



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

802.11 b/g/n WLAN MODULE

MODEL NUMBER: SDGOB-0991

FCC ID: B94SDGOB0991

REPORT NUMBER: 09U12655-1, Revision c

ISSUE DATE: AUGUST 11, 2009

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	07/31/09	Initial Issue	T. Chan
B	08/10/09	Added setup photos	A. Zaffar
C	08/11/09	Added Col-located MPE	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Hewlett Packard Company
3000 Hanover Street,
Palo Alto, CA 94304 USA

EUT DESCRIPTION: 802.11 b/g/n WLAN MODULE

MODEL: SDGOB-0991

SERIAL NUMBER: 002265E08299A

DATE TESTED: JULY 22-25, 2009

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 2	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For CCS By:



Tested By:



THU CHAN
EMC MANAGER
COMPLIANCE CERTIFICATION SERVICES

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EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. 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.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11 b/g/n WLAN Module.

The radio module is manufactured by HONG FU JIN Precision Industry (Shenzhen) Co., Ltd, Foxconn Network System Group.

The Bluetooth module is manufactured by Hewlwt Packard (Broadcom) ith original FCC ID: FCC ID: B94SDGOB0891 grant on November 22, 2008 by Elliott Laboratories

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	22.00	158.49
2412 - 2462	802.11g	25.80	380.19
2412 - 2462	802.11n HT20	25.60	363.08
2422 - 2452	802.11n HT40	24.20	263.03

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes 802.11b/g/n antenna, with a maximum gain of 2.2 dBi.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was wl_tool, Batch file 4319.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case data rate for each mode is determined to be as follows, based on preliminary tests of the chipset utilized in this radio.

The worst-case data rate for each mode is determined to be as follows, based on input from the manufacturer of the radio.

All final tests in the 802.11b mode were made at 1 Mb/s.
 All final tests in the 802.11g mode were made at 6 Mb/s.
 All final tests in the 802.11n HT20 mode were made at MCS0.
 All final tests in the 802.11n HT40 mode were made at MCS0.

For radiated emissions below 1 GHz the worst-case configuration is determined to be the mode and channel with the highest output power.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	PP09S	27920070721	DoC
AC Adapter	Dell	PA-1650-06D3	CNODF263716156CGF8C9	DoC

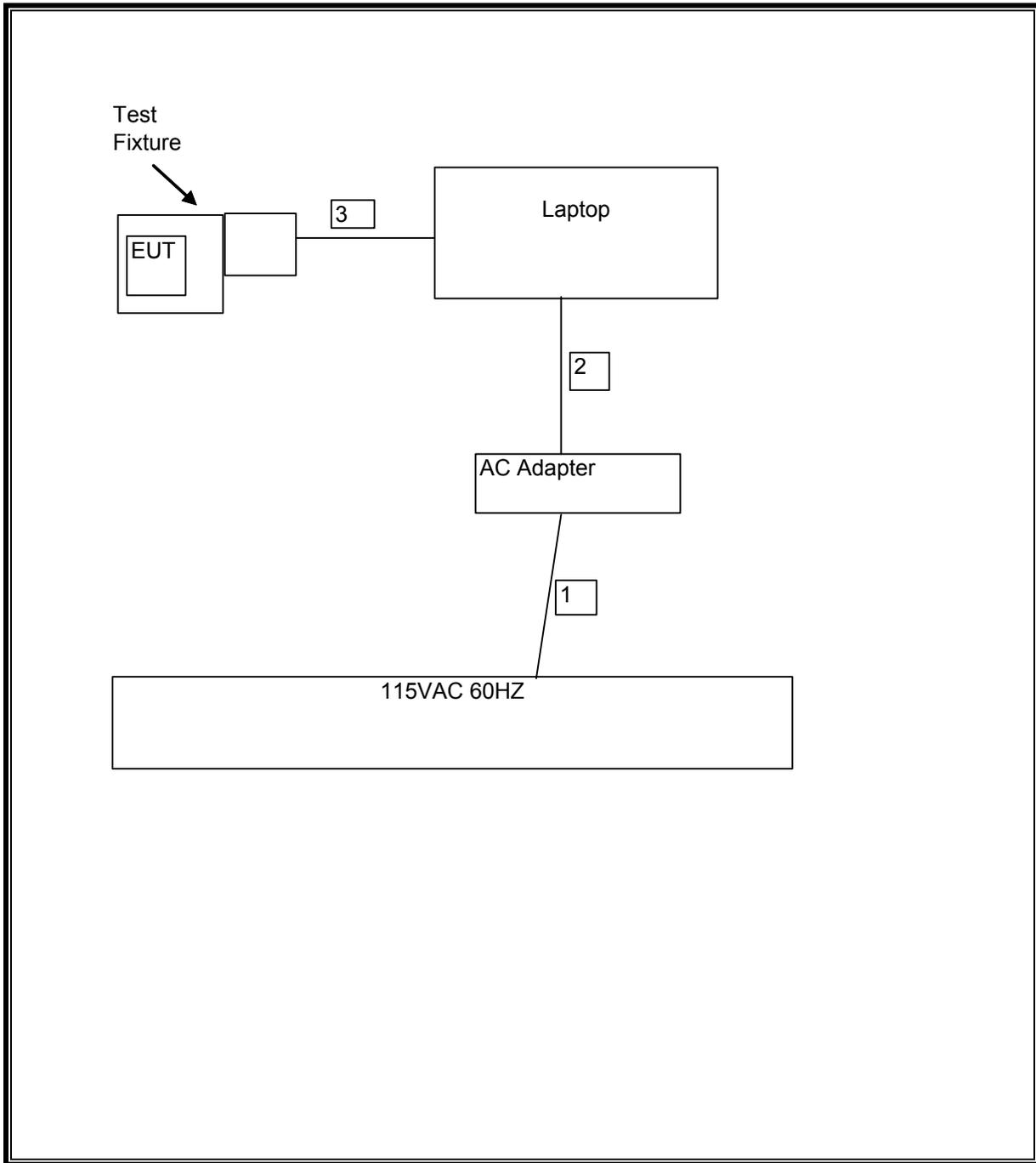
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US 115V	Un-shielded	2m	NA
2	DC	1	DC	Un-shielded	2m	NA
3	USB	1	USB	Un-shielded	2m	NA

TEST SETUP

The EUT is installed in a host laptop computer via a USB cable during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Antenna, Horn, 18 GHz	EMCO	3115	C00872	01/29/10
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	02/04/10
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00778	12/16/09
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	02/03/10
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/06/09
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/09
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
Peak Power Meter	Boonton	4541	C01186	11/19/10
Peak Power Sensor	Boonton	57318	N/A	02/02/10
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	01/14/10

7. ANTENNA PORT TEST RESULTS

7.1. 802.11b MODE IN THE 2.4 GHz BAND

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

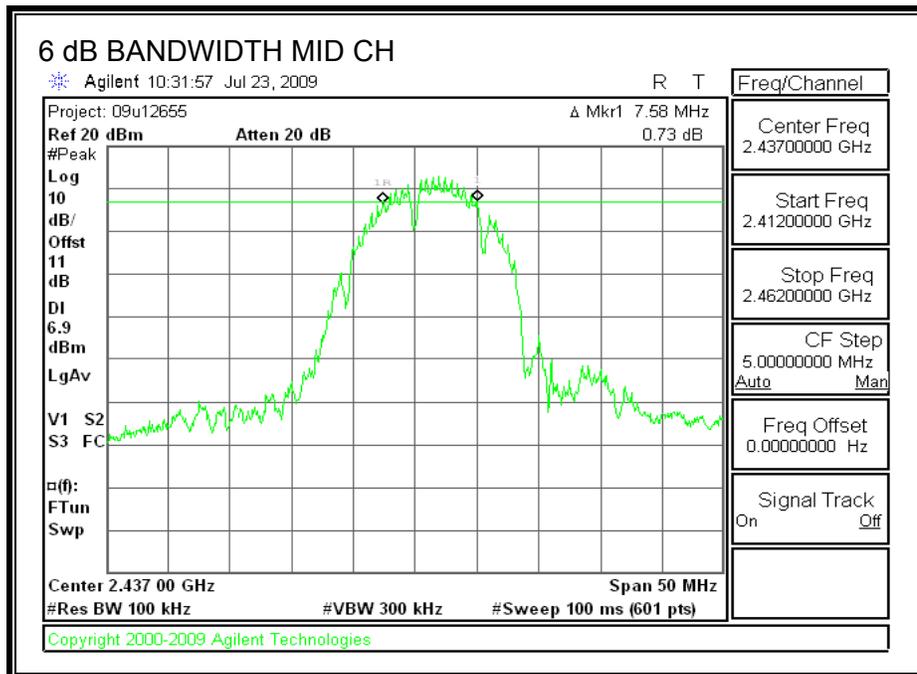
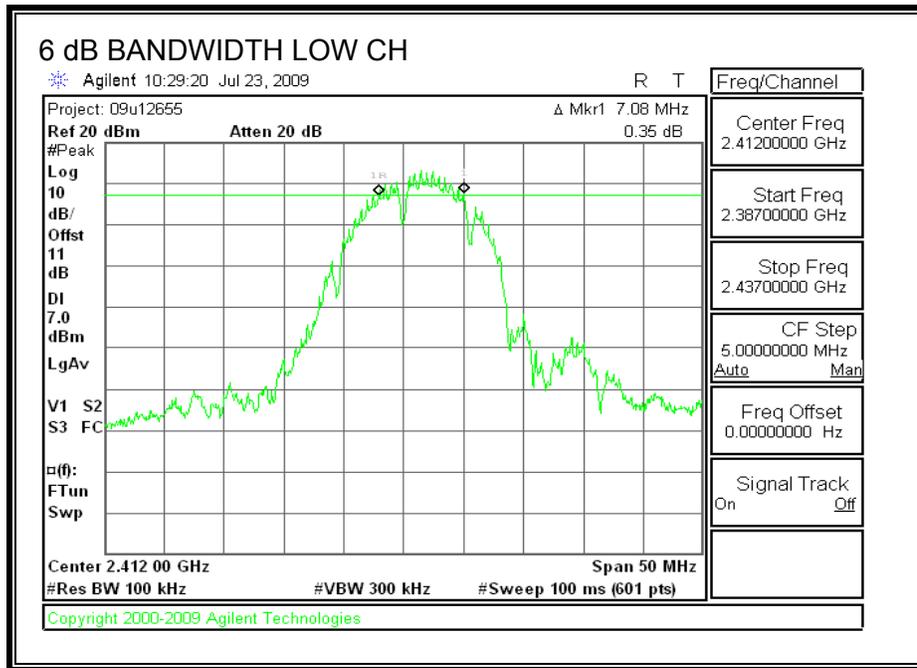
TEST PROCEDURE

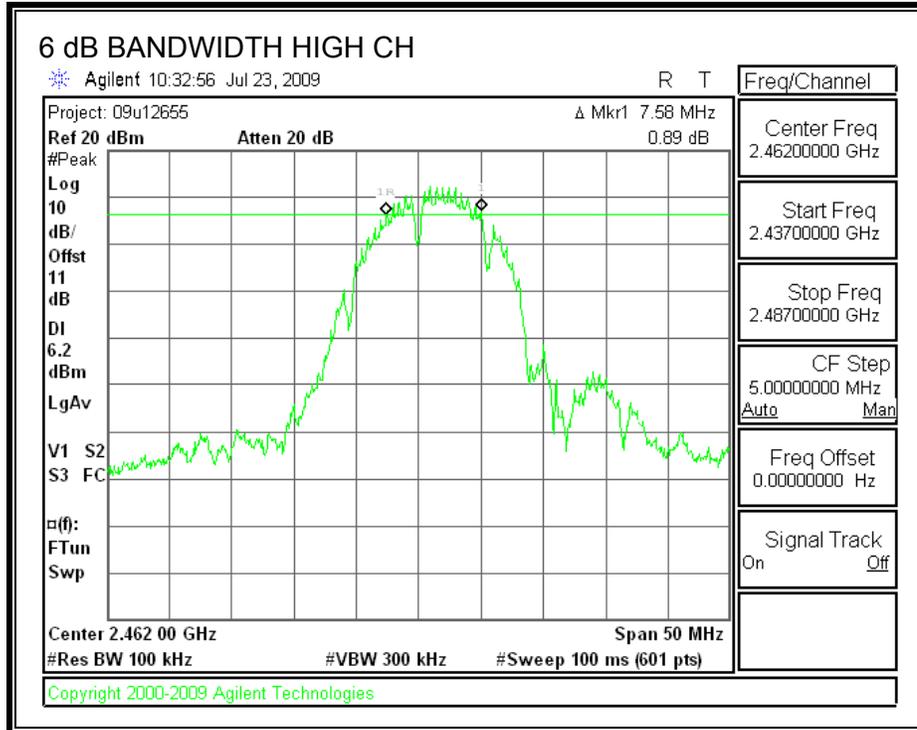
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	7.08	0.5
Middle	2437	7.58	0.5
High	2462	7.58	0.5

6 dB BANDWIDTH





7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

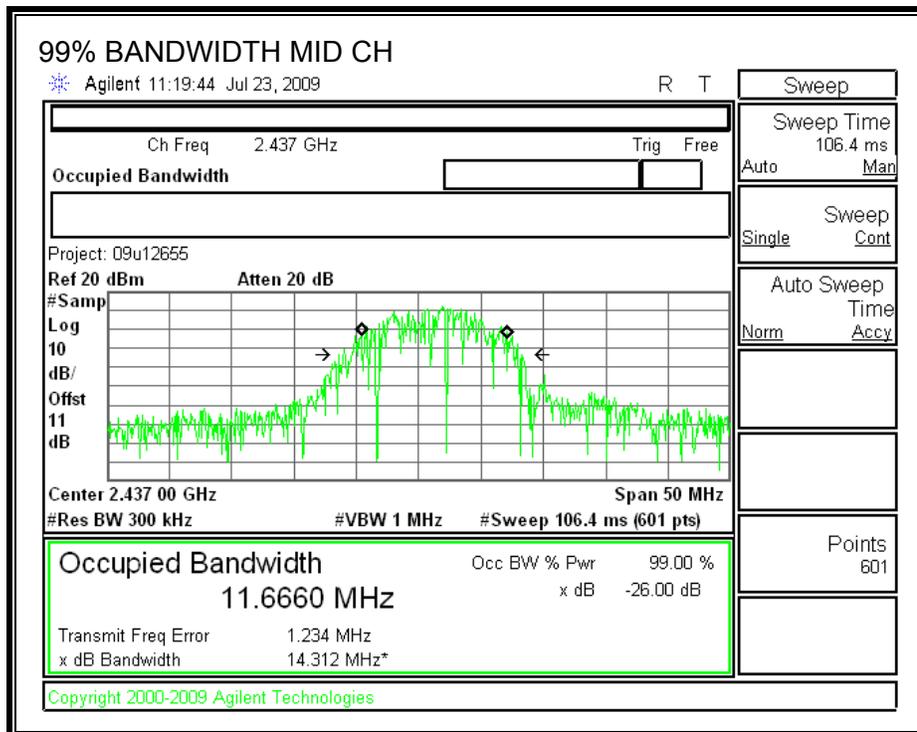
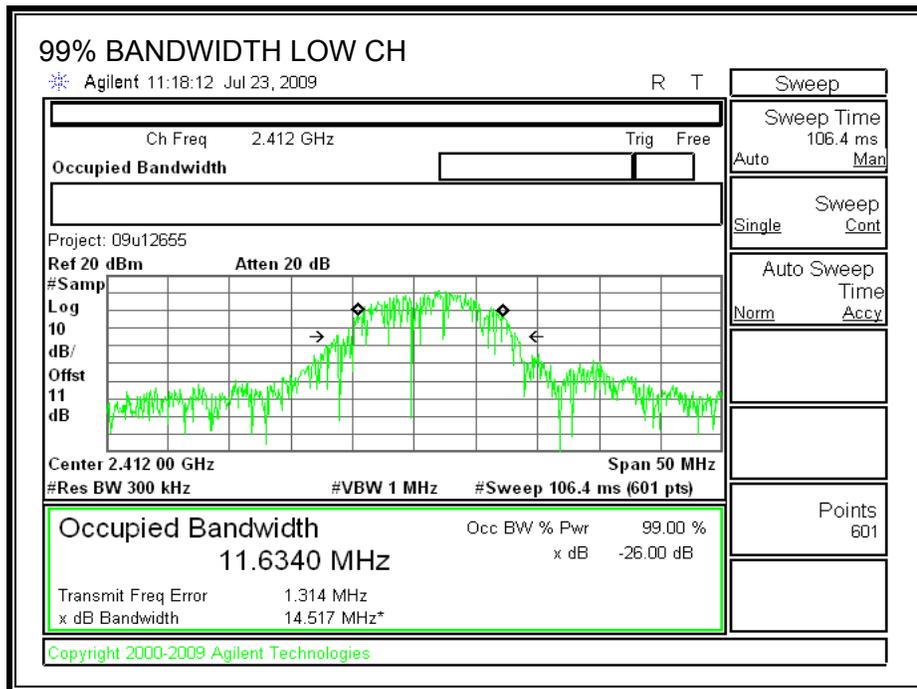
TEST PROCEDURE

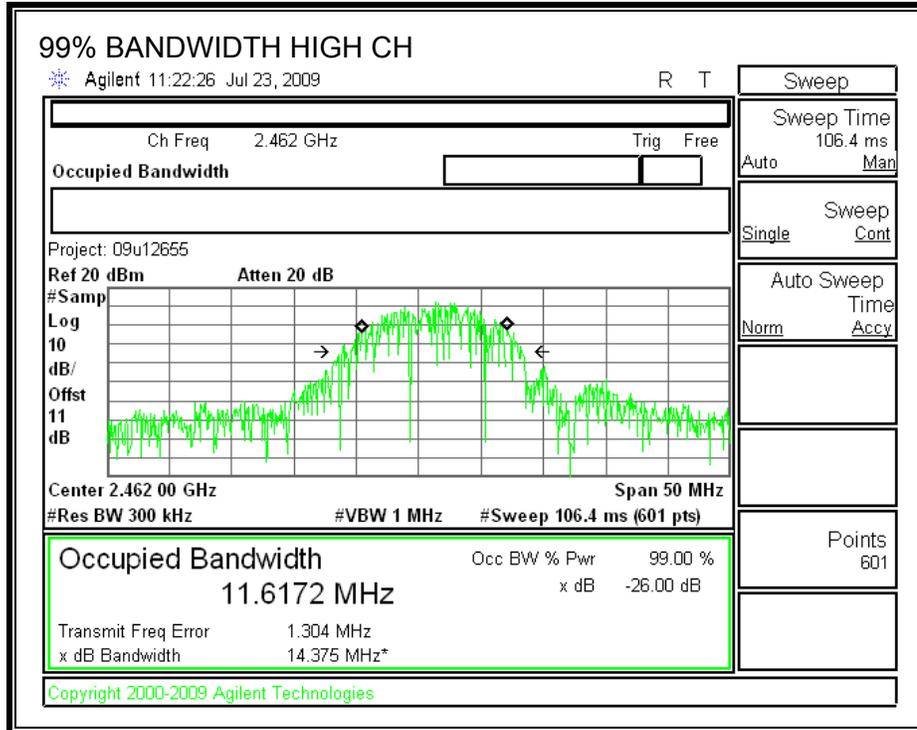
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	11.634
Middle	2437	11.666
High	2462	11.617

99% BANDWIDTH





7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a Boonton Power Meter

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1dB cable) was entered as an offset in the power meter to allow for direct reading of power

Channel	Frequency (MHz)	Spectrum Analyzer Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	21.7	30	-8.30
Middle	2437	22	30	-8.00
High	2462	21.9	30	-8.10

7.1.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

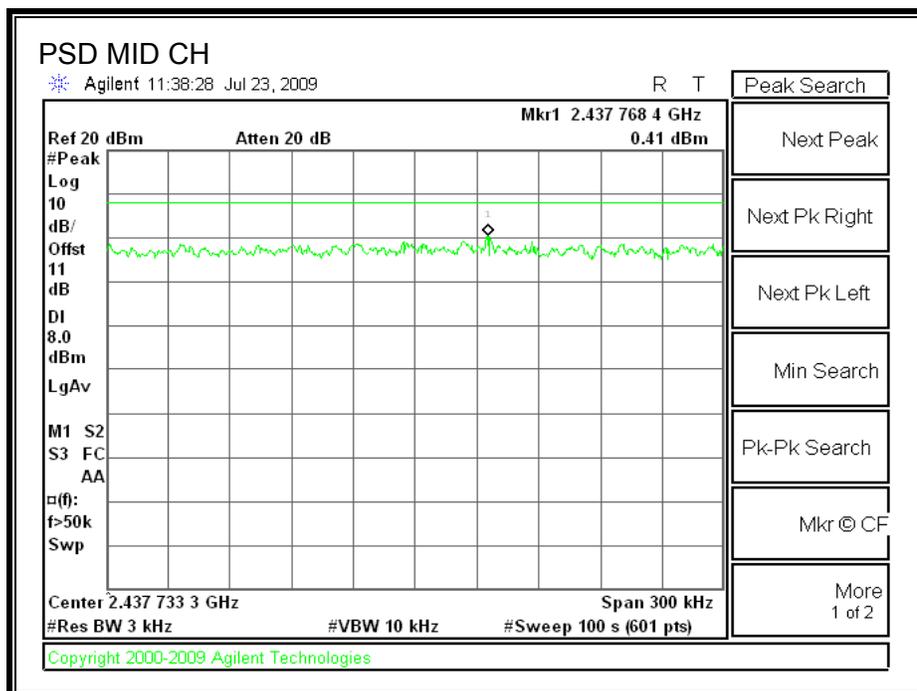
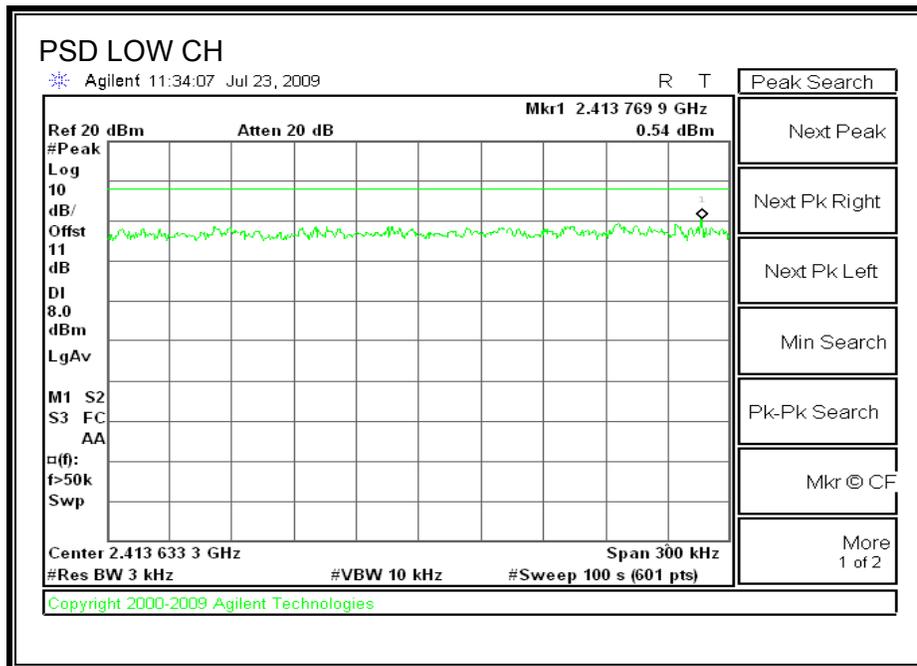
TEST PROCEDURE

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	0.54	8	-7.46
Middle	2437	0.41	8	-7.59
High	2462	-1.09	8	-9.09

POWER SPECTRAL DENSITY



7.1.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

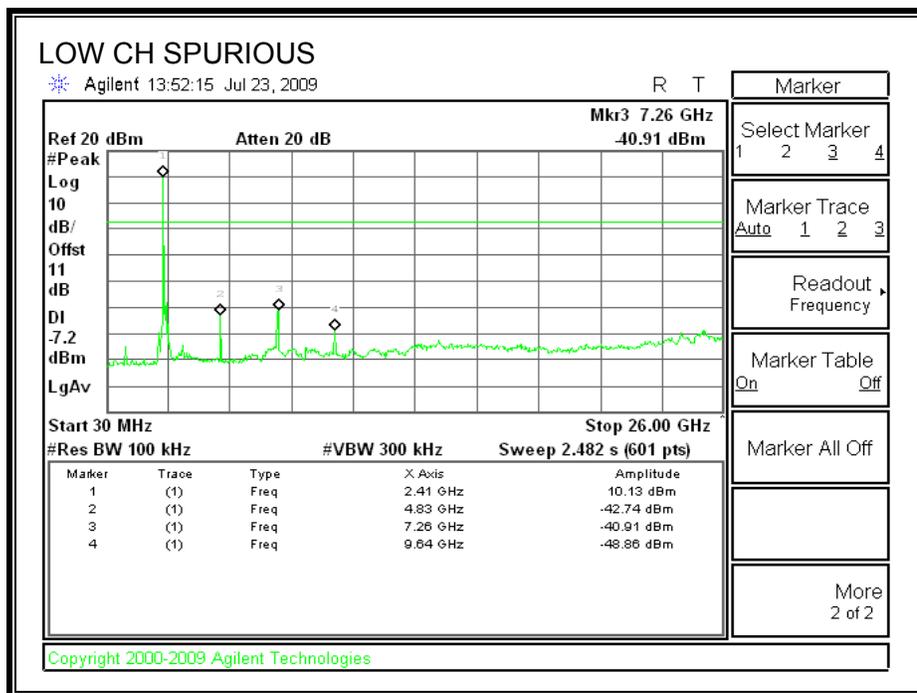
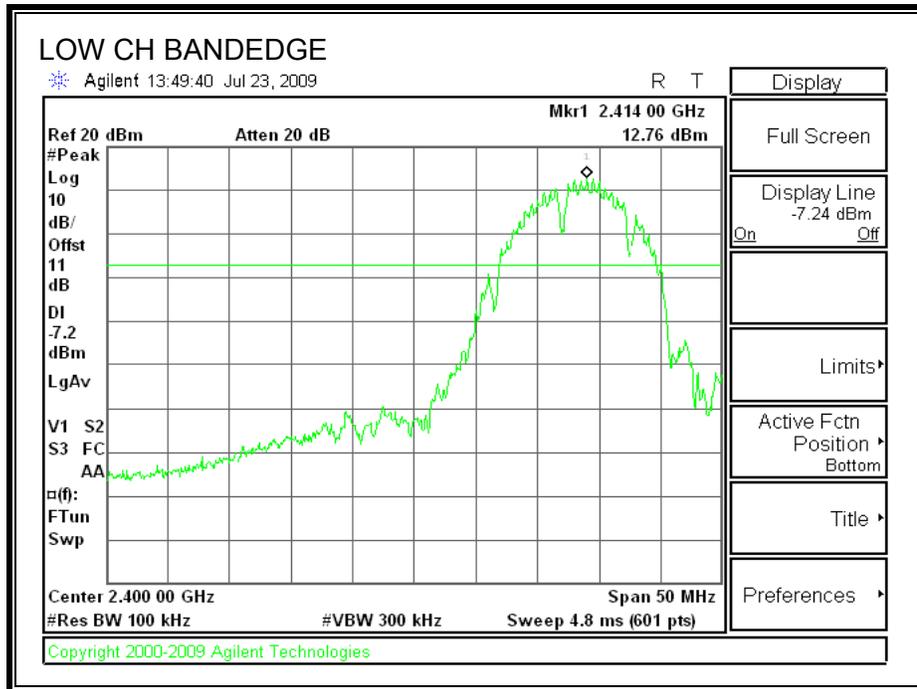
TEST PROCEDURE

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.

