FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 7

CERTIFICATION TEST REPORT

FOR

802.11n-BT COMBO CARD

MODEL NUMBER: AR5B195

FCC ID: PPD-AR5B195
IC: 4104A-AR5B195

REPORT NUMBER: 09U12738-1, Revision B

ISSUE DATE: OCTOBER 08, 2009

Prepared for
ATHEROS COMMUNICATIONS, INC.
5480 GREAT AMERICA PARKWAY
SANTA CLARA, CA 95054, U.S.A.

Prepared by
COMPLIANCE CERTIFICATION SERVICES
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	09/24/09	Initial Issue	T. Chan
A	10/01/09	Corrected HT40 Frequency Channel & Added Note in Section 5.2, Also Corrected IC #	T. Chan
B	10/08/09	Added b-Mode RF Conducted Measurement On Single Antenna Configuration Per TCB Question	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: ATHEROS COMMUNICATION, INC
5480 GREAT AMERICA PARKWAY
SANTA CLARA, CA 95054 USA

EUT DESCRIPTION: 802.11n-BT COMBO CARD

MODEL: AR5B195

SERIAL NUMBER: WB-195DA-040-D1090 (Dual Antenna configuration);
WB-195SA-140-D1163 (Single Antenna configuration)

DATE TESTED: AUGUST 27-OCTOBER 7, 2009

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

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

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

Approved & Released For CCS By:

THU CHAN
EMC MANAGER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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 EUT is an 802.11n-BT Combo Card with dual or single antenna configuration.

The radio module is manufactured by Atheros Communications

5.2. MAXIMUM OUTPUT POWER

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

DUAL ANTENNA CONFIGURATION

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	20.80	120.23
2412 - 2462	802.11g	26.40	436.52
2412 - 2462	802.11n HT20	26.30	426.58
2422 - 2452	802.11n HT40	25.30	338.84

SINGLE ANTENNA CONFIGURATION

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	20.70	117.49
2412 - 2462	802.11g	25.00	316.23
2412 - 2462	802.11n HT20	25.00	316.23
2422 - 2452	802.11n HT40	24.20	263.03

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna with 800mm cable length and maximum peak gain of 3.62 dBi.

5.4. SOFTWARE AND FIRMWARE

The test utility and driver software used during testing was Art ANWI 1.4 and Devlib Revision 0.9 Build #15 Art_11n.

5.5. WORST-CASE CONFIGURATION AND MODE

Both single and dual antenna configurations were evaluated on conducted and radiated emissions test, however, the single antenna configuration only performed on the worst case of dual antenna configuration.

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

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

All final tests in the 802.11b mode were made at 1 Mb/s
All final tests in the 802.11g mode were made at 6 Mb/s
All final tests in the 802.11n HT20 mode were made at MCS0 6.5 Mb/s.
All final tests in the 802.11n HT40 mode were made at MCS013.5 Mb/s

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

Based on the results of dual antenna configuration, g mode, HT20 and HT40 mode were considered to be the worst case due to the restricted band edge; and b mode harmonic was considered to be the worst case of all; therefore, only worst case modes were performed on the single antenna configuration module.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	769	L3-BA653	DoC
AC Adapter	Lenovo	42T5008	11S92P1156Z1ZDXN7CR2AD	DoC

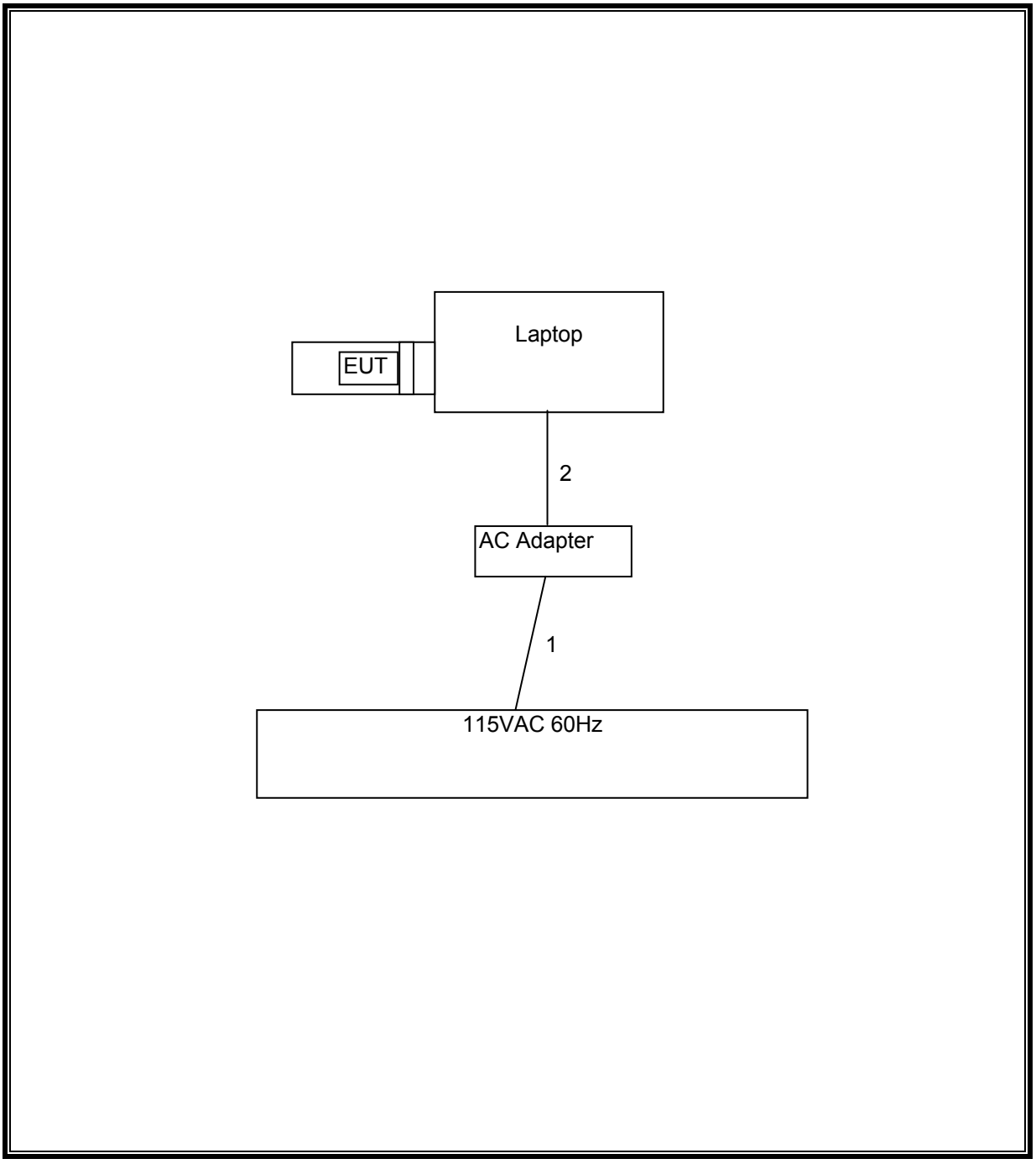
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	2m	No
2	DC	1	DC	Un-shielded	2m	One ferrite's at Laptop's end

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	01/14/10
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	02/04/10
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	12/16/09
Antenna, Horn, 18 GHz	EMCO	3115	C00945	01/29/10
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/09
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	06/01/10
Peak Power Meter	Boonton	4541	C01186	01/19/10
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRC13192	N02683	CNR
Peak Power Sensor	Boonton	57318		02/02/10

7. DUAL ANTENNA CONFIGURATION TEST RESULTS

7.1. 802.11b MODE IN THE 2.4 GHz BAND

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

TEST PROCEDURE

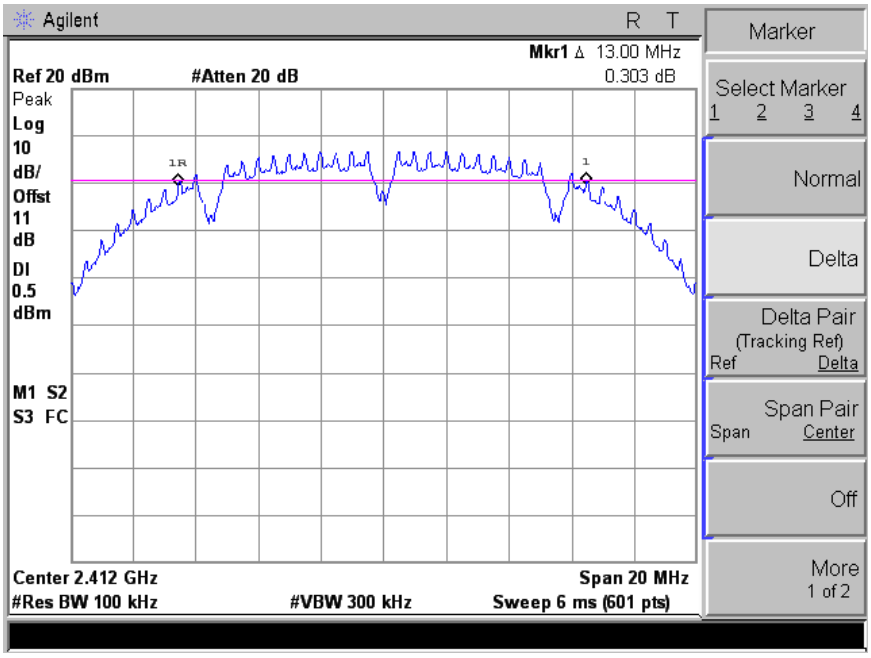
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

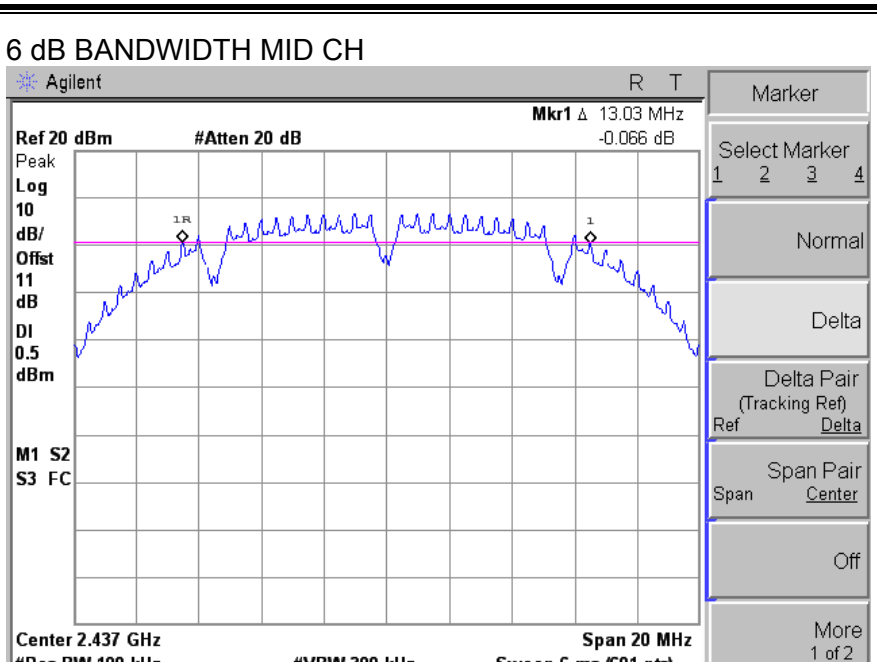
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	13.00	0.5
Middle	2437	13.03	0.5
High	2462	13.03	0.5

6 dB BANDWIDTH

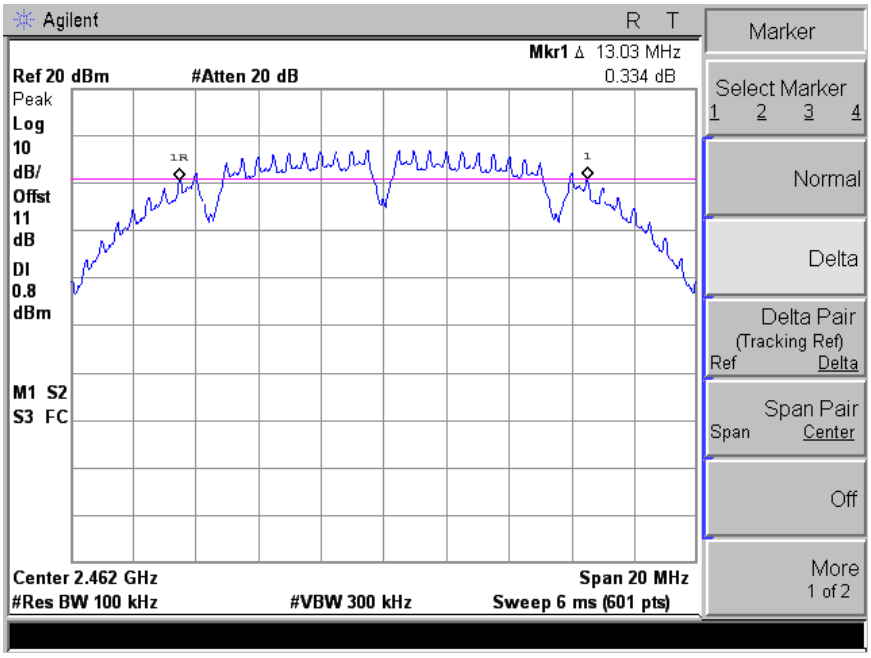
6 dB BANDWIDTH LOW CH



6 dB BANDWIDTH MID CH



6 dB BANDWIDTH HIGH CH



7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

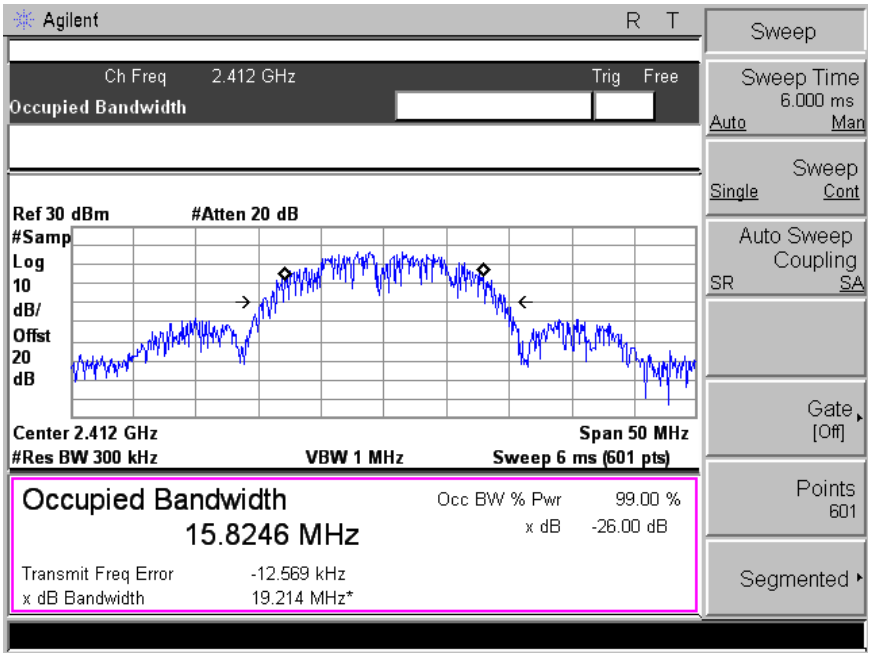
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

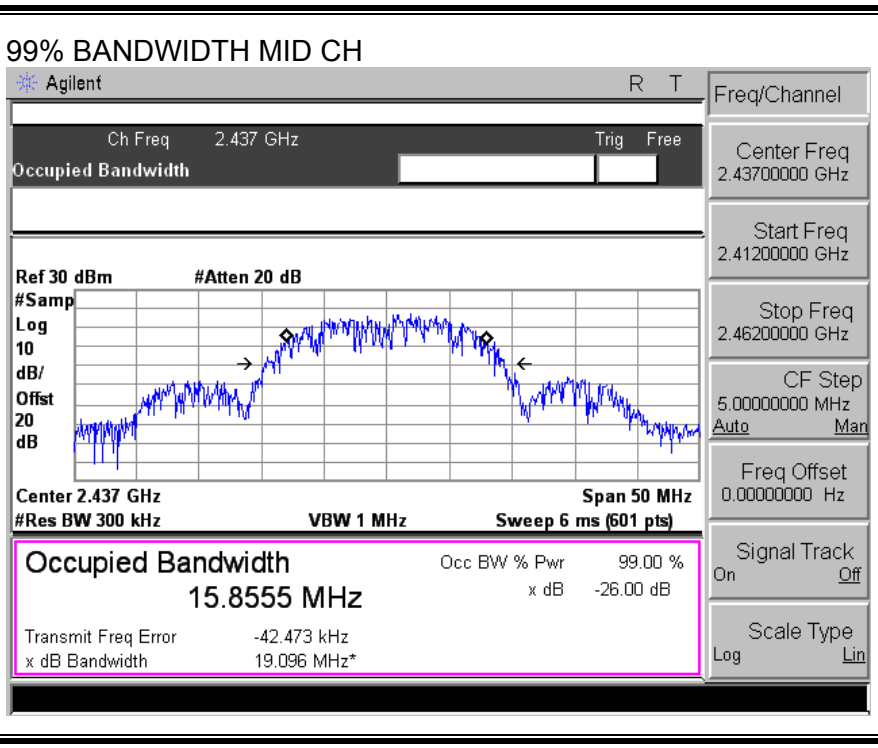
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	15.8246
Middle	2437	15.8555
High	2462	15.8234

99% BANDWIDTH

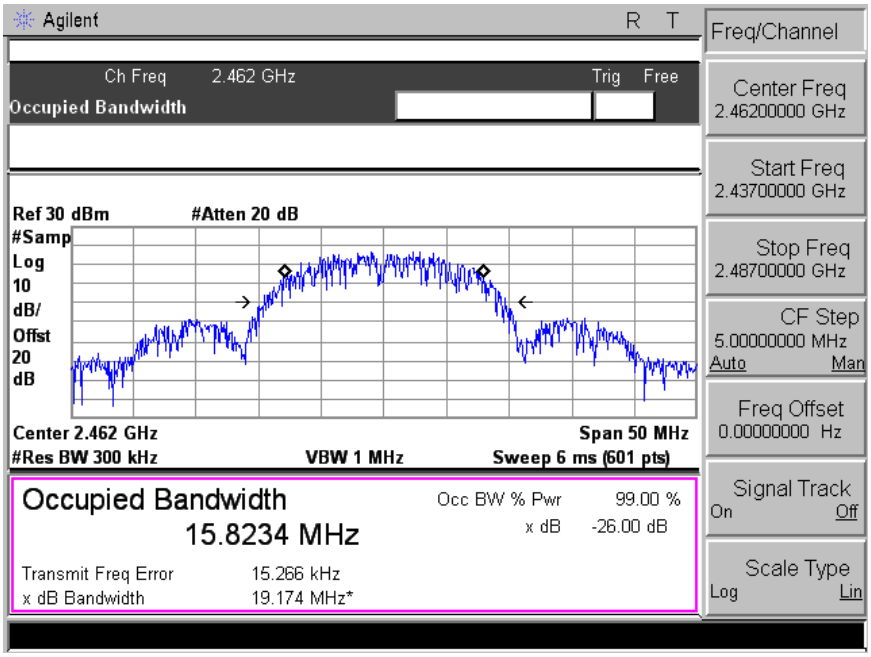
99% BANDWIDTH LOW CH



99% BANDWIDTH MID CH



99% BANDWIDTH HIGH CH



7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using Boonton Peak Power Meter,

RESULTS

Channel	Frequency (MHz)	Peak Power Meter Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	20.37	30	-9.63
Middle	2437	20.80	30	-9.20
High	2462	20.60	30	-9.40

7.1.4. AVERAGE POWER (11b-Mode)

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 1dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	17.54
Middle	2437	17.90
High	2462	17.30

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

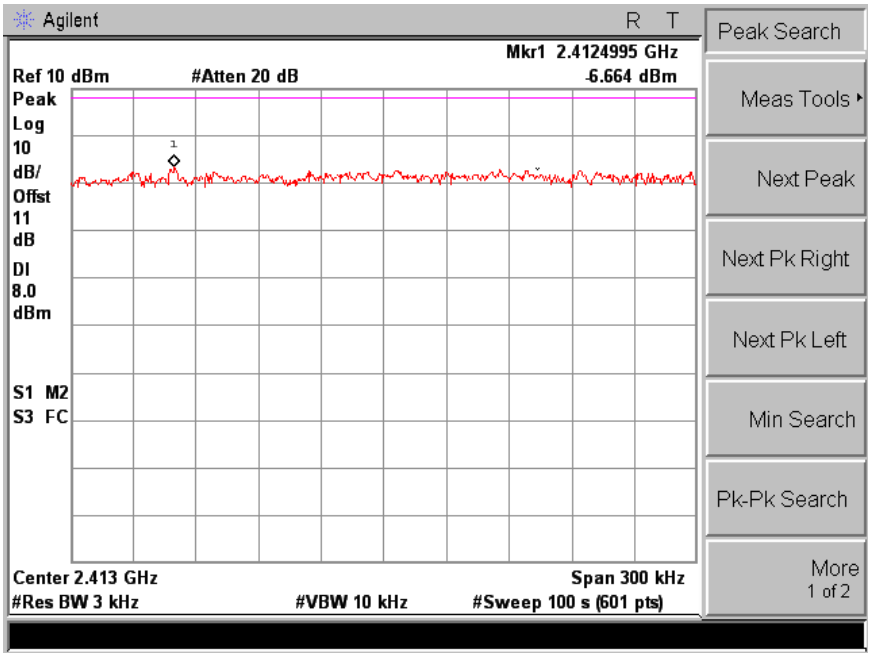
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

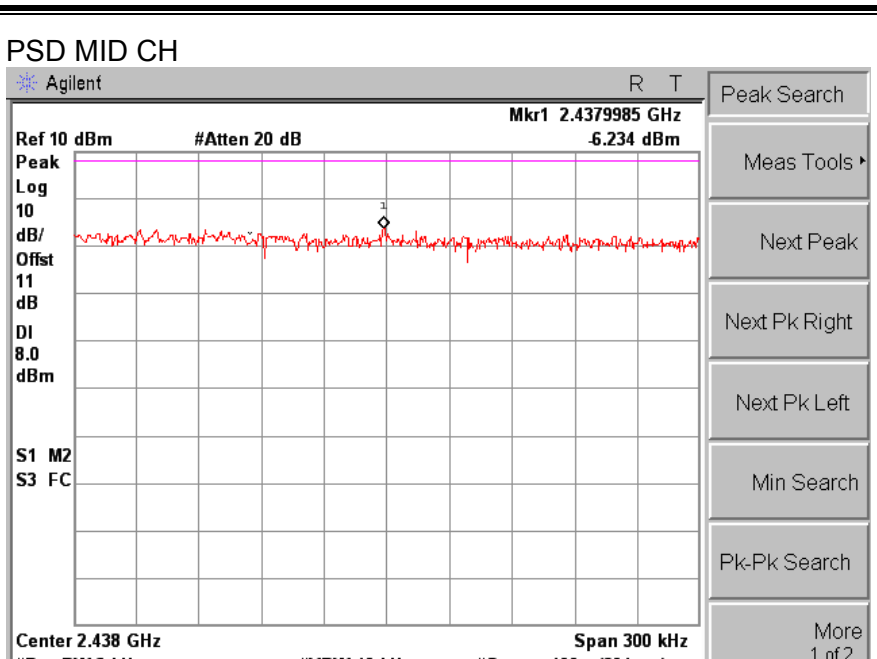
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-6.66	8	-14.66
Middle	2437	-6.23	8	-14.23
High	2462	-5.96	8	-13.96

POWER SPECTRAL DENSITY

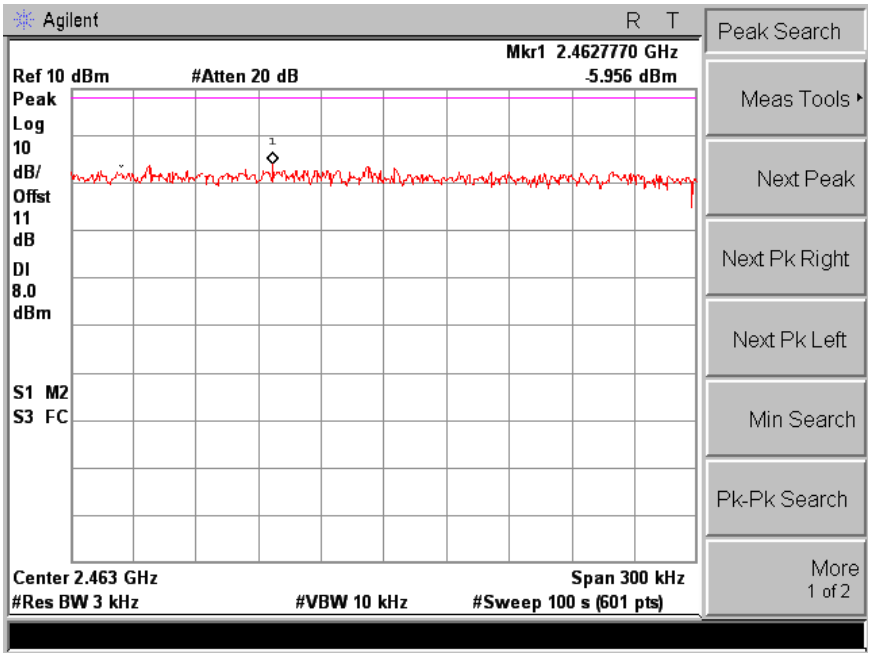
PSD LOW CH



PSD MID CH



PSD HIGH CH



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

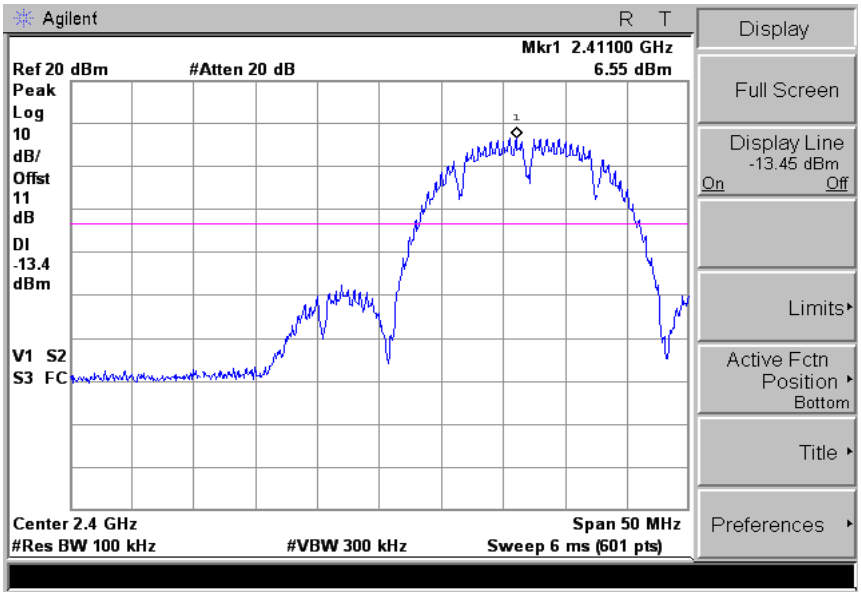
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

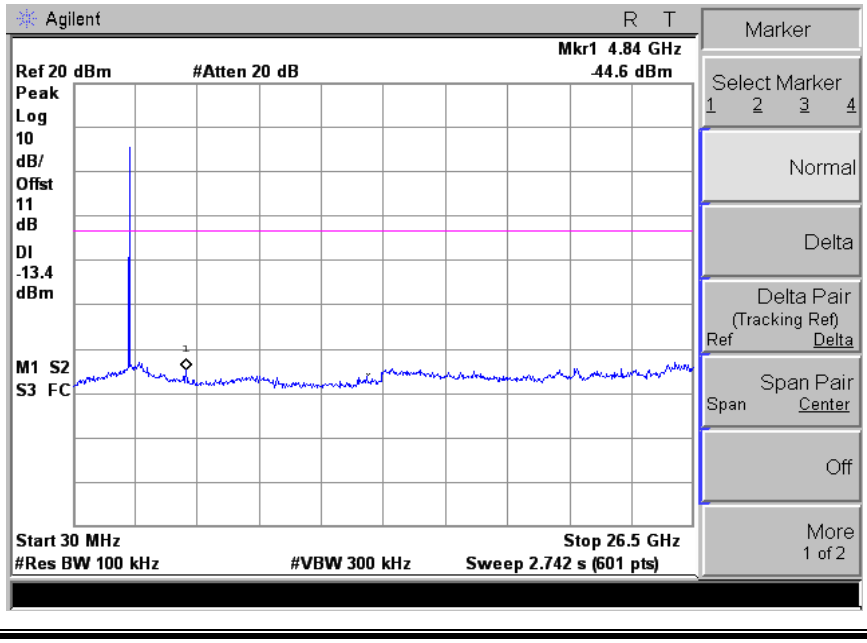
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

LOW CH BANDEDGE

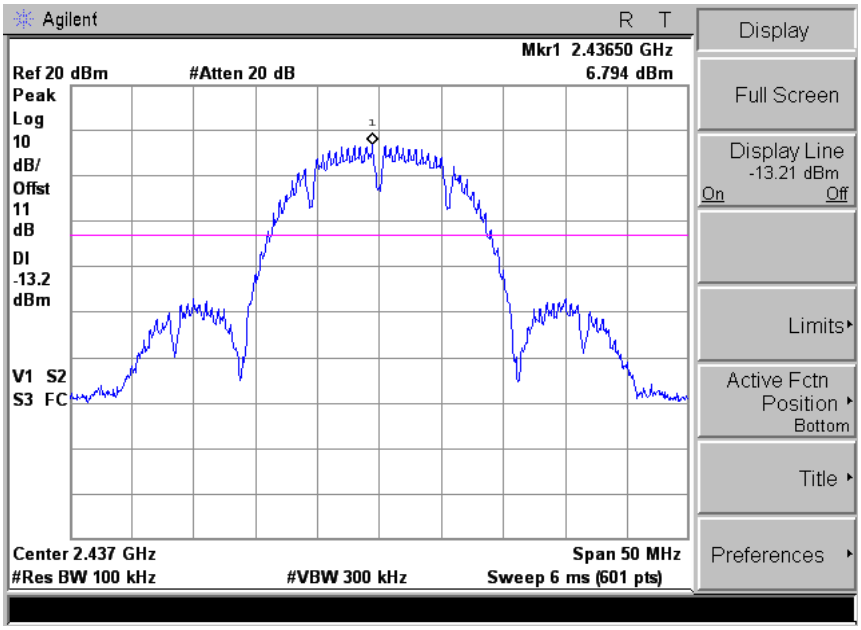


LOW CH SPURIOUS

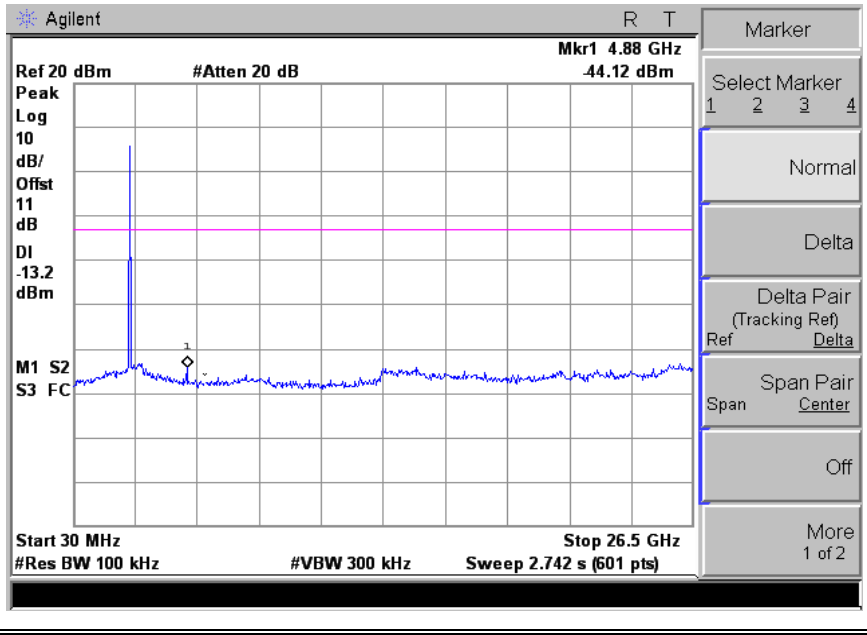


SPURIOUS EMISSIONS, MID CHANNEL

MID CH REFERENCE

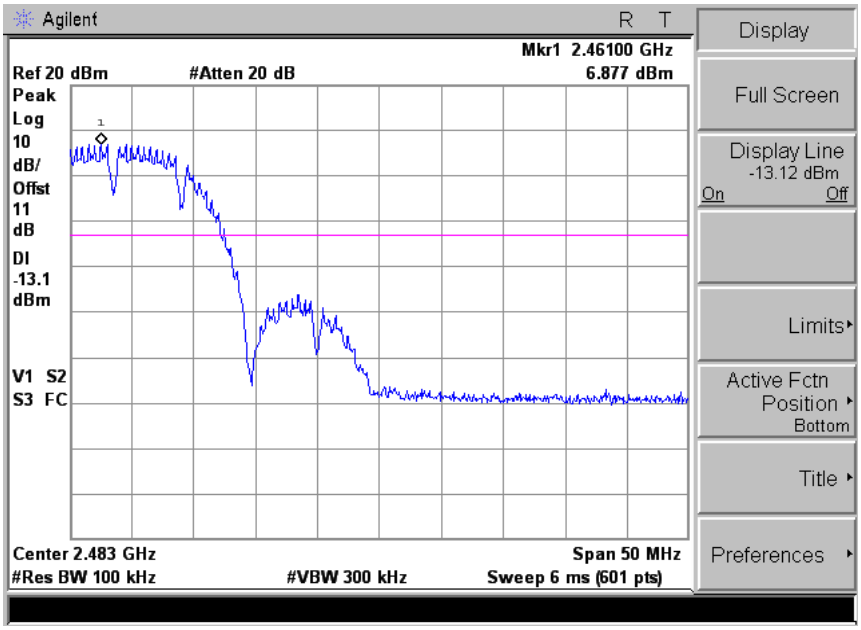


MID CH SPURIOUS

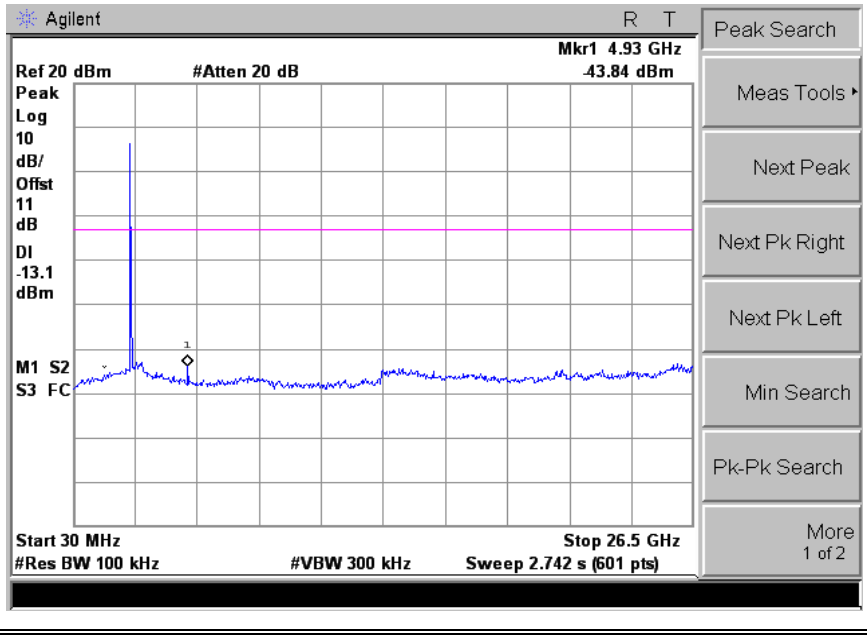


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CH BANDEDGE



HIGH CH SPURIOUS



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

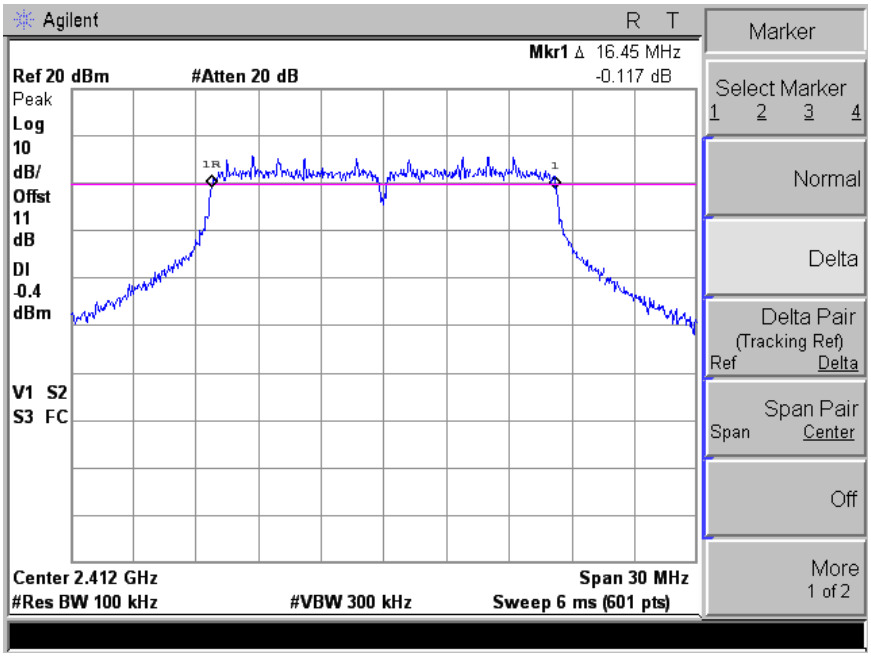
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

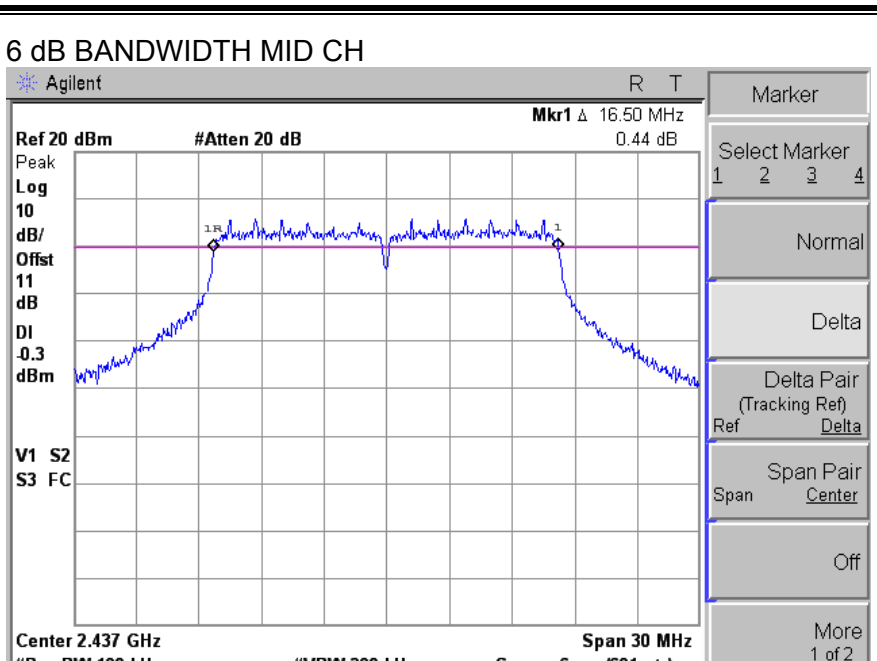
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.45	0.5
Middle	2437	16.50	0.5
High	2462	16.50	0.5

