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

CERTIFICATION TEST REPORT

FOR

802.11agn 3x3 MIMO PCIe Mini Card

MODEL NUMBER: WPEA-127N

FCC ID: ZZ6-AR5BXB112
IC: 9909A-AR5BXB112

REPORT NUMBER: 11U13957-1, Revision C

ISSUE DATE: December 20, 2011

Prepared for
VARIAN MEDICAL SYSTEMS, INC. X-RAY PRODUCTS
1678 SOUTH PIONEER ROAD
SALT LAKE CITY, UT 84104

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	11/08/11	Initial Issue	F. Ibrahim
A	12/15/11	Revised section 8.2.2	F. Ibrahim
B	12/19/11	Added MPE section	F. Ibrahim
C	12/20/11	Updated effective antenna gain in the output power sections for MCS0 data rates.	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Varian Medial Systems, Inc. X-Ray Products
1678 South Pioneer Road
Salt Lake City, UT 84104

EUT DESCRIPTION: 802.11agn 3x3 MIMO PCIe Mini Card

MODEL: WPEA-127N

SERIAL NUMBER: 11735M1100680

DATE TESTED: SEPTEMBER 20 – DECEMBER 15, 2011

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

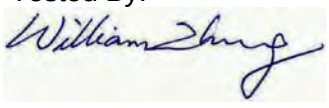
Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties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

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

Approved & Released For UL CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

Tested By:



WILLIAM ZHUANG
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/g/n 3x3 MIMO transceiver 3x3 module.

The radio module is manufactured by SparkLAN.

5.2. MAXIMUM OUTPUT POWER

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

2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11g CDD 9Mbps	26.57	453.94
2412 - 2462	802.11n HT20 CDD MCS0	26.26	422.67
2412 - 2462	802.11n HT20 CDD MCS8	27.14	517.61
2412 - 2462	802.11n HT20 CDD MCS16	26.57	453.94
2422 - 2452	802.11n HT40 CDD MCS0	21.96	157.04
2422 - 2452	802.11n HT40 CDD MCS8	22.71	186.64
2422 - 2452	802.11n HT40 CDD MCS16	22.32	170.61

5725 to 5850 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5745 - 5825	802.11a CDD 9Mbps	24.06	254.68
5745 - 5825	802.11n HT20 CDD MCS0	23.67	232.81
5745 - 5825	802.11n HT20 CDD MCS8	24.82	303.39
5745 - 5825	802.11n HT20 CDD MCS16	24.05	254.10
5755 - 5795	802.11n HT40 CDD MCS0	21.97	157.40
5755 - 5795	802.11n HT40 CDD MCS8	22.56	180.30
5755 - 5795	802.11n HT40 CDD MCS16	22.50	177.83

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The EUT can be used with the following antennas:

- Monopole Antenna with the following gains:

2.4 GHz band = 4 dBi
5.2 GHz band = 5 dBi
5.8 GHz band = 4.5 dBi

- Fractal/stacked-patch Antenna with the following gains:

2.4 GHz band = -6 dBi
5.2 GHz band =3 dBi
5.8 GHz band = -1 dBi

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Atheros AR9300 Anwi Diagostic Kernel.

The test utility software used during testing was Atheros Radio Test 2(ART2-GUI), rev.2.3.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power, radiated emissions below 1 GHz and power line conducted emissions were performed with the EUT set to transmit at the channel with highest output power.

The Monopole antenna was set to a fixed orientation which is the normal way it is oriented (vertical orientation).

The Fractal antenna was initially assessed in each of three axes of orientation (X, Y and Z) and it was found that the antenna in the Y orientation is worst-case orientation. See the setup photographs for an indication of the antennas orientations.

Worst-case data rates as provided by the client that were used for the testing are as follows:

2.4 GHz Band:
802.11g CDD 20M, 9 Mbps
802.11n HT20 1 Stream CDD, MCS0
802.11n HT20 2 Streams CDD, MCS8
802.11n HT20 3 Streams CDD, MCS16
802.11n HT40 1 Stream CDD, MCS0
802.11n HT40 2 Streams CDD, MCS8
802.11n HT40 3 Streams CDD, MCS16

5.2 GHz Band:
802.11a CDD 20M, 9 Mbps
802.11n HT20 1 Stream CDD, MCS0
802.11n HT20 2 Streams CDD, MCS8
802.11n HT20 3 Streams CDD, MCS16
802.11n HT40 1 Stream CDD, MCS0
802.11n HT40 2 Streams CDD, MCS8
802.11n HT40 3 Streams CDD, MCS16

5.8 GHz Band:
802.11a CDD 20M, 9 Mbps
802.11n HT20 1 Stream CDD, MCS0
802.11n HT20 2 Streams CDD, MCS8
802.11n HT20 3 Streams CDD, MCS16
802.11n HT40 1 Stream CDD, MCS0
802.11n HT40 2 Streams CDD, MCS8
802.11n HT40 3 Streams CDD, MCS16

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	IBM	T43p	L3-BY957	DoC
AC Adapter	IBM	08K8204	11S08K8204Z1Z6V3BW5ND	N/A
Express Card Adapter	N/A	N/A	N/A	N/A
MiniPCIe Card Adapter	N/A	E204460	2000023185	N/A
HDMI Cable	N/A	N/A	N/A	N/A

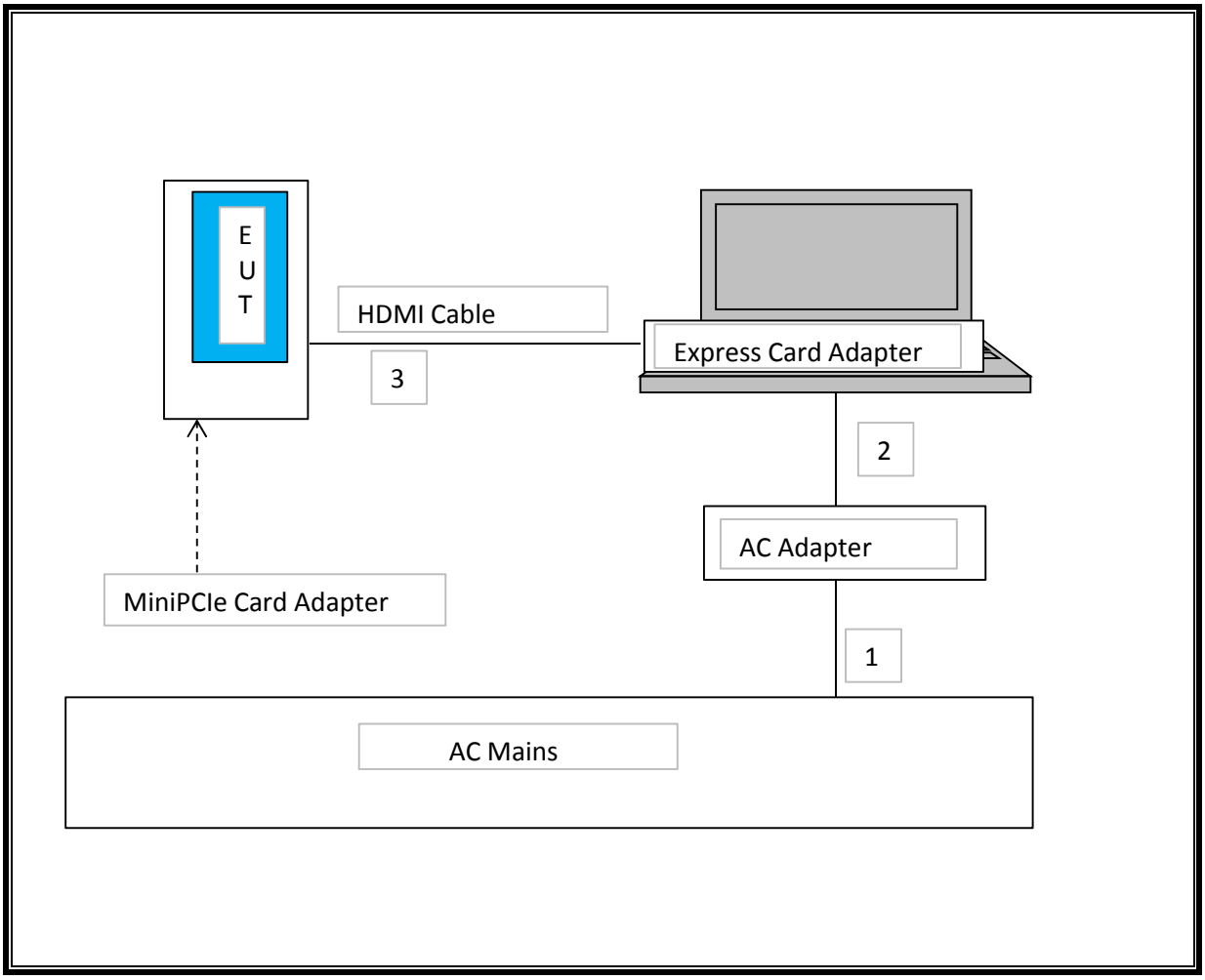
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-Shielded	1.5m	
2	DC	1	DC	Un-Shielded	1.5m	
3	HDMI	1	HDMI	Shielded	25cm	

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**Asset**	**Cal Date**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	12/17/10	12/17/12
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/30/10	08/30/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	07/12/10	07/16/12
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/10	06/29/12
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	01/29/10	07/29/12
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	06/29/10	06/14/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/27/11	01/27/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/14/10	01/27/12
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	07/14/10	8/2/2012
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/10	11/10/11
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR	CNR
Reject Filter, 5.725-5.825 GHz	Micro-Tronics	BRC13192	N02676	CNR	CNR
Power Meter	HP	437B	CCS-154	07/29/11	10/29/12
Power Sensor, 18 GHz	HP	8481A	CCS-157	07/29/11	10/29/12

7. ANTENNA PORT TEST RESULTS

7.1. 802.11g 3TX 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.

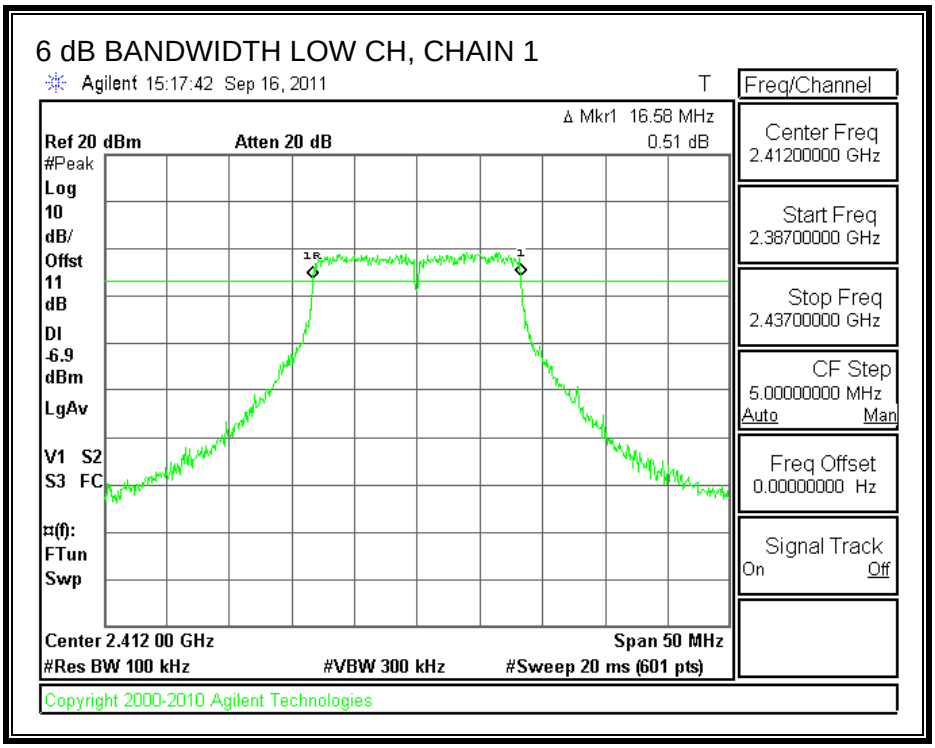
TEST PROCEDURE

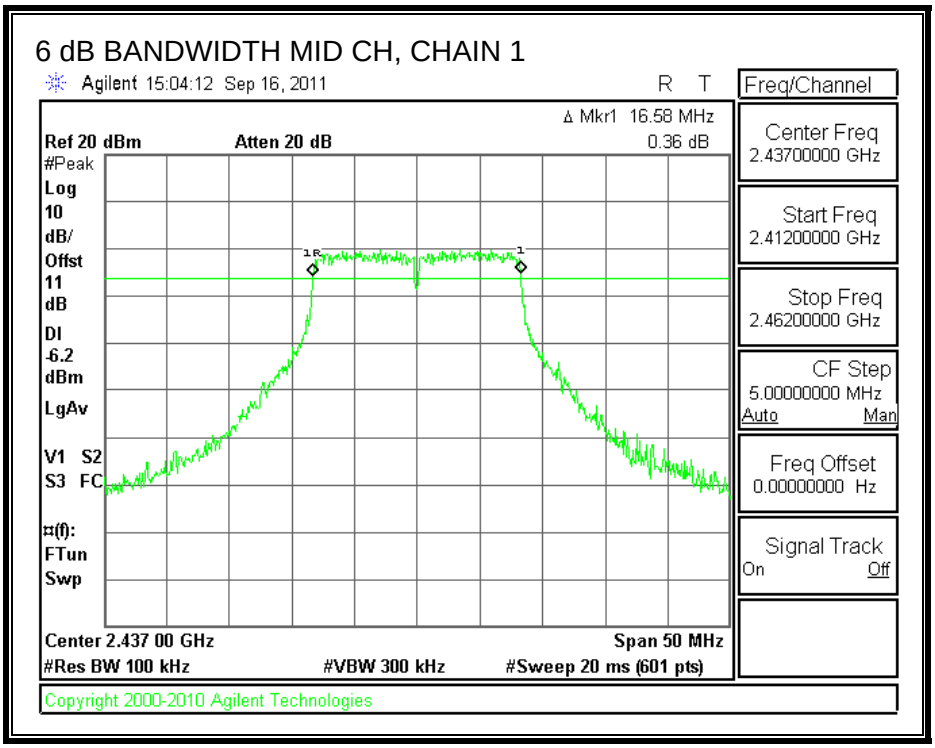
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

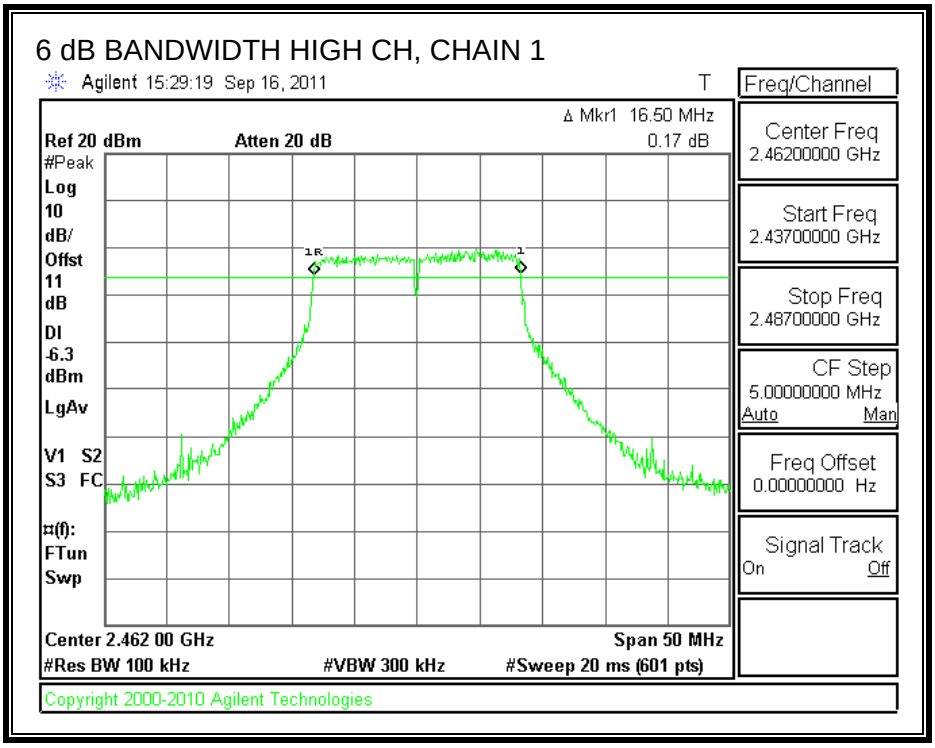
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Chain 3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	16.58	16.58	16.58	0.5
Middle	2437	16.58	16.58	16.58	0.5
High	2462	16.50	16.58	16.58	0.5

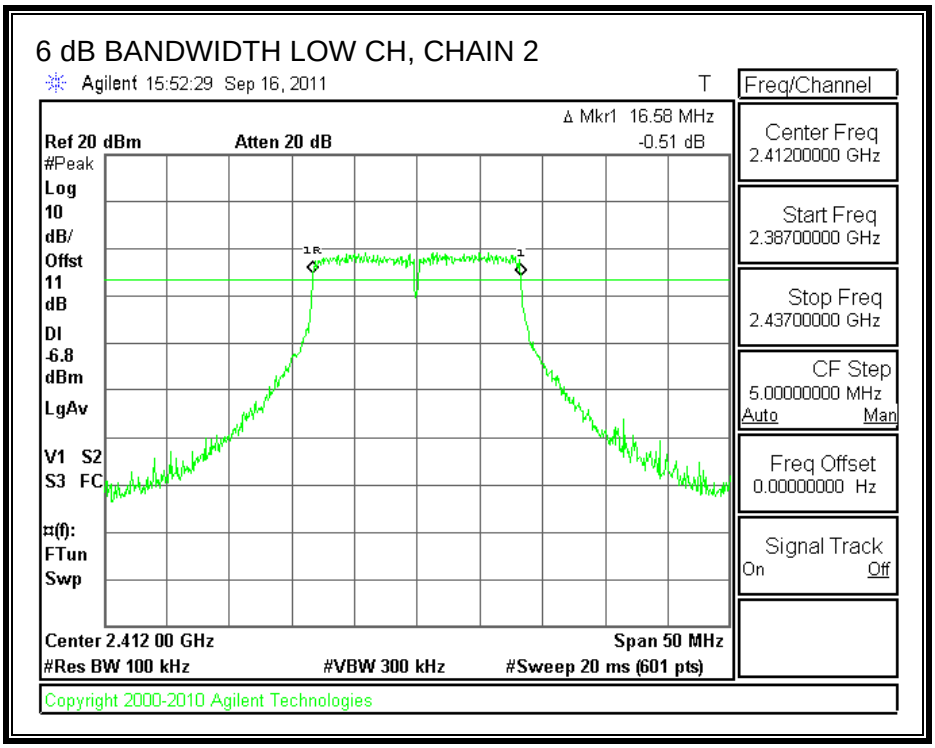
6 dB BANDWIDTH, CHAIN 1

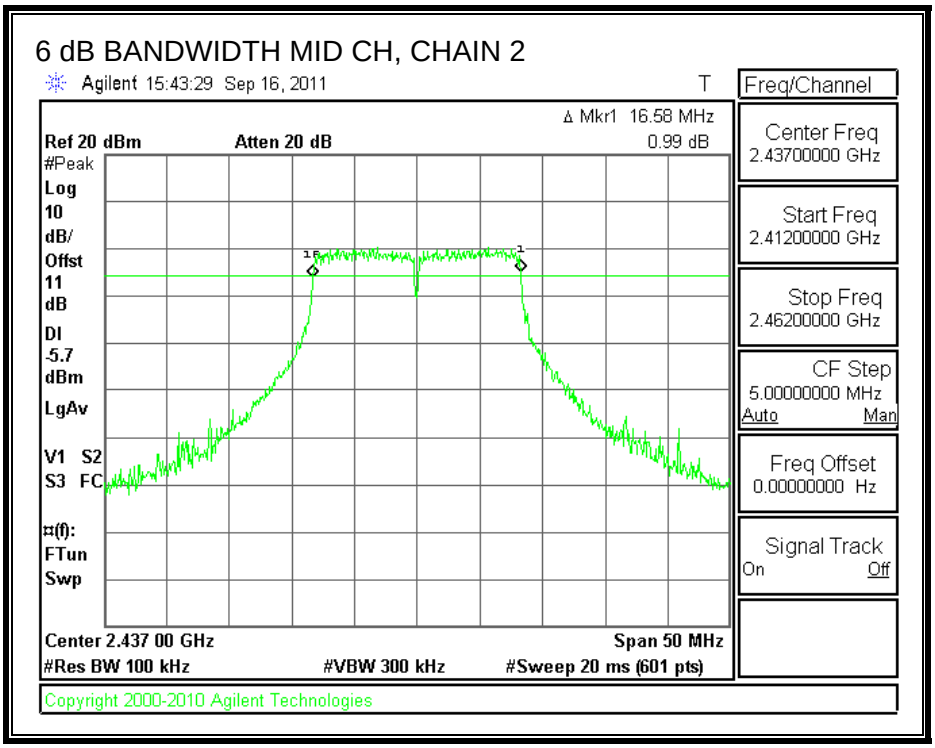


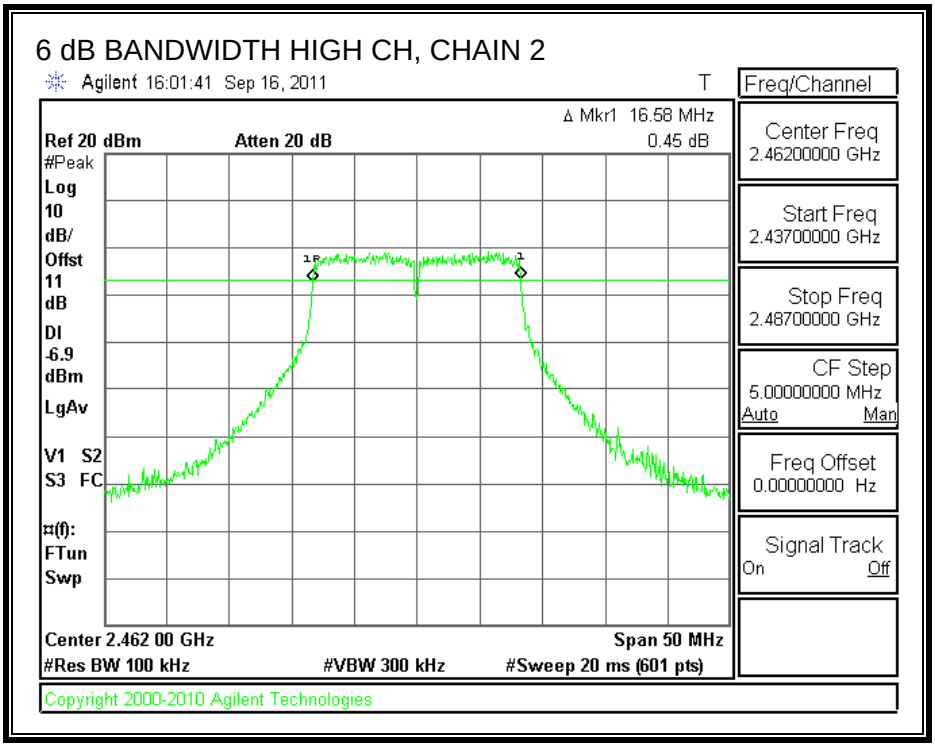




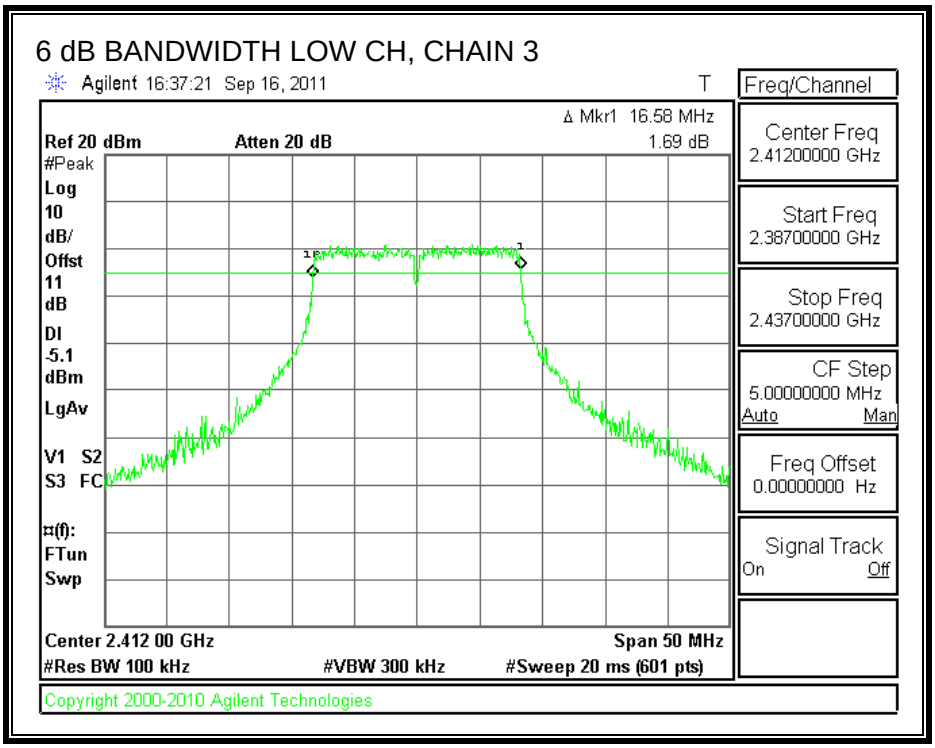
6 dB BANDWIDTH, CHAIN 2

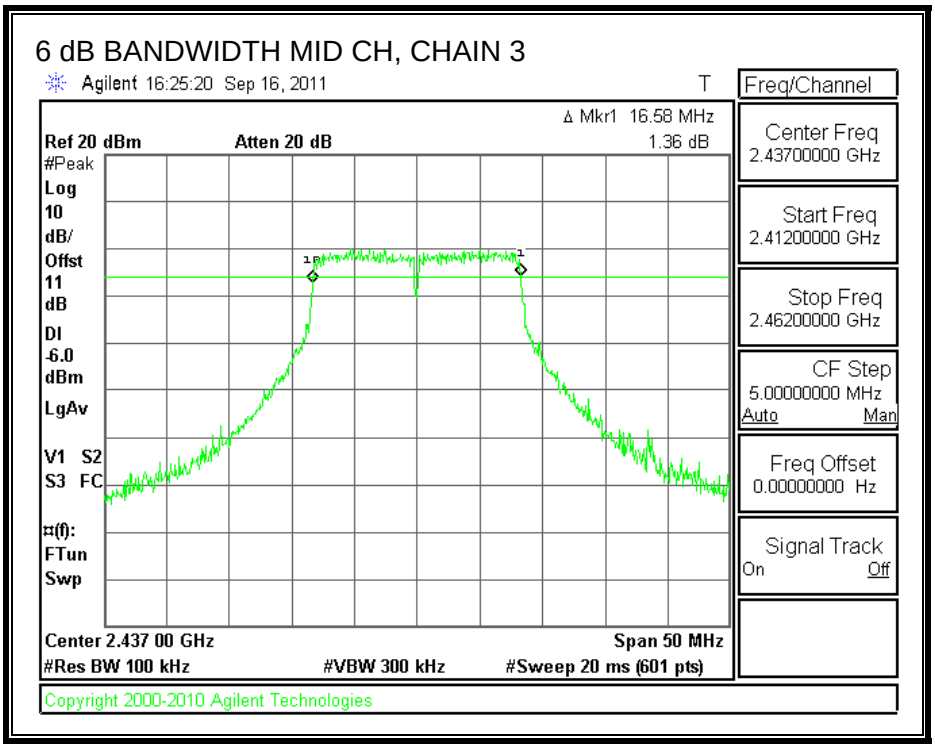


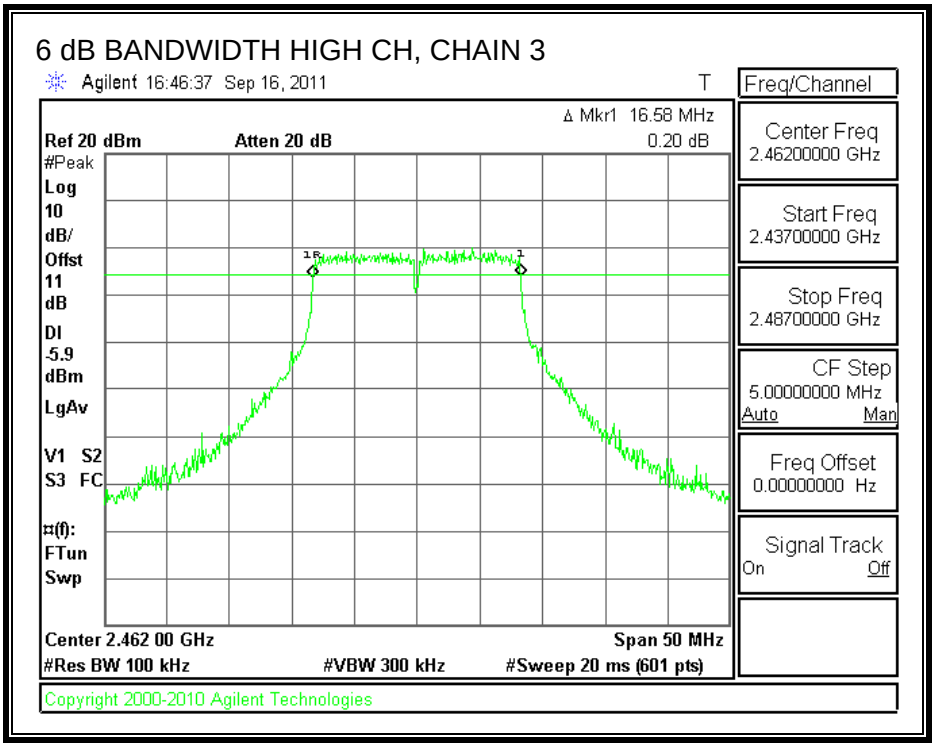




6 dB BANDWIDTH, CHAIN 3







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

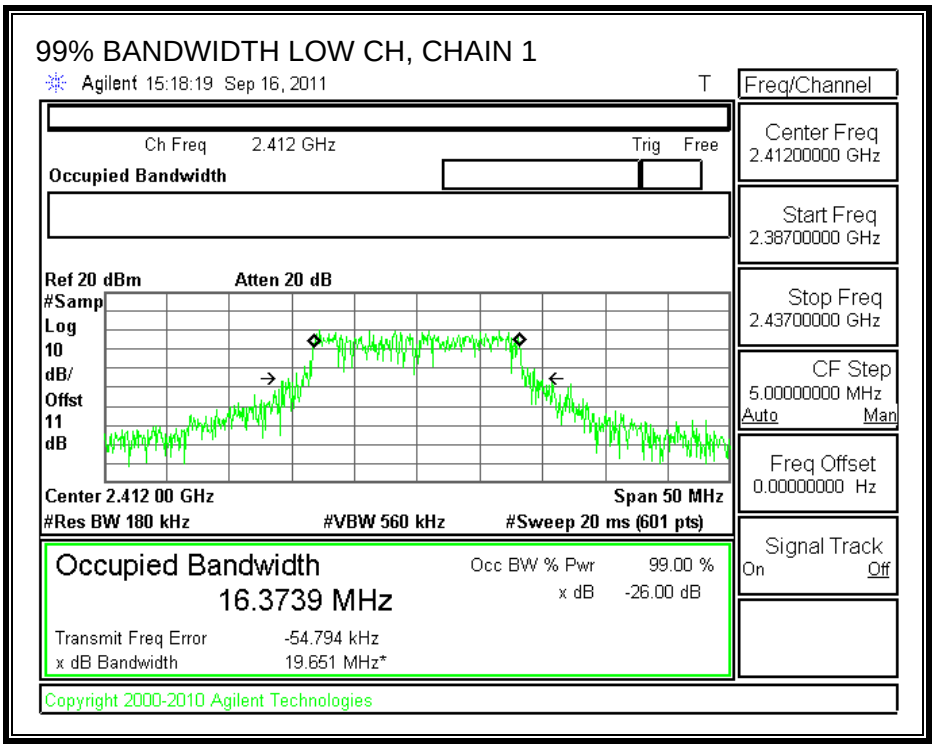
TEST PROCEDURE

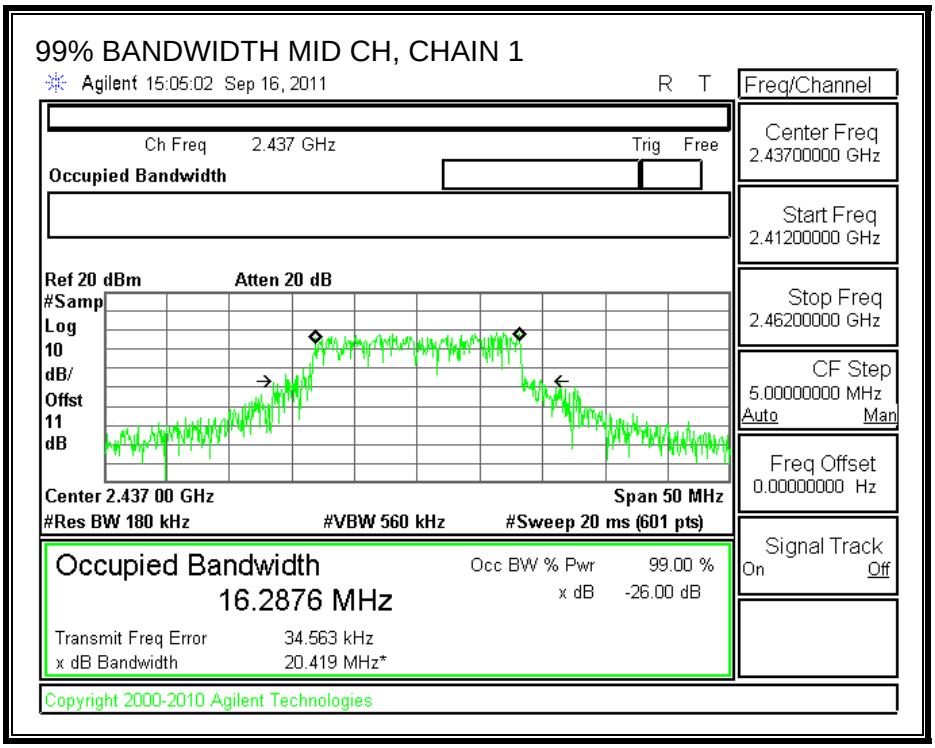
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

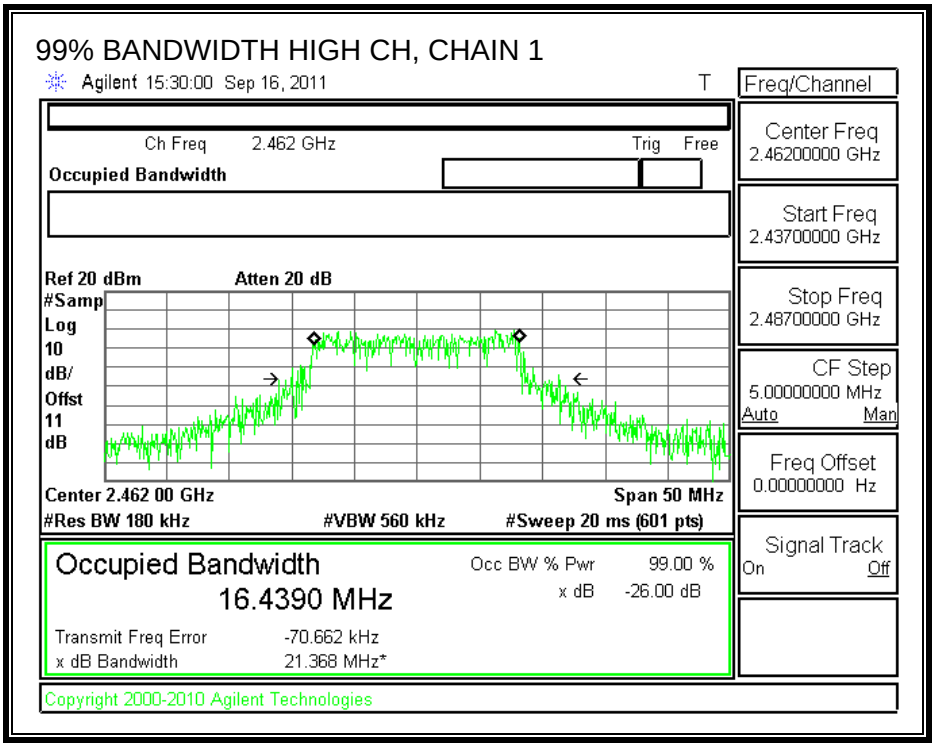
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)	Chain 3 99% Bandwidth (MHz)
Low	2412	16.3739	16.4376	16.4514
Middle	2437	16.2876	16.4760	16.4123
High	2462	16.4390	16.5378	16.4302

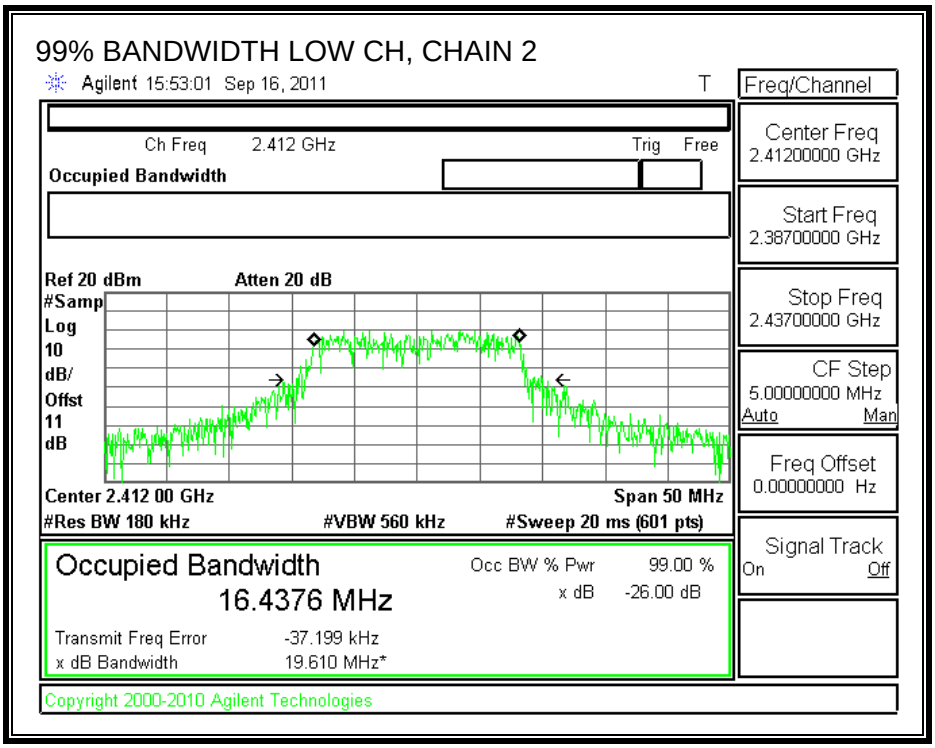
99% BANDWIDTH, CHAIN 1

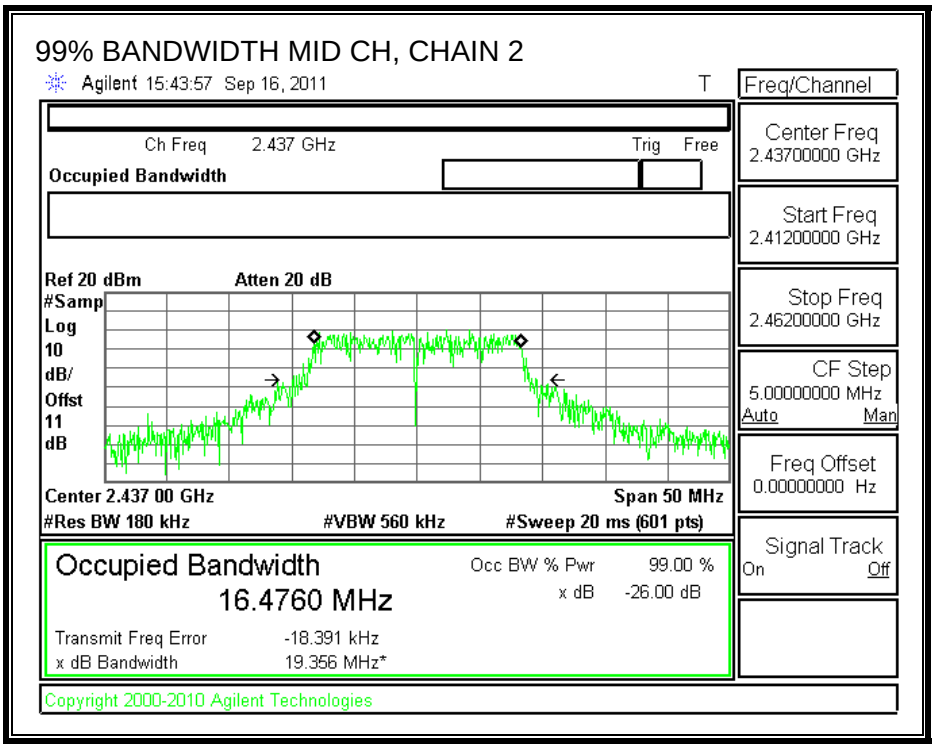


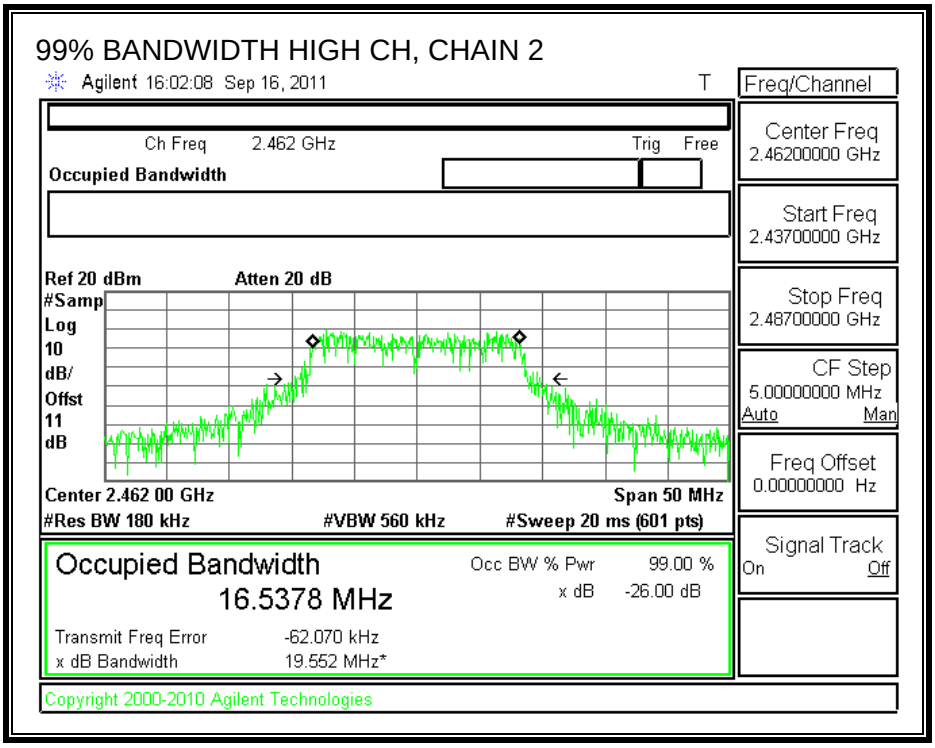




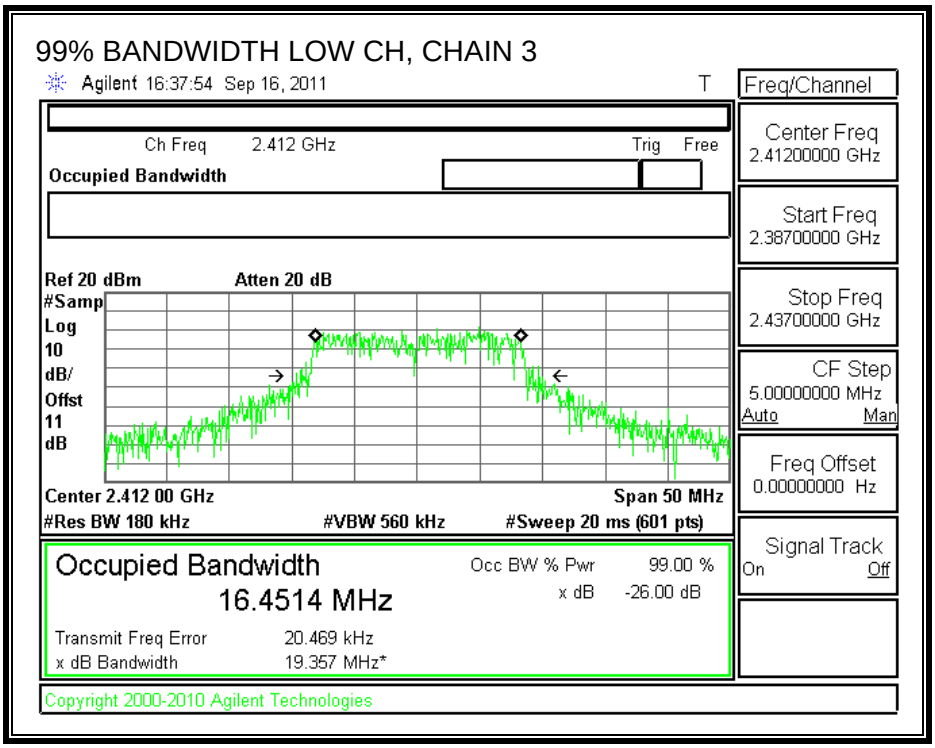
99% BANDWIDTH, CHAIN 2

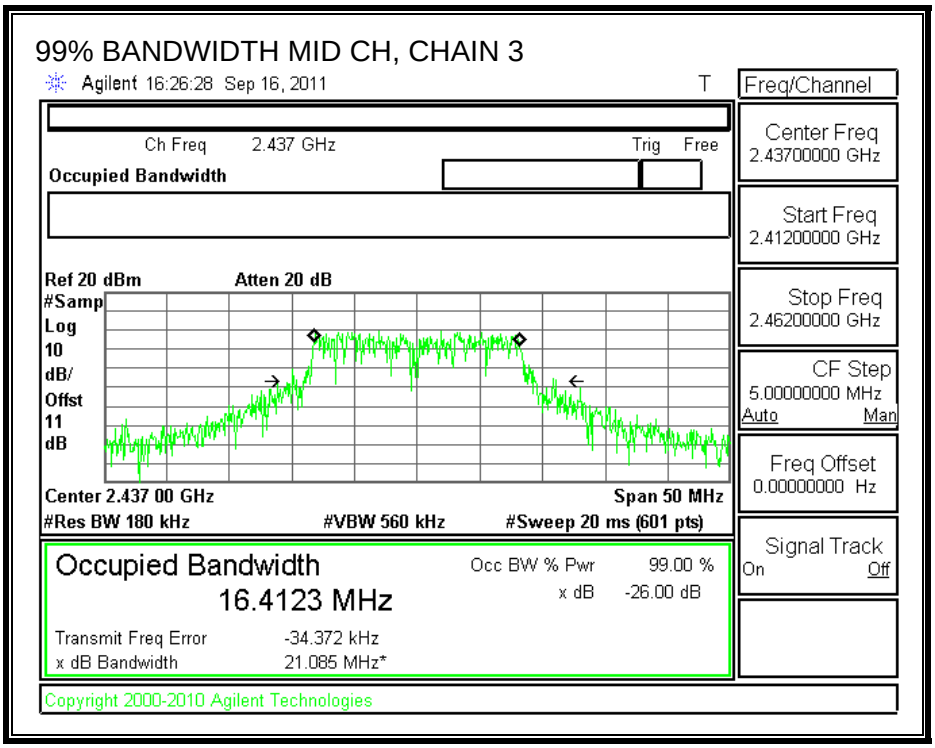


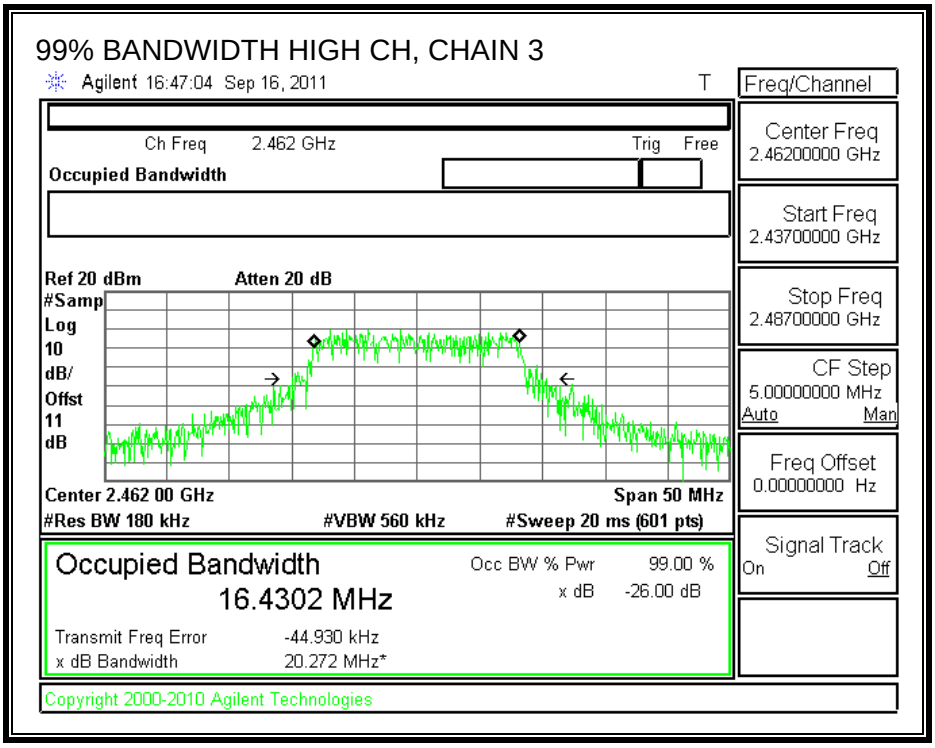




99% BANDWIDTH, CHAIN 3







7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
4	4.77	8.77

The maximum effective legacy gain is 8.77 dBi for other than fixed, point-to-point operations, therefore the limit is 27.23 dBm.

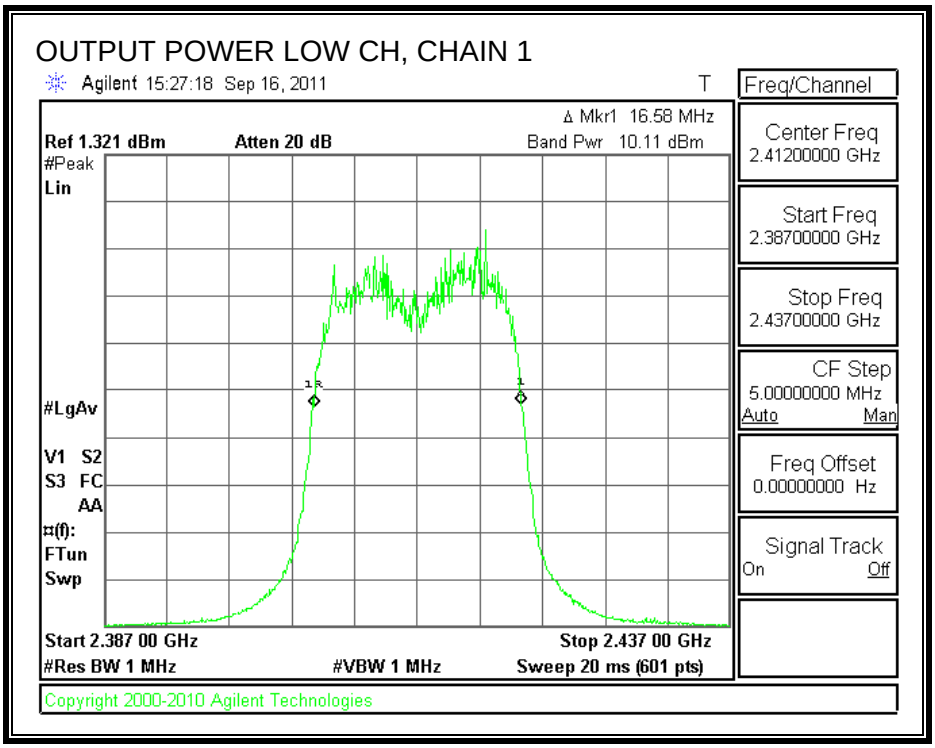
TEST PROCEDURE

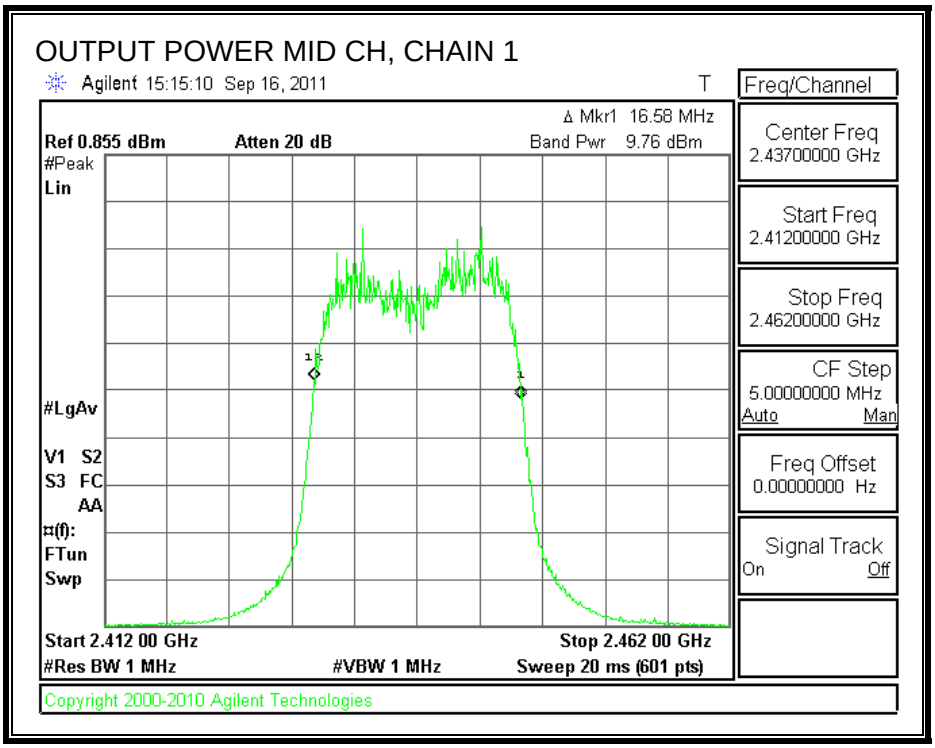
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

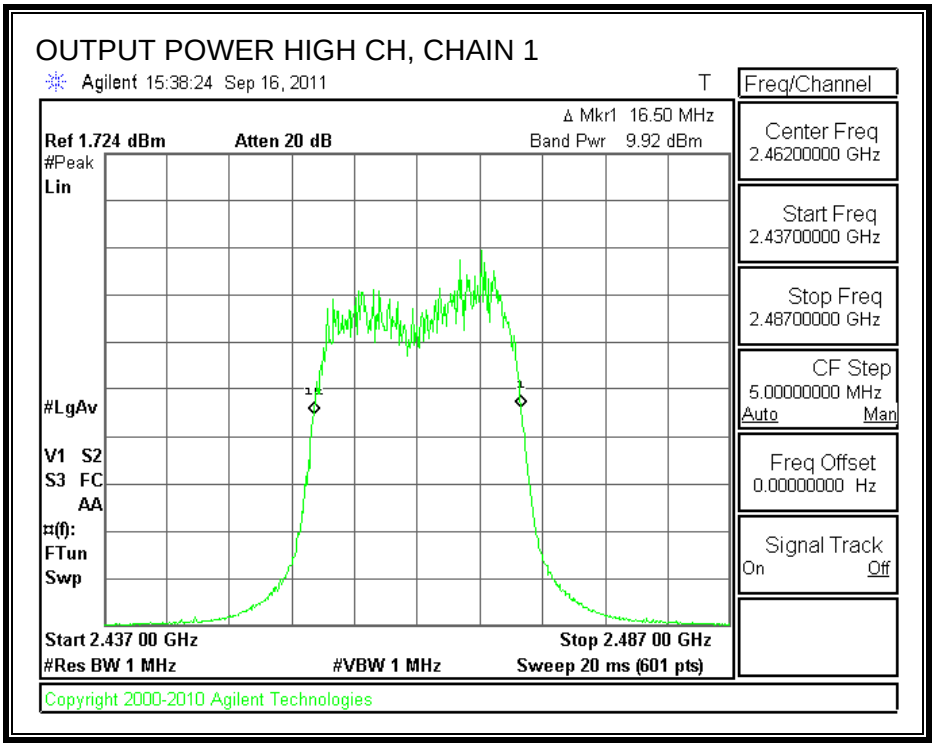
RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Chain 3 PK Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	10.11	10.60	11.55	11.00	26.57	27.23	-0.66
Mid	2437	9.76	10.58	11.00	11.00	26.25	27.23	-0.98
High	2462	9.92	10.48	11.18	11.00	26.33	27.23	-0.90

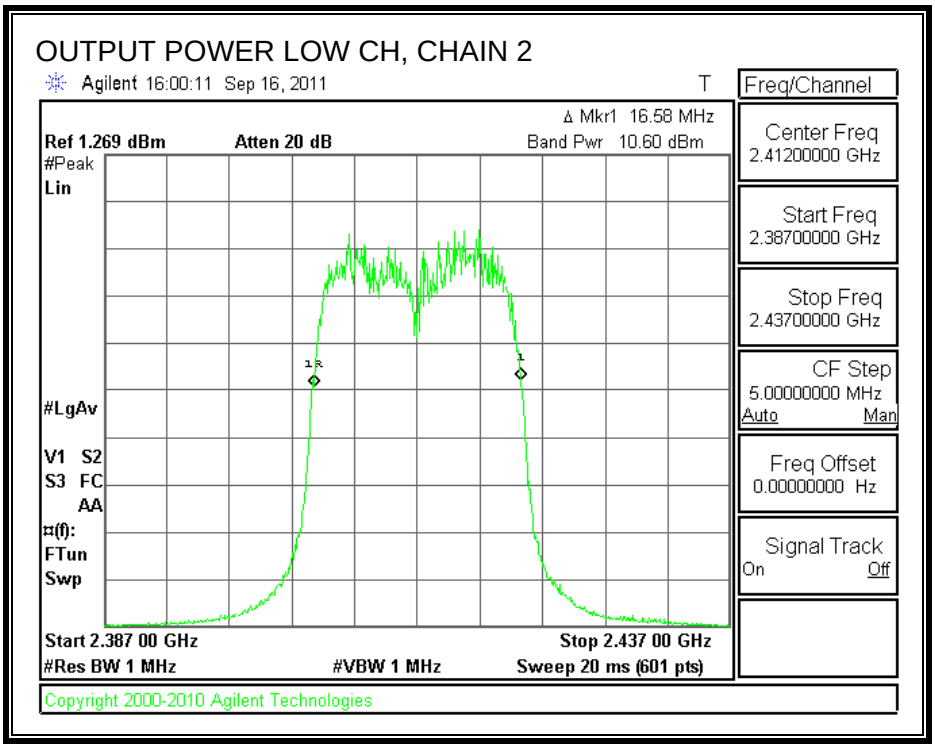
CHAIN 1 OUTPUT POWER

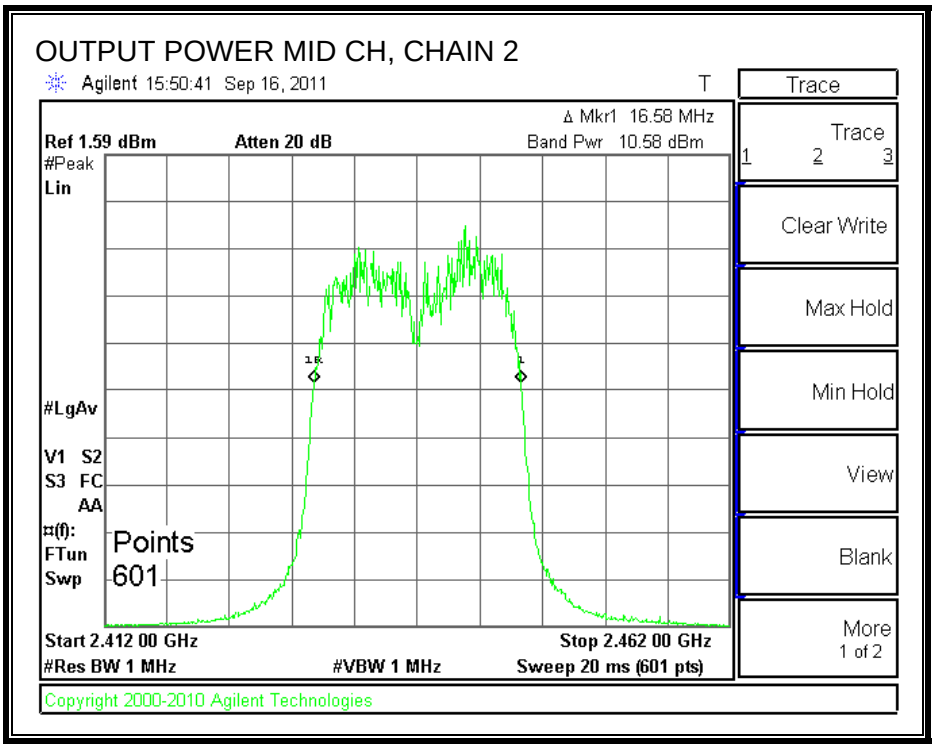


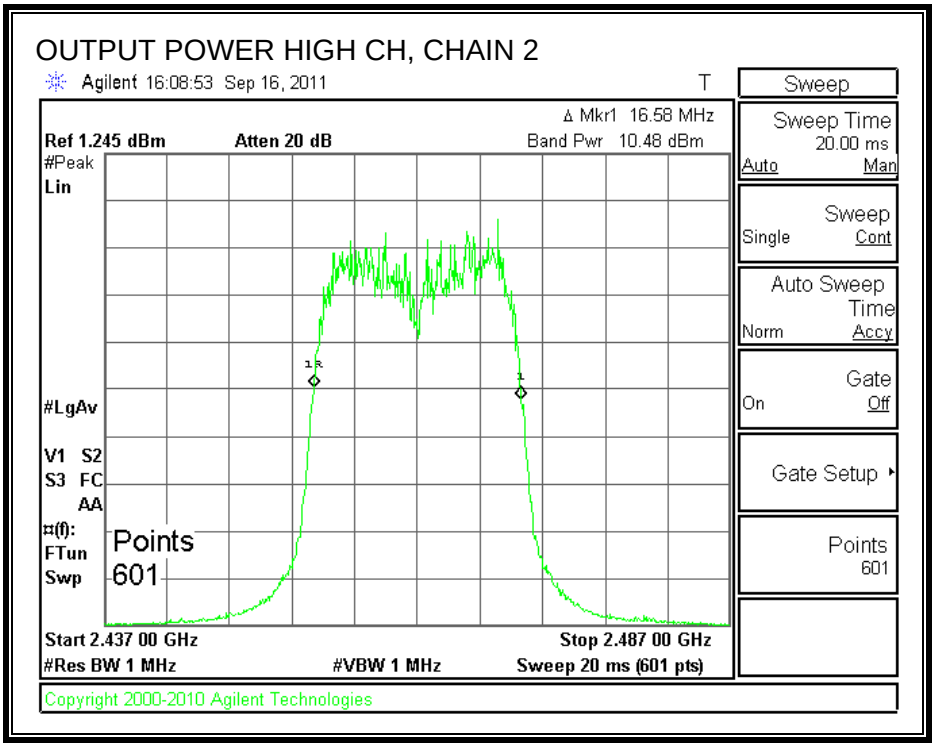




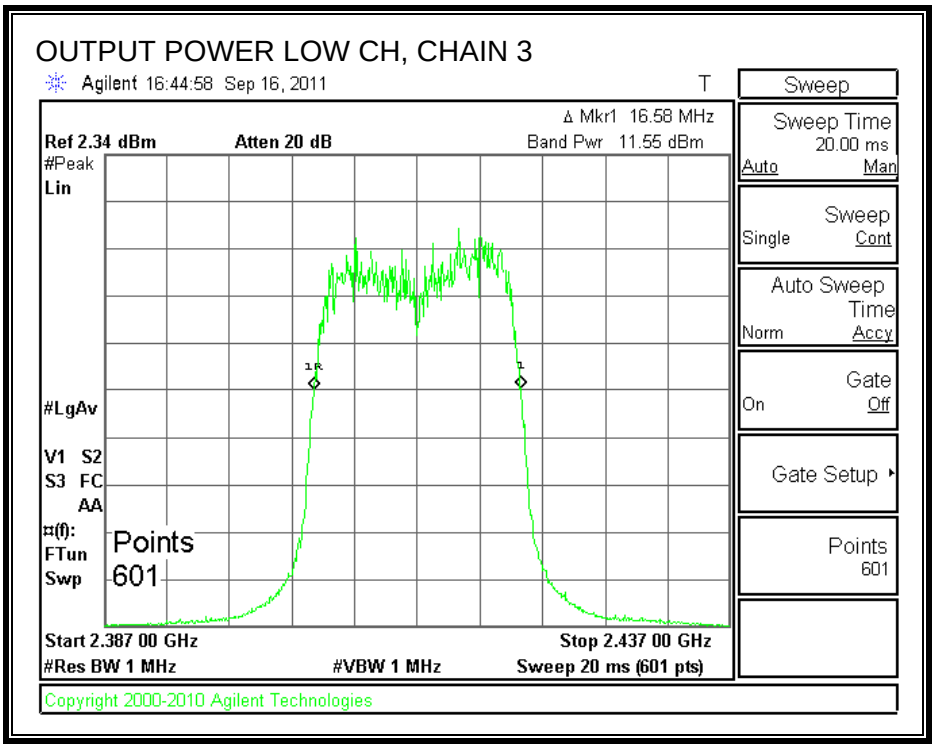
CHAIN 2 OUTPUT POWER

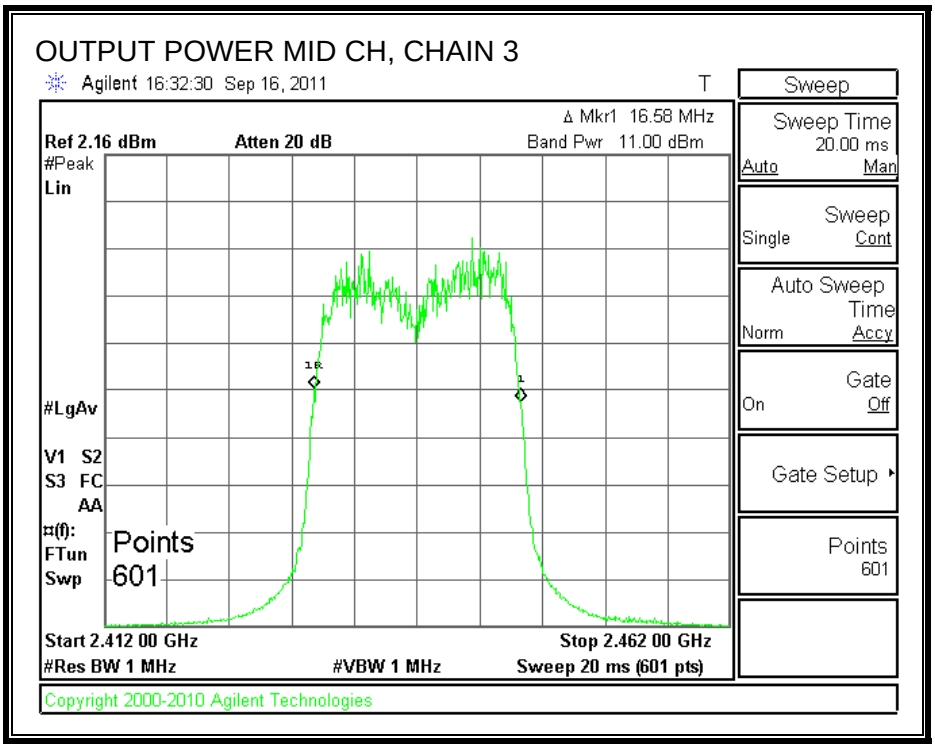


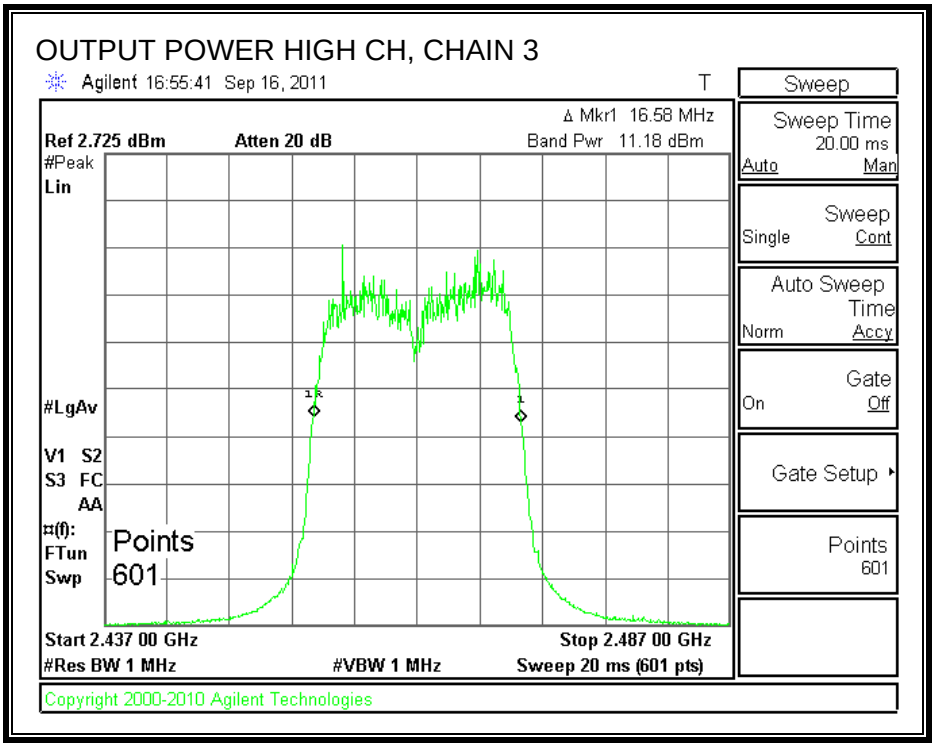




CHAIN 3 OUTPUT POWER







7.1.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1.0 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	2412	13.40	13.40	13.40	18.17
Middle	2437	13.40	13.40	13.40	18.17
High	2462	13.60	13.60	13.60	18.37

7.1.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

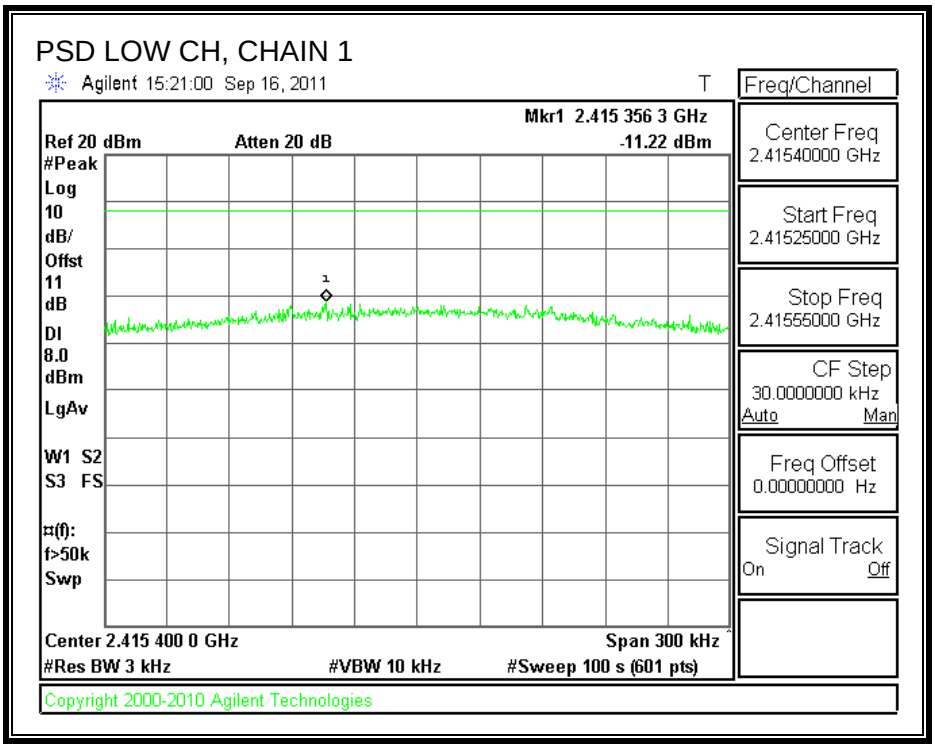
TEST PROCEDURE

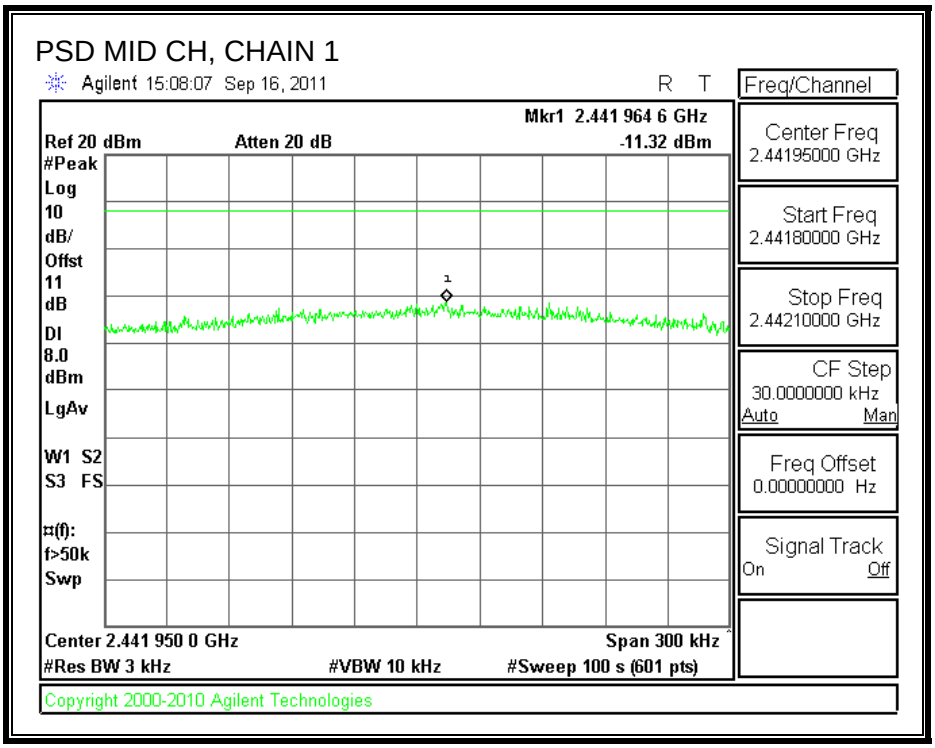
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

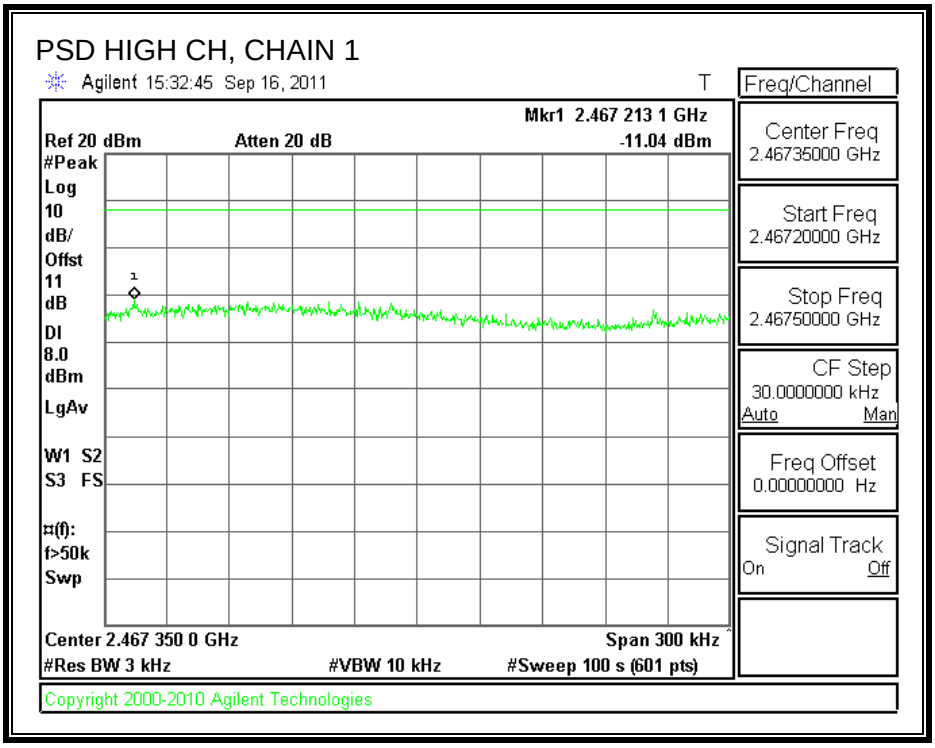
RESULTS

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-11.22	-11.71	-10.84	-6.47	8	-14.47
Middle	2437	-11.32	-11.00	-10.88	-6.29	8	-14.29
High	2462	-11.04	-12.24	-11.83	-6.90	8	-14.90

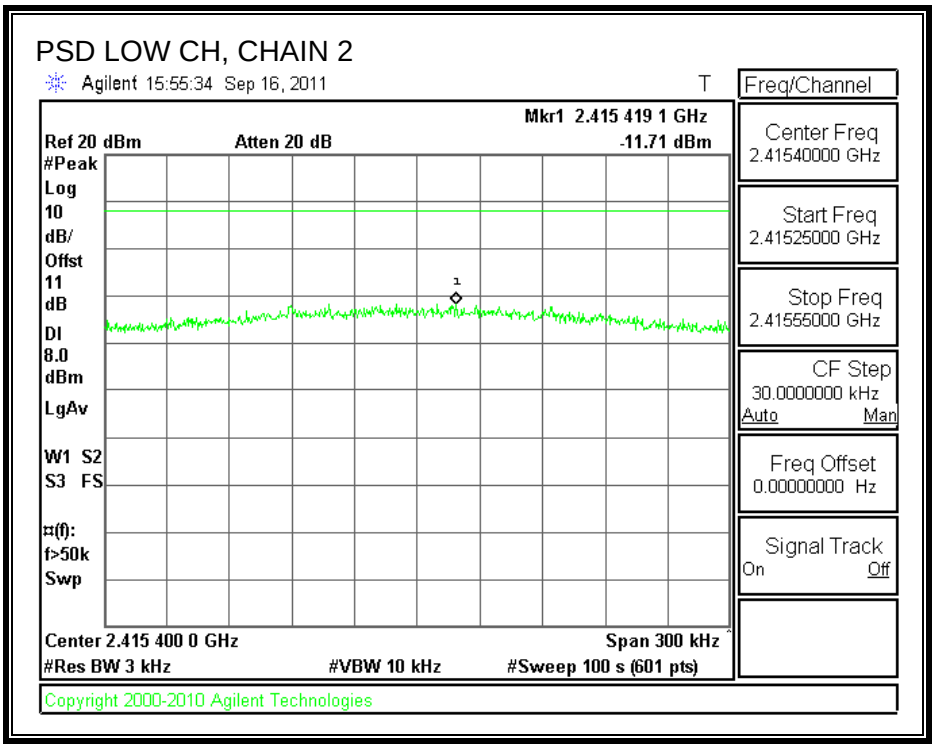
POWER SPECTRAL DENSITY, CHAIN 1

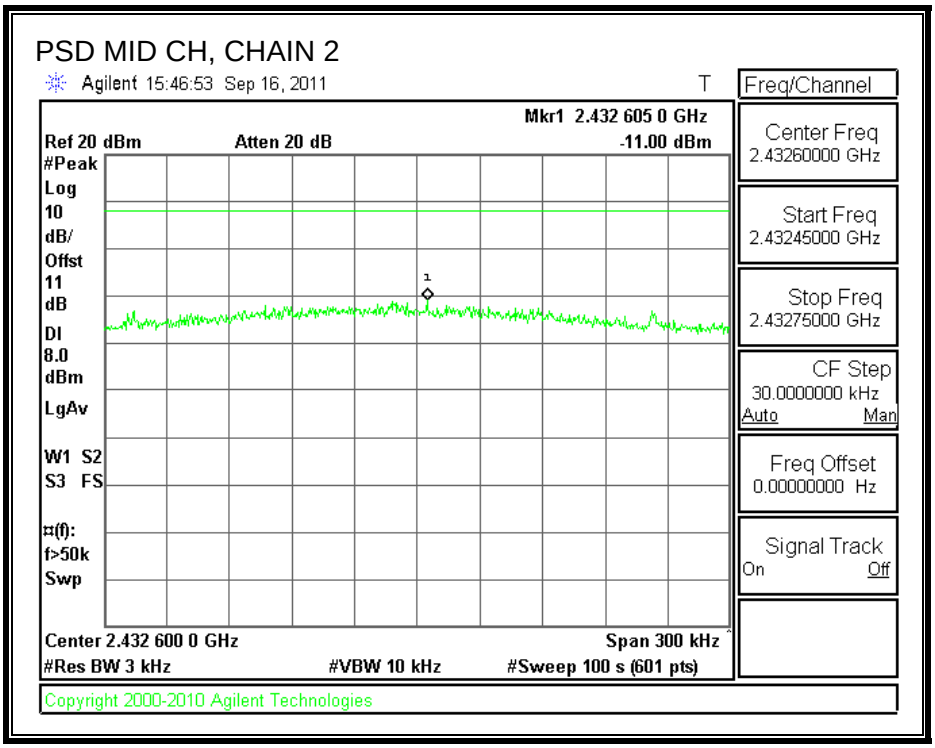


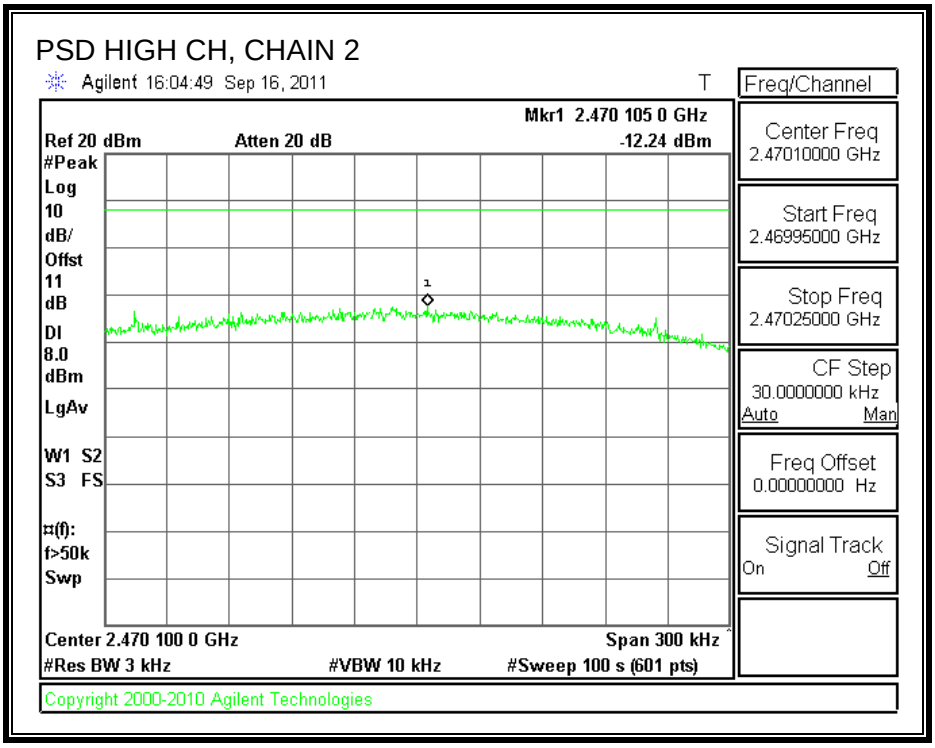




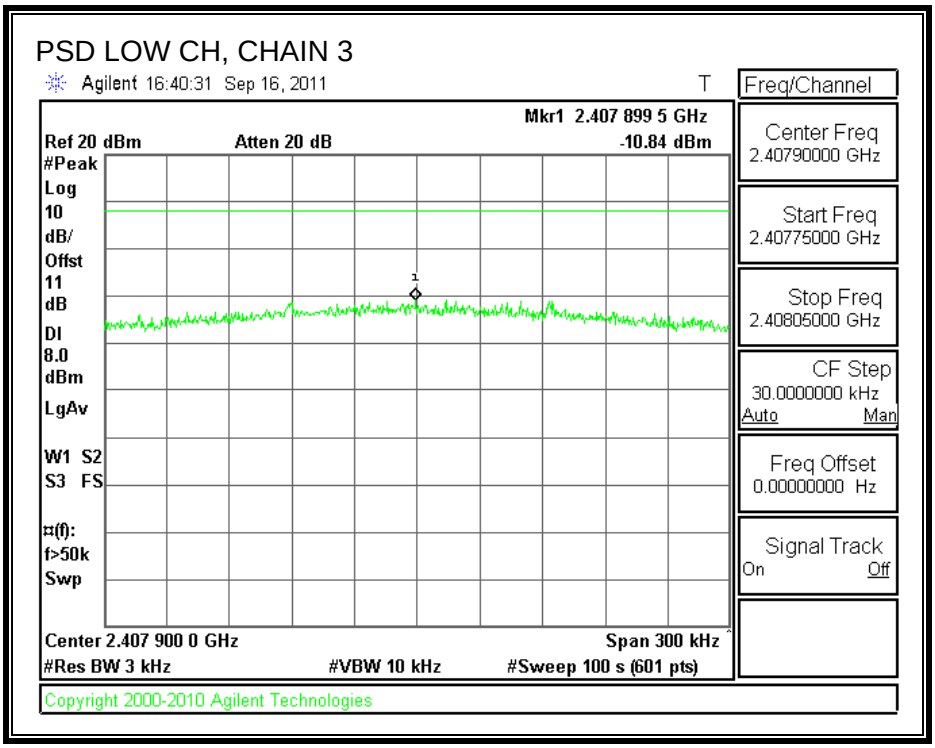
POWER SPECTRAL DENSITY, CHAIN 2

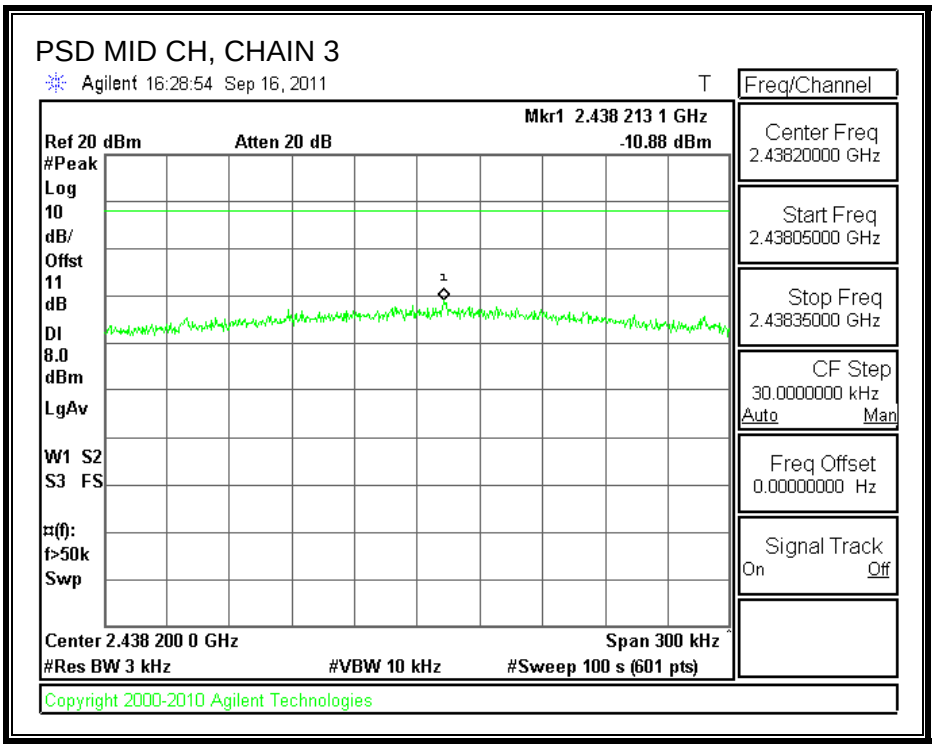


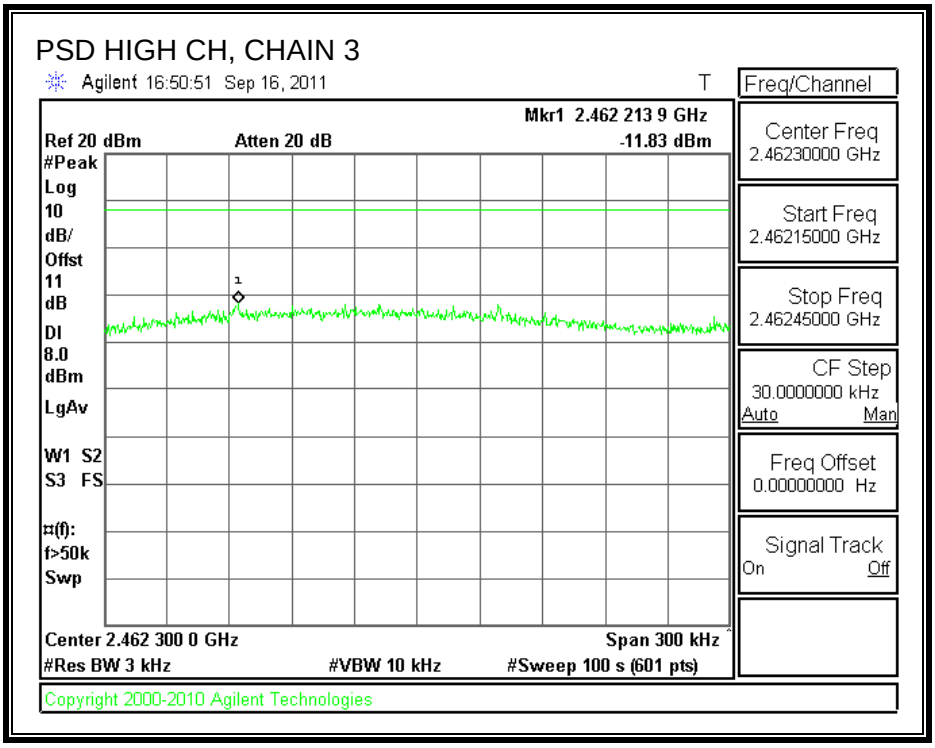




POWER SPECTRAL DENSITY, CHAIN 3







7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

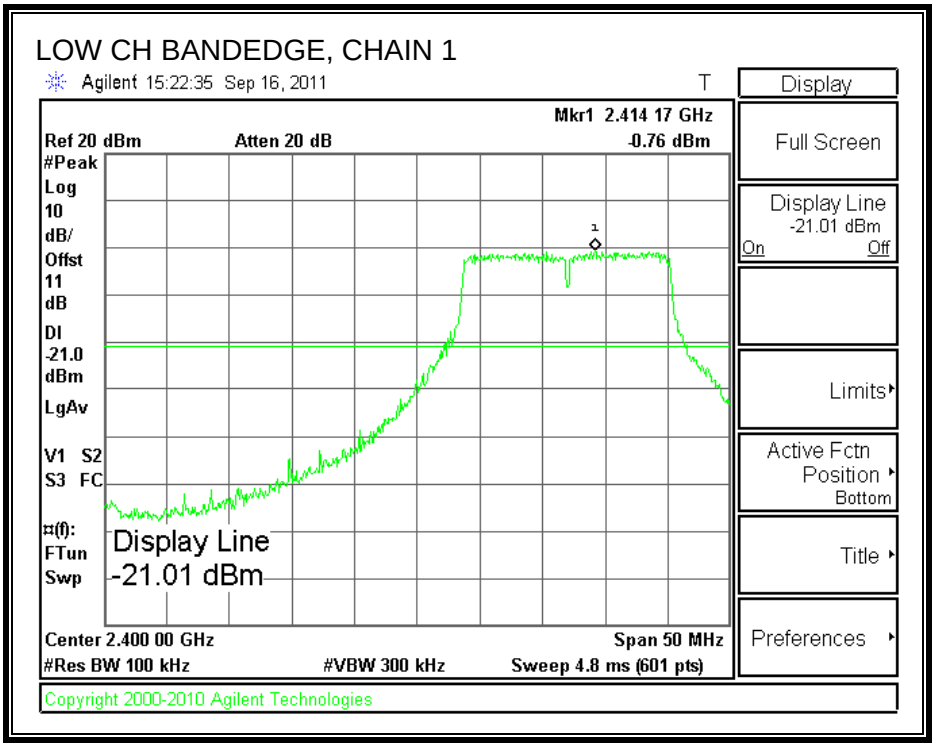
TEST PROCEDURE

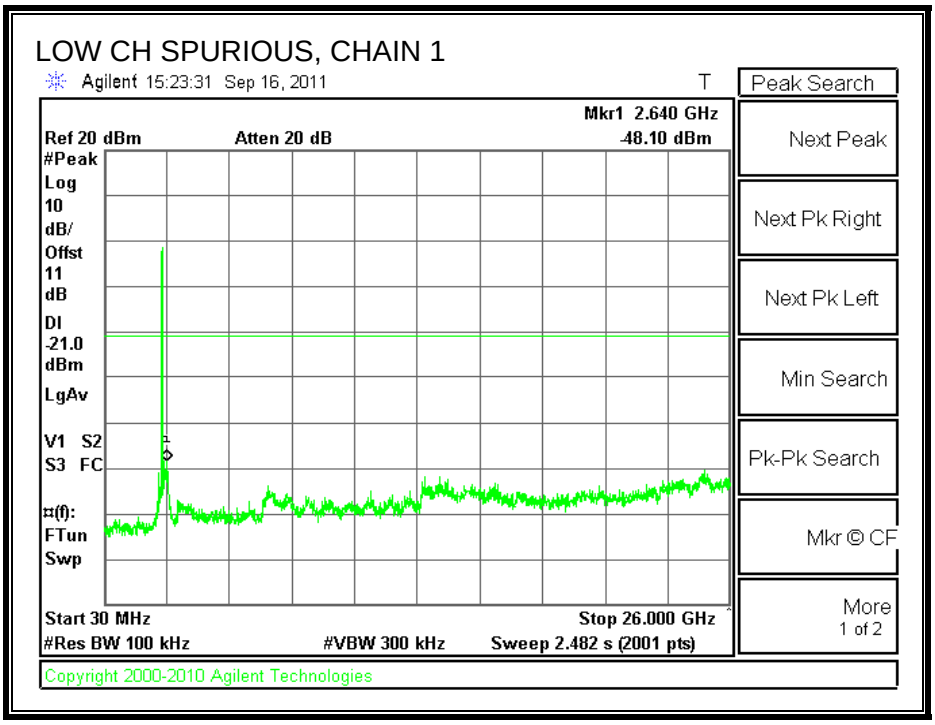
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

