FCC 47 CFR PART 15 SUBPART C: 2008 AND ANSI C63.4: 2003

TEST REPORT

For

11n Dual-Band USB Dongle

Model Number: WU319d

Brand Name: E-TOP

Issued for

E-Top Network Technology Inc.

No. 82, Gongye 2nd Rd., Tainan City 70955, Taiwan, R.O.C.

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: January 04, 2012

Testing Laboratory
1109

REVISION HISTORY

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	January 04, 2012	Initial Issue	ALL	Sunny Chang

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1. TEST REPORT CERTIFICATION

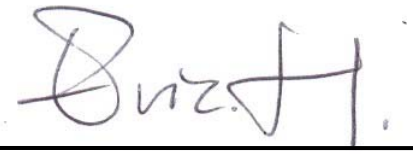
Applicant	：E-Top Network Technology Inc.
Address	：No. 82, Gongye 2nd Rd., Tainan City 70955, Taiwan, R.O.C.
Manufacture	：E-Top Network Technology Inc
Address	：No. 82, Gongye 2nd Rd., Tainan City 70955, Taiwan, R.O.C.
Equipment Under Test	：11n Dual-Band USB Dongle
Model Number	：WU319d
Brand Name	：E-TOP
Date of Test	：August 02, 2011 ~ August 23, 2011

APPLICABLE STANDARD	
STANDARD	**TEST RESULT**
FCC Part 15 Subpart C : 2008 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	11n Dual-Band USB Dongle
Model Number	WU319d
Brand Name	E-TOP
Received Date	December 26, 2011
Frequency Range	IEEE 802.11b/g, 802.11n HT20 (DTS Band):2412MHz～2462MHz IEEE 802.11n HT40 (DTS Band):2422MHz～2452MHz
Transmit Power	IEEE 802.11b Mode : 17.05dBm (DTS Band) (50.69911mW) IEEE 802.11g Mode : 22.22dBm (DTS Band) (166.7247mW) IEEE 802.11n HT20 Mode : 23.65dBm (DTS Band) (231.7995mW) IEEE 802.11n HT40 Mode : 21.73dBm (DTS Band) (149.0660mW)
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 : 144.4, 130, 115.6, 86.7, 57.8, 43.3, 28.9, 14.4, 72.2, 65, 21.7, 13, 7.2 Mbps
	IEEE 802.11n HT40 :300, 270, 240, 180, 120, 90, 60, 30, 150, 135, 45, 27, 15 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)
Frequency Selection	By software / firmware
Antenna Type	**Two Antenna (2TX2RX)** Type: Omni Antenna Model: AN-152RRSU00 Antenna Gain: 3dBi Connector: Reverse SMA PLUG Manufacture: Yong-Shun Technology Co., Ltd XinXie Technology(SHENZHEN) co,Ltd.
Power Source	5Vdc
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: **U6A-WU319D** 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. To add a series model is for business necessary. The different of the each model is shown as below:

Company Name/Address	Brand name	Model	Product Name
E-Top Network Technology Inc. No. 82 ,Gongye 2nd Rd.,Tainan City 70955,Taiwan,R.O.C.	E-TOP	WU319d	11n Dual-Band USB Dongle
Amigo Technology Inc. 5F., No.63, Lane 77, Xing-Ai Road, Neihu Dist., Taipei City 114, Taiwan (R.O.C.)	Amigo	WU319d	11n Dual-Band USB Dongle
Sapido Technology Inc. No. 383., Sec. 2, Minsheng Rd., West Central District, Tainan 700, Taiwan, R.O.C.	SAPIDO	AU-5125	Wireless N Dual-band High Power USB Adapter

3. DESCRIPTION OF TEST MODES

The EUT is a **Wireless USB Donegle**. It has two transmitter chains and two receive chains (2x2 configurations). The 2x2 configuration is implemented with two outside chains (Chain 0 and Chain 1).

The RF chipset is manufactured by Realtek Technology, Corp.

The antenna peak gain 3 dBi (highest gain) 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: 13Mbps 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: 27Mbps 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.

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2452 MHz.

4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 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, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors 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).

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:

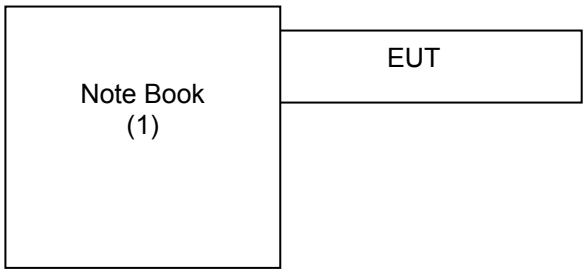
PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz Test Site : OATS-6	±3.59dB
Radiated Emission, 200 to 1000 MHz Test Site : OATS-6	±3.27dB
Radiated Emission, 1 to 26.5 GHz	± 3.20dB
Power Line Conducted Emission	± 2.90dB

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 & EMI test



7.2 SUPPORT EQUIPMENT

RF & EMI 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	N/A	---

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

RF Setup

1. Set up all computers like the setup diagram.
2. The “Realtek 11n Dual MAC 92D USB WLAN MP Diagnostic Program” software was used for testing
3. MAC , select [DMSP] from the command list.
4. Setting , Testing item select [Continuous Tx] from the command list.
5. Setting , Modulation select [Continuous Tx] from the command list.

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)
  13Mbps (IEEE 802.11n HT20 mode ,chain 0, chain 1 TX)
  27Mbps (IEEE 802.11n HT40 mode, chain 0, chain 1 TX**)**

Power control mode

Target Power: IEEE 802.11b Channel Low (2412MHz) = **44 (Chain 0)**
IEEE 802.11b Channel Middle (2437MHz) = **44 (Chain 0)**
IEEE 802.11b Channel High (2462MHz) = **44 (Chain 0)**
Target Power: IEEE 802.11g Channel Low (2412MHz) = **48 (Chain 0)**
IEEE 802.11g Channel Middle (2437MHz) = **48 (Chain 0)**
IEEE 802.11g Channel High (2462MHz) = **48 (Chain 0)**
Target Power: IEEE 802.11n HT20 Channel Low (2412MHz) = **46 (Chain 0)**
IEEE 802.11 n HT20 Channel Middle (2437MHz) = **46 (Chain 0)**
IEEE 802.11 n HT20 Channel High (2462MHz) = **46 (Chain 0)**
IEEE 802.11n HT20 Channel Low (2412MHz) = **46 (Chain 1)**
IEEE 802.11 n HT20 Channel Middle (2437MHz) = **46 (Chain 1)**
IEEE 802.11 n HT20 Channel High (2462MHz) = **46 (Chain 1)**
Target Power: IEEE 802.11n HT40 Channel Low (2422MHz) = **44 (Chain 0)**
IEEE 802.11 n HT40 Channel Middle (2437MHz) = **44 (Chain 0)**
IEEE 802.11 n HT40 Channel High (2452MHz) = **44 (Chain 0)**
IEEE 802.11n HT40 Channel Low (2422MHz) = **44 (Chain 1)**
IEEE 802.11 n HT40 Channel Middle (2437MHz) = **44 (Chain 1)**
IEEE 802.11 n HT40 Channel High (2452MHz) = **44 (Chain 1)**

(2) **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.

8. APPLICABLE LIMITS AND TEST RESULTS

8.1 6DB BANDWIDTH

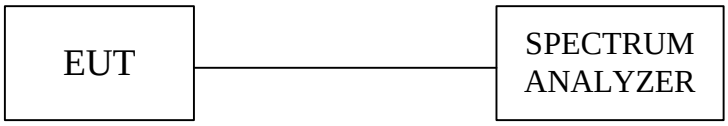
LIMIT

§ 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	FSEK 30	835253/002	JUL. 14, 2012

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 100 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

TEST RESULTS

No non-compliance noted.

IEEE 802.11b mode (Two TX)

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	10321	500	PASS
Middle	2437	10321	500	PASS
High	2462	10321	500	PASS

NOTE : 1. At finial test to get the worst-case emission at1Mbps 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 (Two TX)

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	16733	500	PASS
Middle	2437	16733	500	PASS
High	2462	16733	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 (Two TX)

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)		Minimum Limit (kHz)	Pass / Fail
		Chain 0	Chain1		
Low	2412	17936	17836	500	PASS
Middle	2437	17936	17836	500	PASS
High	2462	17936	17836	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 13Mbps.
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.

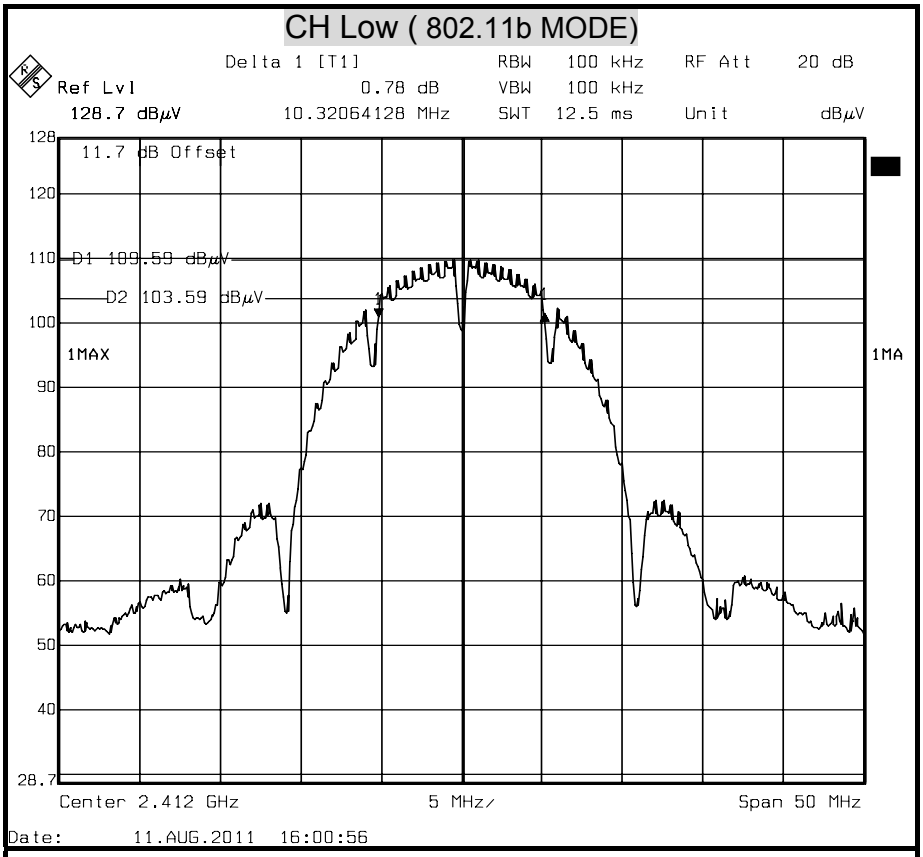
IEEE 802.11n HT40 mode (Two TX)

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)		Minimum Limit (kHz)	Pass / Fail
		Chain 0	Chain1		
Low	2422	36673	36673	500	PASS
Middle	2437	36673	36673	500	PASS
High	2452	36673	36673	500	PASS

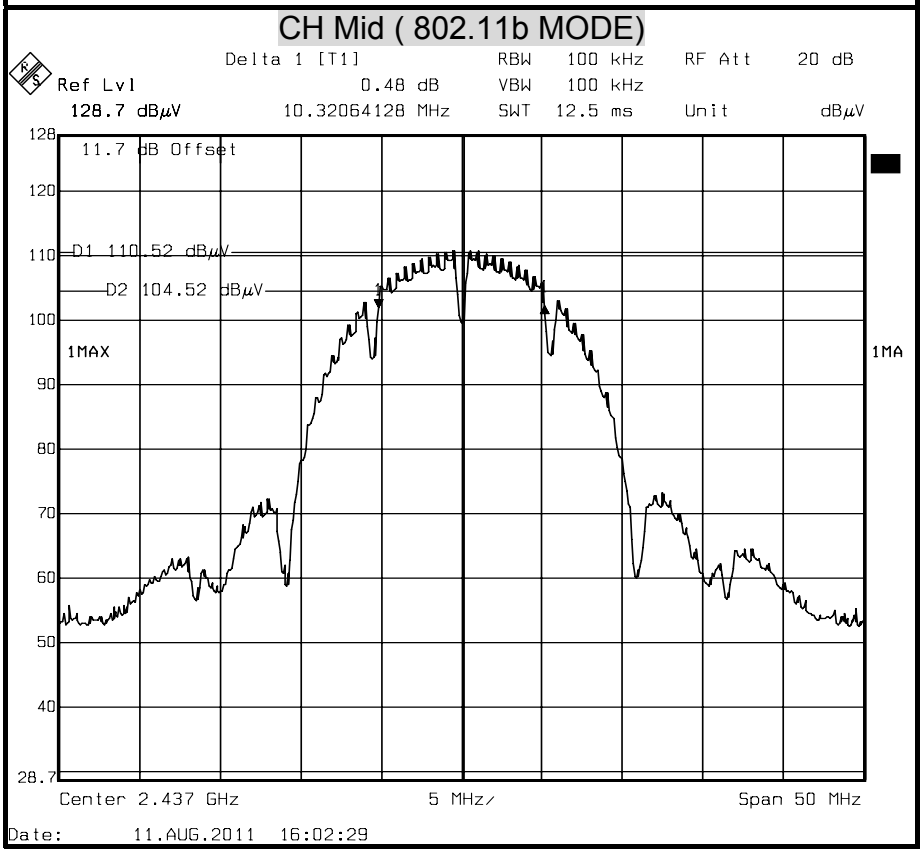
NOTE : 1. At finial test to get the worst-case emission at 27Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

6dB BANDWIDTH (802.11b MODE)

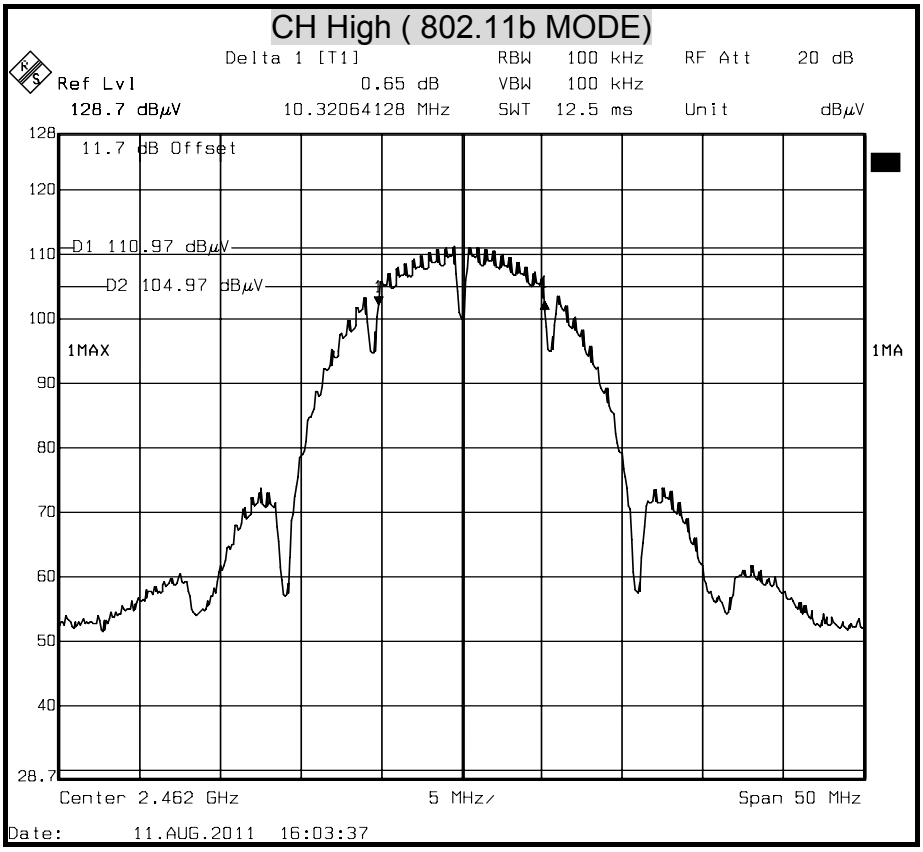
CH Low (802.11b MODE)



CH Mid (802.11b MODE)

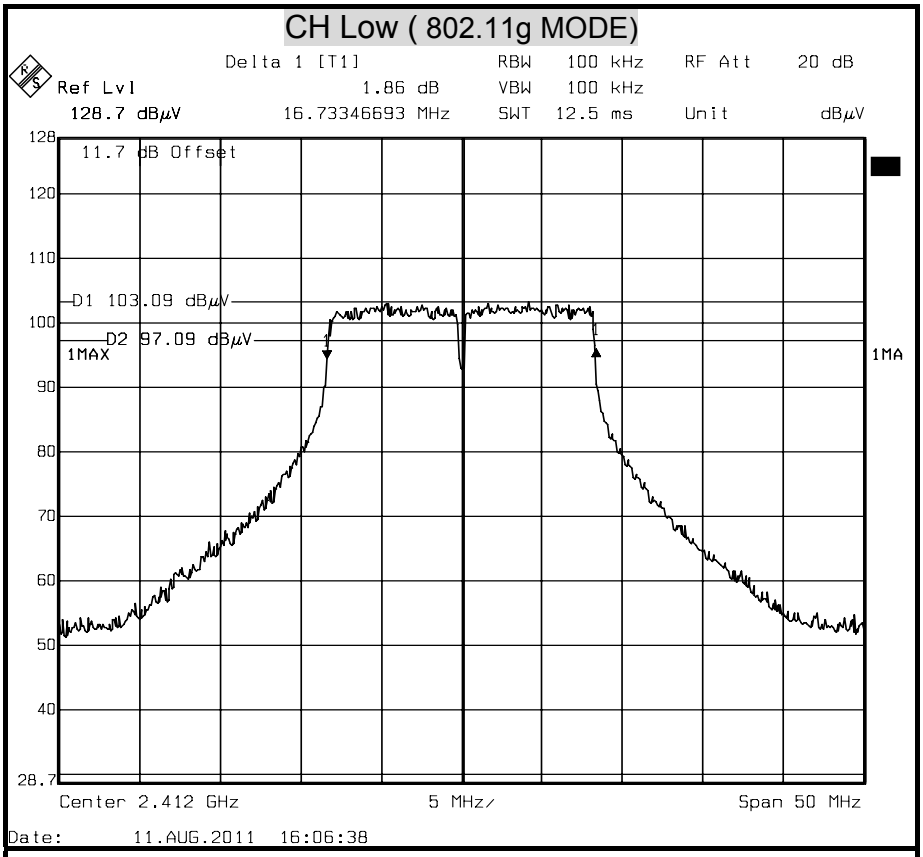


CH High (802.11b MODE)