6 dB BANDWIDTH

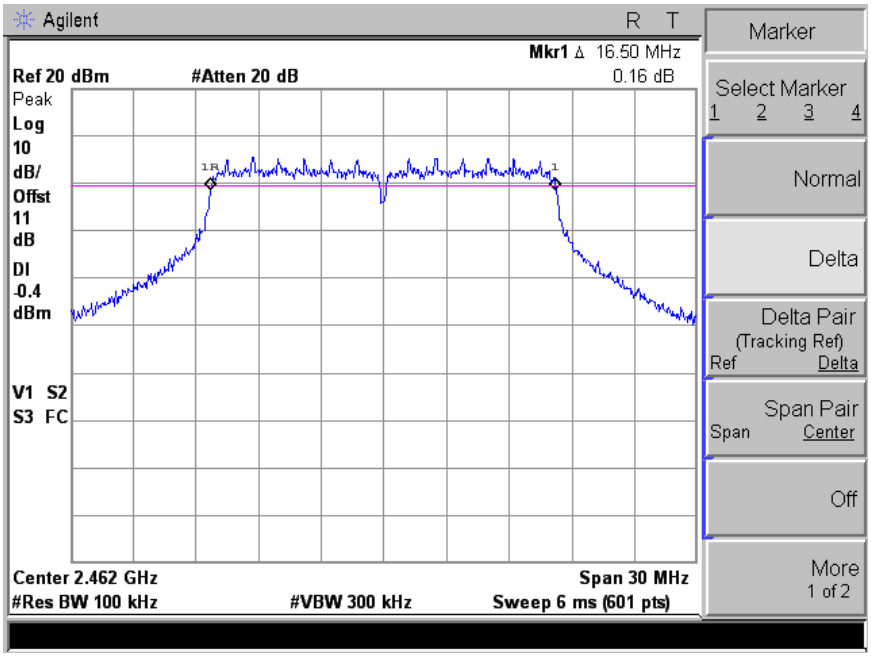
6 dB BANDWIDTH LOW CH



6 dB BANDWIDTH MID CH



6 dB BANDWIDTH HIGH CH



7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

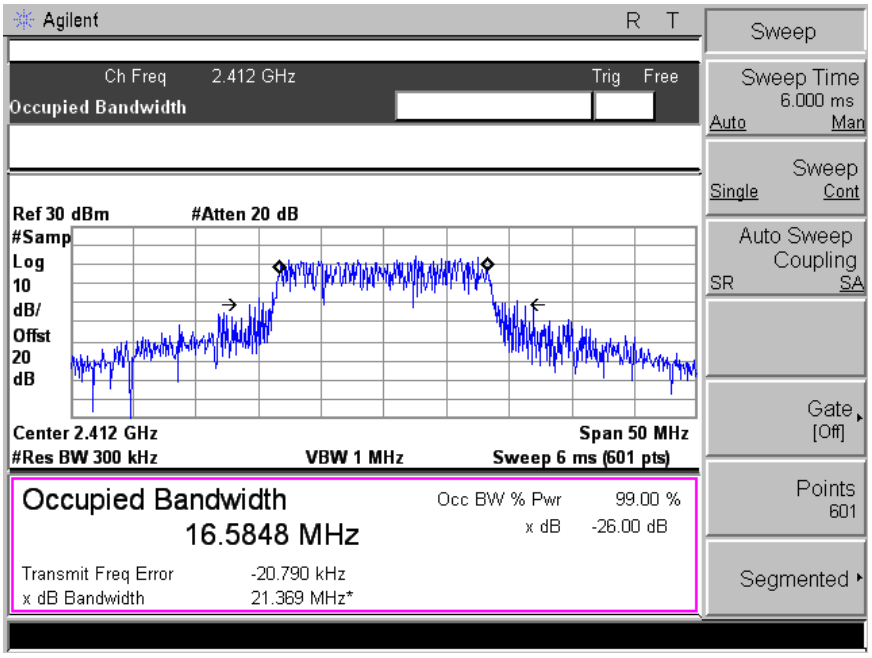
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

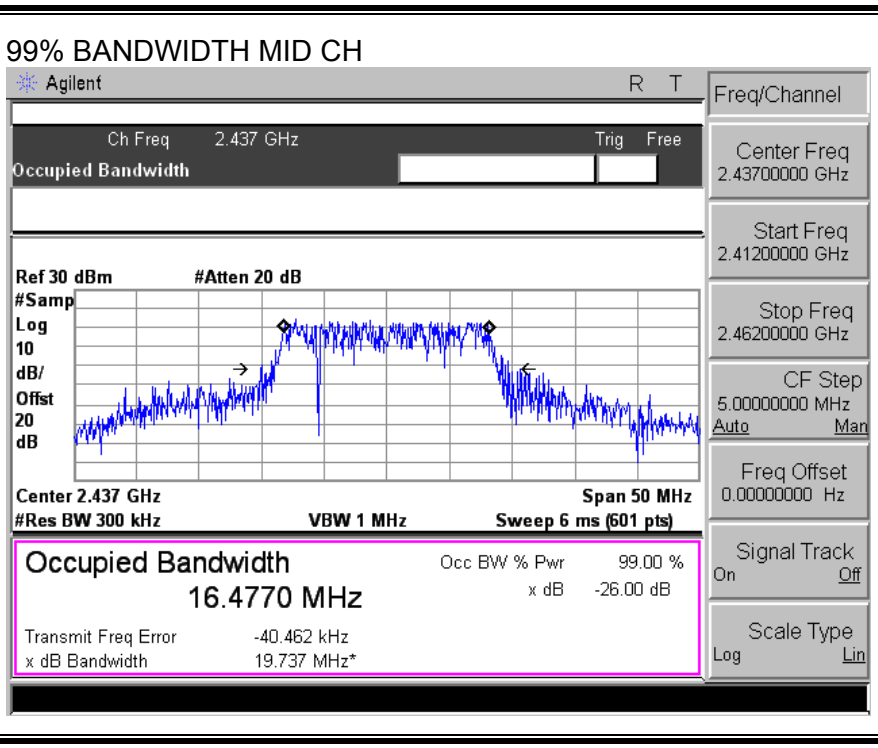
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.5848
Middle	2437	16.4770
High	2462	16.5395

99% BANDWIDTH

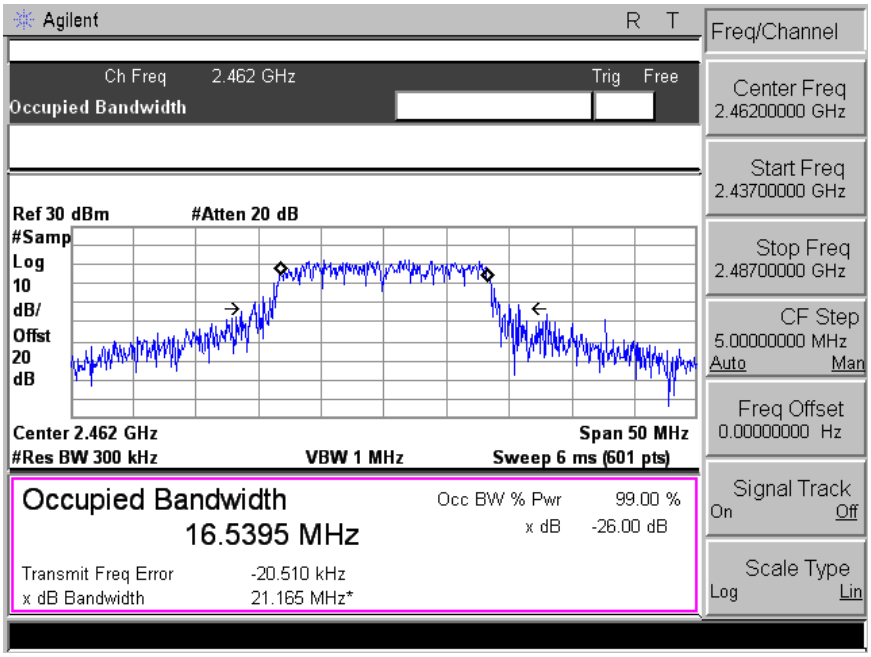
99% BANDWIDTH LOW CH



99% BANDWIDTH MID CH



99% BANDWIDTH HIGH CH



7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using Boonton Peak Power Meter,

RESULTS

Channel	Frequency (MHz)	Peak Power Meter Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	23.70	30	-6.30
Middle	2437	26.40	30	-3.60
High	2462	23.30	30	-6.70

7.2.4. AVERAGE POWER (11g-Mode)

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	17.20
High	2462	13.50

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

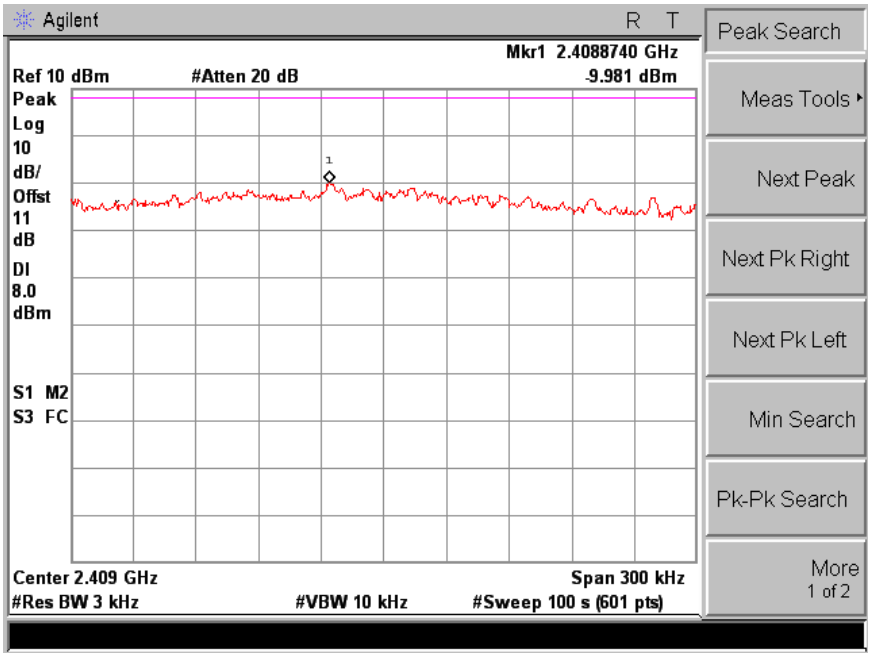
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

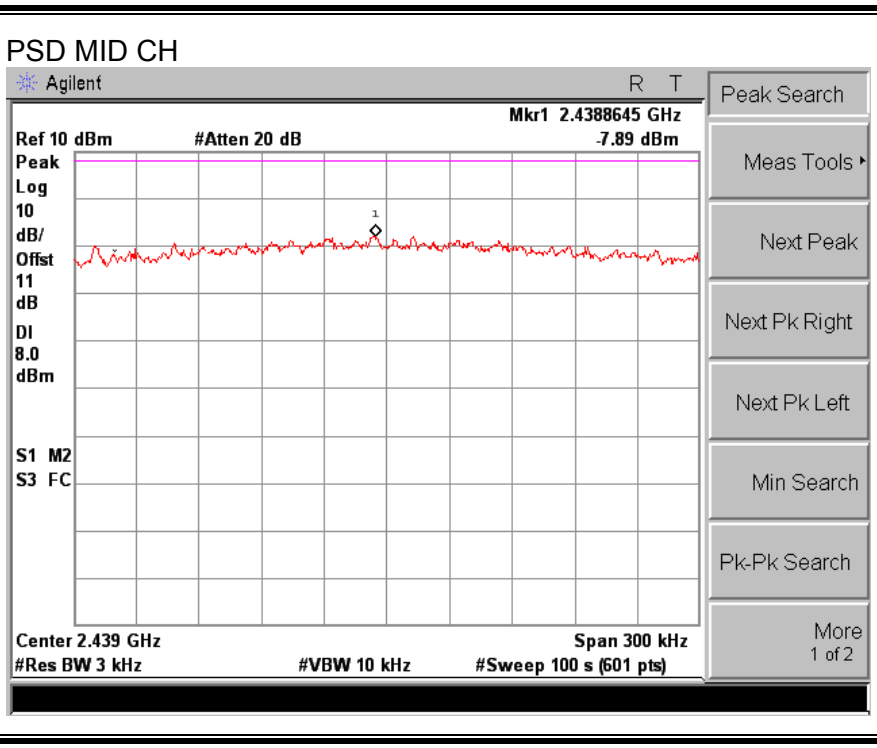
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.98	8	-17.98
Middle	2437	-7.89	8	-15.89
High	2462	-10.07	8	-18.07

POWER SPECTRAL DENSITY

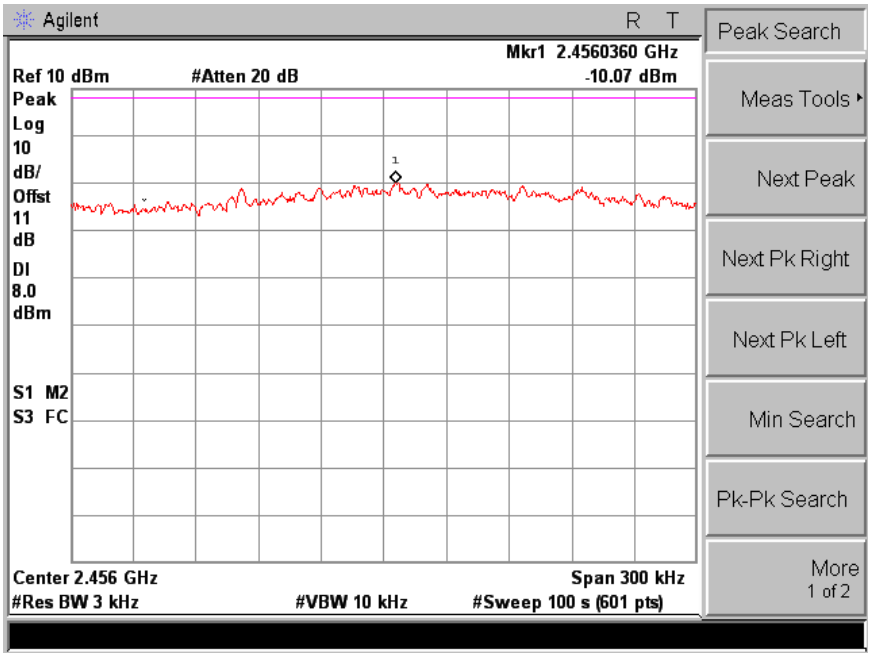
PSD LOW CH



PSD MID CH



PSD HIGH CH



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

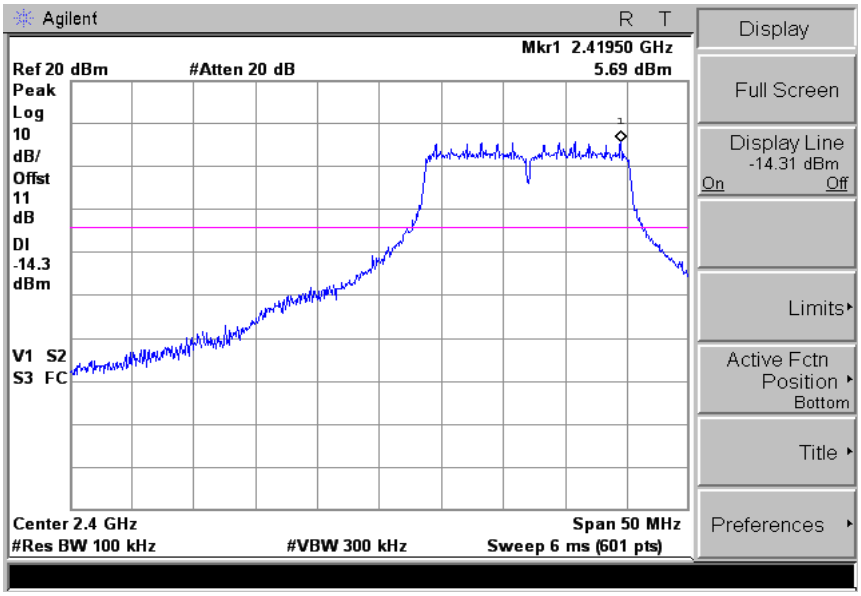
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

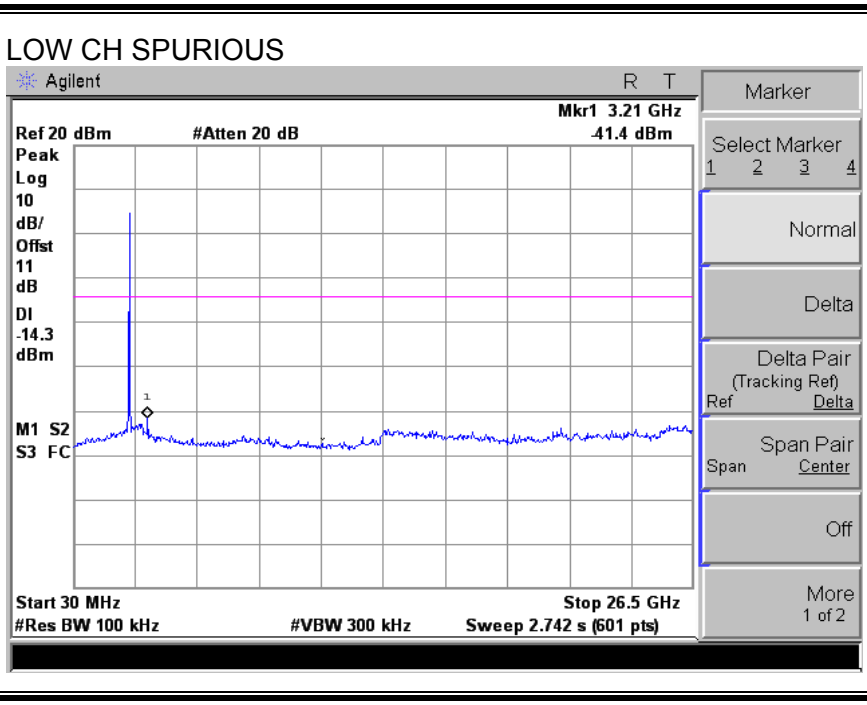
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

LOW CH BANDEDGE

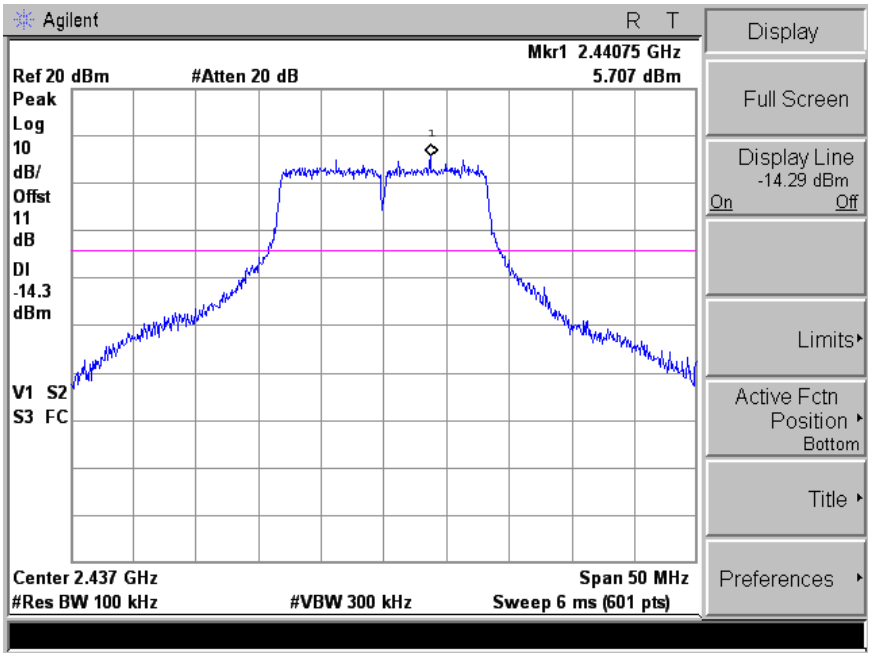


LOW CH SPURIOUS

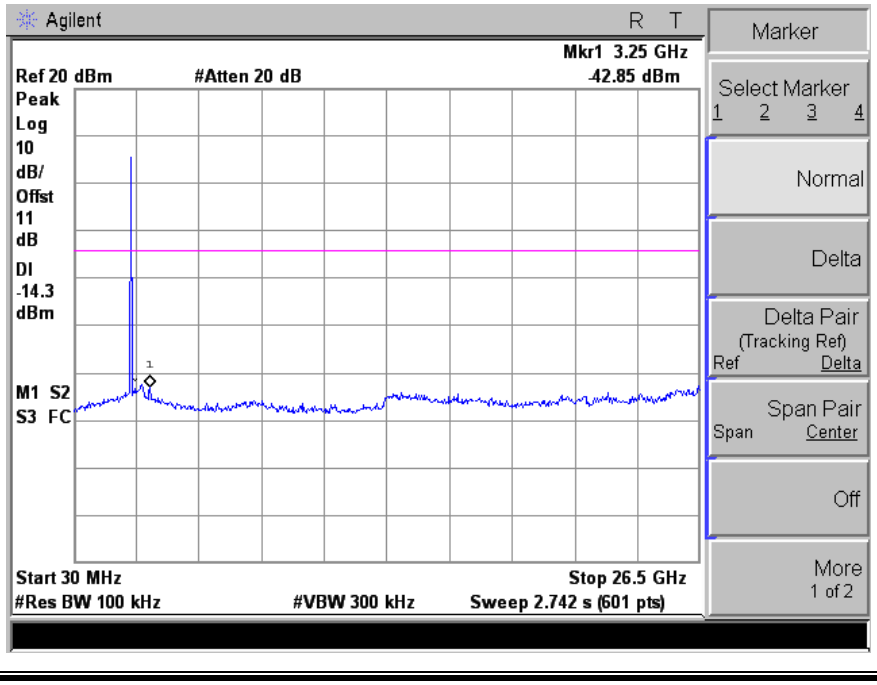


SPURIOUS EMISSIONS, MID CHANNEL

MID CH REFERENCE

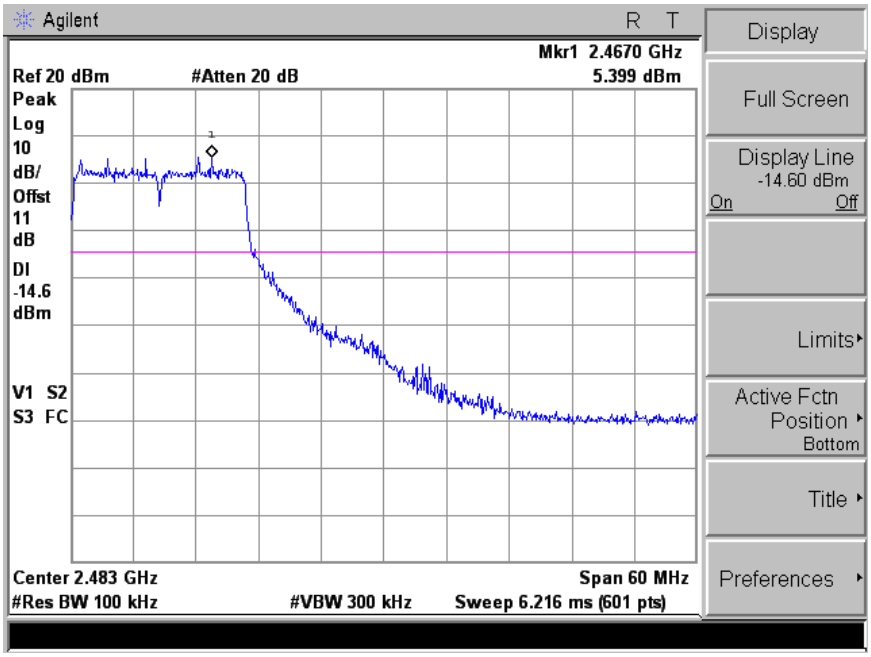


MID CH SPURIOUS

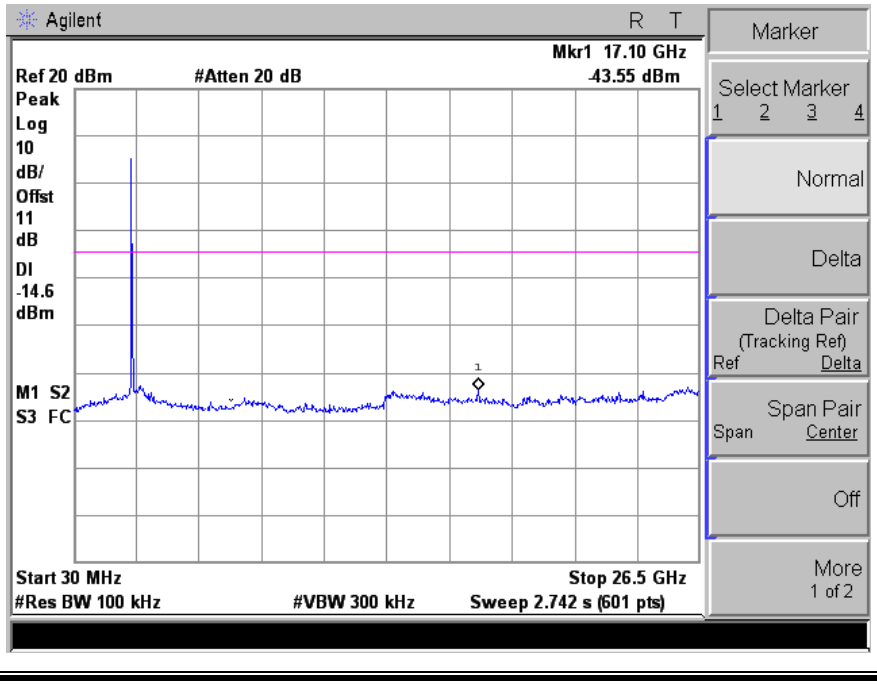


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CH BANDEDGE



HIGH CH SPURIOUS



7.3. 802.11 HT20 MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

TEST PROCEDURE

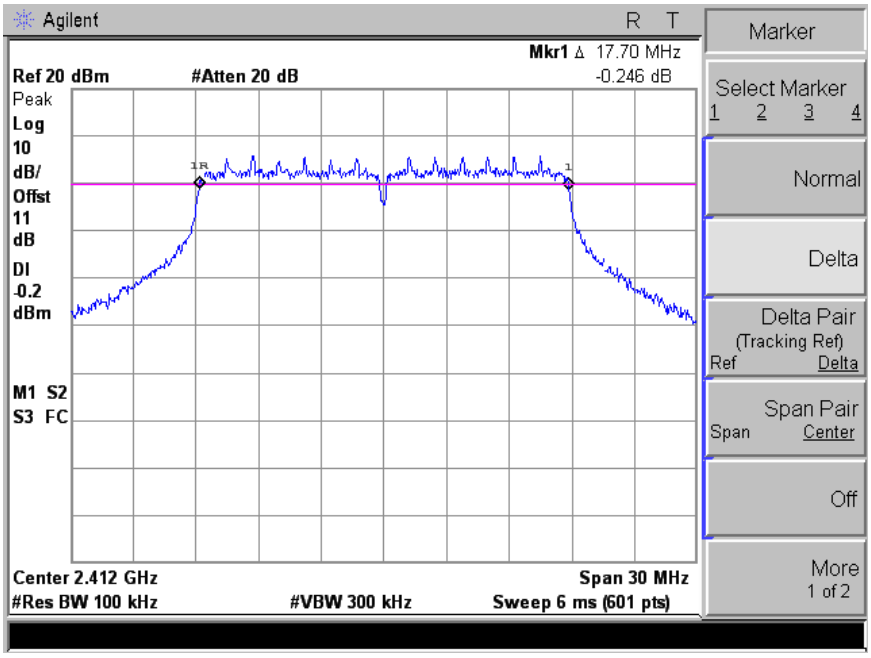
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

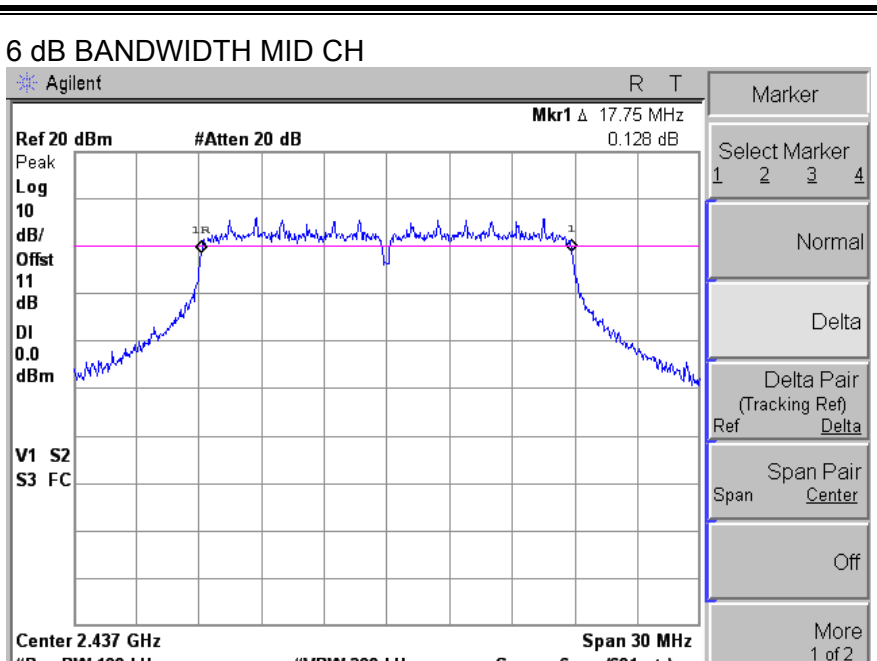
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	17.70	0.5
Middle	2437	17.75	0.5
High	2462	17.70	0.5

6 dB BANDWIDTH

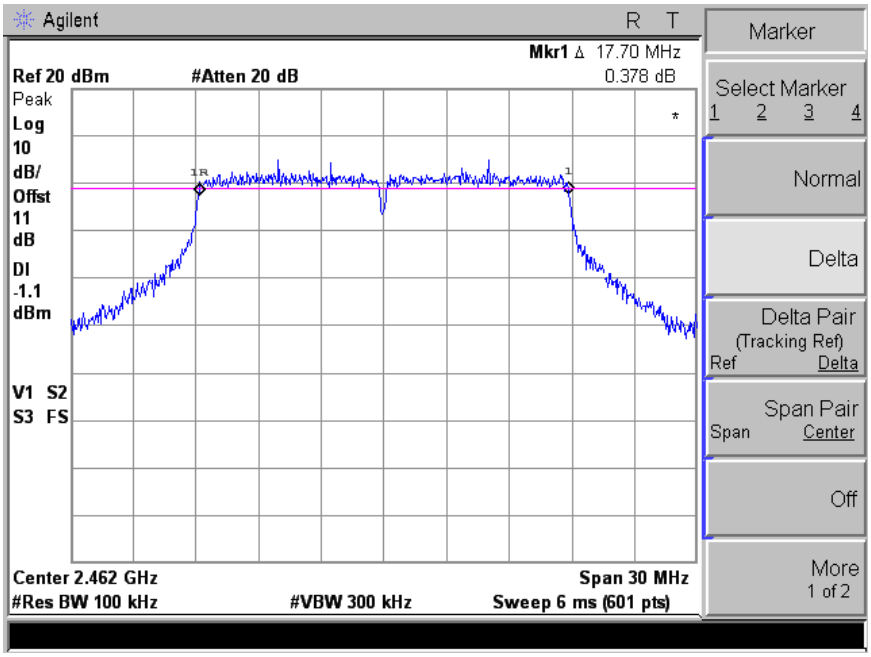
6 dB BANDWIDTH LOW CH



6 dB BANDWIDTH MID CH



6 dB BANDWIDTH HIGH CH



7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

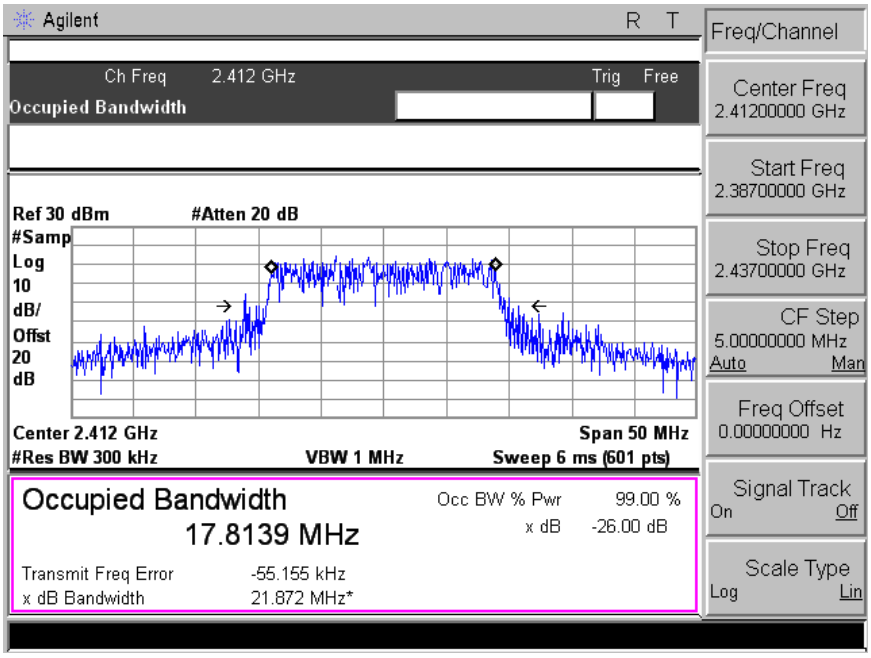
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

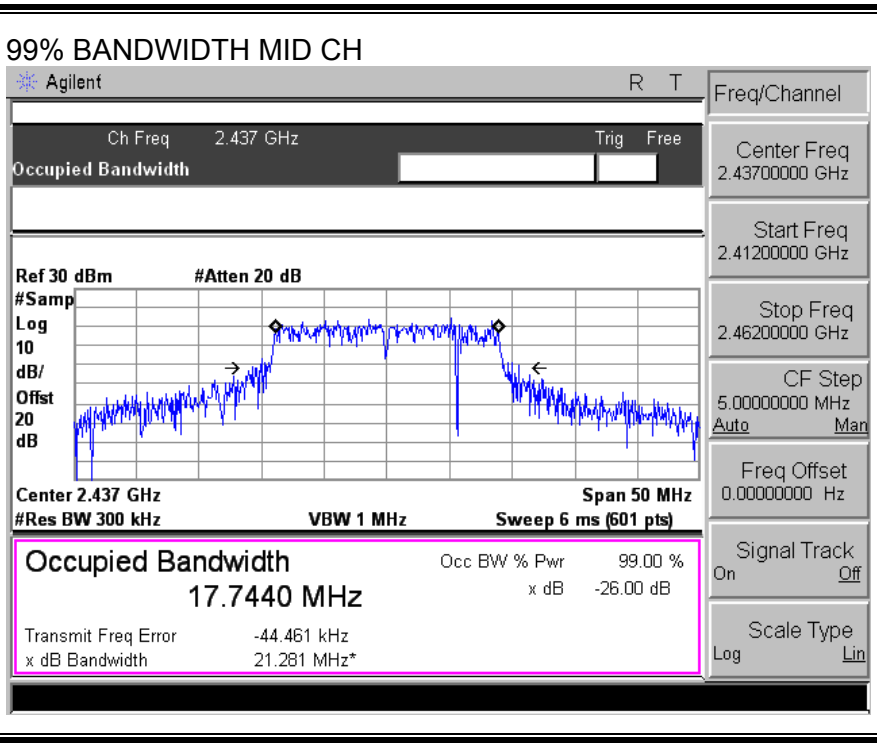
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.8139
Middle	2437	17.744
High	2462	17.6779

99% BANDWIDTH

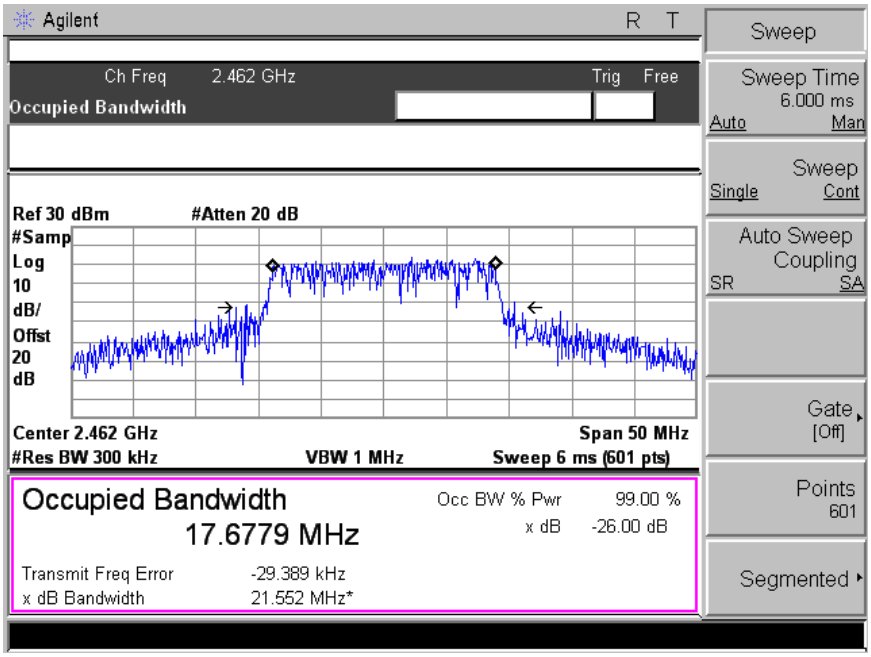
99% BANDWIDTH LOW CH



99% BANDWIDTH MID CH



99% BANDWIDTH HIGH CH



7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using Boonton Peak Power Meter,

RESULTS

Channel	Frequency (MHz)	Peak Power Meter Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	23.00	30	-7.00
Middle	2437	26.30	30	-3.70
High	2462	22.00	30	-8.00

7.3.4. AVERAGE POWER (HT20-Mode)

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	13.10
Middle	2437	17.20
High	2462	12.50

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

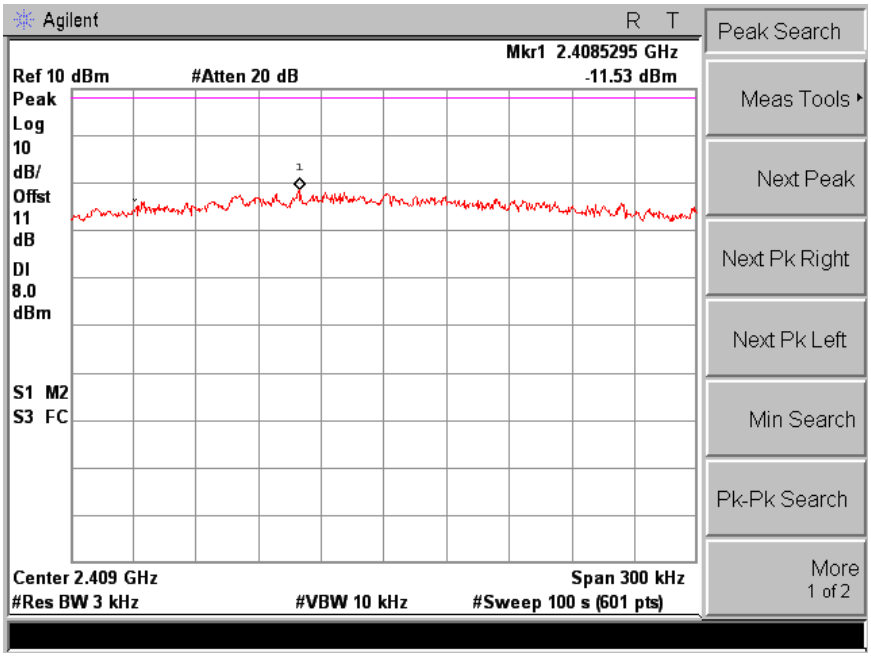
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

