : OATS-6	±3.04dB
Radiated Emission, 1 to 26.5 GHz	± 2.38 dB
Power Line Conducted Emission	±2.01dB
Band Width	136.49kHz
Peak Output Power MU	±1.904dB
Band Edge MU	±0.302dBuV
Channel Separation MU	361.69Hz
Duty Cycle MU	0.064ms
Frequency Stability MU	0.223kHz

Uncertainty figures are valid to a confidence level of 95%, K=2

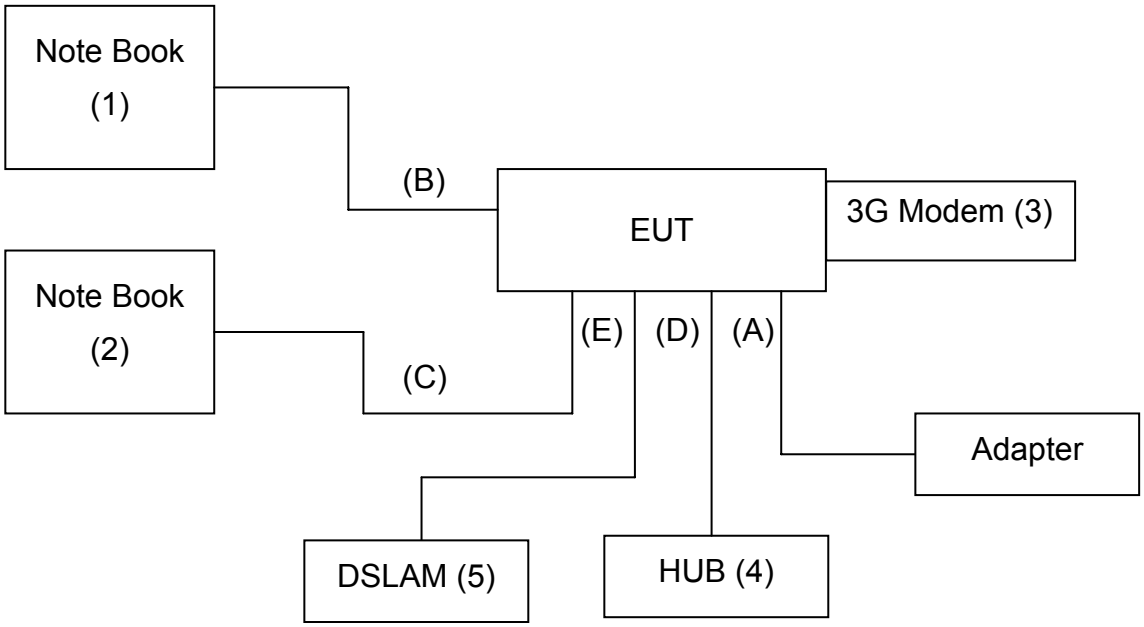
7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

For RF test



For EMI test



7.2 SUPPORT EQUIPMENT

RF test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1.	Note Book	IBM	T43	DoC	Power cable, unshd, 1.6m

No.	Signal cable description	
A	DC	Unshielded, 1.5m, 1pcs.
B	LAN	Unshielded, 10m, 1pcs.

EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1.	Note Book	IBM	R51	R33026	Power cable, unshd, 1.6m
2.	Note Book	TOSHIBA	Satellite L730	R43039	Power cable, unshd, 1.6m
3.	3G Dongle	NOVATEL	Qualcomm 3G CDMA	PKRNVW MC727	N/A
4.	HUB	BARRICAD	SMC7008BR	DOC	Power cable, unshd, 1.6m
5.	DSLAM	ZyXEL	IES-1000	3912A165 -100	RJ11 cable, unshd, 3.2m

No.	Signal cable description	
A	Power	Unshielded, 1.5m, 1pcs.
B	LAN	Unshielded, 10m, 1pcs.
C	LAN	Unshielded, 10m, 1pcs.
D	LAN	Unshielded, 2m, 2pcs.
E	RJ11	Unshielded, 3.2m, 1pcs.

REMARK:

1. All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.
2. Grounding was established in accordance with the manufacturer’s requirements and conditions for the intended use.

7.3 EUT OPERATING CONDITION

Antenna Gain	4.04 dBi

RF Setup

1. Set up all computers like the setup diagram.
2. The “Ralink QA Test Program for “RT5x9xQA V1.0.8.0” software was used for testing The EUT driver software installed in the host support equipment during testing was Ralink QA Test Program for “RT5x9xQA V1.0.8.0” Drive

TX Mode:

⇨ **Tx Mode:CCK 、OFDM、 HT MixMode** (Bandwidth: 20、40)

⇨ **Tx Data Rate: 1Mbps long** (IEEE 802.11b mode , TX)
6Mbps (IEEE 802.11g mode , TX)
6.5Mbps (IEEE 802.11n HT20 mode ,chain 0)
13.5Mbps (IEEE 802.11n HT40 mode, chain 0)

Power control mode

Target Power: IEEE 802.11b Channel Low (2412MHz) =14
IEEE 802.11b Channel Middle (2437MHz) =17
IEEE 802.11b Channel High (2462MHz) = 19
Target Power: IEEE 802.11g Channel Low (2412MHz) = 13
IEEE 802.11g Channel Middle (2437MHz) = 17
IEEE 802.11g Channel High (2462MHz) = 19
Target Power: IEEE 802.11n HT20 Channel Low (2412MHz) = 14 **(Chain 0)**
IEEE 802.11 n HT20 Channel Middle (2437MHz) =17 **(Chain 0)**
IEEE 802.11 n HT20 Channel High (2462MHz) = 19 **(Chain 0)**
Target Power: IEEE 802.11n HT40 Channel Low (2422MHz) = 13 **(Chain 0)**
IEEE 802.11 n HT40 Channel Middle (2442MHz) = 17 **(Chain 0)**
IEEE 802.11 n HT40 Channel High (2437MHz) = 19 **(Chain 0)**

RX Mode：

Start RX

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

Normal Link Setup

1. Set up all computers like the setup diagram.
2. All of the function are under run.
3. Notebook PC (2) ping 192.168.0.10 –t to Notebook PC (1).
4. Notebook PC (1) ping 192.168.0.20 –t to Notebook PC (2).
5. Notebook PC (1) ping 192.168.0.50 –t to Wireless Access Point (3).

Start test.

Antenna Gain	2.0 dBi

RF Setup

1. Set up all computers like the setup diagram.
2. The “Ralink QA Test Program for “RT5x9xQA V1.0.8.0” software was used for testing The EUT driver software installed in the host support equipment during testing was Ralink QA Test Program for “RT5x9xQA V1.0.8.0” Drive

TX Mode:

⇨ **Tx Mode:CCK 、OFDM、 HT MixMode** (Bandwidth: 20、40)

⇨ **Tx Data Rate: 1Mbps long** (IEEE 802.11b mode , TX)
6Mbps (IEEE 802.11g mode , TX)
6.5Mbps (IEEE 802.11n HT20 mode ,chain 0)
13.5Mbps (IEEE 802.11n HT40 mode, chain 0)

Power control mode

Target Power: IEEE 802.11b Channel Low (2412MHz) =16
IEEE 802.11b Channel Middle (2437MHz) =1A
IEEE 802.11b Channel High (2462MHz) = 1D
Target Power: IEEE 802.11g Channel Low (2412MHz) = 16
IEEE 802.11g Channel Middle (2437MHz) = 1A
IEEE 802.11g Channel High (2462MHz) = 1D
Target Power: IEEE 802.11n HT20 Channel Low (2412MHz) = 16 **(Chain 0)**
IEEE 802.11 n HT20 Channel Middle (2437MHz) =1A **(Chain 0)**
IEEE 802.11 n HT20 Channel High (2462MHz) = 1D **(Chain 0)**
Target Power: IEEE 802.11n HT40 Channel Low (2422MHz) = 15 **(Chain 0)**
IEEE 802.11 n HT40 Channel Middle (2437MHz) = 19 **(Chain 0)**
IEEE 802.11 n HT40 Channel High (2437MHz) = 1B **(Chain 0)**

RX Mode：

Start RX

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

Normal Link Setup

6. Set up all computers like the setup diagram.
7. All of the function are under run.
8. Notebook PC (2) ping 192.168.0.10 –t to Notebook PC (1).
9. Notebook PC (1) ping 192.168.0.20 –t to Notebook PC (2).
10. Notebook PC (1) ping 192.168.0.50 –t to Wireless Access Point (3).

Start test.

8. APPLICABLE LIMITS AND TEST RESULTS

8.1 6DB BANDWIDTH

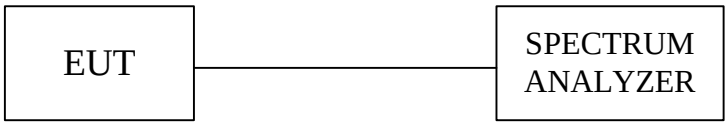
LIMIT

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

TEST EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSU	200789	SEP. 29, 2013

TEST SETUP



TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 1-5 % of the emission bandwidth (EBW).
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. Compare the resultant bandwidth with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is 1-5 %.

TEST RESULTS

No non-compliance noted.

Antenna Gain	4.04 dBi

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	12.24	500	PASS
Middle	2437	12.24	500	PASS
High	2462	12.24	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps long.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 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)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	16.47	500	PASS
Middle	2437	16.47	500	PASS
High	2462	16.47	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
		Chain 0		
Low	2412	17.63	500	PASS
Middle	2437	17.63	500	PASS
High	2462	17.63	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

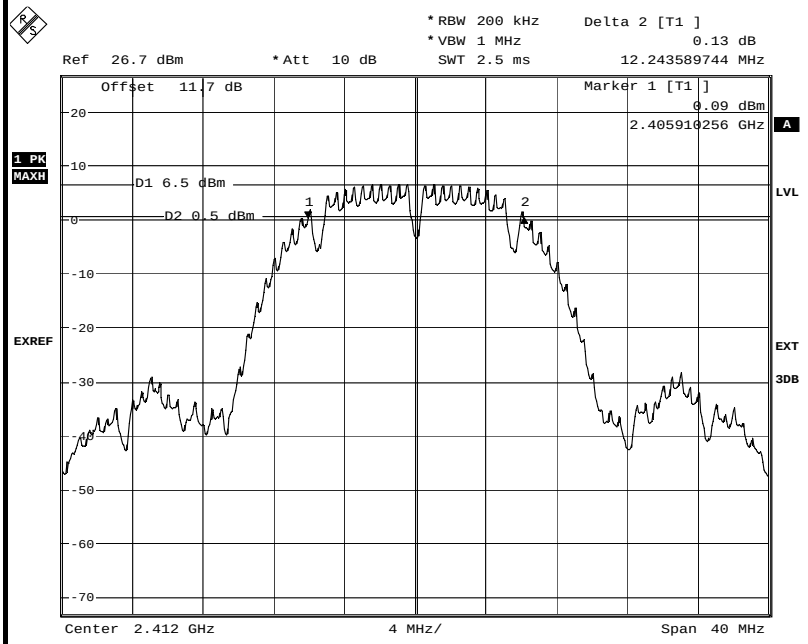
IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
		Chain 0		
Low	2422	36.28	500	PASS
Middle	2437	36.28	500	PASS
High	2452	36.28	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

6dB BANDWIDTH (802.11b MODE)

CH Low (802.11b MODE)



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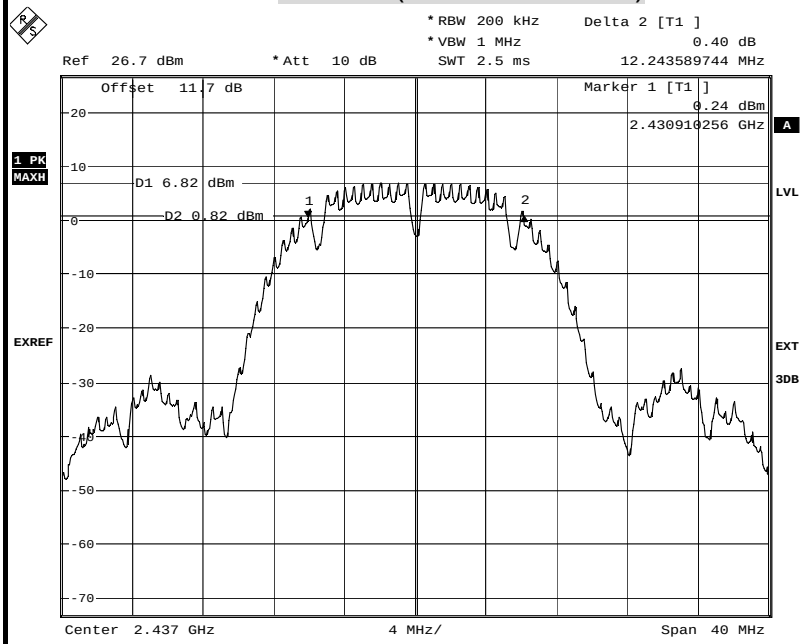
CH Mid (802.11b MODE)



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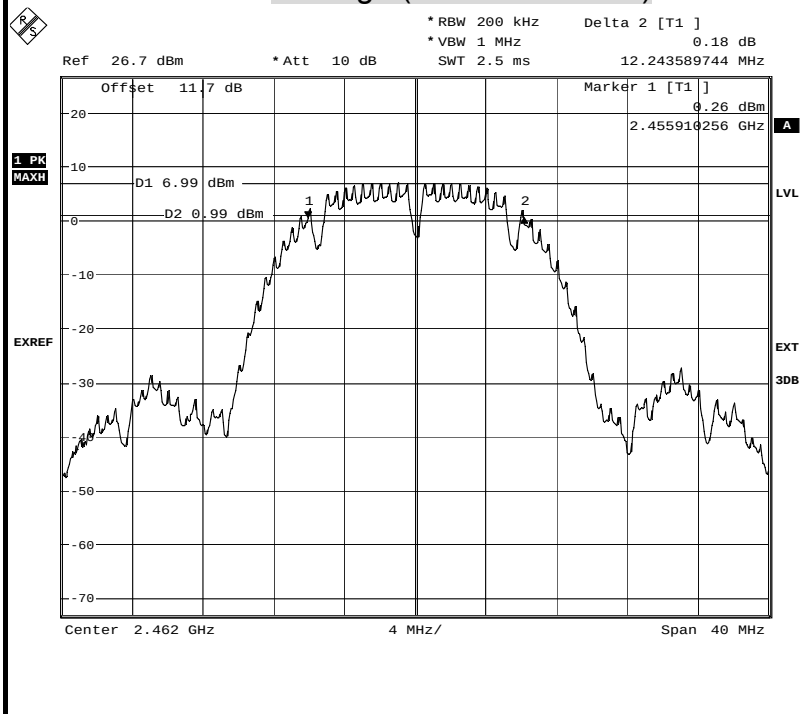
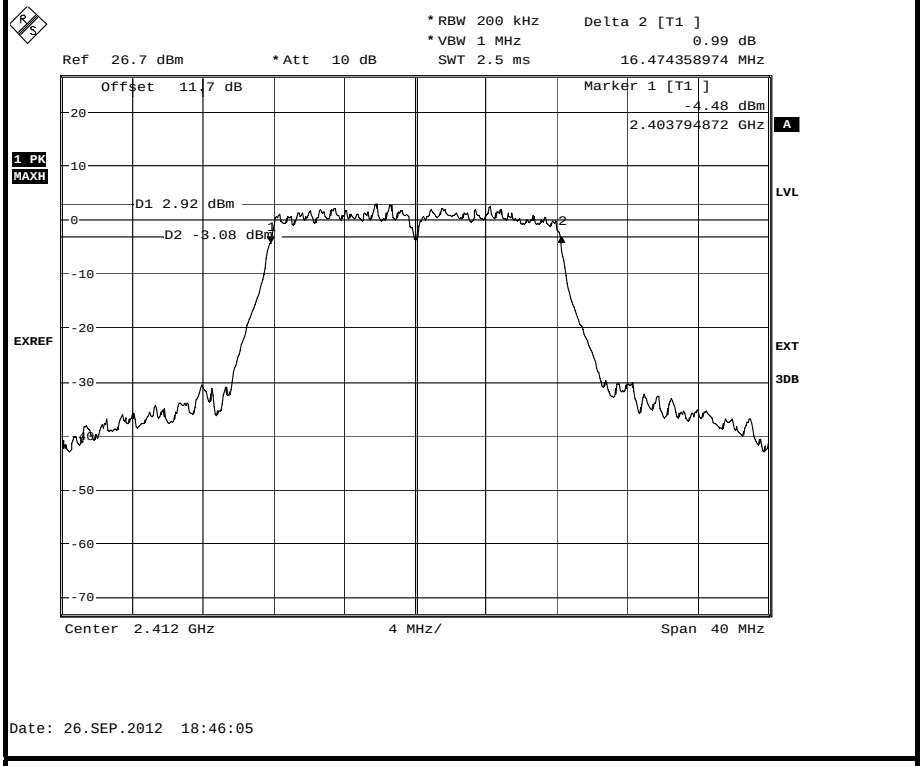
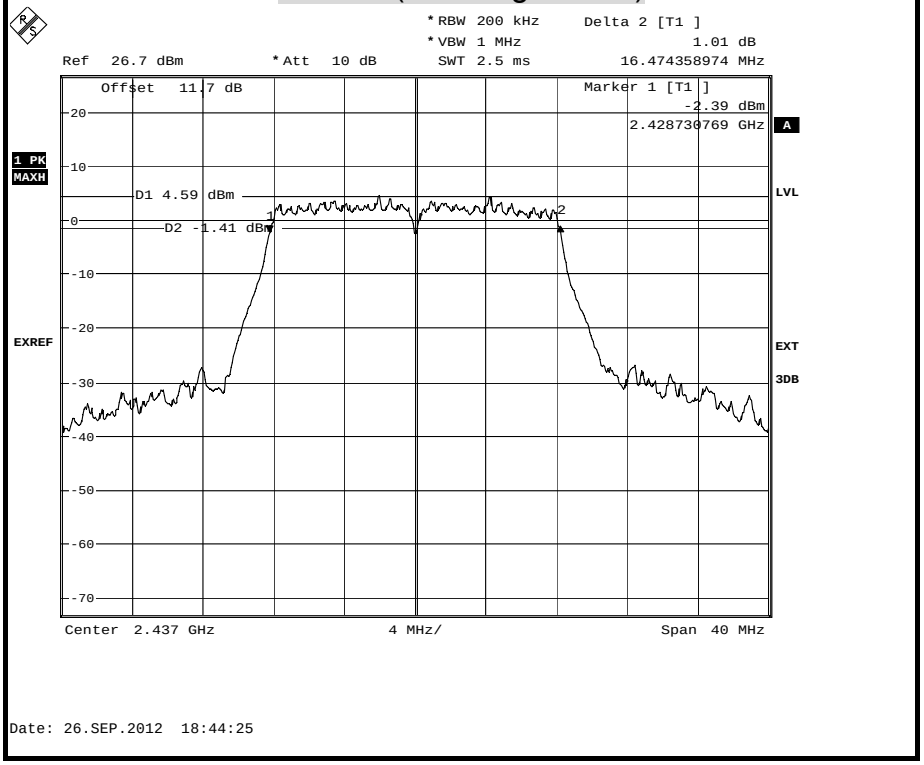


6dB BANDWIDTH (802.11g MODE)

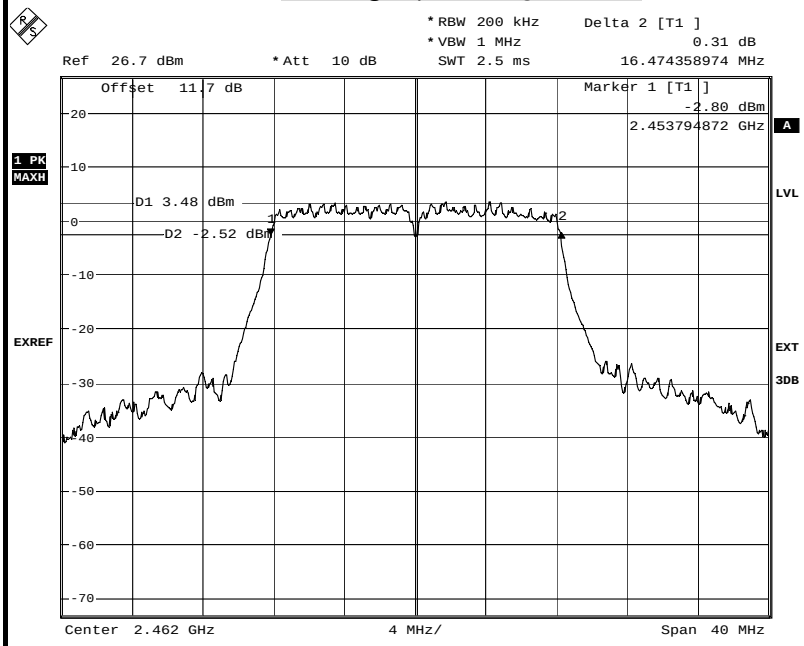
CH Low (802.11g MODE)



CH Mid (802.11g MODE)

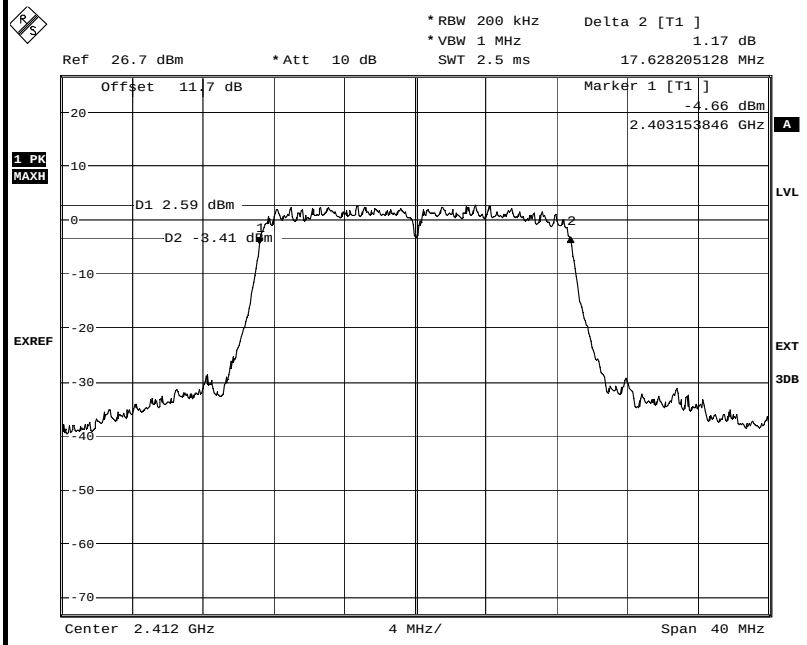


CH High (802.11g MODE)



6dB BANDWIDTH (802.11n HT20 MODE) Chain 0

CH Low (802.11n HT20 MODE)-Chain 0



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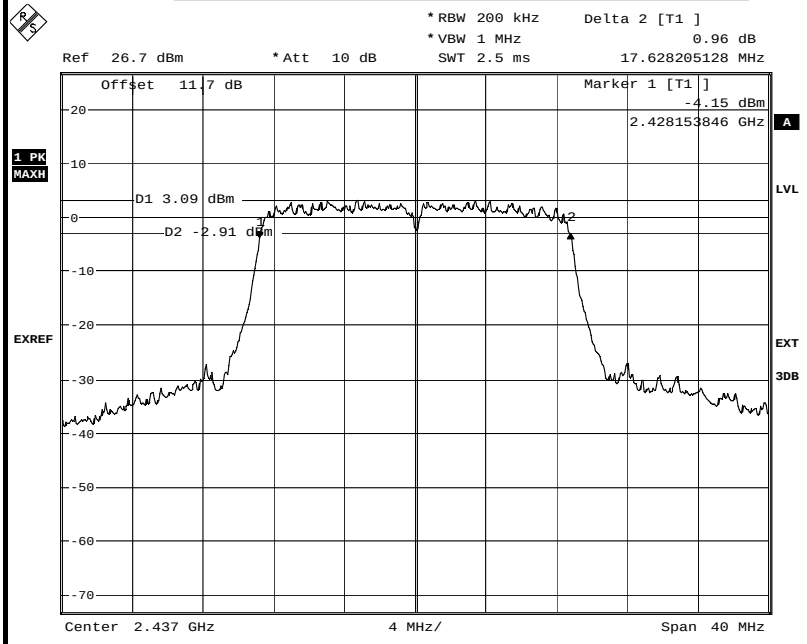
CH Mid (802.11n HT20 MODE)-Chain 0



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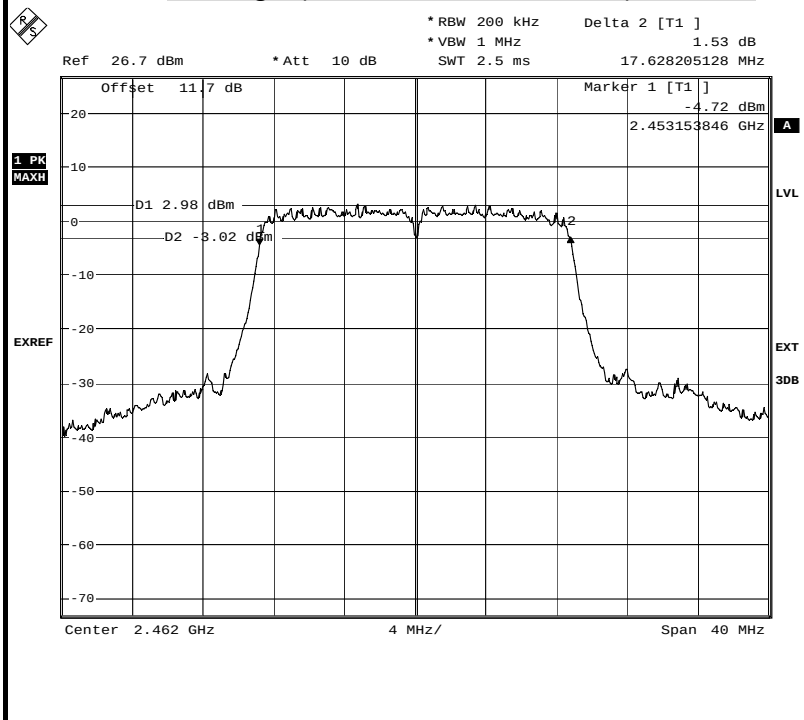
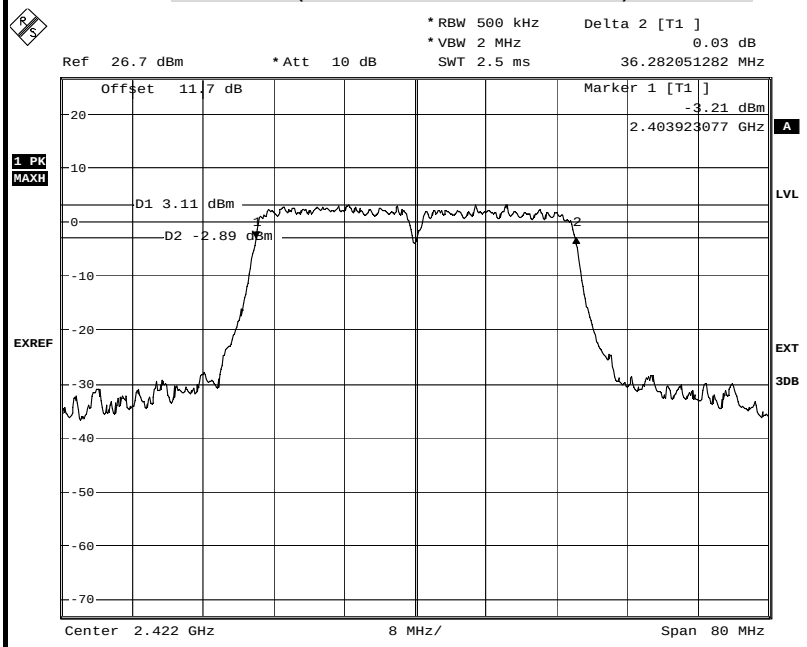
CH High (802.11n HT20 MODE)-Chain 0



6dB BANDWIDTH (802.11n HT40 MODE) Chain 0

CH Low (802.11n HT40 MODE)-Chain 0



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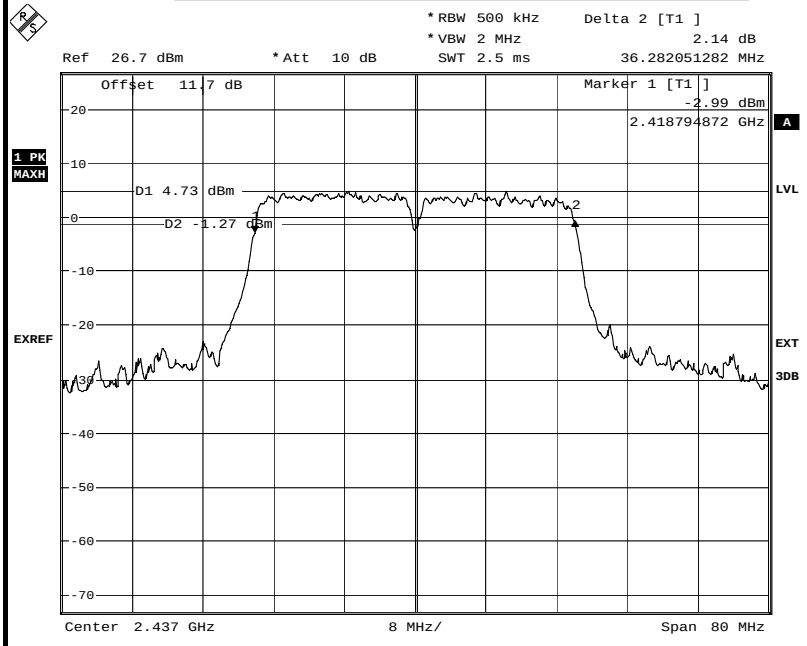
CH Mid (802.11n HT40 MODE)-Chain 0



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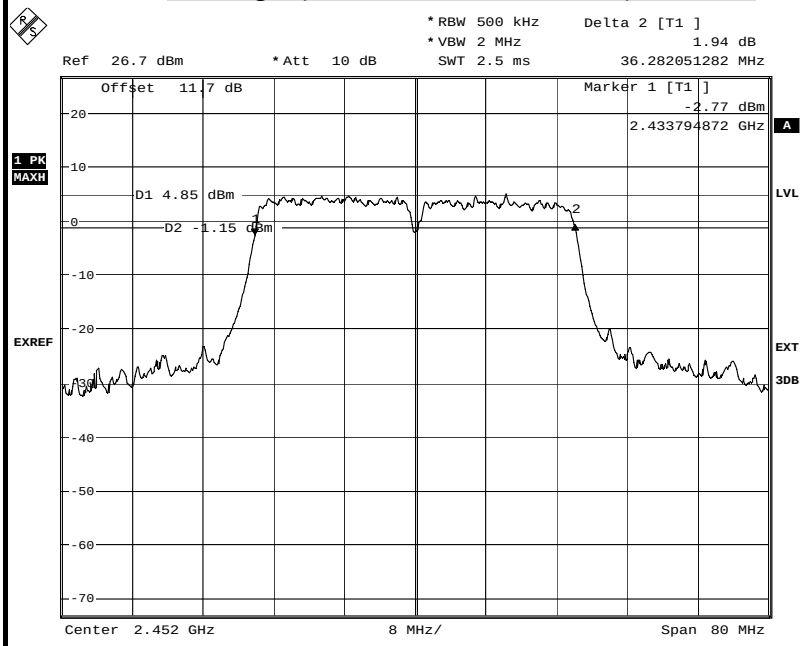
CH High (802.11n HT40 MODE)-Chain 0



Antenna Gain	2.0 dBi

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	12.24	500	PASS
Middle	2437	12.24	500	PASS
High	2462	12.24	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps long.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 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)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	16.41	500	PASS
Middle	2437	16.41	500	PASS
High	2462	16.41	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
		Chain 0		
Low	2412	17.69	500	PASS
Middle	2437	17.69	500	PASS
High	2462	17.69	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

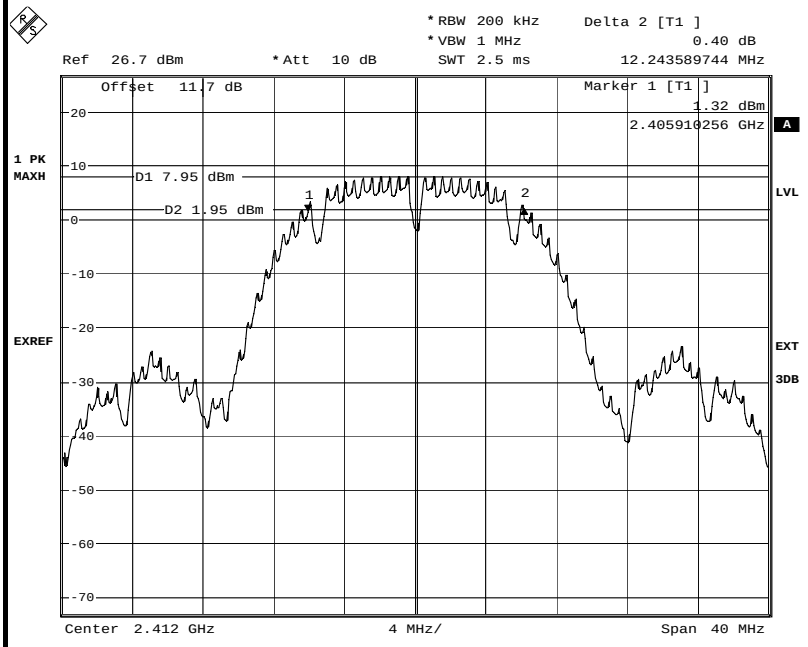
IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
		Chain 0		
Low	2422	36.41	500	PASS
Middle	2437	36.41	500	PASS
High	2452	36.41	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

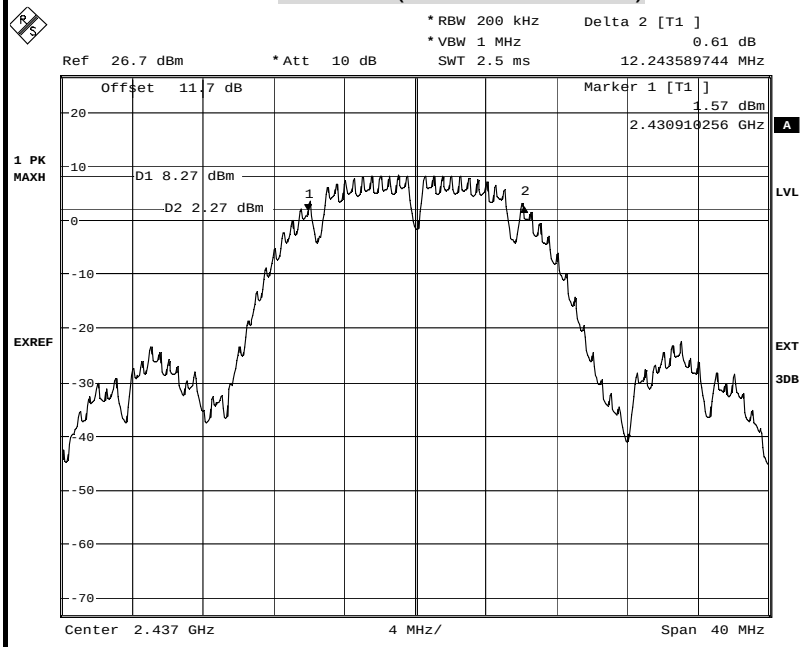
6dB BANDWIDTH (802.11b MODE)