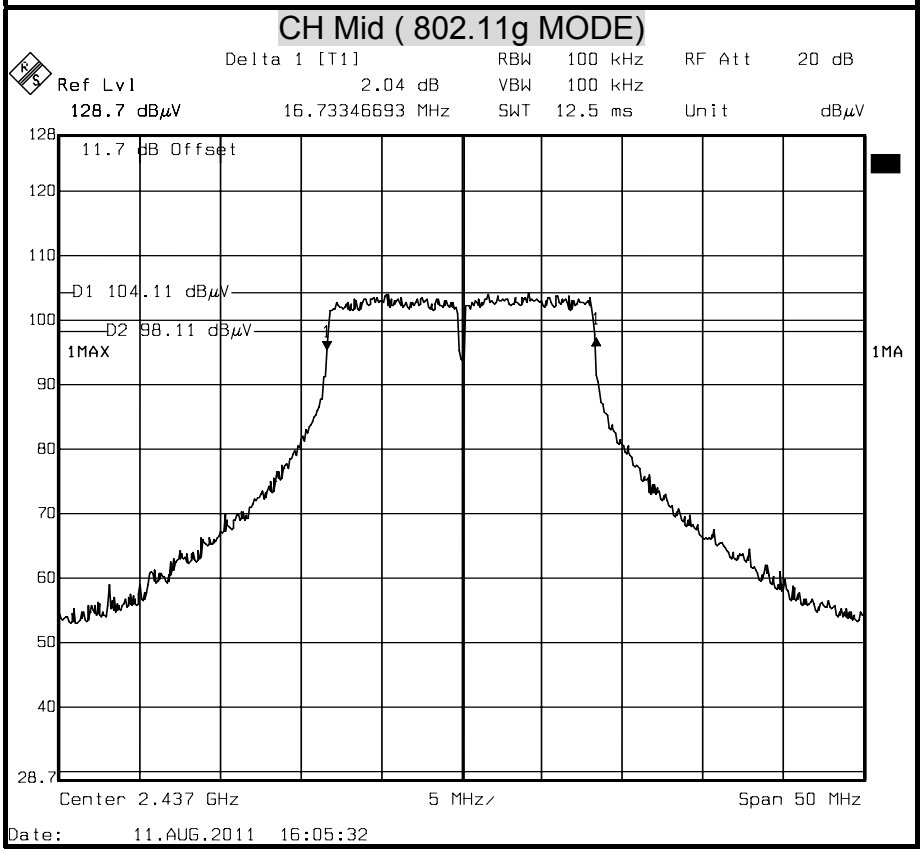


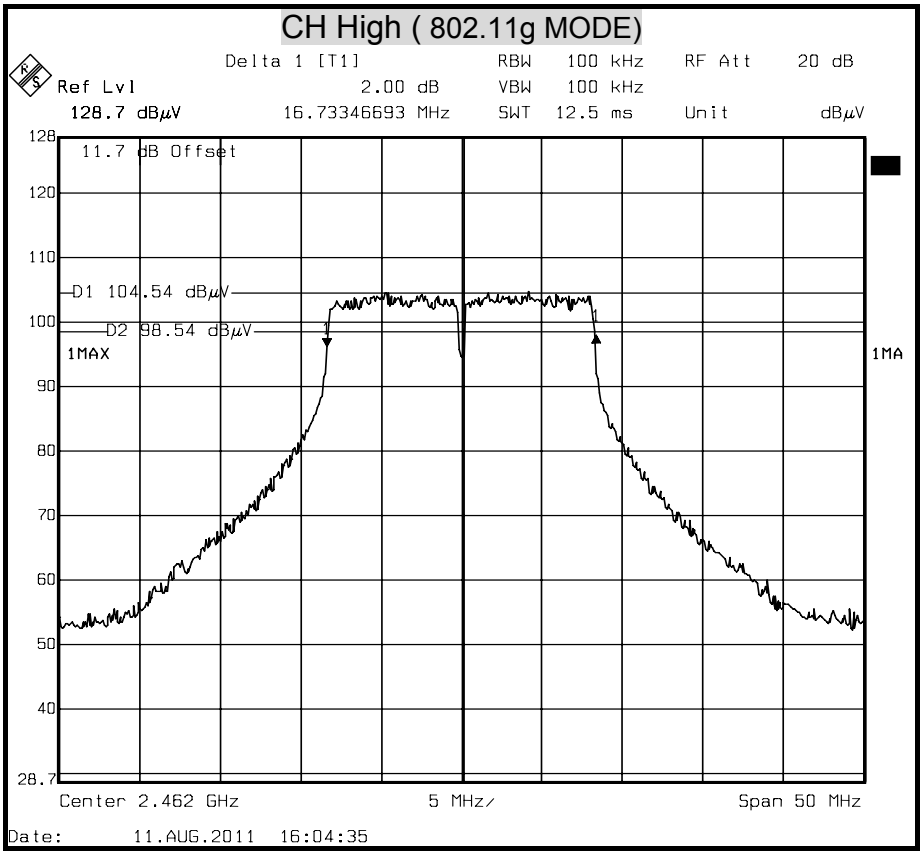
6dB BANDWIDTH (802.11g MODE)

CH Low (802.11g MODE)

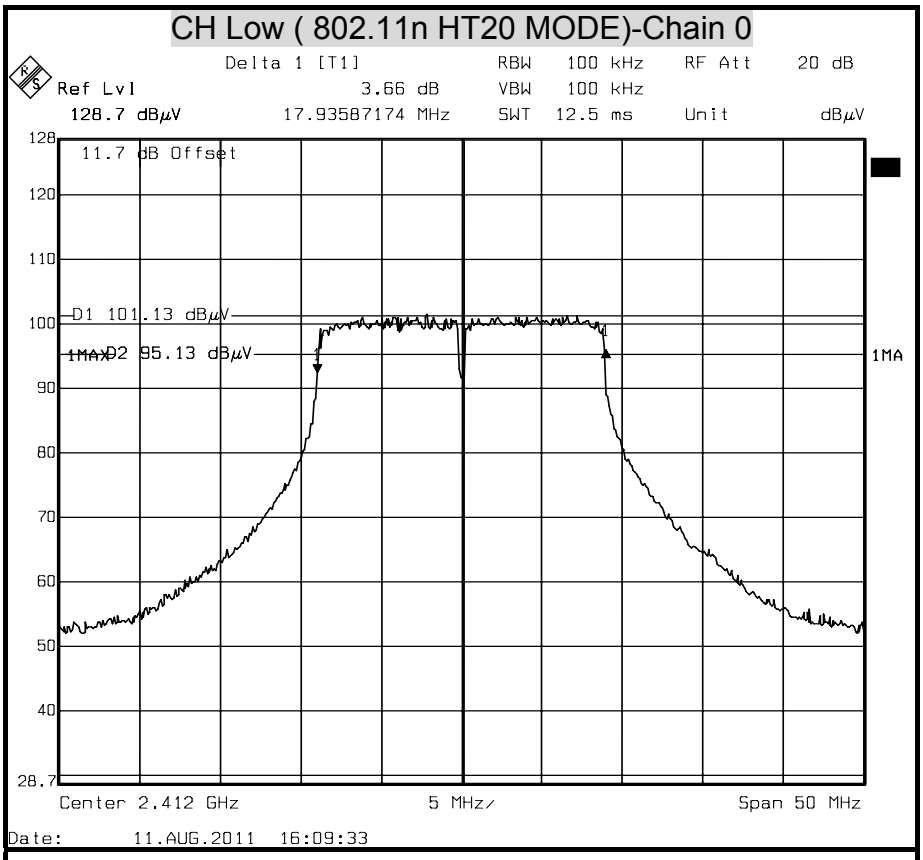


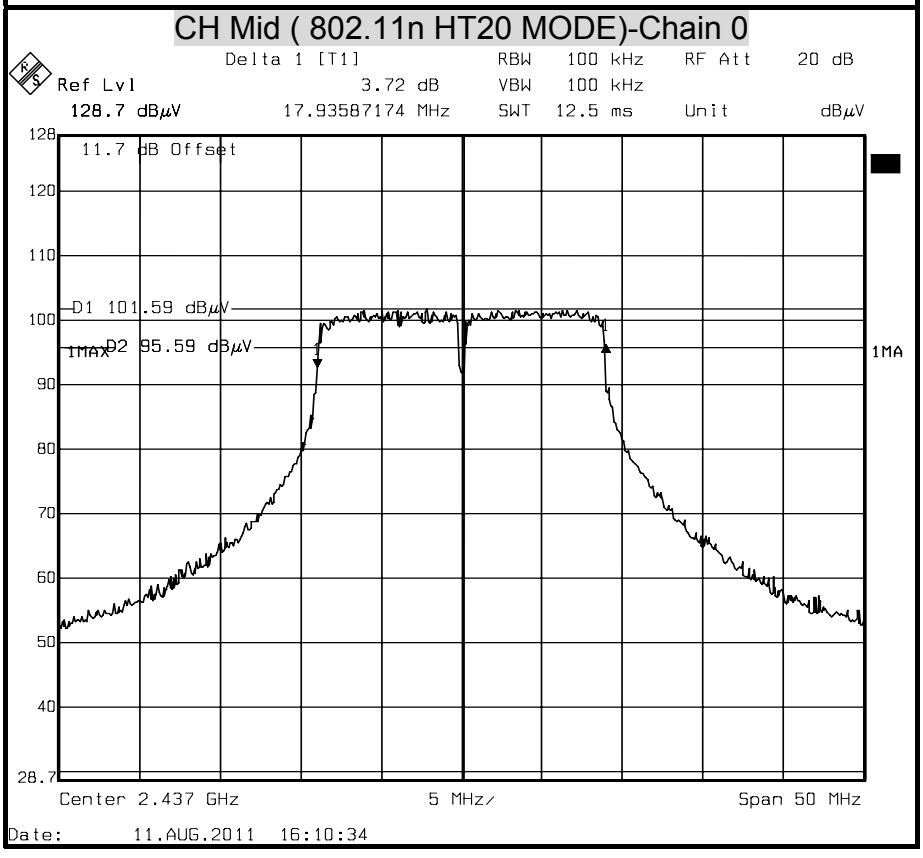
CH Mid (802.11g MODE)

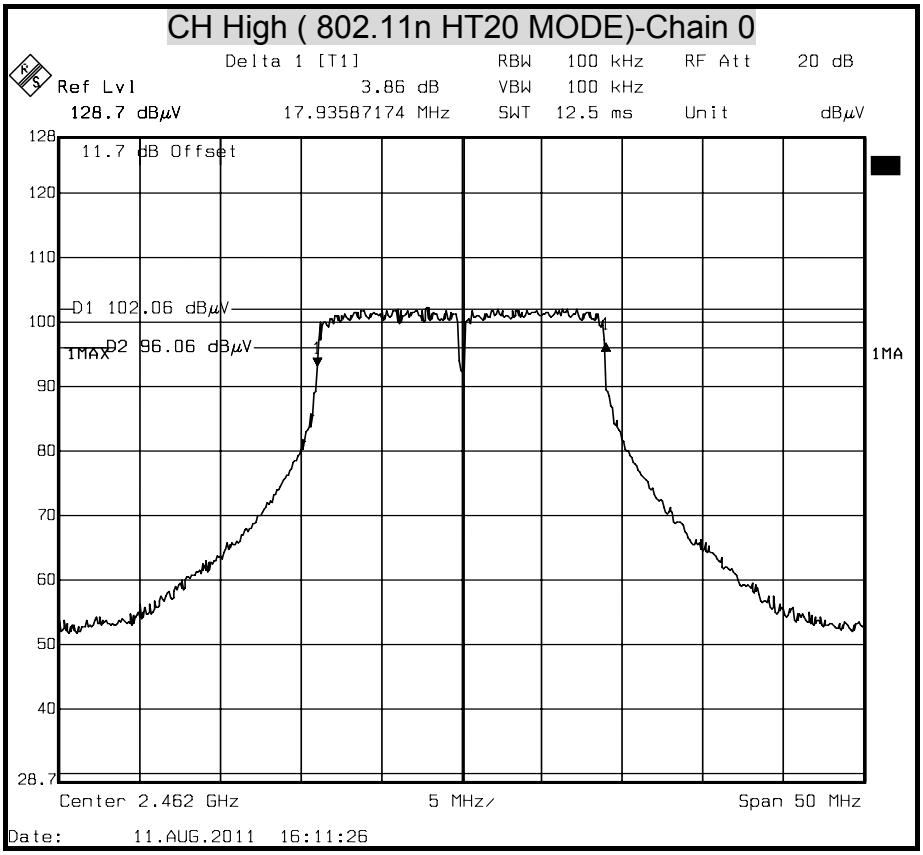



CH High (802.11g MODE)
Delta 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
2.00 dB
VBW 100 kHz
128.7 dBµV
16.73346693 MHz
SWT 12.5 ms
Unit dBµV
11.7 dB Offset
D1 104.54 dBµV
D2 98.54 dBµV
1MAX
1MA
128
120
110
100
90
80
70
60
50
40
28.7
Center 2.462 GHz
5 MHz/
Span 50 MHz
Date: 11.AUG.2011 16:04:35

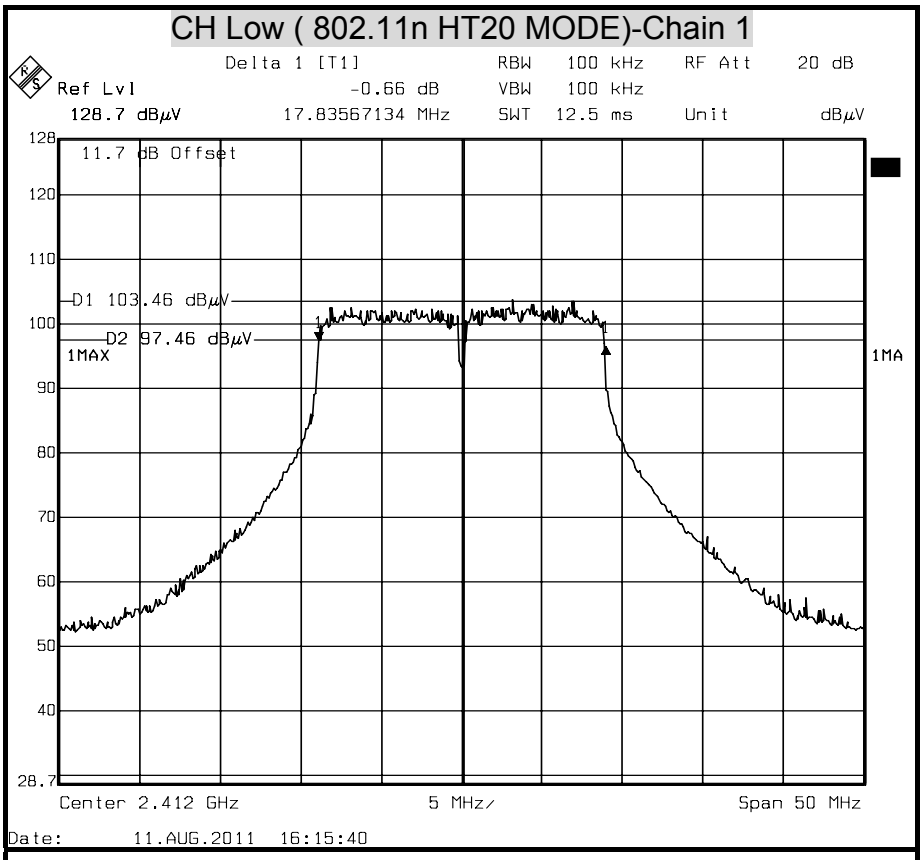
6dB BANDWIDTH (802.11n HT20 MODE) Chain 0

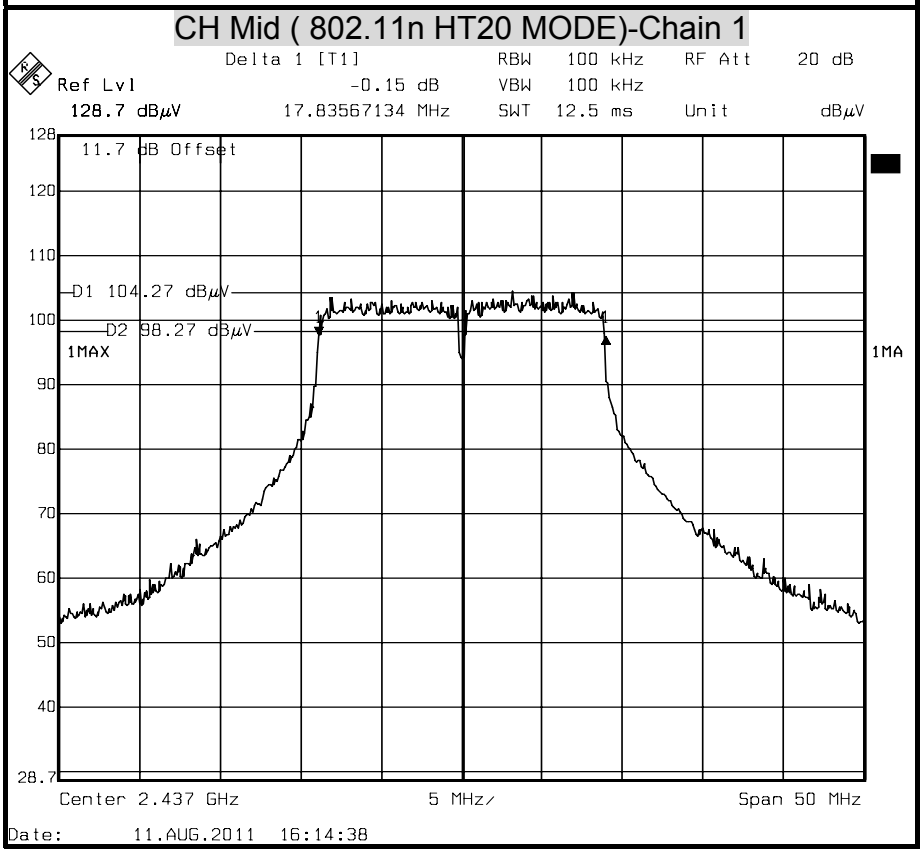


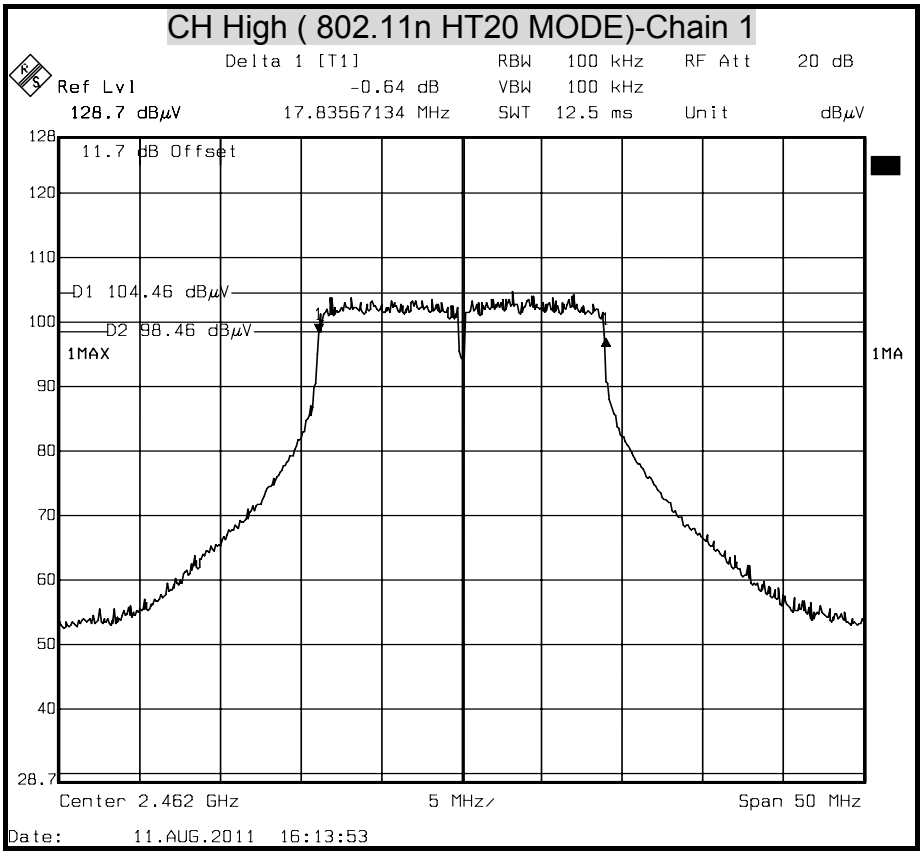



CH High (802.11n HT20 MODE)-Chain 0
Delta 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
3.86 dB
VBW 100 kHz
128.7 dBµV
17.93587174 MHz
SWT 12.5 ms
Unit dBµV
11.7 dB Offset
D1 102.06 dBµV
1MAX
D2 96.06 dBµV
1MA
128
120
110
100
90
80
70
60
50
40
28.7
Center 2.462 GHz
5 MHz/
Span 50 MHz
Date: 11.AUG.2011 16:11:26

