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

TEST REPORT

For

11n Download Server Router

Model Number: CDR-905

Brand Name: CNet

Issued for

CNet Technology Inc.

No. 15, Park Avenue II, Hsinchu Science Park, Hsin-Chu City, Taiwan, R.O.C.

Issued by

Compliance Certification Services Inc.
Tainan Lab.
No. 8, Jiu Cheng Ling, Jiaokeng Village,Sinhua Township, Tainan Hsien 712, Taiwan R.O.C.
TEL: 886-6-580-2201
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REVISION HISTORY

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		January 22, 2009		Initial Issue	ALL	Leah Peng

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1. TEST REPORT CERTIFICATION

Applicant	: CNet Technology Inc.
Address	: No. 15, Park Avenue II, Hsinchu Science Park, Hsin-Chu City, Taiwan, R.O.C.
Manufacture	: CNet Technology Inc.
Address	: No. 15, Park Avenue II, Hsinchu Science Park, Hsin-Chu City, Taiwan, R.O.C.
Equipment Under Test	: 11n Download Server Router
Model Number	: CDR-905
Brand Name	: CNet
Date of Test	: January 7, 2009 ~ January 15, 2009

APPLICABLE STANDARD	
STANDARD	**TEST RESULT**
FCC Part 15 Subpart C : 2006 AND ANSI C63.4 : 2003	No non-compliance noted

Approved by:

Jeter Wu
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Eric Yang
Senior Engineer
Compliance Certification Services Inc.

2. EUT DESCRIPTION

2.1 DESCRIPTION OF EUT & POWER

Product Name	11n Download Server Router
Model Number	CDR-905
Brand Name	CNet
Frequency Range	IEEE 802.11b/g, 802.11n HT20 (DTS Band):2412MHz～2462MHz IEEE 802.11n HT40 (DTS Band):2422MHz～2452MHz
Transmit Power (ERP)	IEEE 802.11b Mode : 16.14dBm (DTS Band) (41.115 mW) IEEE 802.11g Mode : 15.84dBm (DTS Band) (38.371 mW) IEEE 802.11n HT20 Mode : 16.09dBm (DTS Band) (40.644 mW) IEEE 802.11n HT40 Mode : 16.02dBm (DTS Band) (39.994 mW)
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, 1Mbps
	IEEE 802.11g : 54, 48 ,36, 24, 18, 12, 11, 9, 6Mbps
	IEEE 802.11n HT20 : 150 Mbps
	IEEE 802.11n HT40 : 300 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 antennas Model: WSS006 Connector: RP-SMA(M)(Silver) Type: Dipole Antenna Gain: 2.27 dBi
Power source	Powered from adapter **Adapter (1):** AMIGO I.T.E. POWER SUPPLY Model: AMS2-0501500FU Input: 100-240Vac, 50/60Hz, 0.5A Output: 5Vdc, 1.5A **Adapter (2):** LB I.T.E. POWER SUPPLY Model: M2-12USG05R-A Input: 100-240Vac, 0.5A, 50-60Hz Output: 5Vdc, 2.5A
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: **IIOCDR-905** 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 and External photo of the EUT.
4. To add series models and two iron plates are for business necessary, just for marketing purpose only. The different of the each model is shown as below:

Multiple Listing:

Company Name/ Address	Brand name	Model	Product Name
Without USB port			
E-TOP Network Technology Inc. No. 82, Gongye 2nd Rd., Tainan City 70955, Taiwan, R.O.C.	ETOP	BR760n	11n Broadband Router
Amigo Technology Inc. 1F, No. 333, Sec. 1, Ti-Ding BLVD., NeiHu, Taipei 114, Taiwan	Amigo	BR760n	11n Broadband Router
CNet Technology Inc. No. 15, Park Avenue II, Hsinchu Science Park, Hsin-Chu City, Taiwan, R.O.C.	CNet	CWR-905, WR-905, WR-100N, WR-95N, WR-900N, BR-100N, BR-95N, BR-900N	11n Broadband Router
Sapido Technology Inc. No. 383., Sec. 2, Minsheng Rd., West Central District Tainan 700, Taiwan, R.O.C.	Sapido	RB1402	11n Broadband Router
With USB port			
E-TOP Network Technology Inc. No. 82, Gongye 2nd Rd., Tainan City 70955, Taiwan, R.O.C.	ETOP	DR768n	11n Download Server Router
Amigo Technology Inc. 1F, No. 333, Sec. 1, Ti-Ding BLVD., NeiHu, Taipei 114, Taiwan	Amigo	DR768n	11n Download Server Router
CNet Technology Inc. No. 15, Park Avenue II, Hsinchu Science Park, Hsin-Chu City, Taiwan, R.O.C.	CNet	CDR-905, DR-905, DR-100N, DR-95N, DR-900N	11n Download Server Router
Sapido Technology Inc. No. 383., Sec. 2, Minsheng Rd., West Central District Tainan 700, Taiwan, R.O.C.	Sapido	WE1412, WE1422, GR1412, GR1422	11n Download Server Router

3. DESCRIPTION OF TEST MODES

The EUT is a 802.11n Download Server Router. It has one transmitter chain and two receiver chain (1x2 configurations). The 1x2 configuration is implemented with one outside chain (Chain 0).

The RF chipset is manufactured by Realtek Technology, Corp.

The antenna peak gain 2.27dBi (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: 11Mbps 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: 6.5Mbps 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.

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2462 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, Jiu Cheng Ling, Jiaokeng Village,Sinhua Township, Tainan Hsien 712, Taiwan R.O.C.

The sites are constructed in conformance with the requirements of ANSI C63.7, 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 and 455173).

5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	455173 TW-1037
Japan	VCCI	3/10 meter Open Area Test Sites and conducted test sites to perform radiated/conducted measurements	C-2882 R-2635
Taiwan	TAF	CISPR 11, FCC METHOD-47 CFR Part 18, EN 55011, CNS 13803, CISPR 14, EN 55014, CNS 13783-1, CISPR 22, EN 55022, VCCI, FCC, Method-47 CFR Part 15 Subpart B, CNS 13438	
Taiwan	BSMI	CNS 13438, CNS 13439, CNS 13783-1	SL2-IN-E-0039 SL2-R1/R2-0039 SL2-A1-E-0039
Canada	Industry Canada	RSS210, Issue 7	IC 2324H-I

* No part of this report may be used to claim or imply product endorsement by TAF or any agency of the US Government.

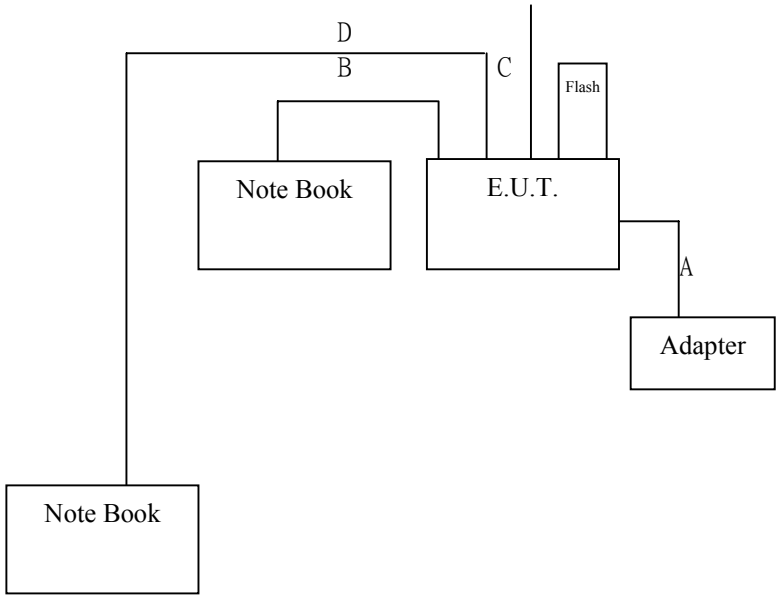
6. CALIBRATION AND UNCERTAINTY

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.

7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT



7.2 SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Note Book	HP	CNS 6000	CNTPP2090	Power cable, unshd, 1.6m
2	Note Book	IBM	ThinkPad2888	DoC	Power cable, unshd, 1.6m
3	USB Disk	Kingston	DPI/512	DoC	N/A (2 pcs.)

No.	Signal cable description	
A	Power Cable	Unshielded, 1.6m, 1 pcs.
B	LAN Cable	Unshielded, 1.6m, 1 pcs.
C	LAN Cable	Unshielded, 1.2m, 3 pcs.
D	LAN Cable	Unshielded, 10m, 1 pcs.

EMARK:

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. Before connecting power press reset key, 10 seconds after transmit power unlock reset key.
2. Enter DOS under the environment of release-V2-0 materials are inserted, carried out batch shelf. Put first.
3. Carry out MP test.exe.
4. Set b/g/n mode, 10n TX/RX, channel bandwidth, data rate, transmit power.
5. Start to test.

(1) **TX Mode:**

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

⇨ **Tx Data Rate: 11Mbps long** (IEEE 802.11b mode ,chain 0 TX)
6Mbps (IEEE 802.11g mode ,chain 0 TX)
6.5Mbps (IEEE 802.11n HT20 mode ,chain 0 TX)
6.5Mbps (IEEE 802.11n HT40 mode, chain 0 TX**)**

Power control mode

Target Power: IEEE 802.11b Channel Low (2412MHz) = **11 (Chain 0)**
IEEE 802.11b Channel Middle (2437MHz) = **11 (Chain 0)**
IEEE 802.11b Channel High (2462MHz) = **11 (Chain 0)**
Target Power: IEEE 802.11g Channel Low (2412MHz) = **11 (Chain 0)**
IEEE 802.11g Channel Middle (2437MHz) = **11 (Chain 0)**
IEEE 802.11g Channel High (2462MHz) = **11(Chain 0)**
Target Power: IEEE 802.11n HT20 Channel Low (2412MHz) = **11 (Chain 0)**
IEEE 802.11 n HT20 Channel Middle (2437MHz) = **11 (Chain 0)**
IEEE 802.11 n HT20 Channel High (2462MHz) = **11 (Chain 0)**
Target Power: IEEE 802.11n HT40 Channel Low (2422MHz) = **11 (Chain 0)**
IEEE 802.11 n HT40 Channel Middle (2437MHz) = **11 (Chain 0)**
IEEE 802.11 n HT40 Channel High (2452MHz) = **11 (Chain 0)**

(2) **RX Mode**：

Start RX

5. All of the function are under run.
6. 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)
6.. Start test

8. APPLICABLE LIMITS AND TEST RESULTS

8.1 6DB BANDWIDTH

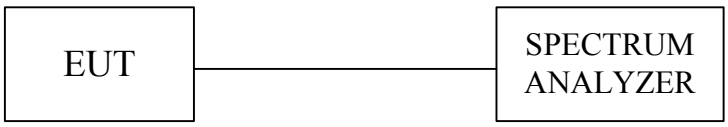
LIMIT

§ 15.207(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	FSEM	829054/017	APR. 14, 2009

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 (One TX)

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	10120	500	PASS
Middle	2437	10115	500	PASS
High	2462	10114	500	PASS

NOTE : 1. At finial test to get the worst-case emission at11Mbps.
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)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	16633	500	PASS
Middle	2437	16643	500	PASS
High	2462	16638	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 (One TX)

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	17835	500	PASS
Middle	2437	17829	500	PASS
High	2462	17833	500	PASS

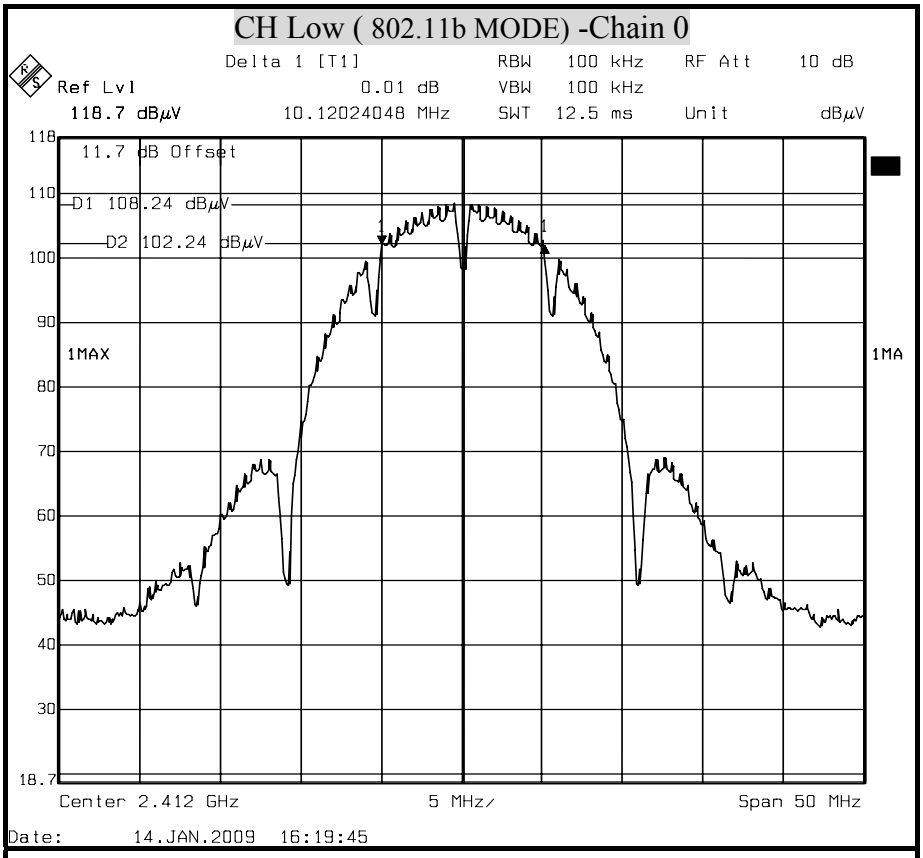
NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

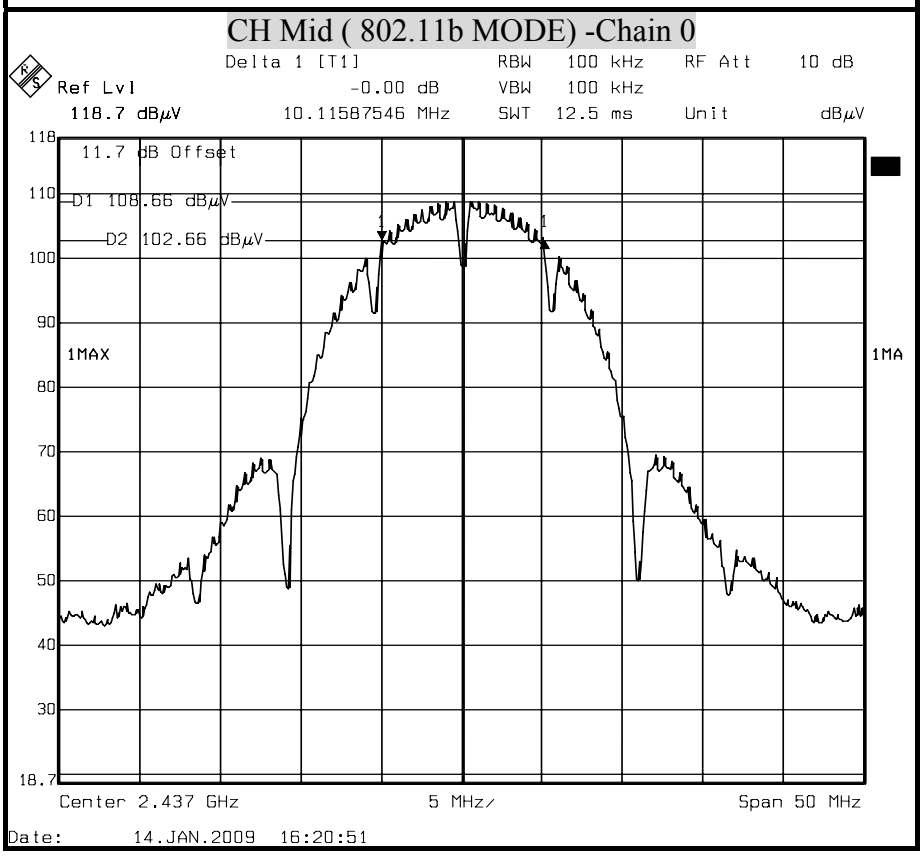
IEEE 802.11n HT40 mode (One TX)

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2422	36472	500	PASS
Middle	2437	36482	500	PASS
High	2452	36474	500	PASS

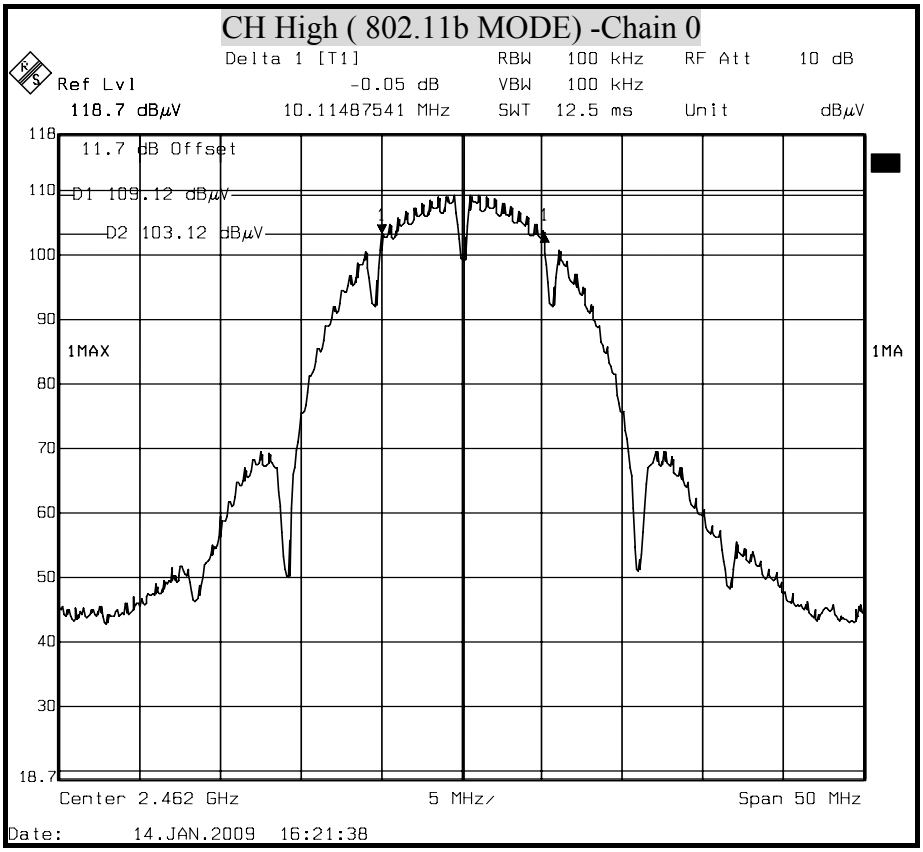
NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

6dB BANDWIDTH (802.11b MODE)

