



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

CERTIFICATION TEST REPORT

FOR

802.11ab/g/n WLAN PCI-E MINICARD

MODEL NUMBER: BCM943228HM4L

**FCC ID: QDS-BRCM1054
IC: 4324A-BRCM1054**

REPORT NUMBER: 10U13394-1

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Prepared for

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, USA

EUT DESCRIPTION: 802.11a/b/g/n WLAN PCI-E MINICARD

MODEL: BCM943228HM4L

SERIAL NUMBER: 305 (P301)

DATE TESTED: NOVEMBER 01 to DECEMBER 03, 2010

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. (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:

Tested By:



THU CHAN
EMC MANAGER
UL CCS



VIEN TRAN
EMC ENGINEER
UL CCS

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.

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:

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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g/n WLAN PCI-E Minicard.
The radio module is manufactured by Broadcom.

5.2. MAXIMUM OUTPUT POWER

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

2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Mode	Peak Power Chain 0 (dBm)	Peak Power Chain 1 (dBm)	Total Peak Power (dBm)	Output Power (mW)
2412 - 2462	802.11b Legacy			22.74	187.93
2412 - 2462	802.11g Legacy			25.94	392.64
2412 - 2462	802.11n 20MHz SISO	Covered by the worst case 802.11g Mode Legacy testing			
2412 - 2462	802.11g CDD	Covered by the worst case 802.11n 20MHz CDD			
2412 - 2462	802.11n 20MHz CDD MCS0	25.17	25.24	28.22	663.05
2422 - 2452	802.11n 40MHz CDD MCS0	24.03	24.05	27.05	507.03

5725 to 5850 MHz Authorized Band

Frequency Range (MHz)	Mode	Peak Power Chain 0 (dBm)	Peak Power Chain 1 (dBm)	Total Peak Power (dBm)	Output Power (mW)
5745 - 5825	802.11a Legacy			23.10	204.17
5745 - 5825	802.11n 20MHz SISO	Covered by the worst case 802.11a Mode Legacy testing			
5745 - 5825	802.11a Mode CDD	Covered by the worst case 802.11n 20MHz CDD			
5745 - 5825	802.11n 20MHz CDD	22.65	23.33	26.01	399.36
5755 - 5795	802.11n 40MHz CDD	22.44	22.89	25.68	369.92

5.3. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom, rev. 5.100.93
The test utility software used during testing was BCM Internal, rev. 5.100.RC82.20.

5.4. WORST-CASE CONFIGURATION AND MODE

The EUT was tested as an external module installed in a test jig board connected to a host Laptop PC.

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

For 2.4GHz Band:

All final tests in the 802.11b Legacy mode were made at 1 Mb/s.
All final tests in the 802.11g Legacy mode were made at 6 Mb/s.
All final tests in the 802.11n 20MHz CDD/SDM mode were made at MCS0.
All final tests in the 802.11n 40MHz CDD/SDM mode were made at MCS0.

For 5.8GHz Band:

All final tests in the 802.11a Mode (Legacy) were made at 6 Mb/s.
All final tests in the 802.11n 20MHz CDD/SDM mode were made at MCS0.
All final tests in the 802.11n 40MHz CDD/SDM mode were made at MCS0.

Worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was the mode and channel with the highest output power, that was determined to be 11n HT20 mode, mid channel..

For MIMO conducted spurious measurement preliminary testing showed that combiner is worst-case compared to individual chains; therefore final measurements were performed using combiner for all channels and modes.

For MIMO PSD measurement preliminary testing showed that combiner is worst-case compared to individual chains; therefore final measurements were performed using combiner for all channels and modes.

For Radiated Band Edge measurements preliminary testing showed that the worst case was horizontal polarization, so final measurements were performed with horizontal polarization.

All legacy modes were measured with the highest gain for each type of antenna.

All MIMO modes were measured with the highest combination of gains for each type of antenna. Note that this combination of antennas will not be implemented in the end product. This combination was selected for testing purposes only, to accommodate the highest gain of each antenna type in one single test configuration. The combined gain of this test configuration is higher than any combined gain that will be implemented in the end product.

5.5. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes two antennas, with the maximum gain as shown below:

GHz	Antenna Gain		Antenna Gain
	Ant 1 dBi	Ant 2 dBi	Combined dBi
2.4	3.9	3.9	6.91
5.8	4.2	4.2	7.21

5.6. DESCRIPTION OF TEST SETUP

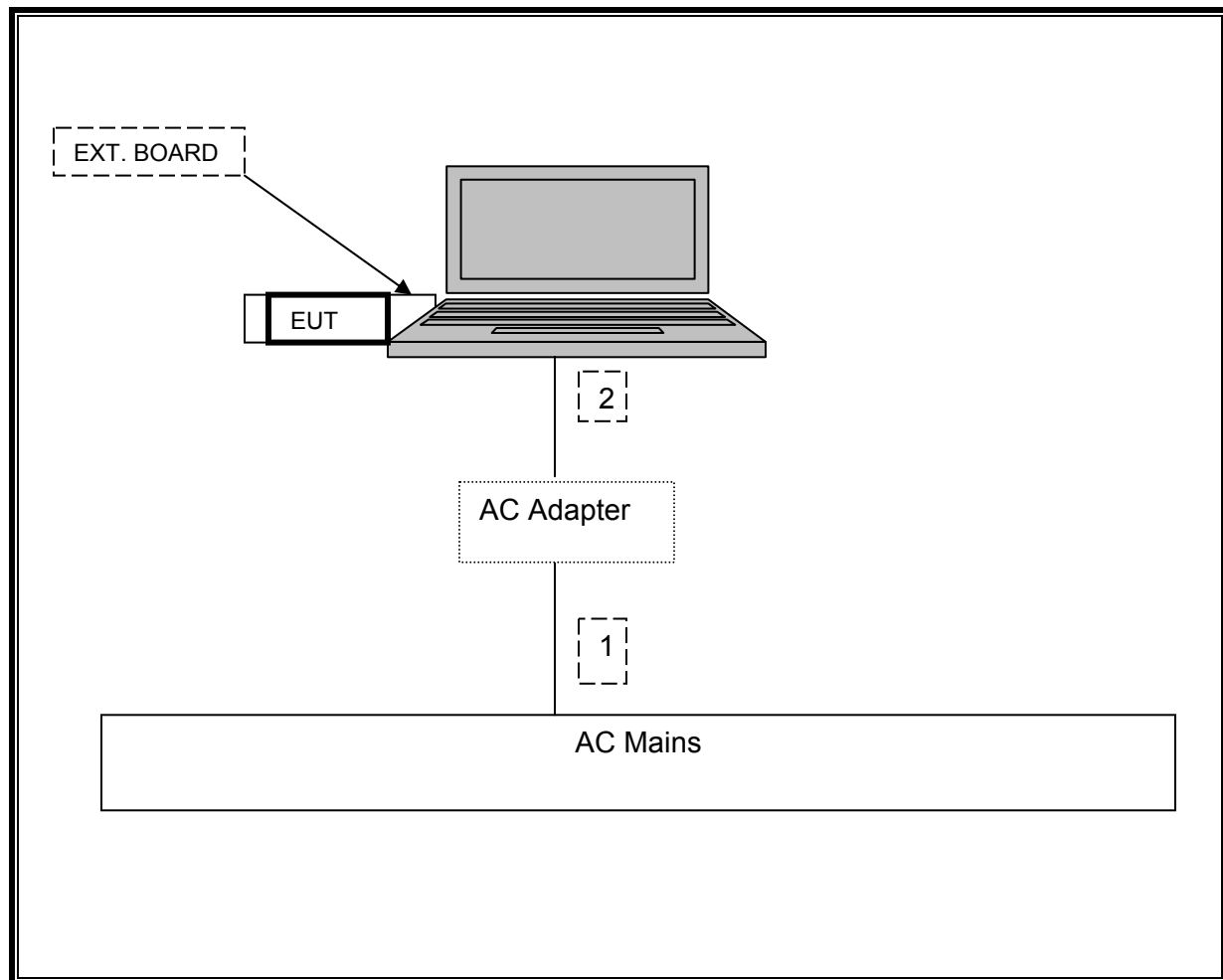
SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop PC	Dell	Inspiron 1526	N/A	DoC
AC Adapter	Dell	DA90PS1-00	CN-0MM545-48661-78J-9M4Q	N/A
Adapter Board	Catalyst	MINI2EXP	BRCM07	N/A

I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	AC	Unshielded	1.8 m	N/A
2	DC	1	DC	Unshielded	1.8 m	Ferrite on laptop's end

SETUP DIAGRAM



TEST SETUP

The EUT is attached to a jig board which is installed in the PCMCIA slot of a host laptop computer during the tests. Test software exercised the radio card.

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 Date	Cal Due
EMI Test Receiver, 9KHz - 6.5MHz	HP	8546A	CCS 147	05/19/10	08/19/11
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	01/05/10	01/05/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	01/14/10	01/14/11
Antenna, Horn, 18 GHz	EMCO	3115	C00945	04/22/10	04/22/11
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	09/29/10	11/28/11
Antenna, Horn, 40 GHz	ARA	MWH-2640B	C00981	05/21/10	05/21/11
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	10/11/10	10/11/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	03/31/10	03/31/11
Preamplifier, 1-26GHz	Agilent / HP	8449B	C01052	07/05/10	07/05/11
Peak Power Meter	Boonton	4541	C01186	01/19/10	01/19/11
Peak Power Sensor	Boonton	4541	C01189	01/15/10	01/15/11
Peak Power Meter	Agilent / HP	E9327A	C00964	01/07/10	12/04/11
Peak Power Sensor	Agilent / HP	E4416A	C00963	12/04/09	12/04/11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/10	10/29/11
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	02/06/10	02/06/11

7. ANTENNA PORT TEST RESULTS

7.1. 802.11b MODE IN THE 2.4 GHz BAND

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

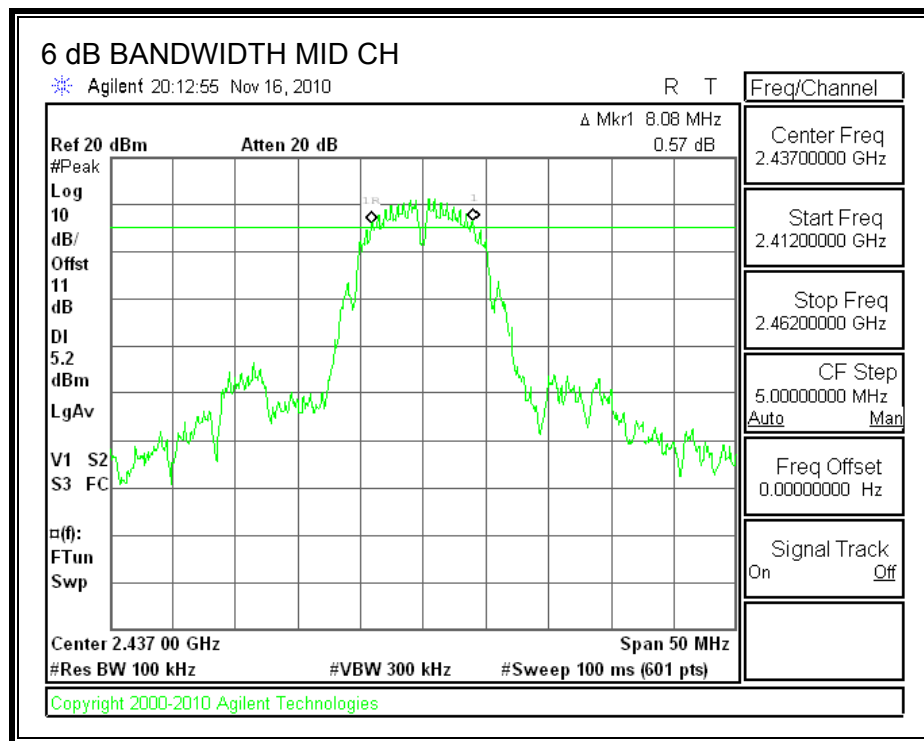
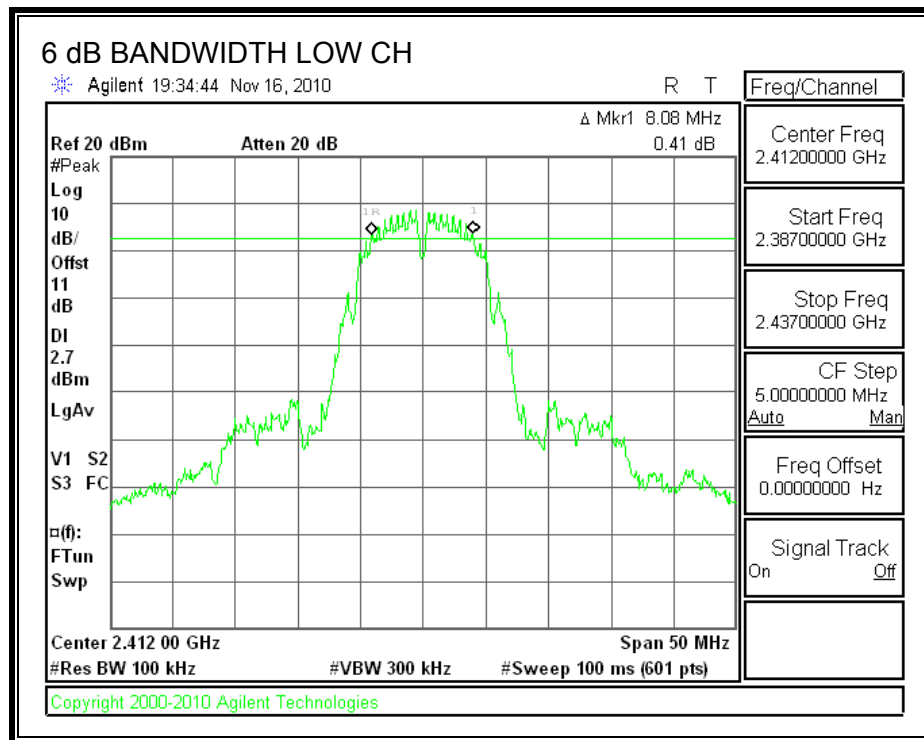
TEST PROCEDURE

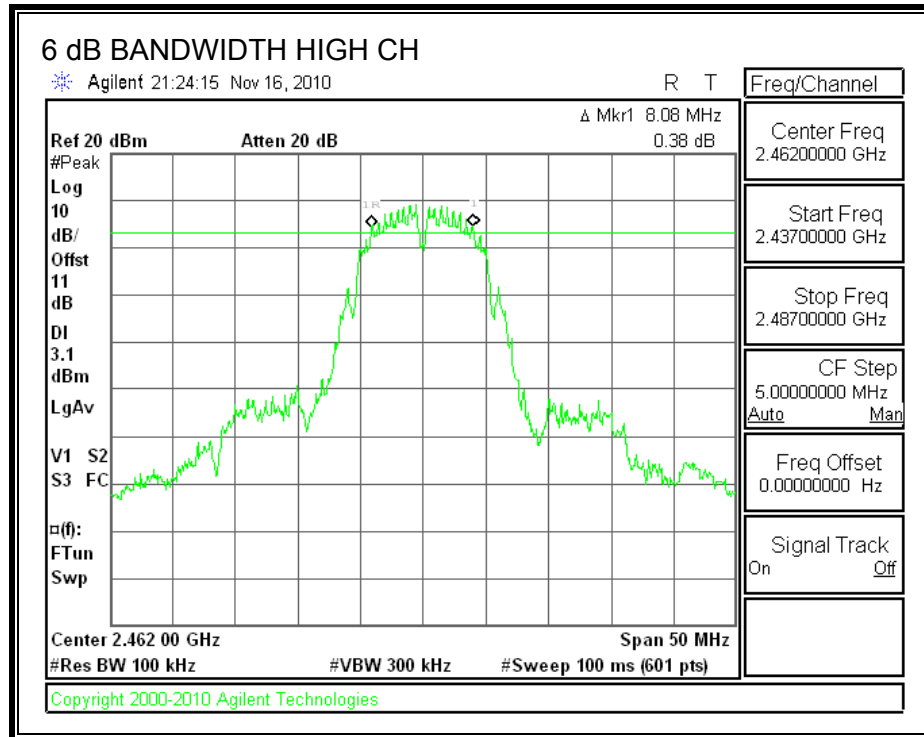
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	8.08	0.5
Middle	2437	8.08	0.5
High	2462	8.08	0.5

6 dB BANDWIDTH





7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

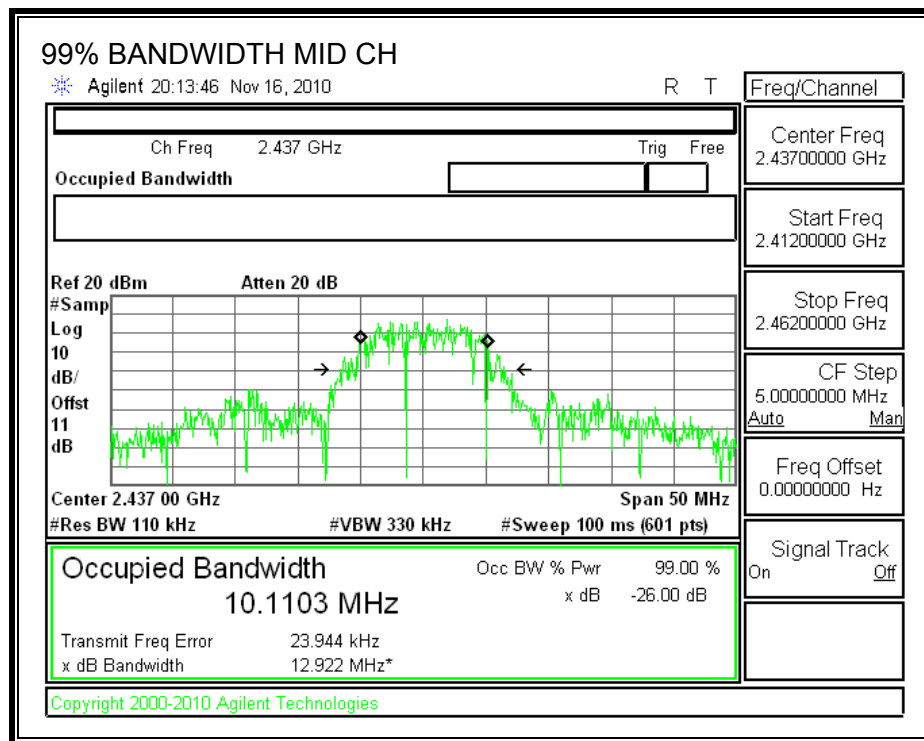
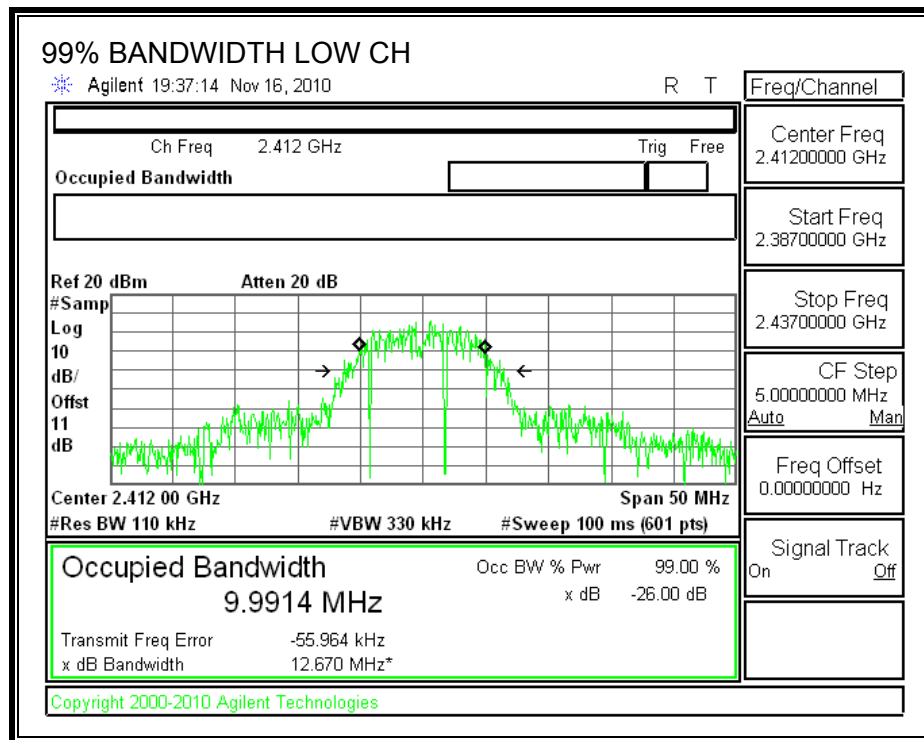
TEST PROCEDURE

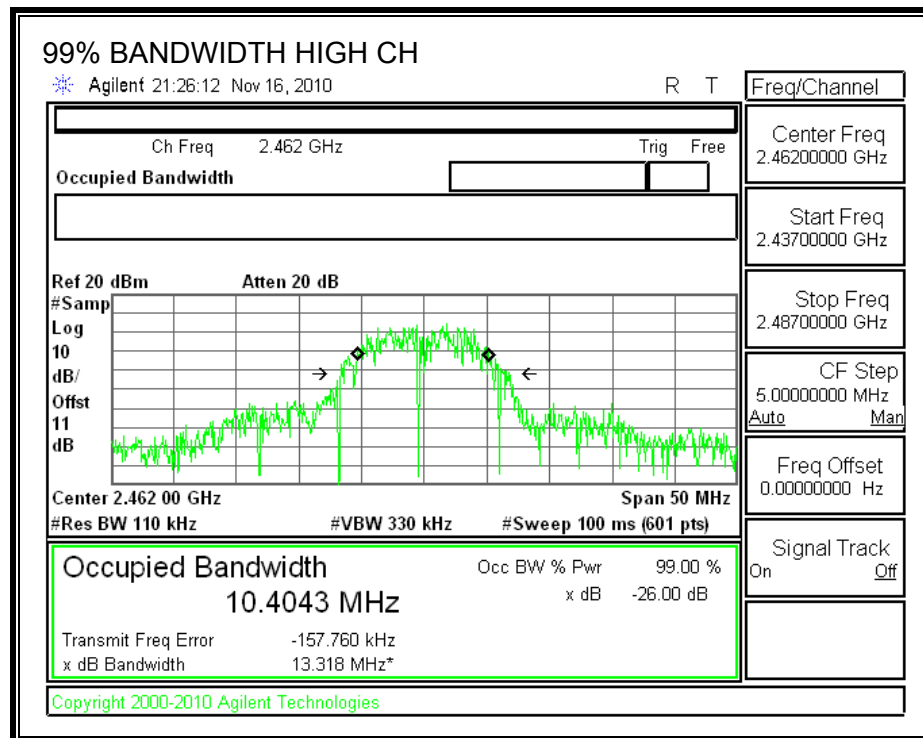
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	9.9914
Middle	2437	10.1103
High	2462	10.4043

99% BANDWIDTH





7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Channel	Frequency (MHz)	Peak Power Meter Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	22.37	30	-7.63
Middle	2437	22.74	30	-7.26
High	2462	20.27	30	-9.73

7.1.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

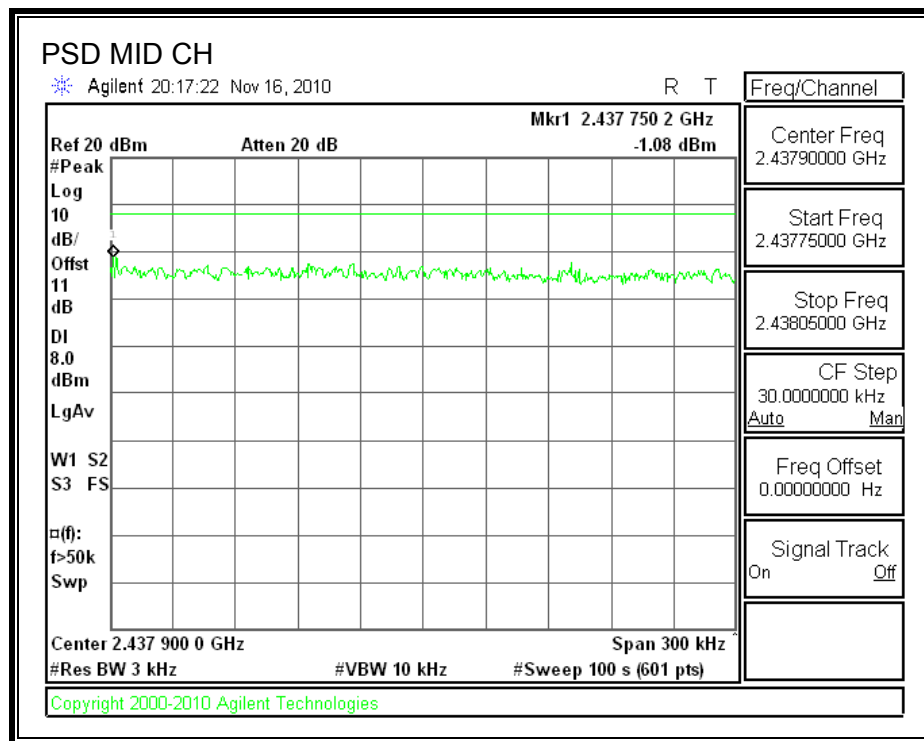
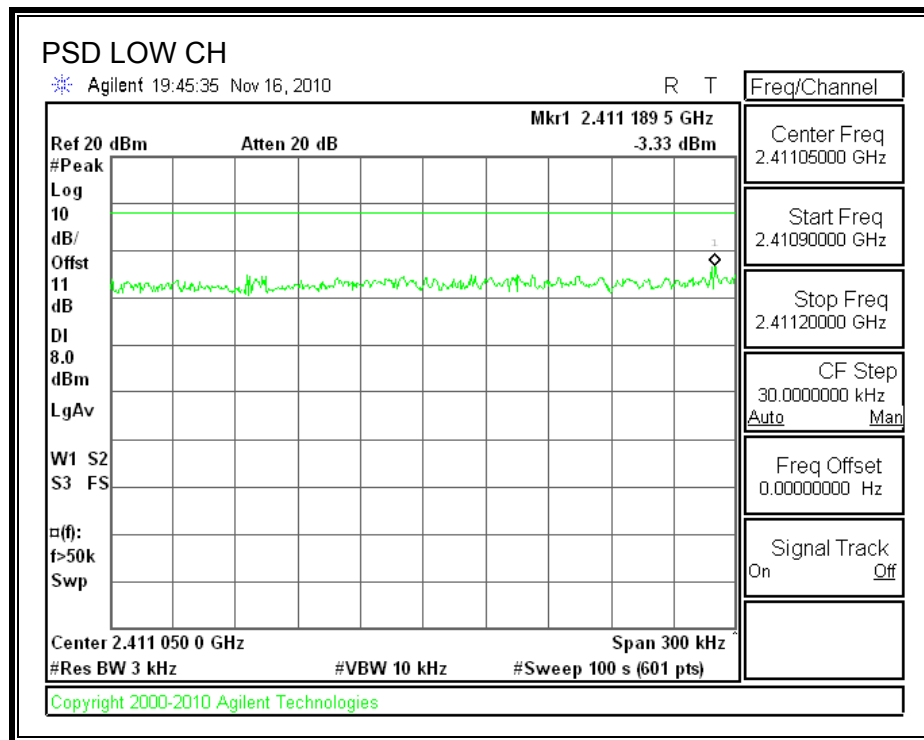
TEST PROCEDURE

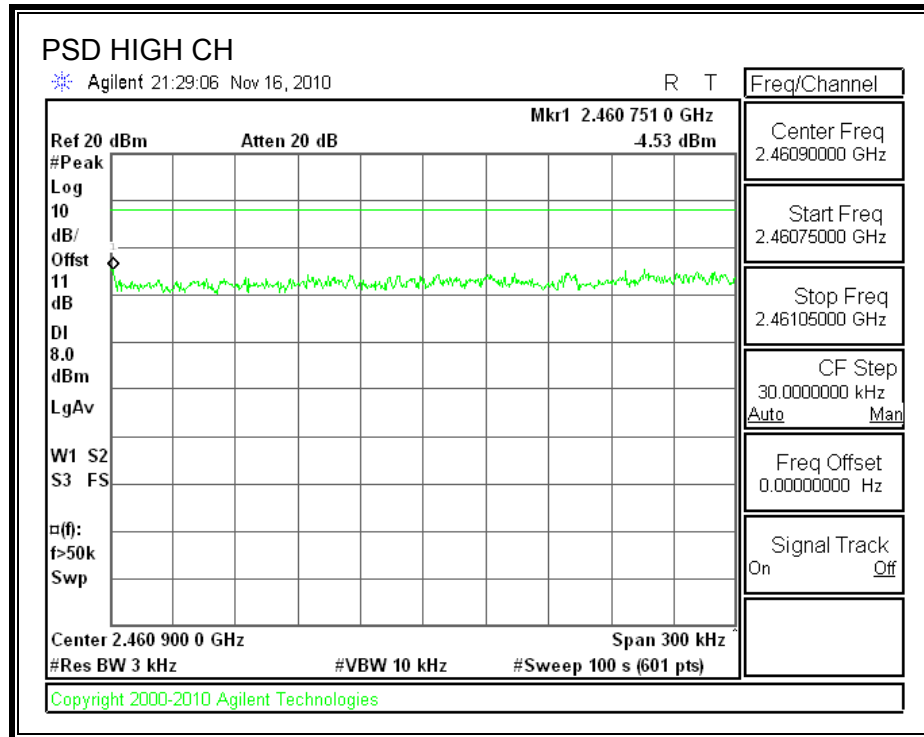
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-3.33	8	-11.33
Middle	2437	-1.08	8	-9.08
High	2462	-4.53	8	-12.53

POWER SPECTRAL DENSITY





7.1.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

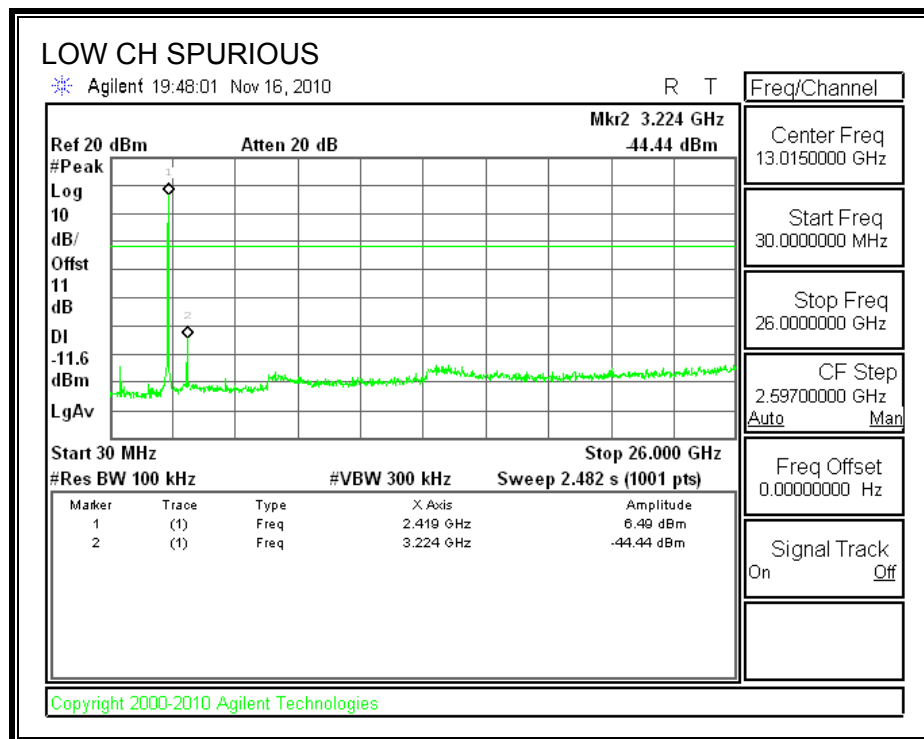
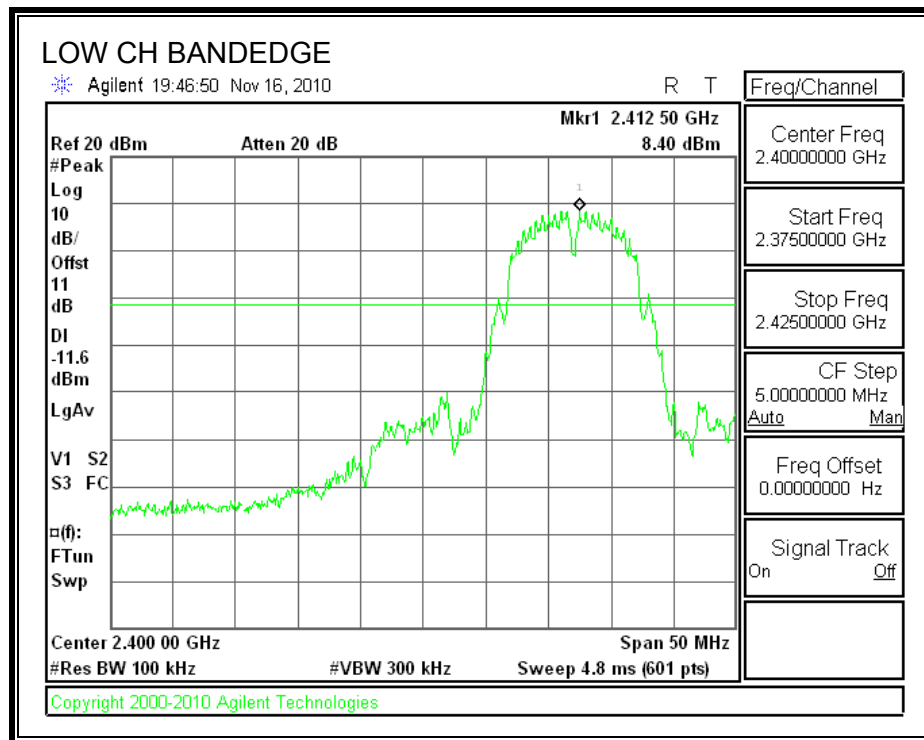
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

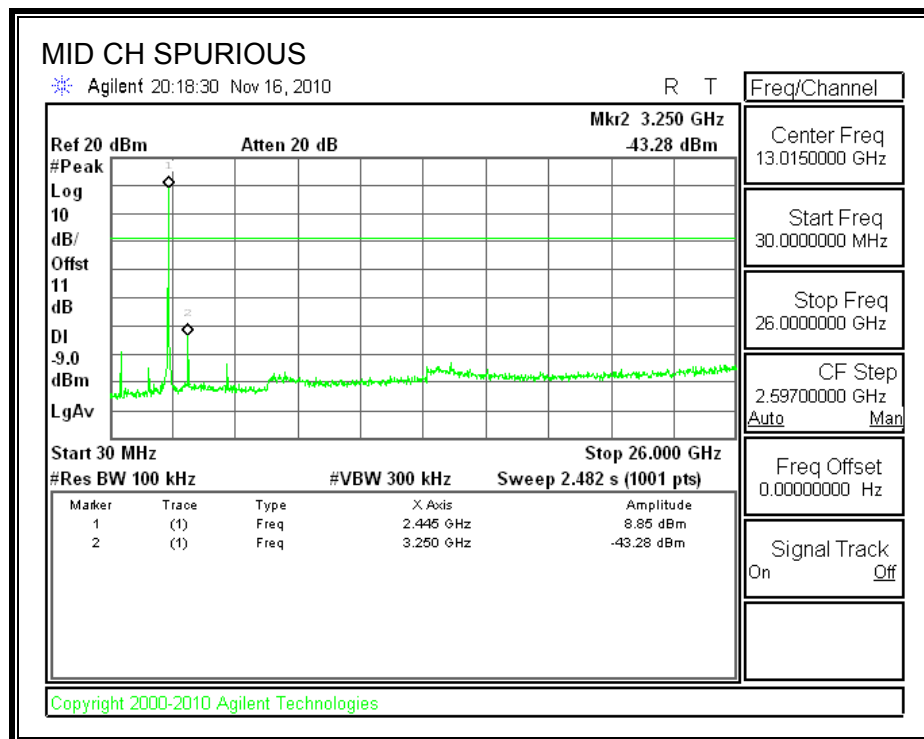
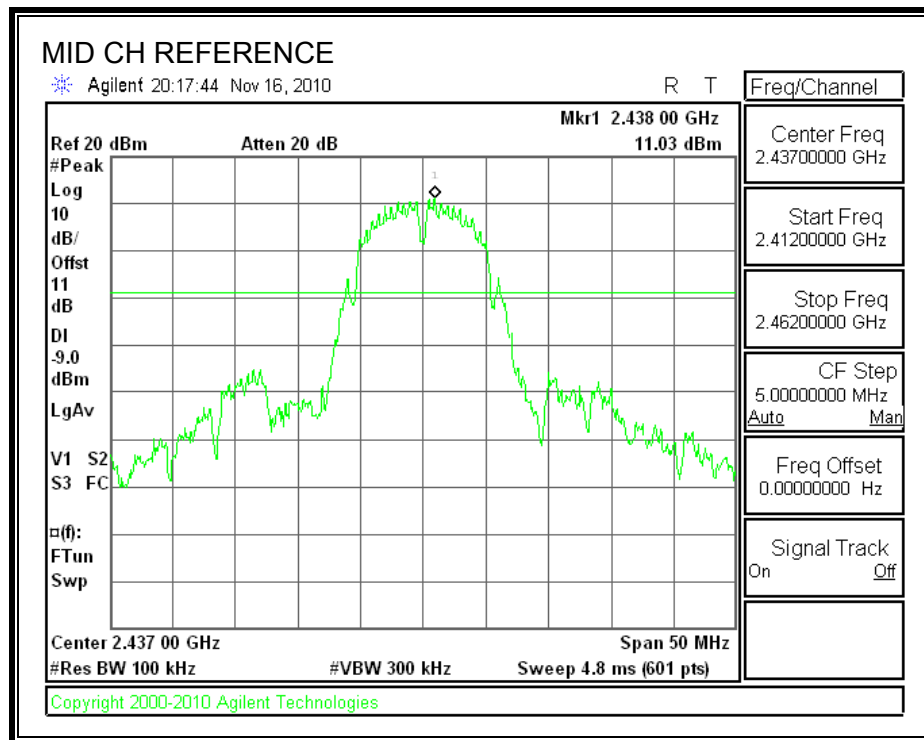
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

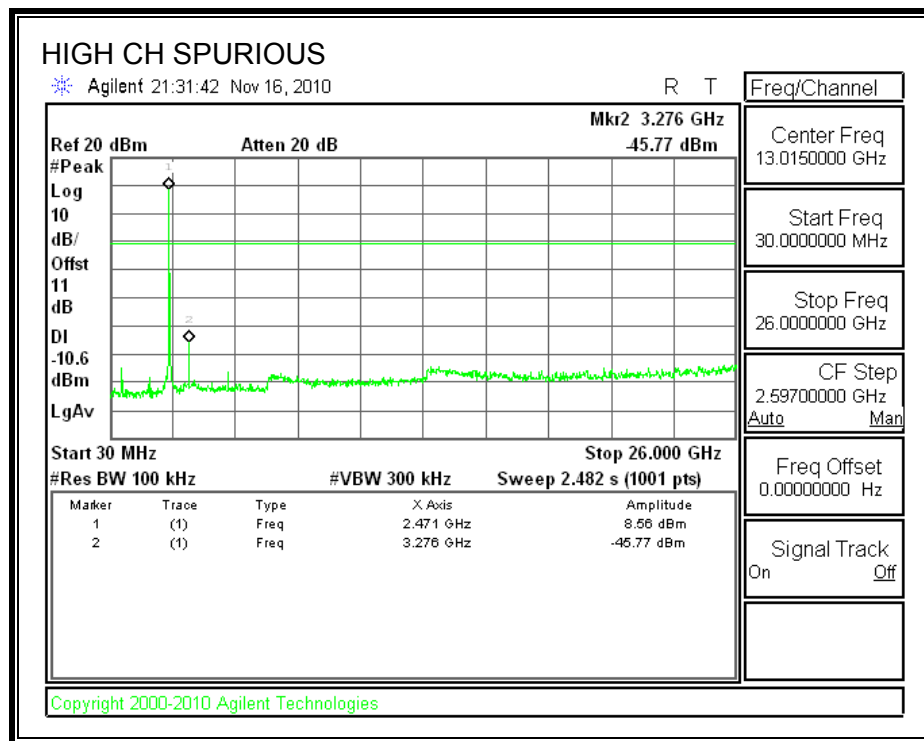
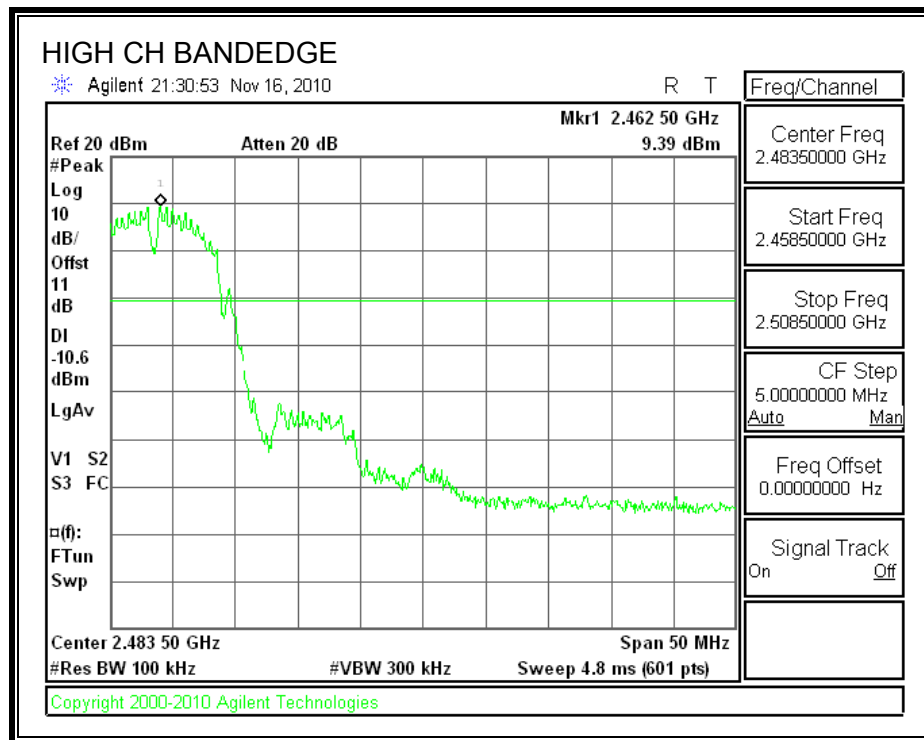
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