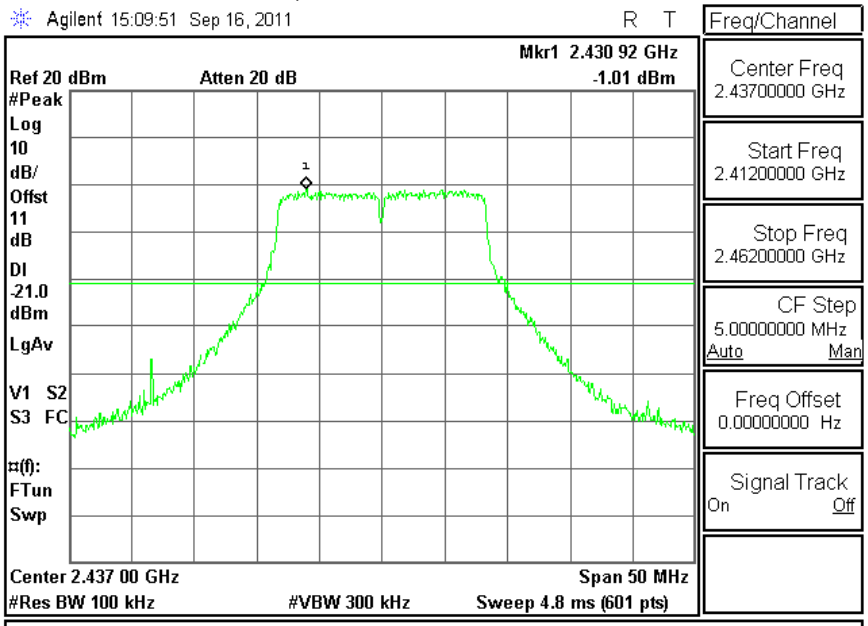
RESULTS

CHAIN 1 SPURIOUS EMISSIONS

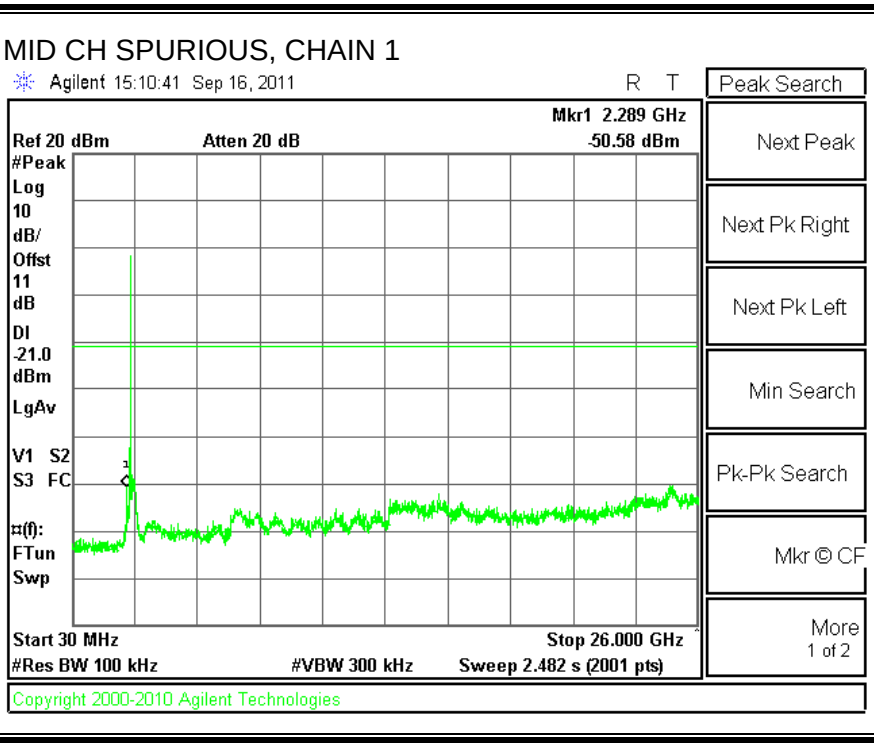




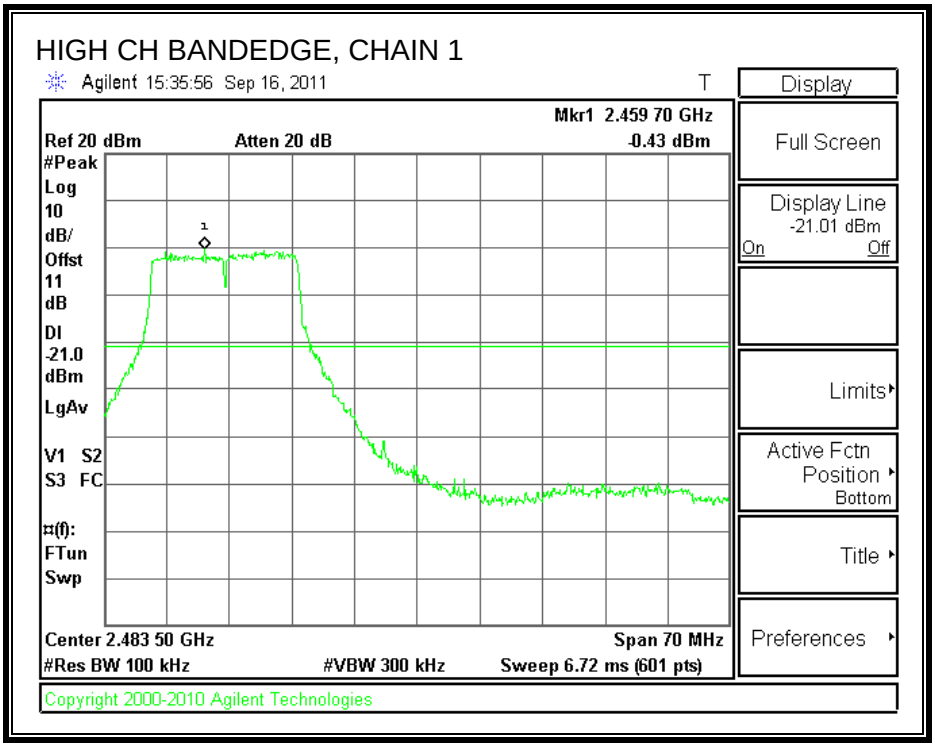
MID CH REFERENCE, CHAIN 1



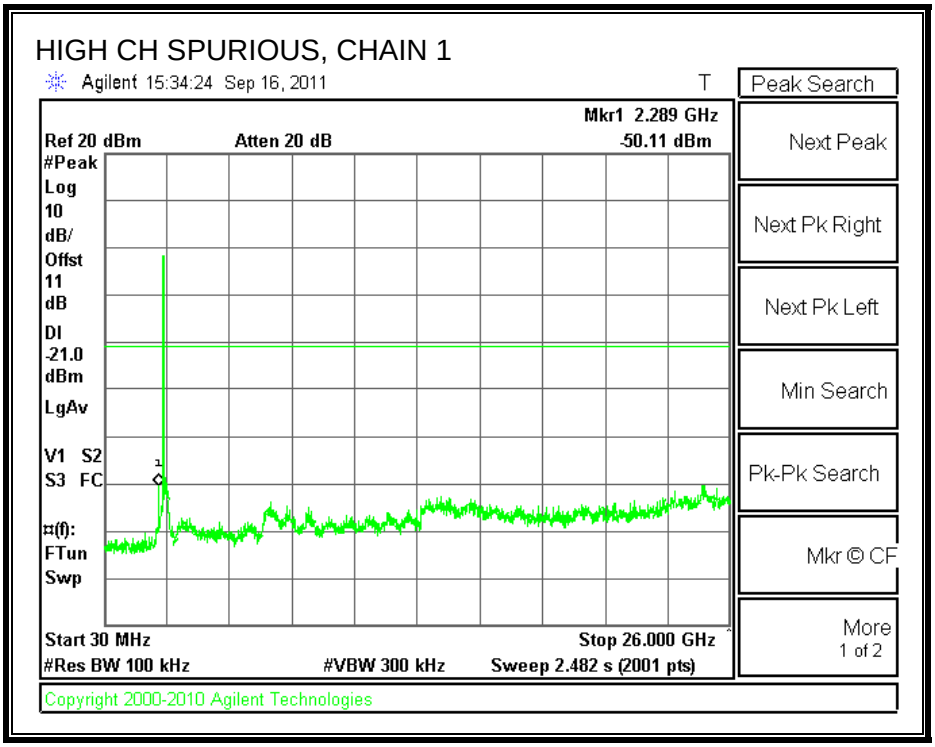
MID CH SPURIOUS, CHAIN 1



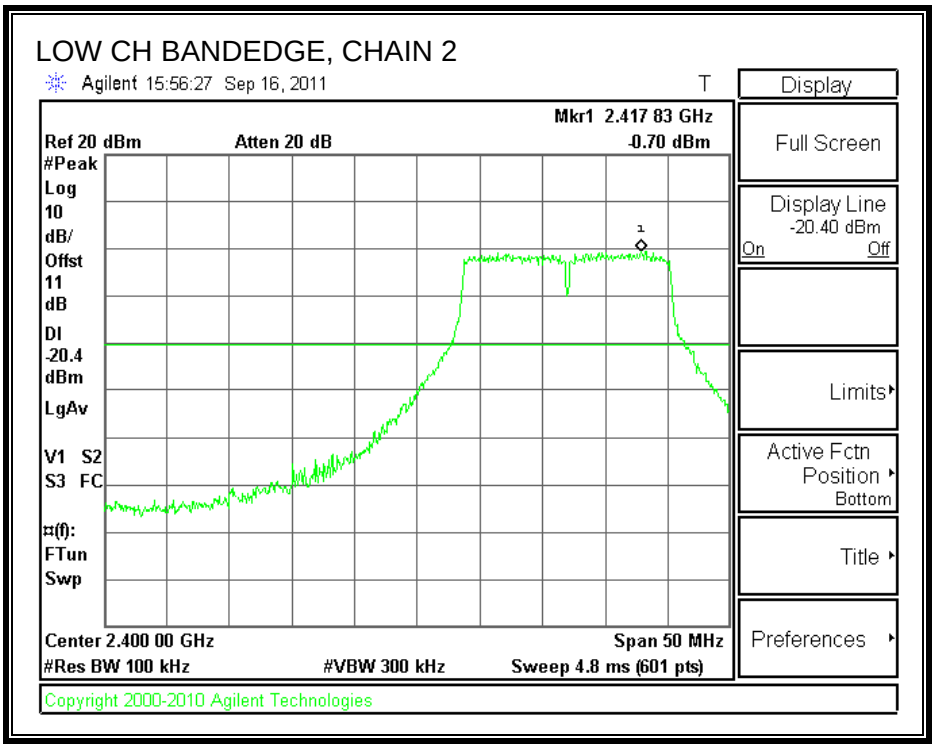
HIGH CH BANDEDGE, CHAIN 1

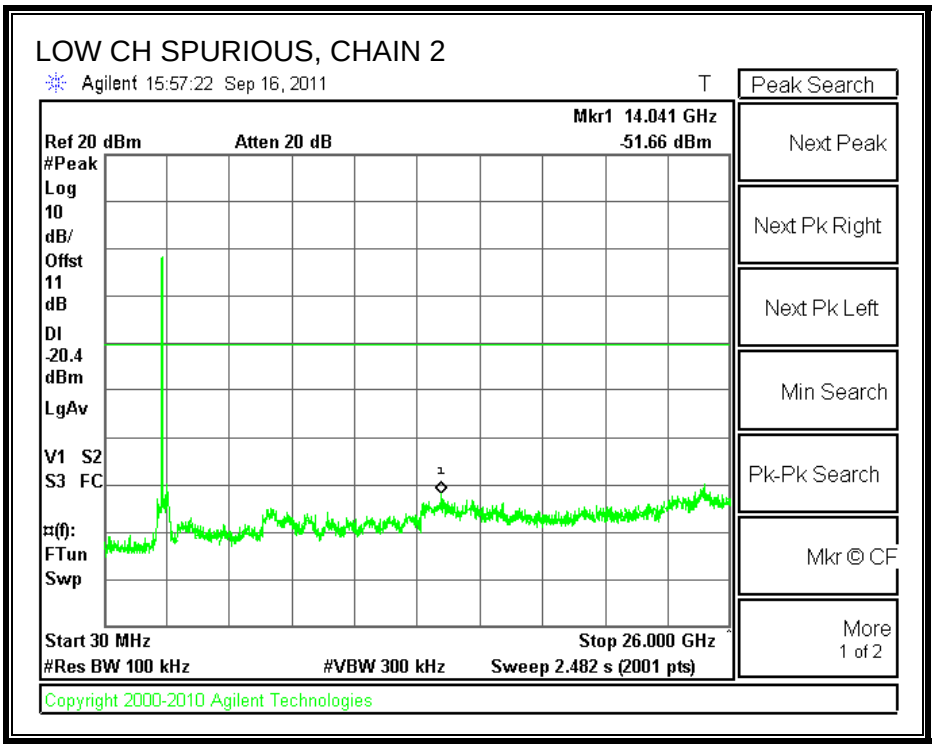


HIGH CH SPURIOUS, CHAIN 1

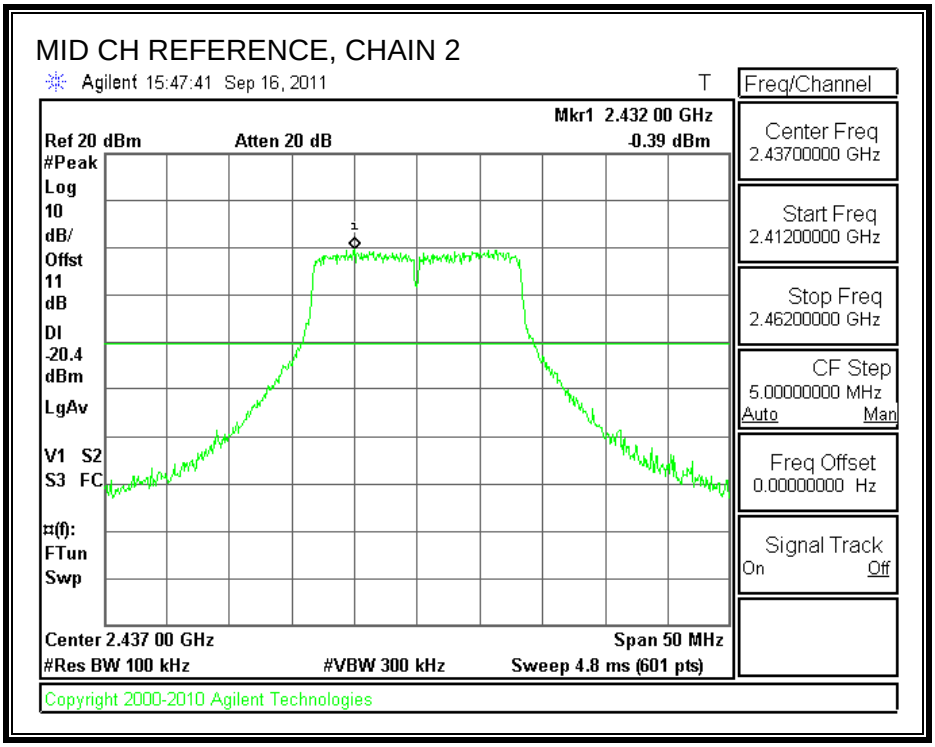


CHAIN 2 SPURIOUS EMISSIONS

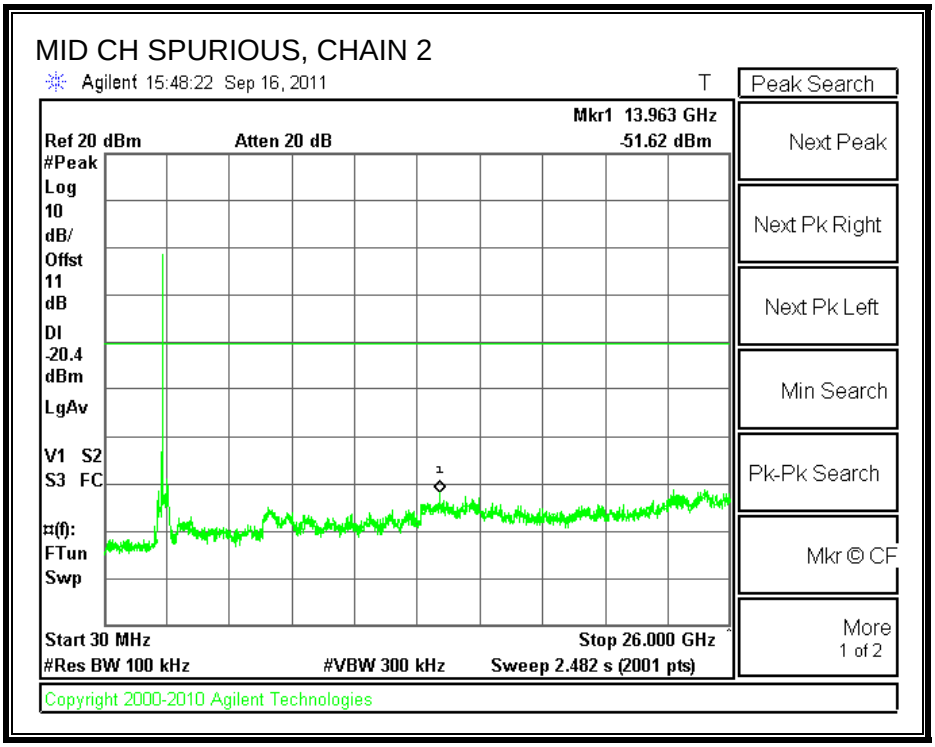




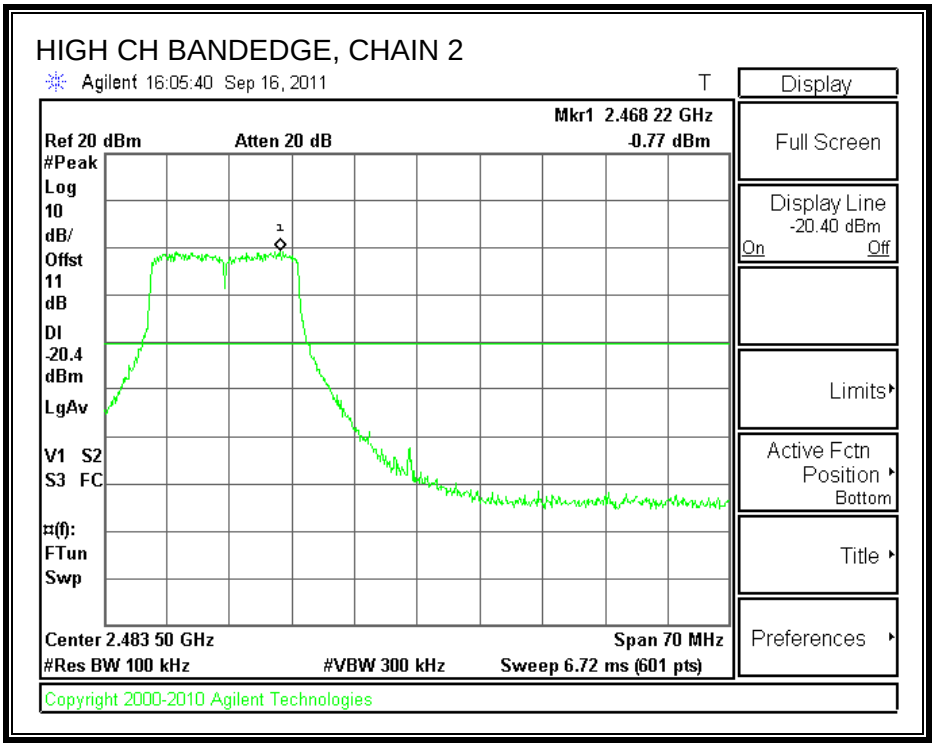
MID CH REFERENCE, CHAIN 2



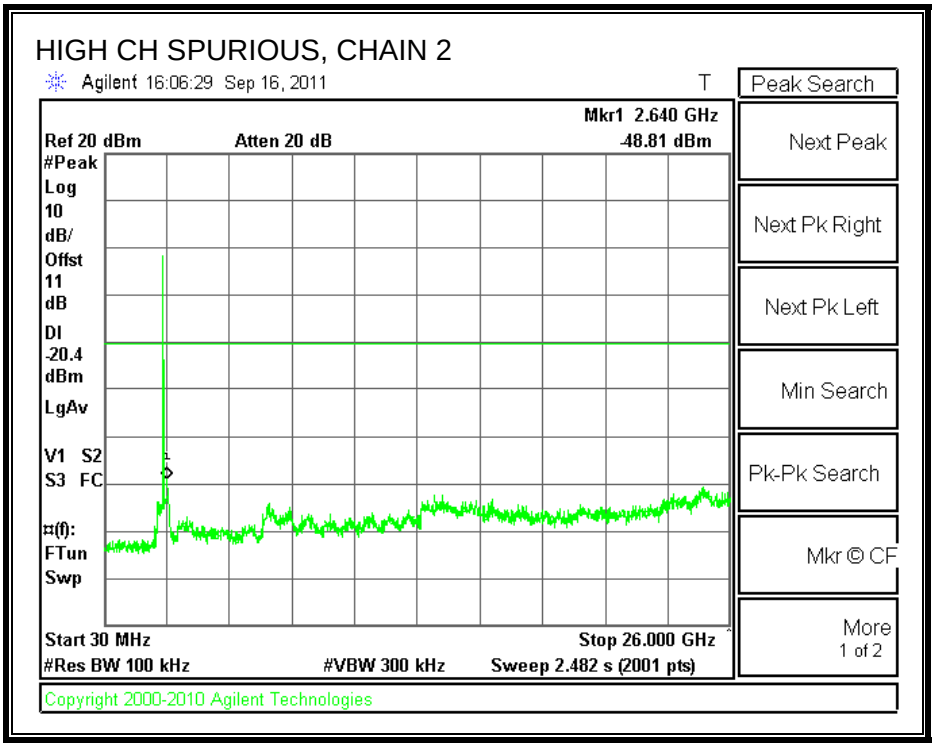
MID CH SPURIOUS, CHAIN 2



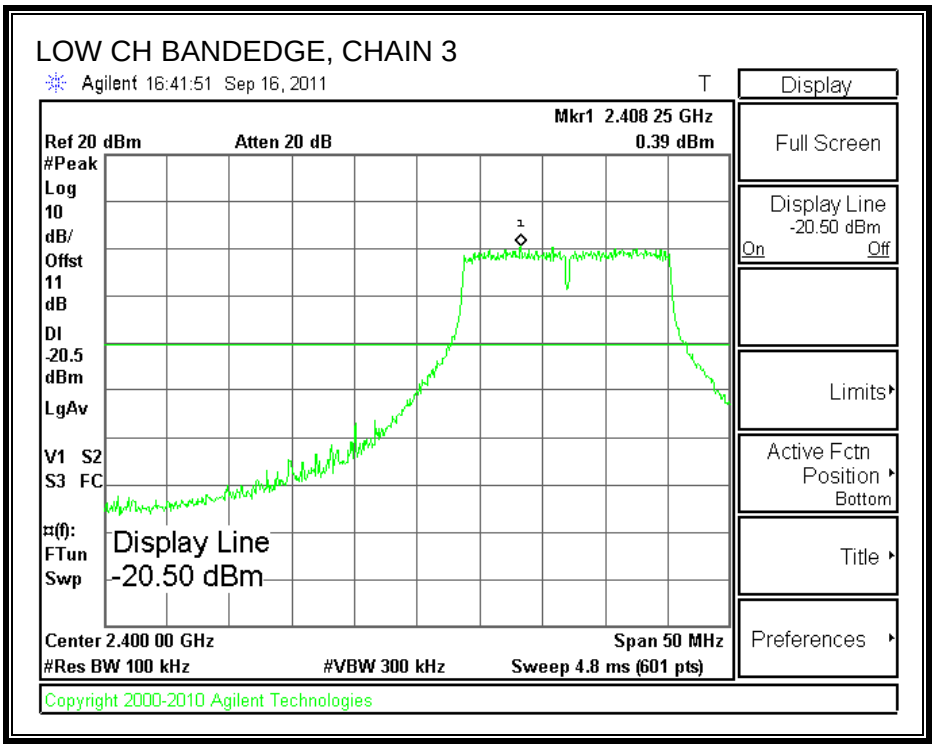
HIGH CH BANDEDGE, CHAIN 2

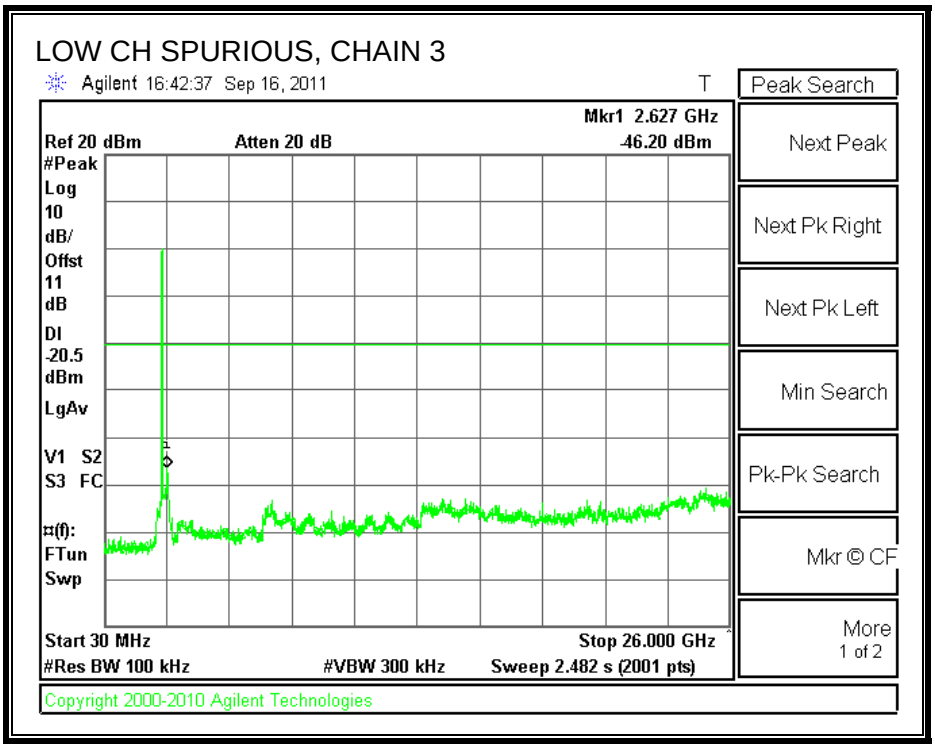


HIGH CH SPURIOUS, CHAIN 2

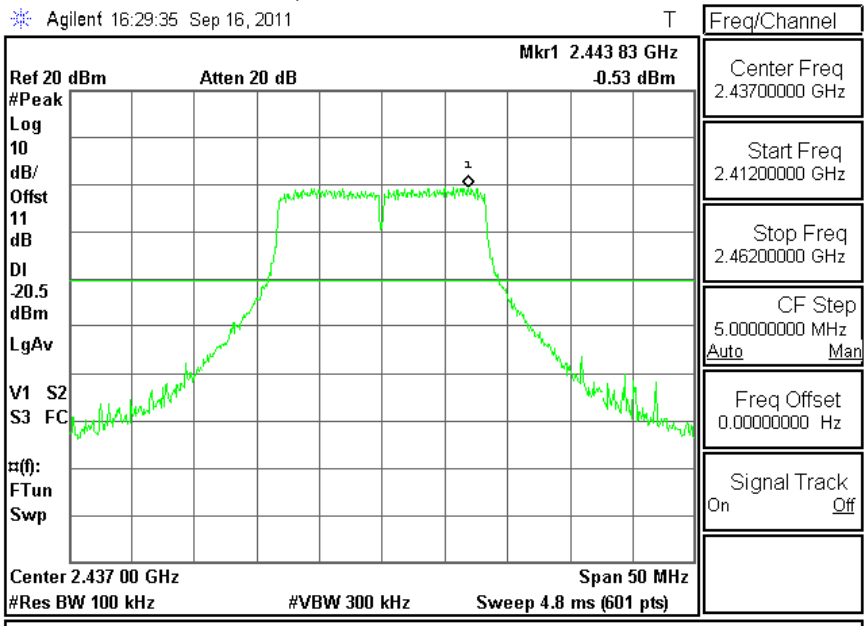


CHAIN 3 SPURIOUS EMISSIONS

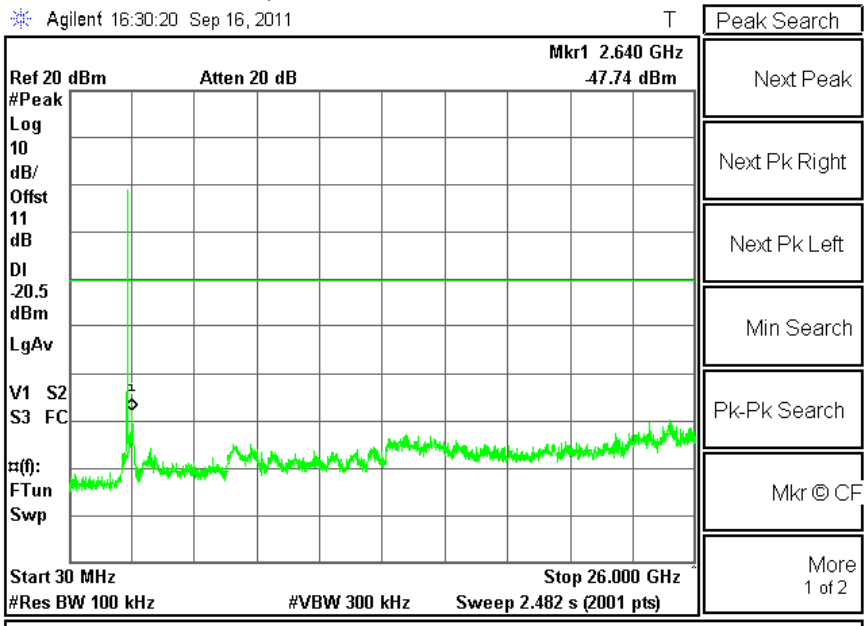




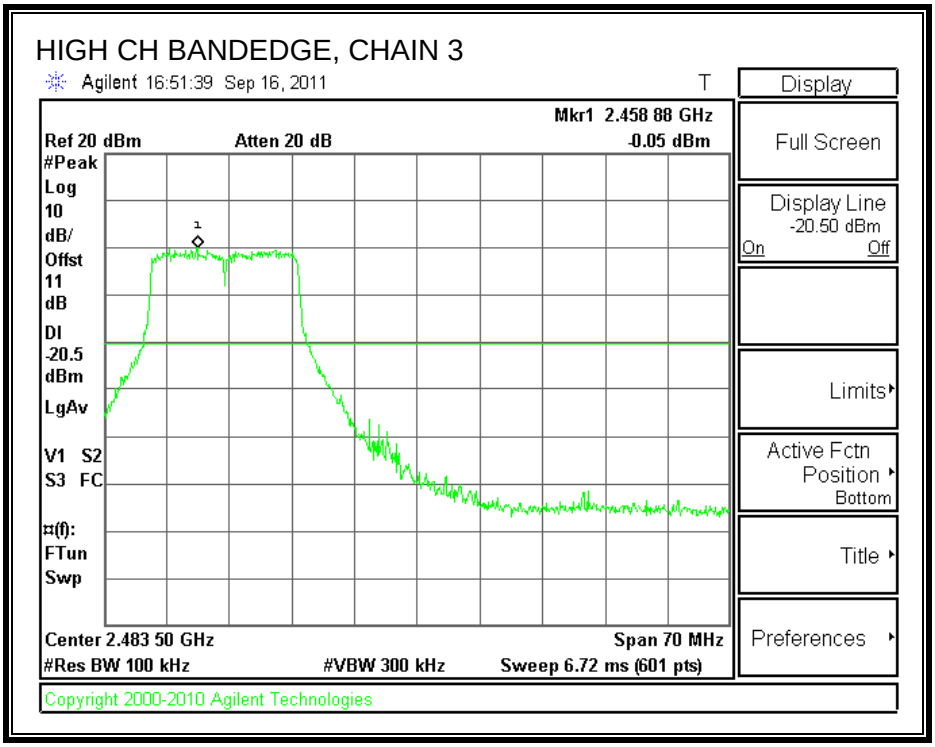
MID CH REFERENCE, CHAIN 3



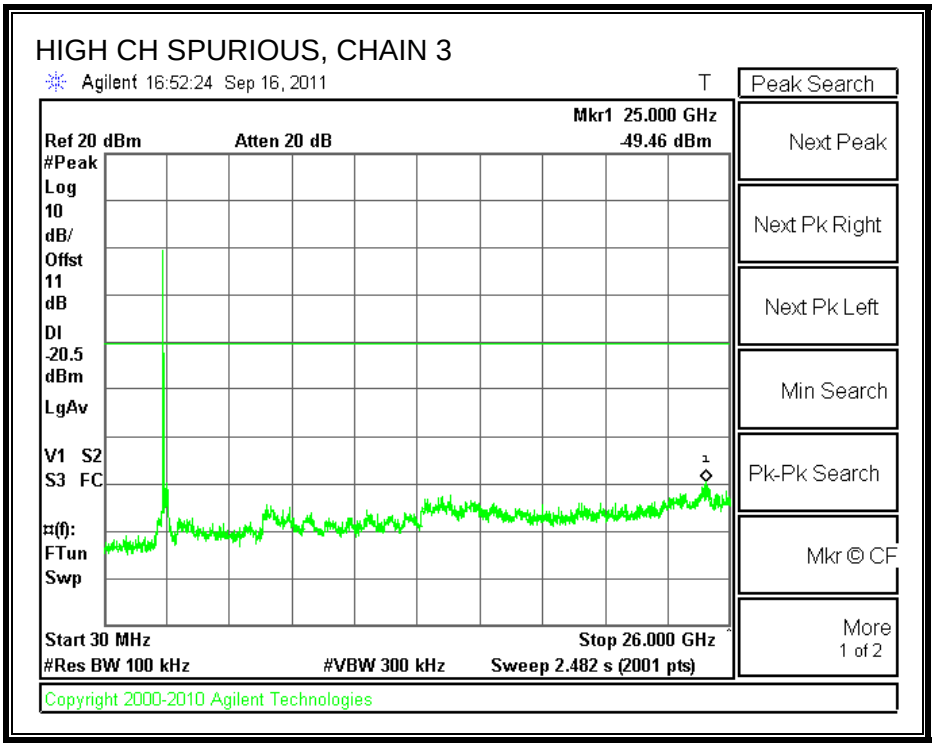
MID CH SPURIOUS, CHAIN 3



HIGH CH BANDEDGE, CHAIN 3



HIGH CH SPURIOUS, CHAIN 3



7.2. 802.11n HT20 MCS0 3TX 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.

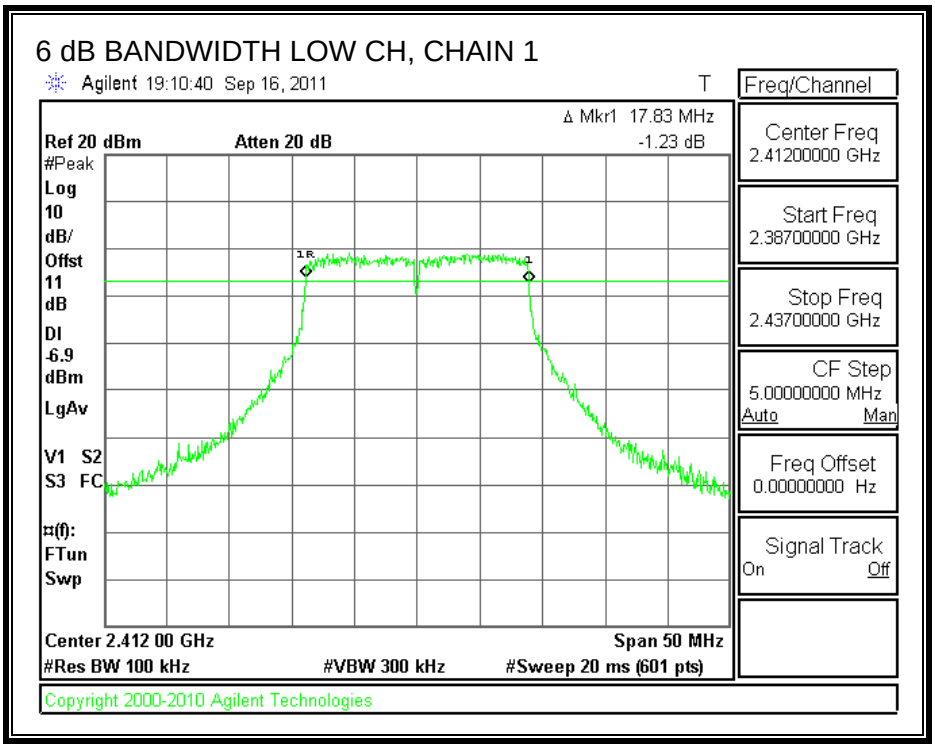
TEST PROCEDURE

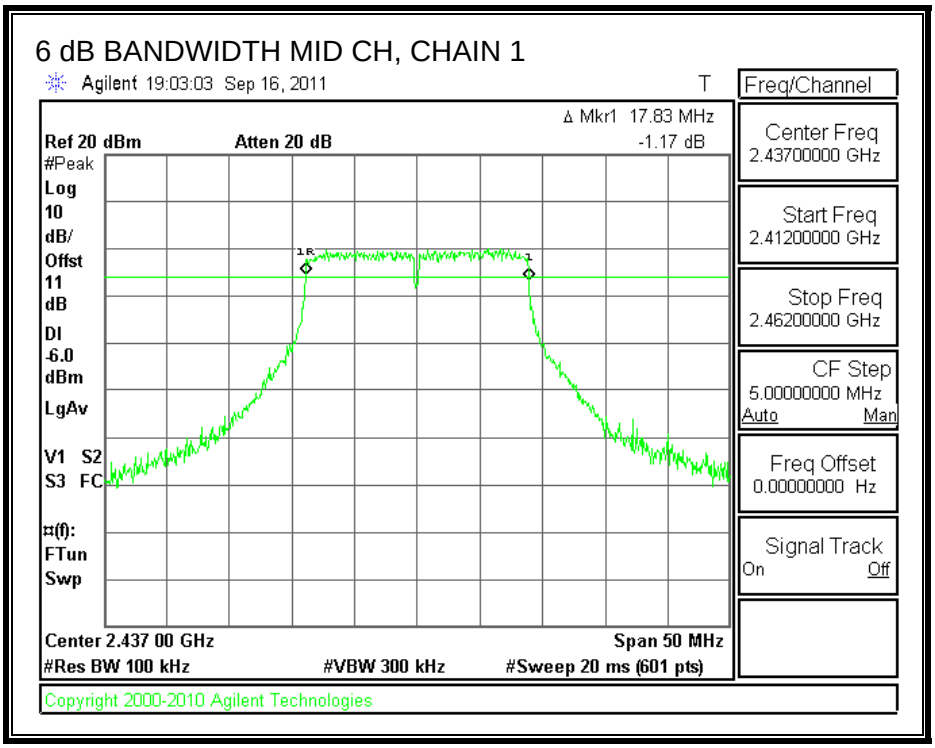
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

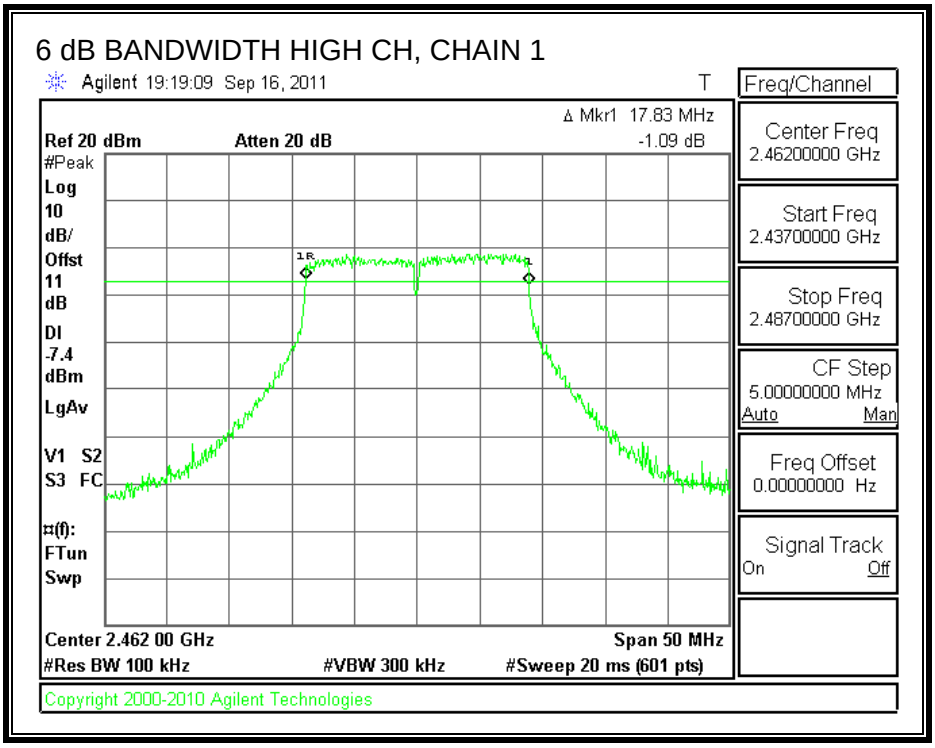
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Chain 3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	17.83	17.75	17.75	0.5
Middle	2437	17.83	17.75	17.83	0.5
High	2462	17.83	17.75	17.75	0.5

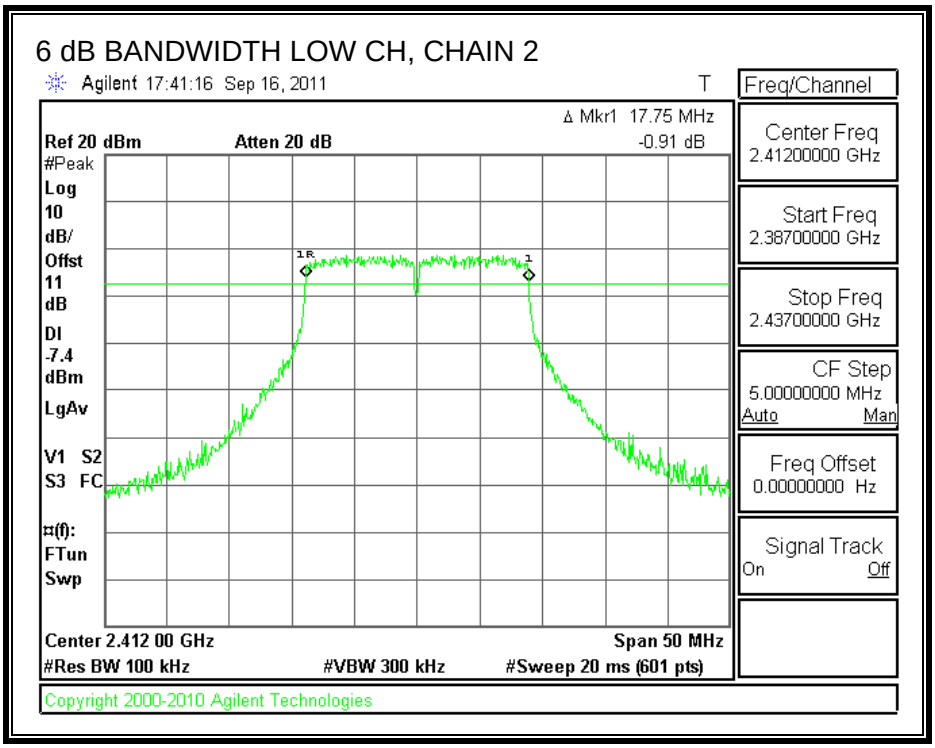
6 dB BANDWIDTH, CHAIN 1

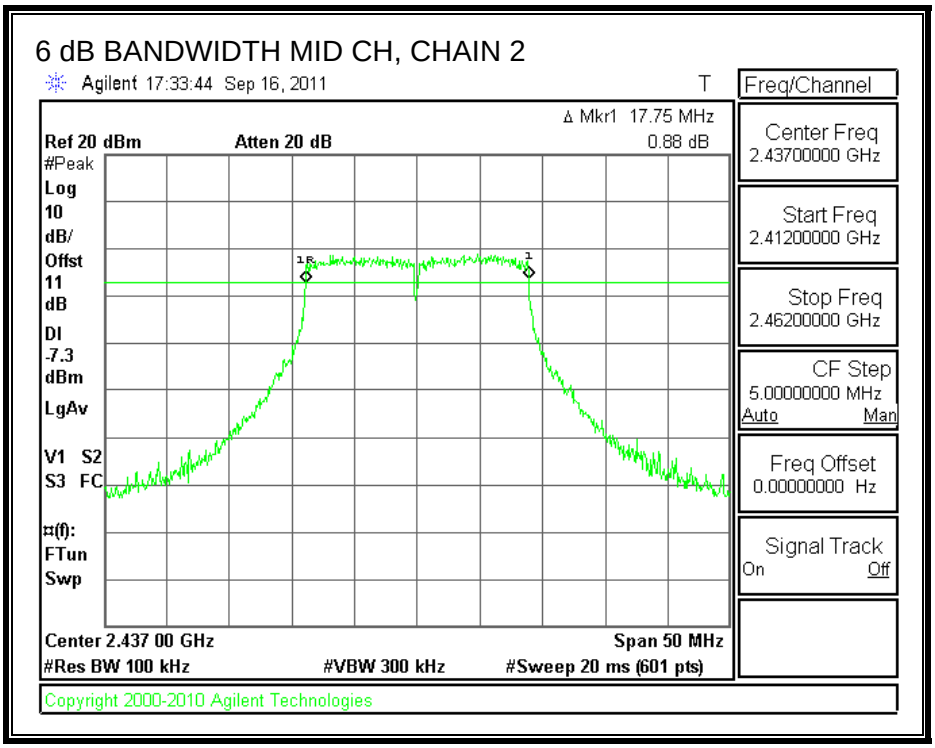


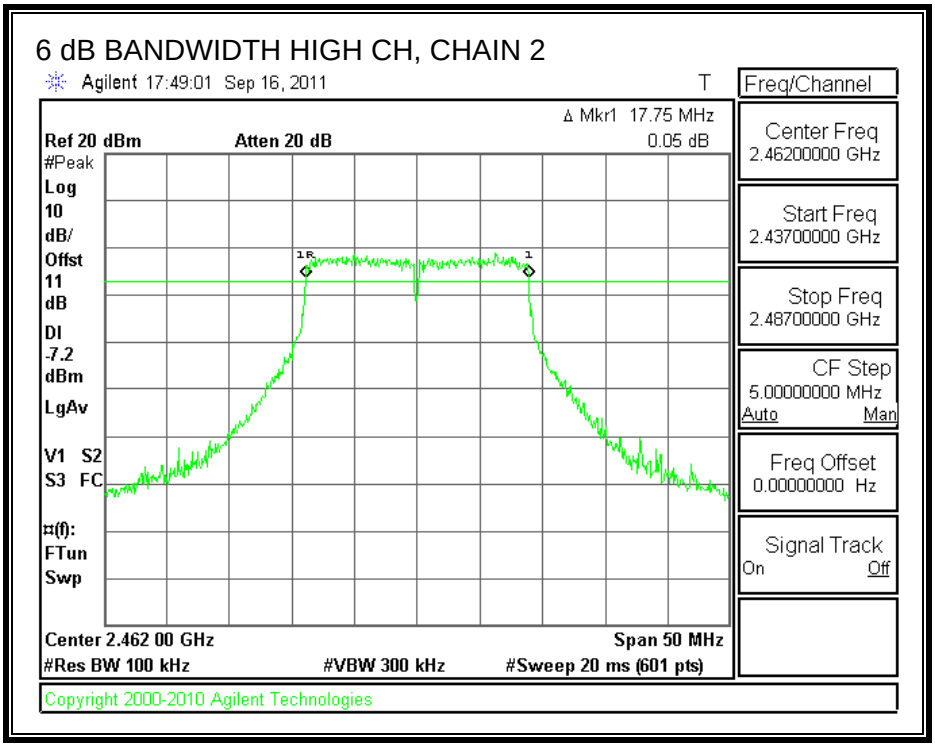




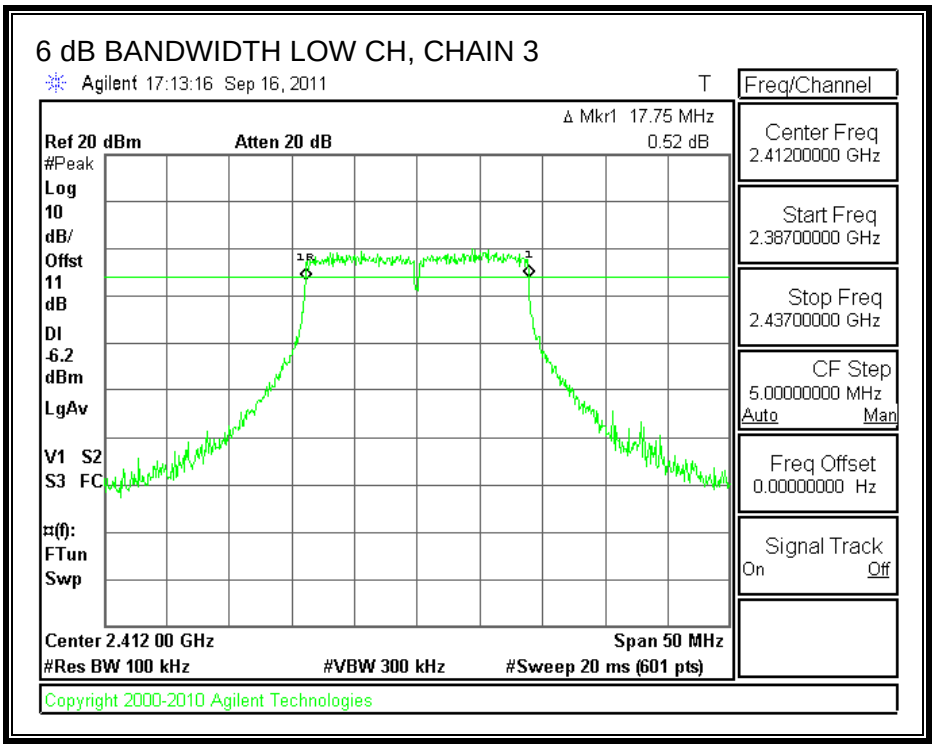
6 dB BANDWIDTH, CHAIN 2

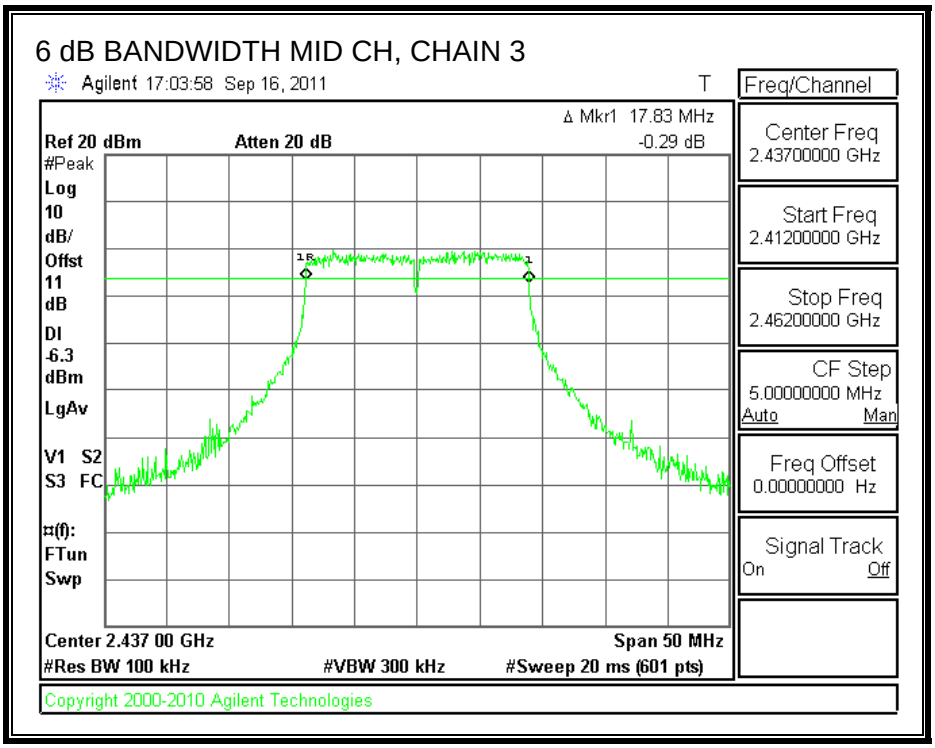


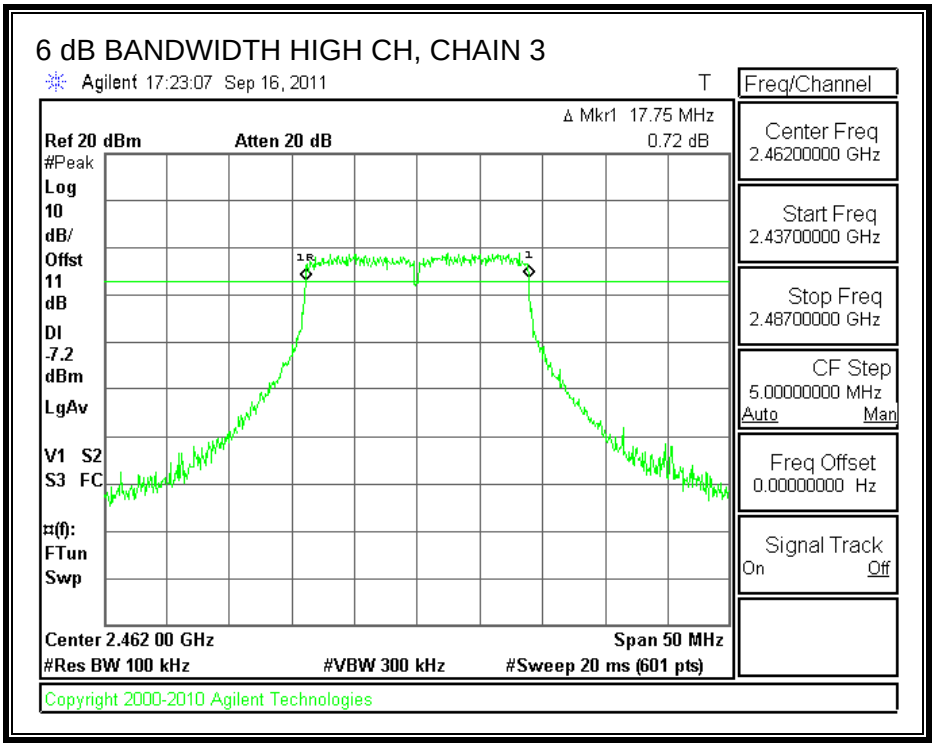




6 dB BANDWIDTH, CHAIN 3







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

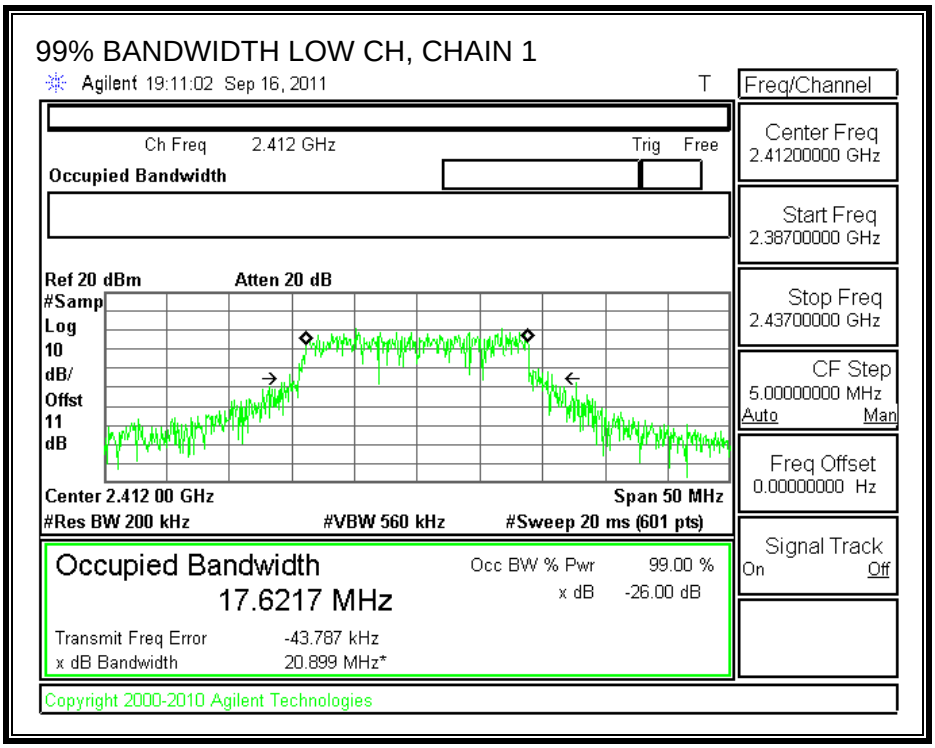
TEST PROCEDURE

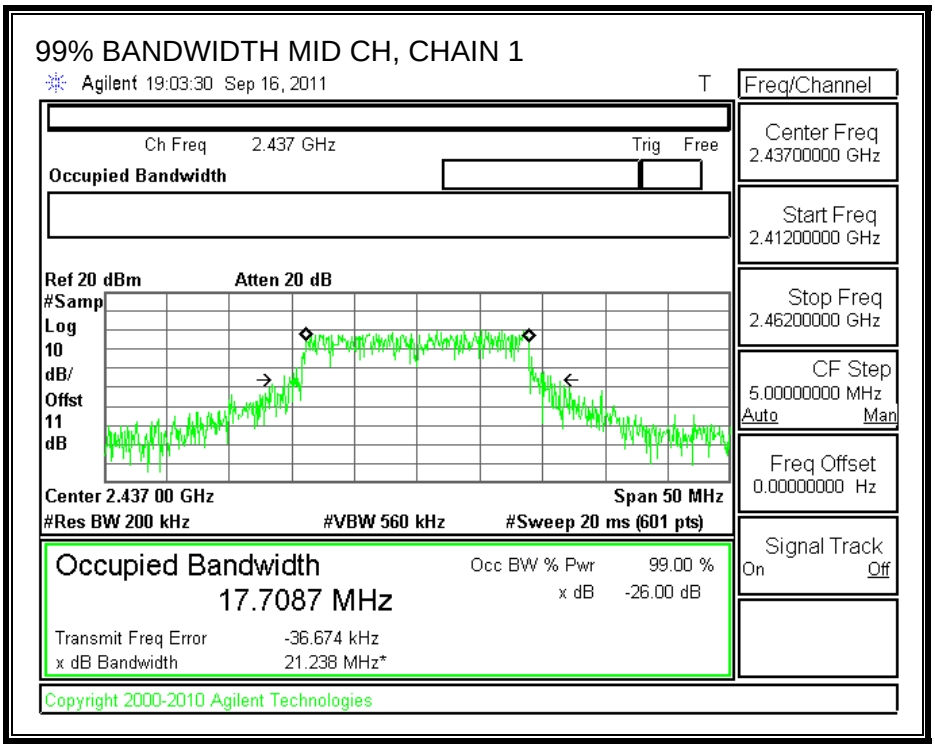
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

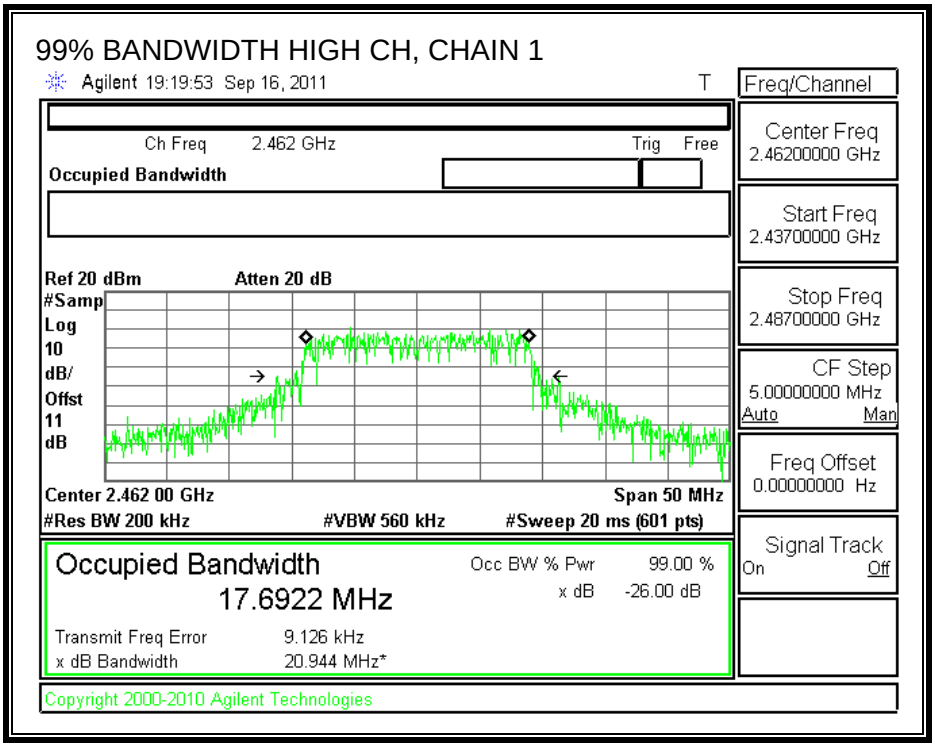
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)	Chain 3 99% Bandwidth (MHz)
Low	2412	17.6217	17.6779	17.6946
Middle	2437	17.7087	17.6205	17.6142
High	2462	17.6922	17.6677	17.5342

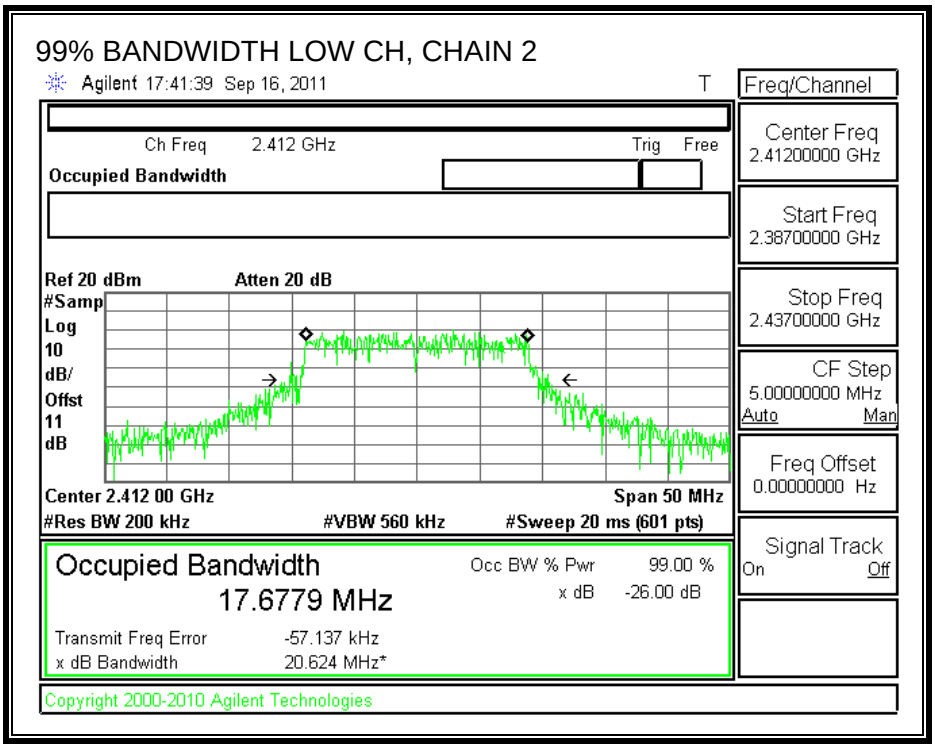
99% BANDWIDTH, CHAIN 1

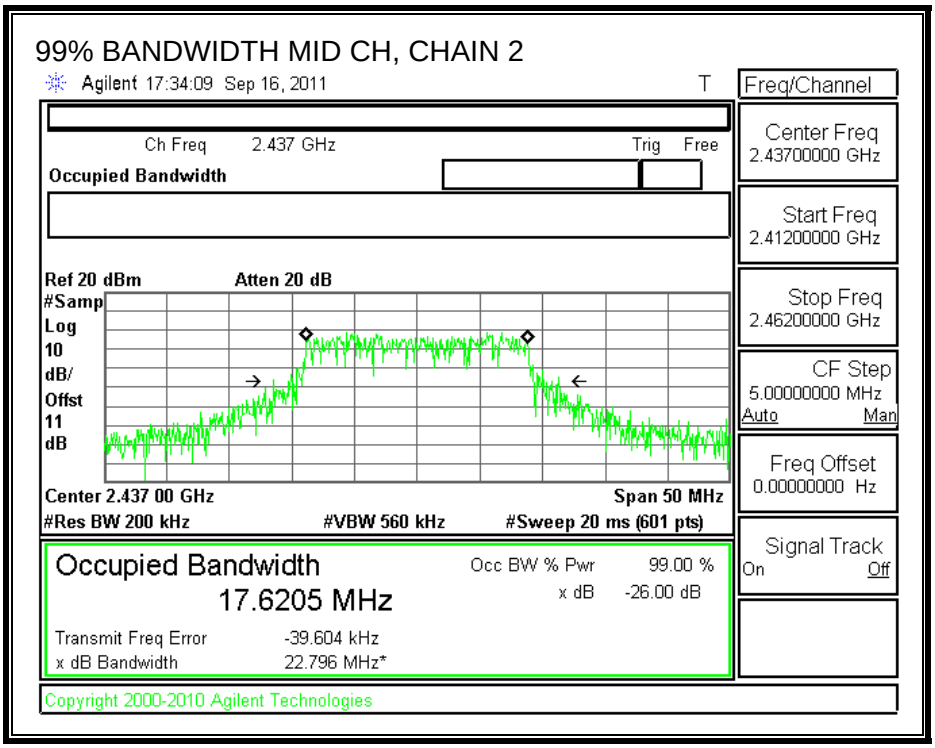


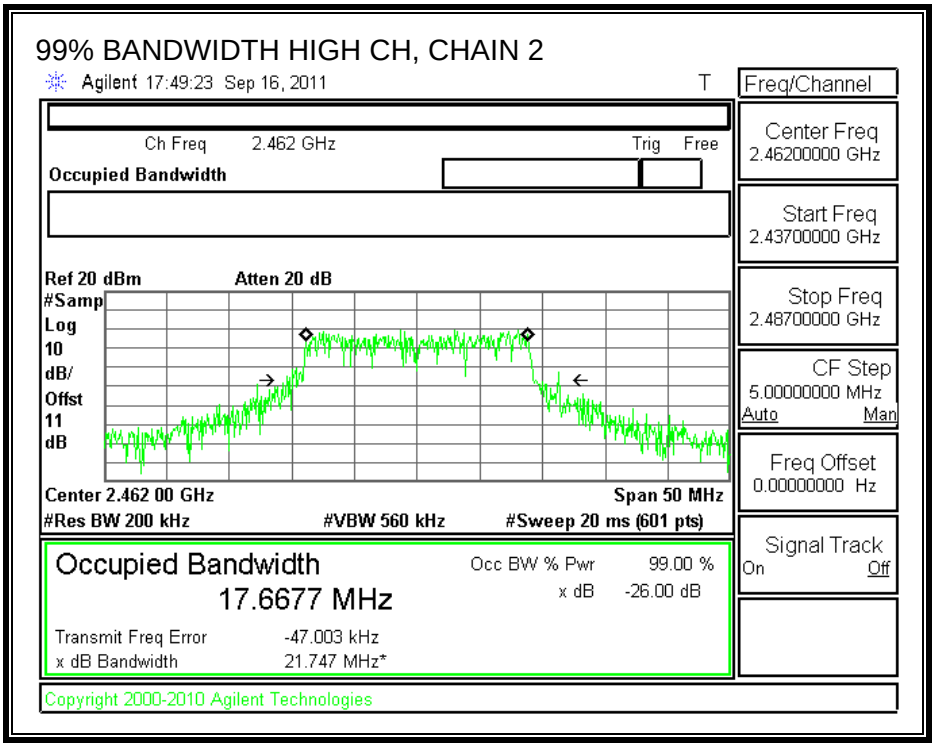




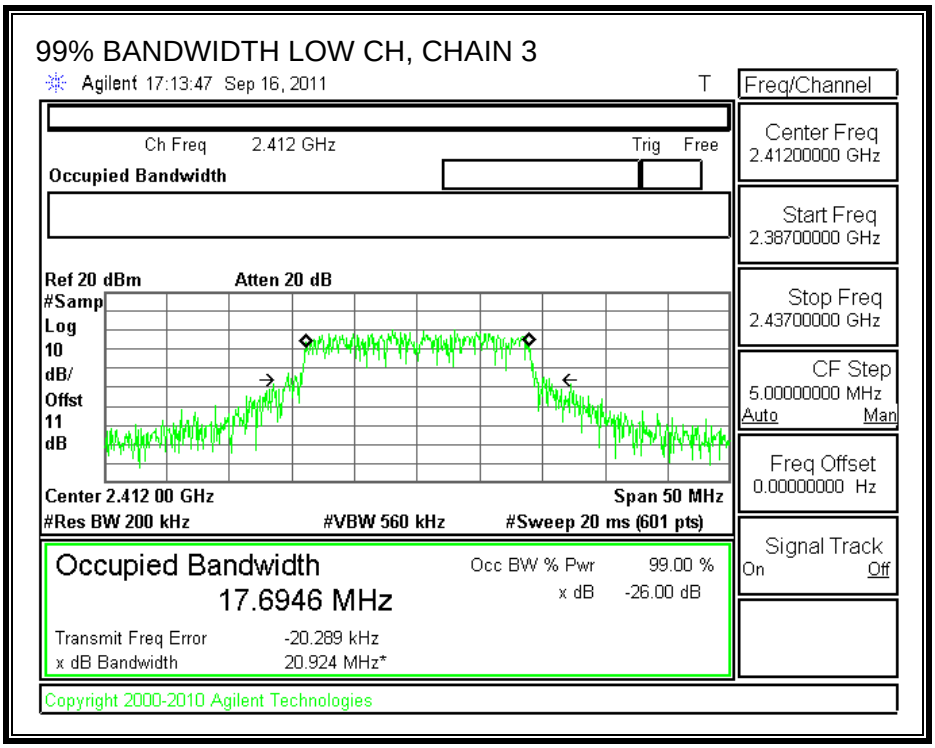
99% BANDWIDTH, CHAIN 2

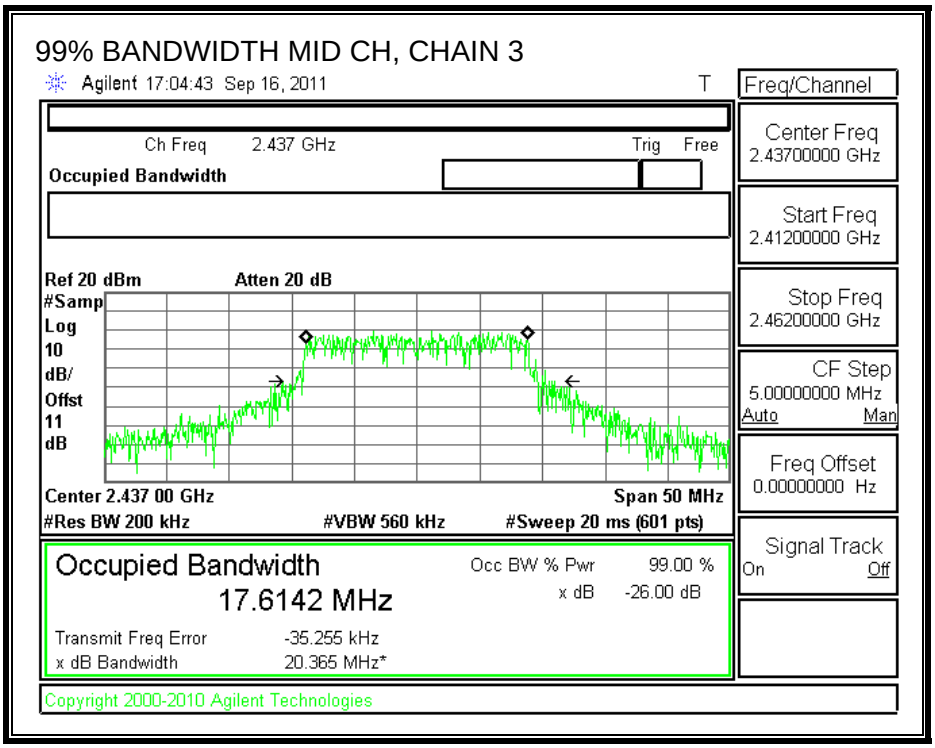


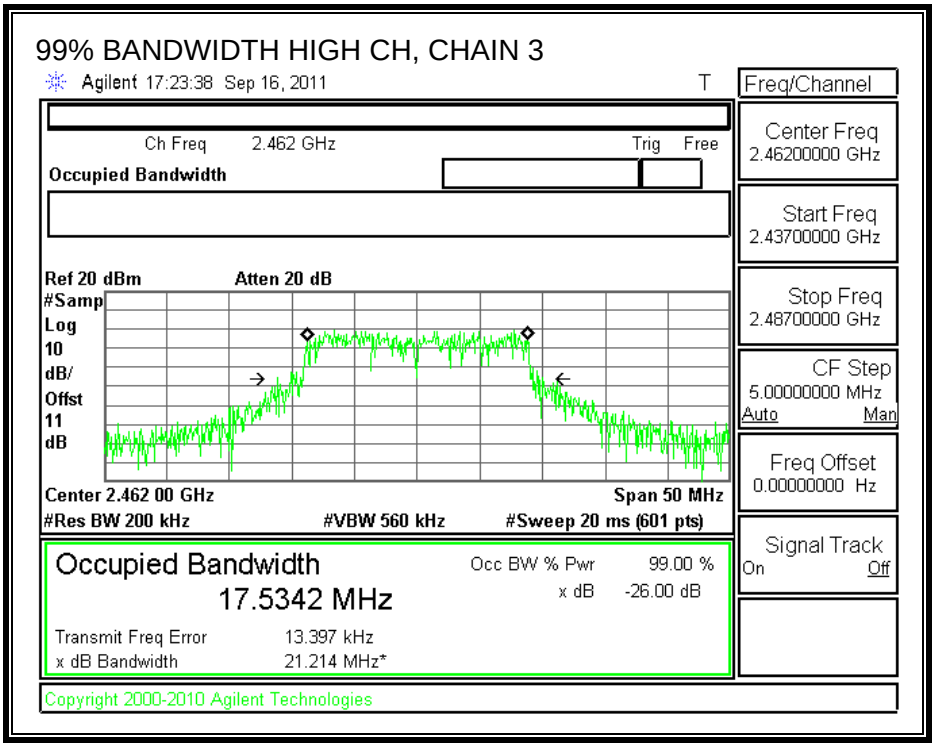




99% BANDWIDTH, CHAIN 3







7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
4	4.77	8.77

The maximum effective legacy gain is 8.77 dBi for other than fixed, point-to-point operations, therefore the limit is 27.23 dBm.

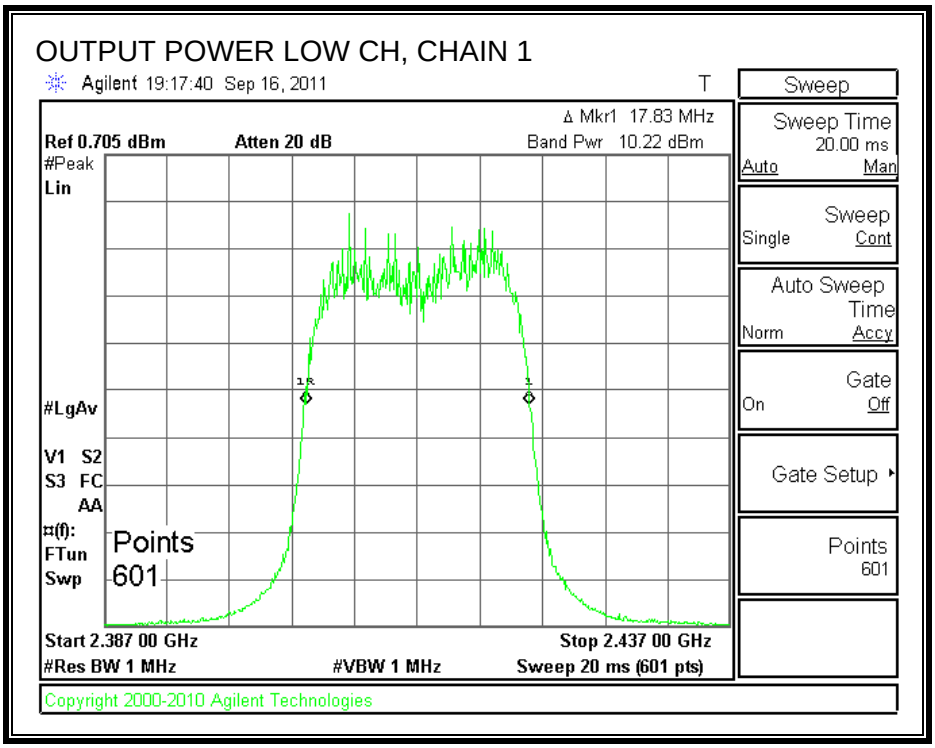
TEST PROCEDURE

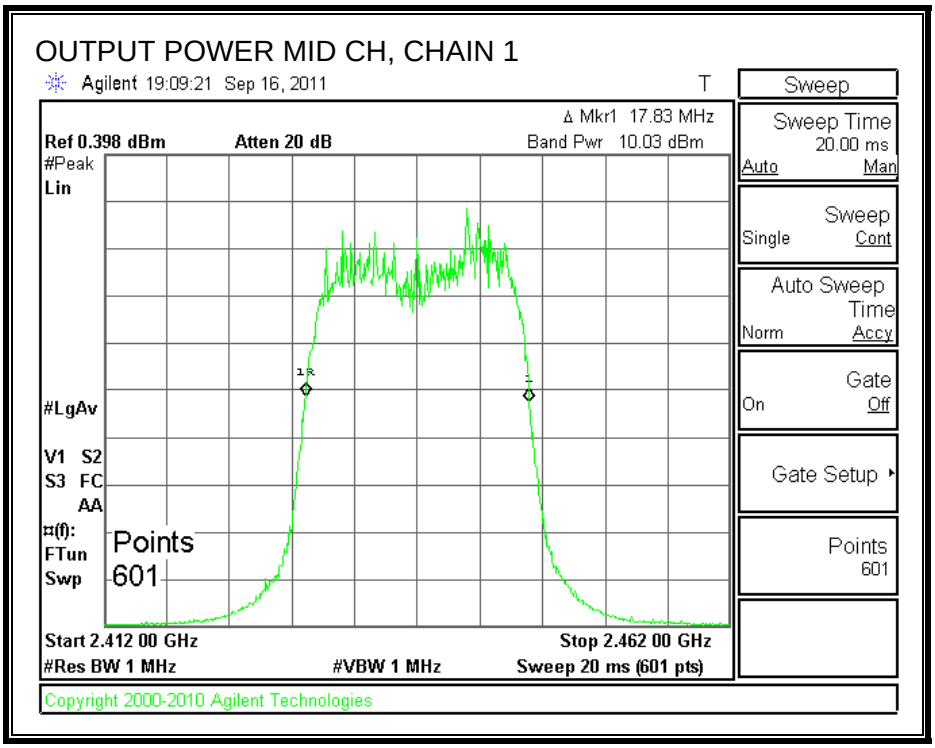
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

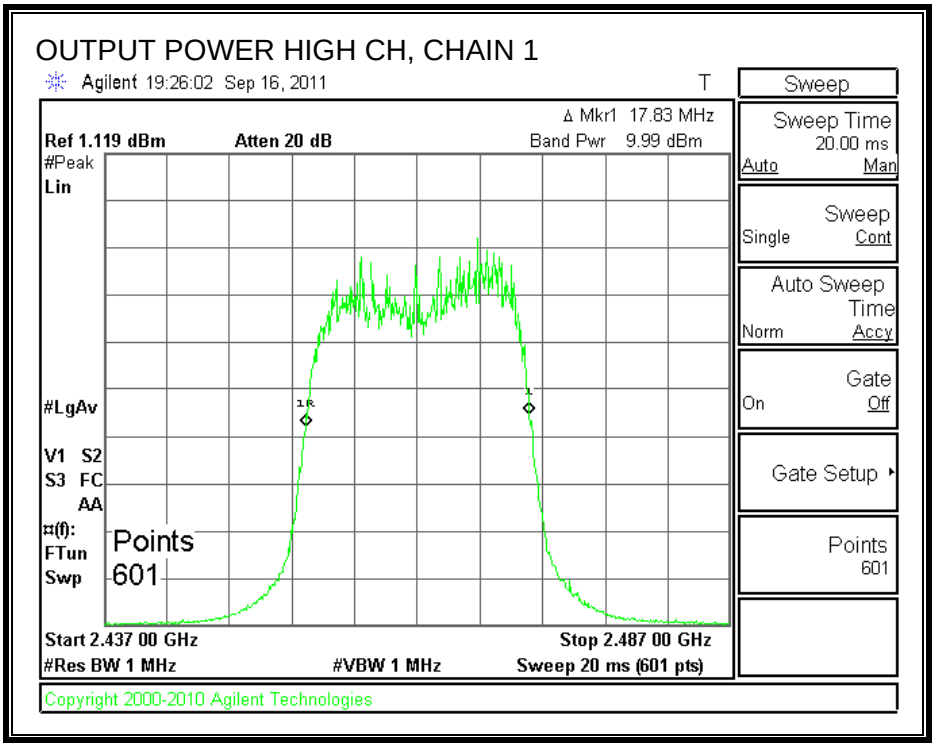
RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Chain 3 PK Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	10.22	10.19	11.00	11.00	26.26	27.23	-0.97
Mid	2437	10.03	10.04	10.64	11.00	26.02	27.23	-1.21
High	2462	9.99	9.86	10.64	11.00	25.95	27.23	-1.28

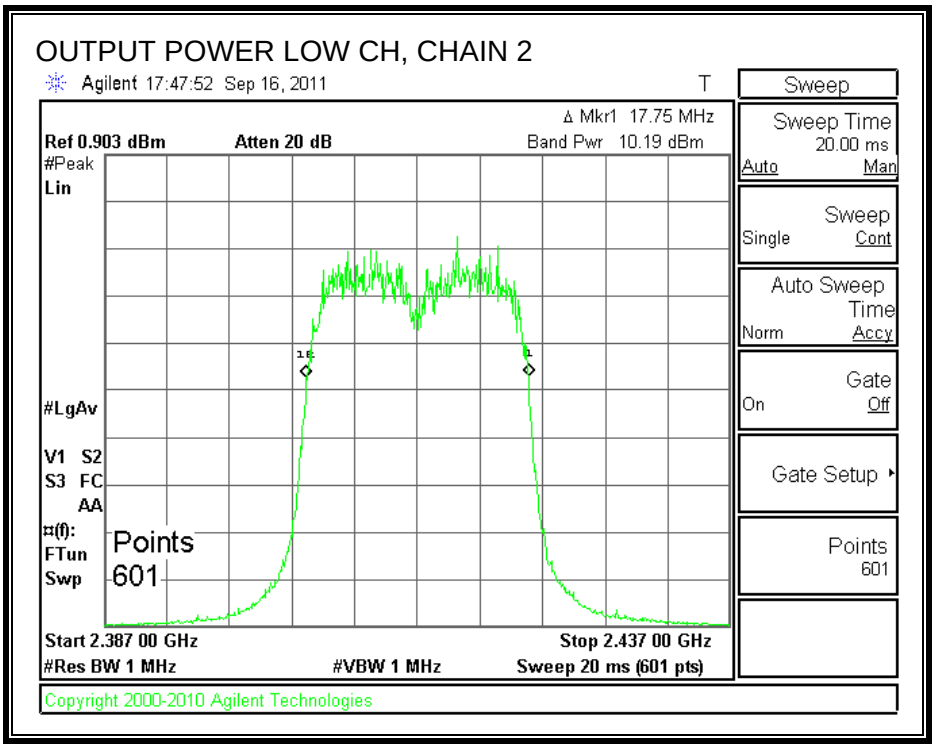
CHAIN 1 OUTPUT POWER

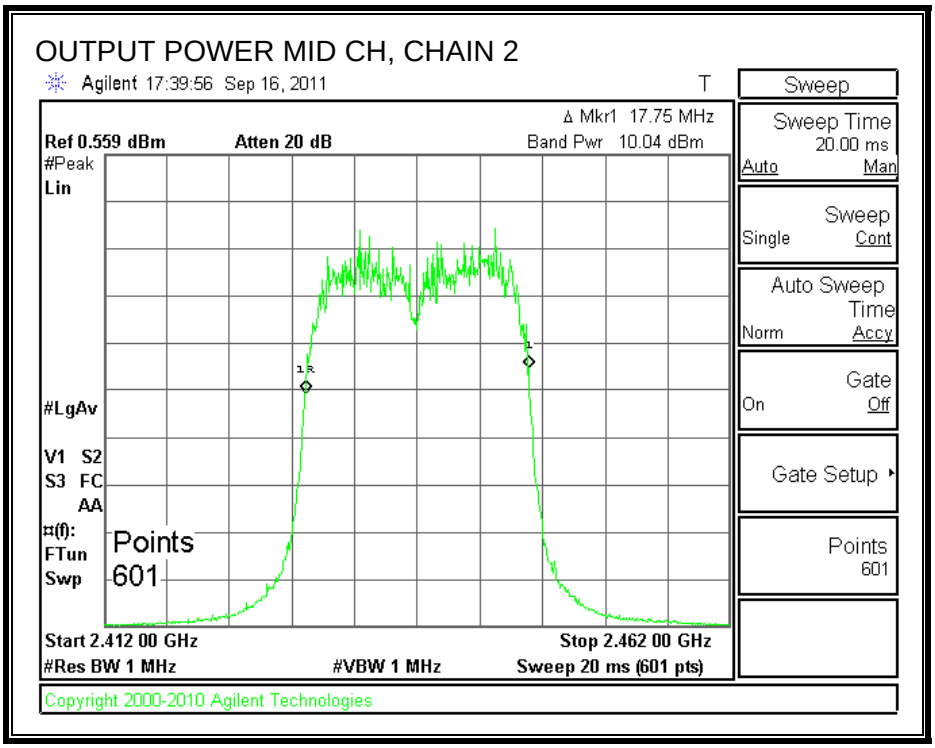


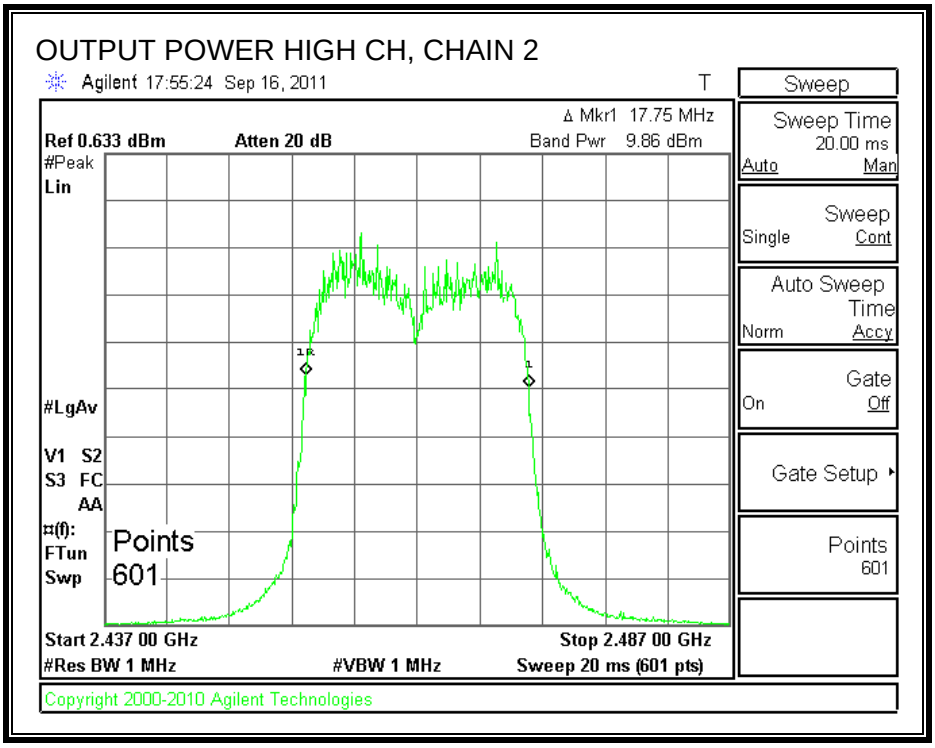




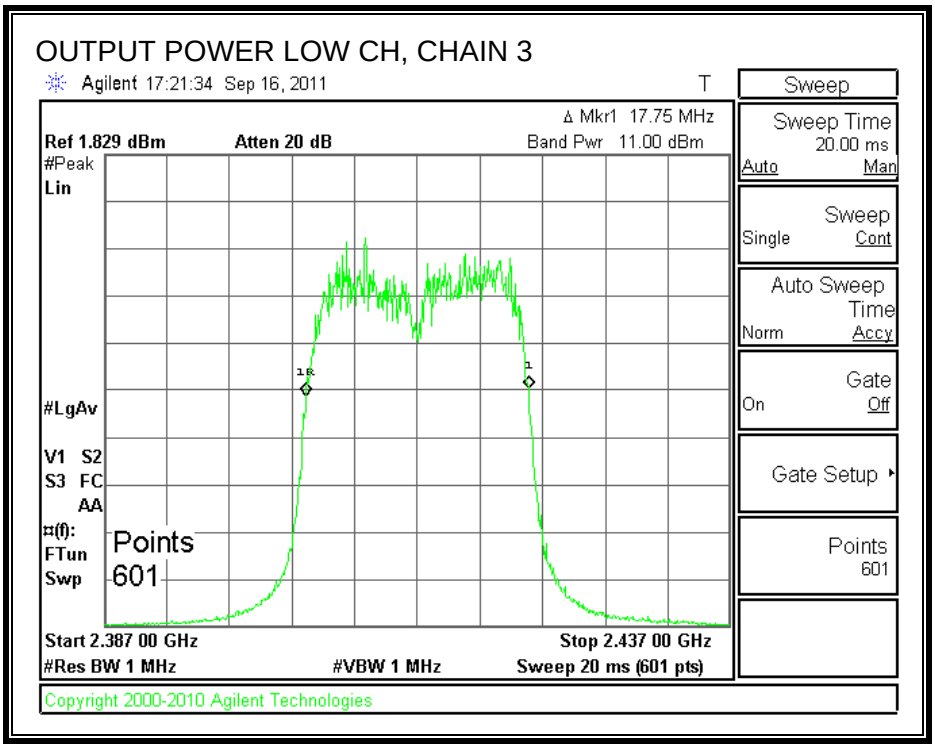
CHAIN 2 OUTPUT POWER

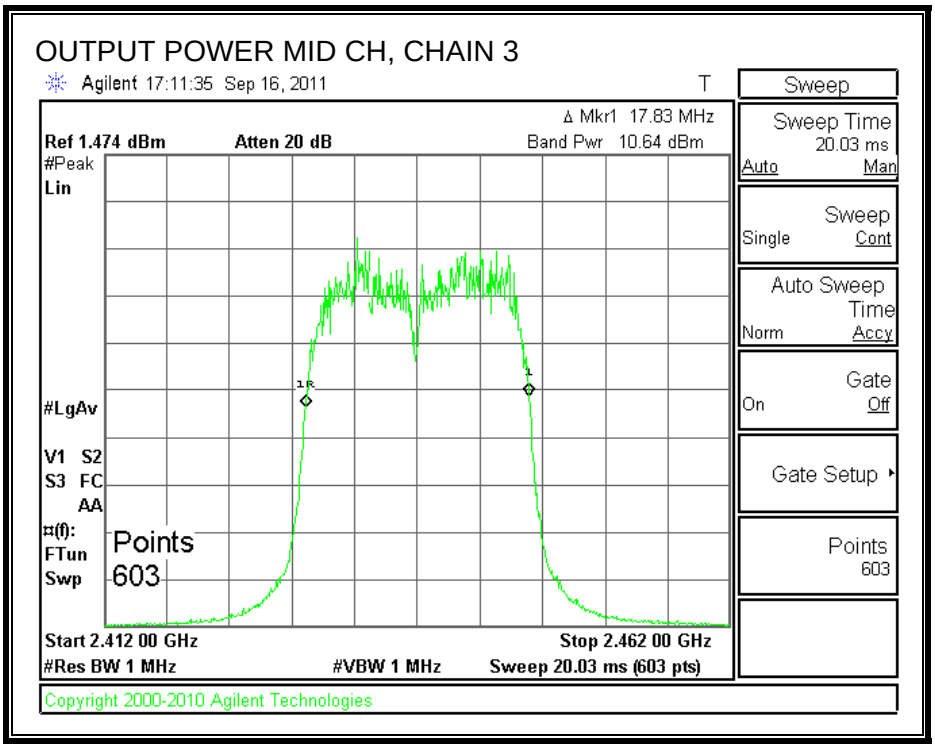


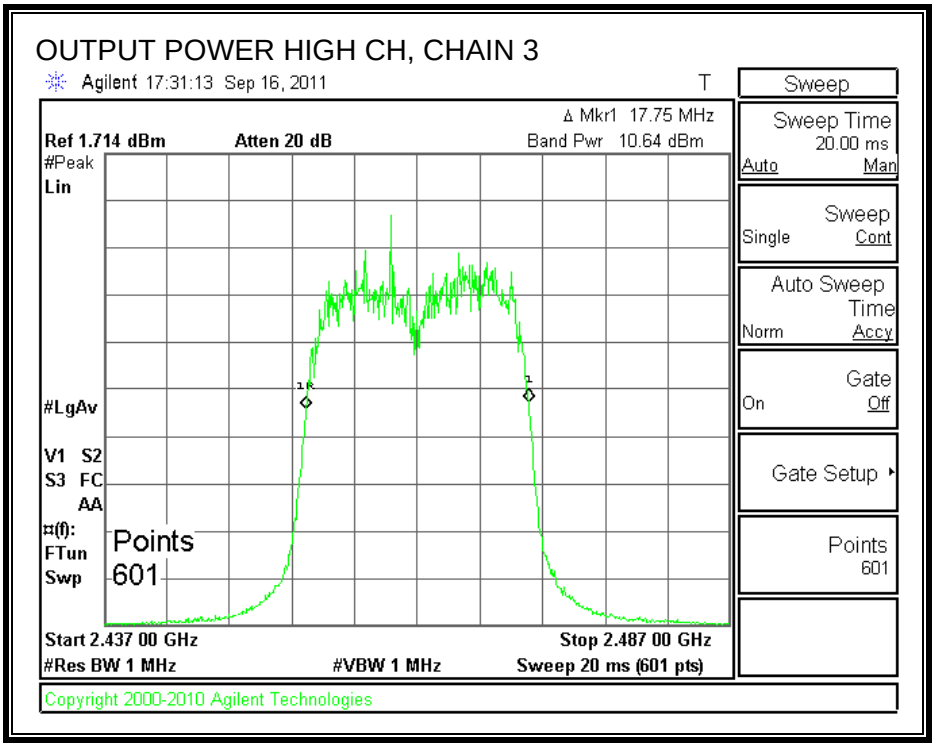




CHAIN 3 OUTPUT POWER







7.2.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1.0 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	2412	14.20	14.20	14.20	18.97
Middle	2437	14.00	14.00	14.00	18.77
High	2462	14.00	14.00	14.00	18.77

7.2.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

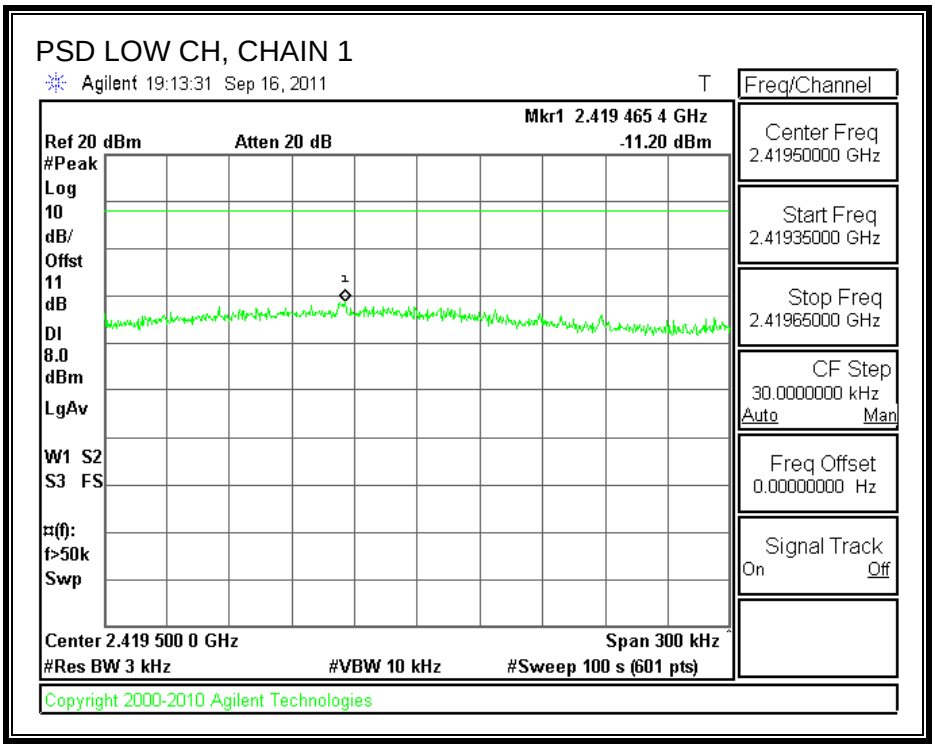
TEST PROCEDURE

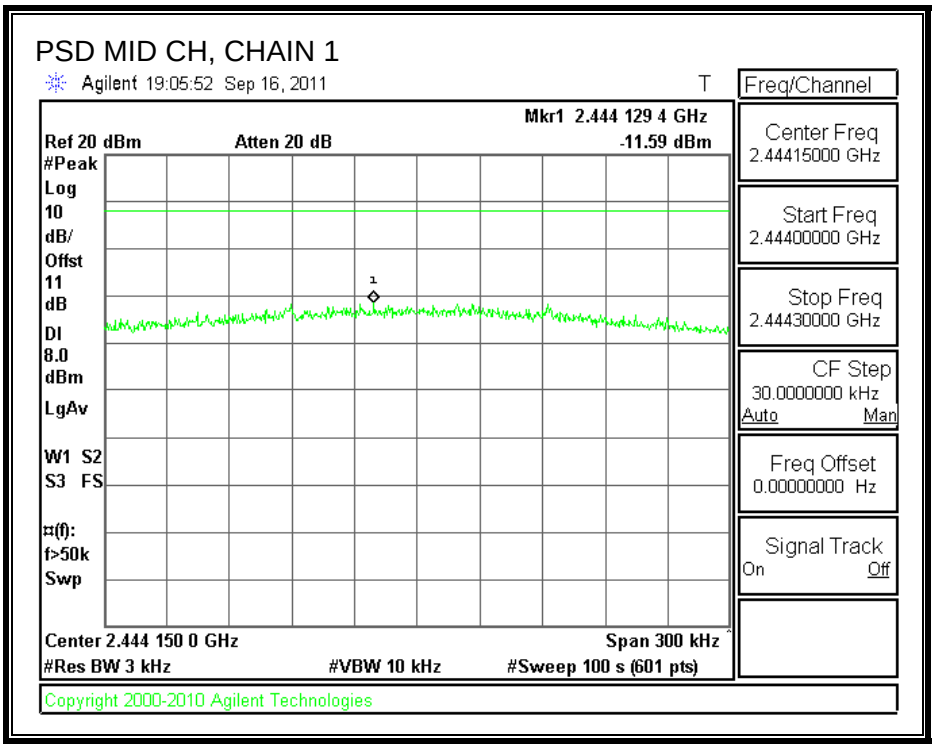
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

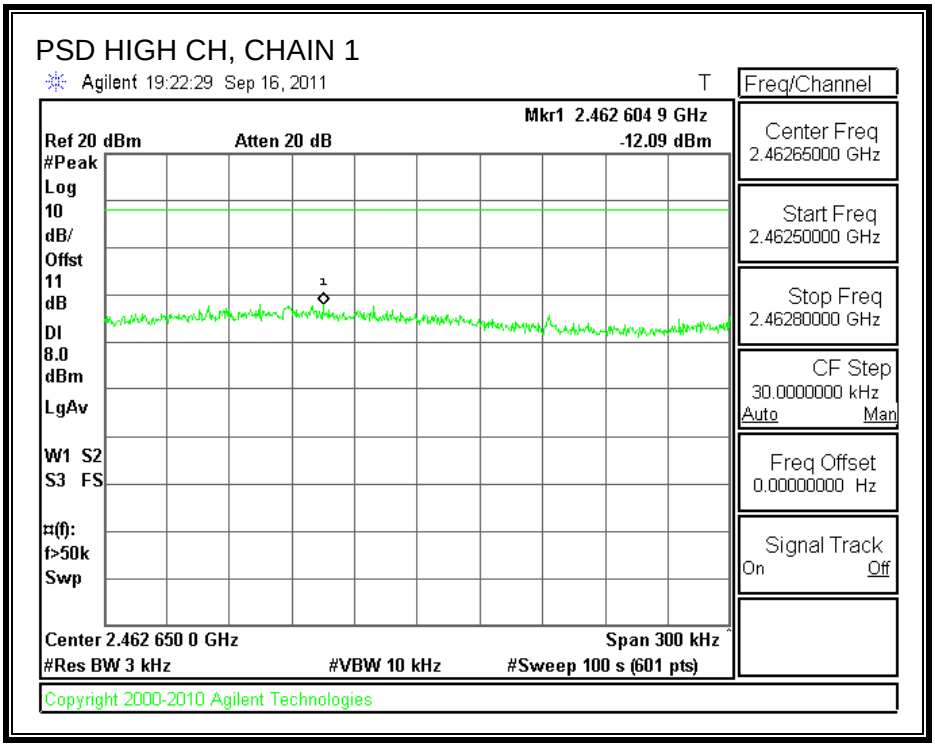
RESULTS

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-11.2	-10.14	-10.16	-5.70	8	-13.70
Middle	2437	-11.59	-11.37	-10.35	-6.30	8	-14.30
High	2462	-12.09	-11.84	-11.01	-6.85	8	-14.85

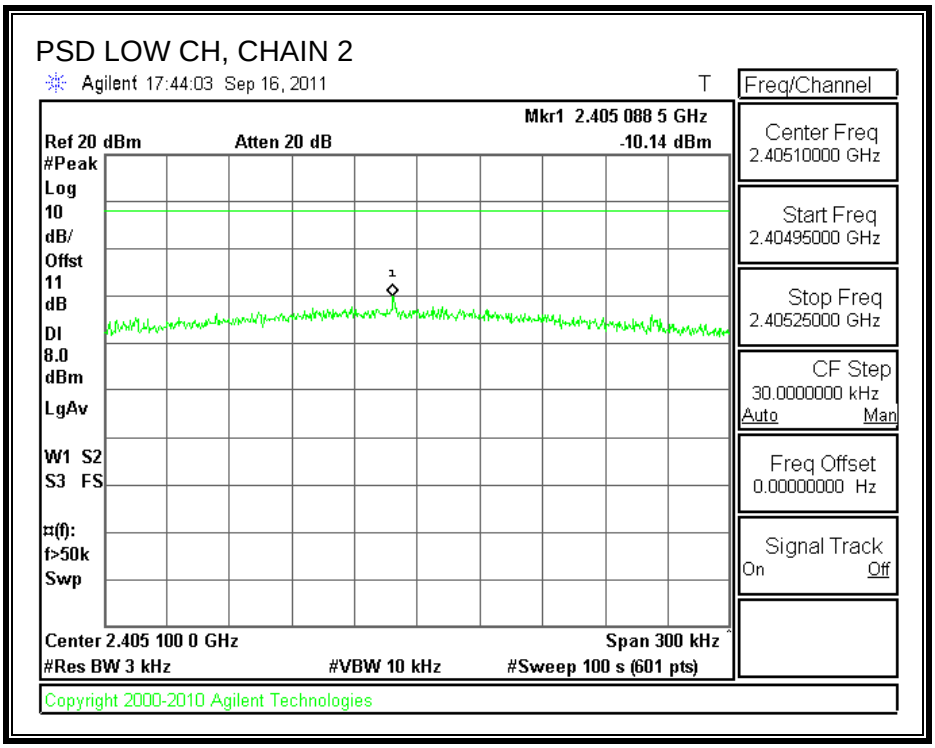
POWER SPECTRAL DENSITY, CHAIN 1

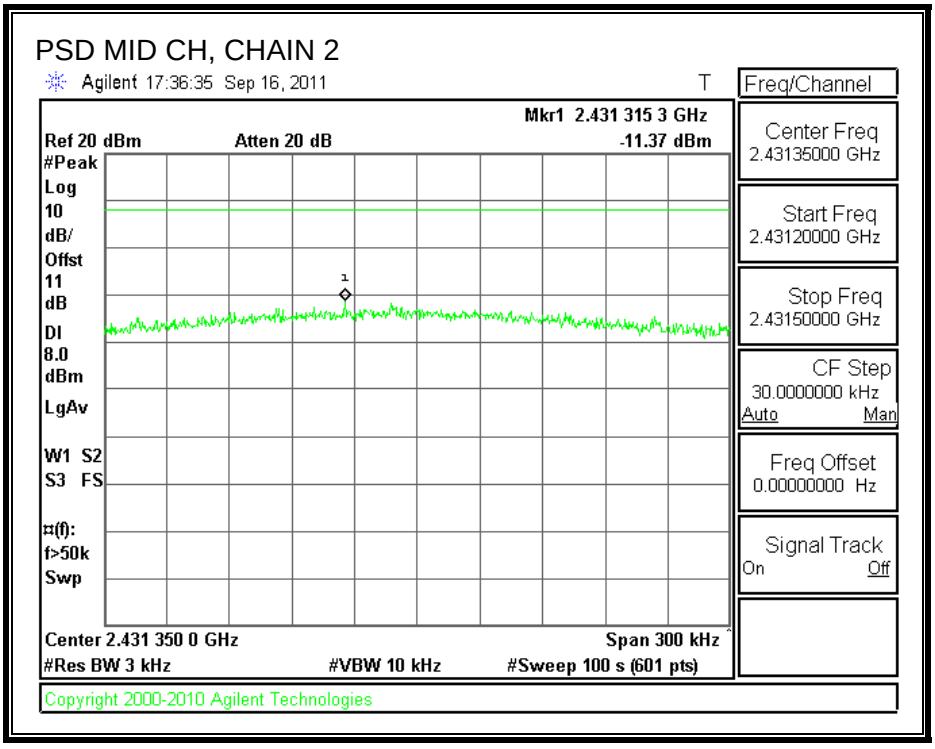




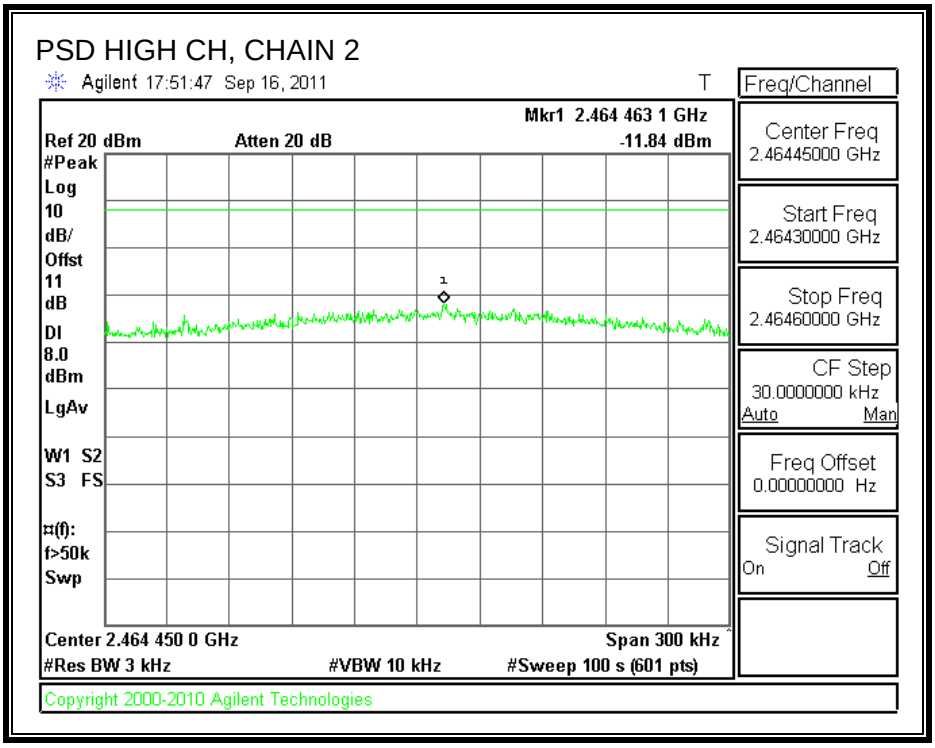


POWER SPECTRAL DENSITY, CHAIN 2

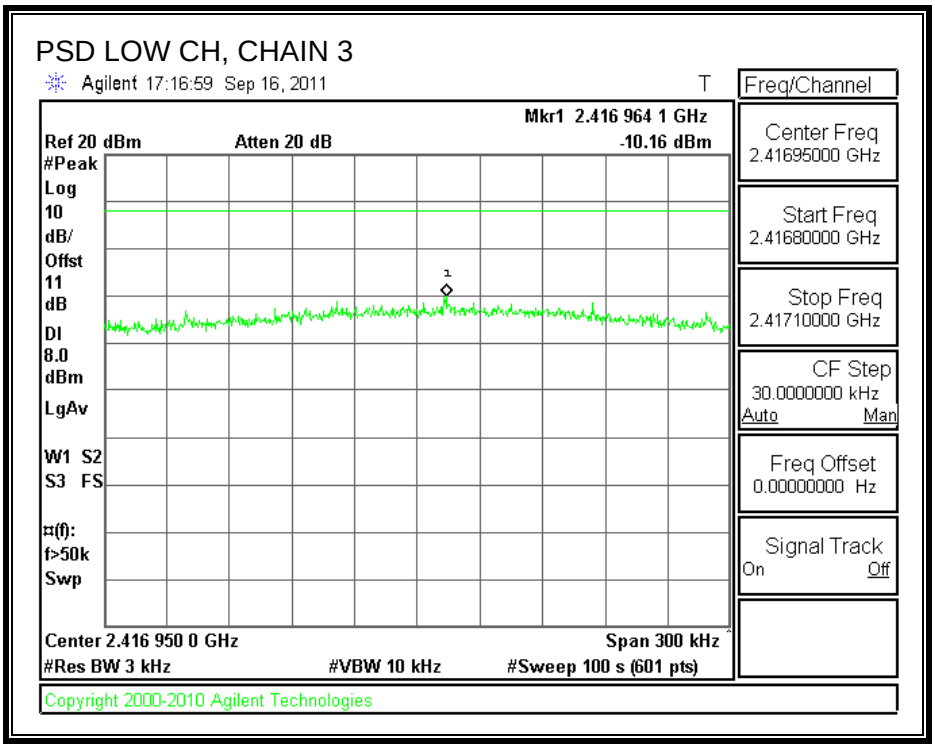


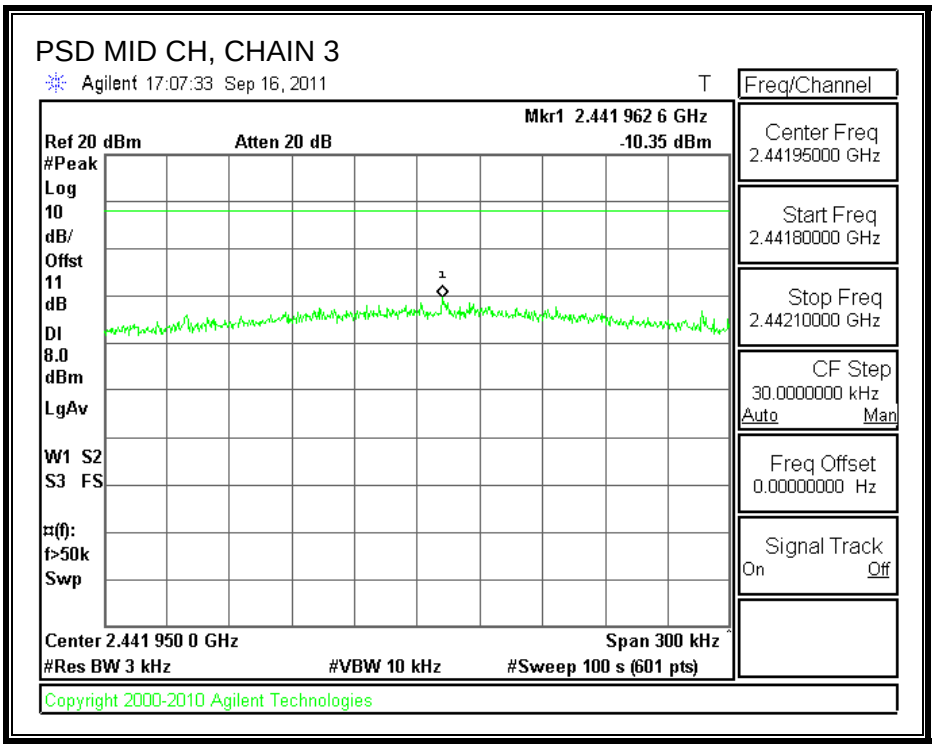


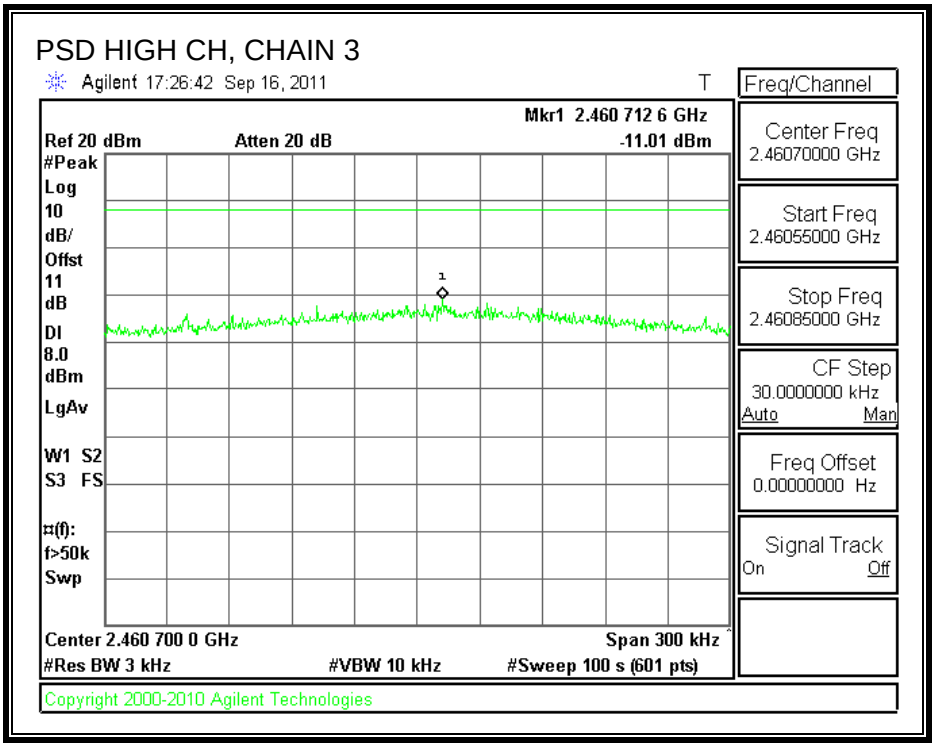
PSD HIGH CH, CHAIN 2



POWER SPECTRAL DENSITY, CHAIN 3







7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

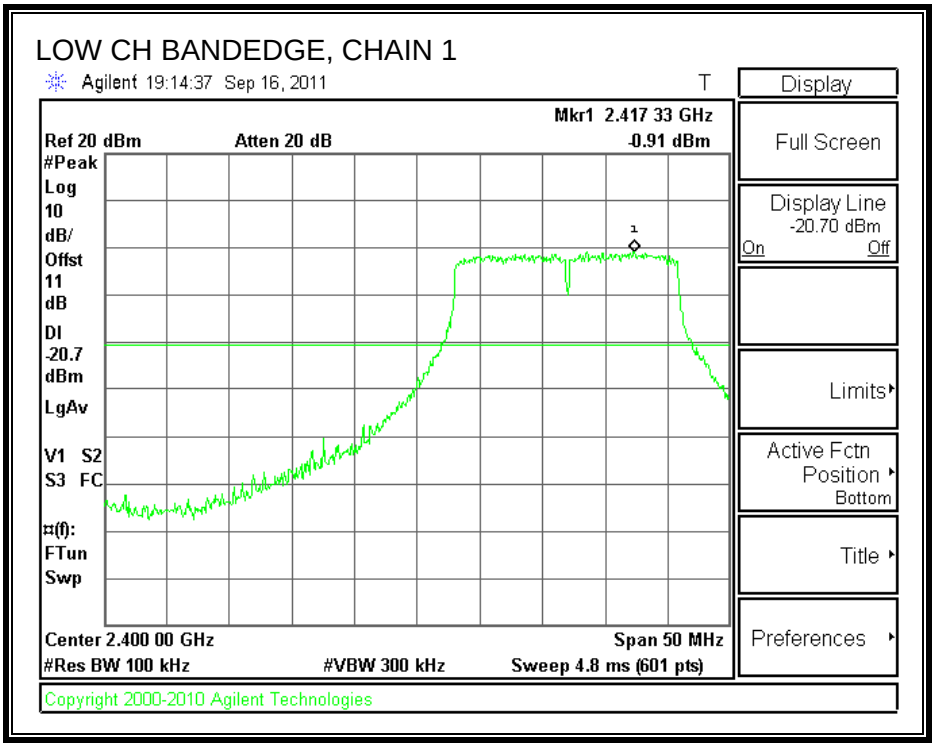
TEST PROCEDURE

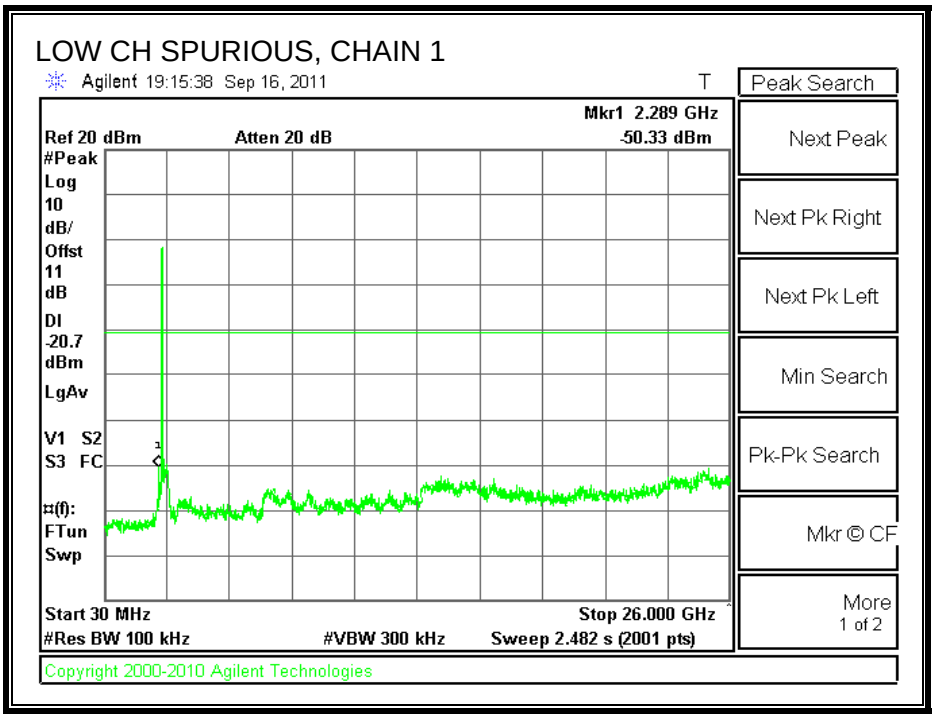
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