CH Low (802.11b MODE)



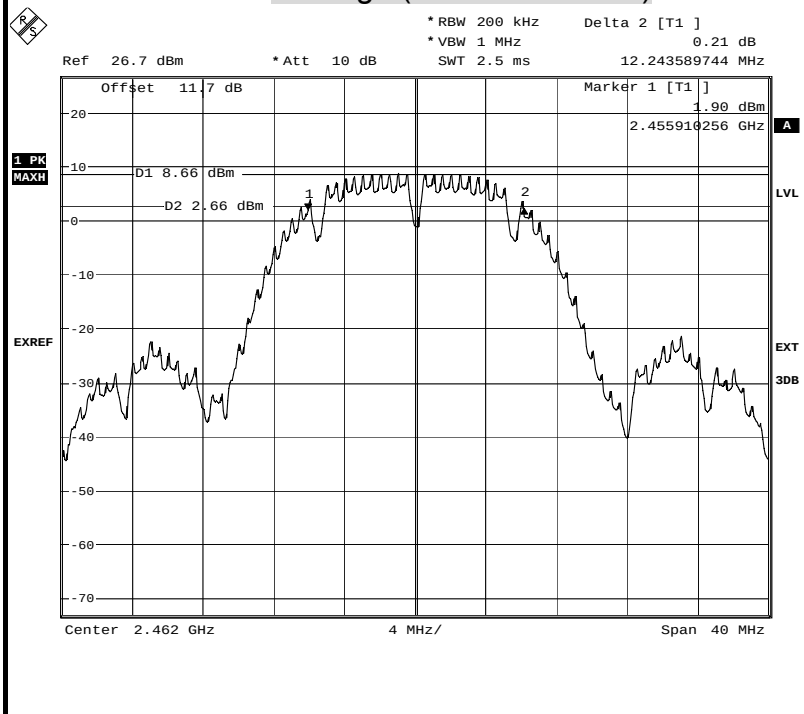
Date: 26.SEP.2012 18:05:50

CH Mid (802.11b MODE)



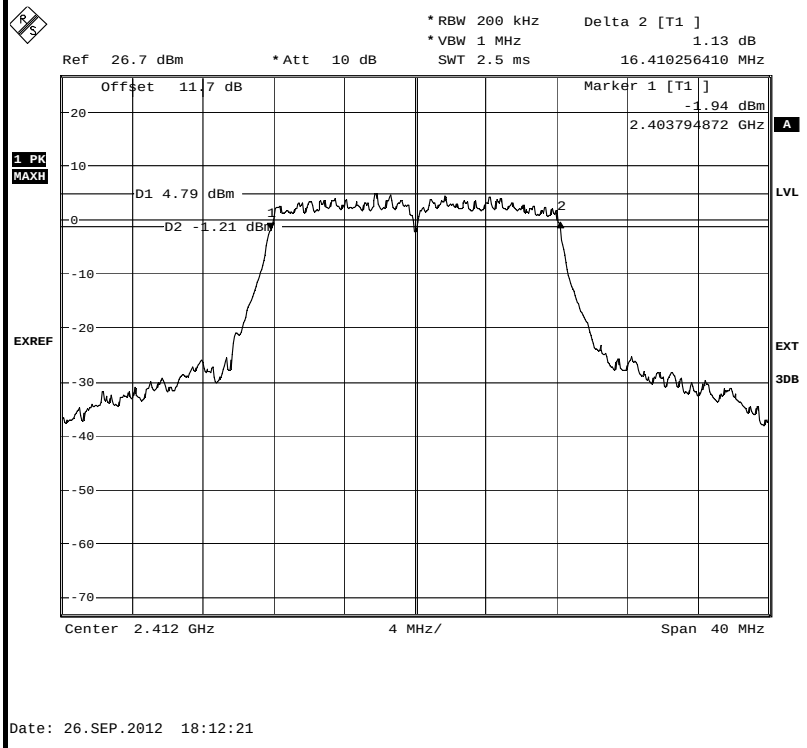
Date: 26.SEP.2012 18:07:37

CH High (802.11b MODE)

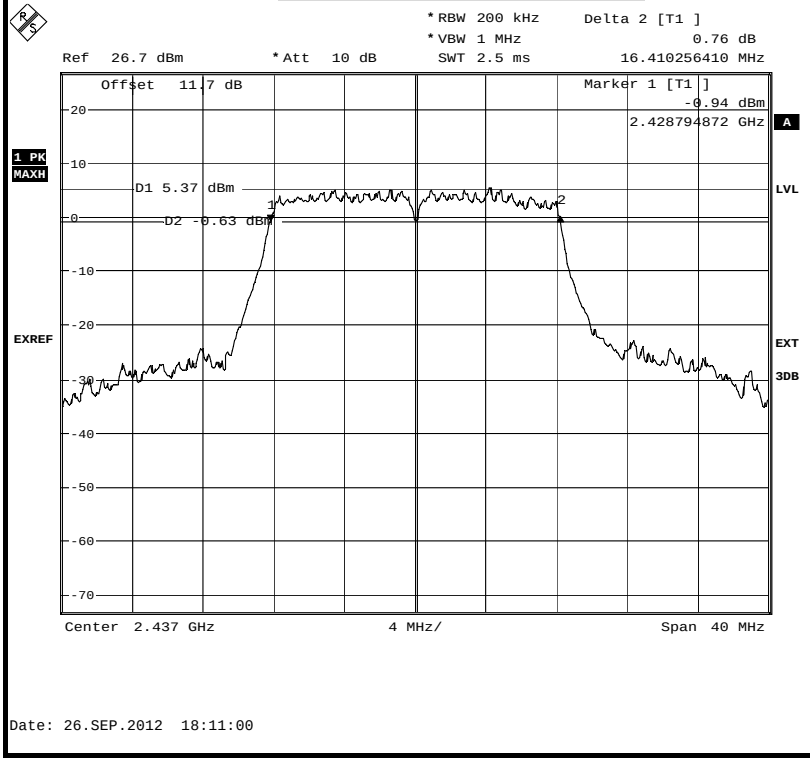


6dB BANDWIDTH (802.11g MODE)

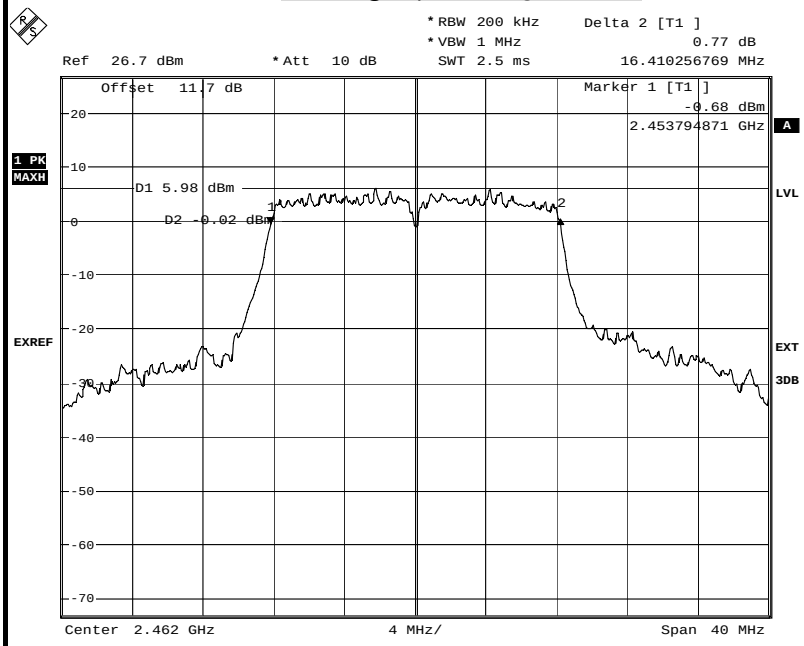
CH Low (802.11g MODE)



CH Mid (802.11g MODE)

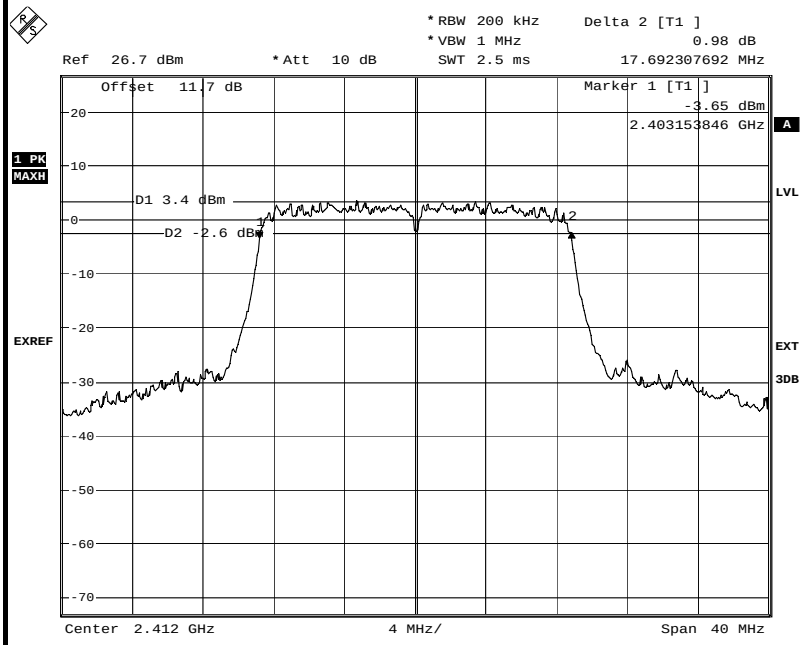


CH High (802.11g MODE)



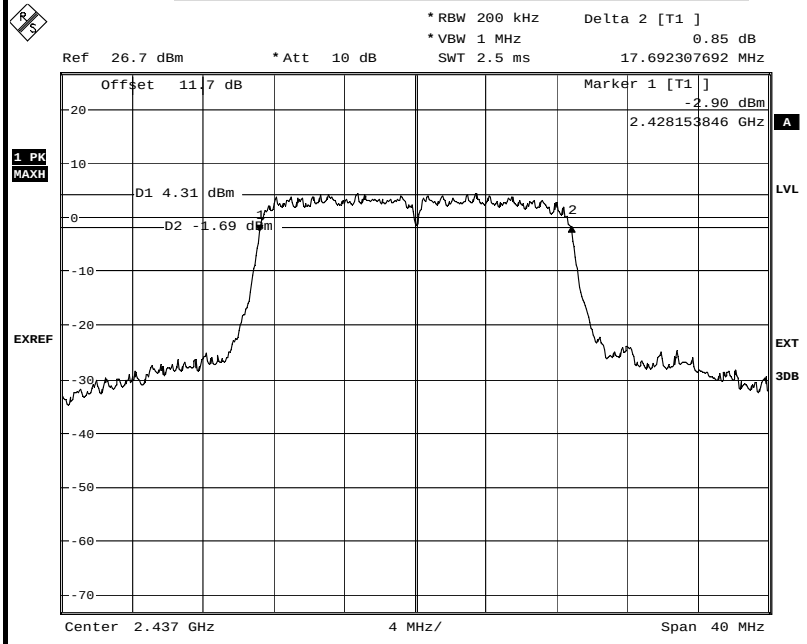
6dB BANDWIDTH (802.11n HT20 MODE) Chain 0

CH Low (802.11n HT20 MODE)-Chain 0



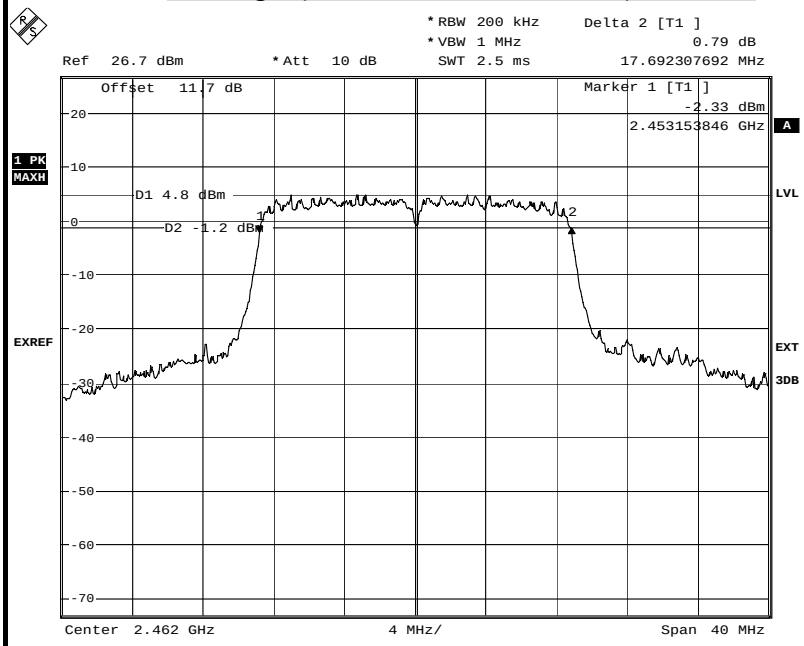
Date: 26.SEP.2012 18:13:30

CH Mid (802.11n HT20 MODE)-Chain 0



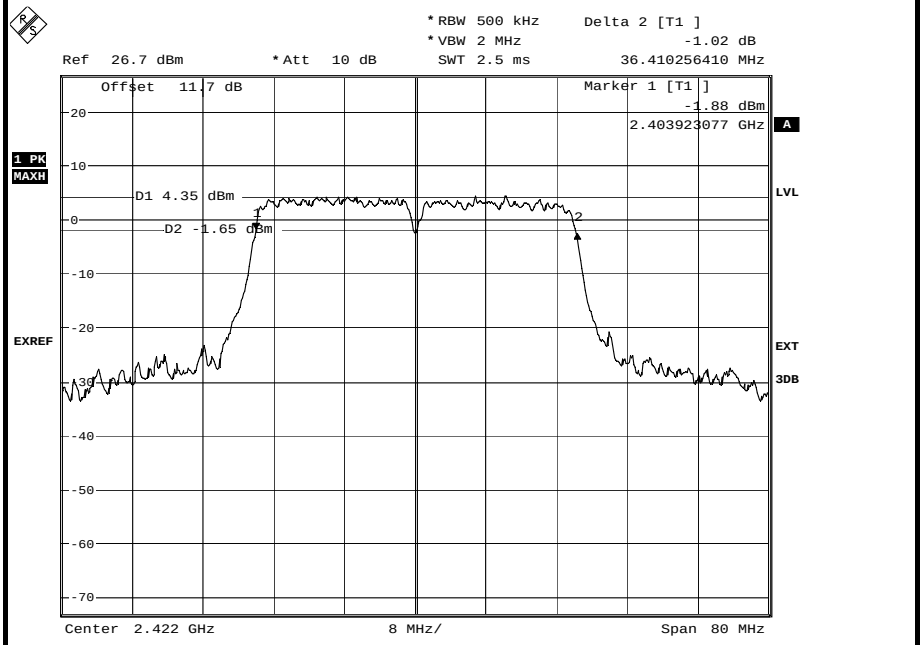
Date: 26.SEP.2012 18:14:31

CH High (802.11n HT20 MODE)-Chain 0



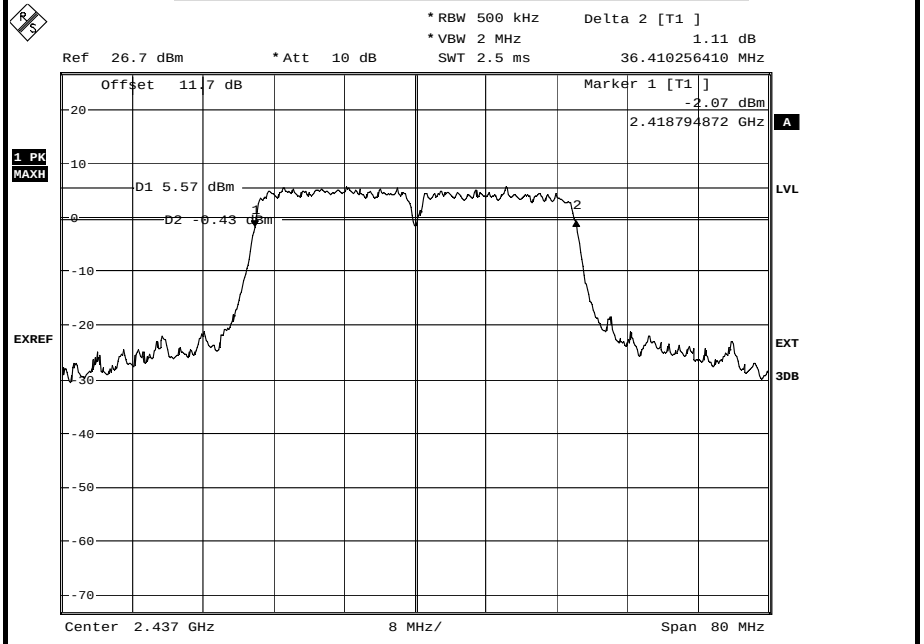
6dB BANDWIDTH (802.11n HT40 MODE) Chain 0

CH Low (802.11n HT40 MODE)-Chain 0



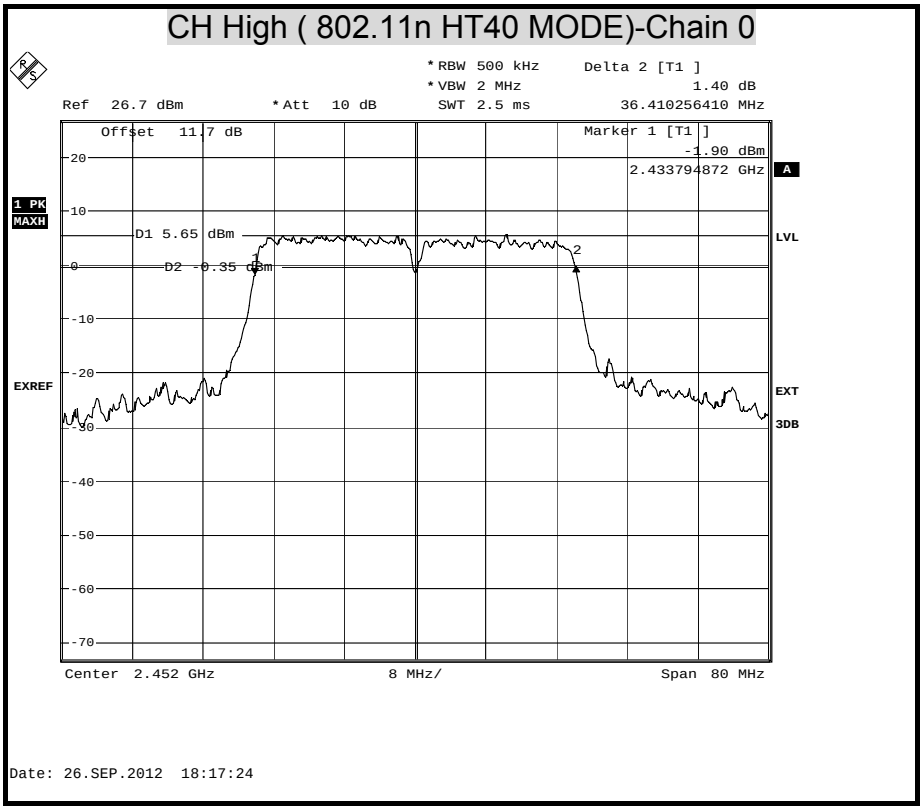
Date: 26.SEP.2012 18:19:00

CH Mid (802.11n HT40 MODE)-Chain 0



Date: 26.SEP.2012 18:18:15

CH High (802.11n HT40 MODE)-Chain 0



8.2 MAXIMUM PEAK OUTPUT POWER

LIMIT

§ 15.247(b) The maximum peak output power of the intentional radiator shall not exceed the following :

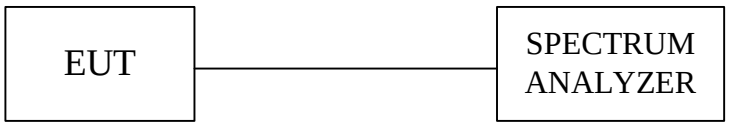
§ 15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands : 1 watt.

§ 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 EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSU	200789	SEP. 29, 2013

TEST SETUP



TEST PROCEDURE

The tests were performed in accordance with KDB 558074 5.2.1.2 and 5.2.2.1.

5.2.1.2 Measurement Procedure PK2:

1. This procedure provides an integrated measurement alternative when the maximum available RBW < EBW.
2. Set the RBW = 1 MHz.
3. Set the VBW = 3 MHz.
4. Set the span to a value that is 5-30 % greater than the EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the spectrum analyzer's integrated band power measurement function with band limits set equal to the EBW band edges(for some analyzers, this may require a manual overrideto ensure use of peak detector). If the spectrum analyzer does not have a band power function, sum the spectrum levels (in linear power units) at 1 MHz intervals extending across the EBW of the spectrum.

5.2.2.1 Measurement Procedure AVG1(power averaging over the EBW with slow sweep speed):

1. Set the analyzer span to 5-30% greater than the EBW.
2. Set the RBW = 1 MHz.
3. Set the VBW ≥ 3 MHz.
4. Detector = power average (RMS).
5. Ensure that the number of measurement points in the sweep ≥ 2 x (span/RBW).
6. Manually set the sweep time to: ≥10 x (number of measurement points in sweep) x (transmission symbol period).
7. Perform the measurement over a single sweep.
8. Use the spectrum analyzer's integrated band power measurement function with band limits set equal to the EBW band edges to determine the maximum conducted output power of the EUTover the EBW. Note: If the analyzer does not have a band power function, sum the spectral levels (in linear power units) at 1 MHz intervals extending across the entire EBW.

TEST RESULTS

No non-compliance noted

Antenna Gain	4.04 dBi

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	18.91	30.00	PASS
Middle	2437	19.62	30.00	PASS
High	2462	19.16	30.00	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps long.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 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 (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	20.14	30.00	PASS
Middle	2437	21.15	30.00	PASS
High	2462	21.28	30.00	PASS

NOTE : 1.At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
		Chain 0		
Low	2412	20.75	30.00	PASS
Middle	2437	21.62	30.00	PASS
High	2462	21.12	30.00	PASS

NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
		Chain 0		
Low	2422	20.62	30.00	PASS
Middle	2437	21.75	30.00	PASS
High	2452	22.17	30.00	PASS

NOTE : 1. At finial test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

Average Power Data

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2412	16.70
Middle	2437	16.72
High	2462	16.85

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2412	14.09
Middle	2437	15.66
High	2462	15.19

IEEE 802.11n HT20 mode

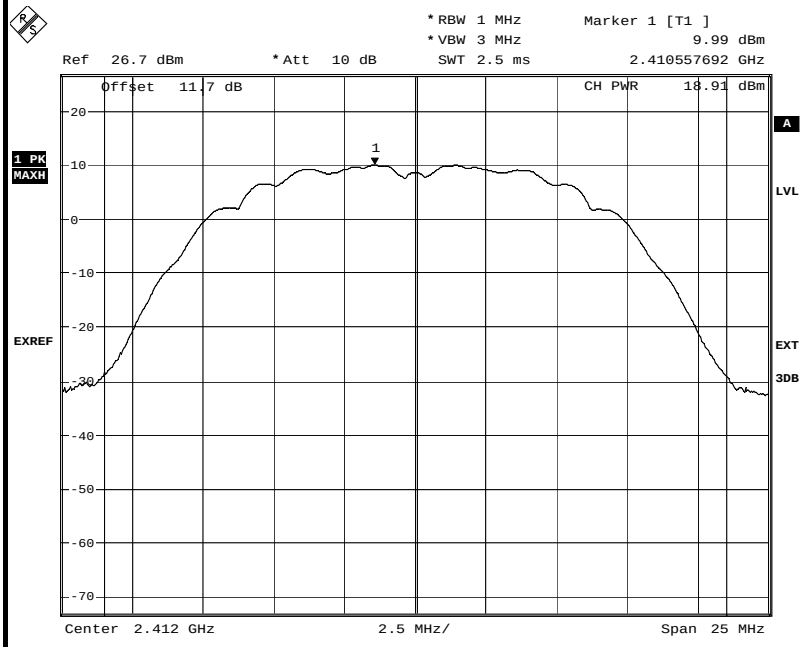
Channel	Channel Frequency (MHz)	Average Power (dBm)
		Chain 0
Low	2412	15.07
Middle	2437	15.39
High	2462	15.36

IEEE 802.11n HT40 mode

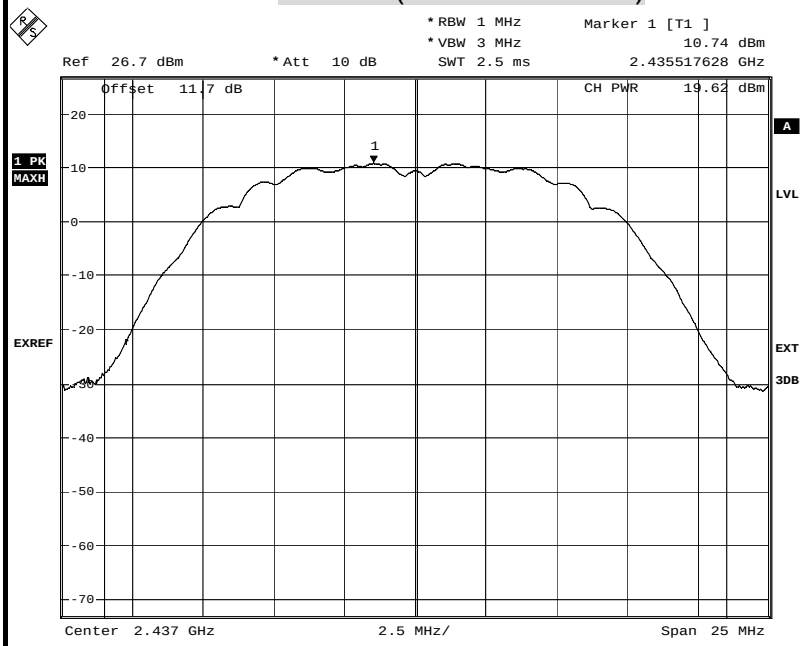
Channel	Channel Frequency (MHz)	Average Power (dBm)
		Chain 0
Low	2422	14.21
Middle	2437	15.97
High	2452	15.99

MAXIMUM PEAK OUTPUT POWER (802.11b MODE)

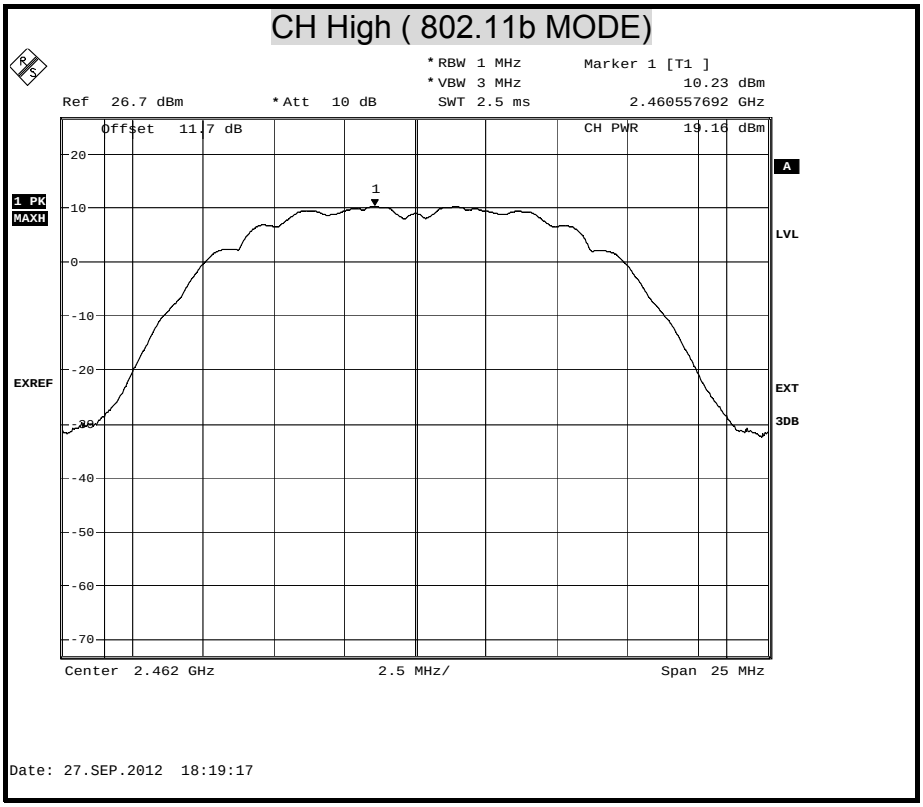
CH Low (802.11b MODE)



CH Mid (802.11b MODE)

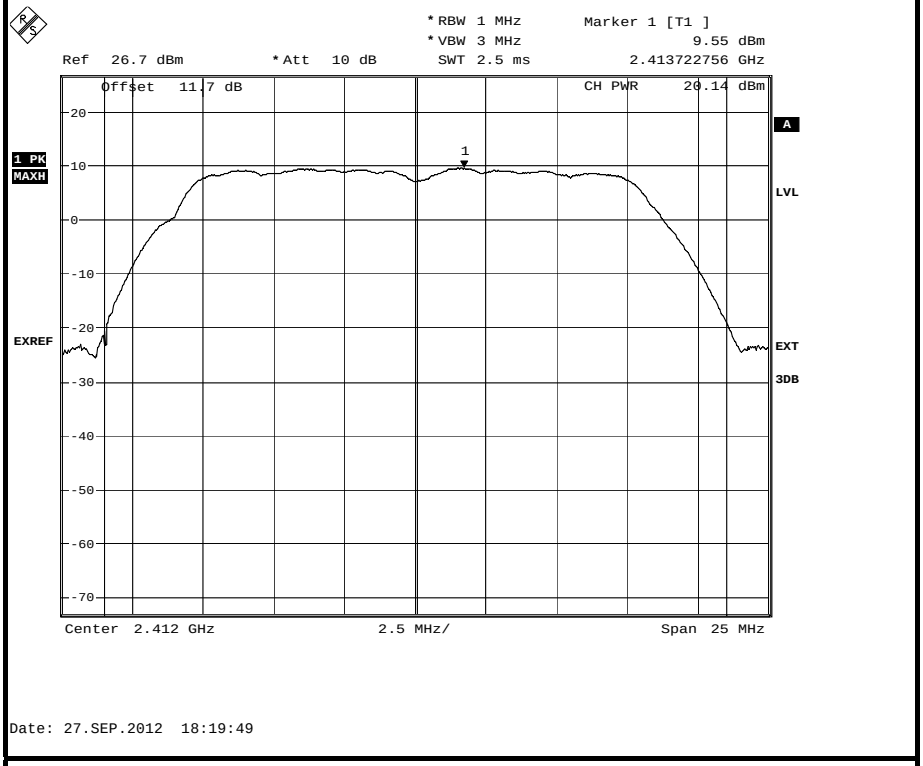


CH High (802.11b MODE)

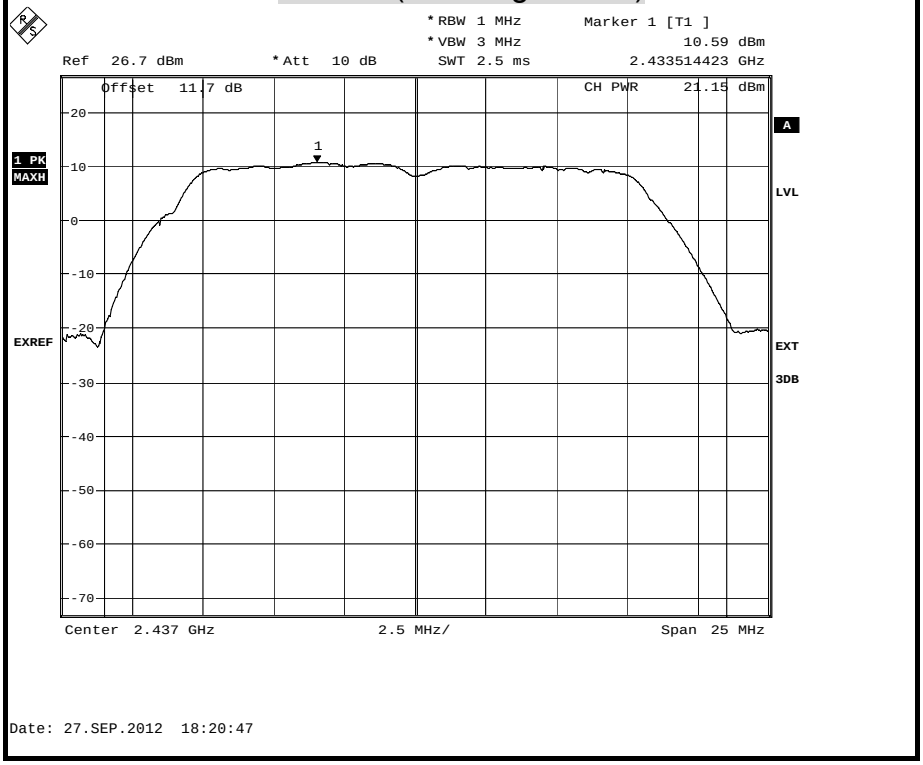


MAXIMUM PEAK OUTPUT POWER (802.11g MODE)

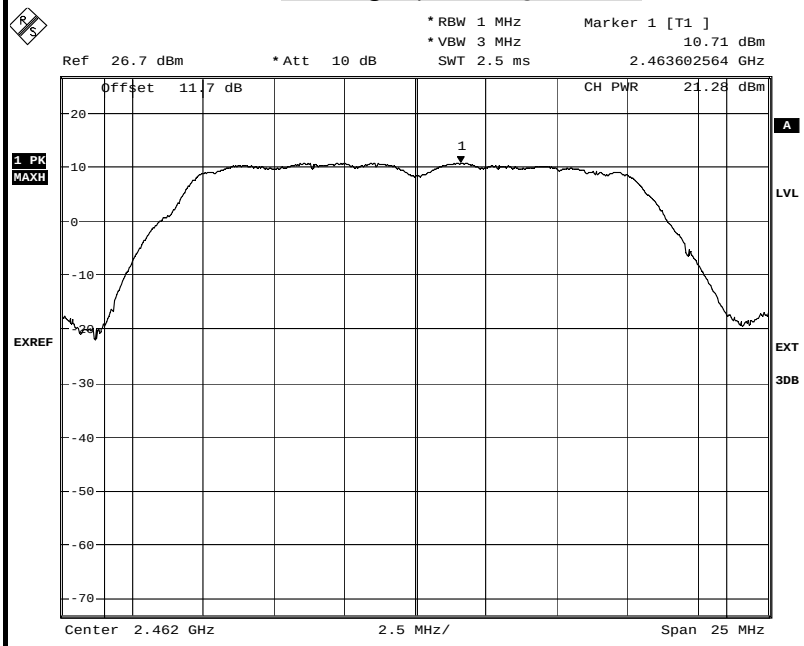
CH Low (802.11g MODE)



CH Mid (802.11g MODE)