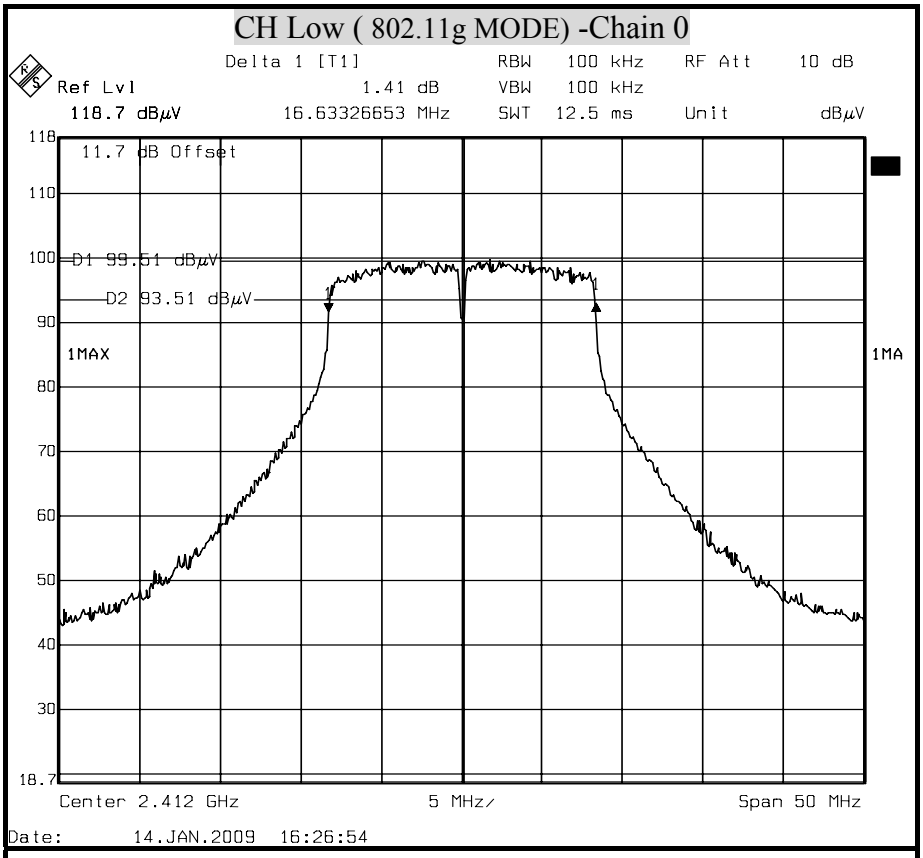


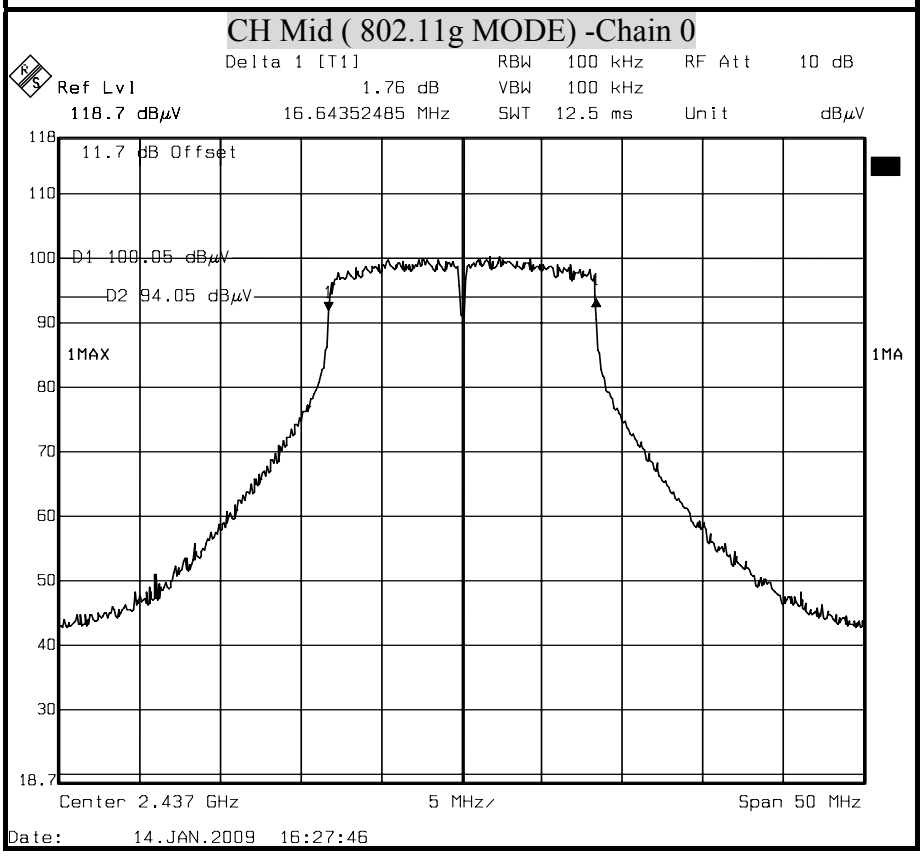


CH High (802.11b MODE) -Chain 0

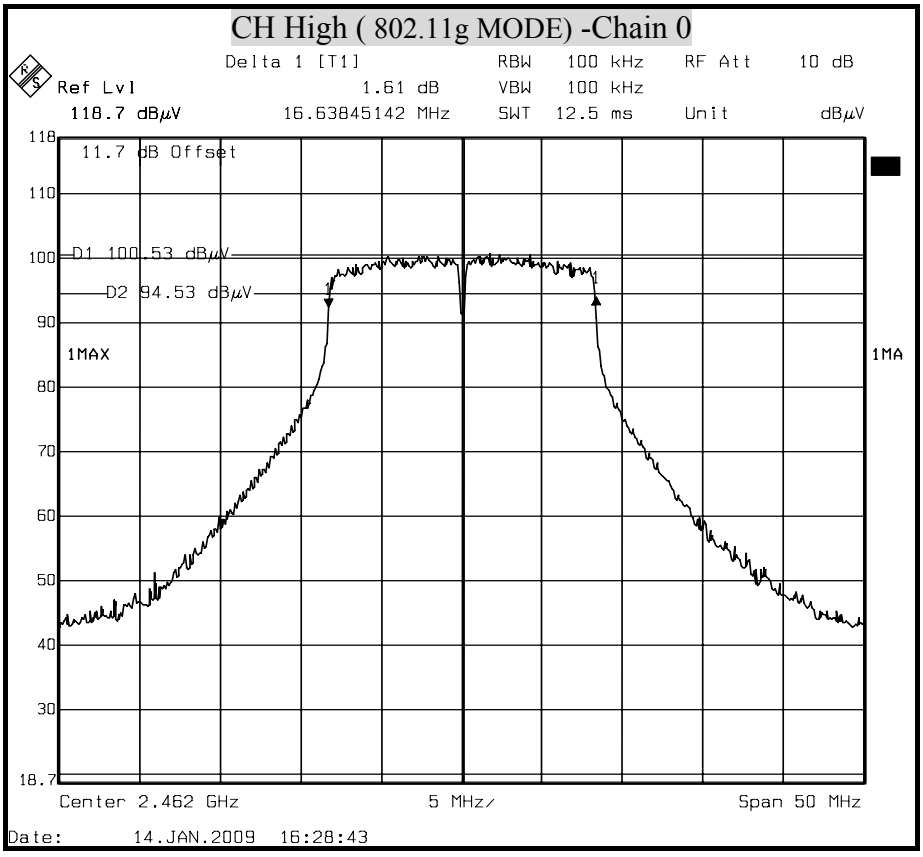


6dB BANDWIDTH (802.11g MODE)



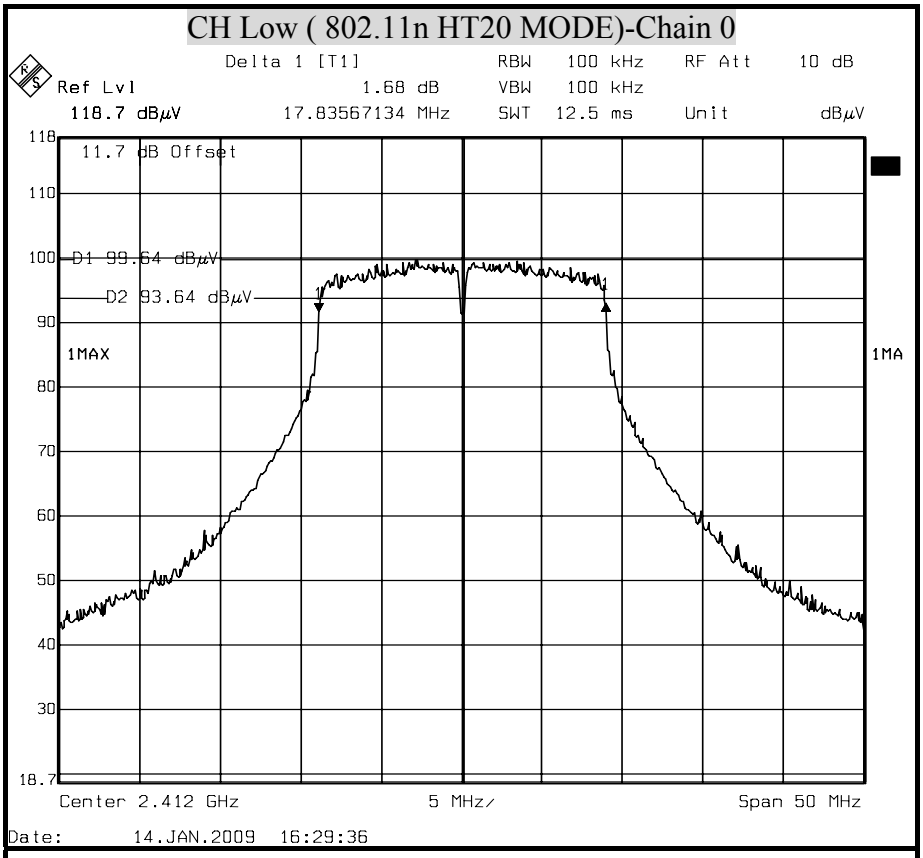


CH High (802.11g MODE) -Chain 0

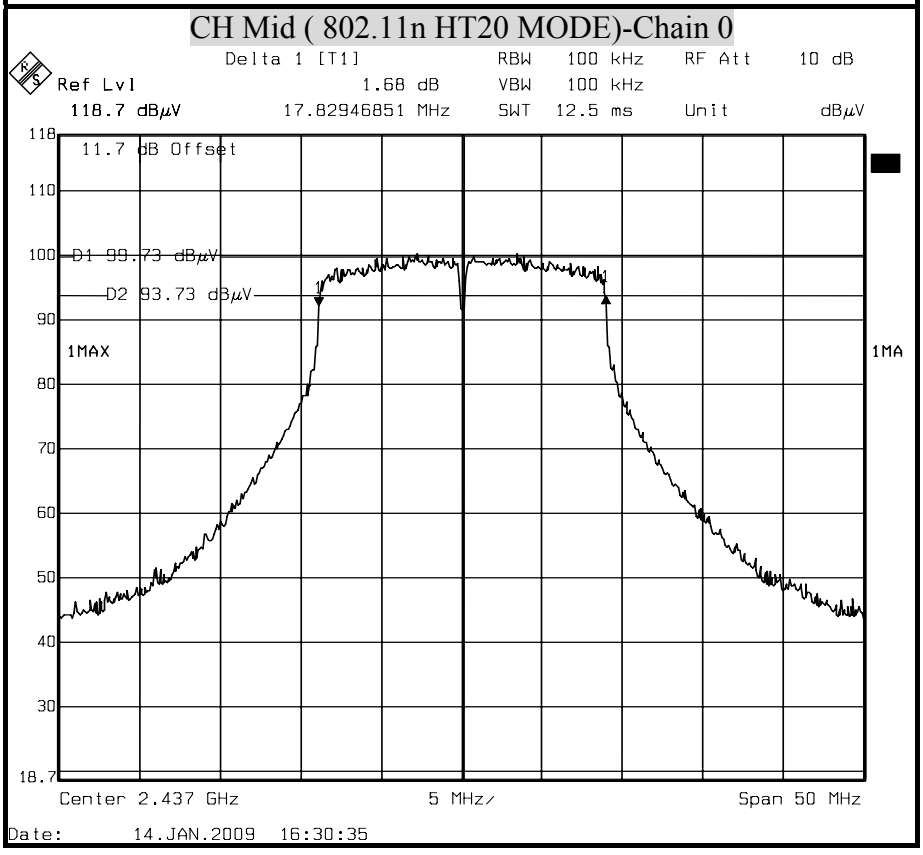


6dB BANDWIDTH (802.11n HT20 MODE)

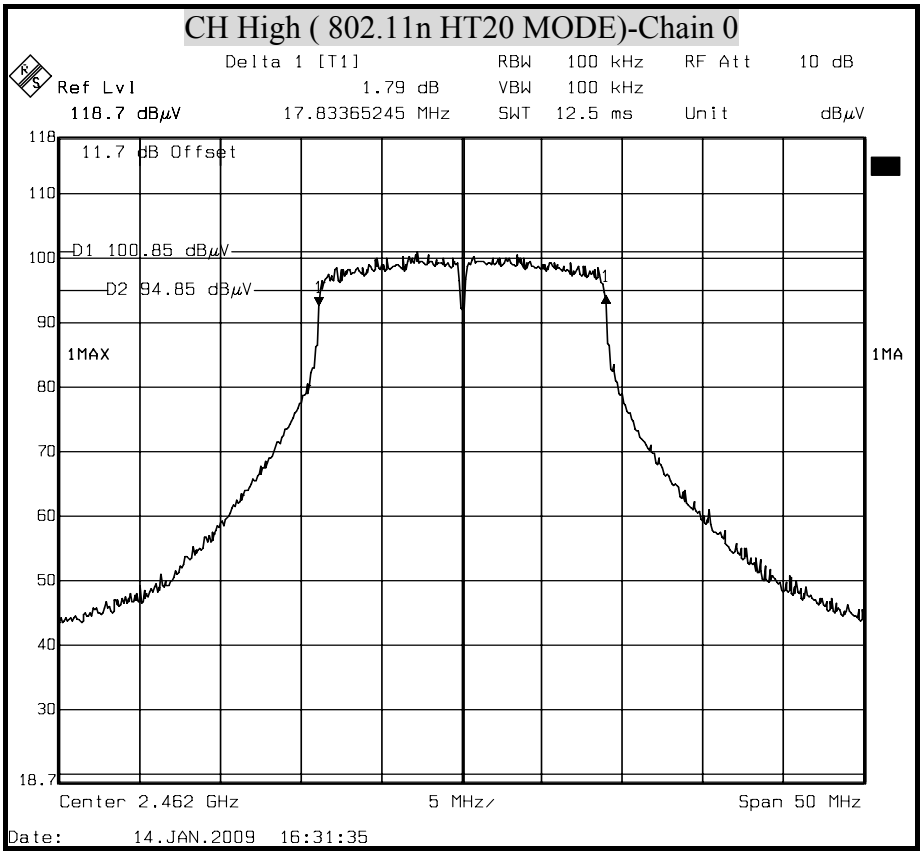
CH Low (802.11n HT20 MODE)-Chain 0



CH Mid (802.11n HT20 MODE)-Chain 0

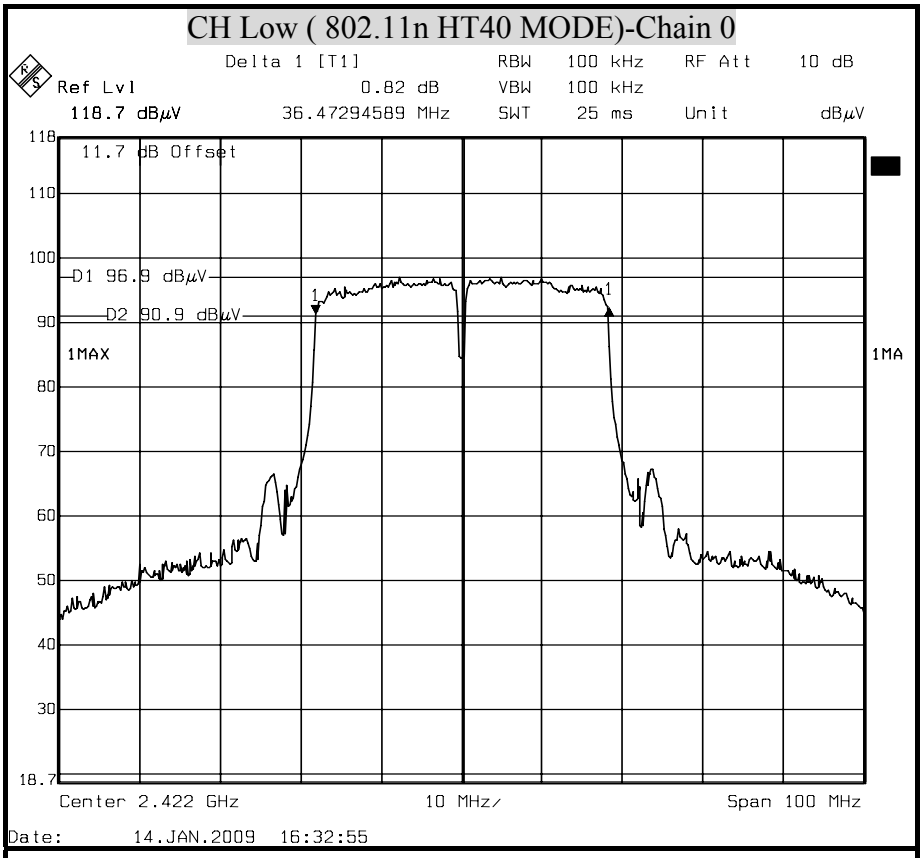


CH High (802.11n HT20 MODE)-Chain 0

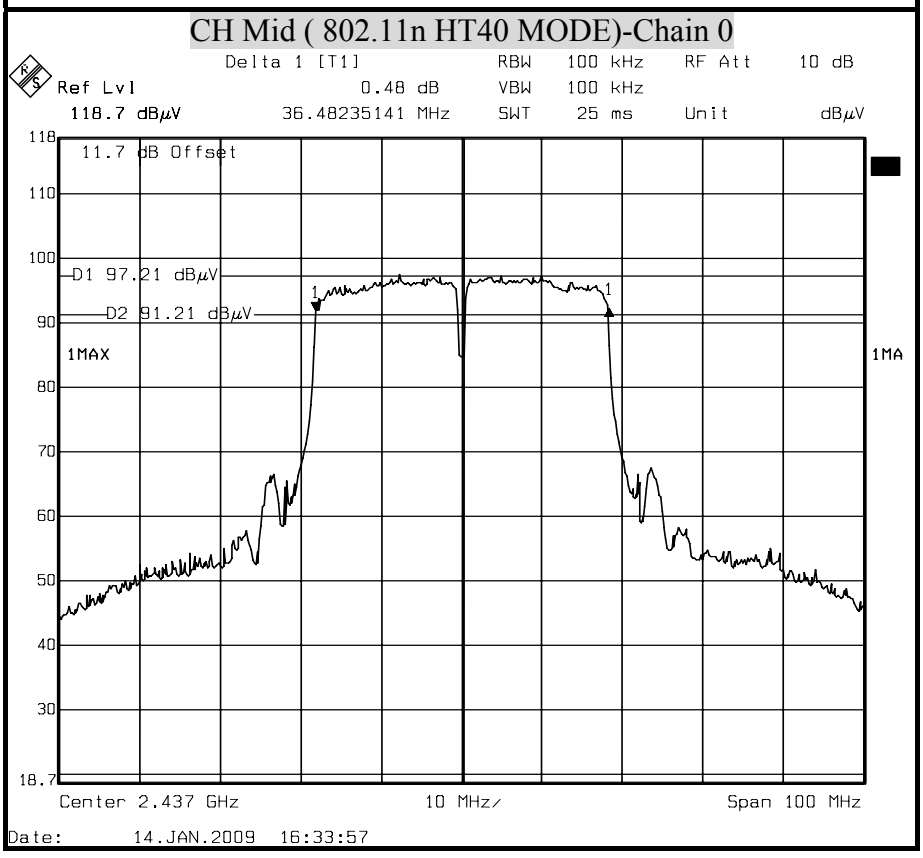


6dB BANDWIDTH (802.11n HT40 MODE)

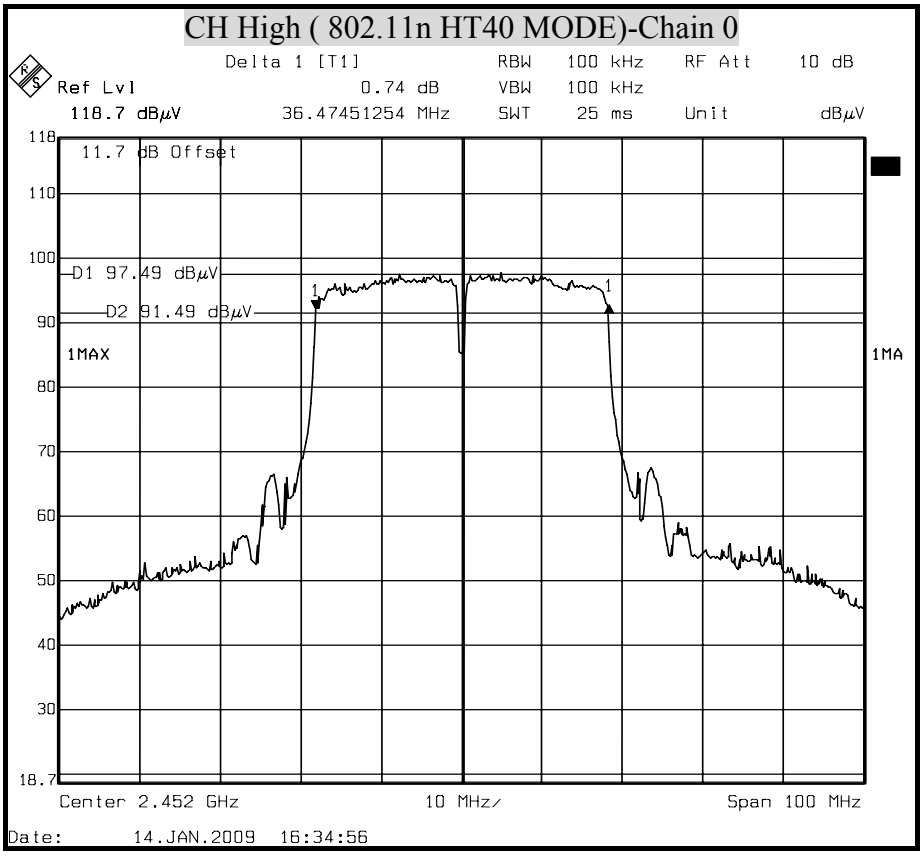
CH Low (802.11n HT40 MODE)-Chain 0



CH Mid (802.11n HT40 MODE)-Chain 0



CH High (802.11n HT40 MODE)-Chain 0



8.2 99% BANDWIDTH

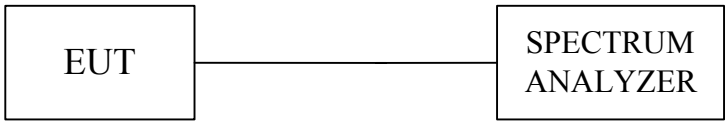
LIMIT

None for reporting purposes only.

TEST EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEM	829054/017	APR. 14, 2009

TEST SETUP



TEST PROCEDURE

1. The spectrum shall be set as follows :
   Span : The minimum span to fully display the emission and approximately 20dB below peak level.
   RBW : The set to 1% to 3% of the approximate emission width.
2. Compute the combined power of all signal responses contained in the trace by covering all the data points.
3. For 99% occupied BW, place the markers at the frequency at which 0.5% of the power lies to the right of the right marker and 0.5% of the power lies to the left of the left marker.
4. The 99% BW is the bandwidth between the right and left markers.

TEST RESULTS

No non-compliance noted.