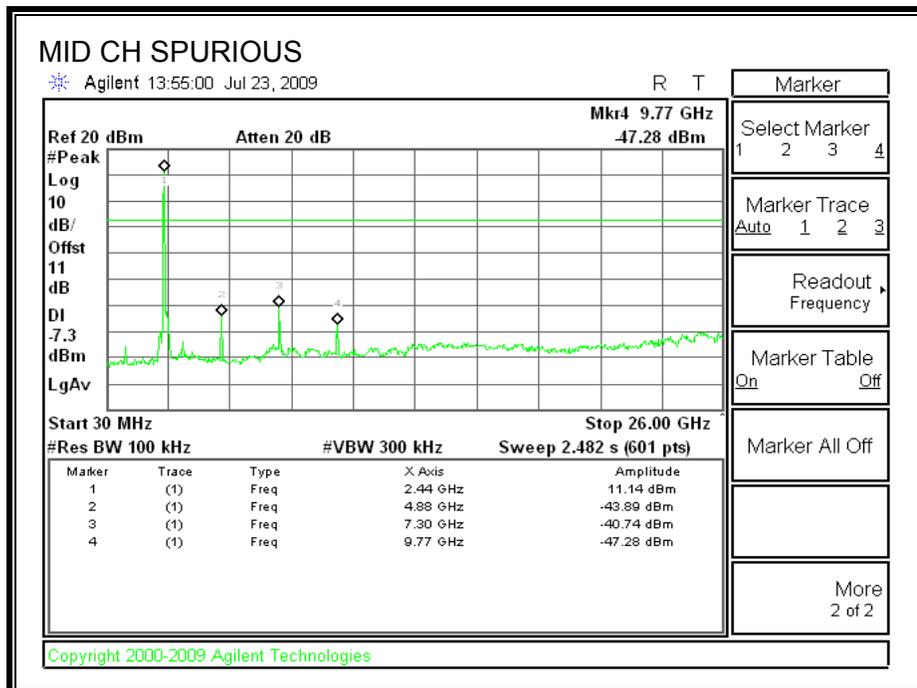
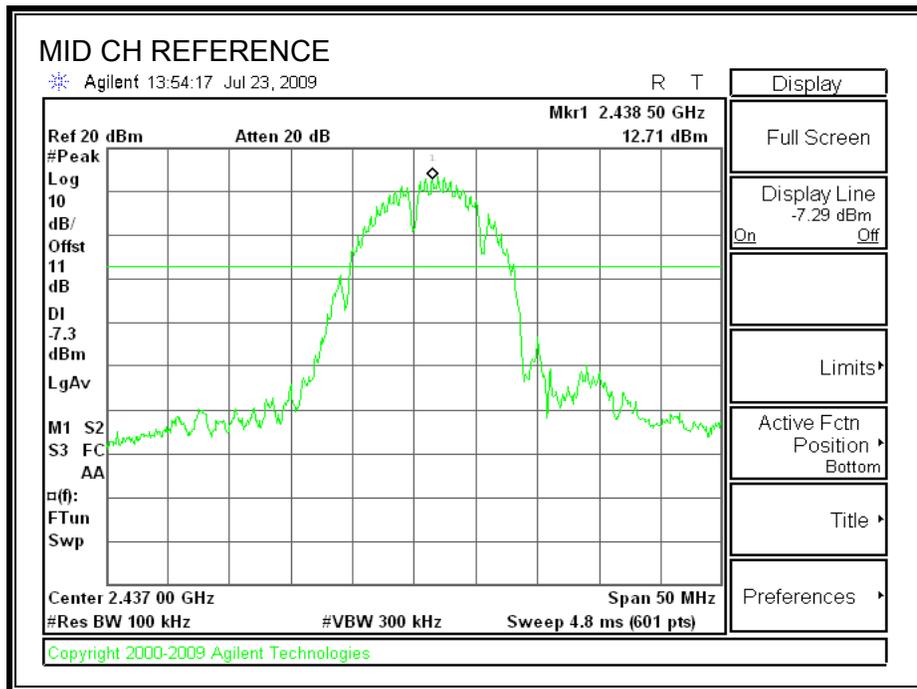
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

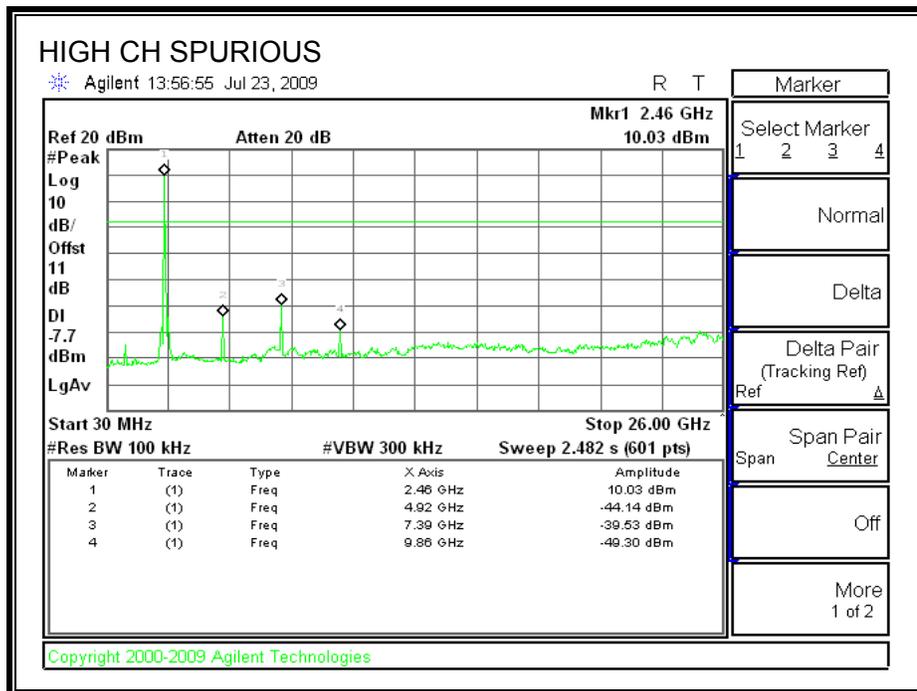
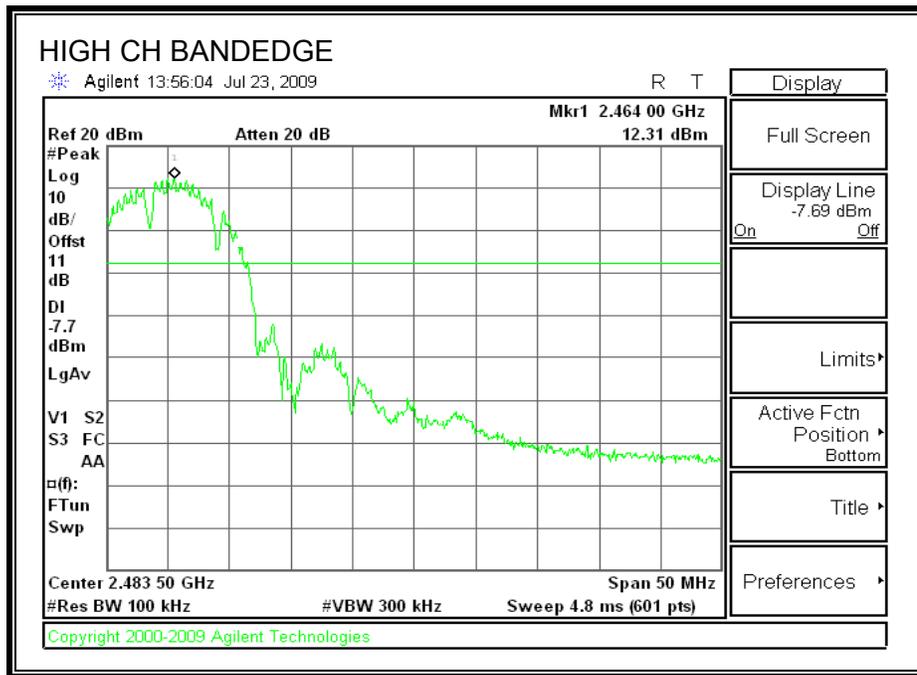
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



7.2. 802.11g MODE IN THE 2.4 GHz BAND

7.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

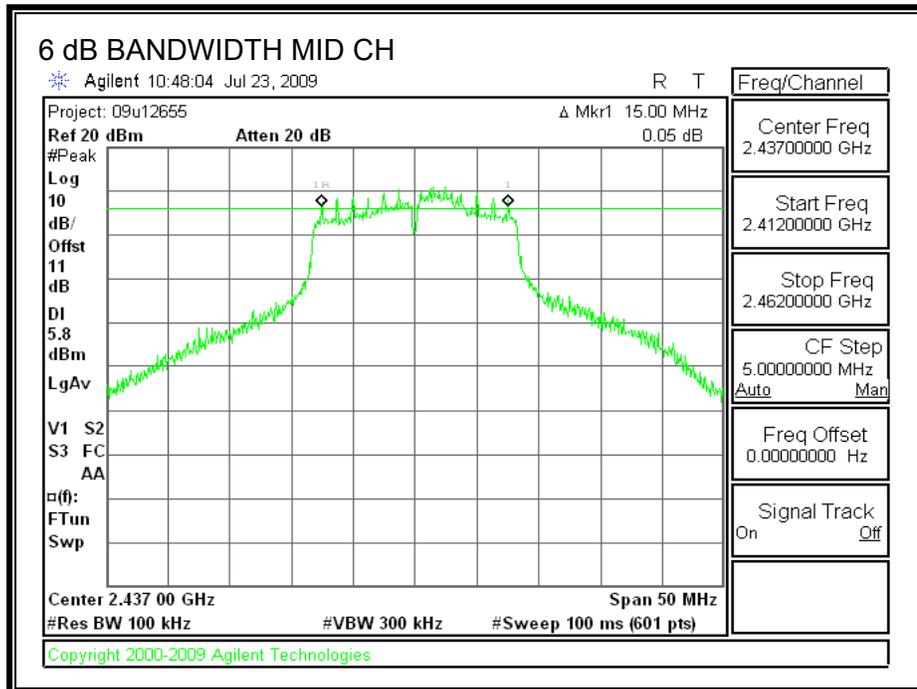
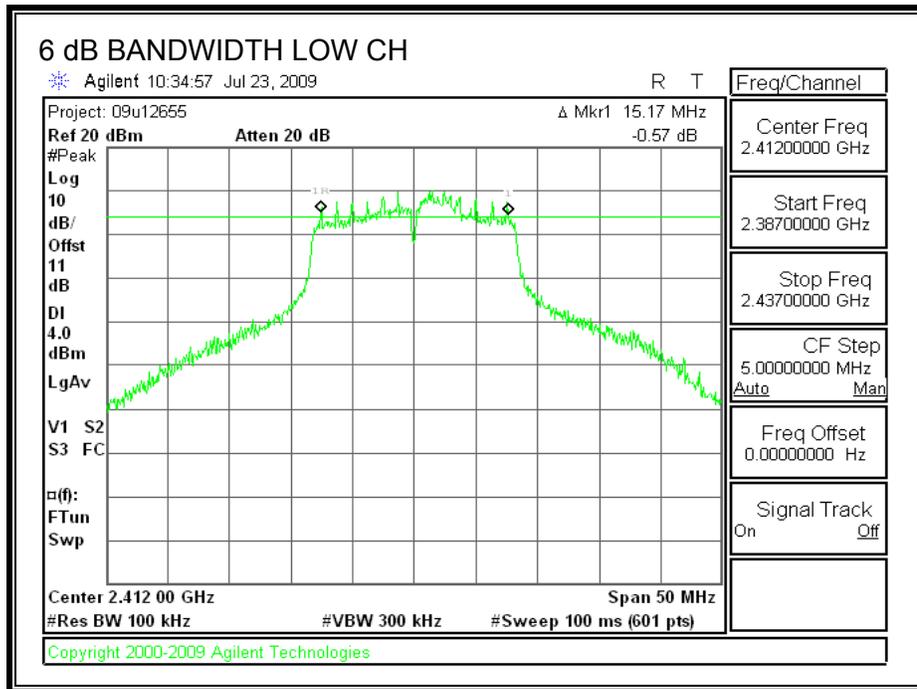
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.17	0.5
Middle	2437	15.00	0.5
High	2462	15.17	0.5

6 dB BANDWIDTH



7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

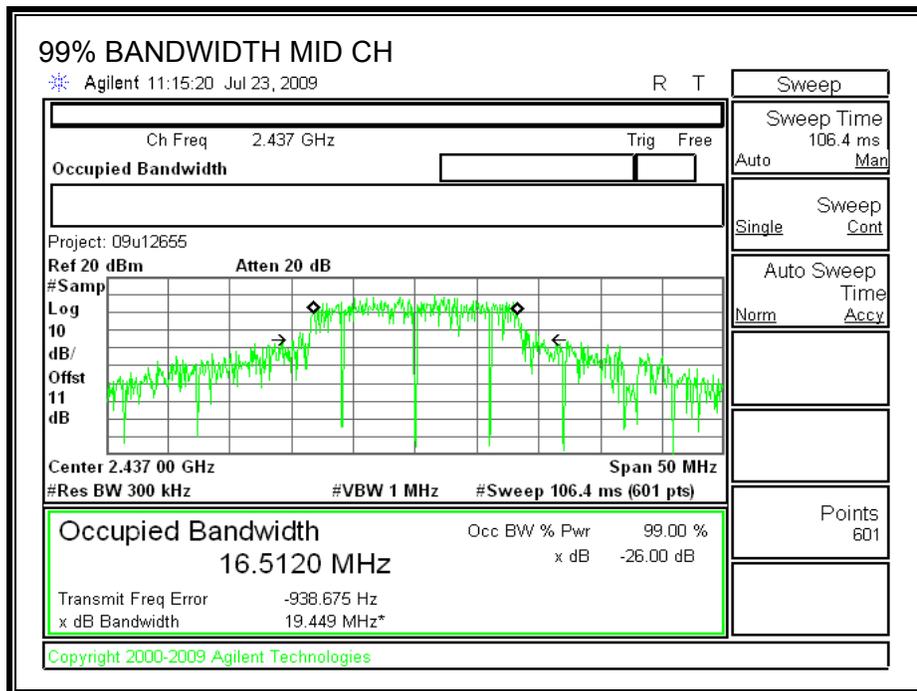
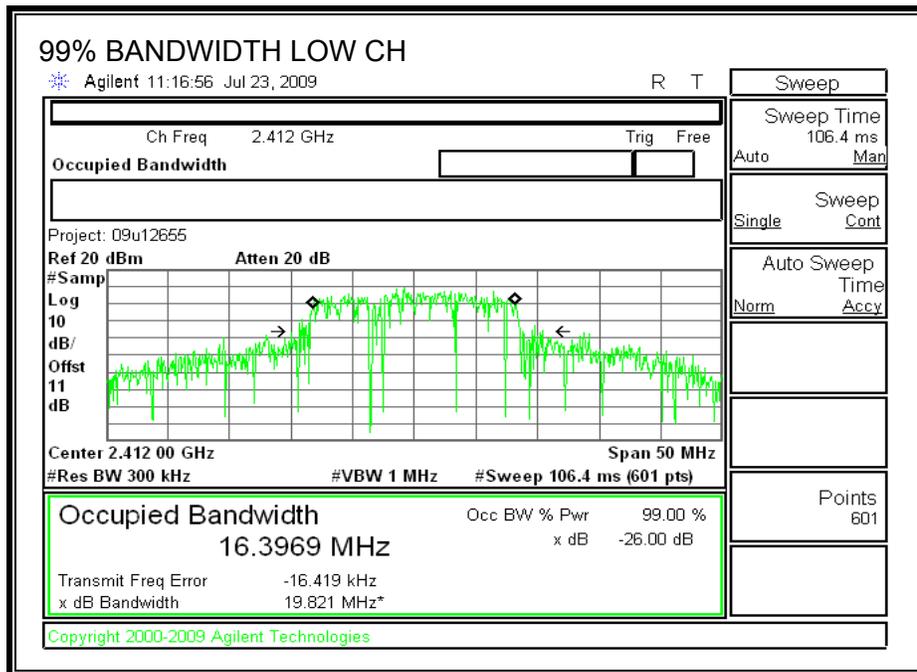
TEST PROCEDURE

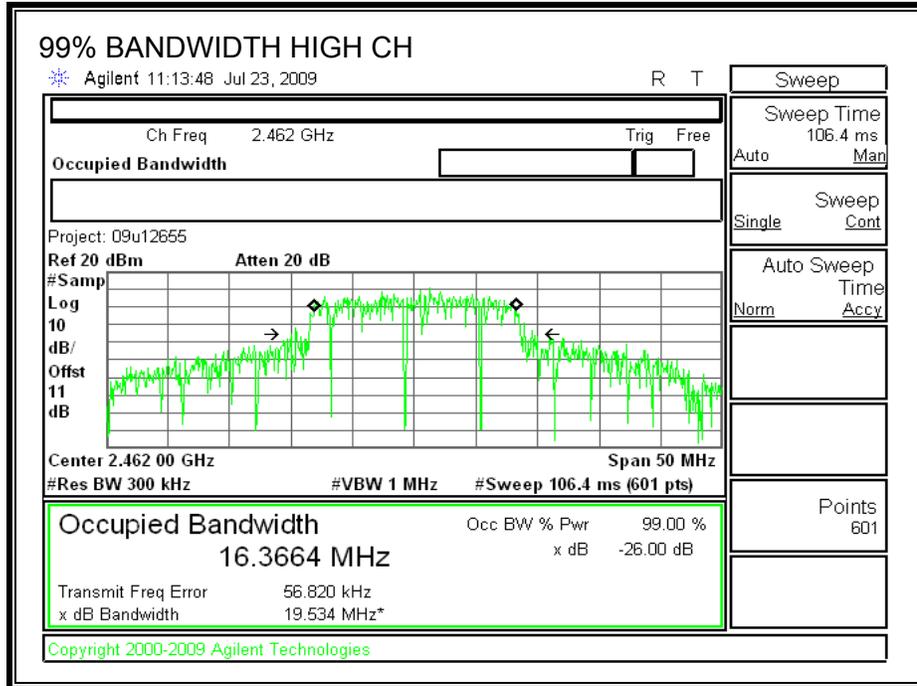
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.3969
Middle	2437	16.5120
High	2462	16.3664

99% BANDWIDTH





7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a Boonton Power Meter

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1dB cable) was entered as an offset in the power meter to allow for direct reading of power

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	25.50	30	-4.50
Middle	2437	25.80	30	-4.20
High	2462	25.50	30	-4.50

7.2.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

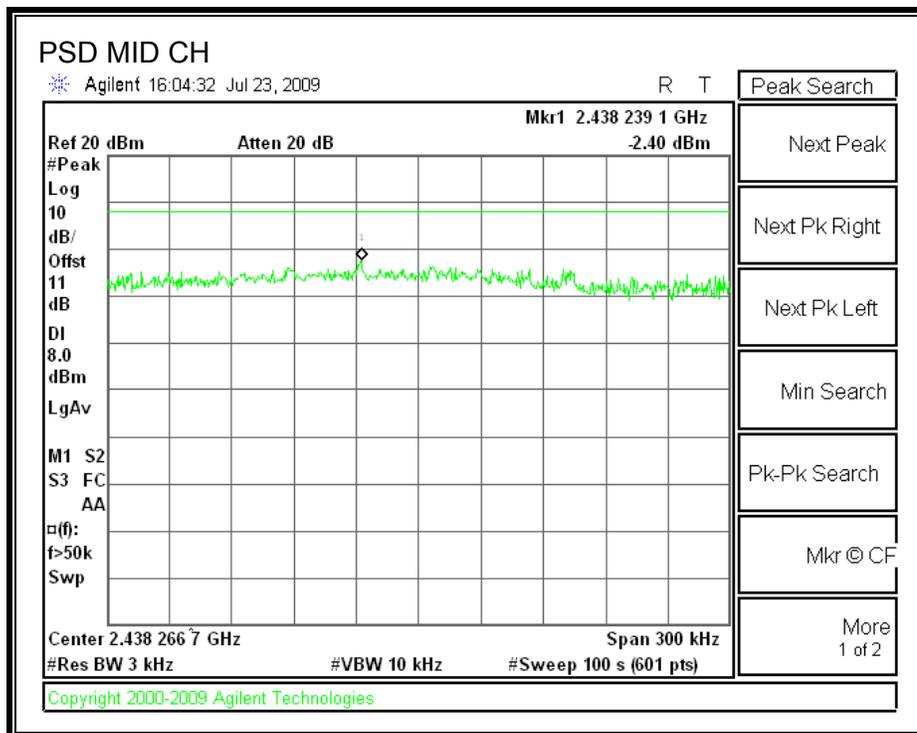
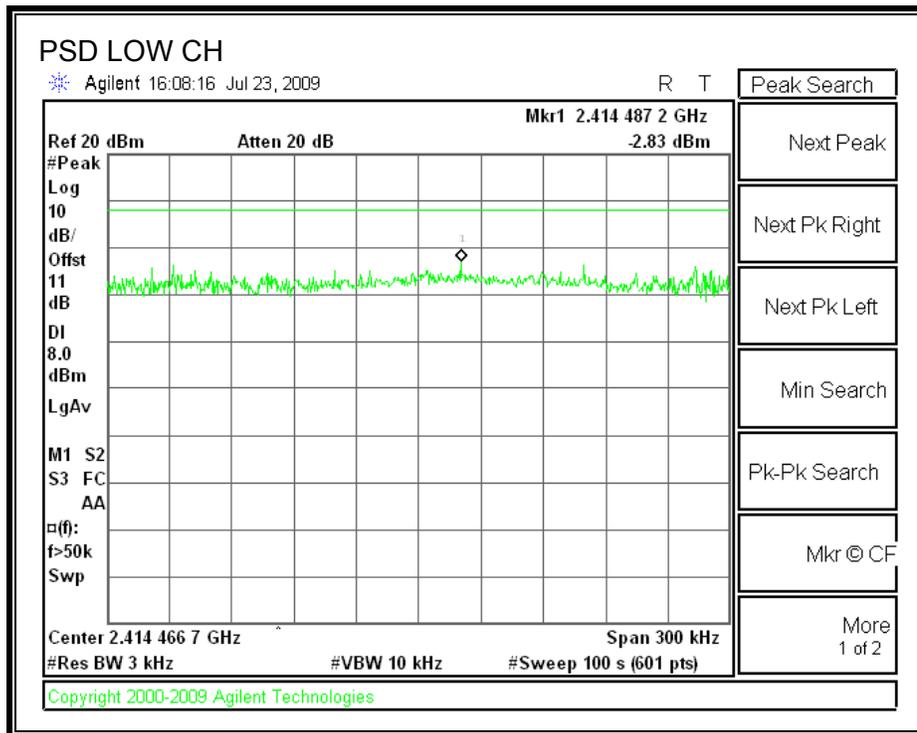
TEST PROCEDURE

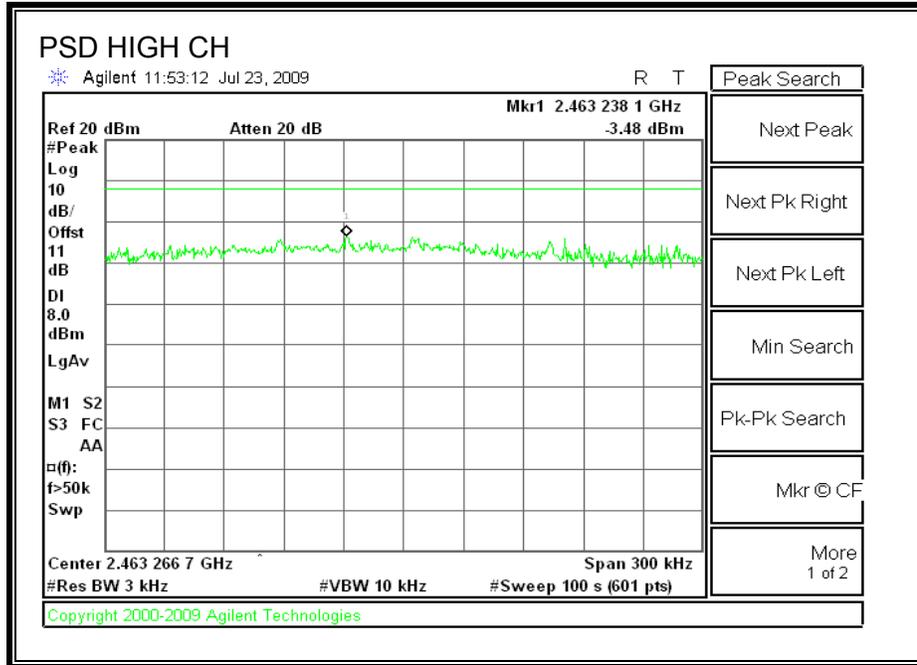
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-2.83	8	-10.83
Middle	2437	-2.40	8	-10.40
High	2462	-3.48	8	-11.48

POWER SPECTRAL DENSITY





7.2.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

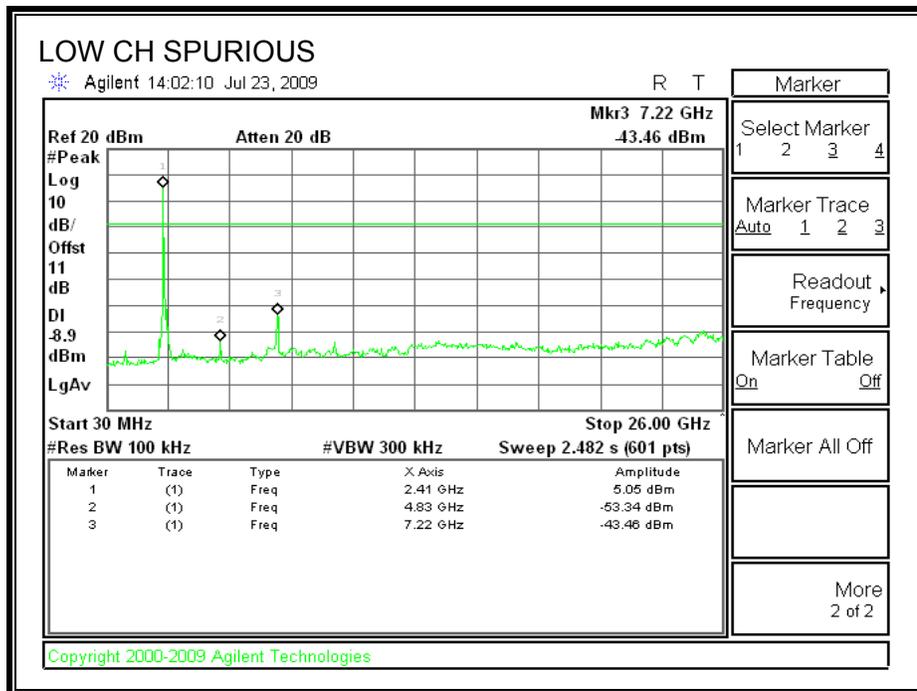
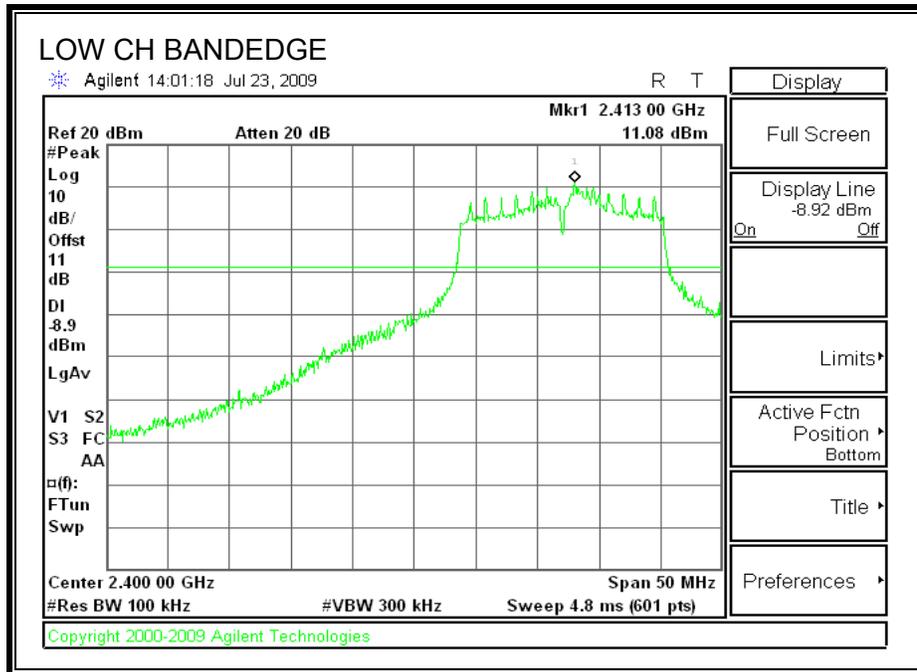
TEST PROCEDURE

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.