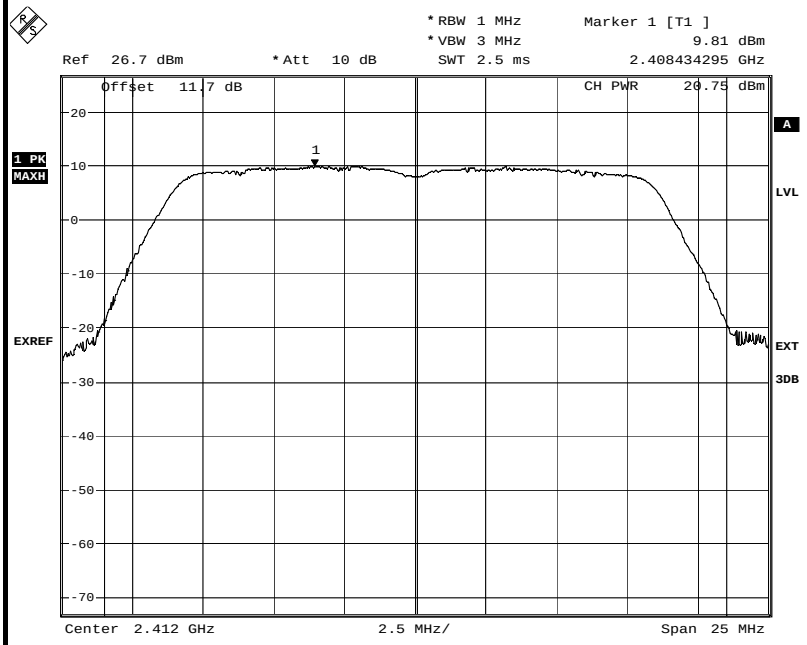


CH High (802.11g MODE)



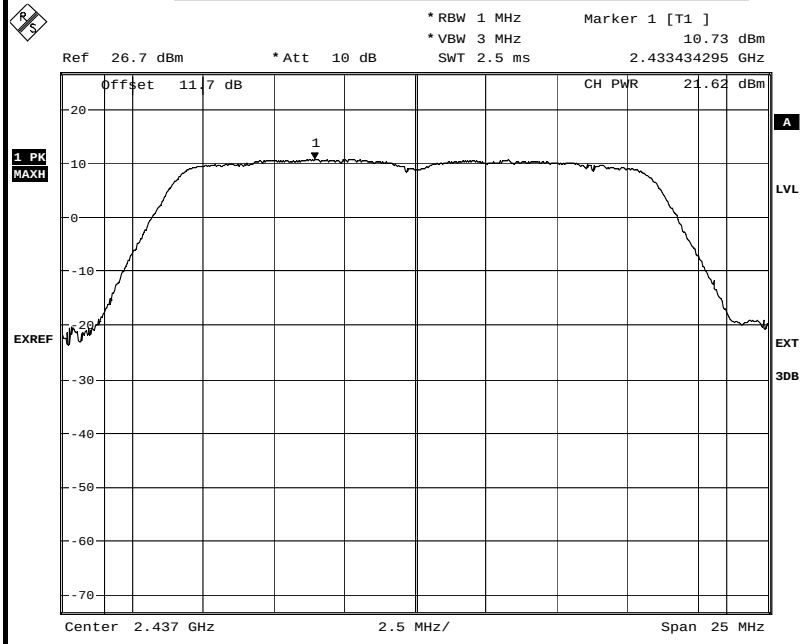
MAXIMUM PEAK OUTPUT POWER (802.11n HT20 MODE) Chain 0

CH Low (802.11n HT20 MODE)-Chain 0



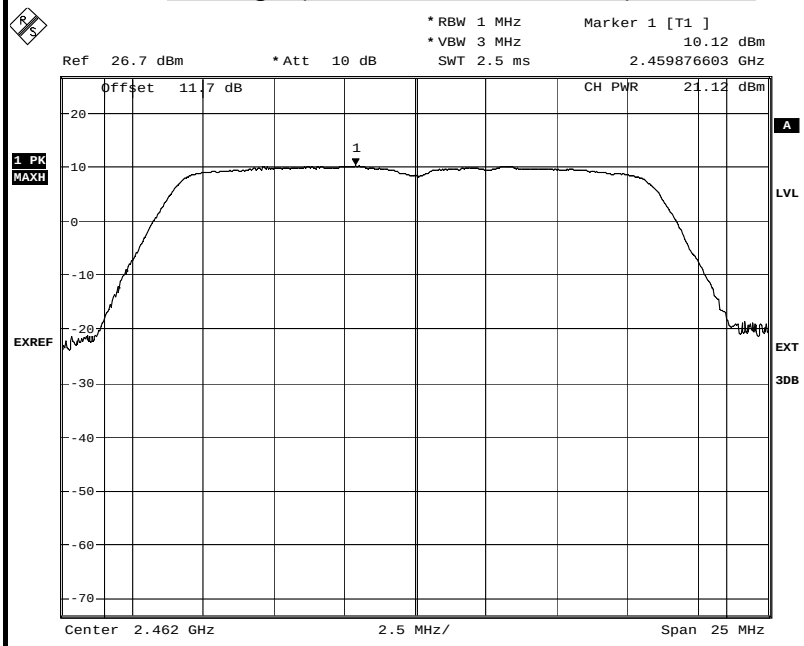
Date: 27.SEP.2012 18:22:16

CH Mid (802.11n HT20 MODE)-Chain 0



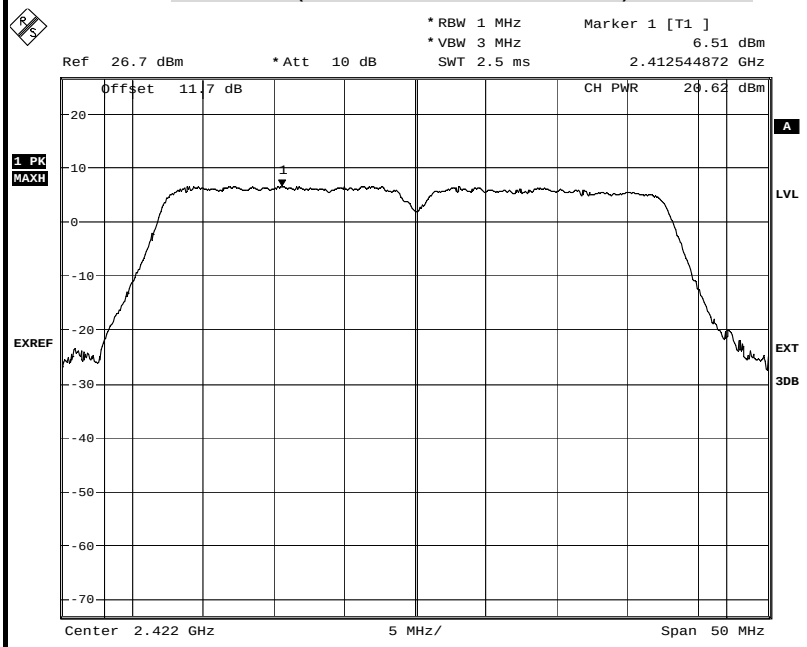
Date: 27.SEP.2012 18:22:40

CH High (802.11n HT20 MODE)-Chain 0



MAXIMUM PEAK OUTPUT POWER (802.11n HT40 MODE) Chain 0

CH Low (802.11n HT40 MODE)-Chain 0



Date: 27.SEP.2012 18:14:45

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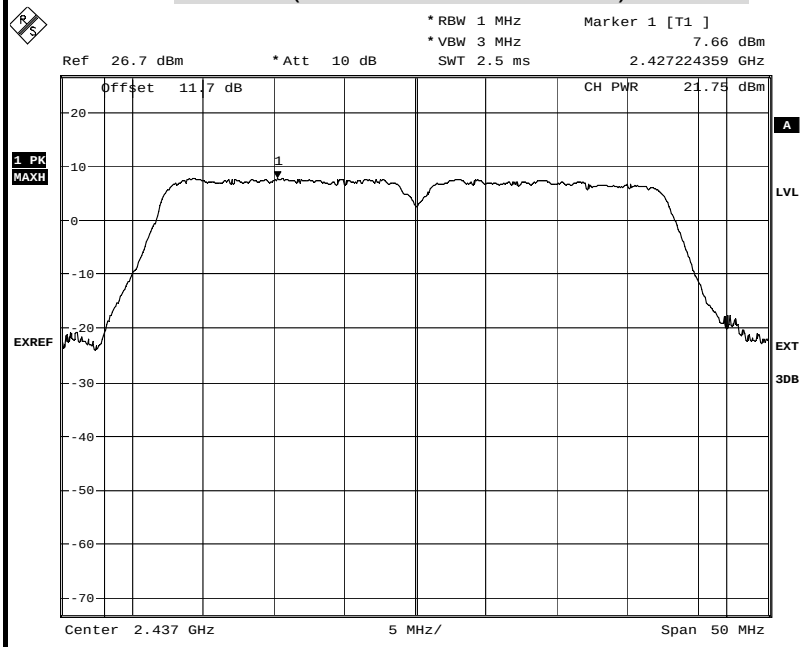
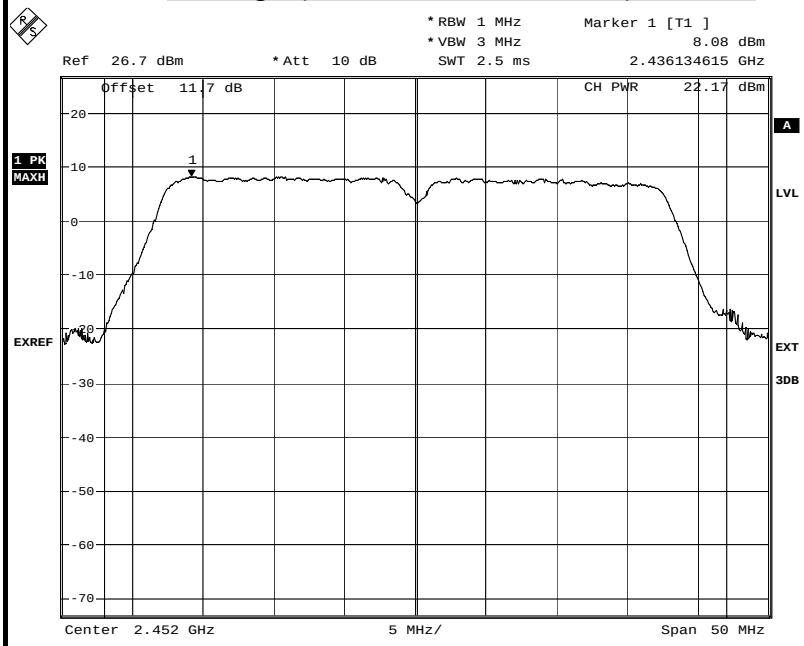


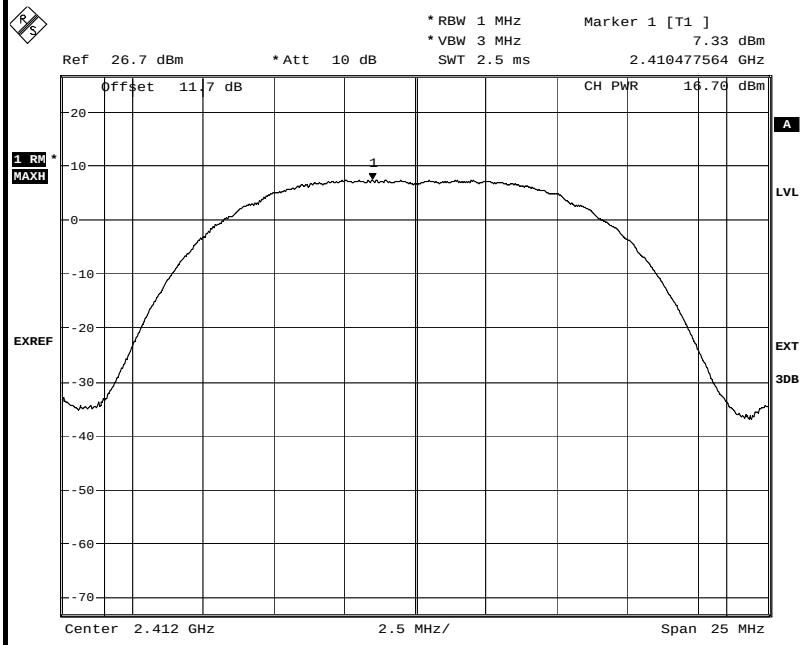
Date: 27.SEP.2012 18:15:32

CH High (802.11n HT40 MODE)-Chain 0



AVERAGE (802.11b MODE)

CH Low (802.11b MODE)



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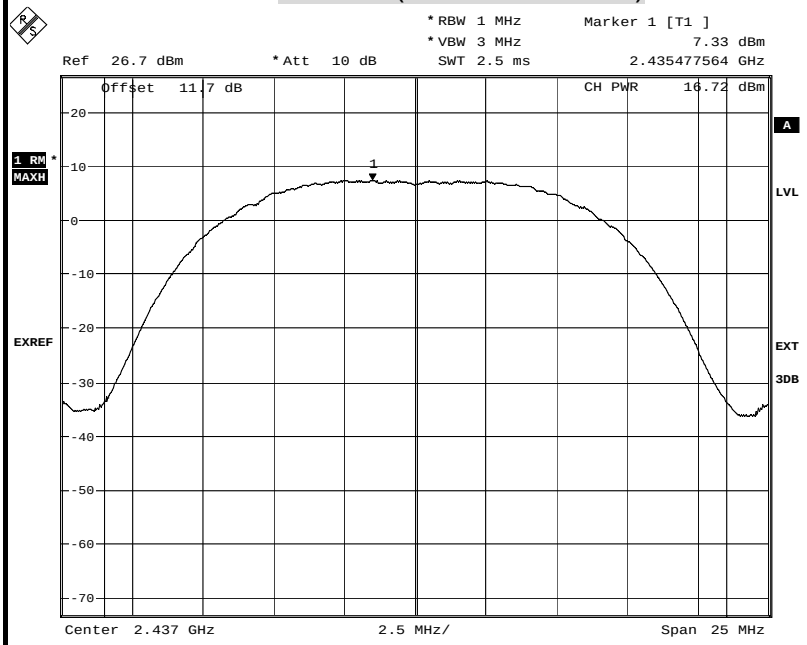
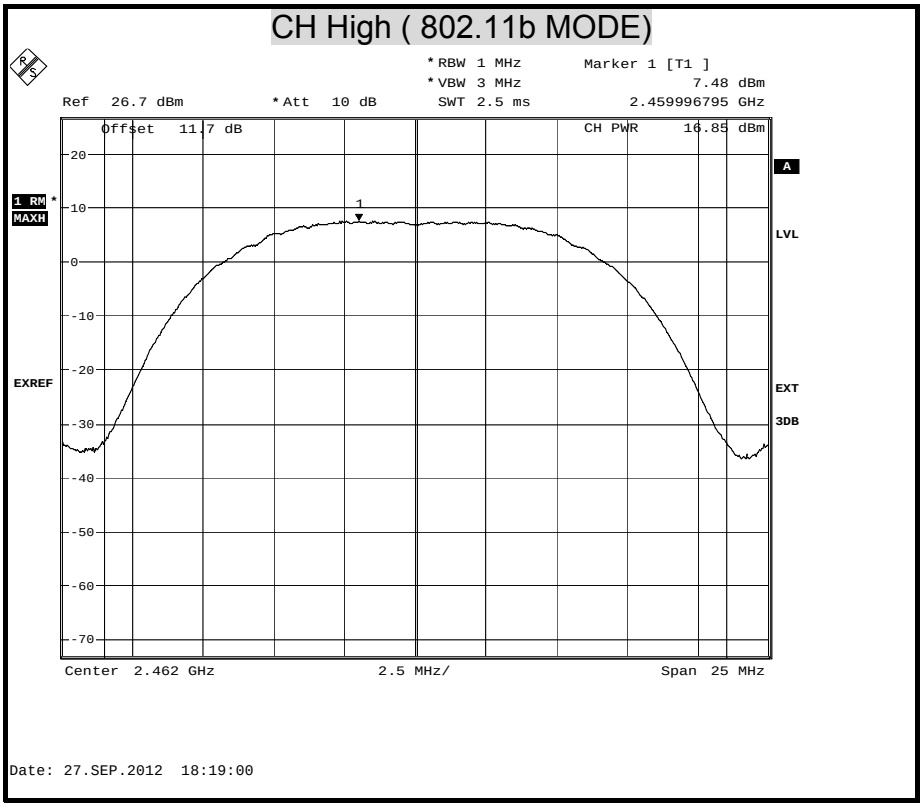
CH Mid (802.11b MODE)



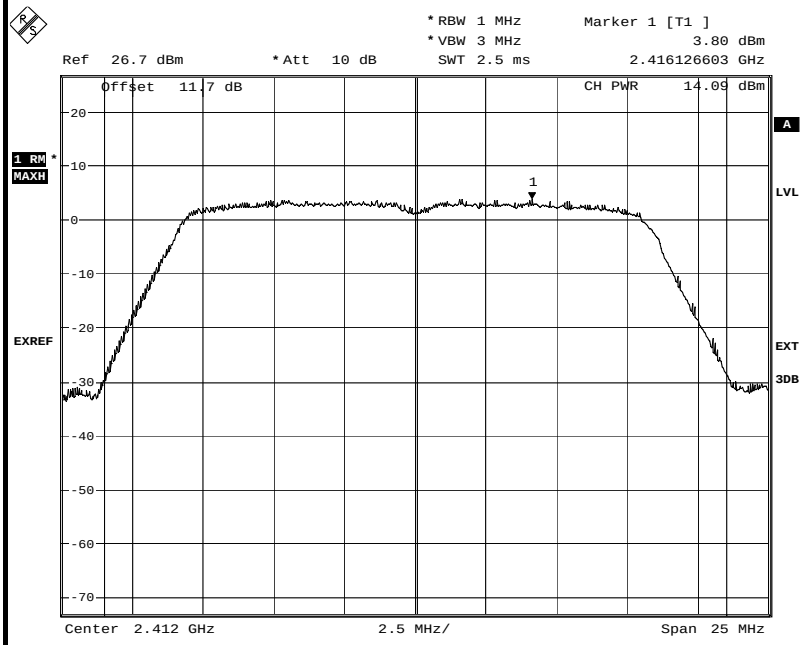
Date: 27.SEP.2012 18:18:31

CH High (802.11b MODE)



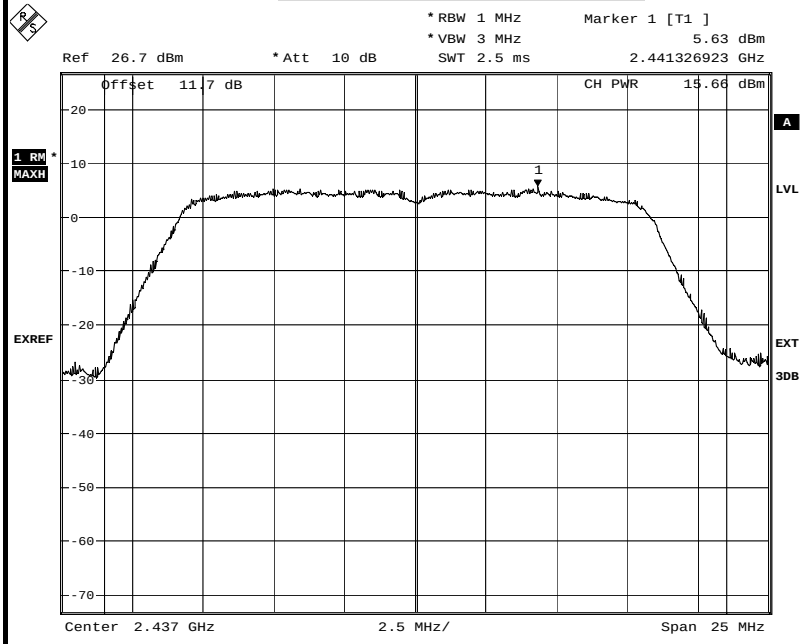
AVERAGE (802.11g MODE)

CH Low (802.11g MODE)



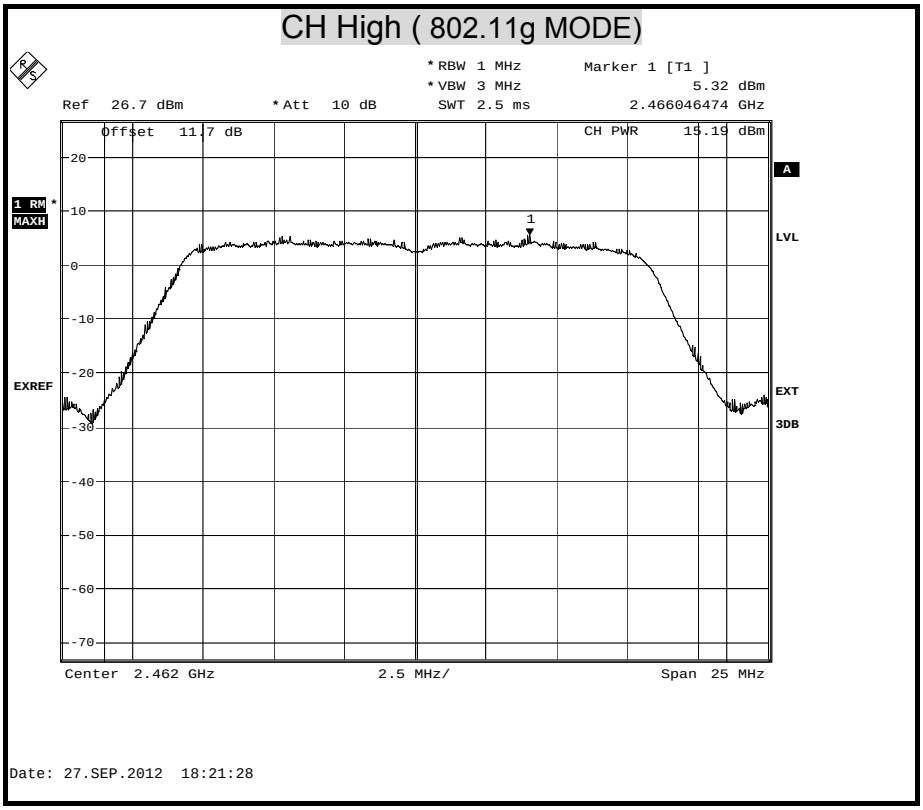
Date: 27.SEP.2012 18:20:04

CH Mid (802.11g MODE)



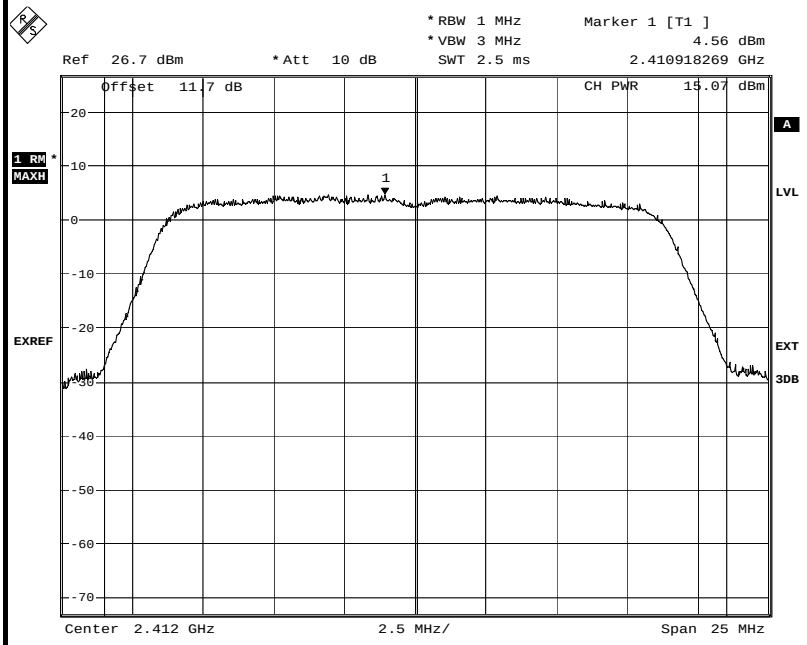
Date: 27.SEP.2012 18:20:36

CH High (802.11g MODE)



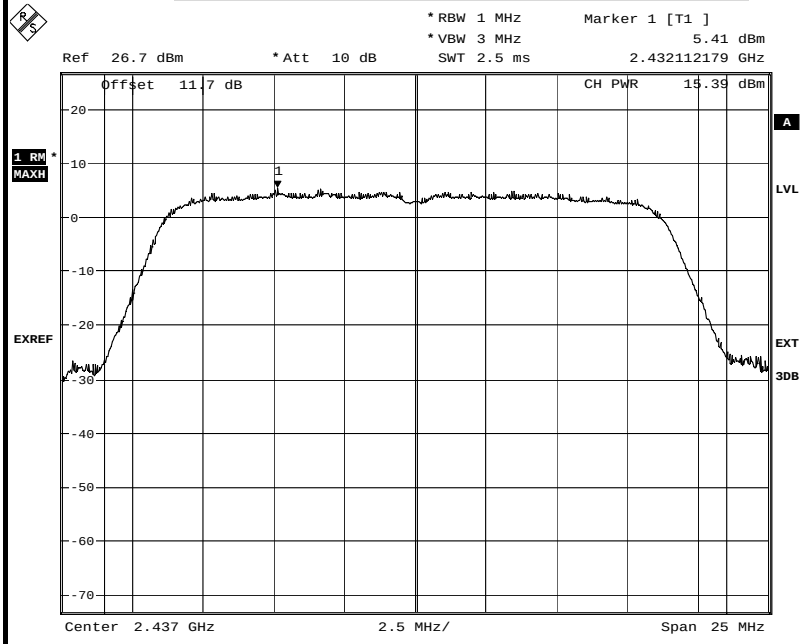
AVERAGE (802.11n HT20 MODE) Chain 0

CH Low (802.11n HT20 MODE)-Chain 0



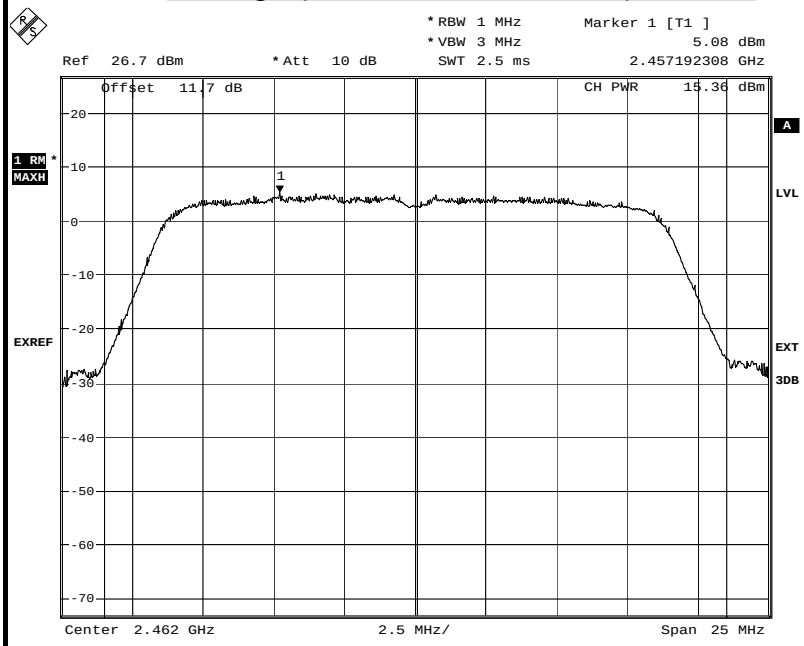
Date: 27.SEP.2012 18:22:07

CH Mid (802.11n HT20 MODE)-Chain 0



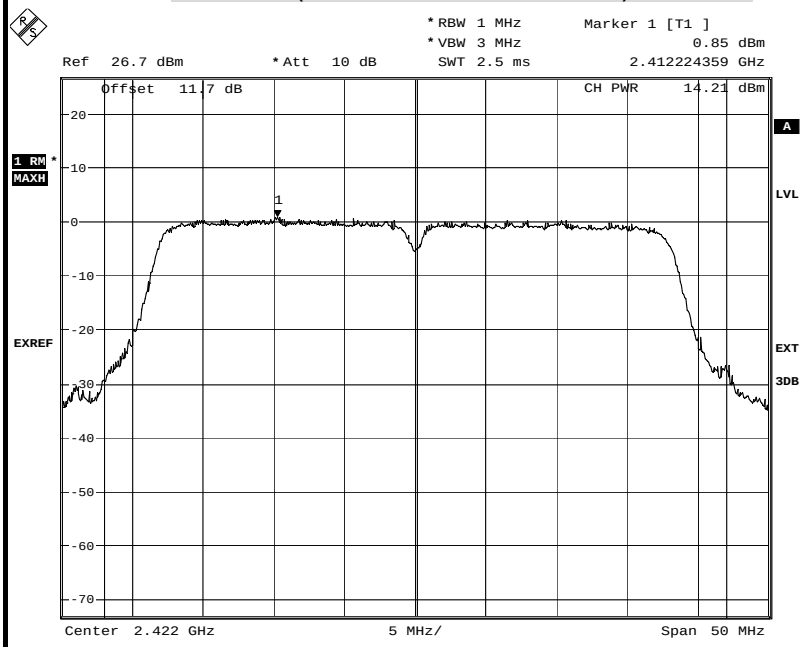
Date: 27.SEP.2012 18:22:55

CH High (802.11n HT20 MODE)-Chain 0



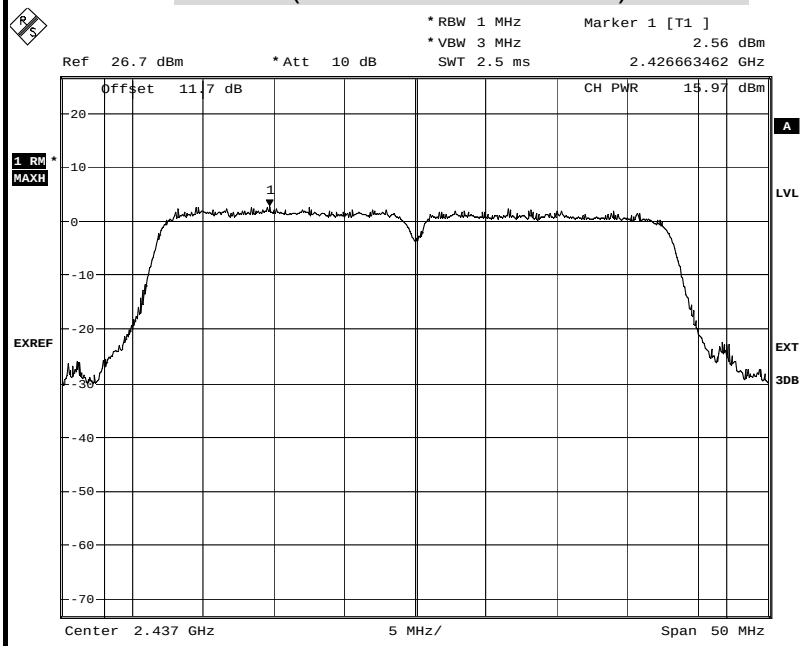
AVERAGE (802.11n HT40 MODE) Chain 0

CH Low (802.11n HT40 MODE)-Chain 0



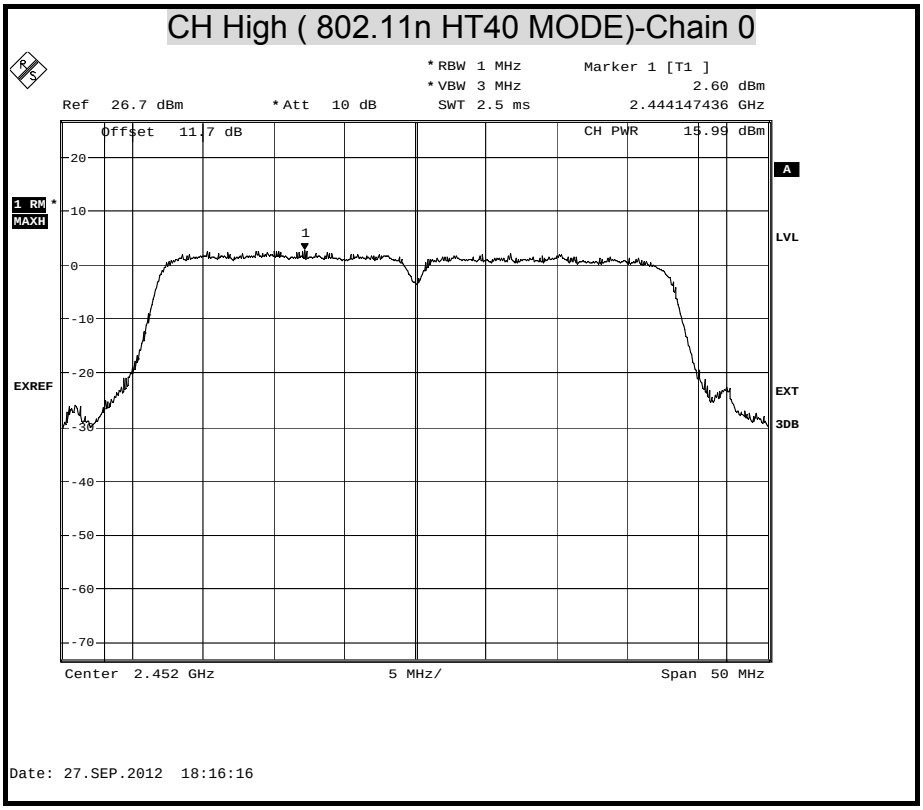
Date: 27.SEP.2012 18:14:56

CH Mid (802.11n HT40 MODE)-Chain 0



Date: 27.SEP.2012 18:15:22

CH High (802.11n HT40 MODE)-Chain 0



Antenna Gain	2.0 dBi

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	19.99	30.00	PASS
Middle	2437	20.75	30.00	PASS
High	2462	21.48	30.00	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps long.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 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 (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	21.75	30.00	PASS
Middle	2437	22.42	30.00	PASS
High	2462	22.74	30.00	PASS

NOTE : 1.At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
		Chain 0		
Low	2412	22.03	30.00	PASS
Middle	2437	22.63	30.00	PASS
High	2462	23.25	30.00	PASS

NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
		Chain 0		
Low	2422	21.27	30.00	PASS
Middle	2437	22.73	30.00	PASS
High	2452	22.88	30.00	PASS

NOTE : 1. At finial test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

Average Power Data

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2412	17.34
Middle	2437	18.48
High	2462	18.51

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2412	16.09
Middle	2437	16.60
High	2462	17.22

IEEE 802.11n HT20 mode

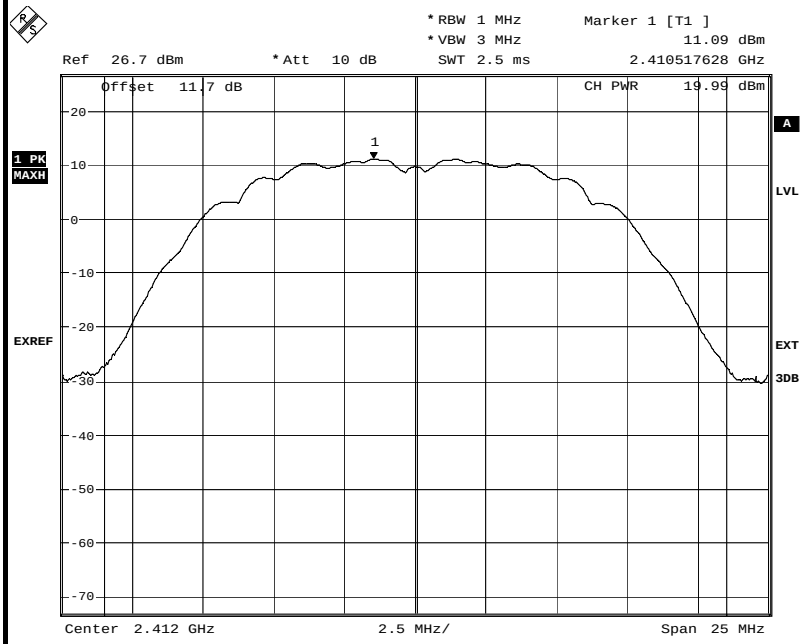
Channel	Channel Frequency (MHz)	Average Power (dBm)
		Chain 0
Low	2412	15.72
Middle	2437	16.89
High	2462	16.88

IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
		Chain 0
Low	2422	15.44
Middle	2437	16.47
High	2452	17.21

MAXIMUM PEAK OUTPUT POWER (802.11b MODE)

CH Low (802.11b MODE)



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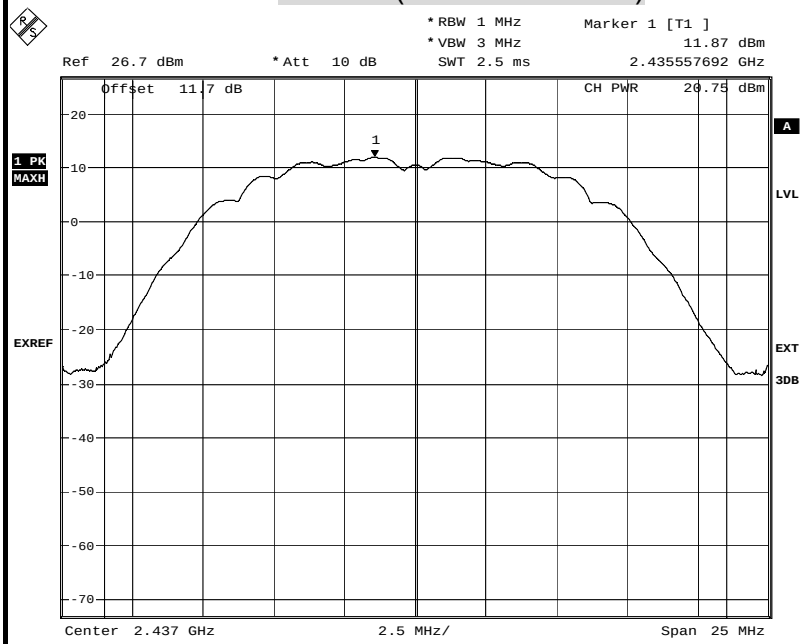

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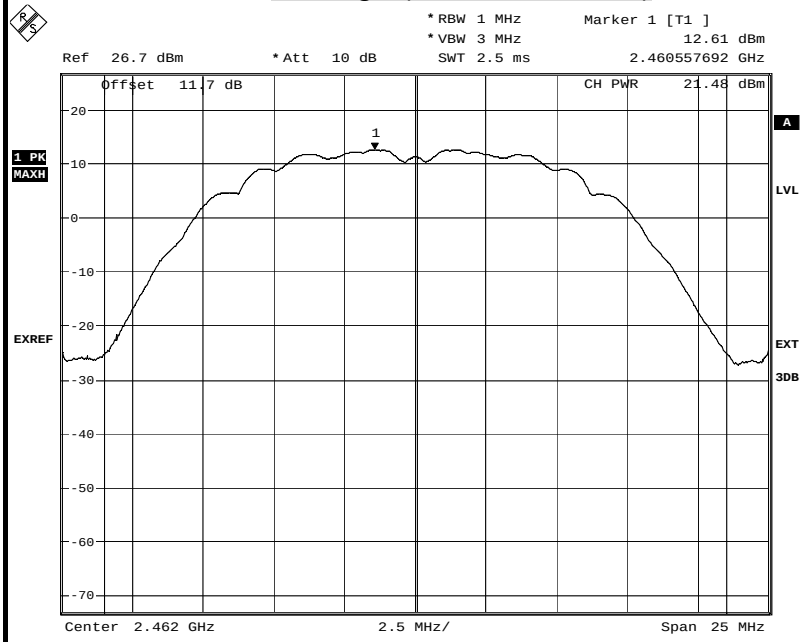
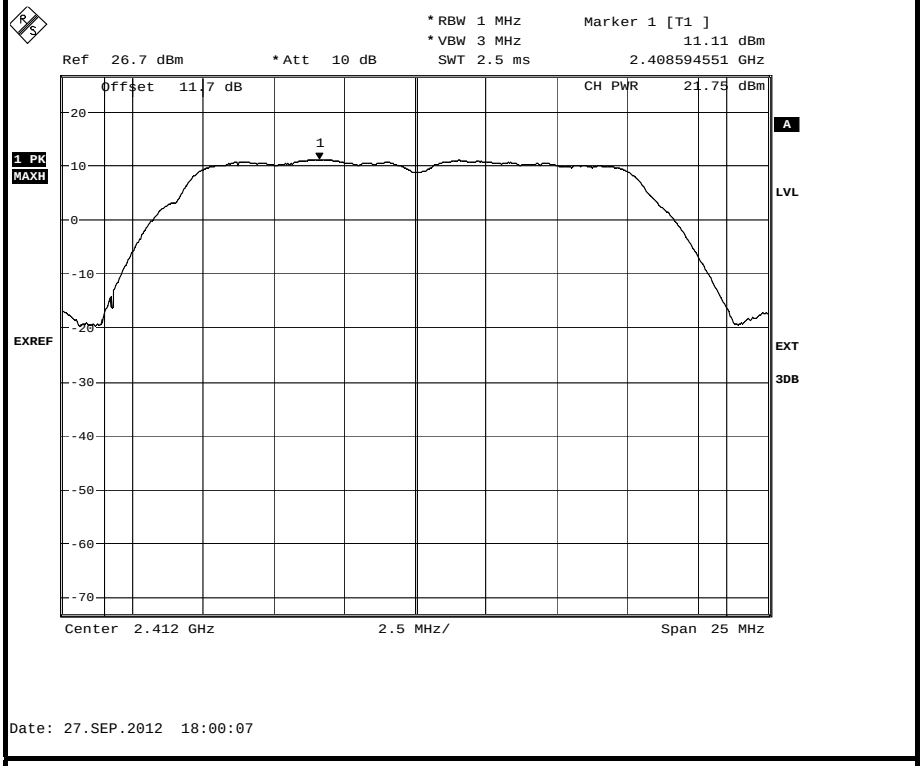


MAXIMUM PEAK OUTPUT POWER (802.11g MODE)

CH Low (802.11g MODE)



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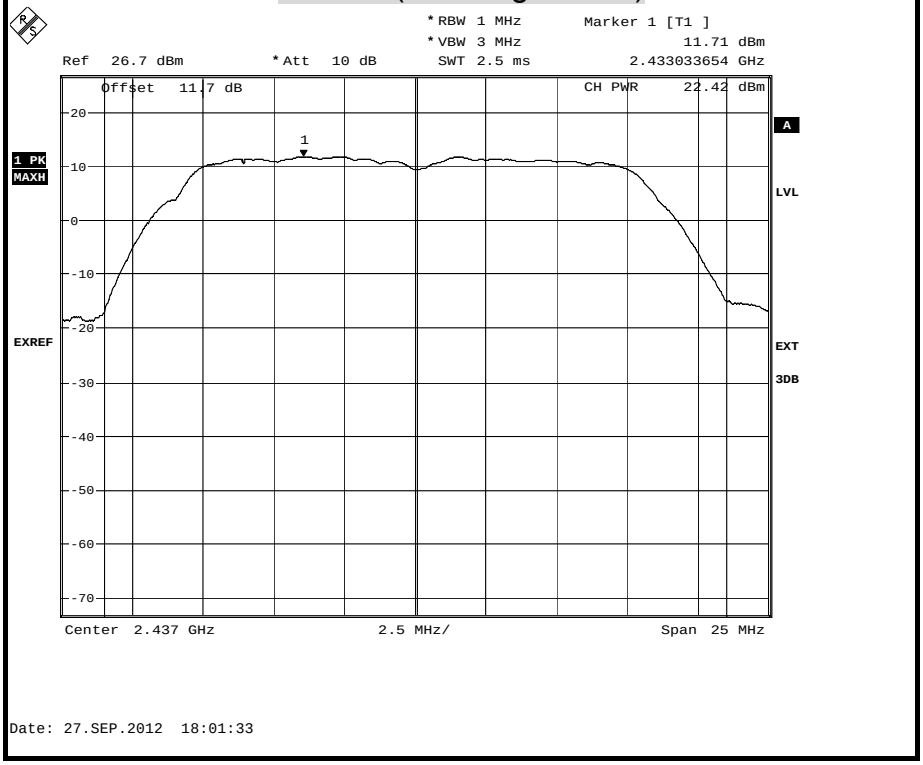
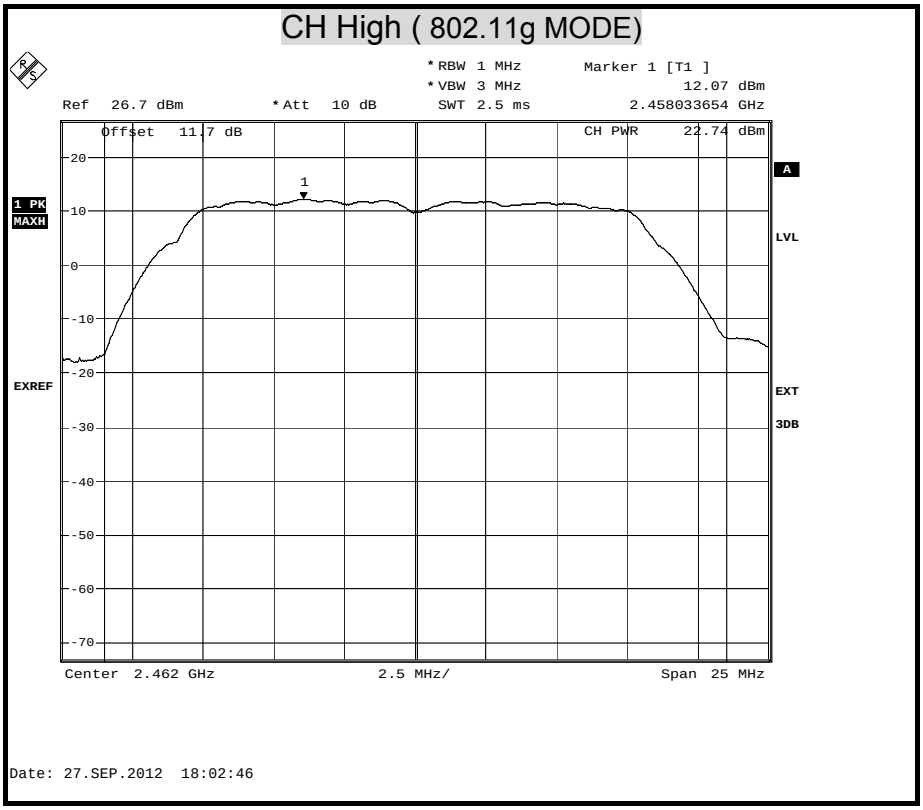
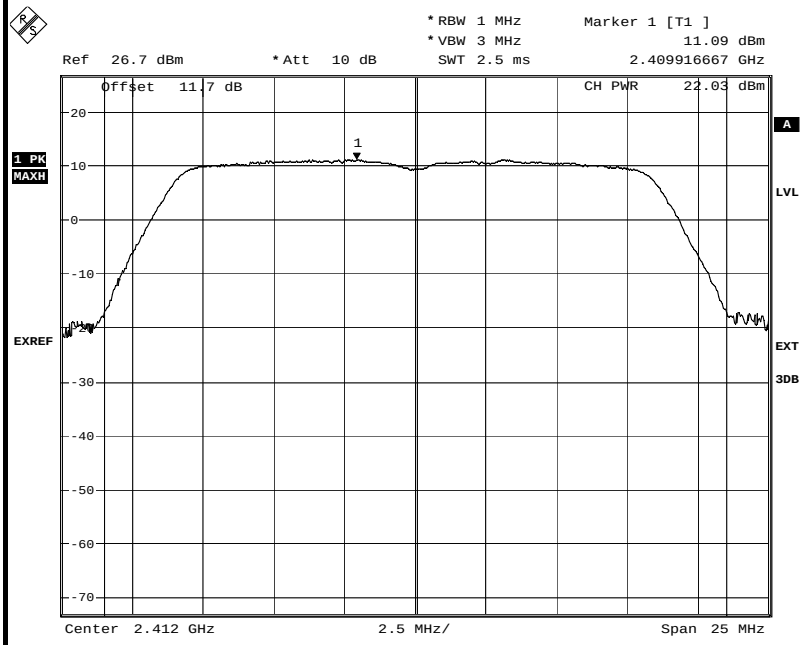


CH High (802.11g MODE)



MAXIMUM PEAK OUTPUT POWER (802.11n HT20 MODE) Chain 0

CH Low (802.11n HT20 MODE)-Chain 0



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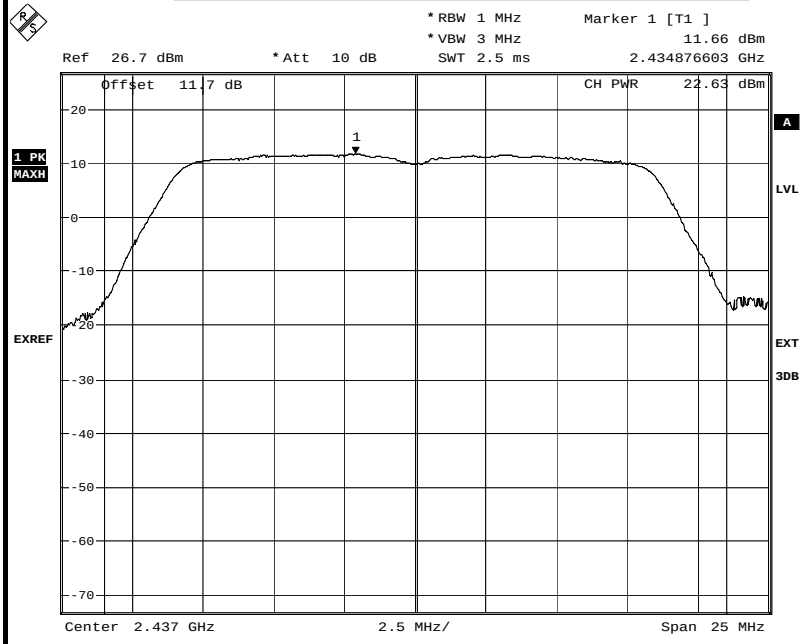

Date: 27.SEP.2012 18:05:17

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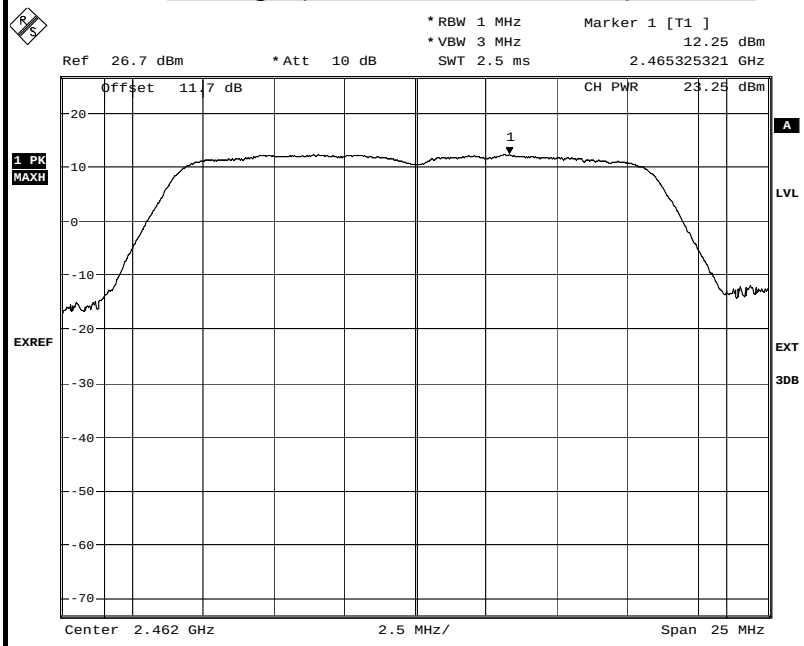
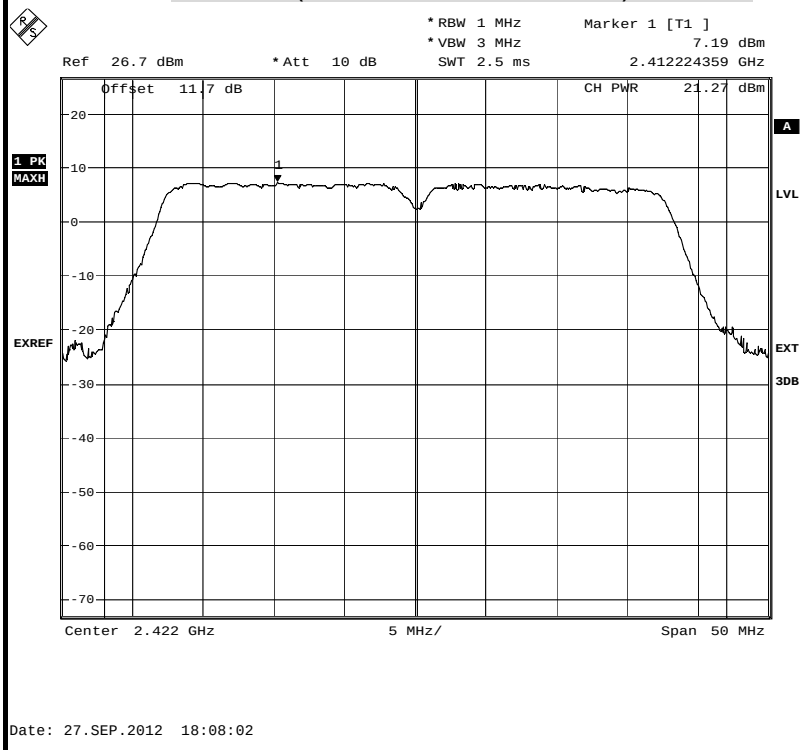


MAXIMUM PEAK OUTPUT POWER (802.11n HT40 MODE) Chain 0

CH Low (802.11n HT40 MODE)-Chain 0



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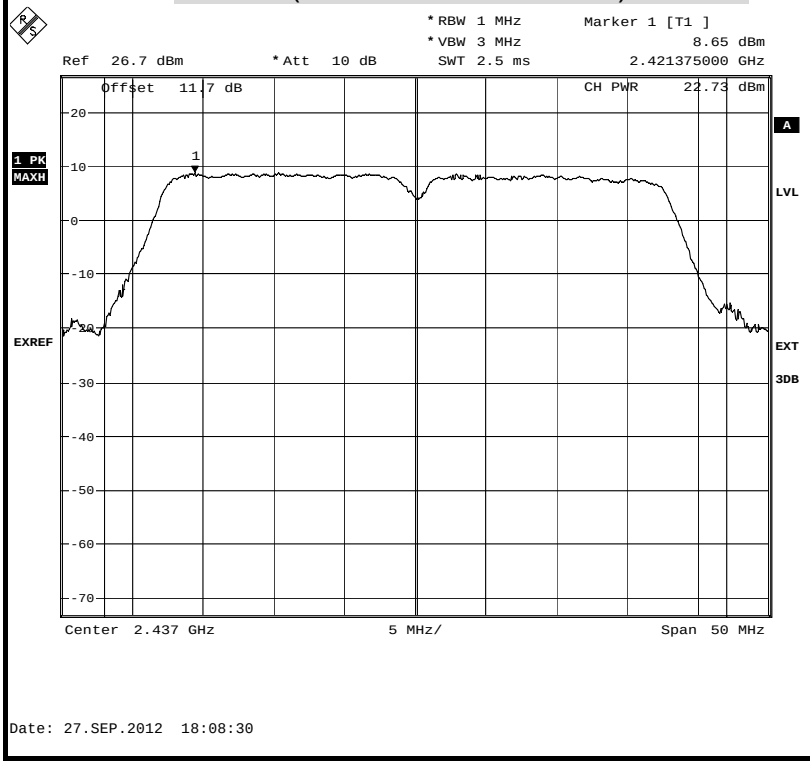

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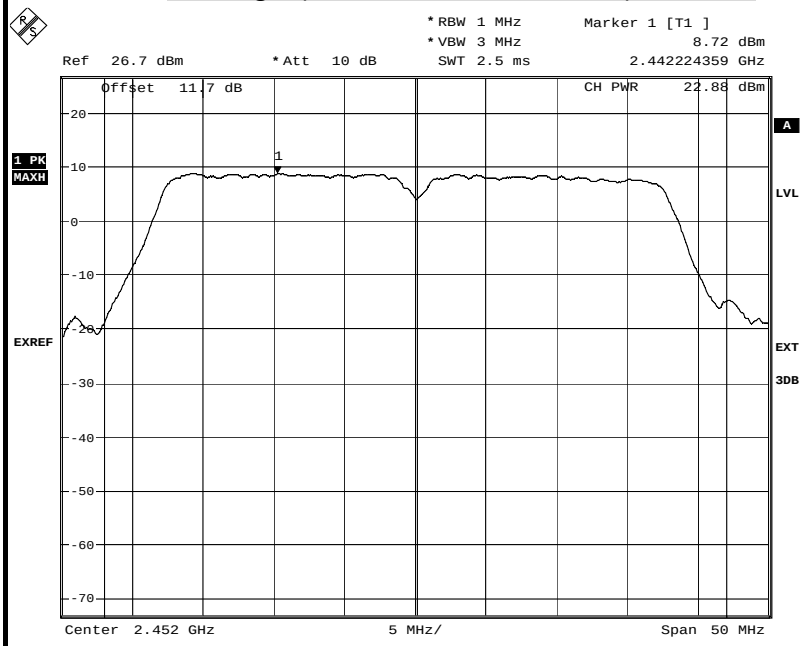
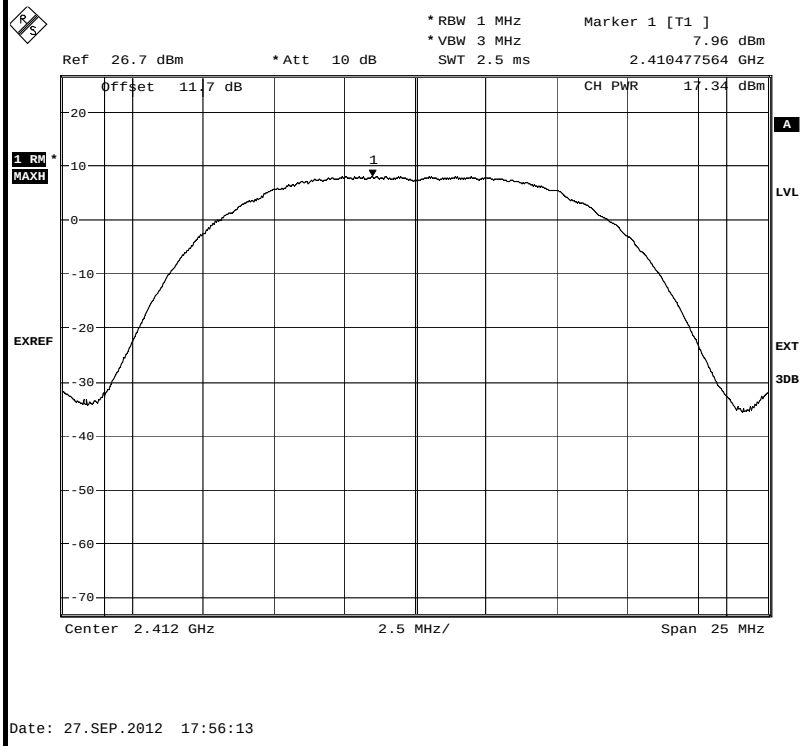
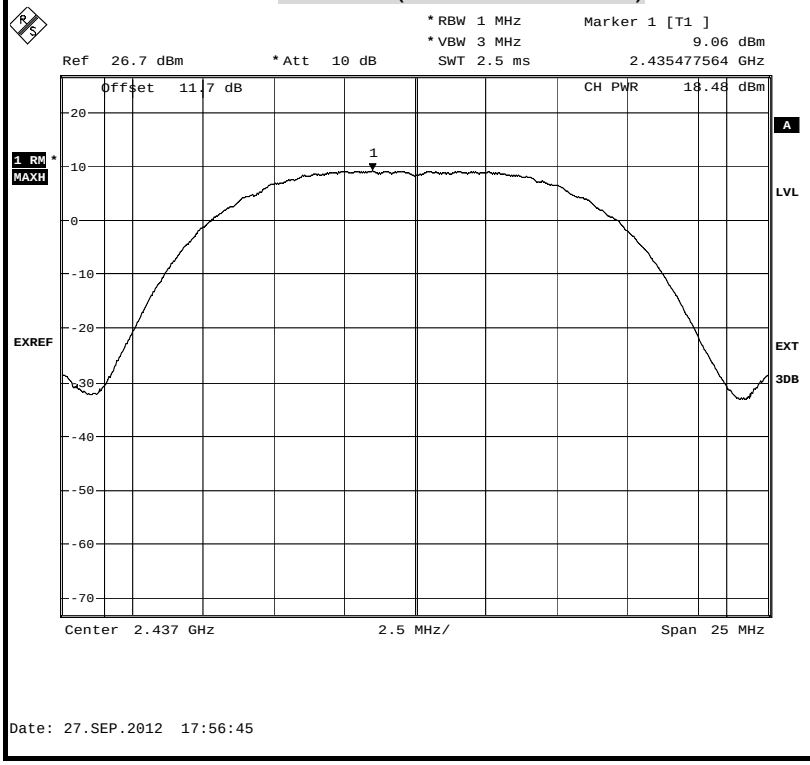


AVERAGE (802.11b MODE)

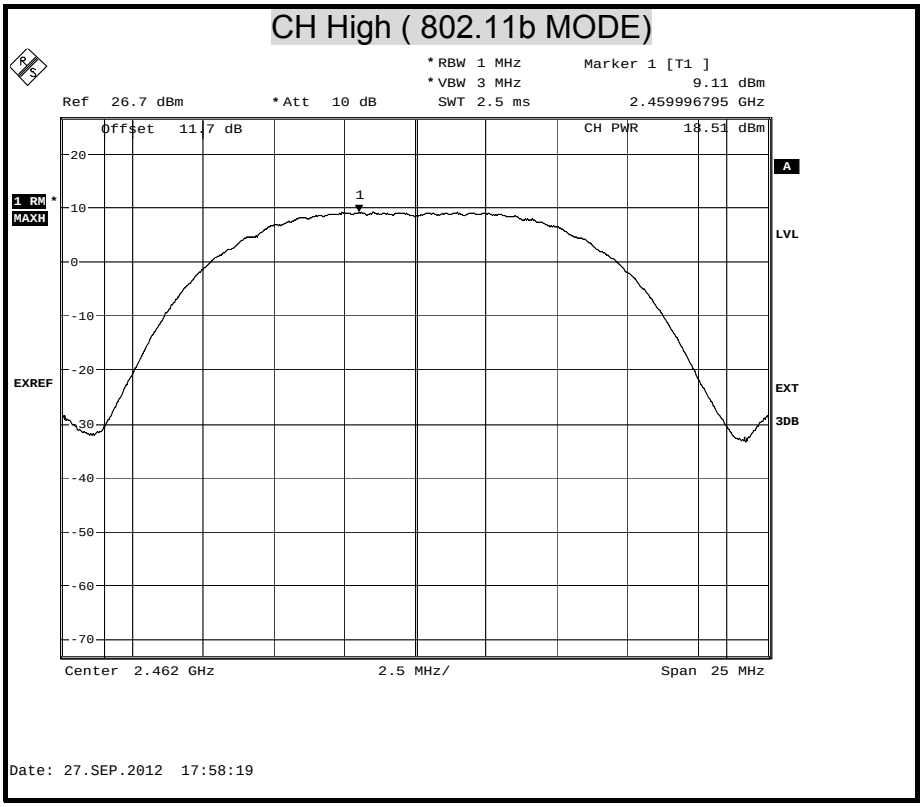
CH Low (802.11b MODE)



CH Mid (802.11b MODE)

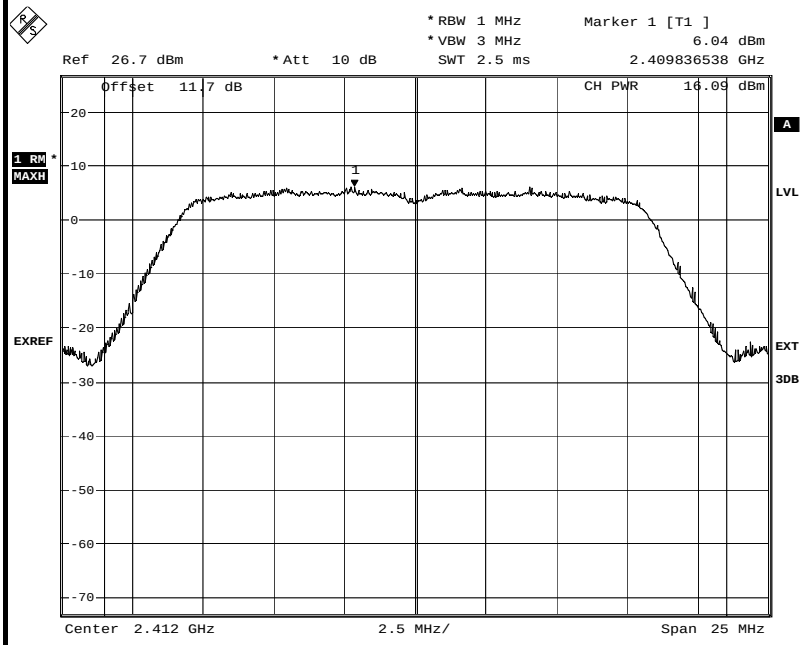


CH High (802.11b MODE)



AVERAGE (802.11g MODE)

CH Low (802.11g MODE)



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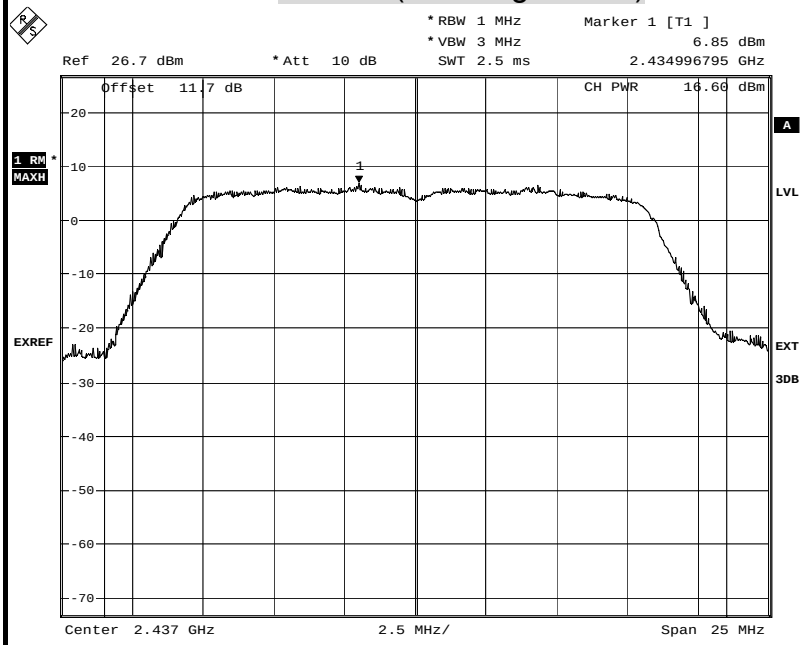
CH Mid (802.11g MODE)



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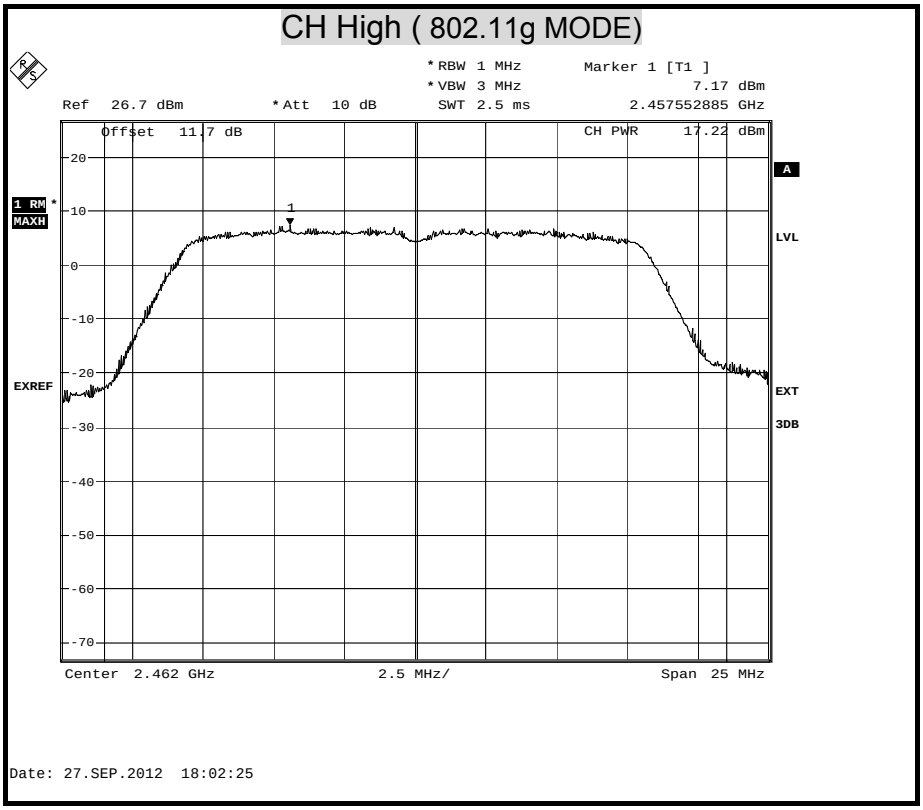
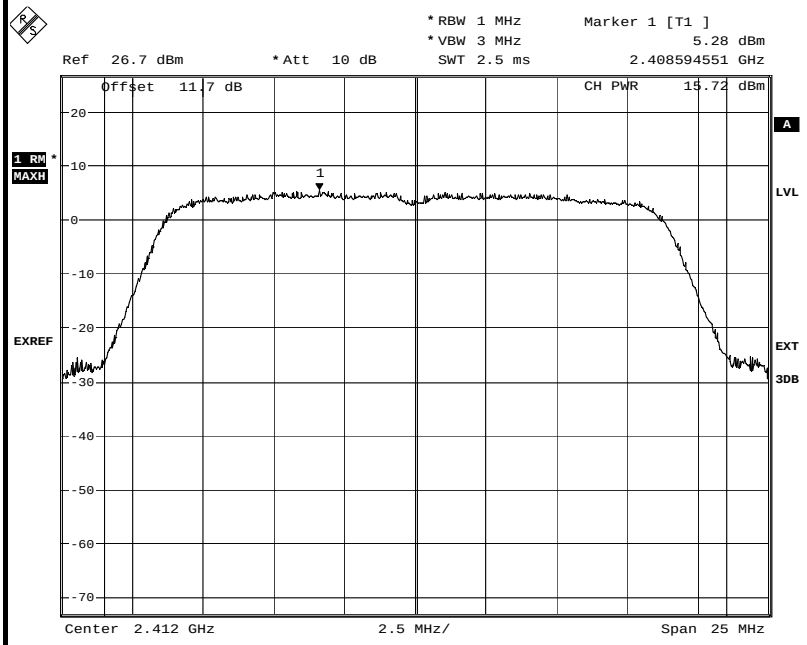
CH High (802.11g MODE)