7.2. 802.11g MODE IN THE 2.4 GHz BAND

7.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

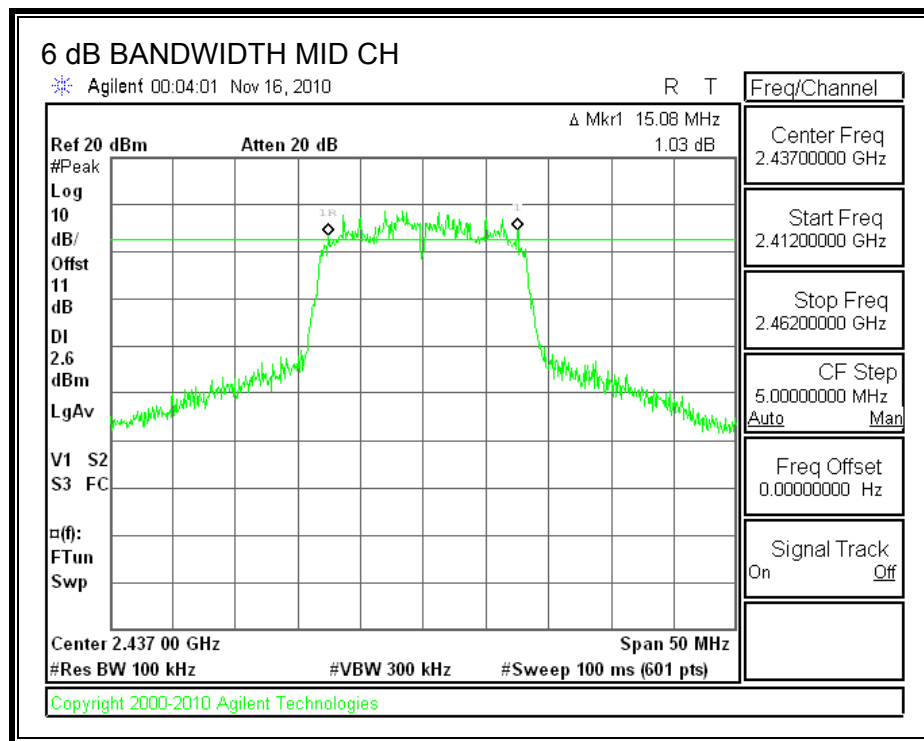
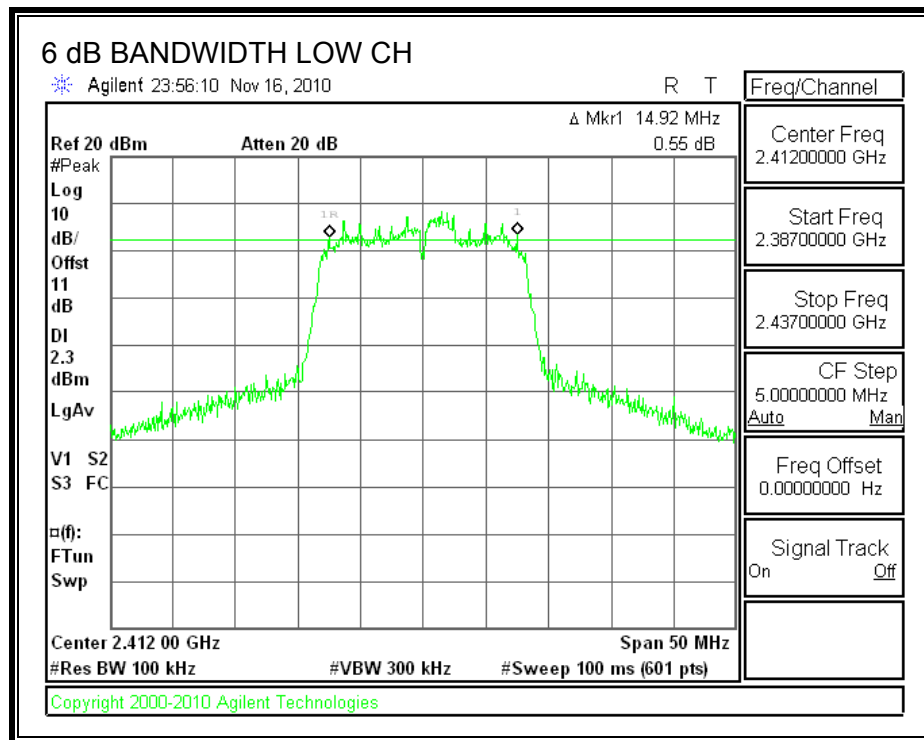
TEST PROCEDURE

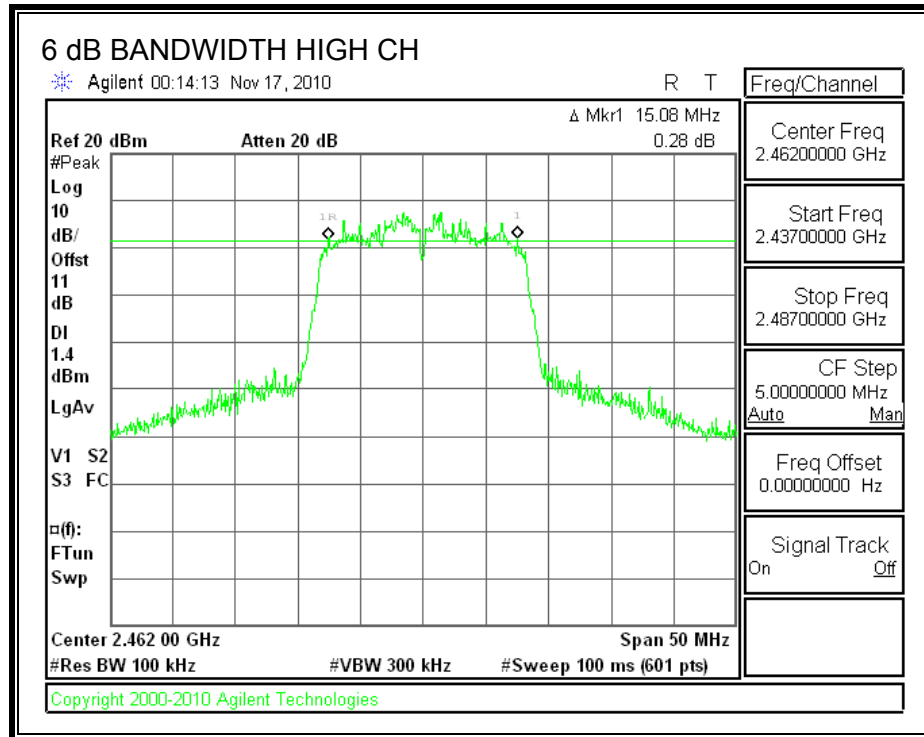
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	14.92	0.5
Middle	2437	15.08	0.5
High	2462	15.08	0.5

6 dB BANDWIDTH





7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

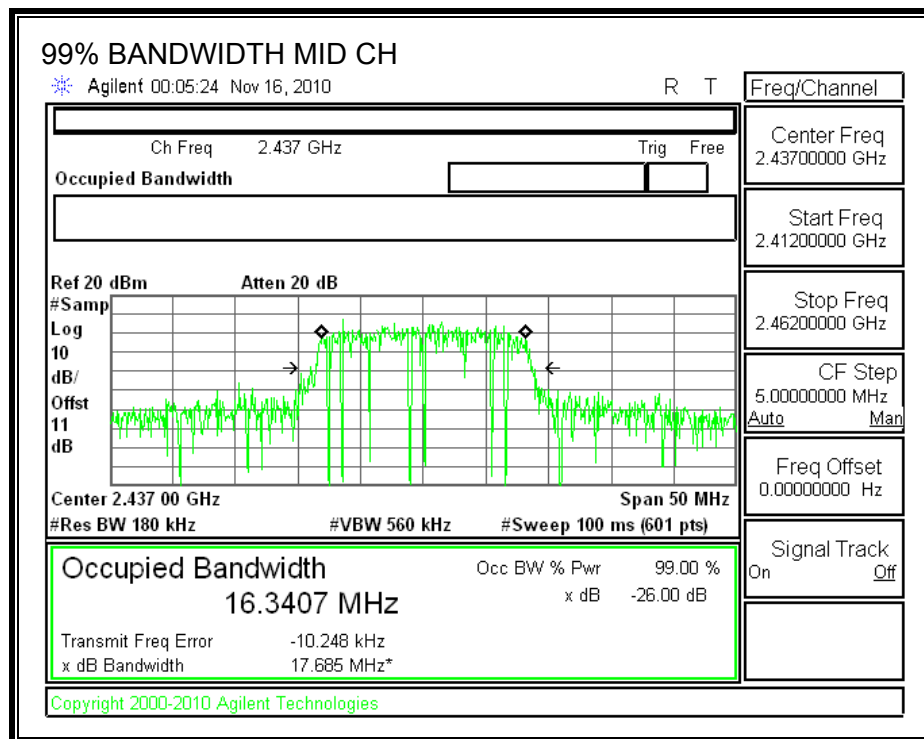
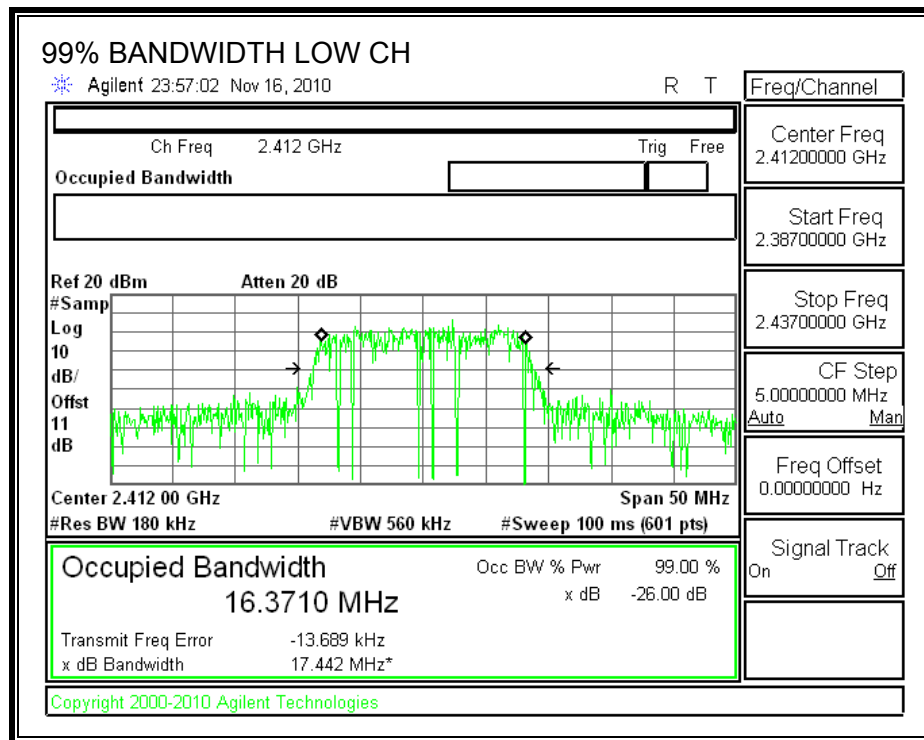
TEST PROCEDURE

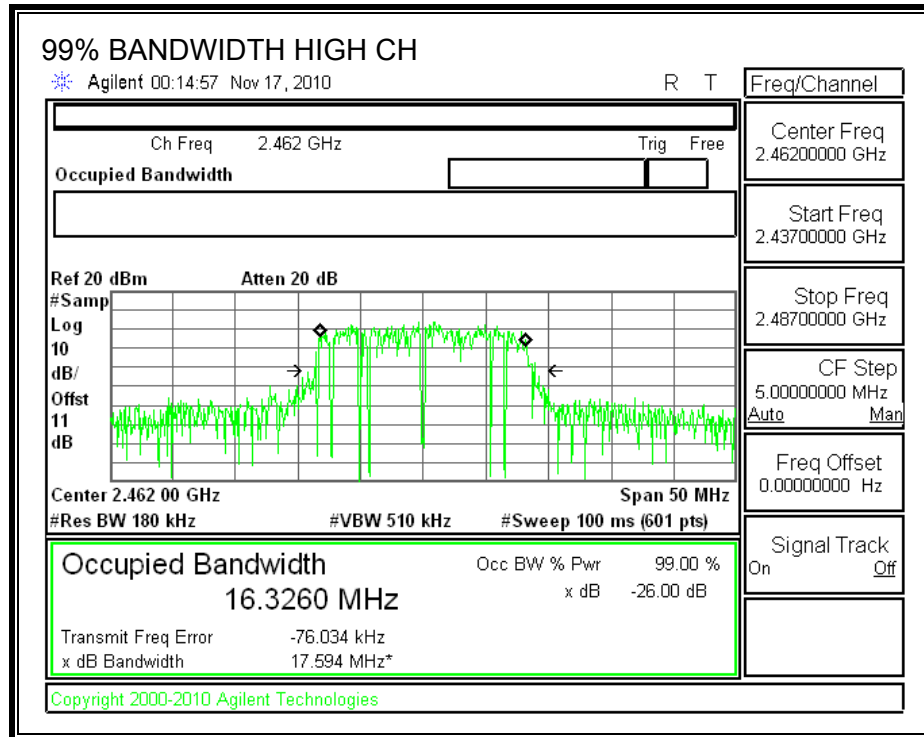
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.371
Middle	2437	16.3407
High	2462	16.3260

99% BANDWIDTH





7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

The transmitter output is connected to a 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)	Peak Power Meter Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	25.44	30	-4.56
Middle	2437	25.94	30	-4.06
High	2462	25.43	30	-4.57

7.2.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

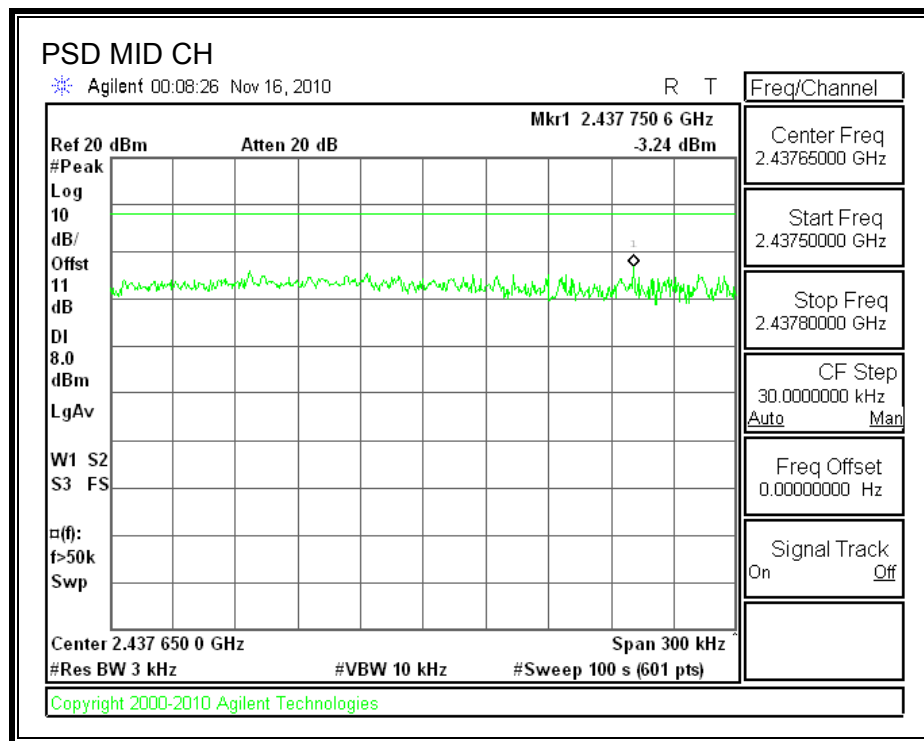
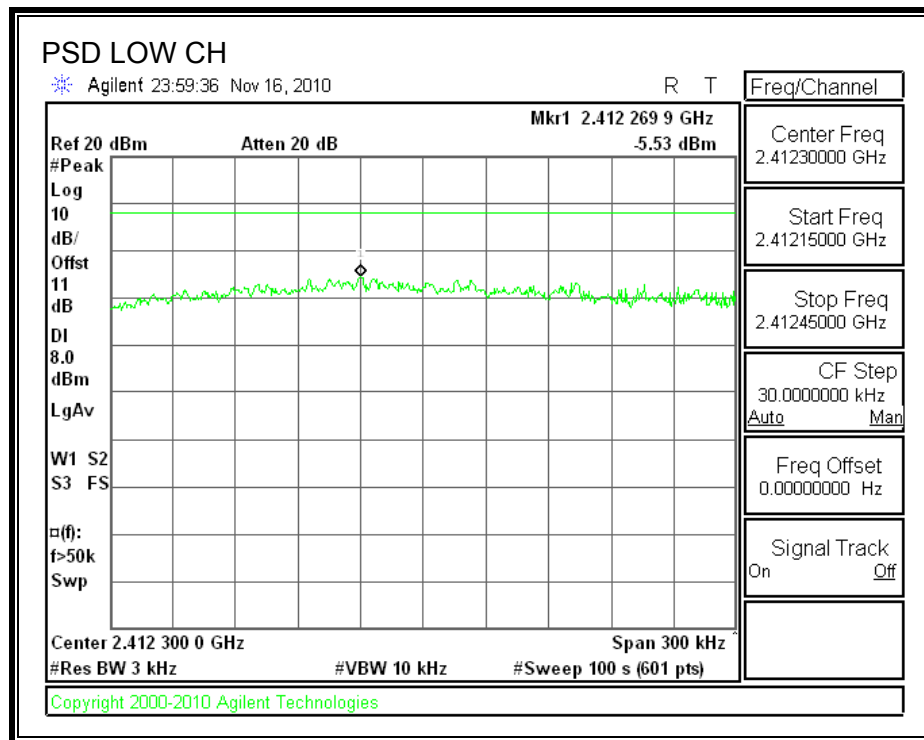
TEST PROCEDURE

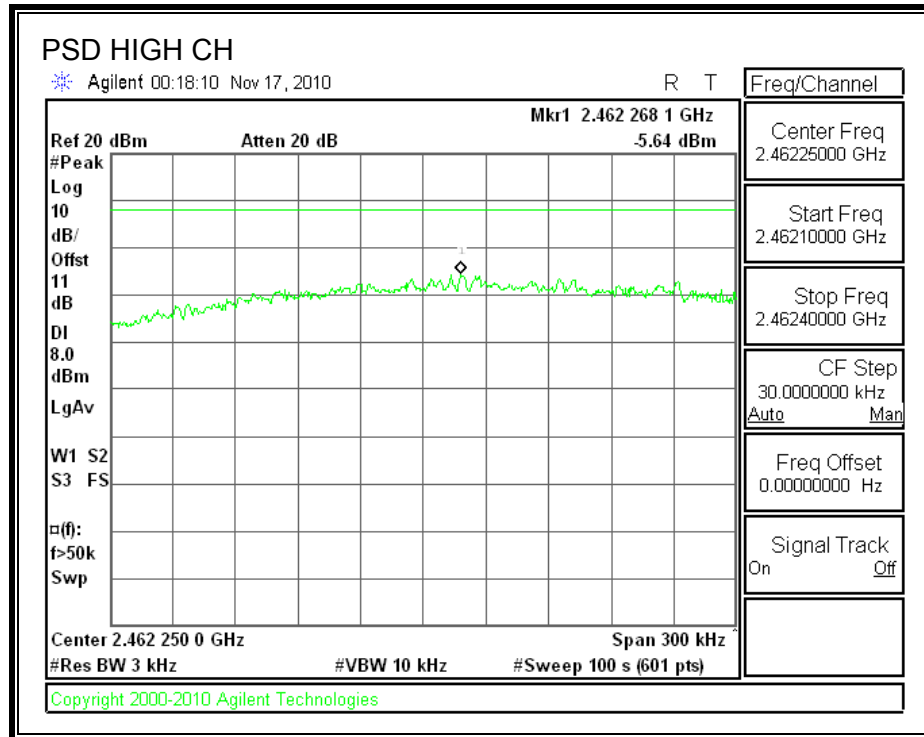
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-5.53	8	-13.53
Middle	2437	-3.24	8	-11.24
High	2462	-5.64	8	-13.64

POWER SPECTRAL DENSITY





7.2.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

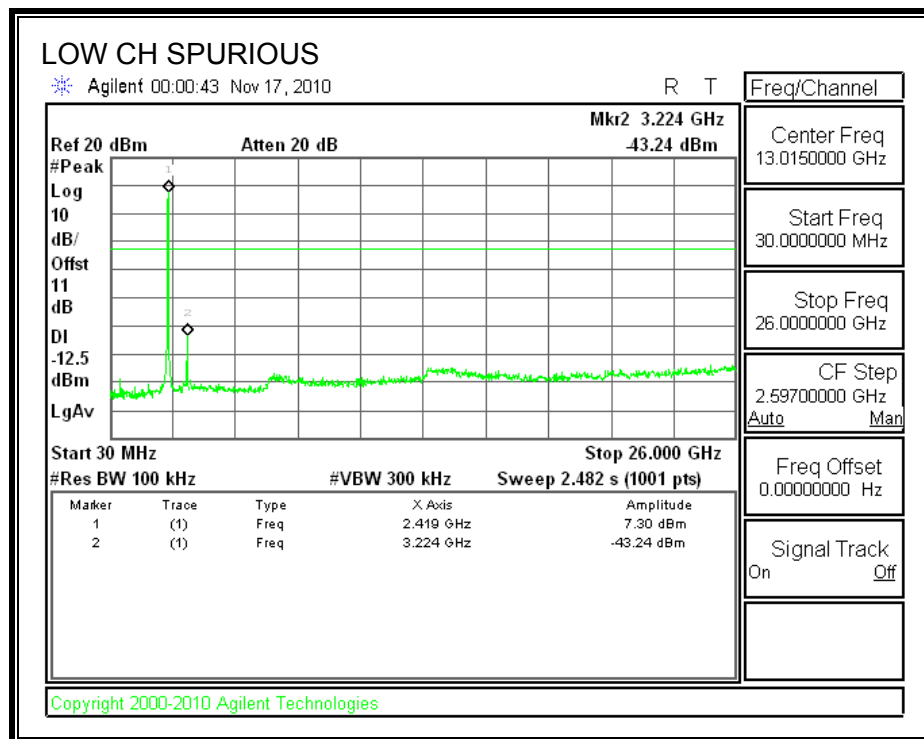
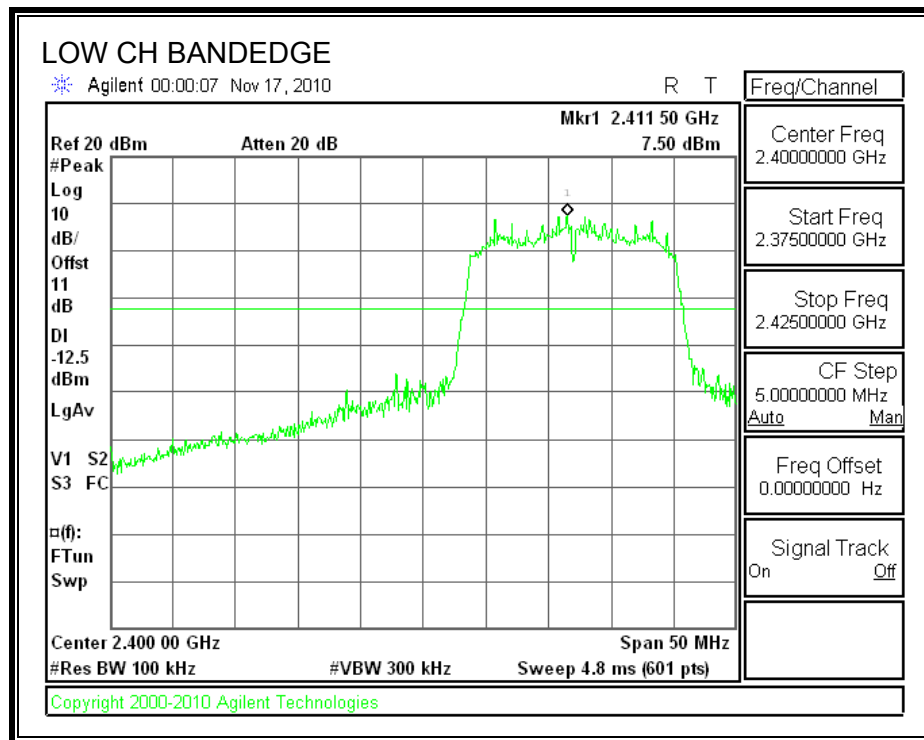
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

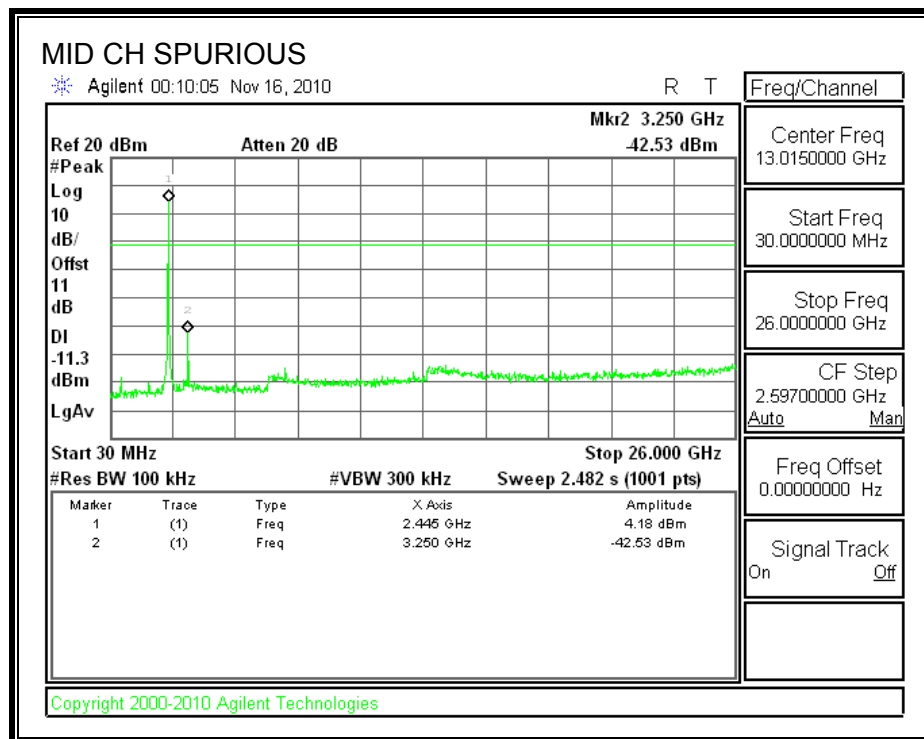
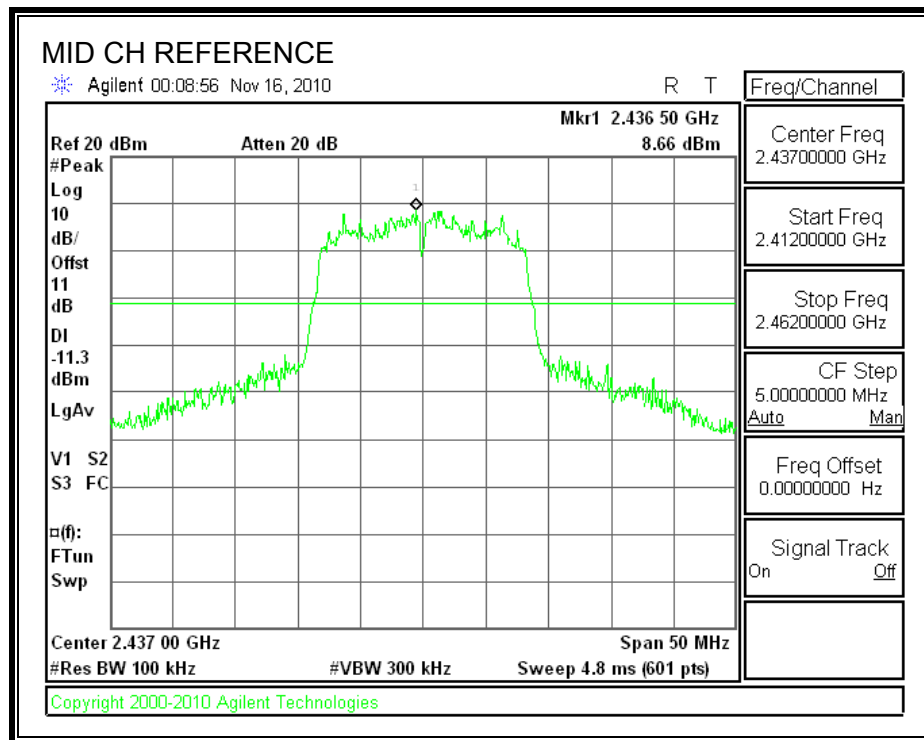
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

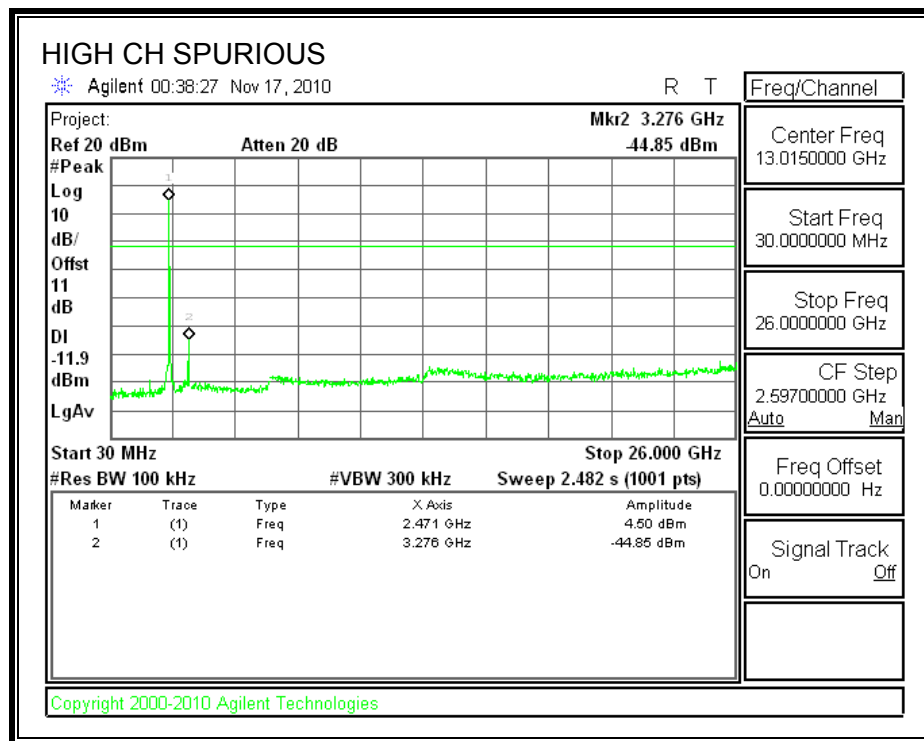
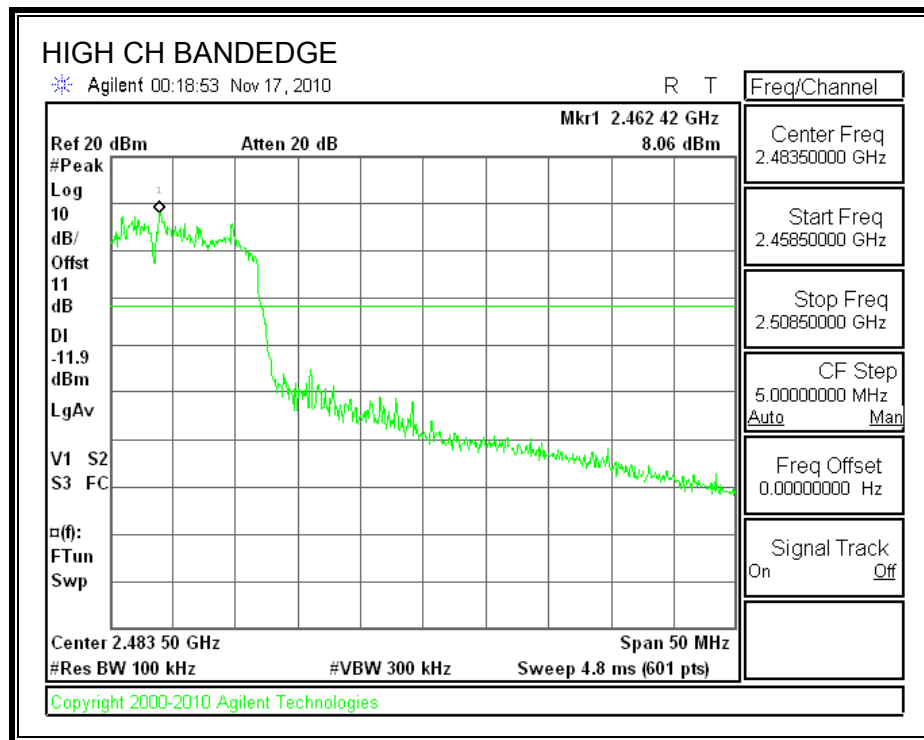
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



7.3. 802.11n HT20 CDD MCS0 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.

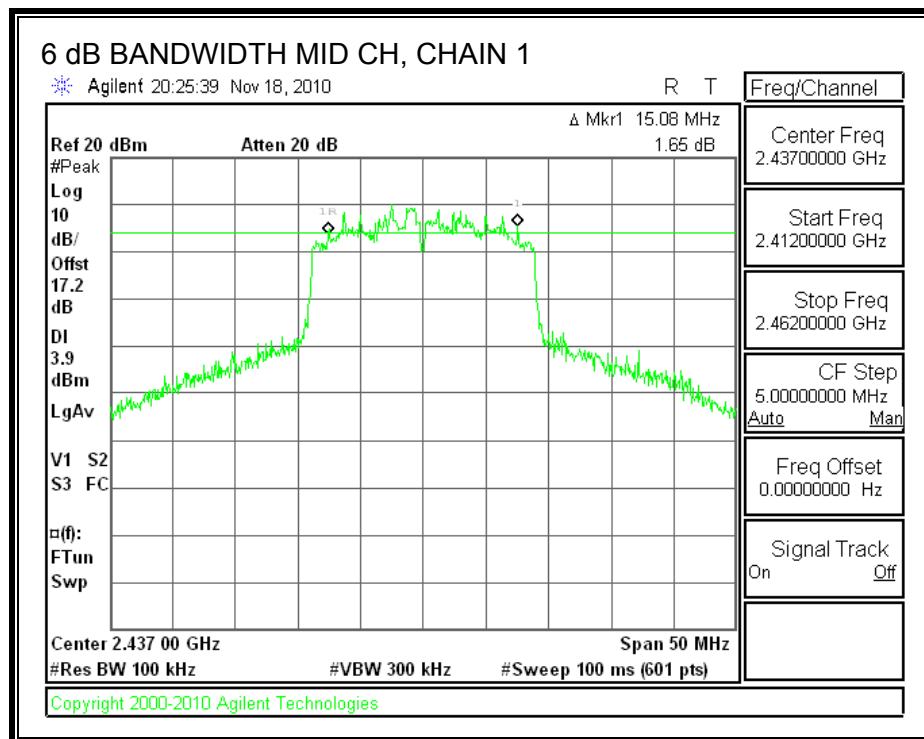
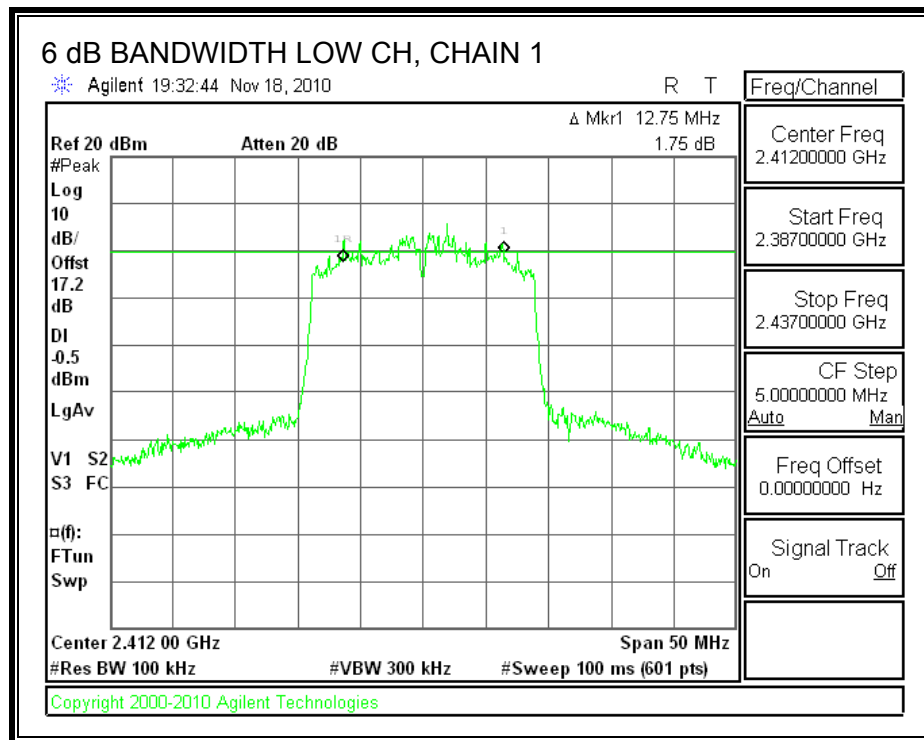
TEST PROCEDURE

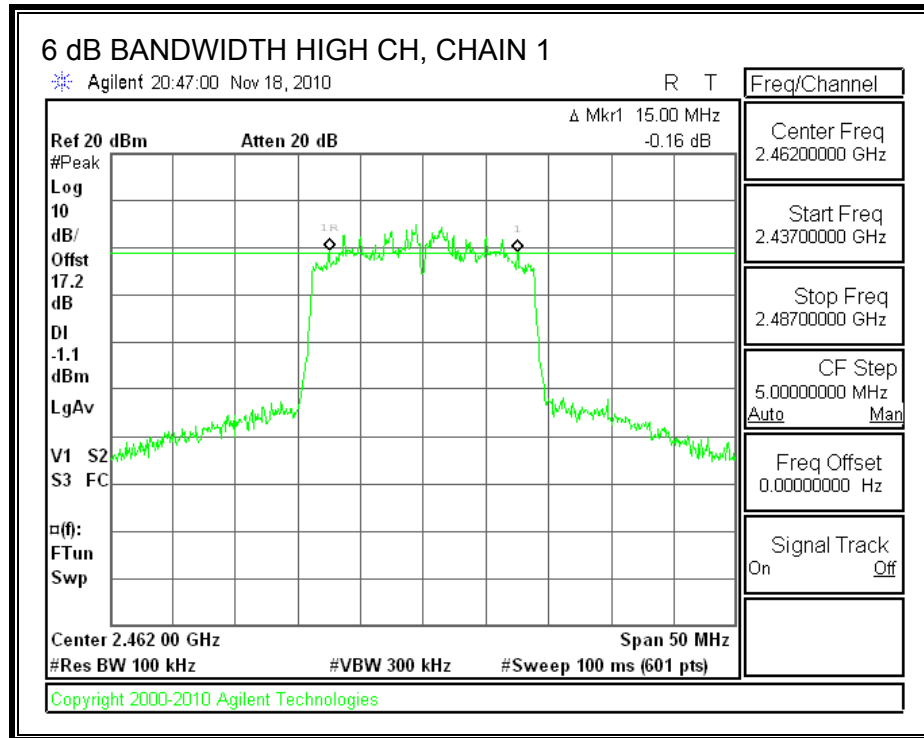
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

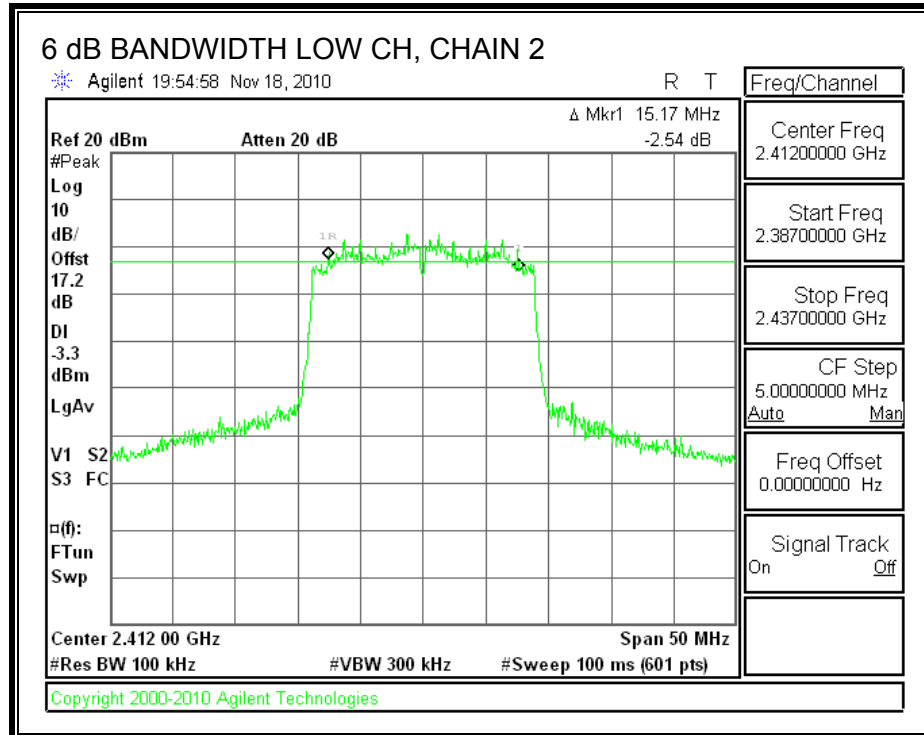
Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	12.75	15.17	0.5
Middle	2437	15.08	15.17	0.5
High	2462	15.00	15.08	0.5

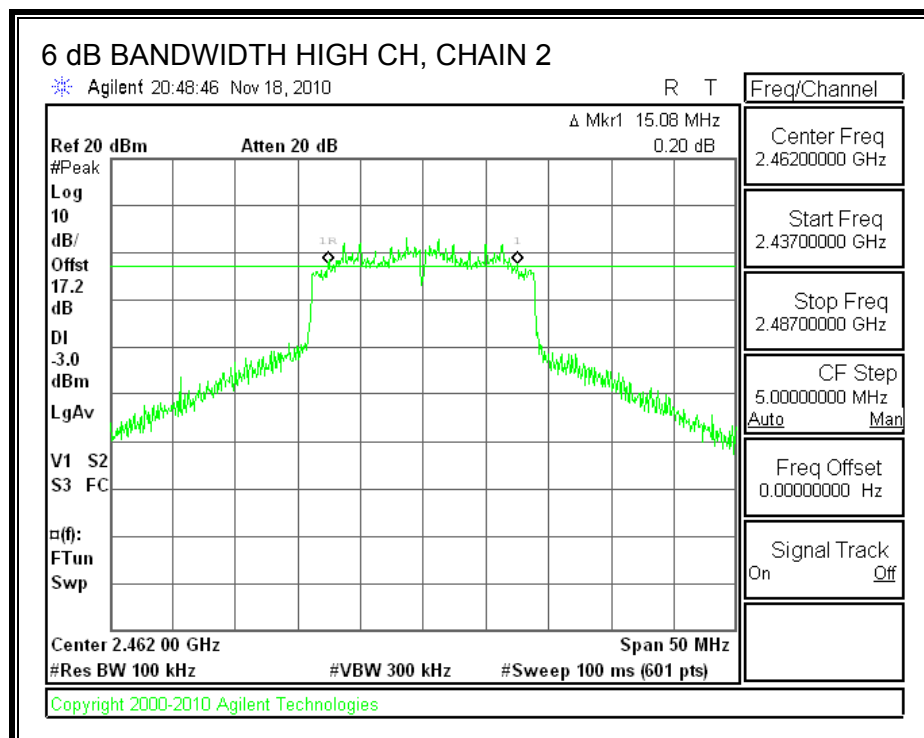
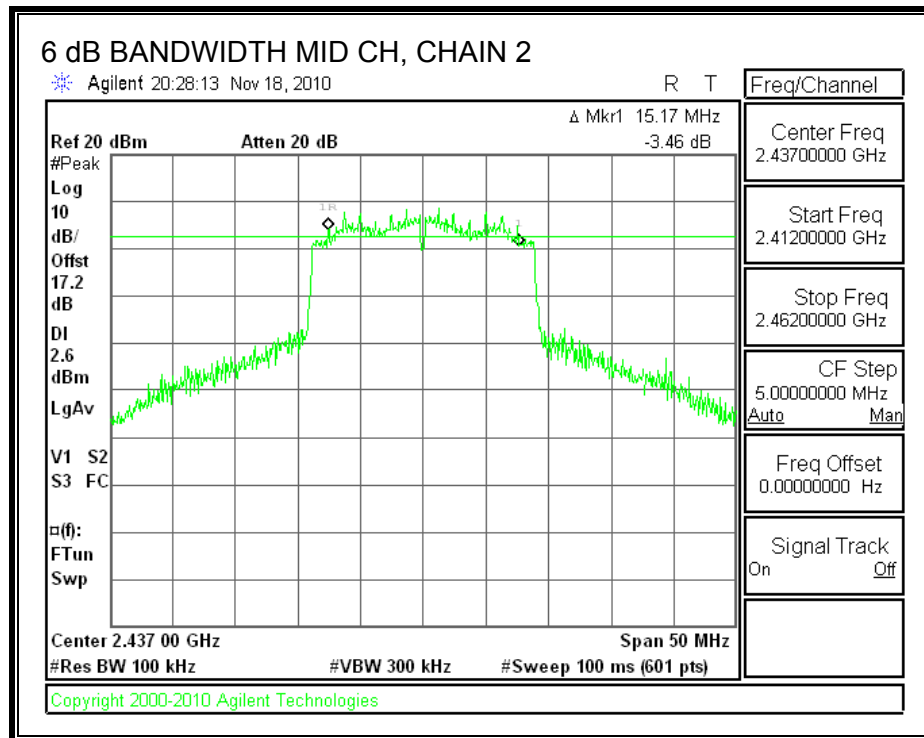
6 dB BANDWIDTH, CHAIN 1