IEEE 802.11b mode (One TX)

Channel	Channel Frequency (MHz)	99% Occupied power bandwidth (MHz)
		Chain 0
Low	2412	14.529
Middle	2437	14.529
High	2462	14.529

IEEE 802.11g mode (One TX)

Channel	Channel Frequency (MHz)	99% Occupied power bandwidth (MHz)
		Chain 0
Low	2412	16.833
Middle	2437	16.933
High	2462	16.933

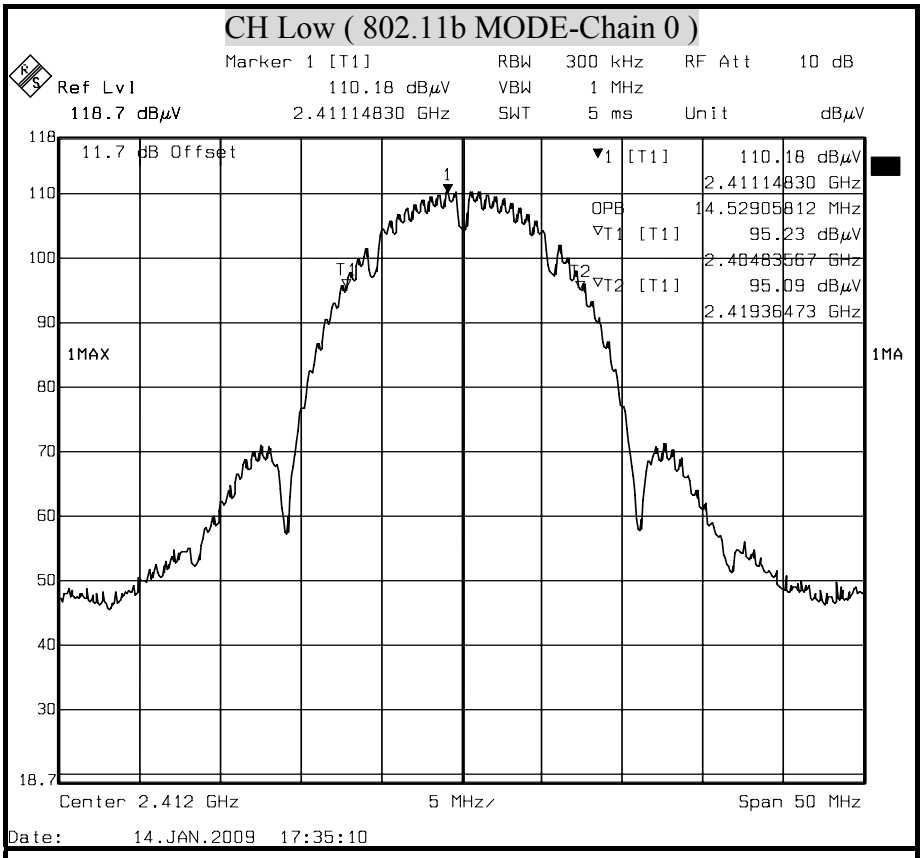
IEEE 802.11n HT20 mode (One TX)

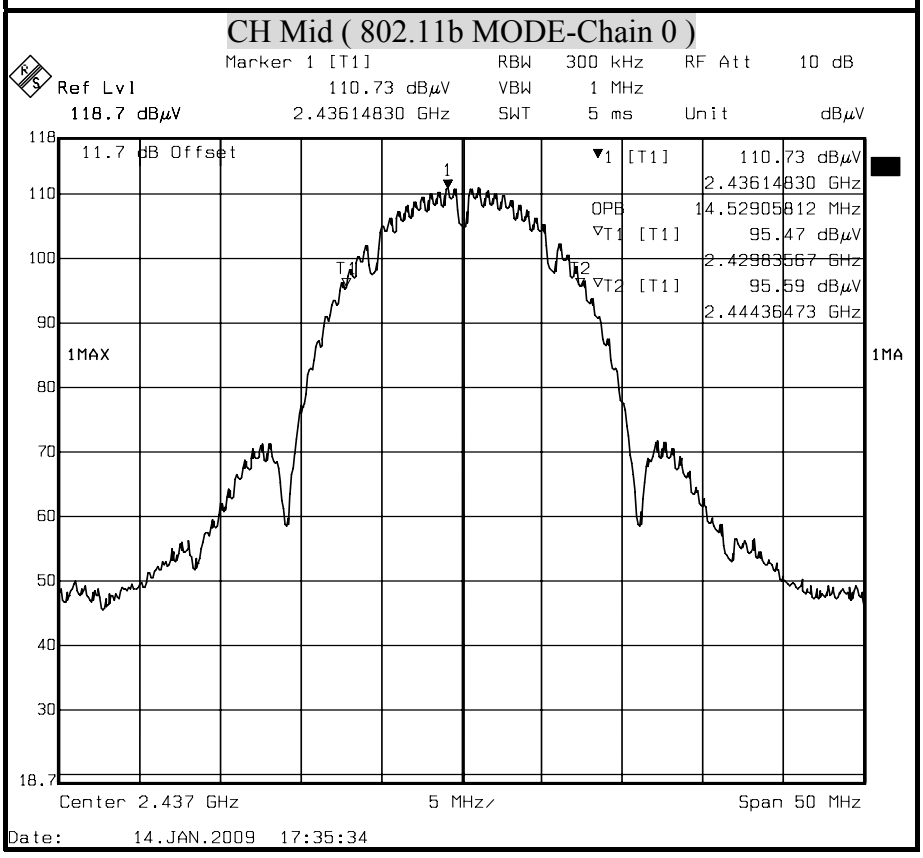
Channel	Channel Frequency (MHz)	99% Occupied power bandwidth (MHz)
		Chain 0
Low	2412	17.935
Middle	2437	17.935
High	2462	17.935

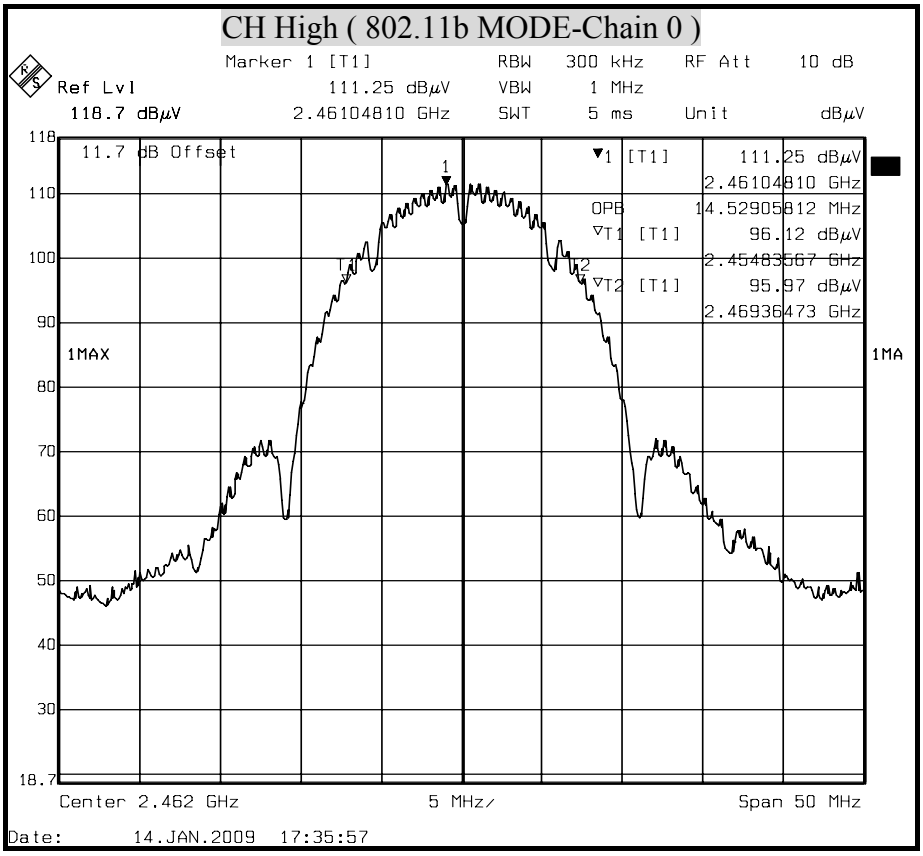
IEEE 802.11n HT40 mode (One TX)

Channel	Channel Frequency (MHz)	99% Occupied power bandwidth (MHz)
		Chain 0
Low	2422	35.871
Middle	2437	35.871
High	2452	35.871

99% BANDWIDTH (802.11b MODE)

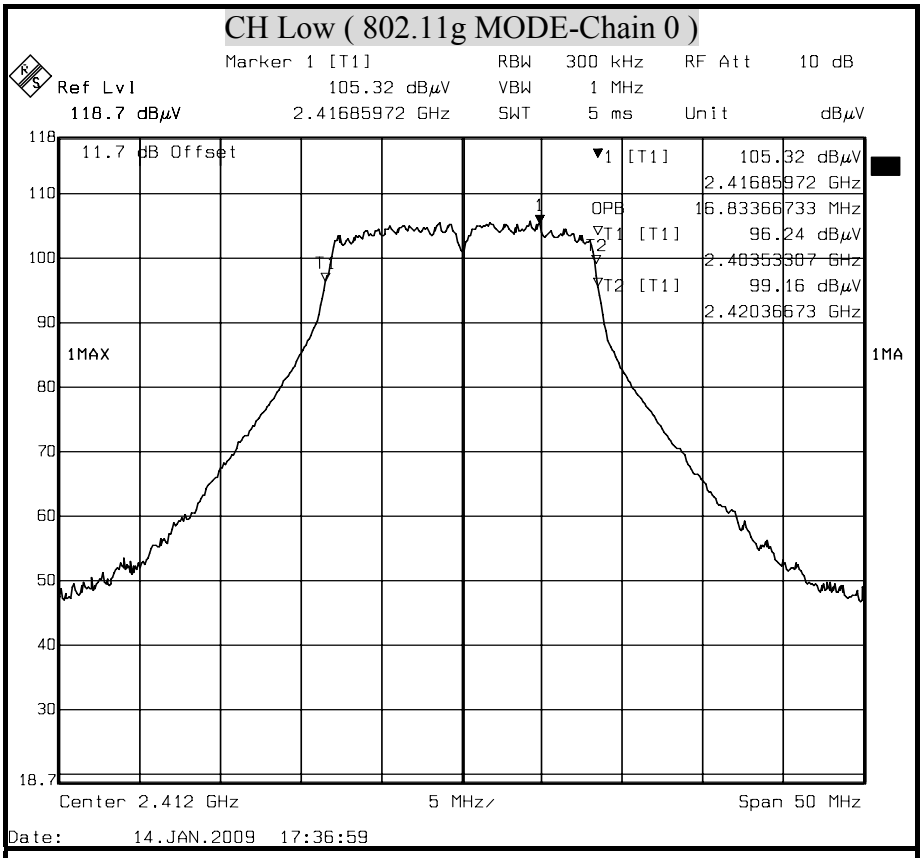




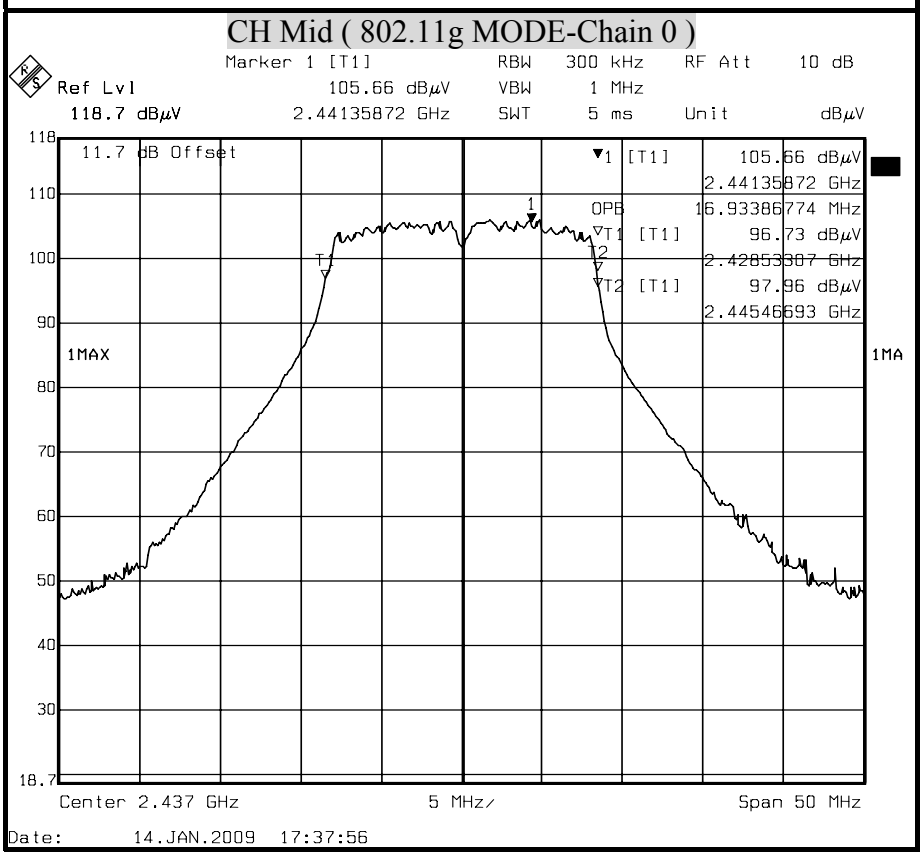

CH High (802.11b MODE-Chain 0)
Marker 1 [T1]
RBW 300 kHz
RF Att 10 dB
Ref Lvl
111.25 dBµV
VBW 1 MHz
118.7 dBµV
2.46104810 GHz
SWT 5 ms
Unit dBµV
11.7 dB Offset
▼1 [T1]
111.25 dBµV
2.46104810 GHz
OPB
14.52905812 MHz
▽T1 [T1]
96.12 dBµV
2.45483567 GHz
▽T2 [T1]
95.97 dBµV
2.46936473 GHz
1MAX
1MA
118
110
100
90
80
70
60
50
40
30
18.7
Center 2.462 GHz
5 MHz/
Span 50 MHz
Date: 14.JAN.2009 17:35:57

99% BANDWIDTH (802.11g MODE)

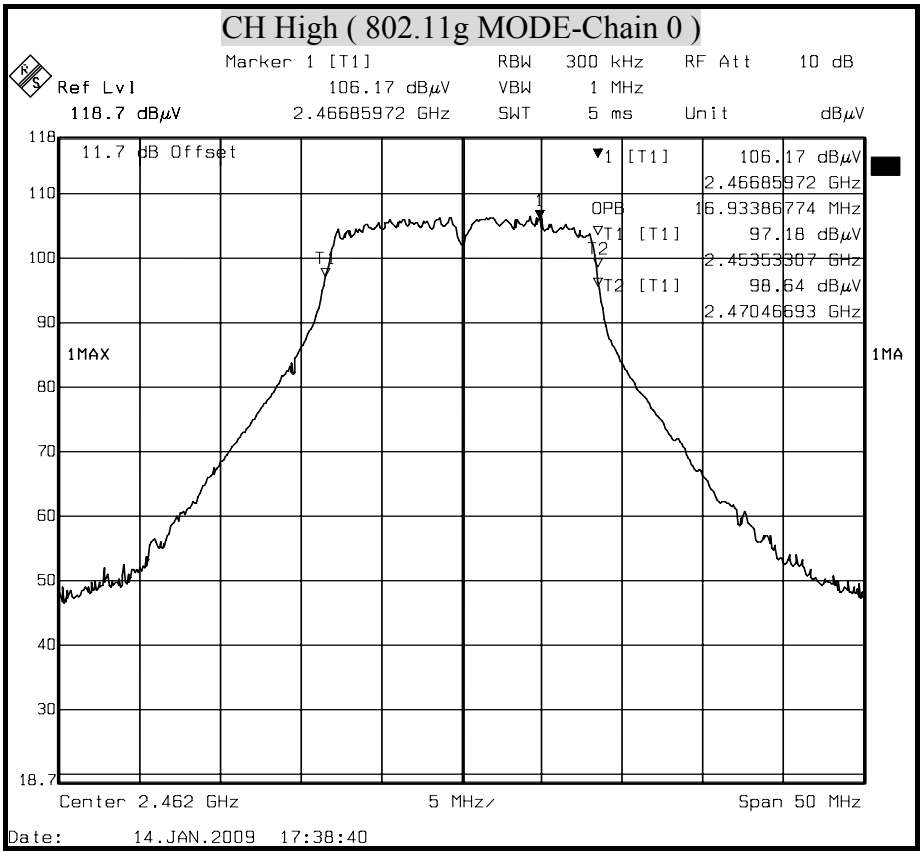
CH Low (802.11g MODE-Chain 0)



CH Mid (802.11g MODE-Chain 0)

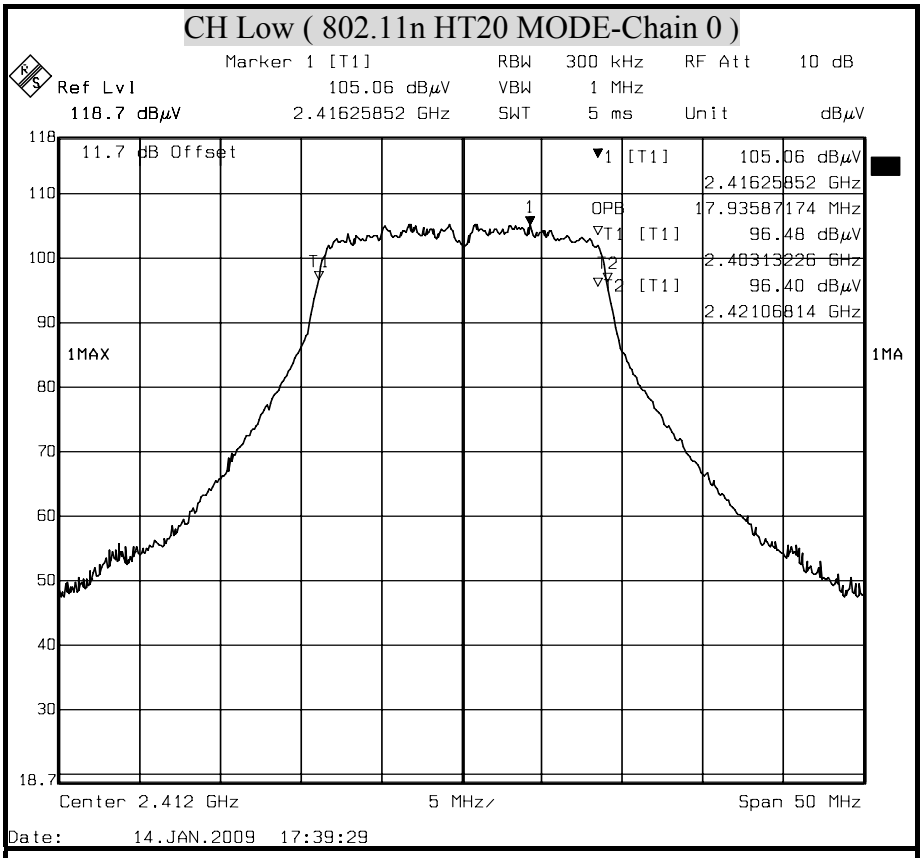


CH High (802.11g MODE-Chain 0)

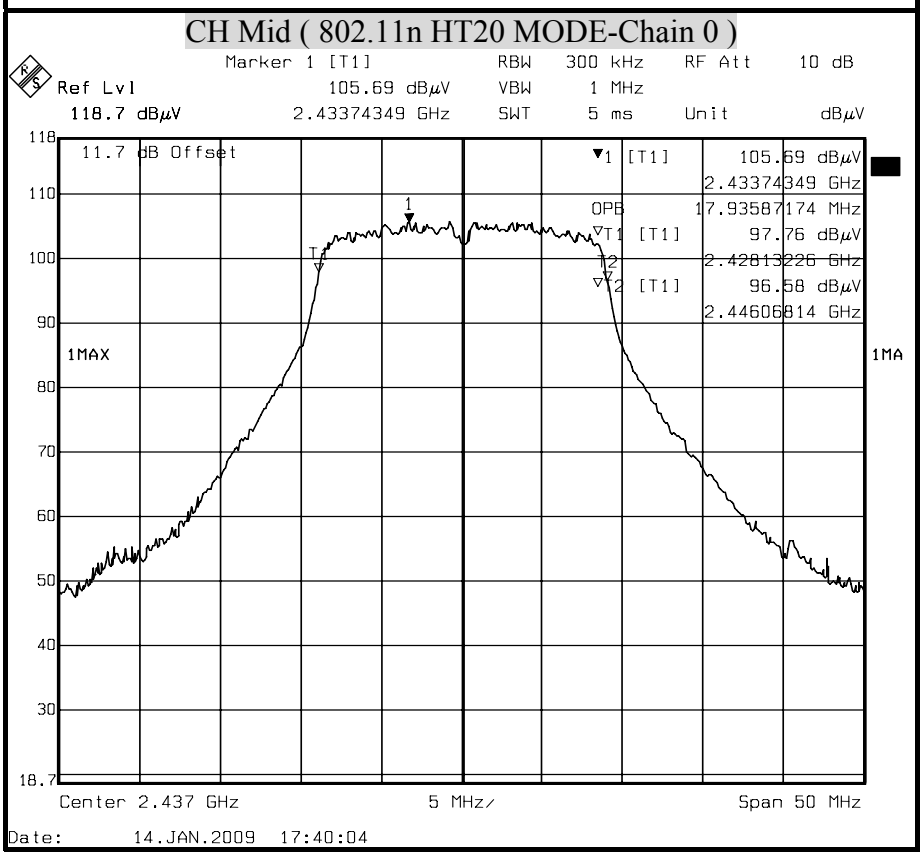


99% BANDWIDTH (802.11n HT20 MODE)

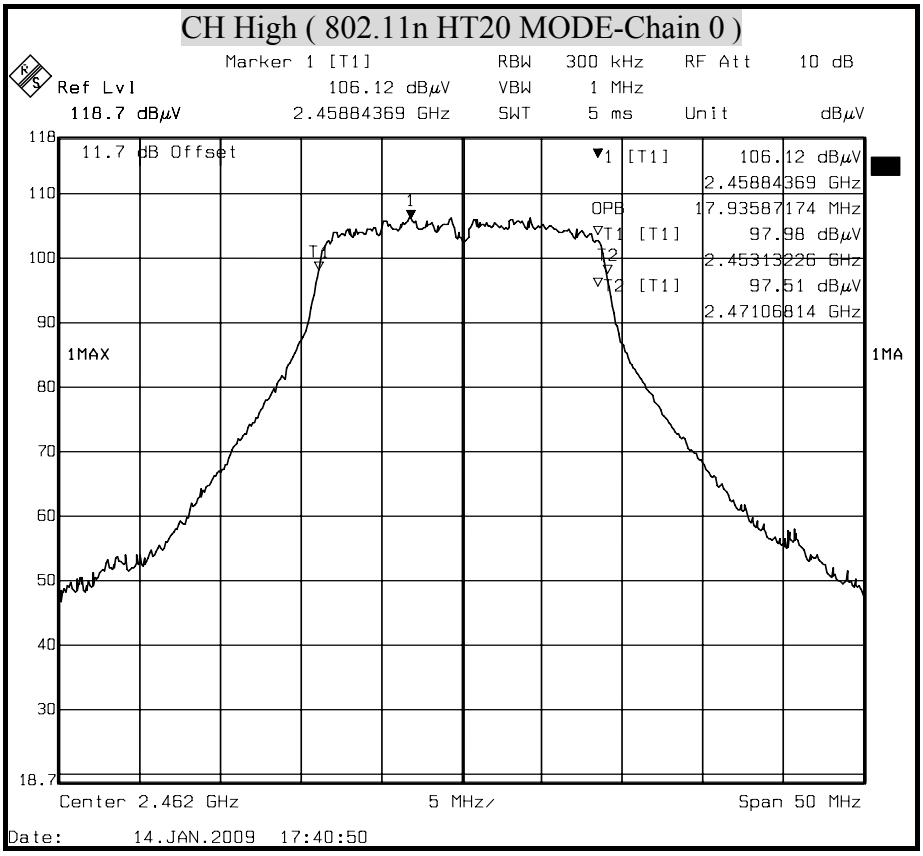
CH Low (802.11n HT20 MODE-Chain 0)