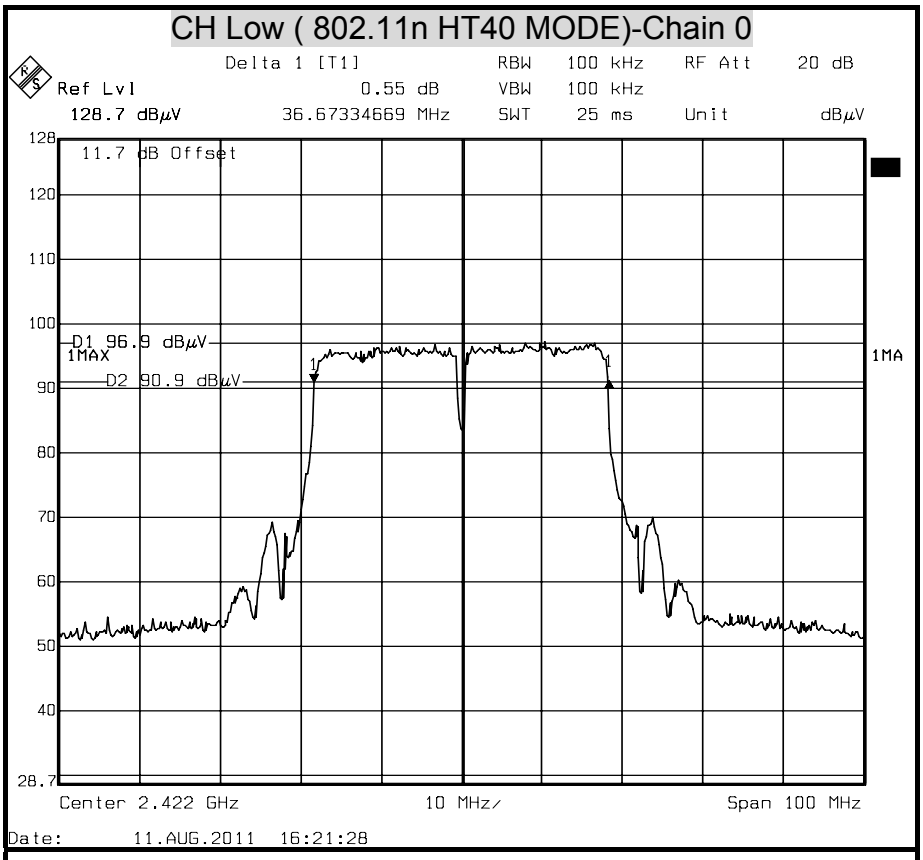
6dB BANDWIDTH (802.11n HT20 MODE) Chain 1

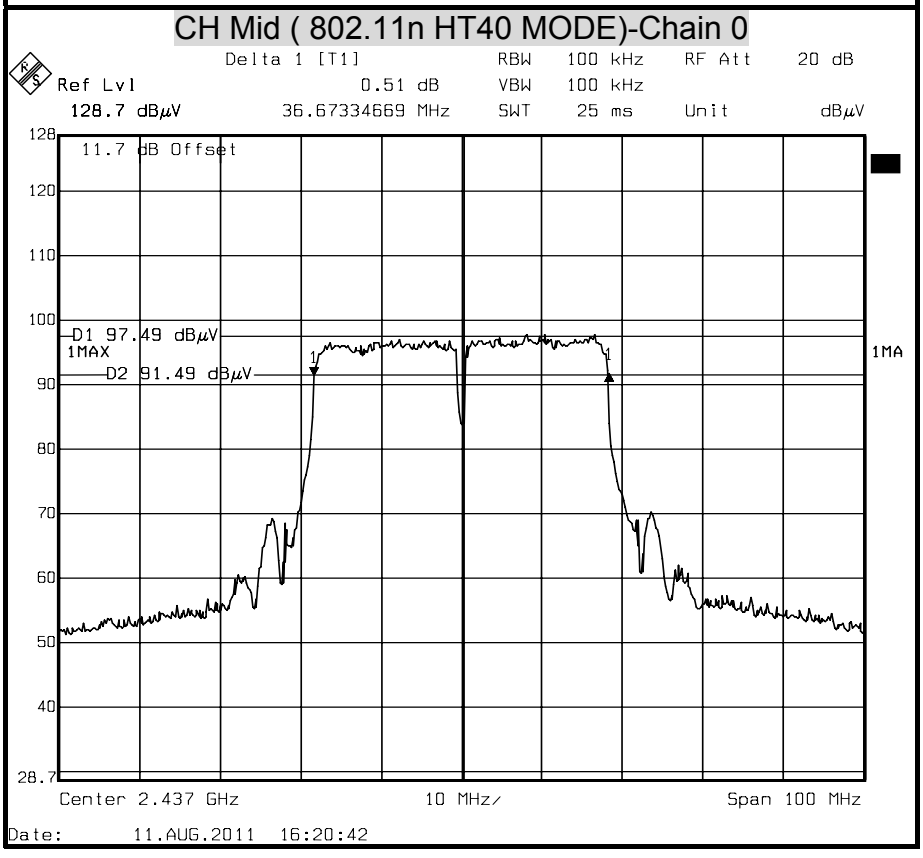


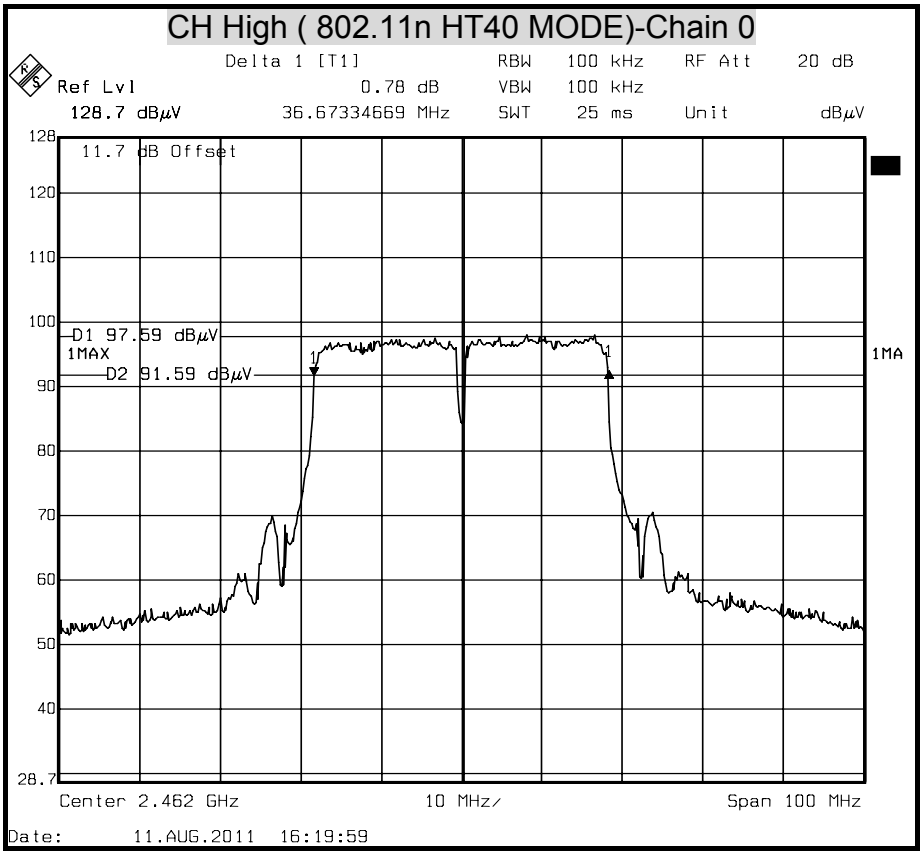



CH High (802.11n HT20 MODE)-Chain 1
Delta 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-0.64 dB
VBW 100 kHz
128.7 dBµV
17.83567134 MHz
SWT 12.5 ms
Unit dBµV
11.7 dB Offset
D1 104.46 dBµV
D2 98.46 dBµV
1MAX
1MA
128
120
110
100
90
80
70
60
50
40
28.7
Center 2.462 GHz
5 MHz/
Span 50 MHz
Date: 11.AUG.2011 16:13:53

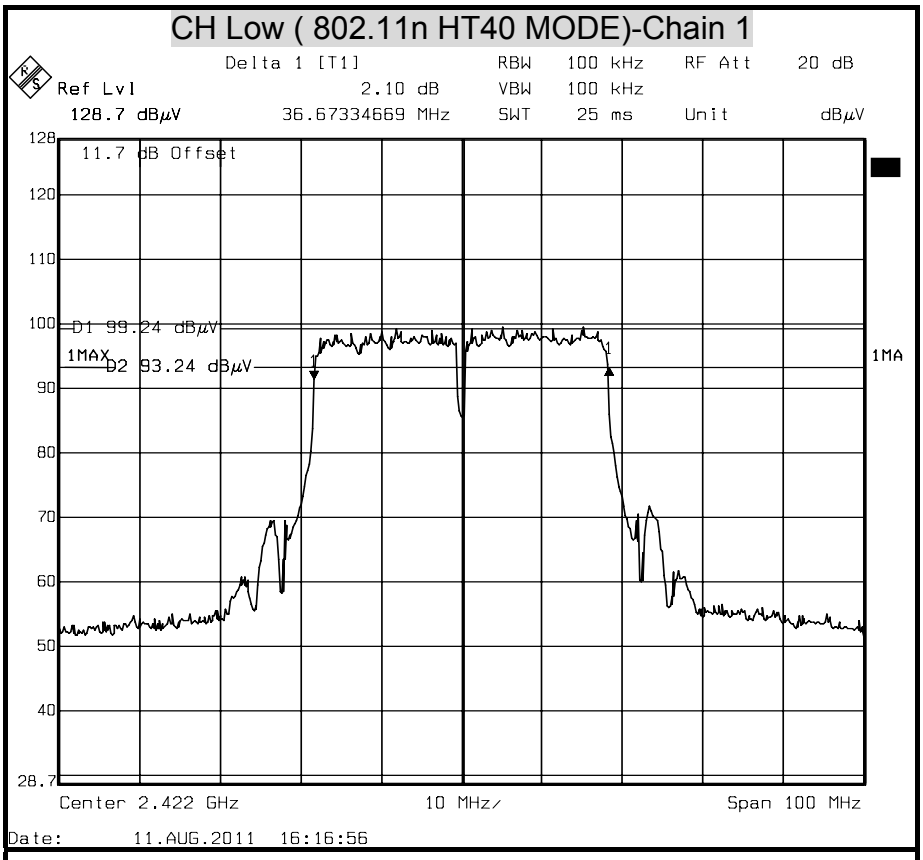
6dB BANDWIDTH (802.11n HT40 MODE) Chain 0

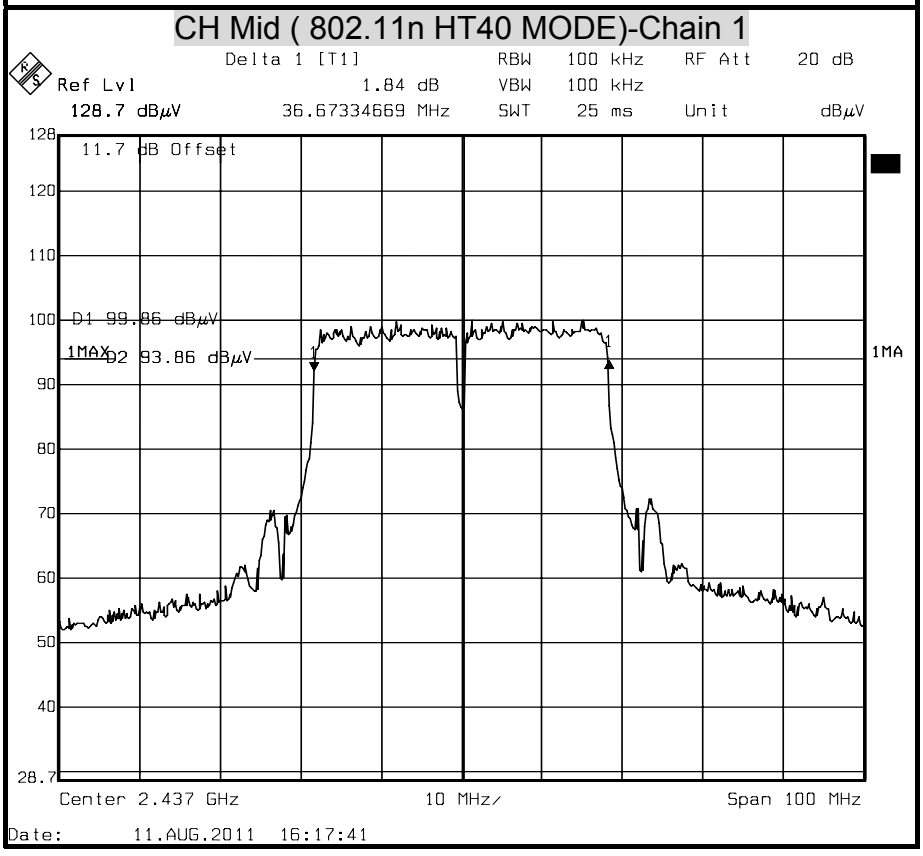


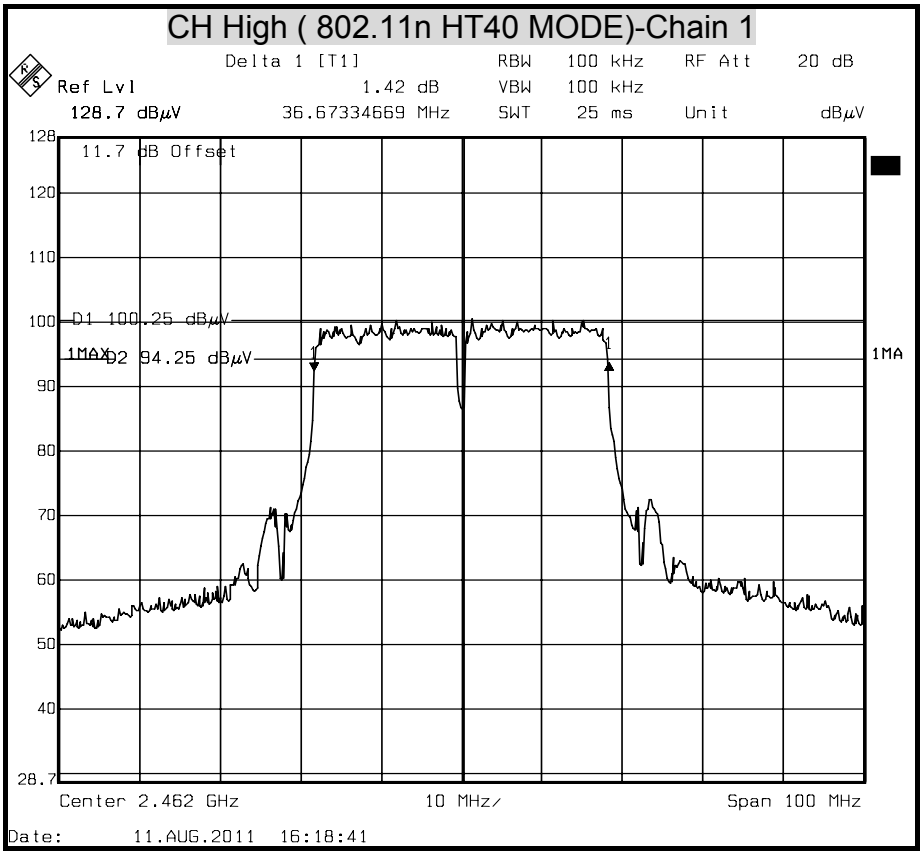



CH High (802.11n HT40 MODE)-Chain 0
Delta 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
0.78 dB
VBW 100 kHz
128.7 dBµV
36.67334669 MHz
SWT 25 ms
Unit dBµV
11.7 dB Offset
D1 97.59 dBµV
1MAX
D2 91.59 dBµV
1MA
128
120
110
100
90
80
70
60
50
40
28.7
Center 2.462 GHz
10 MHz/
Span 100 MHz
Date: 11.AUG.2011 16:19:59

6dB BANDWIDTH (802.11n HT40 MODE) Chain 1






CH High (802.11n HT40 MODE)-Chain 1
Delta 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
1.42 dB
VBW 100 kHz
128.7 dBµV
36.67334669 MHz
SWT 25 ms
Unit dBµV
11.7 dB Offset
D1 100.25 dBµV
1MAX D2 94.25 dBµV
1MA
128
120
110
100
90
80
70
60
50
40
28.7
Center 2.462 GHz
10 MHz/
Span 100 MHz
Date: 11.AUG.2011 16:18:41

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
Power Meter	Anritsu	ML2487A	6K00003888	MAY. 11, 2012

TEST SETUP

TEST PROCEDURE

Connect the EUT to spectrum analyzer, set the center frequency of the spectrum analyzer to the channel center frequency. Set the RBW to 1MHz and VBW to 3MHz.

Set sweep time=auto

Use detector max peak mode

Measurement of Digital Transmission Systems Operating under Section 15.247

TEST RESULTS

No non-compliance noted

IEEE 802.11b mode (One TX)

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	15.89	30.00	PASS
Middle	2437	16.67	30.00	PASS
High	2462	17.05	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 (One TX)

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	20.98	30.00	PASS
Middle	2437	21.92	30.00	PASS
High	2462	22.22	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.

10*log((10^(3/10))+(10^(3/10)))=6.01
30-(6.01-6)=29.99
IEEE 802.11n HT20 mode(Two TX)

Channel	Channel Frequency (MHz)	Peak Power (dBm)		Peak Power Total (dBm)	Peak Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1			
Low	2412	18.86	19.23	22.06	29.99	PASS
Middle	2437	20.04	20.43	23.25	29.99	PASS
High	2462	20.41	20.86	23.65	29.99	PASS

NOTE : 1. At finial test to get the worst-case emission at 13Mbps.
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.

