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

CERTIFICATION TEST REPORT

FOR

802.11 a/b/g/n 3X3 ACCESS POINT

MODEL NUMBER: A1408

FCC ID: BCGA1408
IC: 579C-A1408

REPORT NUMBER: 11U13614-1, REVISION C

ISSUE DATE: JUNE 13, 2011

Prepared for
APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA, 95014, U.S.A.

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	03/08/11	Initial Issue	F. Ibrahim
A	05/03/11	Revised MPE section, and updated PPSD results based on individual chains measurement	F. Ibrahim
B	05/16/11	Revised all conducted spurious sections	F. Ibrahim
C	06/13/11	Updated EUT description	A. Zaffar

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA, 95014, U.S.A.

EUT DESCRIPTION: 802.11 a/b/g/n 3X3 ACCESS POINT

MODEL: A1408

SERIAL NUMBER: 6F03165QACC

DATE TESTED: JANUARY 25 – MAY 02, 2011

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

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

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

Approved & Released For CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

TOM CHEN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, ICES-003 ISSUE 4, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11 a/b/g/n transceiver Access Point.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	24.10	257.04
2412 - 2462	802.11g	24.88	307.61
2412 - 2462	802.11n HT20	24.11	257.63

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5745 - 5825	802.11a	25.14	326.59
5745 - 5805	802.11n HT20	25.28	337.29
5755 - 5795	802.11n HT40	25.94	392.64

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes 3 IFA integrated antennas, with the following peak gains:

Frequency Range (MHz)	AP2 Peak gain dBi	AP3 Peak gain dBi	AP4 Peak gain dBi
2.4 - 2483.5	1.41	2.33	1.83

Frequency Range (MHz)	AP1 Peak gain (dBi)	AP2 Peak gain (dBi)	AP3 Peak gain (dBi)
5725 - 5850	1.74	2.97	2.67

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was k10b_7.5.3d5auto20110307T0000-TOT_develop.basebinary.

The test utility is Terminal Version 2.1.1 (273).

5.5. WORST-CASE CONFIGURATION AND MODE

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

Worst-case data rates as provided by the manufacturer are:
For 11b mode: 1Mbps
For 11g mode: 6Mbps
For 11n HT20 (2.4 GHz band): MCS0
For 11a mode: 6Mbps
For 11n HT20 (5.8 GHz band): MCS0
For 11n HT40 (5.8 GHz band): MCS0

EUT only has one orientation (laid down on the desktop) and it was tested in that orientation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	**Manufacturer**	**Model**	**Serial Number**
Laptop	Apple	Mac Book	PT429161
AC Adaptor	Apple	A1344	N/A

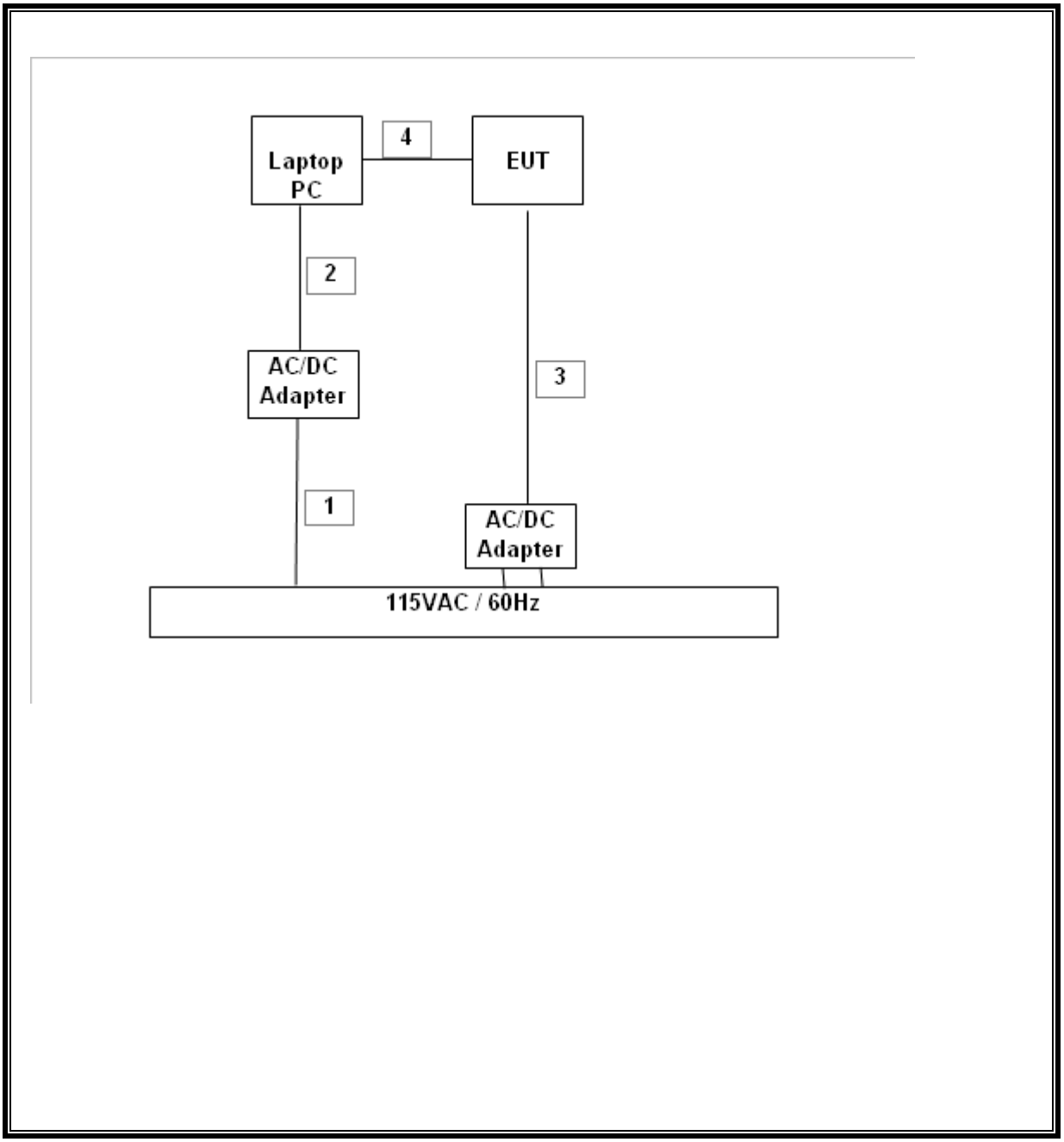
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	AC	unshielded	2m	N/A
2	DC	1	DC	unshielded	2.5m	N/A
3	DC	1	DC	unshielded	2m	N/A
4	Ethernet	4	RJ45	Shielded	1.5m	N/A

TEST SETUP

The Access Point EUT is controlled externally with a laptop, via Ethernet.

SETUP DIAGRAM FOR RADIO TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	07/14/11
Antenna, Horn, 18 GHz	EMCO	3115	C00945	06/29/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/27/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/12/11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/06/11
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11
Reject Filter, 2.0-2.9 GHz	Micro-Tronics	BRM50702	N02684	CNR
High Pass Filter, 7.6 GHz	Micro-Tronics	HPM13195	N02682	CNR
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/30/11
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	05/08/11
Peak Power Meter	Boonton	4541	C01186	03/01/11
Peak Power Sensor	Boonton	57318	C01202	02/23/11
Reject Filter, 5.725-5.825 GHz	Micro-Tronics	BRC13192	N02676	CNR
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
Highpass Filter, 7.6 GHz	Micro-Tronics	HPM13195	N02682	CNR
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/11

7. ANTENNA PORT TEST RESULTS

7.1. 802.11b THREE CHAINS LEGACY 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.

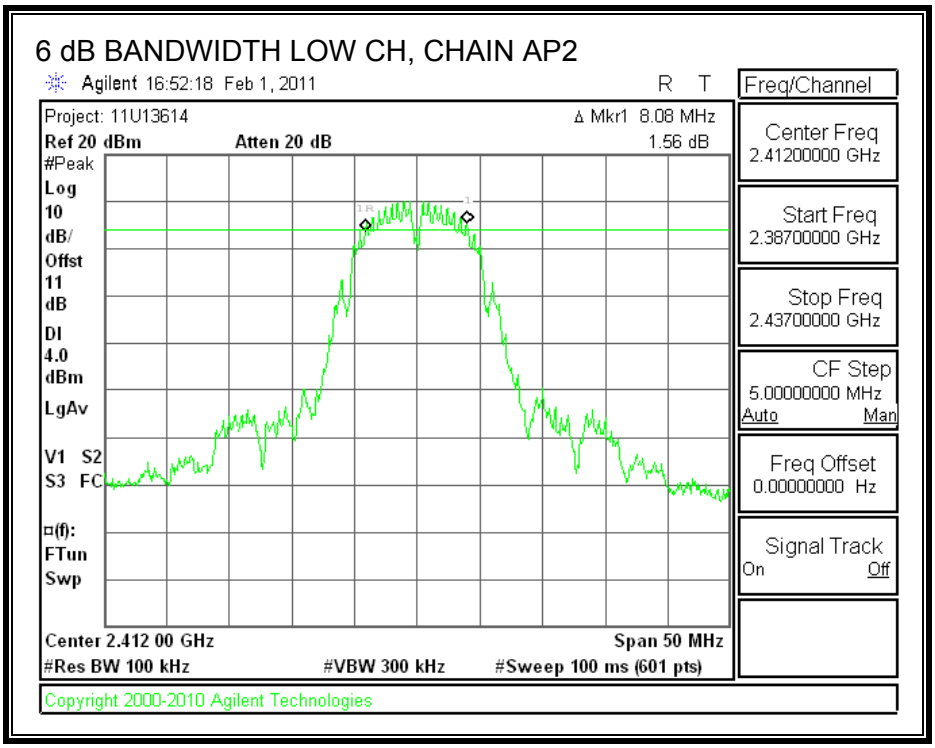
TEST PROCEDURE

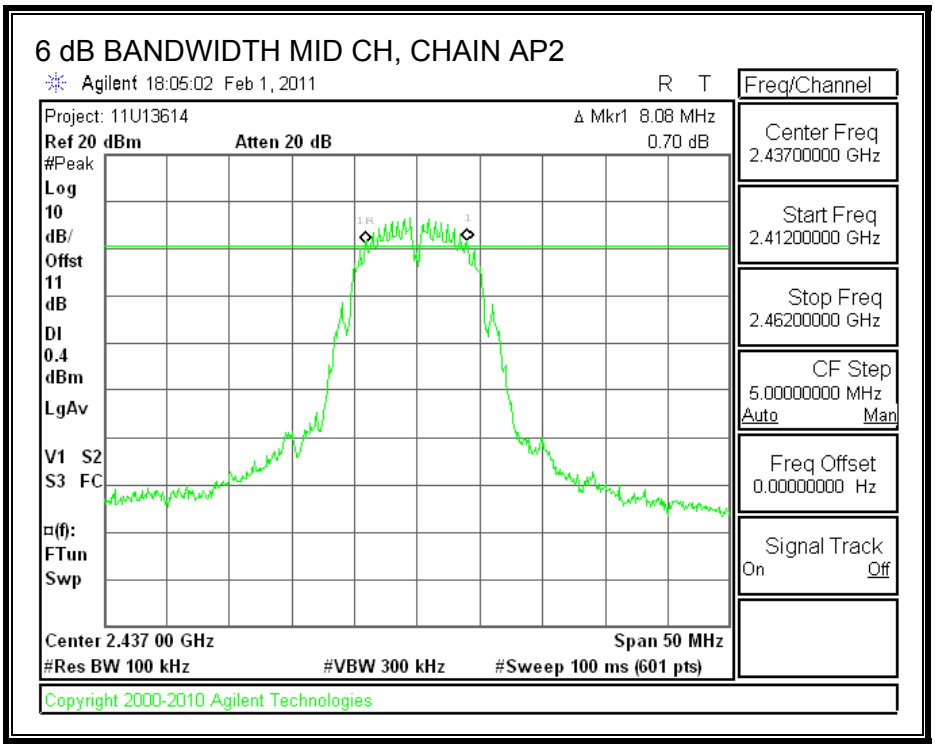
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

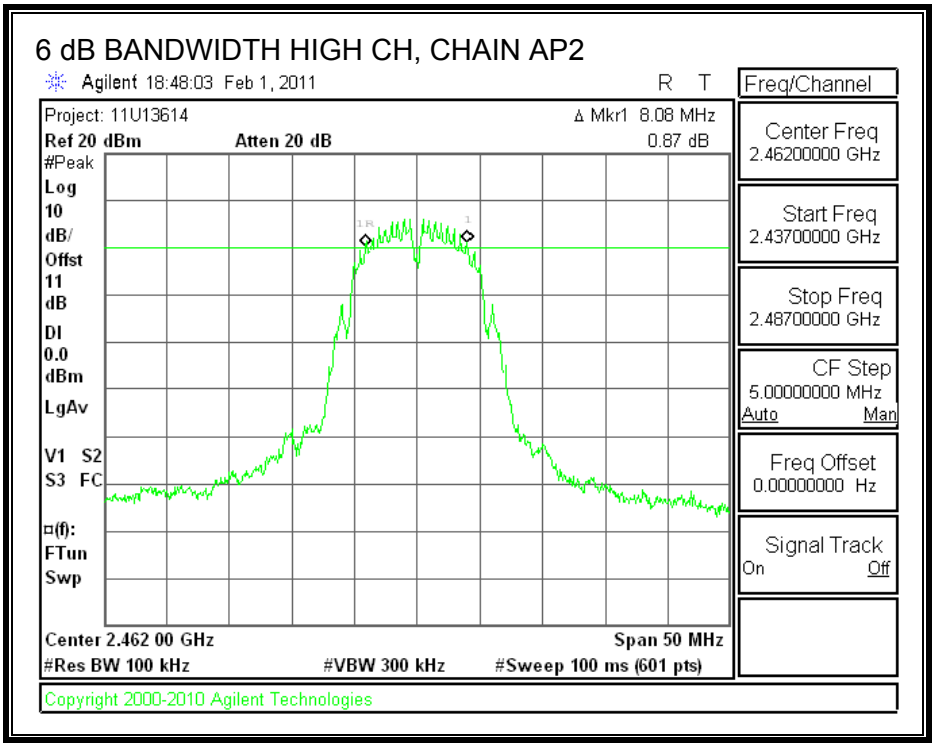
RESULTS

Channel	Frequency (MHz)	Chain AP2 6 dB BW (MHz)	Chain AP3 6 dB BW (MHz)	Chain AP4 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	8.08	8.08	8.08	0.5
Middle	2437	8.08	8.08	8.08	0.5
High	2462	8.08	8.08	8.08	0.5

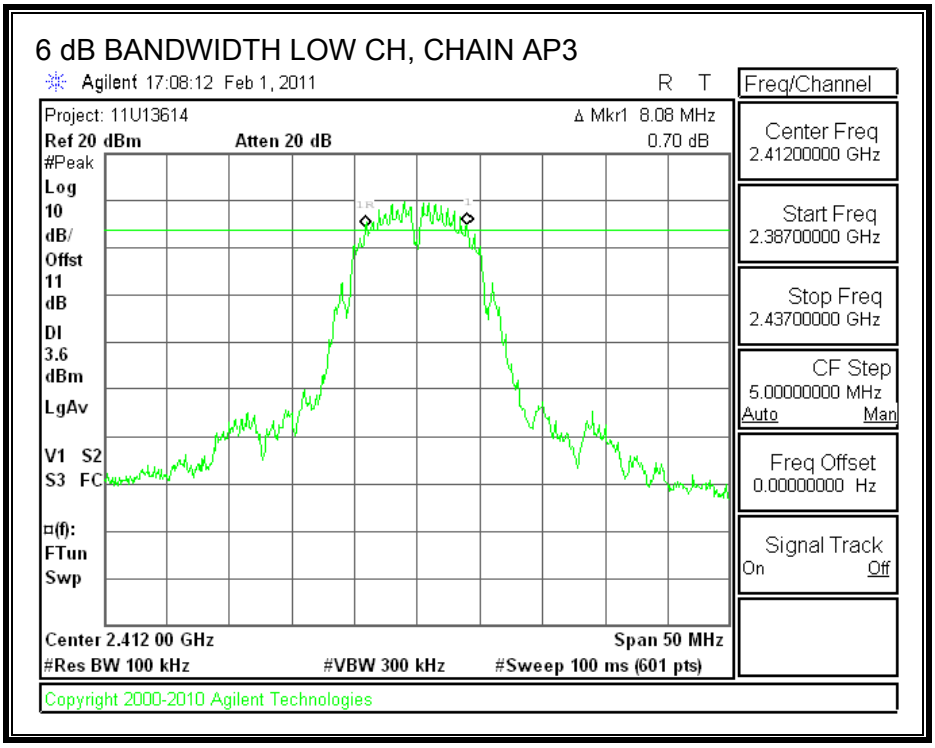
6 dB BANDWIDTH, CHAIN AP2

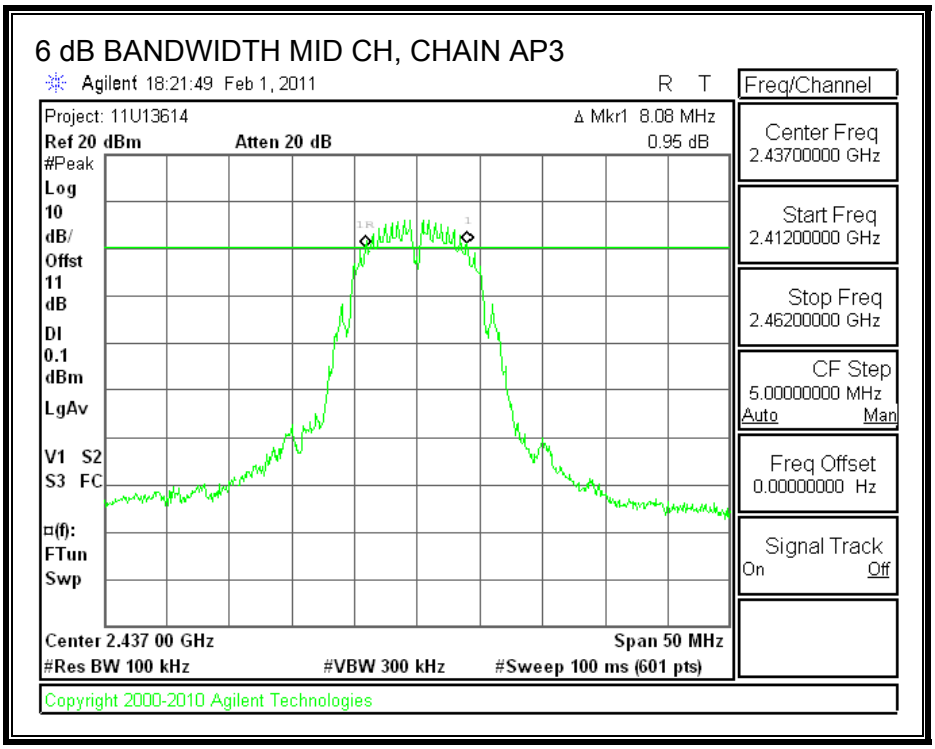


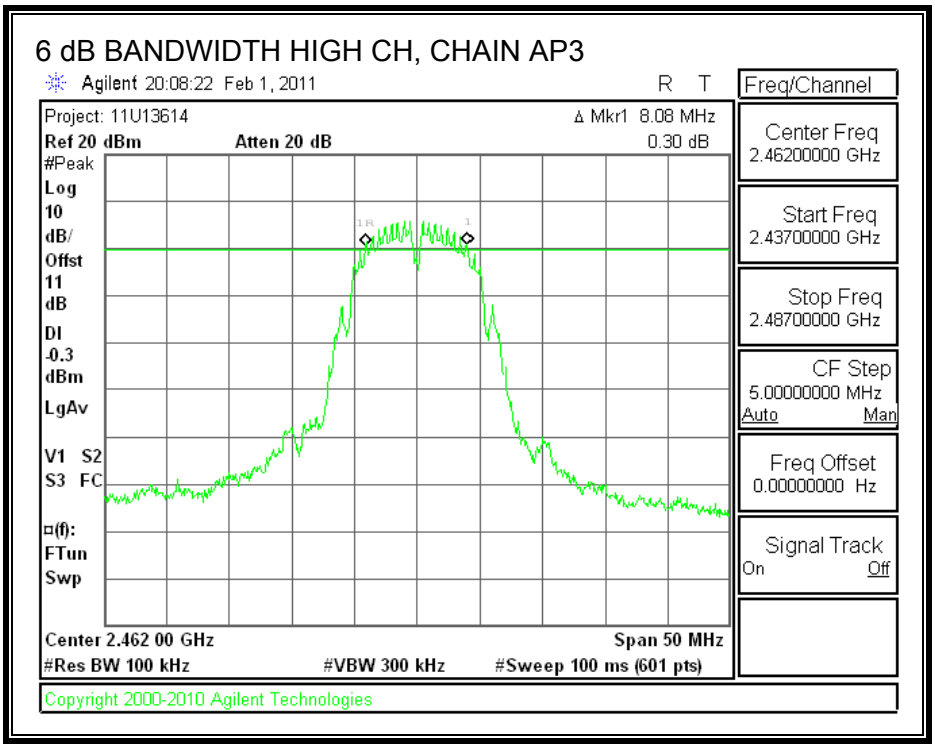




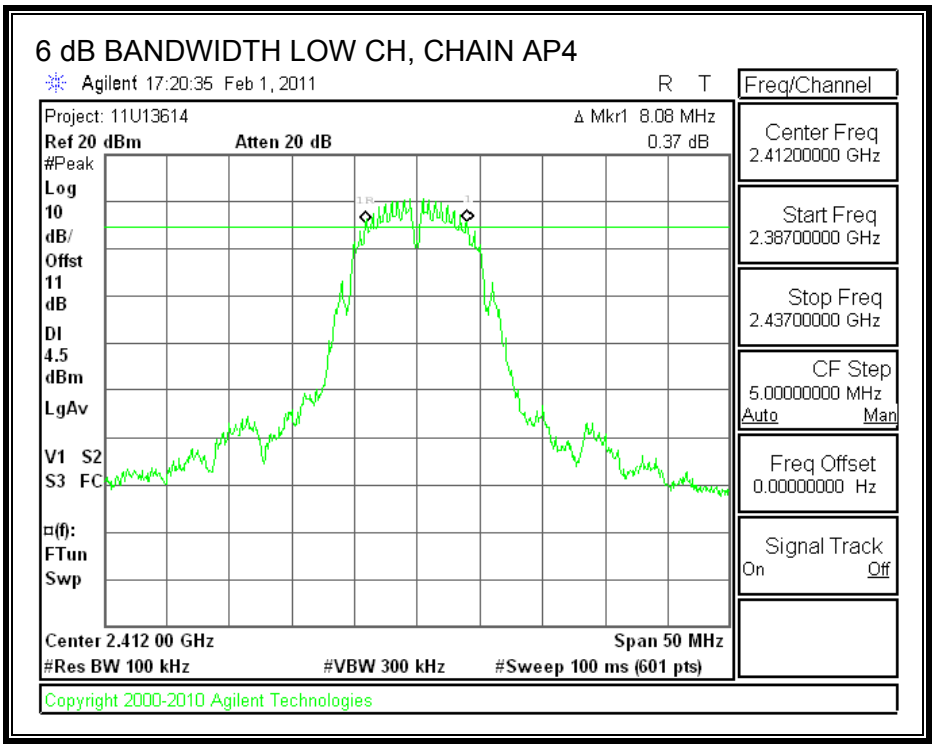
6 dB BANDWIDTH, CHAIN AP3

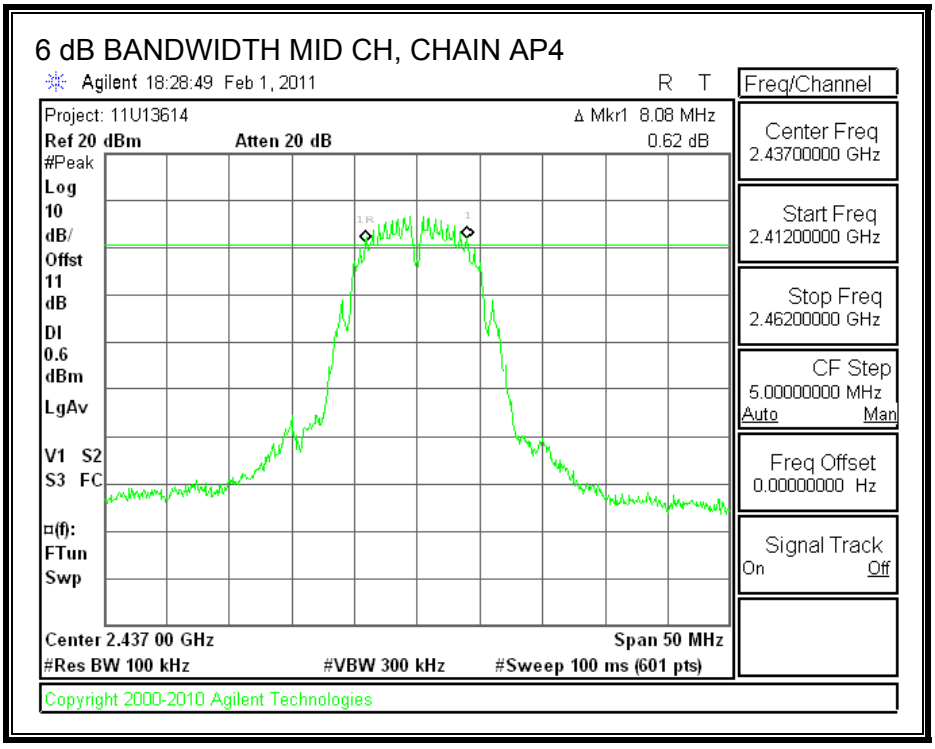


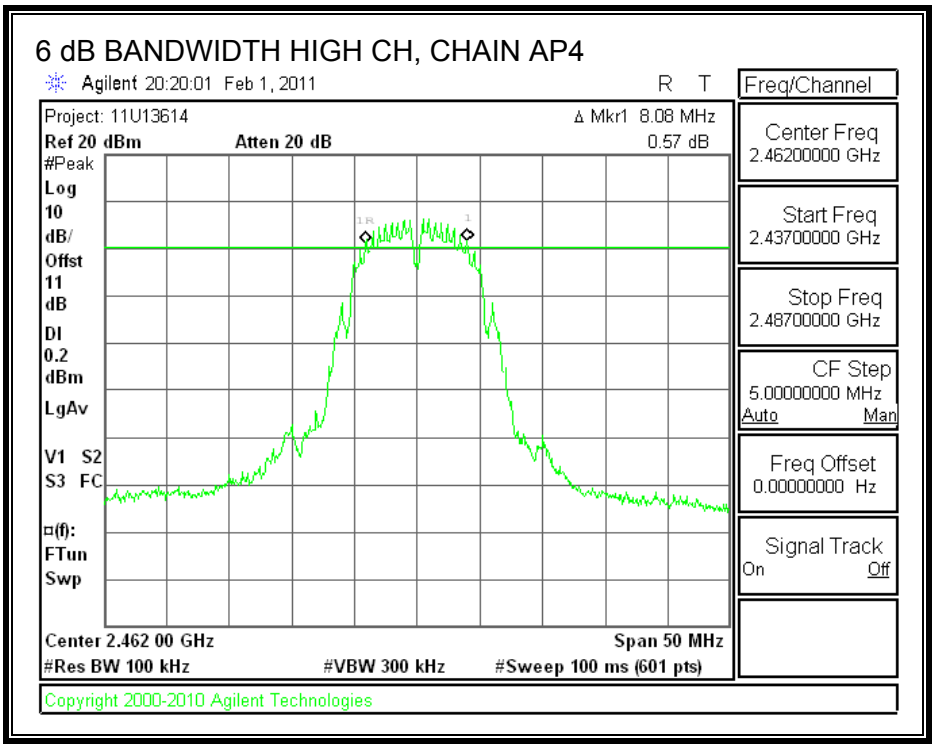




6 dB BANDWIDTH, CHAIN AP4







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

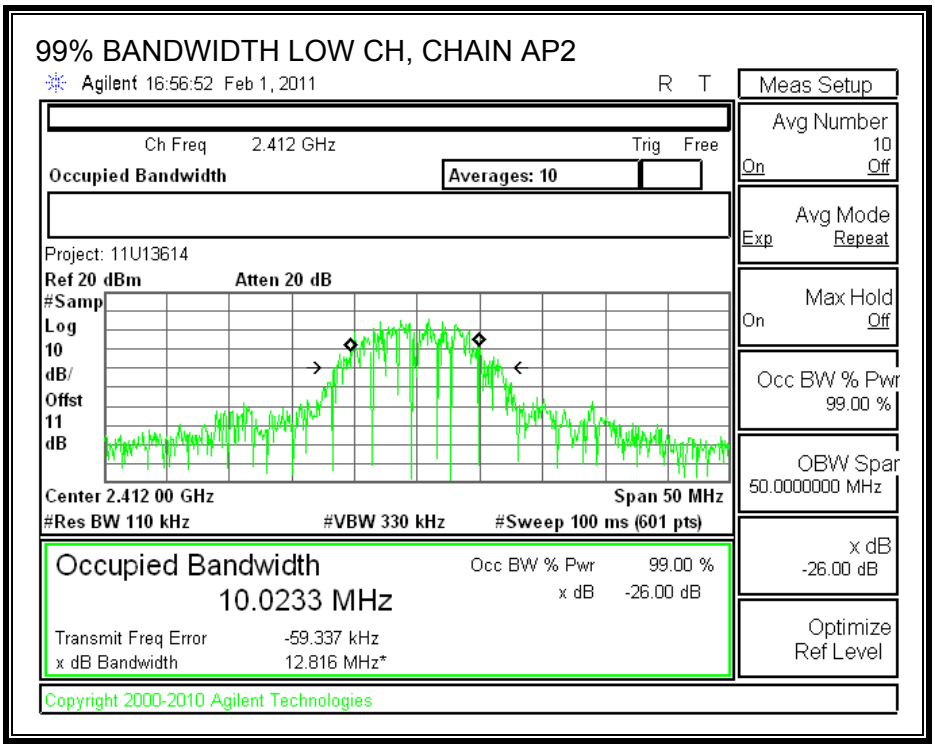
TEST PROCEDURE

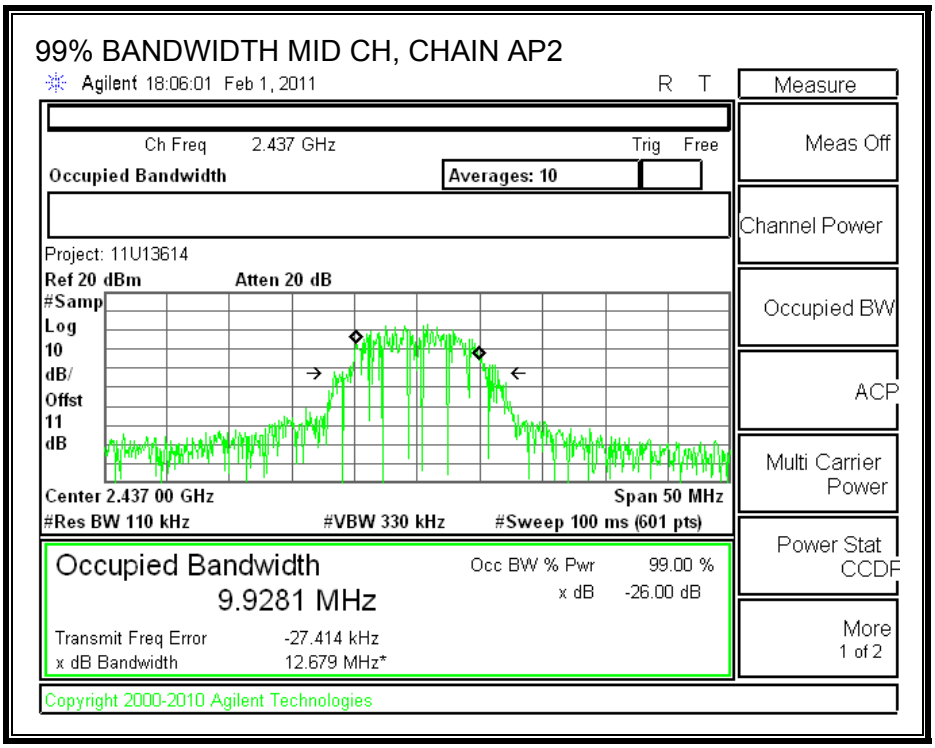
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

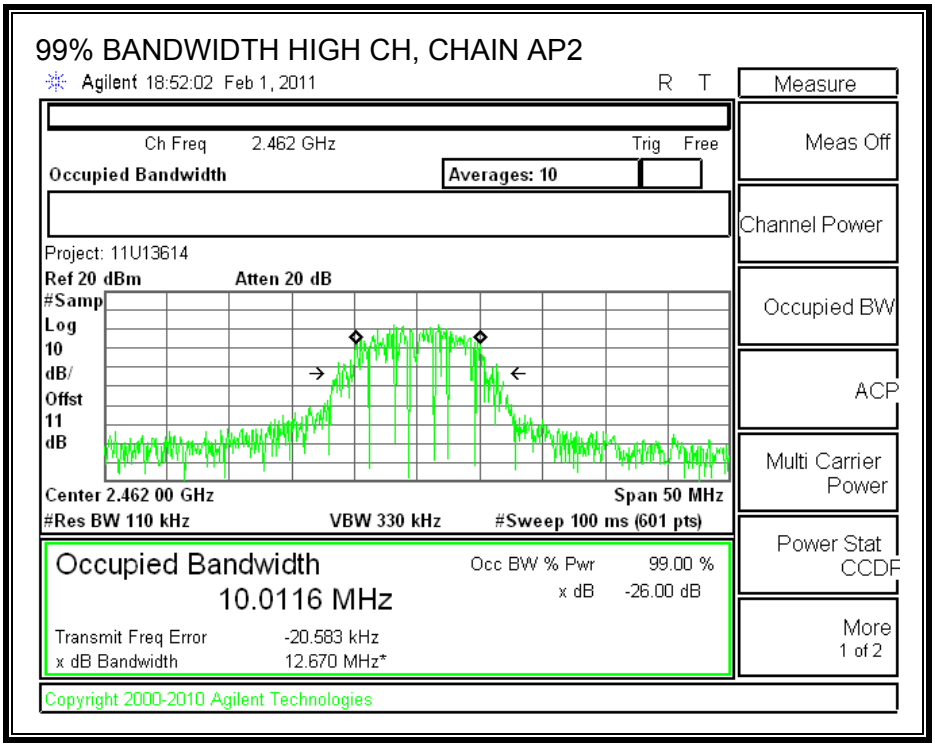
RESULTS

Channel	Frequency (MHz)	AP2 99% Bandwidth (MHz)	AP3 99% Bandwidth (MHz)	AP4 99% Bandwidth (MHz)
Low	2412	10.0233	10.0037	10.0165
Middle	2437	9.9281	9.9828	10.0297
High	2462	10.0116	9.9908	9.9641

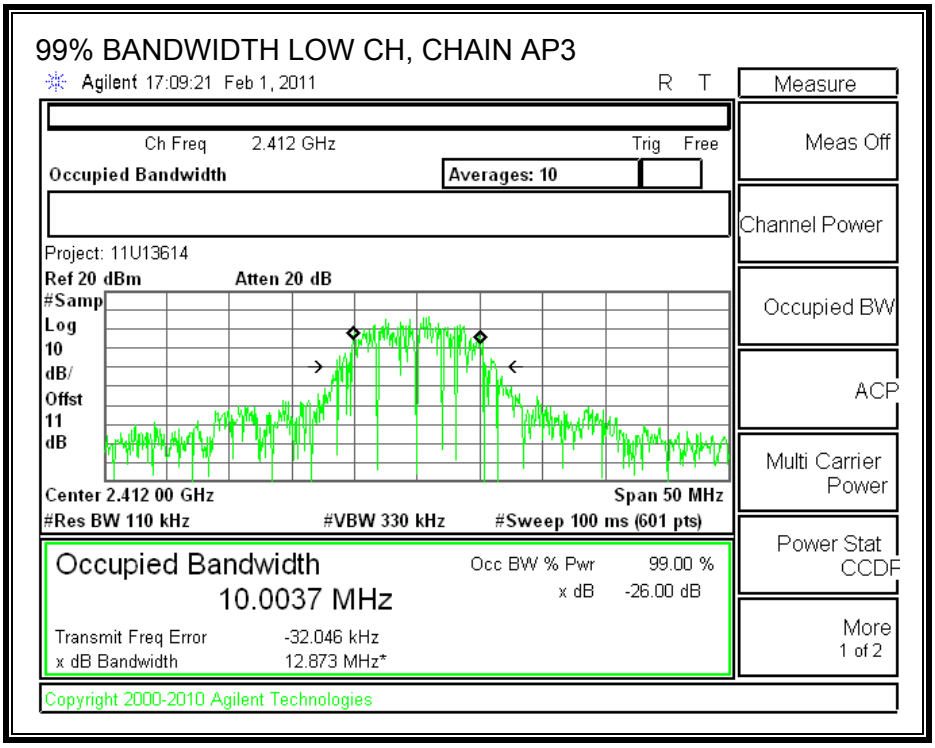
99% BANDWIDTH, CHAIN AP2

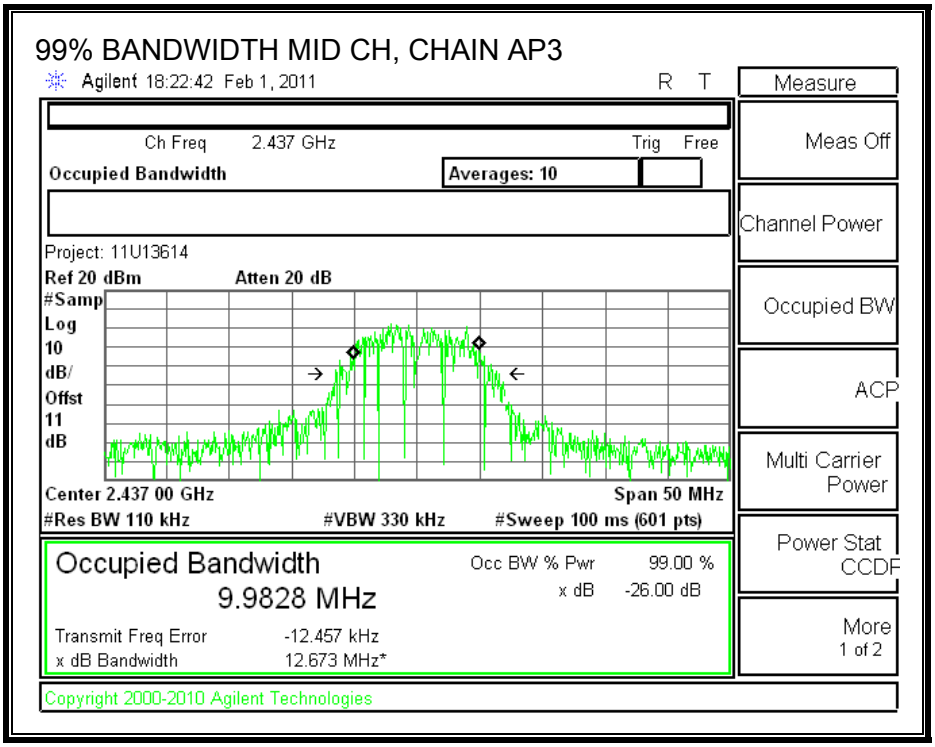


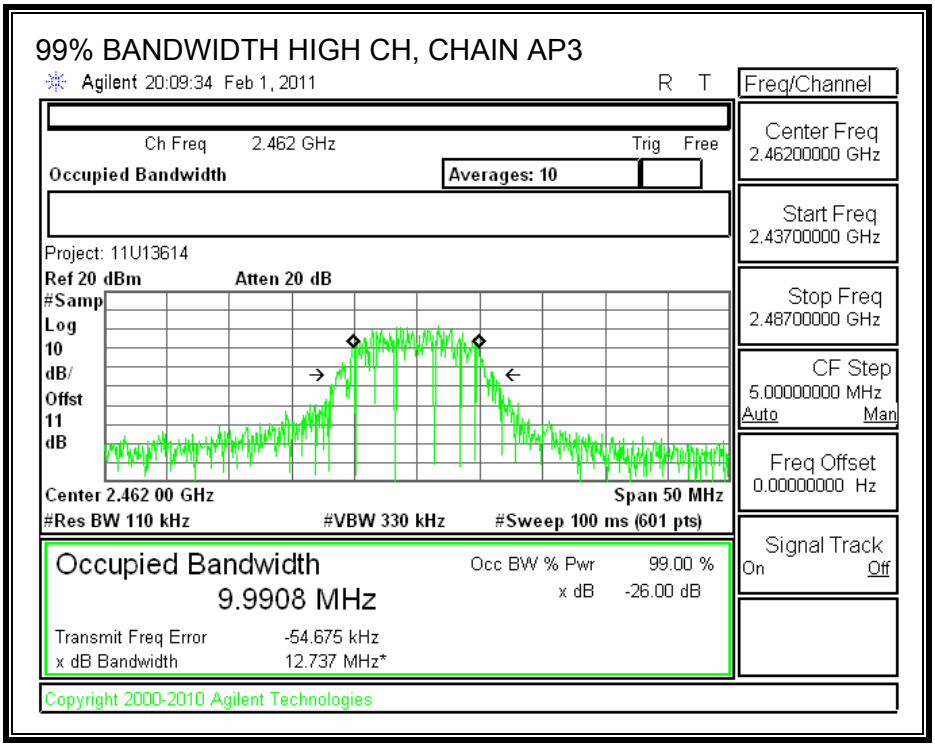




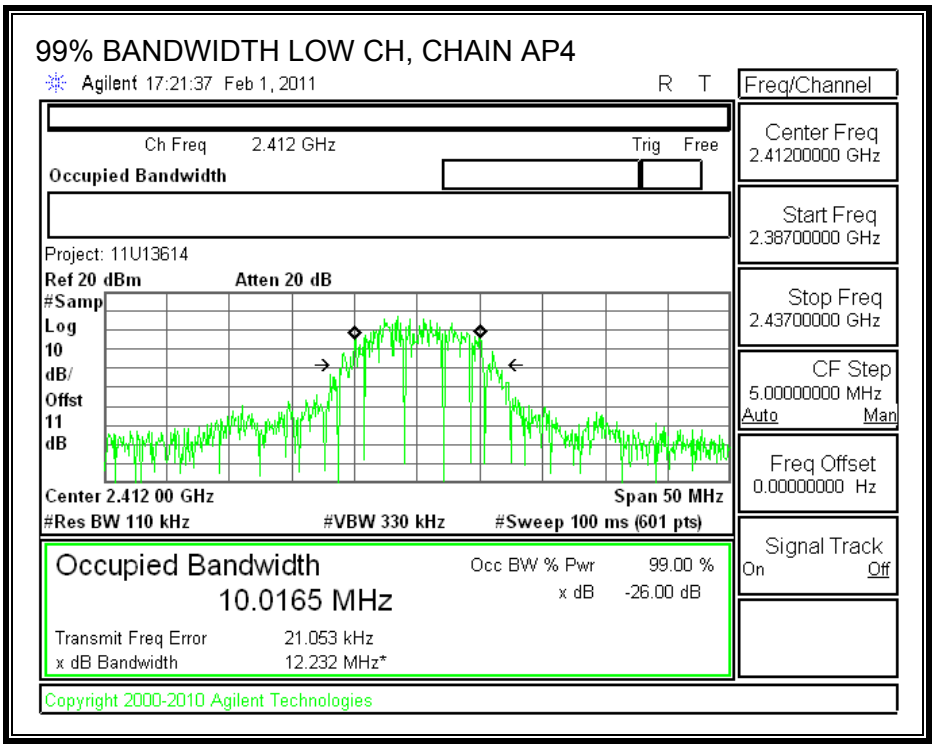
99% BANDWIDTH, CHAIN AP3

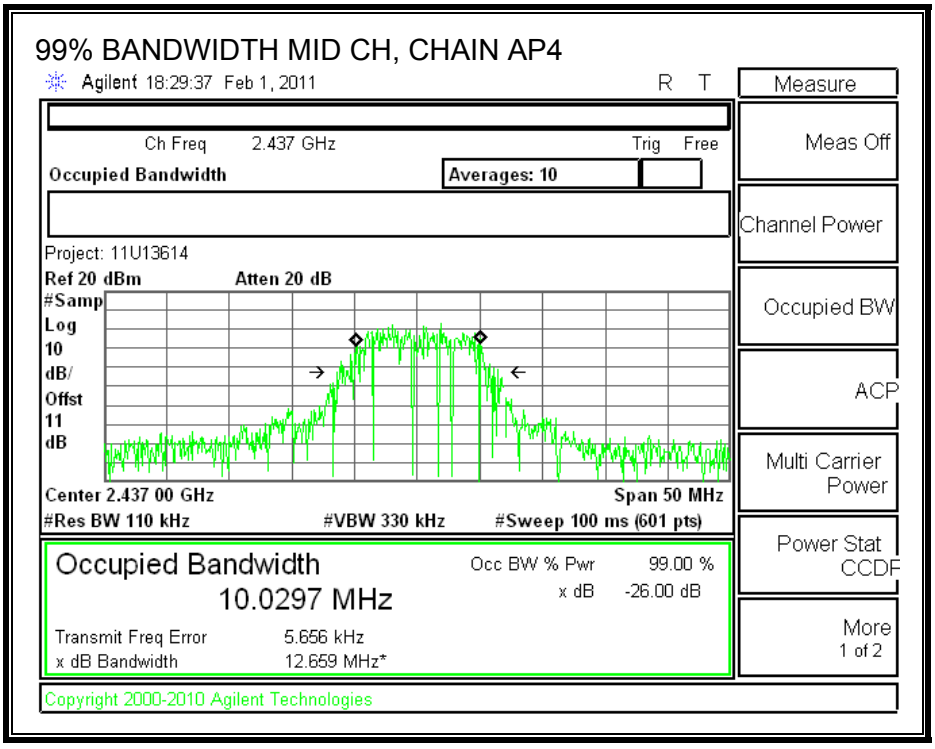


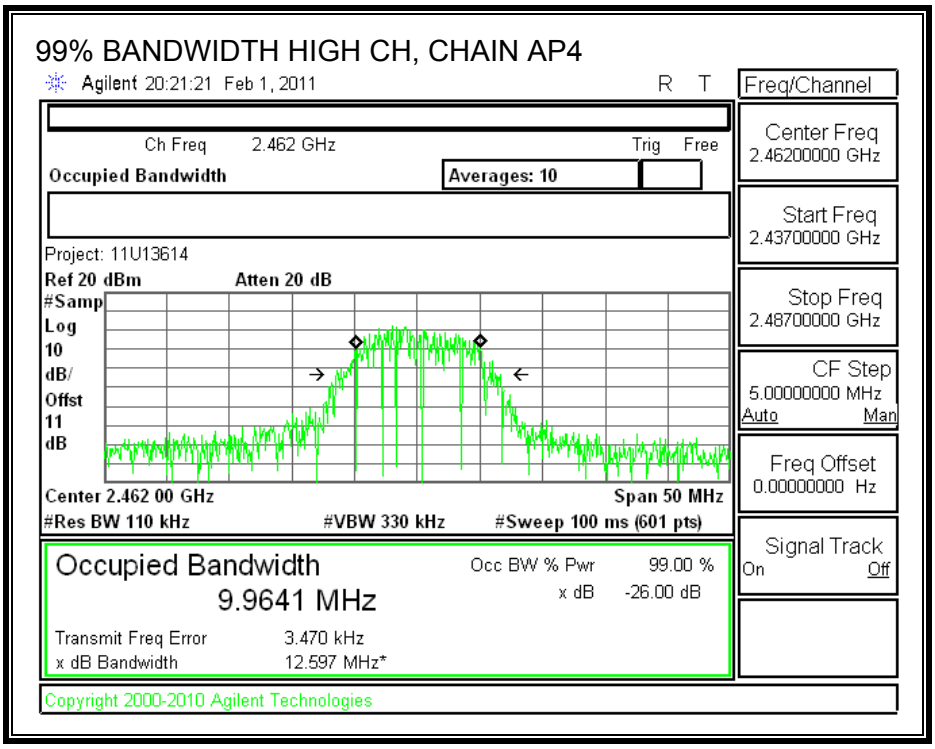




99% BANDWIDTH, CHAIN AP4







7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

Antenna Gain (AP2) (dBi)	Antenna Gain (AP3) (dBi)	Antenna Gain (AP4) (dBi)	Effective Legacy Gain (dBi)
1.41	2.33	1.83	6.64

The maximum effective legacy gain is 6.64Bi for other than fixed, point-to-point operations, therefore the limit is 29.36 dBm.

TEST PROCEDURE

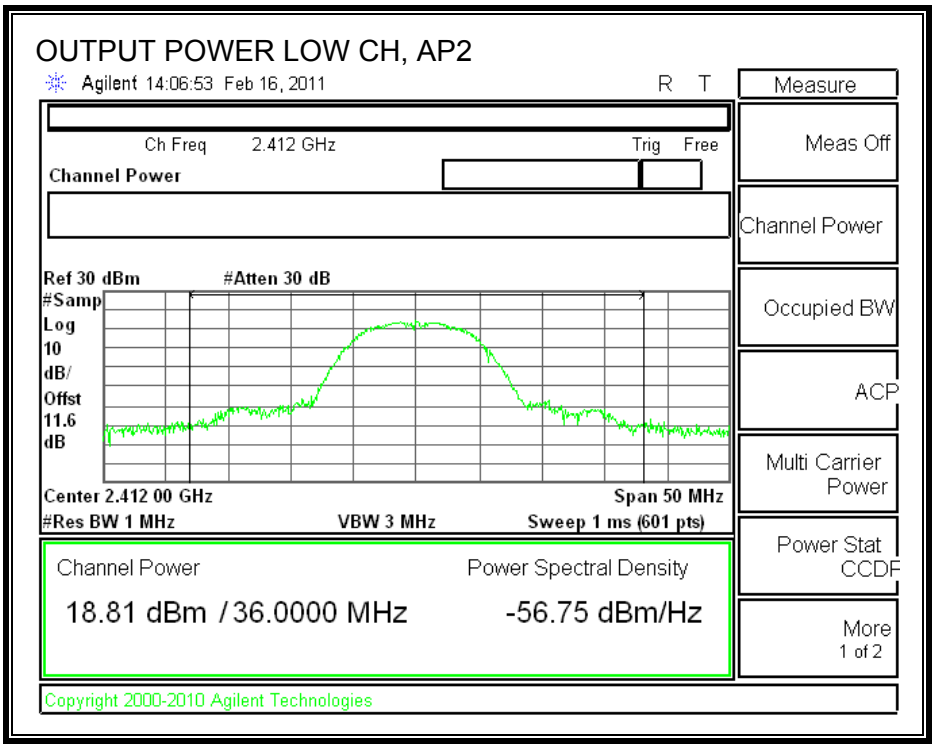
Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 26dB bandwidth.

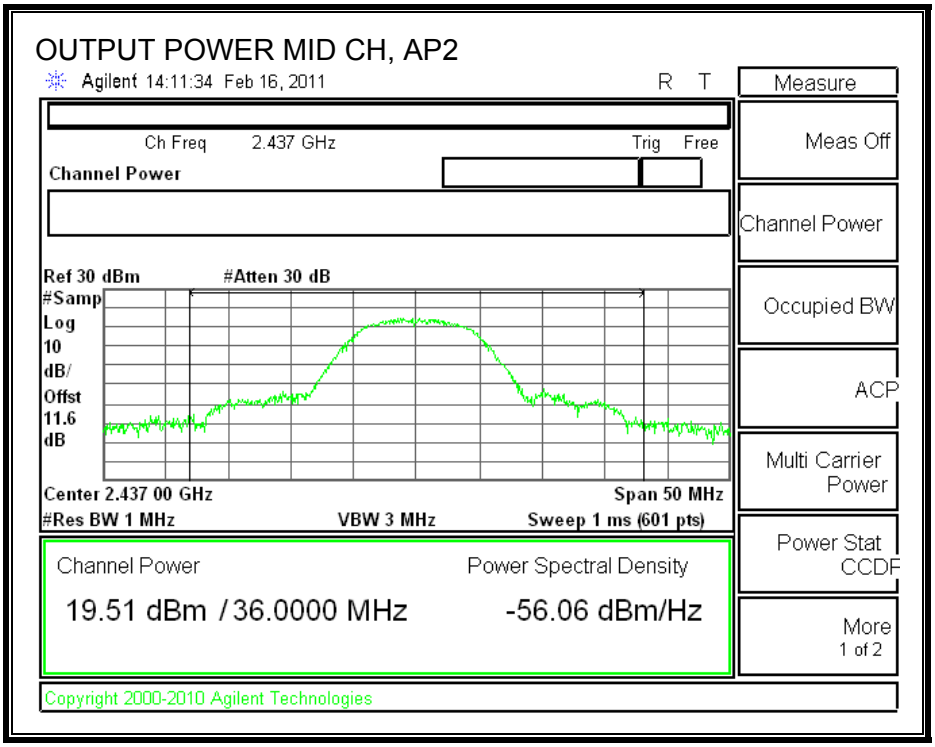
Maximum Conducted Output Power based on RMS averaging over a time interval is measured in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005. The transmitter operates continuously therefore Power Output Option 2, Method # 1 is used.

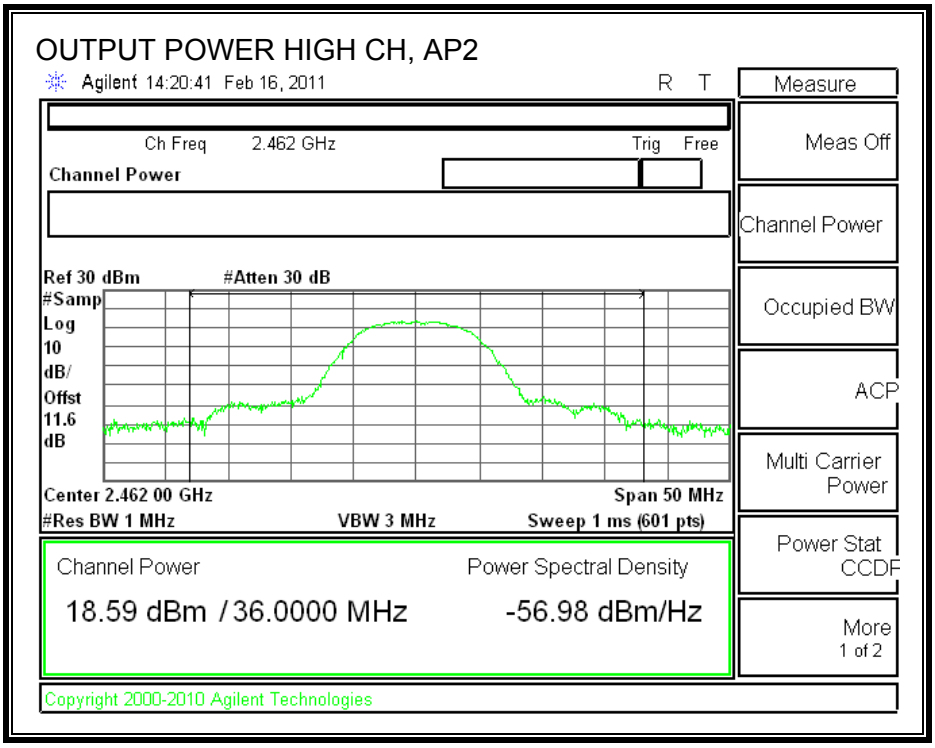
RESULTS

Channel	Frequency (MHz)	Chain AP2 Power (dBm)	Chain AP3 Power (dBm)	Chain AP4 Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	18.81	18.35	19.11	0.00	23.54	29.36	-5.82
Mid	2437	19.51	18.98	19.48	0.00	24.10	29.36	-5.26
High	2462	18.59	18.31	18.50	0.00	23.24	29.36	-6.12

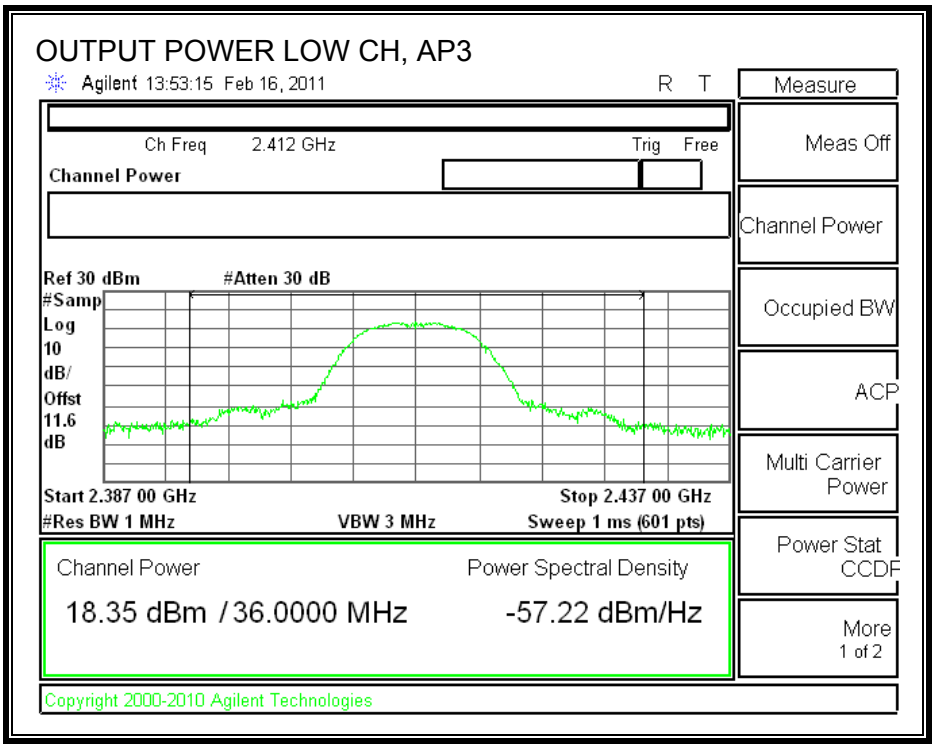
AP2 OUTPUT POWER

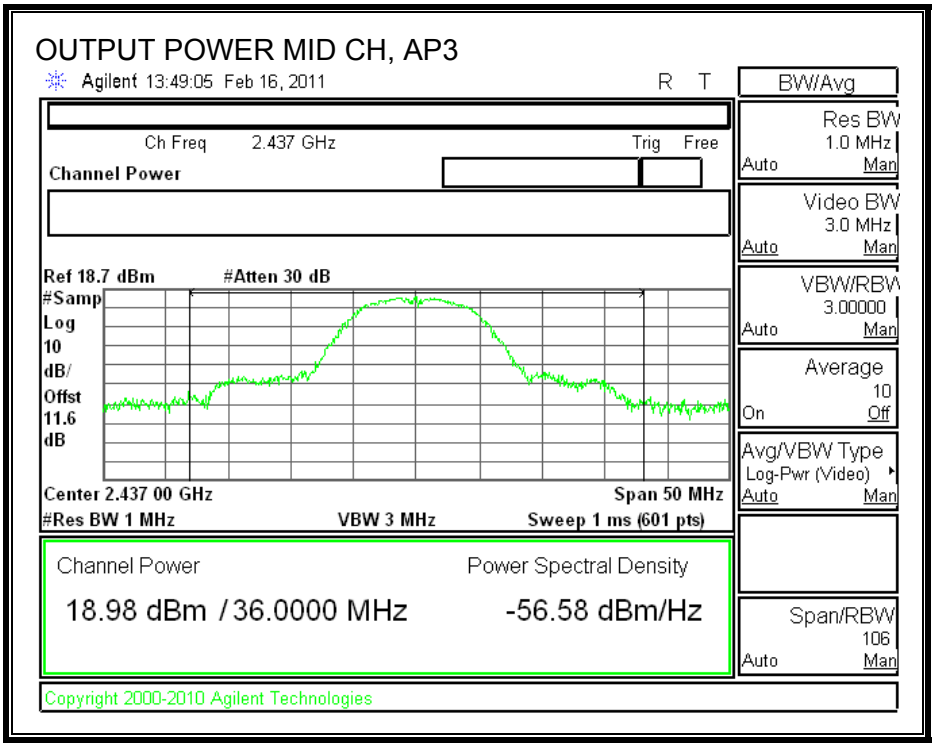


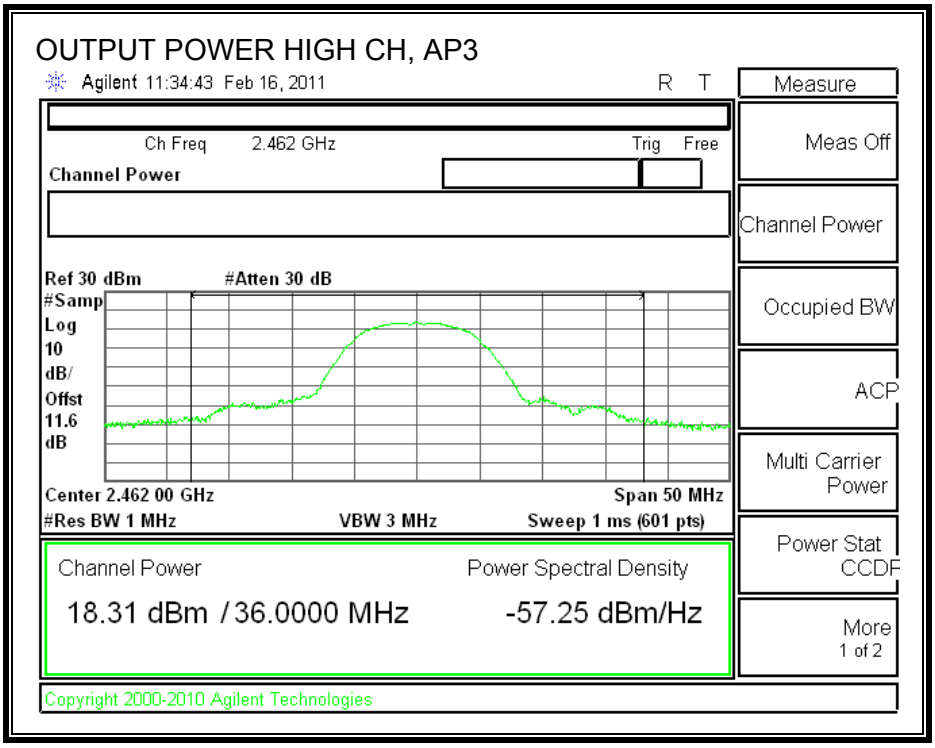




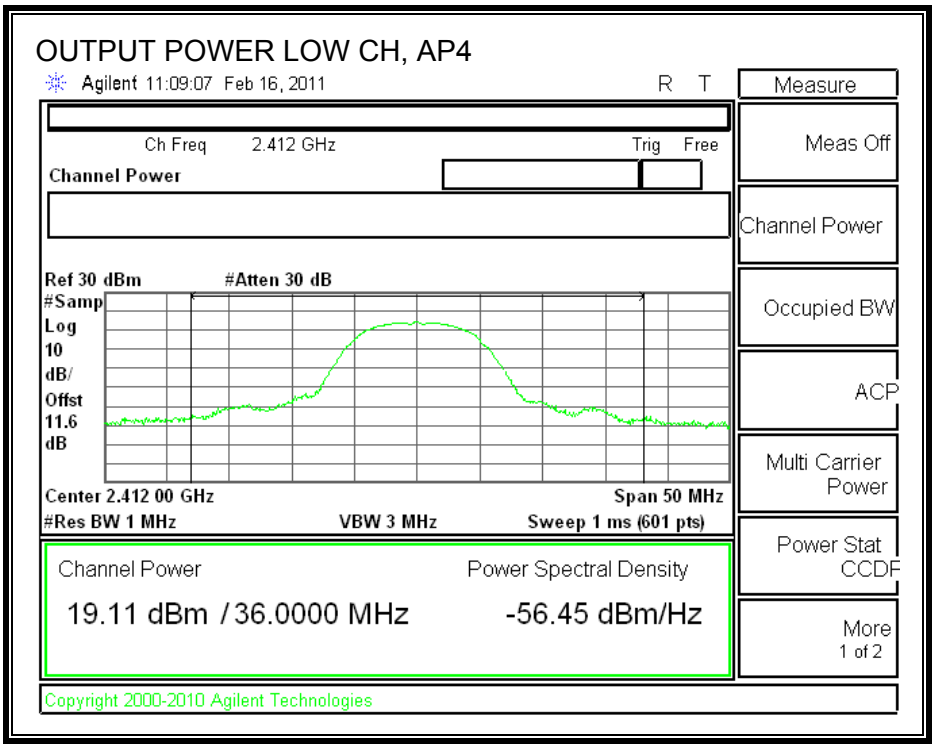
AP3 OUTPUT POWER

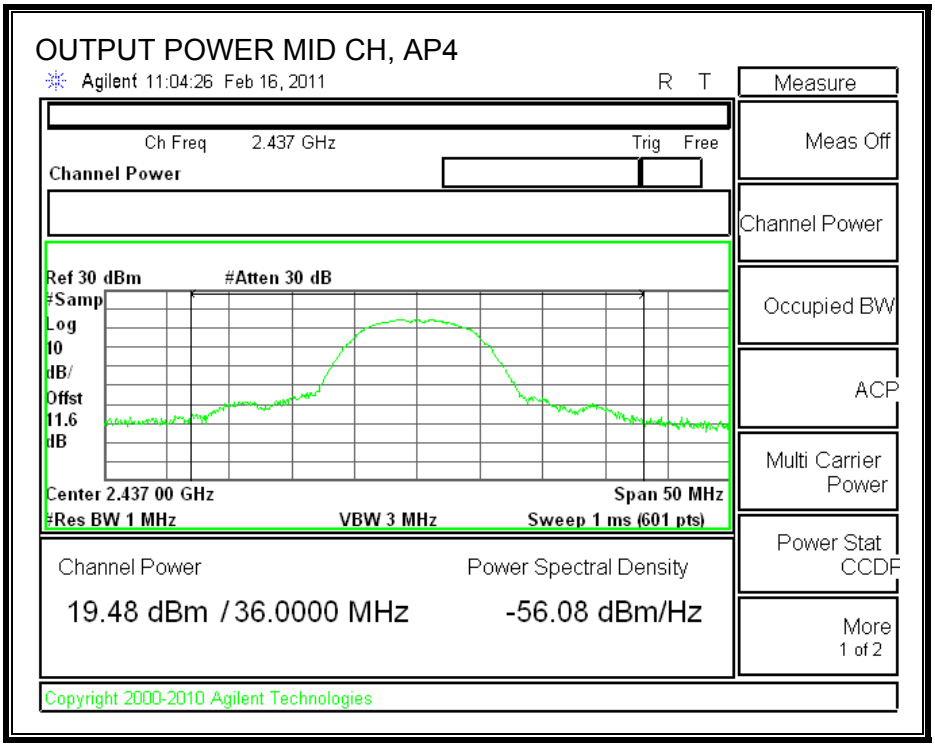


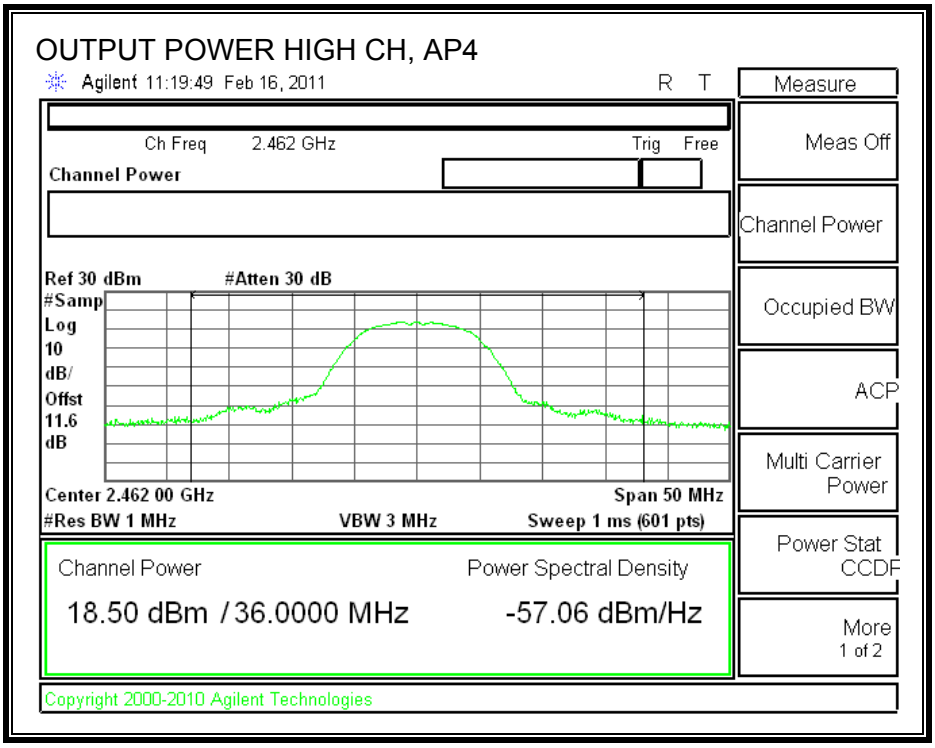




AP4 OUTPUT POWER







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.

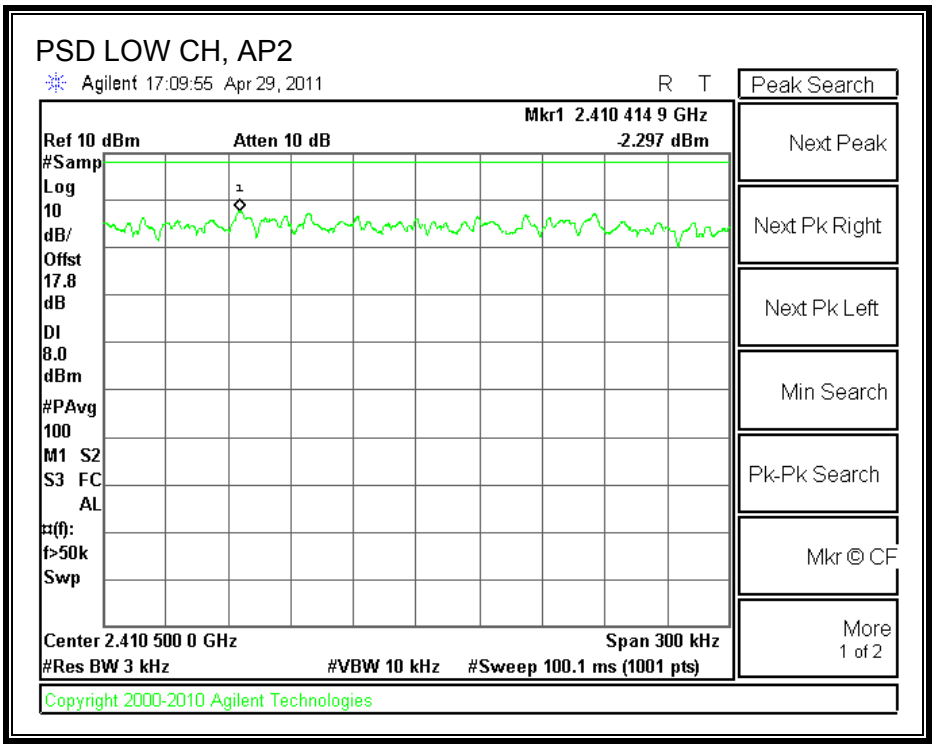
TEST PROCEDURE

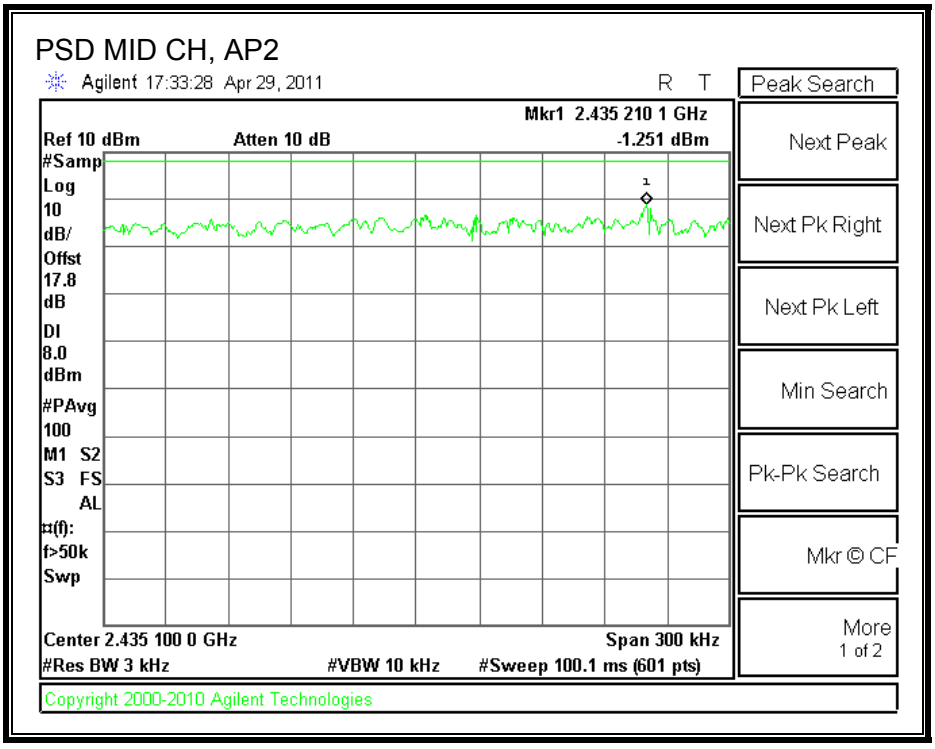
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

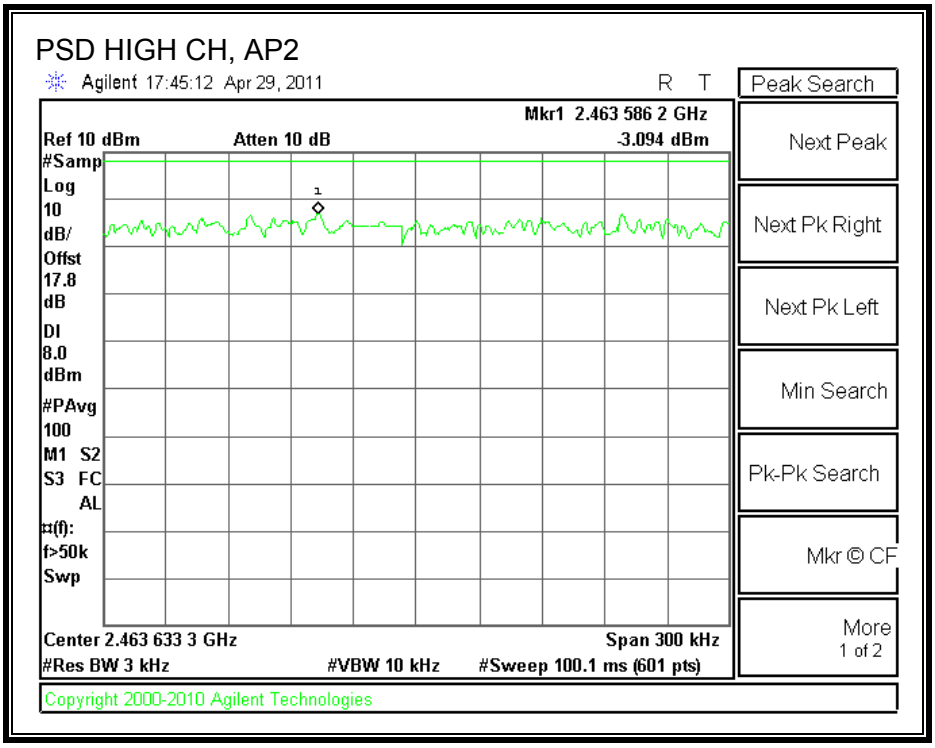
RESULTS

Channel	Frequency (MHz)	AP2 PSD (dBm)	AP3 PSD (dBm)	AP4 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-2.297	-1.812	-2.706	2.51	8	-5.49
Middle	2437	-1.251	-2.343	-2.839	2.68	8	-5.32
High	2462	-3.094	-0.539	-2.998	2.73	8	-5.27

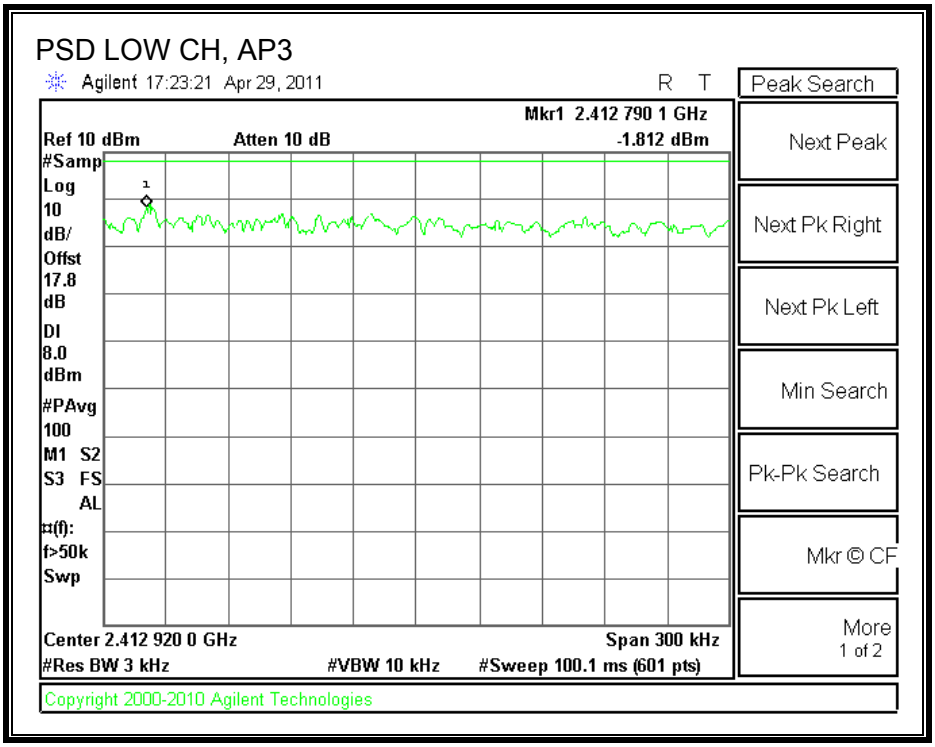
POWER SPECTRAL DENSITY, AP2



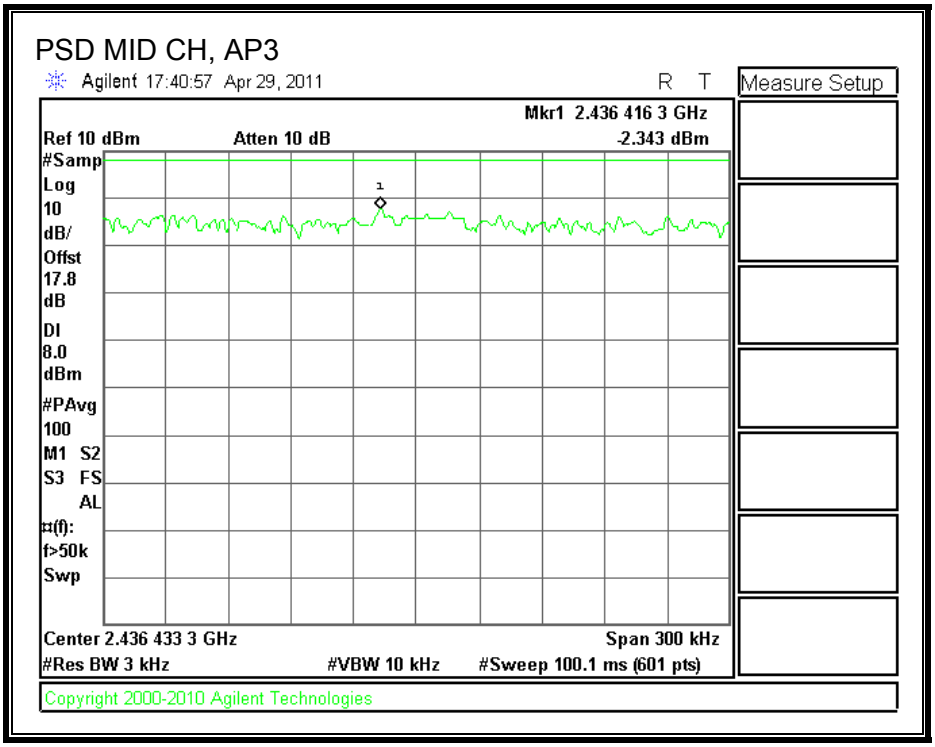




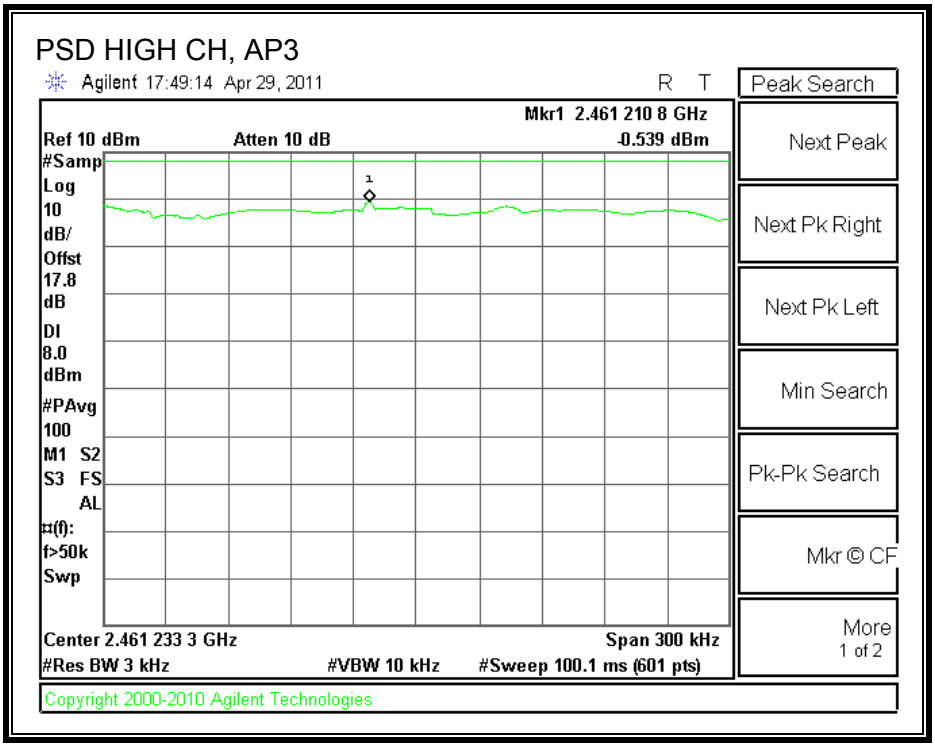
POWER SPECTRAL DENSITY, AP3



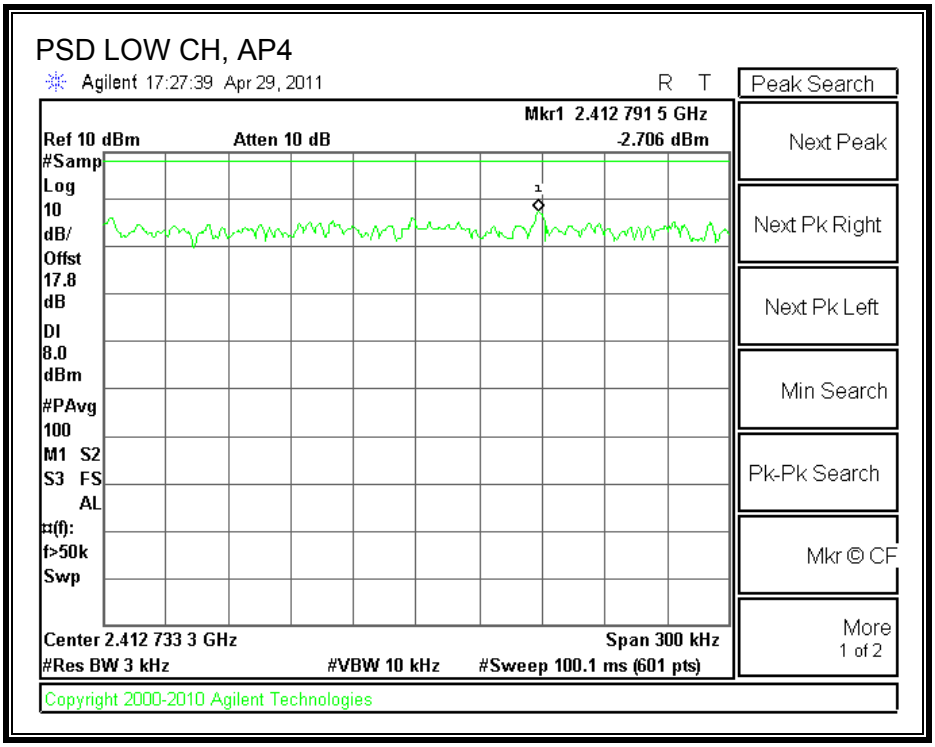
PSD MID CH, AP3

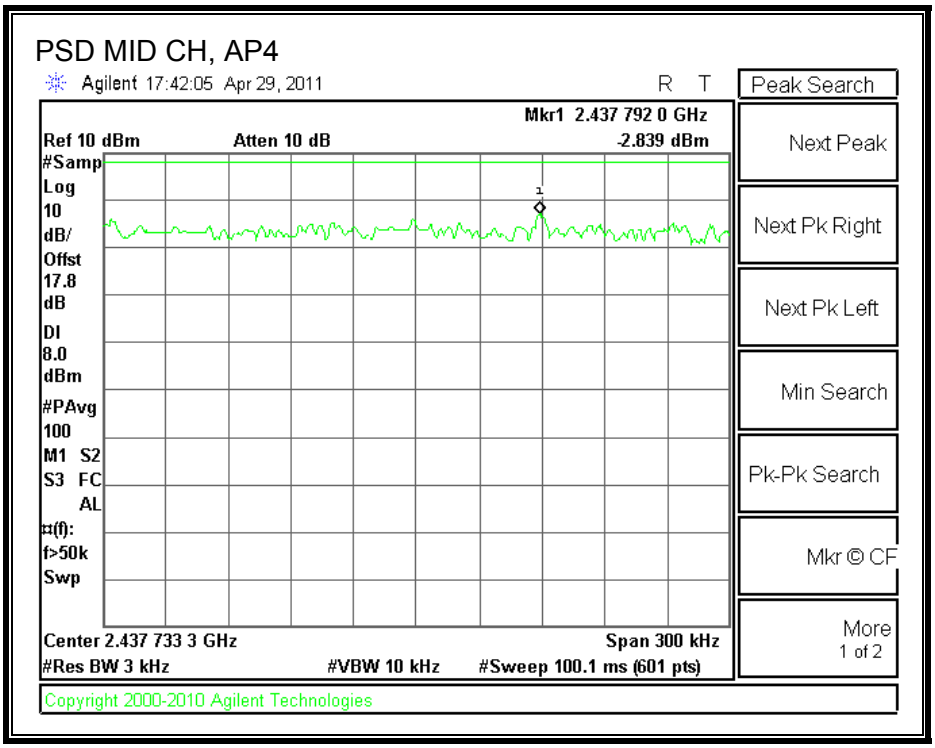


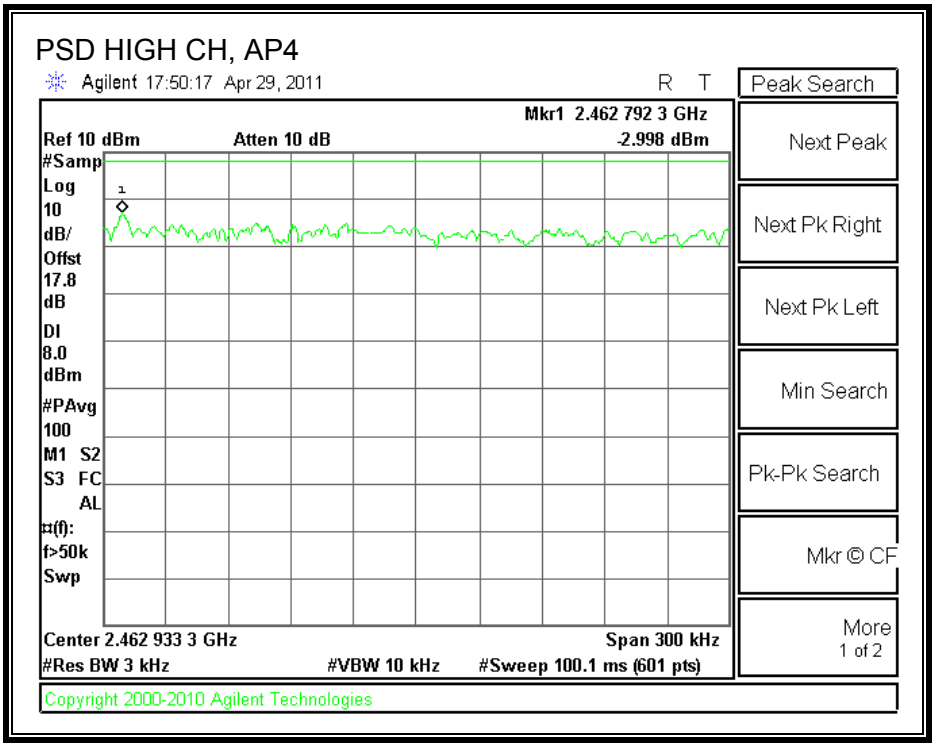
PSD HIGH CH, AP3



POWER SPECTRAL DENSITY, AP4







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 RMS averaging over time interval; therefore the required attenuation is 30 dB.