CH Mid (802.11n HT20 MODE-Chain 0)

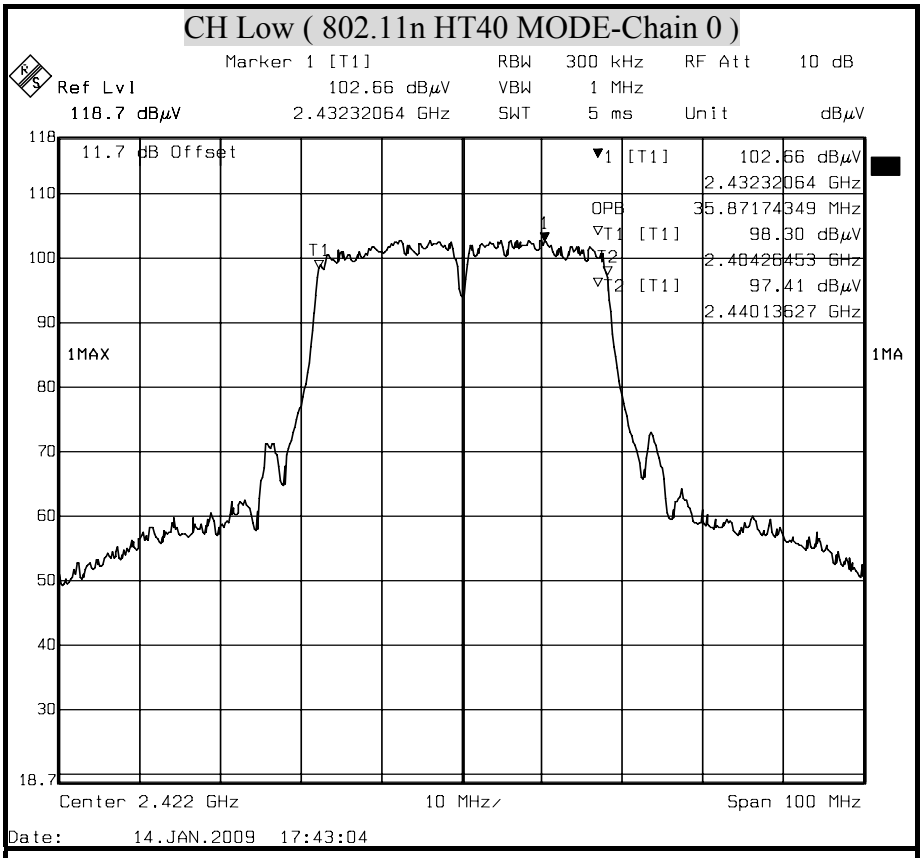


CH High (802.11n HT20 MODE-Chain 0)

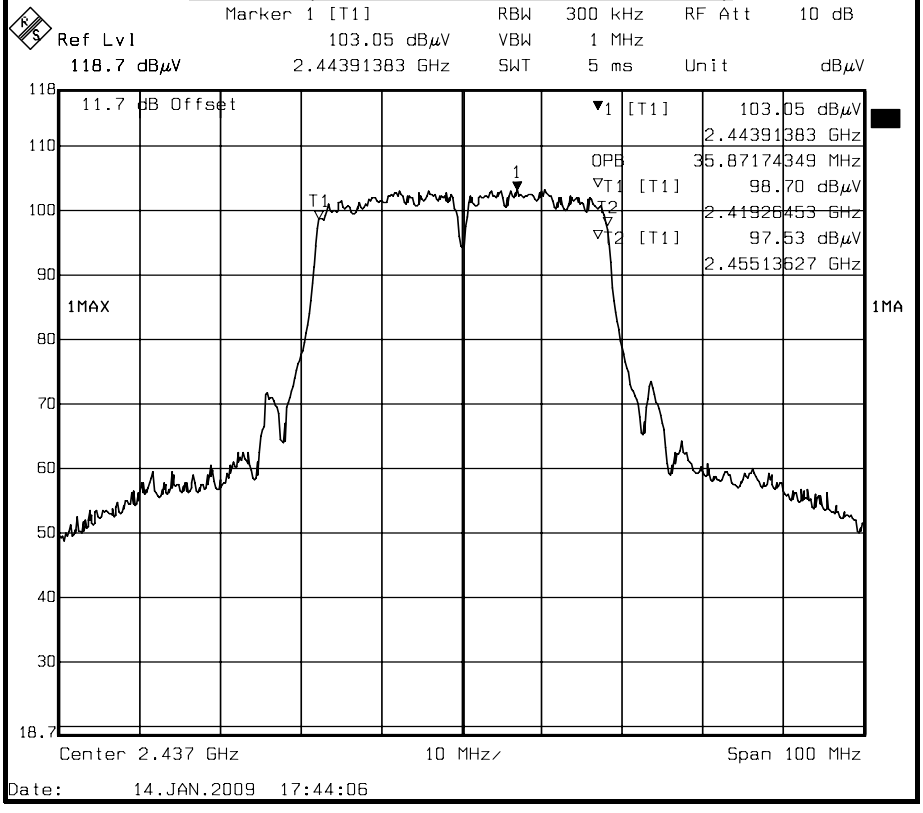


99% BANDWIDTH (802.11n HT40 MODE)

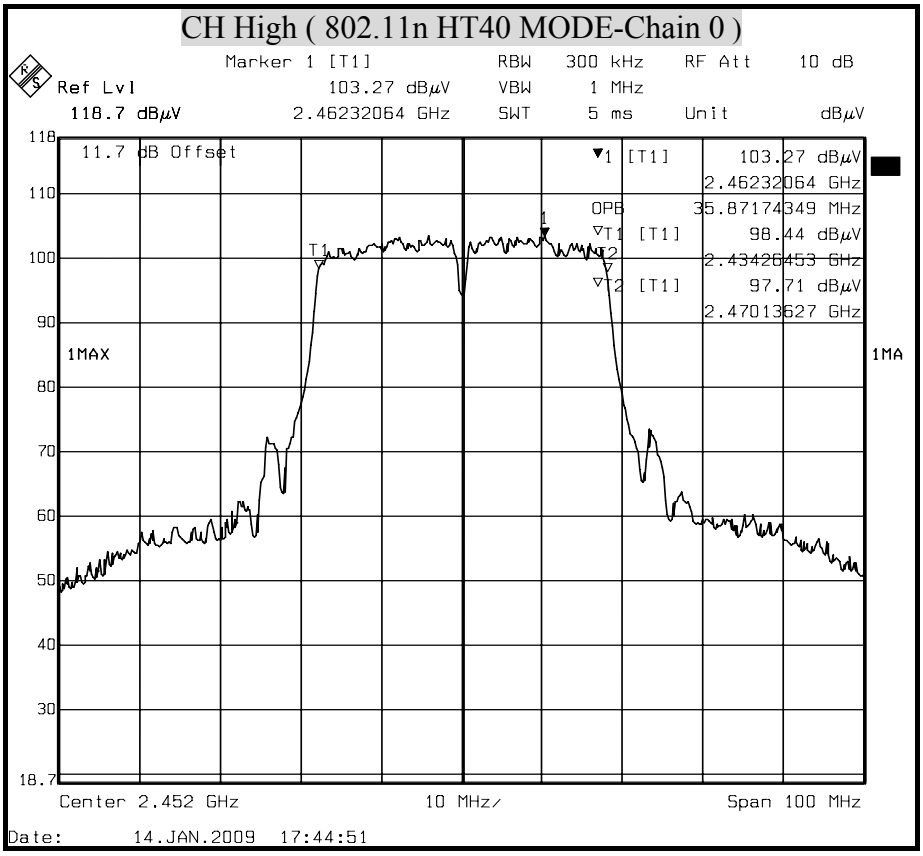
CH Low (802.11n HT40 MODE-Chain 0)



CH Mid (802.11n HT40 MODE-Chain 0)



CH High (802.11n HT40 MODE-Chain 0)



8.3 MAXIMUM PEAK OUTPUT POWER

LIMIT

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

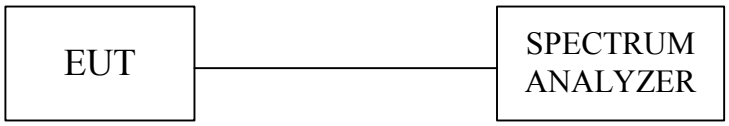
§ 15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands : 1 watt.

§ 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	FSEM	829054/017	APR. 14, 2009

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.

Measurement of Digital Transmission Systems Operating under Section 15.247

Power Output Option 2

Method #1

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

TEST RESULTS

No non-compliance noted

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

The maximum antenna gain is 2.27Bi for other than fixed, point-to-point operations, therefore the limit is 30 dBm. In the legacy mode, the effective antenna gain is
10 x Log (10^ (Chain 0 / 10)) = 2.27dBi.

IEEE 802.11b mode (One TX)

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Total (dBm)	Peak Power Limit (dBm)	Pass / Fail
		Chain 0			
Low	2412	15.23	15.23	30	PASS
Middle	2437	15.70	15.70	30	PASS
High	2462	16.14	16.14	30	PASS

NOTE : 1. At finial test to get the worst-case emission at 11Mbps.
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 Total (dBm)	Peak Power Limit (dBm)	Pass / Fail
		Chain 0			
Low	2412	14.89	14.89	30	PASS
Middle	2437	15.41	15.41	30	PASS
High	2462	15.84	15.84	30	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(One TX)

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Total (dBm)	Peak Power Limit (dBm)	Pass / Fail
		Chain 0			
Low	2412	15.15	15.15	30	PASS
Middle	2437	15.62	15.62	30	PASS
High	2462	16.09	16.09	30	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.

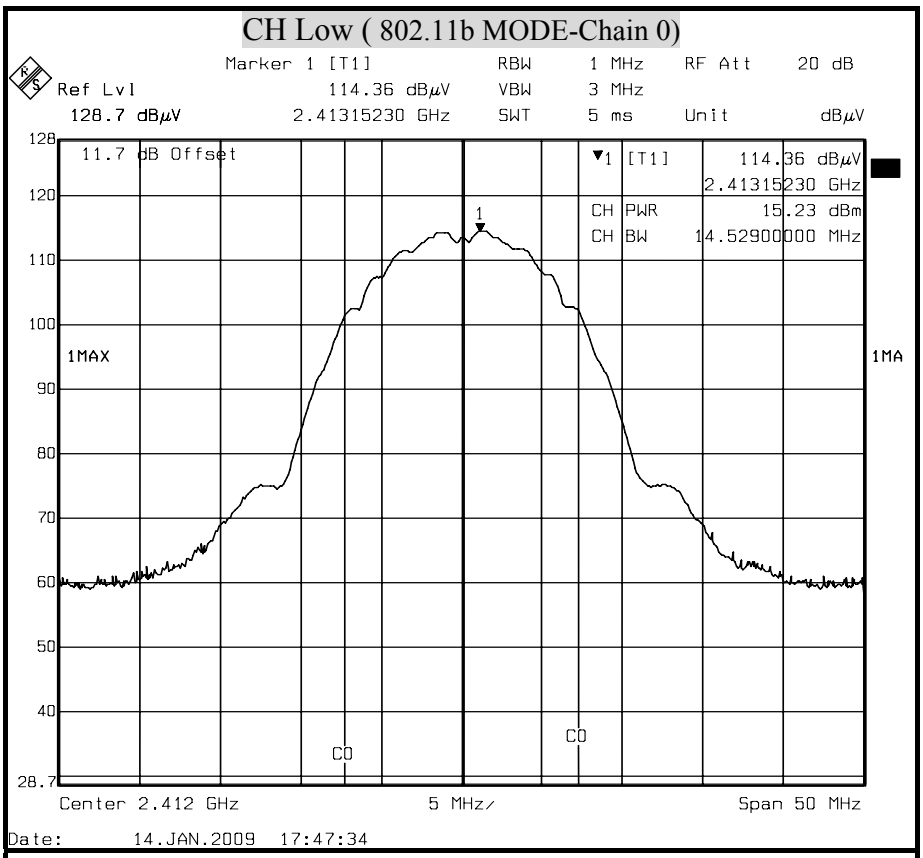
IEEE 802.11n HT40 mode (One TX)

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Total (dBm)	Peak Power Limit (dBm)	Pass / Fail
		Chain 0			
Low	2422	15.52	15.52	30	PASS
Middle	2437	15.79	15.79	30	PASS
High	2452	16.02	16.02	30	PASS

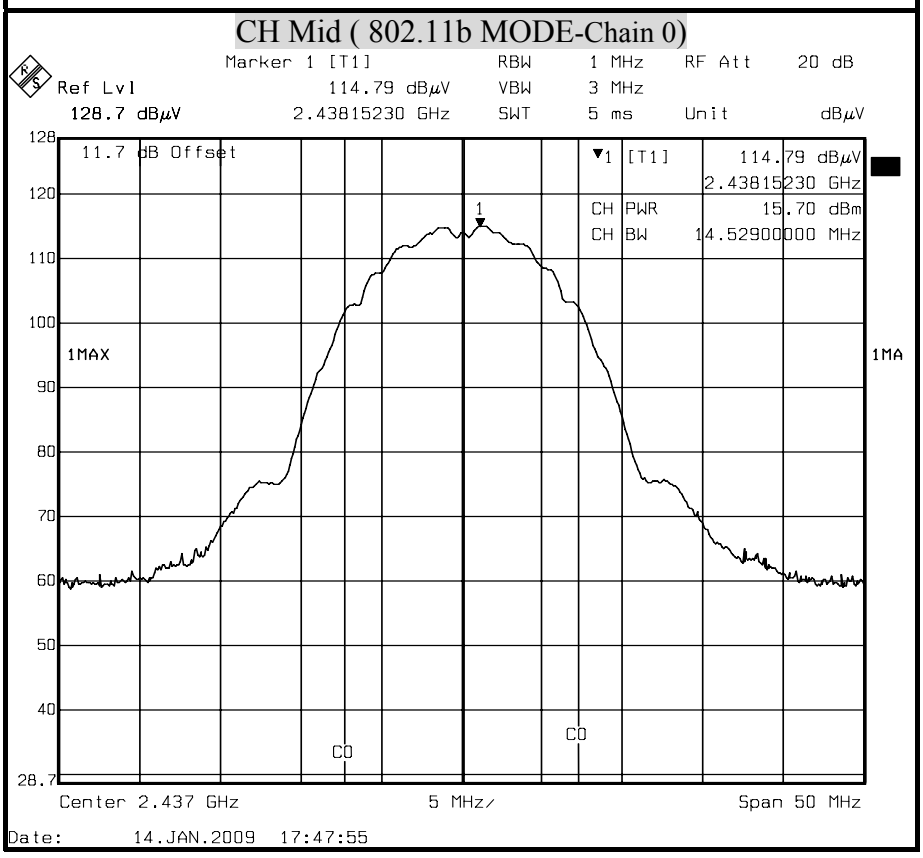
NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

MAXIMUM PEAK OUTPUT POWER (802.11b MODE)

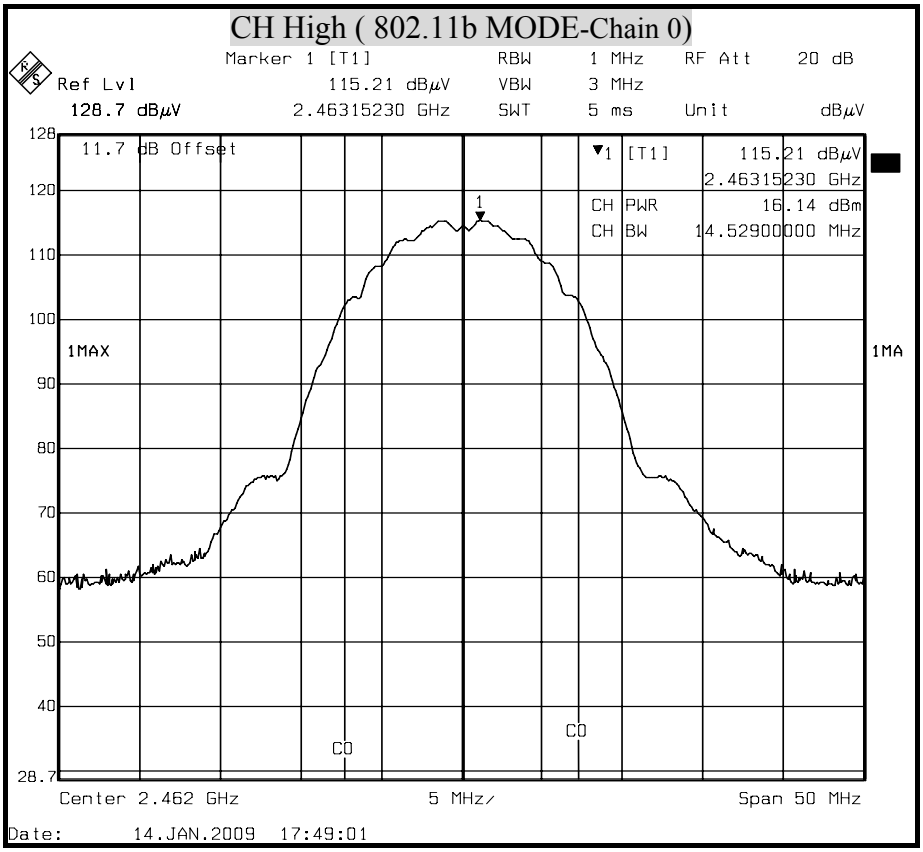
CH Low (802.11b MODE-Chain 0)



CH Mid (802.11b MODE-Chain 0)

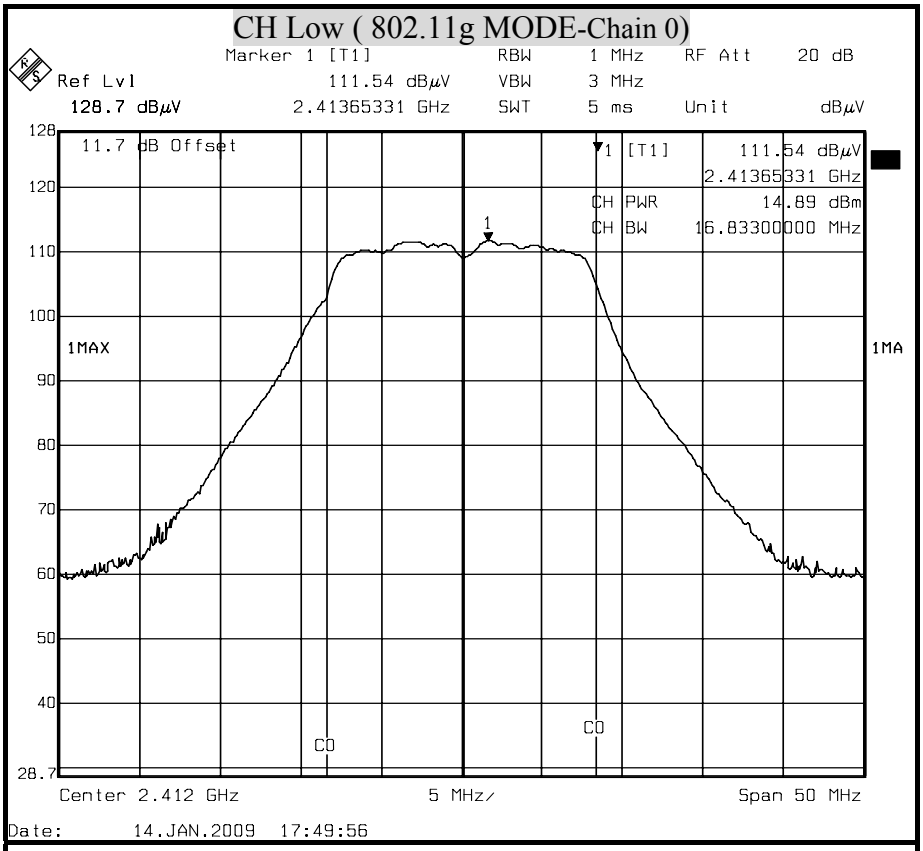


CH High (802.11b MODE-Chain 0)

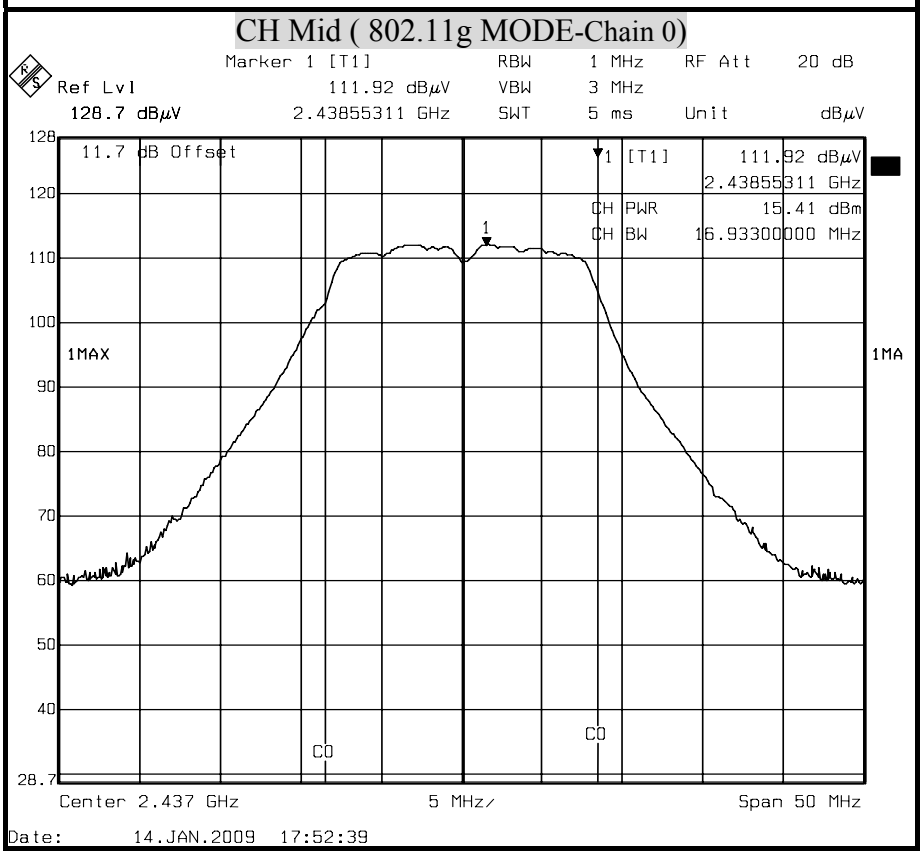


MAXIMUM PEAK OUTPUT POWER (802.11g MODE)