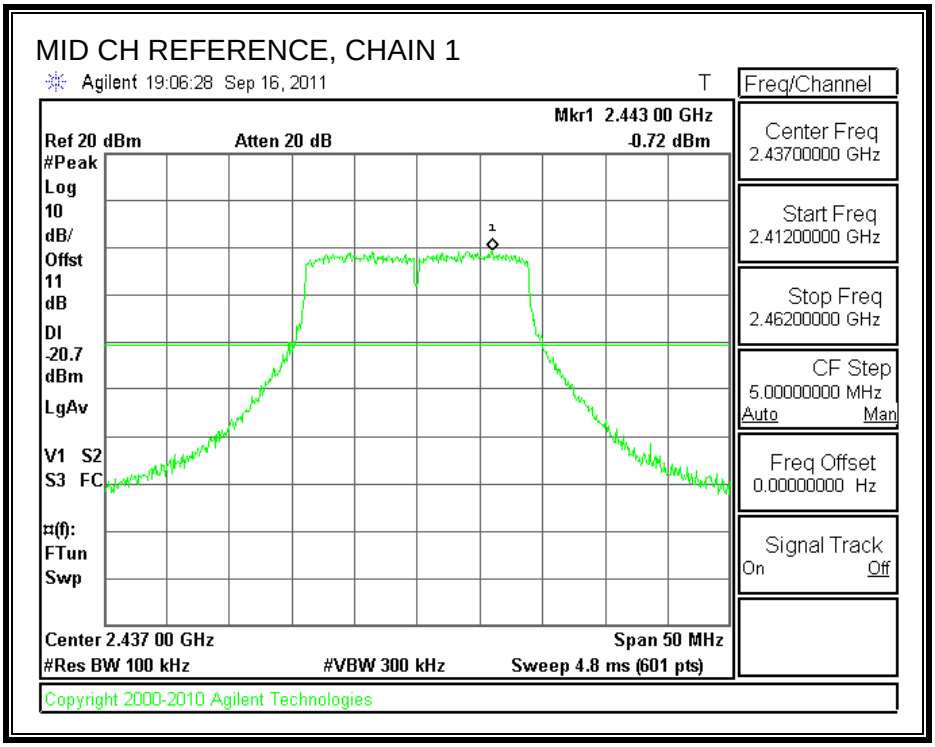
RESULTS

CHAIN 1 SPURIOUS EMISSIONS

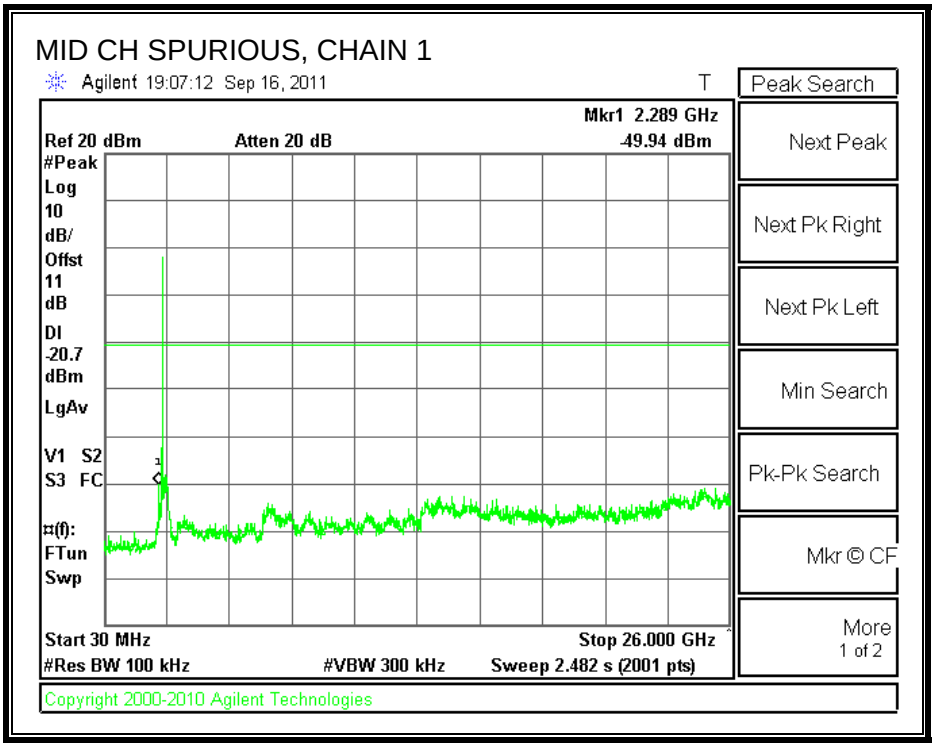




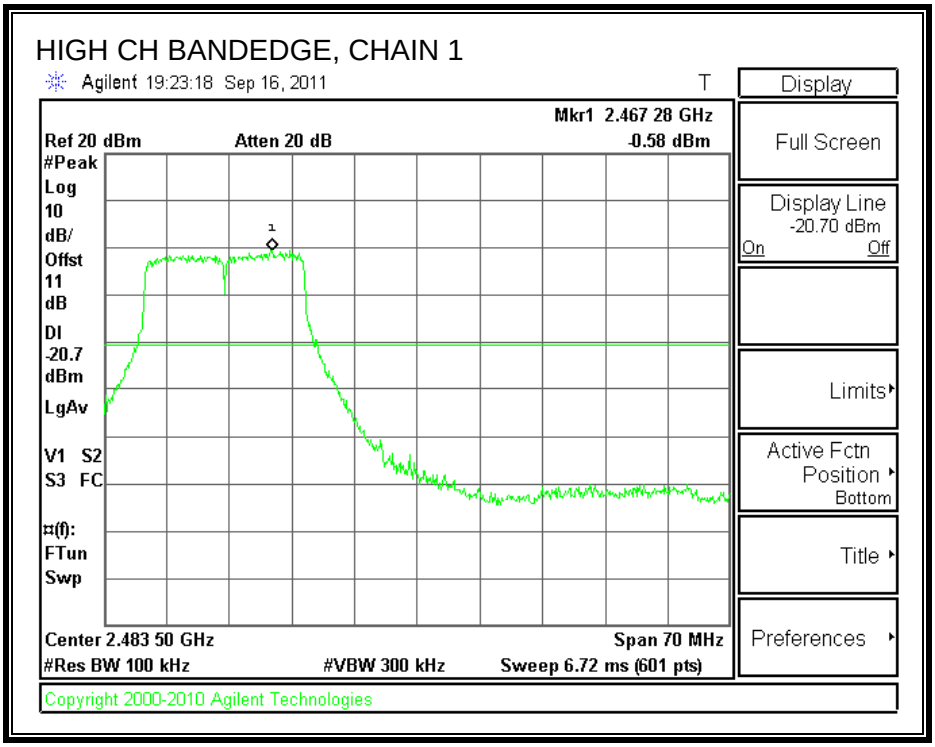
MID CH REFERENCE, CHAIN 1



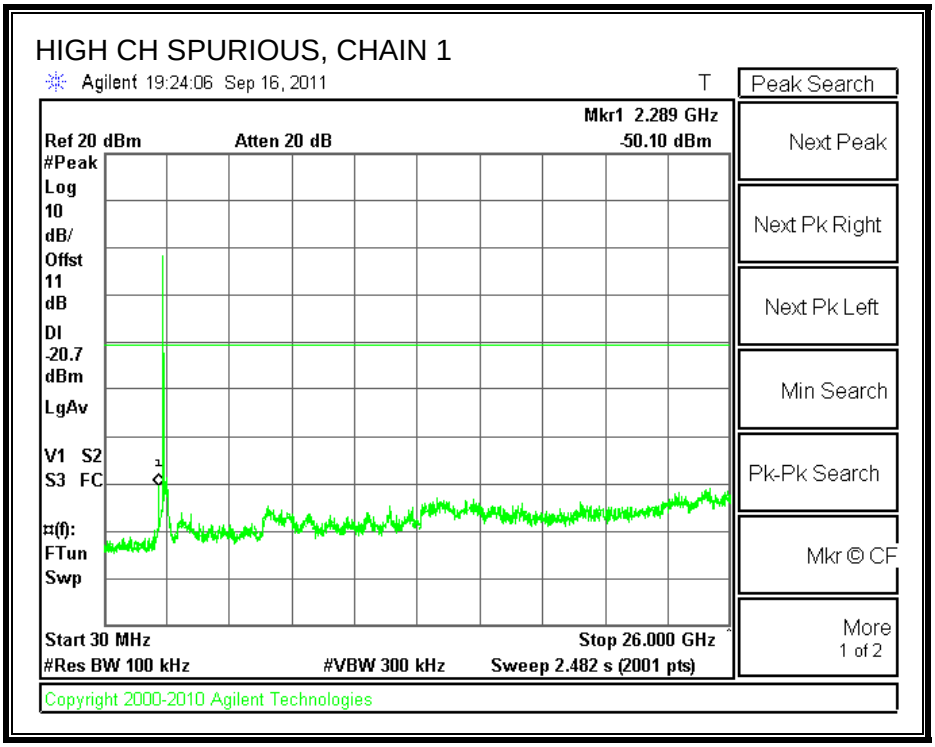
MID CH SPURIOUS, CHAIN 1



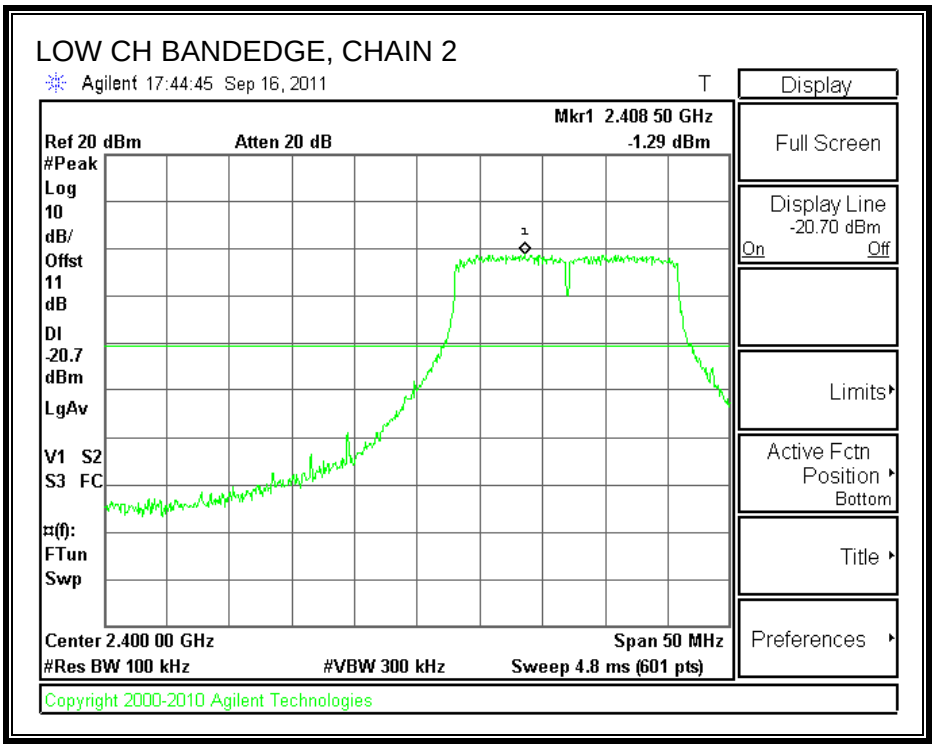
HIGH CH BANDEDGE, CHAIN 1

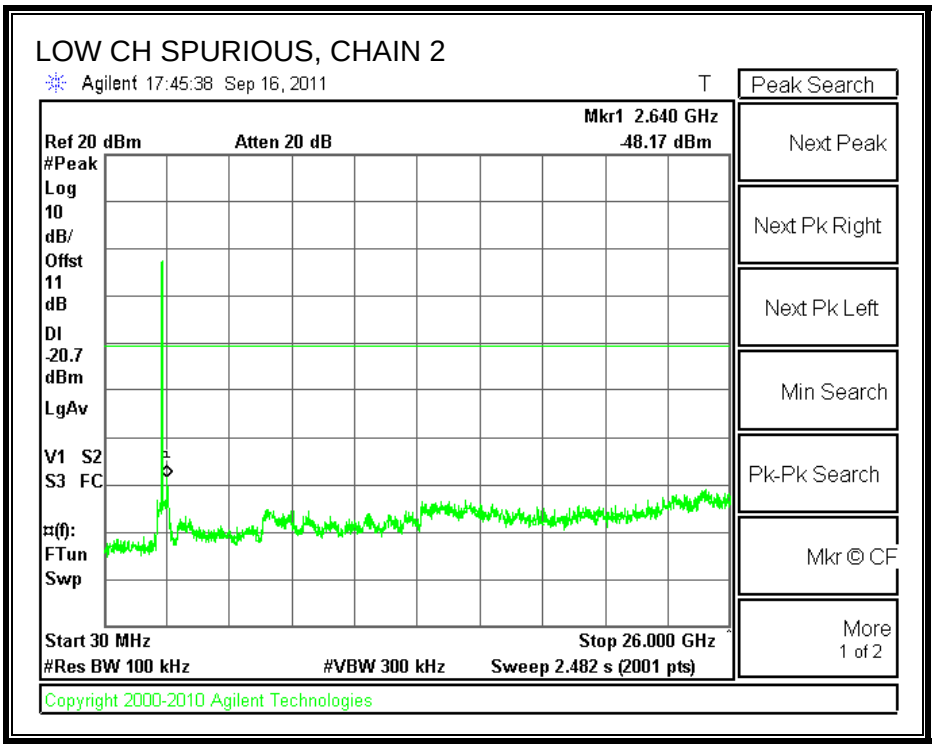


HIGH CH SPURIOUS, CHAIN 1

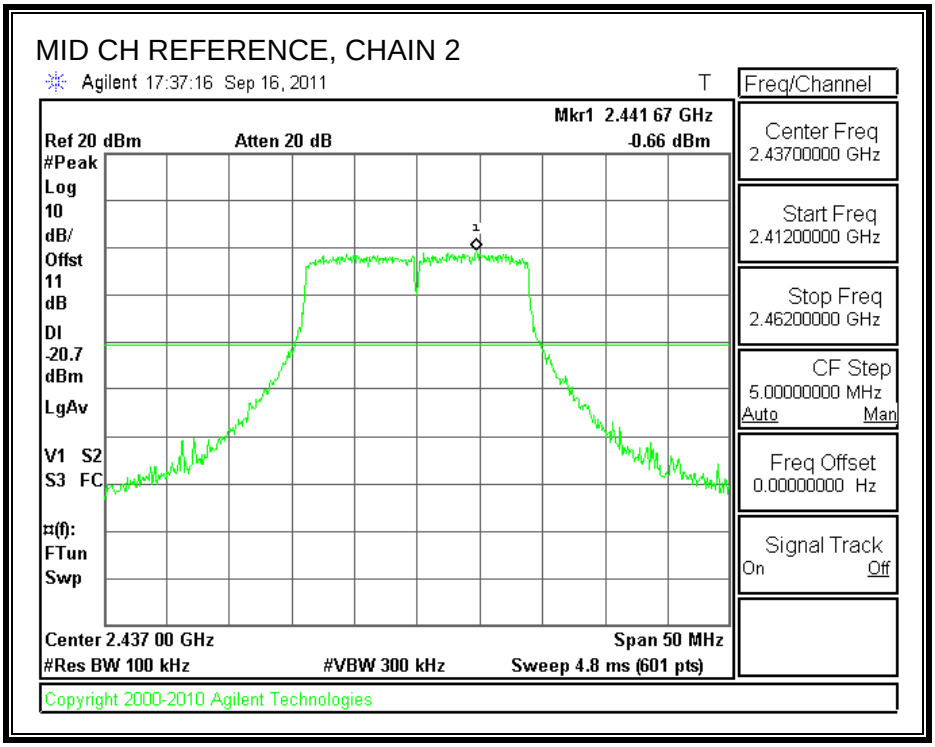


CHAIN 2 SPURIOUS EMISSIONS

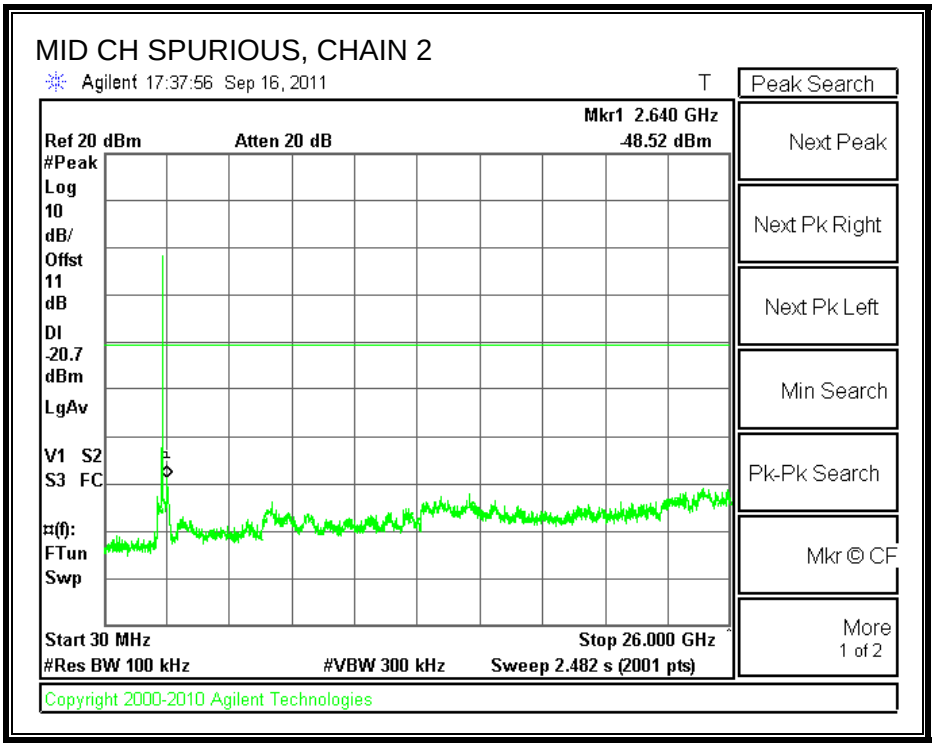




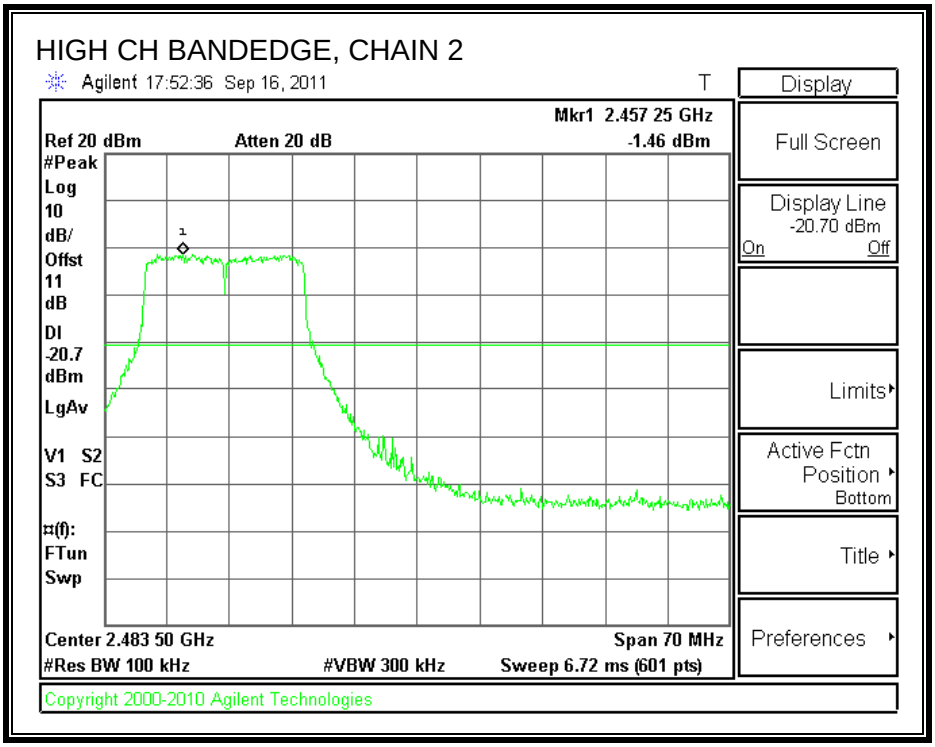
MID CH REFERENCE, CHAIN 2



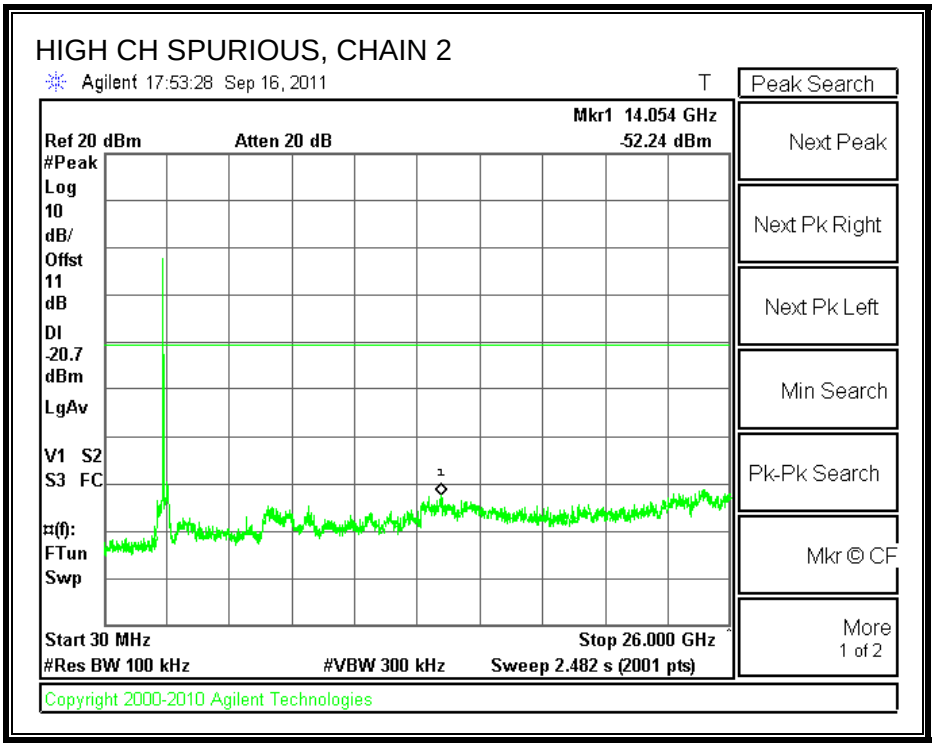
MID CH SPURIOUS, CHAIN 2



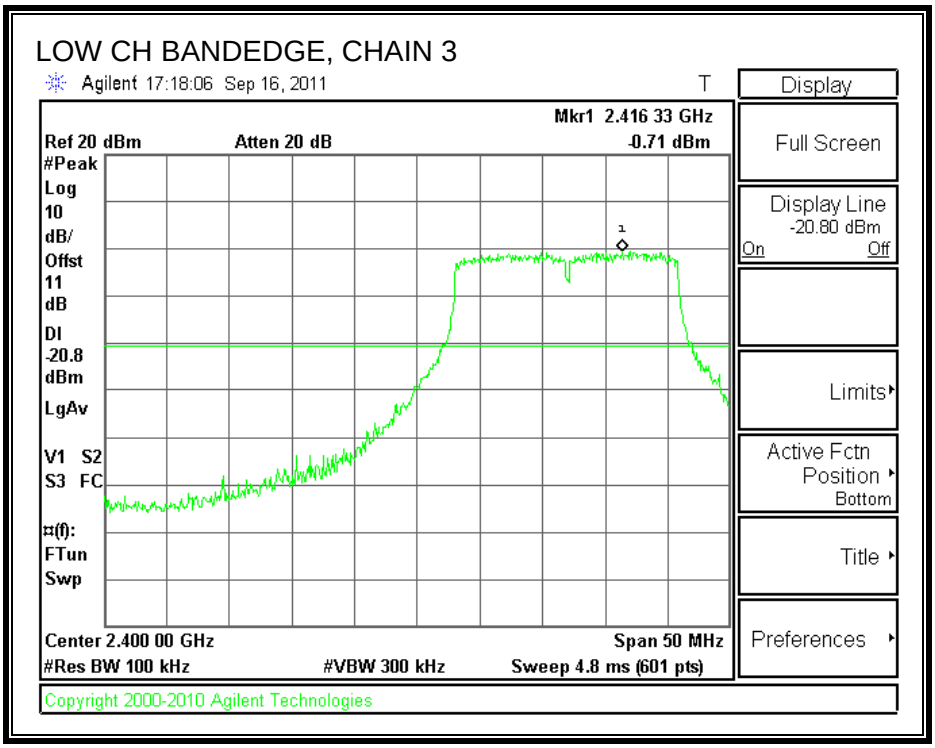
HIGH CH BANDEDGE, CHAIN 2

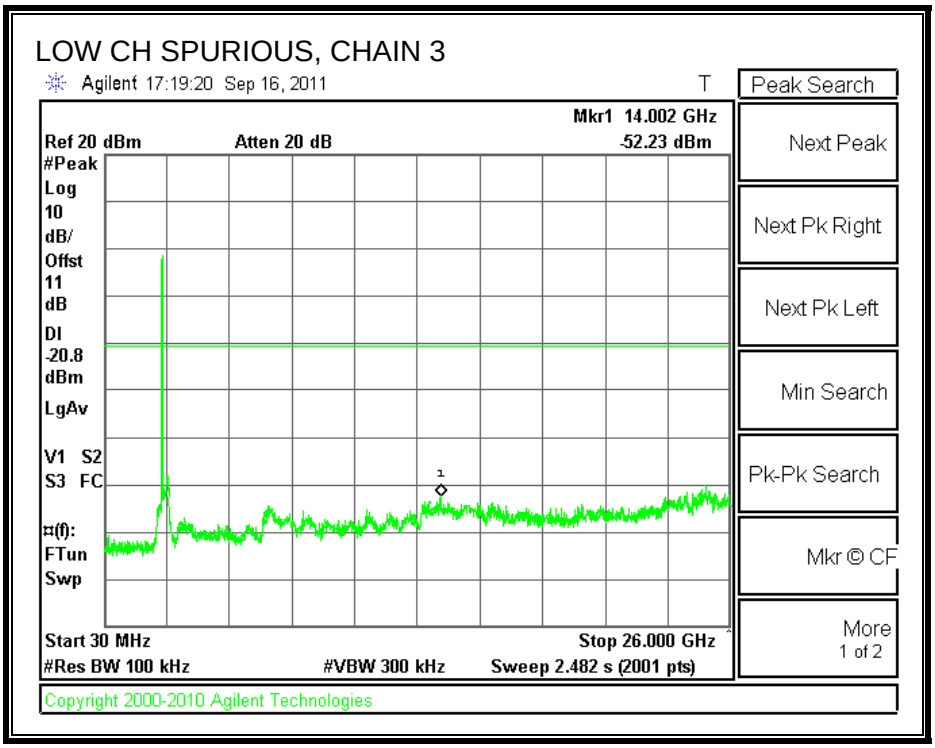


HIGH CH SPURIOUS, CHAIN 2

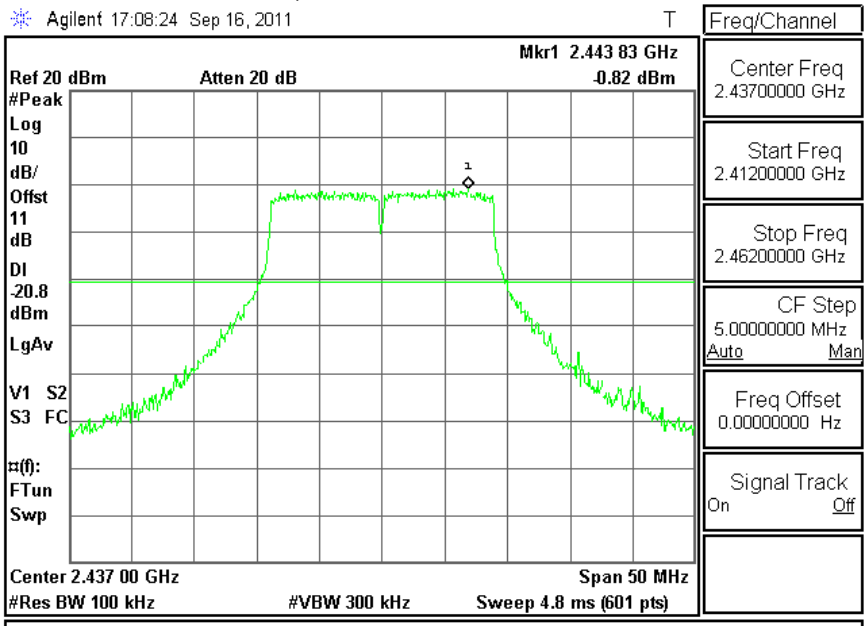


CHAIN 3 SPURIOUS EMISSIONS

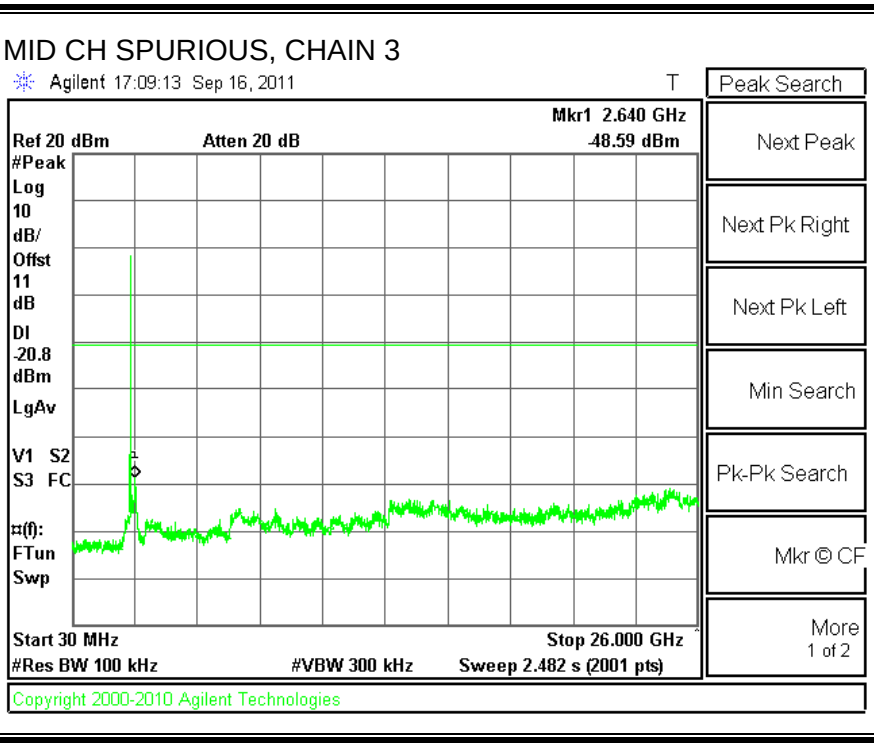




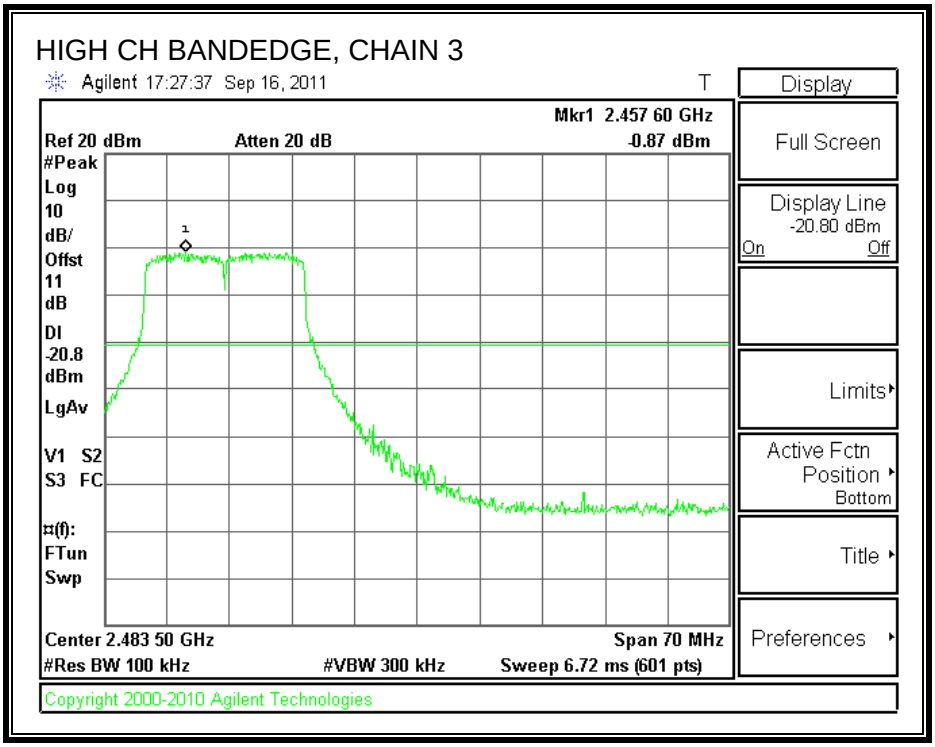
MID CH REFERENCE, CHAIN 3



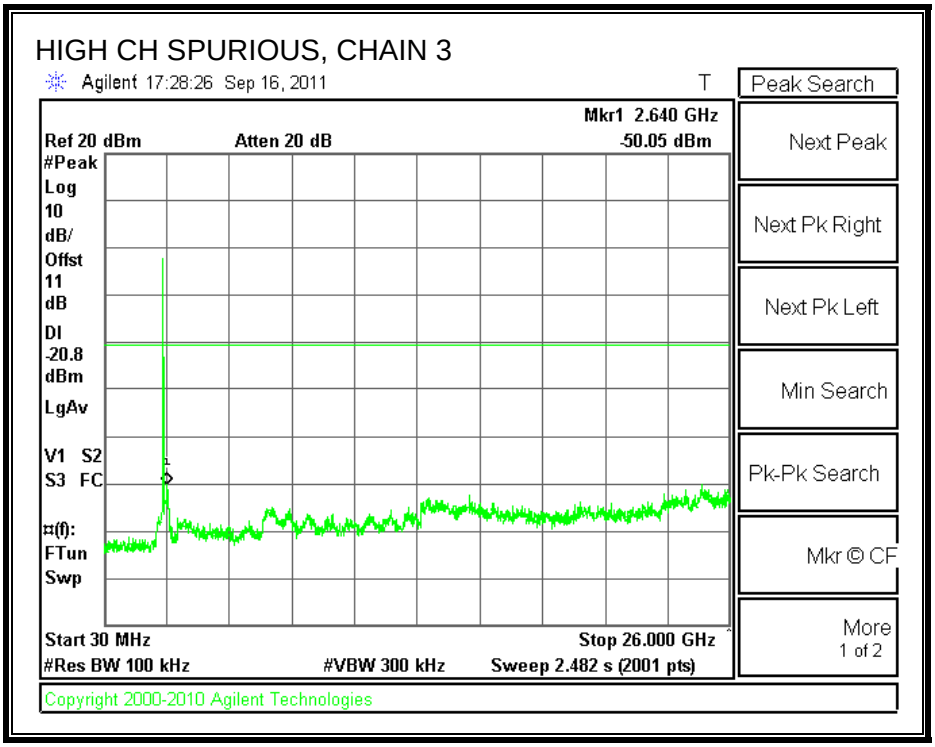
MID CH SPURIOUS, CHAIN 3



HIGH CH BANDEDGE, CHAIN 3



HIGH CH SPURIOUS, CHAIN 3



7.3. 802.11n HT20 MCS8 3TX MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

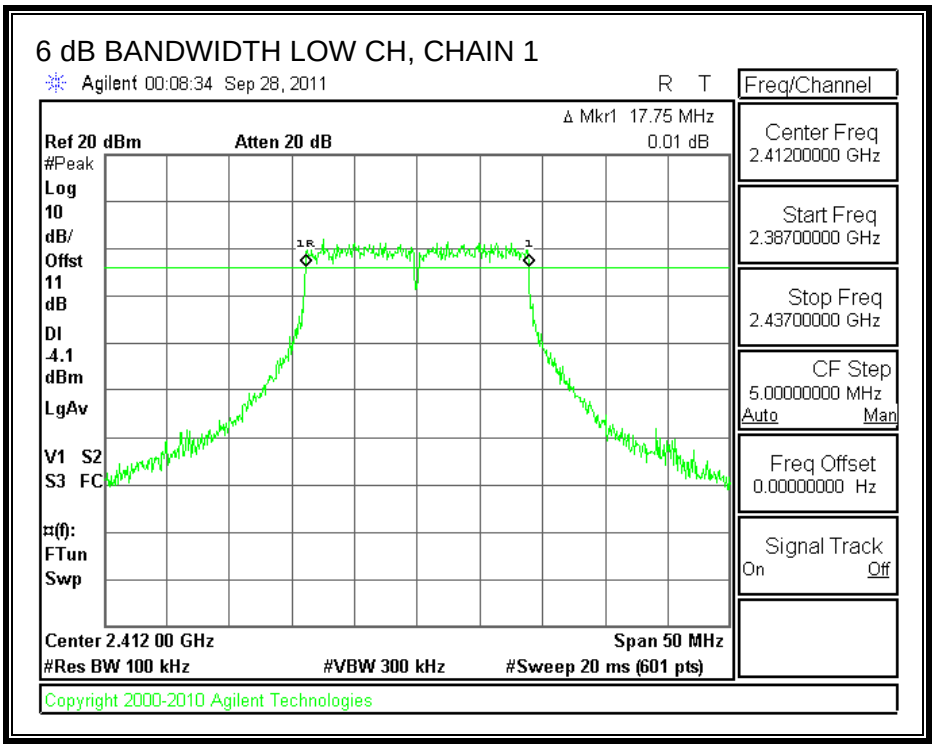
TEST PROCEDURE

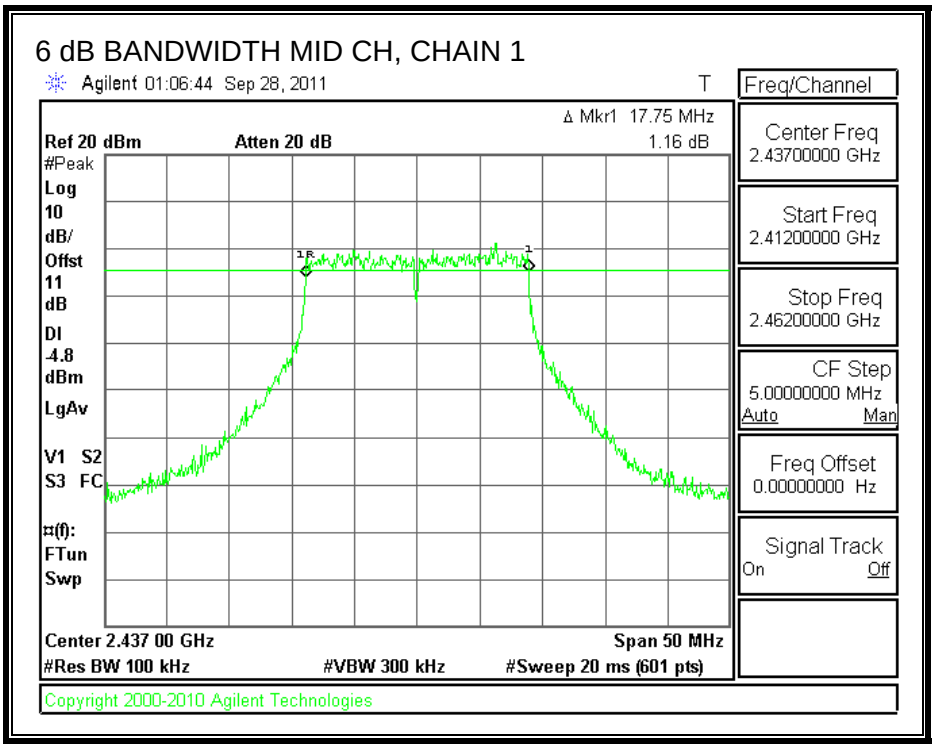
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

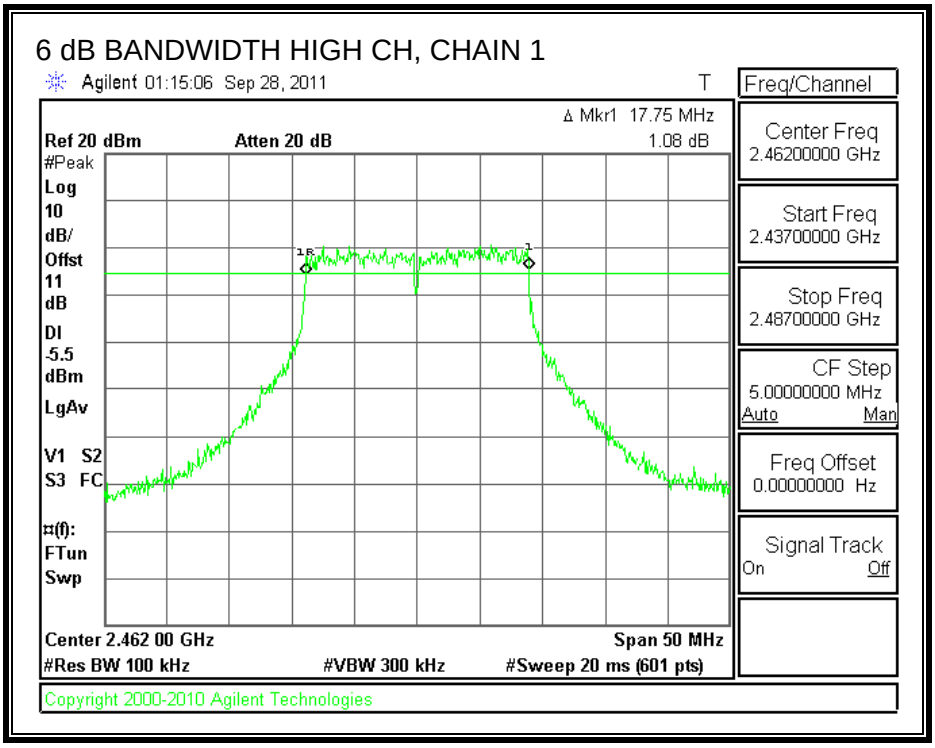
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Chain 3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	17.75	17.75	17.75	0.5
Middle	2437	17.75	17.75	17.75	0.5
High	2462	17.75	17.75	17.75	0.5

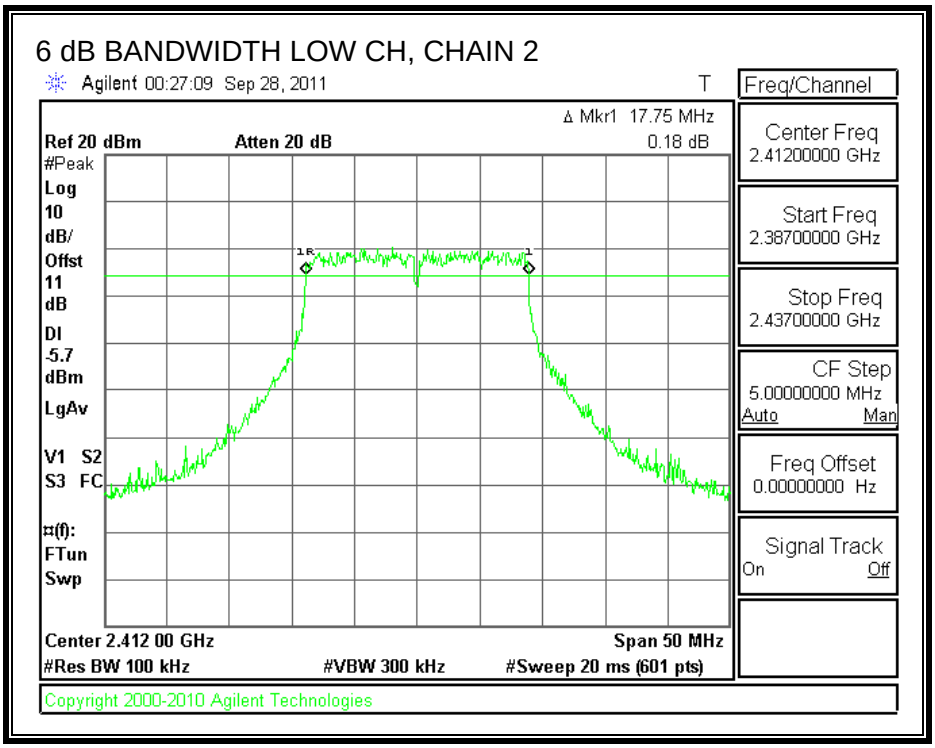
6 dB BANDWIDTH, CHAIN 1

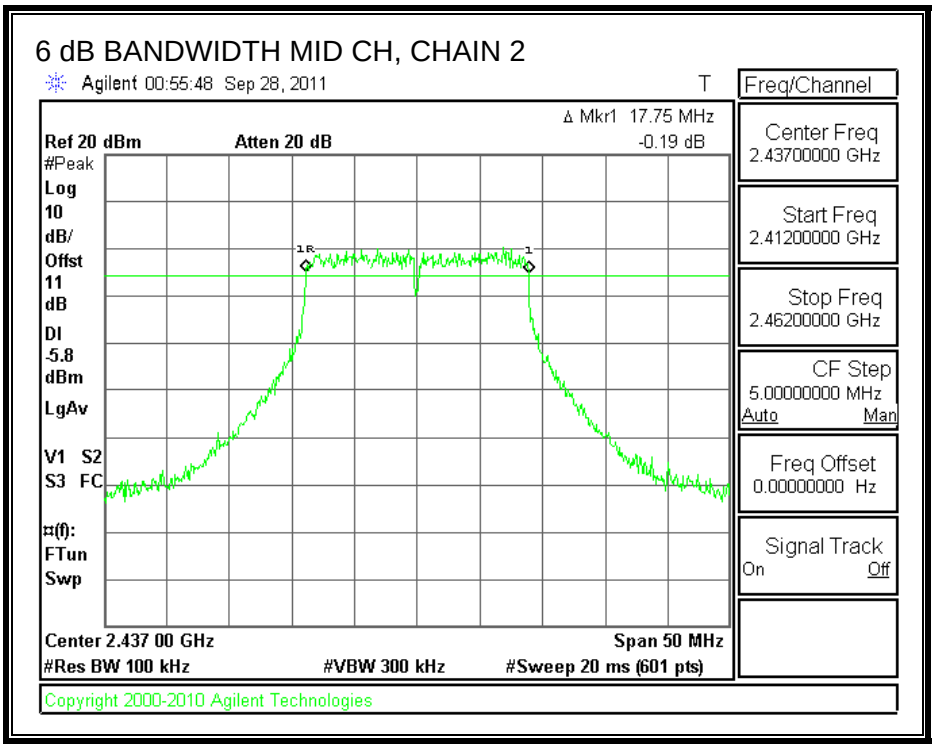


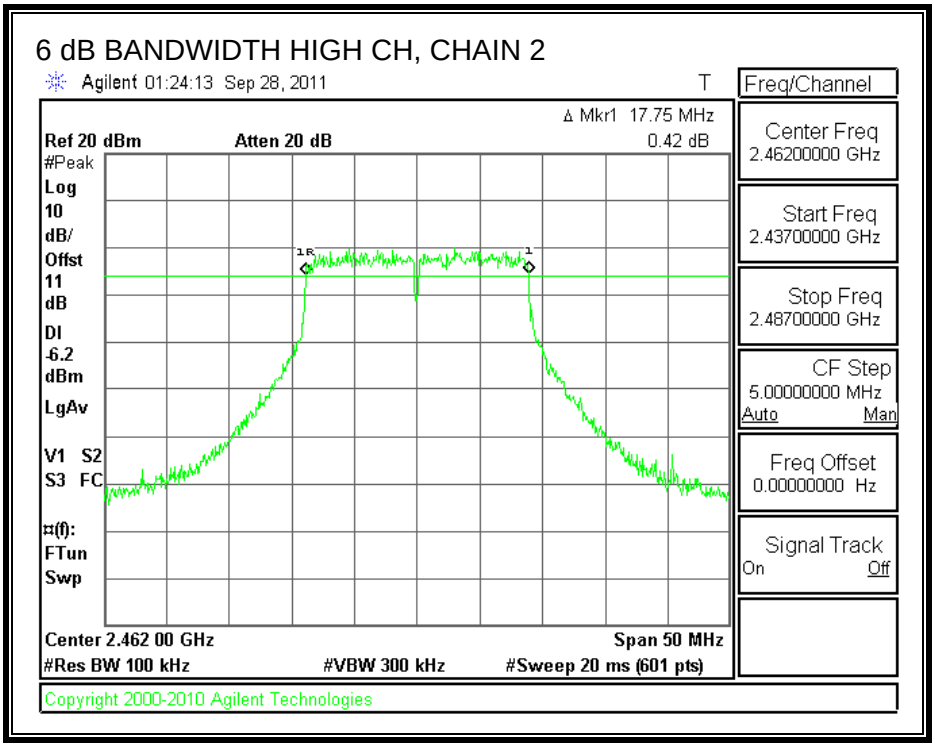




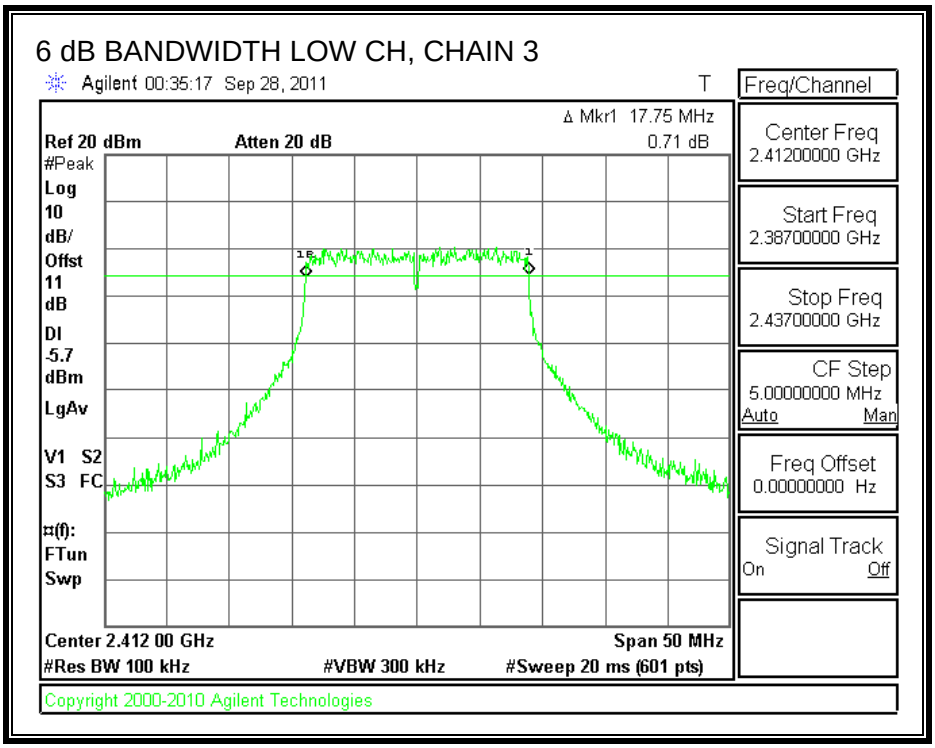
6 dB BANDWIDTH, CHAIN 2

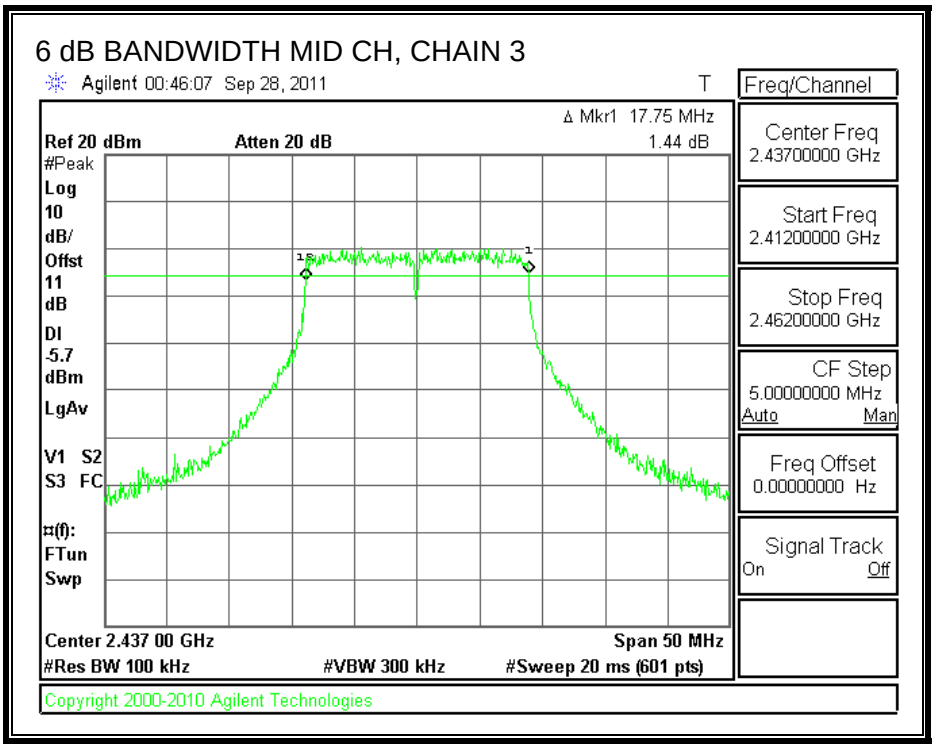


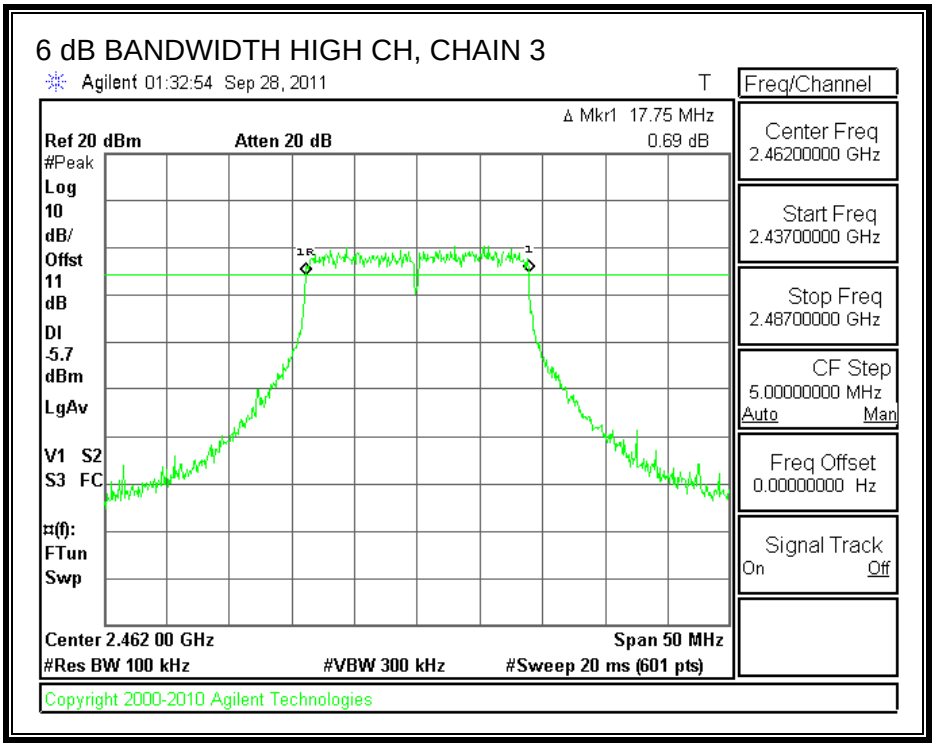




6 dB BANDWIDTH, CHAIN 3







7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

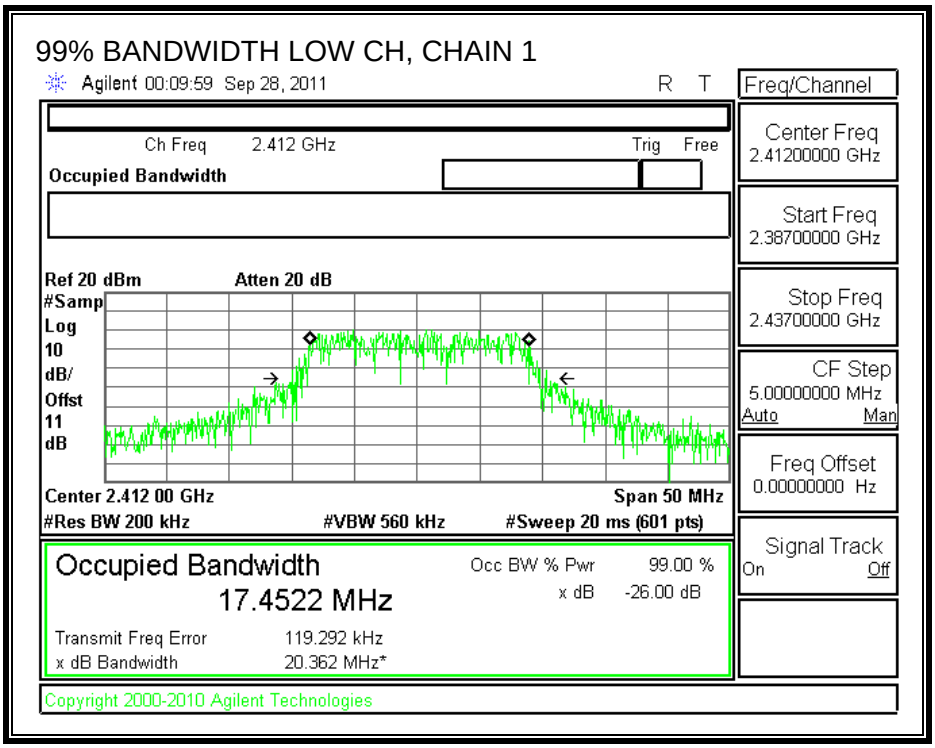
TEST PROCEDURE

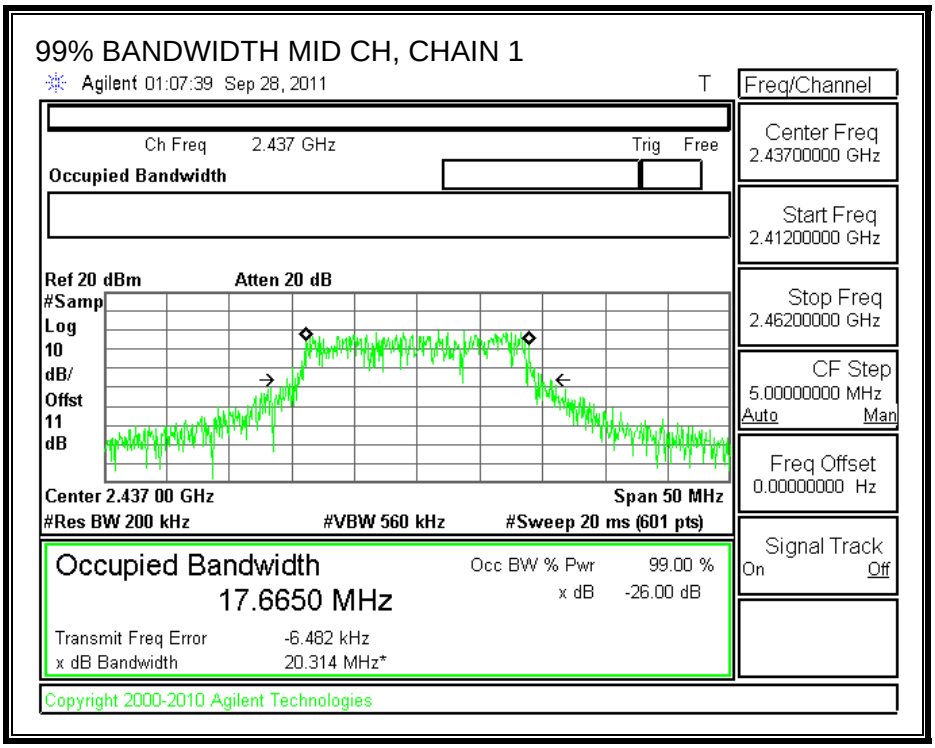
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

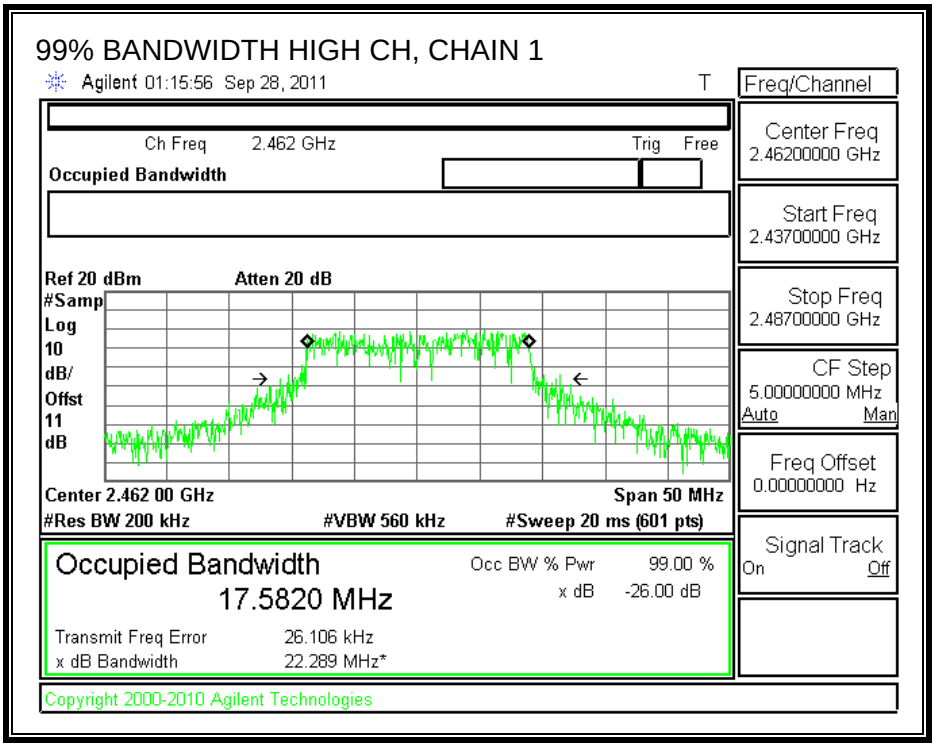
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)	Chain 3 99% Bandwidth (MHz)
Low	2412	17.4522	17.5962	17.6733
Middle	2437	17.6650	17.6823	17.7882
High	2462	17.5820	17.6793	17.5641

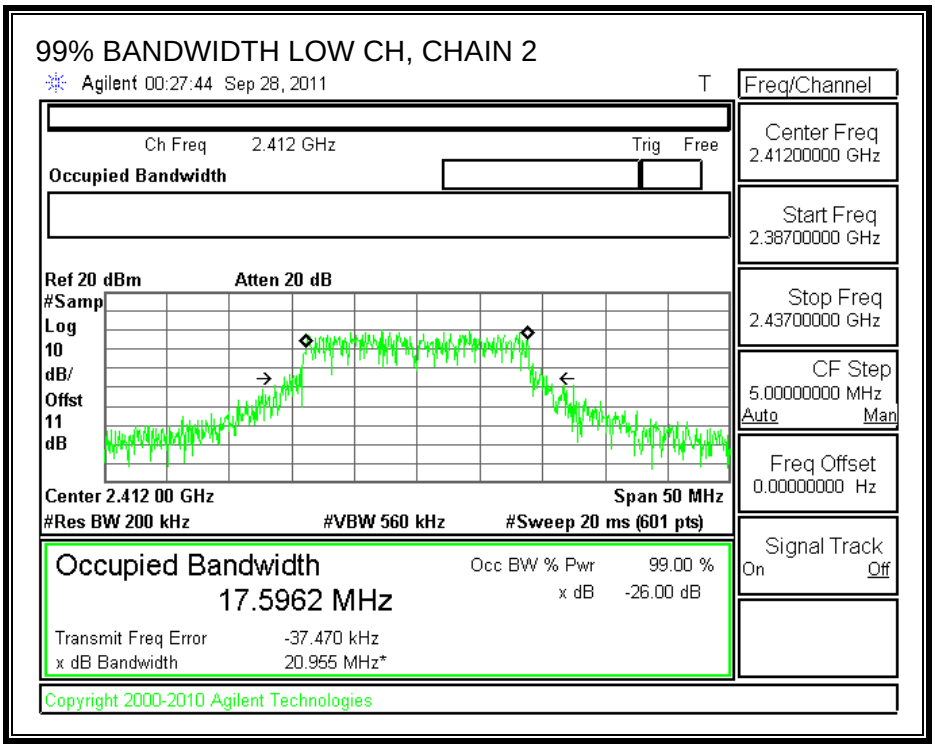
99% BANDWIDTH, CHAIN 1

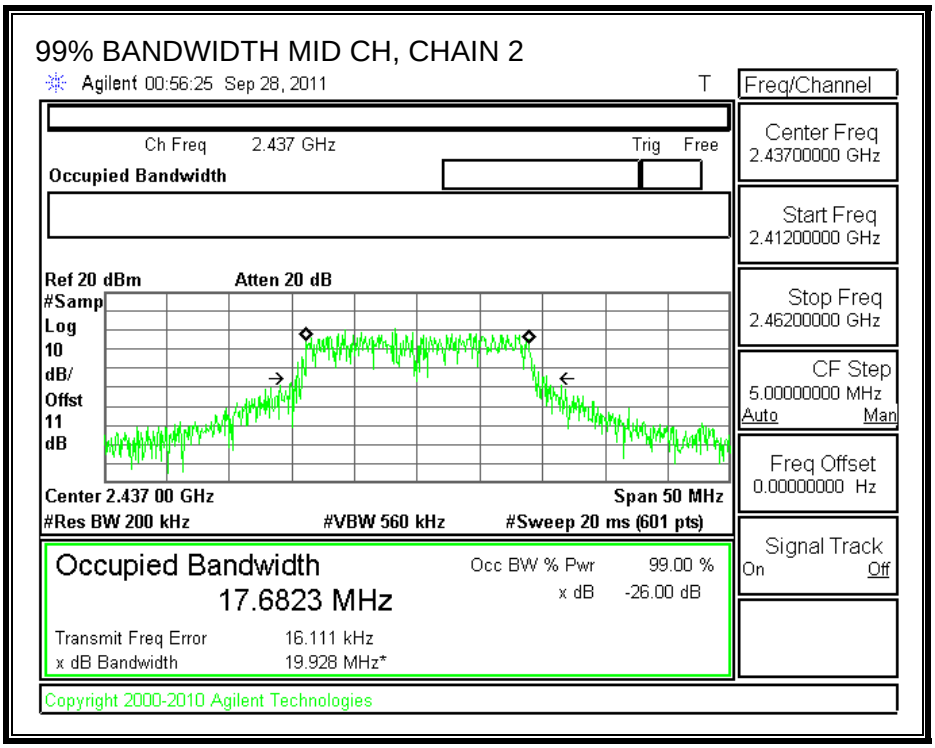


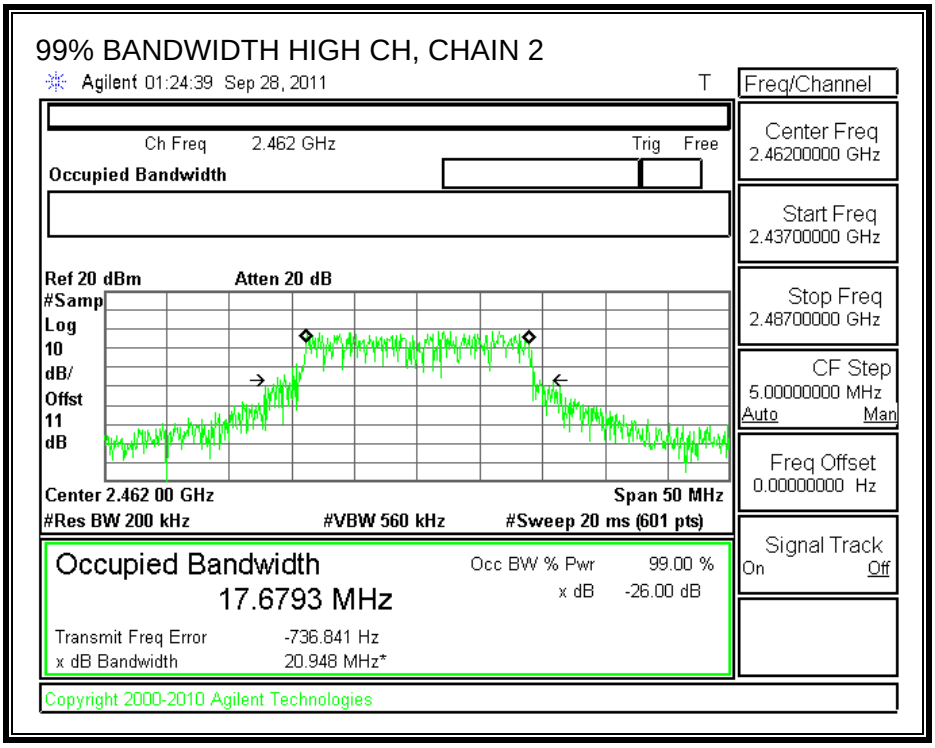




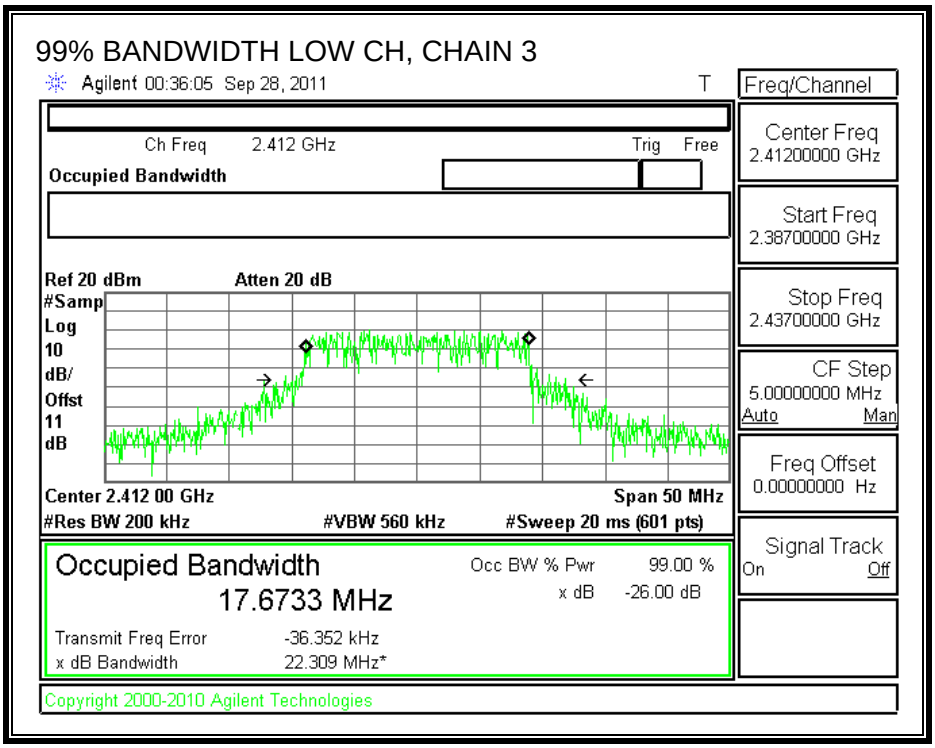
99% BANDWIDTH, CHAIN 2

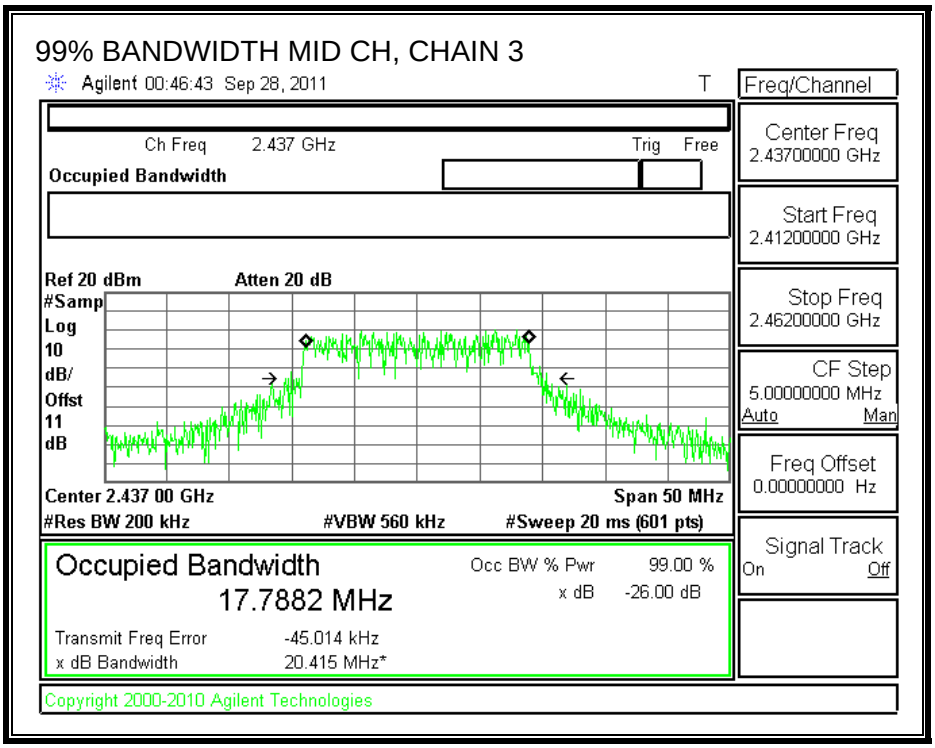


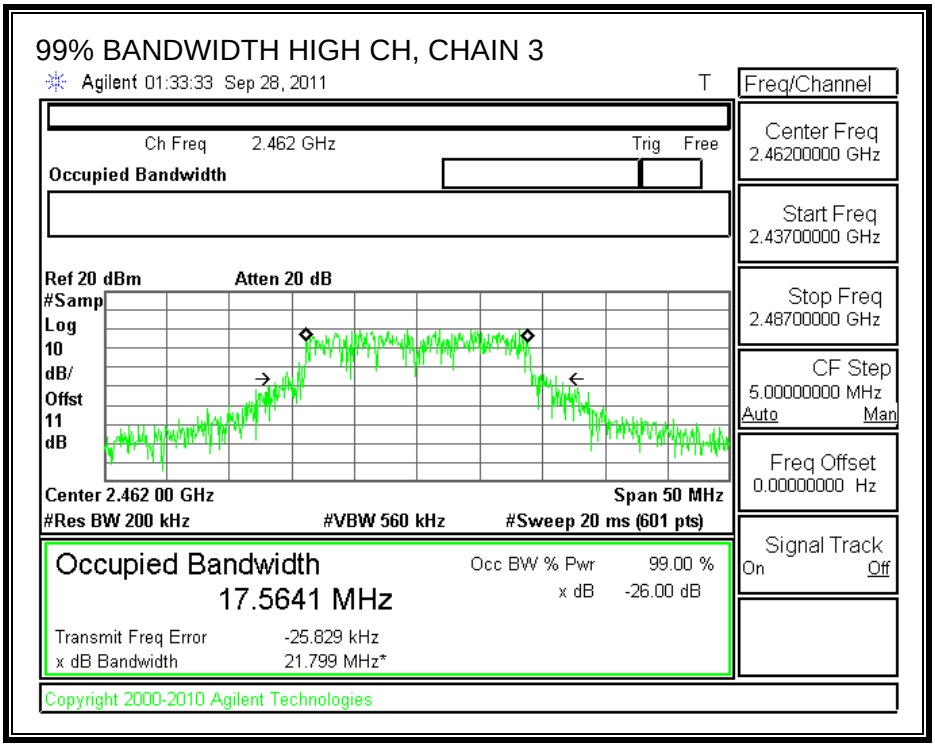




99% BANDWIDTH, CHAIN 3







7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

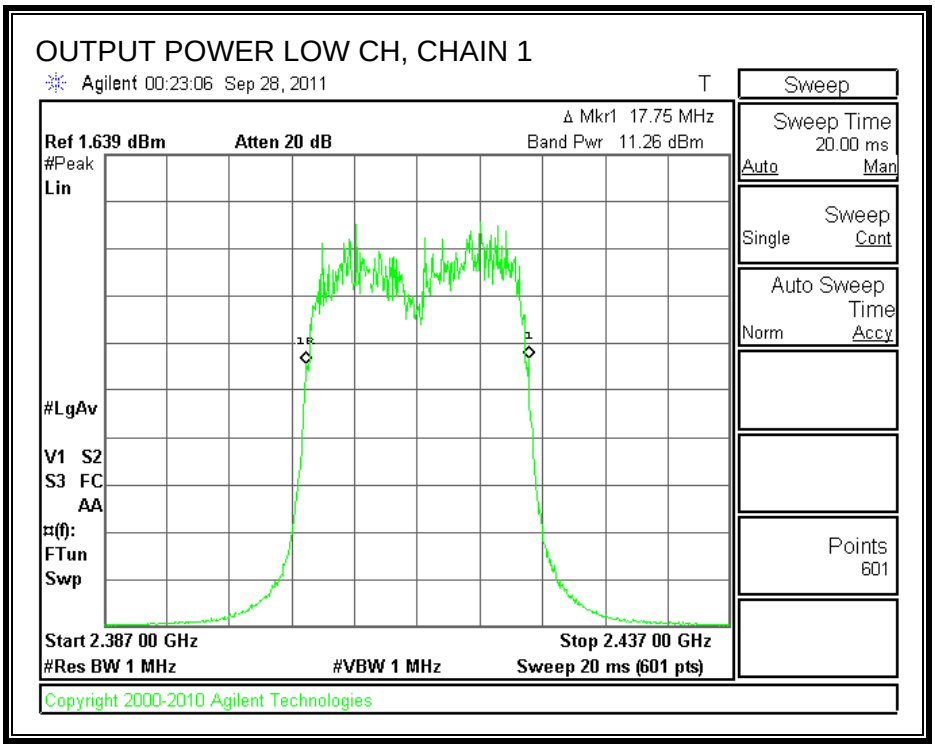
TEST PROCEDURE

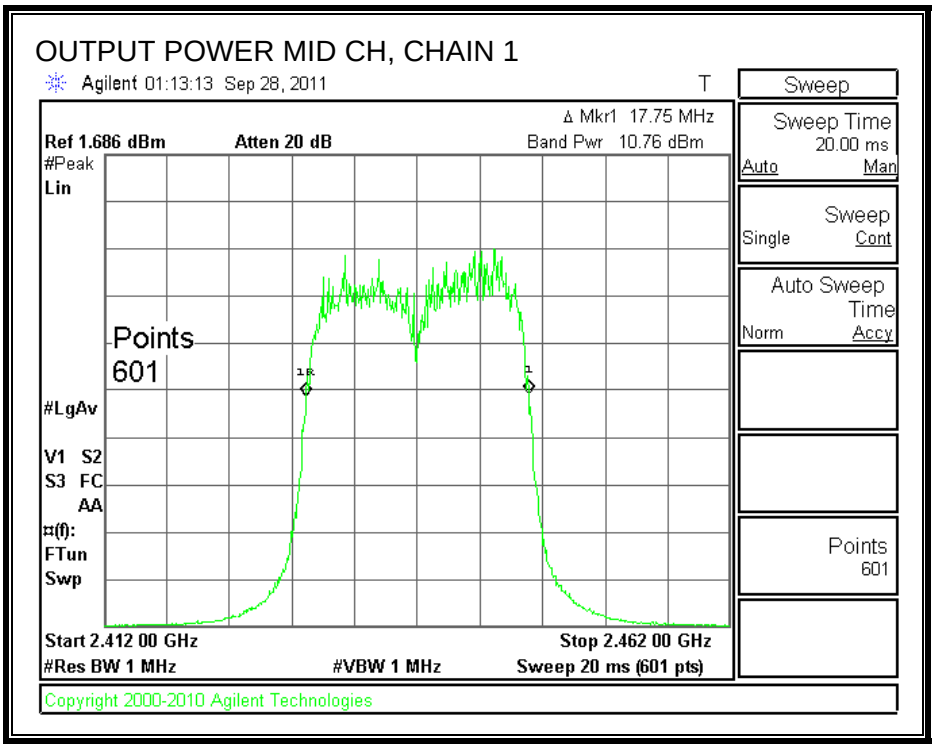
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

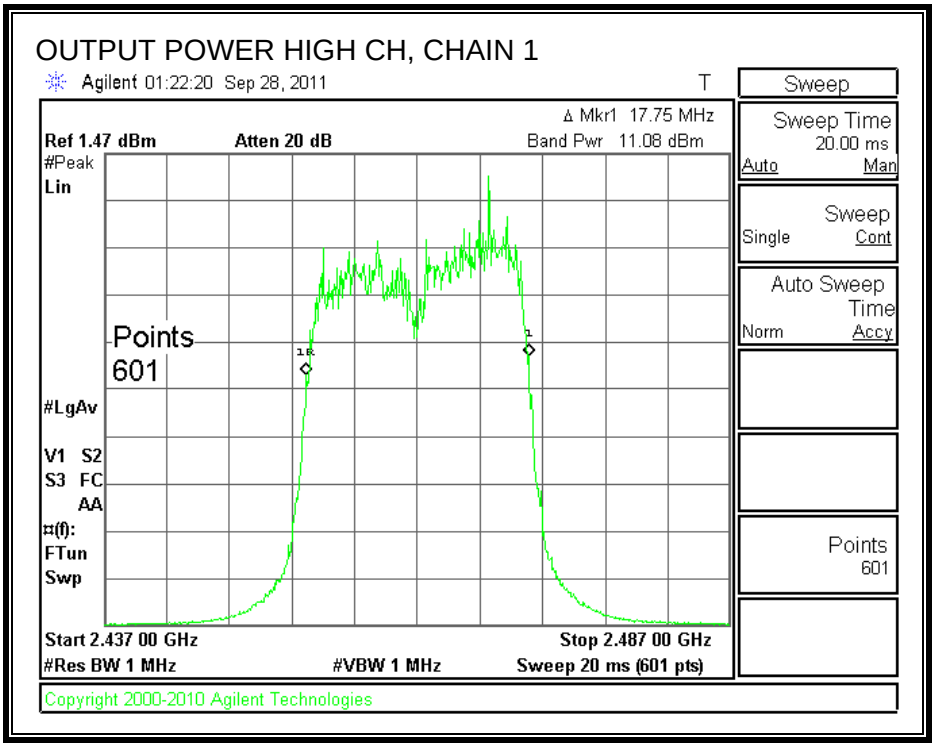
RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Chain 3 PK Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	11.26	11.27	11.57	11.00	27.14	30.00	-2.86
Mid	2437	10.76	11.06	11.06	11.00	26.73	30.00	-3.27
High	2462	11.08	10.89	11.20	11.00	26.83	30.00	-3.17

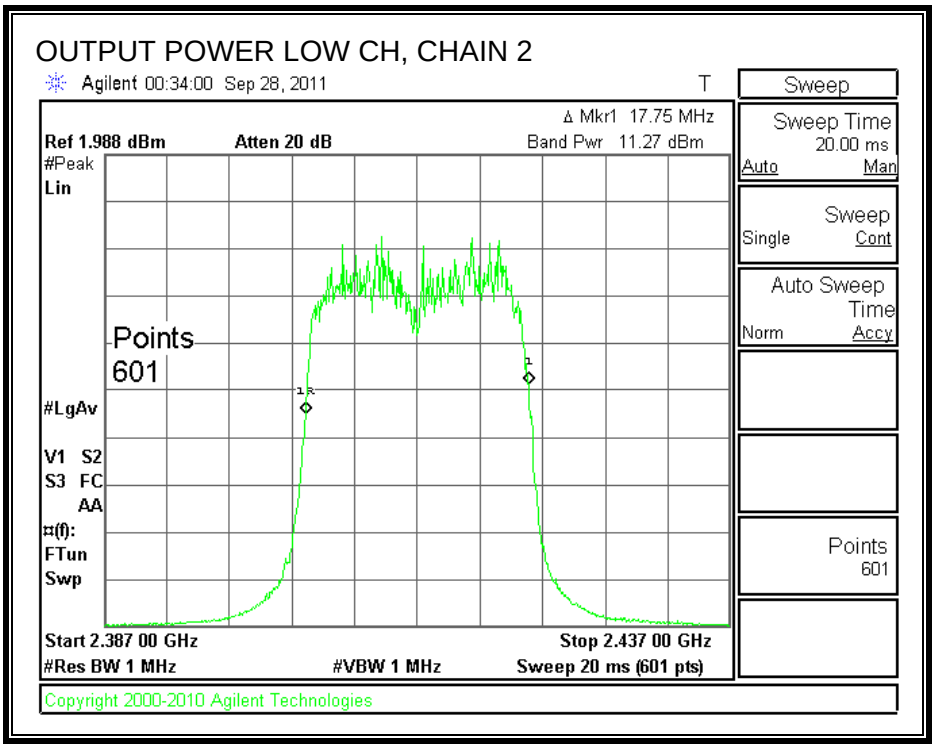
CHAIN 1 OUTPUT POWER

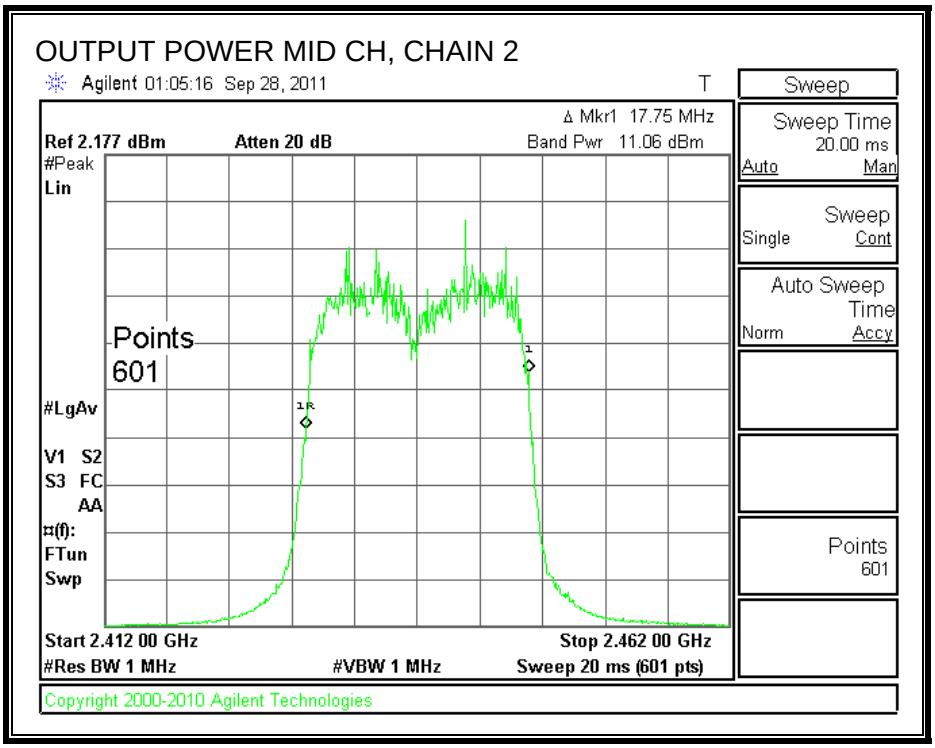


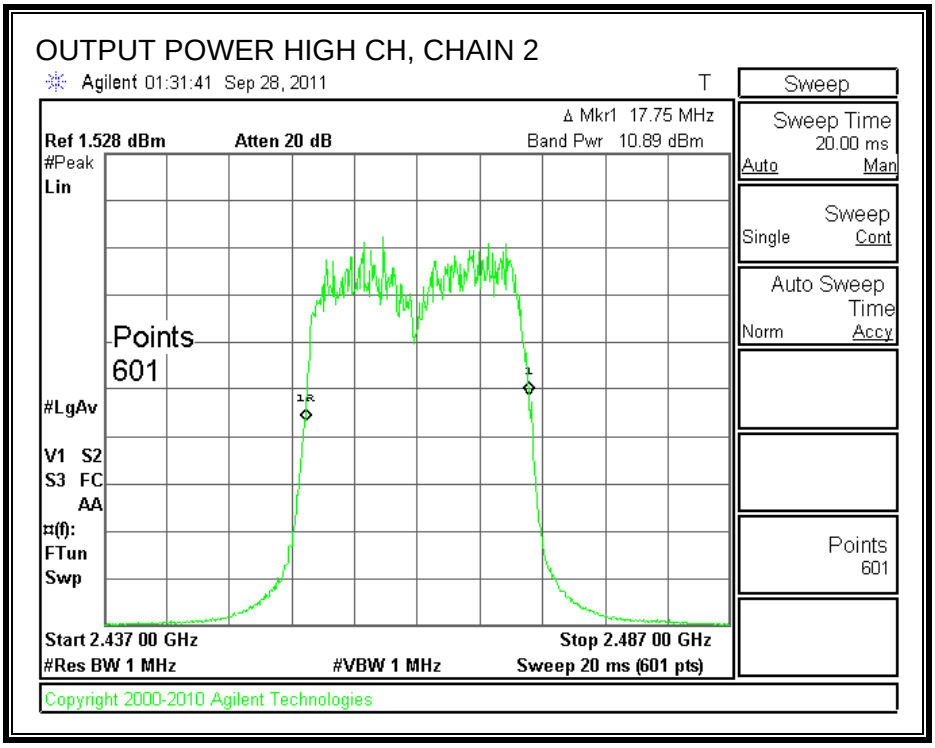




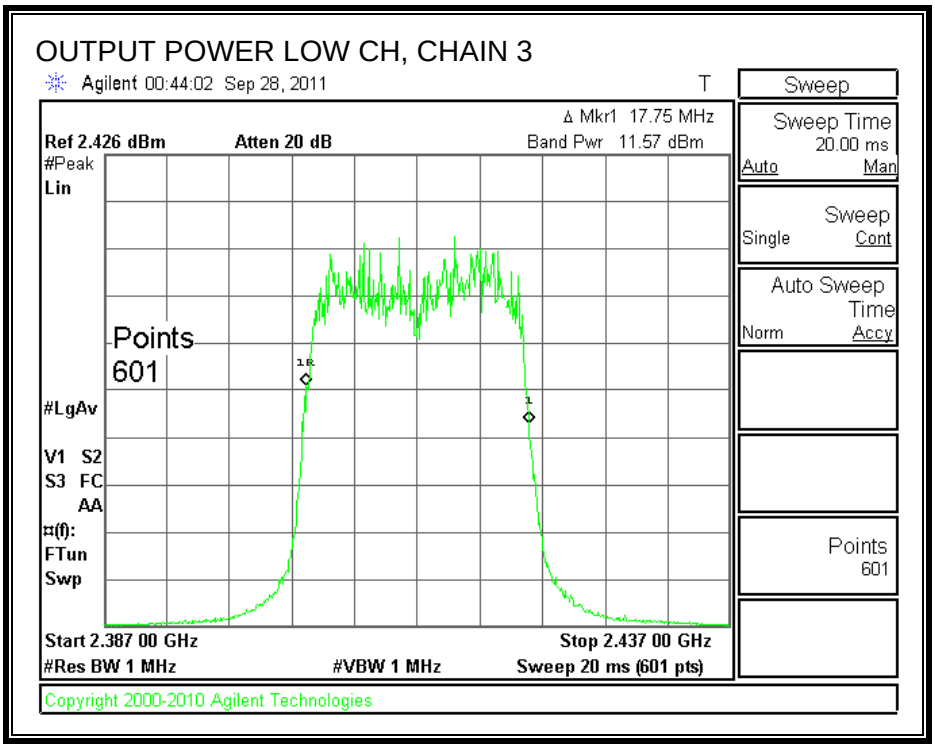
CHAIN 2 OUTPUT POWER

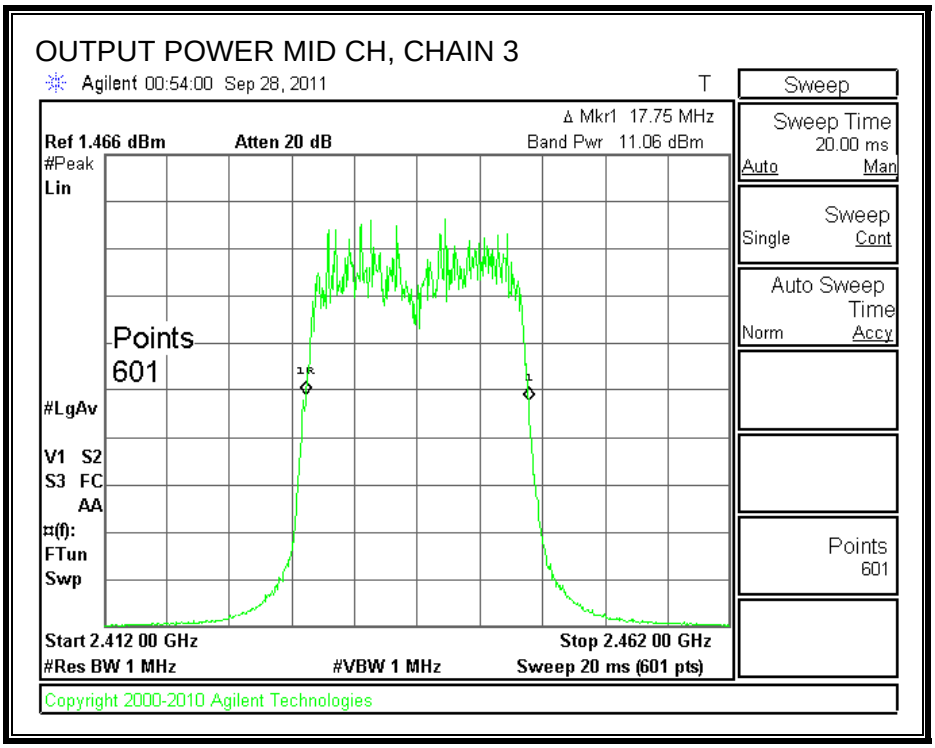


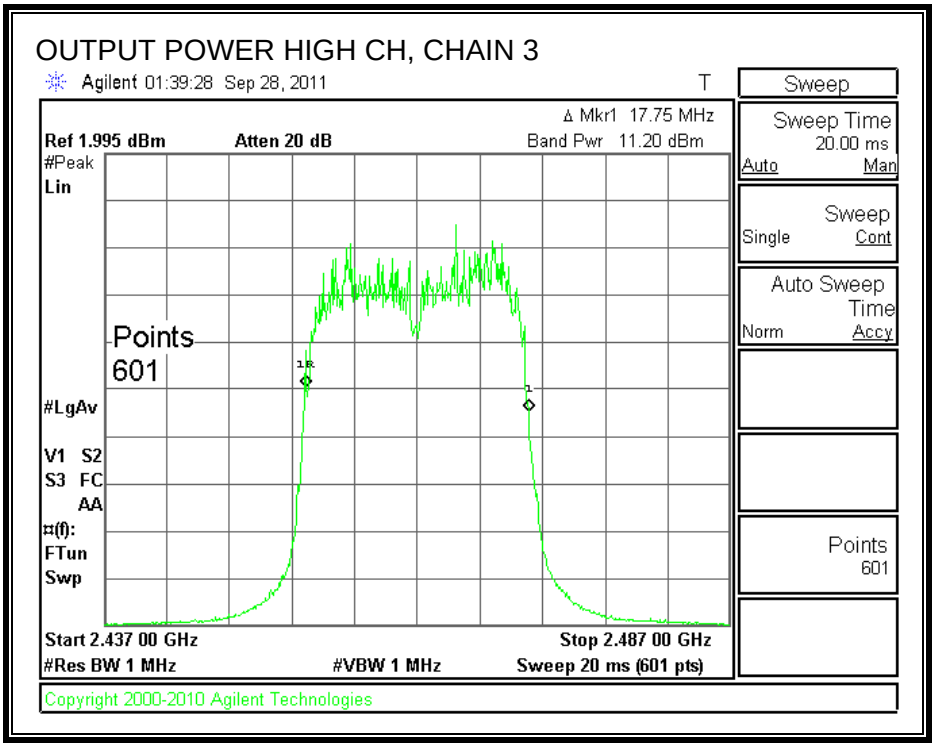




CHAIN 3 OUTPUT POWER







7.3.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1.0 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	2412	14.20	14.20	14.20	18.97
Middle	2437	14.00	14.00	14.00	18.77
High	2462	14.00	14.00	14.00	18.77

