FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

iPhone With GSM WCDMA 1xRTT/CDMA 1xEVDO Rev. A, Bluetooth EDR 2.1, Bluetooth 4.0 LE, and WiFi 802.11 bgn

MODEL NUMBER: A1387

FCC ID: BCG-E2430A
IC: 579C-E2430A

REPORT NUMBER: 11U13896-2, Revision B

ISSUE DATE: SEPTEMBER 19, 2011

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
---	08/25/11	Initial Issue	T. Chan
A	09/08/11	Revised EUT description	A. Zaffar
B	09/19/11	Revised section 8.4	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	APPLE, INC. 1 INFINITE LOOP CUPERTINO, CA, 95014, U.S.A.
EUT DESCRIPTION:	iPhone With GSM WCDMA 1xRTT/CDMA 1xEVDO Rev. A, Bluetooth EDR 2.1, Bluetooth 4.0 LE, and WiFi 802.11 bgn
MODEL:	A1387
SAMPLE TESTED:	BOM #1(D0415), BOM#2 (D0485), BOM #3(D0930)
SERIAL NUMBER:	C39G500HDRT3, C39G507FDRT1, C39G50APDRT1
DATE TESTED:	JULY 04 - AUGUST 16, 2011

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

Compliance Certification Services (UL 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 UL 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 UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL 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 UL CCS By:

THU CHAN
ENGINEERING MANAGER
UL CCS

Tested By:

CHIN PANG
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

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

UL 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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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 Apple iPhone, Model A1387, is a mobile phone with multimedia functions (music, application support, and video), cellular GSM, WCDMA-HSDPA & HSUPA, CDMA -1xRTT, EV-DO Rev 0 & Rev A radio, IEEE 802.11b/g/n radio and Bluetooth radio. This device measures 115.6 mm (4.55 inches) tall x 59.3 mm (2.33 inches) and 9.36 mm (0.368 inches) thick and weighs 140 grams (4.9 oz.). The rechargeable battery is not user accessible.

5.2. MAXIMUM OUTPUT POWER

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

BOM VARIANT 1

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	19.35	86.10
2412 - 2462	802.11g	25.27	336.51
2412 - 2462	802.11n	25.16	328.10

BOM VARIANT 2

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	19.17	82.60
2412 - 2462	802.11g	25.16	328.10
2412 - 2462	802.11n	24.92	310.46

BOM VARIANT 3

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	19.05	80.35
2412 - 2462	802.11g	25.25	334.97
2412 - 2462	802.11n	24.91	309.74

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PiFA integrated antennas, with the peak gains of -1.5 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Broadcom 156_13

The EUT software installed during testing was 9A287.

5.5. WORST-CASE CONFIGURATION AND MODE

For Radiated Emissions below 1 GHz and Power line Conducted Emissions, the channel with the highest conducted output power was selected.

Worst-case data rates as provided by the manufacturer are:
For 11b mode: 1Mbps
For 11g mode: 6Mbps
For 11n HT20: MCS0

EUT is a portable device that has three orientations; therefore X, Y and Z orientations have been investigated, and the worst case was found to be at X position.

Three sample units D0415 (BOM Variant 1), D0930 (BOM Variant 3) and D0485 (BOM Variant 2) were used to perform on full RF radiated and conducted tests, excepted bandwidth and PSD for both BOM Variant 3 and BOM Variant 2.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	Manufacturer	Model	Serial Number
AC Adaptor	Apple	A1344	N/A

I/O CABLES (Conducted Setup)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	AC	unshielded	2m	N/A
2	DC	1	DC	unshielded	1m	N/A
3	Antenna	1	Spectrum Analyzer	unshielded	0.10m	N/A

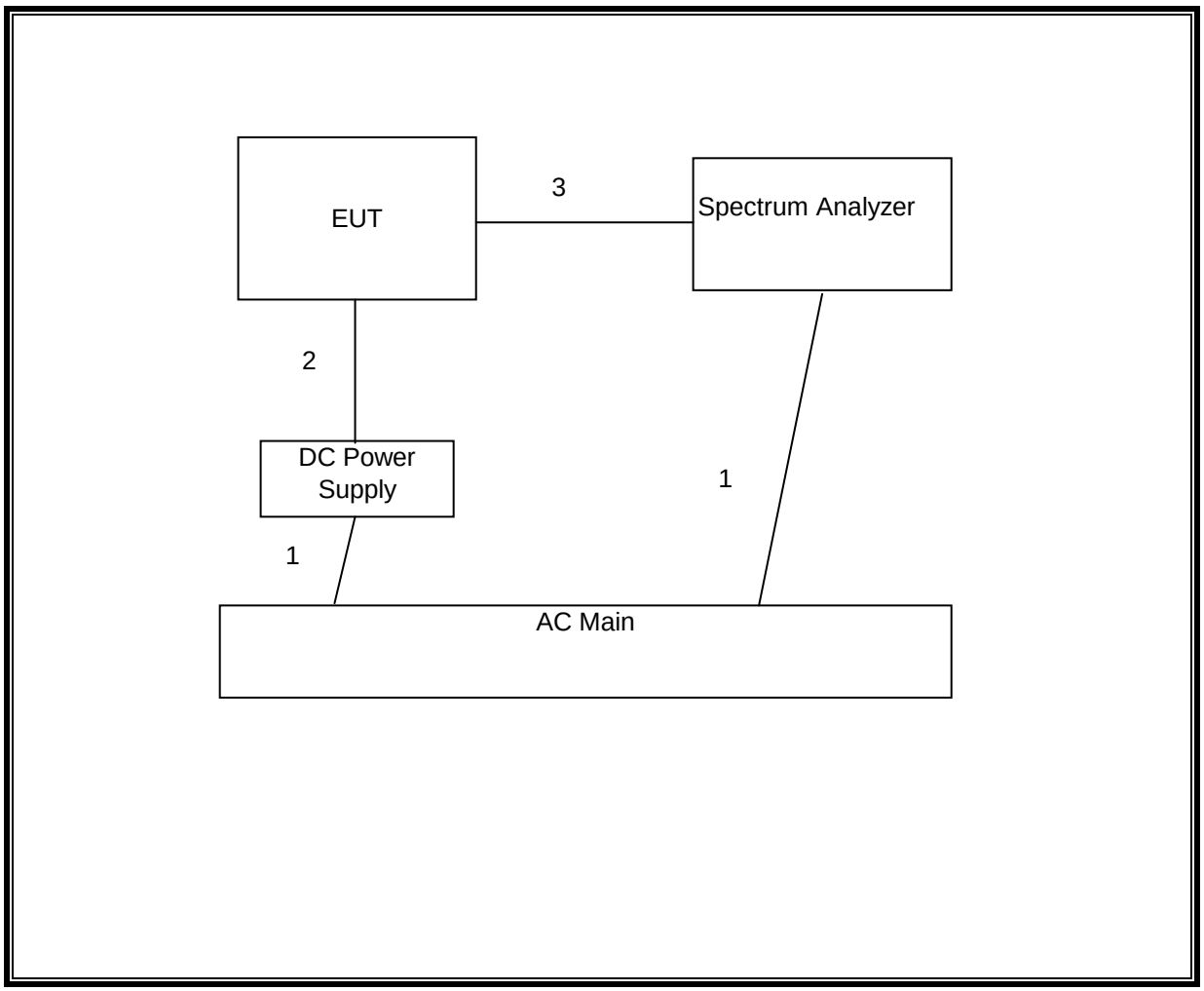
I/O CABLES (Radiated Setup)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	AC	unshielded	2m	N/A
2	DC	1	DC	unshielded	1m	N/A
3	Jack	1	Earphone	unshielded	0.5m	N/A

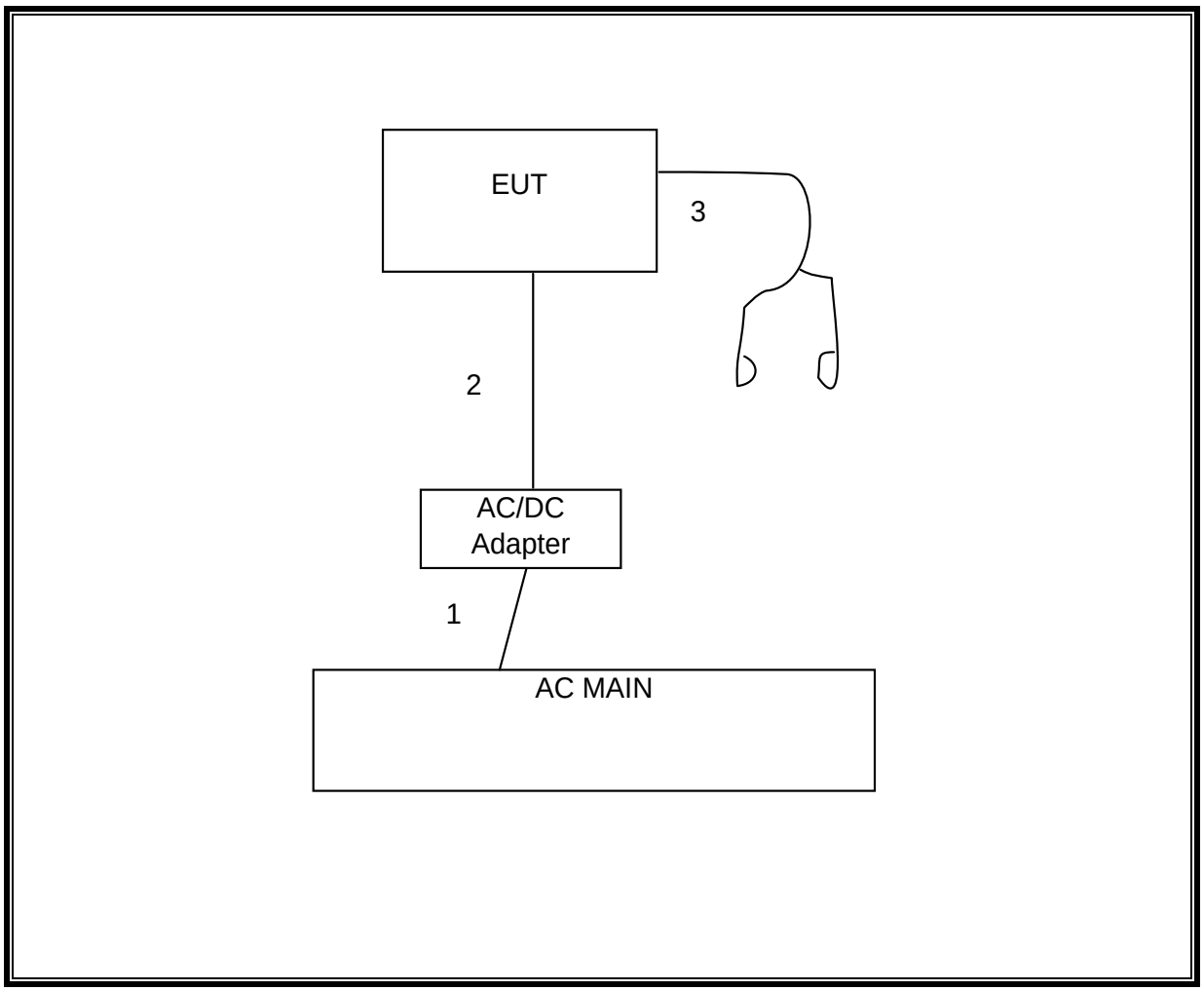
TEST SETUP

The EUT is a stand-alone device.

SETUP DIAGRAM FOR TESTS (CONDUCTED)



SETUP DIAGRAM FOR TESTS (RADIATED)



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**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	05/11/12
Antenna, Horn, 18 GHz	EMCO	3115	C00872	06/29/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	07/16/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/27/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/12/12
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	07/06/12
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/11
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	01/07/12
Peak Power Meter	Agilent / HP	E4416A	C00963	12/04/11

7. ANTENNA PORT TEST RESULTS

BOM VARIANT 1

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

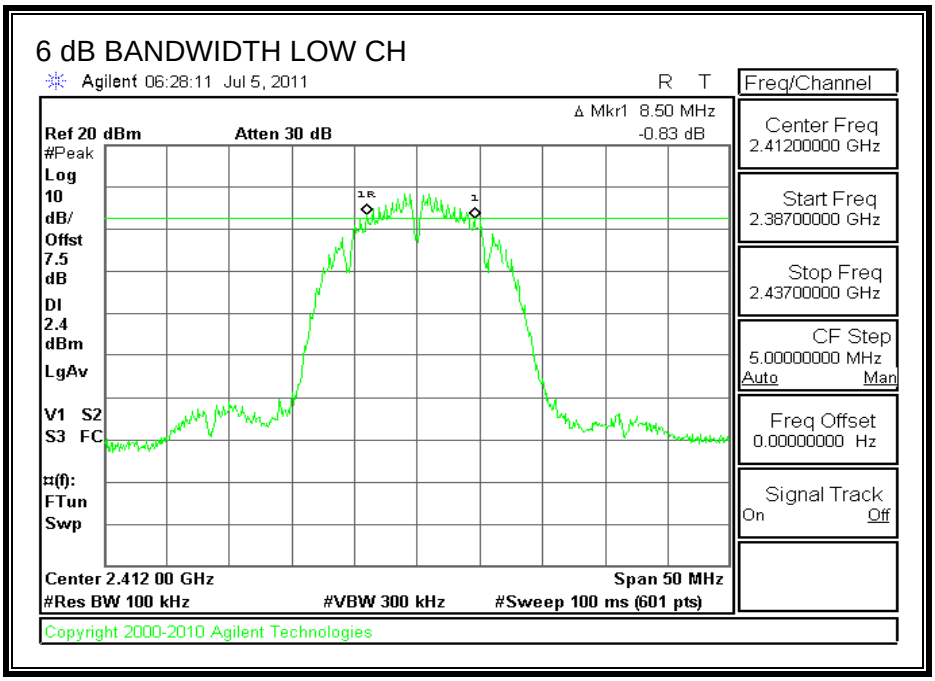
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

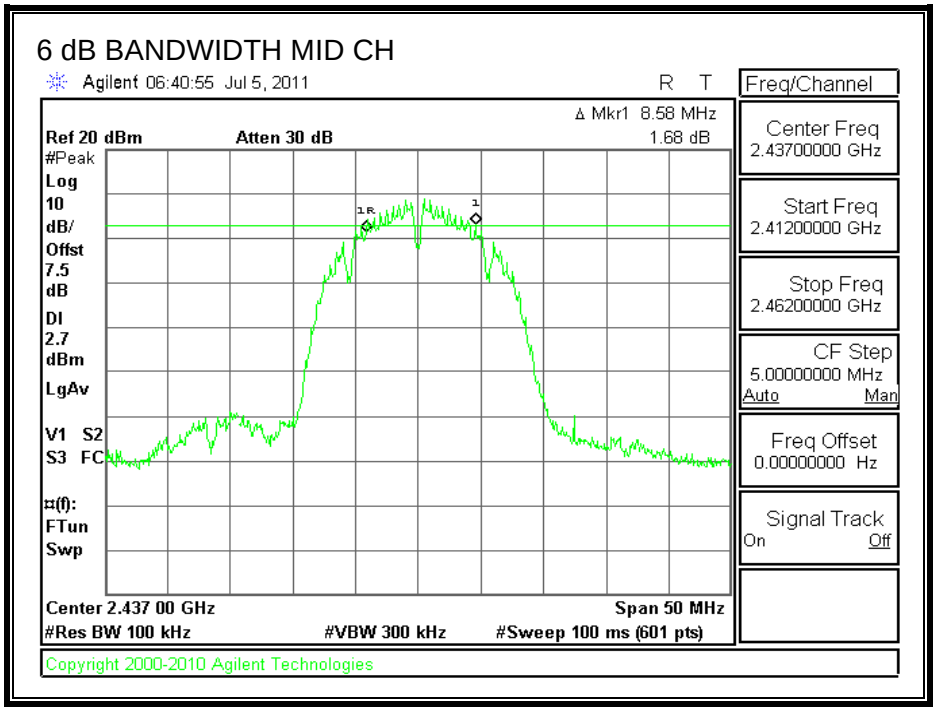
RESULTS

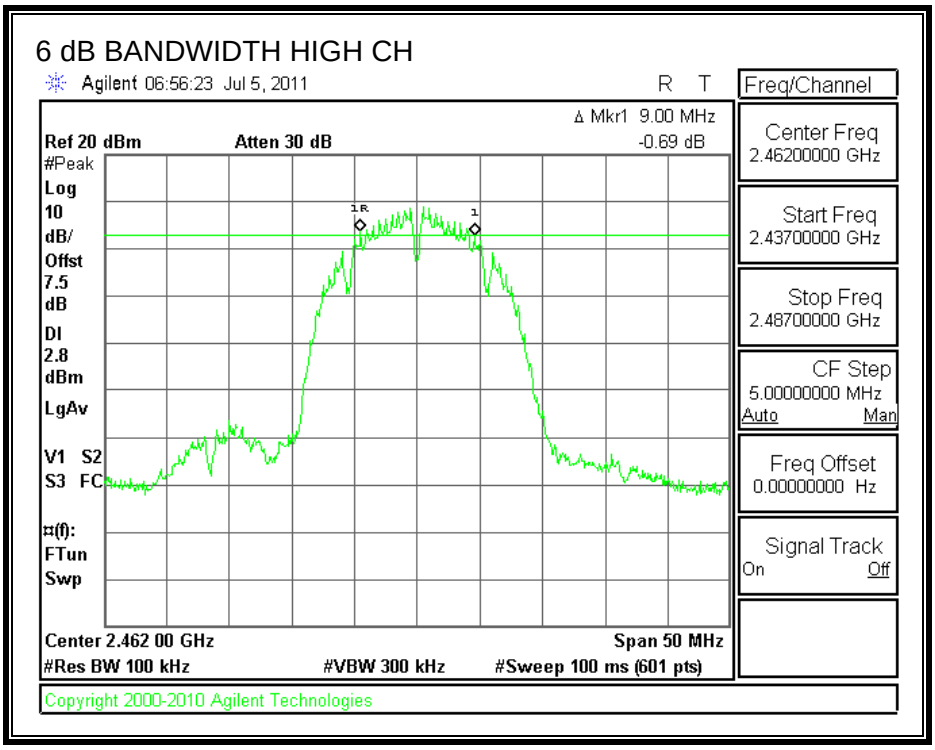
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	8.50	0.5
Middle	2437	8.58	0.5
High	2462	9.00	0.5

BOM VARIANT 1

6 dB BANDWIDTH







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

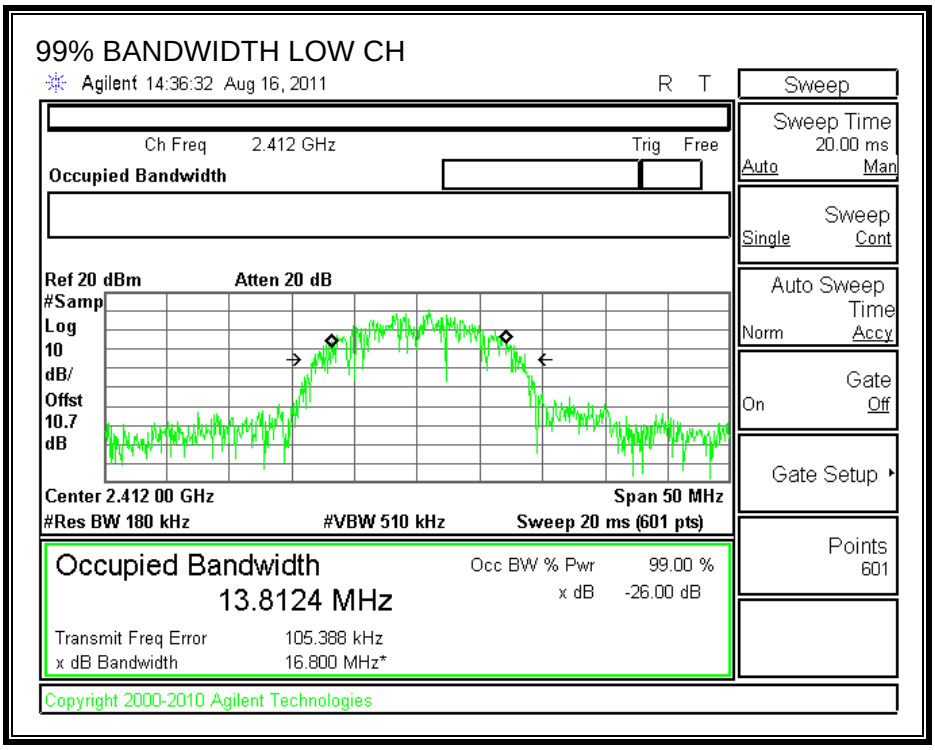
TEST PROCEDURE

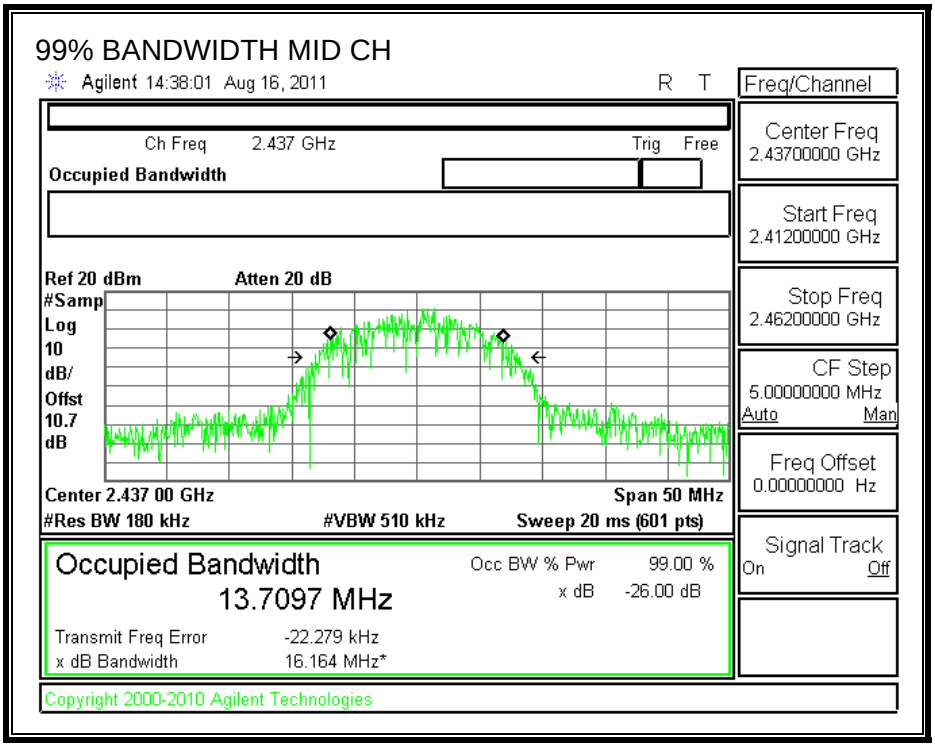
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

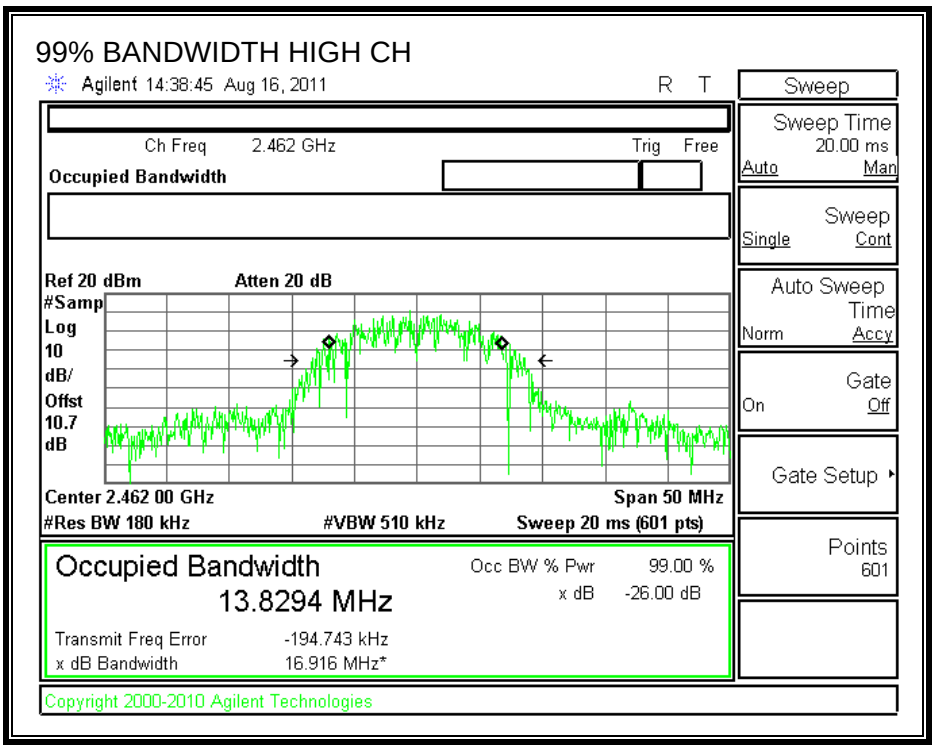
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	13.8124
Middle	2437	13.7097
High	2462	13.8294

99% BANDWIDTH, CHAIN 1







7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

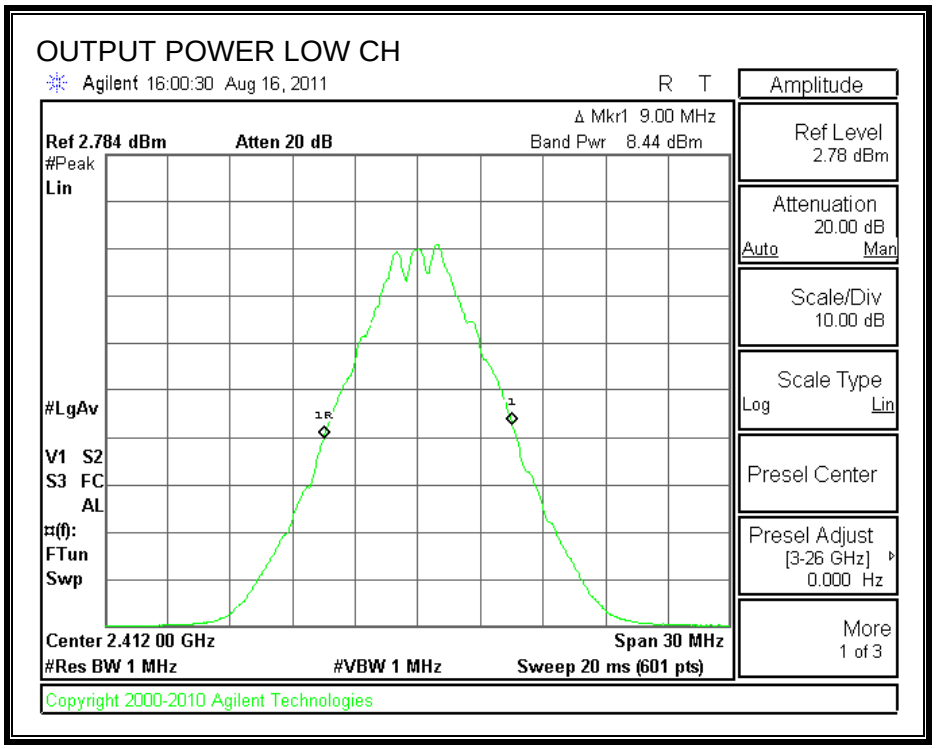
TEST PROCEDURE

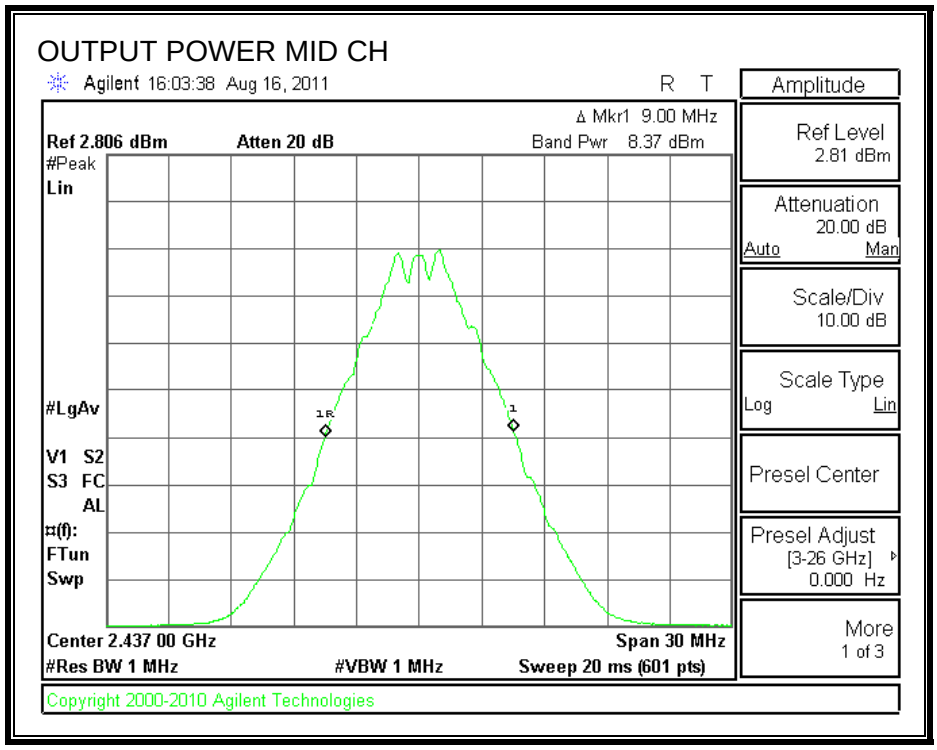
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

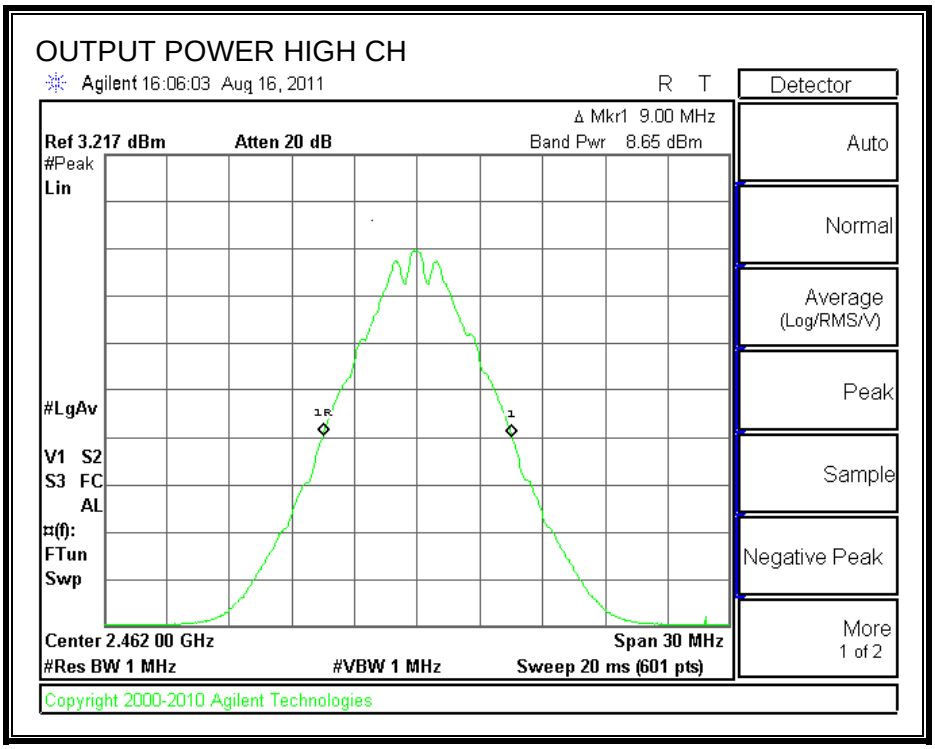
RESULTS

Channel	Frequency (MHz)	Reading (dBm)	Attenuator and Cable Offset	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	8.44	10.7	19.14	30	-10.86
Middle	2437	8.37	10.7	19.07	30	-10.93
High	2462	8.65	10.7	19.35	30	-10.65

OUTPUT POWER







7.1.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Power (dBm)
Low	2412	17.15
Middle	2437	17.05
High	2462	17.10

7.1.5. 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.

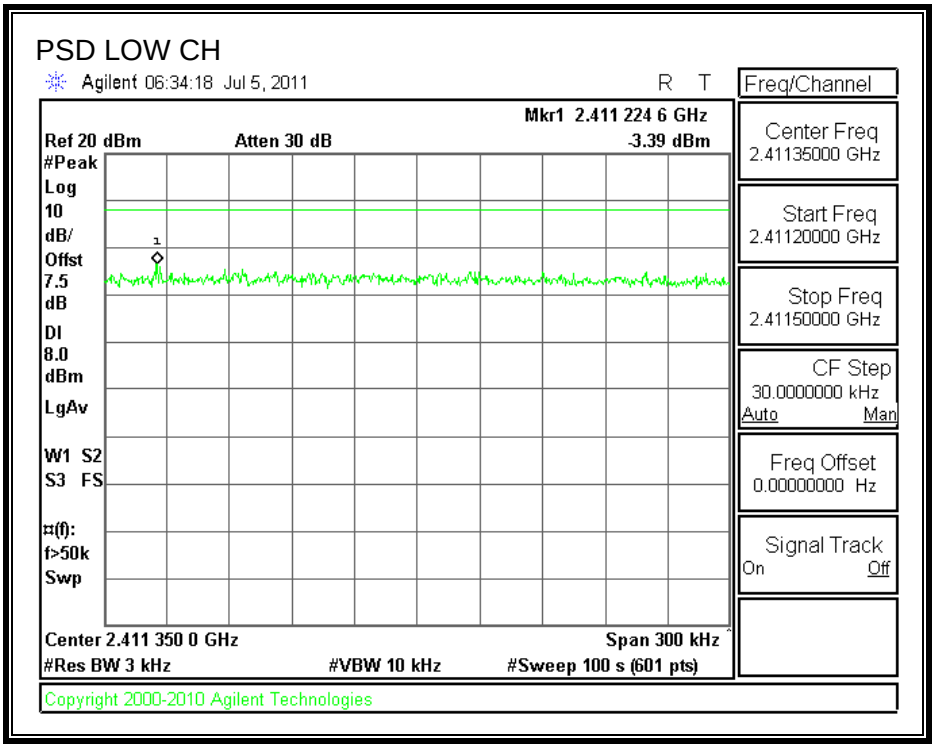
TEST PROCEDURE

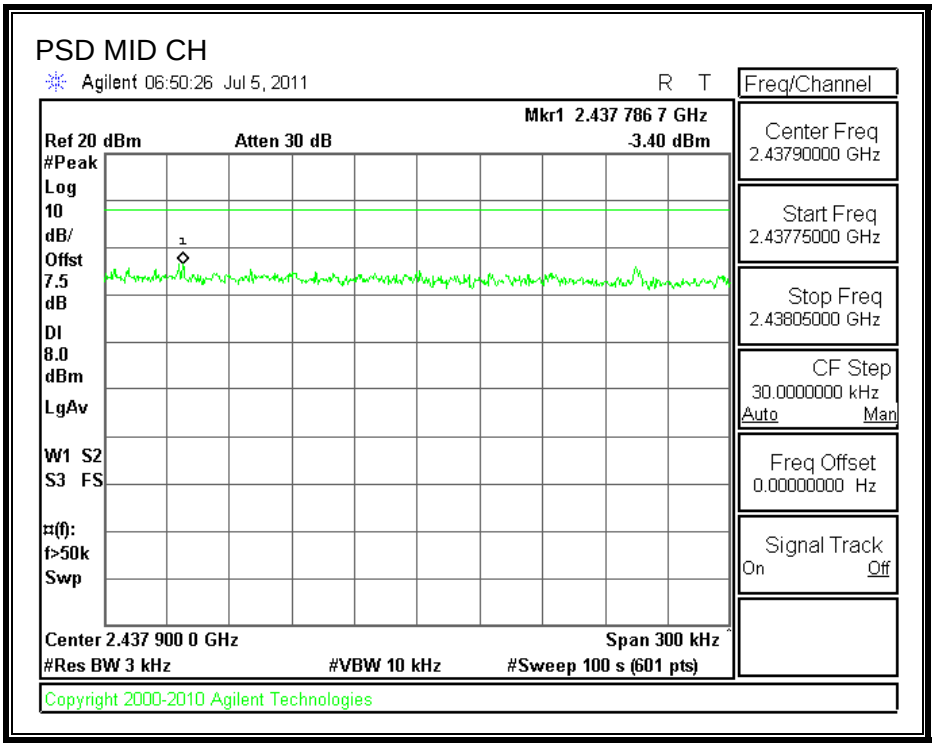
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

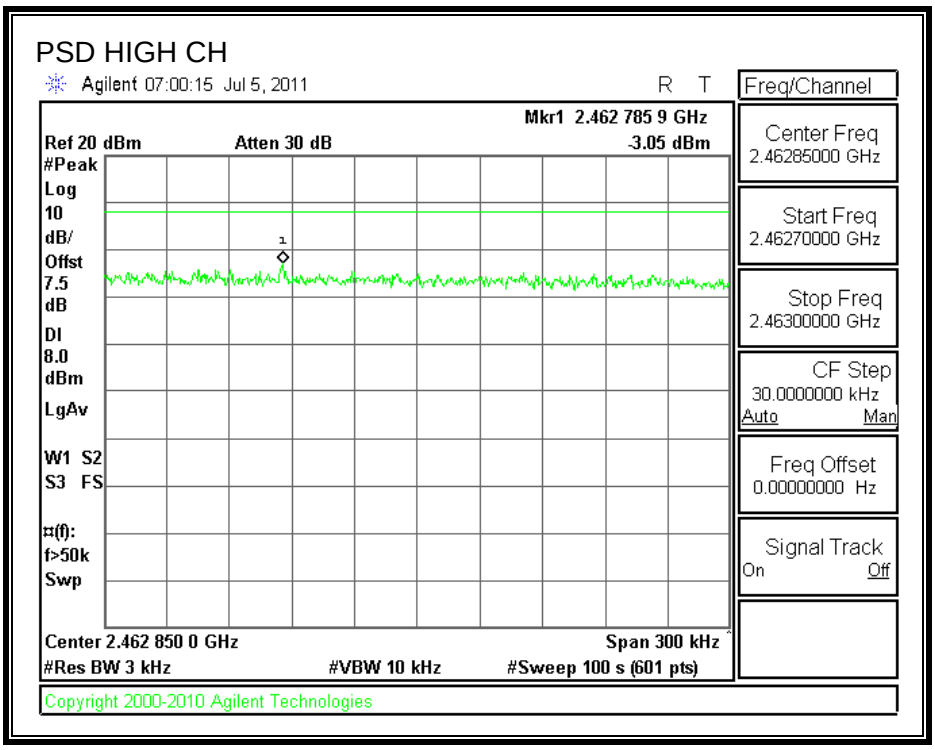
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-3.39	8	-11.39
Middle	2437	-3.40	8	-11.40
High	2462	-3.05	8	-11.05

POWER SPECTRAL DENSITY







7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

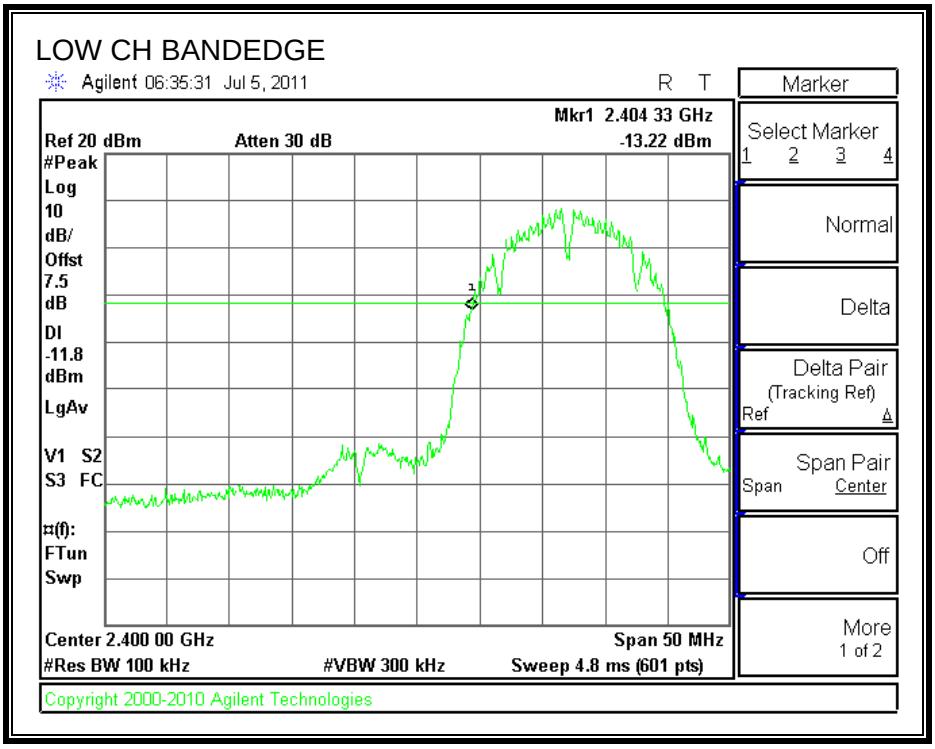
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

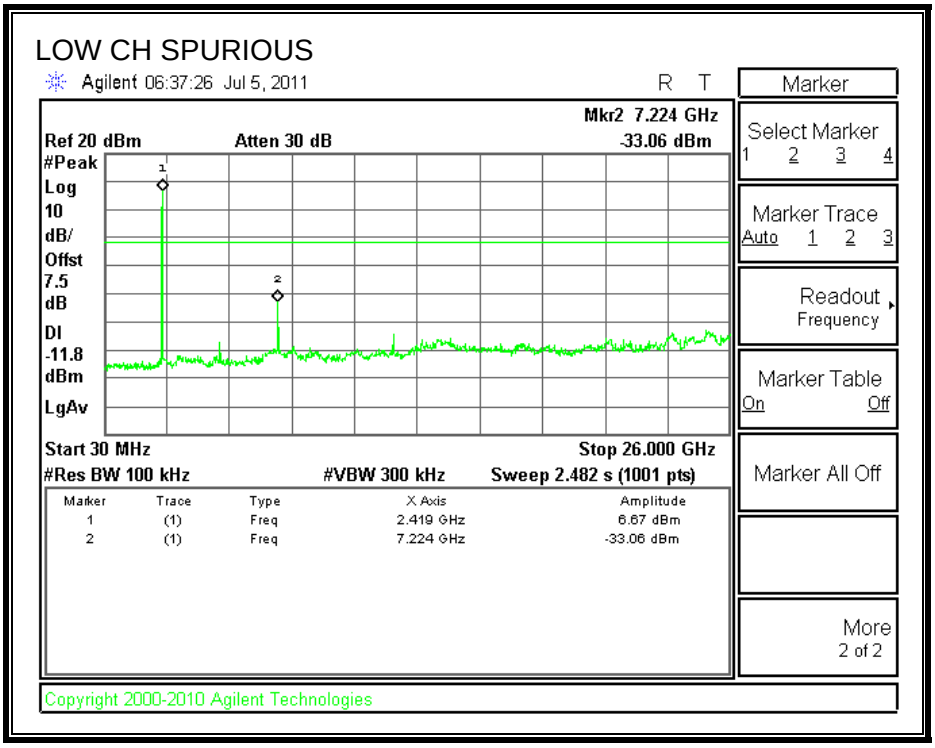
TEST PROCEDURE

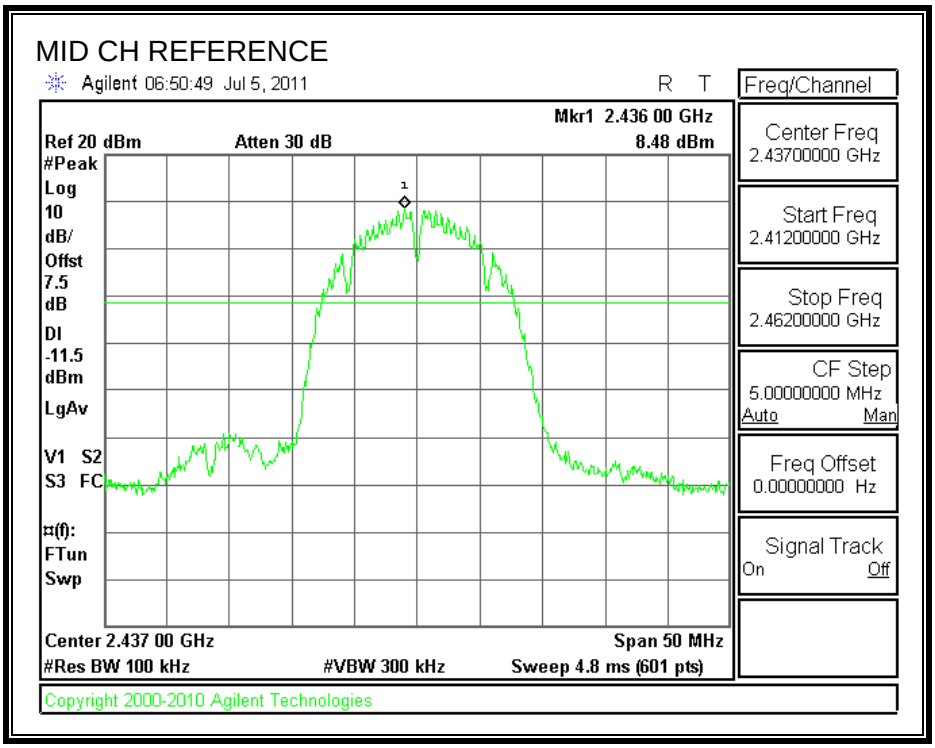
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

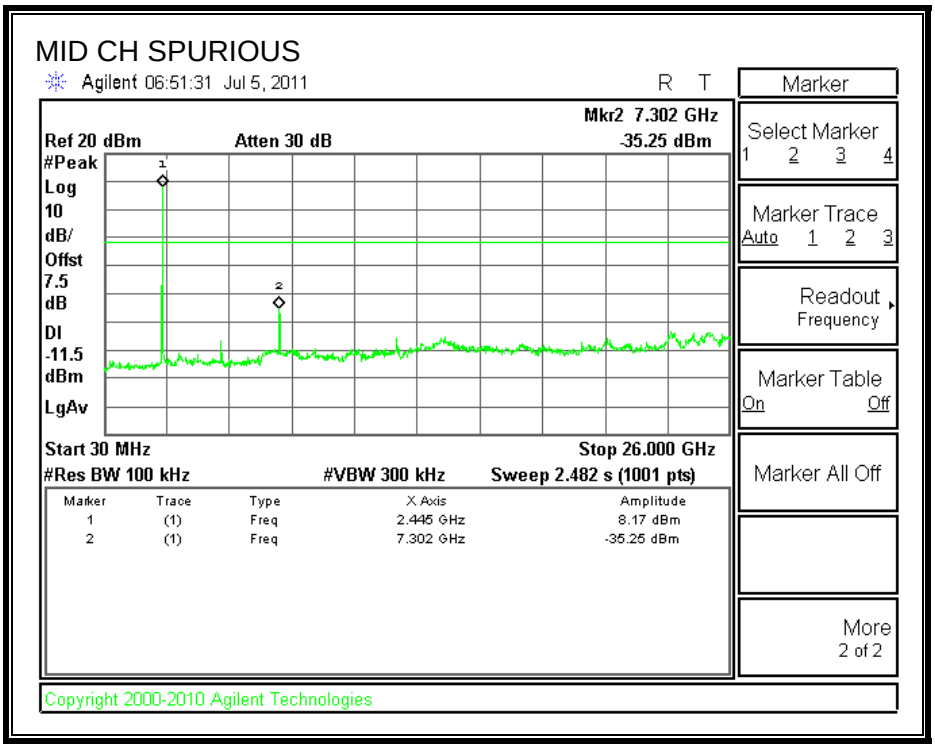
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

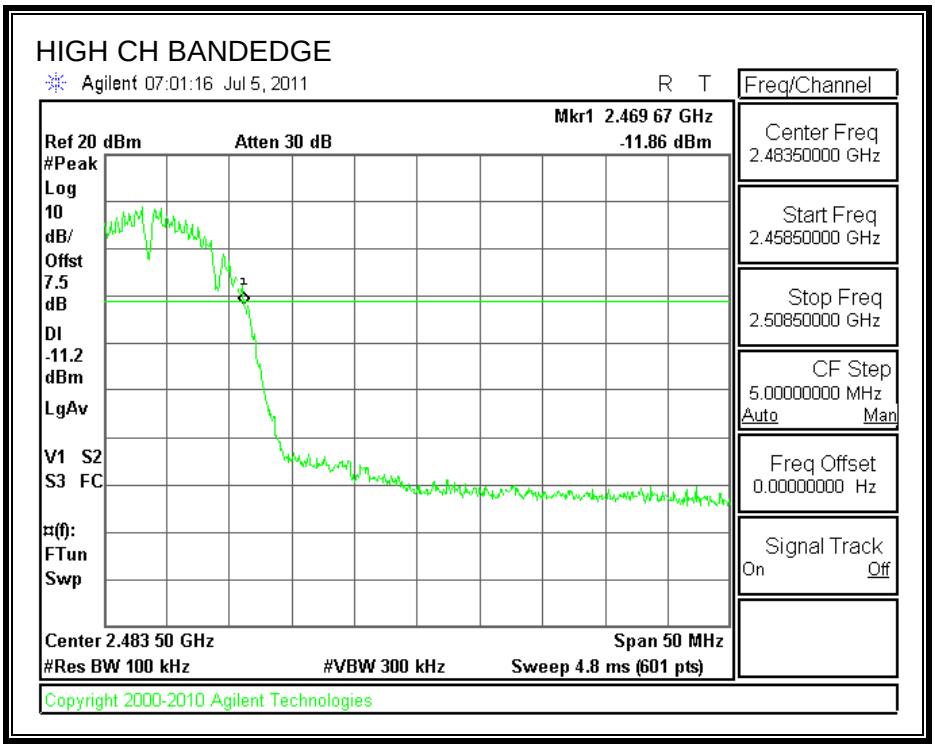
SPURIOUS EMISSIONS

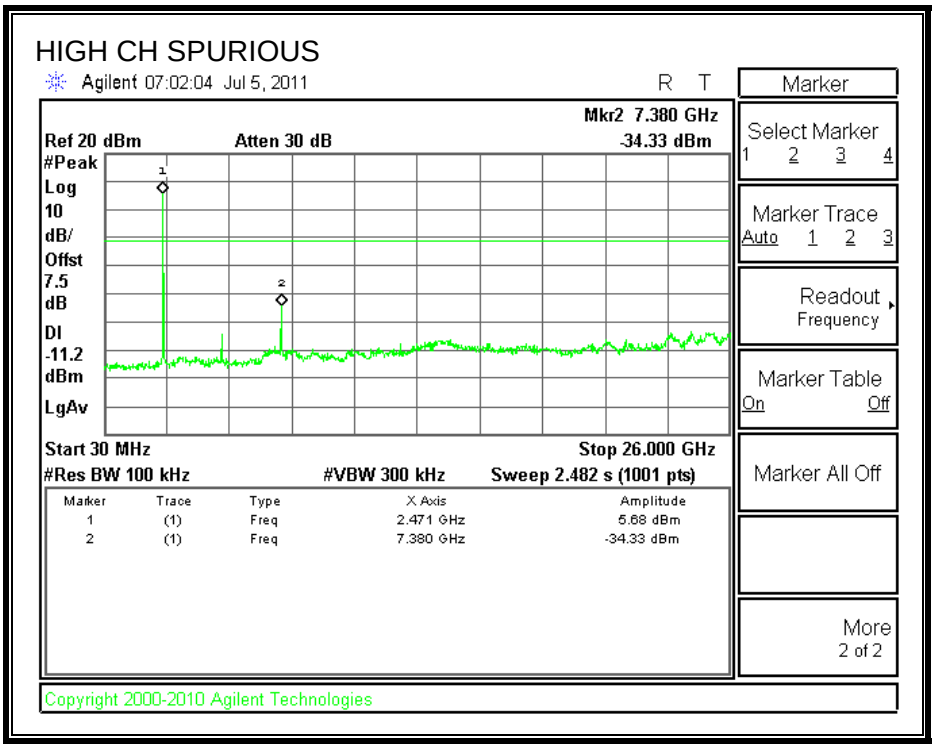












7.2. 802.11g MODE IN THE 2.4 GHz BAND

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.