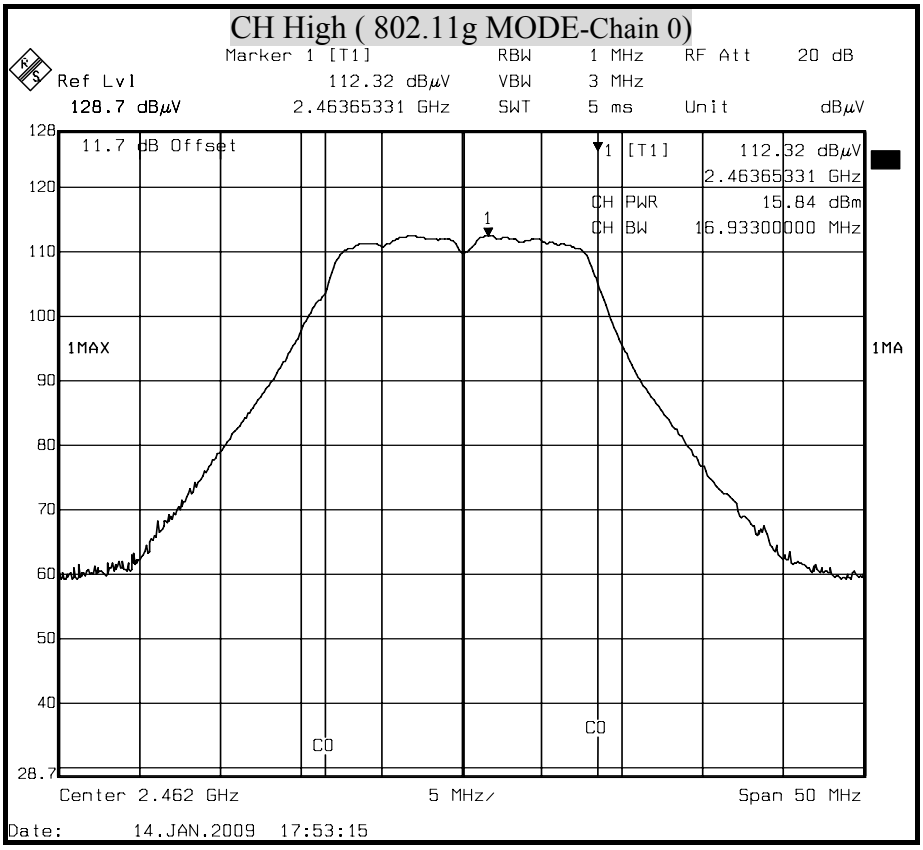
CH Low (802.11g MODE-Chain 0)



CH Mid (802.11g MODE-Chain 0)

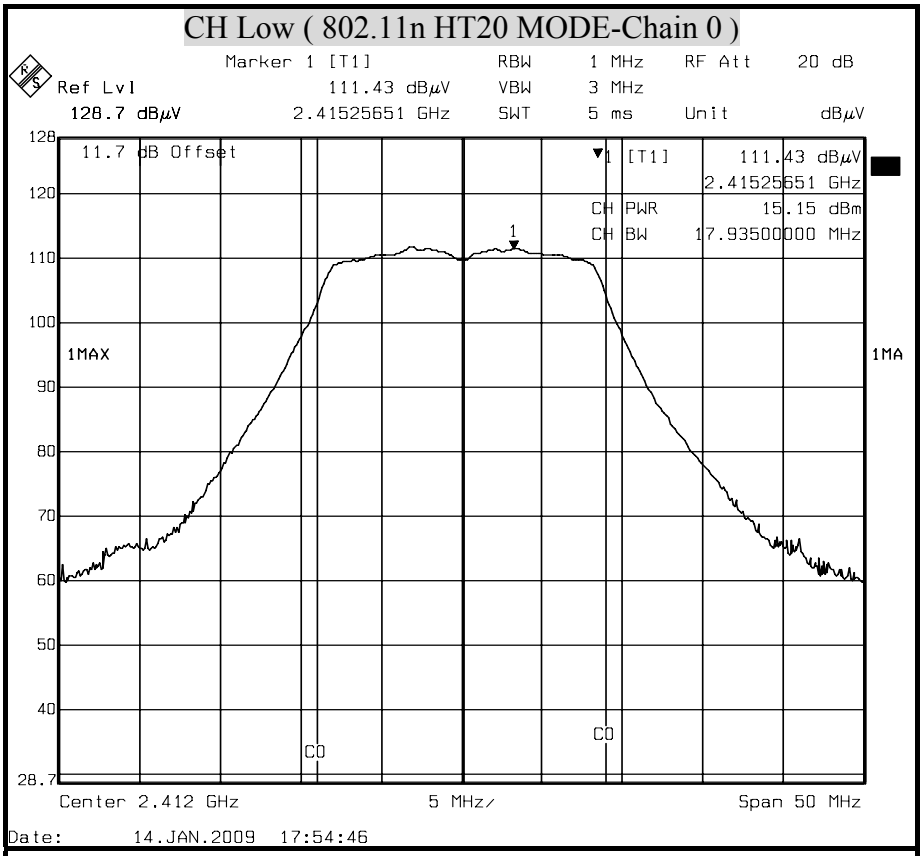


CH High (802.11g MODE-Chain 0)

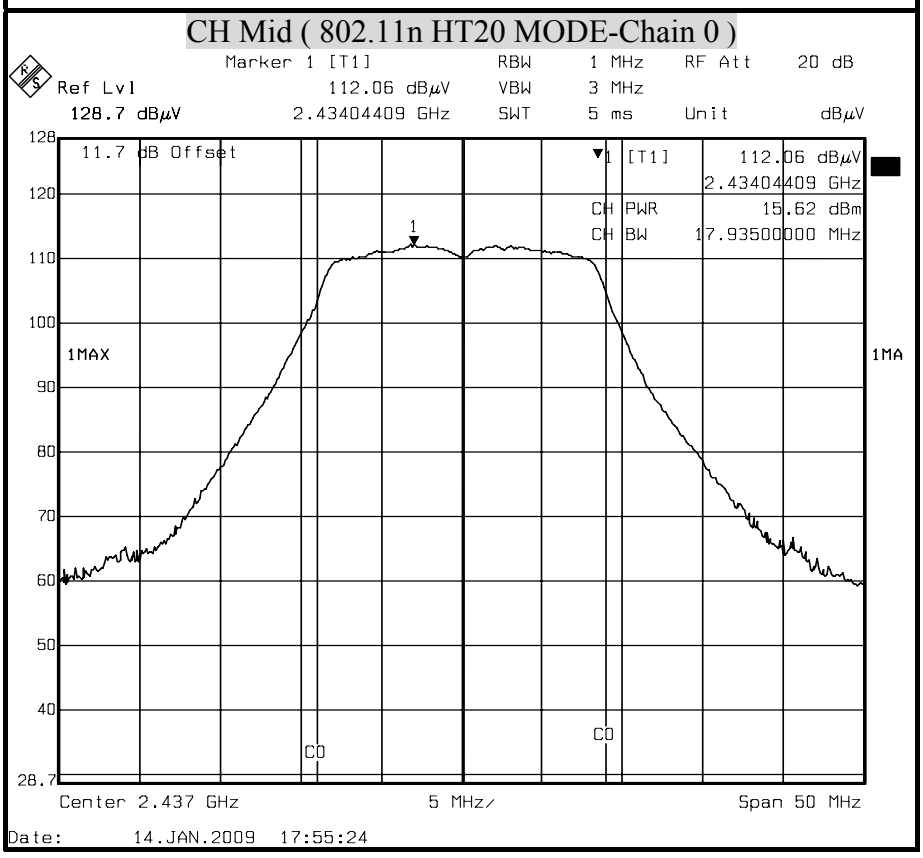


MAXIMUM PEAK OUTPUT POWER (802.11n HT20 MODE)

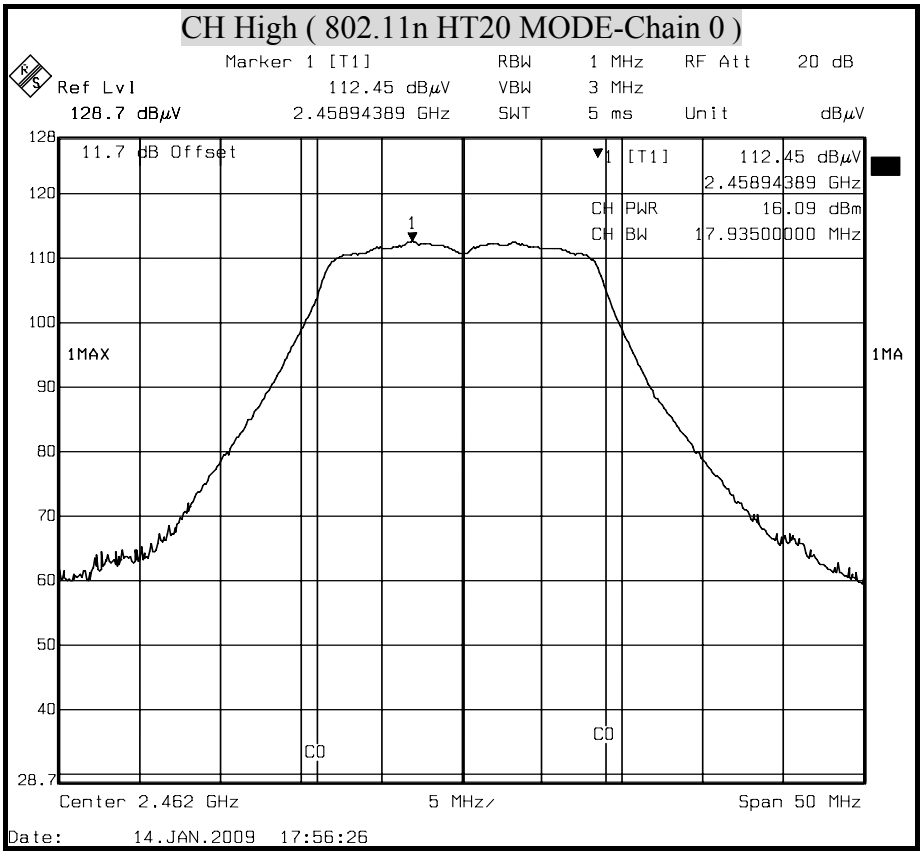
CH Low (802.11n HT20 MODE-Chain 0)



CH Mid (802.11n HT20 MODE-Chain 0)

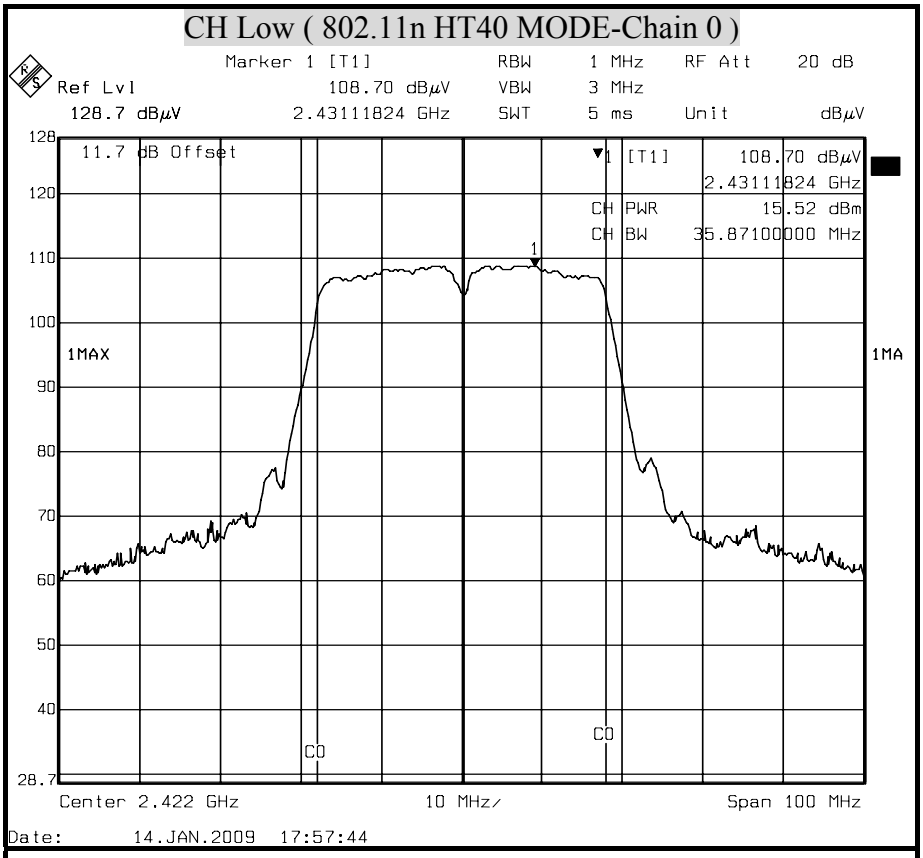


CH High (802.11n HT20 MODE-Chain 0)

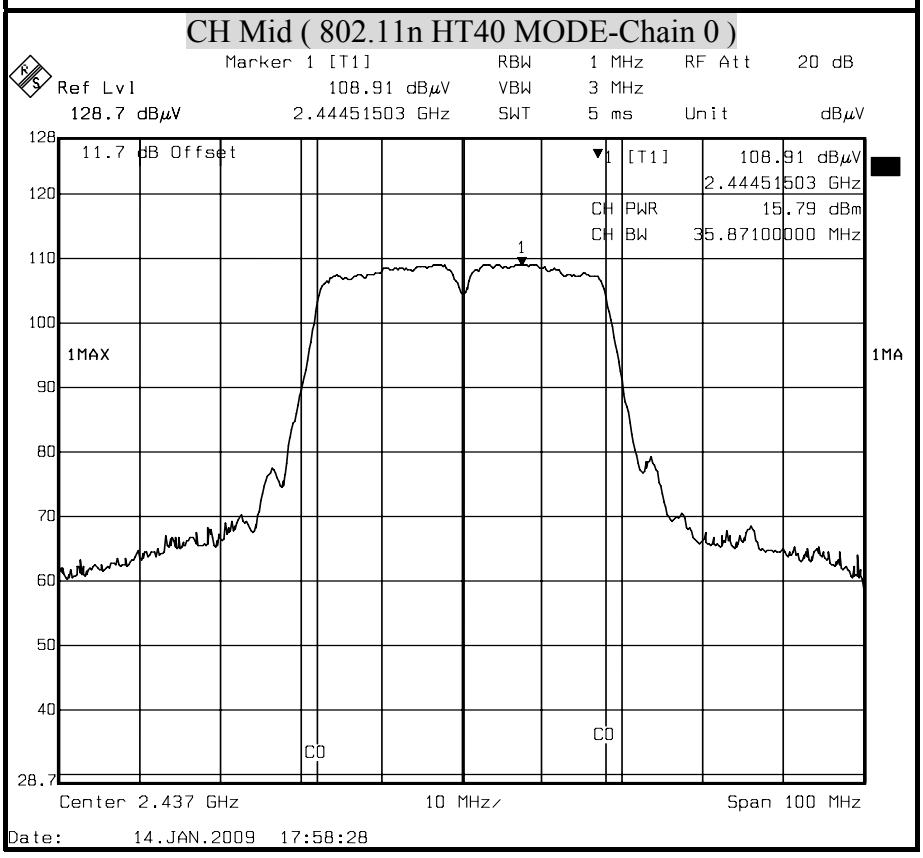


MAXIMUM PEAK OUTPUT POWER (802.11n HT40 MODE)

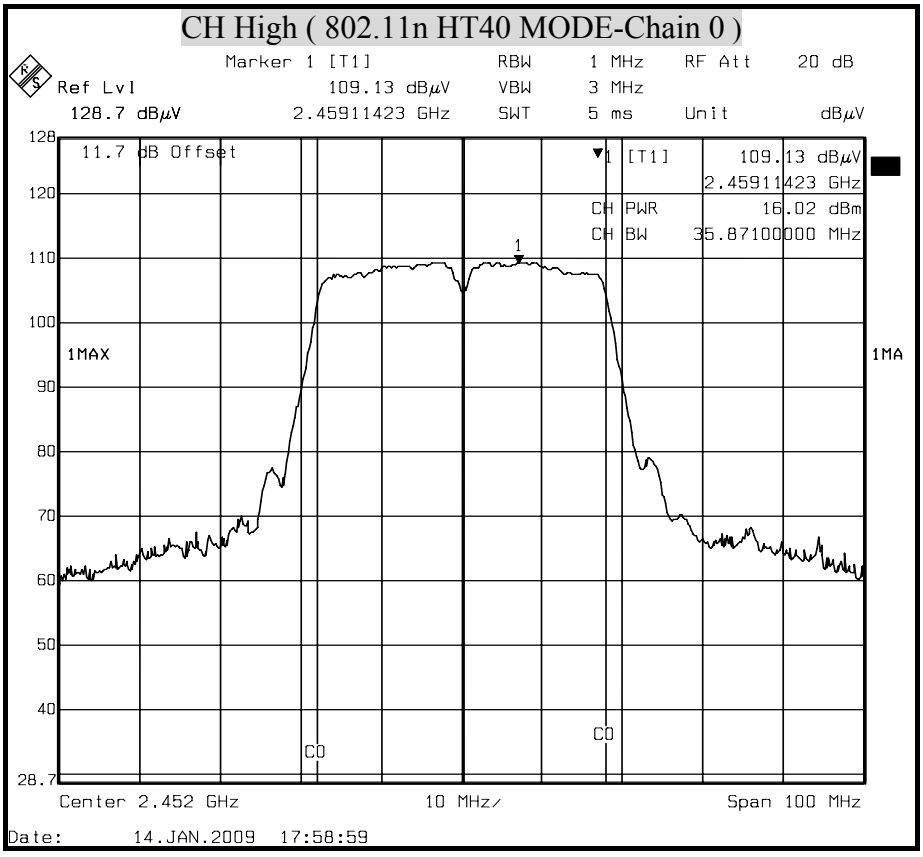
CH Low (802.11n HT40 MODE-Chain 0)



CH Mid (802.11n HT40 MODE-Chain 0)



CH High (802.11n HT40 MODE-Chain 0)



8.4 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.

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

G=2.27dBi=1.68655303 mW

IEEE 80211b = 0.0796 * 41.11497 * 1.68655303 / 400 = 0.013799

IEEE 80211g = 0.0796 * 38.37072 * 1.68655303 / 400 = 0.012878

IEEE 802n HT20= 0.0796 * 40.64433 * 1.68655303 / 400 = 0.013641

IEEE 802n HT40= 0.0796 * 39.99447 * 1.68655303 / 400 = 0.013423

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	20.0	16.14	41.11497	2.27	1	0.013799
IEEE 802.11g	20.0	15.84	38.37072	2.27	1	0.012878
IEEE 802.11n HT20	20.0	16.09	40.64433	2.27	1	0.013641
IEEE 802.11n HT40	20.0	16.02	39.99447	2.27	1	0.013423

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.

8.5 POWER SPECTRAL DENSITY

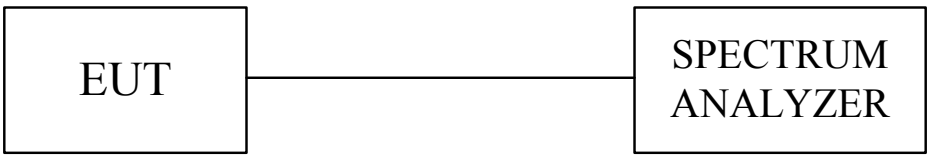
LIMIT

§ 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	FSEM	829054/017	APR. 14, 2009

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)	Final RF Power Level in 3KHz BW (dBm)	PPSD Total (dBm)	Maximum Limit (dBm)	Pass / Fail
		Chain 0			
Low	2412	-16.45	-16.45	8	PASS
Middle	2437	-16.12	-16.12	8	PASS
High	2462	-16.41	-16.41	8	PASS

NOTE : 1. At finial test to get the worst-case emission at 11Mbps.
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)	Final RF Power Level in 3KHz BW (dBm)	PPSD Total (dBm)	Maximum Limit (dBm)	Pass / Fail
		Chain 0			
Low	2412	-21.55	-21.55	8	PASS
Middle	2437	-22.25	-22.25	8	PASS
High	2462	-22.54	-22.54	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.

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	PPSD Total (dBm)	Maximum Limit (dBm)	Pass / Fail
		Chain 0			
Low	2412	-21.19	-21.19	8	PASS
Middle	2437	-21.61	-21.61	8	PASS
High	2462	-20.32	-20.32	8	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.