6 dB BANDWIDTH, CHAIN 2





7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

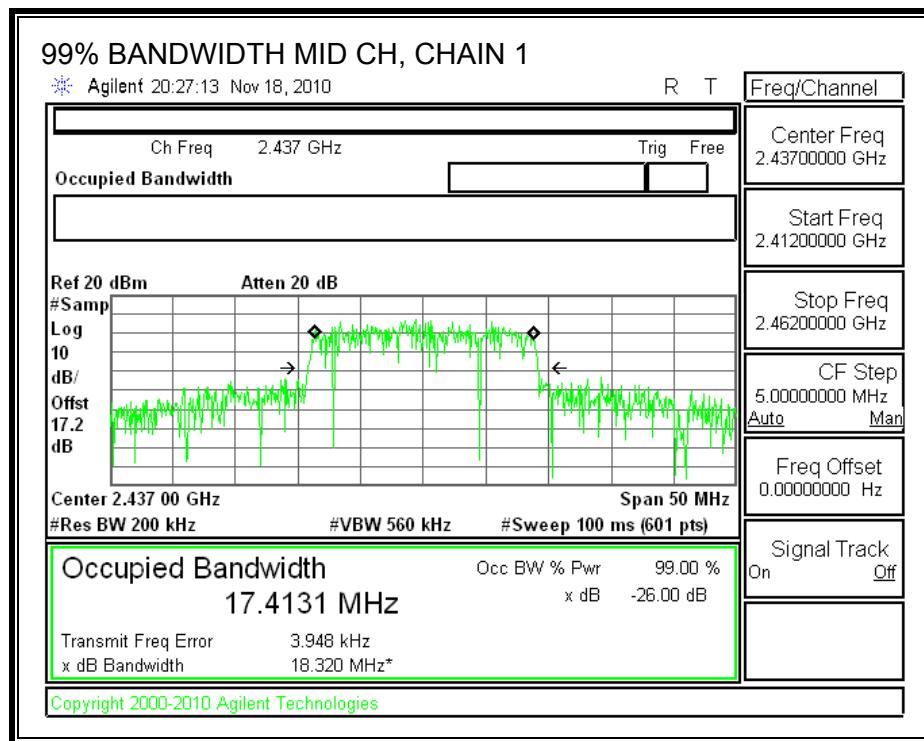
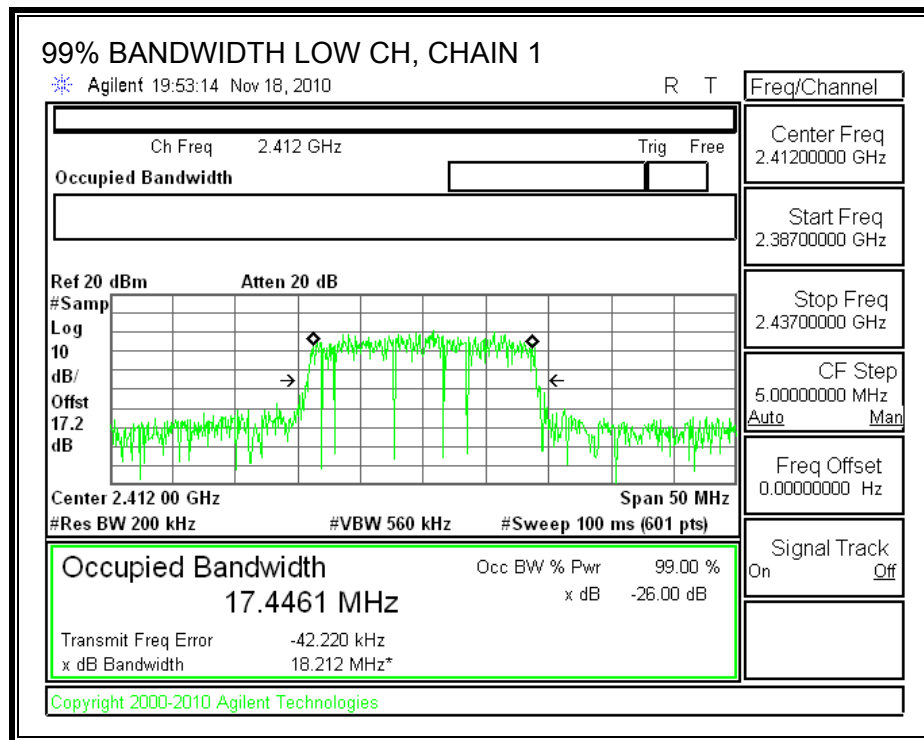
TEST PROCEDURE

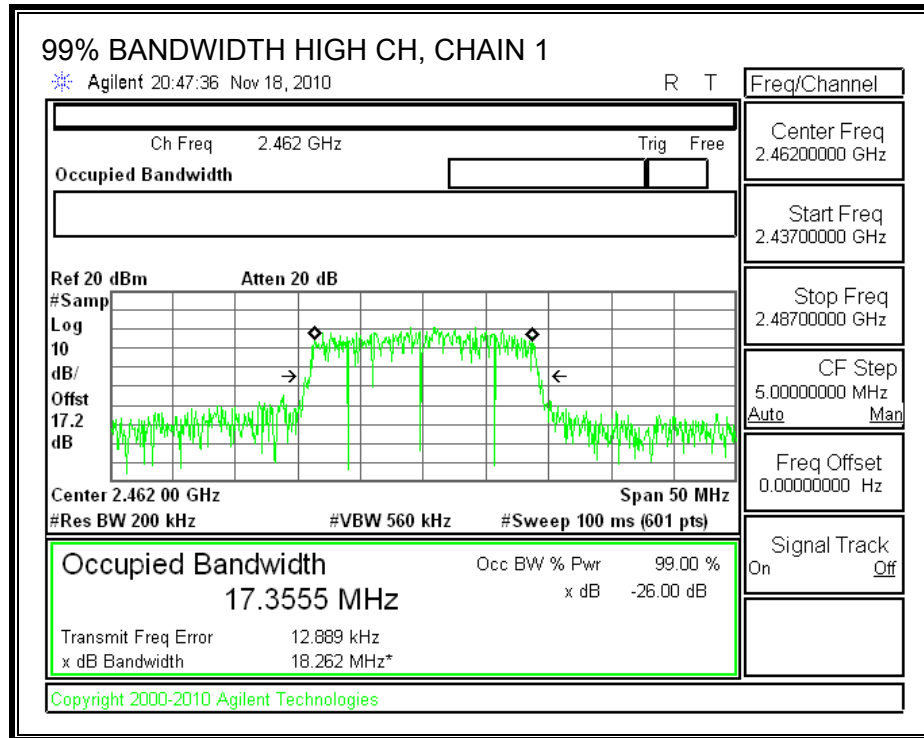
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

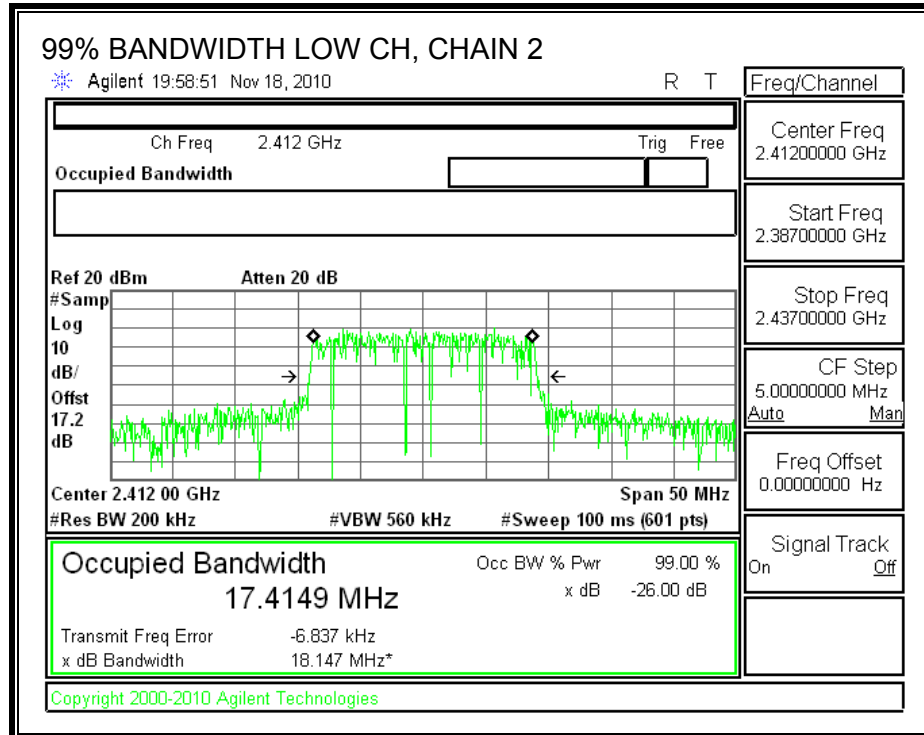
Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	2412	17.4461	17.4149
Middle	2437	17.4131	17.4506
High	2462	17.3555	17.4483

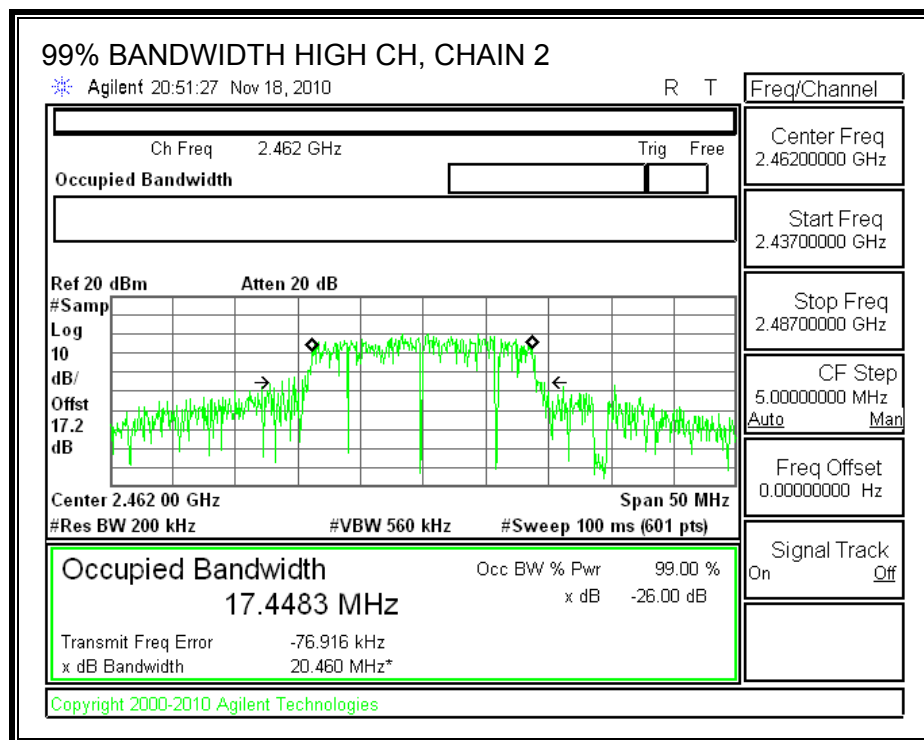
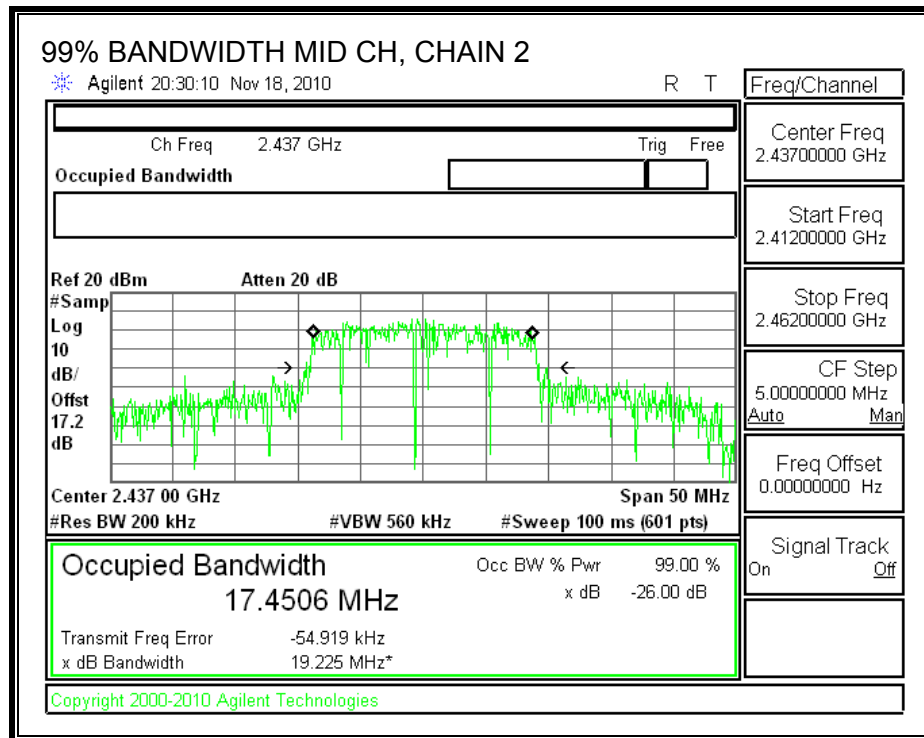
99% BANDWIDTH, CHAIN 1





99% BANDWIDTH, CHAIN 2





7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The highest combination of antenna gains is equal 6.91 dBi, therefore the limit is 29.09 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 17.2 dB (including 16.2 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)	Limit (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	2412	29.09	24.34	23.47	26.94	-2.15
Mid	2437	29.09	25.17	25.24	28.22	-0.87
High	2462	29.09	24.55	24.39	27.48	-1.61

7.3.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

The highest combination of antenna gains is equal 6.91 dBi, therefore the limit is 7.09 dBm.

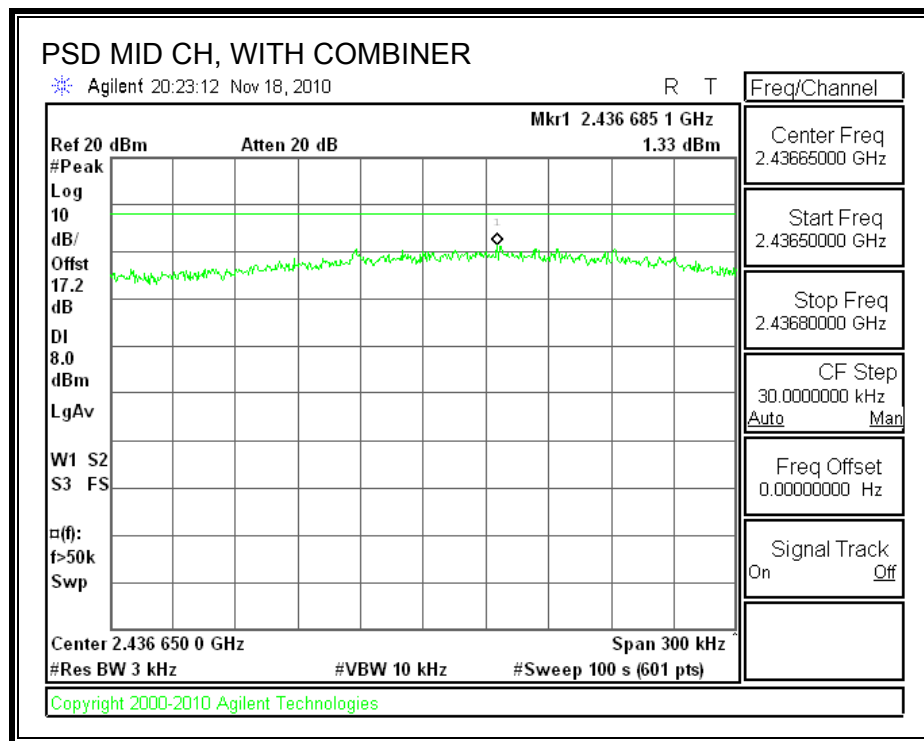
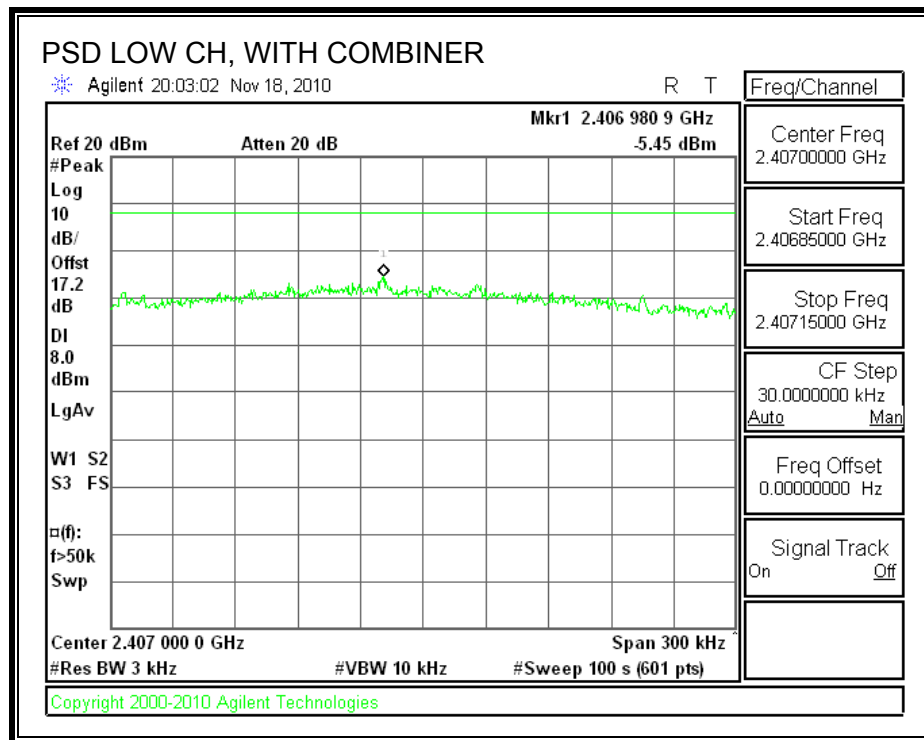
TEST PROCEDURE

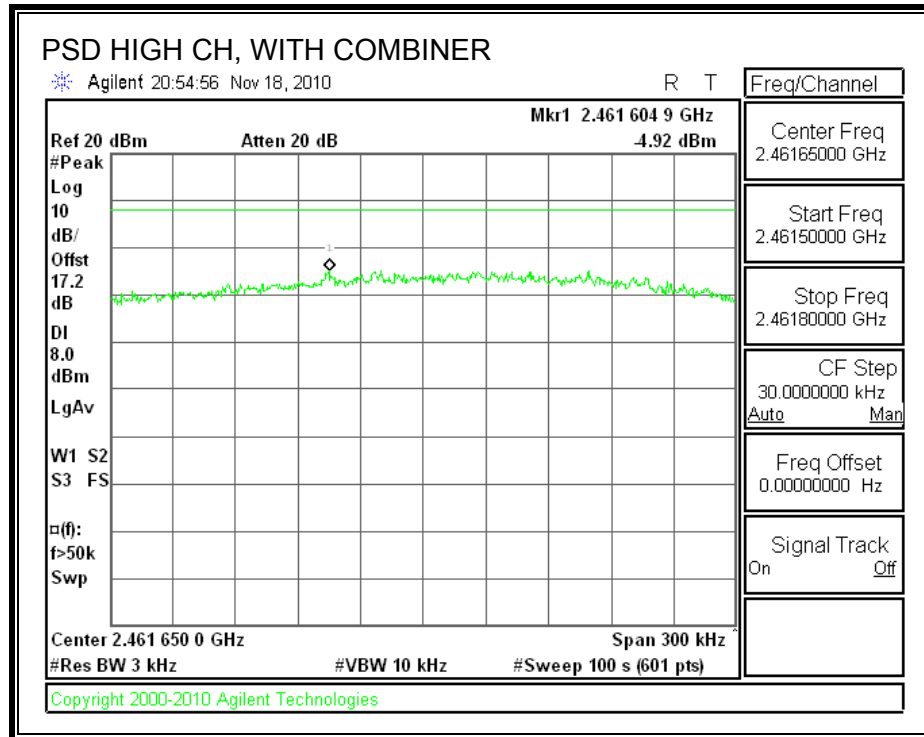
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-5.45	7.09	-12.54
Middle	2437	1.33	7.09	-5.76
High	2462	-4.92	7.09	-12.01

POWER SPECTRAL DENSITY, WITH COMBINER





7.3.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

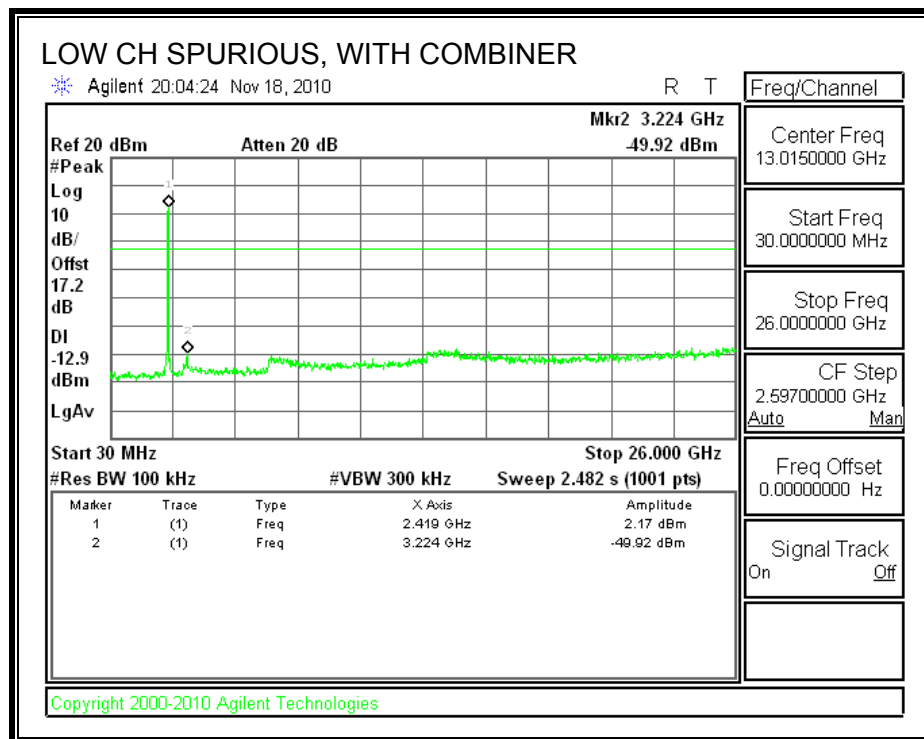
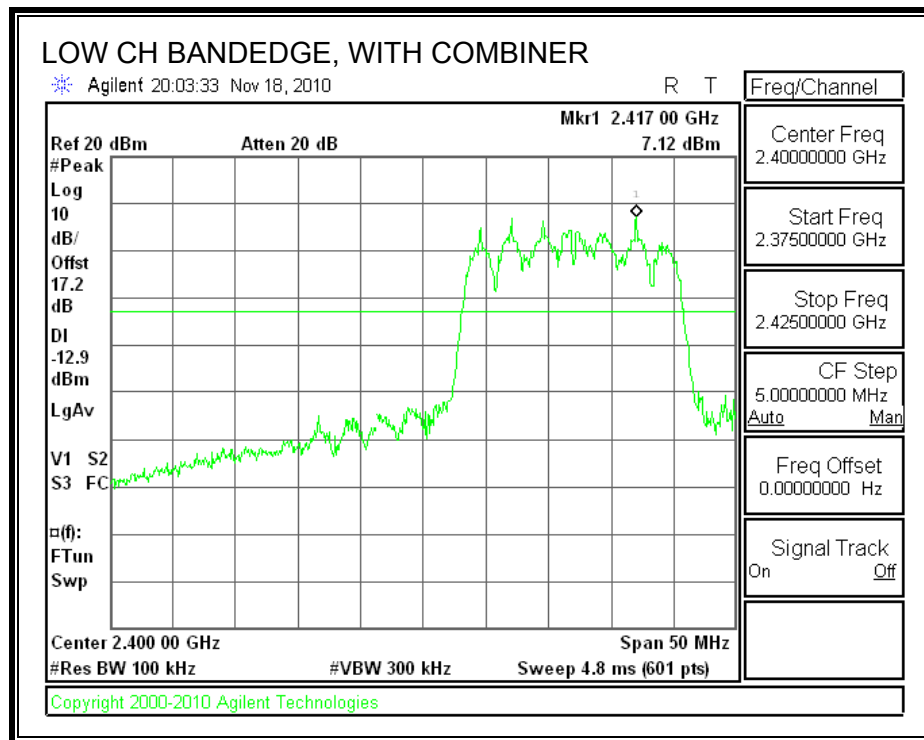
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

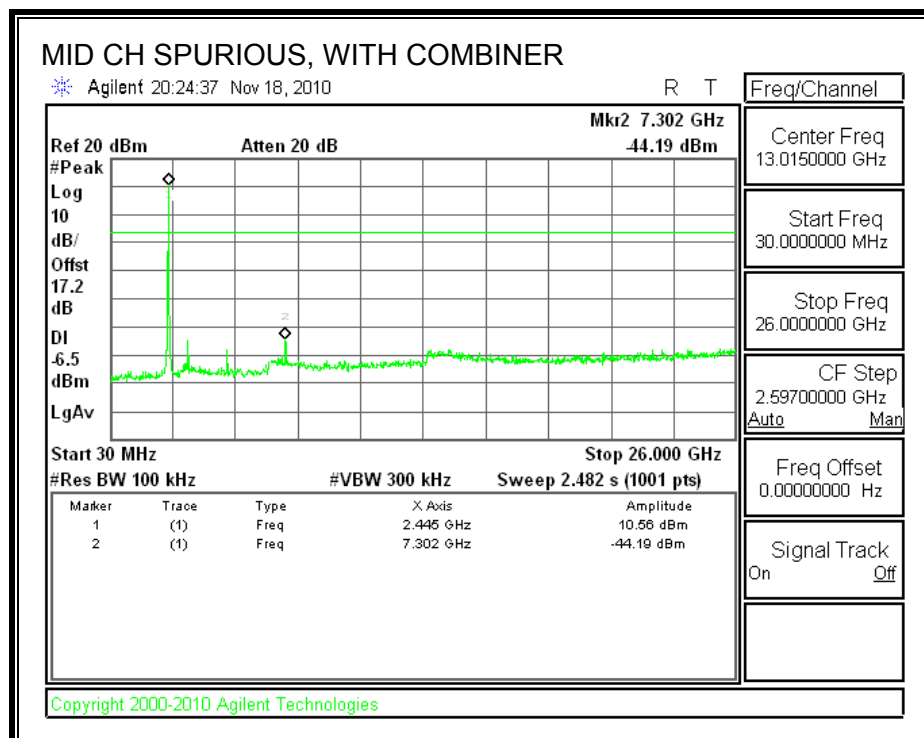
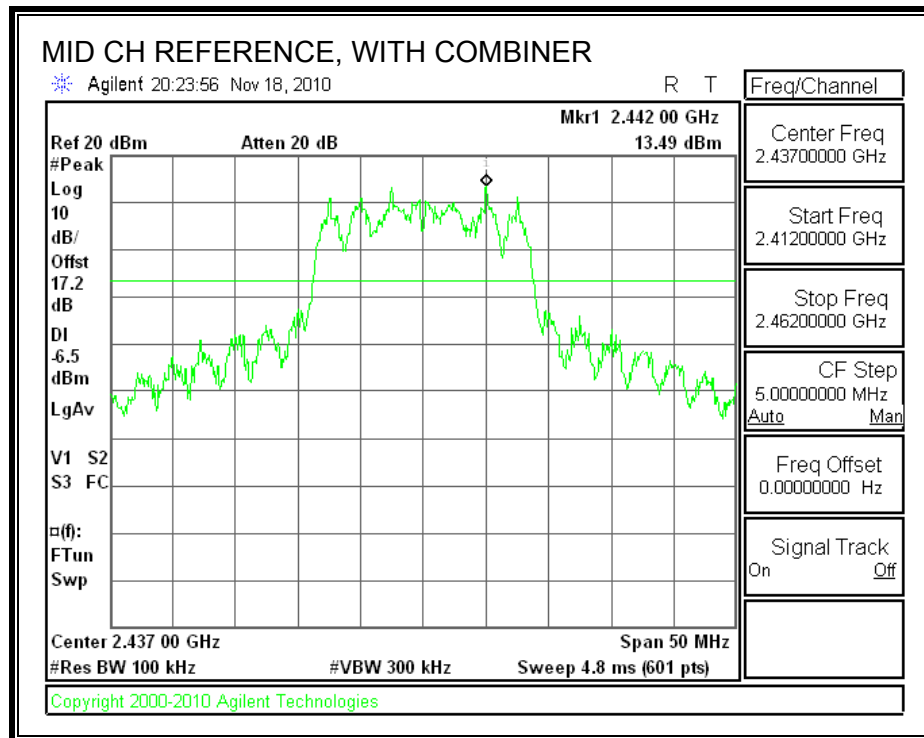
TEST PROCEDURE

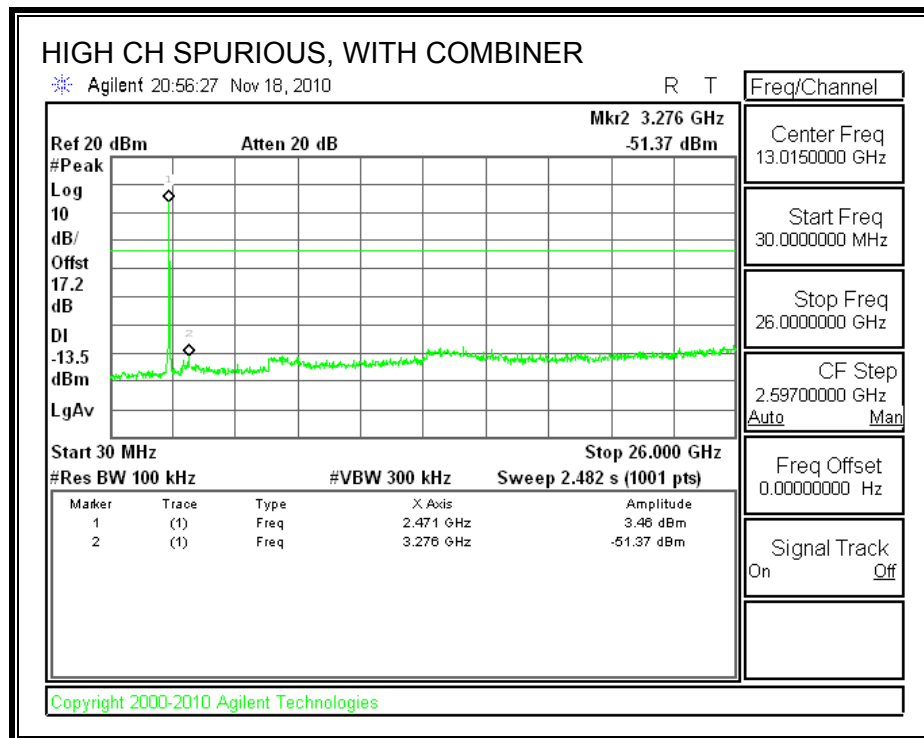
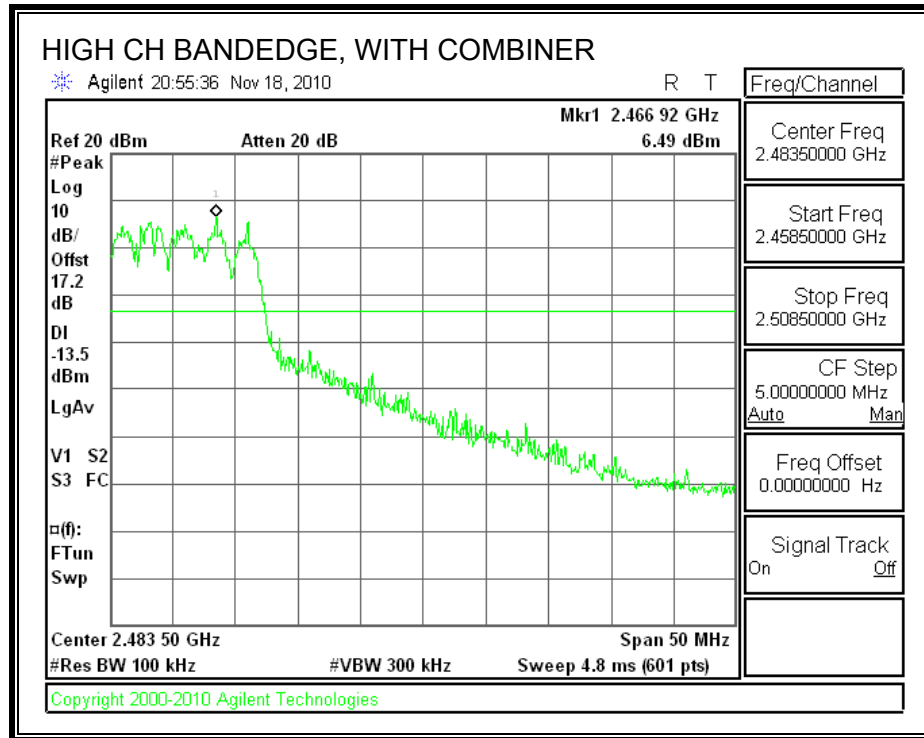
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

SPURIOUS EMISSIONS WITH COMBINER







7.4. 802.11n HT40 CDD MCS0 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.

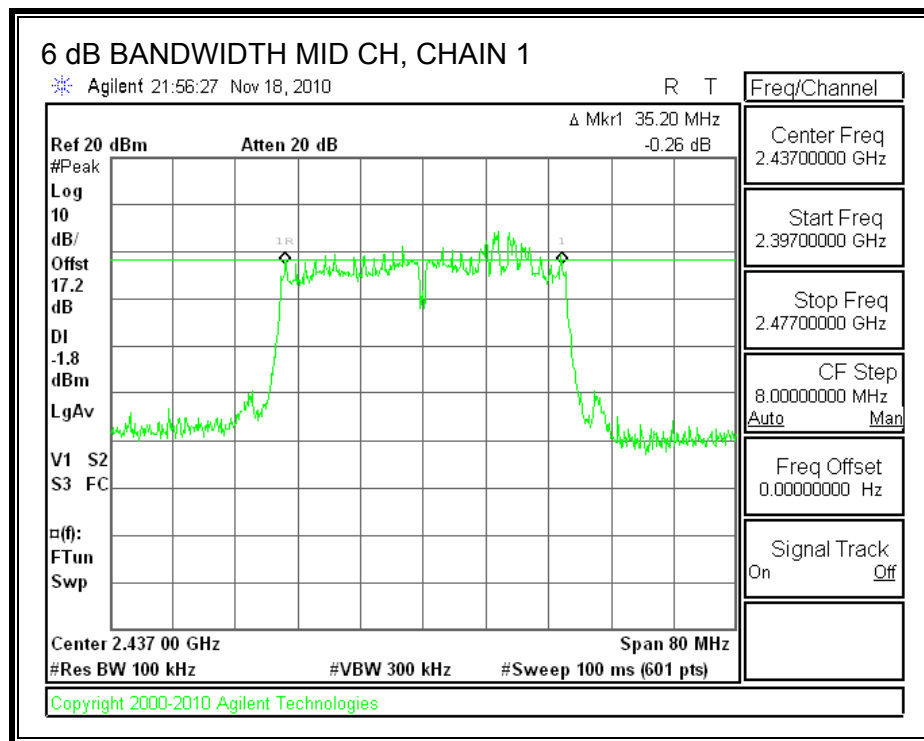
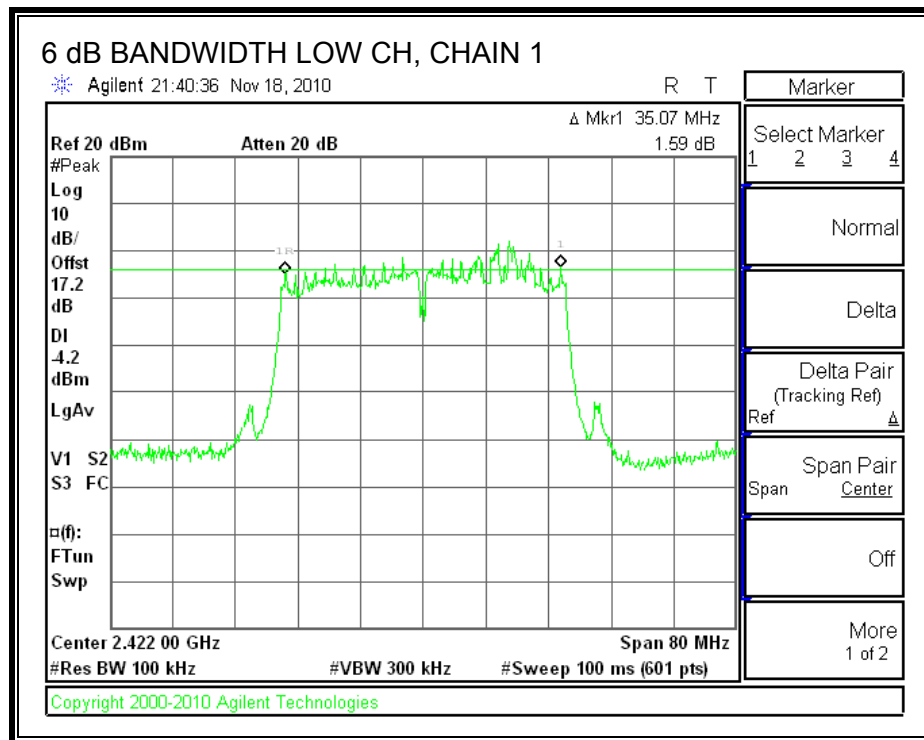
TEST PROCEDURE

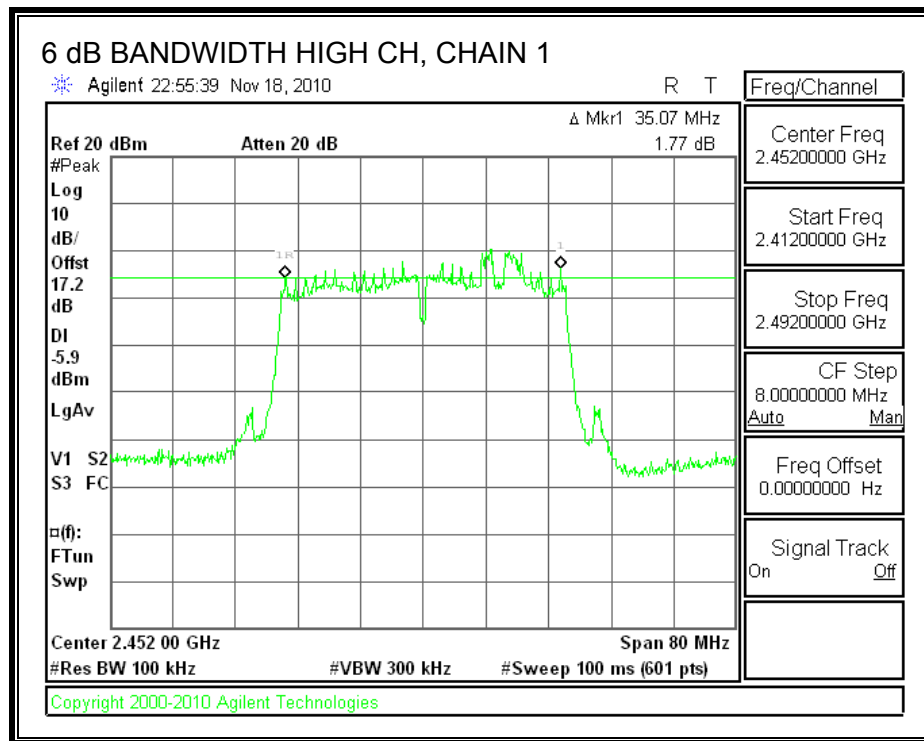
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

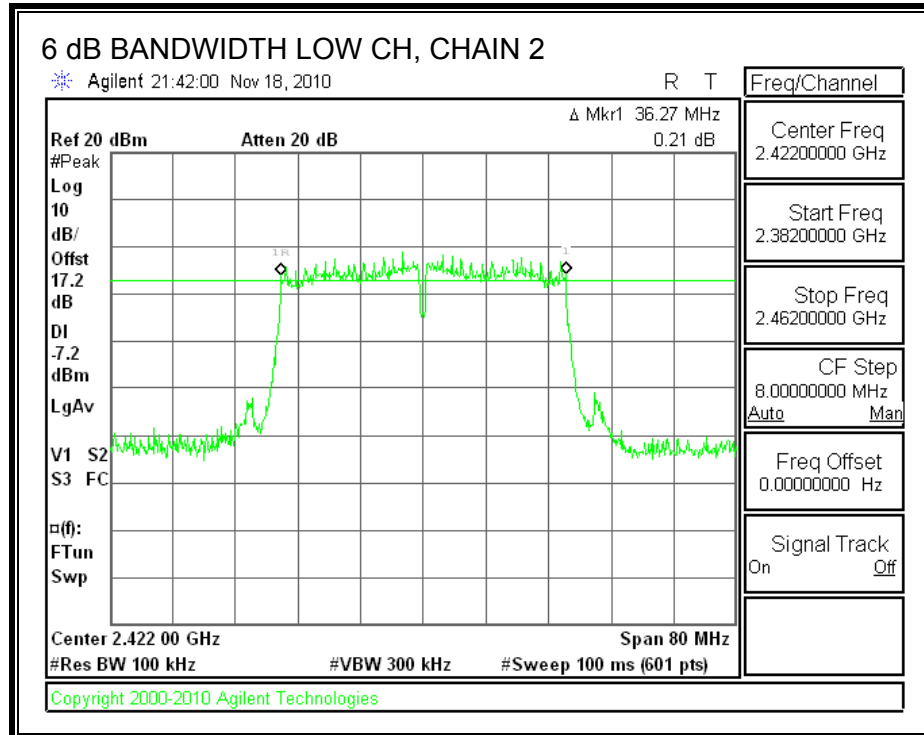
Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2422	35.07	36.27	0.5
Middle	2437	35.20	36.27	0.5
High	2452	35.07	36.27	0.5