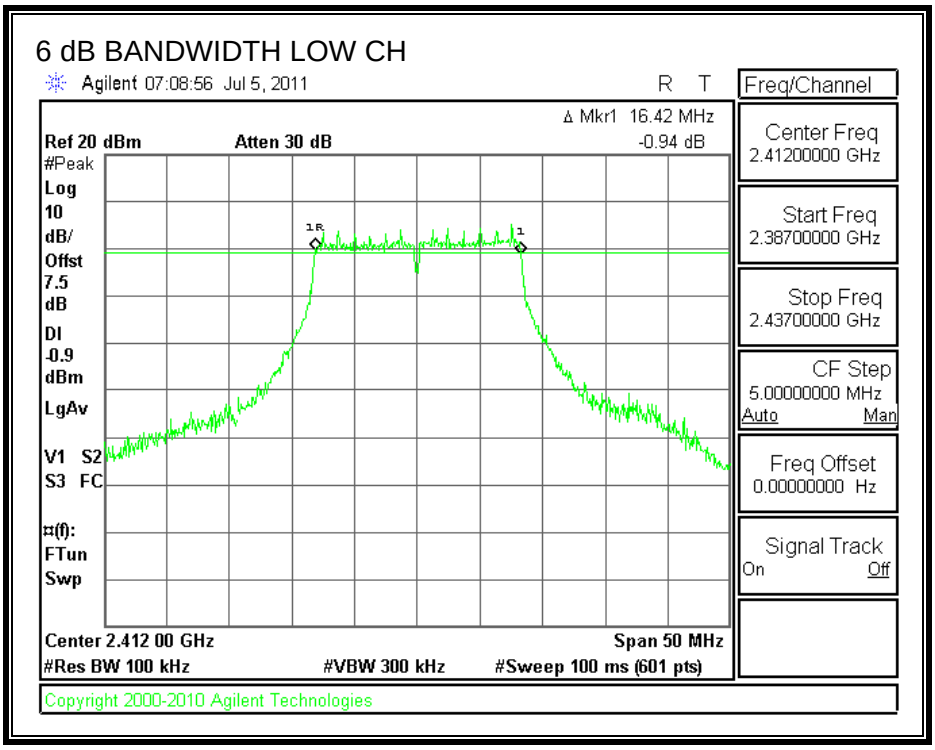
TEST PROCEDURE

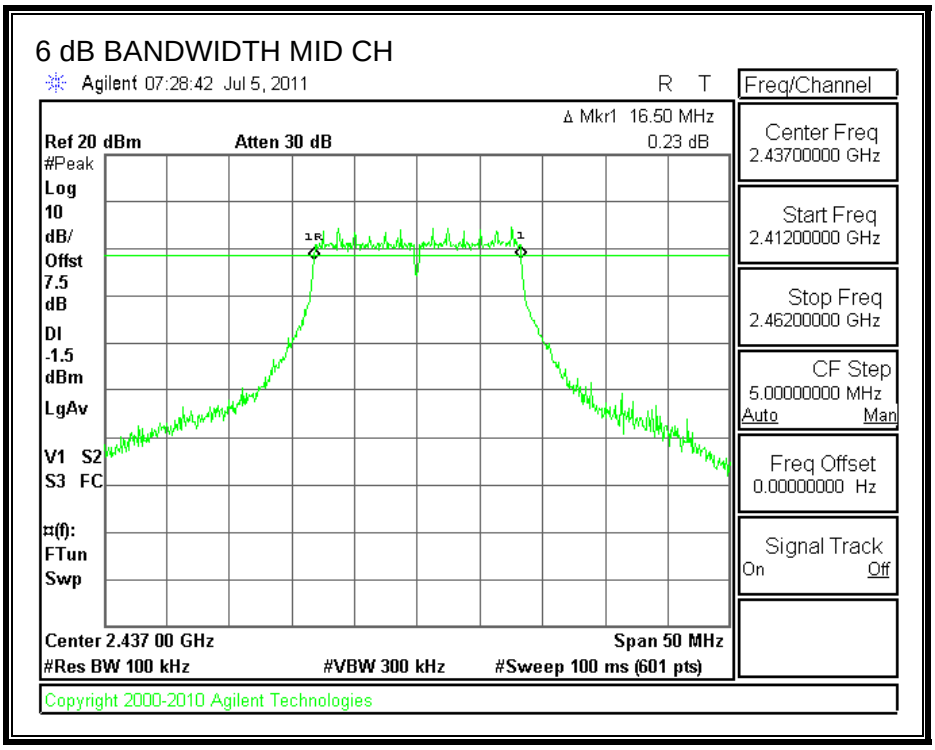
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

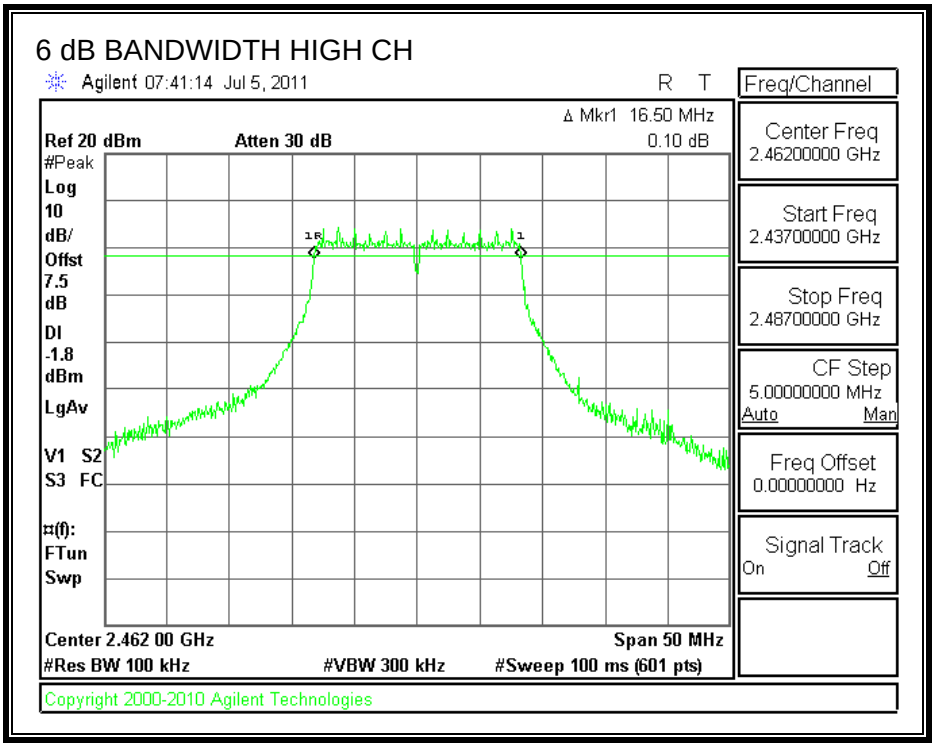
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.42	0.5
Middle	2437	16.50	0.5
High	2462	16.50	0.5

6 dB BANDWIDTH







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

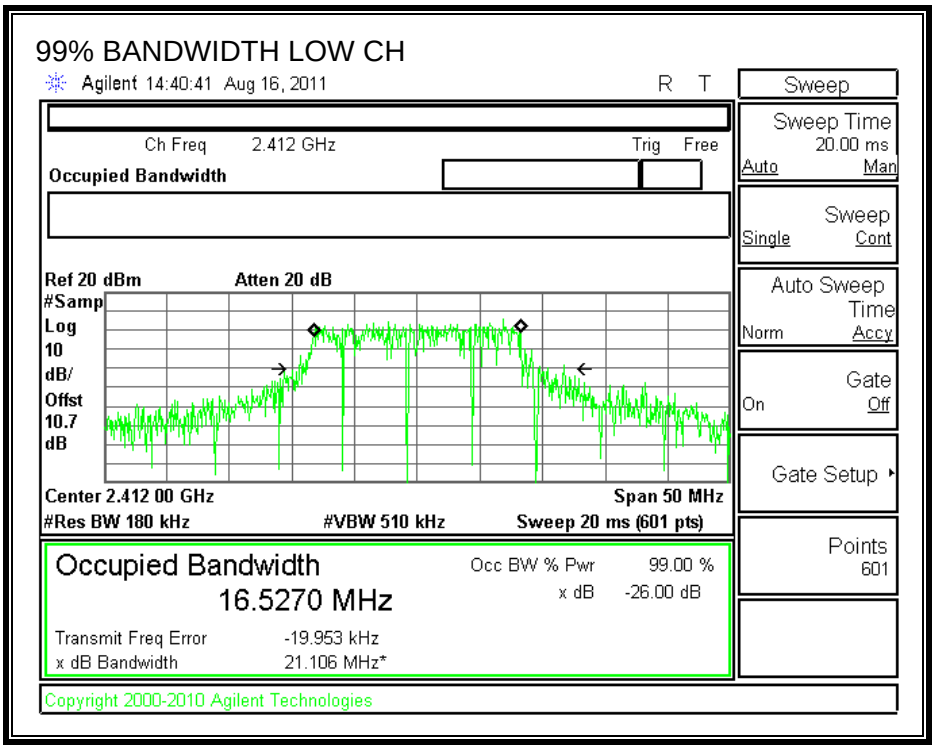
TEST PROCEDURE

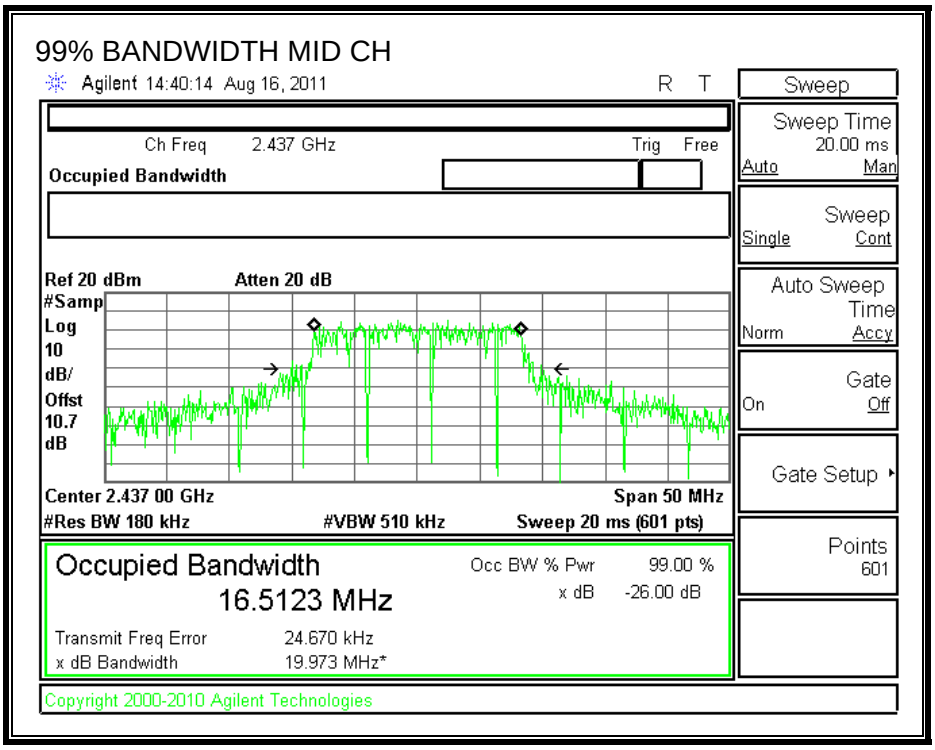
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

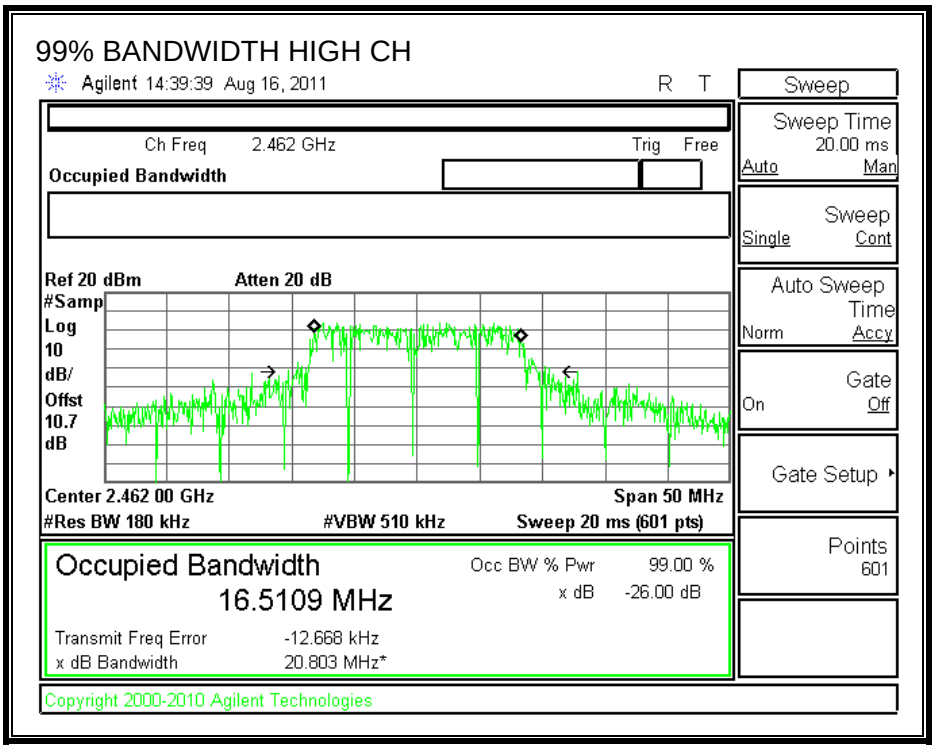
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.5270
Middle	2437	16.5123
High	2462	16.5109

99% BANDWIDTH







7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

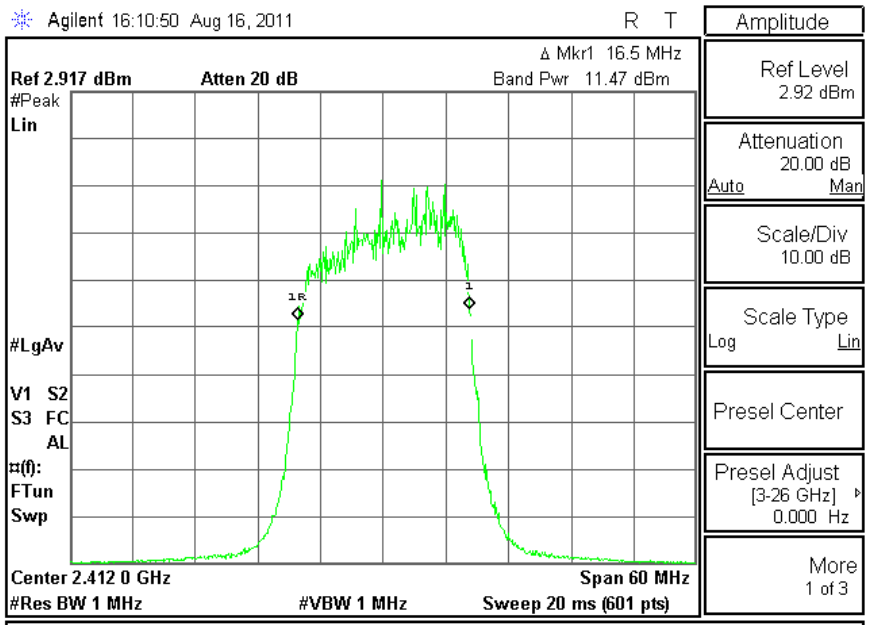
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

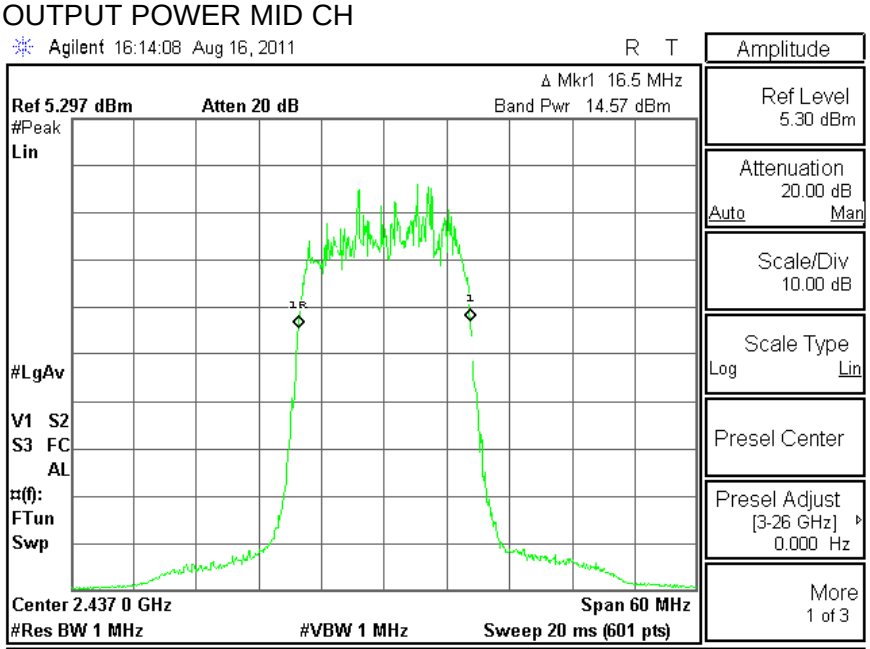
Channel	Frequency (MHz)	Peak power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	11.47	10.7	22.17	30	-7.83
Middle	2437	14.57	10.7	25.27	30	-4.73
High	2462	11.67	10.7	22.37	30	-7.63

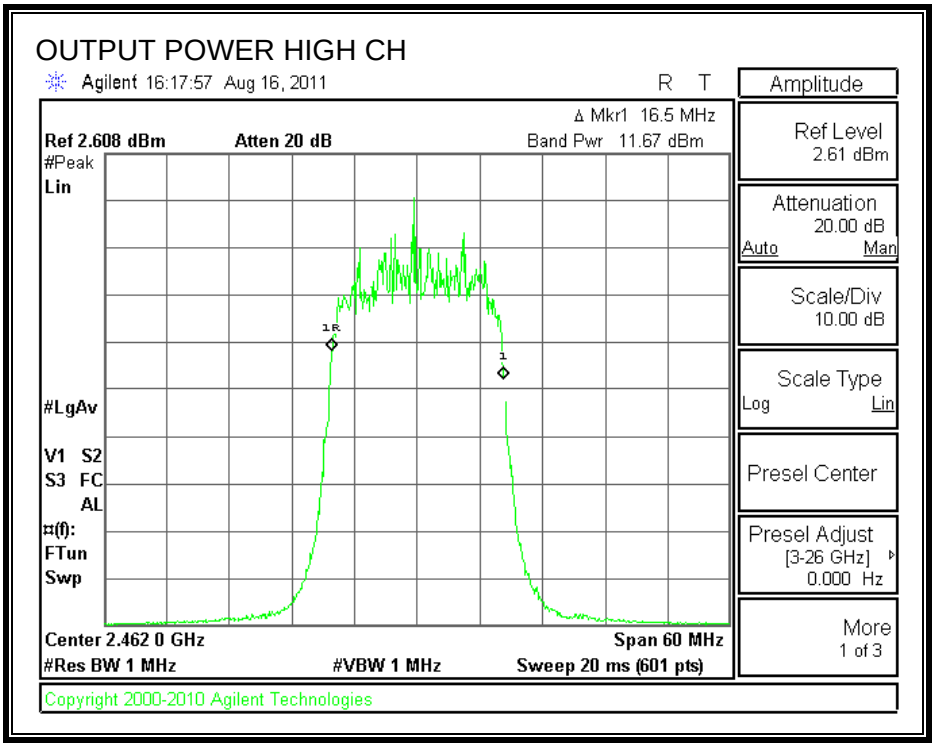
OUTPUT POWER

OUTPUT POWER LOW CH



OUTPUT POWER MID CH





7.2.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Power (dBm)
Low	2412	14.00
Middle	2437	17.00
High	2462	14.00

7.2.5. 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.

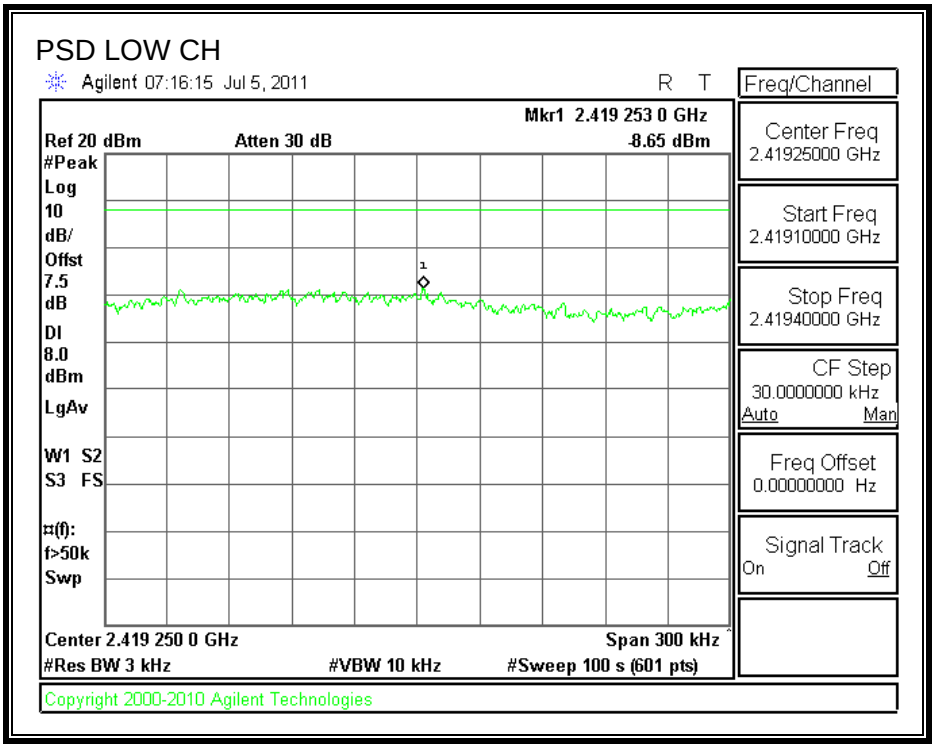
TEST PROCEDURE

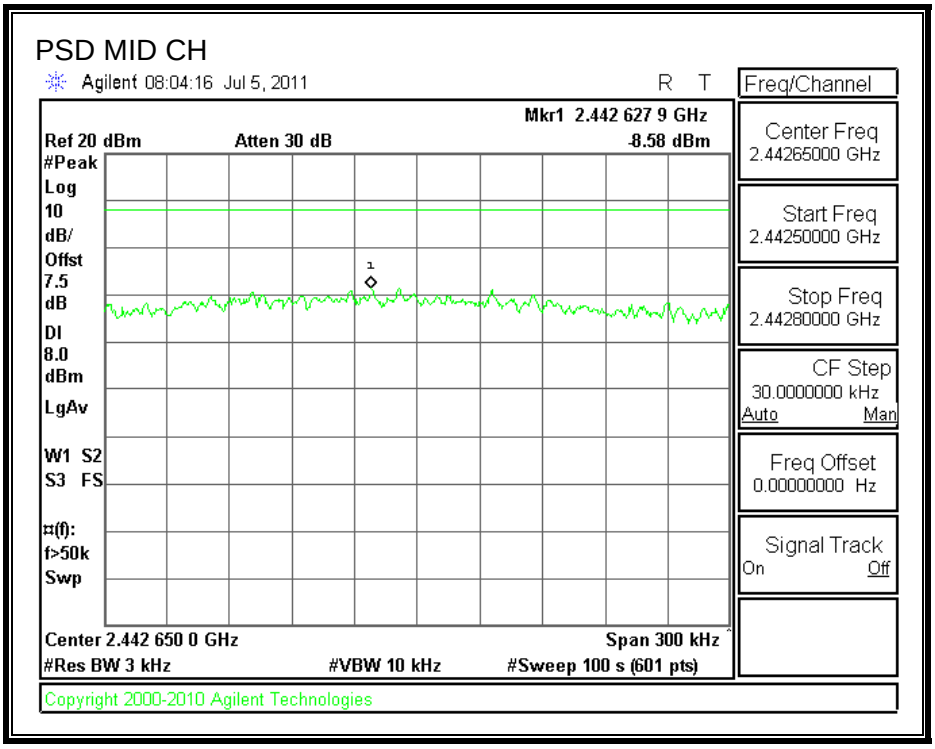
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

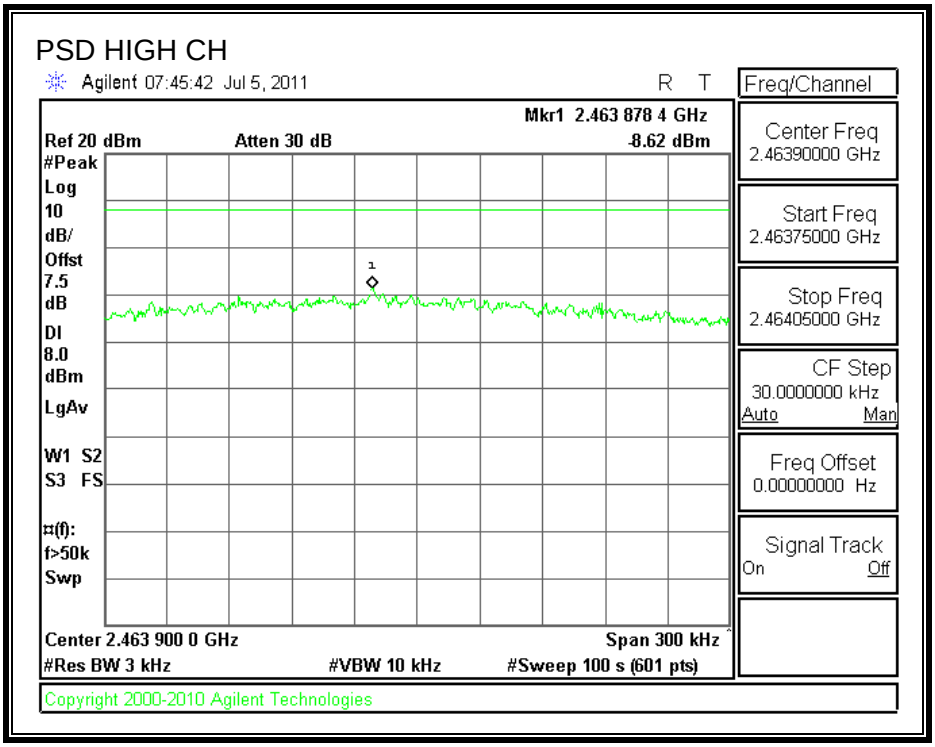
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-8.65	8	-16.65
Middle	2437	-8.58	8	-16.58
High	2462	-8.62	8	-16.62

POWER SPECTRAL DENSITY







7.2.6. 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.

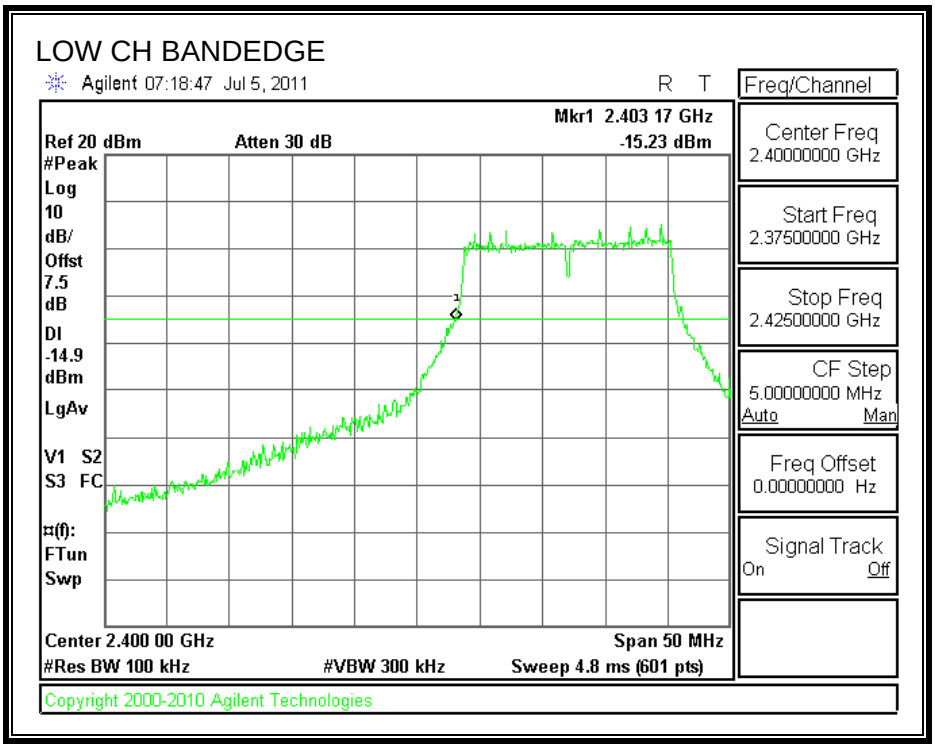
TEST PROCEDURE

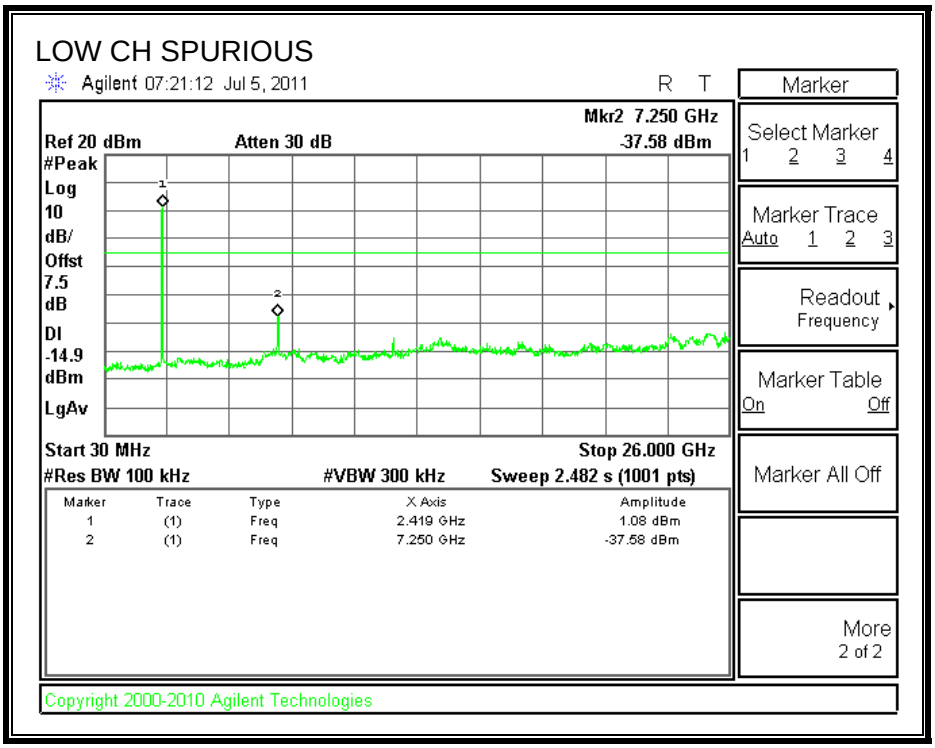
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

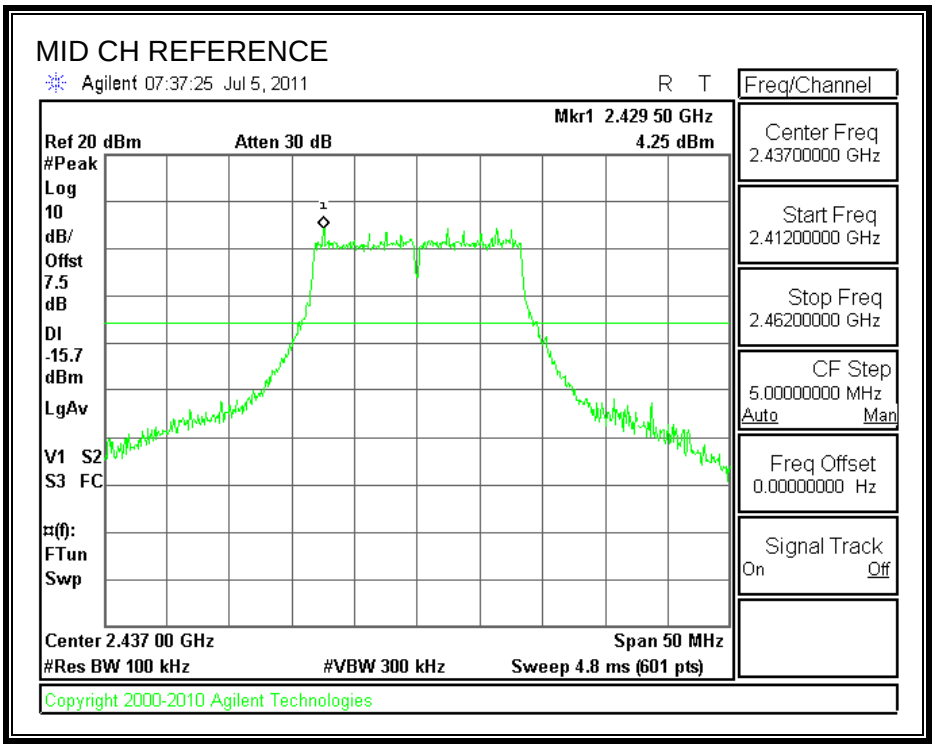
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

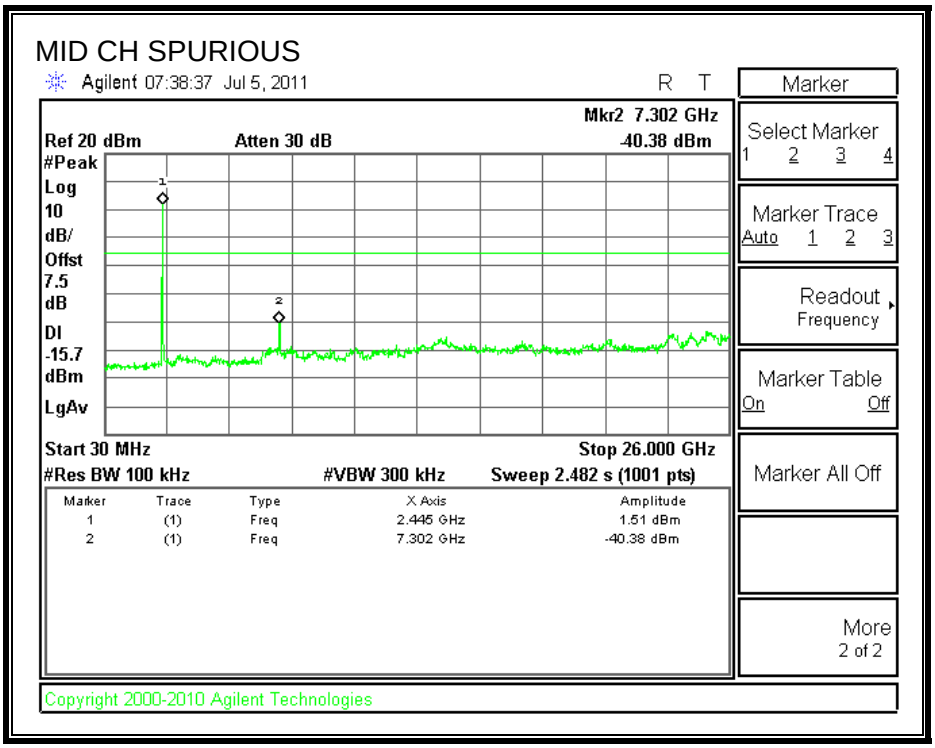
RESULTS

SPURIOUS EMISSIONS

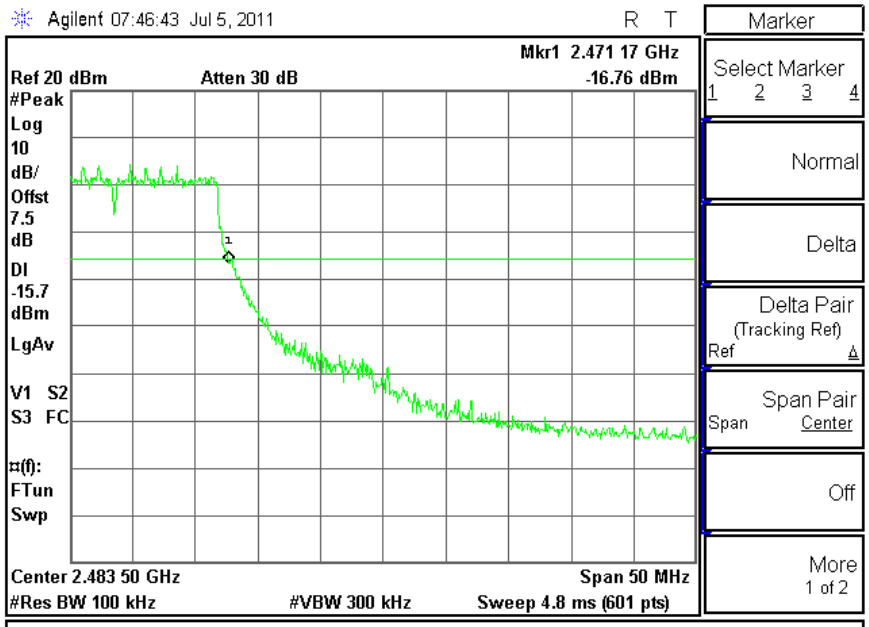




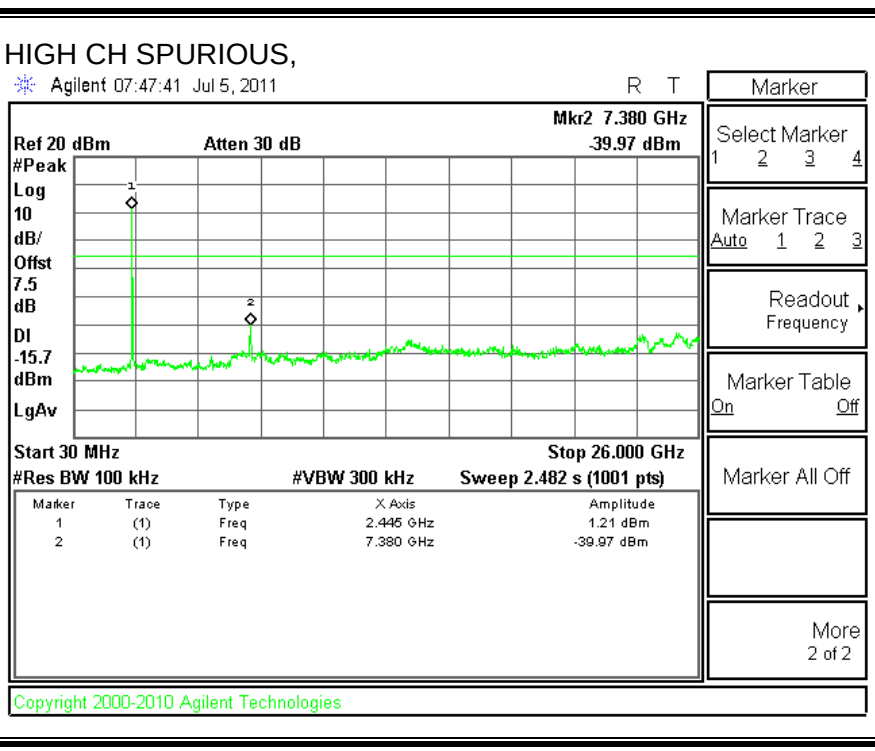




HIGH CH BANDEDGE



HIGH CH SPURIOUS,



7.3. 802.11n 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.

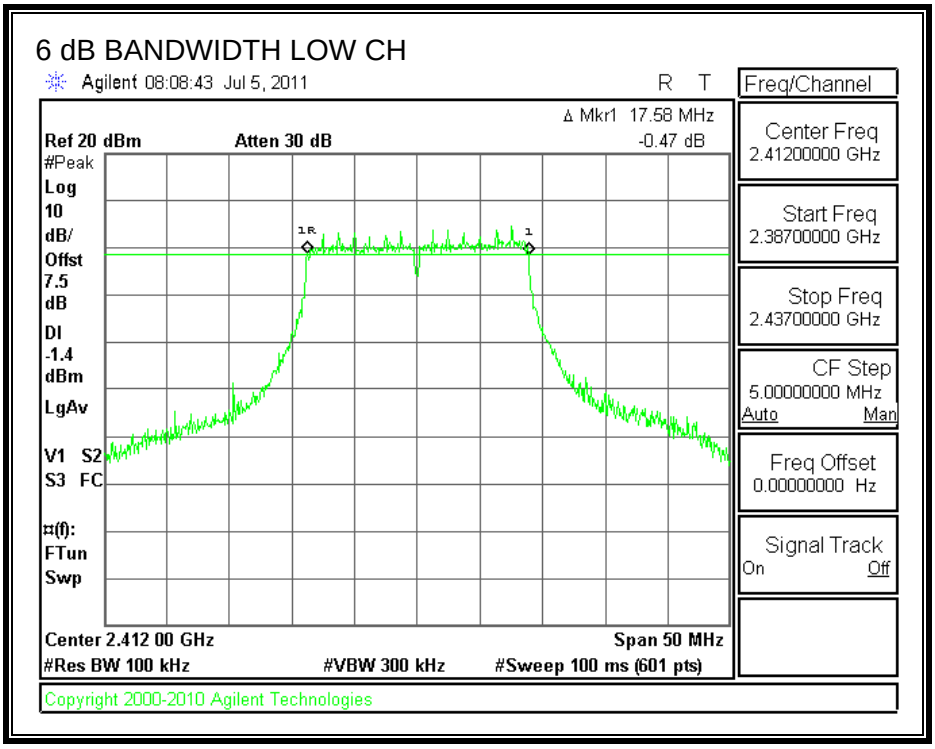
TEST PROCEDURE

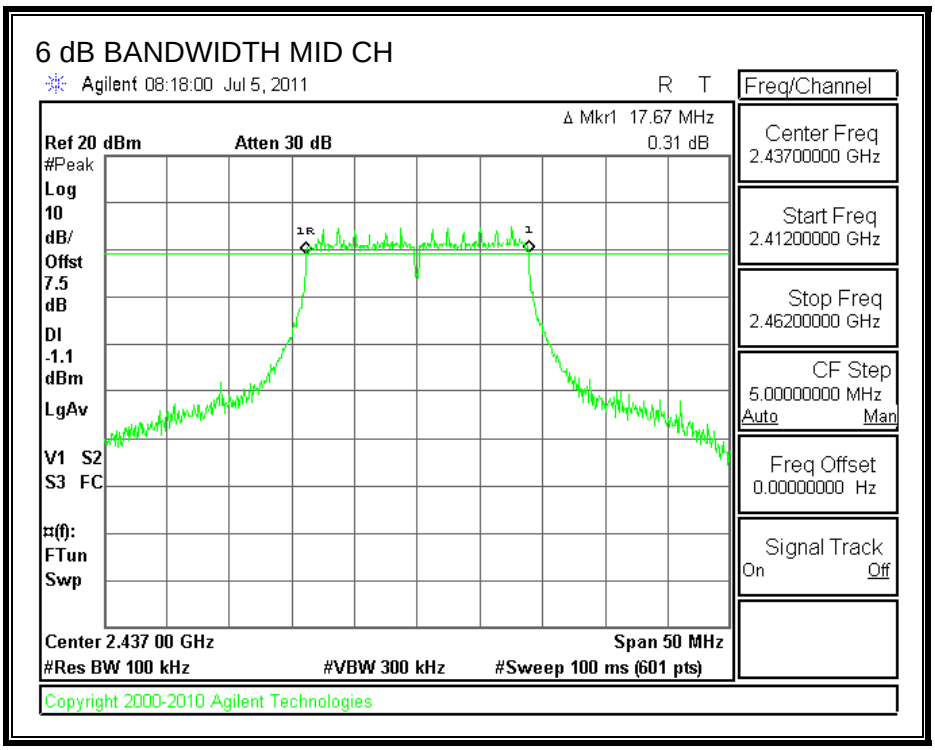
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

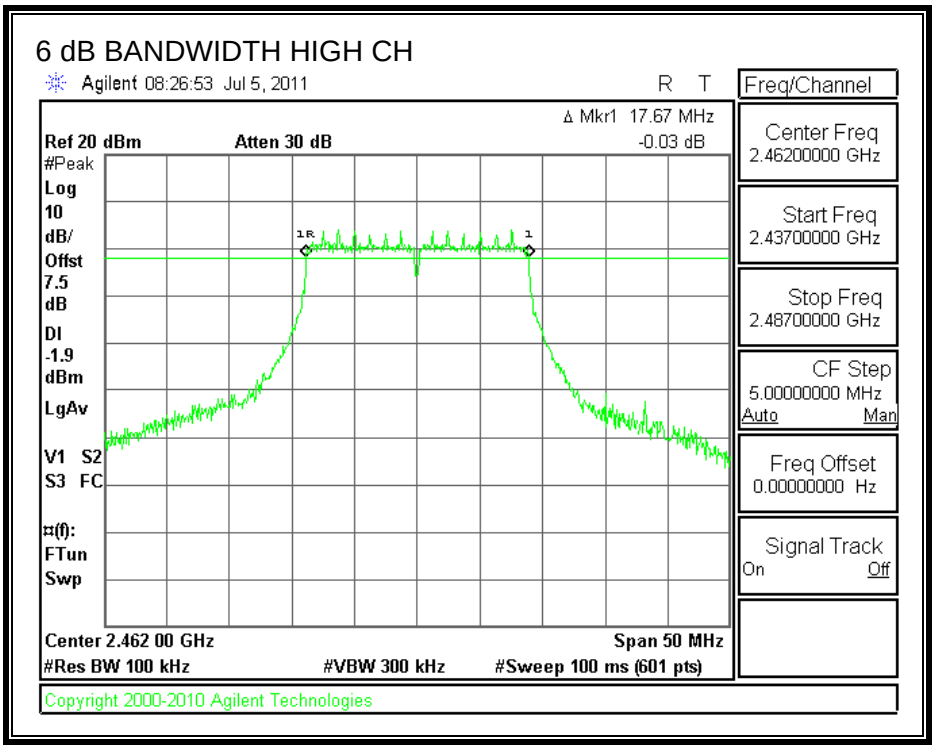
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	17.58	0.5
Middle	2437	17.67	0.5
High	2462	17.67	0.5

6 dB BANDWIDTH







7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

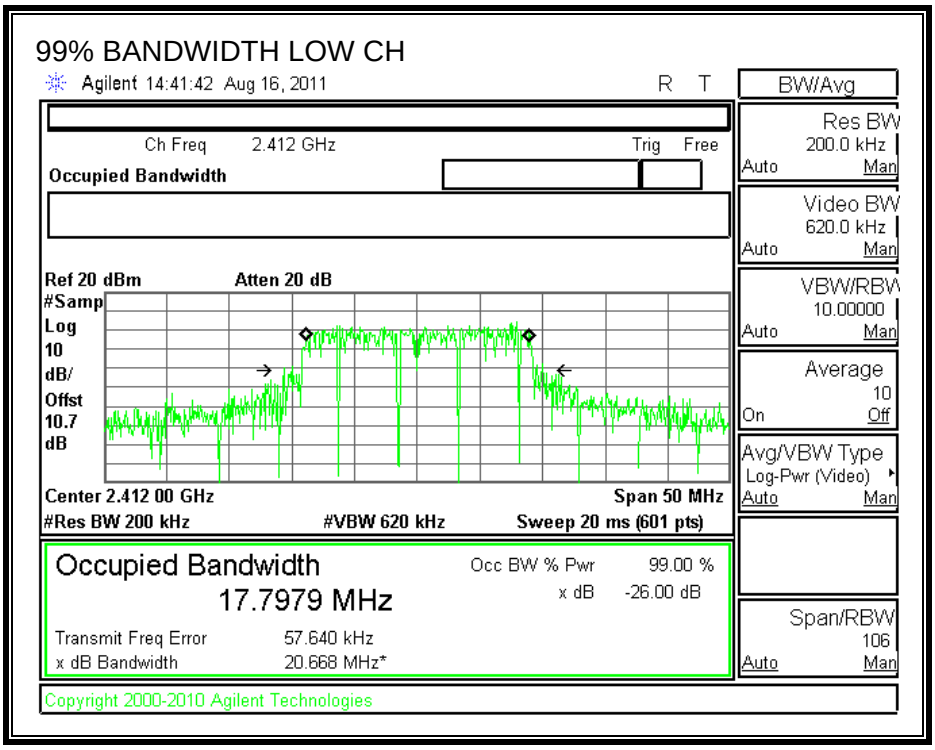
TEST PROCEDURE

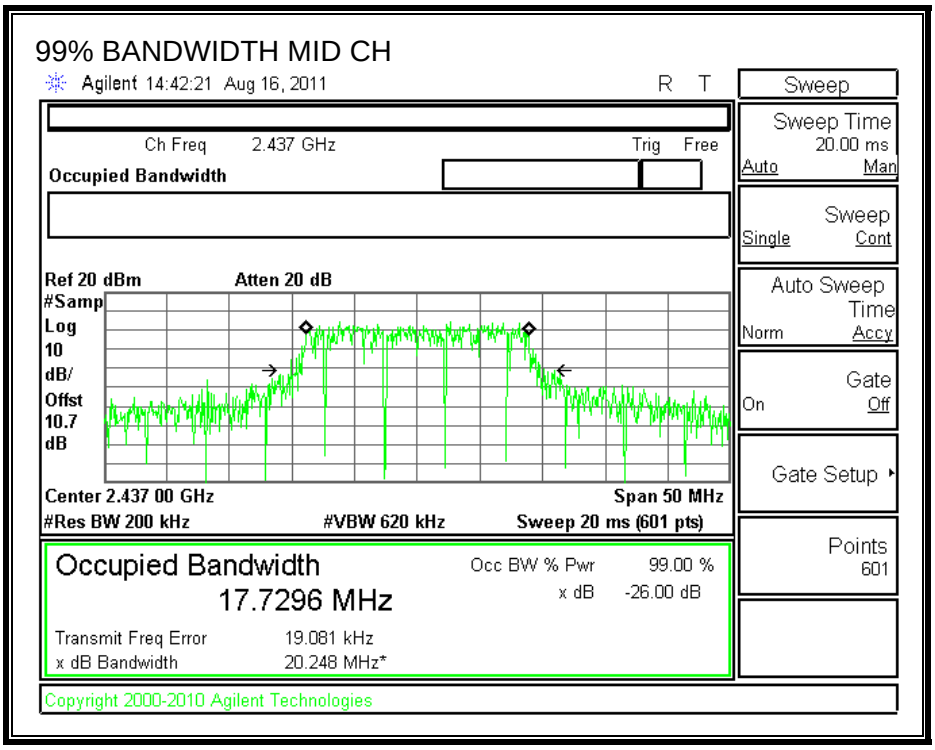
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

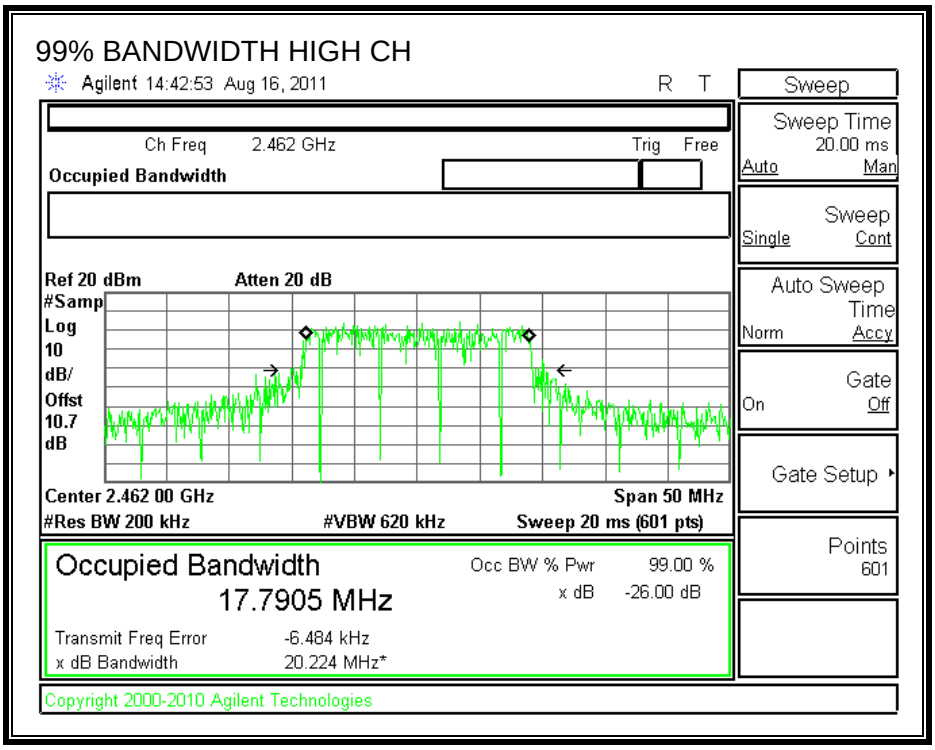
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.7979
Middle	2437	17.7296
High	2462	17.7905

99% BANDWIDTH







7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

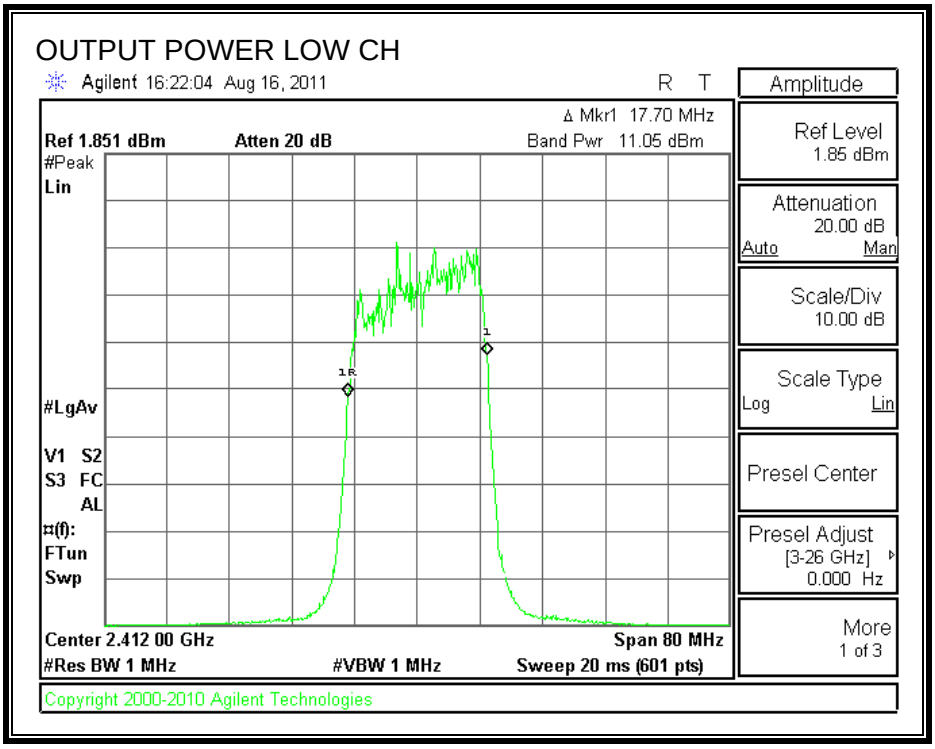
TEST PROCEDURE

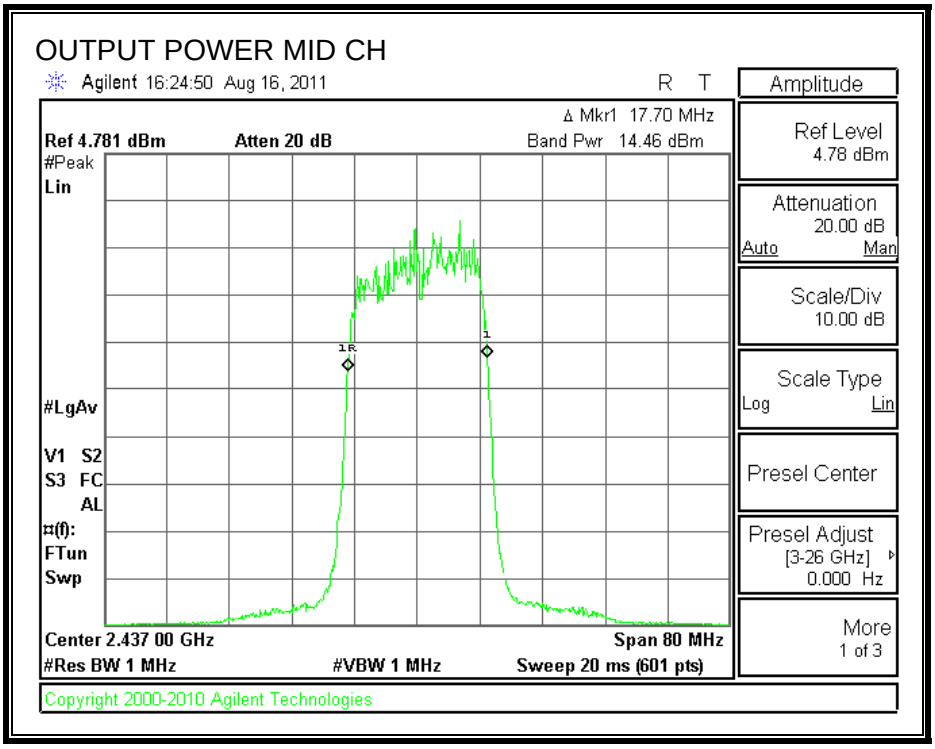
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

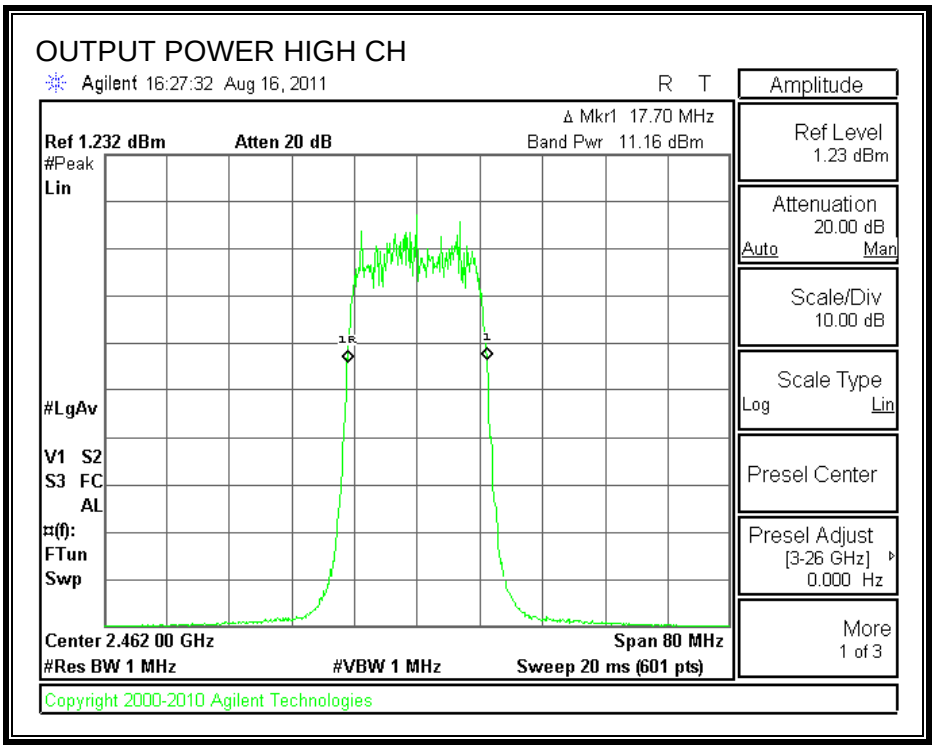
RESULTS

Channel	Frequency (MHz)	Peak power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	11.05	10.7	21.75	30	-8.25
Middle	2437	14.46	10.7	25.16	30	-4.84
High	2462	11.16	10.7	21.86	30	-8.14

OUTPUT POWER







7.3.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Power (dBm)
Low	2412	13.50
Middle	2437	17.00
High	2462	13.50

7.3.5. 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.