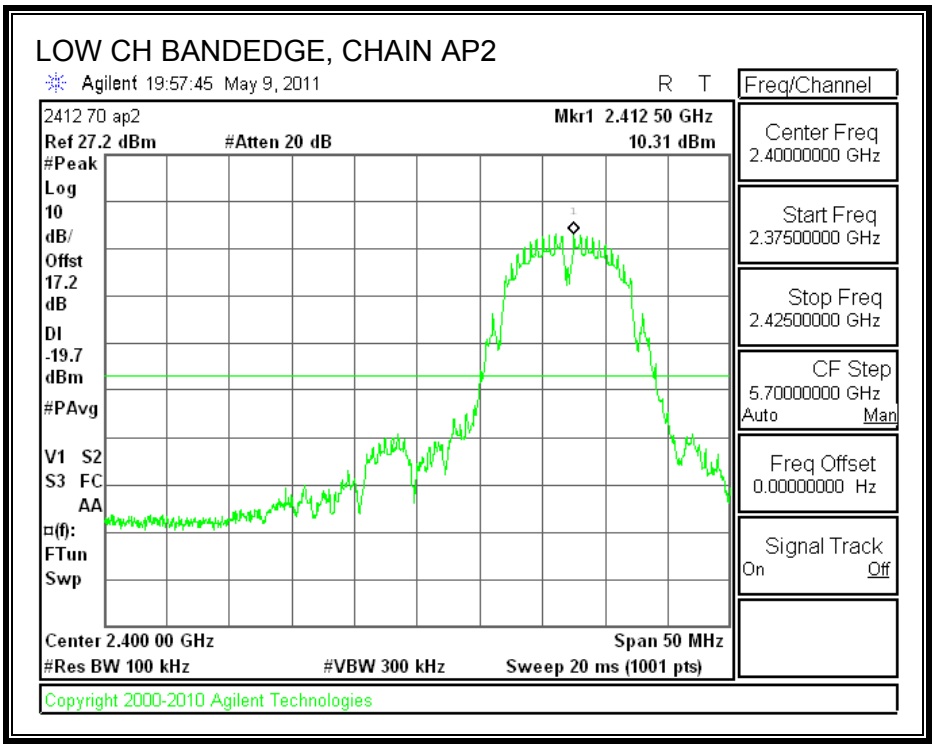
TEST PROCEDURE

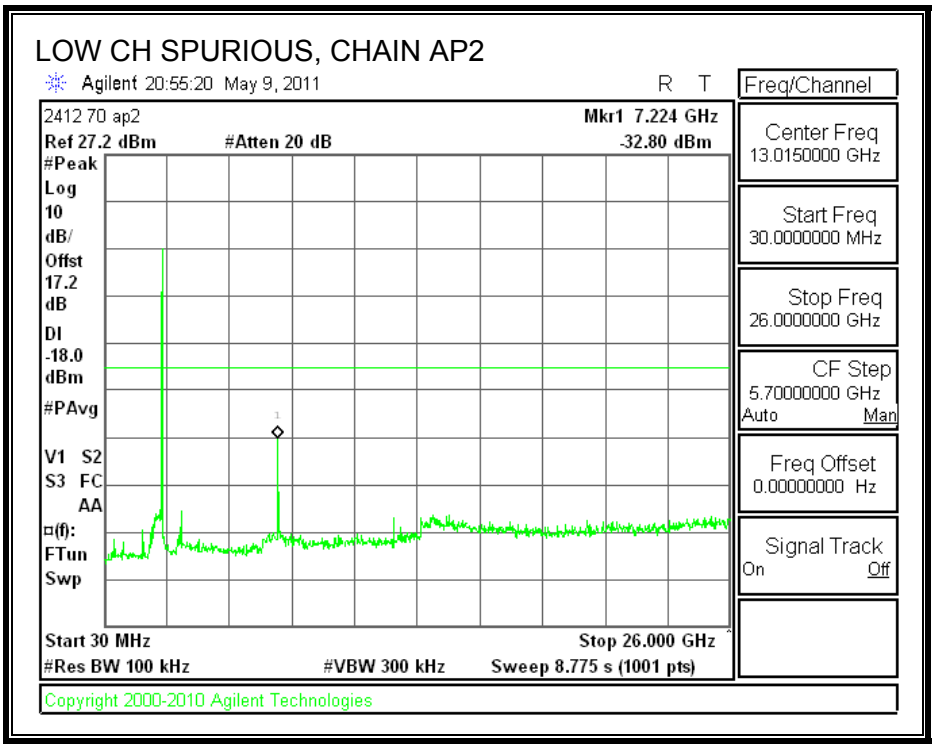
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

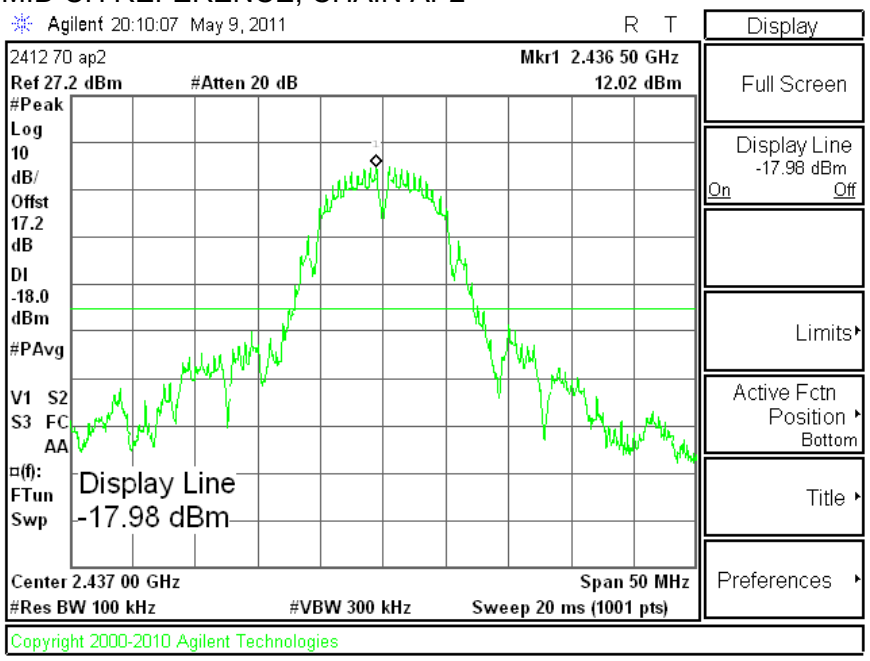
RESULTS

CHAIN AP2 SPURIOUS EMISSIONS

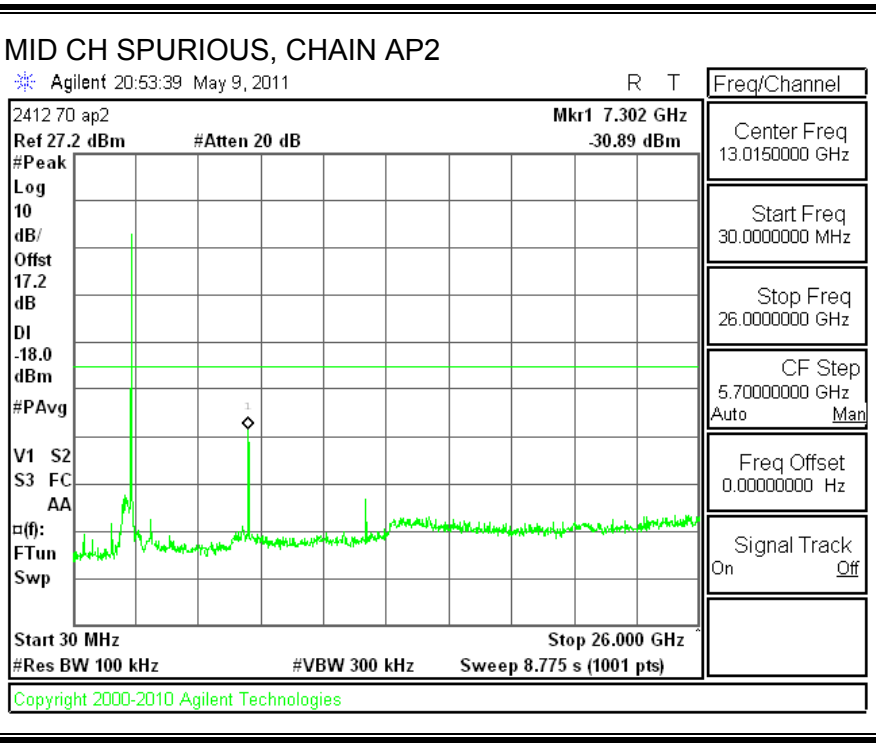




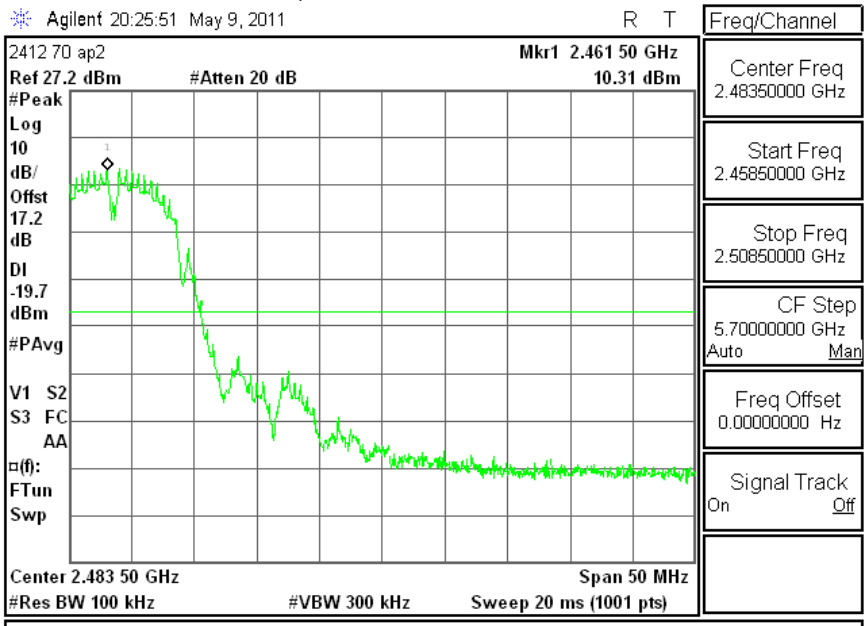
MID CH REFERENCE, CHAIN AP2



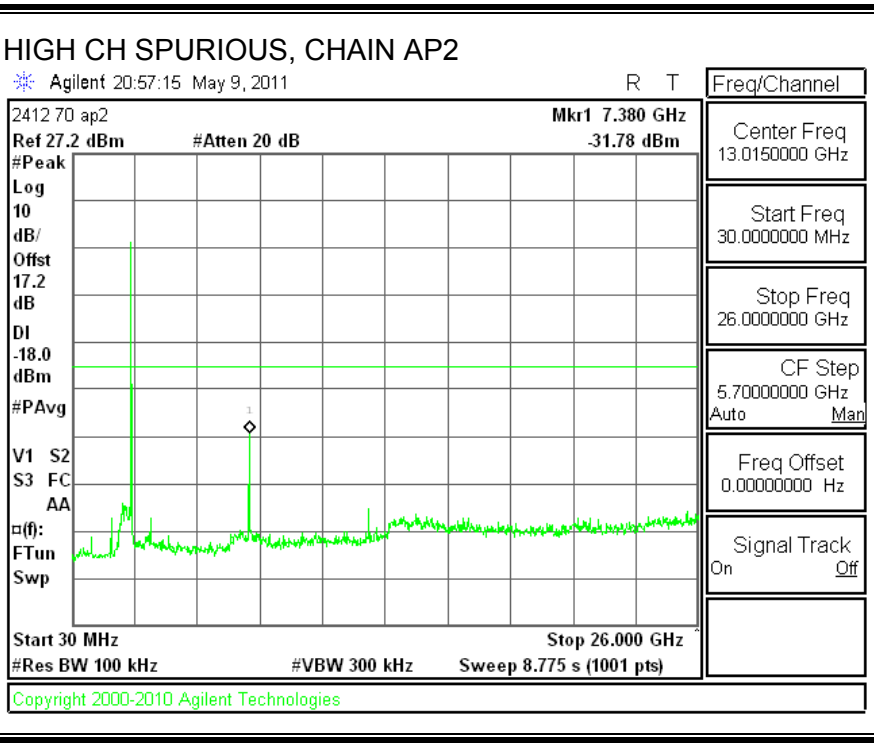
MID CH SPURIOUS, CHAIN AP2



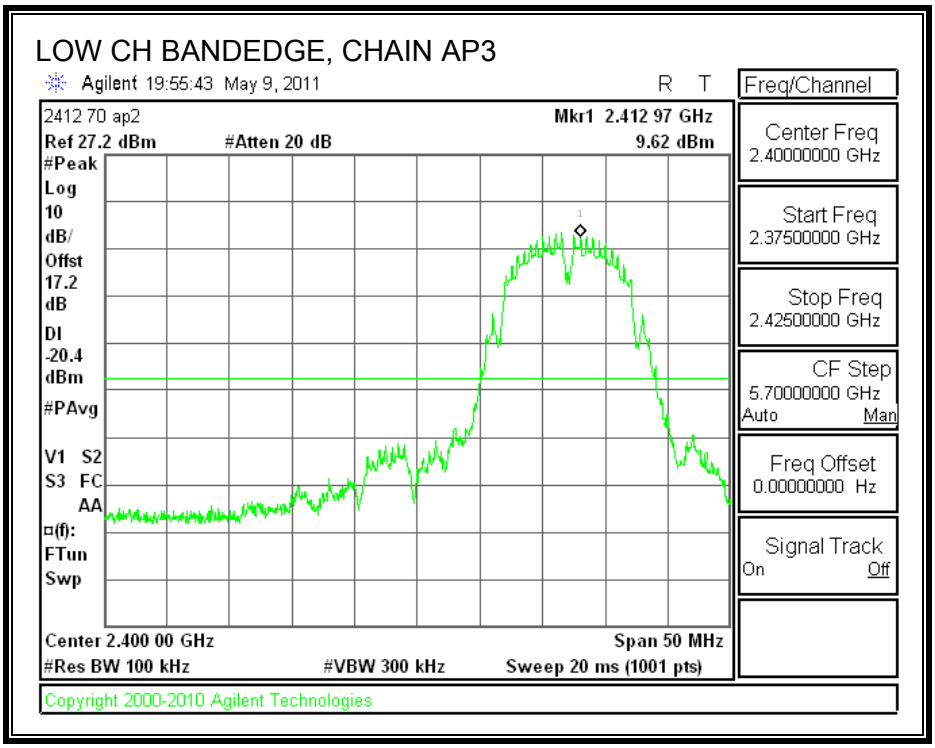
HIGH CH BANDEDGE, CHAIN AP2

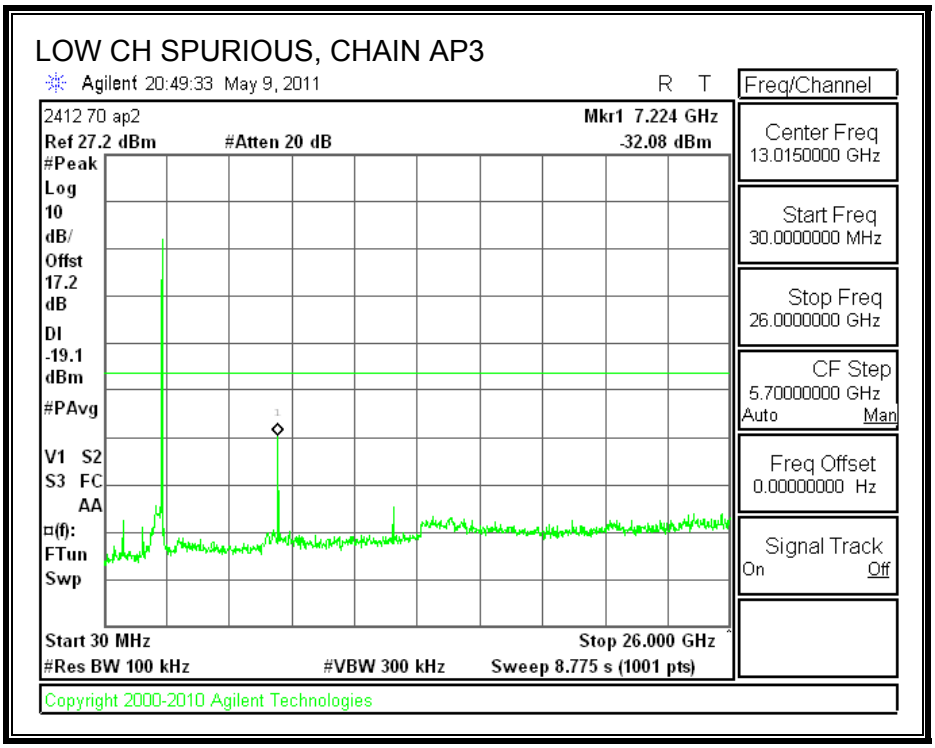


HIGH CH SPURIOUS, CHAIN AP2

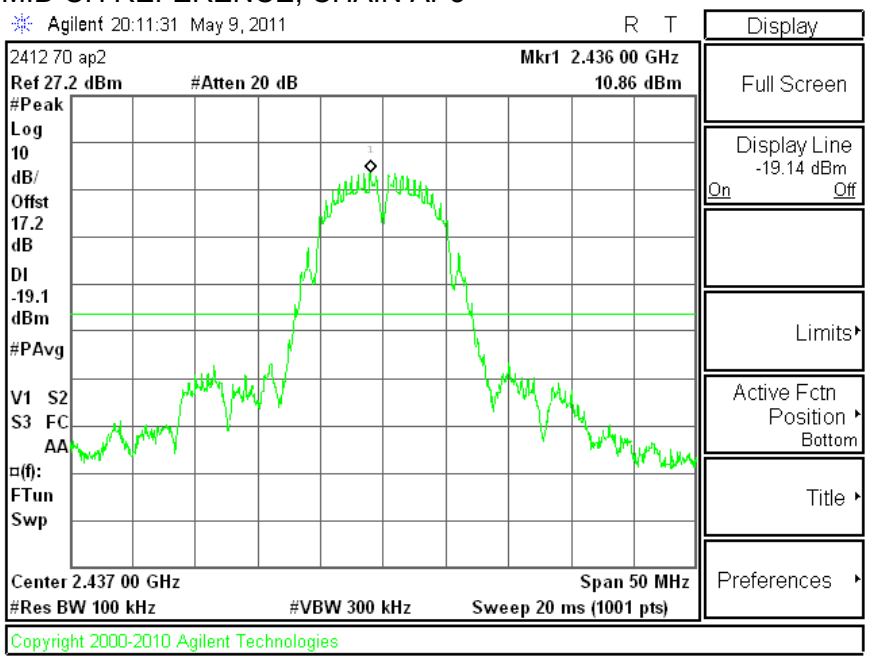


CHAIN AP3 SPURIOUS EMISSIONS

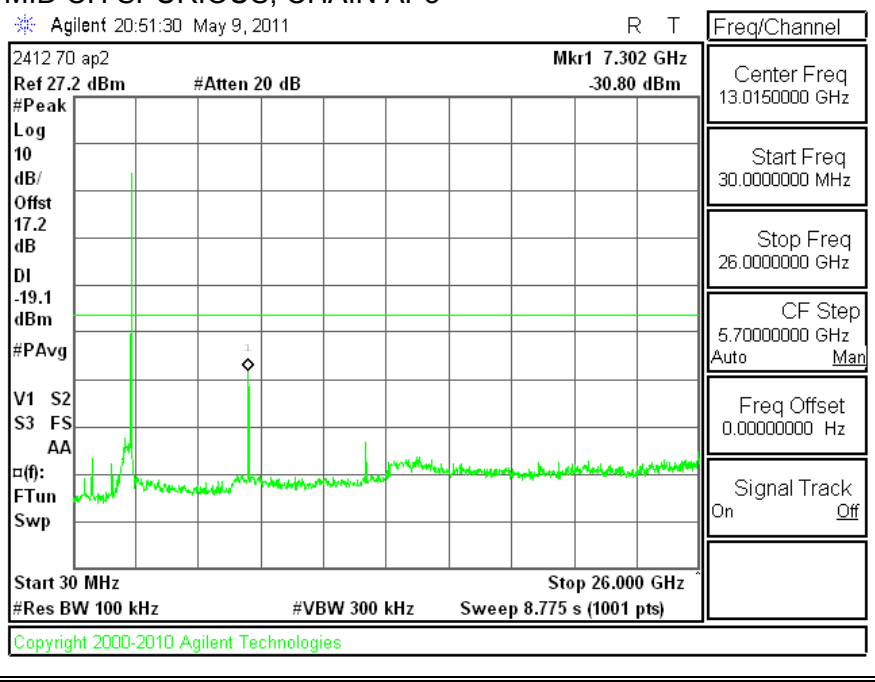




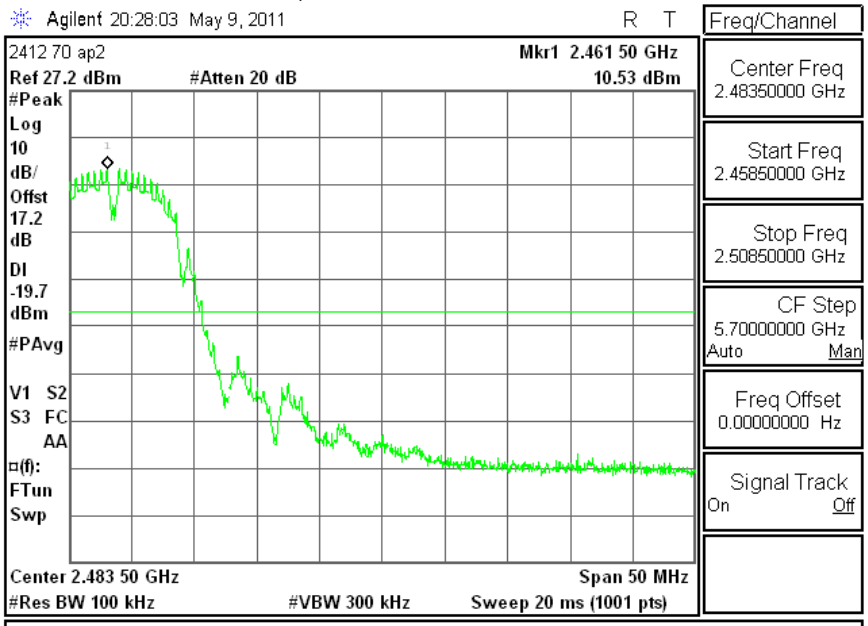
MID CH REFERENCE, CHAIN AP3



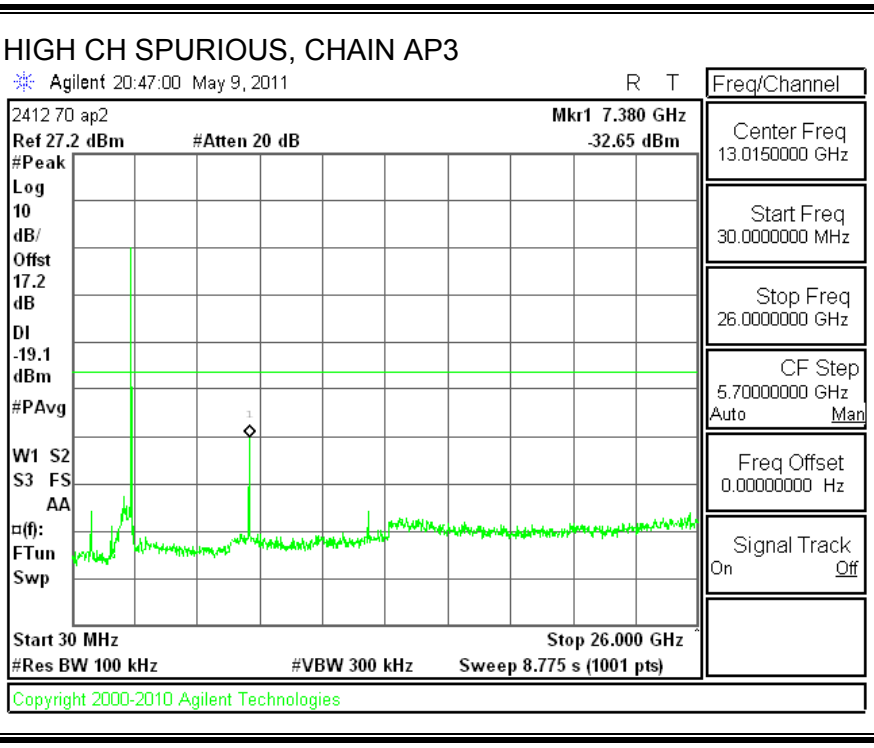
MID CH SPURIOUS, CHAIN AP3



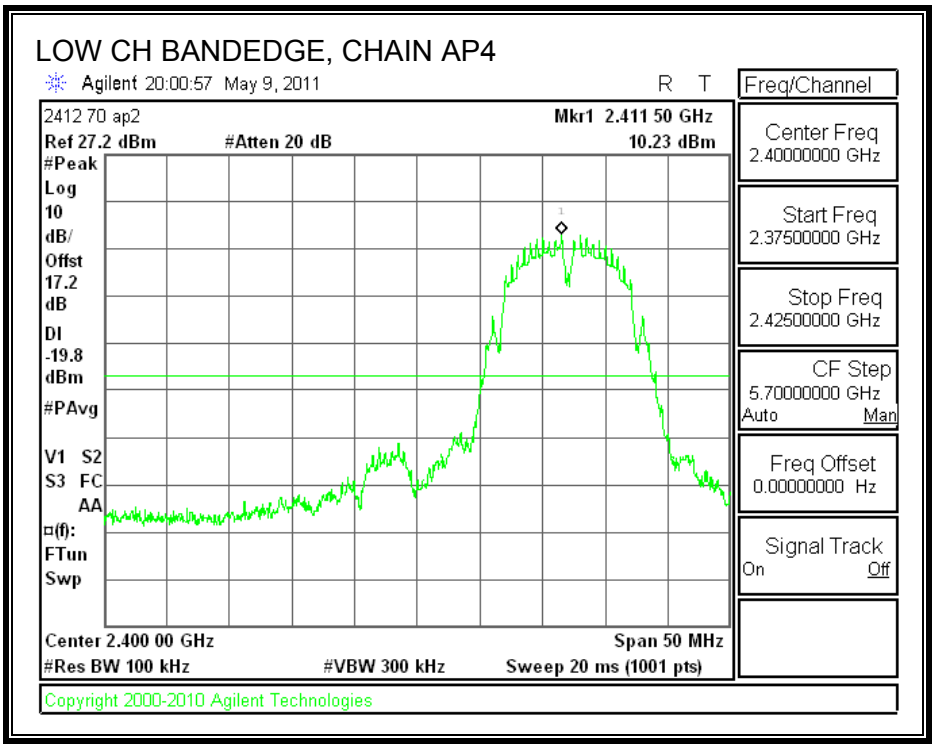
HIGH CH BANDEDGE, CHAIN AP3

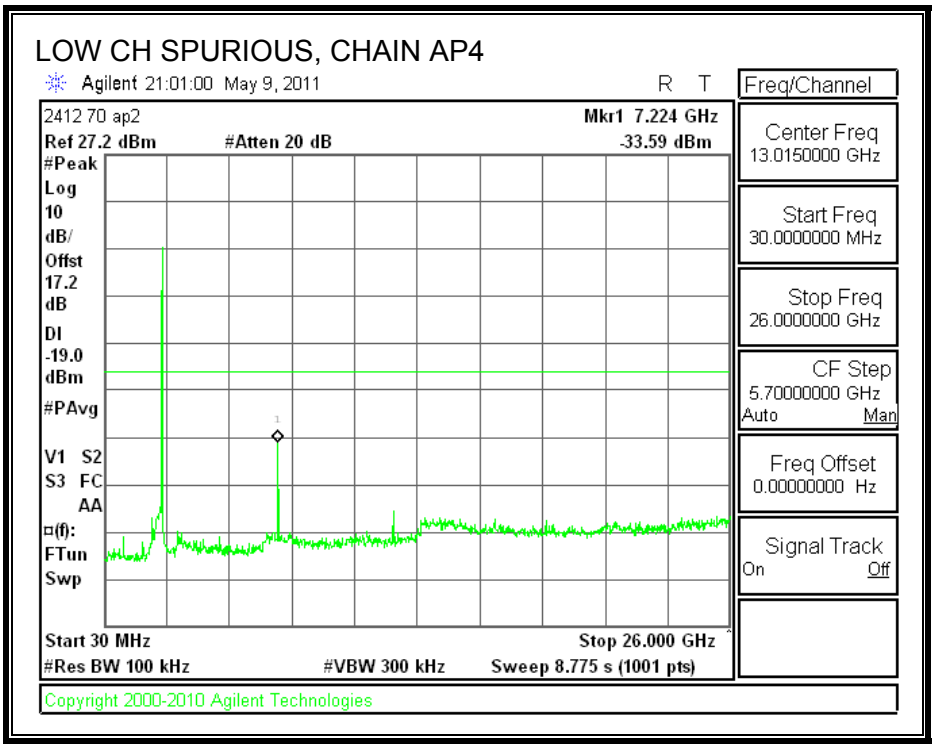


HIGH CH SPURIOUS, CHAIN AP3

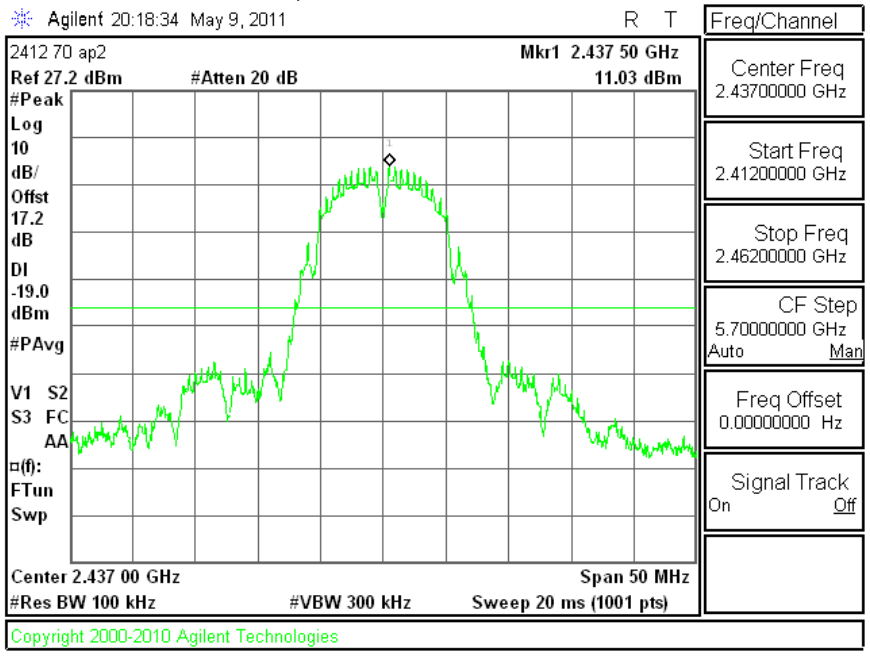


CHAIN AP4 SPURIOUS EMISSIONS

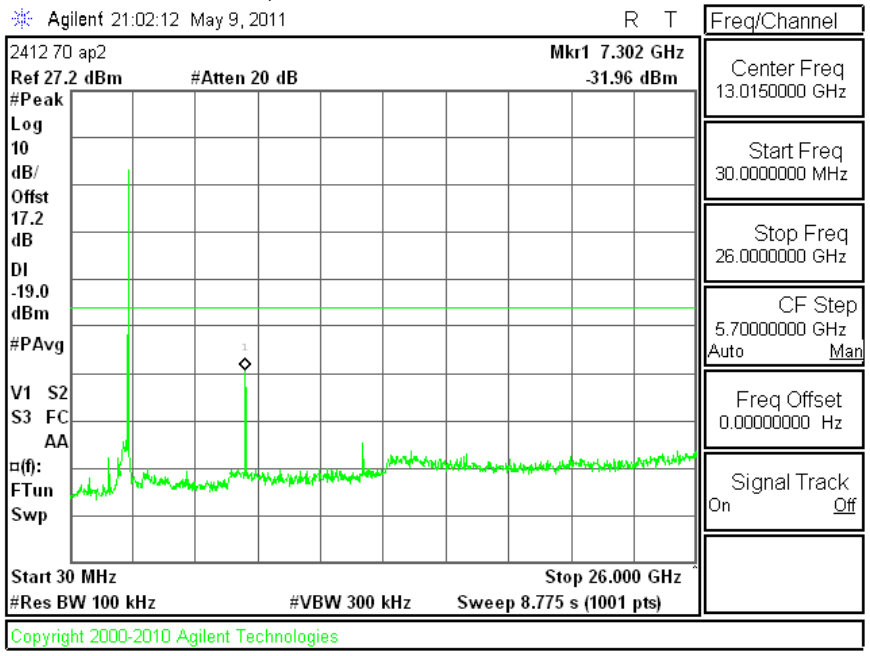




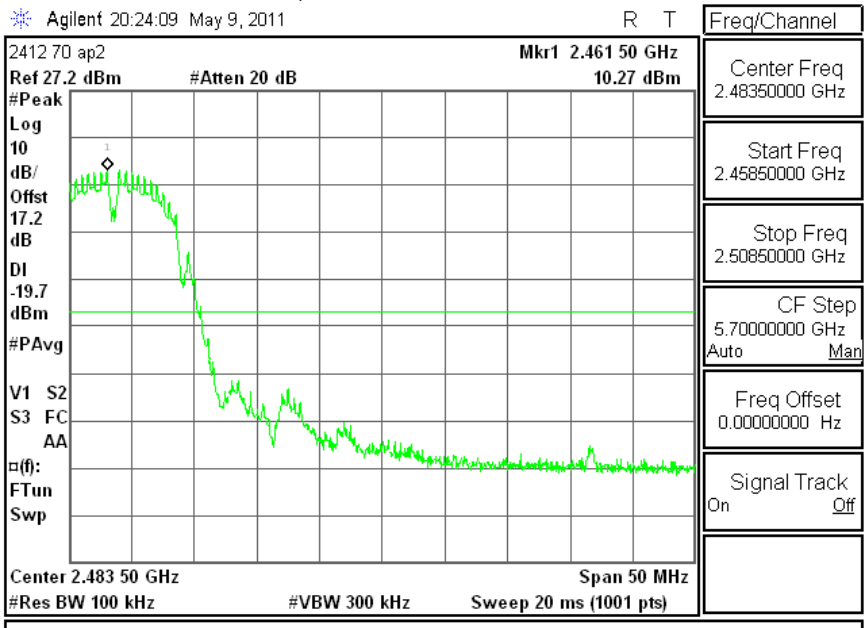
MID CH REFERENCE, CHAIN AP4



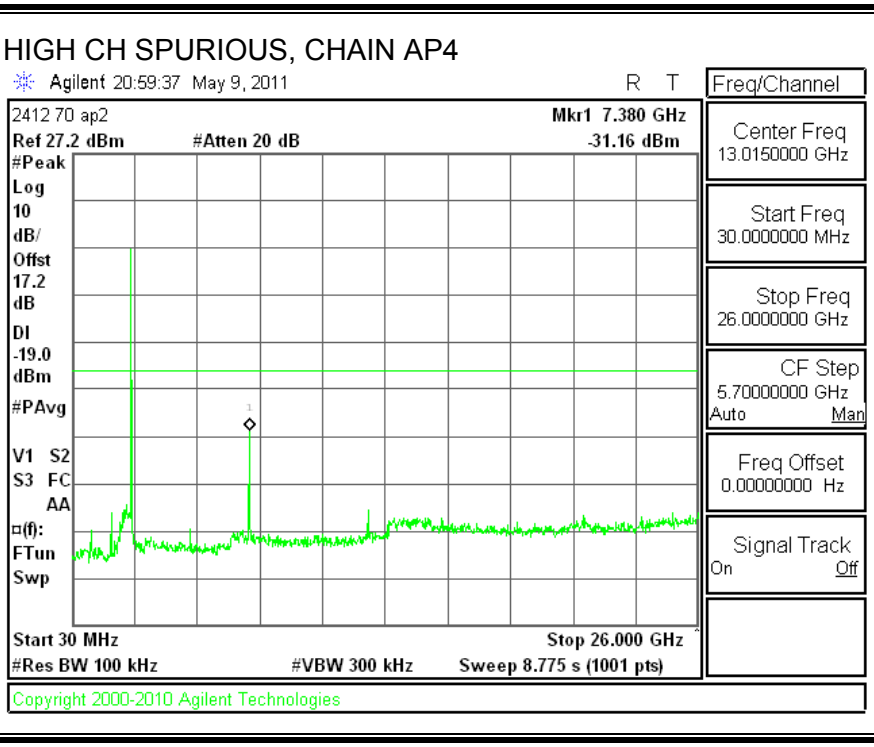
MID CH SPURIOUS, CHAIN AP4



HIGH CH BANDEDGE, CHAIN AP4



HIGH CH SPURIOUS, CHAIN AP4



7.2. 802.11g THREE CHAINS LEGACY 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.

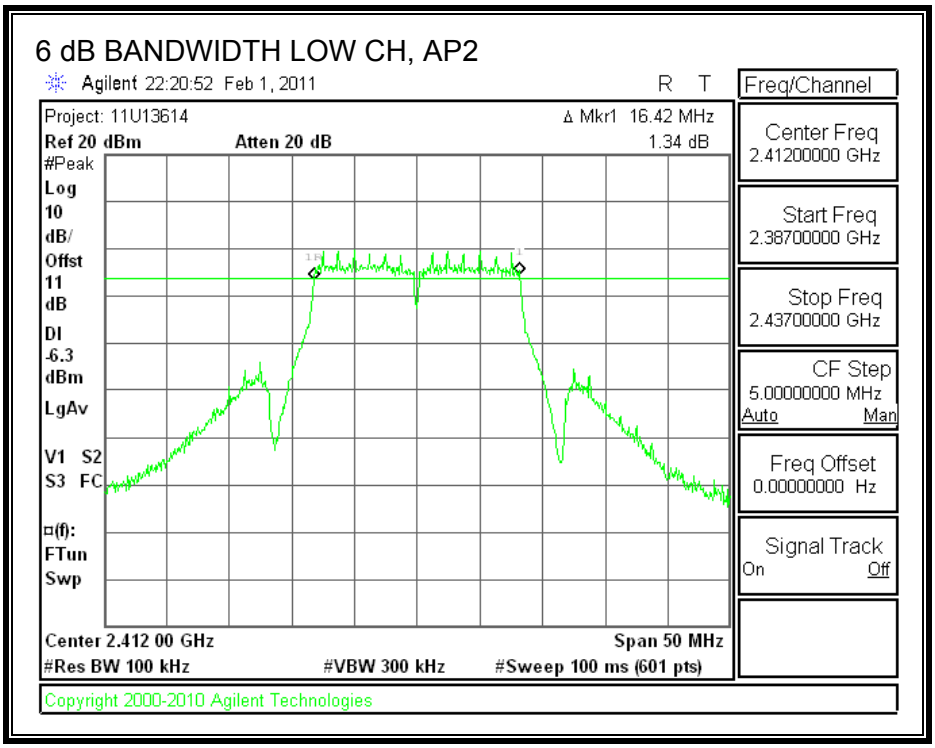
TEST PROCEDURE

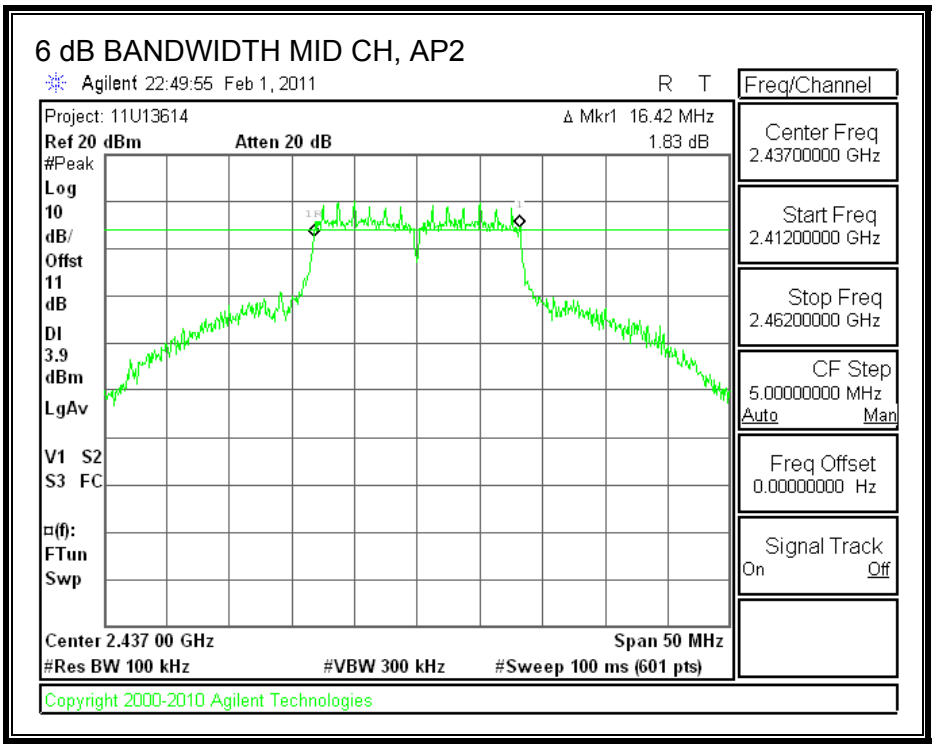
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

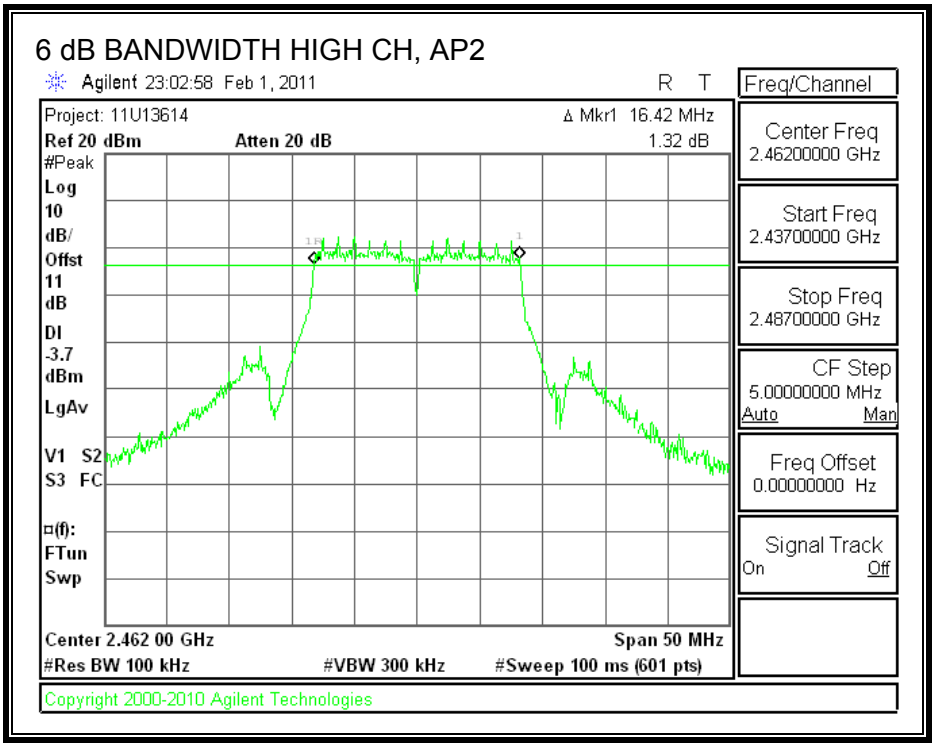
RESULTS

Channel	Frequency (MHz)	Chain AP2 6 dB BW (MHz)	Chain AP3 6 dB BW (MHz)	Chain AP4 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	16.42	16.42	16.50	0.5
Middle	2437	16.42	16.42	16.42	0.5
High	2462	16.42	16.42	16.42	0.5

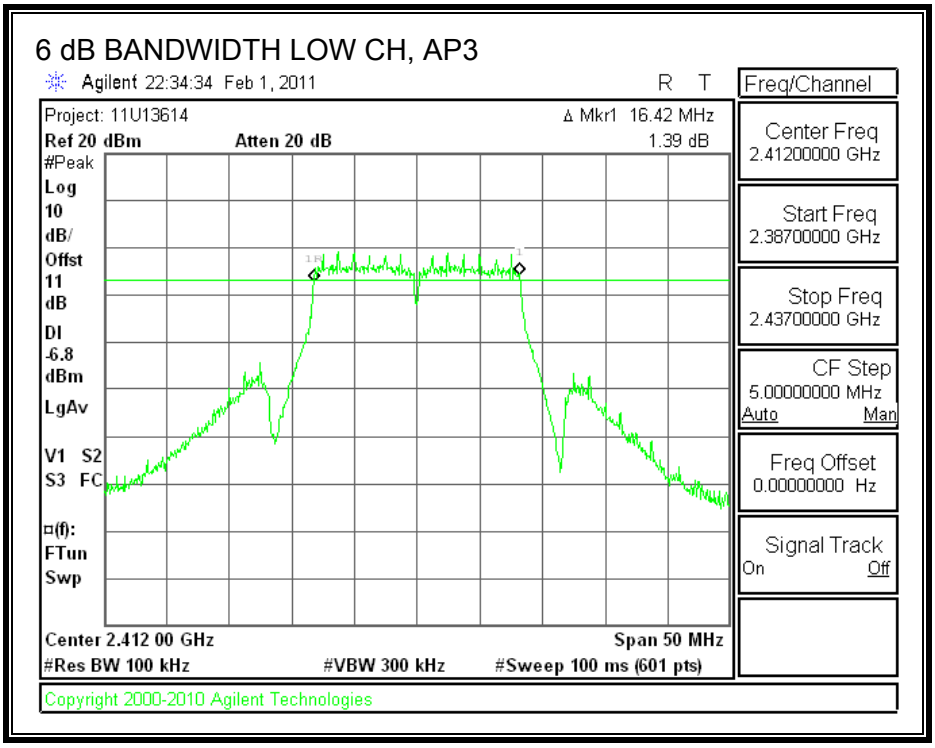
6 dB BANDWIDTH, AP2

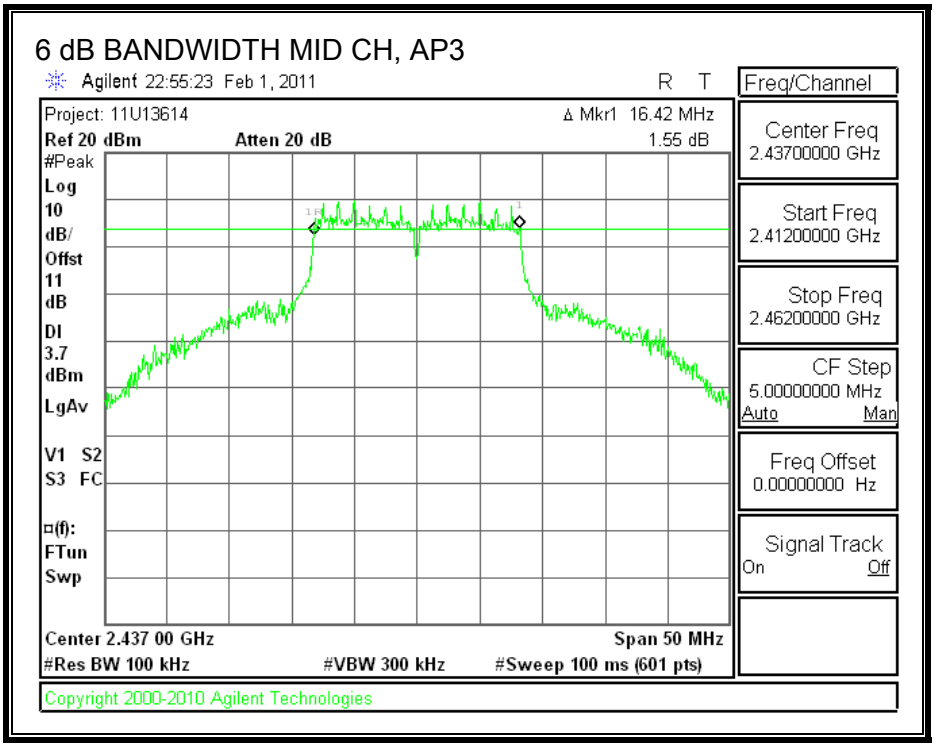


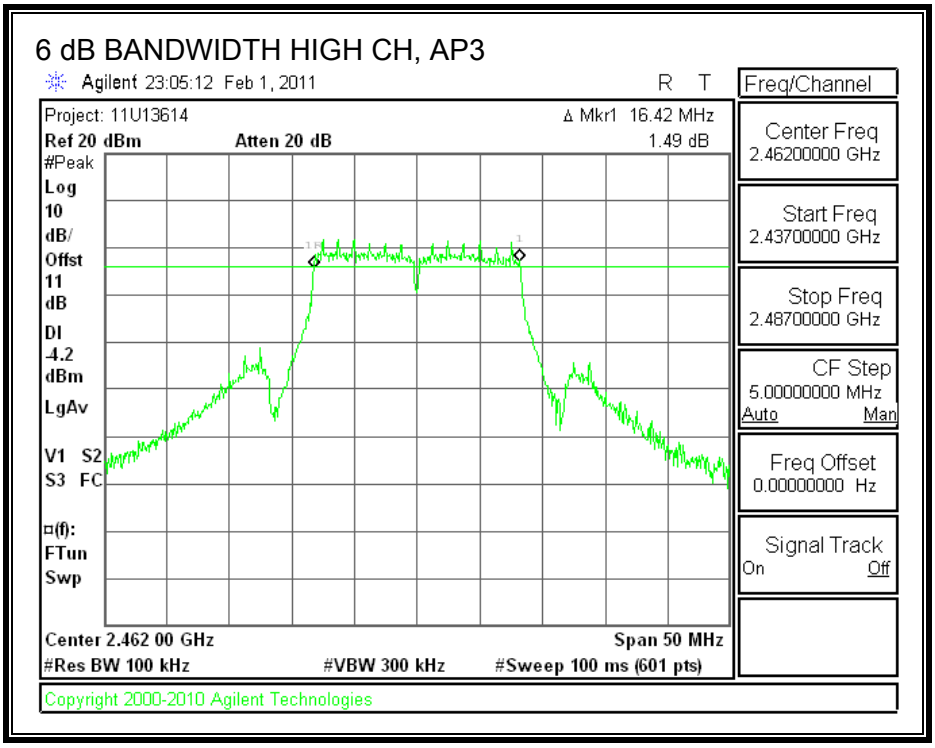




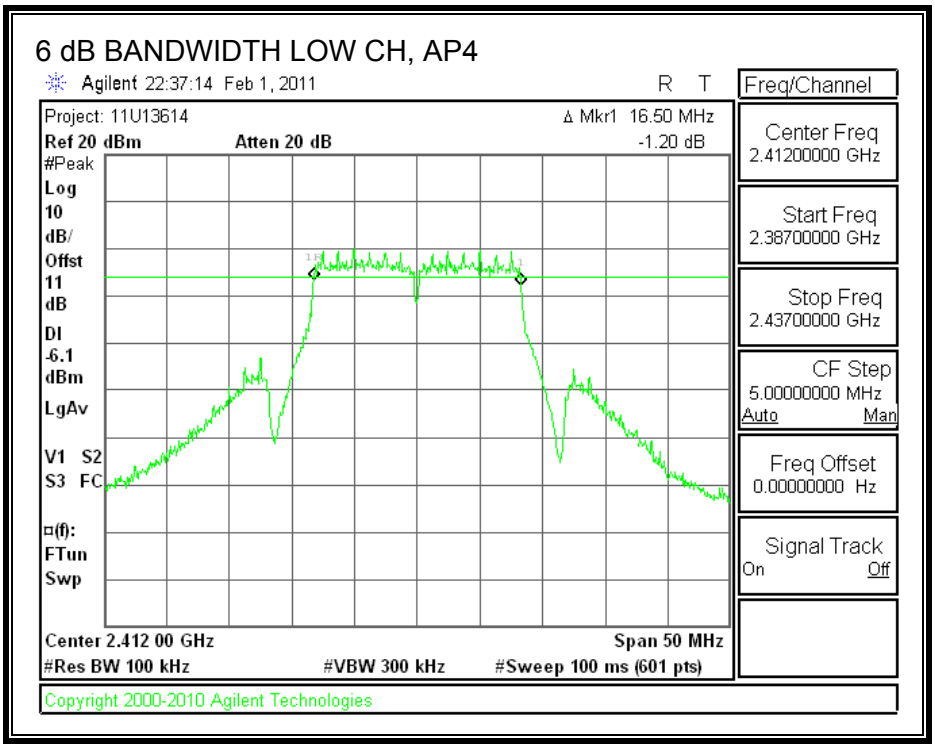
6 dB BANDWIDTH, AP3

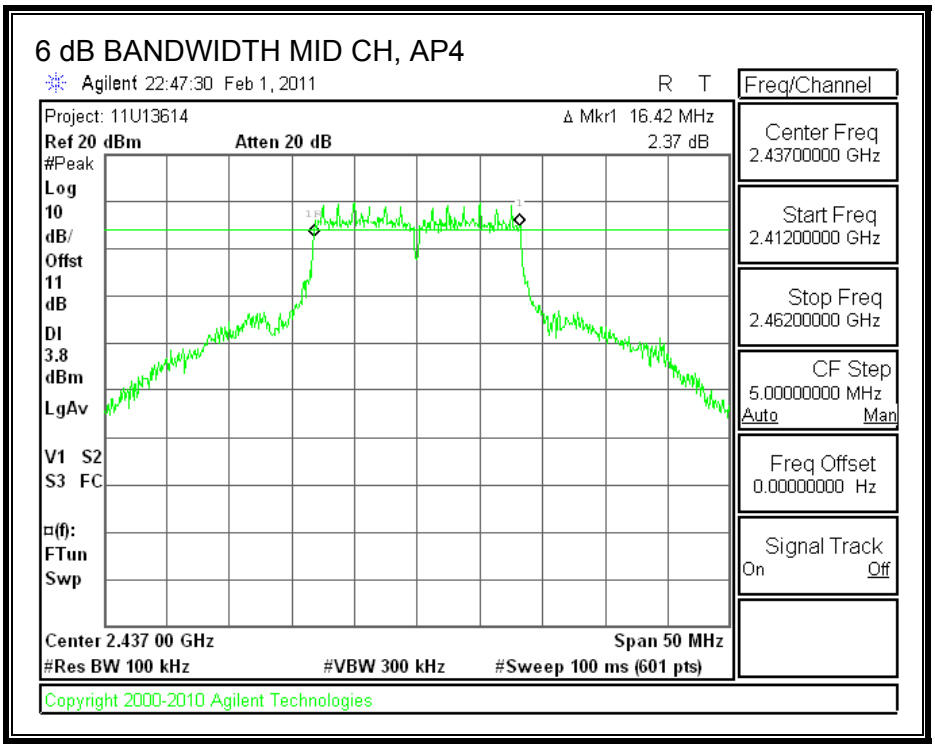


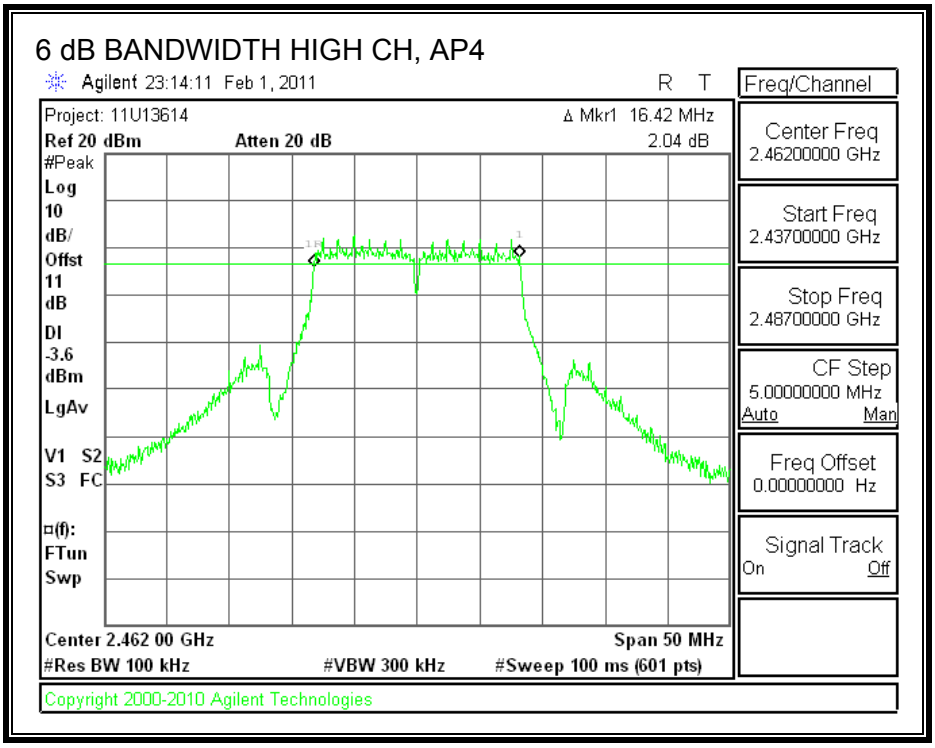




6 dB BANDWIDTH, AP4







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

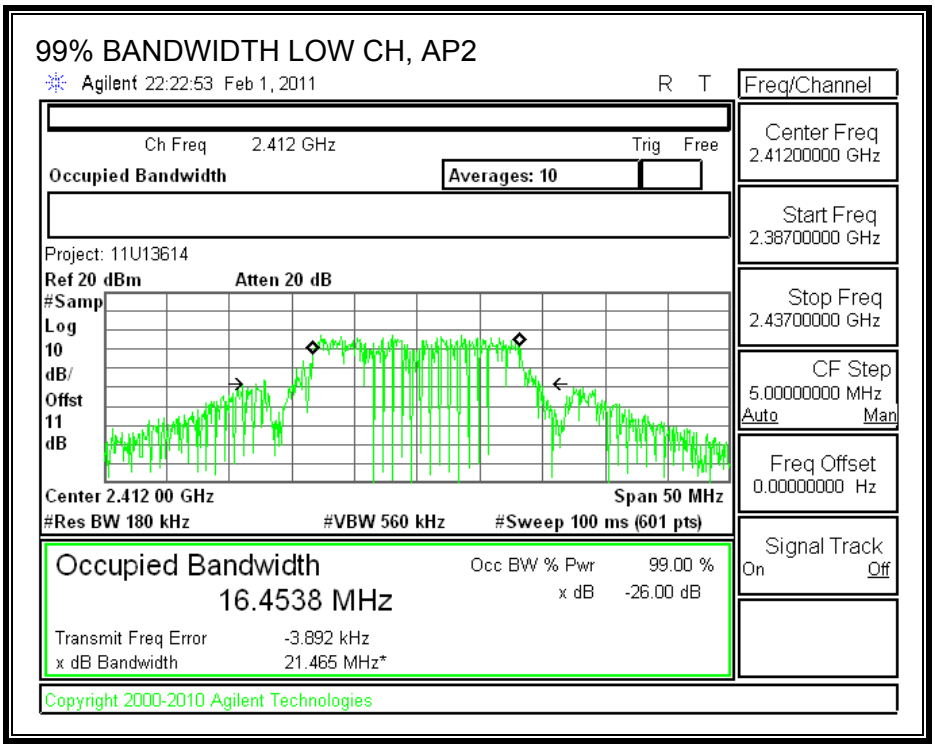
TEST PROCEDURE

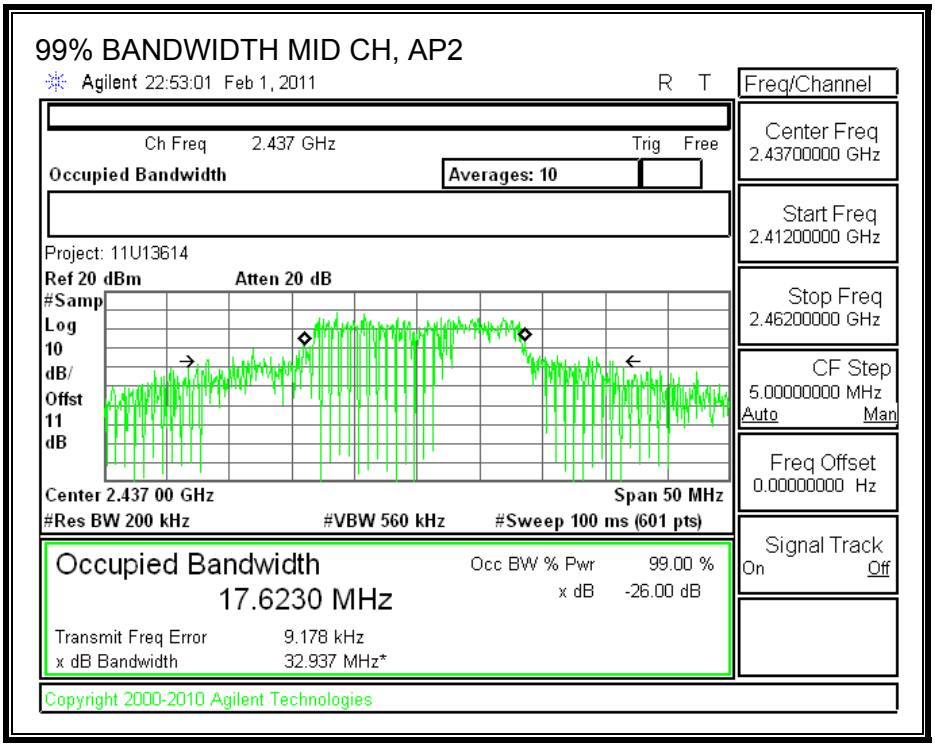
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

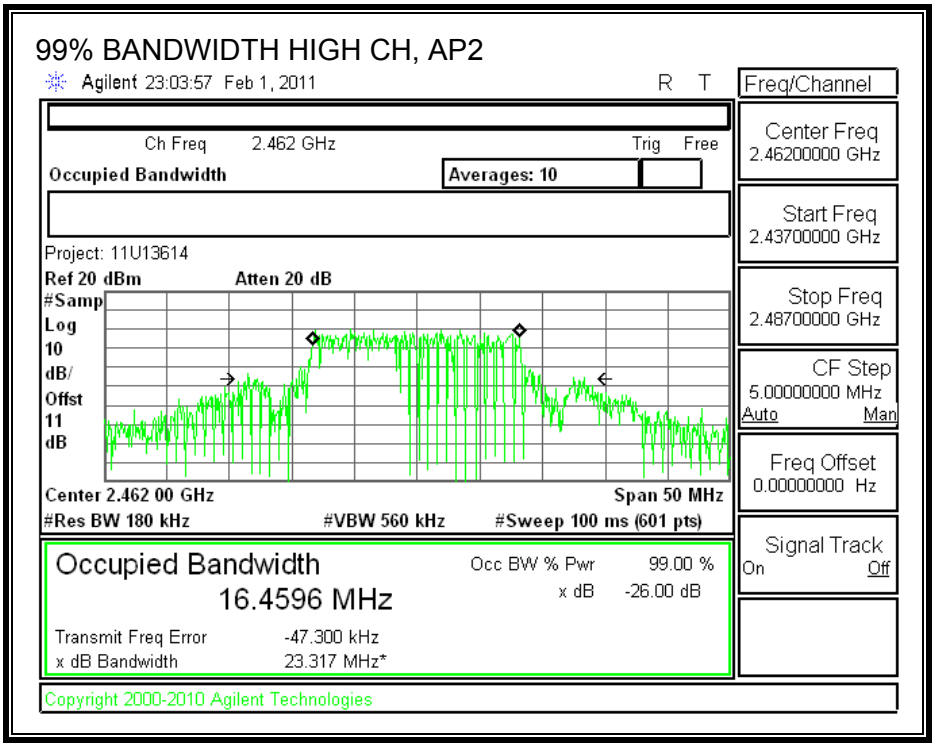
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)	Chain 3 99% Bandwidth (MHz)
Low	2412	16.4538	16.4993	16.5196
Middle	2437	17.623	16.7592	16.569
High	2462	16.4596	16.5052	16.452

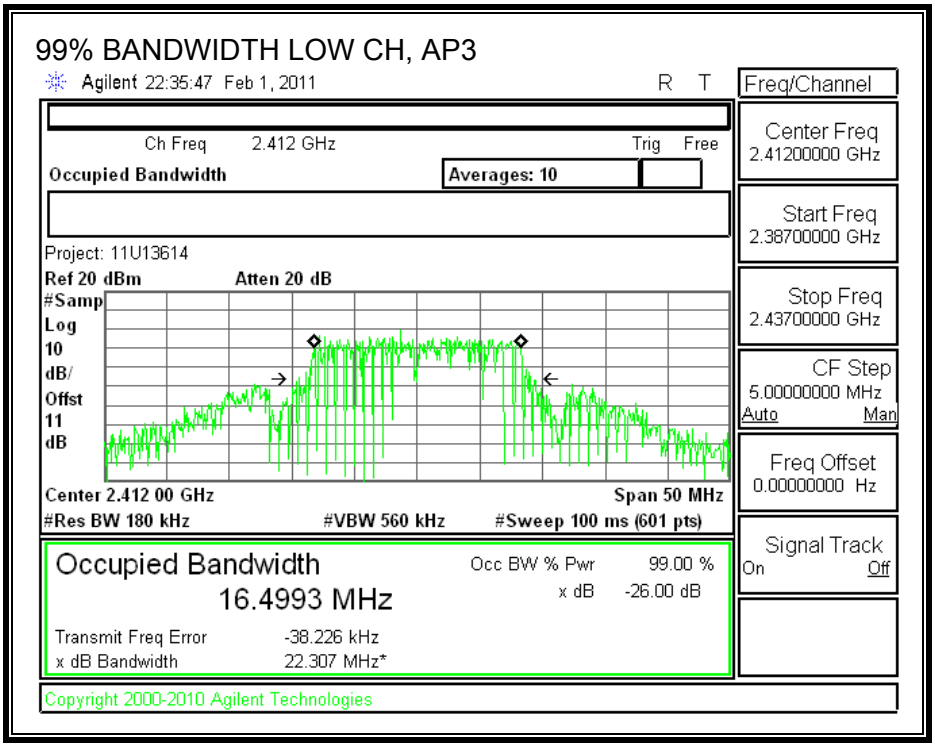
99% BANDWIDTH, AP2



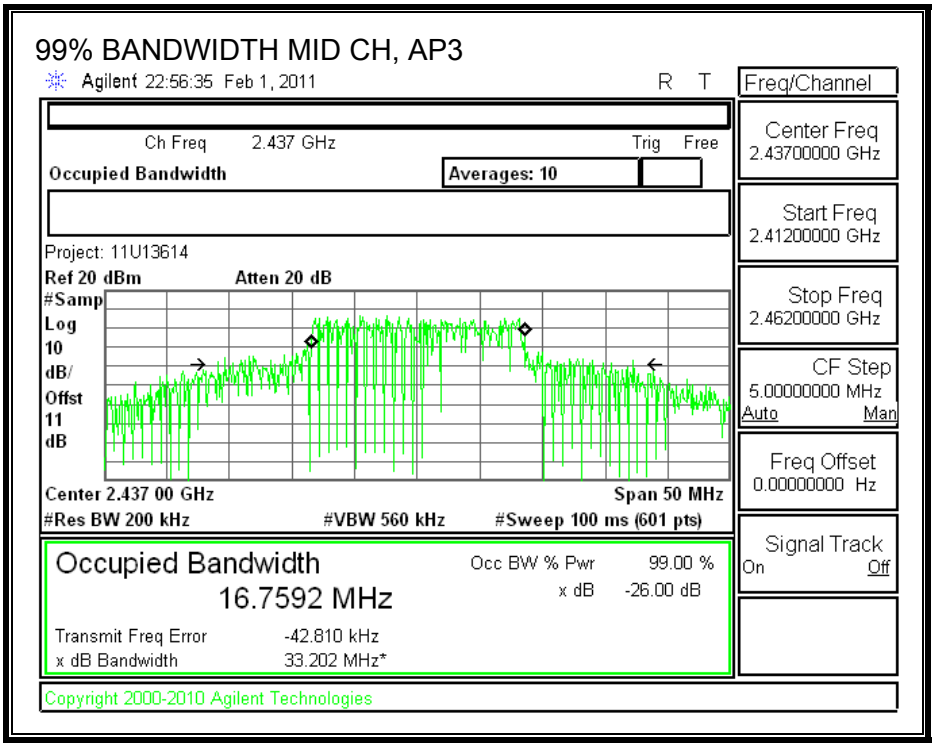




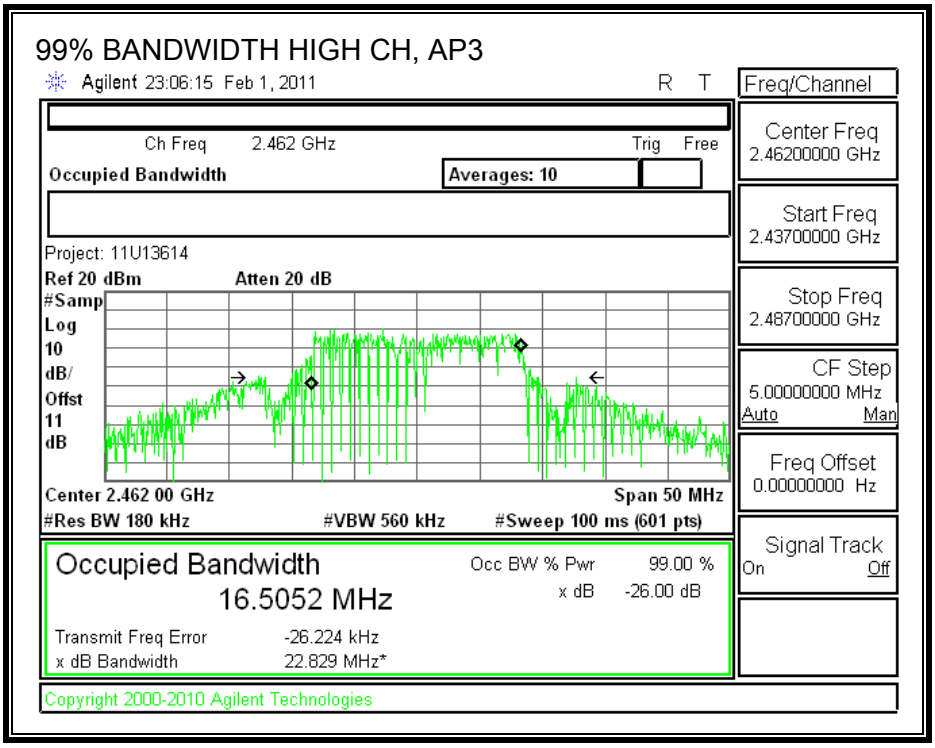
99% BANDWIDTH, AP3



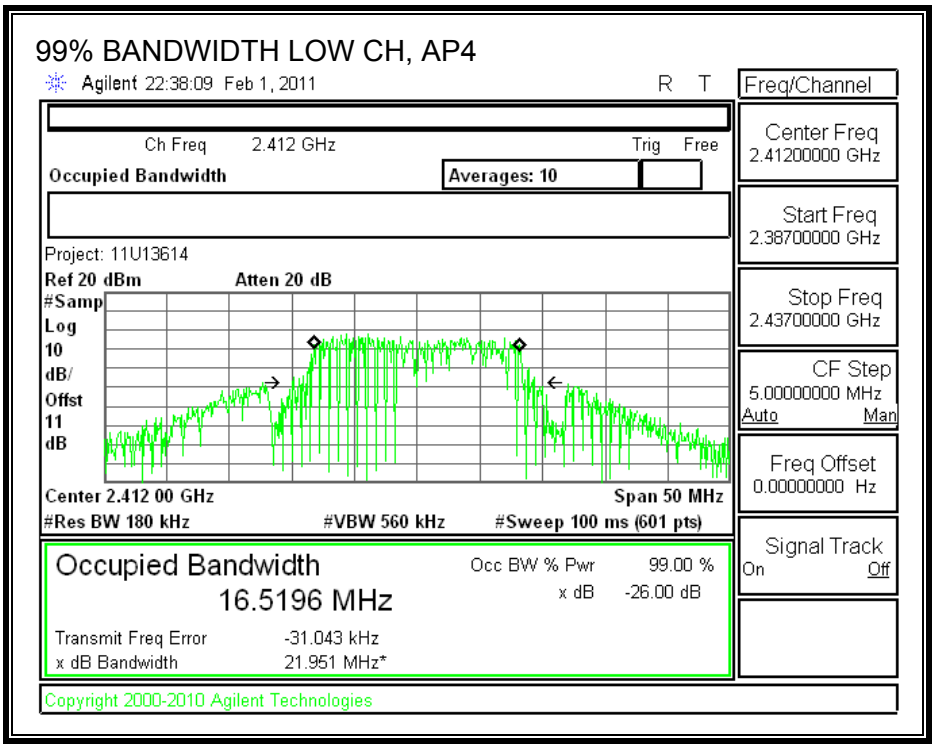
99% BANDWIDTH MID CH, AP3

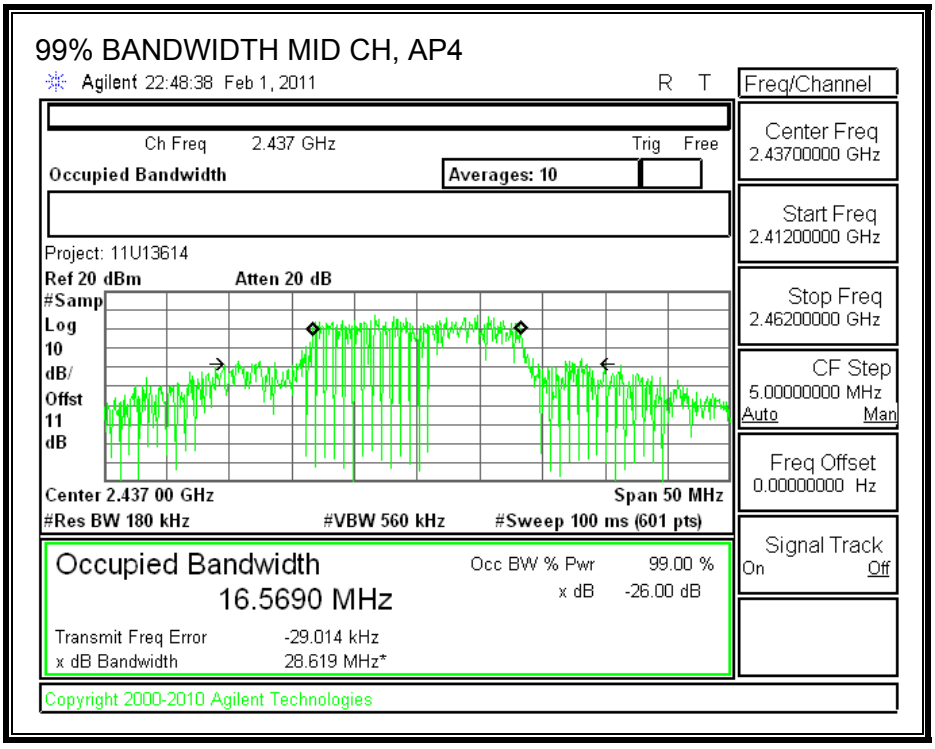


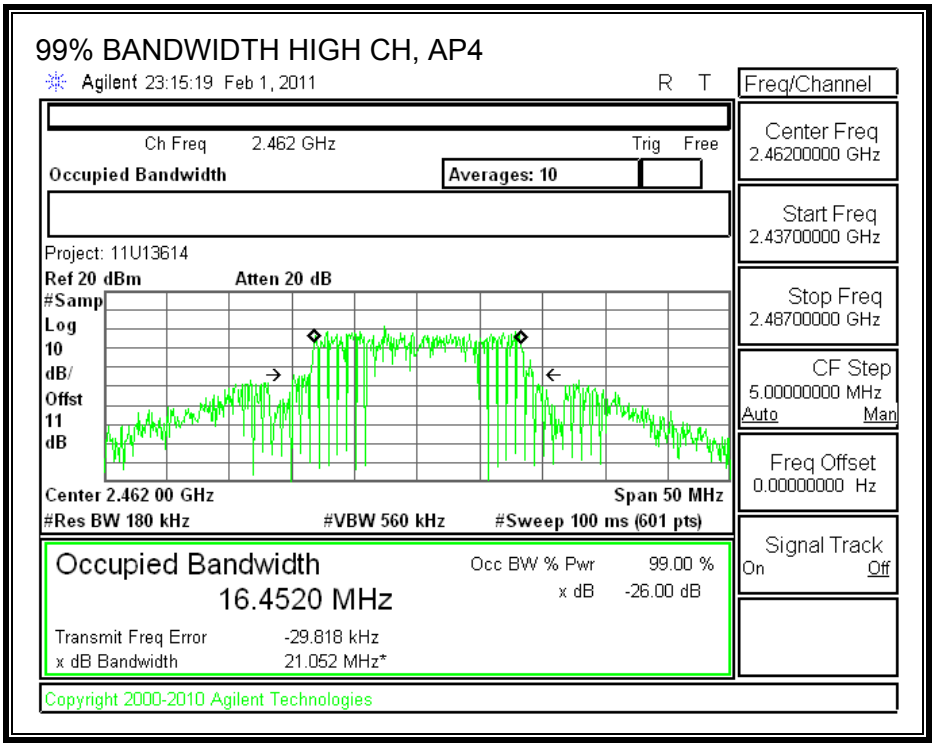
99% BANDWIDTH HIGH CH, AP3



99% BANDWIDTH, AP4







7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

Antenna Gain (AP2) (dBi)	Antenna Gain (AP3) (dBi)	Antenna Gain (AP4) (dBi)	Effective Legacy Gain (dBi)
1.41	2.33	1.83	6.64

The maximum effective legacy gain is 6.64 dBi for other than fixed, point-to-point operations, therefore the limit is 29.36 dBm.

TEST PROCEDURE

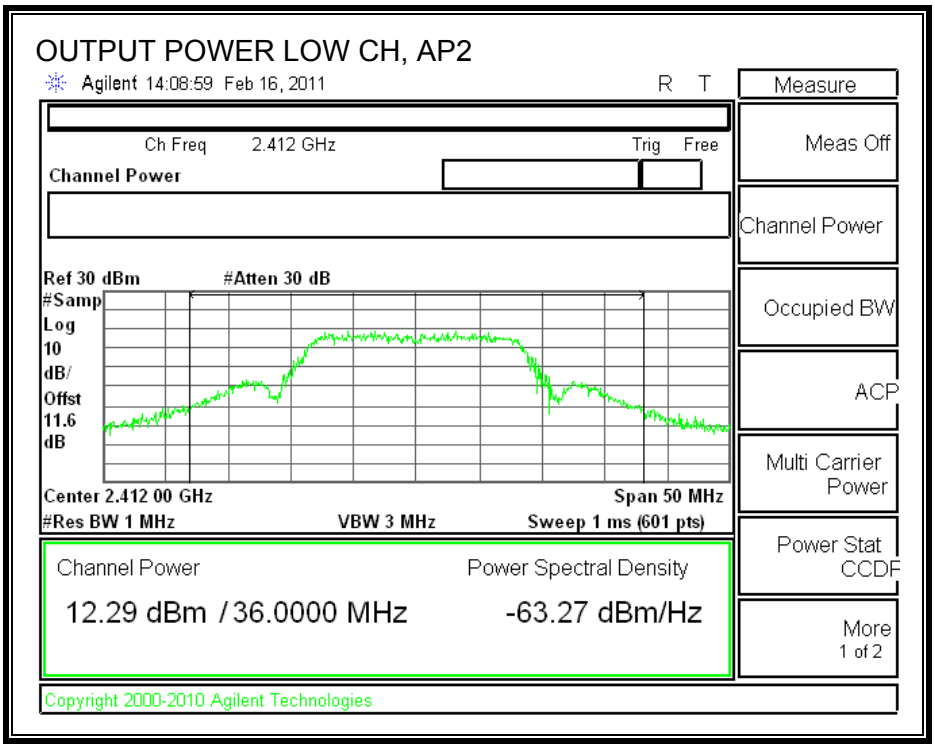
Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 26dB bandwidth.

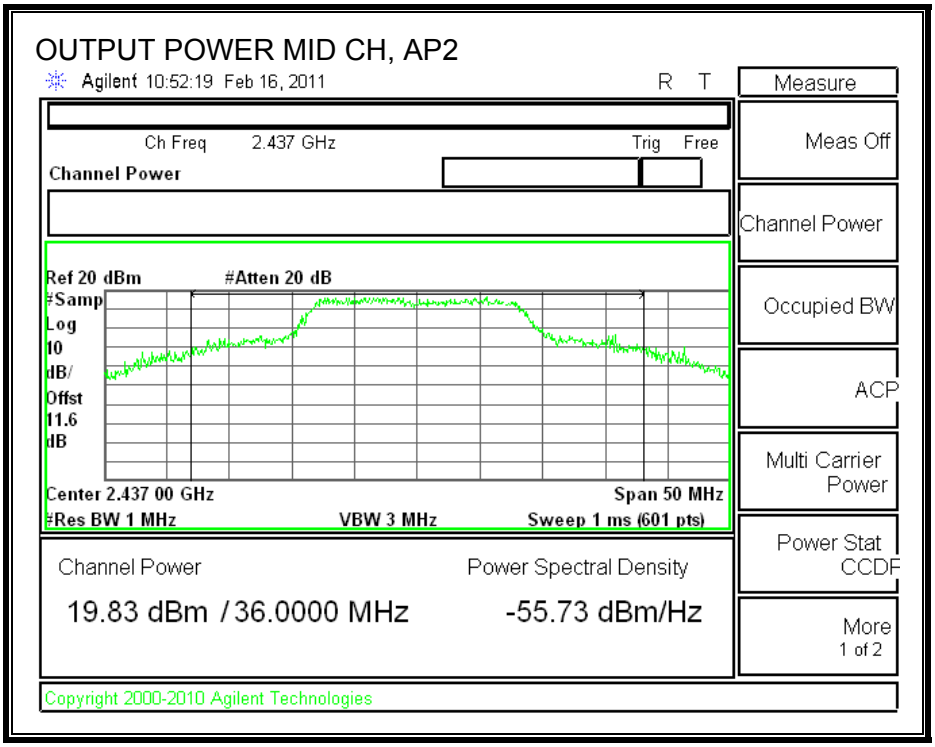
Maximum Conducted Output Power based on RMS averaging over a time interval is measured in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005. The transmitter operates continuously therefore Power Output Option 2, Method # 1 is used.

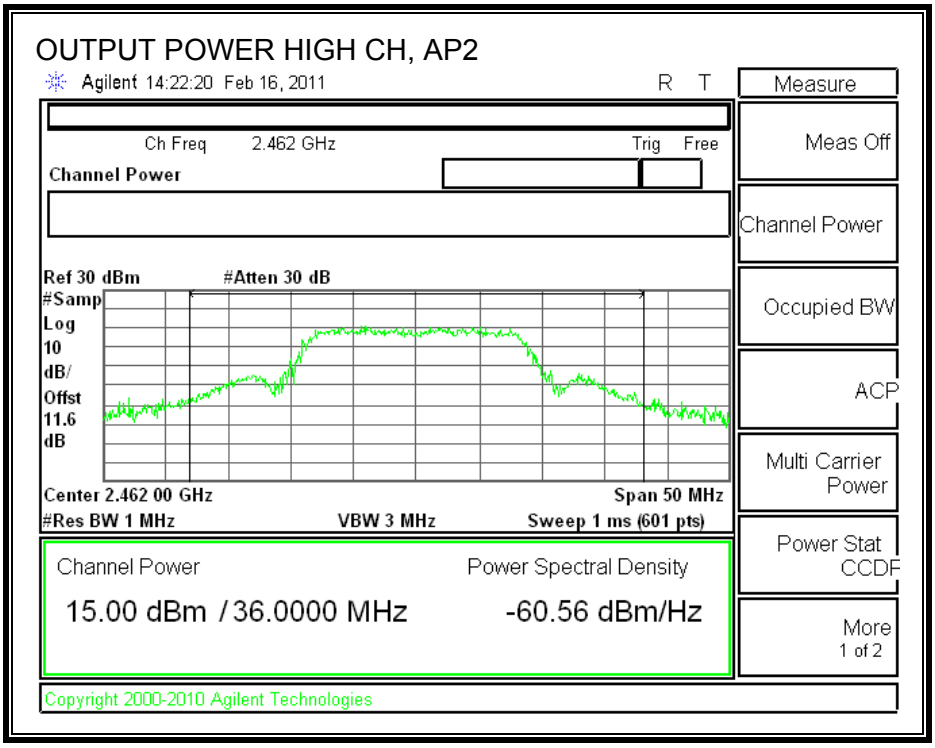
RESULTS

Channel	Frequency (MHz)	AP2 Power (dBm)	AP3 Power (dBm)	AP4 Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	12.29	11.56	13.21	0.00	17.18	29.36	-12.18
Mid	2437	19.83	20.27	20.20	0.00	24.88	29.36	-4.48
High	2462	15.00	14.01	14.46	0.00	19.28	29.36	-10.08

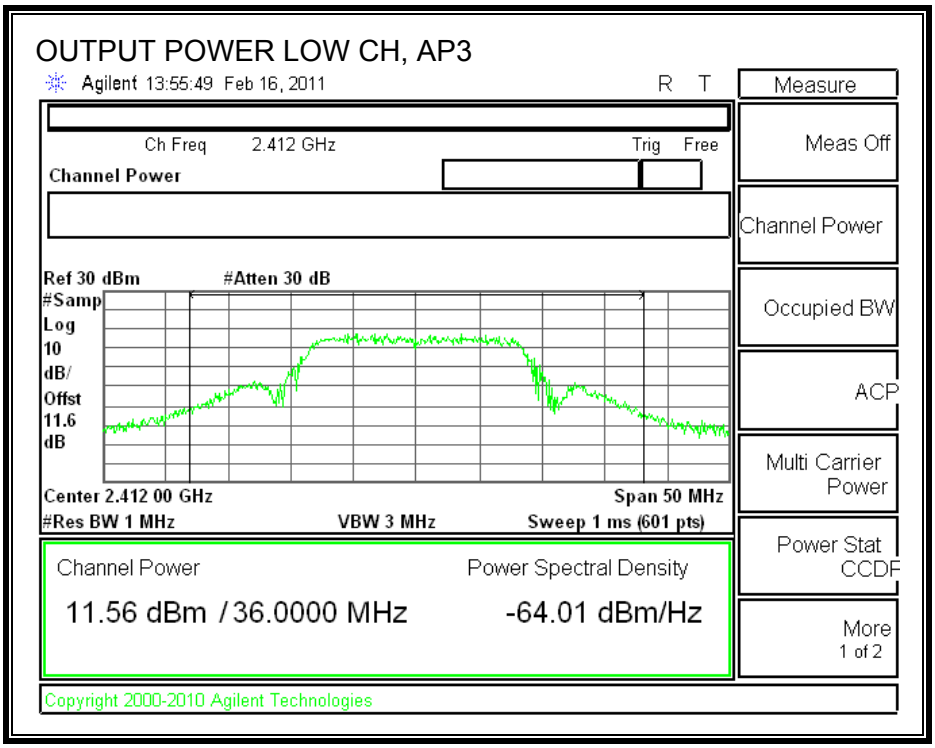
AP2 OUTPUT POWER

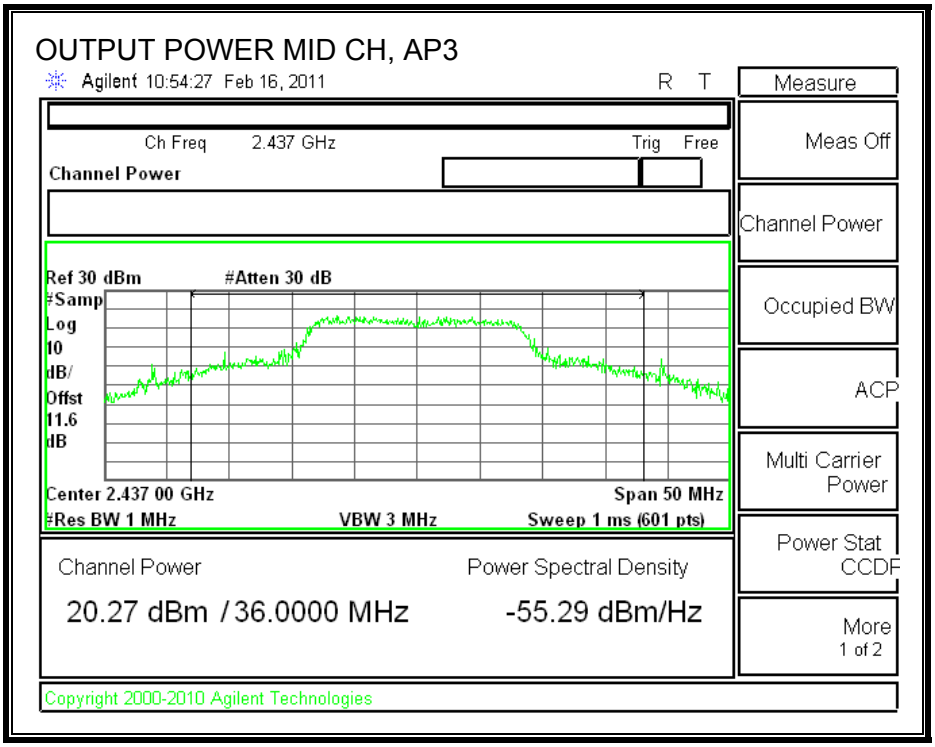


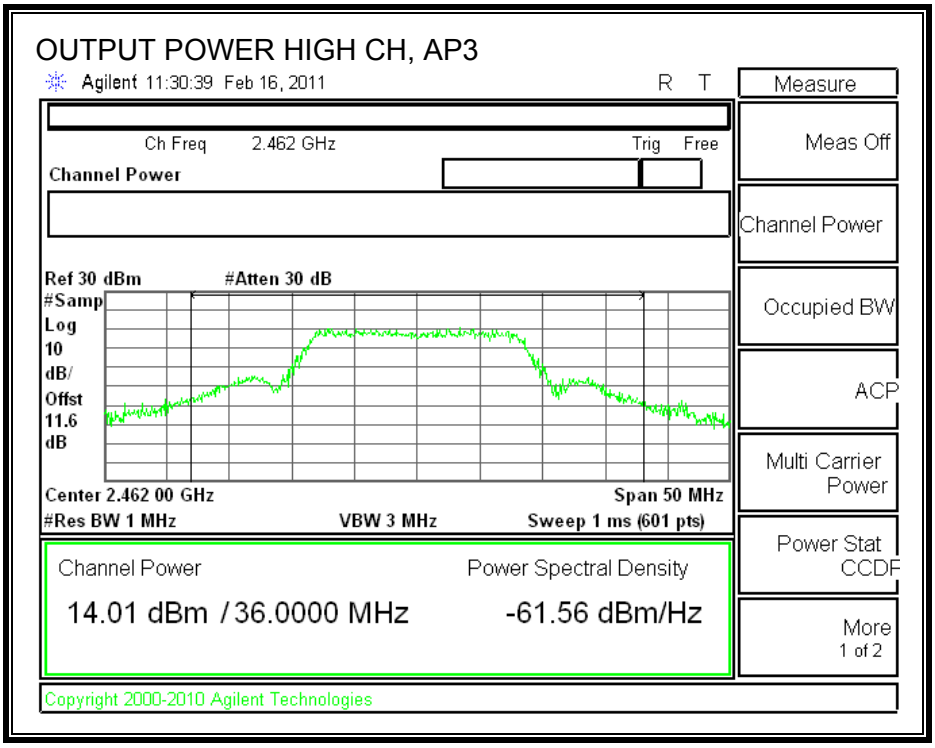




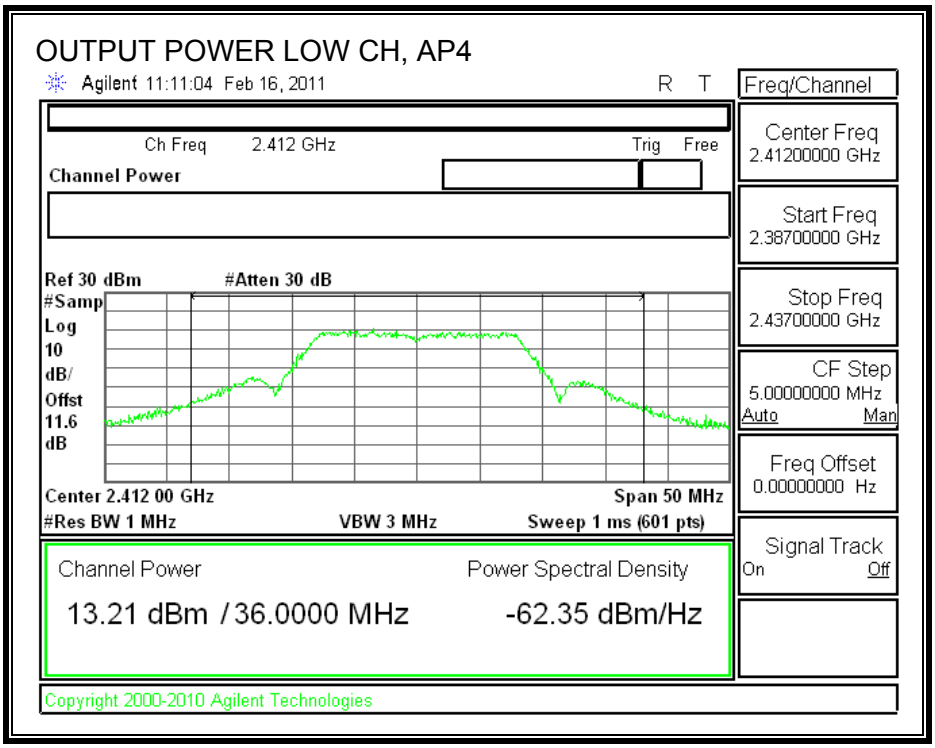
AP3 OUTPUT POWER

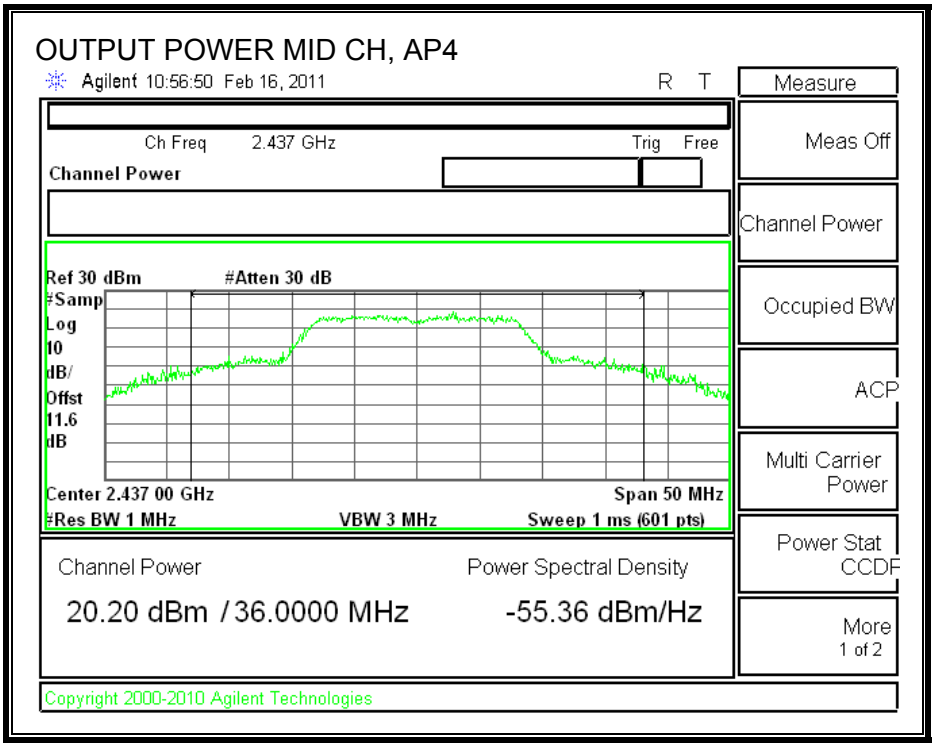


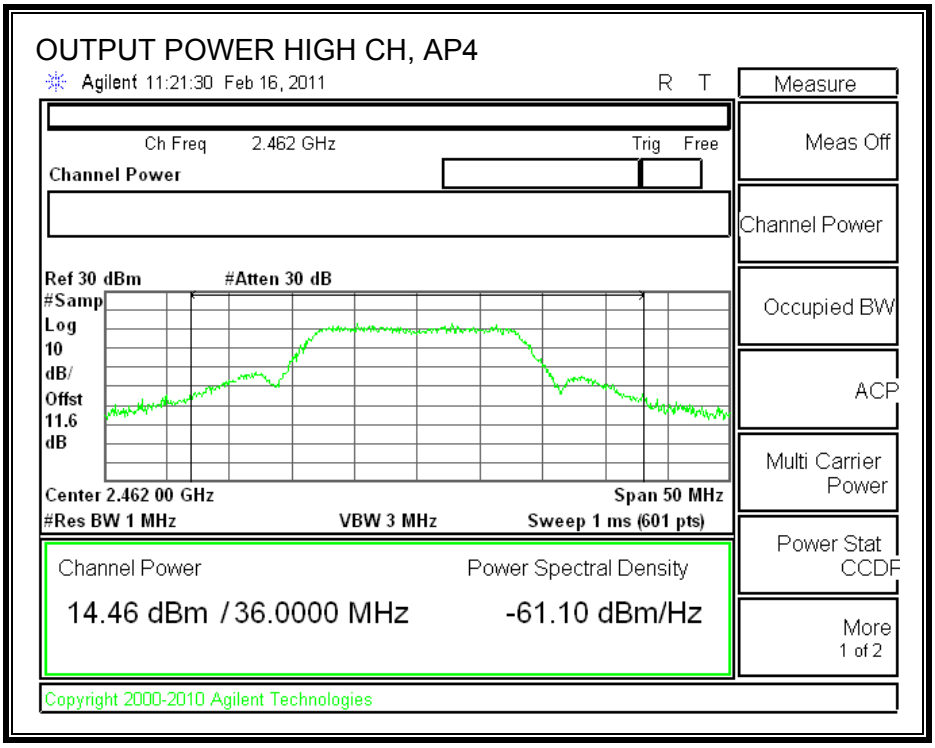




AP4 OUTPUT POWER







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.