7.3.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

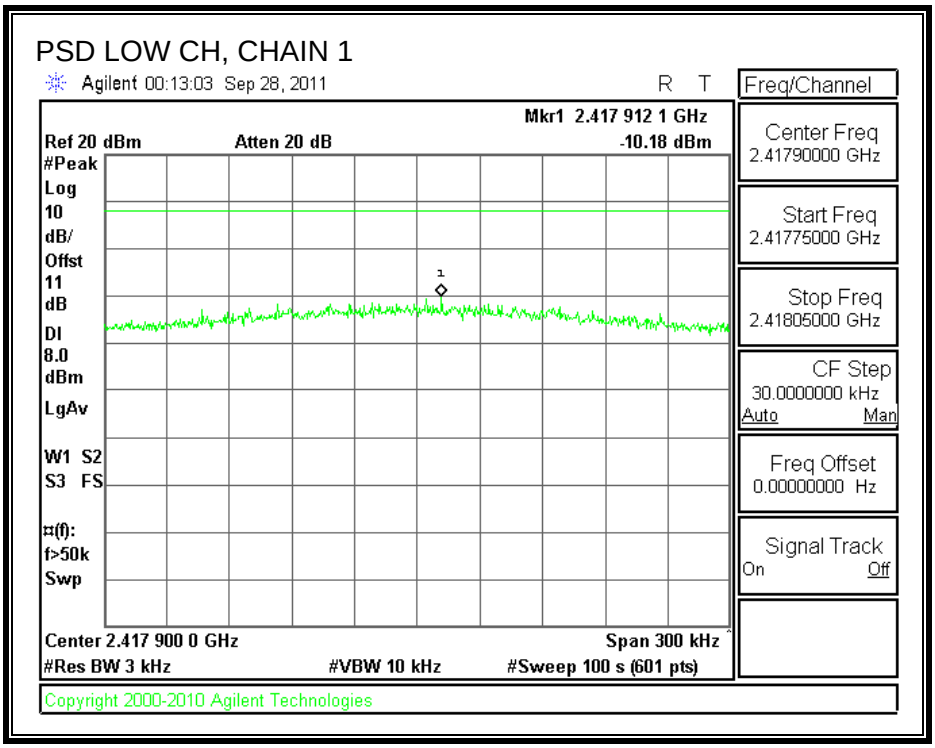
TEST PROCEDURE

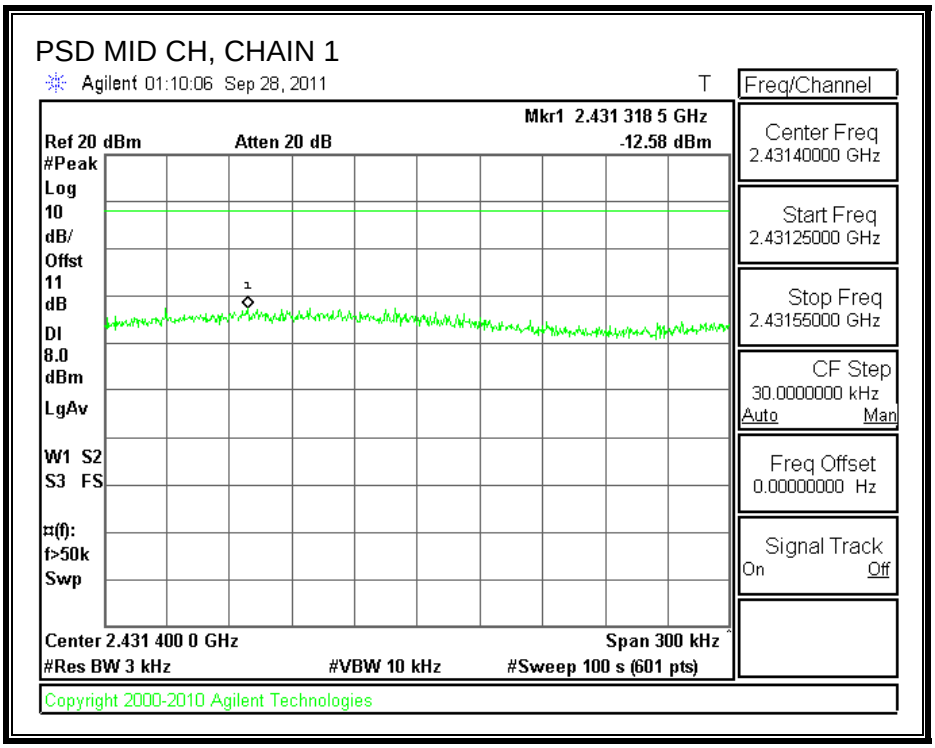
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

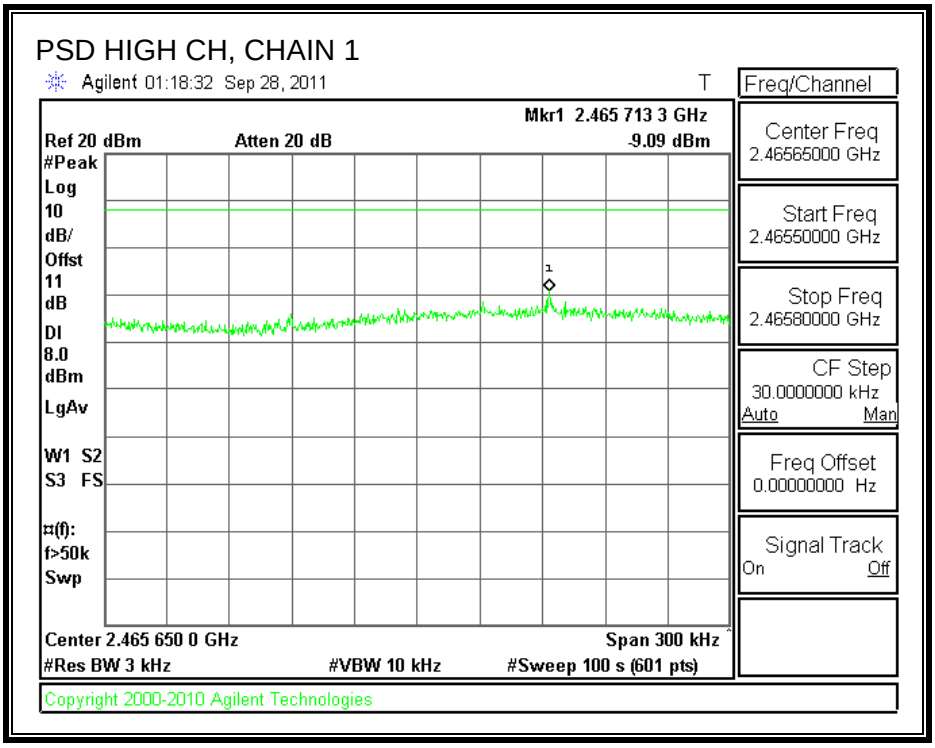
RESULTS

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-10.18	-11.84	-10.54	-6.03	8	-14.03
Middle	2437	-12.58	-11.57	-12.15	-7.31	8	-15.31
High	2462	-9.09	-11.97	-11.89	-5.99	8	-13.99

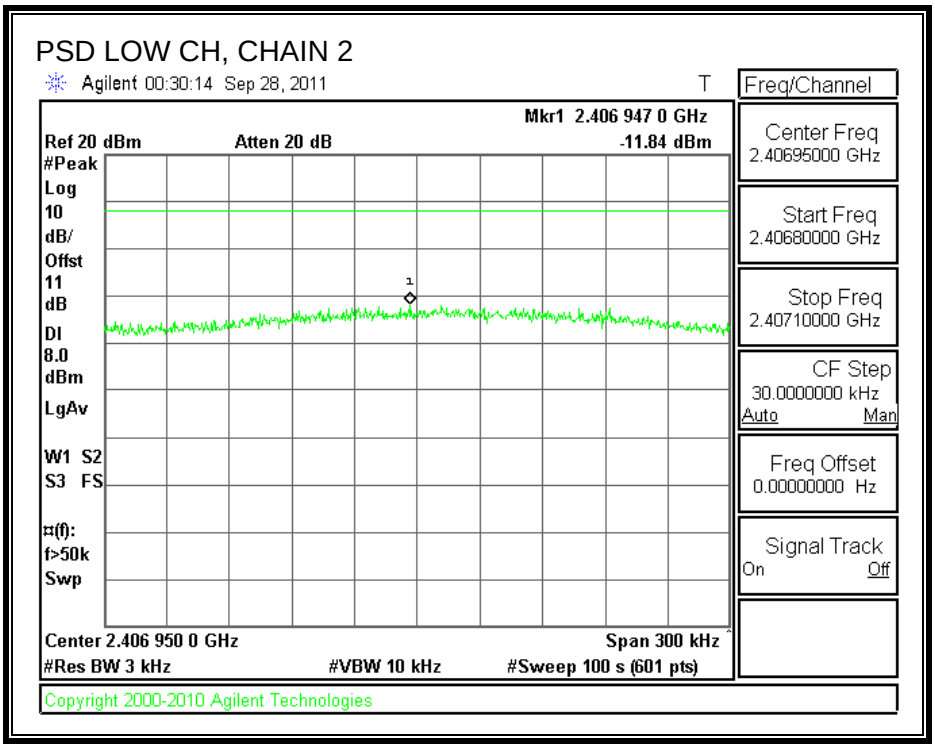
POWER SPECTRAL DENSITY, CHAIN 1

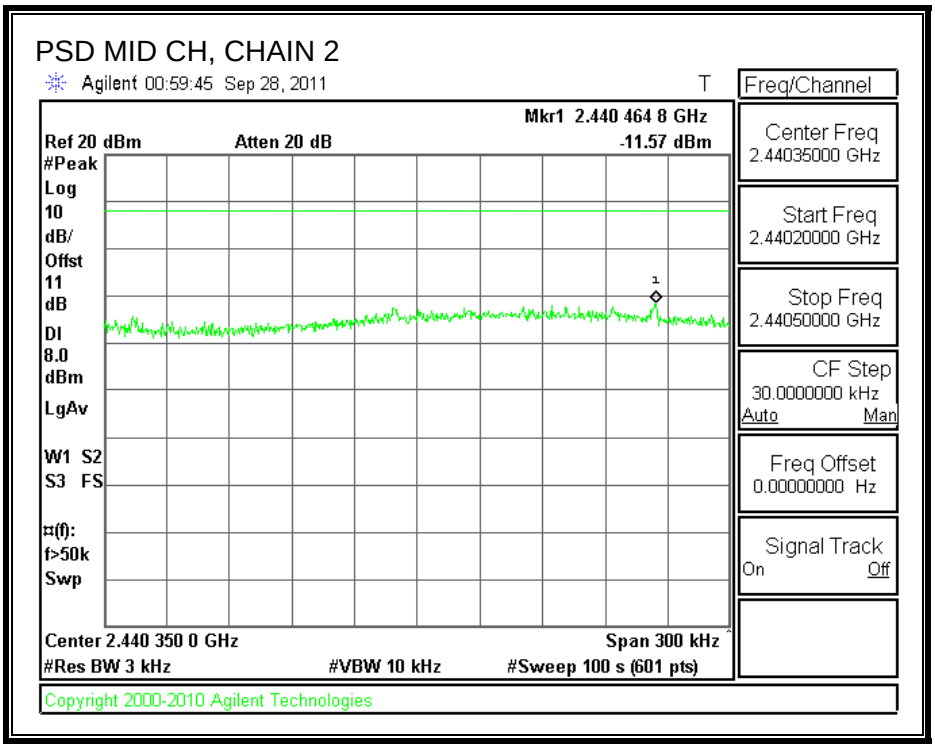


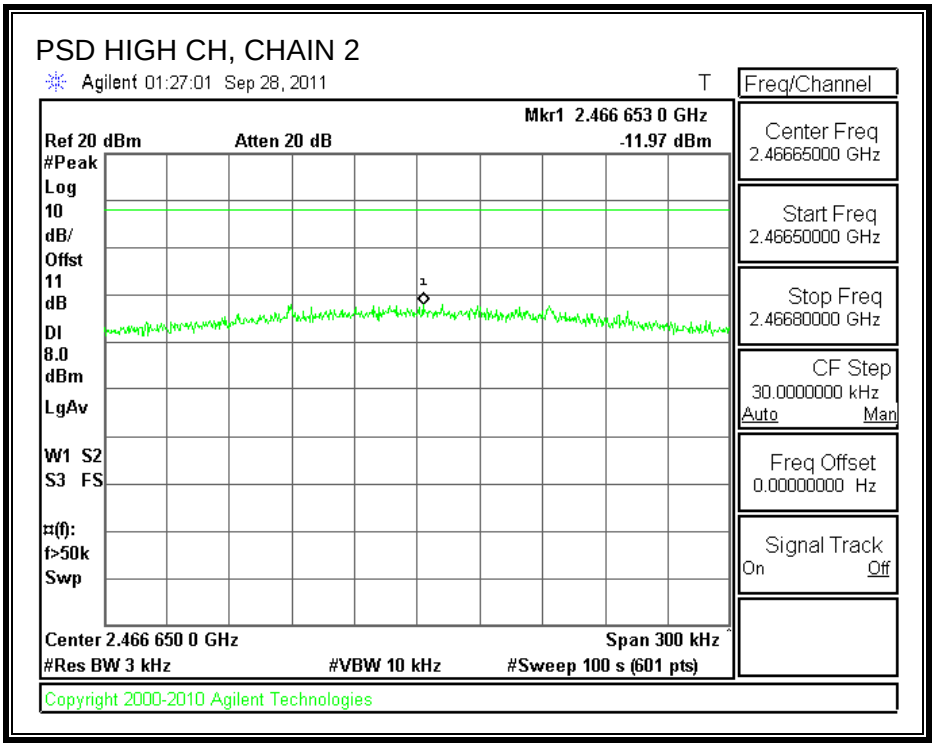




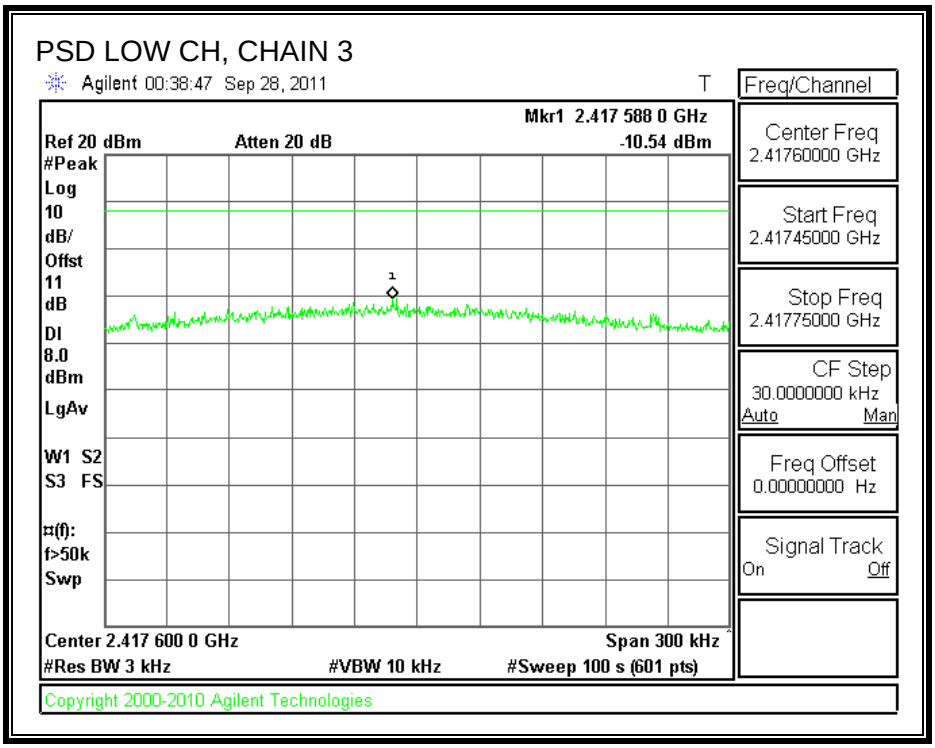
POWER SPECTRAL DENSITY, CHAIN 2

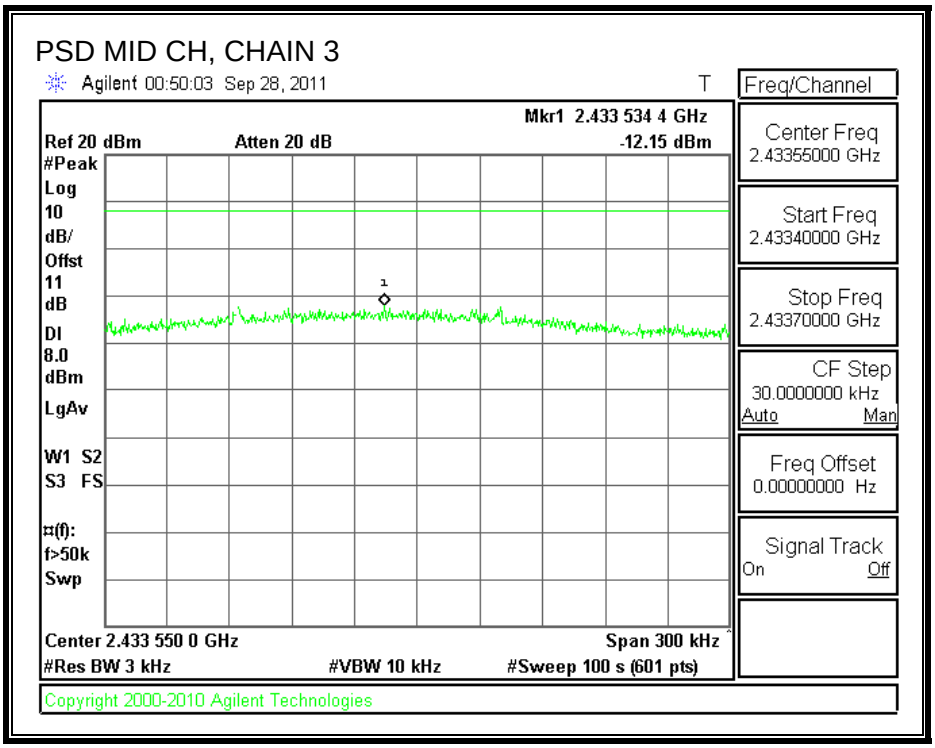


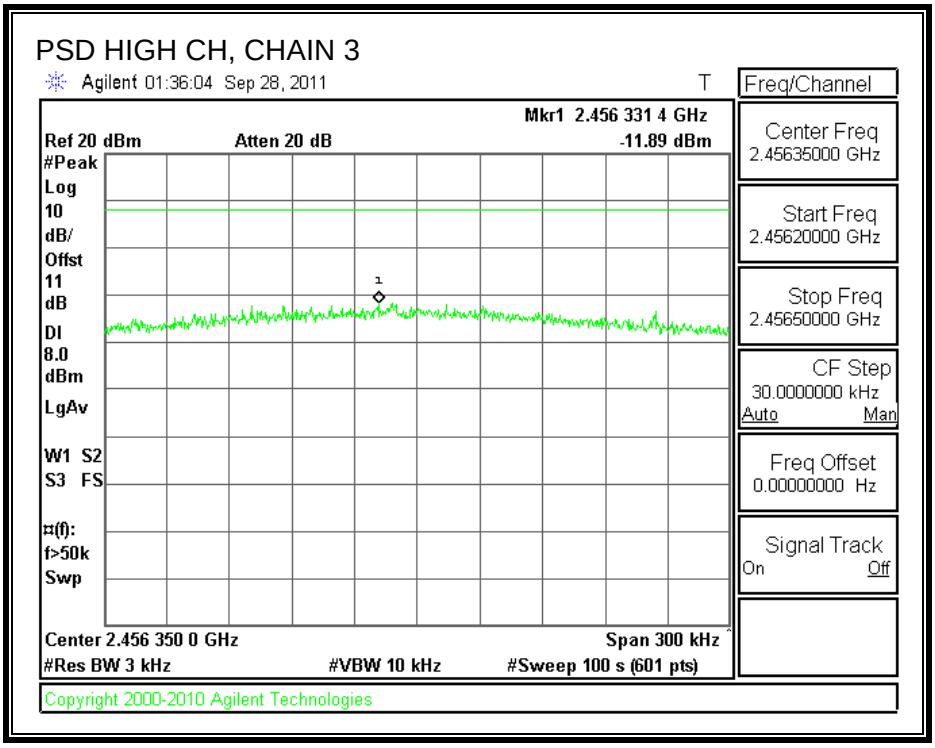




POWER SPECTRAL DENSITY, CHAIN 3







7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

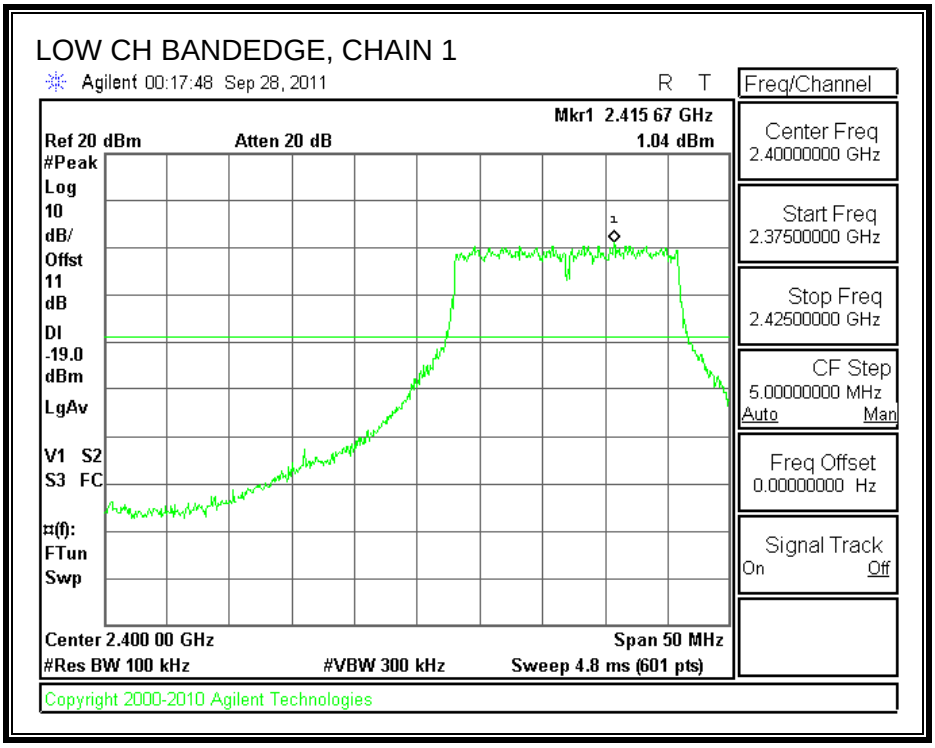
TEST PROCEDURE

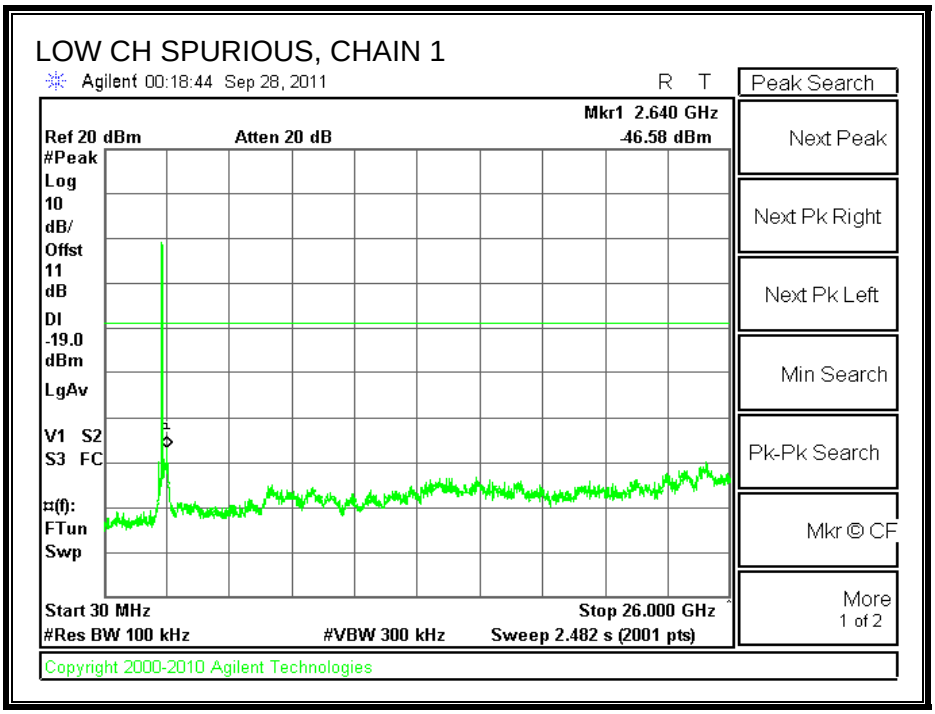
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

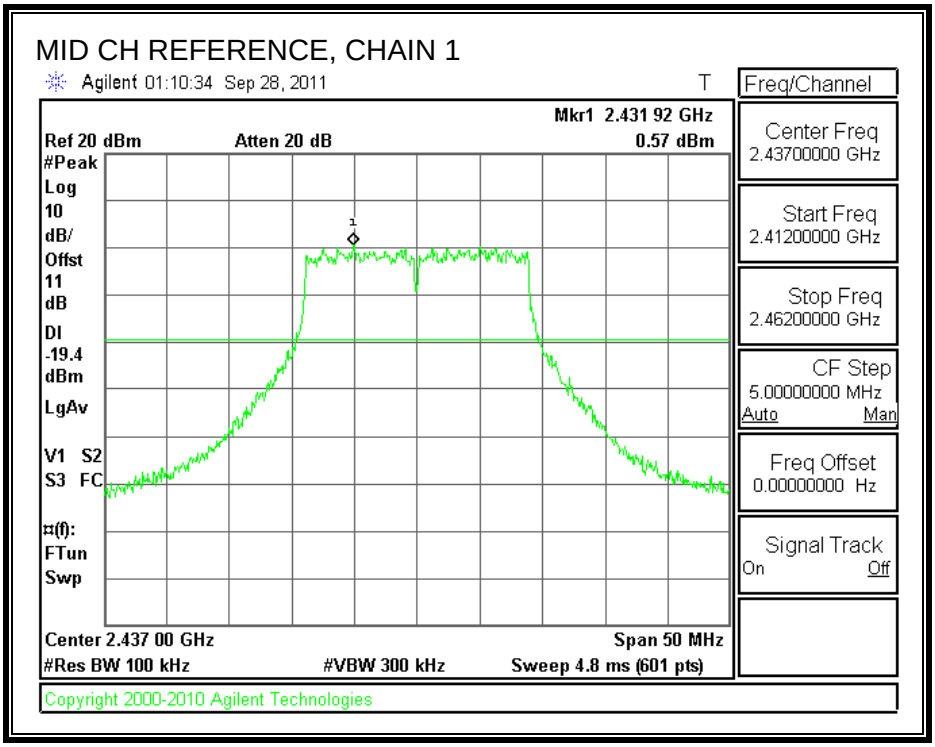
RESULTS

CHAIN 1 SPURIOUS EMISSIONS

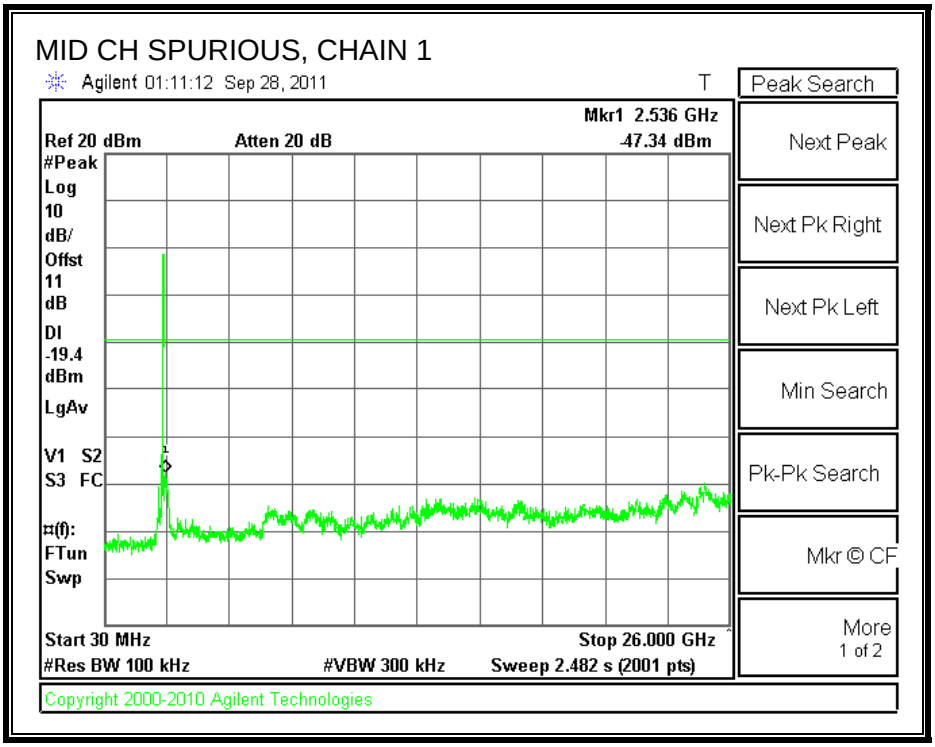




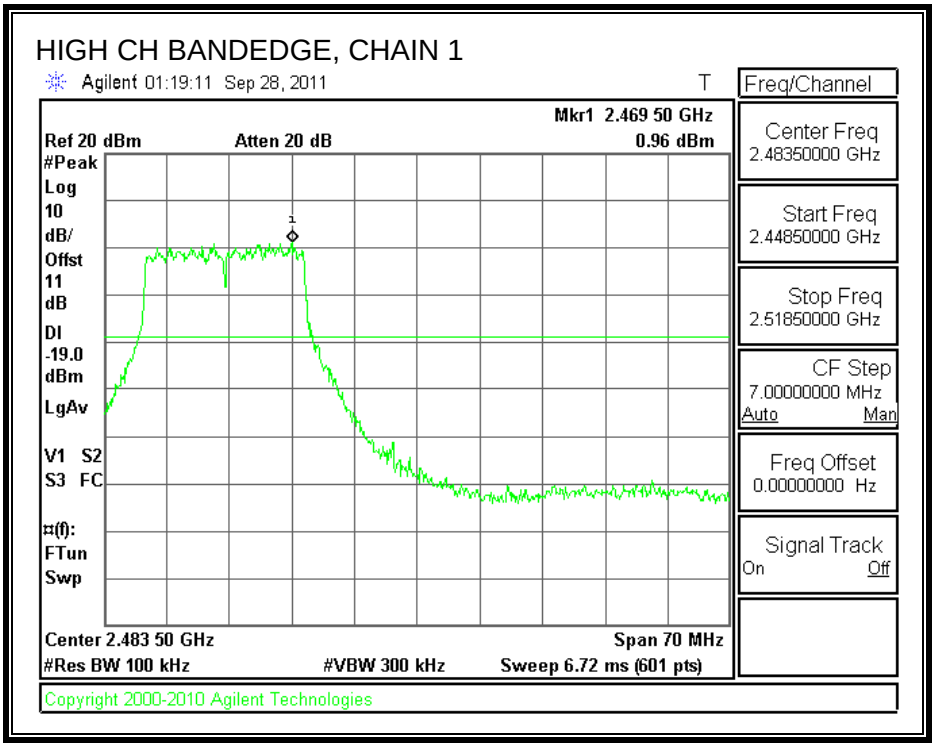
MID CH REFERENCE, CHAIN 1



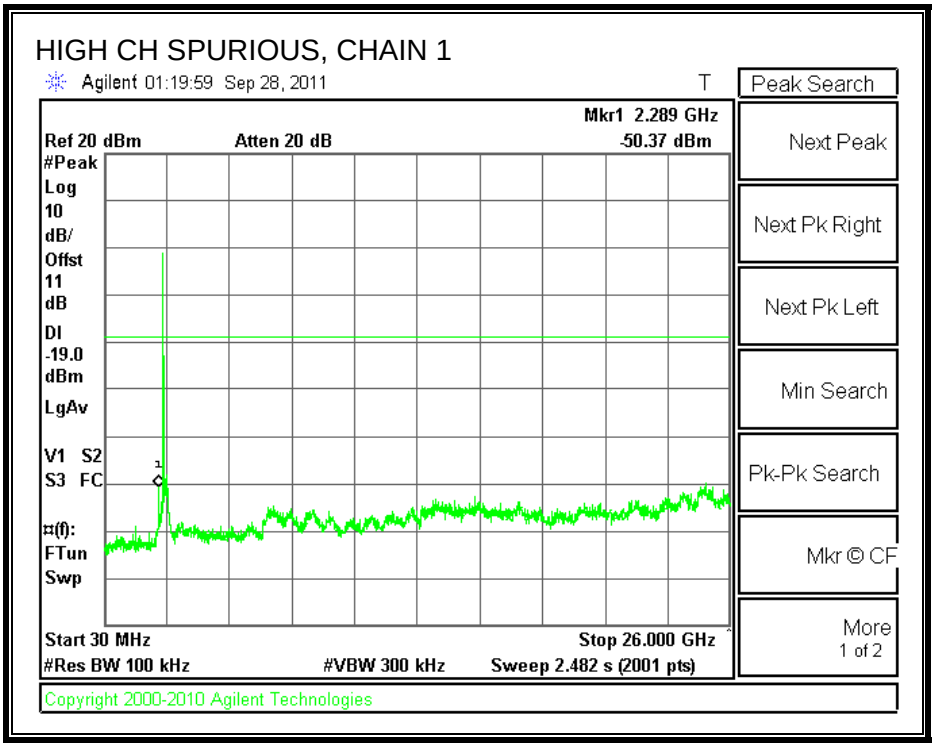
MID CH SPURIOUS, CHAIN 1



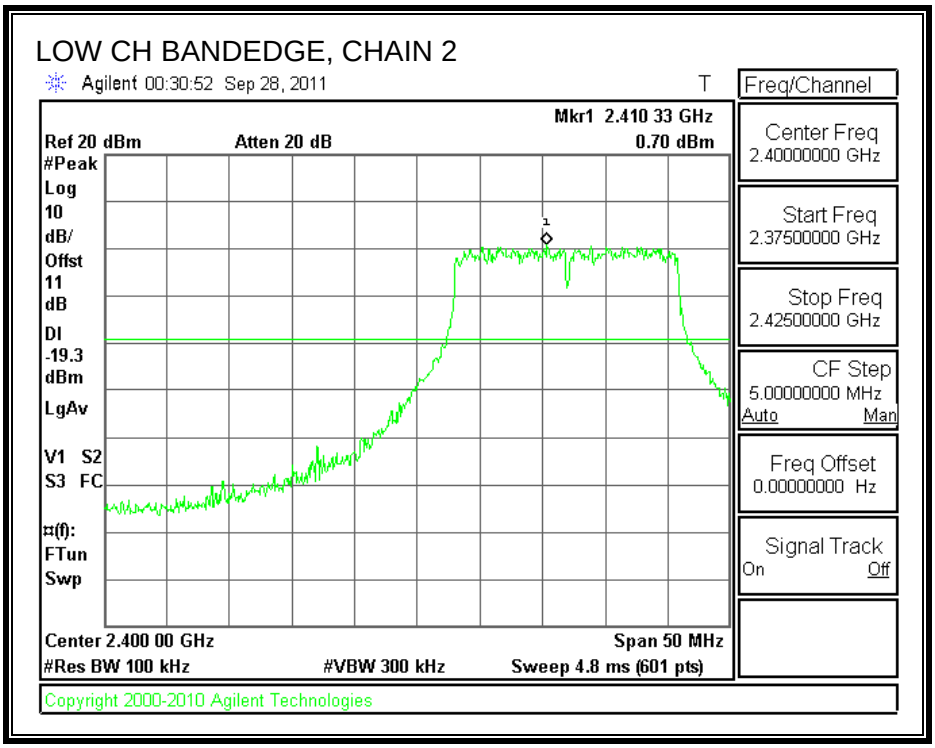
HIGH CH BANDEDGE, CHAIN 1

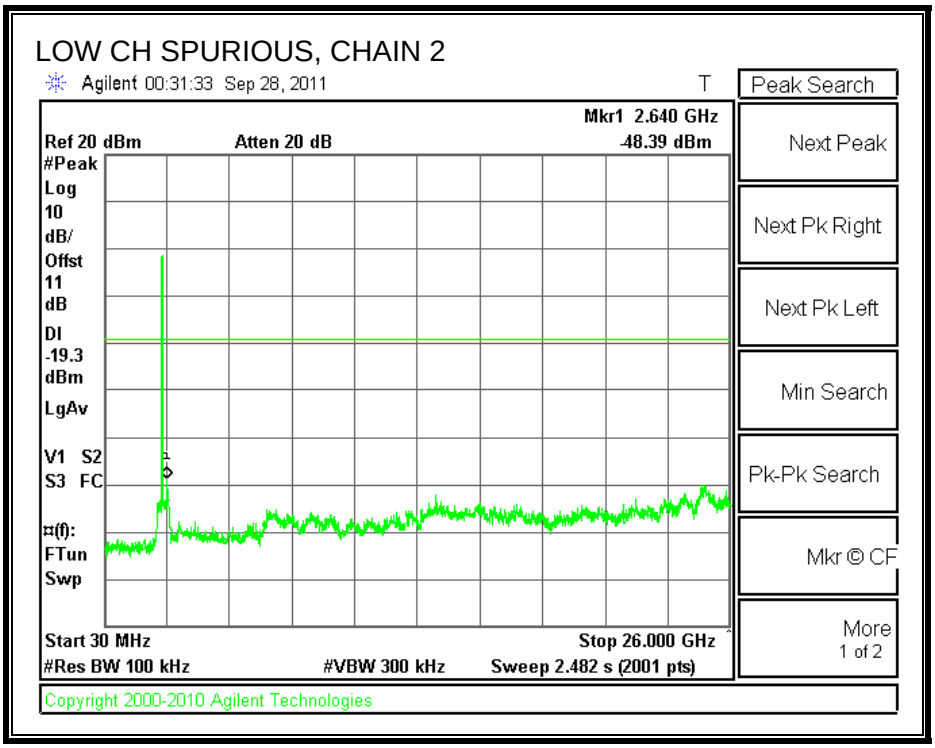


HIGH CH SPURIOUS, CHAIN 1

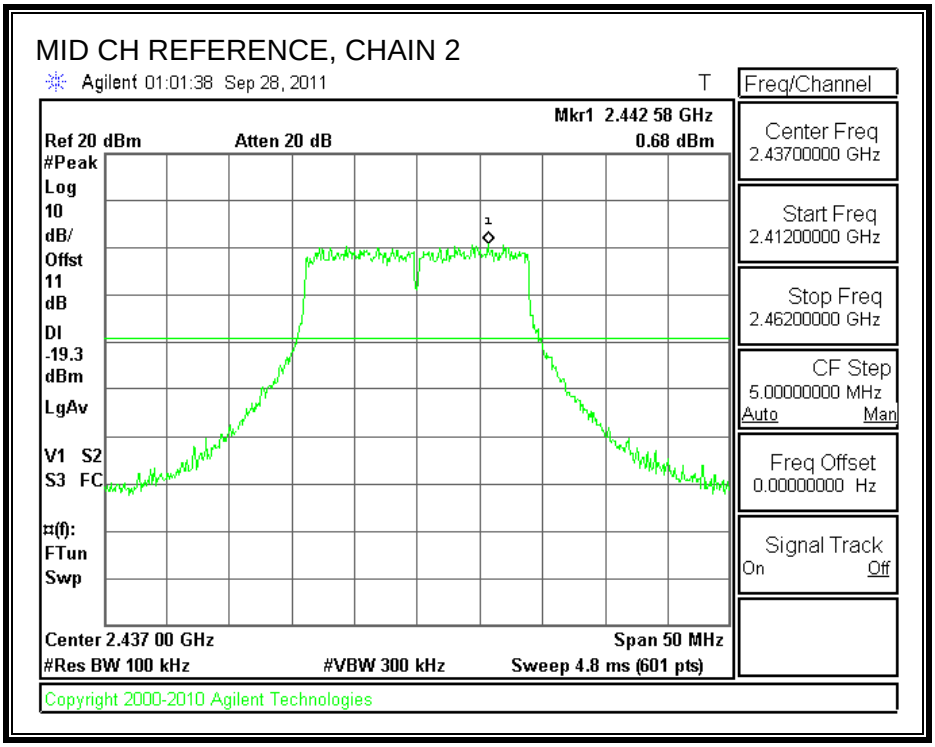


CHAIN 2 SPURIOUS EMISSIONS

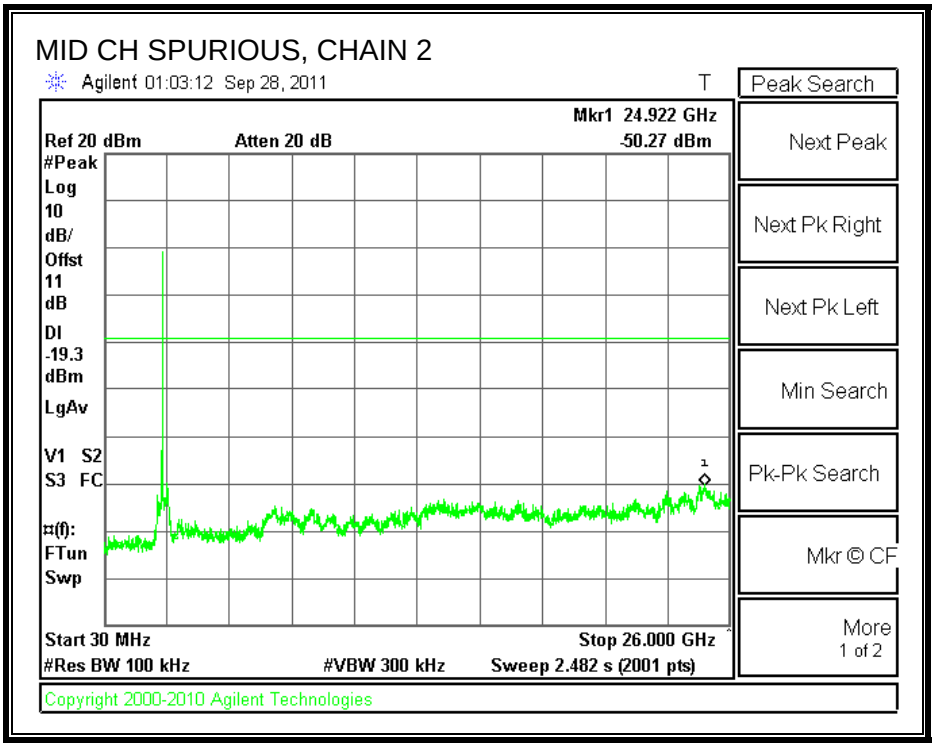




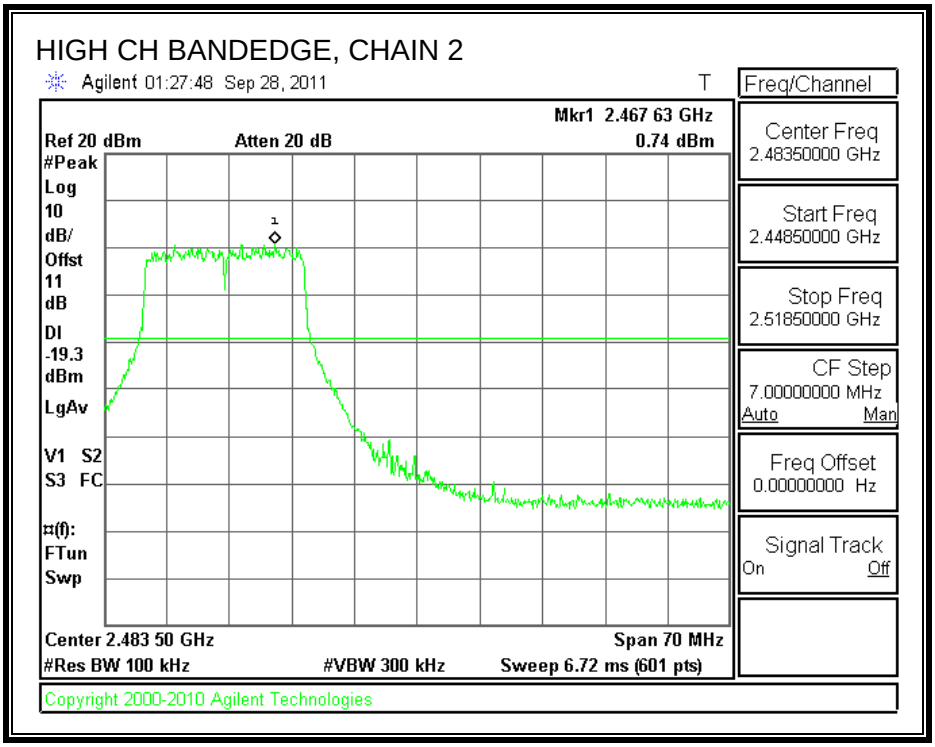
MID CH REFERENCE, CHAIN 2



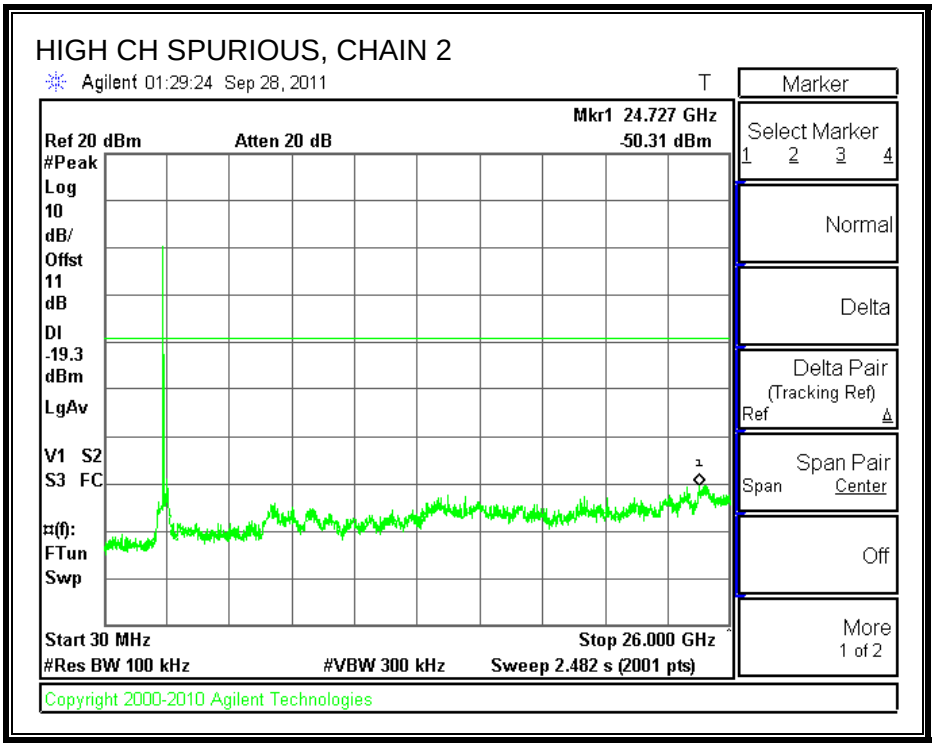
MID CH SPURIOUS, CHAIN 2



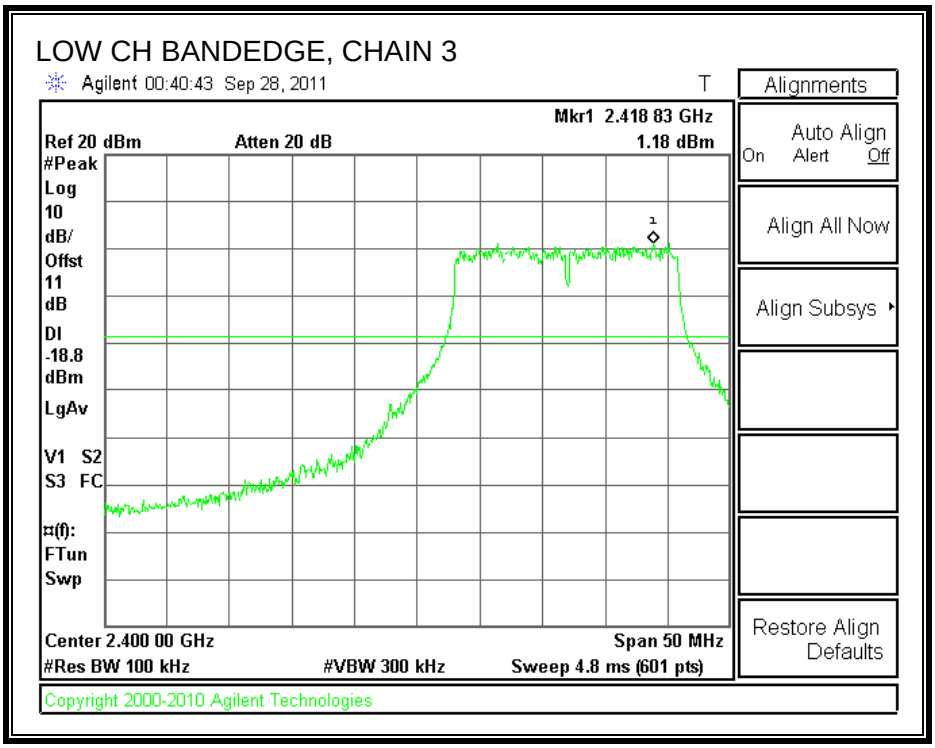
HIGH CH BANDEDGE, CHAIN 2

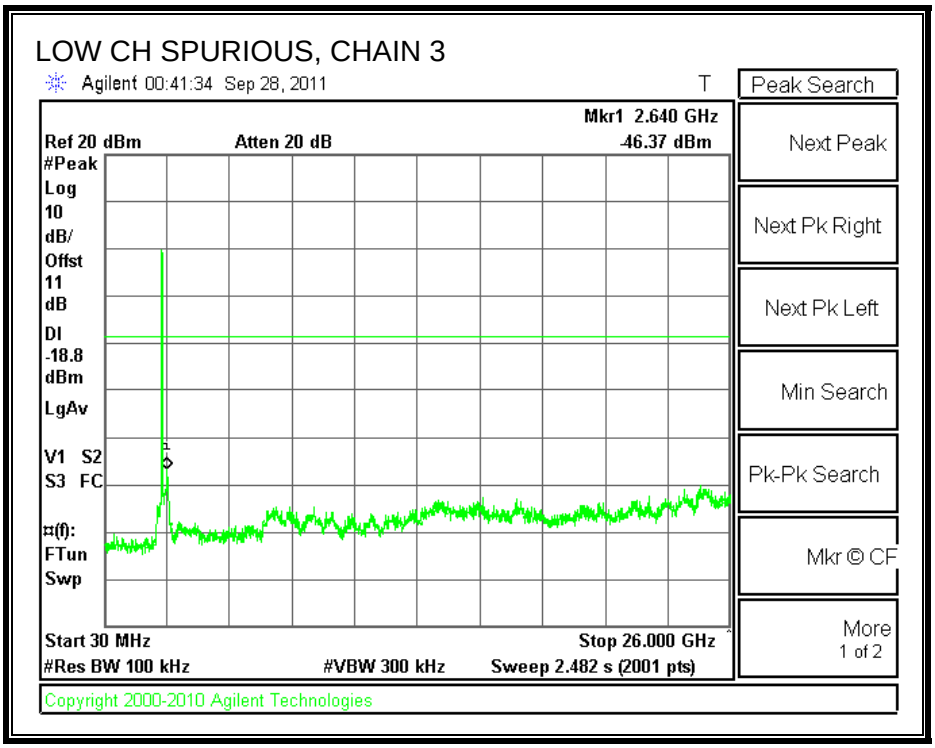


HIGH CH SPURIOUS, CHAIN 2

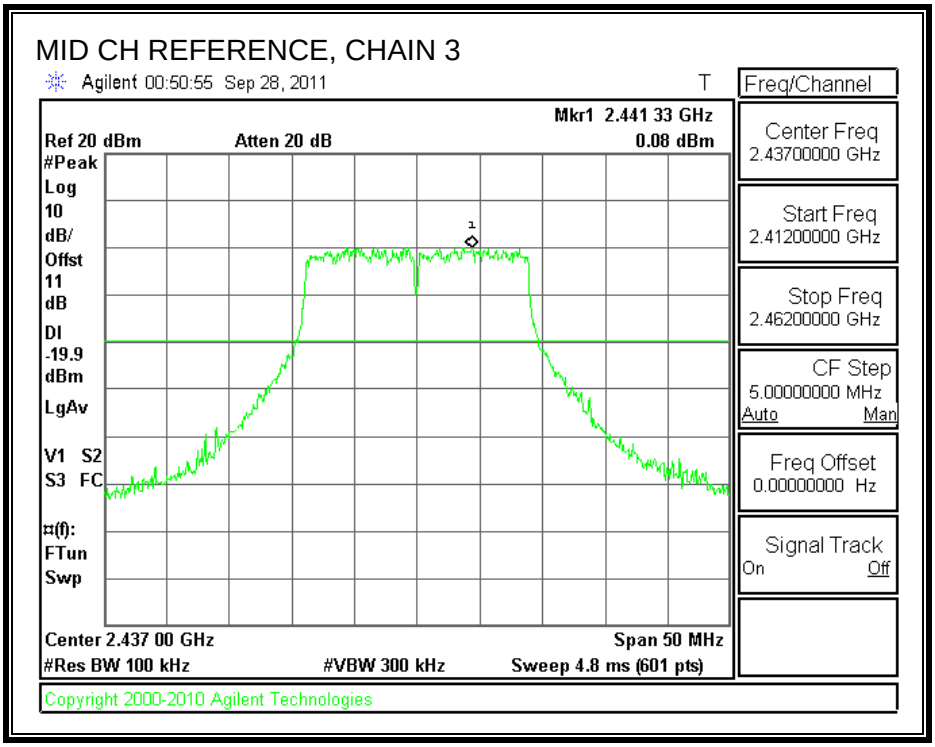


CHAIN 3 SPURIOUS EMISSIONS

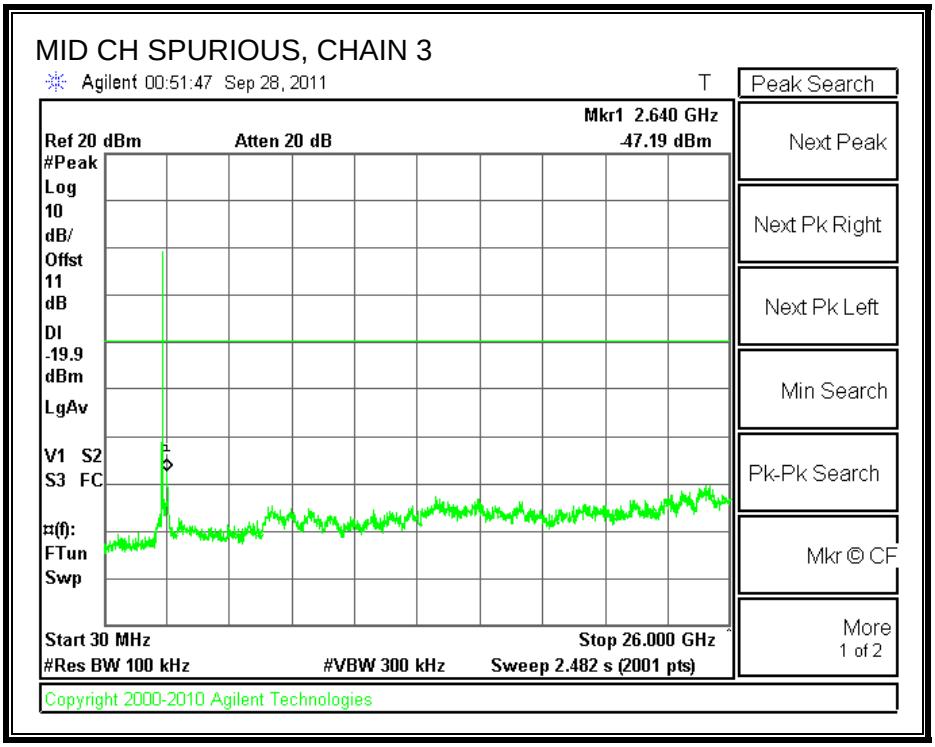




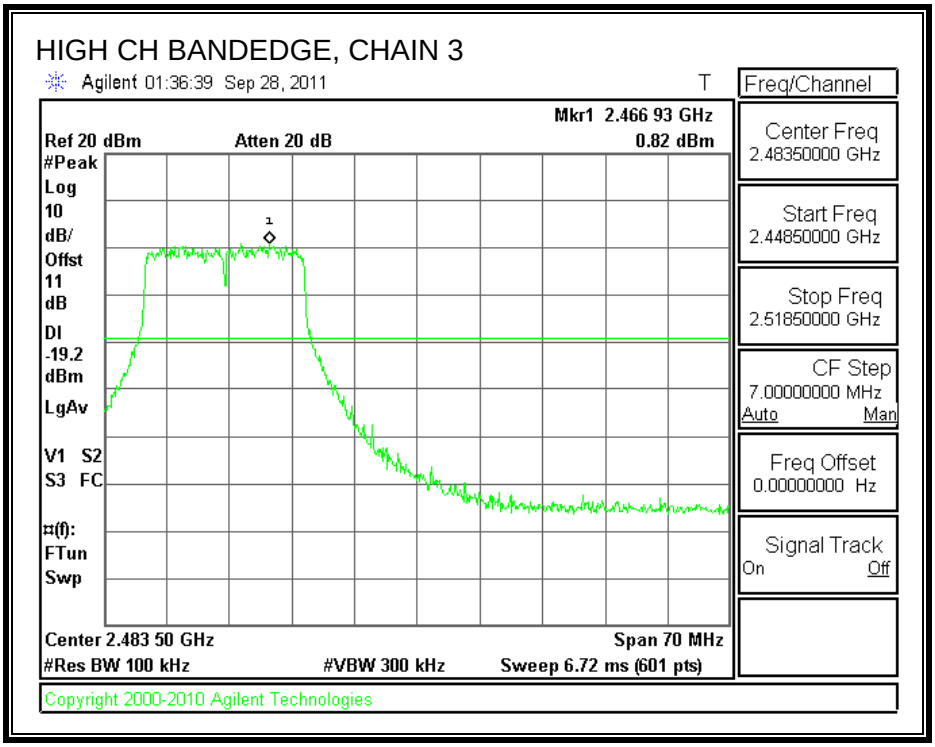
MID CH REFERENCE, CHAIN 3



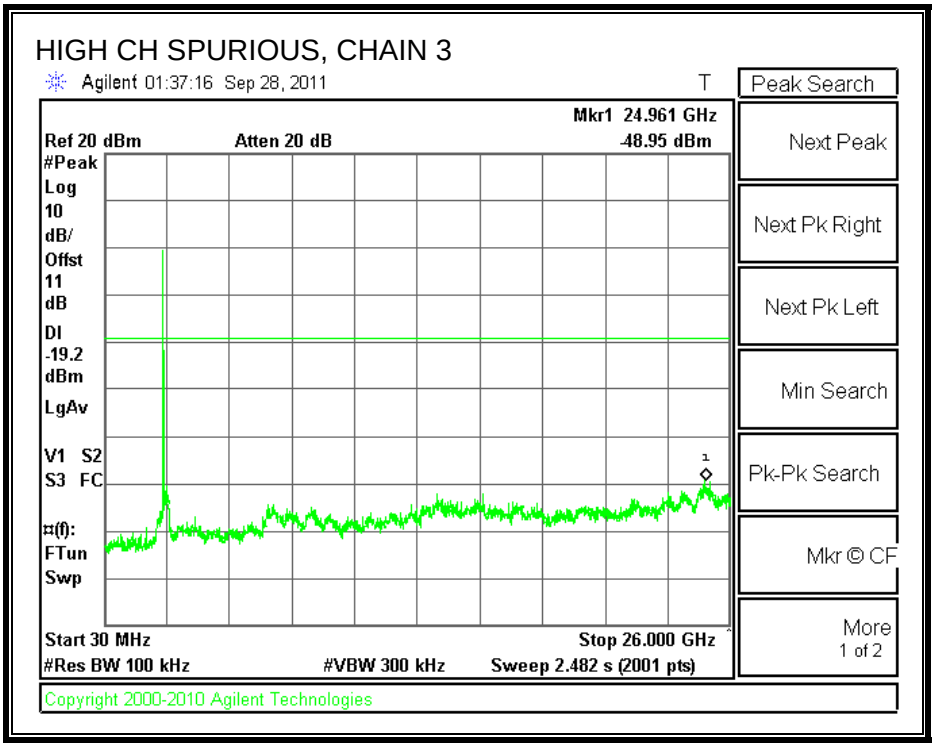
MID CH SPURIOUS, CHAIN 3



HIGH CH BANDEDGE, CHAIN 3



HIGH CH SPURIOUS, CHAIN 3



7.4. 802.11n HT20 MCS16 3TX MODE IN THE 2.4 GHz BAND

7.4.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

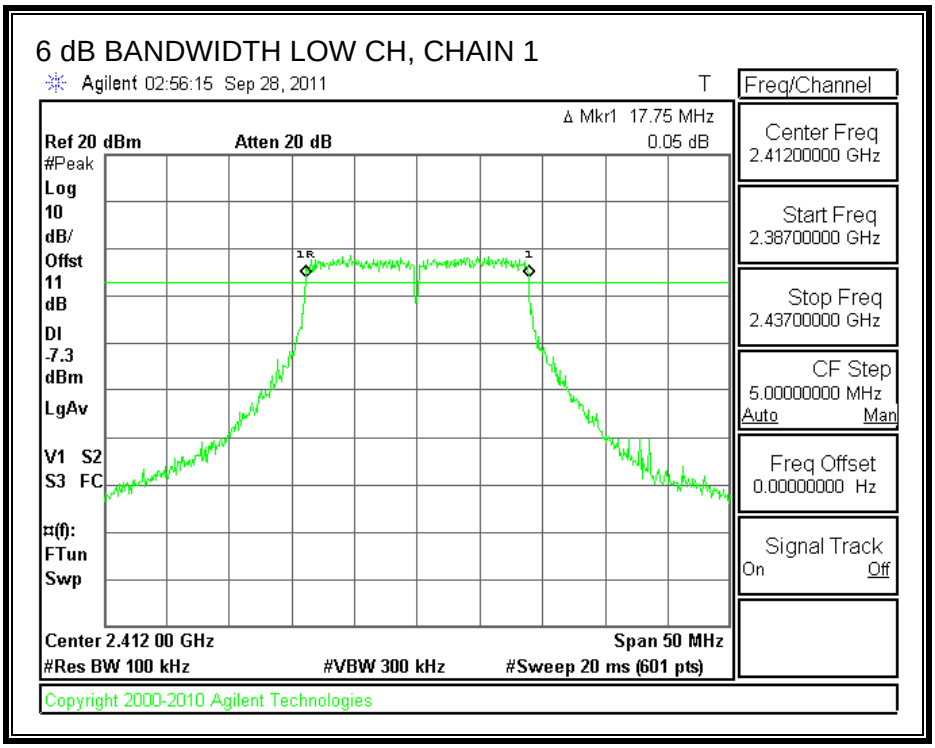
TEST PROCEDURE

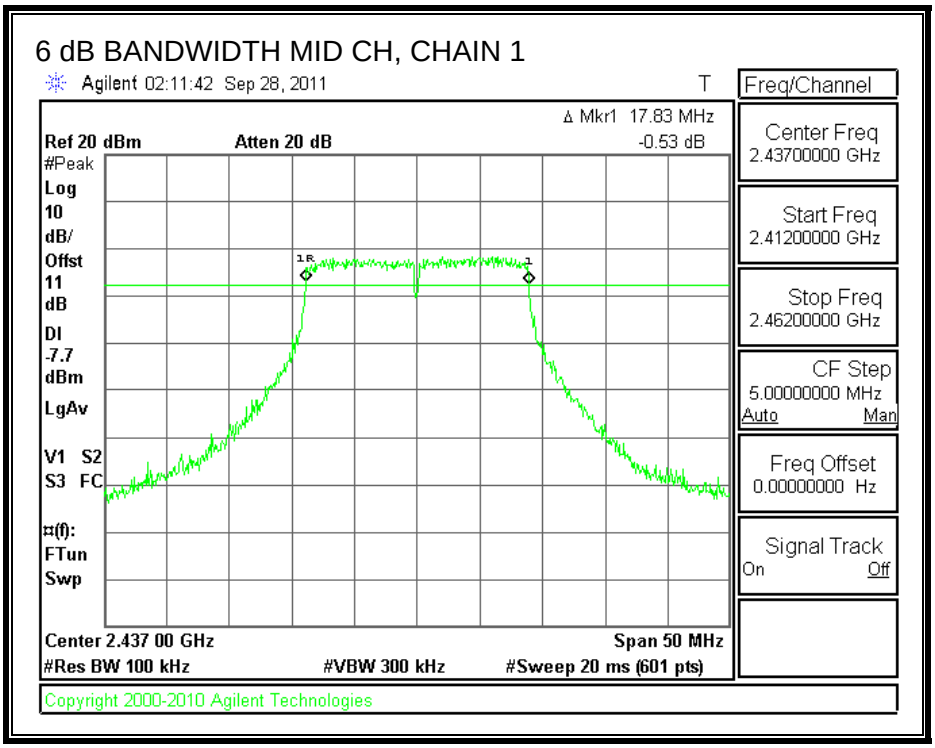
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

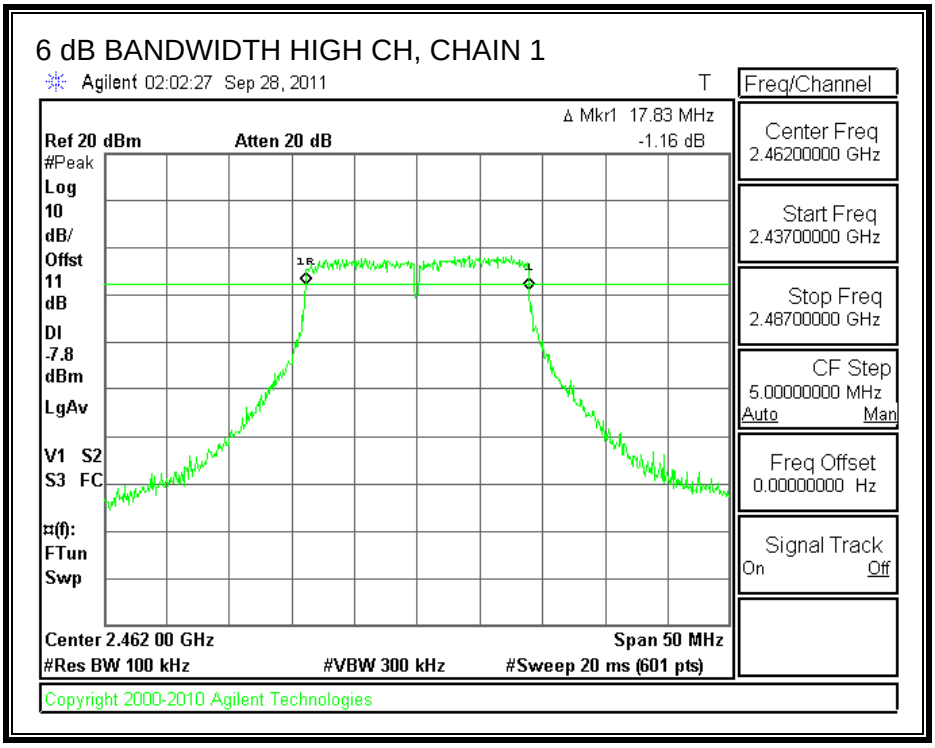
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Chain 3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	17.75	17.75	17.75	0.5
Middle	2437	17.83	17.75	17.75	0.5
High	2462	17.83	17.75	17.75	0.5

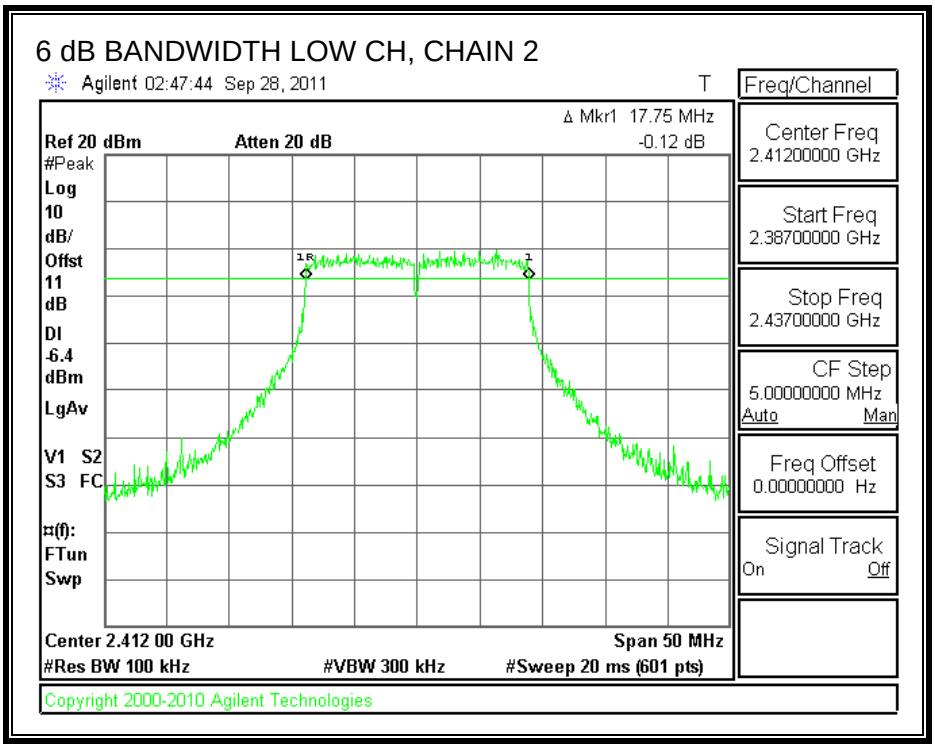
6 dB BANDWIDTH, CHAIN 1

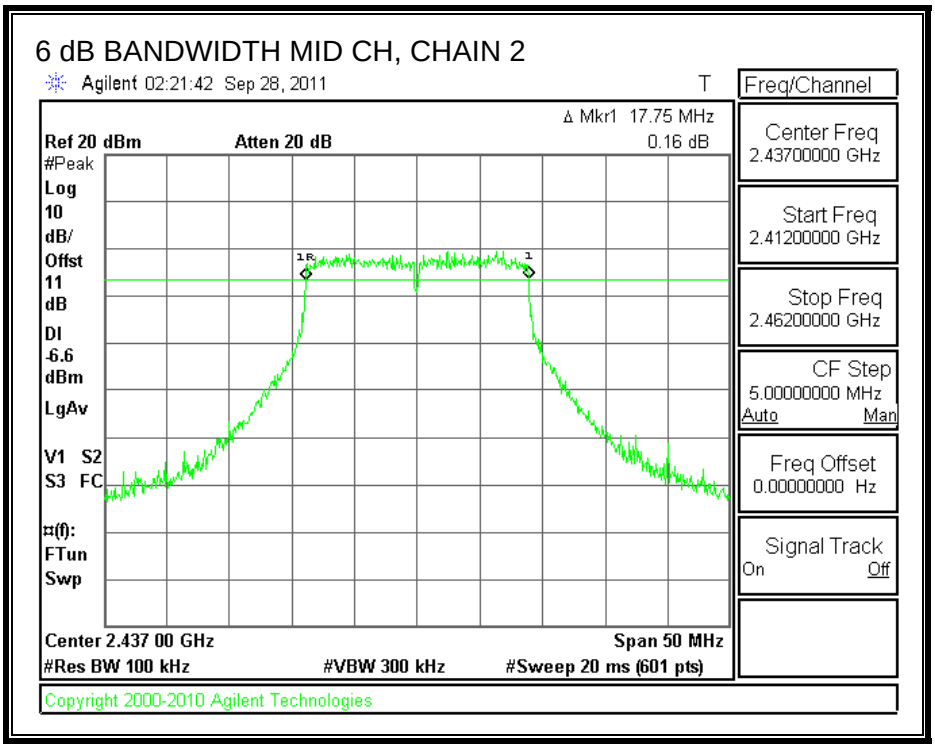


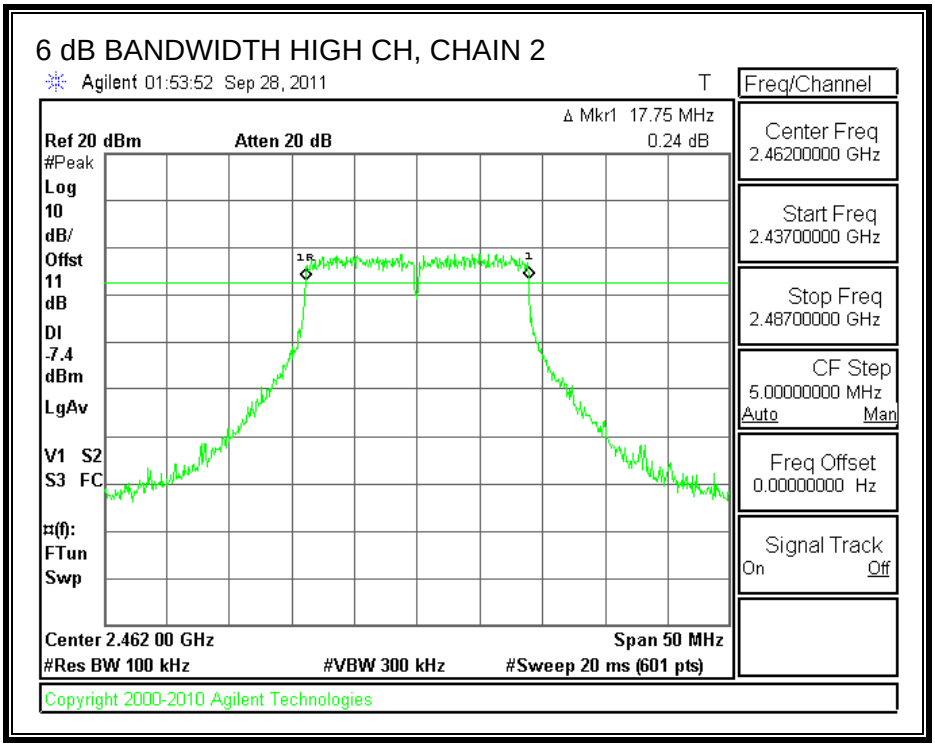




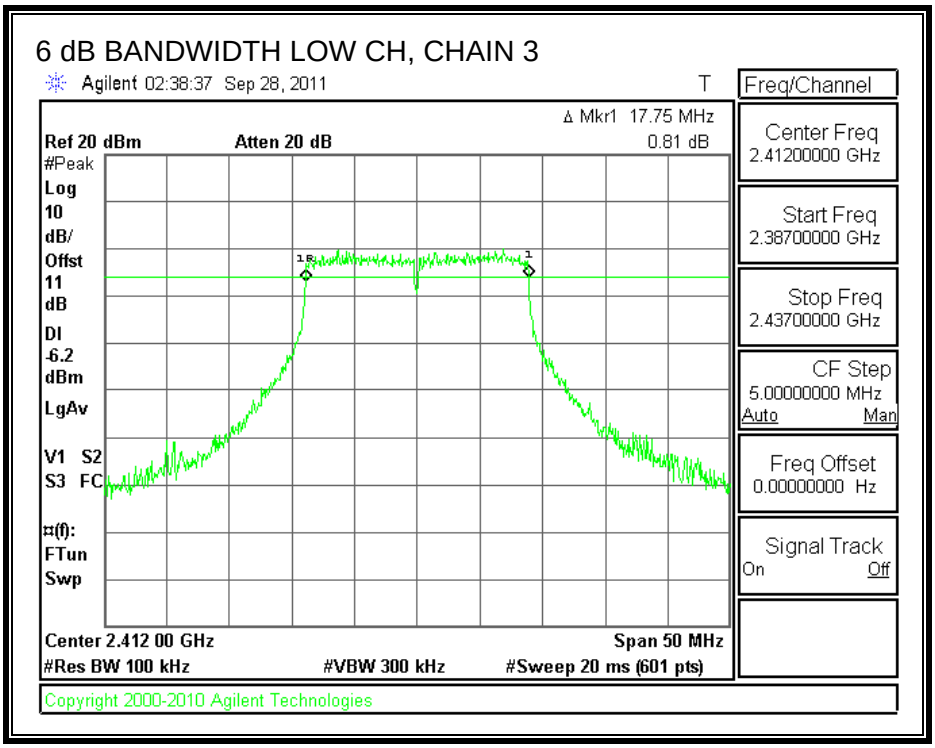
6 dB BANDWIDTH, CHAIN 2

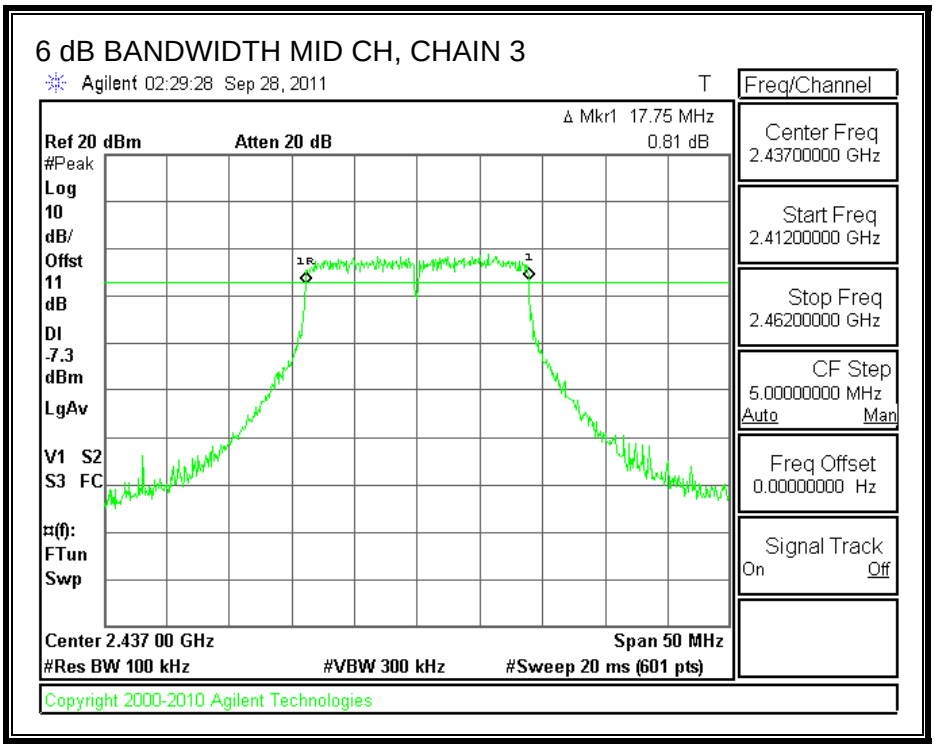


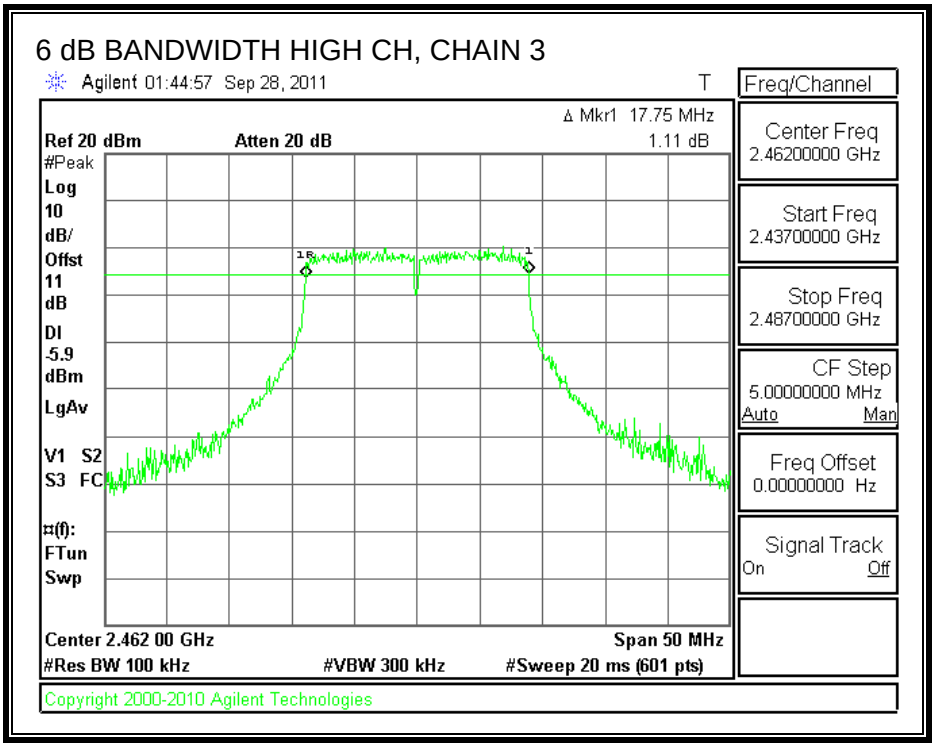




6 dB BANDWIDTH, CHAIN 3







7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

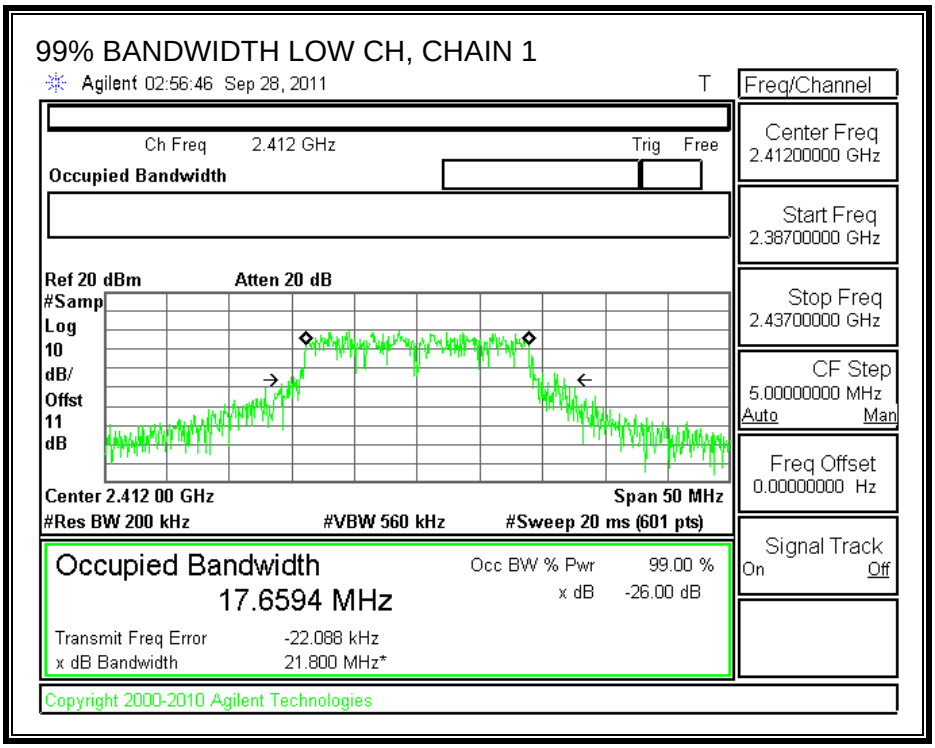
TEST PROCEDURE

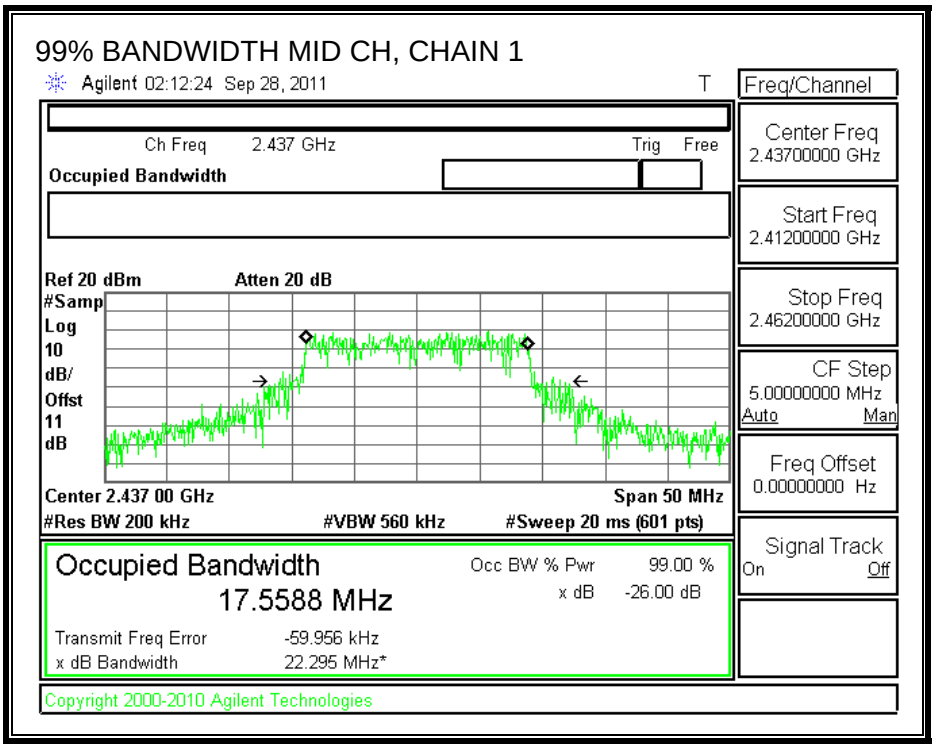
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

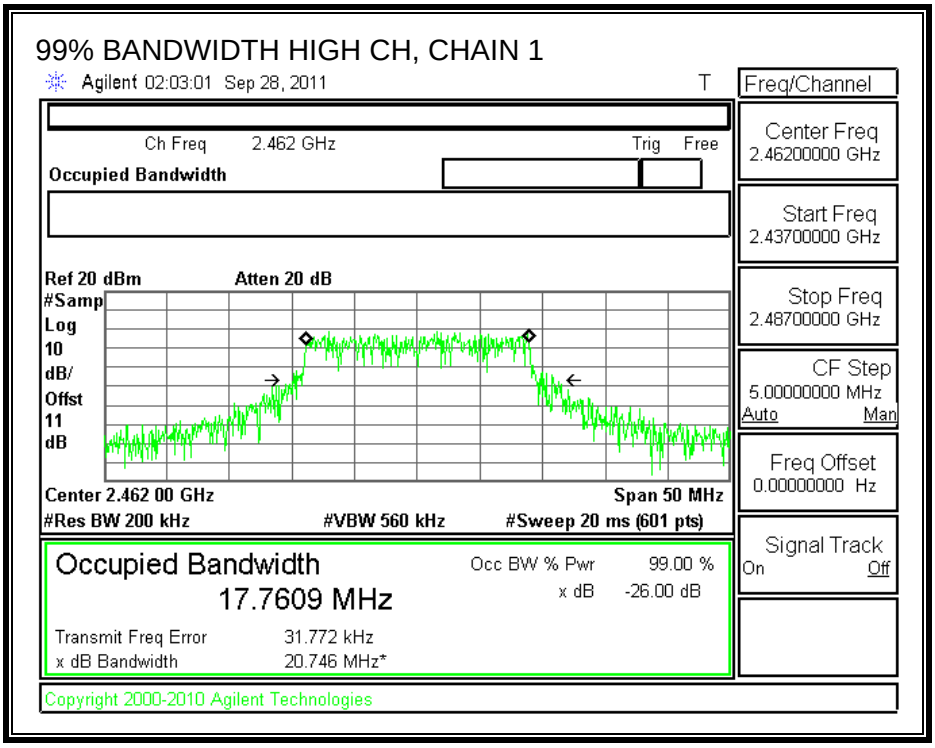
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)	Chain 3 99% Bandwidth (MHz)
Low	2412	17.6594	17.6115	17.5774
Middle	2437	17.5588	17.6560	17.6825
High	2462	17.7609	17.5718	17.6990

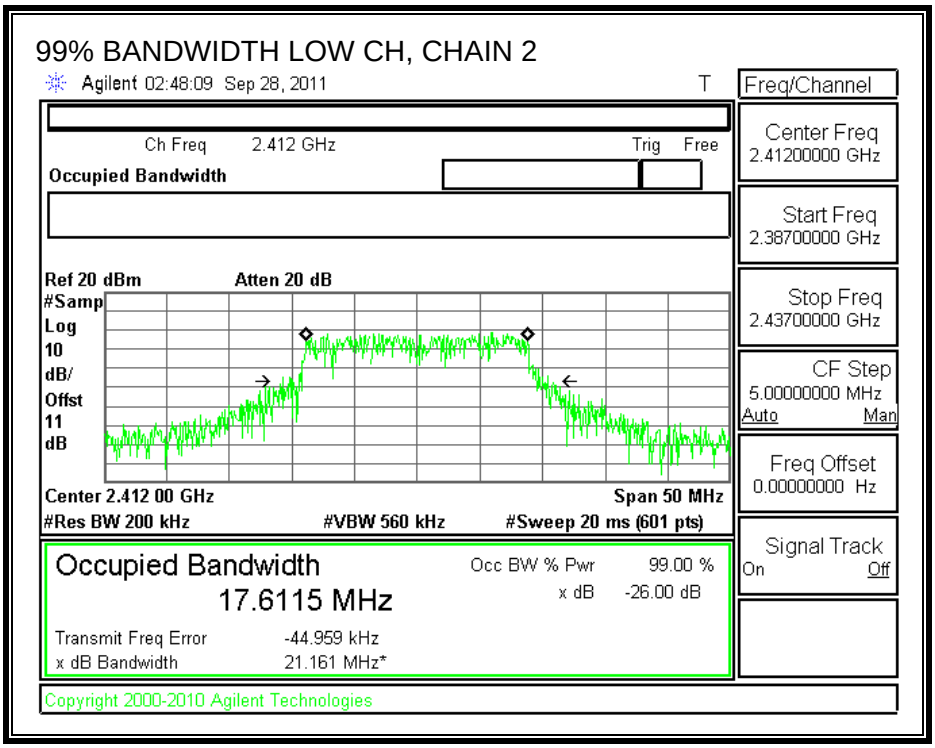
99% BANDWIDTH, CHAIN 1

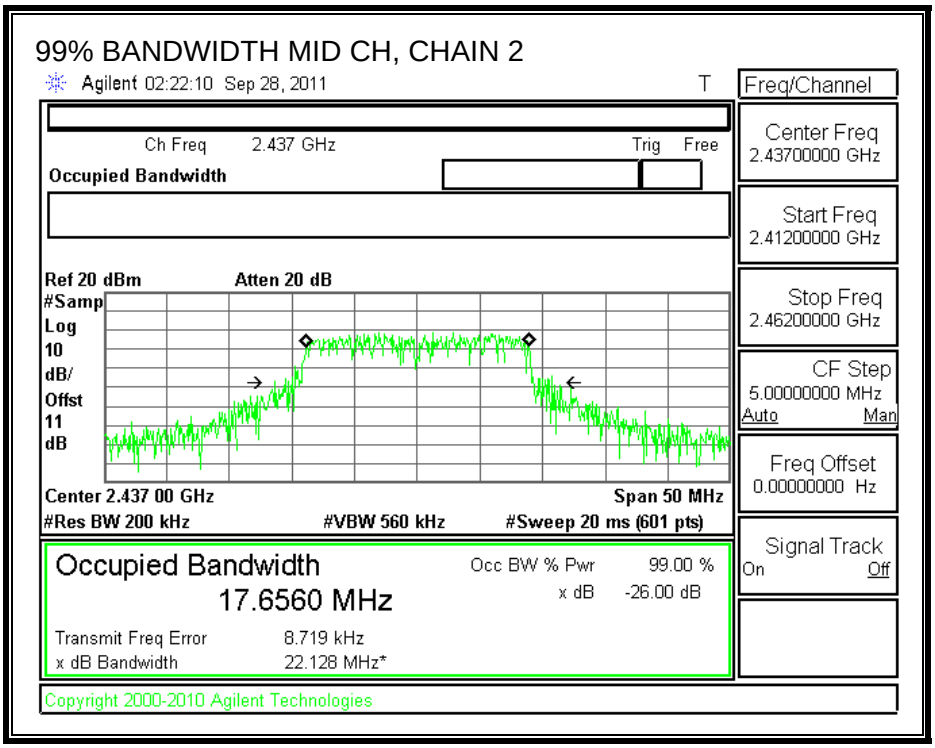


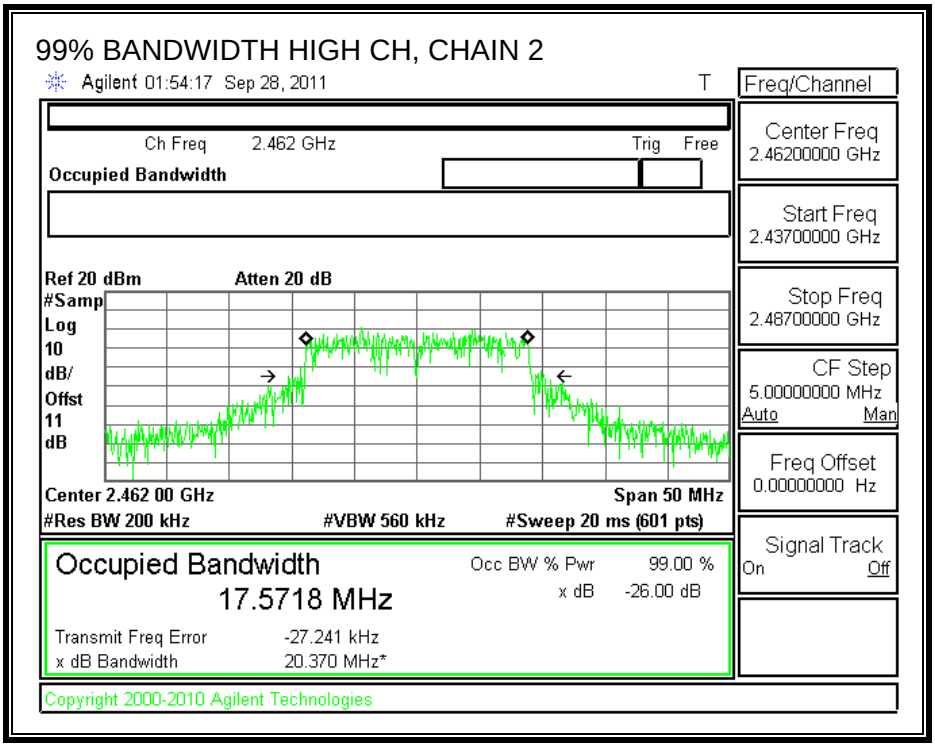




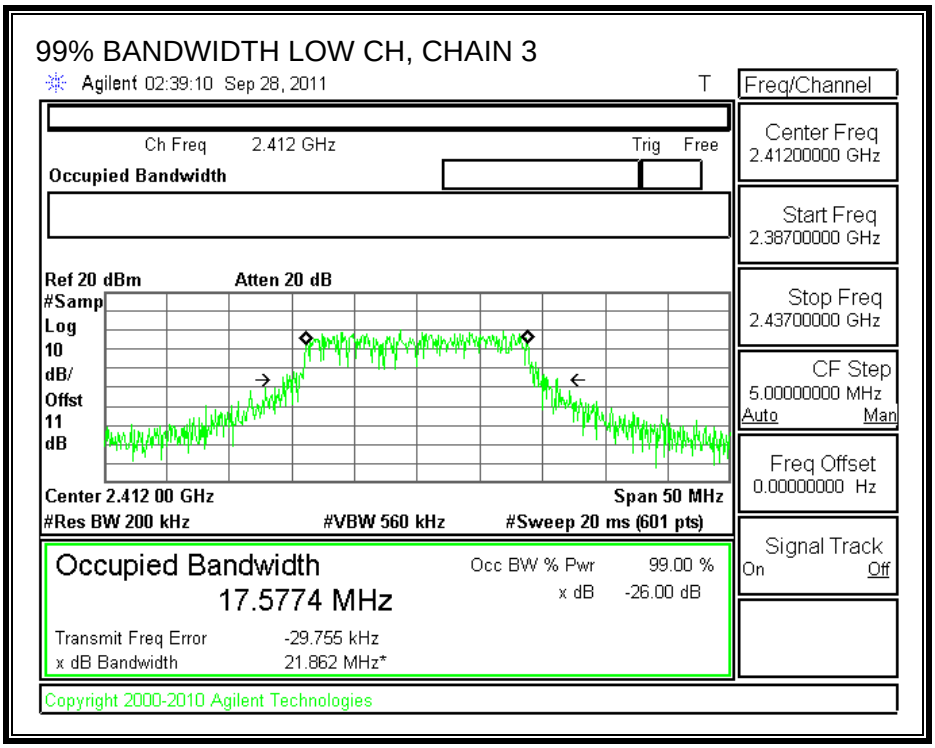
99% BANDWIDTH, CHAIN 2

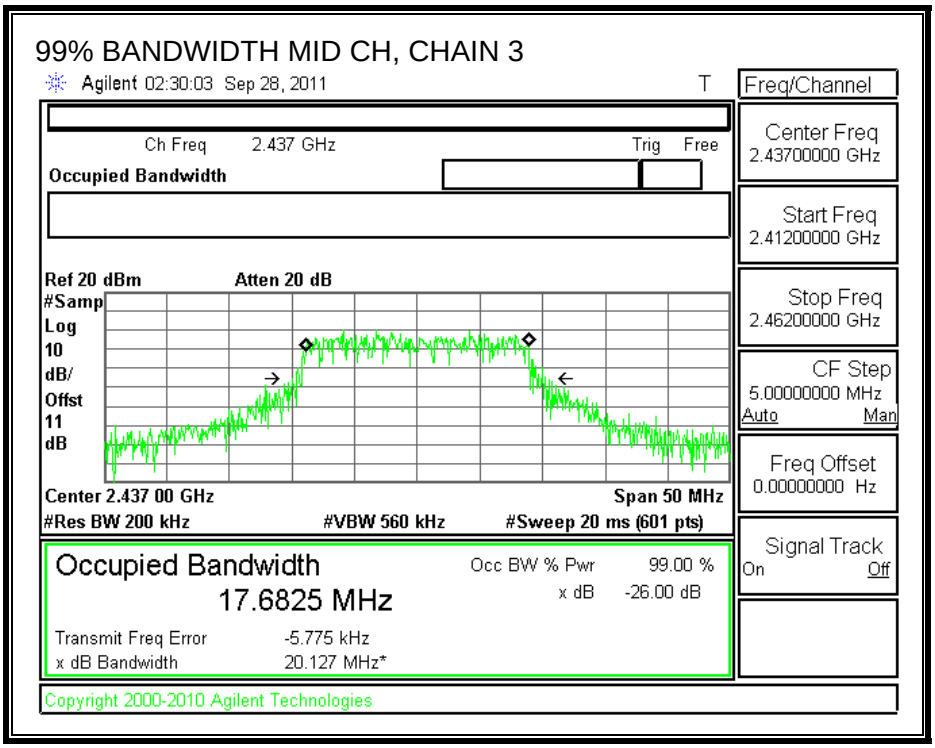


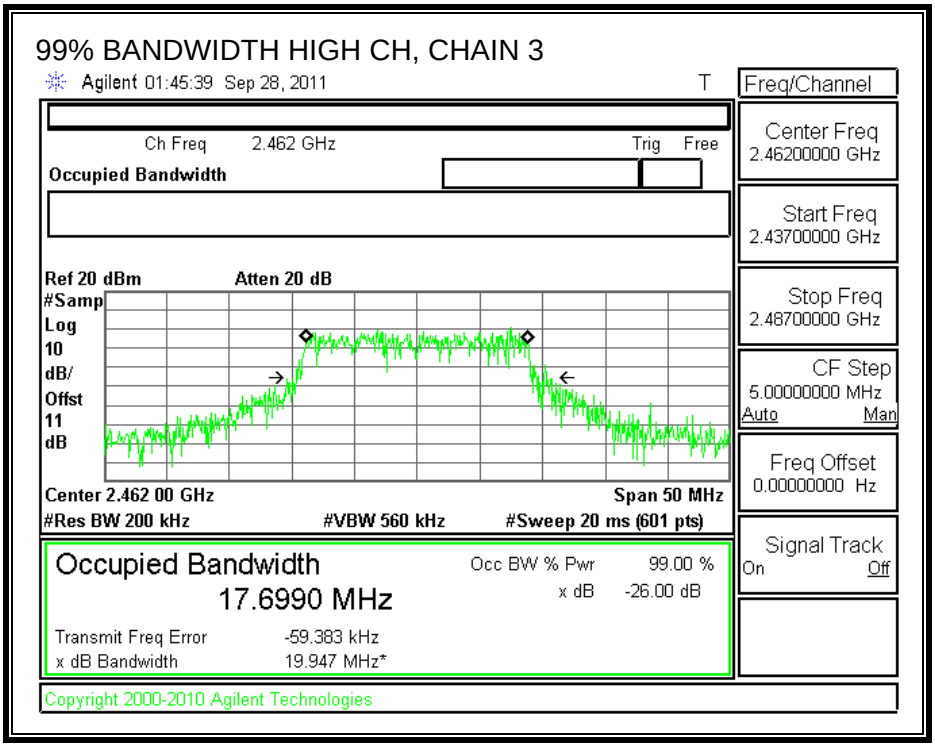




99% BANDWIDTH, CHAIN 3







7.4.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

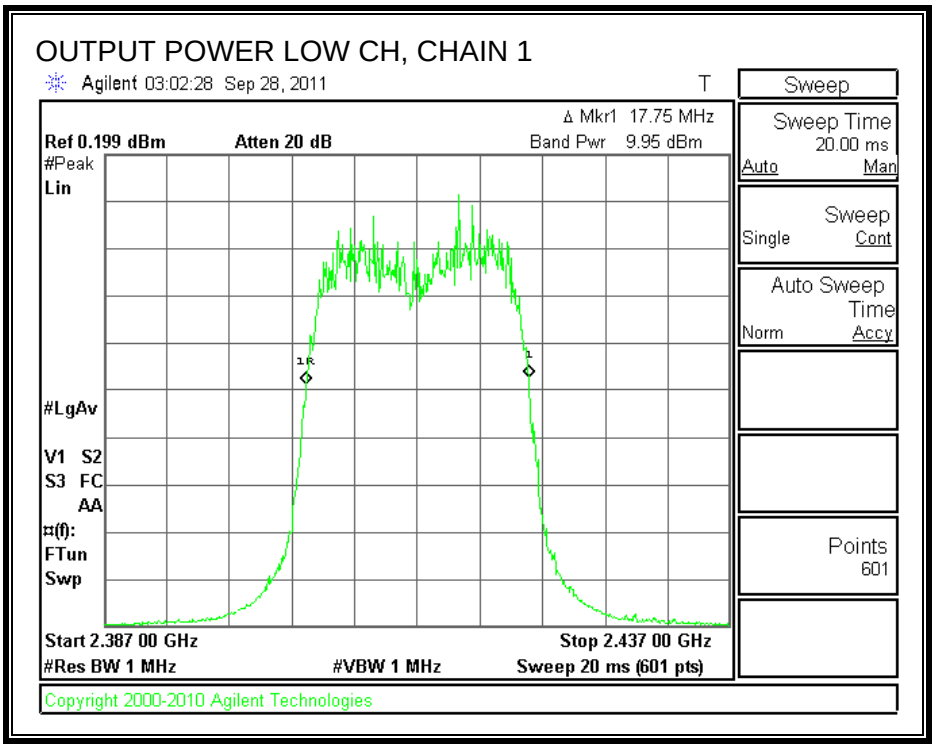
TEST PROCEDURE

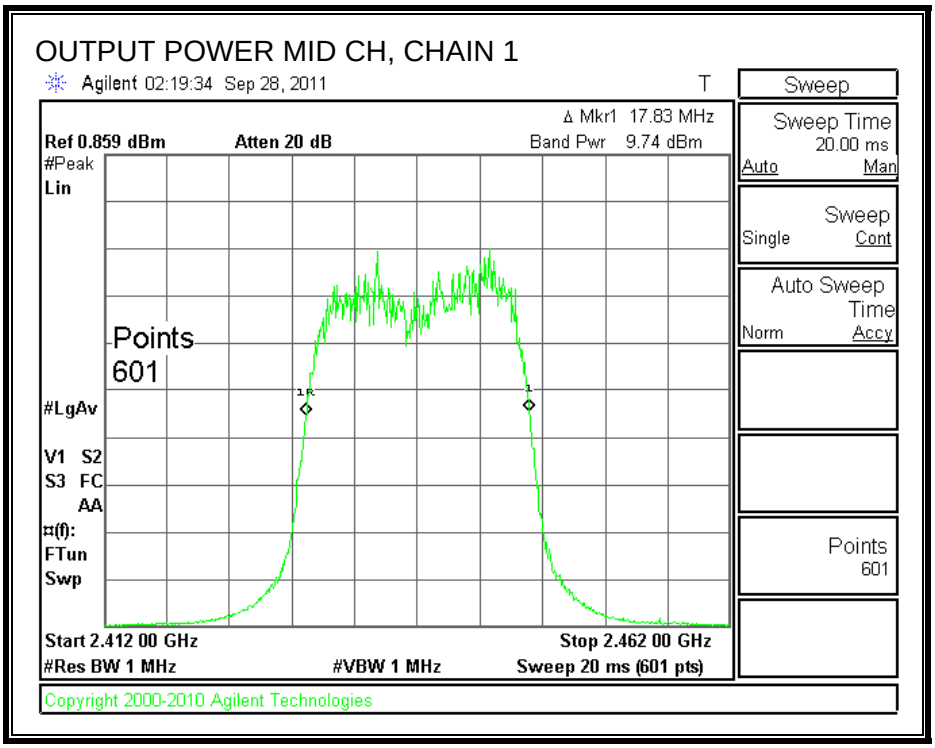
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