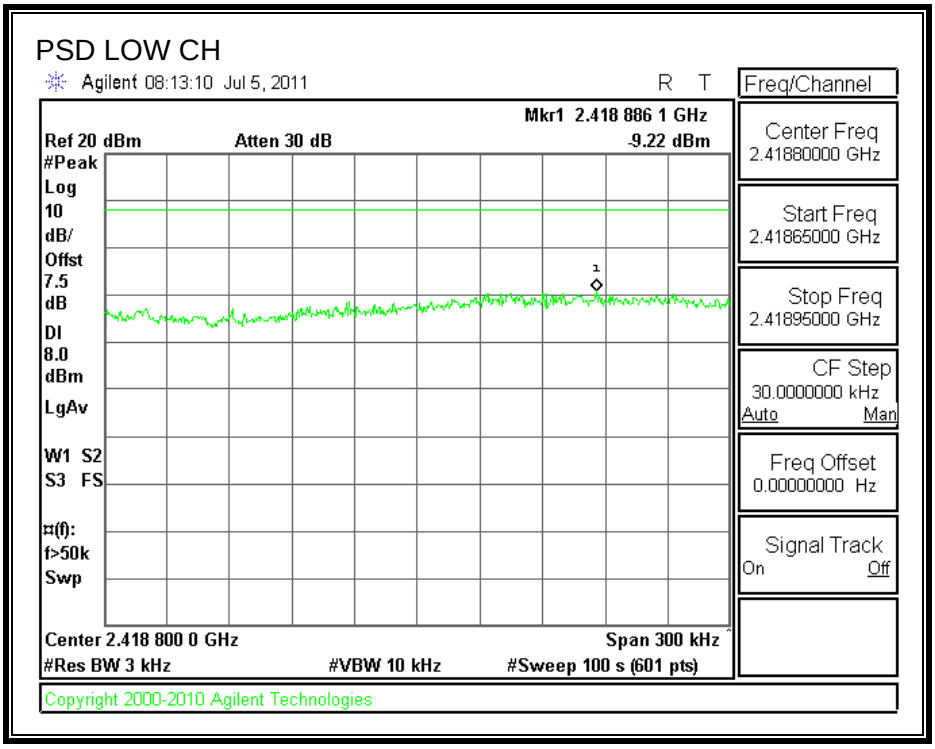
TEST PROCEDURE

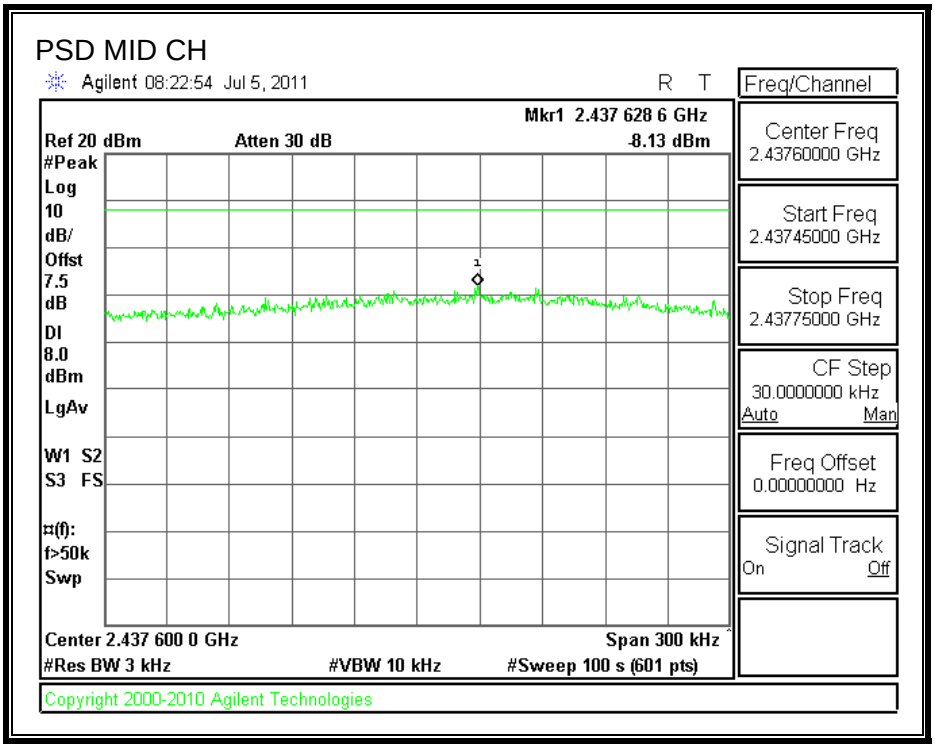
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

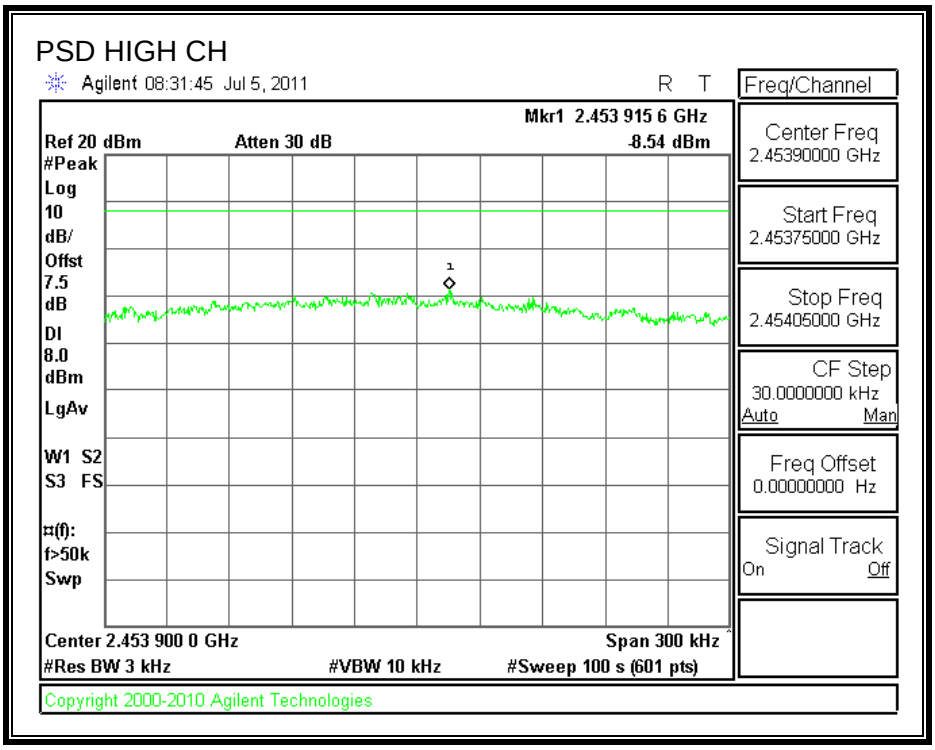
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.22	8	-17.22
Middle	2437	-8.13	8	-16.13
High	2462	-8.54	8	-16.54

POWER SPECTRAL DENSITY







7.3.6. 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.

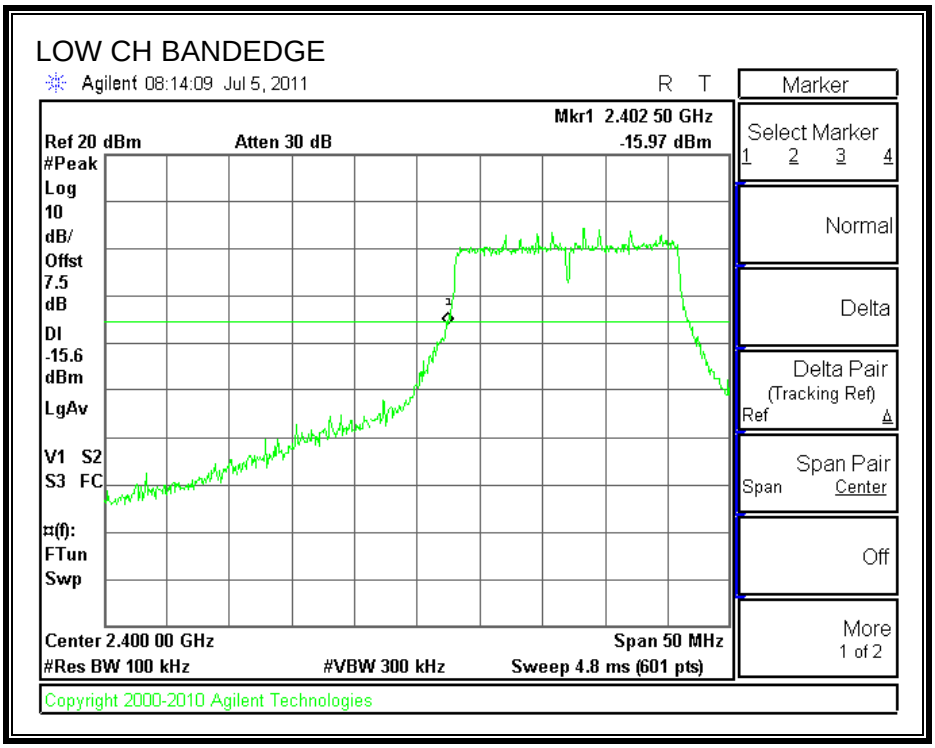
TEST PROCEDURE

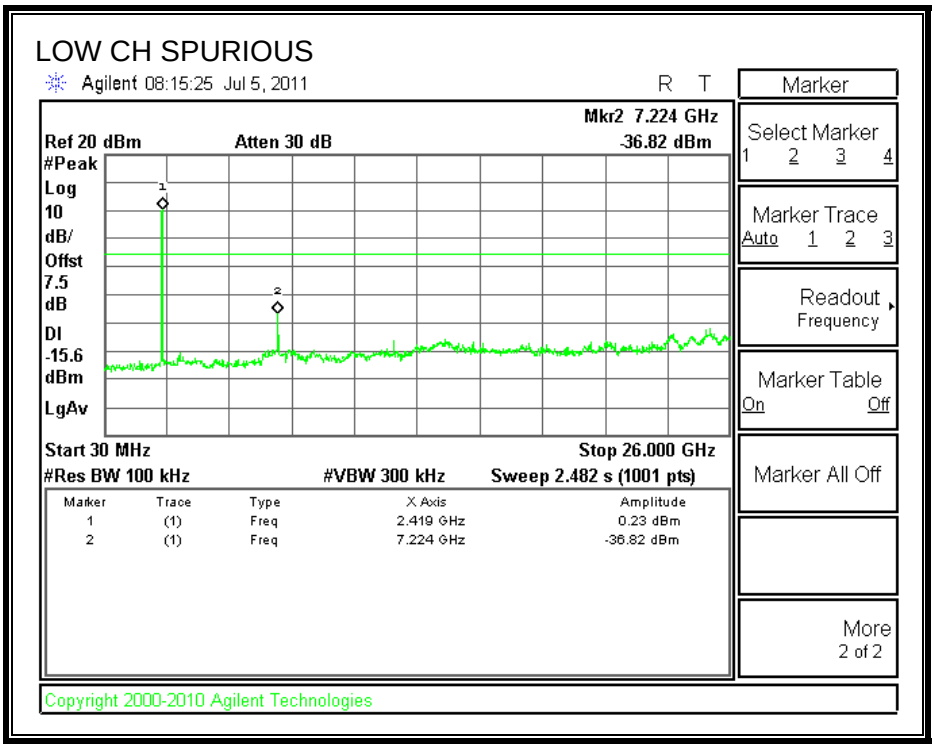
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

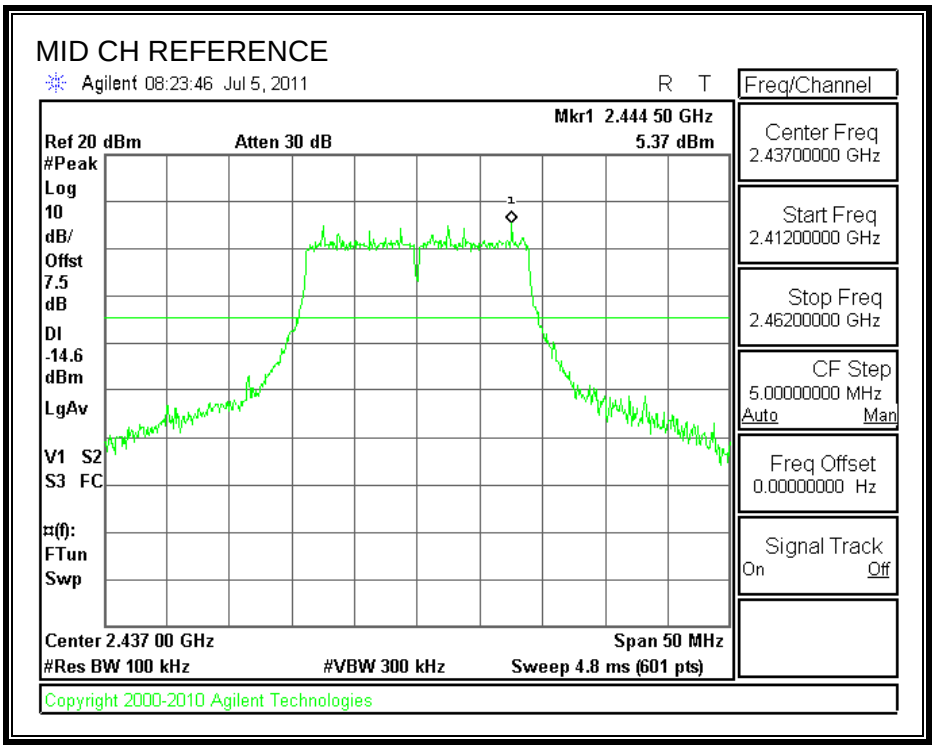
RESULTS

SPURIOUS EMISSIONS

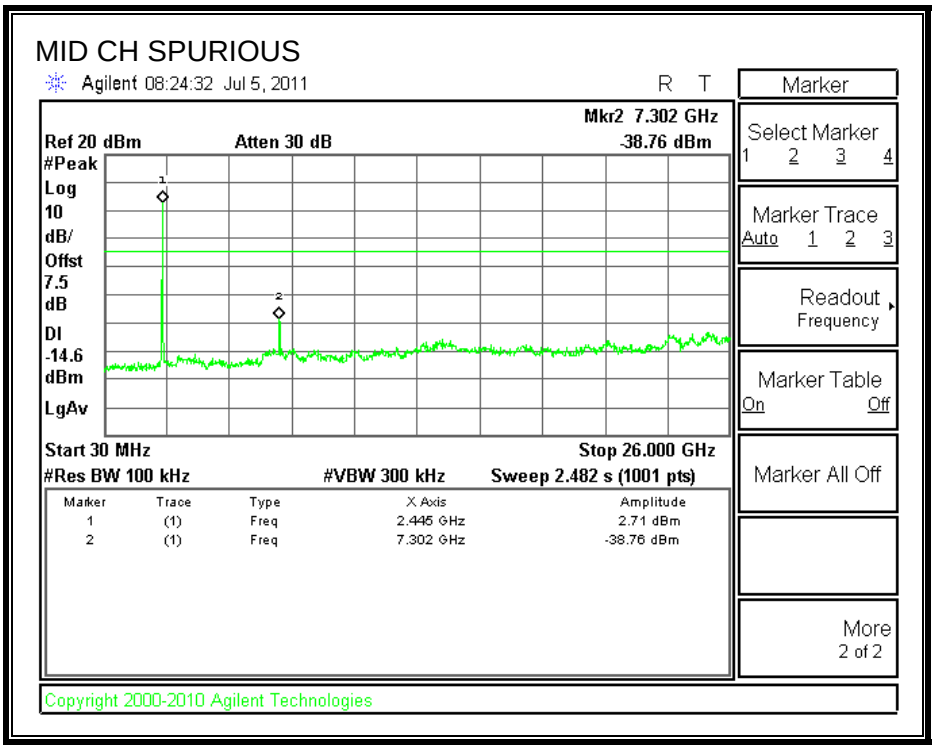


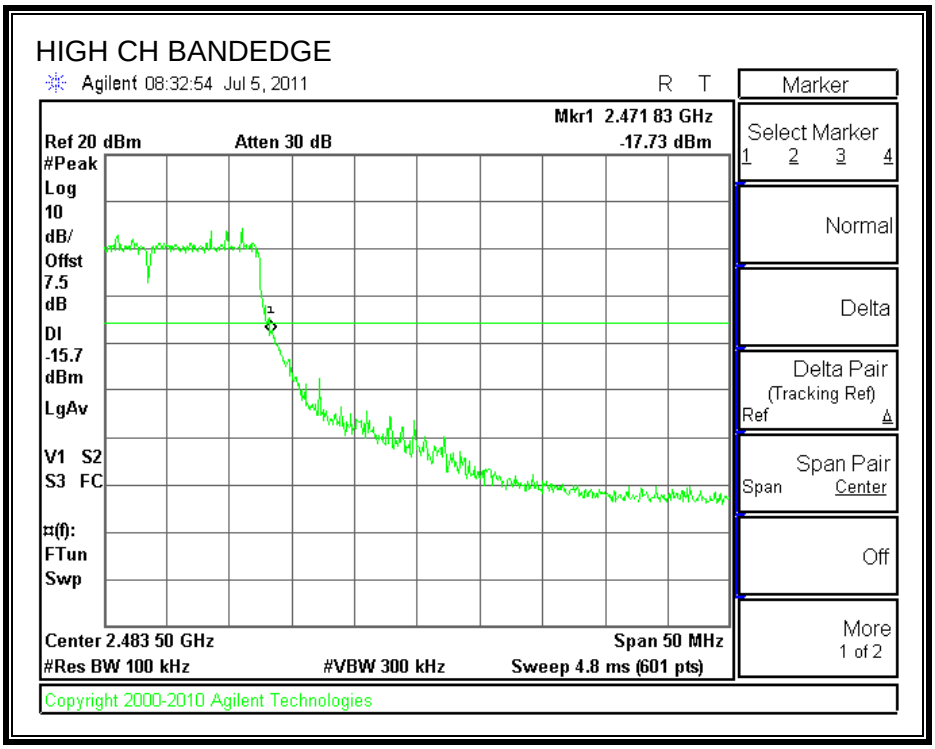


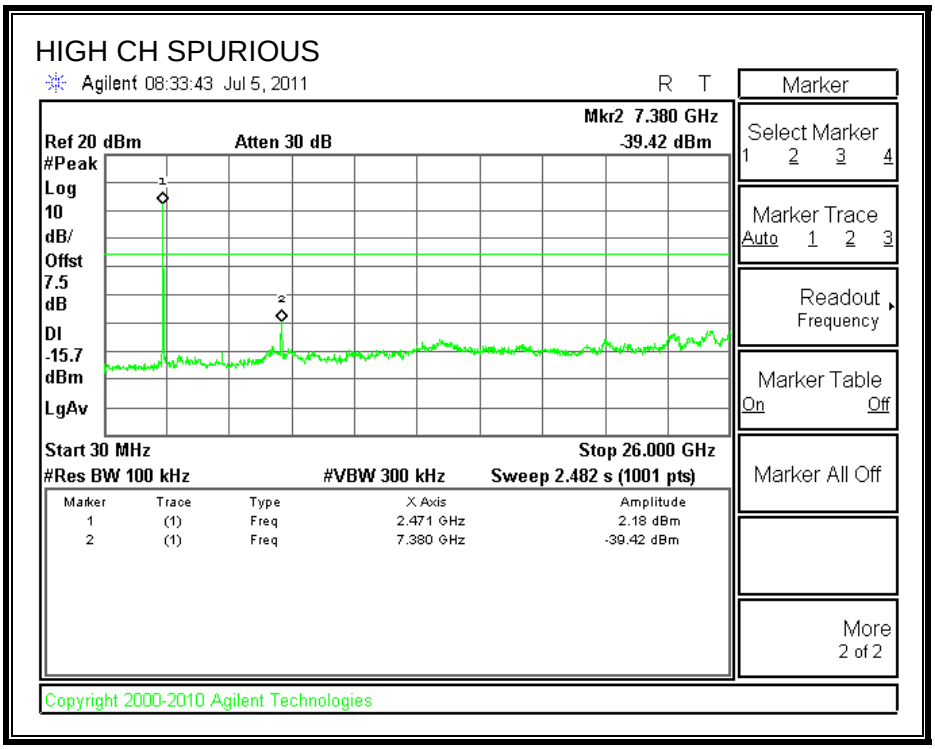
MID CH REFERENCE



MID CH SPURIOUS







BOM VARIANT 2

7.4. 802.11b LEGACY MODE IN THE 2.4 GHz BAND

7.4.1. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

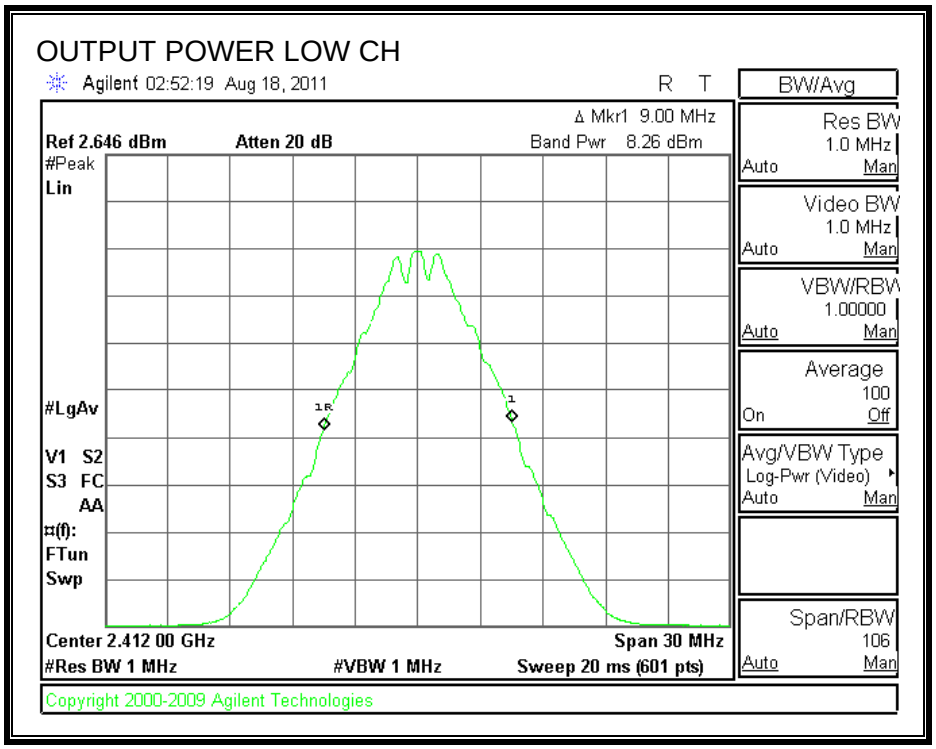
TEST PROCEDURE

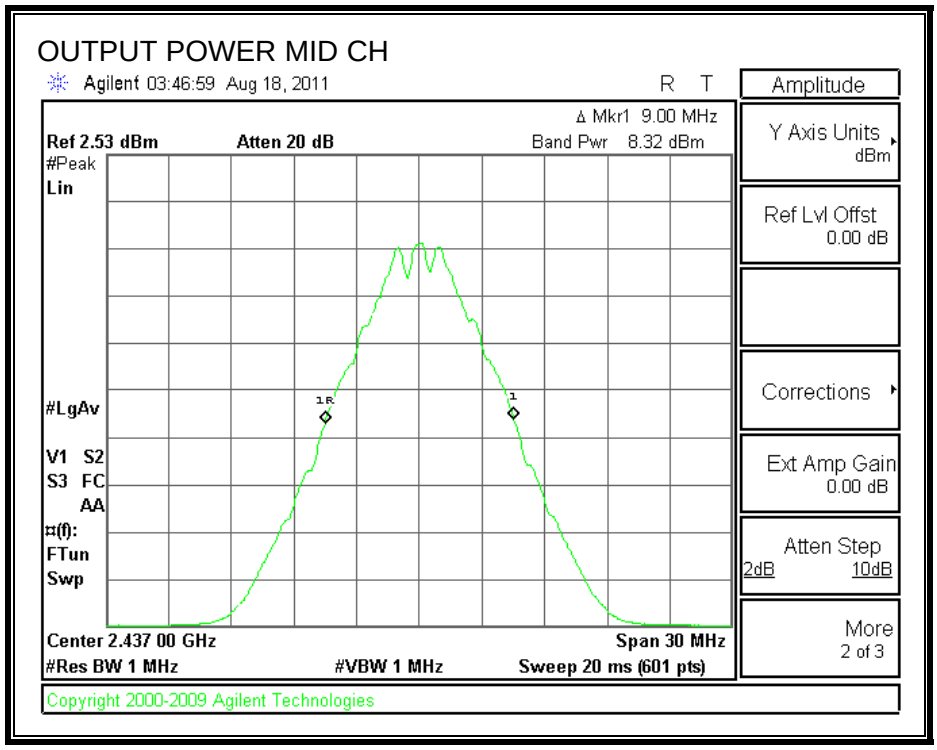
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

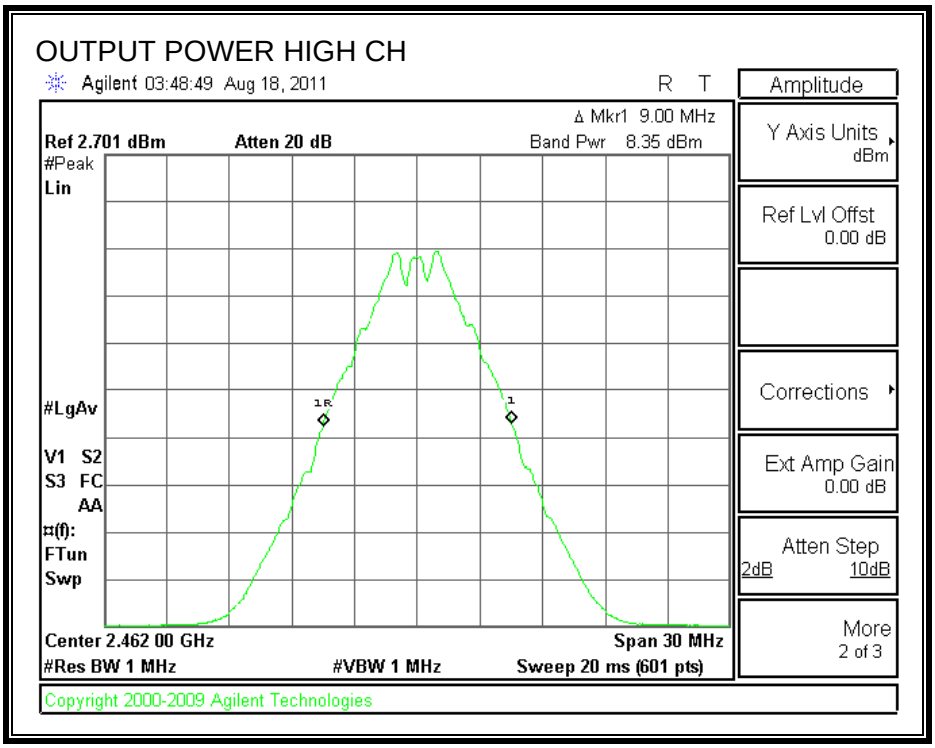
RESULTS

Channel	Frequency (MHz)	Peak Power Meter Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	8.26	10.7	18.96	30	-11.04
Middle	2437	8.32	10.7	19.02	30	-10.98
High	2462	8.35	10.7	19.05	30	-10.95

OUTPUT POWER







7.4.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Power (dBm)
Low	2412	16.97
Middle	2437	17.00
High	2462	17.02

7.4.3. 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.

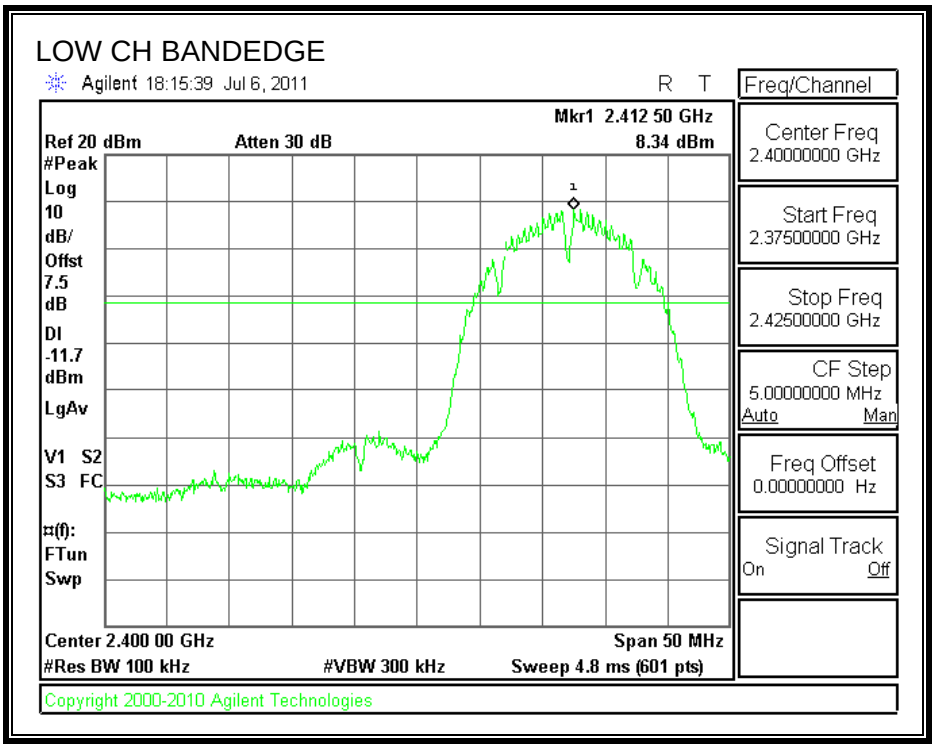
TEST PROCEDURE

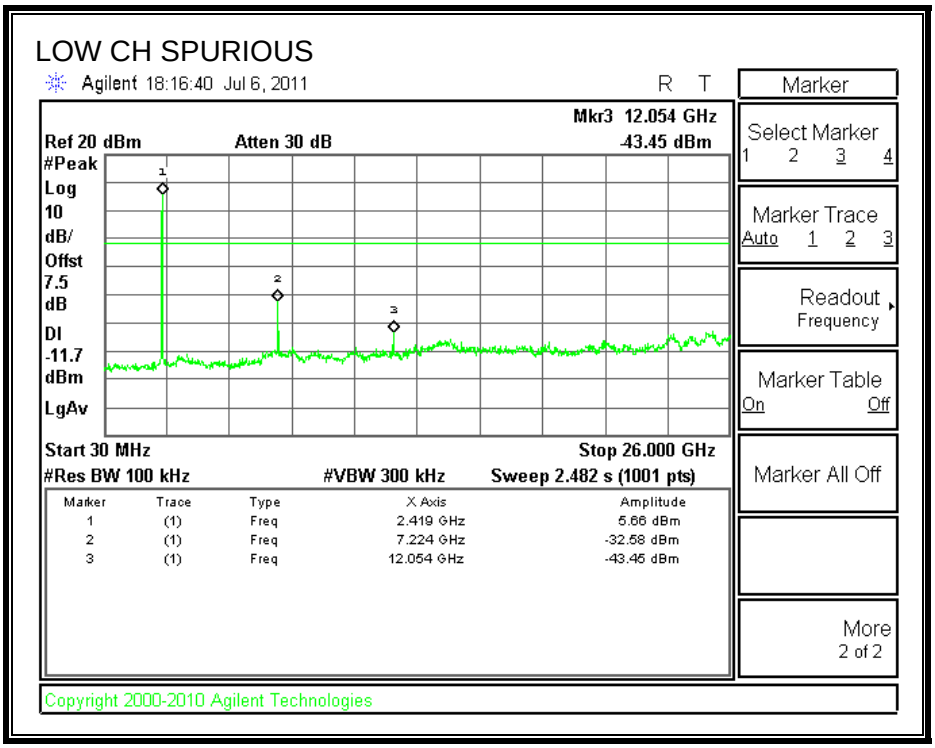
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

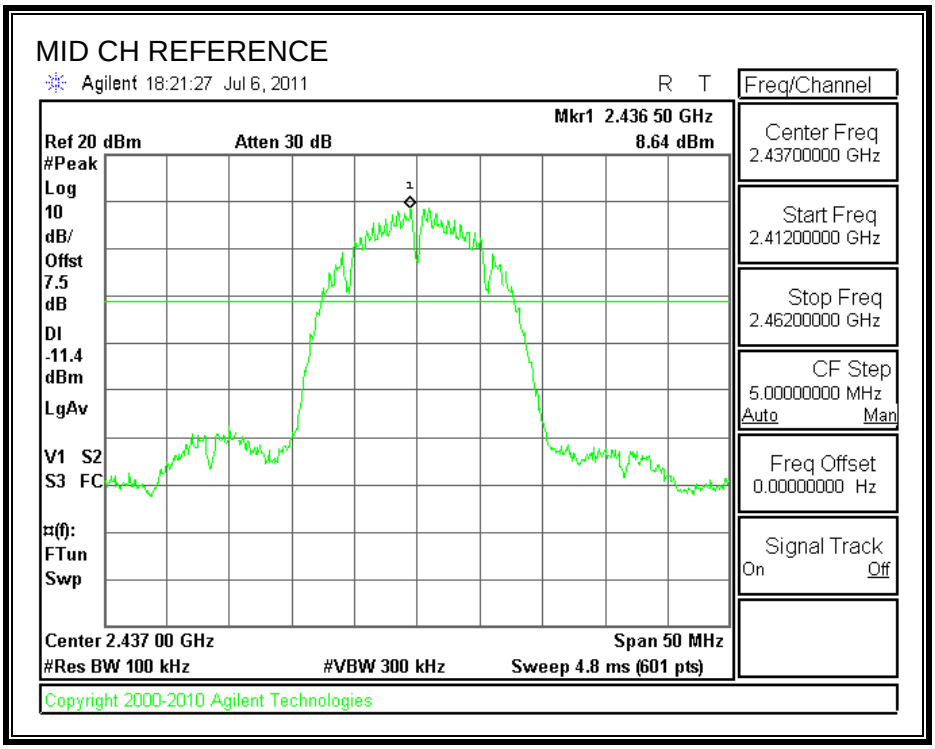
RESULTS

SPURIOUS EMISSIONS

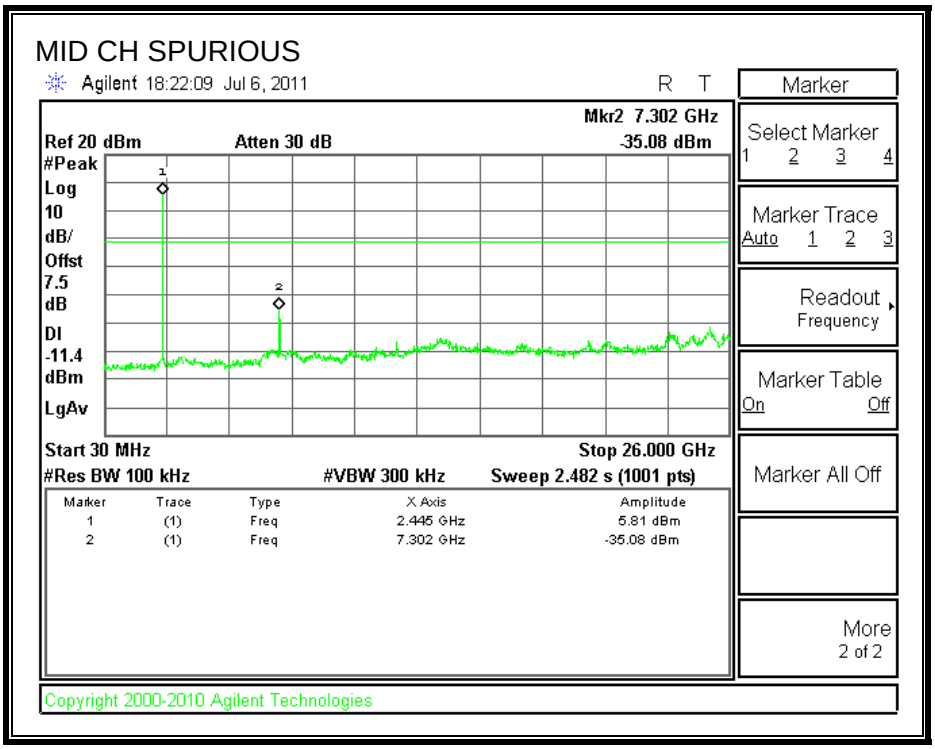


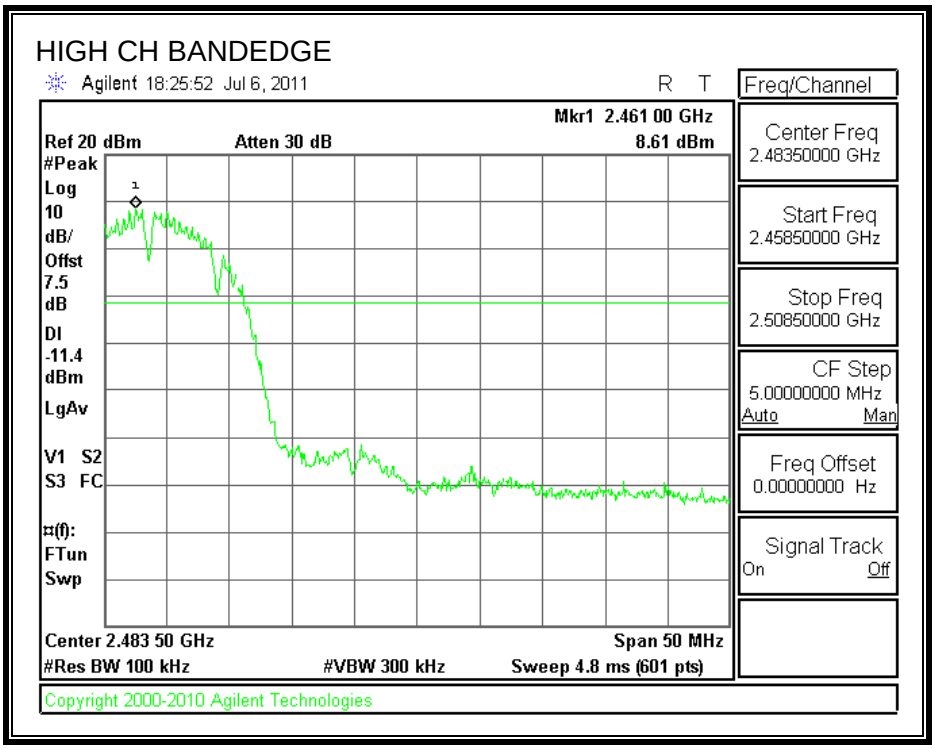


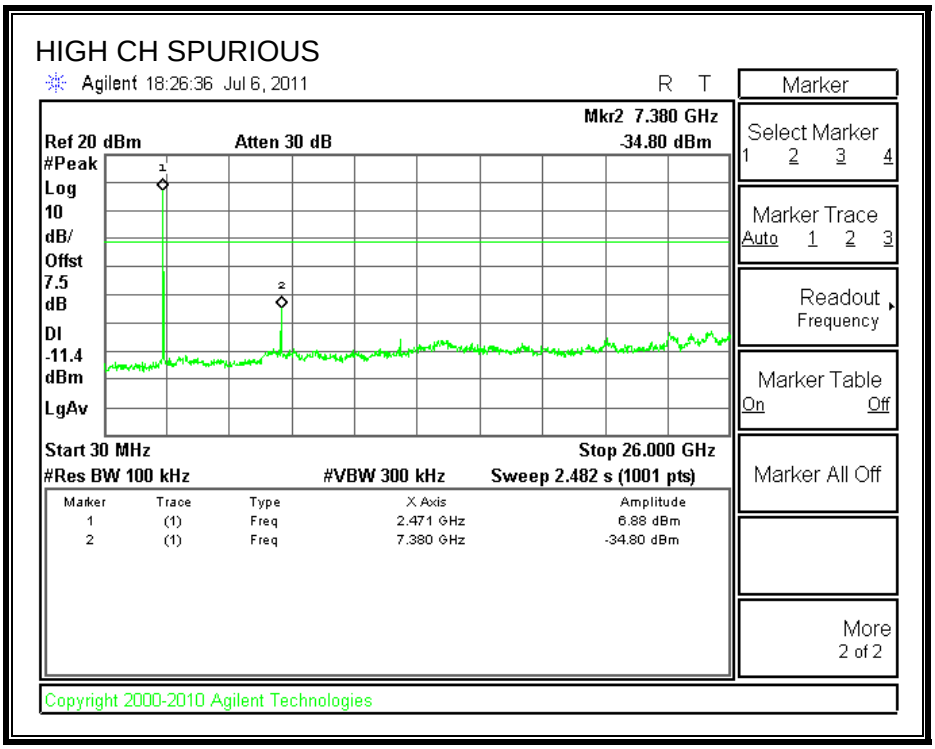
MID CH REFERENCE



MID CH SPURIOUS







7.5. 802.11g MODE IN THE 2.4 GHz BAND

7.5.1. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

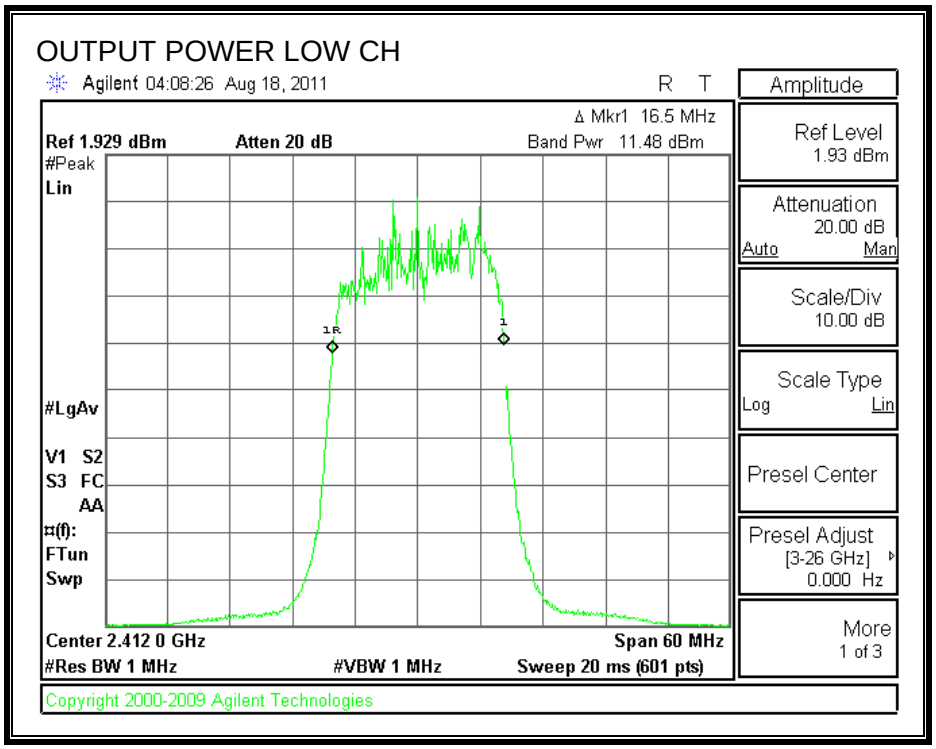
TEST PROCEDURE

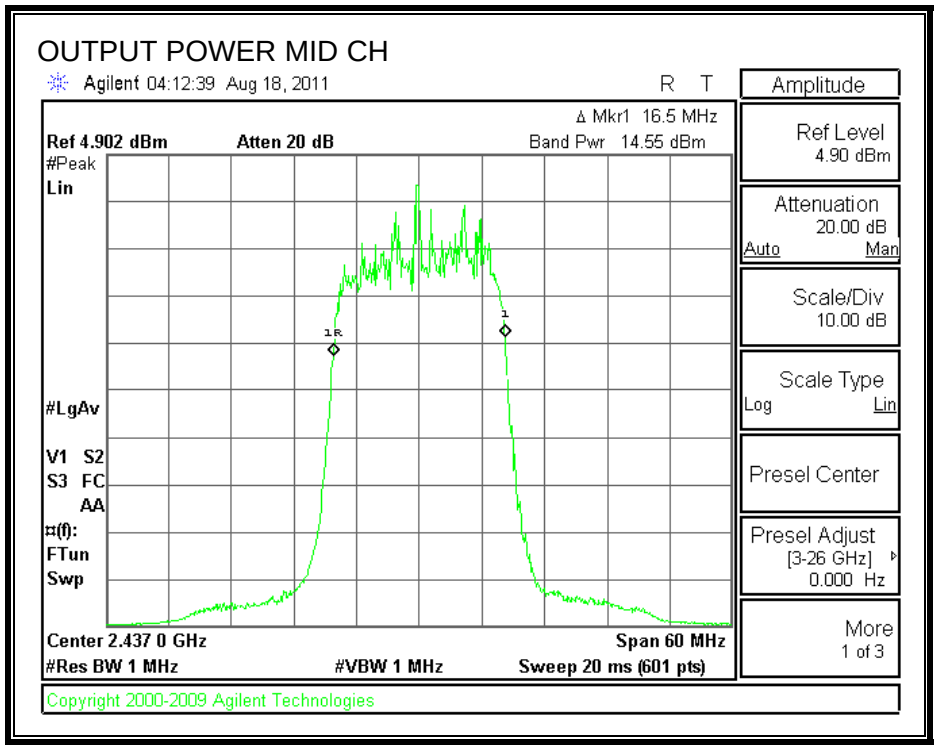
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

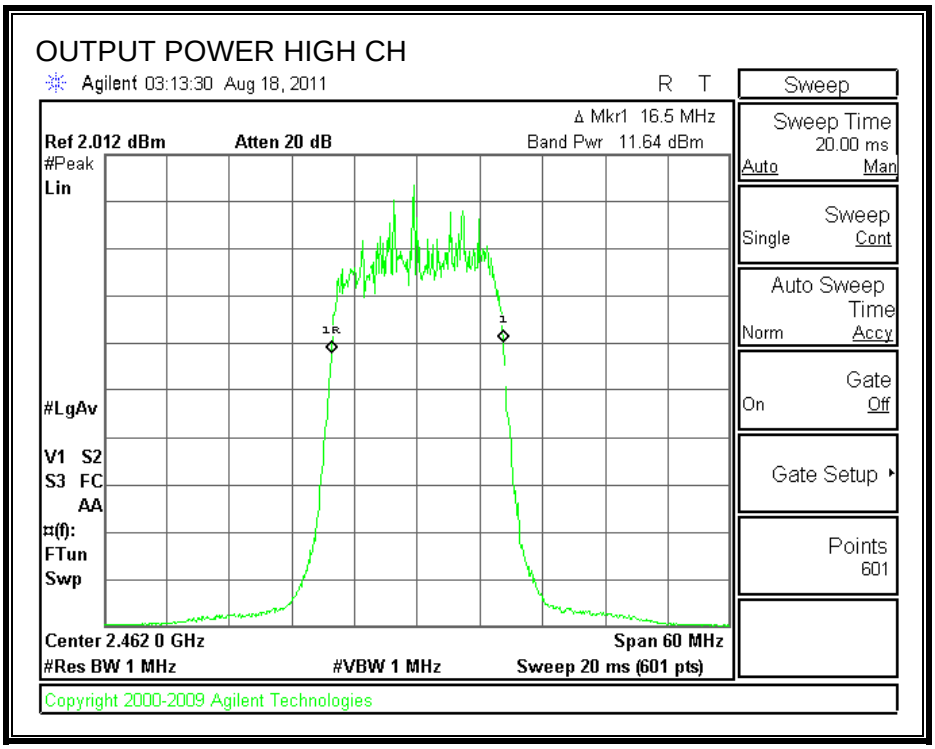
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	11.48	10.7	22.18	30	-7.82
Middle	2437	14.55	10.7	25.25	30	-4.75
High	2462	11.64	10.7	22.34	30	-7.66

OUTPUT POWER







7.5.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Power (dBm)
Low	2412	13.98
Middle	2437	16.96
High	2462	14.00

7.5.3. 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.

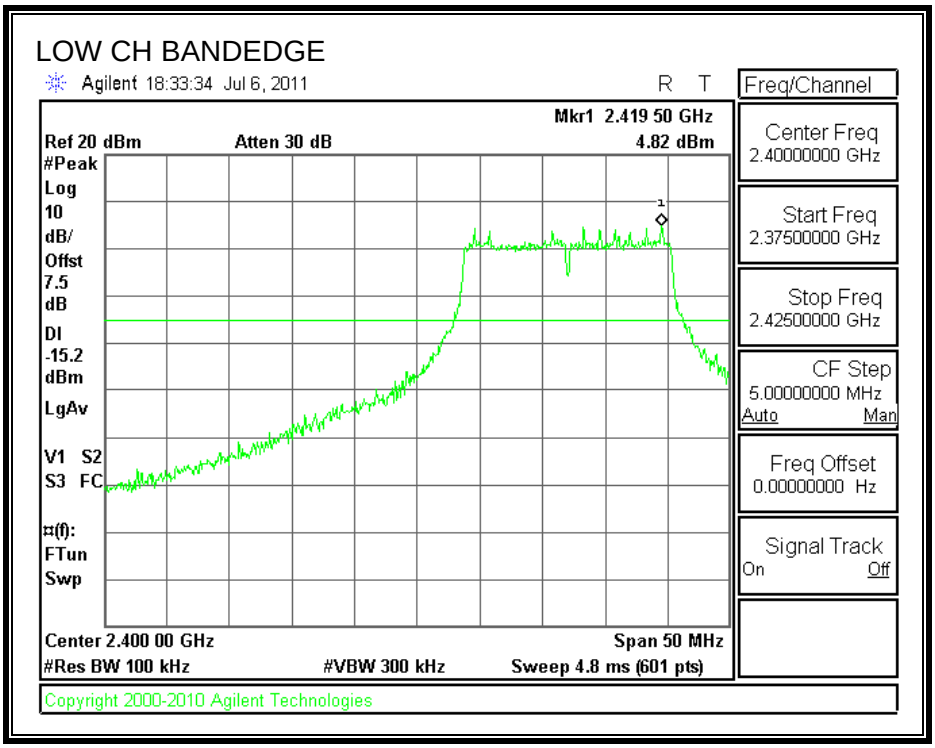
TEST PROCEDURE

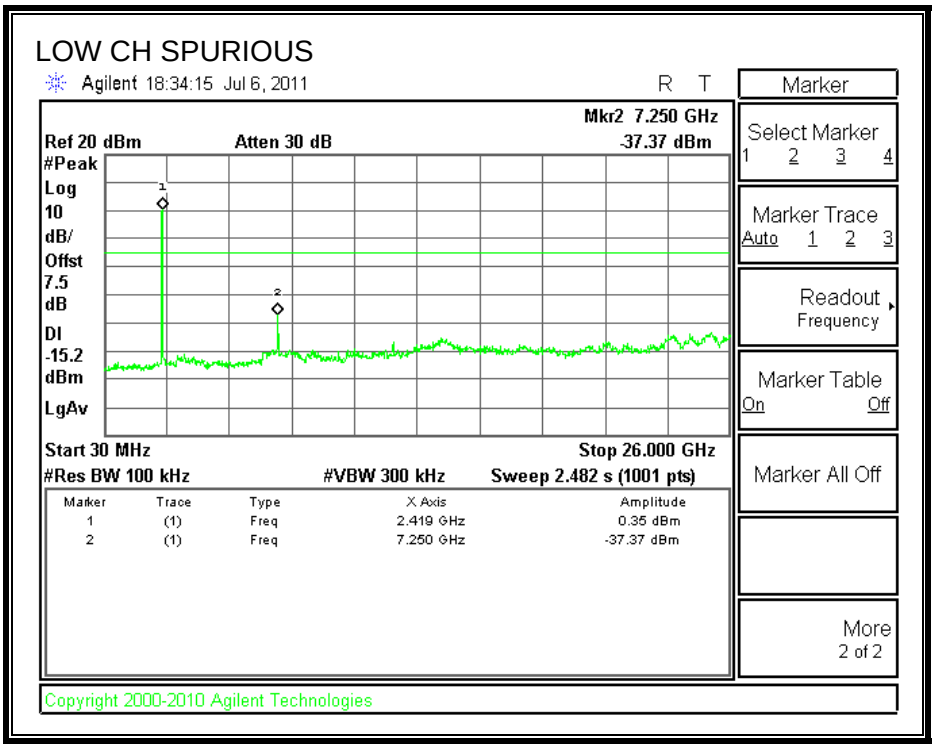
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