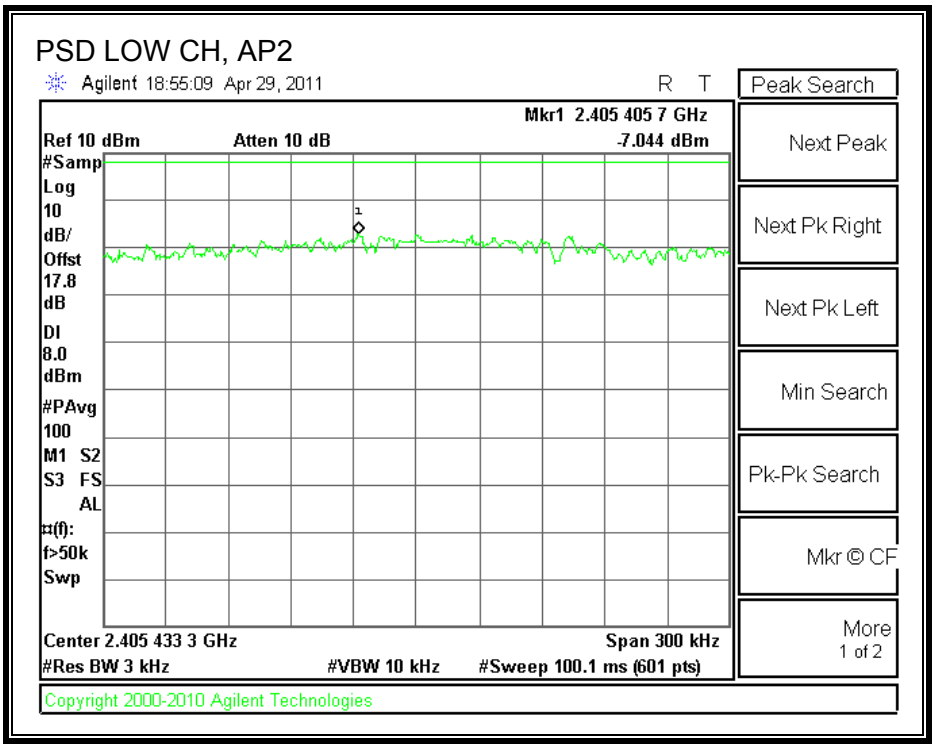
TEST PROCEDURE

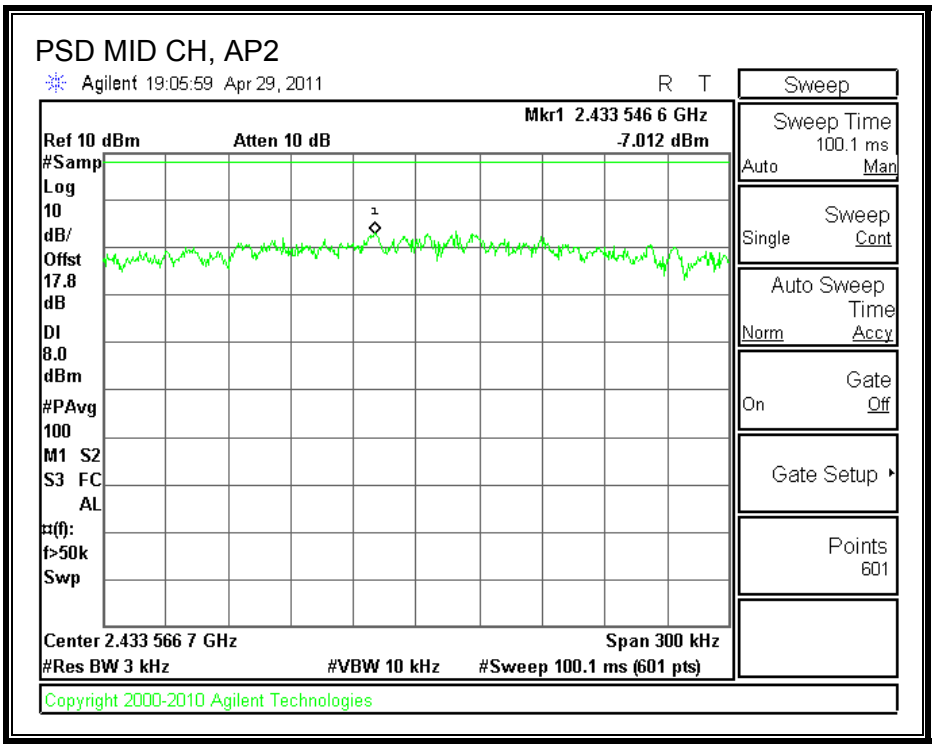
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

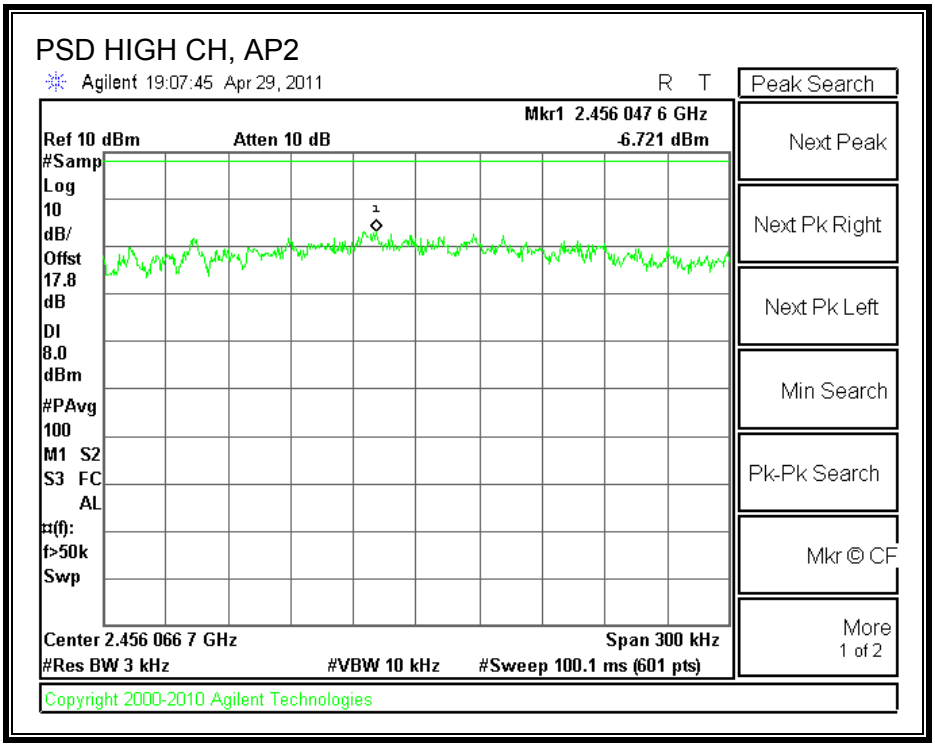
RESULTS

Channel	Frequency (MHz)	AP2 PSD (dBm)	AP3 PSD (dBm)	AP4 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-7.044	-7.729	-8.527	-2.95	8	-10.95
Middle	2437	-7.012	-8.063	-7.462	-2.72	8	-10.72
High	2462	-6.721	-8.513	-7.402	-2.71	8	-10.71

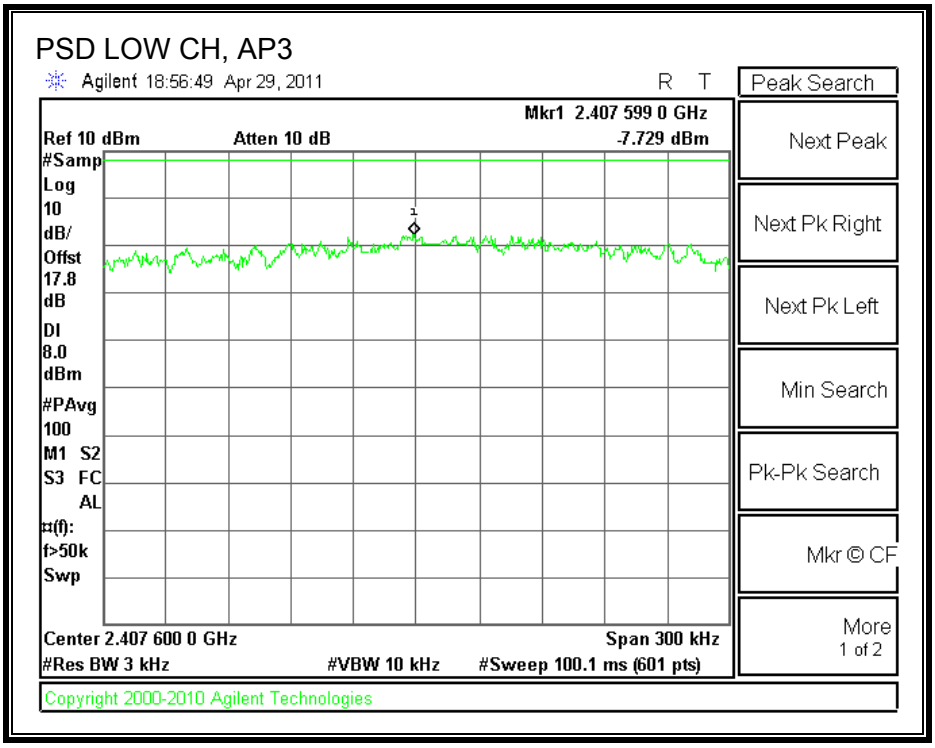
POWER SPECTRAL DENSITY, AP2



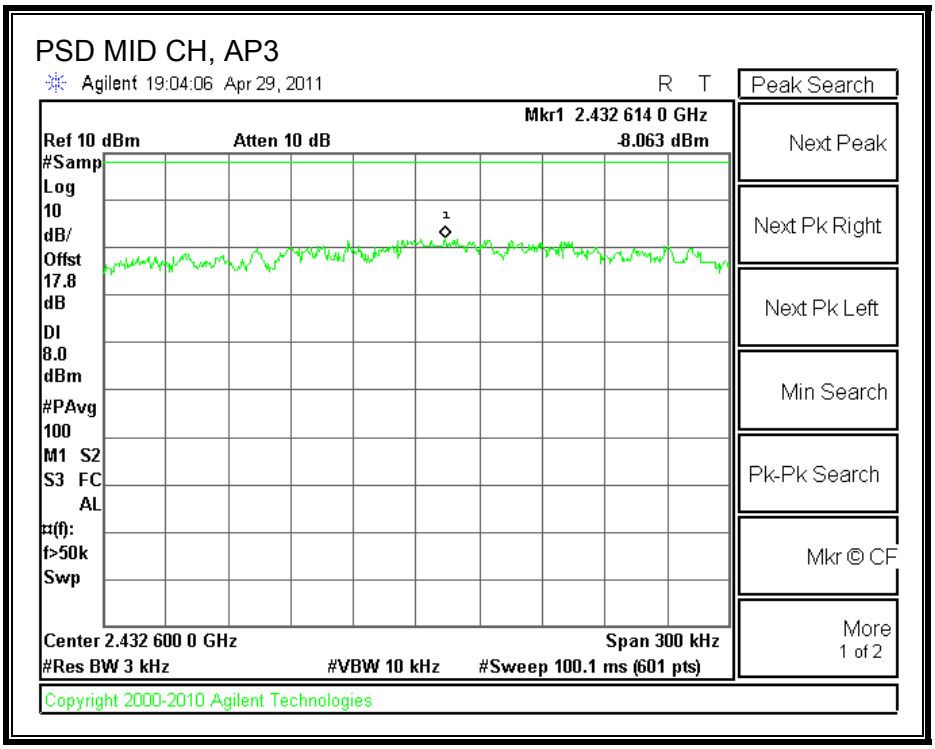




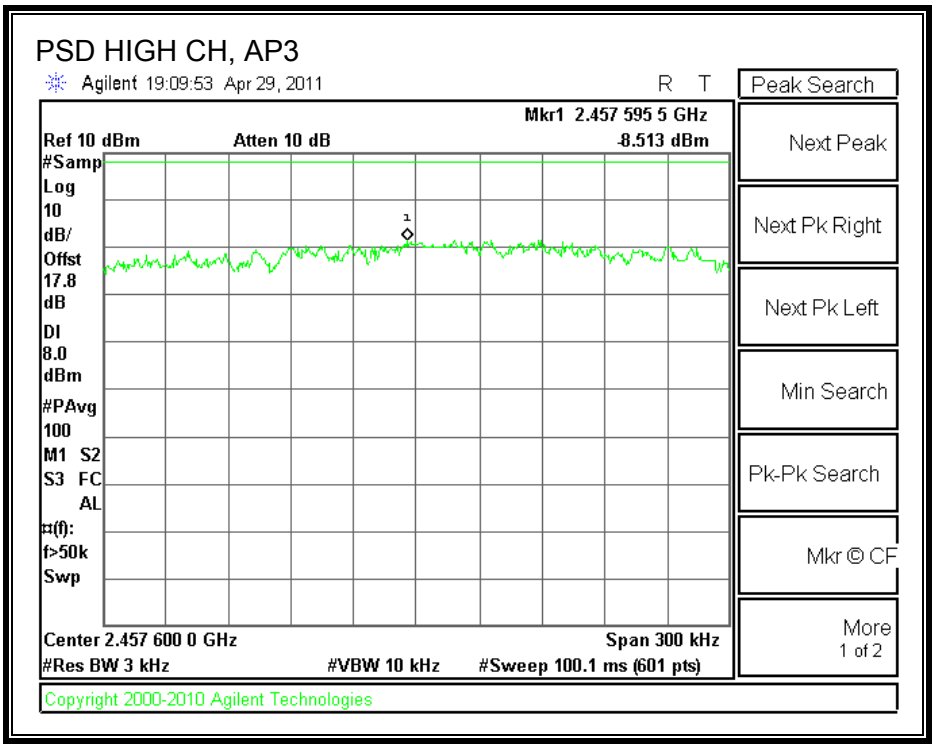
POWER SPECTRAL DENSITY, AP3



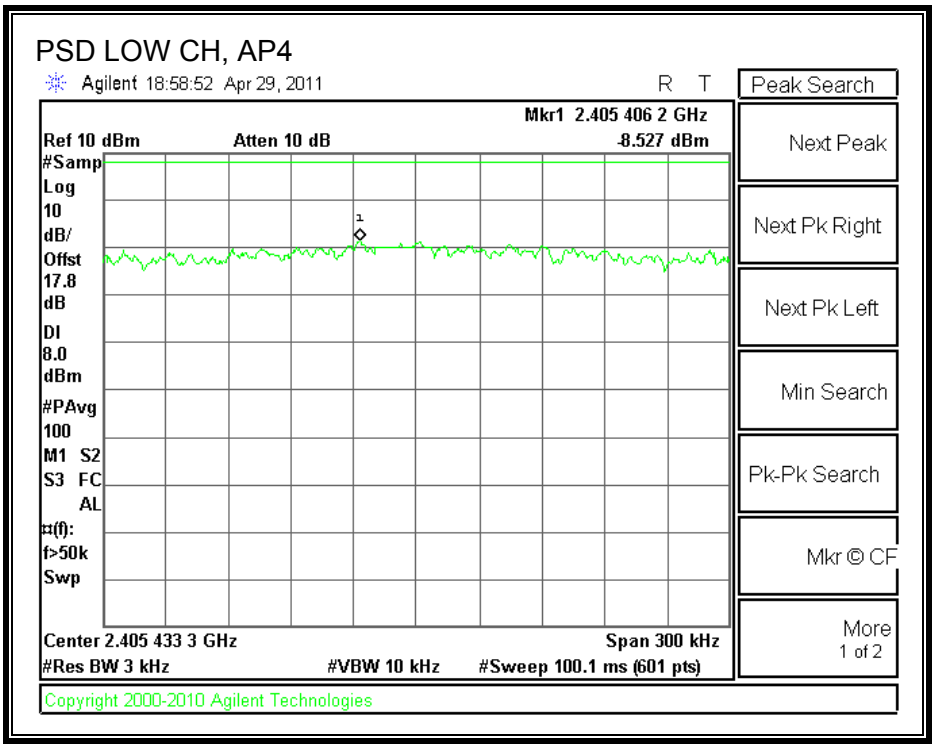
PSD MID CH, AP3

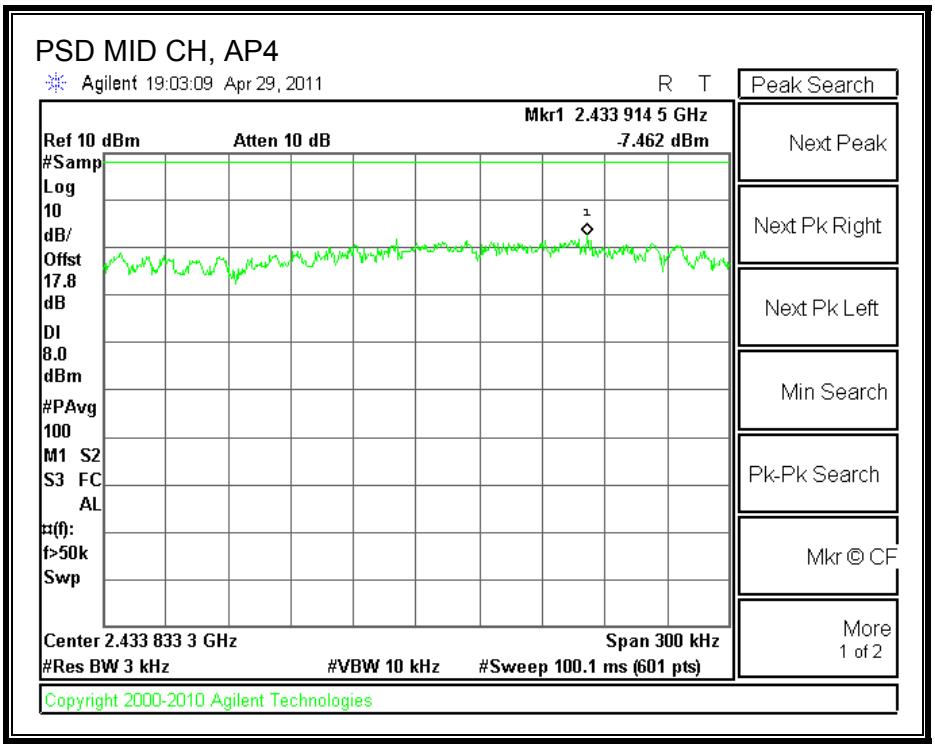


PSD HIGH CH, AP3

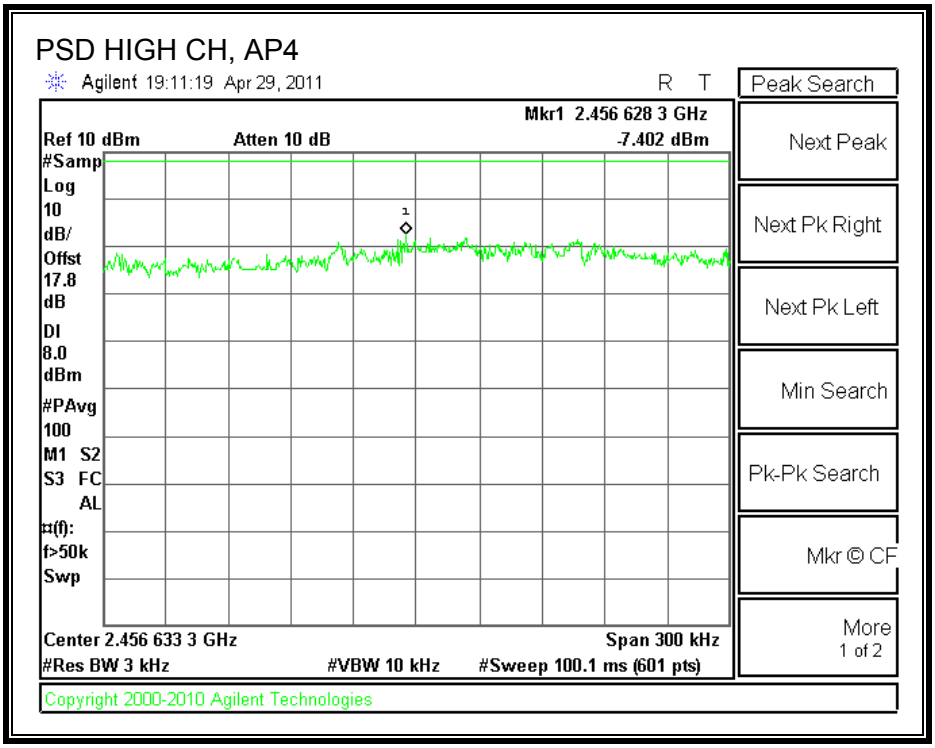


POWER SPECTRAL DENSITY, AP4





PSD HIGH CH, AP4



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 RMS averaging over time interval; therefore the required attenuation is 30 dB.

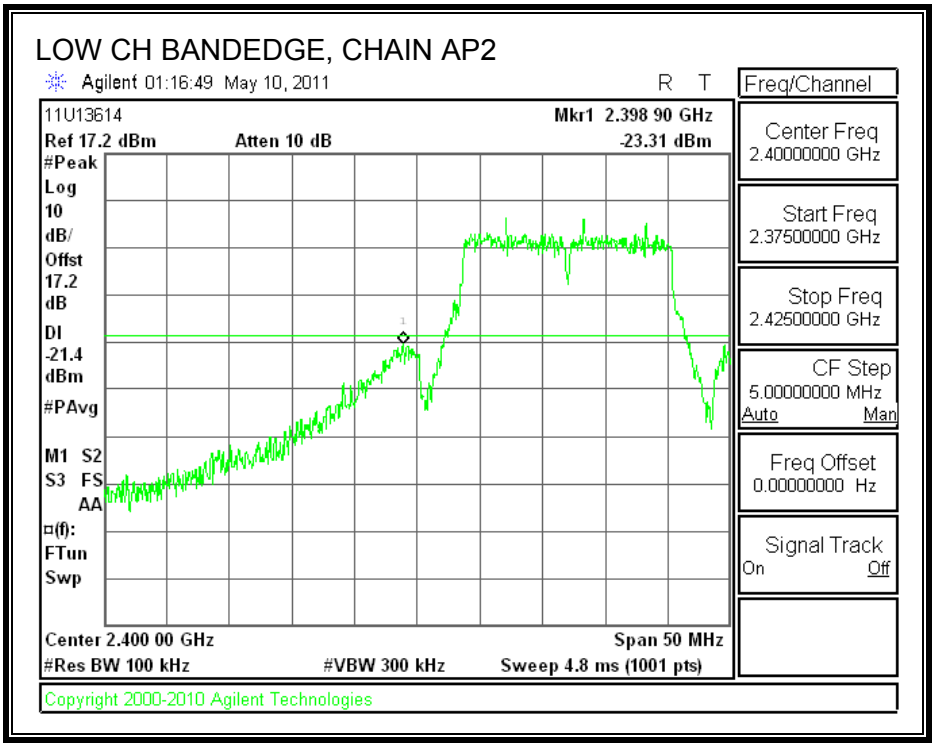
TEST PROCEDURE

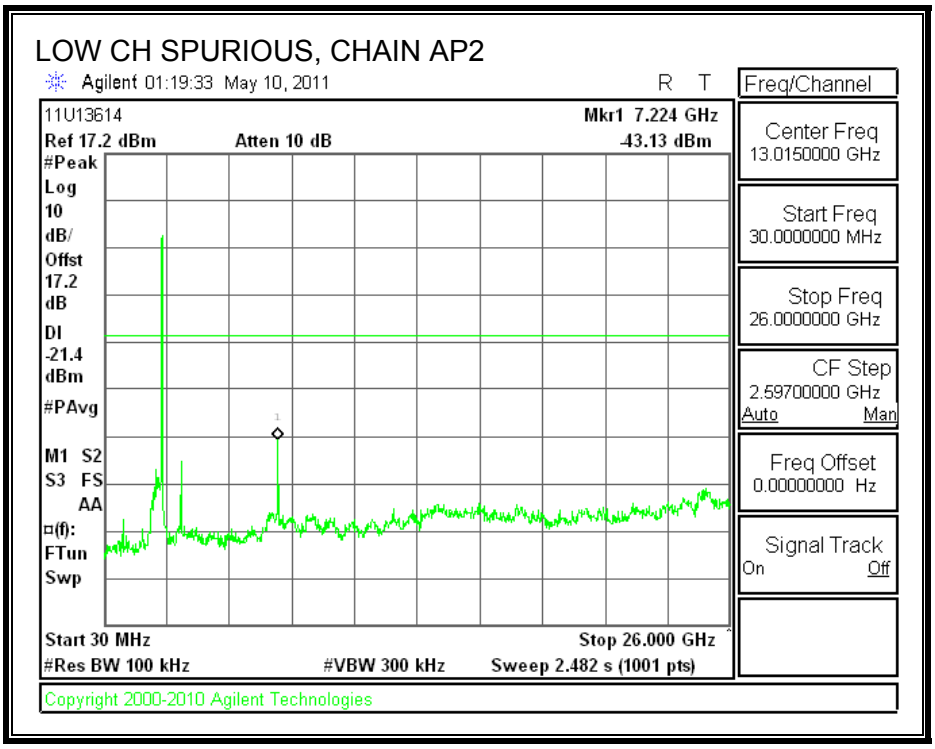
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

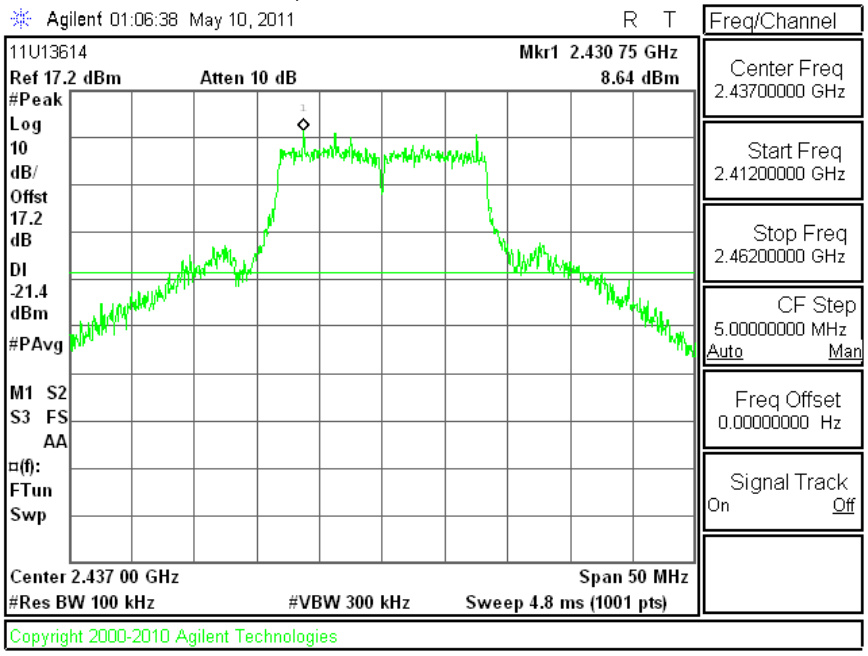
RESULTS

CHAIN AP2 SPURIOUS EMISSIONS

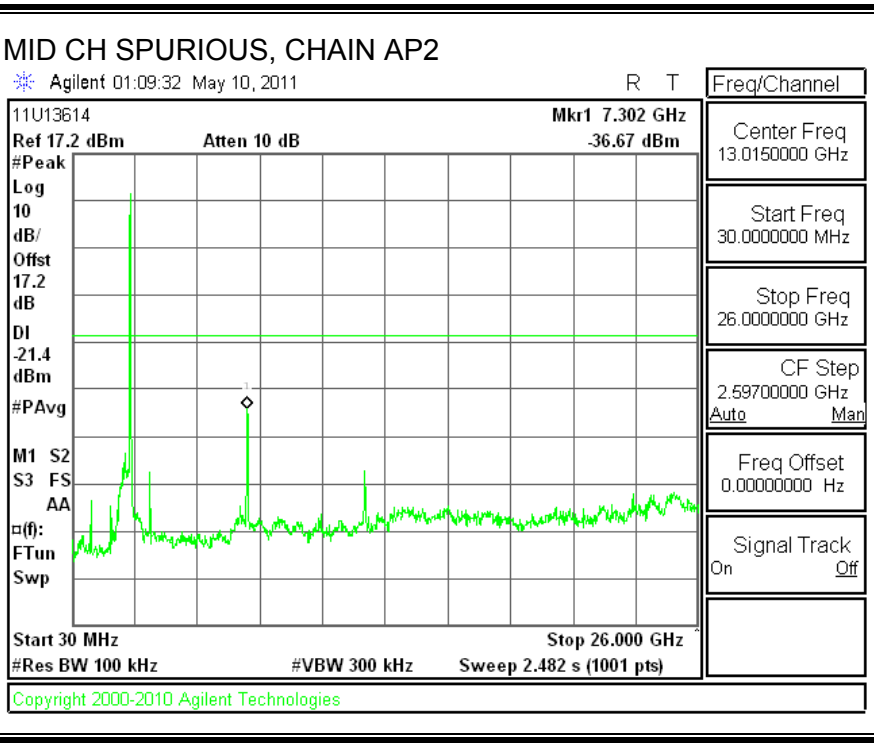




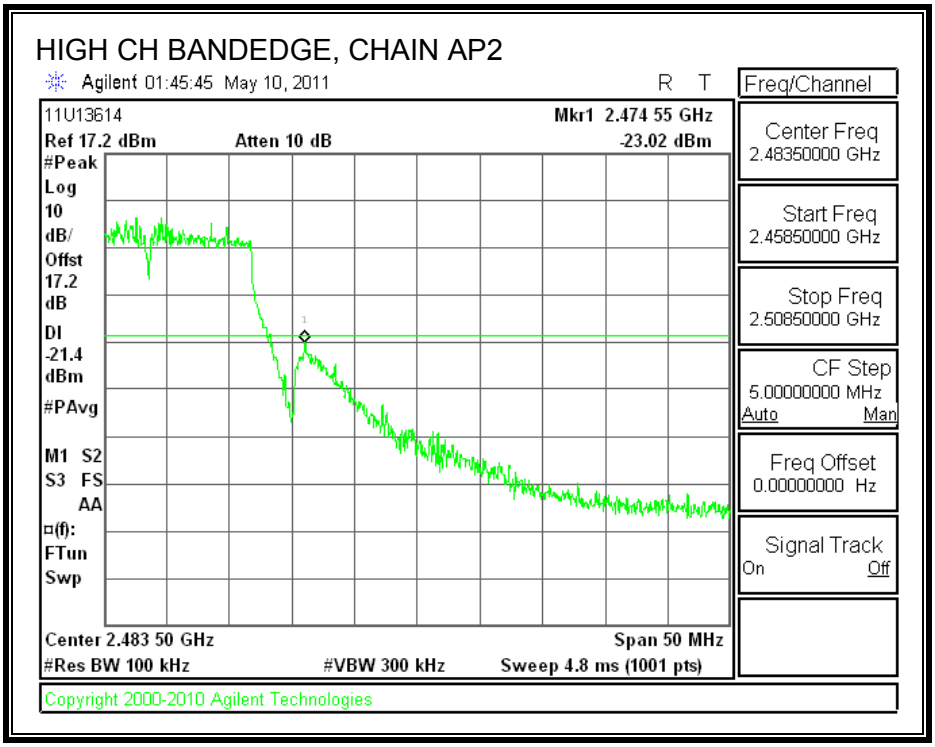
MID CH REFERENCE, CHAIN AP2



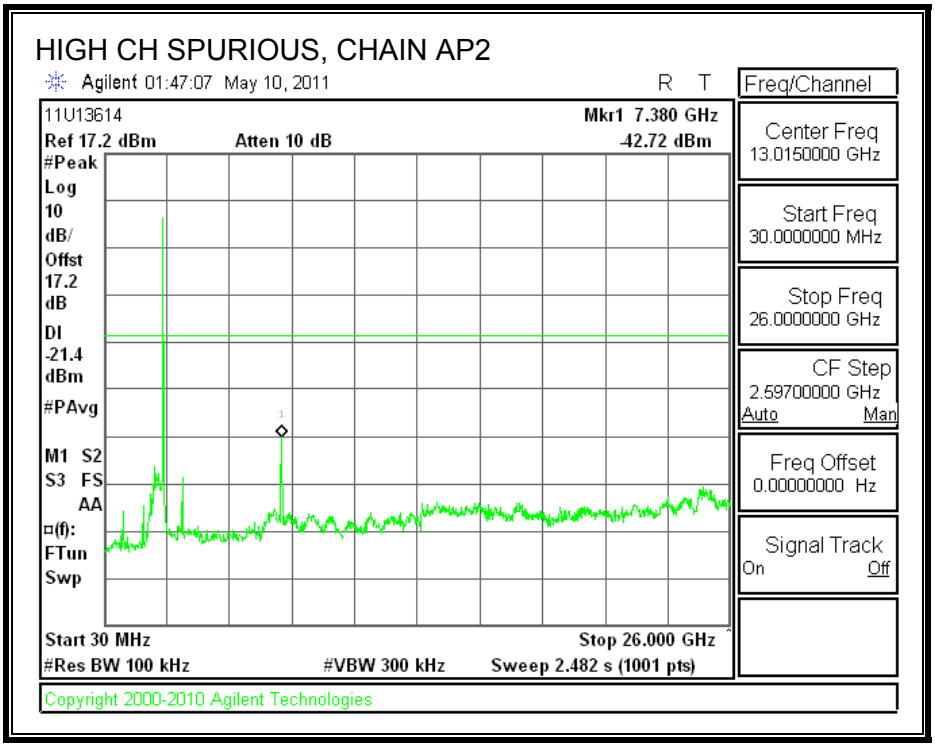
MID CH SPURIOUS, CHAIN AP2



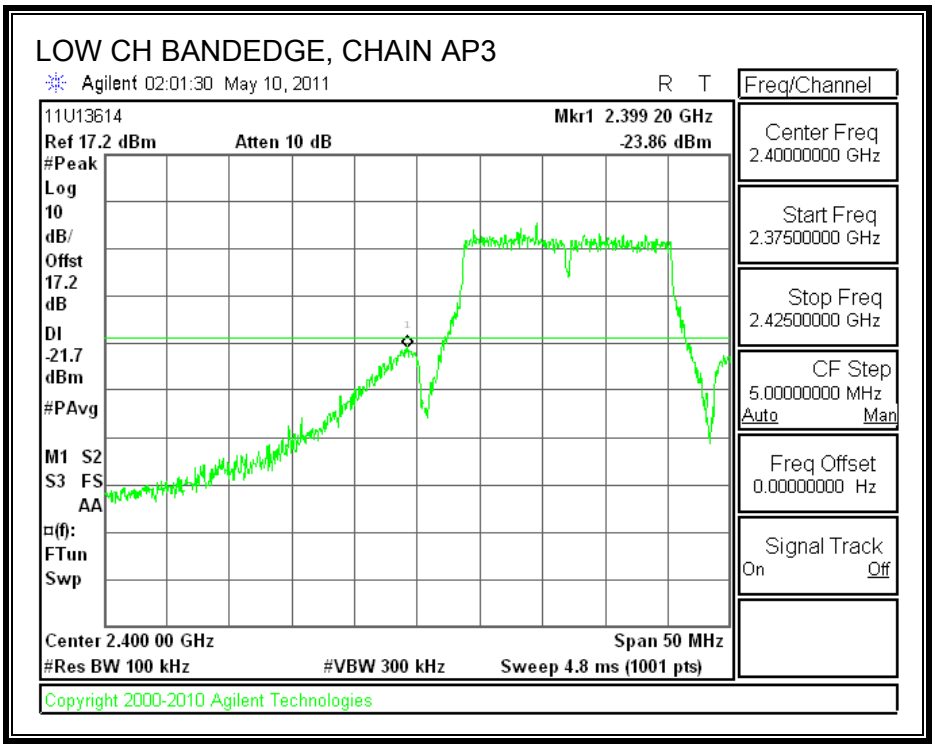
HIGH CH BANDEDGE, CHAIN AP2

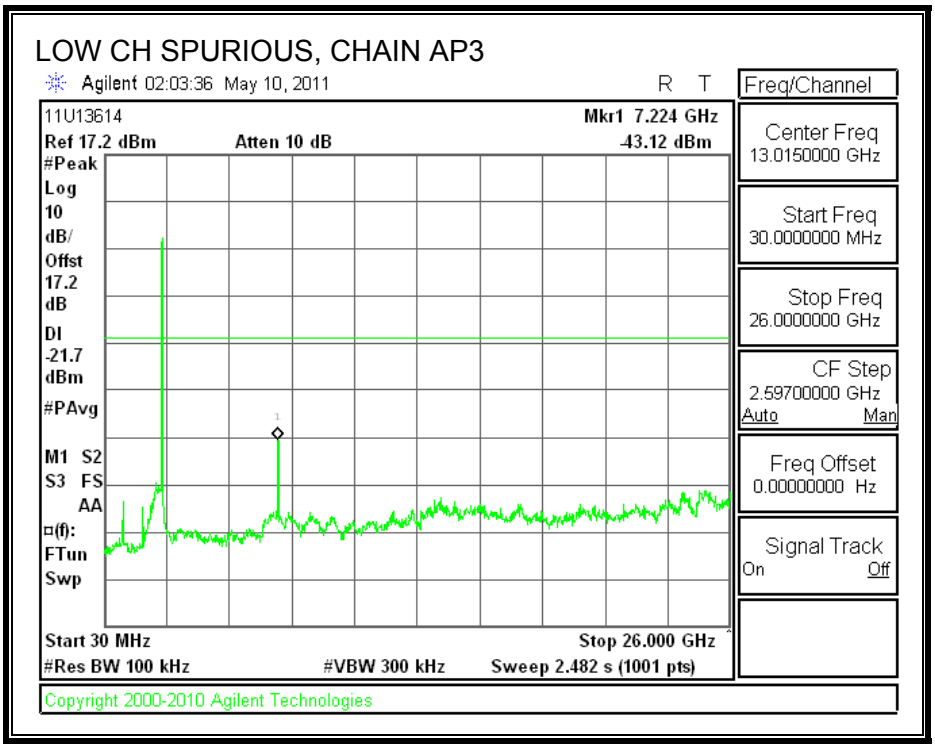


HIGH CH SPURIOUS, CHAIN AP2

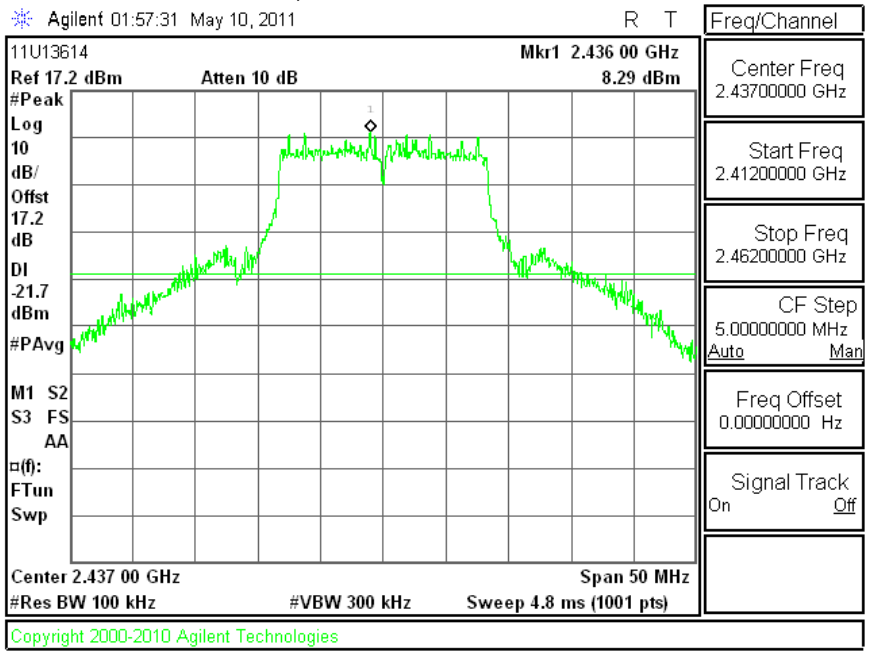


CHAIN AP3 SPURIOUS EMISSIONS

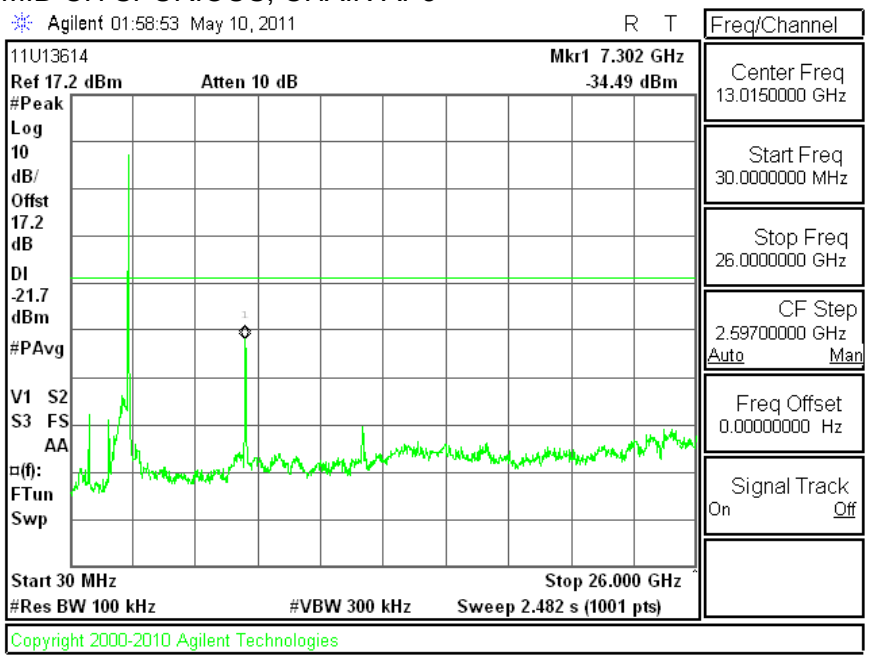




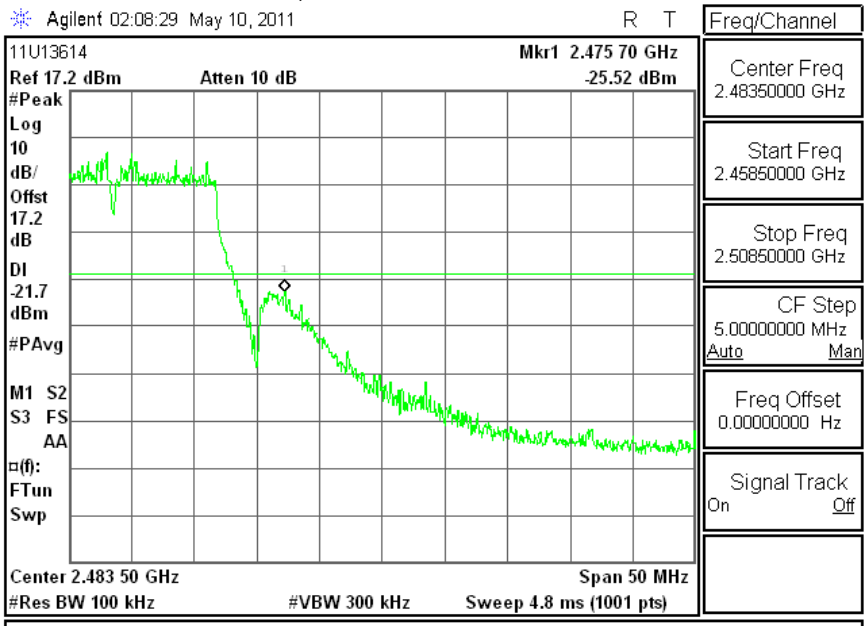
MID CH REFERENCE, CHAIN AP3



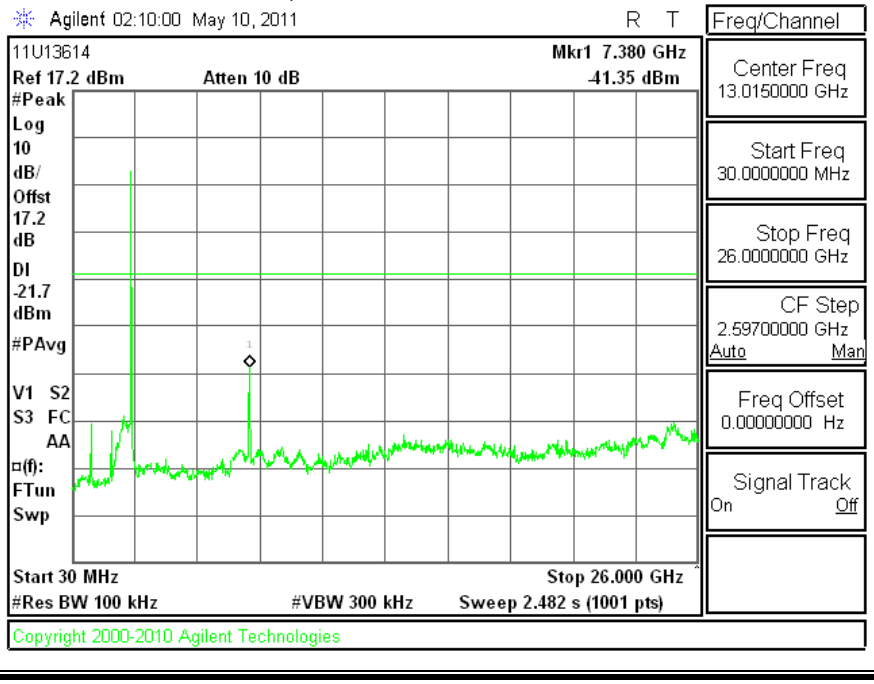
MID CH SPURIOUS, CHAIN AP3



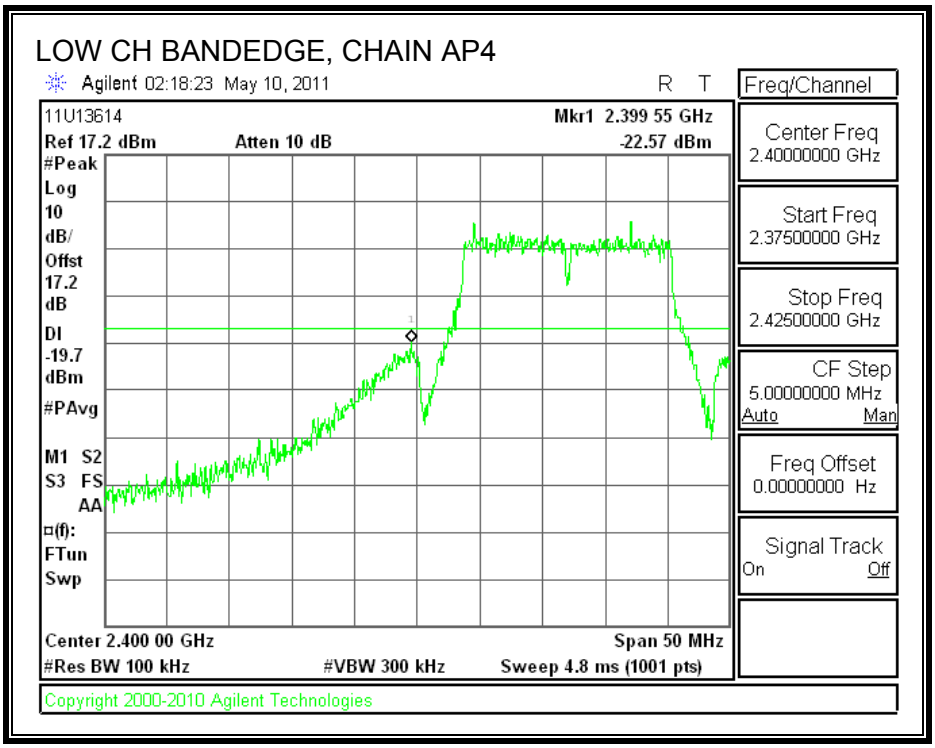
HIGH CH BANDEDGE, CHAIN AP3

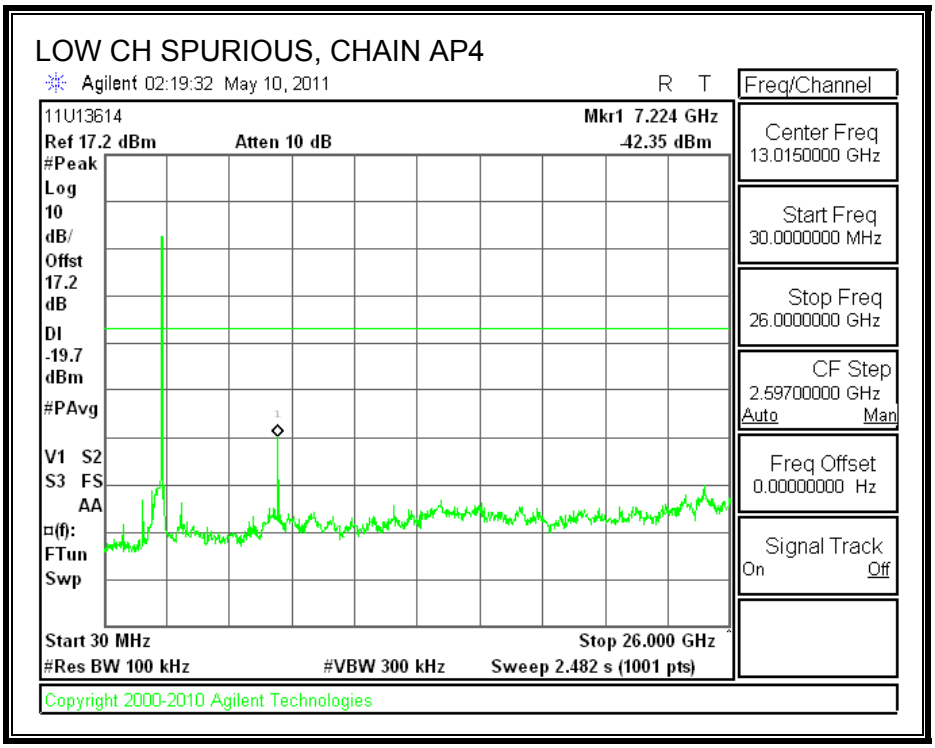


HIGH CH SPURIOUS, CHAIN AP3

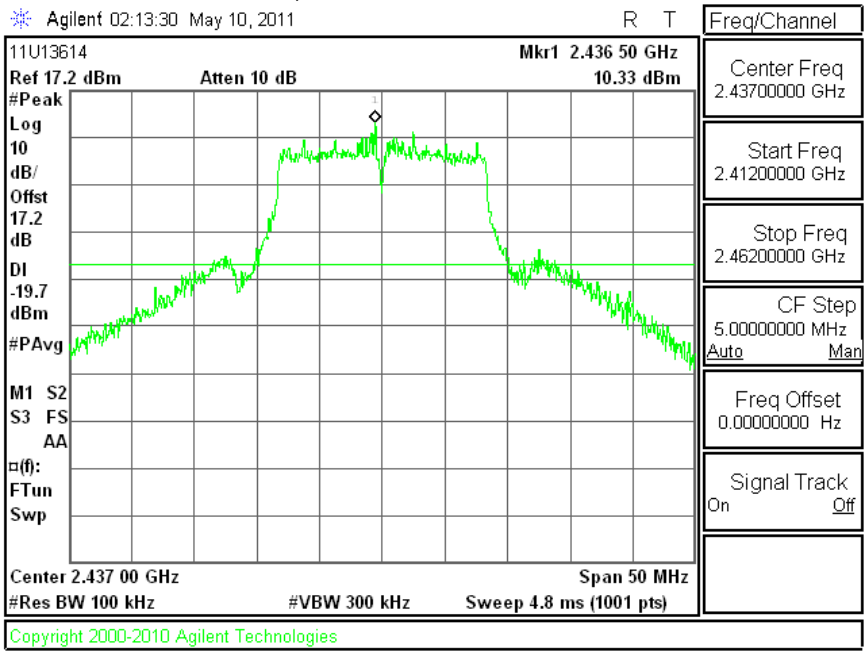


CHAIN AP4 SPURIOUS EMISSIONS

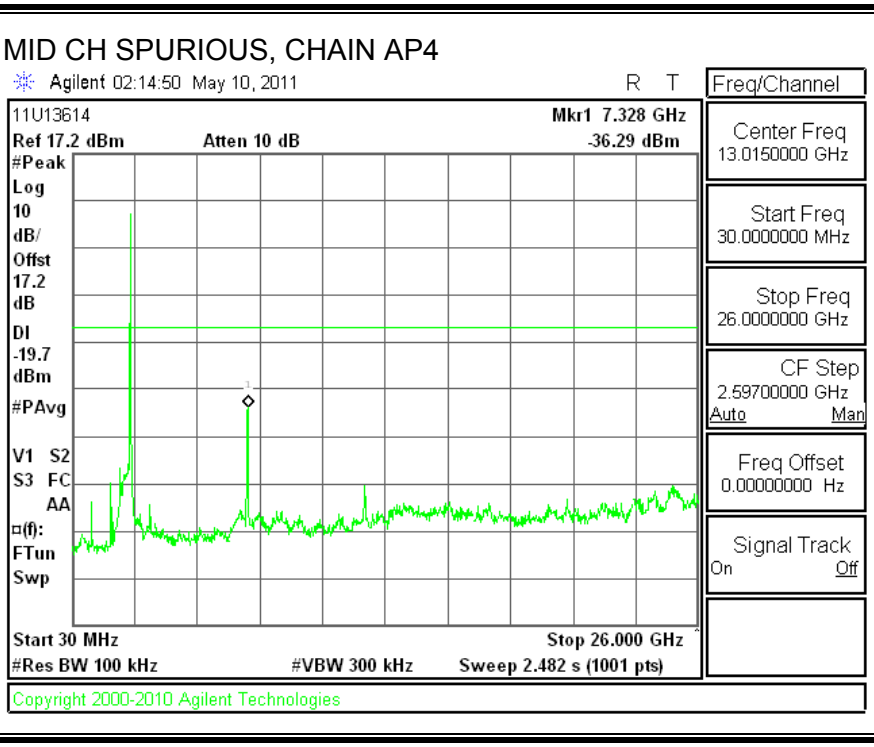




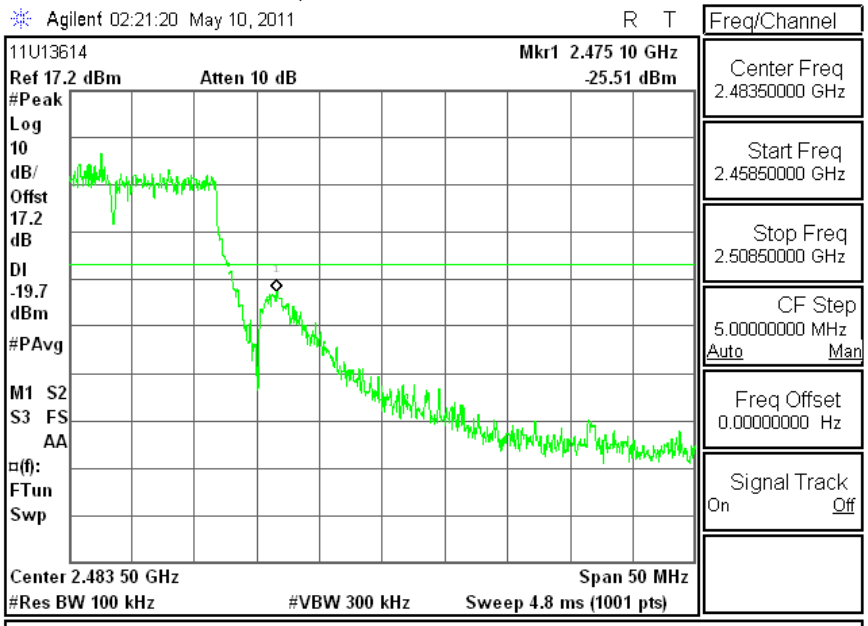
MID CH REFERENCE, CHAIN AP4



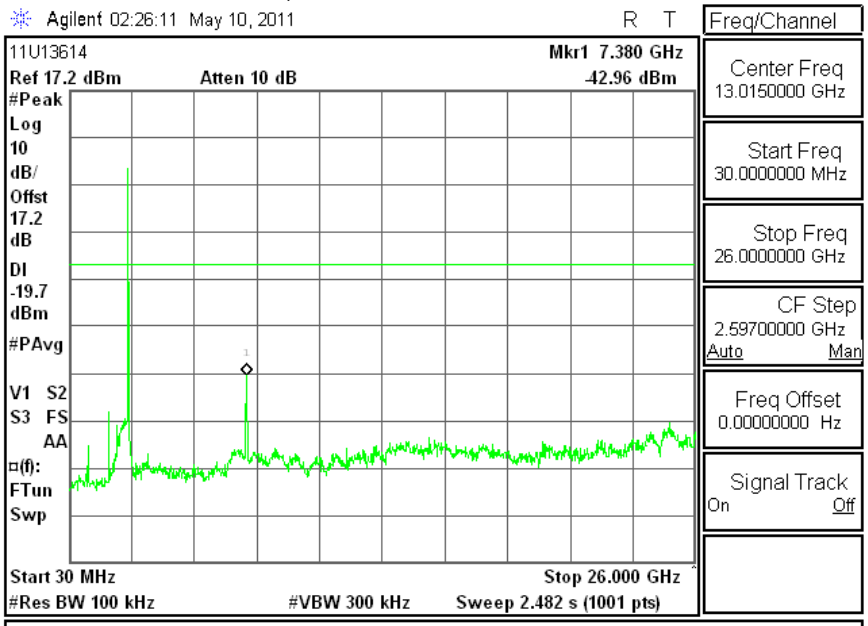
MID CH SPURIOUS, CHAIN AP4



HIGH CH BANDEDGE, CHAIN AP4



HIGH CH SPURIOUS, CHAIN AP4



7.3. 802.11n THREE CHAINS HT20 MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

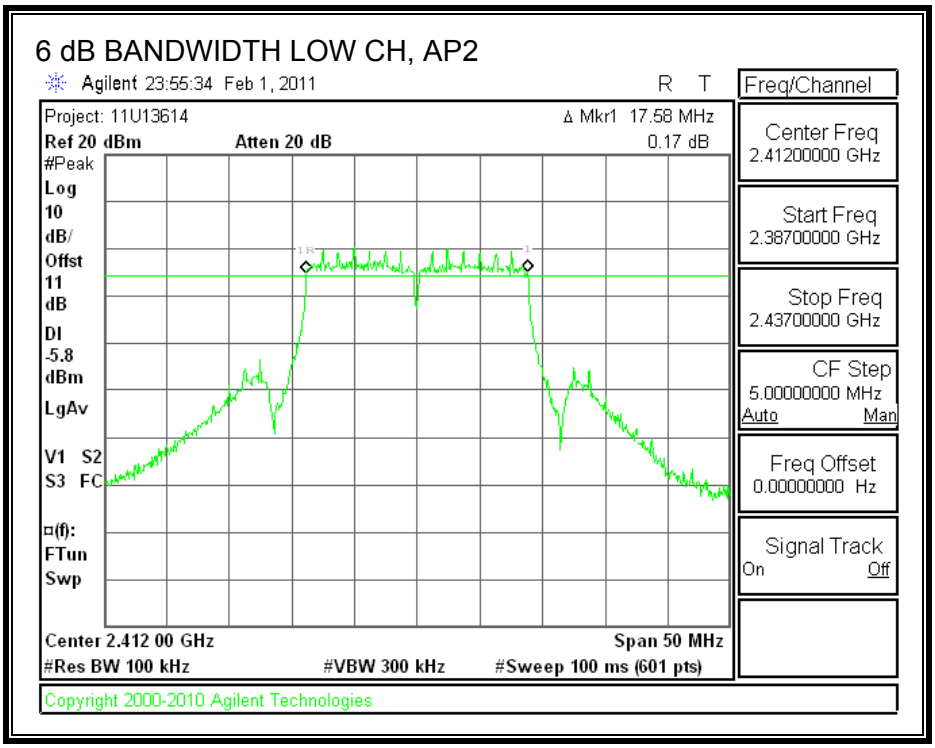
TEST PROCEDURE

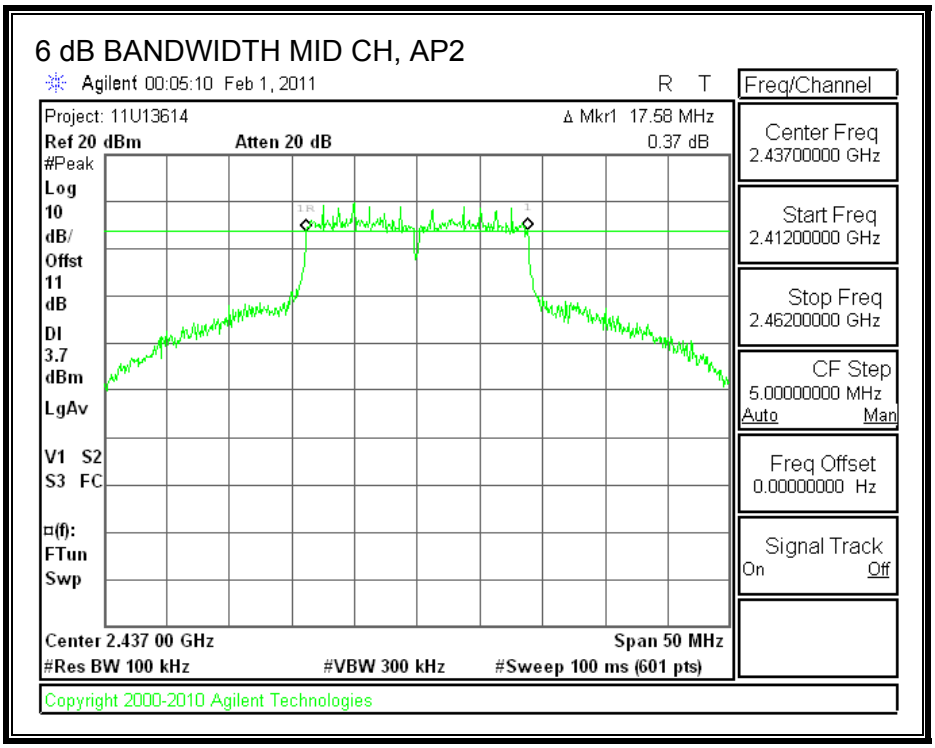
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

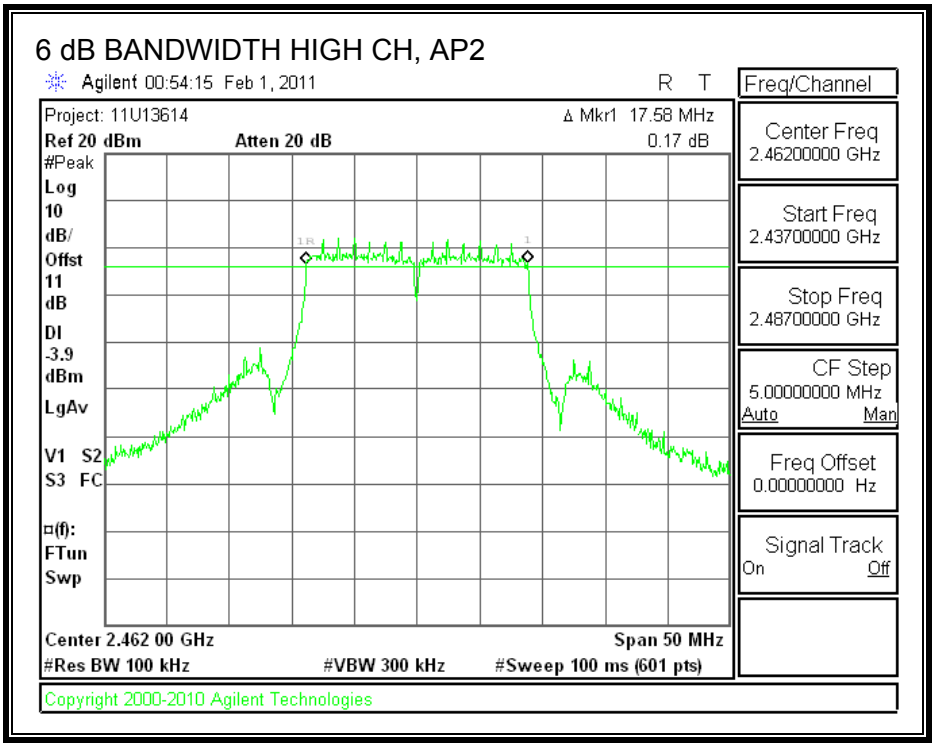
RESULTS

Channel	Frequency (MHz)	AP2 6 dB BW (MHz)	AP3 6 dB BW (MHz)	AP4 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	17.58	17.58	17.58	0.5
Middle	2437	17.58	17.58	17.33	0.5
High	2462	17.58	17.58	17.58	0.5

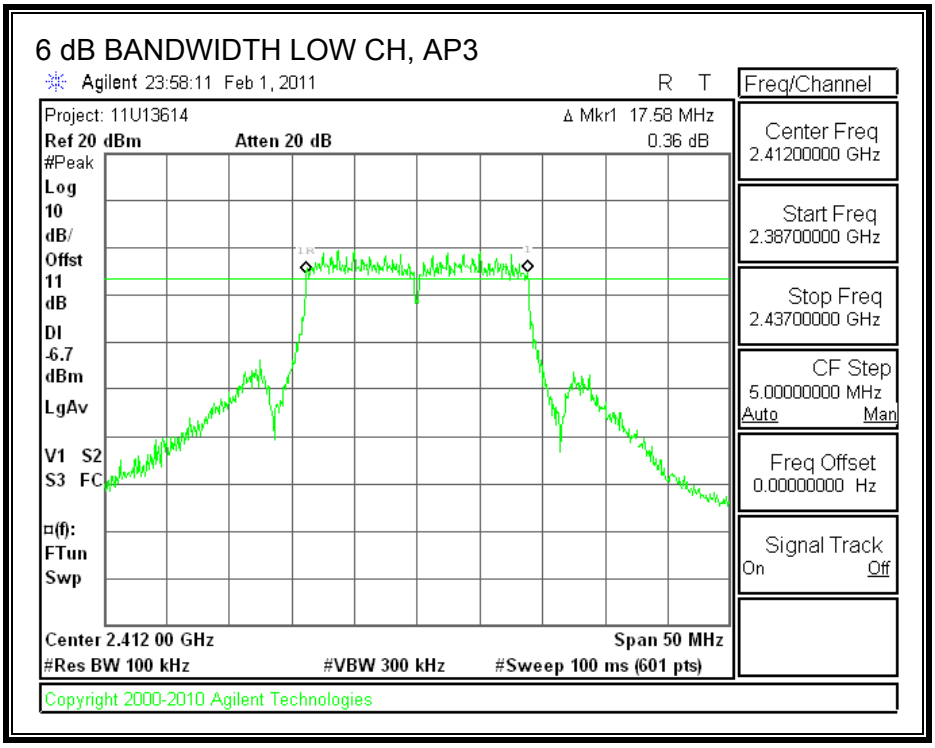
6 dB BANDWIDTH, AP2

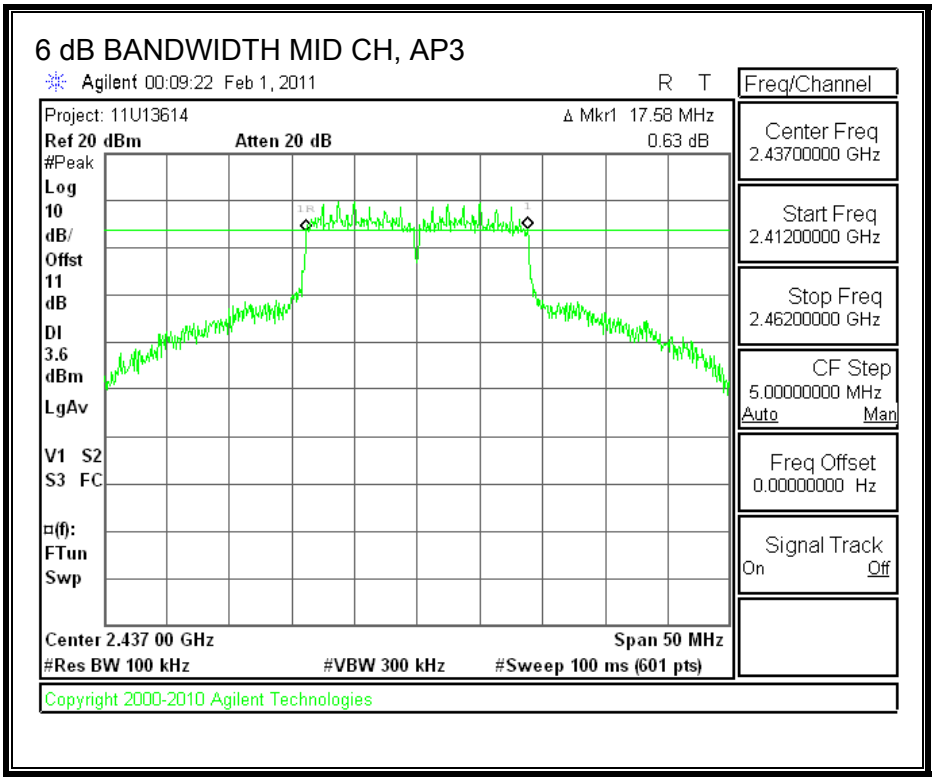


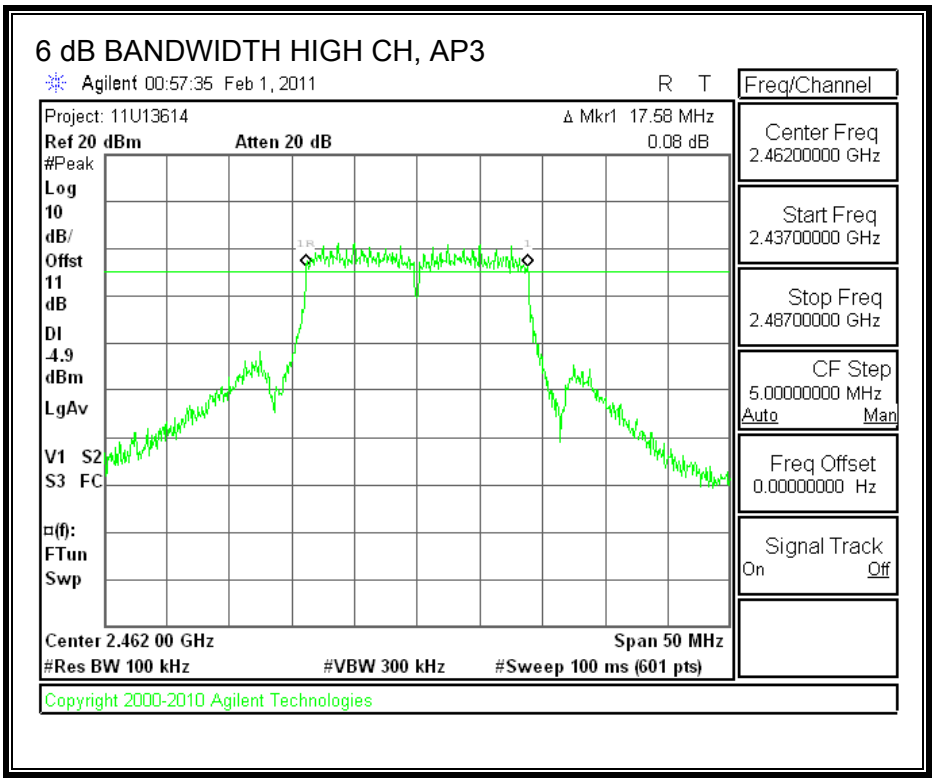




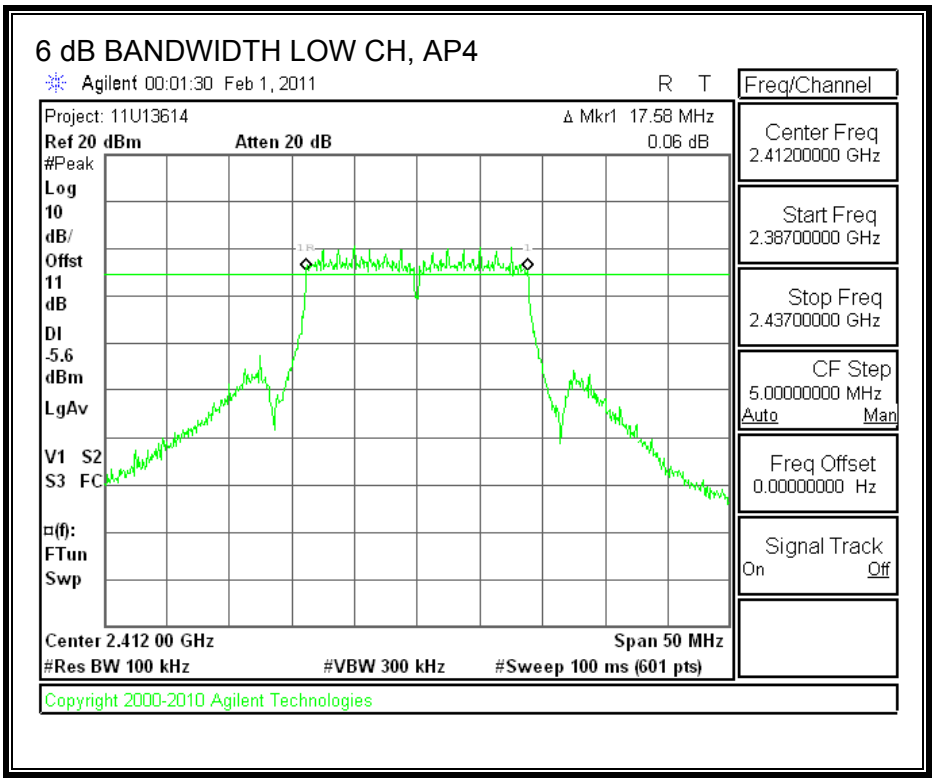
6 dB BANDWIDTH, AP3

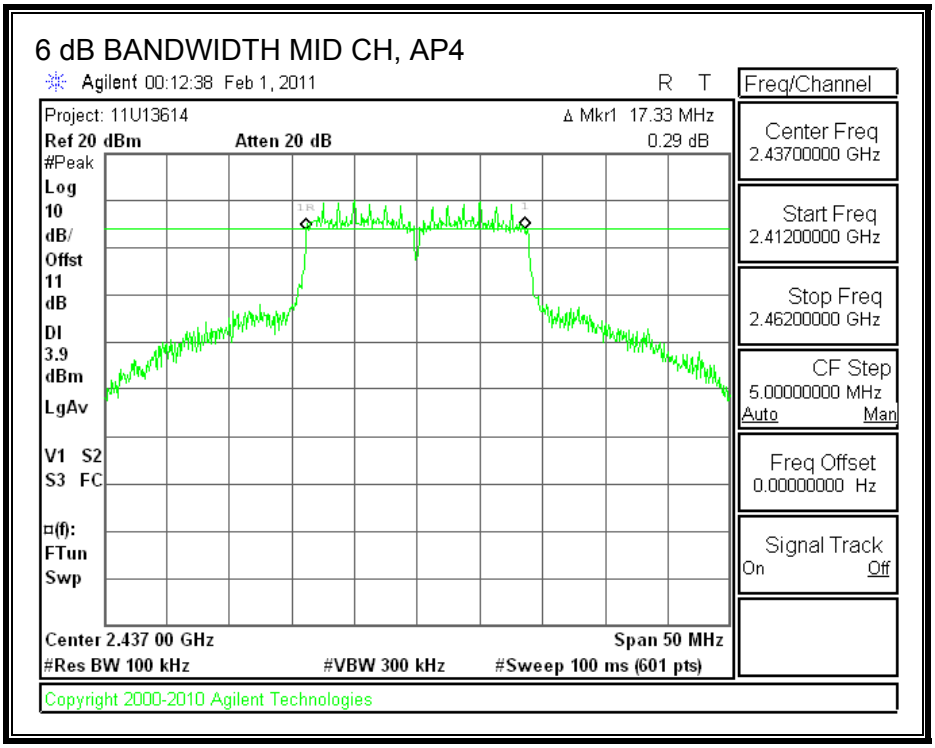


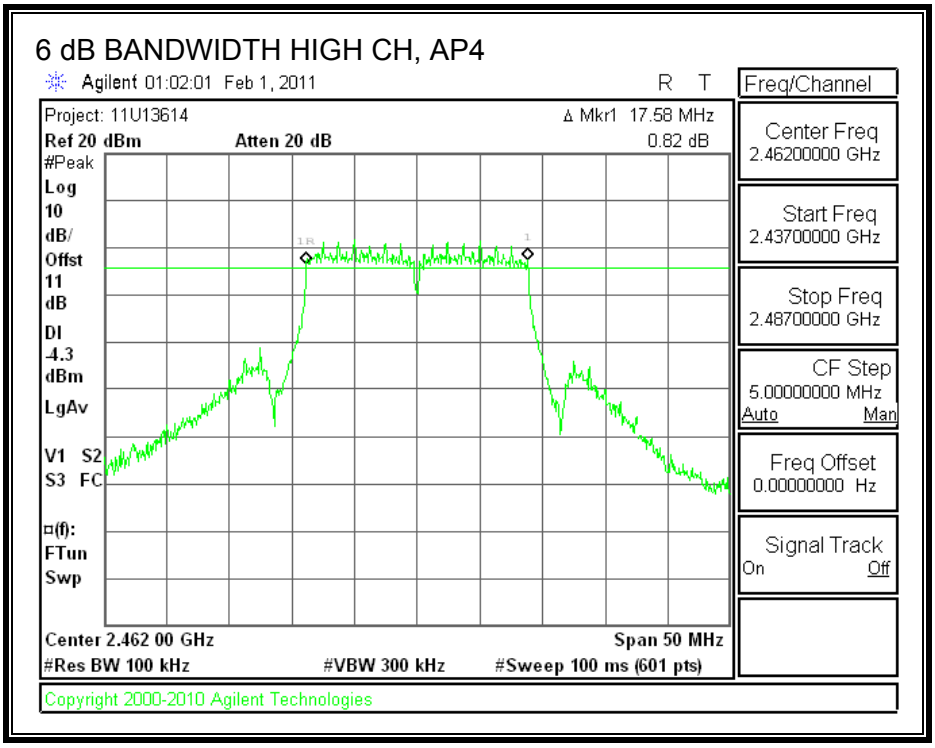




6 dB BANDWIDTH, AP4







7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

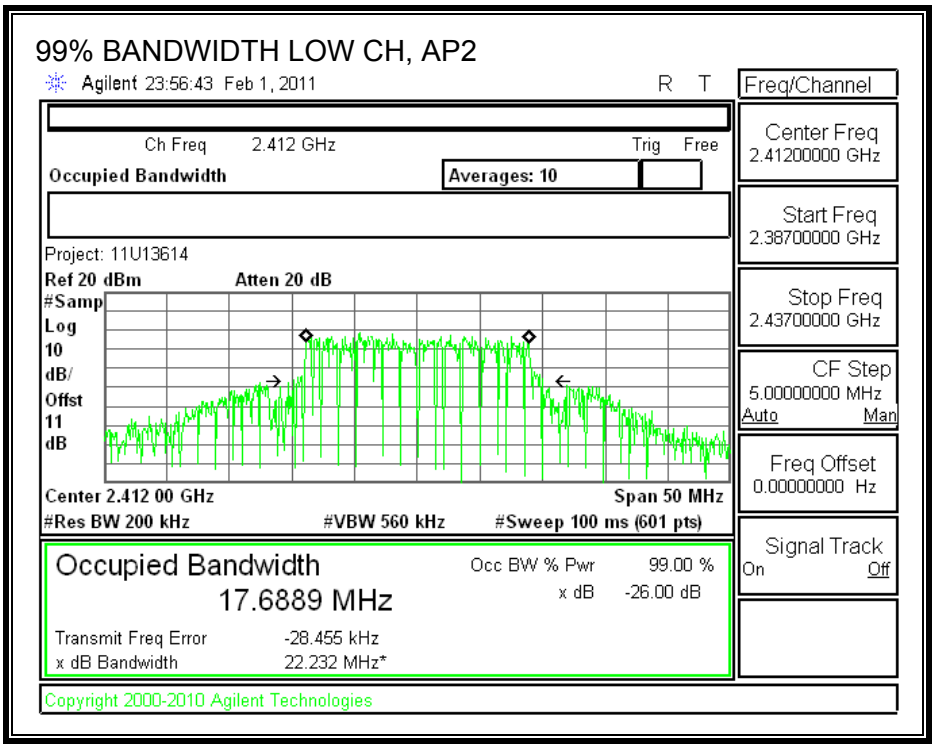
TEST PROCEDURE

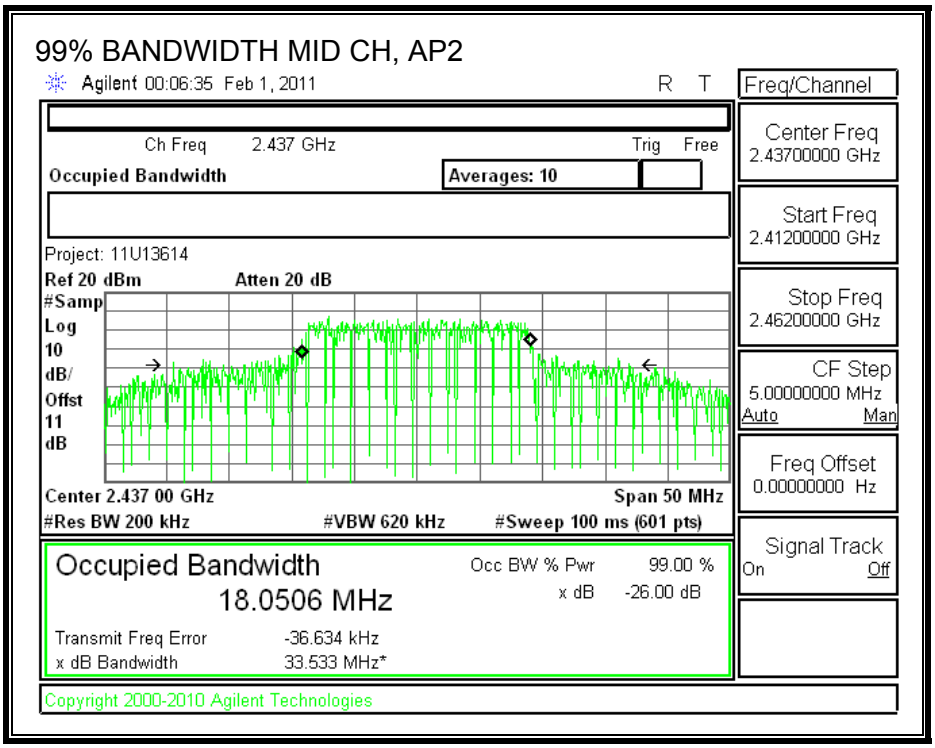
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

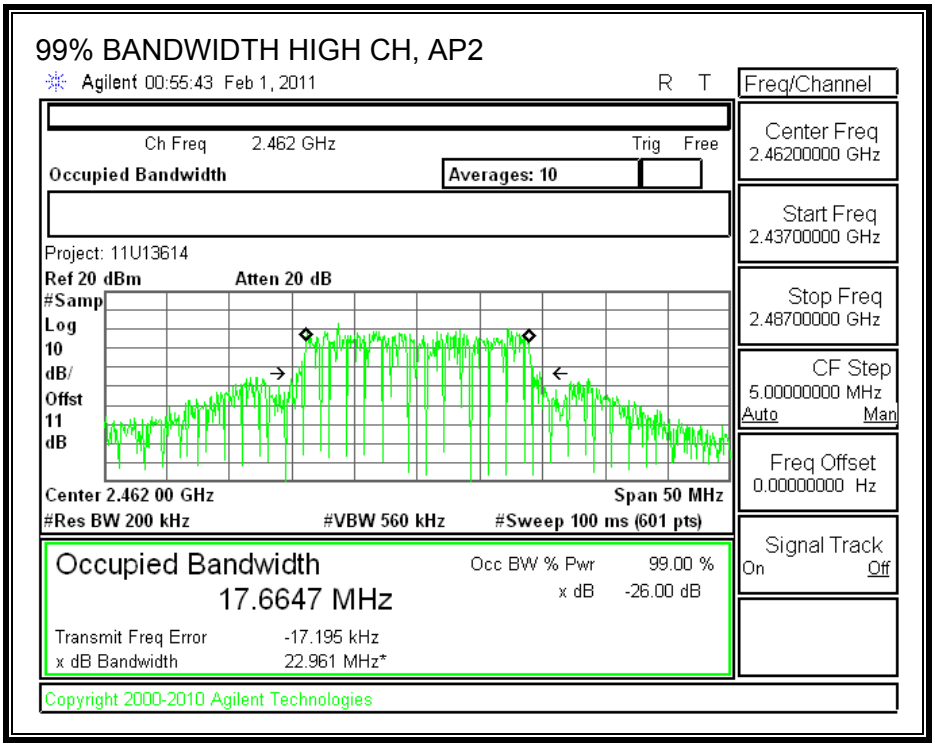
RESULTS

Channel	Frequency (MHz)	AP1 99% Bandwidth (MHz)	AP2 99% Bandwidth (MHz)	AP3 99% Bandwidth (MHz)
Low	2412	17.6889	17.627	17.6528
Middle	2437	18.0506	17.863	17.7258
High	2462	17.6647	17.6644	17.6102

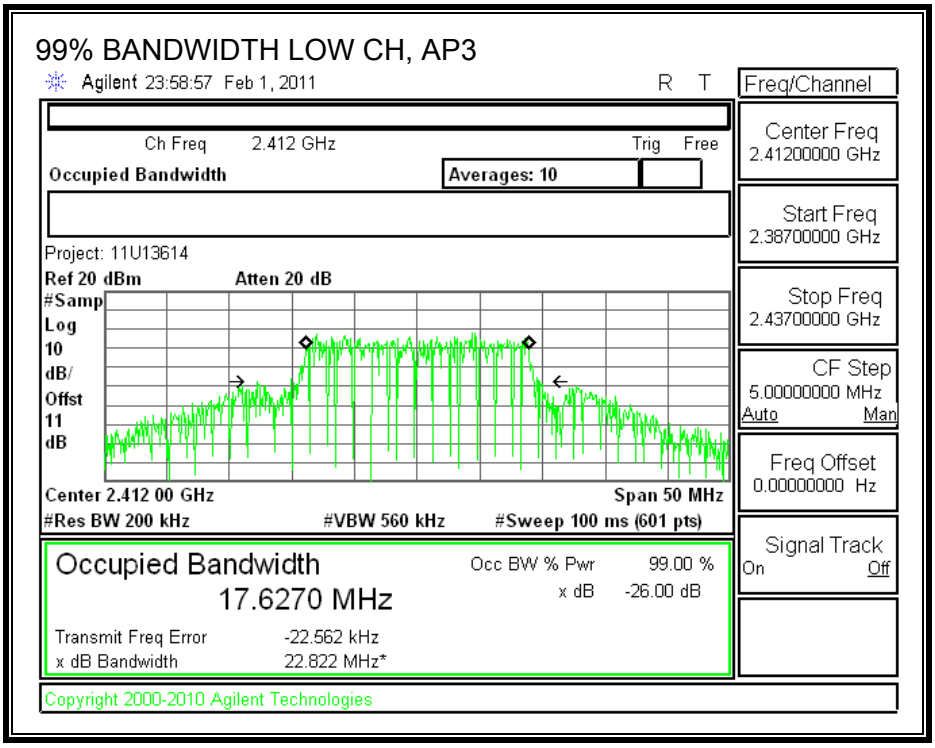
99% BANDWIDTH, AP2

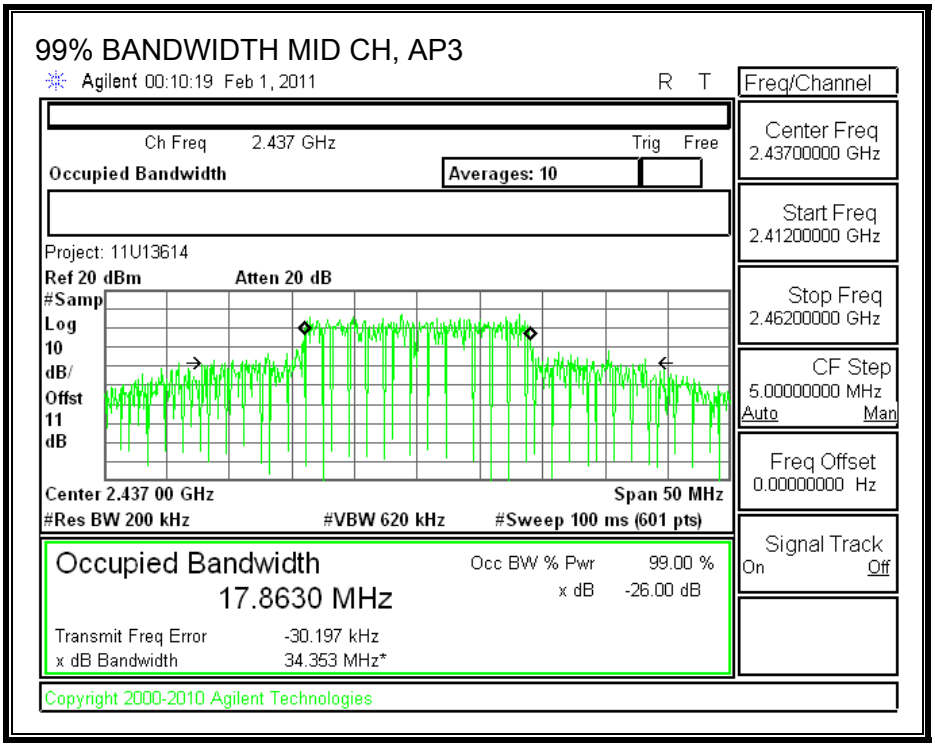


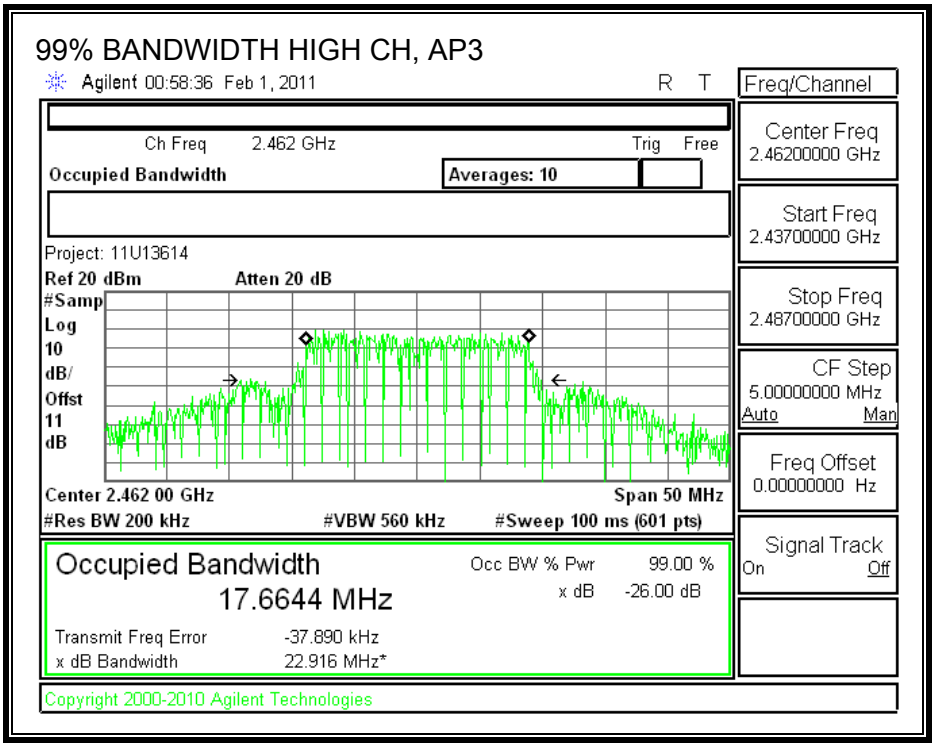




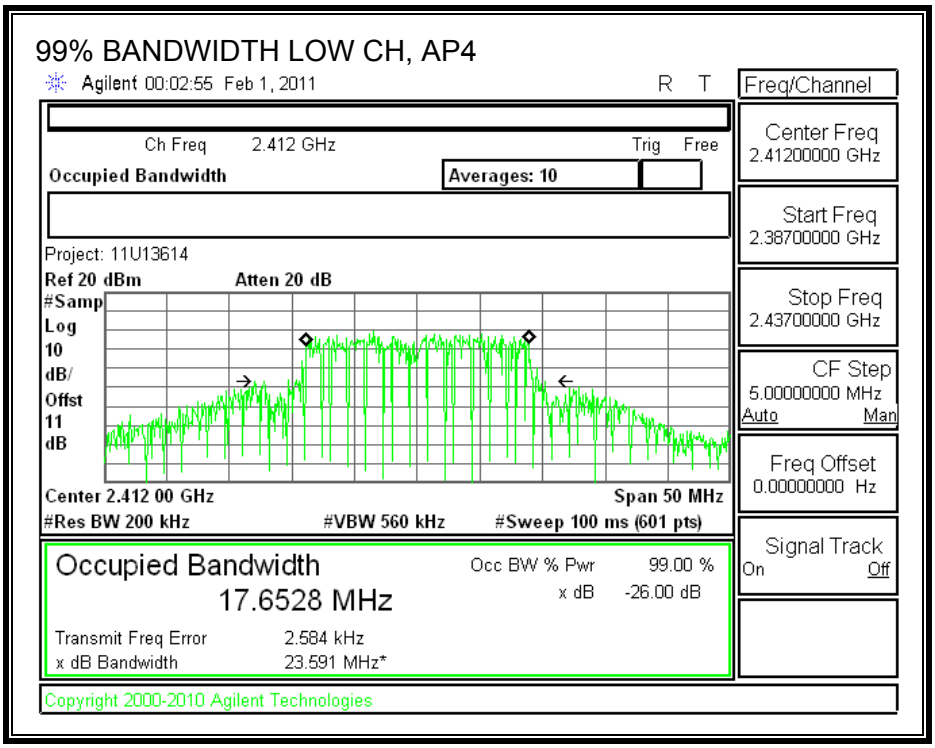
99% BANDWIDTH, AP3

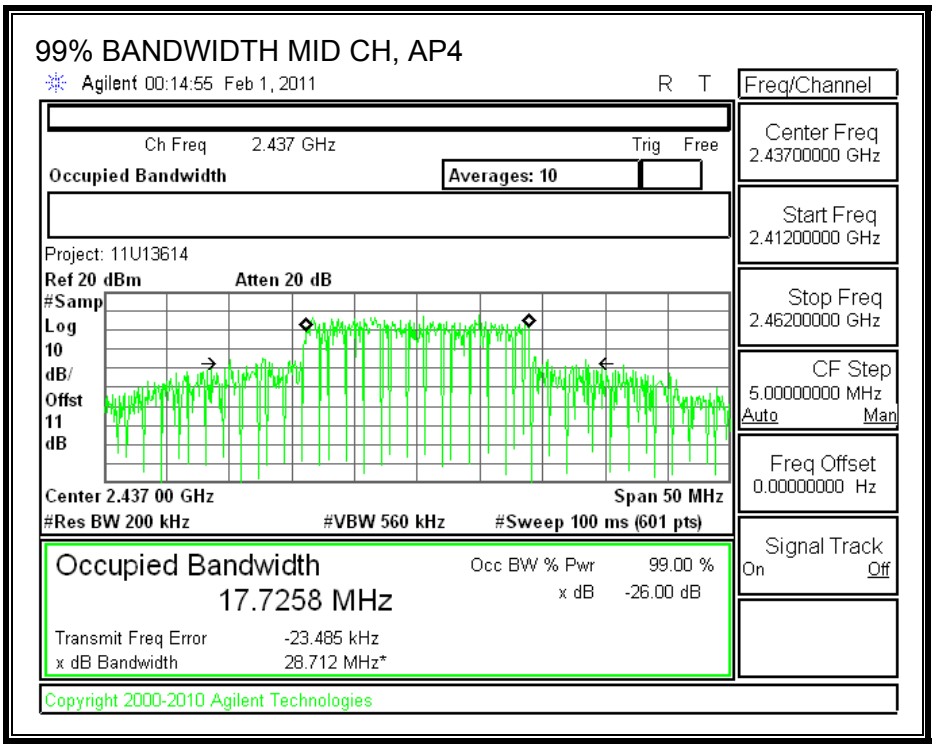


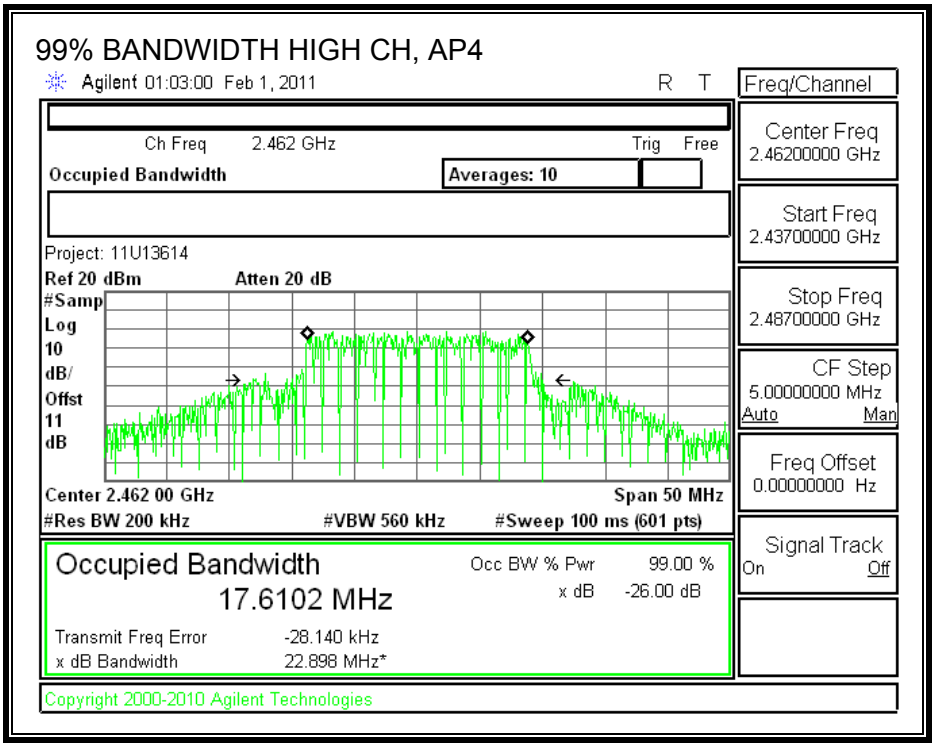




99% BANDWIDTH, AP4







7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain of **2.33 dBi** is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

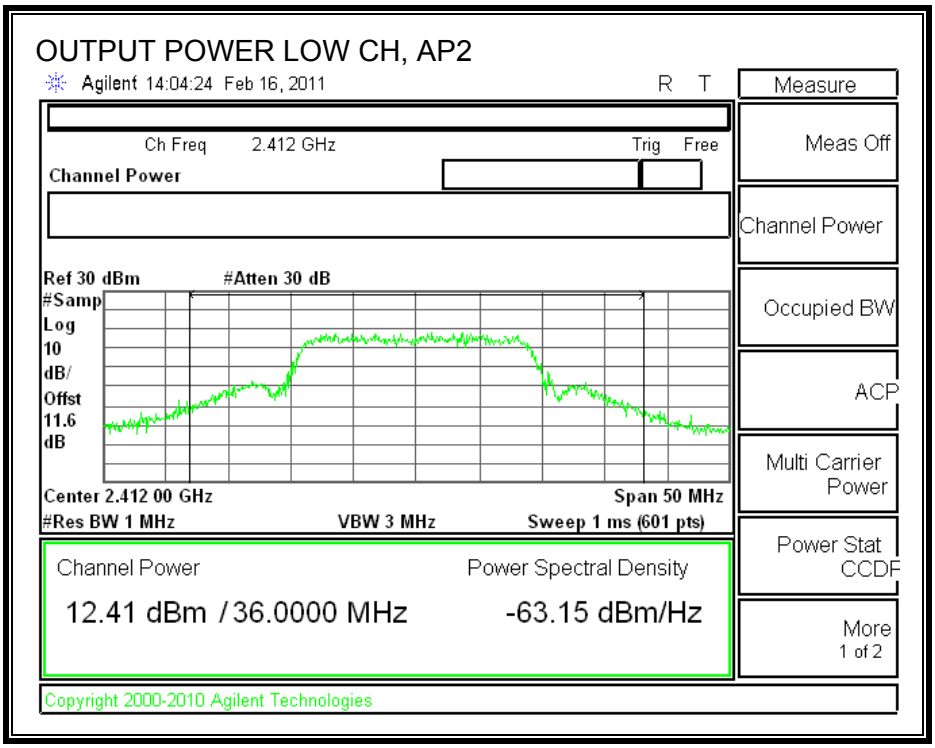
Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 26dB bandwidth.