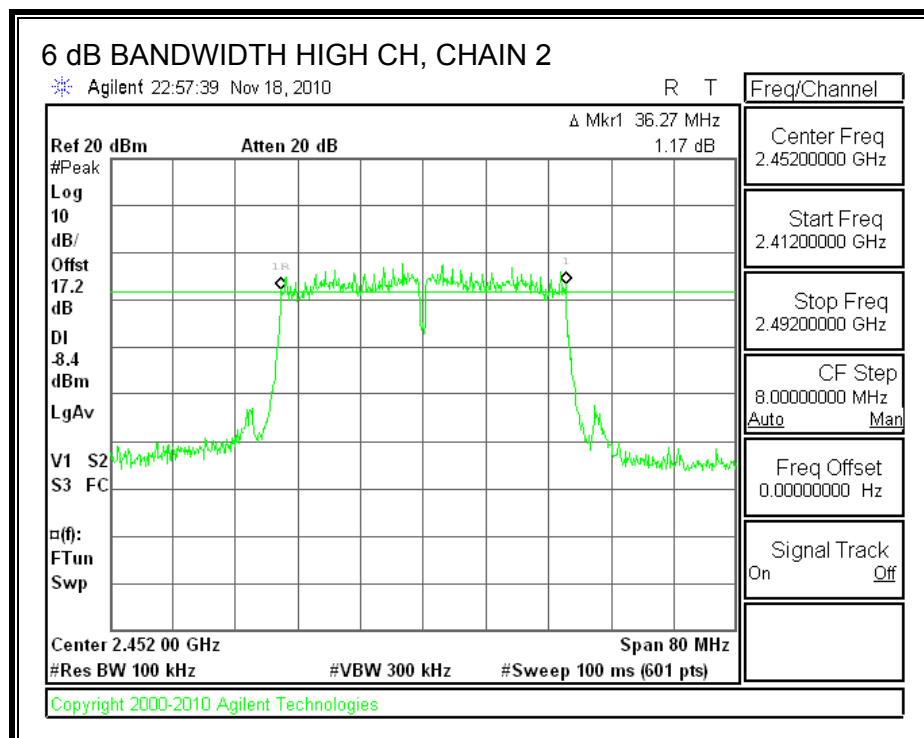
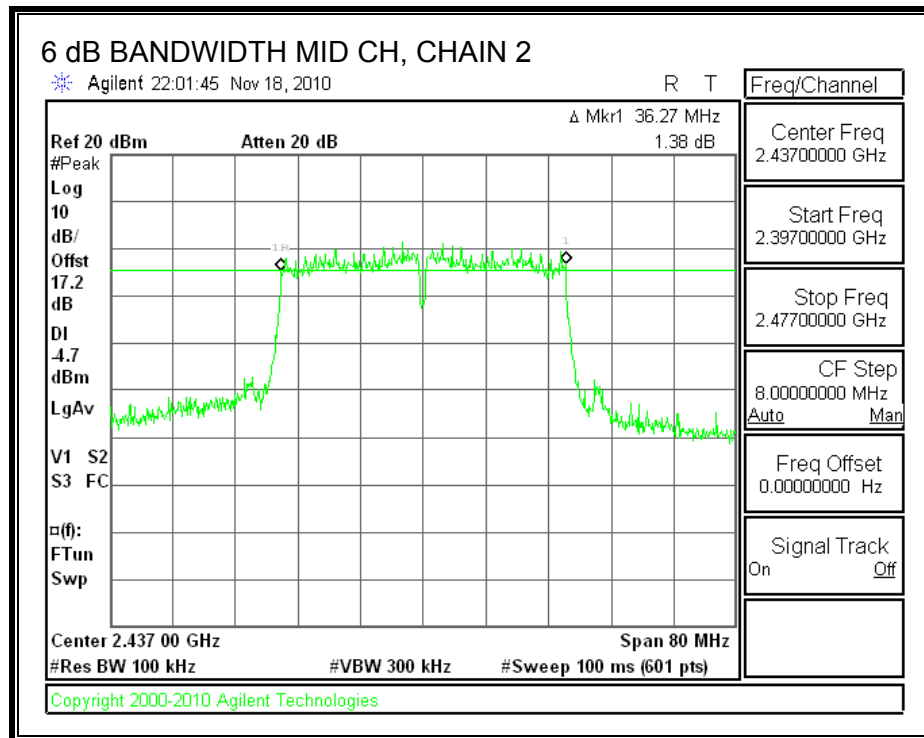
6 dB BANDWIDTH, CHAIN 1





6 dB BANDWIDTH, CHAIN 2





7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

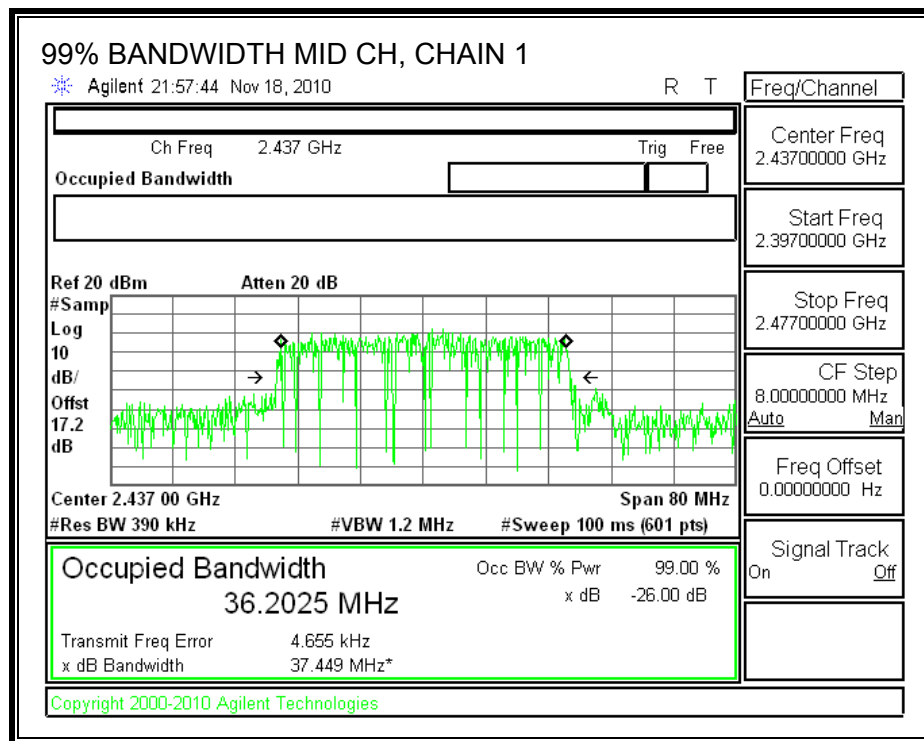
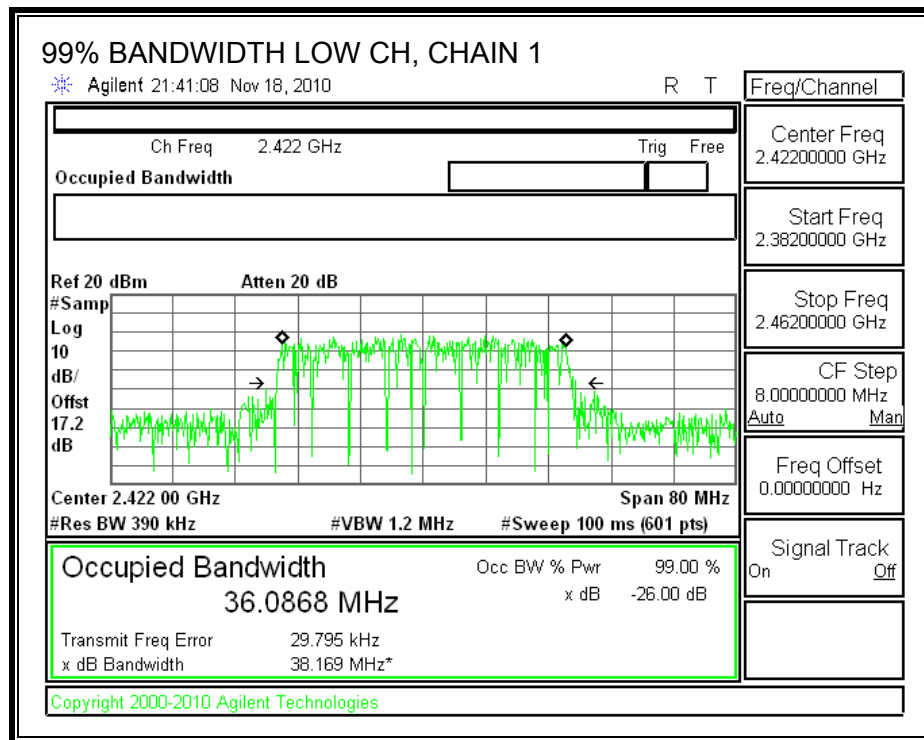
TEST PROCEDURE

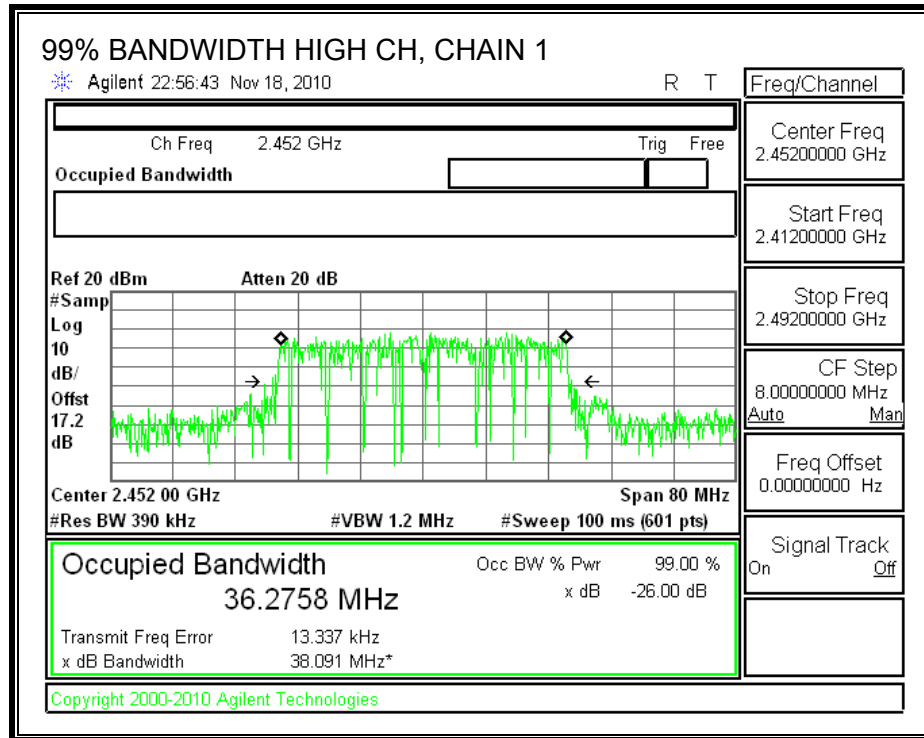
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

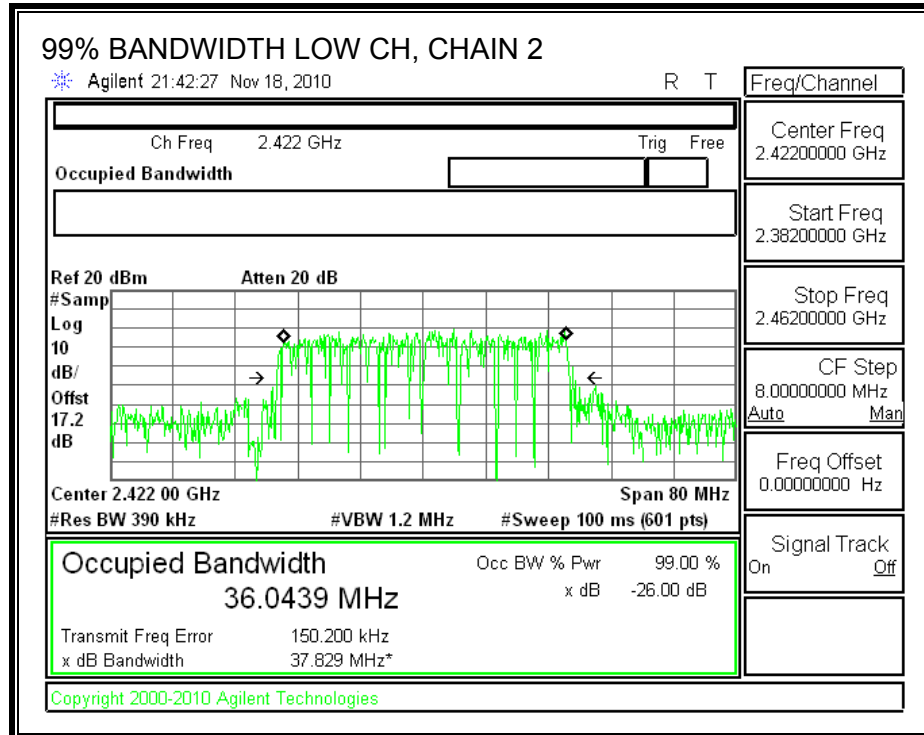
Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	2422	36.0868	36.0439
Middle	2437	36.2025	36.1436
High	2452	36.2758	36.2558

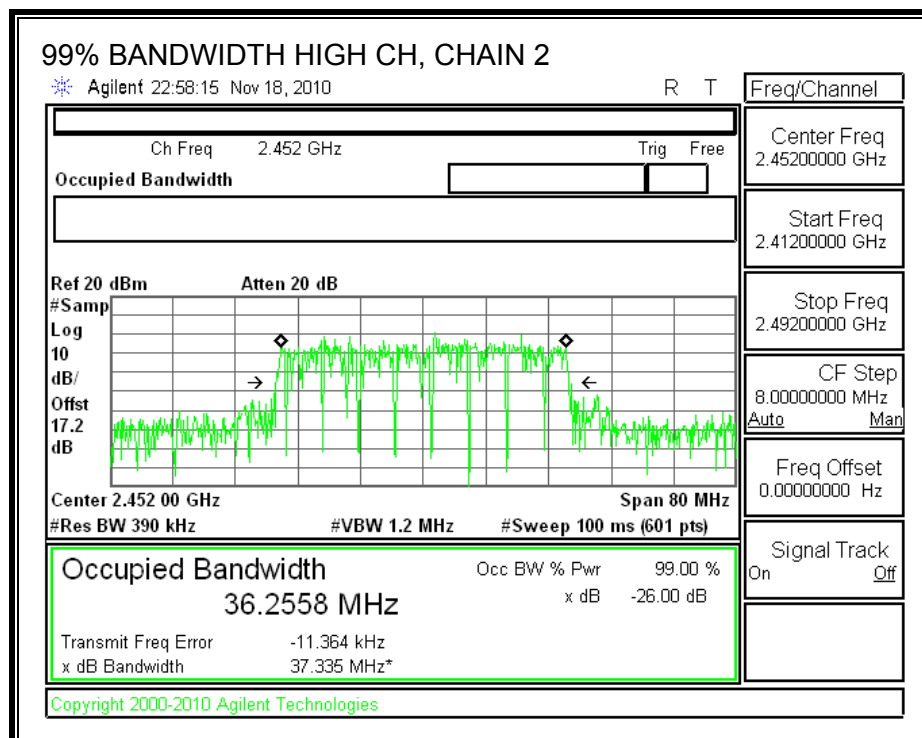
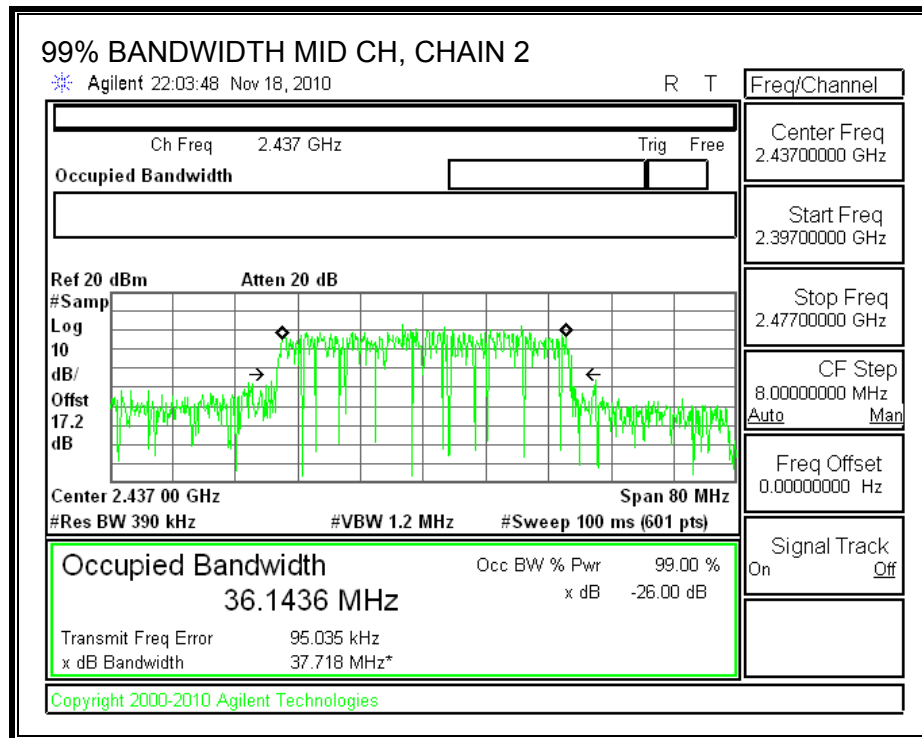
99% BANDWIDTH, CHAIN 1





99% BANDWIDTH, CHAIN 2





7.4.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The highest combination of antenna gains is equal 6.91 dBi, therefore the limit is 29.09 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 17.2 dB (including 16.2 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)	Limit (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	2422	29.09	22.74	23.05	25.91	-3.18
Low	2437	29.09	24.03	24.05	27.05	-2.04
High	2452	29.09	21.82	21.45	24.65	-4.44

7.4.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

The highest combination of antenna gains is equal 6.91 dBi, therefore the limit is 7.09 dBm.

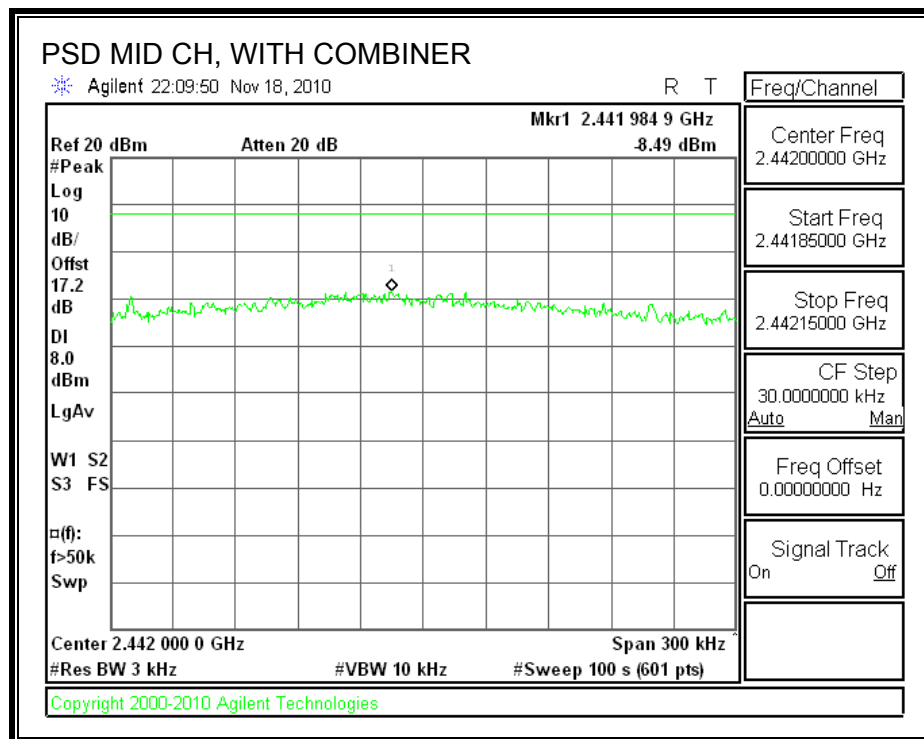
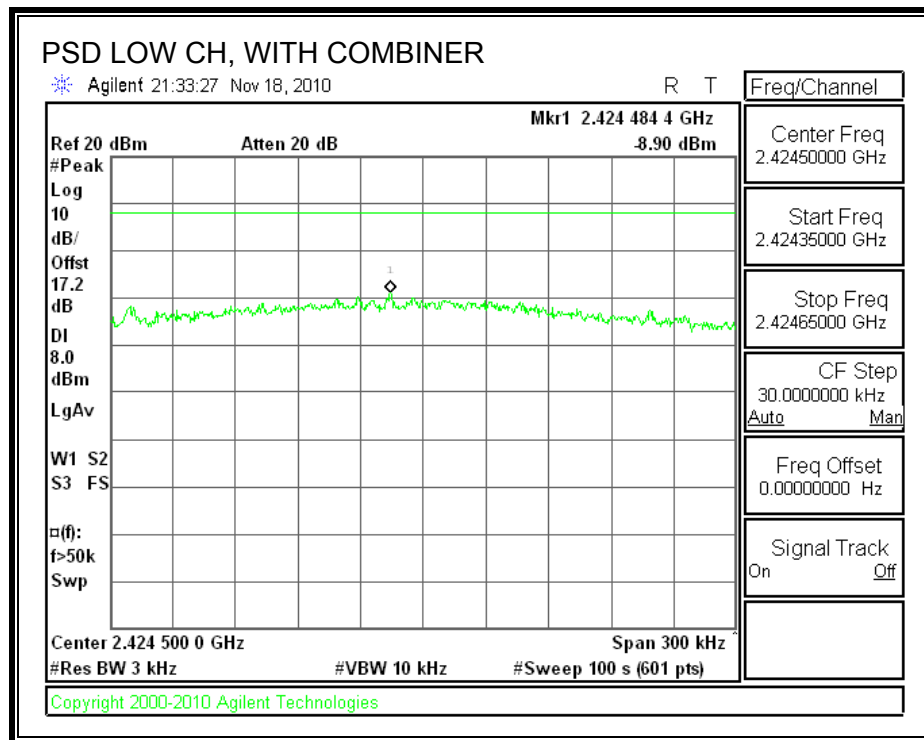
TEST PROCEDURE

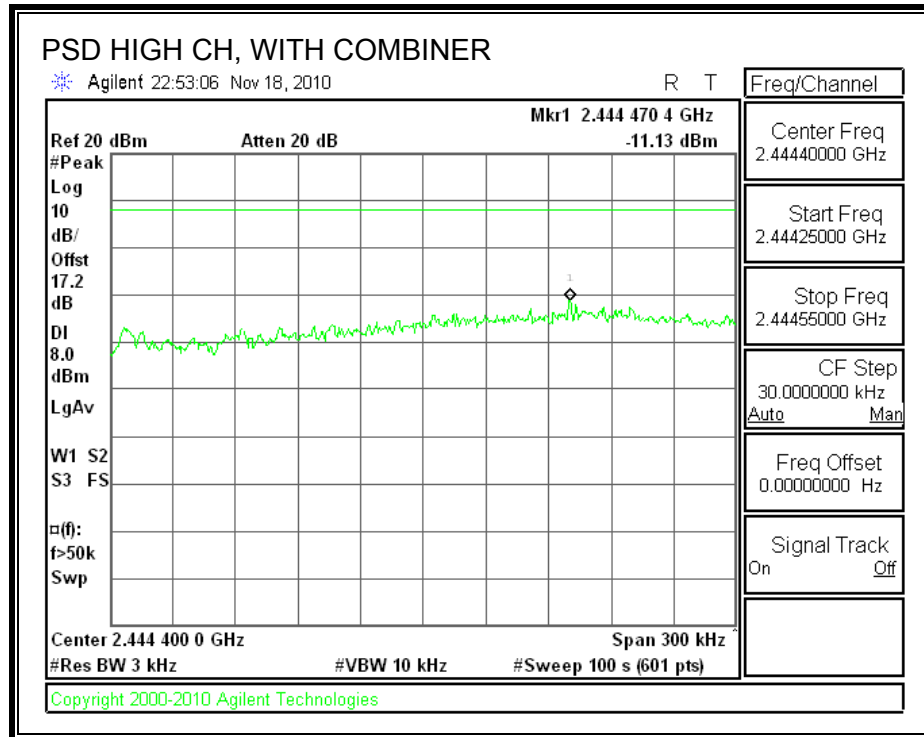
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-8.90	7.09	-15.99
Middle	2437	-8.49	7.09	-15.58
High	2452	-11.13	7.09	-18.22

POWER SPECTRAL DENSITY, WITH COMBINER





7.4.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

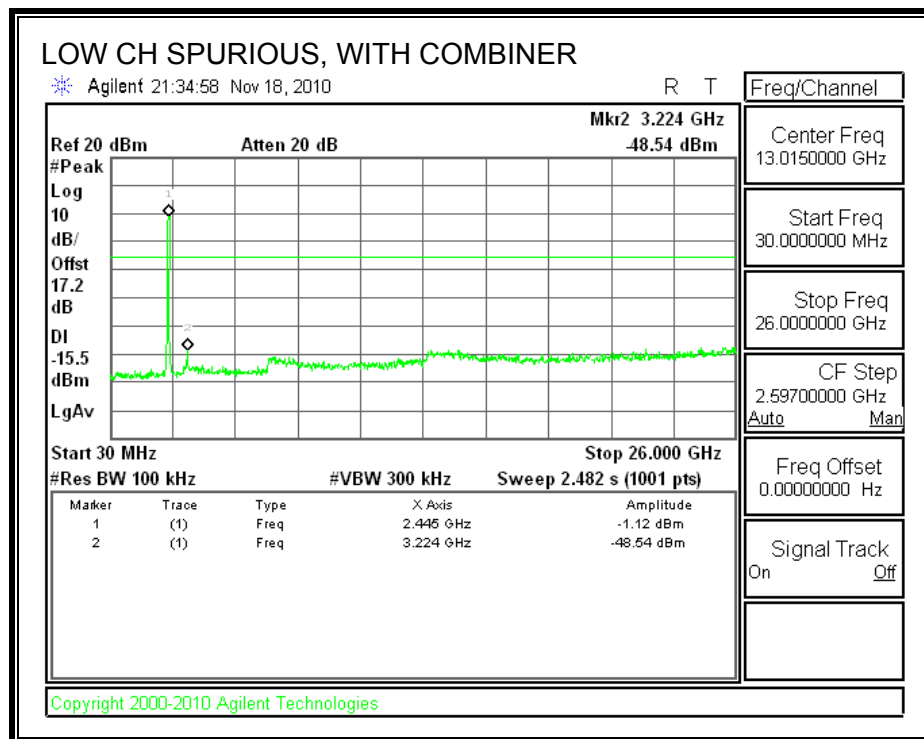
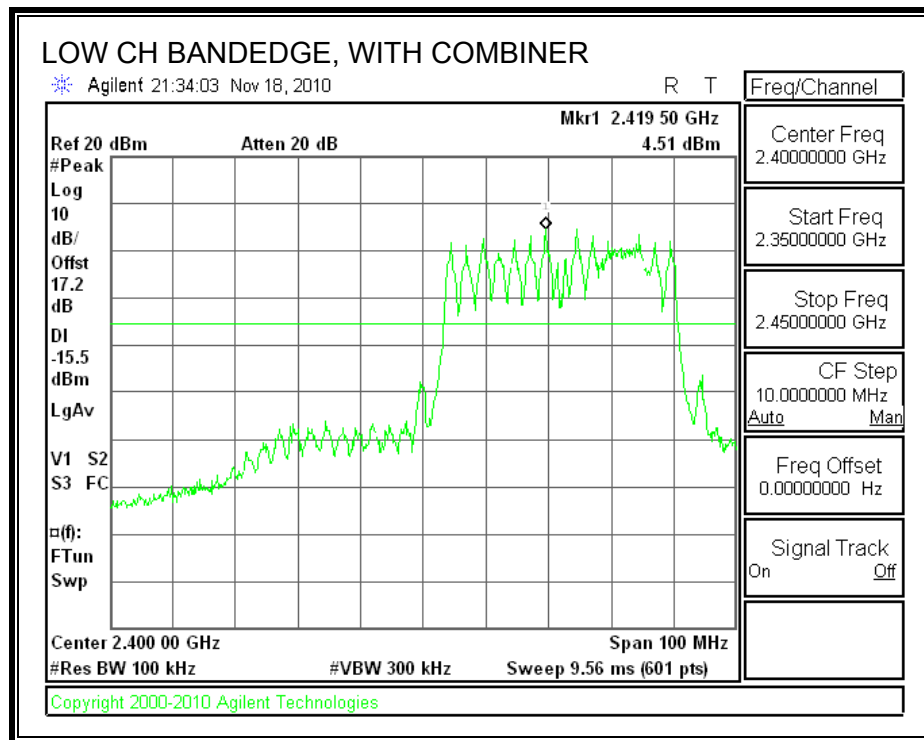
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

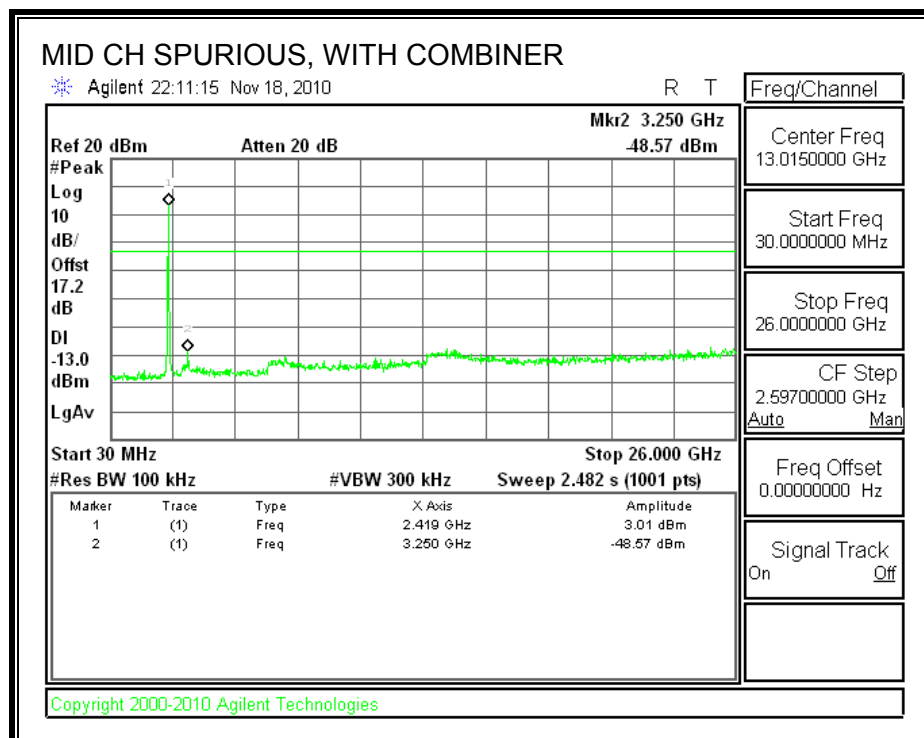
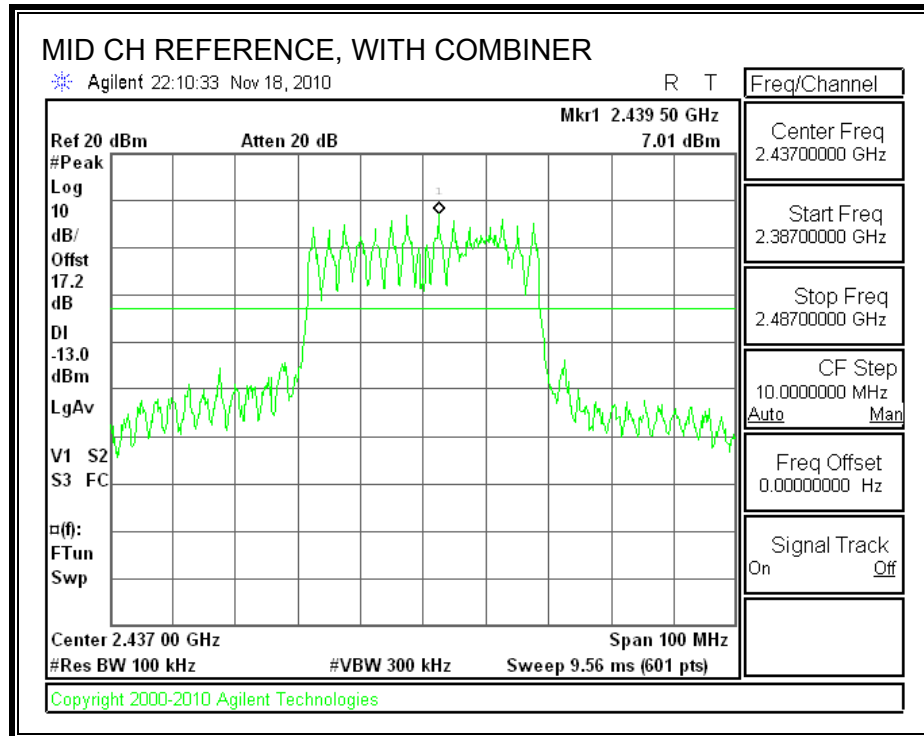
TEST PROCEDURE

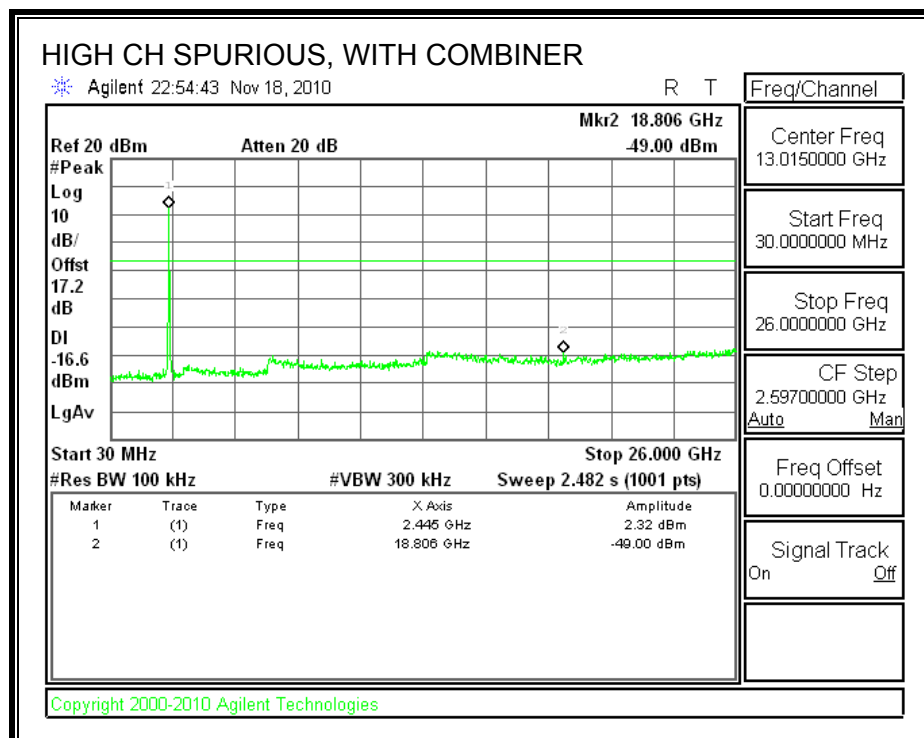
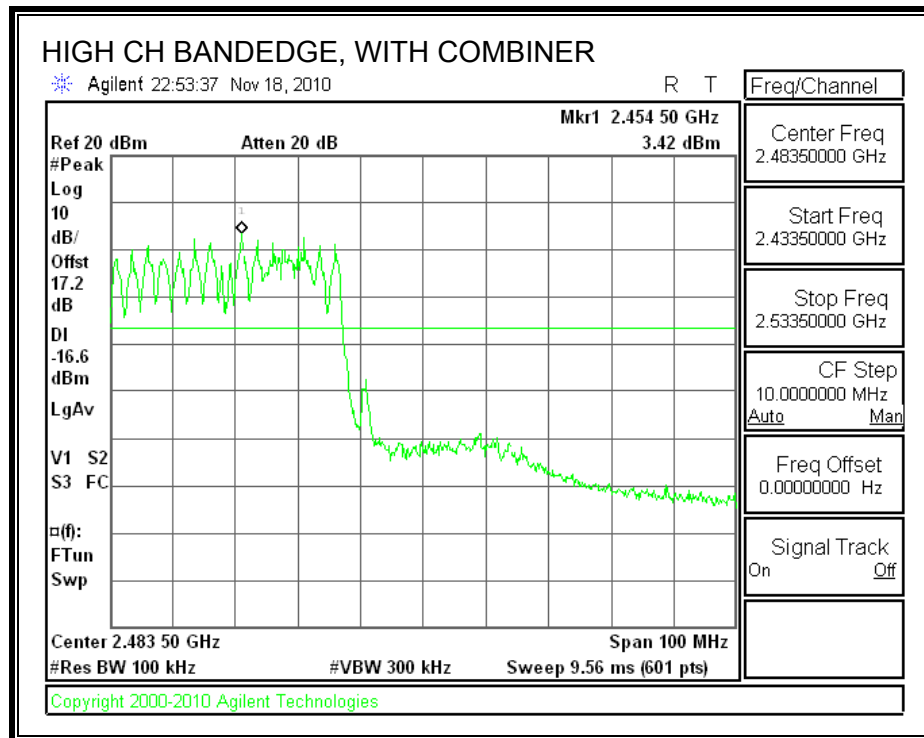
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

SPURIOUS EMISSIONS WITH COMBINER







7.5. 802.11a MODE IN THE 5.8 GHz BAND

7.5.1. 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.