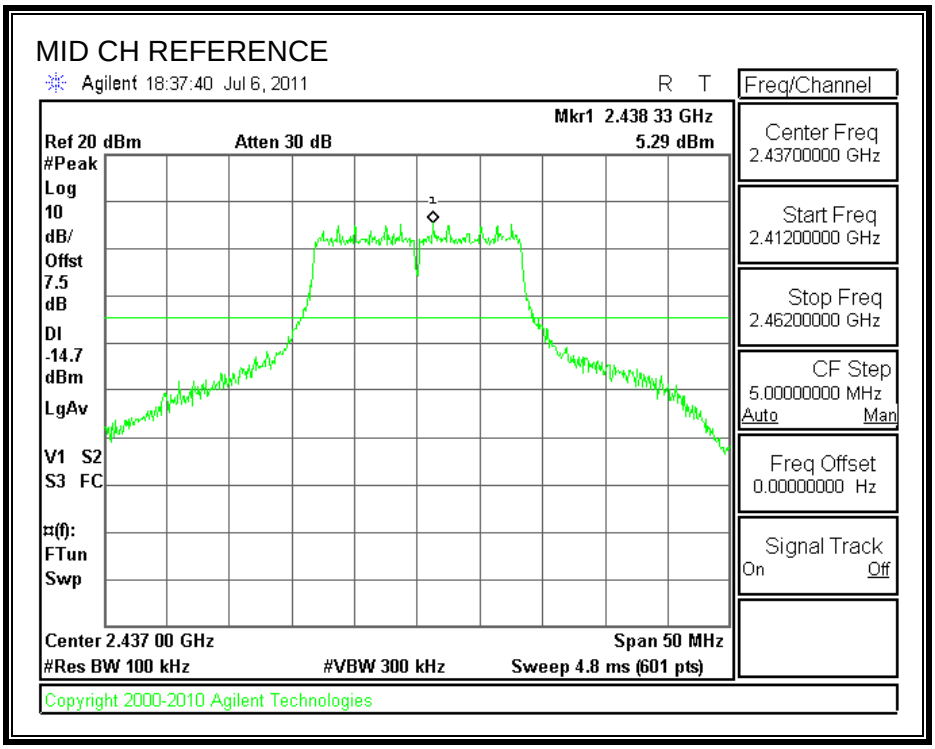
RESULTS

SPURIOUS EMISSIONS

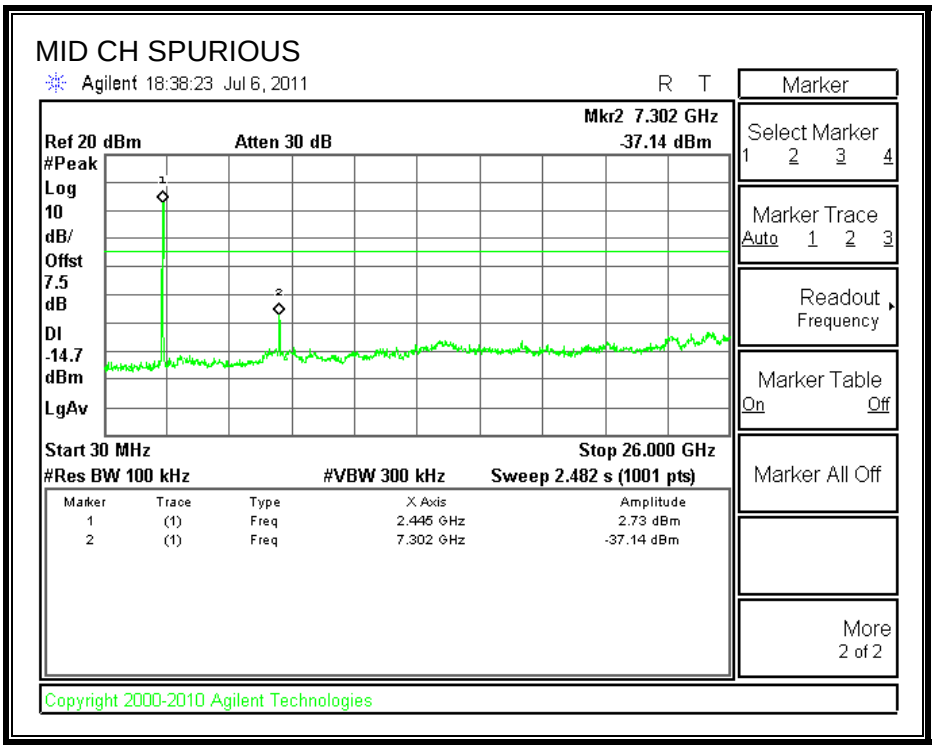




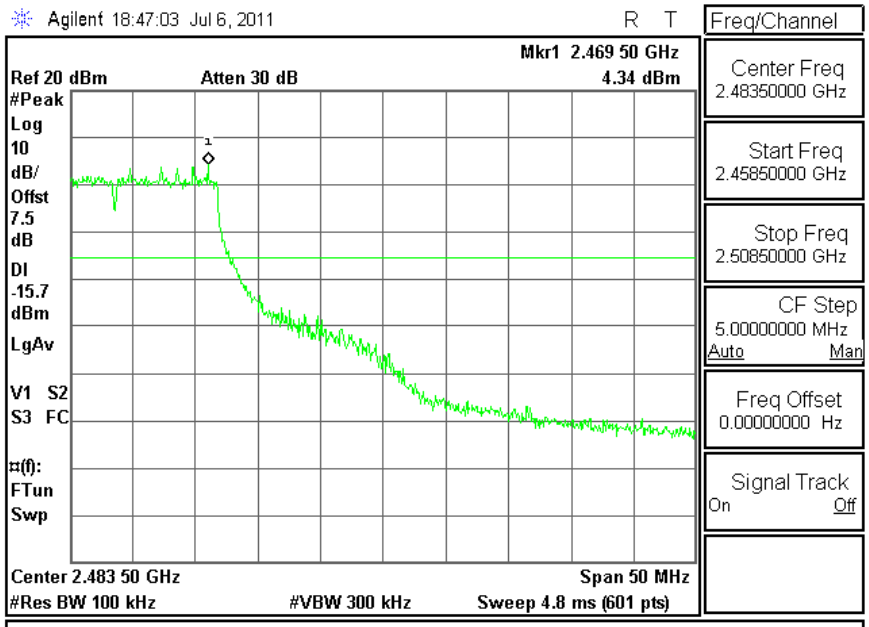
MID CH REFERENCE



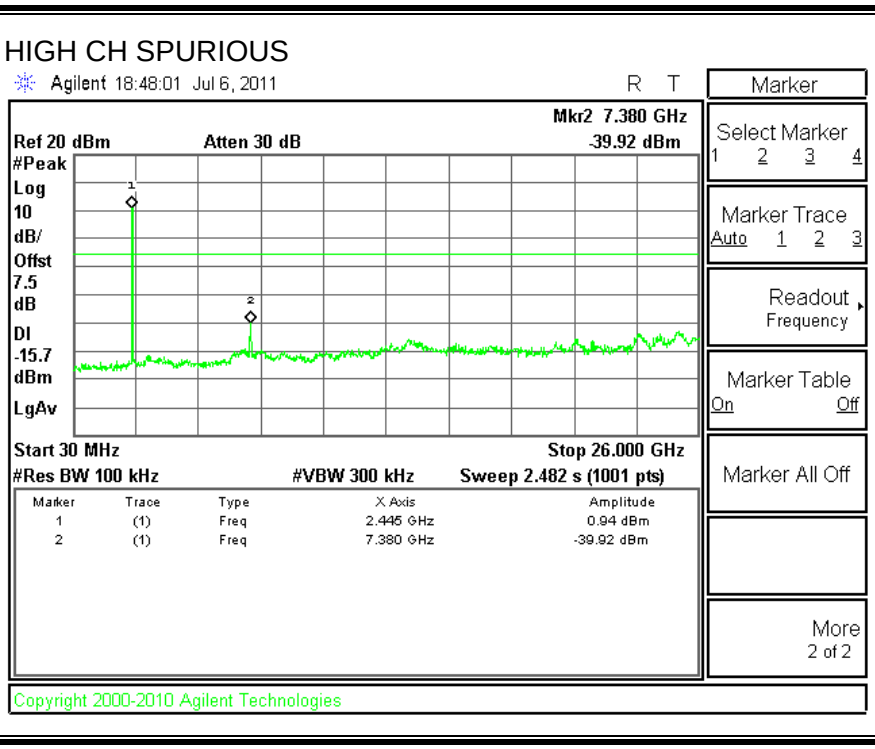
MID CH SPURIOUS



HIGH CH BANDEDGE



HIGH CH SPURIOUS



7.6. 802.11n MODE IN THE 2.4 GHz BAND

7.6.1. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

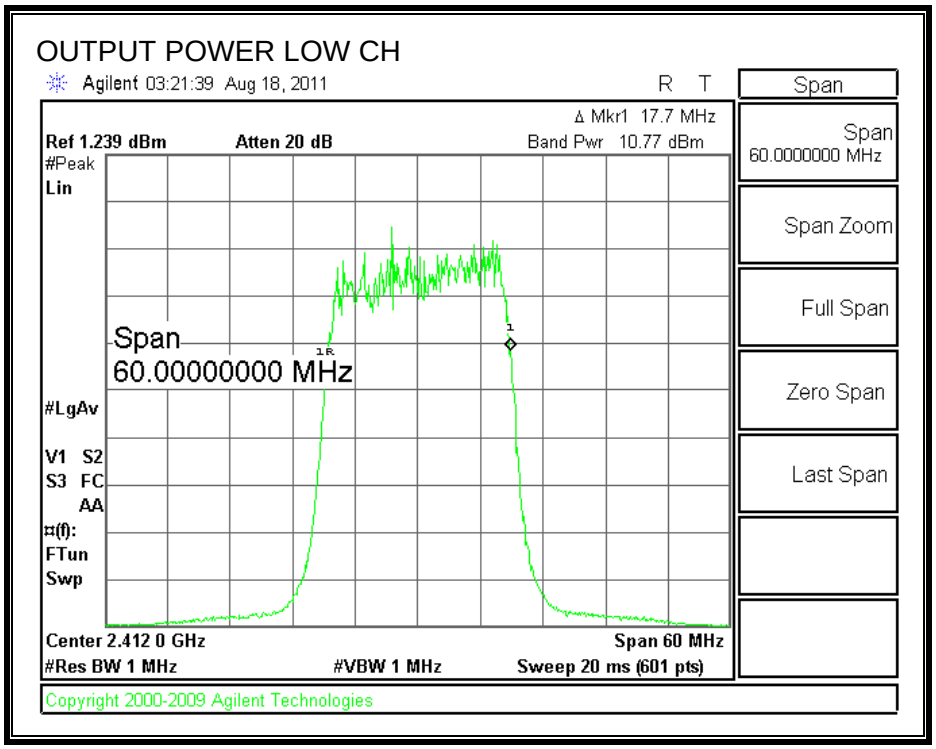
TEST PROCEDURE

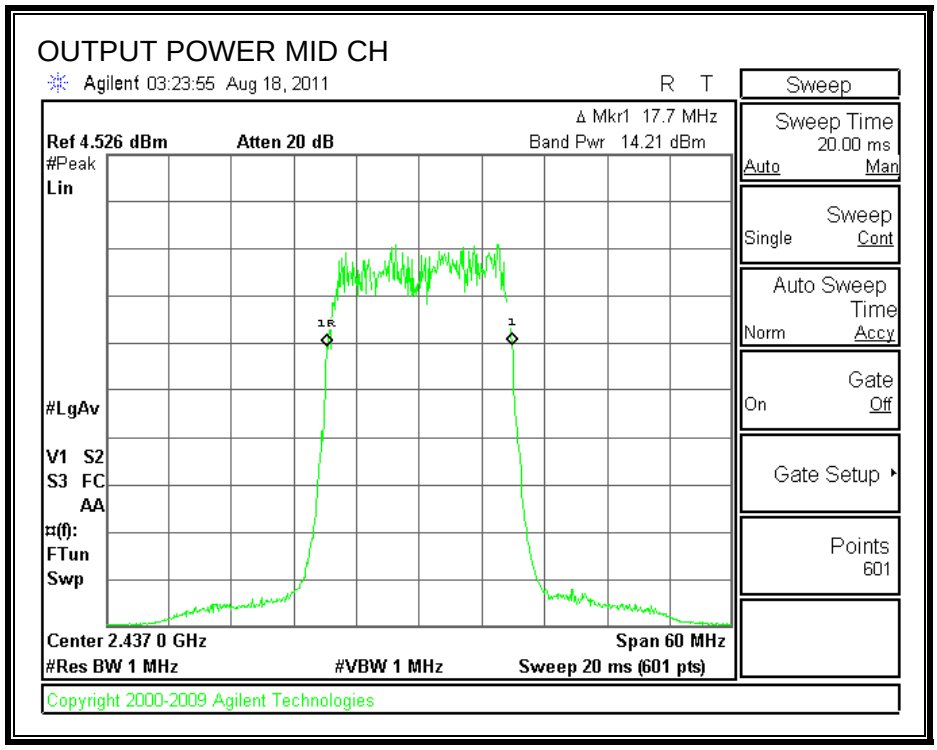
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

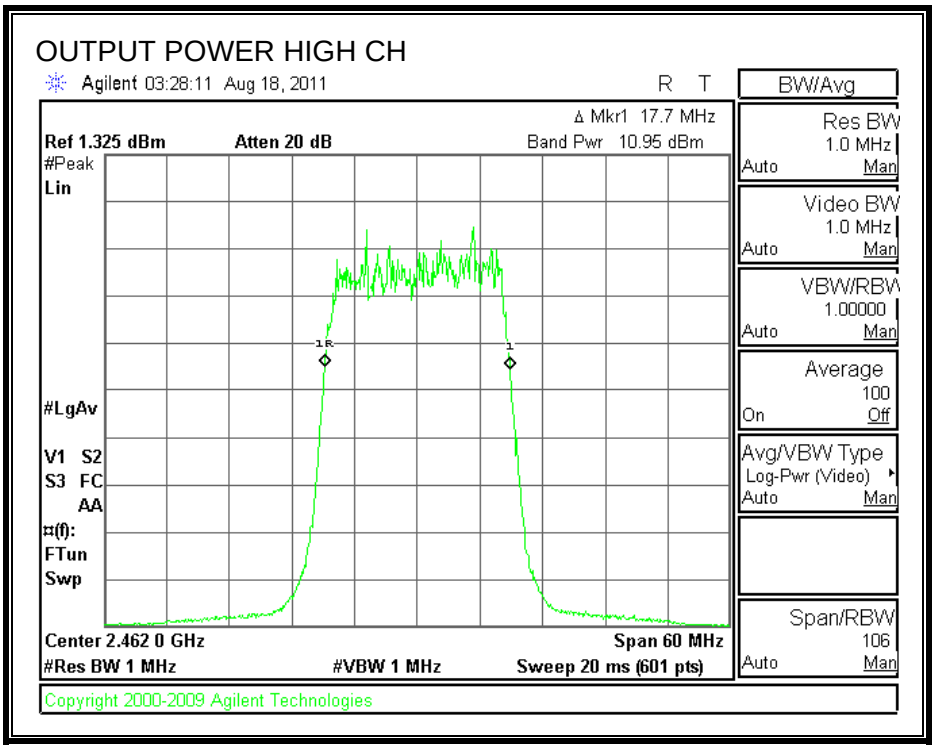
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	10.77	10.7	21.47	30	-8.53
Middle	2437	14.21	10.7	24.91	30	-5.09
High	2462	10.95	10.7	21.65	30	-8.35

OUTPUT POWER







7.6.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Power (dBm)
Low	2412	13.48
Middle	2437	17.00
High	2462	13.50

7.6.3. 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.

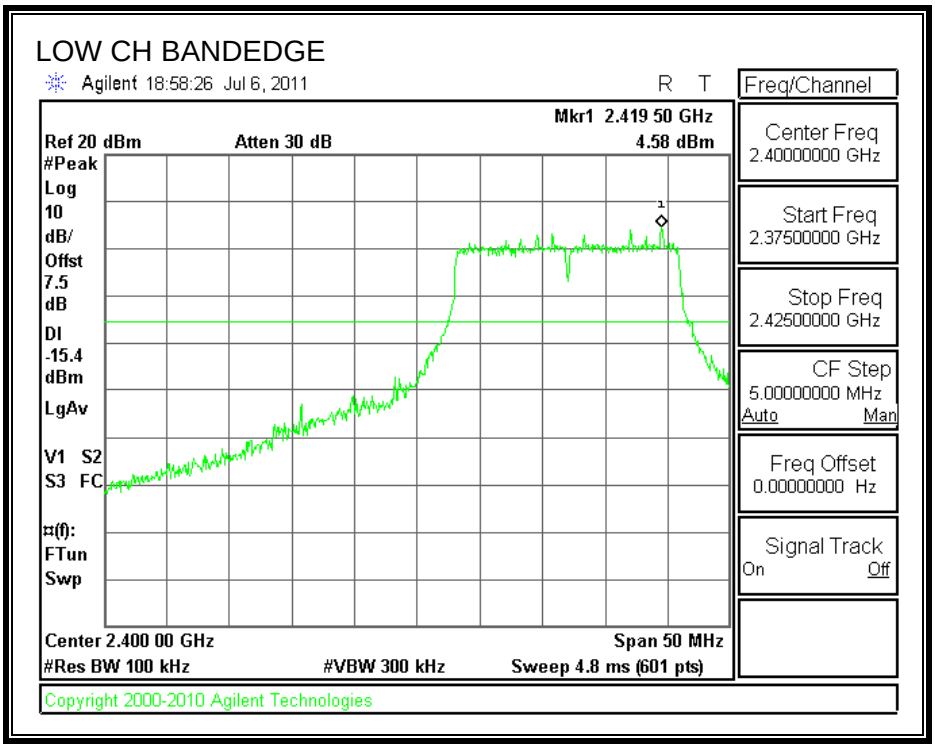
TEST PROCEDURE

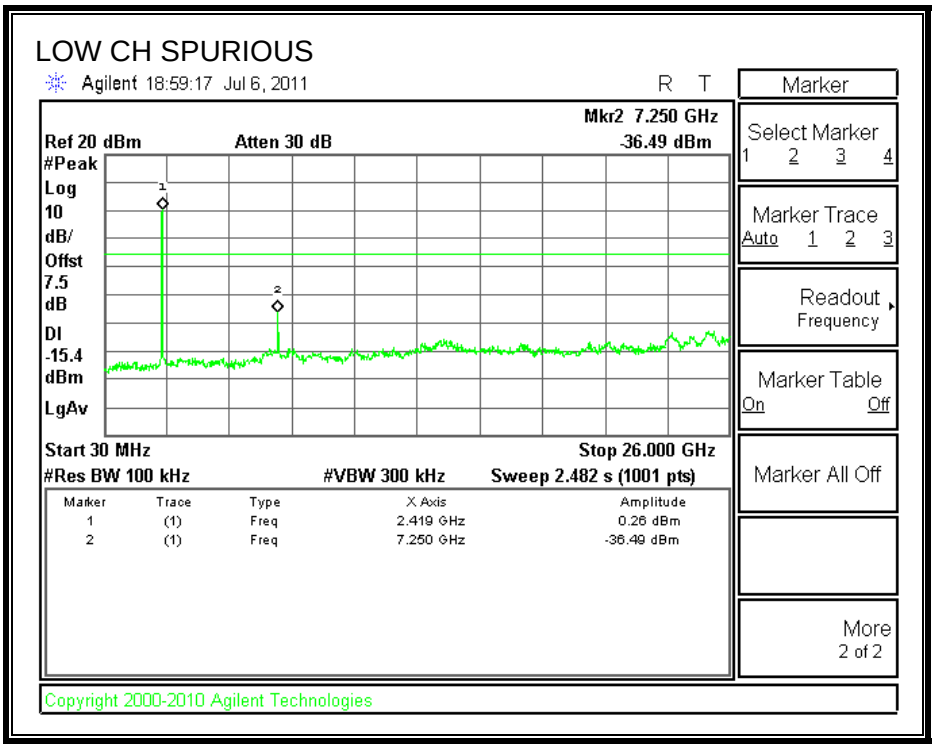
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

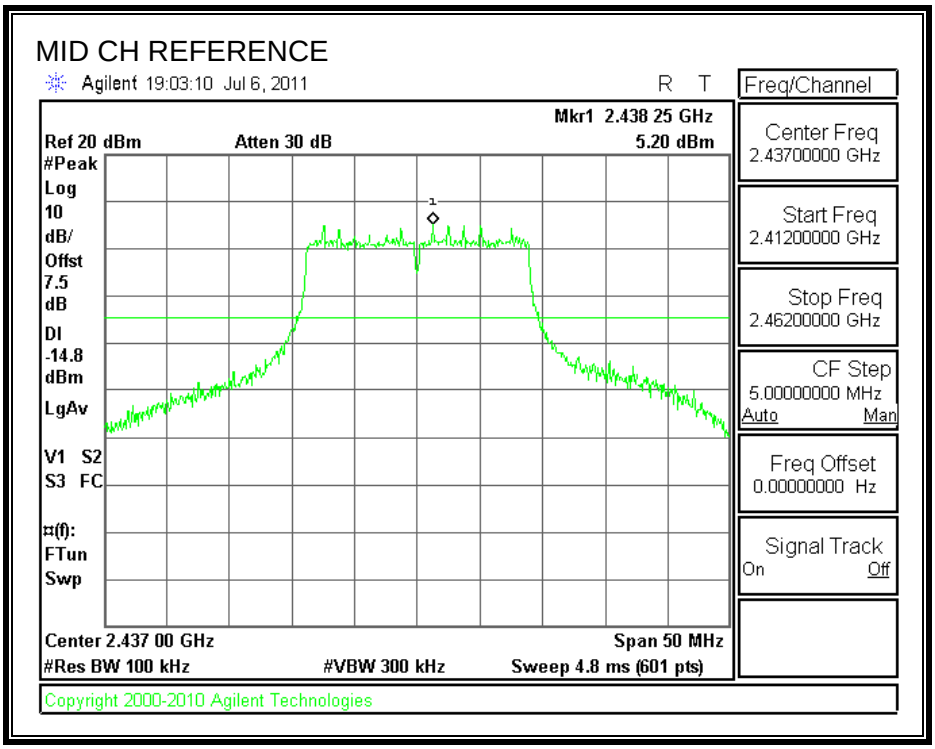
RESULTS

SPURIOUS EMISSIONS

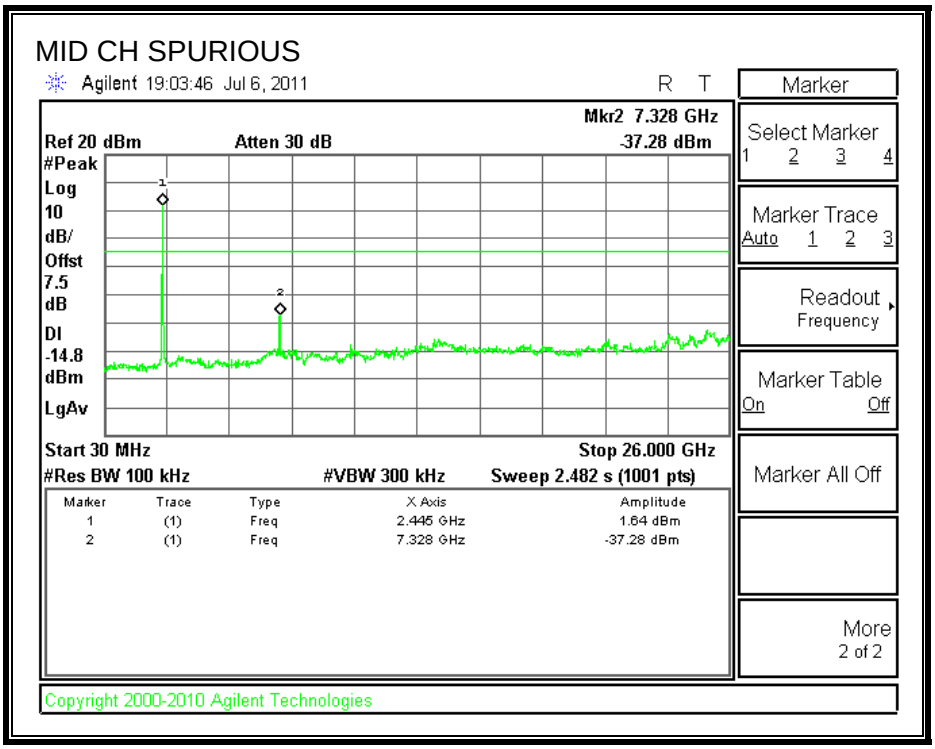


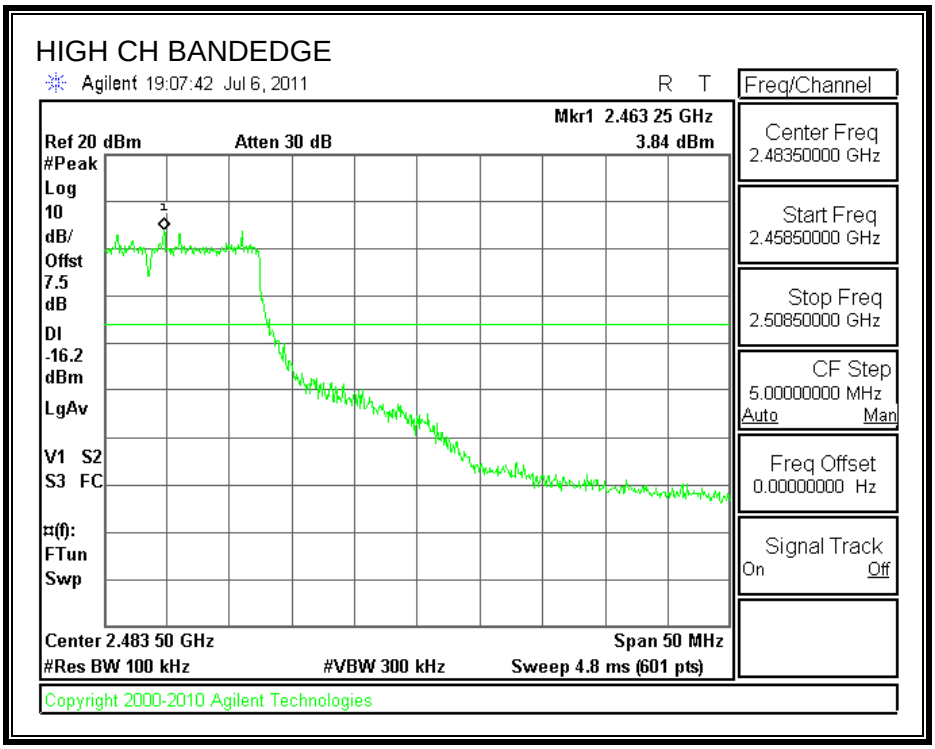


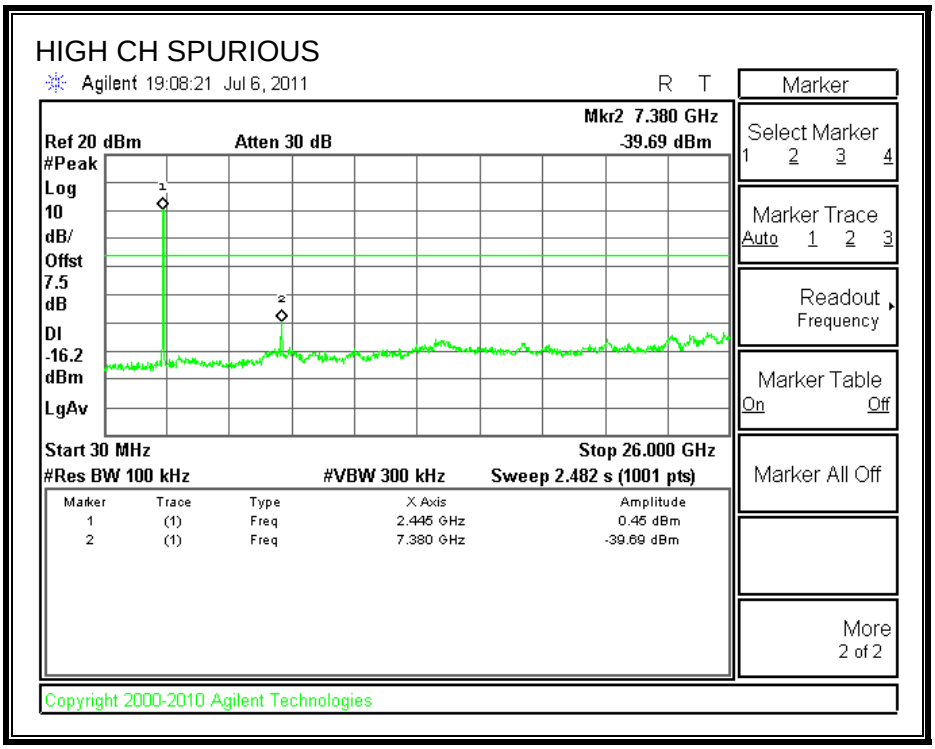
MID CH REFERENCE



MID CH SPURIOUS







BOM VARIANT 3

7.7. 802.11b LEGACY MODE IN THE 2.4 GHz BAND

7.7.1. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

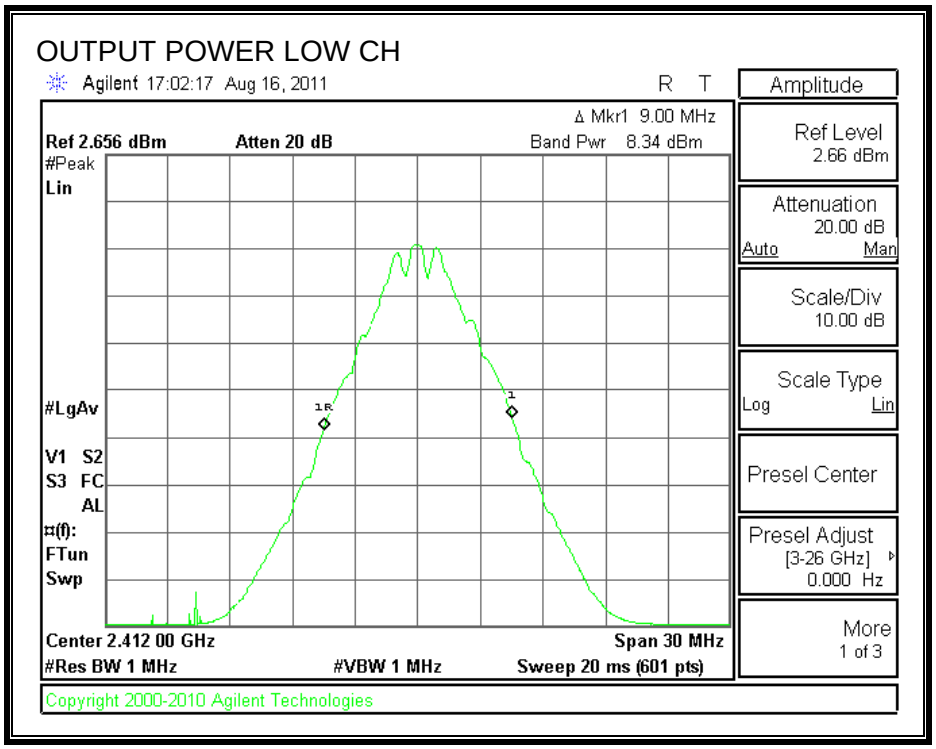
TEST PROCEDURE

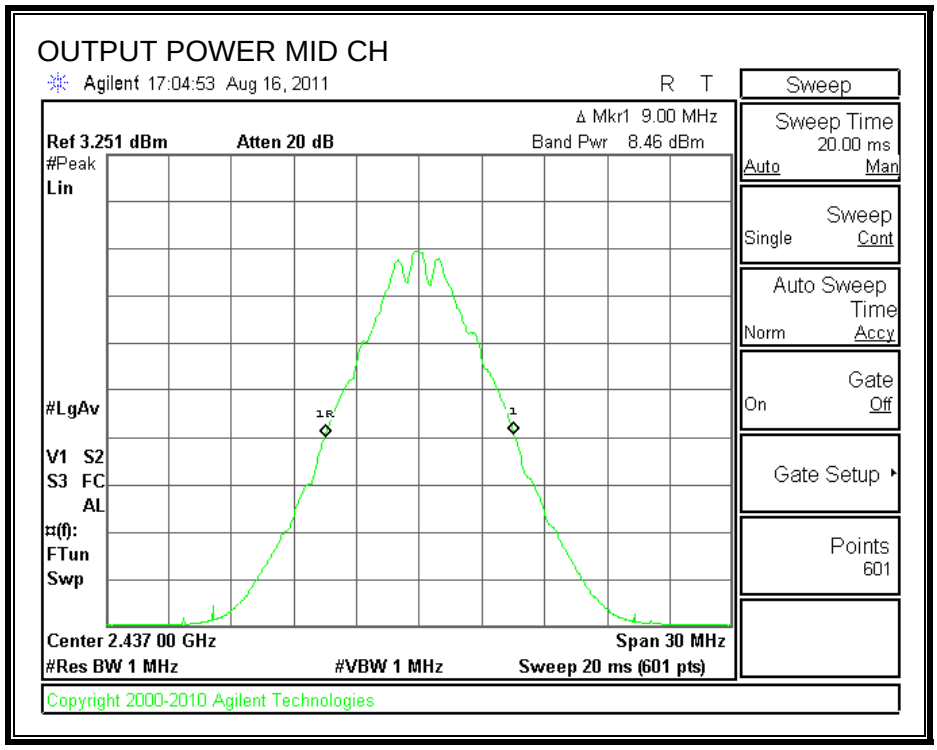
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

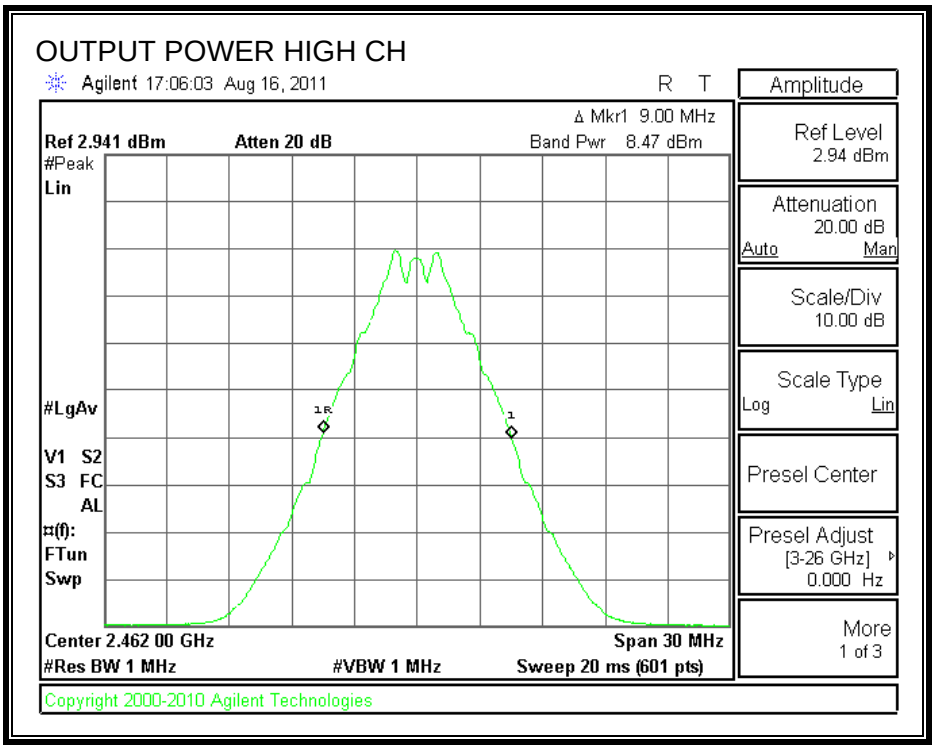
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	8.34	10.7	19.04	30	-10.96
Middle	2437	8.46	10.7	19.16	30	-10.84
High	2462	8.47	10.7	19.17	30	-10.83

OUTPUT POWER







7.7.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Power (dBm)
Low	2412	17.00
Middle	2437	17.10
High	2462	17.05

7.7.3. 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.

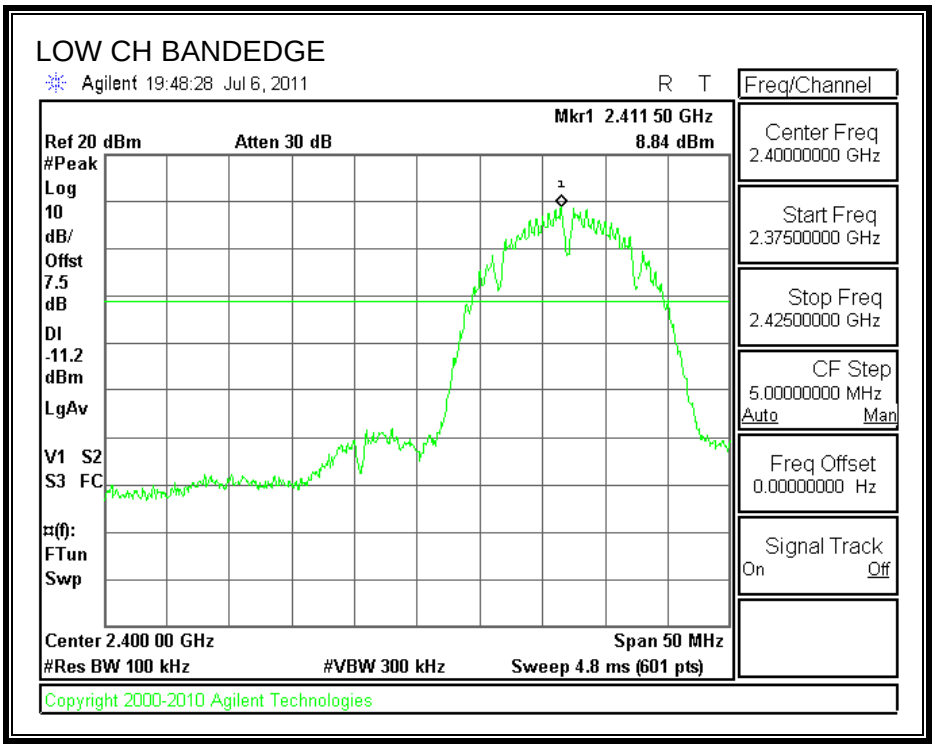
TEST PROCEDURE

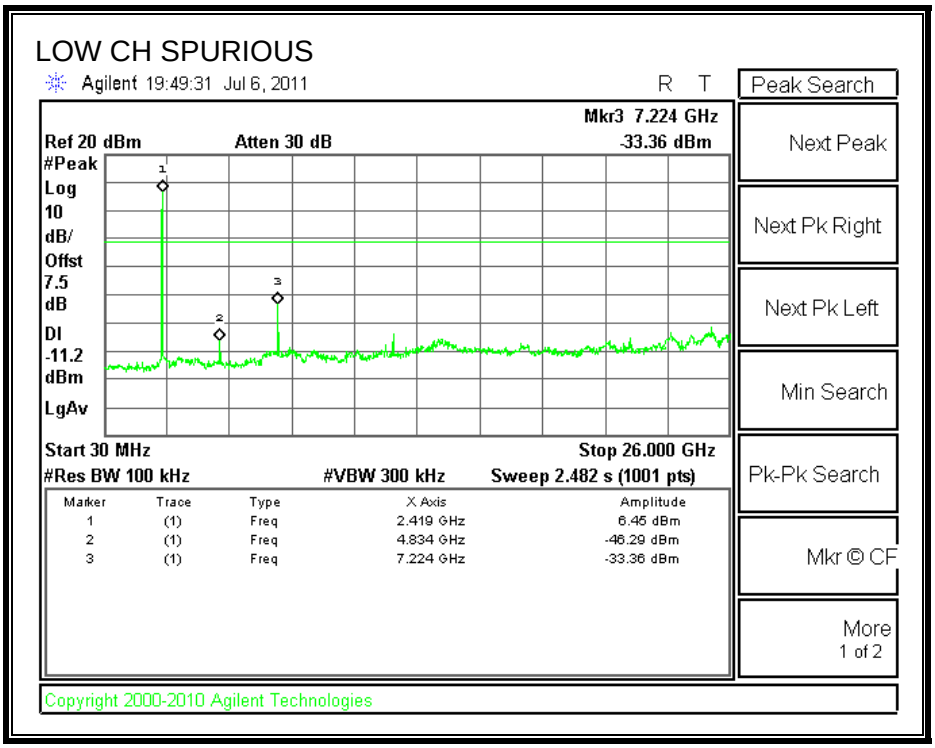
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

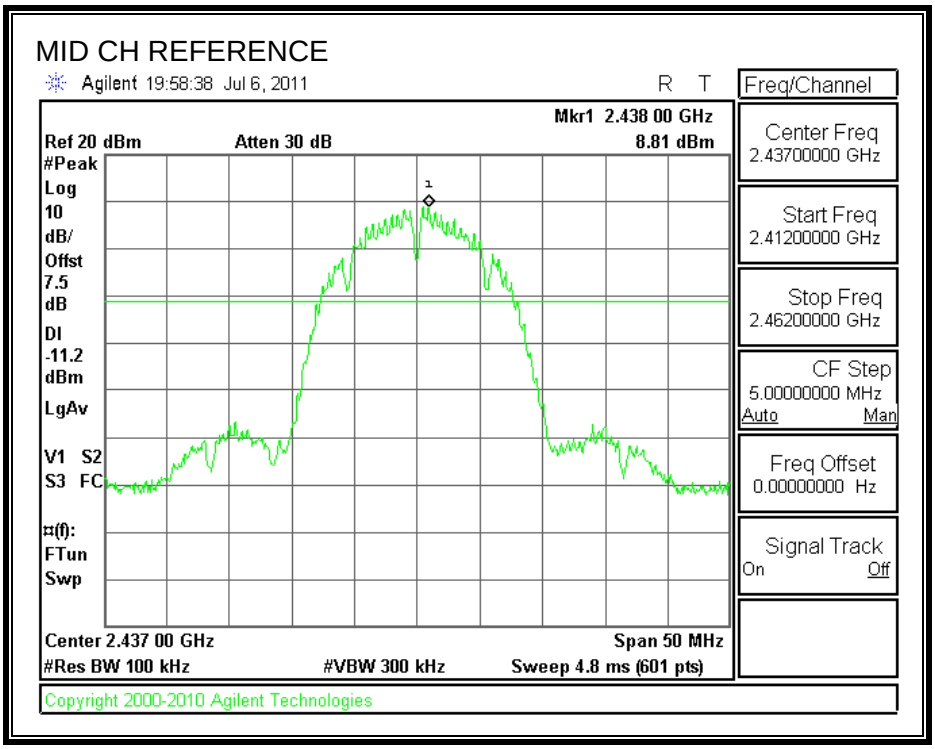
RESULTS

SPURIOUS EMISSIONS

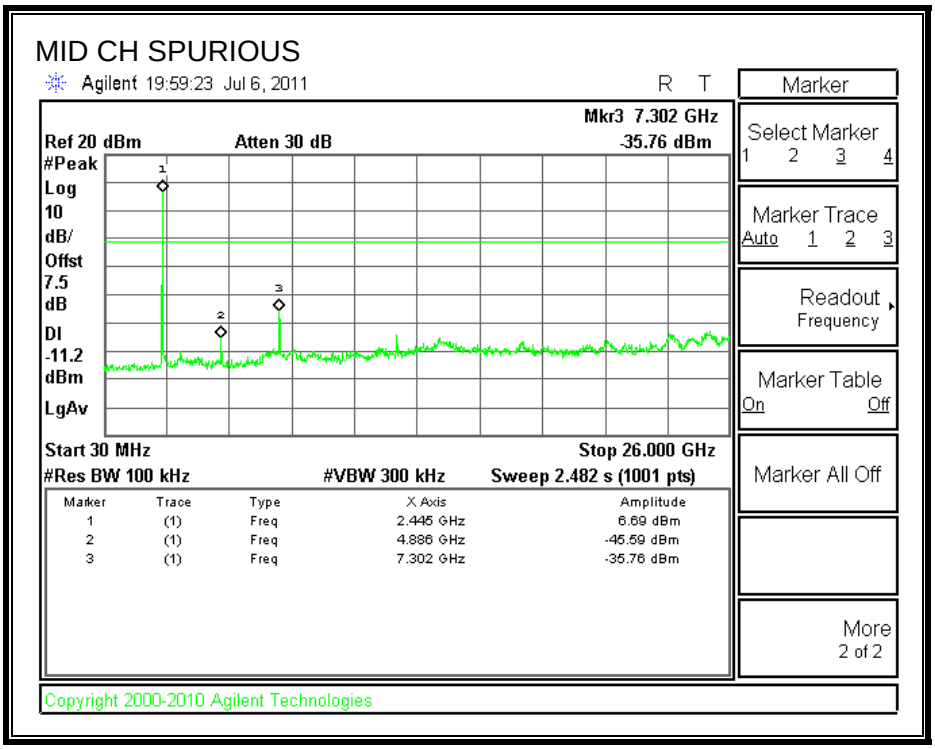


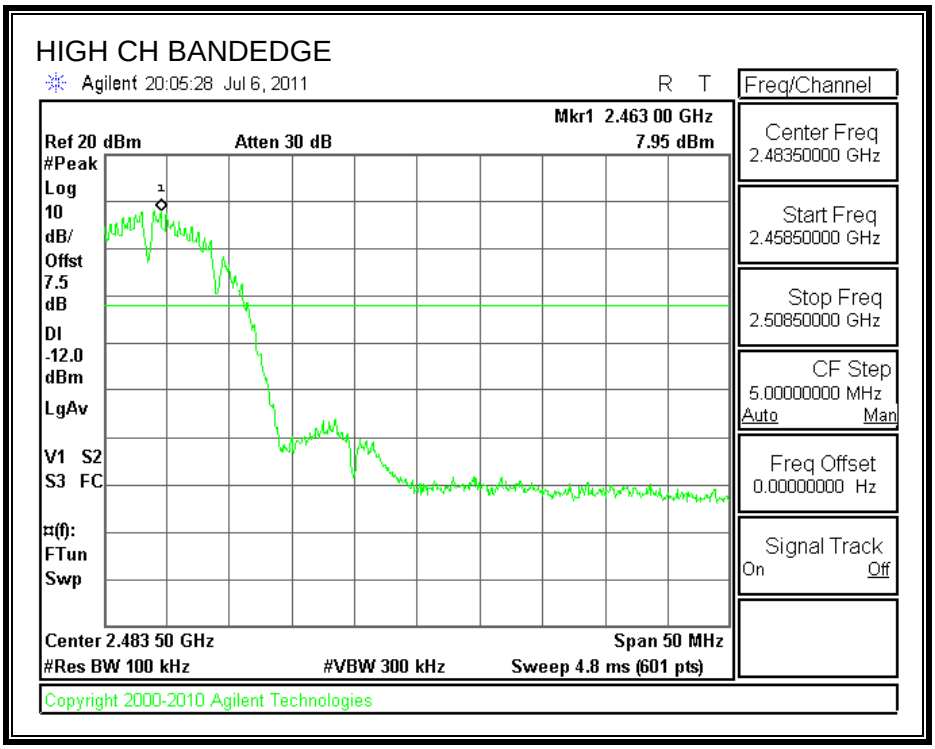


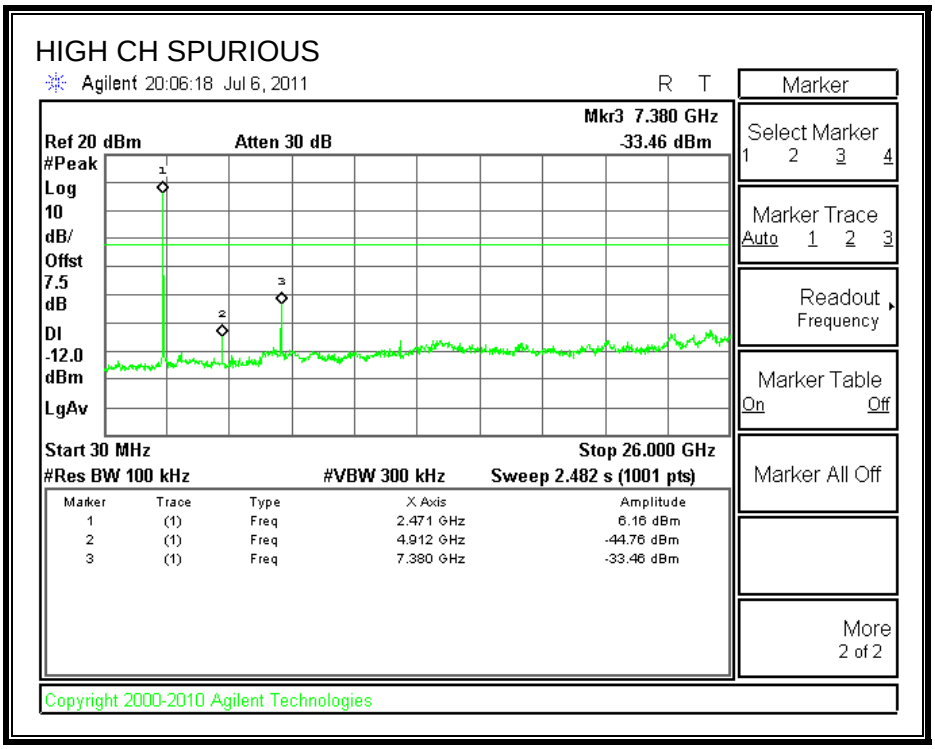
MID CH REFERENCE



MID CH SPURIOUS







7.8. 802.11g MODE IN THE 2.4 GHz BAND

7.8.1. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

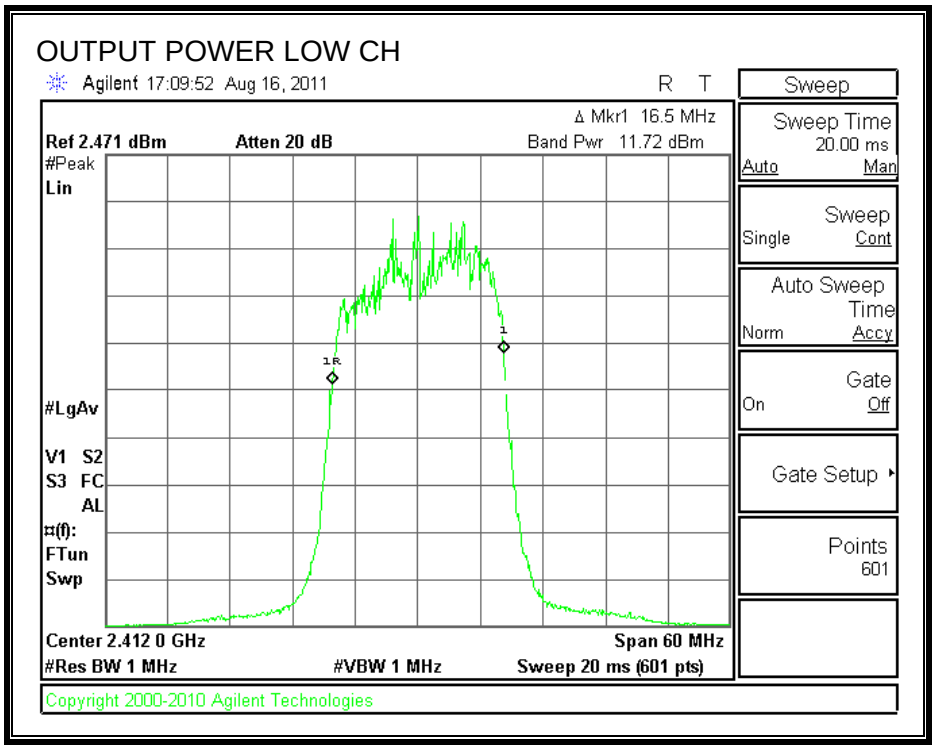
TEST PROCEDURE

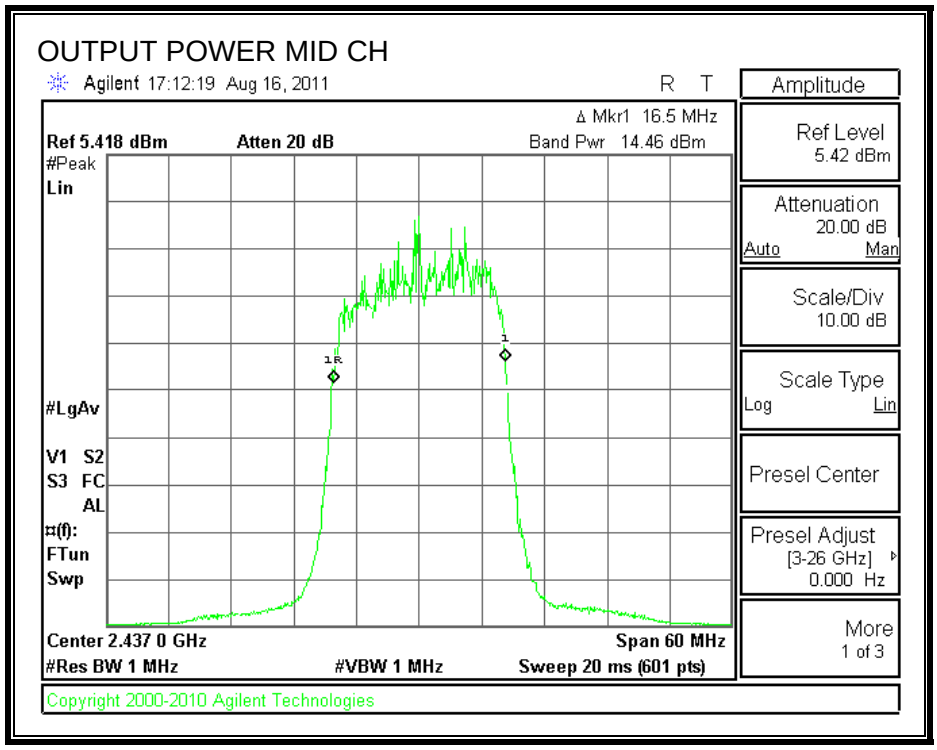
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

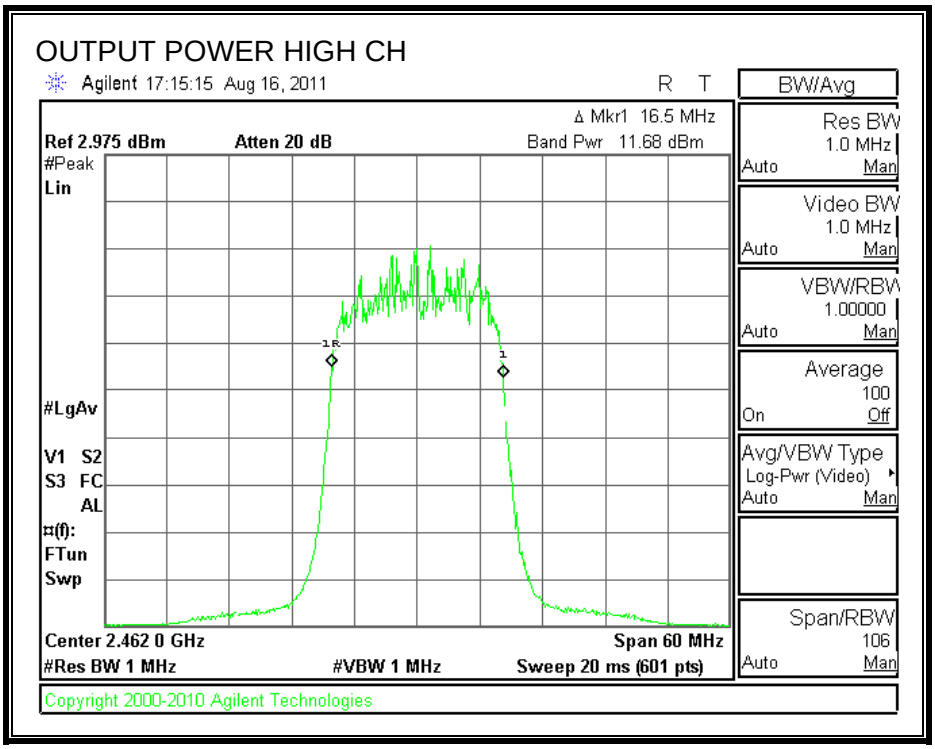
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	11.72	10.7	22.42	30	-7.58
Middle	2437	14.46	10.7	25.16	30	-4.84
High	2462	11.68	10.7	22.38	30	-7.62

OUTPUT POWER







7.8.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Power (dBm)
Low	2412	14.00
Middle	2437	17.15
High	2462	14.00

7.8.3. 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.