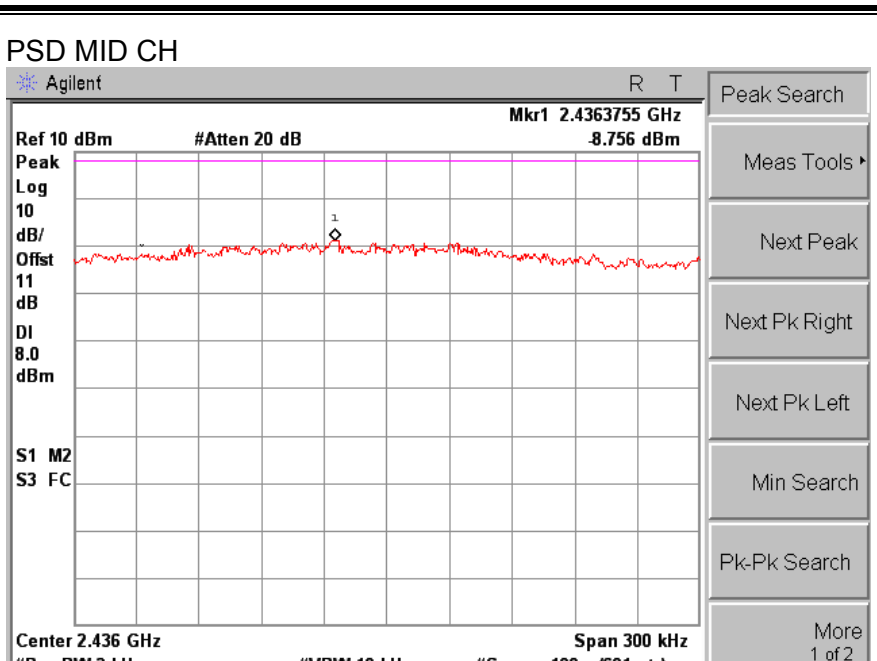
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-11.53	8	-19.53
Middle	2437	-8.76	8	-16.76
High	2462	-11.67	8	-19.67

POWER SPECTRAL DENSITY

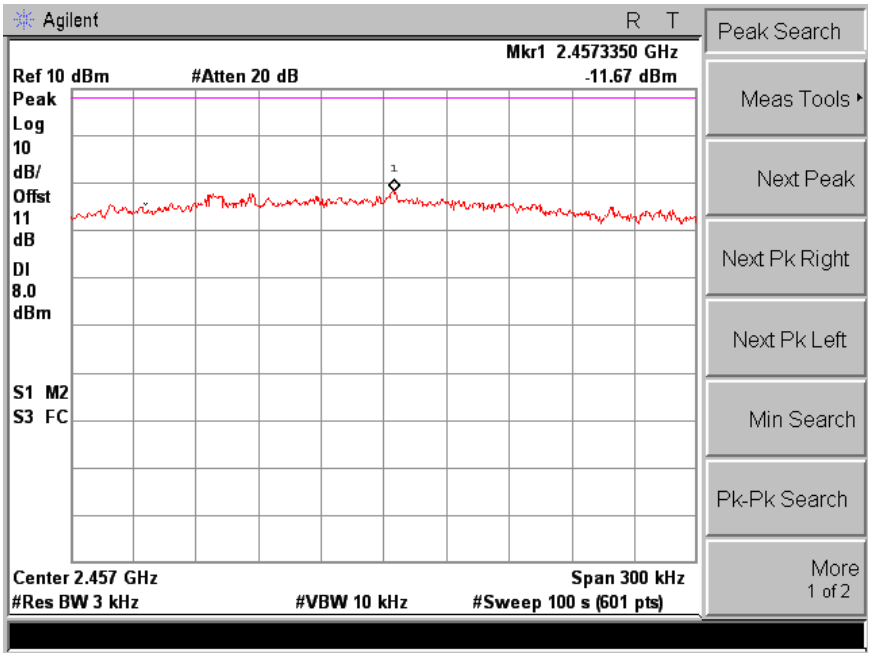
PSD LOW CH



PSD MID CH



PSD HIGH CH



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

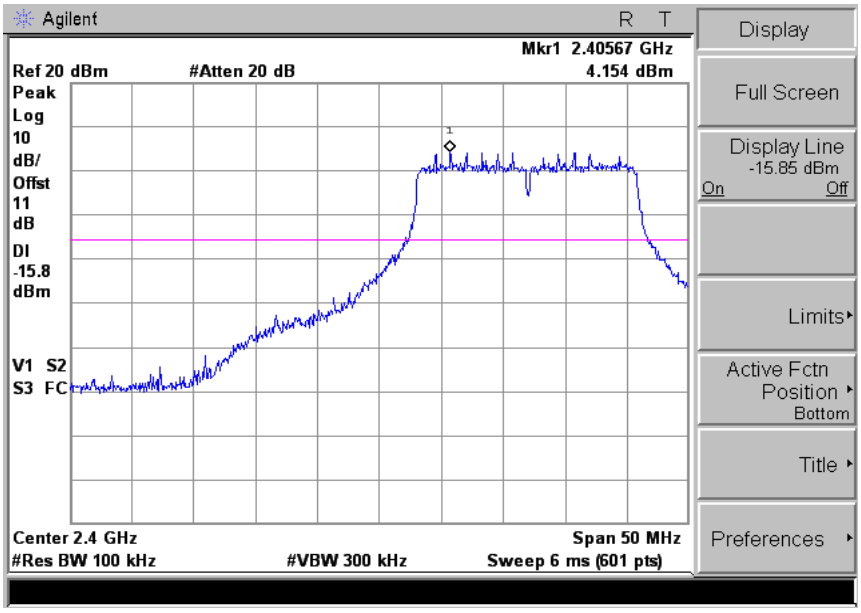
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

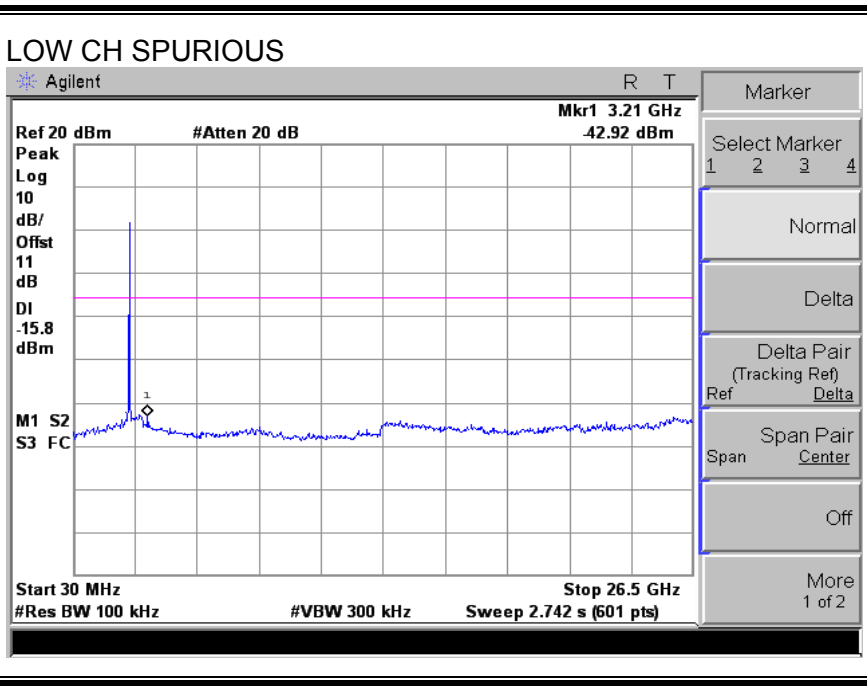
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

LOW CH BANDEDGE

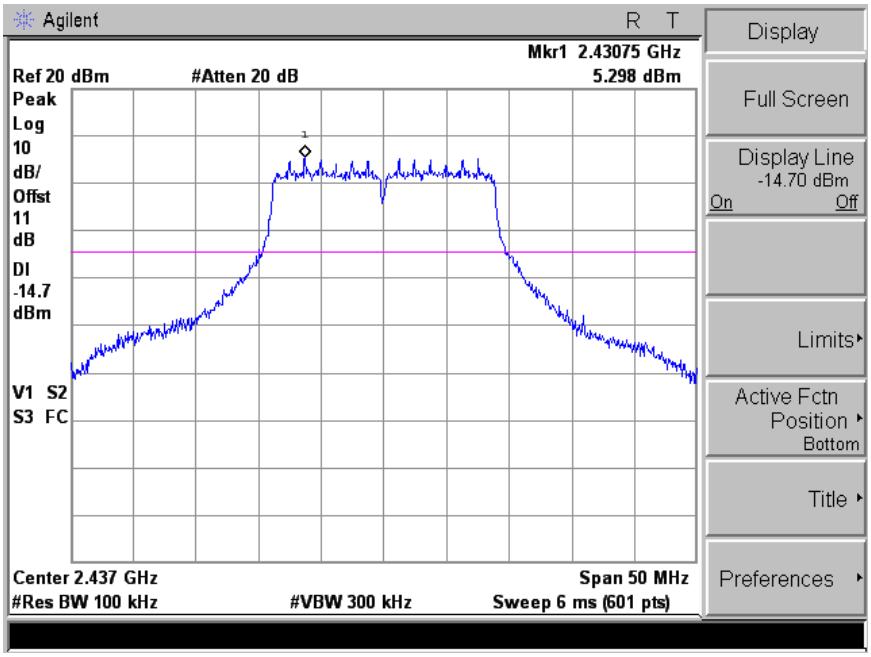


LOW CH SPURIOUS

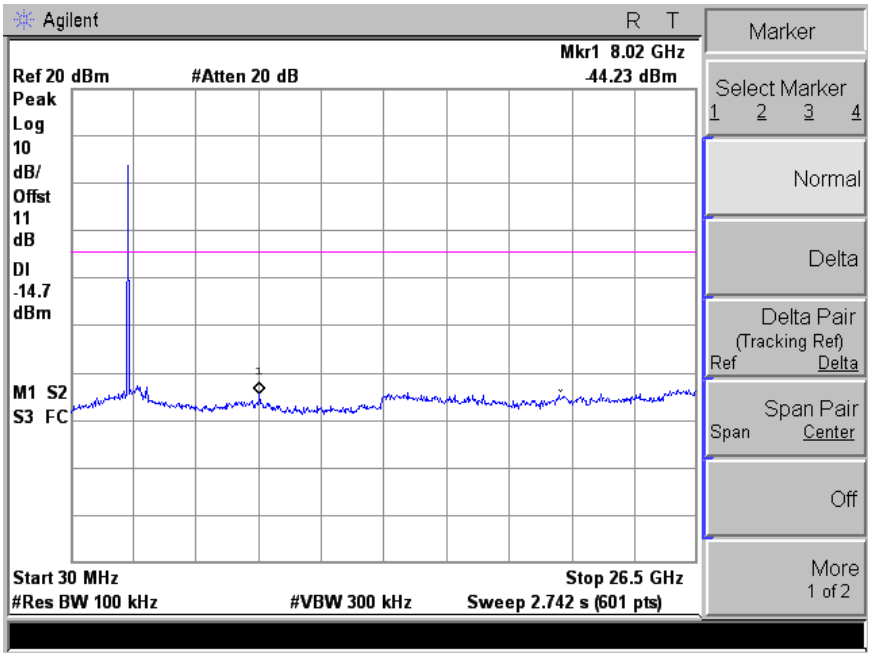


SPURIOUS EMISSIONS, MID CHANNEL

MID CH REFERENCE

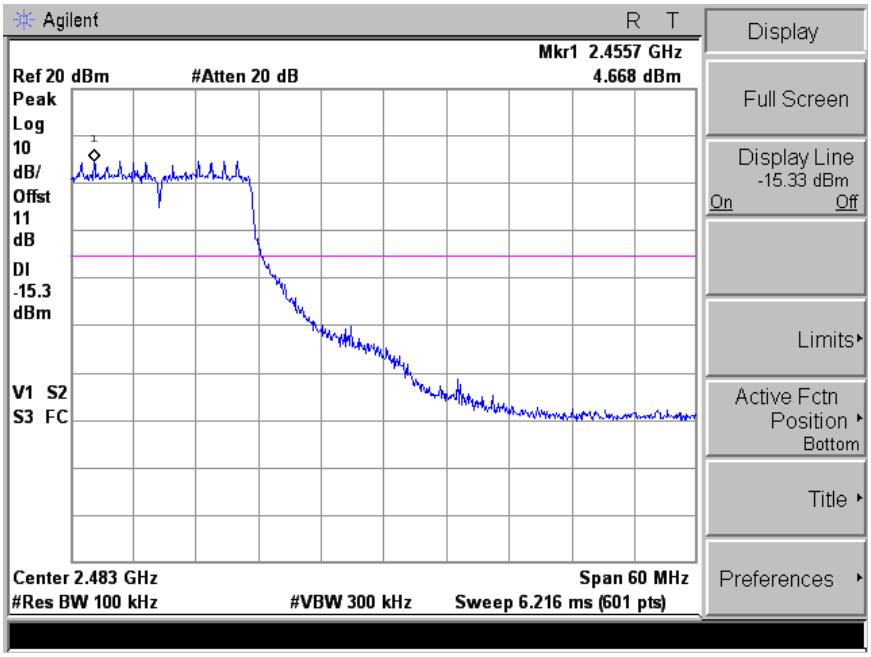


MID CH SPURIOUS

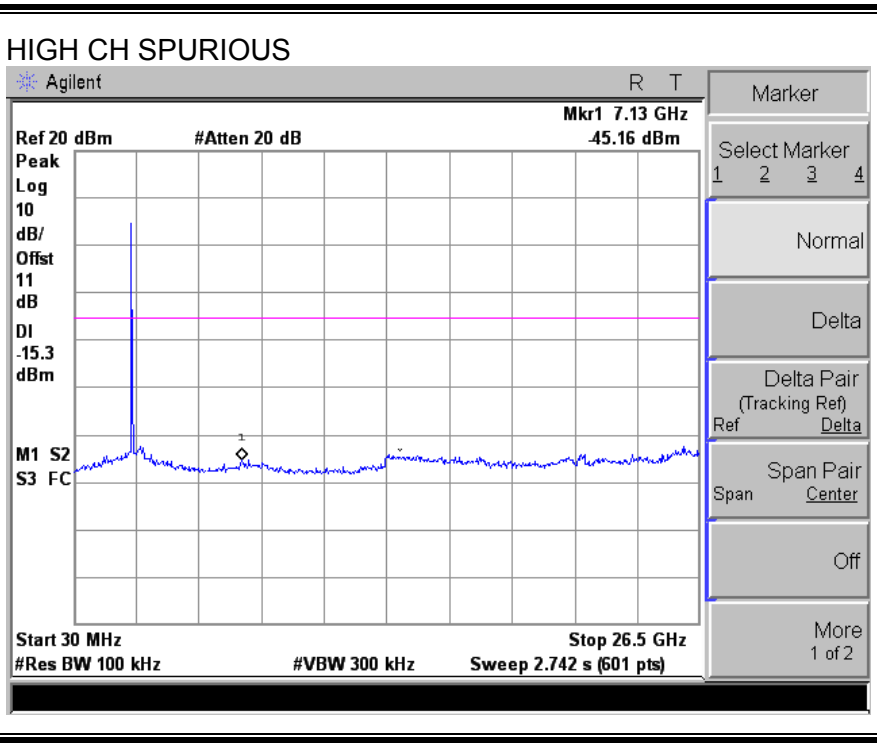


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CH BANDEDGE



HIGH CH SPURIOUS



7.4. 802.11 HT40 MODE IN THE 2.4 GHz BAND

7.4.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

TEST PROCEDURE

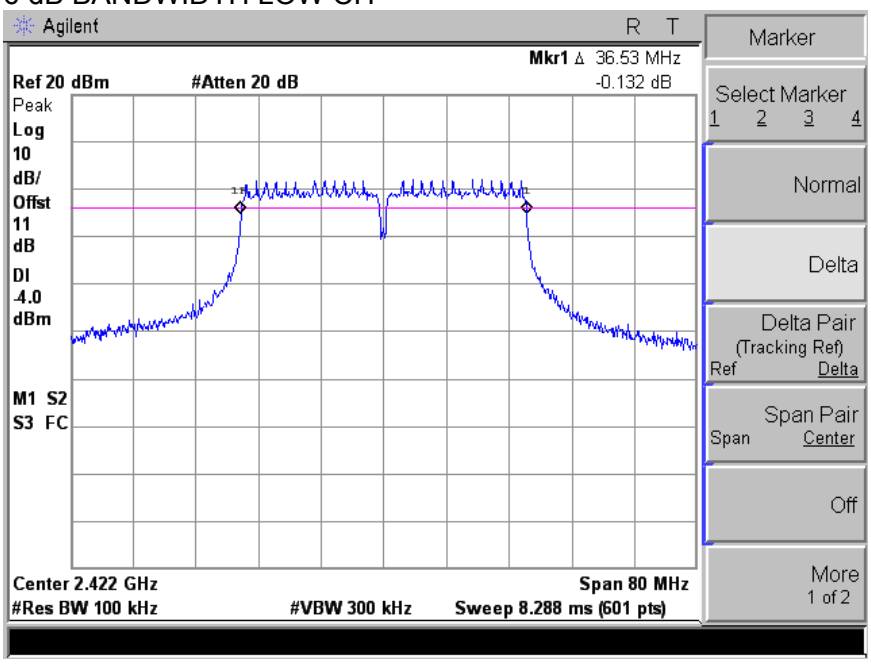
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

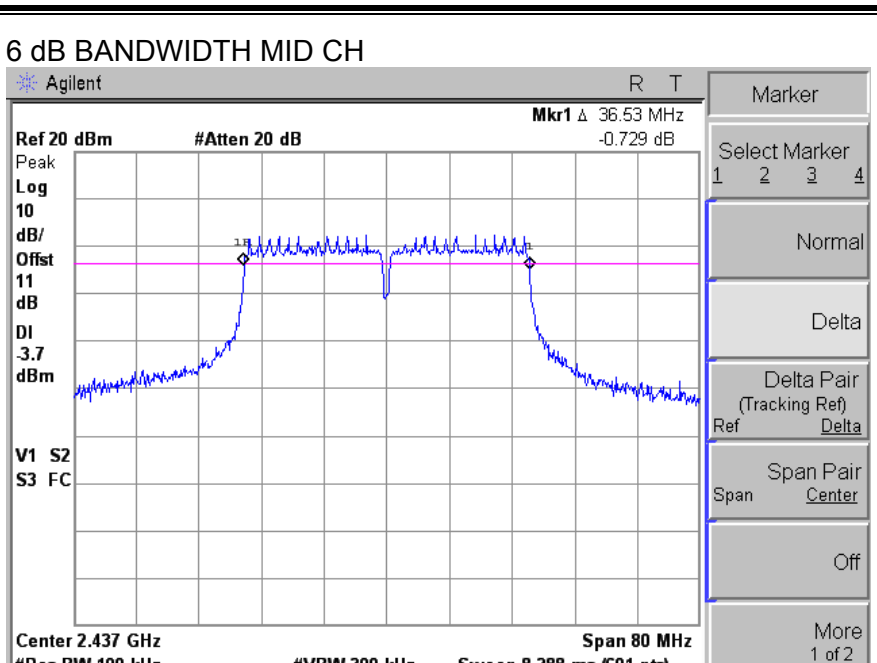
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2422	36.53	0.5
Middle	2437	36.53	0.5
High	2452	36.53	0.5

6 dB BANDWIDTH

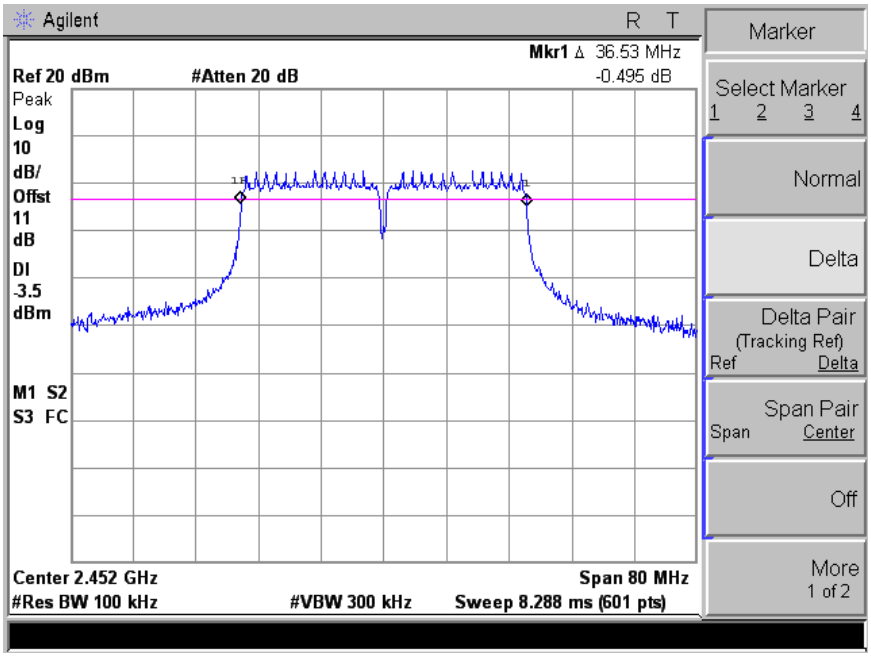
6 dB BANDWIDTH LOW CH



6 dB BANDWIDTH MID CH



6 dB BANDWIDTH HIGH CH



7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

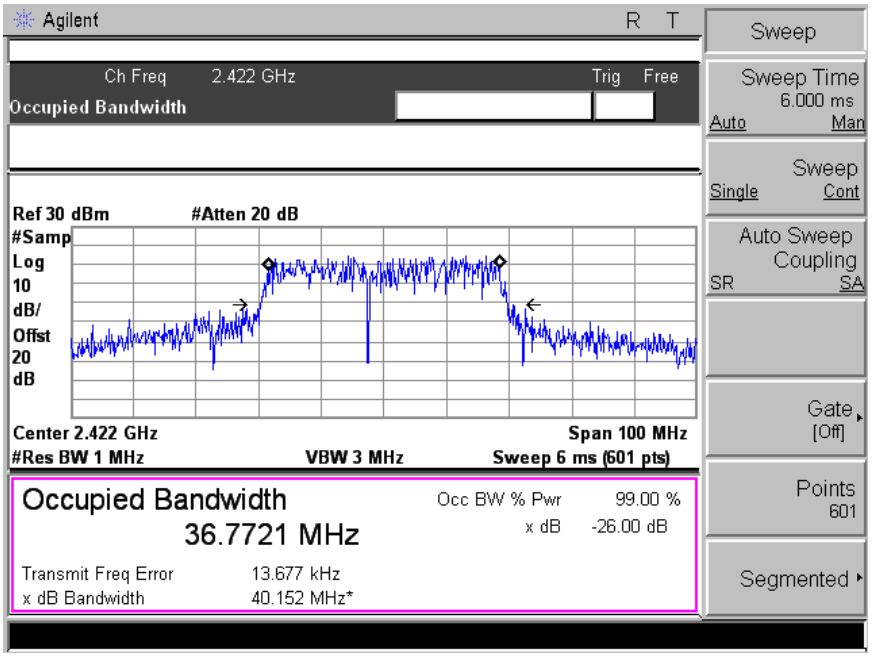
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

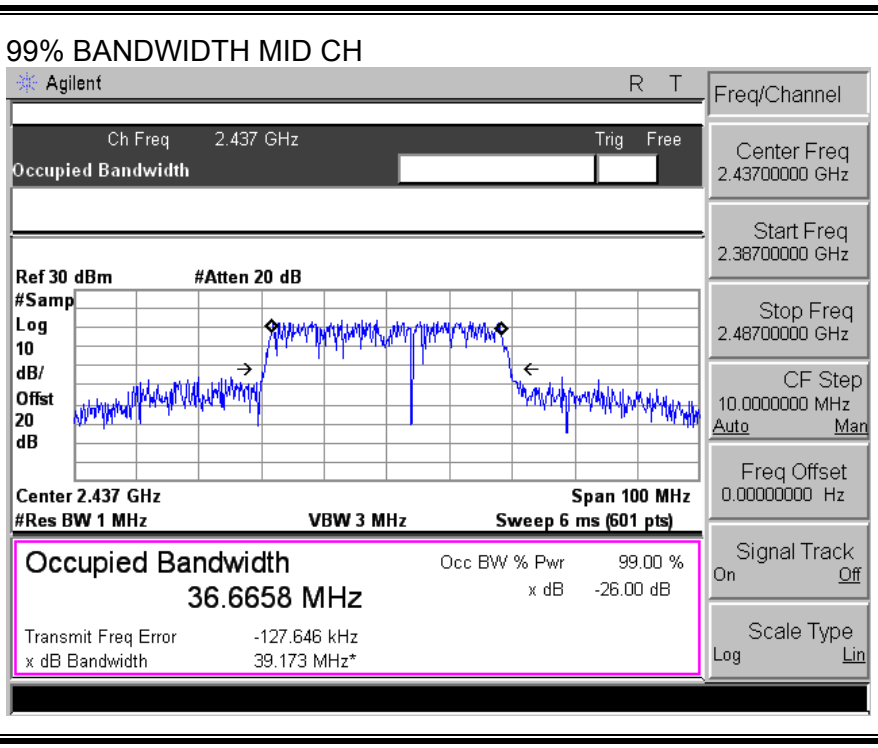
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2422	36.7721
Middle	2437	36.6658
High	2452	36.6104

99% BANDWIDTH

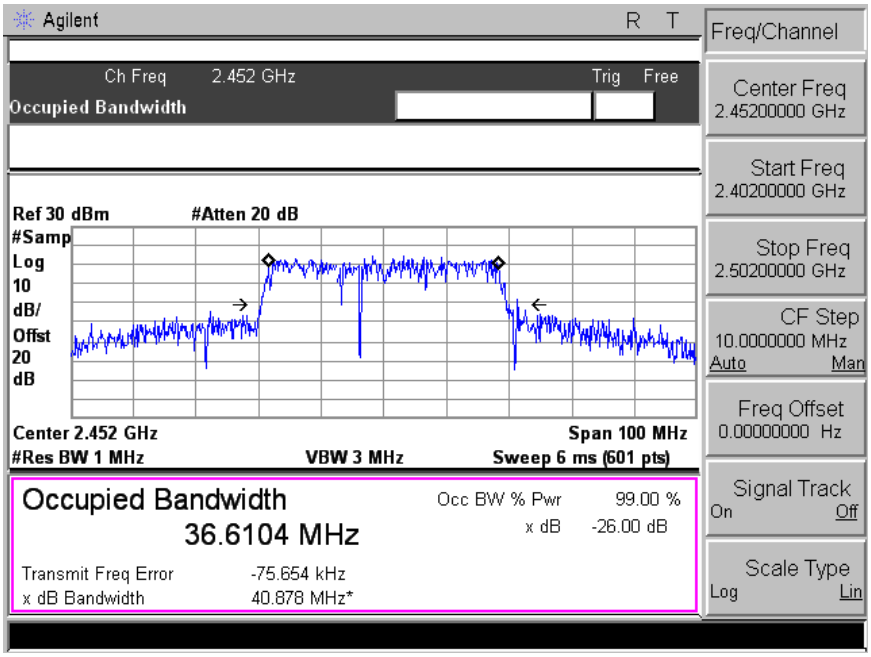
99% BANDWIDTH LOW CH



99% BANDWIDTH MID CH



99% BANDWIDTH HIGH CH



7.4.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using the Boonton Peak Power Meter.

RESULTS

Channel	Frequency (MHz)	Peak power Meter Reading (dB)	Limit (dBm)	Margin (dB)
Low	2422	23.3	30	-6.70
Middle	2437	25.3	30	-4.70
High	2452	23.4	30	-6.60

7.4.4. AVERAGE POWER (HT40-Mode)

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	2422	13.20
Middle	2437	15.20
High	2452	12.90

7.4.5. 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

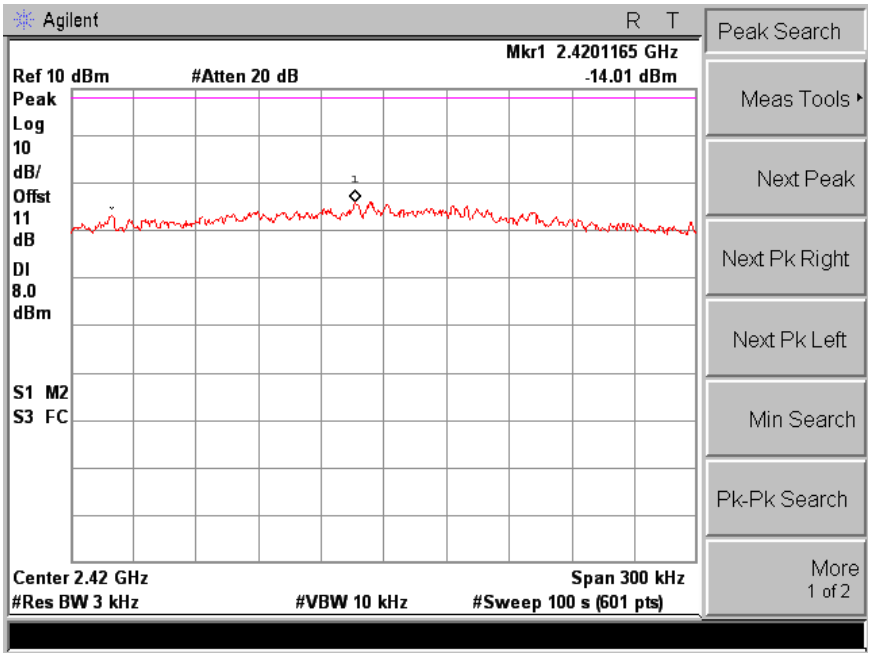
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

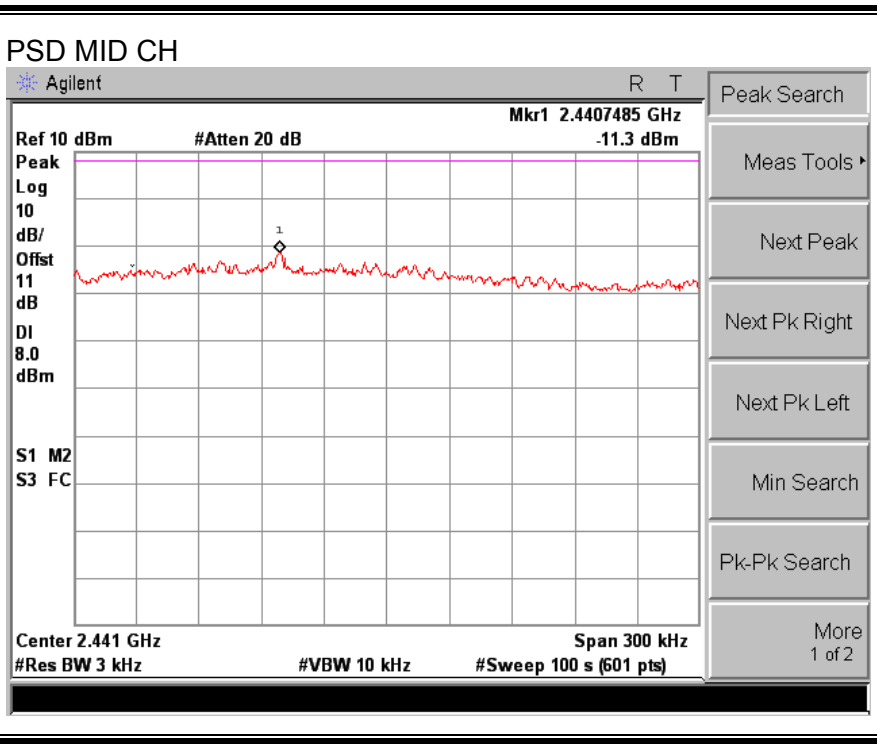
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-14.01	8	-22.01
Middle	2437	-11.30	8	-19.30
High	2452	-11.90	8	-19.90

POWER SPECTRAL DENSITY

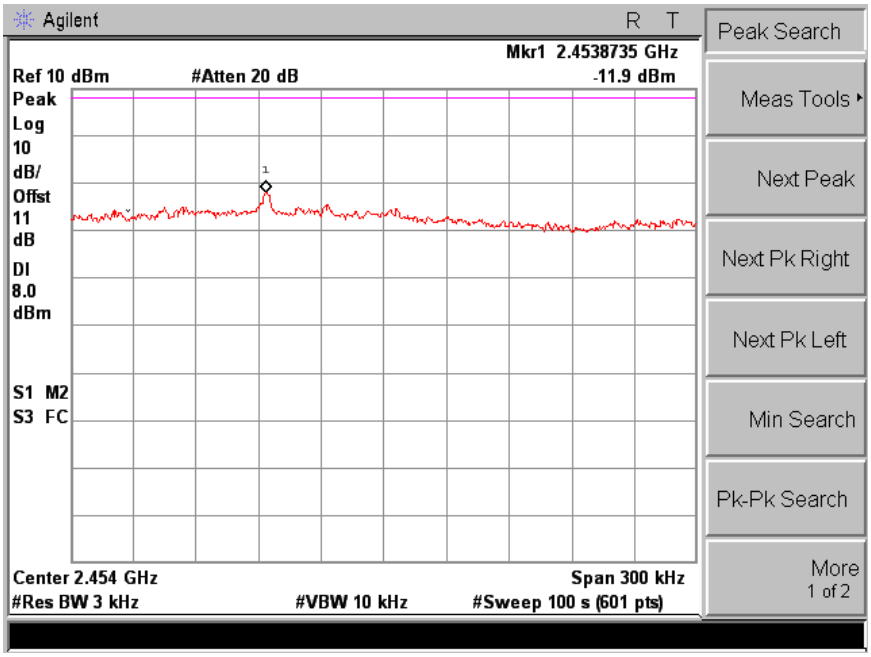
PSD LOW CH



PSD MID CH



PSD HIGH CH



7.4.6. 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

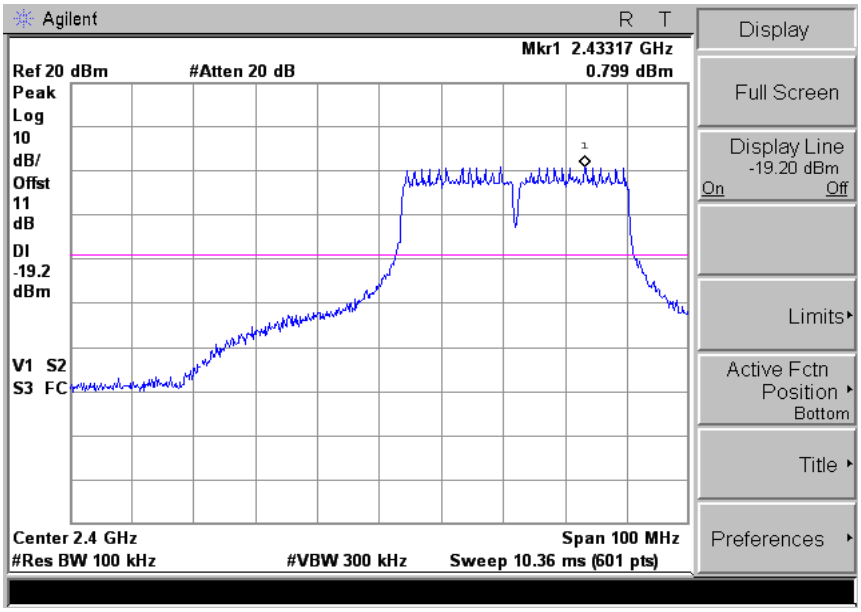
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

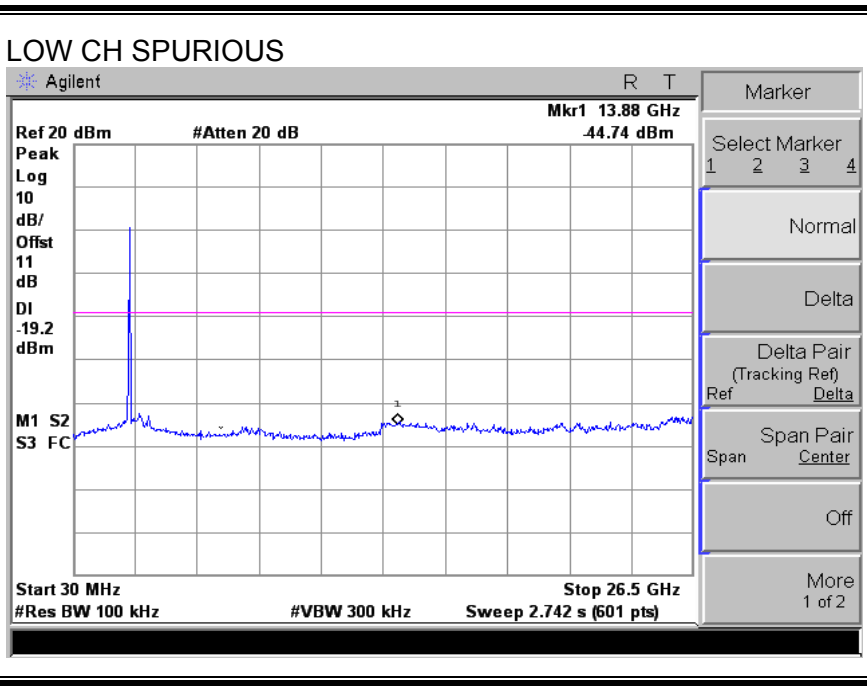
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

LOW CH BANDEDGE

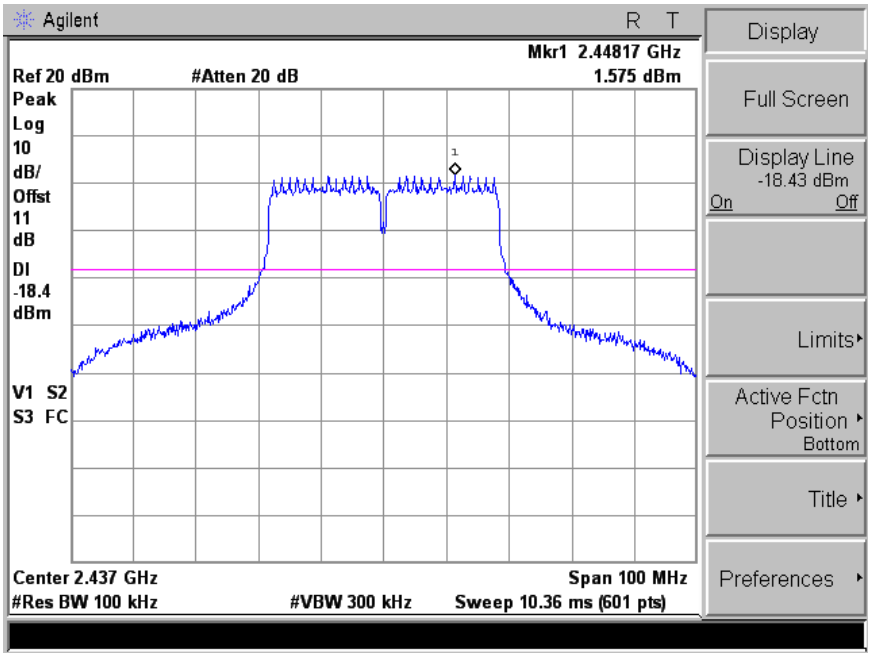


LOW CH SPURIOUS

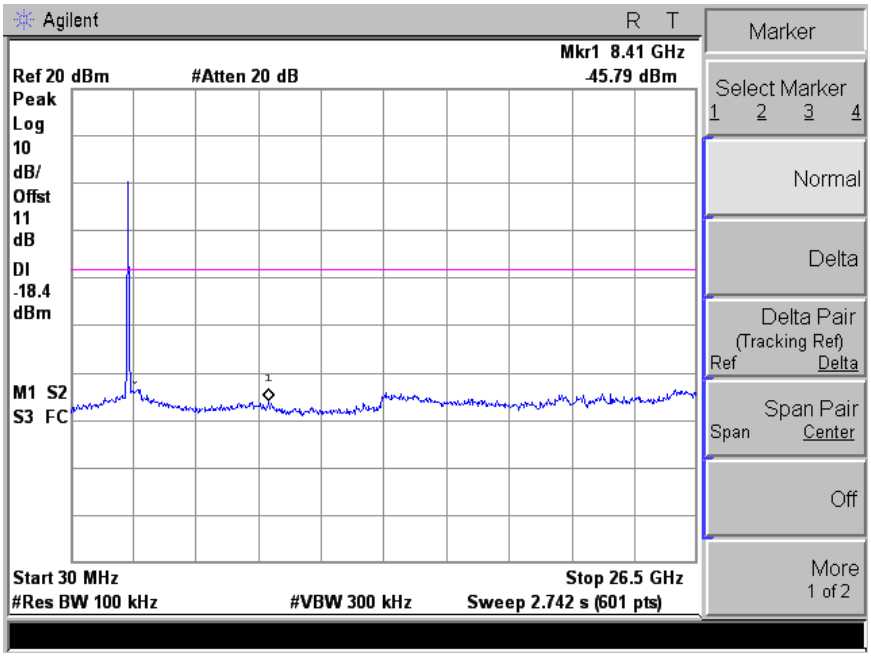


SPURIOUS EMISSIONS, MID CHANNEL

MID CH REFERENCE

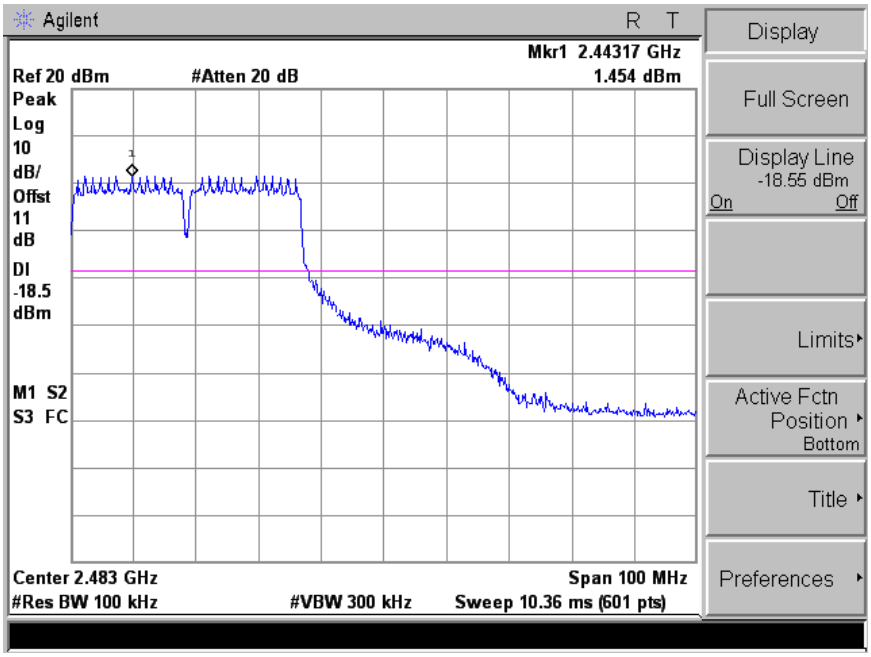


MID CH SPURIOUS

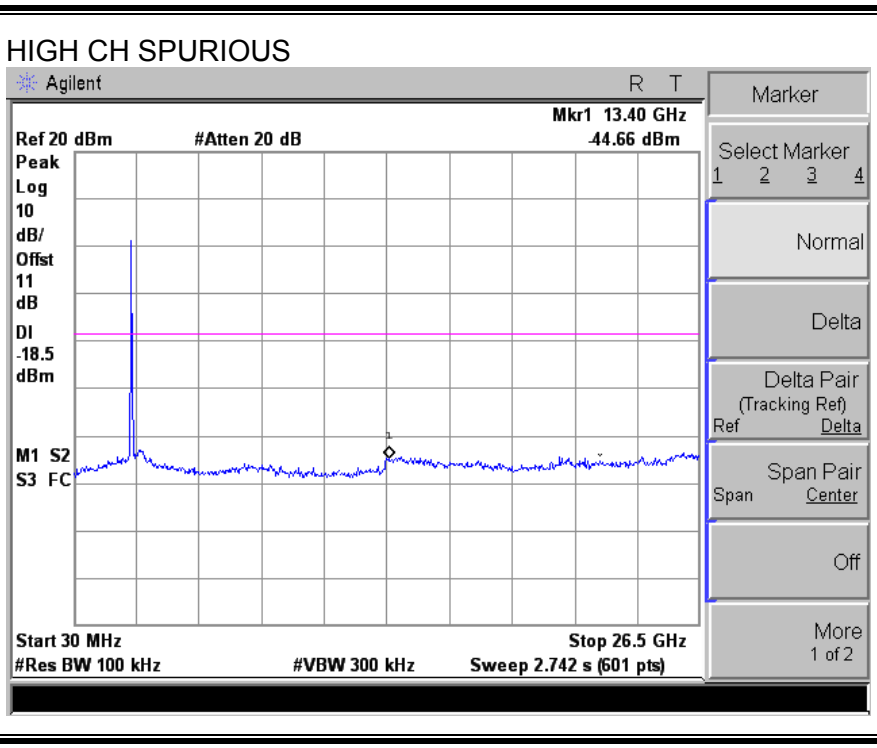


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CH BANDEDGE



HIGH CH SPURIOUS



8. SINGLE ANTENNA CONFIGURATION TEST RESULTS

8.1. 802.11b MODE IN THE 2.4 GHz BAND

8.1.1. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using the Boonton Peak Power Meter,

RESULTS

Channel	Frequency (MHz)	Peak power Meter Reading (dB)	Limit (dBm)	Margin (dB)
Low	2412	20.2	30	-9.80
Middle	2437	20.7	30	-9.30
High	2462	20.3	30	-9.70

8.1.2. AVERAGE POWER (b-Mode)

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	17.50
Middle	2437	17.80
High	2462	17.20

8.1.3. 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.