10*log((10^(3/10))+(10^(3/10)))=6.01
30-(6.01-6)=29.99
IEEE 802.11n HT40 mode (Two TX)

Channel	Channel Frequency (MHz)	Peak Power (dBm)		Peak Power Total (dBm)	Peak Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1			
Low	2422	17.62	18.33	21.00	29.99	PASS
Middle	2437	17.98	19.05	21.56	29.99	PASS
High	2452	18.15	19.23	21.73	29.99	PASS

NOTE : 1. At finial test to get the worst-case emission at 27Mbps.
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	13.63
Middle	2437	14.38
High	2462	14.81

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2412	10.85
Middle	2437	11.69
High	2462	12.12

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	Average Power (dBm)	Average Power (dBm)
		Chain 0	Chain 1
Low	2412	8.89	10.01
Middle	2437	9.92	11.06
High	2462	10.27	11.57

IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)	Average Power (dBm)	Average Power (dBm)
		Chain 0	Chain 1
Low	2422	8.04	9.05
Middle	2437	8.42	9.53
High	2452	8.46	9.81

8.3 POWER SPECTRAL DENSITY

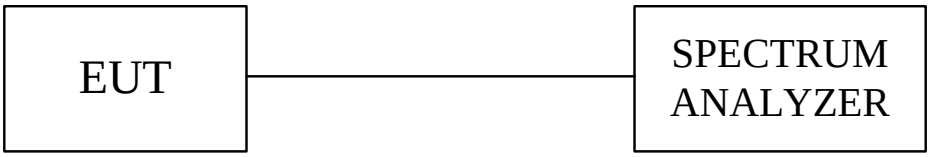
LIMIT

§ 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	FSEK 30	835253/002	JUL. 14, 2012

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 peak power calculation formula:
10 log (10^ (Chain 0 PPSD / 10)).

No non-compliance noted.

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	PPSD Chain 0 (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	-16.79	8	PASS
Middle	2437	-15.90	8	PASS
High	2462	-15.38	8	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)	PPSD Chain 0 (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	-18.73	8	PASS
Middle	2437	-17.89	8	PASS
High	2462	-17.23	8	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.

10*log((10^(3/10))+(10^(3/10)))=6.01	**8-(6.01-6)=7.99**

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	PPSD(dBm)			Maximum Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Total		
Low	2412	-19.61	-18.53	-16.03	7.99	PASS
Middle	2437	-18.12	-17.84	-14.97	7.99	PASS
High	2462	-18.68	-17.40	-14.98	7.99	PASS

NOTE : 1. At finial test to get the worst-case emission at 13Mbps.
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.

10*log((10^(3/10))+(10^(3/10)))=6.01	**8-(6.01-6)=7.99**

IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)	PPSD(dBm)			Maximum Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Total		
Low	2422	-24.59	-22.77	-20.58	7.99	PASS
Middle	2437	-24.09	-22.22	-20.04	7.99	PASS
High	2452	-23.77	-21.97	-19.77	7.99	PASS

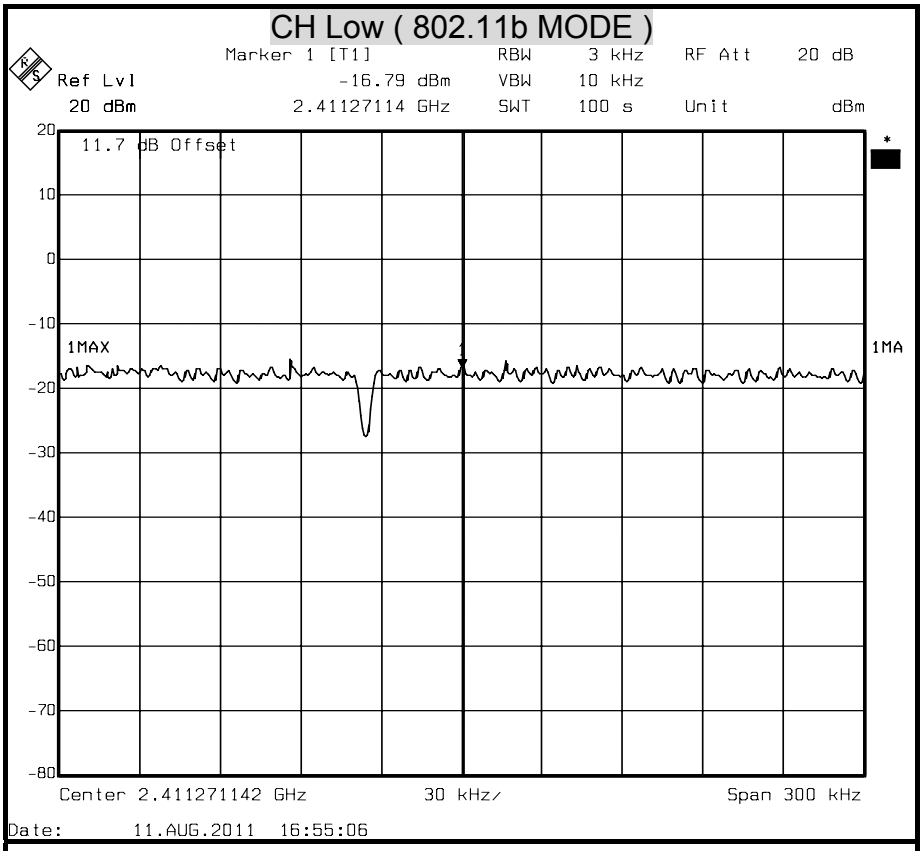
NOTE : 1. At finial test to get the worst-case emission at 27Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

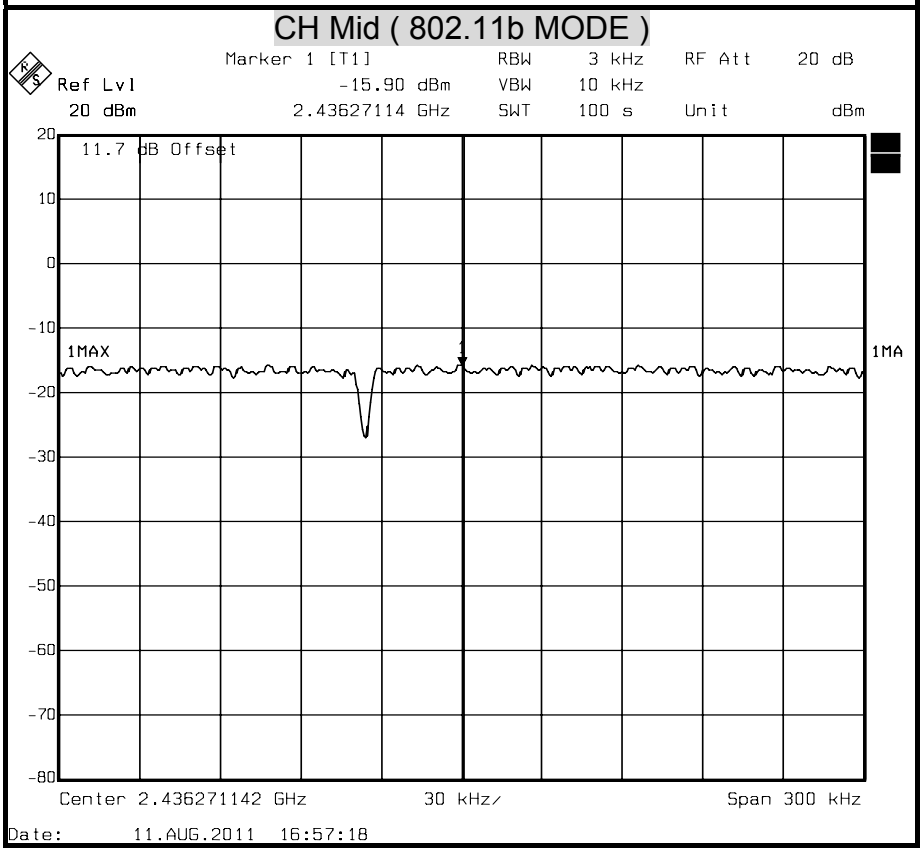
10*log((10^(3/10))+(10^(3/10)))=6.01	**8-(6.01-6)=7.99**

Combined mode

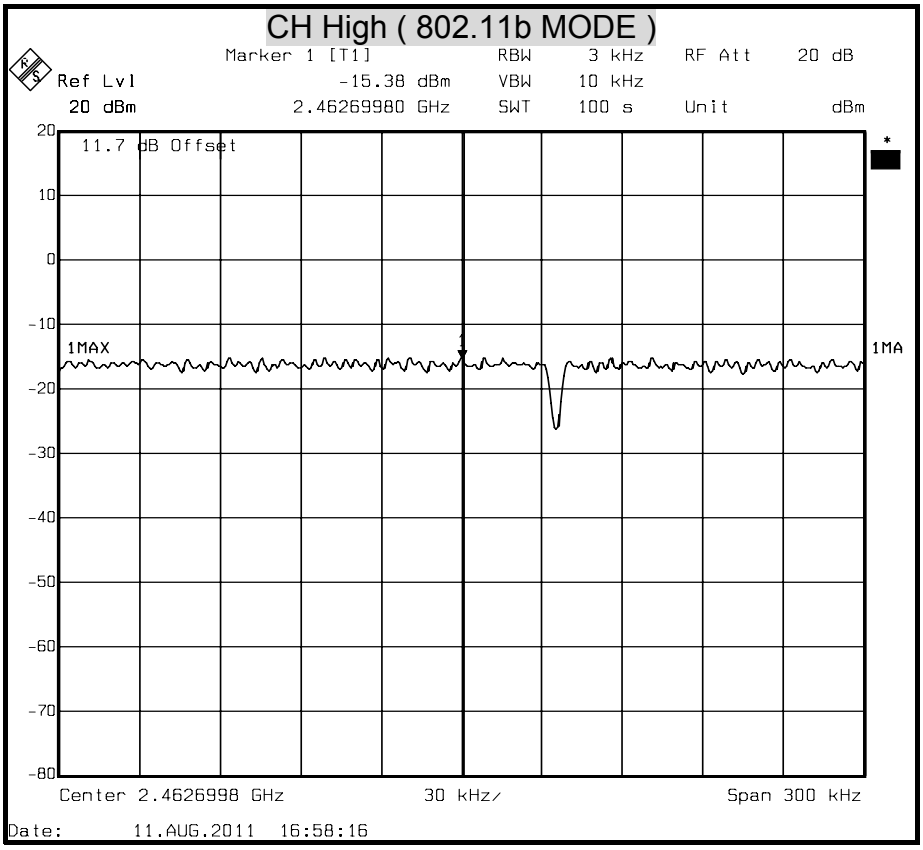
Channel		Channel Frequency (MHz)	PPSD(dBm)	Maximum Limit (dBm)	Pass / Fail
802.11n HT20 Combined mode	CH Low	2412	-14.85	7.99	PASS
	CH Middle	2437	-14.12		
	CH High	2462	-13.57		
802.11n HT40 Combined mode	CH Low	2422	-19.41	7.99	PASS
	CH Middle	2437	-18.86		
	CH High	2452	-18.46		

POWER SPECTRAL DENSITY (IEEE 802.11b MODE)



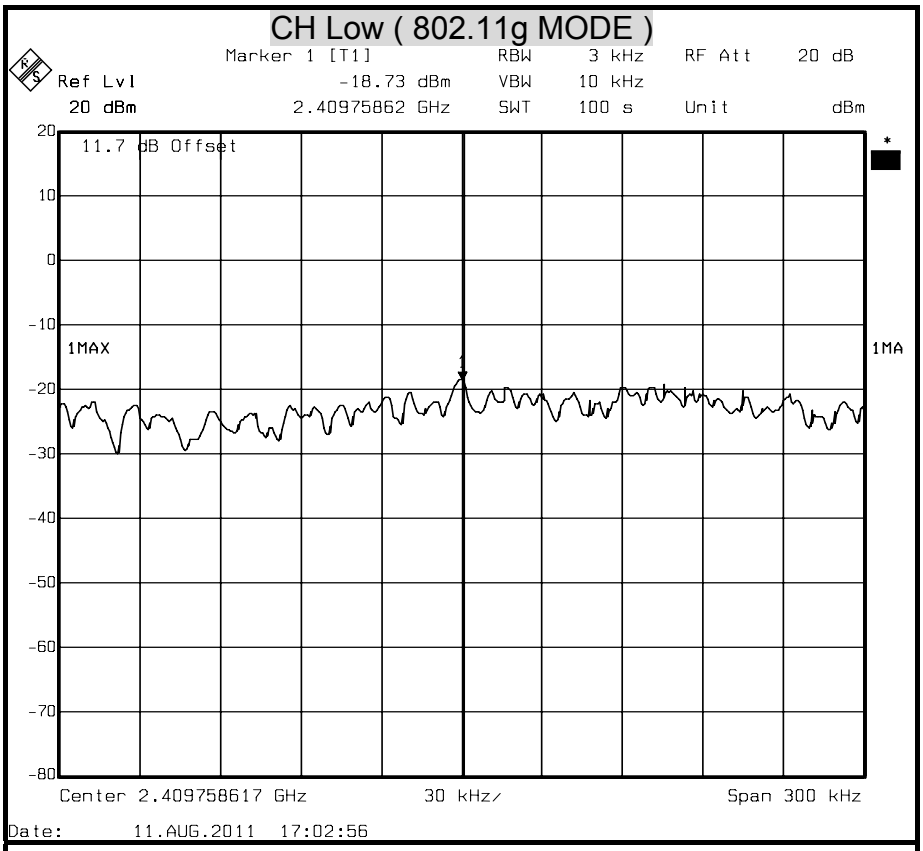


CH High (802.11b MODE)

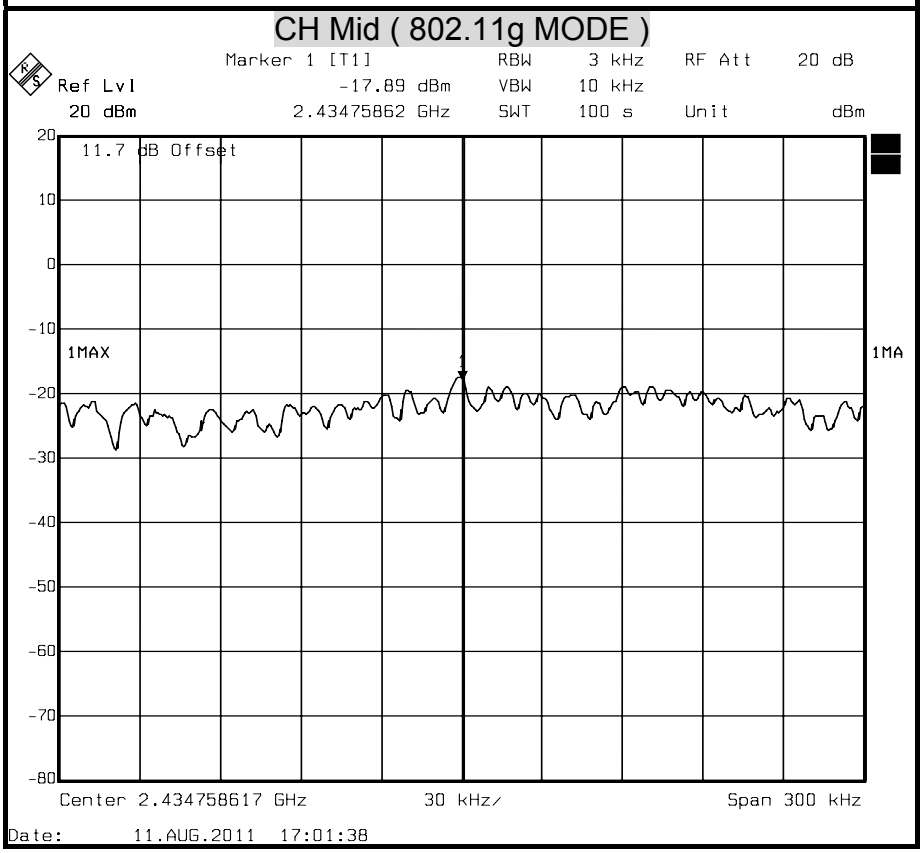


POWER SPECTRAL DENSITY (IEEE 802.11g MODE)

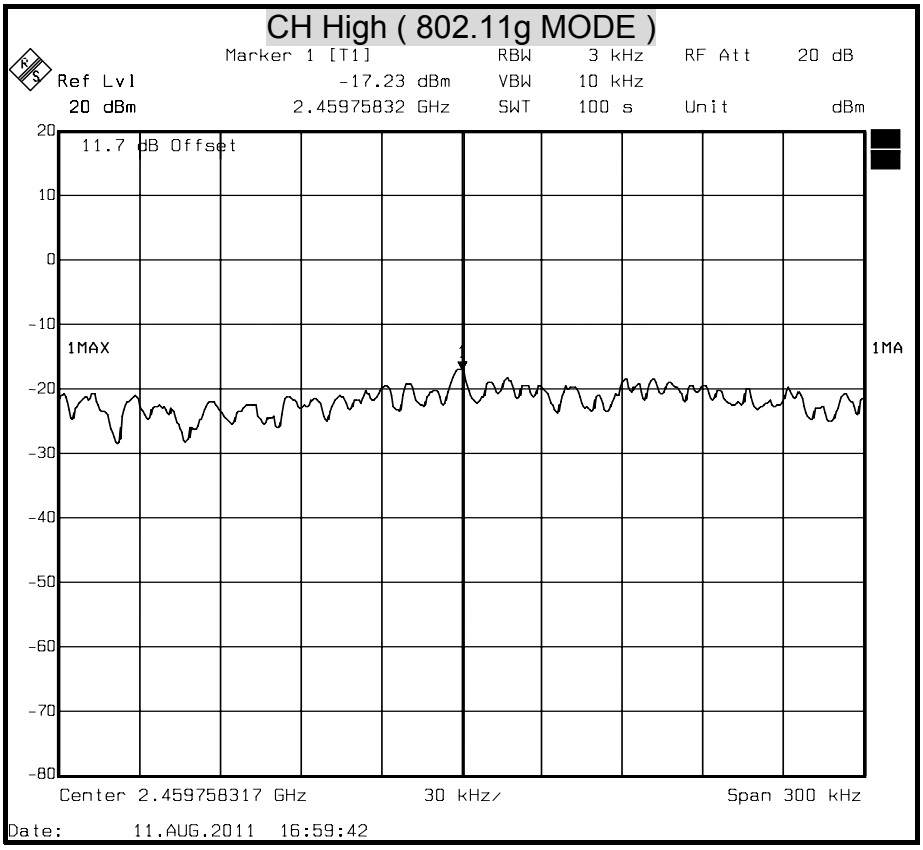
CH Low (802.11g MODE)



CH Mid (802.11g MODE)