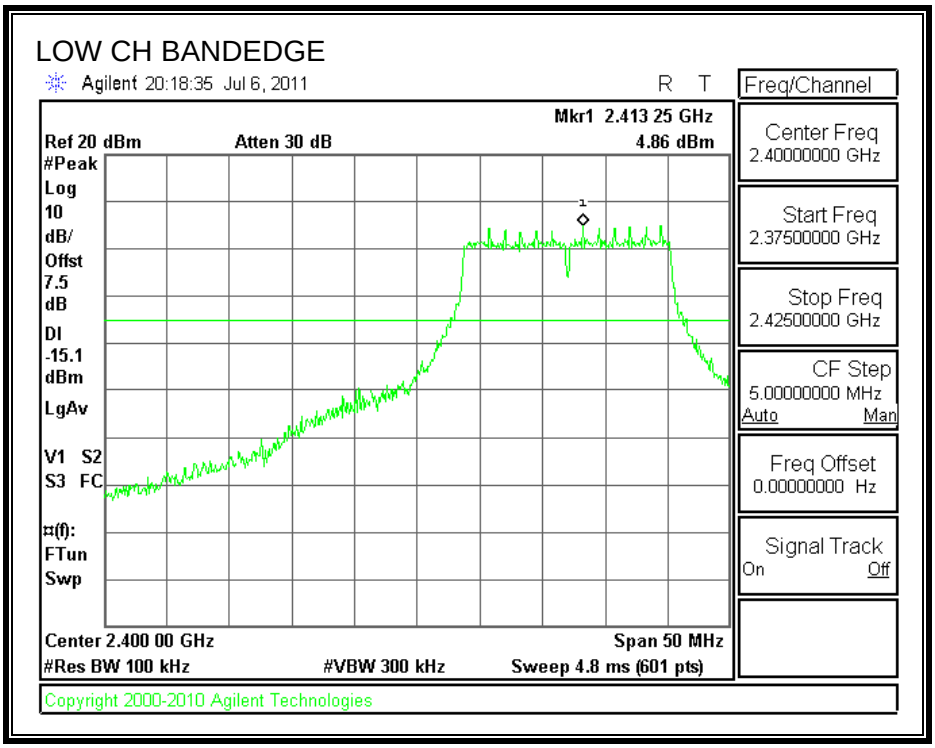
TEST PROCEDURE

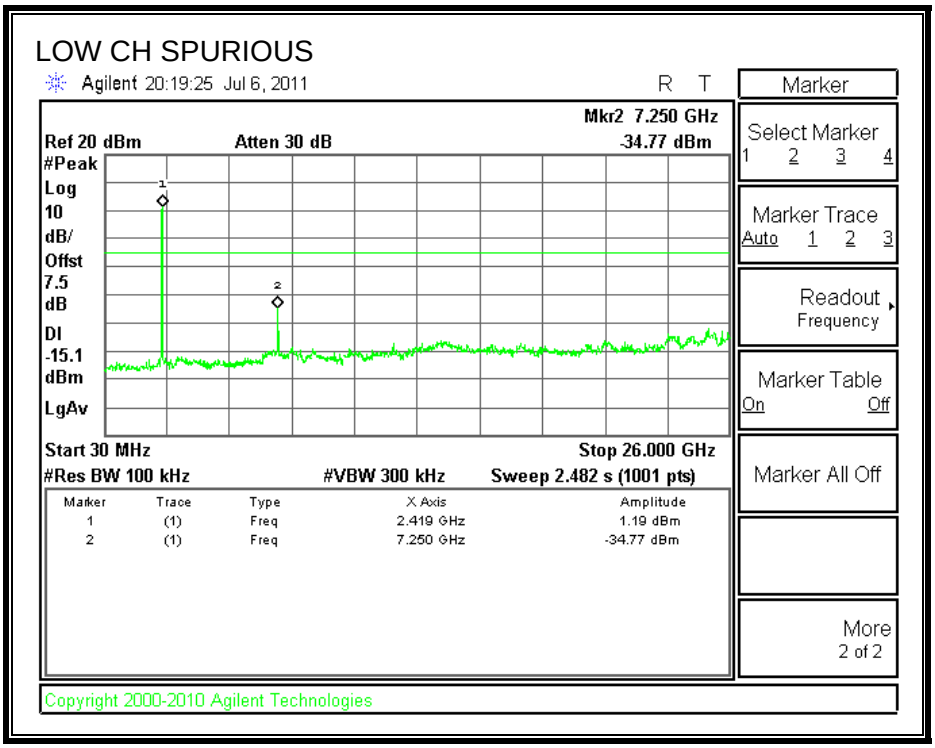
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

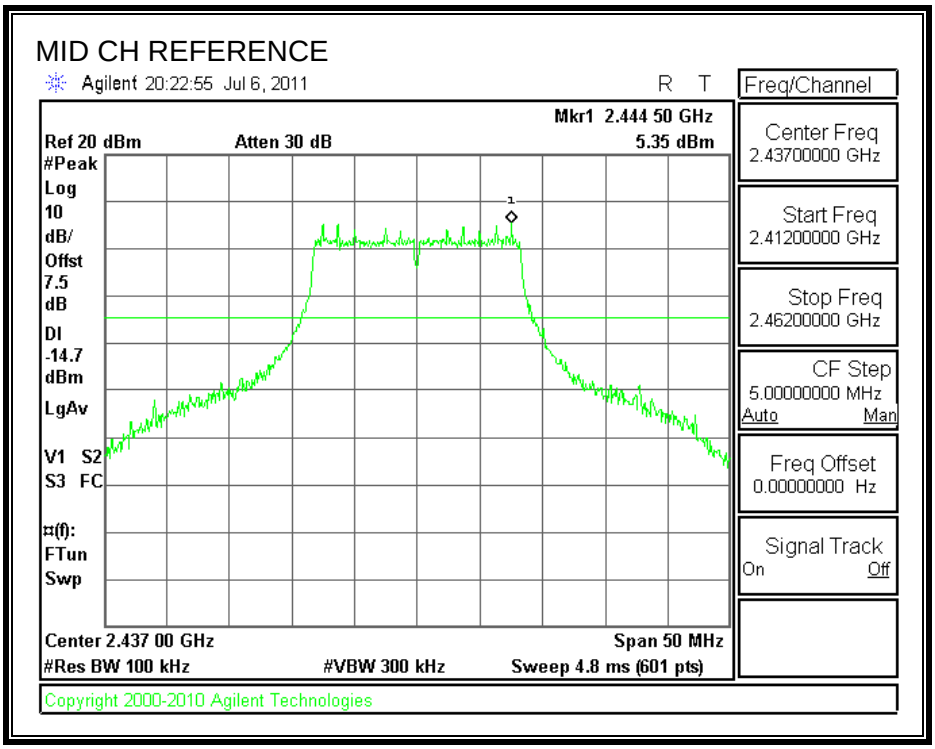
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

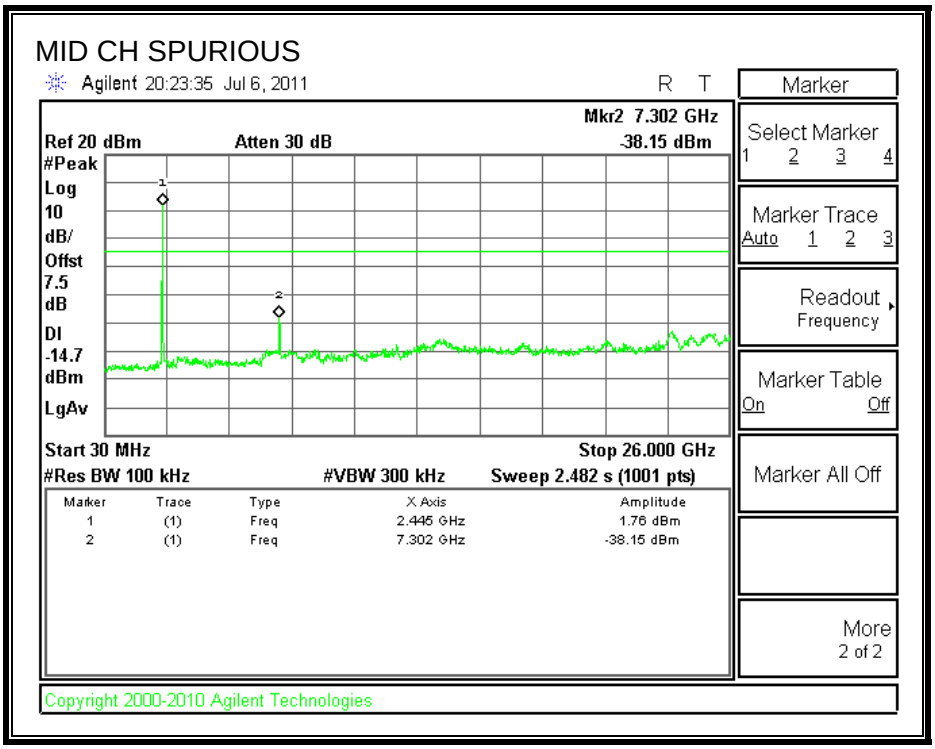
RESULTS

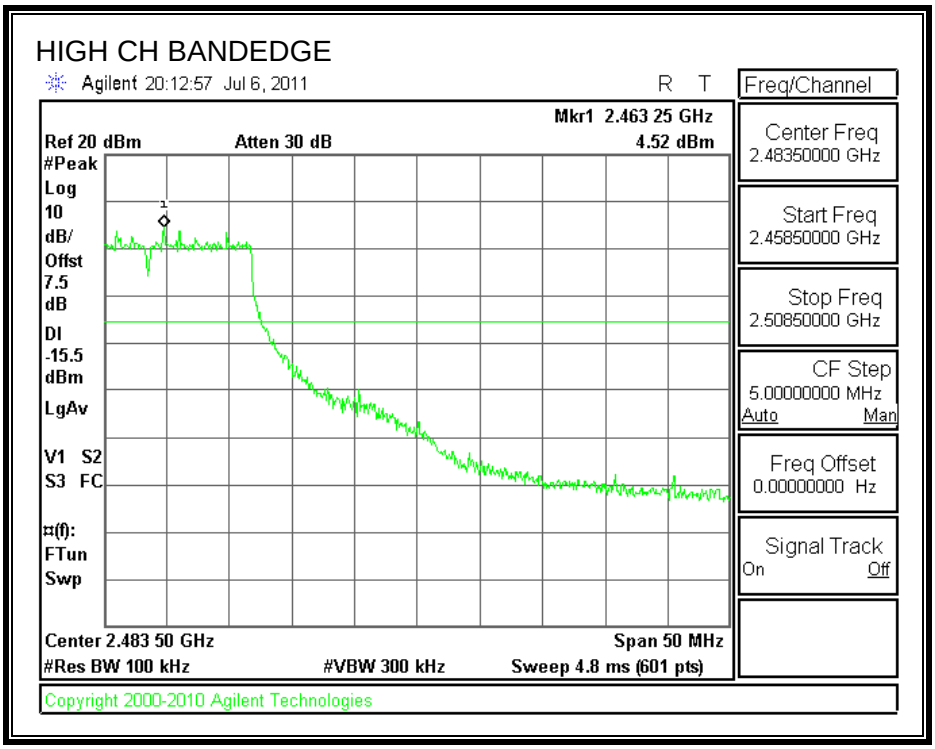
SPURIOUS EMISSIONS

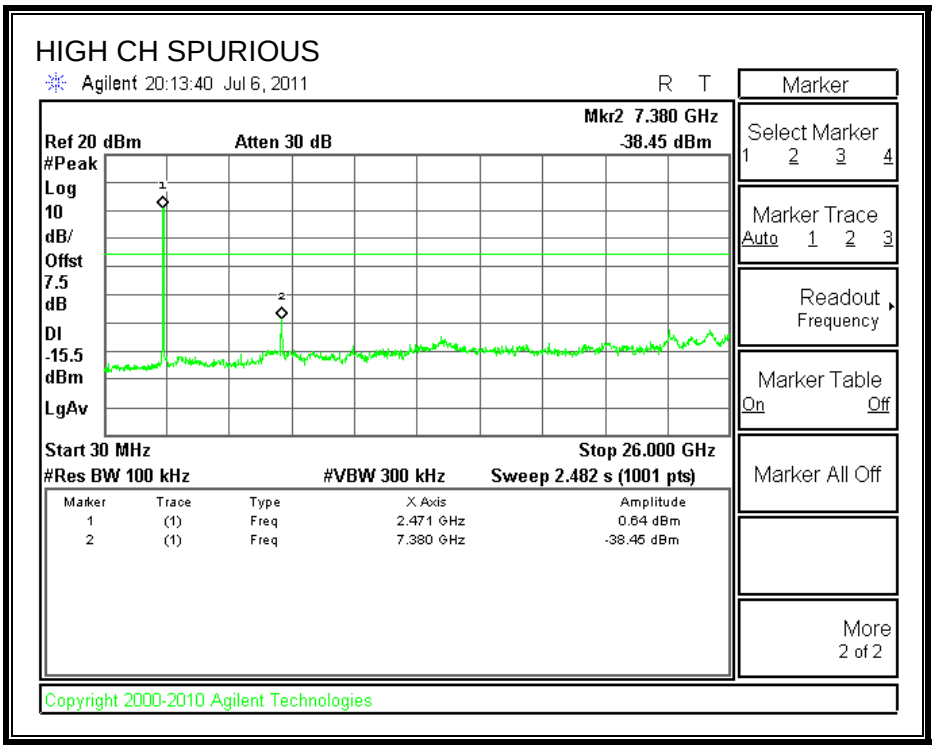












7.9. 802.11n MODE IN THE 2.4 GHz BAND

7.9.1. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

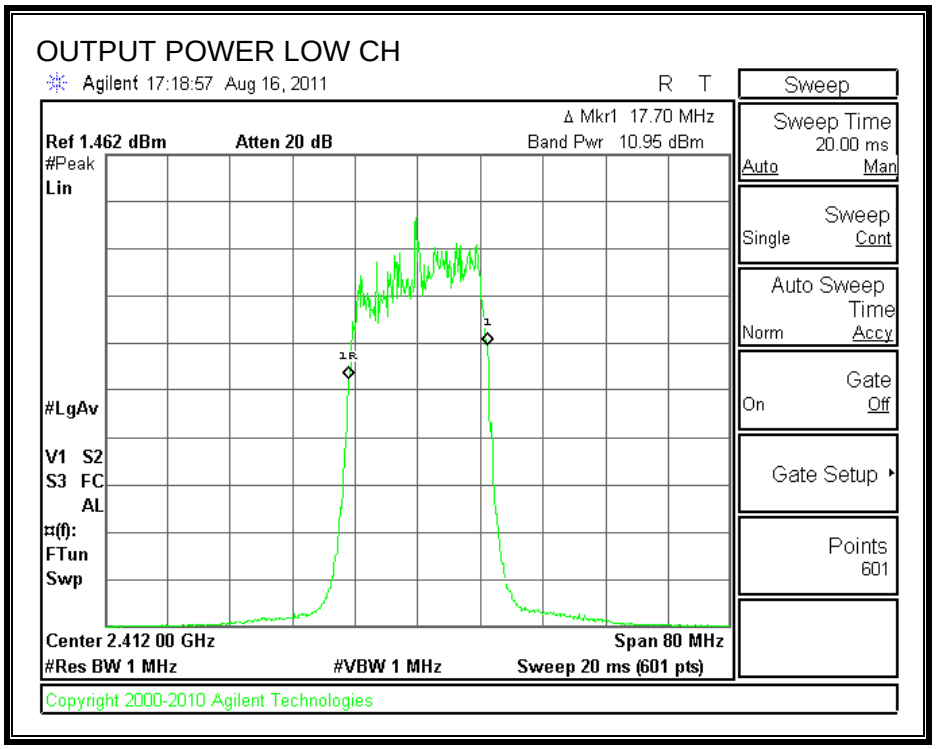
TEST PROCEDURE

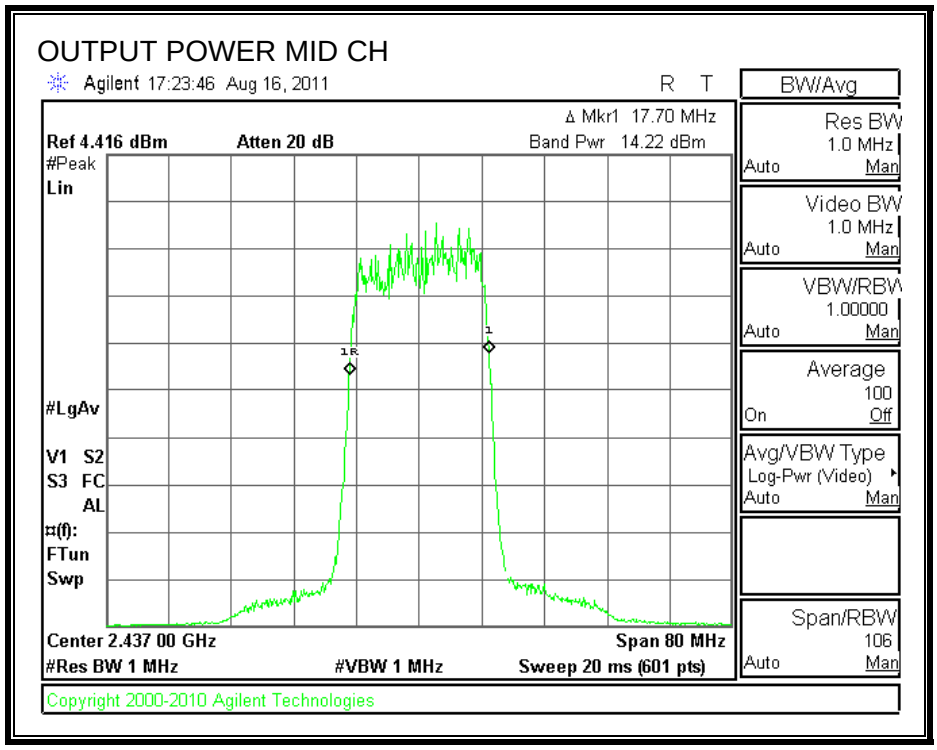
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

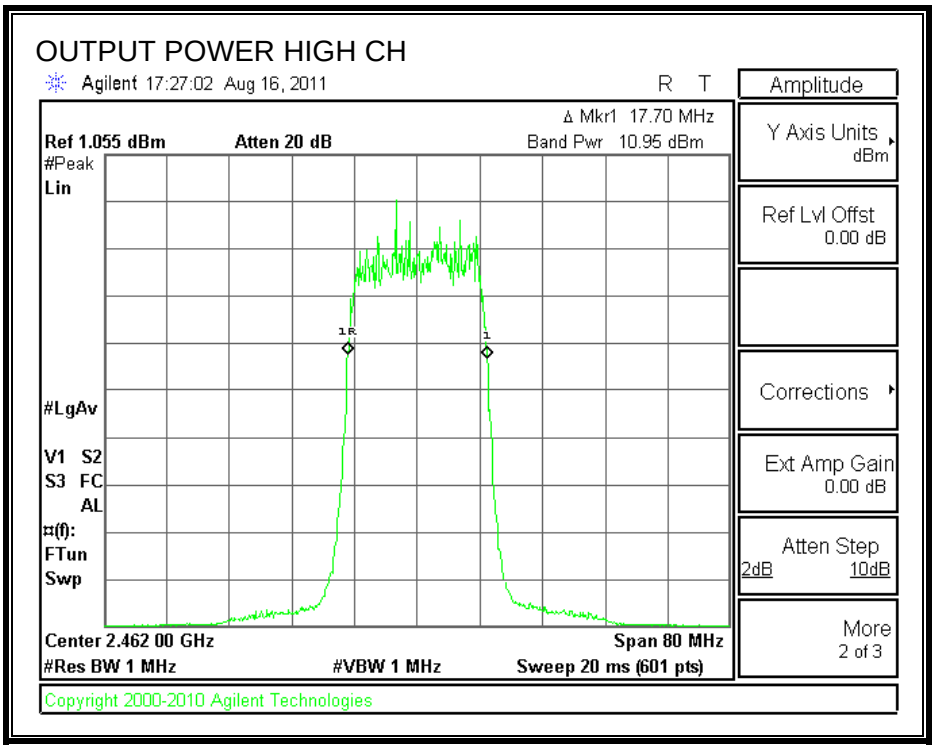
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	10.95	10.7	21.65	30	-8.35
Middle	2437	14.22	10.7	24.92	30	-5.08
High	2462	10.95	10.7	21.65	30	-8.35

OUTPUT POWER







7.9.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Power (dBm)
Low	2412	13.50
Middle	2437	17.05
High	2462	13.50

7.9.3. 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.

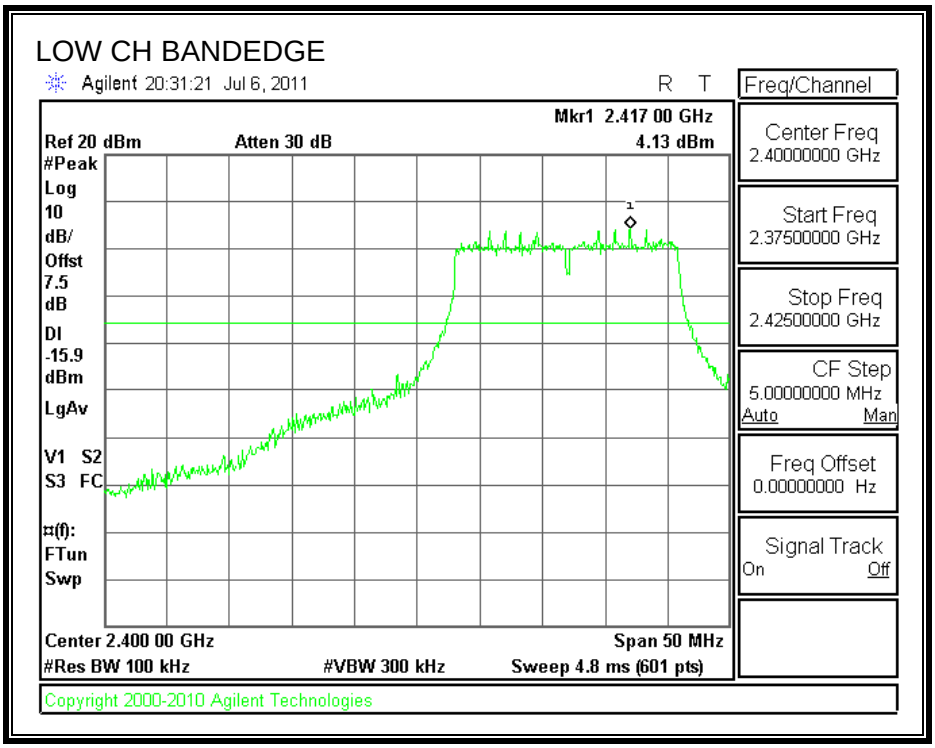
TEST PROCEDURE

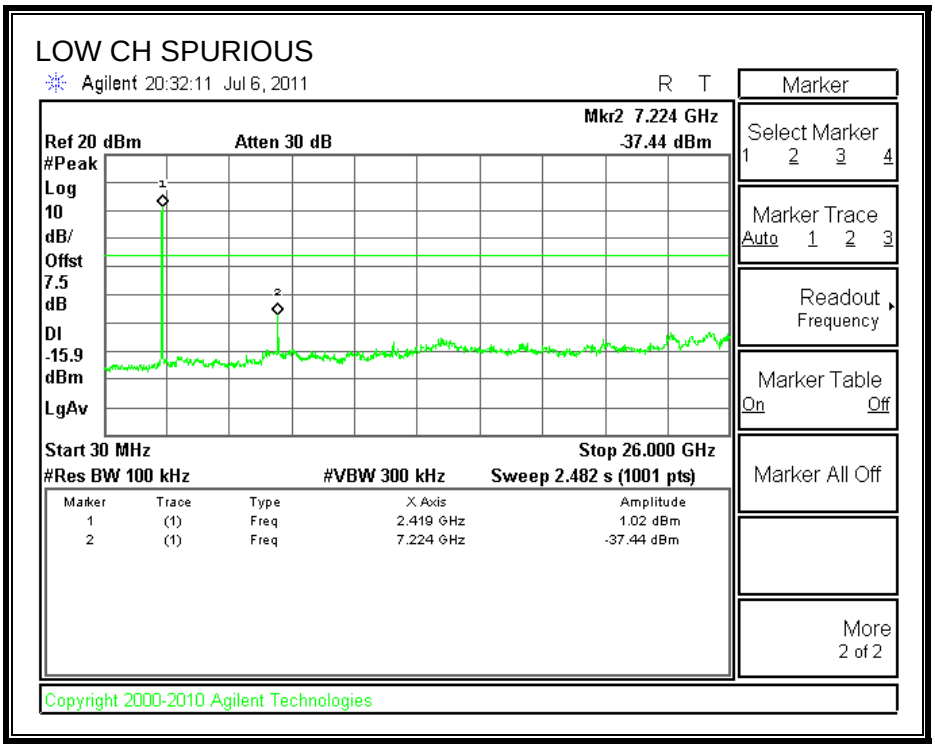
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

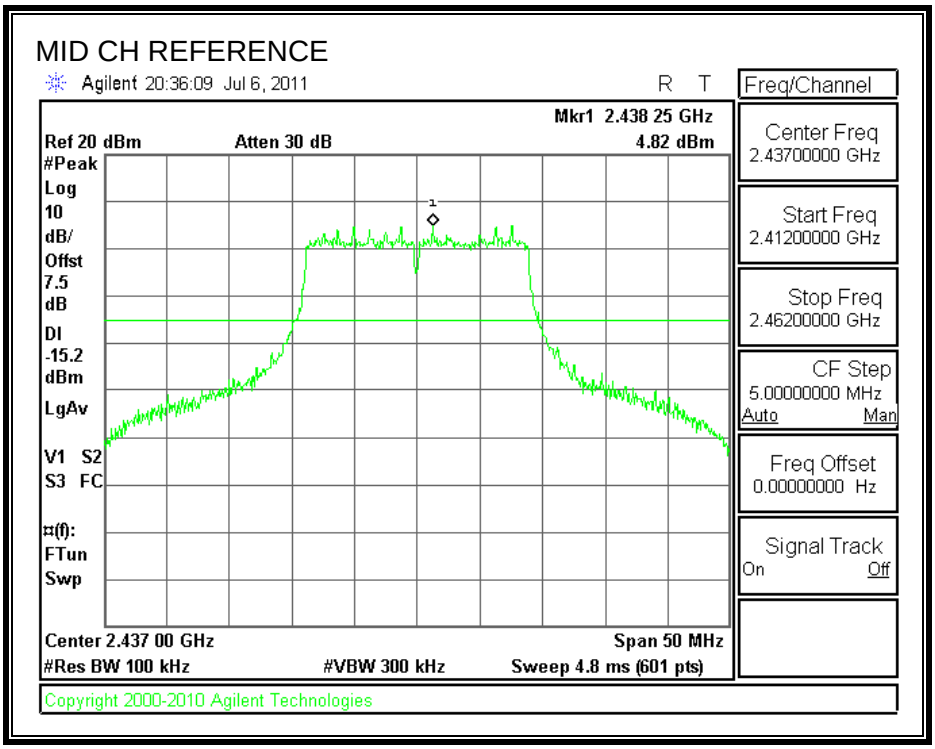
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

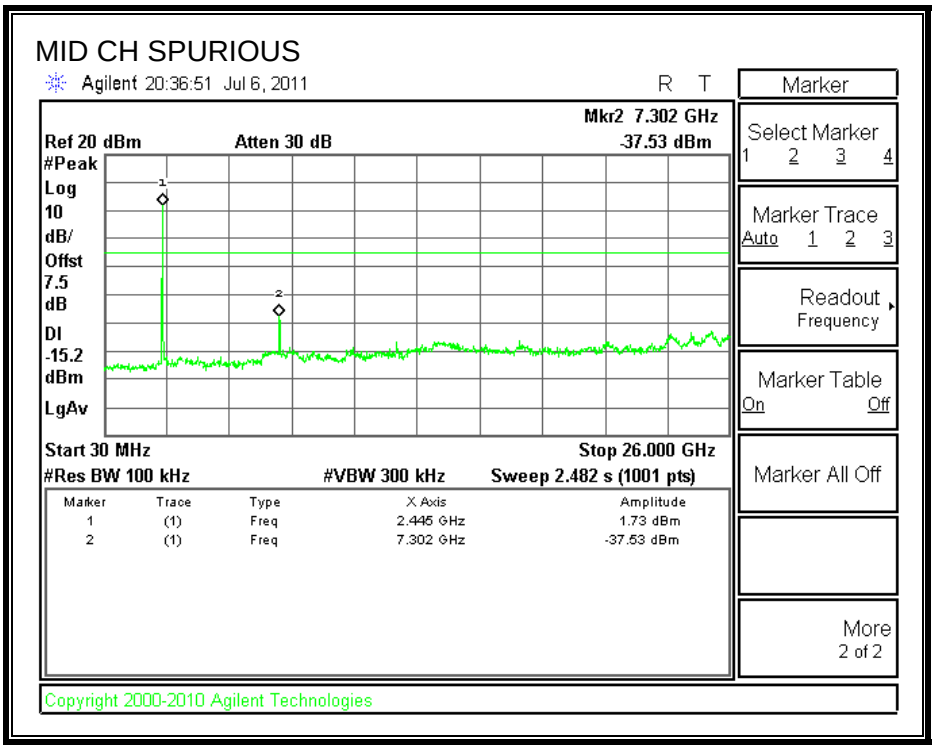
RESULTS

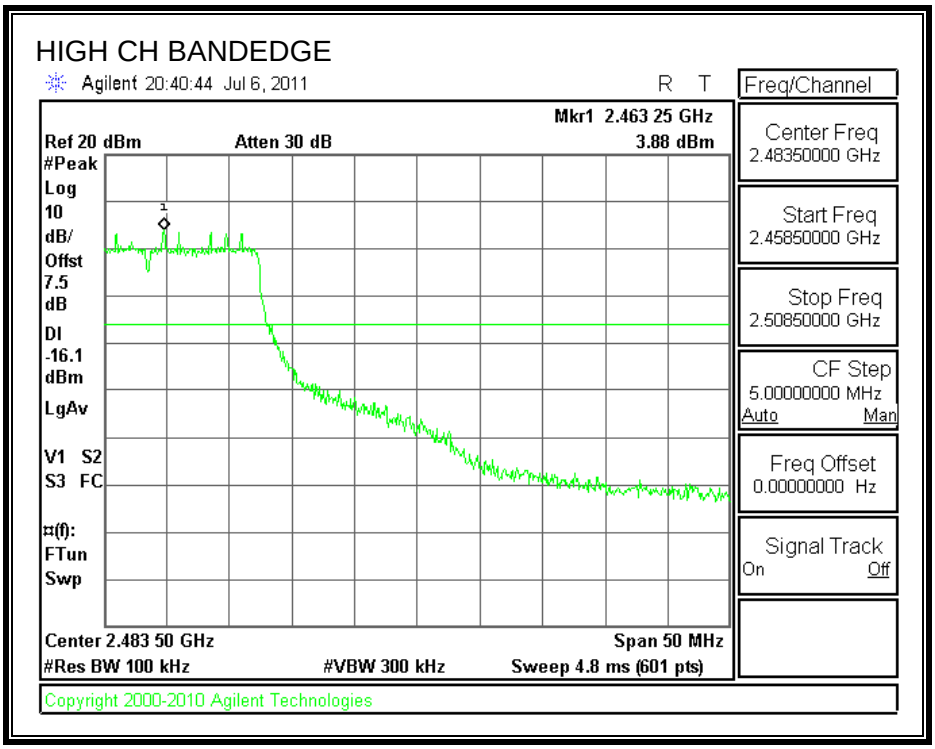
SPURIOUS EMISSIONS

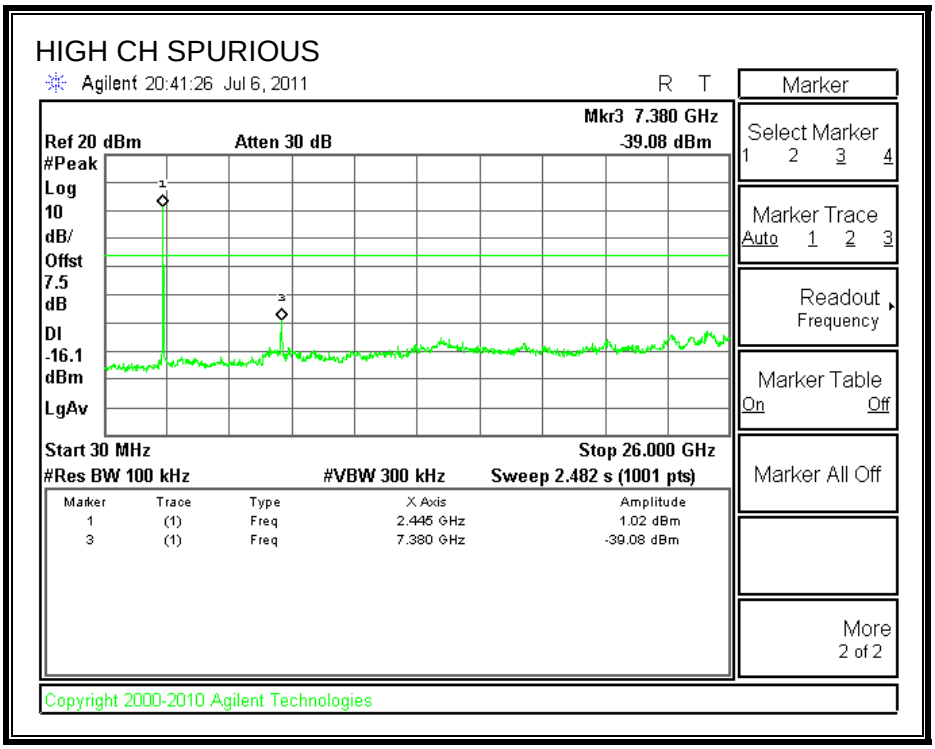












8. RADIATED TEST RESULTS

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.

For 2.4 GHz band, 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.

For 5.8 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.

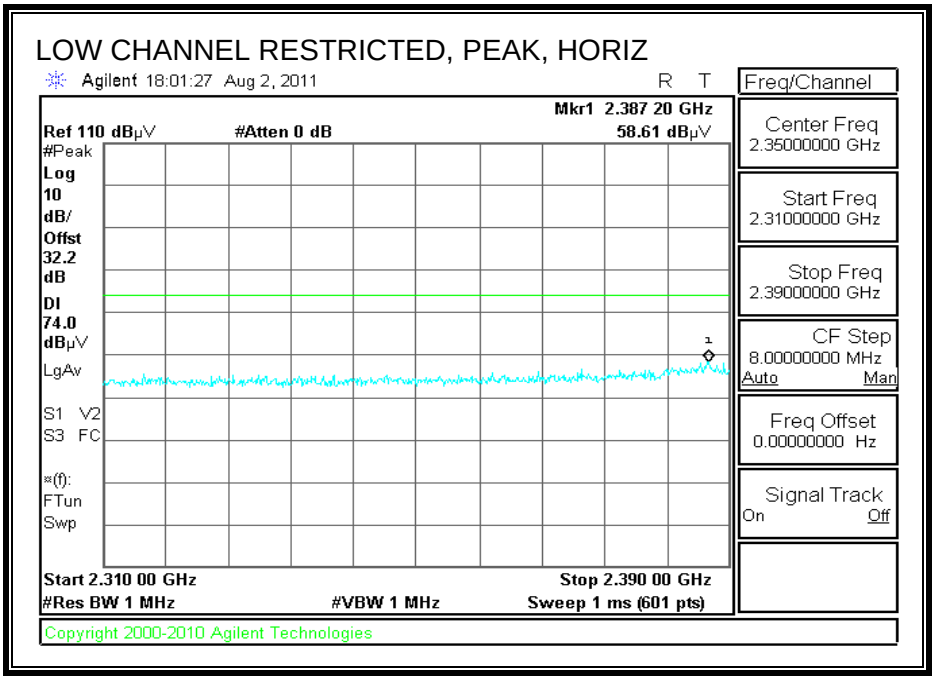
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

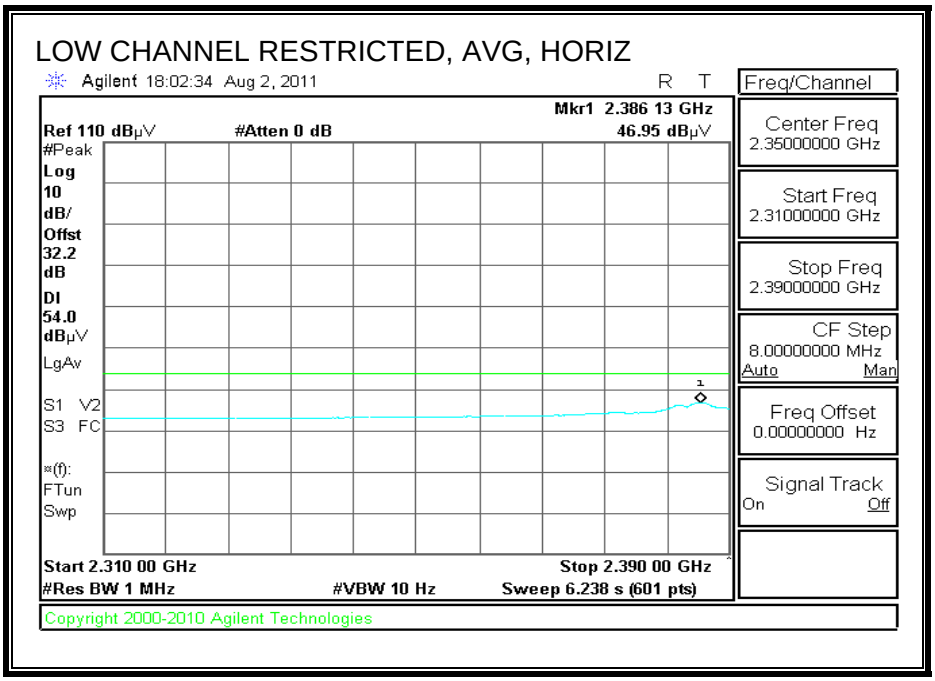
8.2. TRANSMITTER ABOVE 1 GHz

BOM VARIANT 1

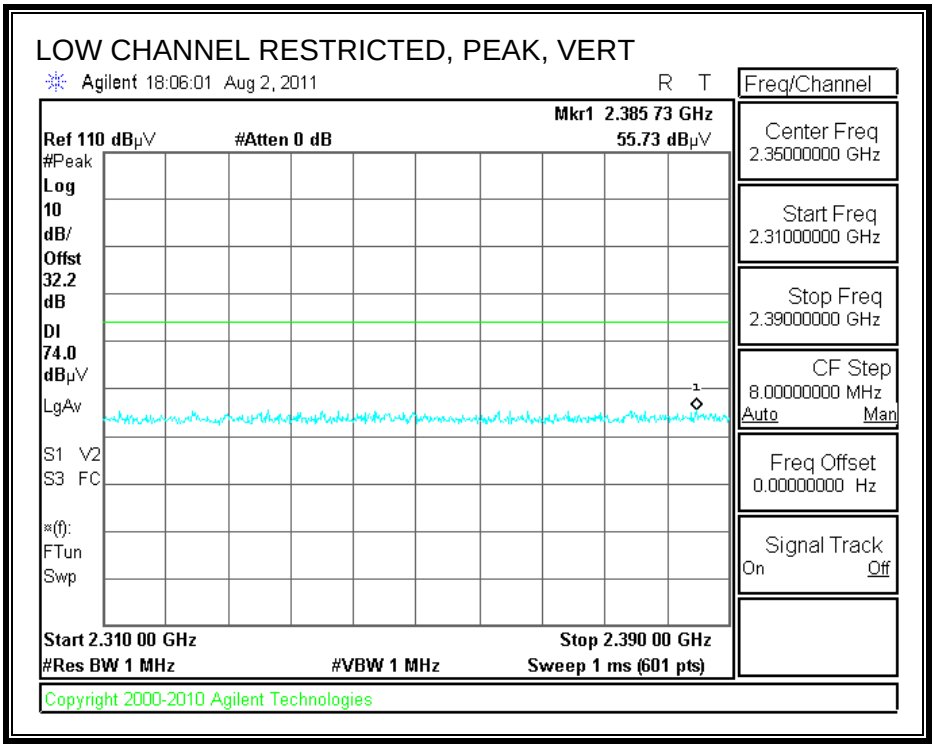
8.2.1. 802.11b MODE IN THE 2.4 GHz BAND

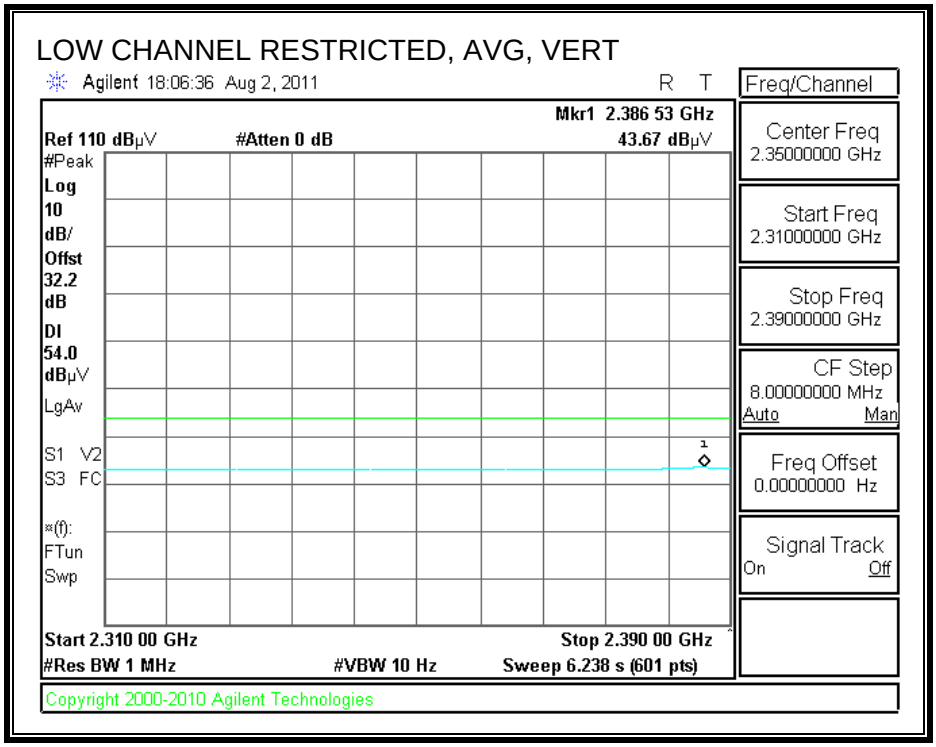
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



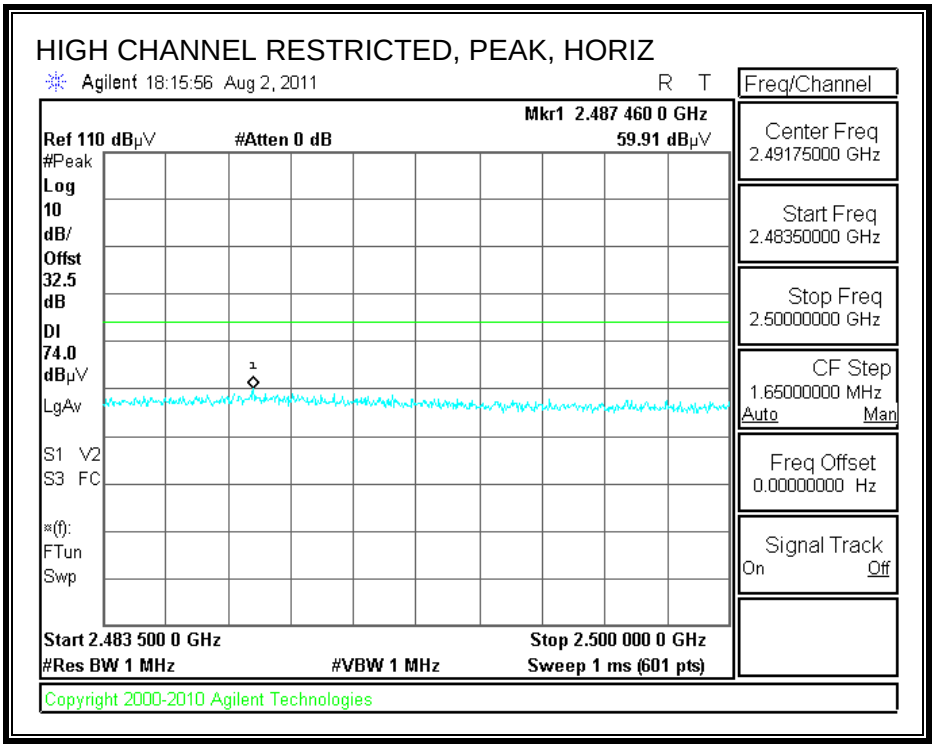


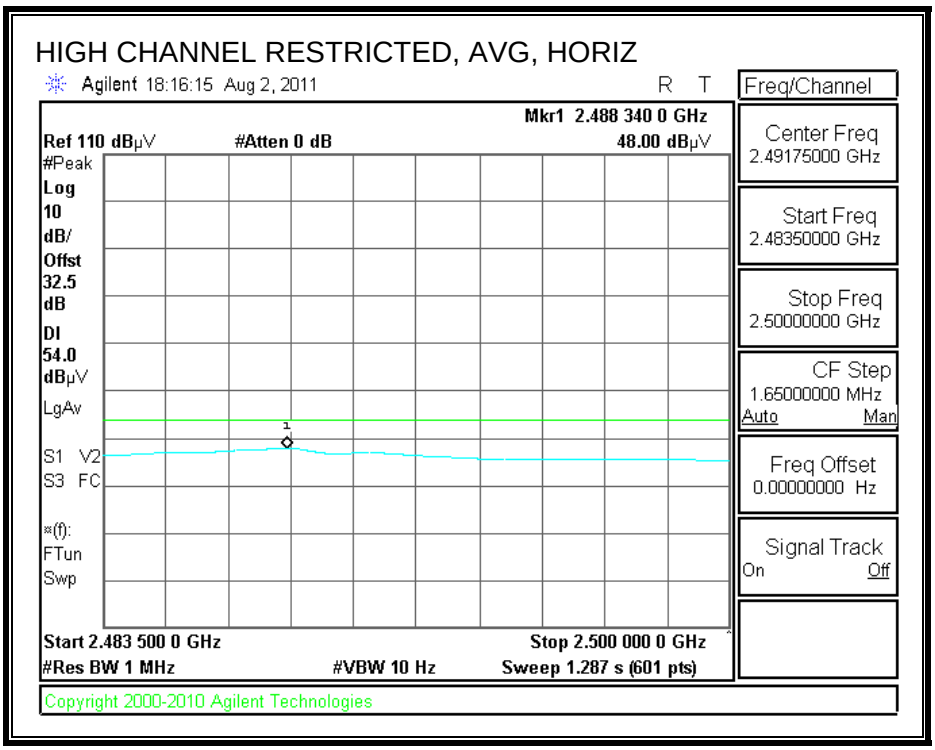
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



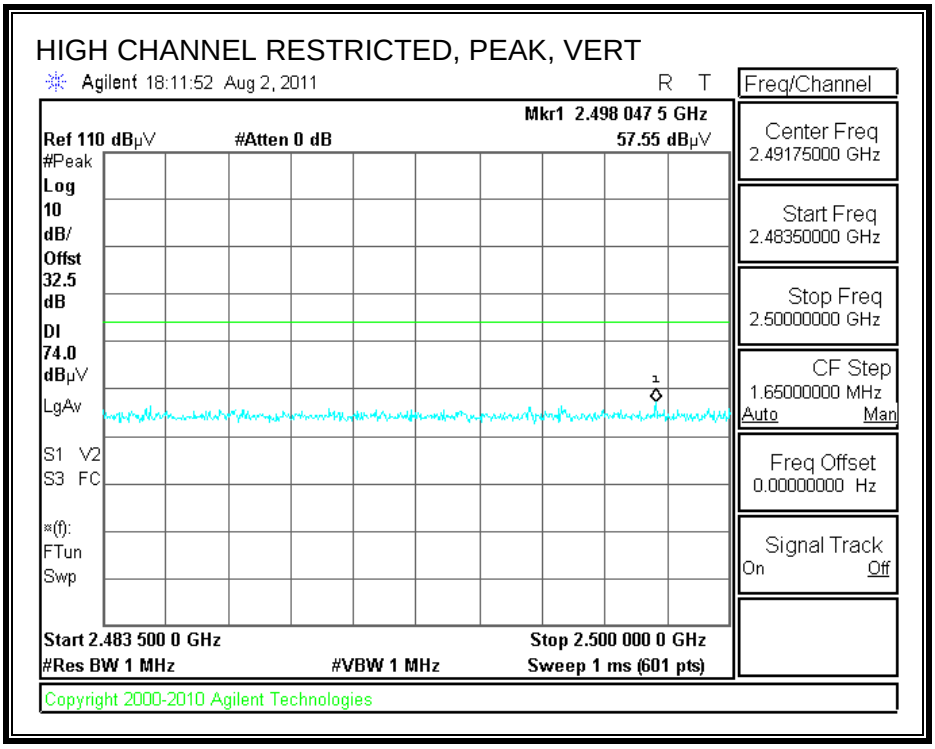


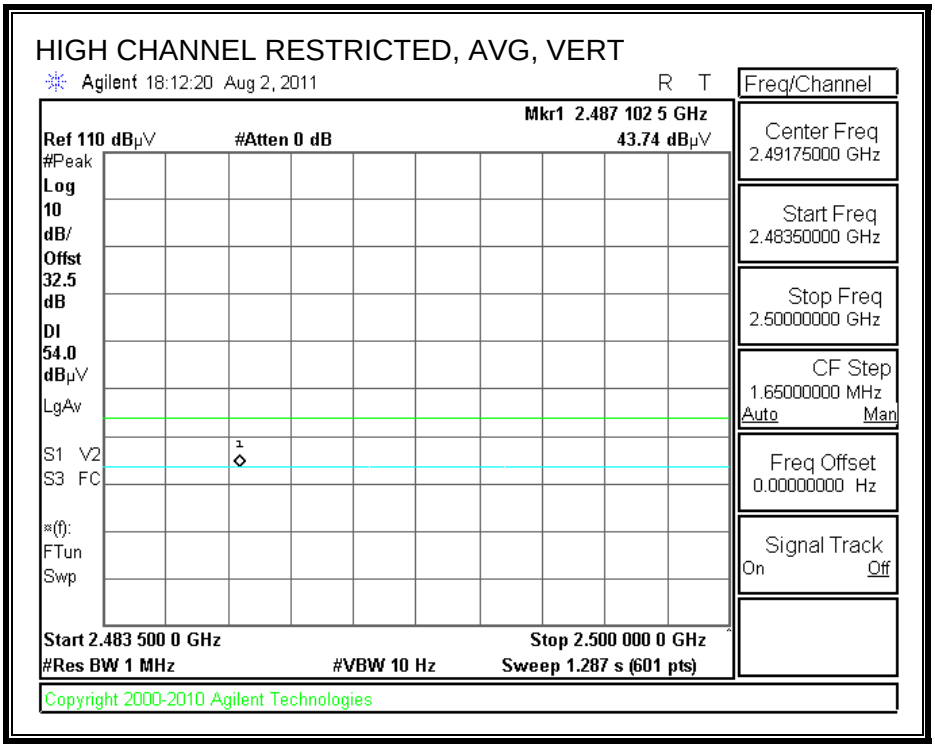
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 08-04-11
Project #: 11U13896
Company: Apple
Test Target: FCC 15.247
Mode Oper: TX, b mode
BOM Variant 1

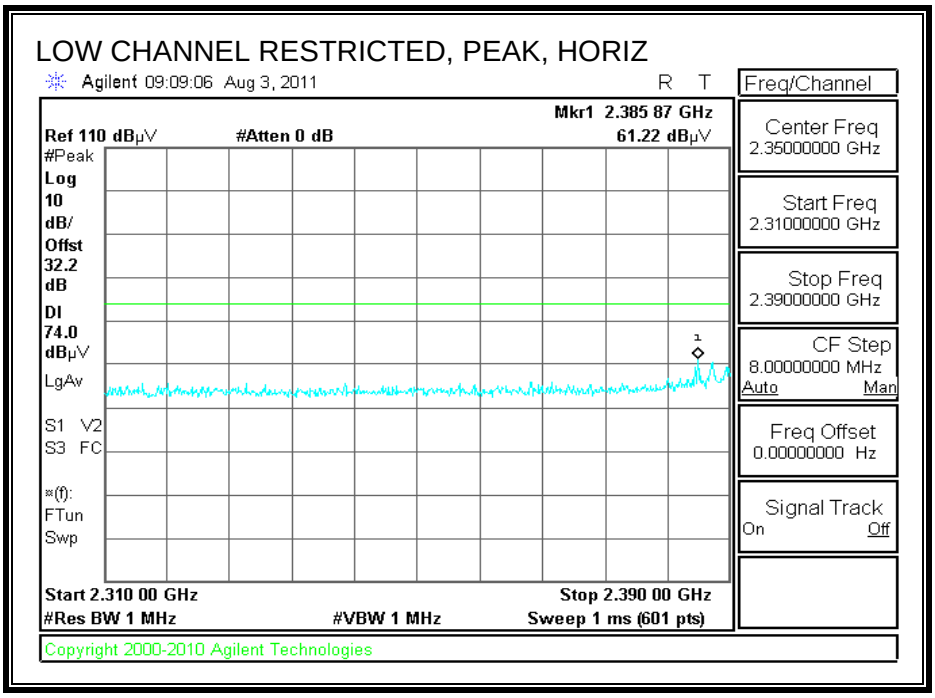
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

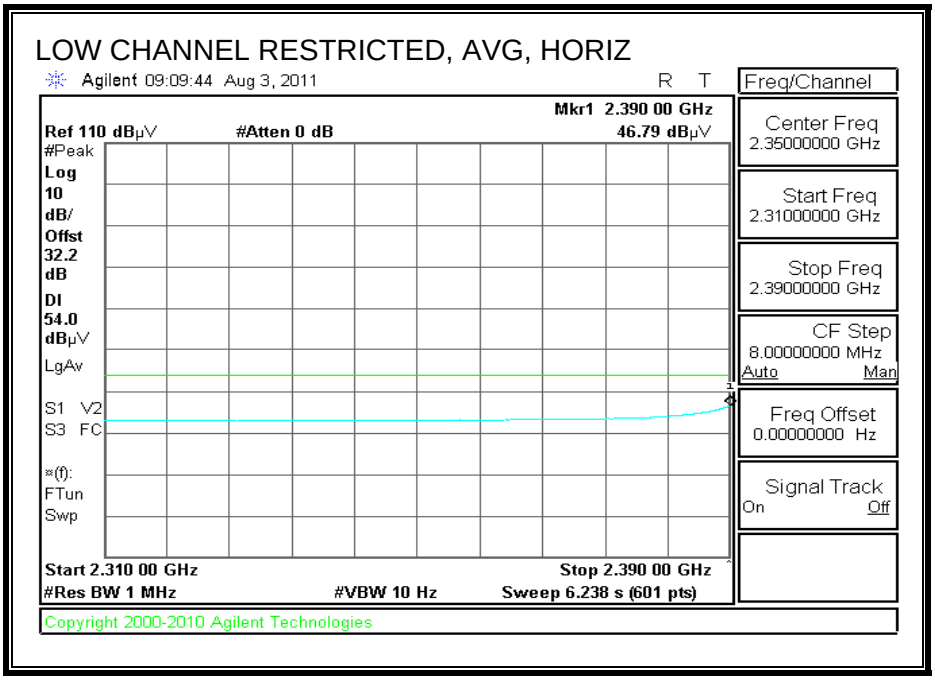
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2412MHz													
4.824	3.0	49.8	33.2	6.3	-34.8	0.0	0.0	54.4	74.0	-19.6	H	P	
4.824	3.0	47.6	33.2	6.3	-34.8	0.0	0.0	52.2	54.0	-1.8	H	A	
4.824	3.0	49.3	33.2	6.3	-34.8	0.0	0.0	53.9	74.0	-20.1	V	P	
4.824	3.0	47.3	33.2	6.3	-34.8	0.0	0.0	52.0	54.0	-2.0	V	A	
Mid Ch, 2437MHz													
4.874	3.0	49.2	33.2	6.3	-34.8	0.0	0.0	54.0	74.0	-20.0	V	P	
4.874	3.0	46.6	33.2	6.3	-34.8	0.0	0.0	51.4	54.0	-2.6	V	A	
7.311	3.0	37.3	36.2	8.5	-34.9	0.0	0.0	47.0	74.0	-27.0	V	P	
7.311	3.0	25.1	36.2	8.5	-34.9	0.0	0.0	34.9	54.0	-19.1	V	A	
4.874	3.0	49.9	33.2	6.3	-34.8	0.0	0.0	54.6	74.0	-19.4	H	P	
4.874	3.0	47.3	33.2	6.3	-34.8	0.0	0.0	52.0	54.0	-2.0	H	A	
7.311	3.0	37.0	36.2	8.5	-34.9	0.0	0.0	46.8	74.0	-27.2	H	P	
7.311	3.0	24.5	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	H	A	
High Ch, 2462MHz													
4.924	3.0	49.4	33.3	6.3	-34.8	0.0	0.0	54.2	74.0	-19.8	H	P	
4.924	3.0	46.9	33.3	6.3	-34.8	0.0	0.0	51.7	54.0	-2.3	H	A	
7.386	3.0	37.4	36.3	8.5	-34.9	0.0	0.0	47.3	74.0	-26.7	H	P	
7.386	3.0	24.8	36.3	8.5	-34.9	0.0	0.0	34.7	54.0	-19.3	H	A	
4.924	3.0	49.5	33.3	6.3	-34.8	0.0	0.0	54.3	74.0	-19.7	V	P	
4.924	3.0	47.2	33.3	6.3	-34.8	0.0	0.0	52.1	54.0	-1.9	V	A	
7.386	3.0	37.0	36.3	8.5	-34.9	0.0	0.0	46.9	74.0	-27.1	V	P	
7.386	3.0	24.8	36.3	8.5	-34.9	0.0	0.0	34.7	54.0	-19.3	V	A	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

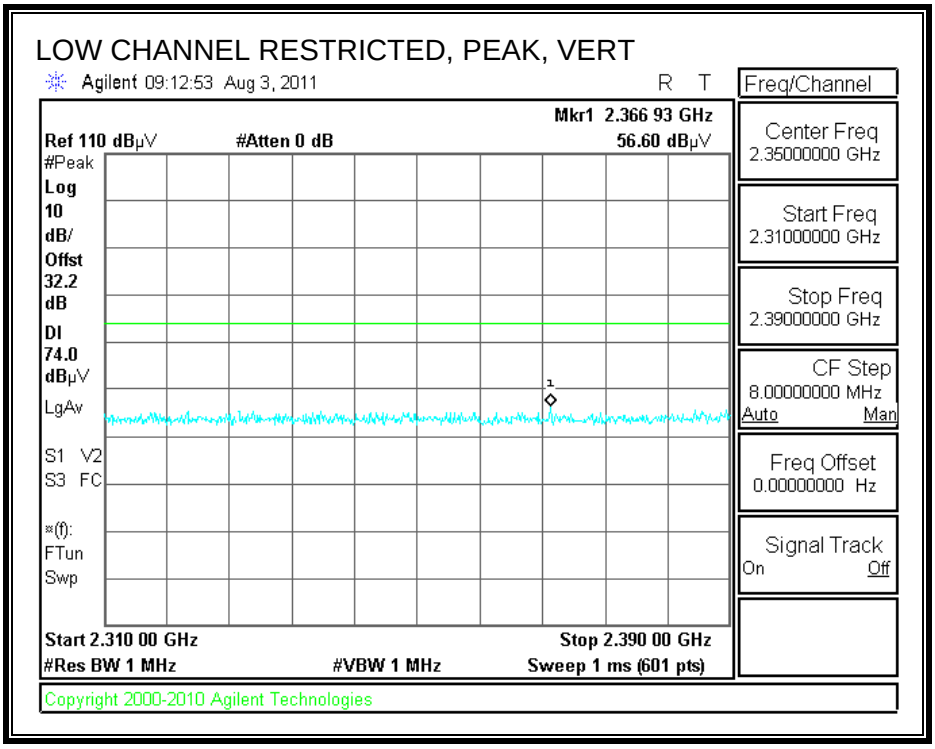
8.2.2. 802.11g MODE IN THE 2.4 GHz BAND

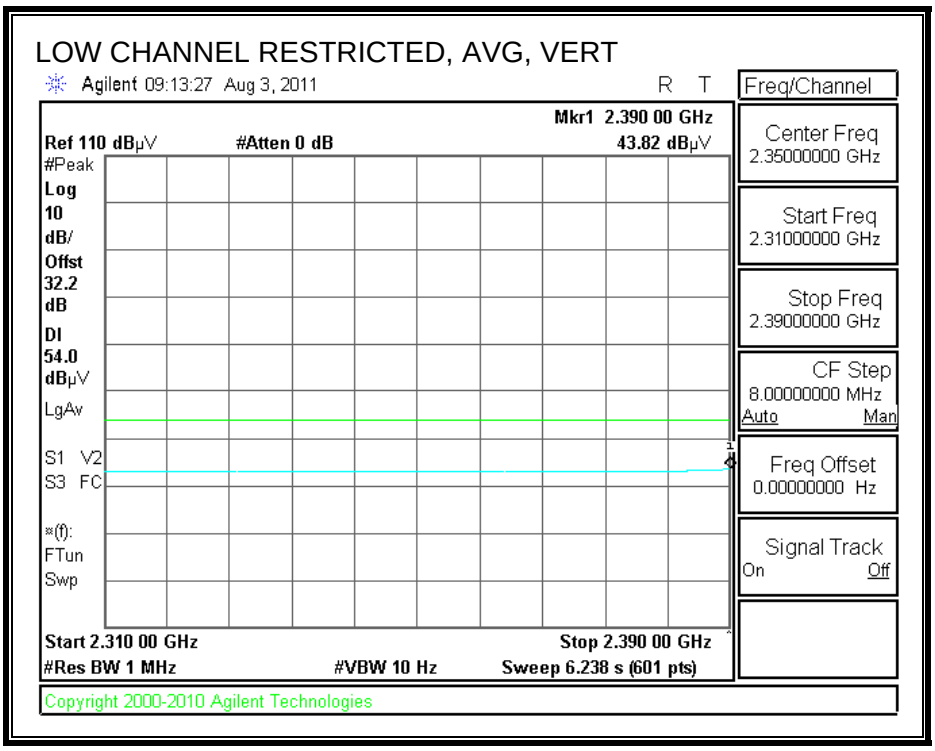
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