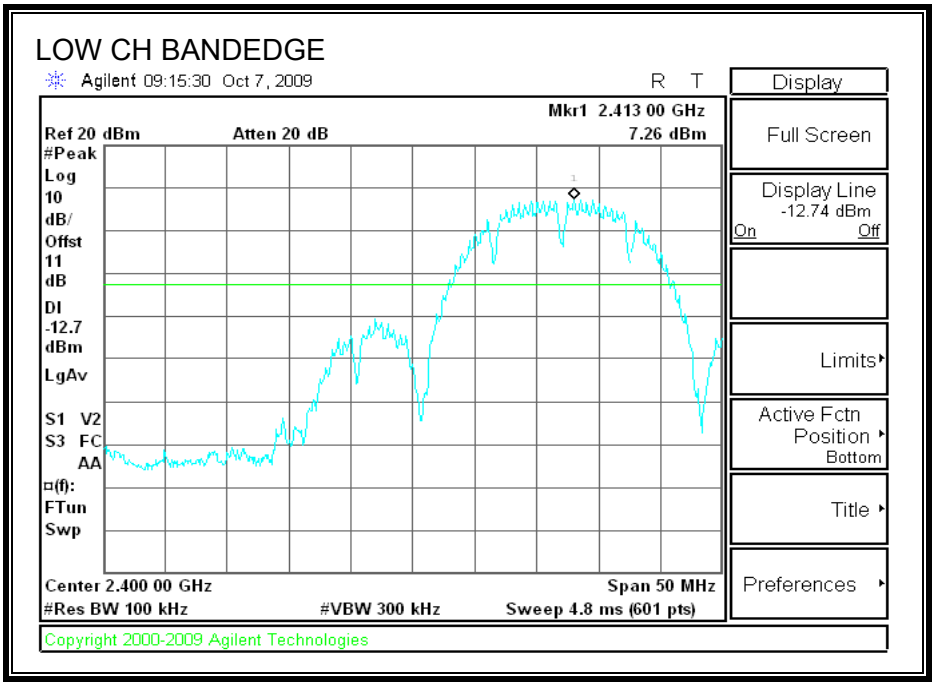
TEST PROCEDURE

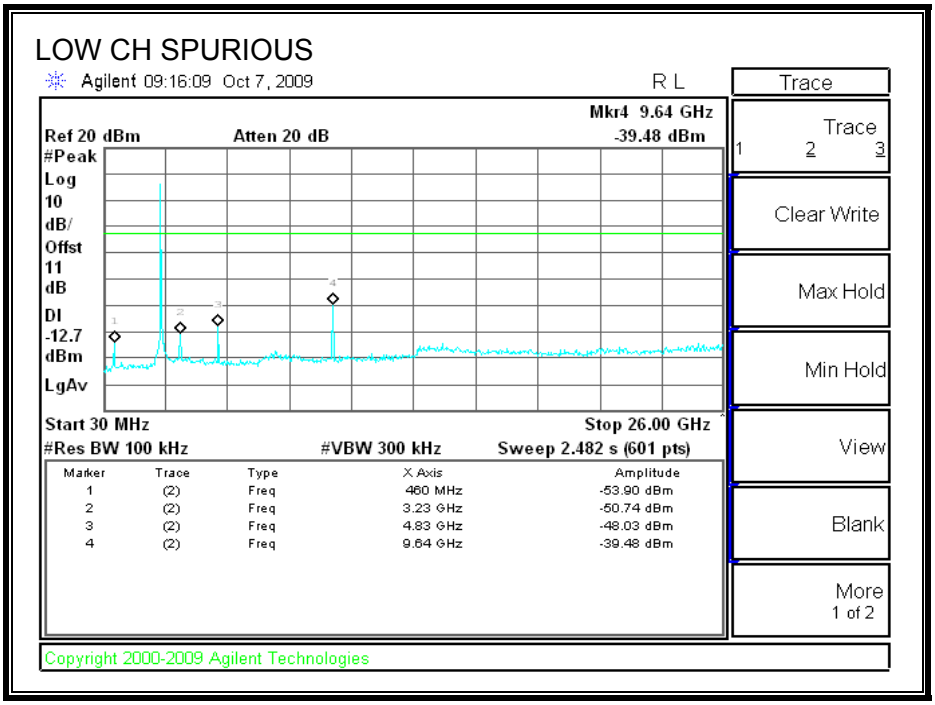
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

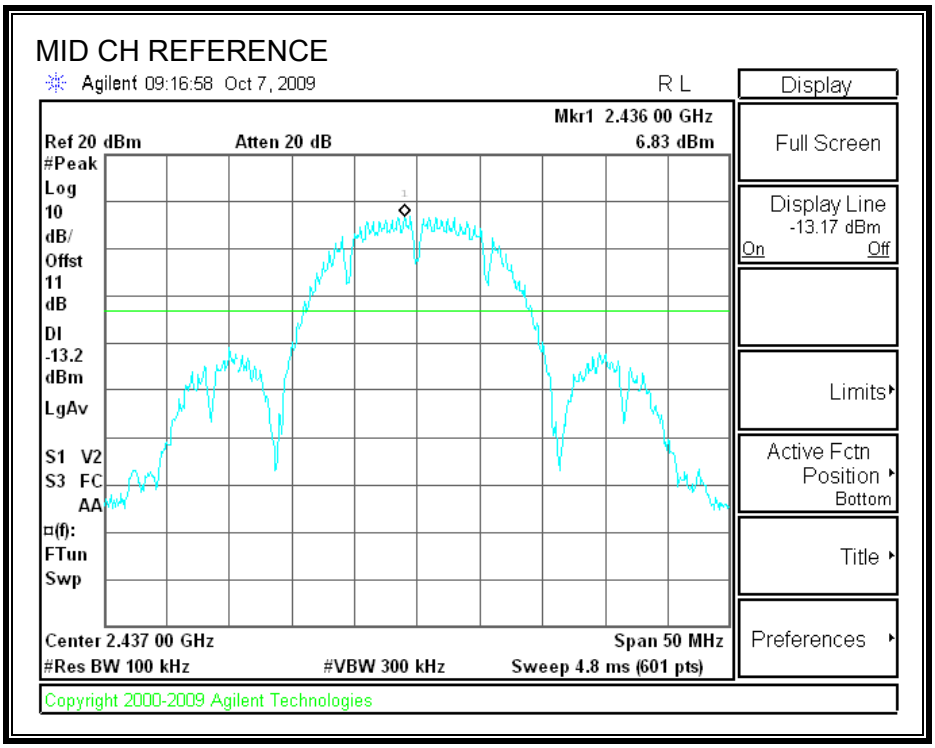
RESULTS

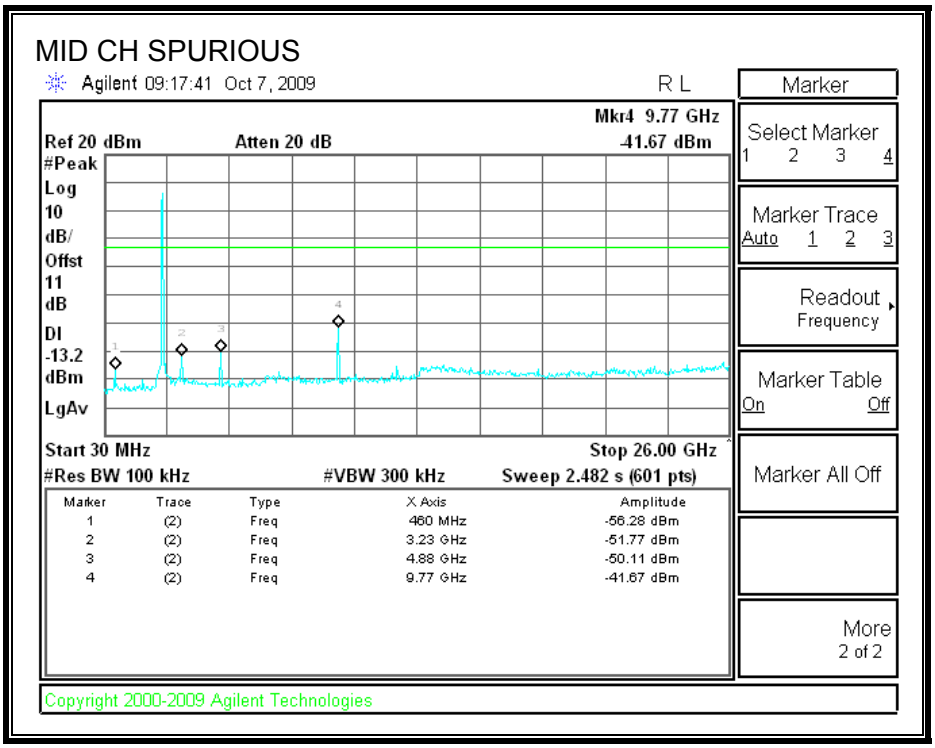
SPURIOUS EMISSIONS, LOW CHANNEL



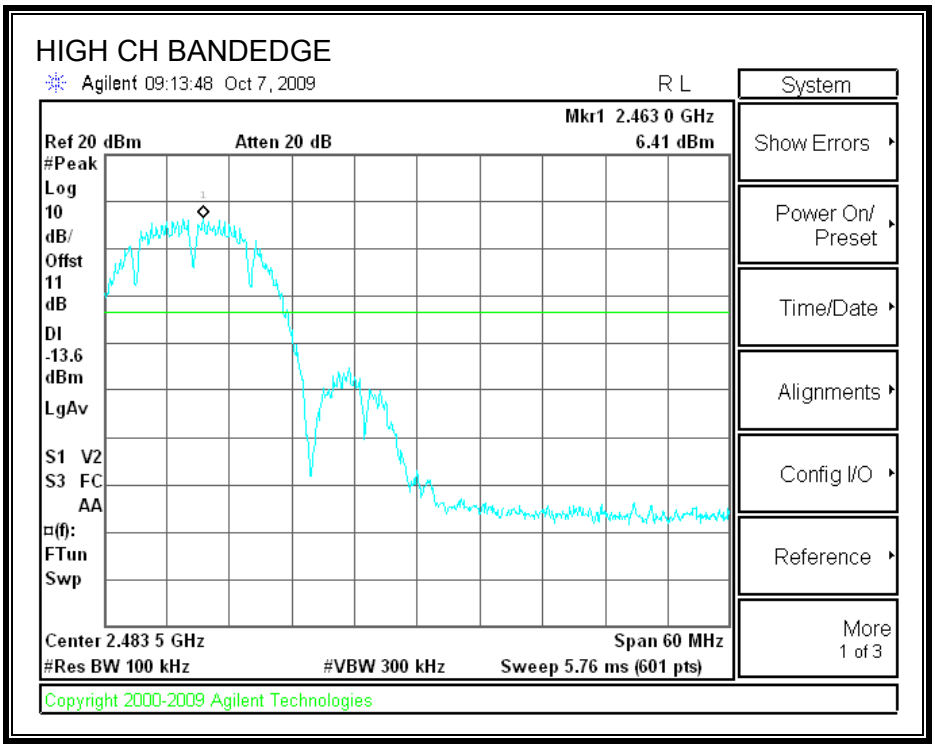


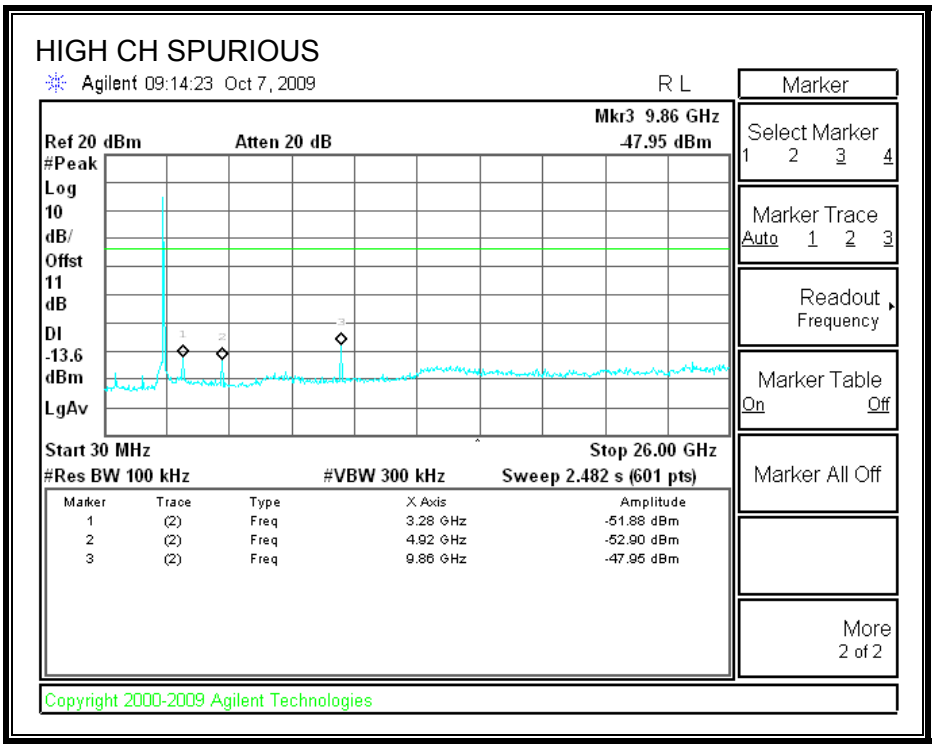
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





8.2. 802.11g MODE IN THE 2.4 GHz BAND

8.2.1. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using the Boonton Peak Power Meter,

RESULTS

Channel	Frequency (MHz)	Peak power Meter Reading (dB)	Limit (dBm)	Margin (dB)
Low	2412	23.7	30	-6.30
Middle	2437	25	30	-5.00
High	2462	23.5	30	-6.50

8.2.2. AVERAGE POWER (11g-Mode)

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	13.40

8.2.3. 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.

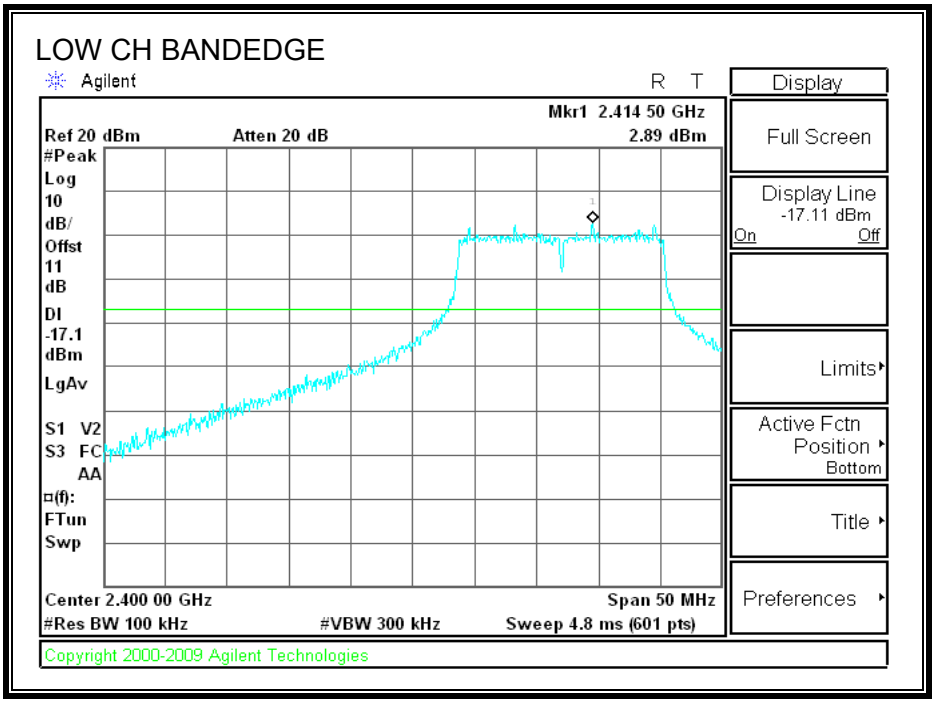
TEST PROCEDURE

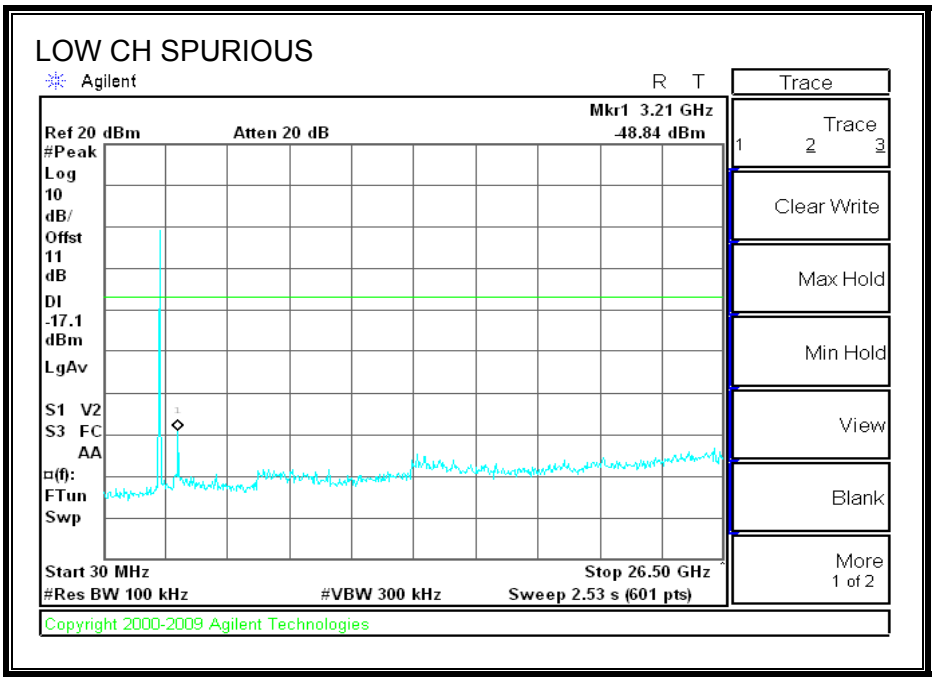
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

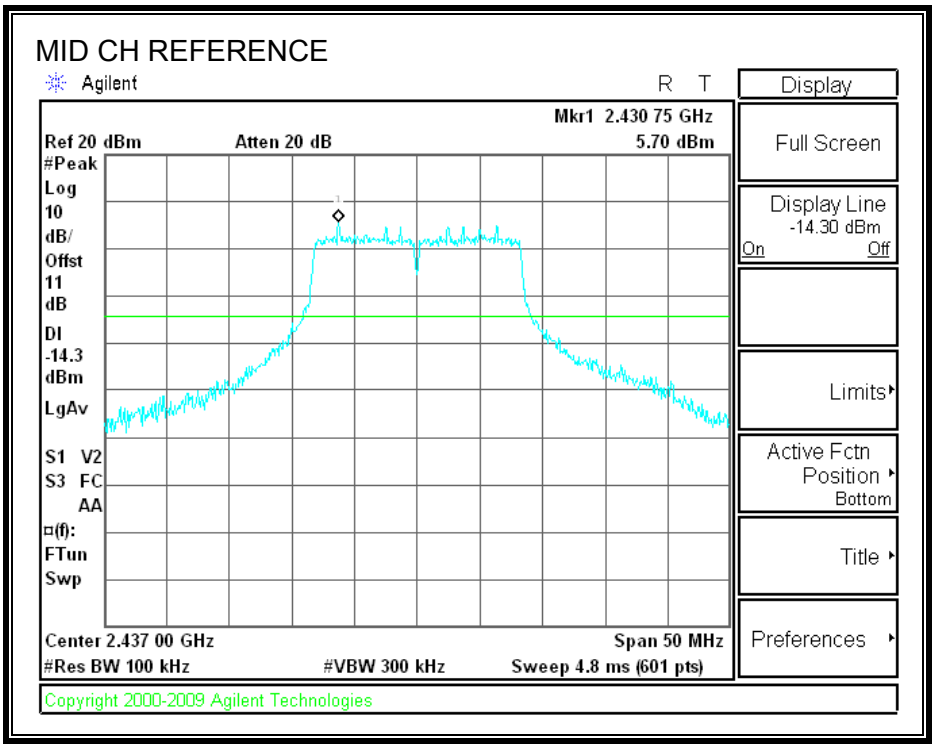
RESULTS

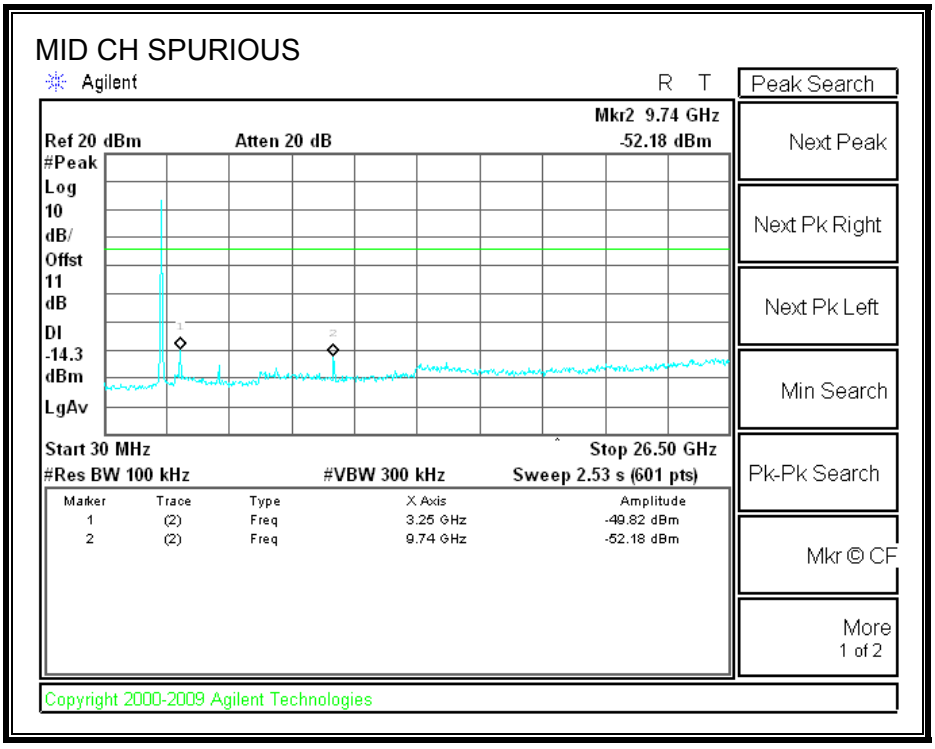
SPURIOUS EMISSIONS, LOW CHANNEL



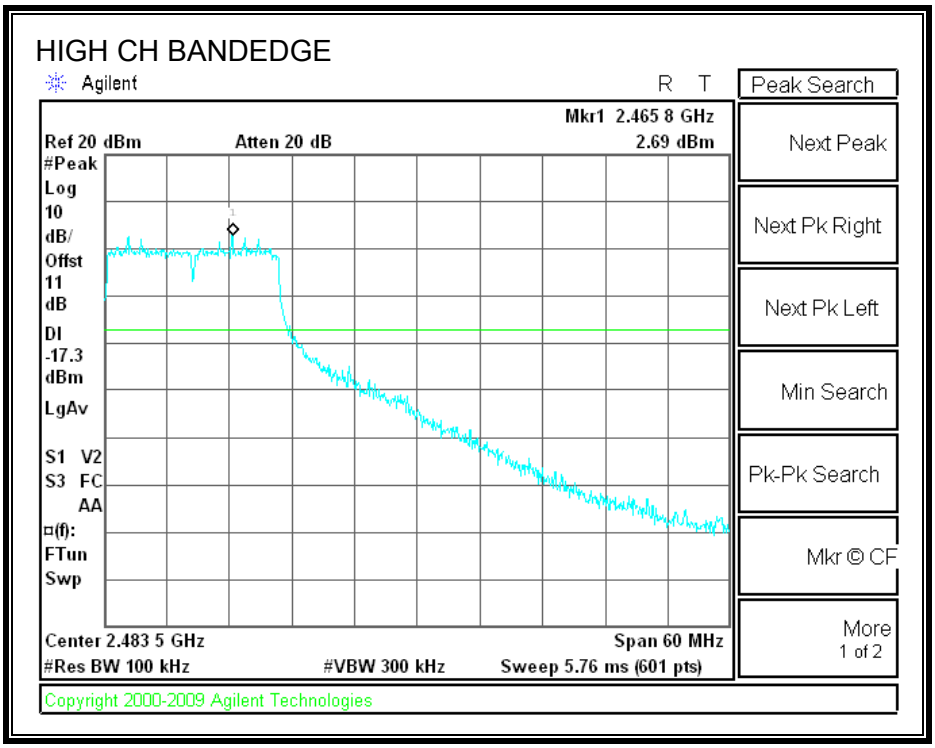


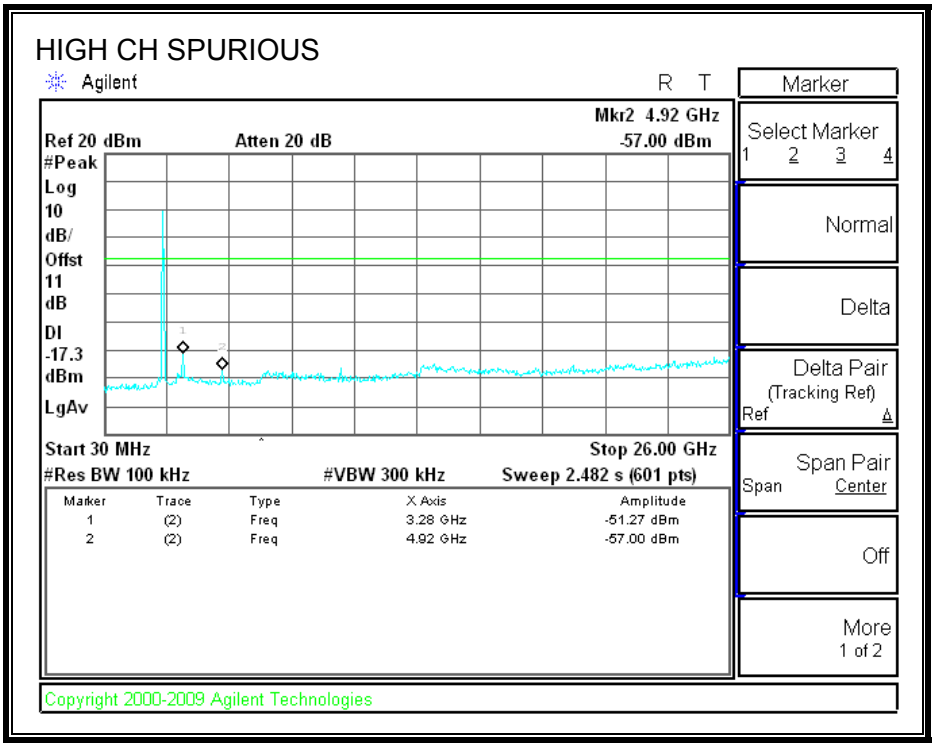
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





8.3. 802.11 HT20 MODE IN THE 2.4 GHz BAND

8.3.1. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using Boonton Peak Power Meter.

RESULTS

Channel	Frequency (MHz)	Peak Power Meter Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	23.00	30	-7.00
Middle	2437	25.00	30	-5.00
High	2462	23.30	30	-6.70

8.3.2. AVERAGE POWER (HT20-Mode)

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	12.00
Middle	2437	16.80
High	2462	12.40

8.3.3. 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.

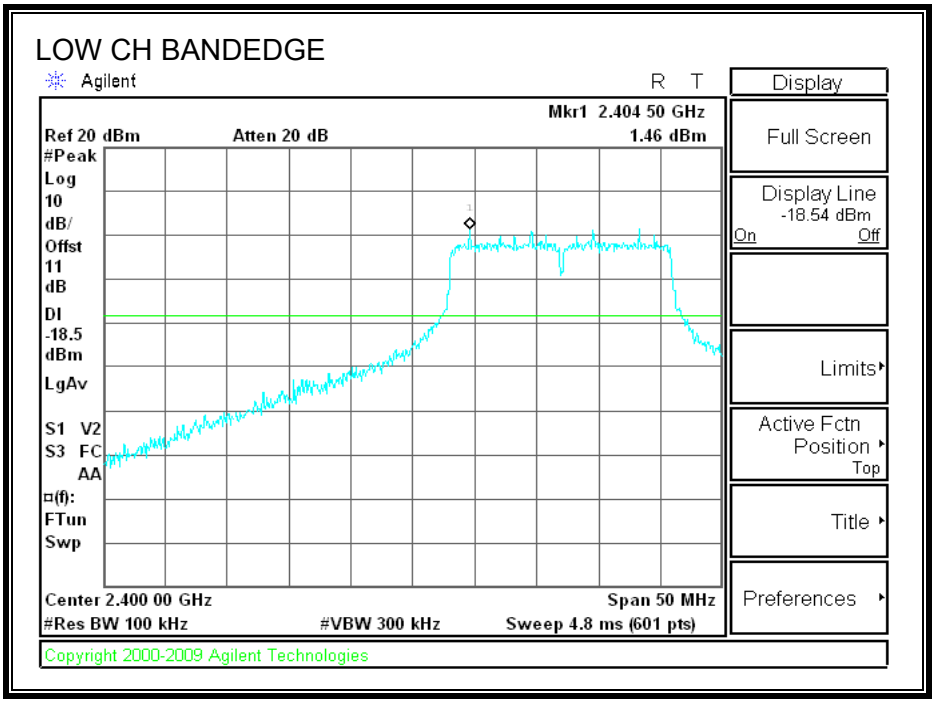
TEST PROCEDURE

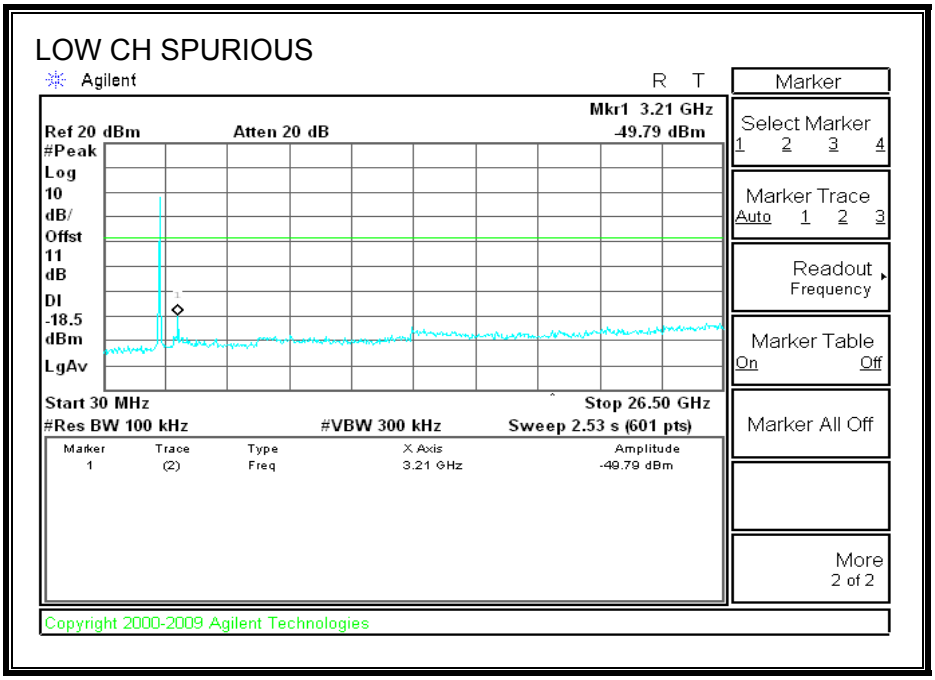
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

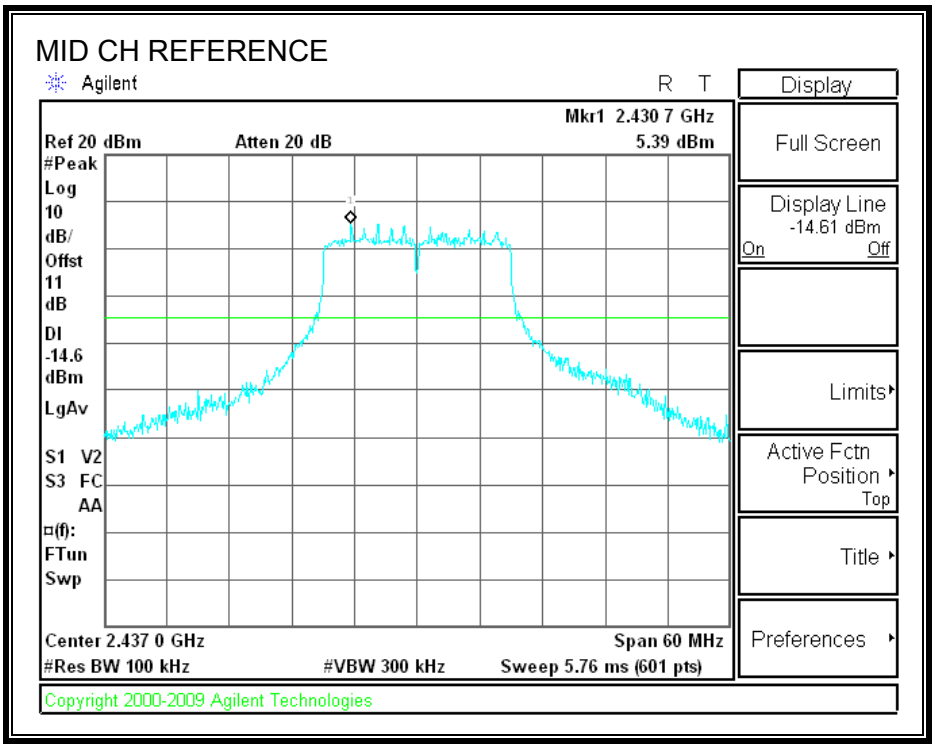
RESULTS

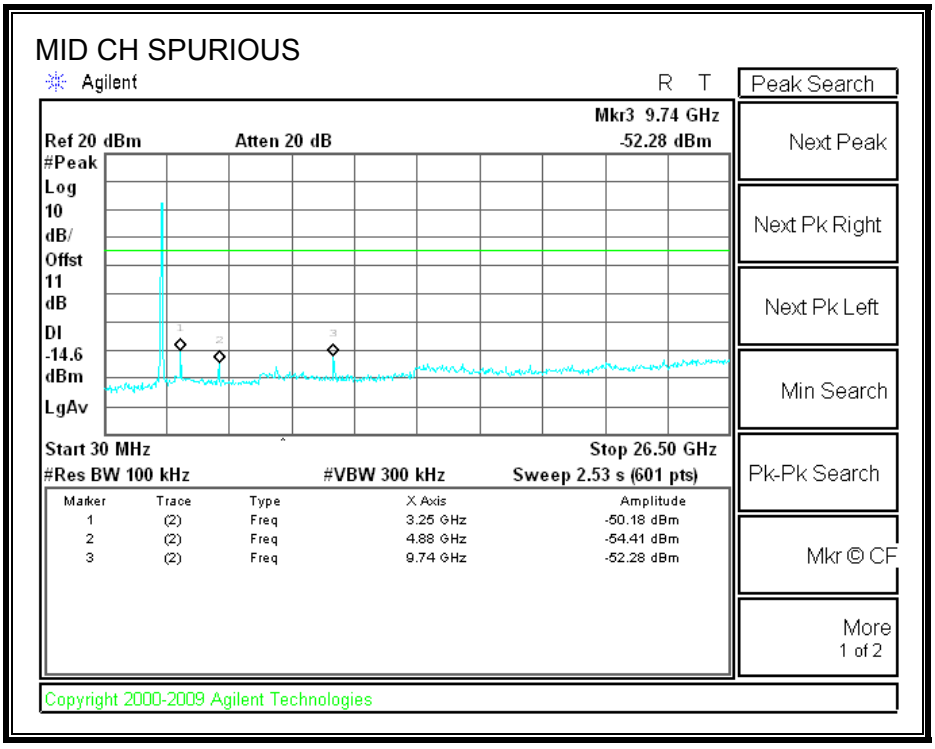
SPURIOUS EMISSIONS, LOW CHANNEL



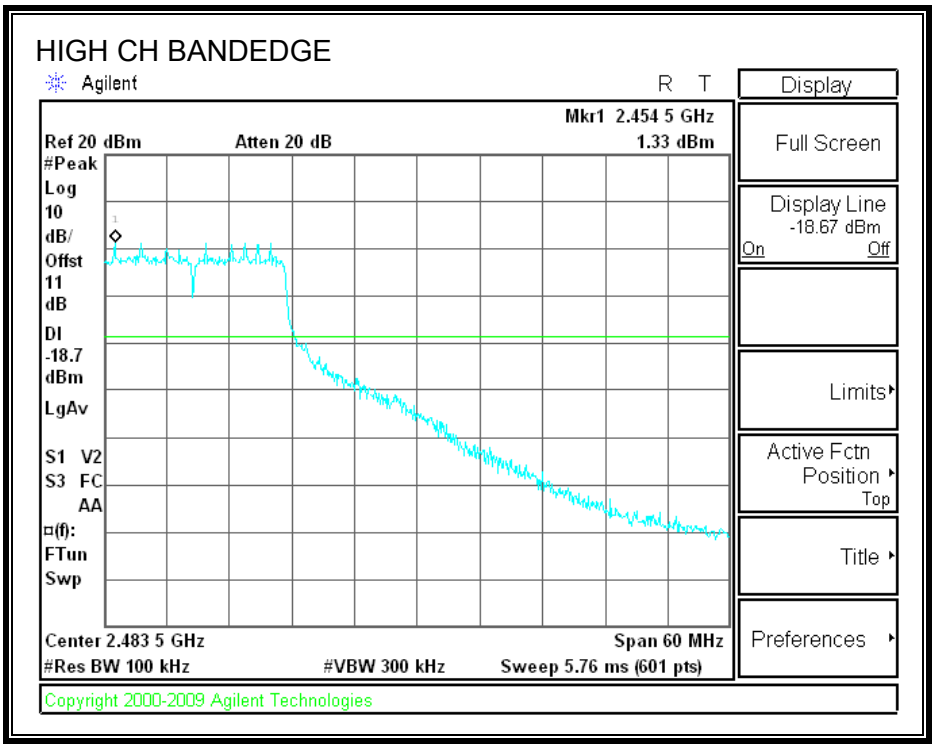


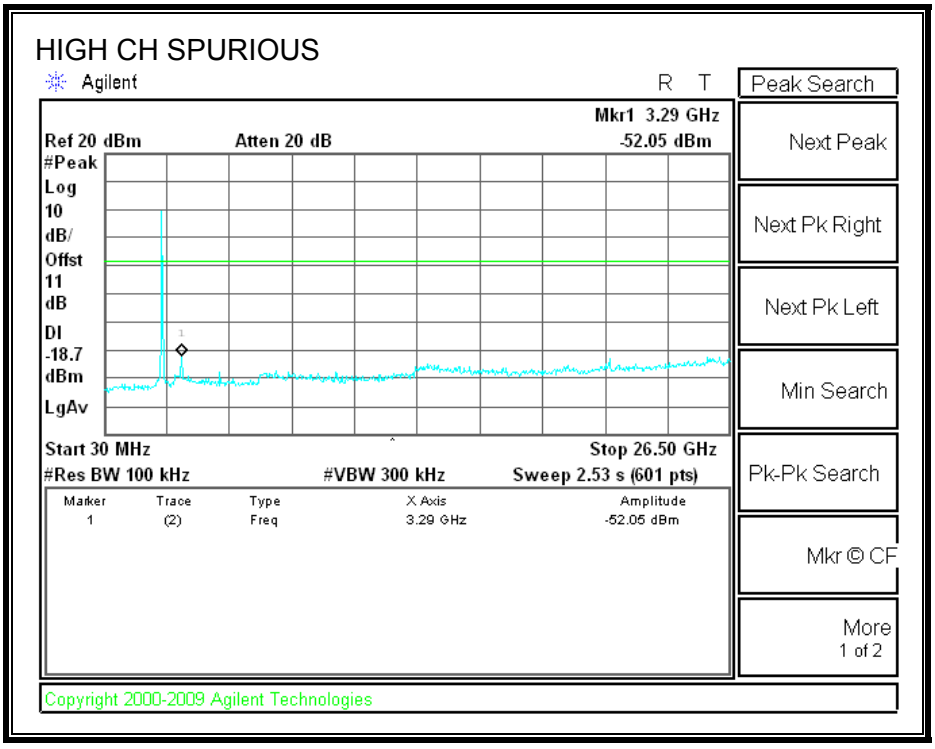
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





8.4. 802.11 HT40 MODE IN THE 2.4 GHz BAND

8.4.1. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using the Boonton Peak Power Meter.