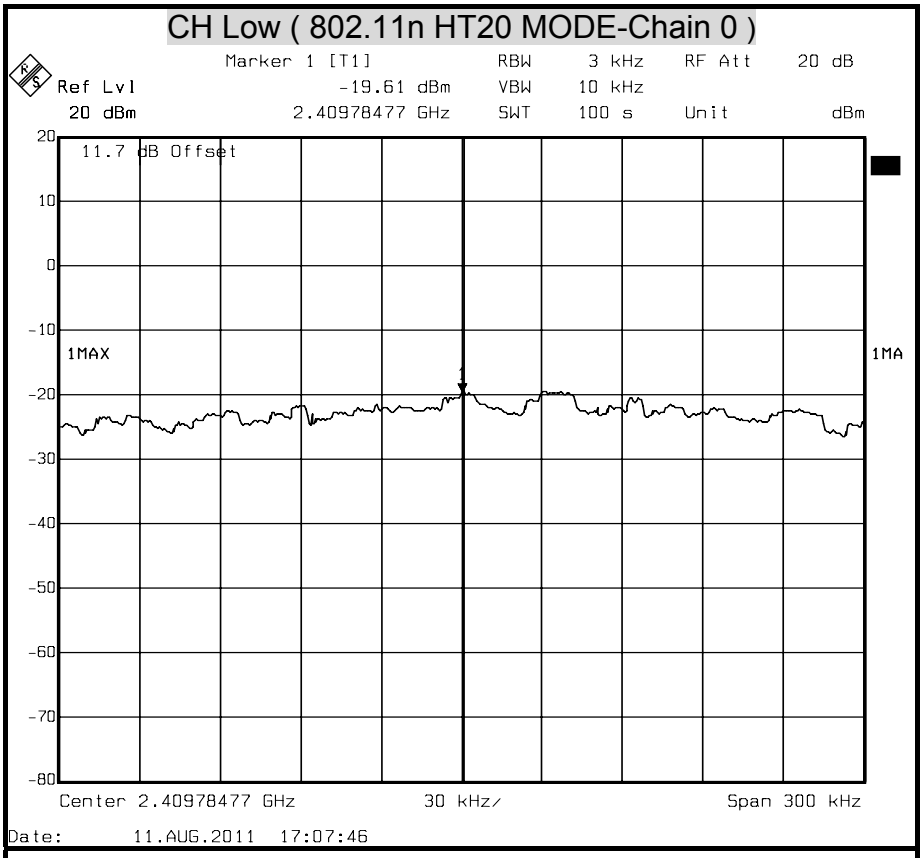


CH High (802.11g MODE)

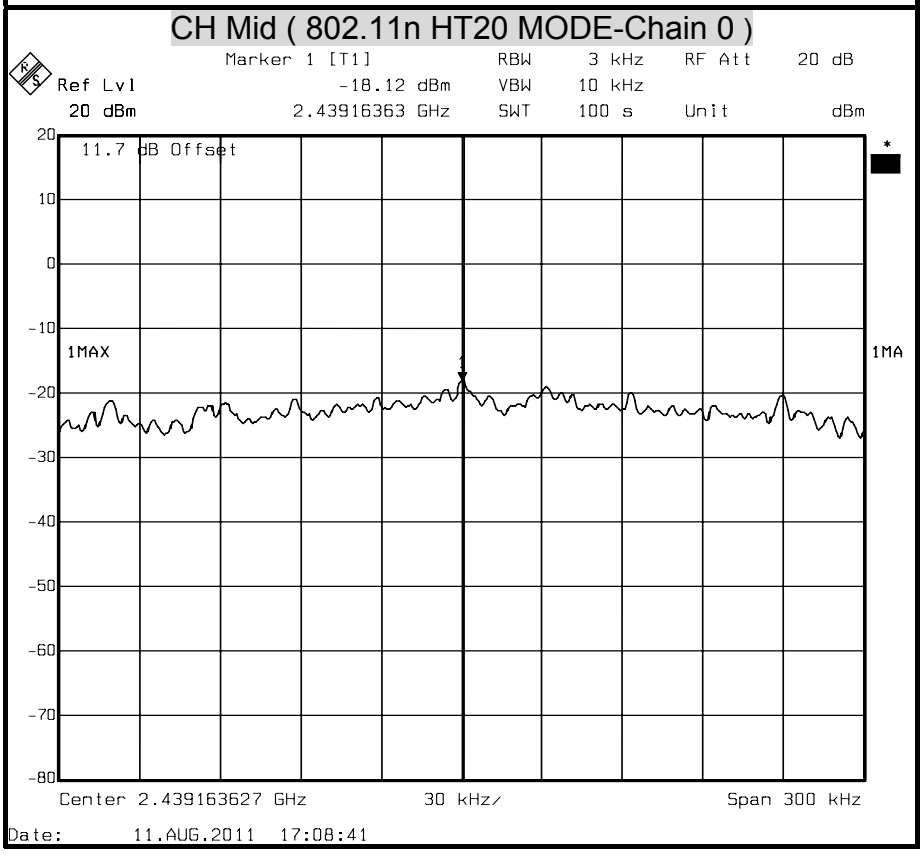


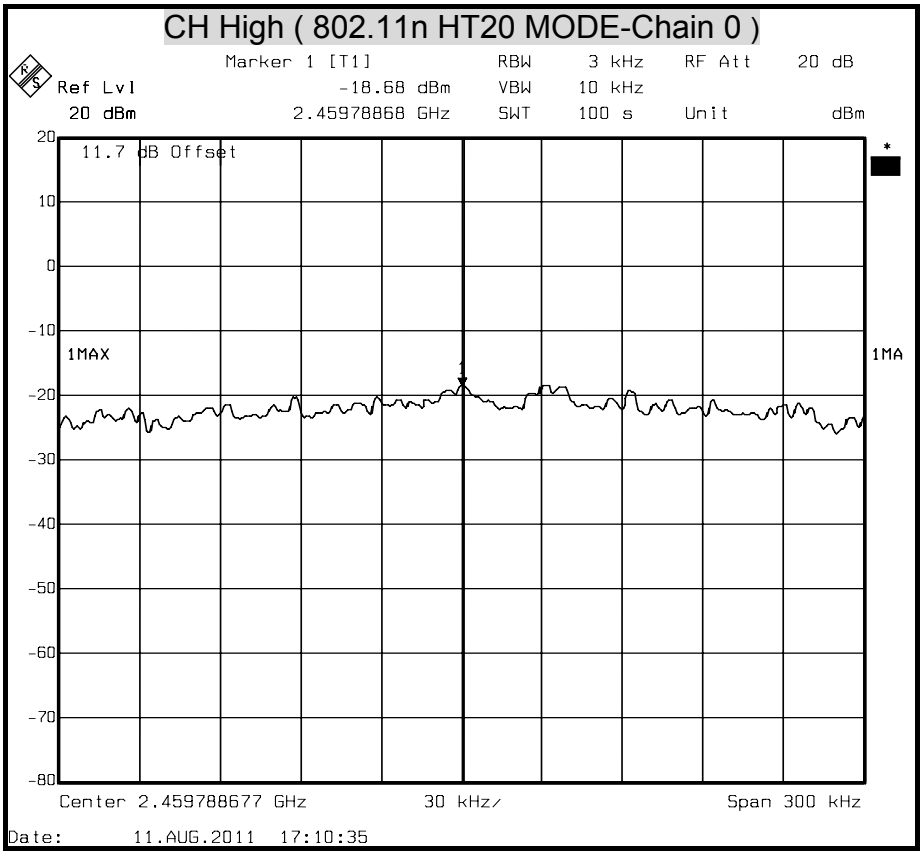
POWER SPECTRAL DENSITY (802.11n HT20 MODE)

CH Low (802.11n HT20 MODE-Chain 0)



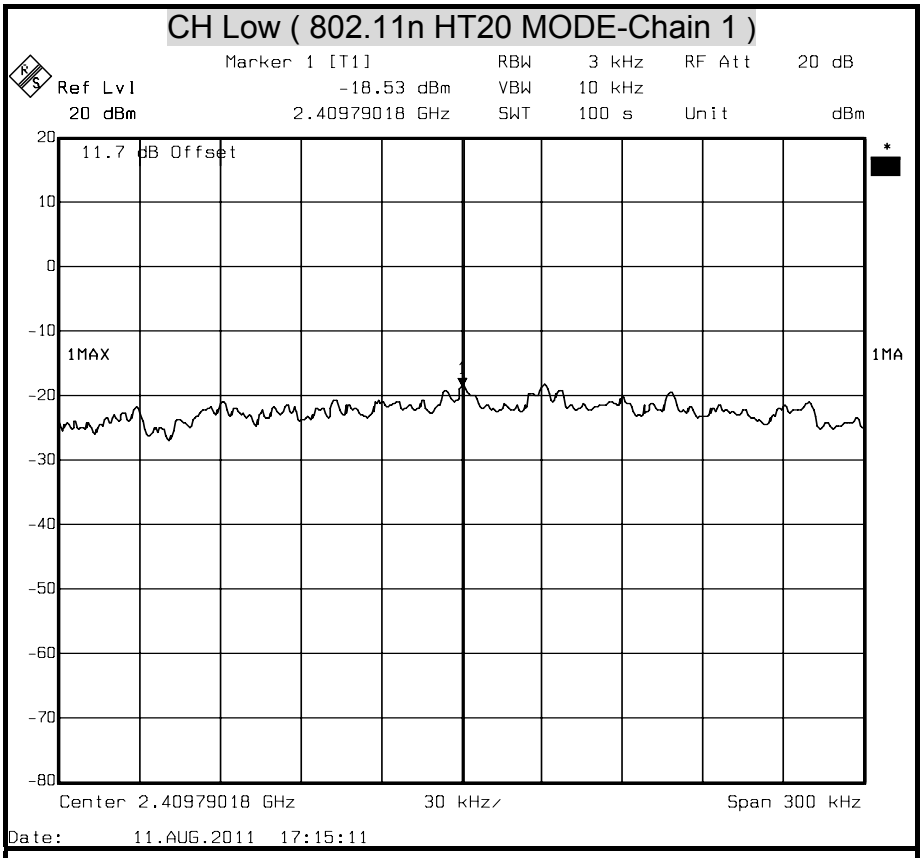
CH Mid (802.11n HT20 MODE-Chain 0)



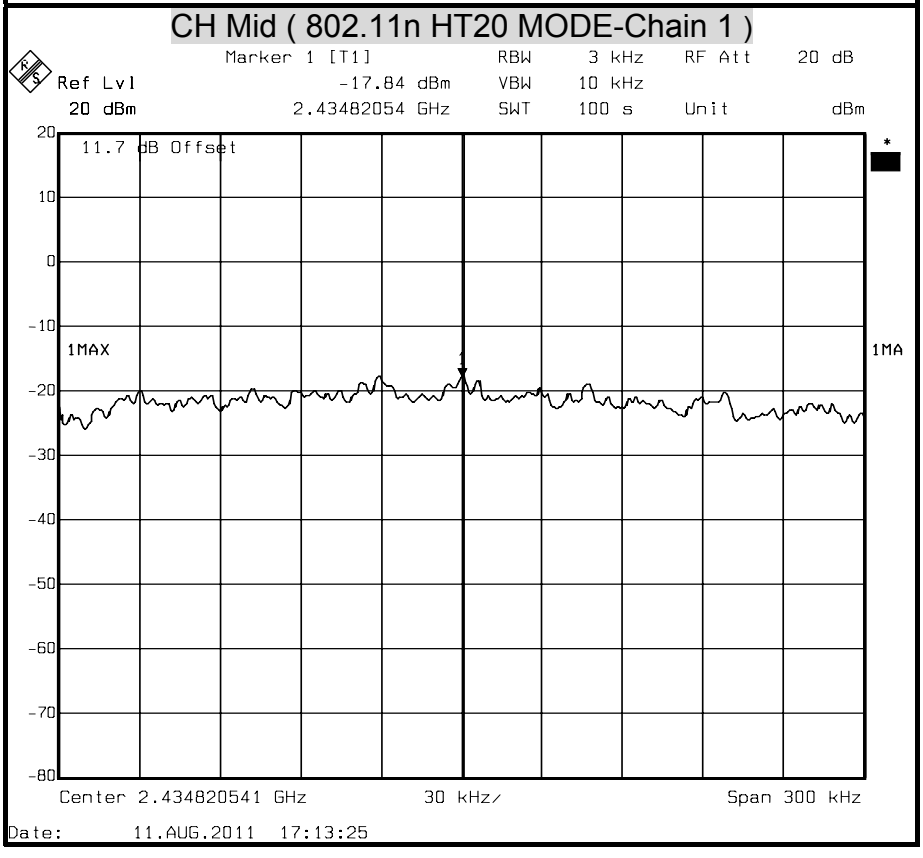

CH High (802.11n HT20 MODE-Chain 0)
Marker 1 [T1]
-18.68 dBm
2.45978868 GHz
RBW 3 kHz
VBW 10 kHz
SWT 100 s
RF Att 20 dB
Unit dBm
Ref Lvl
20 dBm
11.7 dB Offset
1MAX
1MA
Center 2.459788677 GHz
30 kHz/
Span 300 kHz
Date: 11.AUG.2011 17:10:35

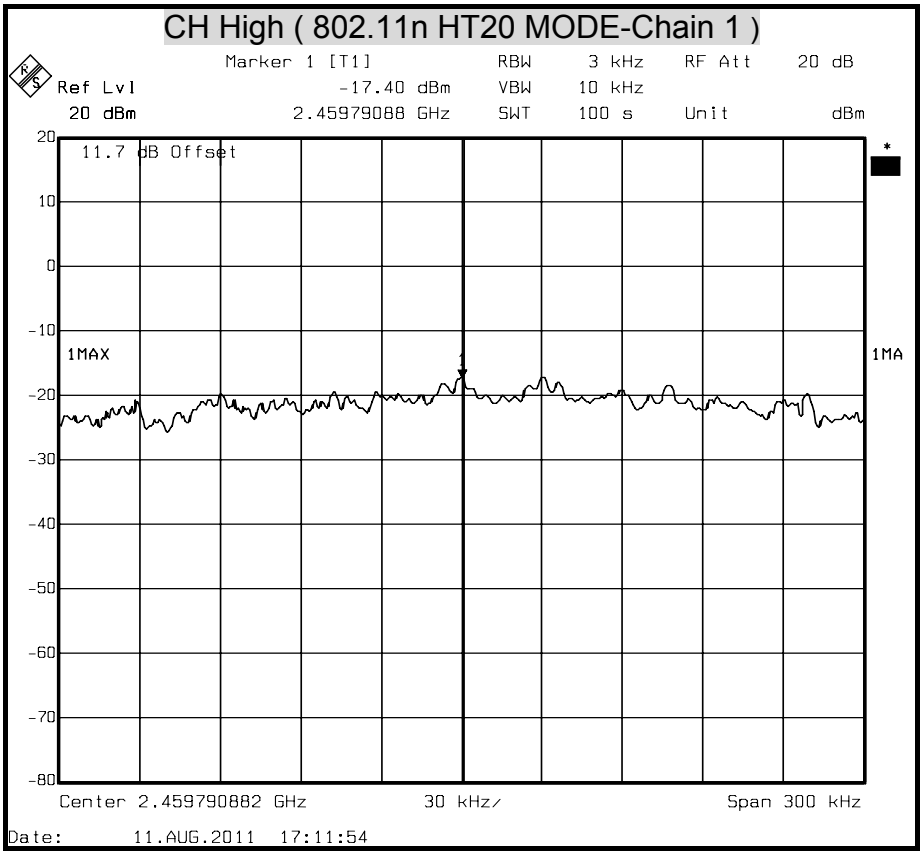
POWER SPECTRAL DENSITY (802.11n HT20 MODE)

CH Low (802.11n HT20 MODE-Chain 1)



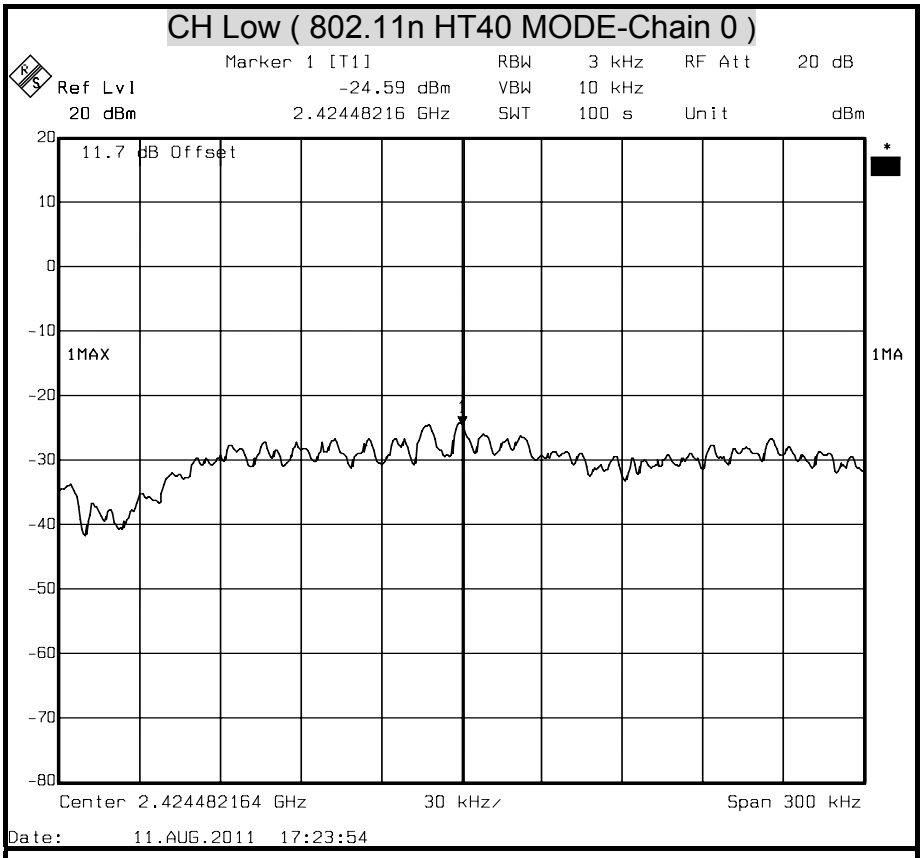
CH Mid (802.11n HT20 MODE-Chain 1)



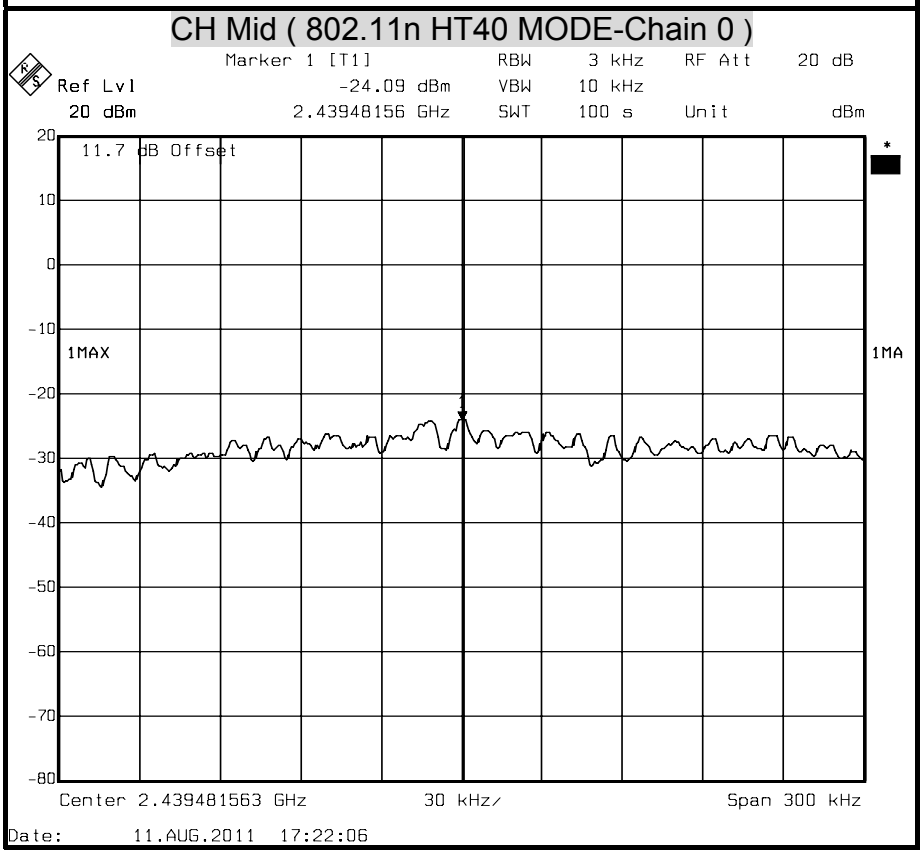

CH High (802.11n HT20 MODE-Chain 1)
Marker 1 [T1]
RBW 3 kHz
RF Att 20 dB
Ref Lvl
-17.40 dBm
VBW 10 kHz
20 dBm
2.45979088 GHz
SWT 100 s
Unit dBm
11.7 dB Offset
1MAX
1MA
Center 2.459790882 GHz
30 kHz/
Span 300 kHz
Date: 11.AUG.2011 17:11:54