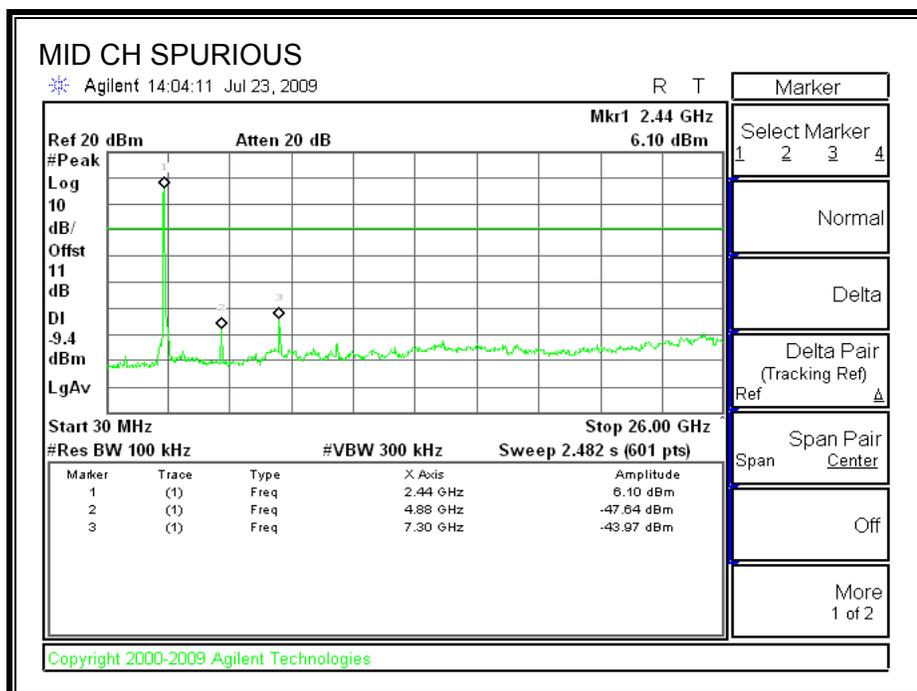
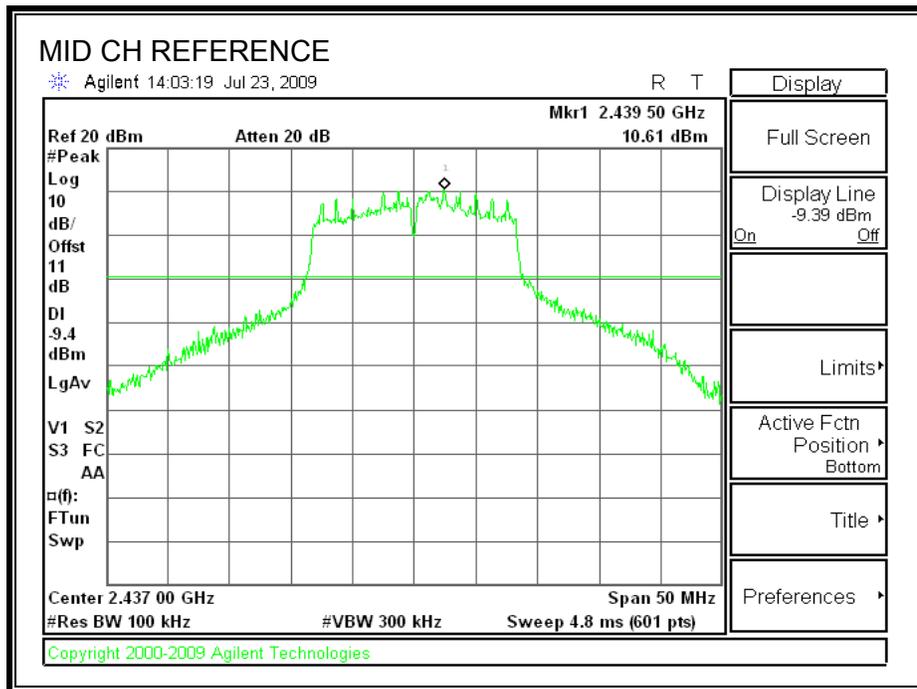
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

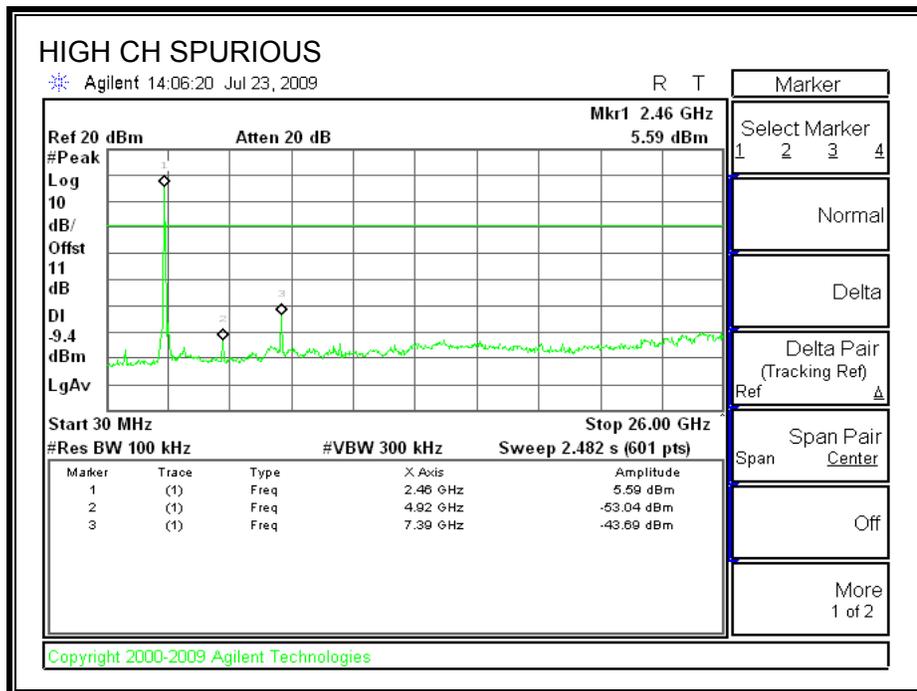
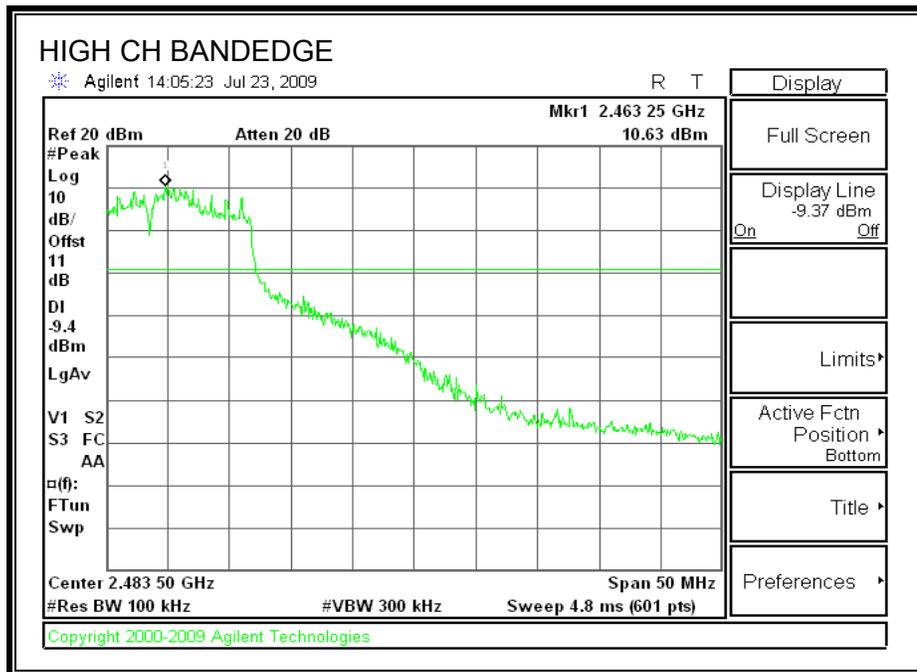
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



7.3. 802.11 HT20 MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

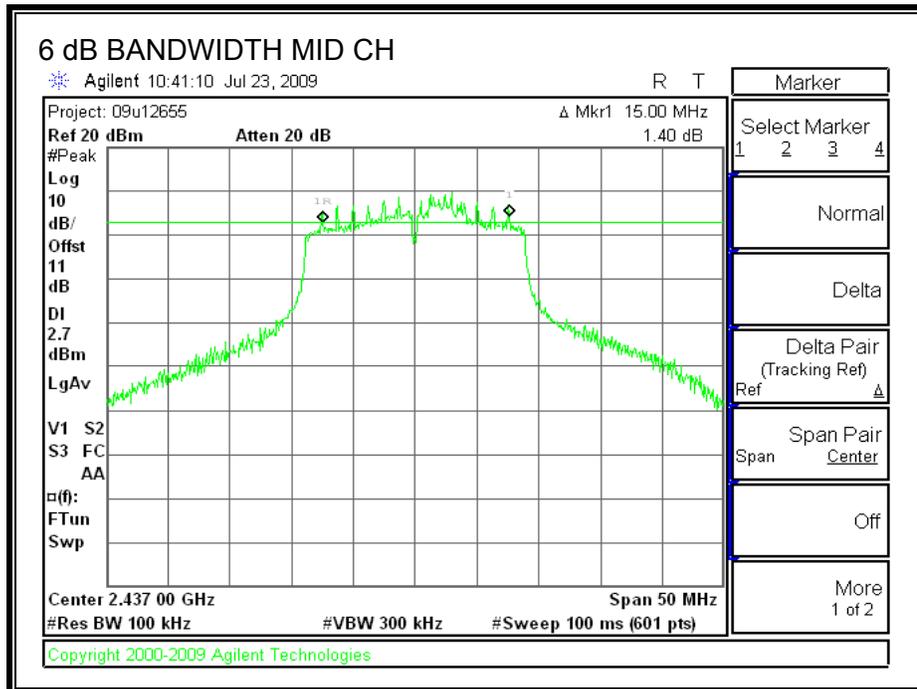
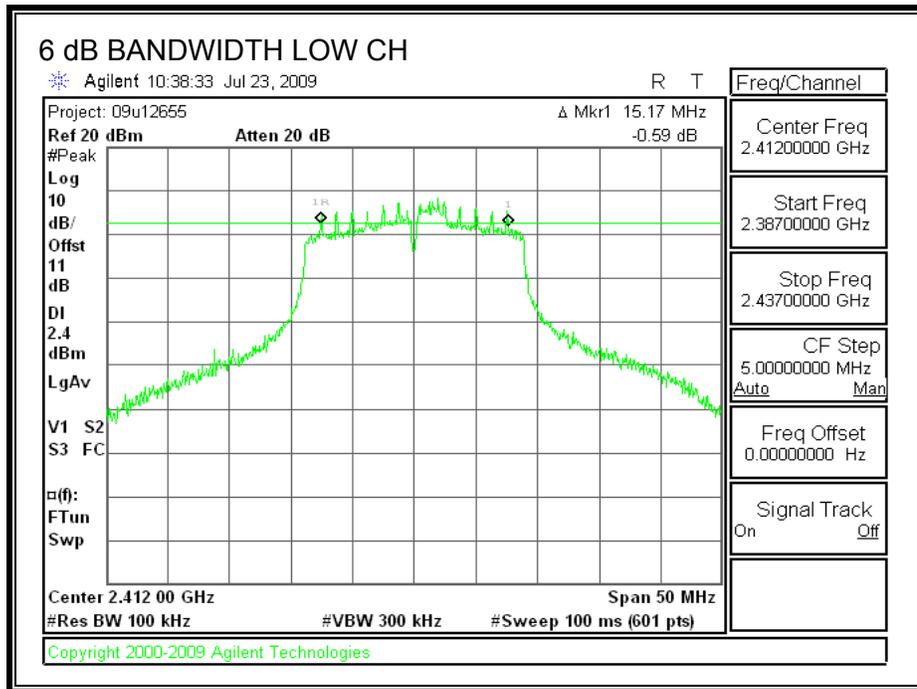
TEST PROCEDURE

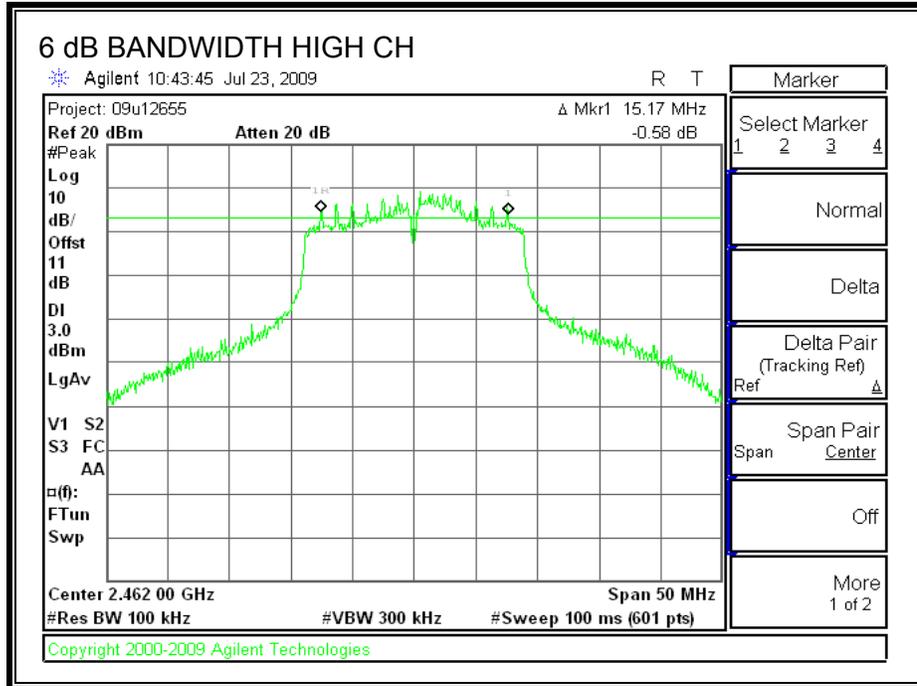
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.17	0.5
Middle	2437	15.00	0.5
High	2462	15.17	0.5

6 dB BANDWIDTH





7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

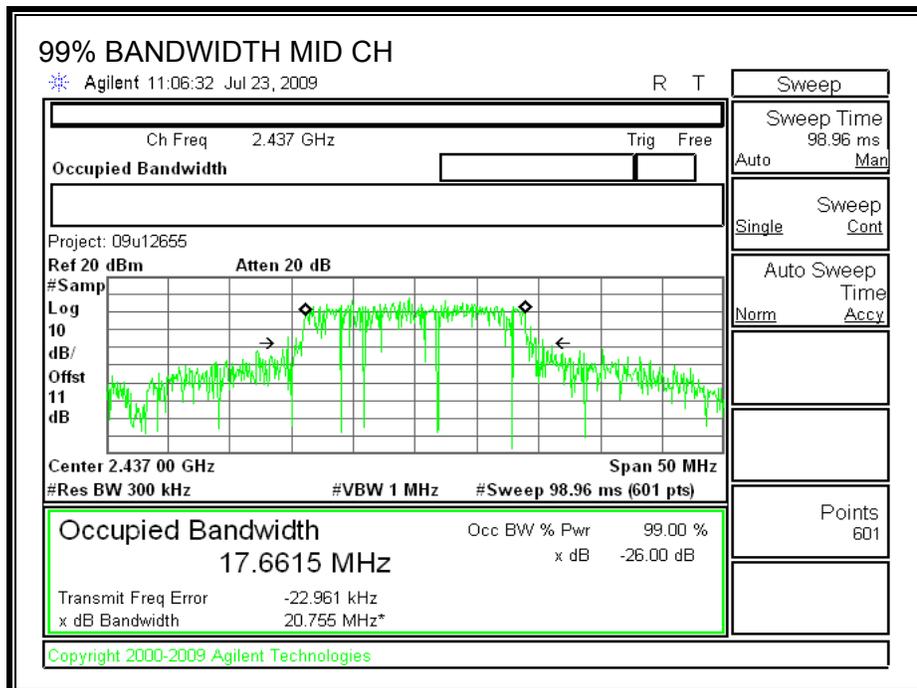
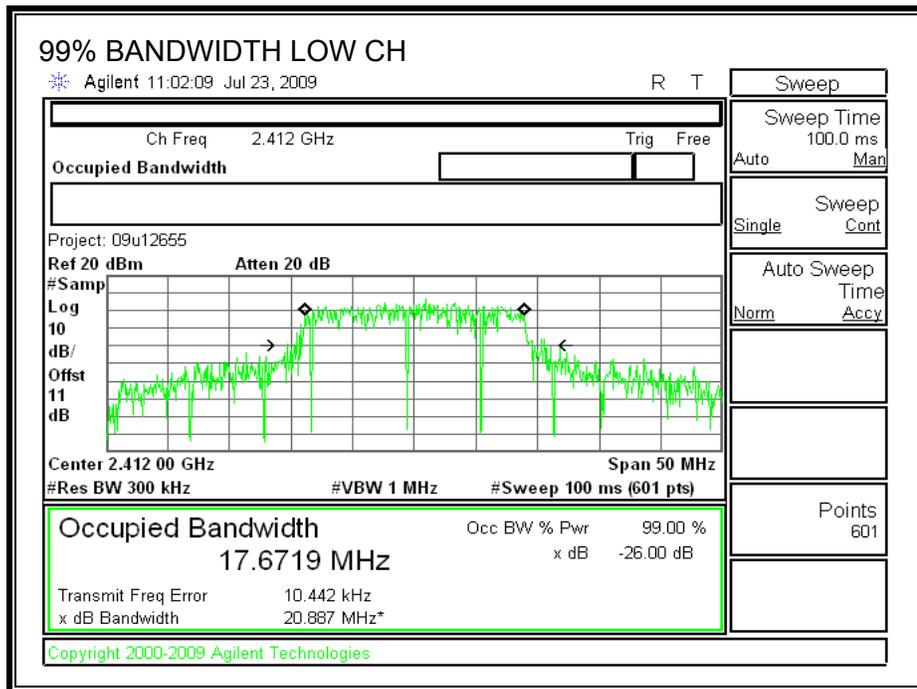
TEST PROCEDURE

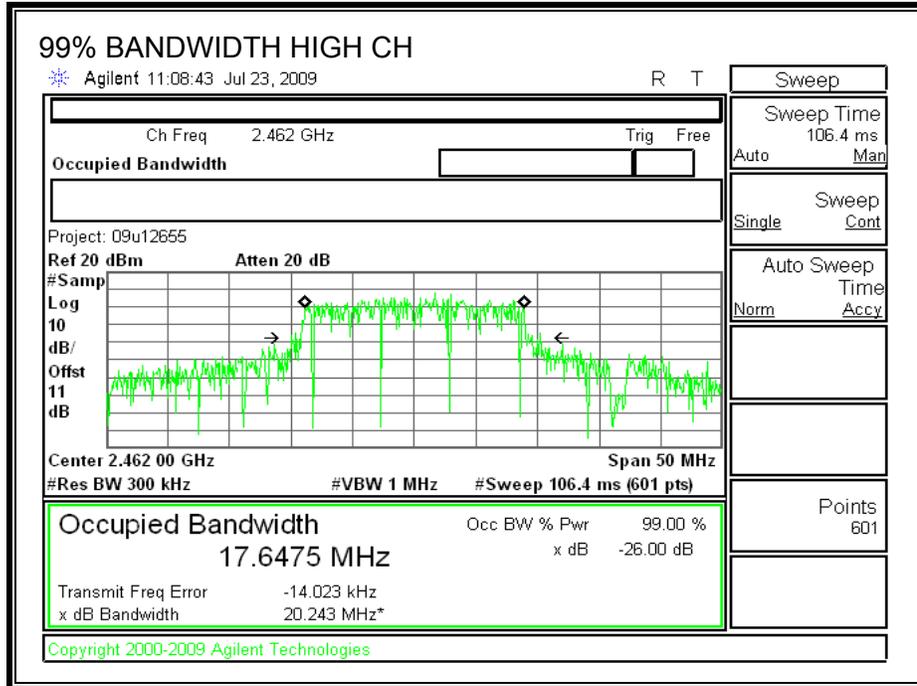
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.6719
Middle	2437	17.6615
High	2462	17.6475

99% BANDWIDTH





7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a Boonton Power Meter

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1dB cable) was entered as an offset in the power meter to allow for direct reading of power

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	25.15	30	-4.85
Middle	2437	25.60	30	-4.40
High	2462	25.00	30	-5.00

7.3.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

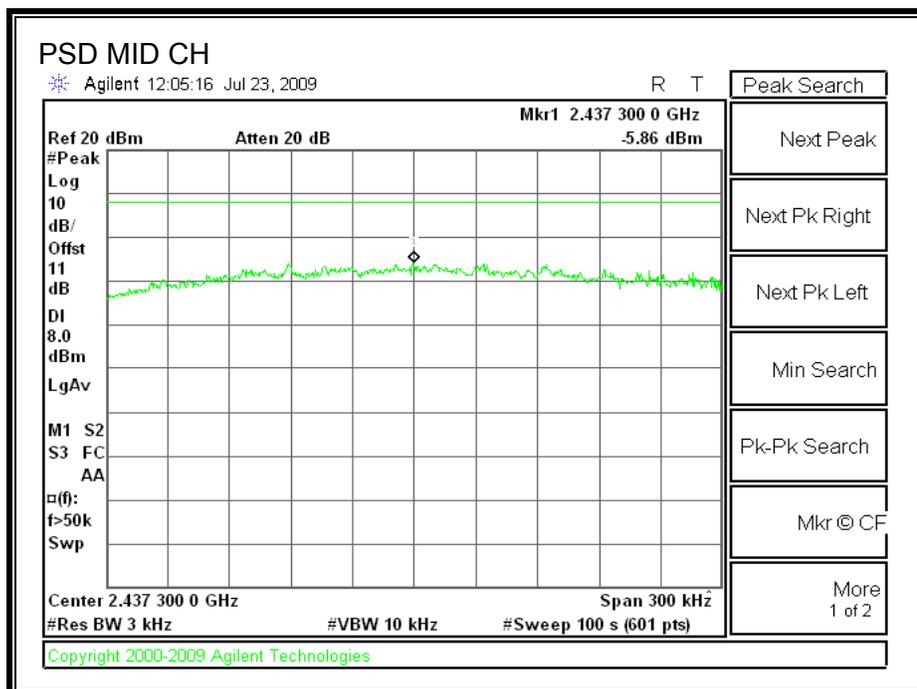
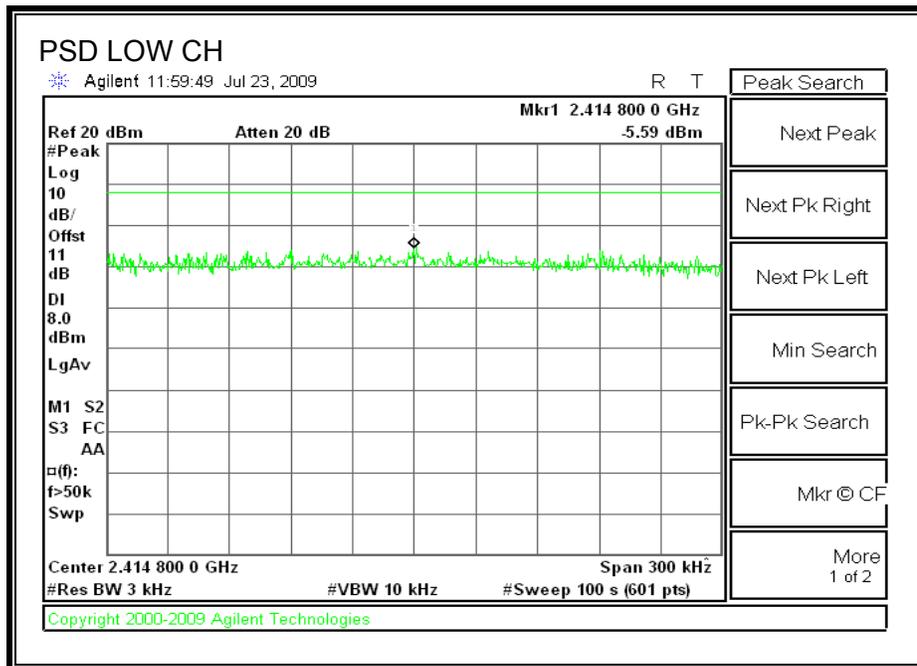
TEST PROCEDURE

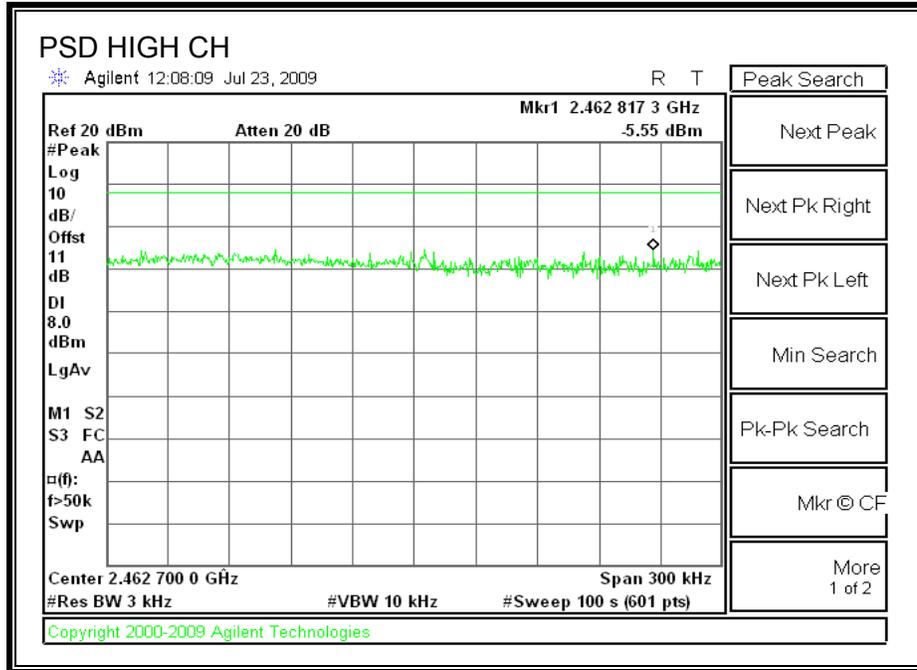
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-5.59	8	-13.59
Middle	2437	-5.86	8	-13.86
High	2462	-5.55	8	-13.55

POWER SPECTRAL DENSITY





7.3.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

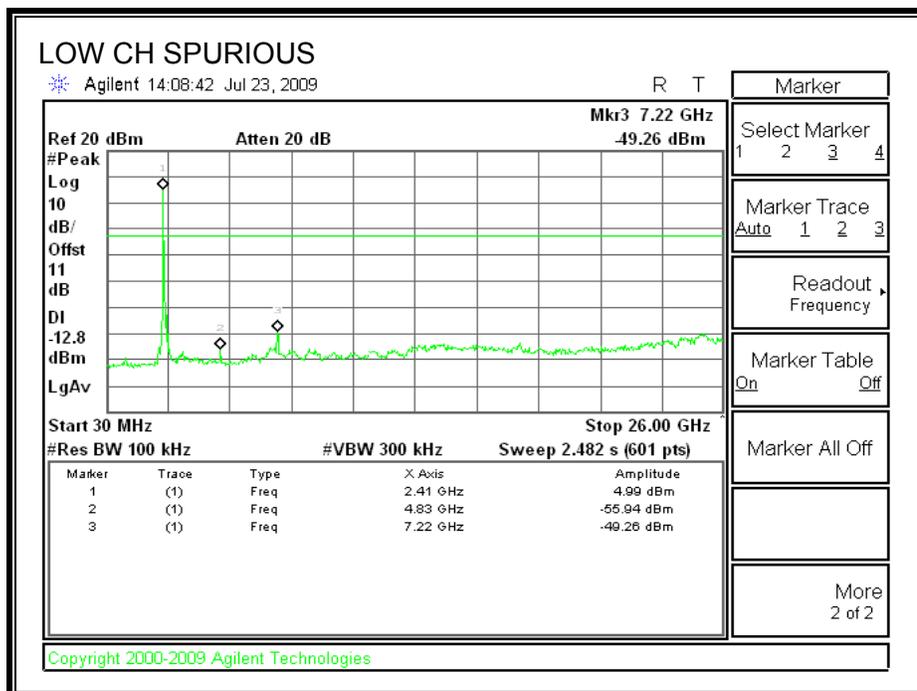
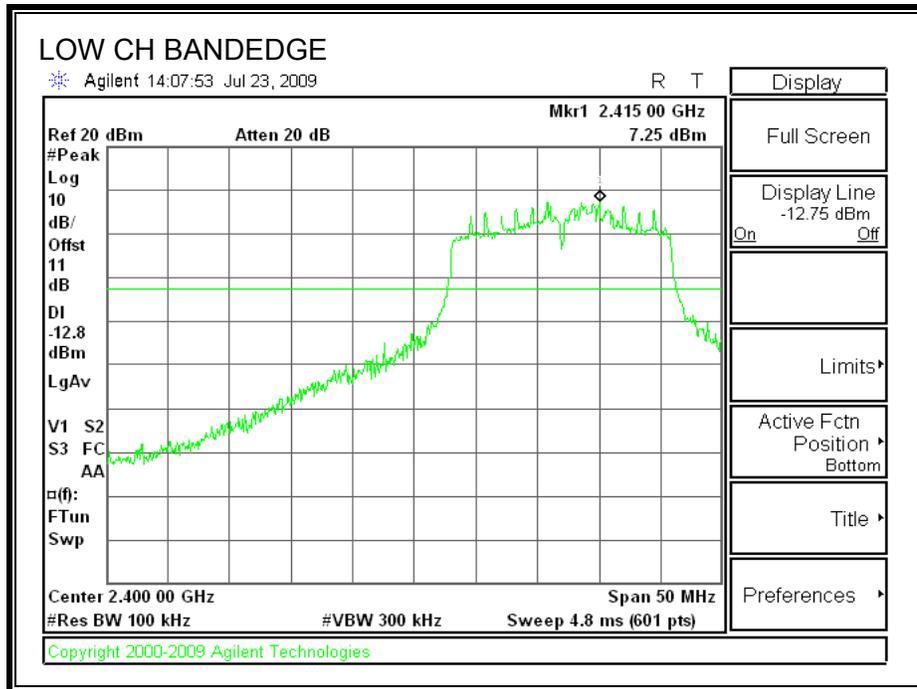
TEST PROCEDURE

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.