RESULTS

Channel	Frequency (MHz)	Peak power Meter Reading (dB)	Limit (dBm)	Margin (dB)
Low	2422	22.8	30	-7.20
Middle	2437	24.2	30	-5.80
High	2452	23.2	30	-6.80

8.4.2. AVERAGE POWER (HT40-Mode)

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	2422	11.50
Middle	2437	15.20
High	2452	12.00

8.4.3. 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

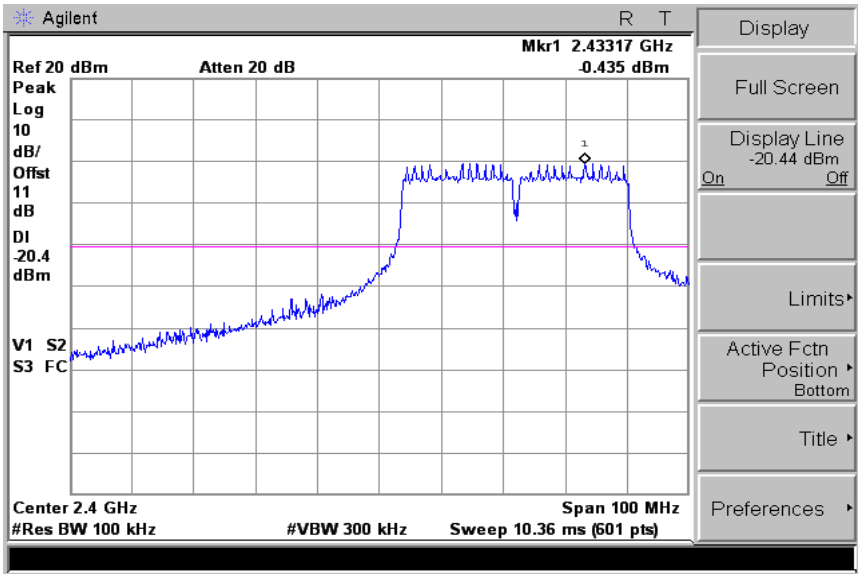
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

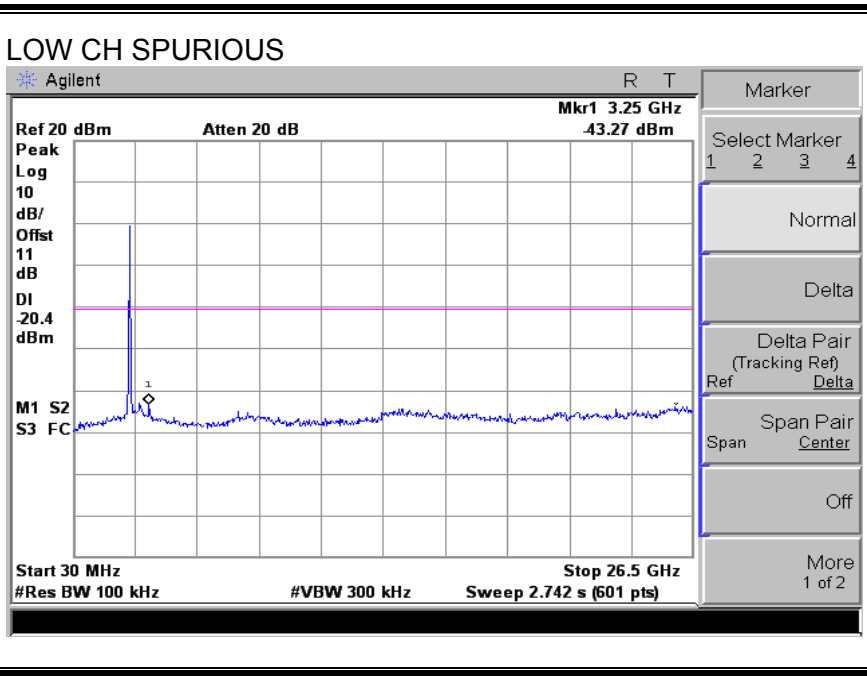
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

LOW CH BANDEDGE

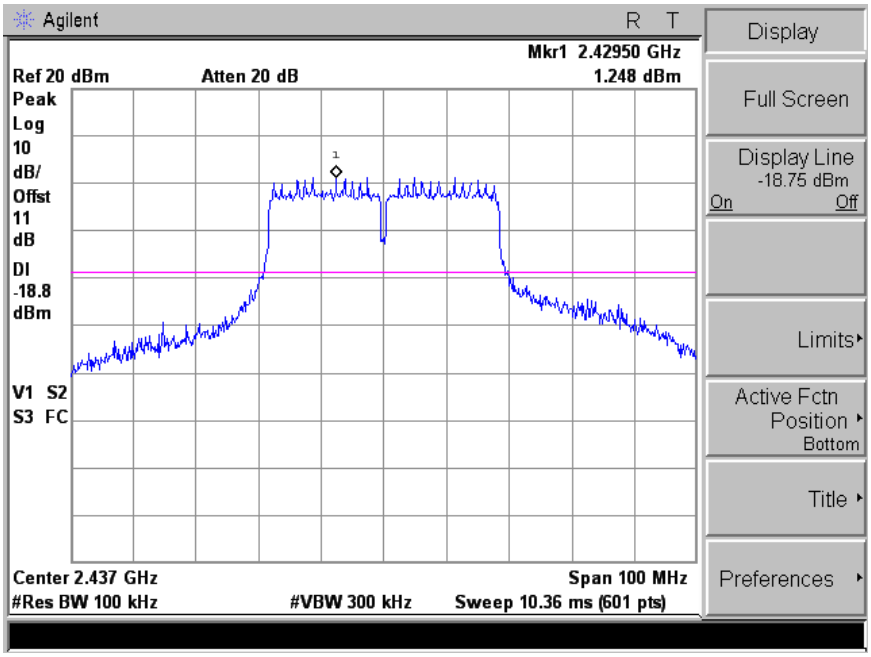


LOW CH SPURIOUS

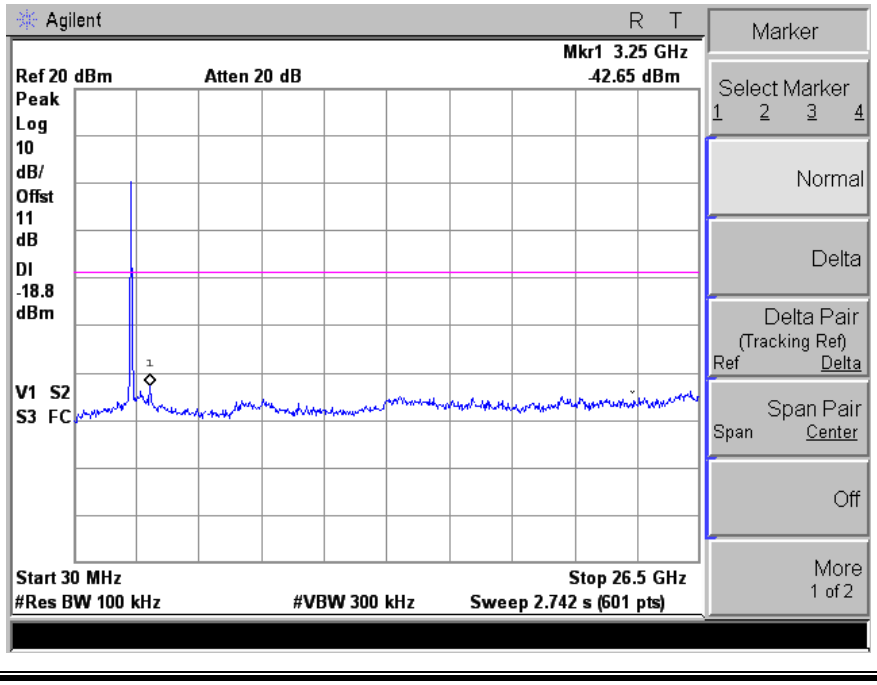


SPURIOUS EMISSIONS, MID CHANNEL

MID CH REFERENCE

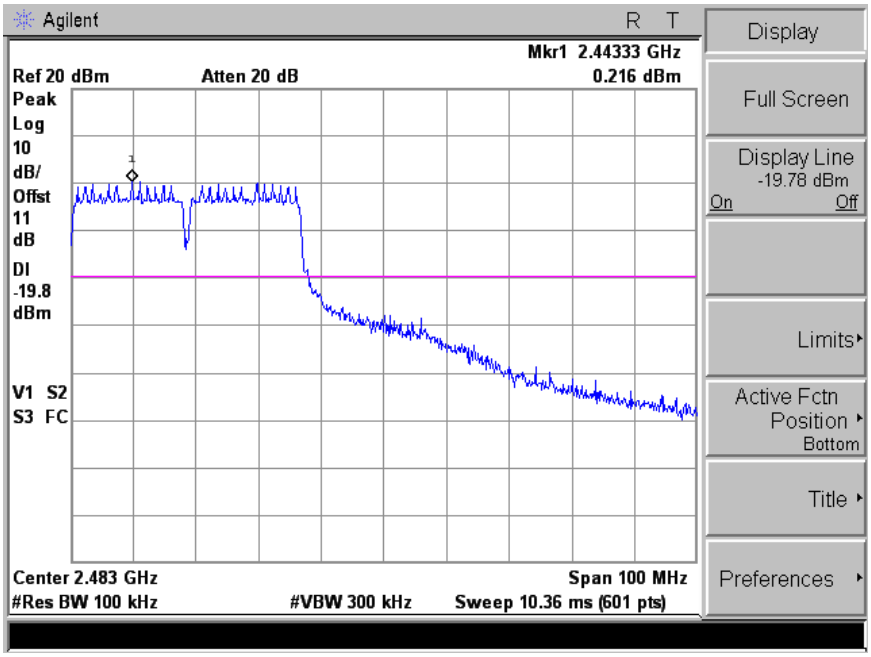


MID CH SPURIOUS

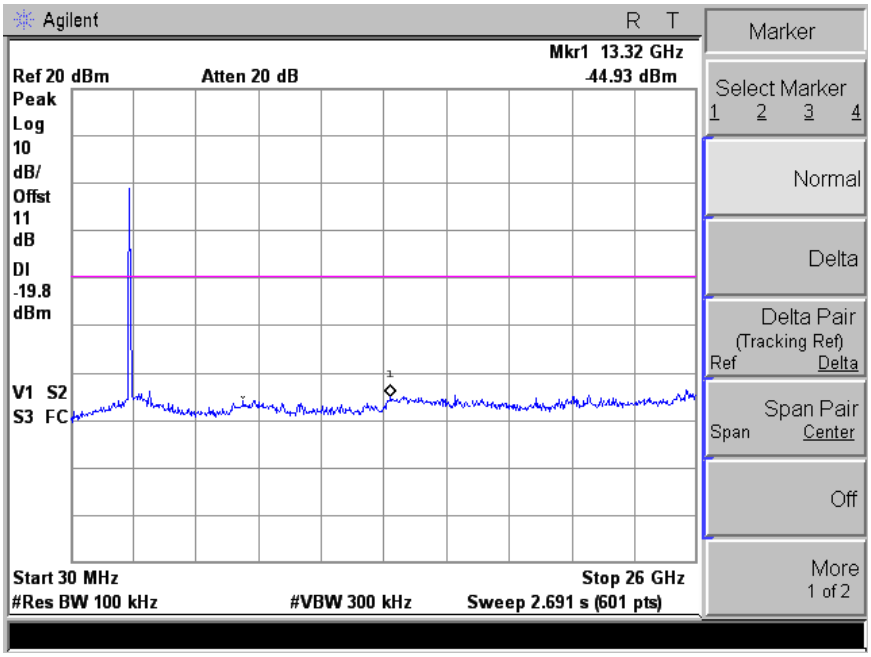


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CH BANDEDGE



HIGH CH SPURIOUS



9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

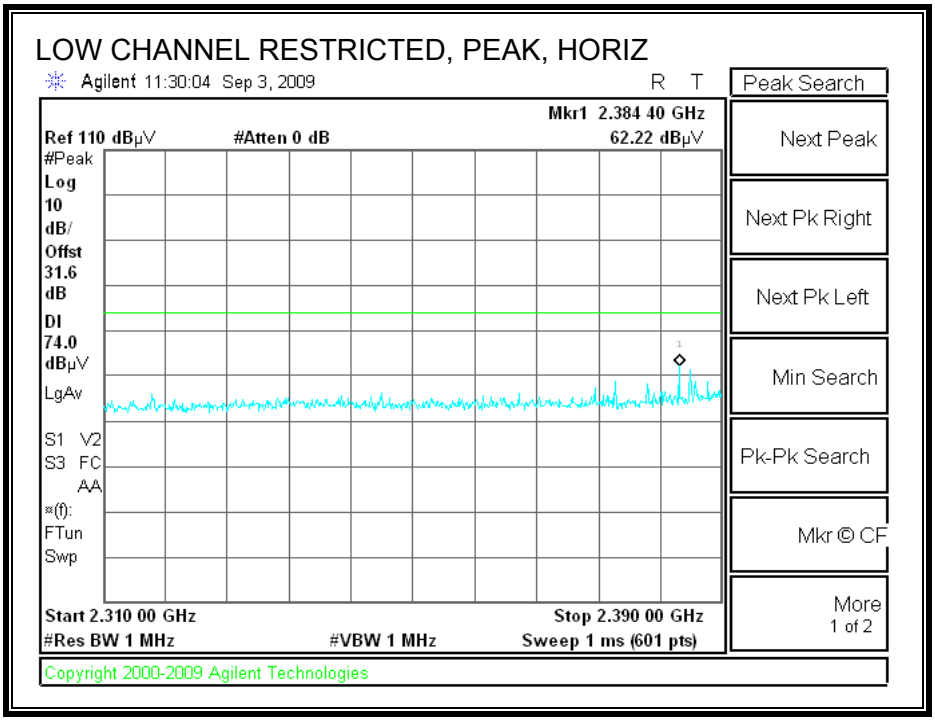
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each appplicable band.

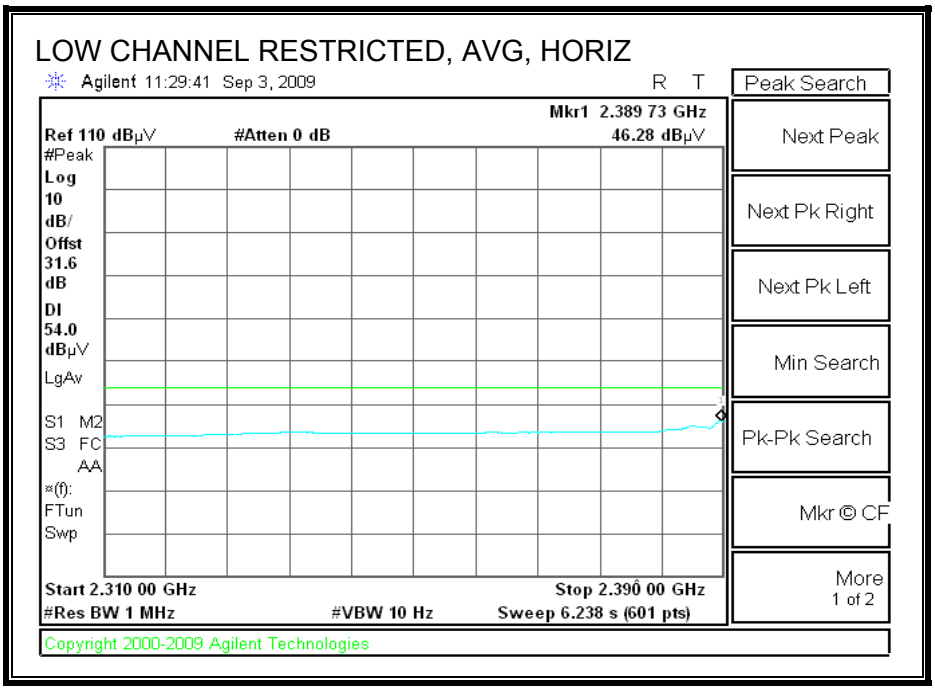
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

9.2. DUAL ANTENNA CONFIGURATION TRANSMITTER ABOVE 1 GHz

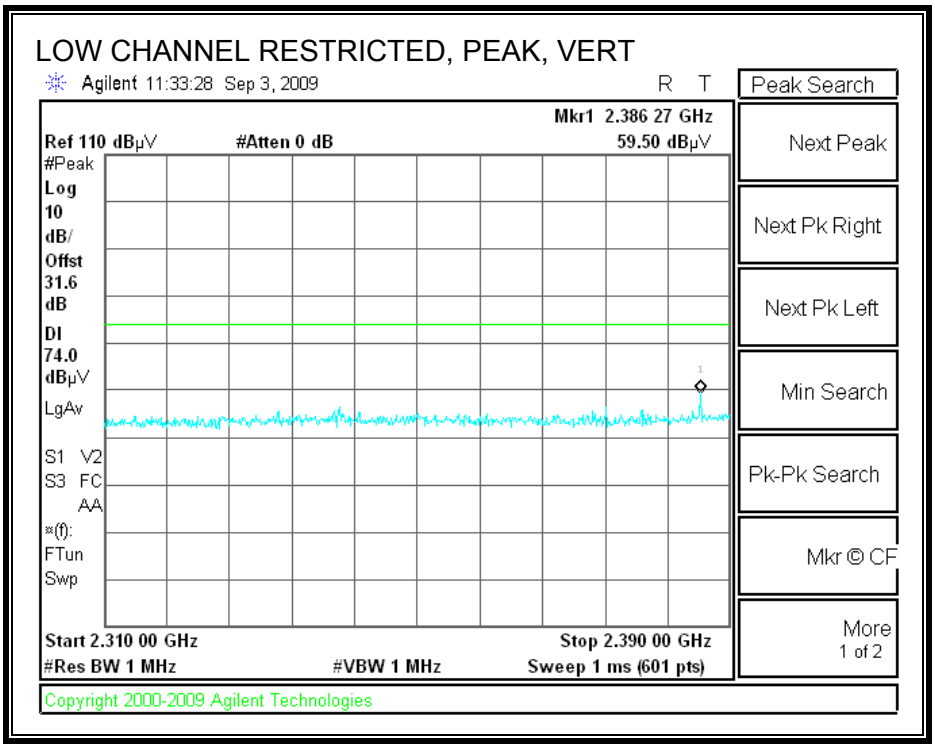
9.2.1. TRANSMITTER ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

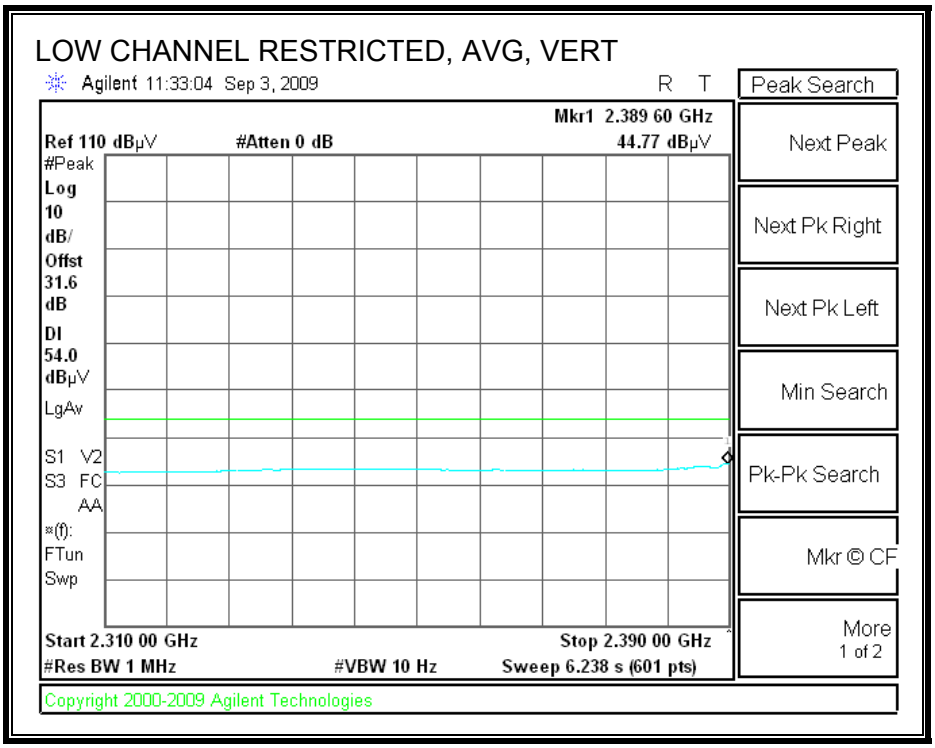
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



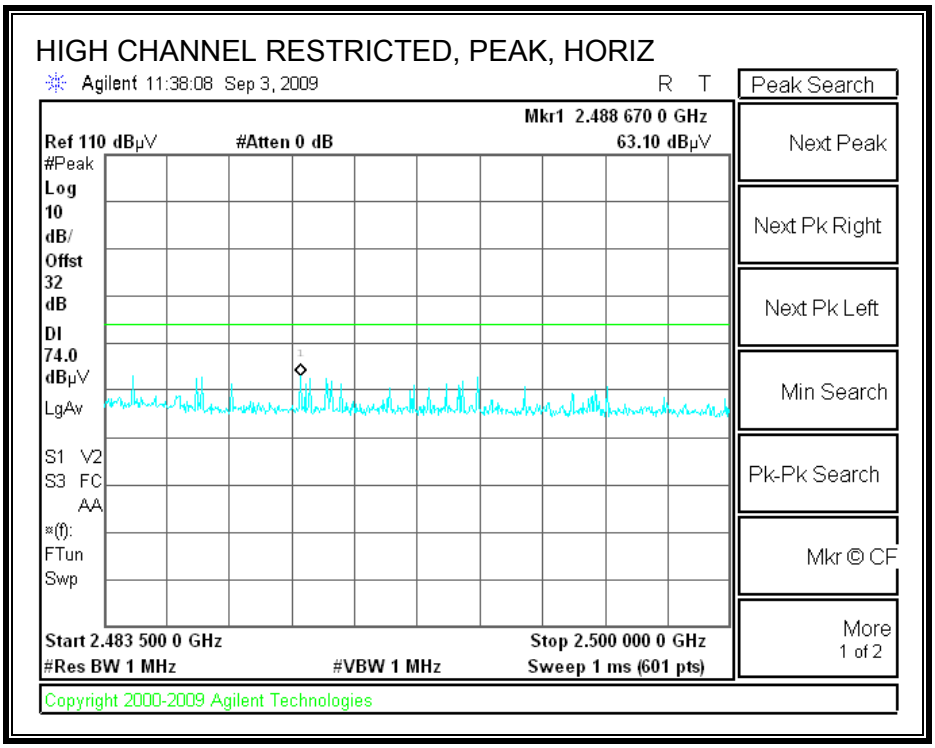


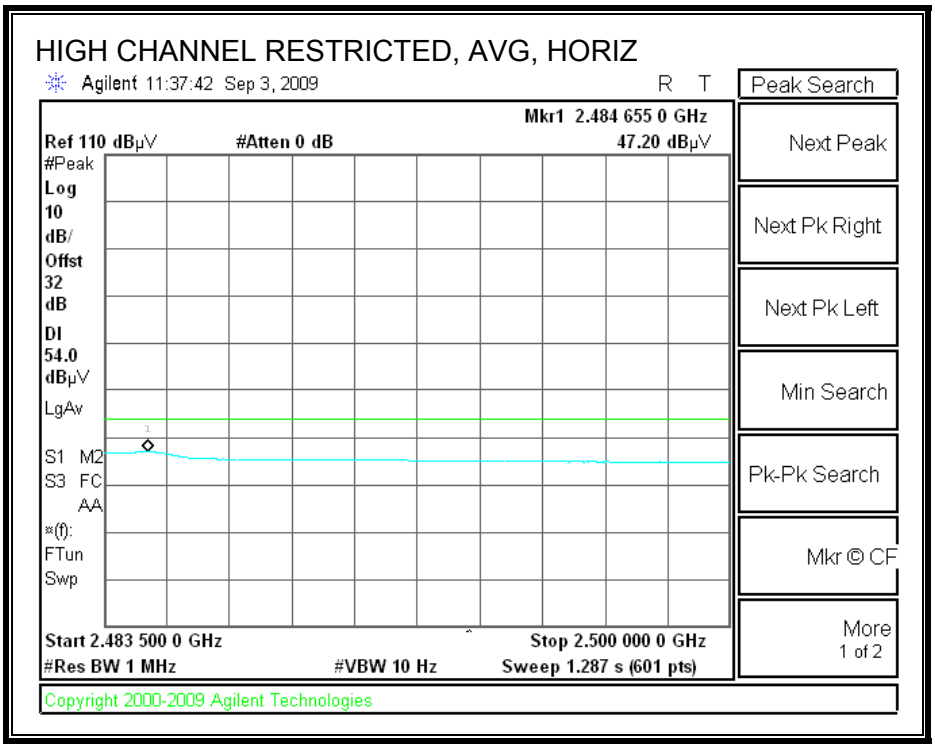
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



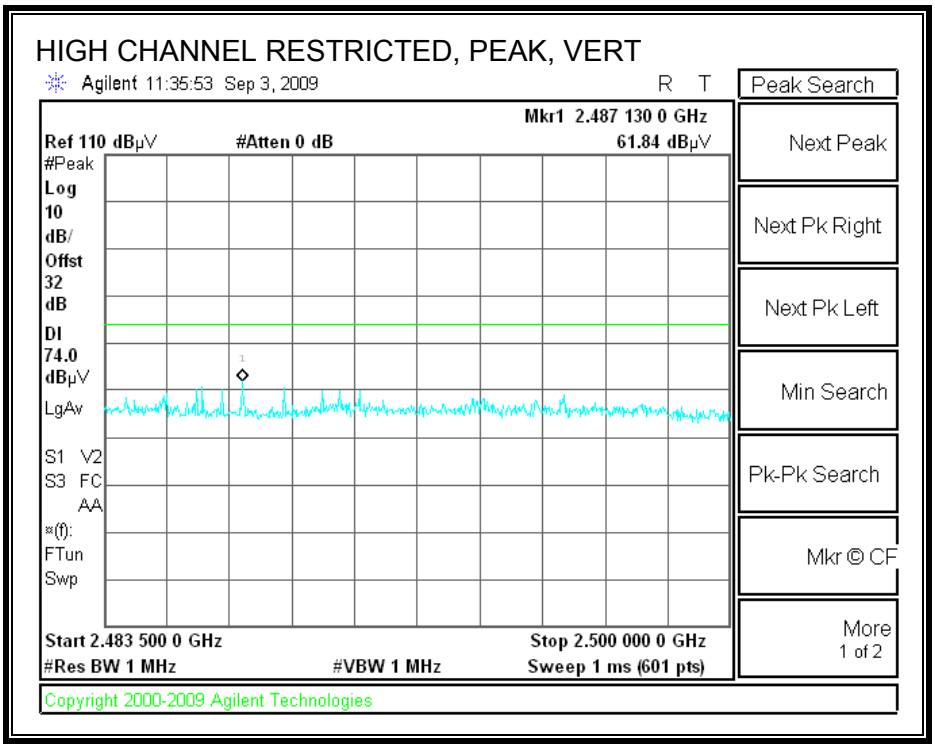


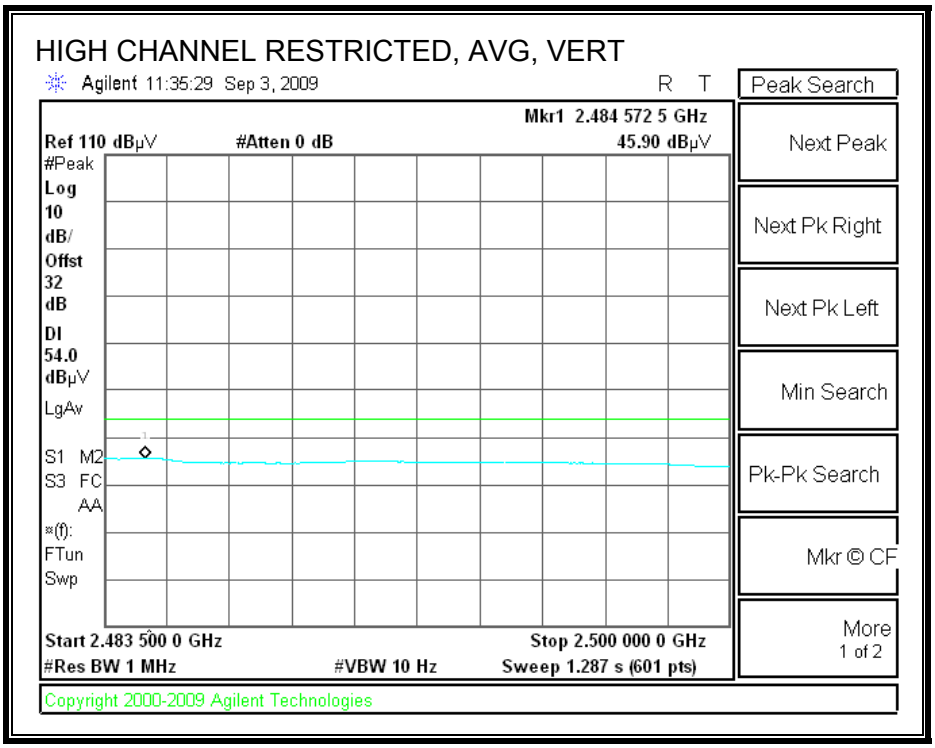
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 09U12738
Date: 9/9/2009
Test Engineer: Chin Pang
Configuration: EUT (Dual Antenna) / Antenna
Mode: b, TX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

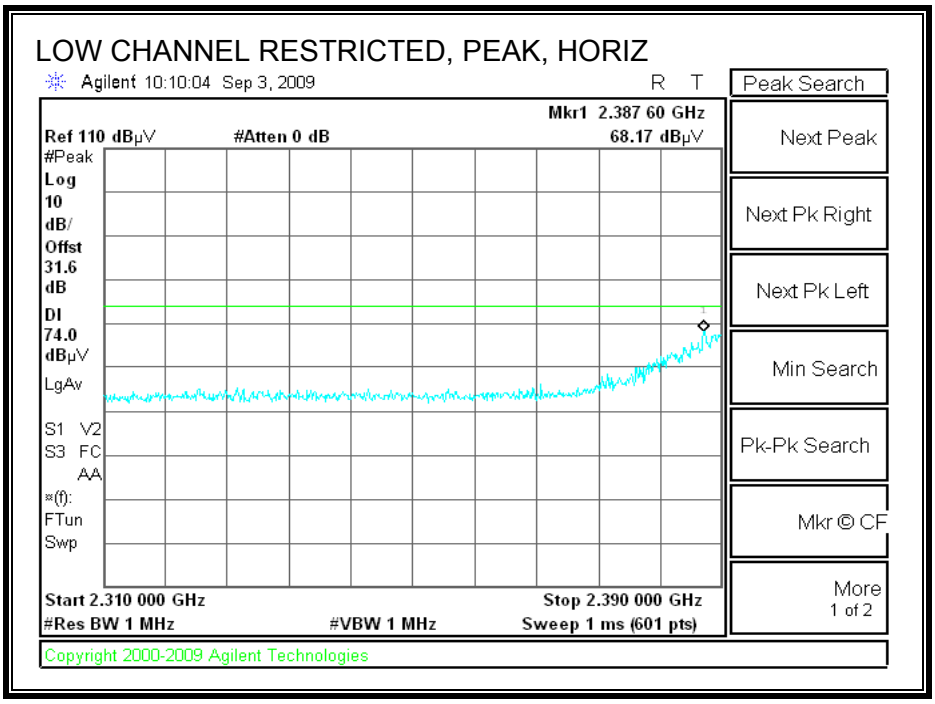
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 2412MHz															
4.824	3.0	46.0	39.8	33.0	5.8	-36.5	0.0	0.0	48.4	42.2	74	54	-25.6	-11.8	V
4.824	3.0	44.8	38.8	33.0	5.8	-36.5	0.0	0.0	47.2	41.2	74	54	-26.8	-12.8	H
Mid Ch, 2437MHz															
4.874	3.0	48.0	43.6	33.1	5.8	-36.5	0.0	0.0	50.5	46.1	74	54	-23.5	-7.9	V
7.311	3.0	42.5	28.2	35.3	7.3	-36.2	0.0	0.0	48.8	34.5	74	54	-25.2	-19.5	V
4.874	3.0	47.0	42.0	33.1	5.8	-36.5	0.0	0.0	49.5	44.5	74	54	-24.5	-9.5	H
7.311	3.0	42.0	28.0	35.3	7.3	-36.2	0.0	0.0	48.3	34.3	74	54	-25.7	-19.7	H
High Ch, 2462MHz															
4.924	3.0	47.0	41.1	33.1	5.9	-36.5	0.0	0.0	49.6	43.7	74	54	-24.4	-10.3	V
7.386	3.0	42.0	28.0	35.4	7.3	-36.2	0.0	0.0	48.5	34.5	74	54	-25.5	-19.5	V
4.924	3.0	46.0	40.5	33.1	5.9	-36.5	0.0	0.0	48.6	43.1	74	54	-25.4	-10.9	H
7.386	3.0	41.8	27.8	35.4	7.3	-36.2	0.0	0.0	48.3	34.3	74	54	-25.7	-19.7	H

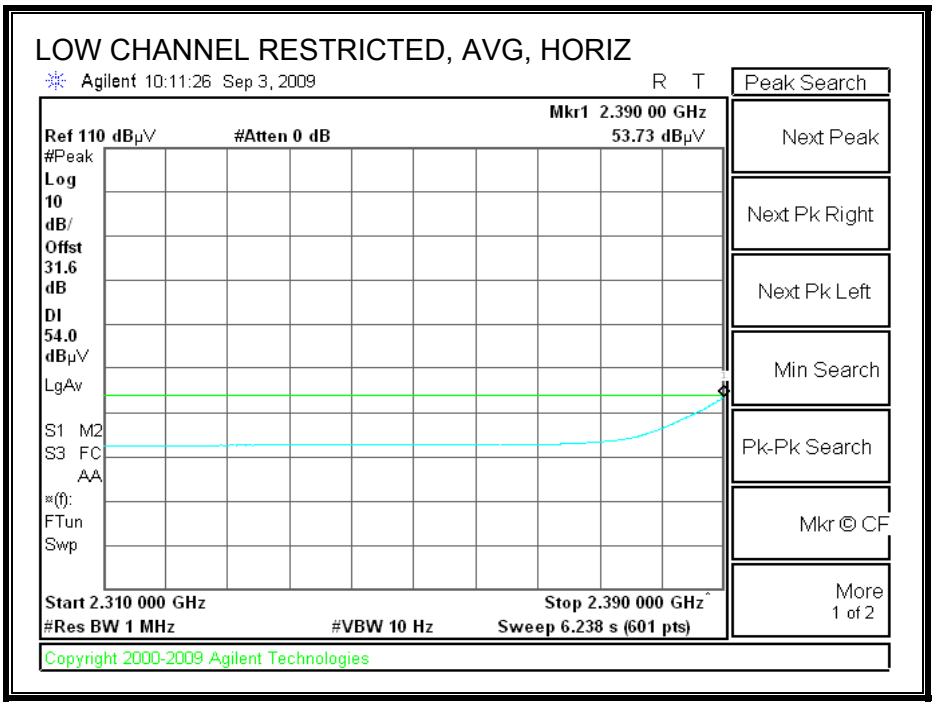
Rev. 11.10.08
Note: No other emissions were detected above the system nose floor