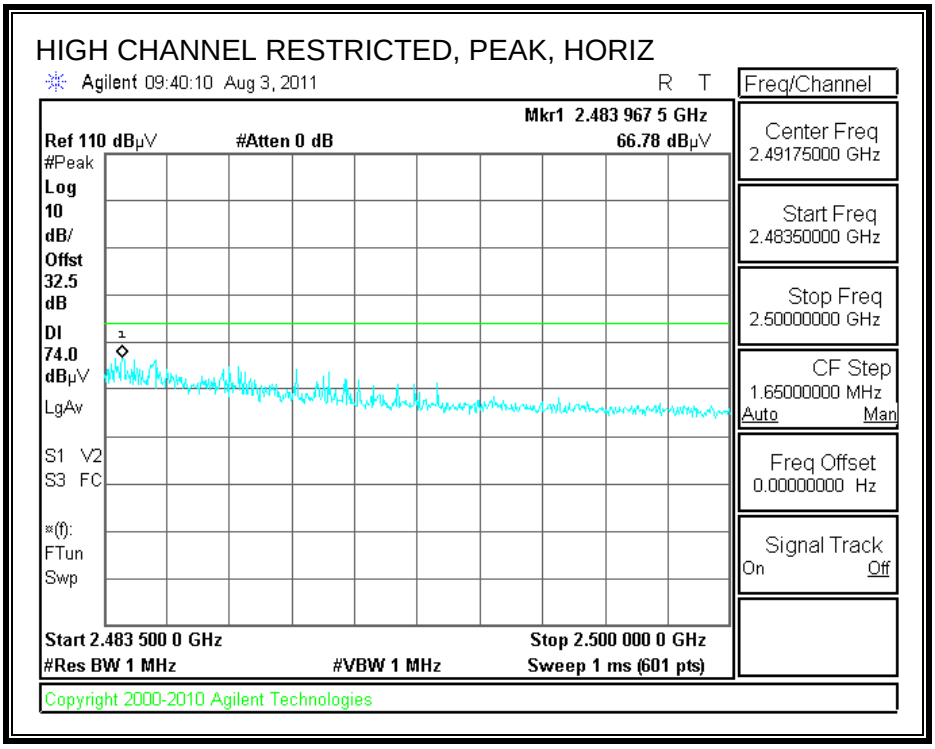


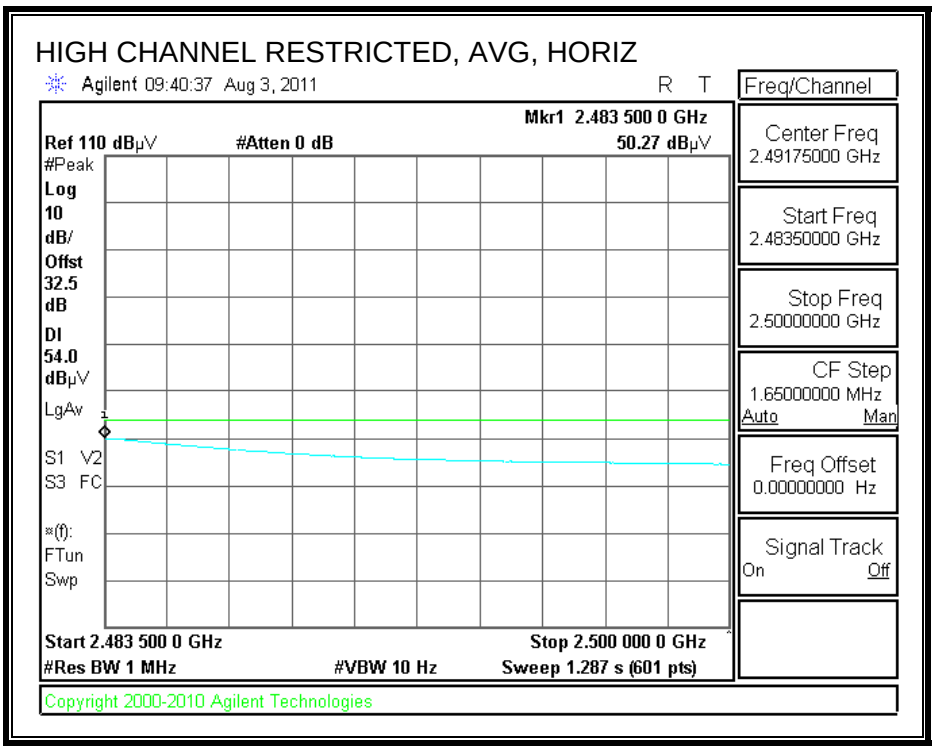
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



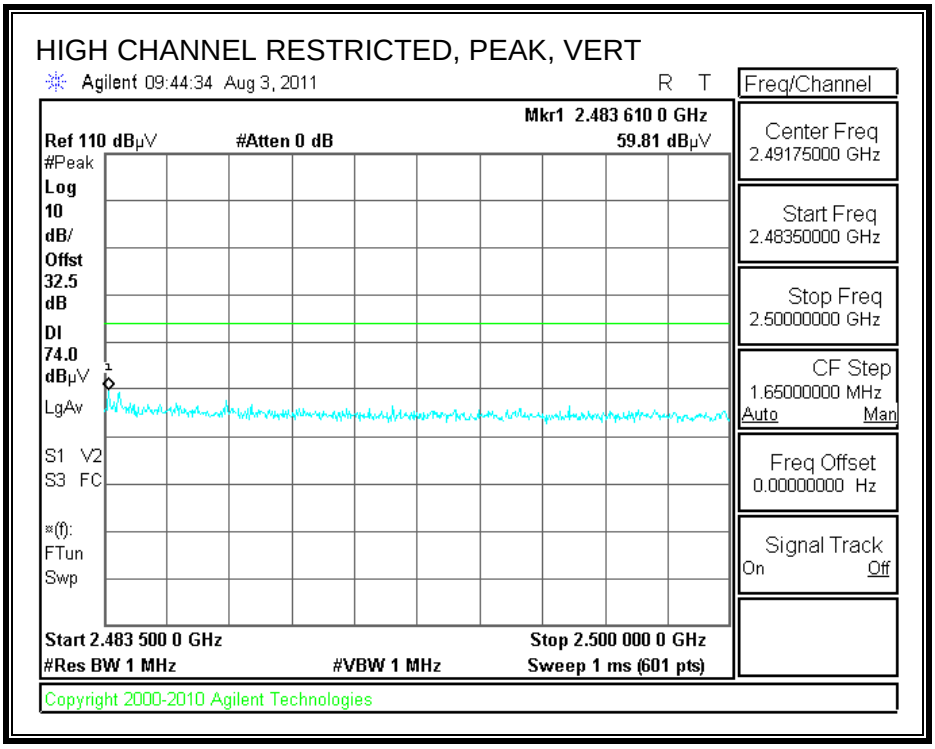


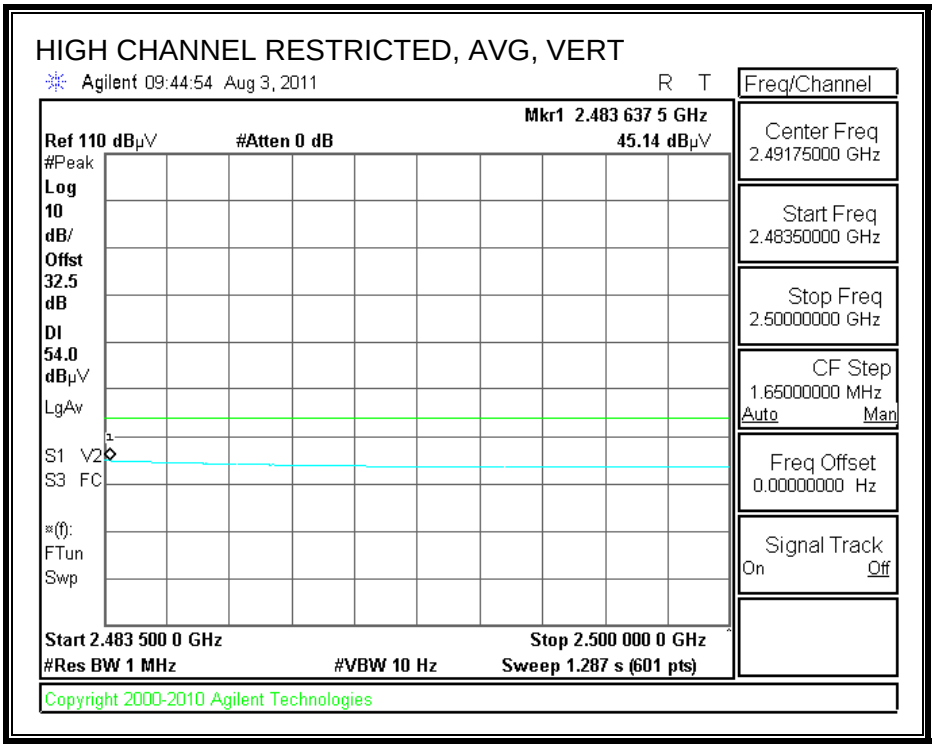
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

uency Measurement
on Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 08-04-11
Project #: 11U13896
Company: Apple
Test Target: FCC 15.247
Mode Oper: TX, g mode
BOM Variant 1

f	urement Frequency	Amp	reamp Gain
Dist	ance to Antenna	D Corr	Correct to 3 meters
Read	ualyzer Reading	Avg	ield Strength @ 3 m
AF	ntenna Factor	Peak	Peak Field Strength
CL	Cable Loss	HPF	h Pass Filter

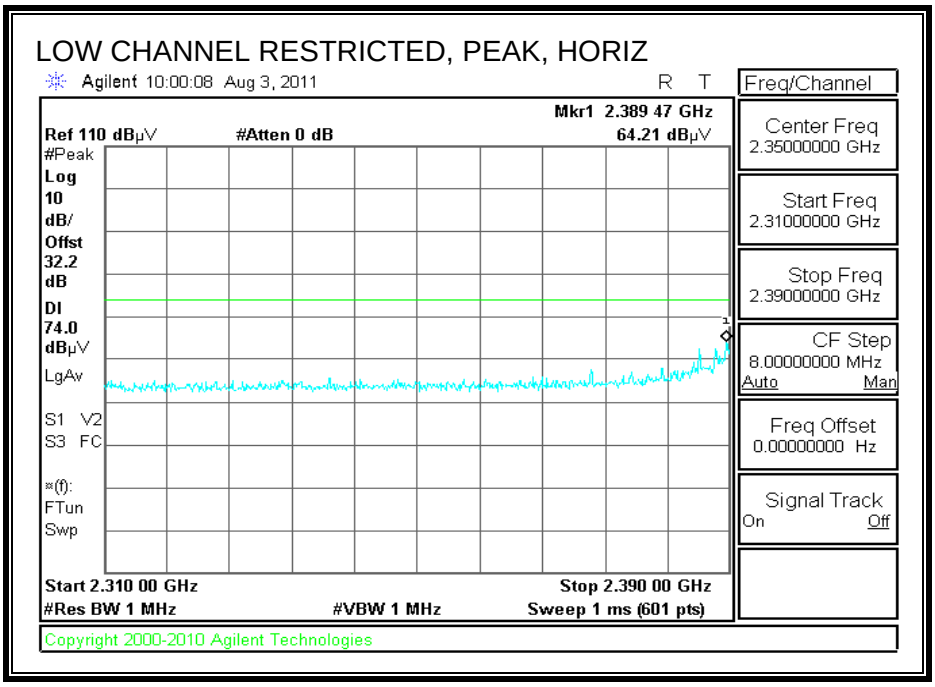
Average Field Strength Limit
Peak Field Strength Limit
Margin vs. Average Limit
Margin vs. Peak Limit

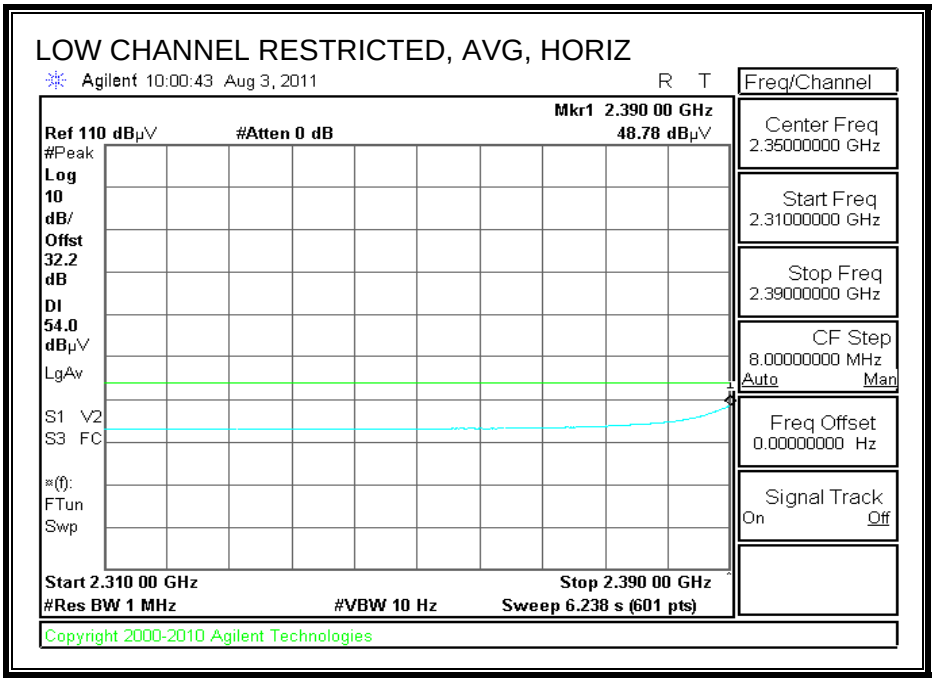
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Ch, 2412MHz													
4.824	3.0	45.5	33.2	6.3	-34.8	0.0	0.0	50.1	74.0	-23.9	V	P	
4.824	3.0	31.8	33.2	6.3	-34.8	0.0	0.0	36.4	54.0	-17.6	V	A	
4.824	3.0	47.9	33.2	6.3	-34.8	0.0	0.0	52.6	74.0	-21.4	H	P	
4.824	3.0	34.0	33.2	6.3	-34.8	0.0	0.0	38.7	54.0	-15.3	H	A	
Ch, 2437MHz													
4.874	3.0	46.7	33.2	6.3	-34.8	0.0	0.0	51.4	74.0	-22.6	V	P	
4.874	3.0	33.3	33.2	6.3	-34.8	0.0	0.0	38.0	54.0	-16.0	V	A	
7.311	3.0	38.2	36.2	8.5	-34.9	0.0	0.0	48.0	74.0	-26.0	V	P	
7.311	3.0	25.0	36.2	8.5	-34.9	0.0	0.0	34.8	54.0	-19.2	V	A	
4.874	3.0	47.7	33.2	6.3	-34.8	0.0	0.0	52.5	74.0	-21.5	H	P	
4.874	3.0	34.8	33.2	6.3	-34.8	0.0	0.0	39.5	54.0	-14.5	H	A	
7.311	3.0	38.0	36.2	8.5	-34.9	0.0	0.0	47.8	74.0	-26.2	H	P	
7.311	3.0	24.6	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	H	A	
Ch, 2462MHz													
4.924	3.0	42.4	33.3	6.3	-34.8	0.0	0.0	47.2	74.0	-26.8	V	P	
4.924	3.0	30.0	33.3	6.3	-34.8	0.0	0.0	34.8	54.0	-19.2	V	A	
7.386	3.0	37.7	36.3	8.5	-34.9	0.0	0.0	47.5	74.0	-26.5	V	P	
7.386	3.0	25.1	36.3	8.5	-34.9	0.0	0.0	35.0	54.0	-19.0	V	A	
4.924	3.0	42.4	33.3	6.3	-34.8	0.0	0.0	47.2	74.0	-26.8	H	P	
4.924	3.0	29.8	33.3	6.3	-34.8	0.0	0.0	34.6	54.0	-19.4	H	A	
7.386	3.0	37.3	36.3	8.5	-34.9	0.0	0.0	47.2	74.0	-26.8	H	P	
7.386	3.0	25.0	36.3	8.5	-34.9	0.0	0.0	34.9	54.0	-19.1	H	A	

Rev. 4.1.2.7
re detected above the system noise floor.

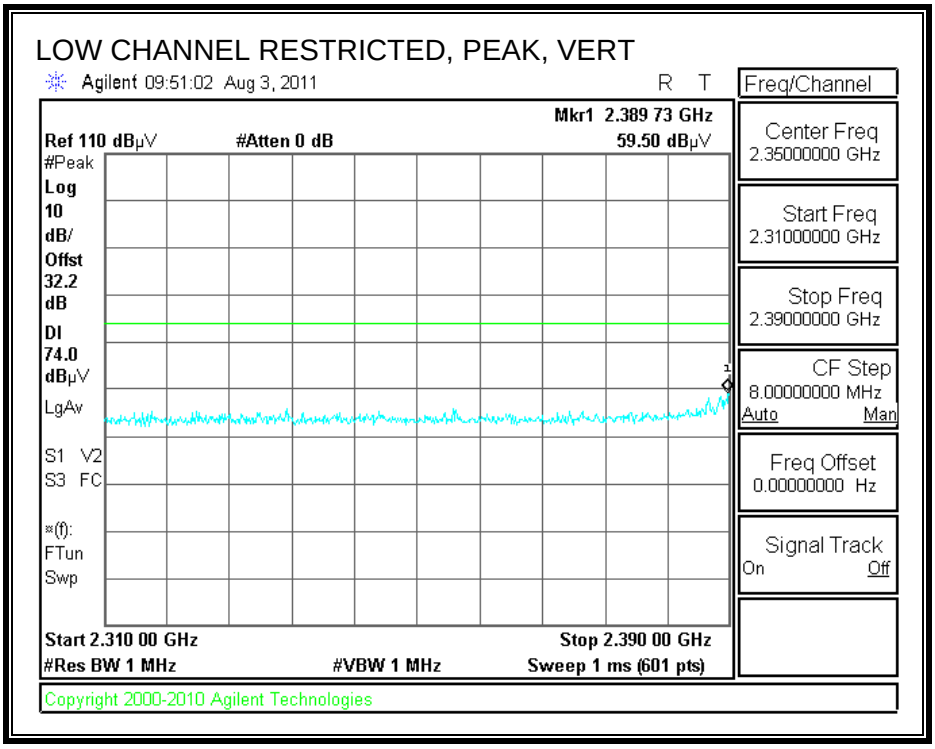
8.2.3. 802.11n MODE IN THE 2.4 GHz BAND

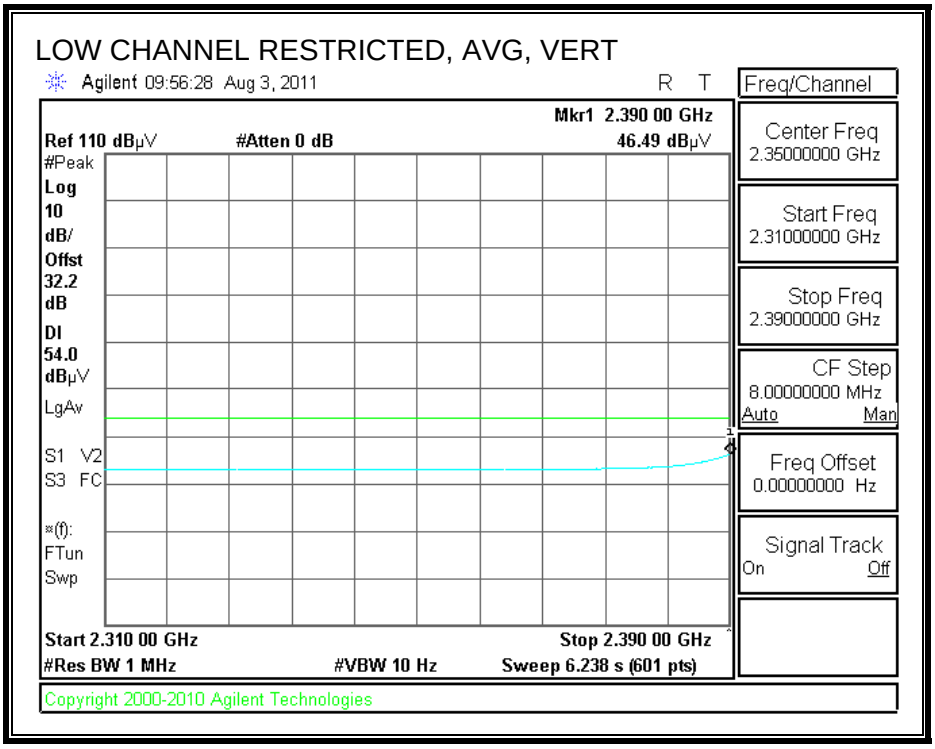
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



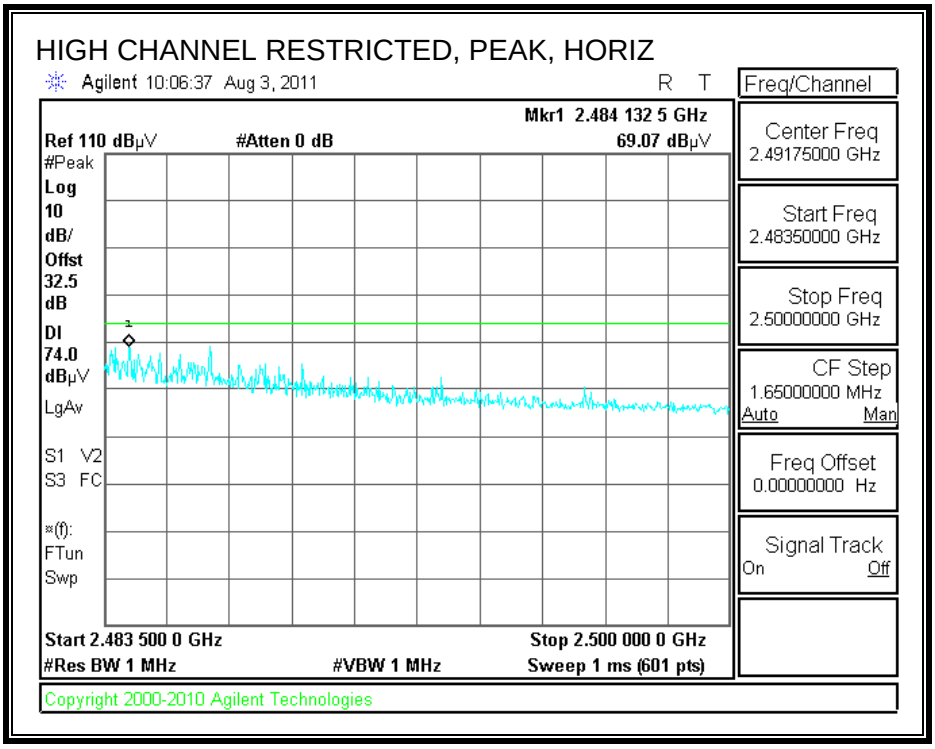


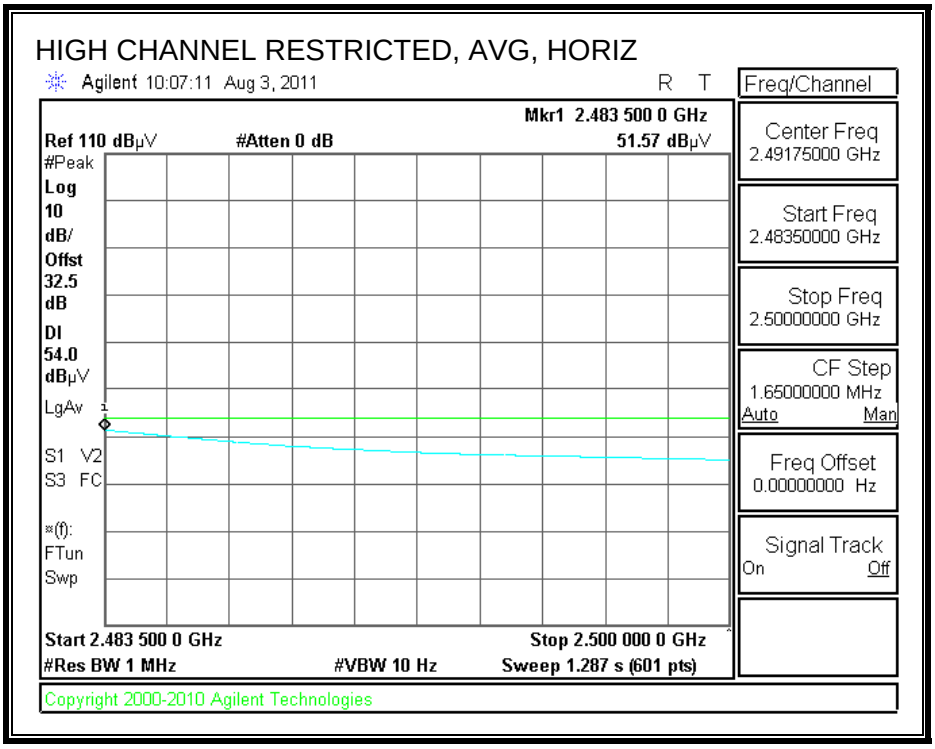
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



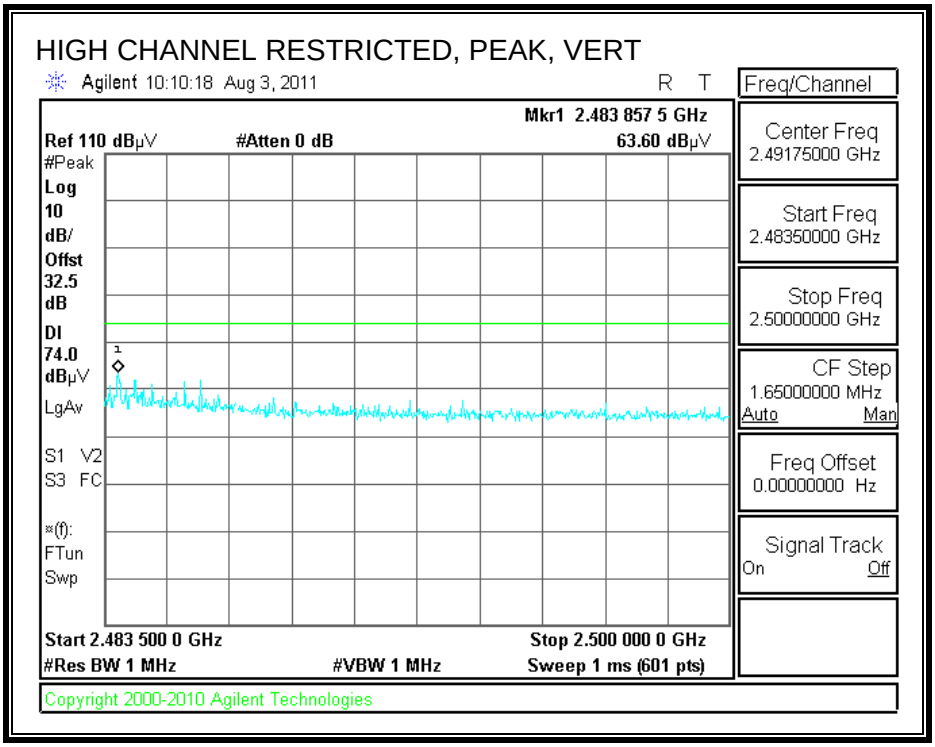


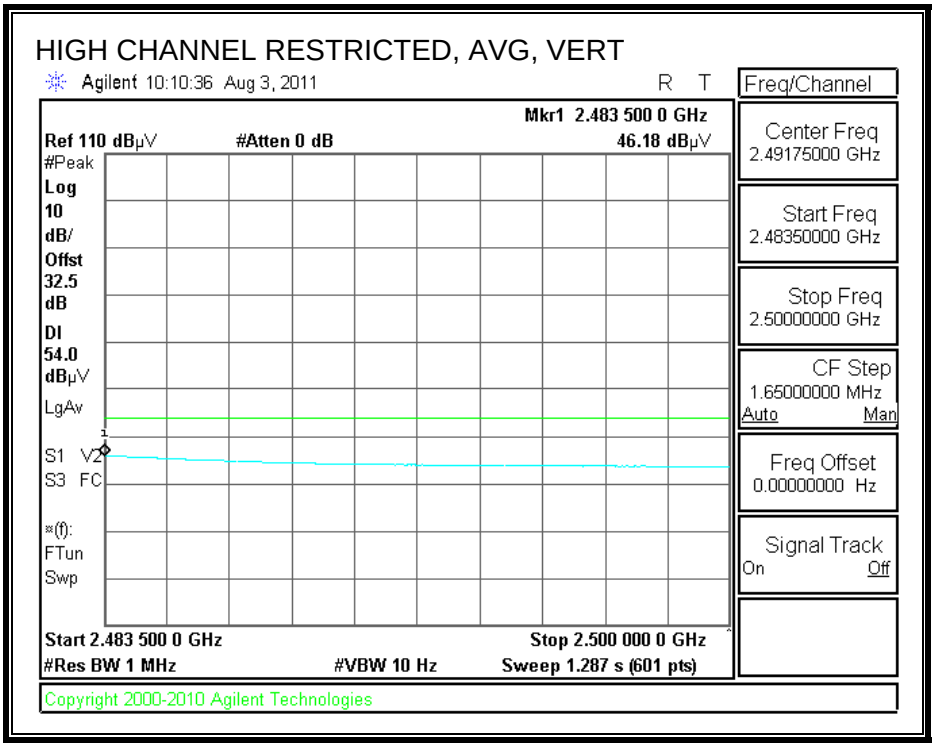
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 08-03-11
Project #: 11U13896
Company: Apple
Test Target: FCC 15.247
Mode Oper: TX, 802.11n
BOM Variant 1

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		

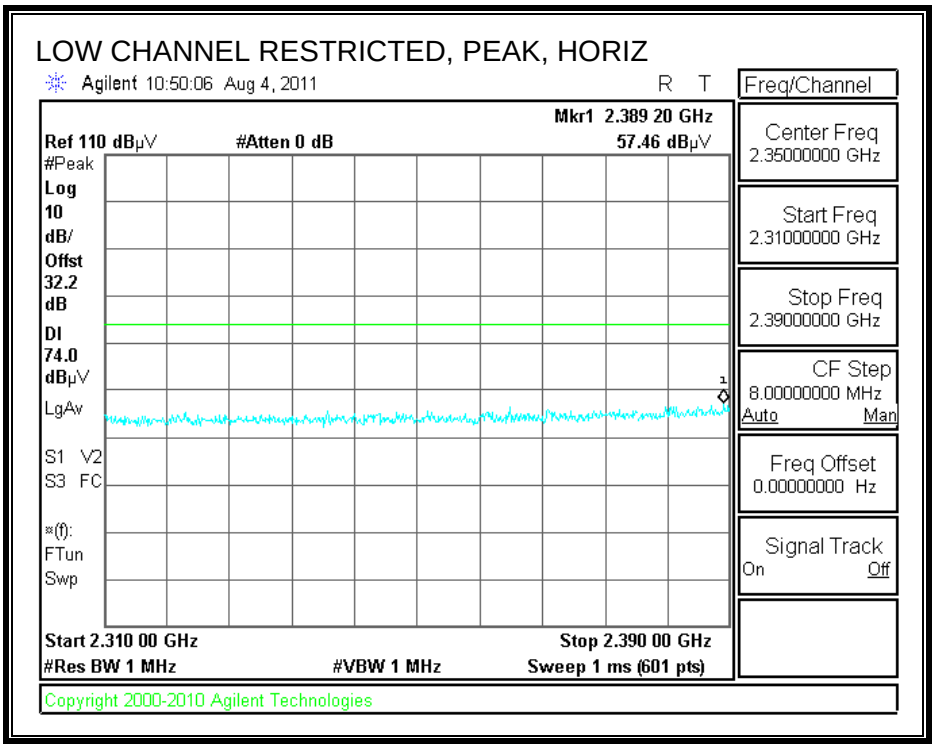
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2412MHz													
4.824	3.0	38.8	33.2	6.3	-34.8	0.0	0.0	43.5	74.0	-30.5	V	P	
4.824	3.0	26.3	33.2	6.3	-34.8	0.0	0.0	30.9	54.0	-23.1	V	A	
4.824	3.0	39.3	33.2	6.3	-34.8	0.0	0.0	44.0	74.0	-30.0	H	P	
4.824	3.0	26.7	33.2	6.3	-34.8	0.0	0.0	31.3	54.0	-22.7	H	A	
Mid Ch, 2437MHz													
4.874	3.0	47.0	33.2	6.3	-34.8	0.0	0.0	51.7	74.0	-22.3	V	P	
4.874	3.0	33.3	33.2	6.3	-34.8	0.0	0.0	38.0	54.0	-16.0	V	A	
7.311	3.0	44.7	36.2	8.5	-34.9	0.0	0.0	54.4	74.0	-19.6	V	P	
7.311	3.0	33.3	36.2	8.5	-34.9	0.0	0.0	43.0	54.0	-11.0	V	A	
4.874	3.0	48.6	33.2	6.3	-34.8	0.0	0.0	53.3	74.0	-20.7	H	P	
4.874	3.0	35.1	33.2	6.3	-34.8	0.0	0.0	39.8	54.0	-14.2	H	A	
7.311	3.0	39.7	36.2	8.5	-34.9	0.0	0.0	49.5	74.0	-24.5	H	P	
7.311	3.0	29.2	36.2	8.5	-34.9	0.0	0.0	39.0	54.0	-15.0	H	A	
High Ch, 2462MHz													
4.924	3.0	41.4	33.3	6.3	-34.8	0.0	0.0	46.2	74.0	-27.8	V	P	
4.924	3.0	28.7	33.3	6.3	-34.8	0.0	0.0	33.5	54.0	-20.5	V	A	
7.386	3.0	37.6	36.3	8.5	-34.9	0.0	0.0	47.5	74.0	-26.5	V	P	
7.386	3.0	24.7	36.3	8.5	-34.9	0.0	0.0	34.6	54.0	-19.4	V	A	
4.924	3.0	38.1	33.3	6.3	-34.8	0.0	0.0	42.9	74.0	-31.1	H	P	
4.924	3.0	25.5	33.3	6.3	-34.8	0.0	0.0	30.4	54.0	-23.7	H	A	
7.386	3.0	37.5	36.3	8.5	-34.9	0.0	0.0	47.4	74.0	-26.6	H	P	
7.386	3.0	24.6	36.3	8.5	-34.9	0.0	0.0	34.5	54.0	-19.5	H	A	

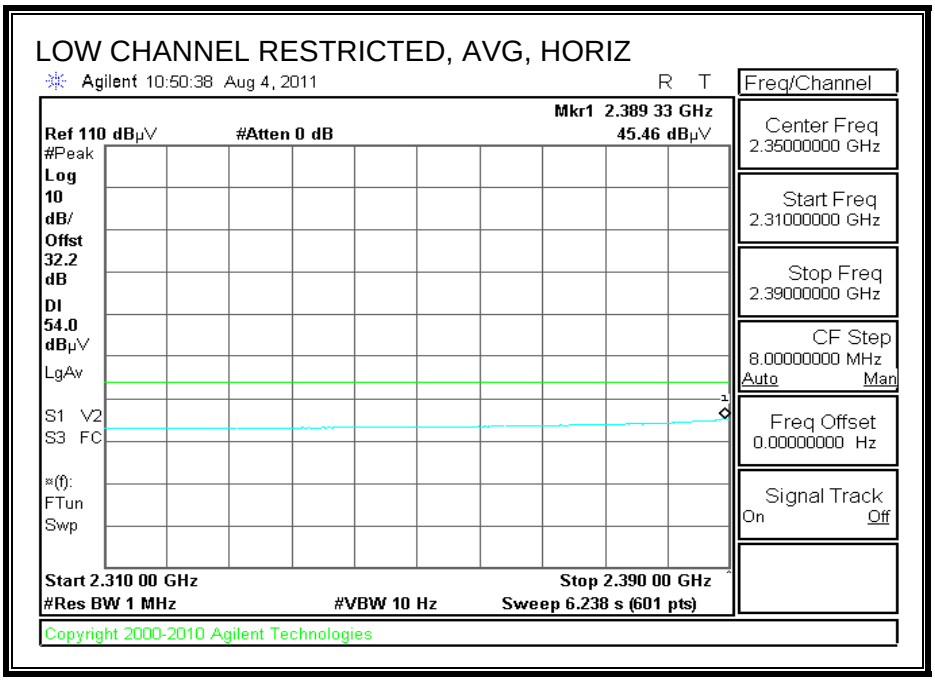
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

BOM VARIANT 2

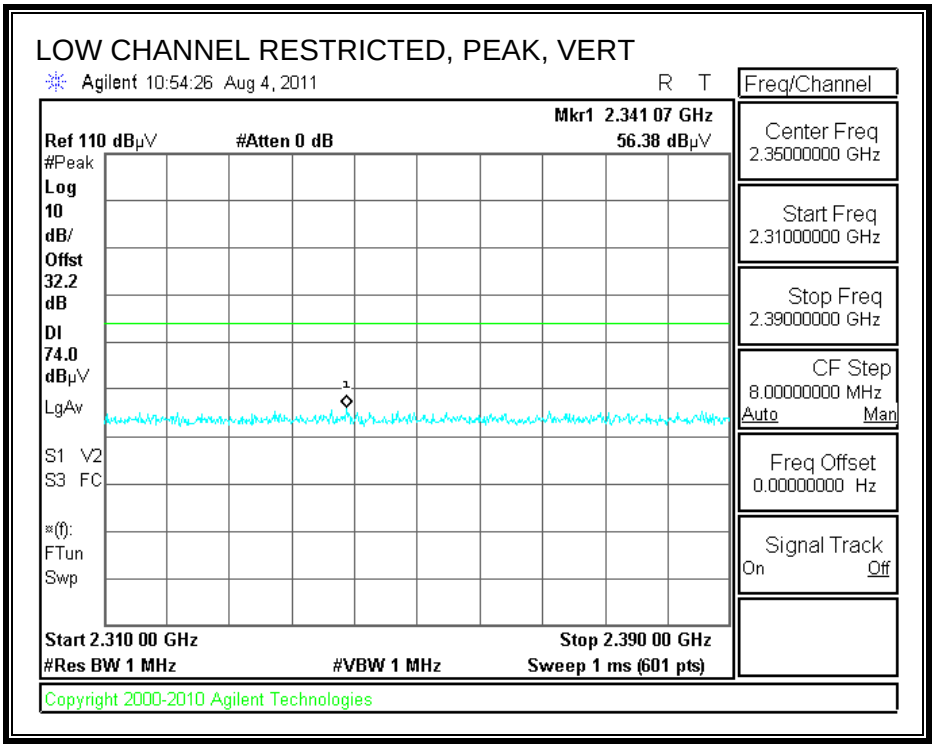
8.2.4. 802.11b MODE IN THE 2.4 GHz BAND

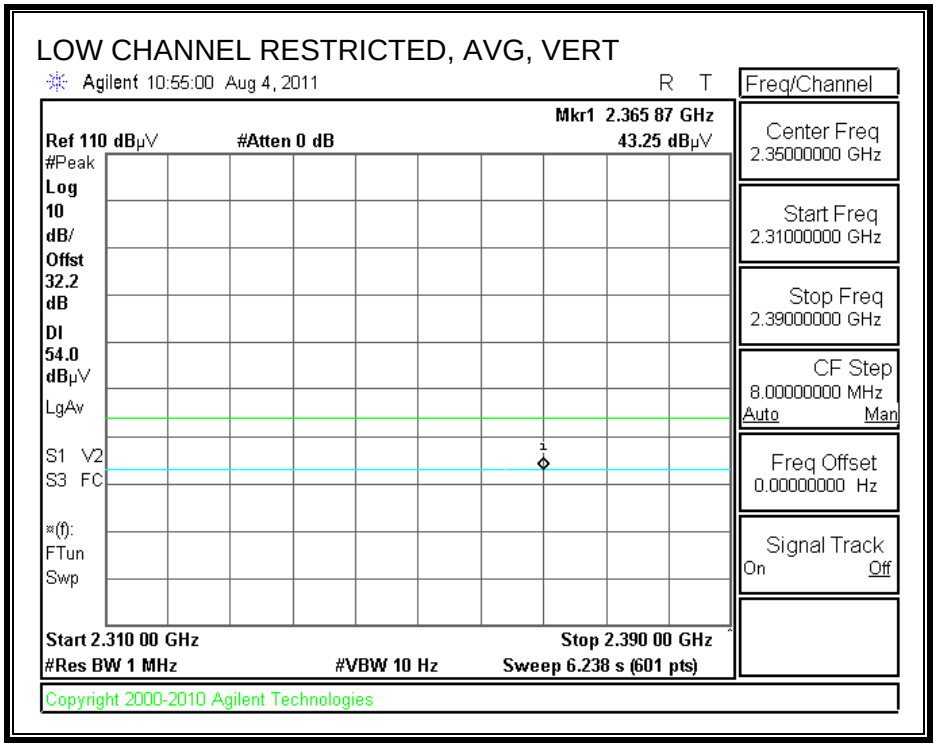
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



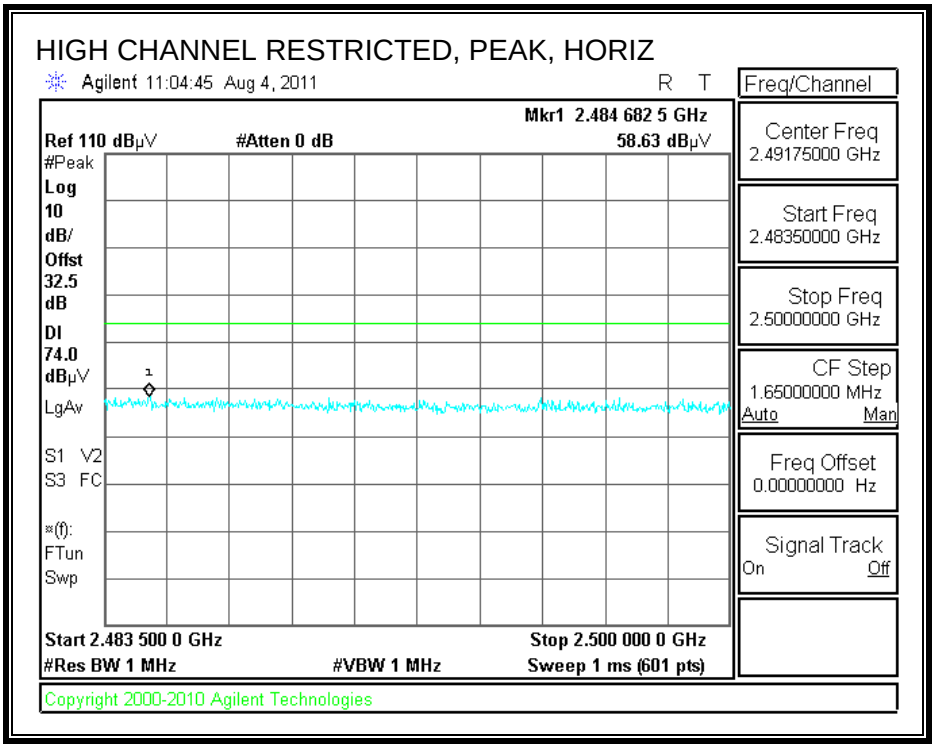


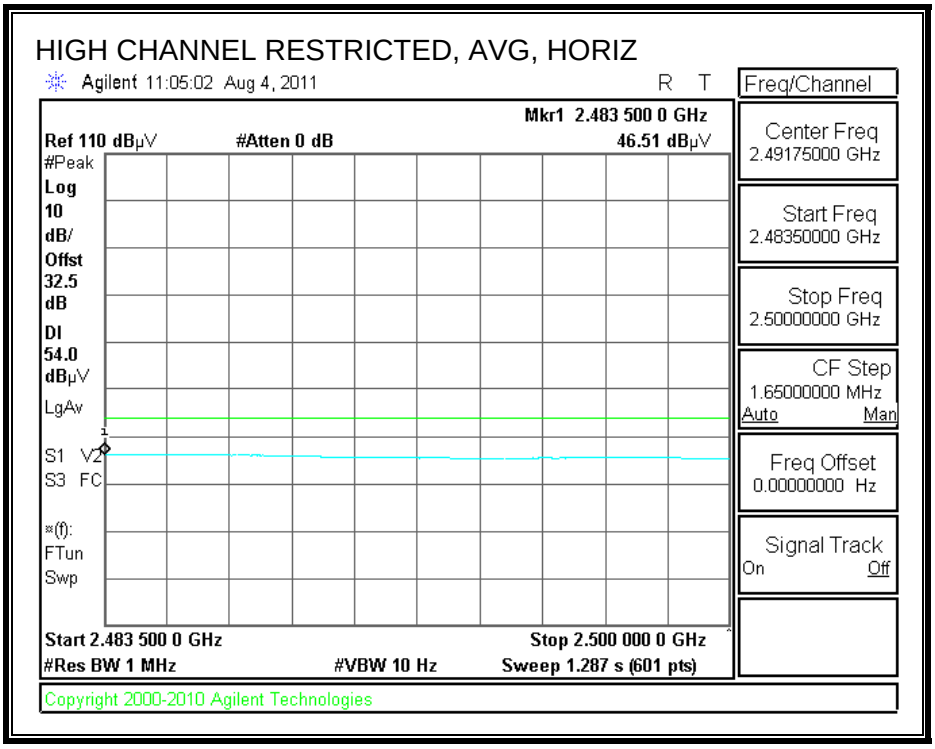
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



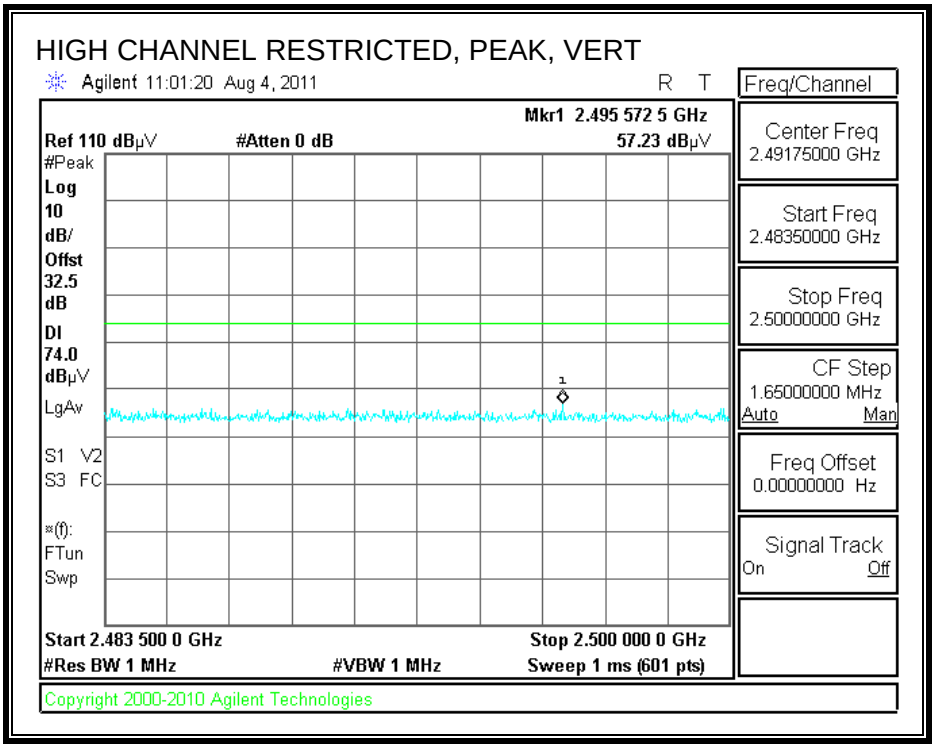


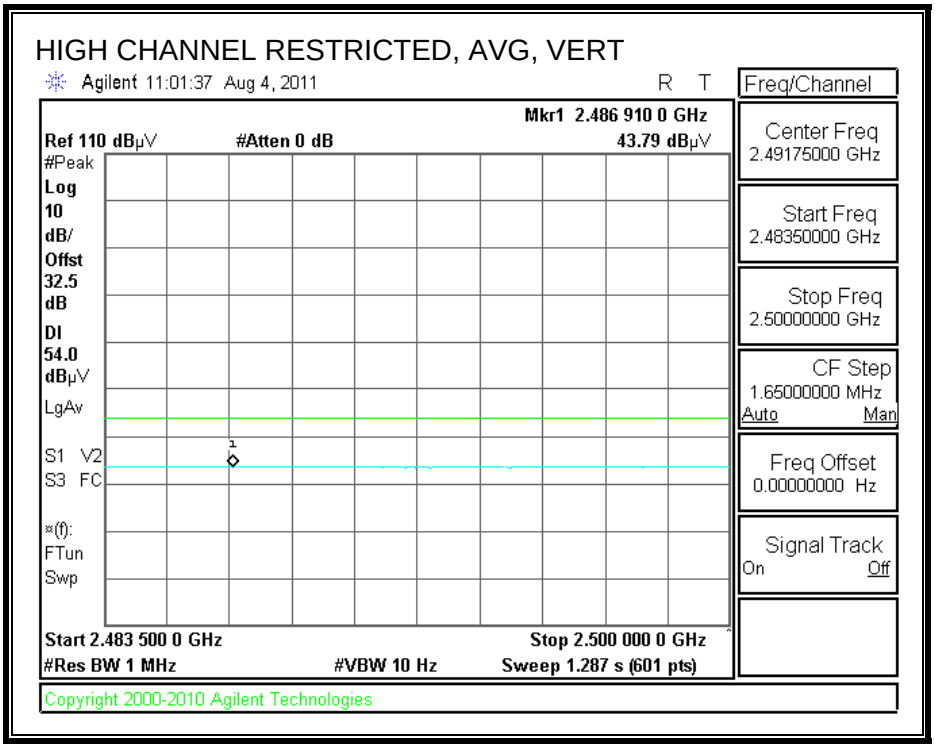
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 08-04-11
Project #: 11U13896
Company: Apple
Test Target: FCC 15.247
Mode Oper: b mode, TX, Har

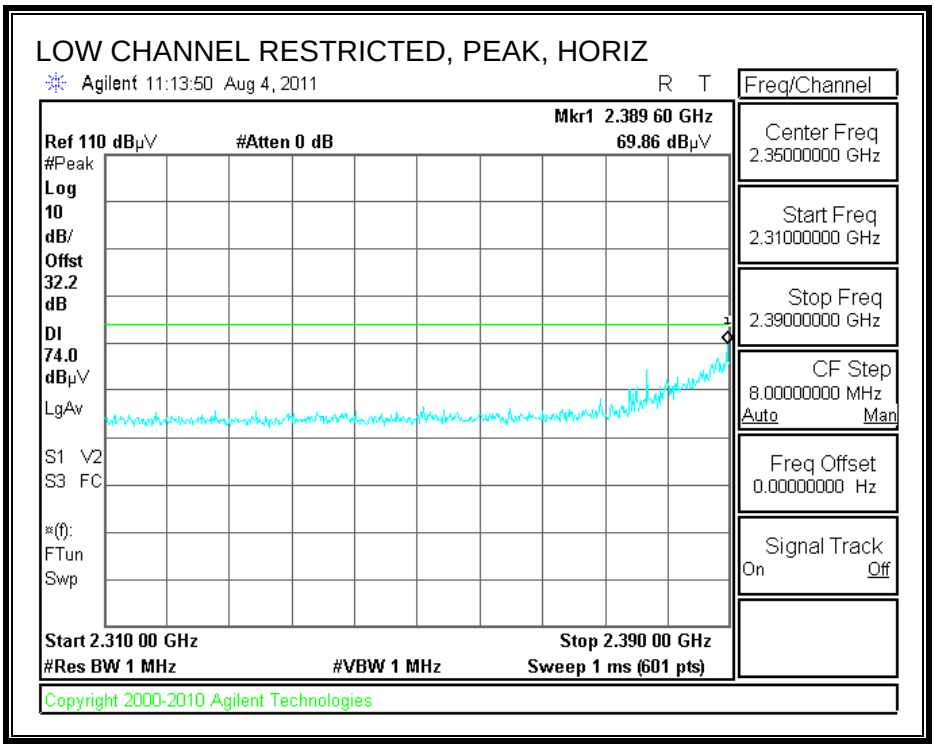
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

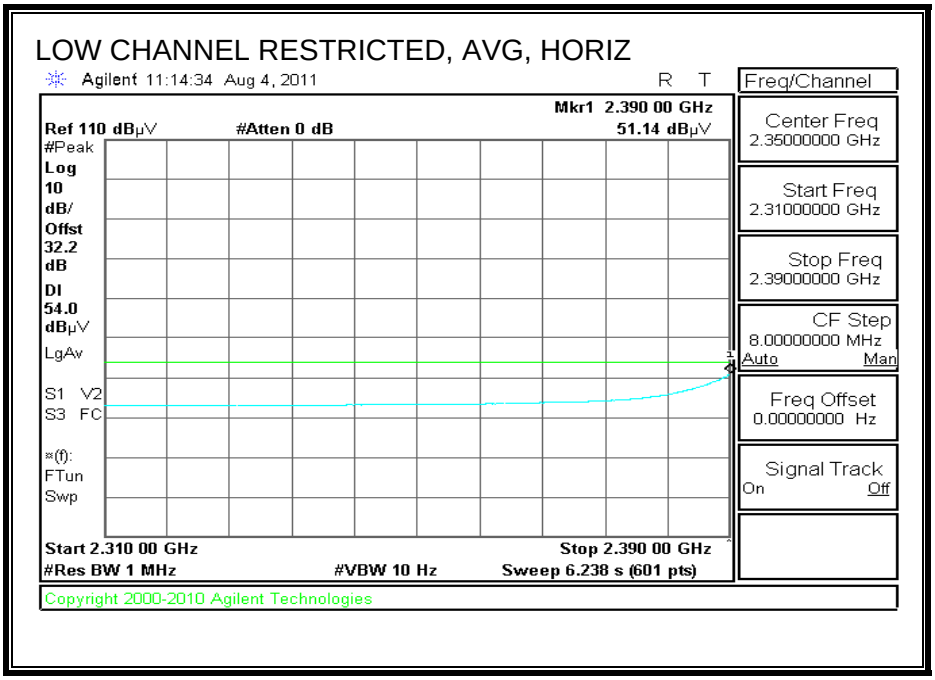
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2412MHz													
4.824	3.0	38.6	33.2	6.3	-34.8	0.0	0.0	43.2	74.0	-30.8	H	P	
4.824	3.0	26.5	33.2	6.3	-34.8	0.0	0.0	31.1	54.0	-22.9	H	A	
4.824	3.0	37.8	33.2	6.3	-34.8	0.0	0.0	42.4	74.0	-31.6	V	P	
4.824	3.0	27.4	33.2	6.3	-34.8	0.0	0.0	32.0	54.0	-22.0	V	A	
Mid Ch, 2437MHz													
4.874	3.0	38.0	33.2	6.3	-34.8	0.0	0.0	42.7	74.0	-31.3	H	P	
4.874	3.0	26.0	33.2	6.3	-34.8	0.0	0.0	30.8	54.0	-23.2	H	A	
7.311	3.0	37.3	36.2	8.5	-34.9	0.0	0.0	47.0	74.0	-27.0	H	P	
7.311	3.0	24.7	36.2	8.5	-34.9	0.0	0.0	34.4	54.0	-19.6	H	A	
4.874	3.0	37.8	33.2	6.3	-34.8	0.0	0.0	42.5	74.0	-31.5	V	P	
4.874	3.0	26.7	33.2	6.3	-34.8	0.0	0.0	31.4	54.0	-22.6	V	A	
7.311	3.0	36.7	36.2	8.5	-34.9	0.0	0.0	46.4	74.0	-27.6	V	P	
7.311	3.0	24.6	36.2	8.5	-34.9	0.0	0.0	34.4	54.0	-19.6	V	A	
High Ch, 2462MHz													
4.924	3.0	37.7	33.3	6.3	-34.8	0.0	0.0	42.5	74.0	-31.5	H	P	
4.924	3.0	25.3	33.3	6.3	-34.8	0.0	0.0	30.2	54.0	-23.8	H	A	
7.386	3.0	36.9	36.3	8.5	-34.9	0.0	0.0	46.8	74.0	-27.2	H	P	
7.386	3.0	24.4	36.3	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	H	A	
4.924	3.0	38.2	33.3	6.3	-34.8	0.0	0.0	43.0	74.0	-31.0	V	P	
4.924	3.0	27.8	33.3	6.3	-34.8	0.0	0.0	32.6	54.0	-21.4	V	A	
7.386	3.0	36.7	36.3	8.5	-34.9	0.0	0.0	46.6	74.0	-27.4	V	P	
7.386	3.0	24.5	36.3	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	V	A	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