AVERAGE (802.11n HT20 MODE) Chain 0

CH Low (802.11n HT20 MODE)-Chain 0



Date: 27.SEP.2012 18:04:21

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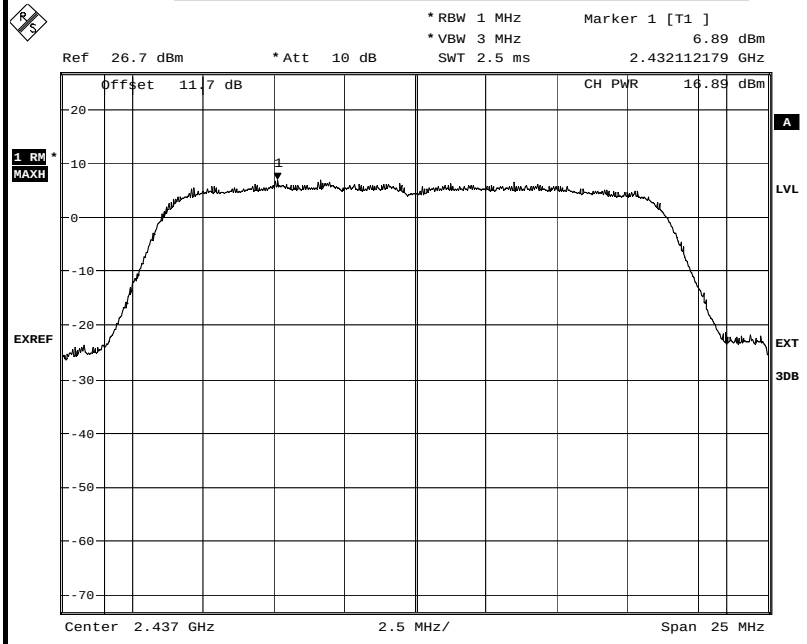

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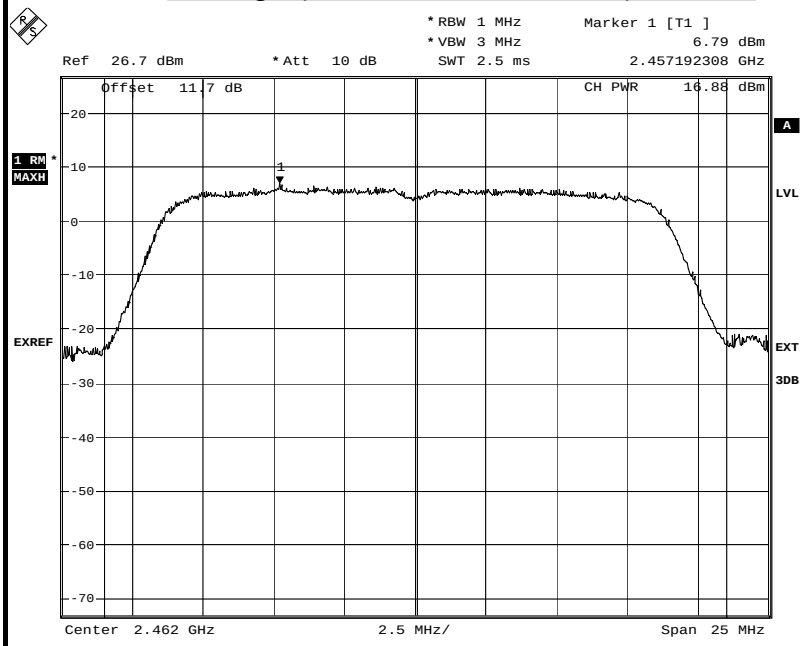
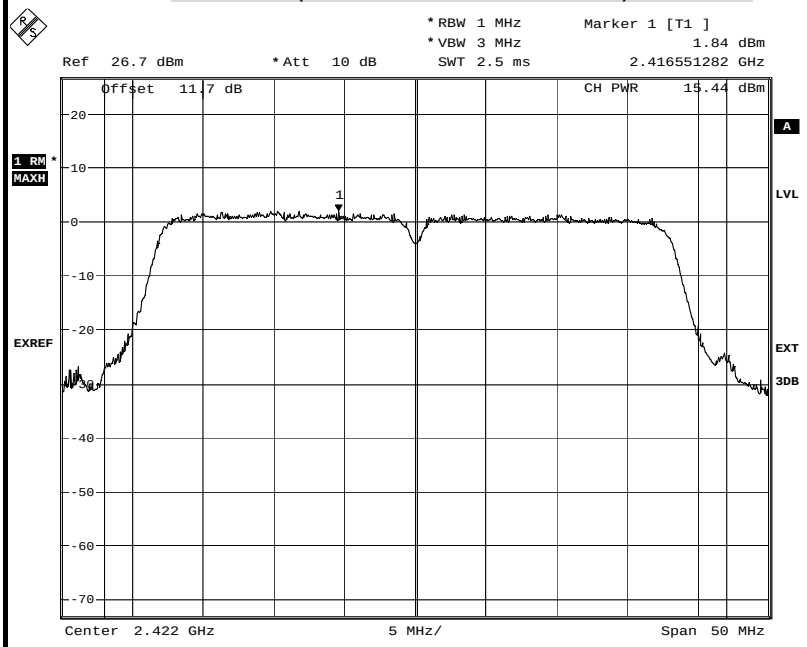


AVERAGE (802.11n HT40 MODE) Chain 0

CH Low (802.11n HT40 MODE)-Chain 0



Date: 27.SEP.2012 18:07:47

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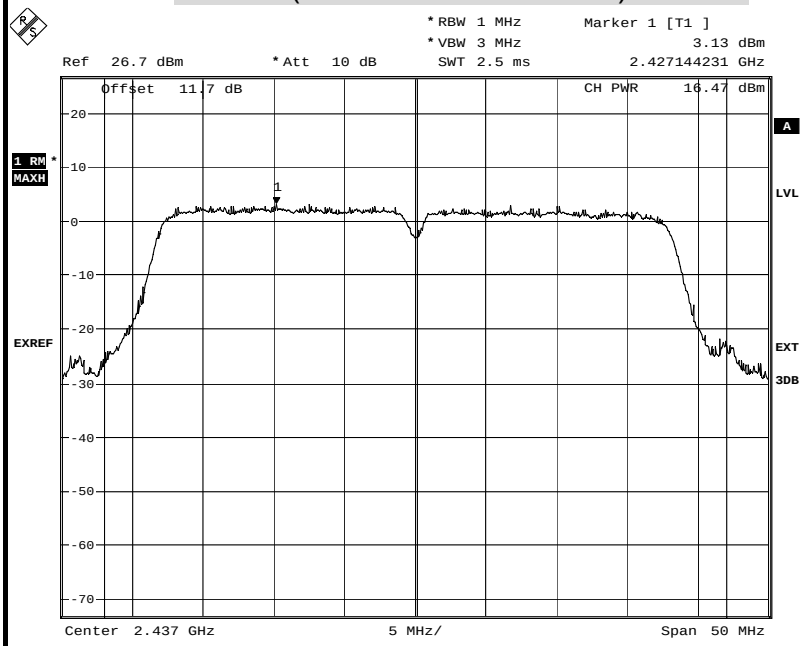

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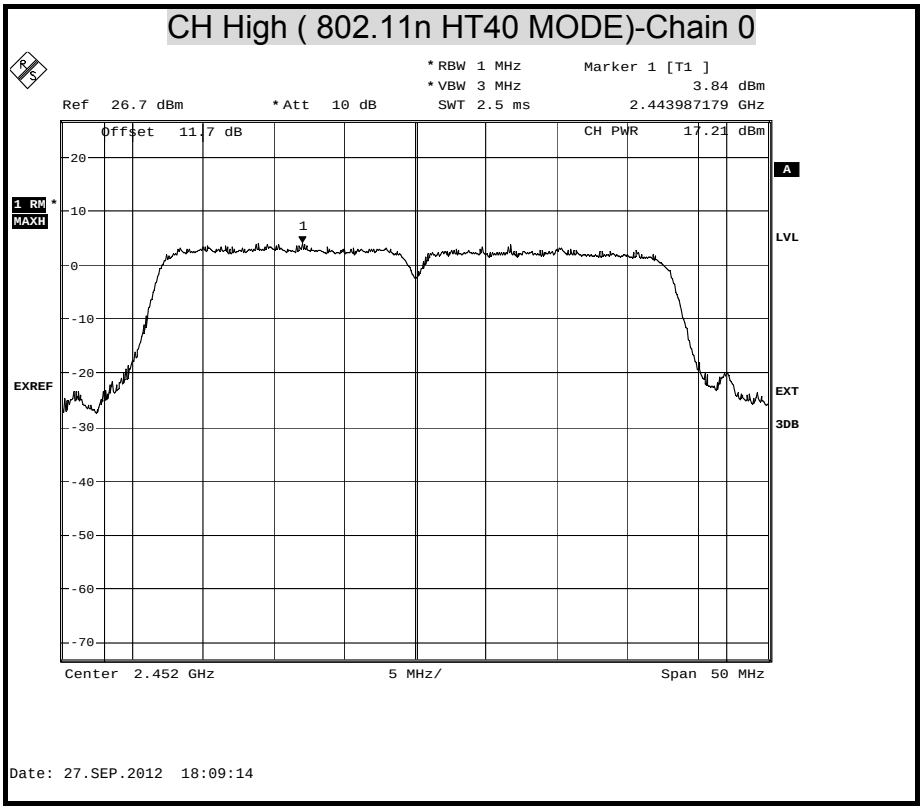
CH High (802.11n HT40 MODE)-Chain 0



8.3 MAXIMUM PERMISSIBLE EXPOSURE

According to FCC 1.1310 : The criteria listed in the following table shall be used to evaluate the environment 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 / cm^2

LIMIT

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

TEST RESULTS

No non-compliance noted.

Antenna Gain	4.04 dBi

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

Once Antenna Gain=4.04dBi=2.53512863mW

IEEE 802.11b	=	0.0796 *	91.6220	*	2.53512863	÷ 400 =	0.04622
IEEE 802.11g	=	0.0796 *	134.2765	*	2.53512863	÷ 400 =	0.06774
IEEE 802.11n HT20	=	0.0796 *	145.2112	*	2.53512863	÷ 400 =	0.07326
IEEE 802.11n HT40	=	0.0796 *	164.8162	*	2.53512863	÷ 400 =	0.08315

Mode	Minimum separation distance (cm)	Output Power (dBm)	Output Power (mW)	Antenna Gain (dBi)	Power Density Limit (mW/cm^2)	Power Density at 20cm (mW/cm^2)
IEEE 802.11b	20	19.62	91.62	4.04	1.00	0.046222
IEEE 802.11g	20	21.28	134.28	4.04	1.00	0.067741
IEEE 802.11n HT20	20	21.62	145.21	4.04	1.00	0.073258
IEEE 802.11n HT40	20	22.17	164.82	4.04	1.00	0.083148

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.

Antenna Gain	2.0 dBi

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

Once Antenna Gain=2.0dBi=1.58489319mW

IEEE 802.11b	=	0.0796 *	140.6048	*	1.58489319	÷ 400 =	0.04435
IEEE 802.11g	=	0.0796 *	187.9317	*	1.58489319	÷ 400 =	0.05927
IEEE 802.11n HT20	=	0.0796 *	211.3489	*	1.58489319	÷ 400 =	0.06666
IEEE 802.11n HT40	=	0.0796 *	194.0886	*	1.58489319	÷ 400 =	0.06121

Mode	Minimum separation distance (cm)	Output Power (dBm)	Output Power (mW)	Antenna Gain (dBi)	Power Density Limit (mW/cm^2)	Power Density at 20cm (mW/cm^2)
IEEE 802.11b	20	21.48	140.60	2.00	1.00	0.044346
IEEE 802.11g	20	22.74	187.93	2.00	1.00	0.059272
IEEE 802.11n HT20	20	23.25	211.35	2.00	1.00	0.066658
IEEE 802.11n HT40	20	22.88	194.09	2.00	1.00	0.061214

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.

8.4 POWER SPECTRAL DENSITY

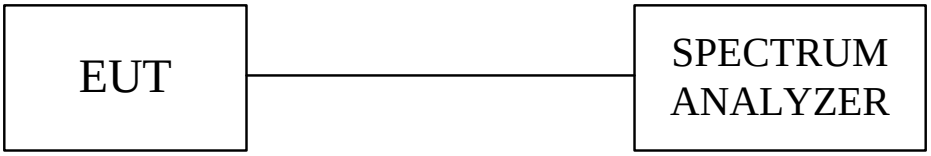
LIMIT

§ 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 EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSU	200789	SEP. 29, 2013

TEST SETUP



TEST PROCEDURE

The tests were performed in accordance with KDB 558074 5.3.1.

5.3.1 Measurement Procedure PKPSD:

1.Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2.Set the RBW = 100 kHz.
3.Set the VBW ≥ 300 kHz.
4.Set the span to 5-30 % greater than the EBW.
5.Detector = peak.
6.Sweep time = auto couple.
7.Trace mode = max hold.
8.Allow trace to fully stabilize.
9.Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
10.Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(3 kHz/100 kHz= -15.2 dB).11.The resulting peak PSD level must be ≤ 8 dBm.

TEST RESULTS

Antenna Gain	4.04 dBi

IEEE 802.11b mode

Channel	Frequency (MHz)	Reading (dBm)	BWCF (dB)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2412	4.40	-15.2	-10.80	8.00	-18.80	PASS
Middle	2437	4.91	-15.2	-10.29	8.00	-18.29	PASS
High	2462	4.70	-15.2	-10.50	8.00	-18.50	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps long.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11g mode

Channel	Frequency (MHz)	Reading (dBm)	BWCF (dB)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2412	-2.35	-15.2	-17.55	8.00	-25.55	PASS
Middle	2437	-0.65	-15.2	-15.85	8.00	-23.85	PASS
High	2462	-1.03	-15.2	-16.23	8.00	-24.23	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps long.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	Reading (dBm)	BWCF (dB)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2412	-0.82	-15.2	-16.02	8.00	-24.02	PASS
Middle	2437	-0.73	-15.2	-15.93	8.00	-23.93	PASS
High	2462	-0.48	-15.2	-15.68	8.00	-23.68	PASS

NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps long.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

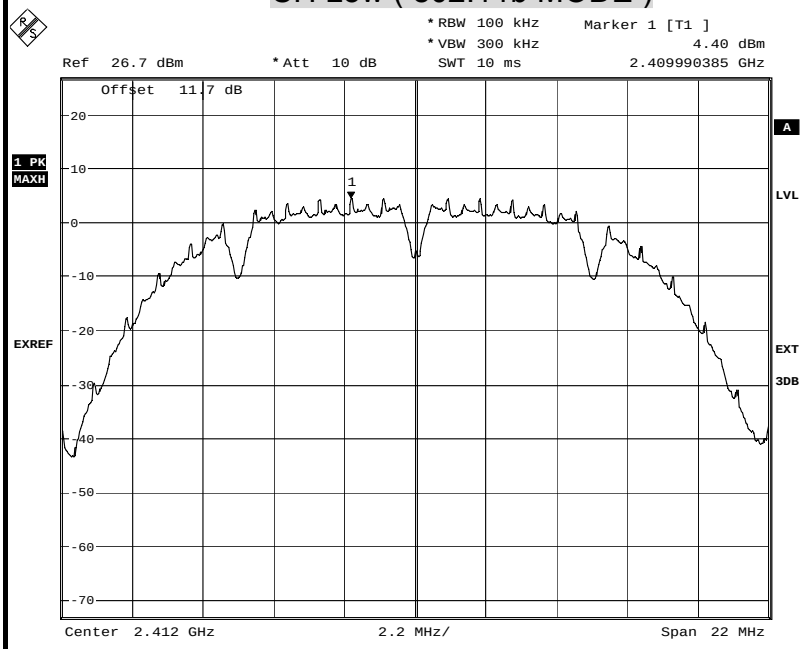
IEEE 802.11n HT40 mode

Channel	Frequency (MHz)	Reading (dBm)	BWCF (dB)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	-5.02	-15.2	-20.22	8.00	-28.22	-5.02	PASS
Middle	-3.61	-15.2	-18.81	8.00	-26.81	-3.61	PASS
High	-2.98	-15.2	-18.18	8.00	-26.18	-2.98	PASS

NOTE : 1. At finial test to get the worst-case emission at 13.5Mbps long.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

POWER SPECTRAL DENSITY (IEEE 802.11b MODE)

CH Low (802.11b MODE)



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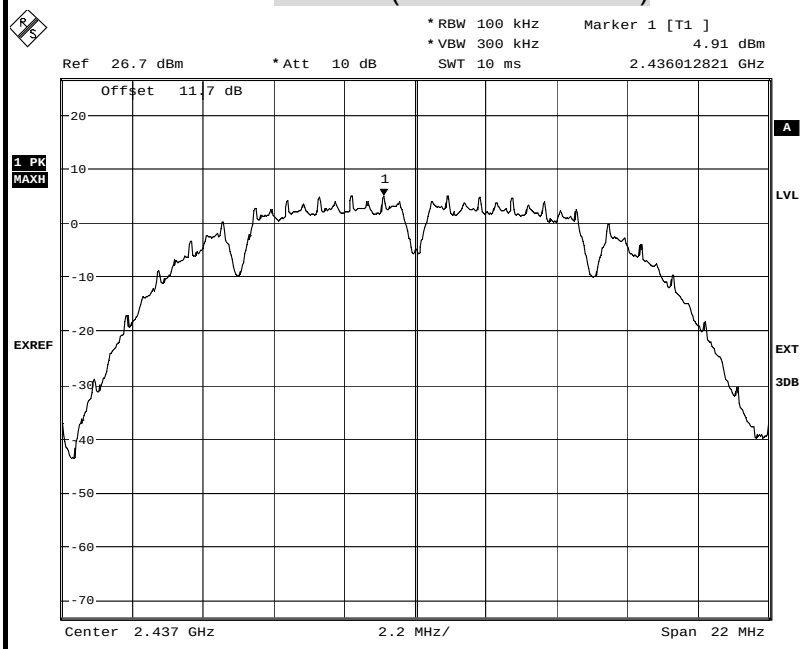
CH Mid (802.11b MODE)



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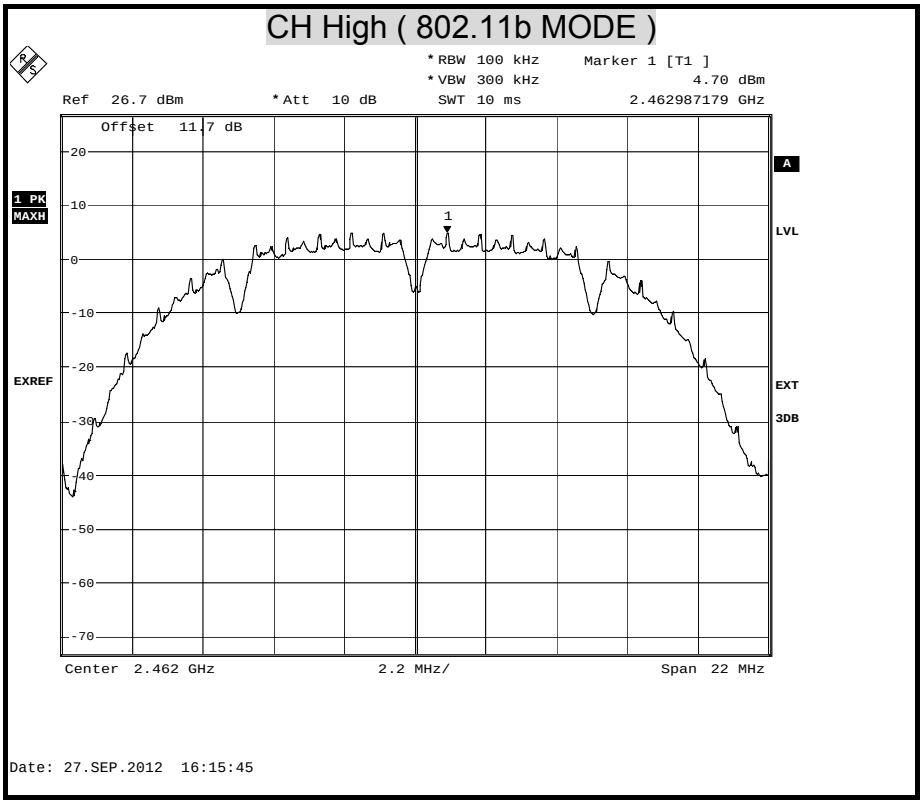
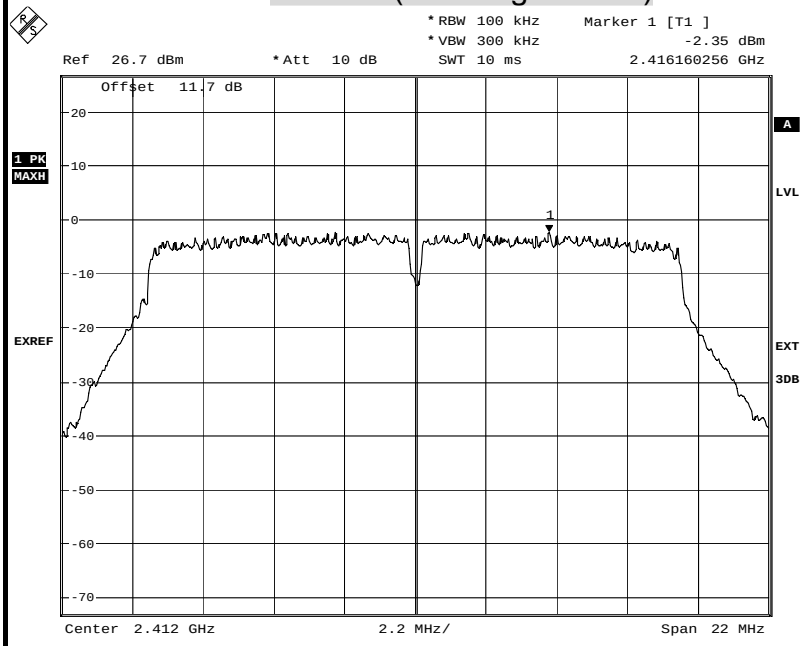
CH High (802.11b MODE)



POWER SPECTRAL DENSITY (IEEE 802.11g MODE)

CH Low (802.11g MODE)



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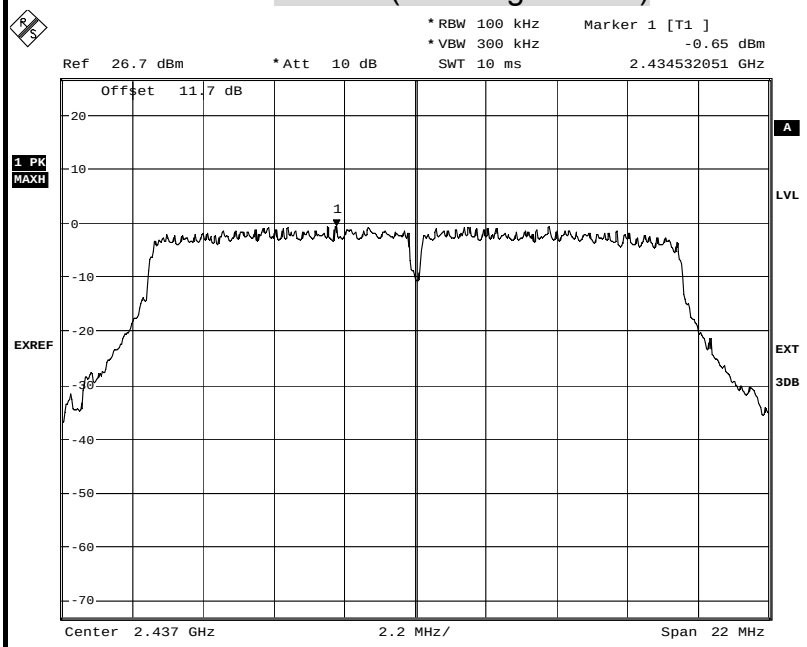
CH Mid (802.11g MODE)



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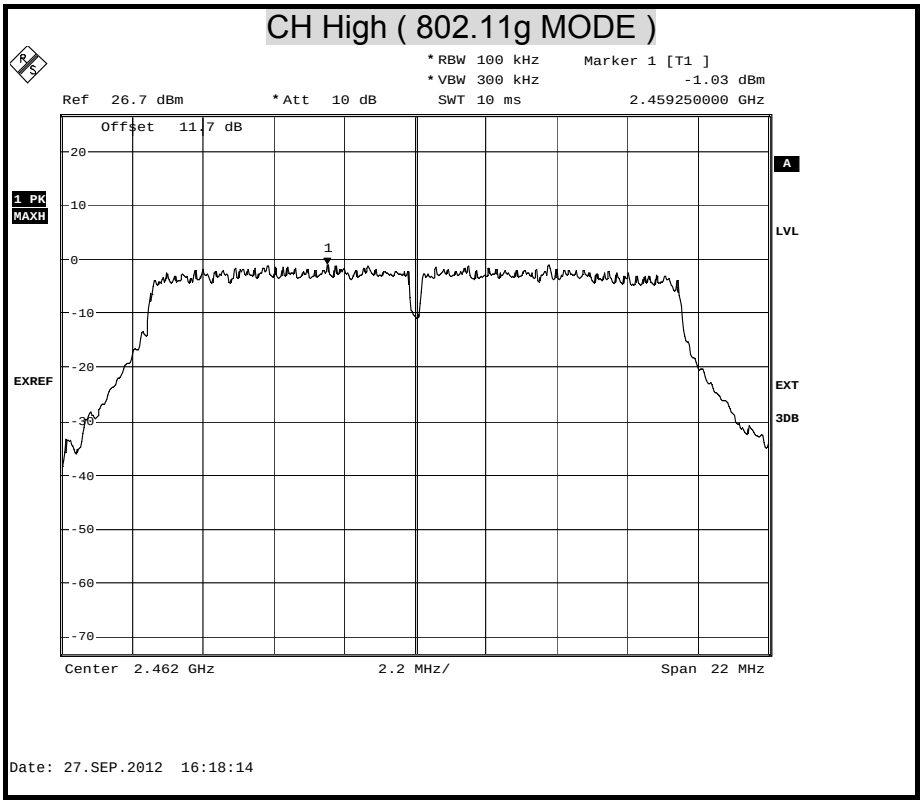
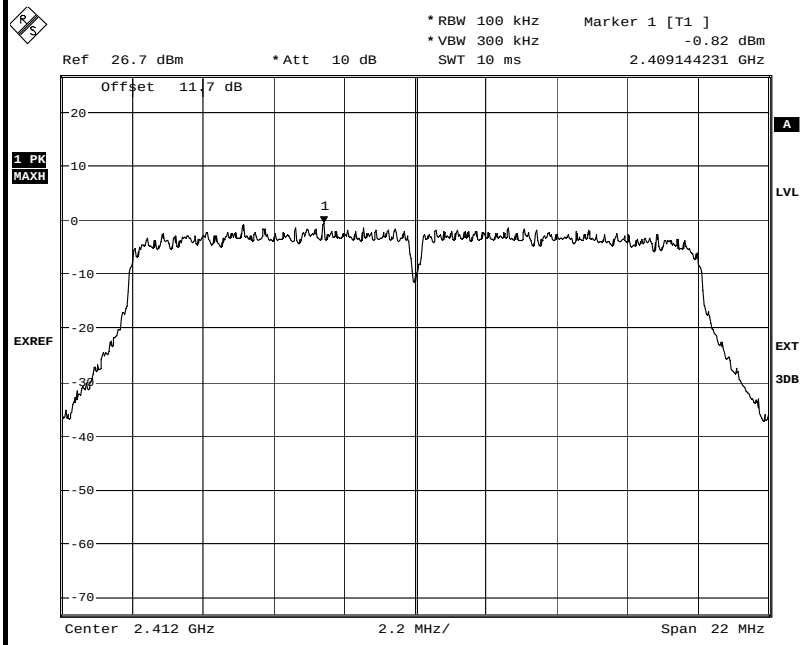
CH High (802.11g MODE)



POWER SPECTRAL DENSITY (802.11n HT20 MODE)

CH Low (802.11n HT20 MODE-Chain 0)



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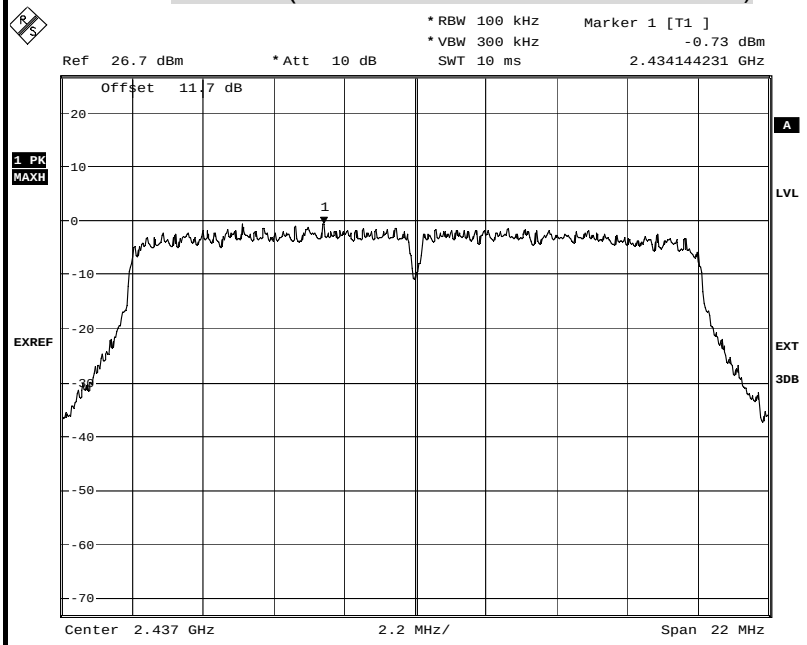

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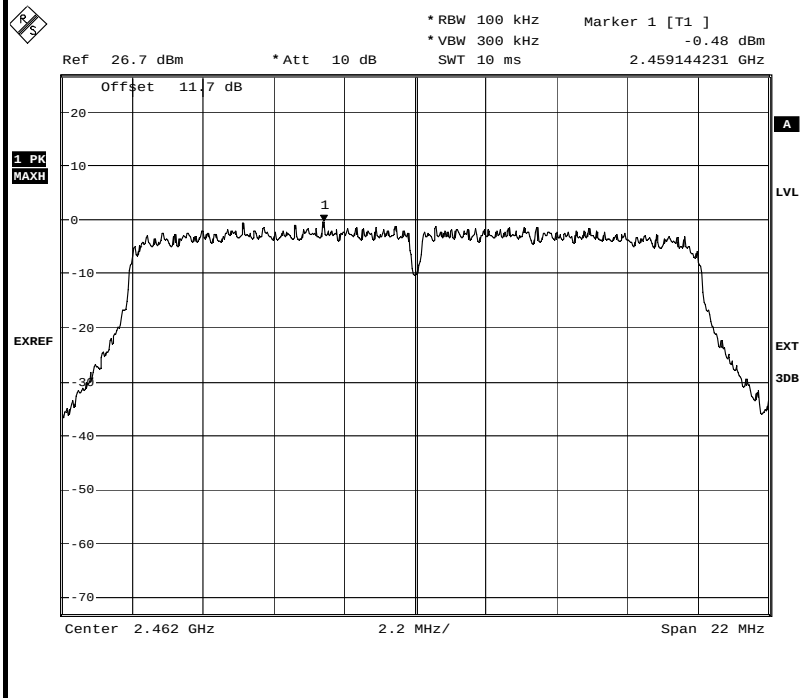
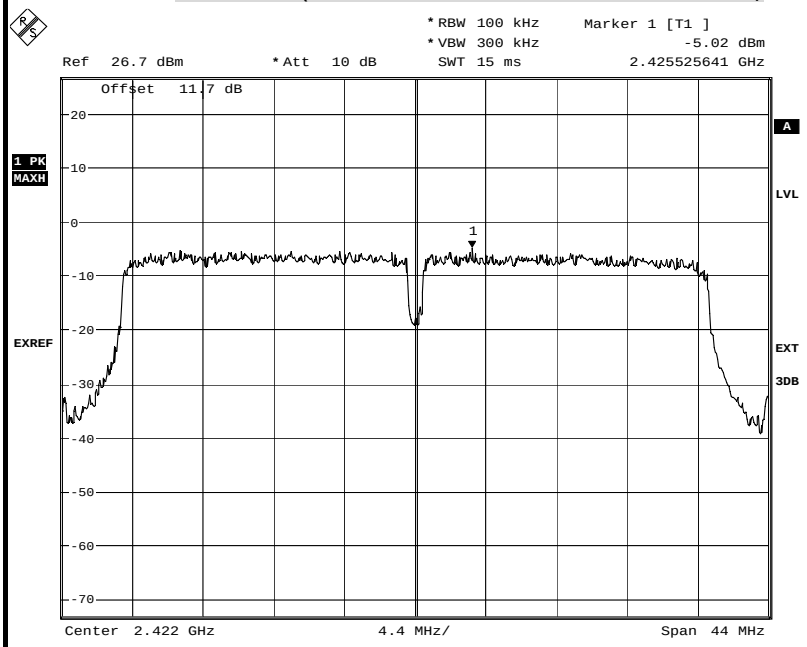


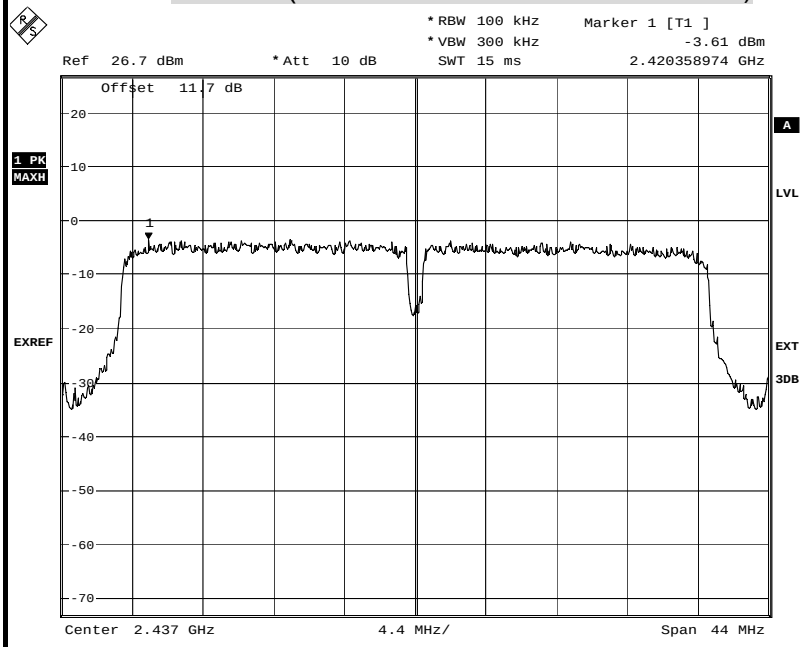
POWER SPECTRAL DENSITY (802.11n HT40 MODE)

CH Low (802.11n HT40 MODE-Chain 0)