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		

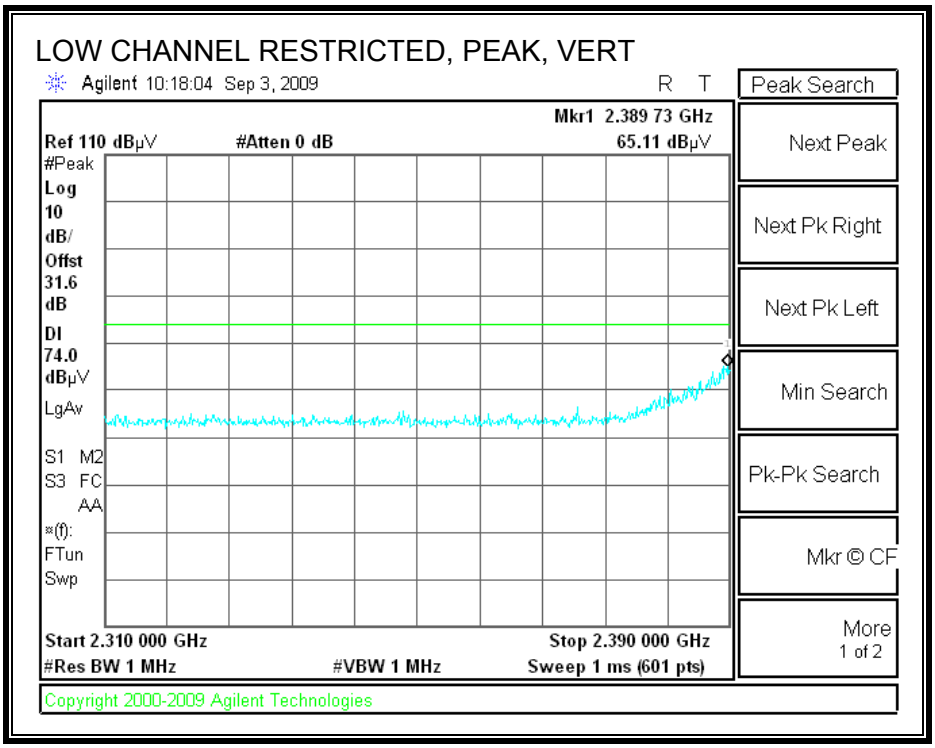
9.2.2. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

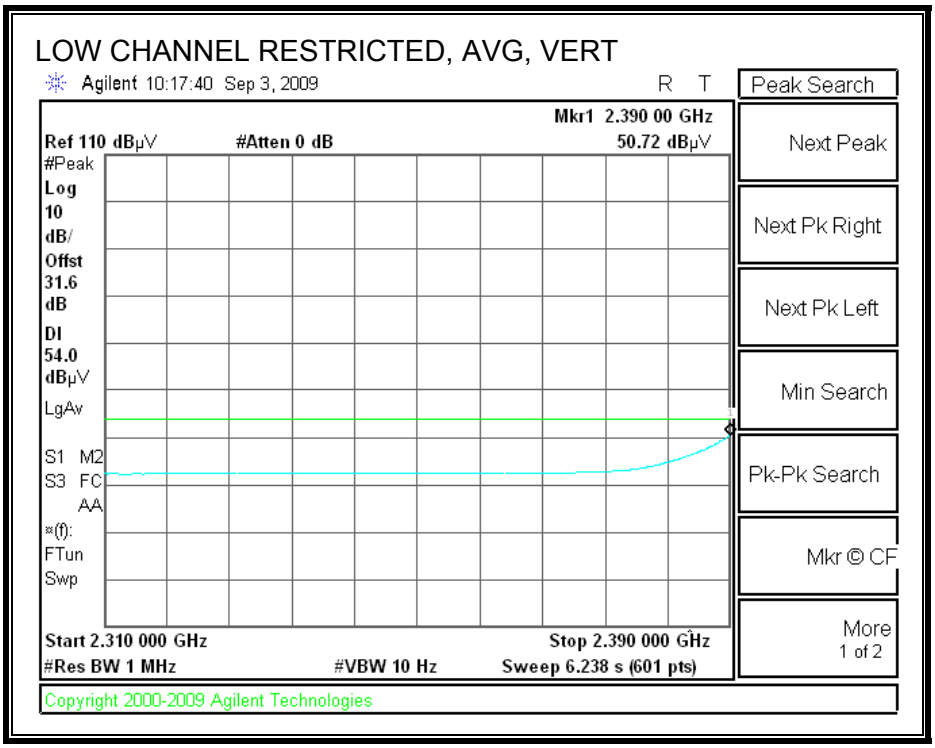
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



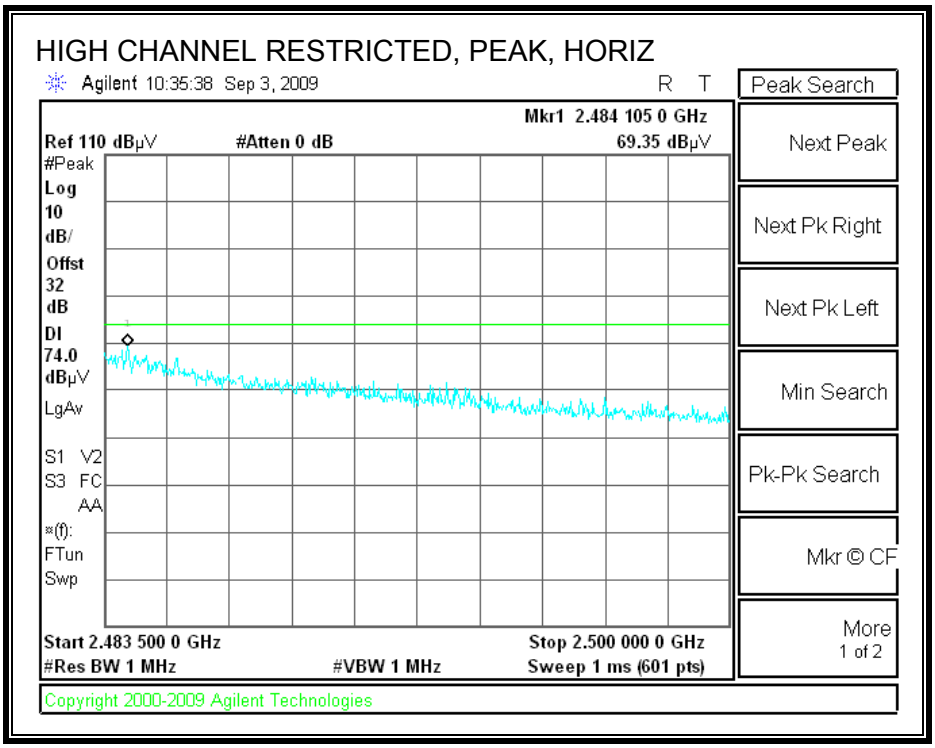


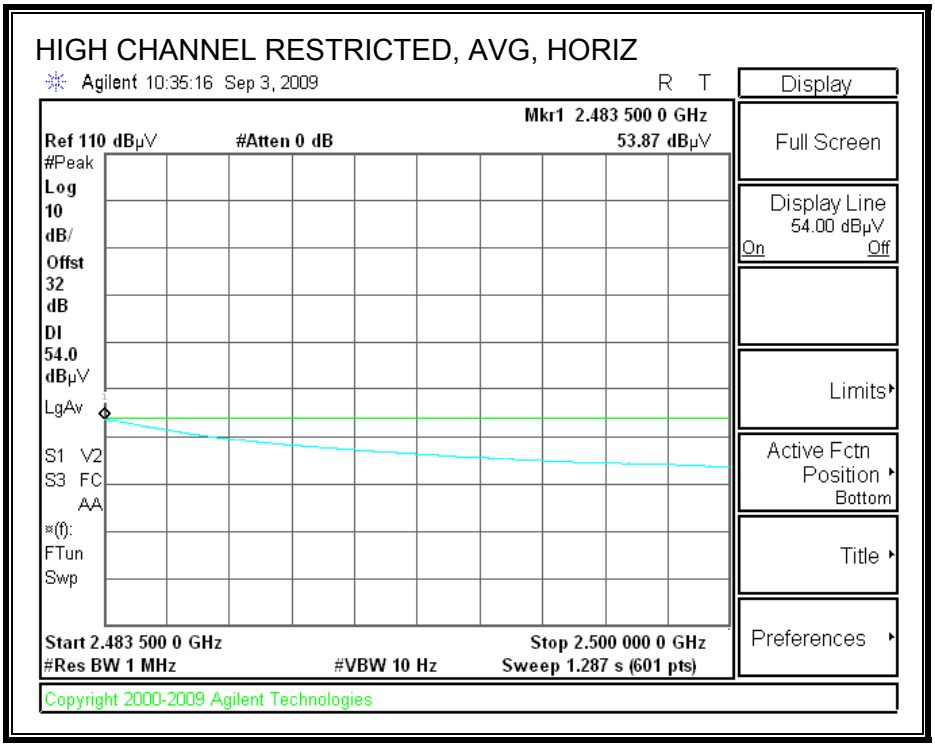
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



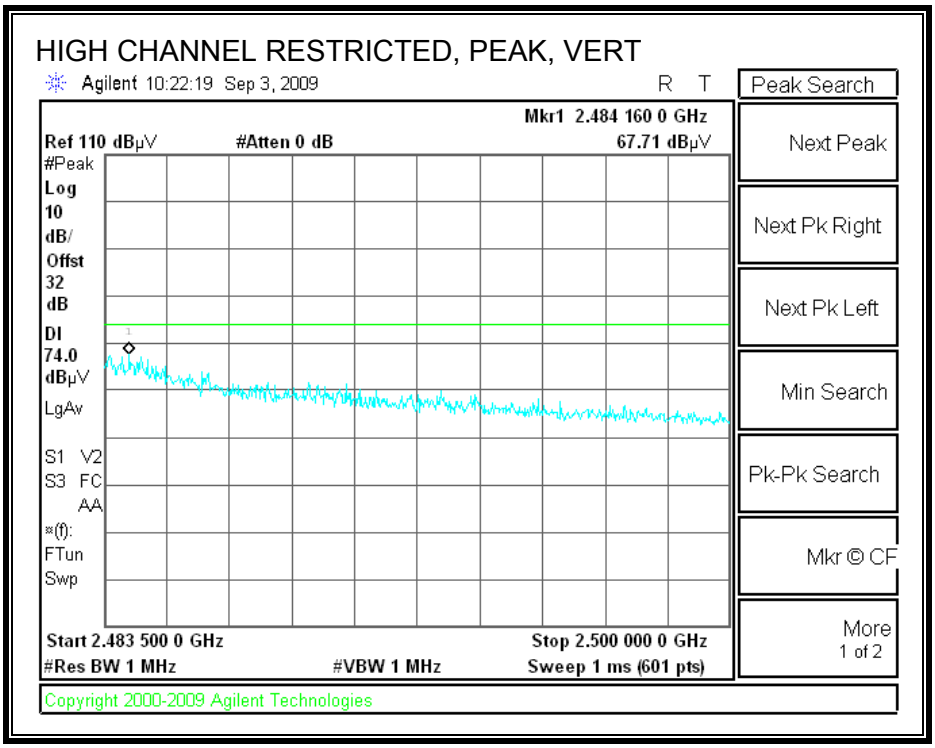


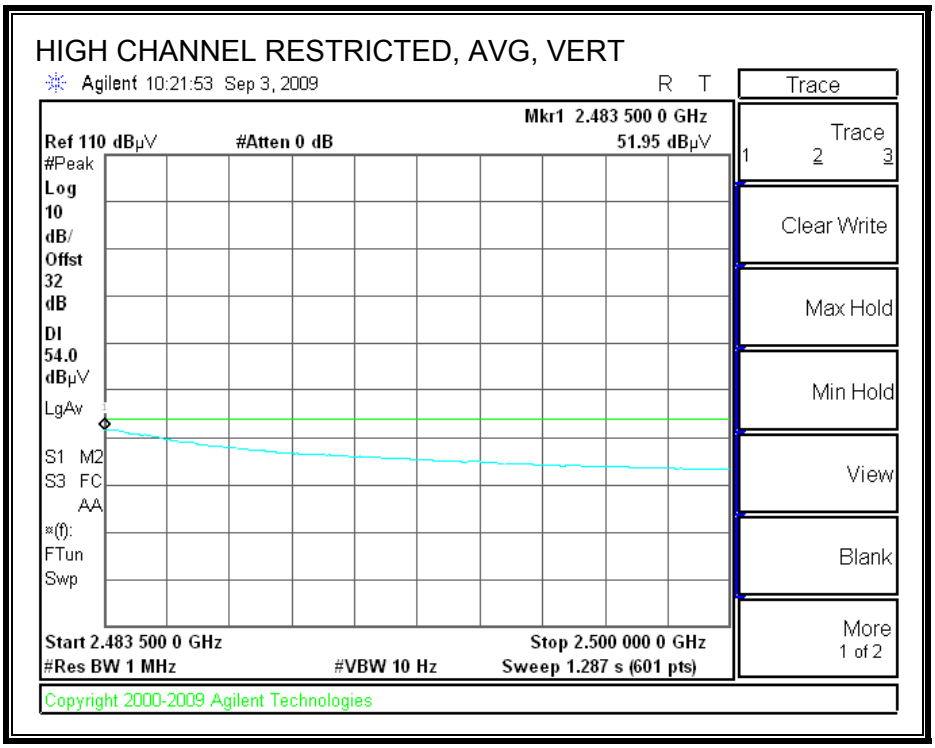
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 09U12738
Date: 9/9/2009
Test Engineer: Chin Pang
Configuration: EUT/Antenna
Mode: g, TX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

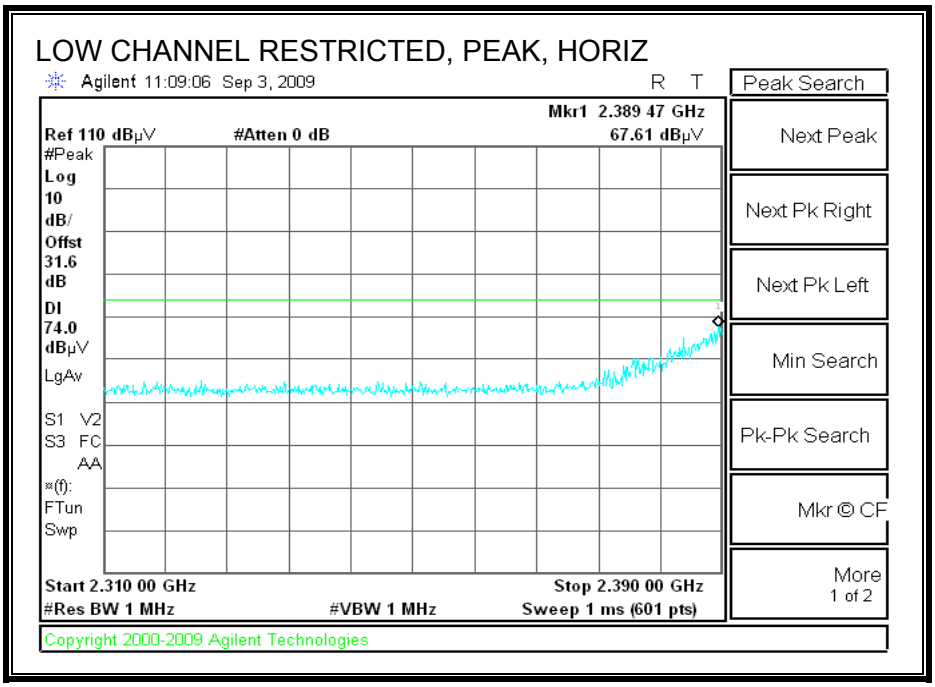
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 2412MHz															
4.824	3.0	49.2	34.0	33.0	5.8	-36.5	0.0	0.0	51.6	36.4	74	54	-22.4	-17.6	V
4.824	3.0	49.5	34.5	33.0	5.8	-36.5	0.0	0.0	51.9	36.9	74	54	-22.1	-17.1	H
Mid Ch, 2437MHz															
4.874	3.0	51.3	39.5	33.1	5.8	-36.5	0.0	0.0	53.8	42.0	74	54	-20.2	-12.0	V
7.311	3.0	45.6	32.2	35.3	7.3	-36.2	0.0	0.0	51.9	38.5	74	54	-22.1	-15.5	V
4.874	3.0	50.0	37.6	33.1	5.8	-36.5	0.0	0.0	52.5	40.1	74	54	-21.5	-13.9	H
7.311	3.0	43.7	31.6	35.3	7.3	-36.2	0.0	0.0	50.0	37.9	74	54	-24.0	-16.1	H
High Ch, 2462MHz															
4.924	3.0	47.5	35.6	33.1	5.9	-36.5	0.0	0.0	50.1	38.2	74	54	-23.9	-15.8	V
7.386	3.0	44.5	32.8	35.4	7.3	-36.2	0.0	0.0	51.0	39.3	74	54	-23.0	-14.7	V
4.924	3.0	47.0	35.6	33.1	5.9	-36.5	0.0	0.0	49.6	38.2	74	54	-24.4	-15.8	H
7.386	3.0	43.0	31.5	35.4	7.3	-36.2	0.0	0.0	49.5	38.0	74	54	-24.5	-16.0	H

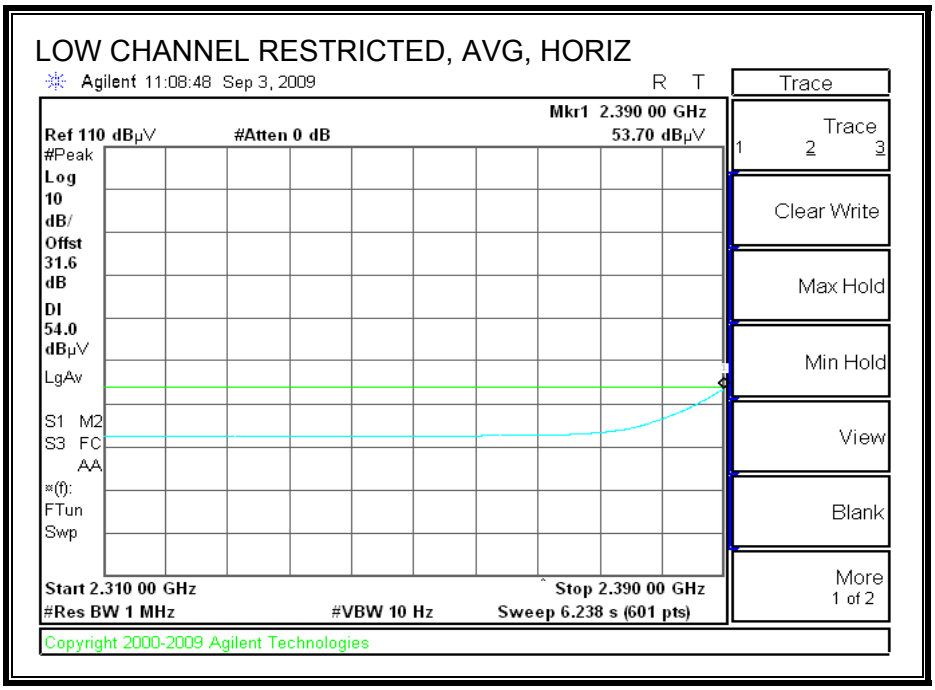
Rev. 11.10.08
Note: No other emissions were detected above the system nose floor

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		

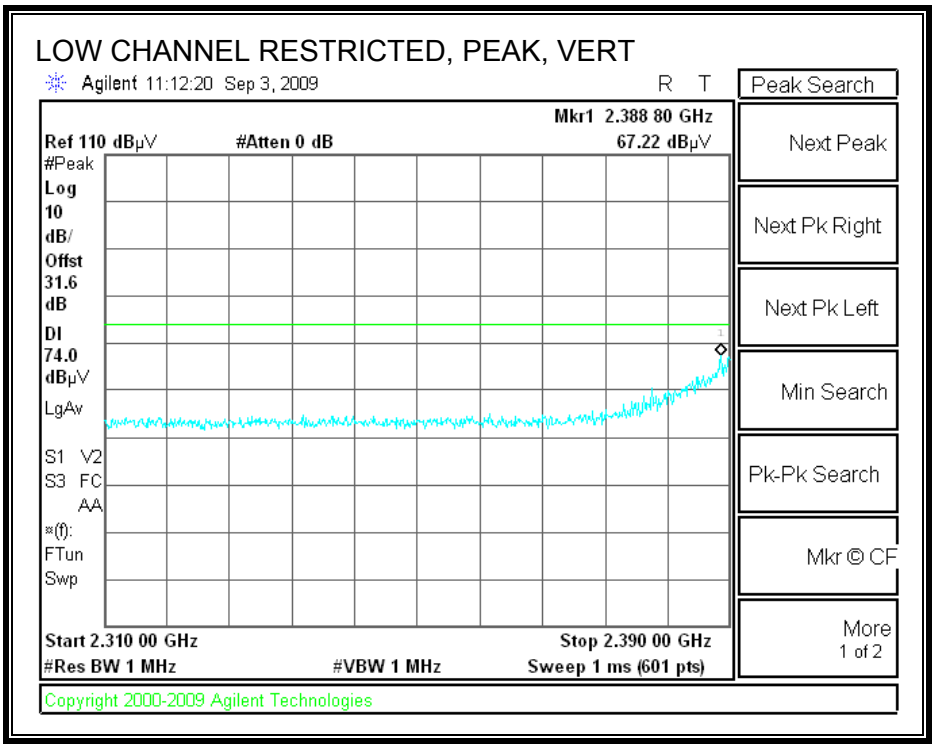
9.2.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 2.4 GHz BAND

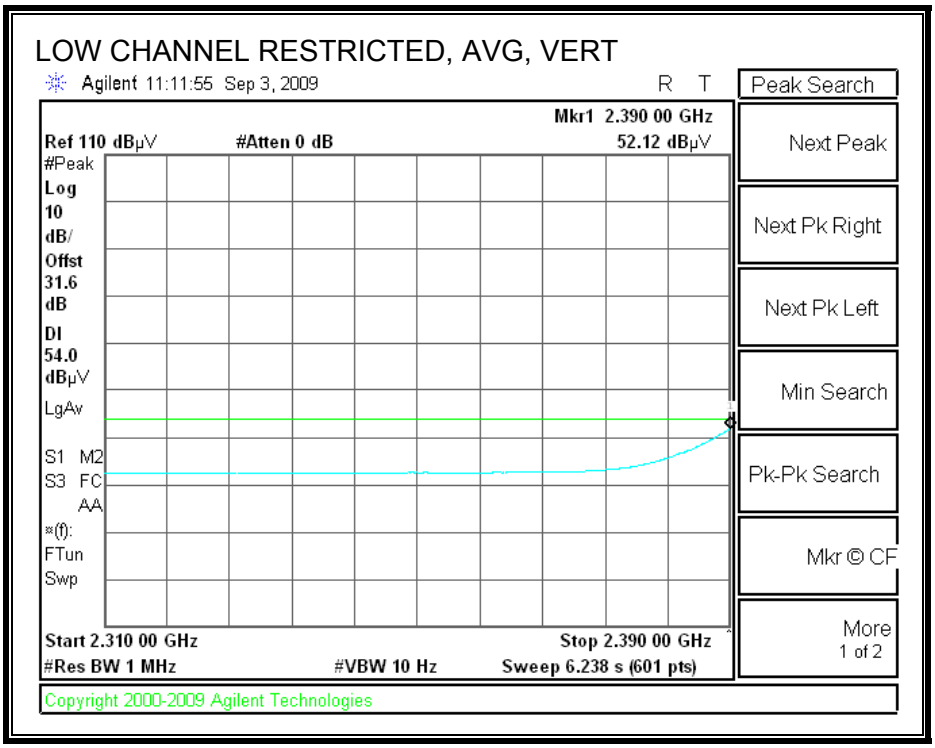
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



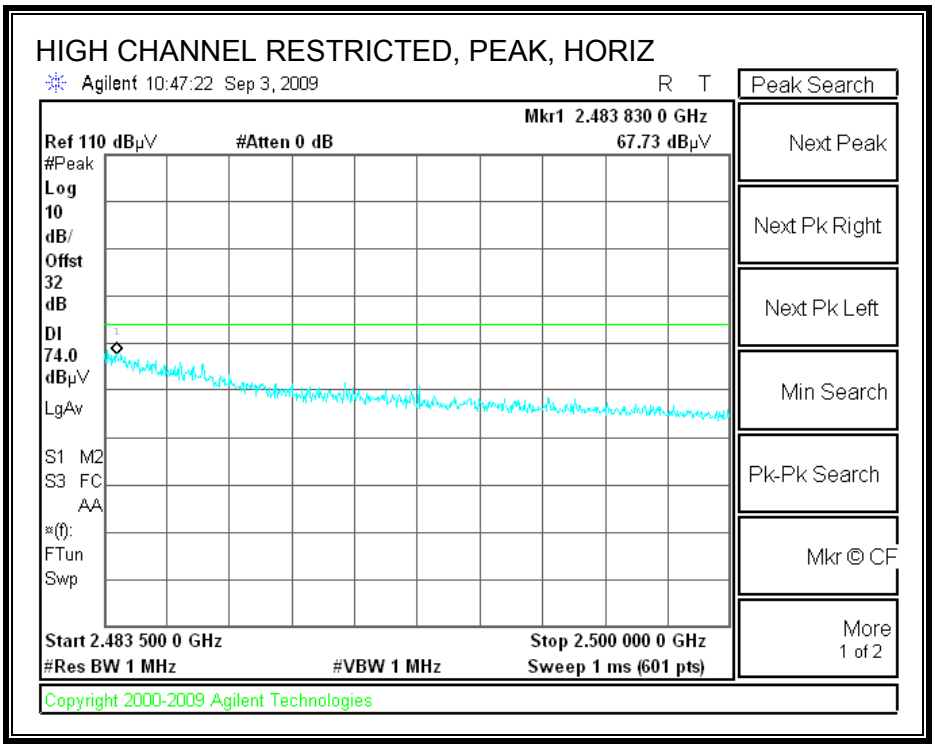


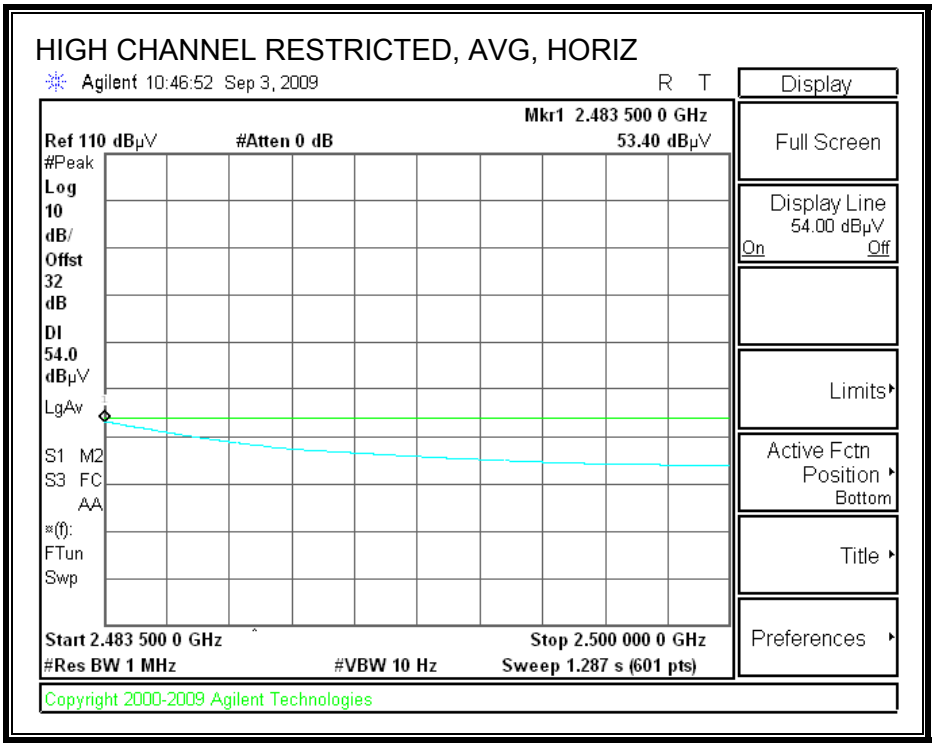
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



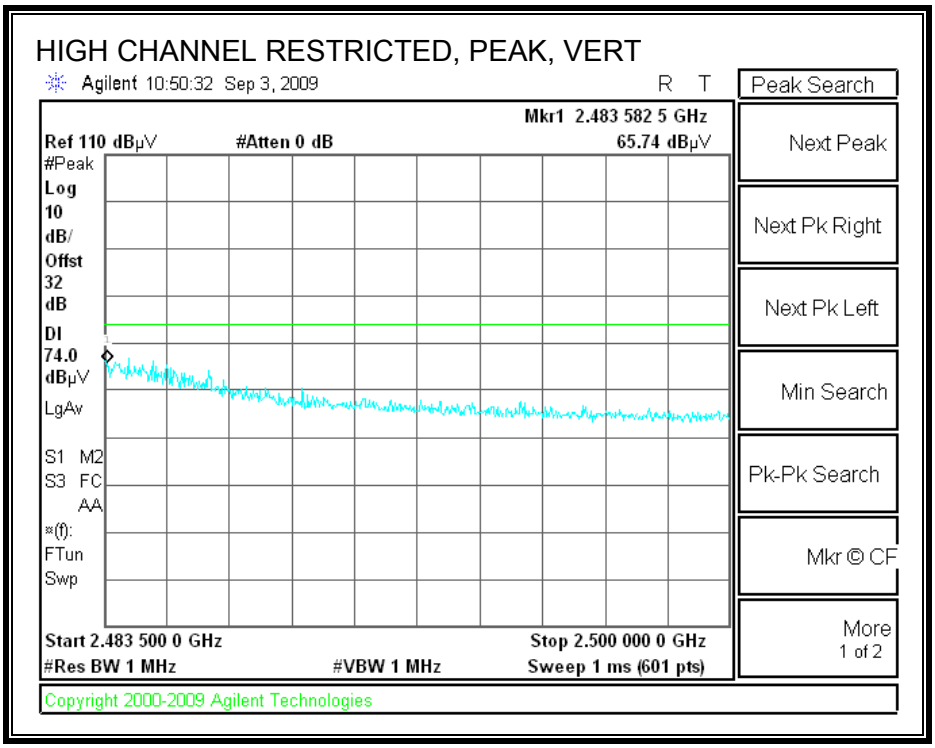


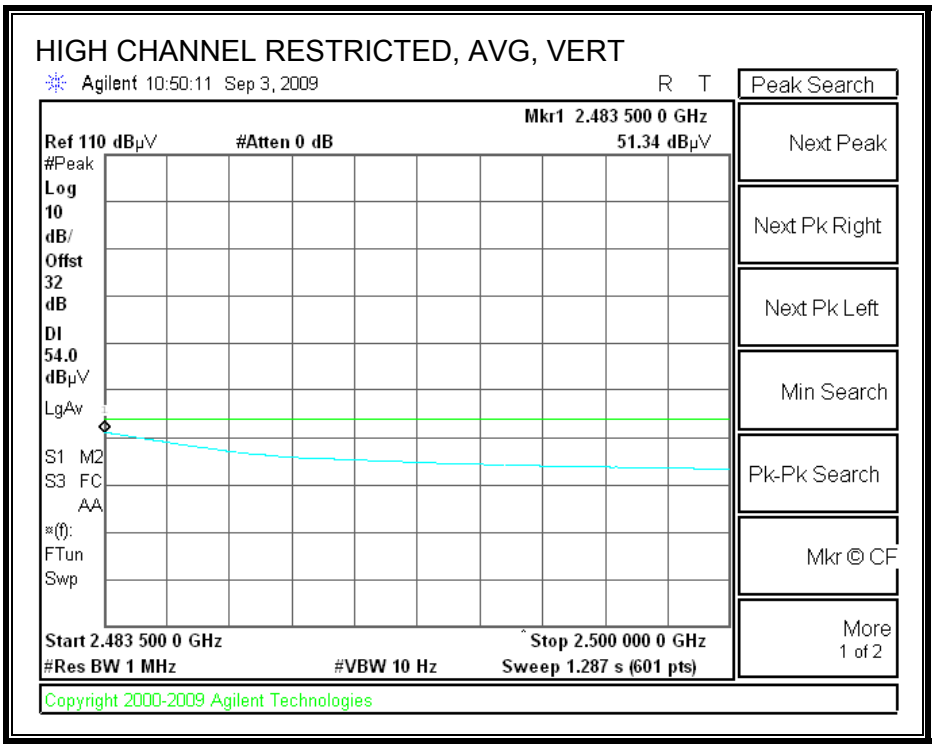
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 09U12738
Date: 9/9/2009
Test Engineer: Chin Pang
Configuration: EUT (Dual Antenna)/Antenna
Mode: HT20, TX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

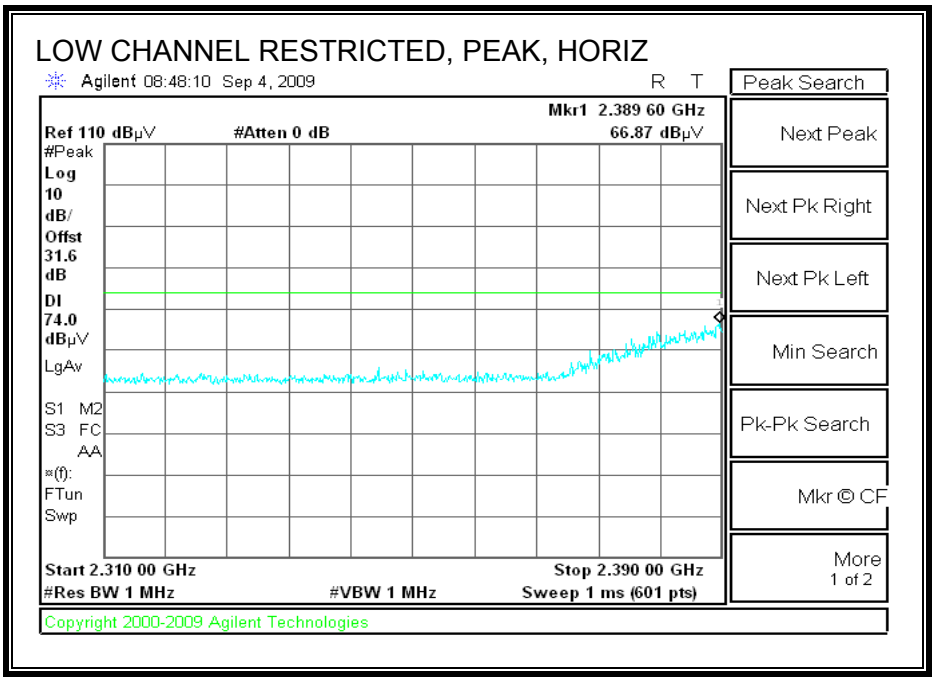
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 2412MHz															
4.824	3.0	49.2	36.5	33.0	5.8	-36.5	0.0	0.0	51.6	38.9	74	54	-22.4	-15.1	V
4.824	3.0	48.1	36.0	33.0	5.8	-36.5	0.0	0.0	50.5	38.4	74	54	-23.5	-15.6	H
Mid Ch, 2437MHz															
4.874	3.0	50.5	38.9	33.1	5.8	-36.5	0.0	0.0	53.0	41.4	74	54	-21.0	-12.6	V
7.311	3.0	45.7		35.3	7.3	-36.2	0.0	0.0	52.0	6.3	74	54	-22.0	-47.7	V
4.874	3.0	51.3	39.2	33.1	5.8	-36.5	0.0	0.0	53.8	41.7	74	54	-20.2	-12.3	H
7.311	3.0	42.6	31.7	35.3	7.3	-36.2	0.0	0.0	48.9	38.0	74	54	-25.1	-16.0	H
High Ch, 2462MHz															
4.924	3.0	49.3	37.7	33.1	5.9	-36.5	0.0	0.0	51.8	40.3	74	54	-22.2	-13.7	V
7.386	3.0	43.5	31.6	35.4	7.3	-36.2	0.0	0.0	50.0	38.1	74	54	-24.0	-15.9	V
4.924	3.0	46.0	34.6	33.1	5.9	-36.5	0.0	0.0	48.6	37.2	74	54	-25.4	-16.8	H
7.386	3.0	42.8	31.5	35.4	7.3	-36.2	0.0	0.0	49.3	38.0	74	54	-24.7	-16.0	H

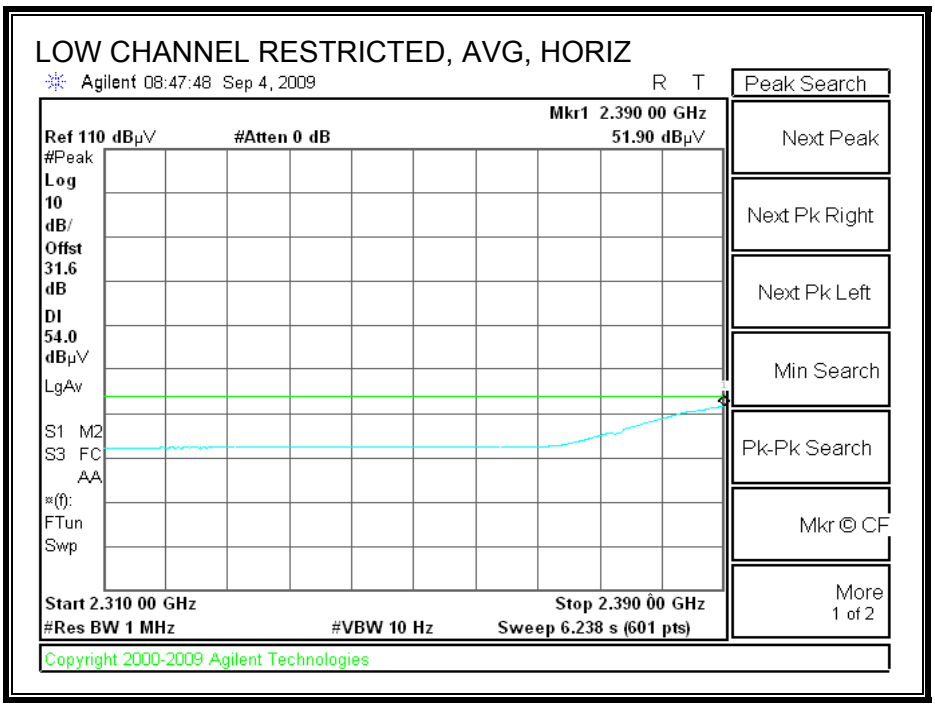
Rev. 11.10.08
Note: No other emissions were detected above the system nose floor

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		

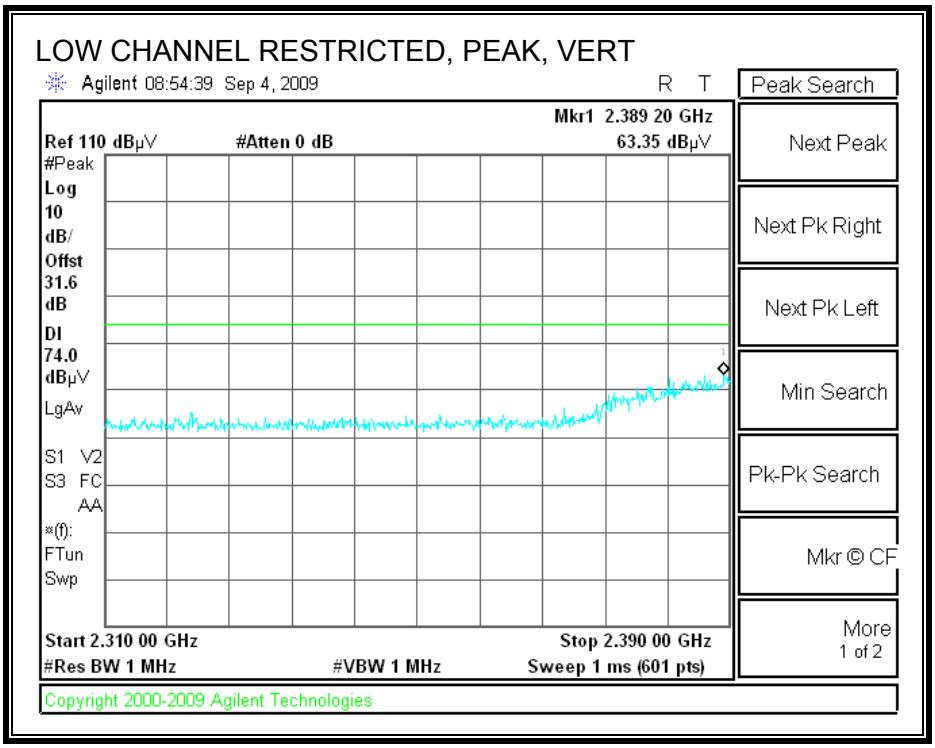
9.2.4. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 2.4 GHz BAND