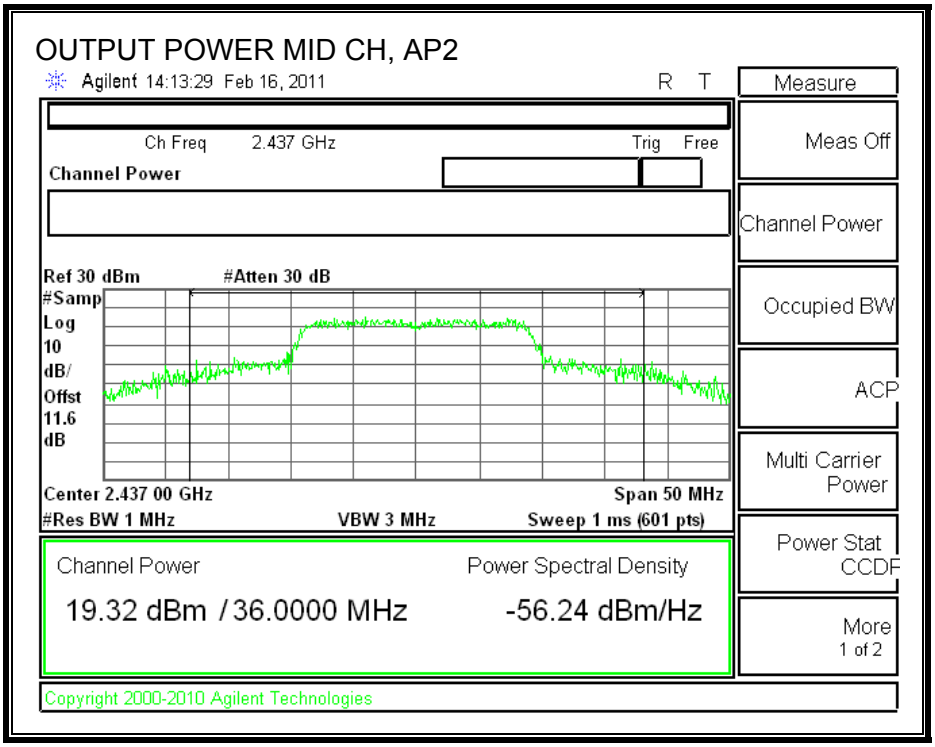
Maximum Conducted Output Power based on RMS averaging over a time interval is measured in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005. The transmitter operates continuously therefore Power Output Option 2, Method # 1 is used.

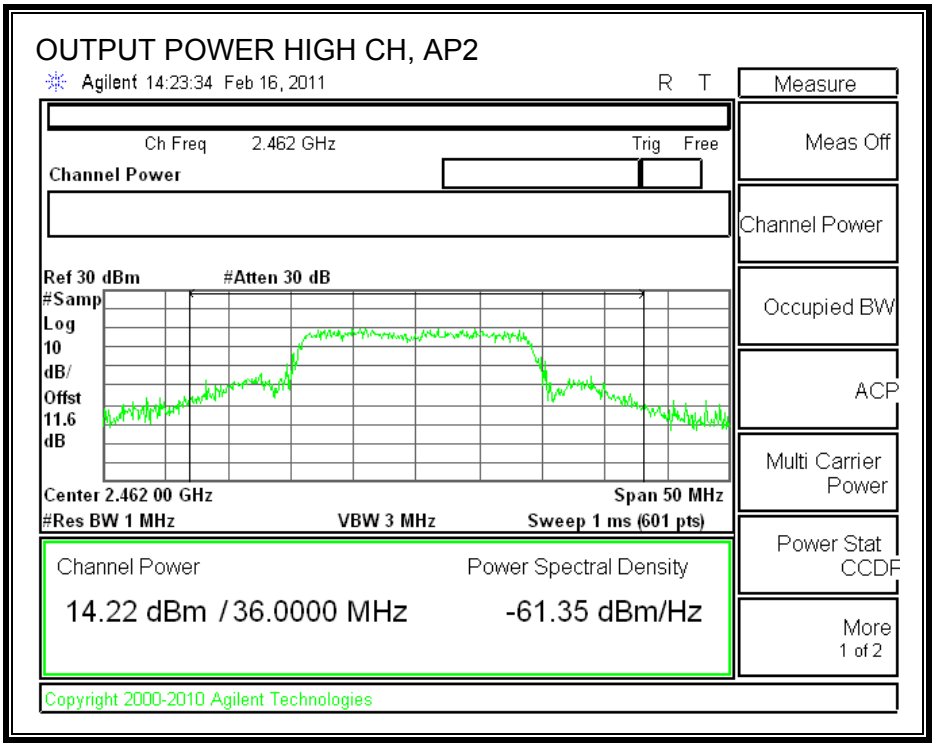
RESULTS

Channel	Frequency (MHz)	AP2 Power (dBm)	AP3 Power (dBm)	AP4 Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	12.41	11.62	12.20	0.00	16.86	30.00	-13.14
Mid	2437	19.32	19.32	19.38	0.00	24.11	30.00	-5.89
High	2462	14.22	14.18	14.03	0.00	18.92	30.00	-11.08

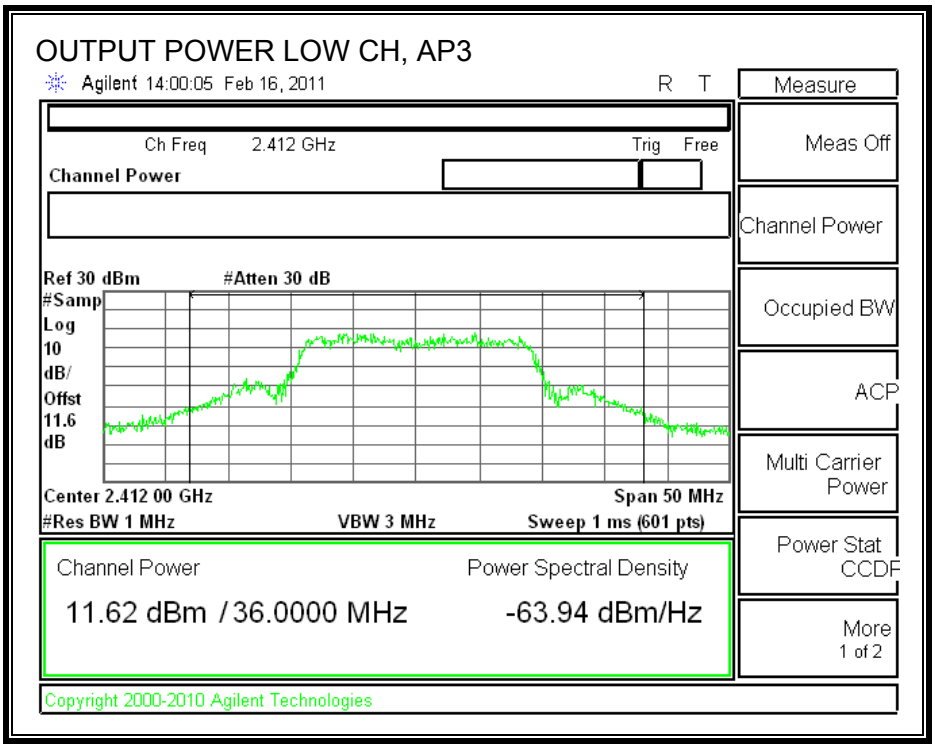
AP2 OUTPUT POWER

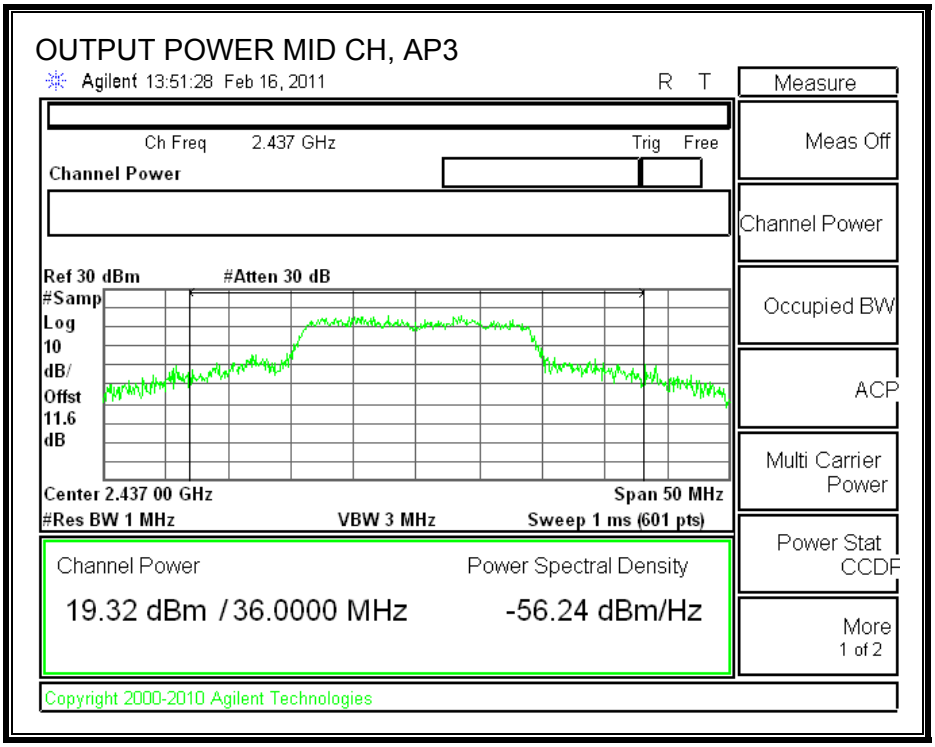


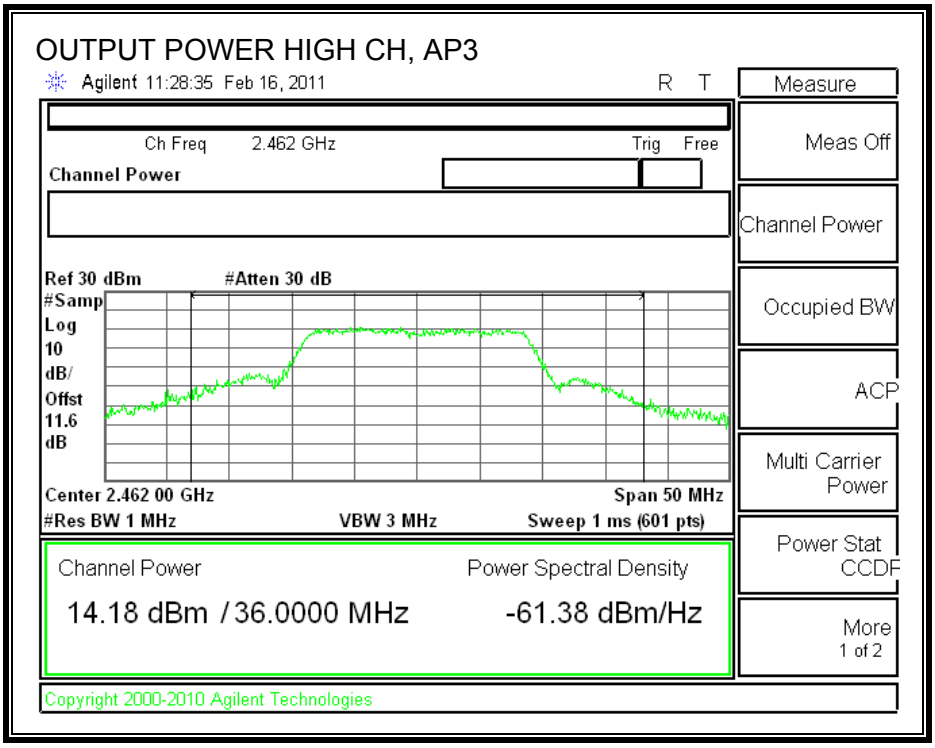




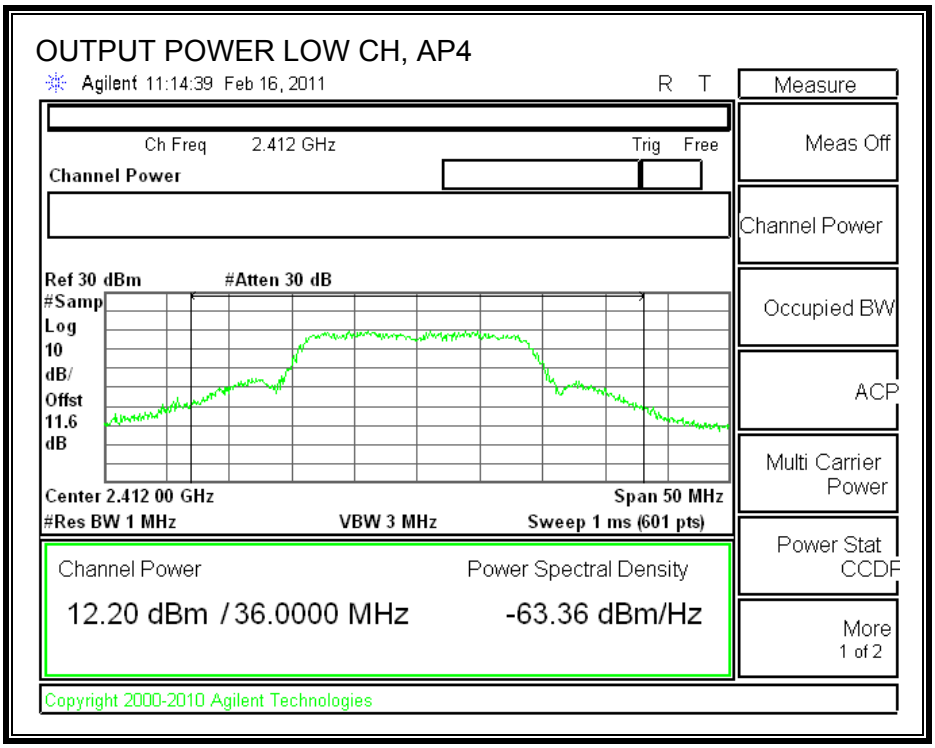
AP3 OUTPUT POWER

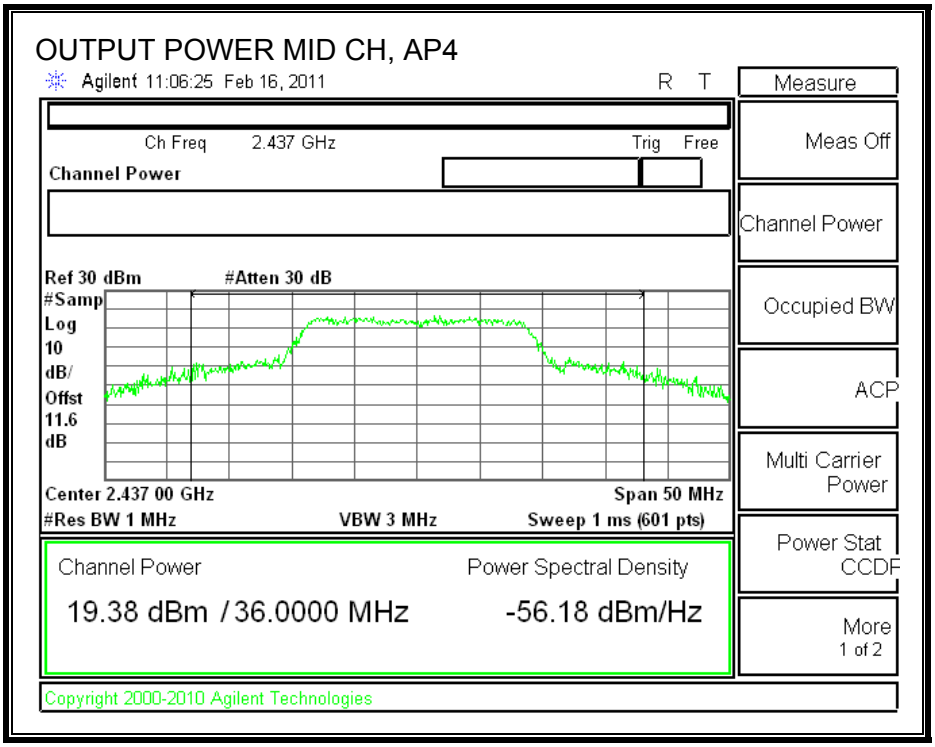


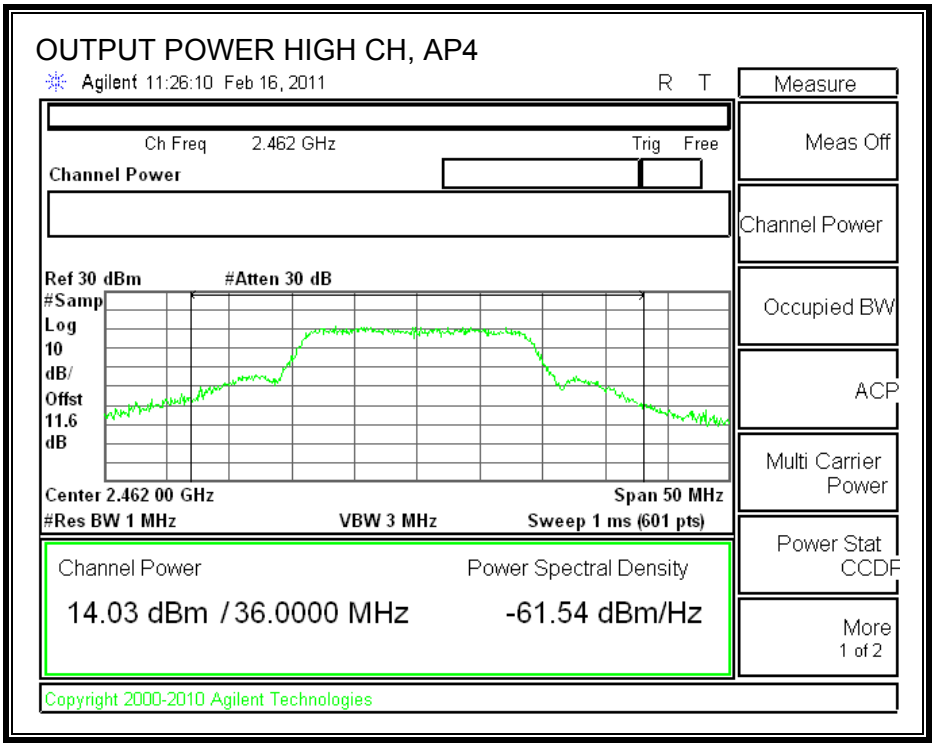




AP4 OUTPUT POWER







7.3.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

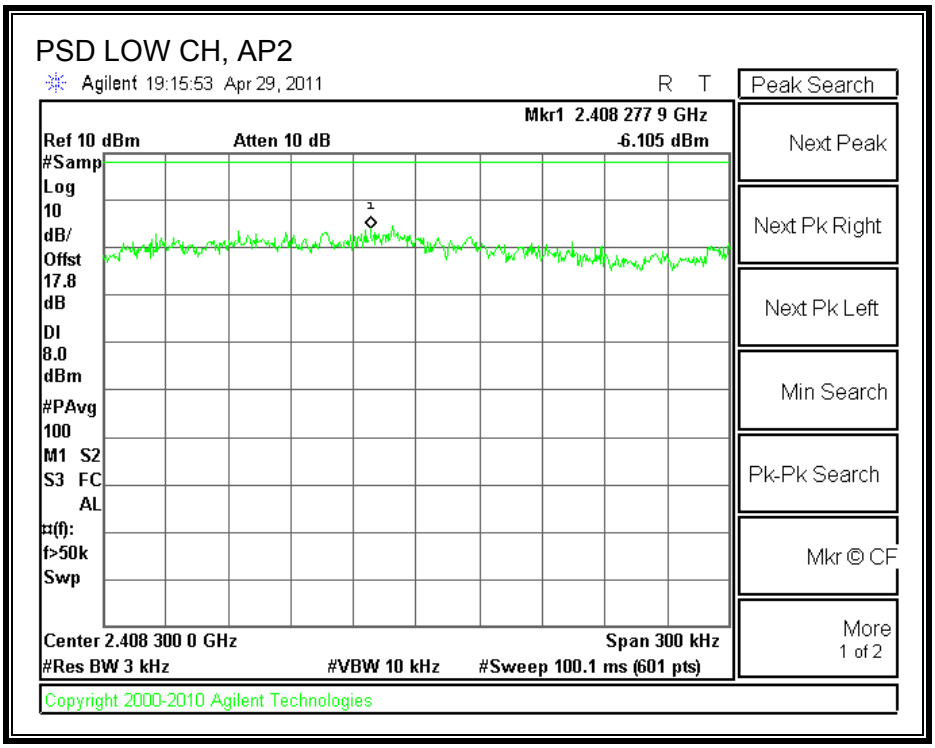
TEST PROCEDURE

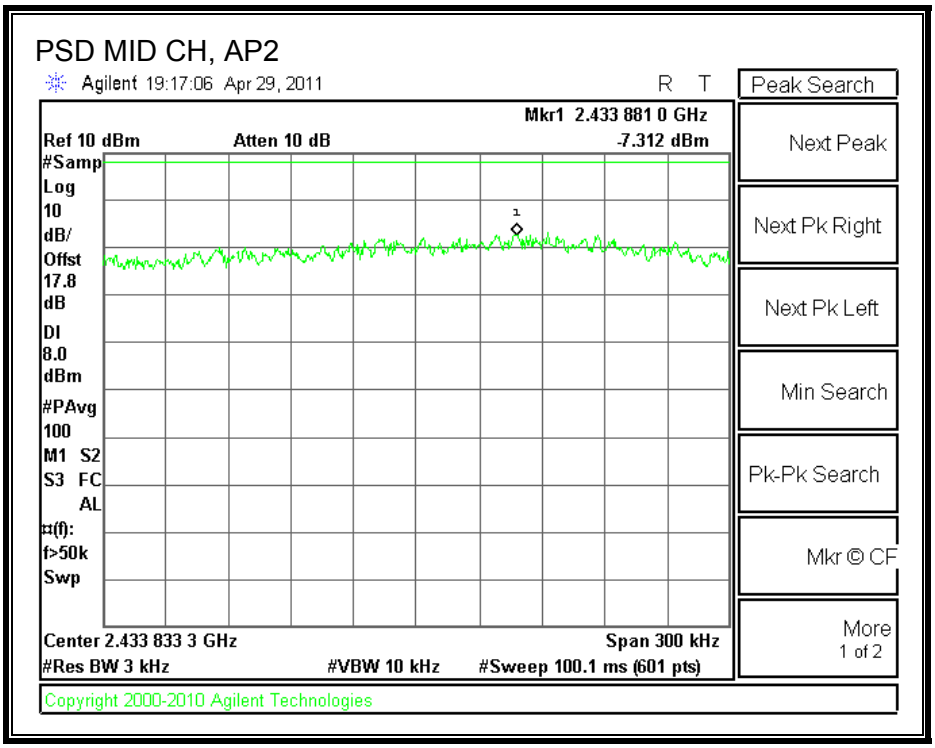
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

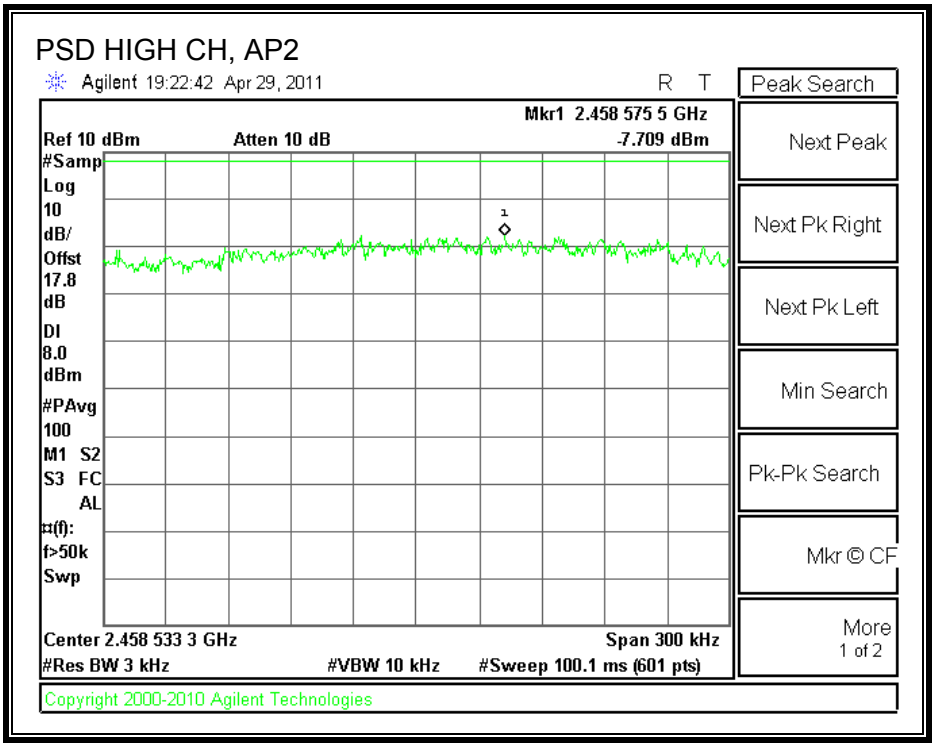
RESULTS

Channel	Frequency (MHz)	AP2 PSD (dBm)	AP3 PSD (dBm)	AP4 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-6.105	-6.463	-6.165	-1.47	8	-9.47
Middle	2437	-7.312	-7.523	-7.050	-2.52	8	-10.52
High	2462	-7.709	-6.364	-8.425	-2.64	8	-10.64

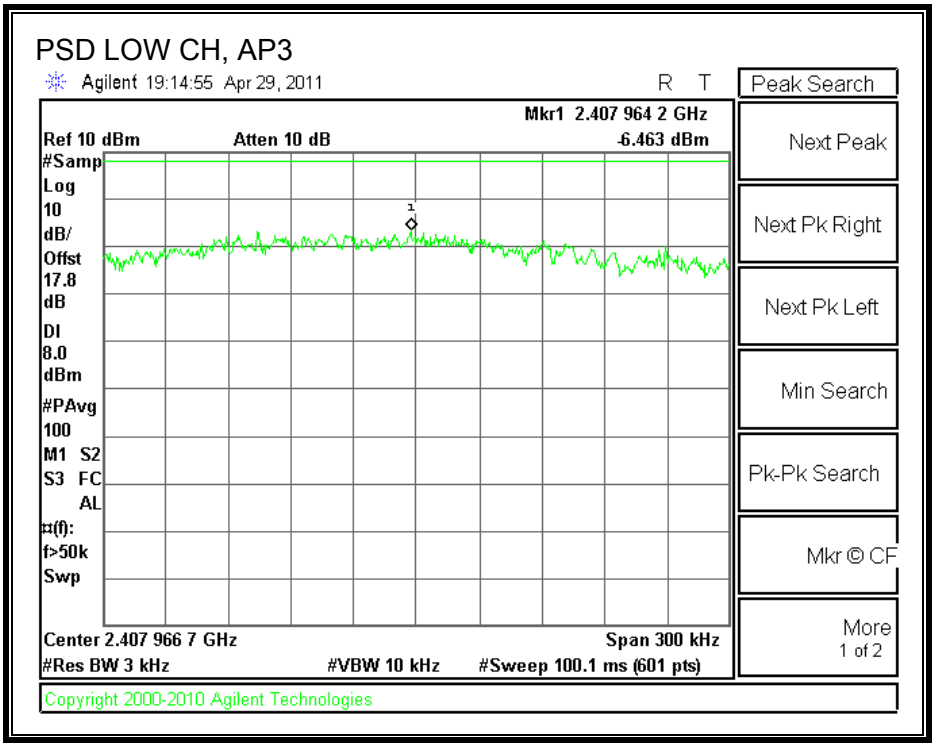
POWER SPECTRAL DENSITY, AP2



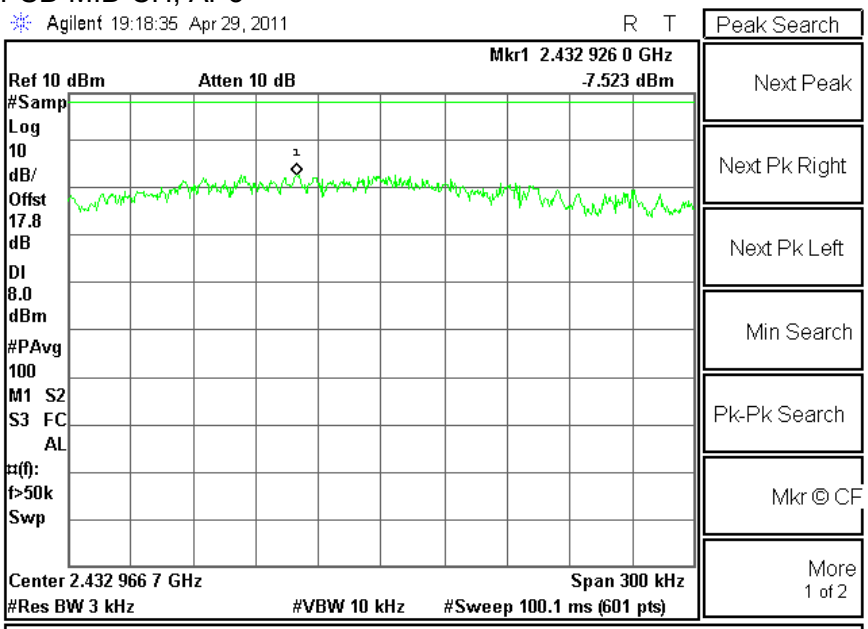




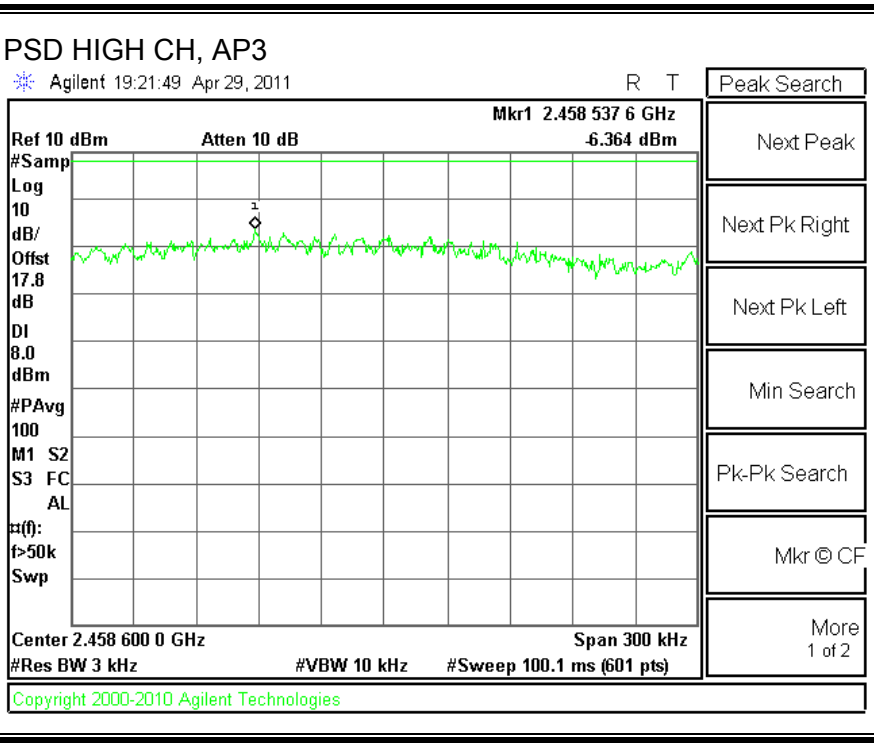
POWER SPECTRAL DENSITY, AP3



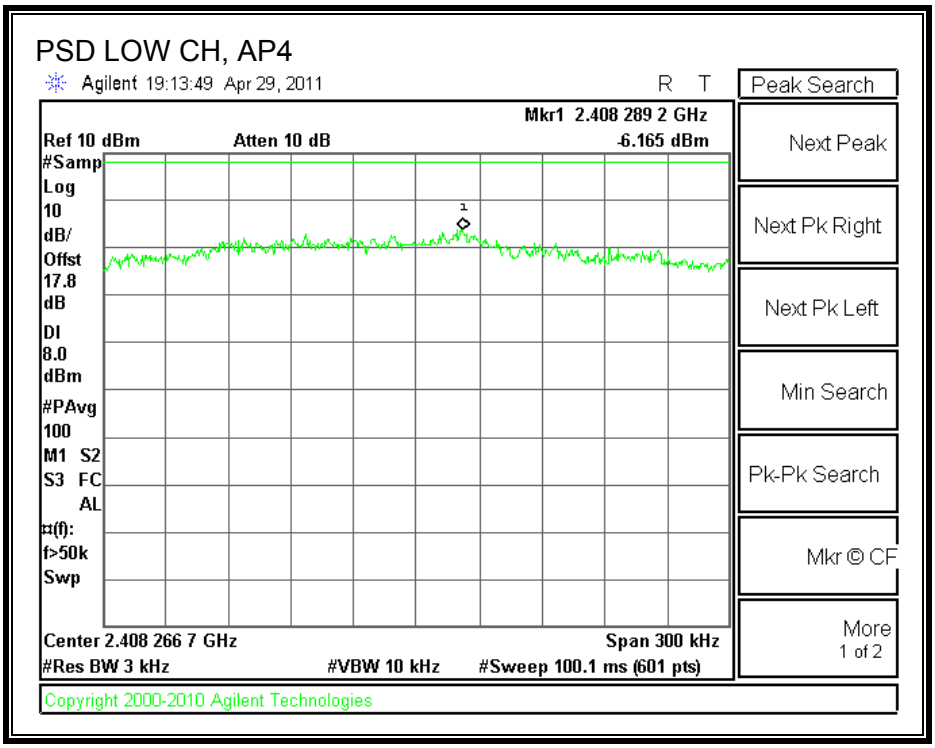
PSD MID CH, AP3

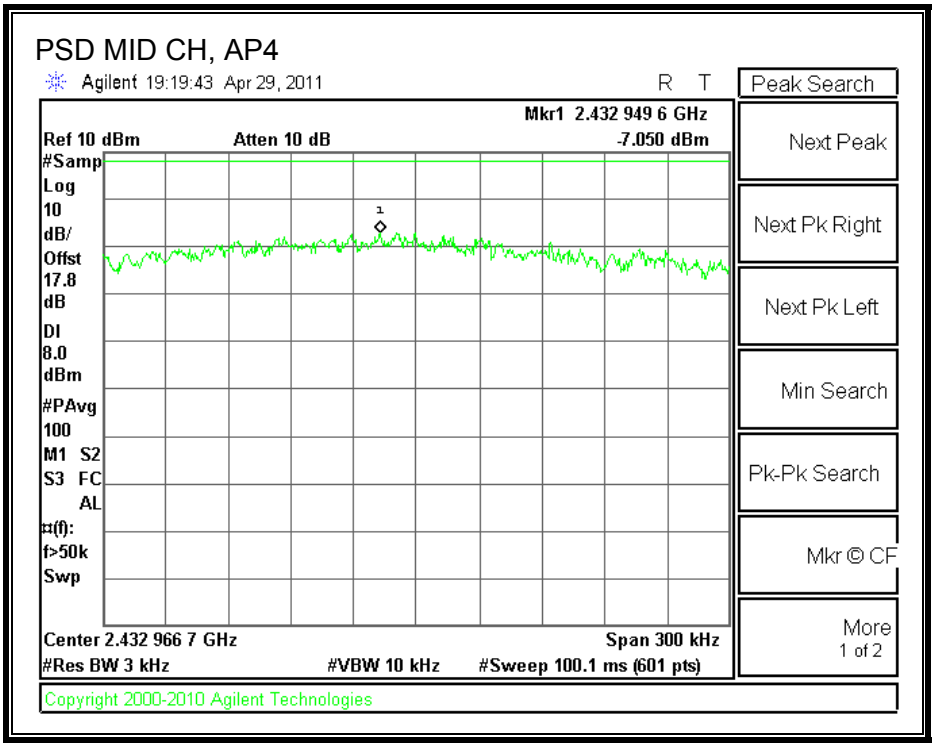


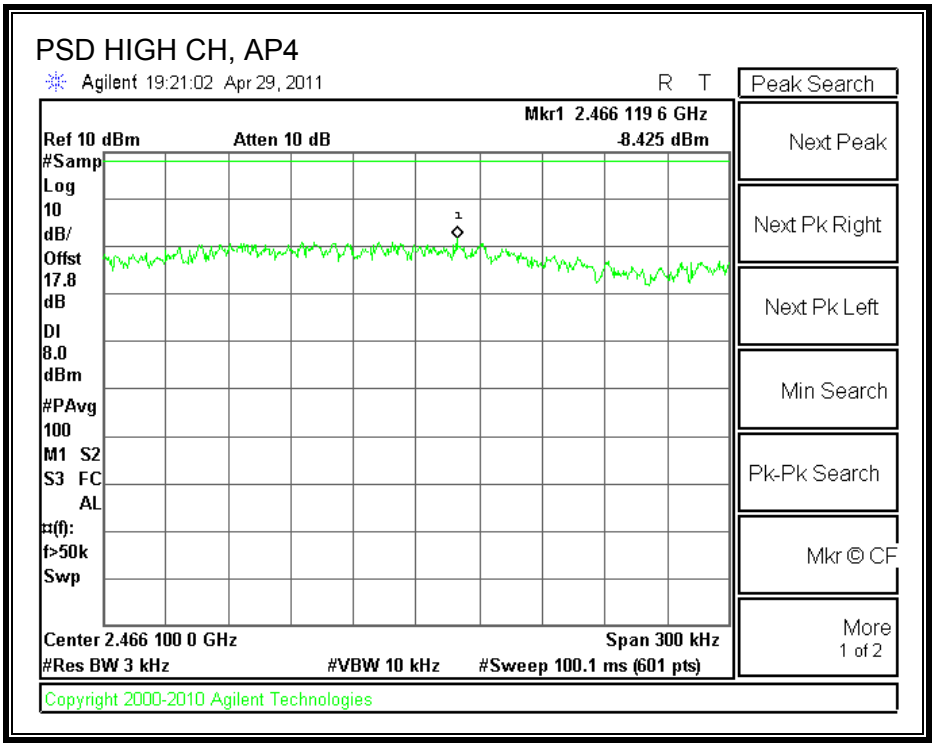
PSD HIGH CH, AP3



POWER SPECTRAL DENSITY, AP4







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 RMS averaging over time interval; therefore the required attenuation is 30 dB.

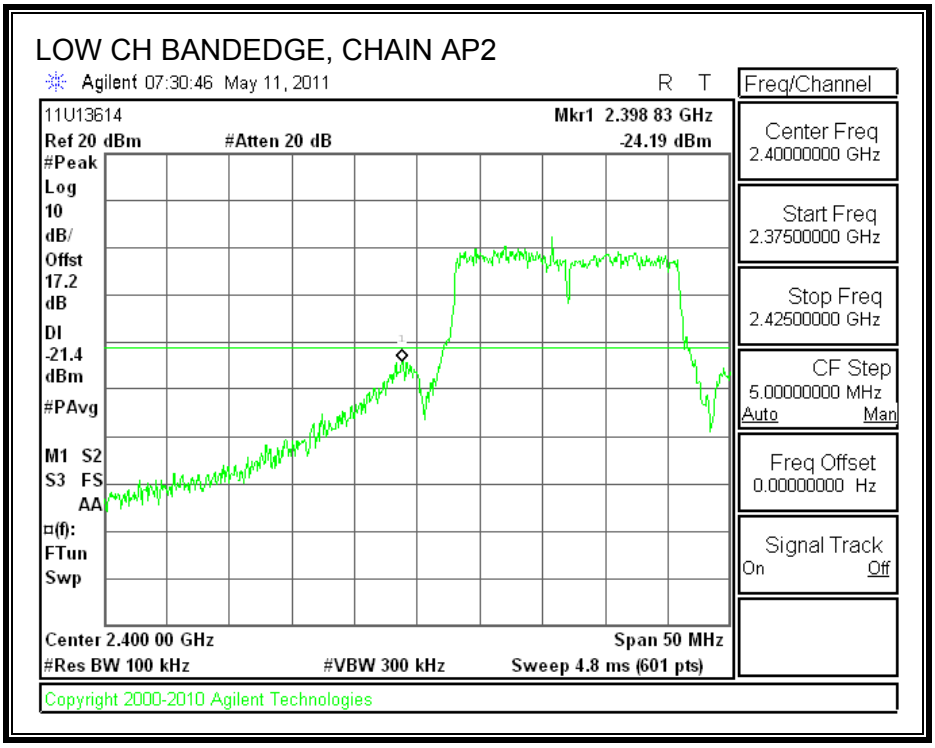
TEST PROCEDURE

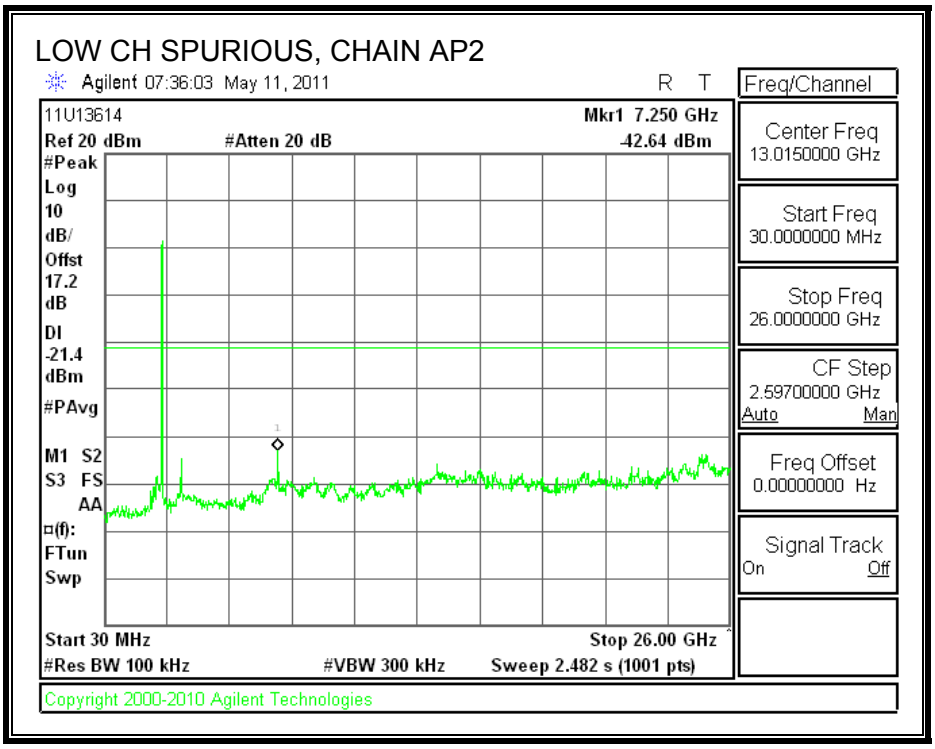
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

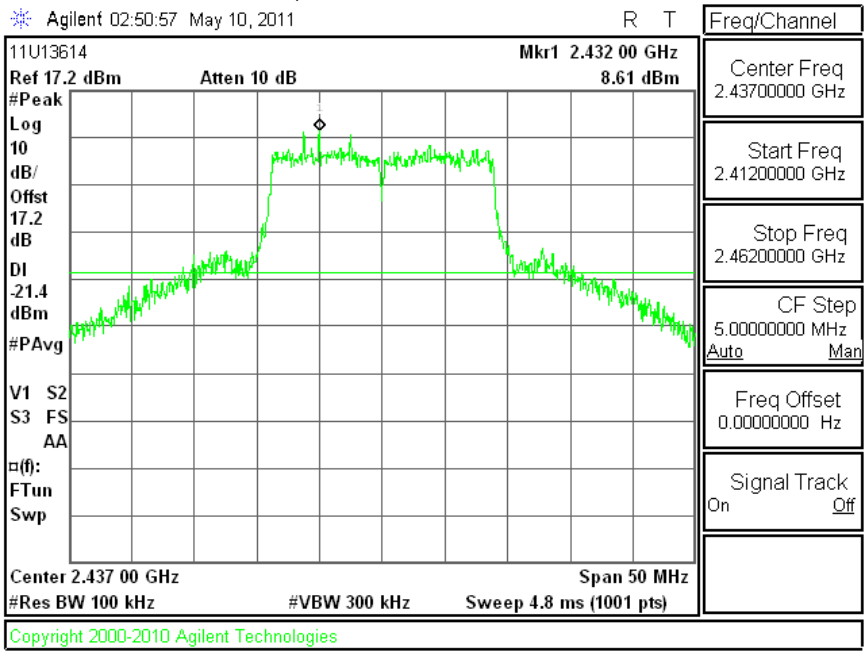
RESULTS

CHAIN AP2 SPURIOUS EMISSIONS

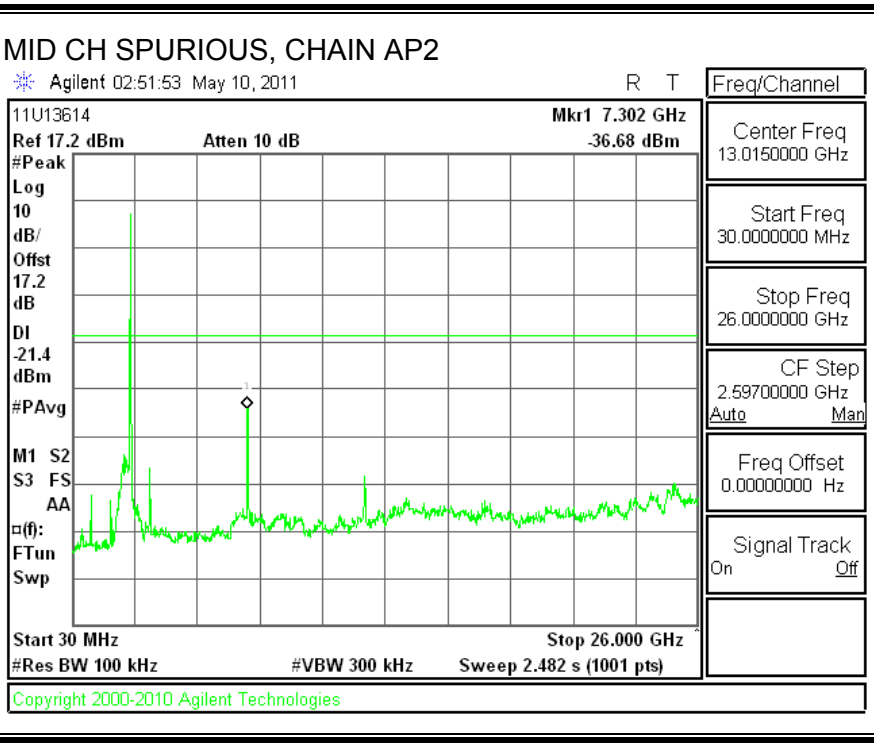




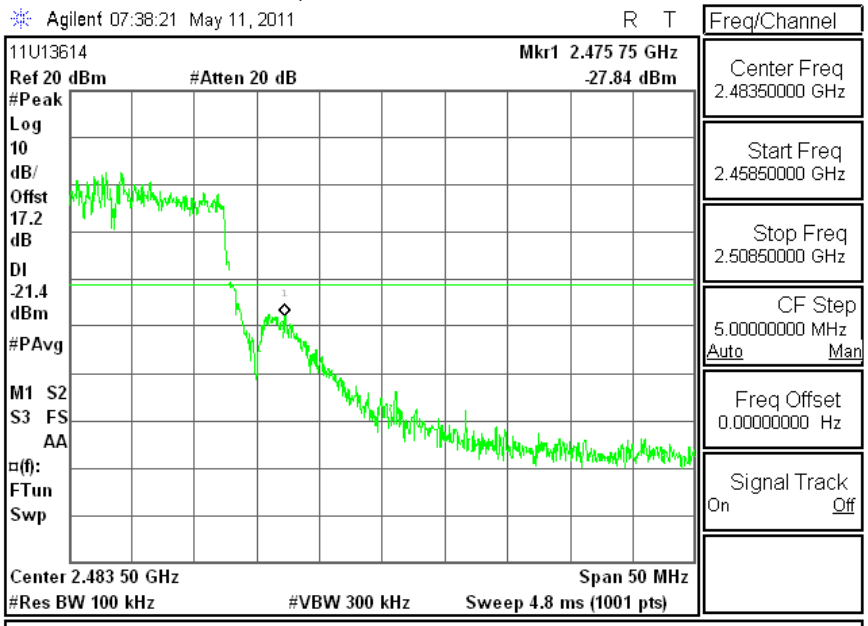
MID CH REFERENCE, CHAIN AP2



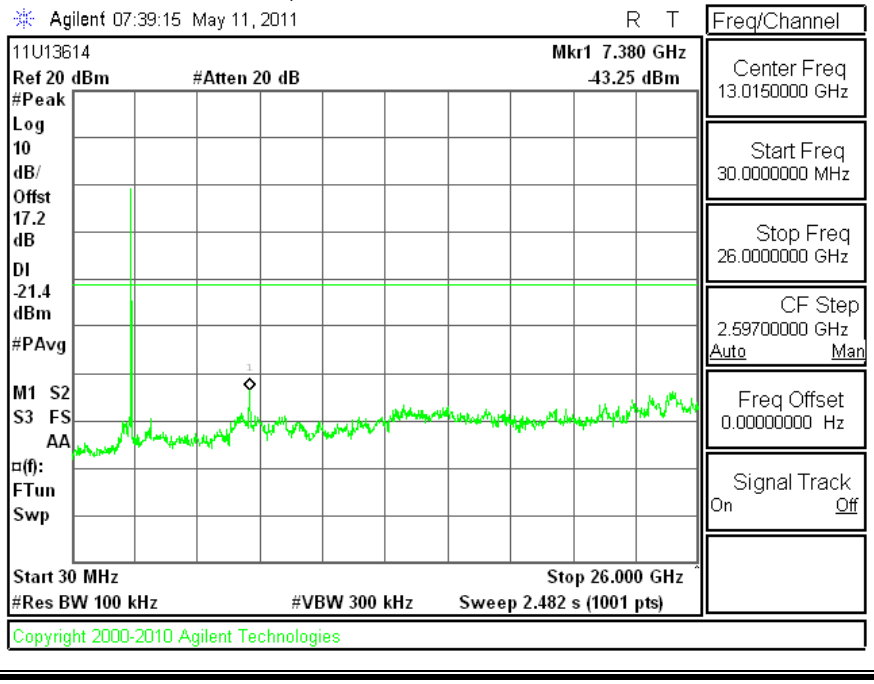
MID CH SPURIOUS, CHAIN AP2



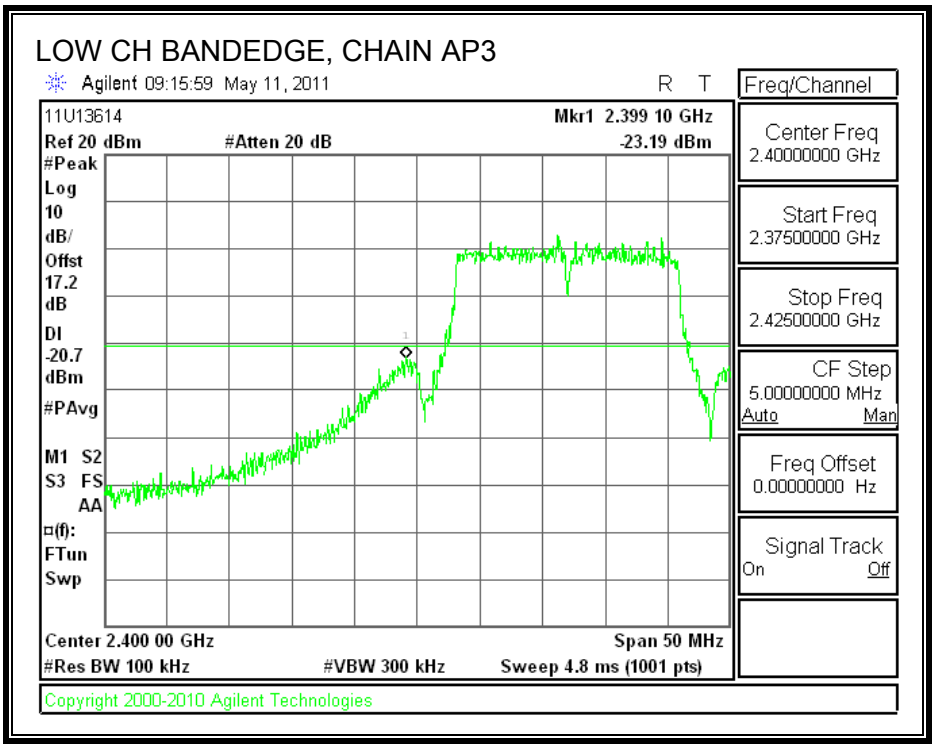
HIGH CH BANDEDGE, CHAIN AP2

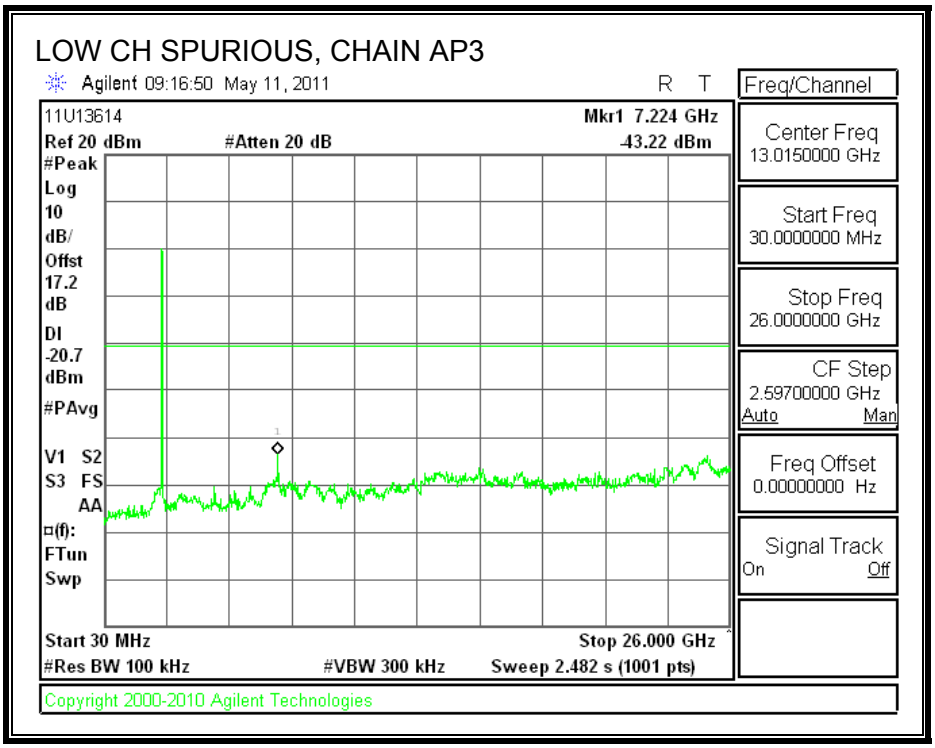


HIGH CH SPURIOUS, CHAIN AP2

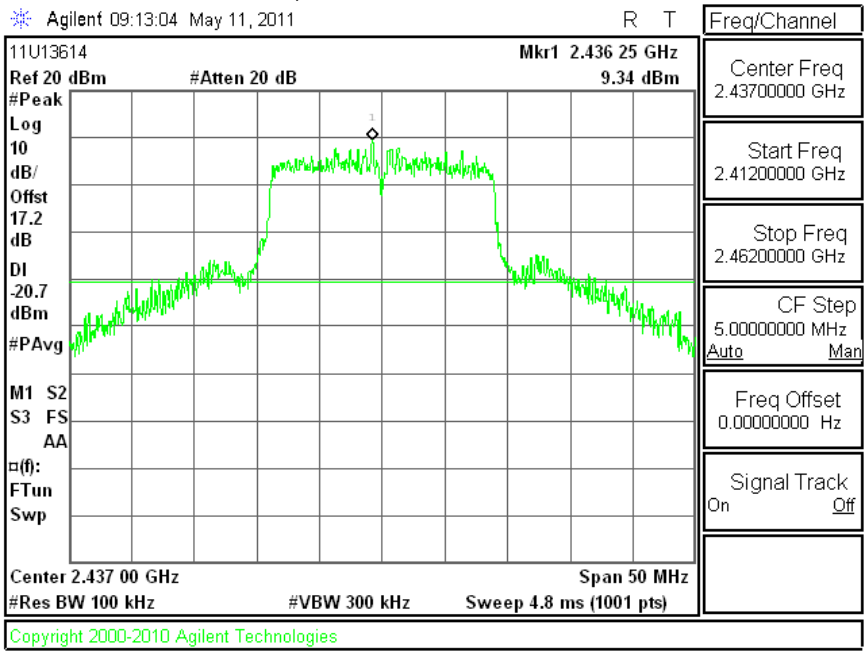


CHAIN AP3 SPURIOUS EMISSIONS

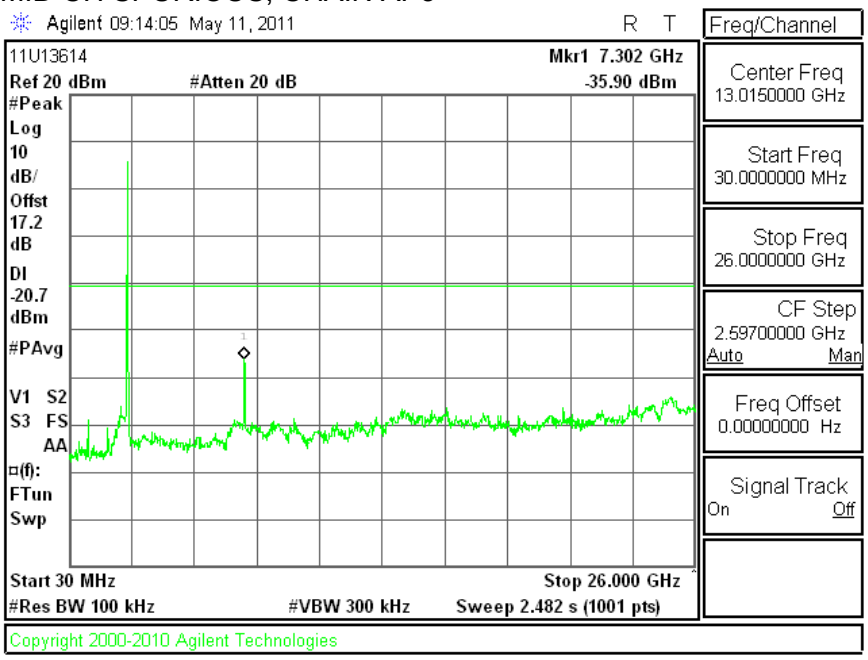




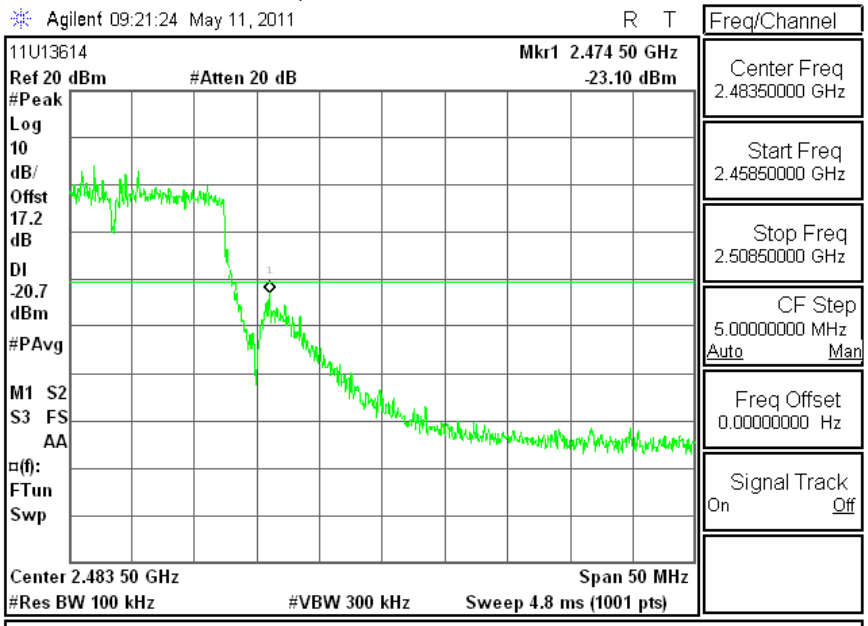
MID CH REFERENCE, CHAIN AP3



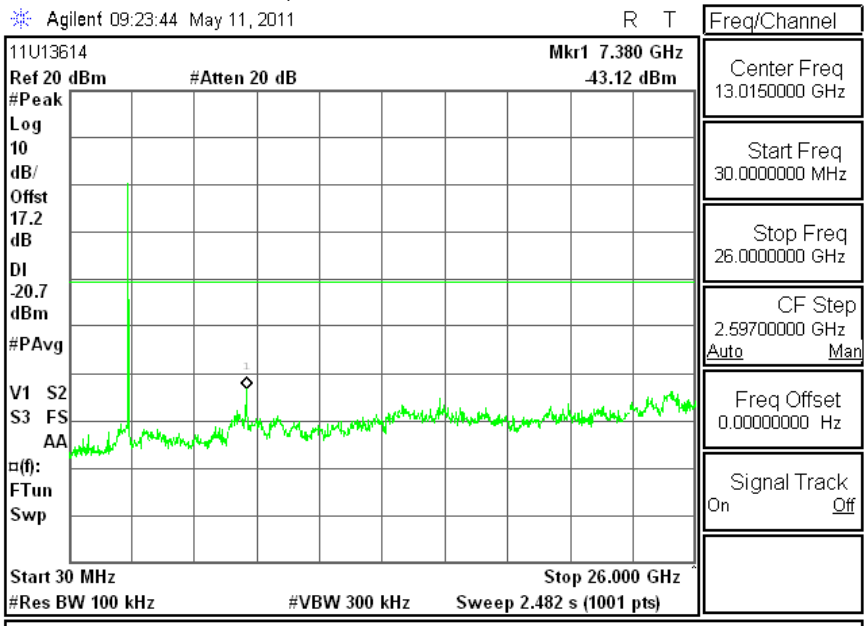
MID CH SPURIOUS, CHAIN AP3



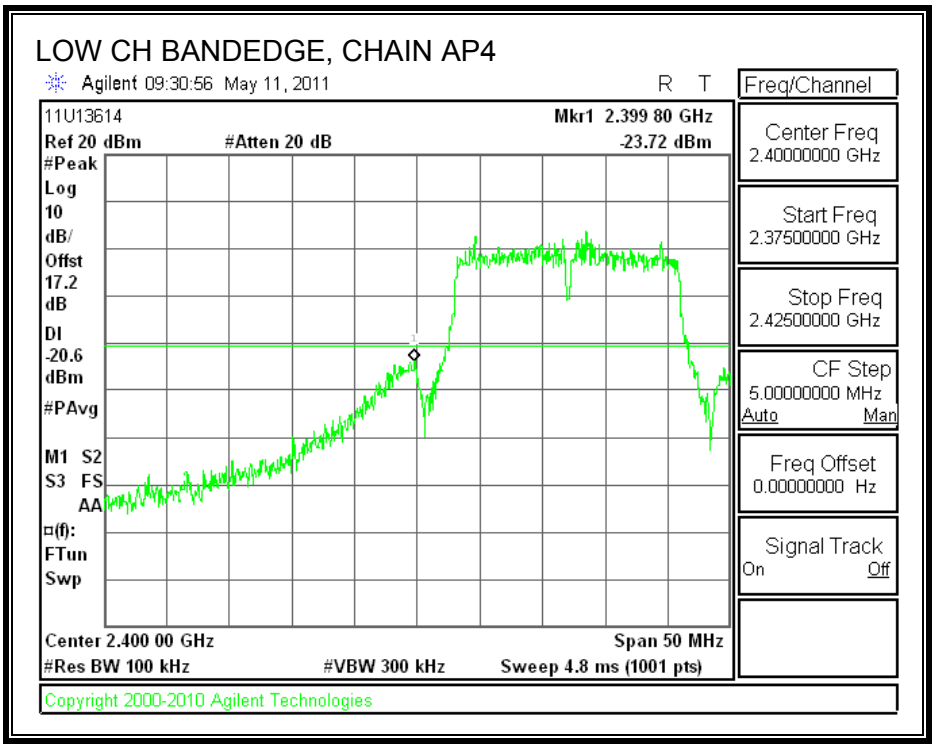
HIGH CH BANDEDGE, CHAIN AP3

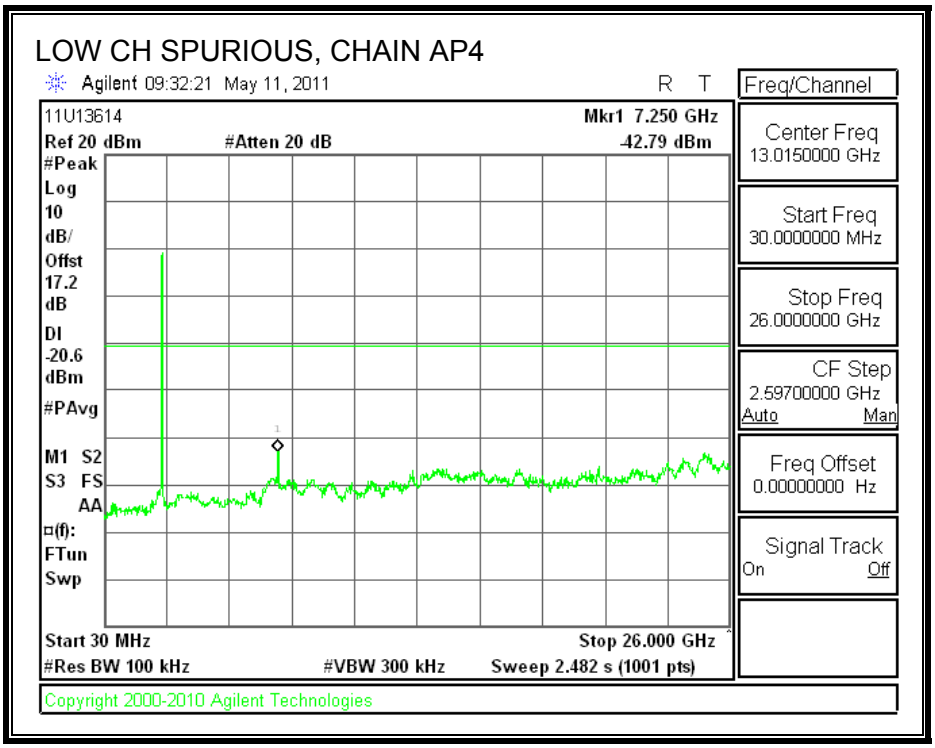


HIGH CH SPURIOUS, CHAIN AP3

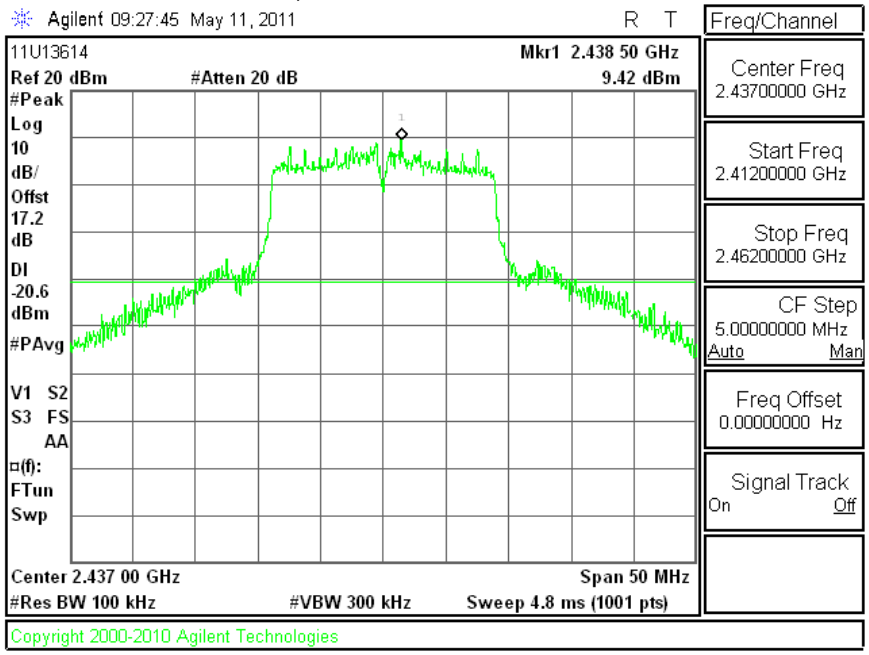


CHAIN AP4 SPURIOUS EMISSIONS

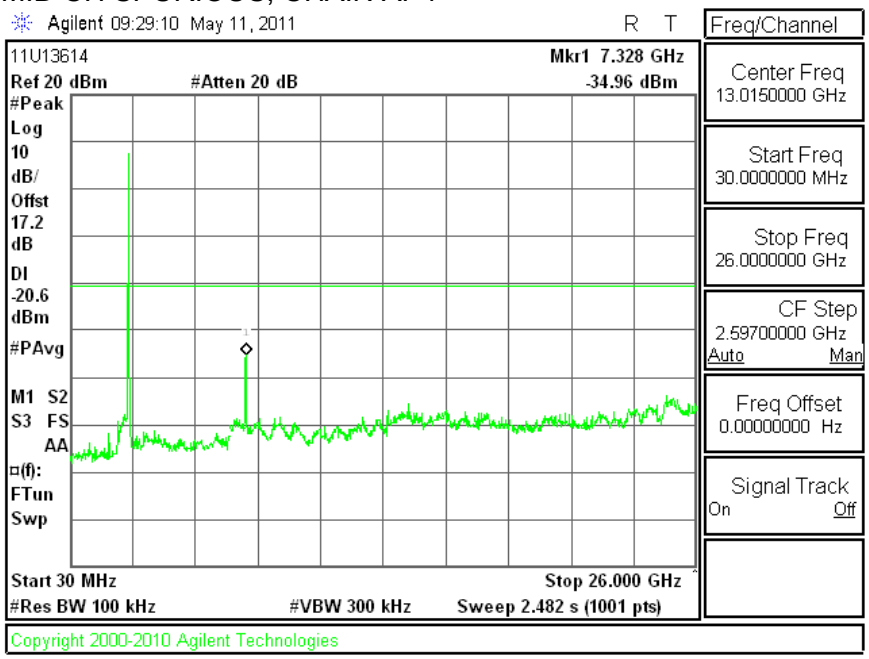




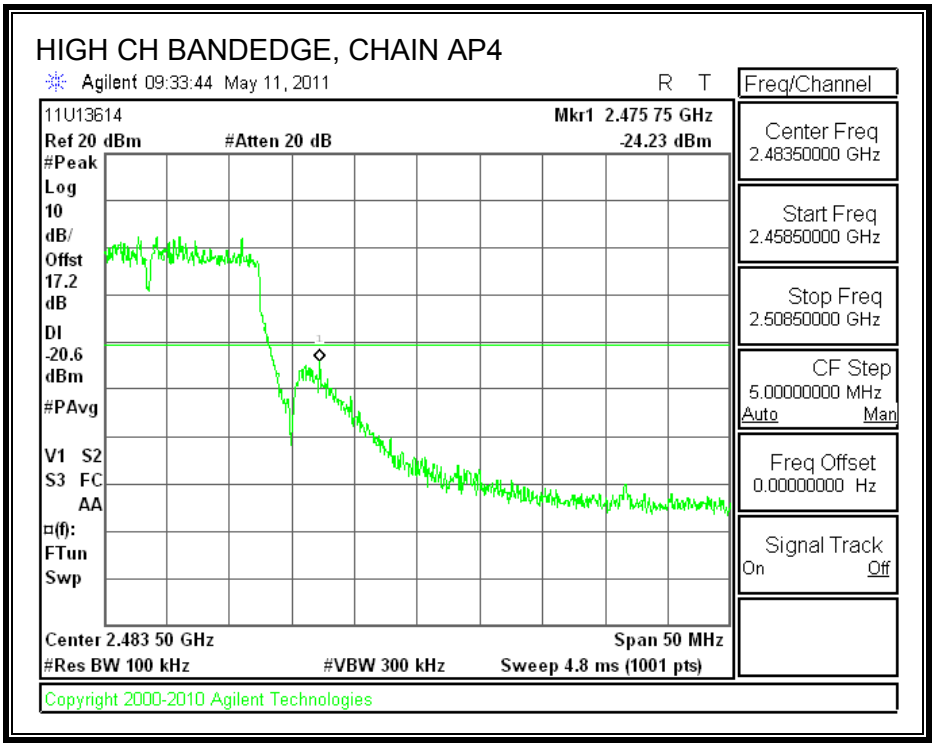
MID CH REFERENCE, CHAIN AP4



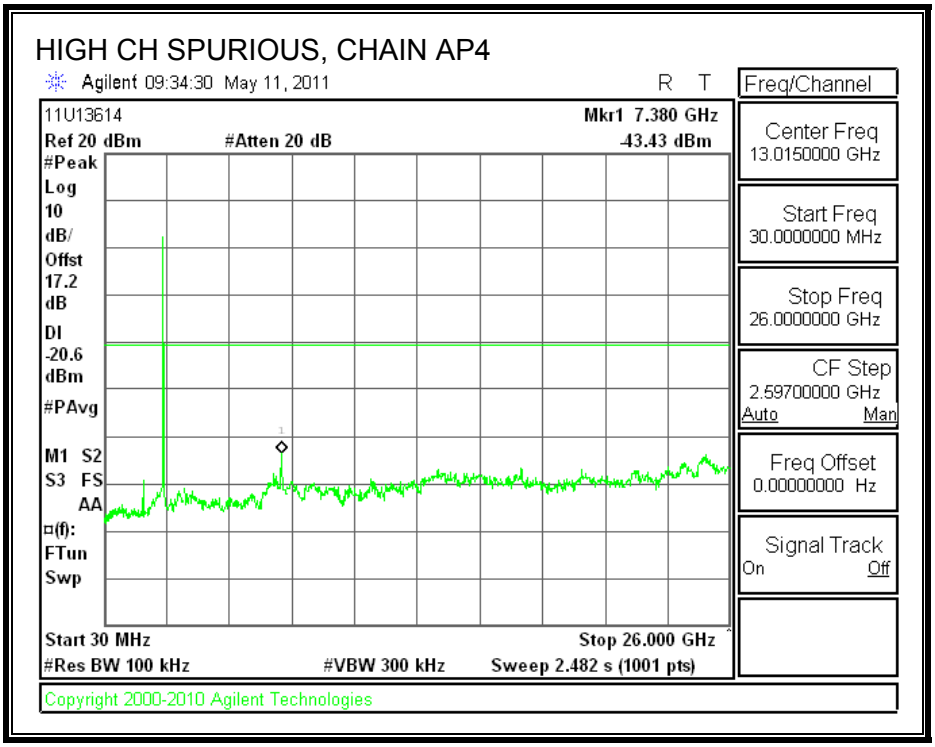
MID CH SPURIOUS, CHAIN AP4



HIGH CH BANDEDGE, CHAIN AP4



HIGH CH SPURIOUS, CHAIN AP4



7.4. 802.11a THREE CHAINS MODE IN THE 5.8 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.

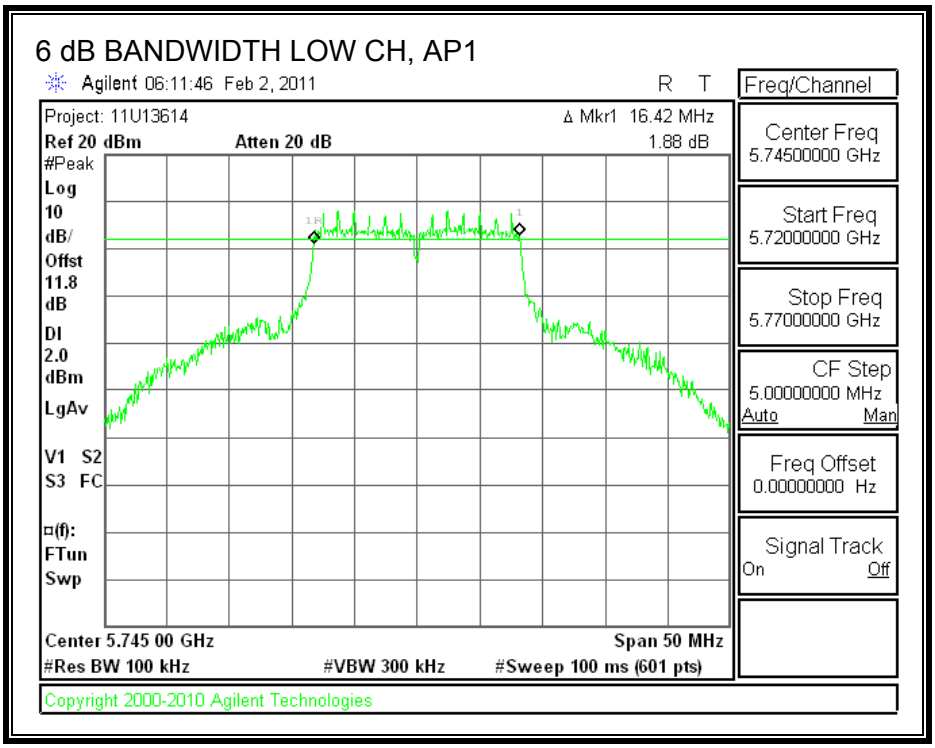
TEST PROCEDURE

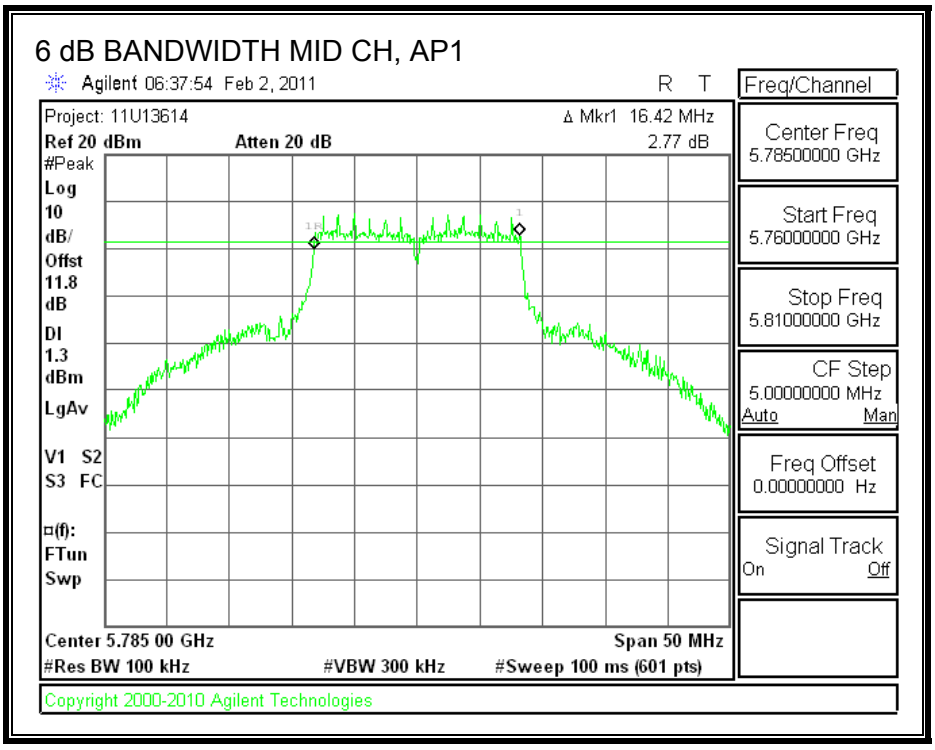
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

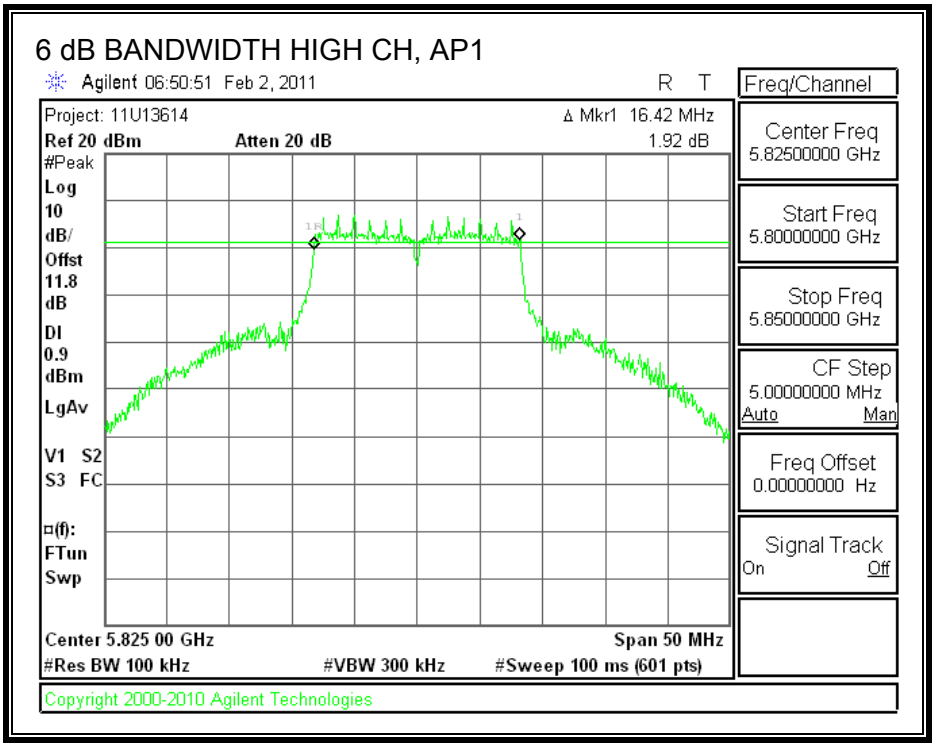
RESULTS

Channel	Frequency (MHz)	AP1 6 dB BW (MHz)	AP2 6 dB BW (MHz)	AP3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5745	16.42	16.33	16.33	0.5
Middle	5785	16.42	16.33	16.33	0.5
High	5825	16.42	16.33	16.5	0.5

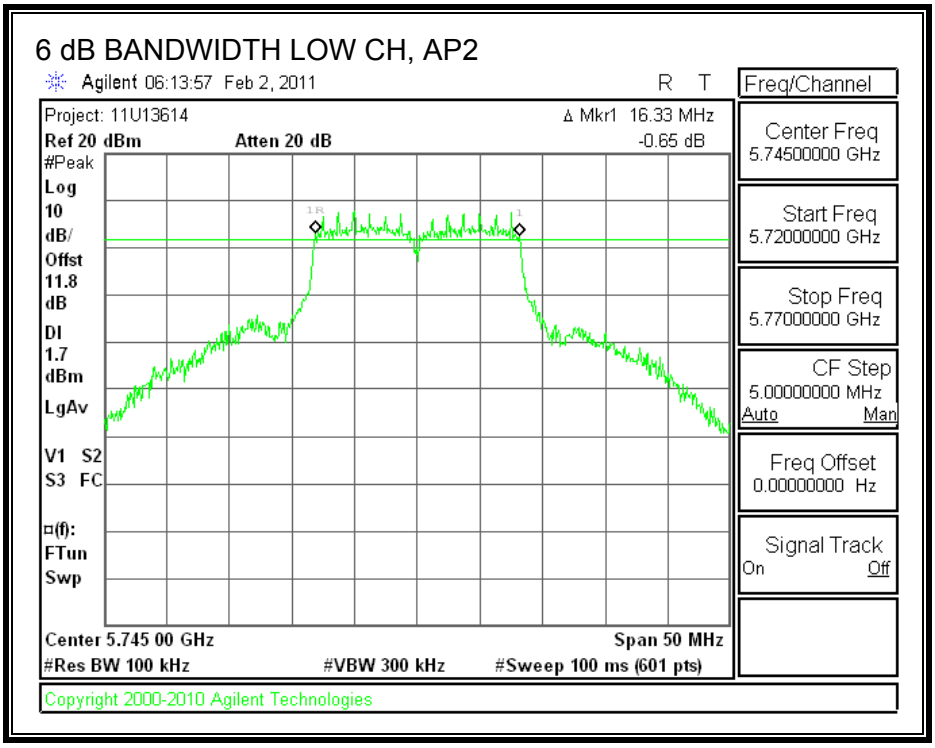
6 dB BANDWIDTH, AP1

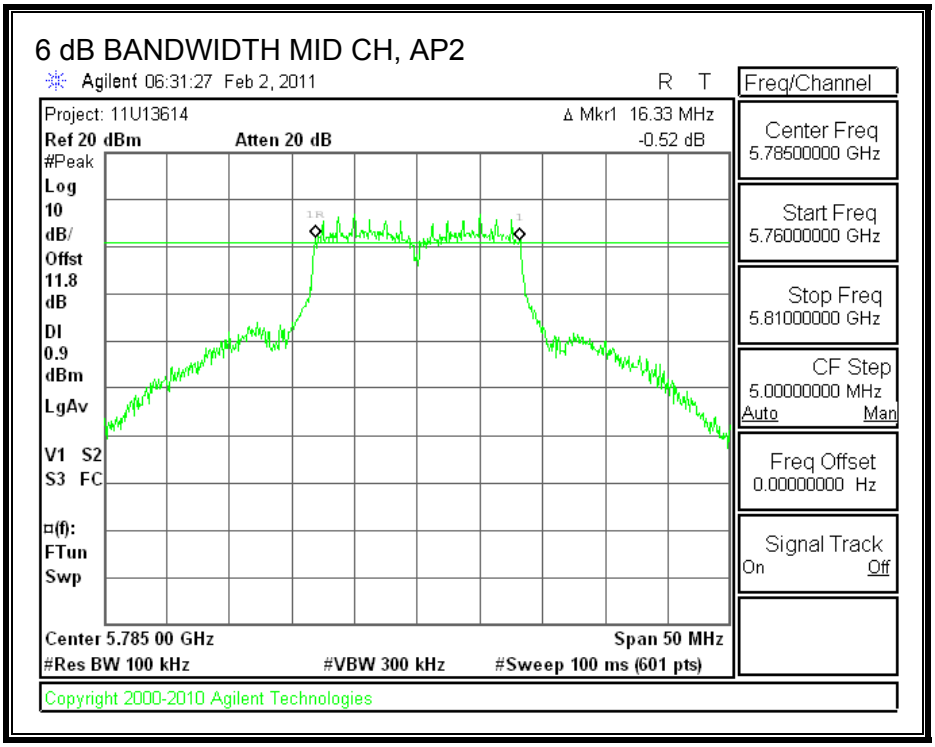


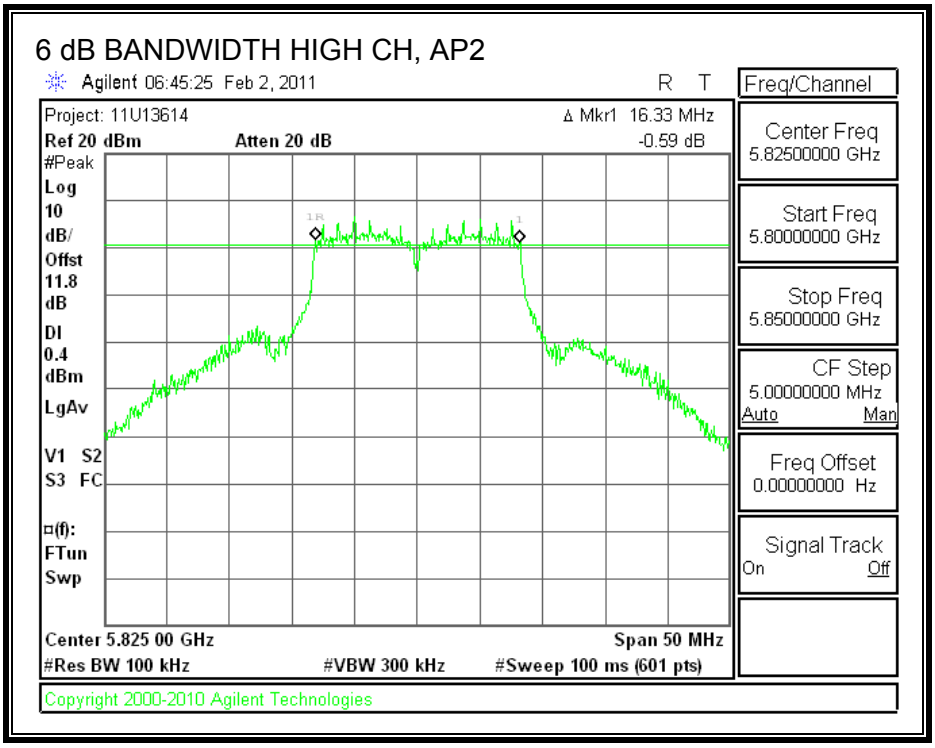




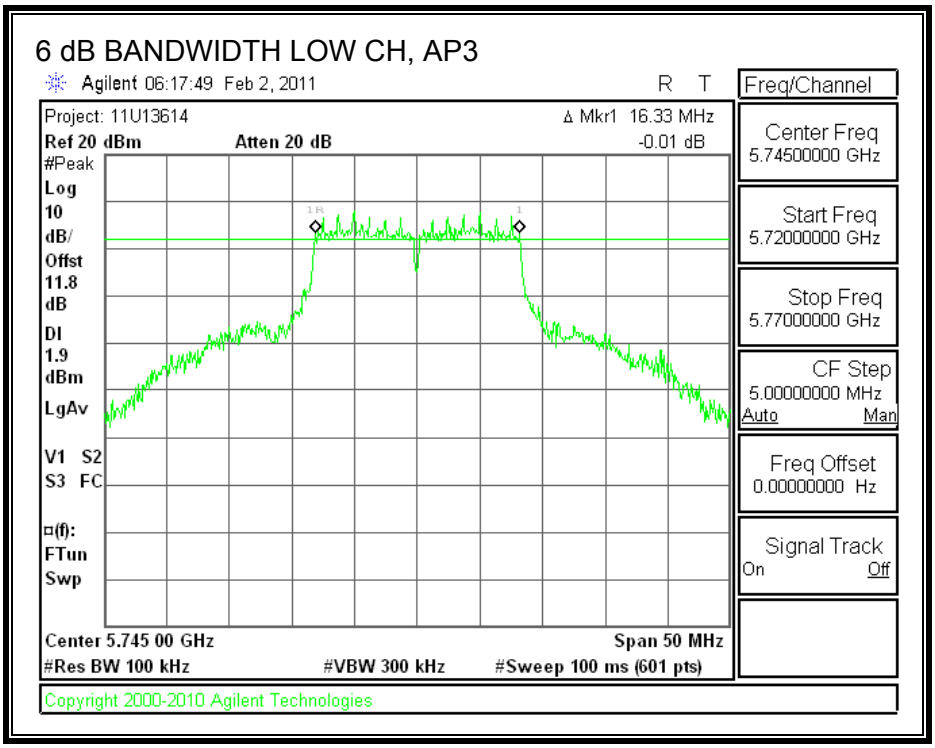
6 dB BANDWIDTH, AP2

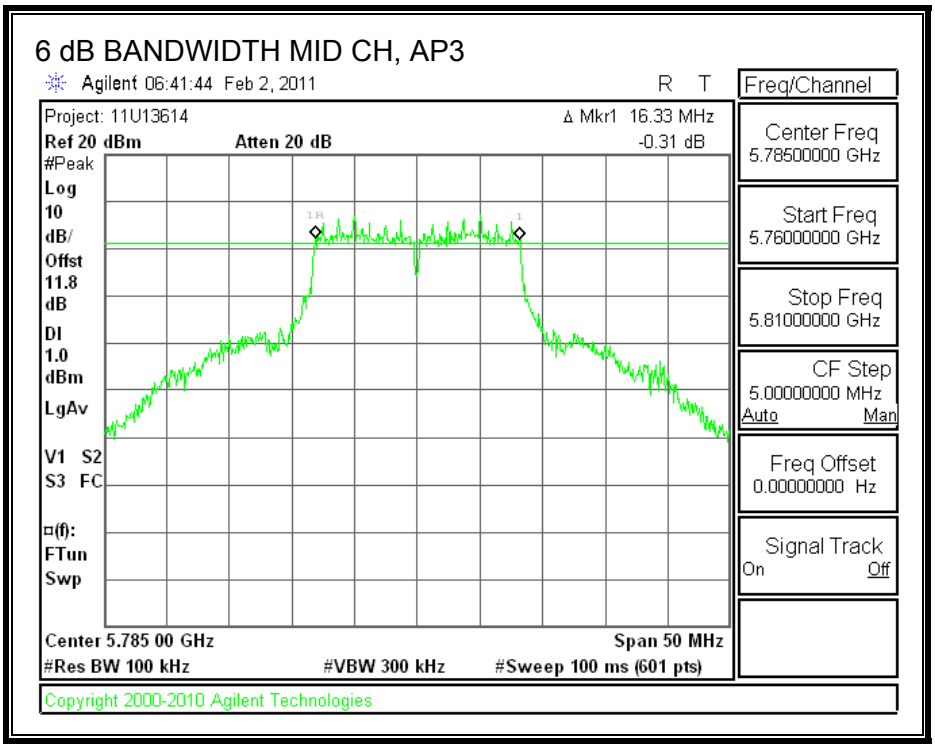


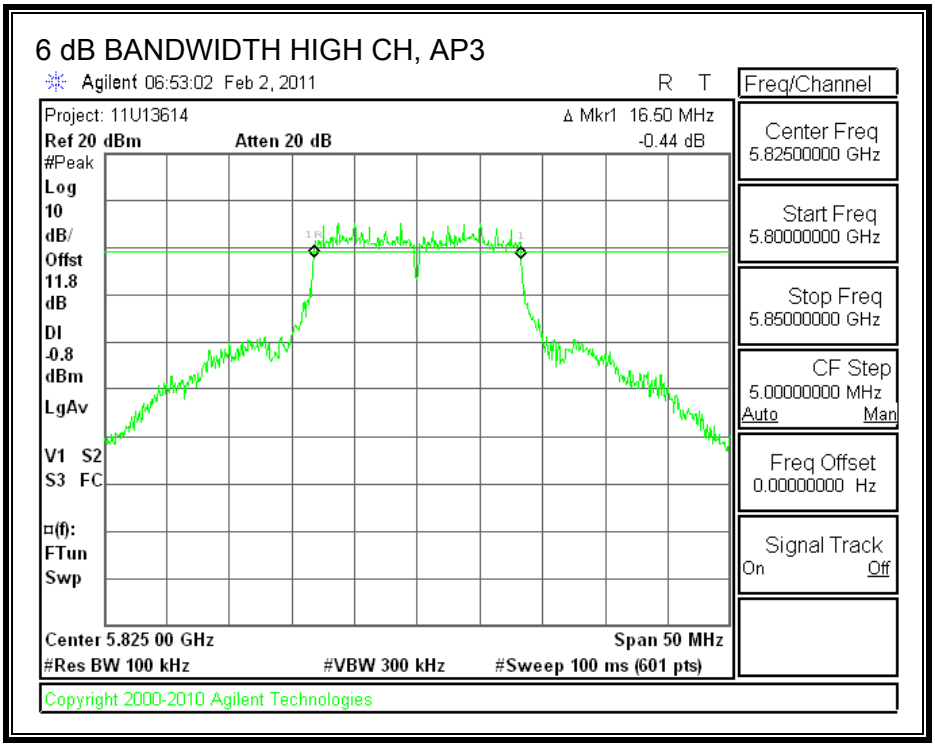




6 dB BANDWIDTH, AP3







7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

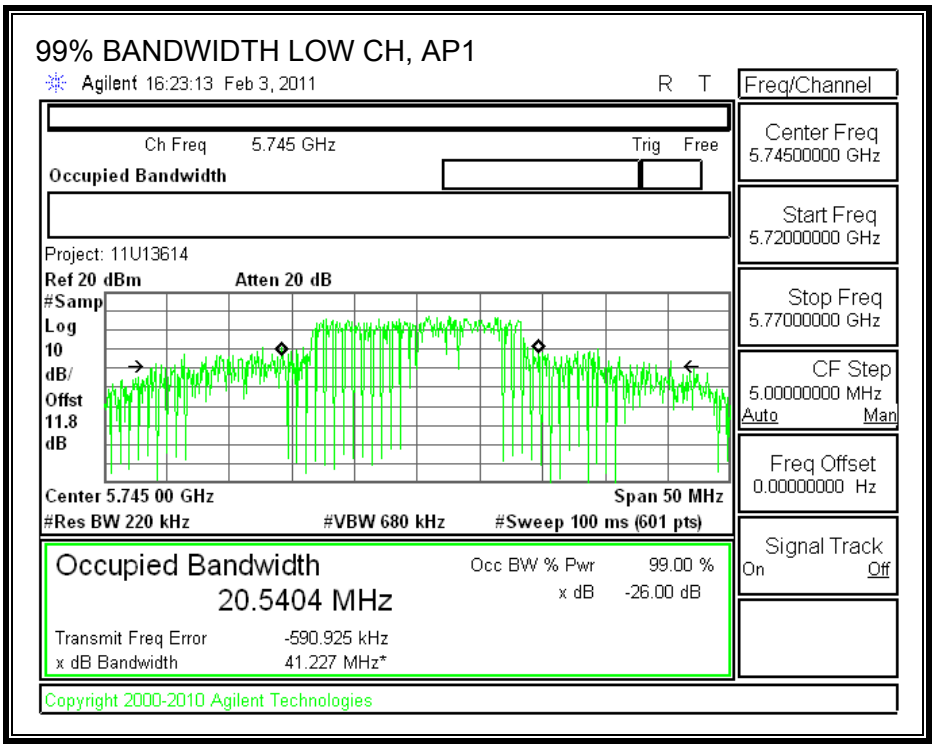
TEST PROCEDURE

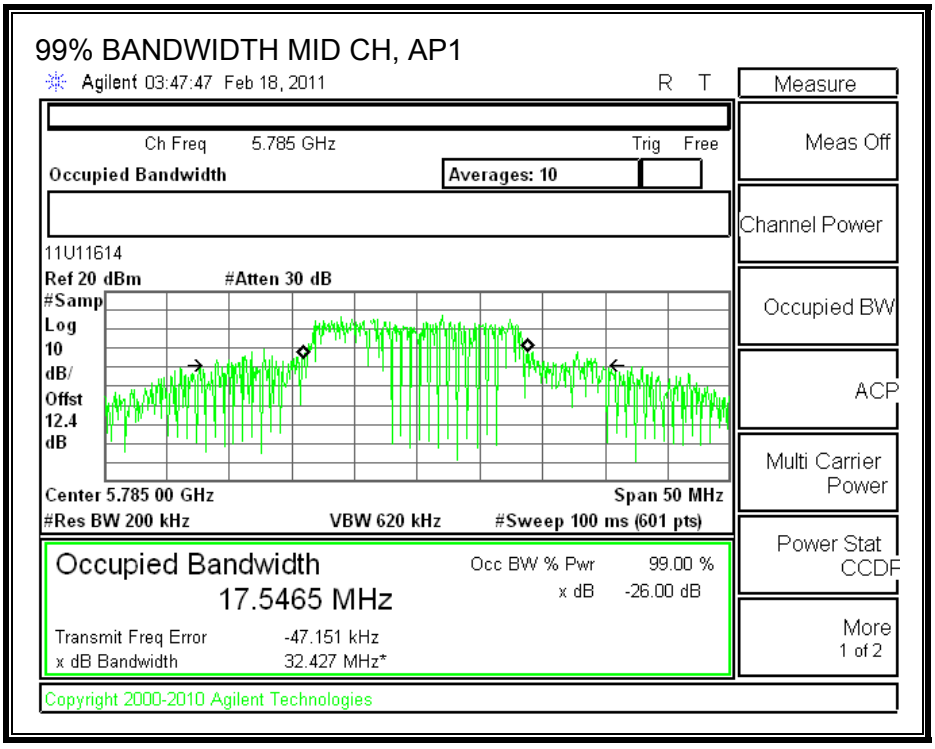
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