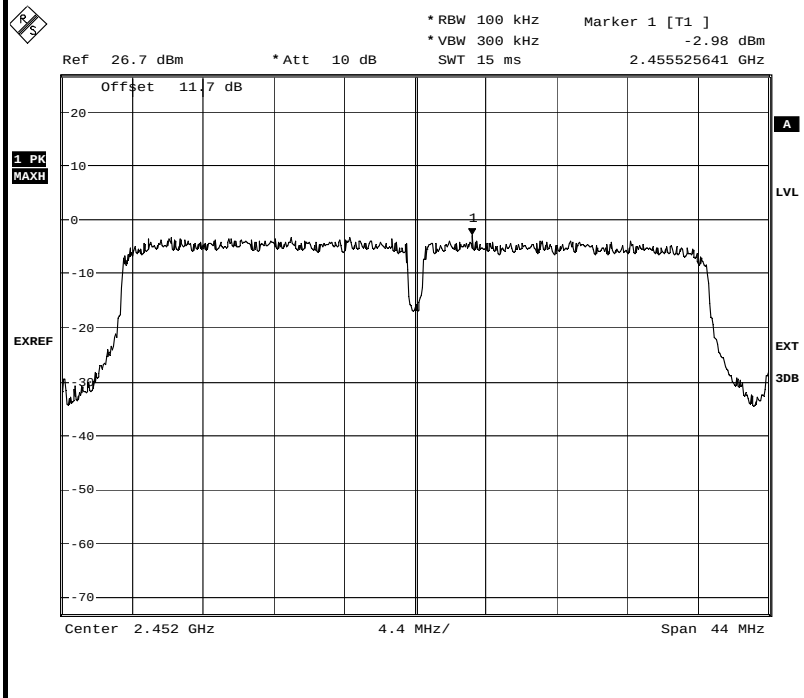
Date: 27.SEP.2012 16:20:25

CH Mid (802.11n HT40 MODE-Chain 0)



Date: 27.SEP.2012 16:20:54

CH High (802.11n HT40 MODE-Chain 0)



Antenna Gain	2.0 dBi

IEEE 802.11b mode

Channel	Frequency (MHz)	Reading (dBm)	BWCF (dB)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2412	4.94	-15.2	-10.26	8.00	-18.26	PASS
Middle	2437	5.98	-15.2	-9.22	8.00	-17.22	PASS
High	2462	6.52	-15.2	-8.68	8.00	-16.68	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps long.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11g mode

Channel	Frequency (MHz)	Reading (dBm)	BWCF (dB)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2412	0.04	-15.2	-15.16	8.00	-23.16	PASS
Middle	2437	0.93	-15.2	-14.27	8.00	-22.27	PASS
High	2462	0.98	-15.2	-14.22	8.00	-22.22	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps long.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	Reading (dBm)	BWCF (dB)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2412	0.13	-15.2	-15.07	8.00	-23.07	PASS
Middle	2437	0.98	-15.2	-14.22	8.00	-22.22	PASS
High	2462	1.01	-15.2	-14.19	8.00	-22.19	PASS

NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps long.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

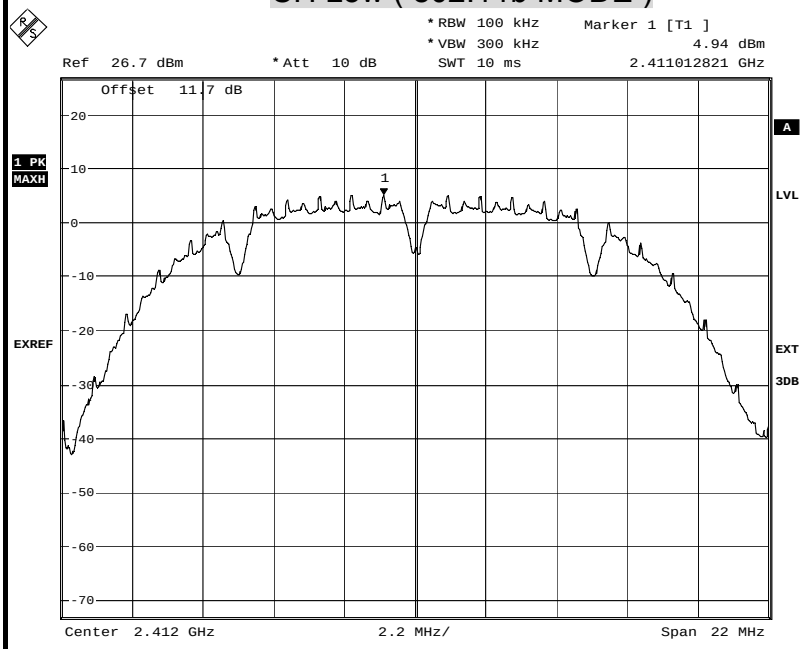
IEEE 802.11n HT40 mode

Channel	Frequency (MHz)	Reading (dBm)	BWCF (dB)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	-5.02	-4.05	-15.2	-19.25	8.00	-27.25	PASS
Middle	-3.61	-2.45	-15.2	-17.65	8.00	-25.65	PASS
High	-2.98	-2.17	-15.2	-17.37	8.00	-25.37	PASS

NOTE : 1. At finial test to get the worst-case emission at 13.5Mbps long.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

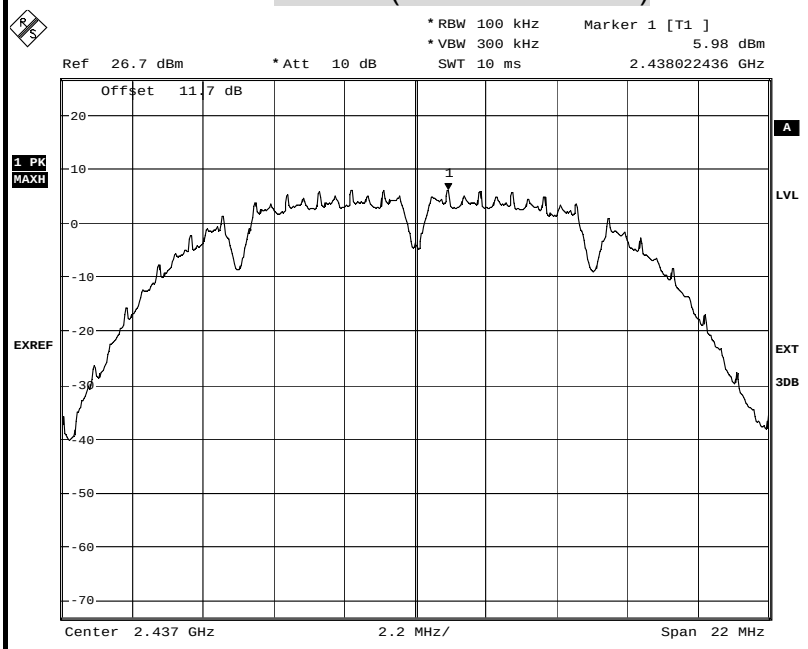
POWER SPECTRAL DENSITY (IEEE 802.11b MODE)

CH Low (802.11b MODE)



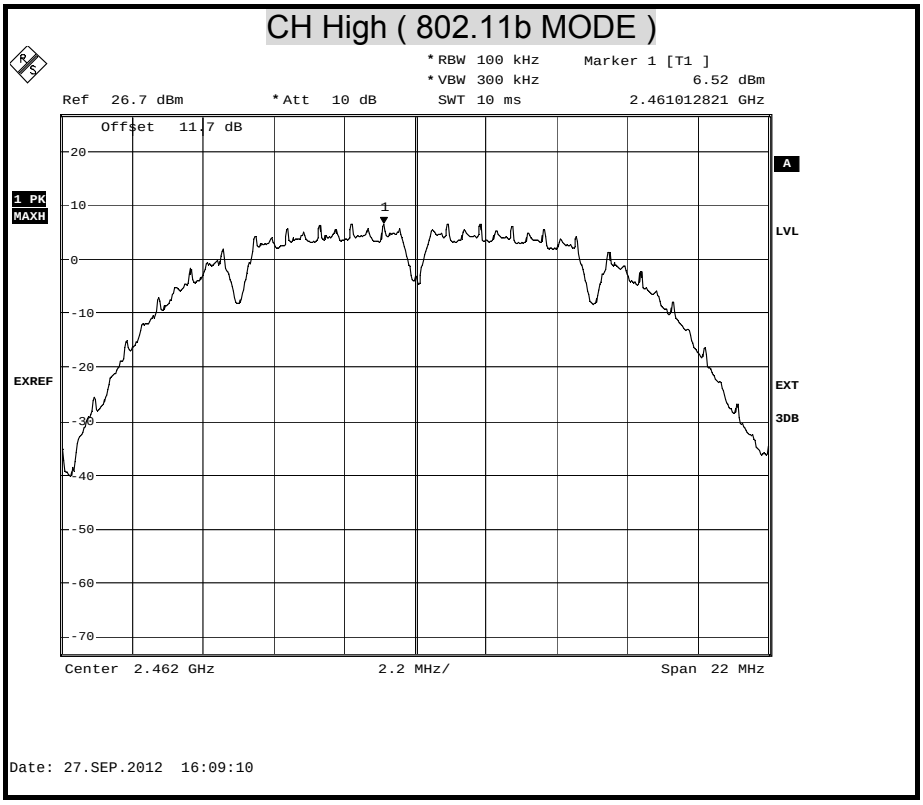
Date: 27.SEP.2012 16:08:14

CH Mid (802.11b MODE)



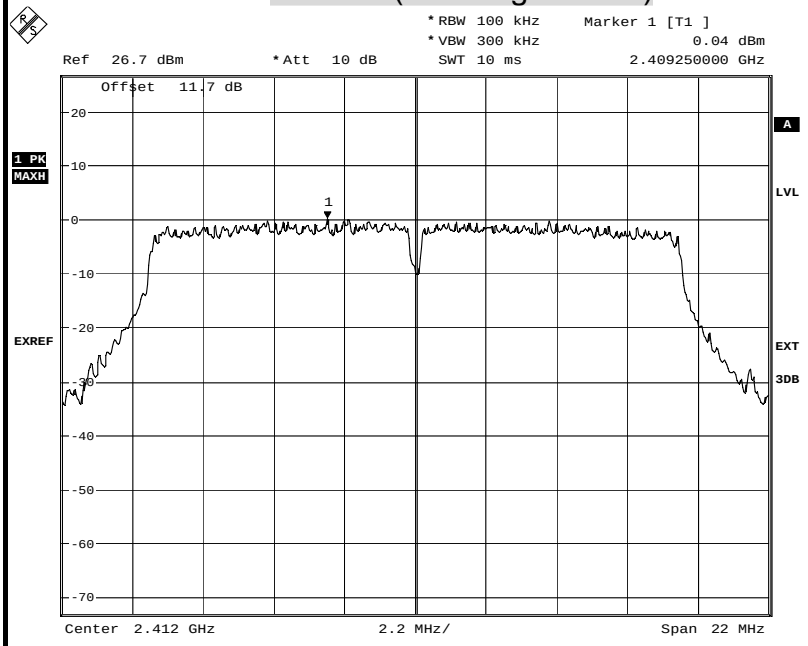
Date: 27.SEP.2012 16:08:42

CH High (802.11b MODE)



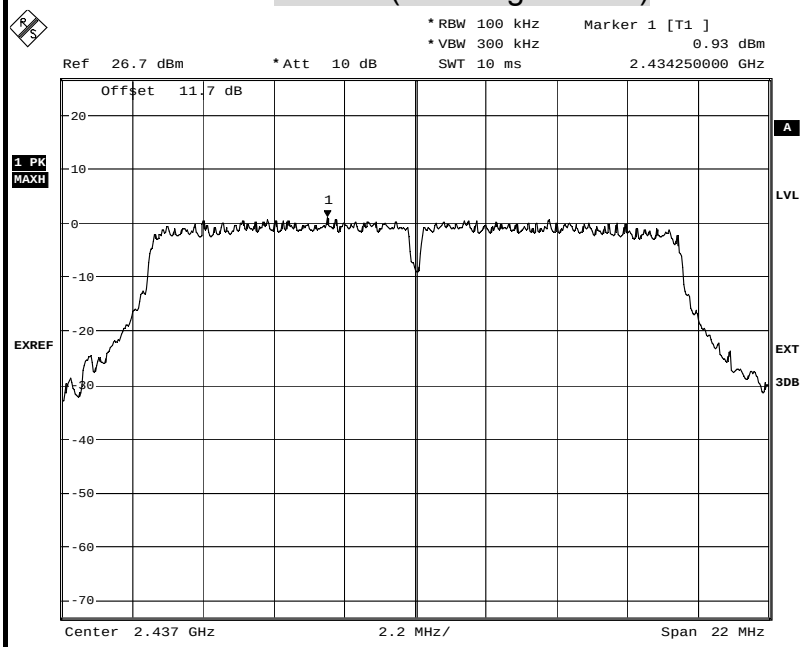
POWER SPECTRAL DENSITY (IEEE 802.11g MODE)

CH Low (802.11g MODE)



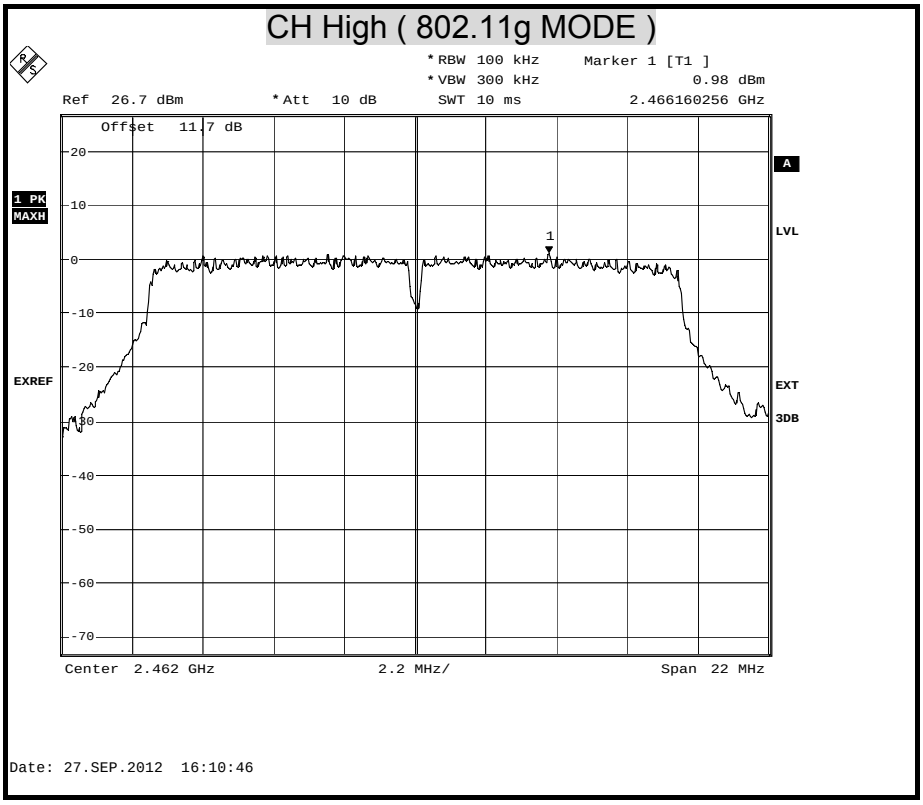
Date: 27.SEP.2012 16:09:43

CH Mid (802.11g MODE)



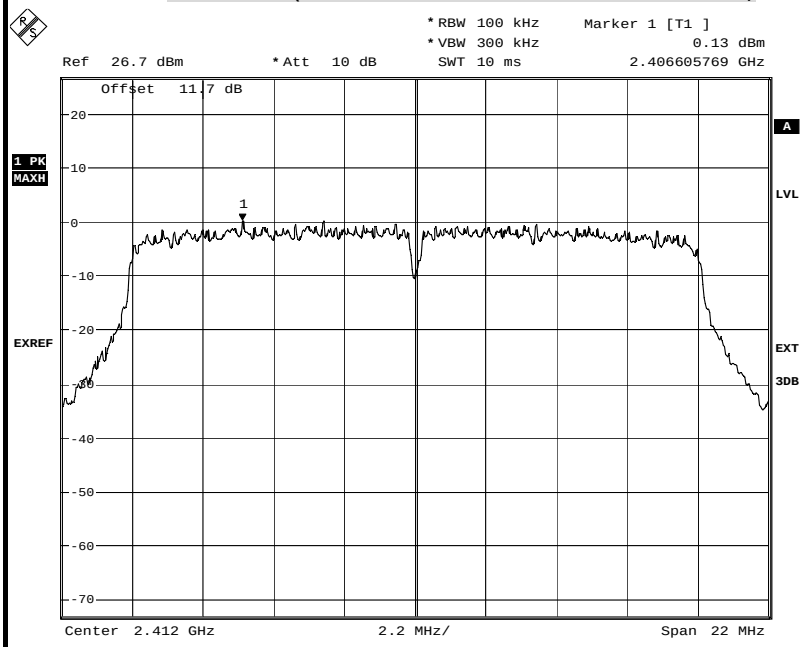
Date: 27.SEP.2012 16:10:12

CH High (802.11g MODE)

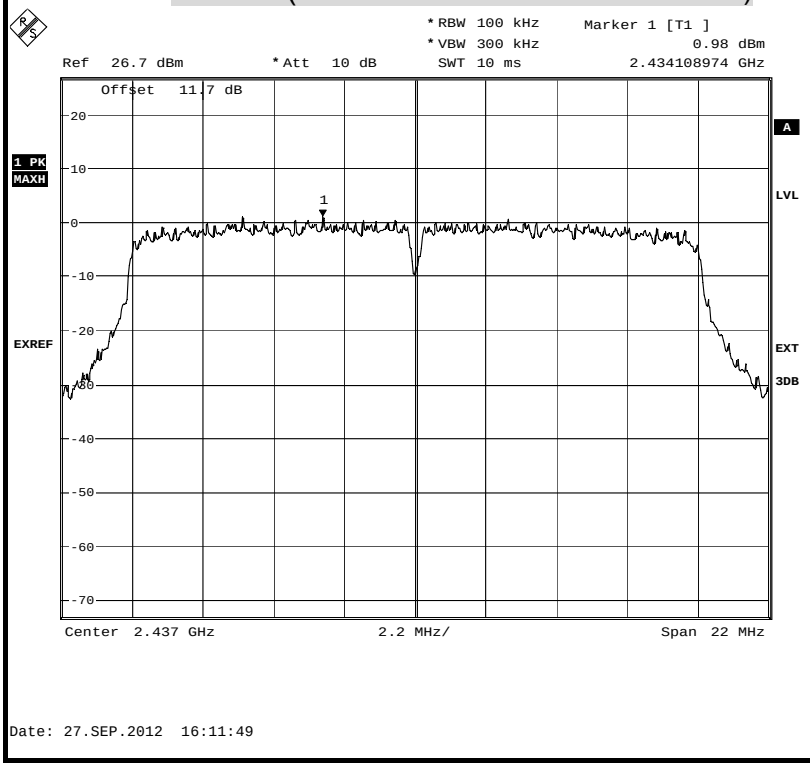


POWER SPECTRAL DENSITY (802.11n HT20 MODE)

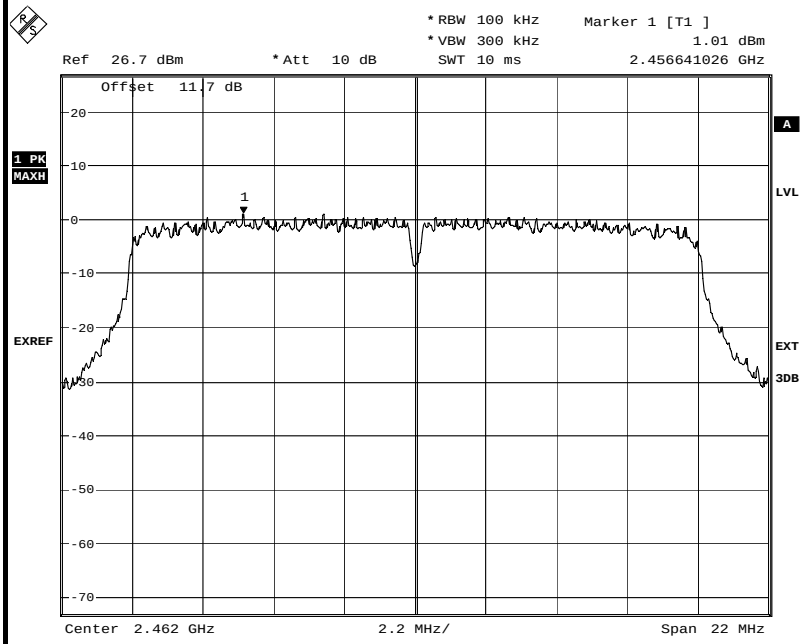
CH Low (802.11n HT20 MODE-Chain 0)



CH Mid (802.11n HT20 MODE-Chain 0)

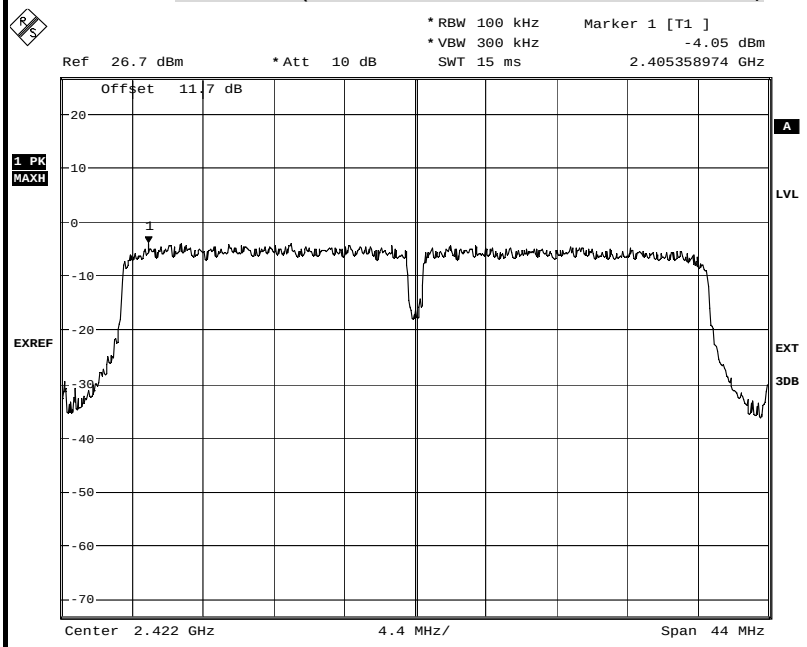


CH High (802.11n HT20 MODE-Chain 0)



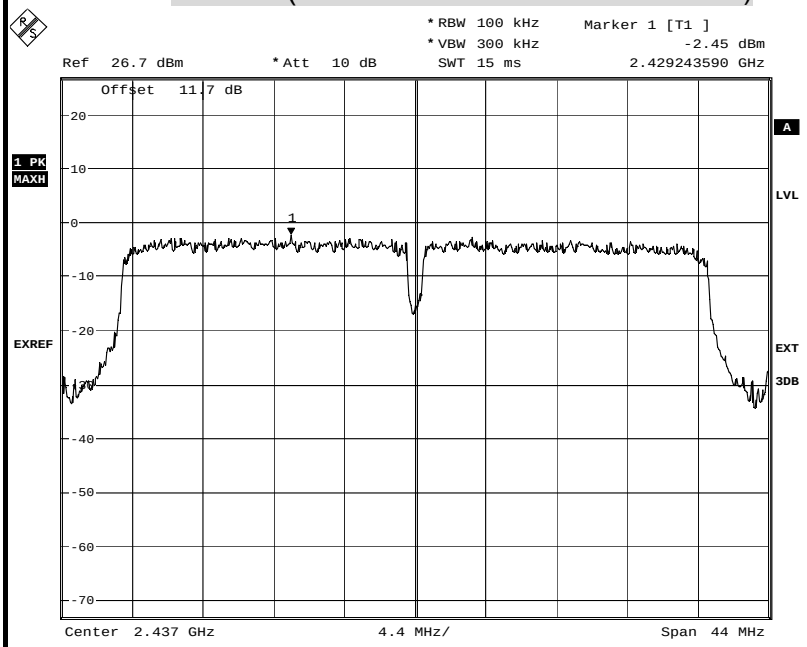
POWER SPECTRAL DENSITY (802.11n HT40 MODE)

CH Low (802.11n HT40 MODE-Chain 0)



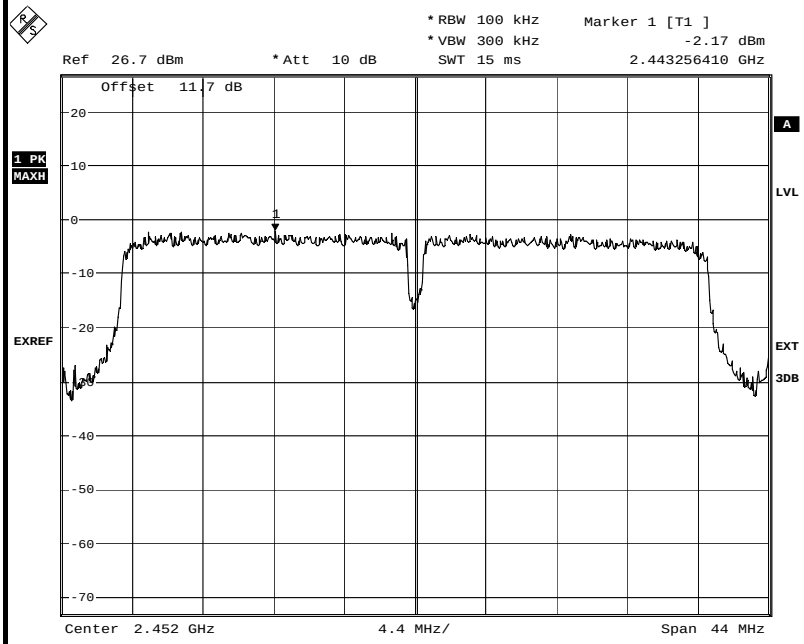
Date: 27.SEP.2012 16:13:03

CH Mid (802.11n HT40 MODE-Chain 0)



Date: 27.SEP.2012 16:13:31

CH High (802.11n HT40 MODE-Chain 0)



8.5 CONDUCTED SPURIOUS EMISSION

LIMITS

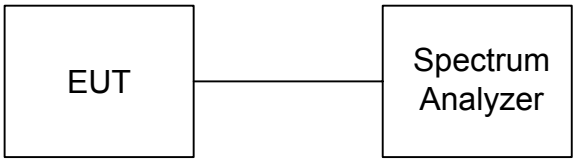
§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the and that contains the highest level 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	R&S	FSU	200789	SEP. 29, 2013

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

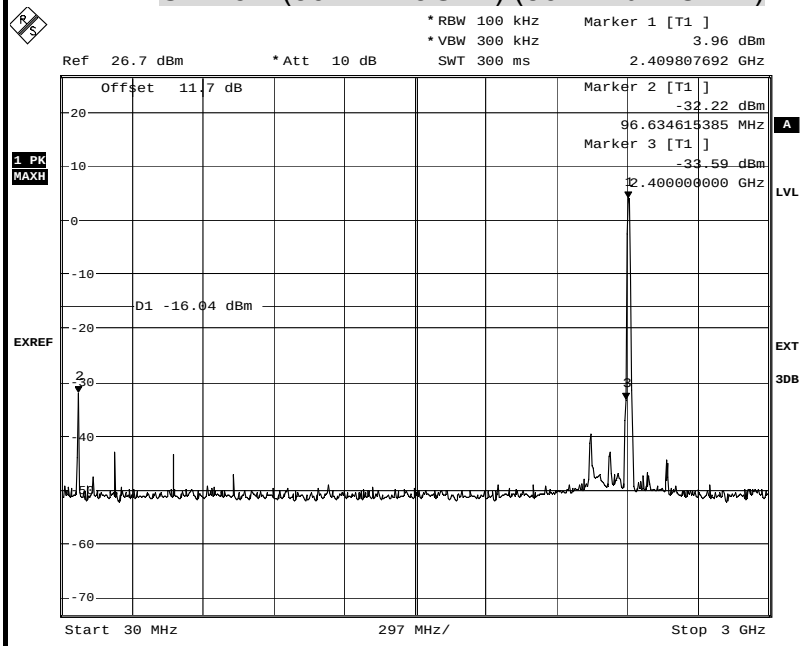
No non-compliance noted.

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

Antenna Gain	4.04 dBi

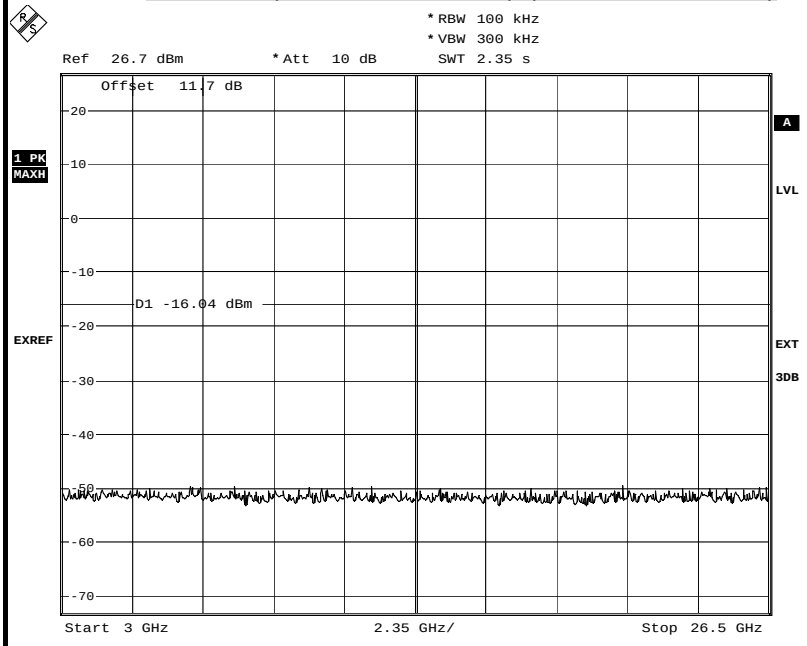
(IEEE 802.11b MODE)

CH Low (30MHz~3GHz) (802.11b MODE)



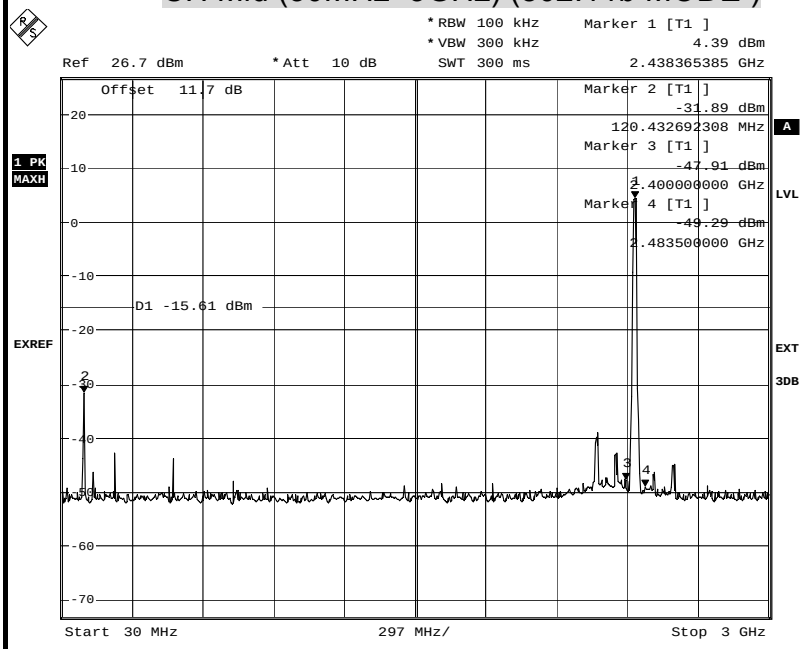
Date: 27.SEP.2012 18:52:14

CH Low (3GHz~26.5GHz) (802.11b MODE)



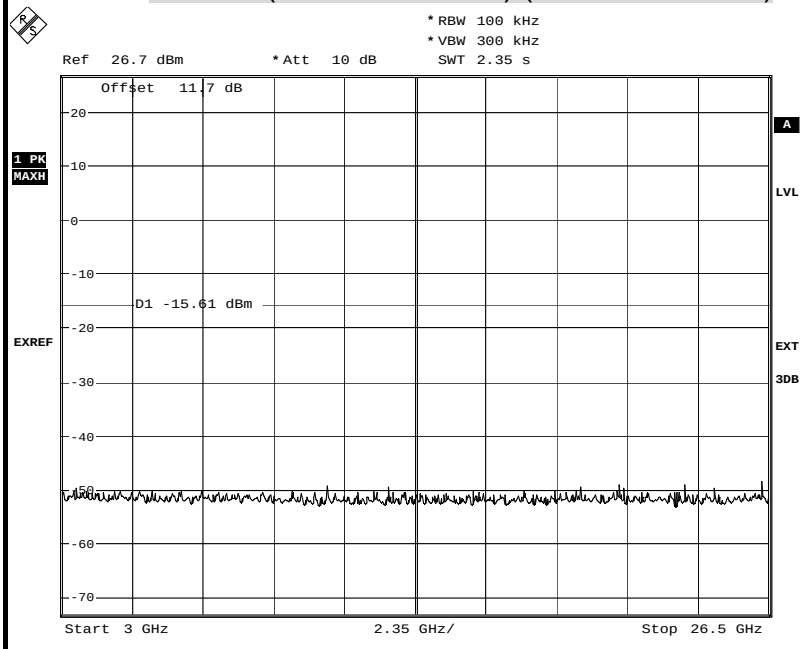
Date: 27.SEP.2012 18:52:29

CH Mid (30MHz~3GHz) (802.11b MODE)



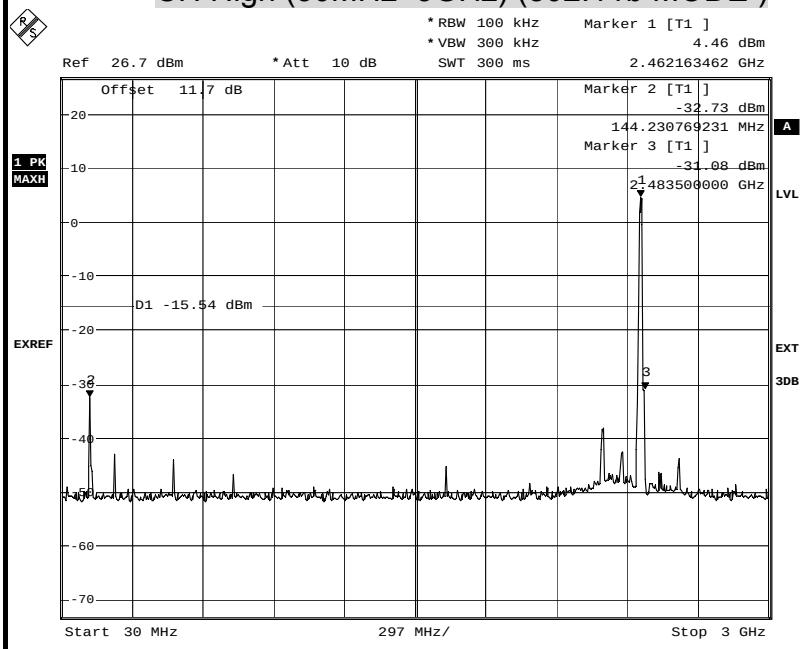
Date: 27.SEP.2012 18:53:12

CH Mid (3GHz~26.5GHz) (802.11b MODE)