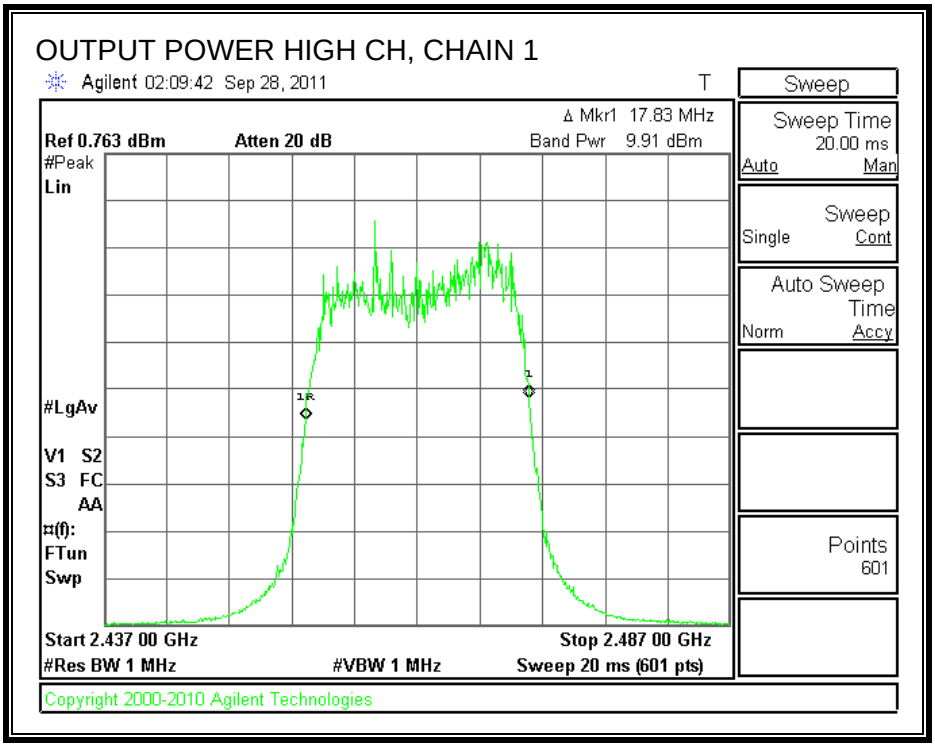
RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Chain 3 PK Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	9.95	10.90	11.41	11.00	26.57	30.00	-3.43
Mid	2437	9.74	10.71	10.94	11.00	26.26	30.00	-3.74
High	2462	9.91	10.45	10.94	11.00	26.22	30.00	-3.78

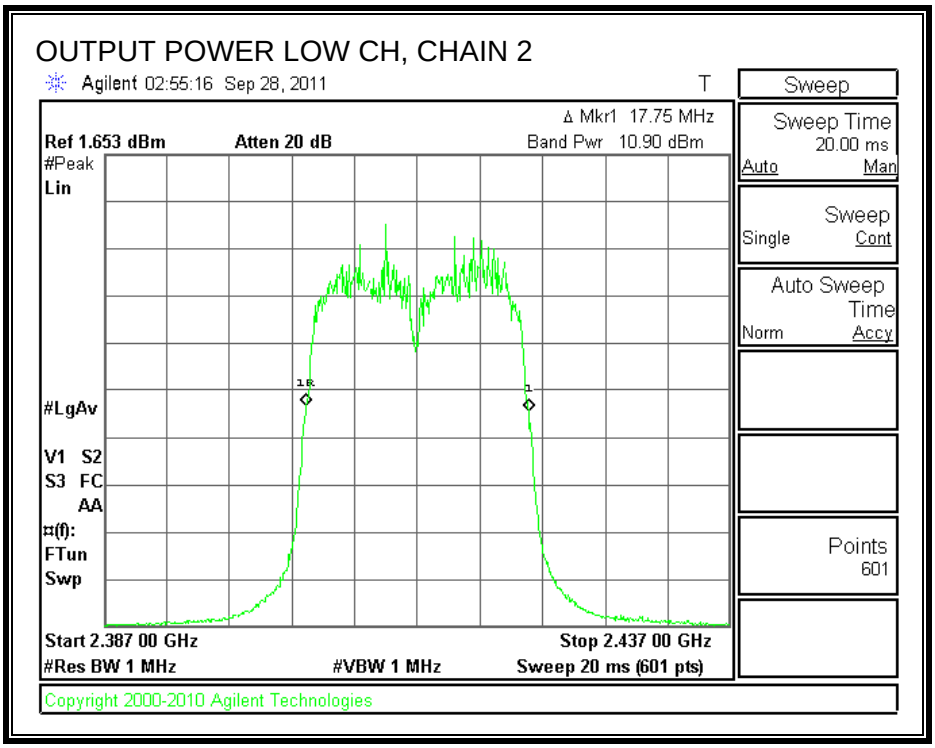
CHAIN 1 OUTPUT POWER

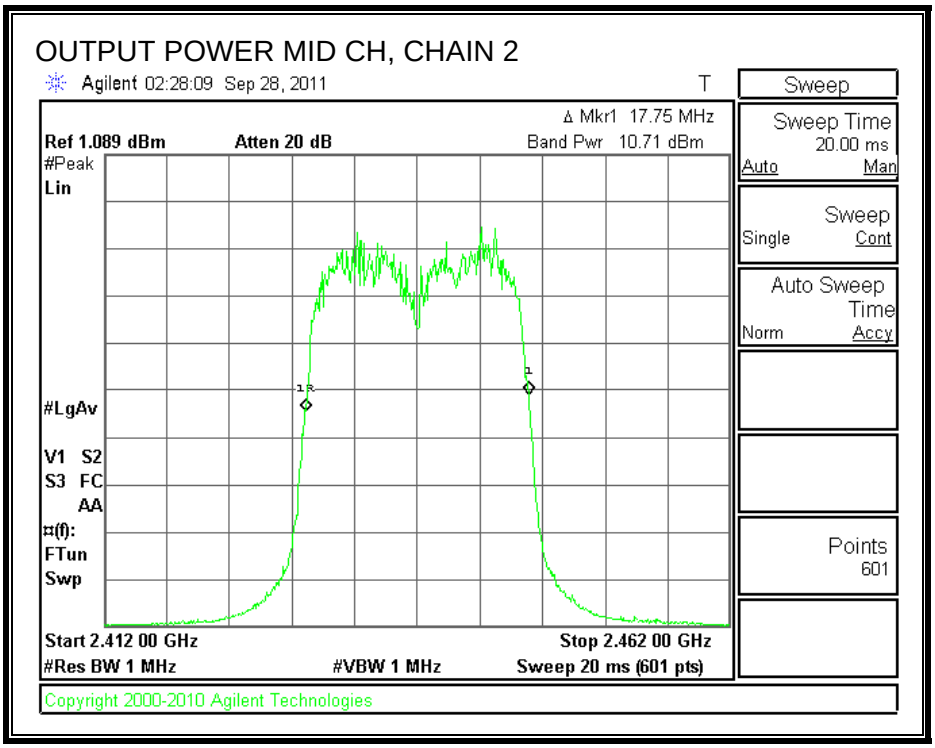


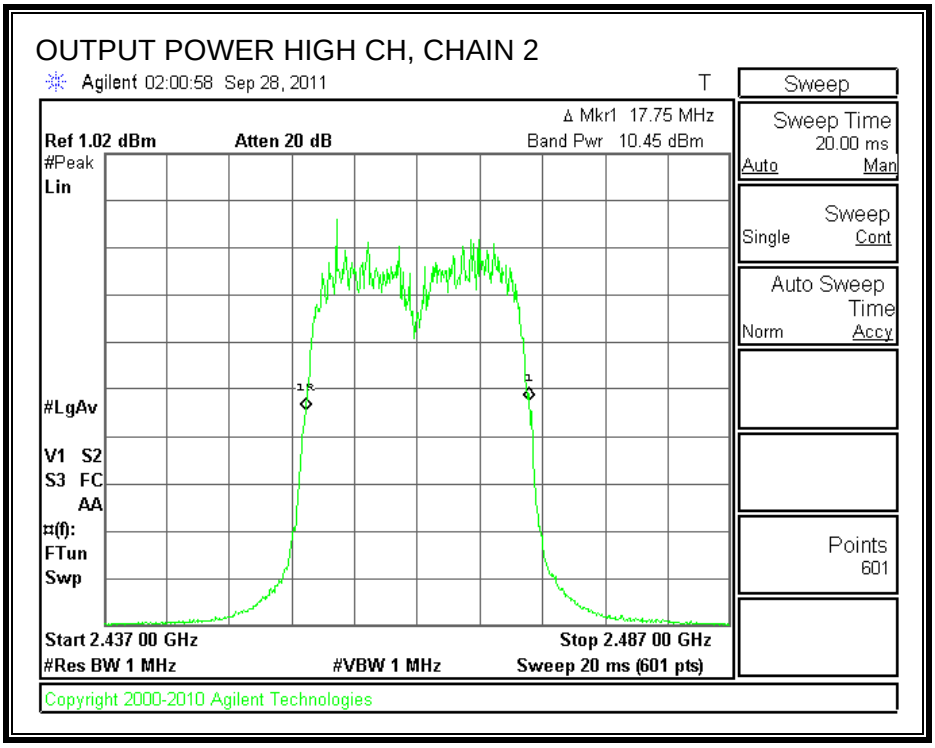




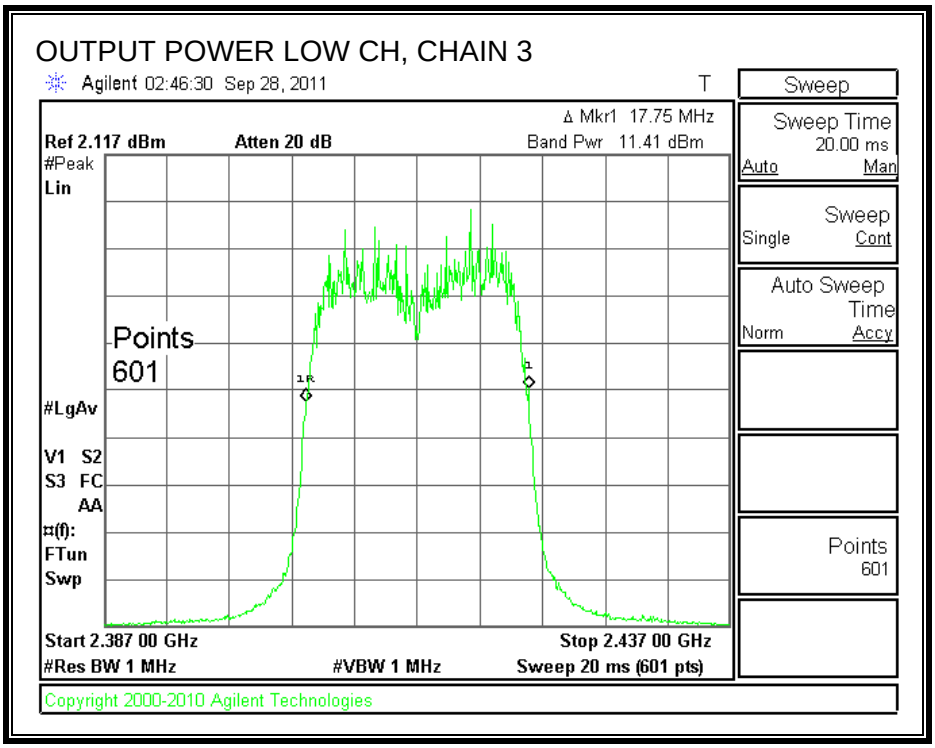
CHAIN 2 OUTPUT POWER

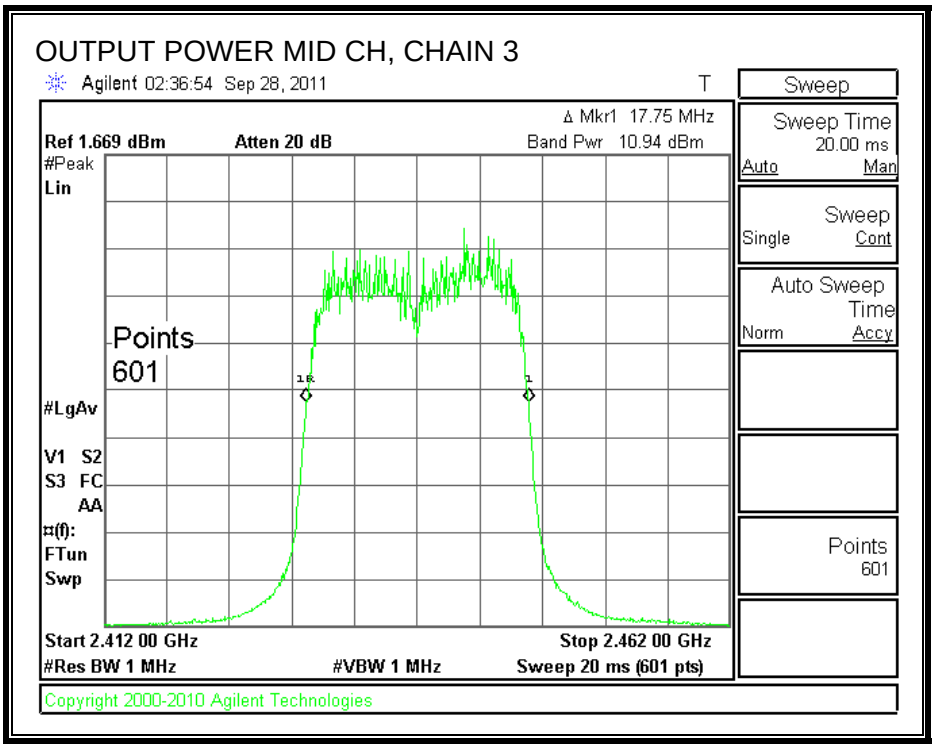


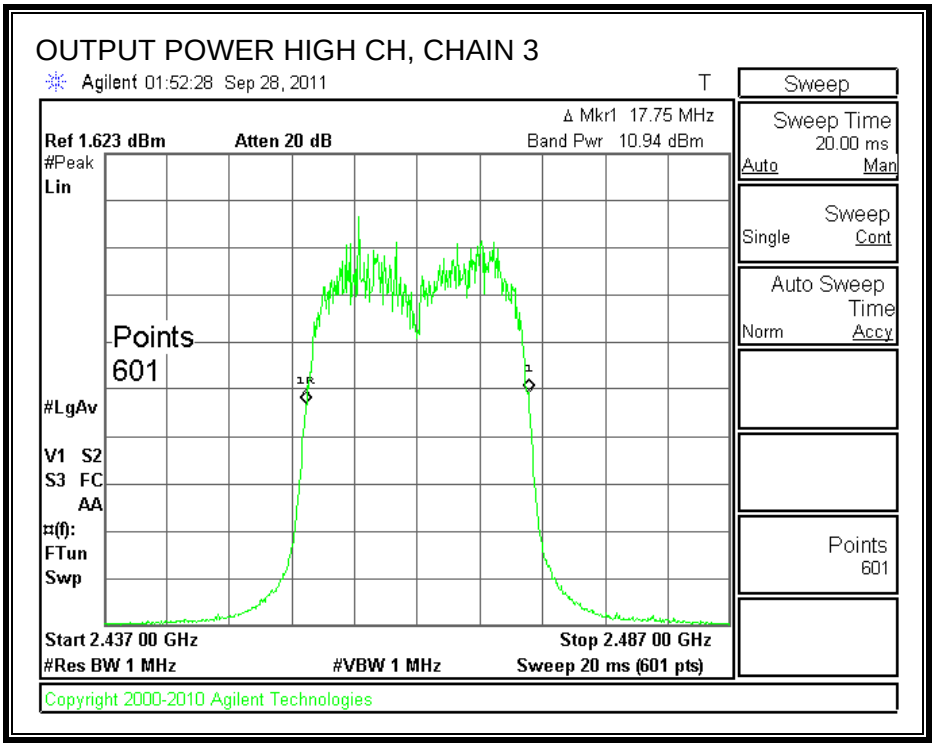




CHAIN 3 OUTPUT POWER







7.4.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1.0 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	2412	14.20	14.20	14.20	18.97
Middle	2437	14.00	14.00	14.00	18.77
High	2462	14.00	14.00	14.00	18.77

7.4.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

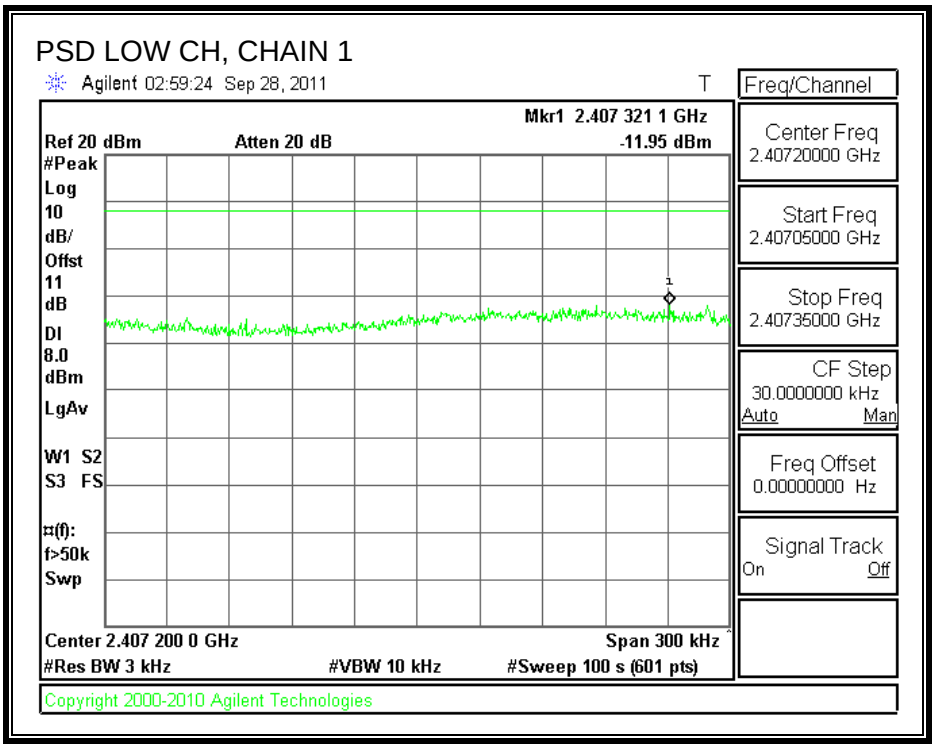
TEST PROCEDURE

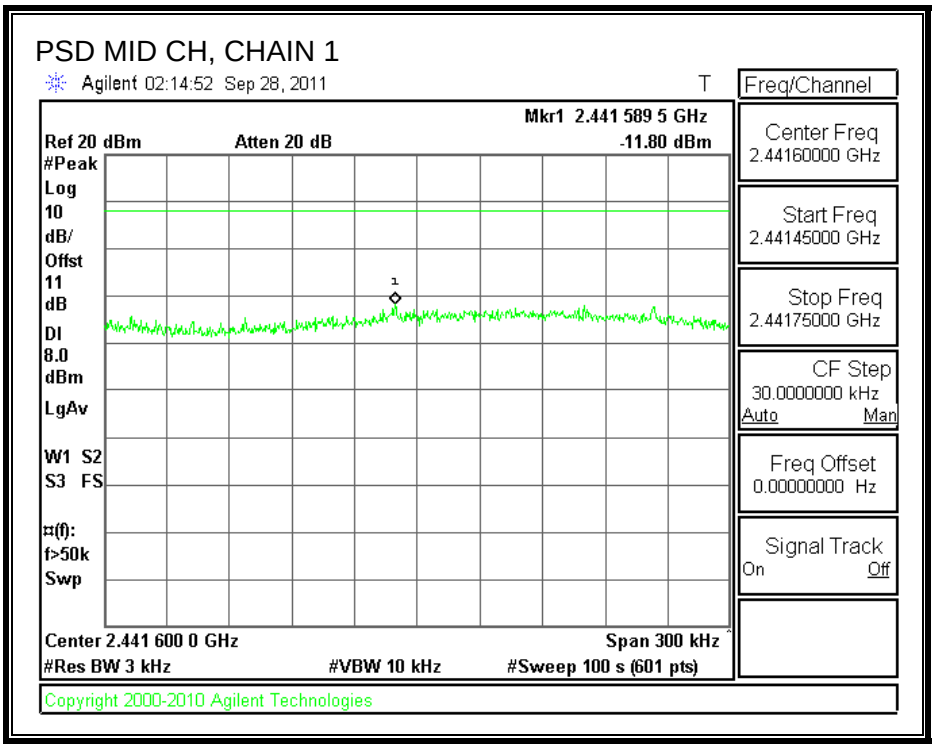
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

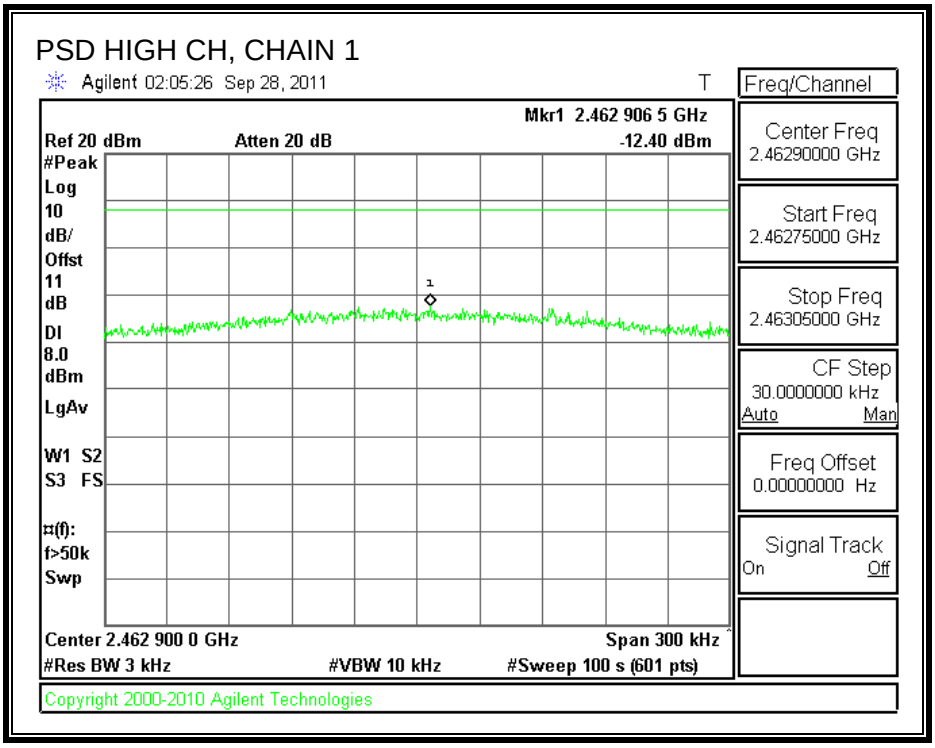
RESULTS

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-11.95	-10.73	-11.35	-6.54	8	-14.54
Middle	2437	-11.80	-12.22	-11.84	-7.18	8	-15.18
High	2462	-12.40	-11.41	-11.08	-6.82	8	-14.82

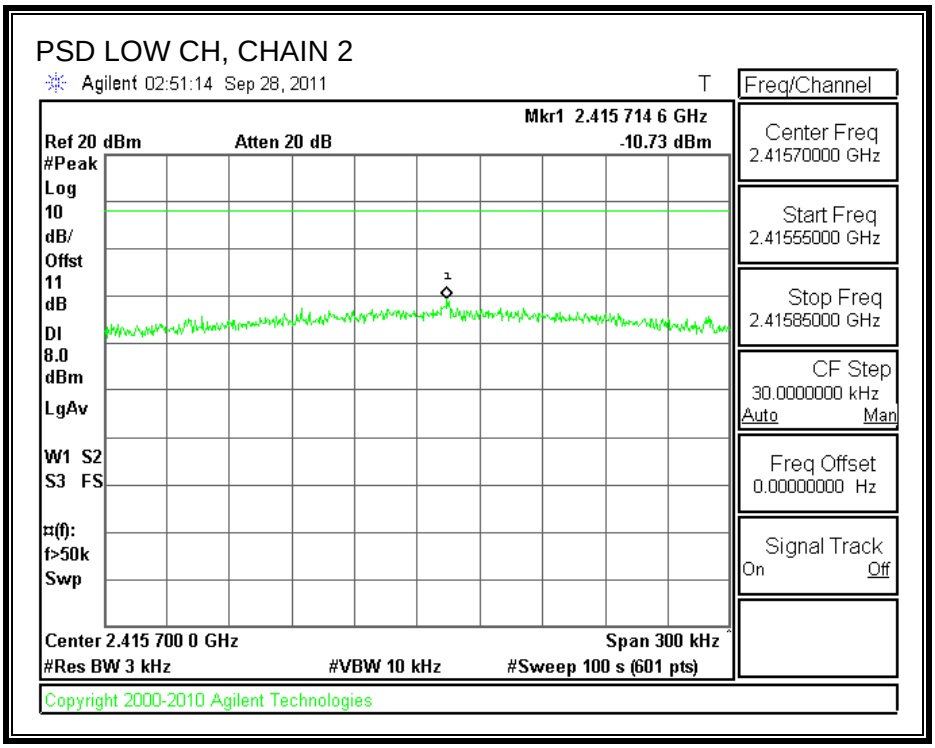
POWER SPECTRAL DENSITY, CHAIN 1

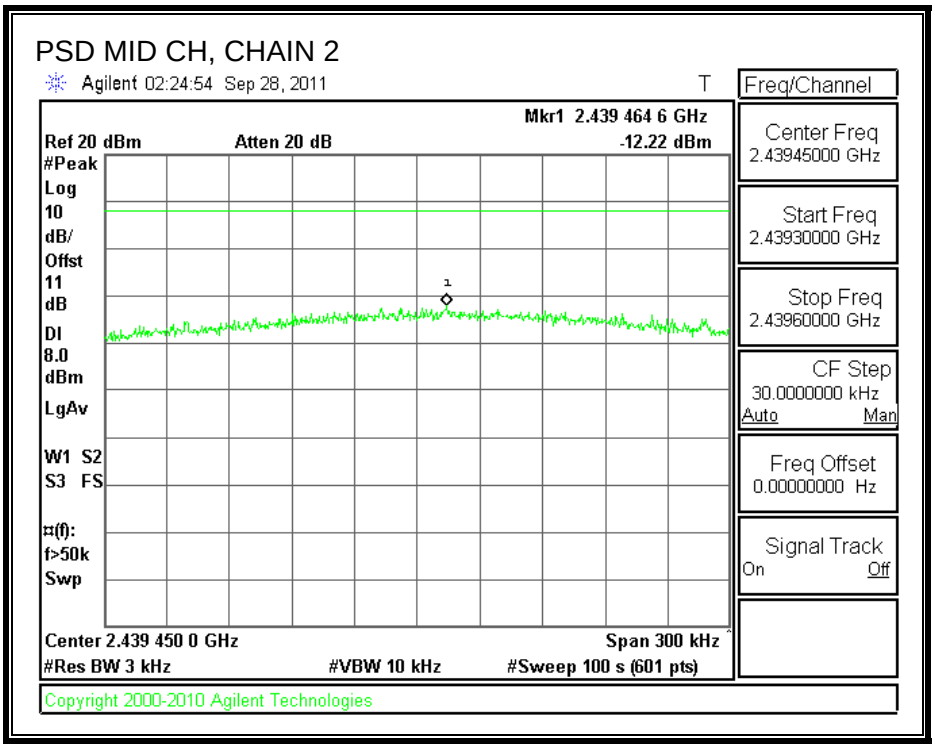


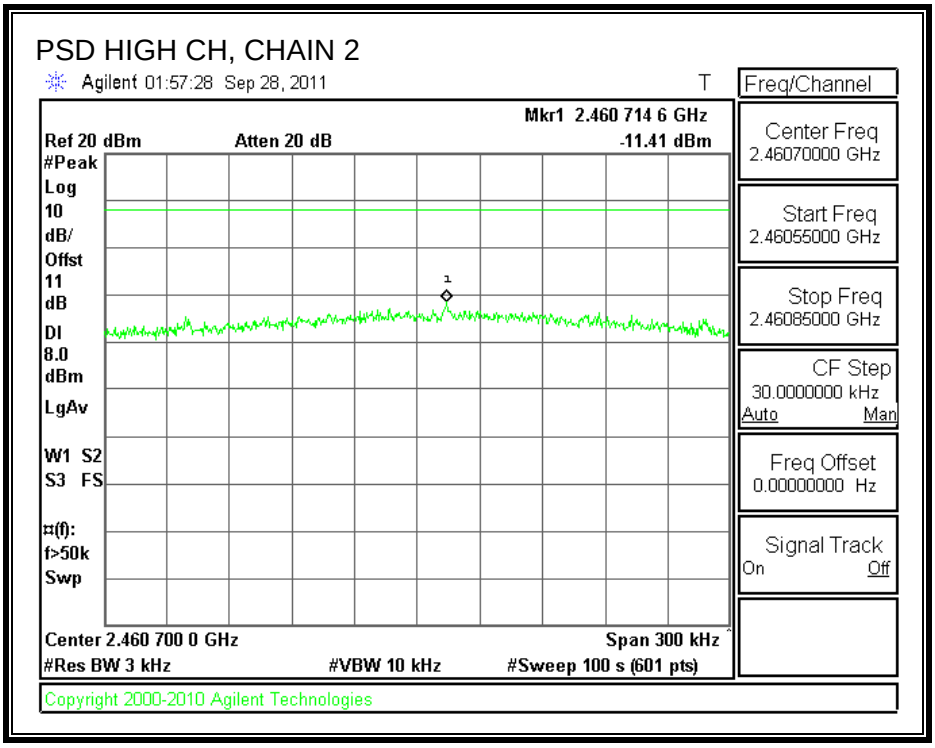




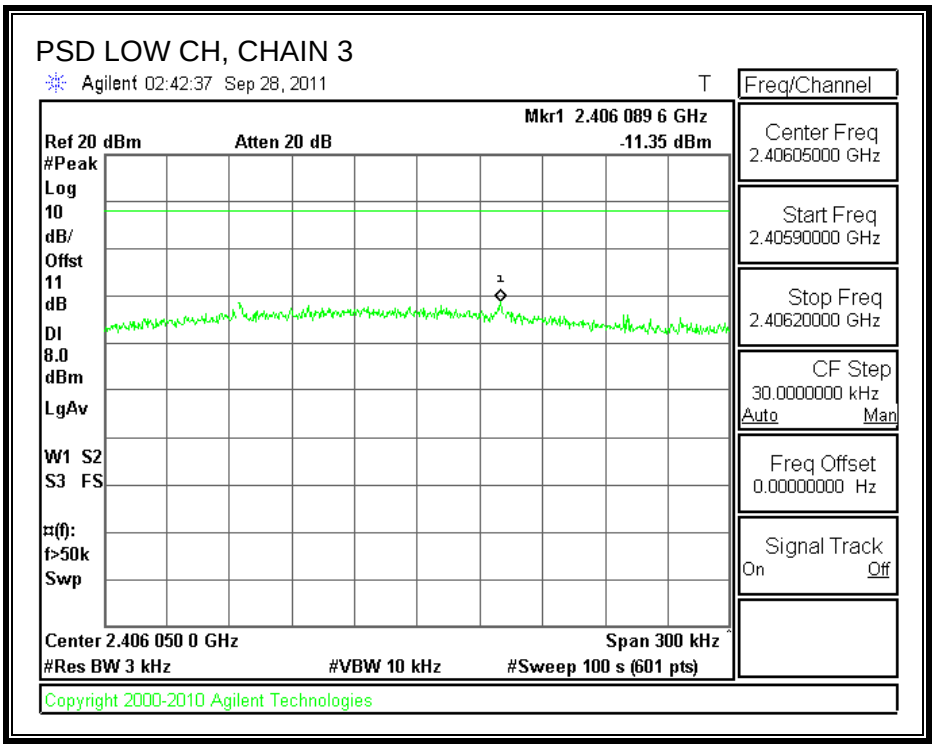
POWER SPECTRAL DENSITY, CHAIN 2

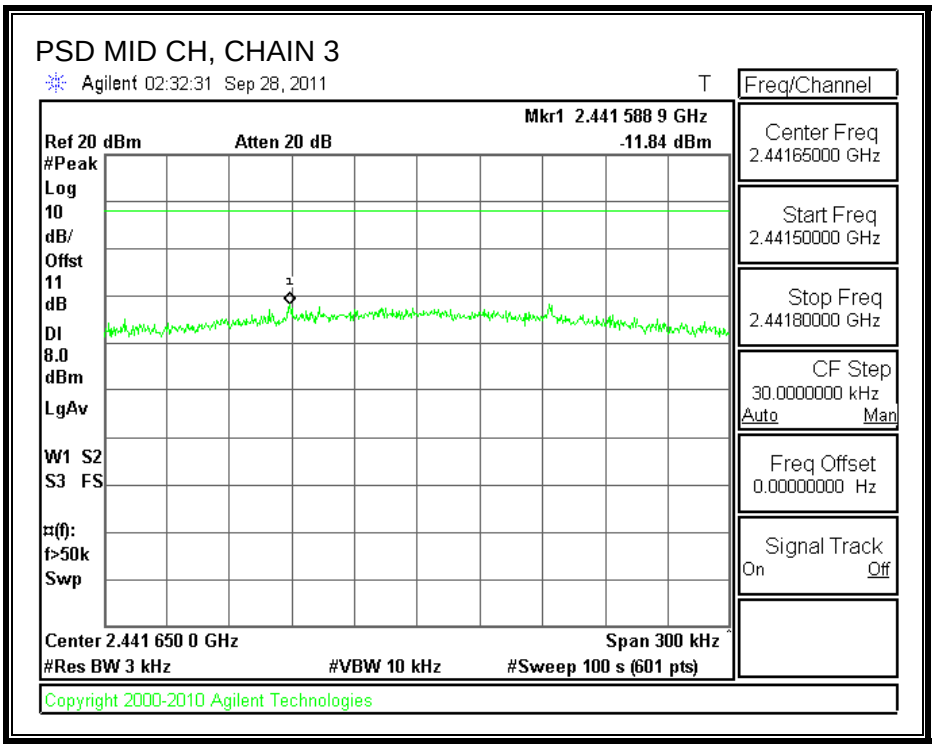


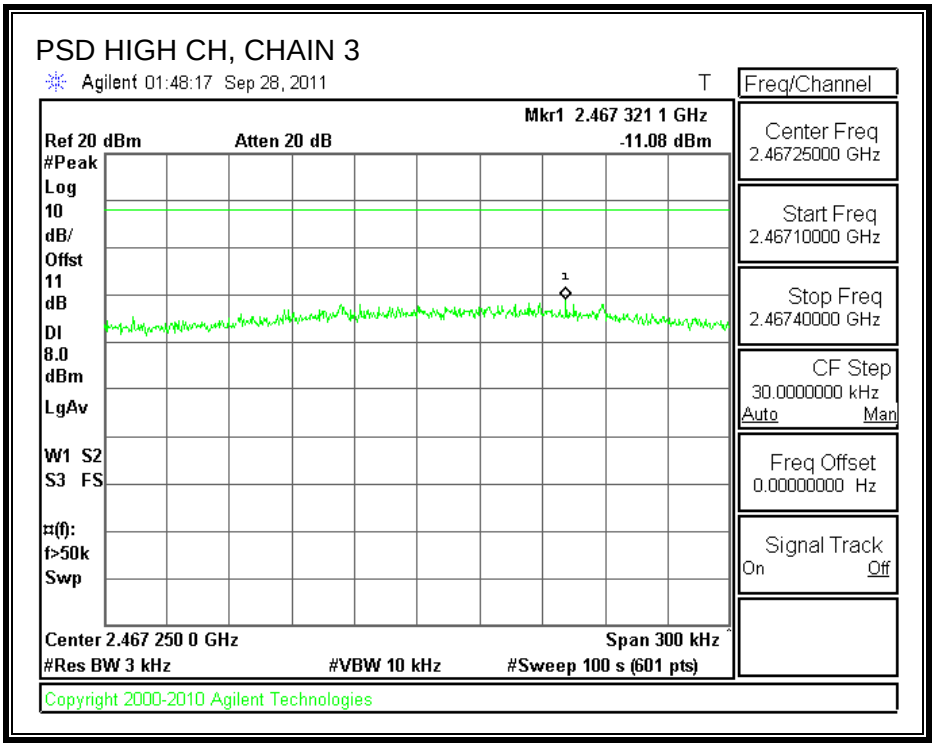




POWER SPECTRAL DENSITY, CHAIN 3







7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

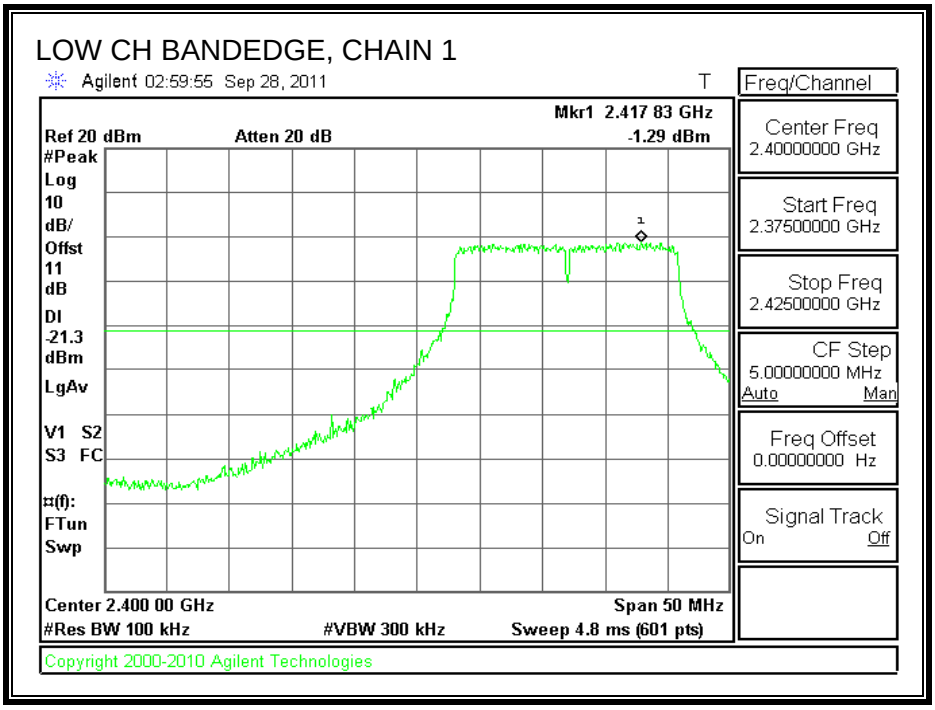
TEST PROCEDURE

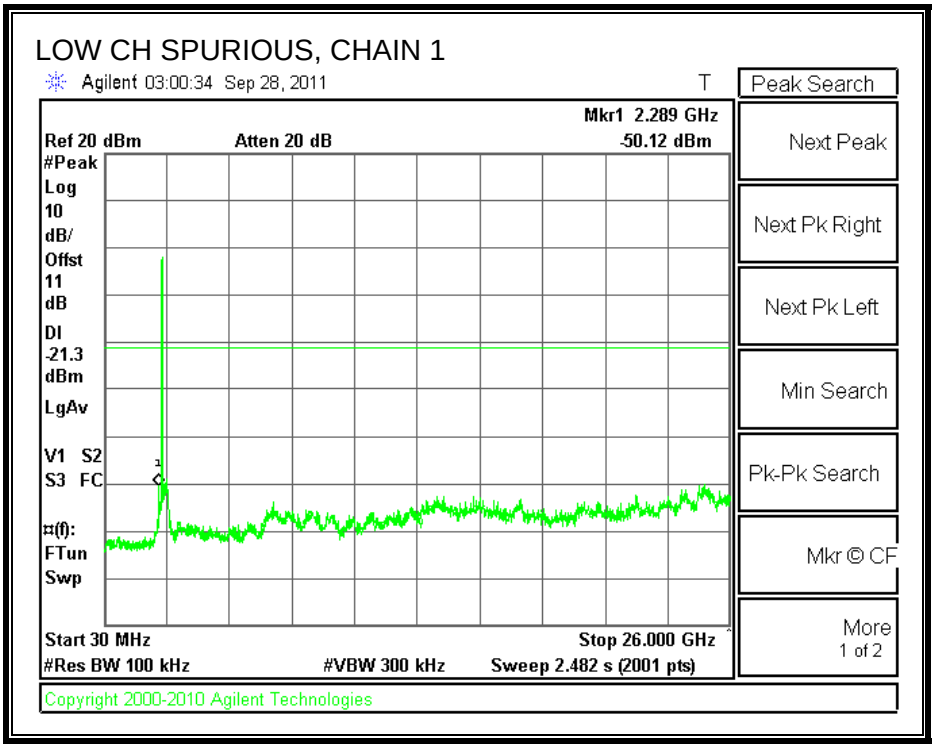
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

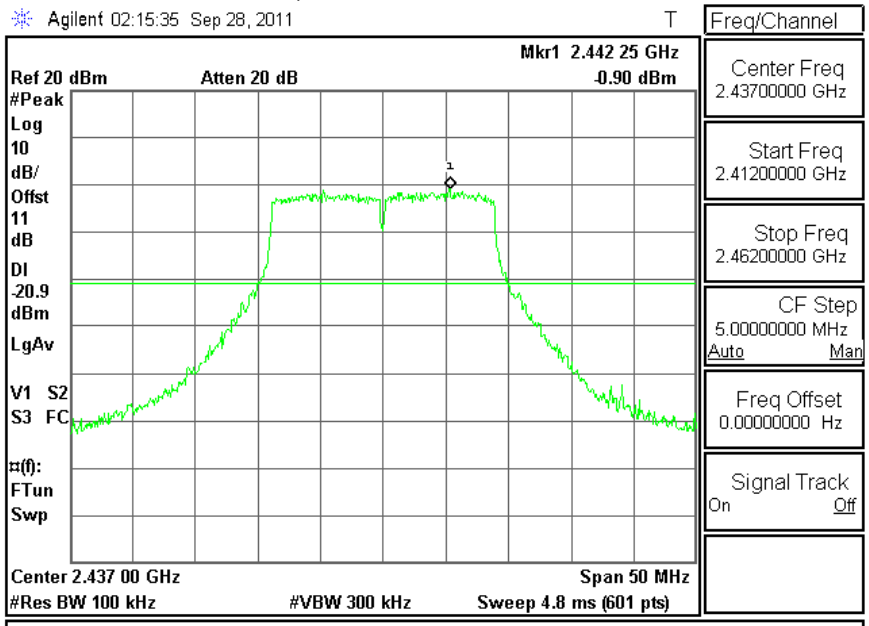
RESULTS

CHAIN 1 SPURIOUS EMISSIONS

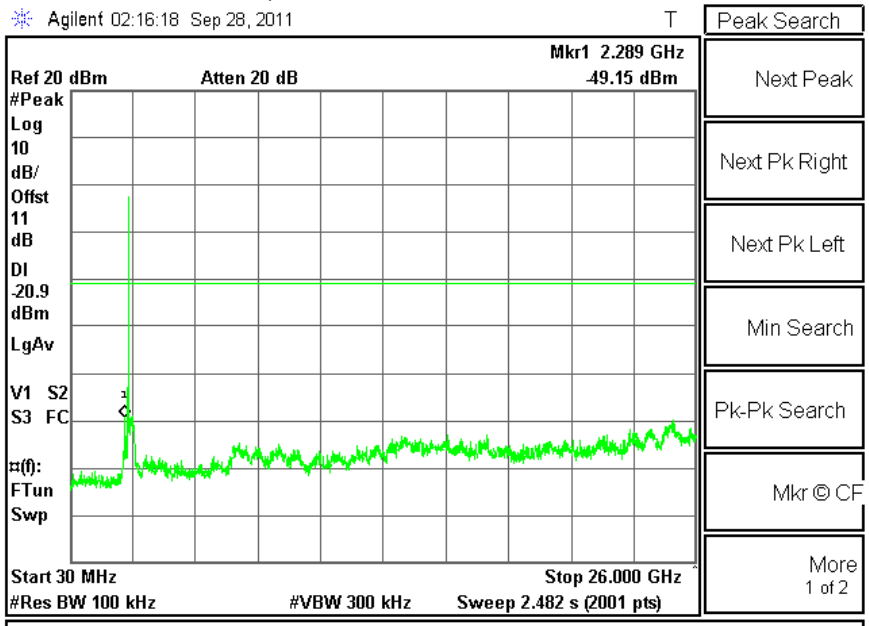




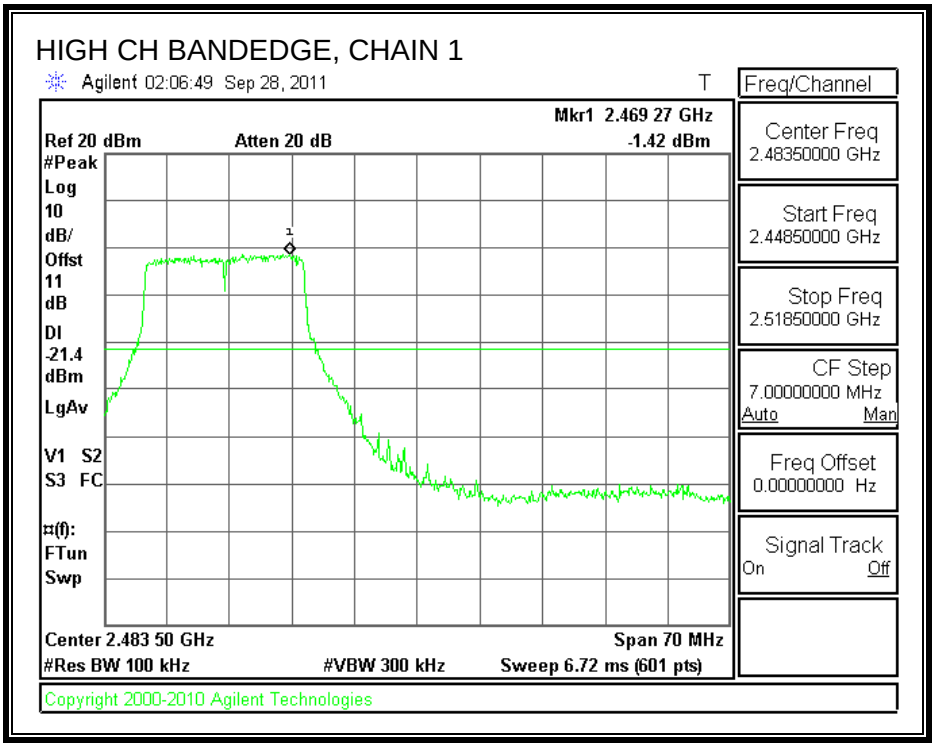
MID CH REFERENCE, CHAIN 1



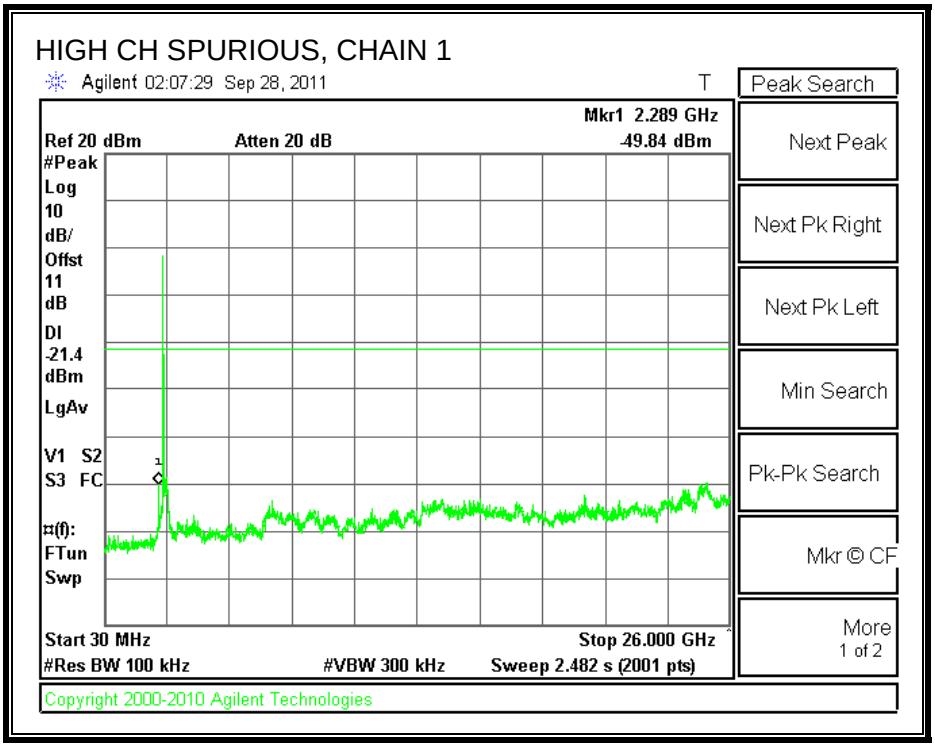
MID CH SPURIOUS, CHAIN 1



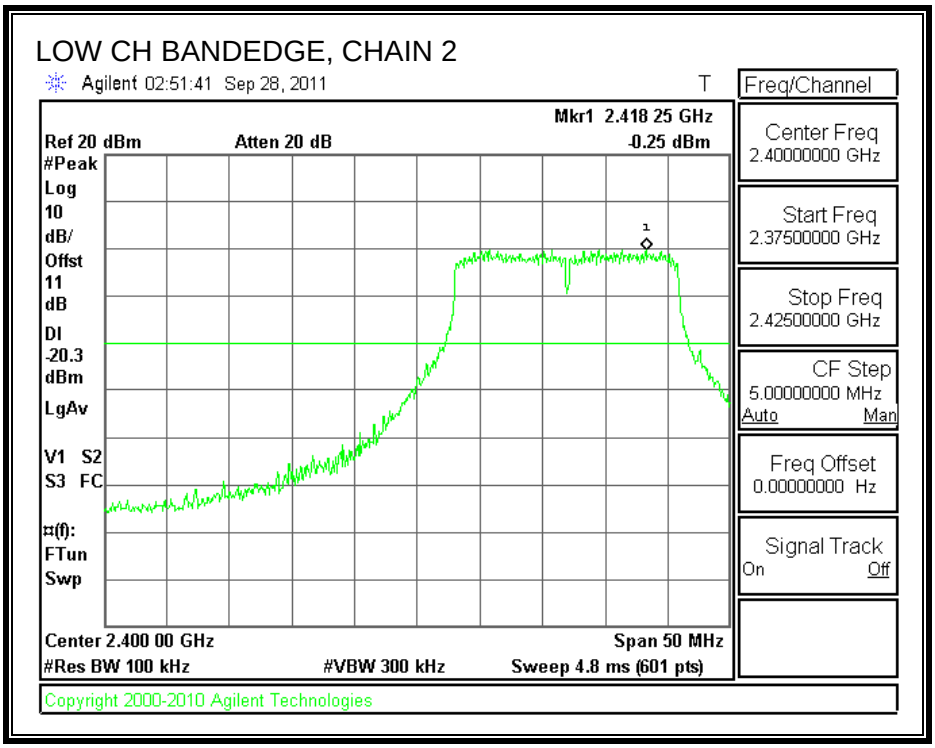
HIGH CH BANDEDGE, CHAIN 1

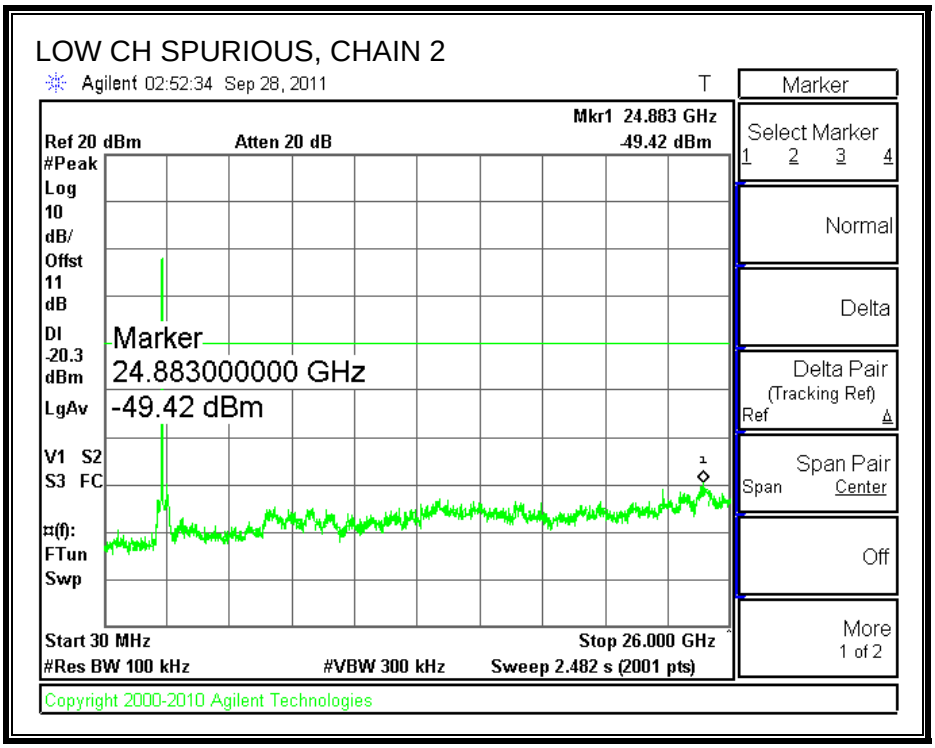


HIGH CH SPURIOUS, CHAIN 1

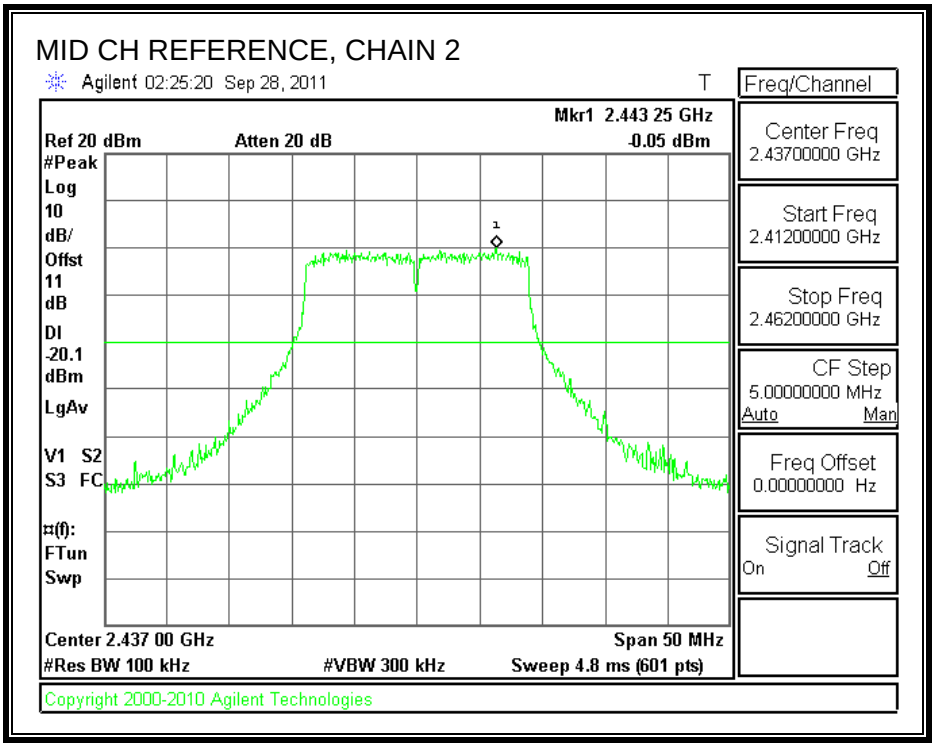


CHAIN 2 SPURIOUS EMISSIONS

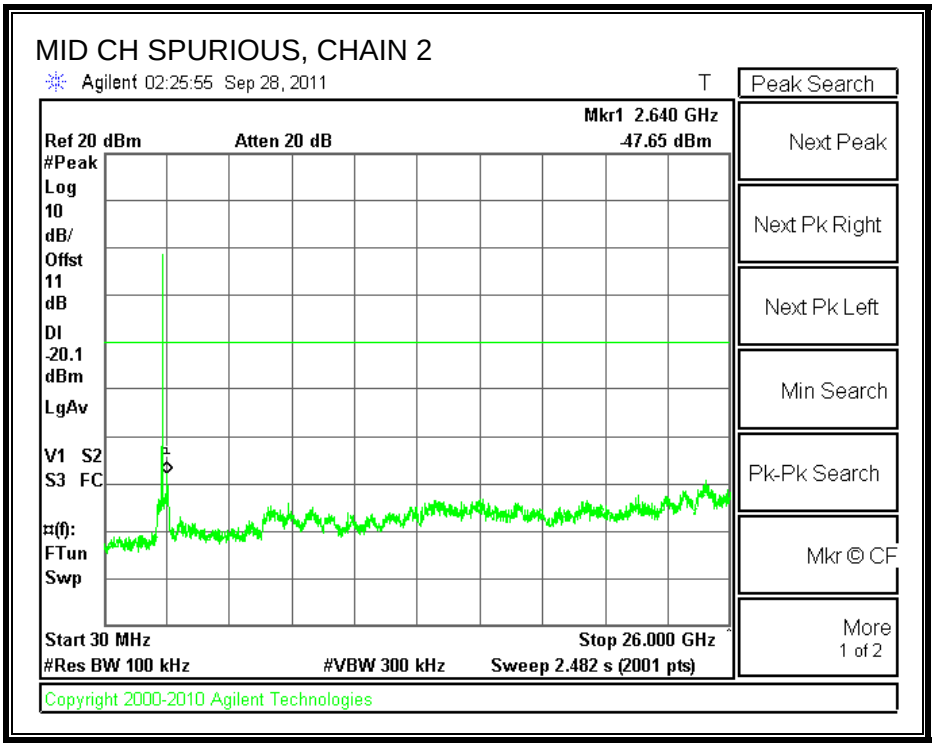




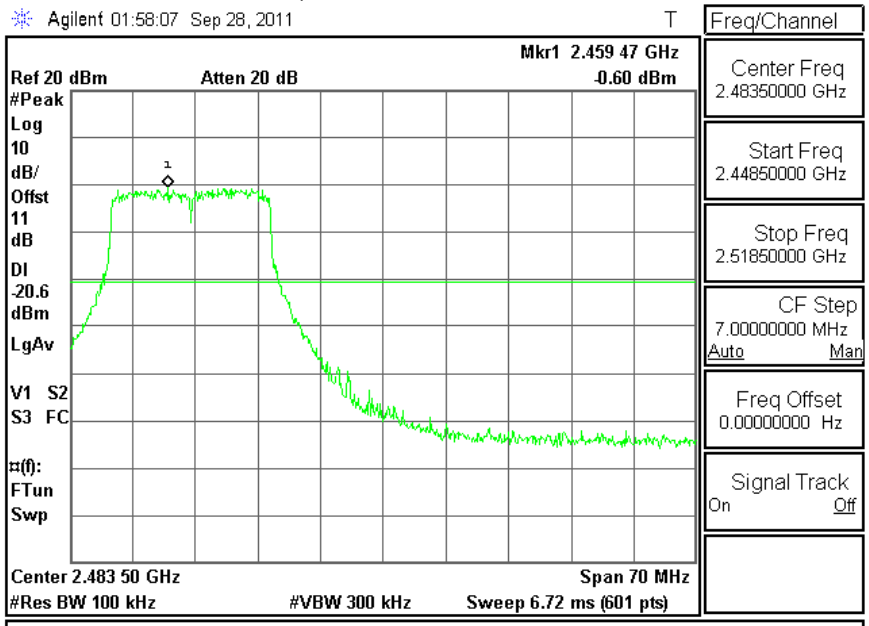
MID CH REFERENCE, CHAIN 2



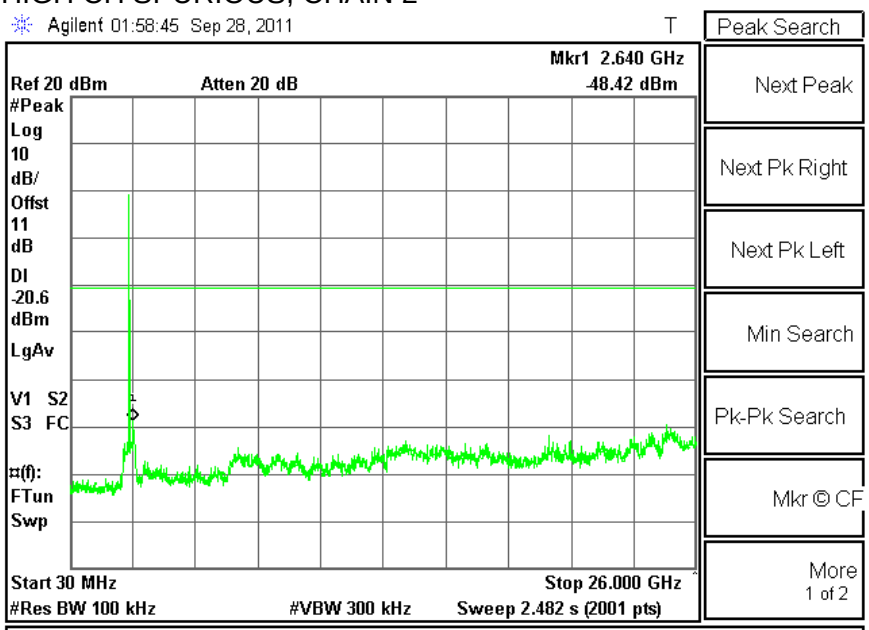
MID CH SPURIOUS, CHAIN 2



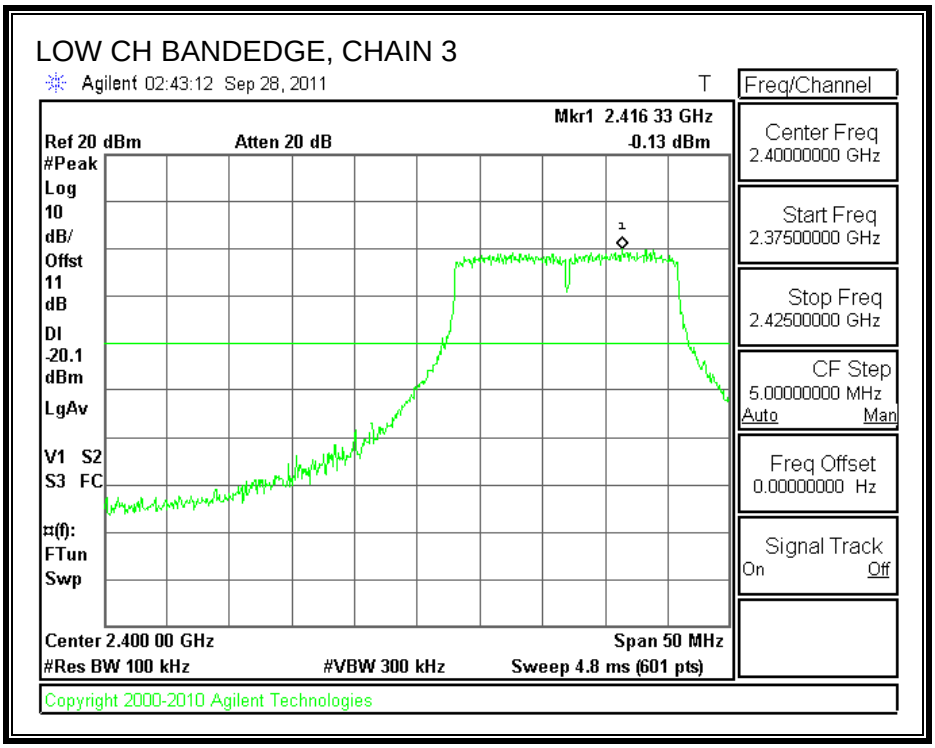
HIGH CH BANDEDGE, CHAIN 2

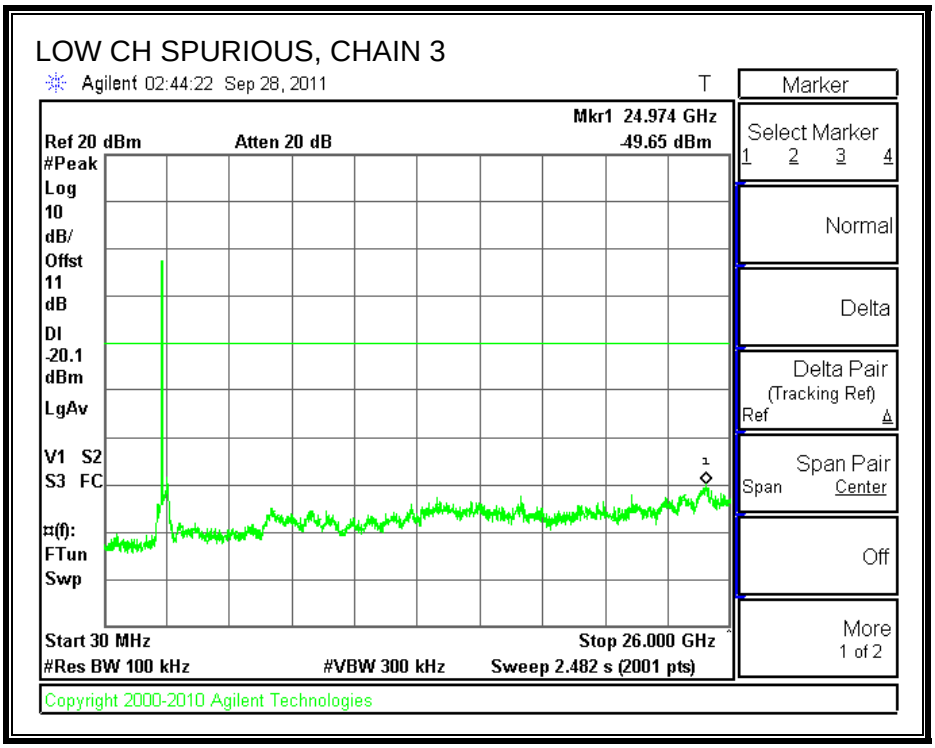


HIGH CH SPURIOUS, CHAIN 2

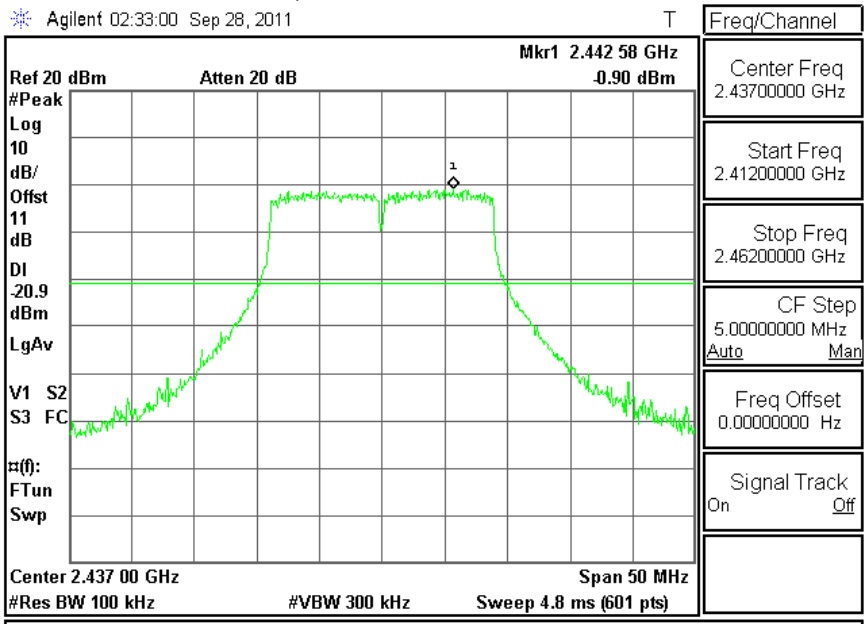


CHAIN 3 SPURIOUS EMISSIONS

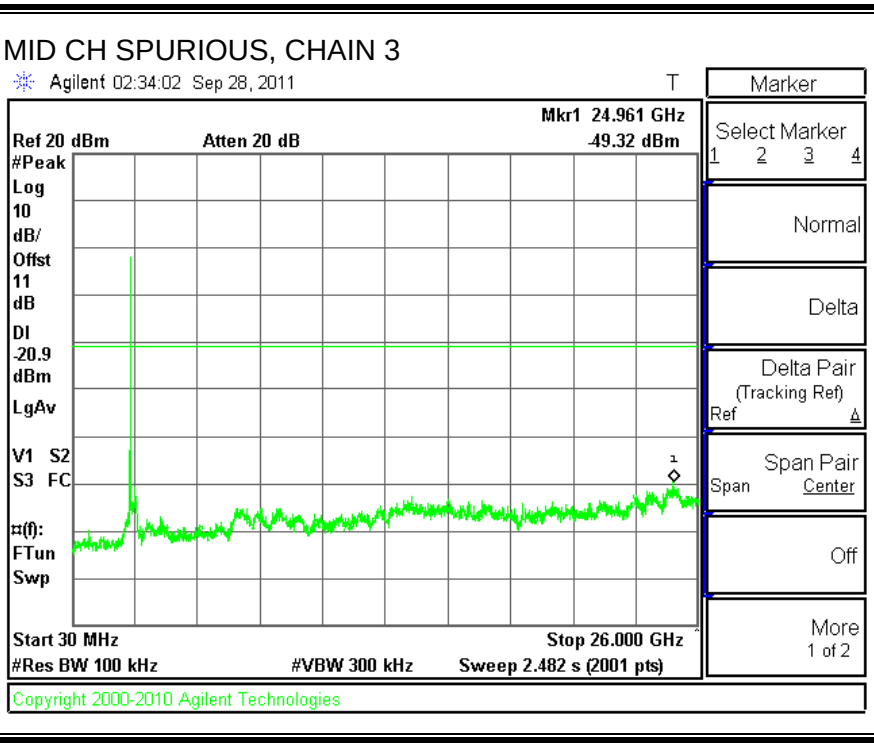




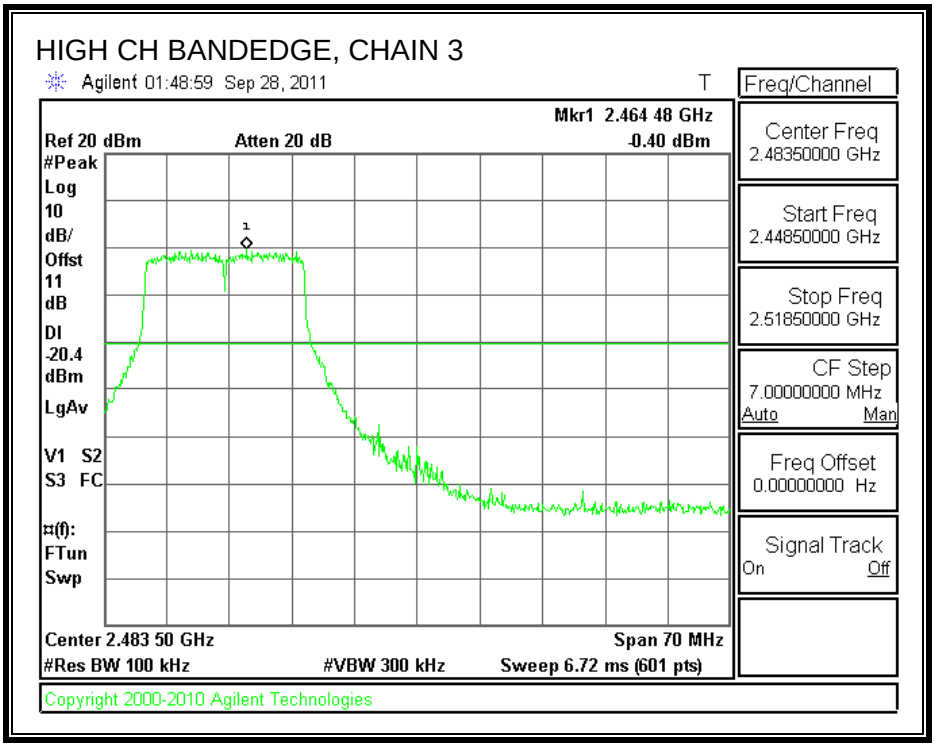
MID CH REFERENCE, CHAIN 3



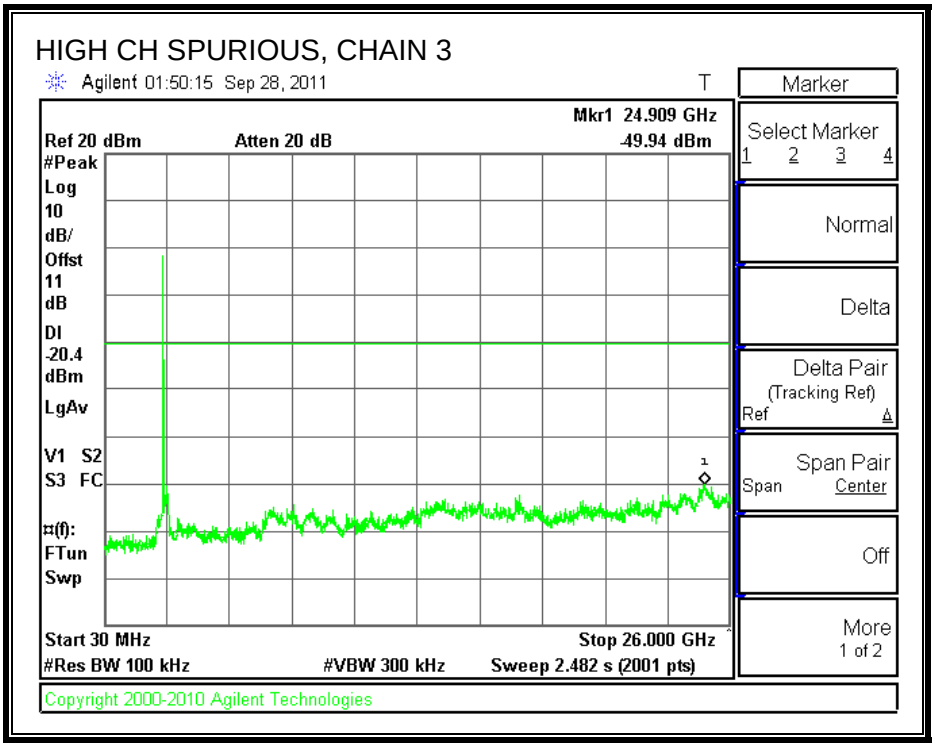
MID CH SPURIOUS, CHAIN 3



HIGH CH BANDEDGE, CHAIN 3



HIGH CH SPURIOUS, CHAIN 3



7.5. 802.11n HT40 MCS0 3TX MODE IN THE 2.4 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.

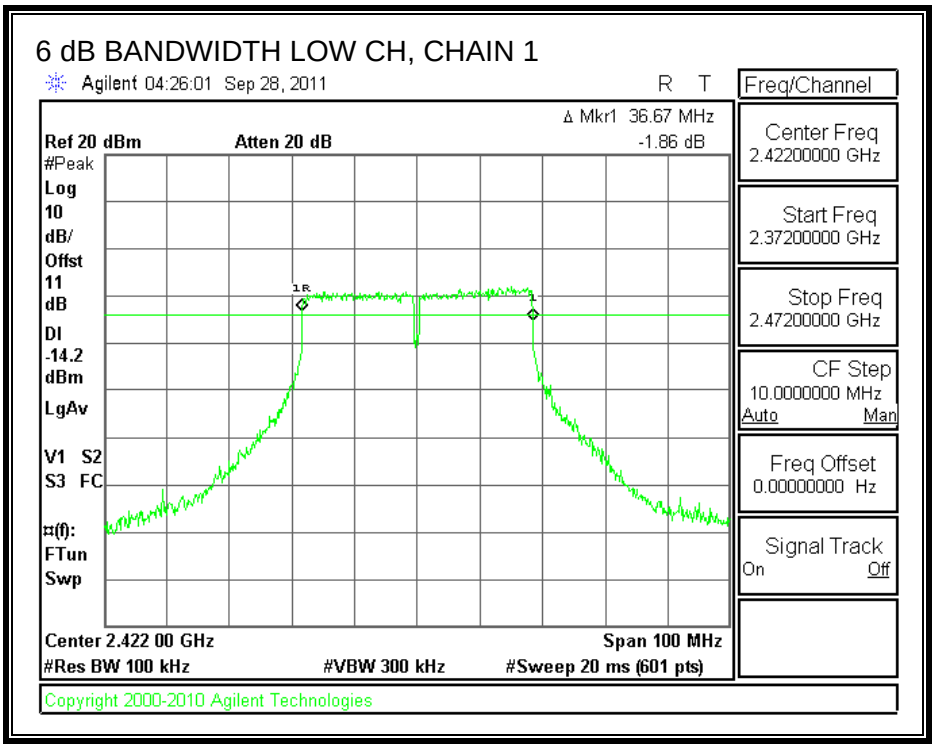
TEST PROCEDURE

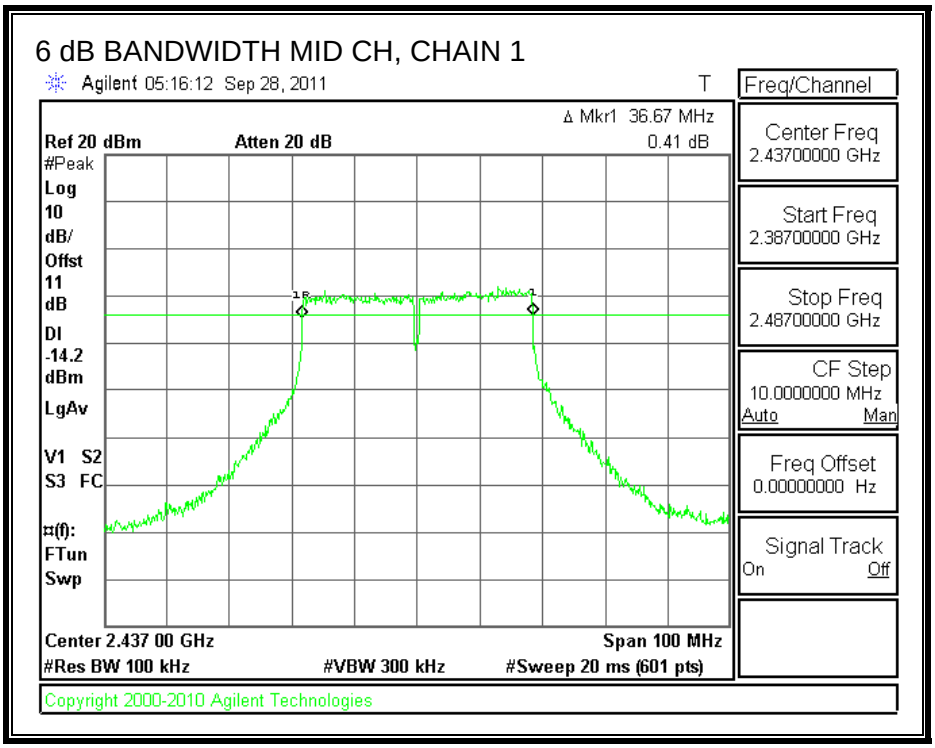
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

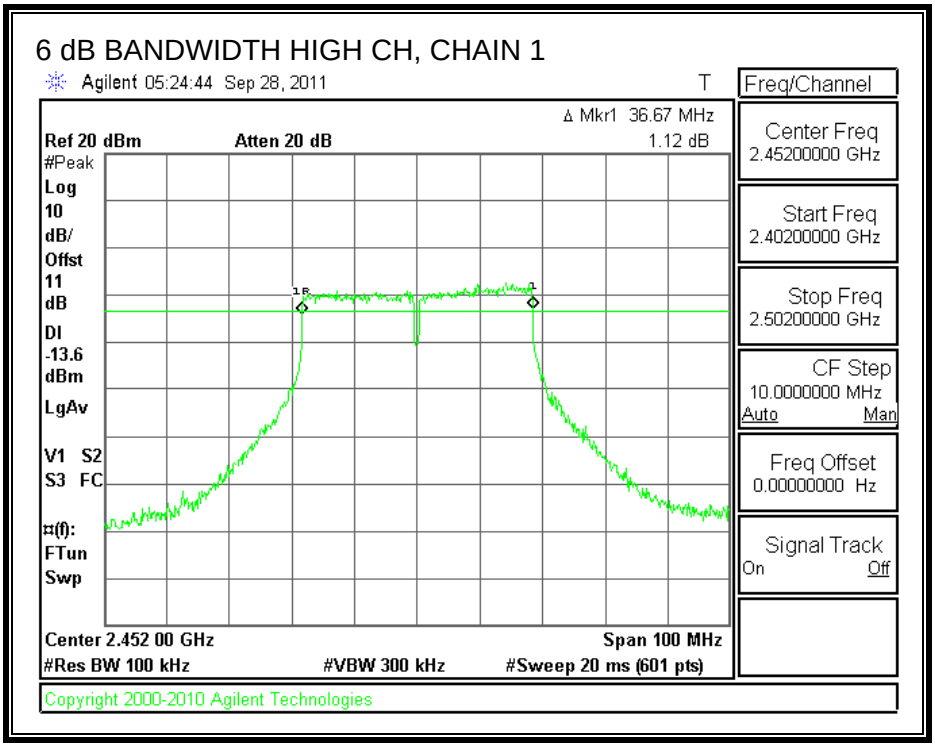
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Chain 3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2422	36.67	36.67	36.67	0.5
Middle	2437	36.67	36.67	36.67	0.5
High	2452	36.67	36.67	36.67	0.5

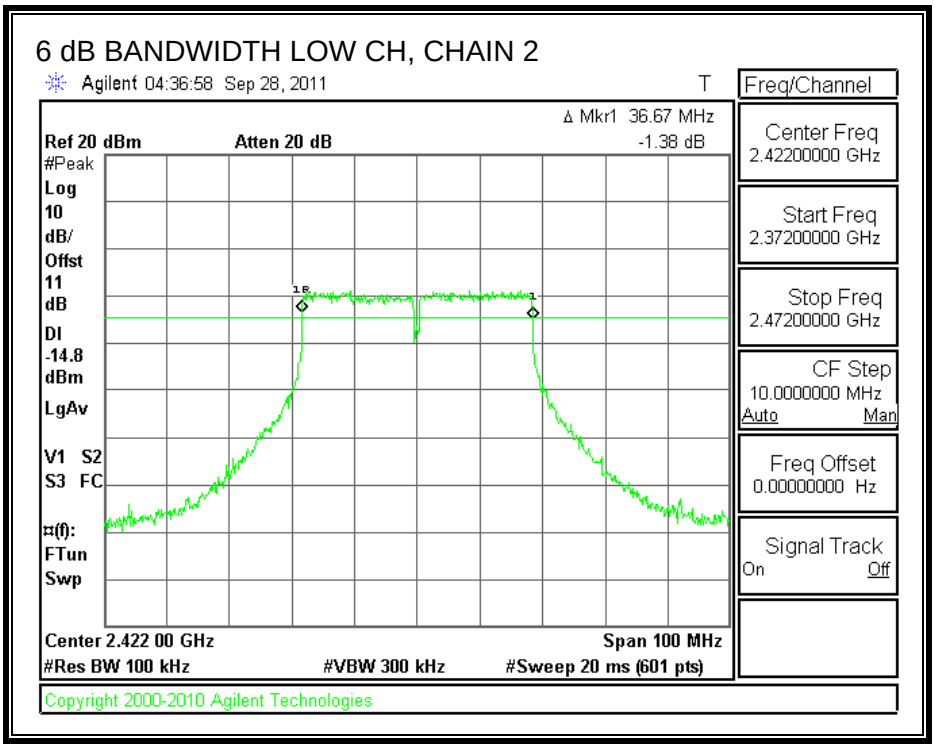
6 dB BANDWIDTH, CHAIN 1

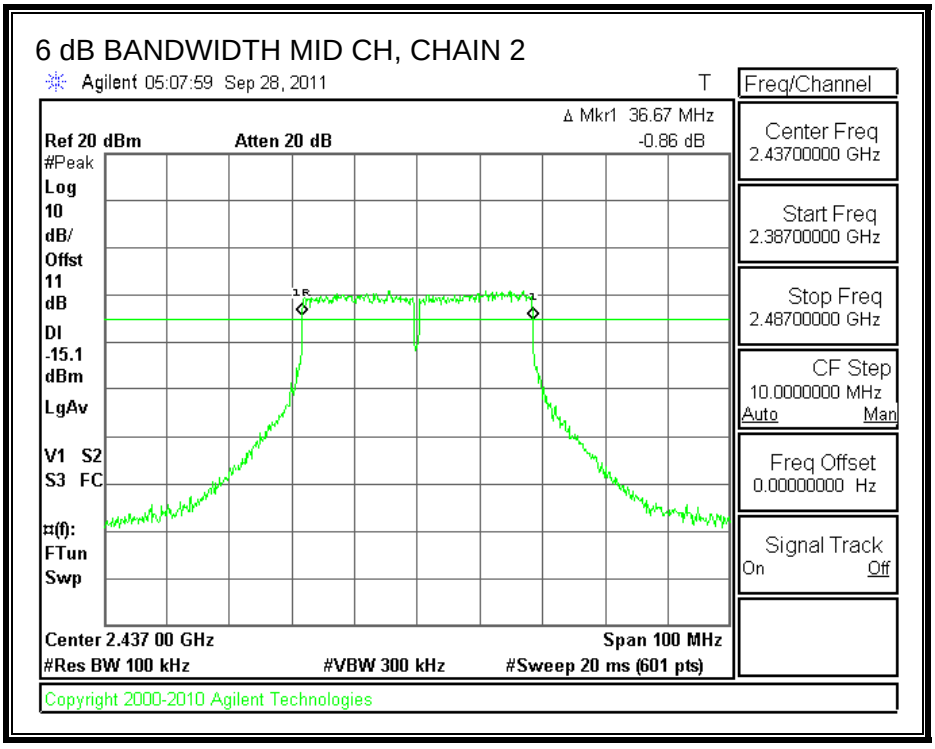


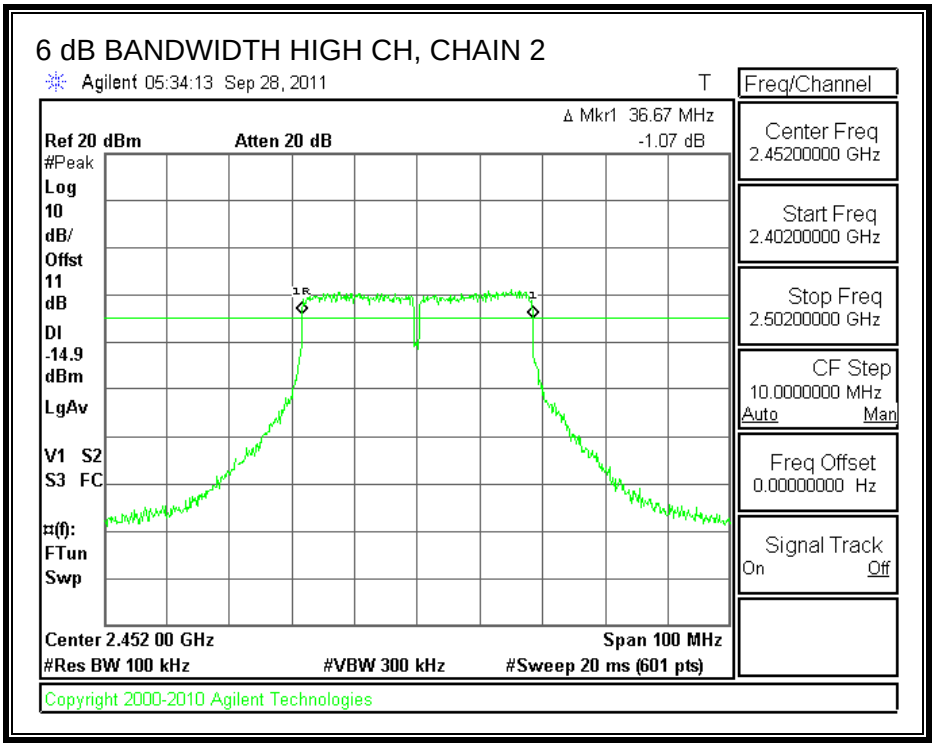




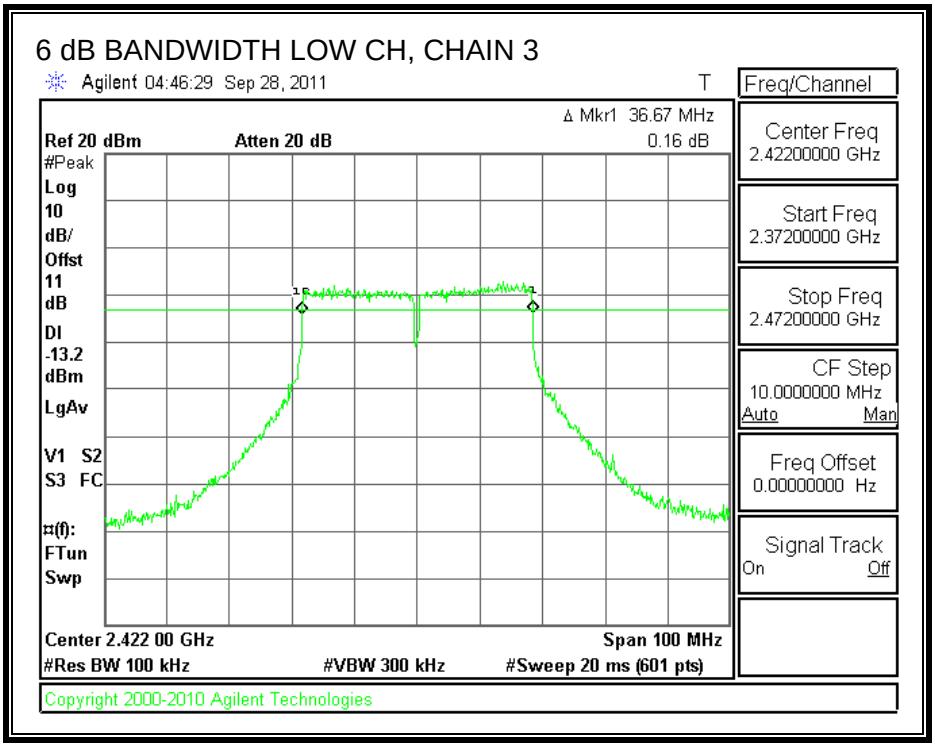
6 dB BANDWIDTH, CHAIN 2

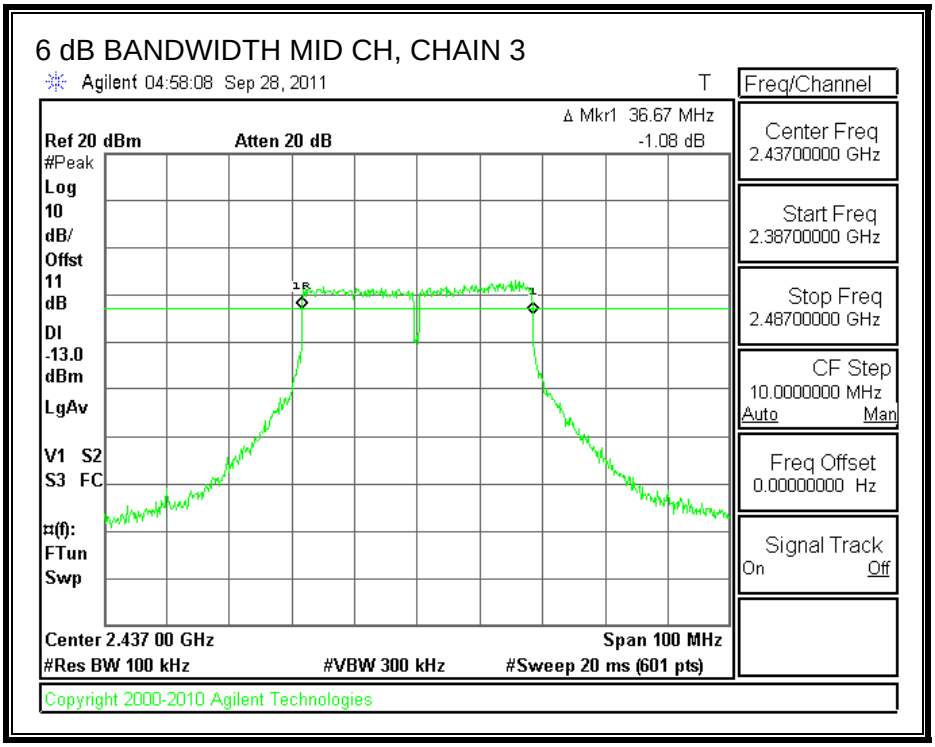


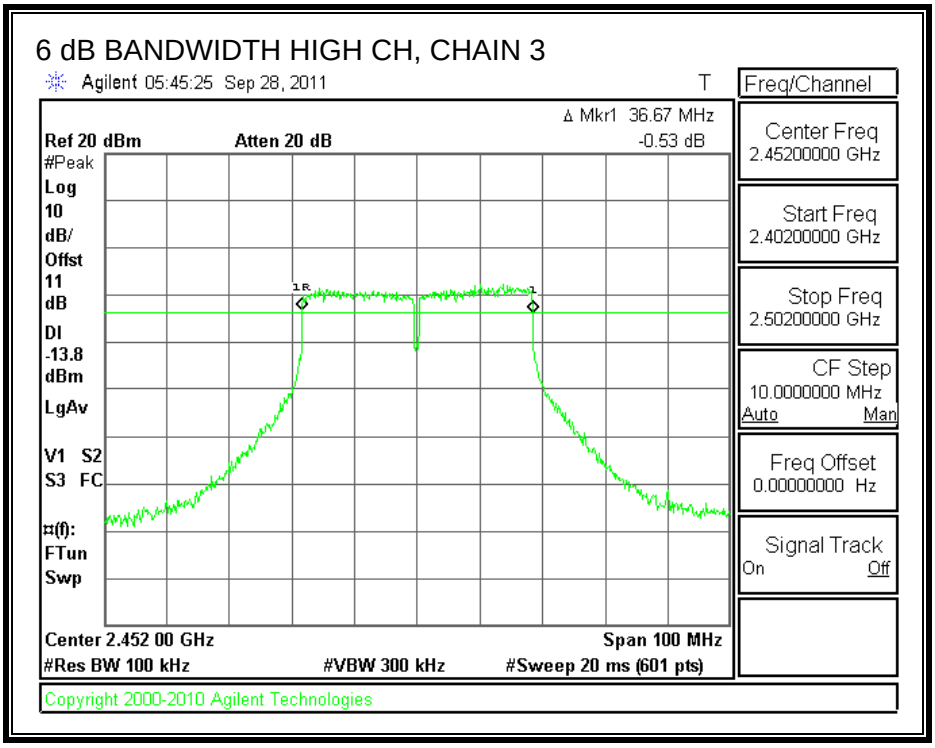




6 dB BANDWIDTH, CHAIN 3







7.5.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

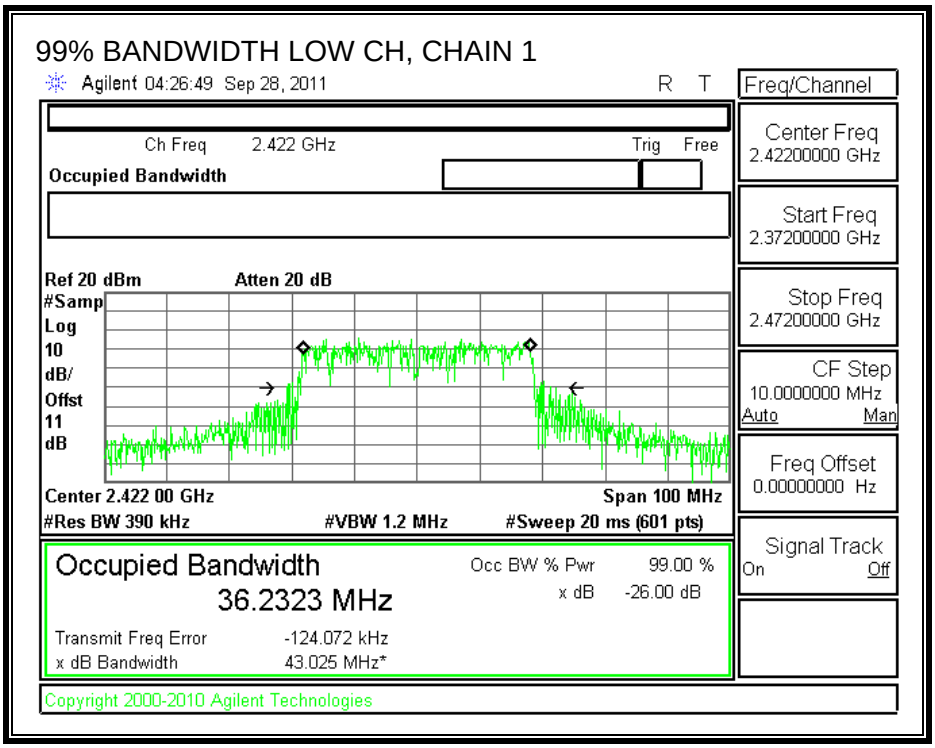
TEST PROCEDURE

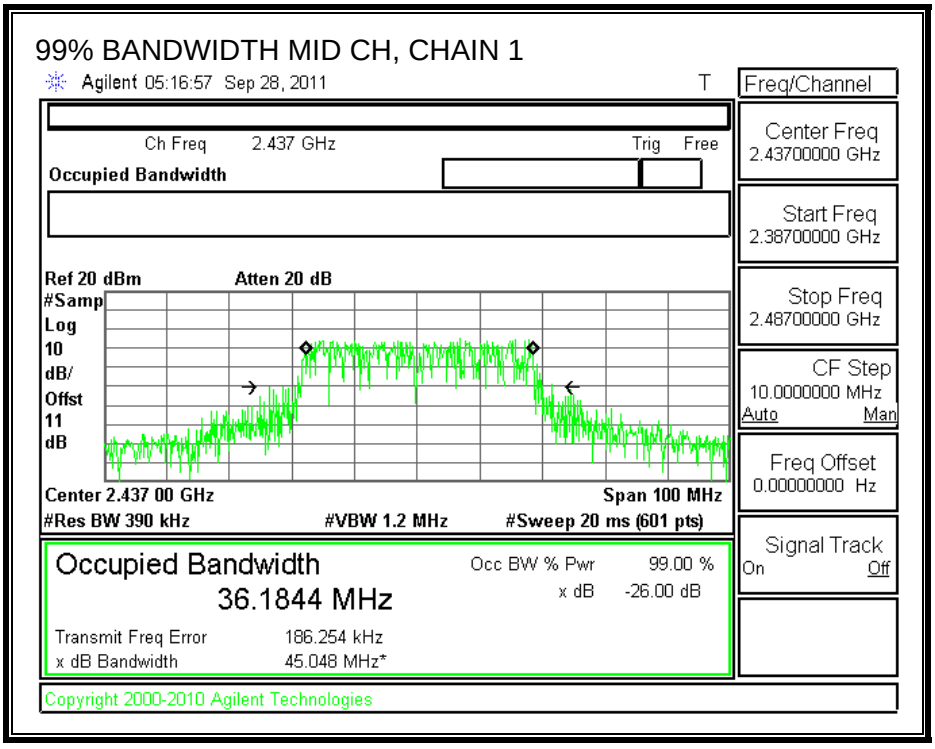
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

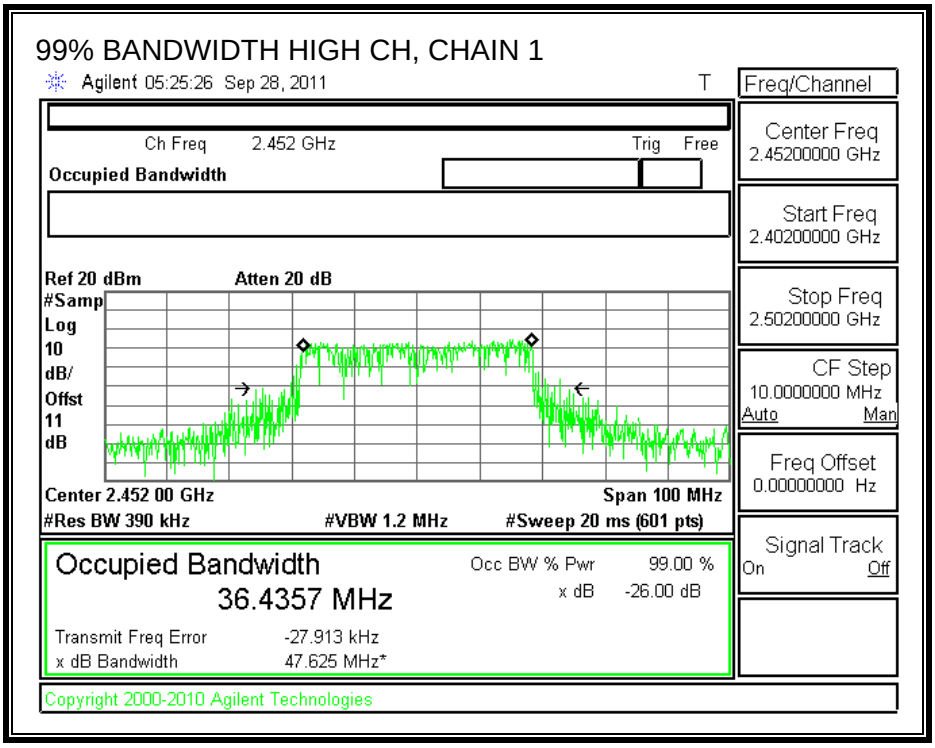
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)	Chain 3 99% Bandwidth (MHz)
Low	2422	36.2323	35.8994	35.9764
Middle	2437	36.1844	36.2800	36.0062
High	2452	36.4357	36.3648	36.2871

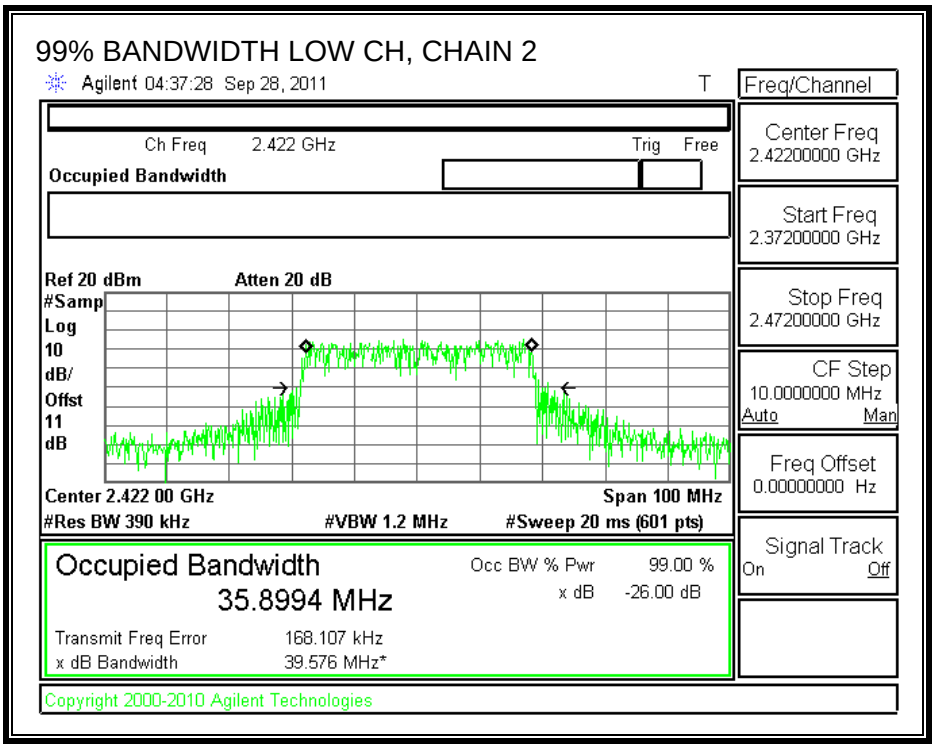
99% BANDWIDTH, CHAIN 1

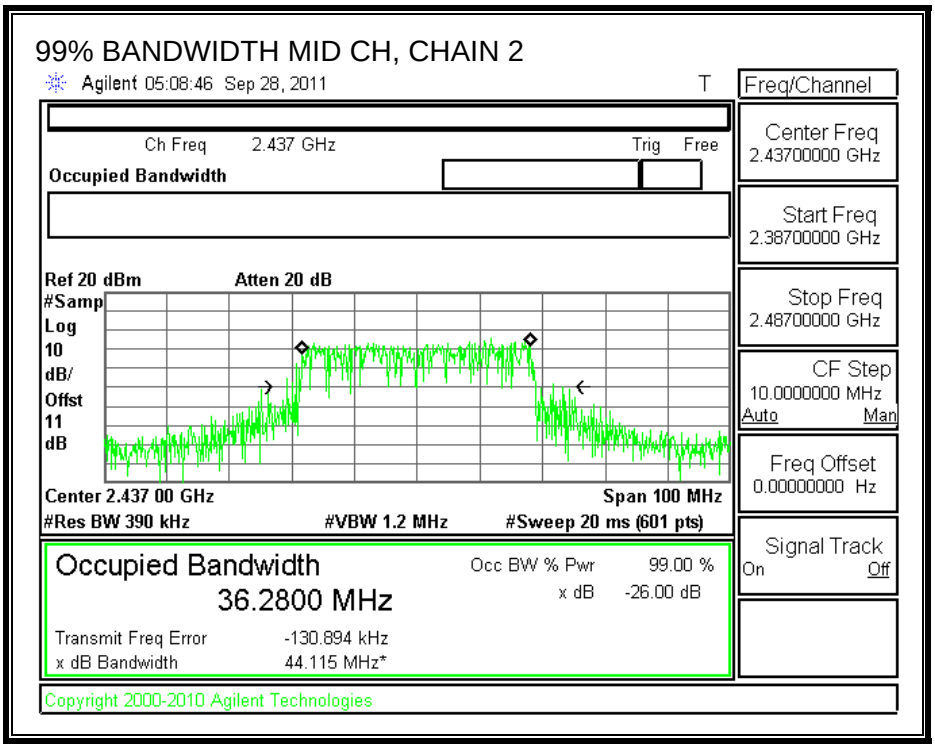


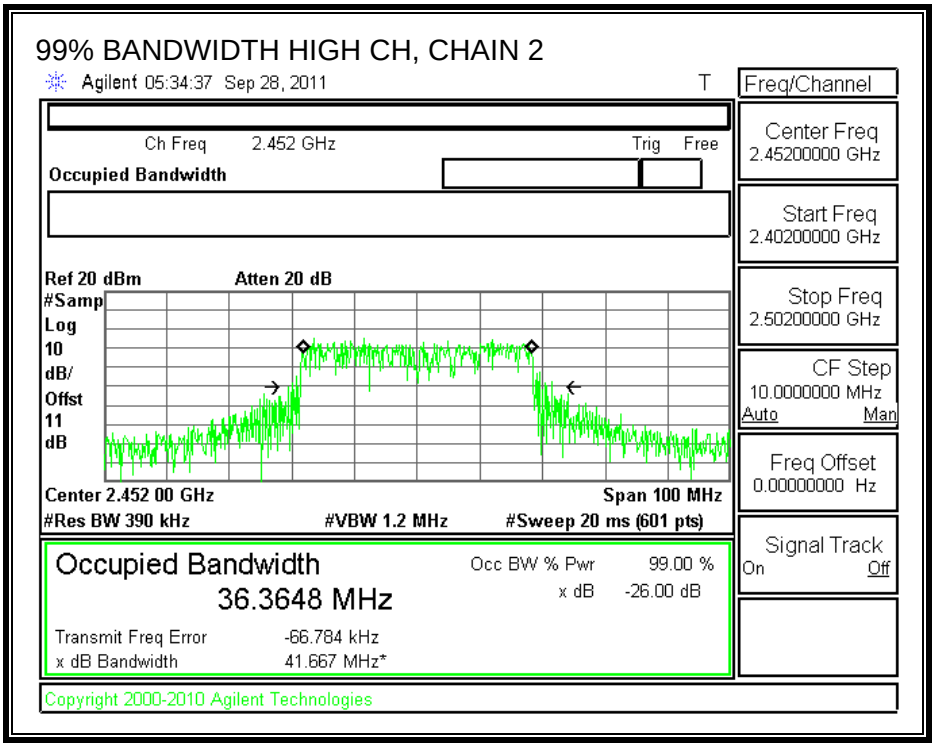




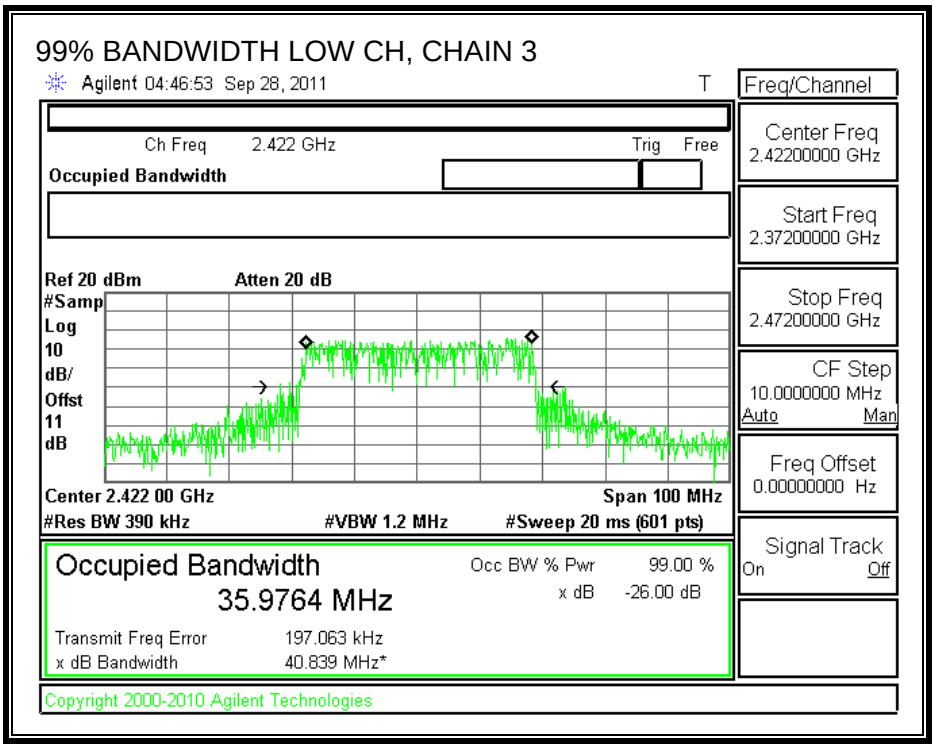
99% BANDWIDTH, CHAIN 2

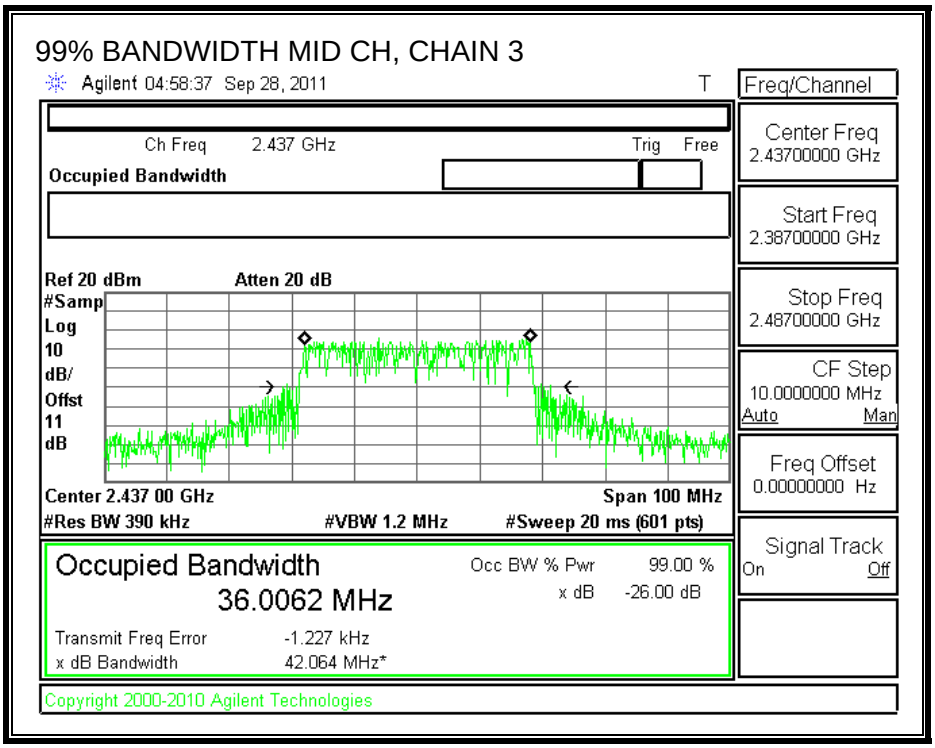


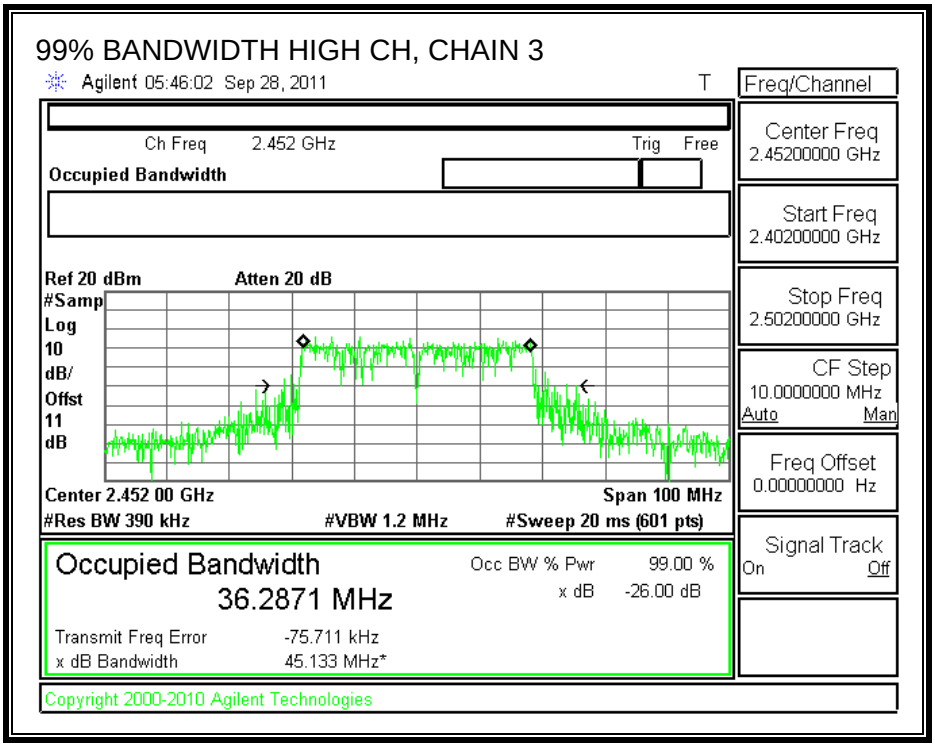




99% BANDWIDTH, CHAIN 3







7.5.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
4	4.77	8.77

The maximum effective legacy gain is 8.77 dBi for other than fixed, point-to-point operations, therefore the limit is 27.23 dBm.