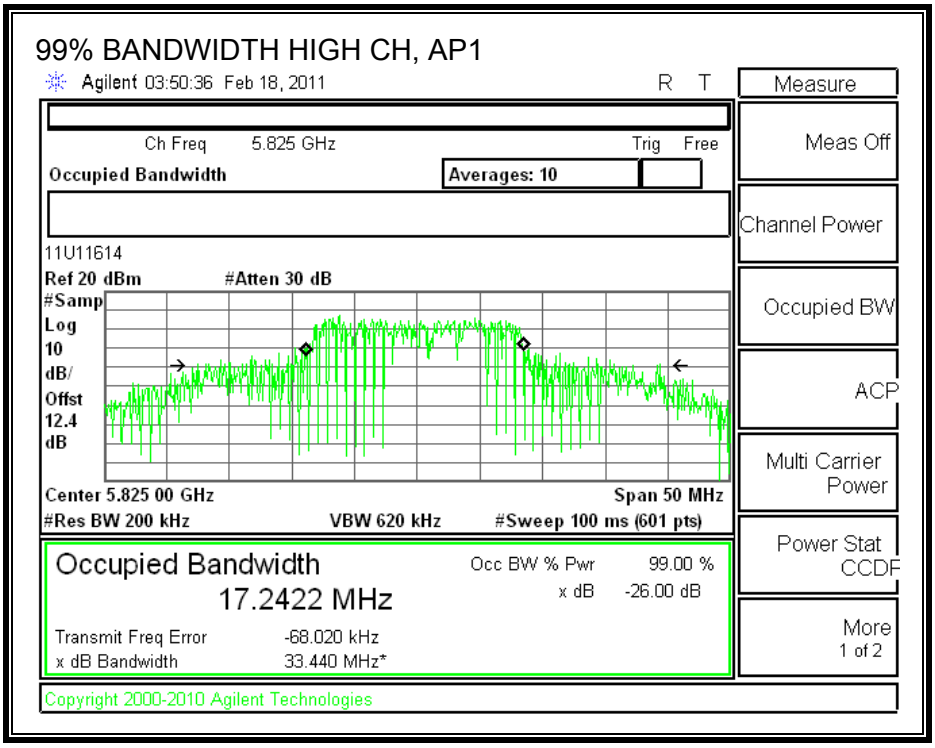
RESULTS

Channel	Frequency (MHz)	AP1 99% Bandwidth (MHz)	AP2 99% Bandwidth (MHz)	AP3 99% Bandwidth (MHz)
Low	5745	20.5404	19.0607	19.2224
Middle	5785	17.5465	18.4594	17.8583
High	5825	17.2422	17.5025	17.1152

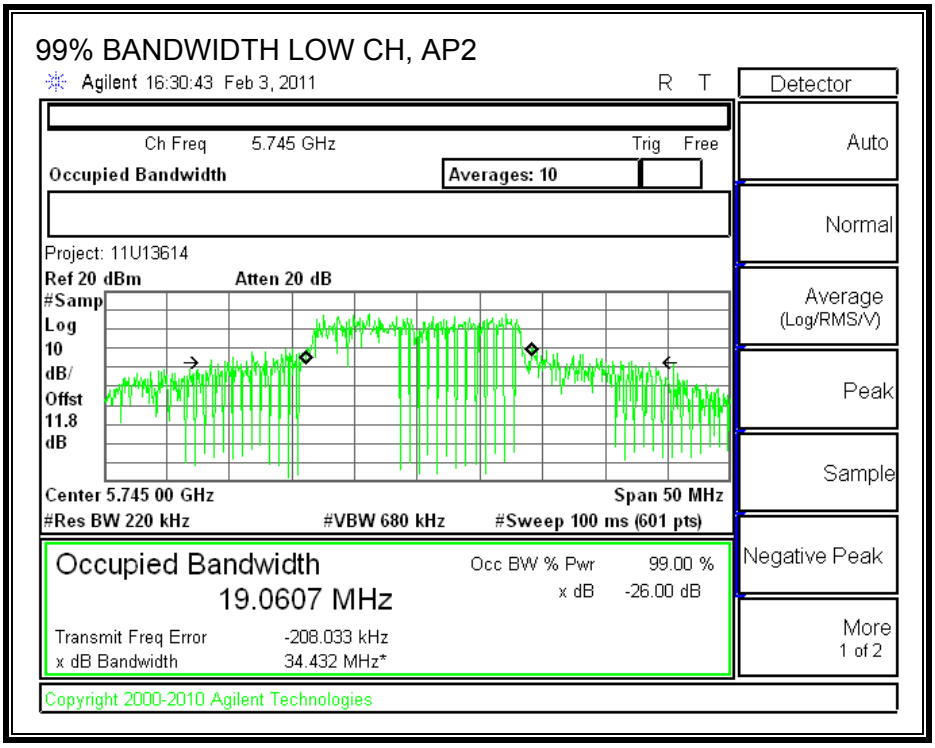
99% BANDWIDTH, AP1

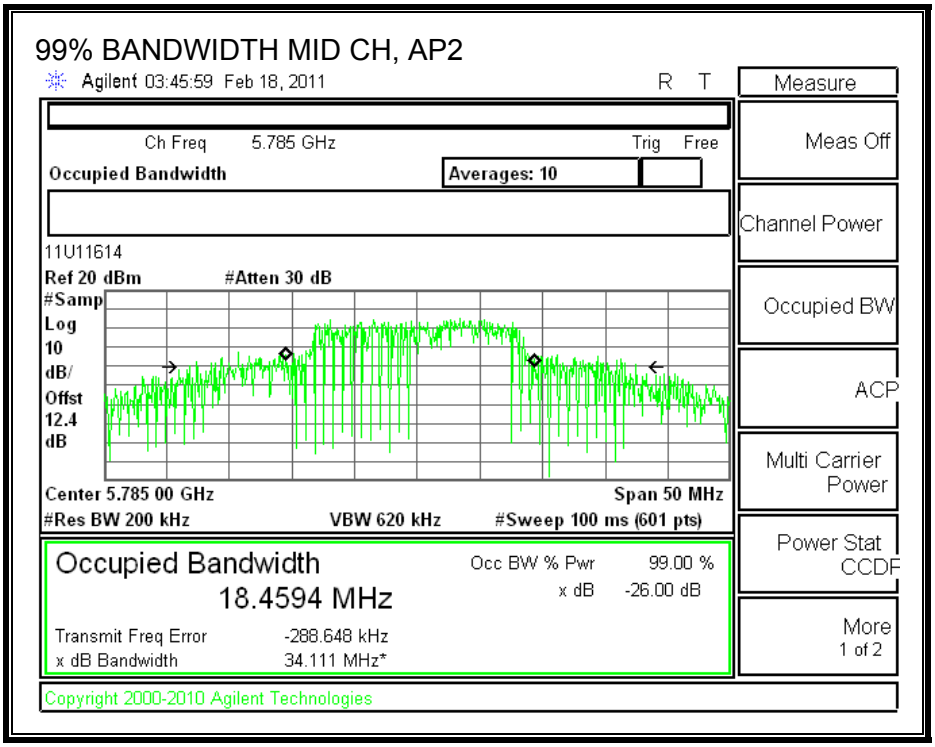


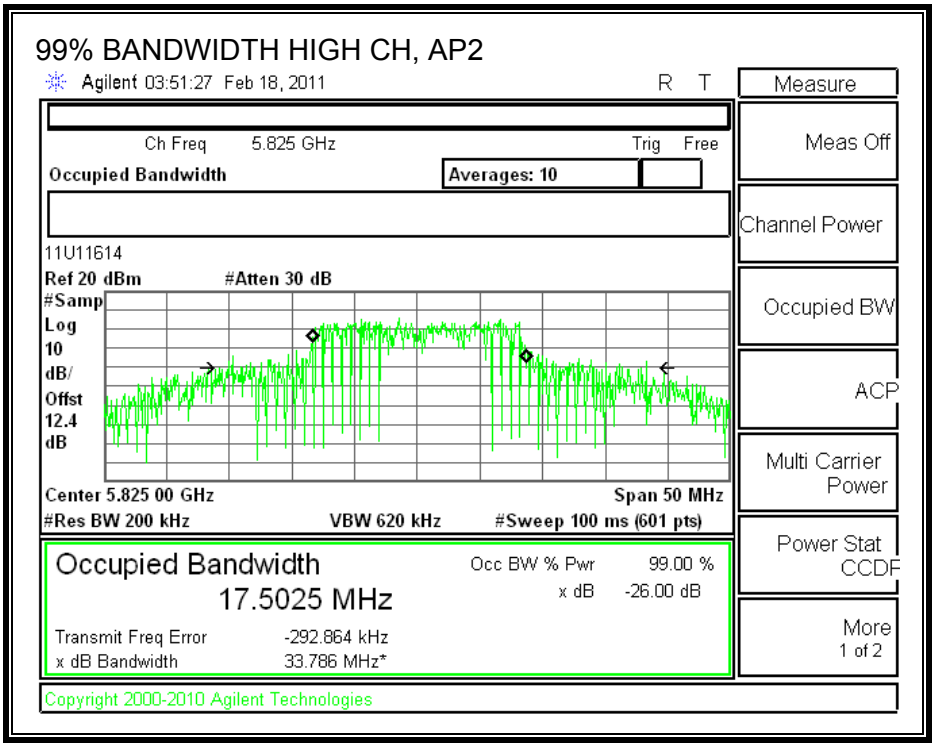




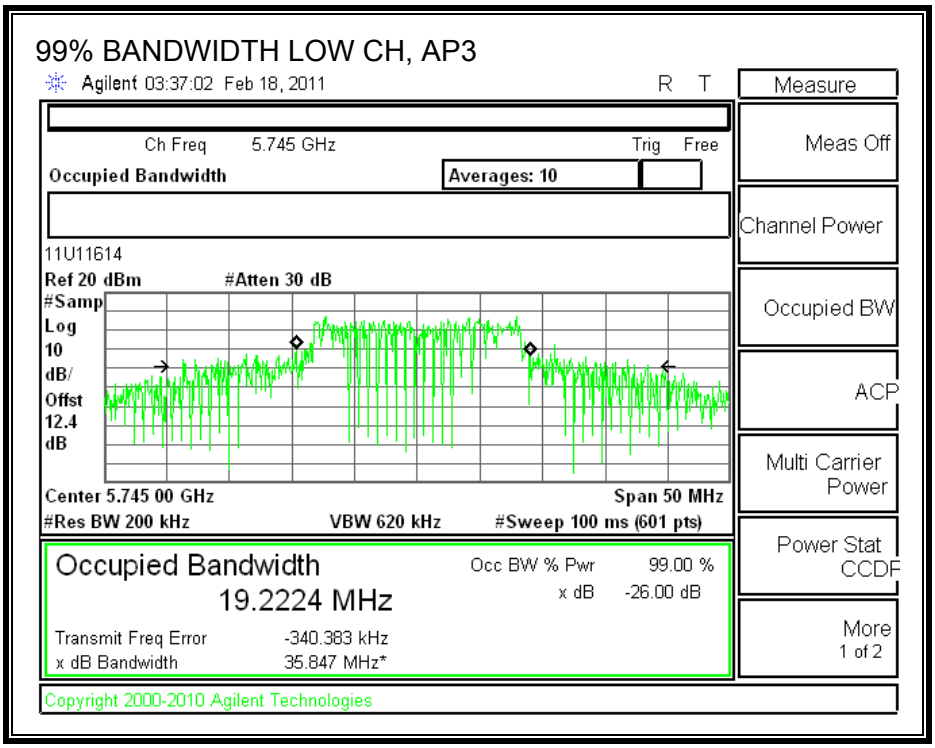
99% BANDWIDTH, AP2

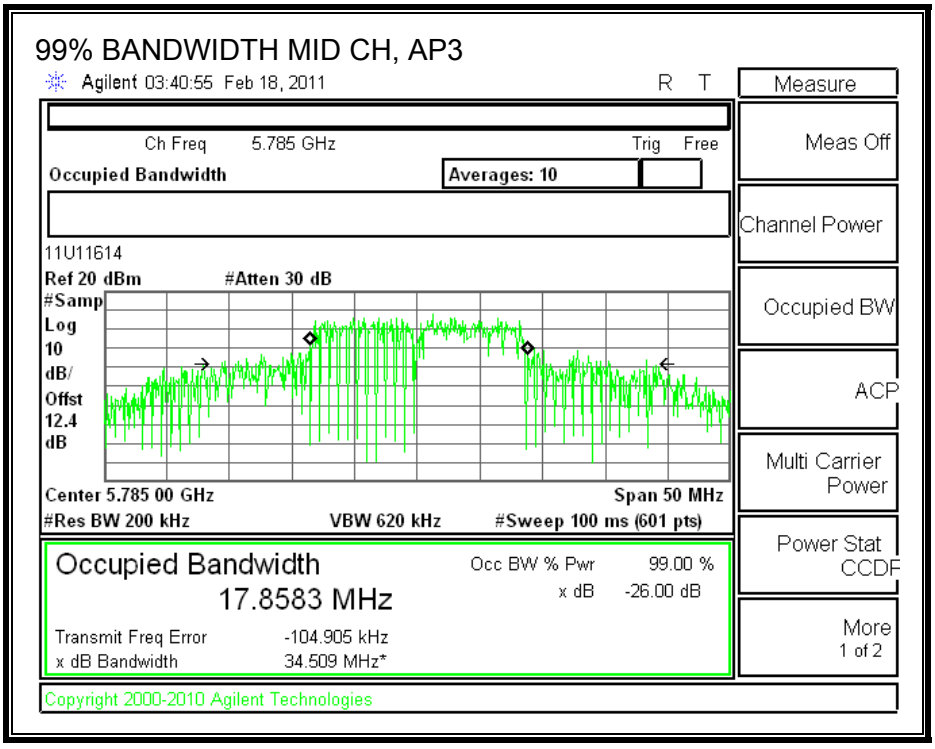


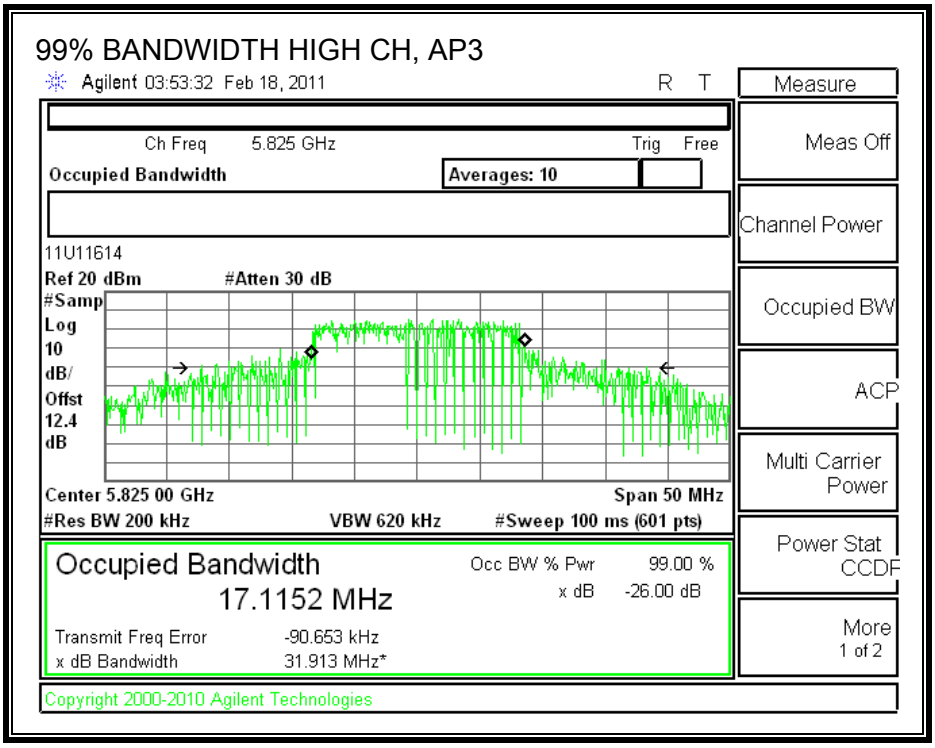




99% BANDWIDTH, AP3







7.4.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

Antenna Gain (AP1) (dBi)	Antenna Gain (AP2) (dBi)	Antenna Gain (AP3) (dBi)	Effective Legacy Gain (dBi)
1.74	2.97	2.67	7.26

The maximum effective legacy gain is 7.26 dBi for other than fixed, point-to-point operations, therefore the limit is 28.74 dBm.

TEST PROCEDURE

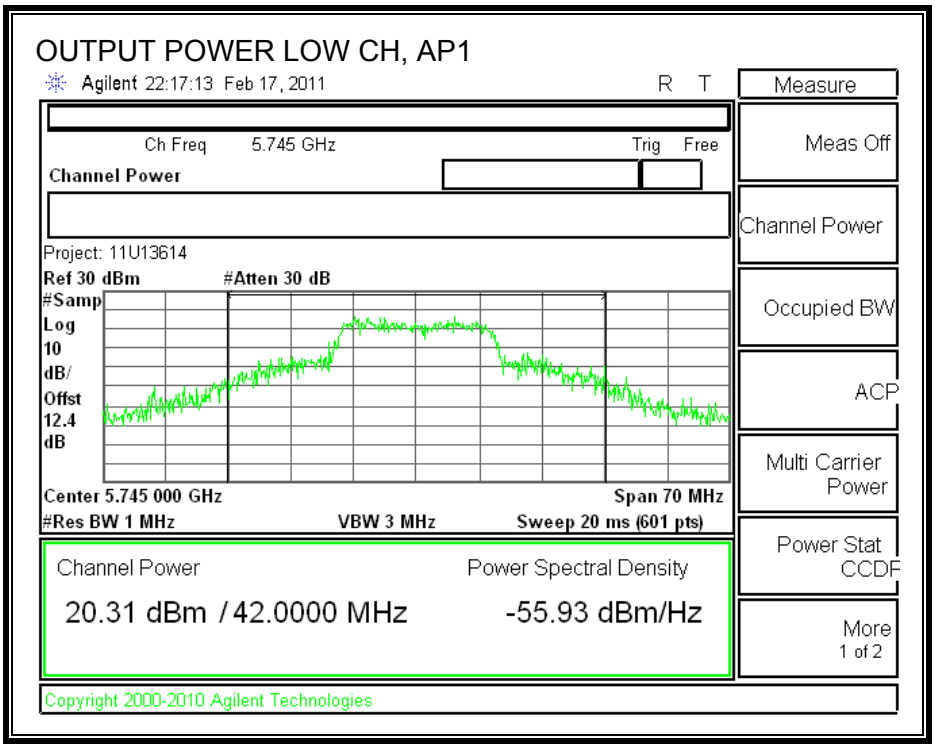
Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 26dB bandwidth.

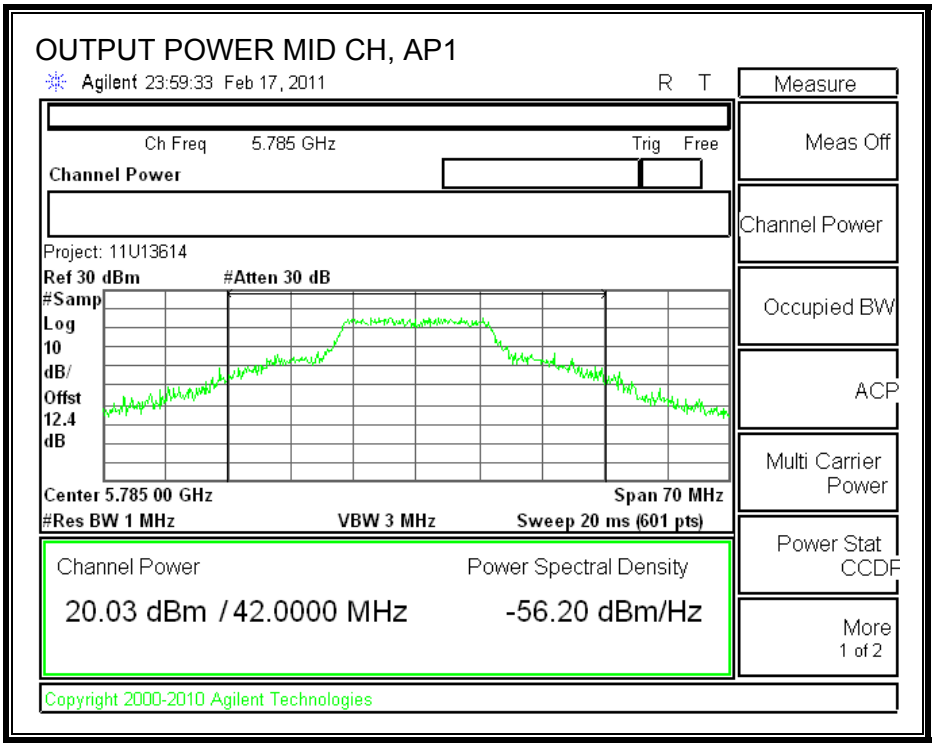
Maximum Conducted Output Power based on RMS averaging over a time interval is measured in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005. The transmitter operates continuously therefore Power Output Option 2, Method # 1 is used.

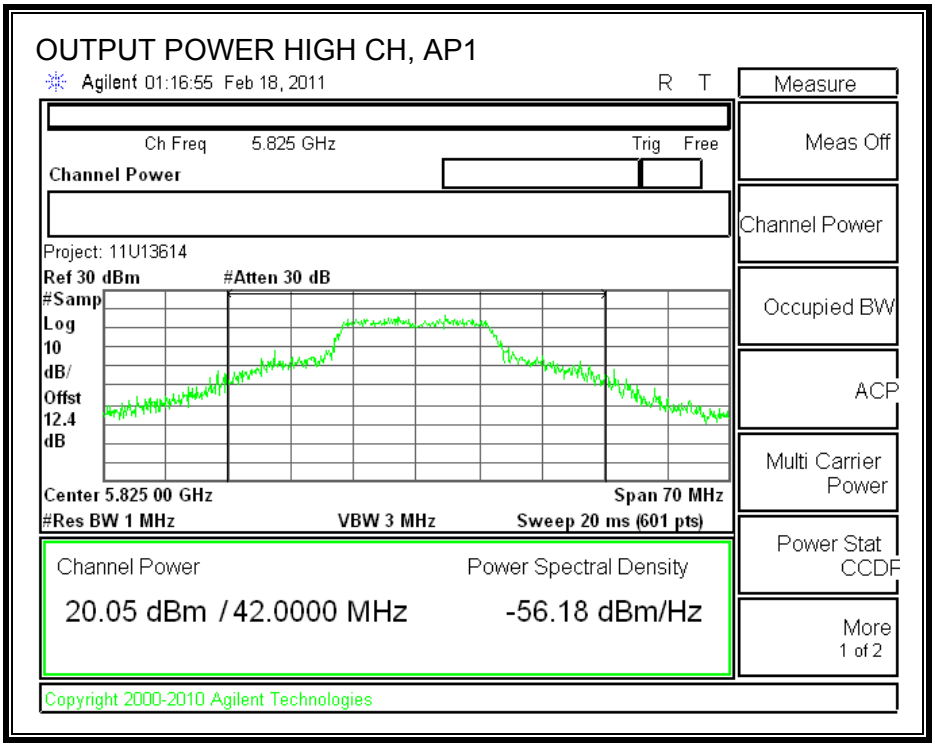
RESULTS

Channel	Frequency (MHz)	AP1 Power (dBm)	AP2 Power (dBm)	AP3 Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	20.31	20.22	20.57	0.00	25.14	28.74	-3.60
Mid	5785	20.03	20.06	20.01	0.00	24.80	28.74	-3.94
High	5825	20.05	19.08	20.15	0.00	24.56	28.74	-4.18

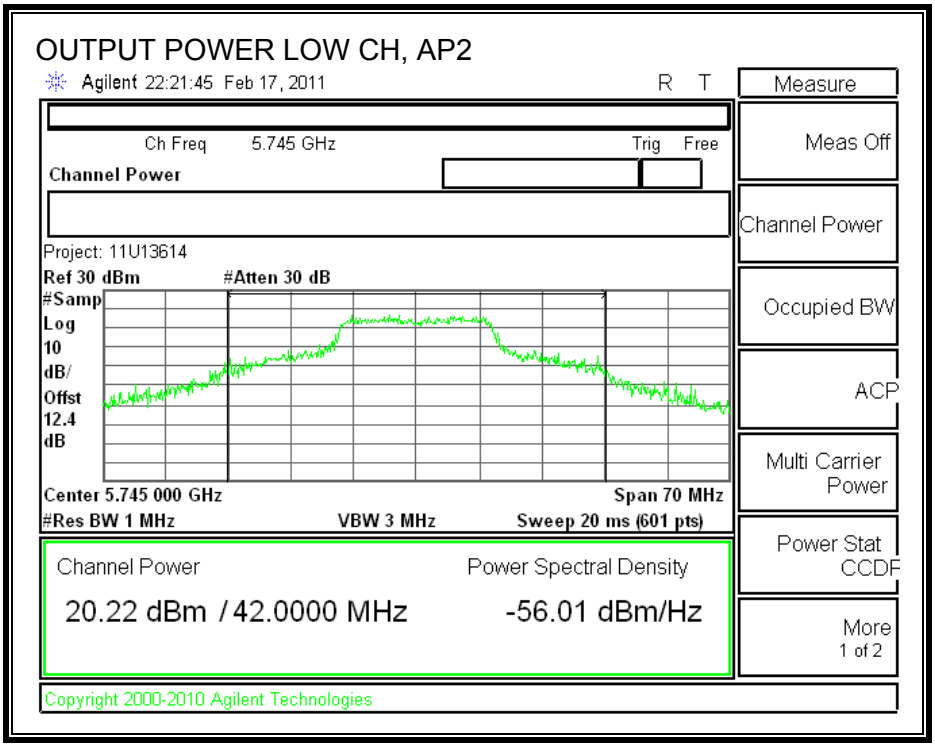
AP1 OUTPUT POWER



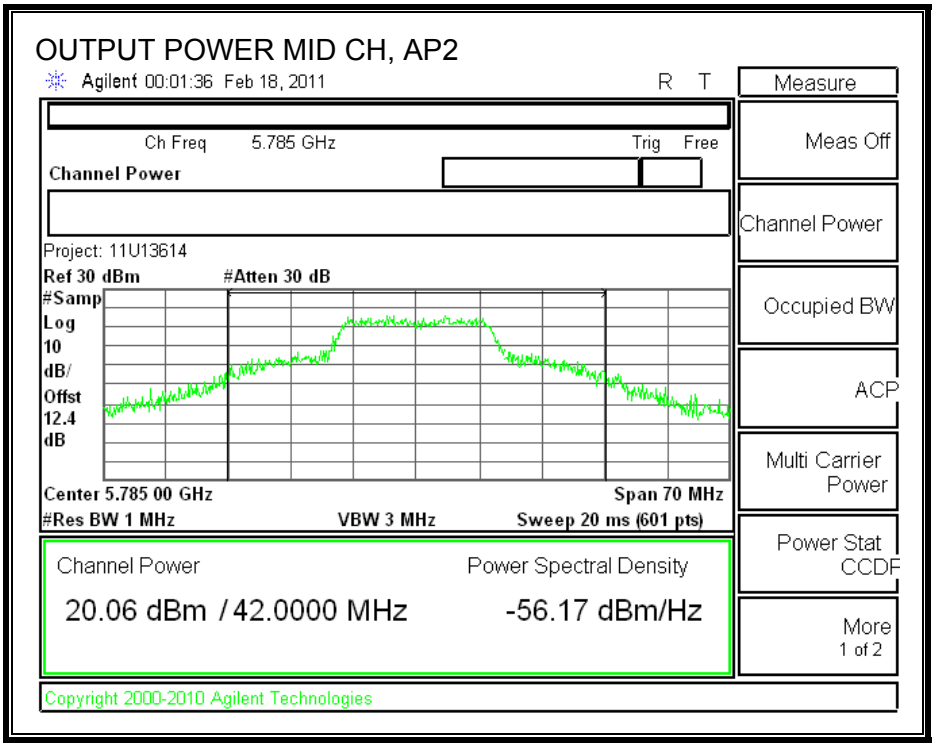




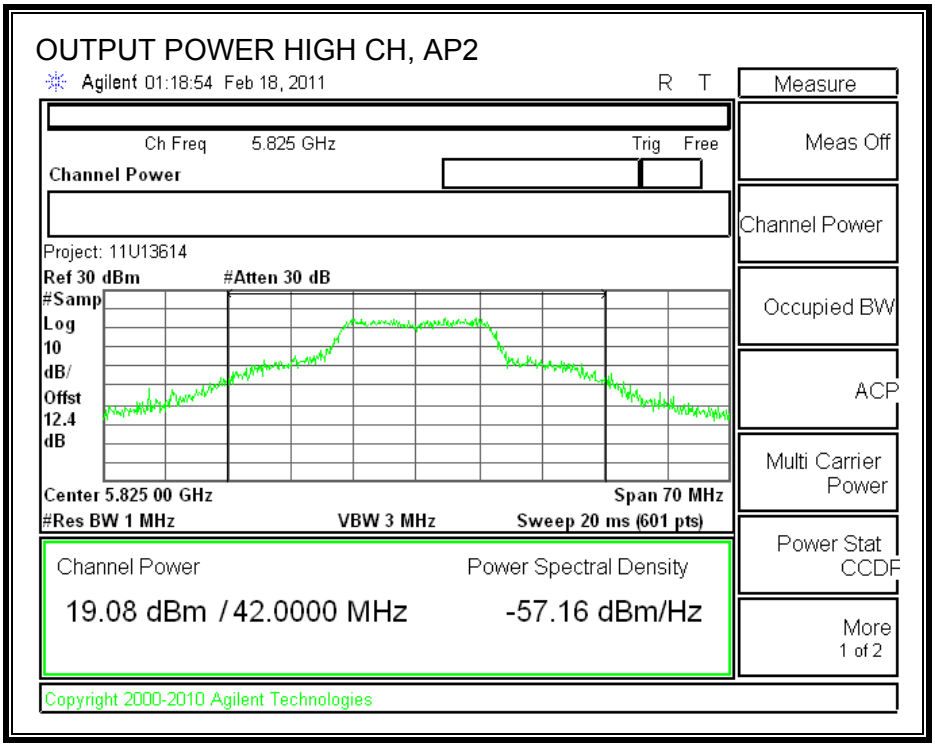
AP2 OUTPUT POWER



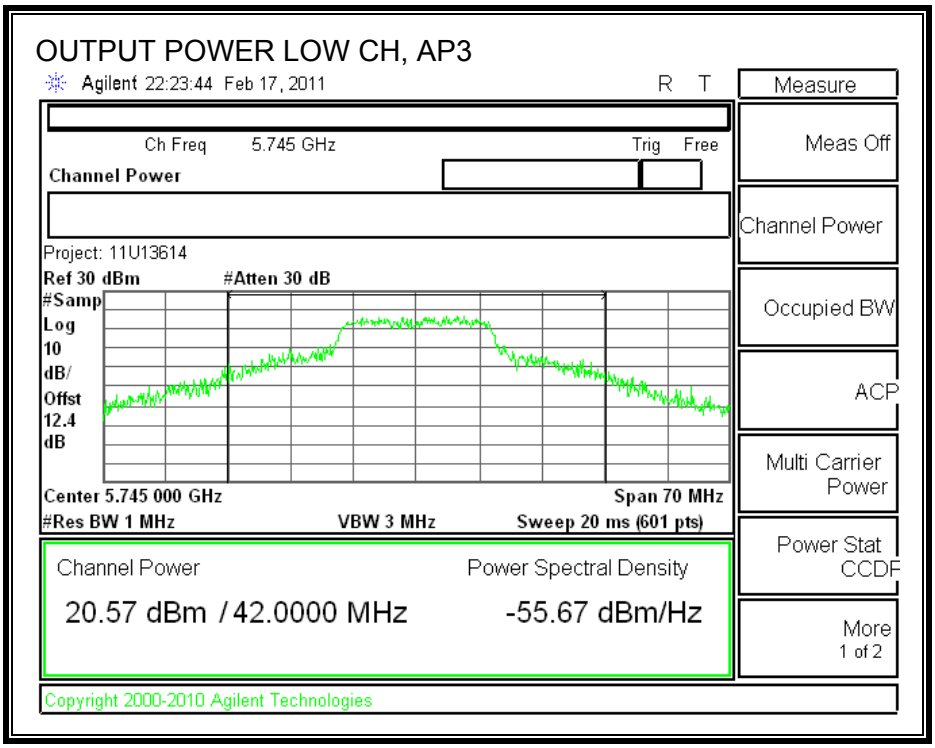
OUTPUT POWER MID CH, AP2

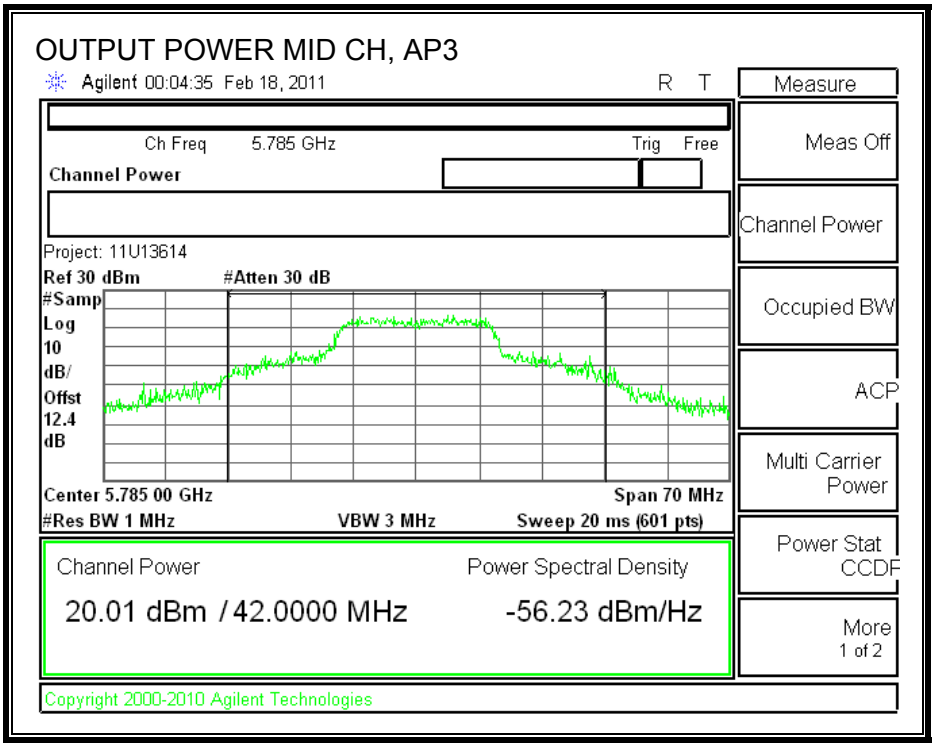


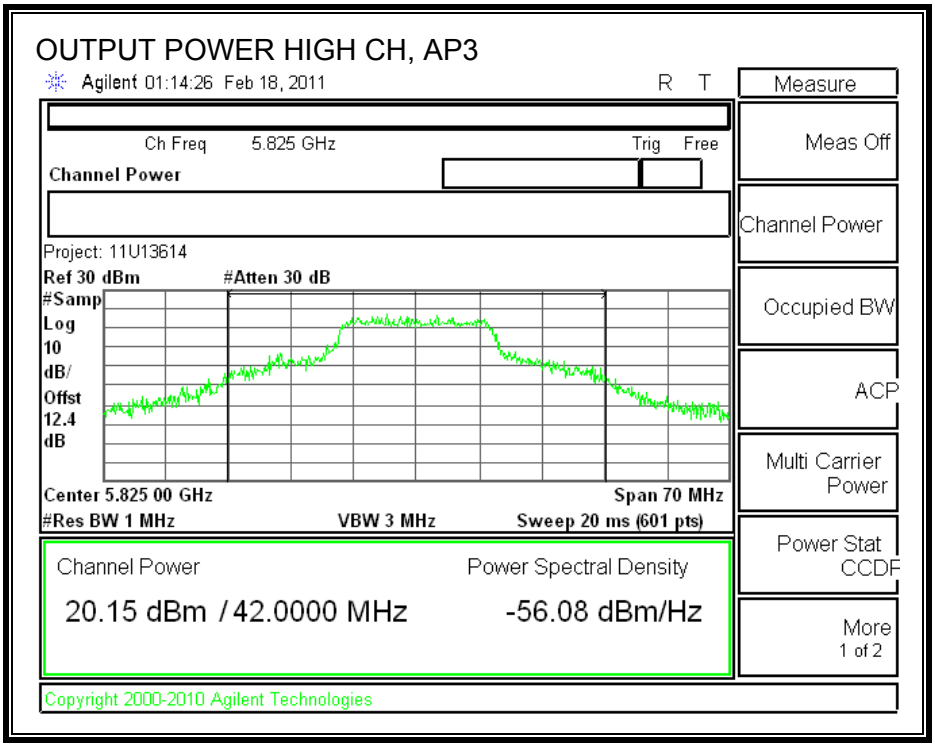
OUTPUT POWER HIGH CH, AP2



AP3 OUTPUT POWER







7.4.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

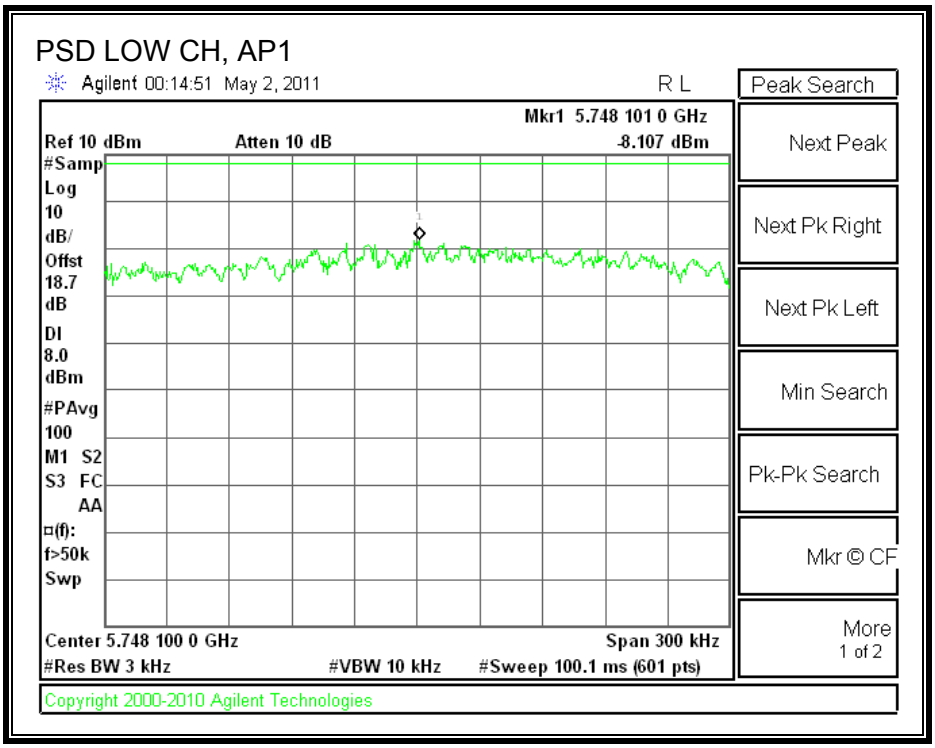
TEST PROCEDURE

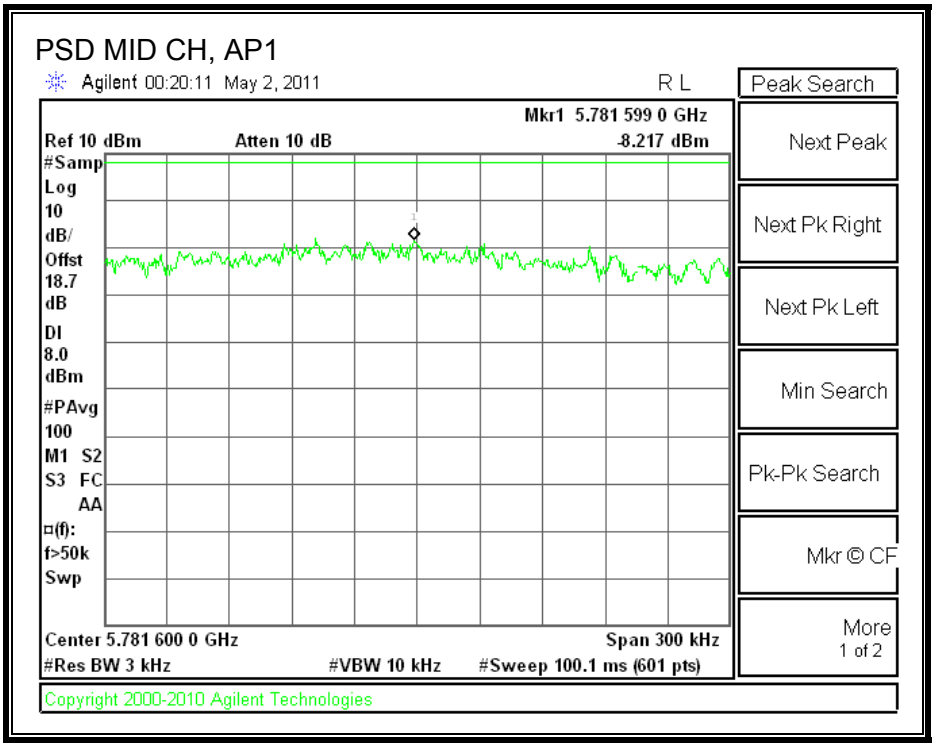
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

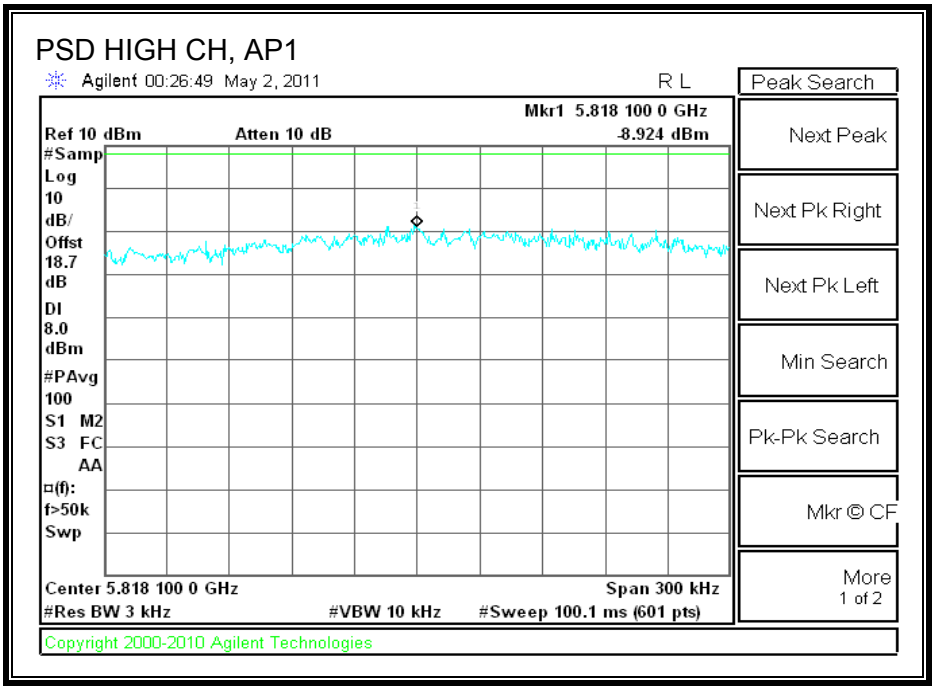
RESULTS:

Channel	Frequency (MHz)	AP1 PSD (dBm)	AP2 PSD (dBm)	AP3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-8.107	-8.694	-7.725	-3.39	8	-11.39
Middle	5785	-8.217	-9.81	-8.172	-3.90	8	-11.90
High	5825	-8.924	-8.776	-7.849	-3.72	8	-11.72

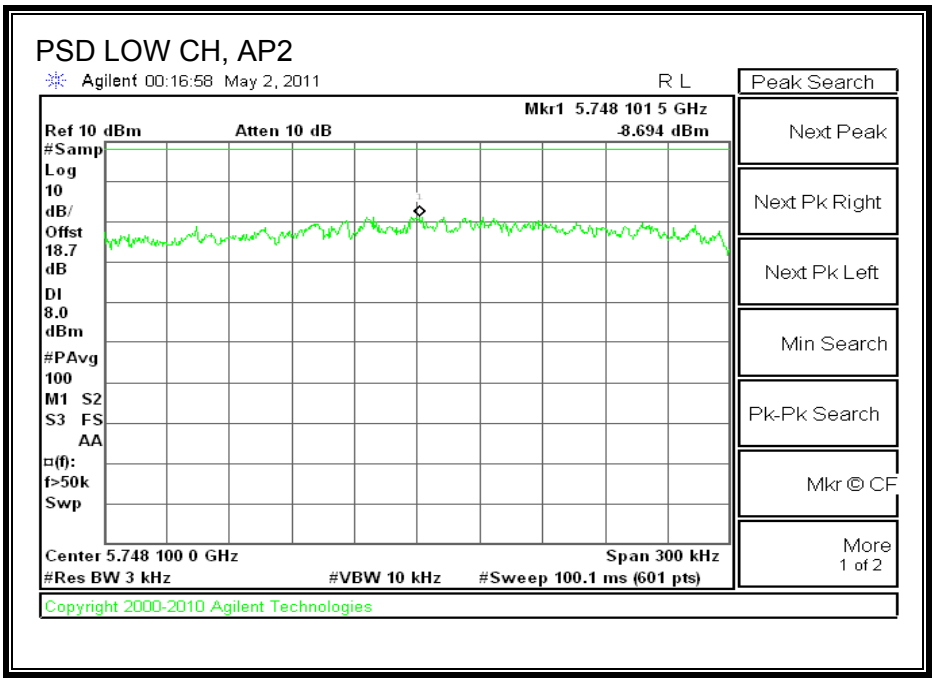
POWER SPECTRAL DENSITY, AP1



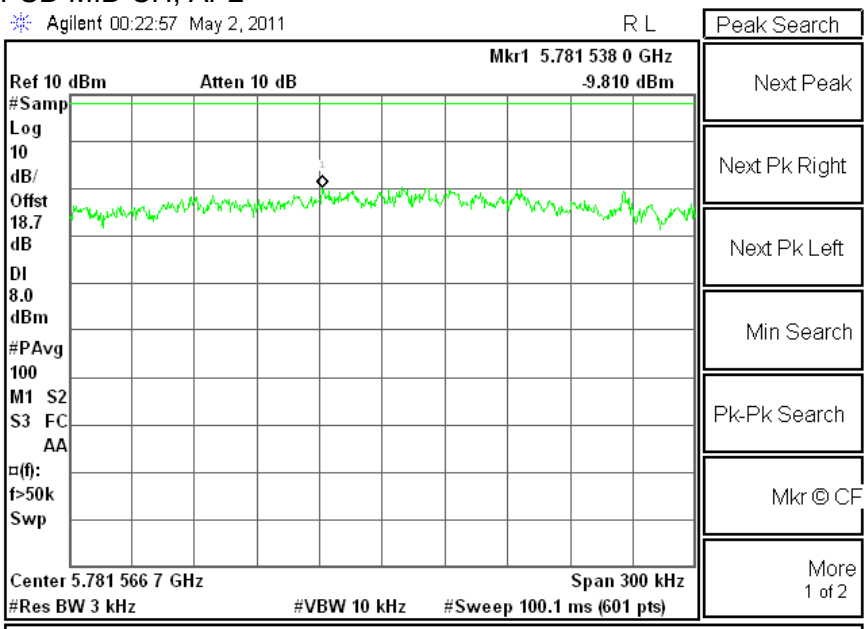




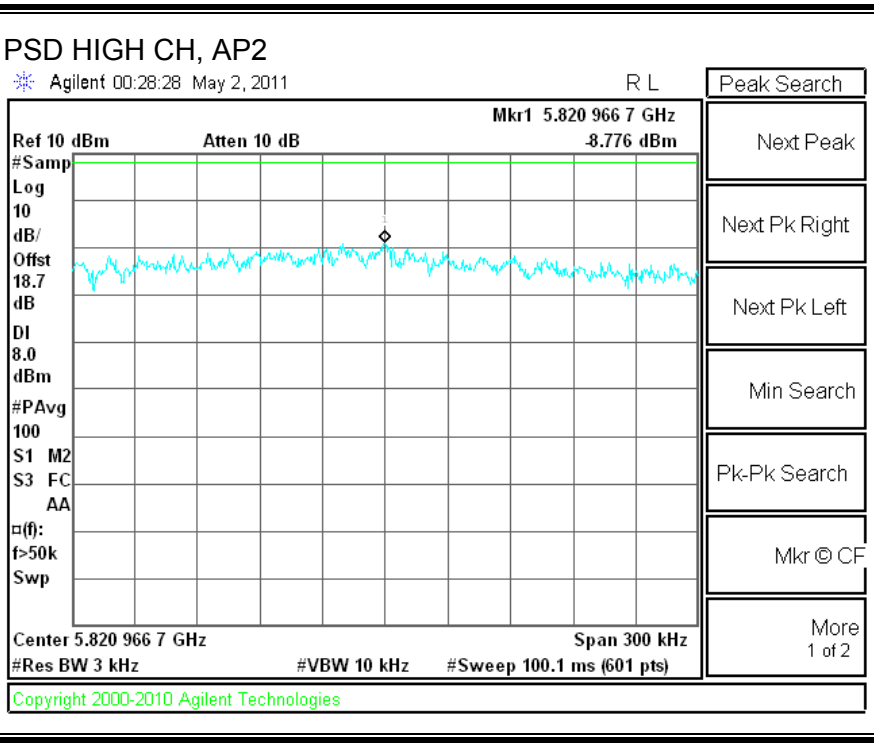
POWER SPECTRAL DENSITY, AP2



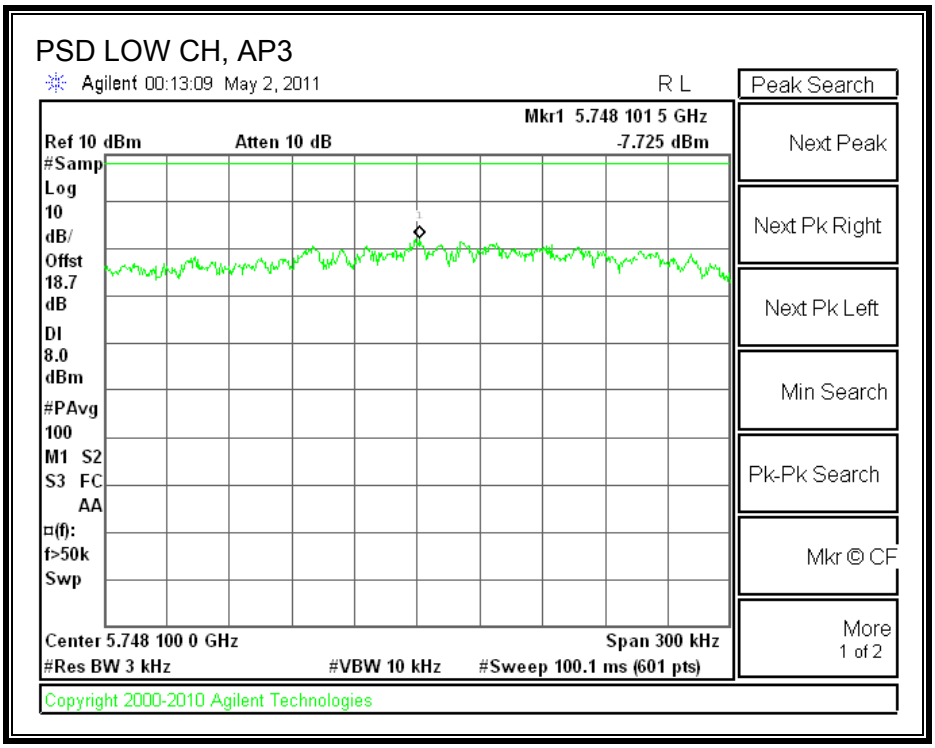
PSD MID CH, AP2

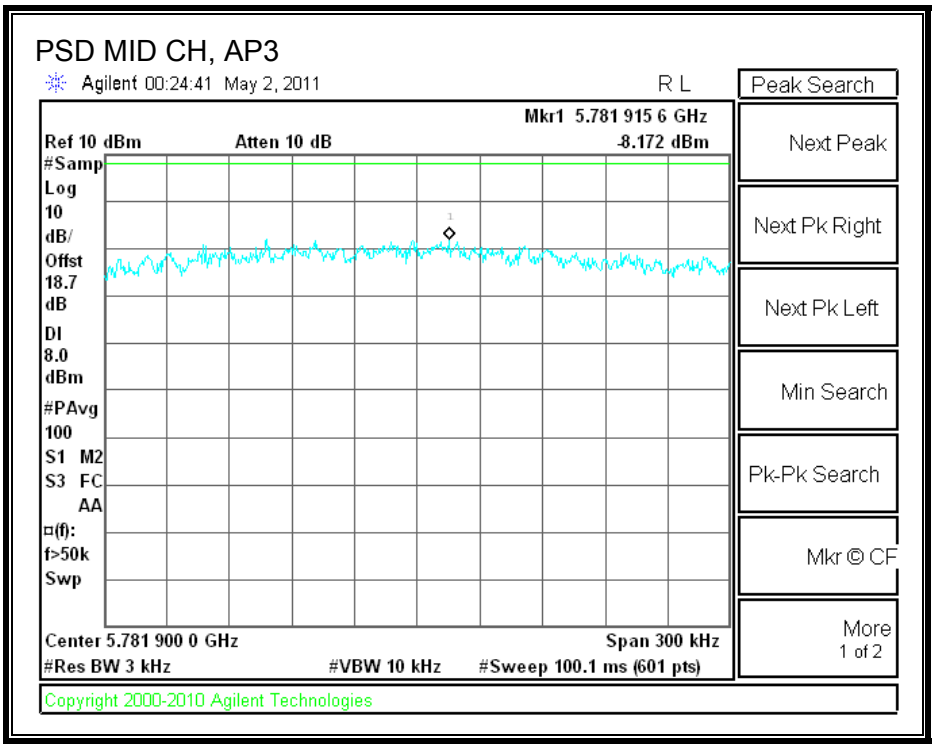


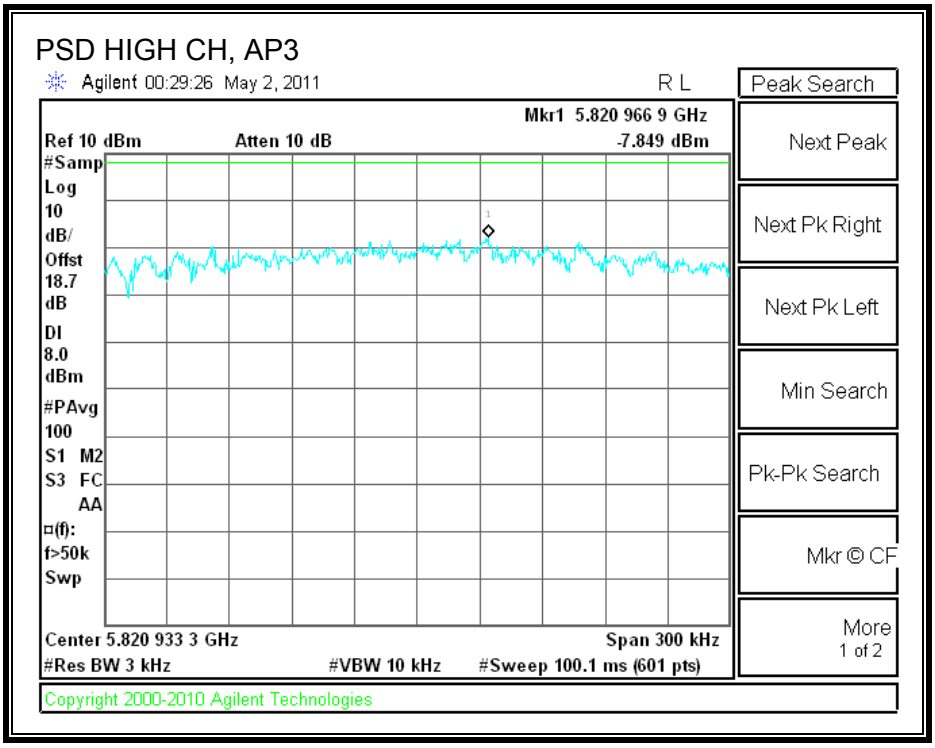
PSD HIGH CH, AP2



POWER SPECTRAL DENSITY, AP3







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 RMS averaging over time interval; therefore the required attenuation is 30 dB.

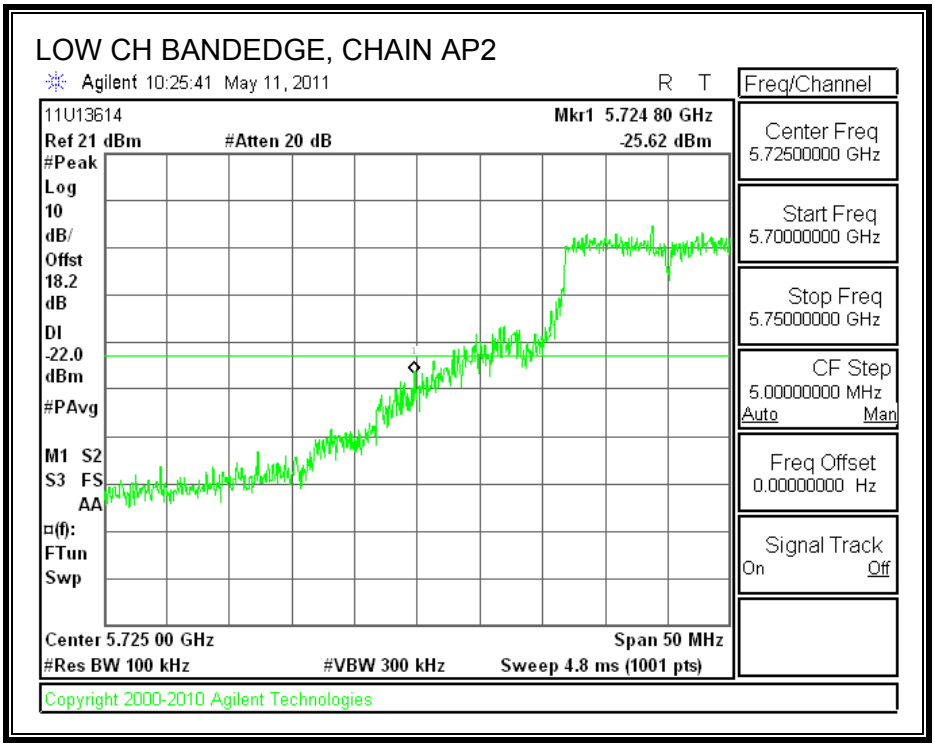
TEST PROCEDURE

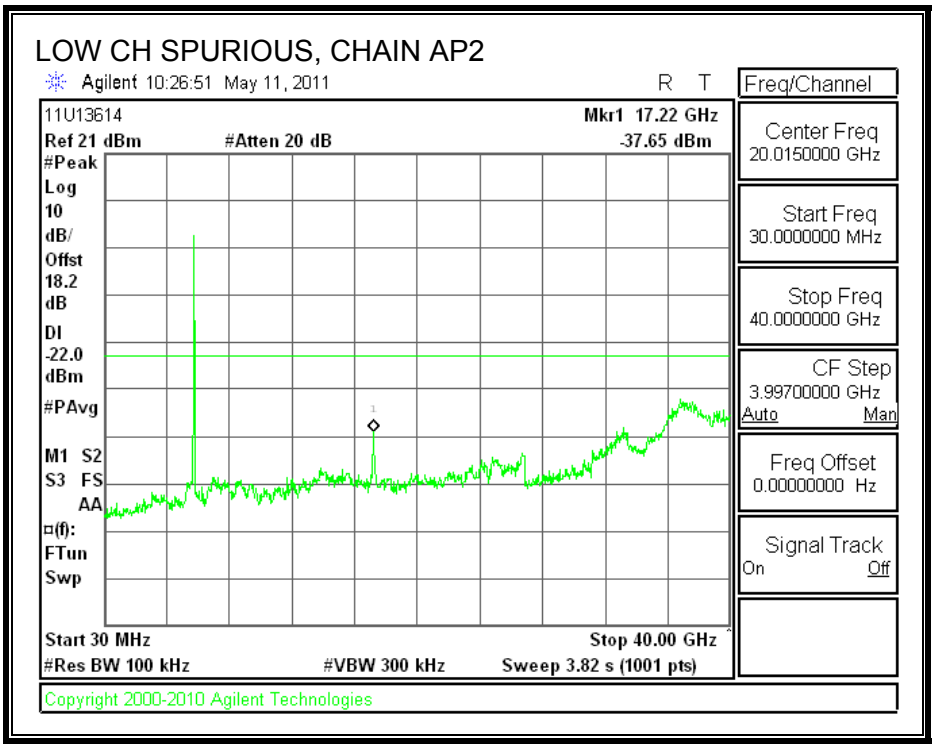
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

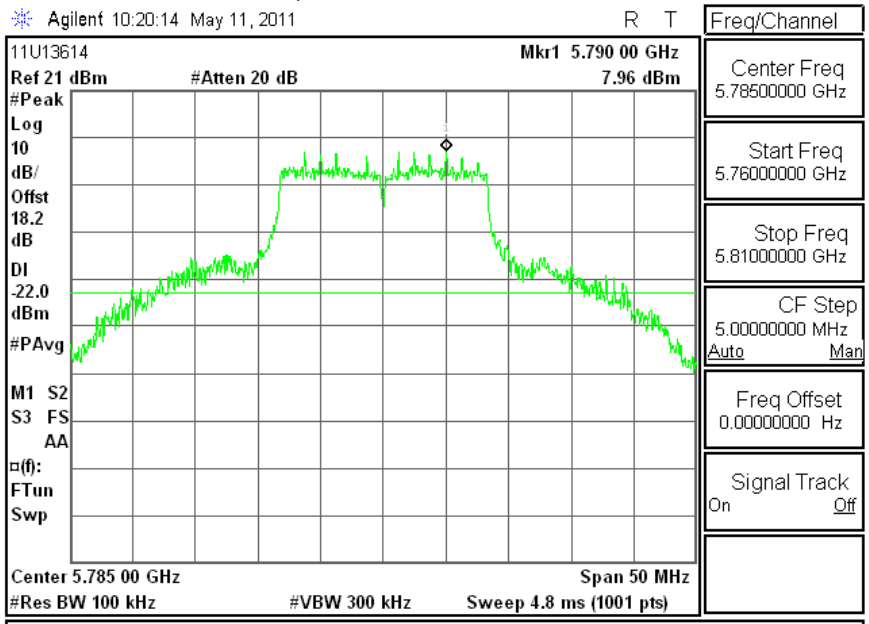
RESULTS

CHAIN AP2 SPURIOUS EMISSIONS

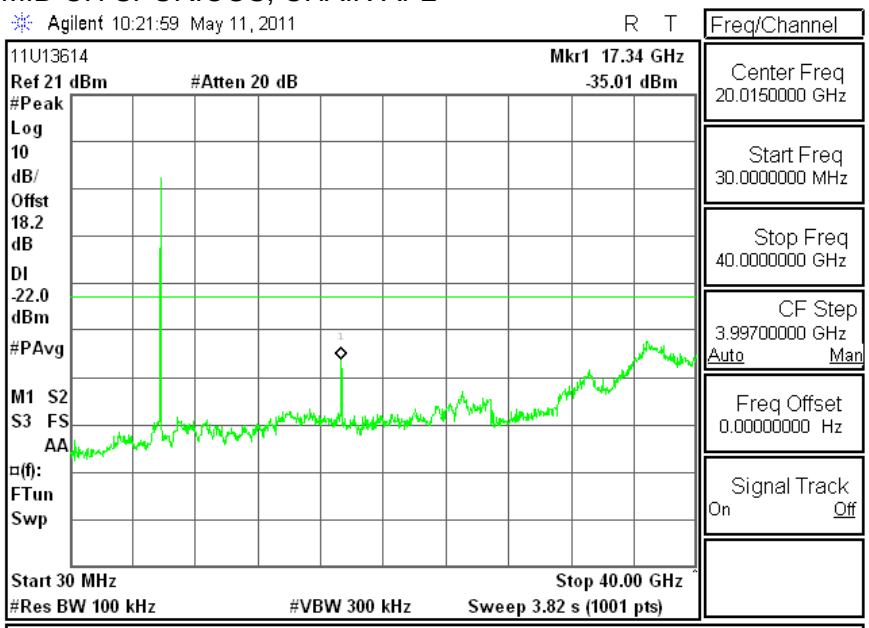




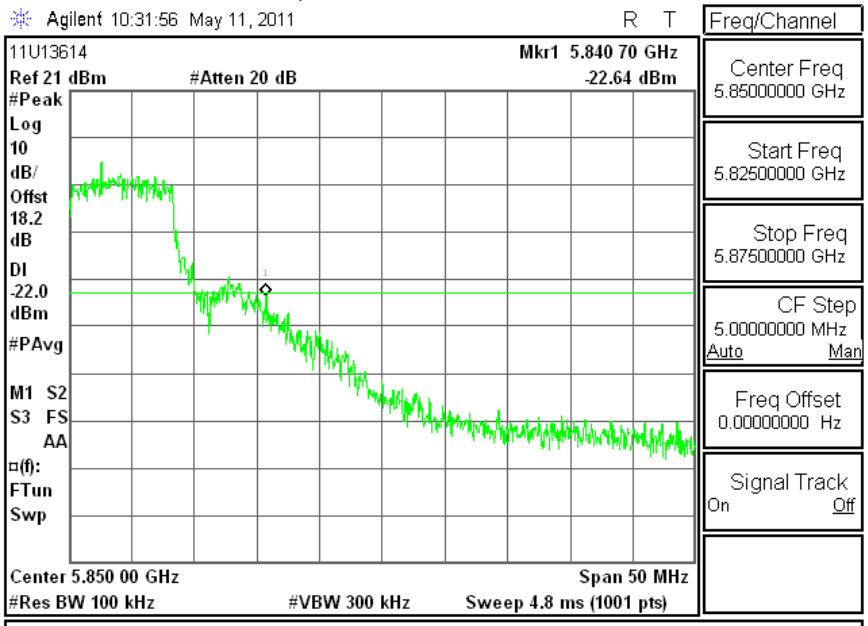
MID CH REFERENCE, CHAIN AP2



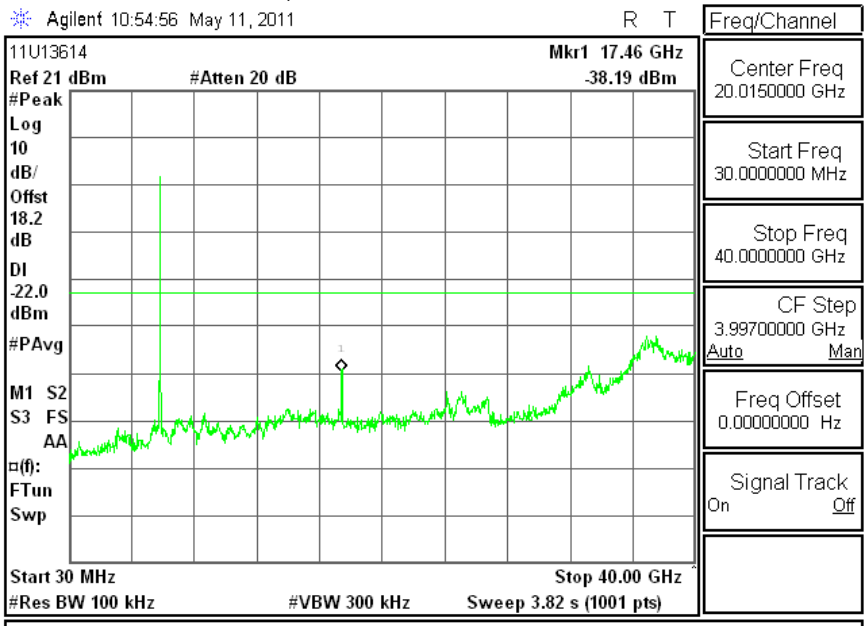
MID CH SPURIOUS, CHAIN AP2



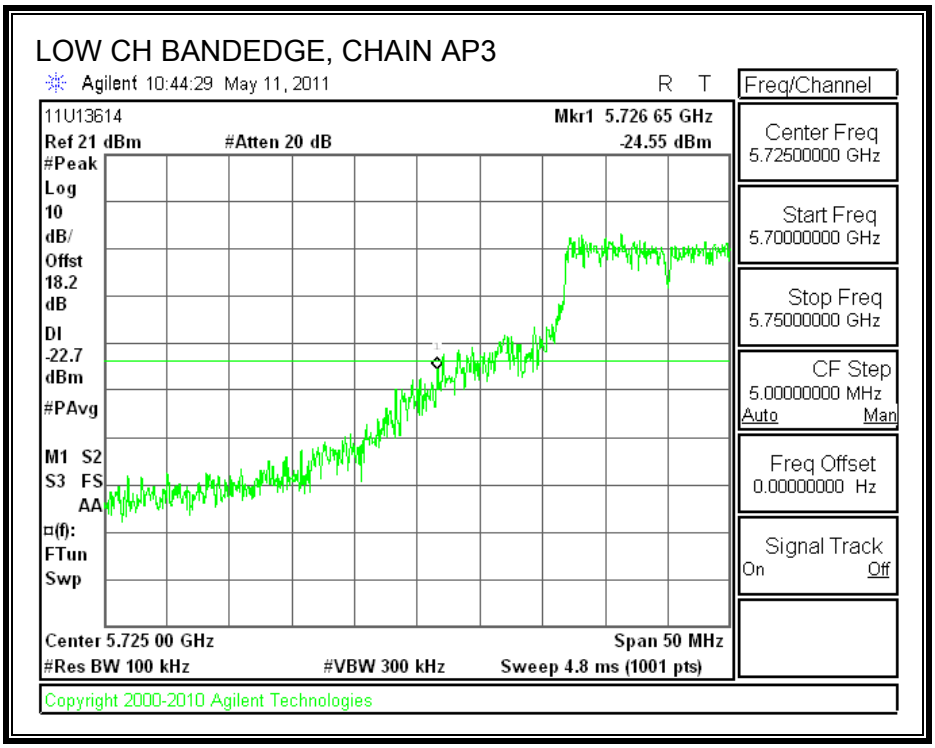
HIGH CH BANDEDGE, CHAIN AP2

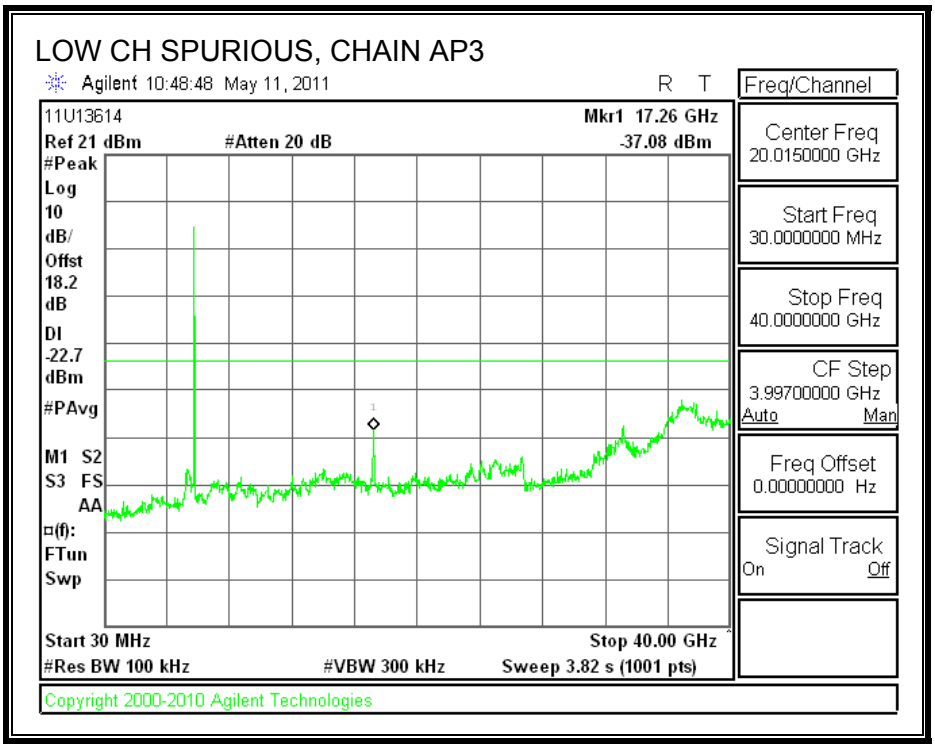


HIGH CH SPURIOUS, CHAIN AP2

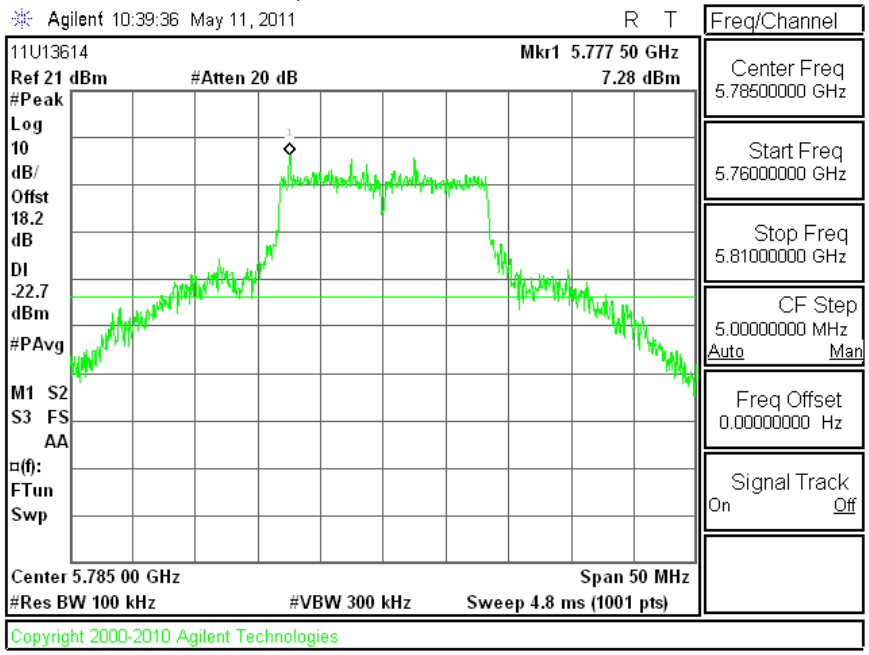


CHAIN AP3 SPURIOUS EMISSIONS

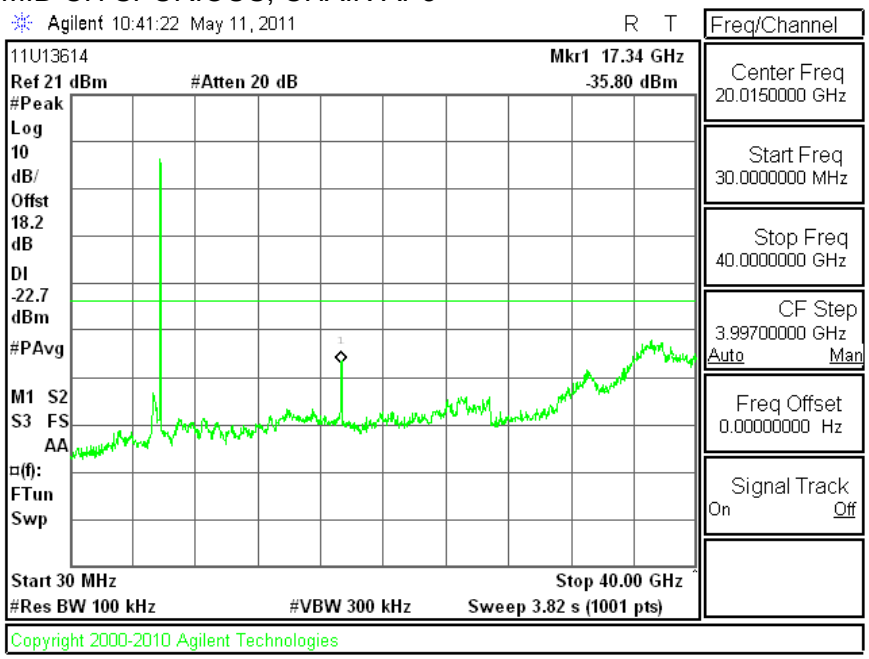




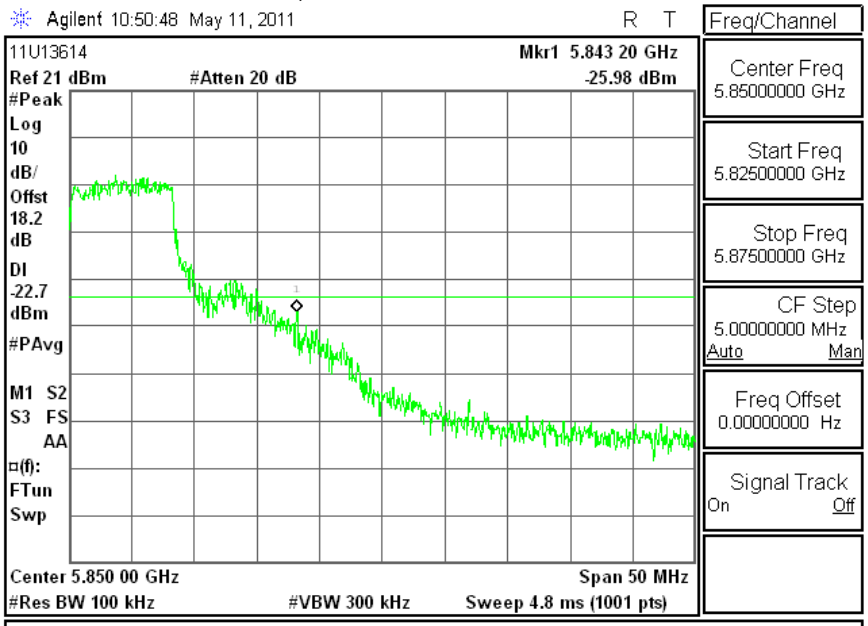
MID CH REFERENCE, CHAIN AP3



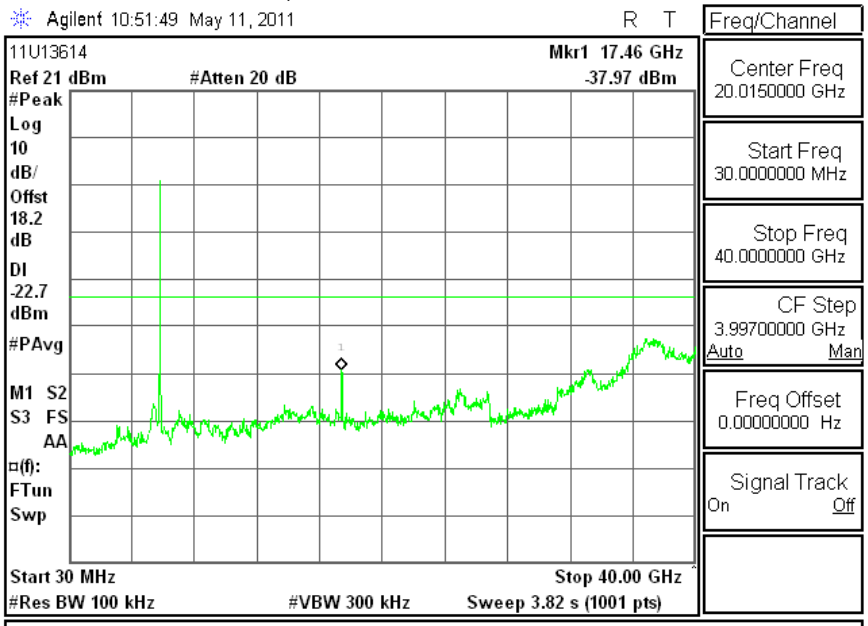
MID CH SPURIOUS, CHAIN AP3



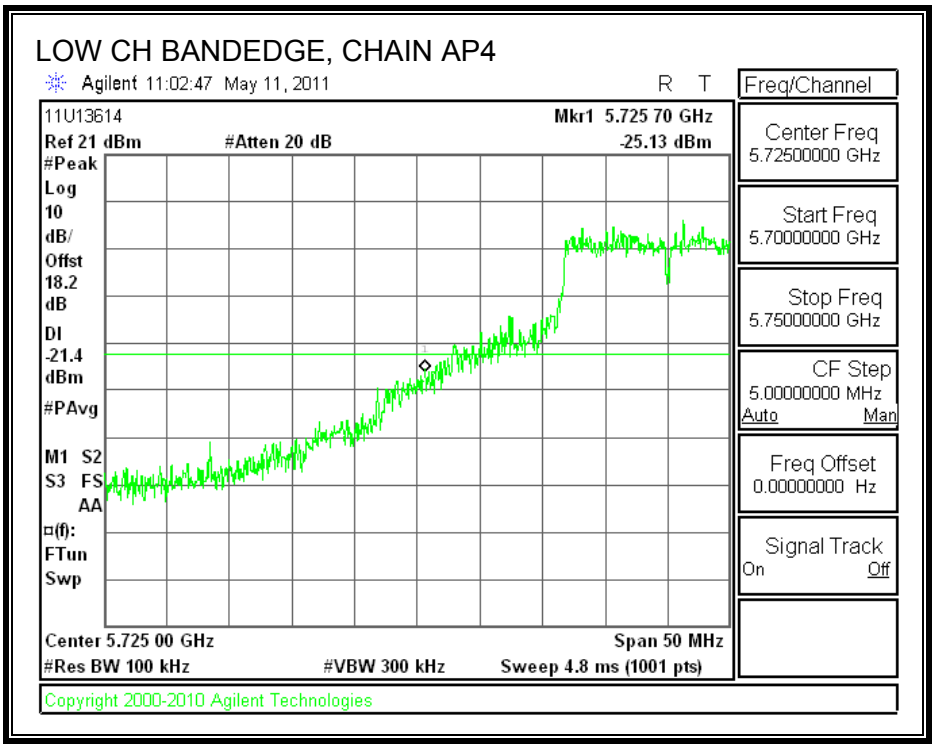
HIGH CH BANDEDGE, CHAIN AP3

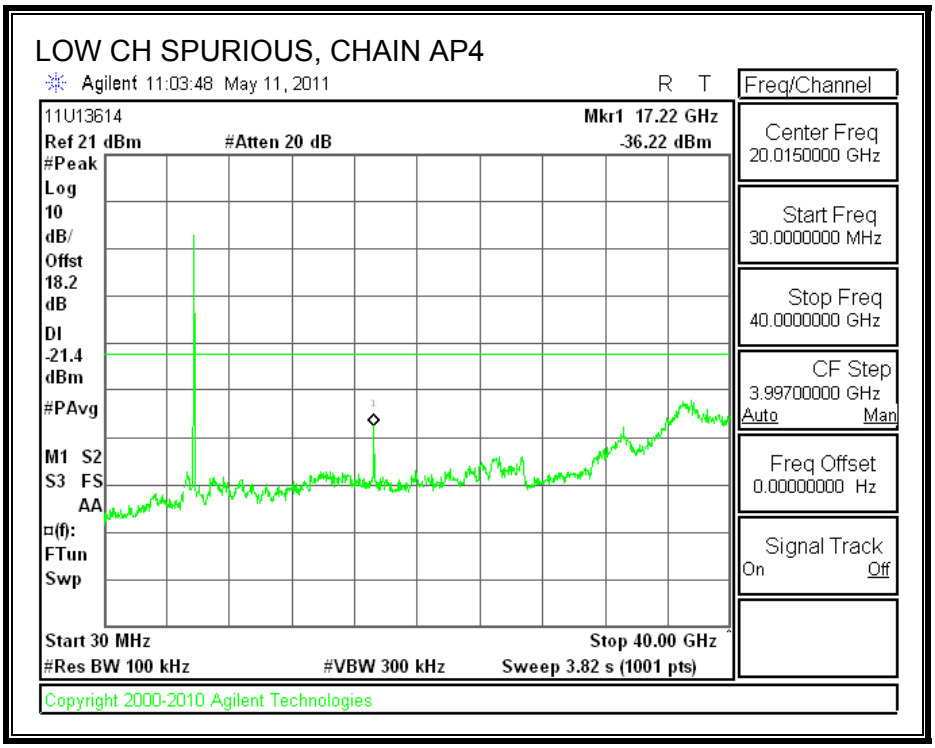


HIGH CH SPURIOUS, CHAIN AP3

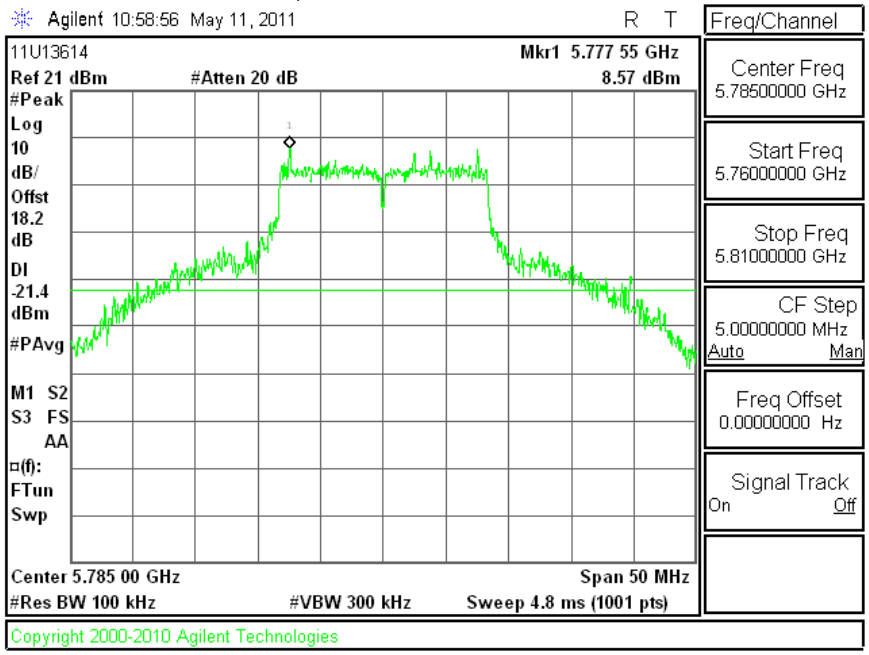


CHAIN AP4 SPURIOUS EMISSIONS

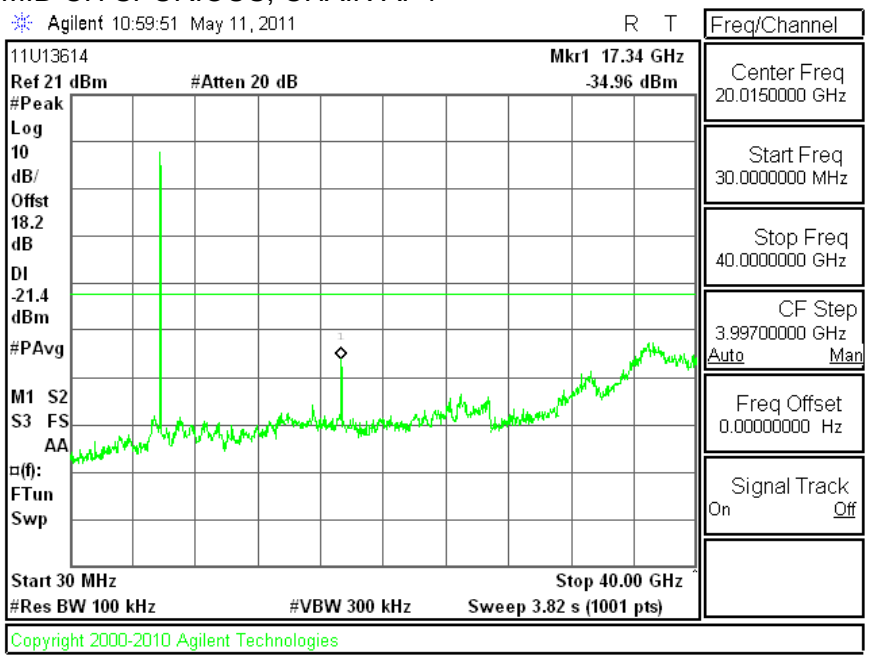




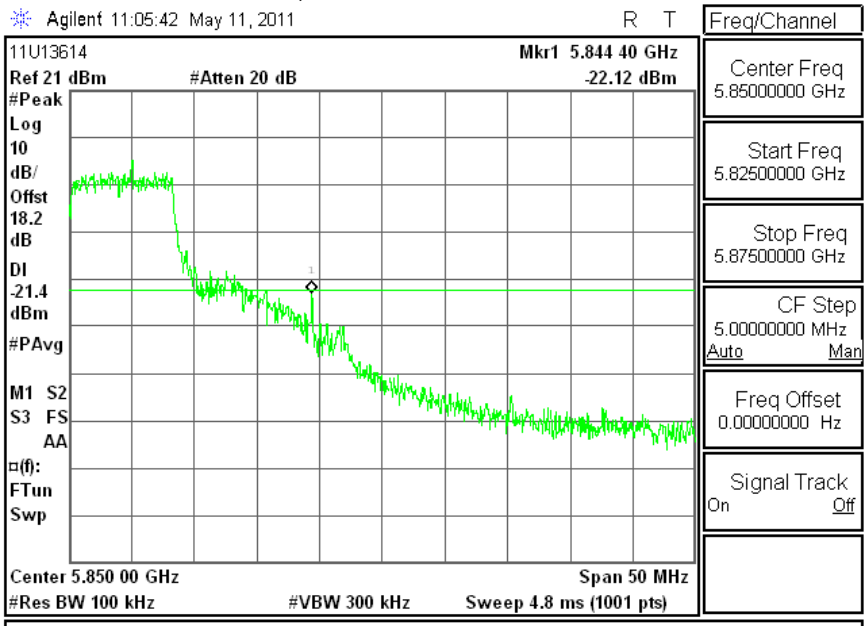
MID CH REFERENCE, CHAIN AP4



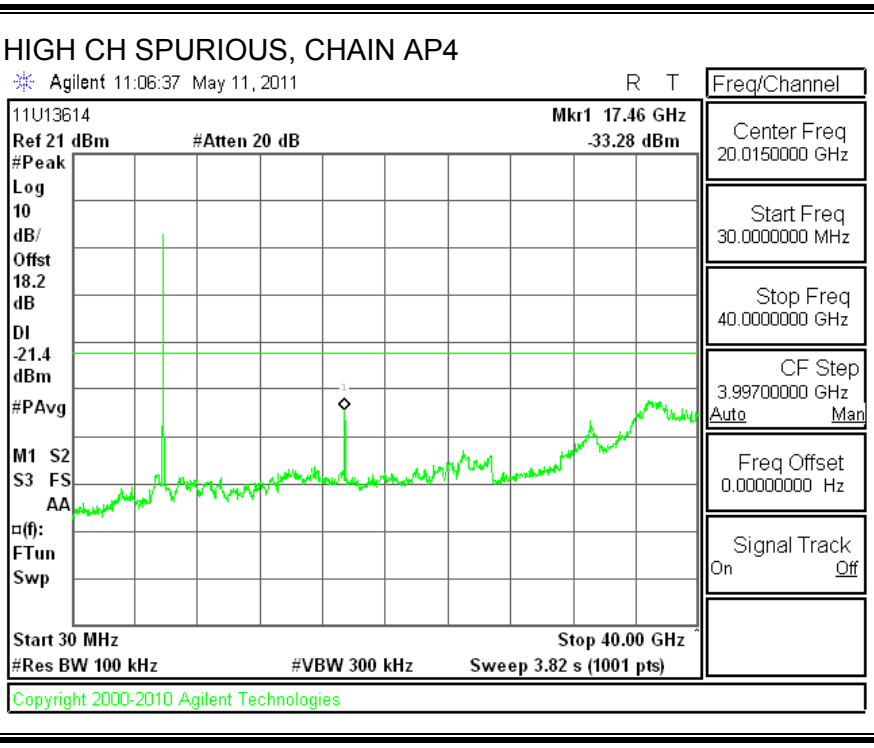
MID CH SPURIOUS, CHAIN AP4



HIGH CH BANDEDGE, CHAIN AP4



HIGH CH SPURIOUS, CHAIN AP4



7.5. 802.11n THREE CHAINS HT20 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.