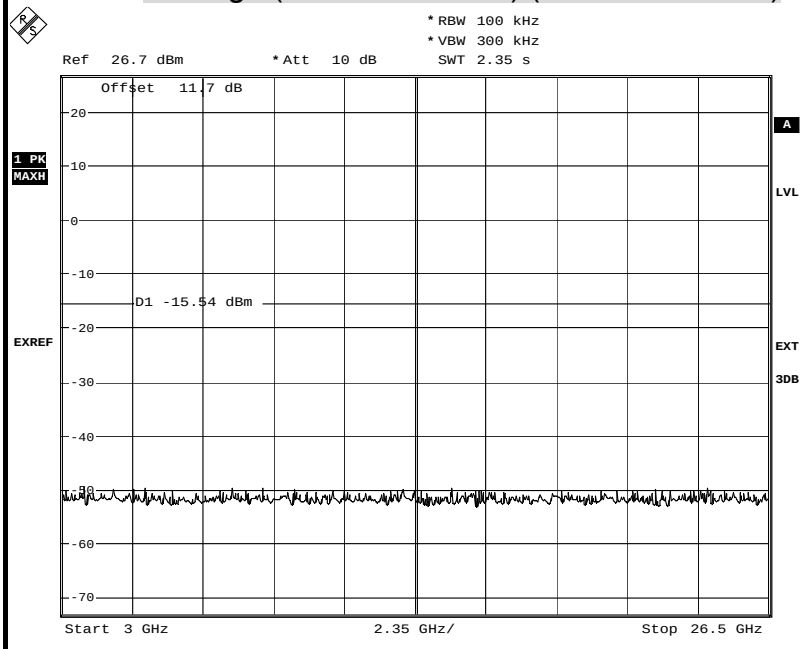
Date: 27.SEP.2012 18:53:36

CH High (30MHz~3GHz) (802.11b MODE)



Date: 27.SEP.2012 18:54:21

CH High (3GHz~26.5GHz) (802.11b MODE)

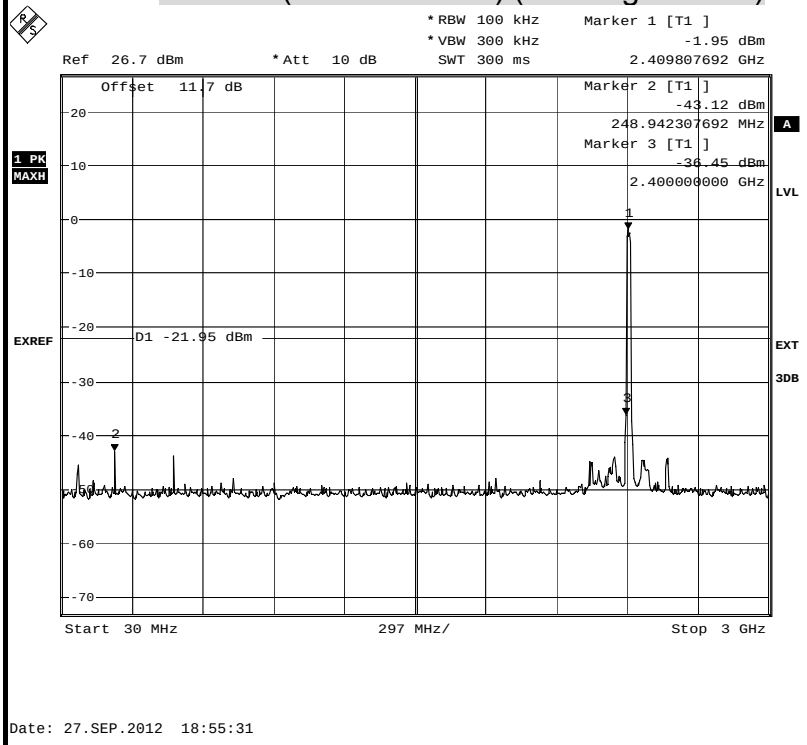


Date: 27.SEP.2012 18:54:35

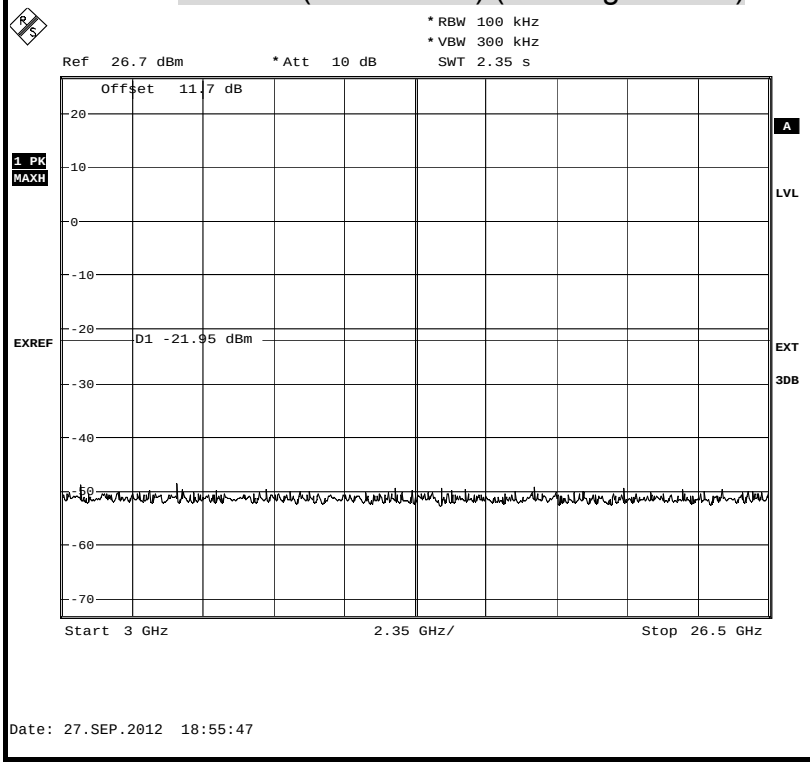
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(802.11g MODE)

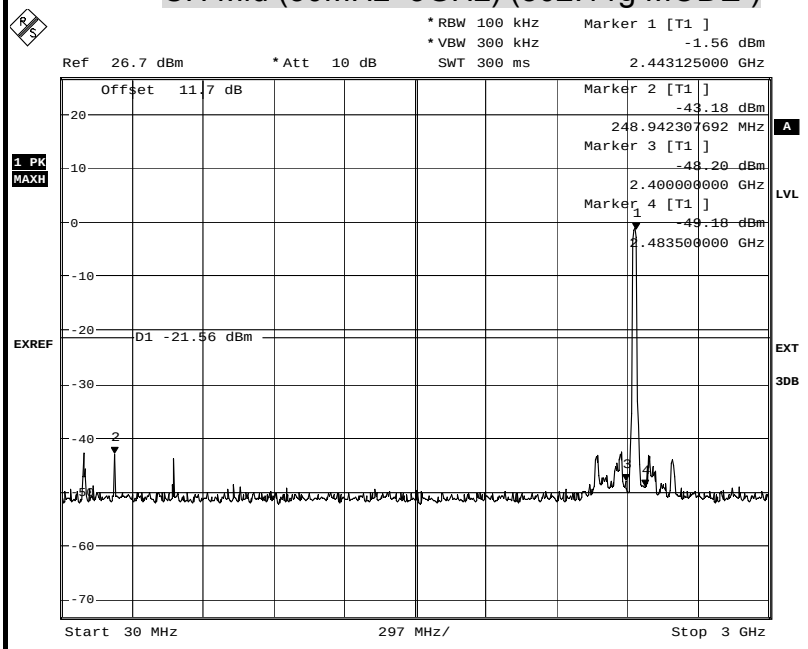
CH Low (30MHz~3GHz) (802.11g MODE)



CH Low (3~26.5GHz) (802.11g MODE)

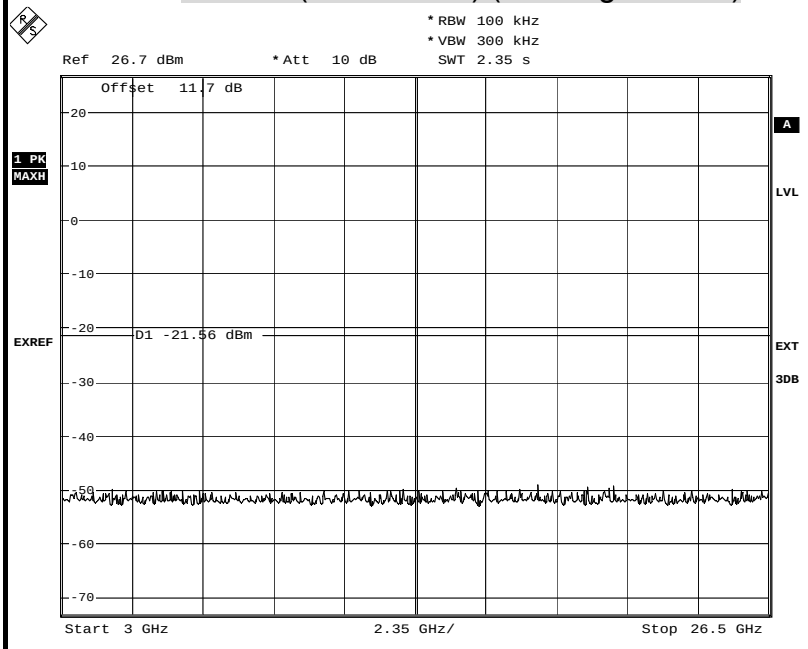


CH Mid (30MHz~3GHz) (802.11g MODE)



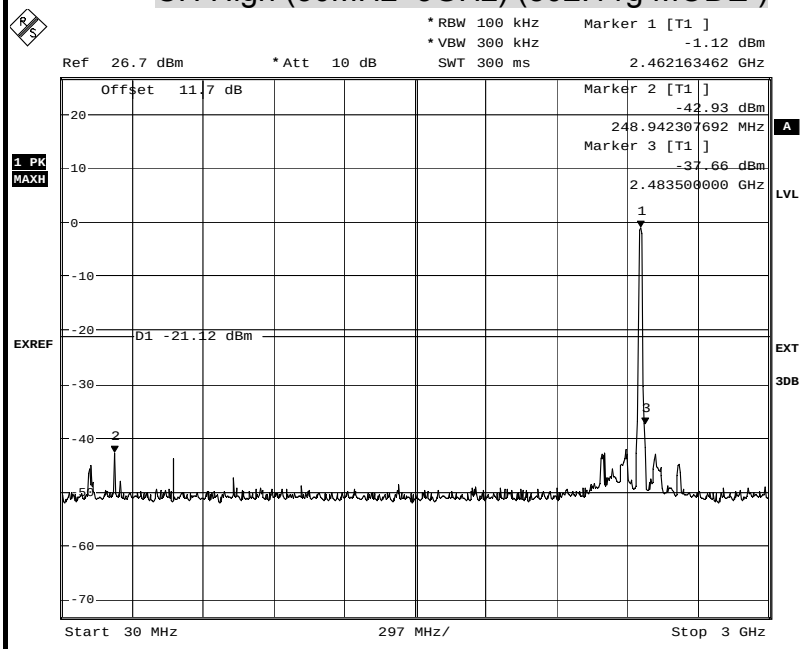
Date: 27.SEP.2012 18:56:26

CH Mid (3~26.5GHz) (802.11g MODE)



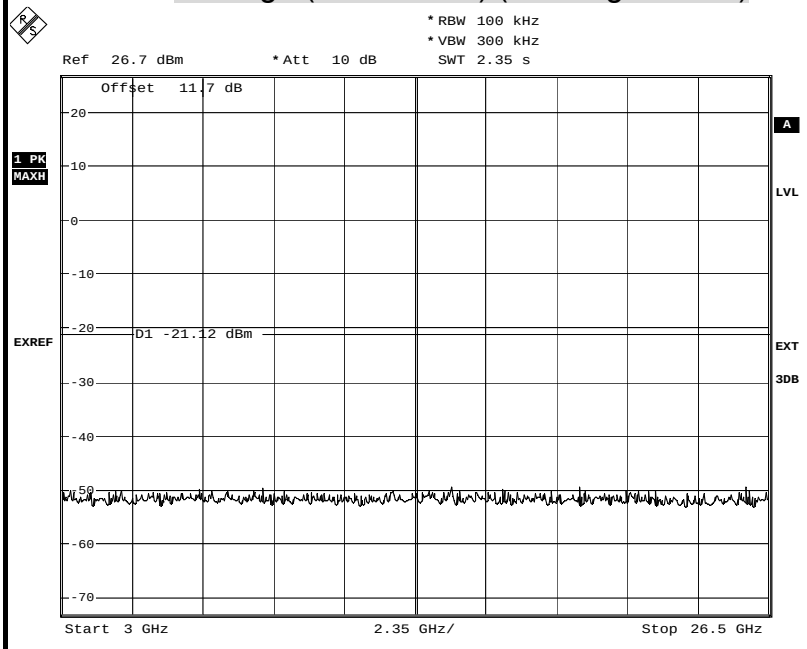
Date: 27.SEP.2012 18:56:40

CH High (30MHz~3GHz) (802.11g MODE)



Date: 27.SEP.2012 18:57:36

CH High (3~26.5GHz) (802.11g MODE)

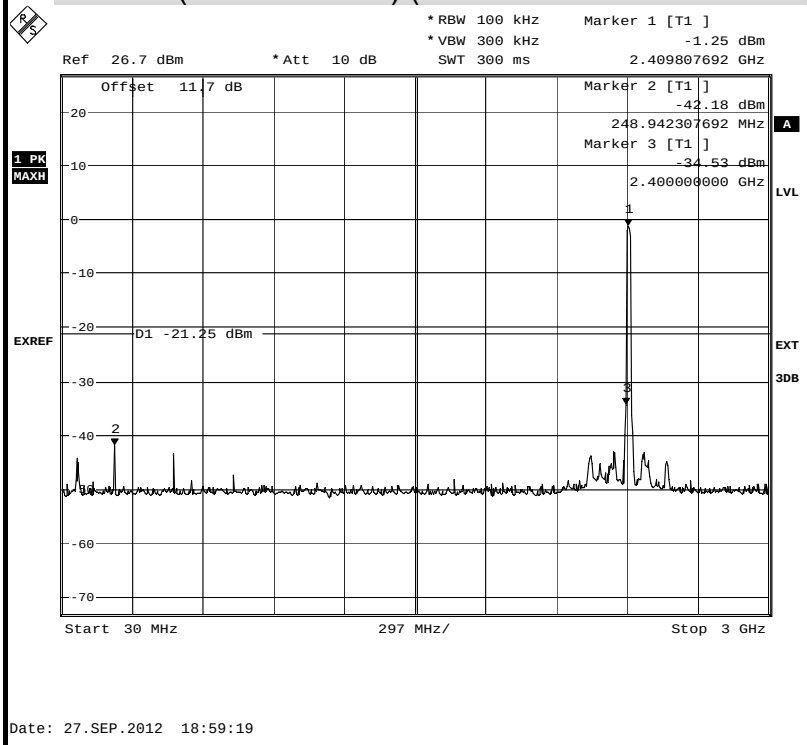


Date: 27.SEP.2012 18:57:50

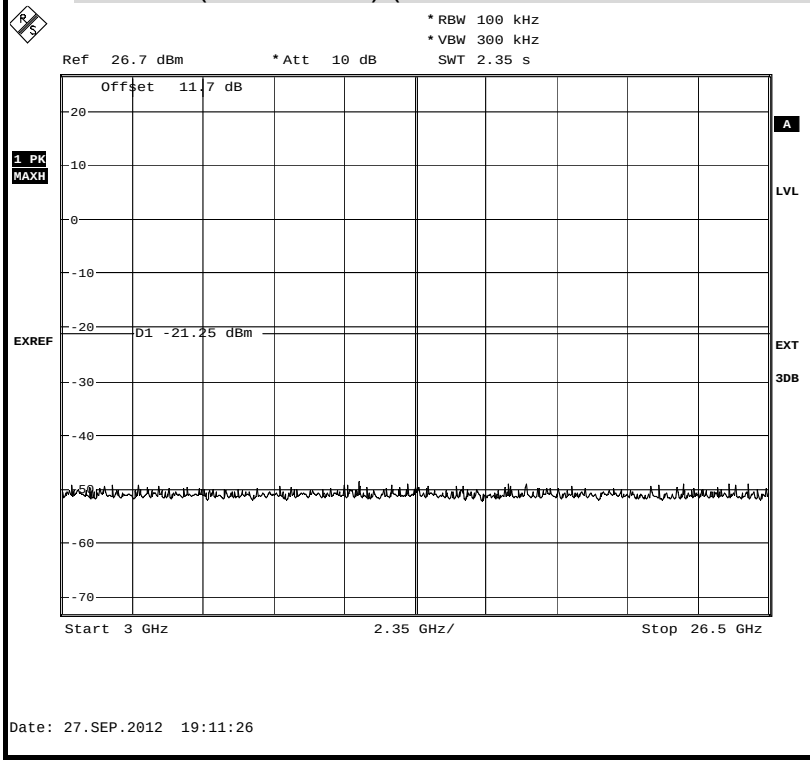
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(802.11n HT20 MODE)

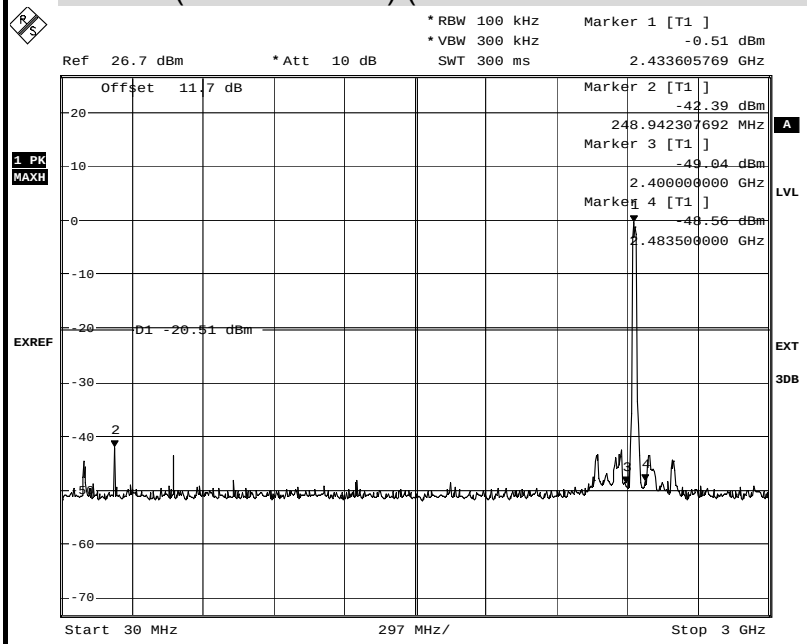
CH Low (30MHz~3GHz) (802.11n HT20 MODE-Chain 0)



CH Low (3~26.5GHz) (802.11n HT20 MODE-Chain 0)

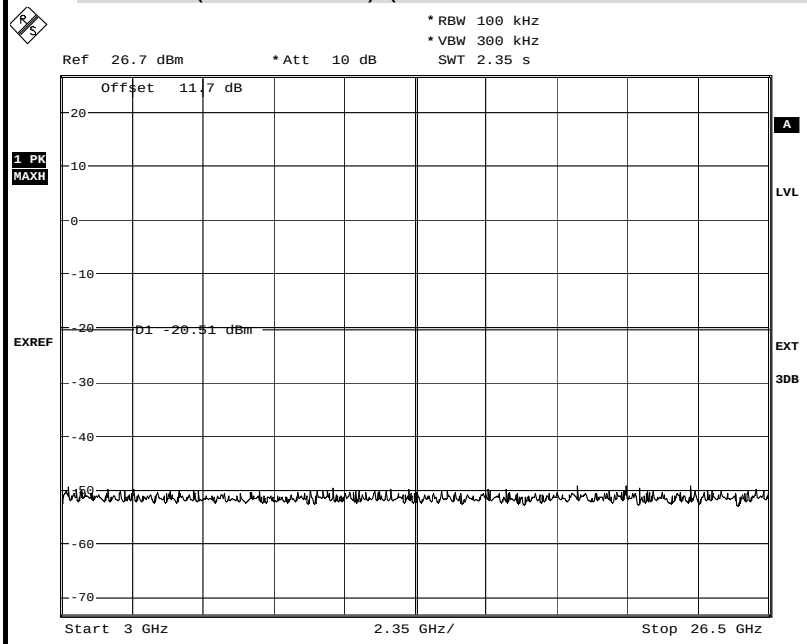


CH Mid (30MHz~3GHz) (802.11n HT20 MODE-Chain 0)



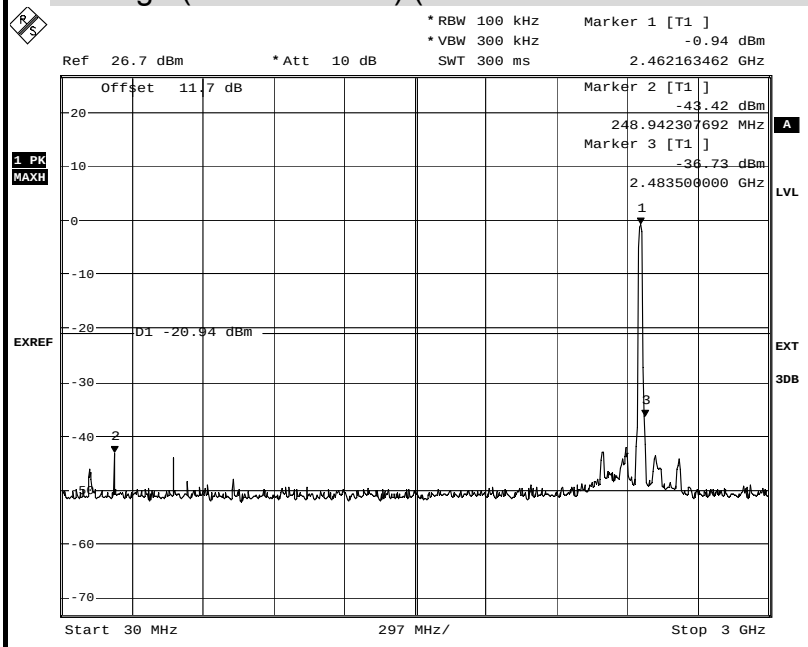
Date: 27.SEP.2012 19:00:18

CH Mid (3~26.5GHz) (802.11n HT20 MODE-Chain 0)



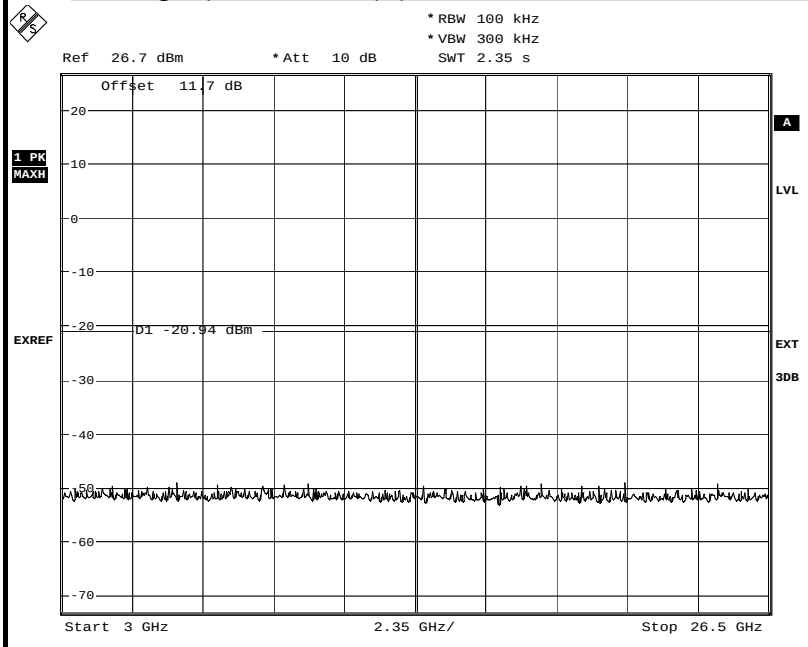
Date: 27.SEP.2012 19:00:50

CH High (30MHz~3GHz) (802.11n HT20 MODE-Chain 0)



Date: 27.SEP.2012 19:01:40

CH High (3~26.5GHz) (802.11n HT20 MODE-Chain 0)

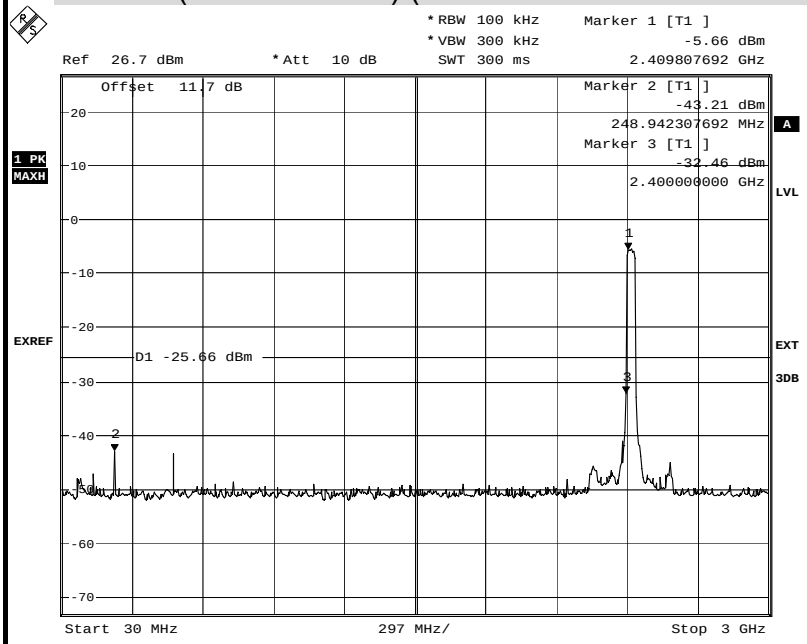


Date: 27.SEP.2012 19:01:57

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

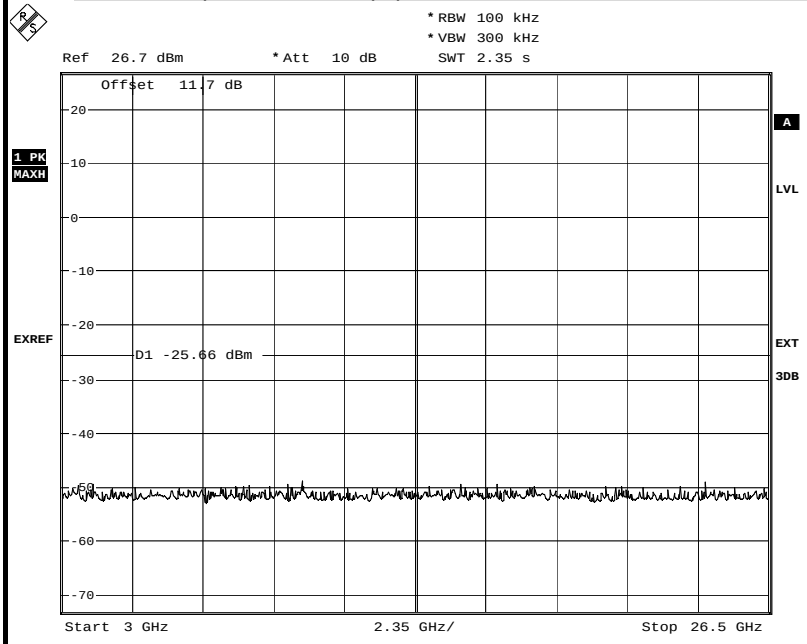
(802.11n HT40 MODE)

CH Low (30MHz~3GHz) (802.11n HT40 MODE-Chain 0)



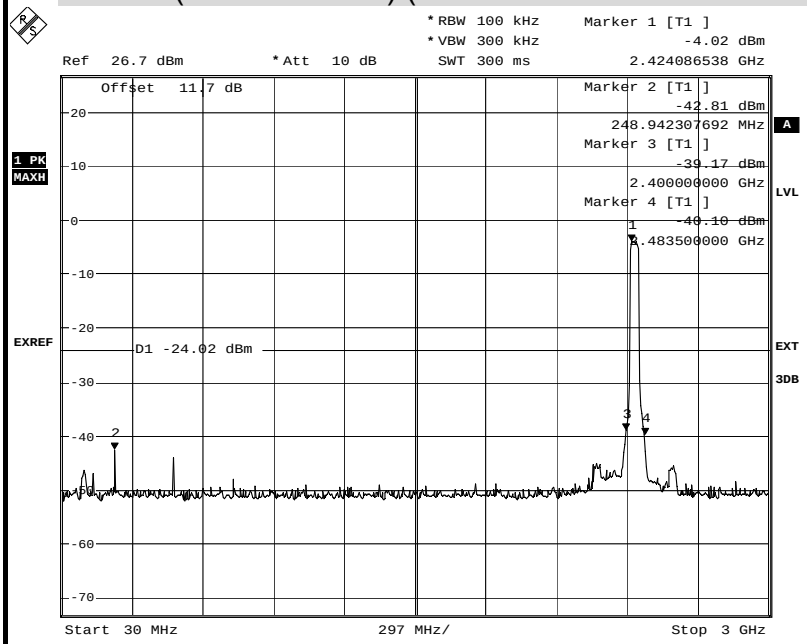
Date: 27.SEP.2012 19:03:01

CH Low (3~26.5GHz) (802.11n HT40 MODE-Chain 0)



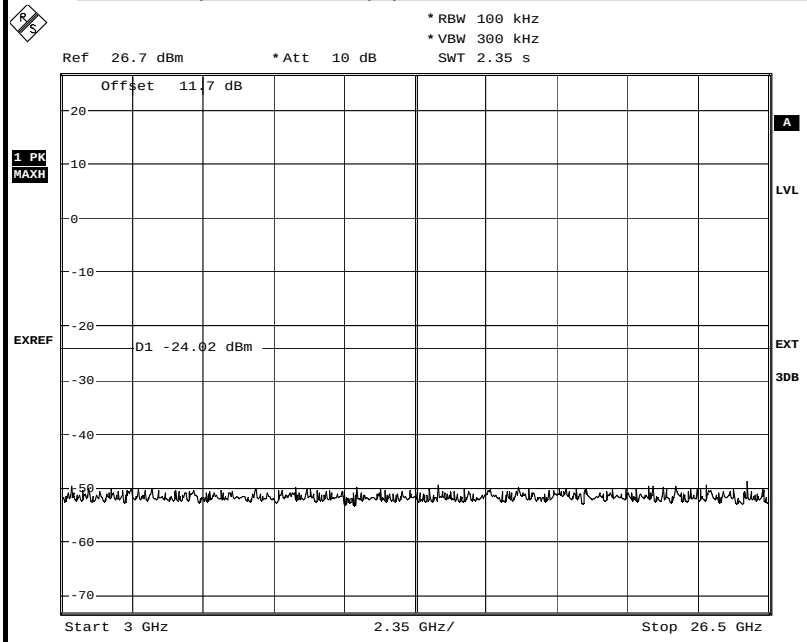
Date: 27.SEP.2012 19:03:18

CH Mid (30MHz~3GHz) (802.11n HT40 MODE-Chain 0)



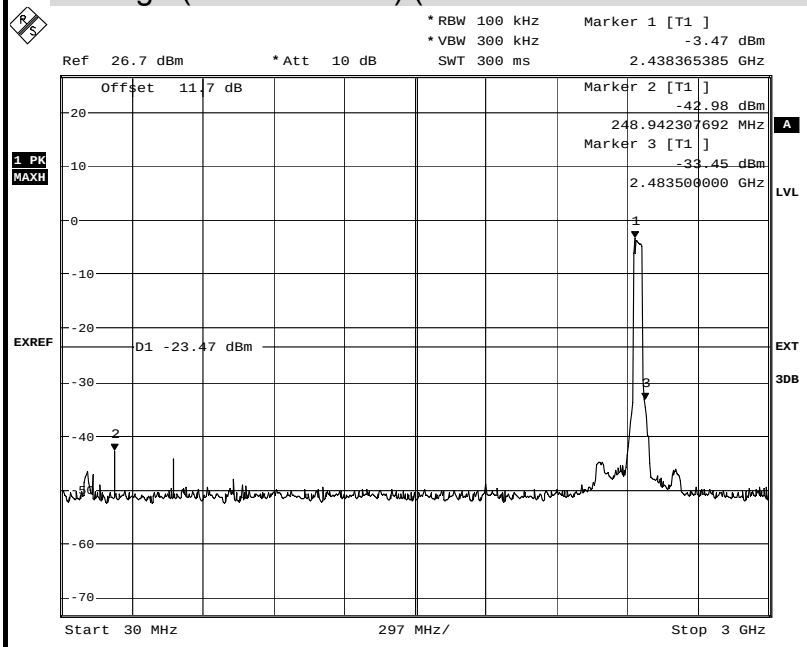
Date: 27.SEP.2012 19:04:15

CH Mid (3~26.5GHz) (802.11n HT40 MODE-Chain 0)



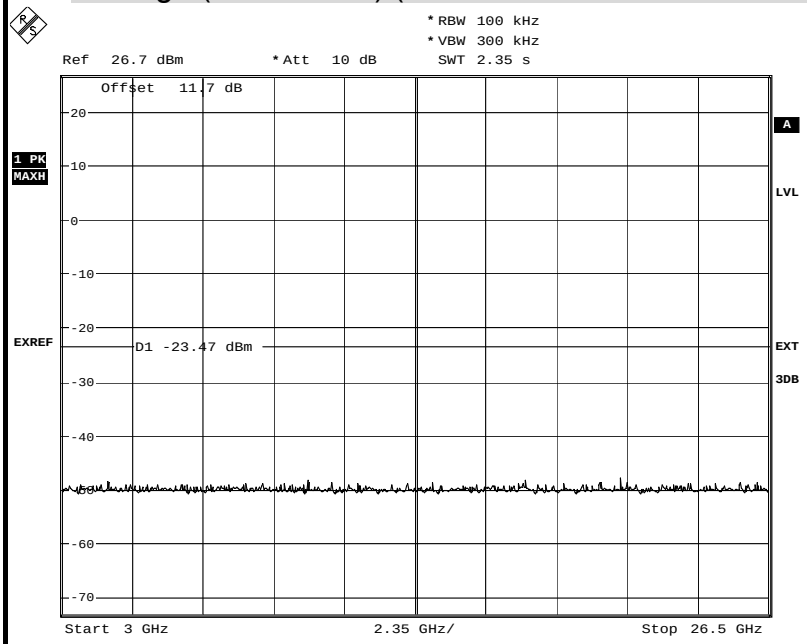
Date: 27.SEP.2012 19:04:31

CH High (30MHz~3GHz) (802.11n HT40 MODE-Chain 0)



Date: 27.SEP.2012 19:05:06

CH High (3~26.5GHz) (802.11n HT40 MODE-Chain 0)