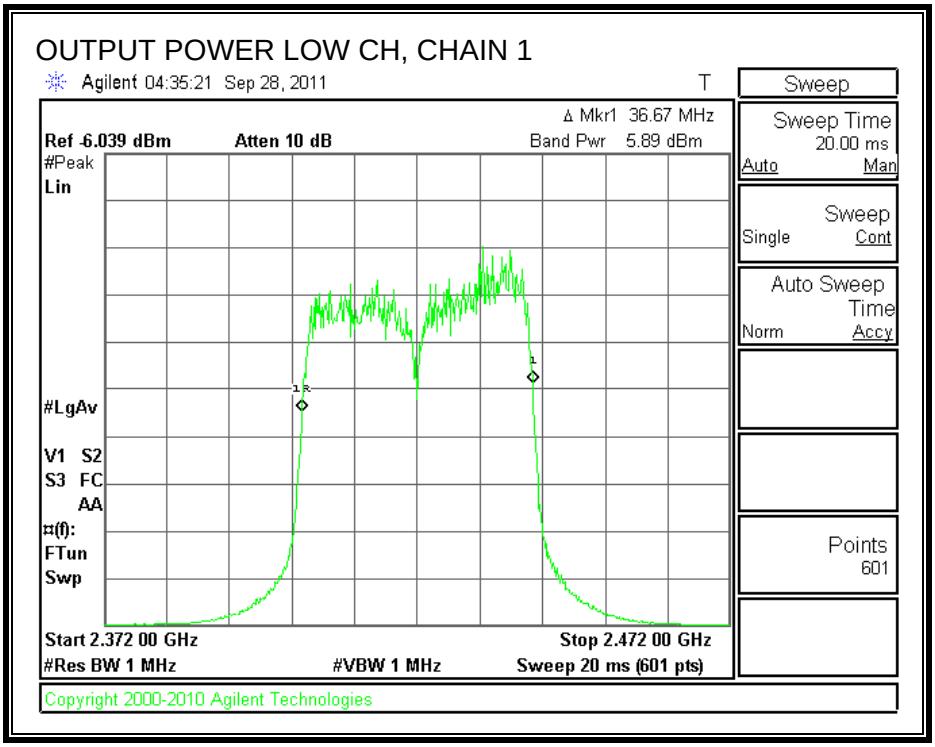
TEST PROCEDURE

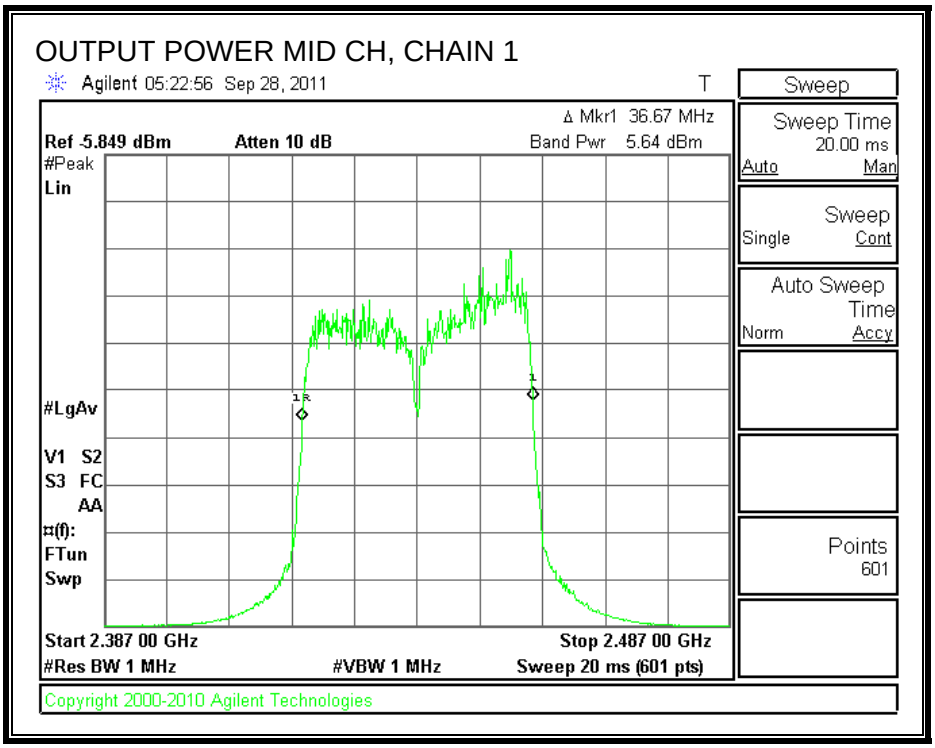
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

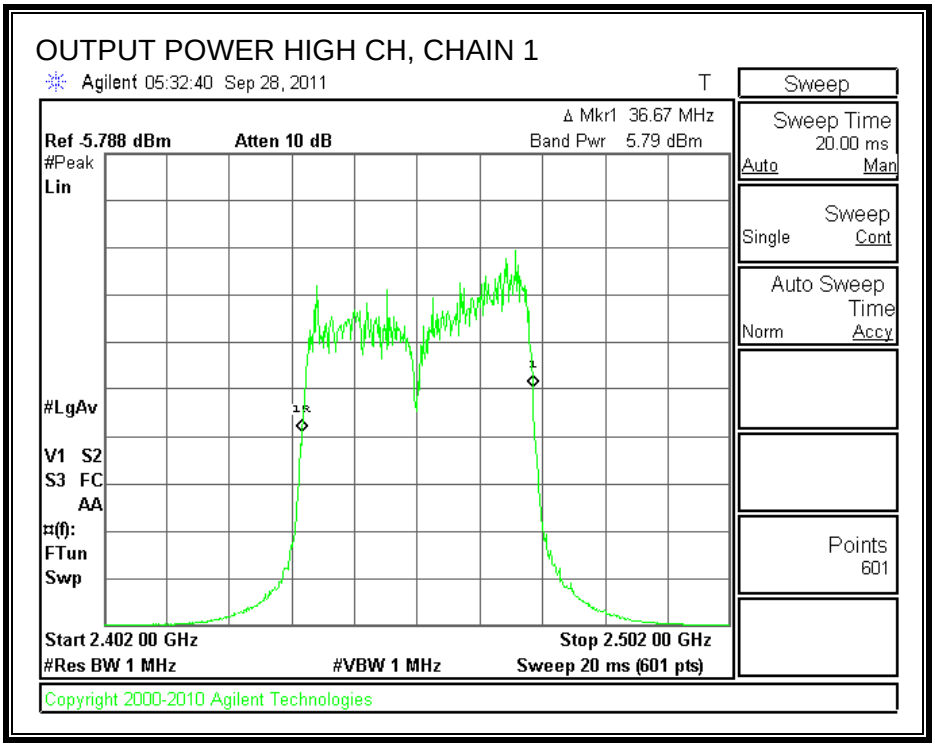
RESULTS

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	5.89	5.79	6.82	11.00	21.96	27.23	-5.27
Mid	2437	5.64	5.42	6.75	11.00	21.75	27.23	-5.48
High	2452	5.79	5.53	6.52	11.00	21.74	27.23	-5.49

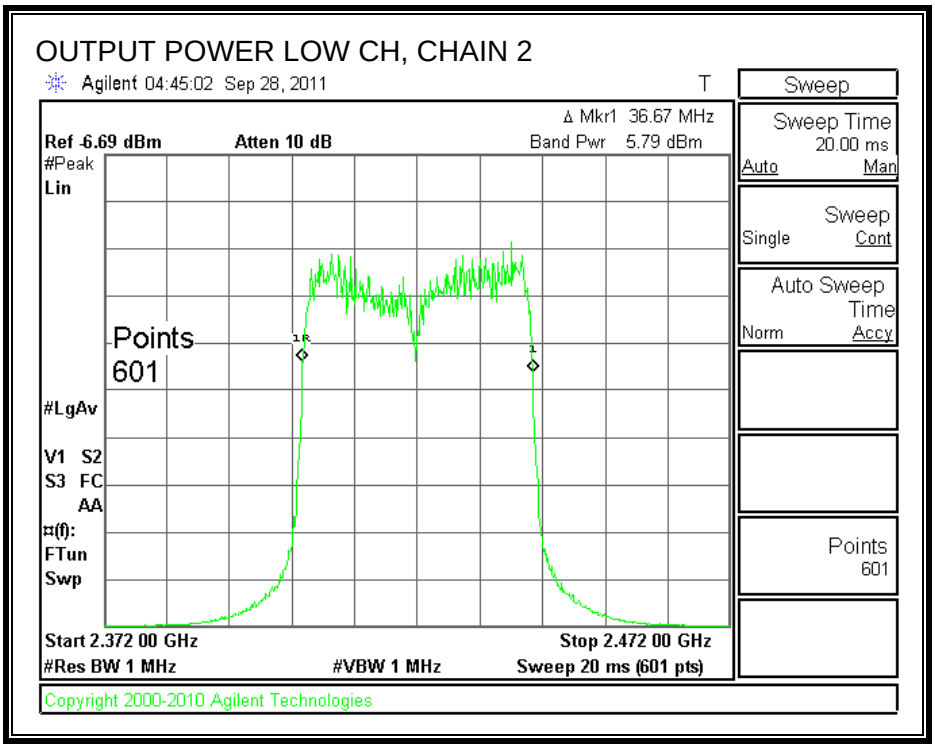
CHAIN 1 OUTPUT POWER

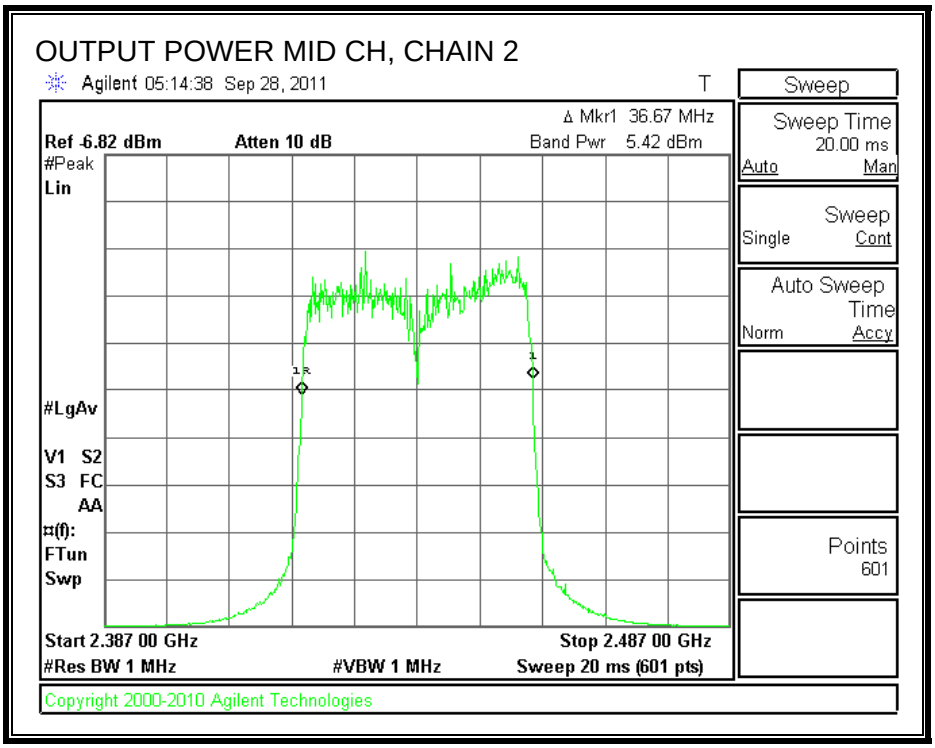


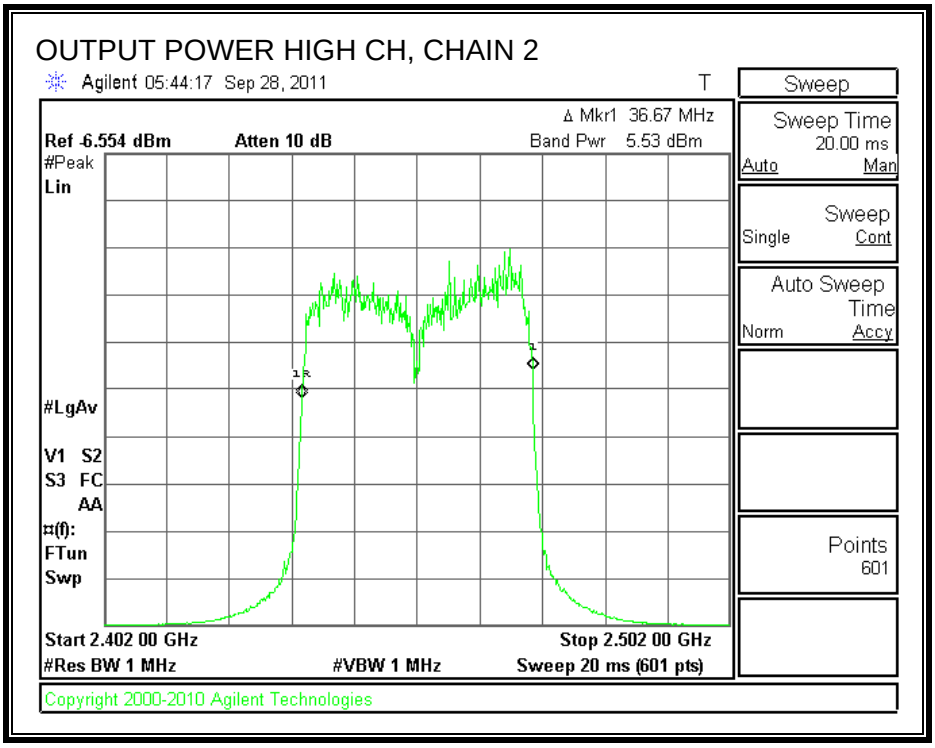




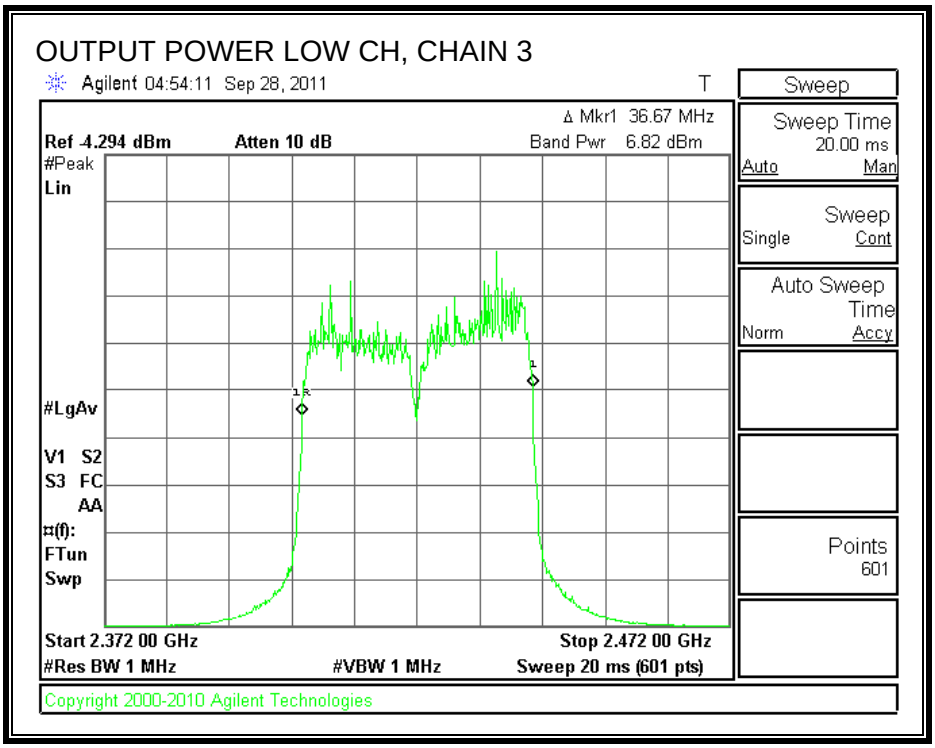
CHAIN 2 OUTPUT POWER

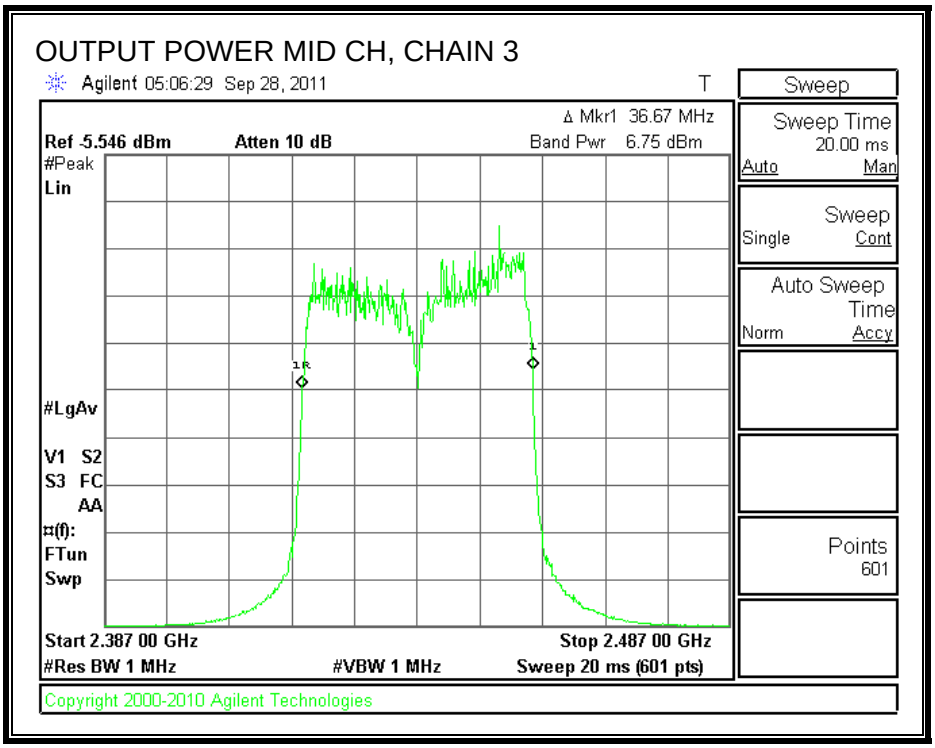


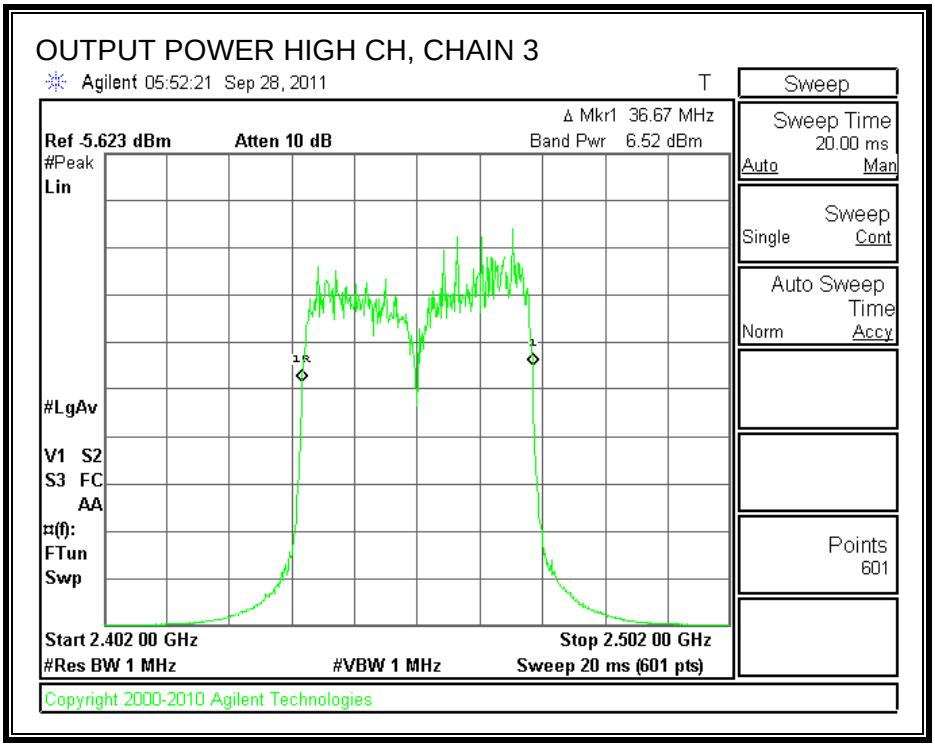




CHAIN 3 OUTPUT POWER







7.5.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1.0 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	2422	10.00	10.00	10.00	14.77
Middle	2437	10.00	10.00	10.00	14.77
High	2452	10.00	10.00	10.00	14.77

7.5.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

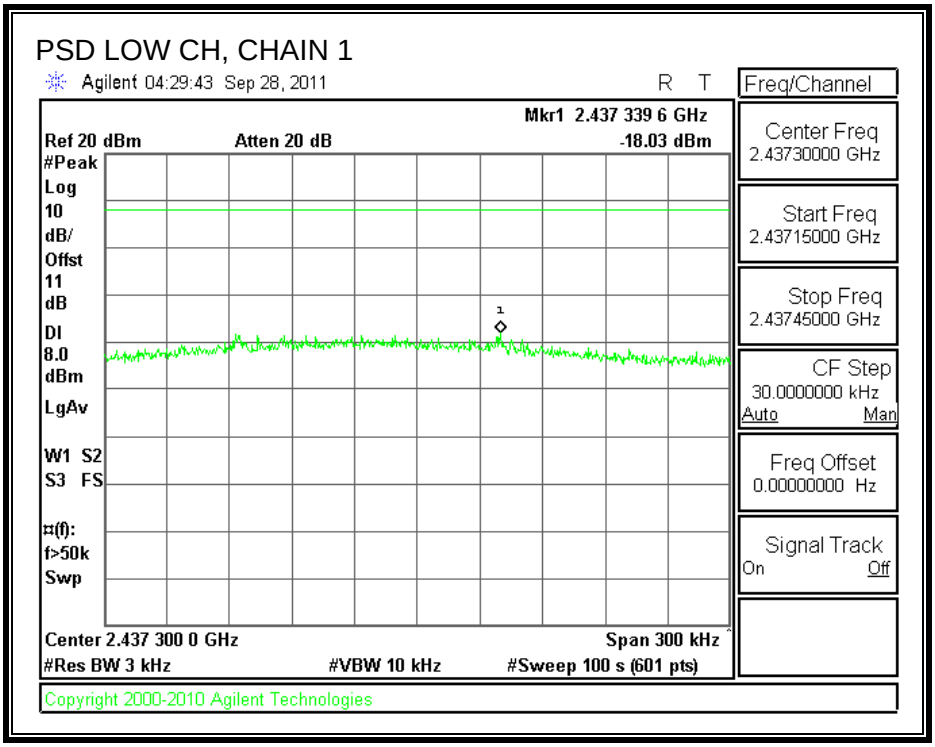
TEST PROCEDURE

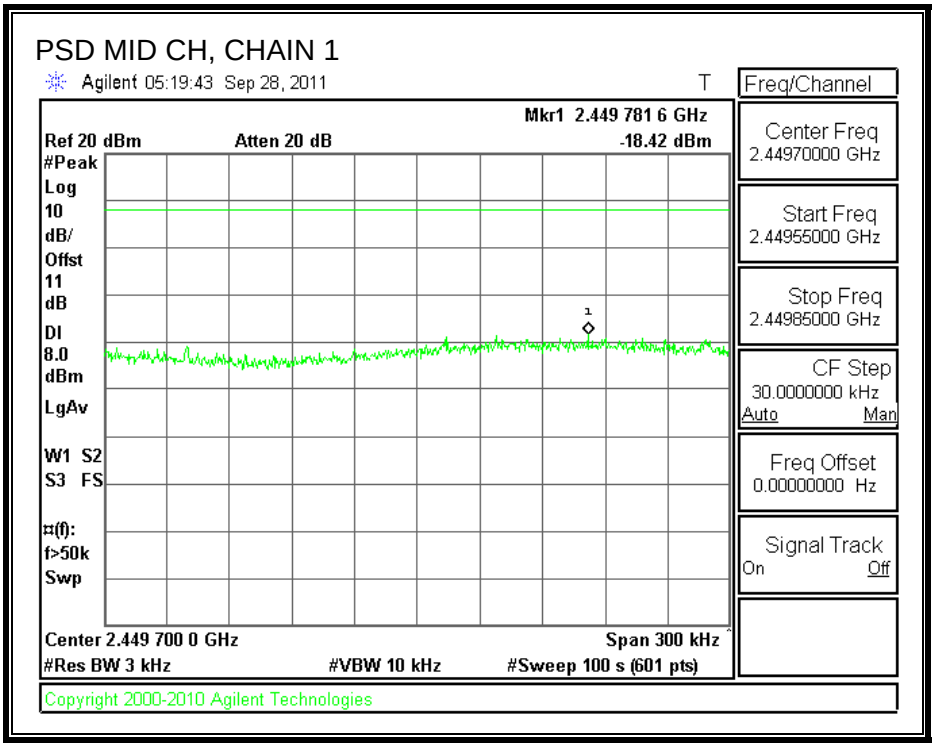
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

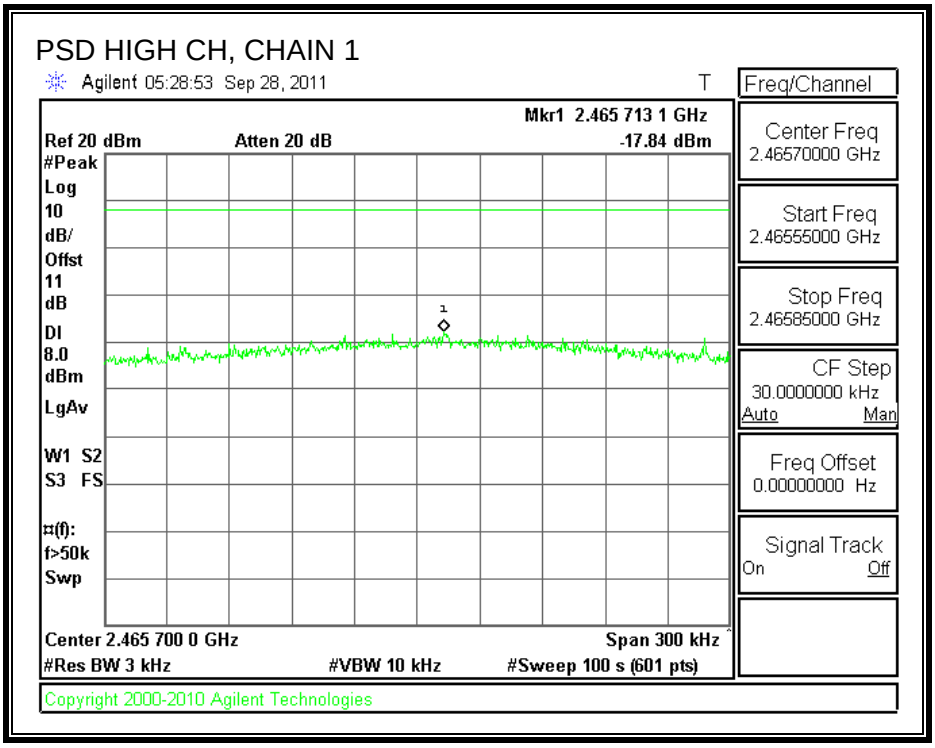
RESULTS

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-18.03	-17.83	-17.17	-12.89	8	-20.89
Middle	2437	-18.42	-19.41	-18.02	-13.81	8	-21.81
High	2452	-17.84	-18.90	-16.09	-12.68	8	-20.68

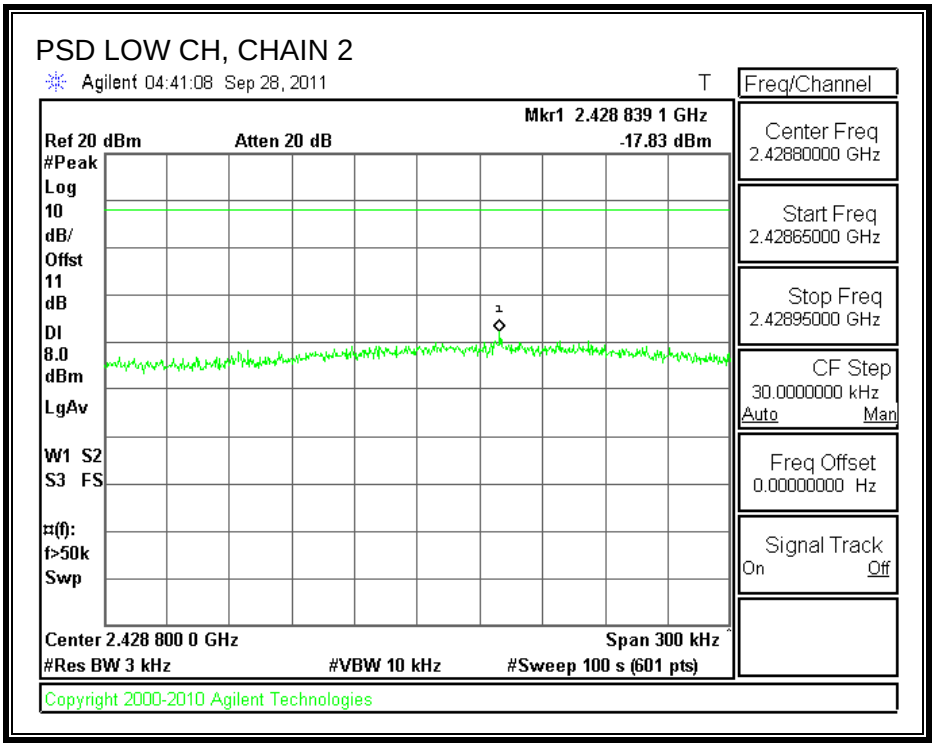
POWER SPECTRAL DENSITY, CHAIN 1

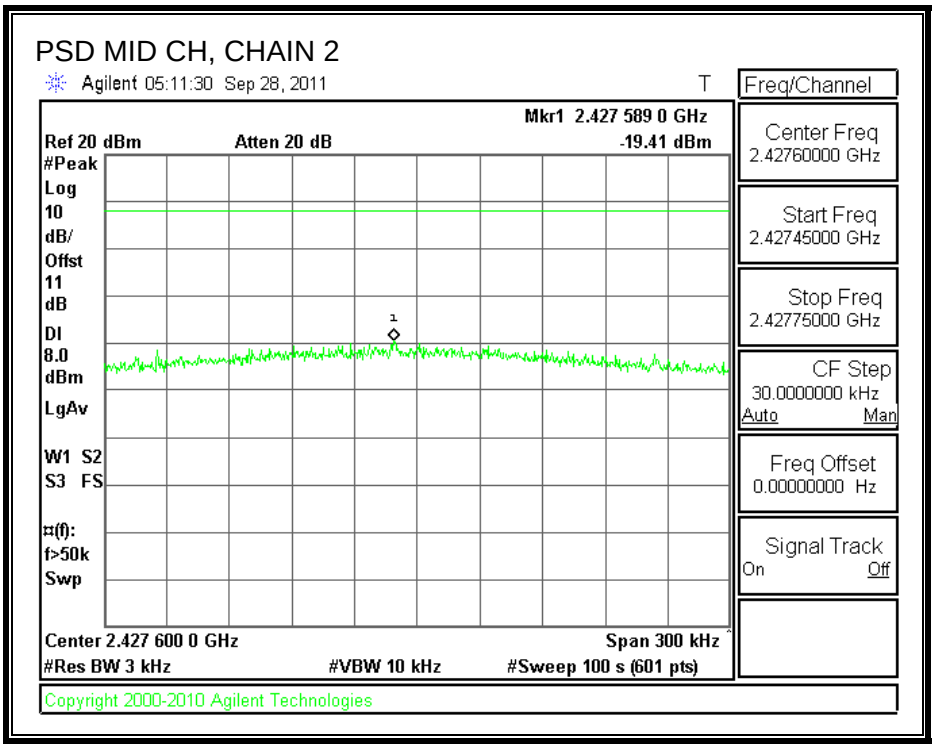


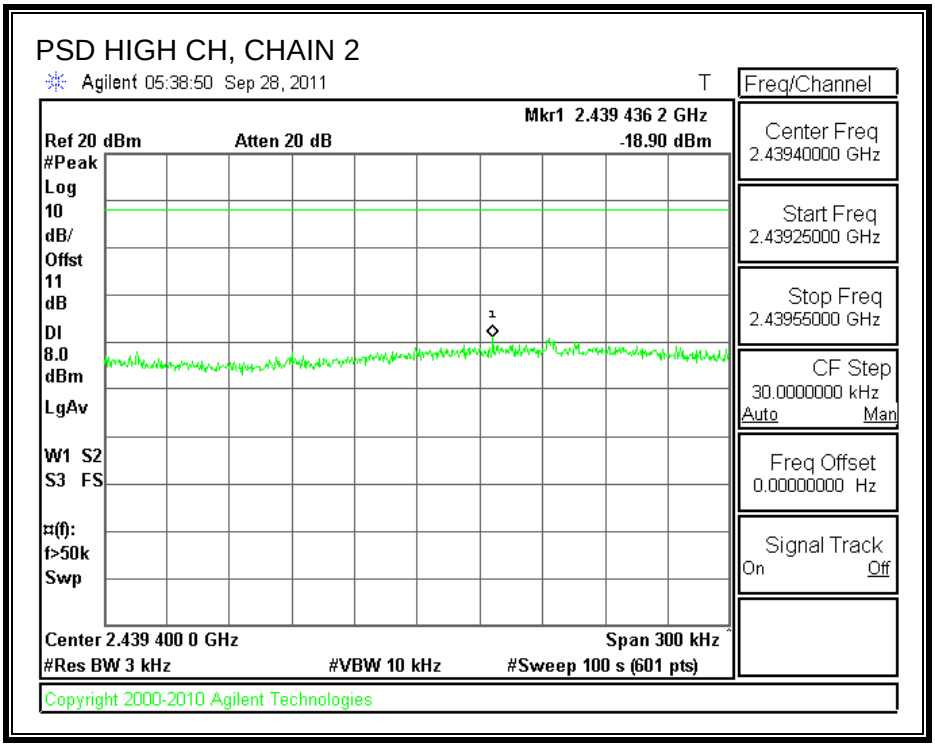




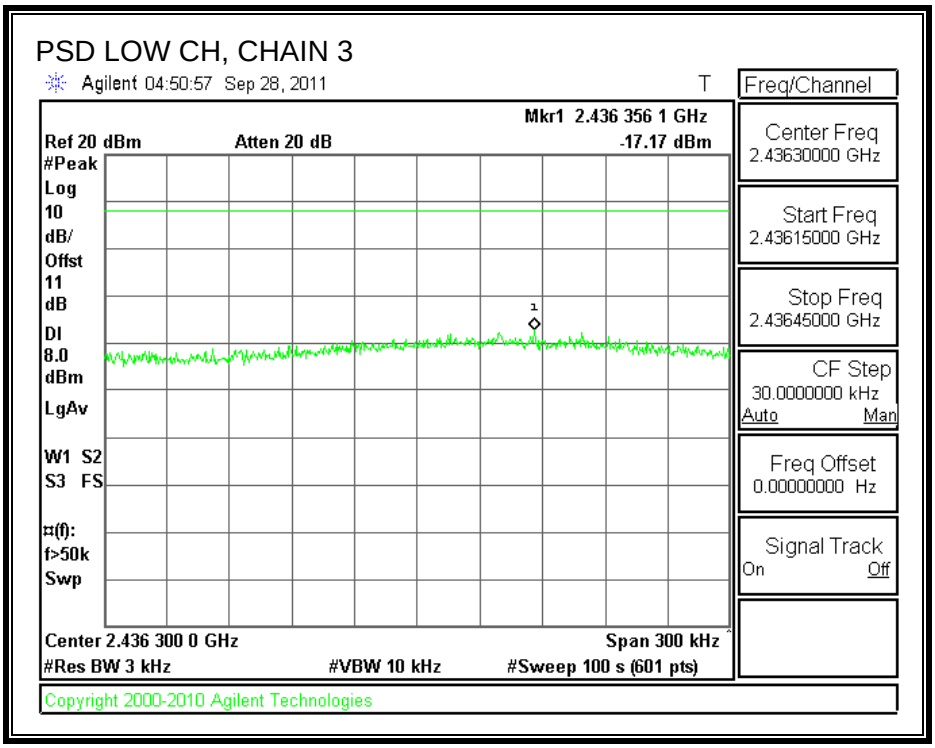
POWER SPECTRAL DENSITY, CHAIN 2

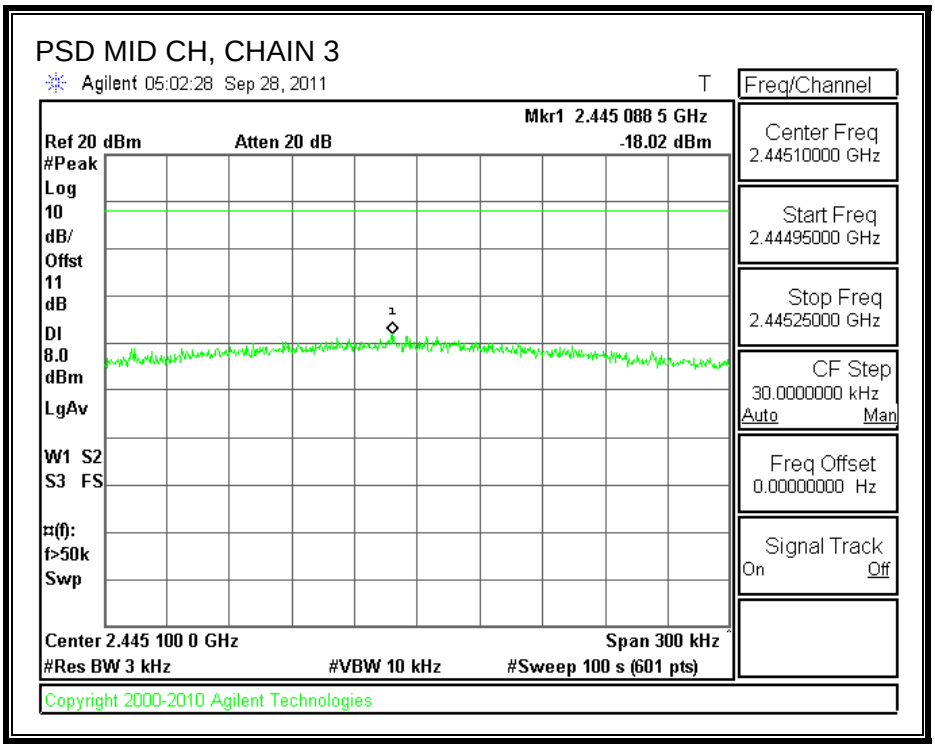


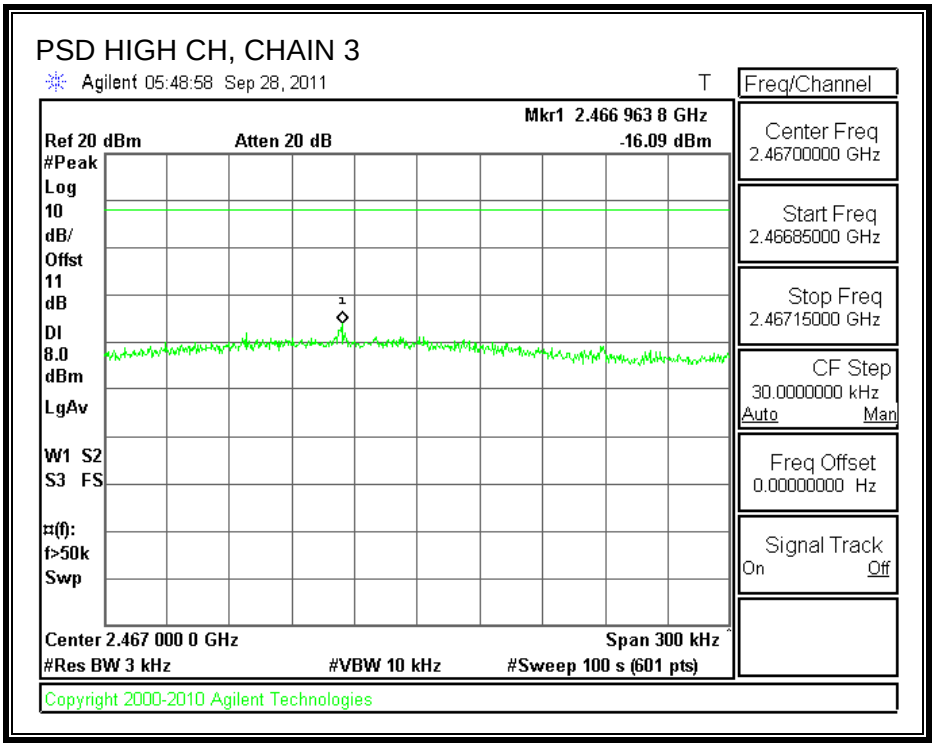




POWER SPECTRAL DENSITY, CHAIN 3







7.5.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

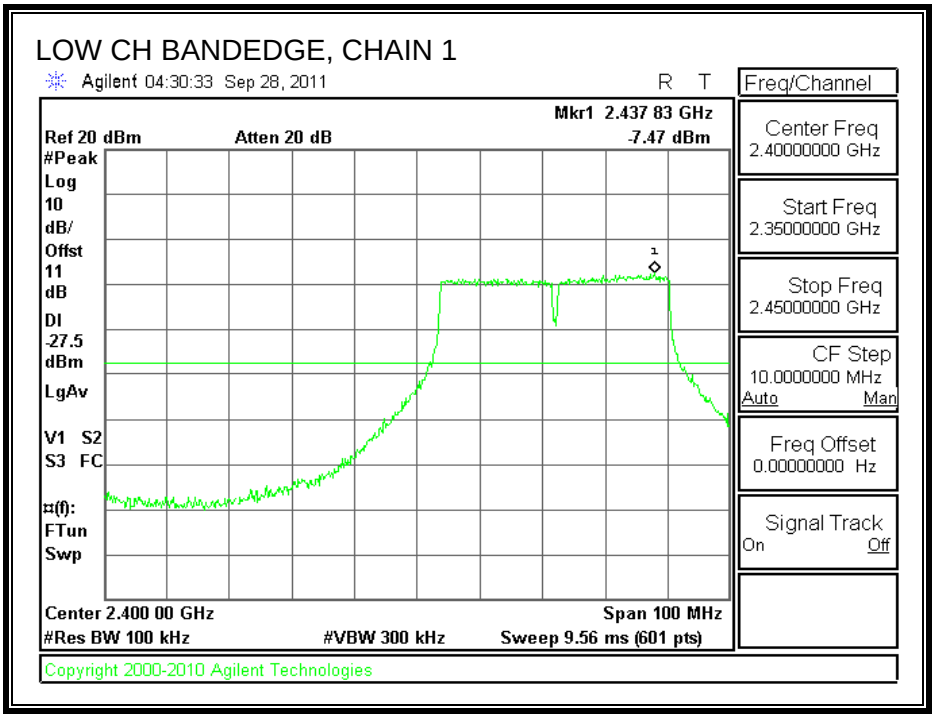
TEST PROCEDURE

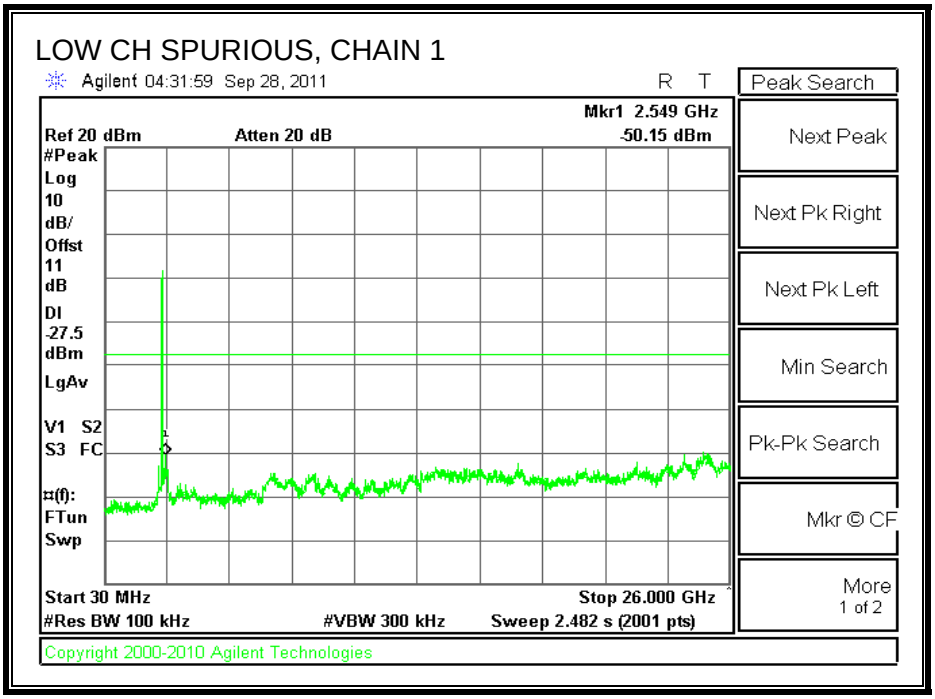
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

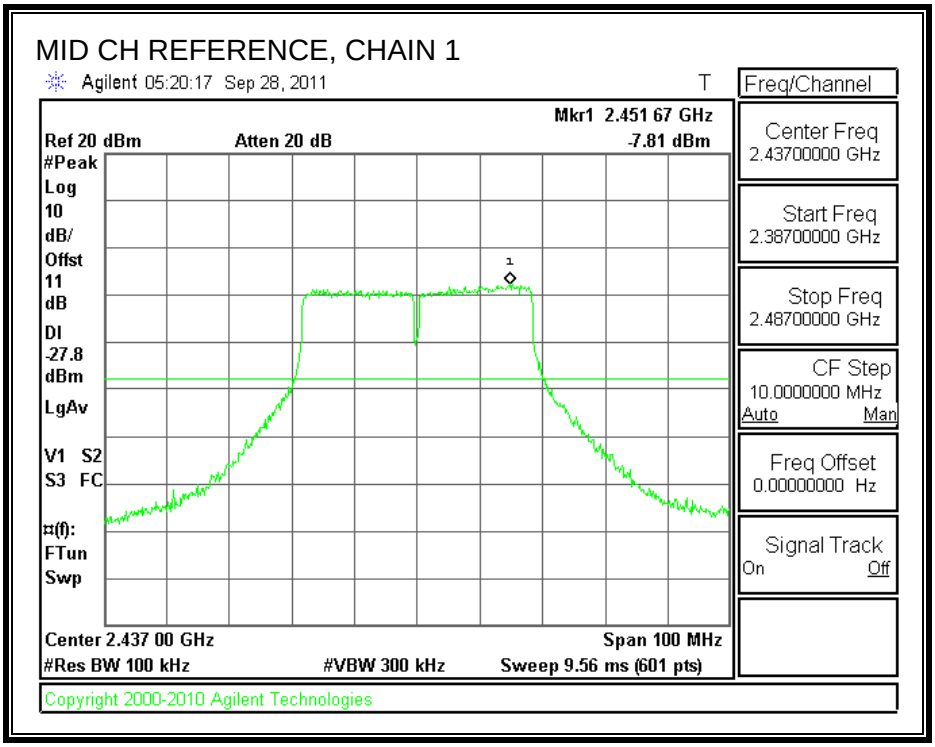
RESULTS

CHAIN 1 SPURIOUS EMISSIONS

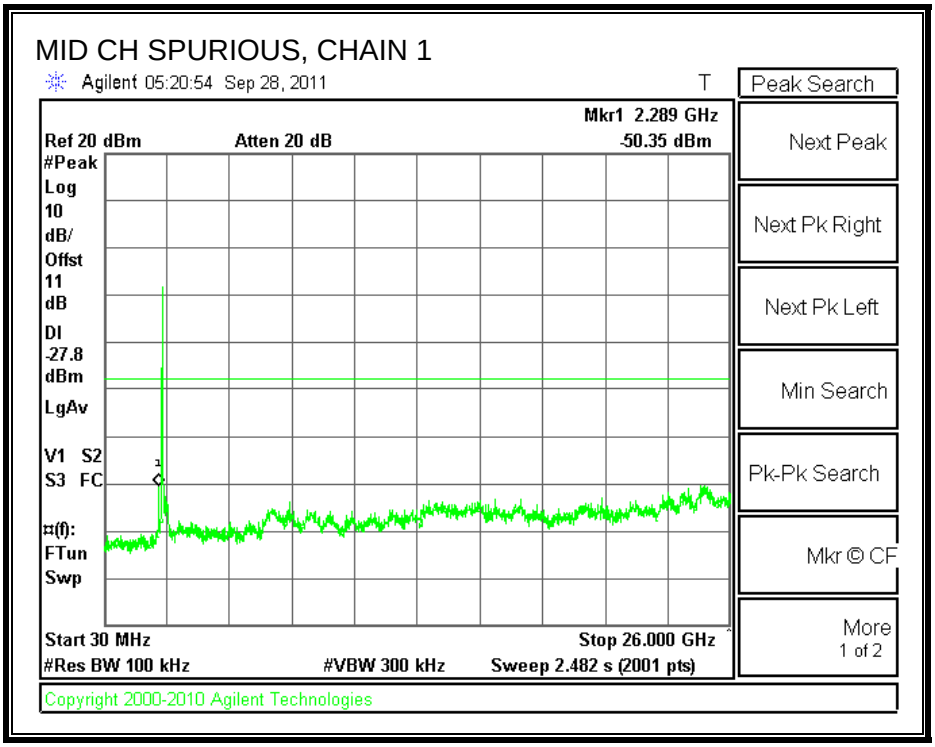




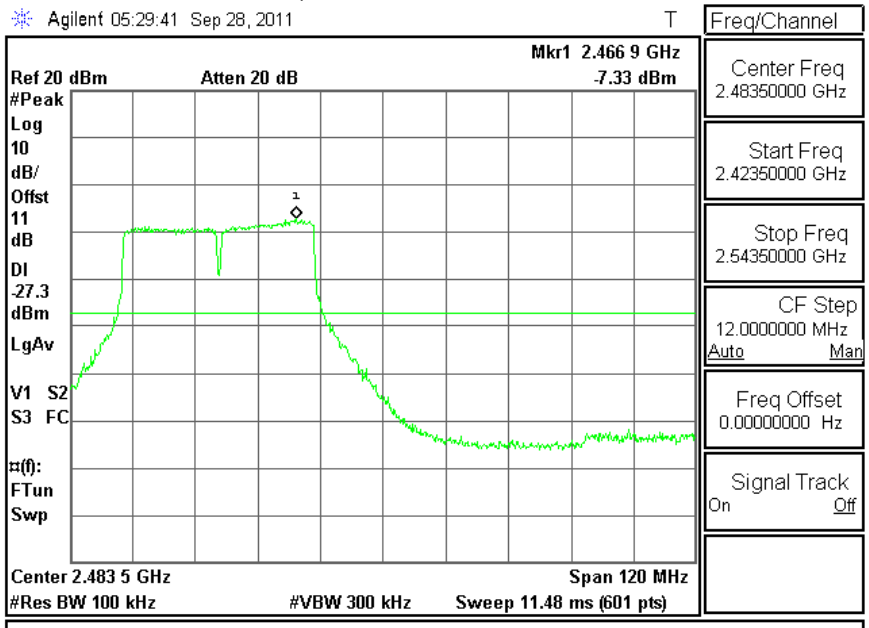
MID CH REFERENCE, CHAIN 1



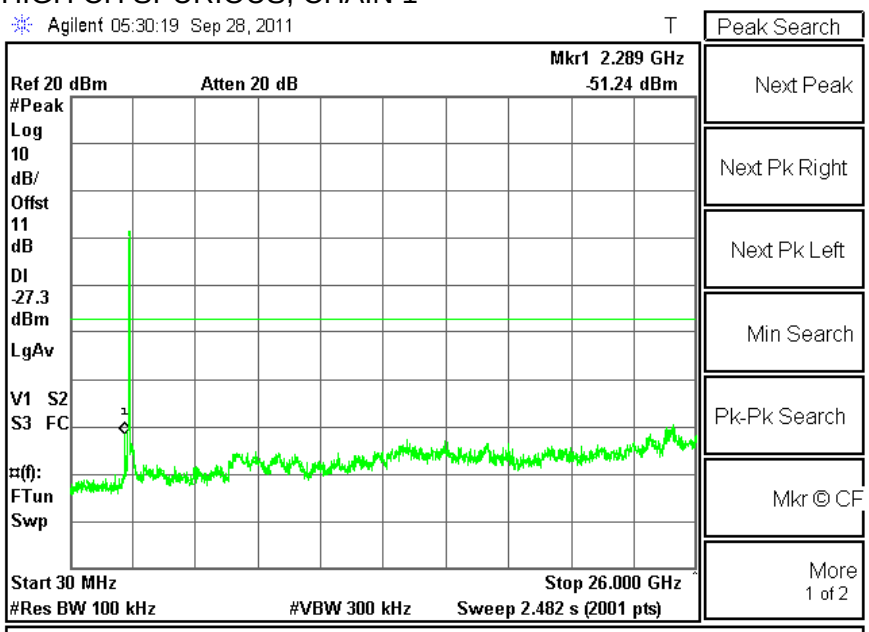
MID CH SPURIOUS, CHAIN 1



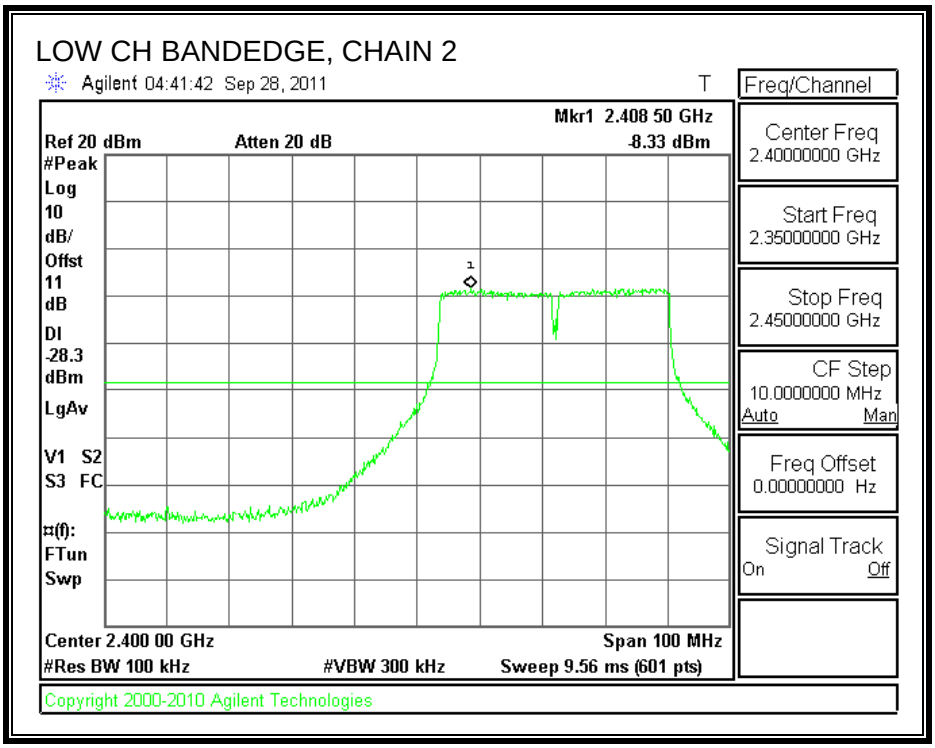
HIGH CH BANDEDGE, CHAIN 1

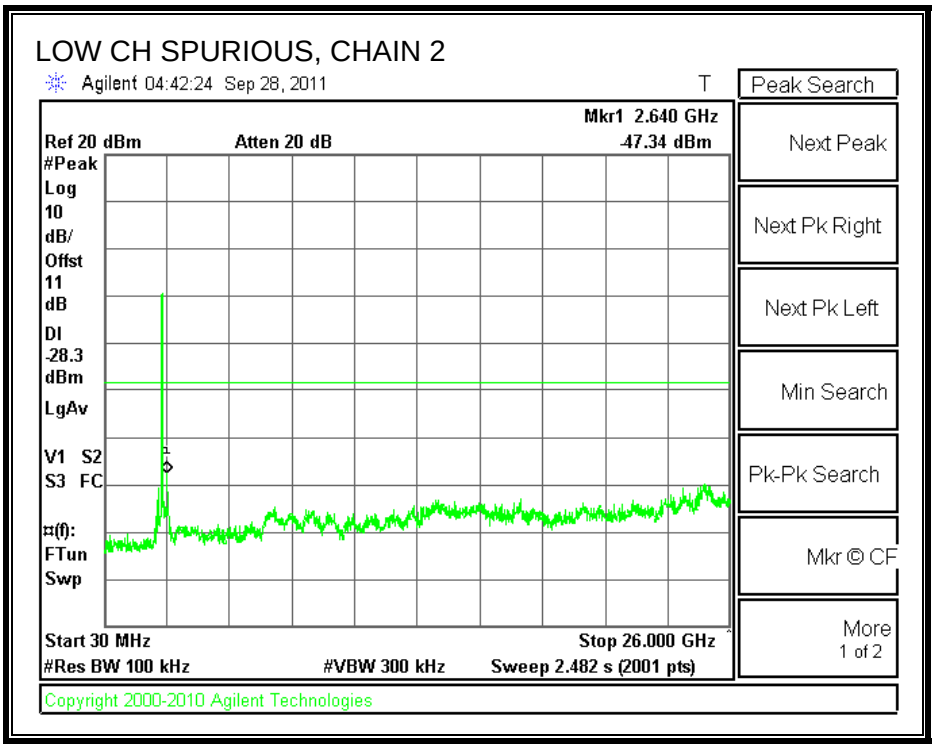


HIGH CH SPURIOUS, CHAIN 1

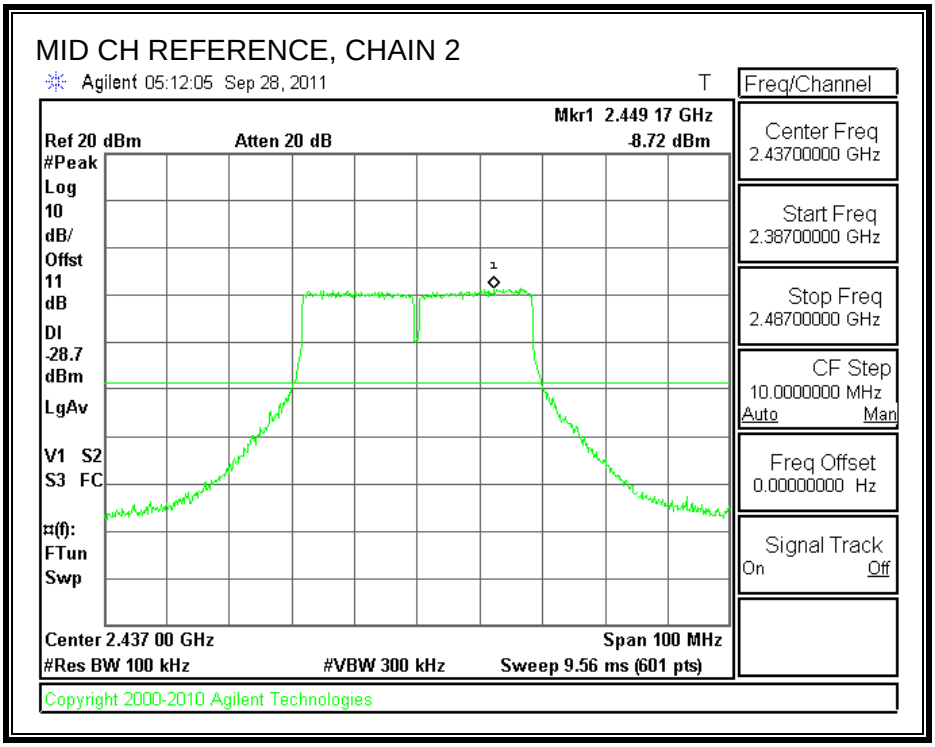


CHAIN 2 SPURIOUS EMISSIONS

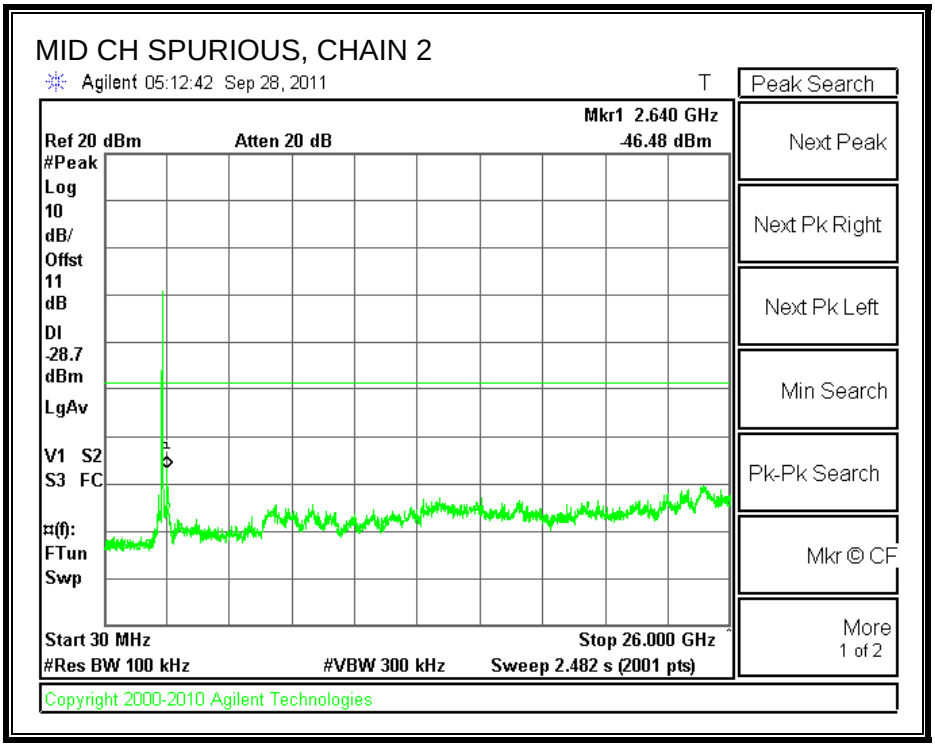




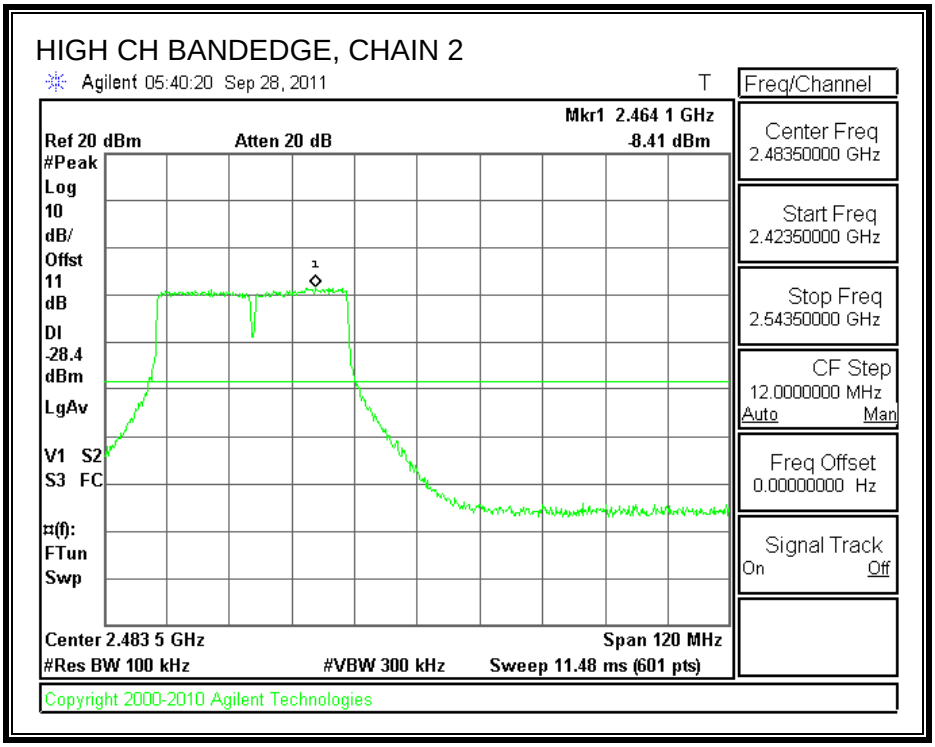
MID CH REFERENCE, CHAIN 2



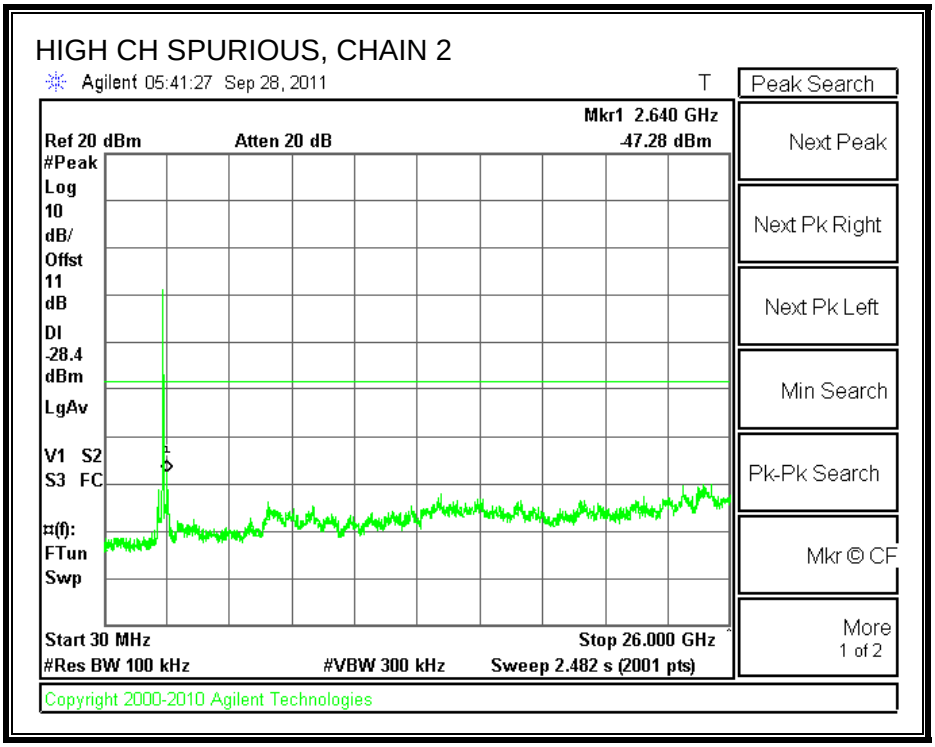
MID CH SPURIOUS, CHAIN 2



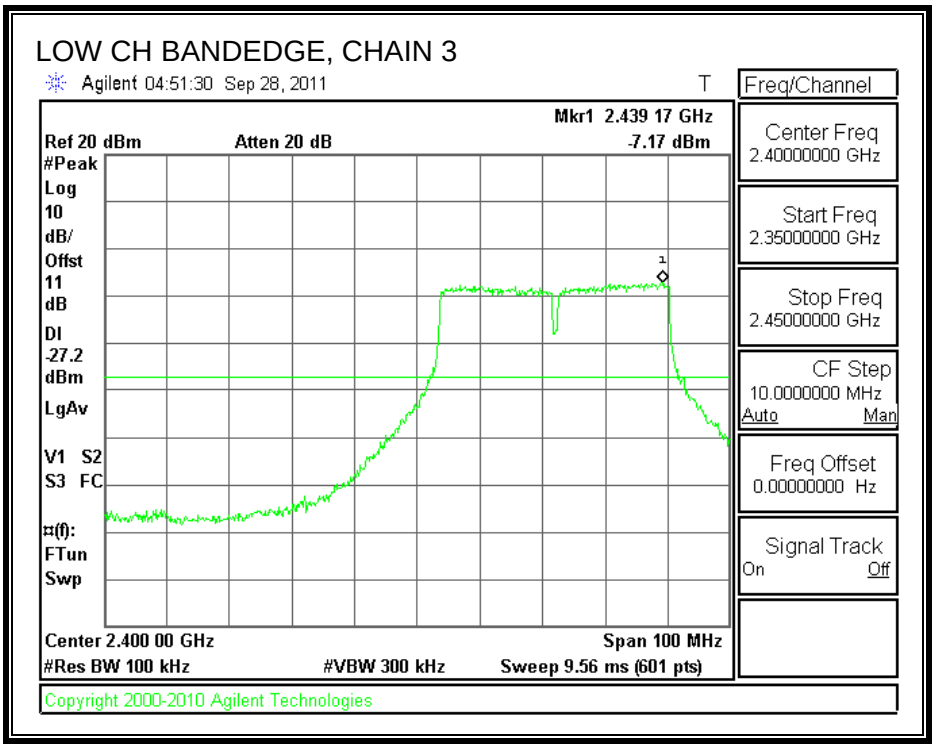
HIGH CH BANDEDGE, CHAIN 2

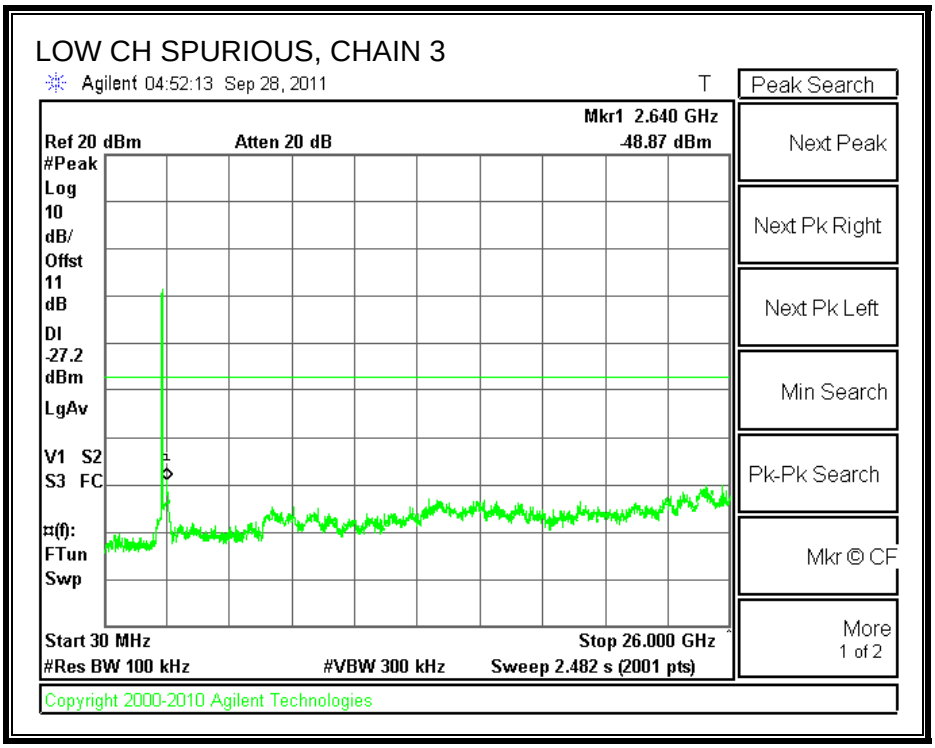


HIGH CH SPURIOUS, CHAIN 2

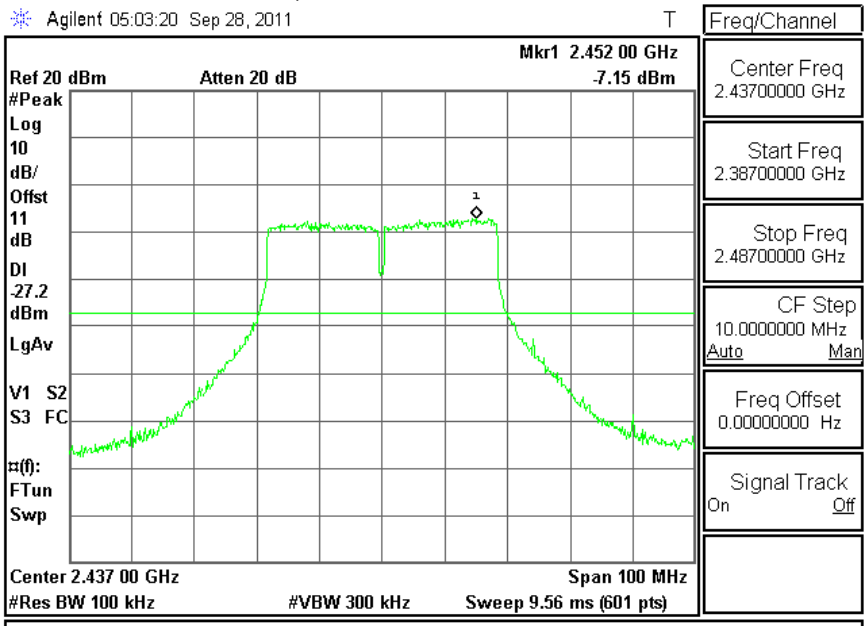


CHAIN 3 SPURIOUS EMISSIONS

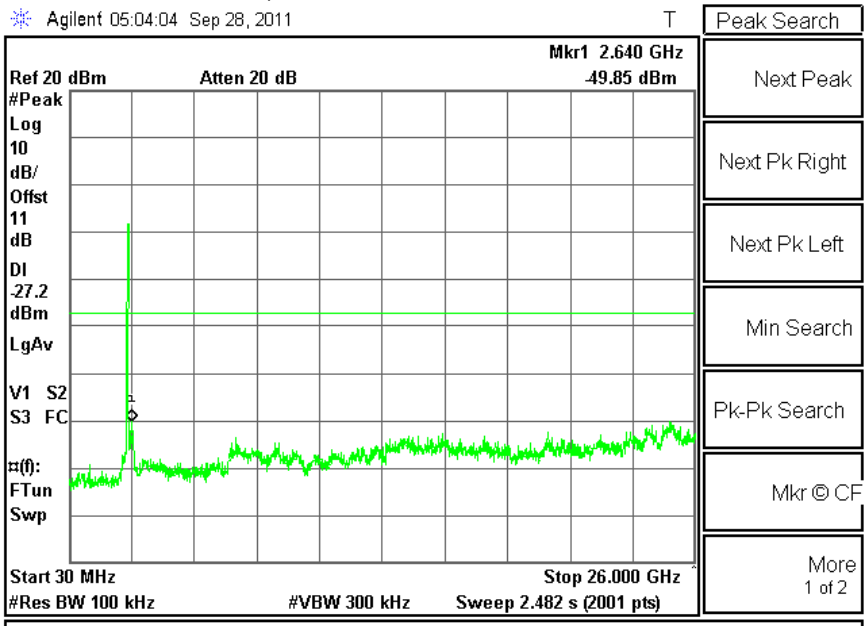




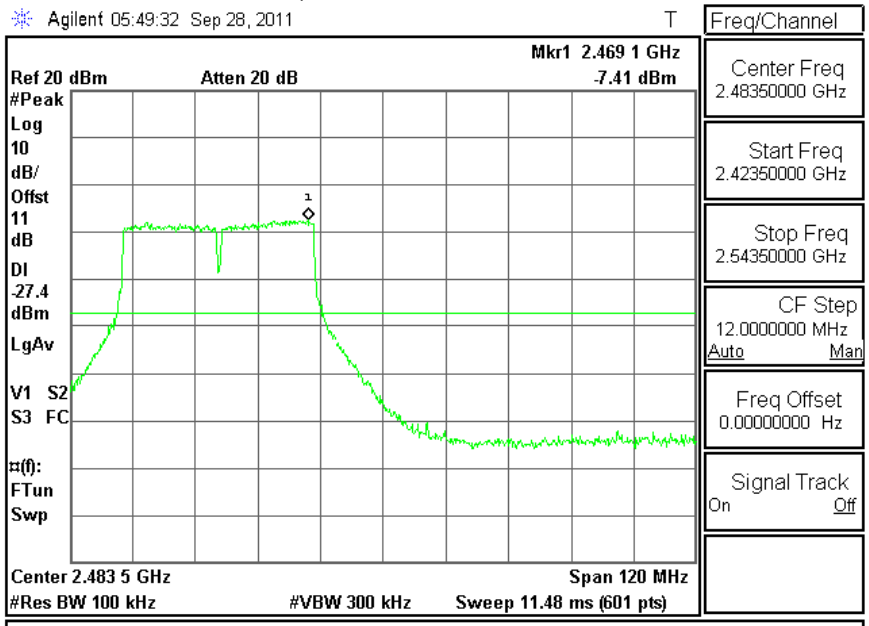
MID CH REFERENCE, CHAIN 3



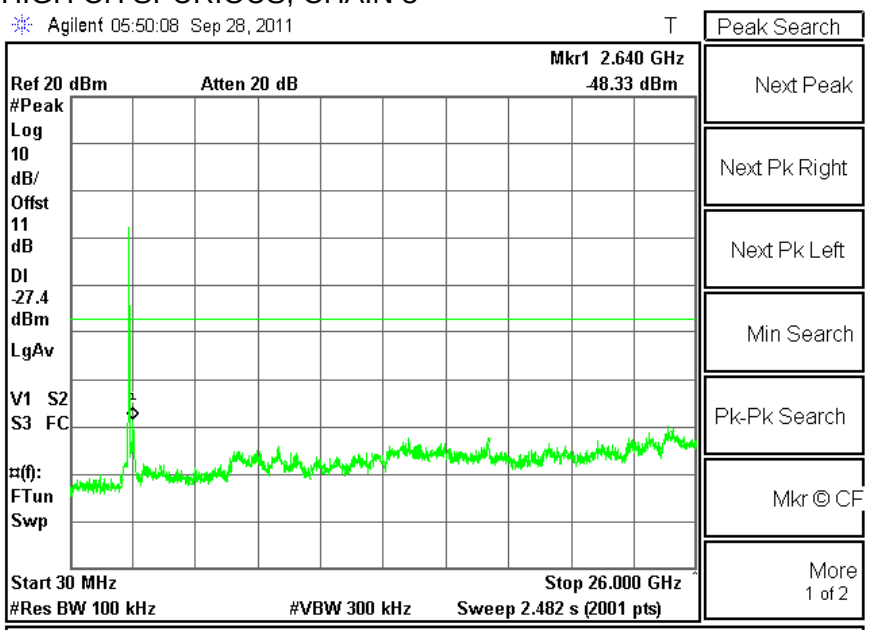
MID CH SPURIOUS, CHAIN 3



HIGH CH BANDEDGE, CHAIN 3



HIGH CH SPURIOUS, CHAIN 3



7.6. 802.11n HT40 MCS8 3TX MODE IN THE 2.4 GHz BAND

7.6.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

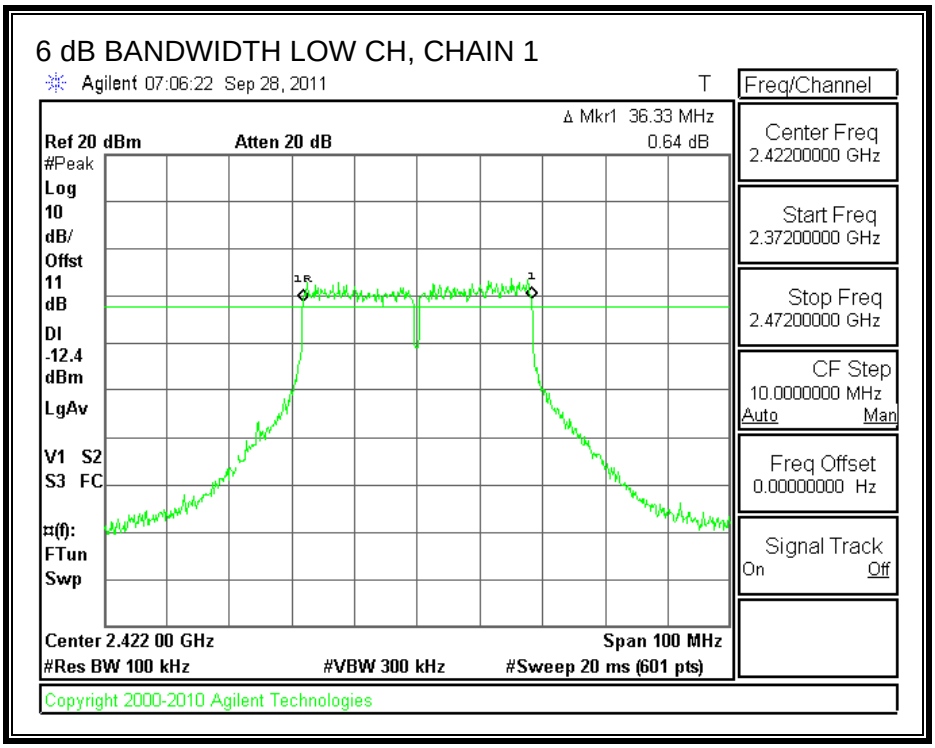
TEST PROCEDURE

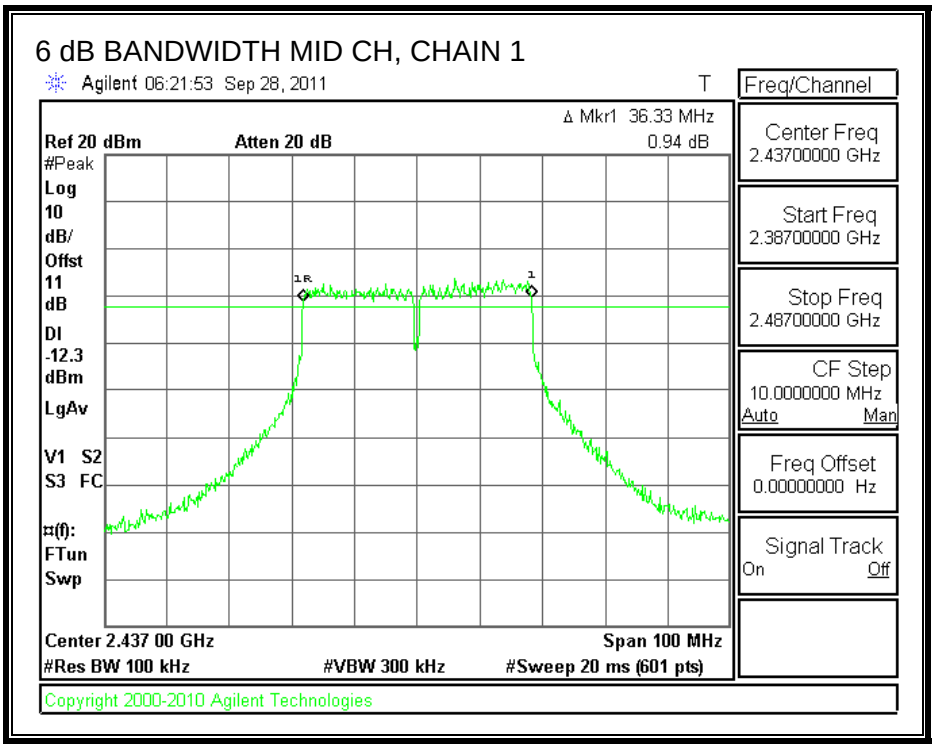
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

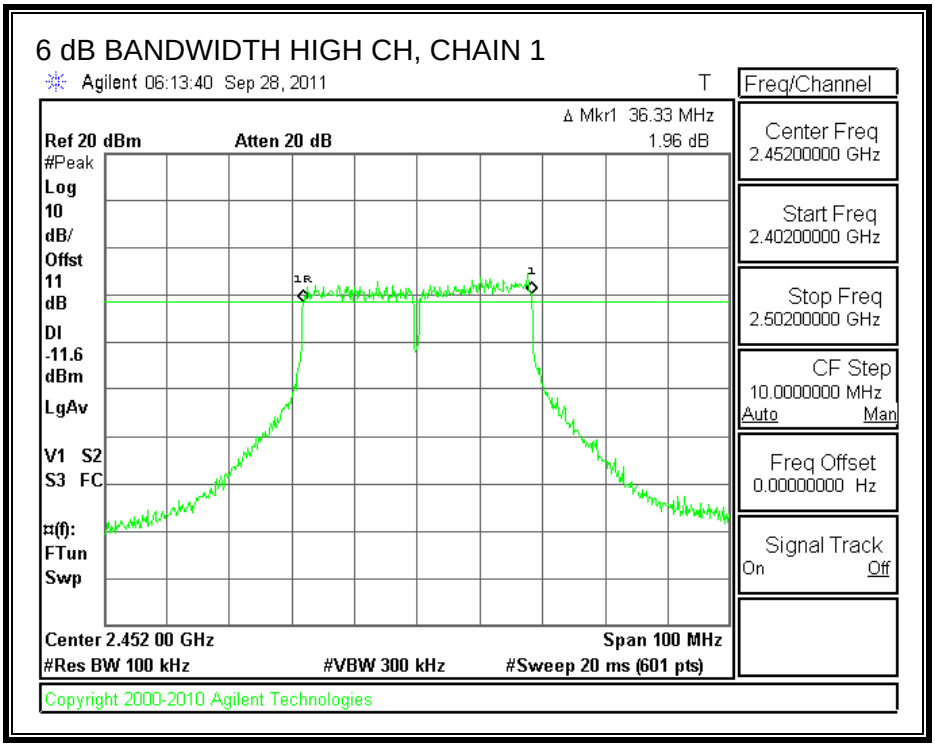
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Chain 3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2422	36.33	36.67	36.67	0.5
Middle	2437	36.33	36.67	36.67	0.5
High	2452	36.33	36.67	36.67	0.5