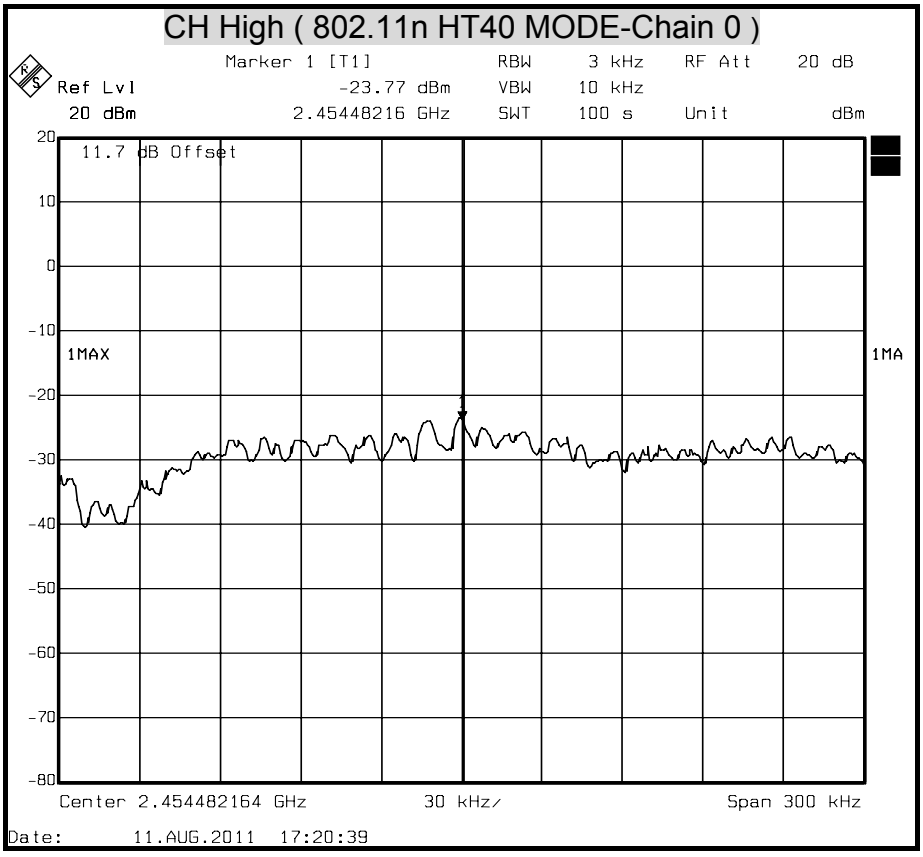
POWER SPECTRAL DENSITY (802.11n HT40 MODE)

CH Low (802.11n HT40 MODE-Chain 0)



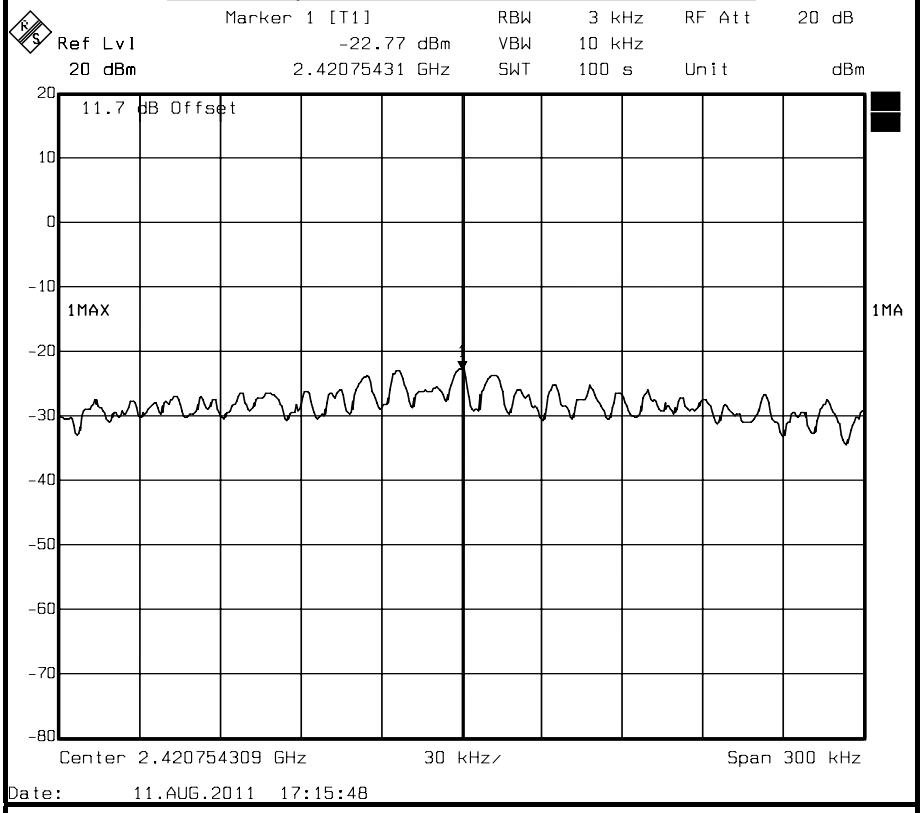
CH Mid (802.11n HT40 MODE-Chain 0)



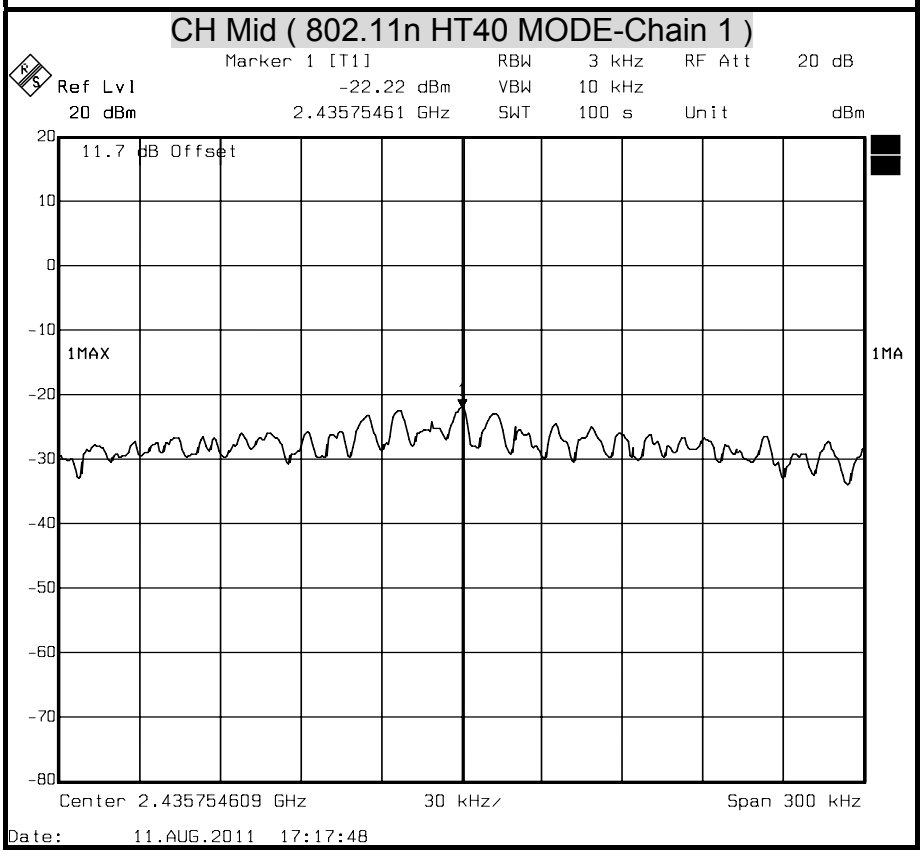

CH High (802.11n HT40 MODE-Chain 0)
Marker 1 [T1]
RBW 3 kHz
RF Att 20 dB
Ref Lvl
-23.77 dBm
VBW 10 kHz
20 dBm
2.45448216 GHz
SWT 100 s
Unit dBm
11.7 dB Offset
1MAX
1MA
Center 2.454482164 GHz
30 kHz/
Span 300 kHz
Date: 11.AUG.2011 17:20:39

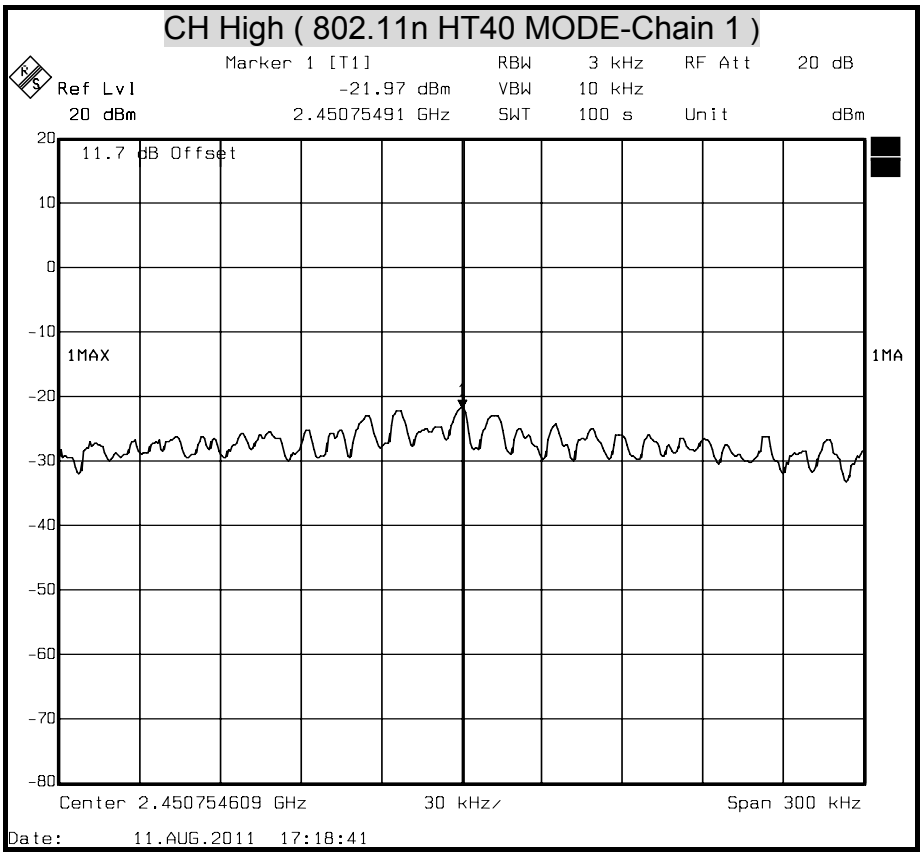
POWER SPECTRAL DENSITY (802.11n HT40 MODE)

CH Low (802.11n HT40 MODE-Chain 1)

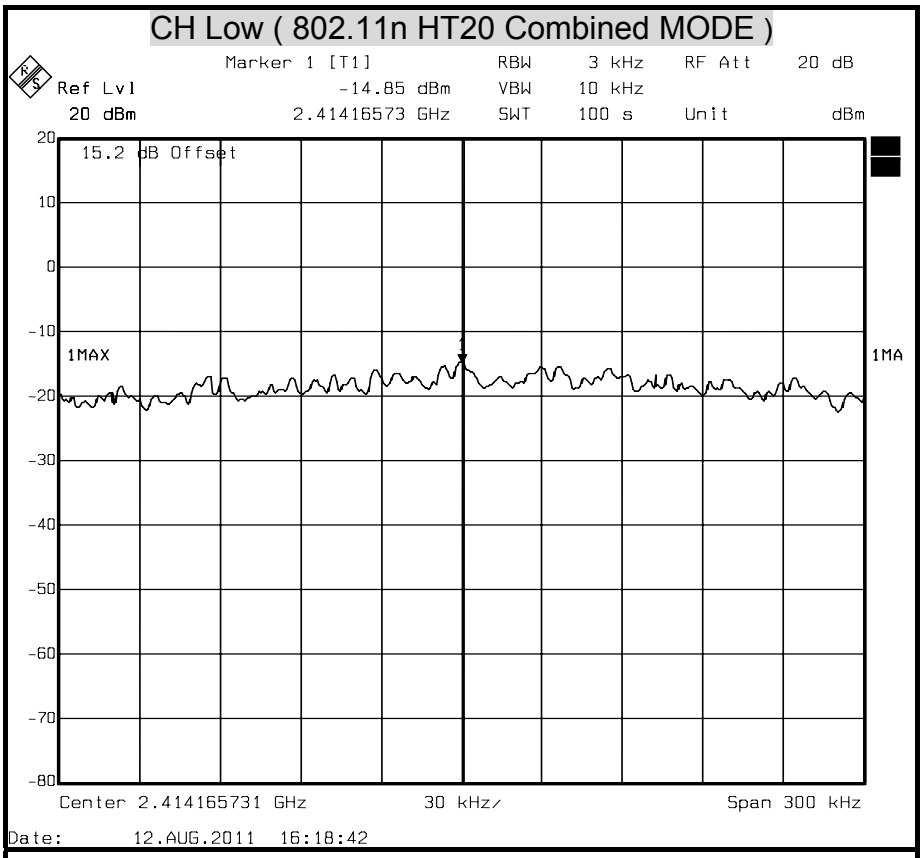


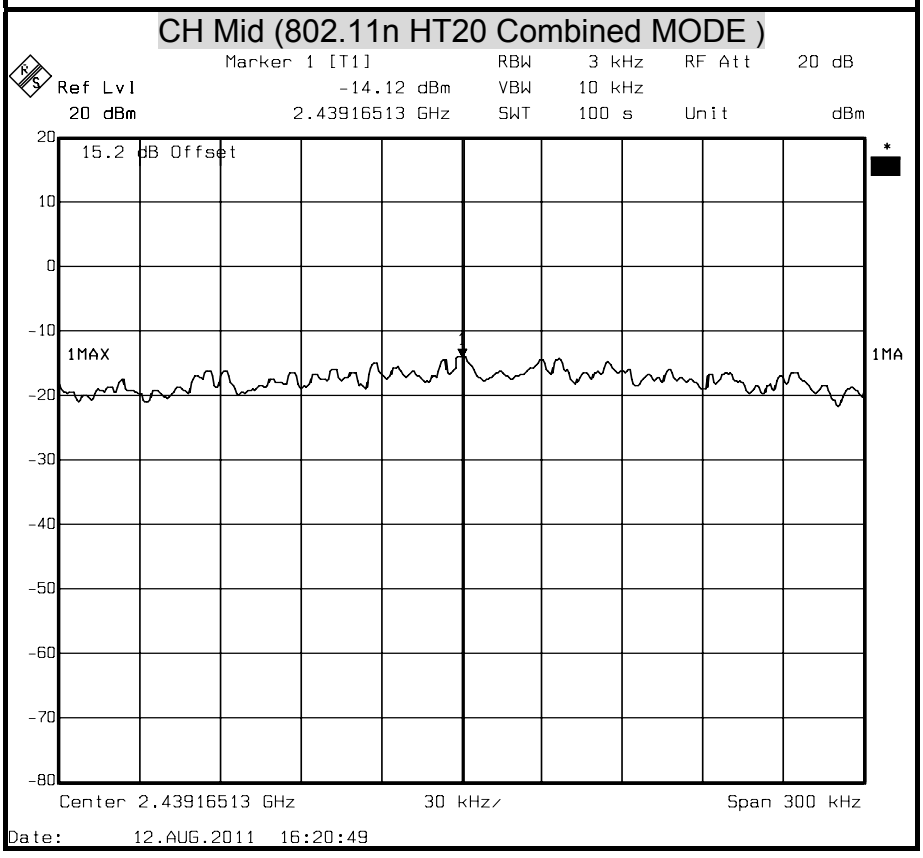
CH Mid (802.11n HT40 MODE-Chain 1)

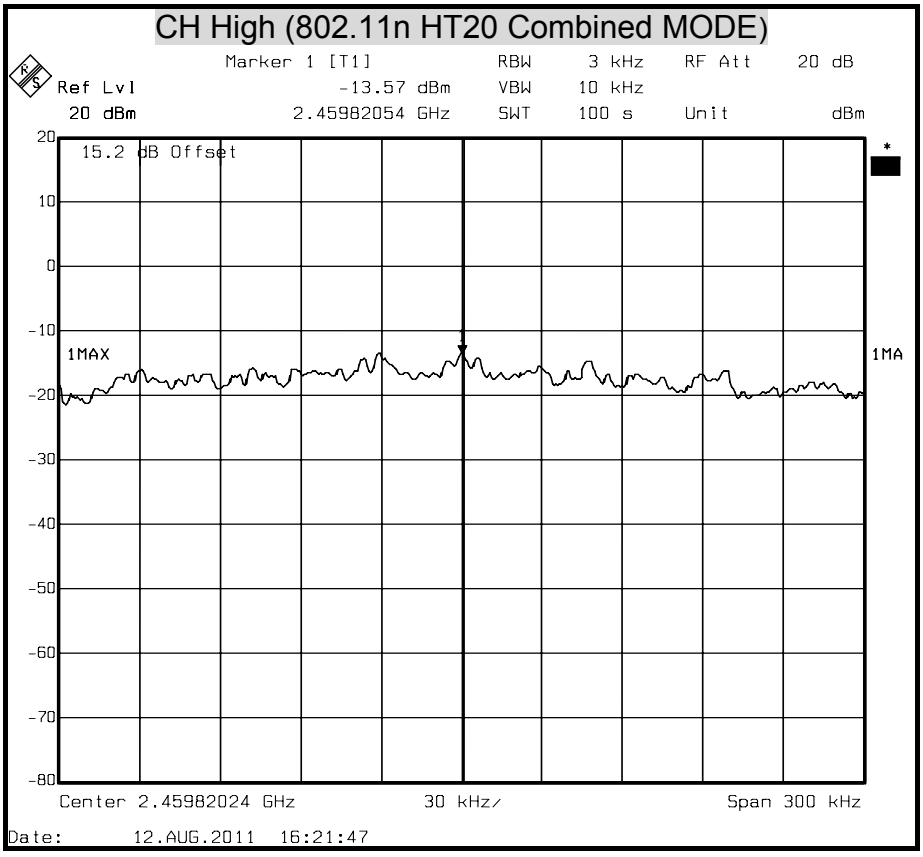



CH High (802.11n HT40 MODE-Chain 1)
Marker 1 [T1]
Ref Lvl
20 dBm
-21.97 dBm
2.45075491 GHz
RBW 3 kHz
VBW 10 kHz
SWT 100 s
RF Att 20 dB
Unit dBm
11.7 dB Offset
1MAX
1MA
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.450754609 GHz
30 kHz/
Span 300 kHz
Date: 11.AUG.2011 17:18:41