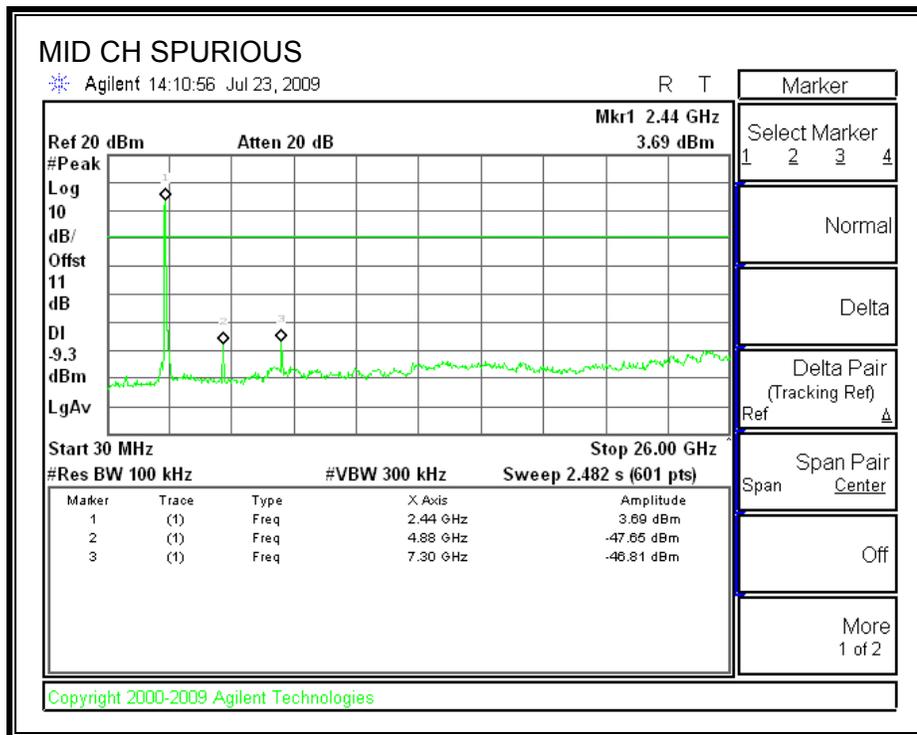
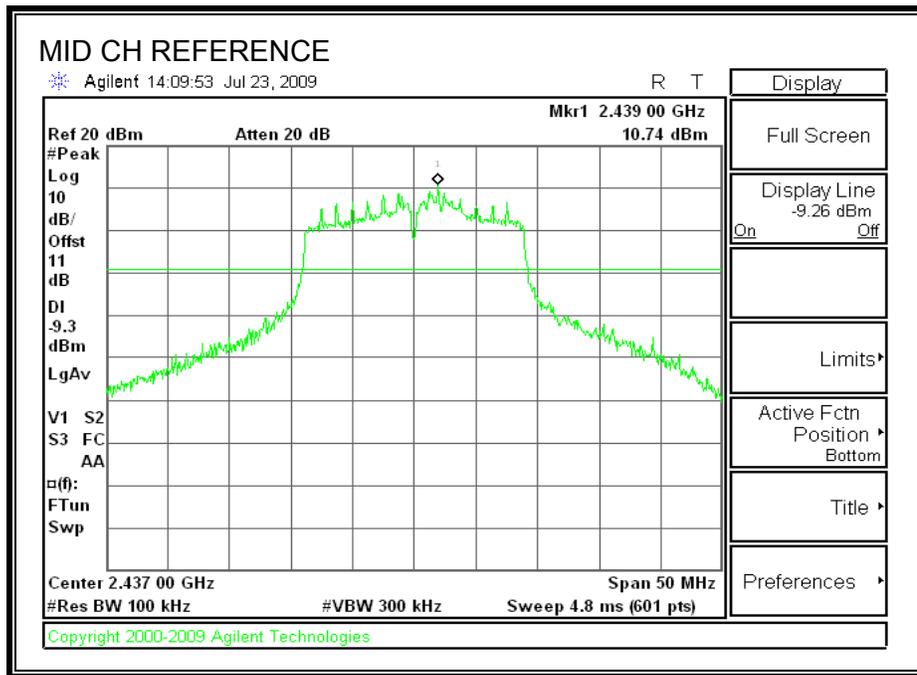
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

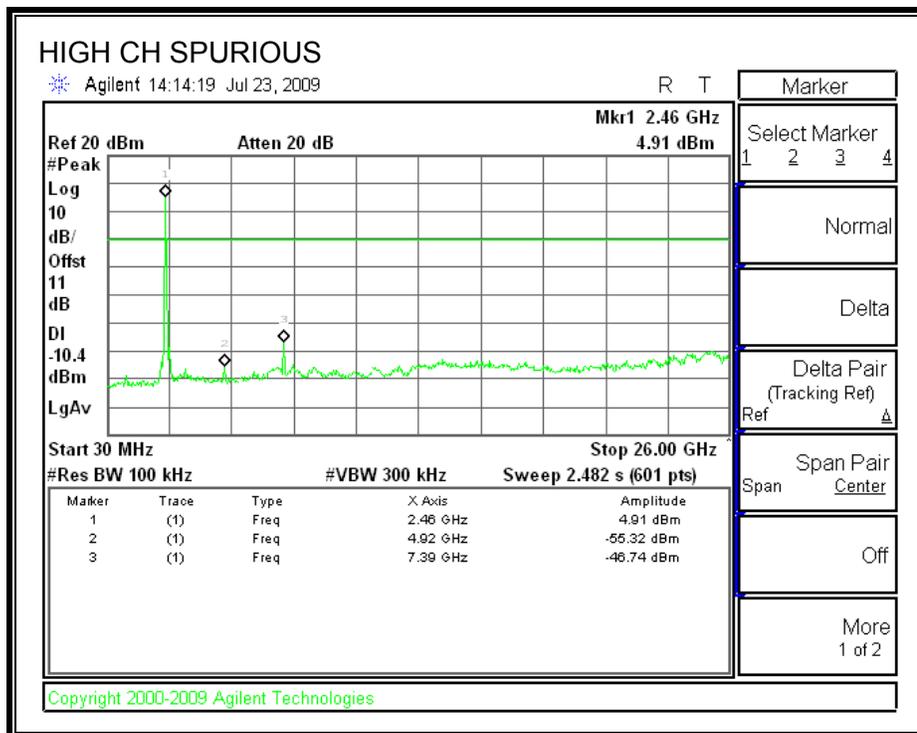
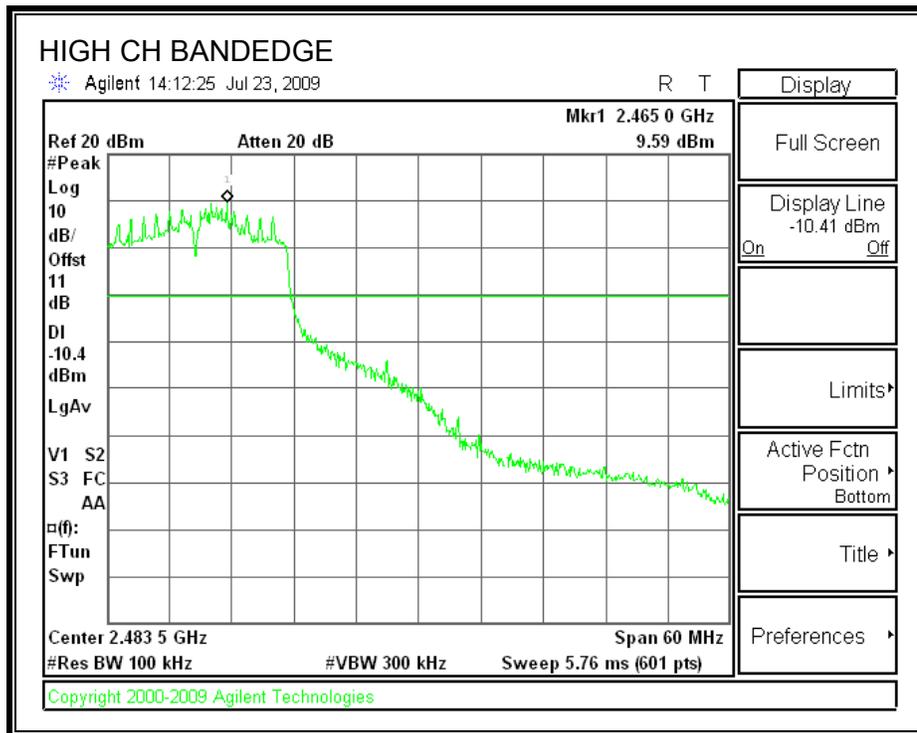
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



7.4. 802.11 HT40 MODE IN THE 2.4 GHz BAND

7.4.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

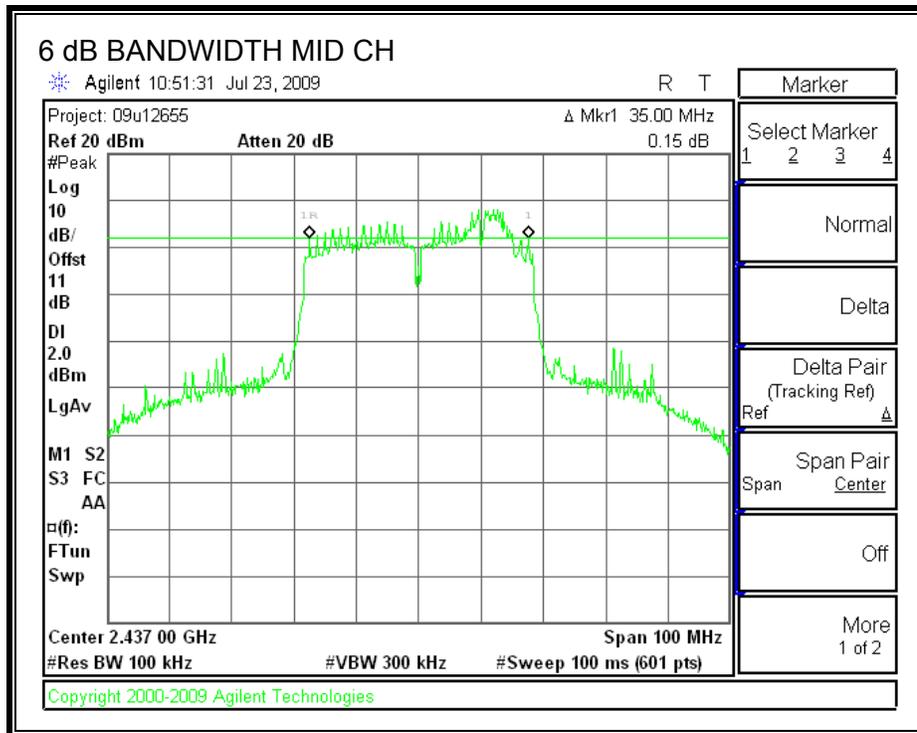
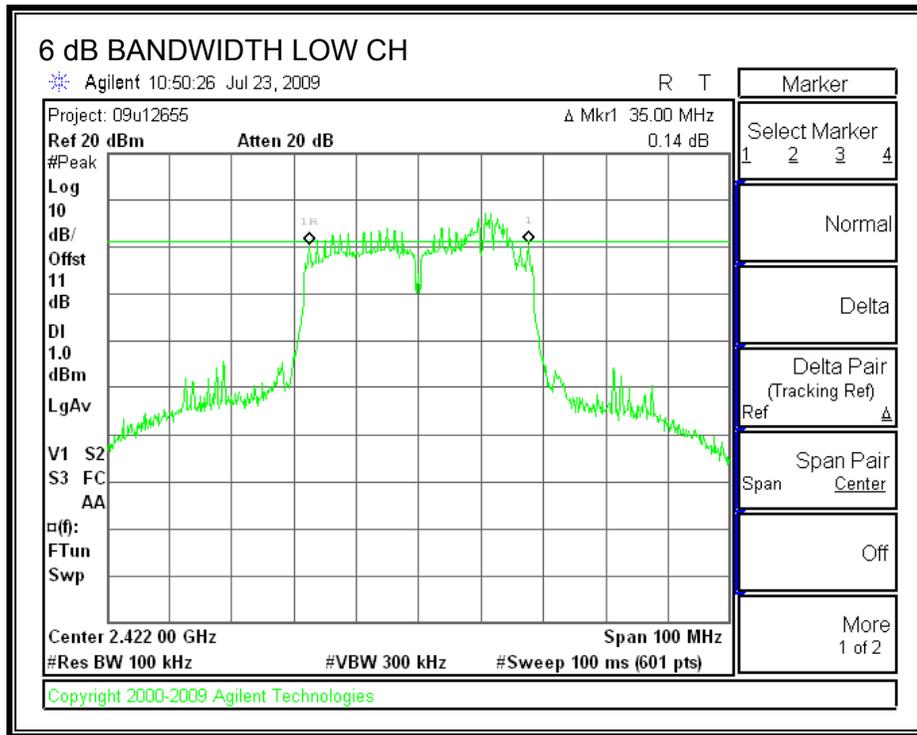
TEST PROCEDURE

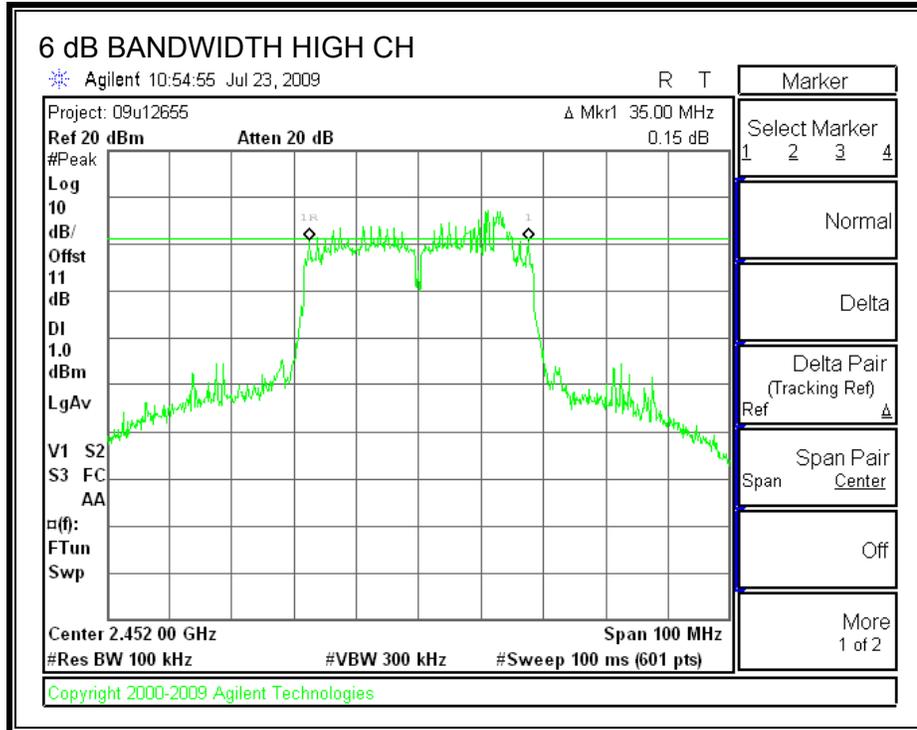
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2422	35.00	0.5
Middle	2437	35.00	0.5
High	2452	35.00	0.5

6 dB BANDWIDTH





7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

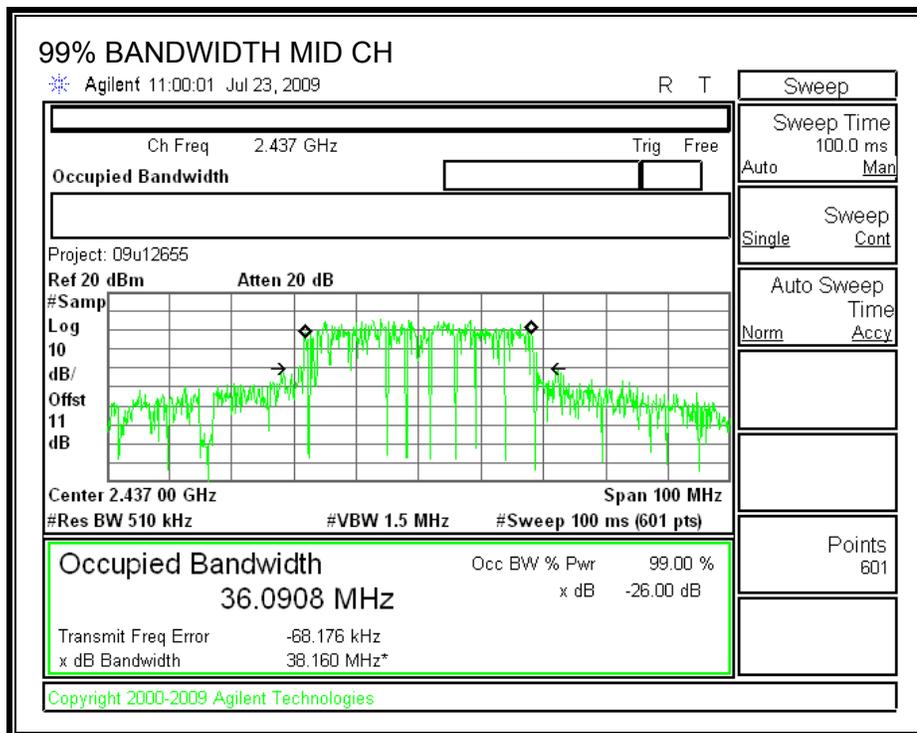
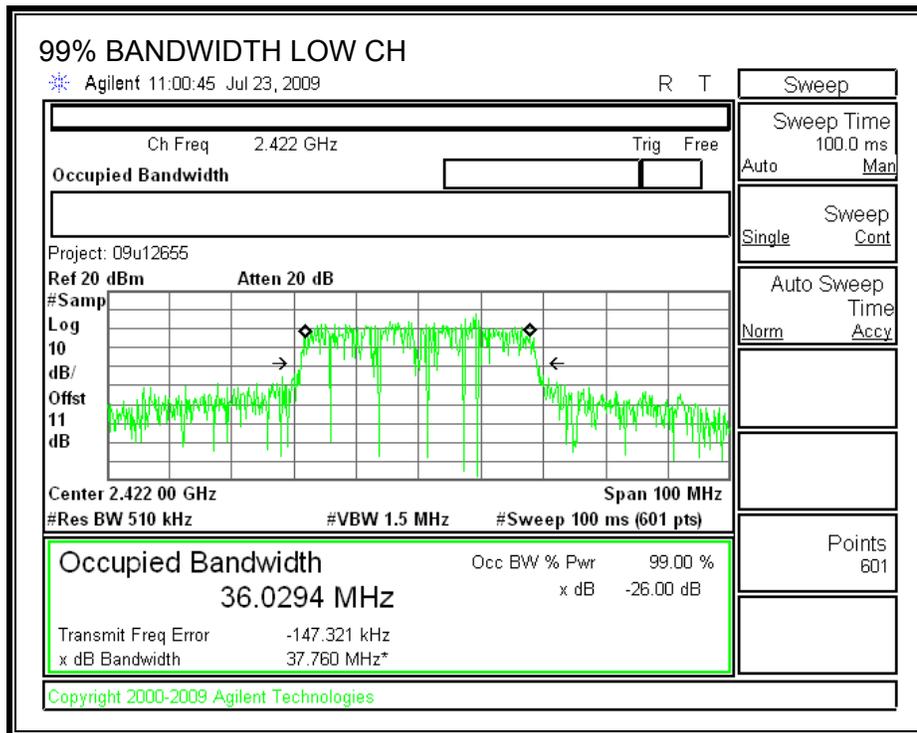
TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2422	36.0294
Middle	2437	36.0908
High	2452	36.1194

99% BANDWIDTH





7.4.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a Boonton Power Meter

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1dB cable) was entered as an offset in the power meter to allow for direct reading of power

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	23.00	30	-7.00
Middle	2437	24.20	30	-5.80
High	2452	23.90	30	-6.10

7.4.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

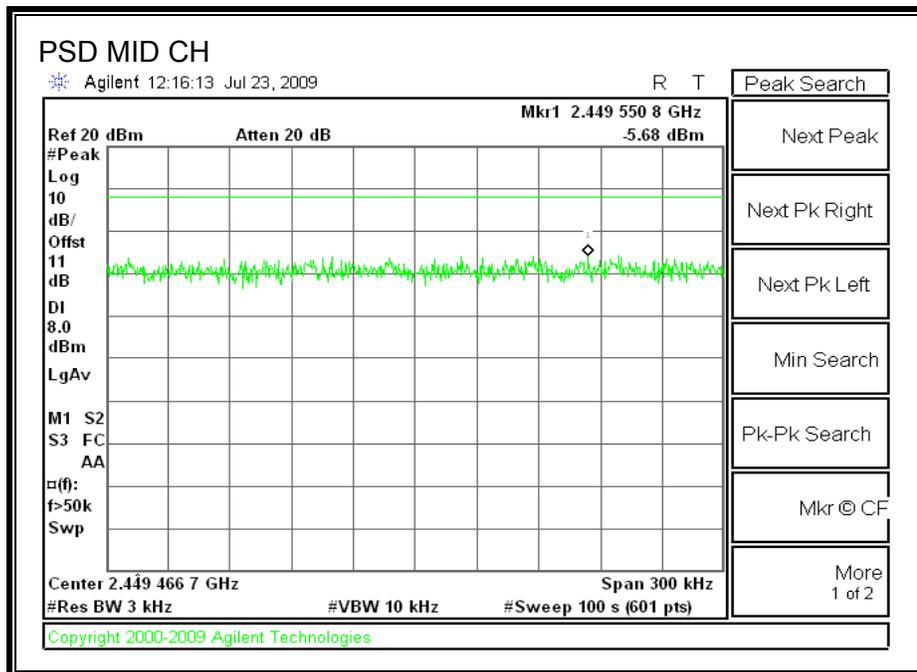
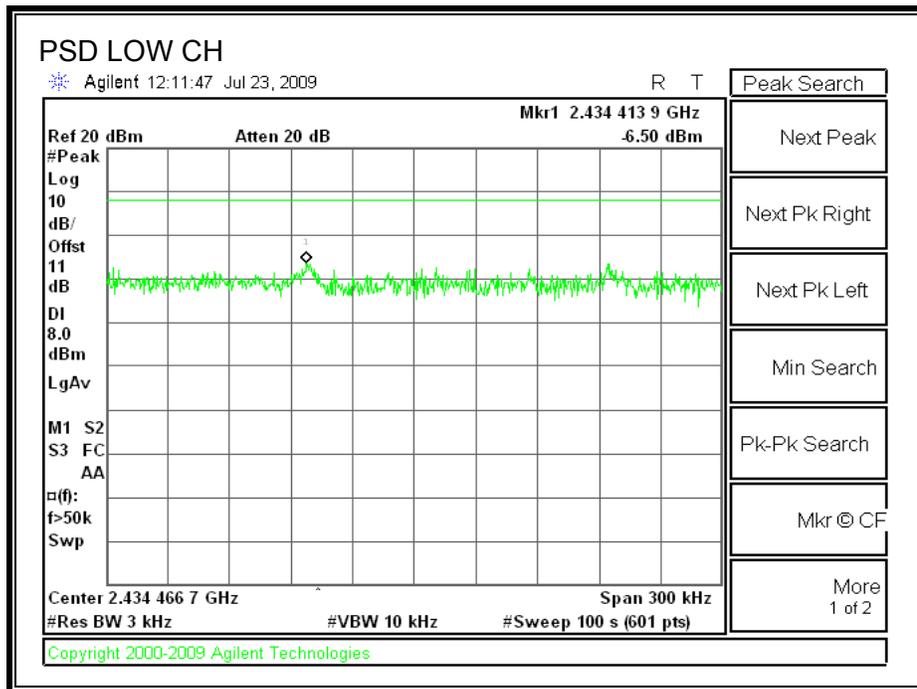
TEST PROCEDURE

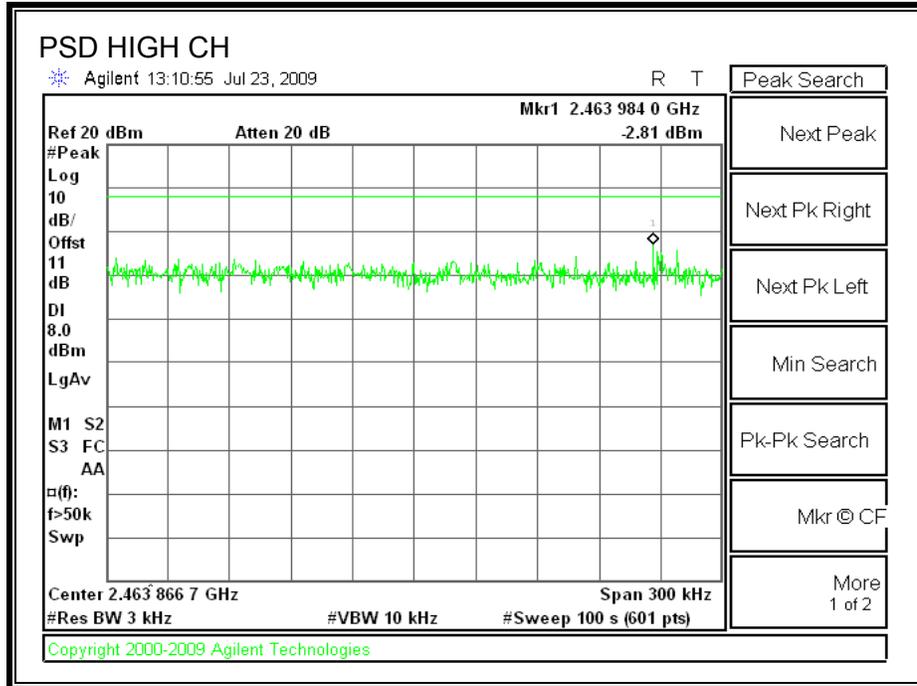
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-6.50	8	-14.50
Middle	2437	-5.68	8	-13.68
High	2452	-2.81	8	-10.81

POWER SPECTRAL DENSITY





7.4.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

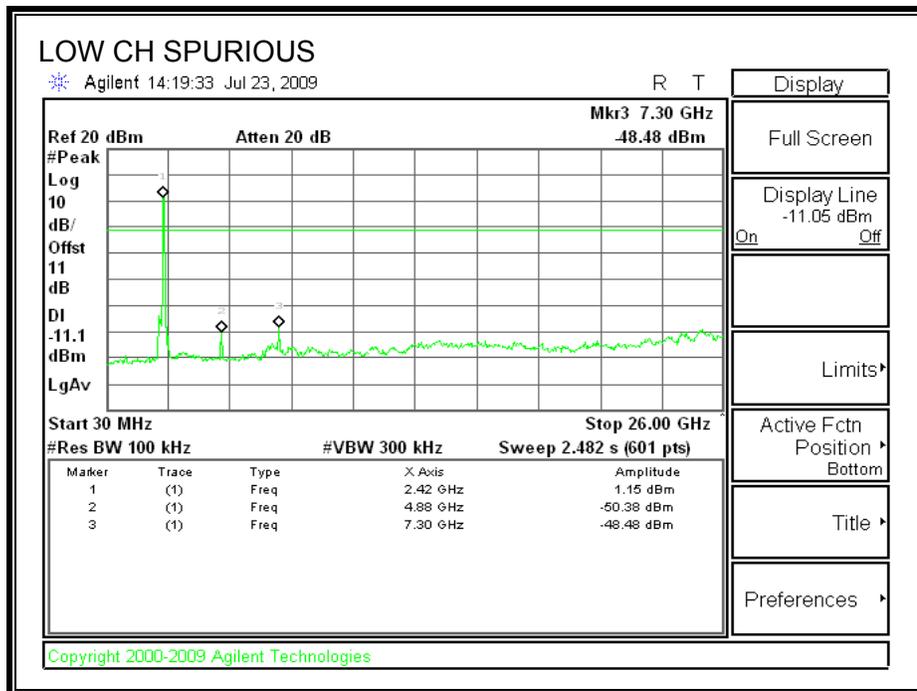
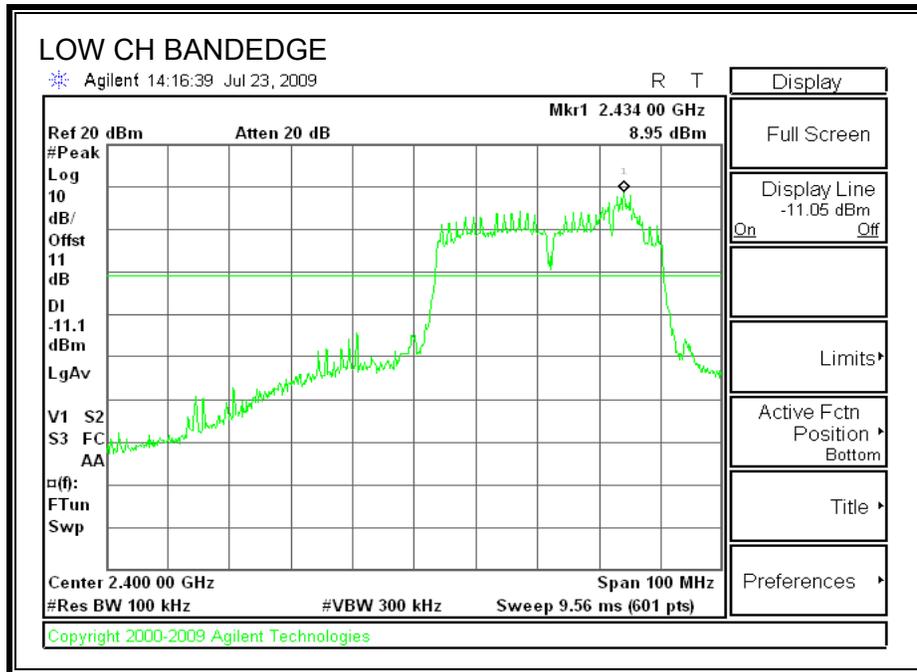
TEST PROCEDURE

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.