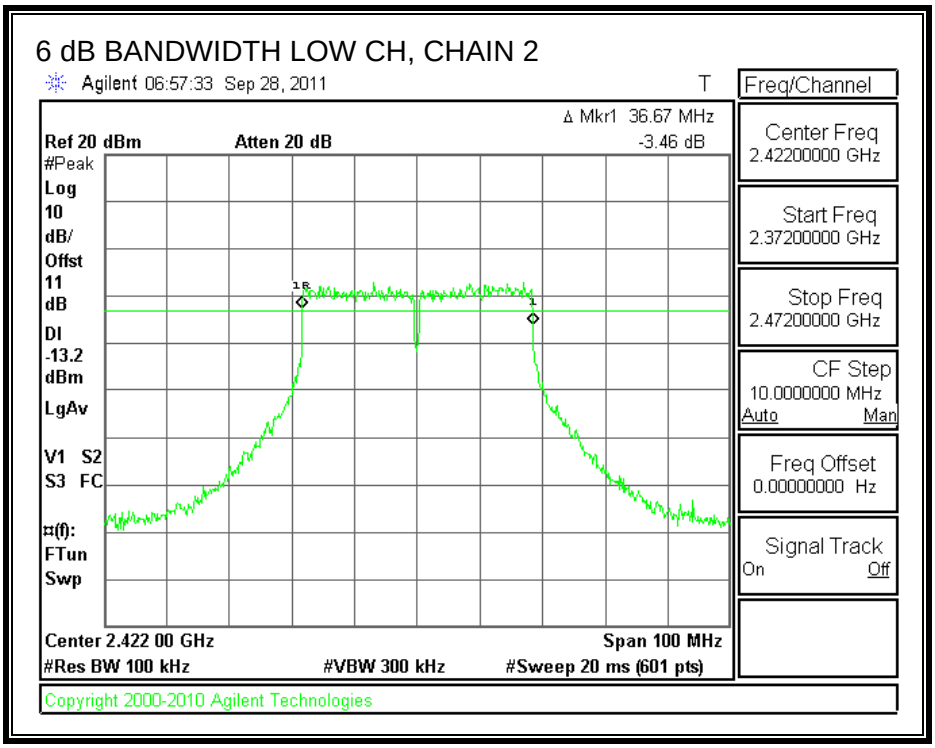
6 dB BANDWIDTH, CHAIN 1

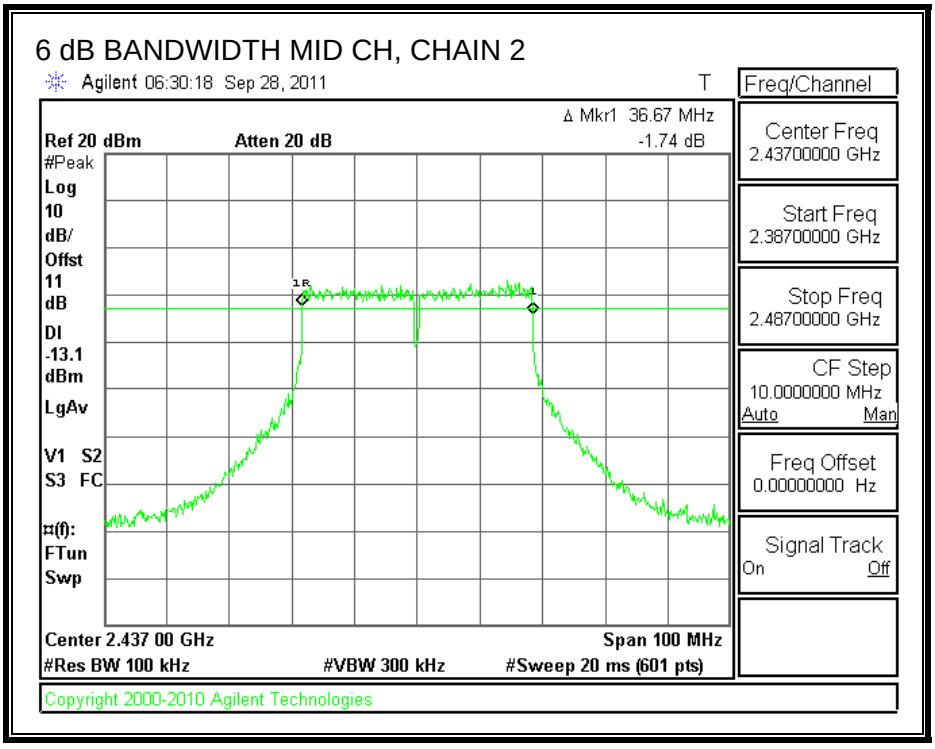


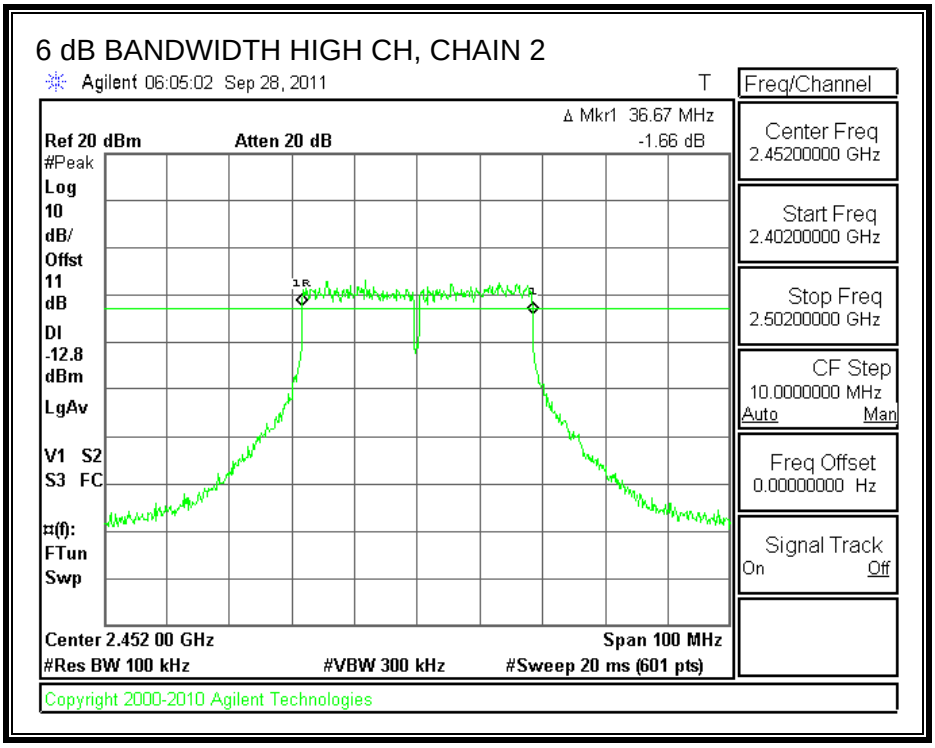




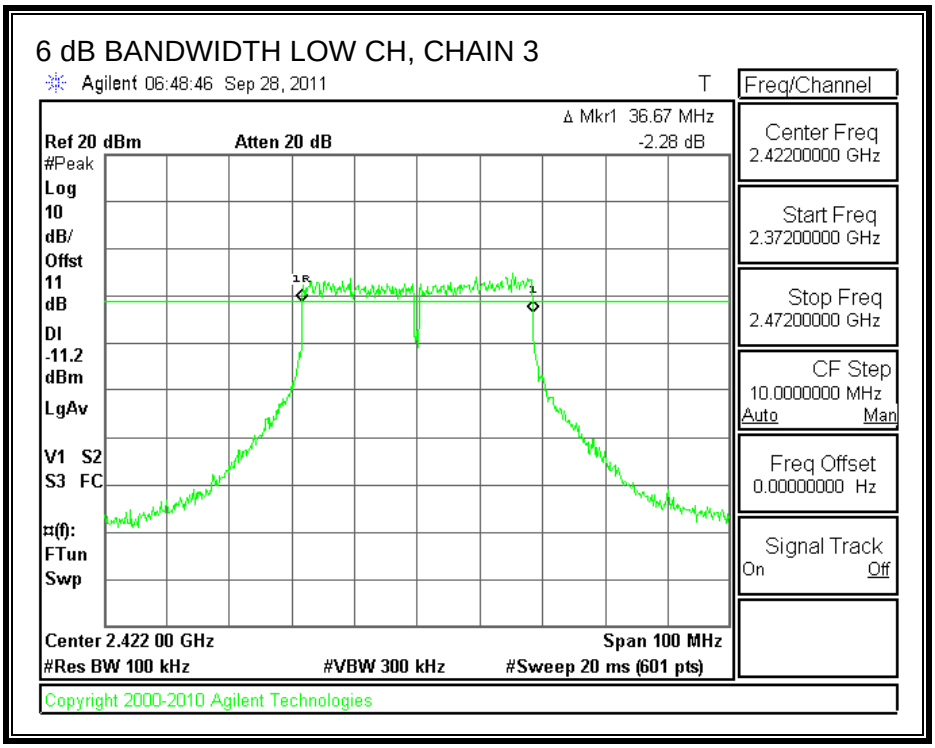
6 dB BANDWIDTH, CHAIN 2

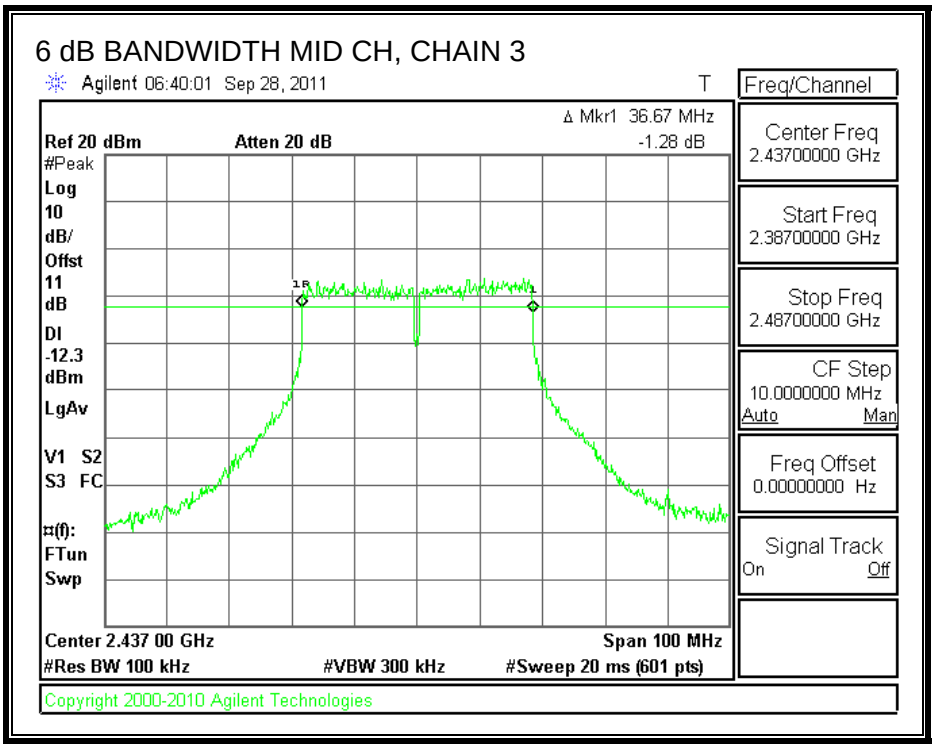


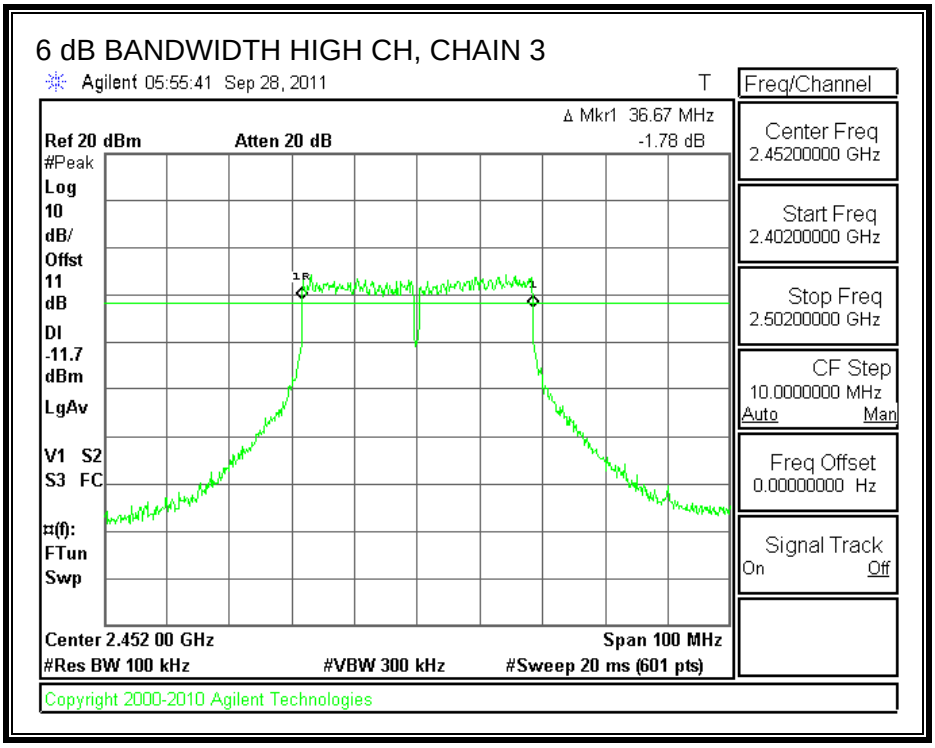




6 dB BANDWIDTH, CHAIN 3







7.6.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

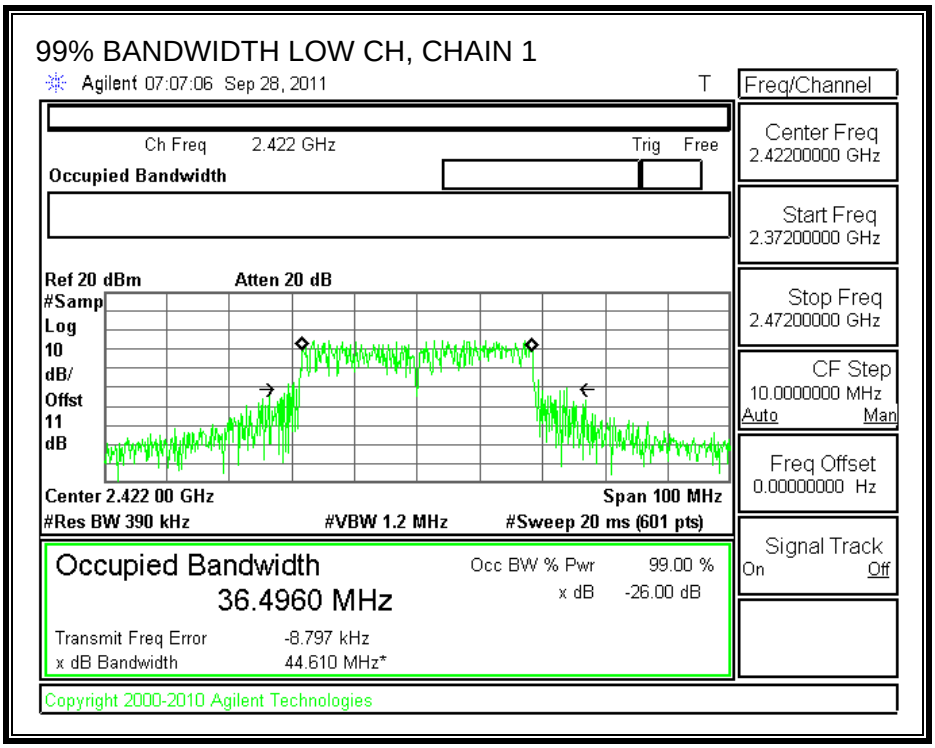
TEST PROCEDURE

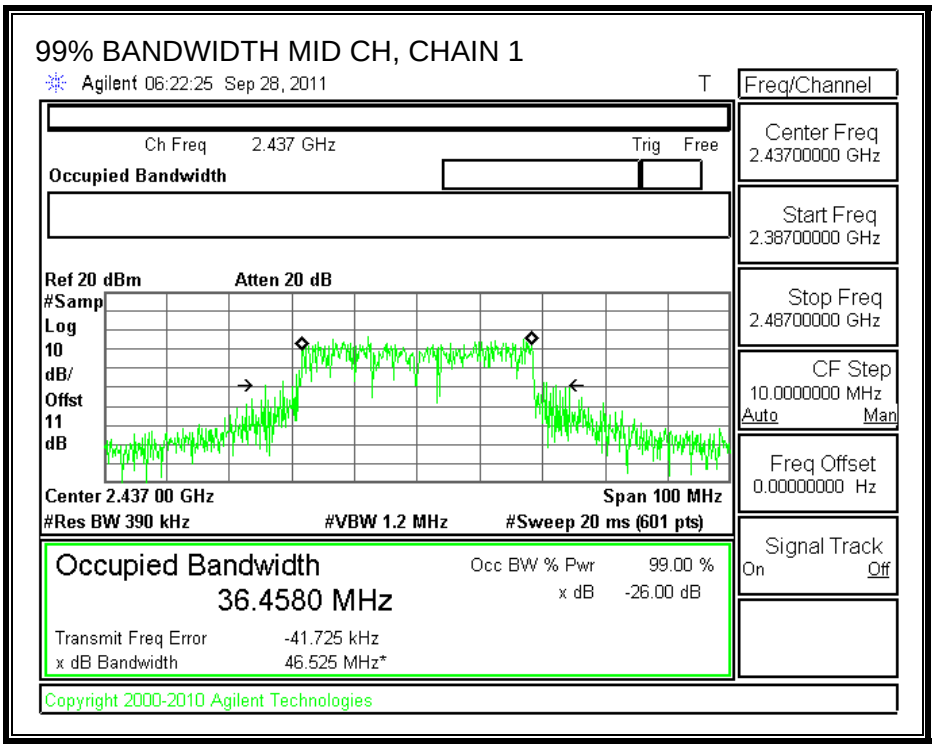
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

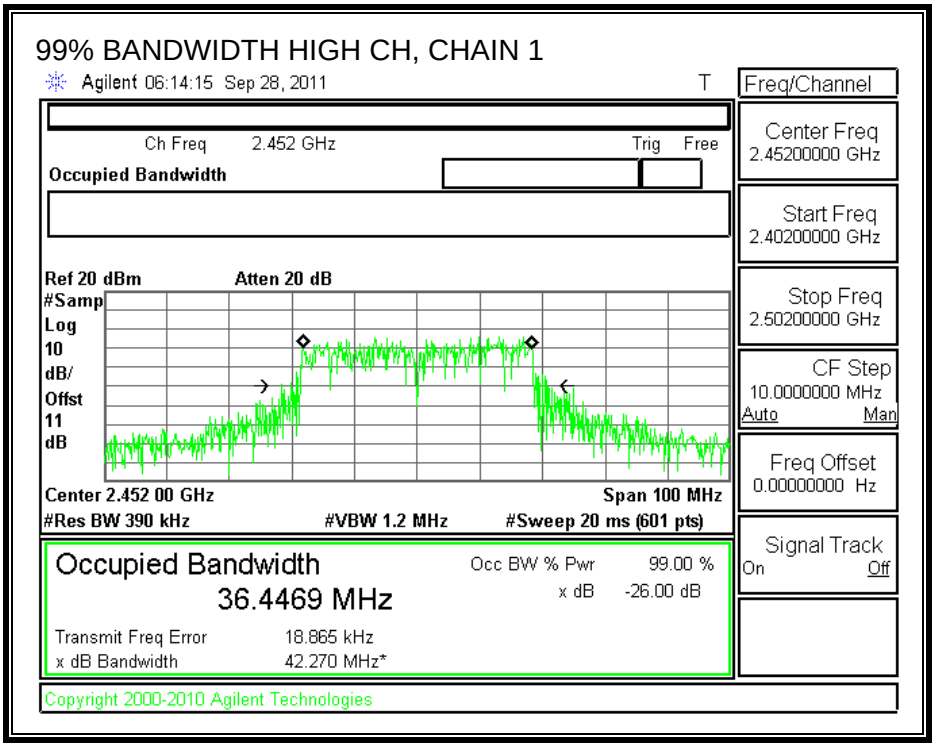
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)	Chain 3 99% Bandwidth (MHz)
Low	2422	36.4960	36.3815	36.1277
Middle	2437	36.4580	36.2314	36.5498
High	2452	36.4469	36.2730	36.4242

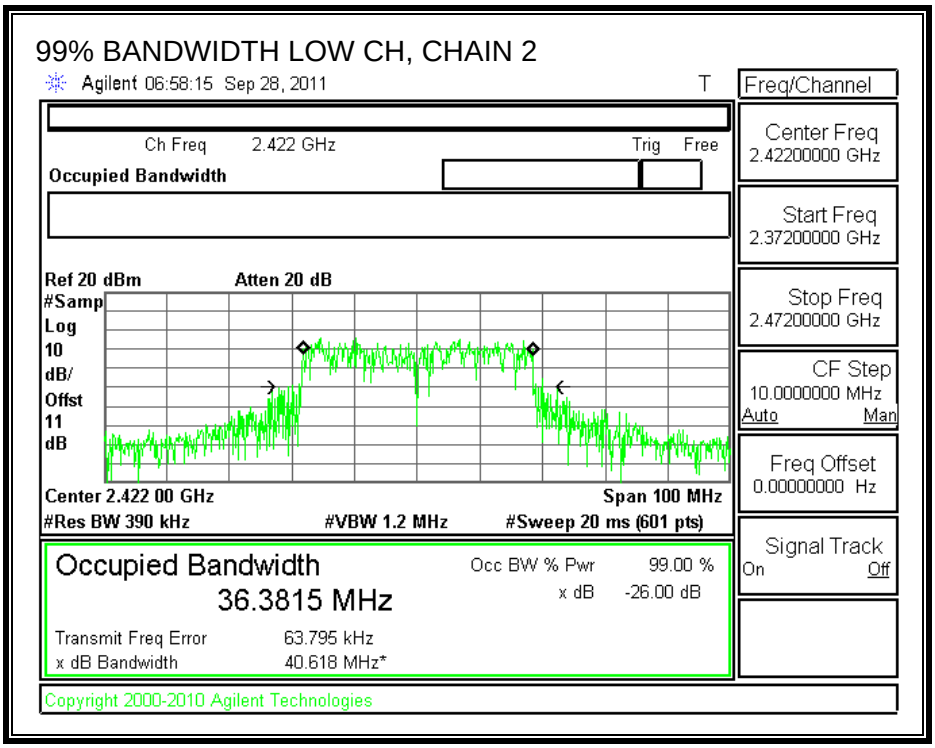
99% BANDWIDTH, CHAIN 1

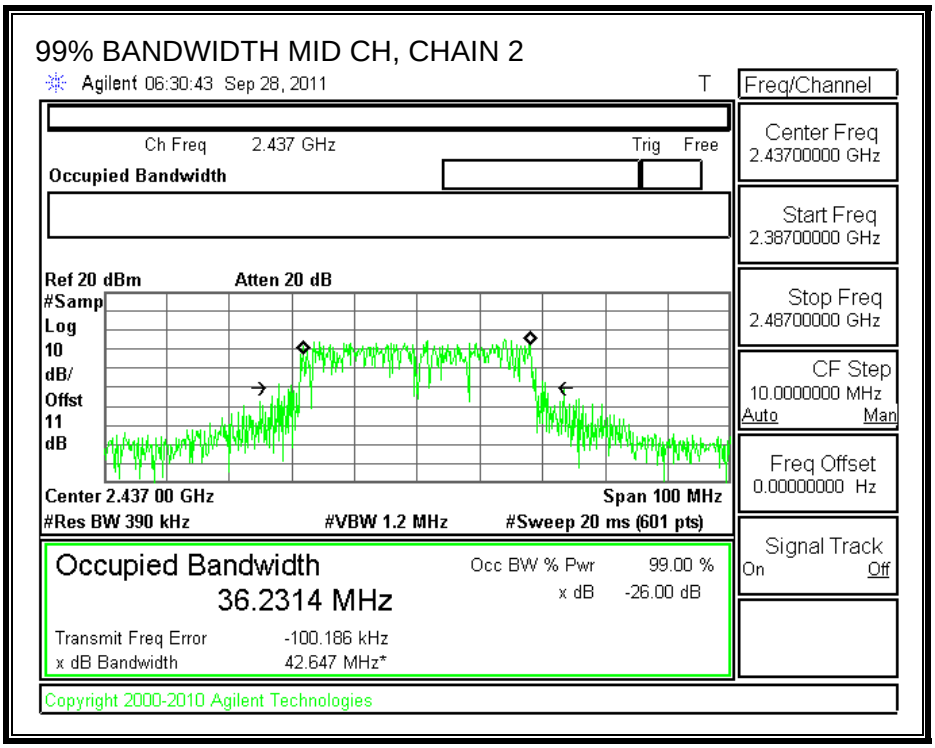


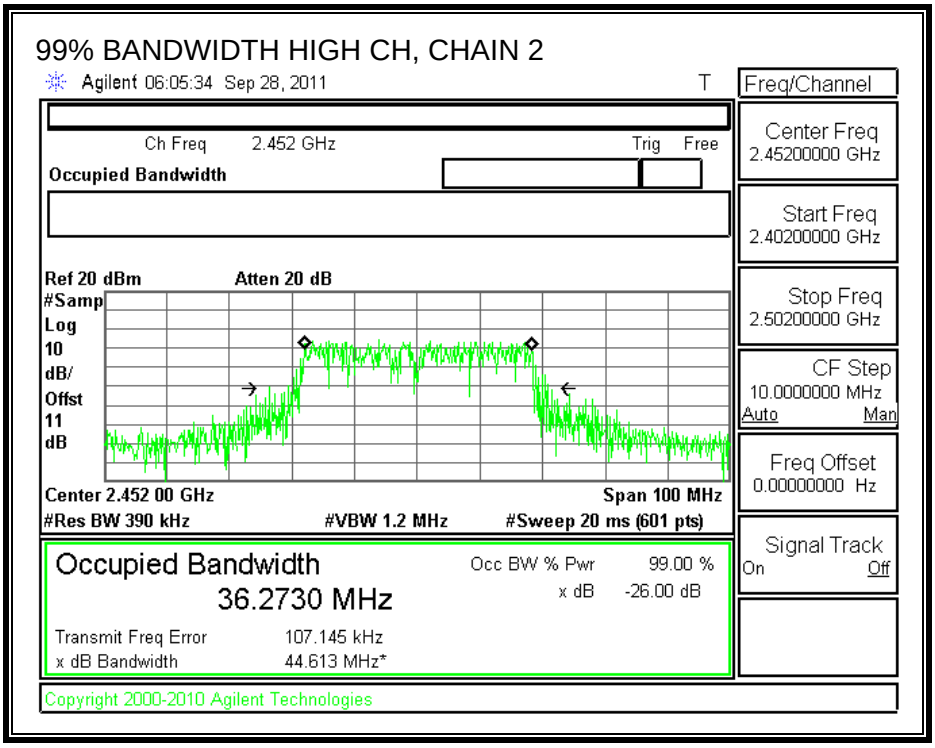




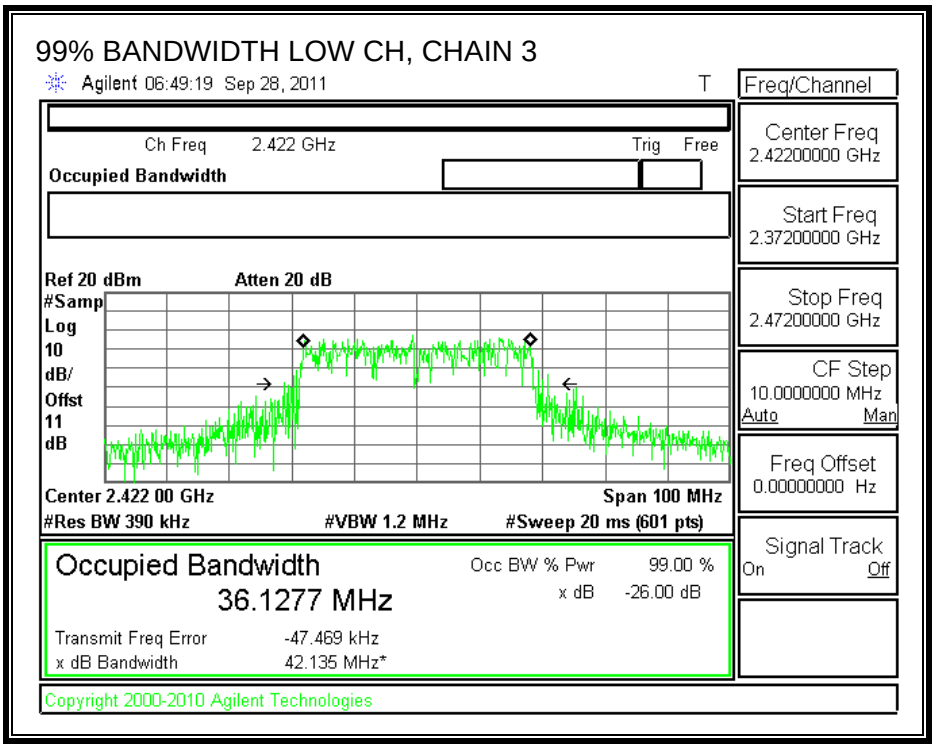
99% BANDWIDTH, CHAIN 2

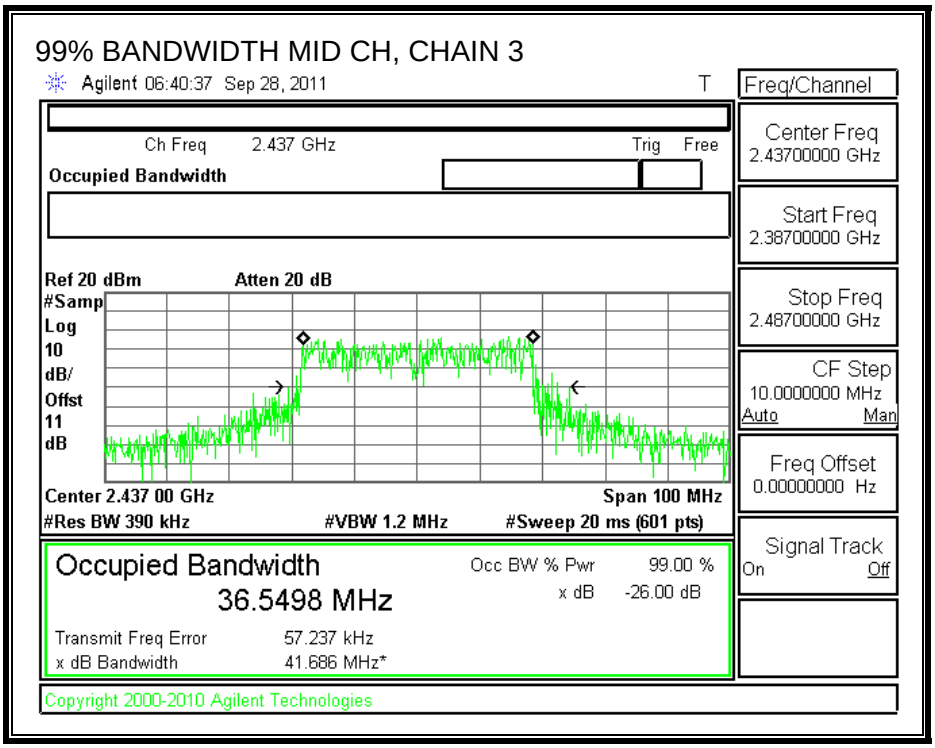


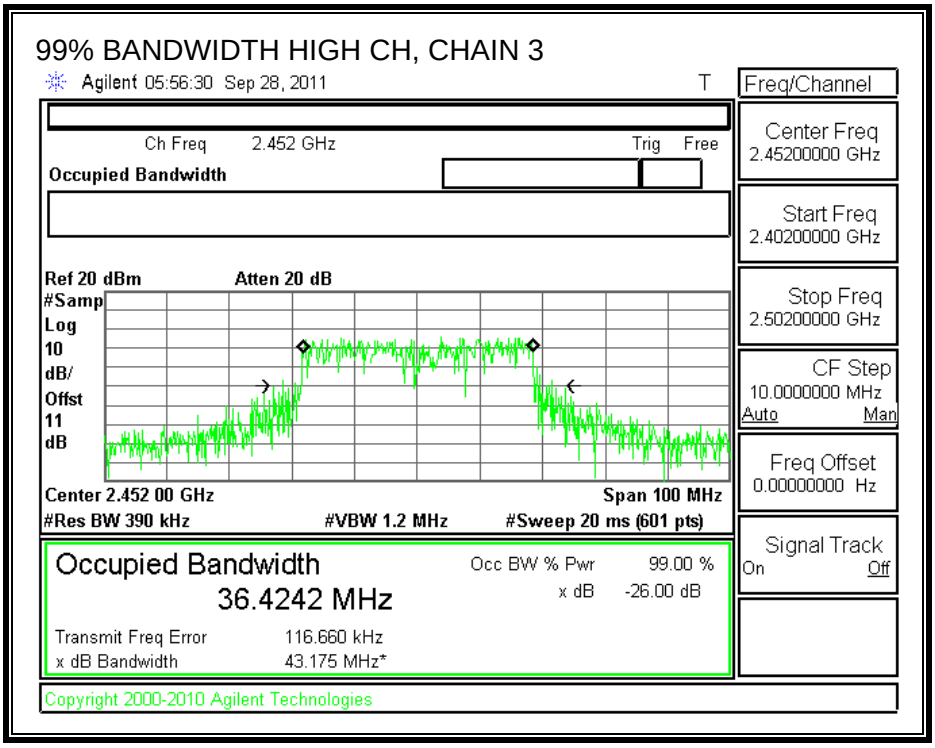




99% BANDWIDTH, CHAIN 3







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 6 dBi, therefore the limit is 30 dBm.

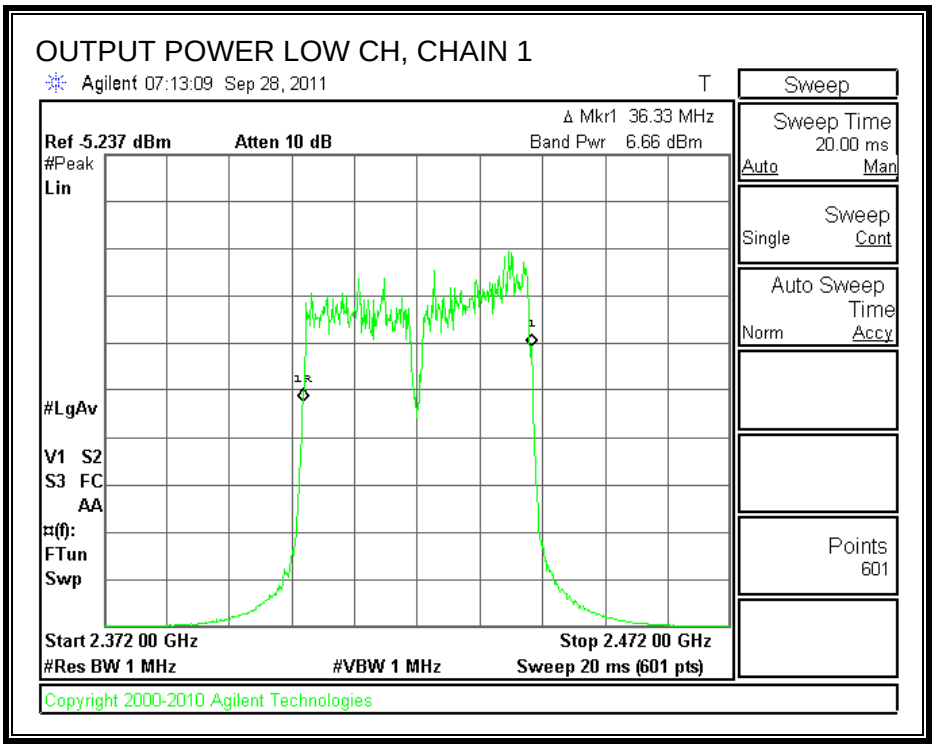
TEST PROCEDURE

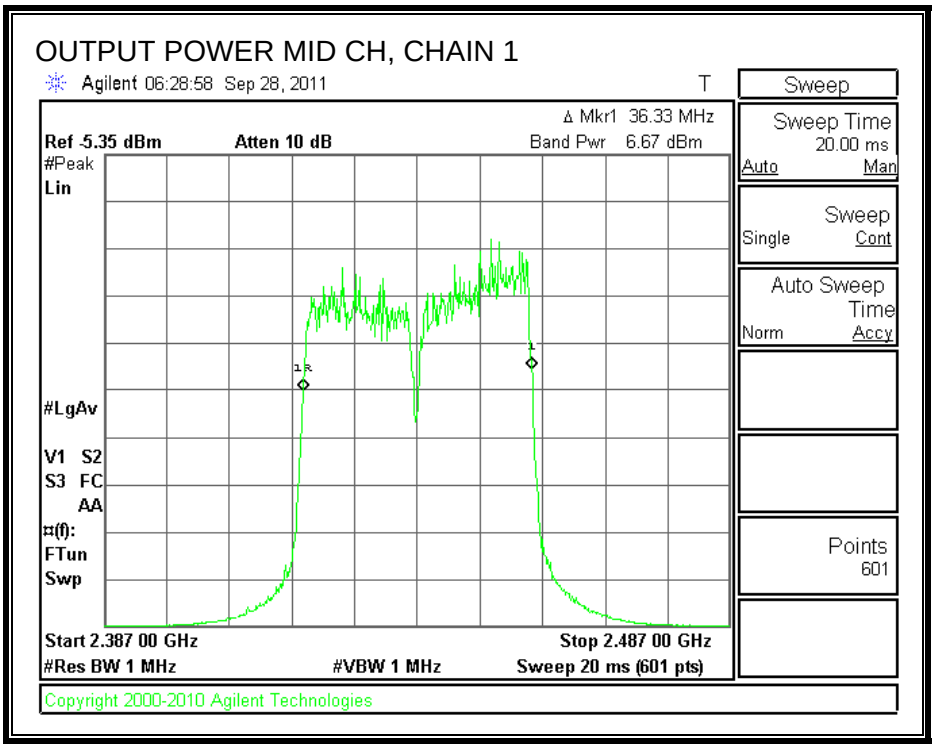
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

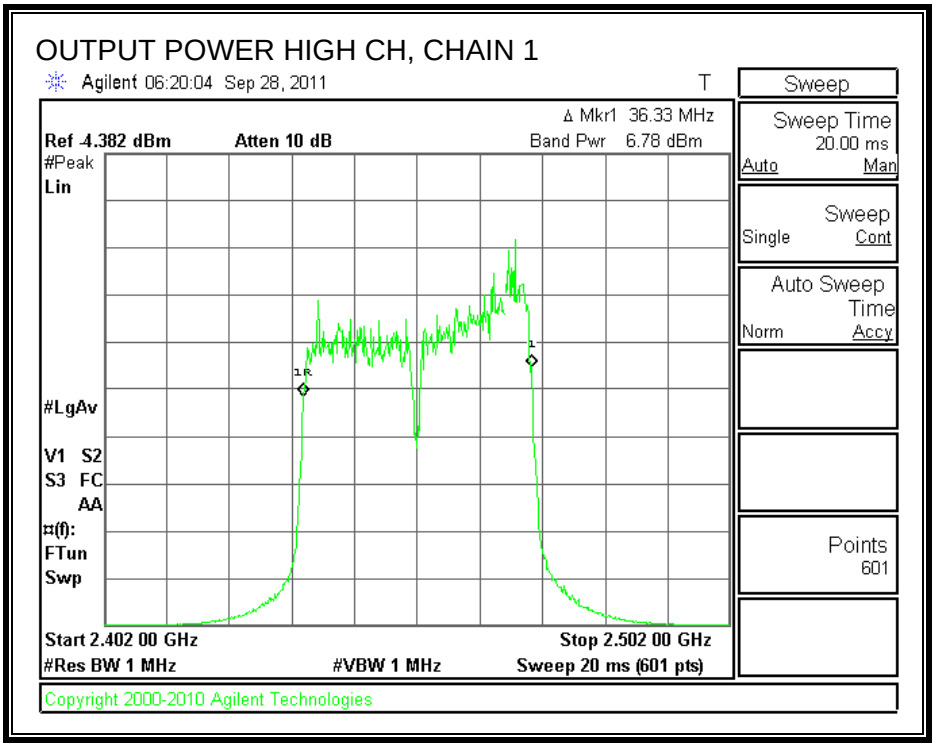
RESULTS

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	6.66	6.66	7.45	11.00	22.71	30.00	-7.29
Mid	2437	6.67	6.40	7.37	11.00	22.60	30.00	-7.40
High	2452	6.78	6.46	7.14	11.00	22.57	30.00	-7.43

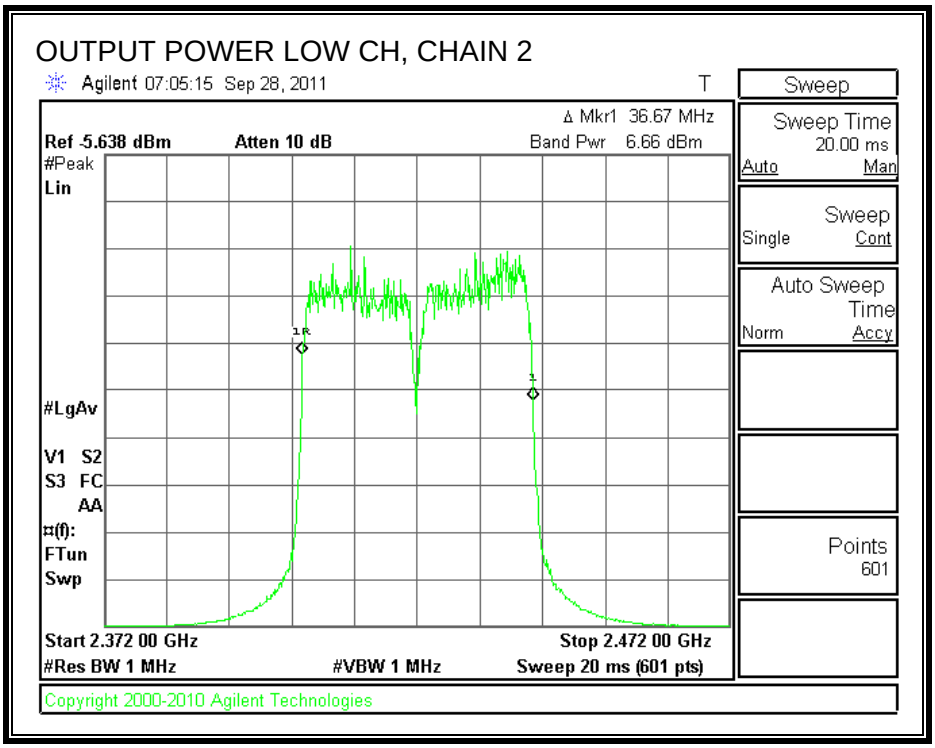
CHAIN 1 OUTPUT POWER

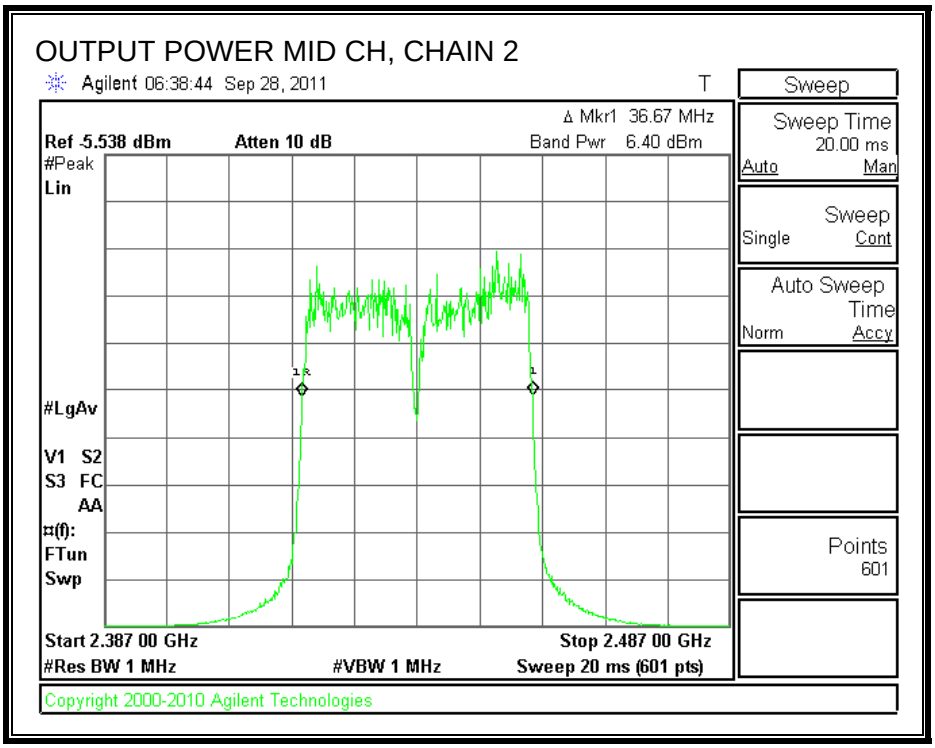


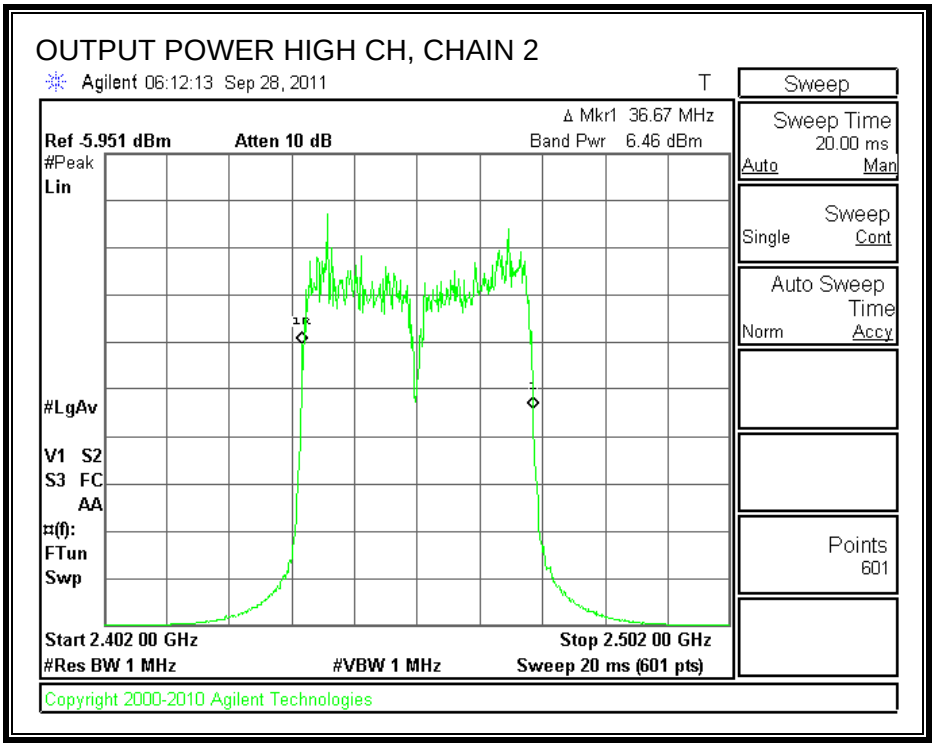




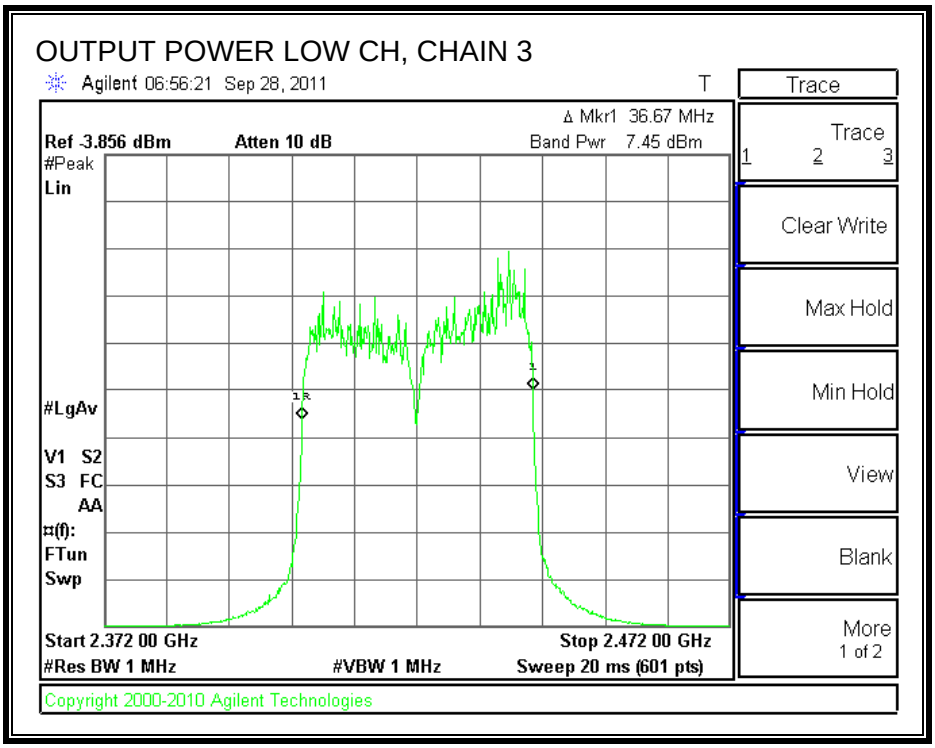
CHAIN 2 OUTPUT POWER

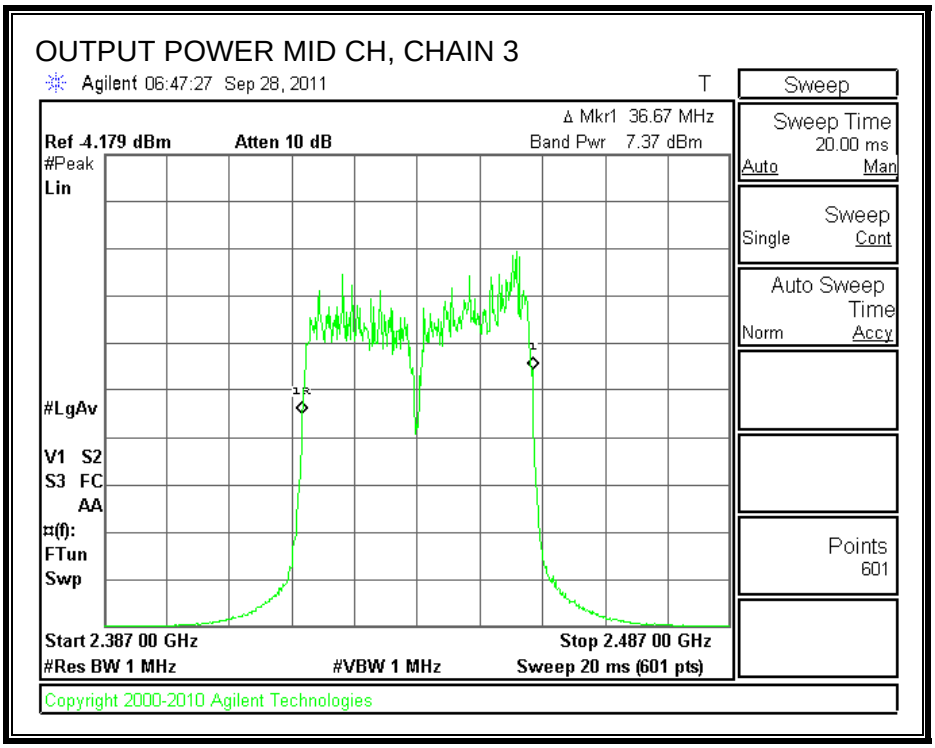


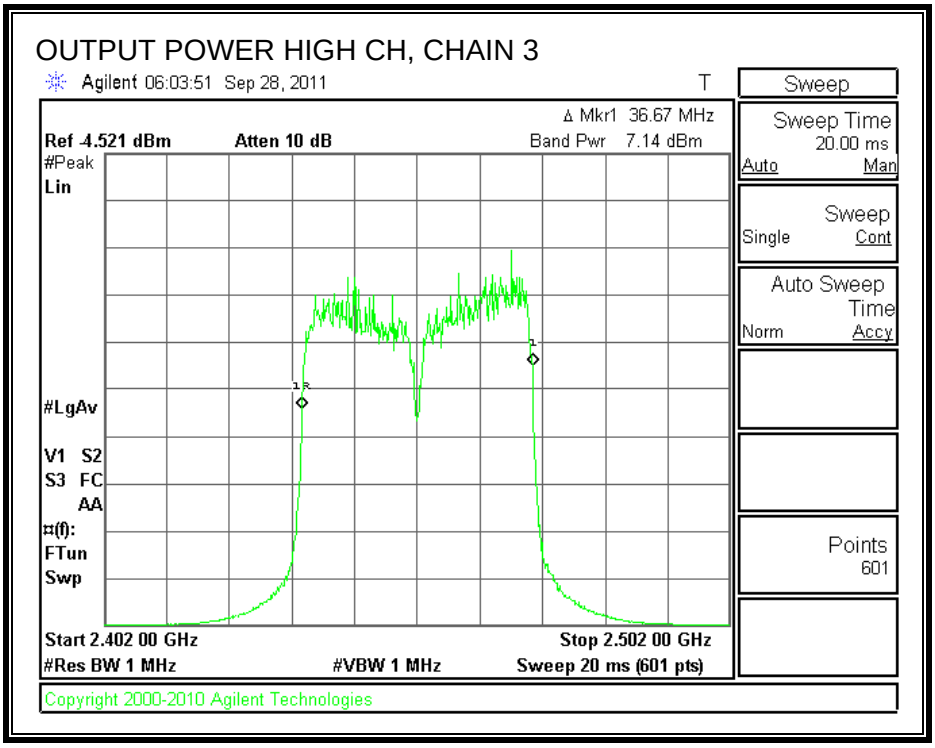




CHAIN 3 OUTPUT POWER







7.6.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1.0 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	2422	10.00	10.00	10.00	14.77
Middle	2437	10.00	10.00	10.00	14.77
High	2452	10.00	10.00	10.00	14.77

7.6.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

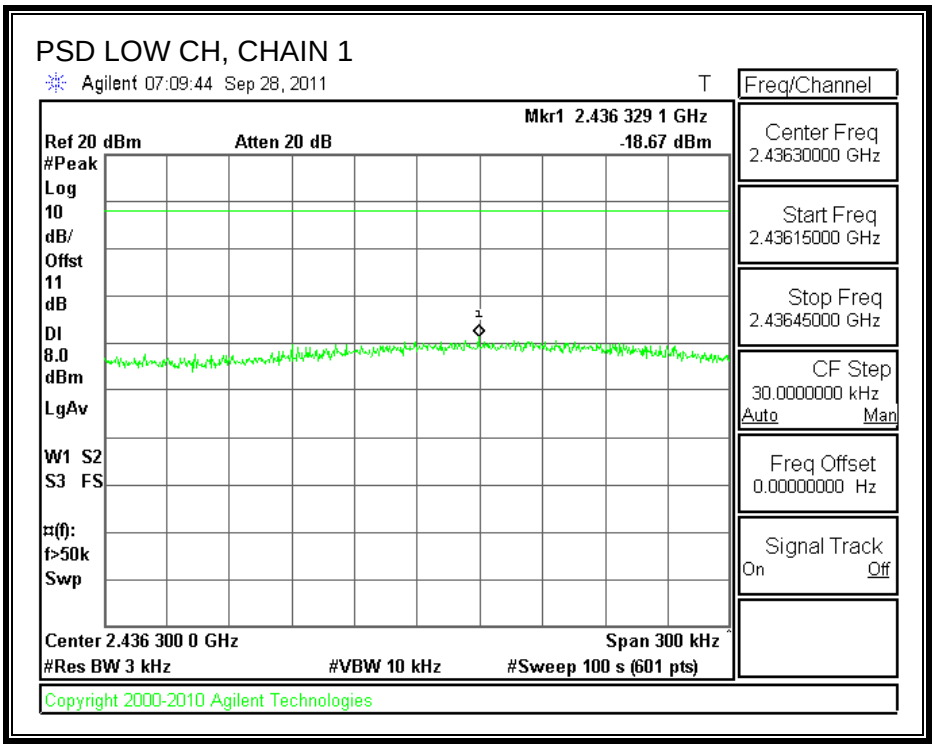
TEST PROCEDURE

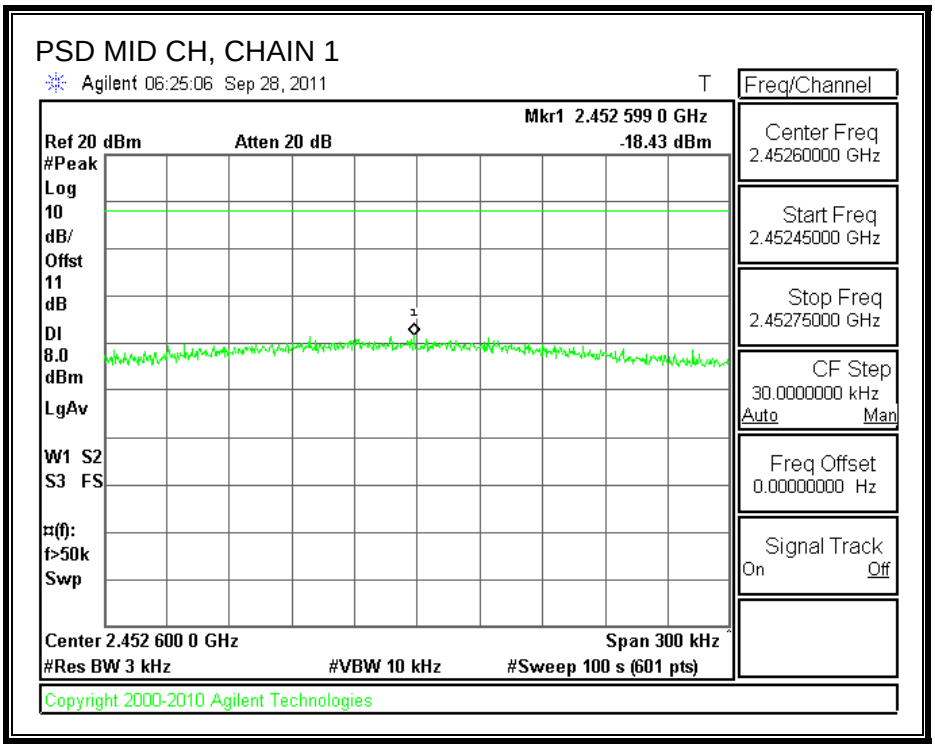
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

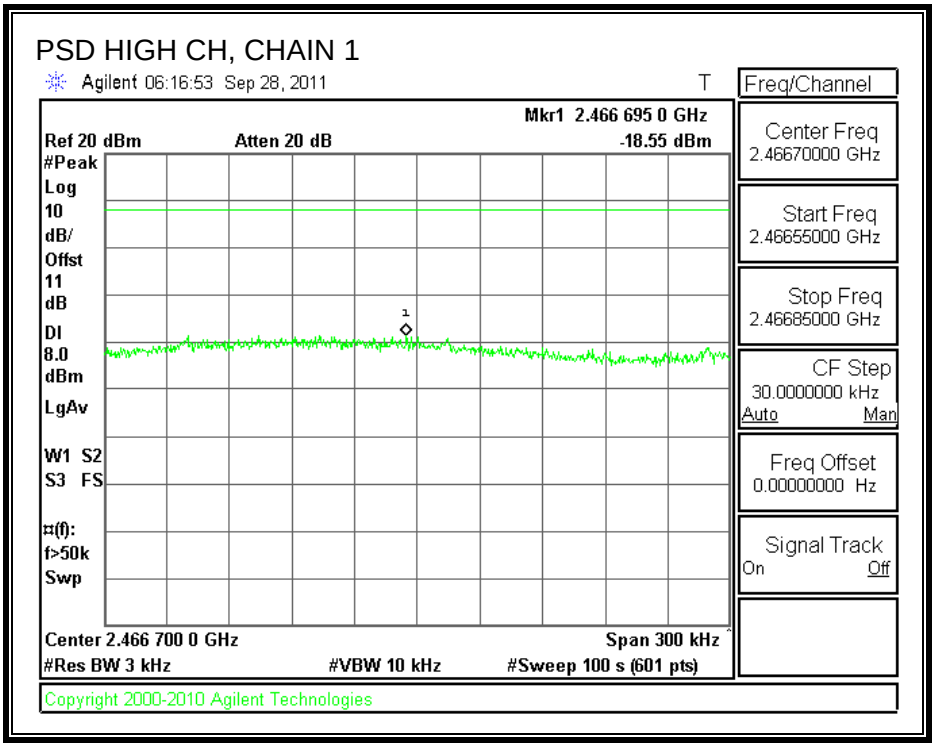
RESULTS

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-18.67	-20.03	-18.17	-14.12	8	-22.12
Middle	2437	-18.43	-19.40	-17.43	-13.57	8	-21.57
High	2452	-18.55	-19.90	-18.43	-14.14	8	-22.14

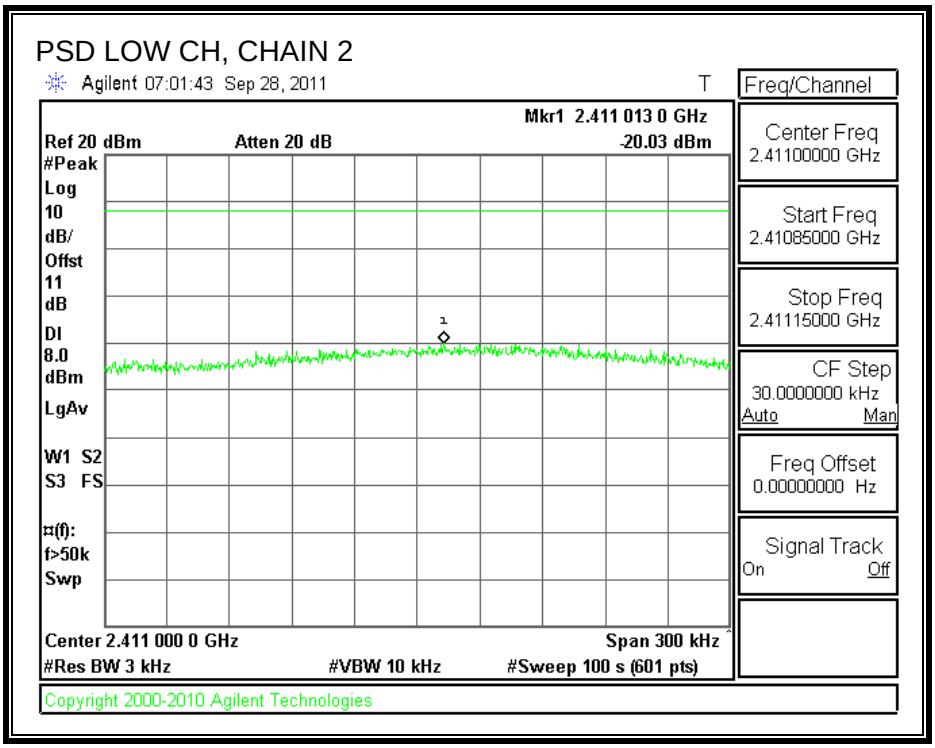
POWER SPECTRAL DENSITY, CHAIN 1

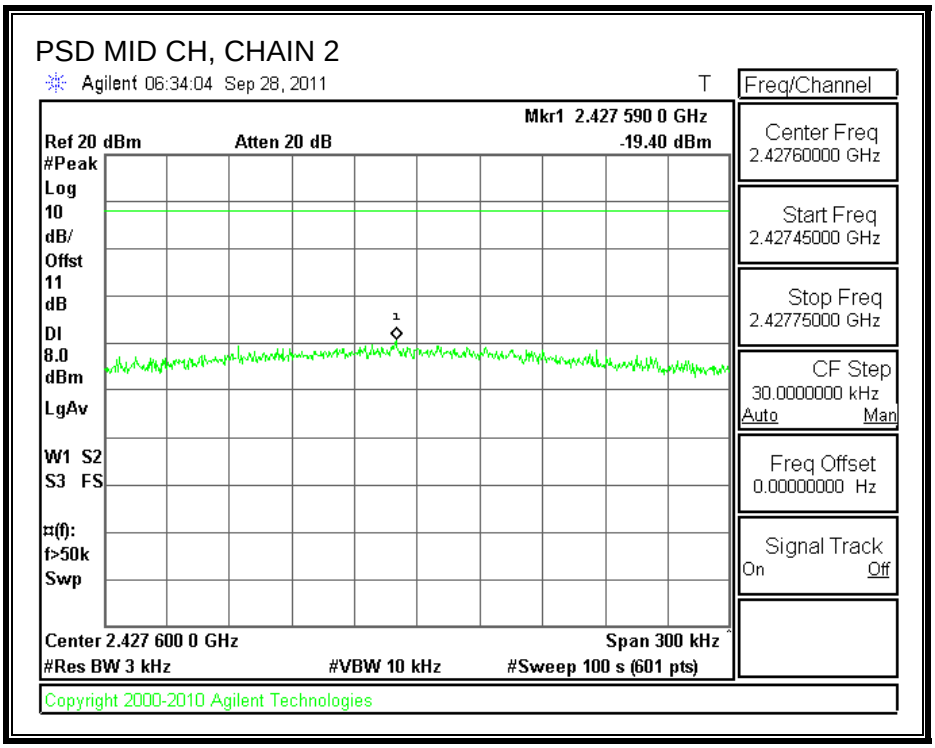


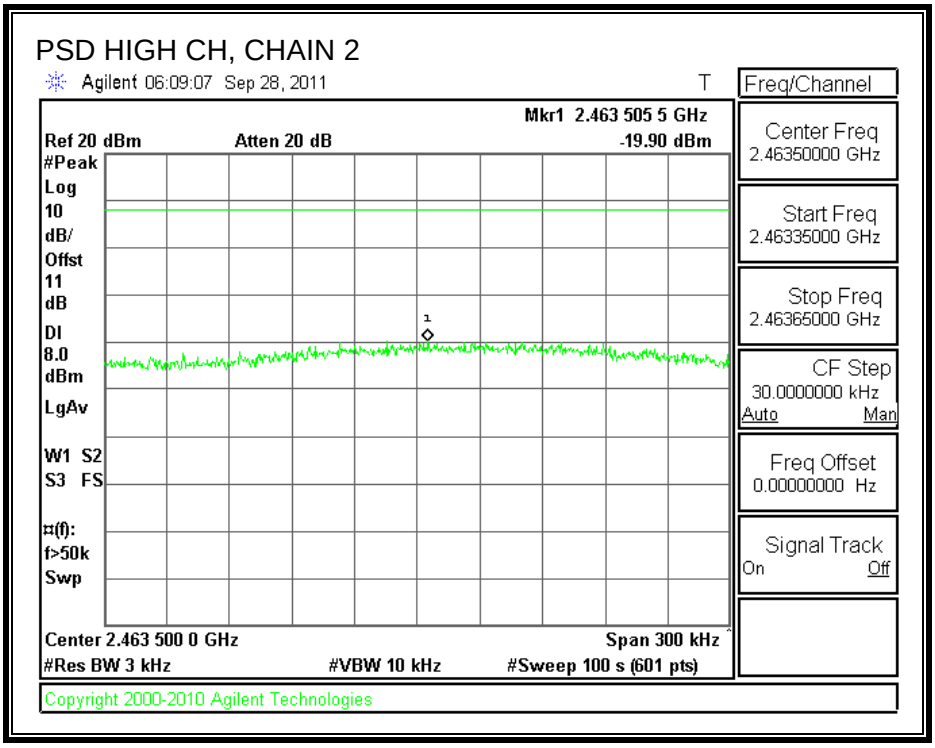




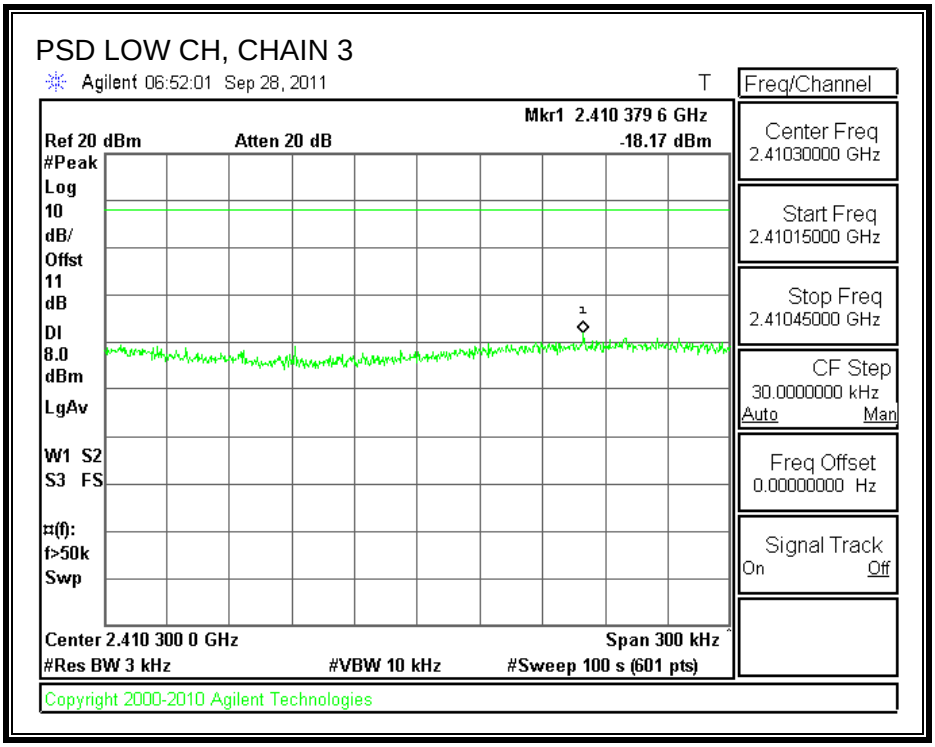
POWER SPECTRAL DENSITY, CHAIN 2

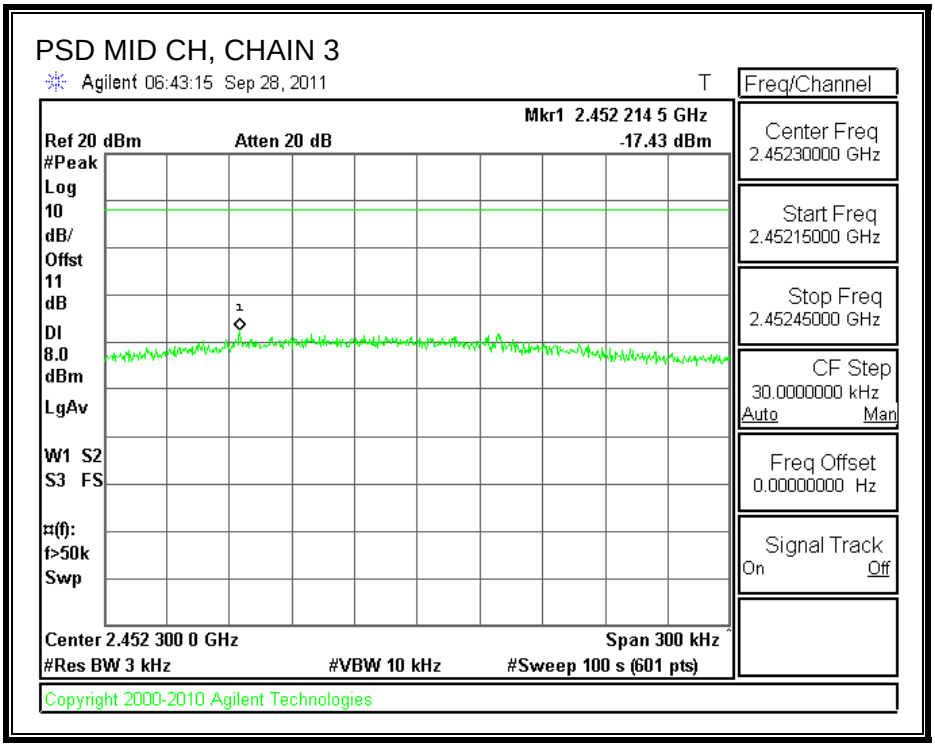


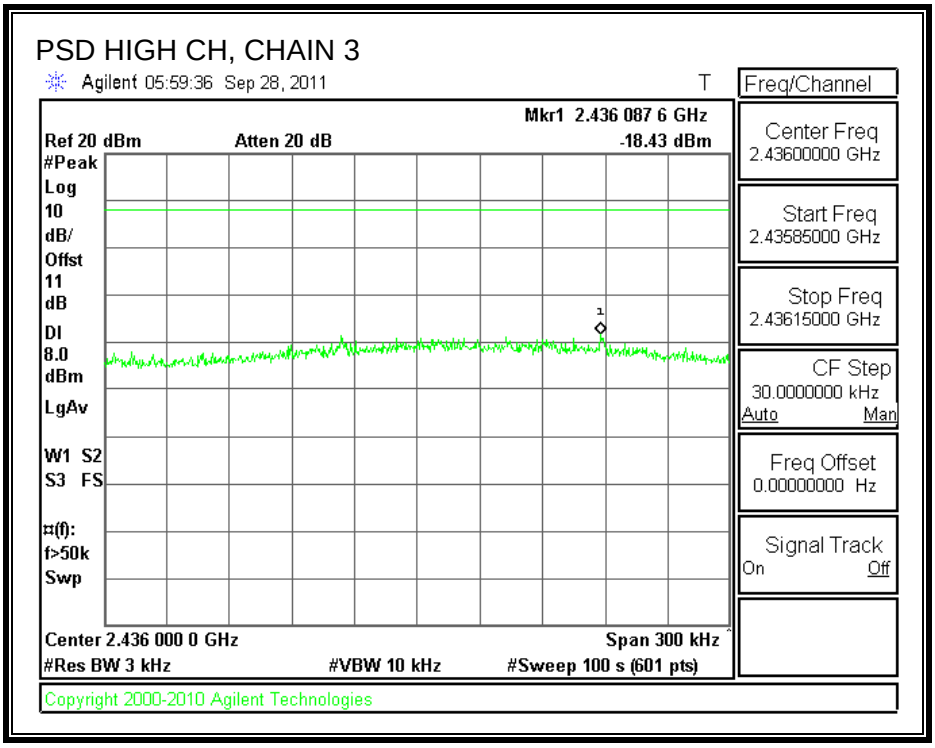




POWER SPECTRAL DENSITY, CHAIN 3







7.6.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

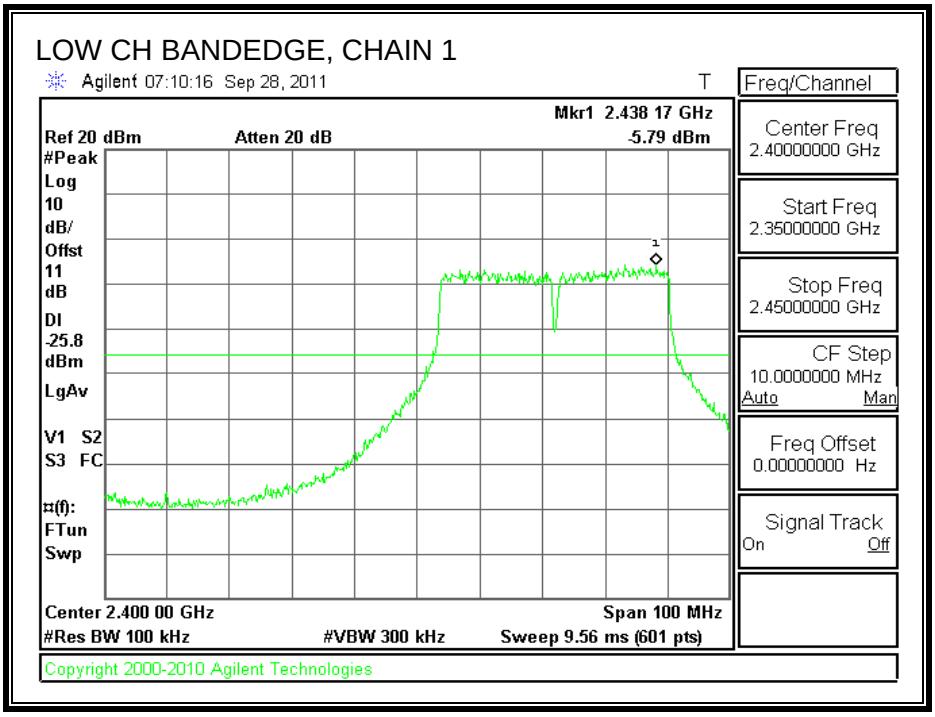
TEST PROCEDURE

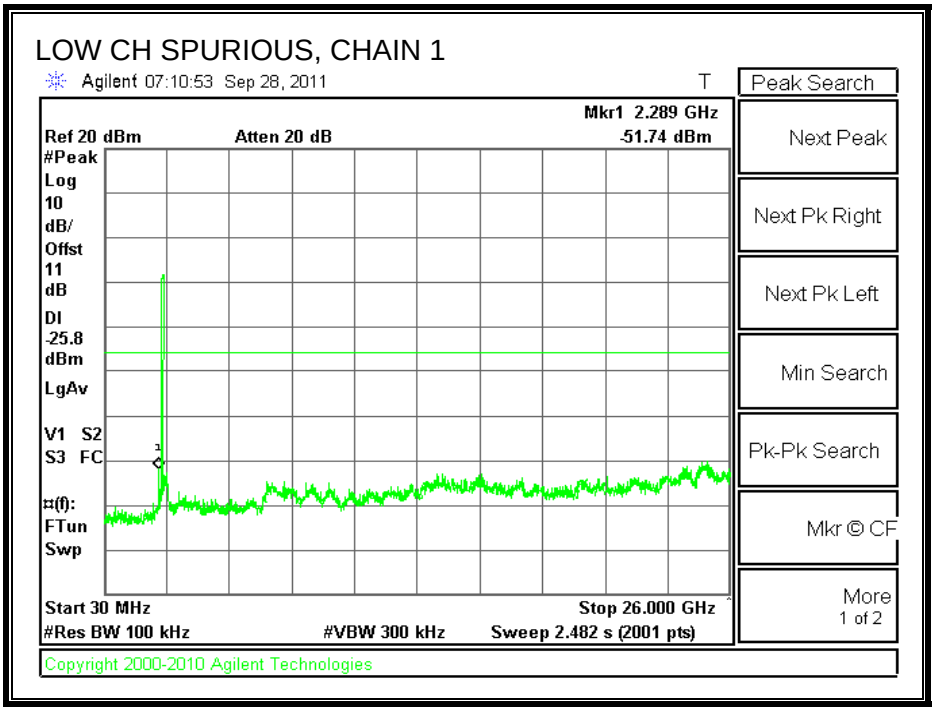
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

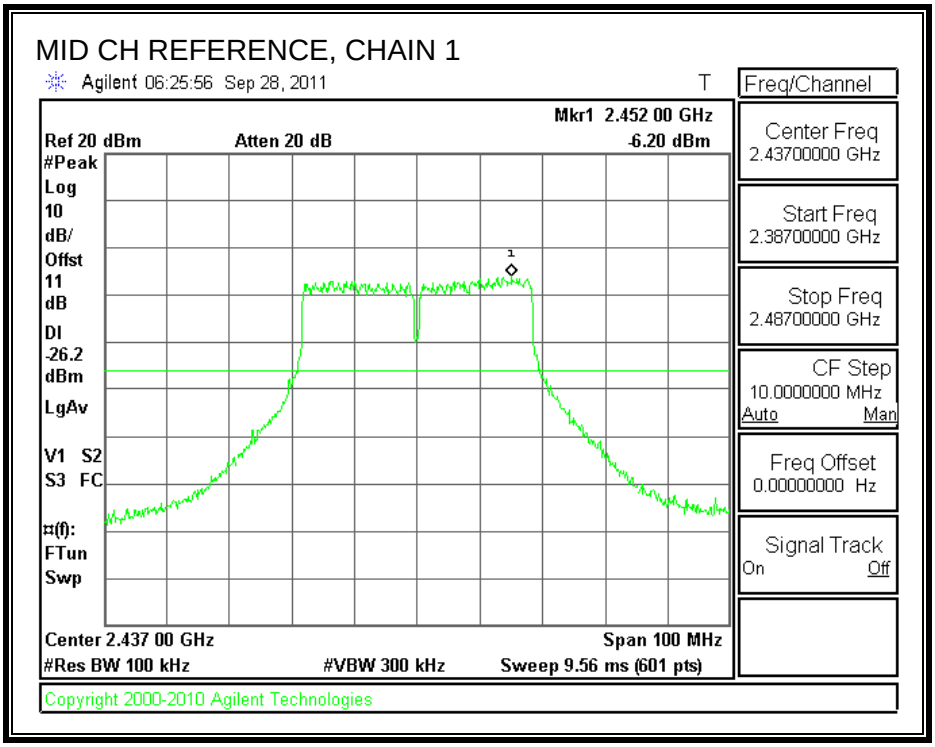
RESULTS

CHAIN 1 SPURIOUS EMISSIONS

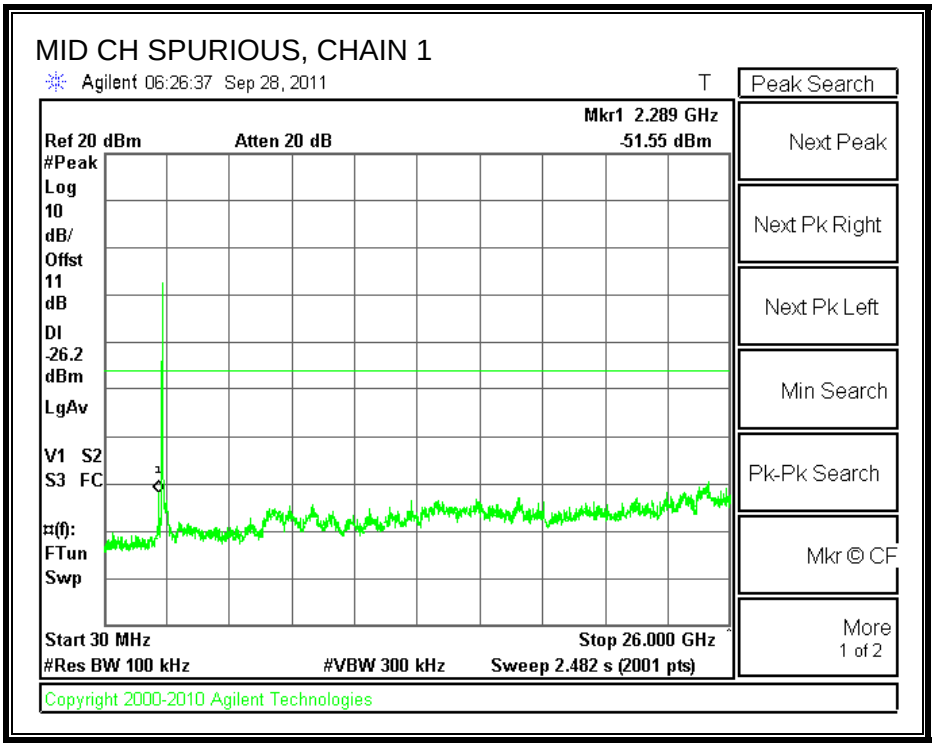




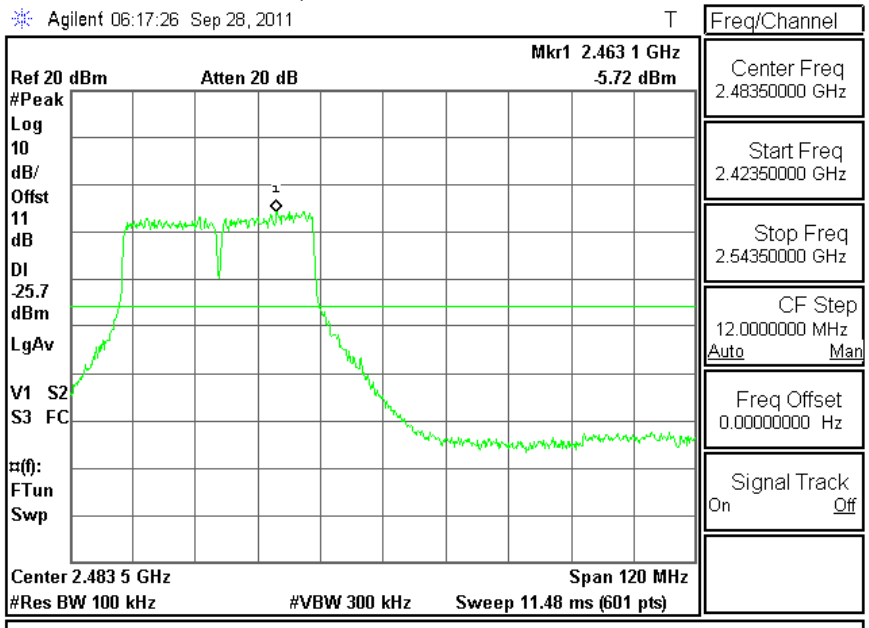
MID CH REFERENCE, CHAIN 1



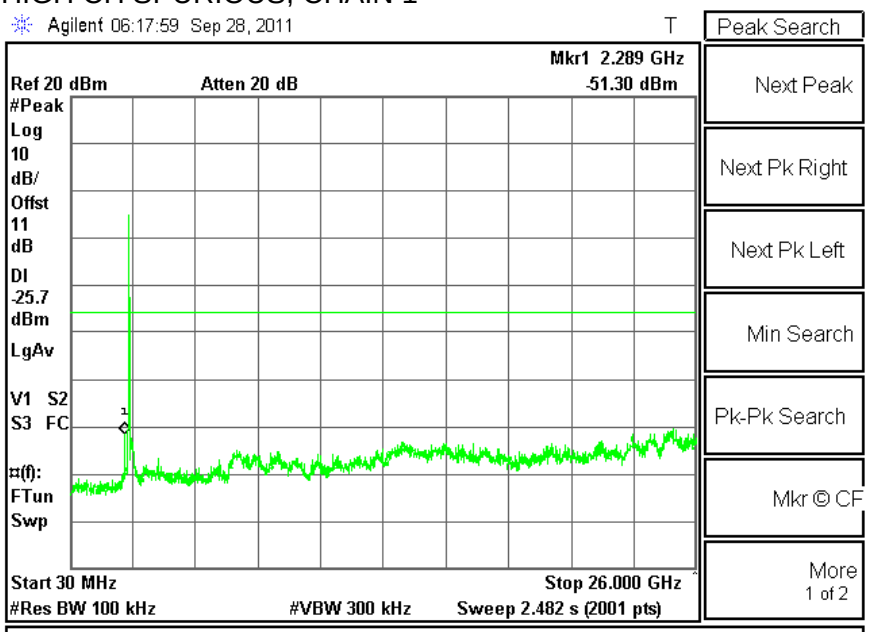
MID CH SPURIOUS, CHAIN 1



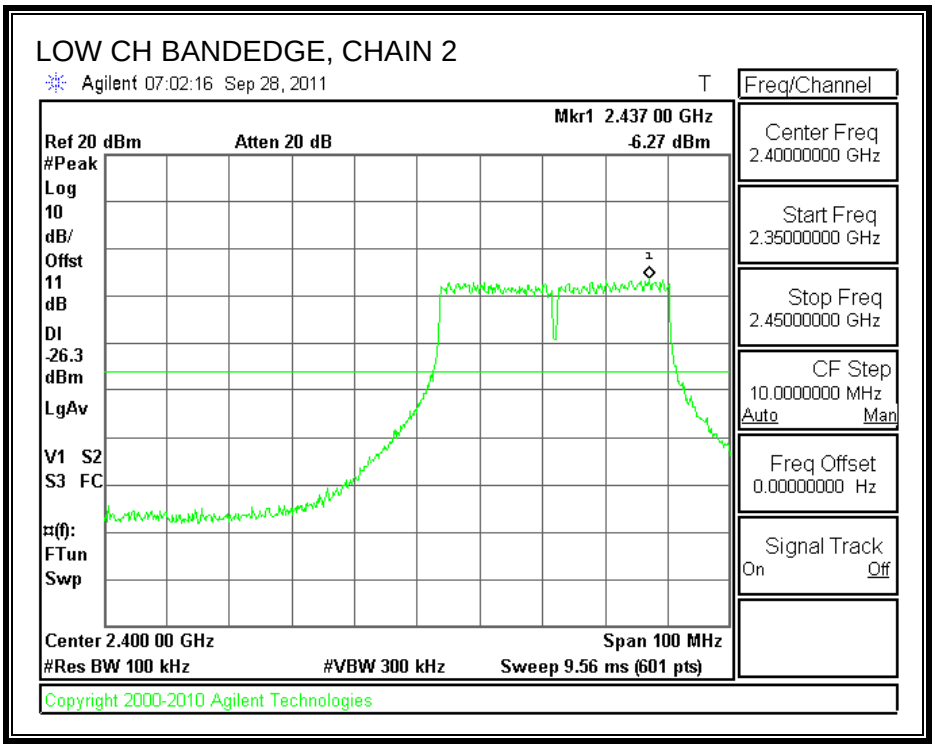
HIGH CH BANDEDGE, CHAIN 1

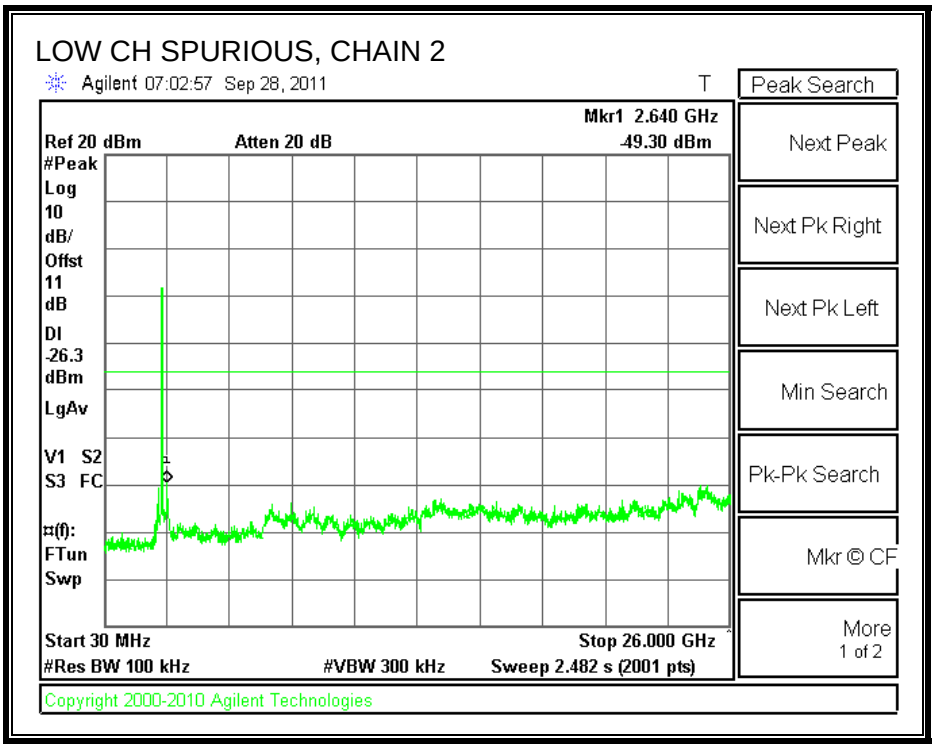


HIGH CH SPURIOUS, CHAIN 1

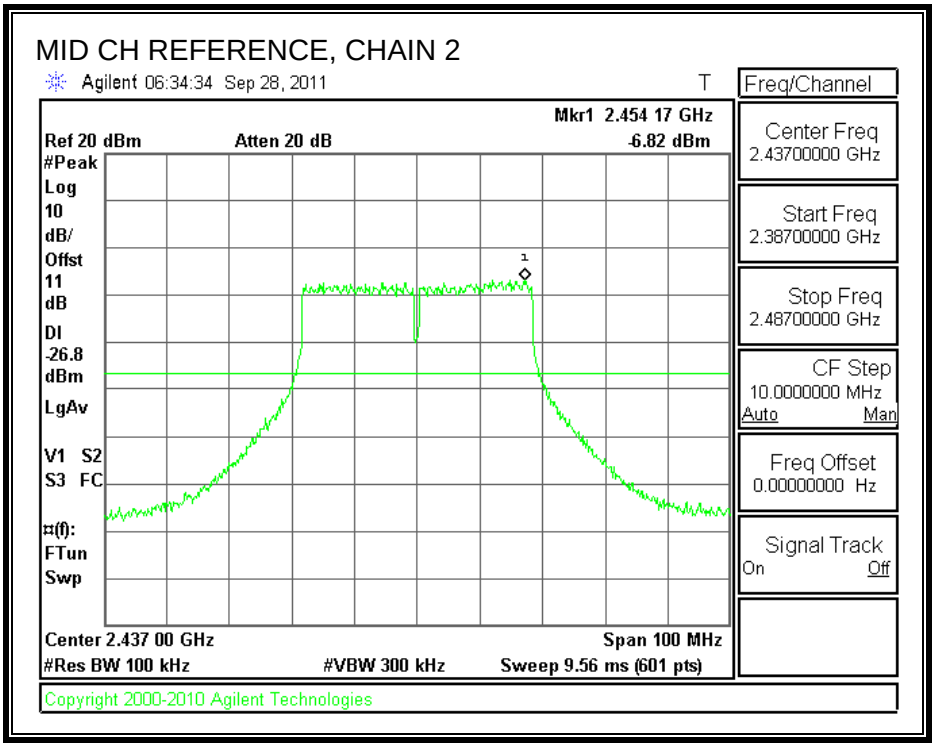


CHAIN 2 SPURIOUS EMISSIONS

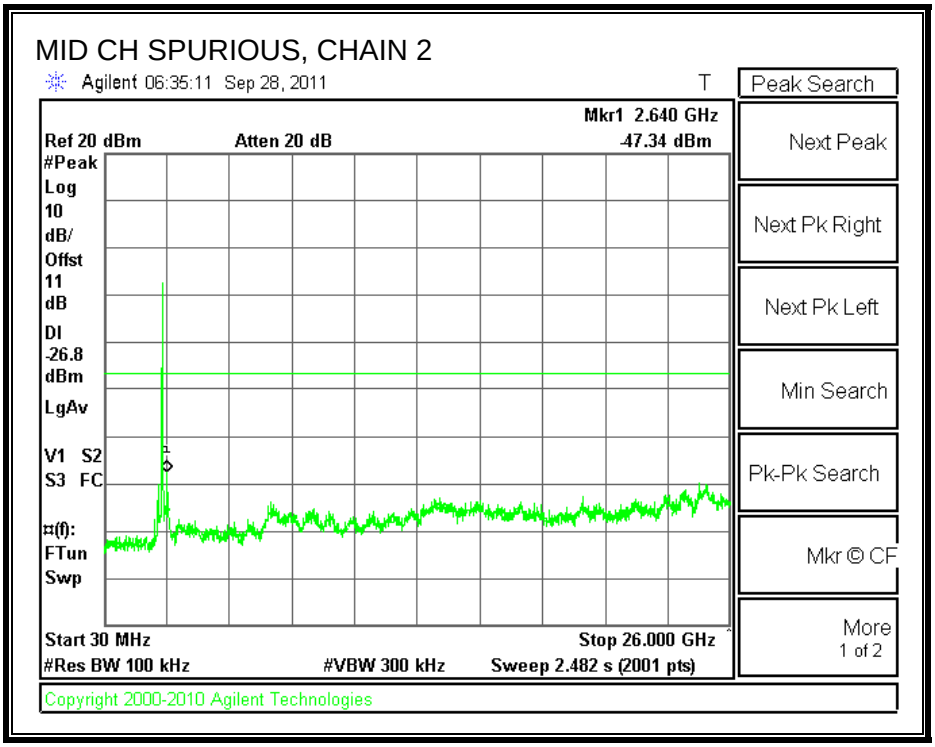




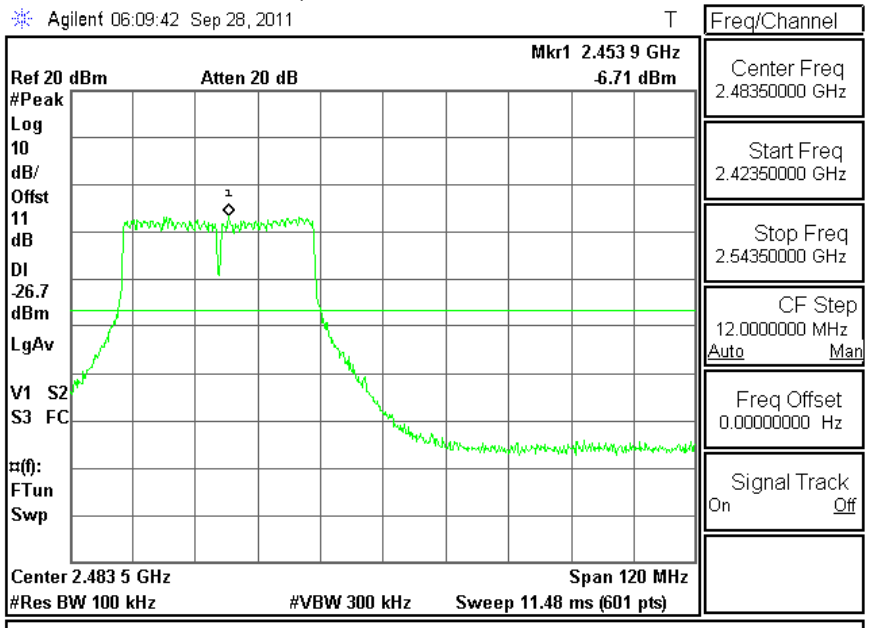
MID CH REFERENCE, CHAIN 2



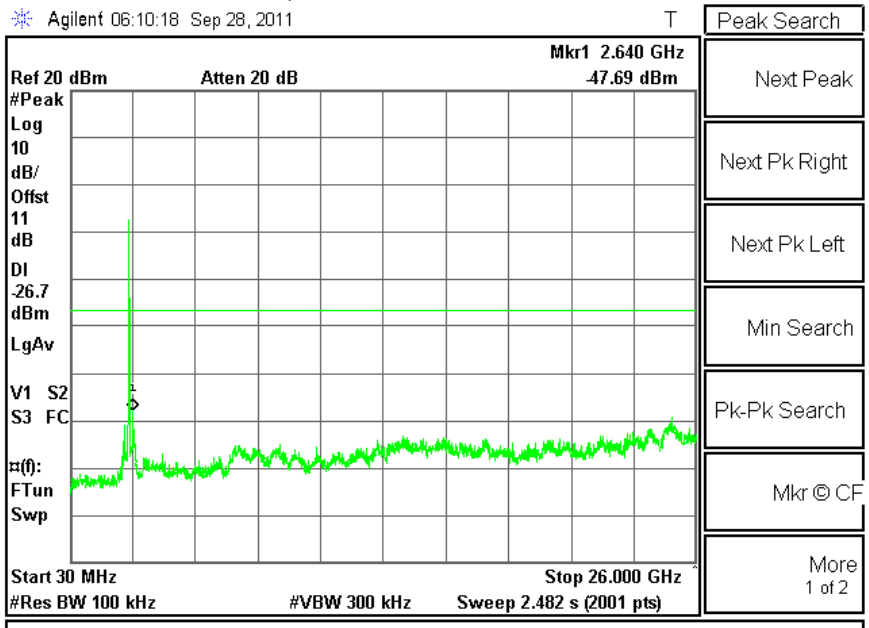
MID CH SPURIOUS, CHAIN 2



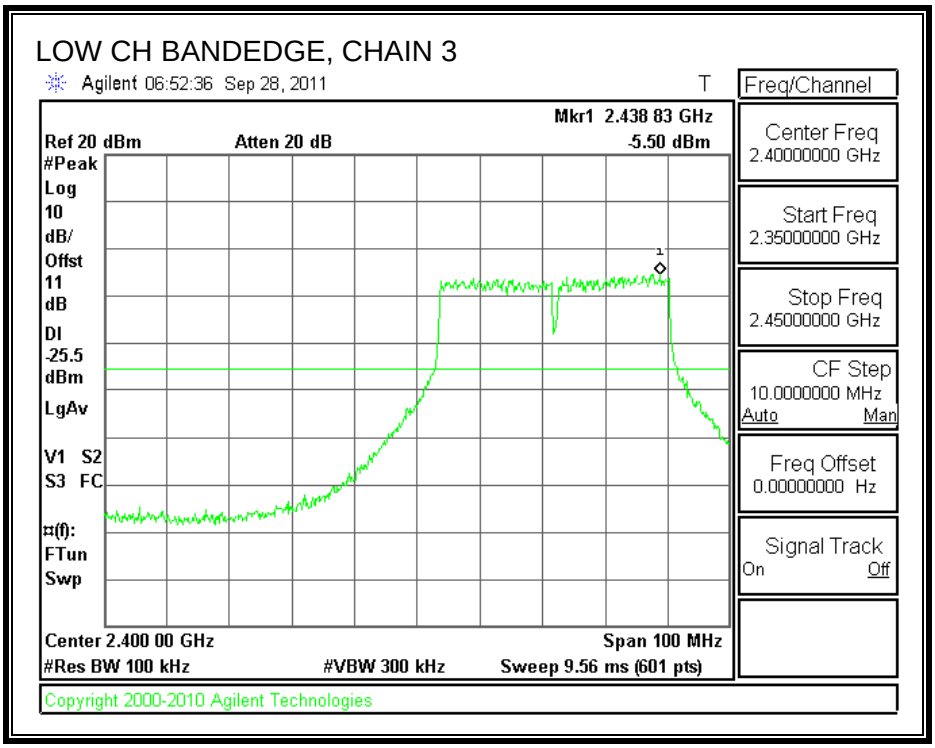
HIGH CH BANDEDGE, CHAIN 2

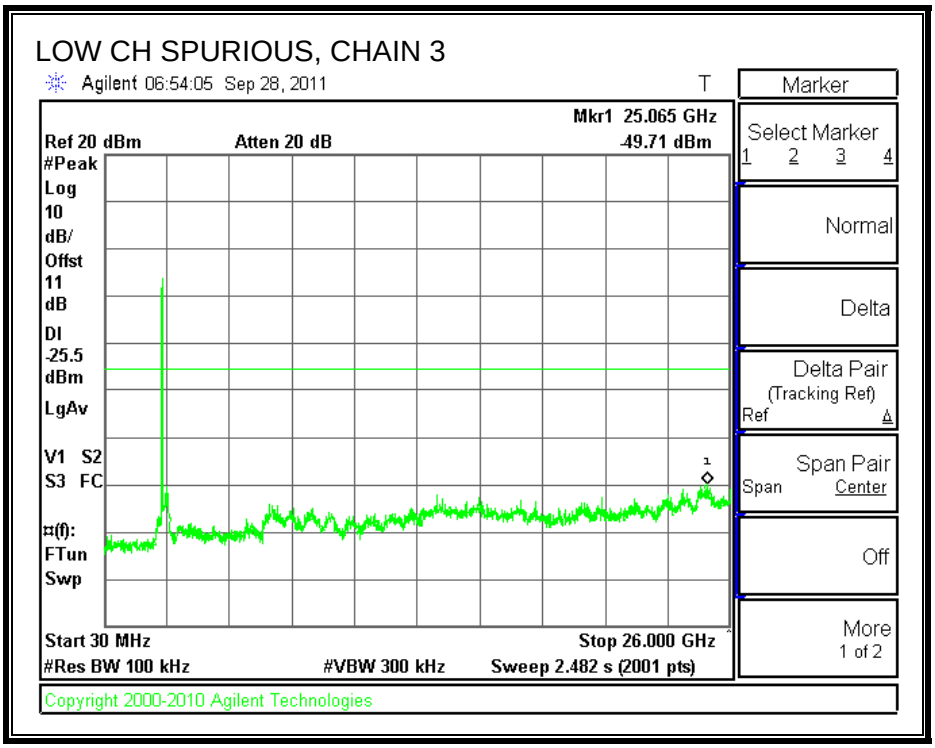


HIGH CH SPURIOUS, CHAIN 2

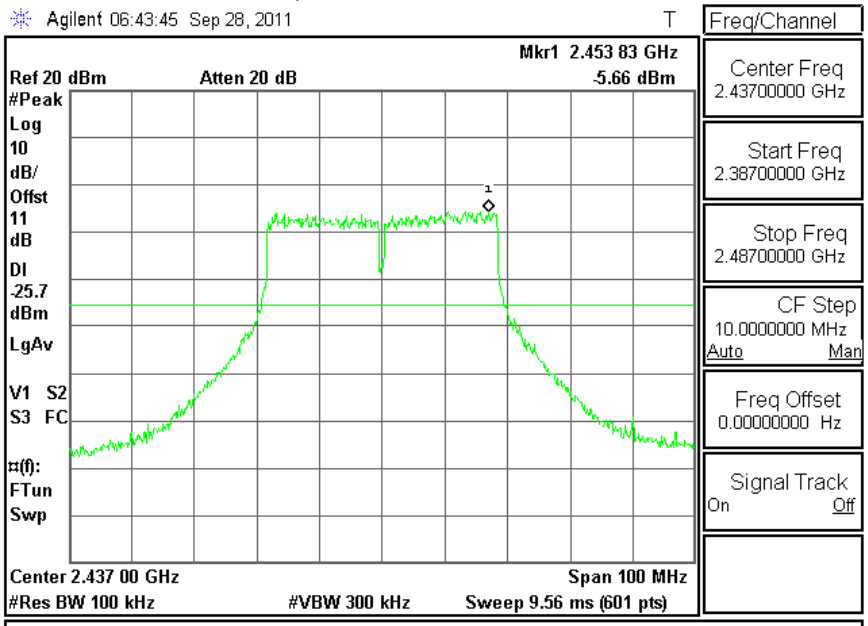


CHAIN 3 SPURIOUS EMISSIONS

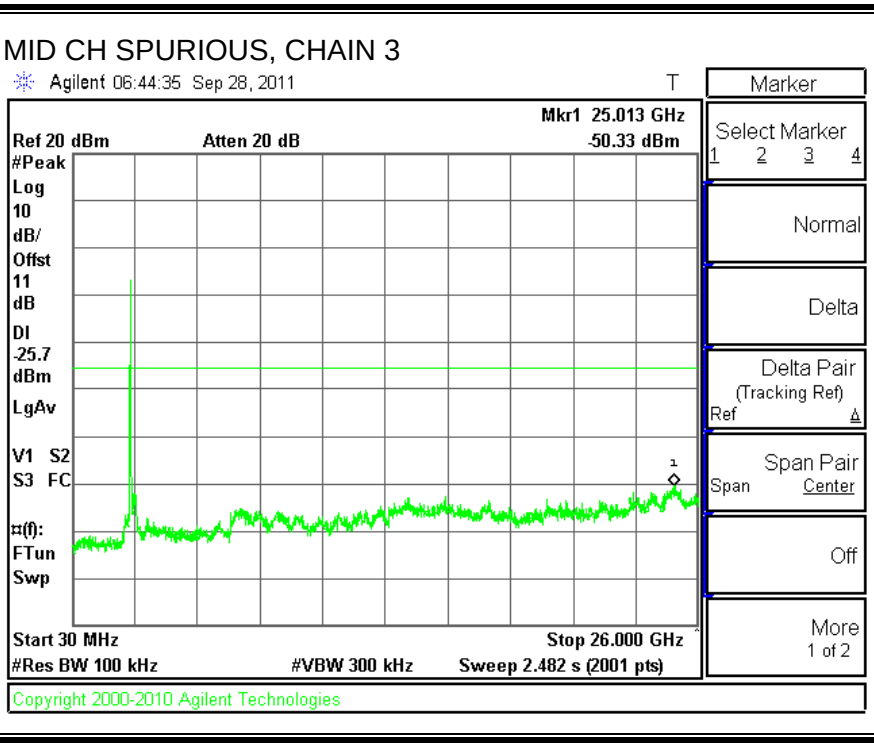


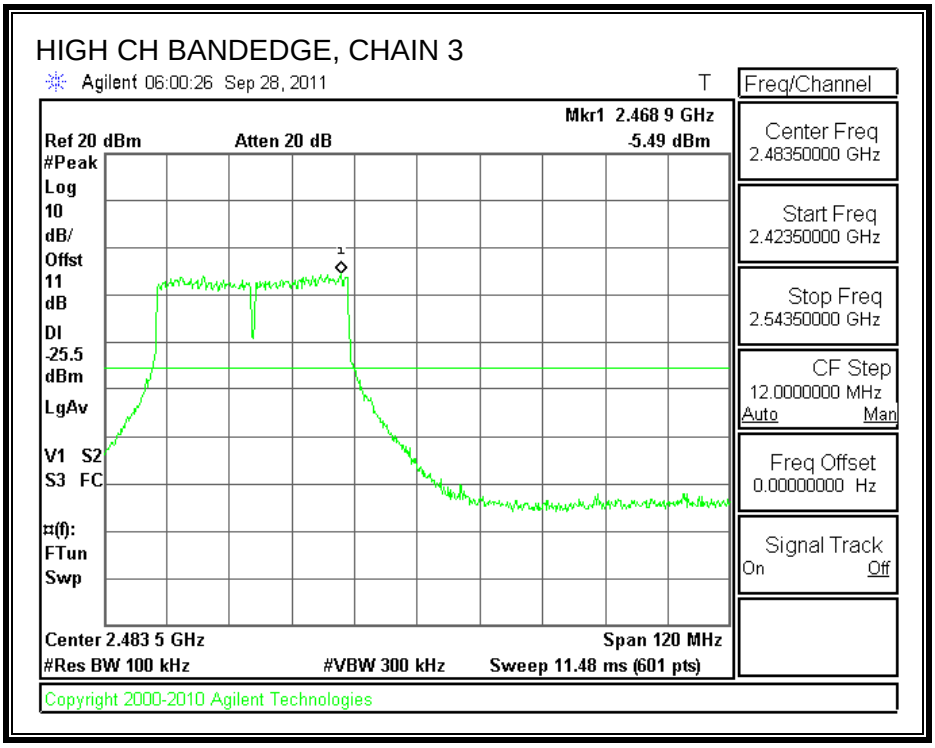


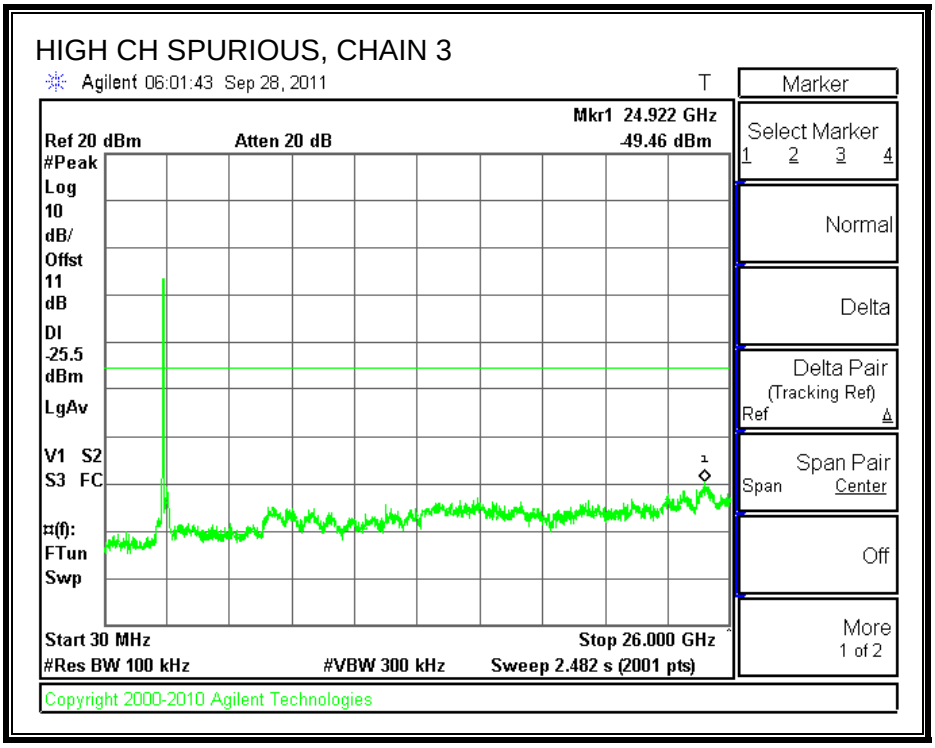
MID CH REFERENCE, CHAIN 3



MID CH SPURIOUS, CHAIN 3







7.7. 802.11n HT40 MCS16 3TX MODE IN THE 2.4 GHz BAND

7.7.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

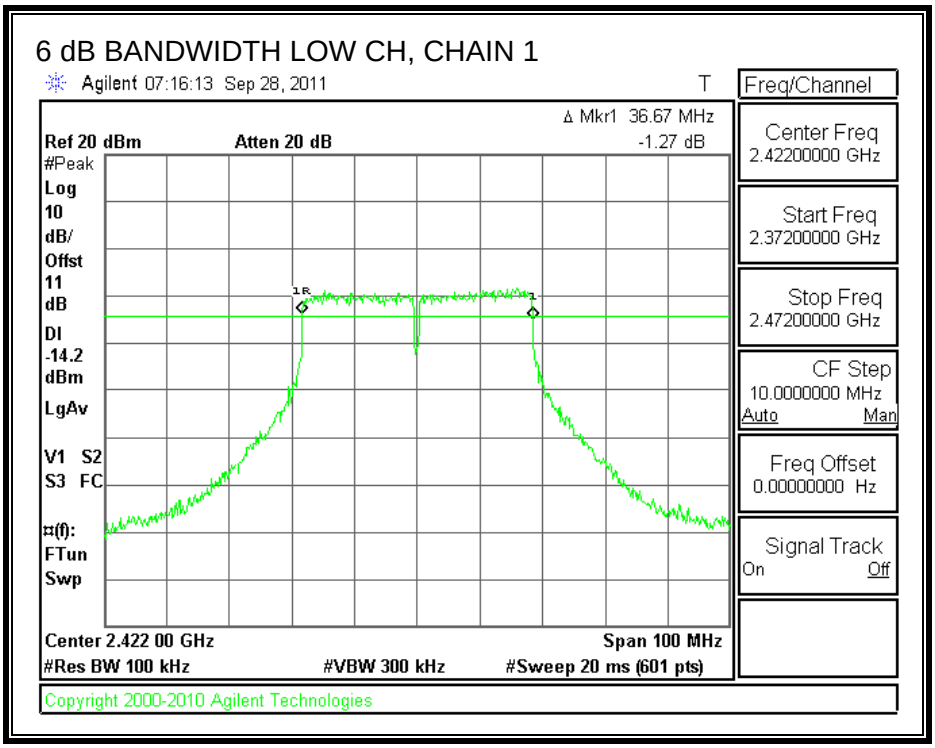
TEST PROCEDURE

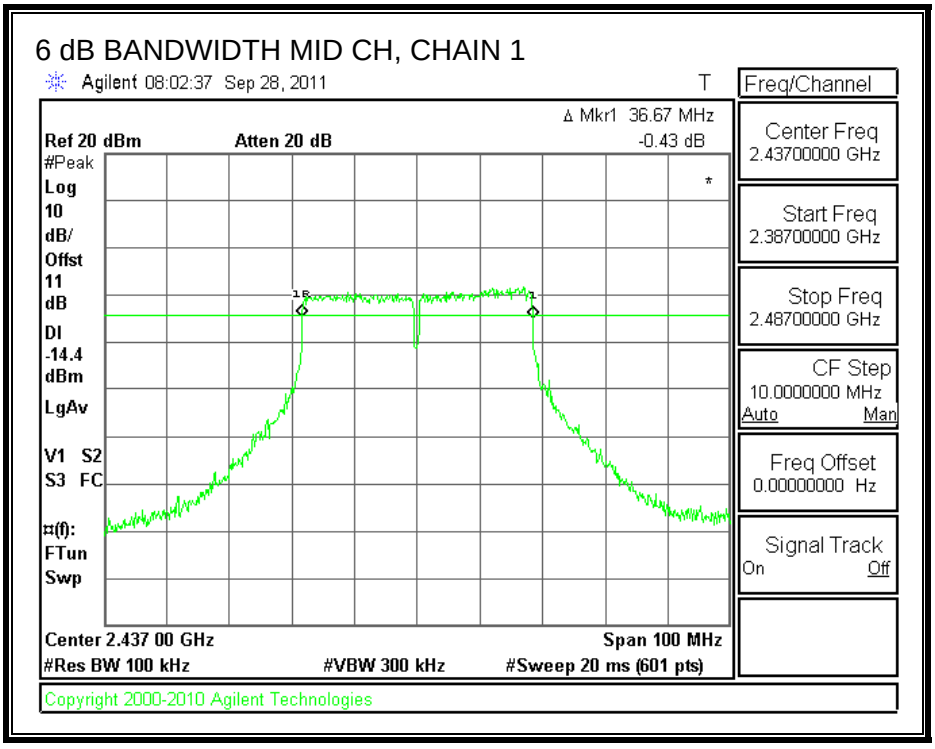
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