POWER SPECTRAL DENSITY (802.11n HT20 Combined MODE)

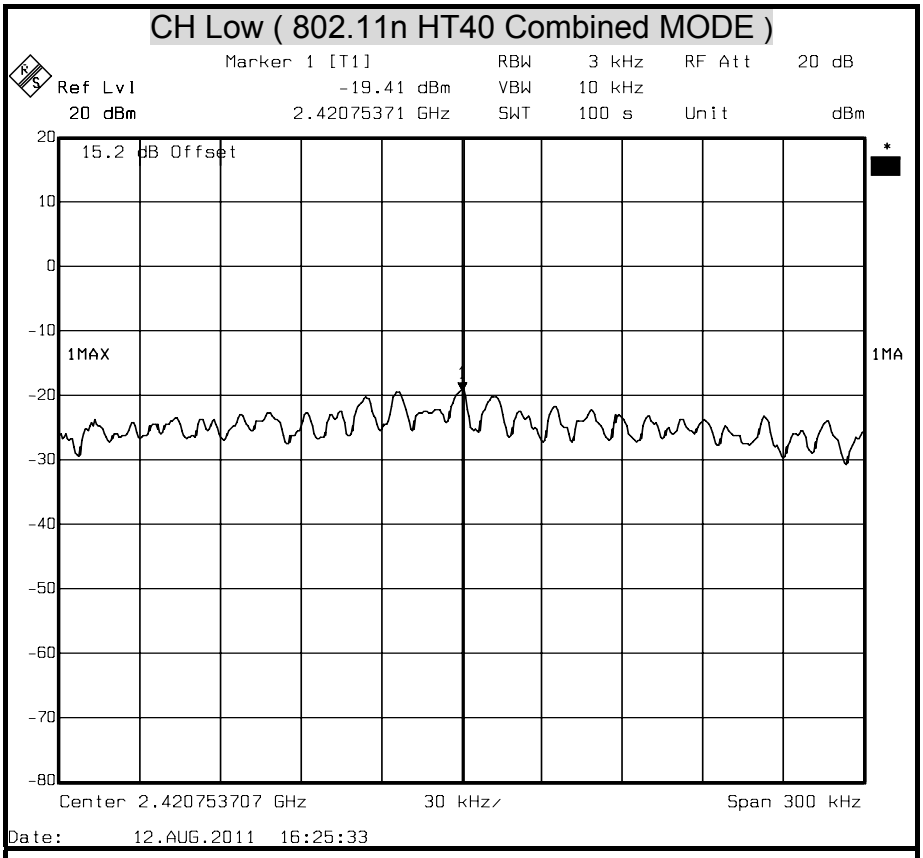




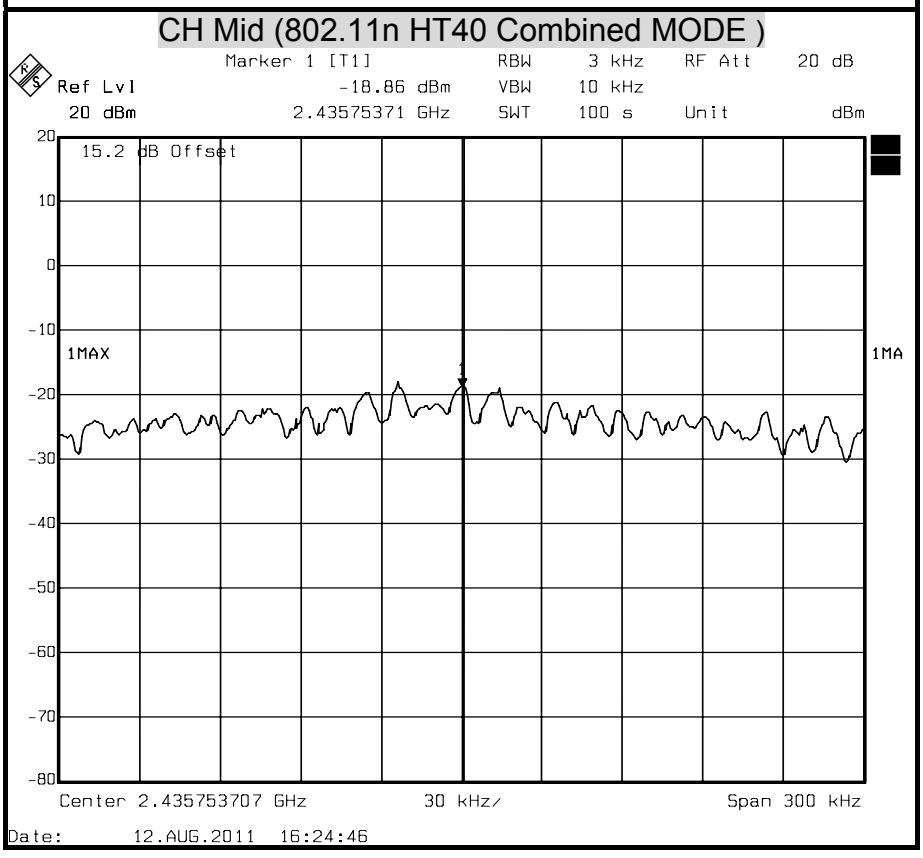

CH High (802.11n HT20 Combined MODE)
Marker 1 [T1]
Ref Lvl
20 dBm
-13.57 dBm
2.45982054 GHz
RBW 3 kHz
VBW 10 kHz
SWT 100 s
RF Att 20 dB
Unit dBm
15.2 dB Offset
1MAX
1MA
Center 2.45982024 GHz
30 kHz/
Span 300 kHz
Date: 12.AUG.2011 16:21:47

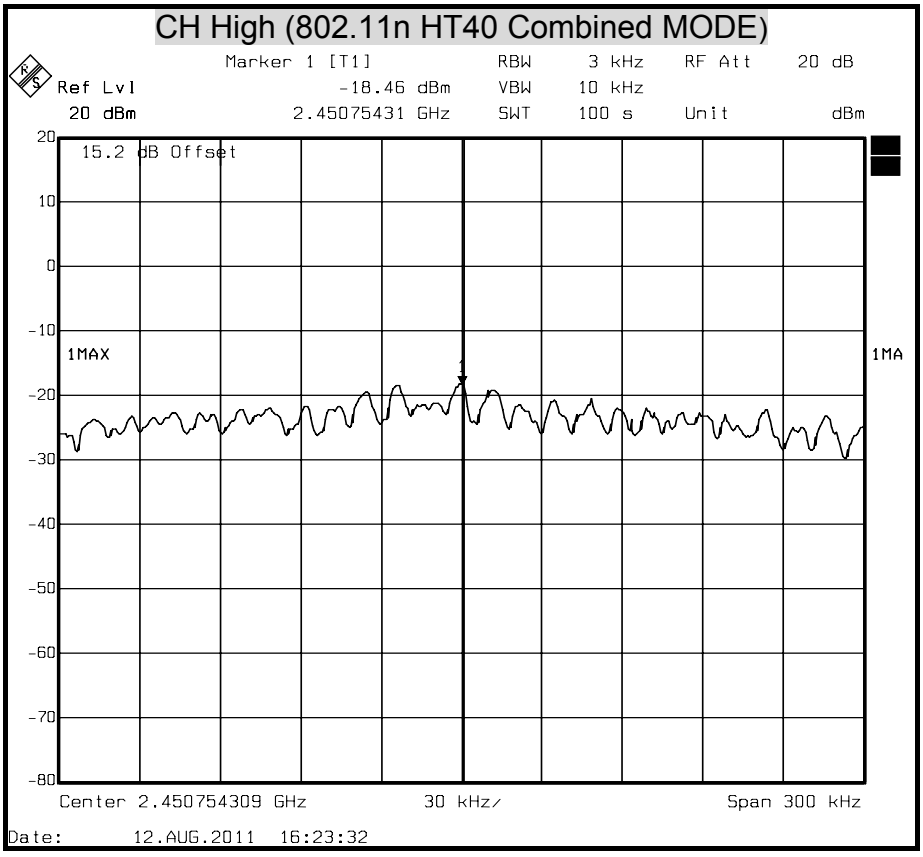
POWER SPECTRAL DENSITY (802.11n HT40 Combined MODE)

CH Low (802.11n HT40 Combined MODE)



CH Mid (802.11n HT40 Combined MODE)




CH High (802.11n HT40 Combined MODE)
Marker 1 [T1]
Ref Lvl
20 dBm
-18.46 dBm
2.45075431 GHz
RBW 3 kHz
VBW 10 kHz
SWT 100 s
RF Att 20 dB
Unit dBm
15.2 dB Offset
1MAX
1MA
Center 2.450754309 GHz
30 kHz/
Span 300 kHz
Date: 12.AUG.2011 16:23:32

8.4 CONDUCTED SPURIOUS EMISSION

LIMITS

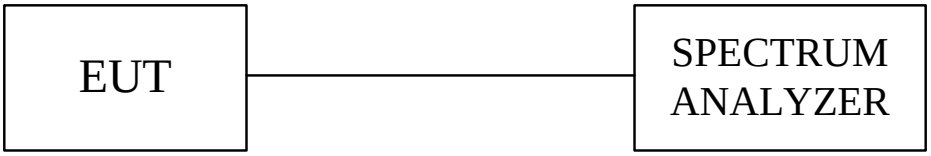
§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the and that contains the highest level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

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

The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

TEST SETUP



TEST RESULTS

No non-compliance noted.

802.11b Mode

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2412	11.7	97.21	108.91	N/A	N/A
2400	11.7	59.02	70.72	88.91	-18.19
2613.12625	11.7	42.12	53.82	88.91	-35.09
6908.81764	11.7	44.98	56.68	88.91	-32.23

CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2437	11.7	98.22	109.92	N/A	N/A
2400	11.7	41.67	53.37	89.92	-36.55
2190.54108	11.7	40.82	52.52	89.92	-37.40
6955.91182	11.7	43.96	55.66	89.92	-34.26

CH High

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2462	11.7	98.85	110.55	N/A	N/A
2400	11.7	41.05	52.75	90.55	-37.80
1672.72545	11.7	41.31	53.01	90.55	-37.54
6908.81764	11.7	44.87	56.57	90.55	-33.98

802.11g Mode

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2412	11.7	90.92	102.62	N/A	N/A
2400	11.7	60.55	72.25	82.62	-10.37
1976.27255	11.7	40.91	52.61	82.62	-30.01
6955.91182	11.7	45.16	56.86	82.62	-25.76

CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2437	11.7	91.56	103.26	N/A	N/A
2400	11.7	39.80	51.5	83.26	-31.76
1583.44689	11.7	41.00	52.7	83.26	-30.56
6955.91182	11.7	45.09	56.79	83.26	-26.47

CH High

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2462	11.7	92.44	104.14	N/A	N/A
2400	11.7	40.50	52.2	84.14	-31.94
2833.34669	11.7	41.80	53.5	84.14	-30.64
6908.81764	11.7	44.90	56.6	84.14	-27.54

802.11n HT20 Mode Chain 0

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2412	11.7	89.08	100.78	N/A	N/A
2400	11.7	58.53	70.23	80.78	-10.55
1892.94589	11.7	41.04	52.74	80.78	-28.04
6720.44088	11.7	44.97	56.67	80.78	-24.11

CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2437	11.7	89.14	100.84	N/A	N/A
2400	11.7	39.98	51.68	80.84	-29.16
637.0941884	11.7	39.98	51.68	80.84	-29.16
6861.72345	11.7	45.70	57.4	80.84	-23.44

CH High

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2462	11.7	89.65	101.35	N/A	N/A
2400	11.7	41.38	53.08	81.35	-28.27
2910.72144	11.7	40.84	52.54	81.35	-28.81
6673.34669	11.7	45.60	57.3	81.35	-24.05

802.11n HT20 Mode Chain 1

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2412	11.7	90.08	101.78	N/A	N/A
2400	11.7	60.55	72.25	81.78	-9.53
1547.73547	11.7	41.02	52.72	81.78	-29.06
6673.34669	11.7	44.29	55.99	81.78	-25.79

CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2437	11.7	90.92	102.62	N/A	N/A
2400	11.7	40.63	52.33	82.62	-30.29
1256.09218	11.7	40.62	52.32	82.62	-30.30
6673.34669	11.7	44.12	55.82	82.62	-26.80

CH High

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2462	11.7	91.10	102.8	N/A	N/A
2400	11.7	40.52	52.22	82.80	-30.58
2232.20441	11.7	41.55	53.25	82.80	-29.55
6955.91182	11.7	44.91	56.61	82.80	-26.19

802.11n HT40 Mode Chain 0

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2422	11.7	84.25	95.95	N/A	N/A
2400	11.7	57.08	68.78	75.95	-7.17
1571.54309	11.7	40.97	52.67	75.95	-23.28
6673.34669	11.7	44.55	56.25	75.95	-19.70

CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2437	11.7	84.29	95.99	N/A	N/A
2400	11.7	42.46	54.16	75.99	-21.83
2625.03006	11.7	41.54	53.24	75.99	-22.75
6626.25251	11.7	44.42	56.12	75.99	-19.87

CH High

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2452	11.7	84.52	96.22	N/A	N/A
2400	11.7	39.28	50.98	76.22	-25.24
1946.51303	11.7	41.28	52.98	76.22	-23.24
6673.34669	11.7	44.30	56	76.22	-20.22

802.11n HT40 Mode Chain 1

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2422	11.7	87.33	99.03	N/A	N/A
2400	11.7	57.47	69.17	79.03	-9.86
1714.38878	11.7	40.78	52.48	79.03	-26.55
6955.91182	11.7	45.92	57.62	79.03	-21.41

CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2437	11.7	87.14	98.84	N/A	N/A
2400	11.7	42.05	53.75	78.84	-25.09
1875.09018	11.7	41.11	52.81	78.84	-26.03
6955.91182	11.7	44.57	56.27	78.84	-22.57

CH High

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2452	11.7	87.93	99.63	N/A	N/A
2400	11.7	40.52	52.22	79.63	-27.41
1339.41884	11.7	41.39	53.09	79.63	-26.54
6955.91182	11.7	44.62	56.32	79.63	-23.31

802.11n HT20 Combined Mode

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2412	15.2	91.87	107.07	N/A	N/A
2400	15.2	61.71	76.91	87.07	-10.16
125.2304609	15.2	40.08	55.28	87.07	-31.79
6579.15832	15.2	44.79	59.99	87.07	-27.08

CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2437	15.2	91.19	106.39	N/A	N/A
2400	15.2	40.29	55.49	86.39	-30.90
1351.32265	15.2	40.10	55.3	86.39	-31.09
6955.91182	15.2	44.42	59.62	86.39	-26.77

CH High

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2462	15.2	92.65	107.85	N/A	N/A
2400	15.2	41.07	56.27	87.85	-31.58
89.51903808	15.2	40.66	55.86	87.85	-31.99
6955.91182	15.2	46.51	61.71	87.85	-26.14

802.11n HT40 Combined Mode

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2422	15.2	87.69	102.89	N/A	N/A
2400	15.2	57.67	72.87	82.89	-10.02
89.51903808	15.2	41.22	56.42	82.89	-26.47
6720.44088	15.2	45.46	60.66	82.89	-22.23

CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2437	15.2	87.82	103.02	N/A	N/A
2400	15.2	43.98	59.18	83.02	-23.84
89.51903808	15.2	41.63	56.83	83.02	-26.19
6626.25251	15.2	43.92	59.12	83.02	-23.90

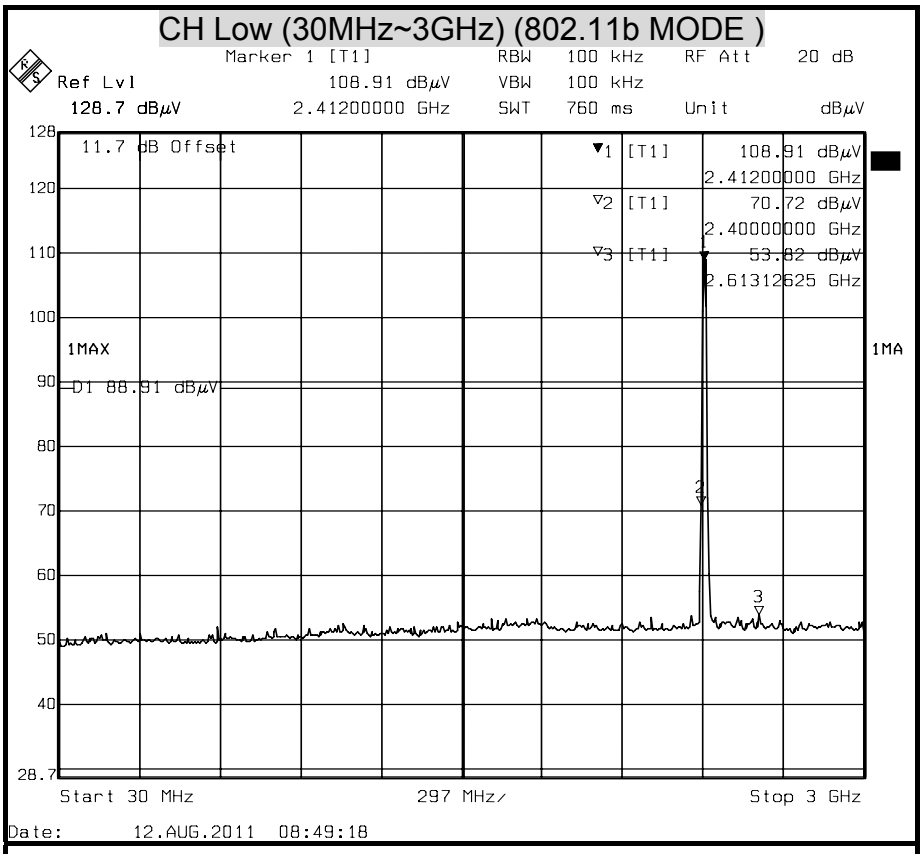
CH High

Frequency (MHz)	Offset (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)
2452	15.2	88.23	103.43	N/A	N/A
2400	15.2	39.22	54.42	83.43	-29.01
1256.09218	15.2	40.55	55.75	83.43	-27.68
6579.15832	15.2	44.18	59.38	83.43	-24.05