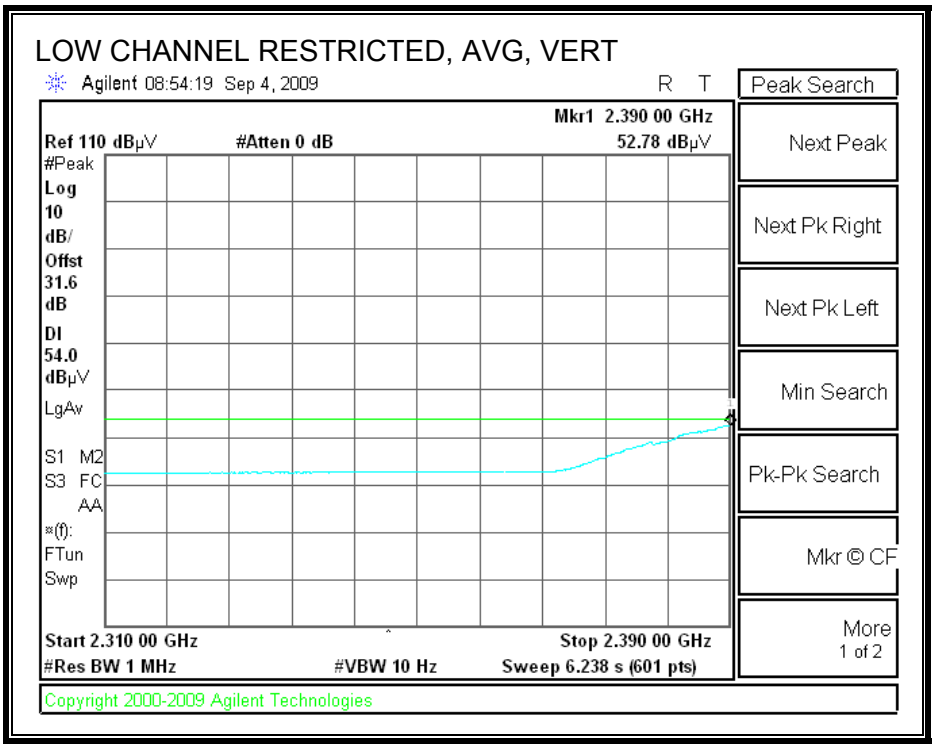
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



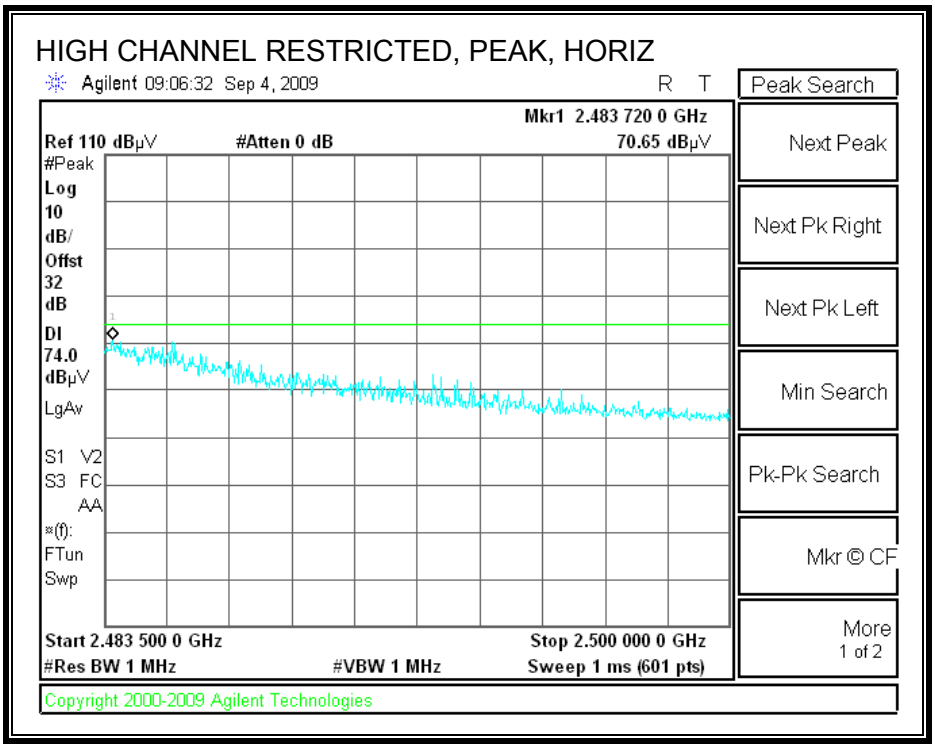


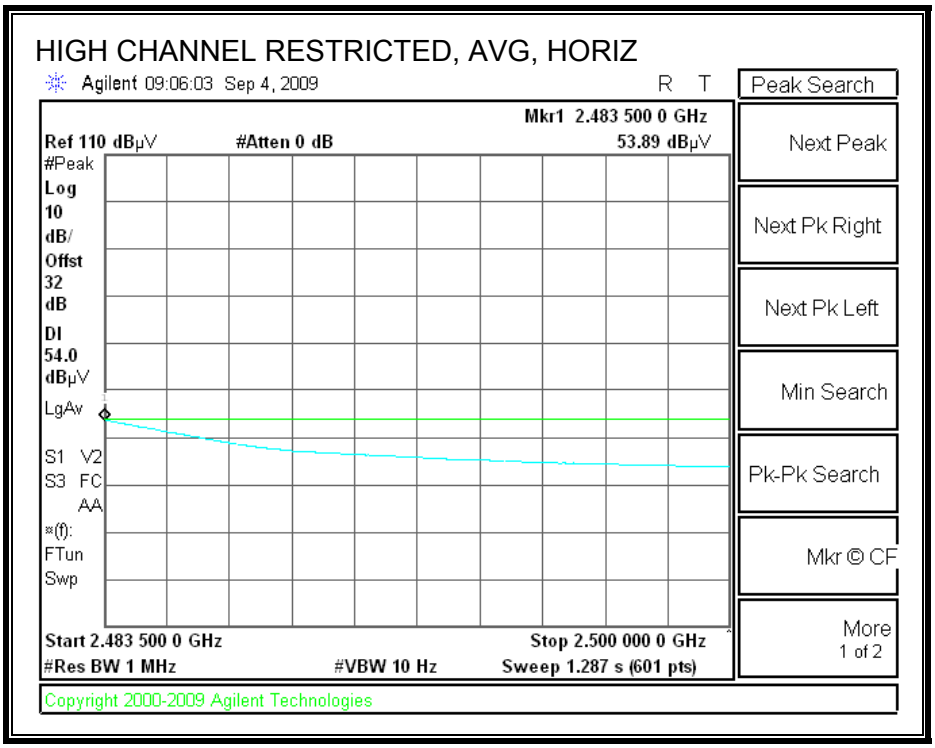
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



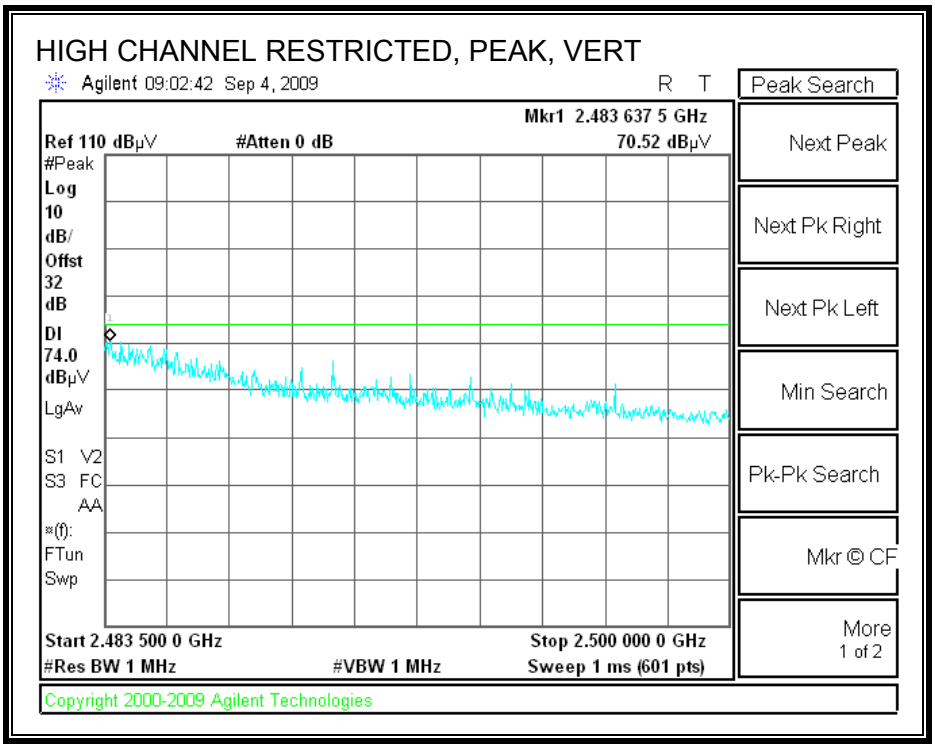


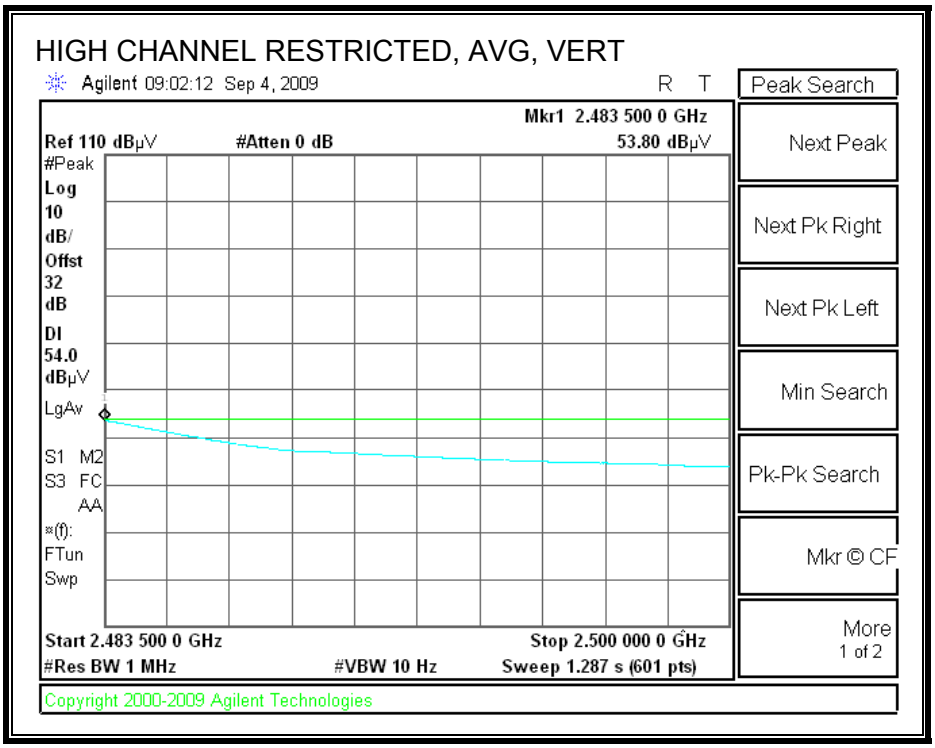
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 09U12738
Date: 9/9/2009
Test Engineer: Chin Pang
Configuration: EUT (Dual Antenna)/Antenna
Mode: HT40, TX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

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)
Low Ch, 2422MHz															
4.844	3.0	46.0	34.3	33.1	5.8	-36.5	0.0	0.0	48.4	36.7	74	54	-25.6	-17.3	V
7.266	3.0	43.2	30.2	35.2	7.2	-36.2	0.0	0.0	49.4	36.4	74	54	-24.6	-17.6	V
4.844	3.0	44.0	33.1	33.1	5.8	-36.5	0.0	0.0	46.4	35.5	74	54	-27.6	-18.5	H
7.266	3.0	42.3	28.0	35.2	7.2	-36.2	0.0	0.0	48.5	34.2	74	54	-25.5	-19.8	H
Mid Ch, 2437MHz															
4.874	3.0	47.1	35.8	33.1	5.8	-36.5	0.0	0.0	49.6	38.3	74	54	-24.4	-15.7	V
7.311	3.0	42.3	31.0	35.3	7.3	-36.2	0.0	0.0	48.6	37.3	74	54	-25.4	-16.7	V
4.874	3.0	46.5	34.6	33.1	5.8	-36.5	0.0	0.0	49.0	37.1	74	54	-25.0	-16.9	H
7.311	3.0	42.5	30.8	35.3	7.3	-36.2	0.0	0.0	48.8	37.1	74	54	-25.2	-16.9	H
High Ch, 2452MHz															
4.904	3.0	45.0	34.3	33.1	5.9	-36.5	0.0	0.0	47.5	36.8	74	54	-26.5	-17.2	V
7.356	3.0	43.0	30.8	35.4	7.3	-36.2	0.0	0.0	49.4	37.2	74	54	-24.6	-16.8	V
4.904	3.0	44.2	32.6	33.1	5.9	-36.5	0.0	0.0	46.7	35.1	74	54	-27.3	-18.9	H
7.356	3.0	42.3	30.5	35.4	7.3	-36.2	0.0	0.0	48.7	36.9	74	54	-25.3	-17.1	H

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

9.3. SINGLE ANTENNA CONFIGURATION TRANSMITTER ABOVE 1 GHz

9.3.1. TRANSMITTER ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND WORST CASE

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 09U12738
Date: 9/12/2009
Test Engineer: Chin Pang
Configuration: EUT (Single Antenna Port) / Antenna
Mode: b, TX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

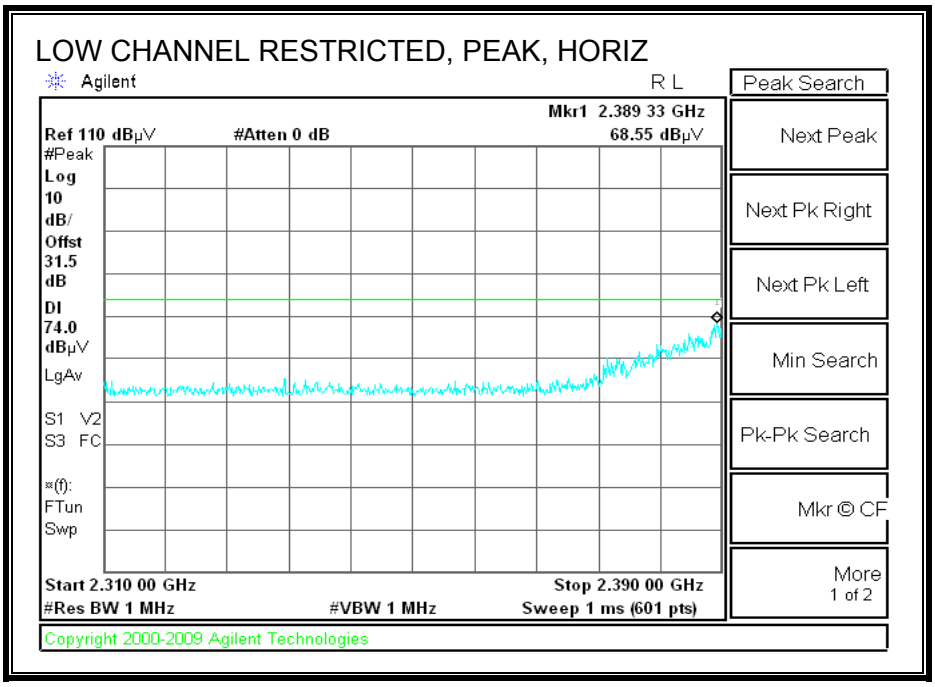
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 2412MHz															
4.824	3.0	47.0	42.3	33.0	5.8	-36.5	0.0	0.0	49.4	44.7	74	54	-24.6	-9.3	V
4.824	3.0	45.0	42.1	33.0	5.8	-36.5	0.0	0.0	47.4	44.5	74	54	-26.6	-9.5	H
Mid Ch, 2437MHz															
4.874	3.0	46.3	43.2	33.1	5.8	-36.5	0.0	0.0	48.8	45.7	74	54	-25.2	-8.3	V
7.311	3.0	42.0	31.0	35.3	7.3	-36.2	0.0	0.0	48.3	37.3	74	54	-25.7	-16.7	V
4.874	3.0	45.0	40.0	33.1	5.8	-36.5	0.0	0.0	47.5	42.5	74	54	-26.5	-11.5	H
7.311	3.0	42.6	31.1	35.3	7.3	-36.2	0.0	0.0	48.9	37.4	74	54	-25.1	-16.6	H
High Ch, 2462MHz															
4.924	3.0	47.2	44.1	33.1	5.9	-36.5	0.0	0.0	49.8	46.7	74	54	-24.2	-7.3	V
7.386	3.0	42.0	29.8	35.4	7.3	-36.2	0.0	0.0	48.5	36.3	74	54	-25.5	-17.7	V
4.924	3.0	45.0	40.6	33.1	5.9	-36.5	0.0	0.0	47.6	43.2	74	54	-26.4	-10.8	H
7.386	3.0	41.5	29.0	35.4	7.3	-36.2	0.0	0.0	48.0	35.5	74	54	-26.0	-18.5	H

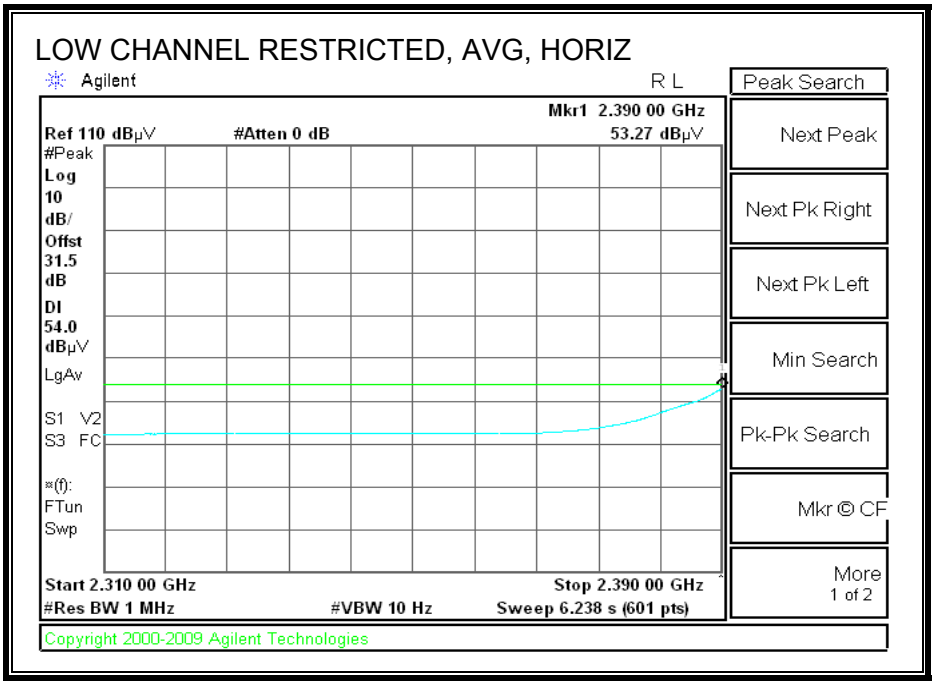
Rev. 11.10.08
Note: No other emissions were detected above the system nose floor

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		

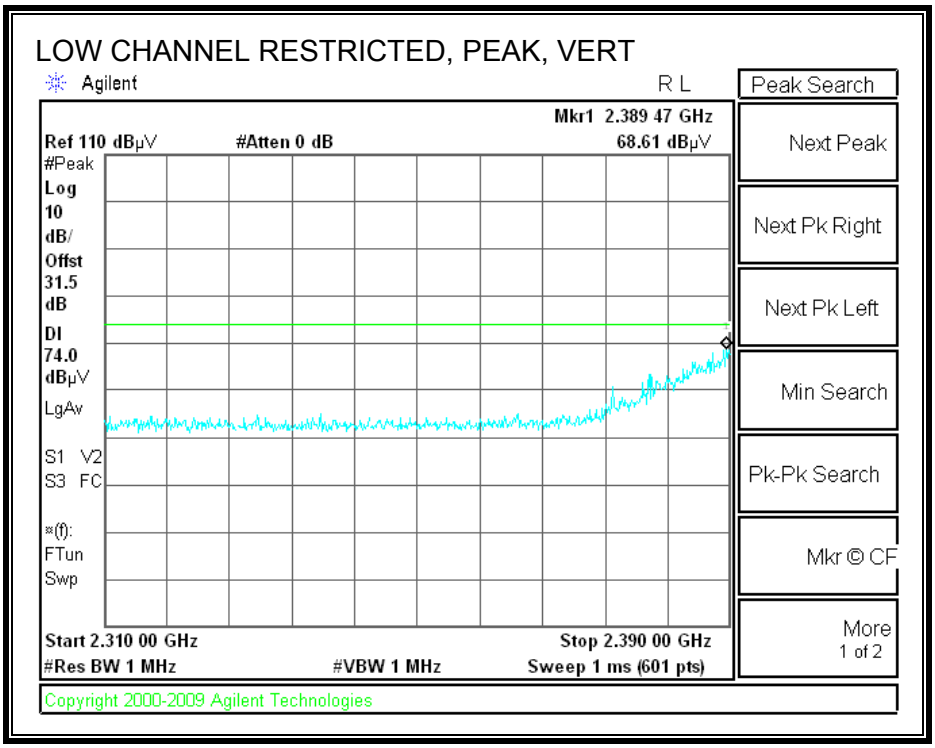
9.3.2. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND WORST CASE

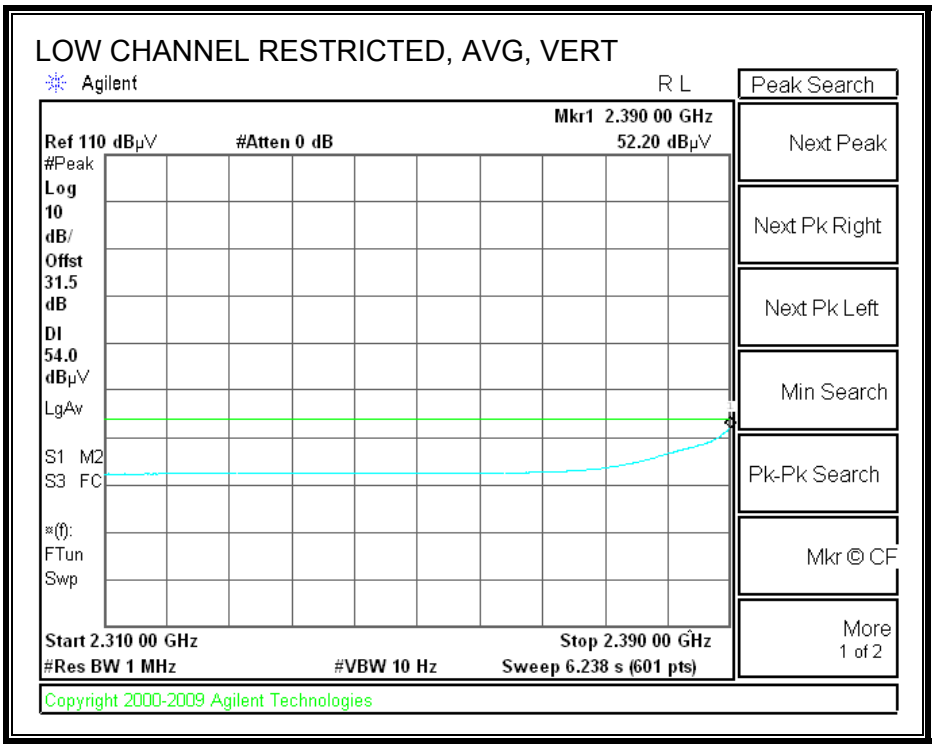
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



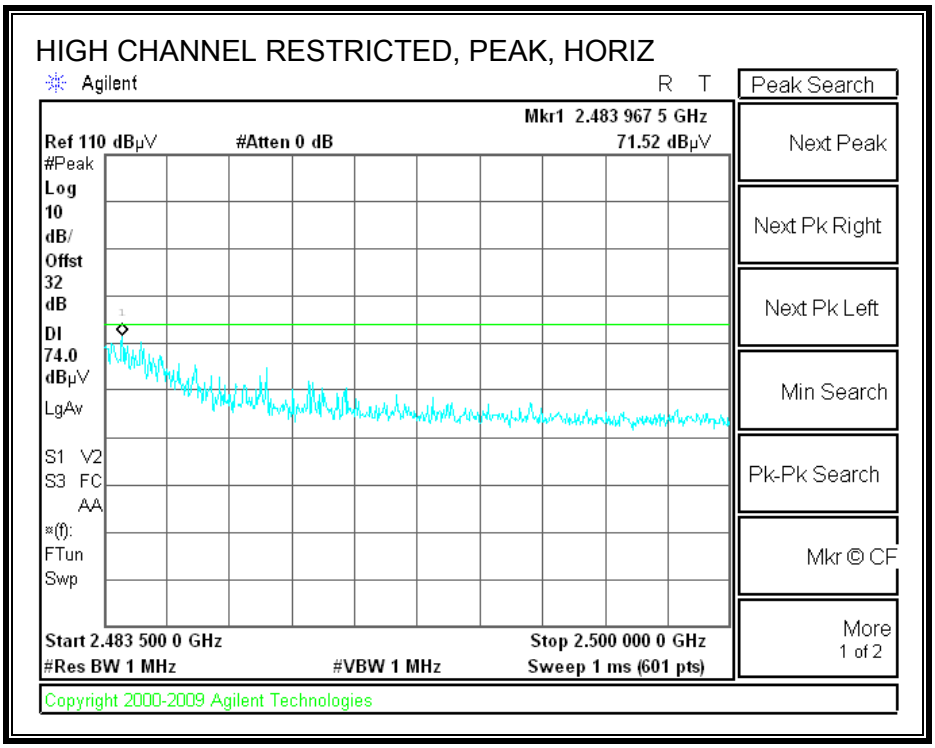


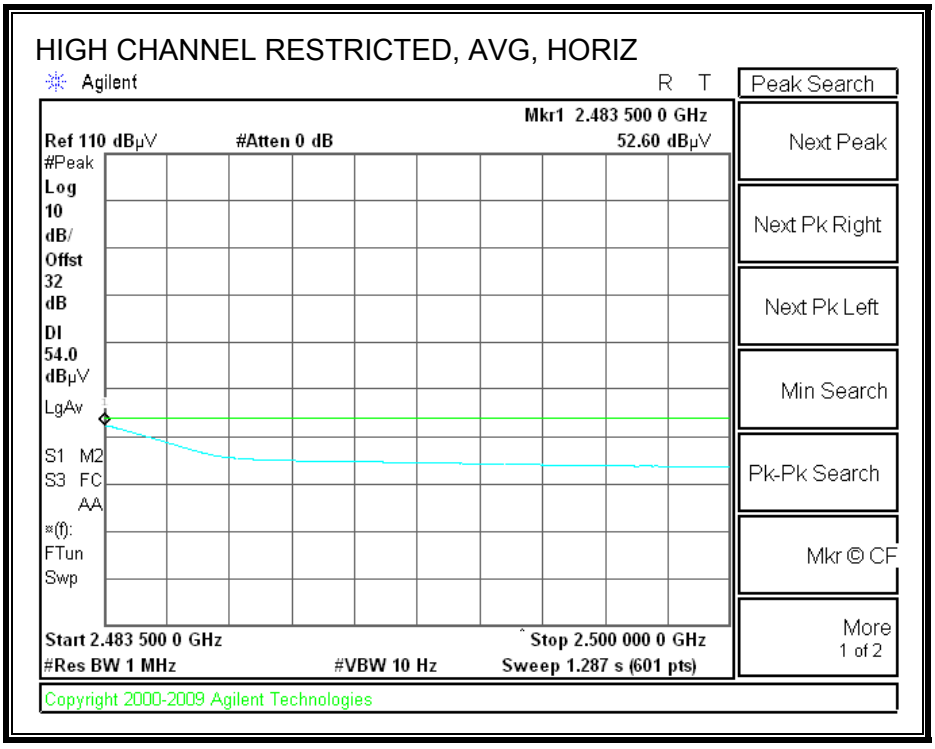
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



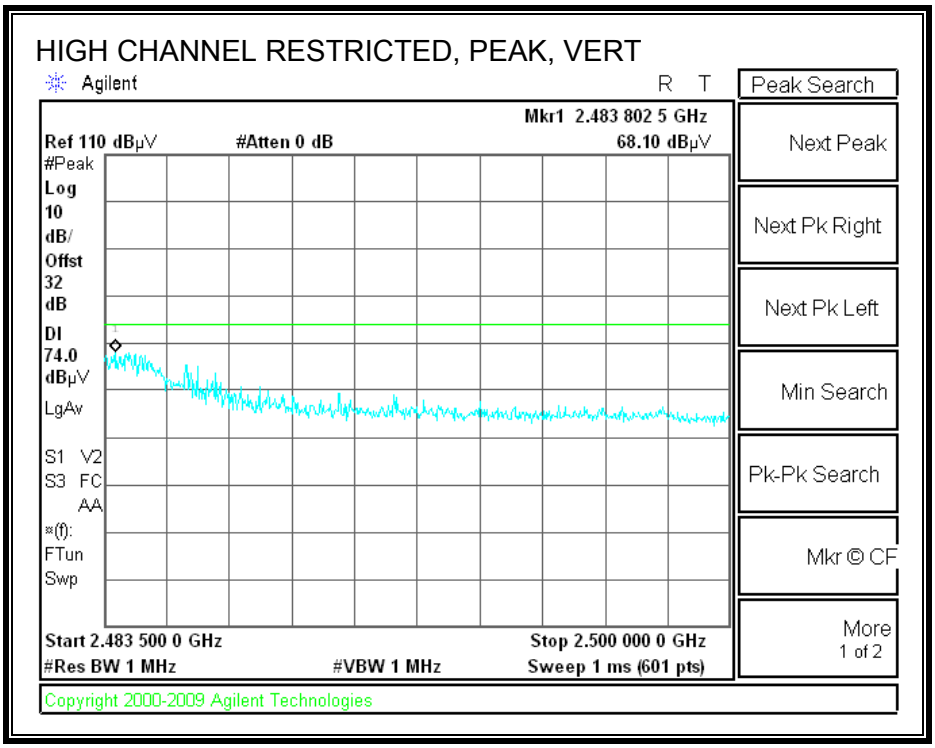


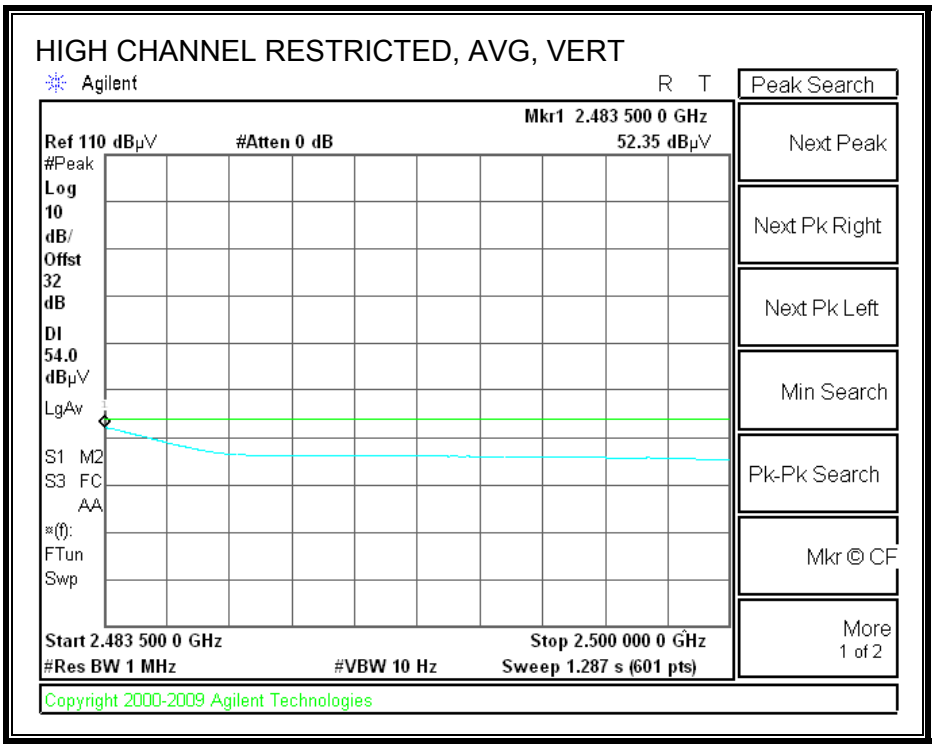
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





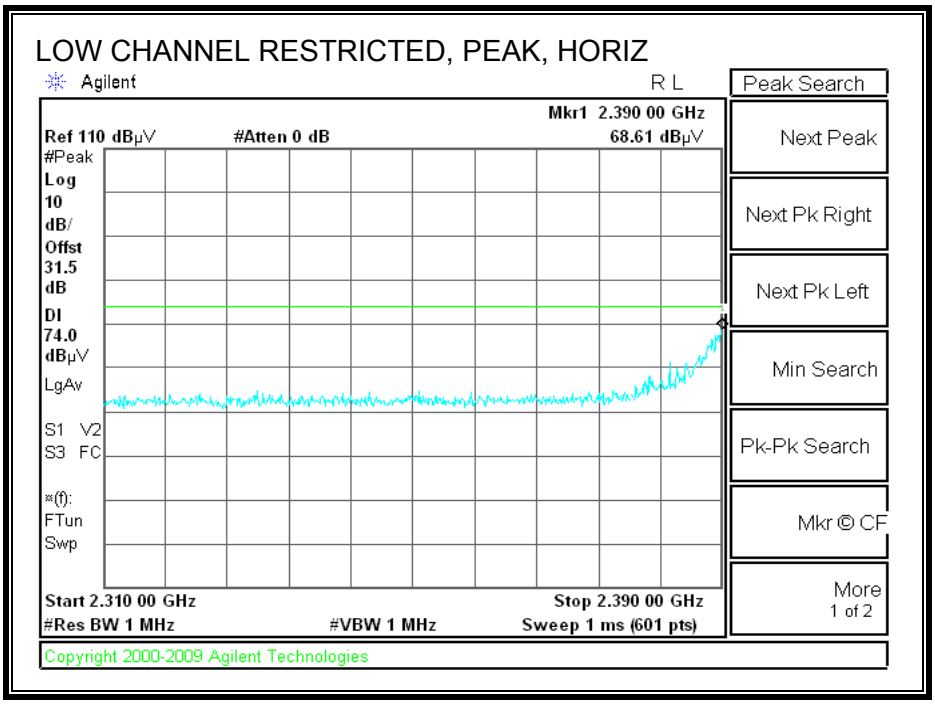
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

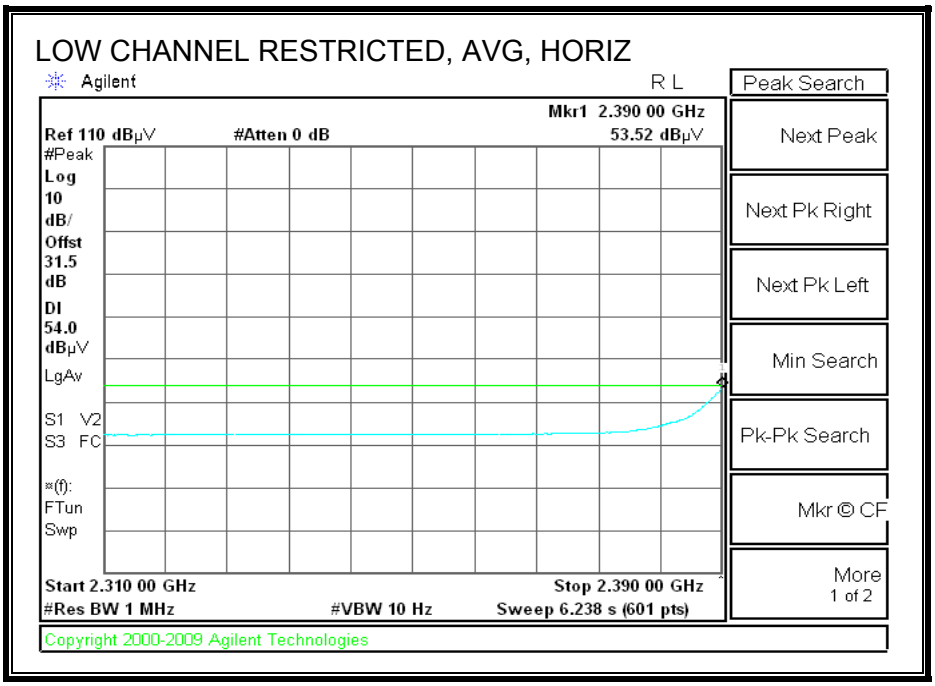




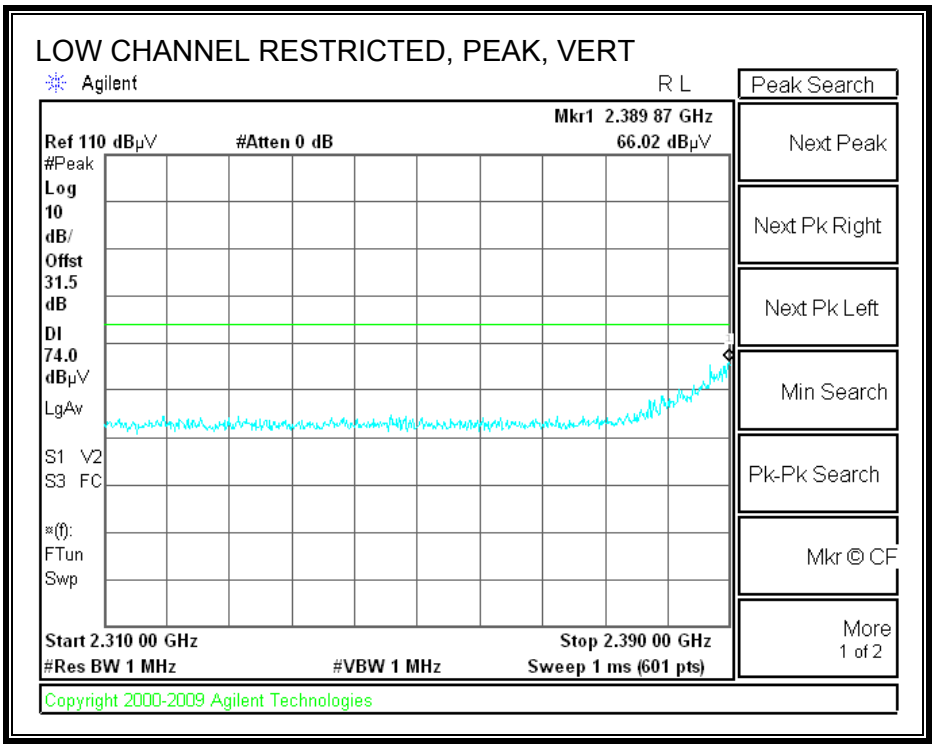
9.3.3. TRANSMITTER ABOVE 1 GHz FOR 802.11 HT20 MODE IN THE 2.4 GHz BAND WORST CASE