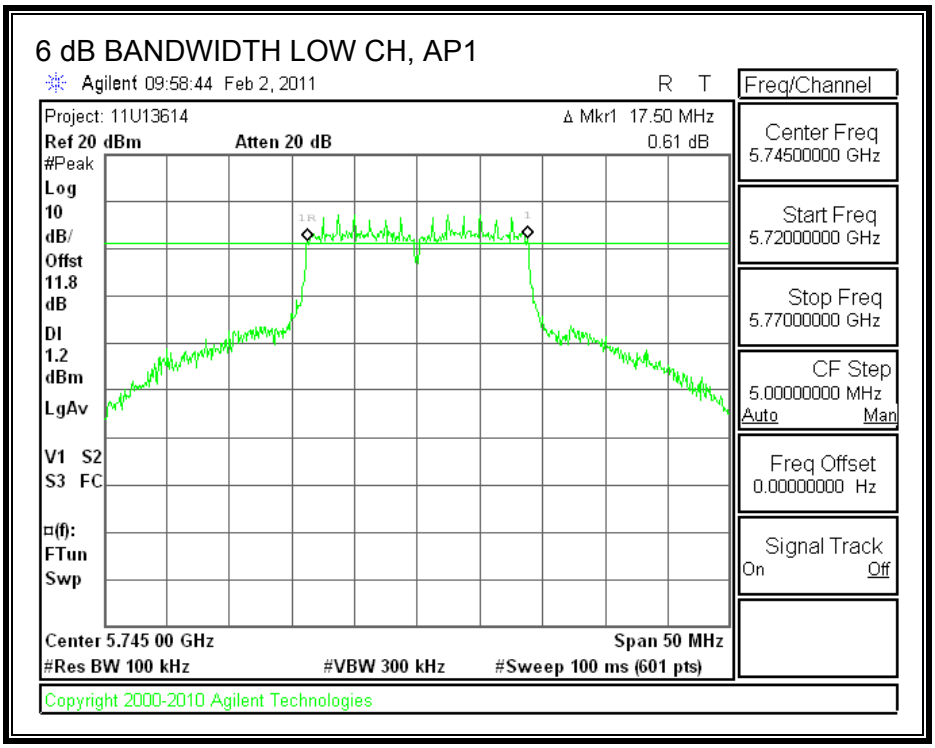
TEST PROCEDURE

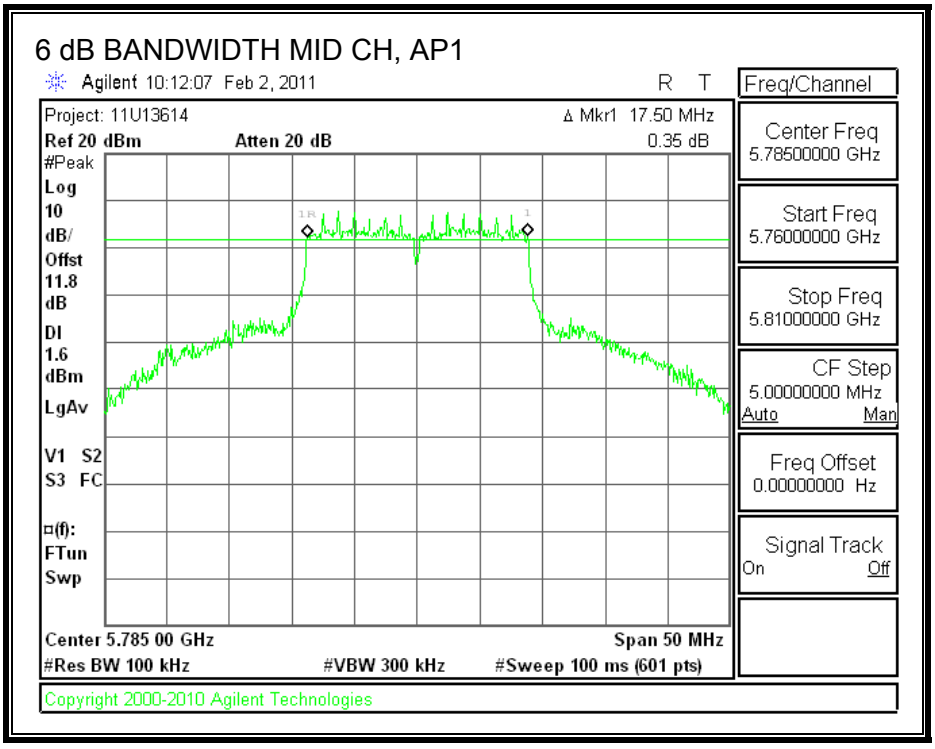
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

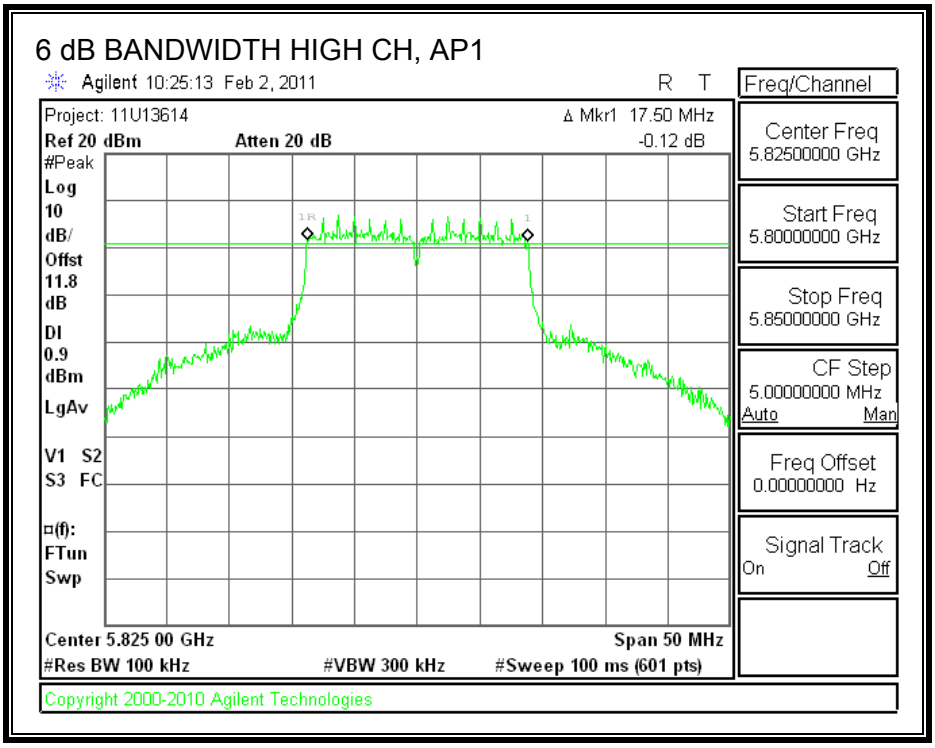
RESULTS

Channel	Frequency (MHz)	AP1 6 dB BW (MHz)	AP2 6 dB BW (MHz)	AP3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5745	17.5	17.5	17.5	0.5
Middle	5785	17.5	17.5	17.5	0.5
High	5825	17.5	17.5	17.25	0.5

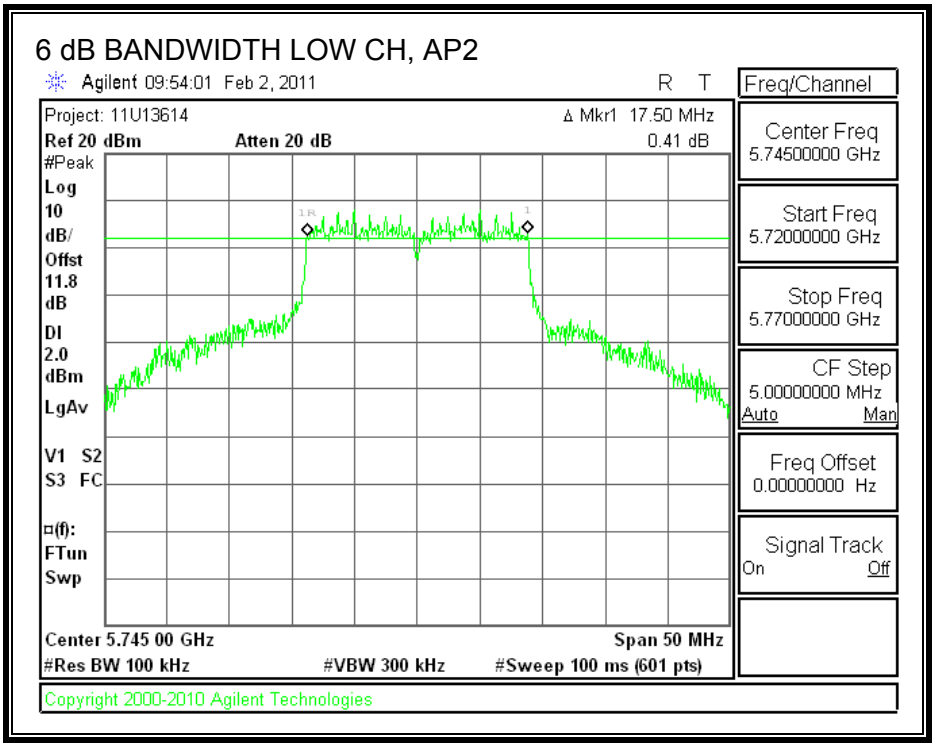
6 dB BANDWIDTH, AP1

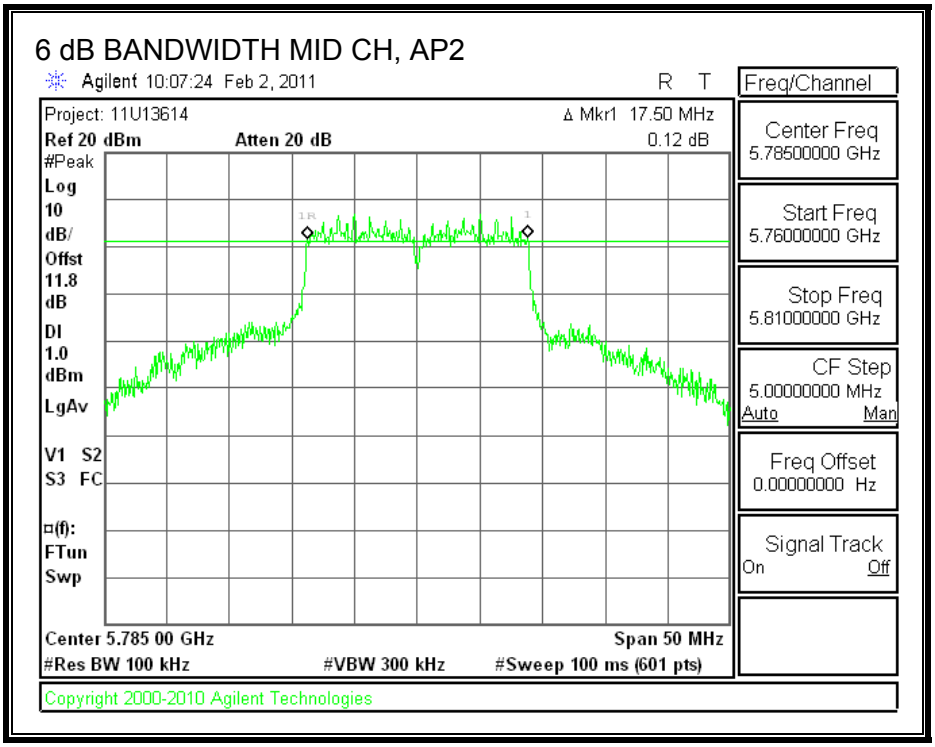


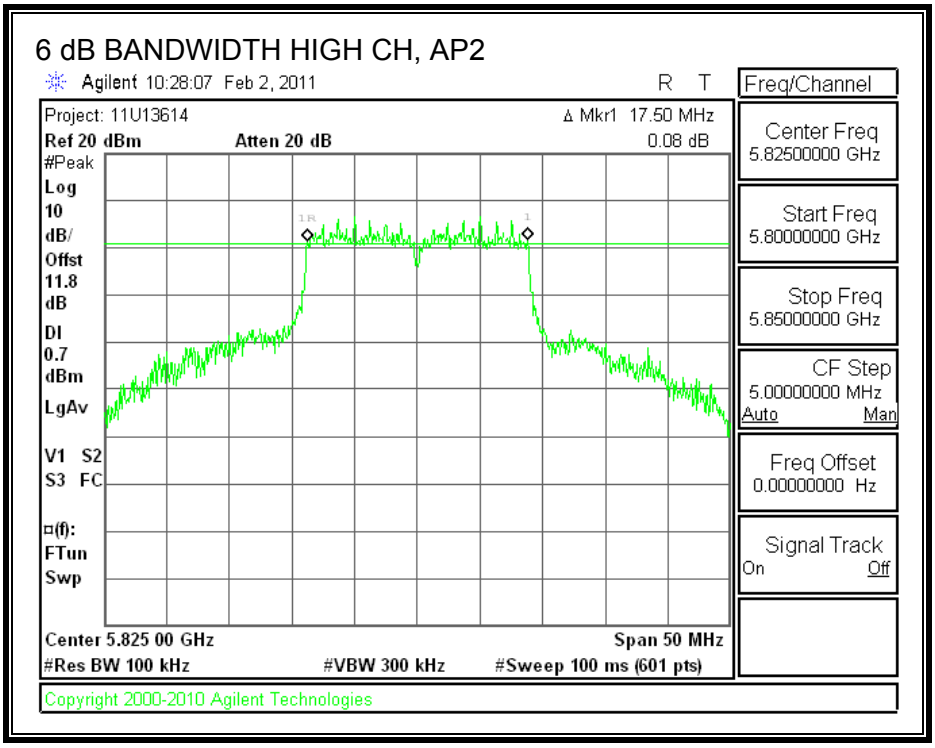




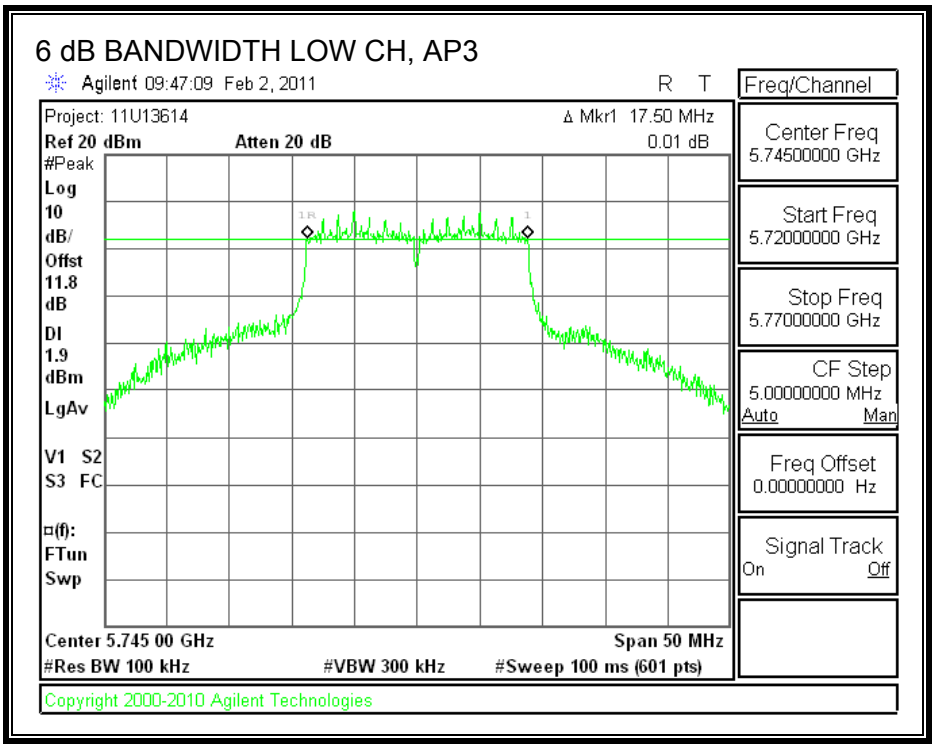
6 dB BANDWIDTH, AP2

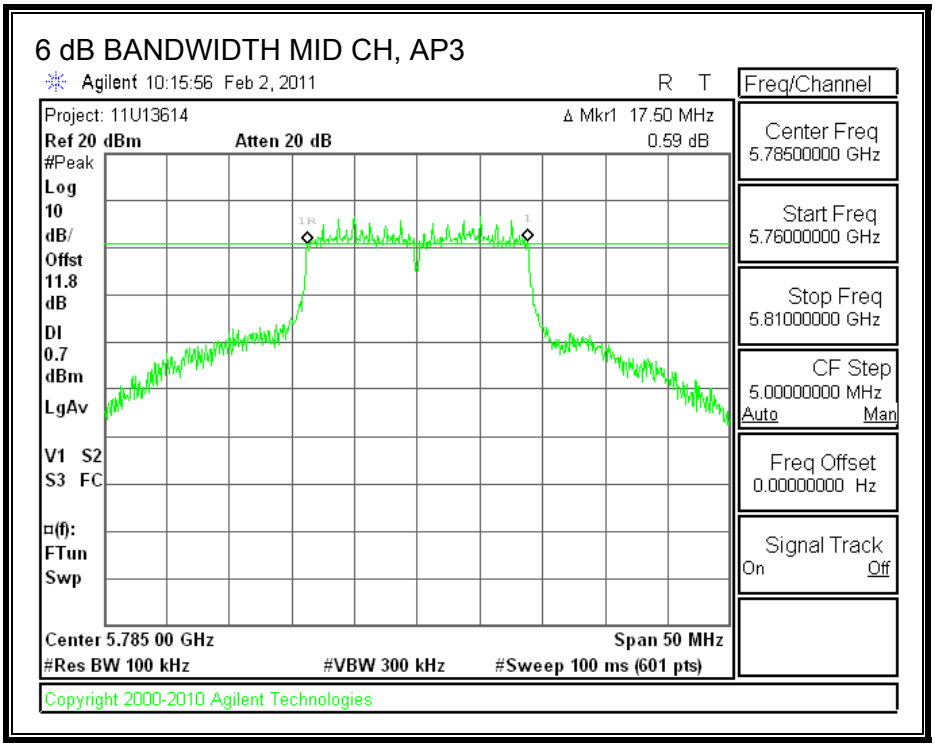


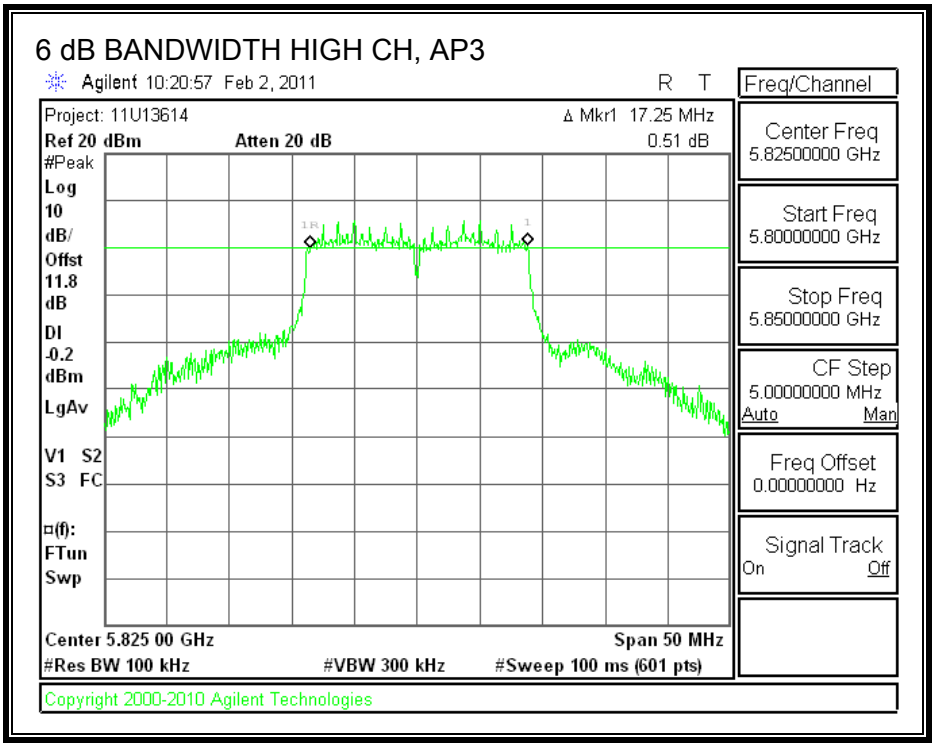




6 dB BANDWIDTH, AP3







7.5.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

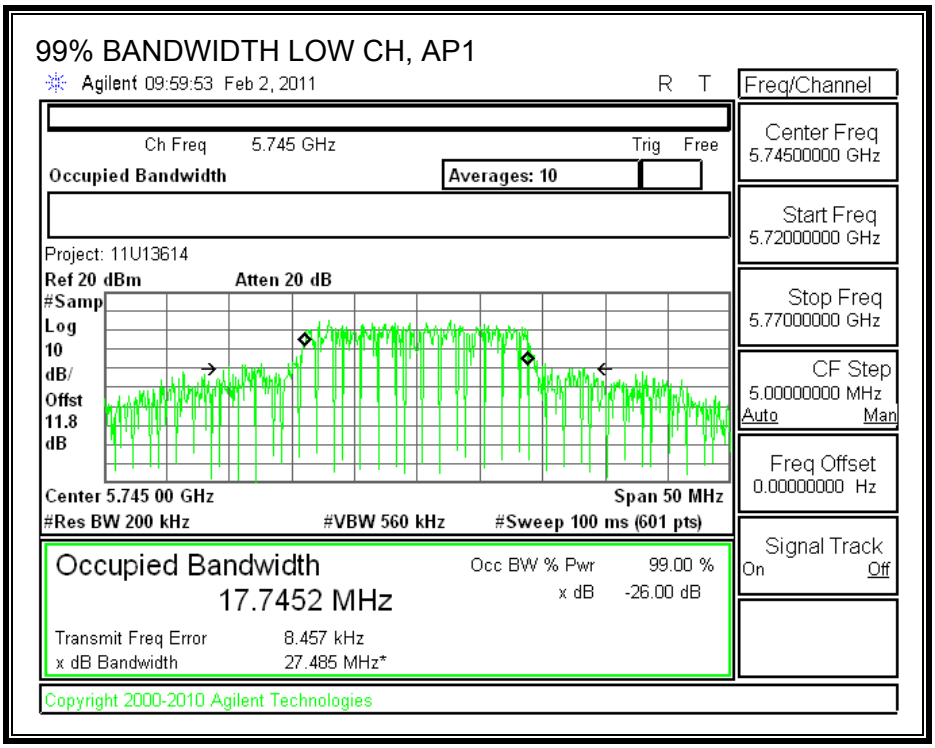
TEST PROCEDURE

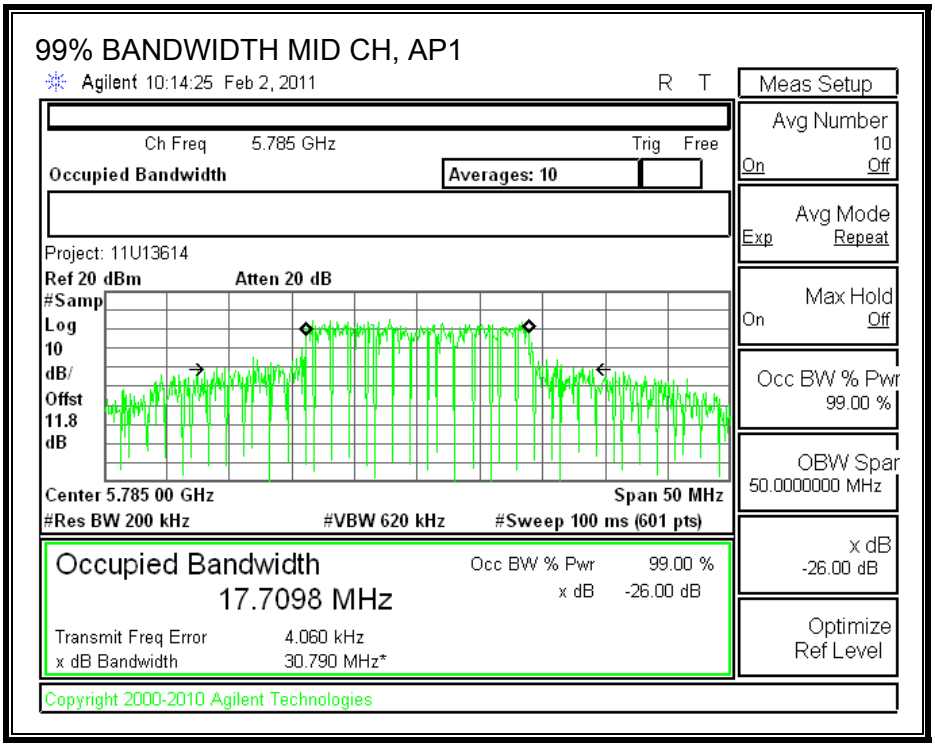
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

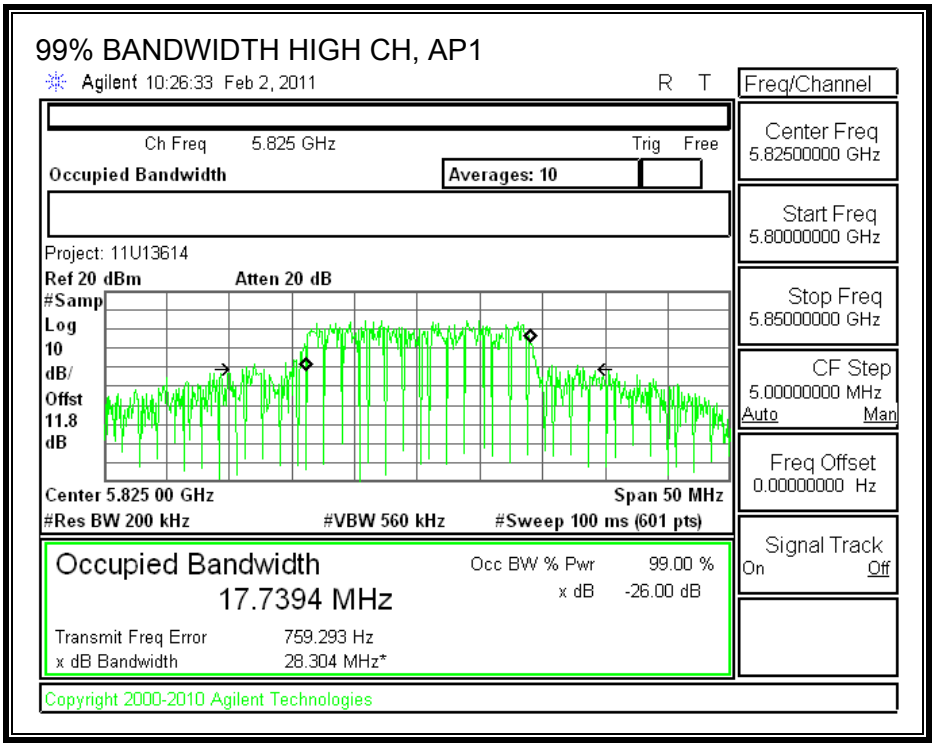
RESULTS

Channel	Frequency (MHz)	AP1 99% Bandwidth (MHz)	AP2 99% Bandwidth (MHz)	AP3 99% Bandwidth (MHz)
Low	5745	17.7452	17.7325	17.7563
Middle	5785	17.7098	17.7182	17.7442
High	5825	17.7394	17.7142	17.7024

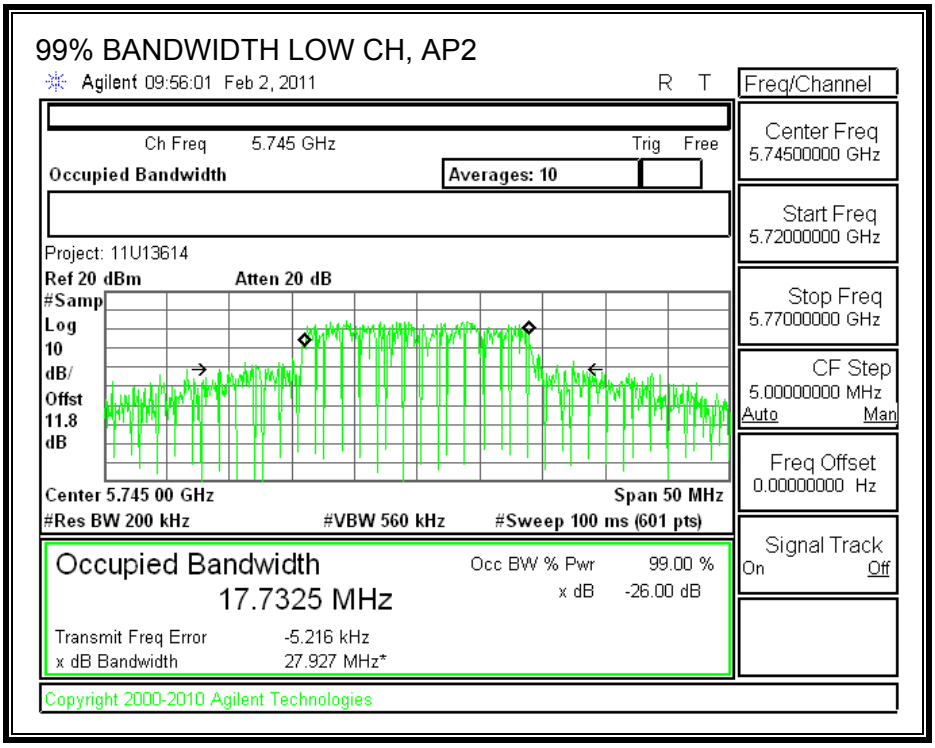
99% BANDWIDTH, AP1

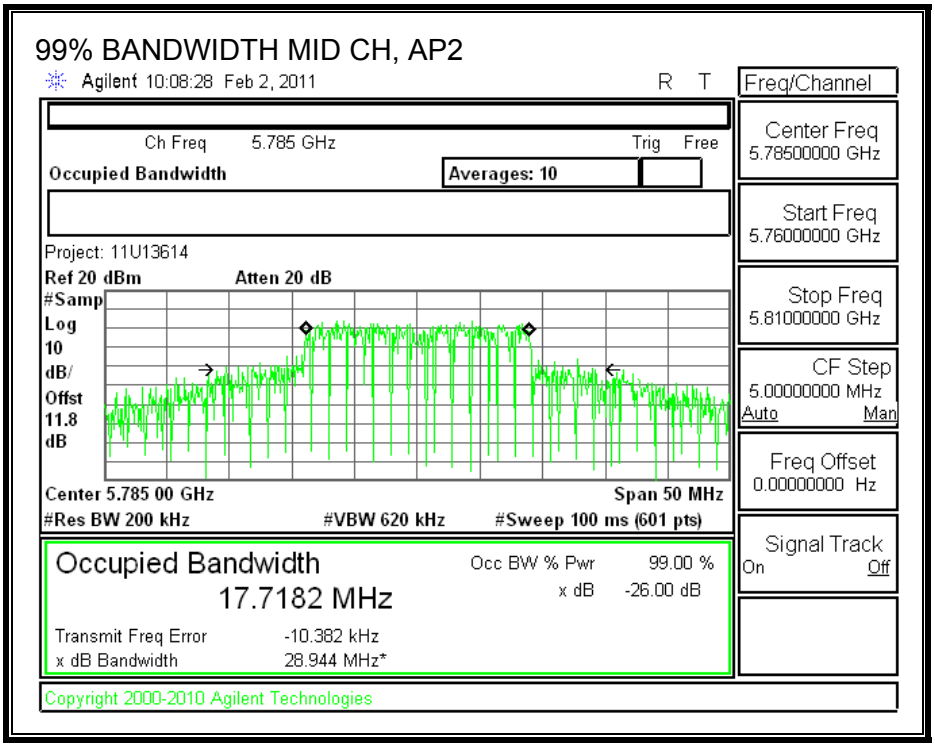


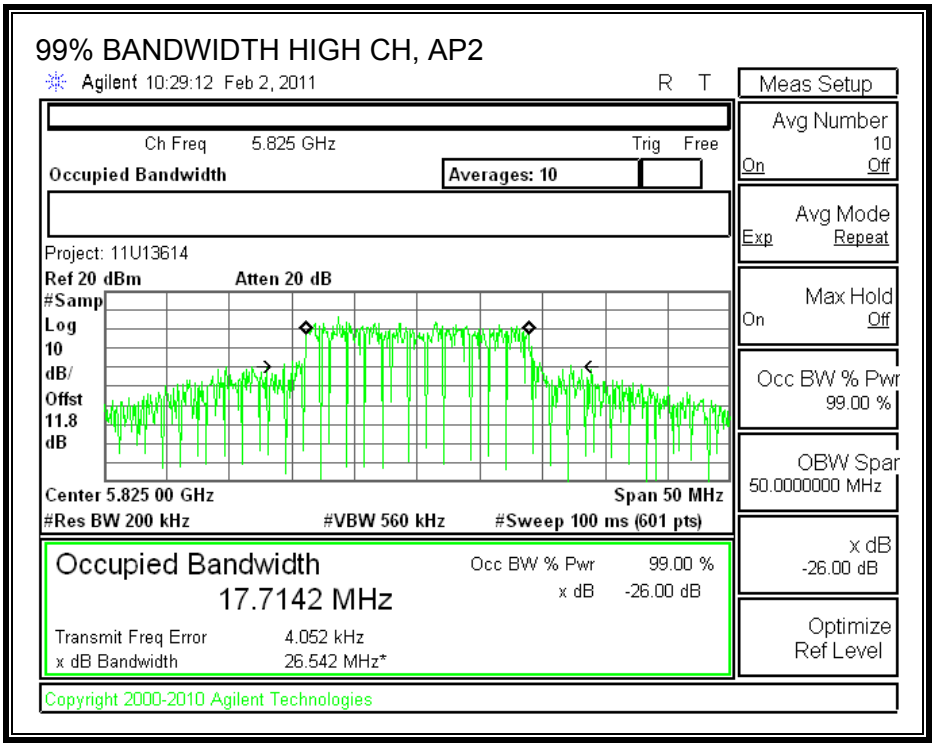




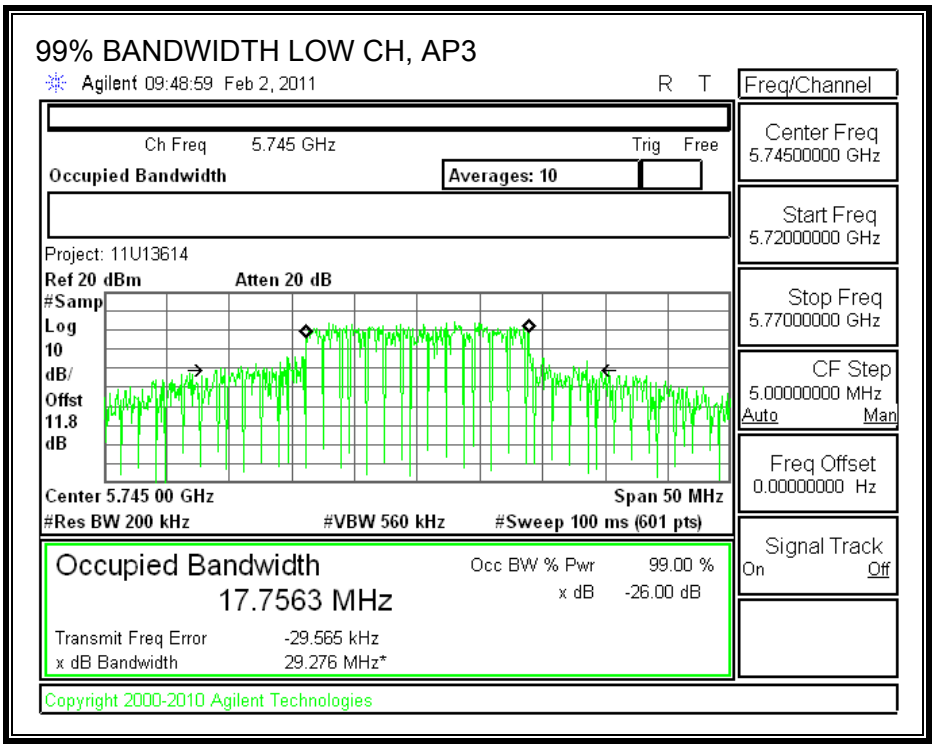
99% BANDWIDTH, AP2

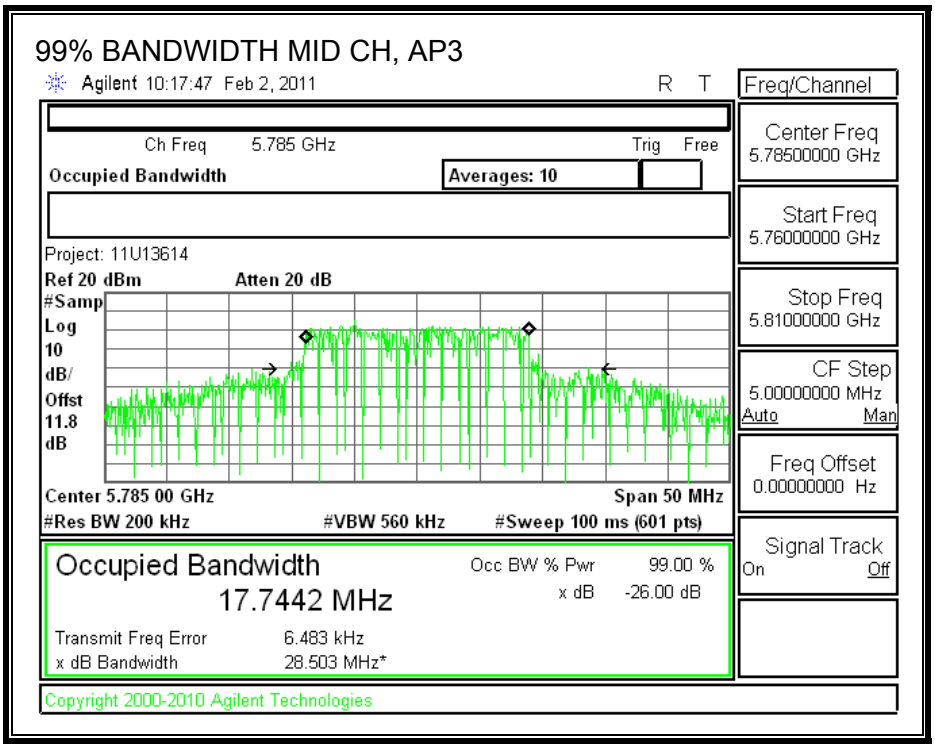


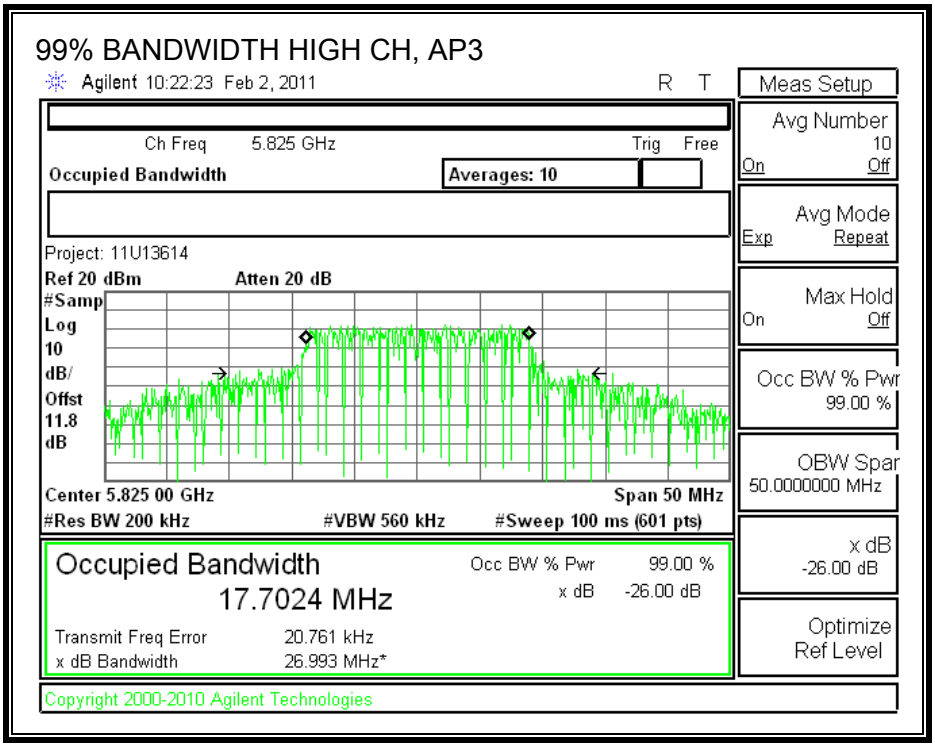




99% BANDWIDTH, AP3







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 **2.97 dBi**, therefore the limit is 30 dBm.

TEST PROCEDURE

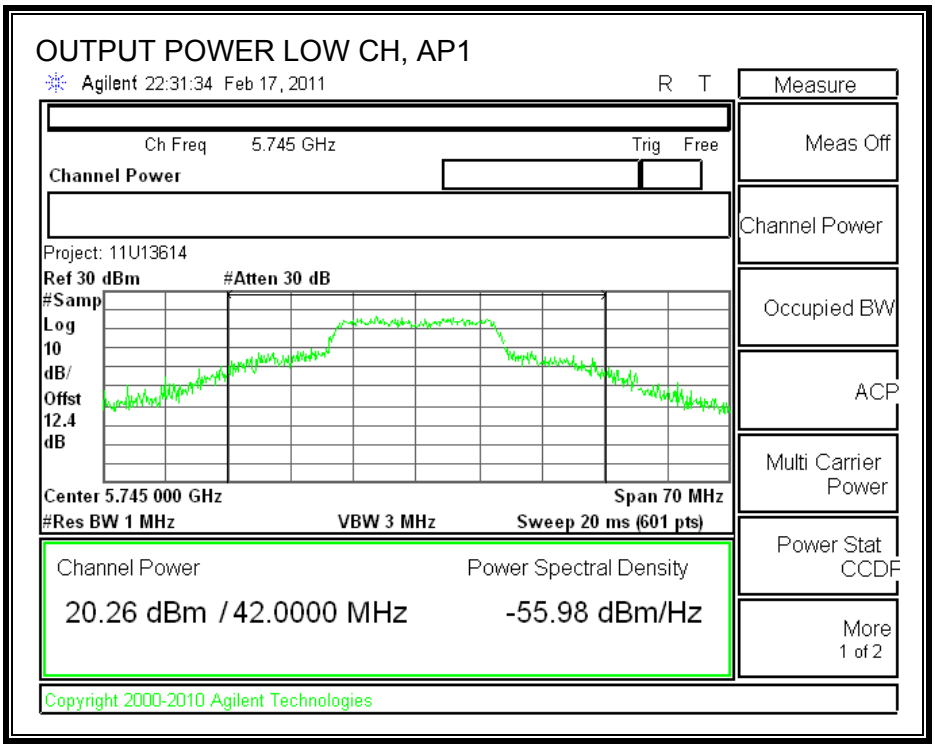
Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 26dB bandwidth.

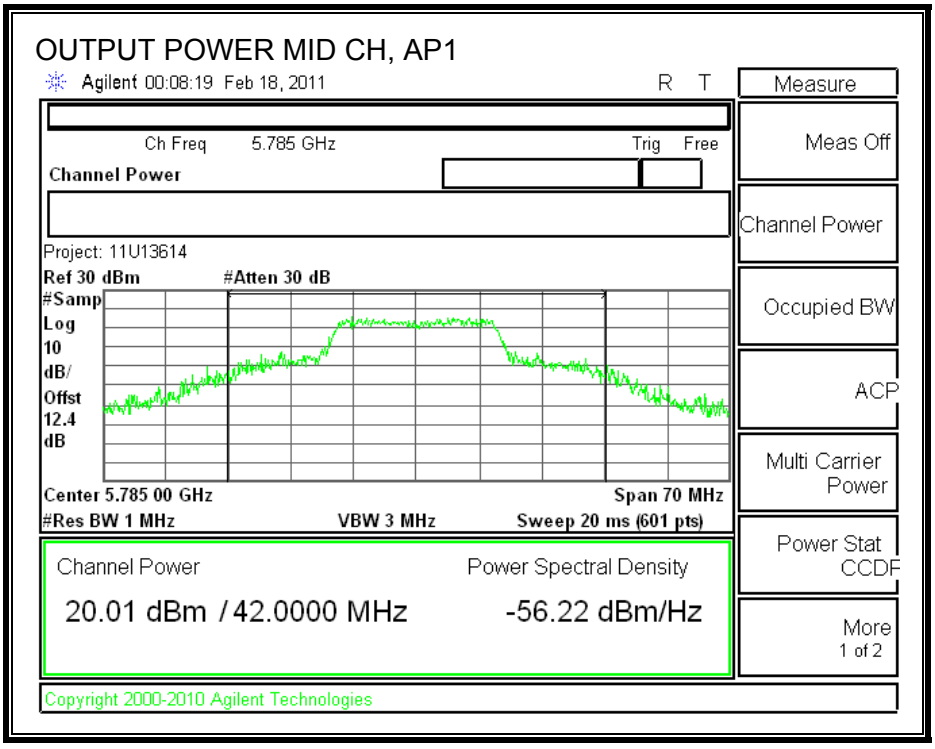
Maximum Conducted Output Power based on RMS averaging over a time interval is measured in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005. The transmitter operates continuously therefore Power Output Option 2, Method # 1 is used.

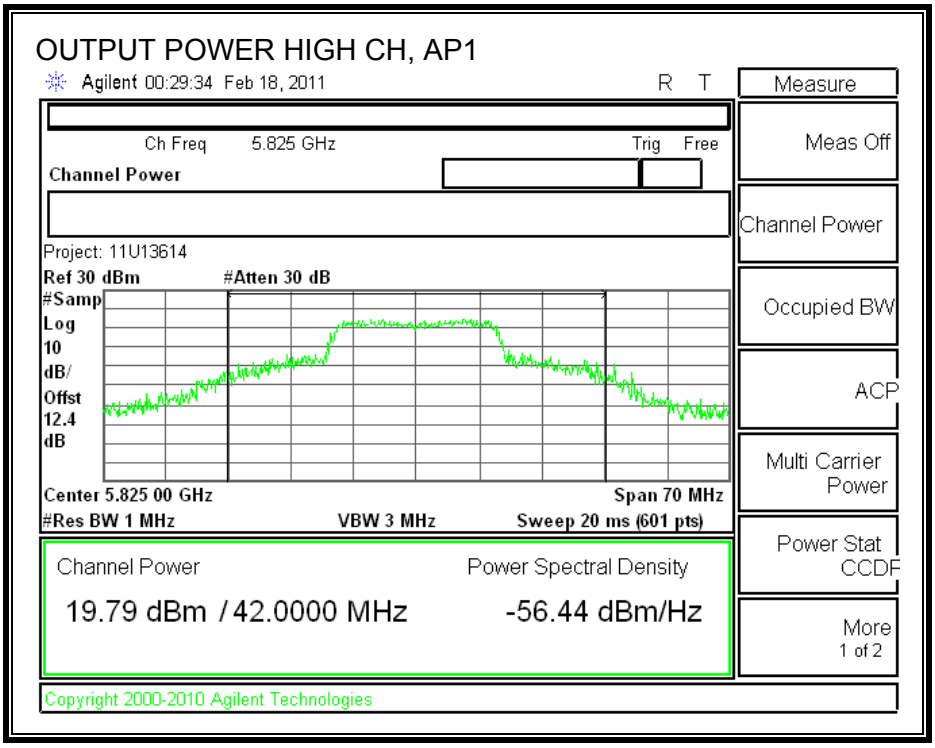
RESULTS

Channel	Frequency (MHz)	AP1 Power (dBm)	AP2 Power (dBm)	AP3 Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	20.26	20.39	20.86	0.00	25.28	30.00	-4.72
Mid	5785	20.01	19.89	20.20	0.00	24.81	30.00	-5.19
High	5825	19.79	19.23	19.66	0.00	24.34	30.00	-5.66

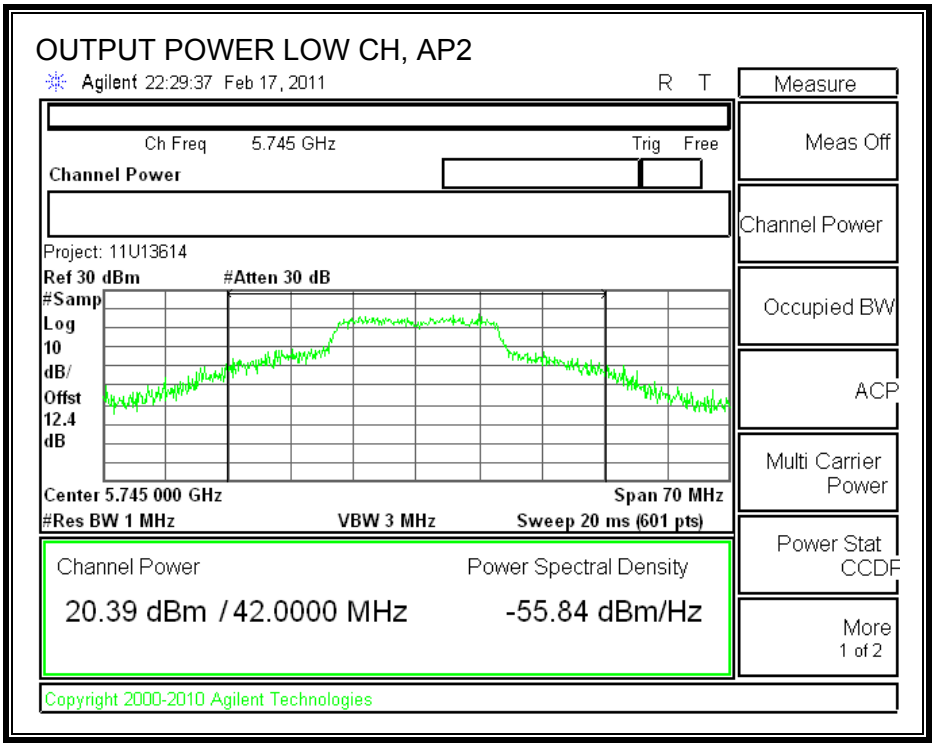
AP1 OUTPUT POWER



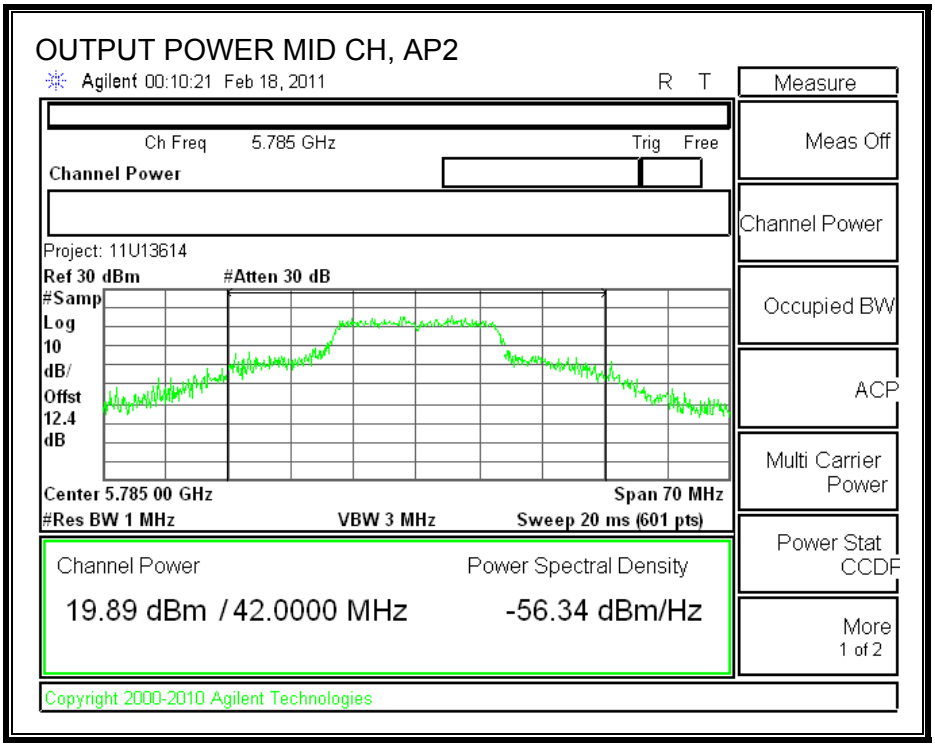




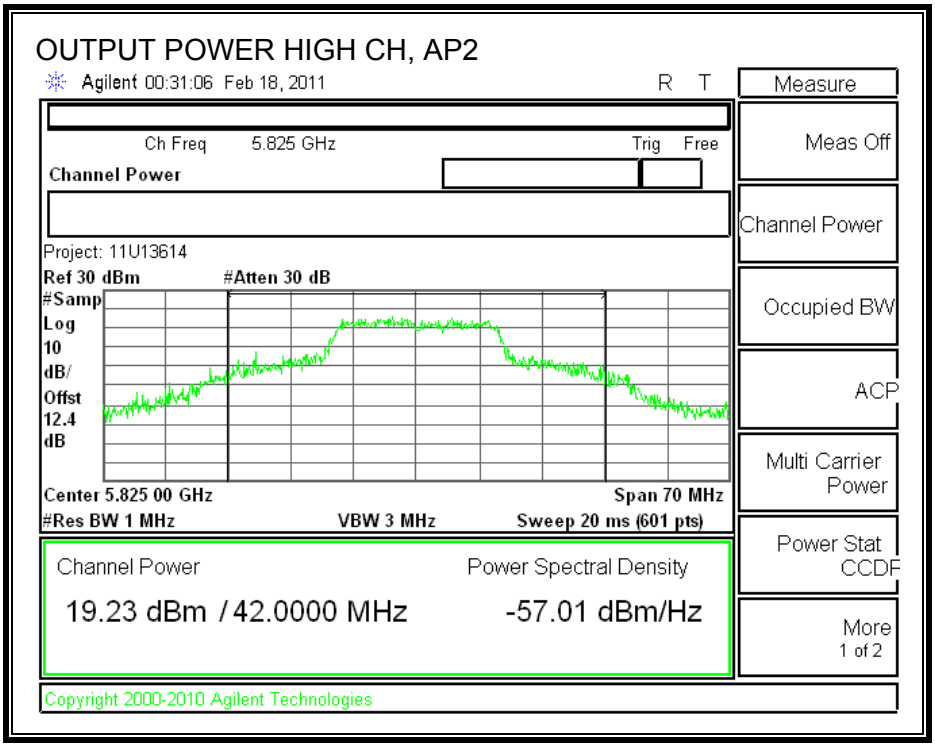
AP2 OUTPUT POWER



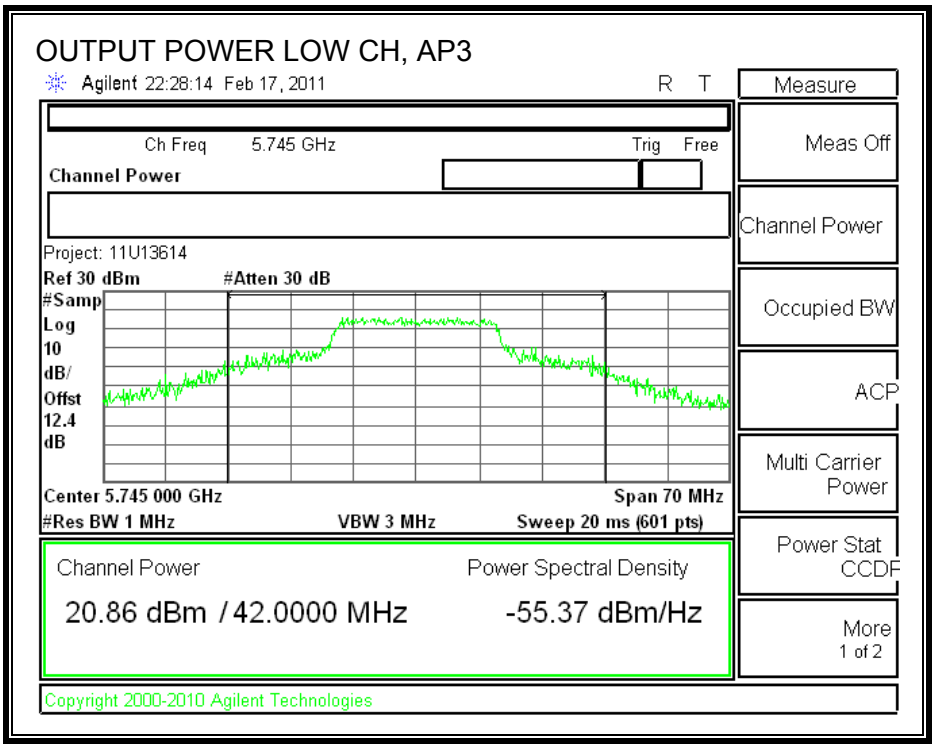
OUTPUT POWER MID CH, AP2

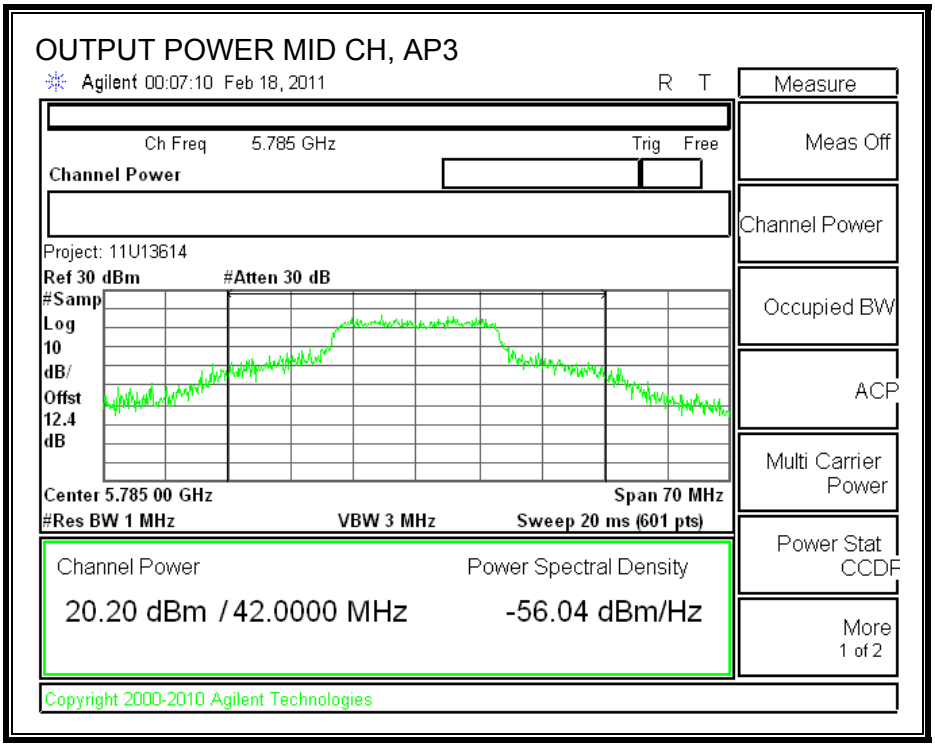


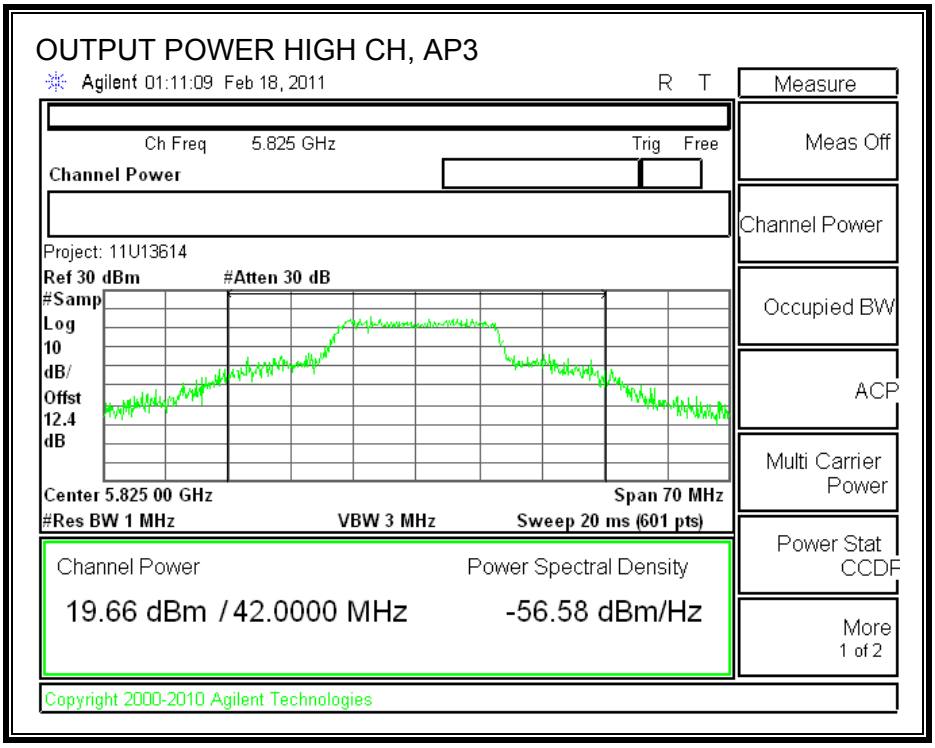
OUTPUT POWER HIGH CH, AP2



AP3 OUTPUT POWER







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.

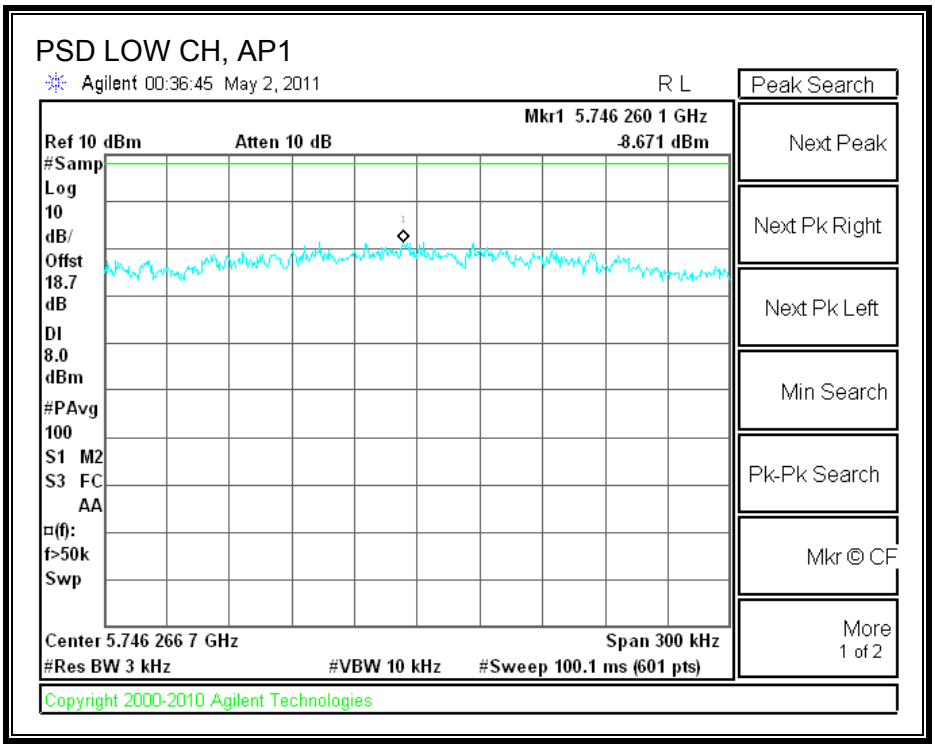
TEST PROCEDURE

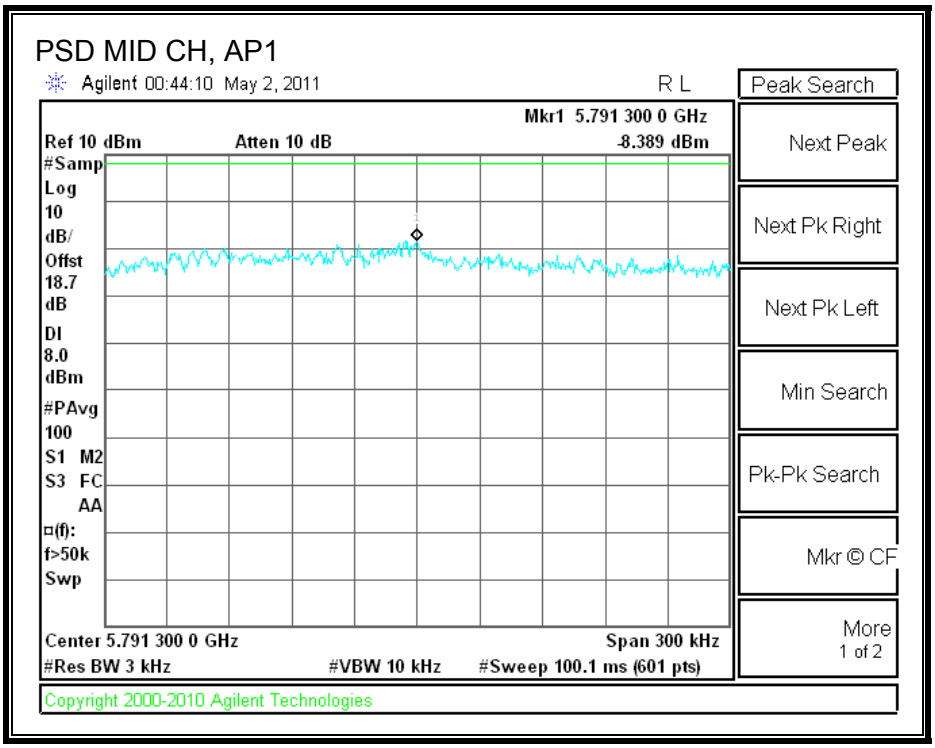
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

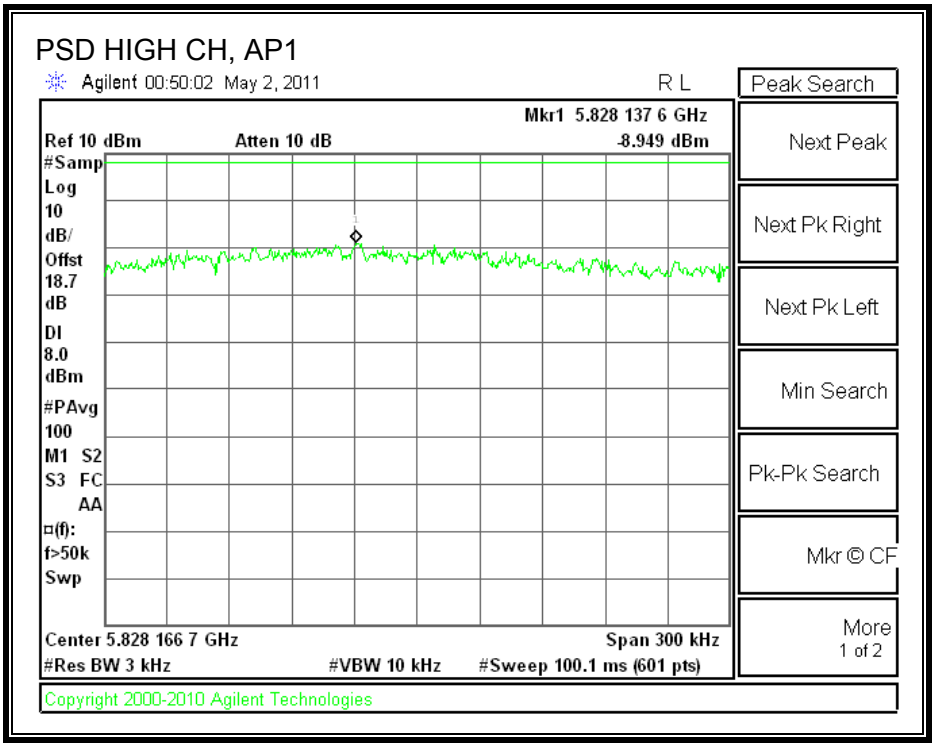
RESULTS:

Channel	Frequency (MHz)	AP1 PSD (dBm)	AP2 PSD (dBm)	AP3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-8.671	-9.055	-8.084	-3.81	8	-11.81
Middle	5785	-8.389	-9.685	-7.323	-3.59	8	-11.59
High	5825	-8.949	-7.604	-7.937	-3.36	8	-11.36

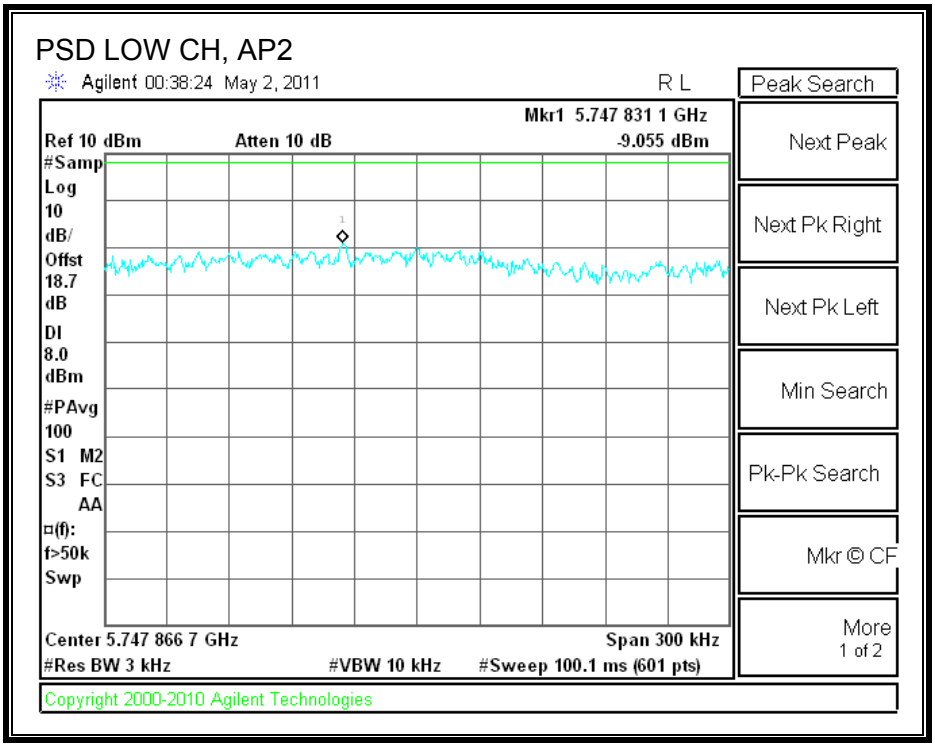
POWER SPECTRAL DENSITY, AP1



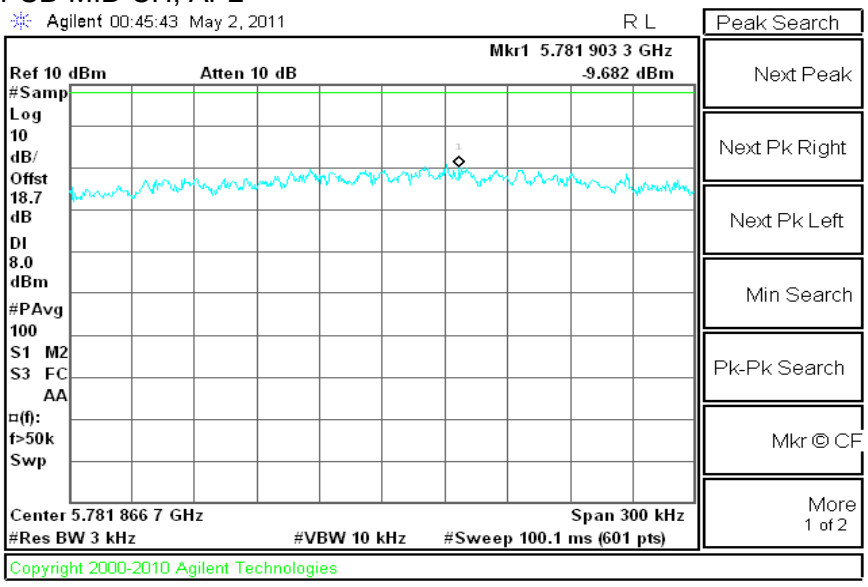




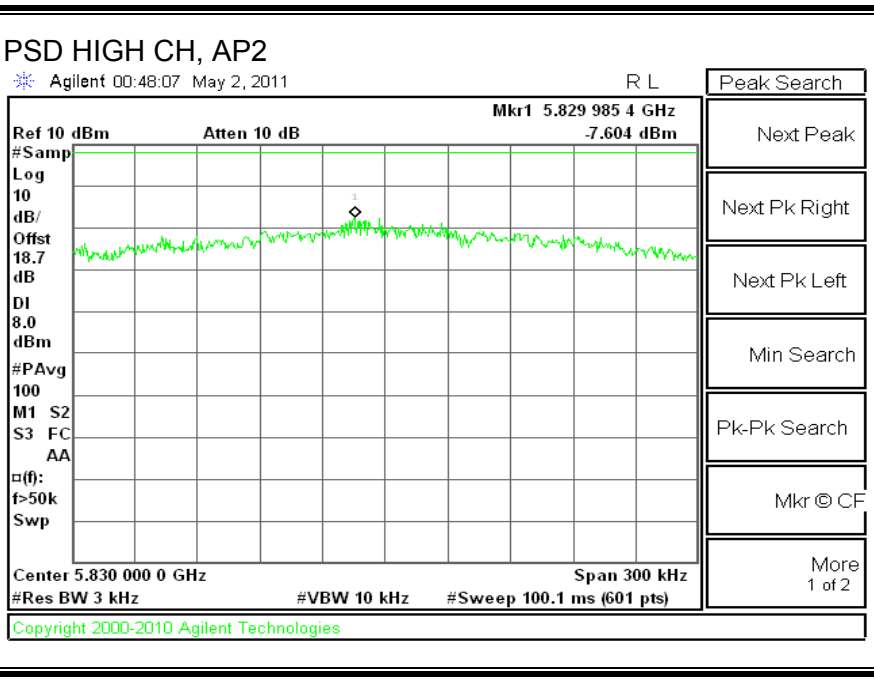
POWER SPECTRAL DENSITY, AP2



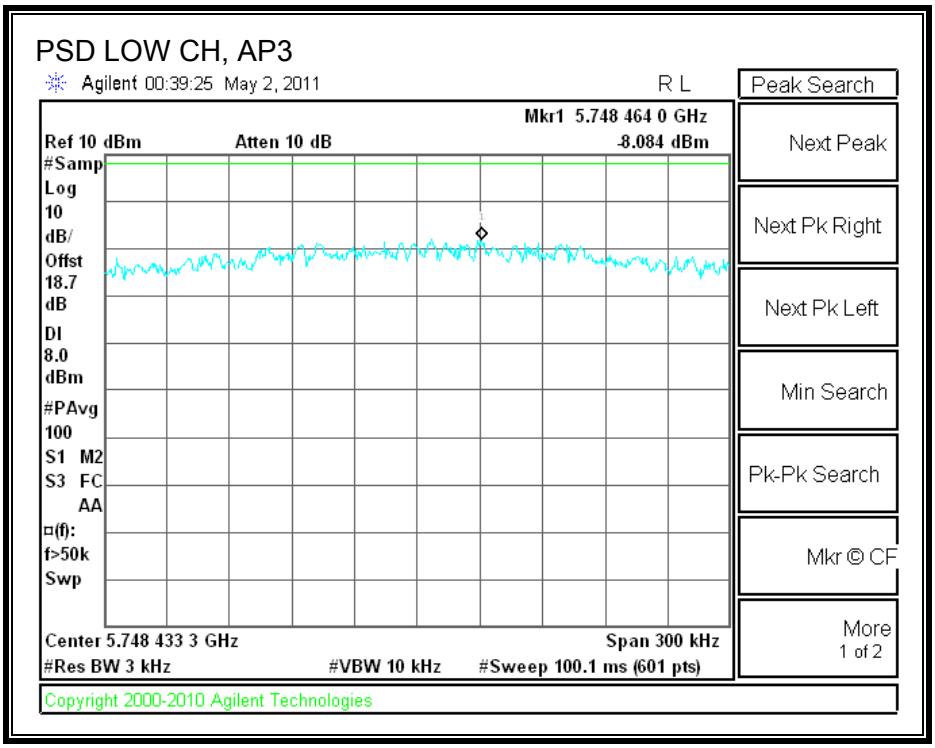
PSD MID CH, AP2

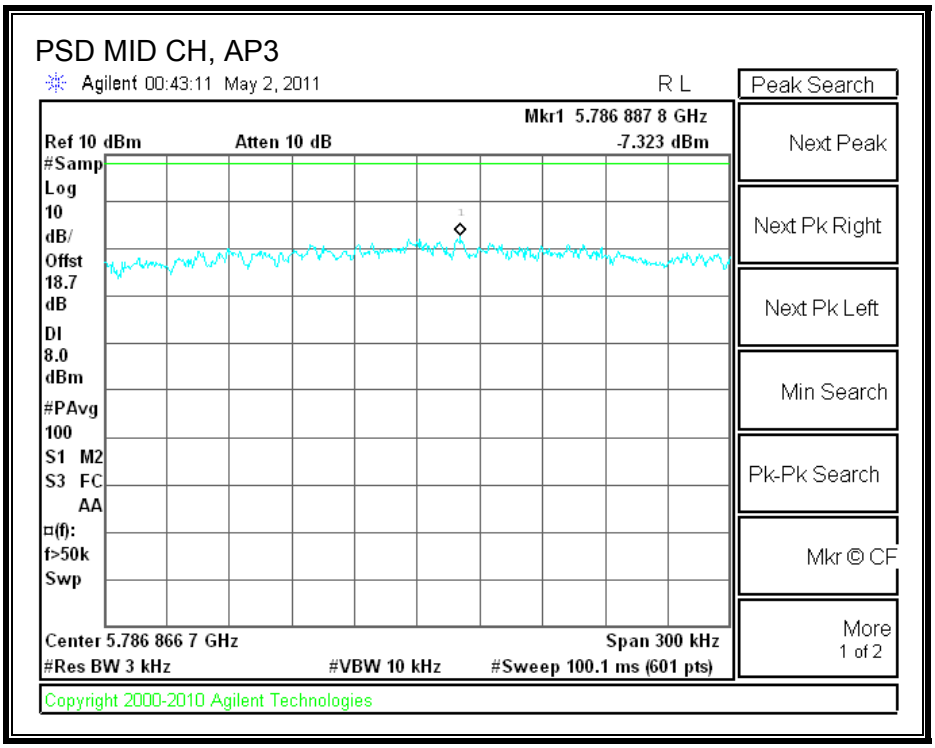


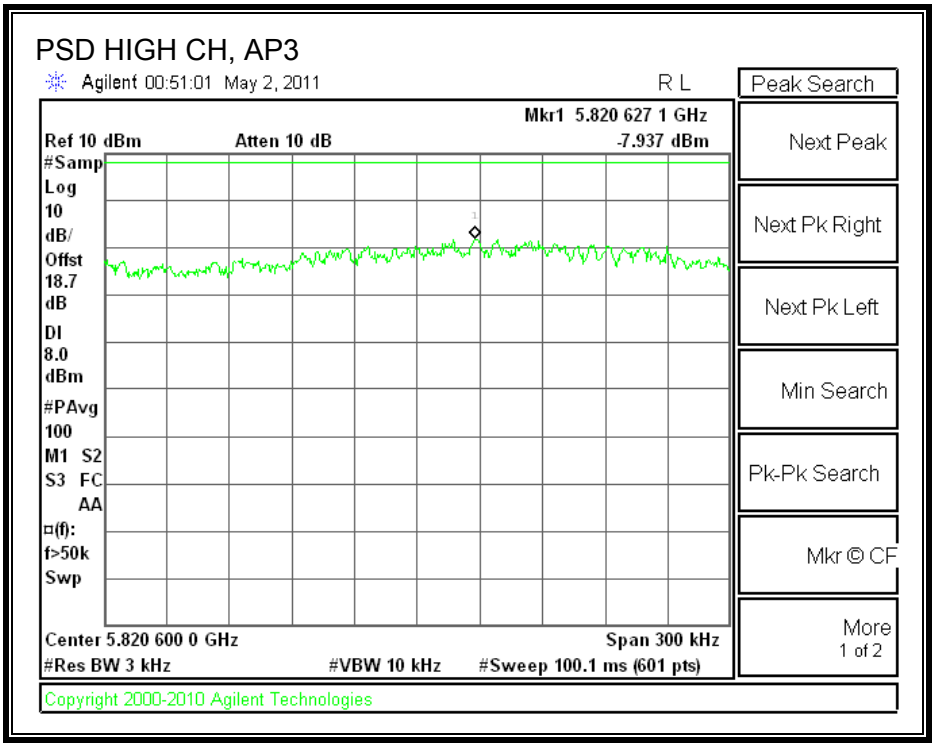
PSD HIGH CH, AP2



POWER SPECTRAL DENSITY, AP3







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 RMS averaging over time interval; therefore the required attenuation is 30 dB.