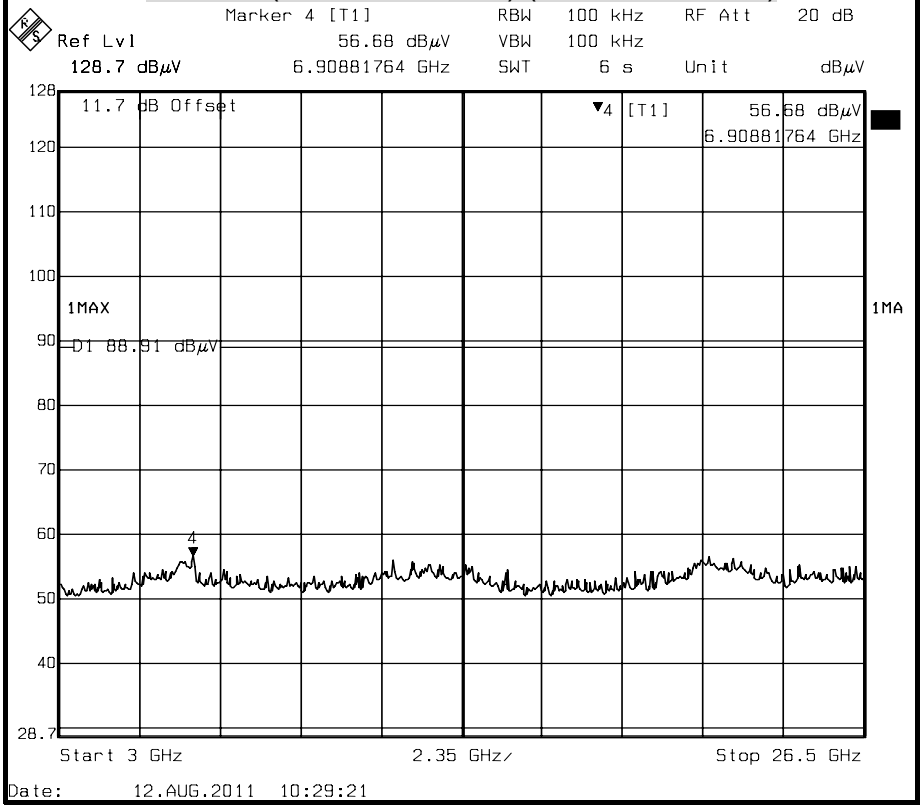
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(IEEE 802.11b MODE)

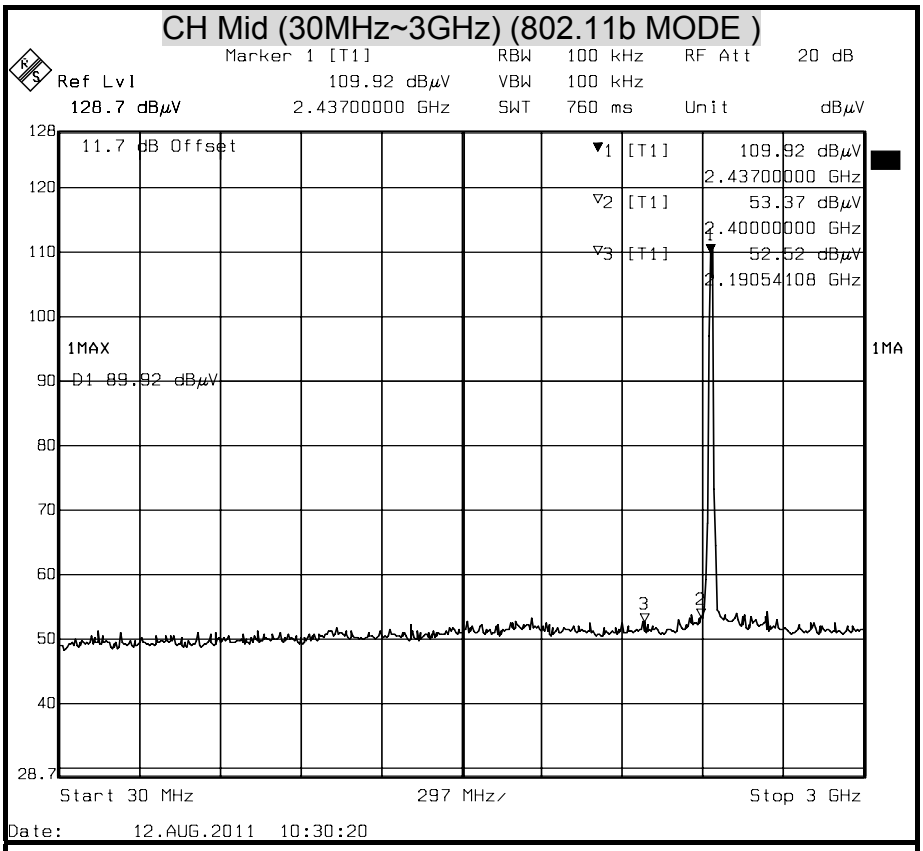
CH Low (30MHz~3GHz) (802.11b MODE)



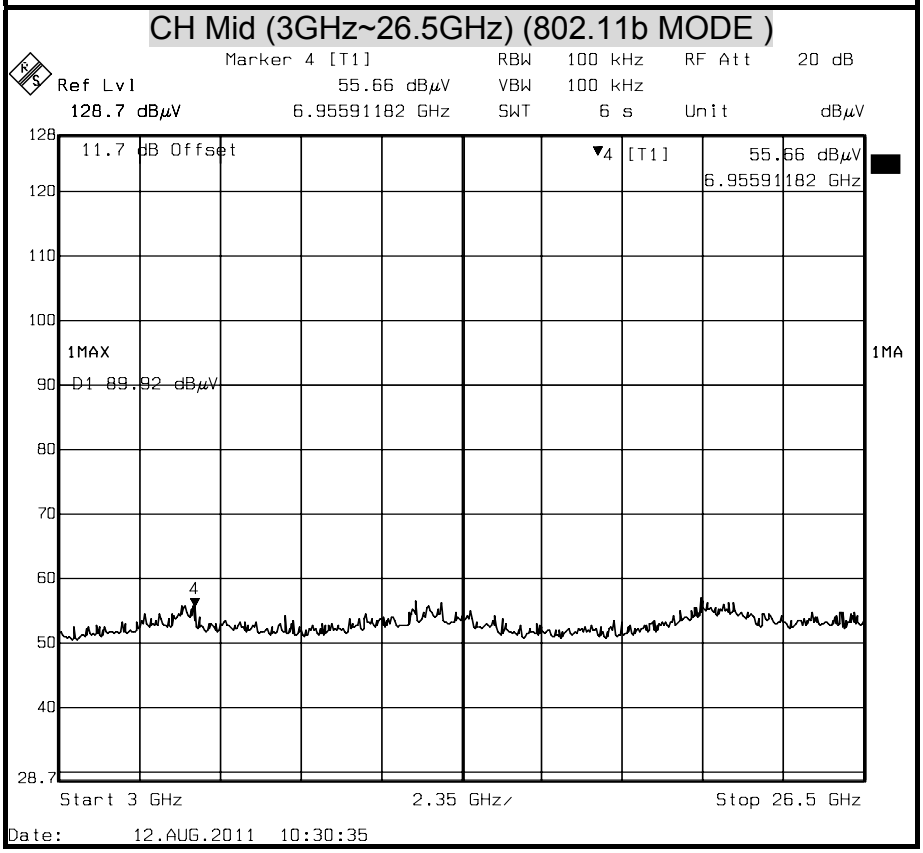
CH Low (3GHz~26.5GHz) (802.11b MODE)



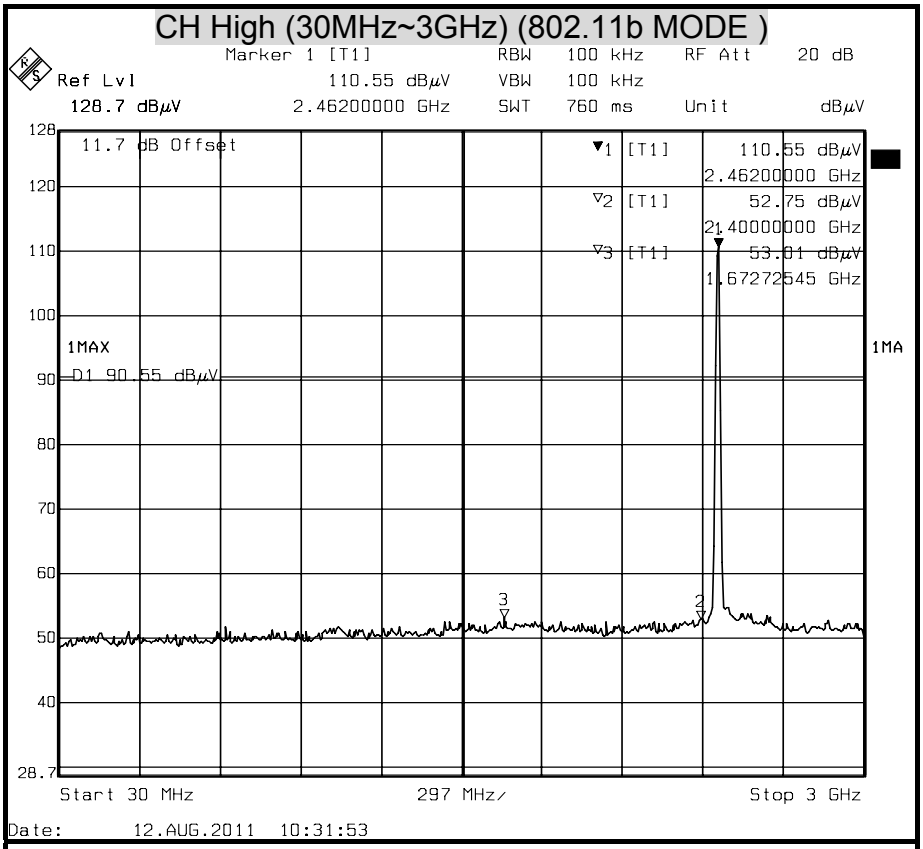
CH Mid (30MHz~3GHz) (802.11b MODE)



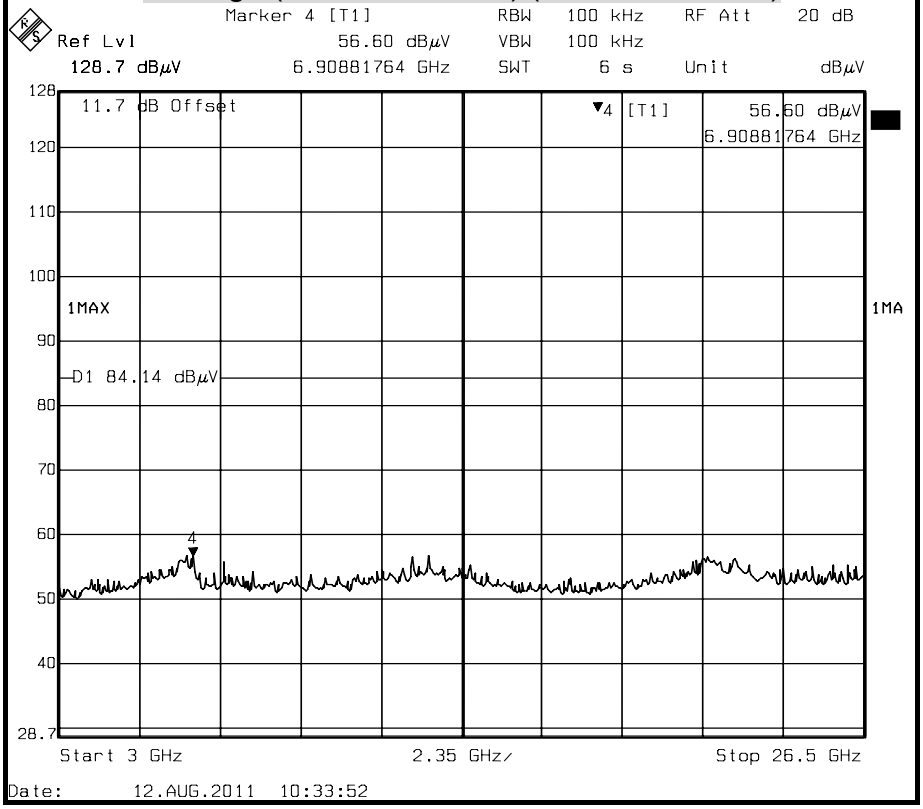
CH Mid (3GHz~26.5GHz) (802.11b MODE)



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



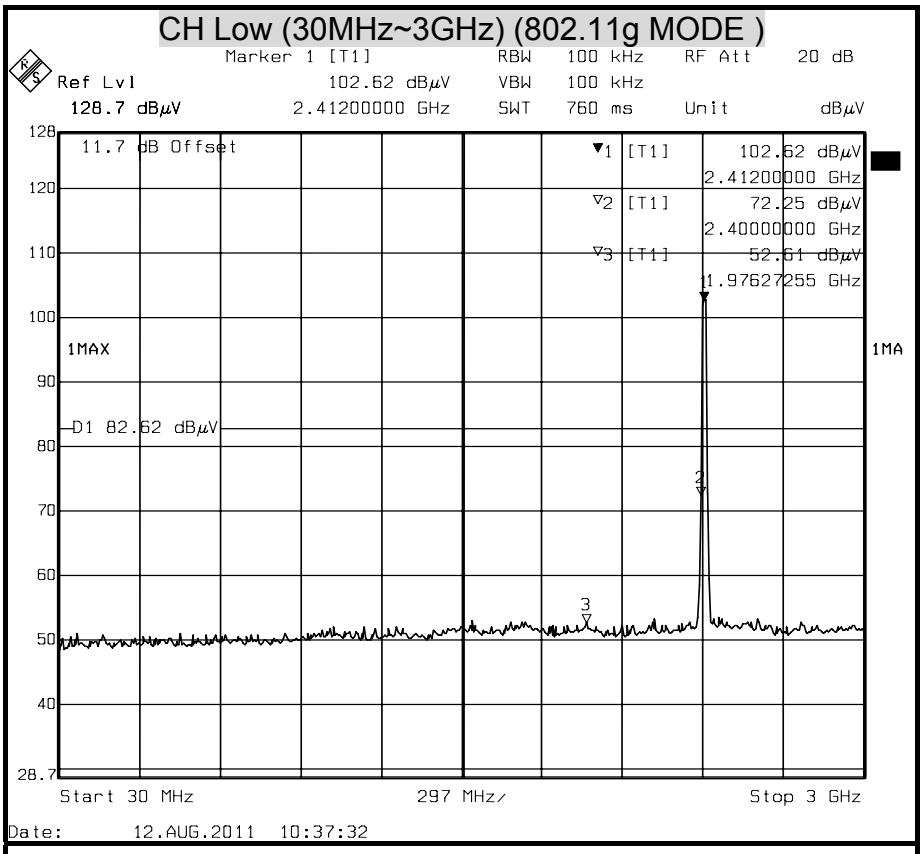
CH High (3GHz~26.5GHz) (802.11b MODE)



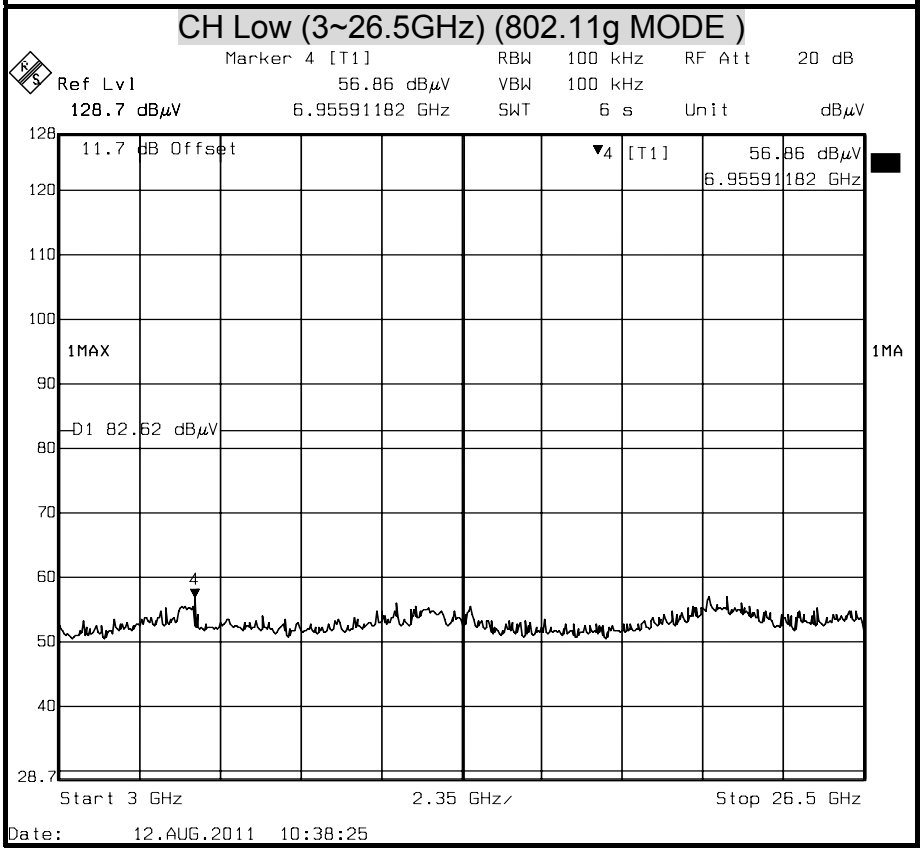
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(802.11g MODE)

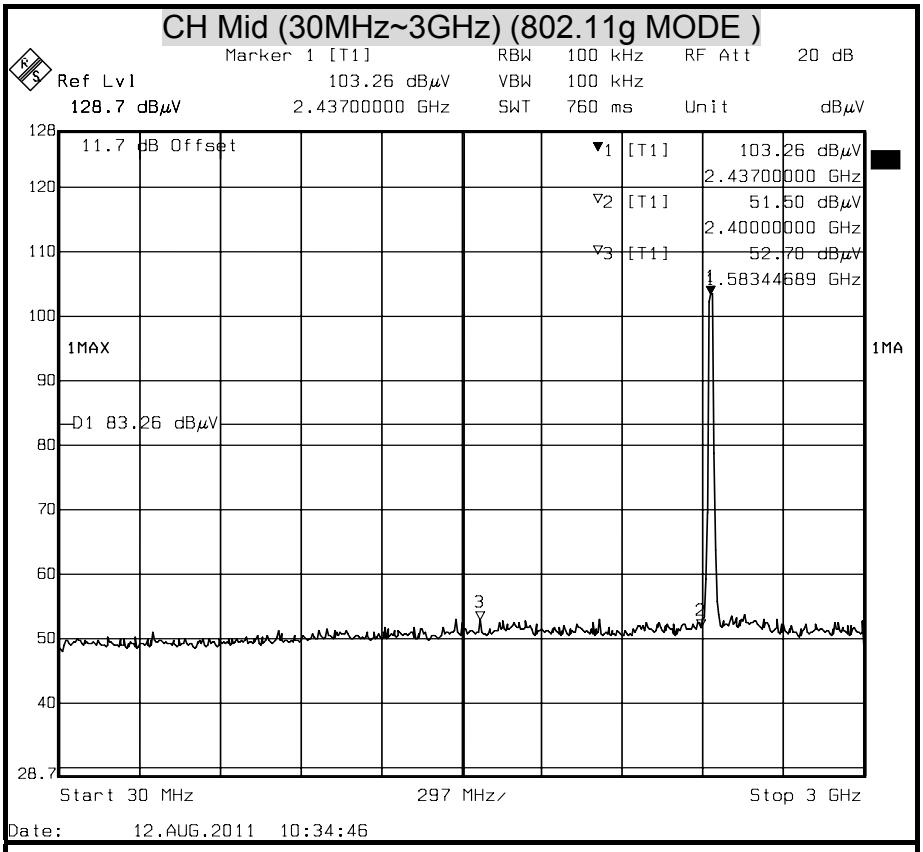
CH Low (30MHz~3GHz) (802.11g MODE)



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



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



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