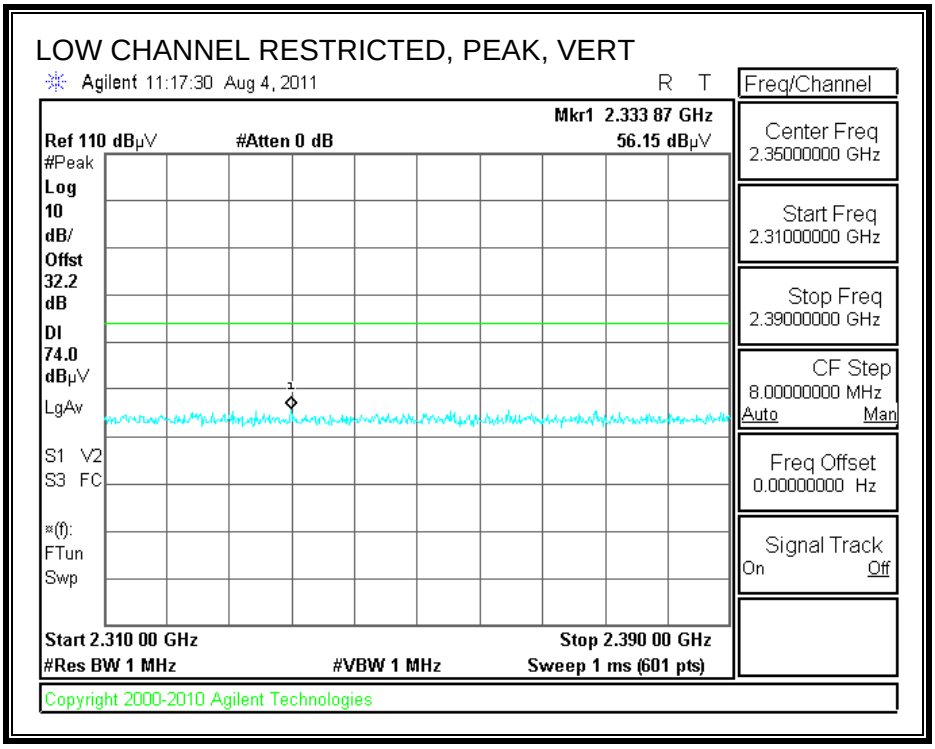
8.2.5. 802.11g MODE IN THE 2.4 GHz BAND

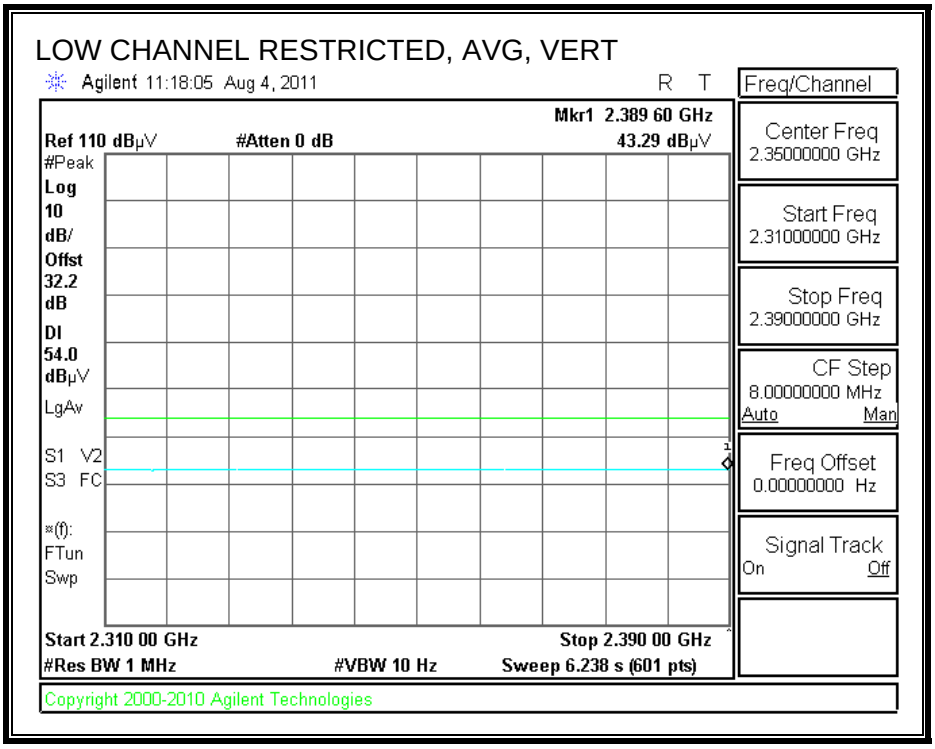
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



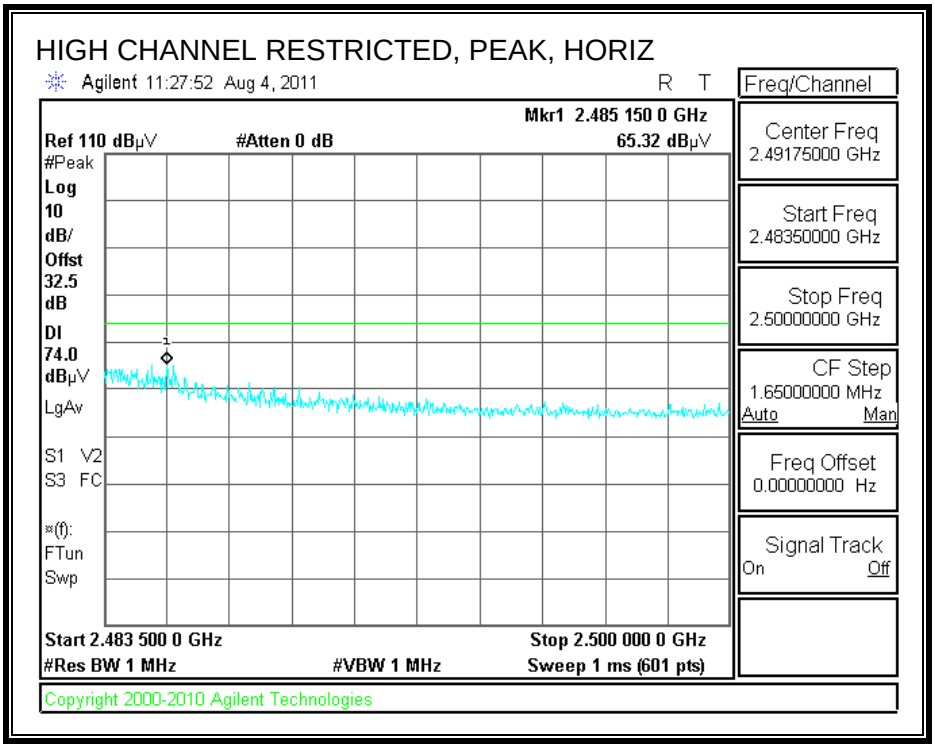


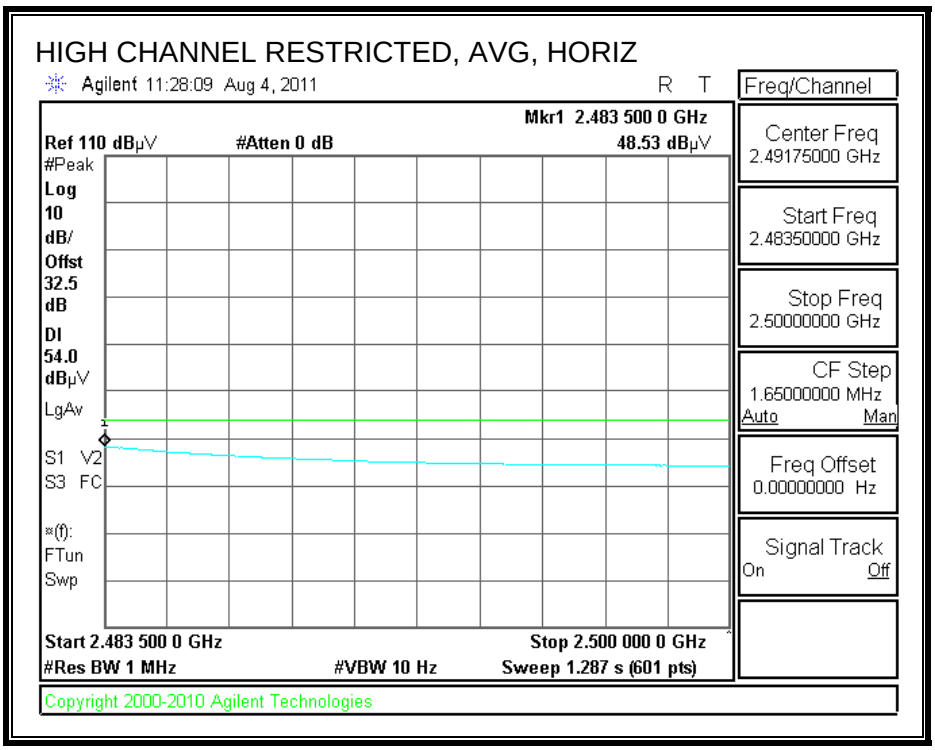
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



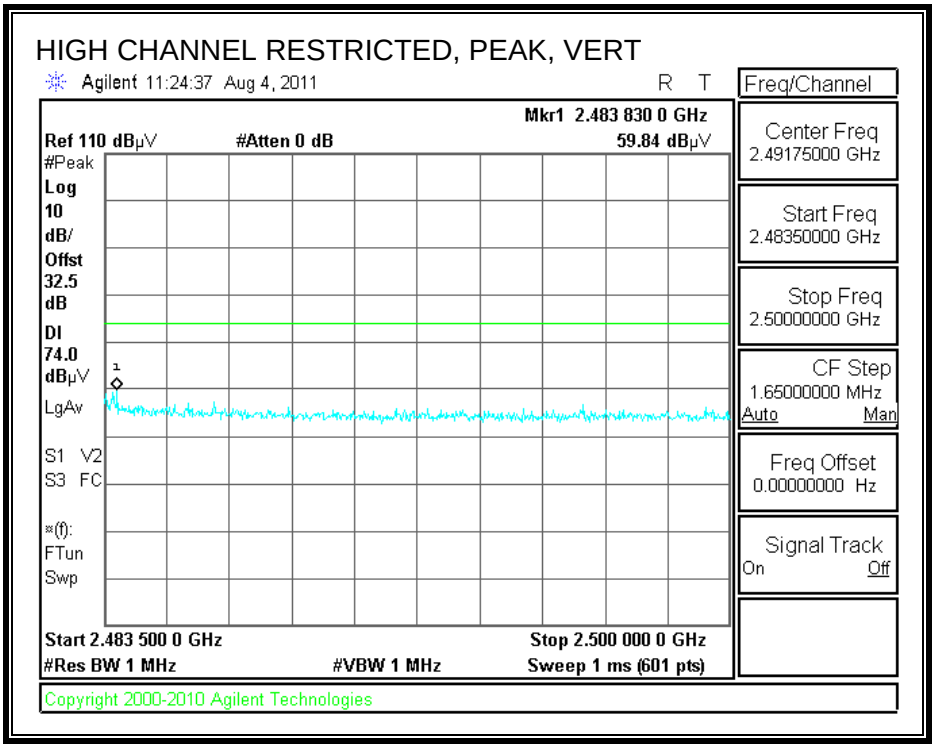


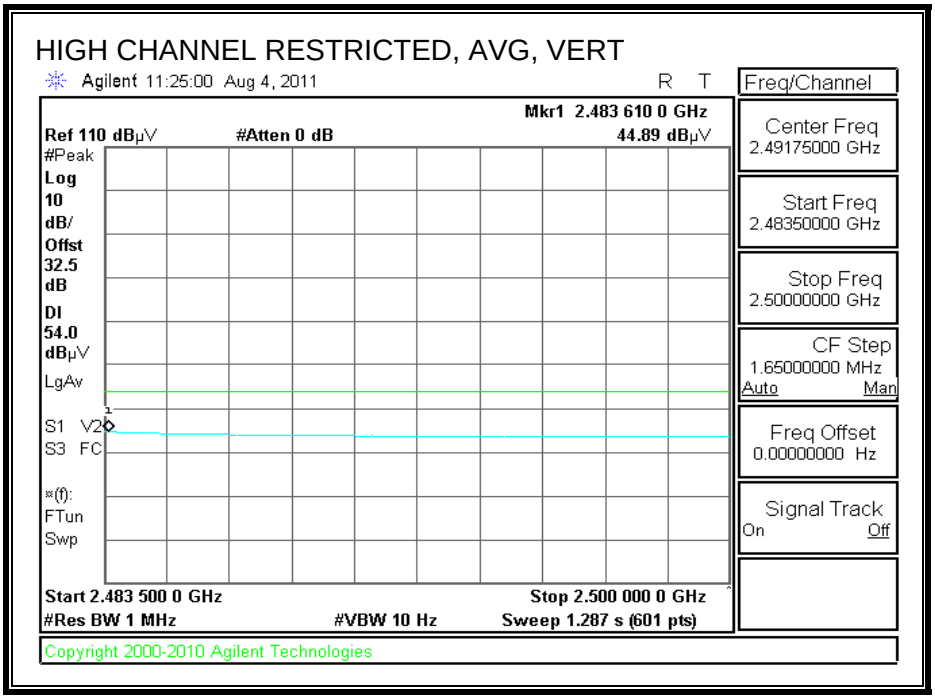
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 08-04-11
Project #: 11U13896
Company: Apple
Test Target: FCC 15.247
Mode Oper: TX, g mode
BOM Variant 2

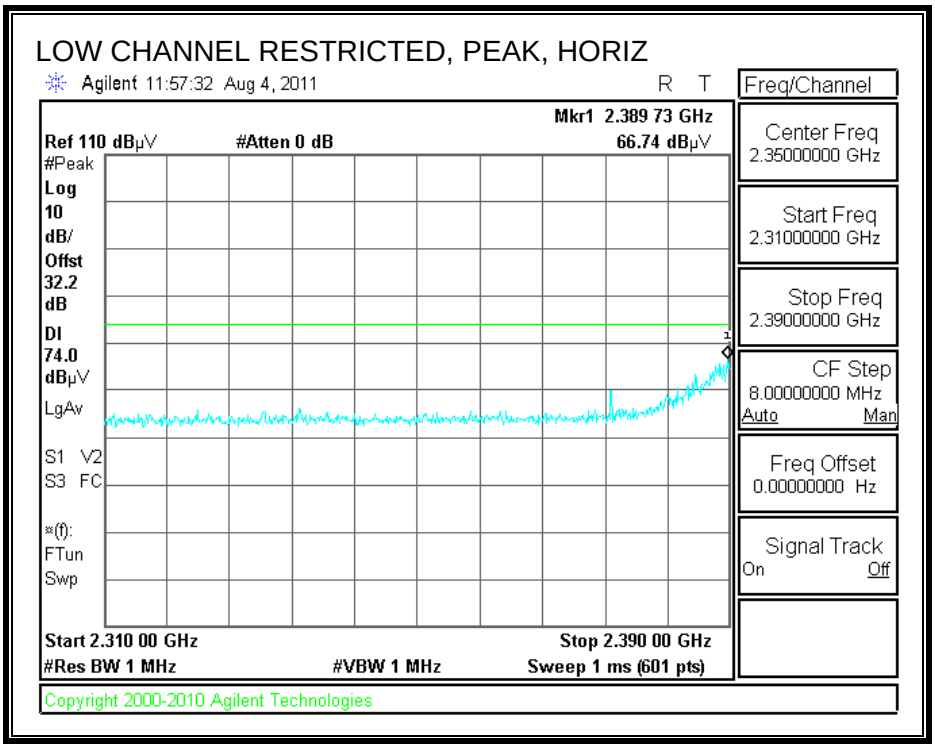
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

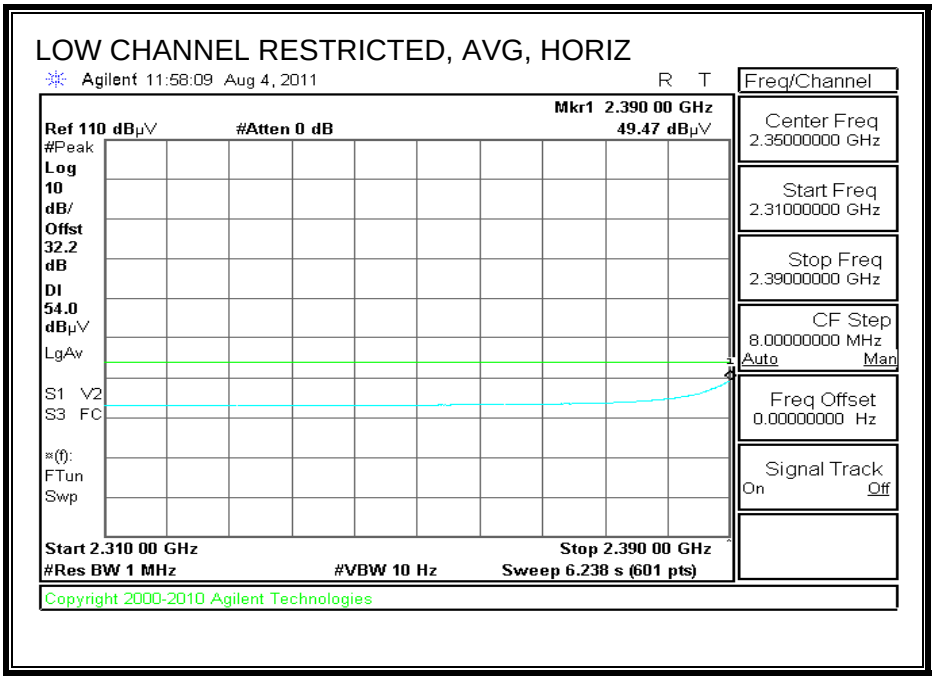
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2412MHz													
4.824	3.0	38.1	33.2	6.3	-34.8	0.0	0.0	42.7	74.0	-31.3	V	P	
4.824	3.0	25.6	33.2	6.3	-34.8	0.0	0.0	30.2	54.0	-23.8	V	A	
4.824	3.0	37.9	33.2	6.3	-34.8	0.0	0.0	42.5	74.0	-31.5	H	P	
4.824	3.0	25.5	33.2	6.3	-34.8	0.0	0.0	30.2	54.0	-23.8	H	A	
Mid Ch, 2437MHz													
4.874	3.0	37.6	33.2	6.3	-34.8	0.0	0.0	42.4	74.0	-31.6	V	P	
4.874	3.0	25.3	33.2	6.3	-34.8	0.0	0.0	30.0	54.0	-24.0	V	A	
7.311	3.0	36.8	36.2	8.5	-34.9	0.0	0.0	46.6	74.0	-27.4	V	P	
7.311	3.0	24.5	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	V	A	
4.874	3.0	36.8	33.2	6.3	-34.8	0.0	0.0	41.6	74.0	-32.4	H	P	
4.874	3.0	25.3	33.2	6.3	-34.8	0.0	0.0	30.0	54.0	-24.0	H	A	
7.311	3.0	36.8	36.2	8.5	-34.9	0.0	0.0	46.6	74.0	-27.4	H	P	
7.311	3.0	24.6	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	H	A	
High Ch, 2462MHz													
4.924	3.0	37.7	33.3	6.3	-34.8	0.0	0.0	42.5	74.0	-31.5	V	P	
4.924	3.0	25.3	33.3	6.3	-34.8	0.0	0.0	30.1	54.0	-23.9	V	A	
7.386	3.0	36.5	36.3	8.5	-34.9	0.0	0.0	46.4	74.0	-27.6	V	P	
7.386	3.0	24.4	36.3	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	V	A	
4.924	3.0	38.2	33.3	6.3	-34.8	0.0	0.0	43.0	74.0	-31.0	H	P	
4.924	3.0	25.3	33.3	6.3	-34.8	0.0	0.0	30.1	54.0	-23.9	H	A	
7.386	3.0	36.8	36.3	8.5	-34.9	0.0	0.0	46.7	74.0	-27.3	H	P	
7.386	3.0	24.3	36.3	8.5	-34.9	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.

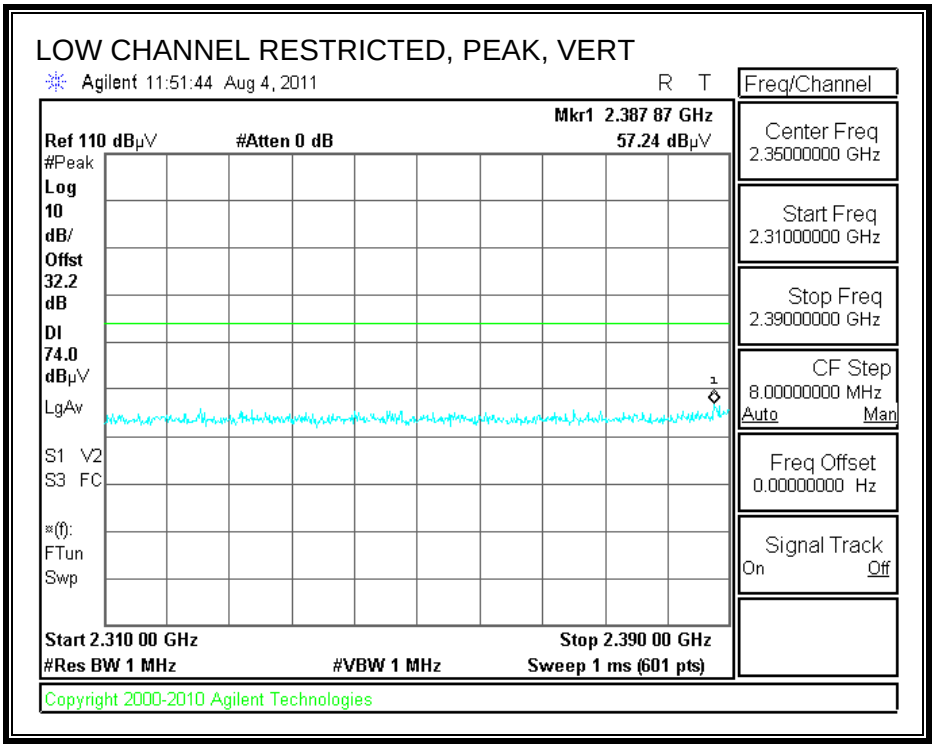
8.2.6. 802.11n MODE IN THE 2.4 GHz BAND

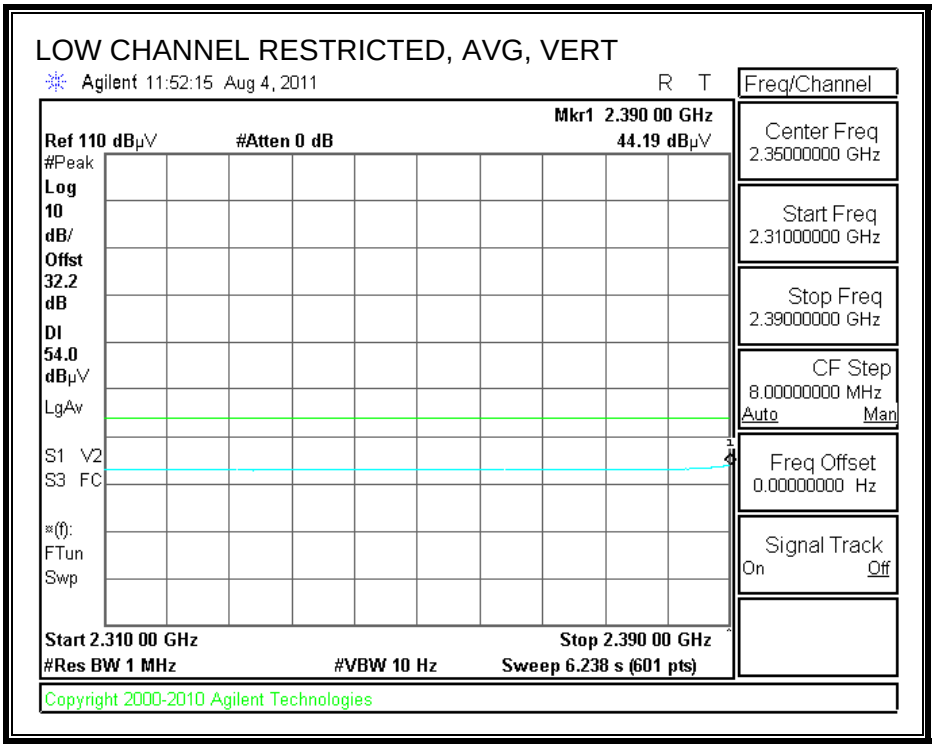
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



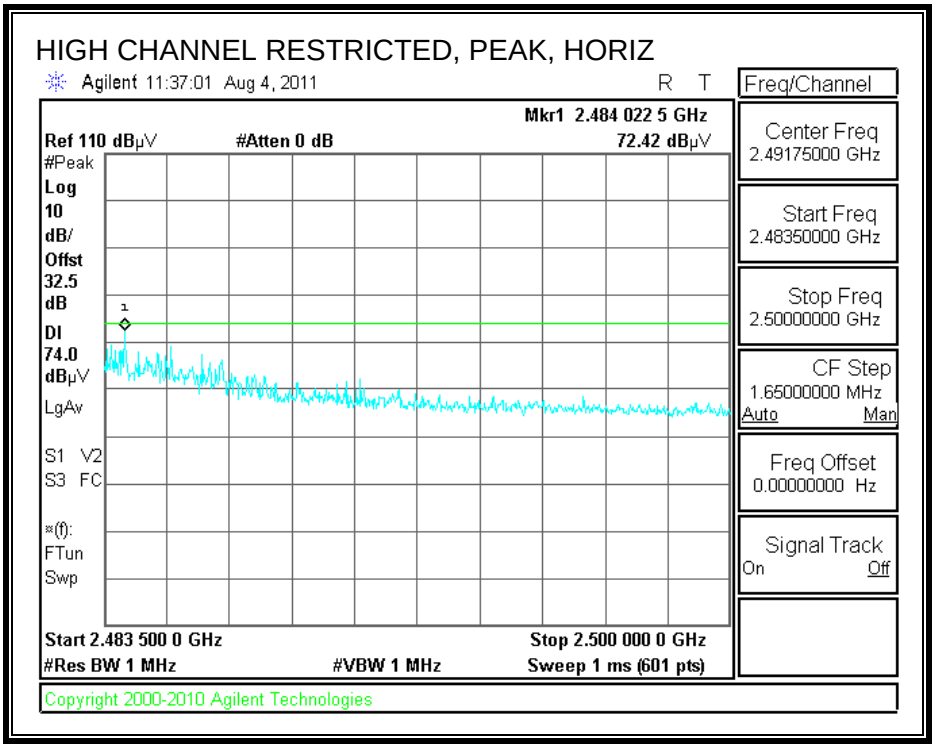


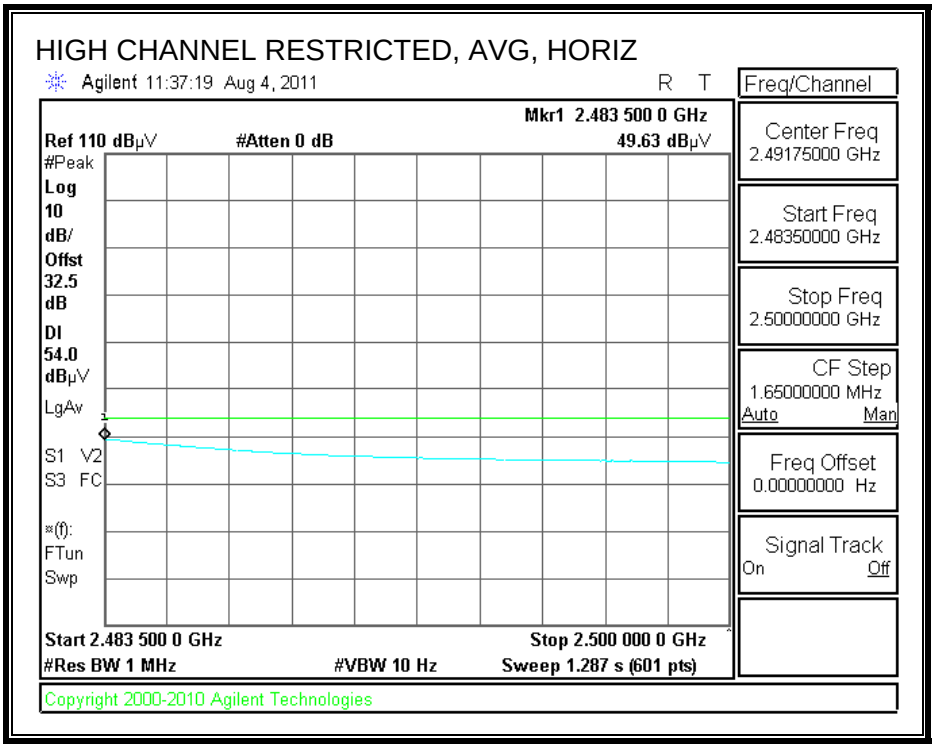
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



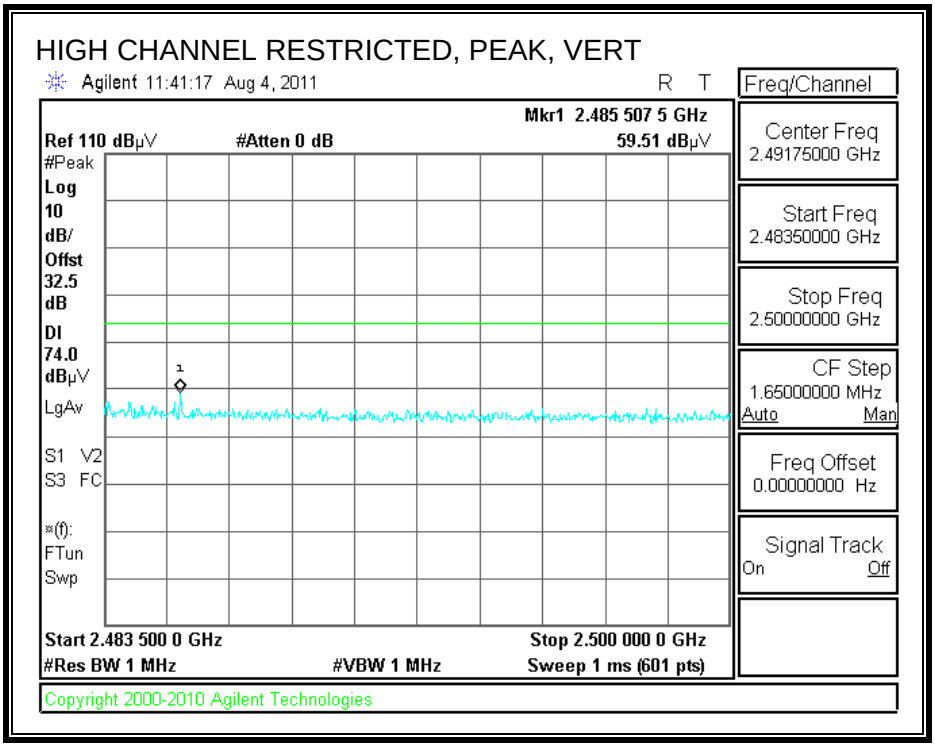


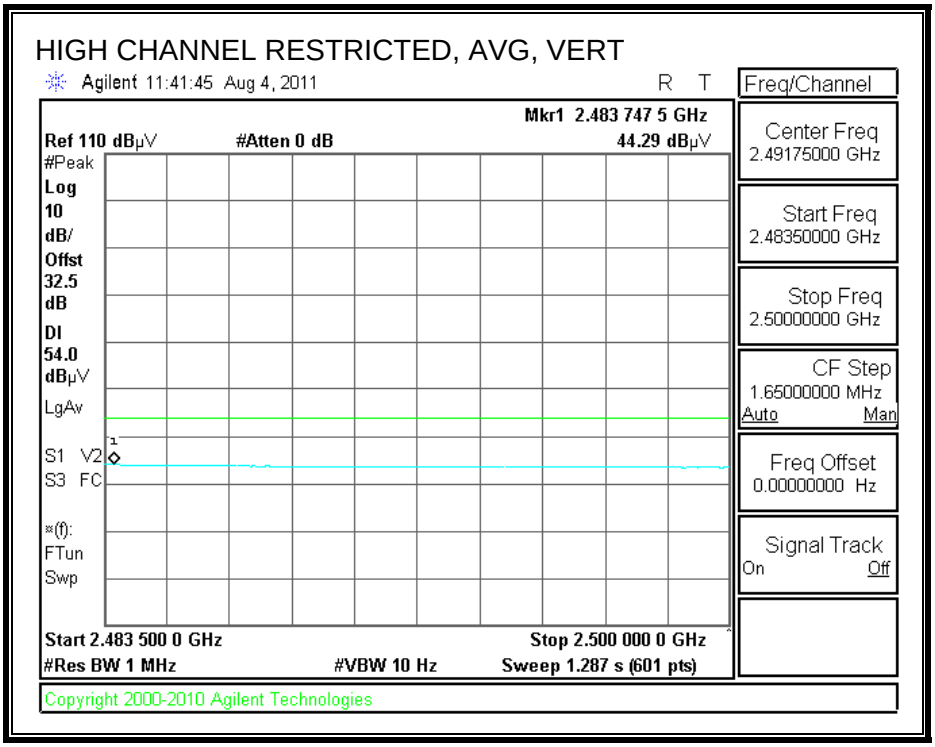
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 08-04-11
Project #: 11U13896
Company: Apple
Test Target: FCC 15.247
Mode Oper: TX, 802.11n
BOM Variant 2

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		

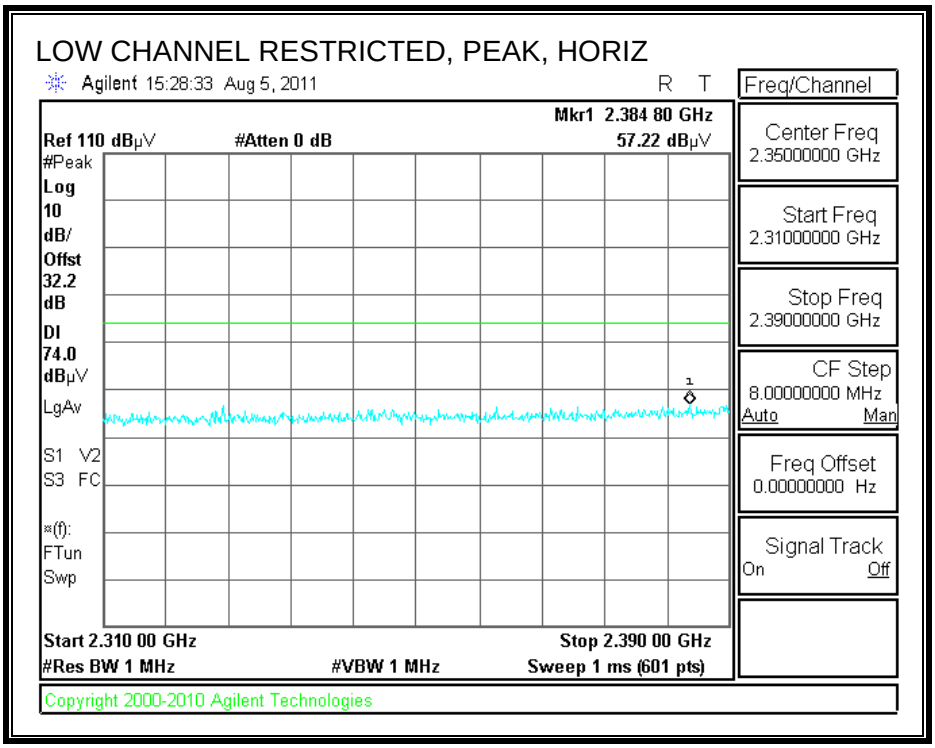
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2412MHz													
4.824	3.0	37.5	33.2	6.3	-34.8	0.0	0.0	42.1	74.0	-31.9	H	P	
4.824	3.0	24.8	33.2	6.3	-34.8	0.0	0.0	29.4	54.0	-24.6	H	A	
4.824	3.0	37.2	33.2	6.3	-34.8	0.0	0.0	41.8	74.0	-32.2	V	P	
4.824	3.0	24.8	33.2	6.3	-34.8	0.0	0.0	29.4	54.0	-24.6	V	A	
Mid Ch, 2437MHz													
4.874	3.0	37.3	33.2	6.3	-34.8	0.0	0.0	42.1	74.0	-31.9	H	P	
4.874	3.0	25.4	33.2	6.3	-34.8	0.0	0.0	30.2	54.0	-23.8	H	A	
7.311	3.0	37.2	36.2	8.5	-34.9	0.0	0.0	47.0	74.0	-27.0	H	P	
7.311	3.0	24.7	36.2	8.5	-34.9	0.0	0.0	34.4	54.0	-19.6	H	A	
4.874	3.0	39.5	33.2	6.3	-34.8	0.0	0.0	44.2	74.0	-29.8	V	P	
4.874	3.0	25.4	33.2	6.3	-34.8	0.0	0.0	30.1	54.0	-23.9	V	A	
7.311	3.0	37.5	36.2	8.5	-34.9	0.0	0.0	47.2	74.0	-26.8	V	P	
7.311	3.0	24.7	36.2	8.5	-34.9	0.0	0.0	34.4	54.0	-19.6	V	A	
High Ch, 2462MHz													
4.924	3.0	37.7	33.3	6.3	-34.8	0.0	0.0	42.5	74.0	-31.5	H	P	
4.924	3.0	25.4	33.3	6.3	-34.8	0.0	0.0	30.2	54.0	-23.8	H	A	
7.386	3.0	36.8	36.3	8.5	-34.9	0.0	0.0	46.7	74.0	-27.3	H	P	
7.386	3.0	24.5	36.3	8.5	-34.9	0.0	0.0	34.4	54.0	-19.6	H	A	
4.924	3.0	38.6	33.3	6.3	-34.8	0.0	0.0	43.4	74.0	-30.6	V	P	
4.924	3.0	25.5	33.3	6.3	-34.8	0.0	0.0	30.3	54.0	-23.7	V	A	
7.386	3.0	36.7	36.3	8.5	-34.9	0.0	0.0	46.6	74.0	-27.4	V	P	
7.386	3.0	24.5	36.3	8.5	-34.9	0.0	0.0	34.4	54.0	-19.6	V	A	

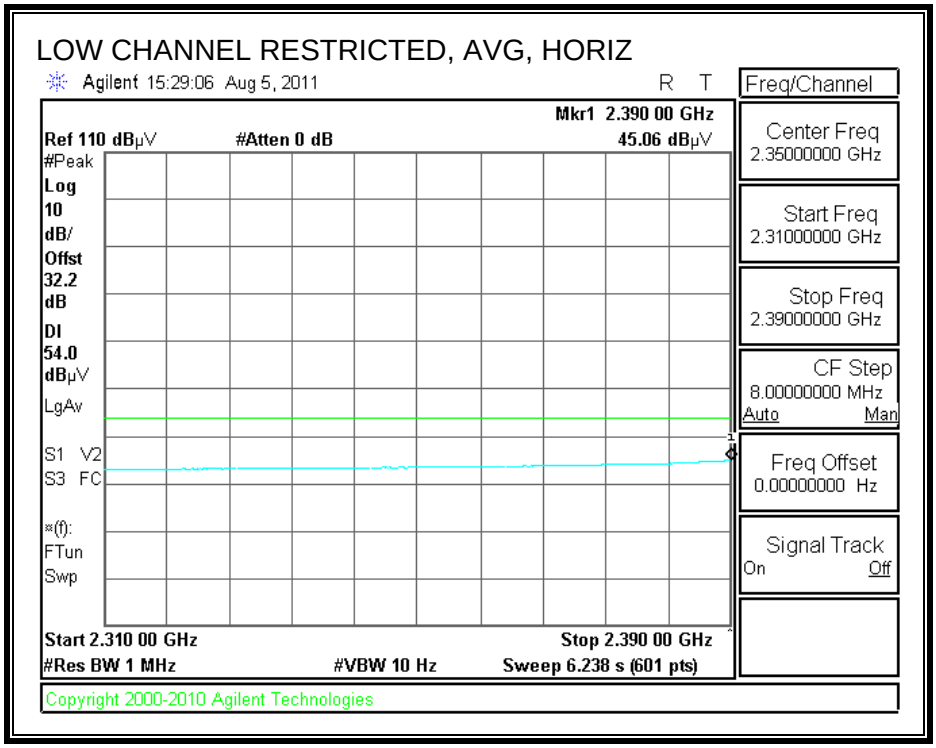
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

BOM VARIANT 3

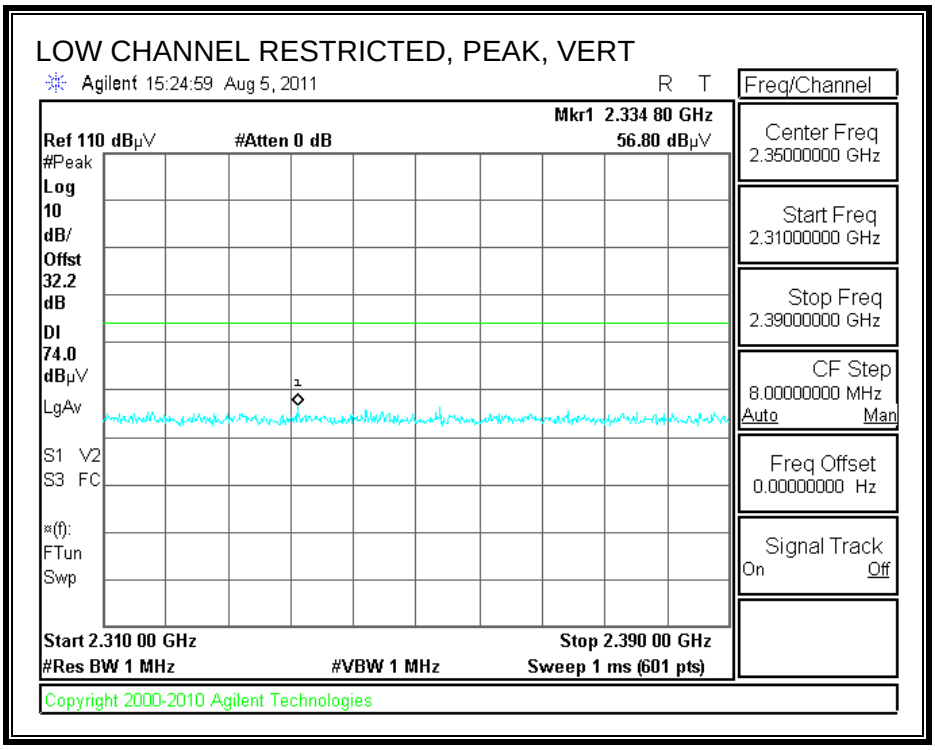
8.2.7. 802.11b MODE IN THE 2.4 GHz BAND

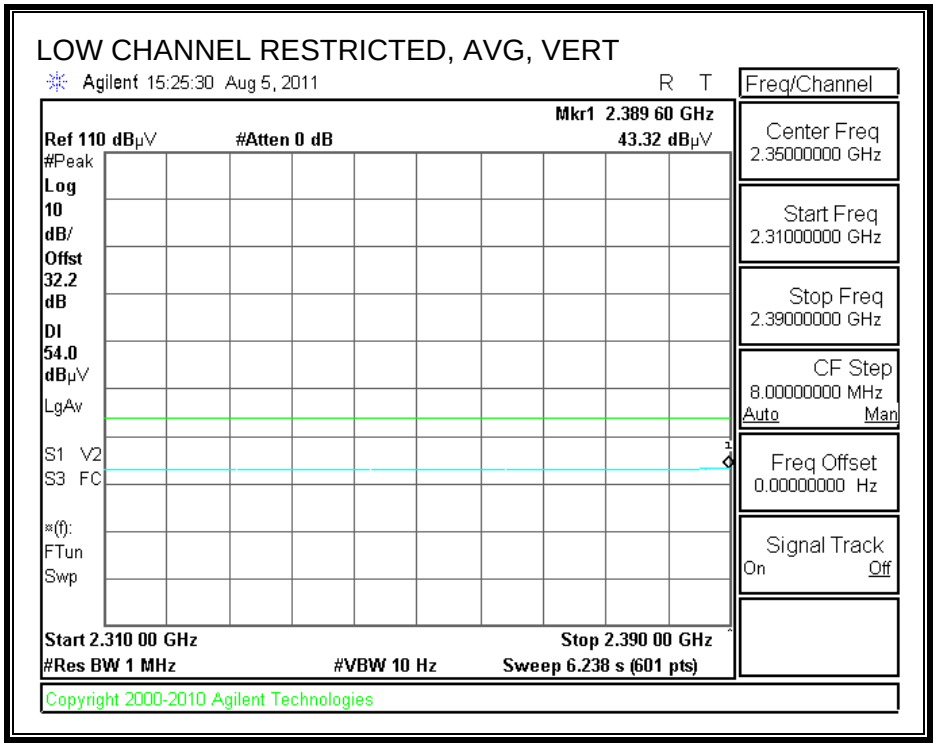
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



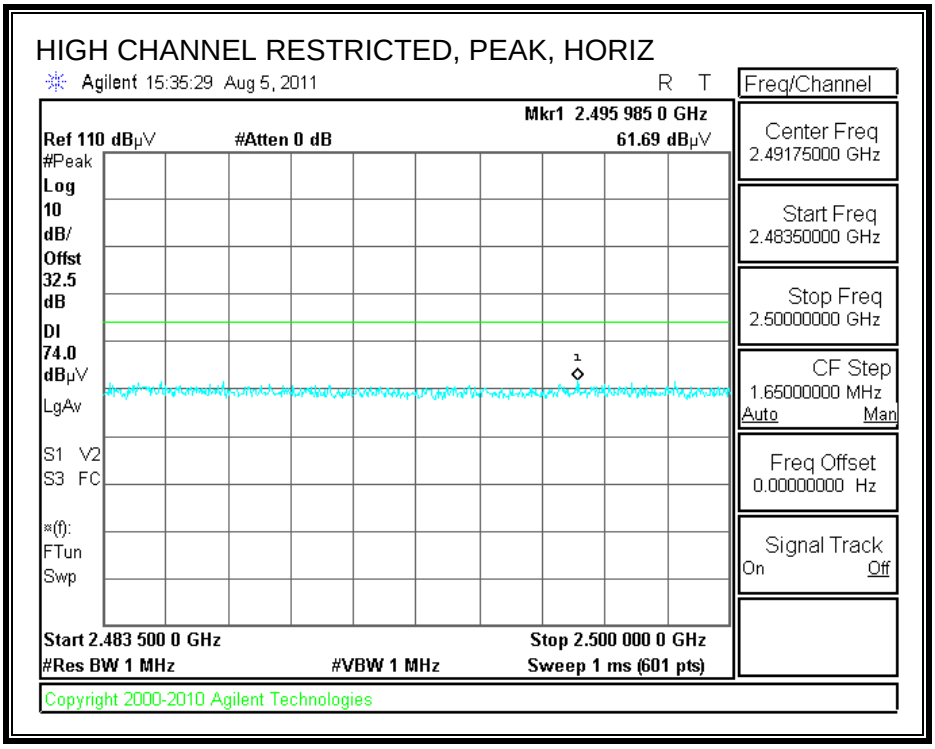


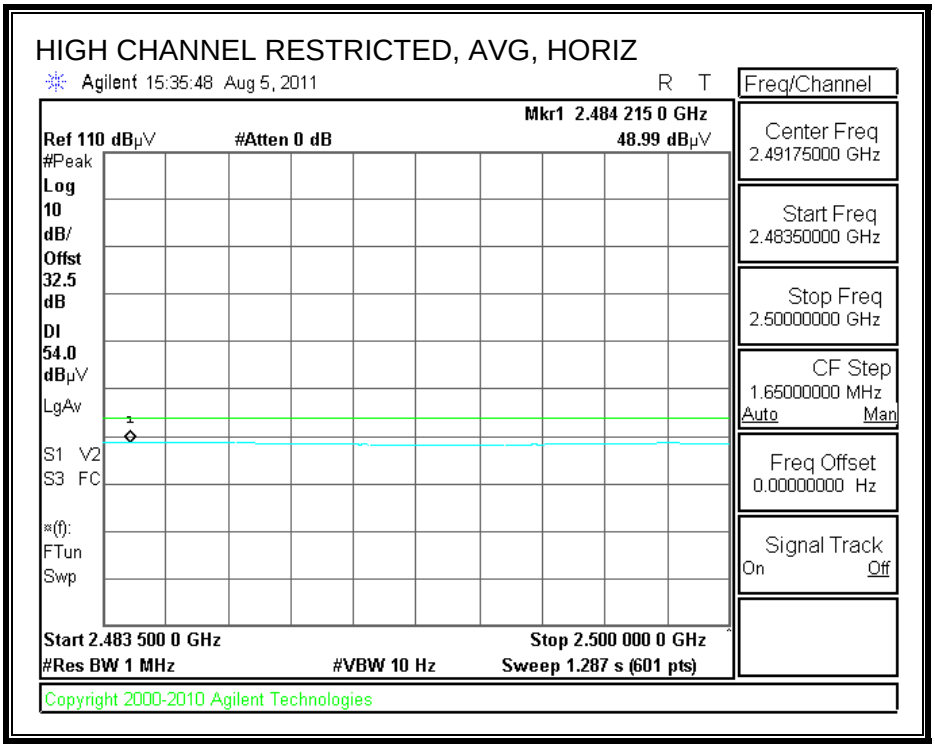
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



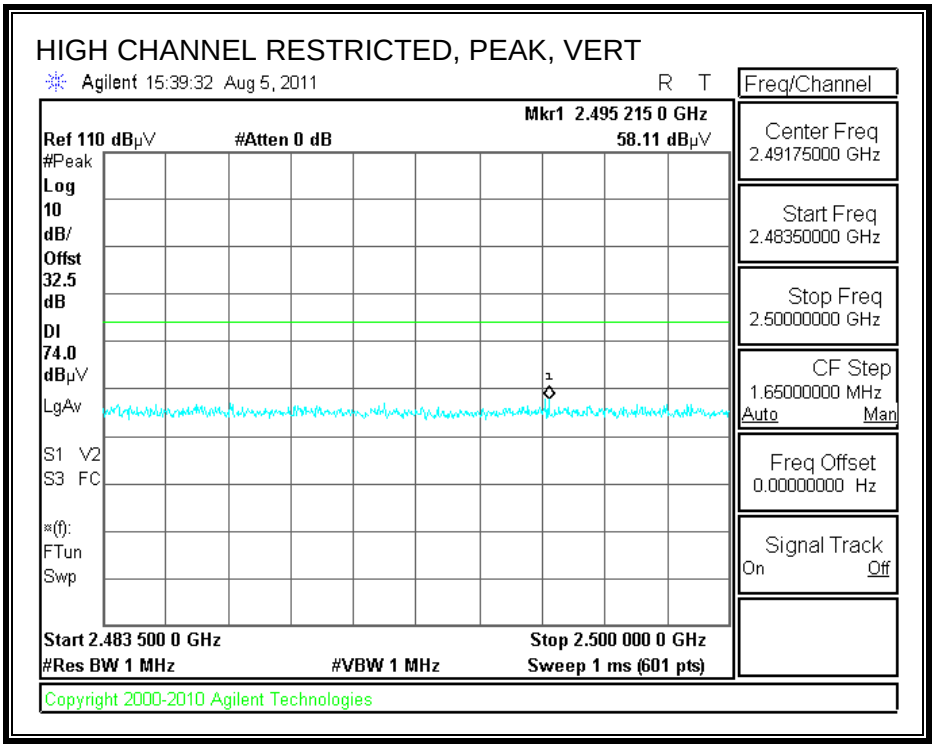


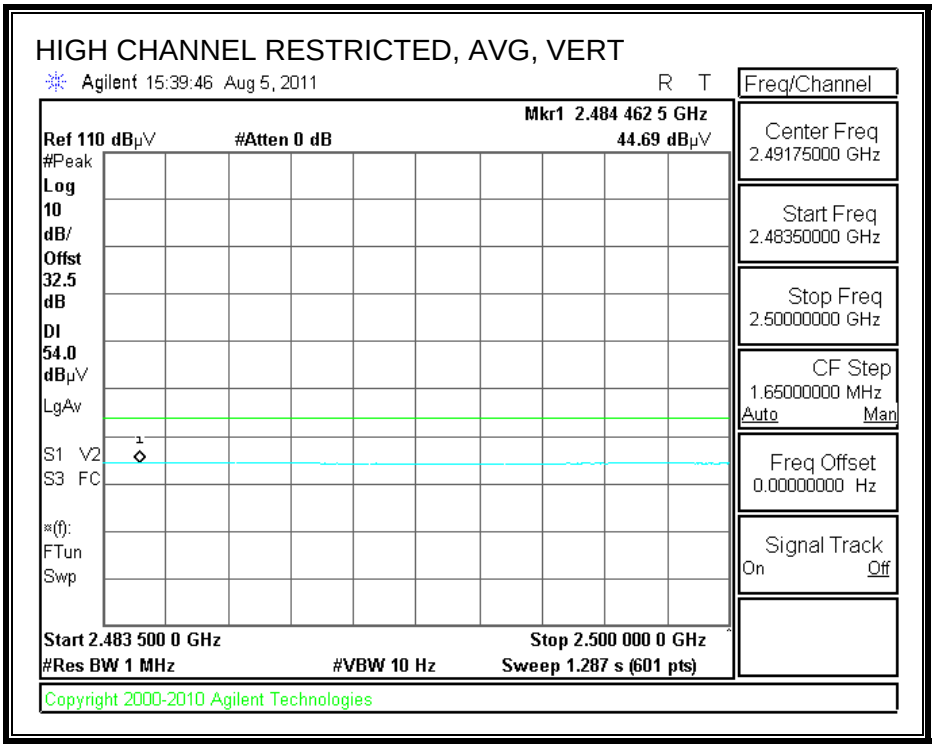
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 08-05-11
Project #: 11U13896
Company: Apple
Test Target: Fcc 15.247
Mode Oper: B mode, TX
BOM Variant 3

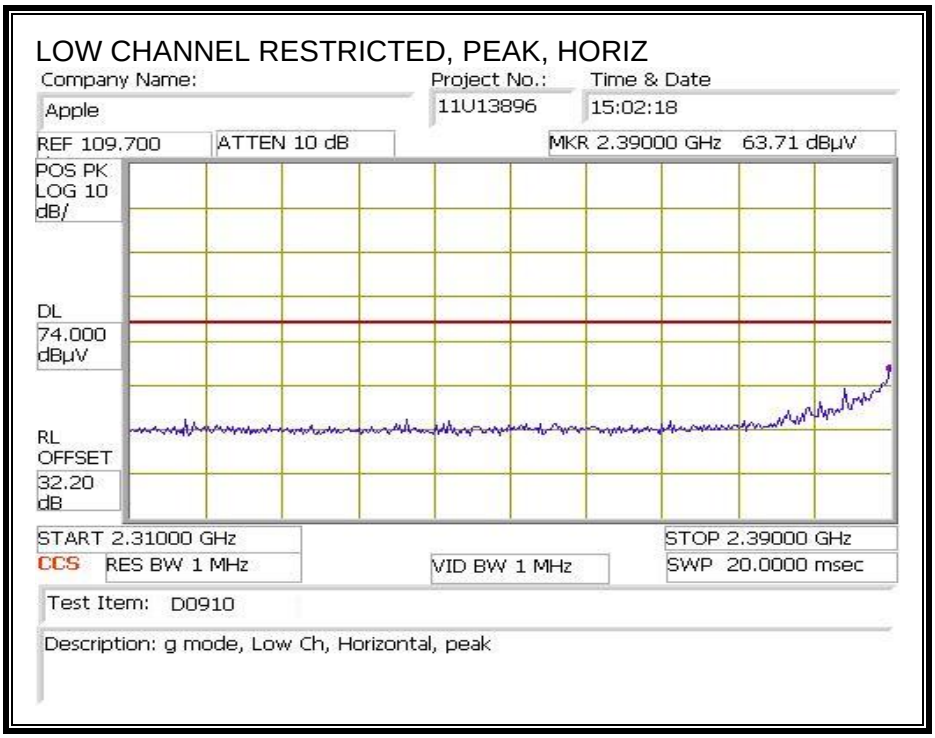
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