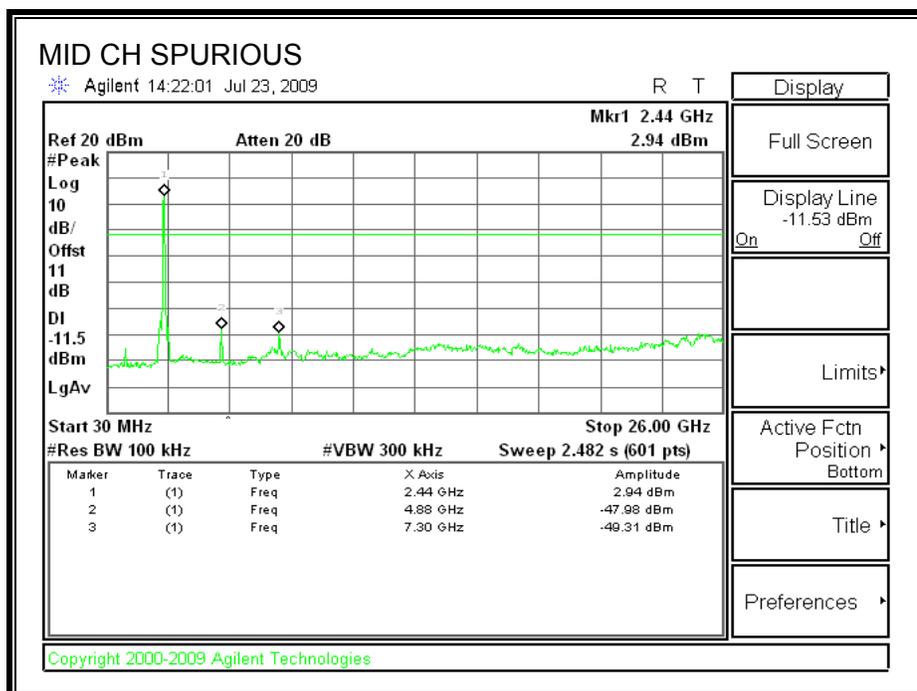
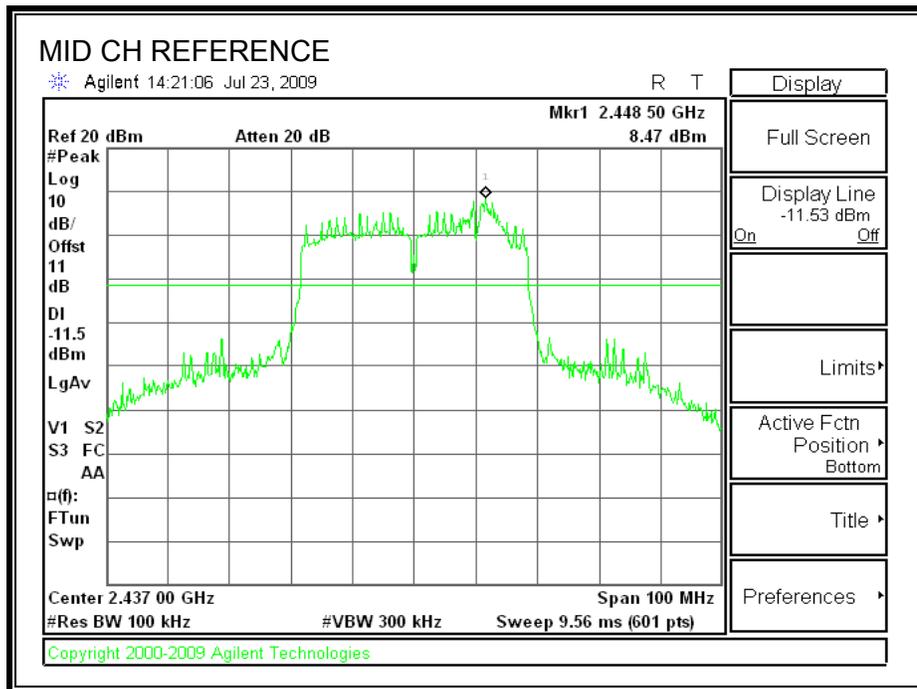
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

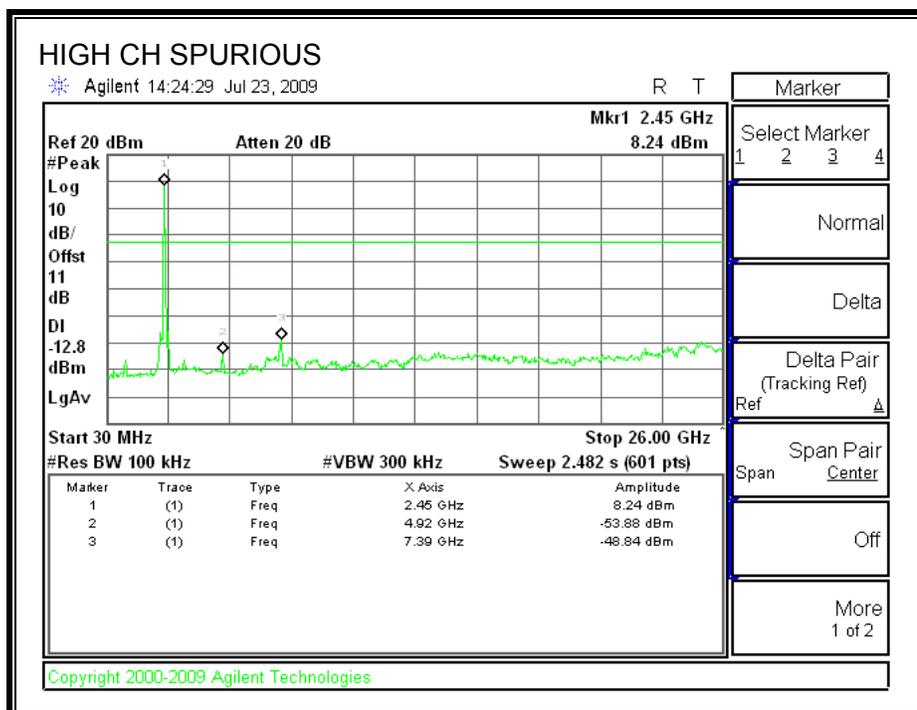
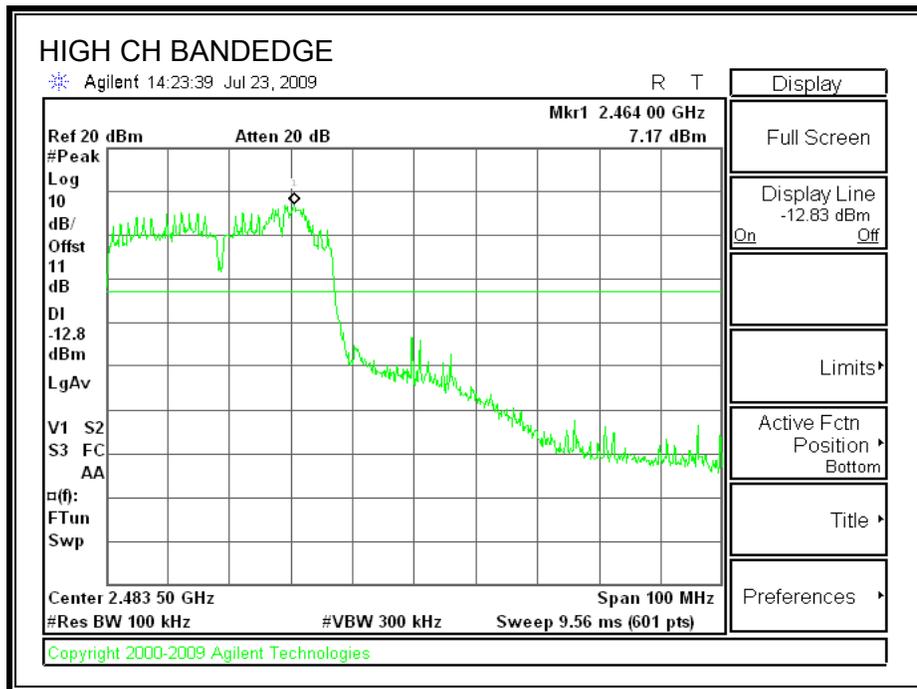
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

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.

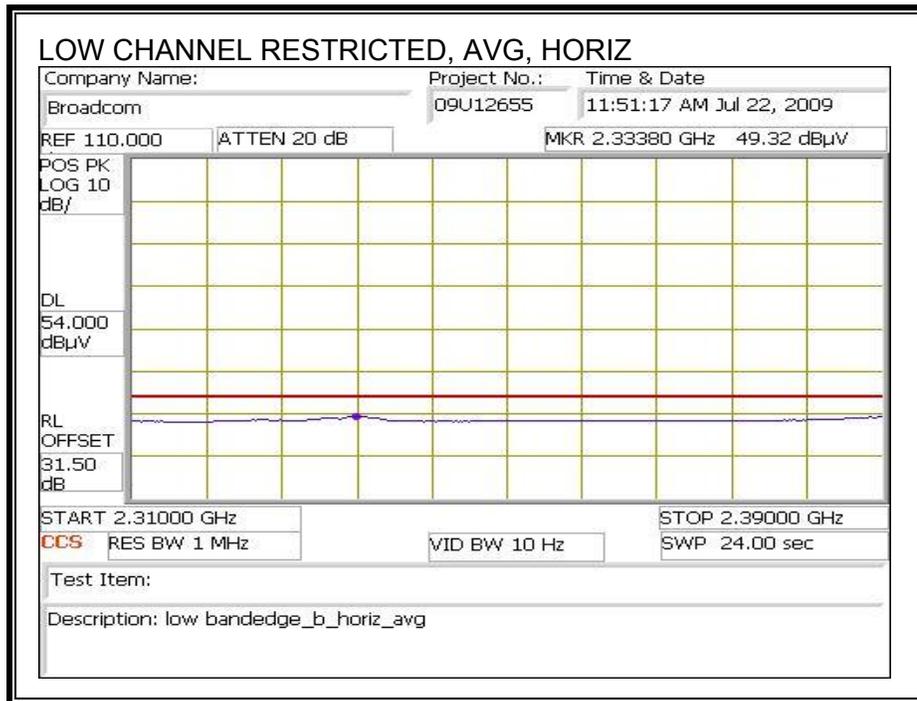
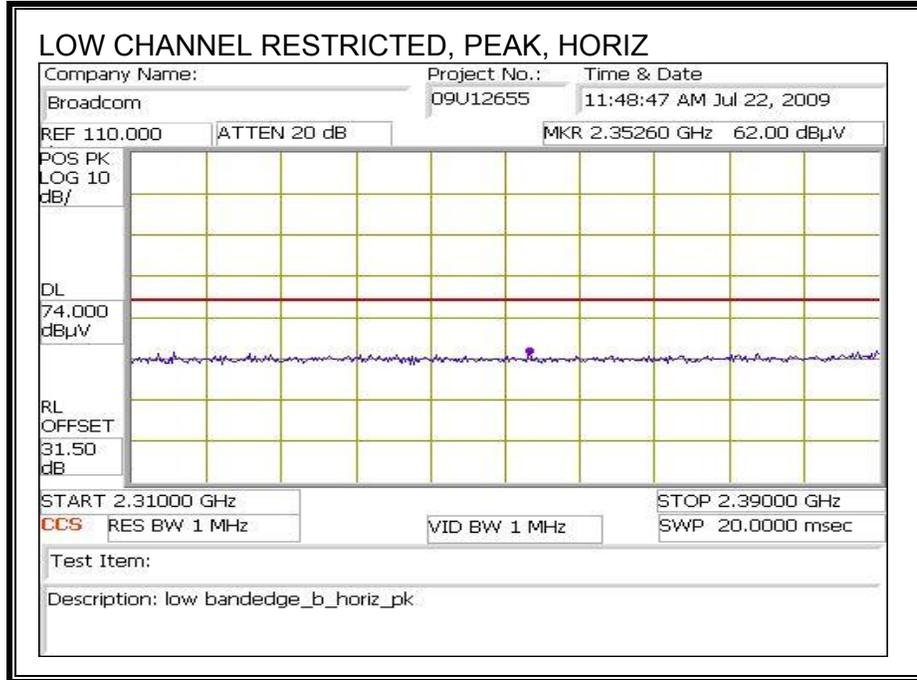
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

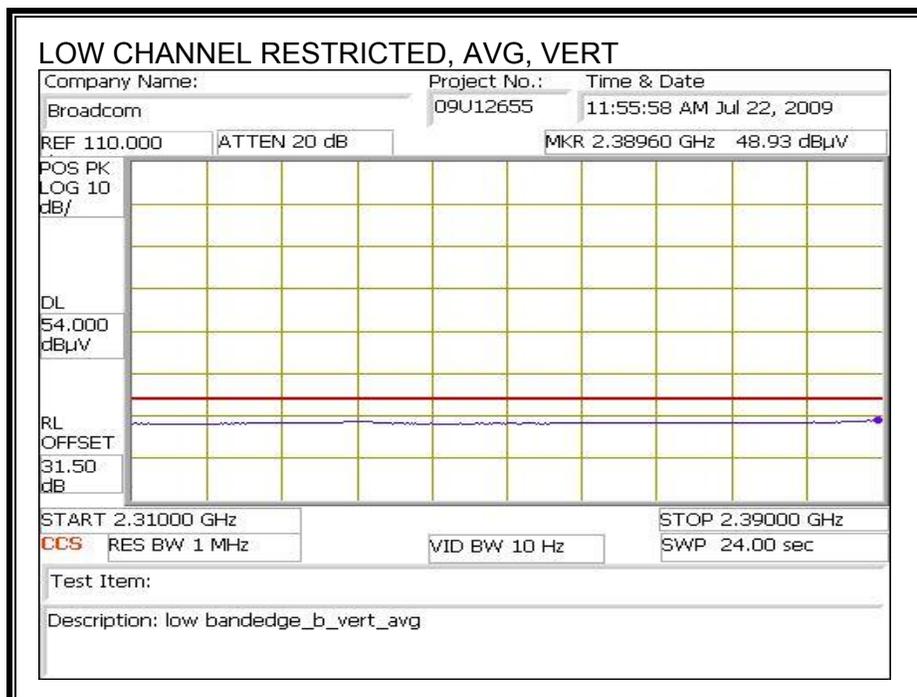
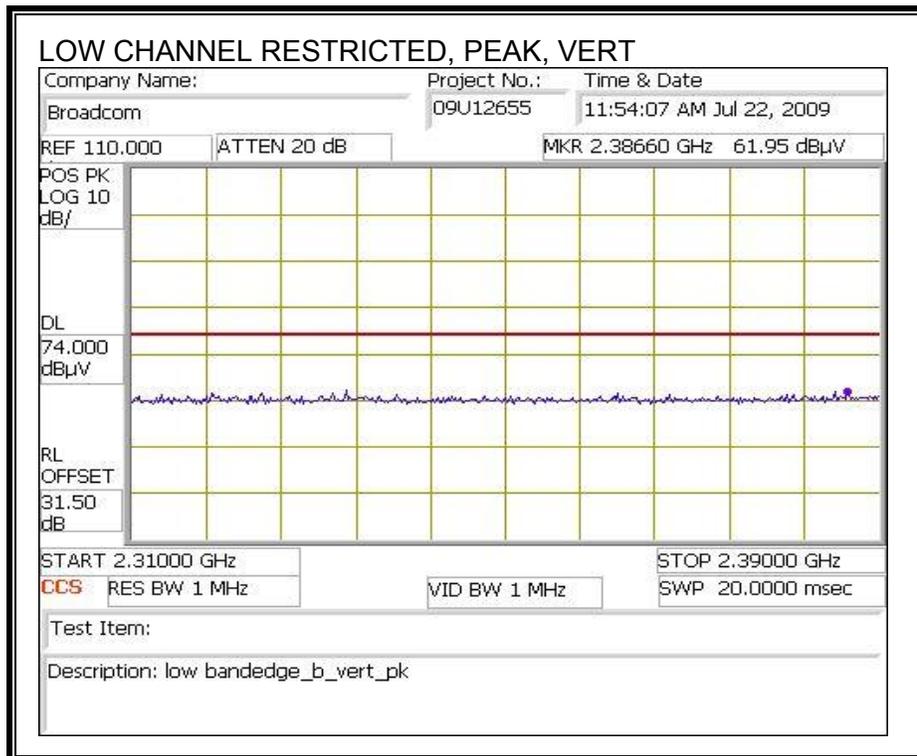
8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. TRANSMITTER ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

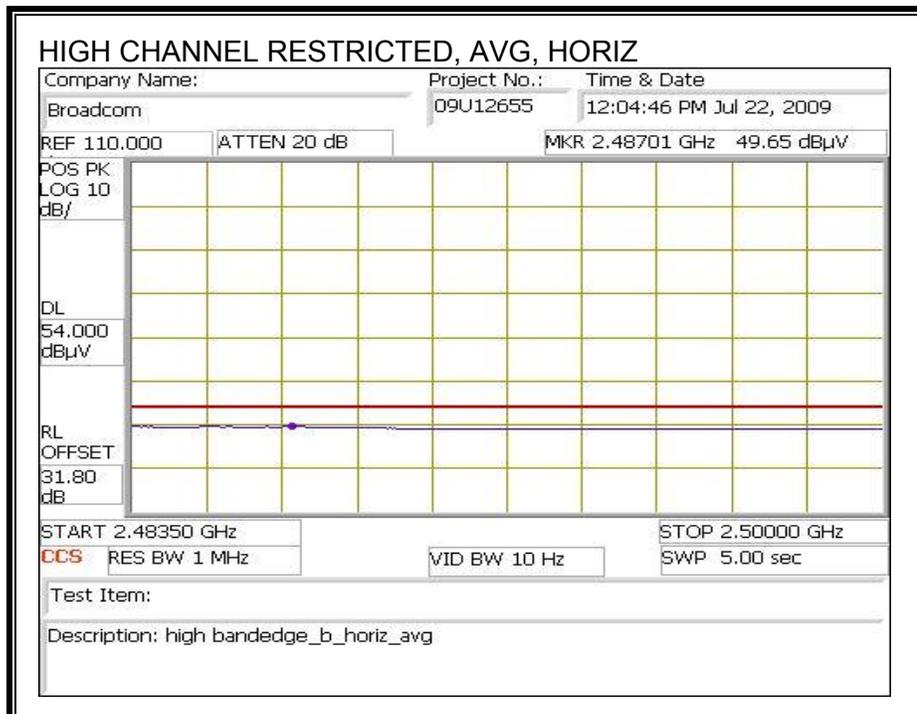
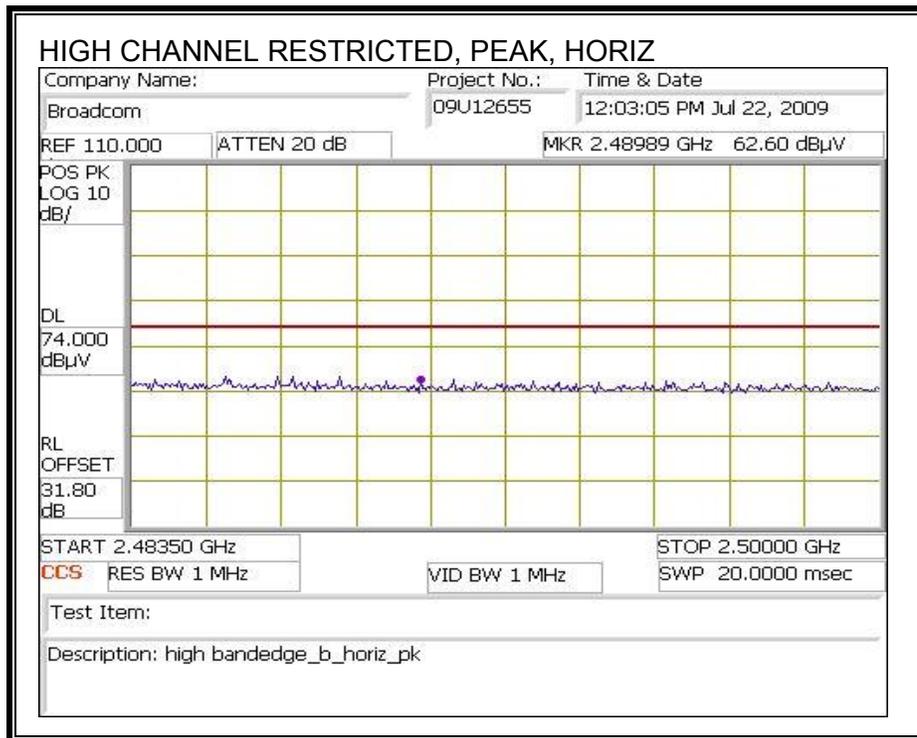
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



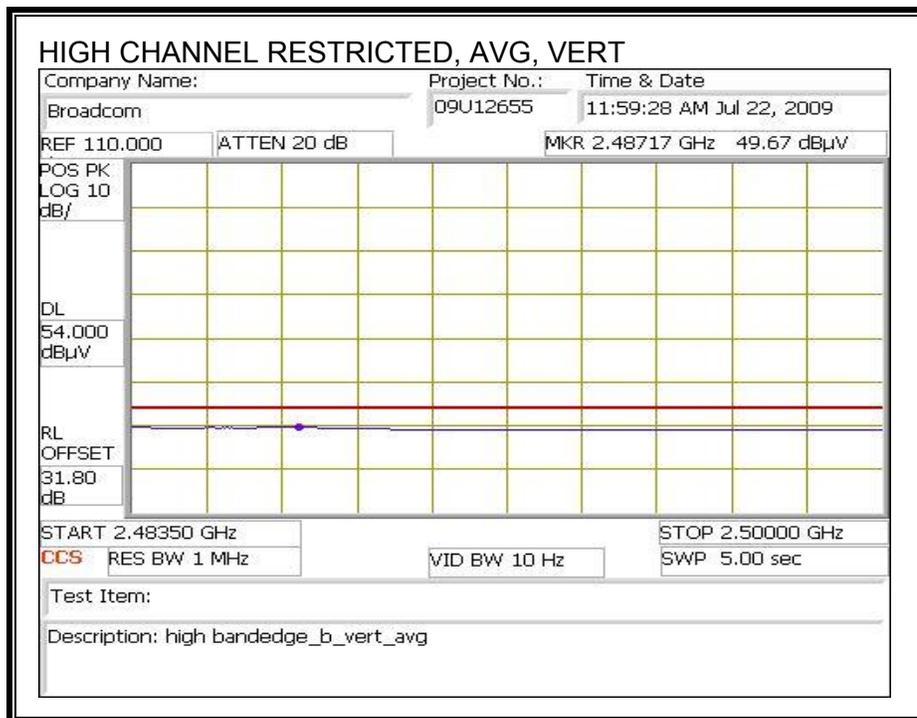
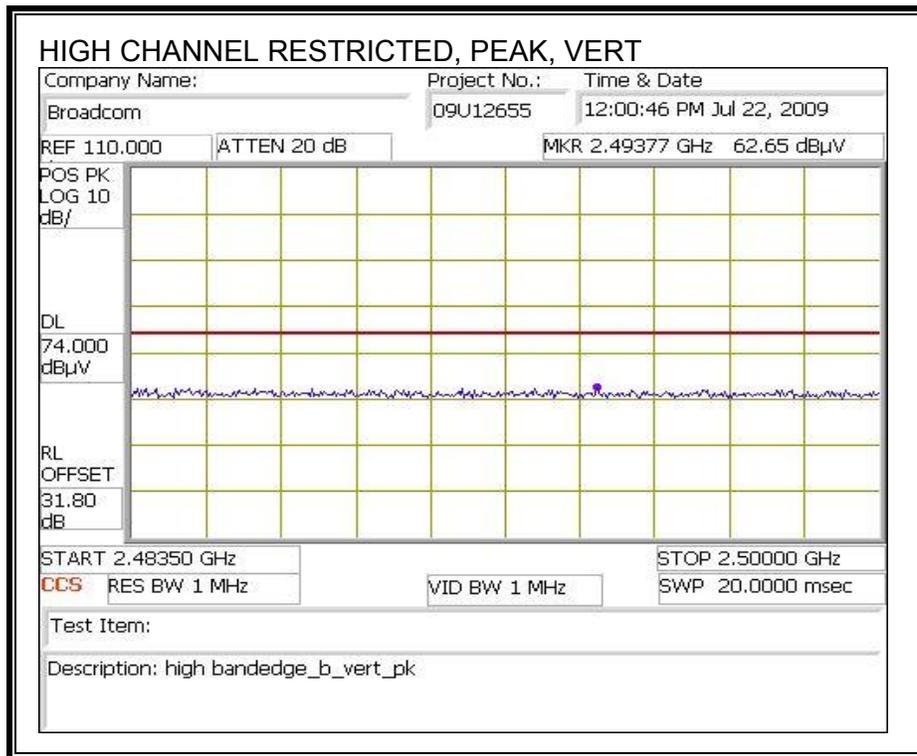
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