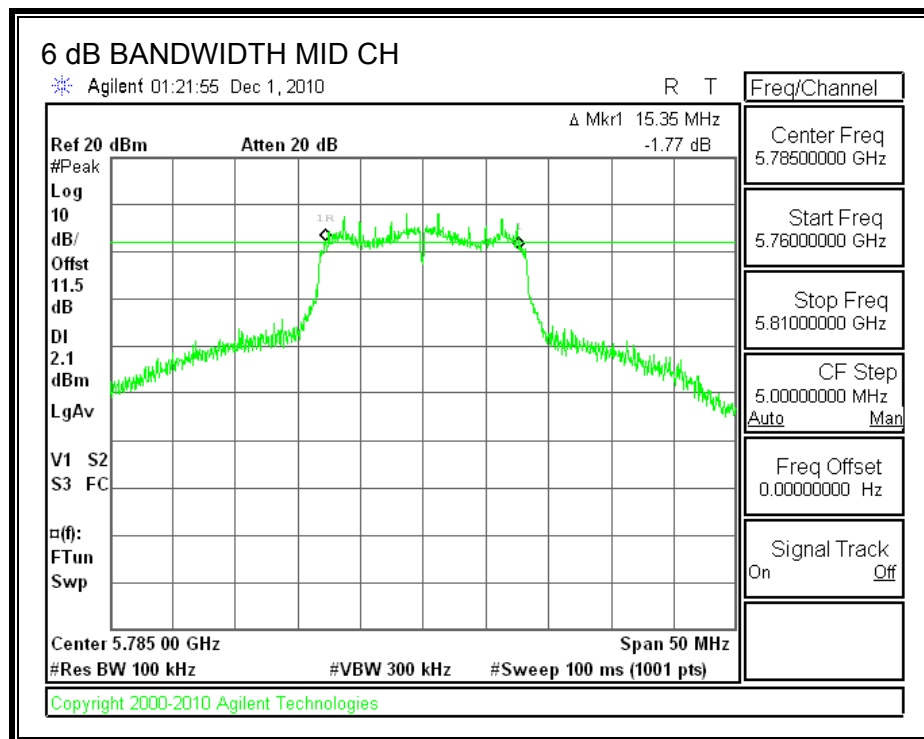
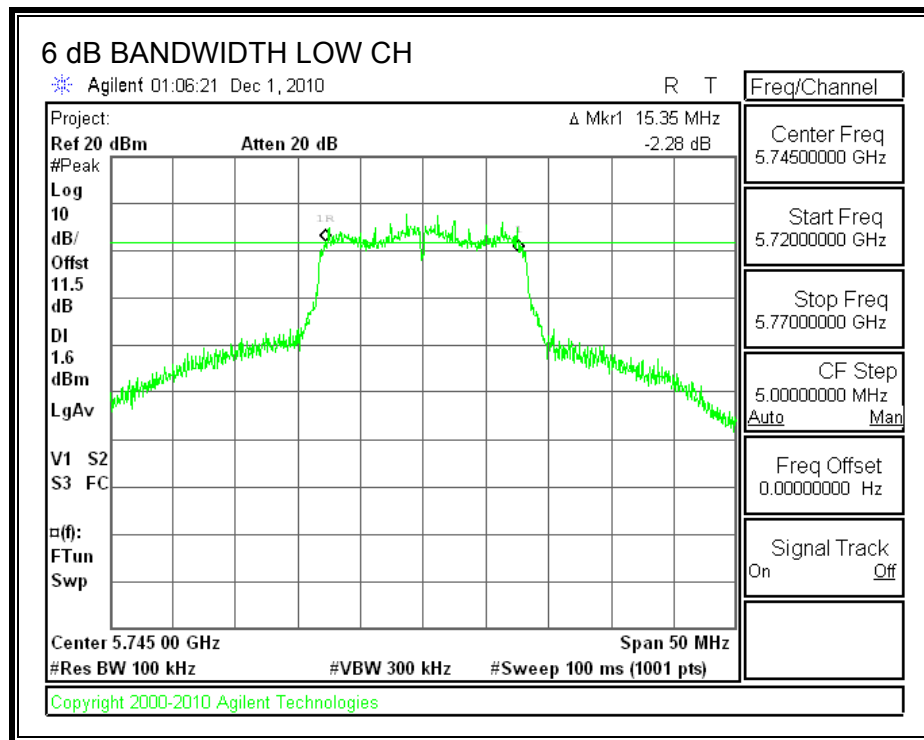
TEST PROCEDURE

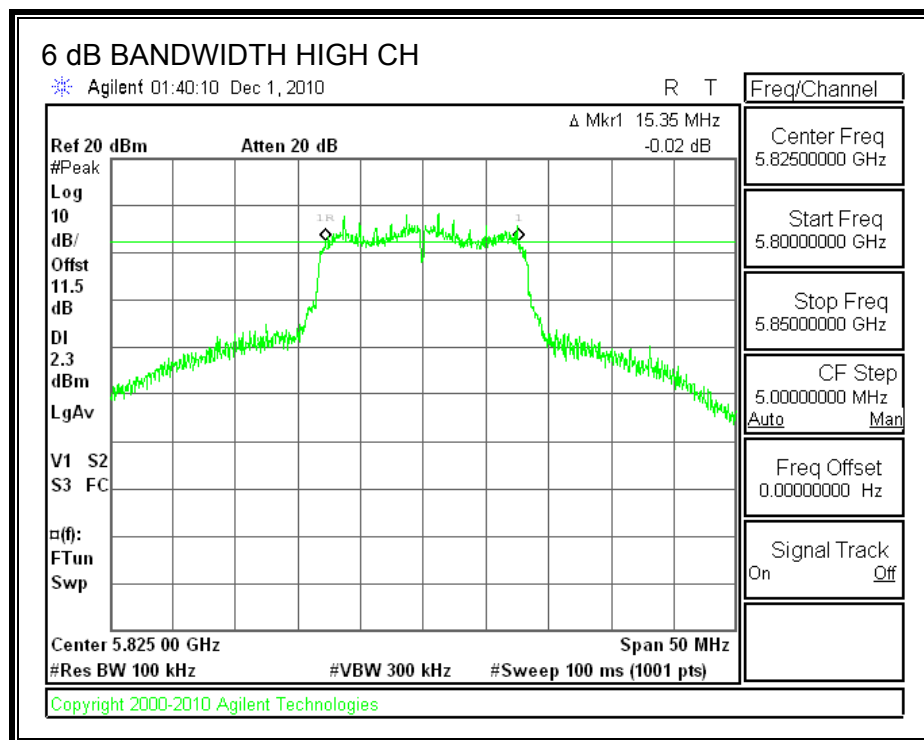
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	15.35	0.5
Middle	5785	15.35	0.5
High	5825	15.35	0.5

6 dB BANDWIDTH





7.5.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

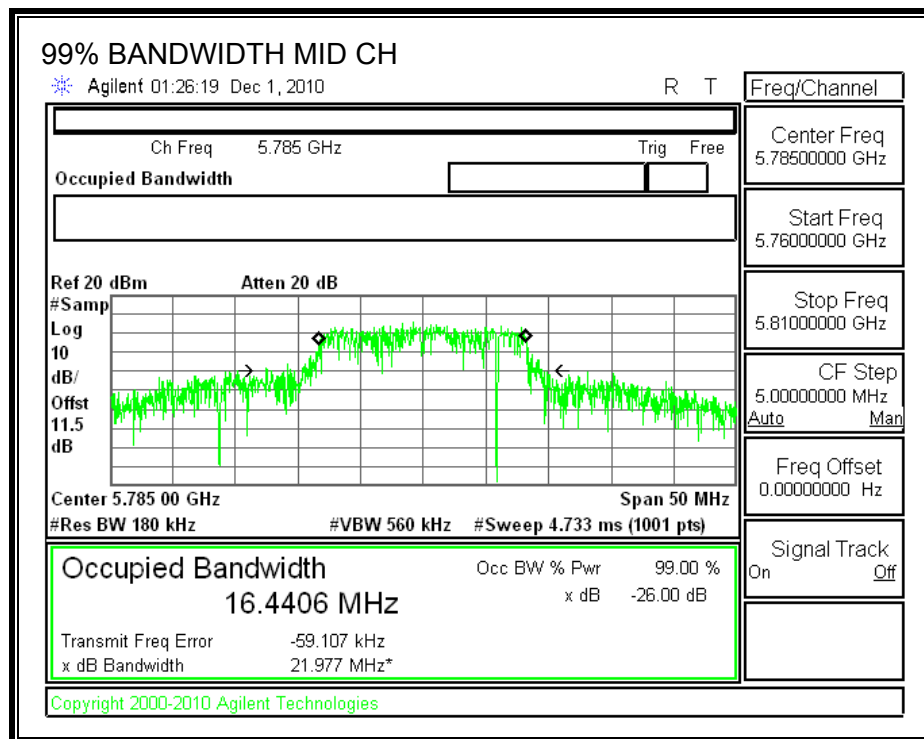
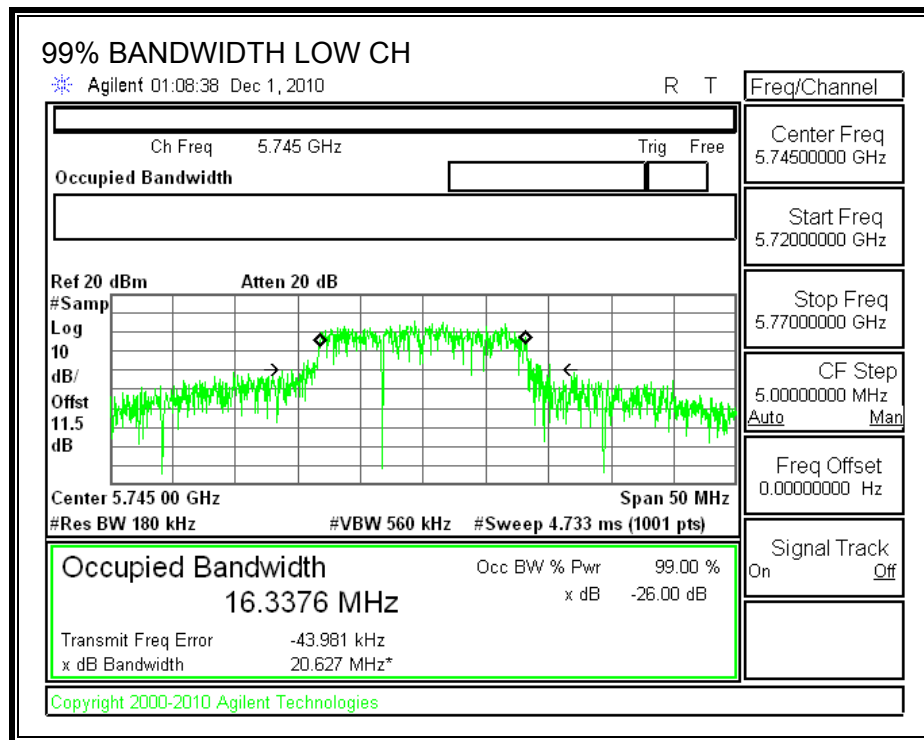
TEST PROCEDURE

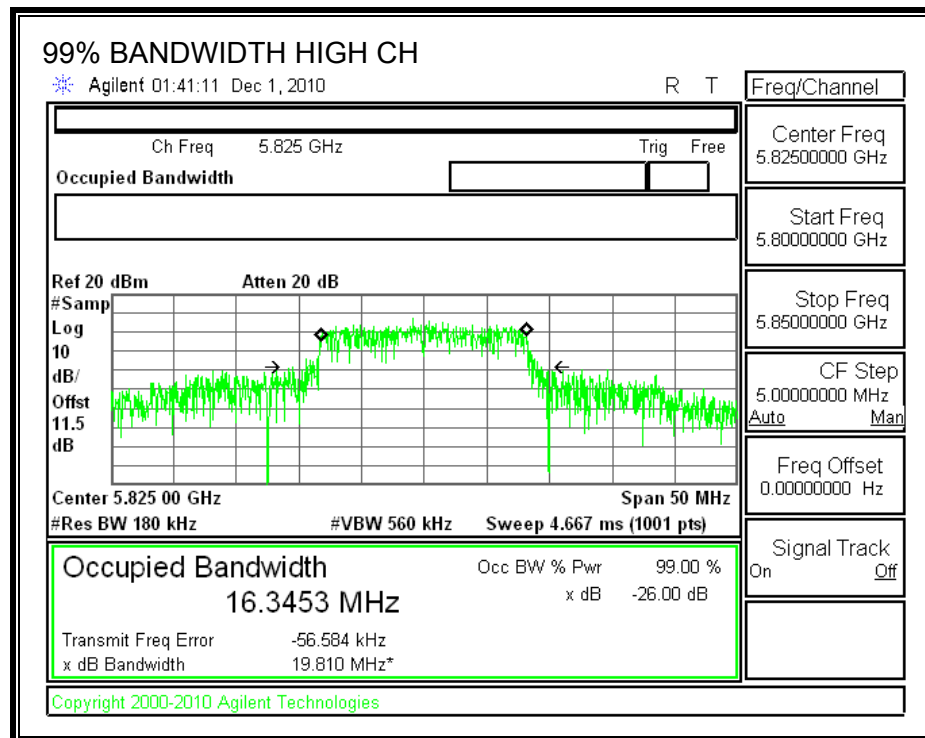
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	16.3376
Middle	5785	16.4406
High	5825	16.3453

99% BANDWIDTH





7.5.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Peak Power Meter Reading (dBm)	Limit (dBm)	Margin (dB)
Low	5745	22.94	30	-7.07
Middle	5784	22.98	30	-7.02
High	5825	23.10	30	-6.90

7.5.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

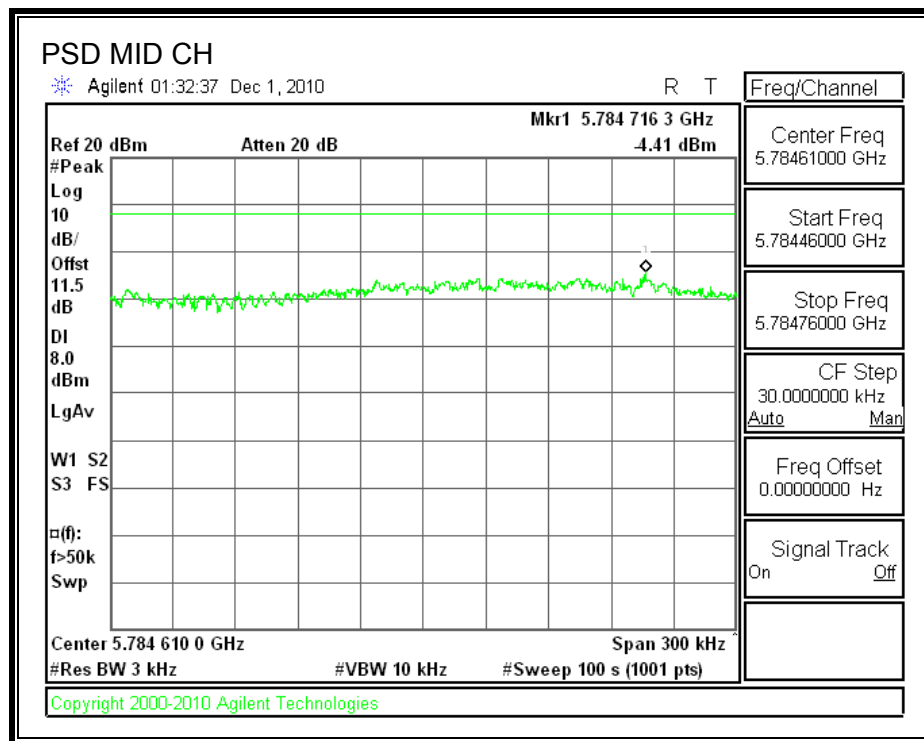
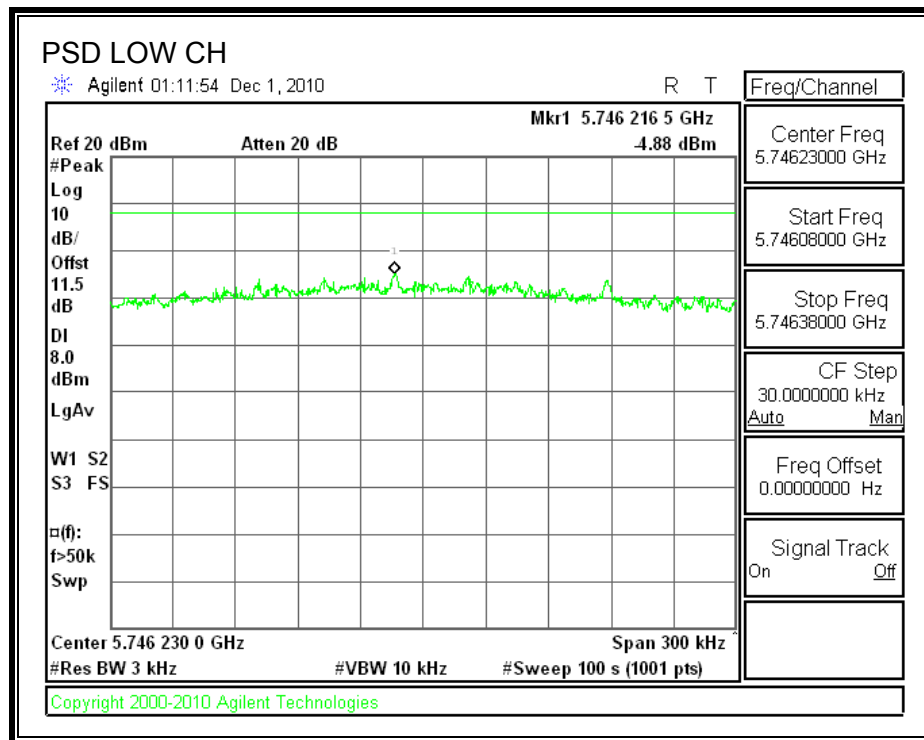
TEST PROCEDURE

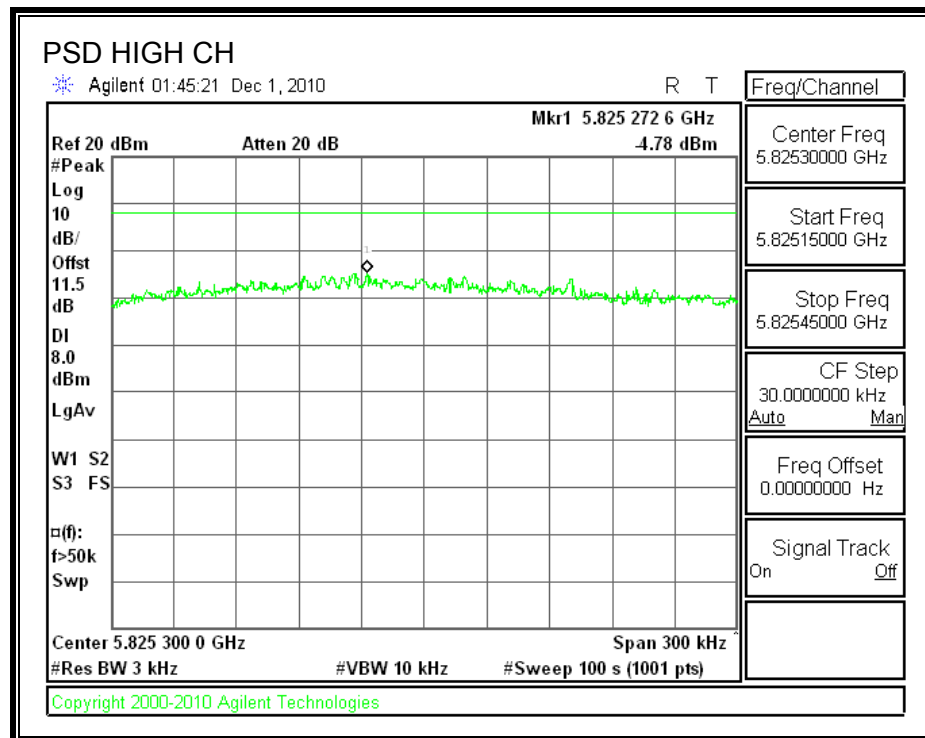
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-4.88	8	-12.88
Middle	5785	-4.41	8	-12.41
High	5825	-4.78	8	-12.78

POWER SPECTRAL DENSITY





7.5.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

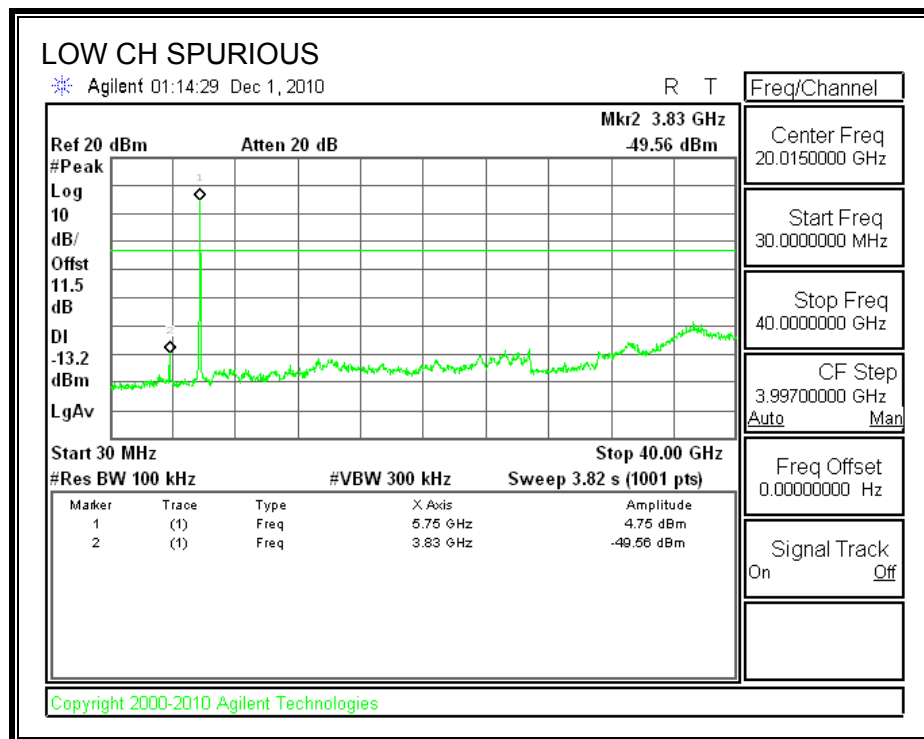
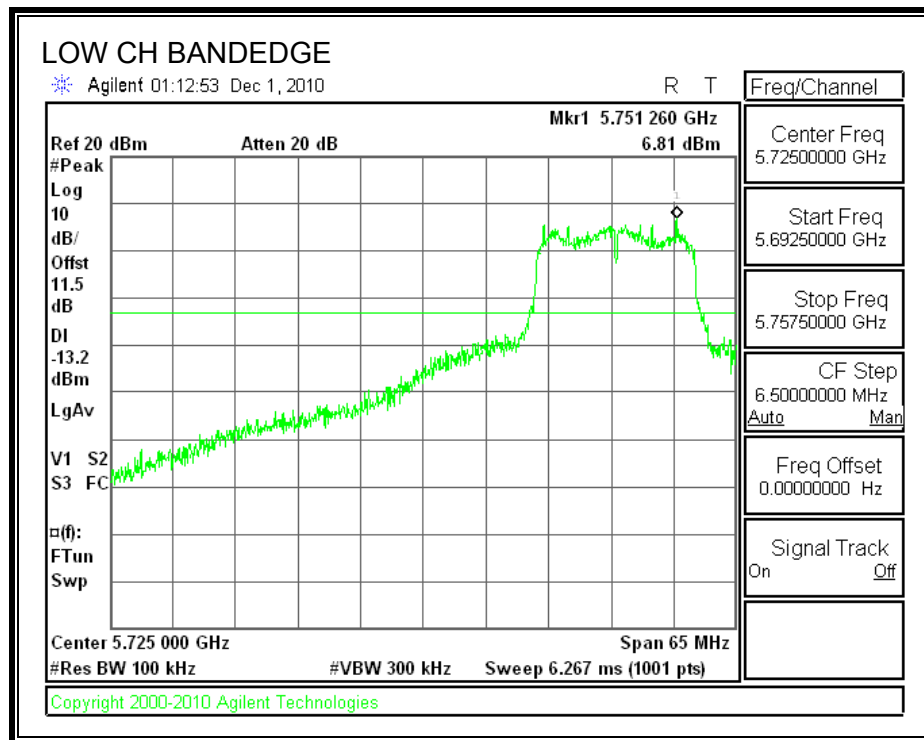
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

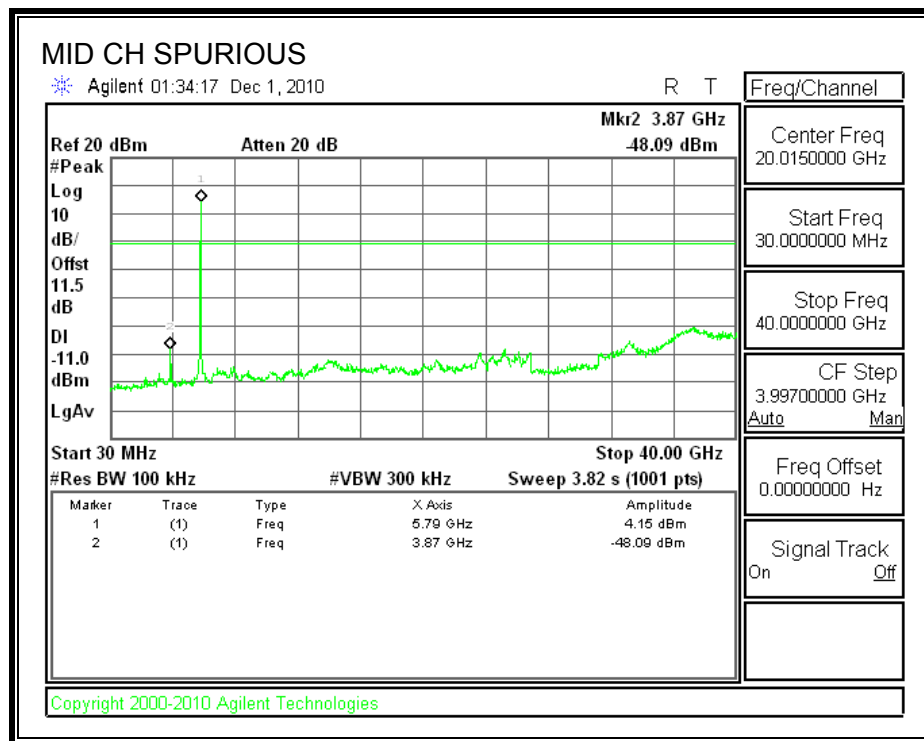
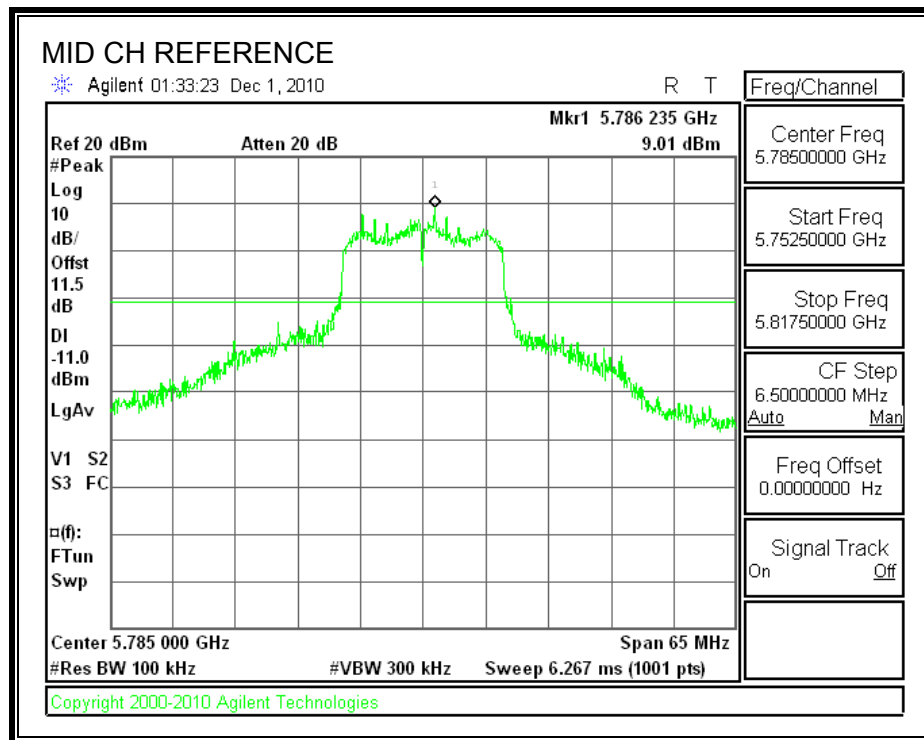
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

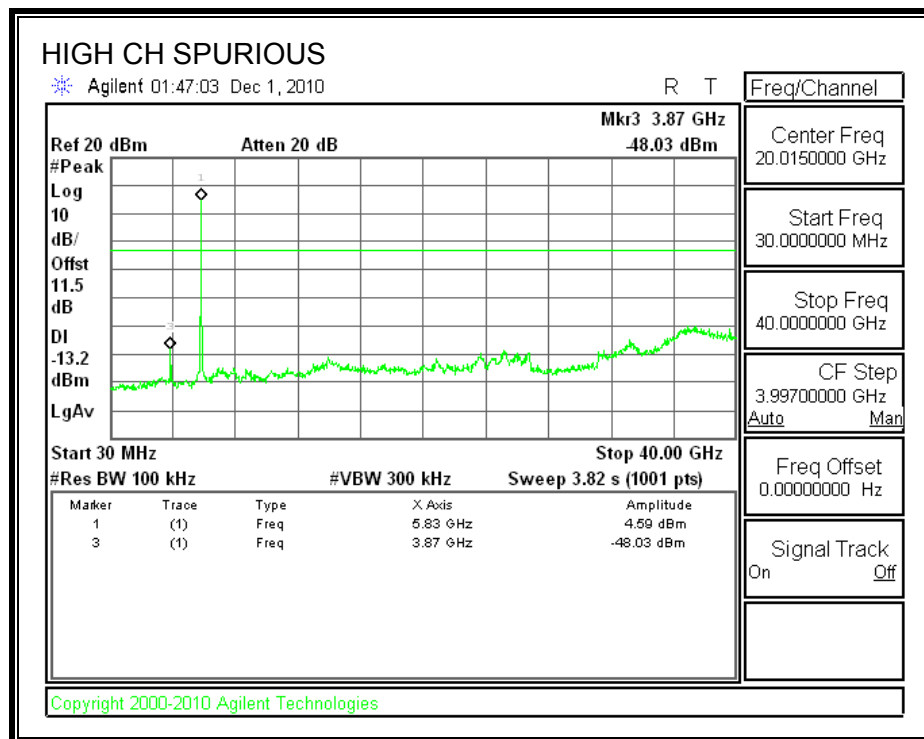
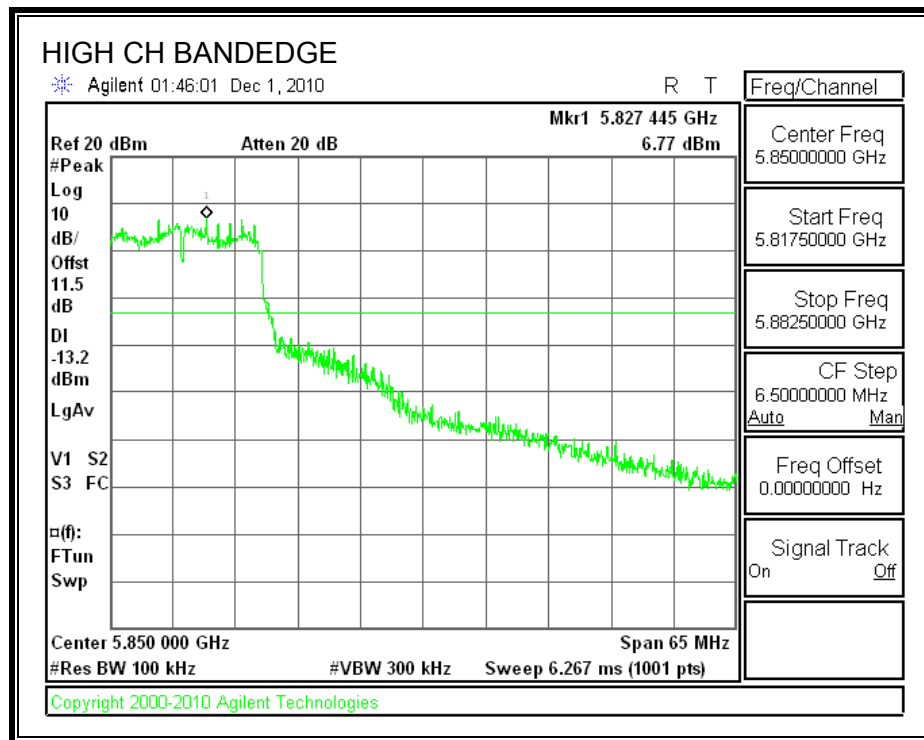
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



7.6. 802.11n HT20 MODE IN THE 5.8 GHz BAND

7.6.1. 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.

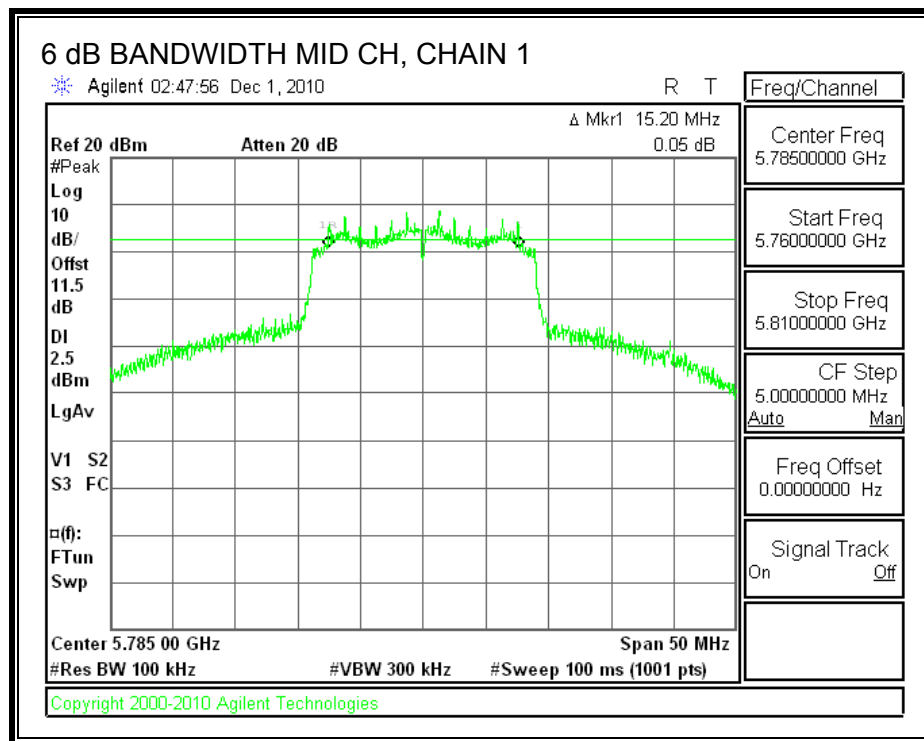
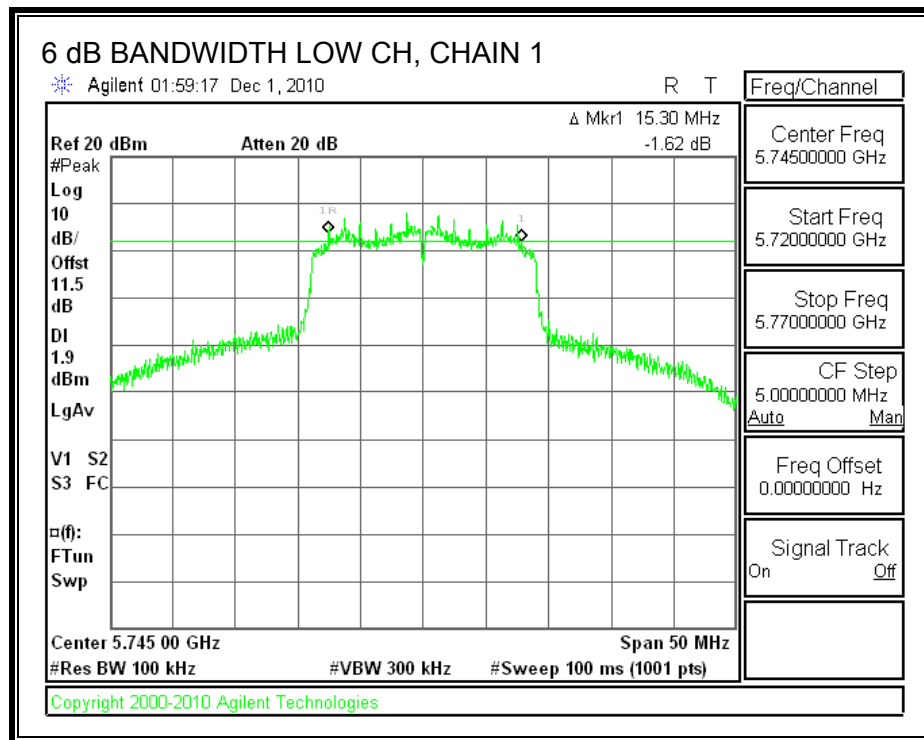
TEST PROCEDURE

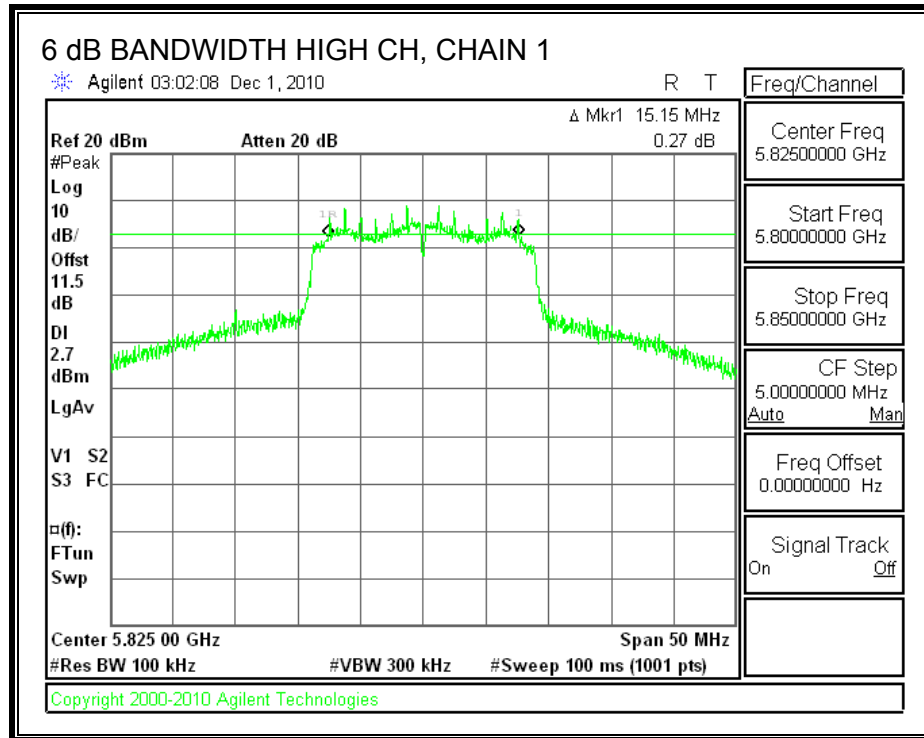
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

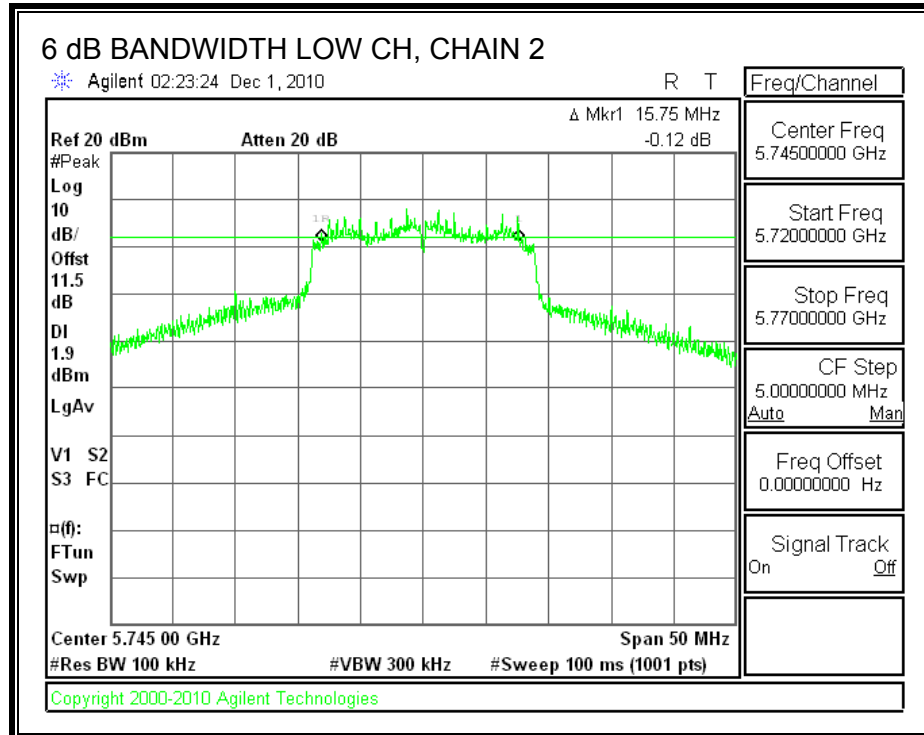
Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5745	15.30	15.75	0.5
Middle	5785	15.20	15.85	0.5
High	5825	15.15	15.7	0.5

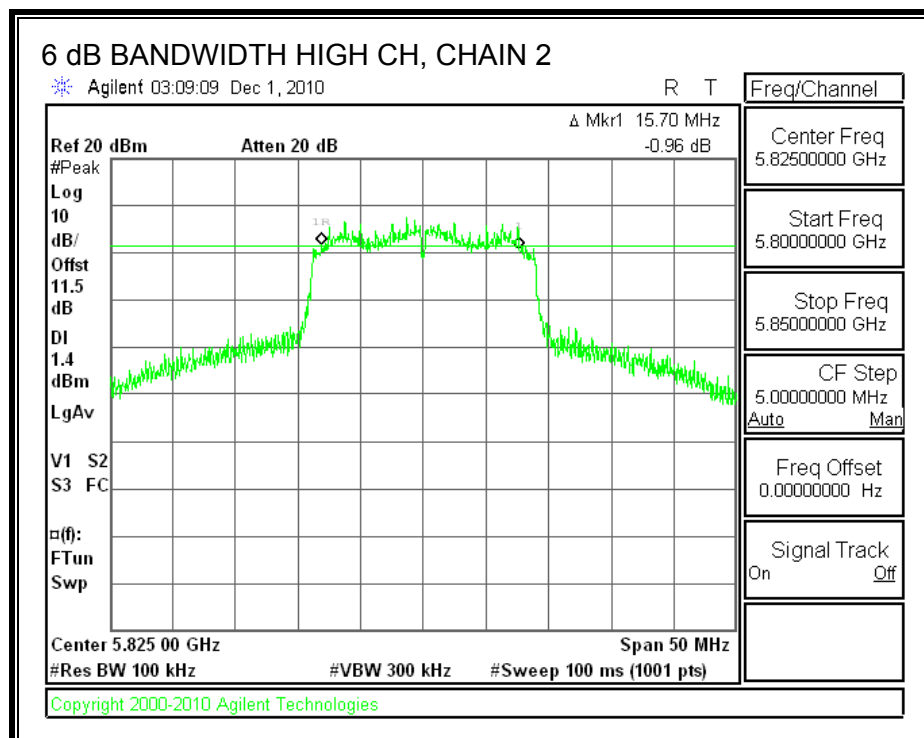
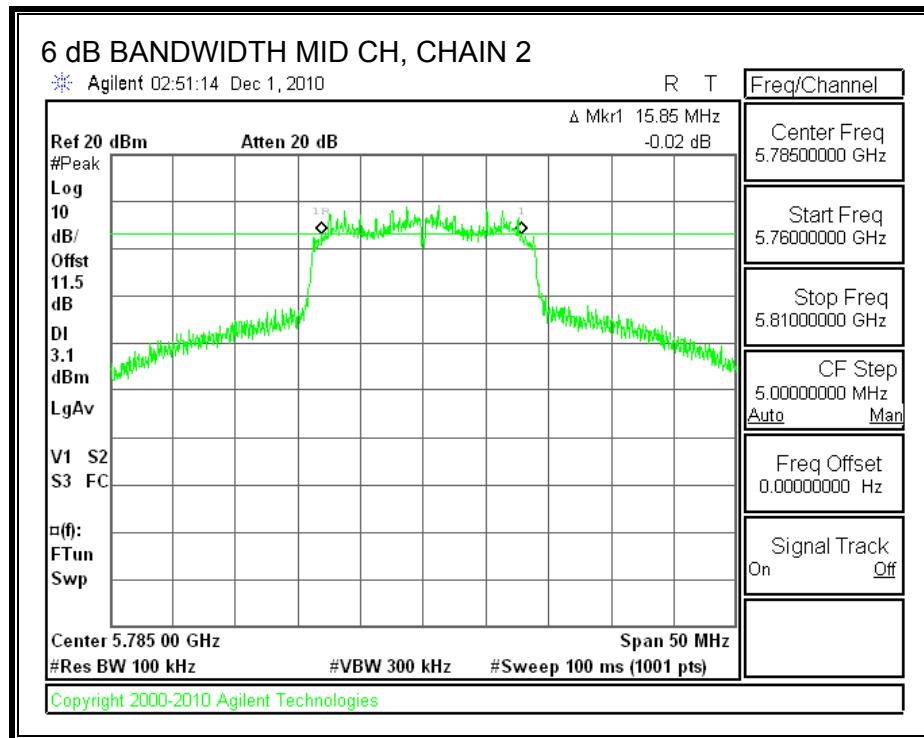
6 dB BANDWIDTH, CHAIN 1





6 dB BANDWIDTH, CHAIN 2





7.6.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

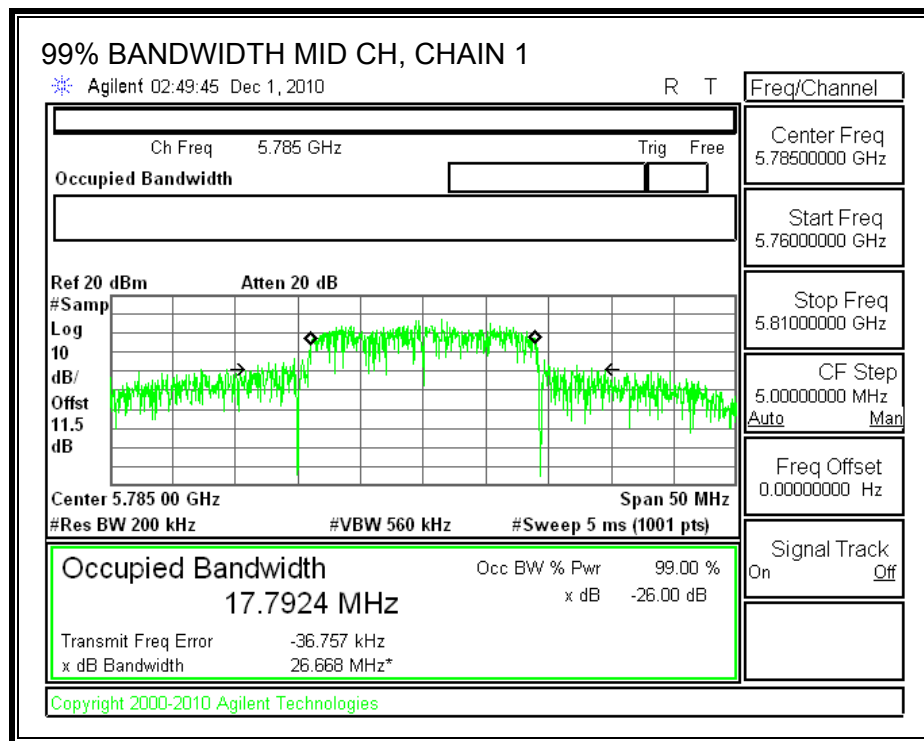
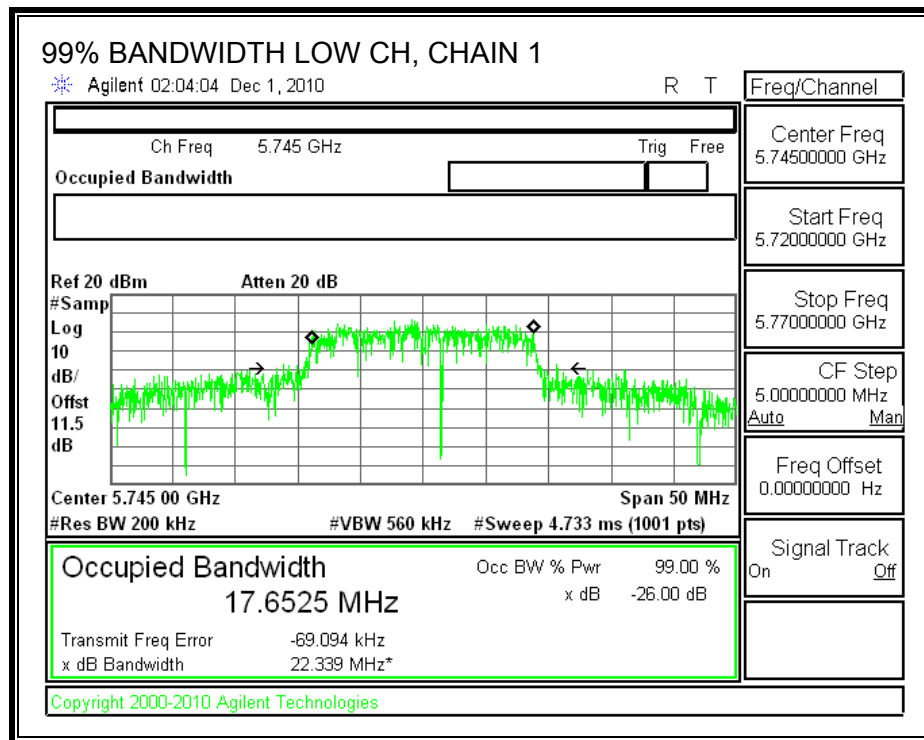
TEST PROCEDURE