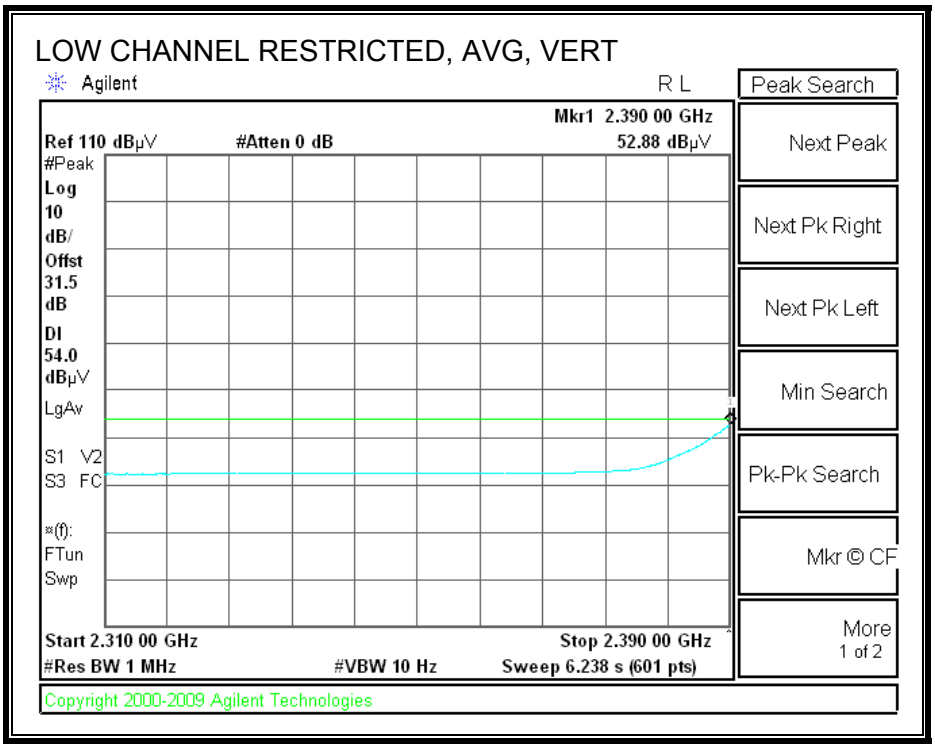
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



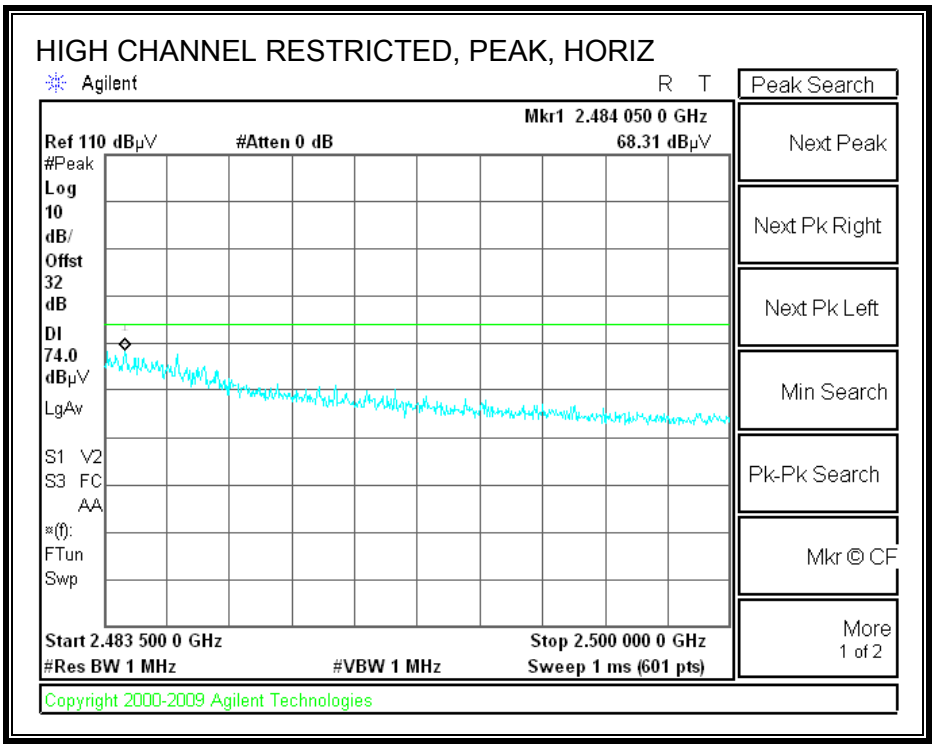


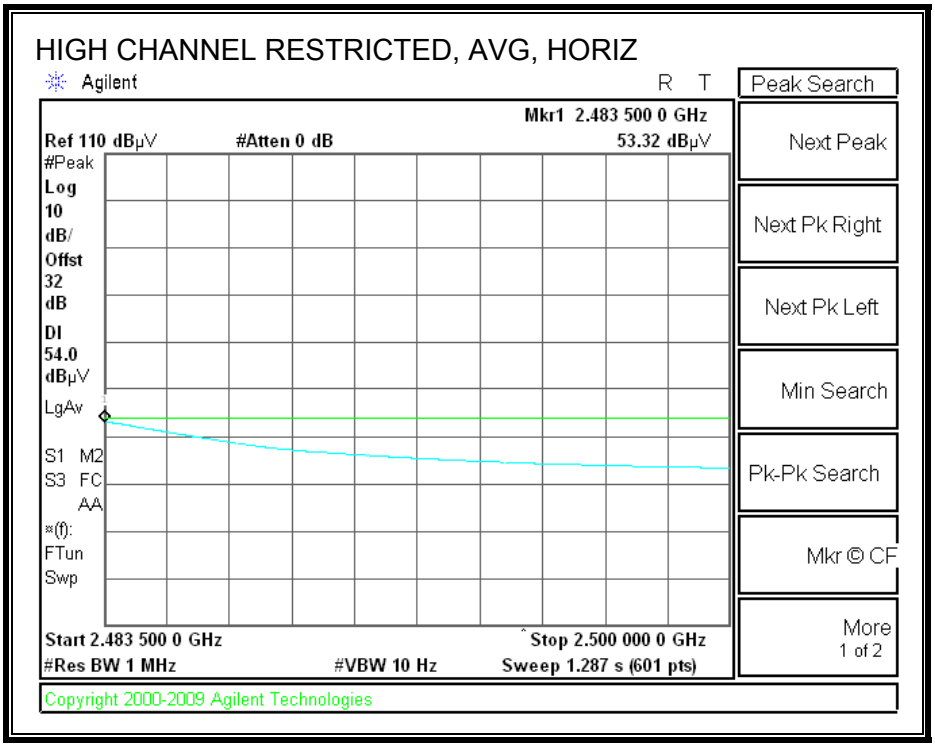
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



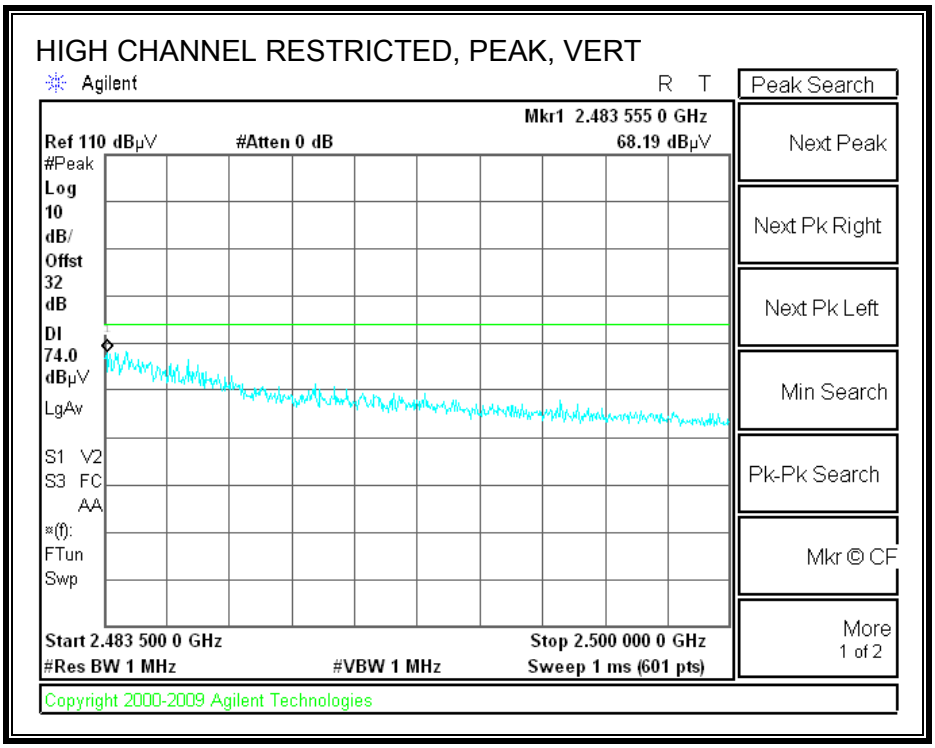


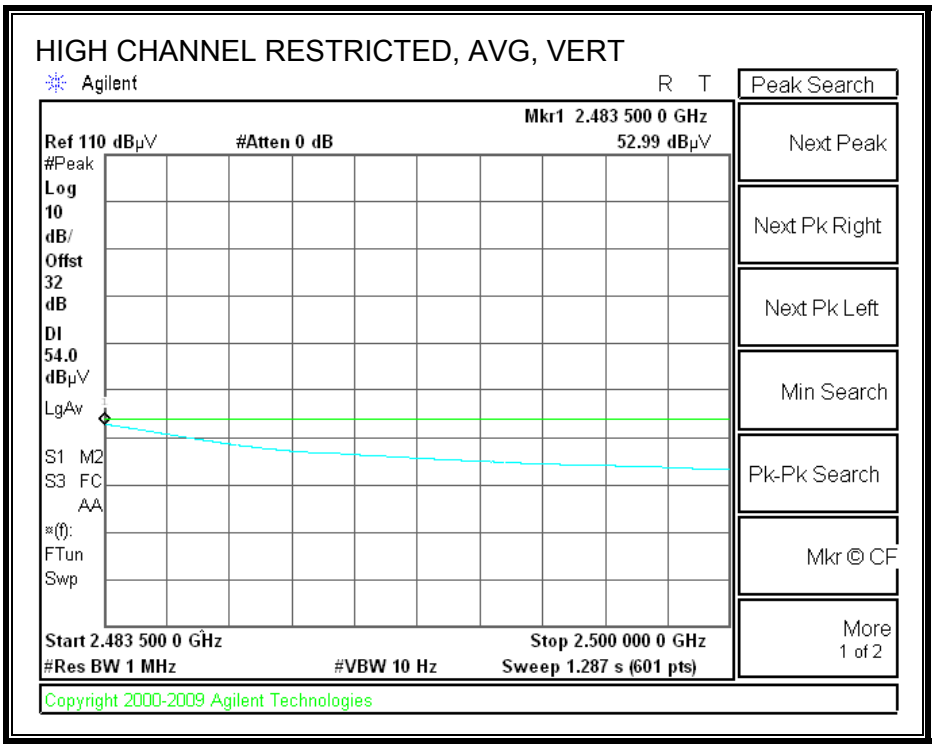
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





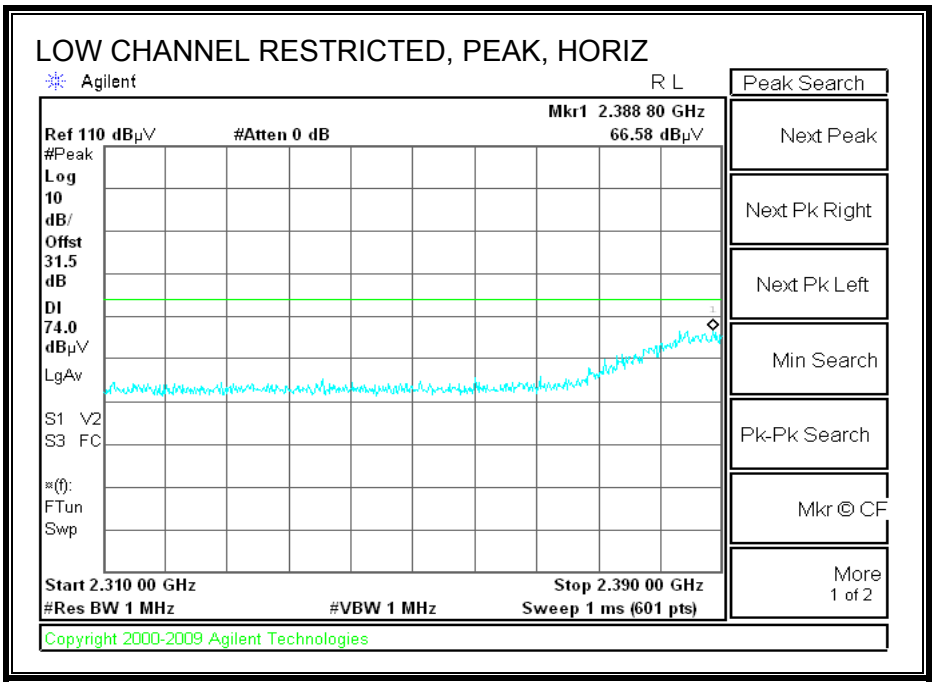
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

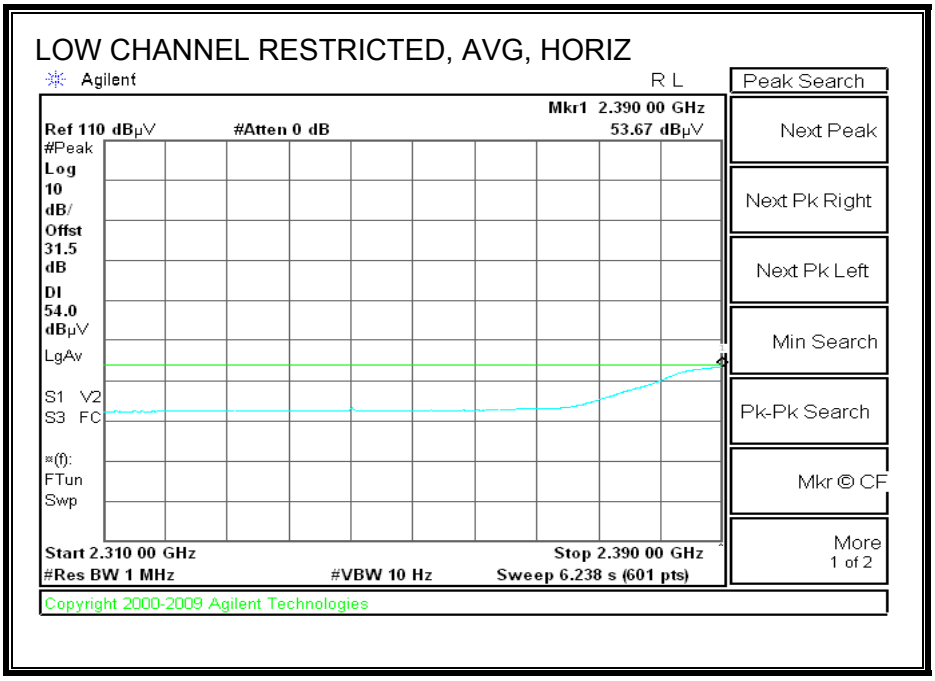




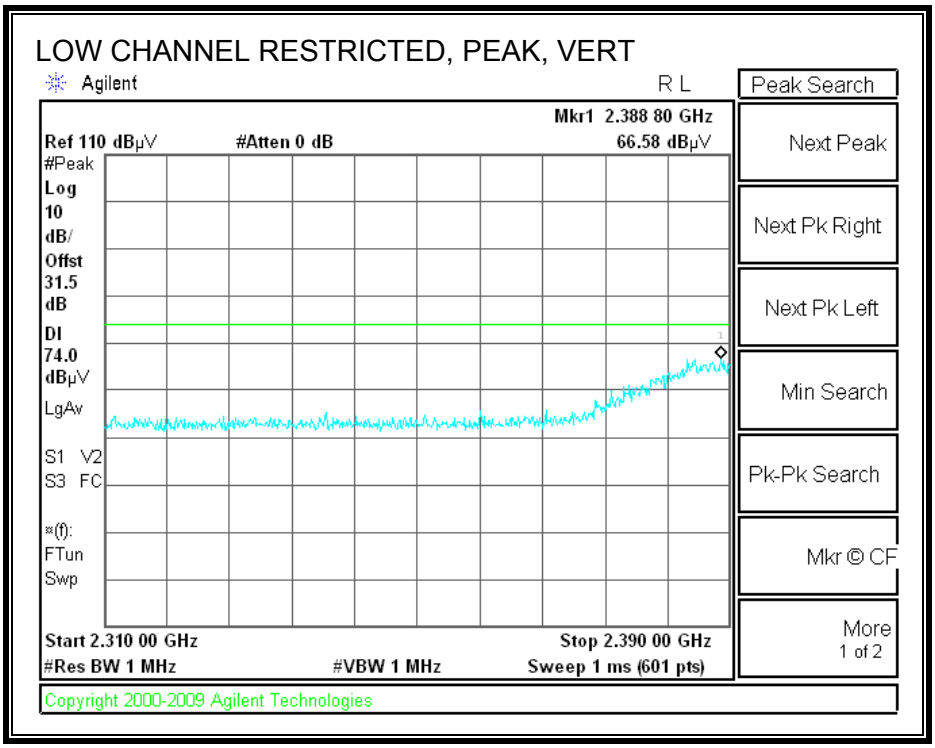
9.3.4. TRANSMITTER ABOVE 1 GHz FOR 802.11 HT40 MODE IN THE 2.4 GHz BAND

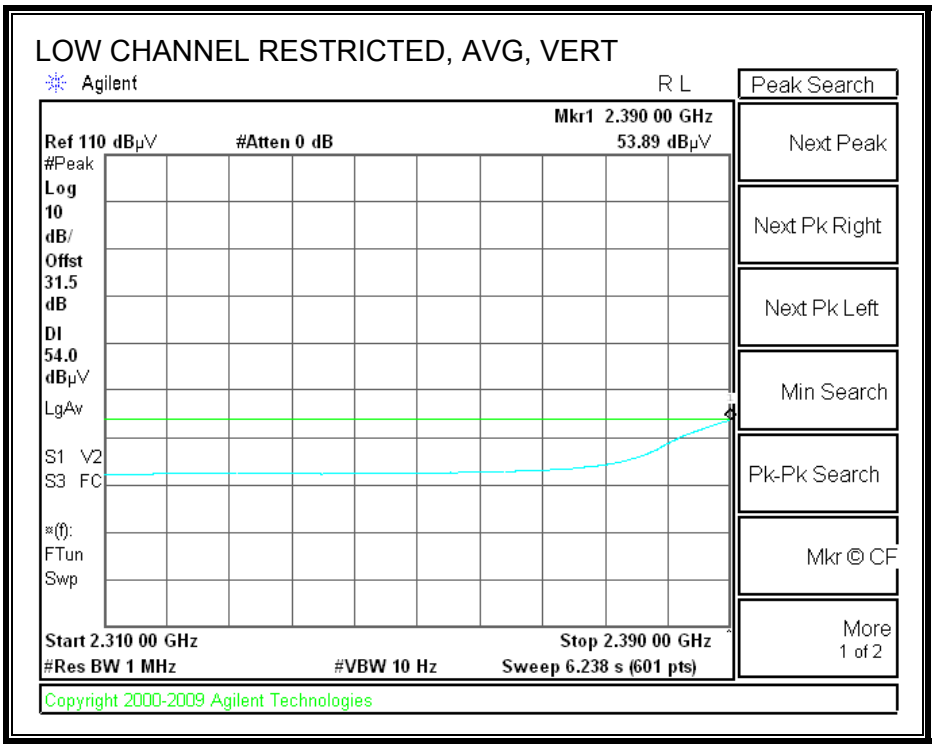
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



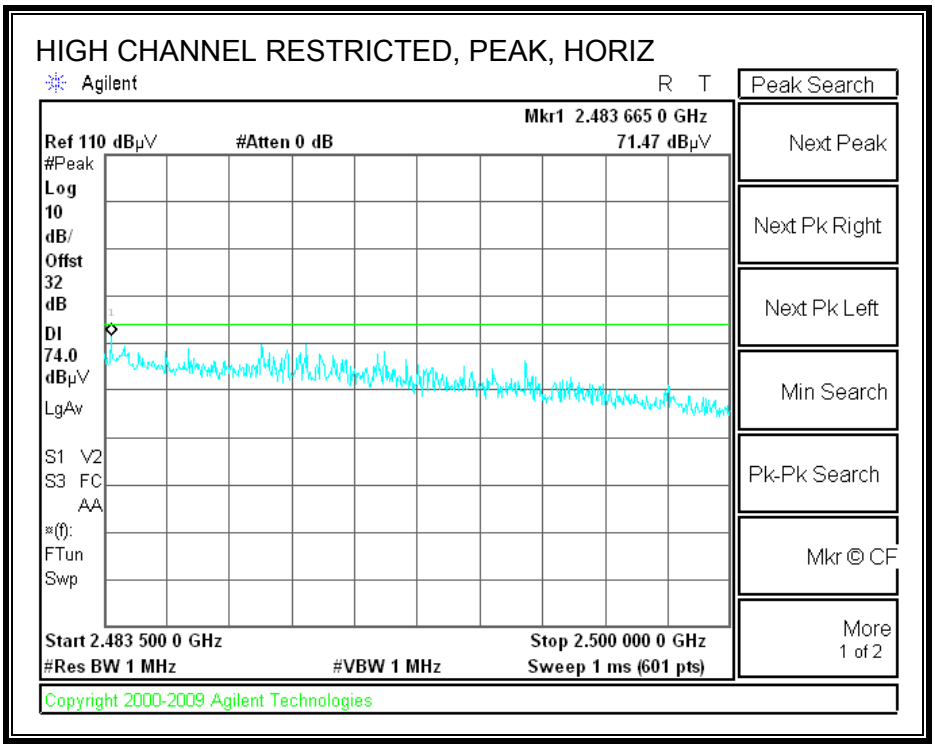


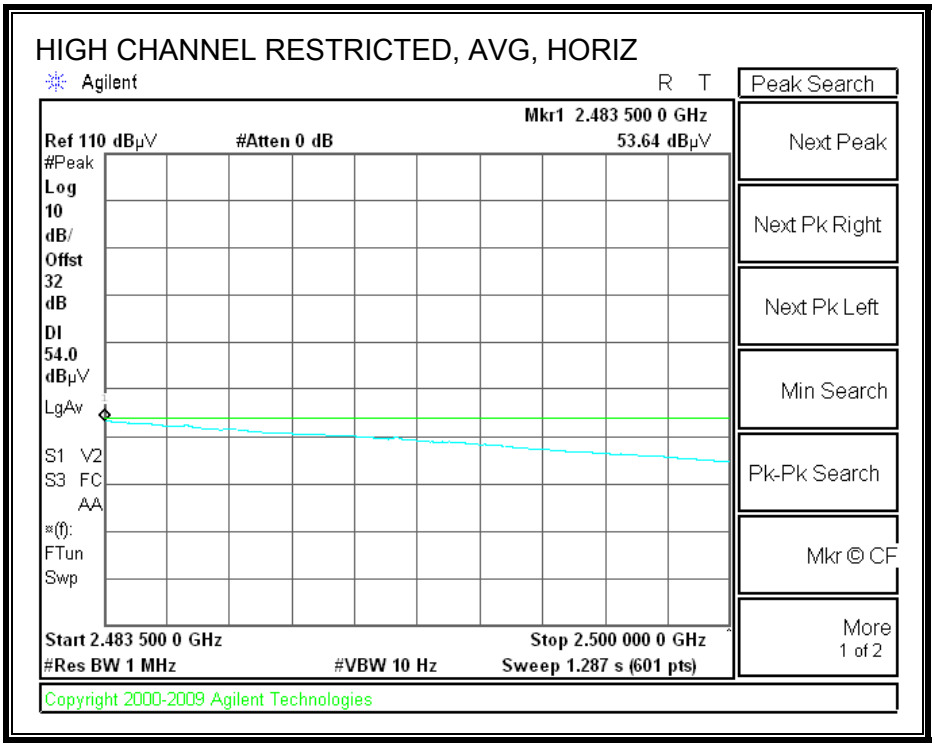
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



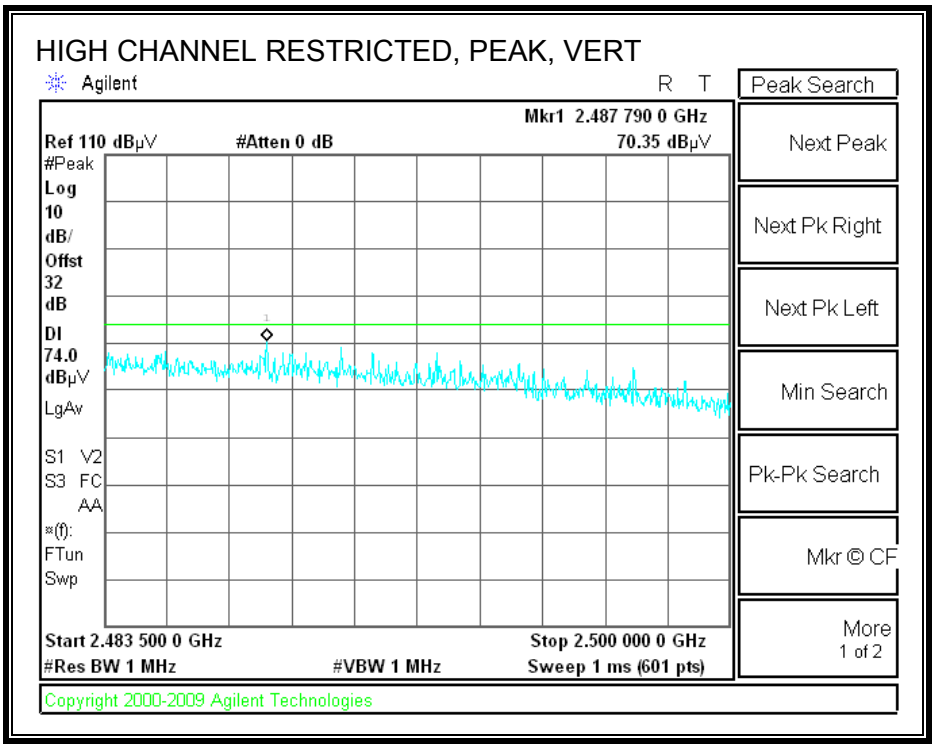


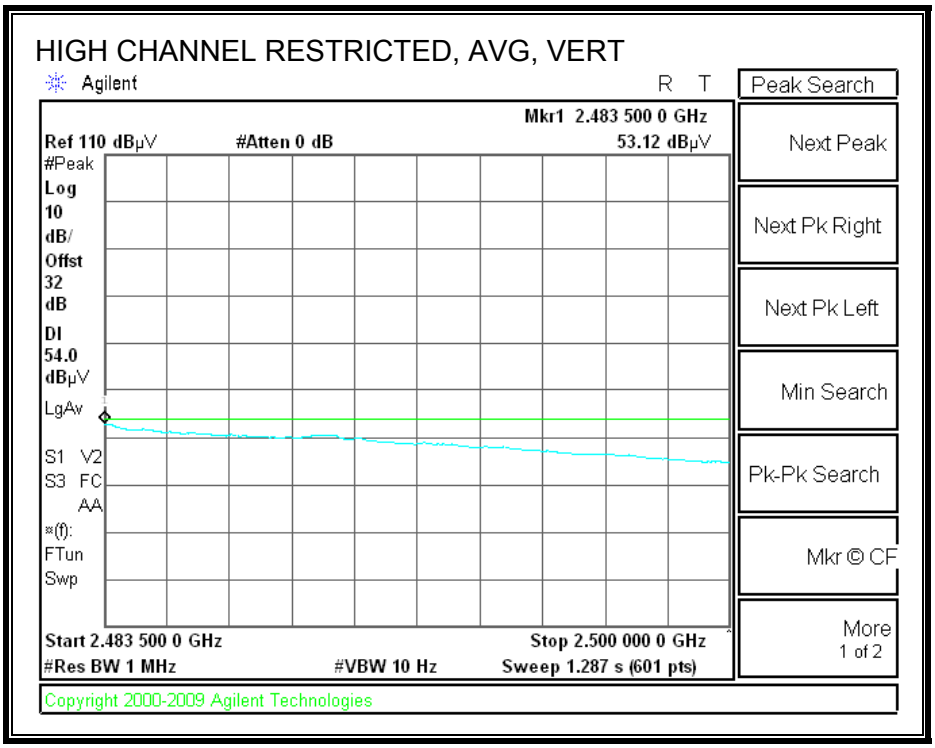
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





9.4. RECEIVER ABOVE 1 GHz

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

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 09U12738
Date: 9/9/2009
Test Engineer: Chin Pang
Configuration: EUT (Dual Antenna) / Antenna
Mode: HT20, RX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

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)
Mid Ch, 2437MHz															
1.511	3.0	55.0	40.0	25.6	3.0	-38.8	0.0	0.0	44.8	29.8	74	54	-29.2	-24.2	V
1.600	3.0	54.6	44.5	25.9	3.0	-38.6	0.0	0.0	44.9	34.8	74	54	-29.1	-19.2	V
2.500	3.0	60.0	46.0	28.5	3.9	-37.5	0.0	0.0	55.0	41.0	74	54	-19.0	-13.0	V
1.595	3.0	55.1	44.6	25.9	3.0	-38.6	0.0	0.0	45.4	34.9	74	54	-28.6	-19.1	H
1.795	3.0	54.0	45.0	26.5	3.2	-38.4	0.0	0.0	45.4	36.4	74	54	-28.6	-17.6	H
2.500	3.0	59.2	47.5	28.5	3.9	-37.5	0.0	0.0	54.2	42.5	74	54	-19.8	-11.5	H

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

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

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 09U12738
Date: 9/9/2009
Test Engineer: Chin Pang
Configuration: EUT (Dual Antenna)/Antenna
Mode: HT40, RX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

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)
Mid Ch, 2437MHz															
1.593	3.0	54.7	45.8	25.8	3.0	-38.6	0.0	0.0	44.9	36.0	74	54	-29.1	-18.0	V
1.800	3.0	53.0	40.6	26.5	3.3	-38.3	0.0	0.0	44.4	32.0	74	54	-29.6	-22.0	V
2.500	3.0	59.7	47.0	28.5	3.9	-37.5	0.0	0.0	54.7	42.0	74	54	-19.3	-12.0	V
1.595	3.0	53.0	43.4	25.9	3.0	-38.6	0.0	0.0	43.3	33.7	74	54	-30.7	-20.3	H
1.793	3.0	54.5	40.0	26.5	3.2	-38.4	0.0	0.0	45.9	31.4	74	54	-28.1	-22.6	H
2.500	3.0	59.5	49.6	28.5	3.9	-37.5	0.0	0.0	54.5	44.6	74	54	-19.5	-9.4	H

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

9.5. WORST-CASE BELOW 1 GHz

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

DUAL ANTENNA CONFIGURATION

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 09/04/09
Project #: 09U12738
Company: Atheros
EUT Description: 802.11b/g/n + BT2.1+EDR MISO combo
EUT M/N: AR5B195
Test Target: FCC Class B
Mode Oper: TX, WLAN (Dual Antenna)

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
vert													
367.454	3.0	47.7	14.5	1.8	29.1	0.0	0.0	34.8	46.0	-11.2	V	EP	
443.897	3.0	44.4	15.8	2.0	29.5	0.0	0.0	32.7	46.0	-13.3	V	EP	
472.458	3.0	44.2	16.3	2.1	29.6	0.0	0.0	33.0	46.0	-13.0	V	EP	
508.820	3.0	46.9	16.9	2.2	29.7	0.0	0.0	36.3	46.0	-9.7	V	EP	
168.006	3.0	51.8	10.3	1.2	29.3	0.0	0.0	34.0	43.5	-9.5	H	EP	
368.774	3.0	52.1	14.5	1.8	29.1	0.0	0.0	39.2	46.0	-6.8	H	EP	
443.897	3.0	47.5	15.8	2.0	29.5	0.0	0.0	35.8	46.0	-10.2	H	EP	

Rev. 1.27.09

SINGLE ANTENNA CONFIGURATION

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 09/09/09
Project #: 09U12738
Company: Atheros
EUT Description: 802.11b/g/n + BT2.1+EDR MISO combo
EUT M/N: AR5B195
Test Target: FCC Class B
Mode Oper: TX, WLAN (Single Antenna Port)

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
horiz													
92.523	3.0	47.8	7.8	0.8	28.2	0.0	0.0	28.2	43.5	-15.3	H	EP	
194.287	3.0	49.8	11.6	1.1	27.4	0.0	0.0	35.1	43.5	-8.4	H	EP	
276.250	3.0	48.7	12.7	1.4	27.4	0.0	0.0	35.4	46.0	-10.6	H	EP	
322.692	3.0	47.2	13.8	1.5	27.5	0.0	0.0	35.0	46.0	-11.0	H	EP	
538.581	3.0	41.9	17.5	2.1	28.6	0.0	0.0	32.8	46.0	-13.2	H	EP	
143.525	3.0	43.0	13.0	1.0	27.9	0.0	0.0	28.9	43.5	-14.6	V	EP	
210.247	3.0	46.5	11.9	1.2	27.4	0.0	0.0	32.5	43.5	-11.0	V	EP	
322.812	3.0	46.3	13.8	1.5	27.5	0.0	0.0	33.6	46.0	-12.4	V	EP	
415.216	3.0	42.6	15.3	1.8	28.1	0.0	0.0	31.0	46.0	-15.0	V	EP	

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

ANSI C63.4

RESULTS

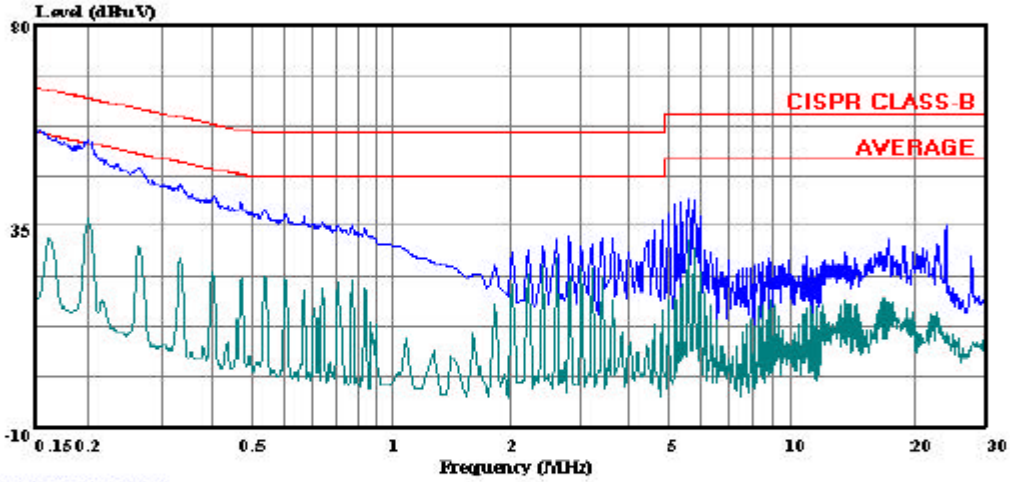
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.20	54.21	--	36.89	0.00	63.61	53.61	-9.40	-16.72	L1
0.27	48.06	--	30.31	0.00	61.24	51.24	-13.18	-20.93	L1
5.68	40.85	--	31.76	0.00	60.00	50.00	-19.15	-18.24	L1
1.98	53.93	--	36.30	0.00	56.00	46.00	-2.07	-9.70	L2
0.27	47.94	--	30.63	0.00	61.24	51.24	-13.30	-20.61	L2
5.68	42.97	--	32.38	0.00	60.00	50.00	-17.03	-17.62	L2
6 Worst Data									

LINE 1 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 7 File#: 09u12738 LC.emi Date: 08-27-2009 Time: 10:13:14

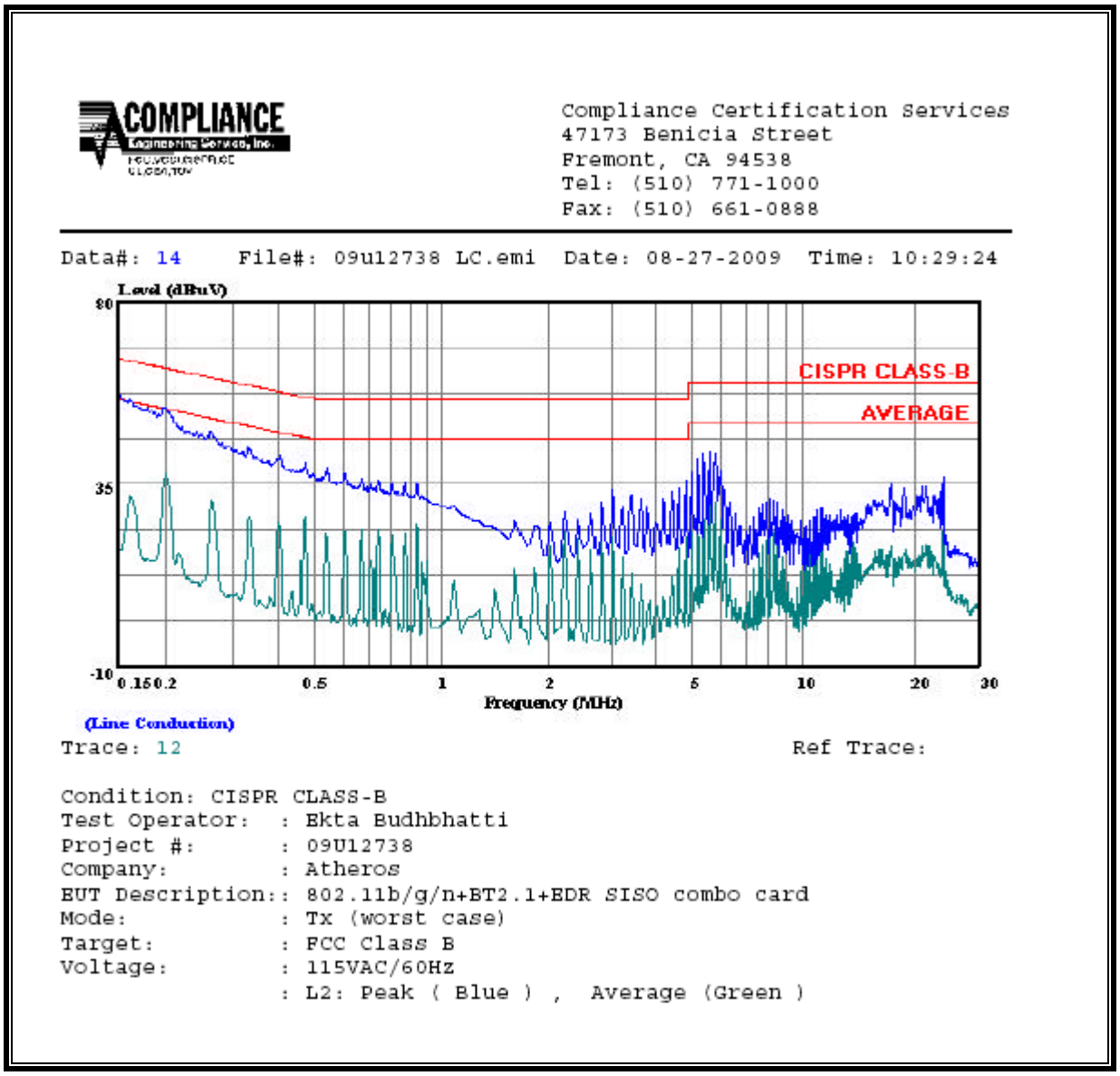


(Line Conduction)

Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Ekta Budhbhatti
Project #: : 09U12738
Company: : Atheros
EUT Description:: 802.11b/g/n+BT2.1+EDR MISO combo card
Mode: : Tx (worst case)
Target: : FCC Class B
Voltage: : 115VAC/60Hz
: L1: Peak (Blue) , Average (Green)

LINE 2 RESULTS



11. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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

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

f = frequency in MHz
* = Plane-wave equivalent power density

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

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

IC RULES

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

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

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

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

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

EQUATIONS

Power density is given by:

S = EIRP / (4 * Pi * D^2)

where

S = Power density in W/m^2
EIRP = Equivalent Isotropic Radiated Power in W
D = Separation distance in m

Power density in units of W/m^2 is converted to units of mWc/m^2 by dividing by 10.

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

where

D = Separation distance in m
EIRP = Equivalent Isotropic Radiated Power in W
S = Power density in W/m^2

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

Total EIRP = (P1 * G1) + (P2 * G2) + ... + (Pn * Pn)

where

Px = Power of transmitter x
Gx = Numeric gain of antenna x

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

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

RESULTS

(MPE distance equals 20 cm)

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m^2)	FCC Power Density (mW/cm^2)
2.4 GHz	WLAN	0.20	26.40	3.62	2.00	0.200