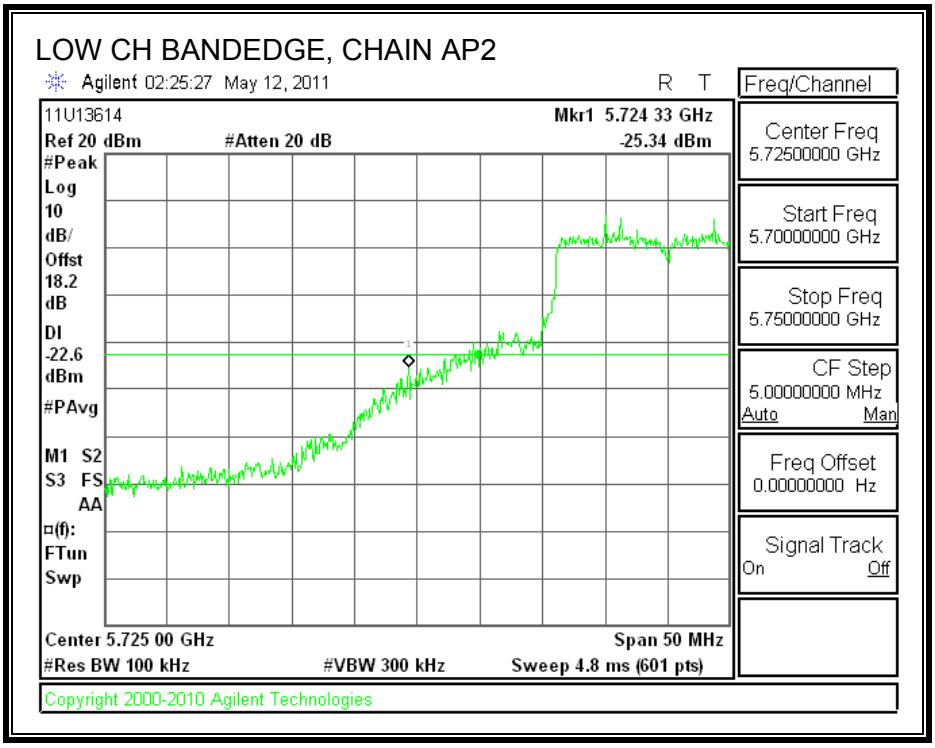
TEST PROCEDURE

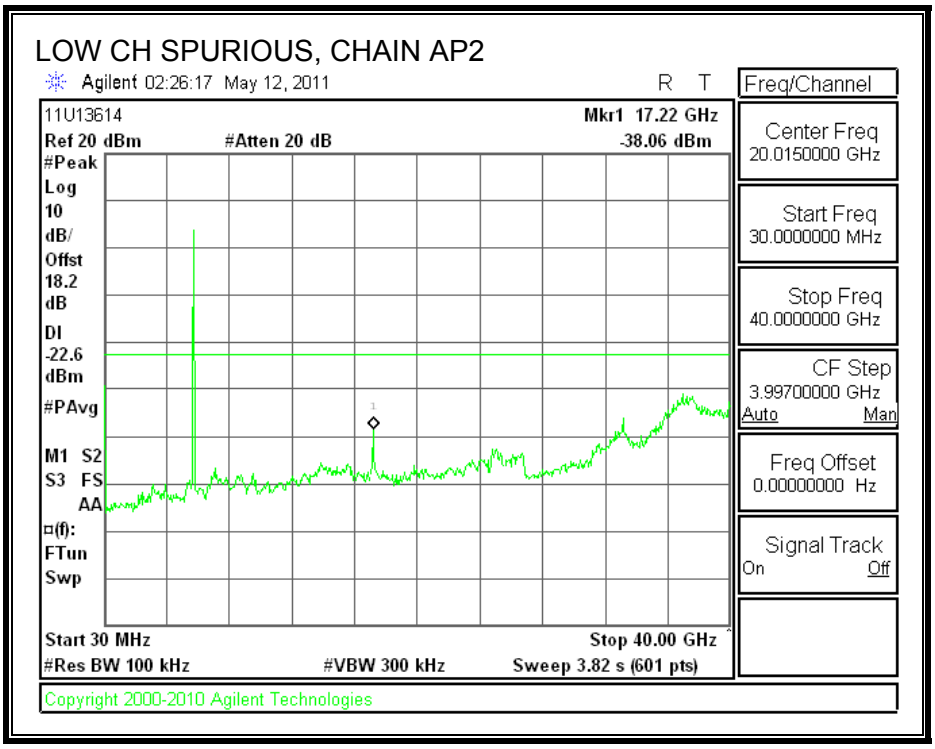
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

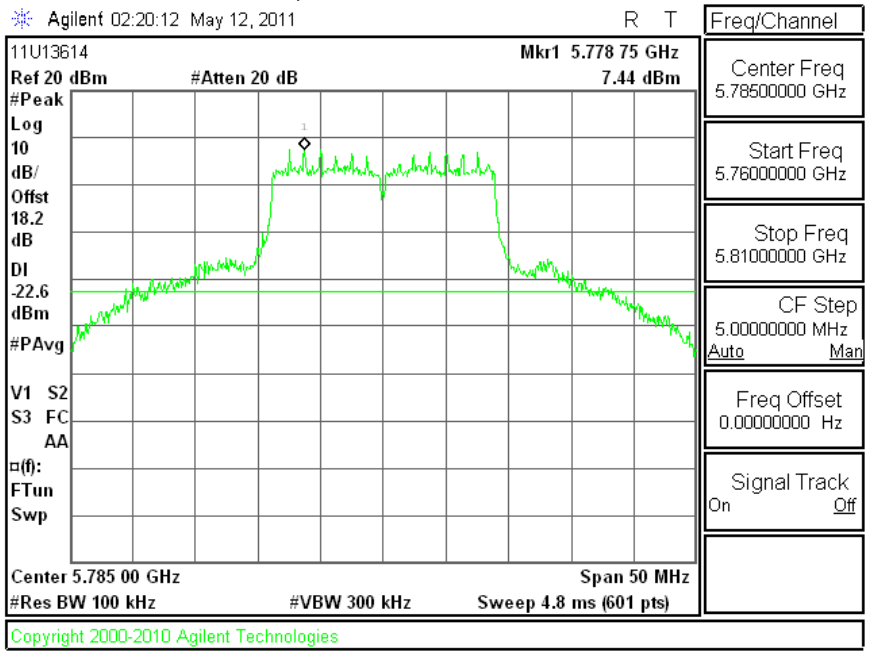
RESULTS

CHAIN AP2 SPURIOUS EMISSIONS

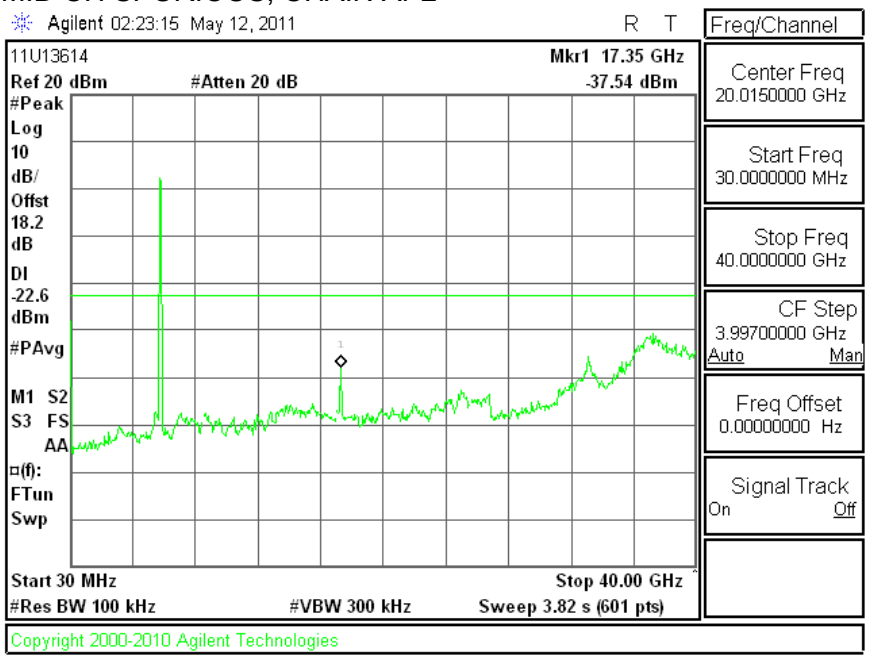




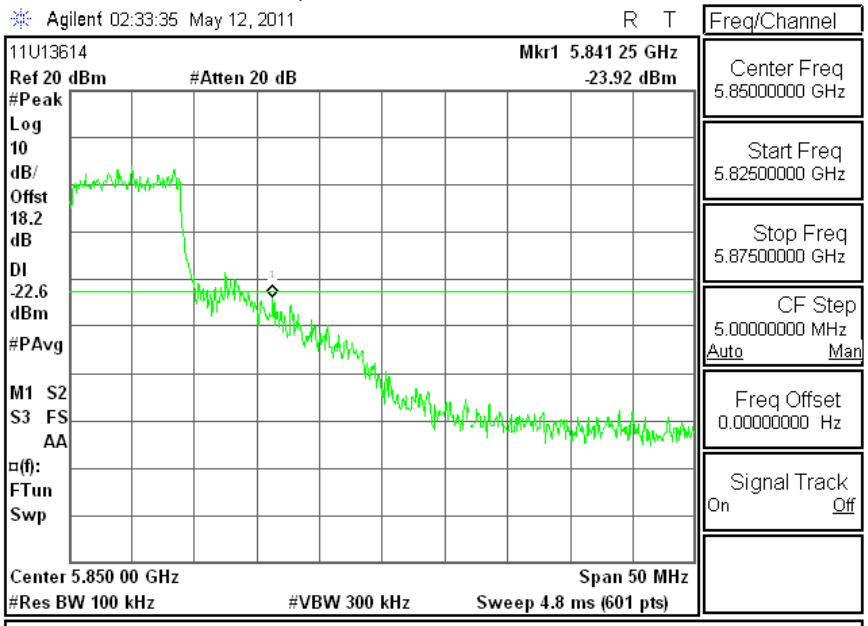
MID CH REFERENCE, CHAIN AP2



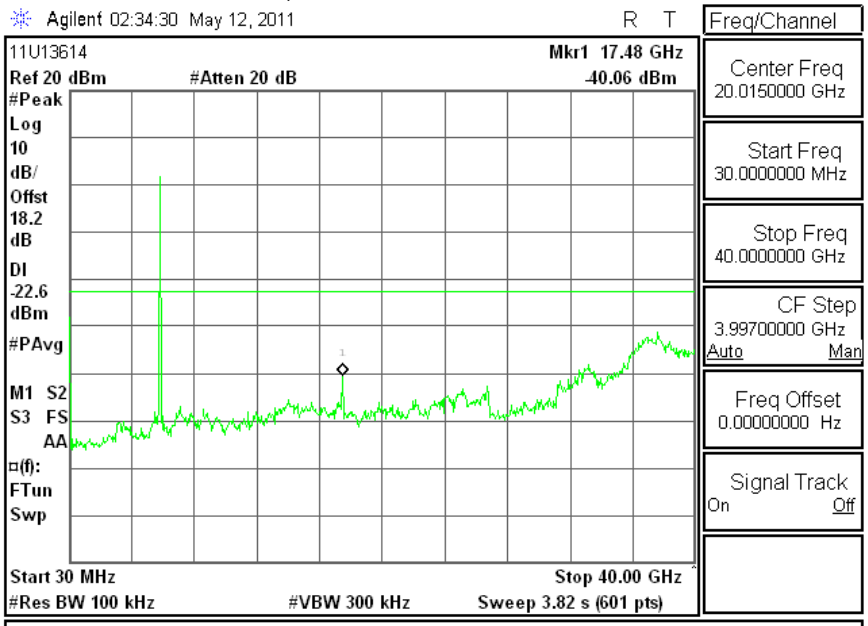
MID CH SPURIOUS, CHAIN AP2



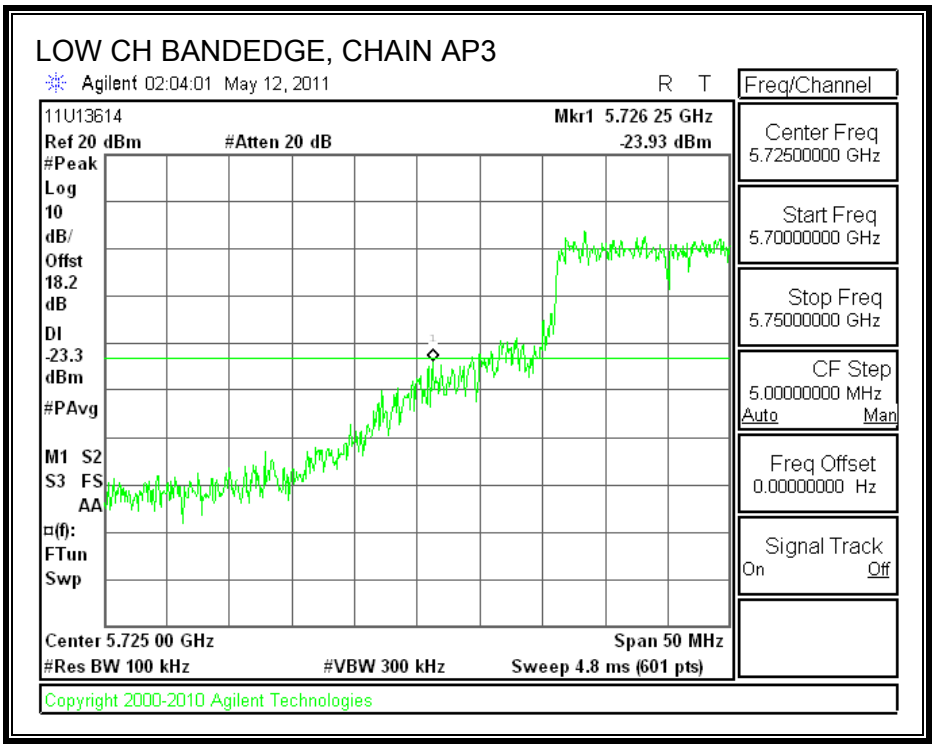
HIGH CH BANDEDGE, CHAIN AP2

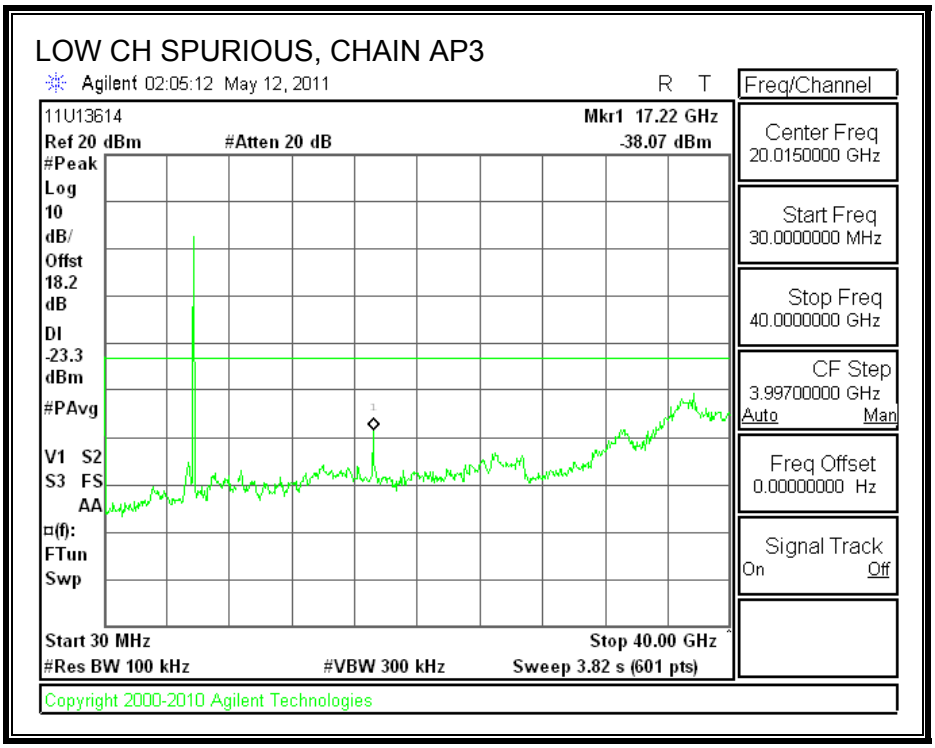


HIGH CH SPURIOUS, CHAIN AP2

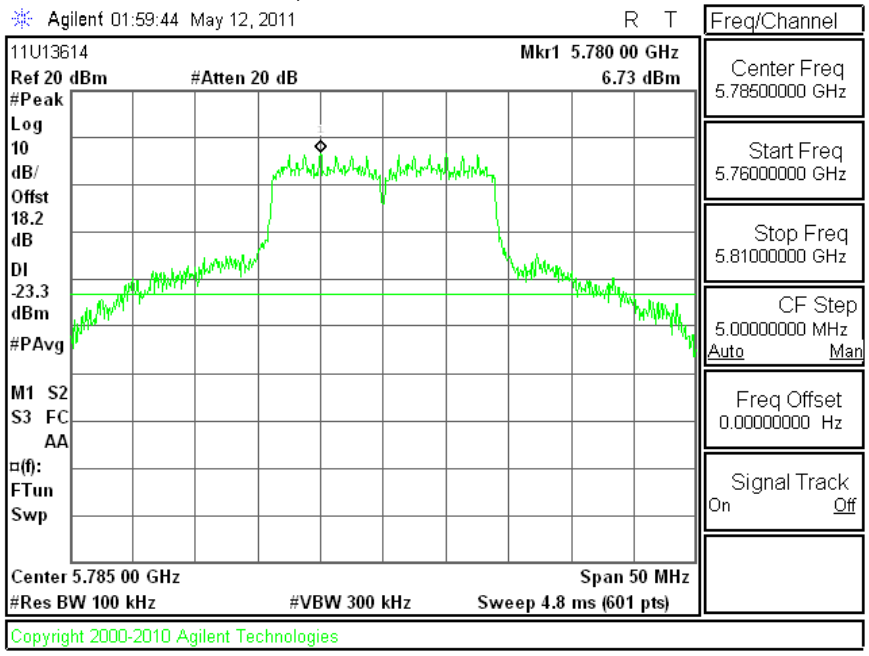


CHAIN AP3 SPURIOUS EMISSIONS

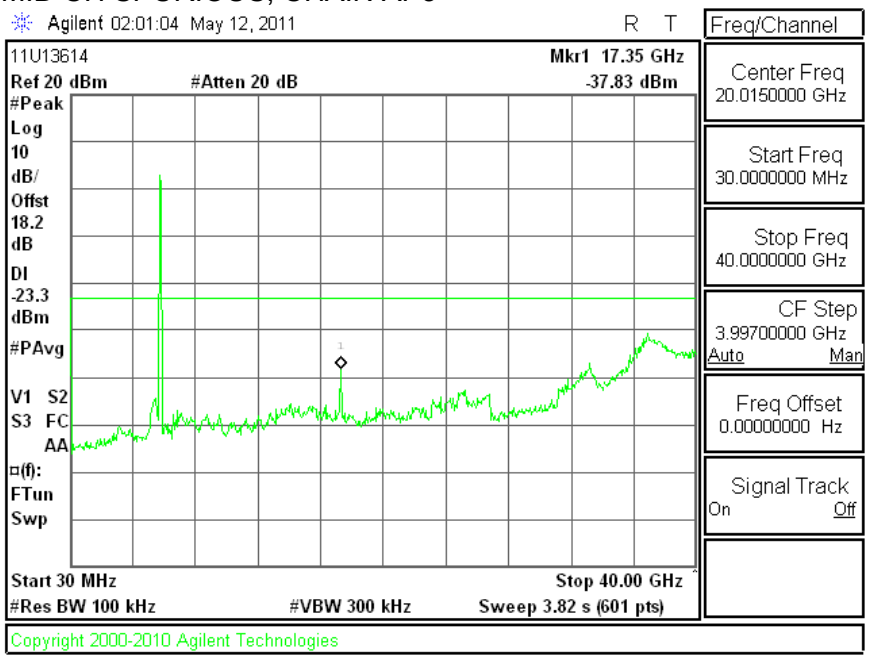




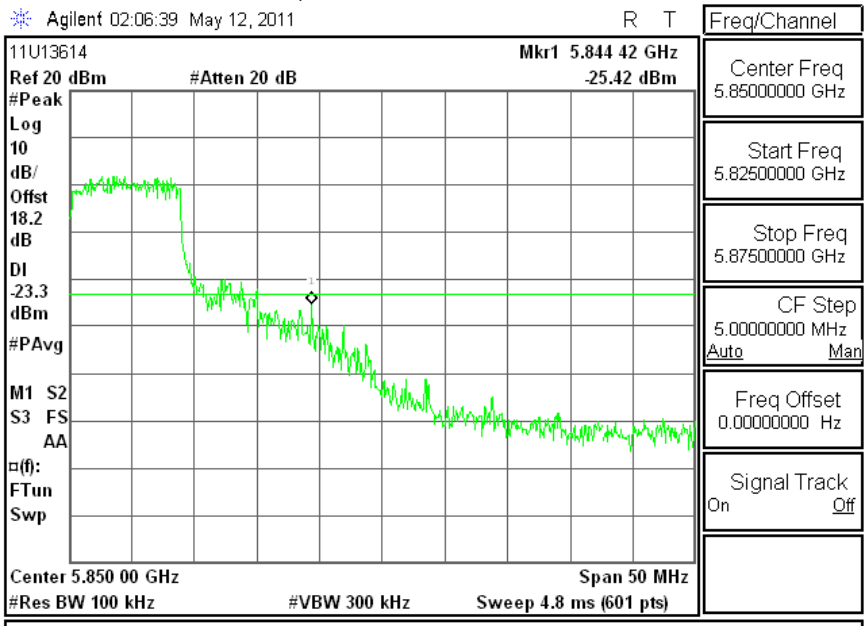
MID CH REFERENCE, CHAIN AP3



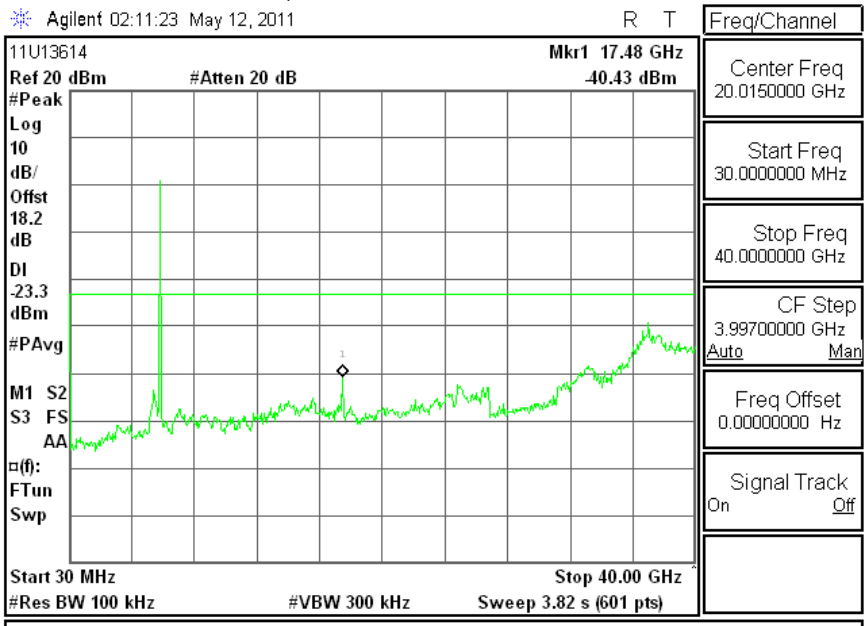
MID CH SPURIOUS, CHAIN AP3



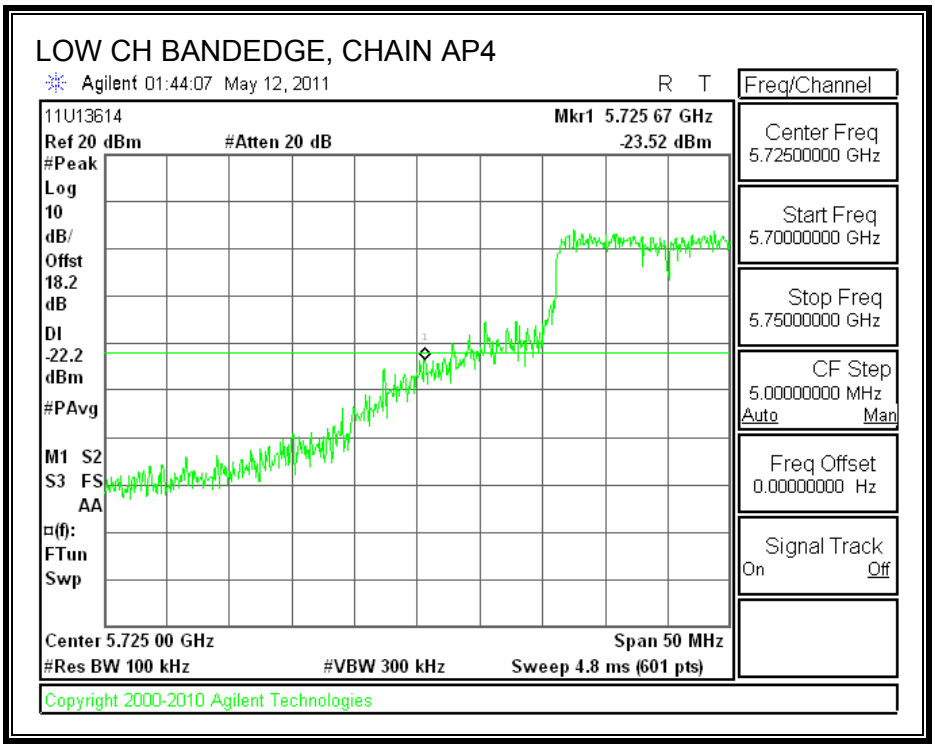
HIGH CH BANDEDGE, CHAIN AP3

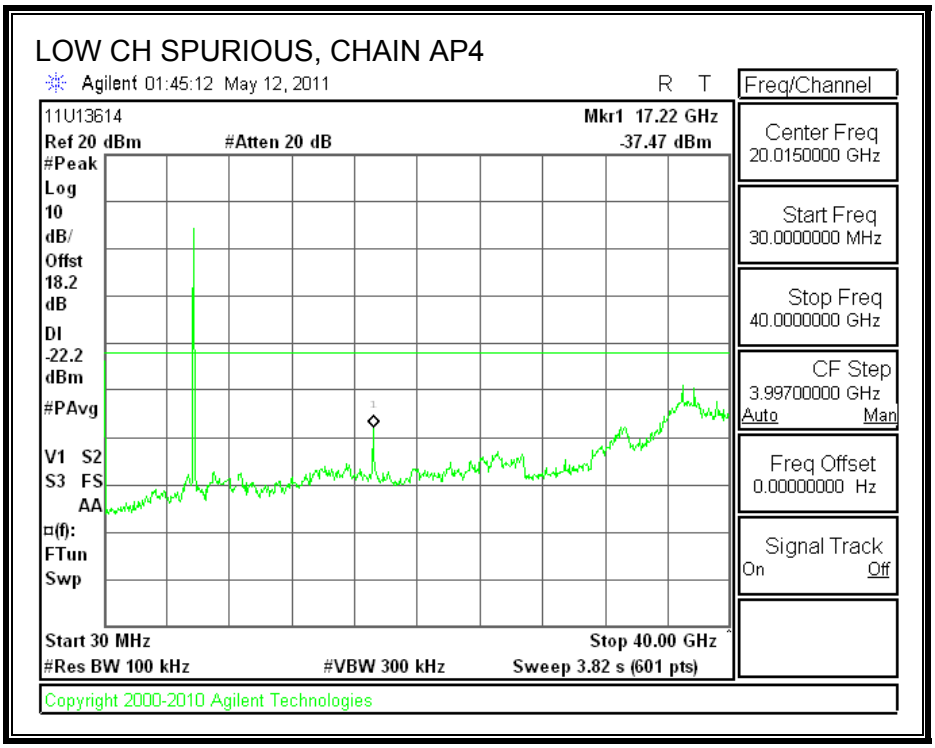


HIGH CH SPURIOUS, CHAIN AP3

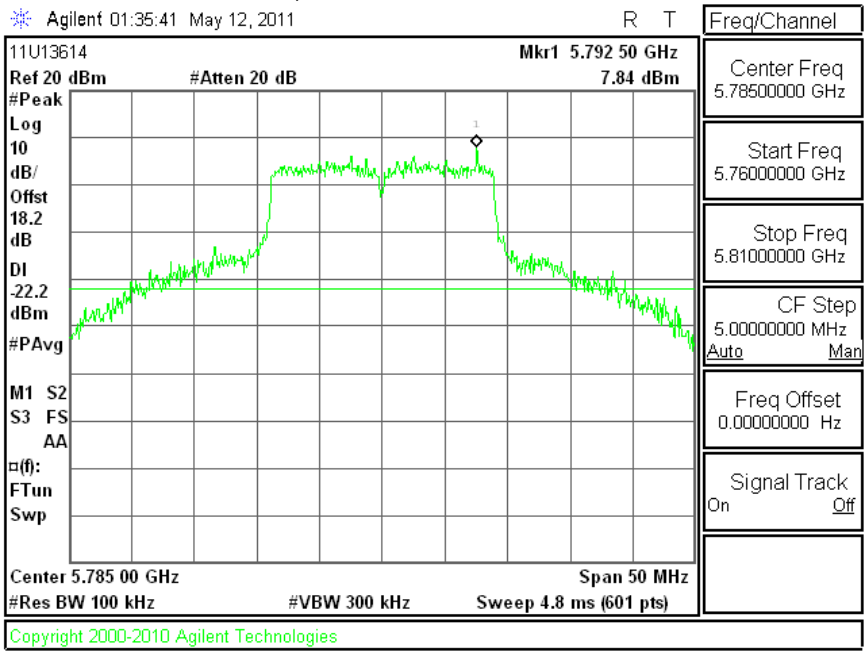


CHAIN AP4 SPURIOUS EMISSIONS

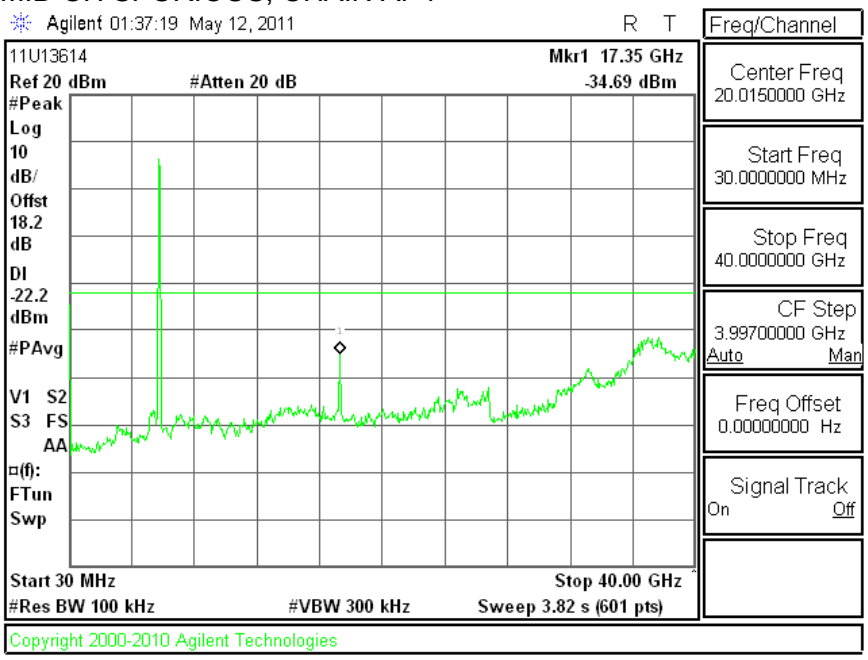




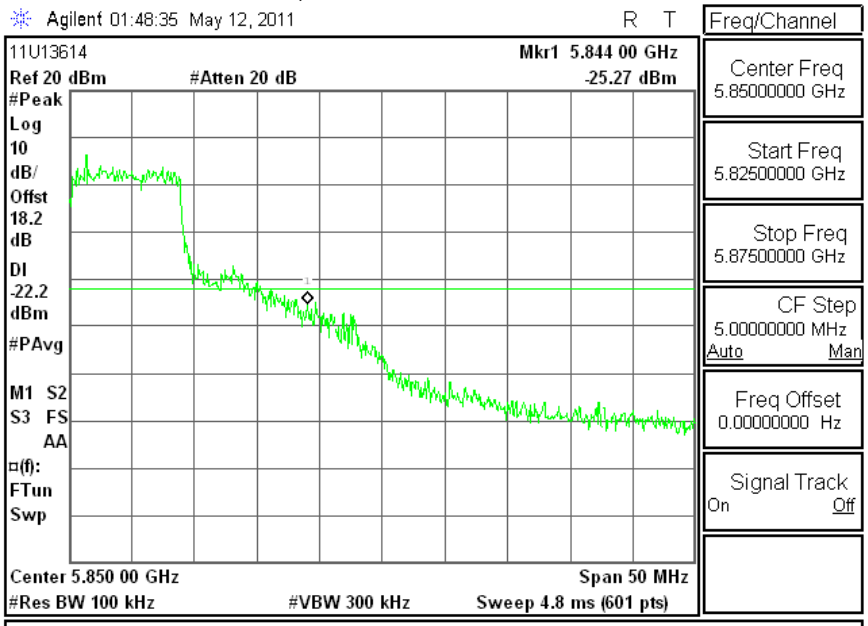
MID CH REFERENCE, CHAIN AP4



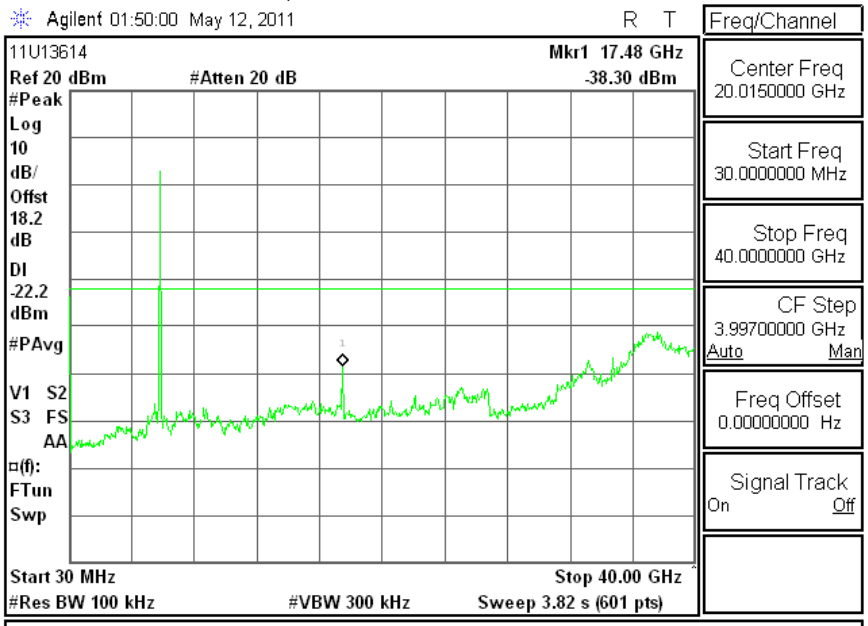
MID CH SPURIOUS, CHAIN AP4



HIGH CH BANDEDGE, CHAIN AP4



HIGH CH SPURIOUS, CHAIN AP4



7.6. 802.11n THREE CHAINS HT40 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.

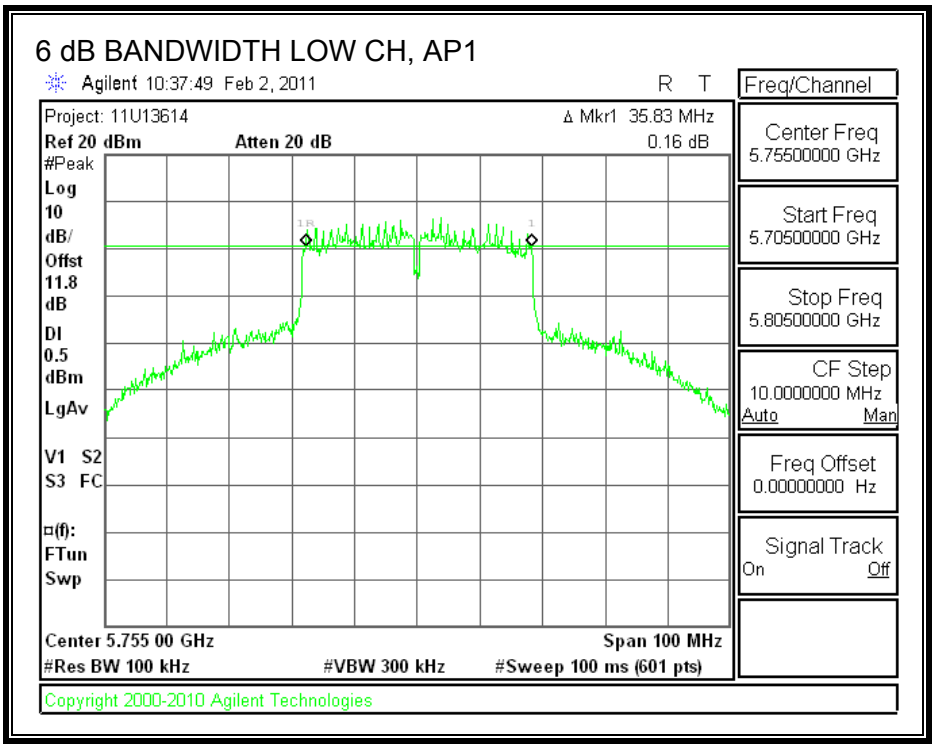
TEST PROCEDURE

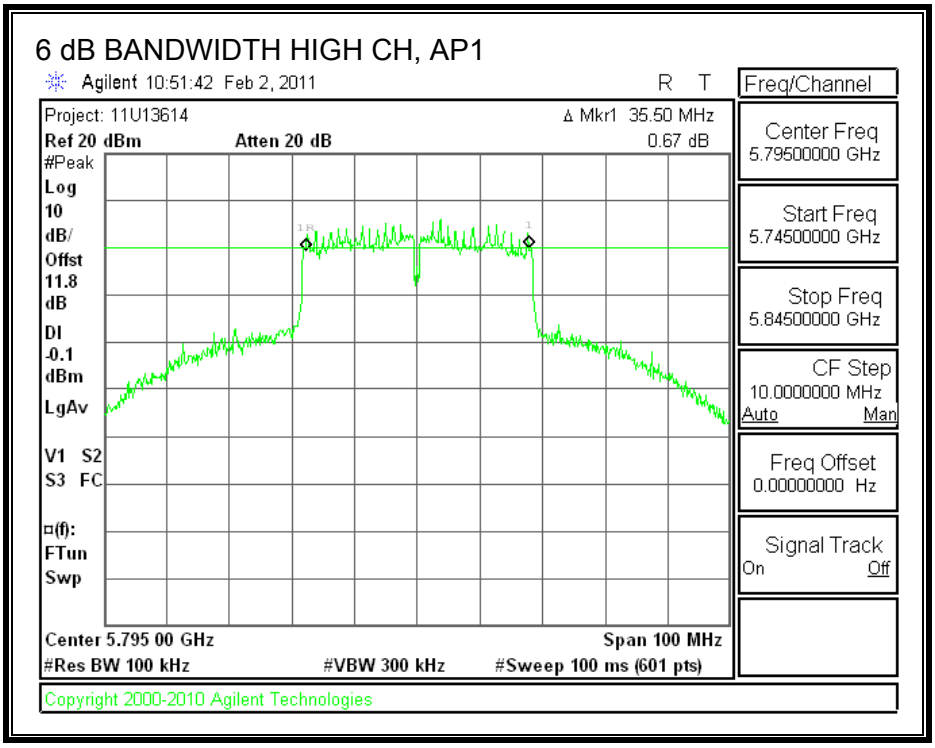
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

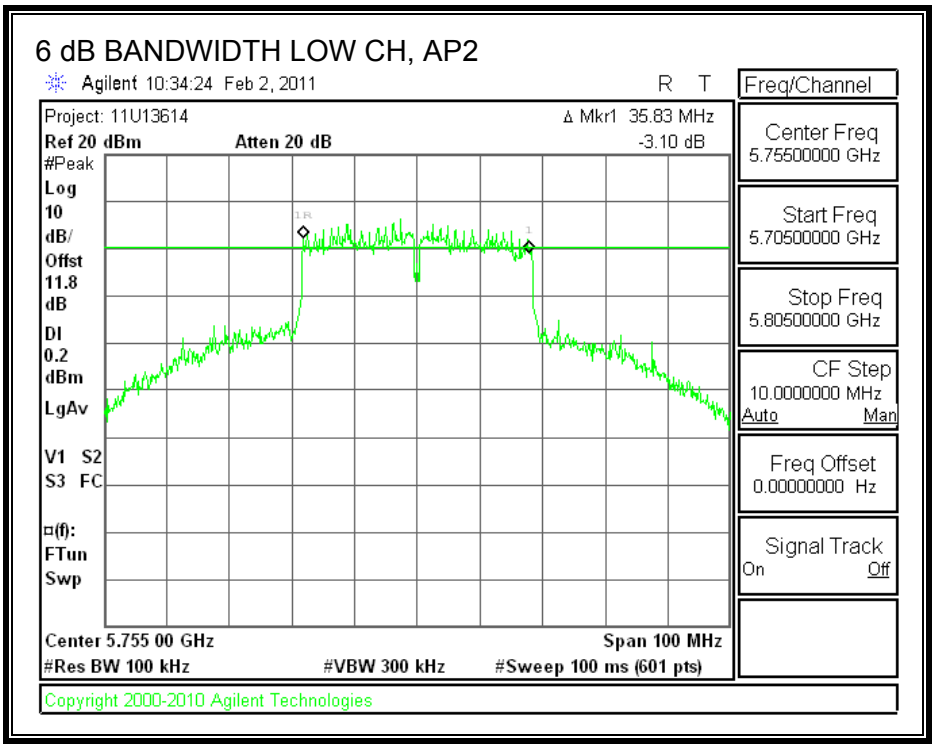
Channel	Frequency (MHz)	AP1 6 dB BW (MHz)	AP2 6 dB BW (MHz)	AP3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5755	35.83	35.83	35.83	0.5
High	5795	35.5	36.33	36.33	0.5

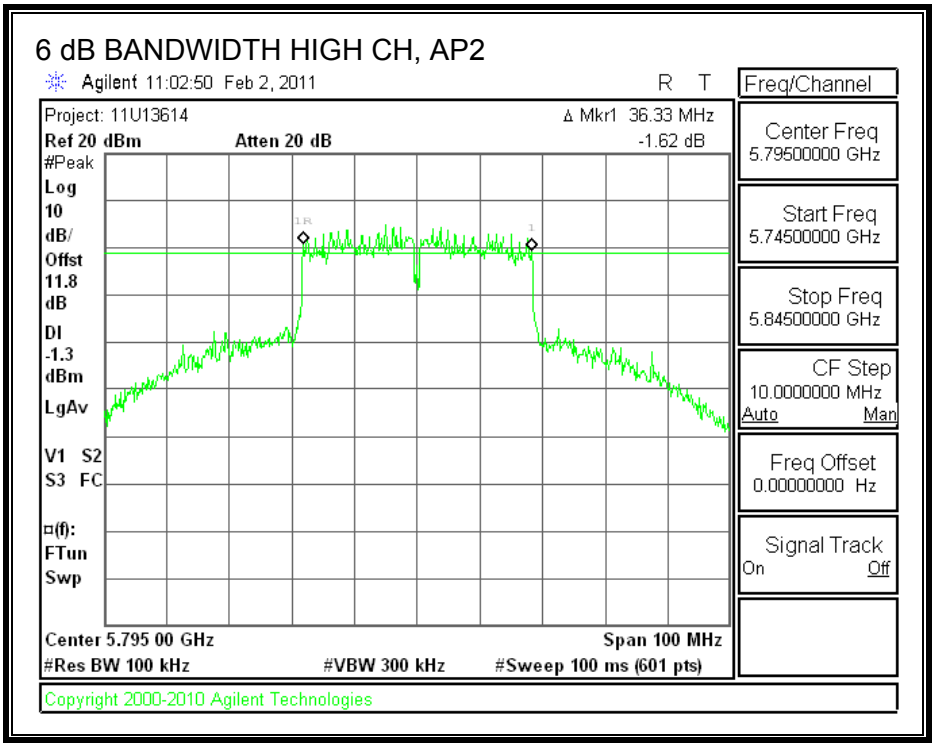
6 dB BANDWIDTH, AP1



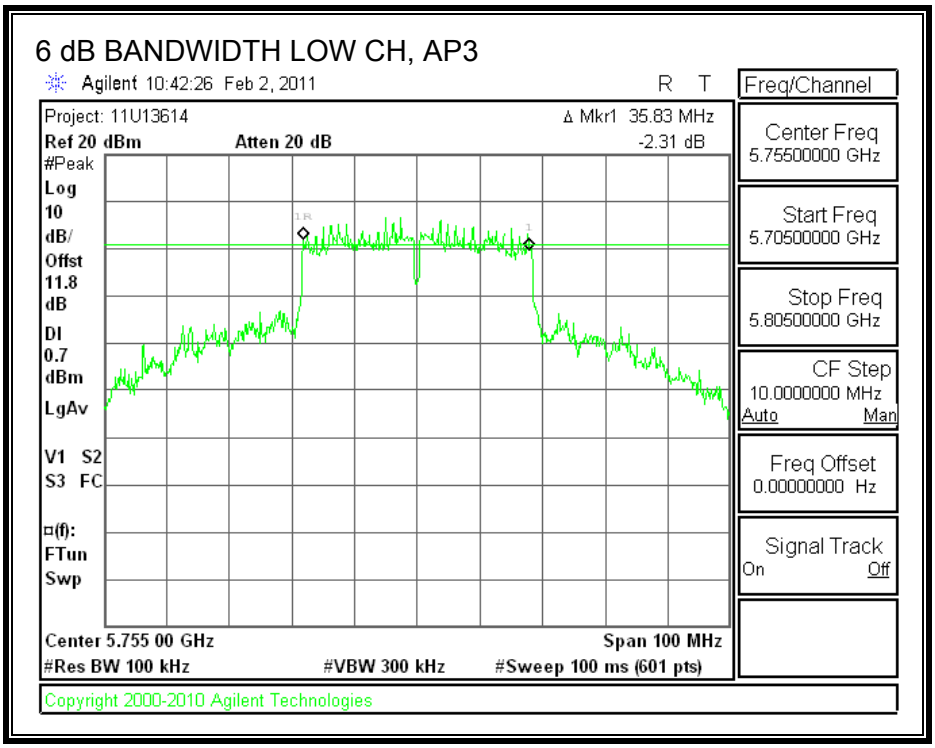


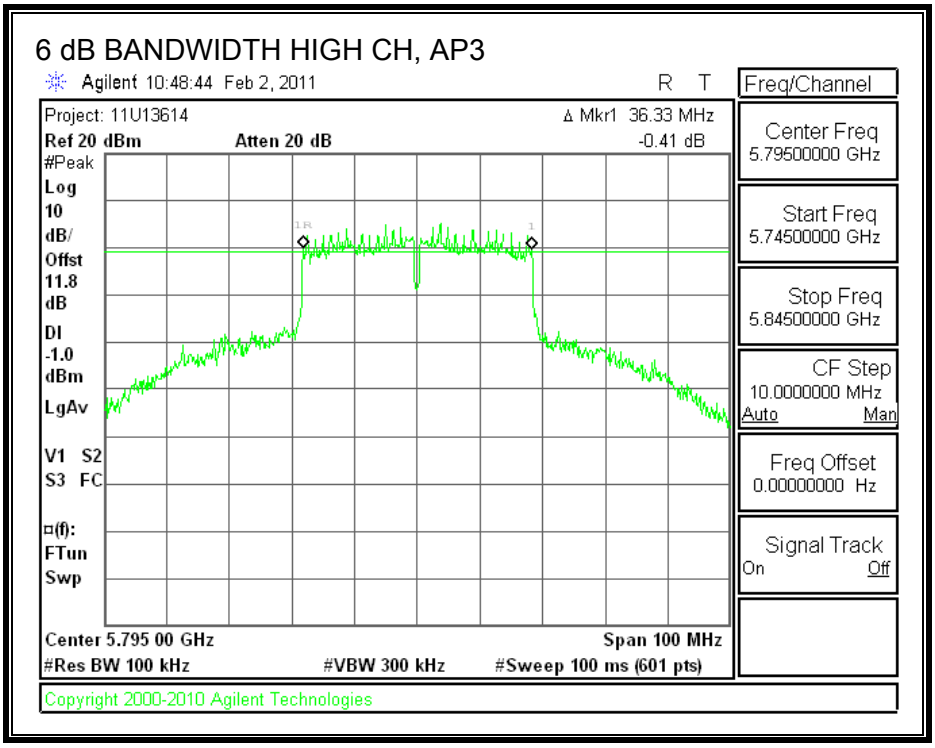
6 dB BANDWIDTH, AP2





6 dB BANDWIDTH, AP3





7.6.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

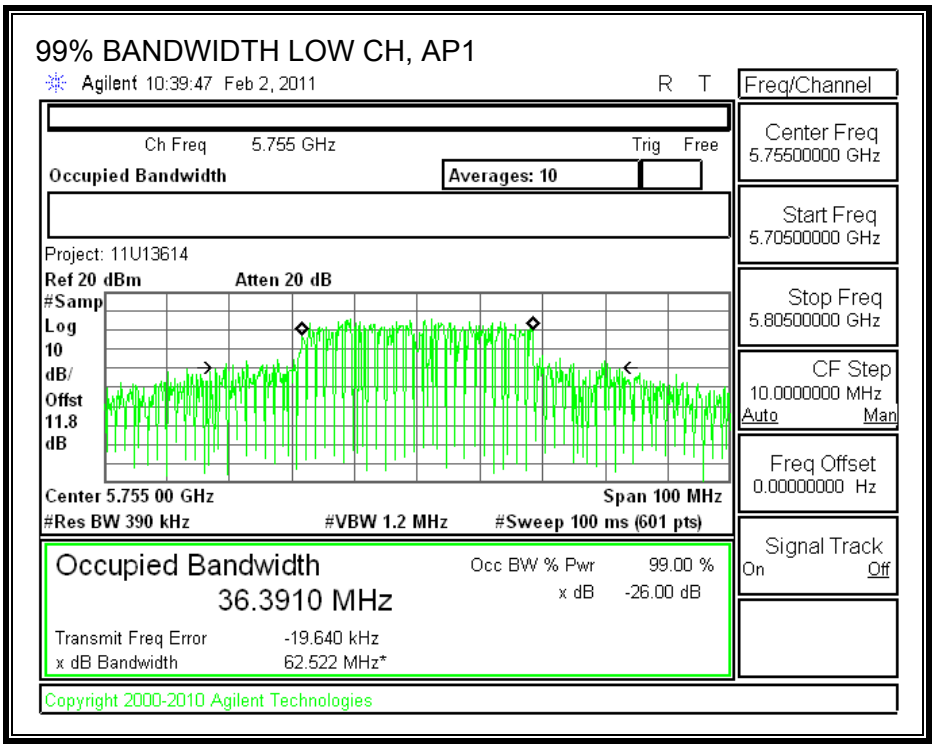
TEST PROCEDURE

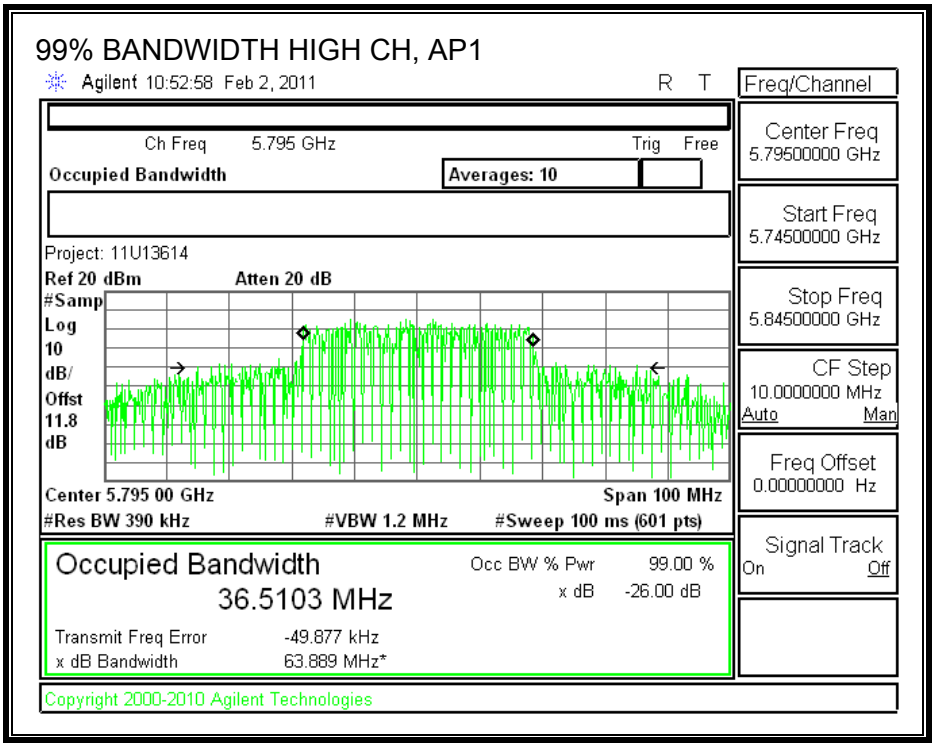
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

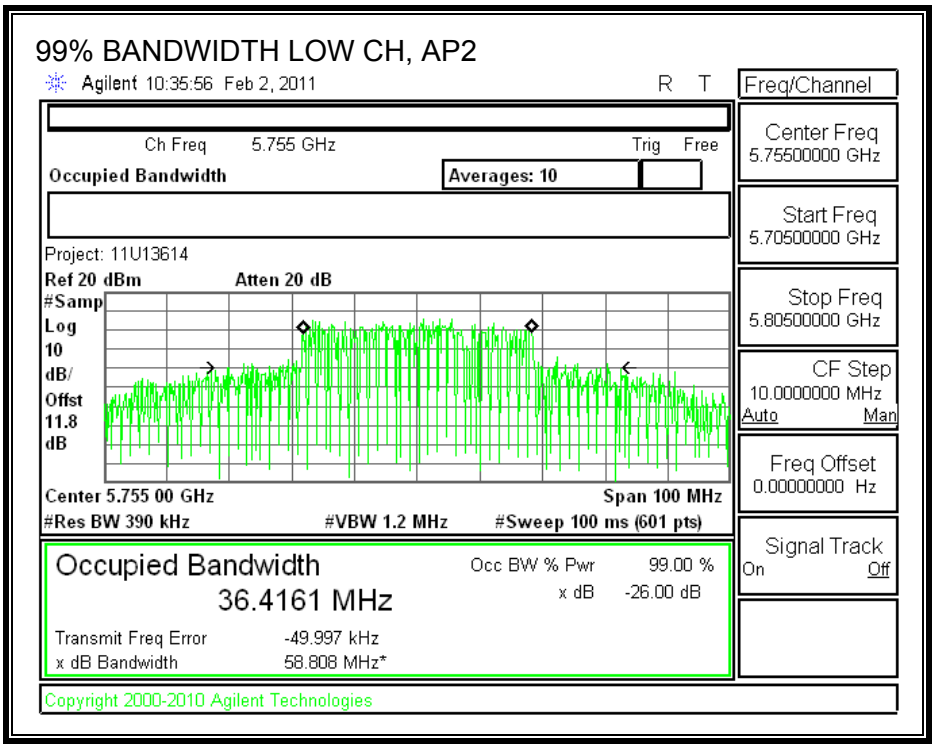
Channel	Frequency (MHz)	AP1 99% Bandwidth (MHz)	AP2 99% Bandwidth (MHz)	AP3 99% Bandwidth (MHz)
Low	5755	36.391	36.4161	36.6136
High	5795	36.5103	36.41	36.3818

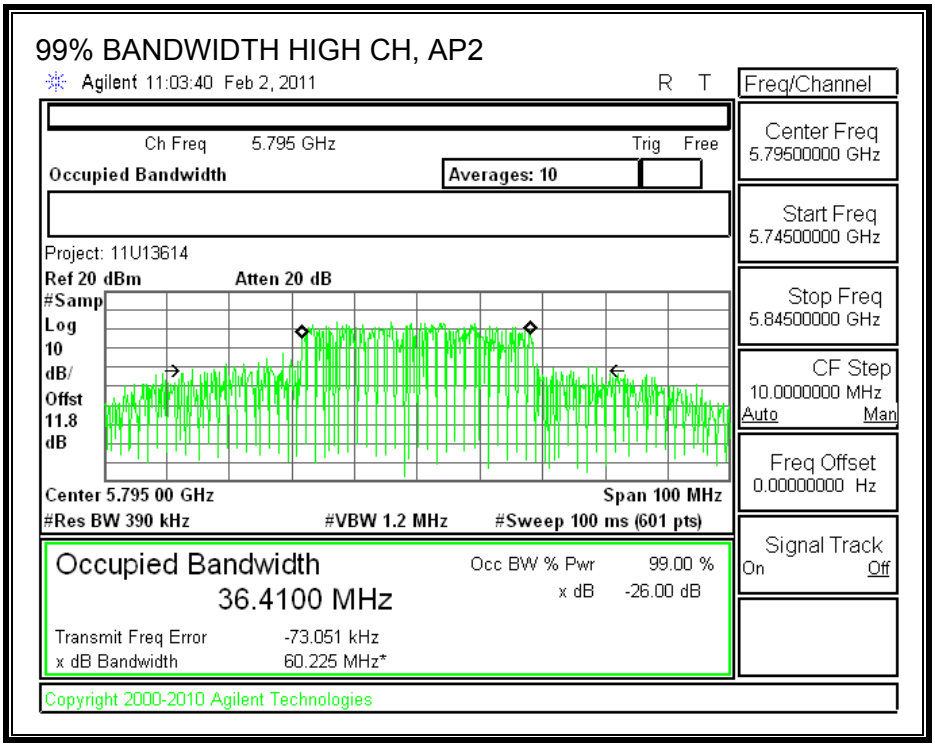
99% BANDWIDTH, AP1



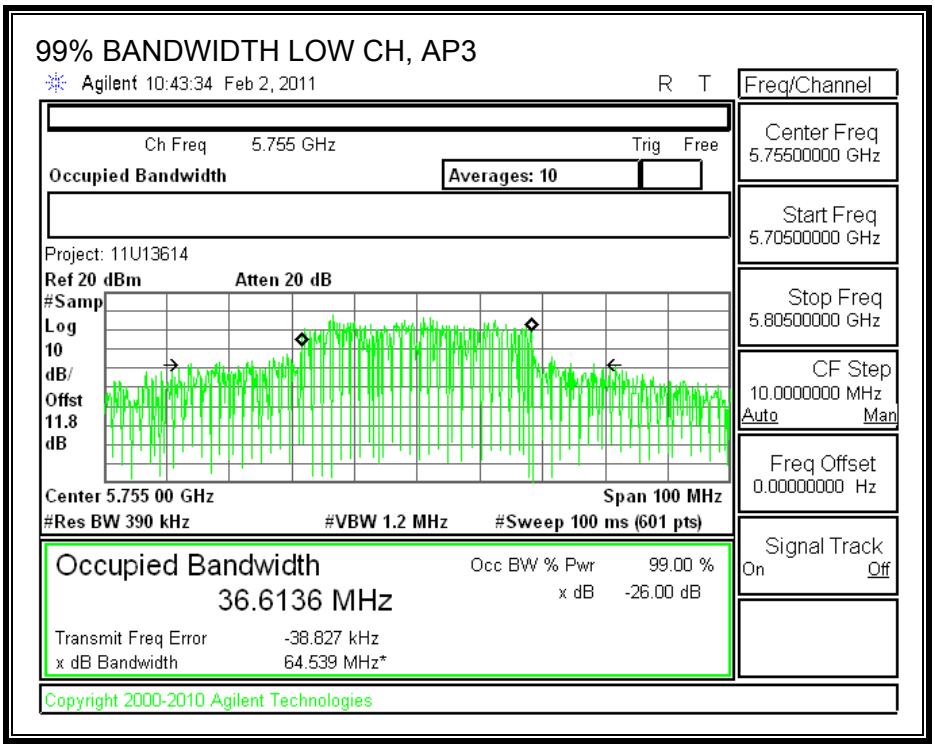


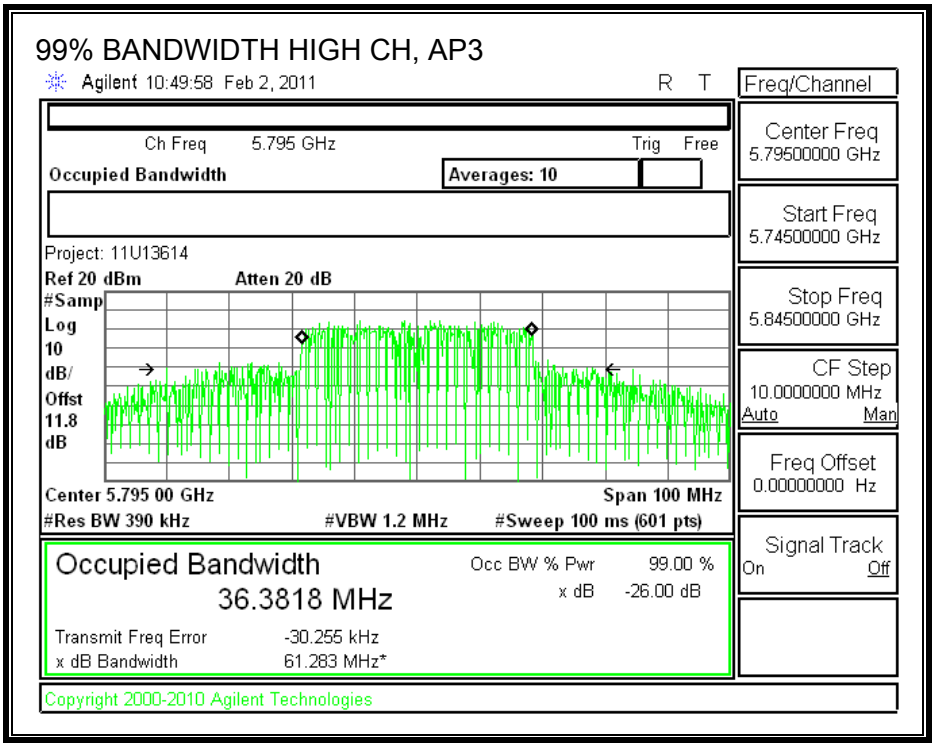
99% BANDWIDTH, AP2





99% BANDWIDTH, AP3





7.6.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to **2.97 dBi**, therefore the limit is 30 dBm.

TEST PROCEDURE

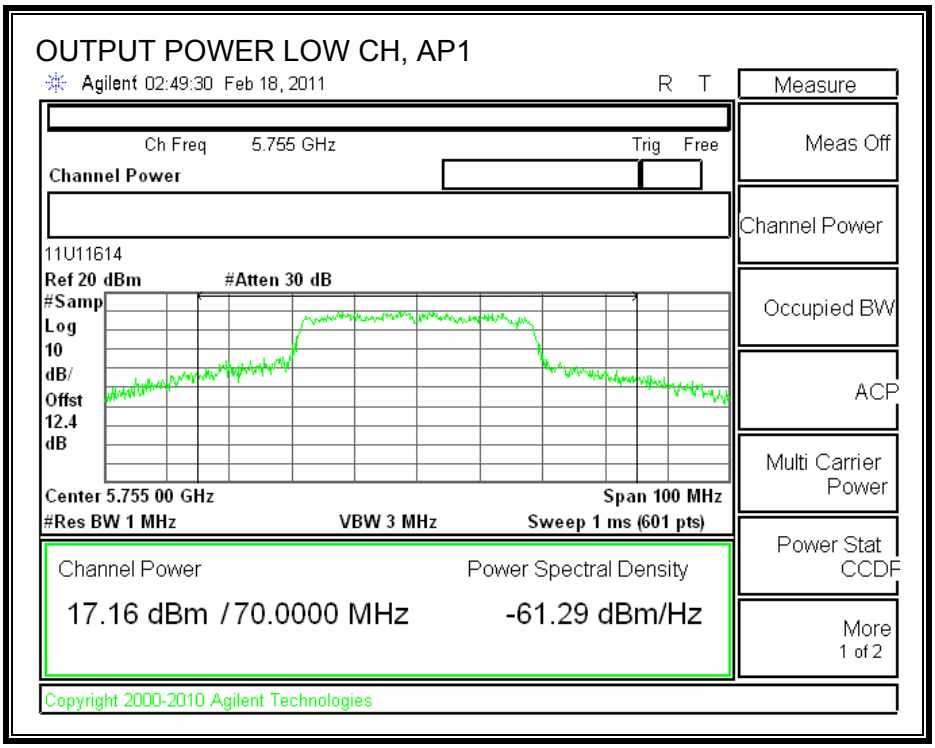
Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 26dB bandwidth.

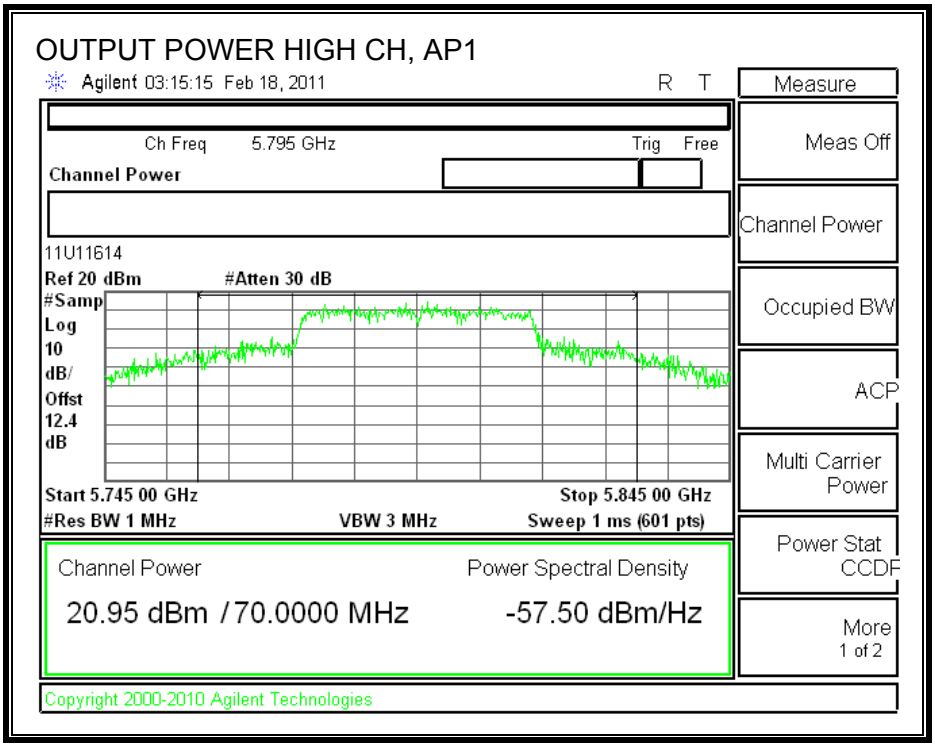
Maximum Conducted Output Power based on RMS averaging over a time interval is measured in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005. The transmitter operates continuously therefore Power Output Option 2, Method # 1 is used.

RESULTS

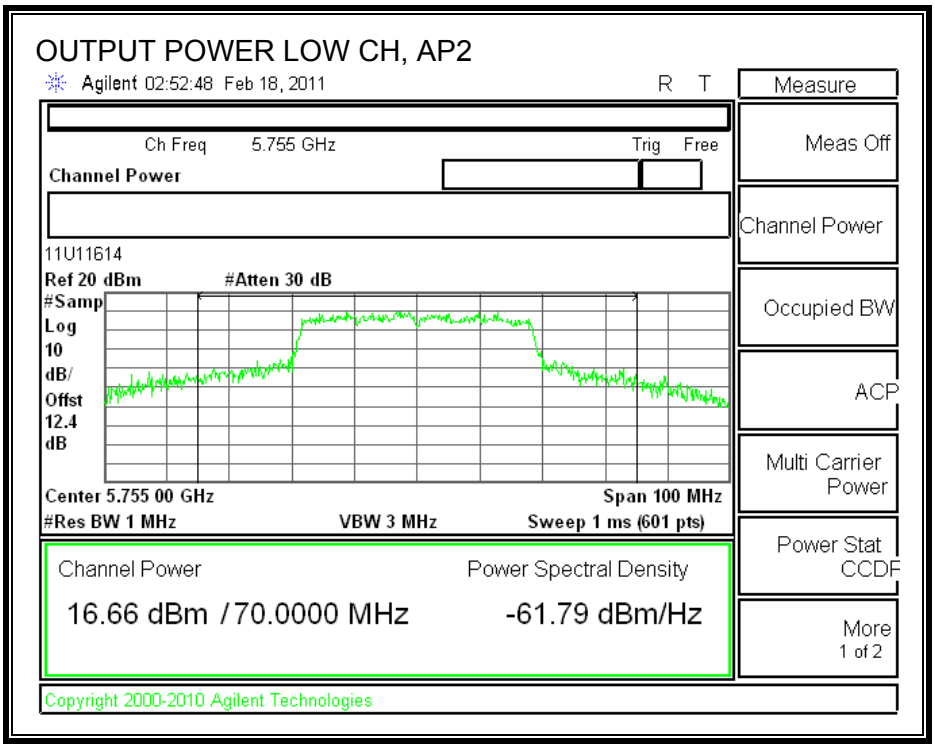
Channel	Frequency (MHz)	AP1 Power (dBm)	AP2 Power (dBm)	AP3 Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5755	17.16	16.66	17.87	0.00	22.03	30.00	-7.97
High	5795	20.95	21.09	21.45	0.00	25.94	30.00	-4.06

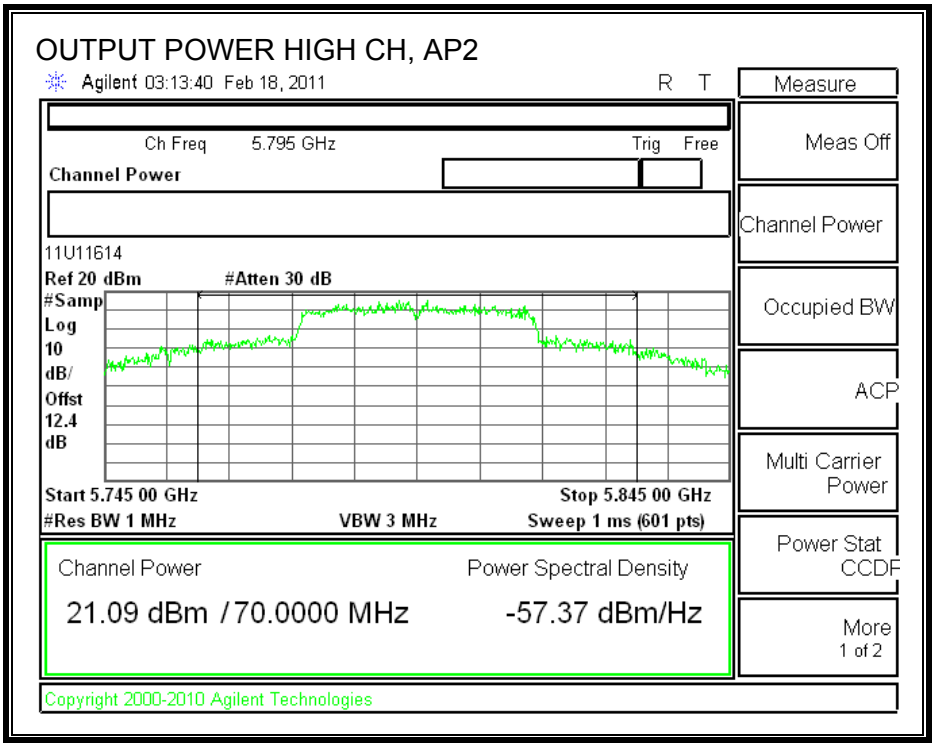
AP1 OUTPUT POWER



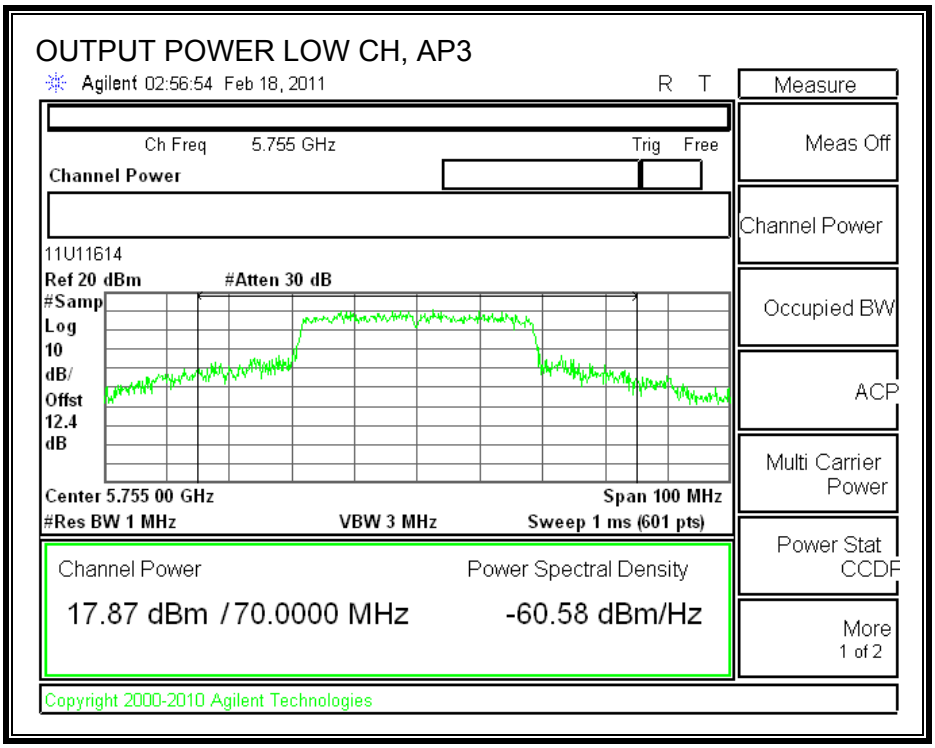


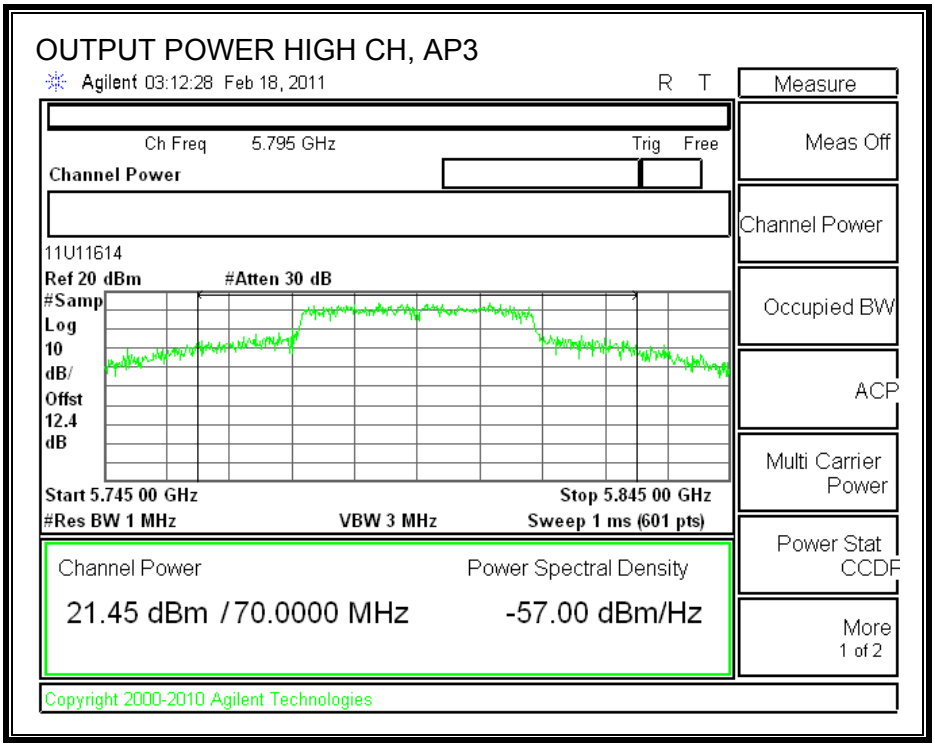
AP2 OUTPUT POWER





AP3 OUTPUT POWER





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.

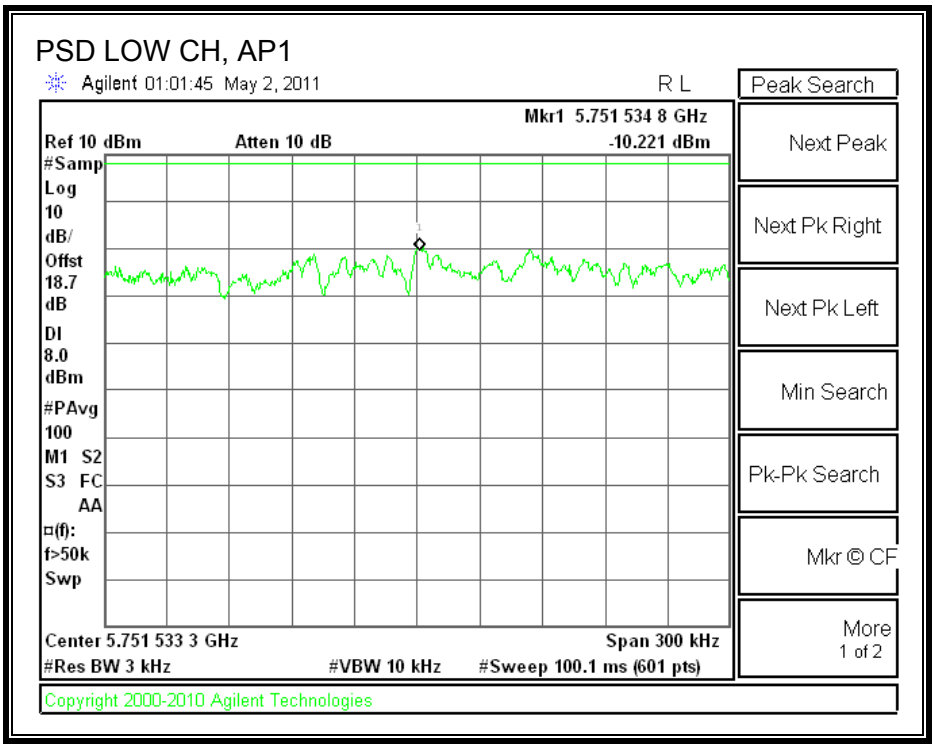
TEST PROCEDURE

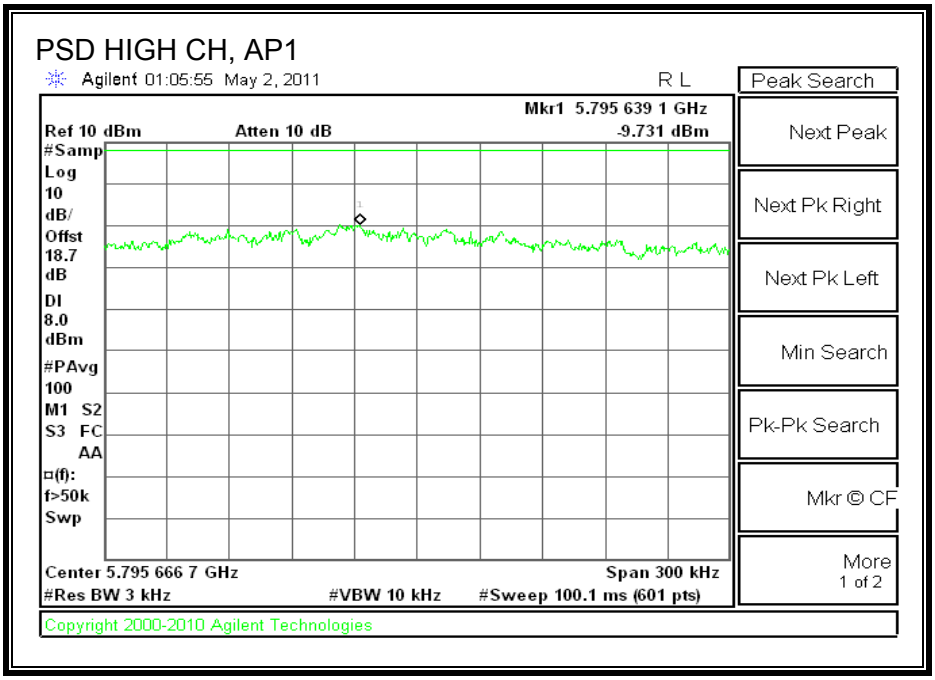
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS:

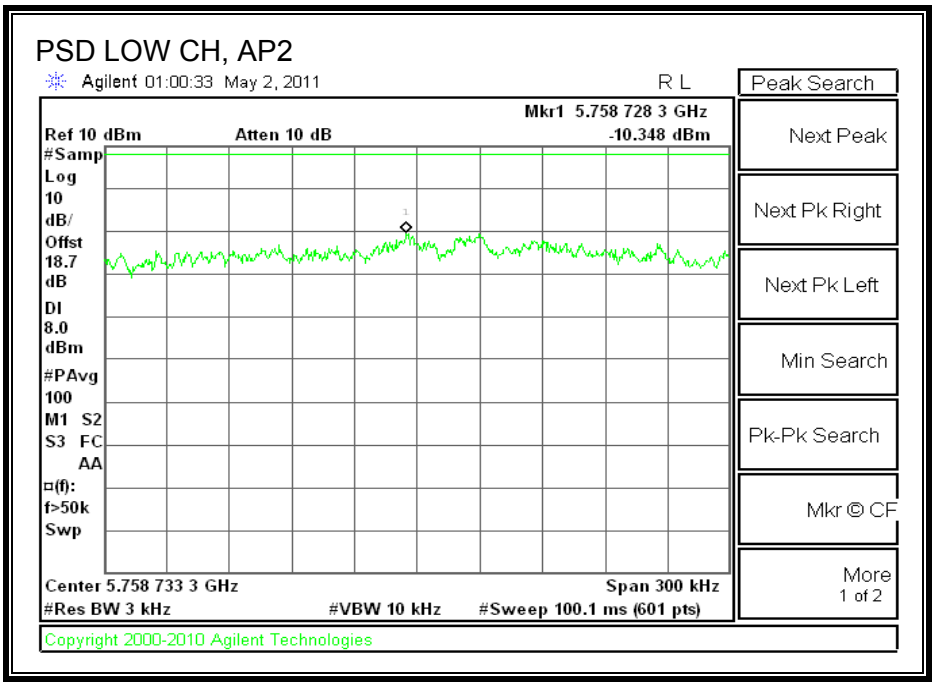
Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5755	-10.221	-10.348	-8.958	-5.02	8	-13.02
High	5795	-9.731	-10.802	-9.777	-5.30	8	-13.30

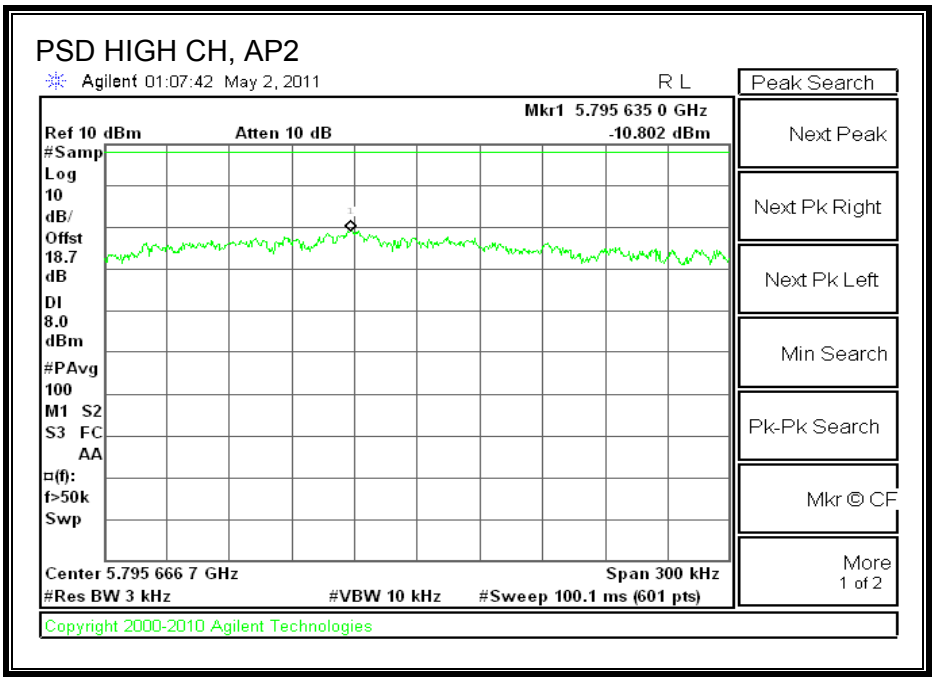
POWER SPECTRAL DENSITY, AP1



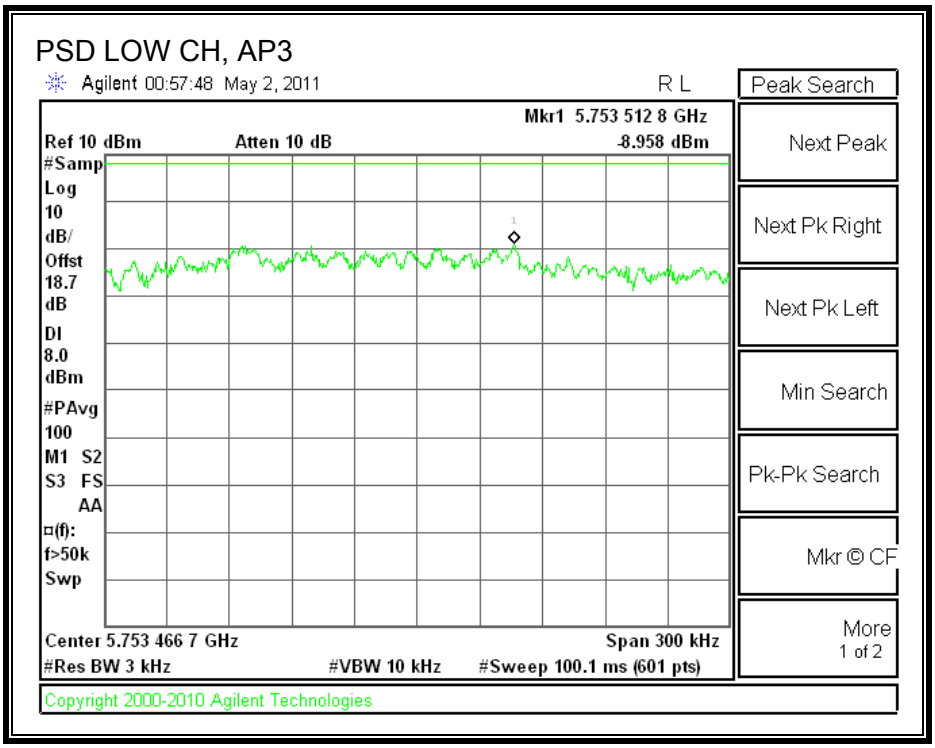


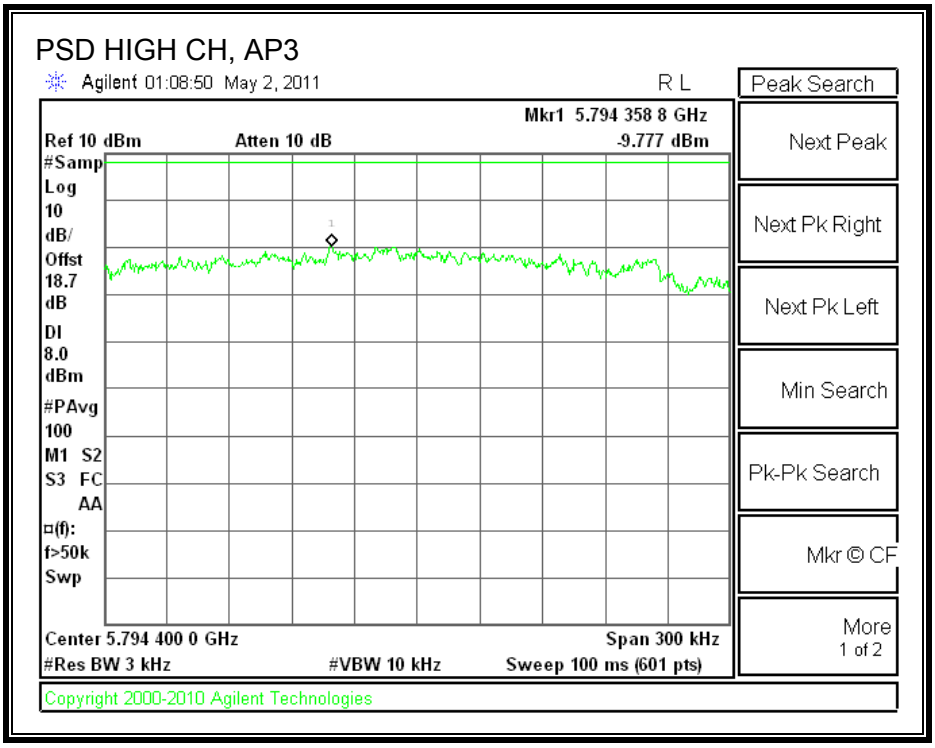
POWER SPECTRAL DENSITY, AP2





POWER SPECTRAL DENSITY, AP3





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 30 dB.

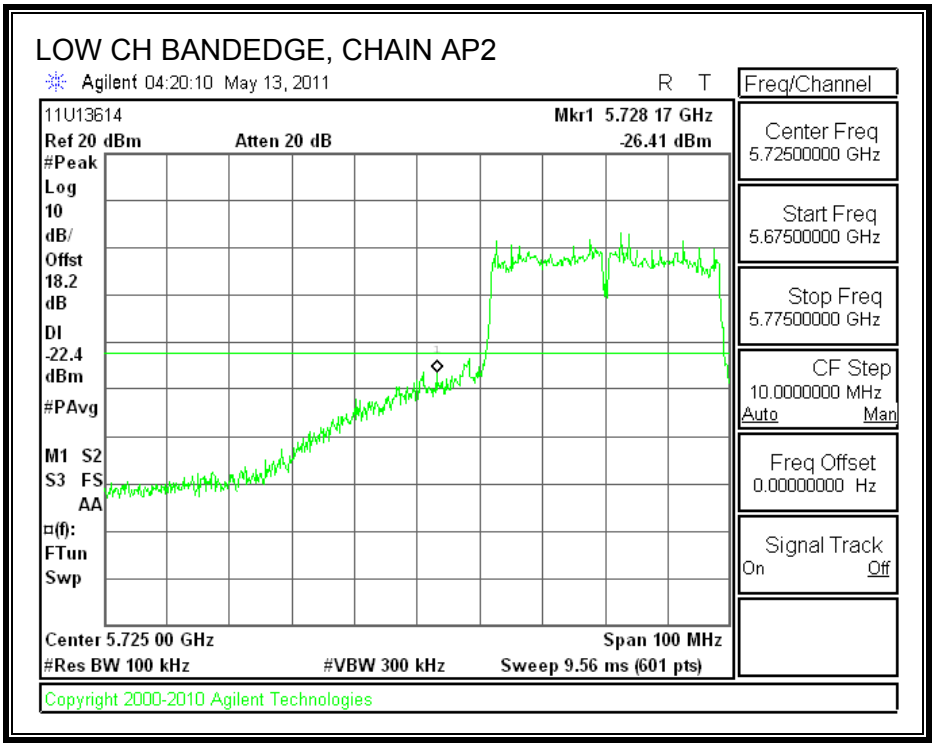
TEST PROCEDURE

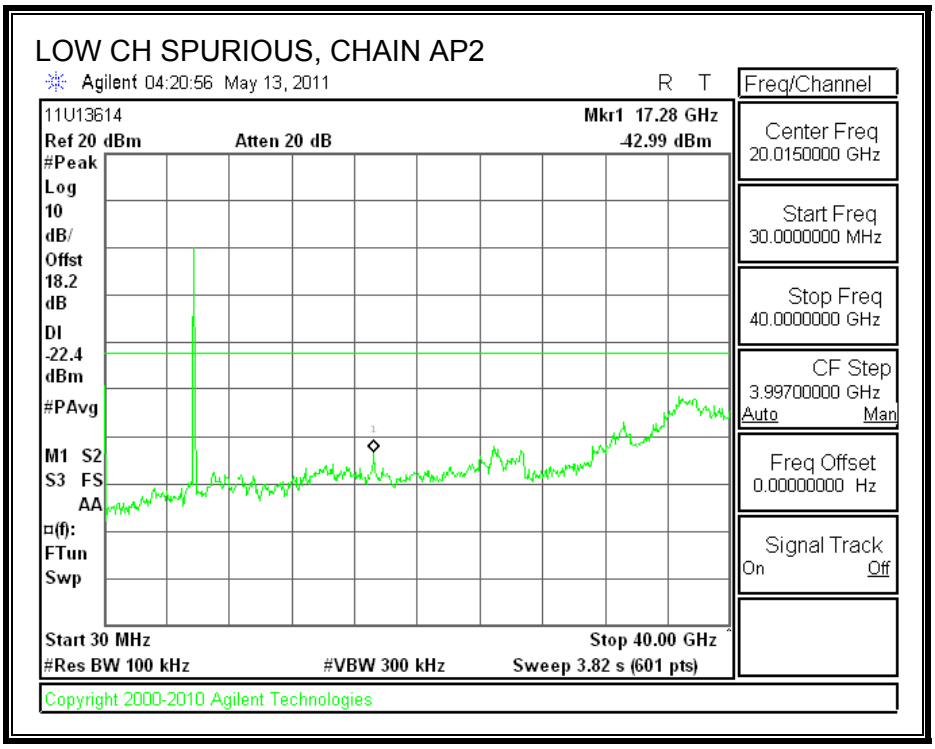
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

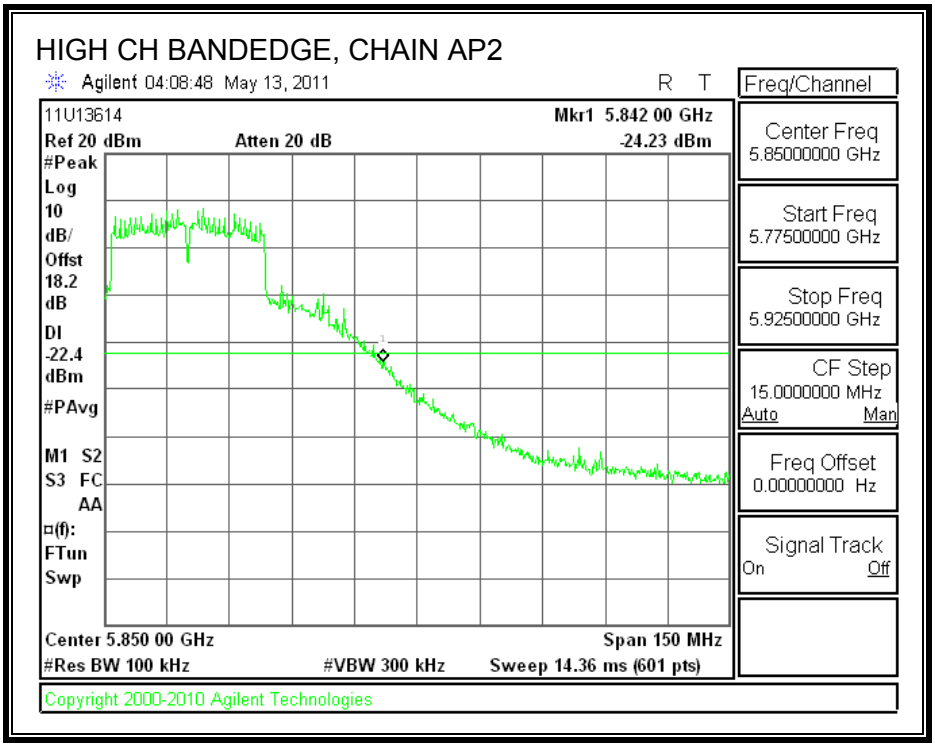
RESULTS

CHAIN AP2 SPURIOUS EMISSIONS

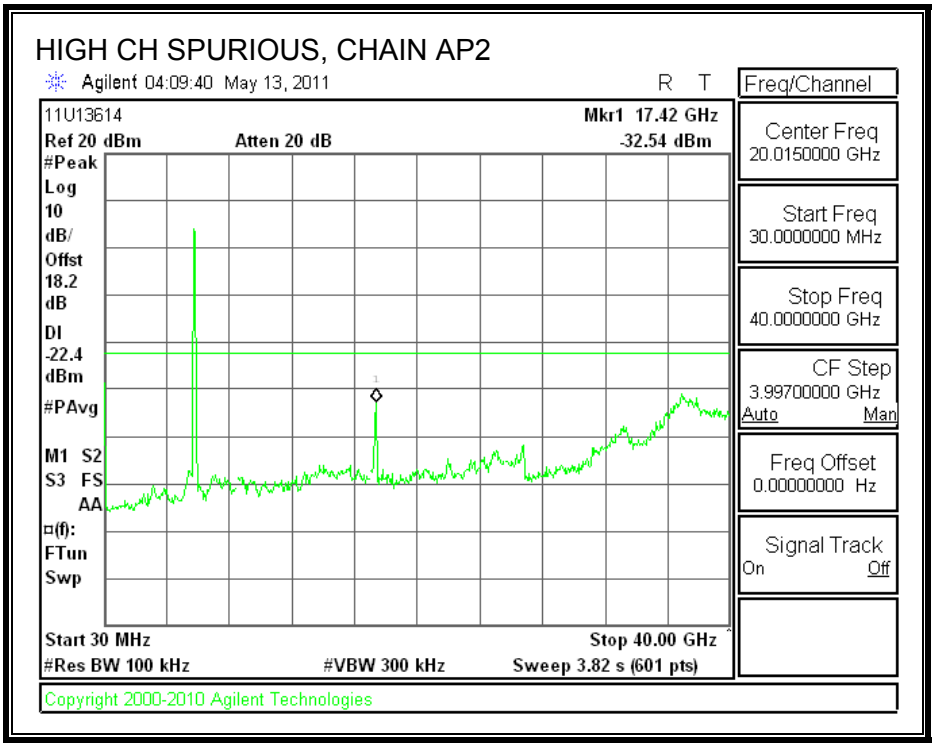




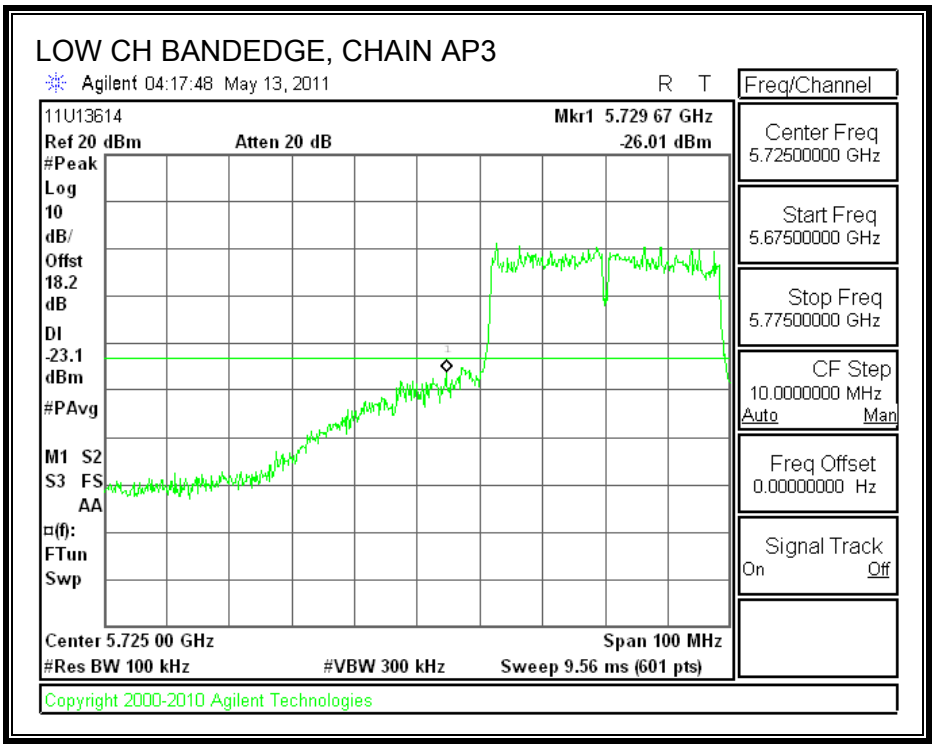
HIGH CH BANDEDGE, CHAIN AP2

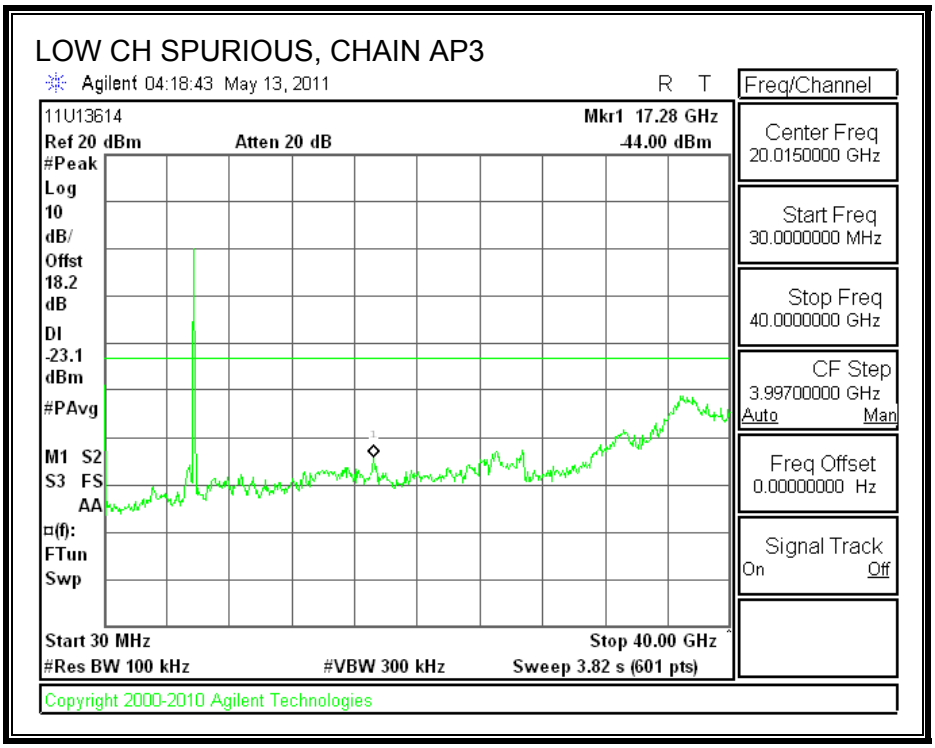


HIGH CH SPURIOUS, CHAIN AP2

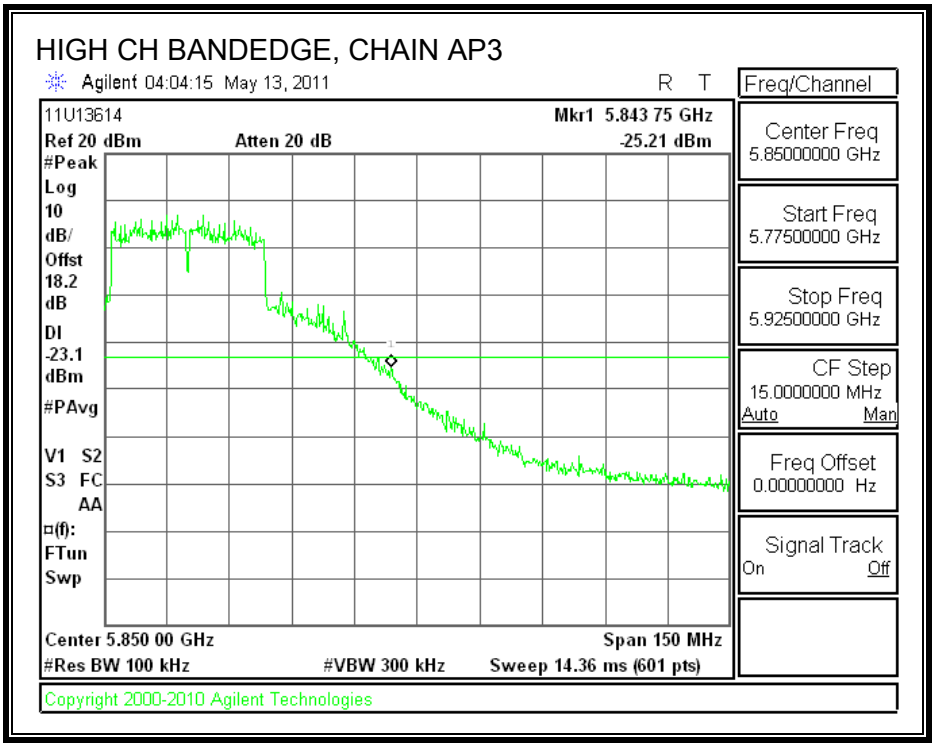


CHAIN AP3 SPURIOUS EMISSIONS

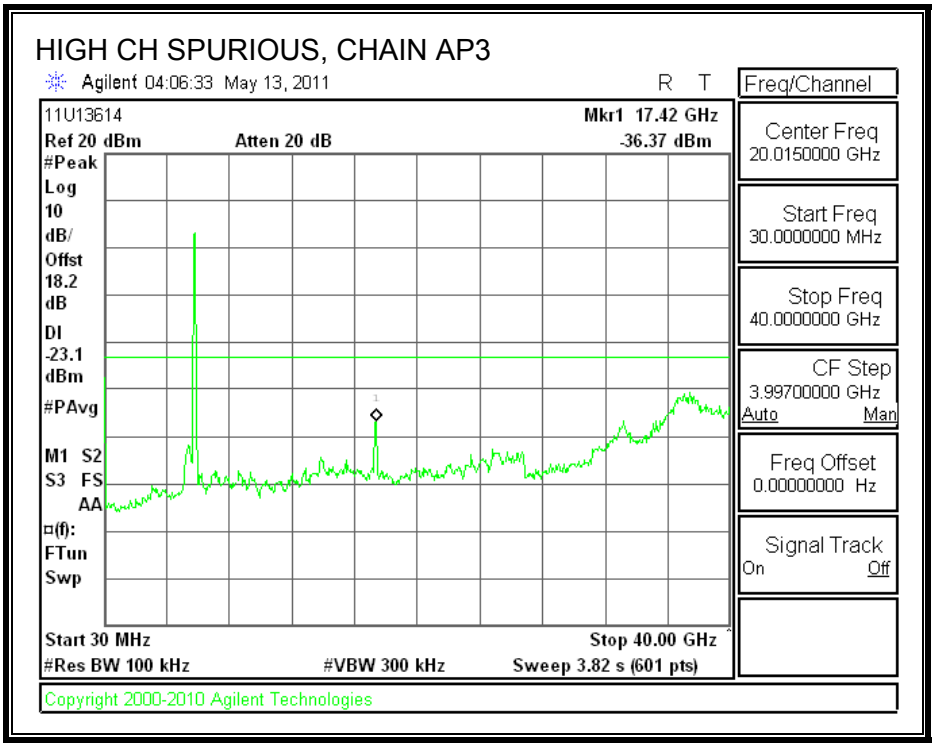




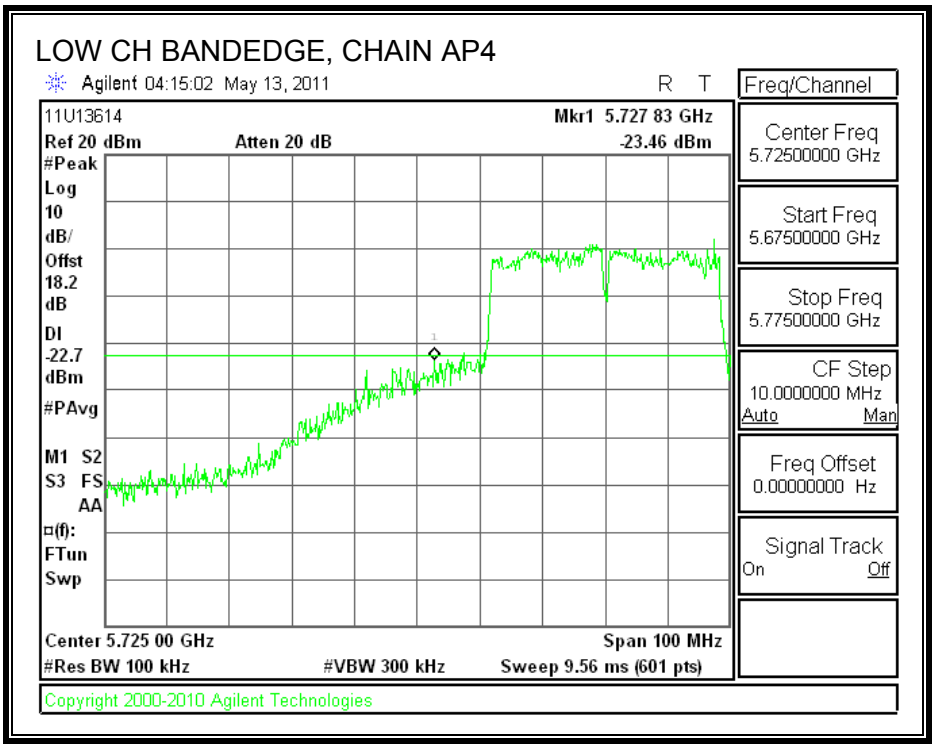
HIGH CH BANDEDGE, CHAIN AP3

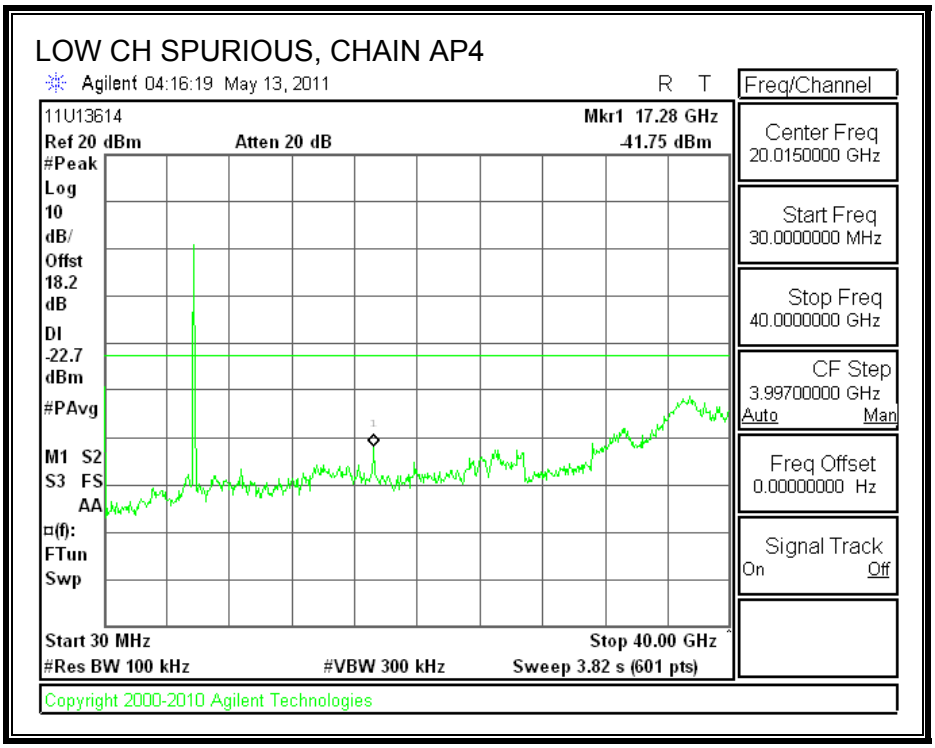


HIGH CH SPURIOUS, CHAIN AP3

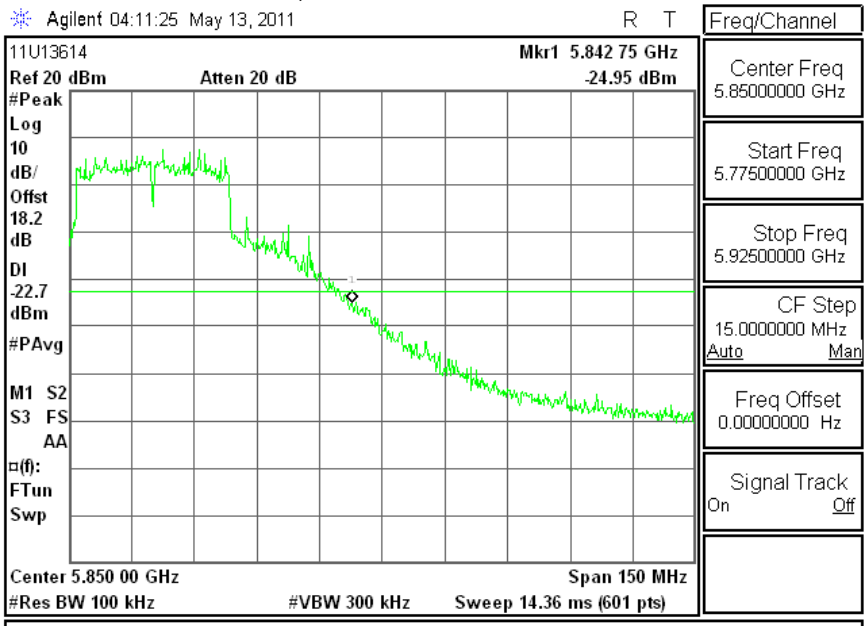


CHAIN AP4 SPURIOUS EMISSIONS

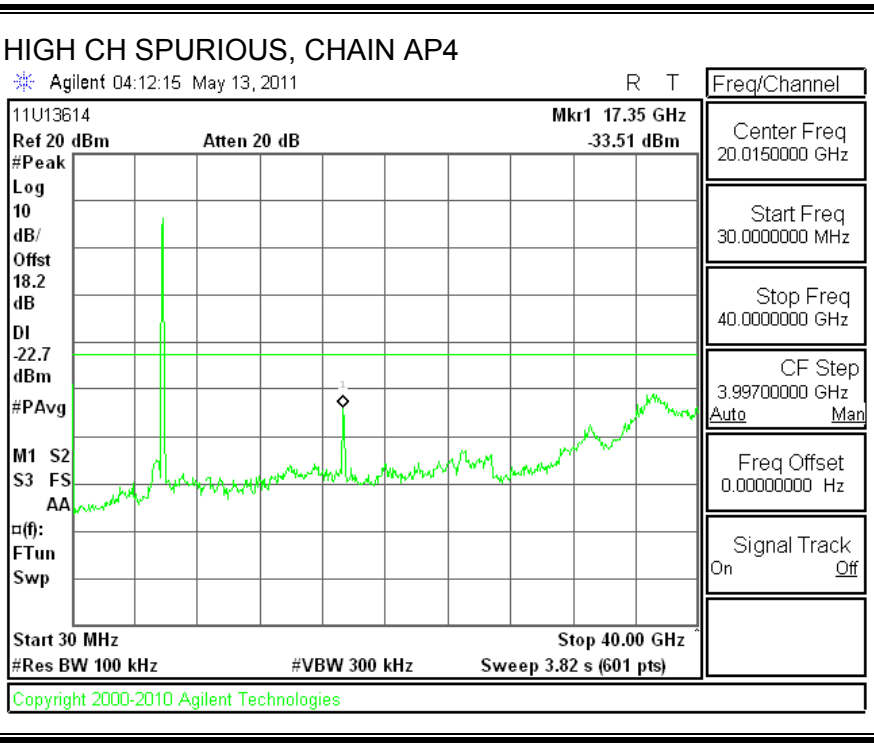




HIGH CH BANDEDGE, CHAIN AP4



HIGH CH SPURIOUS, CHAIN AP4



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.