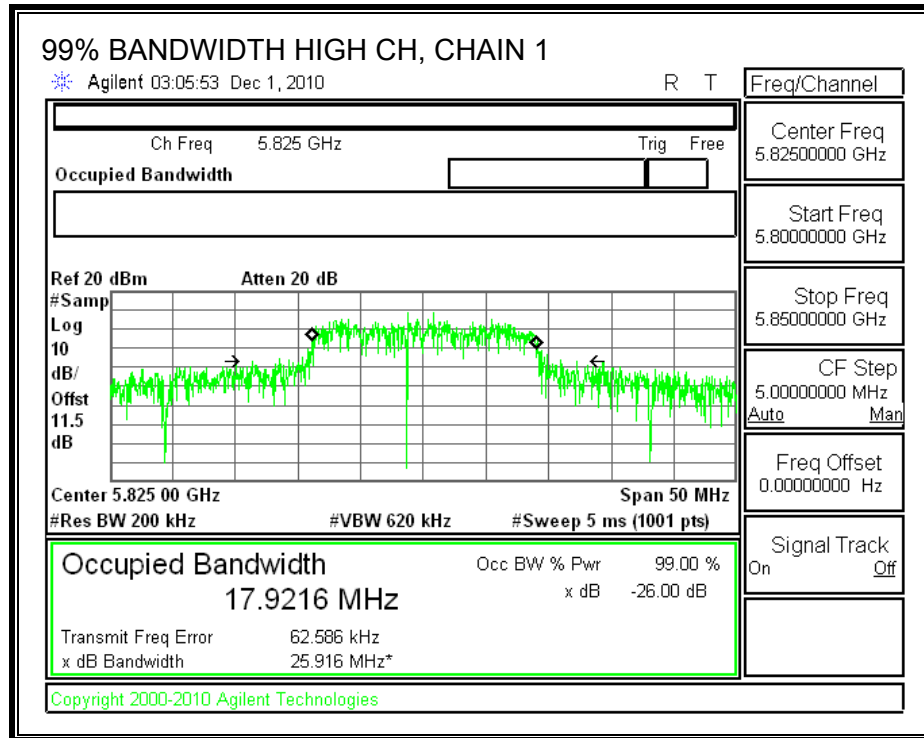
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

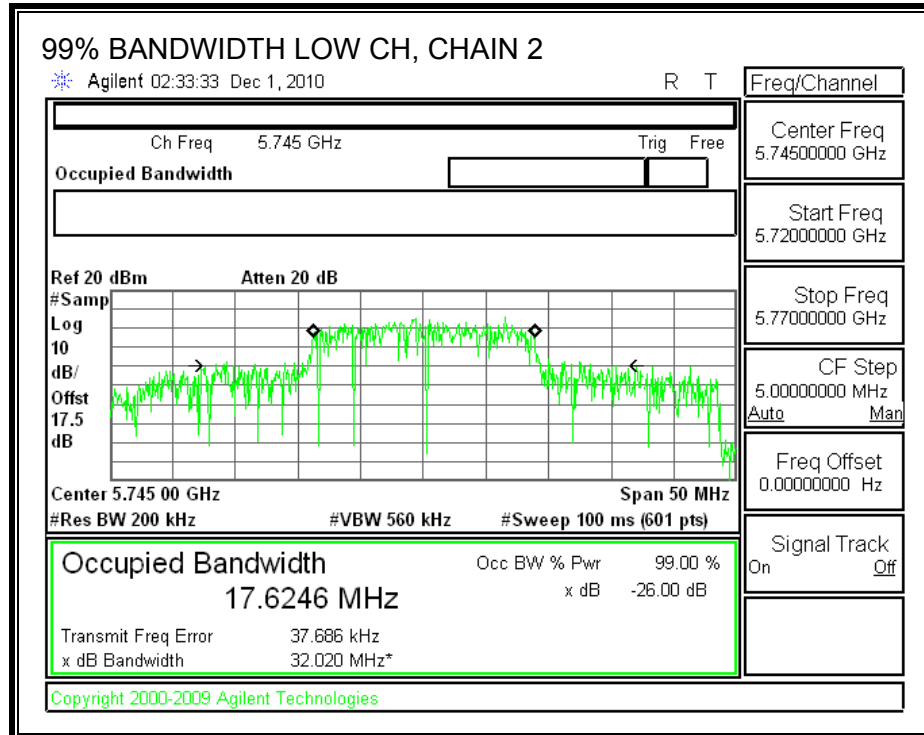
Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
5745	17.6525	17.6246
5785	17.7924	17.8870
5825	17.9216	17.5128

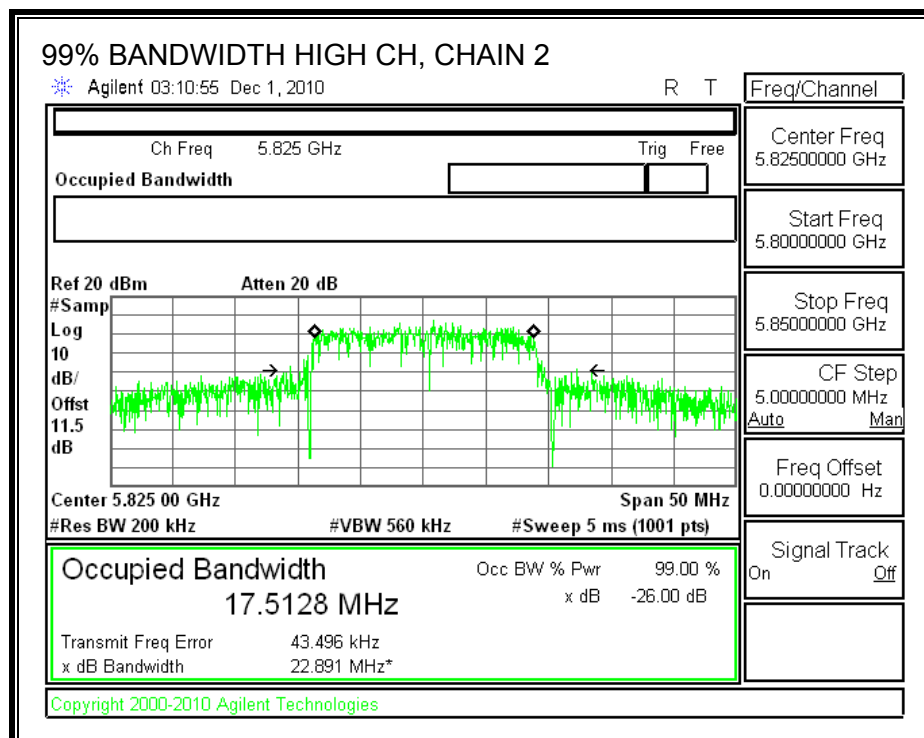
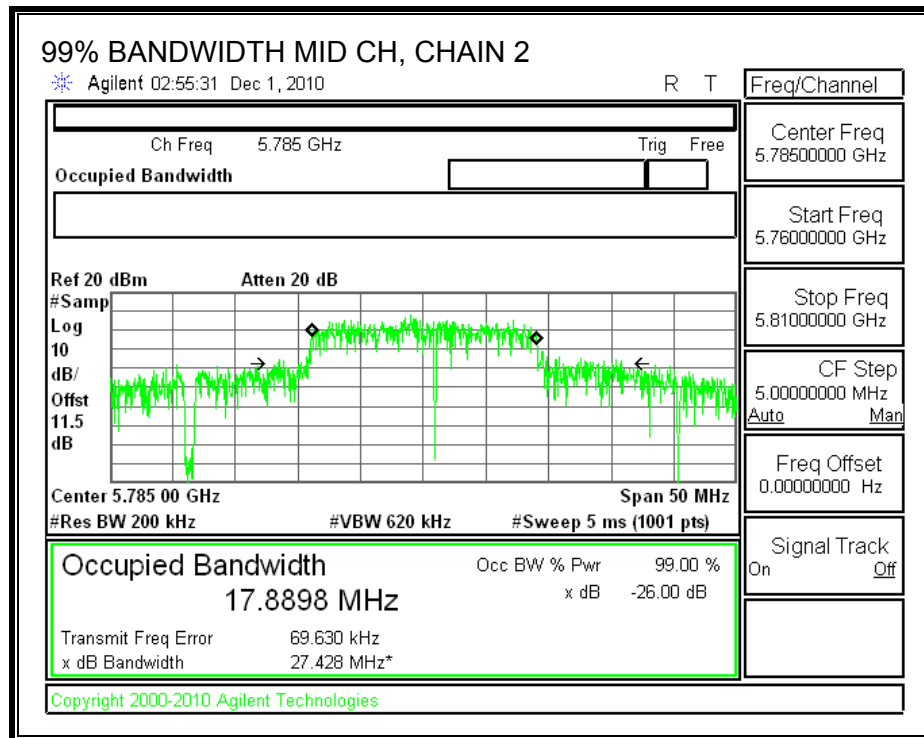
99% BANDWIDTH, CHAIN 1





99% BANDWIDTH, CHAIN 2





7.6.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The highest combination of antenna gains is equal to 7.21 dBi, therefore the limit is 28.79 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Limit (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	5745	28.79	22.67	22.87	25.78	-3.01
Mid	5785	28.79	22.65	23.33	26.01	-2.78
High	5825	28.79	22.65	23.14	25.91	-2.88

7.6.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

The highest combination of antenna gains is equal to 7.21 dBi, therefore the limit is 6.79 dBm.

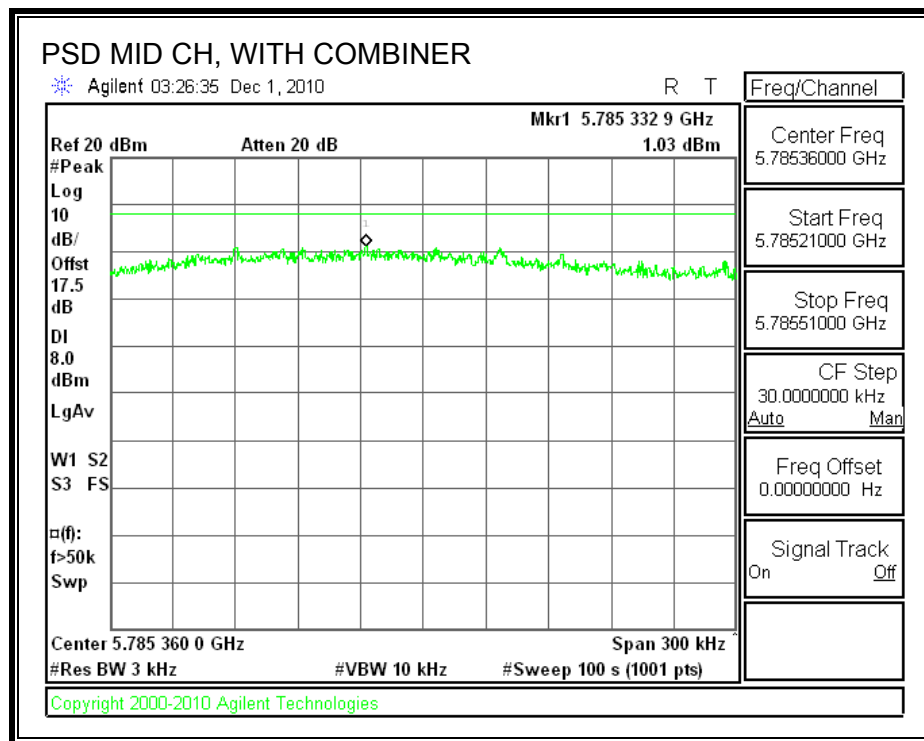
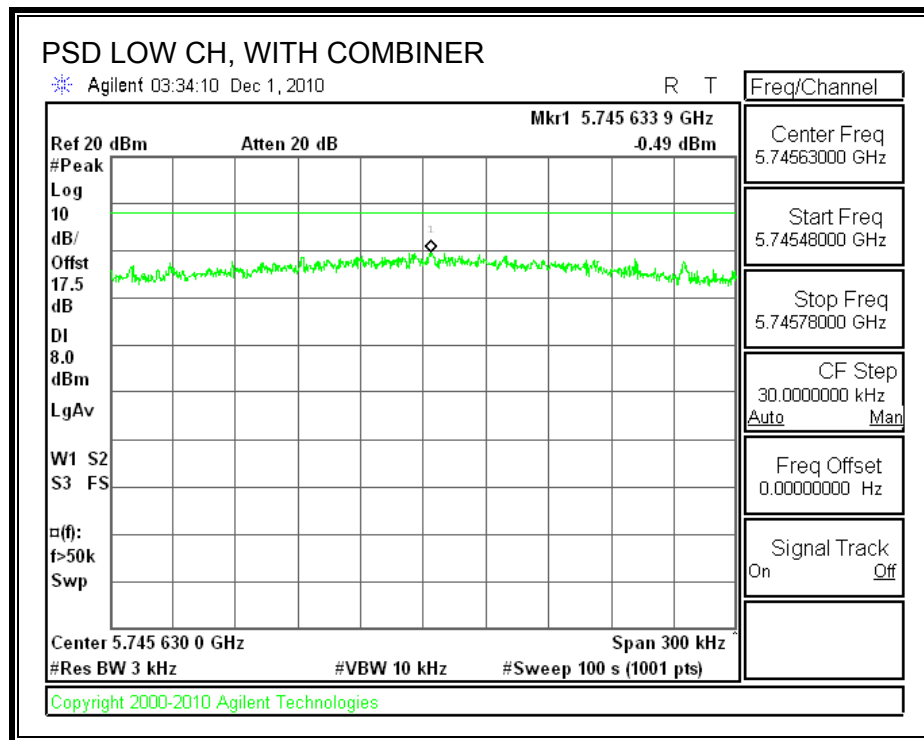
TEST PROCEDURE

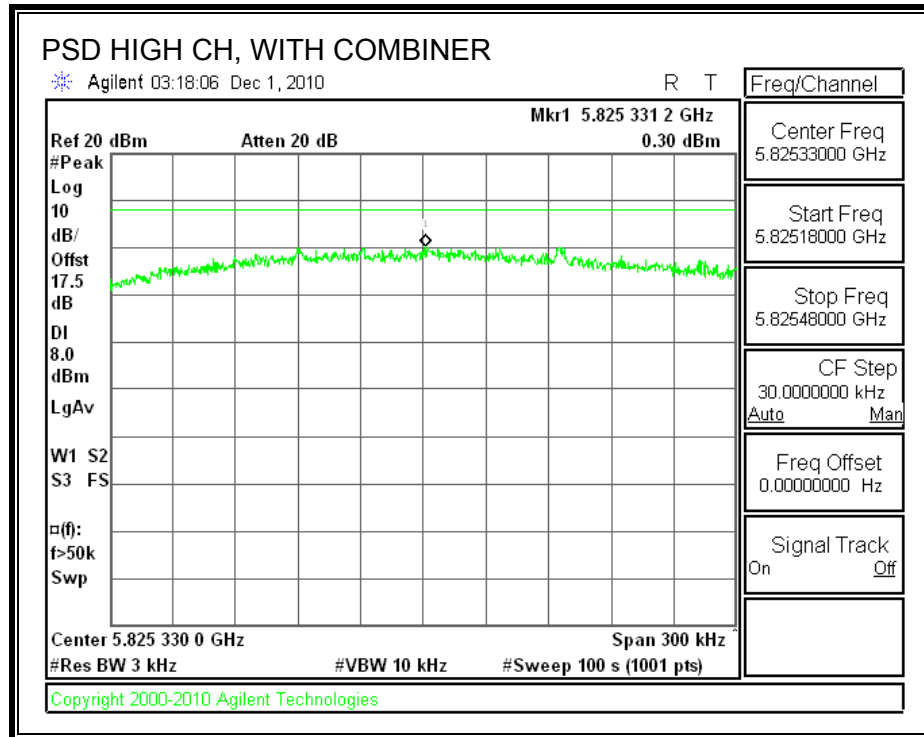
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS:

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-0.49	6.79	-7.28
Middle	5785	1.03	6.79	-5.76
High	5825	0.30	6.79	-6.49

POWER SPECTRAL DENSITY, WITH COMBINER





7.6.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

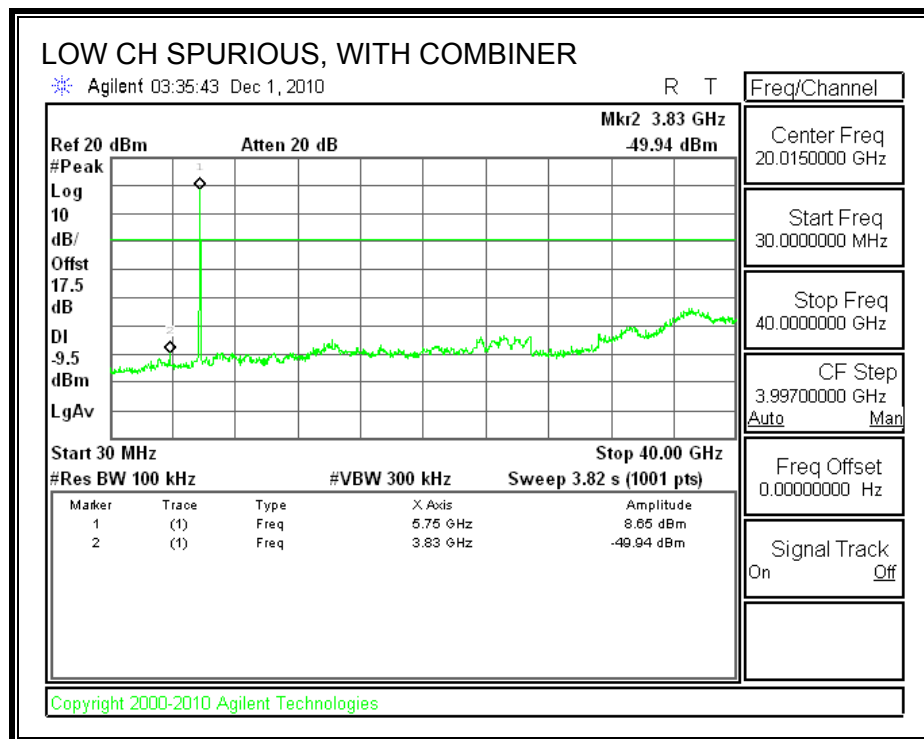
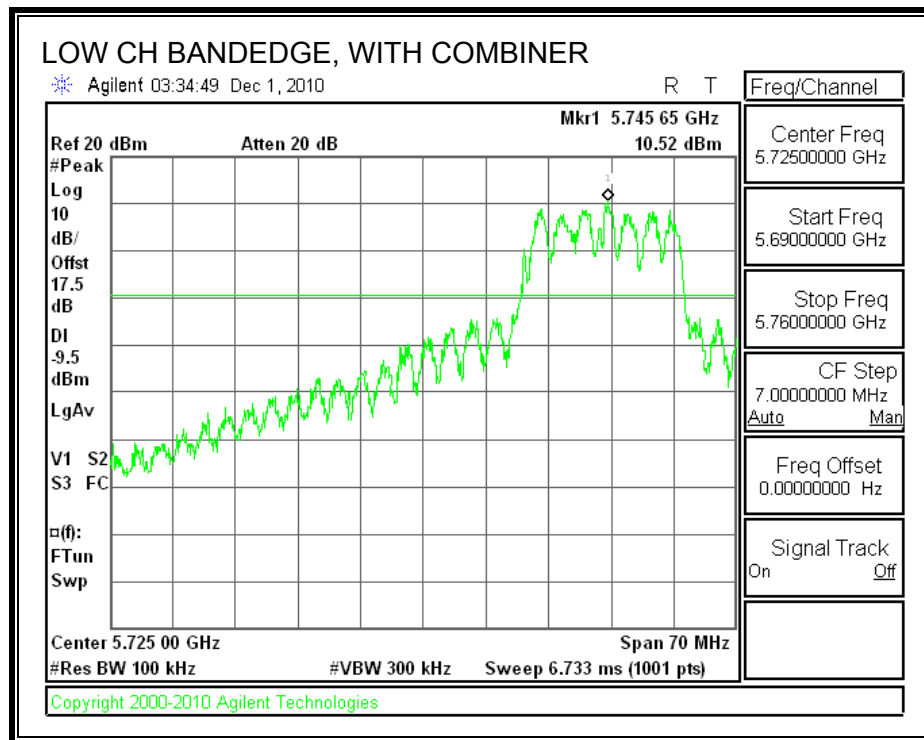
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

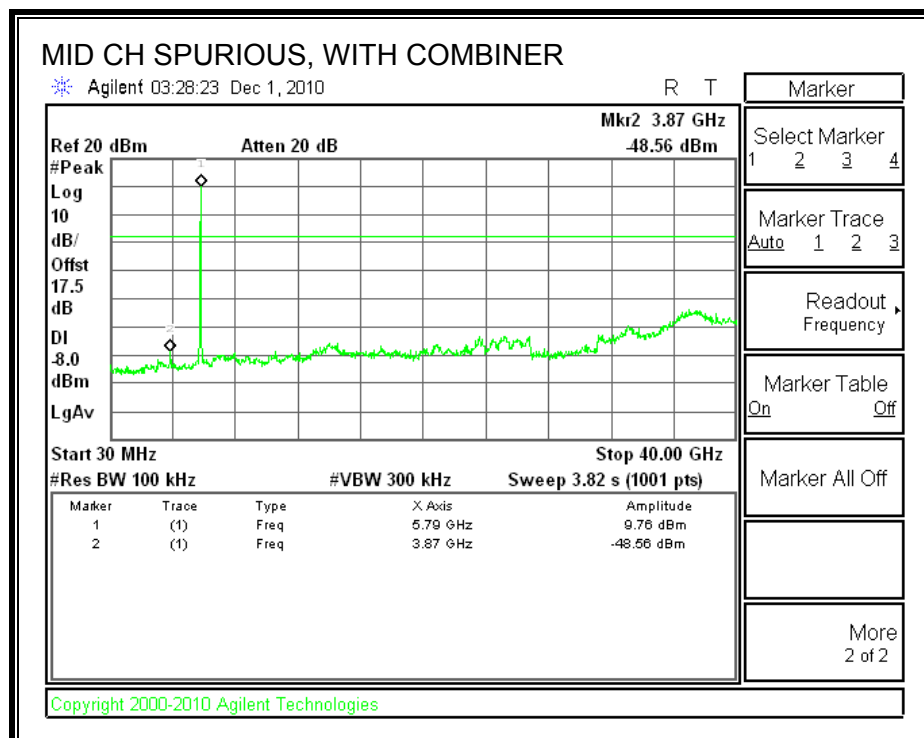
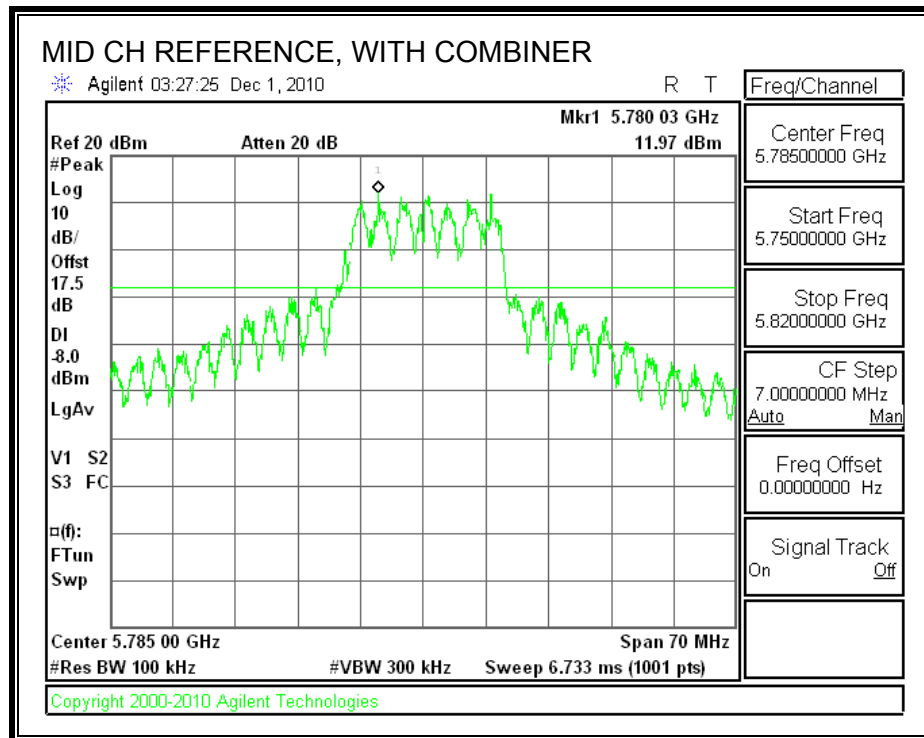
TEST PROCEDURE

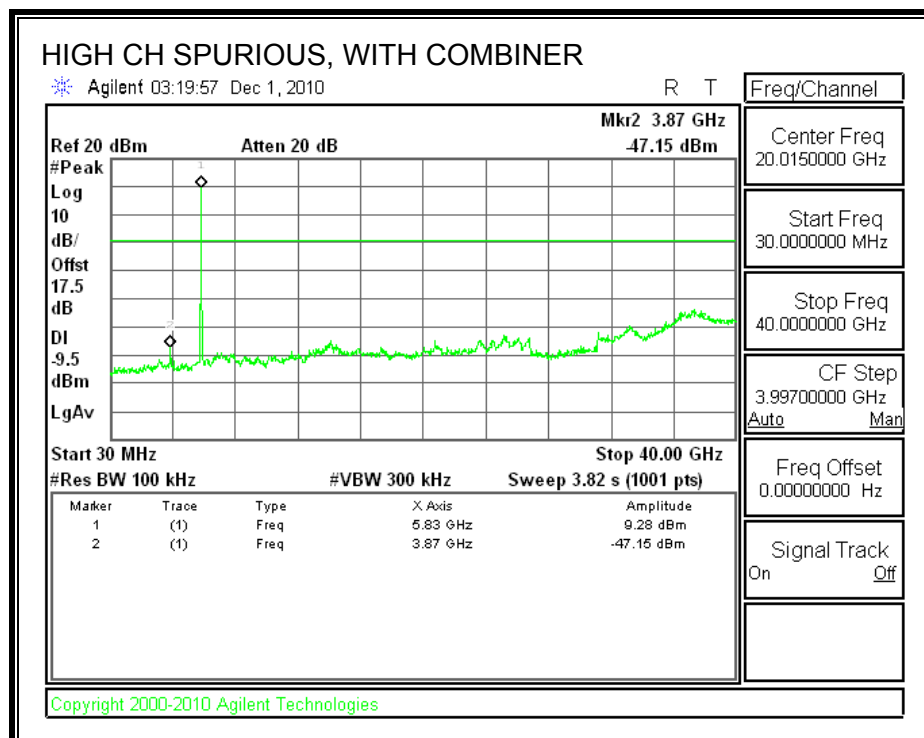
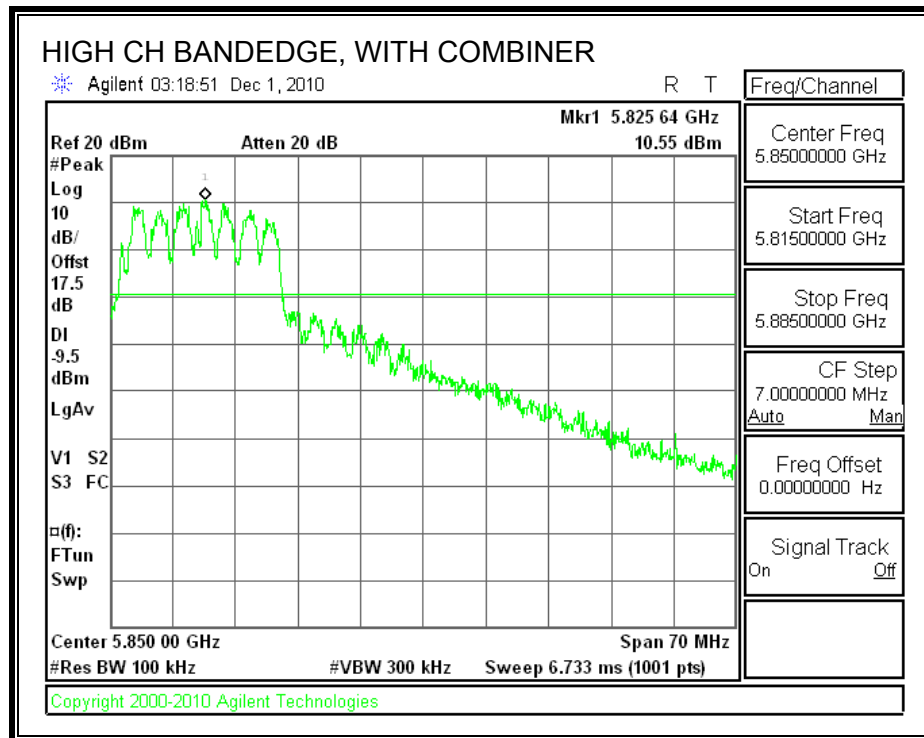
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

SPURIOUS EMISSIONS WITH COMBINER







7.7. 802.11n HT40 MODE IN THE 5.8 GHz BAND

7.7.1. 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.

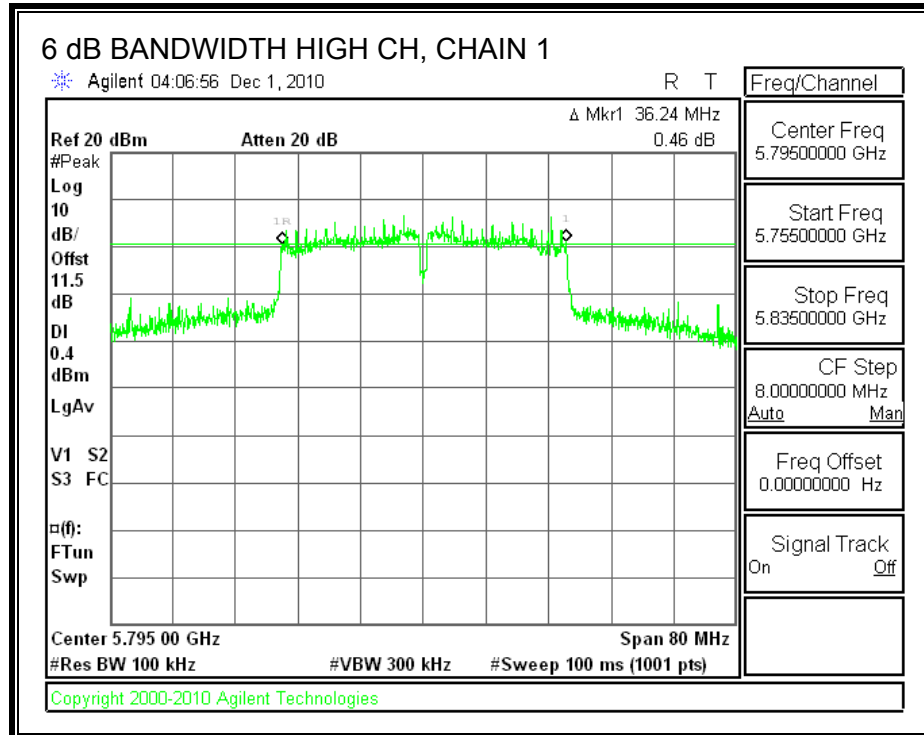
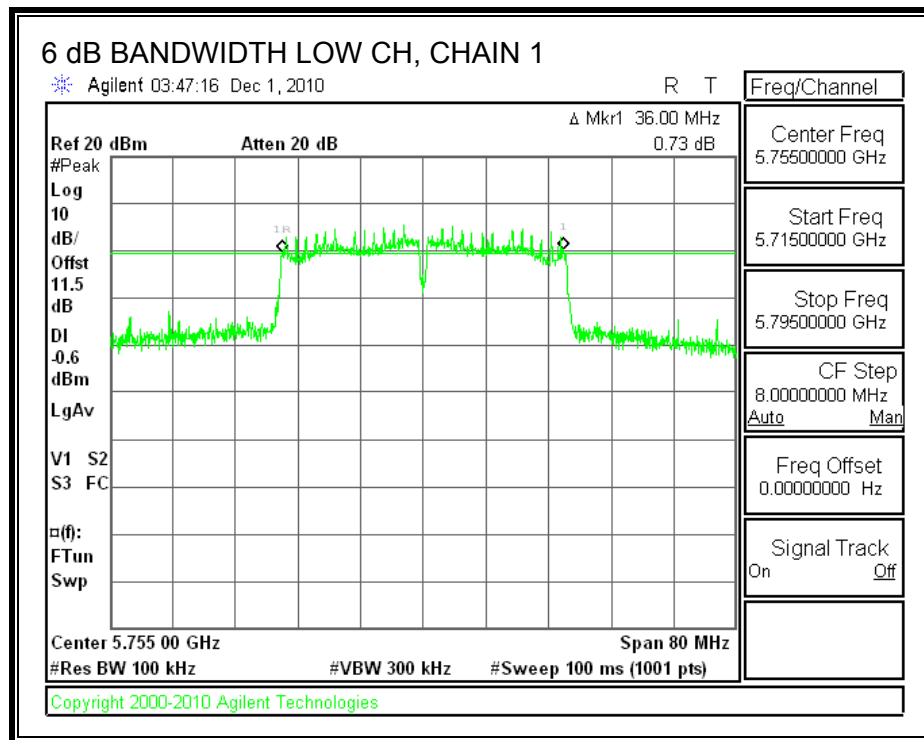
TEST PROCEDURE

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.

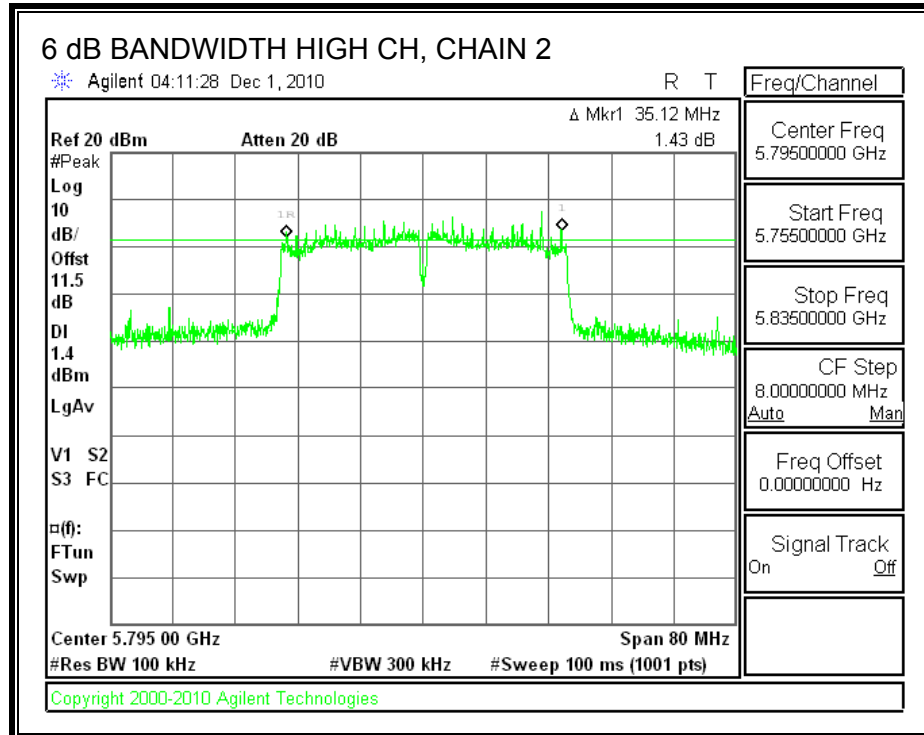
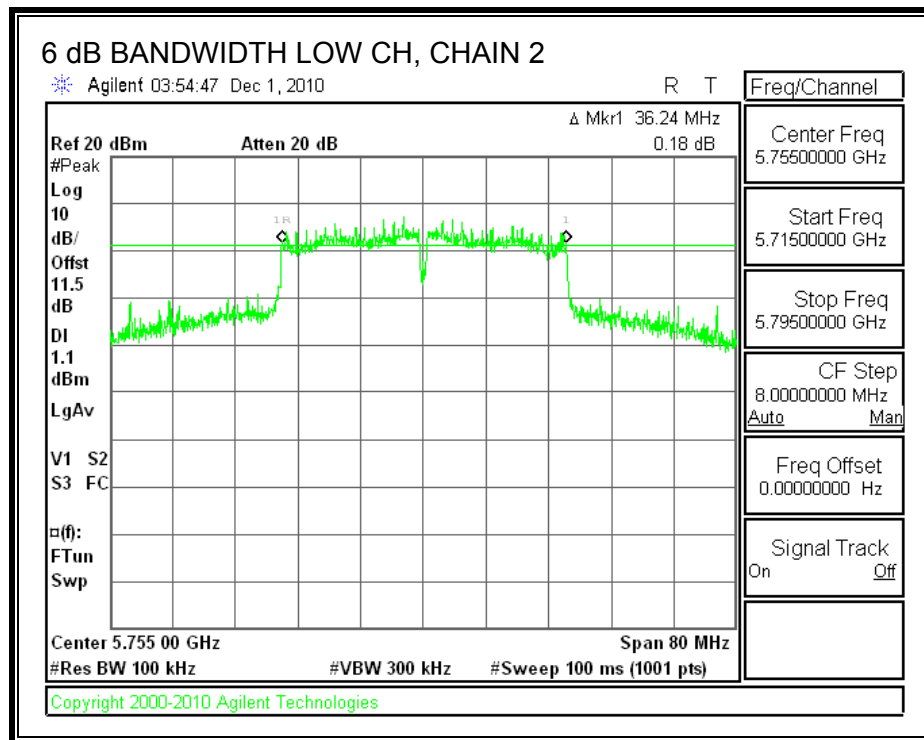
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5755	36.00	36.24	0.5
High	5795	36.24	35.12	0.5

6 dB BANDWIDTH, CHAIN 1



6 dB BANDWIDTH, CHAIN 2



7.7.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

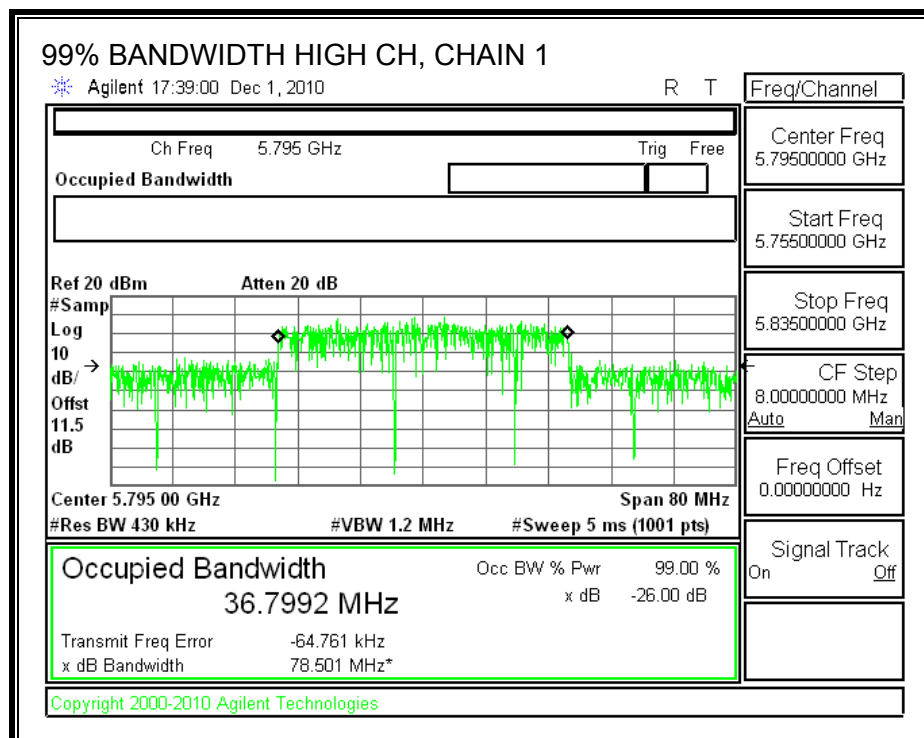
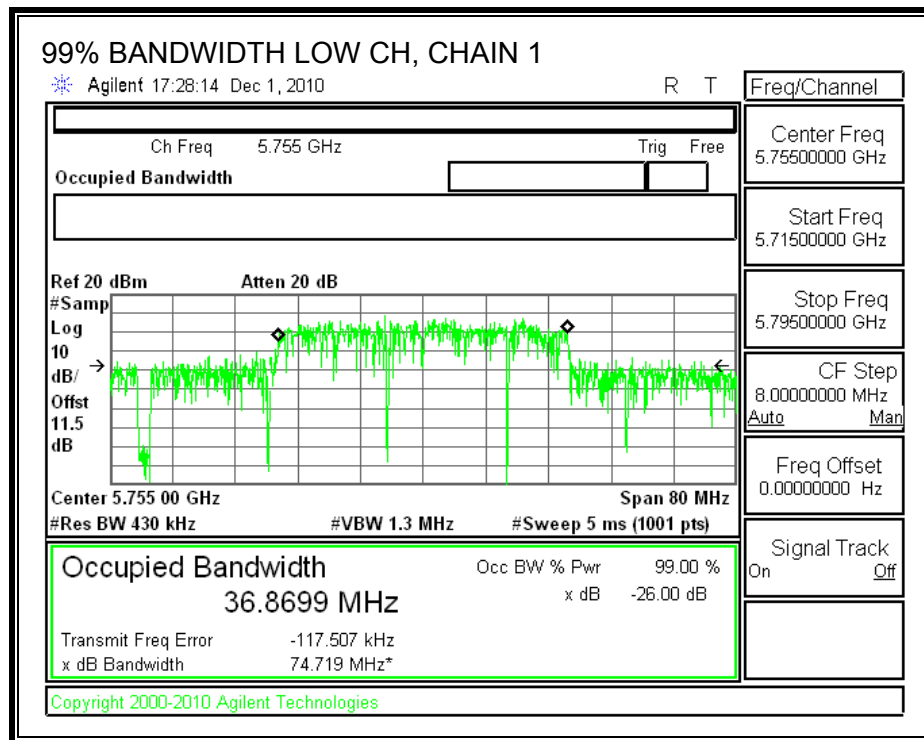
TEST PROCEDURE

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.