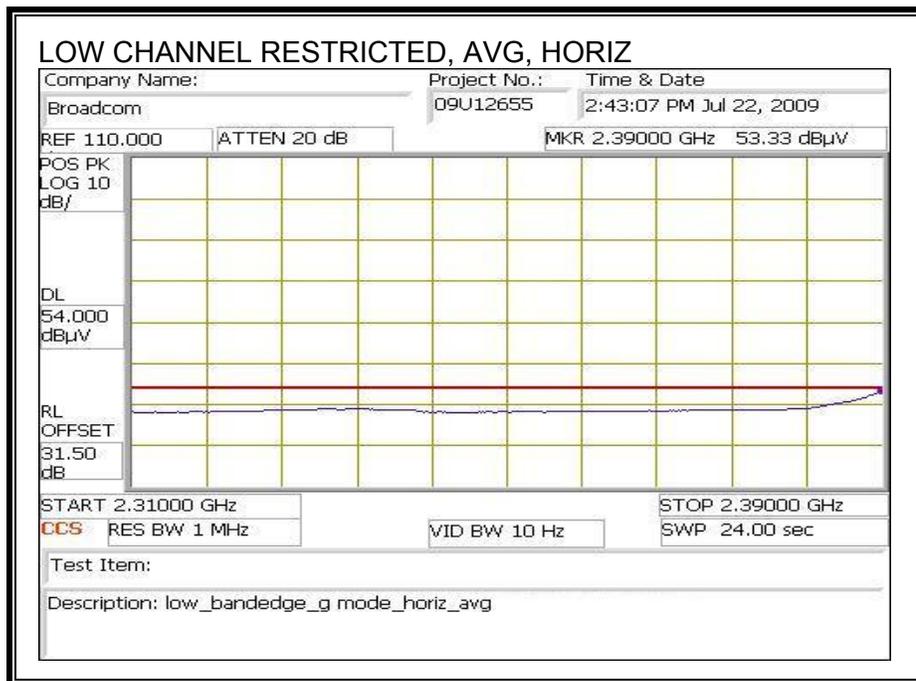
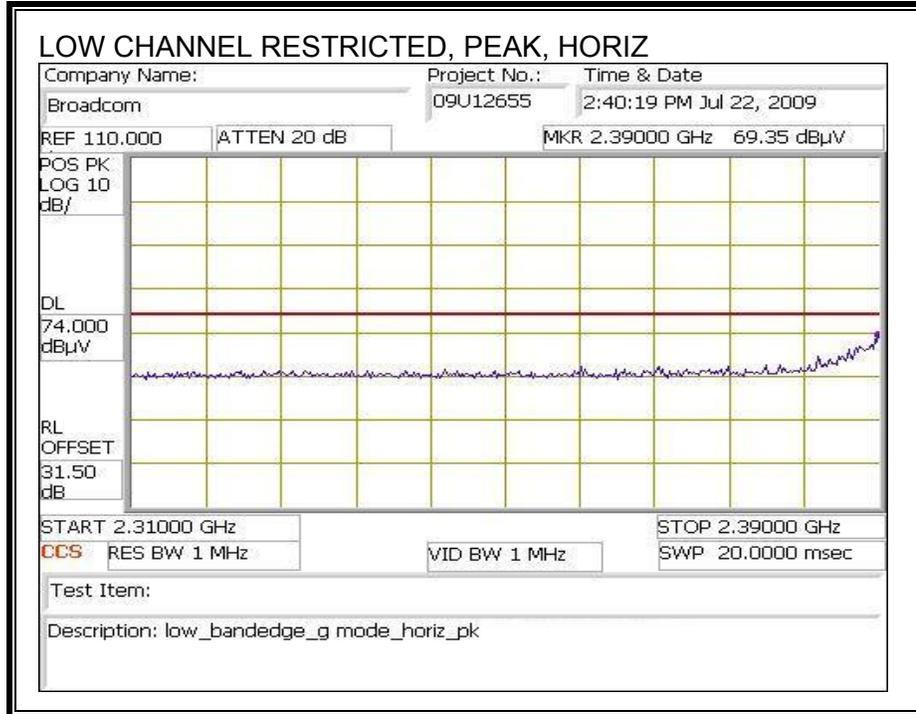


HARMONICS AND SPURIOUS EMISSIONS

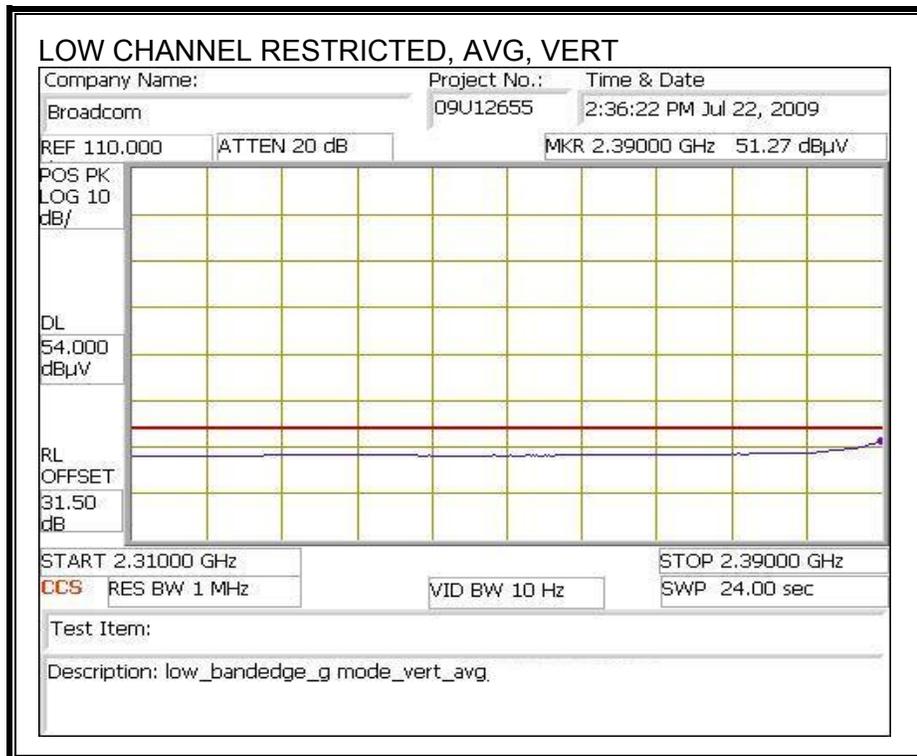
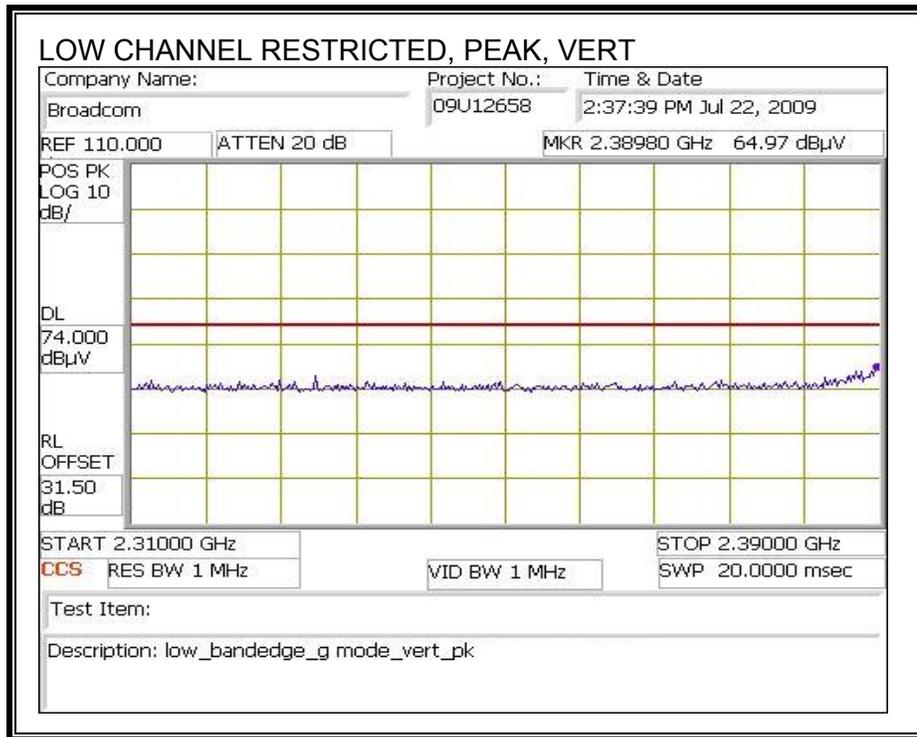
High Frequency Measurement													
Compliance Certification Services, Fremont 5m Chamber													
Test Engrg		Chin Pang											
Date:		07/22/09											
Project #:		09U12655											
Company:		Broadcom											
EUT Description:		802.11bg/Draft 802.11n Wlan PCI-E Minicard											
EUT M/N:		BCM94319WLUSBN4L											
Test Target:		FCC 15.247											
Mode Oper:		TX, b mode											
f	Measurement Frequency			Amp	Preamp Gain			Average Field Strength Limit					
Dist	Distance to Antenna			D Corr	Distance Correct to 3 meters			Peak Field Strength Limit					
Read	Analyzer Reading			Avg	Average Field Strength @ 3 m			Margin vs. Average Limit					
AF	Antenna Factor			Peak	Calculated Peak Field Strength			Margin vs. Peak Limit					
CL	Cable Loss			HPF	High Pass Filter								
f	Dist	Read	AF	CL	Amp	D Corr	Fitr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch, 2412MHz													
4.824	3.0	38.3	32.7	5.8	-34.8	0.0	0.0	41.9	74.0	-32.1	H	P	
4.824	3.0	31.3	32.7	5.8	-34.8	0.0	0.0	34.9	54.0	-19.1	H	A	
4.824	3.0	38.2	32.7	5.8	-34.8	0.0	0.0	41.8	74.0	-32.2	V	P	
4.824	3.0	30.3	32.7	5.8	-34.8	0.0	0.0	33.9	54.0	-20.1	V	A	
Mid Ch, 2437MHz													
4.874	3.0	37.1	32.7	5.8	-34.8	0.0	0.0	40.8	74.0	-33.2	H	P	
4.874	3.0	30.4	32.7	5.8	-34.8	0.0	0.0	34.1	54.0	-19.9	H	A	
7.311	3.0	40.0	35.5	7.3	-34.1	0.0	0.0	48.6	74.0	-25.4	H	P	
7.311	3.0	33.5	35.5	7.3	-34.1	0.0	0.0	42.1	54.0	-11.9	H	A	
4.874	3.0	35.6	32.7	5.8	-34.8	0.0	0.0	39.3	74.0	-34.7	V	P	
4.874	3.0	24.3	32.7	5.8	-34.8	0.0	0.0	28.0	54.0	-26.0	V	A	
7.311	3.0	39.3	35.5	7.3	-34.1	0.0	0.0	47.9	74.0	-26.1	V	P	
7.311	3.0	33.2	35.5	7.3	-34.1	0.0	0.0	41.8	54.0	-12.2	V	A	
High Ch, 2462MHz													
4.924	3.0	37.5	32.7	5.9	-34.8	0.0	0.0	41.3	74.0	-32.7	H	P	
4.924	3.0	30.7	32.7	5.9	-34.8	0.0	0.0	34.6	54.0	-19.4	H	A	
7.386	3.0	39.2	35.6	7.3	-34.1	0.0	0.0	48.0	74.0	-26.0	H	P	
7.386	3.0	32.9	35.6	7.3	-34.1	0.0	0.0	41.7	54.0	-12.3	H	A	
4.924	3.0	38.5	32.7	5.9	-34.8	0.0	0.0	42.3	74.0	-31.7	V	P	
4.924	3.0	31.9	32.7	5.9	-34.8	0.0	0.0	35.7	54.0	-18.3	V	A	
7.386	3.0	39.5	35.6	7.3	-34.1	0.0	0.0	48.3	74.0	-25.7	V	P	
7.386	3.0	31.9	35.6	7.3	-34.1	0.0	0.0	40.7	54.0	-13.3	V	A	
Rev. 4.1.2.7													
Note: No other emissions were detected above the system noise floor.													

8.2.2. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

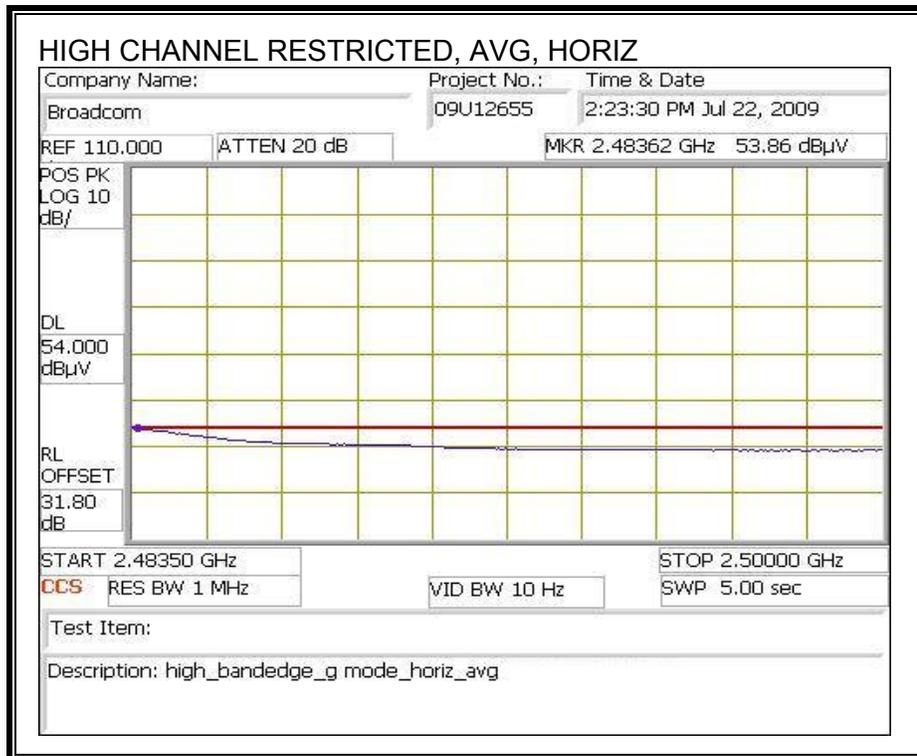
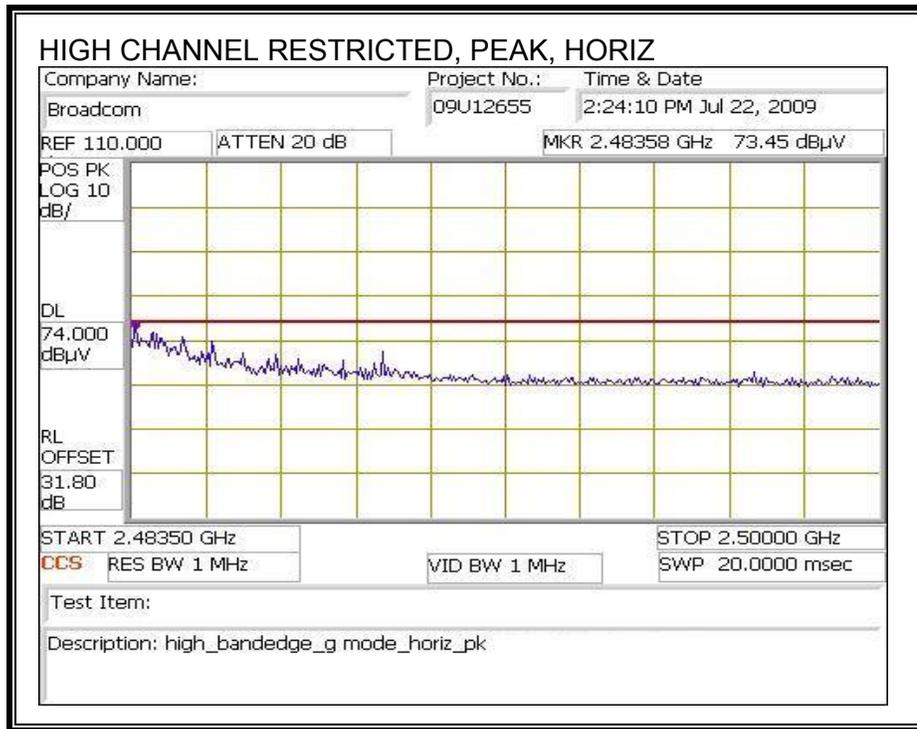
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



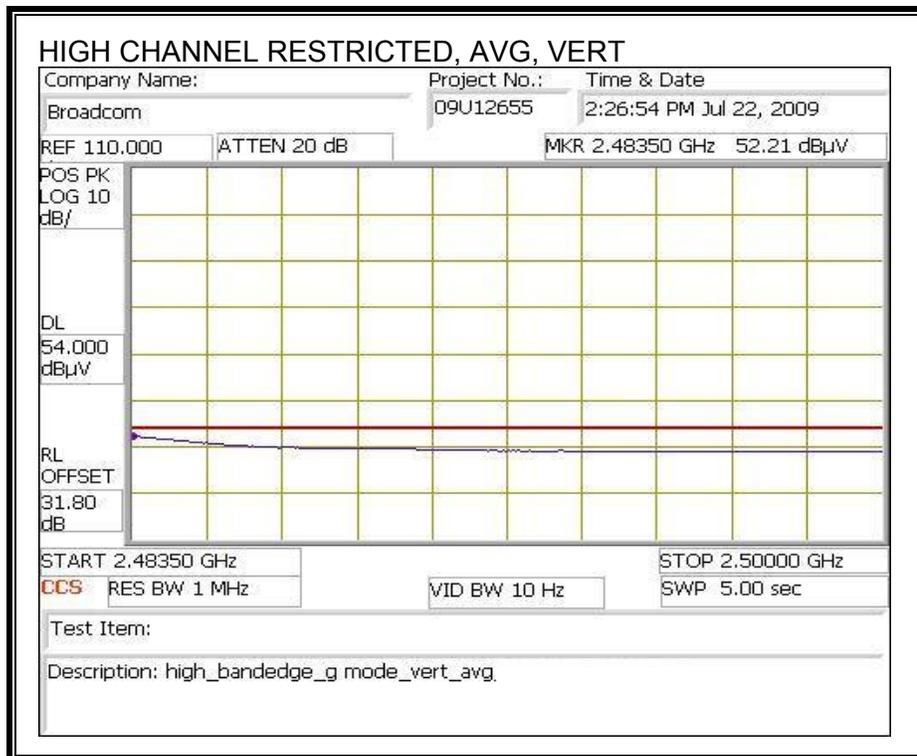
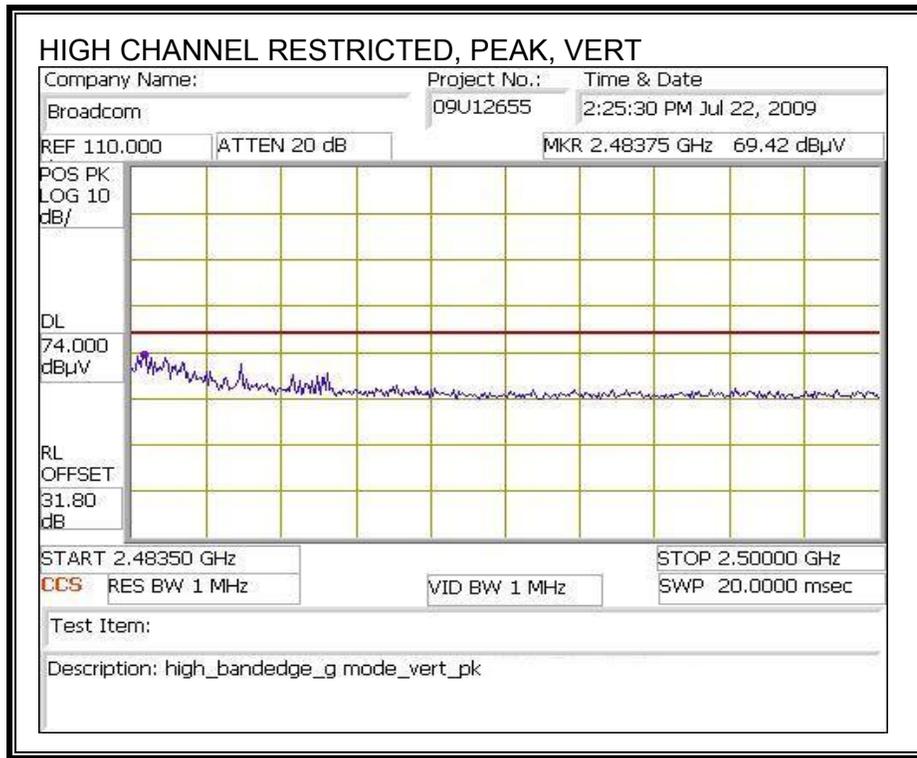
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

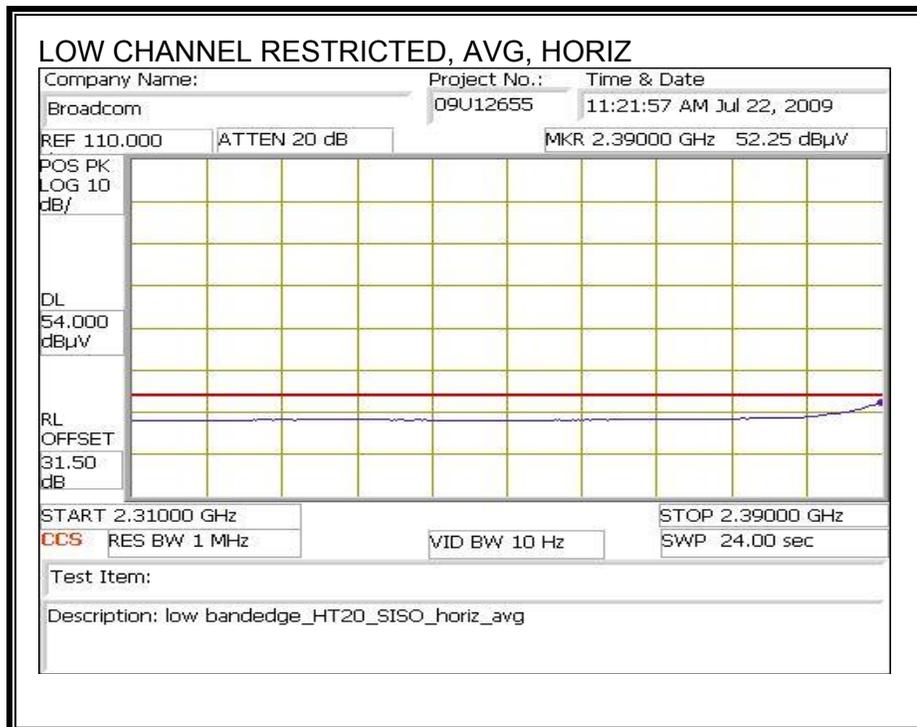
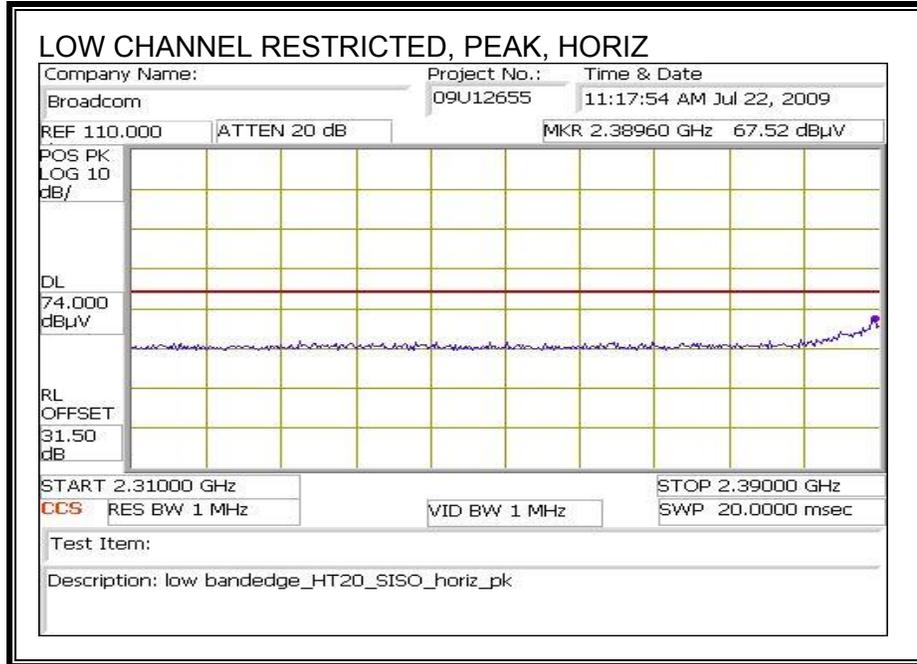


HARMONICS AND SPURIOUS EMISSIONS

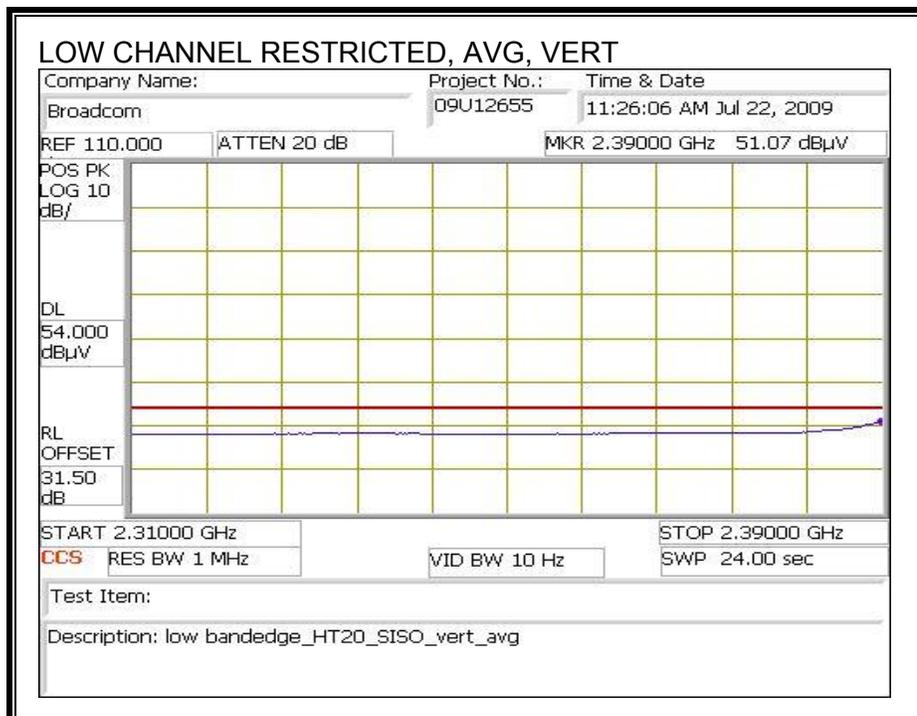
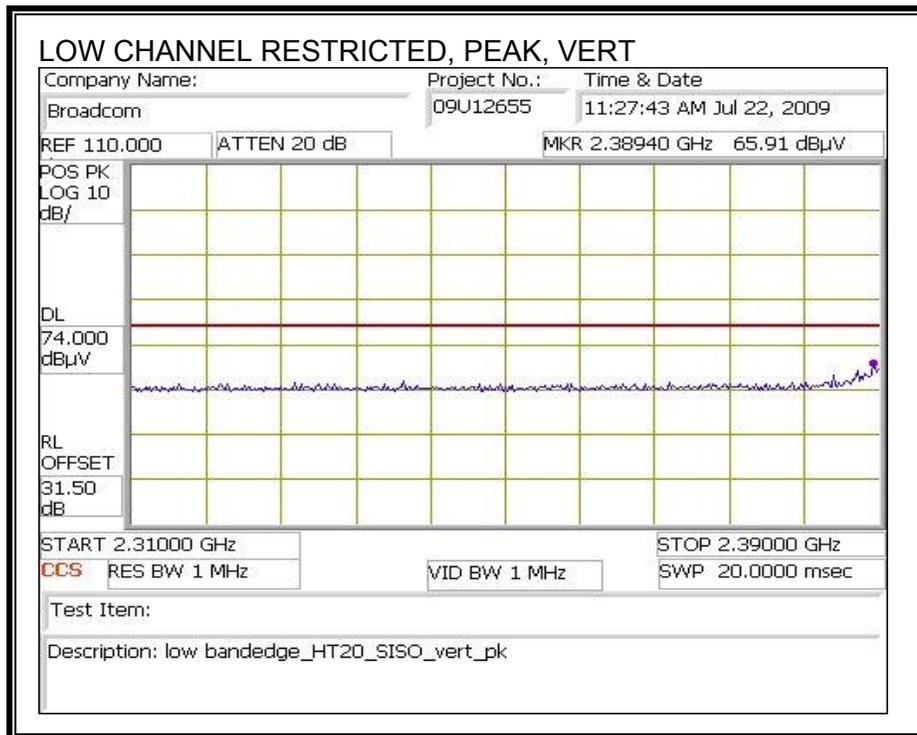
High Frequency Measurement													
Compliance Certification Services, Fremont 5m Chamber													
Test Engrg		Chin Pang											
Date:		07/22/09											
Project #:		09U12655											
Company:		Broadcom											
EUT Description:		802.11bg/Draft 802.11n Wlan PCI-E Minicard											
EUT M/N:		BCM94319WLUSBN4L											
Test Target:		FCC 15.247											
Mode Oper:		TX, g mode											
f	Measurement Frequency			Amp	Preamp Gain			Average Field Strength Limit					
Dist	Distance to Antenna			D Corr	Distance Correct to 3 meters			Peak Field Strength Limit					
Read	Analyzer Reading			Avg	Average Field Strength @ 3 m			Margin vs. Average Limit					
AF	Antenna Factor			Peak	Calculated Peak Field Strength			Margin vs. Peak Limit					
CL	Cable Loss			HPF	High Pass Filter								
f	Dist	Read	AF	CL	Amp	D Corr	Fitr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch, 2412MHz													
4.824	3.0	36.4	32.7	5.8	-34.8	0.0	0.0	40.0	74.0	-34.0	V	P	
4.824	3.0	23.9	32.7	5.8	-34.8	0.0	0.0	27.5	54.0	-26.5	V	A	
4.824	3.0	36.1	32.7	5.8	-34.8	0.0	0.0	39.8	74.0	-34.2	H	P	
4.824	3.0	24.7	32.7	5.8	-34.8	0.0	0.0	28.3	54.0	-25.7	H	A	
Mid Ch, 2437MHz													
4.874	3.0	35.8	32.7	5.8	-34.8	0.0	0.0	39.5	74.0	-34.5	V	P	
4.874	3.0	23.7	32.7	5.8	-34.8	0.0	0.0	27.4	54.0	-26.6	V	A	
7.311	3.0	40.7	35.5	7.3	-34.1	0.0	0.0	49.3	74.0	-24.7	V	P	
7.311	3.0	27.9	35.5	7.3	-34.1	0.0	0.0	36.6	54.0	-17.4	V	A	
4.874	3.0	36.2	32.7	5.8	-34.8	0.0	0.0	39.9	74.0	-34.1	H	P	
4.874	3.0	24.2	32.7	5.8	-34.8	0.0	0.0	27.9	54.0	-26.1	H	A	
7.311	3.0	38.8	35.5	7.3	-34.1	0.0	0.0	47.5	74.0	-26.5	H	P	
7.311	3.0	26.4	35.5	7.3	-34.1	0.0	0.0	35.1	54.0	-18.9	H	A	
High Ch, 2462MHz													
4.924	3.0	36.6	32.7	5.9	-34.8	0.0	0.0	40.4	74.0	-33.6	V	P	
4.924	3.0	24.3	32.7	5.9	-34.8	0.0	0.0	28.2	54.0	-25.8	V	A	
7.386	3.0	37.3	35.6	7.3	-34.1	0.0	0.0	46.1	74.0	-27.9	V	P	
7.386	3.0	25.6	35.6	7.3	-34.1	0.0	0.0	34.3	54.0	-19.7	V	A	
4.924	3.0	35.2	32.7	5.9	-34.8	0.0	0.0	39.0	74.0	-35.0	H	P	
4.924	3.0	23.5	32.7	5.9	-34.8	0.0	0.0	27.3	54.0	-26.7	H	A	
7.386	3.0	37.7	35.6	7.3	-34.1	0.0	0.0	46.4	74.0	-27.6	H	P	
7.386	3.0	25.4	35.6	7.3	-34.1	0.0	0.0	34.2	54.0	-19.8	H	A	
Rev. 4.1.2.7													
Note: No other emissions were detected above the system noise floor.													