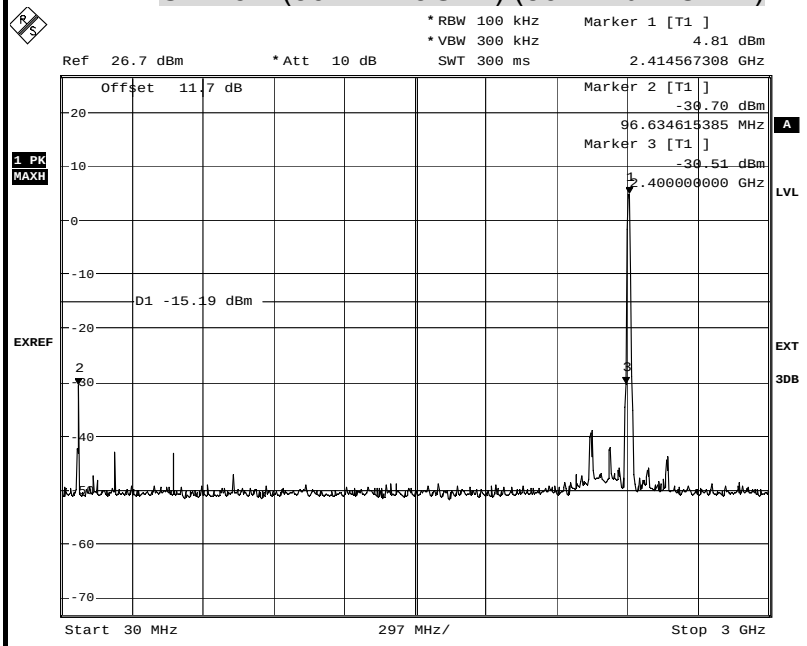
Date: 27.SEP.2012 19:09:46

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

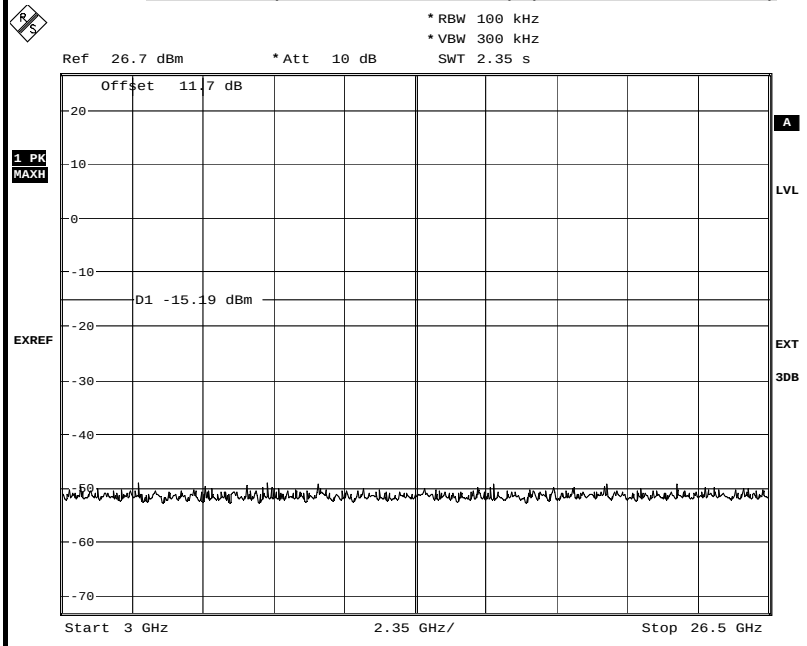
Antenna Gain	2.0 dBi

(IEEE 802.11b MODE)

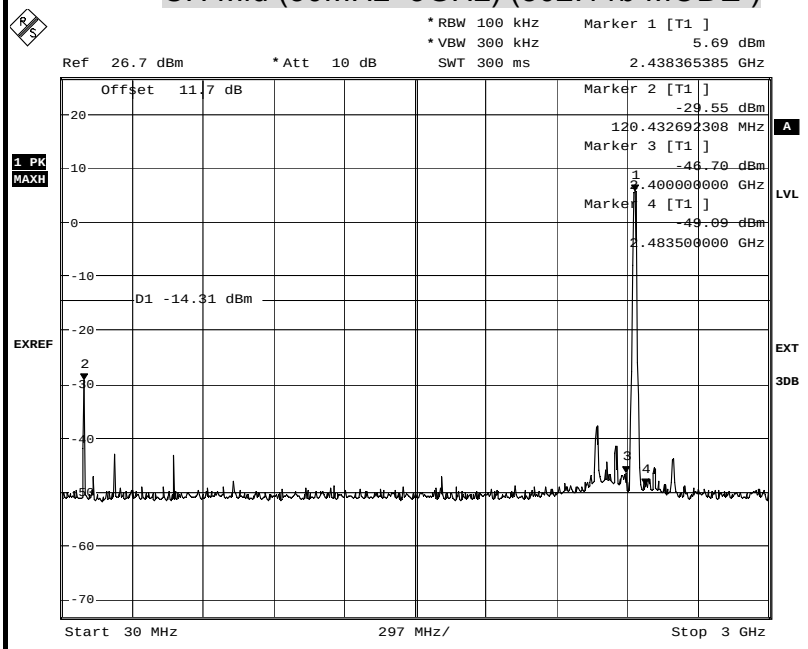
CH Low (30MHz~3GHz) (802.11b MODE)



CH Low (3GHz~26.5GHz) (802.11b MODE)



CH Mid (30MHz~3GHz) (802.11b MODE)



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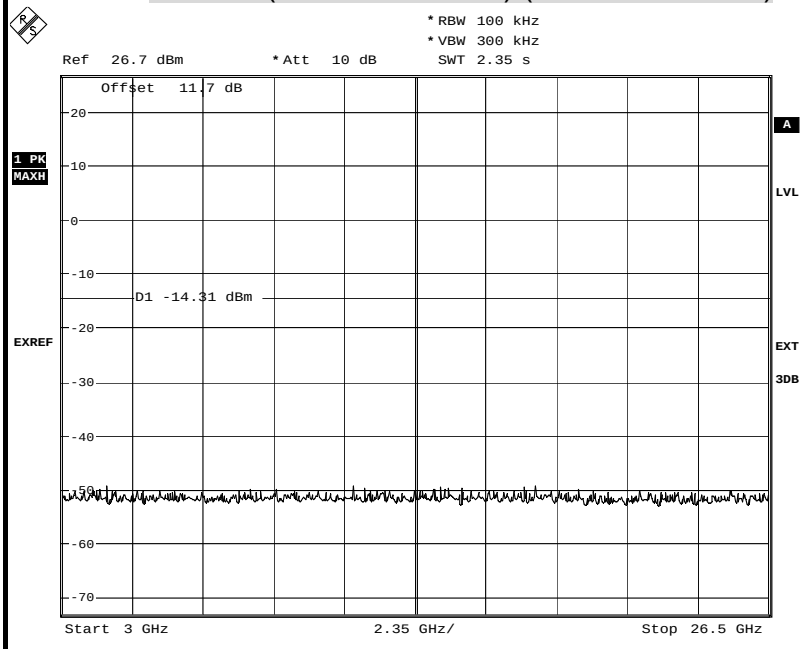
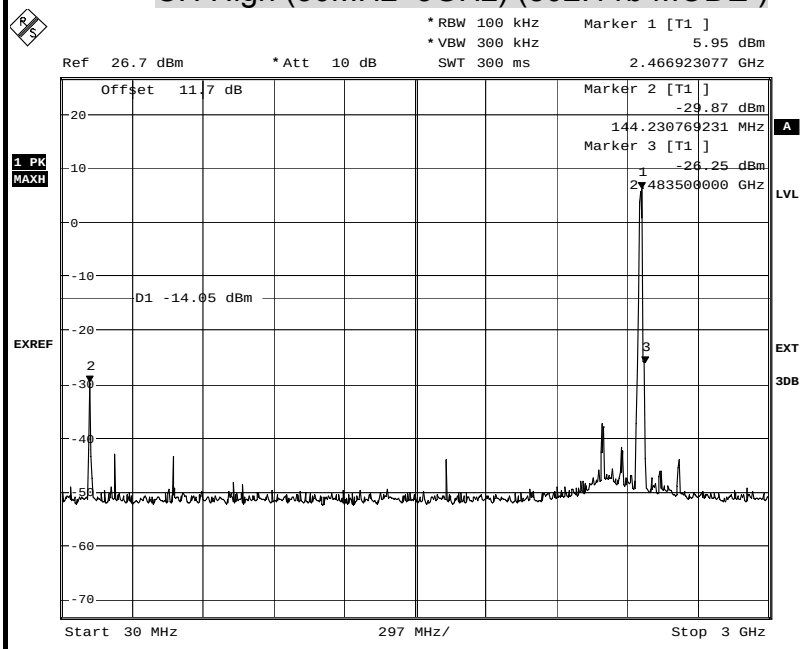
CH Mid (3GHz~26.5GHz) (802.11b MODE)



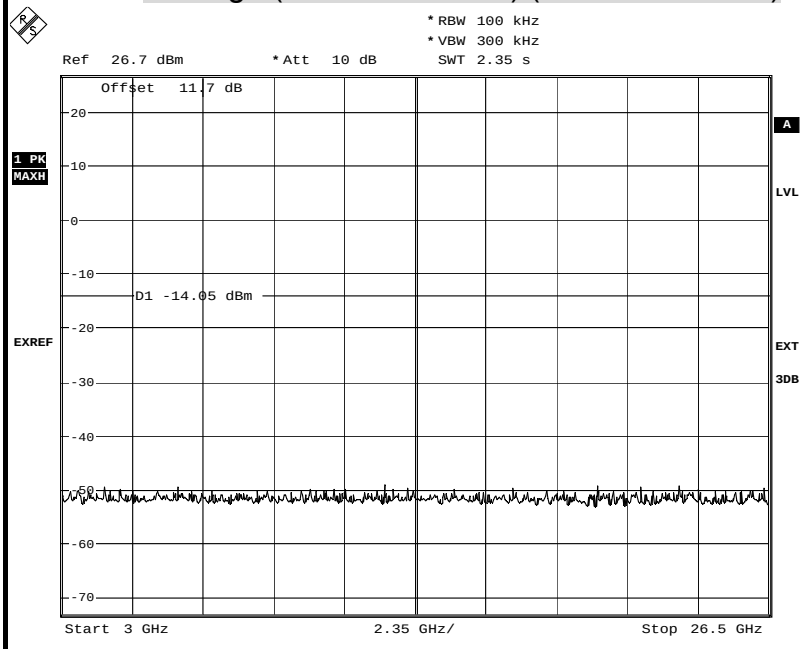
Date: 27.SEP.2012 18:35:15

CH High (30MHz~3GHz) (802.11b MODE)



Date: 27.SEP.2012 18:36:08

CH High (3GHz~26.5GHz) (802.11b MODE)

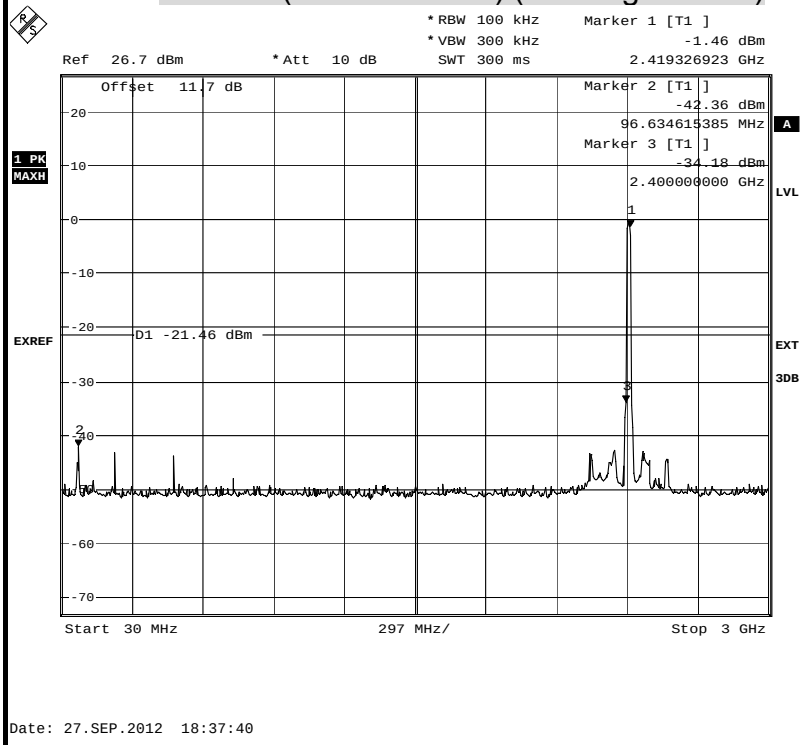


Date: 27.SEP.2012 18:36:25

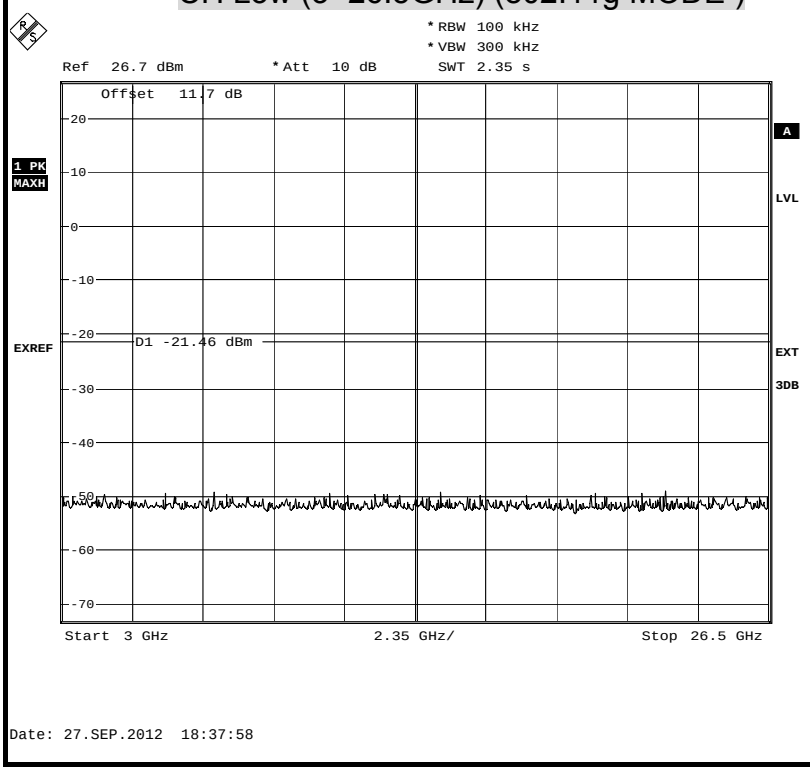
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(802.11g MODE)

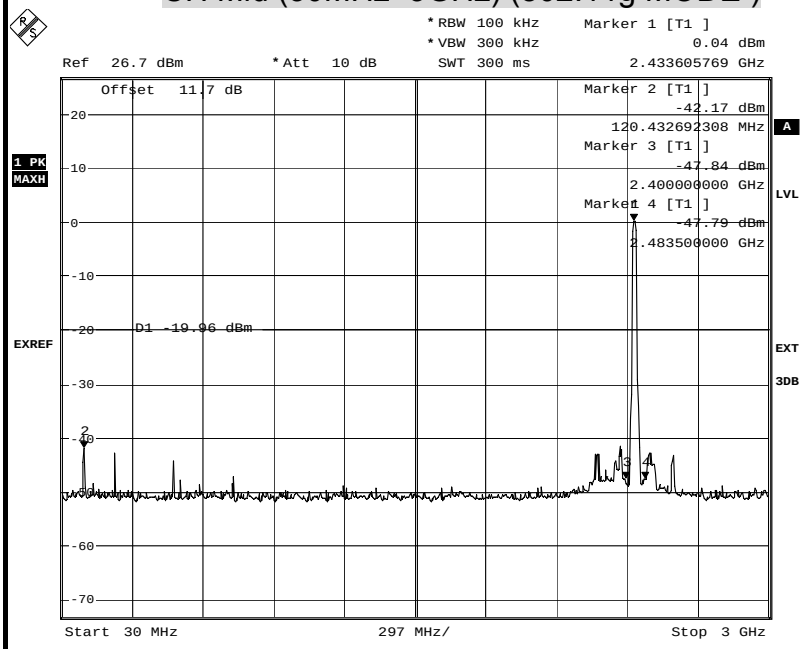
CH Low (30MHz~3GHz) (802.11g MODE)



CH Low (3~26.5GHz) (802.11g MODE)

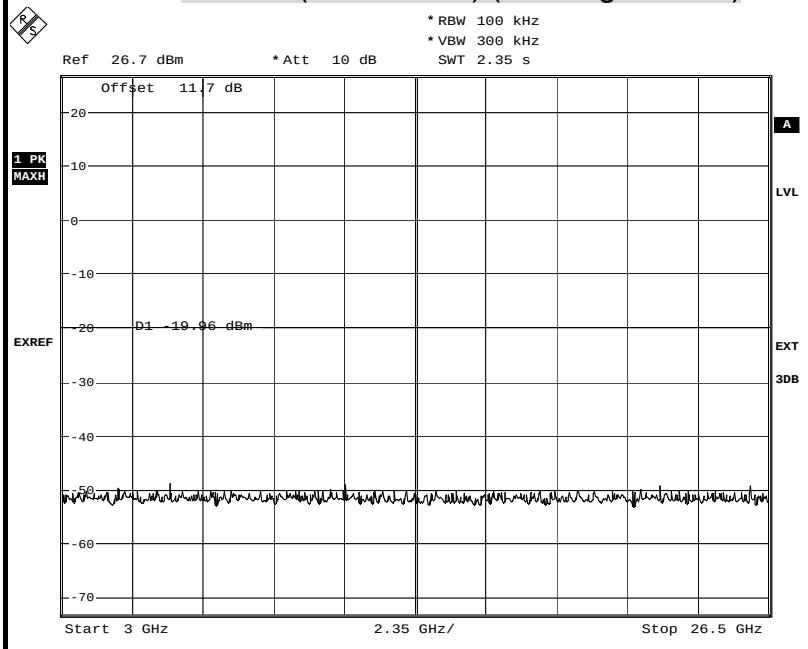


CH Mid (30MHz~3GHz) (802.11g MODE)



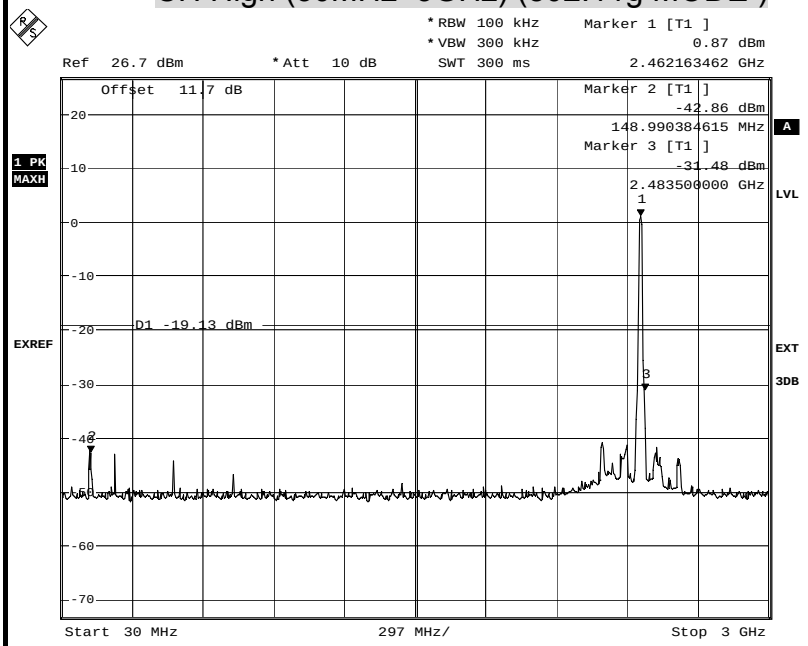
Date: 27.SEP.2012 18:38:50

CH Mid (3~26.5GHz) (802.11g MODE)



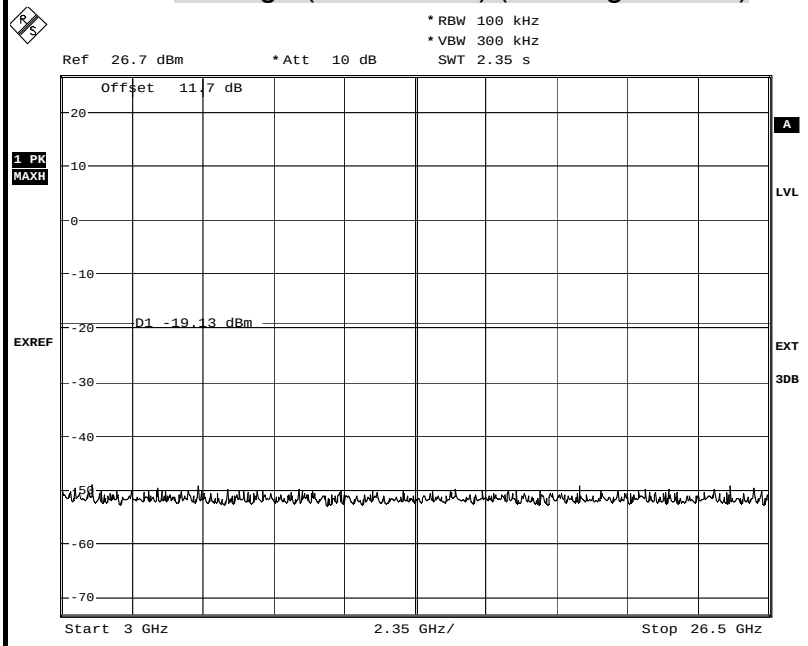
Date: 27.SEP.2012 18:39:05

CH High (30MHz~3GHz) (802.11g MODE)



Date: 27.SEP.2012 18:40:03

CH High (3~26.5GHz) (802.11g MODE)

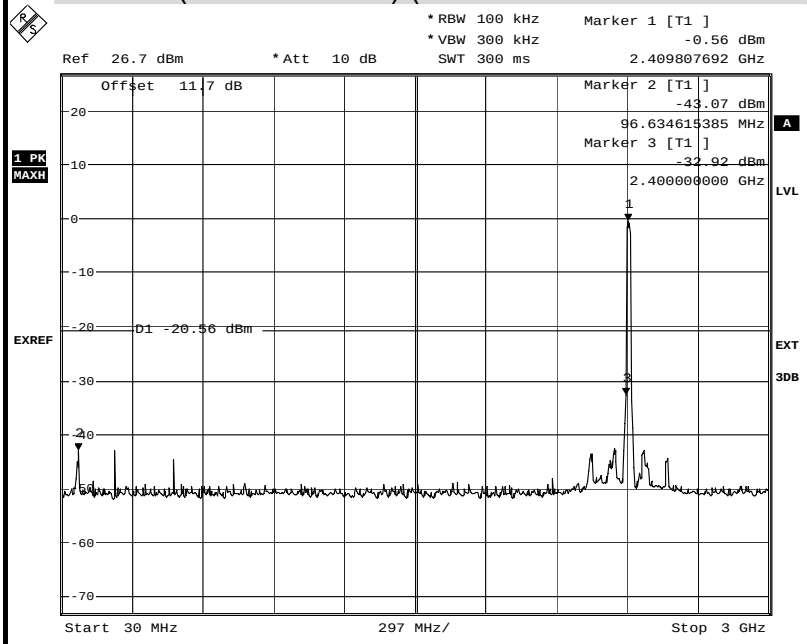


Date: 27.SEP.2012 18:40:16

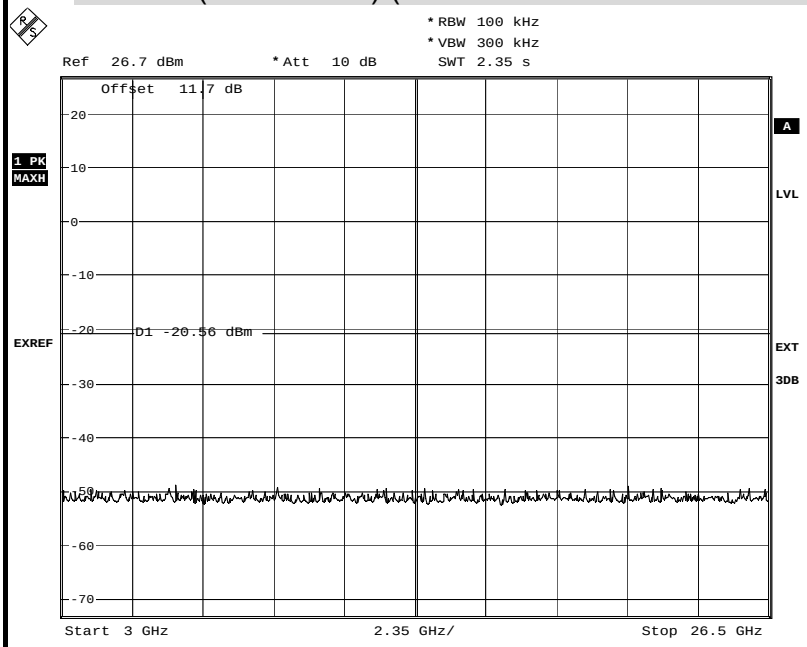
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(802.11n HT20 MODE)

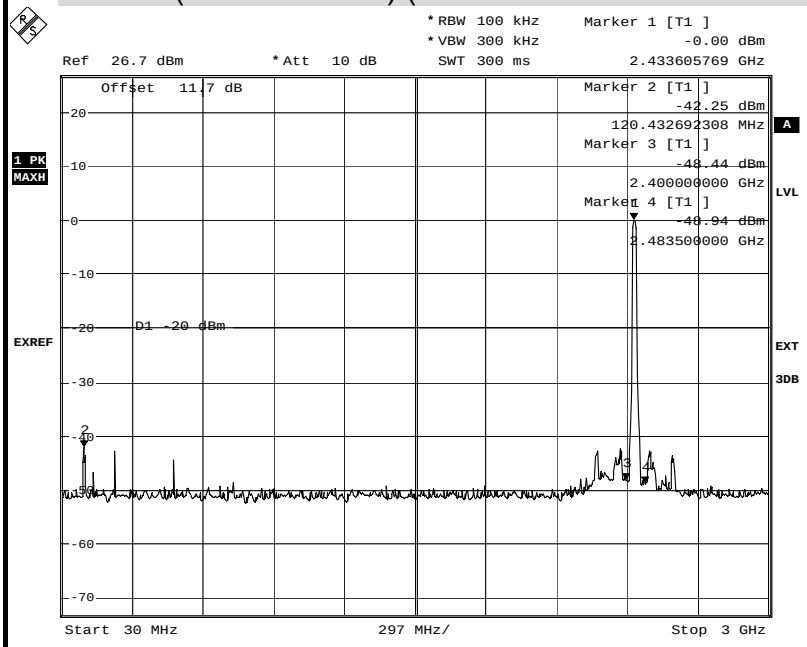
CH Low (30MHz~3GHz) (802.11n HT20 MODE-Chain 0)



CH Low (3~26.5GHz) (802.11n HT20 MODE-Chain 0)

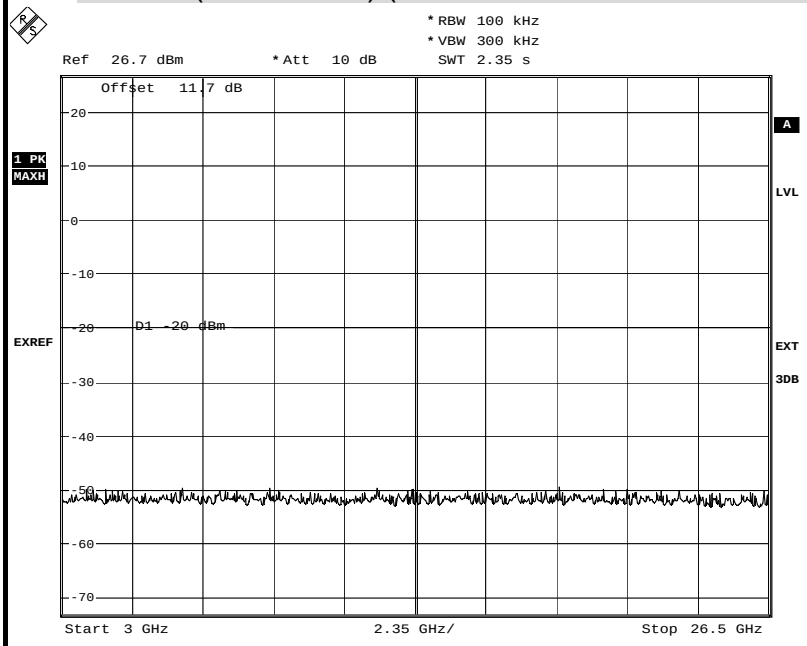


CH Mid (30MHz~3GHz) (802.11n HT20 MODE-Chain 0)



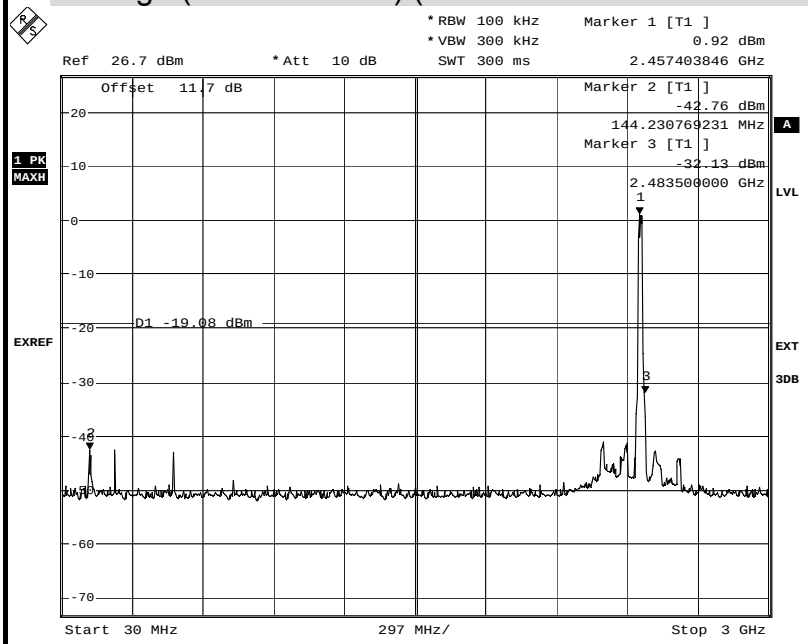
Date: 27.SEP.2012 18:42:22

CH Mid (3~26.5GHz) (802.11n HT20 MODE-Chain 0)



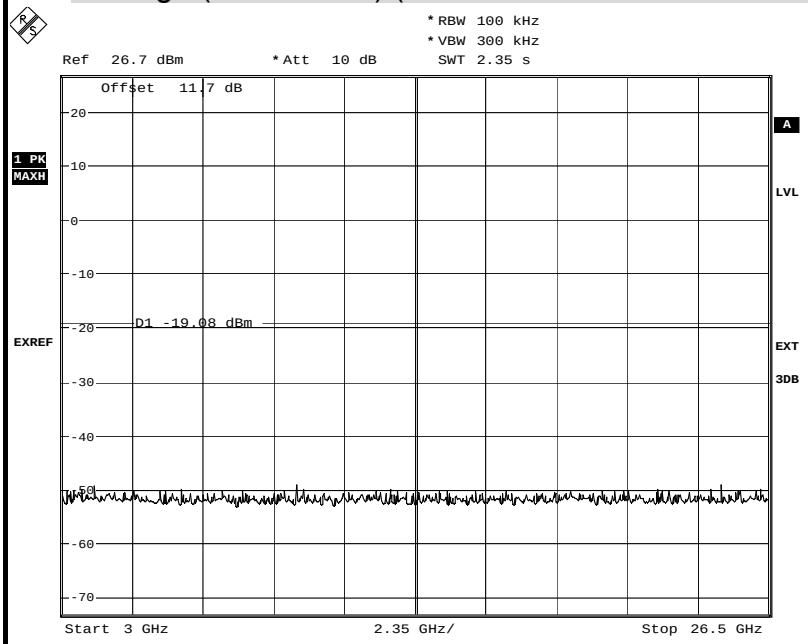
Date: 27.SEP.2012 18:42:38

CH High (30MHz~3GHz) (802.11n HT20 MODE-Chain 0)



Date: 27.SEP.2012 18:43:35

CH High (3~26.5GHz) (802.11n HT20 MODE-Chain 0)

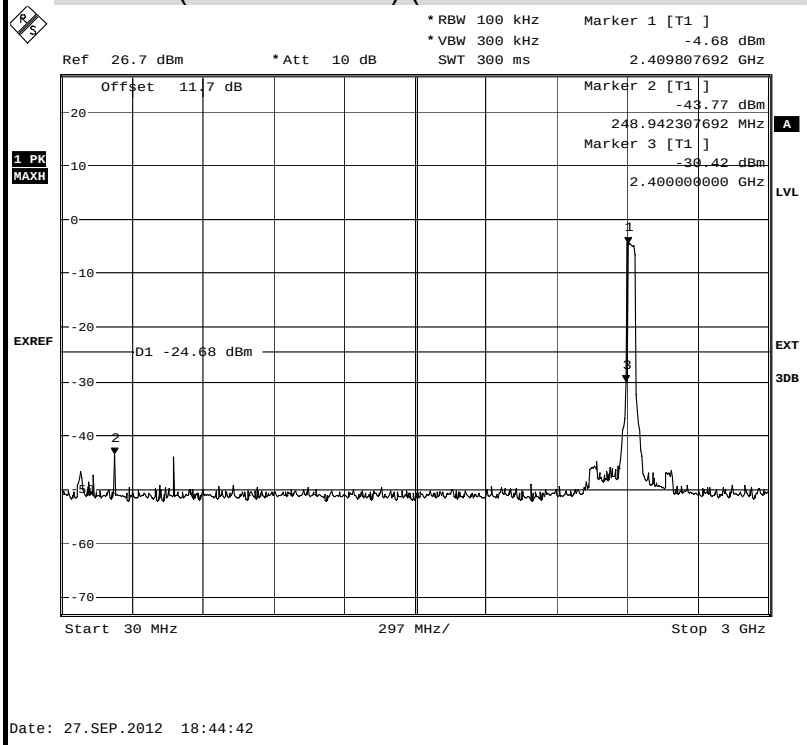


Date: 27.SEP.2012 18:44:02

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

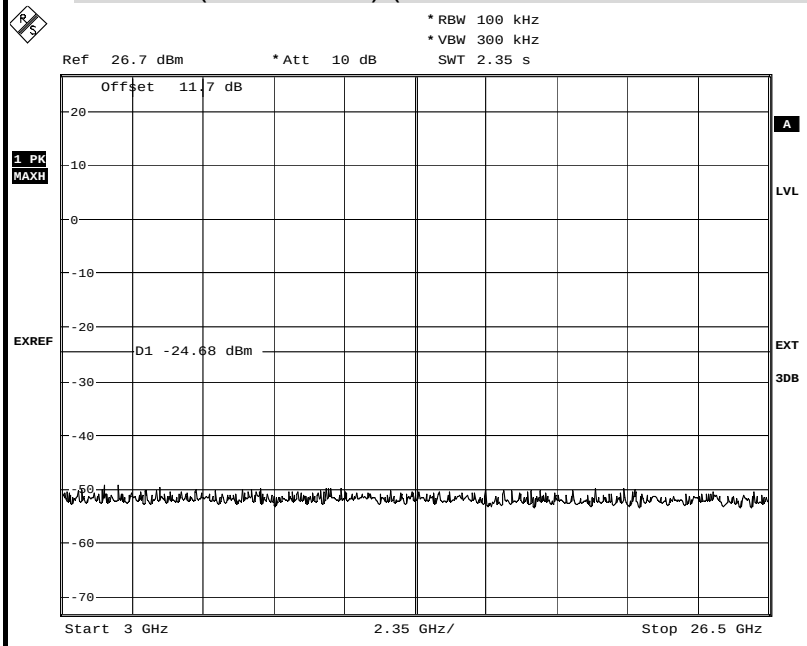
(802.11n HT40 MODE)

CH Low (30MHz~3GHz) (802.11n HT40 MODE-Chain 0)



Date: 27.SEP.2012 18:44:42

CH Low (3~26.5GHz) (802.11n HT40 MODE-Chain 0)



Date: 27.SEP.2012 18:44:53