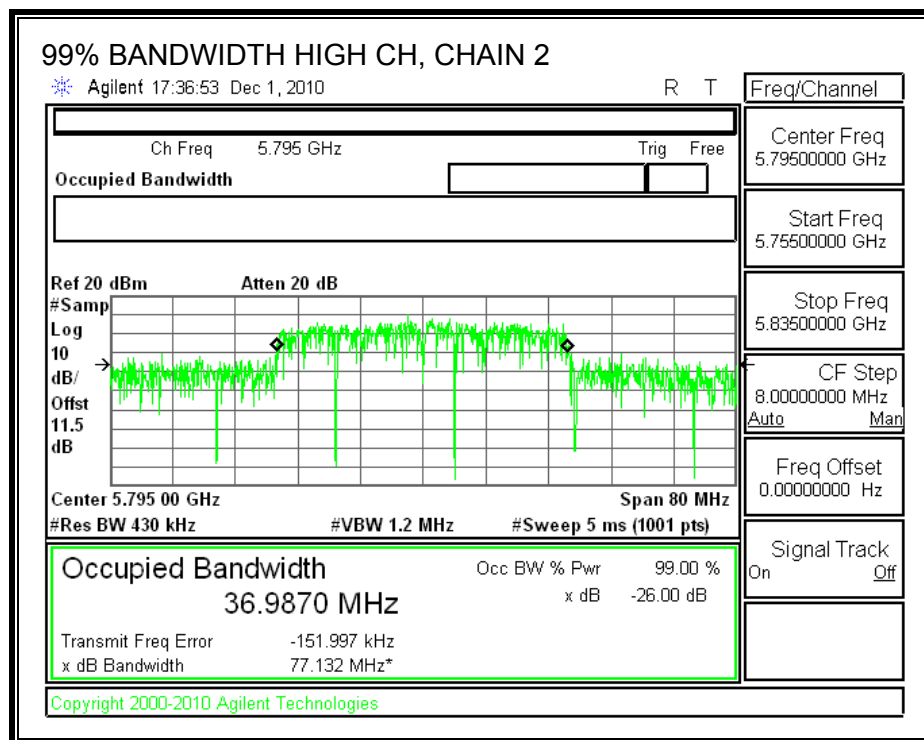
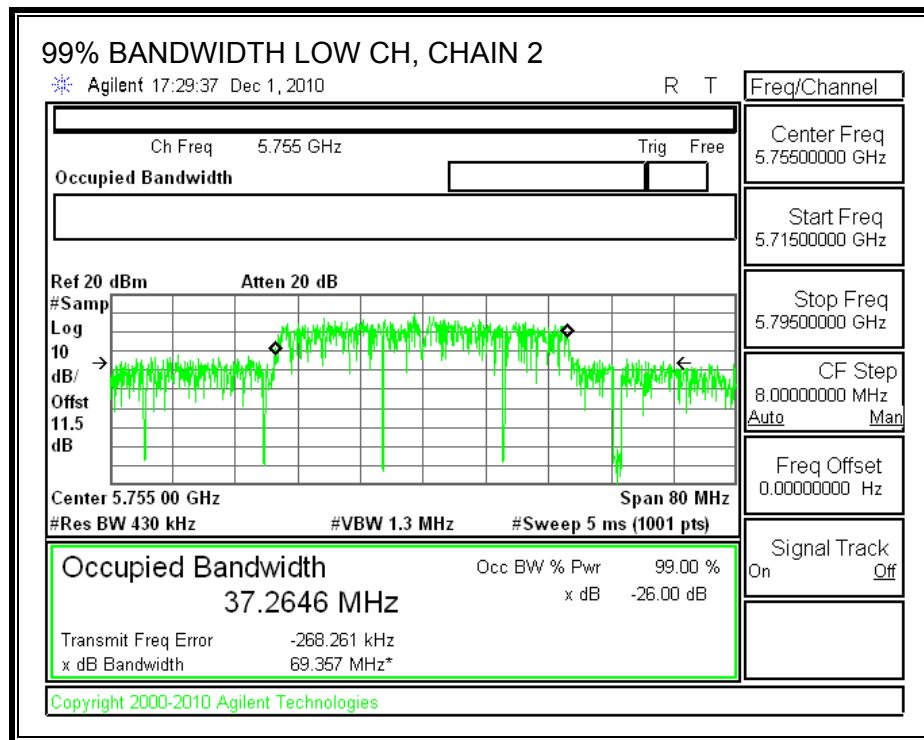
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	5755	36.8699	37.2646
High	5795	36.7992	36.9879

99% BANDWIDTH, CHAIN 1



99% BANDWIDTH, CHAIN 2



7.7.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The highest combination of antenna gains is equal to 7.21 dBi, therefore the limit is 28.79 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Limit (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	5755	28.79	22.44	22.89	25.68	-3.11
High	5795	29.53	22.42	22.84	25.64	-3.89

7.7.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

The highest combination of antenna gains is equal to 7.21 dBi, therefore the limit is 6.79 dBm.

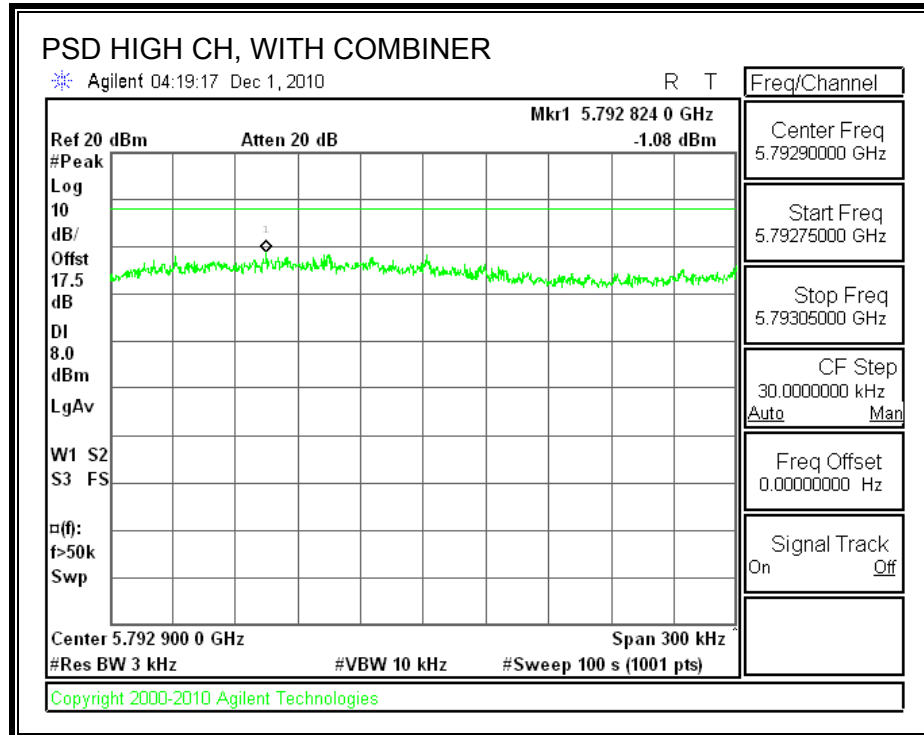
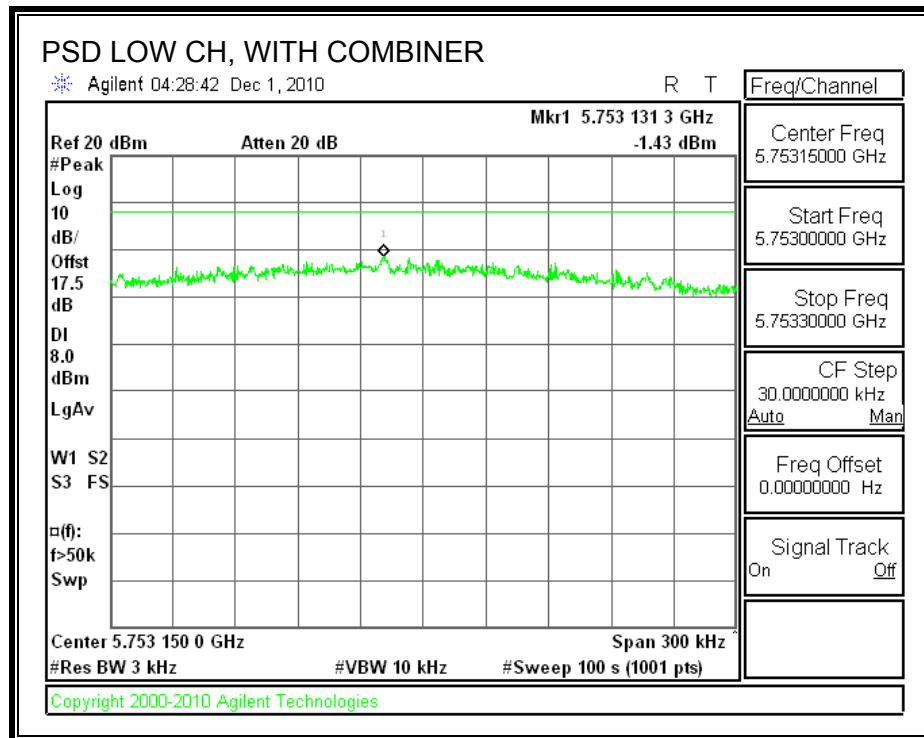
TEST PROCEDURE

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)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5755	-1.43	6.79	-8.22
High	5795	-1.08	6.79	-7.87

POWER SPECTRAL DENSITY, WITH COMBINER



7.7.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

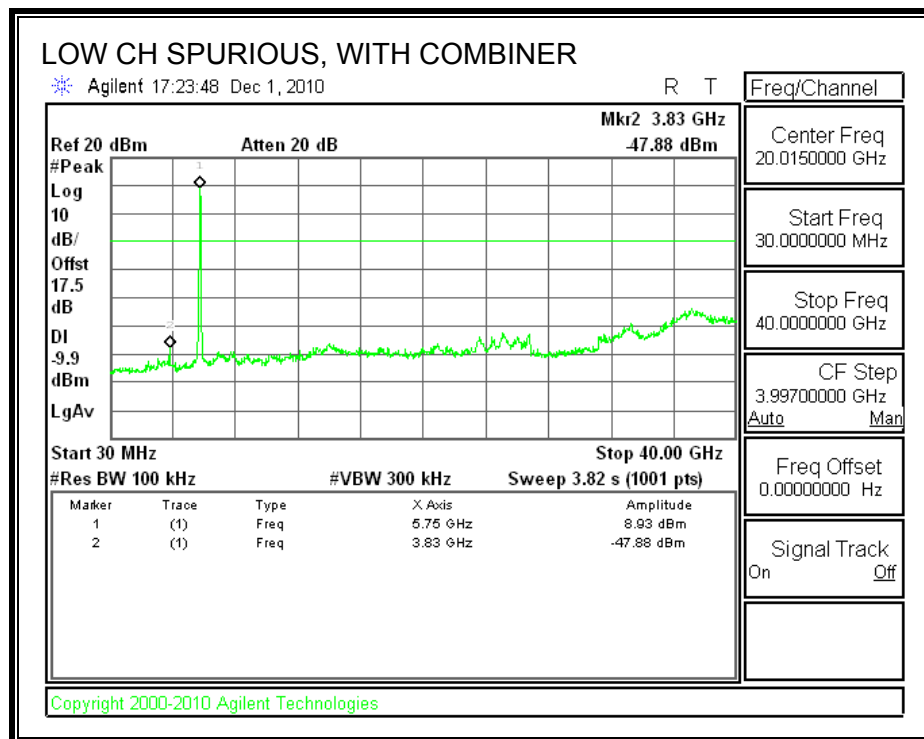
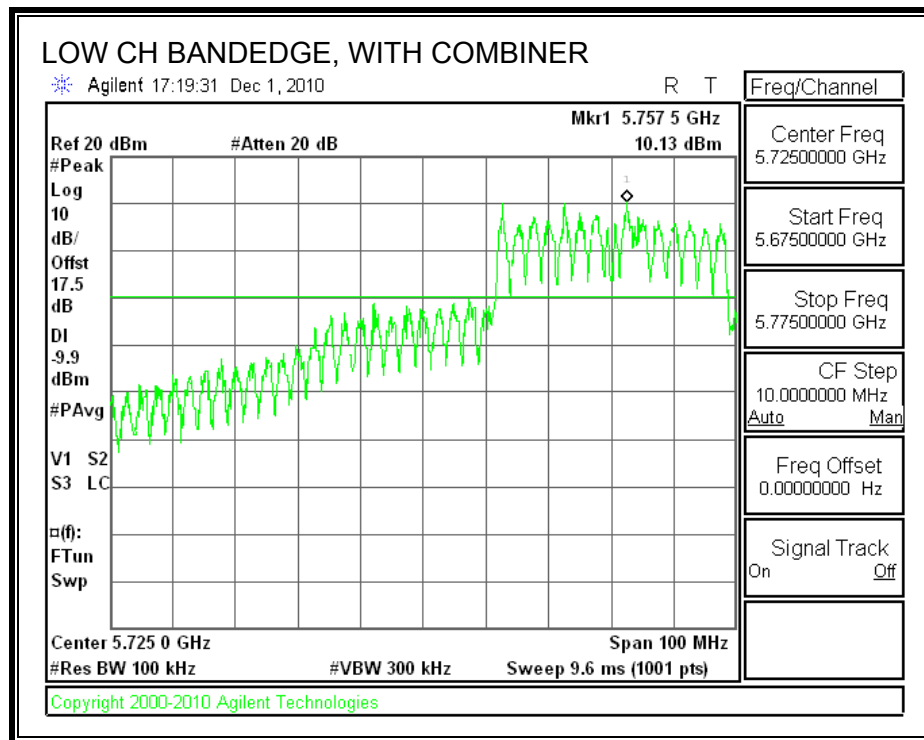
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

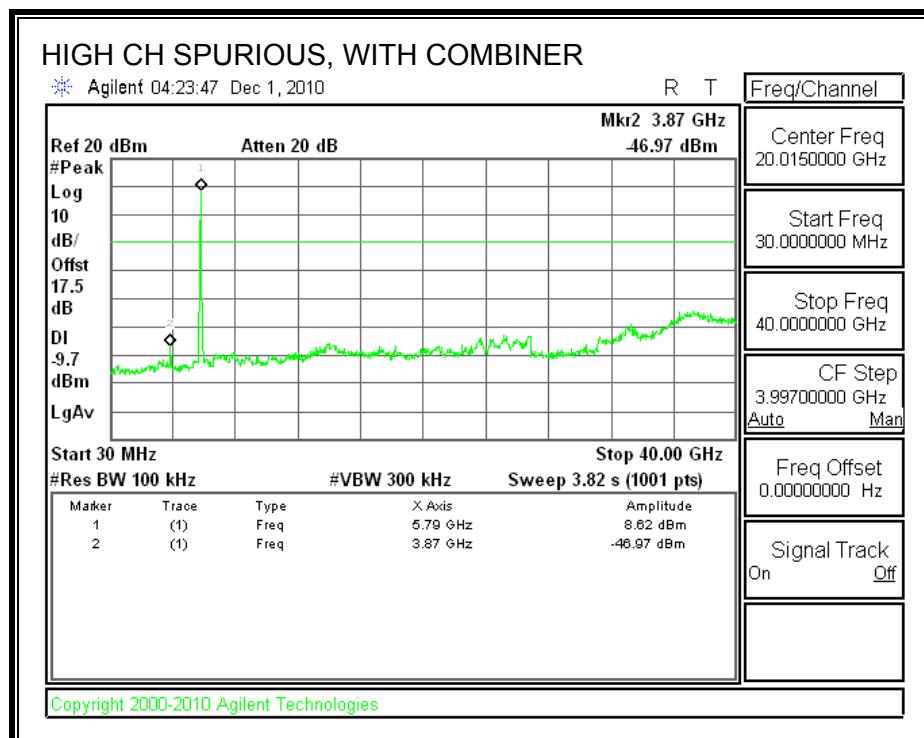
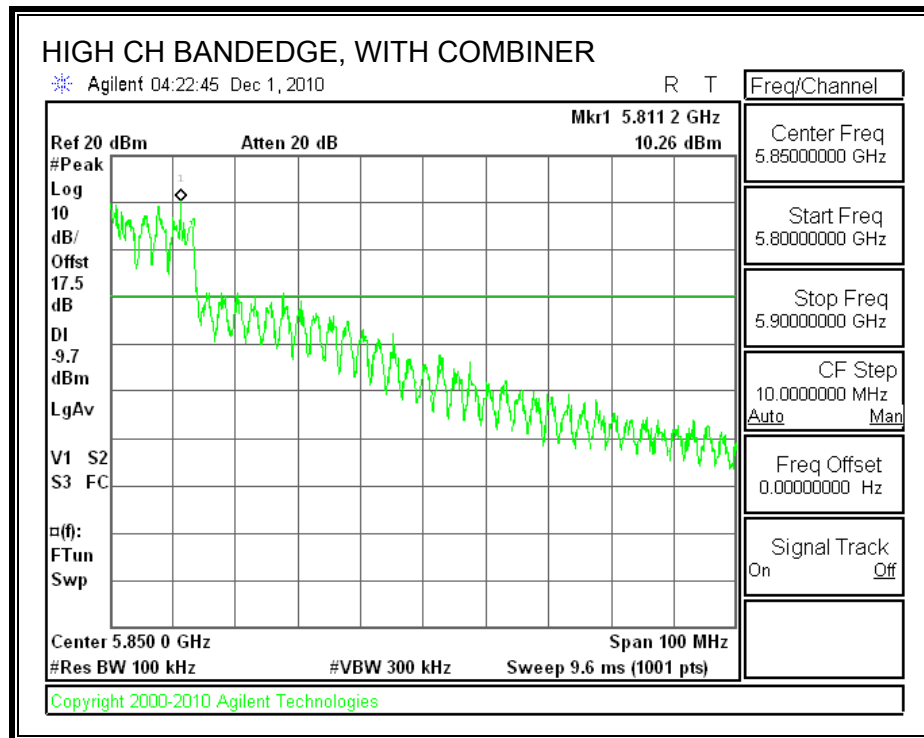
TEST PROCEDURE

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

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest and highest channels.

SPURIOUS EMISSIONS WITH COMBINER





8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

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

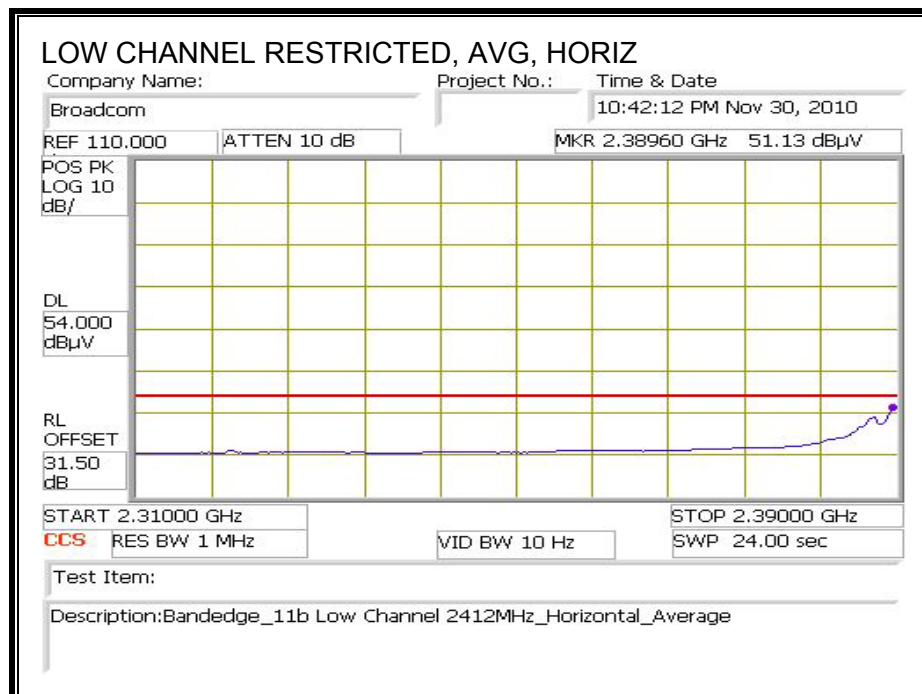
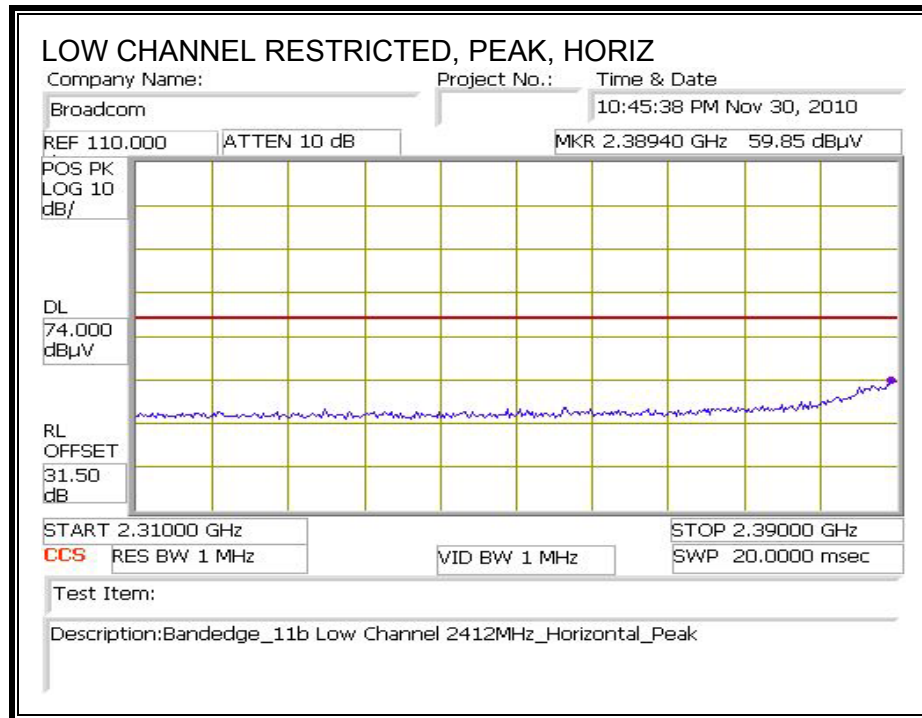
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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

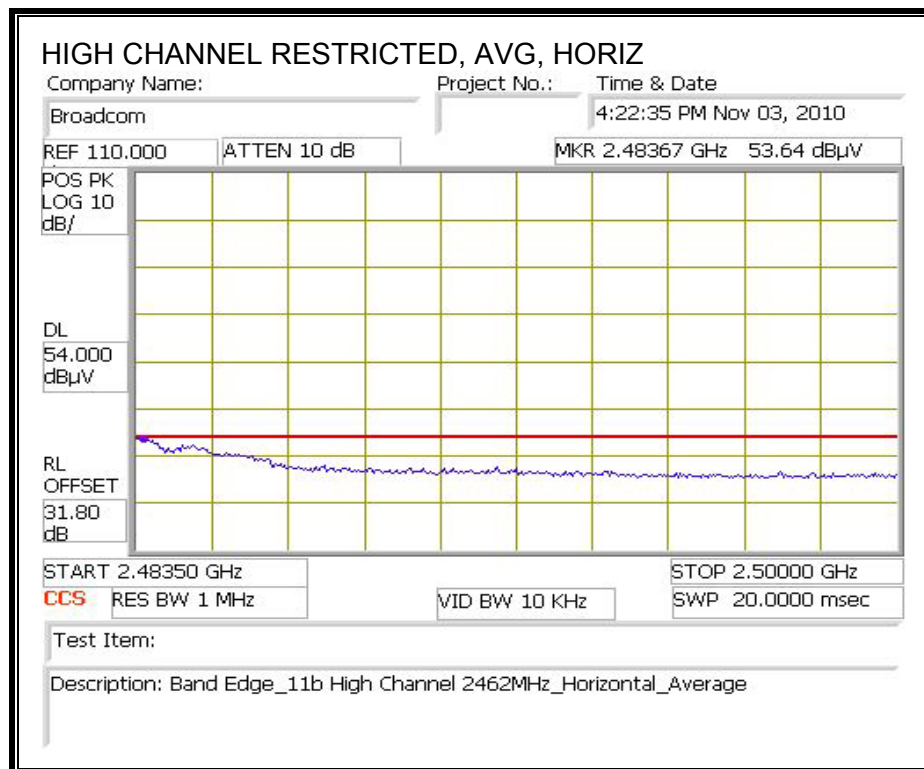
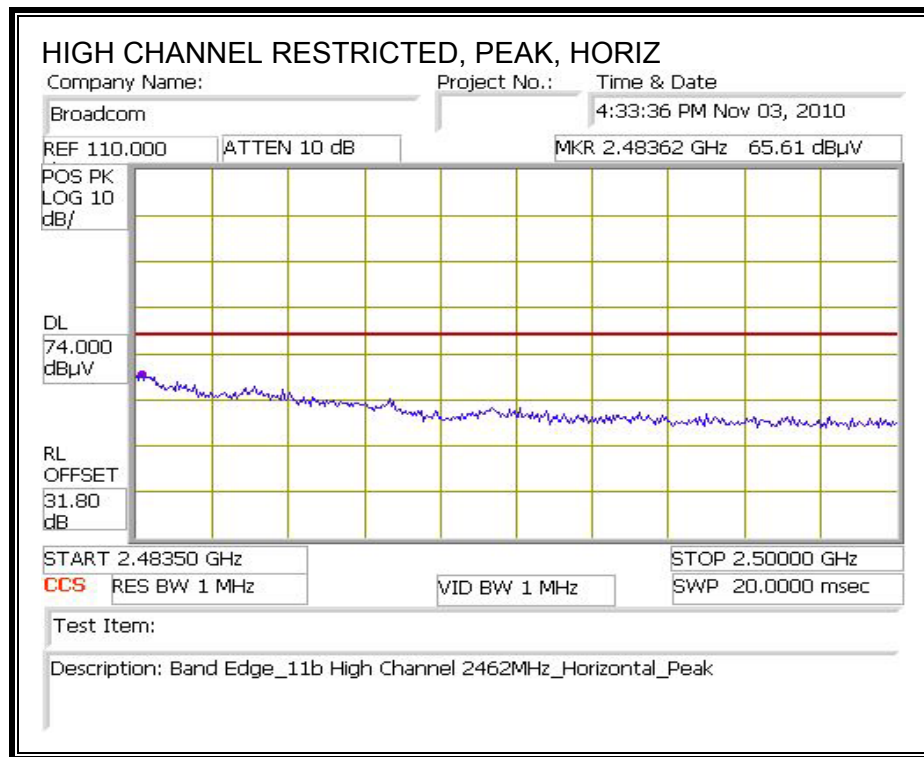
8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. 802.11b MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANEDGE (HIGH CHANNEL, HORIZONTAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 3m Chamber

Test Engr: Vien Tran
Date: 11/15/10
Project #: 10U13394
Company: Broadcom
Test Target: FCC B
Mode Oper: Tx 11b

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

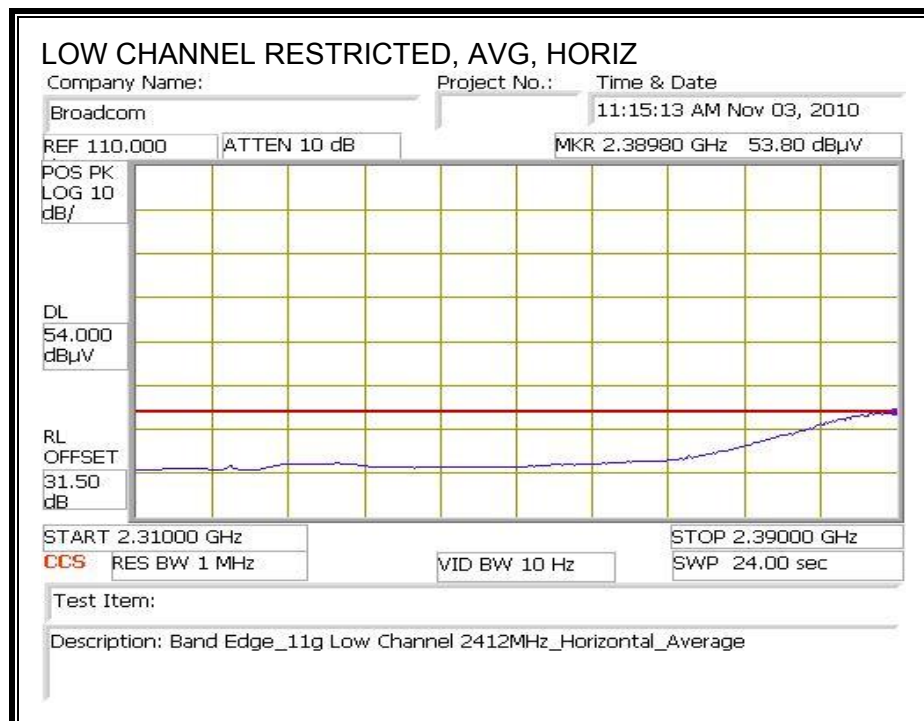
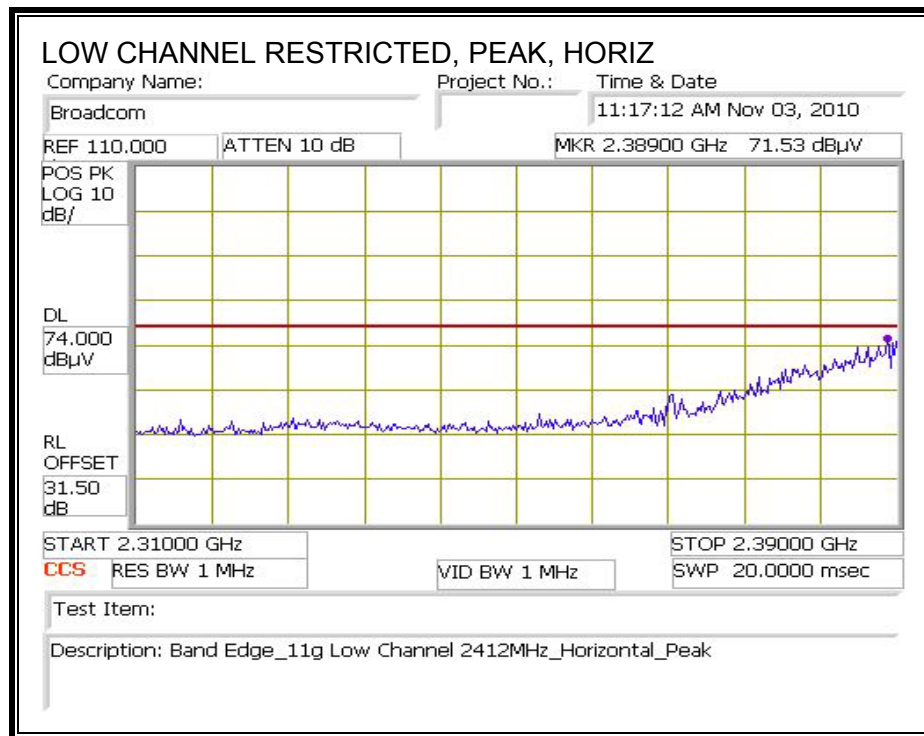
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fitr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
LOW CHANNEL, 2412MHz													
4.824	3.0	44.3	32.7	5.8	-34.8	0.0	0.0	47.9	74.0	-26.1	V	P	
4.824	3.0	40.6	32.7	5.8	-34.8	0.0	0.0	44.2	54.0	-9.8	V	A	
4.824	3.0	41.8	32.7	5.8	-34.8	0.0	0.0	45.4	74.0	-28.6	H	P	
4.824	3.0	37.3	32.7	5.8	-34.8	0.0	0.0	40.9	54.0	-13.1	H	A	
MID CHANNEL, 2437MHz													
4.874	3.0	43.3	32.7	5.8	-34.8	0.0	0.0	47.0	74.0	-27.0	V	P	
4.874	3.0	39.6	32.7	5.8	-34.8	0.0	0.0	43.3	54.0	-10.7	V	A	
7.311	3.0	49.0	35.5	7.3	-34.1	0.0	0.0	57.6	74.0	-16.4	V	P	
7.311	3.0	44.5	35.5	7.3	-34.1	0.0	0.0	53.1	54.0	-0.9	V	A	
12.185	3.0	33.2	38.5	9.8	-32.5	0.0	0.0	49.0	74.0	-25.0	V	P	
12.185	3.0	20.9	38.5	9.8	-32.5	0.0	0.0	36.7	54.0	-17.3	V	A	
4.874	3.0	41.6	32.7	5.8	-34.8	0.0	0.0	45.4	74.0	-28.6	H	P	
4.874	3.0	37.4	32.7	5.8	-34.8	0.0	0.0	41.1	54.0	-12.9	H	A	
7.311	3.0	41.3	35.5	7.3	-34.1	0.0	0.0	49.9	74.0	-24.1	H	P	
7.311	3.0	36.1	35.5	7.3	-34.1	0.0	0.0	44.8	54.0	-9.2	H	A	
7.311	3.0	48.1	35.5	7.3	-34.1	0.0	0.0	56.7	74.0	-17.3	H	P	
7.311	3.0	43.7	35.5	7.3	-34.1	0.0	0.0	52.4	54.0	-1.6	H	A	
HIGH CHANNEL, 2462MHz													
4.924	3.0	44.6	32.7	5.9	-34.8	0.0	0.0	48.4	74.0	-25.6	V	P	
4.924	3.0	41.4	32.7	5.9	-34.8	0.0	0.0	45.2	54.0	-8.8	V	A	
7.386	3.0	48.8	35.6	7.3	-34.1	0.0	0.0	57.5	74.0	-16.5	V	P	
7.386	3.0	44.3	35.6	7.3	-34.1	0.0	0.0	53.0	54.0	-1.0	V	A	
4.924	3.0	45.0	32.7	5.9	-34.8	0.0	0.0	48.8	74.0	-25.2	H	P	
4.924	3.0	42.0	32.7	5.9	-34.8	0.0	0.0	45.8	54.0	-8.2	H	A	
7.386	3.0	47.1	35.6	7.3	-34.1	0.0	0.0	55.8	74.0	-18.2	H	P	
7.386	3.0	42.7	35.6	7.3	-34.1	0.0	0.0	51.5	54.0	-2.5	H	A	

Rev. 4.1.2.7

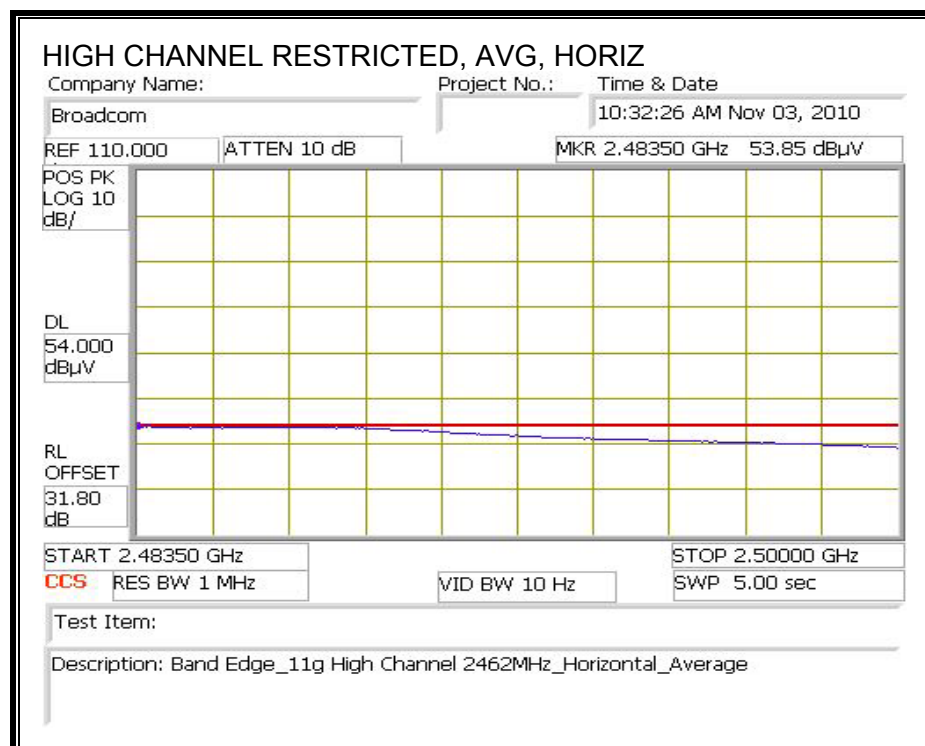
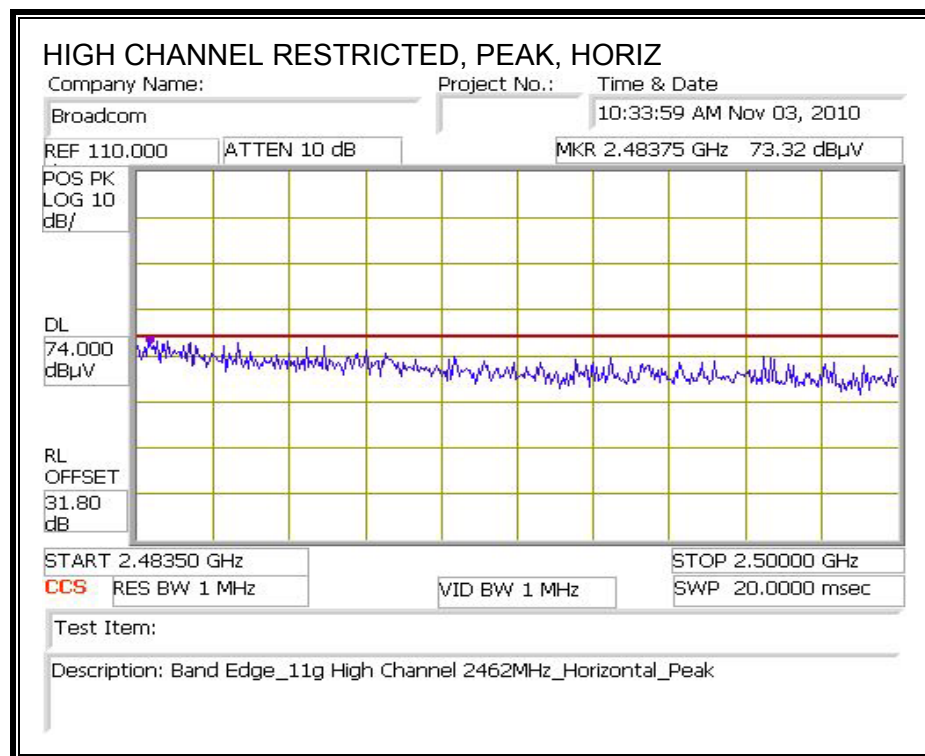
Note: No other emissions were detected above the system noise floor.