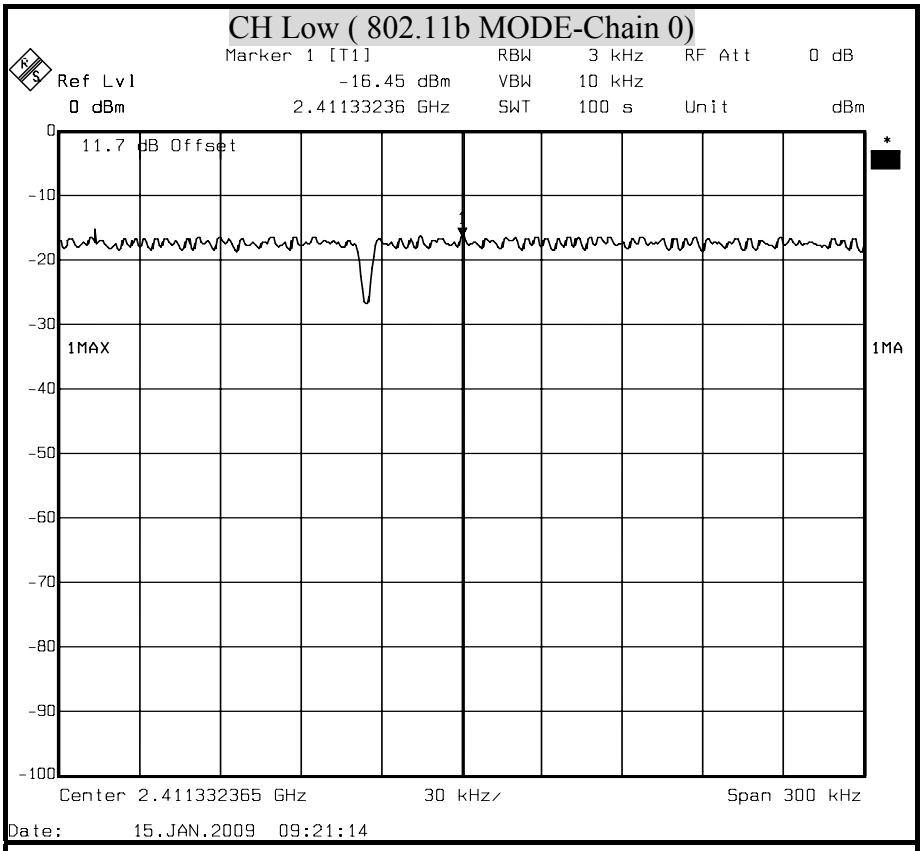
IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	PPSD Total (dBm)	Maximum Limit (dBm)	Pass / Fail
		Chain 0			
Low	2422	-24.41	-24.41	8	PASS
Middle	2437	-24.20	-24.20	8	PASS
High	2452	-24.12	-24.12	8	PASS

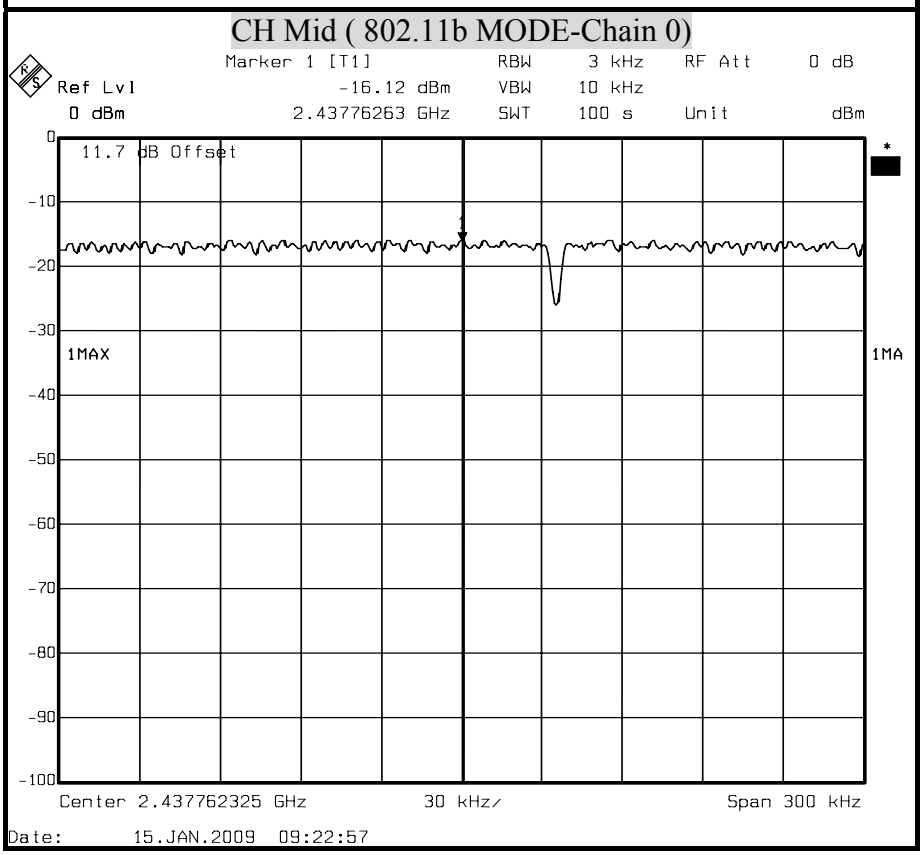
NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

POWER SPECTRAL DENSITY (IEEE 802.11b MODE)

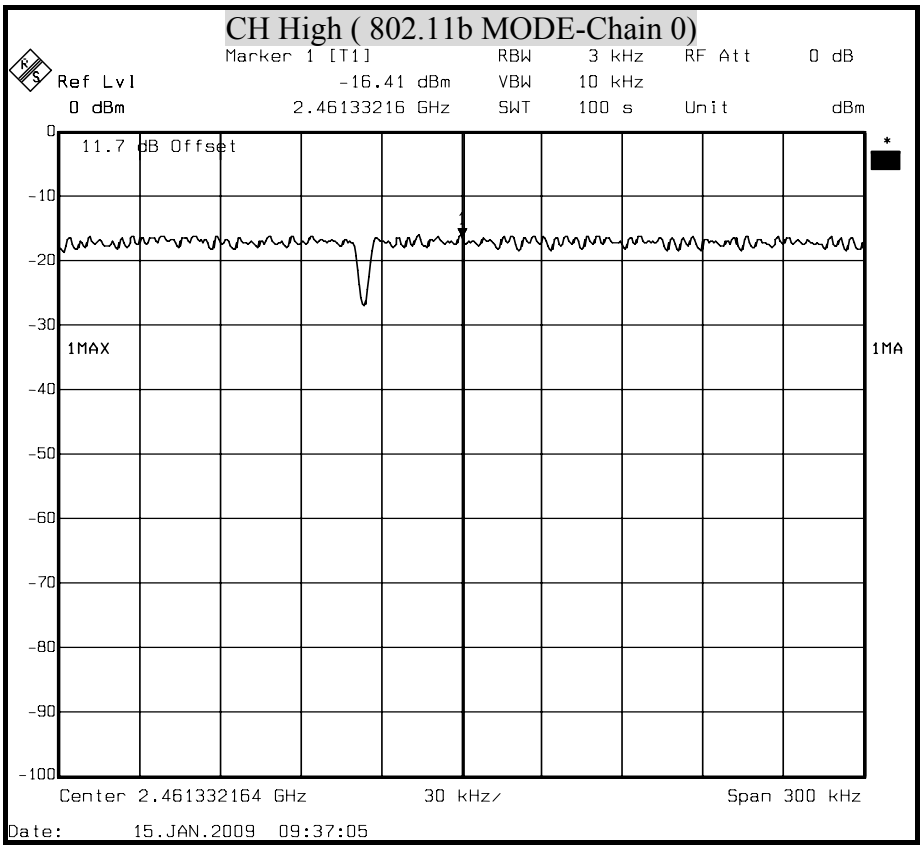
CH Low (802.11b MODE-Chain 0)



CH Mid (802.11b MODE-Chain 0)

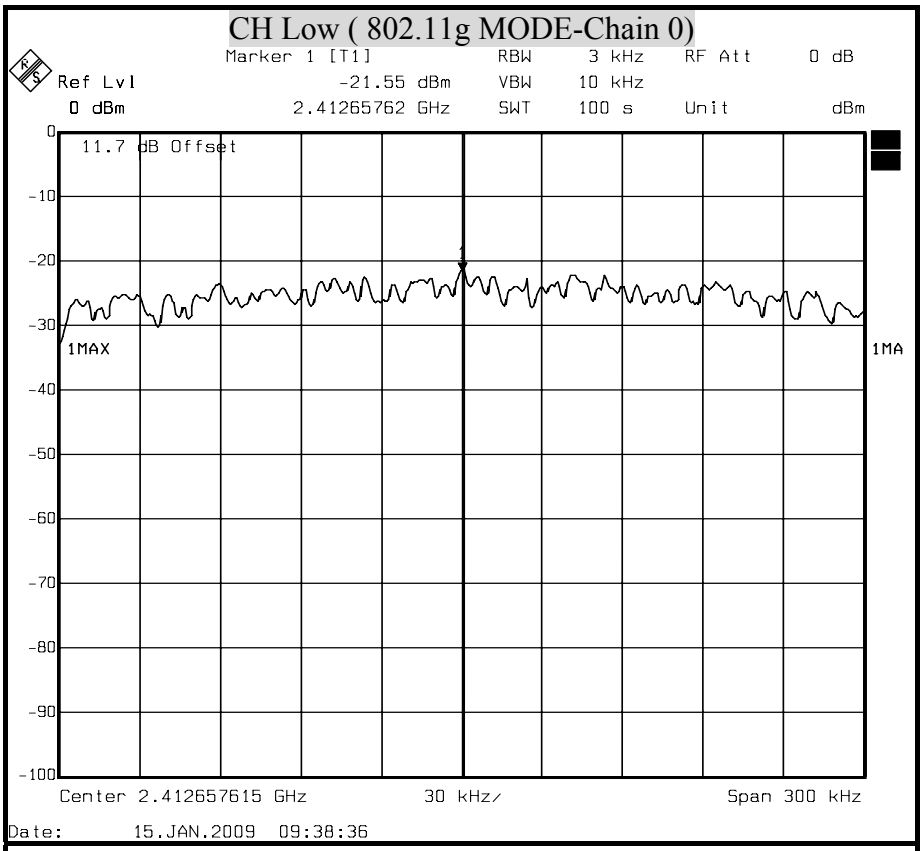


CH High (802.11b MODE-Chain 0)

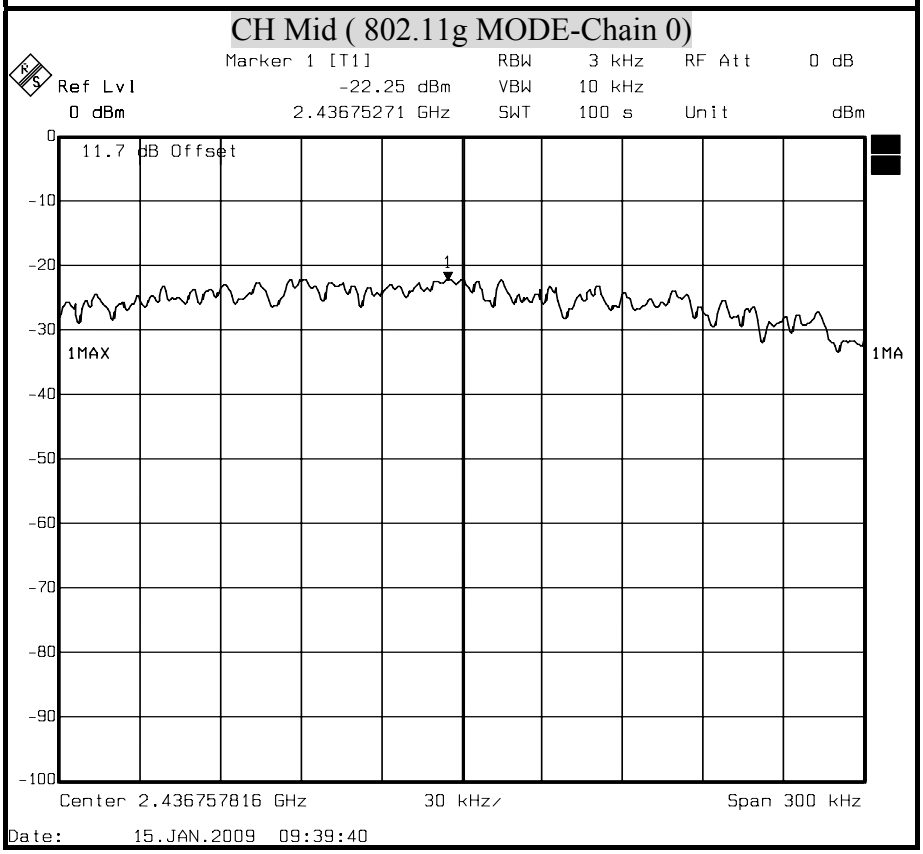


POWER SPECTRAL DENSITY (IEEE 802.11g MODE)

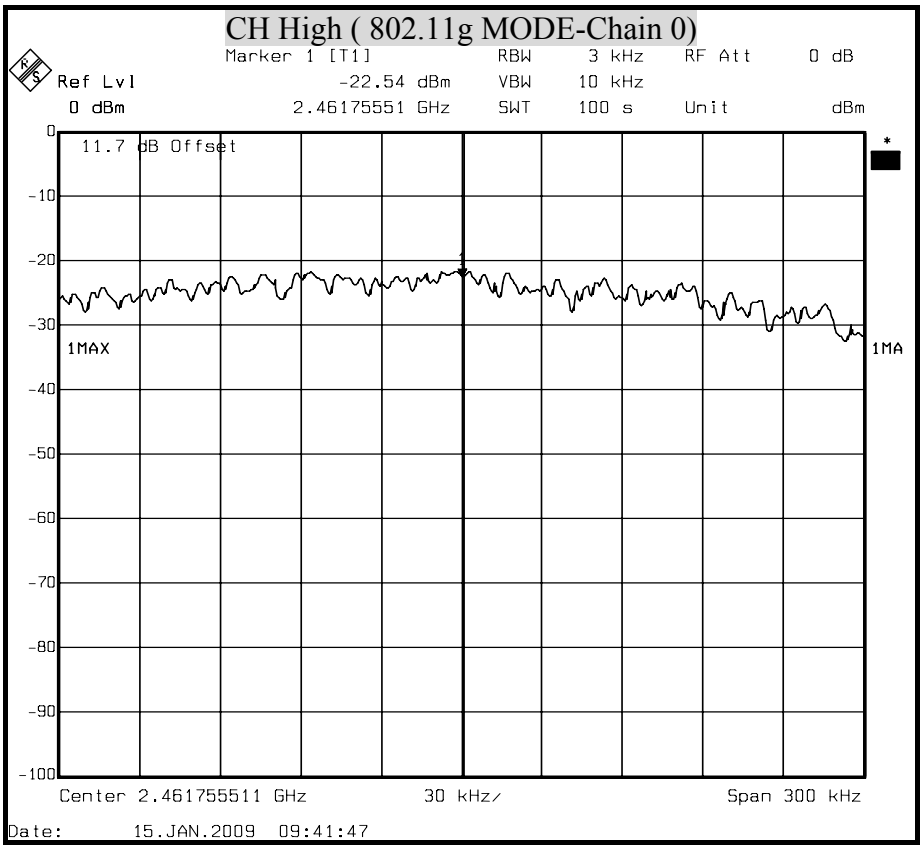
CH Low (802.11g MODE-Chain 0)



CH Mid (802.11g MODE-Chain 0)

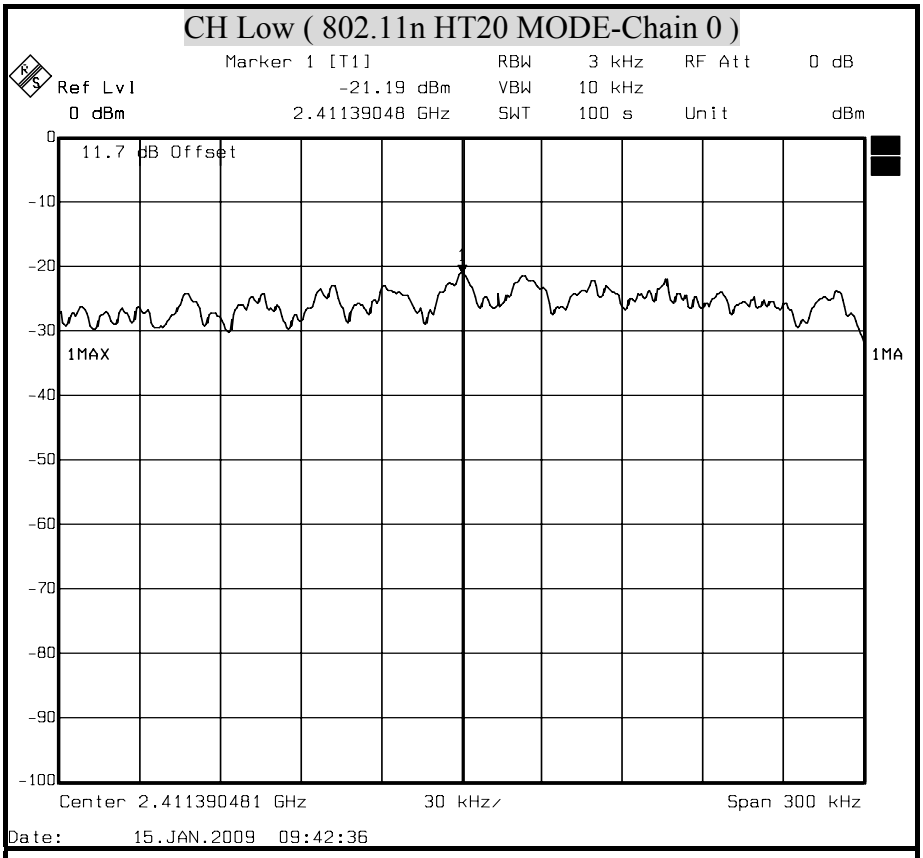


CH High (802.11g MODE-Chain 0)

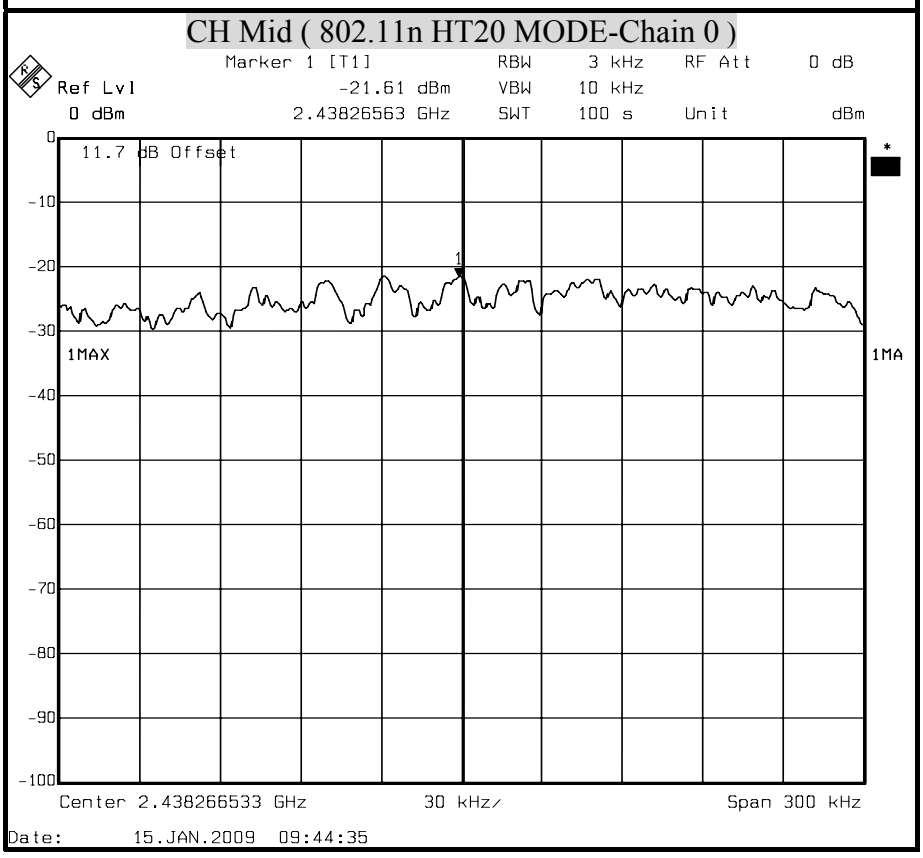


POWER SPECTRAL DENSITY (802.11n HT20 MODE)

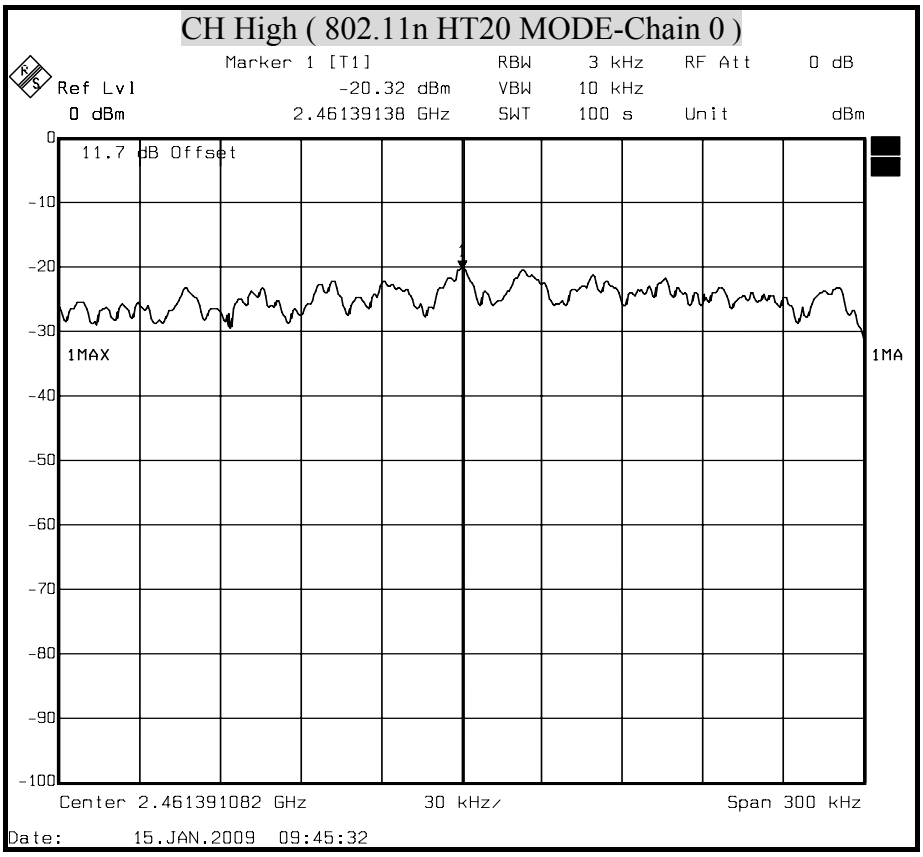
CH Low (802.11n HT20 MODE-Chain 0)