8.2.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 2.4 GHz BAND

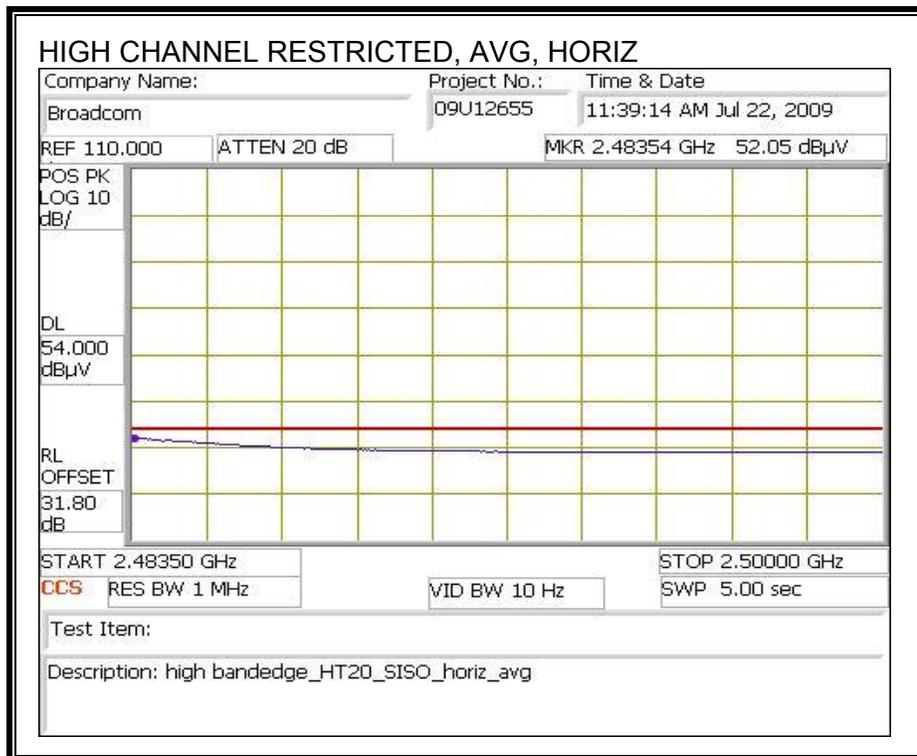
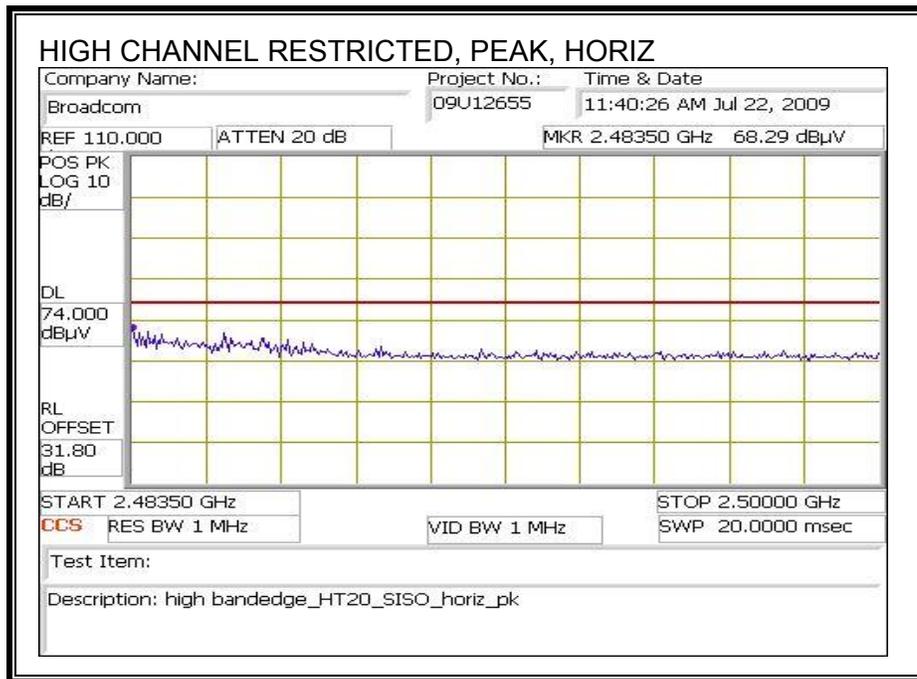
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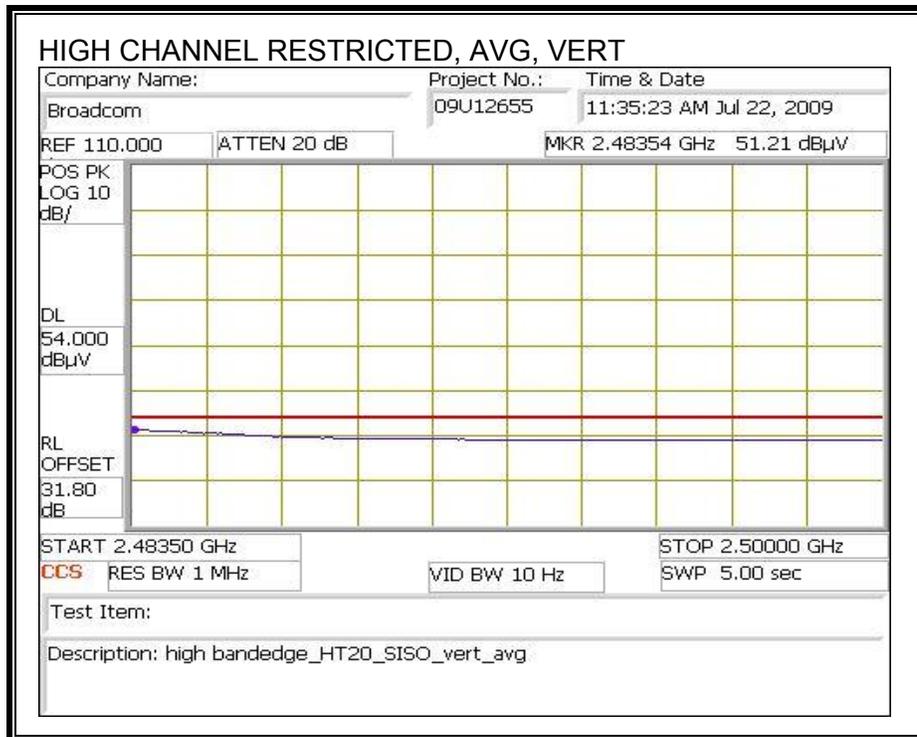
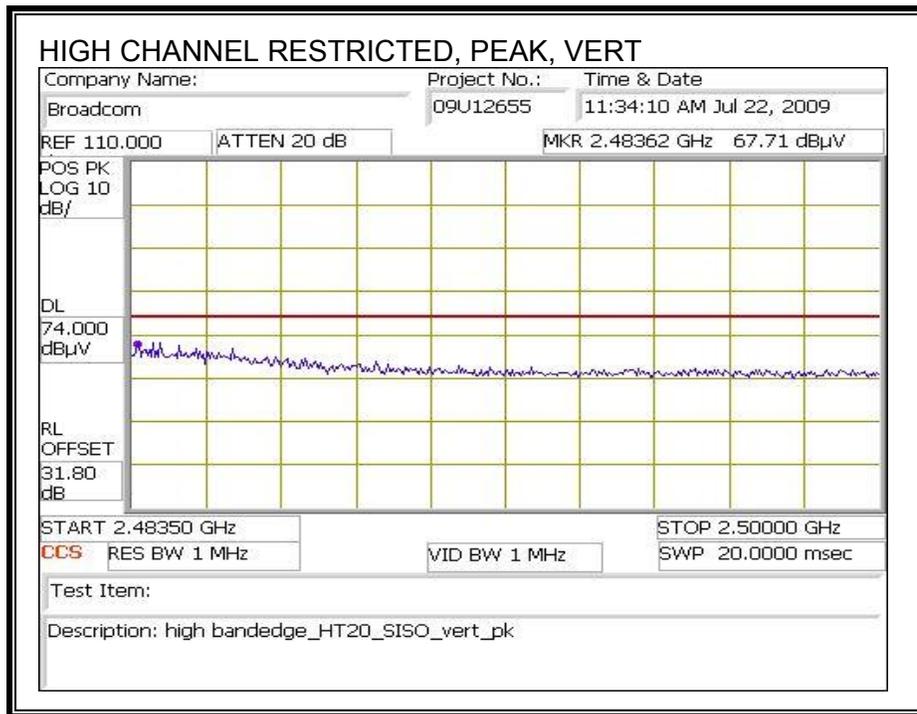
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

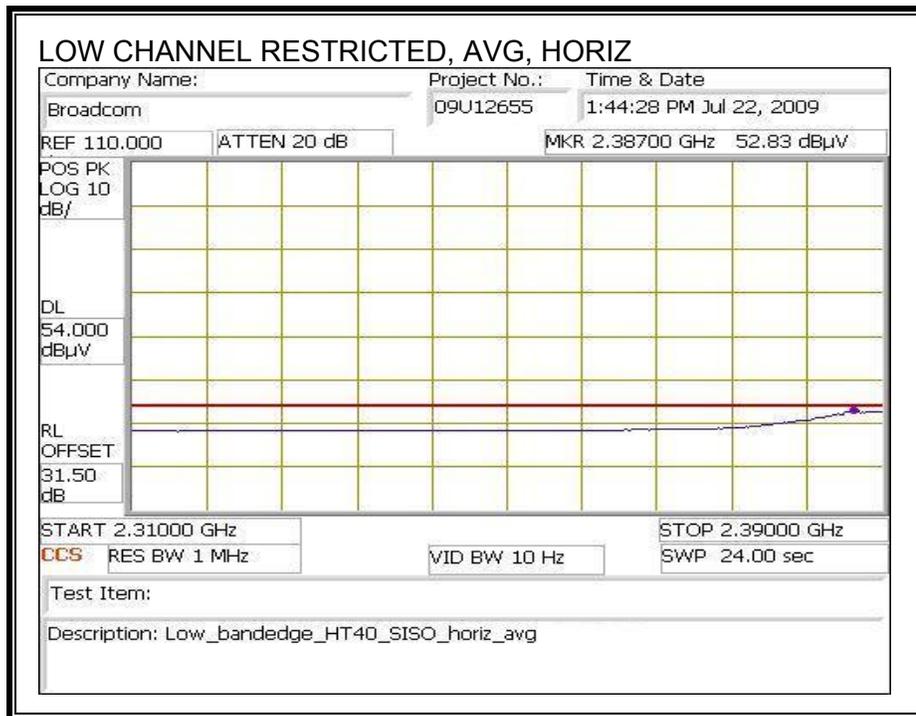
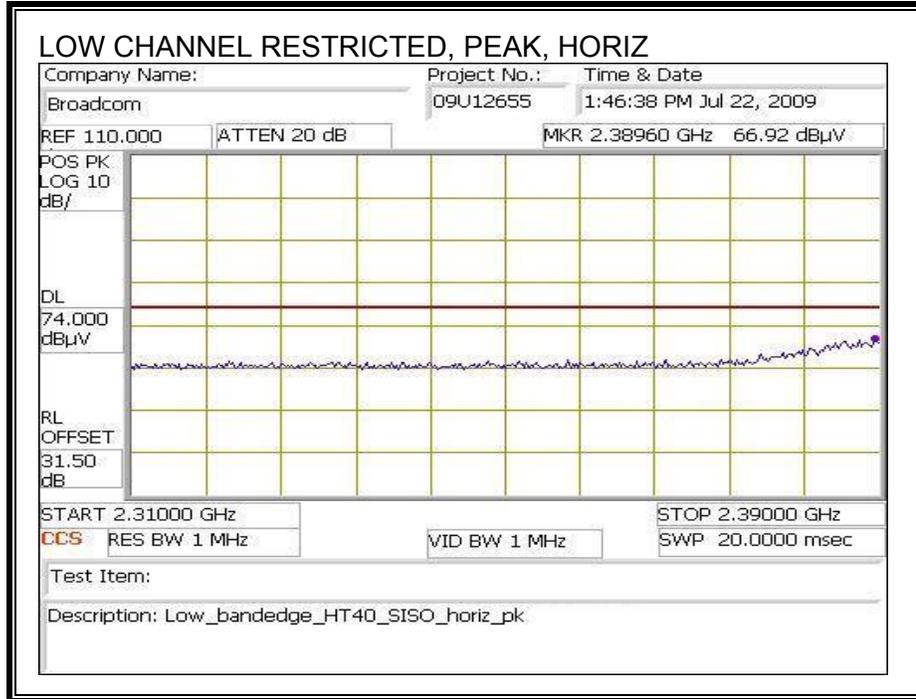


HARMONICS AND SPURIOUS EMISSIONS

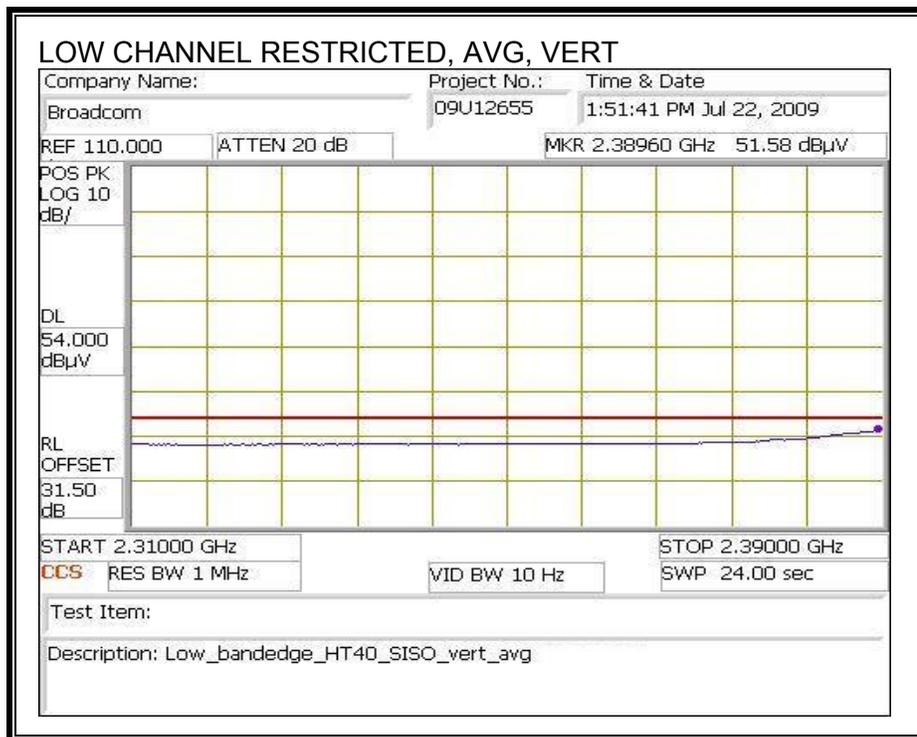
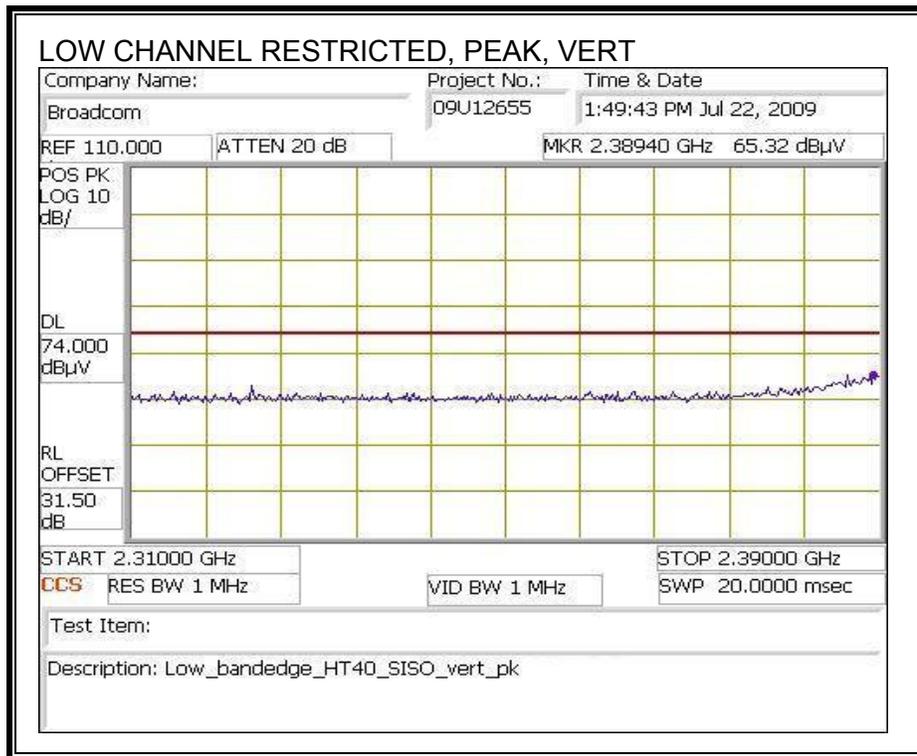
High Frequency Measurement													
Compliance Certification Services, Fremont 5m Chamber													
Test Engrg		Chin Pang											
Date:		07/22/09											
Project #:		09U12655											
Company:		Broadcom											
EUT Description:		802.11bg/Draft 802.11n Wlan PCIe Minicard											
EUT M/N:		BCM94319WLUSBN4L											
Test Target:		FCC 15.247											
Mode Oper:		TX, HT20 mode											
f	Measurement Frequency			Amp	Preamp Gain			Average Field Strength Limit					
Dist	Distance to Antenna			D Corr	Distance Correct to 3 meters			Peak Field Strength Limit					
Read	Analyzer Reading			Avg	Average Field Strength @ 3 m			Margin vs. Average Limit					
AF	Antenna Factor			Peak	Calculated Peak Field Strength			Margin vs. Peak Limit					
CL	Cable Loss			HPF	High Pass Filter								
f	Dist	Read	AF	CL	Amp	D Corr	Fltr	Corr.	Limit	Margin	Ant. Pol	Det	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Ch, 2412MHz													
4.824	3.0	35.0	32.7	5.8	-34.8	0.0	0.0	38.6	74.0	-35.4	H	P	
4.824	3.0	23.2	32.7	5.8	-34.8	0.0	0.0	26.9	54.0	-27.1	H	A	
4.824	3.0	35.1	32.7	5.8	-34.8	0.0	0.0	38.8	74.0	-35.2	V	P	
4.824	3.0	23.2	32.7	5.8	-34.8	0.0	0.0	26.9	54.0	-27.1	V	A	
Mid Ch, 2437MHz													
4.874	3.0	35.2	32.7	5.8	-34.8	0.0	0.0	38.9	74.0	-35.1	H	P	
4.874	3.0	23.4	32.7	5.8	-34.8	0.0	0.0	27.1	54.0	-26.9	H	A	
7.311	3.0	38.6	35.5	7.3	-34.1	0.0	0.0	47.3	74.0	-26.7	H	P	
7.311	3.0	24.8	35.5	7.3	-34.1	0.0	0.0	33.5	54.0	-20.5	H	A	
4.874	3.0	35.9	32.7	5.8	-34.8	0.0	0.0	39.6	74.0	-34.4	V	P	
4.874	3.0	23.1	32.7	5.8	-34.8	0.0	0.0	26.9	54.0	-27.1	V	A	
7.311	3.0	34.0	35.5	7.3	-34.1	0.0	0.0	42.6	74.0	-31.4	V	P	
7.311	3.0	25.1	35.5	7.3	-34.1	0.0	0.0	33.7	54.0	-20.3	V	A	
High Ch, 2462MHz													
4.924	3.0	35.2	32.7	5.9	-34.8	0.0	0.0	39.0	74.0	-35.0	H	P	
4.924	3.0	23.6	32.7	5.9	-34.8	0.0	0.0	27.4	54.0	-26.6	H	A	
7.386	3.0	38.0	35.6	7.3	-34.1	0.0	0.0	46.8	74.0	-27.2	H	P	
7.386	3.0	24.4	35.6	7.3	-34.1	0.0	0.0	33.1	54.0	-20.9	H	A	
4.924	3.0	35.0	32.7	5.9	-34.8	0.0	0.0	38.8	74.0	-35.2	V	P	
4.924	3.0	23.3	32.7	5.9	-34.8	0.0	0.0	27.1	54.0	-26.9	V	A	
7.386	3.0	37.0	35.6	7.3	-34.1	0.0	0.0	45.8	74.0	-28.2	V	P	
7.386	3.0	24.2	35.6	7.3	-34.1	0.0	0.0	33.0	54.0	-21.0	V	A	
Rev. 4.1.2.7													
Note: No other emissions were detected above the system noise floor.													

8.2.4. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 2.4 GHz BAND

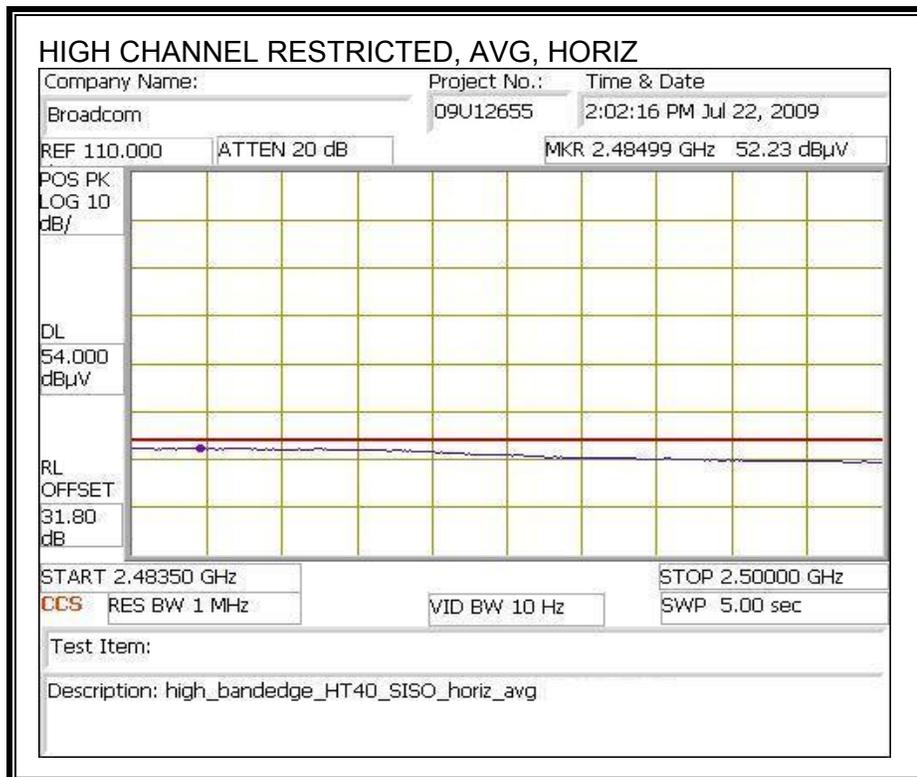
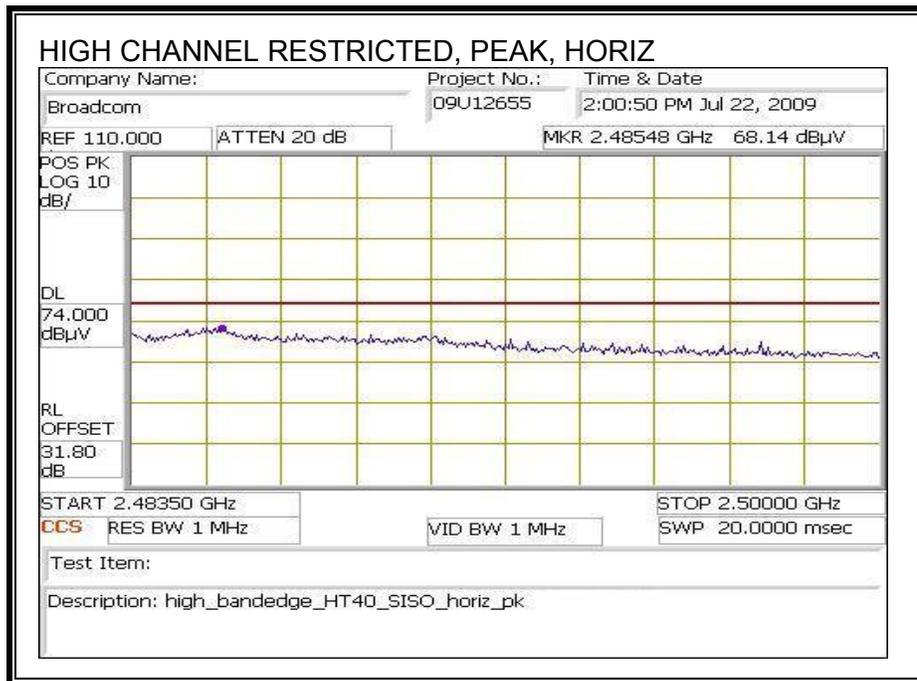
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