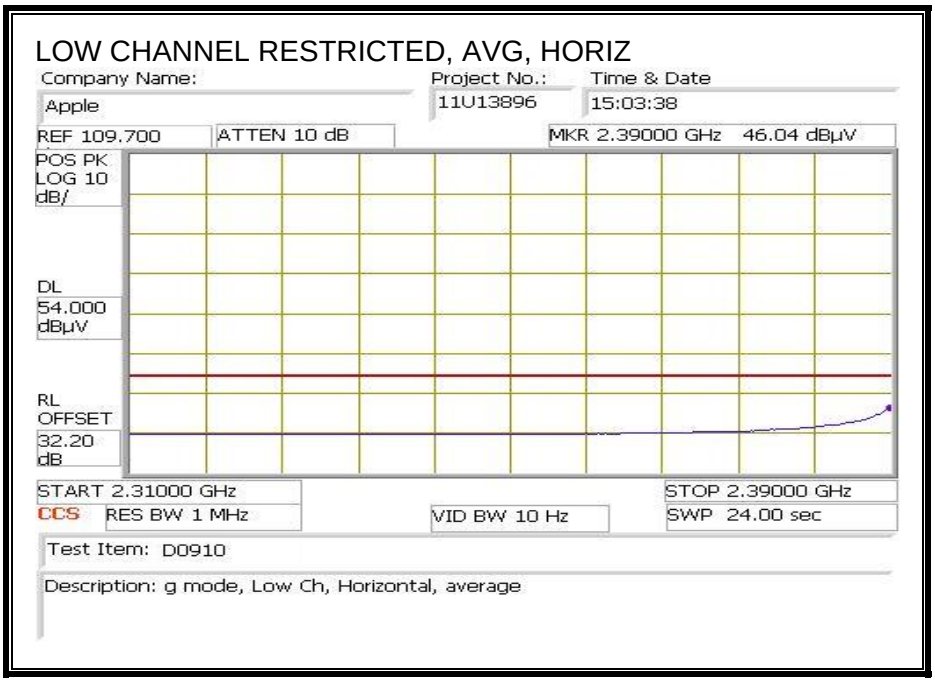
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2412MHz													
4.824	3.0	42.1	33.2	6.3	-34.8	0.0	0.0	46.8	74.0	-27.2	V	P	
4.824	3.0	37.7	33.2	6.3	-34.8	0.0	0.0	42.3	54.0	-11.7	V	A	
4.824	3.0	41.4	33.2	6.3	-34.8	0.0	0.0	46.0	74.0	-28.0	H	P	
4.824	3.0	35.7	33.2	6.3	-34.8	0.0	0.0	40.3	54.0	-13.7	H	A	
Mid Ch, 2437MHz													
4.874	3.0	45.7	33.2	6.3	-34.8	0.0	0.0	50.4	74.0	-23.6	V	P	
4.874	3.0	42.1	33.2	6.3	-34.8	0.0	0.0	46.9	54.0	-7.1	V	A	
7.311	3.0	38.4	36.2	8.5	-34.9	0.0	0.0	48.2	74.0	-25.8	V	P	
7.311	3.0	24.7	36.2	8.5	-34.9	0.0	0.0	34.5	54.0	-19.5	V	A	
4.874	3.0	43.1	33.2	6.3	-34.8	0.0	0.0	47.8	74.0	-26.2	H	P	
4.874	3.0	38.6	33.2	6.3	-34.8	0.0	0.0	43.4	54.0	-10.6	H	A	
7.311	3.0	38.1	36.2	8.5	-34.9	0.0	0.0	47.8	74.0	-26.2	H	P	
7.311	3.0	24.7	36.2	8.5	-34.9	0.0	0.0	34.4	54.0	-19.6	H	A	
High Ch, 2462MHz													
4.924	3.0	47.9	33.3	6.3	-34.8	0.0	0.0	52.7	74.0	-21.3	V	P	
4.924	3.0	45.2	33.3	6.3	-34.8	0.0	0.0	50.0	54.0	-4.0	V	A	
7.386	3.0	37.3	36.3	8.5	-34.9	0.0	0.0	47.2	74.0	-26.8	V	P	
7.386	3.0	24.9	36.3	8.5	-34.9	0.0	0.0	34.7	54.0	-19.3	V	A	
4.924	3.0	45.3	33.3	6.3	-34.8	0.0	0.0	50.1	74.0	-23.9	H	P	
4.924	3.0	41.5	33.3	6.3	-34.8	0.0	0.0	46.3	54.0	-7.7	H	A	
7.386	3.0	37.1	36.3	8.5	-34.9	0.0	0.0	47.0	74.0	-27.0	H	P	
7.386	3.0	24.7	36.3	8.5	-34.9	0.0	0.0	34.6	54.0	-19.4	H	A	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

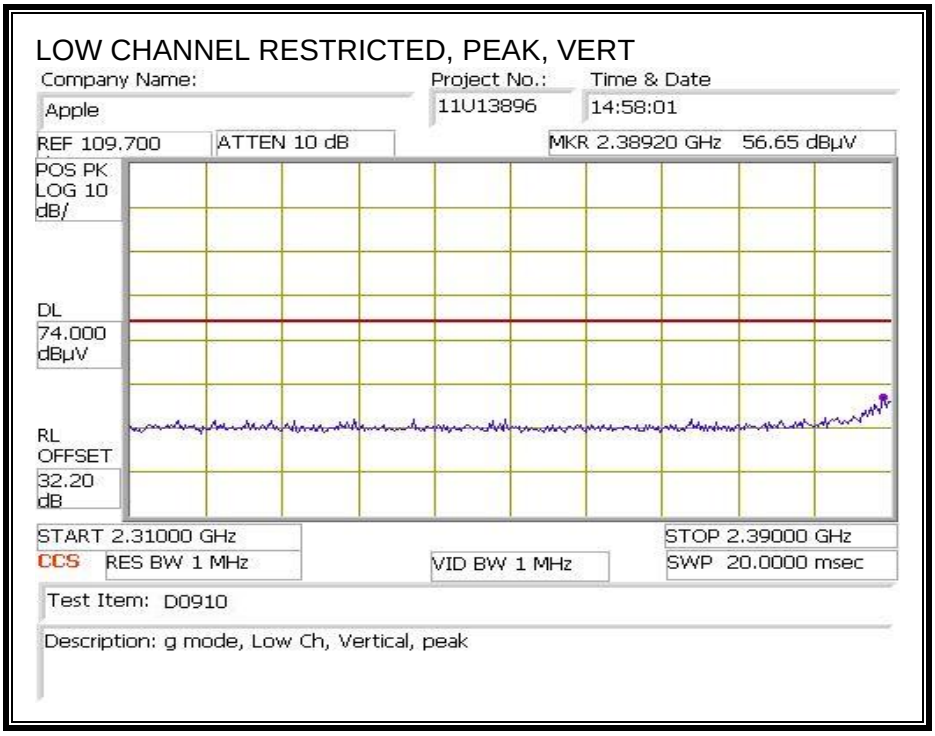
8.2.8. 802.11g MODE IN THE 2.4 GHz BAND

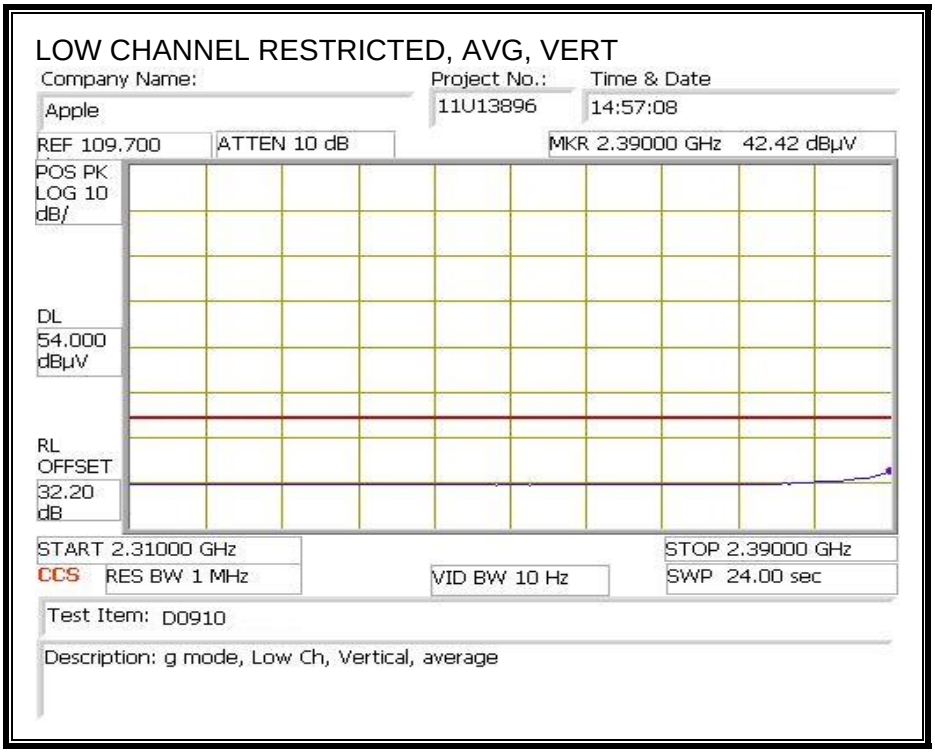
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



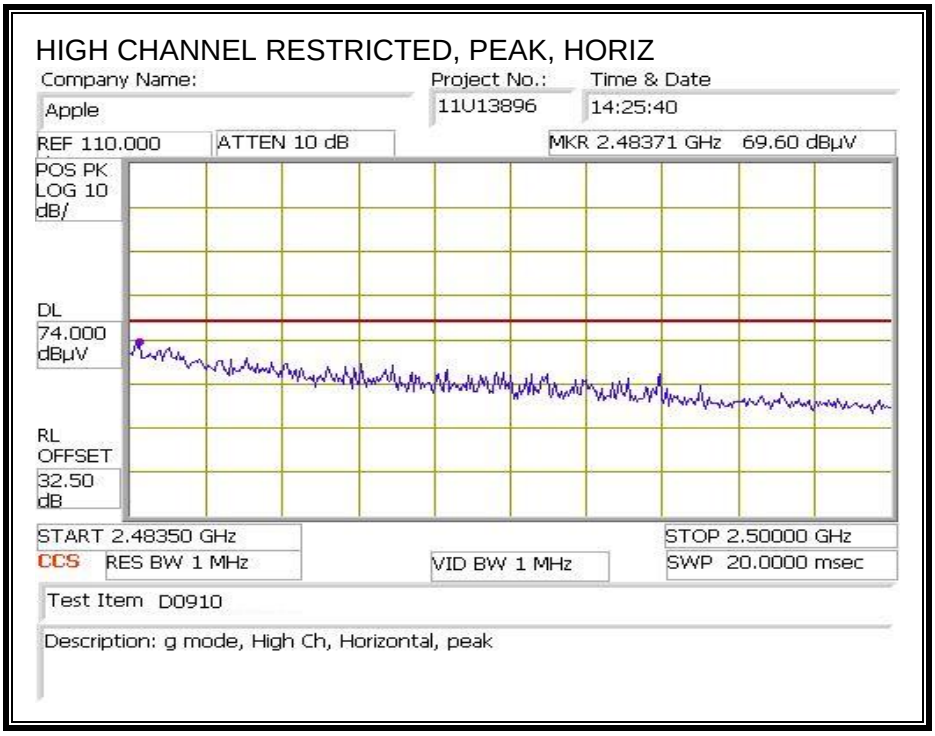


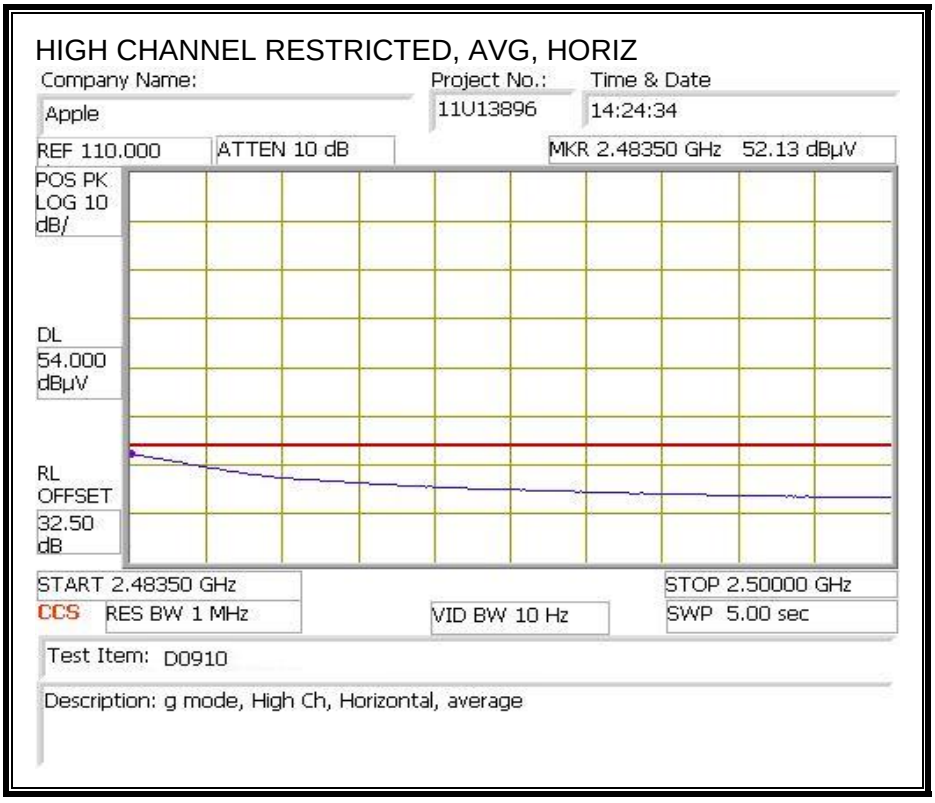
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



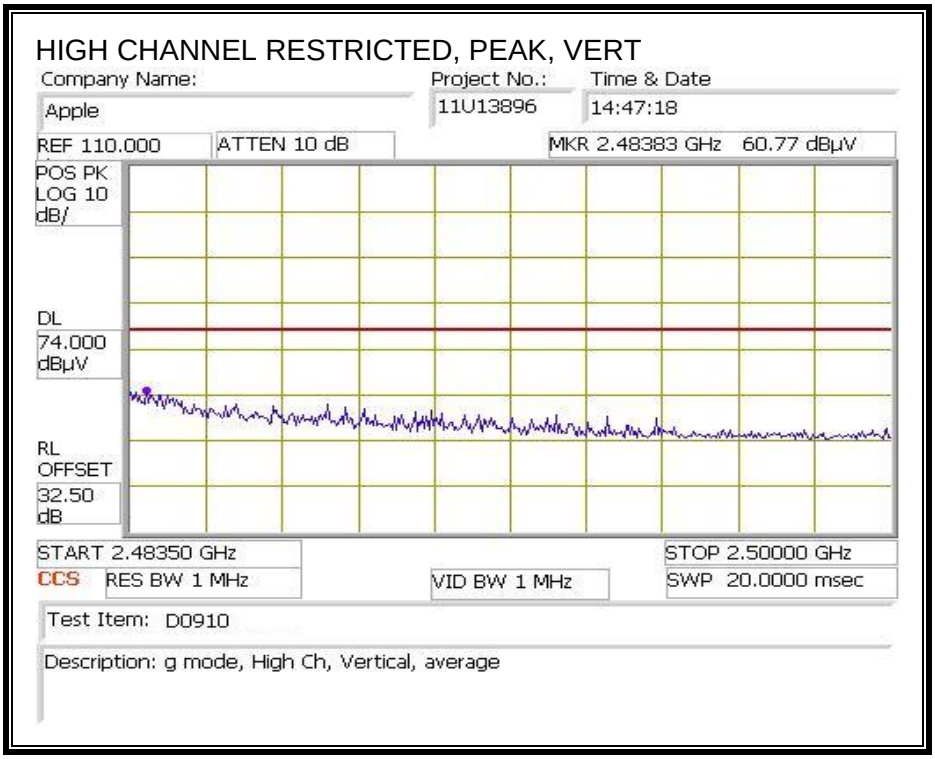


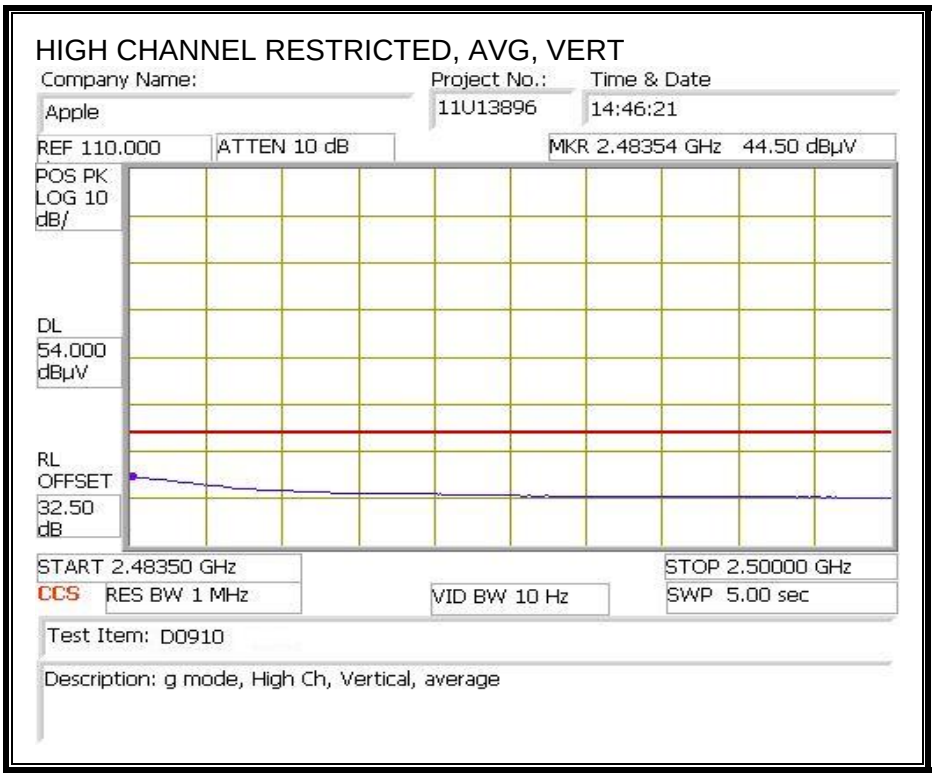
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 08-05-11
Project #: 11U13896
Company: Apple
Test Target: FCC 15.247
Mode Oper: TX, g mode

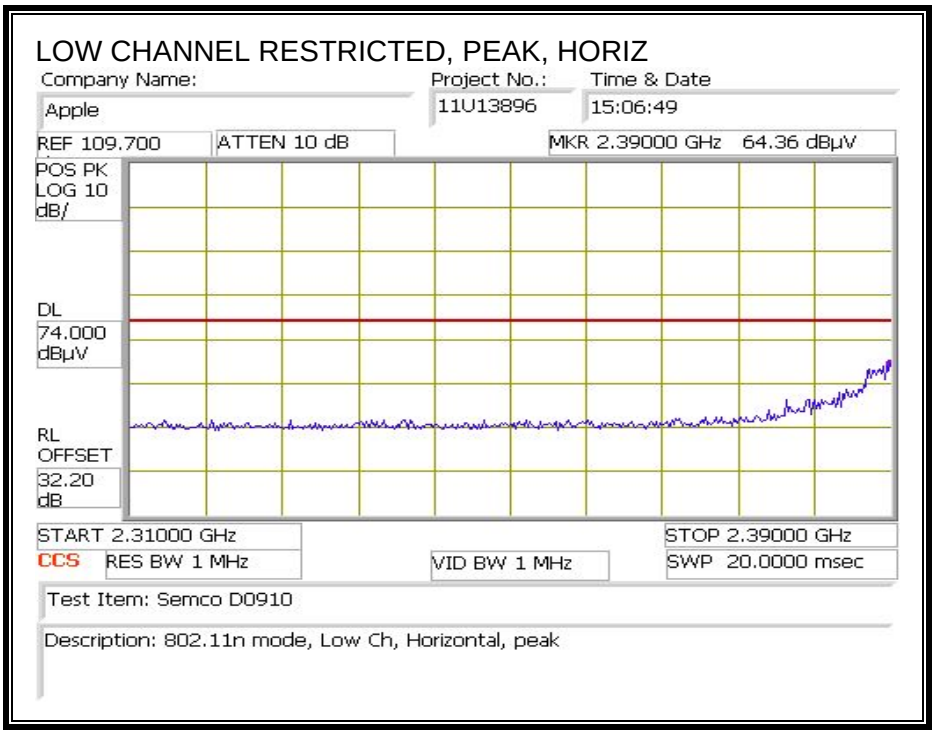
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

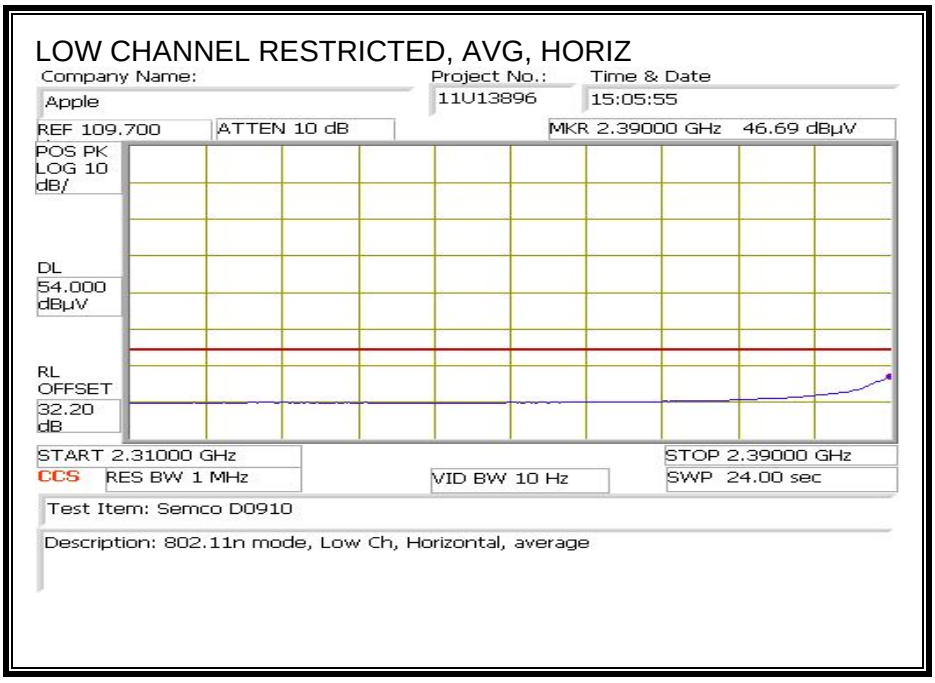
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2412MHz													
4.824	3.0	38.5	33.2	6.3	-34.8	0.0	0.0	43.1	74.0	-30.9	H	P	
4.824	3.0	25.6	33.2	6.3	-34.8	0.0	0.0	30.2	54.0	-23.8	H	A	
4.824	3.0	38.0	33.2	6.3	-34.8	0.0	0.0	42.7	74.0	-31.3	V	P	
4.824	3.0	25.6	33.2	6.3	-34.8	0.0	0.0	30.2	54.0	-23.8	V	A	
Mid Ch, 2437MHz													
4.874	3.0	40.0	33.2	6.3	-34.8	0.0	0.0	44.7	74.0	-29.3	H	P	
4.874	3.0	27.4	33.2	6.3	-34.8	0.0	0.0	32.2	54.0	-21.8	H	A	
7.311	3.0	36.9	36.2	8.5	-34.9	0.0	0.0	46.7	74.0	-27.3	H	P	
7.311	3.0	24.5	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	H	A	
4.874	3.0	39.5	33.2	6.3	-34.8	0.0	0.0	44.2	74.0	-29.8	V	P	
4.874	3.0	26.9	33.2	6.3	-34.8	0.0	0.0	31.7	54.0	-22.3	V	A	
7.311	3.0	36.7	36.2	8.5	-34.9	0.0	0.0	46.5	74.0	-27.5	V	P	
7.311	3.0	24.5	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	V	A	
High Ch, 2462MHz													
4.924	3.0	39.1	33.3	6.3	-34.8	0.0	0.0	43.9	74.0	-30.1	H	P	
4.924	3.0	26.8	33.3	6.3	-34.8	0.0	0.0	31.6	54.0	-22.4	H	A	
7.386	3.0	37.2	36.3	8.5	-34.9	0.0	0.0	47.1	74.0	-26.9	H	P	
7.386	3.0	24.4	36.3	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	H	A	
4.924	3.0	37.8	33.3	6.3	-34.8	0.0	0.0	42.6	74.0	-31.4	V	P	
4.924	3.0	25.3	33.3	6.3	-34.8	0.0	0.0	30.1	54.0	-23.9	V	A	
7.386	3.0	36.5	36.3	8.5	-34.9	0.0	0.0	46.4	74.0	-27.6	V	P	
7.386	3.0	24.4	36.3	8.5	-34.9	0.0	0.0	34.2	54.0	-19.8	V	A	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

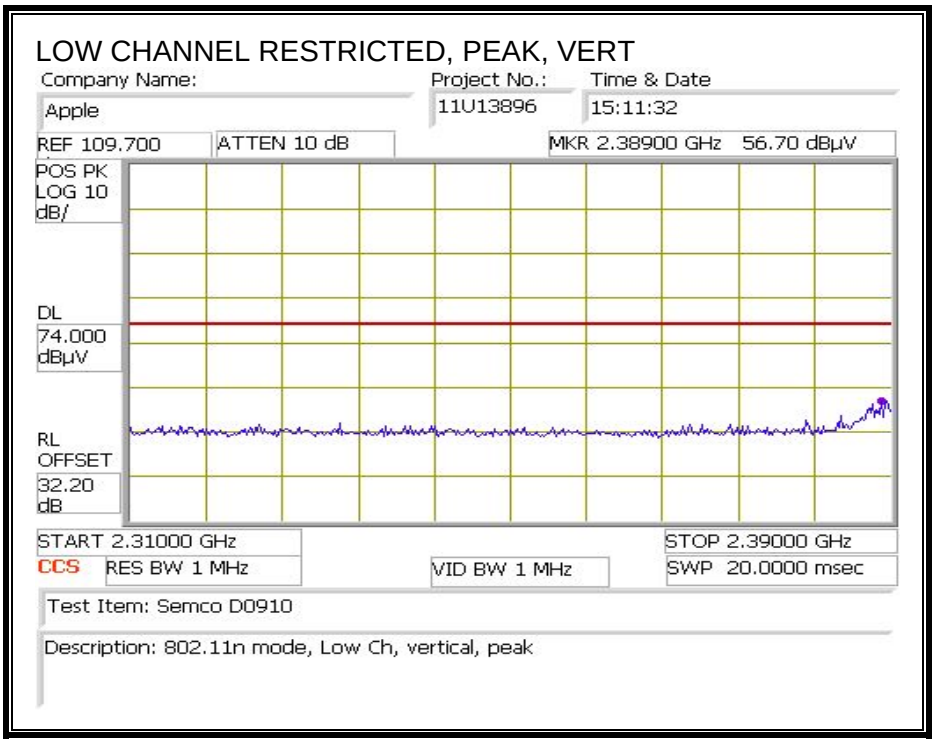
8.2.9. 802.11n MODE IN THE 2.4 GHz BAND

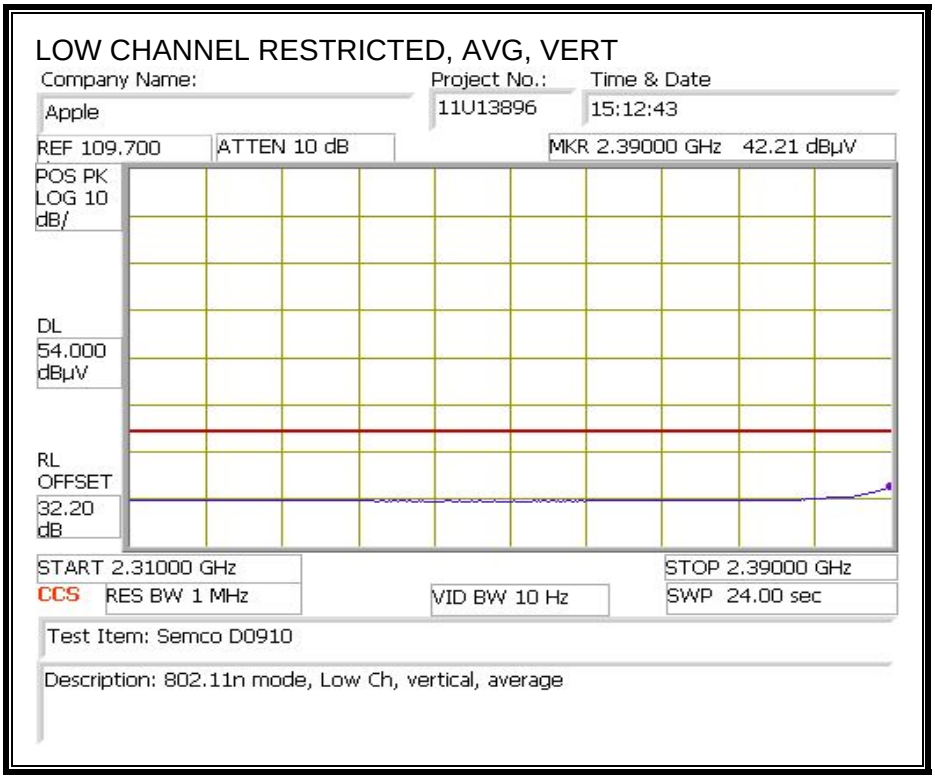
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



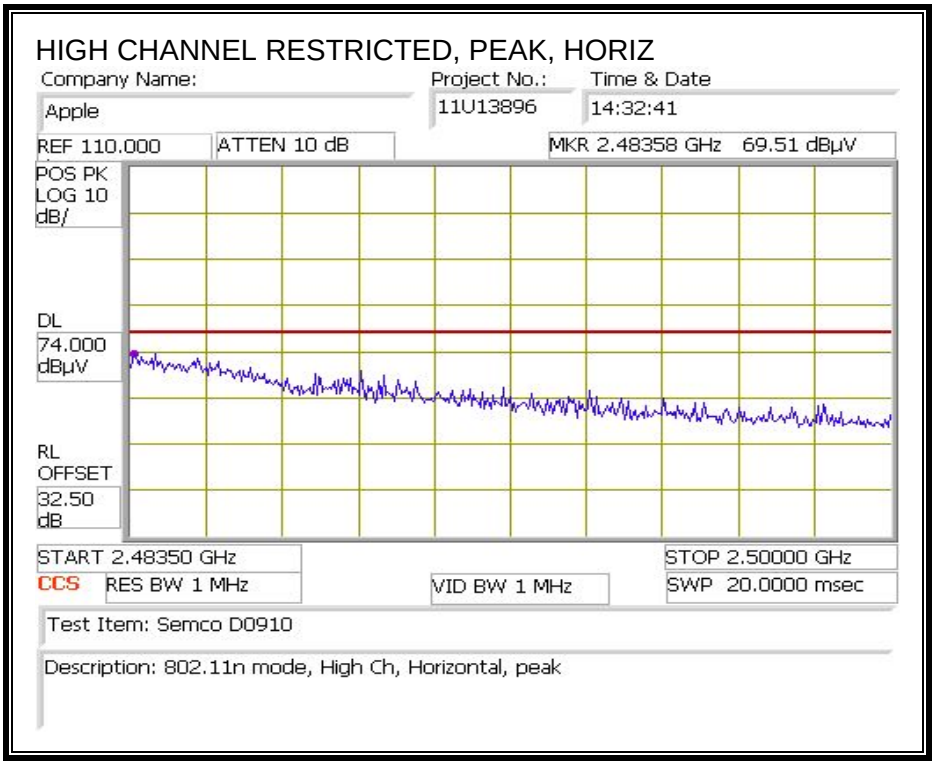


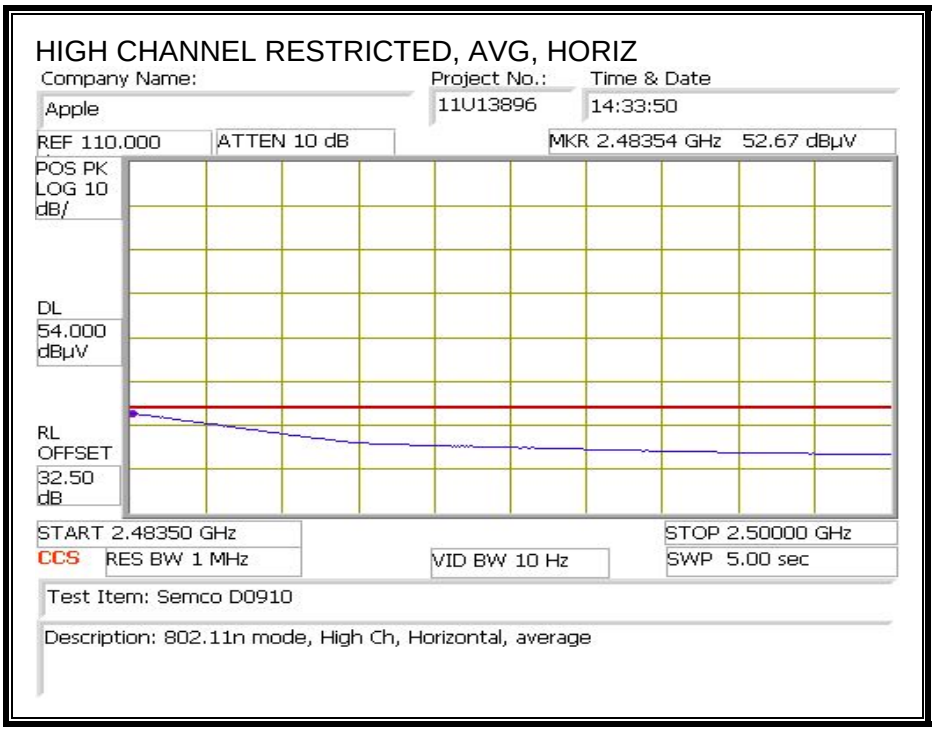
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



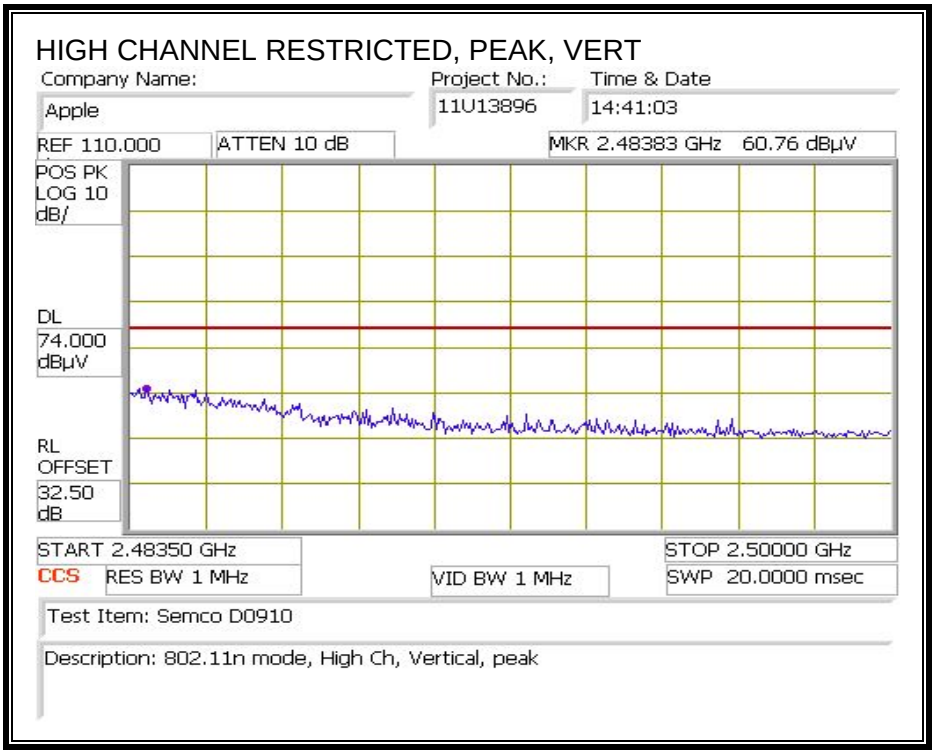


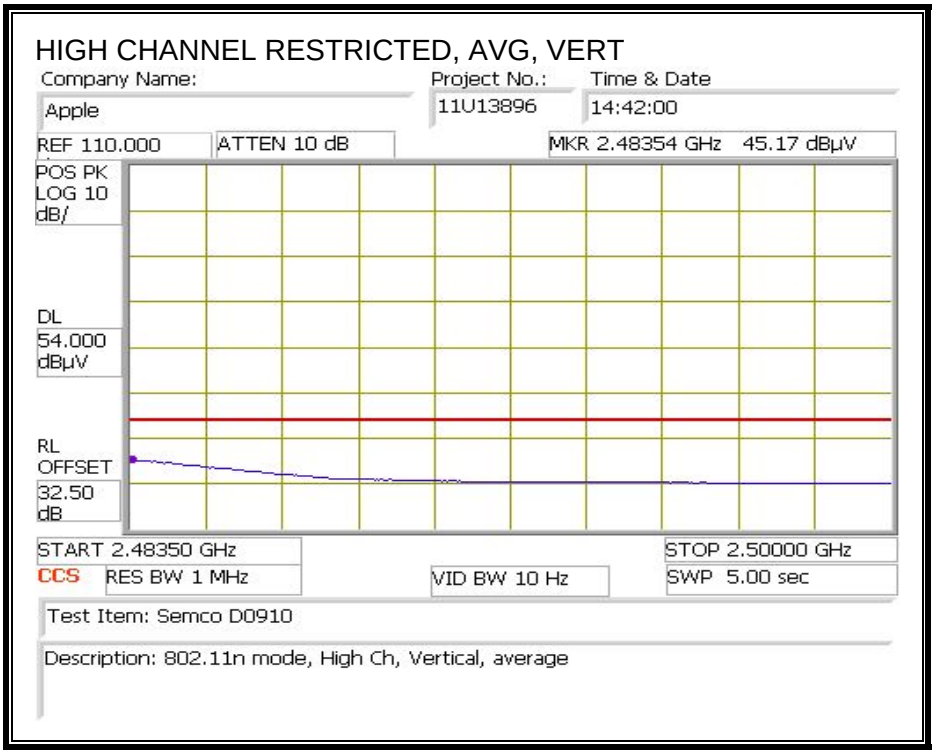
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 08-05-11
Project #: 11U13896
Company: Apple
Test Target: FCC 15.247
Mode Oper: 802.11n, TX
BOM Variant 3

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 GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2412MHz													
4.824	3.0	37.5	33.2	6.3	-34.8	0.0	0.0	42.1	74.0	-31.9	V	P	
4.824	3.0	25.5	33.2	6.3	-34.8	0.0	0.0	30.2	54.0	-23.9	V	A	
4.824	3.0	38.5	33.2	6.3	-34.8	0.0	0.0	43.2	74.0	-30.8	H	P	
4.824	3.0	25.6	33.2	6.3	-34.8	0.0	0.0	30.3	54.0	-23.7	H	A	
Mid Ch, 2437MHz													
4.874	3.0	40.1	33.2	6.3	-34.8	0.0	0.0	44.9	74.0	-29.1	V	P	
4.874	3.0	27.8	33.2	6.3	-34.8	0.0	0.0	32.5	54.0	-21.5	V	A	
7.311	3.0	36.6	36.2	8.5	-34.9	0.0	0.0	46.4	74.0	-27.6	V	P	
7.311	3.0	24.5	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	V	A	
4.874	3.0	40.4	33.2	6.3	-34.8	0.0	0.0	45.1	74.0	-28.9	H	P	
4.874	3.0	27.1	33.2	6.3	-34.8	0.0	0.0	31.8	54.0	-22.2	H	A	
7.311	3.0	37.3	36.2	8.5	-34.9	0.0	0.0	47.1	74.0	-26.9	H	P	
7.311	3.0	24.5	36.2	8.5	-34.9	0.0	0.0	34.2	54.0	-19.8	H	A	
High Ch, 2462MHz													
4.924	3.0	42.5	33.3	6.3	-34.8	0.0	0.0	47.3	74.0	-26.7	V	P	
4.924	3.0	29.9	33.3	6.3	-34.8	0.0	0.0	34.7	54.0	-19.3	V	A	
7.386	3.0	36.2	36.3	8.5	-34.9	0.0	0.0	46.1	74.0	-27.9	V	P	
7.386	3.0	24.3	36.3	8.5	-34.9	0.0	0.0	34.2	54.0	-19.8	V	A	
4.924	3.0	40.3	33.3	6.3	-34.8	0.0	0.0	45.2	74.0	-28.8	H	P	
4.924	3.0	27.0	33.3	6.3	-34.8	0.0	0.0	31.8	54.0	-22.2	H	A	
7.386	3.0	37.1	36.3	8.5	-34.9	0.0	0.0	47.0	74.0	-27.0	H	P	
7.386	3.0	24.4	36.3	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	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. RX ABOVE 1 GHz FOR 20 MHz BANDWIDTH IN THE 2.4 GHz BAND

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber-B

Company: Apple
Project #: 11U13896
Date: 2011-8-5
Test Engineer: Chin Pang
Configuration: EUT with AC Adapter and Earphone
Mode: RX mode (Worsst Case)

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A0056			RX RSS 210

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

Peak Measurements
RBW=VBW=1MHz
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)
3.508	3.0	44.0	31.5	31.4	5.3	-35.0	0.0	0.0	45.6	33.1	74	54	-28.4	-20.9	H
3.917	3.0	48.0	37.4	32.0	5.6	-34.9	0.0	0.0	50.8	40.2	74	54	-23.2	-13.8	H
3.520	3.0	45.0	34.2	31.4	5.3	-35.0	0.0	0.0	46.7	35.9	74	54	-27.3	-18.1	V
3.917	3.0	55.0	42.5	32.0	5.6	-34.9	0.0	0.0	57.8	45.3	74	54	-16.2	-8.7	V

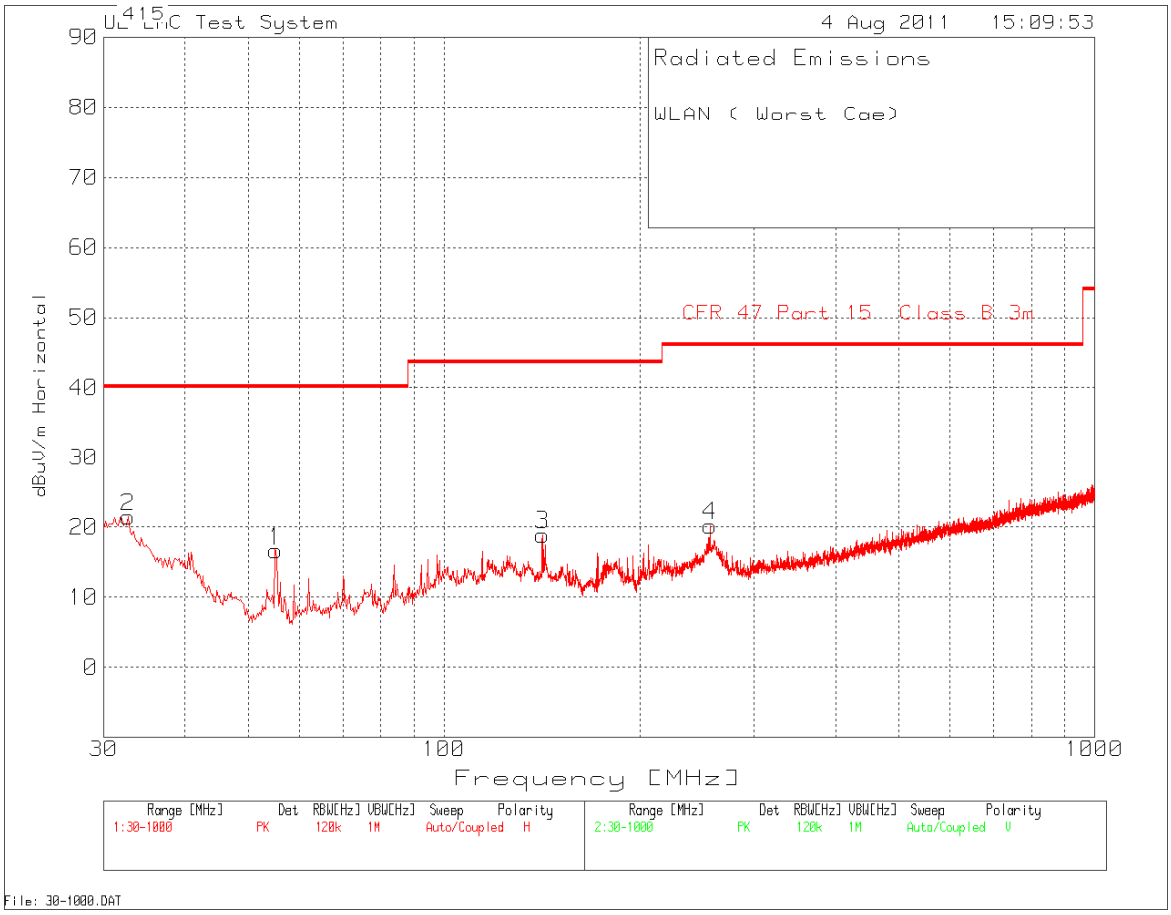
Rev. 07.08.11
Note: No other emissions were detected above the system noise floor.

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

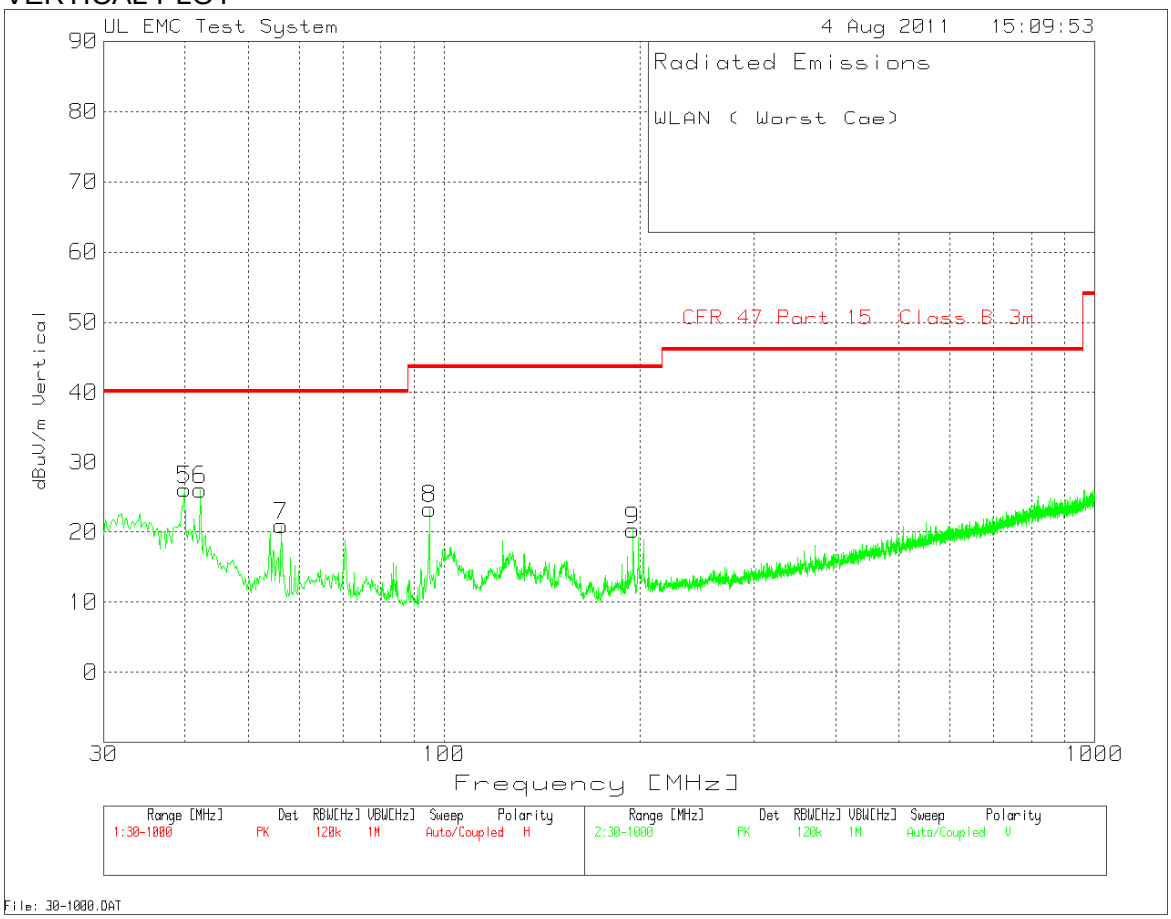
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Range 1 30 - 1000MHz										
Frequency MHz	Reading dBuV	Detector	Cable Loss dB	Amplifier Gain dB	Antenna Factor dB/m	Corrected Reading dBuV/m	Limit dBuV/m	Margin dB	Height [cm]	Polarity
55.1998	37.01	PK	1.1	-29.4	7.9	16.61	40	-23.39	300	Horz
32.7138	30.92	PK	0.9	-29.5	19.1	21.42	40	-18.58	100	Horz
141.6547	33.24	PK	1.7	-29.2	13.1	18.84	43.5	-24.66	300	Horz
256.6047	34.64	PK	2.2	-28.7	12	20.14	46	-25.86	100	Horz
Range 2 30 - 1000MHz										
Frequency MHz	Reading dBuV	Detector	Cable Loss dB	Amplifier Gain dB	Antenna Factor dB/m	Corrected Reading dBuV/m	Limit dBuV/m	Margin dB	Height [cm]	Polarity
39.8861	40.39	PK	0.9	-29.4	14.2	26.09	40	-13.91	100	Vert
42.2122	41.71	PK	1	-29.4	12.7	26.01	40	-13.99	100	Vert
56.1691	41.3	PK	1.1	-29.4	7.9	20.9	40	-19.1	100	Vert
94.9381	42.4	PK	1.4	-29.3	8.8	23.3	43.5	-20.2	100	Vert
195.3497	35.65	PK	1.9	-28.9	11.6	20.25	43.5	-23.25	100	Vert

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

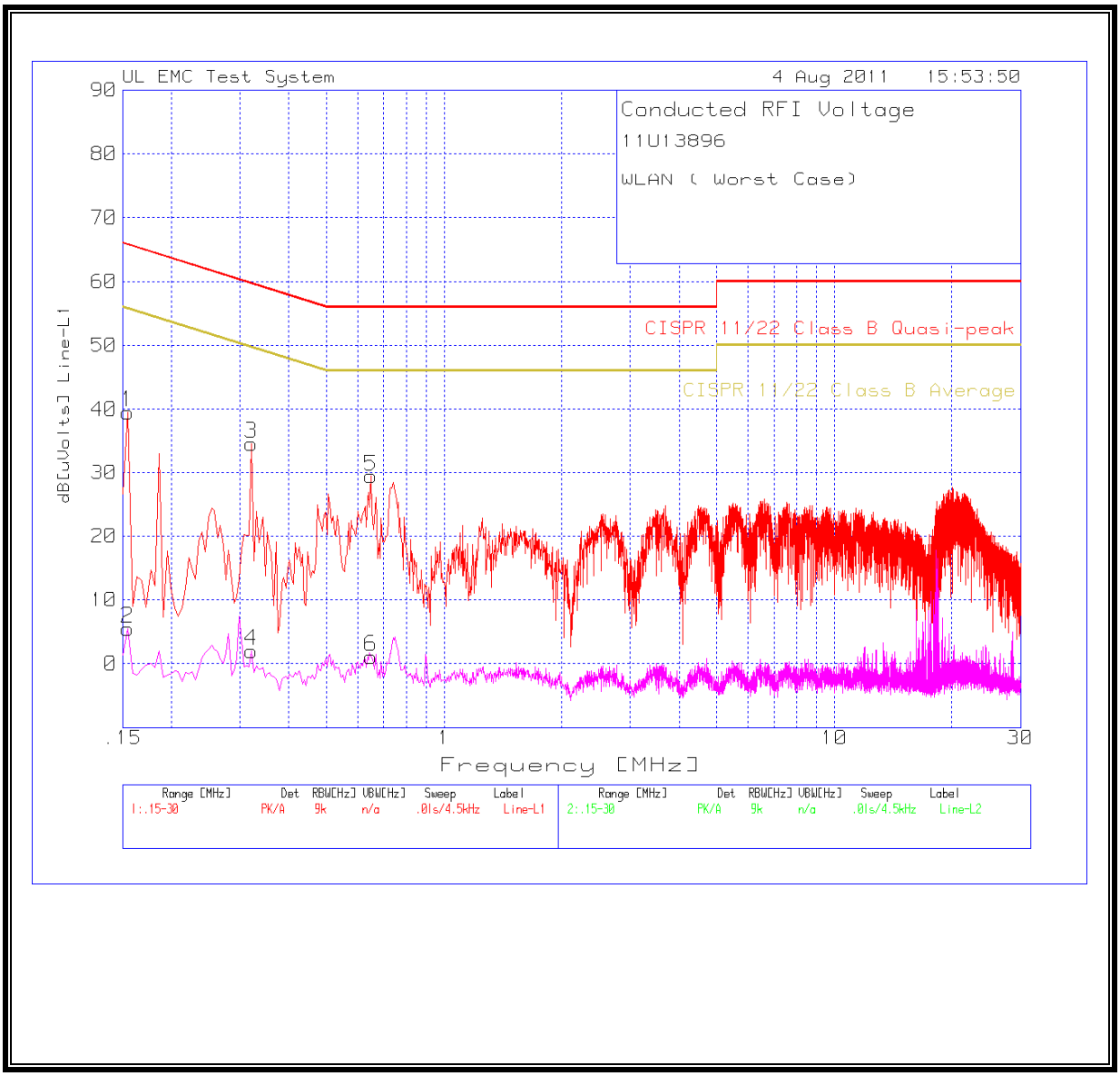
RESULTS

6 WORST EMISSIONS

WLAN

Line-L1 .15 - 30MHz									
Frequency	Reading	Detector	LISN [dB]	Cable [dB	dB[uVolts]	CISPR B Qp	Margin	CISPR B Avg	Margin
0.1545	39.54	PK	0	0	39.54	65.8	-26.26	55.8	-16.26
0.1545	5.45	Av	0	0	5.45	-	-	55.8	-50.35
0.321	34.59	PK	0	0	34.59	59.7	-25.11	49.7	-15.11
0.321	2.01	Av	0	0	2.01	-	-	49.7	-47.69
0.6495	29.46	PK	0	0	29.46	56	-26.54	46	-16.54
0.6495	1.09	Av	0	0	1.09	-	-	46	-44.91
Line-L2 .15 - 30MHz									
Frequency	Reading	Detector	LISN [dB]	Cable [dB	dB[uVolts]	CISPR B Qp	Margin	CISPR B Avg	Margin
0.1725	38.1	PK	0	0	38.1	64.8	-26.7	54.8	-16.7
0.1725	5.04	Av	0	0	5.04	-	-	54.8	-49.76
0.1995	29.81	PK	0	0	29.81	63.6	-33.79	53.6	-23.79
0.1995	1.4	Av	0	0	1.4	-	-	53.6	-52.2
0.744	31.03	PK	0	0	31.03	56	-24.97	46	-14.97
0.744	6.5	Av	0	0	6.5	-	-	46	-39.5

LINE 1 RESULTS



LINE 2 RESULTS