CH Mid (802.11n HT20 MODE-Chain 0)

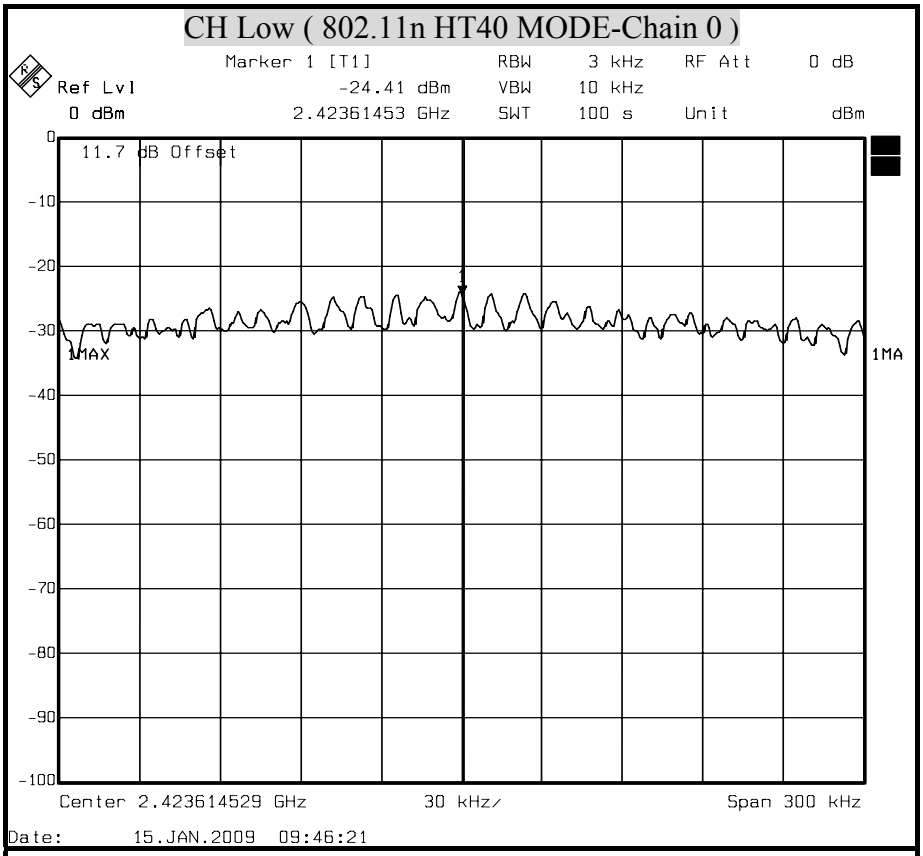


CH High (802.11n HT20 MODE-Chain 0)

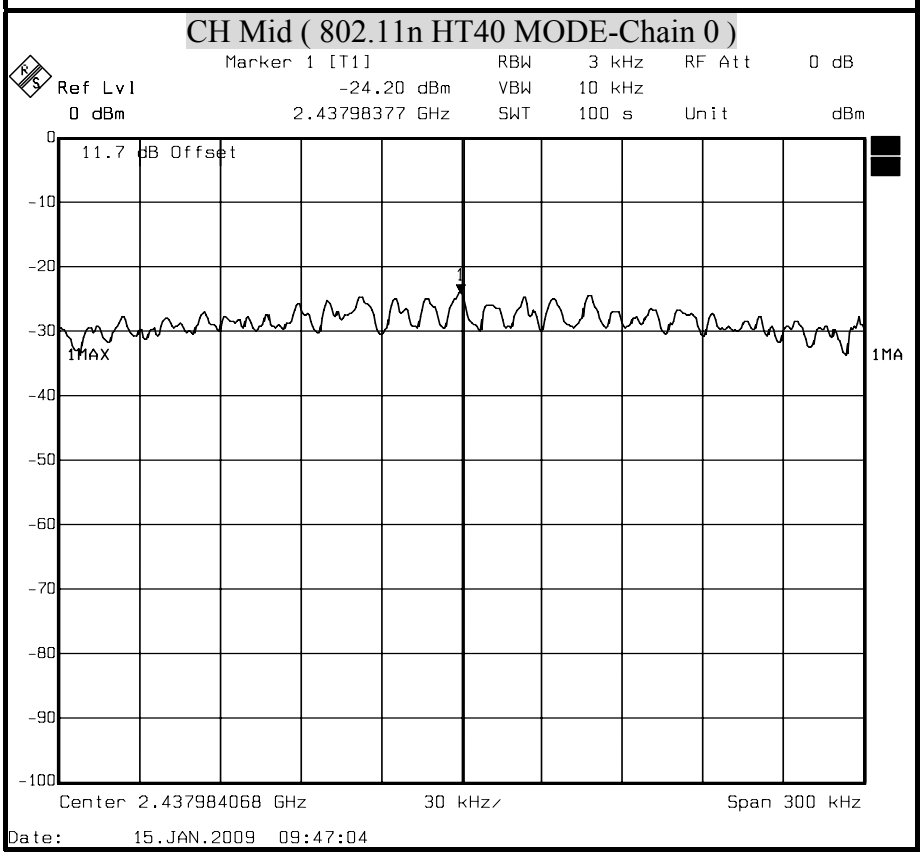


POWER SPECTRAL DENSITY (802.11n HT40 MODE)

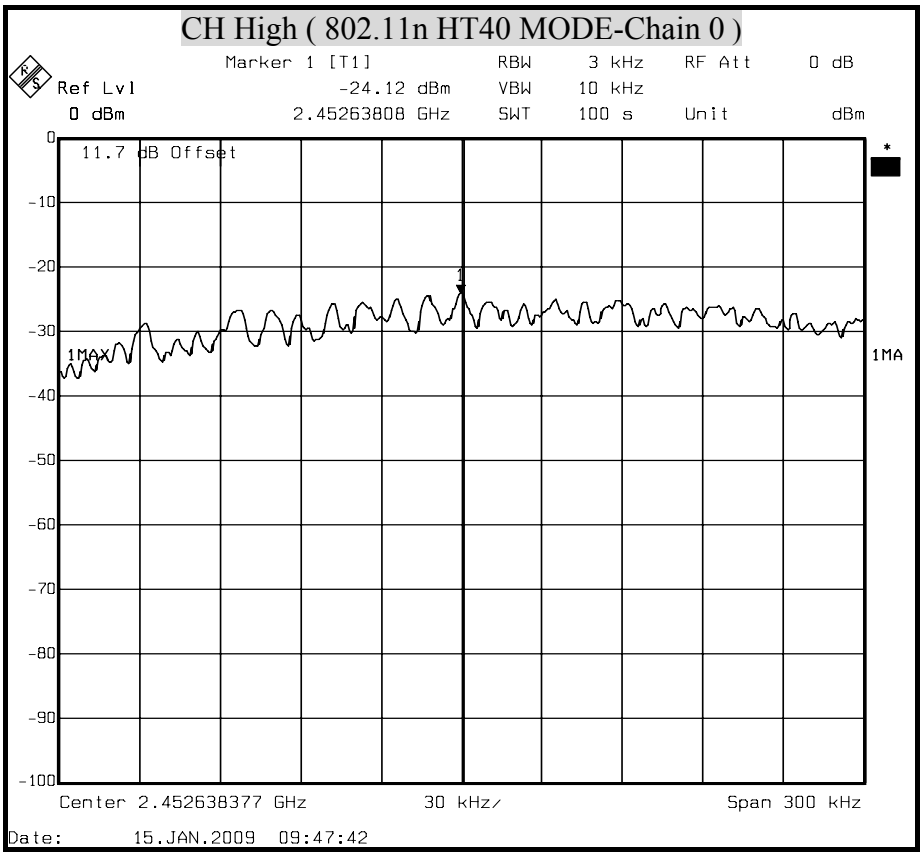
CH Low (802.11n HT40 MODE-Chain 0)



CH Mid (802.11n HT40 MODE-Chain 0)



CH High (802.11n HT40 MODE-Chain 0)



8.7 CONDUCTED SPURIOUS EMISSION

LIMITS

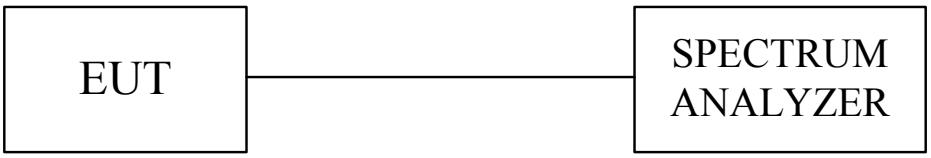
§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the and that contains the highest level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



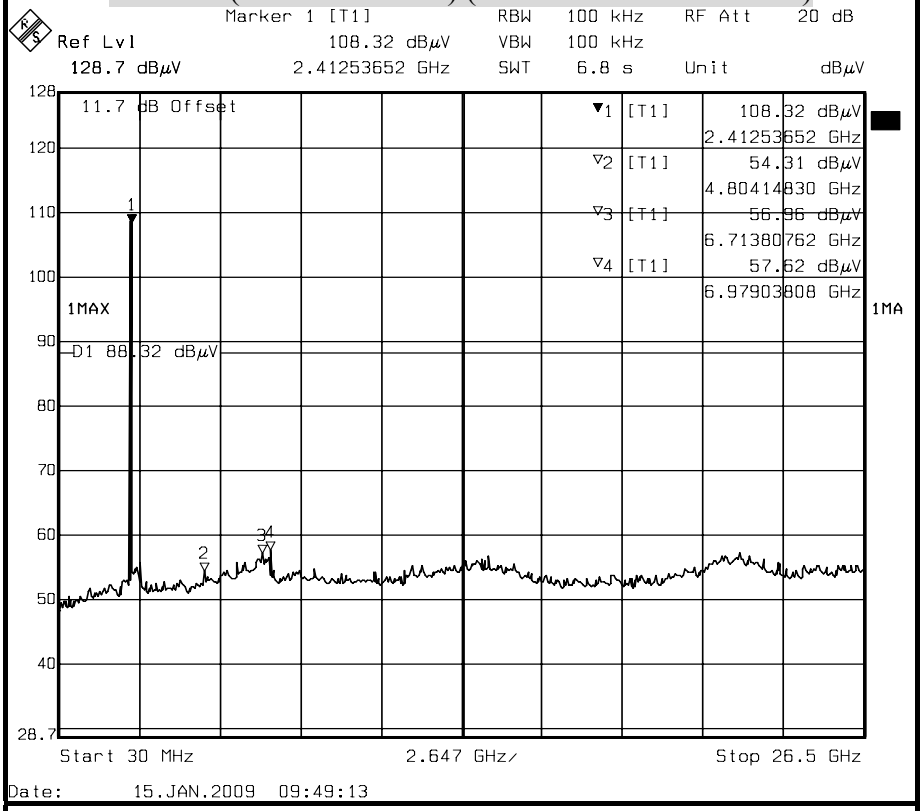
TEST RESULTS

No non-compliance noted.

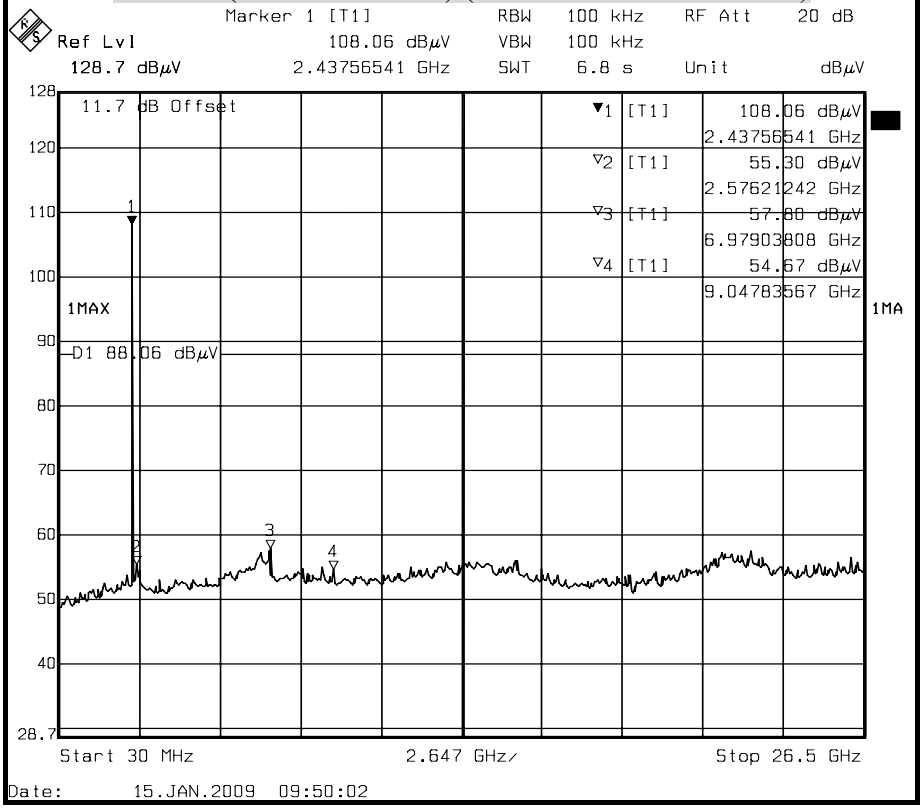
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(IEEE 802.11b MODE)

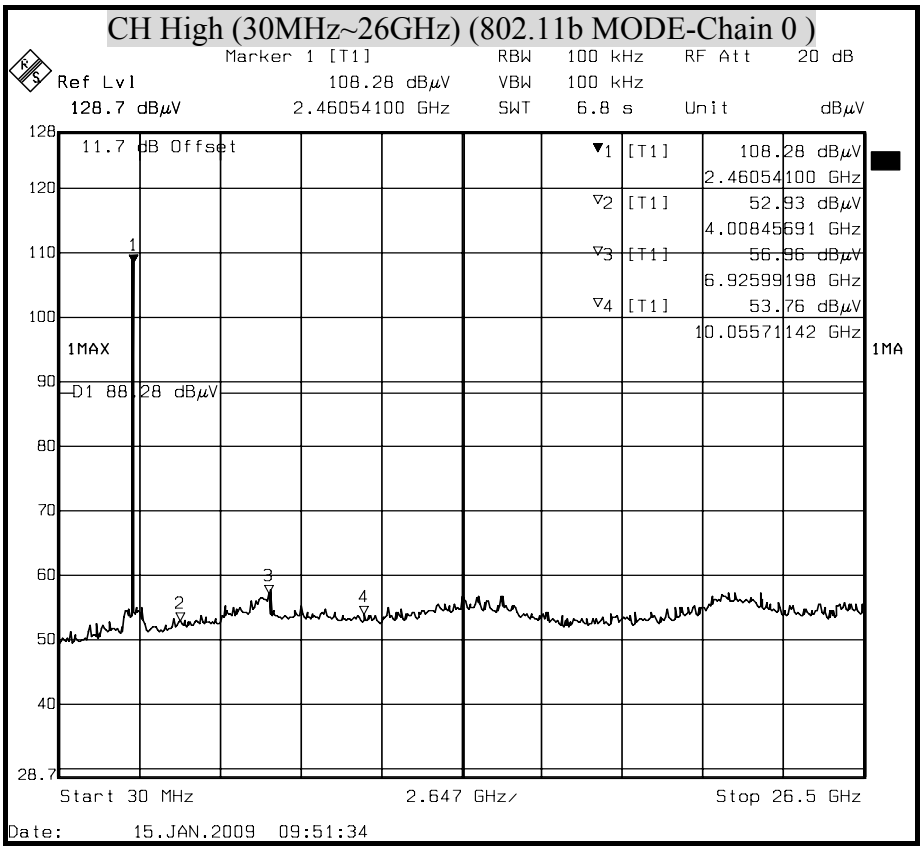
CH Low (30MHz~26GHz) (802.11b MODE-Chain 0)



CH Mid (30MHz~26GHz) (802.11b MODE-Chain 0)



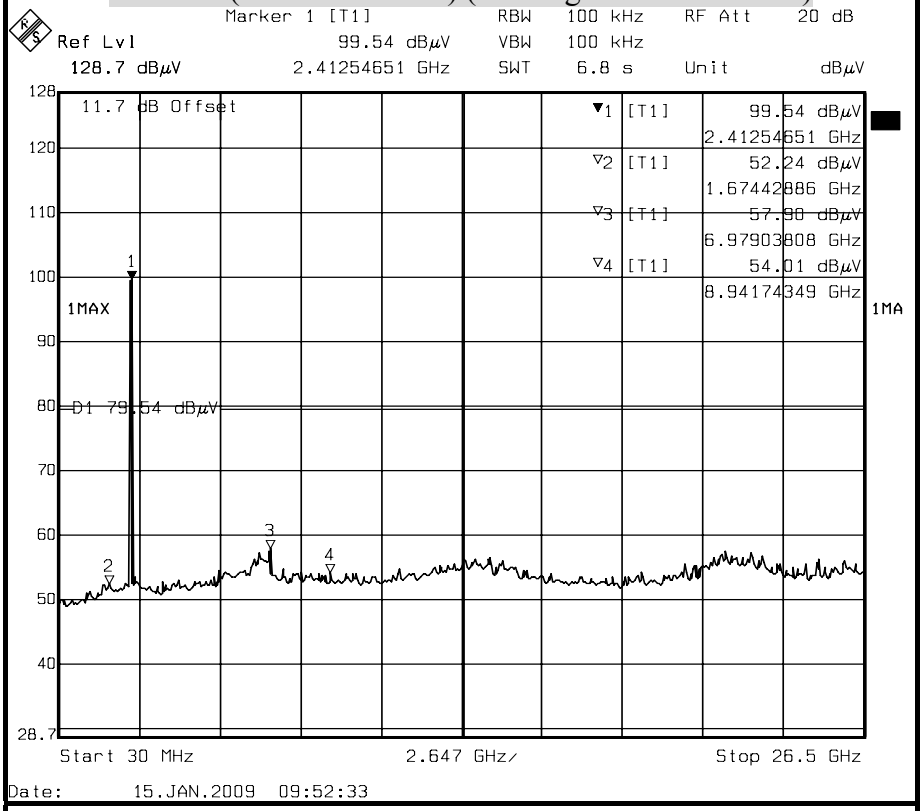
CH High (30MHz~26GHz) (802.11b MODE-Chain 0)



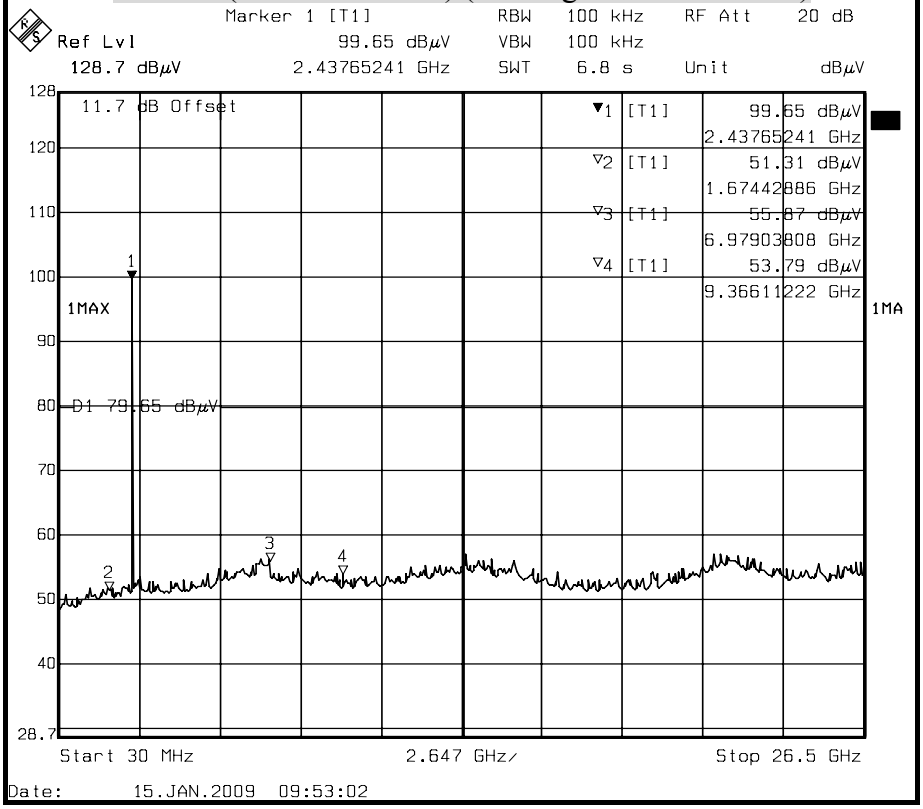
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(802.11g MODE)