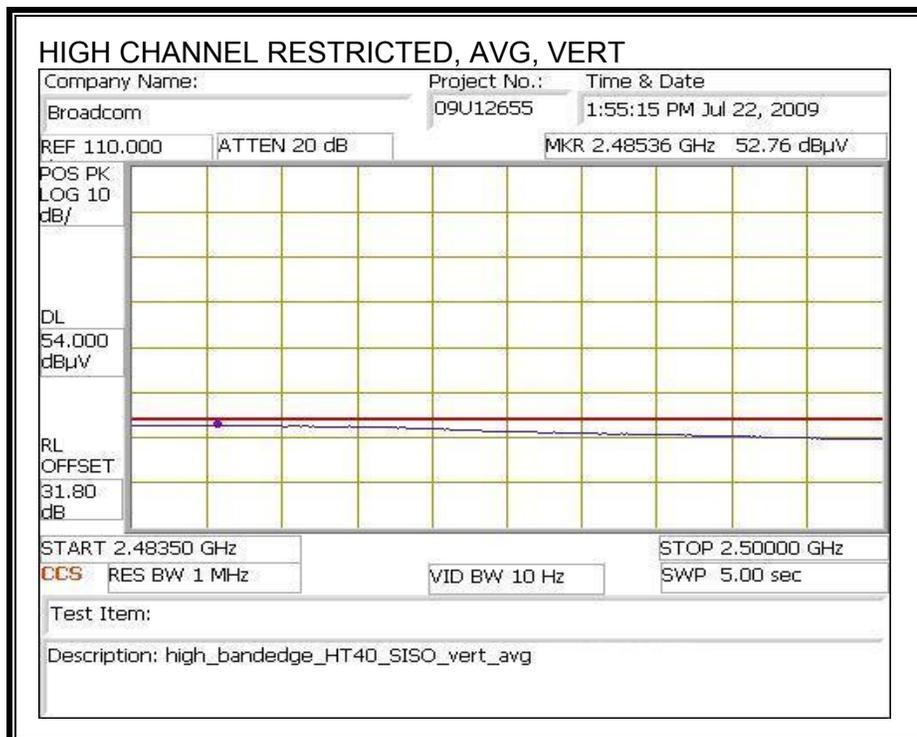
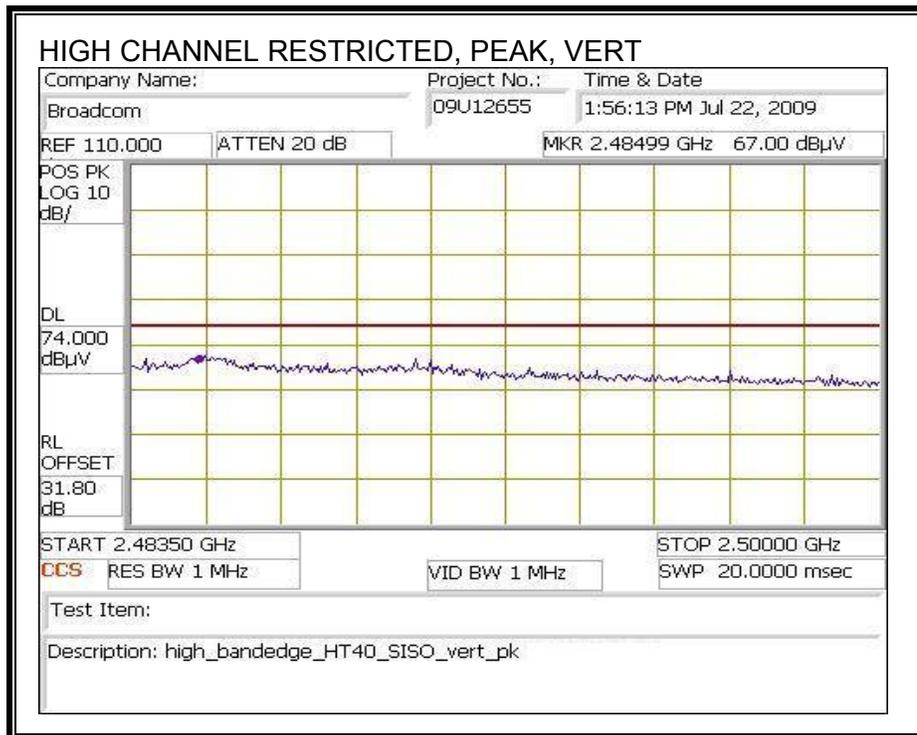
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement													
Compliance Certification Services, Fremont 5m Chamber													
Test Engr:		Chin Pang											
Date:		07/22/09											
Project #:		09U12655											
Company:		Broadcom											
EUT Description:		802.11 B/G/N Wlan Module											
EUT M/N:													
Test Target:		FCC 15.247											
Mode Oper:		TX, HT40											
f	Measurement Frequency			Amp	Preamp Gain			Average Field Strength Limit					
Dist	Distance to Antenna			D Corr	Distance Correct to 3 meters			Peak Field Strength Limit					
Read	Analyzer Reading			Avg	Average Field Strength @ 3 m			Margin vs. Average Limit					
AF	Antenna Factor			Peak	Calculated Peak Field Strength			Margin vs. Peak Limit					
CL	Cable Loss			HPF	High Pass Filter								
f	Dist	Read	AF	CL	Amp	D Corr	Fitr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch, 2422MHz													
4.844	3.0	36.0	32.7	5.8	-34.8	0.0	0.0	39.7	74.0	-34.3	V	P	
4.844	3.0	22.8	32.7	5.8	-34.8	0.0	0.0	26.5	54.0	-27.5	V	A	
7.266	3.0	34.7	35.4	7.2	-34.1	0.0	0.0	43.2	74.0	-30.8	V	P	
7.266	3.0	22.4	35.4	7.2	-34.1	0.0	0.0	31.0	54.0	-23.0	V	A	
4.844	3.0	34.9	32.7	5.8	-34.8	0.0	0.0	38.6	74.0	-35.4	H	P	
4.844	3.0	22.9	32.7	5.8	-34.8	0.0	0.0	26.6	54.0	-27.4	H	A	
7.266	3.0	34.1	35.4	7.2	-34.1	0.0	0.0	42.7	74.0	-31.3	H	P	
7.266	3.0	22.0	35.4	7.2	-34.1	0.0	0.0	30.5	54.0	-23.5	H	A	
Mid Ch, 2437MHz													
4.874	3.0	35.2	32.7	5.8	-34.8	0.0	0.0	38.9	74.0	-35.1	H	P	
4.874	3.0	22.3	32.7	5.8	-34.8	0.0	0.0	26.0	54.0	-28.0	H	A	
7.311	3.0	34.3	35.5	7.3	-34.1	0.0	0.0	42.9	74.0	-31.1	H	P	
7.311	3.0	22.3	35.5	7.3	-34.1	0.0	0.0	31.0	54.0	-23.0	H	A	
4.874	3.0	34.2	32.7	5.8	-34.8	0.0	0.0	38.0	74.0	-36.0	V	P	
4.874	3.0	22.2	32.7	5.8	-34.8	0.0	0.0	25.9	54.0	-28.1	V	A	
7.311	3.0	34.8	35.5	7.3	-34.1	0.0	0.0	43.5	74.0	-30.5	V	P	
7.311	3.0	22.6	35.5	7.3	-34.1	0.0	0.0	31.2	54.0	-22.8	V	A	
High Ch, 2452MHz													
4.904	3.0	35.2	32.7	5.9	-34.8	0.0	0.0	39.0	74.0	-35.0	V	P	
4.904	3.0	22.6	32.7	5.9	-34.8	0.0	0.0	26.4	54.0	-27.6	V	A	
7.356	3.0	35.0	35.5	7.3	-34.1	0.0	0.0	43.7	74.0	-30.3	V	P	
7.356	3.0	23.0	35.5	7.3	-34.1	0.0	0.0	31.7	54.0	-22.3	V	A	
4.904	3.0	35.8	32.7	5.9	-34.8	0.0	0.0	39.5	74.0	-34.5	H	P	
4.904	3.0	22.7	32.7	5.9	-34.8	0.0	0.0	26.4	54.0	-27.6	H	A	
7.356	3.0	34.7	35.5	7.3	-34.1	0.0	0.0	43.4	74.0	-30.6	H	P	
7.356	3.0	22.7	35.5	7.3	-34.1	0.0	0.0	31.4	54.0	-22.6	H	A	
Rev. 4.1.2.7													
Note: No other emissions were detected above the system noise floor.													

8.3. RECEIVER ABOVE 1 GHz

8.3.1. RECEIVER ABOVE 1 GHz FOR 20 MHz BANDWIDTH IN THE 2.4 GHz BAND

High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber																	
Company: Broadcom																	
Project #: 09U12655																	
Date: 7/28/2009																	
Test Engineer: Chin Pang																	
Configuration: EUT only																	
Mode: RX, HT20																	
Test Equipment:																	
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit					
T59; S/N: 3245 @3m			T145 Agilent 3008A0056									FCC 15.209					
Hi Frequency Cables																	
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz		
3' cable 22807700			12' cable 22807600			20' cable 22807500									Average Measurements RBW=1MHz ; VBW=10Hz		
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)		
Mid Ch																	
1.198	3.0	52.0	34.0	24.7	2.6	-36.0	0.0	0.0	43.3	25.3	74	54	-30.7	-28.7	V		
1.596	3.0	51.6	33.6	26.1	3.0	-35.7	0.0	0.0	45.1	27.1	74	54	-28.9	-26.9	V		
1.793	3.0	50.0	32.0	26.9	3.2	-35.5	0.0	0.0	44.6	26.6	74	54	-29.4	-27.4	V		
3.200	3.0	48.5	31.0	30.4	4.5	-35.1	0.0	0.0	48.3	30.8	74	54	-25.7	-23.2	V		
1.200	3.0	51.4	33.8	24.7	2.6	-36.0	0.0	0.0	42.7	25.1	74	54	-31.3	-28.9	H		
1.600	3.0	50.0	34.8	26.1	3.0	-35.7	0.0	0.0	43.5	28.3	74	54	-30.5	-28.7	H		
3.198	3.0	47.0	31.3	30.4	4.5	-35.1	0.0	0.0	46.8	31.1	74	54	-27.2	-22.9	H		
Rev. 11.10.08																	
Note: No other emissions were detected above the system noise floor.																	
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit				
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit				
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit				
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit				
CL	Cable Loss					HPF	High Pass Filter										

8.3.2. RECEIVER ABOVE 1 GHz FOR 40 MHz BANDWIDTH IN THE 2.4 GHz BAND

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber

Company: Broadcom
 Project #: 09U12655
 Date: 7/28/2009
 Test Engineer: Chin Pang
 Configuration: EUT only
 Mode: RX, HT40

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A0056			FCC 15.209

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz
3' cable 22807700	12' cable 22807600	20' cable 22807500			Average Measurements RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Mtd Ck															
1.200	3.0	52.5	34.3	24.7	2.6	-36.0	0.0	0.0	43.8	25.6	74	54	-30.2	-28.4	V
1.600	3.0	52.6	33.7	26.1	3.0	-35.7	0.0	0.0	46.1	27.2	74	54	-27.9	-26.8	V
1.795	3.0	52.0	32.5	26.9	3.2	-35.5	0.0	0.0	46.6	27.1	74	54	-27.4	-26.9	V
3.200	3.0	49.2	32.4	30.4	4.5	-35.1	0.0	0.0	49.0	32.2	74	54	-25.0	-21.8	V
1.200	3.0	52.0	34.1	24.7	2.6	-36.0	0.0	0.0	43.3	25.4	74	54	-30.7	-28.6	H
1.600	3.0	50.6	35.0	26.1	3.0	-35.7	0.0	0.0	44.1	28.5	74	54	-29.9	-25.5	H
3.200	3.0	48.3	32.2	30.4	4.5	-35.1	0.0	0.0	48.1	32.0	74	54	-25.9	-22.0	H

Rev. 11.10.08
Note: No other emissions were detected above the system noise floor.

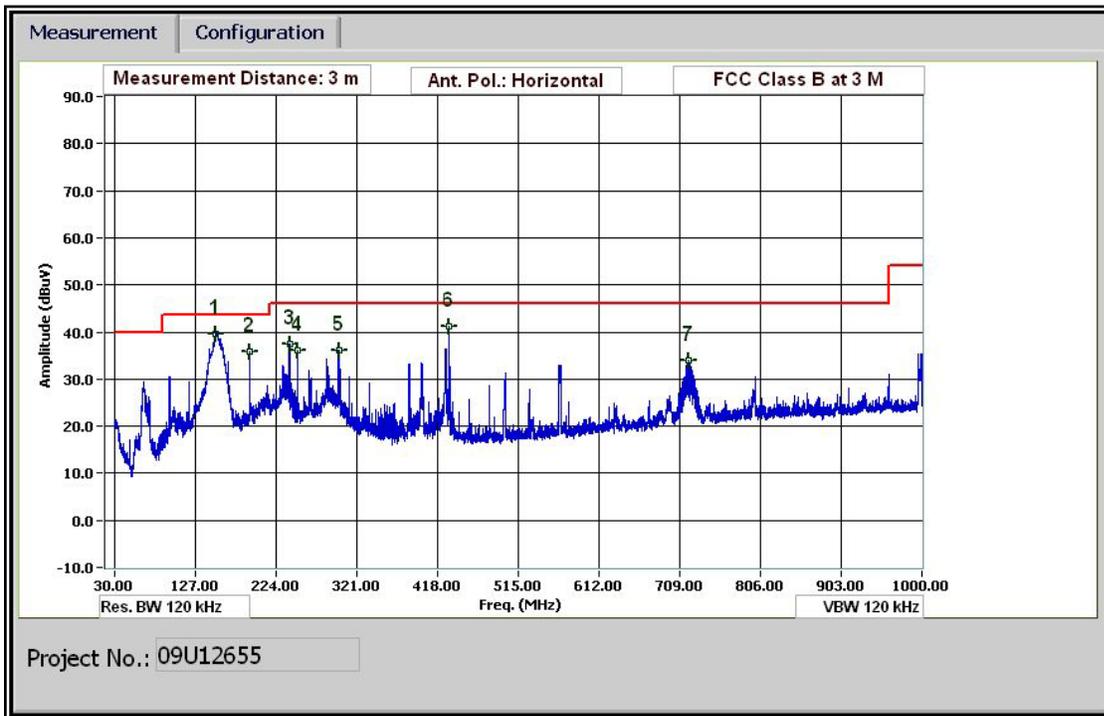
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

8.4. WORST-CASE BELOW 1 GHz

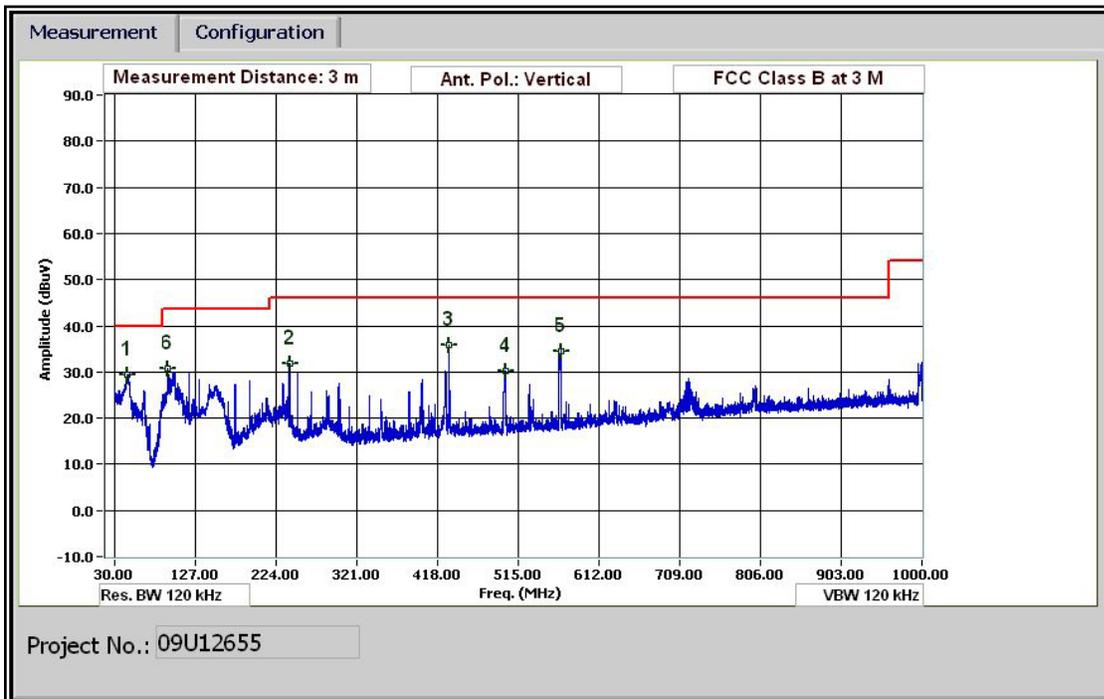
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION,)

30-1000MHz Frequency Measurement													
Compliance Certification Services, Fremont 5m Chamber													
Test Engr:		Chin Pang											
Date:		07/24/09											
Project #:		09U12655											
Company:		Broadcom											
EUT Description:		802.11 B/G/N Wlan Module											
EUT M/N:		BCM94319WLUSBN4L											
Test Target:		FCC 15.247											
Mode Oper:		TX (Worst Case)											
f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit								
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters										
Read	Analyzer Reading	Filter	Filter Insert Loss										
AF	Antenna Factor	Corr.	Calculated Field Strength										
CL	Cable Loss	Limit	Field Strength Limit										
f	Dist	Read	AF	CL	Amp	D Corr	Filter	Corr.	Limit	Margin	Ant. Pol	Det.	Notes
MHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Horiz data													
151.805	3.0	55.4	12.3	1.1	29.3	0.0	0.0	39.5	43.5	-4.0	H	EP	
151.805	3.0	52.2	12.3	1.1	29.3	0.0	0.0	36.3	43.5	-7.2	H	QP	
192.007	3.0	52.2	11.4	1.2	29.0	0.0	0.0	35.8	43.5	-7.7	H	EP	
240.009	3.0	53.0	11.8	1.4	28.8	0.0	0.0	37.4	46.0	-8.6	H	EP	
249.969	3.0	51.7	11.8	1.4	28.8	0.0	0.0	36.1	46.0	-9.9	H	EP	
299.771	3.0	50.0	13.3	1.6	28.8	0.0	0.0	36.1	46.0	-9.9	H	EP	
432.017	3.0	53.2	15.6	2.0	29.4	0.0	0.0	41.3	46.0	-4.7	H	EP	
432.017	3.0	51.8	15.6	2.0	29.4	0.0	0.0	39.9	46.0	-6.1	H	QP	
720.028	3.0	41.2	19.6	2.6	29.5	0.0	0.0	34.0	46.0	-12.0	H	EP	
45.841	3.0	47.8	10.5	0.6	29.6	0.0	0.0	29.3	40.0	-10.7	V	EP	
94.323	3.0	50.7	8.6	0.9	29.5	0.0	0.0	30.6	43.5	-12.9	V	EP	
240.009	3.0	47.3	11.8	1.4	28.8	0.0	0.0	31.7	46.0	-14.3	V	EP	
432.017	3.0	47.7	15.6	2.0	29.4	0.0	0.0	35.8	46.0	-10.2	V	EP	
499.339	3.0	41.0	16.8	2.1	29.7	0.0	0.0	30.2	46.0	-15.8	V	EP	
566.182	3.0	44.0	17.8	2.3	29.7	0.0	0.0	34.4	46.0	-11.6	V	EP	
Rev. 1.27.09													

HORIZONTAL PLOT



VERTICAL PLOT



9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

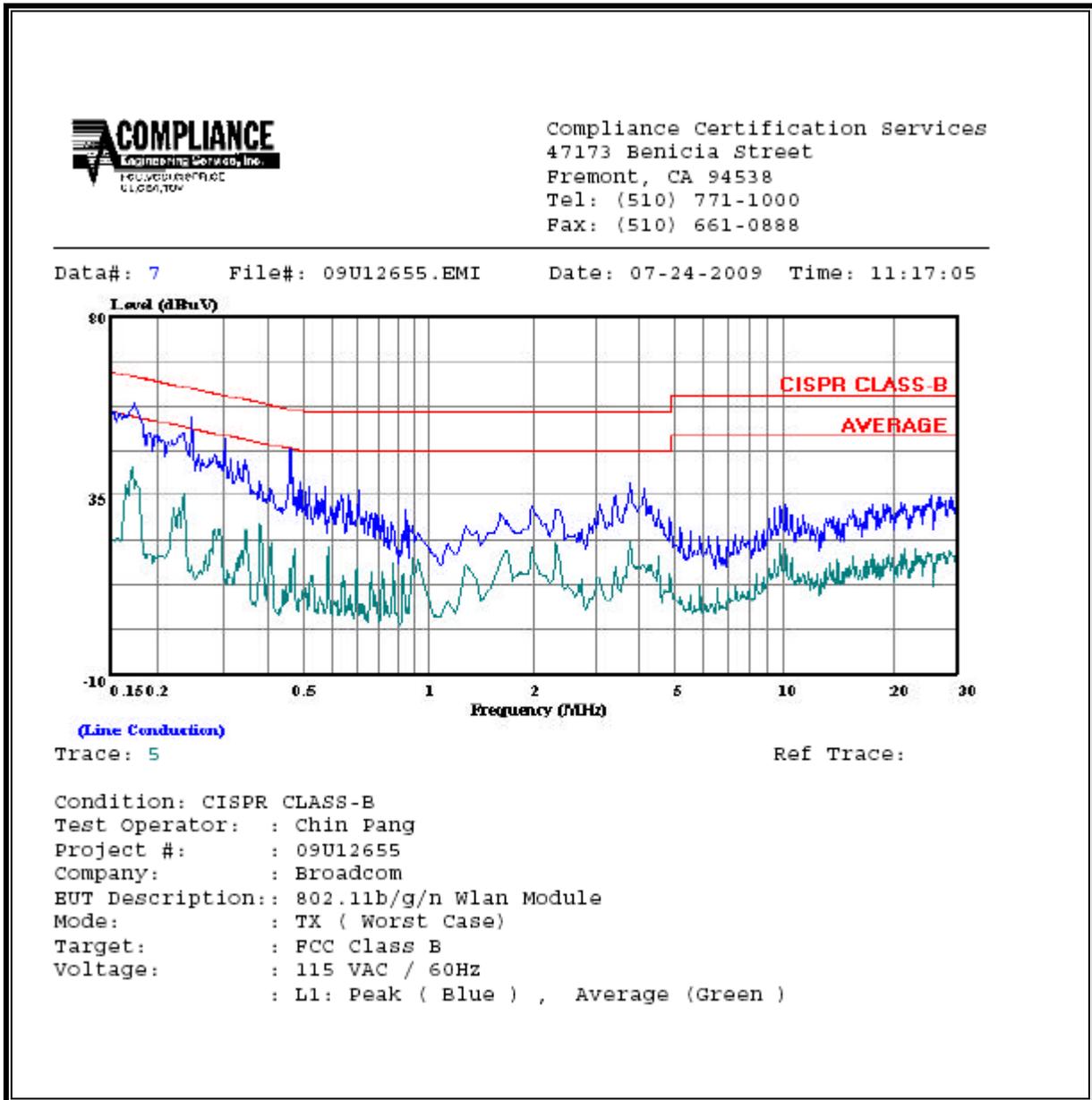
ANSI C63.4

RESULTS

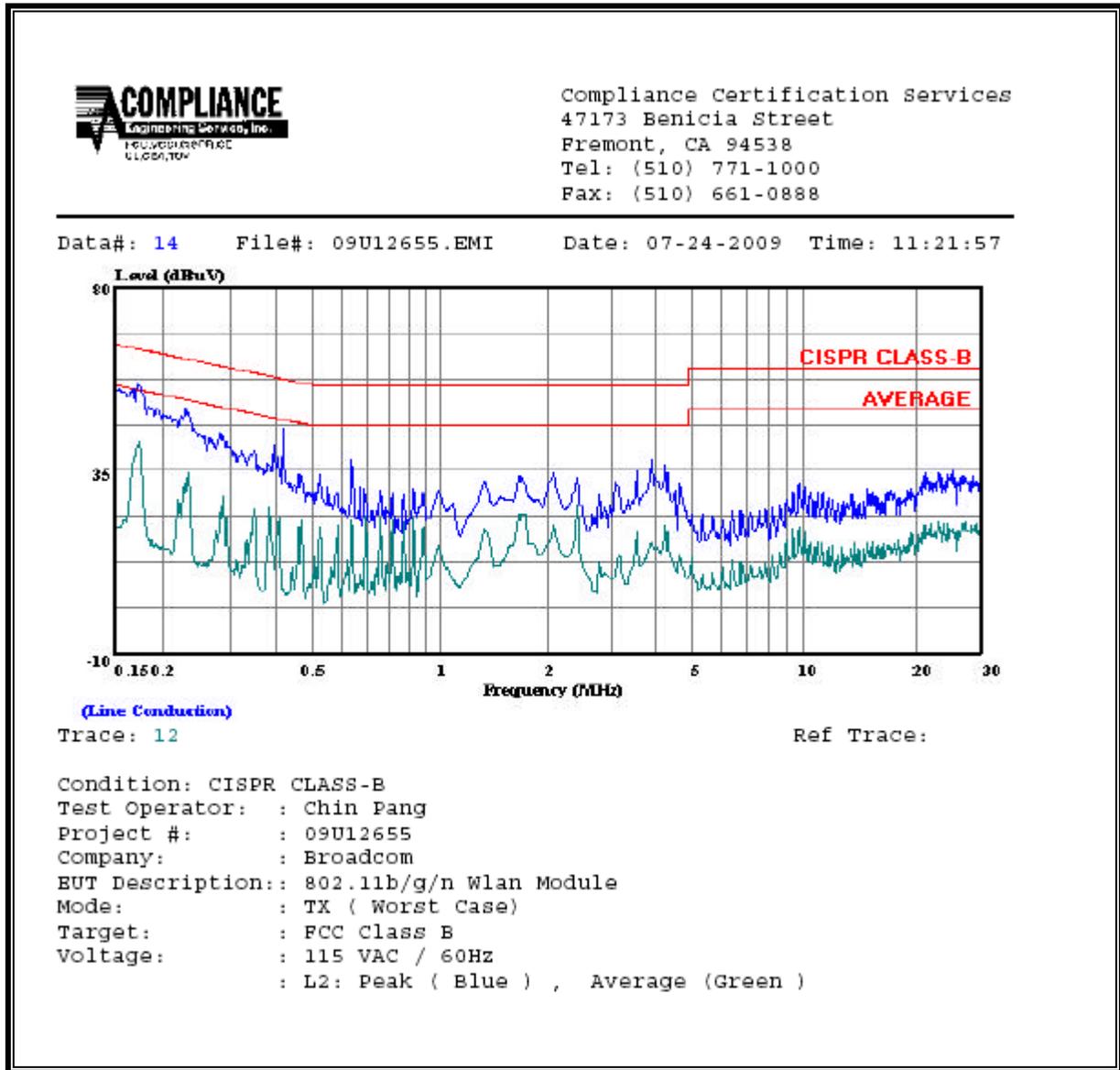
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Class (dB)	Limit QP	EN B AV	Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)				QP (dB)	AV (dB)	
0.17	58.15	--	42.07	0.00	64.77	54.77	-6.62	-12.70	L1
0.25	54.64	--	35.40	0.00	61.82	51.82	-7.18	-16.42	L1
3.88	38.08	--	23.56	0.00	56.00	46.00	-17.92	-22.44	L1
0.17	55.75	--	42.07	0.00	64.77	54.77	-9.02	-12.70	L2
0.23	50.42	--	34.61	0.00	62.49	52.49	-12.07	-17.88	L2
4.01	37.62	--	21.75	0.00	56.00	46.00	-18.38	-24.25	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

**Table 5
 Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)**

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m ²)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	280/ <i>f</i>	2.19/ <i>f</i>		6
10–30	28	2.19/ <i>f</i>		6
30–300	28	0.073	2*	6
300–1 500	1.585 <i>f</i> ^{0.5}	0.0042 <i>f</i> ^{0.5}	<i>f</i> /150	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	616 000 / <i>f</i> ^{1.2}
150 000–300 000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616 000 / <i>f</i> ^{1.2}

* Power density limit is applicable at frequencies greater than 100 MHz.

- Notes:**
1. Frequency, *f*, is in MHz.
 2. A power density of 10 W/m² is equivalent to 1 mW/cm².
 3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

EQUATIONS

Power density is given by:

$$S = \text{EIRP} / (4 * \text{Pi} * \text{D}^2)$$

where

S = Power density in W/m²

EIRP = Equivalent Isotropic Radiated Power in W

D = Separation distance in m

Power density in units of W/m² is converted to units of mW/cm² by dividing by 10.

Distance is given by:

$$D = \text{SQRT} (\text{EIRP} / (4 * \text{Pi} * S))$$

where

D = Separation distance in m

EIRP = Equivalent Isotropic Radiated Power in W

S = Power density in W/m²

For multiple colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the Power * Gain product (in linear units) of each transmitter.

$$\text{Total EIRP} = (P1 * G1) + (P2 * G2) + \dots + (Pn * Gn)$$

where

Px = Power of transmitter x

Gx = Numeric gain of antenna x

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm²

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m²

RESULTS

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m ²)	FCC Power Density (mW/cm ²)
2.4 GHz	WLAN	0.20	25.80	2.20	1.26	0.126

CO-LOCATED RESULTS

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	Duty Cycle (%)	IC Power Density (W/m ²)	FCC Power Density (mW/cm ²)
2.4 GHz	Bluetooth		-0.46	0.48	100		
2.4 GHz	WLAN		25.80	2.20	100		
Combined		0.20				1.26	0.126