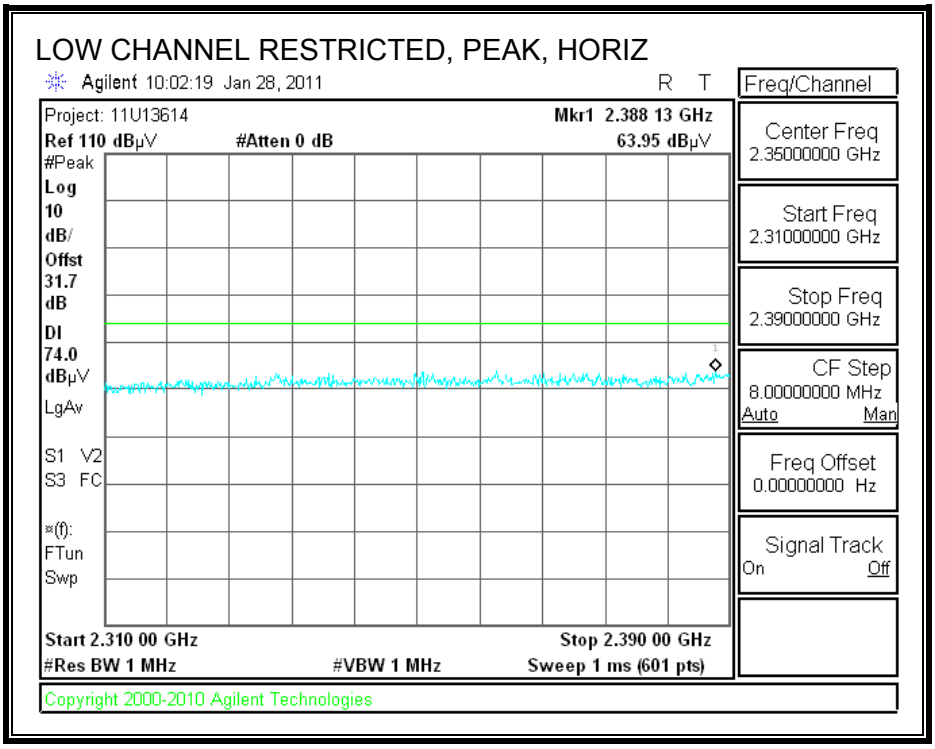
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

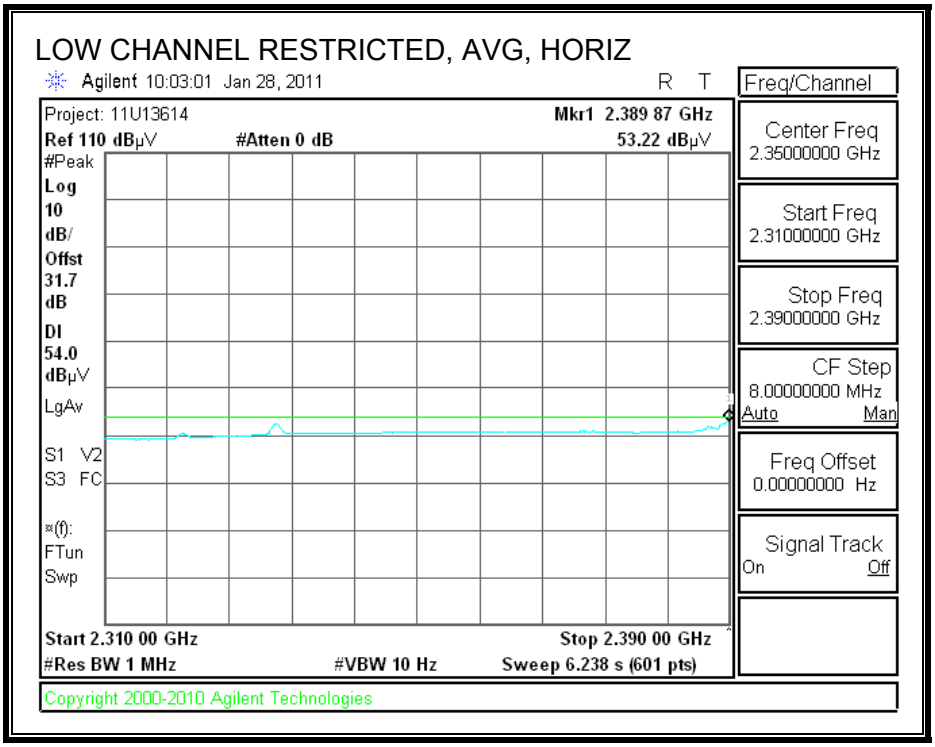
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

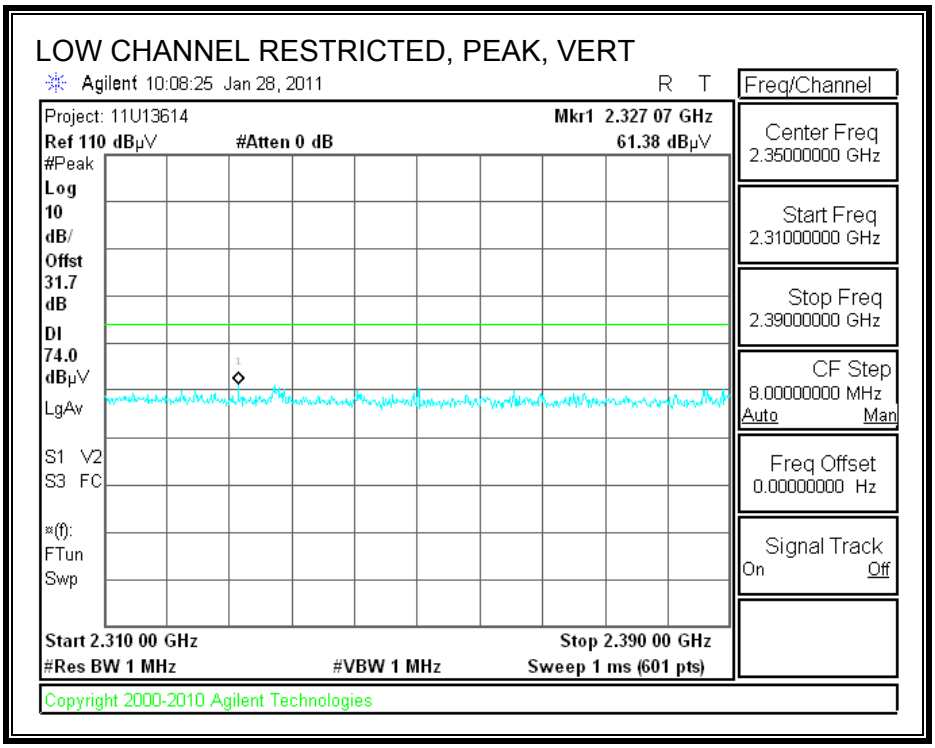
8.2.1. TX ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

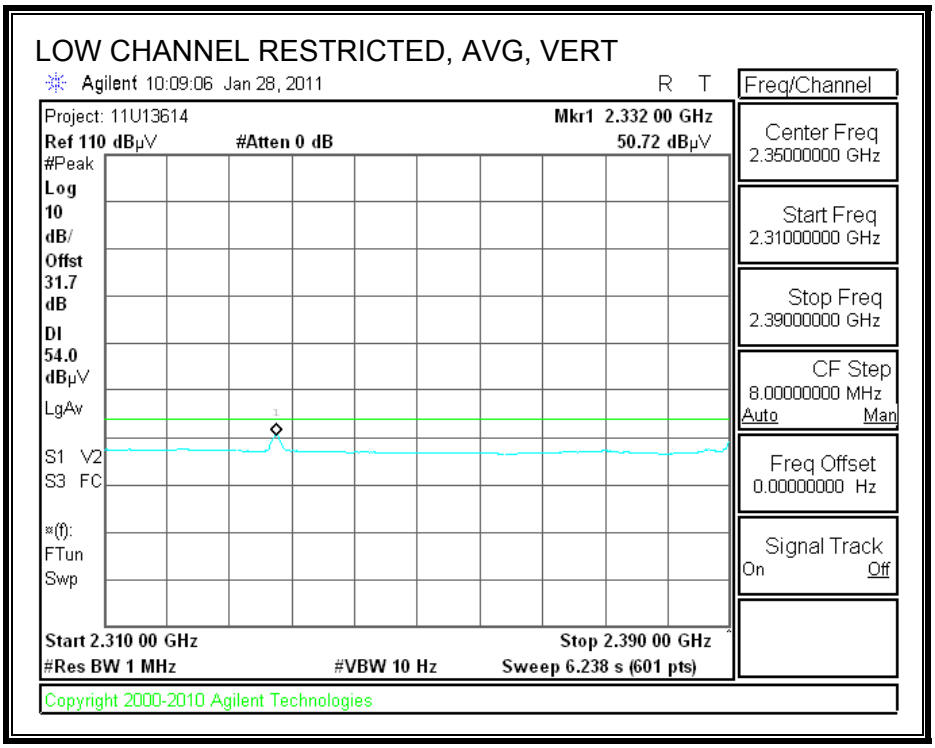
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



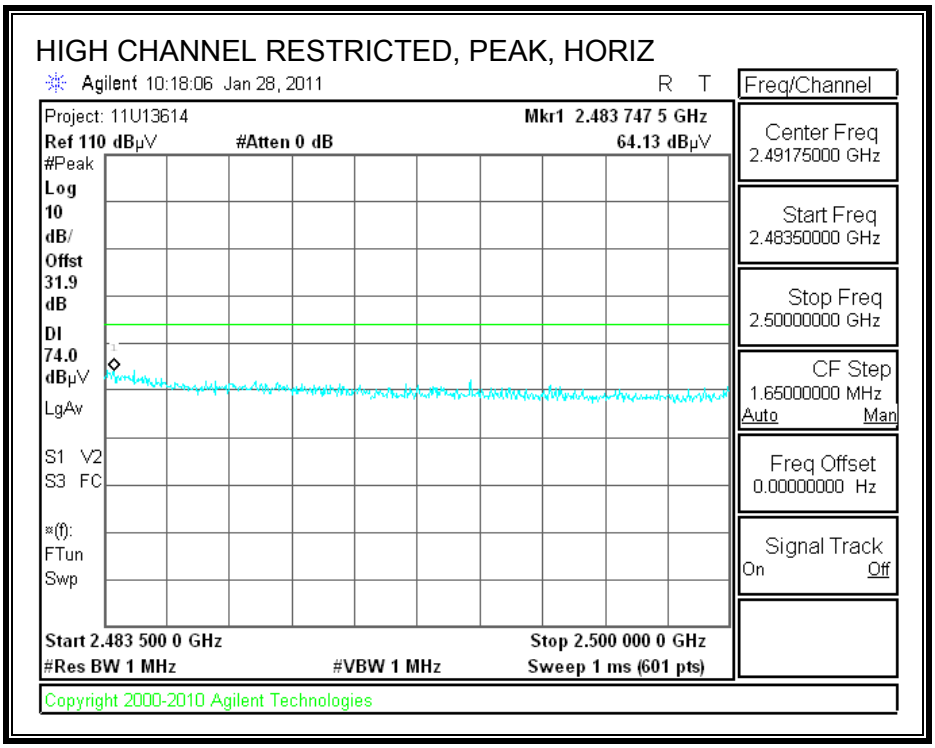


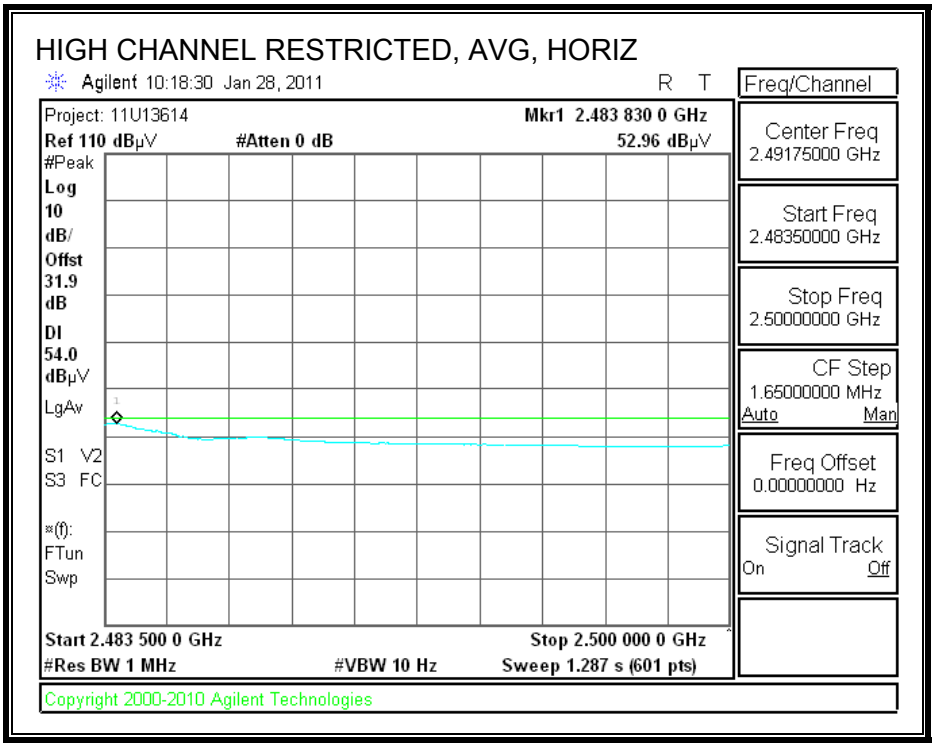
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



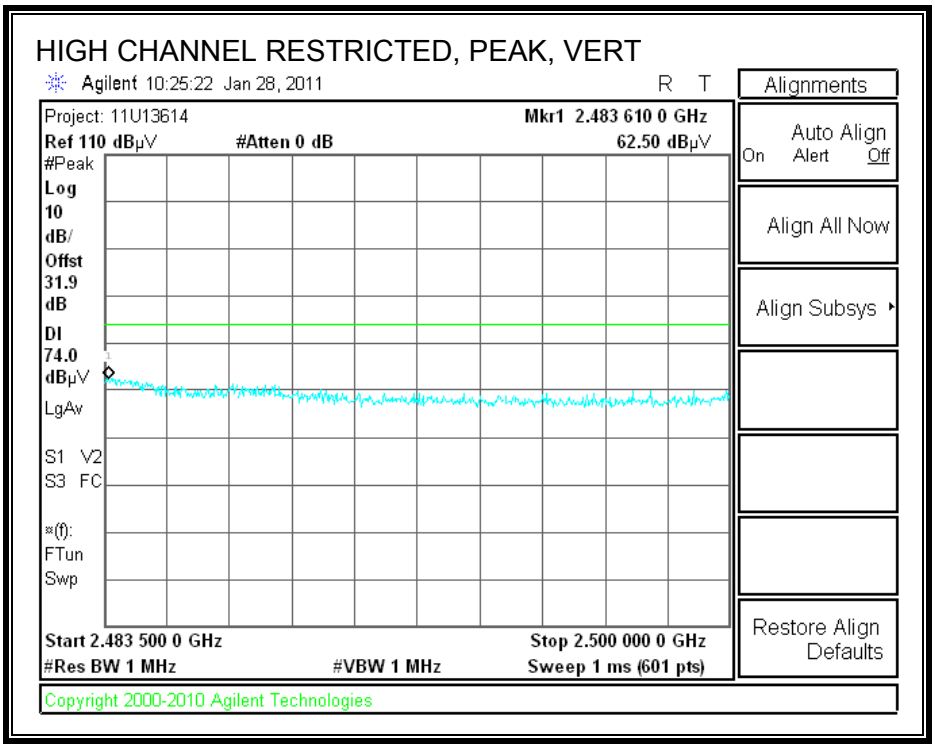


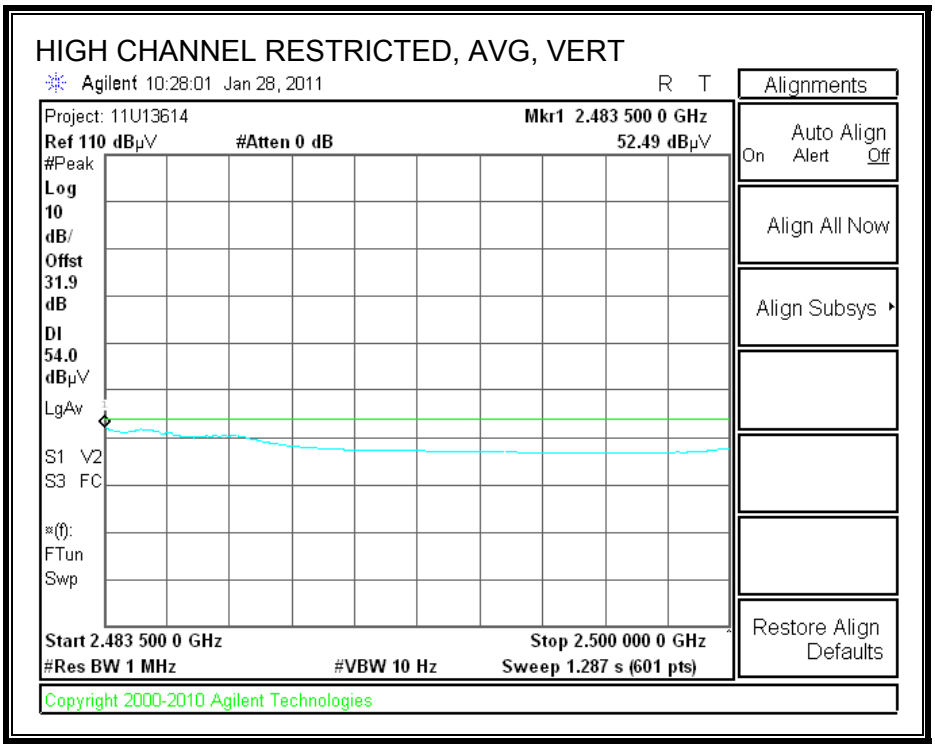
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 02/04/11
Project #: 11U13614
Test Target: FCC Class B
Mode Oper: TX mode, 802.11b

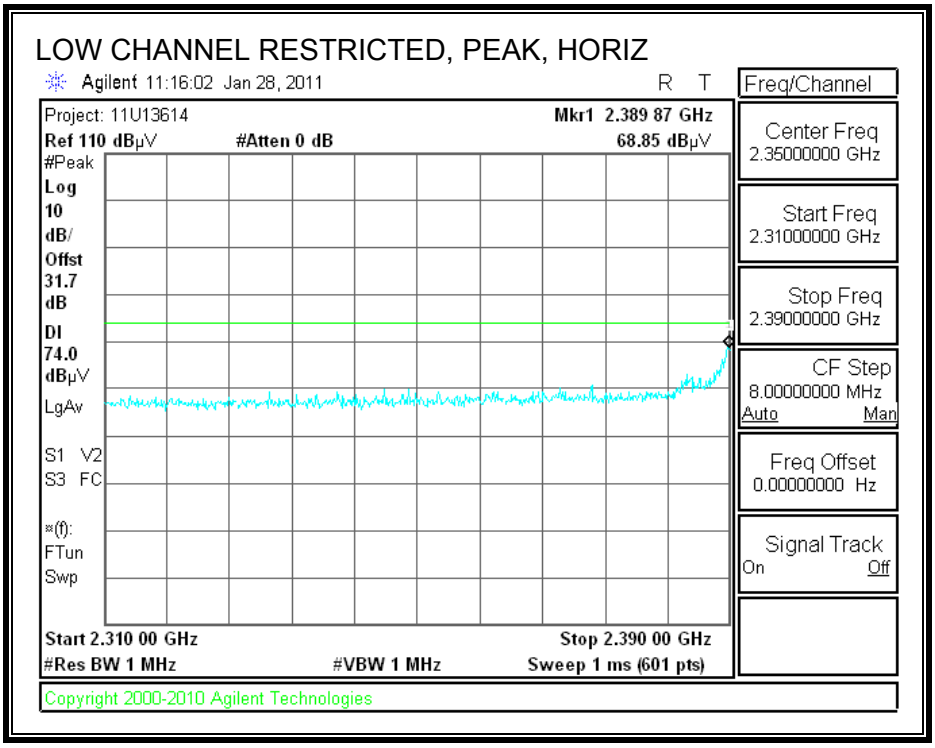
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

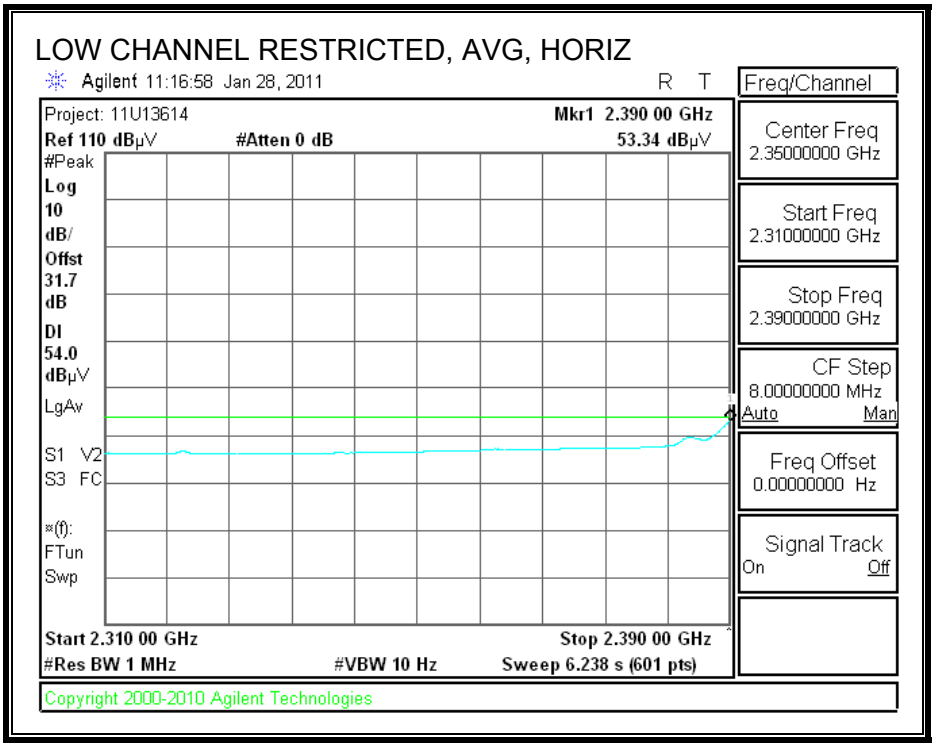
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412 MHz b mode													
4.824	3.0	43.1	33.0	5.8	-36.5	0.0	0.6	46.1	74.0	-27.9	H	P	
4.824	3.0	39.4	33.0	5.8	-36.5	0.0	0.6	42.3	54.0	-11.7	H	A	
7.236	3.0	36.7	35.2	7.2	-36.2	0.0	0.6	43.5	74.0	-30.5	H	P	
7.236	3.0	25.0	35.2	7.2	-36.2	0.0	0.6	31.8	54.0	-22.2	H	A	
2412 MHz b mode													
4.824	3.0	48.7	33.0	5.8	-36.5	0.0	0.6	51.6	74.0	-22.4	V	P	
4.824	3.0	46.4	33.0	5.8	-36.5	0.0	0.6	49.4	54.0	-4.6	V	A	
7.236	3.0	39.4	35.2	7.2	-36.2	0.0	0.6	46.2	74.0	-27.8	V	P	
7.236	3.0	30.0	35.2	7.2	-36.2	0.0	0.6	36.8	54.0	-17.2	V	A	
2437 MHz b mode													
4.874	3.0	53.6	33.1	5.8	-36.5	0.0	0.6	56.6	74.0	-17.4	V	P	
4.874	3.0	50.6	33.1	5.8	-36.5	0.0	0.6	53.7	54.0	-0.3	V	A	
2437 MHz b mode													
4.874	3.0	52.0	33.1	5.8	-36.5	0.0	0.6	55.1	74.0	-18.9	H	P	
4.874	3.0	49.0	33.1	5.8	-36.5	0.0	0.6	52.1	54.0	-1.9	H	A	
7.311	3.0	42.6	35.3	7.3	-36.2	0.0	0.6	49.6	74.0	-24.4	H	P	
7.311	3.0	36.3	35.3	7.3	-36.2	0.0	0.6	43.3	54.0	-10.7	H	A	
2462 MHz b mode													
4.924	3.0	50.3	33.1	5.9	-36.5	0.0	0.6	53.5	74.0	-20.5	H	P	
4.924	3.0	48.5	33.1	5.9	-36.5	0.0	0.6	51.6	54.0	-2.4	H	A	
7.386	3.0	41.3	35.4	7.3	-36.2	0.0	0.6	48.5	74.0	-25.6	H	P	
7.386	3.0	34.8	35.4	7.3	-36.2	0.0	0.6	42.0	54.0	-12.0	H	A	
2462 MHz b mode													
4.924	3.0	52.0	33.1	5.9	-36.5	0.0	0.6	55.2	74.0	-18.8	V	P	
4.924	3.0	50.2	33.1	5.9	-36.5	0.0	0.6	53.4	54.0	-0.6	V	A	
7.386	3.0	40.7	35.4	7.3	-36.2	0.0	0.6	47.8	74.0	-26.2	V	P	
7.386	3.0	31.8	35.4	7.3	-36.2	0.0	0.6	39.0	54.0	-15.0	V	A	

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

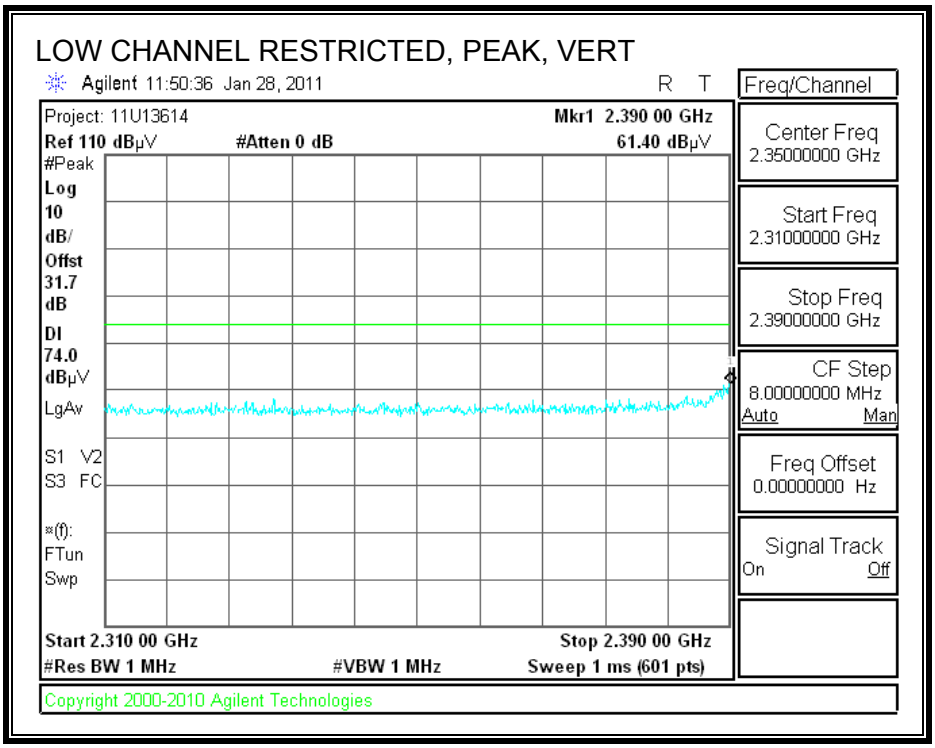
8.2.2. TX ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

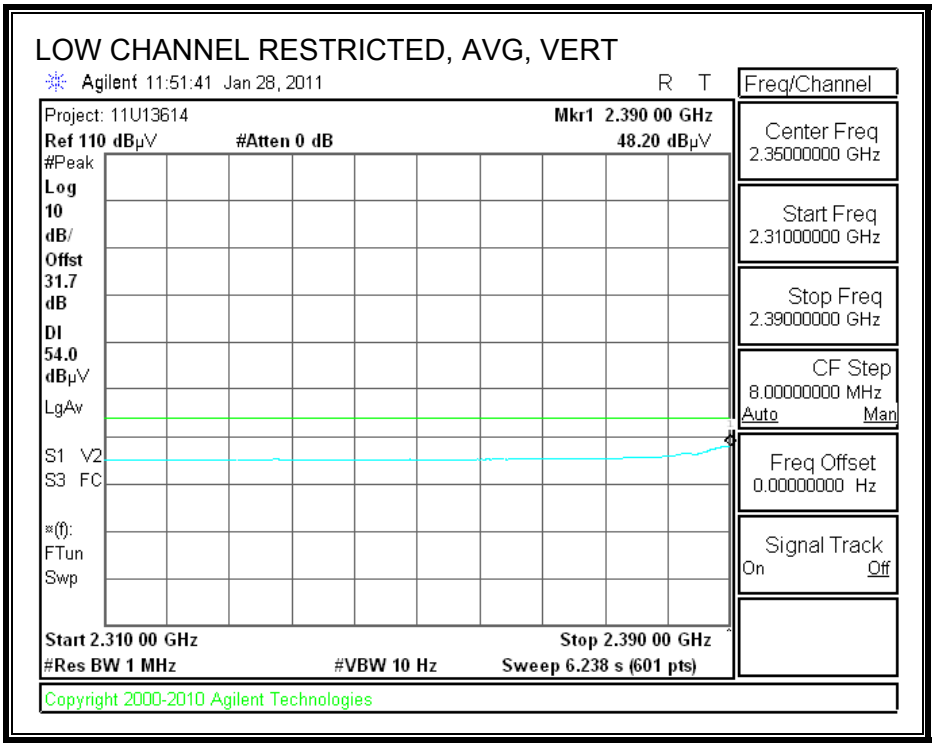
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



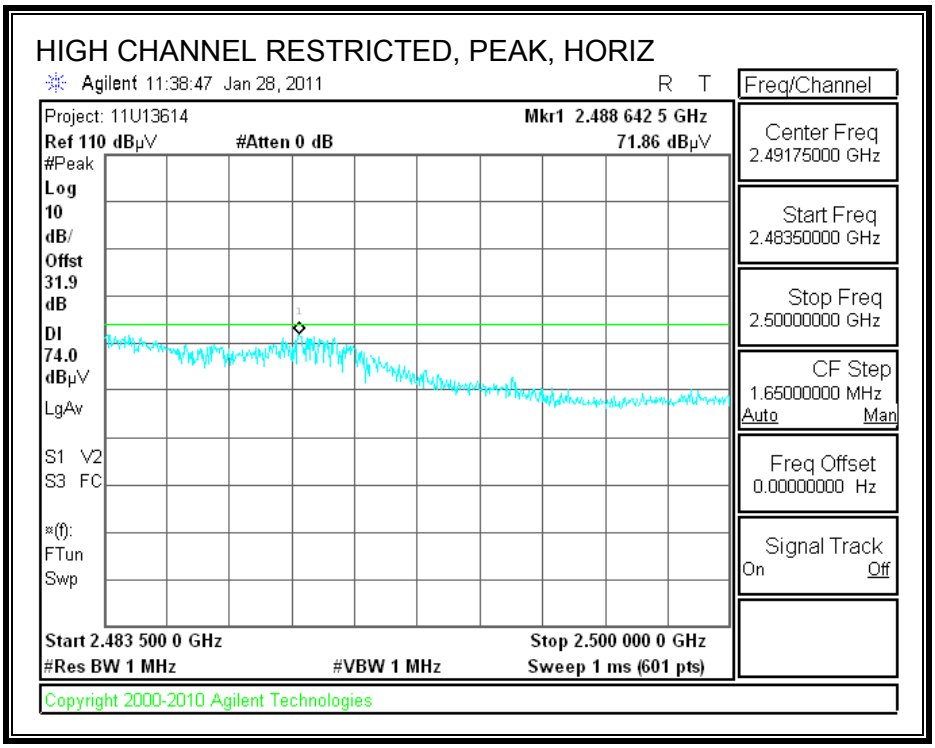


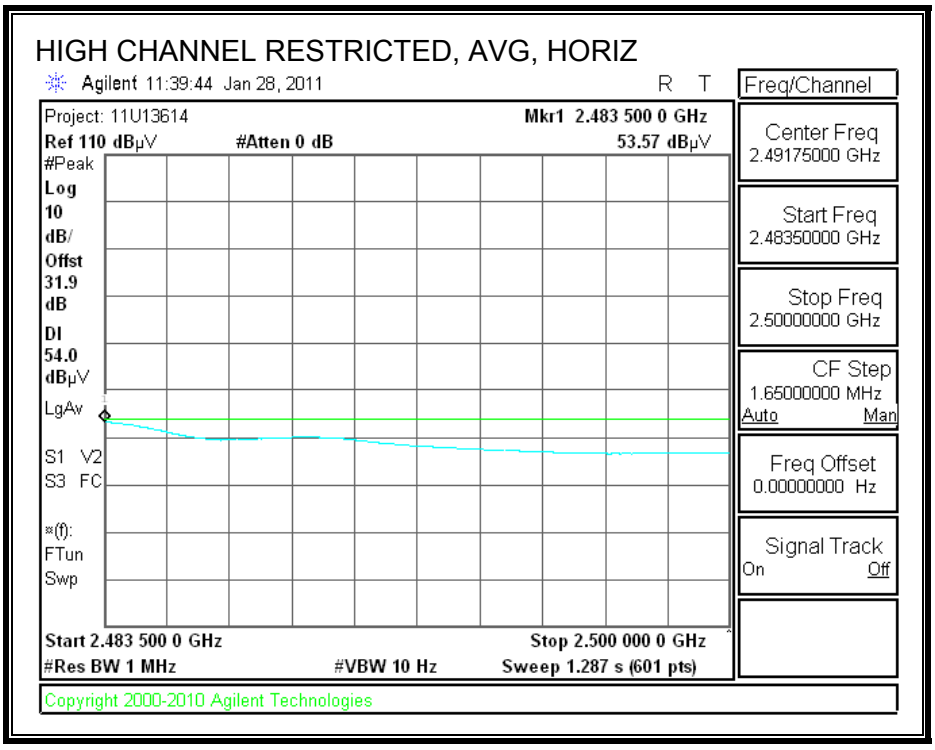
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



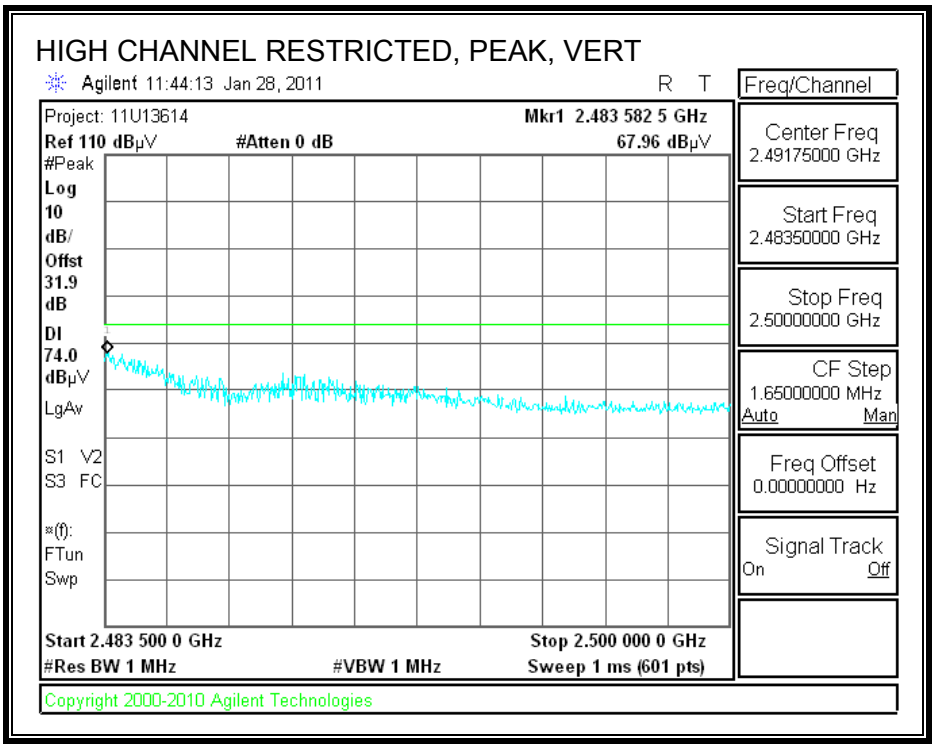


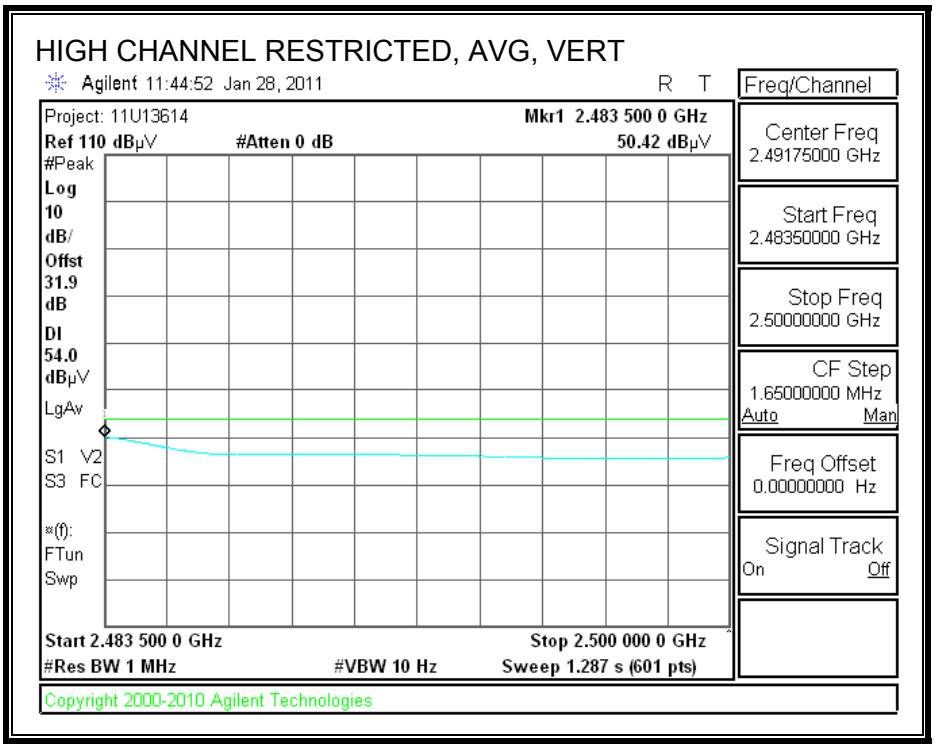
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 02/15/11
Project #: 11U13614
Company: Apple
Test Target: FCC Class B
Mode Oper: g mode, TX mode

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

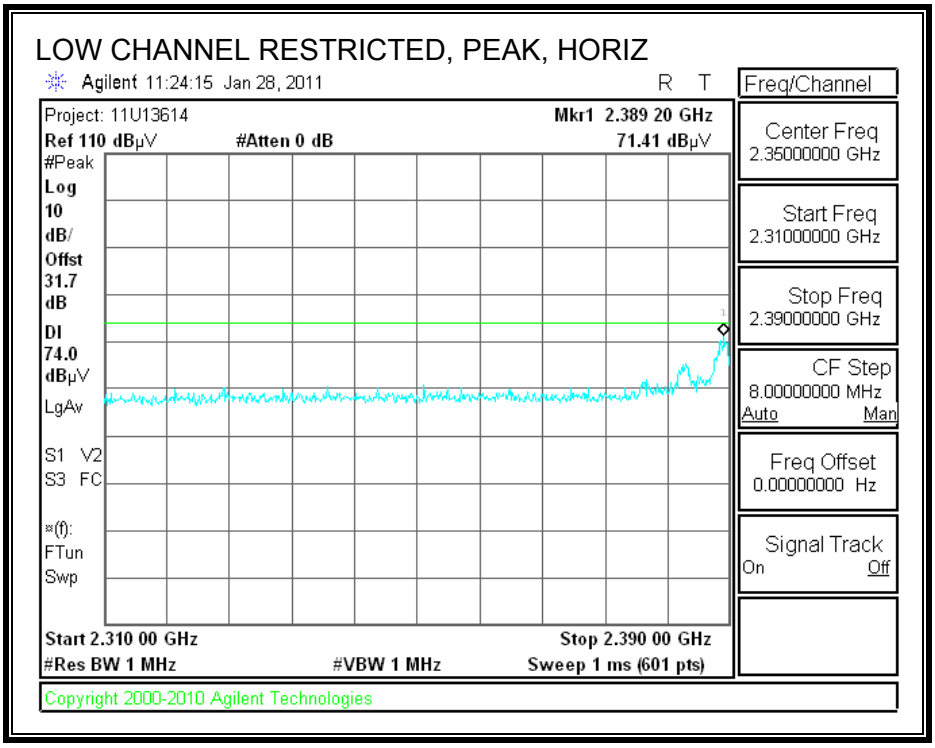
Average Field Strength Limit
Peak Field Strength Limit
Margin vs. Average Limit
Margin vs. Peak Limit

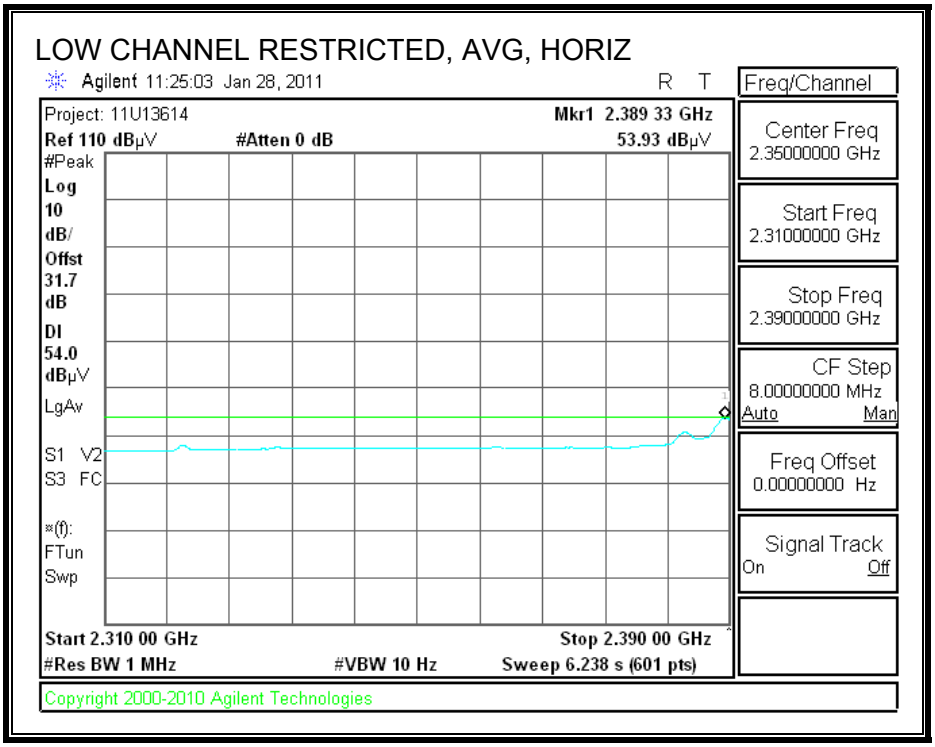
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412MHz g mode													
4.824	3.0	39.7	33.0	5.8	-36.5	0.0	0.6	42.7	74.0	-31.3	H	P	
4.824	3.0	28.0	33.0	5.8	-36.5	0.0	0.6	30.9	54.0	-23.1	H	A	
4.824	3.0	41.0	33.0	5.8	-36.5	0.0	0.6	44.0	74.0	-30.0	H	P	
4.824	3.0	29.5	33.0	5.8	-36.5	0.0	0.6	32.5	54.0	-21.5	H	A	
4.824	3.0	41.9	33.0	5.8	-36.5	0.0	0.6	44.9	74.0	-29.1	V	P	
4.824	3.0	30.2	33.0	5.8	-36.5	0.0	0.6	33.1	54.0	-20.9	V	A	
2437 MHz, g mode													
4.874	3.0	50.7	33.1	5.8	-36.5	0.0	0.0	53.2	74.0	-20.8	H	P	
4.874	3.0	36.8	33.1	5.8	-36.5	0.0	0.0	39.2	54.0	-14.8	H	A	
7.311	3.0	38.6	35.3	7.3	-36.2	0.0	0.0	45.0	74.0	-29.1	H	P	
7.311	3.0	26.7	35.3	7.3	-36.2	0.0	0.0	33.0	54.0	-21.0	H	A	
4.874	3.0	56.6	33.1	5.8	-36.5	0.0	0.0	59.0	74.0	-15.0	V	P	
4.874	3.0	41.7	33.1	5.8	-36.5	0.0	0.0	44.1	54.0	-9.9	V	A	
7.311	3.0	39.5	35.3	7.3	-36.2	0.0	0.0	45.8	74.0	-28.2	V	P	
7.311	3.0	27.1	35.3	7.3	-36.2	0.0	0.0	33.5	54.0	-20.5	V	A	
2462MHz g mode													
4.924	3.0	49.8	33.1	5.9	-36.5	0.0	0.6	52.9	74.0	-21.1	H	P	
4.924	3.0	37.9	33.1	5.9	-36.5	0.0	0.6	41.1	54.0	-12.9	H	A	
7.386	3.0	36.9	35.4	7.3	-36.2	0.0	0.6	44.1	74.0	-29.9	H	P	
7.386	3.0	24.6	35.4	7.3	-36.2	0.0	0.6	31.8	54.0	-22.2	H	A	
4.924	3.0	47.8	33.1	5.9	-36.5	0.0	0.6	51.0	74.0	-23.0	V	P	
4.924	3.0	35.3	33.1	5.9	-36.5	0.0	0.6	38.5	54.0	-15.5	V	A	
7.386	3.0	36.9	35.4	7.3	-36.2	0.0	0.6	44.0	74.0	-30.0	V	P	
7.386	3.0	24.6	35.4	7.3	-36.2	0.0	0.6	31.7	54.0	-22.3	V	A	

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

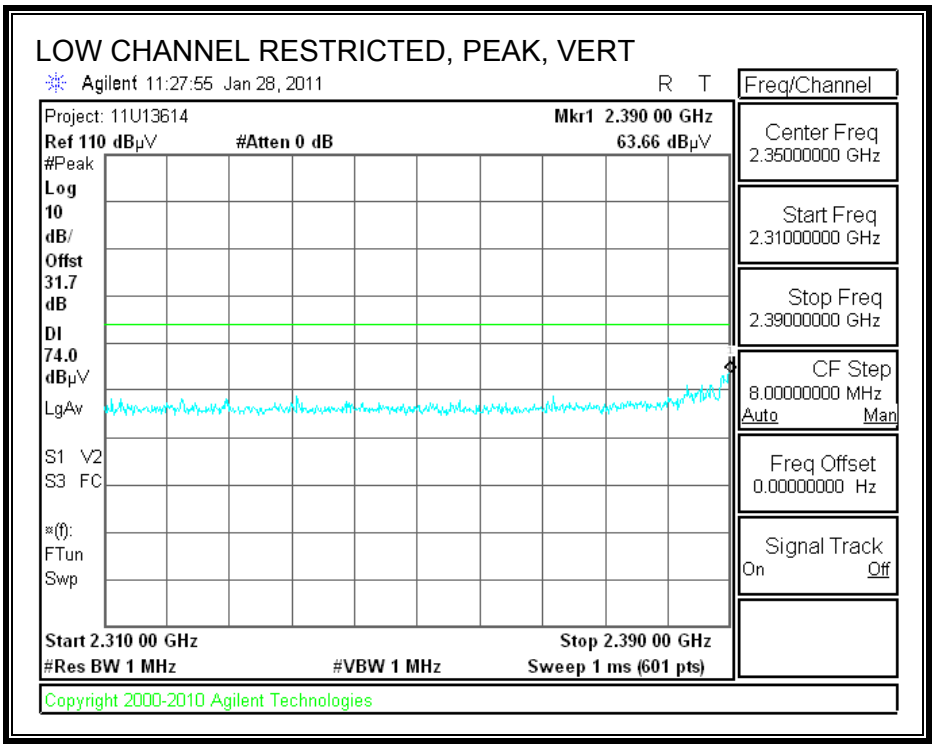
8.2.3. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 2.4 GHz BAND

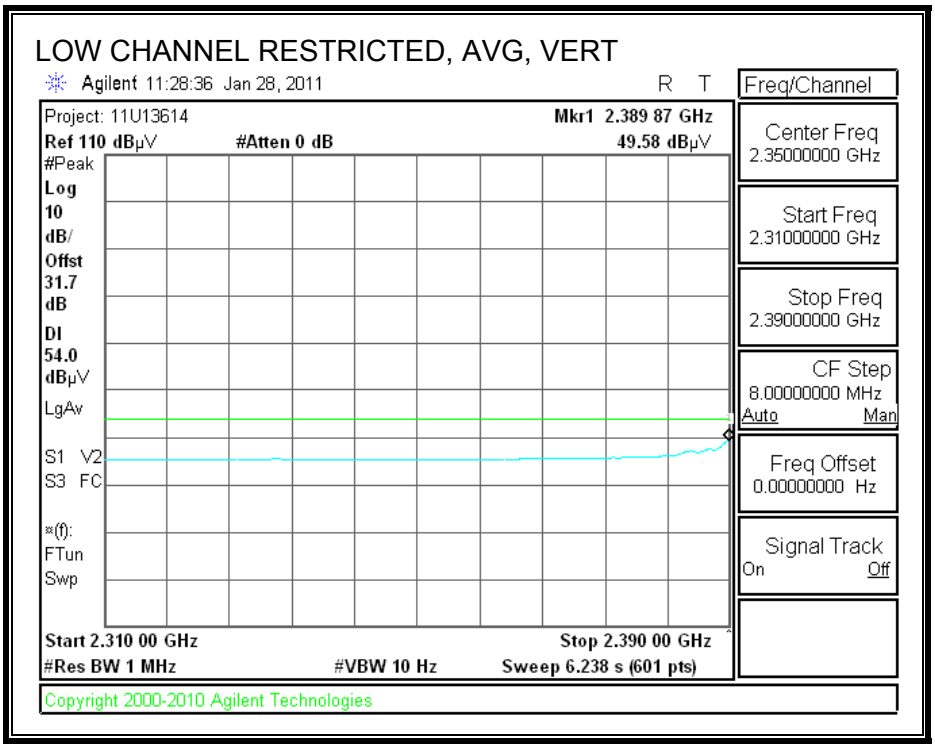
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



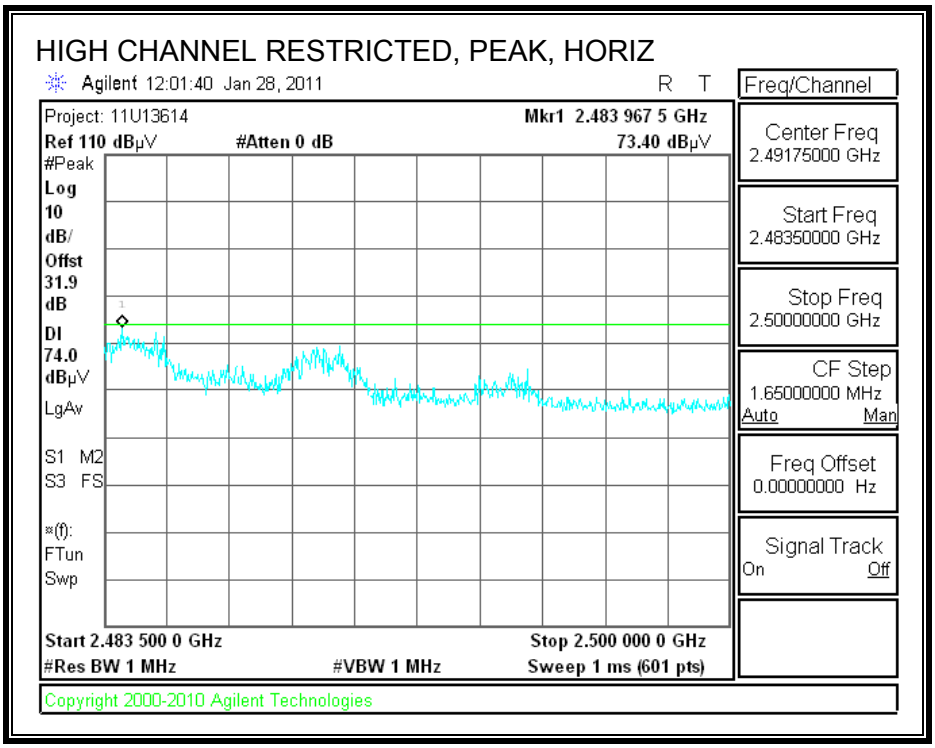


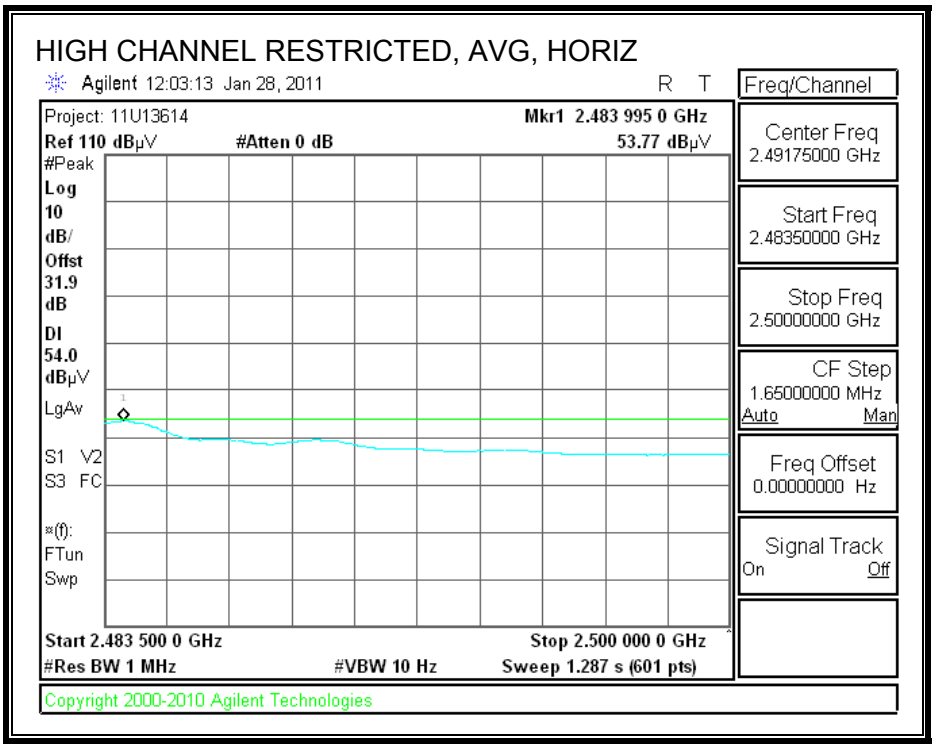
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



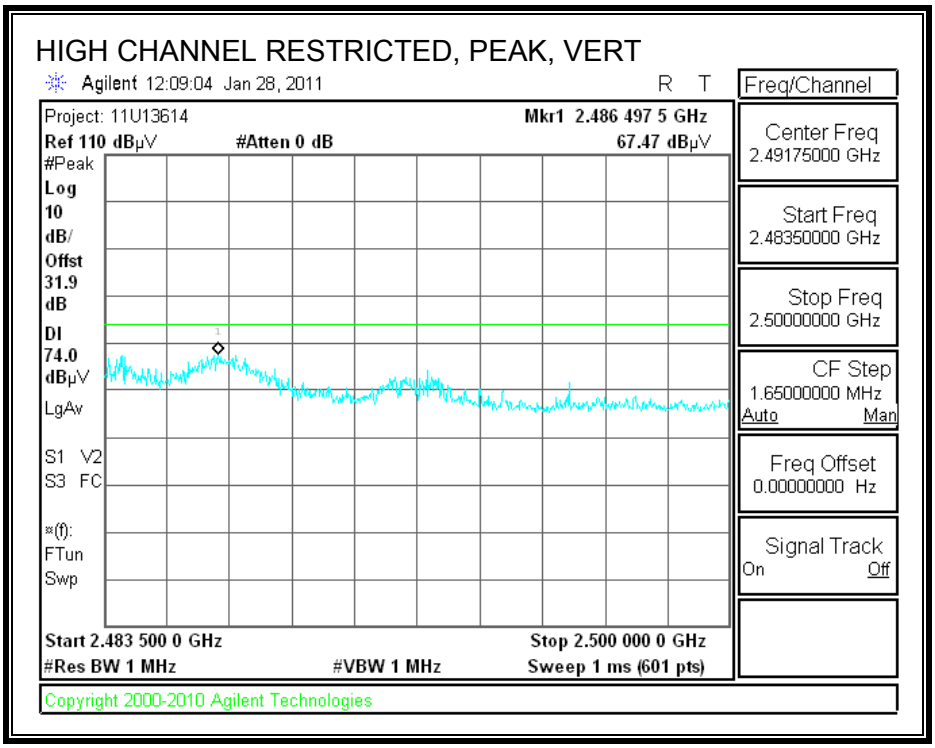


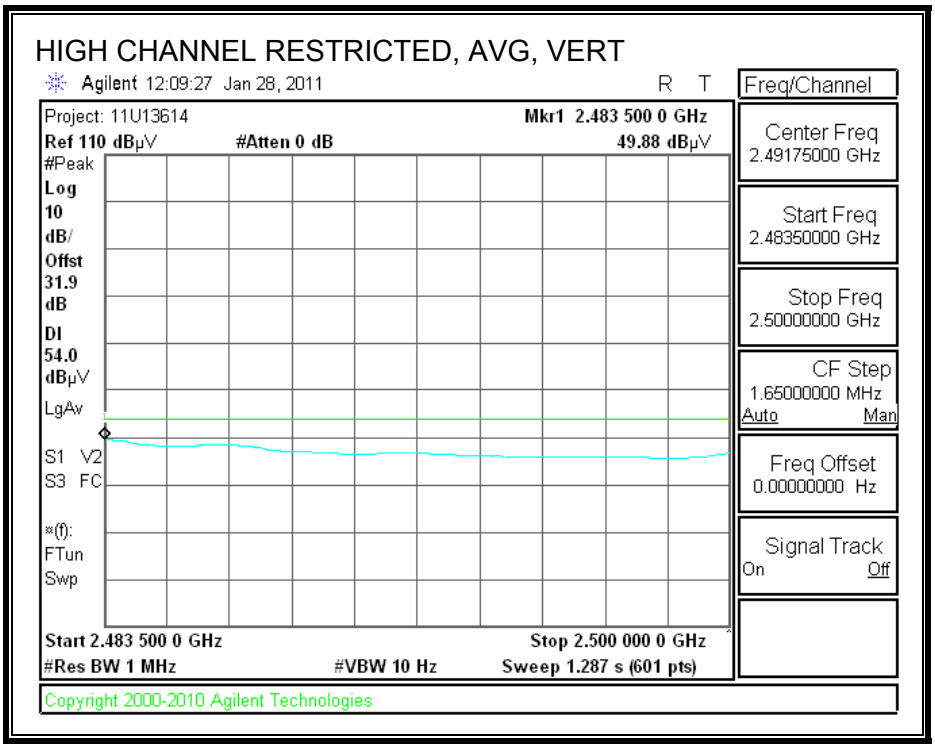
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 01/31/11
Project #: 11U13614
Test Target: FCC Class B
Mode Oper: HT20, TX mode

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

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412MHz HT20													
4.824	3.0	39.8	33.0	5.8	-36.5	0.0	0.6	42.8	74.0	-31.2	H	P	
4.824	3.0	27.4	33.0	5.8	-36.5	0.0	0.6	30.4	54.0	-23.6	H	A	
4.824	3.0	42.6	33.0	5.8	-36.5	0.0	0.6	45.6	74.0	-28.4	V	P	
4.824	3.0	30.1	33.0	5.8	-36.5	0.0	0.6	33.1	54.0	-20.9	V	A	
2437 MHz, HT20													
4.874	3.0	59.3	33.1	5.8	-36.5	0.0	0.6	62.4	74.0	-11.6	V	P	
4.874	3.0	44.1	33.1	5.8	-36.5	0.0	0.6	47.2	54.0	-6.8	V	A	
7.311	3.0	38.0	35.3	7.3	-36.2	0.0	0.6	45.0	74.0	-29.0	V	P	
7.311	3.0	25.4	35.3	7.3	-36.2	0.0	0.6	32.4	54.0	-21.6	V	A	
4.874	3.0	55.3	33.1	5.8	-36.5	0.0	0.6	58.4	74.0	-15.6	H	P	
4.874	3.0	40.7	33.1	5.8	-36.5	0.0	0.6	43.7	54.0	-10.3	H	A	
7.311	3.0	39.6	35.3	7.3	-36.2	0.0	0.6	46.6	74.0	-27.4	H	P	
7.311	3.0	26.9	35.3	7.3	-36.2	0.0	0.6	33.9	54.0	-20.1	H	A	
2462MHz HT20													
4.924	3.0	44.7	33.1	5.9	-36.5	0.0	0.6	47.9	74.0	-26.1	H	P	
4.924	3.0	31.3	33.1	5.9	-36.5	0.0	0.6	34.4	54.0	-19.6	H	A	
7.386	3.0	37.3	35.4	7.3	-36.2	0.0	0.6	44.5	74.0	-29.5	H	P	
7.386	3.0	24.7	35.4	7.3	-36.2	0.0	0.6	31.8	54.0	-22.2	H	A	
4.924	3.0	47.1	33.1	5.9	-36.5	0.0	0.6	50.3	74.0	-23.7	V	P	
4.924	3.0	33.4	33.1	5.9	-36.5	0.0	0.6	36.6	54.0	-17.4	V	A	
7.386	3.0	36.8	35.4	7.3	-36.2	0.0	0.6	43.9	74.0	-30.1	V	P	
7.386	3.0	24.7	35.4	7.3	-36.2	0.0	0.6	31.8	54.0	-22.2	V	A	

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

8.2.4. TX ABOVE 1 GHz FOR 802.11a MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 02/15/11
Project #: 11U13614
Test Target: FCC Class B
Mode Oper: 5.8G a mode, TX mode,

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

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5745 MHz, a mode													
11.490	3.0	52.2	38.4	9.5	-35.9	0.0	0.7	65.0	74.0	-9.0	H	P	
11.490	3.0	39.5	38.4	9.5	-35.9	0.0	0.7	52.2	54.0	-1.8	H	A	
22.980	3.0	34.1	36.1	14.6	-34.3	0.0	0.0	50.4	74.0	-23.6	H	P	
22.980	3.0	21.9	36.1	14.6	-34.3	0.0	0.0	38.3	54.0	-15.8	H	A	
5745 MHz, a mode													
11.490	3.0	50.2	38.4	9.5	-35.9	0.0	0.7	63.0	74.0	-11.0	V	P	
11.490	3.0	37.9	38.4	9.5	-35.9	0.0	0.7	50.7	54.0	-3.3	V	A	
22.980	3.0	34.4	36.1	14.6	-34.3	0.0	0.0	50.7	74.0	-23.3	V	P	
22.980	3.0	21.9	36.1	14.6	-34.3	0.0	0.0	38.2	54.0	-15.8	V	A	
5785 MHz, a mode													
11.570	3.0	49.3	38.5	9.5	-35.8	0.0	0.7	62.2	74.0	-11.8	V	P	
11.570	3.0	36.5	38.5	9.5	-35.8	0.0	0.7	49.4	54.0	-4.6	V	A	
11.570	3.0	51.6	38.5	9.5	-35.8	0.0	0.7	64.5	74.0	-9.5	H	P	
11.570	3.0	39.3	38.5	9.5	-35.8	0.0	0.7	52.3	54.0	-1.7	H	A	
5825 MHz, a mode													
11.650	3.0	54.4	38.6	9.6	-35.7	0.0	0.7	67.5	74.0	-6.5	H	P	
11.650	3.0	40.5	38.6	9.6	-35.7	0.0	0.7	53.6	54.0	-0.4	H	A	
11.650	3.0	44.9	38.6	9.6	-35.7	0.0	0.7	58.0	74.0	-16.0	V	P	
11.650	3.0	32.6	38.6	9.6	-35.7	0.0	0.7	45.7	54.0	-8.3	V	A	

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

8.2.5. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 02/15/11
Project #: 11U13614
Test Target: FCC Class B
Mode Oper: 5.8G HT20, TX mode,

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

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5745 MHz, HT20													
11.490	3.0	49.5	38.4	9.5	-35.9	0.0	0.7	62.2	74.0	-11.8	H	P	
11.490	3.0	35.6	38.4	9.5	-35.9	0.0	0.7	48.4	54.0	-5.6	H	A	
11.490	3.0	49.3	38.4	9.5	-35.9	0.0	0.7	62.0	74.0	-12.0	V	P	
11.490	3.0	35.9	38.4	9.5	-35.9	0.0	0.7	48.6	54.0	-5.4	V	A	
5785 MHz, HT20													
11.570	3.0	48.0	38.5	9.5	-35.8	0.0	0.7	60.9	74.0	-13.1	V	P	
11.570	3.0	34.3	38.5	9.5	-35.8	0.0	0.7	47.2	54.0	-6.8	V	A	
11.570	3.0	51.9	38.5	9.5	-35.8	0.0	0.7	64.9	74.0	-9.1	H	P	
11.570	3.0	37.3	38.5	9.5	-35.8	0.0	0.7	50.2	54.0	-3.8	H	A	
5825 MHz, HT20													
11.650	3.0	51.8	38.6	9.6	-35.7	0.0	0.7	64.9	74.0	-9.1	H	P	
11.650	3.0	38.1	38.6	9.6	-35.7	0.0	0.7	51.2	54.0	-2.8	H	A	
11.650	3.0	48.1	38.6	9.6	-35.7	0.0	0.7	61.2	74.0	-12.8	V	P	
11.650	3.0	33.8	38.6	9.6	-35.7	0.0	0.7	46.9	54.0	-7.1	V	A	

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

8.2.6. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 02/03/11
Project #: 11U13614
Test Target: FCC Class B
Mode Oper: 5.8G HT40, TX mode,

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5755 MHz HT40													
11.510	3.0	45.0	38.4	9.5	-35.8	0.0	0.7	57.8	74.0	-16.2	V	P	
11.510	3.0	32.4	38.4	9.5	-35.8	0.0	0.7	45.2	54.0	-8.8	V	A	
17.265	3.0	37.0	41.8	12.2	-33.8	0.0	0.6	57.9	74.0	-16.1	V	P	
17.265	3.0	24.6	41.8	12.2	-33.8	0.0	0.6	45.5	54.0	-8.5	V	A	
5755 MHz HT40													
11.510	3.0	45.9	38.4	9.5	-35.8	0.0	0.7	58.7	74.0	-15.3	H	P	
11.510	3.0	32.1	38.4	9.5	-35.8	0.0	0.7	44.9	54.0	-9.1	H	A	
17.265	3.0	34.4	41.8	12.2	-33.8	0.0	0.6	55.3	74.0	-18.7	H	P	
17.265	3.0	22.0	41.8	12.2	-33.8	0.0	0.6	42.9	54.0	-11.1	H	A	
5795 MHz HT40													
11.590	3.0	42.0	38.5	9.5	-35.8	0.0	0.7	55.0	74.0	-19.0	H	P	
11.590	3.0	28.9	38.5	9.5	-35.8	0.0	0.7	41.8	54.0	-12.2	H	A	
17.385	3.0	37.7	42.6	12.3	-33.8	0.0	0.6	59.4	74.0	-14.6	H	P	
17.385	3.0	25.0	42.6	12.3	-33.8	0.0	0.6	46.7	54.0	-7.3	H	A	
5795 MHz HT40													
11.590	3.0	44.3	38.5	9.5	-35.8	0.0	0.7	57.3	74.0	-16.7	V	P	
11.590	3.0	30.2	38.5	9.5	-35.8	0.0	0.7	43.2	54.0	-10.8	V	A	
17.385	3.0	36.2	42.6	12.3	-33.8	0.0	0.6	57.8	74.0	-16.2	V	P	
17.385	3.0	23.8	42.6	12.3	-33.8	0.0	0.6	45.5	54.0	-8.5	V	A	

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

8.3. RECEIVER ABOVE 1 GHz

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

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Project #: 11U13614
Date: 1/28/2011
Test Engineer: Tom Chen
Configuration: EUT with support Laptop PC
Mode: RX mode, 20MHz band width

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			RX RSS 210

Hi Frequency Cables

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

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.147	3.0	57.2	44.6	24.3	2.5	-39.3	0.0	0.0	44.8	32.2	74	54	-29.2	-21.8	V
1.500	3.0	51.4	42.3	25.5	2.9	-38.8	0.0	0.0	41.1	32.0	74	54	-32.9	-22.0	V
1.593	3.0	53.8	33.1	25.8	3.0	-38.6	0.0	0.0	44.0	23.3	74	54	-30.0	-30.7	V
1.120	3.0	49.5	33.5	24.3	2.5	-39.3	0.0	0.0	36.9	21.0	74	54	-37.1	-33.0	H
1.193	3.0	51.1	34.1	24.5	2.6	-39.2	0.0	0.0	38.9	22.0	74	54	-35.1	-32.0	H
1.593	3.0	55.7	32.8	25.8	3.0	-38.6	0.0	0.0	45.9	23.1	74	54	-28.1	-30.9	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		

8.3.2. RX ABOVE 1 GHz FOR 20 MHz BANDWIDTH IN THE 5.8 GHz BAND

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Project #: 11U13614
Date: 2/4/2011
Test Engineer: Tom Chen
Configuration: EUT with support Laptop PC
Mode: RX mode, HT20

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			RX RSS 210

Hi Frequency Cables

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

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.190	3.0	50.7	42.4	24.5	2.6	-39.2	0.0	0.0	38.5	30.2	74	54	-35.5	-23.8	V
1.590	3.0	49.3	40.1	25.8	3.0	-38.6	0.0	0.0	39.5	30.3	74	54	-34.5	-23.7	V
2.497	3.0	47.5	30.9	28.5	3.9	-37.5	0.0	0.0	42.4	25.8	74	54	-31.6	-28.2	V
1.590	3.0	47.9	31.3	25.8	3.0	-38.6	0.0	0.0	38.1	21.5	74	54	-35.9	-32.5	H
2.002	3.0	46.6	31.9	27.2	3.5	-38.1	0.0	0.0	39.2	24.5	74	54	-34.8	-29.5	H
2.497	3.0	47.2	30.6	28.5	3.9	-37.5	0.0	0.0	42.2	25.5	74	54	-31.8	-28.5	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		

8.3.3. RX ABOVE 1 GHz FOR 40 MHz BANDWIDTH IN THE 5.8 GHz BAND

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Project #: 11U13614
Date: 2/4/2011
Test Engineer: Tom Chen
Configuration: EUT with support Laptop PC
Mode: RX mode, HT40

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			RX RSS 210

Hi Frequency Cables

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

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.506	3.0	48.9	39.3	25.6	3.0	-38.8	0.0	0.0	38.6	29.0	74	54	-35.4	-25.0	V
1.590	3.0	49.6	37.0	25.8	3.0	-38.6	0.0	0.0	39.8	27.2	74	54	-34.2	-26.8	V
2.497	3.0	46.7	27.8	28.5	3.9	-37.5	0.0	0.0	41.6	22.7	74	54	-32.4	-31.3	V
1.306	3.0	57.2	35.5	24.9	2.7	-39.1	0.0	0.0	45.8	24.1	74	54	-28.2	-29.9	H
2.002	3.0	45.4	36.1	27.2	3.5	-38.1	0.0	0.0	38.0	28.7	74	54	-36.0	-25.3	H
2.497	3.0	46.4	34.8	28.5	3.9	-37.5	0.0	0.0	41.3	29.8	74	54	-32.7	-24.2	H

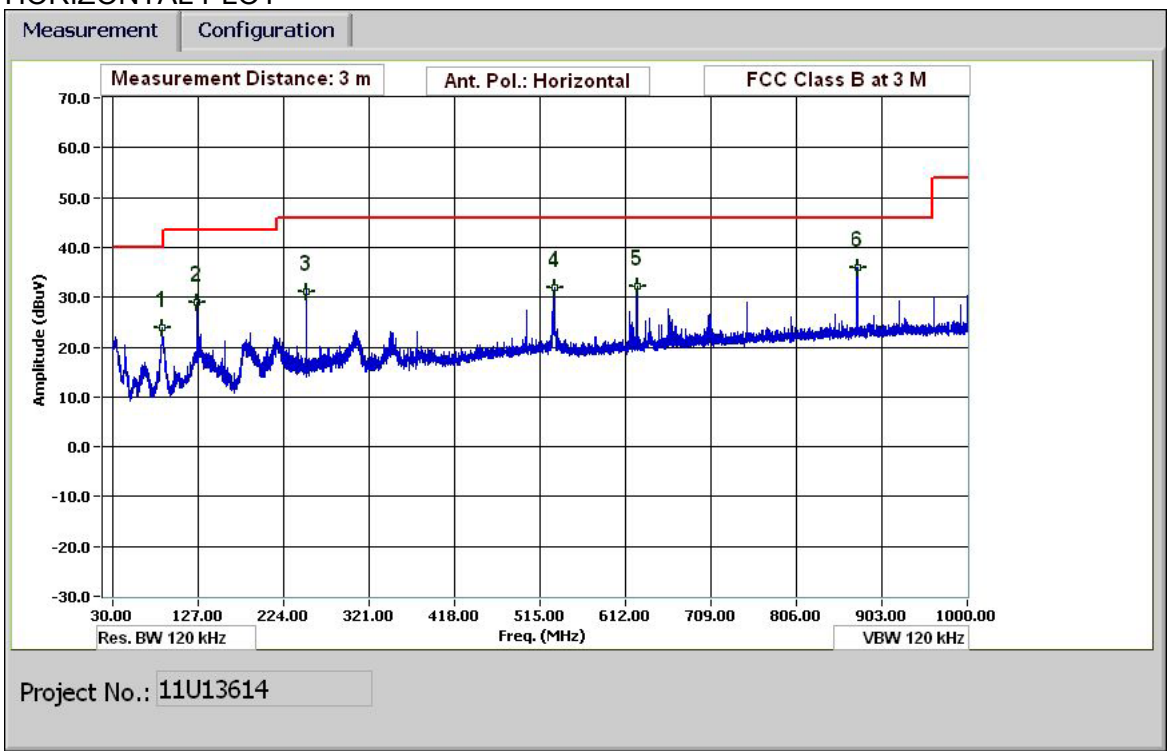
Rev. 07.22.09

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		

8.4. RADIATED BELOW 1 GHz

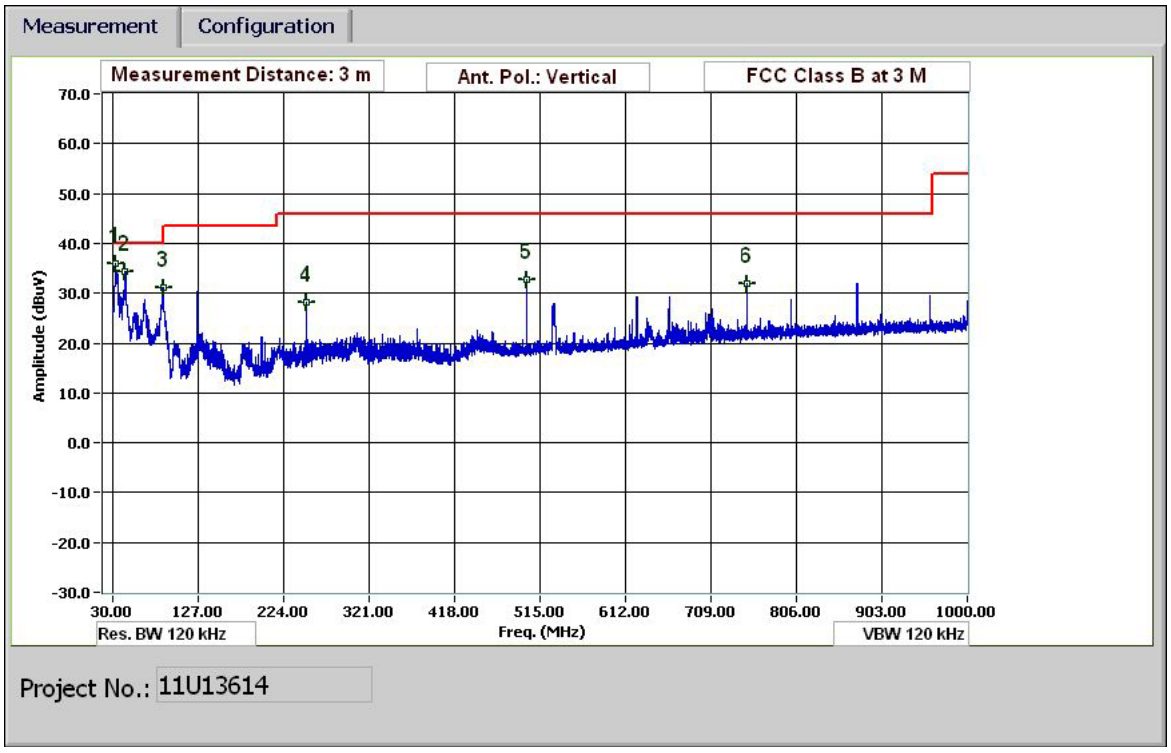
SPURIOUS EMISSIONS 30 TO 1000 MHz (DIGITAL DEVICE, HORIZONTAL)

HORIZONTAL PLOT



SPURIOUS EMISSIONS 30 TO 1000 MHz (DIGITAL DEVICE, VERTICAL)

VERTICAL PLOT



TABULATED DATA

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

Test Engr: Tom Chen
Date: 02/15/11
Project #: 11U13614
Test Target: FCC Class B
Mode Oper: TX mode, 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													
33.6	3.0	45.4	18.5	0.5	28.4	0.0	0.0	36.0	40.0	-4.0	V	P	
43.801	3.0	50.6	11.5	0.6	28.4	0.0	0.0	34.3	40.0	-5.7	V	P	
86.882	3.0	51.3	7.5	0.8	28.3	0.0	0.0	31.2	40.0	-8.8	V	P	
250.089	3.0	43.2	11.8	1.4	28.2	0.0	0.0	28.1	46.0	-17.9	V	P	
500.059	3.0	41.7	16.7	2.0	27.8	0.0	0.0	32.6	46.0	-13.4	V	P	
750.03	3.0	36.5	20.3	2.5	27.3	0.0	0.0	32.0	46.0	-14.0	V	P	
Horizontal													
86.642	3.0	43.8	7.5	0.8	28.3	0.0	0.0	23.8	40.0	-16.2	H	P	
125.044	3.0	42.6	13.7	1.1	28.3	0.0	0.0	29.1	43.5	-14.4	H	P	
250.089	3.0	46.1	11.8	1.4	28.2	0.0	0.0	31.1	46.0	-14.9	H	P	
531.261	3.0	40.4	17.3	2.1	27.7	0.0	0.0	32.0	46.0	-14.0	H	P	
625.105	3.0	38.5	18.7	2.3	27.4	0.0	0.0	32.1	46.0	-13.9	H	P	
875.075	3.0	39.3	21.6	2.8	27.7	0.0	0.0	36.0	46.0	-10.0	H	P	

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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

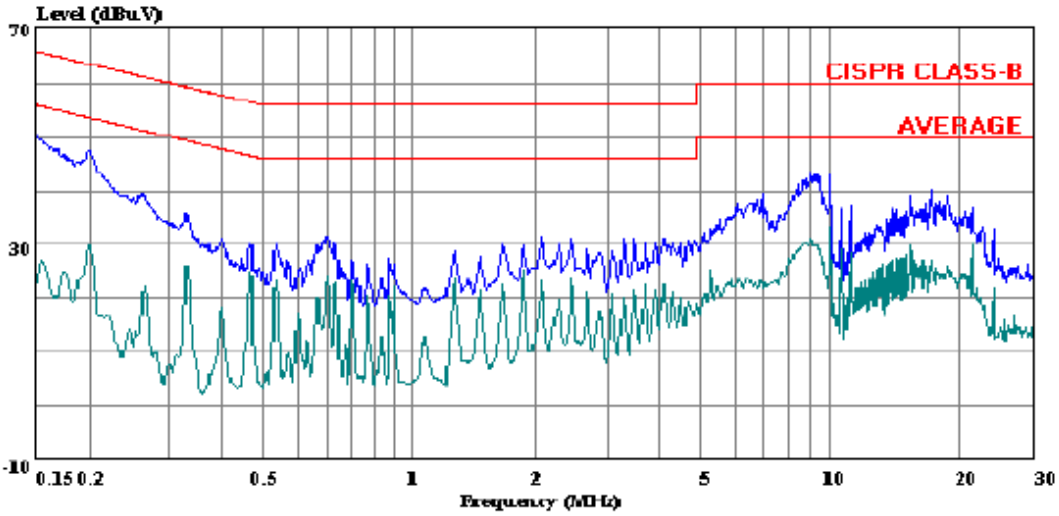
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.16	48.71	--	25.62	0.00	65.62	55.62	-16.91	-30.00	L1
0.20	47.44	--	29.89	0.00	63.69	53.69	-16.25	-23.80	L1
9.35	42.94	--	29.99	0.00	60.00	50.00	-17.06	-20.01	L1
0.16	48.66	--	23.74	0.00	65.73	55.73	-17.07	-31.99	L2
0.20	46.80	--	30.58	0.00	63.69	53.69	-16.89	-23.11	L2
9.45	43.12	--	28.56	0.00	60.00	50.00	-16.88	-21.44	L2
6 Worst Data									

LINE 1 RESULTS

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

Data#: 7 File#: 11U13614-LC.EMI Date: 02-15-2011 Time: 19:33:12



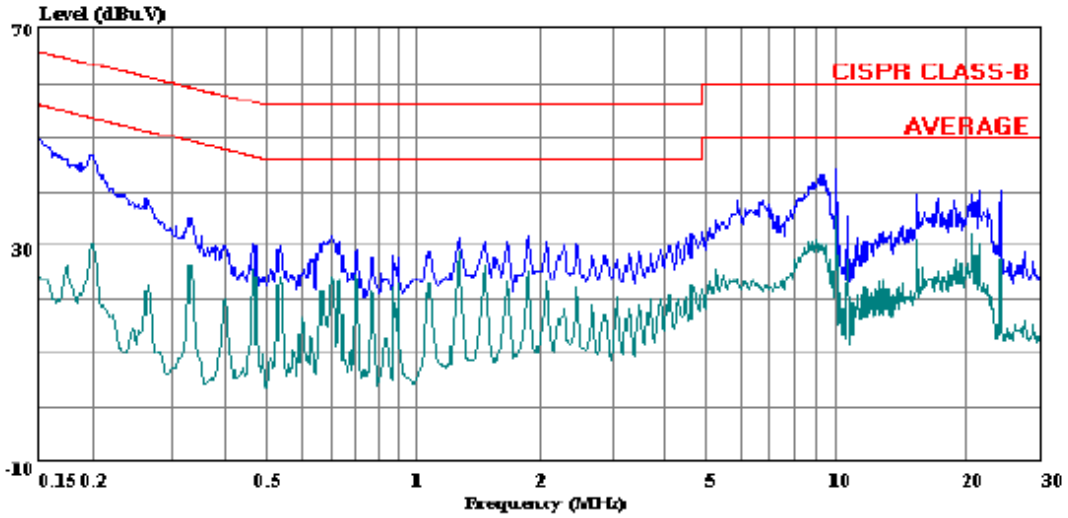
Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: Tom Chen
Project # : 11U13614
Configuration: EUT with AC adapter & support laptop PC
Mode : TX mode worst case
Target : FCC Class B
Voltage : 115 VAC / 60 Hz
: L1: (Peak: Blue, Average: Green)

LINE 2 RESULTS

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

Data#: 14 File#: 11U13614-LC.EMI Date: 02-15-2011 Time: 19:50:55



Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: Tom Chen
Project # : 11U13614
Configuration: EUT with AC adapter & support laptop PC
Mode : TX mode worst case
Target : FCC Class B
Voltage : 115 VAC / 60 Hz
: L2: (Peak: Blue, Average: Green)

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	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

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

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

EQUATIONS

Power density is given by:

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

where

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

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

Distance is given by:

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

where

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

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

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

where

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

For multiple colocated transmitters operating simultaneously in frequency bands where different limits apply, a fraction of the exposure limit is established for each band, such that the sum of the fractions is less than or equal to one.

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

LIMITS

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

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

RESULTS

Multiple chain or colocated transmitters									
Band	**Mode**	**Chain for MIMO**	**Separation Distance (m)**	**Output AV Power (dBm)**	**Antenna Gain (dBi)**	**EIRP (dBm)**	**EIRP (W)**	**IC Power Density (W/m^2)**	**FCC Power Density (mW/cm^2)**
2.4 GHz	Bluetooth	N/A		N/A	N/A	N/A	N/A		
2.4 GHz	WLAN	1		19.40	1.41	20.81	0.12		
2.4 GHz	WLAN	2		19.60	2.33	21.93	0.16		
2.4 GHz	WLAN	3		19.60	1.83	21.43	0.14		
Combined			0.20				0.42	0.83	0.083

Multiple chain or colocated transmitters									
Band	**Mode**	**Chain for MIMO**	**Separation Distance (m)**	**Output AV Power (dBm)**	**Antenna Gain (dBi)**	**EIRP (dBm)**	**EIRP (W)**	**IC Power Density (W/m^2)**	**FCC Power Density (mW/cm^2)**
2.4 GHz	Bluetooth	N/A		N/A	N/A	N/A	N/A		
5.8 GHz	WLAN	1		13.80	1.74	15.54	0.04		
5.8 GHz	WLAN	2		13.20	2.97	16.17	0.04		
5.8 GHz	WLAN	3		12.90	2.67	15.57	0.04		
Combined			0.20				0.11	0.23	0.023