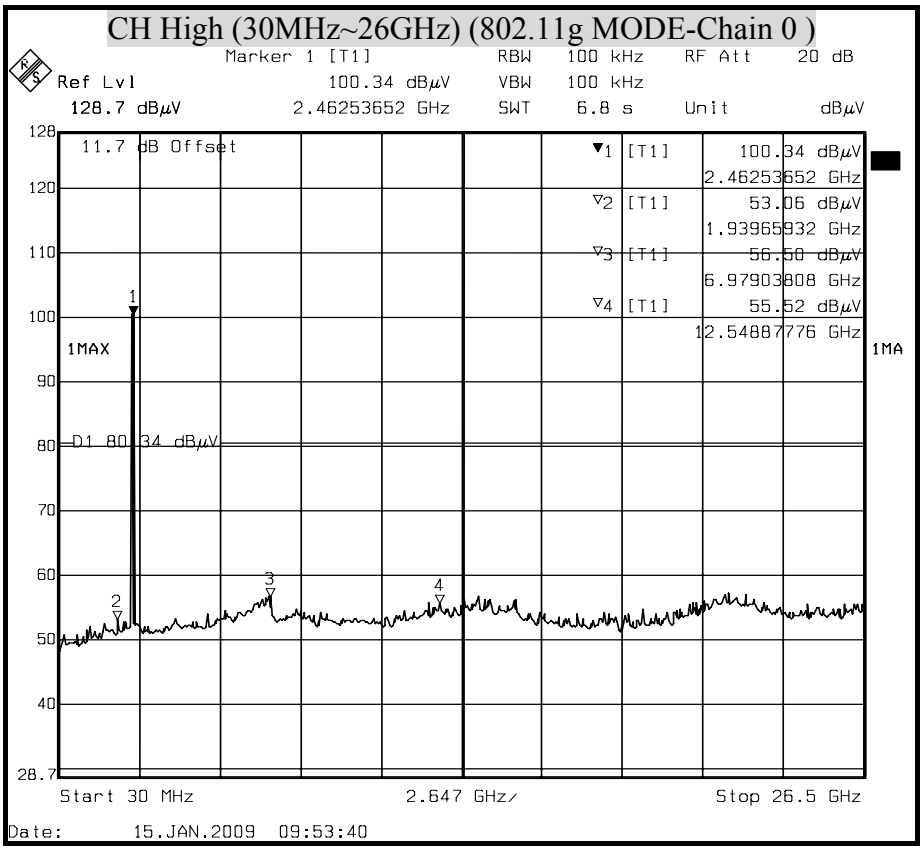
CH Low (30MHz~26GHz) (802.11g MODE-Chain 0)



CH Mid (30MHz~26GHz) (802.11g MODE-Chain 0)



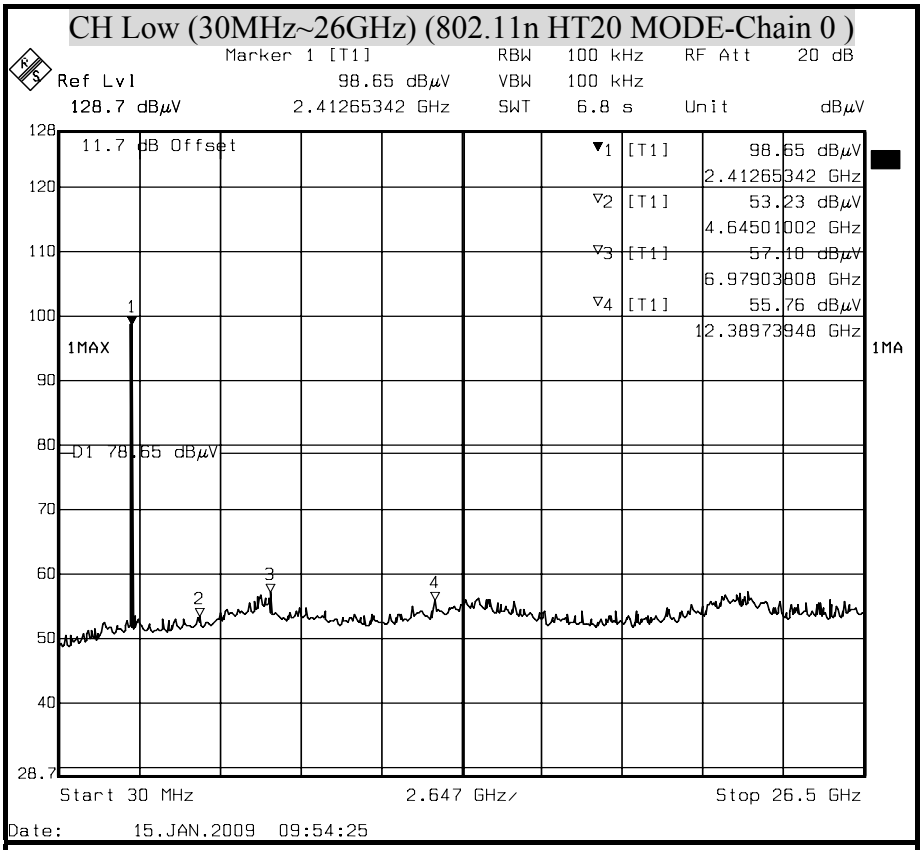
CH High (30MHz~26GHz) (802.11g MODE-Chain 0)



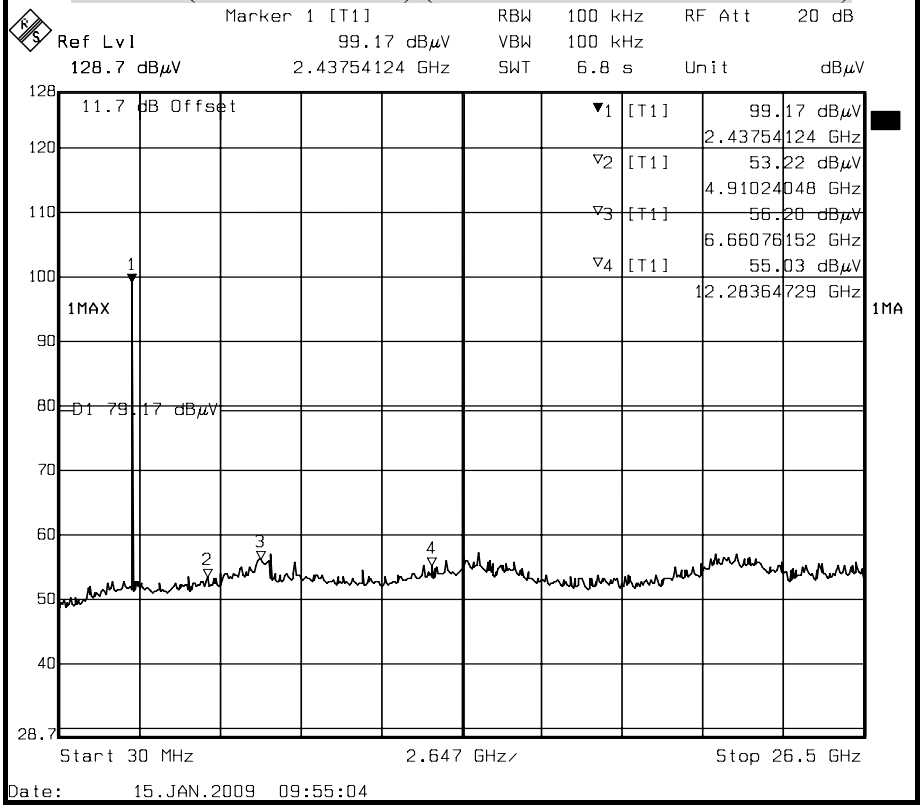
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(802.11n HT20 MODE)

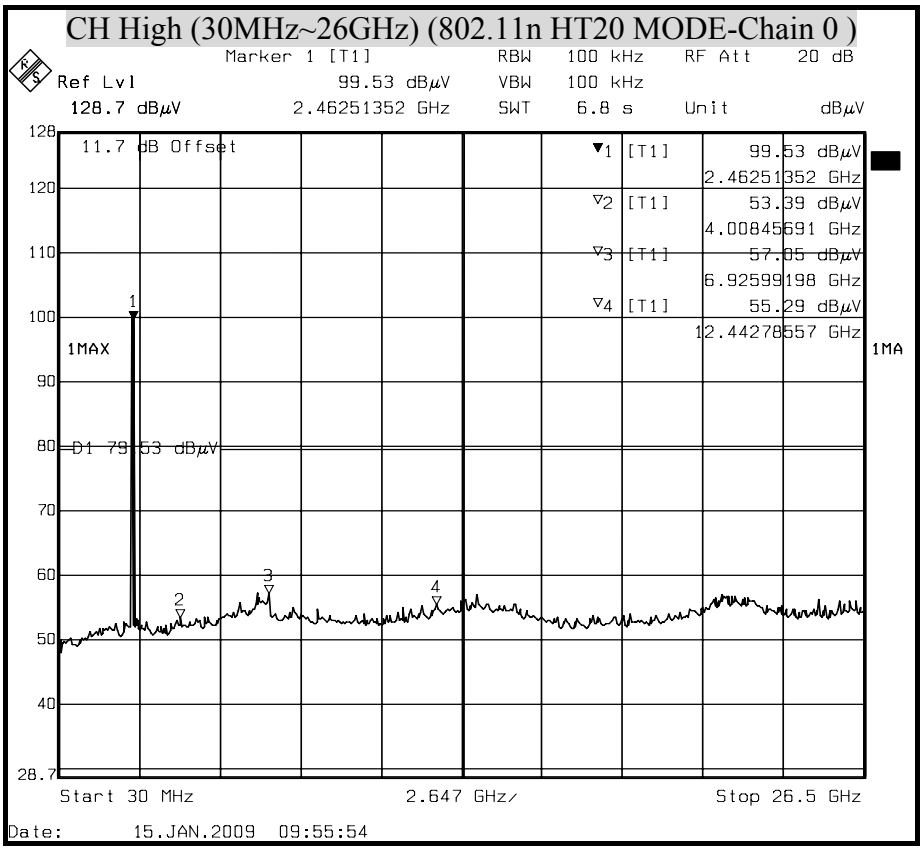
CH Low (30MHz~26GHz) (802.11n HT20 MODE-Chain 0)



CH Mid (30MHz~26GHz) (802.11n HT20 MODE-Chain 0)



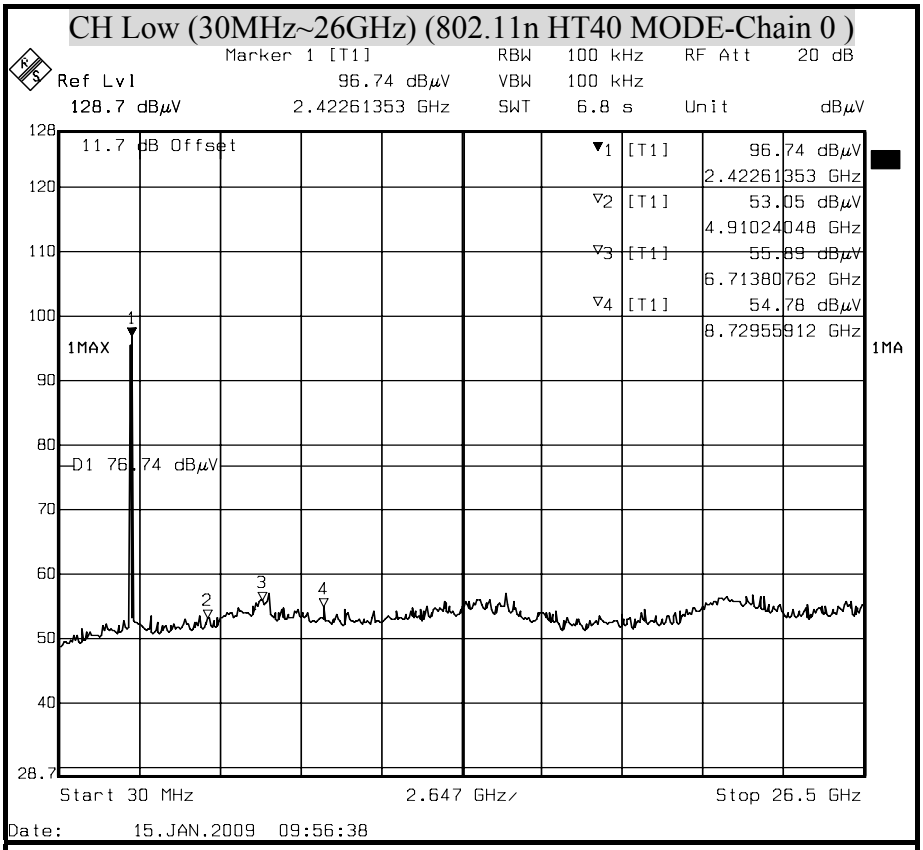
CH High (30MHz~26GHz) (802.11n HT20 MODE-Chain 0)



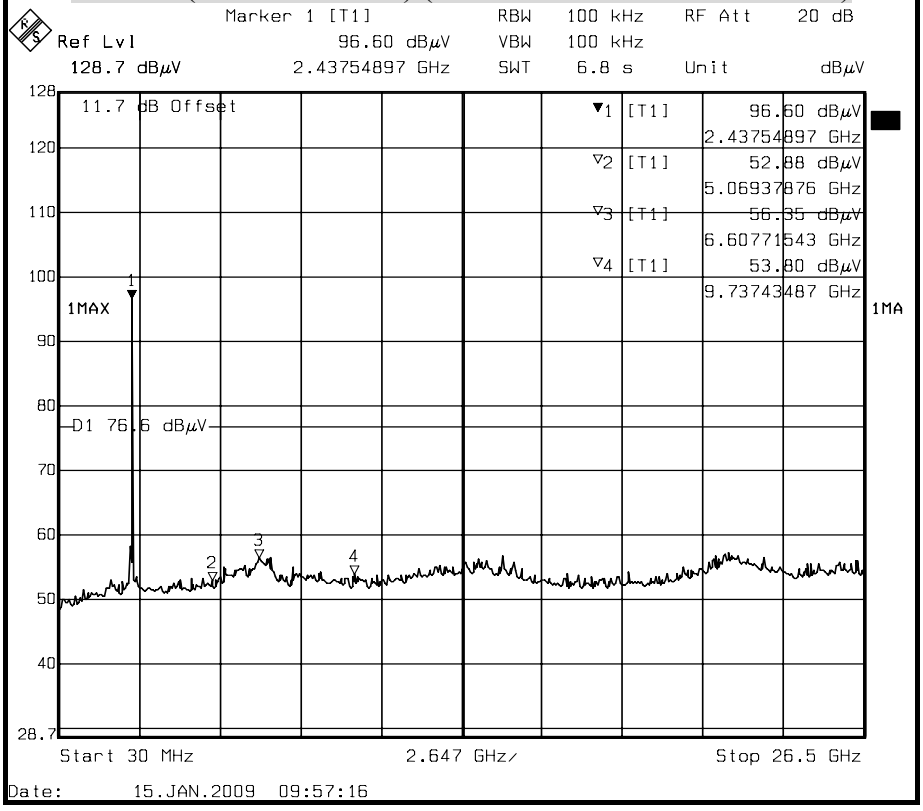
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(802.11n HT40 MODE)

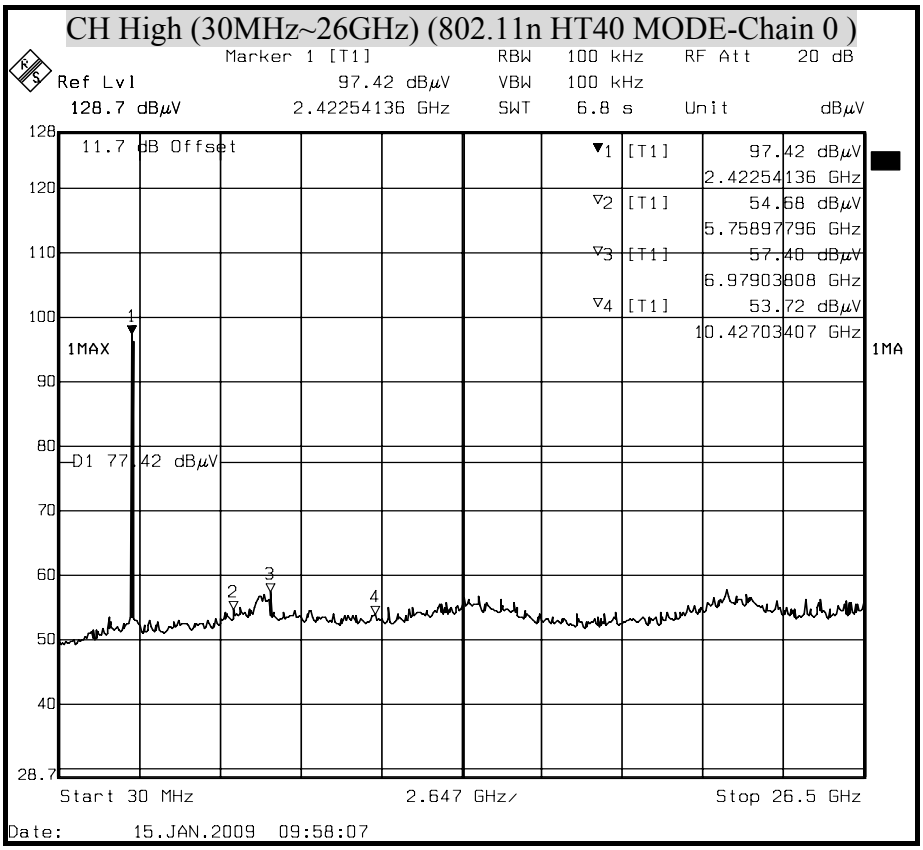
CH Low (30MHz~26GHz) (802.11n HT40 MODE-Chain 0)



CH Mid (30MHz~26GHz) (802.11n HT40 MODE-Chain 0)



CH High (30MHz~26GHz) (802.11n HT40 MODE-Chain 0)



8.8 RADIATED EMISSIONS

8.8.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

LIMITS

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

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 -1710	10.6 -12.7
6.26775 - 6.26825	108 -121.94	1718.8 - 1722.2	13.25 -13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 – 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 -16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	([2])
13.36 - 13.41			

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

[2] Above 38.6

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

§ 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz, However, operation within these frequency bands is permitted under other sections of this Part, e-g, Sections 15.231 and 15.241.

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

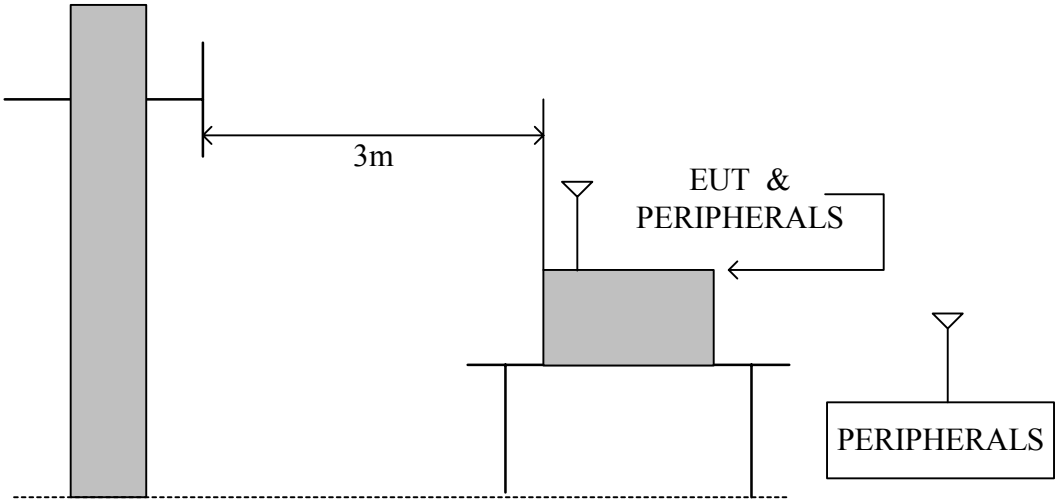
TEST EQUIPMENTS

The following test equipments are utilized in making the measurements contained in this report.

Open Area Test Site # 6				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	R&S	FSEM	829054/017	APR. 14, 2009
Temp./Humidity Chamber	K.SON	THS-M1	242	JUN. 17, 2009
EMI Test Receiver	R&S	ESVS10	833206/012	APR. 15, 2009
Pre-Amplifier	HP	8447F	2944A03817	NOV. 01, 2009
Amplifier	MITEQ	AFSYY-00108650-42-10P-44	1205908	OCT. 24, 2009
Bilog Antenna	Sunol	JB1	A013105-1	SEP. 16, 2009
Horn Antenna	Com-Power	AH-118	71032	DEC. 20, 2009
Turn Table	YO Chen	001	N/A	N.C.R
Antenna Tower	AR	TP100A	N/A	N.C.R
Controller	CT	SC101	N/A	N.C.R
RF Swicth	E-INSTRUMENT TELH LTD	ERS-180-1-2	EC1204141	N.C.R
Power Meter	Anritsu	ML2487A	6K00003888	APR. 15, 2009
Power Sensor	Anritsu	MA2491A	33265	APR. 15, 2009
AC Power Source	T-POWER	TFC-3020	N930010	N.C.R
DC Power Source	LOKO	DSP-5050	L1507009282	N.C.R

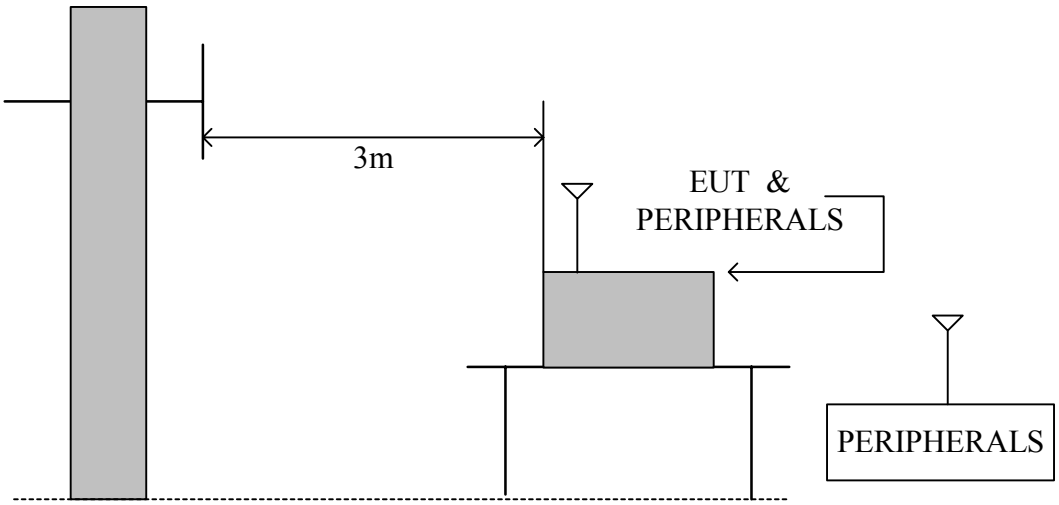
TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 to 1GHz.



Antenna Elevation Variable

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



Antenna Elevation Variable

TEST PROCEDURE

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

b. White measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. White measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE：

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

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

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

4. **No emission is found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)**

TEST RESULTS

No non-compliance noted.