8.2.2. 802.11g MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANEDGE HIGH CHANNEL, HORIZONTAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 3m Chamber

Test Engr: Vien Tran
Date: 11/15/10
Project #: 10U13394
Company: Broadcom
Test Target: FCC B
Mode Oper: Tx 11g

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

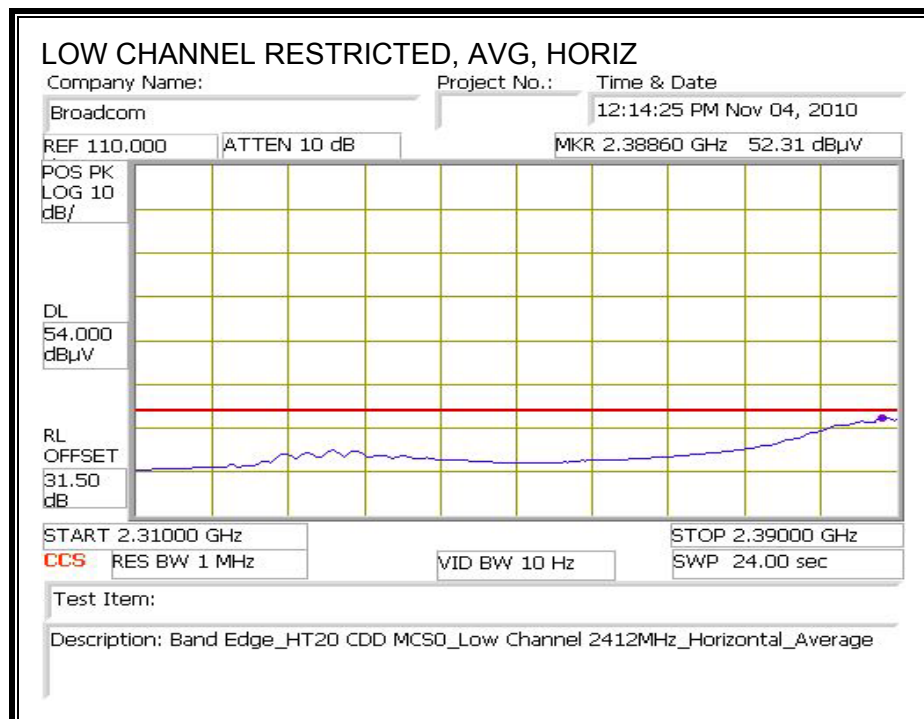
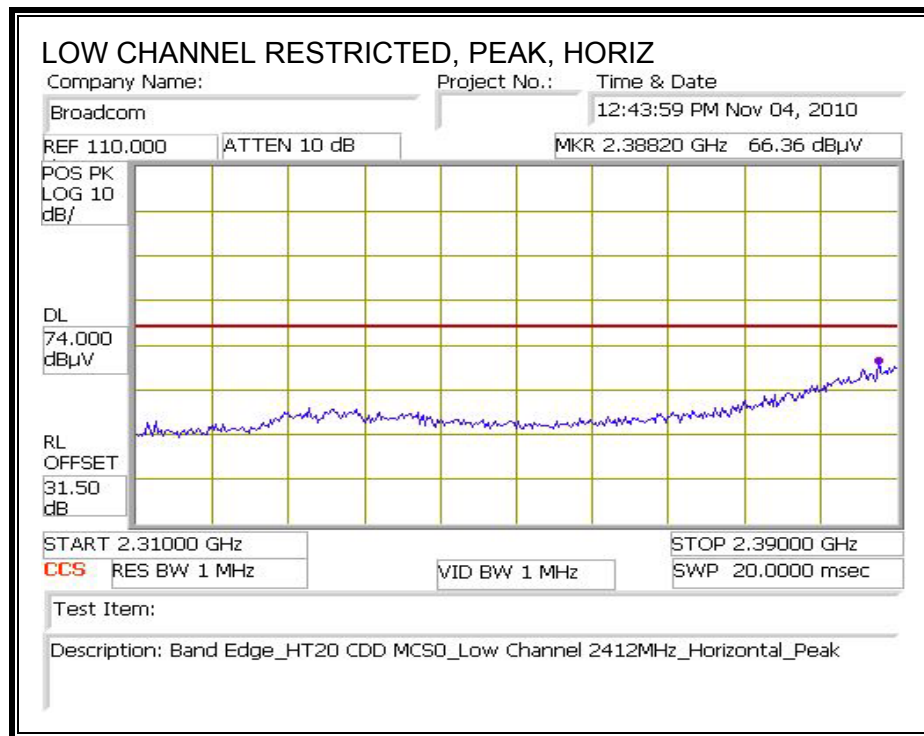
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fitr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol V/H	Det. P/A/QP	Notes
LOW CHANNEL, 2412MHz													
4.824	3.0	43.5	32.7	5.8	-34.8	0.0	0.0	47.1	74.0	-26.9	V	P	
4.824	3.0	29.3	32.7	5.8	-34.8	0.0	0.0	32.9	54.0	-21.1	V	A	
4.824	3.0	36.4	32.7	5.8	-34.8	0.0	0.0	40.1	74.0	-33.9	H	P	
4.824	3.0	23.6	32.7	5.8	-34.8	0.0	0.0	27.2	54.0	-26.8	H	A	
MID CHANNEL, 2437MHz													
4.874	3.0	39.3	32.7	5.8	-34.8	0.0	0.0	43.0	74.0	-31.0	V	P	
4.874	3.0	26.5	32.7	5.8	-34.8	0.0	0.0	30.2	54.0	-23.8	V	A	
7.311	3.0	55.7	35.5	7.3	-34.1	0.0	0.0	64.4	74.0	-9.6	V	P	
7.311	3.0	41.9	35.5	7.3	-34.1	0.0	0.0	50.6	54.0	-3.4	V	A	
4.874	3.0	36.4	32.7	5.8	-34.8	0.0	0.0	40.2	74.0	-33.8	H	P	
4.874	3.0	24.0	32.7	5.8	-34.8	0.0	0.0	27.7	54.0	-26.3	H	A	
7.311	3.0	42.7	35.5	7.3	-34.1	0.0	0.0	51.3	74.0	-22.7	H	P	
7.311	3.0	30.0	35.5	7.3	-34.1	0.0	0.0	38.6	54.0	-15.4	H	A	
HIGH CHANNEL, 2462MHz													
4.924	3.0	44.1	32.7	5.9	-34.8	0.0	0.0	47.9	74.0	-26.1	V	P	
4.924	3.0	30.2	32.7	5.9	-34.8	0.0	0.0	34.0	54.0	-20.0	V	A	
7.386	3.0	53.8	35.6	7.3	-34.1	0.0	0.0	62.6	74.0	-11.4	V	P	
7.386	3.0	40.6	35.6	7.3	-34.1	0.0	0.0	49.4	54.0	-4.6	V	A	
4.924	3.0	45.2	32.7	5.9	-34.8	0.0	0.0	49.0	74.0	-25.0	H	P	
4.924	3.0	30.7	32.7	5.9	-34.8	0.0	0.0	34.5	54.0	-19.5	H	A	
7.386	3.0	50.1	35.6	7.3	-34.1	0.0	0.0	58.9	74.0	-15.1	H	P	
7.386	3.0	37.1	35.6	7.3	-34.1	0.0	0.0	45.9	54.0	-8.1	H	A	

Rev. 4.1.2.7

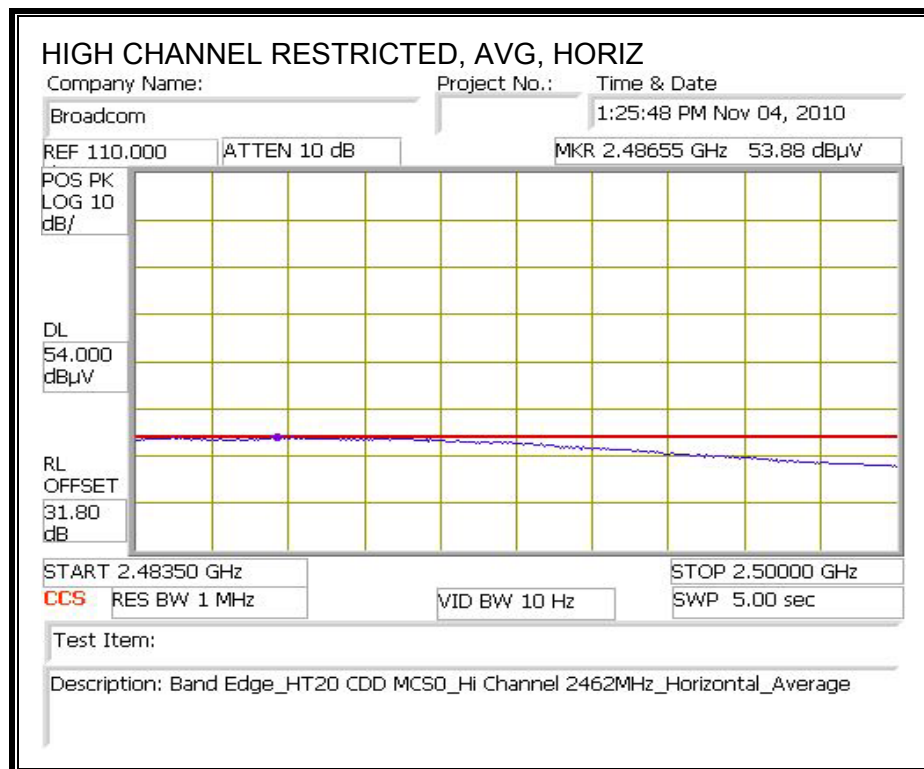
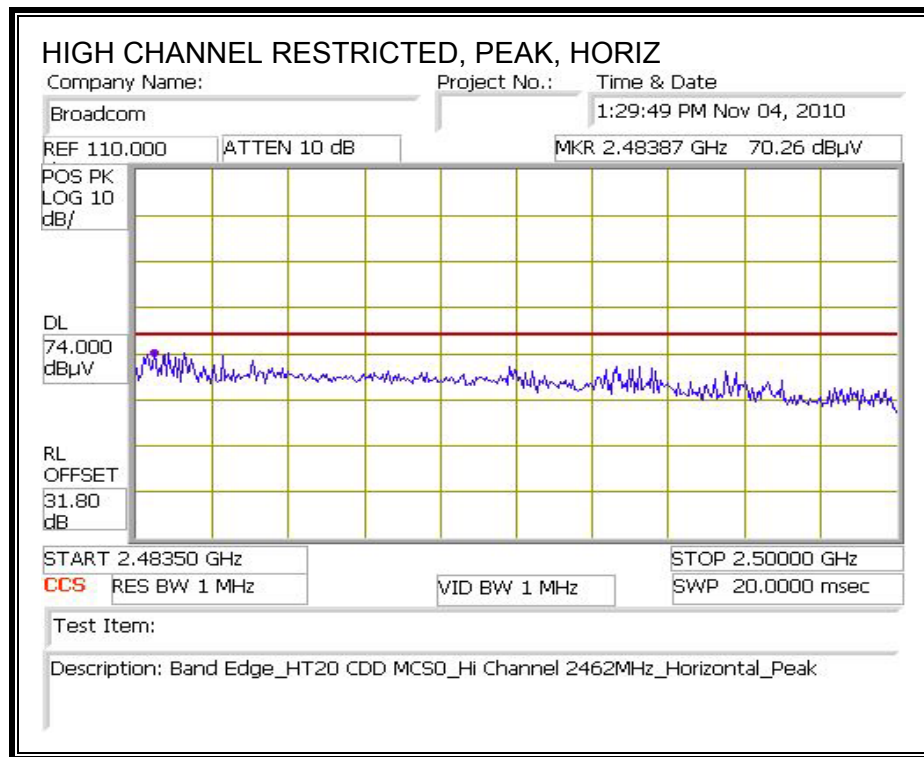
Note: No other emissions were detected above the system noise floor.

8.2.3. 802.11n HT20 CDD MCS0 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE HIGH CHANNEL, HORIZONTAL

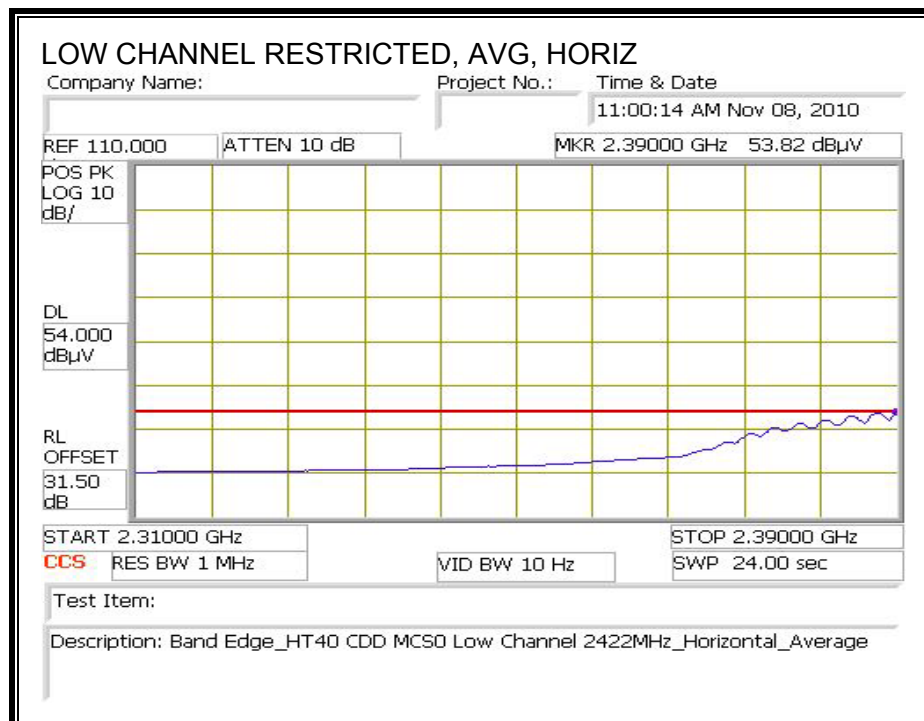
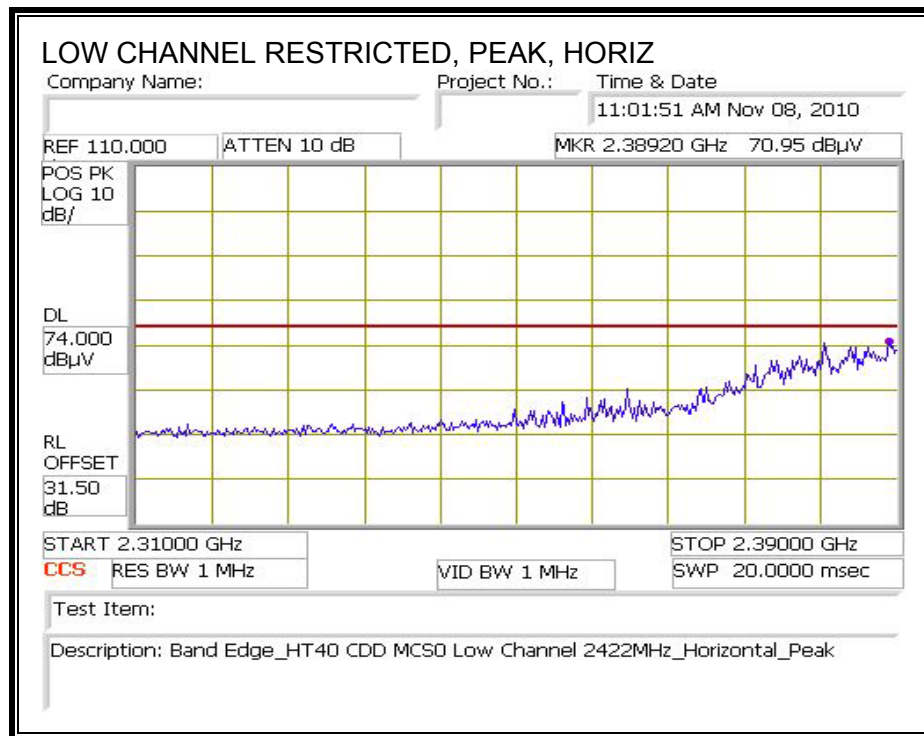


HARMONICS AND SPURIOUS EMISSIONS

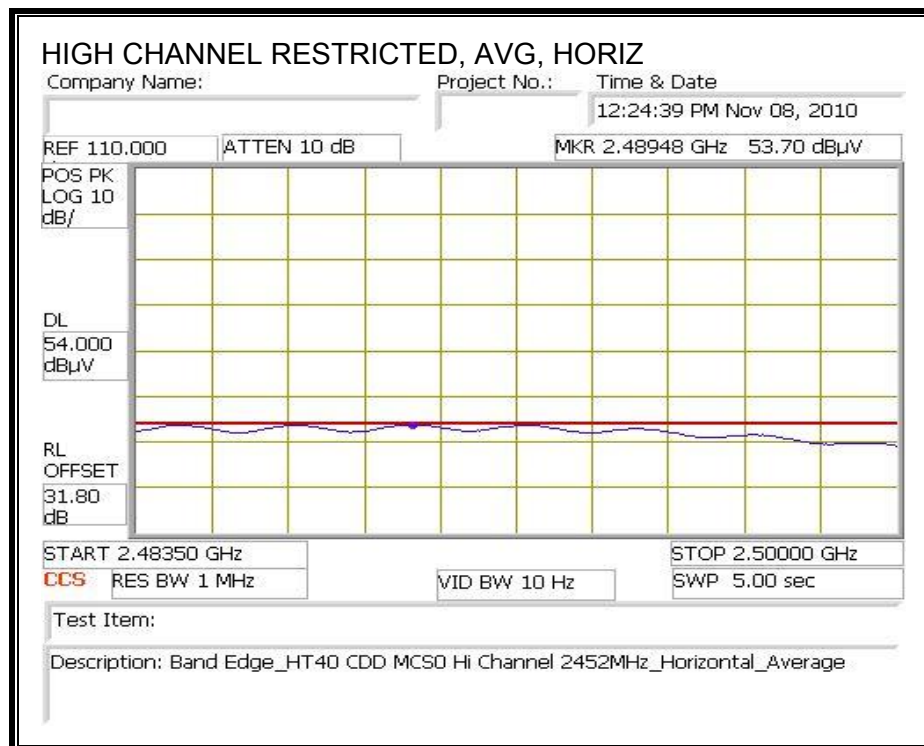
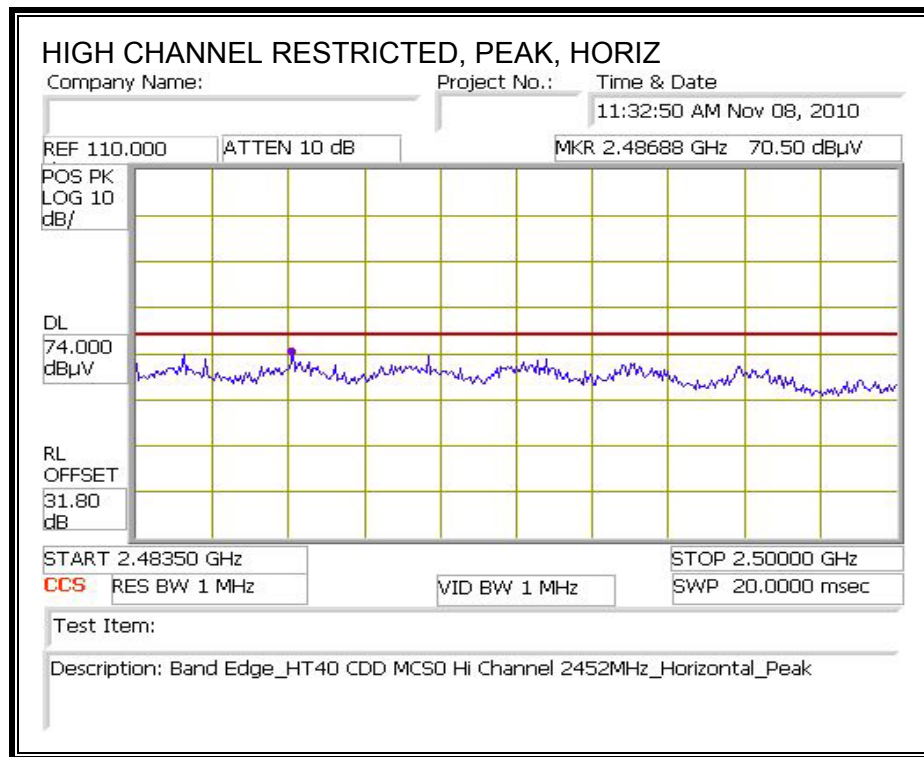
High Frequency Measurement																																													
Compliance Certification Services, Fremont 3m Chamber																																													
Company:		BROADCOM																																											
Project #:		10U13394																																											
Date:		11/15/2010																																											
Test Engineer:		MENGISTU MEKURIA																																											
Configuration:		EUT AND SUPPORT LAPTOP																																											
Mode:		TX, HT20 MODE																																											
Test Equipment:																																													
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit																																	
T60; S/N: 2238 @3m			T34 HP 8449B									FCC 15.205																																	
Hi Frequency Cables																																													
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz																														
3' cable 22807700			12' cable 22807600			20' cable 22807500						R_001																																	
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)																														
Low Ch.(2412.0MHz)																																													
4.824	3.0	61.2	46.3	32.7	5.8	-34.8	0.0	0.0	64.9	49.9	74	54	-9.1	-4.1	V																														
4.824	3.0	60.6	45.7	32.7	5.8	-34.8	0.0	0.0	64.2	49.3	74	54	-9.8	-4.7	H																														
Mid Ch.(2437.0MHz)																																													
4.874	3.0	58.5	44.3	32.7	5.8	-34.8	0.0	0.0	62.2	48.0	74	54	-11.8	-6.0	V																														
7.311	3.0	58.0	43.9	35.5	7.3	-34.1	0.0	0.0	66.6	52.5	74	54	-7.4	-1.5	V																														
4.874	3.0	57.9	43.8	32.7	5.8	-34.8	0.0	0.0	61.6	47.5	74	54	-12.4	-6.5	H																														
7.311	3.0	56.1	43.0	35.5	7.3	-34.1	0.0	0.0	64.7	51.6	74	54	-9.3	-2.4	H																														
7.311	3.0	55.3	40.5	35.5	7.3	-34.1	0.0	0.0	63.9	49.1	74	54	-10.1	-4.9	H																														
Hi Ch.(2462.0MHz)																																													
4.924	3.0	57.2	43.1	32.7	5.9	-34.8	0.0	0.0	61.0	46.9	74	54	-13.0	-7.1	V																														
7.386	3.0	58.1	44.4	35.6	7.3	-34.1	0.0	0.0	66.9	53.2	74	54	-7.1	-0.8	V																														
4.924	3.0	56.9	42.7	32.7	5.9	-34.8	0.0	0.0	60.7	46.5	74	54	-13.3	-7.5	H																														
7.386	3.0	56.6	43.9	35.6	7.3	-34.1	0.0	0.0	65.4	52.6	74	54	-8.6	-1.4	H																														
7.386	3.0	55.8	41.9	35.6	7.3	-34.1	0.0	0.0	64.6	50.7	74	54	-9.4	-3.3	H																														
<table style="width: 100%; border: none;"> <tr> <td>f</td> <td>Measurement Frequency</td> <td>Amp</td> <td>Preamp Gain</td> <td>Avg Lim</td> <td>Average Field Strength Limit</td> </tr> <tr> <td>Dist</td> <td>Distance to Antenna</td> <td>D Corr</td> <td>Distance Correct to 3 meters</td> <td>Pk Lim</td> <td>Peak Field Strength Limit</td> </tr> <tr> <td>Read</td> <td>Analyzer Reading</td> <td>Avg</td> <td>Average Field Strength @ 3 m</td> <td>Avg Mar</td> <td>Margin vs. Average Limit</td> </tr> <tr> <td>AF</td> <td>Antenna Factor</td> <td>Peak</td> <td>Calculated Peak Field Strength</td> <td>Pk Mar</td> <td>Margin vs. Peak Limit</td> </tr> <tr> <td>CL</td> <td>Cable Loss</td> <td>HPF</td> <td>High Pass Filter</td> <td></td> <td></td> </tr> </table>																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		
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																																										

8.2.4. 802.11n HT40 CDD MCS0 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement															
Compliance Certification Services, Fremont 3m Chamber															
Company:		BROADCOM													
Project #:		10U13394													
Date:		11/15/2010													
Test Engineer:		MENGISTU MEKURIA													
Configuration:		EUT AND SUPPORT LAPTOP													
Mode:		TX, HT40 MODE													
Test Equipment:															
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit			
T60; S/N: 2238 @3m			T34 HP 8449B									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			
<div style="display: flex; justify-content: space-between;"> <div> Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz </div> </div>															
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Filt	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
Low Ch.(2422.0MHz)															
4.844	3.0	49.5	34.0	32.7	5.8	-34.8	0.0	0.0	53.2	37.6	74	54	-20.8	-16.4	V
7.266	3.0	51.5	35.0	35.4	7.2	-34.1	0.0	0.0	60.0	43.6	74	54	-14.0	-10.4	V
4.844	3.0	48.7	32.2	32.7	5.8	-34.8	0.0	0.0	52.3	35.8	74	54	-21.7	-18.2	H
7.266	3.0	50.2	33.3	35.4	7.2	-34.1	0.0	0.0	58.7	41.8	74	54	-15.3	-12.2	H
Mid Ch. (2437.0MHz)															
4.874	3.0	45.8	31.2	32.7	5.8	-34.8	0.0	0.0	49.5	34.9	74	54	-24.5	-19.1	V
7.311	3.0	47.0	32.7	35.5	7.3	-34.1	0.0	0.0	55.7	41.3	74	54	-18.3	-12.7	V
4.874	3.0	44.2	29.9	32.7	5.8	-34.8	0.0	0.0	47.9	33.7	74	54	-26.1	-20.3	H
7.311	3.0	45.0	30.5	35.5	7.3	-34.1	0.0	0.0	53.7	39.2	74	54	-20.3	-14.8	H
Hi Ch. (2452.0MHz)															
4.904	3.0	47.9	34.5	32.7	5.9	-34.8	0.0	0.0	51.7	38.3	74	54	-22.3	-15.7	V
7.356	3.0	49.5	35.6	35.5	7.3	-34.1	0.0	0.0	58.2	44.3	74	54	-15.8	-9.7	V
4.904	3.0	44.2	30.2	32.7	5.9	-34.8	0.0	0.0	48.0	34.0	74	54	-26.0	-20.0	H
7.356	3.0	48.4	34.6	35.5	7.3	-34.1	0.0	0.0	57.2	43.3	74	54	-16.8	-10.7	H
<div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div> f Measurement Frequency Dist Distance to Antenna Read Analyzer Reading AF Antenna Factor CL Cable Loss </div> <div> Amp Preamp Gain D Corr Distance Correct to 3 meters Avg Average Field Strength @ 3 m Peak Calculated Peak Field Strength HPF High Pass Filter </div> <div> Avg Lim Average Field Strength Limit Pk Lim Peak Field Strength Limit Avg Mar Margin vs. Average Limit Pk Mar Margin vs. Peak Limit </div> </div>															

8.2.5. 802.11a MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber																
Company:		Broadcom														
Project #:		10U13394														
Date:		11/24/2010														
Test Engineer:		Thanh Nguyen														
Configuration:		EUT and support laptop														
Mode:		Transmit a mode legacy														
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 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			Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz, VBW=10Hz	
3' cable 22807700			12' cable 22807600			20' cable 22807500						R_001				
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
CH 149 (5745MHz)																
11.490	3.0	45.3	31.5	38.4	9.5	-35.9	0.0	0.0	57.4	43.5	74	54	-16.6	-10.5	V	
17.235	3.0	35.0	21.6	41.6	12.2	-33.8	0.0	0.0	55.0	41.6	74	54	-19.0	-12.4	V	
11.490	3.0	43.3	27.7	38.4	9.5	-35.9	0.0	0.0	55.4	39.8	74	54	-18.6	-14.2	H	
17.235	3.0	34.5	21.8	41.6	12.2	-33.8	0.0	0.0	54.5	41.9	74	54	-19.5	-12.1	H	
Ch 157 (5785MHz)																
11.570	3.0	43.9	27.9	38.5	9.5	-35.8	0.0	0.0	56.2	40.2	74	54	-17.8	-13.8	V	
17.355	3.0	35.7	24.7	42.4	12.2	-33.8	0.0	0.0	56.5	45.5	74	54	-17.5	-8.5	V	
11.570	3.0	43.1	30.0	38.5	9.5	-35.8	0.0	0.0	55.3	42.2	74	54	-18.7	-11.8	H	
17.355	3.0	35.4	24.2	42.4	12.2	-33.8	0.0	0.0	56.3	45.0	74	54	-17.7	-9.0	H	
Ch 165 (5825MHz)																
11.650	3.0	41.9	31.3	38.6	9.6	-35.7	0.0	0.0	54.3	43.7	74	54	-19.7	-10.3	V	
17.475	3.0	35.0	24.1	43.2	12.3	-33.8	0.0	0.0	56.6	45.7	74	54	-17.4	-8.3	V	
11.650	3.0	42.5	30.1	38.6	9.6	-35.7	0.0	0.0	54.9	42.5	74	54	-19.1	-11.5	H	
17.475	3.0	34.4	24.1	43.2	12.3	-33.8	0.0	0.0	56.1	45.7	74	54	-17.9	-8.3	H	
Rev. 07.22.09																
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											

8.2.6. 802.11n HT20 CDD MCS0 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement															
Compliance Certification Services, Fremont 5m Chamber															
Company:		Broadcom													
Project #:		10U13394													
Date:		11/24/2010													
Test Engineer:		Thanh Nguyen													
Configuration:		EUT and support laptop													
Mode:		Transmit HT 20 CDD mode.													
Test Equipment:															
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 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		<u>Peak Measurements</u> RBW=VBW=1MHz <u>Average Measurements</u> RBW=1MHz ; VBW=10Hz					
3' cable 22807700		12' cable 22807600		20' cable 22807500				R_001							
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
CH 149 (5745MHz)															
11.490	3.0	40.9	29.6	38.4	9.5	-35.9	0.0	0.0	52.9	41.6	74	54	-21.1	-12.4	V
17.235	3.0	34.7	24.7	41.6	12.2	-33.8	0.0	0.0	54.7	44.8	74	54	-19.3	-9.2	V
11.490	3.0	49.4	38.1	38.4	9.5	-35.9	0.0	0.0	61.5	50.2	74	54	-12.5	-3.8	H
17.235	3.0	33.9	24.0	41.6	12.2	-33.8	0.0	0.0	54.0	44.1	74	54	-20.0	-9.9	H
Ch 157 (5785MHz)															
11.570	3.0	41.8	32.5	38.5	9.5	-35.8	0.0	0.0	54.0	44.7	74	54	-20.0	-9.3	V
17.355	3.0	34.7	24.3	42.4	12.2	-33.8	0.0	0.0	55.5	45.1	74	54	-18.5	-8.9	V
11.570	3.0	49.7	40.1	38.5	9.5	-35.8	0.0	0.0	61.9	52.3	74	54	-12.1	-1.7	H
17.355	3.0	35.5	24.3	42.4	12.2	-33.8	0.0	0.0	56.4	45.1	74	54	-17.6	-8.9	H
Ch 165 (5825MHz)															
11.650	3.0	43.7	32.9	38.6	9.6	-35.7	0.0	0.0	56.1	45.3	74	54	-17.9	-8.7	V
17.475	3.0	34.4	24.2	43.2	12.3	-33.8	0.0	0.0	56.0	45.9	74	54	-18.0	-8.1	V
11.650	3.0	50.7	40.1	38.6	9.6	-35.7	0.0	0.0	63.1	52.5	74	54	-10.9	-1.5	H
17.475	3.0	34.5	24.3	43.2	12.3	-33.8	0.0	0.0	56.1	45.9	74	54	-17.9	-8.1	H
Rev. 07.22.09															
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										

8.2.7. 802.11n HT40 CDD MCS0 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber																
Company:		Broadcom														
Project #:		10U13394														
Date:		11/24/2010														
Test Engineer:		Thanh Nguyen														
Configuration:		EUT and support laptop														
Mode:		Transmit HT 40 CDD 5.8GHz Band.														
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 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			Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz; VBW=10Hz	
3' cable 22807700			12' cable 22807600			20' cable 22807500						R_002				
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fctr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
Ch 151 (5755MHz)																
11.510	3.0	39.4	26.2	38.4	9.5	-35.8	0.0	0.0	51.5	38.3	74	54	-22.5	-15.7	V	
17.265	3.0	40.2	26.8	41.8	12.2	-33.8	0.0	0.0	60.5	47.0	74	54	-13.5	-7.0	V	
11.510	3.0	48.6	36.8	38.4	9.5	-35.8	0.0	0.0	60.7	48.9	74	54	-13.3	-5.1	H	
17.265	3.0	39.2	26.8	41.8	12.2	-33.8	0.0	0.0	59.4	47.0	74	54	-14.6	-7.0	H	
Ch 159 (5795MHz)																
11.590	3.0	40.9	27.4	38.5	9.5	-35.8	0.0	0.0	53.1	39.7	74	54	-20.9	-14.3	V	
17.385	3.0	39.7	27.2	42.6	12.3	-33.8	0.0	0.0	60.7	48.2	74	54	-13.3	-5.8	V	
11.590	3.0	49.2	37.0	38.5	9.5	-35.8	0.0	0.0	61.5	49.3	74	54	-12.5	-4.7	H	
17.385	3.0	40.0	27.6	42.6	12.3	-33.8	0.0	0.0	61.0	48.6	74	54	-13.0	-5.4	H	
f	Measurement Frequency		Amp	Preamp Gain		Avg Lim	Average Field Strength Limit									
Dist	Distance to Antenna		D Corr	Distance Correct to 3 meters		Pk Lim	Peak Field Strength Limit									
Read	Analyzer Reading		Avg	Average Field Strength @ 3 m		Avg Mar	Margin vs. Average Limit									
AF	Antenna Factor		Peak	Calculated Peak Field Strength		Pk Mar	Margin vs. Peak Limit									
CL	Cable Loss		HPF	High Pass Filter												

8.3. RECEIVER ABOVE 1 GHz

8.3.1. FOR 20 MHz BANDWIDTH

High Frequency Measurement																
Compliance Certification Services, Fremont 3m Chamber																
Company:		Broadcom														
Project #:		10U13394														
Date:		11/19/10														
Test Engineer:		Vien Tran														
Configuration:		EUT / Laptop														
Mode:		Rx Mode_20MHz Bandwidth														
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T60; S/N: 2238 @3m			T34 HP 8449B									RX RSS 210				
Hi Frequency Cables																
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz, VBW=10Hz	
3' cable 22807700			12' cable 22807600			20' cable 22807500										
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fldr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
1.200	3.0	54.0	35.9	25.1	2.6	-38.0	0.0	0.0	43.7	25.6	74	54	-30.3	-28.4	H	
2.437	3.0	51.4	48.8	28.1	3.9	-36.3	0.0	0.0	47.1	44.5	74	54	-26.9	-9.5	H	
2.493	3.0	53.6	33.5	28.3	3.9	-36.3	0.0	0.0	49.5	29.5	74	54	-24.5	-24.5	H	
1.700	3.0	56.9	35.8	26.8	3.2	-37.3	0.0	0.0	49.6	28.5	74	54	-24.4	-25.5	V	
2.437	3.0	47.9	44.2	28.1	3.9	-36.3	0.0	0.0	43.6	39.9	74	54	-30.4	-14.1	V	
2.493	3.0	56.8	34.7	28.3	3.9	-36.3	0.0	0.0	52.8	30.7	74	54	-21.2	-23.3	V	
No other emissions were detected above system noise floor																
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit			
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit			
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit			
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit			
CL	Cable Loss					HPF	High Pass Filter									

8.3.2. FOR 40 MHz BANDWIDTH

High Frequency Measurement																
Compliance Certification Services, Fremont 3m Chamber																
Company:		Broadcom														
Project #:		10U13394														
Date:		11/19/10														
Test Engineer:		Vien Tran														
Configuration:		EUT / Laptop														
Mode:		Rx Mode_40MHz Bandwidth														
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T60; S/N: 2238 @3m			T34 HP 8449B									RX RSS 210				
Hi Frequency Cables																
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			<u>Peak Measurements</u> RBW=VBW=1MHz <u>Average Measurements</u> RBW=1MHz ; VBW=10Hz	
3' cable 22807700			12' cable 22807600			20' cable 22807500										
f	Dist	Read Pk	Read Avg	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes	
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)	
2.437	3.0	51.4	48.8	28.1	3.9	-36.3	0.0	0.0	47.1	44.5	74	54	-26.9	-9.5	H	
2.493	3.0	53.6	33.5	28.3	3.9	-36.3	0.0	0.0	49.5	29.5	74	54	-24.5	-24.5	H	
2.437	3.0	47.9	44.2	28.1	3.9	-36.3	0.0	0.0	43.6	39.9	74	54	-30.4	-14.1	V	
2.493	3.0	56.8	34.7	28.3	3.9	-36.3	0.0	0.0	52.8	30.7	74	54	-21.2	-23.3	V	
No other emissions were detected above system noise floor																
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit			
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit			
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit			
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit			
CL	Cable Loss					HPF	High Pass Filter									

8.4. WORST-CASE BELOW 1 GHz

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

30-1000MHz Frequency Measurement Compliance Certification Services, Fremont 3m Chamber

Test Engr: Vien Tran
Date: 11/19/10
Project #: 10U13394
Company: Broadcom
Test Target: FCC B
Mode Oper: Tx Worst-Case

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

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Vertical													
75.122	3.0	46.4	8.1	0.7	28.3	0.0	0.0	27.0	40.0	-13.0	V	P	
120.004	3.0	52.1	13.5	0.9	28.1	0.0	0.0	38.5	43.5	-5.0	V	P	
284.17	3.0	54.7	13.0	1.4	27.4	0.0	0.0	41.7	46.0	-4.3	V	P	
336.013	3.0	51.3	14.0	1.6	27.6	0.0	0.0	39.2	46.0	-6.8	V	P	
350.173	3.0	49.5	14.3	1.6	27.7	0.0	0.0	37.6	46.0	-8.4	V	P	
399.855	3.0	50.1	15.0	1.7	28.0	0.0	0.0	38.9	46.0	-7.1	V	P	
566.542	3.0	48.4	17.9	2.1	28.6	0.0	0.0	39.8	46.0	-6.2	V	P	
587.063	3.0	44.9	18.2	2.2	28.6	0.0	0.0	36.7	46.0	-9.3	V	P	
599.904	3.0	47.1	18.4	2.2	28.6	0.0	0.0	39.1	46.0	-6.9	V	P	
615.624	3.0	44.7	18.5	2.2	28.6	0.0	0.0	36.9	46.0	-9.1	V	P	
671.906	3.0	44.7	18.8	2.3	28.5	0.0	0.0	37.3	46.0	-8.7	V	P	
Horizontal													
32.28	3.0	42.4	18.9	0.5	28.4	0.0	0.0	33.3	40.0	-6.7	H	P	
105.963	3.0	51.4	10.6	0.8	28.2	0.0	0.0	34.7	43.5	-8.9	H	P	
199.807	3.0	50.3	11.9	1.2	27.4	0.0	0.0	36.0	43.5	-7.5	H	P	
213.128	3.0	50.2	11.9	1.2	27.4	0.0	0.0	35.9	43.5	-7.6	H	P	
284.17	3.0	47.8	13.0	1.4	27.4	0.0	0.0	34.7	46.0	-11.3	H	P	
353.893	3.0	45.8	14.3	1.6	27.7	0.0	0.0	34.0	46.0	-12.0	H	P	
399.855	3.0	45.5	15.0	1.7	28.0	0.0	0.0	34.3	46.0	-11.7	H	P	
528.021	3.0	43.3	17.3	2.0	28.6	0.0	0.0	34.0	46.0	-12.0	H	P	
566.422	3.0	46.2	17.9	2.1	28.6	0.0	0.0	37.6	46.0	-8.4	H	P	
599.904	3.0	46.1	18.4	2.2	28.6	0.0	0.0	38.1	46.0	-7.9	H	P	

Rev. 1.27.09

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

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

^{*} Decreases with the logarithm of the frequency.

TEST PROCEDURE

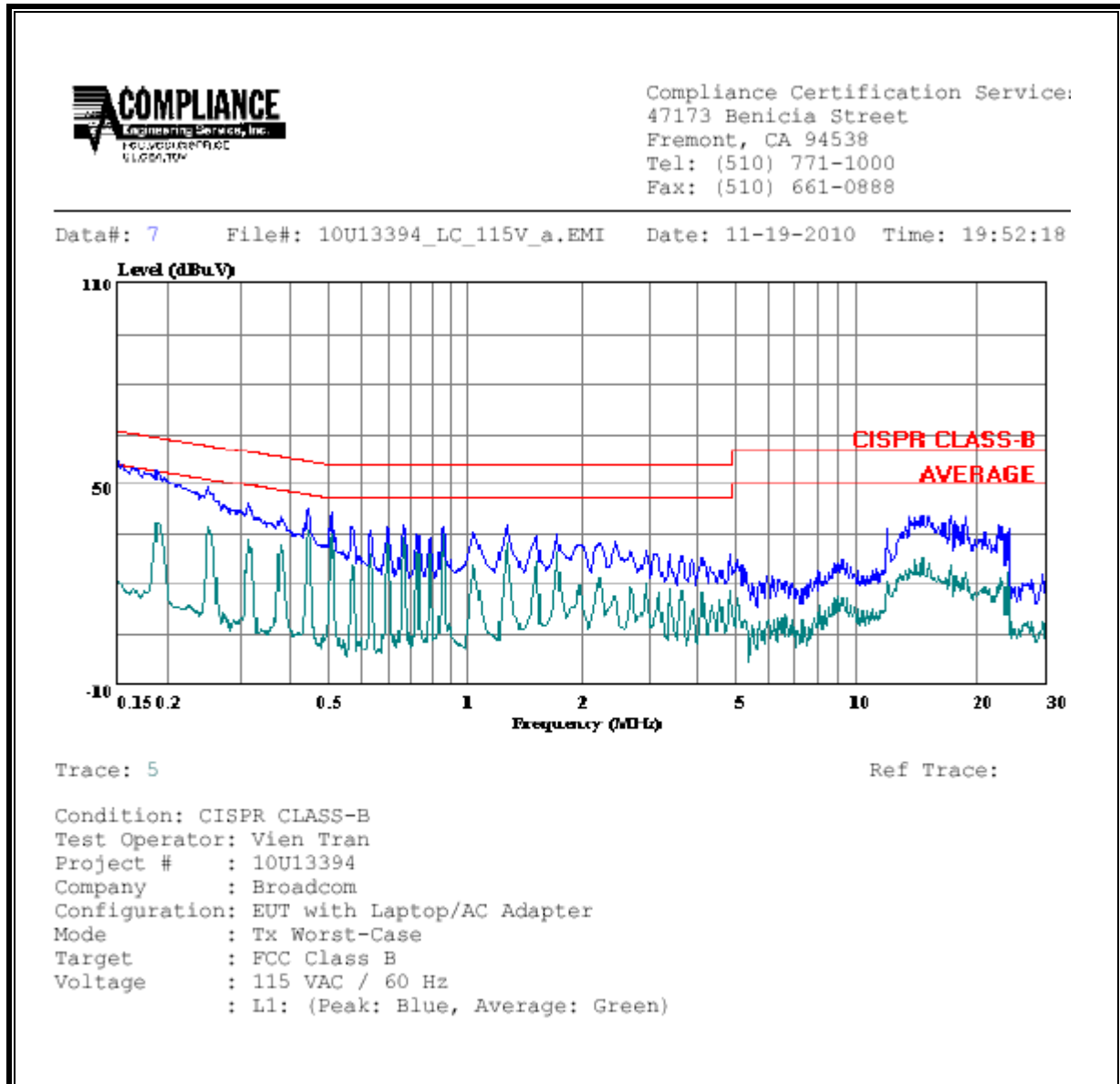
ANSI C63.4

RESULTS

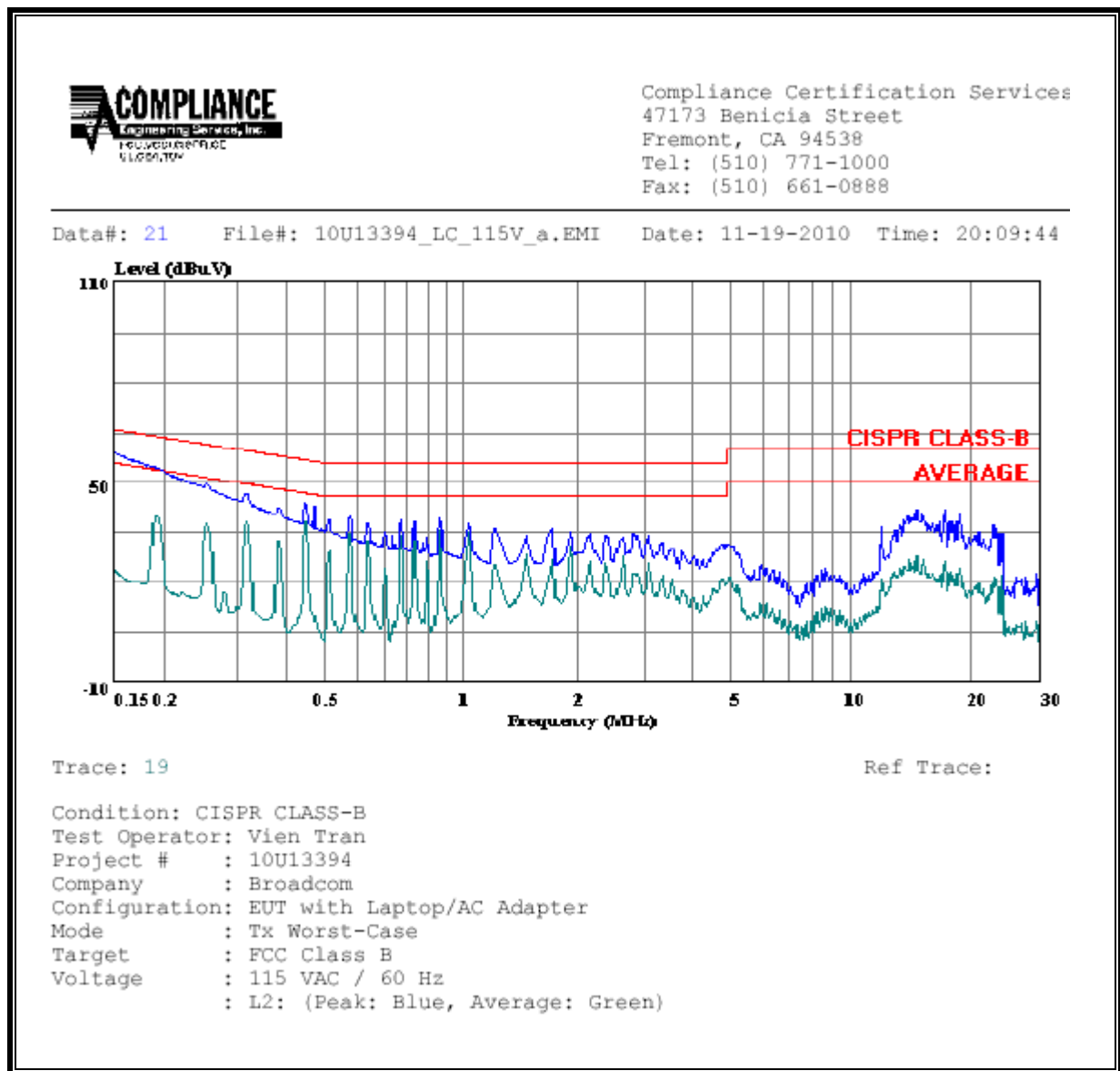
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.15	56.78	--	21.06	0.00	66.00	56.00	-9.22	-34.94	L1
0.51	41.77	--	34.98	0.00	56.00	46.00	-14.23	-11.02	L1
14.75	40.78	--	25.00	0.00	60.00	50.00	-19.22	-25.00	L1
0.15	59.33	--	23.58	0.00	66.00	56.00	-6.67	-32.42	L2
0.96	39.70	--	37.70	0.00	56.00	46.00	-16.30	-8.30	L2
14.75	39.90	--	24.30	0.00	60.00	50.00	-20.10	-25.70	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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

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

f = frequency in MHz

* = Plane-wave equivalent power density

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

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

IC RULES

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

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

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

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

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

EQUATIONS

Power density is given by:

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

where

S = Power density in W/m²

EIRP = Equivalent Isotropic Radiated Power in W

D = Separation distance in m

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

Distance is given by:

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

where

D = Separation distance in m

EIRP = Equivalent Isotropic Radiated Power in W

S = Power density in W/m²

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

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

where

Px = Power of transmitter x

Gx = Numeric gain of antenna x

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

LIMITS

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

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

RESULTS

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m^2)	FCC Power Density (mW/cm^2)
2.4 GHz	WLAN	0.20	28.22	6.91	6.49	0.649
5 GHz	WLAN	0.20	26.01	7.21	4.18	0.418