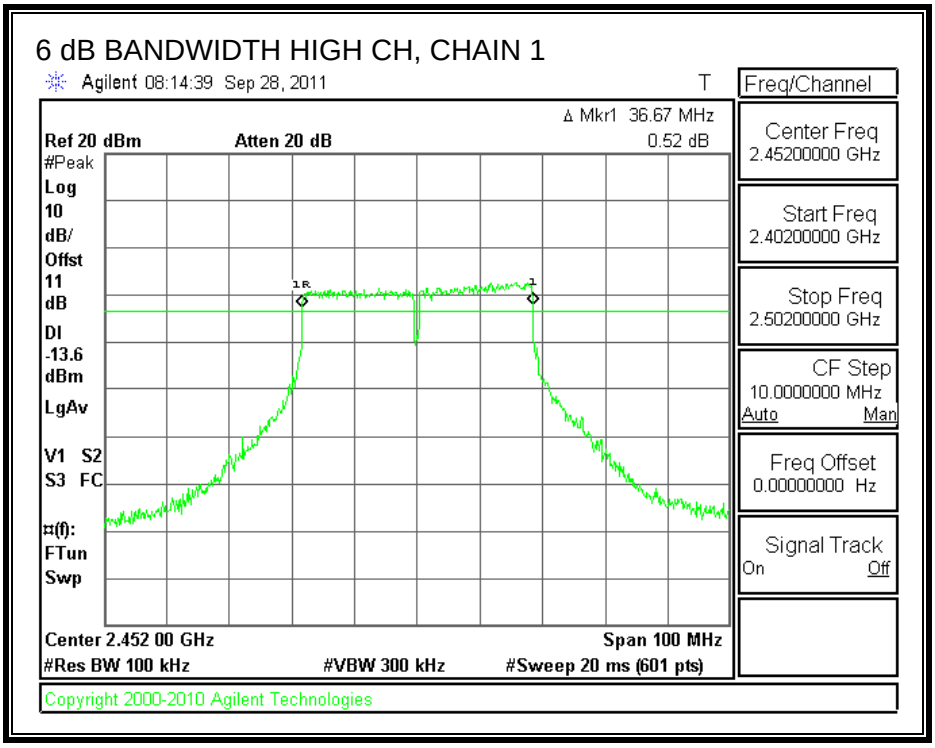
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Chain 3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2422	36.67	36.67	36.67	0.5
Middle	2437	36.67	36.67	36.67	0.5
High	2452	36.67	36.67	36.67	0.5

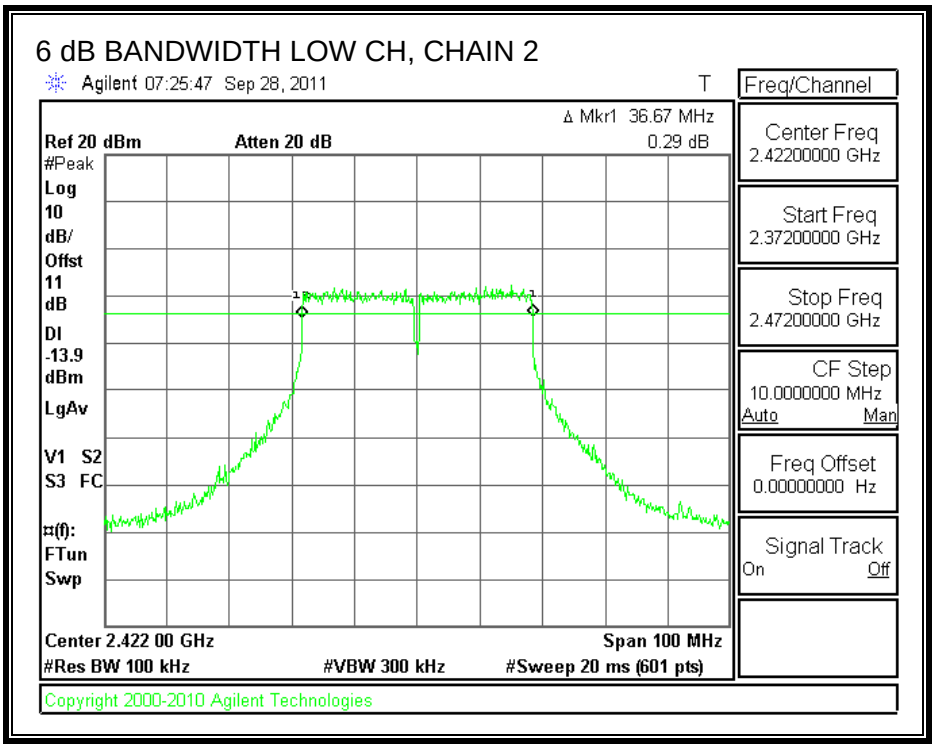
6 dB BANDWIDTH, CHAIN 1

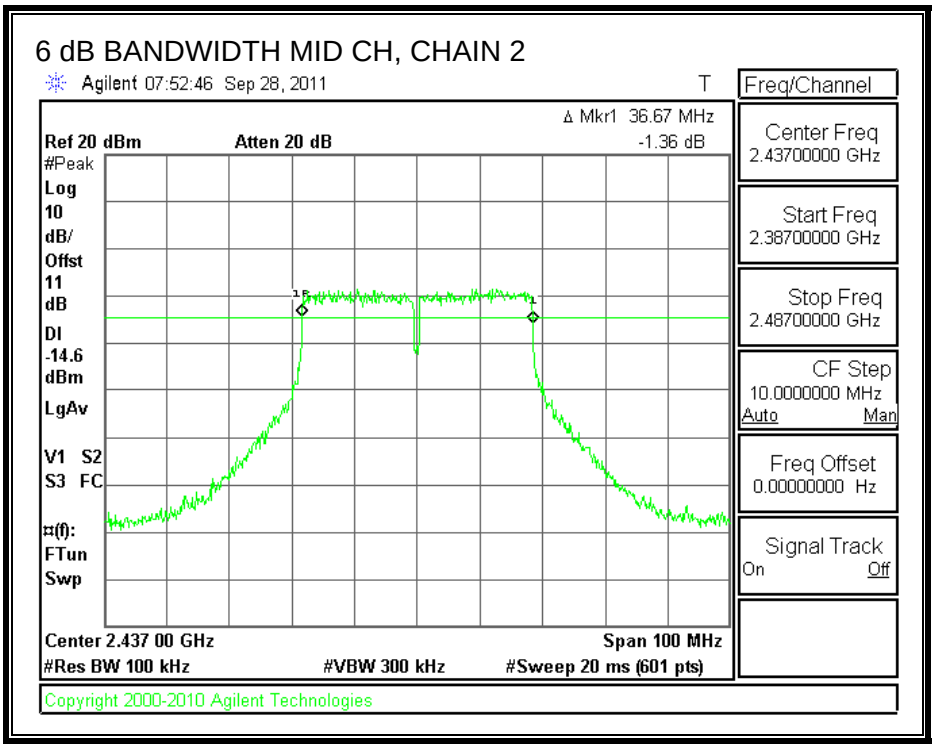


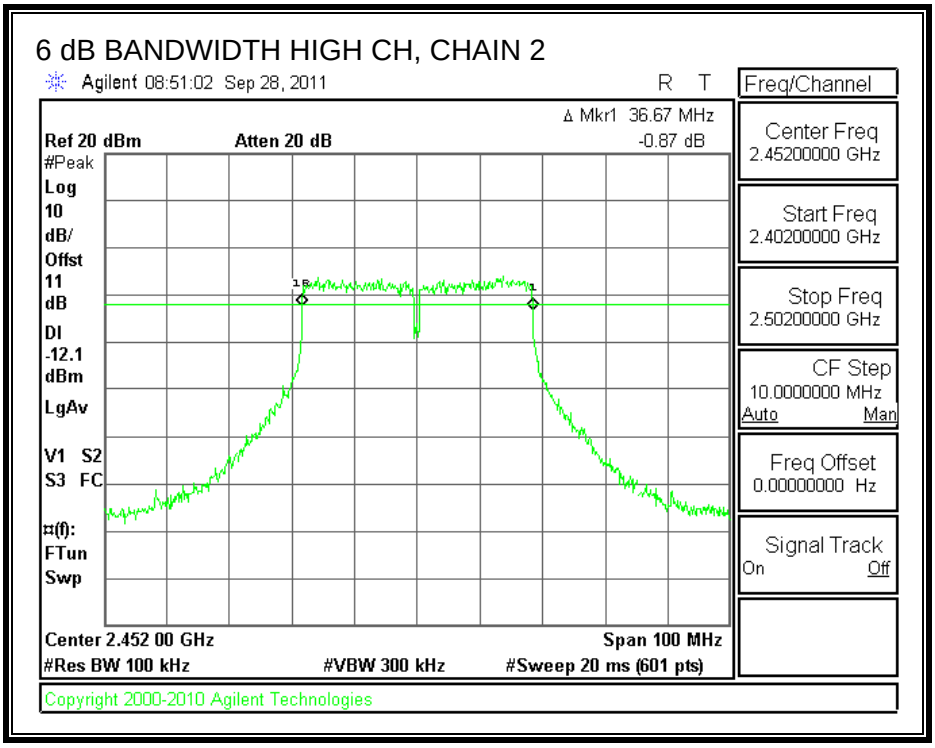




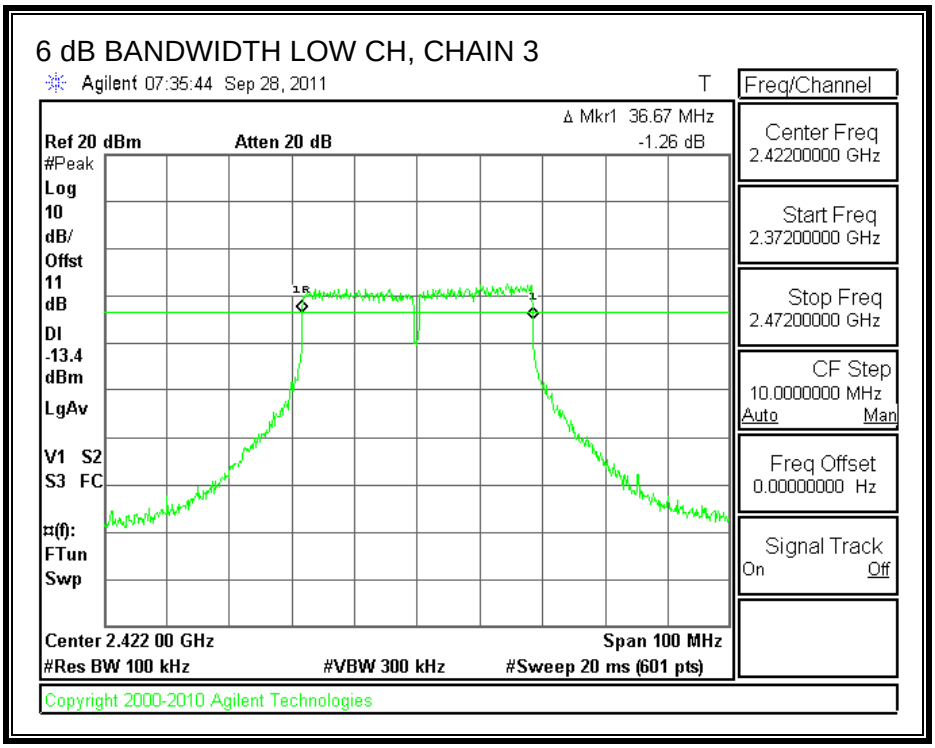
6 dB BANDWIDTH, CHAIN 2

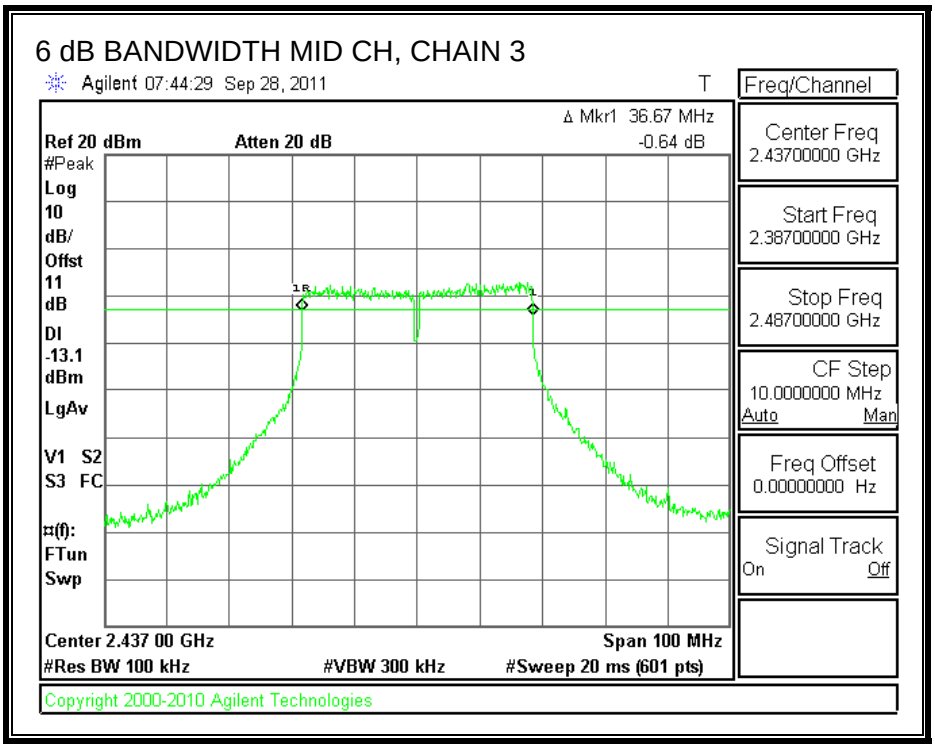


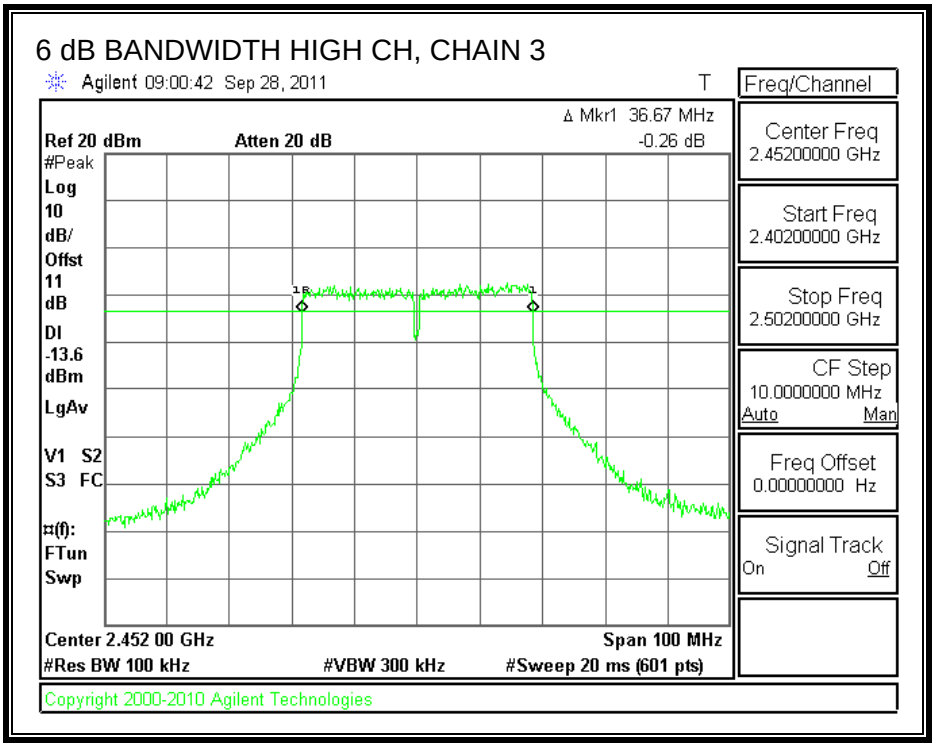




6 dB BANDWIDTH, CHAIN 3







7.7.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

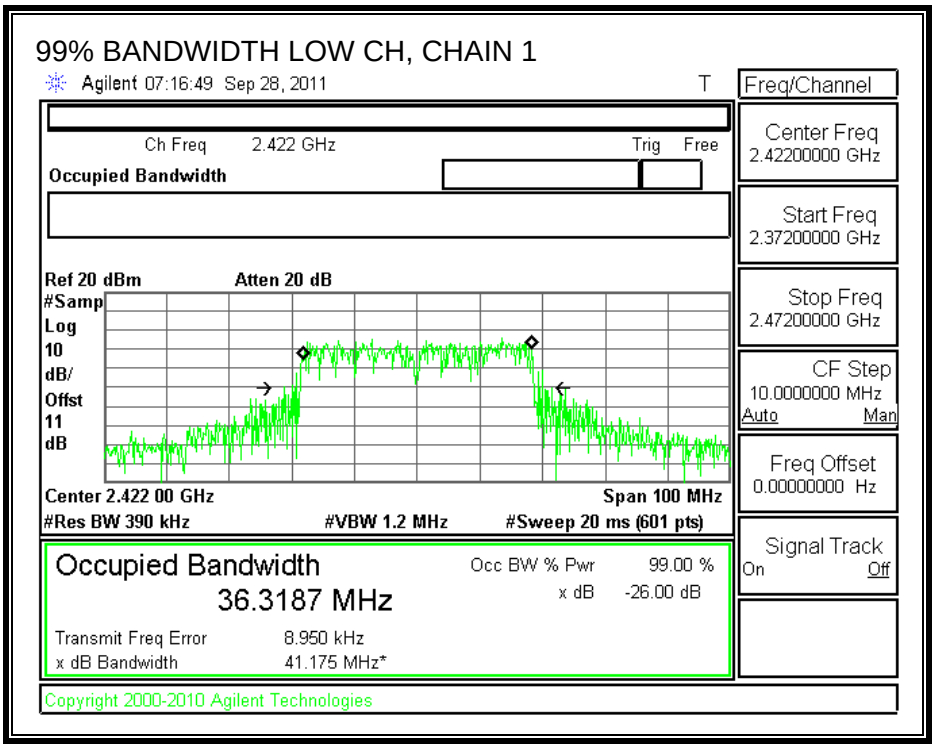
TEST PROCEDURE

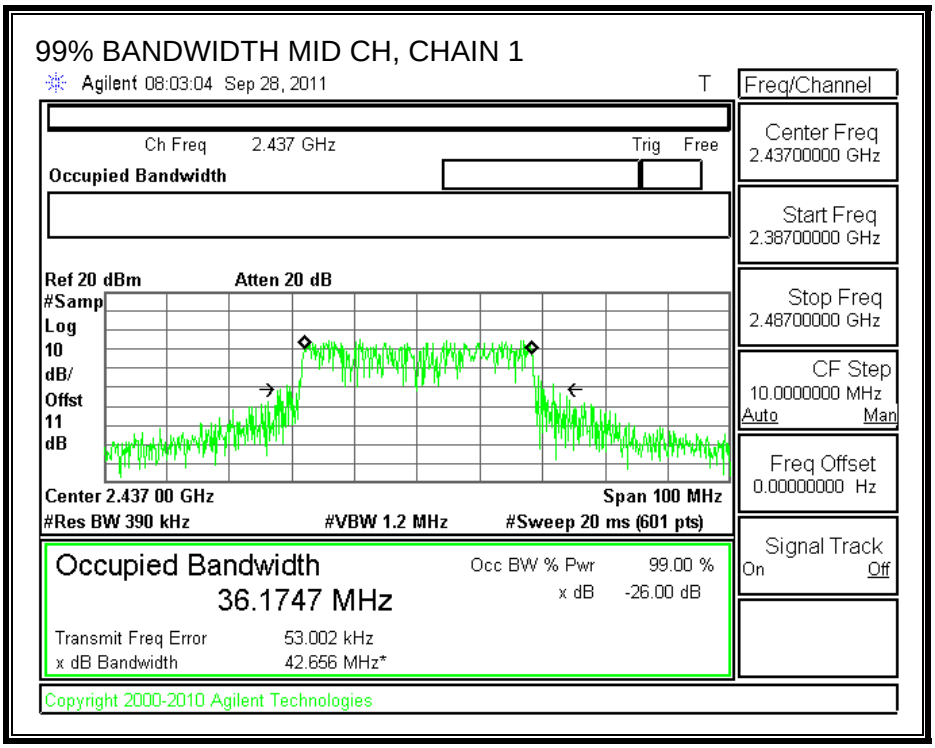
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

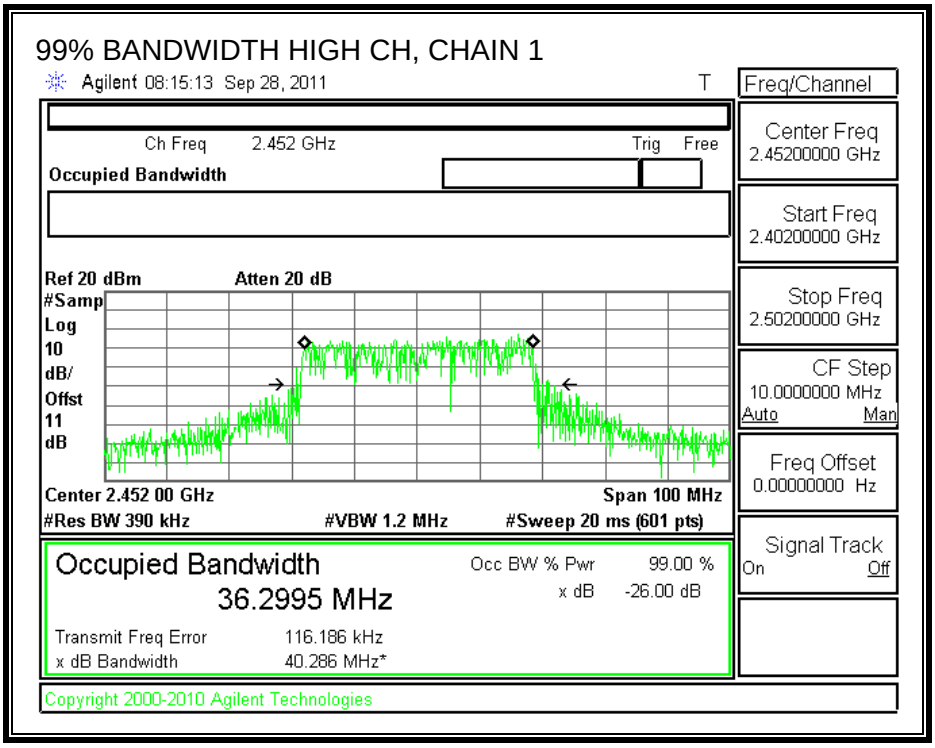
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)	Chain 3 99% Bandwidth (MHz)
Low	2422	36.3187	36.3564	36.3699
Middle	2437	36.1747	36.3169	36.2190
High	2452	36.2995	36.2446	36.4075

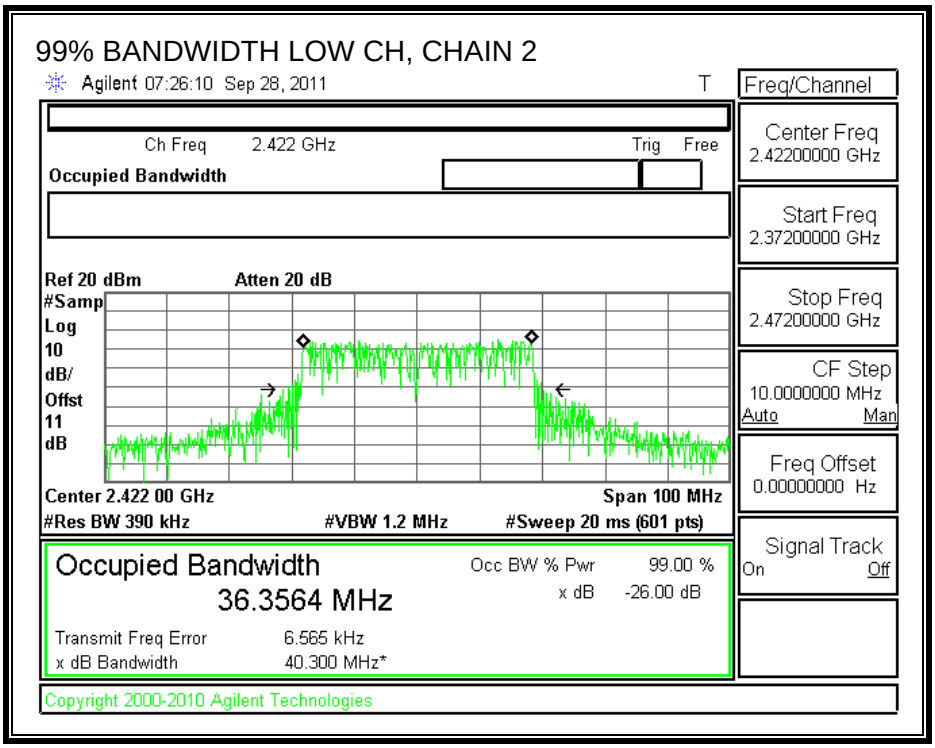
99% BANDWIDTH, CHAIN 1

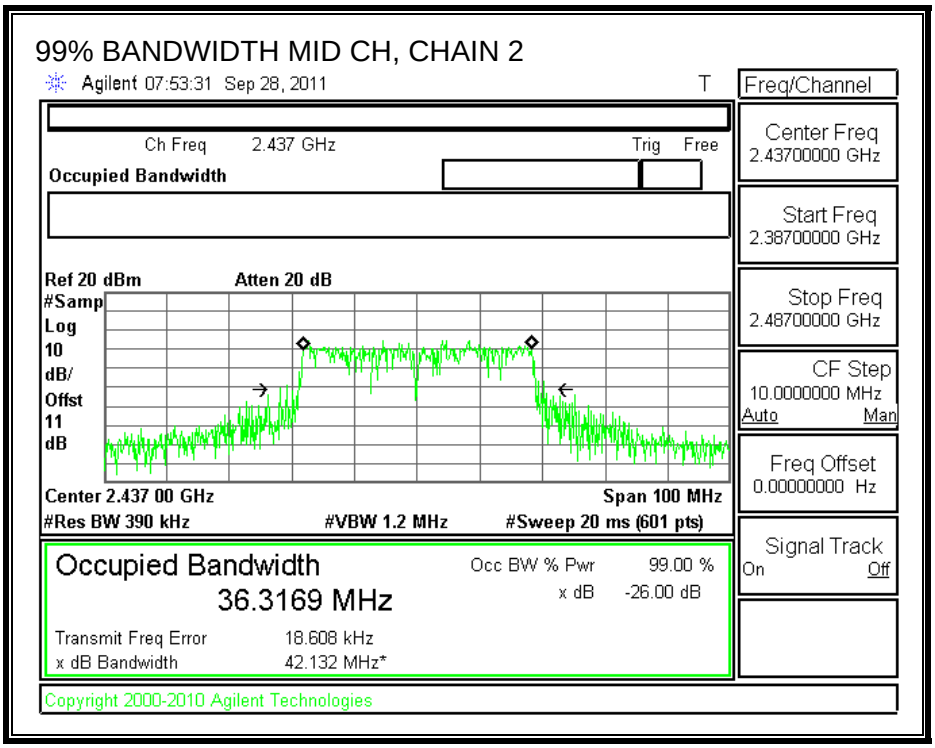


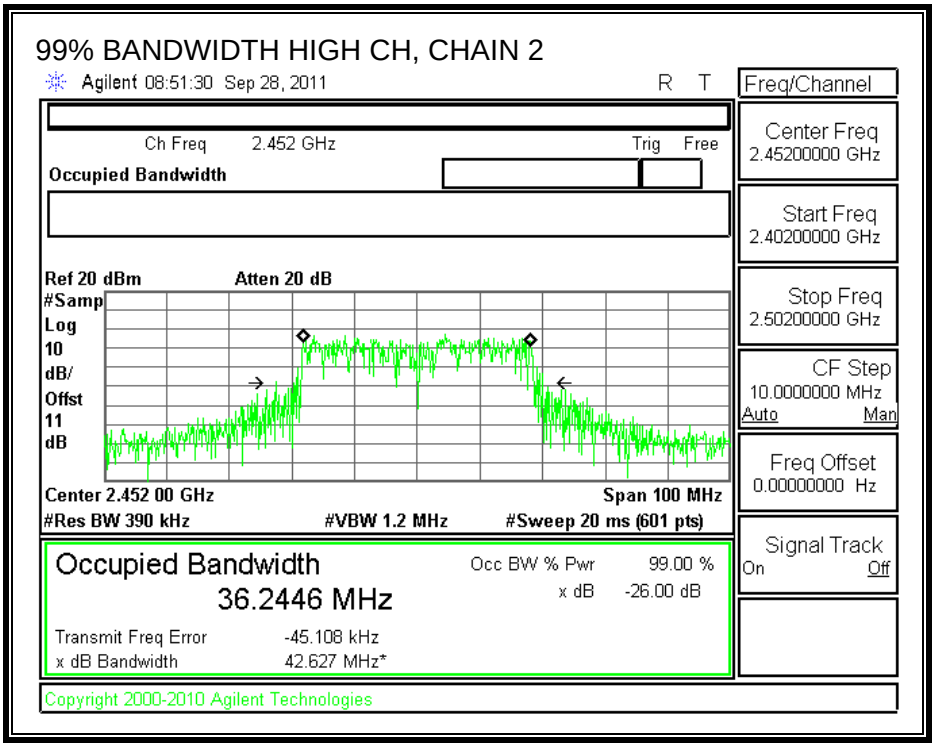




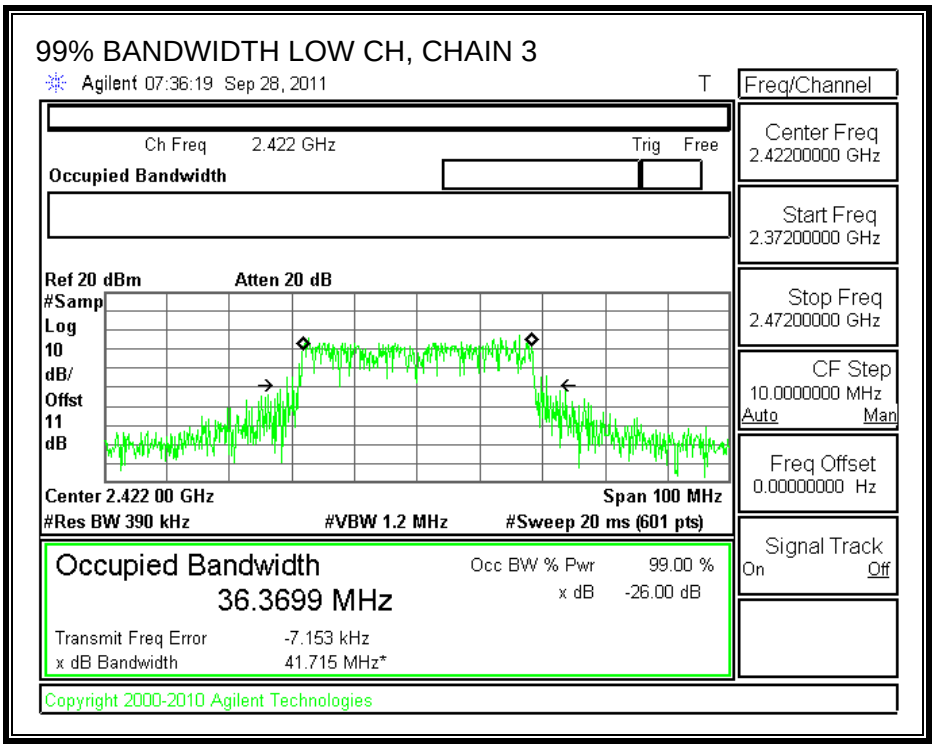
99% BANDWIDTH, CHAIN 2

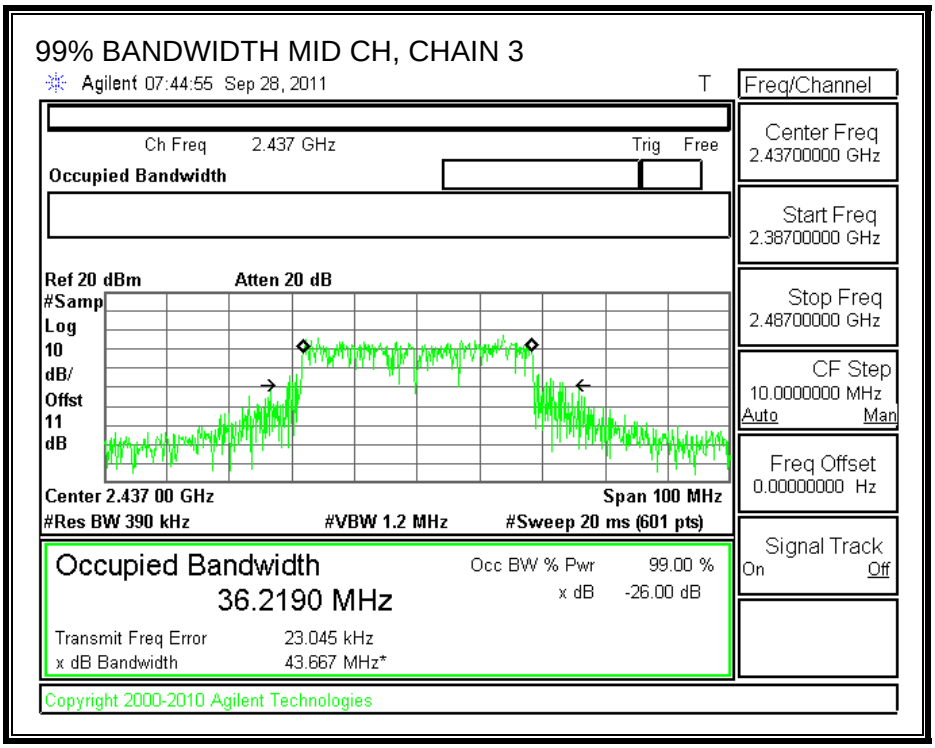


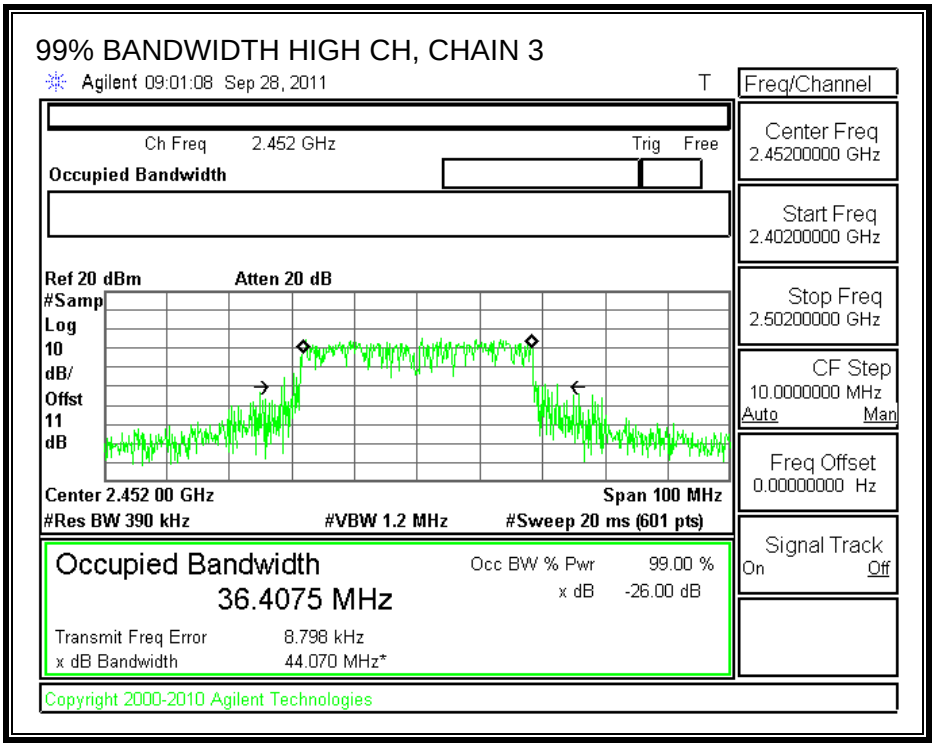




99% BANDWIDTH, CHAIN 3







7.7.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

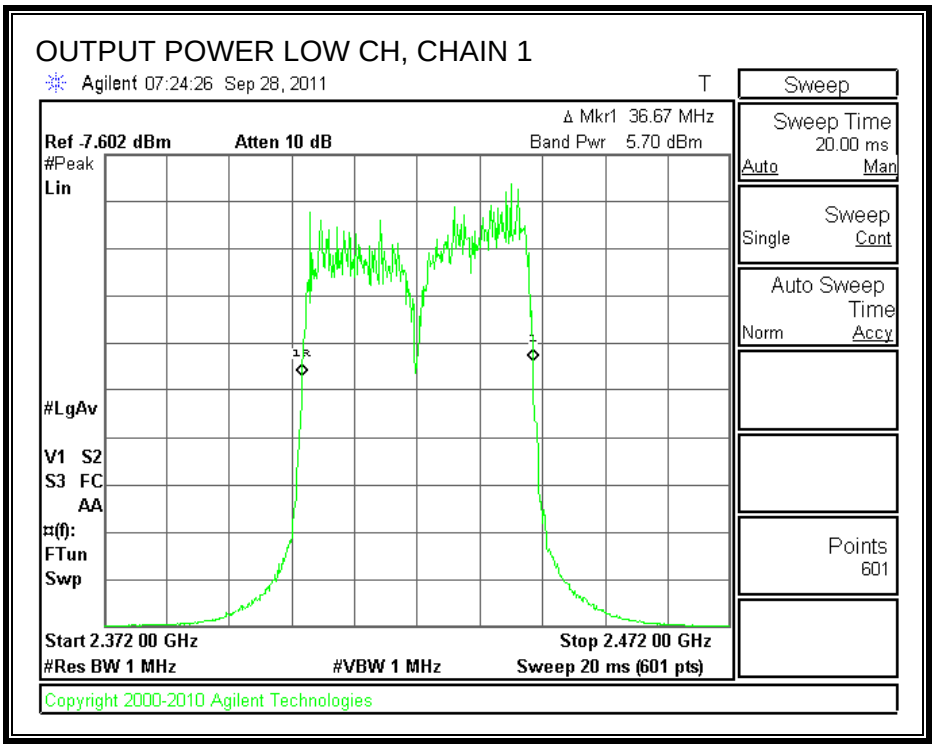
TEST PROCEDURE

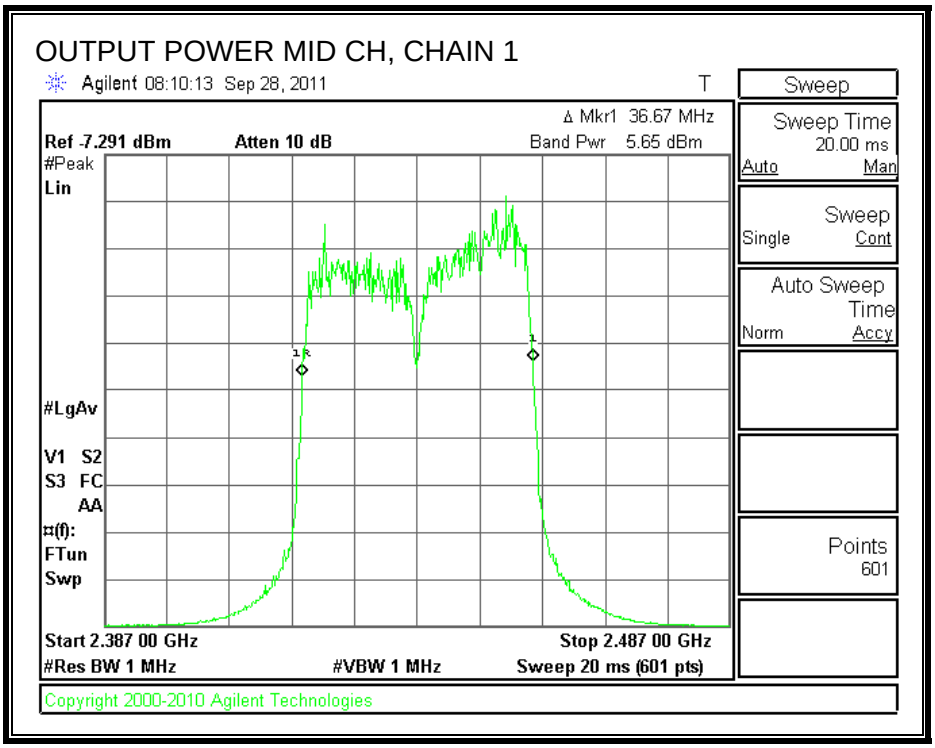
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

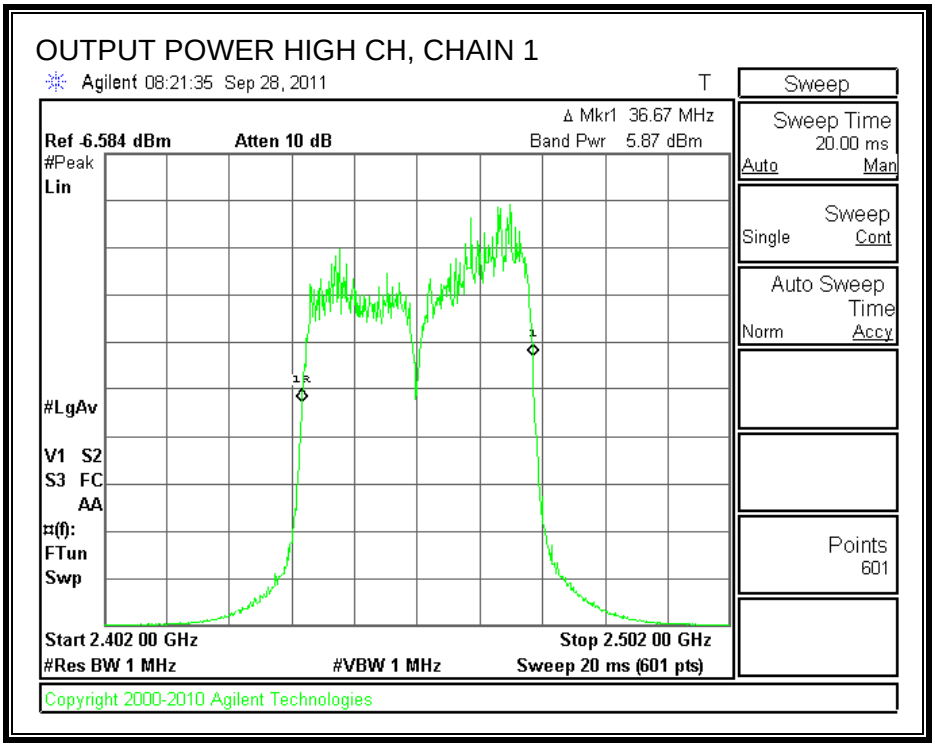
RESULTS

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	5.70	6.45	7.22	11.00	22.27	30.00	-7.73
Mid	2437	5.65	6.18	7.16	11.00	22.15	30.00	-7.85
High	2452	5.87	6.55	7.14	11.00	22.32	30.00	-7.68

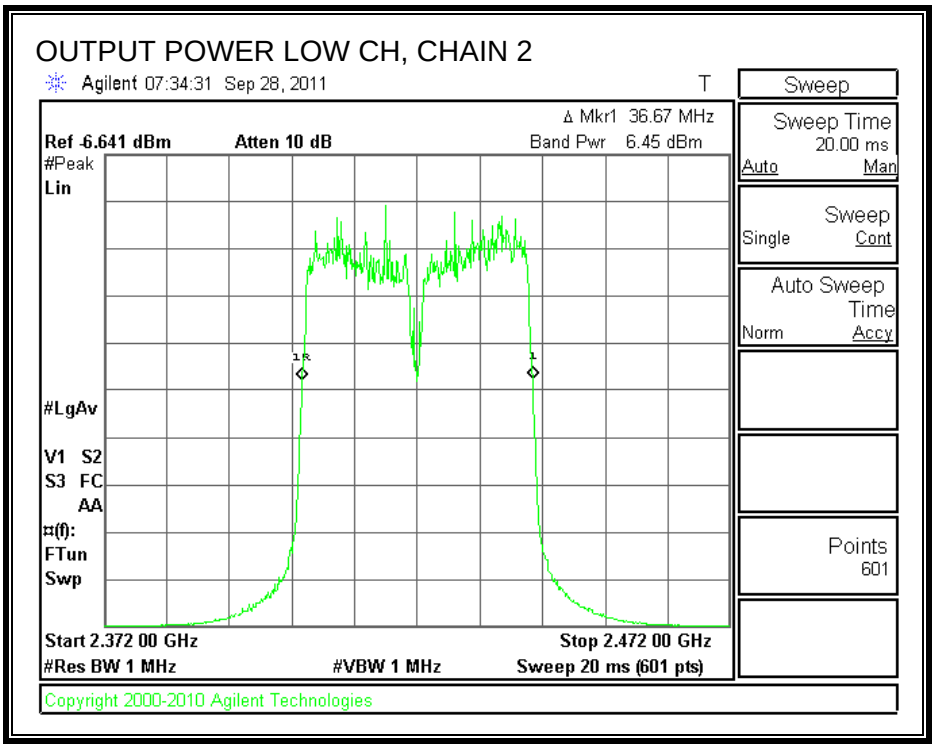
CHAIN 1 OUTPUT POWER

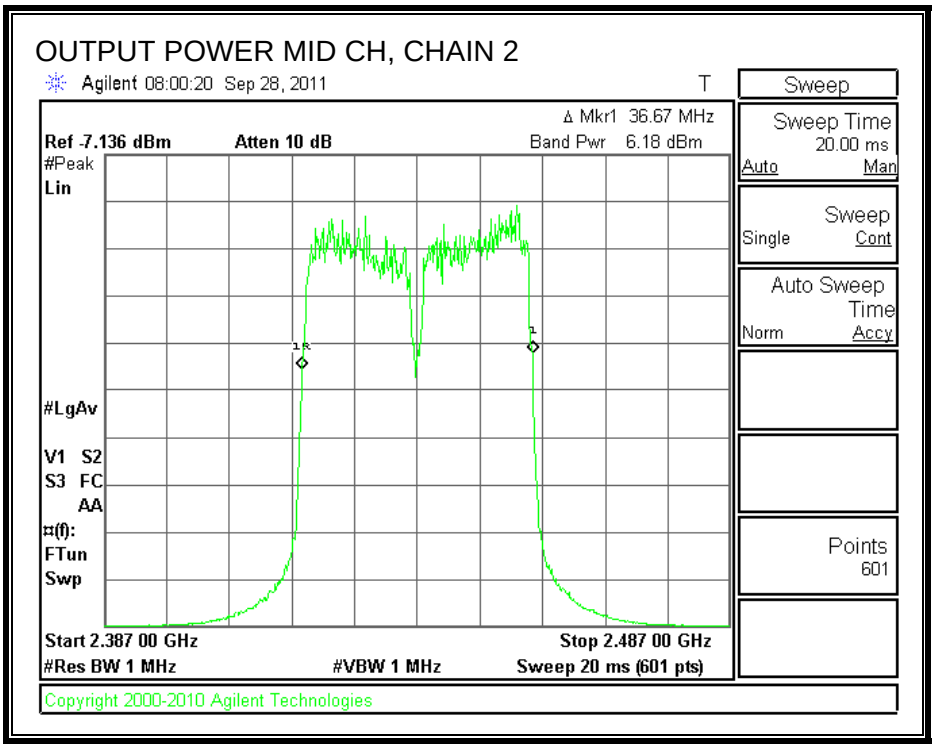


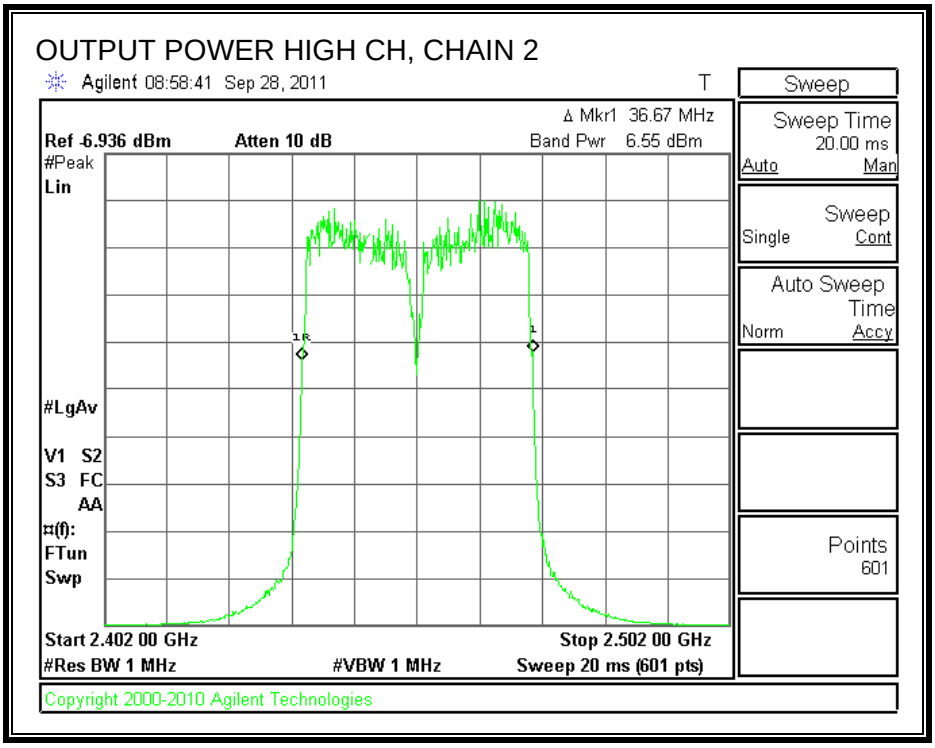




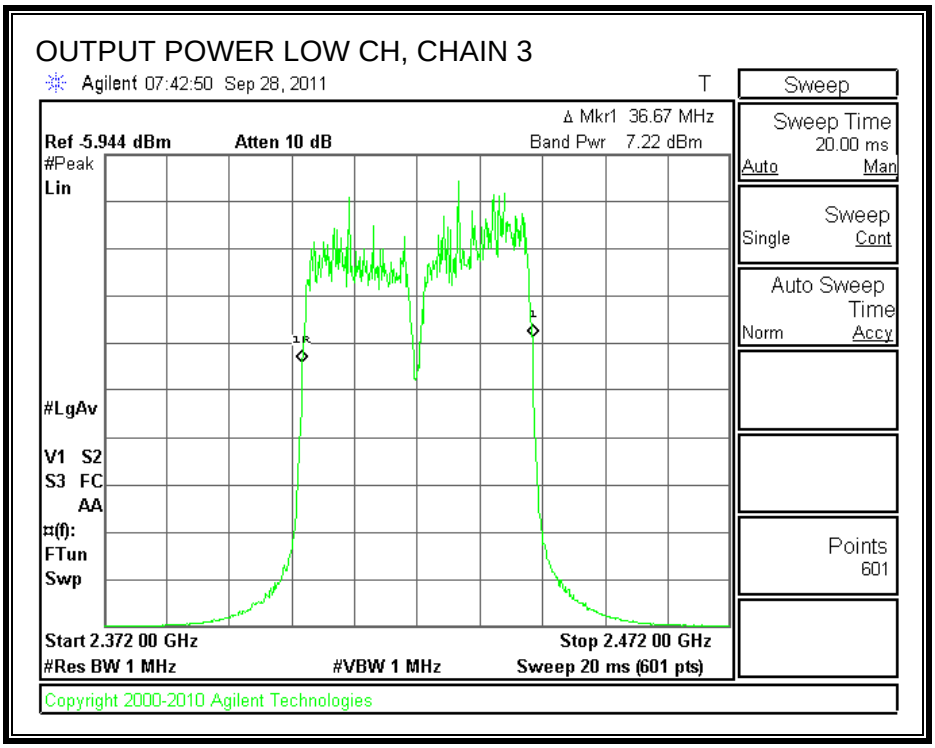
CHAIN 2 OUTPUT POWER

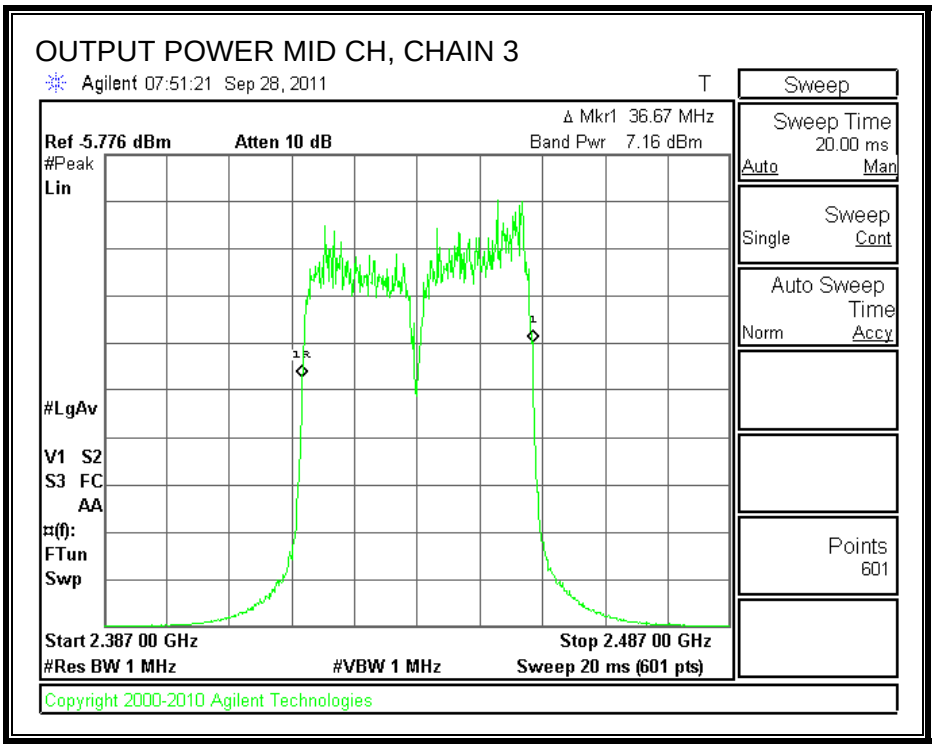


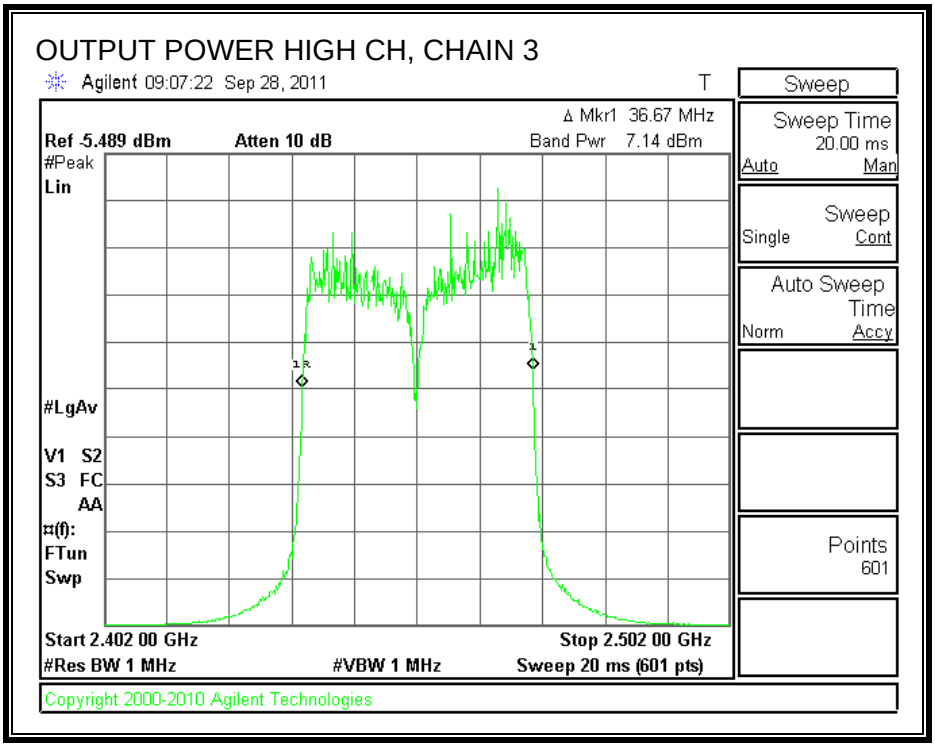




CHAIN 3 OUTPUT POWER







7.7.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1.0 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	2422	10.00	10.00	10.00	14.77
Middle	2437	10.00	10.00	10.00	14.77
High	2452	10.00	10.00	10.00	14.77

7.7.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

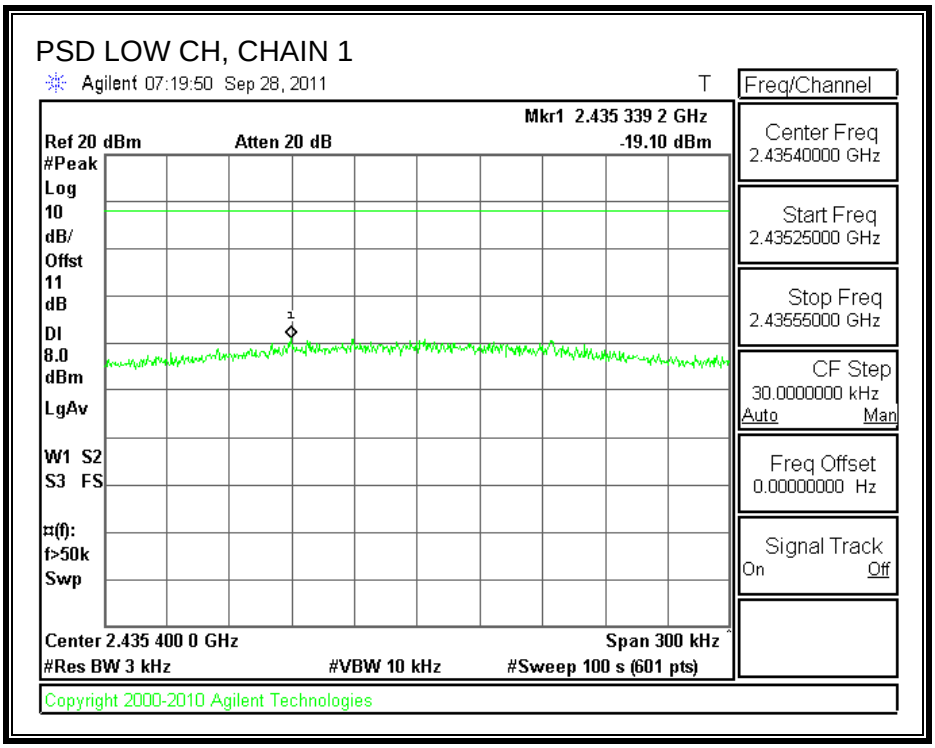
TEST PROCEDURE

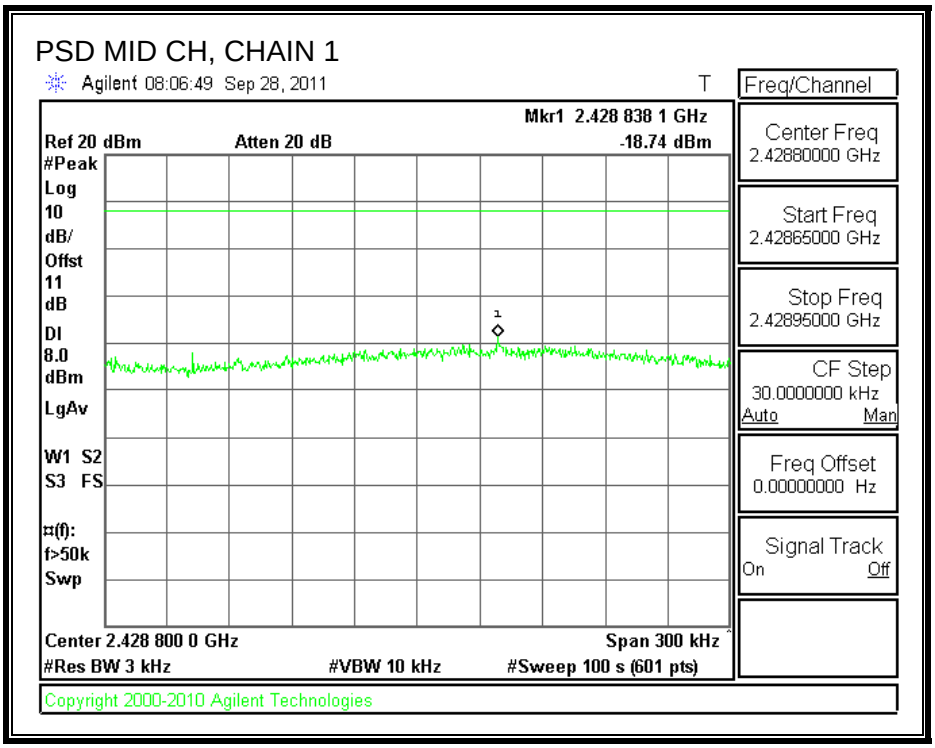
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

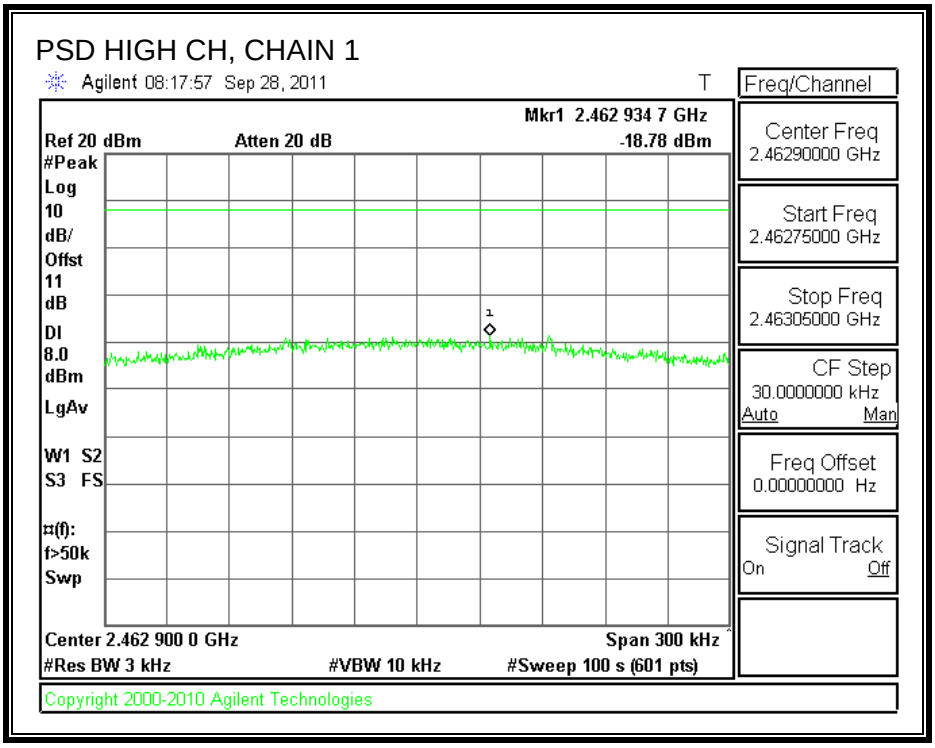
RESULTS

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-19.10	-19.53	-17.26	-13.74	8	-21.74
Middle	2437	-18.74	-18.95	-17.95	-13.75	8	-21.75
High	2452	-18.78	-17.91	-17.33	-13.20	8	-21.20

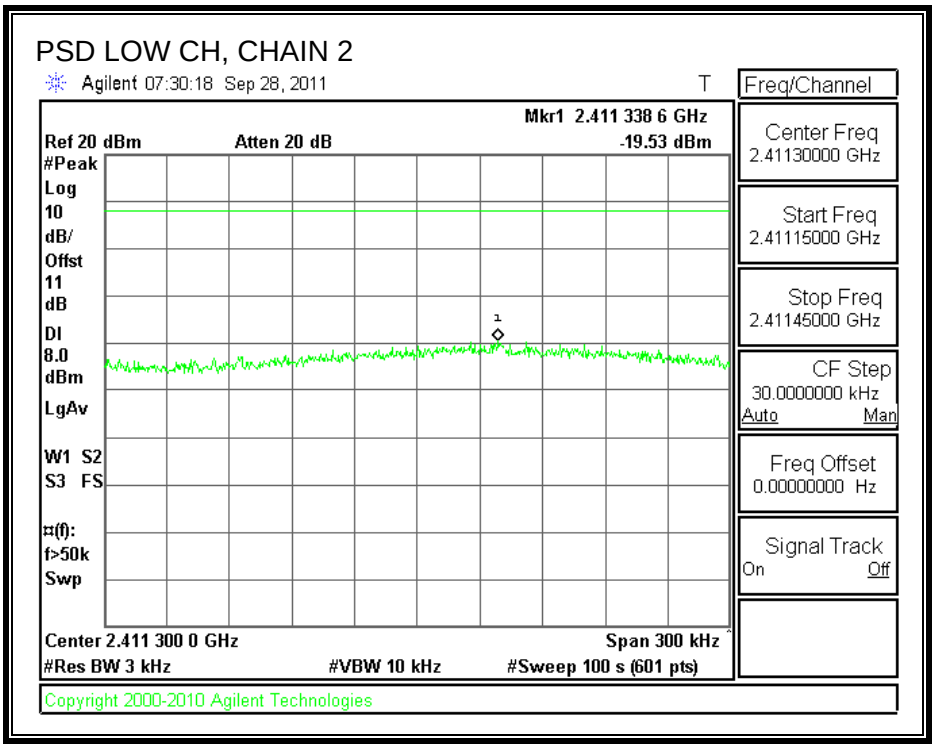
POWER SPECTRAL DENSITY, CHAIN 1

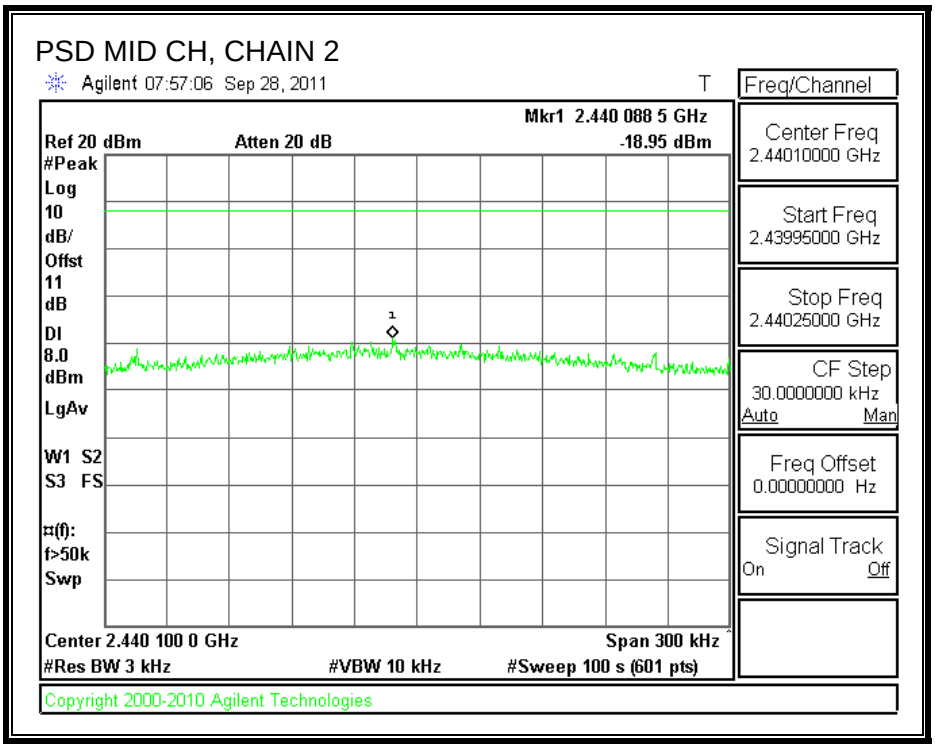


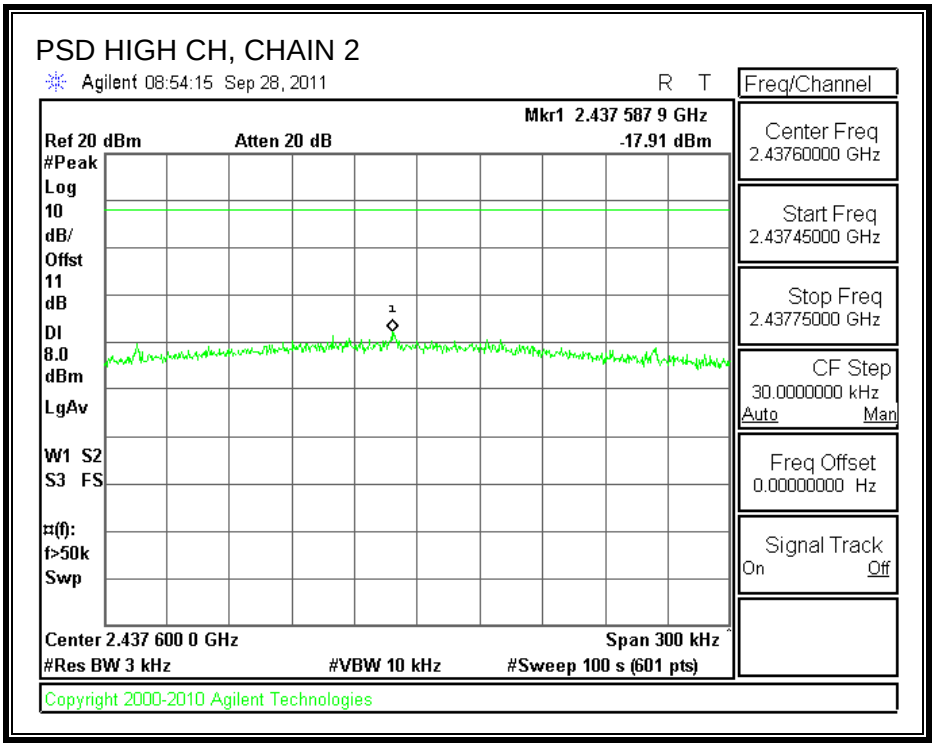




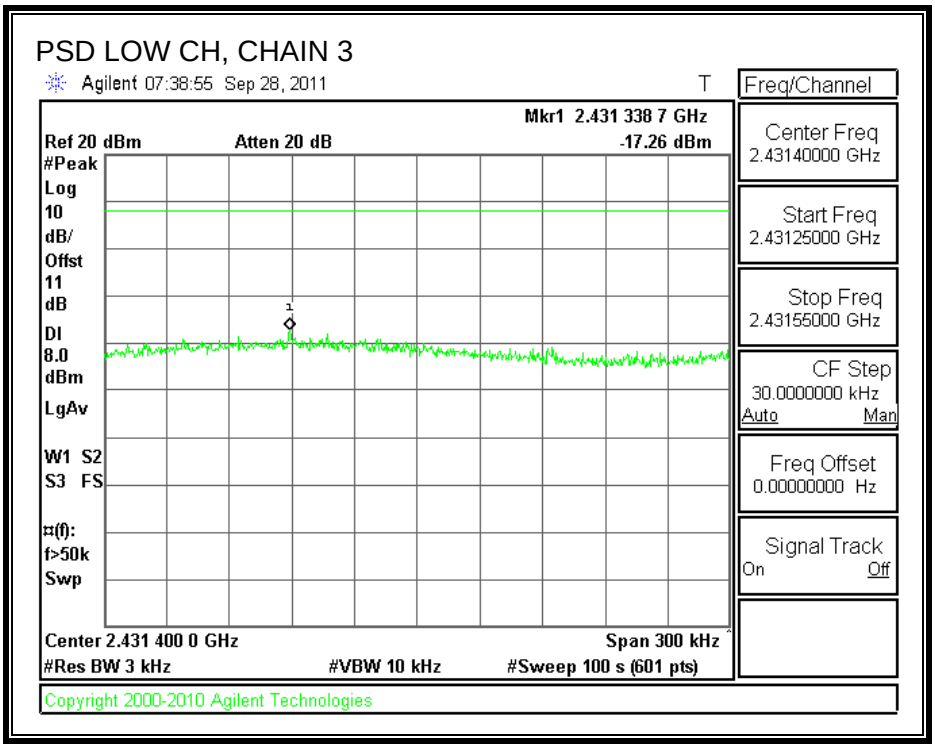
POWER SPECTRAL DENSITY, CHAIN 2

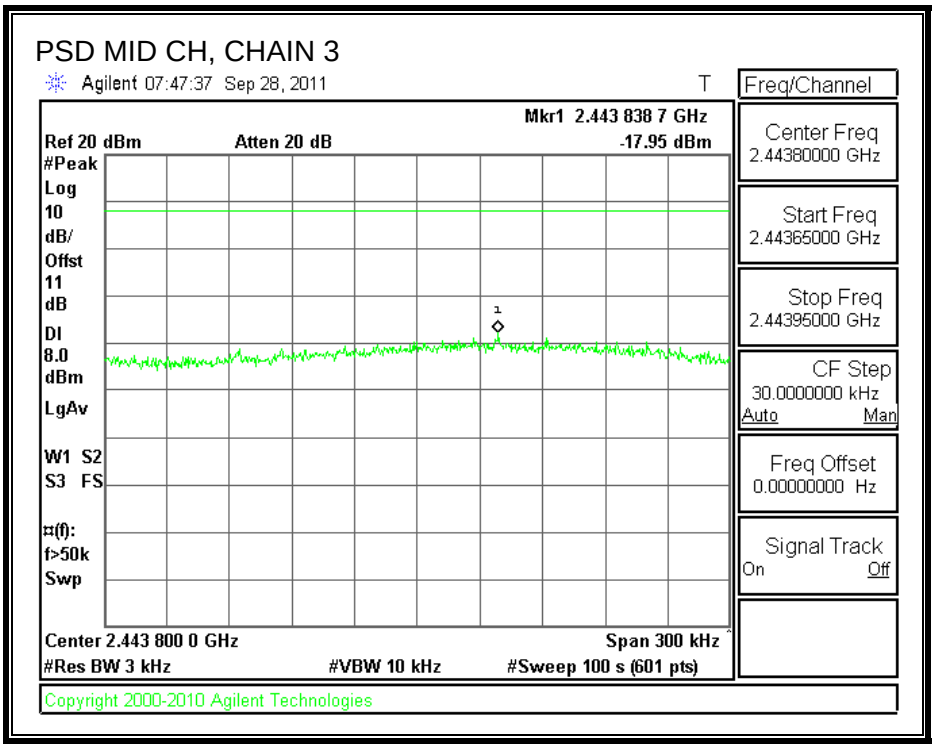


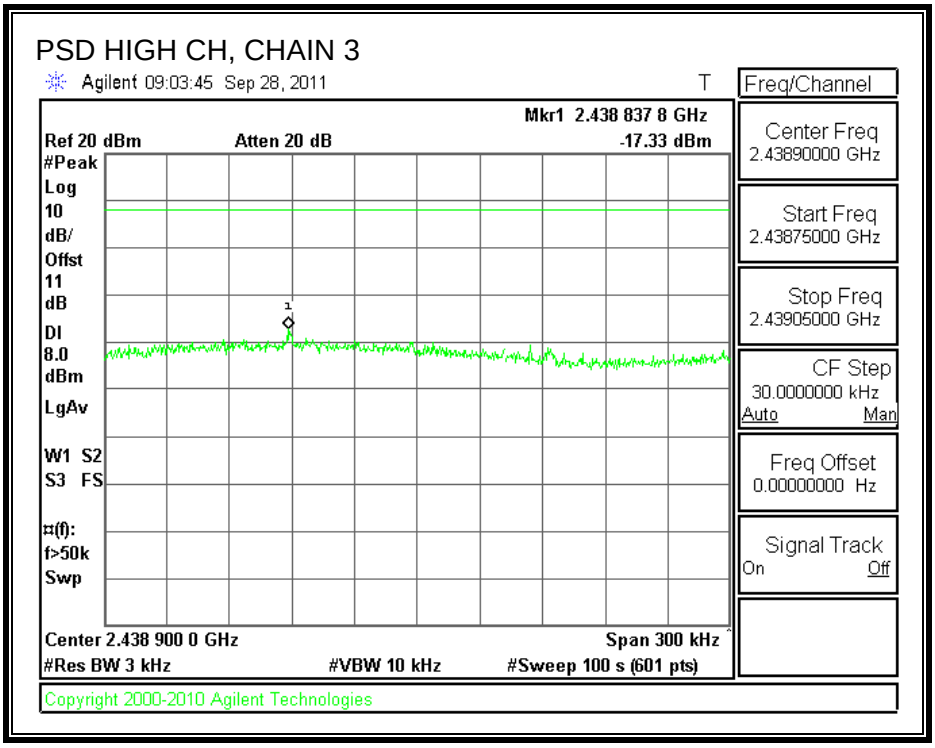




POWER SPECTRAL DENSITY, CHAIN 3







7.7.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

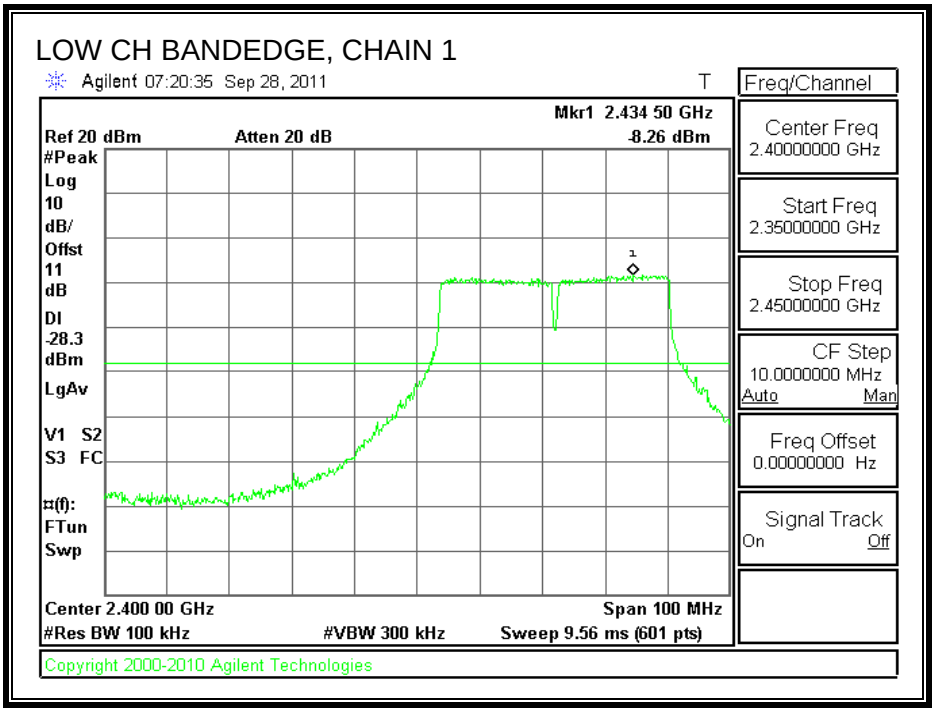
TEST PROCEDURE

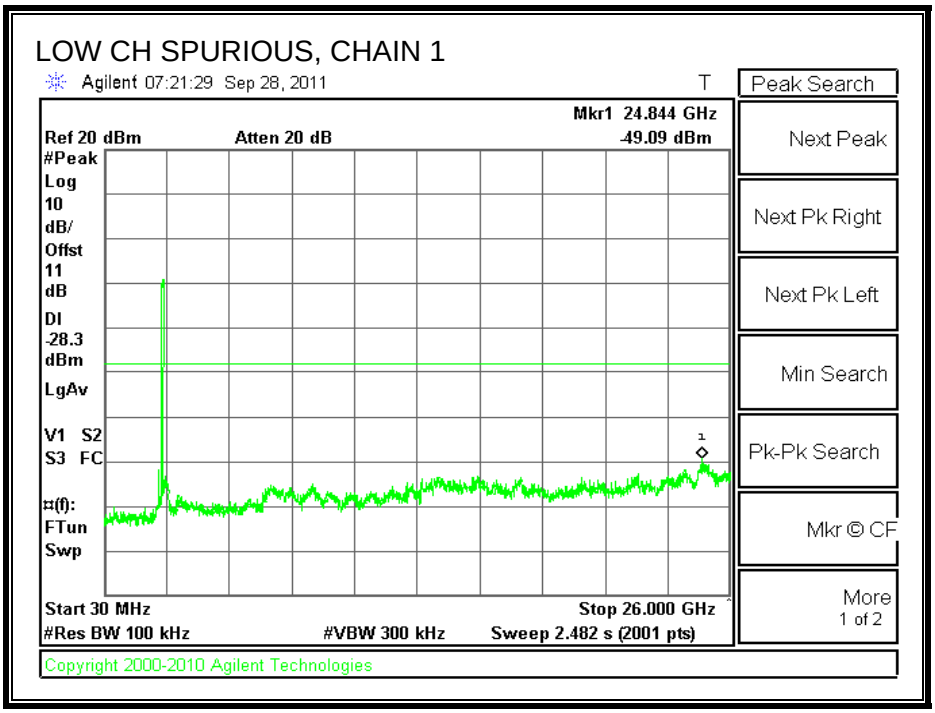
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

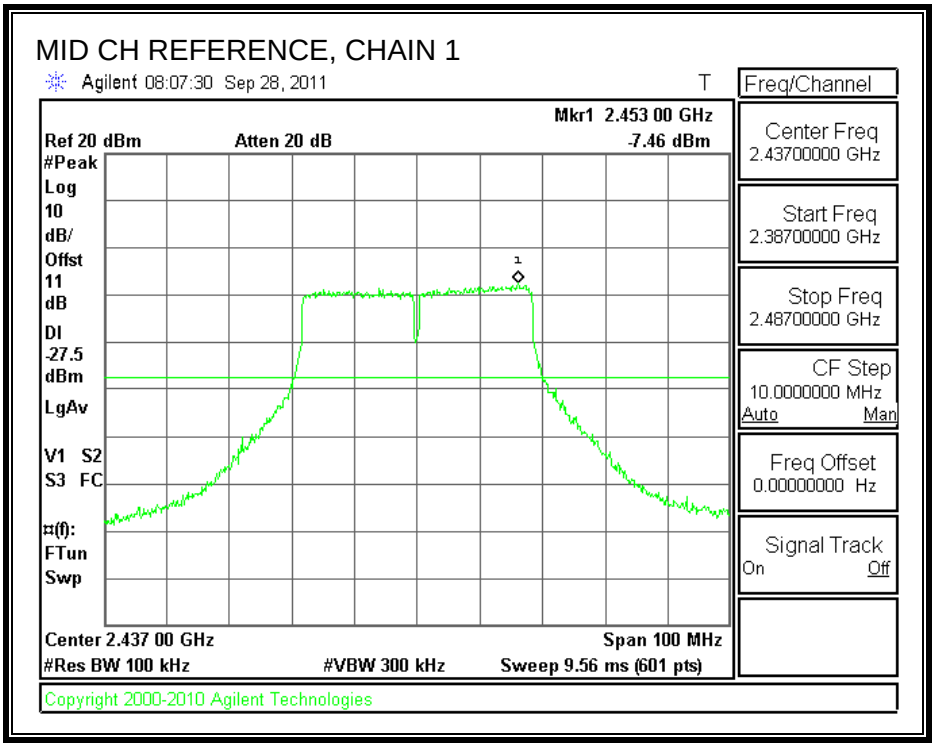
RESULTS

CHAIN 1 SPURIOUS EMISSIONS

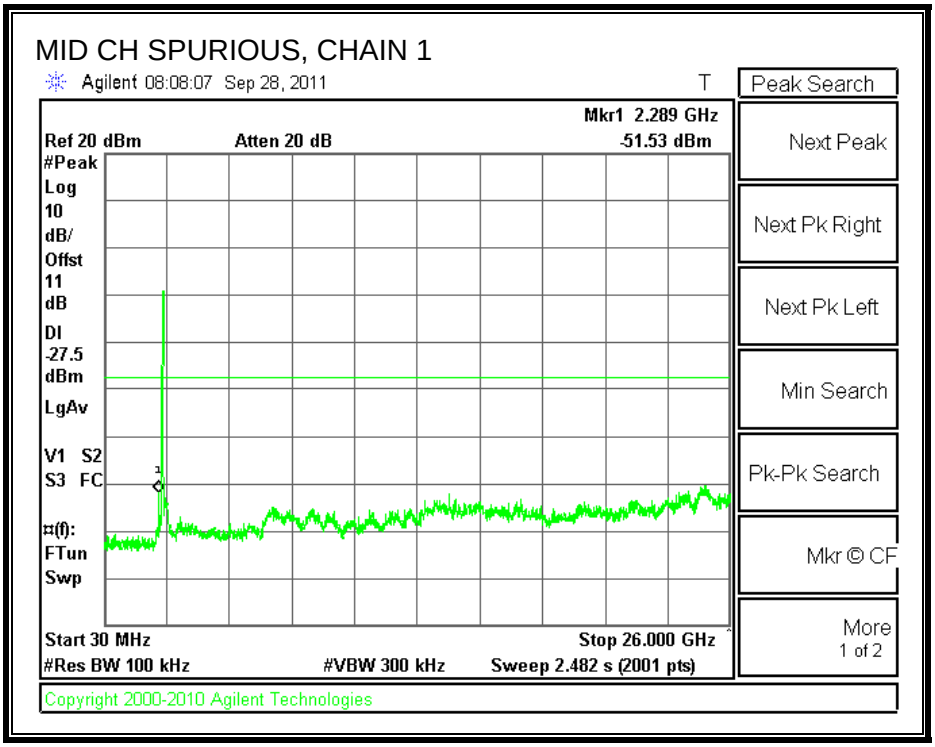




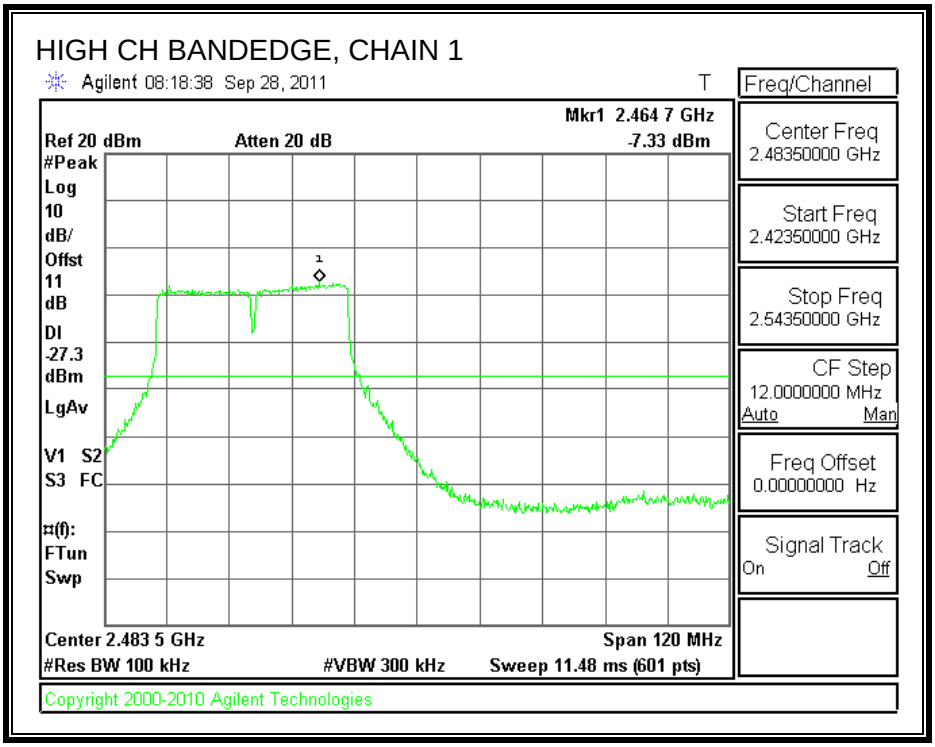
MID CH REFERENCE, CHAIN 1



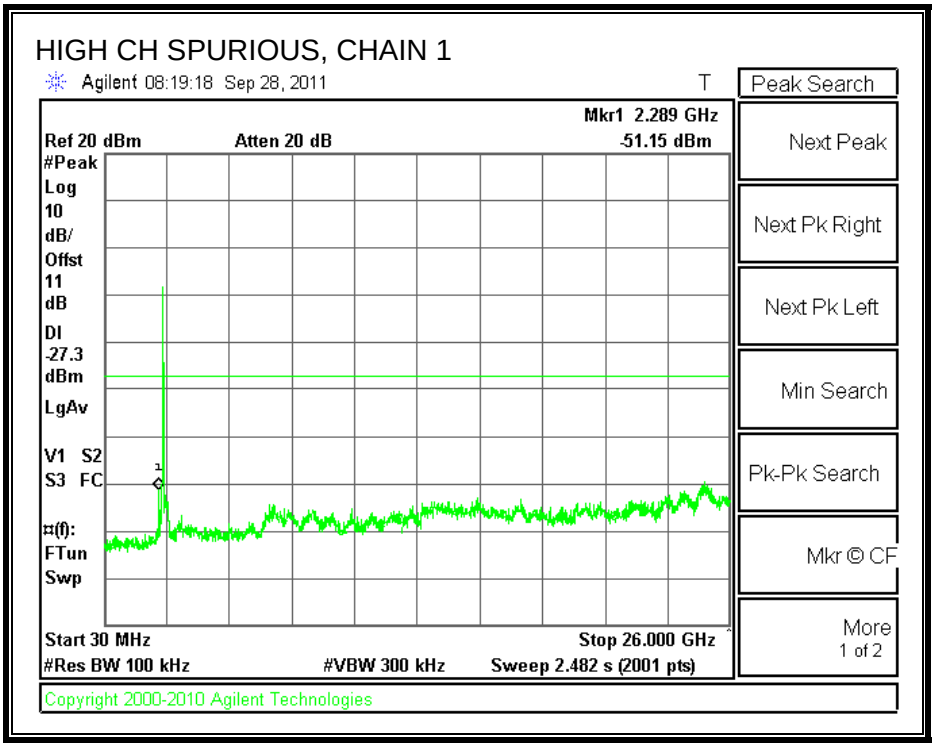
MID CH SPURIOUS, CHAIN 1



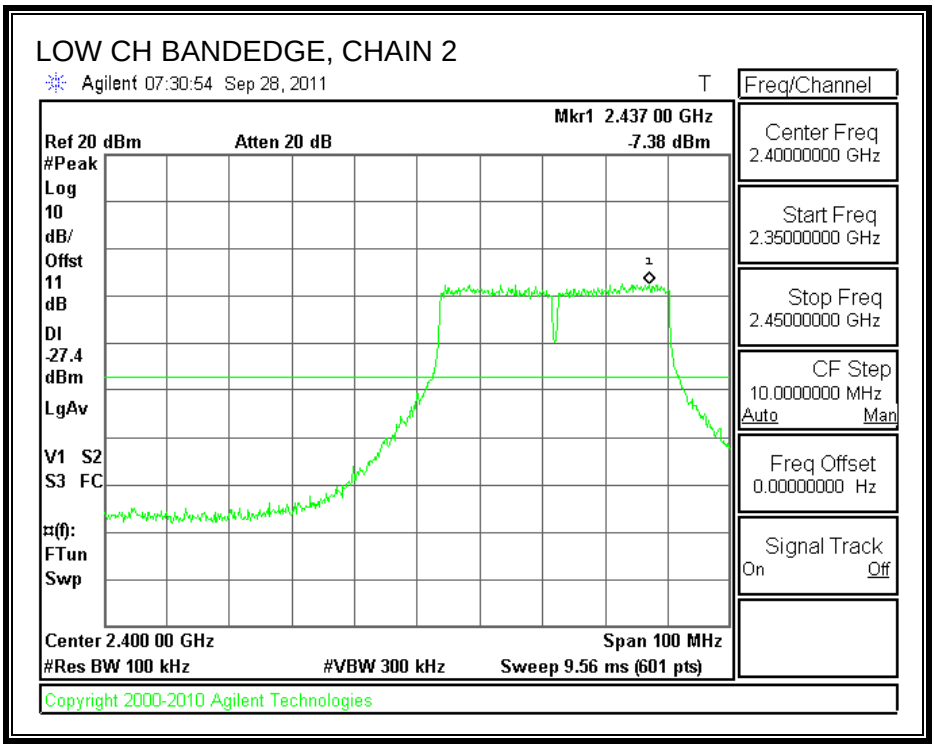
HIGH CH BANDEDGE, CHAIN 1

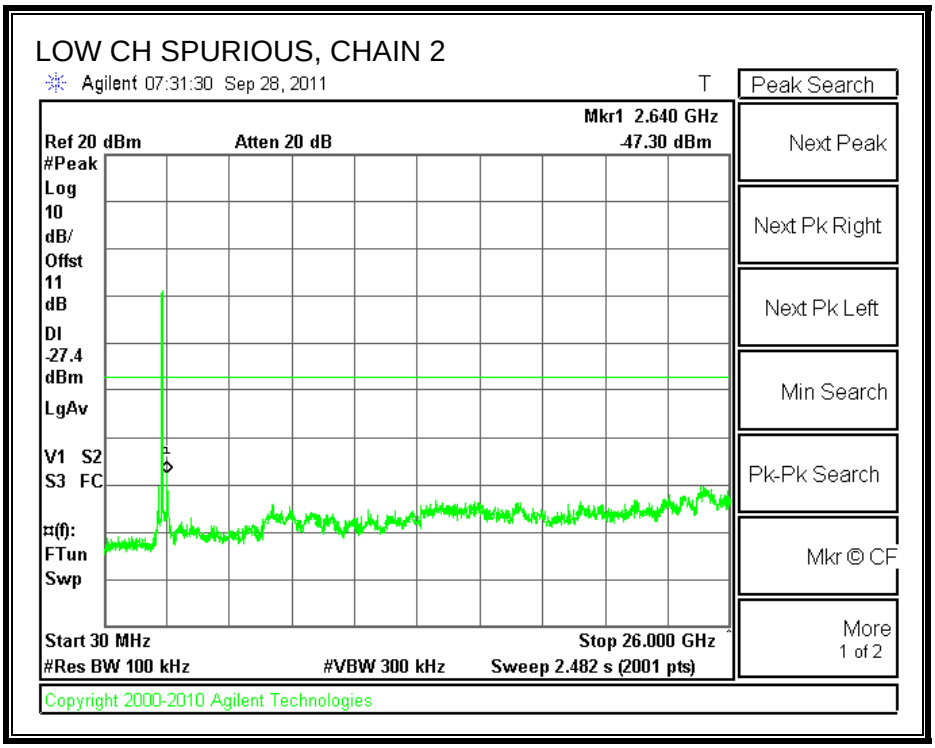


HIGH CH SPURIOUS, CHAIN 1

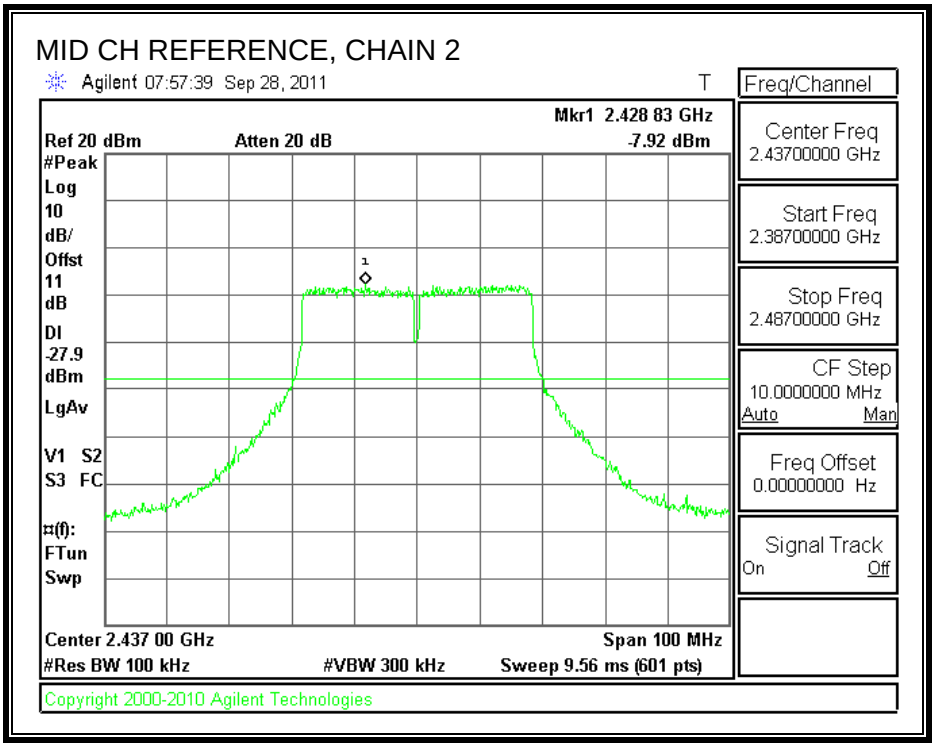


CHAIN 2 SPURIOUS EMISSIONS

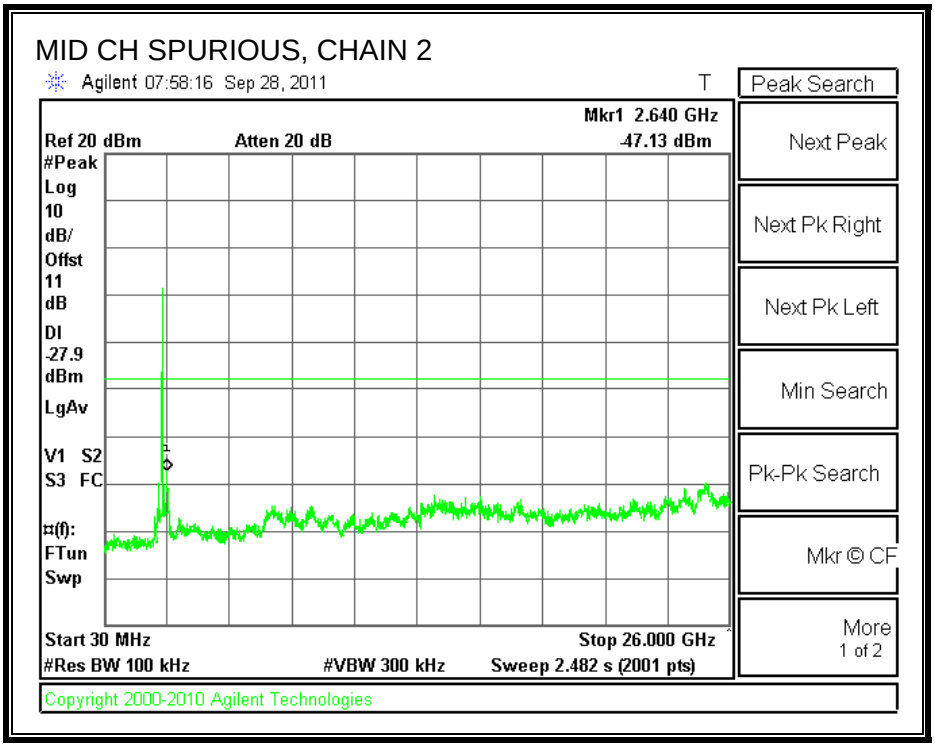




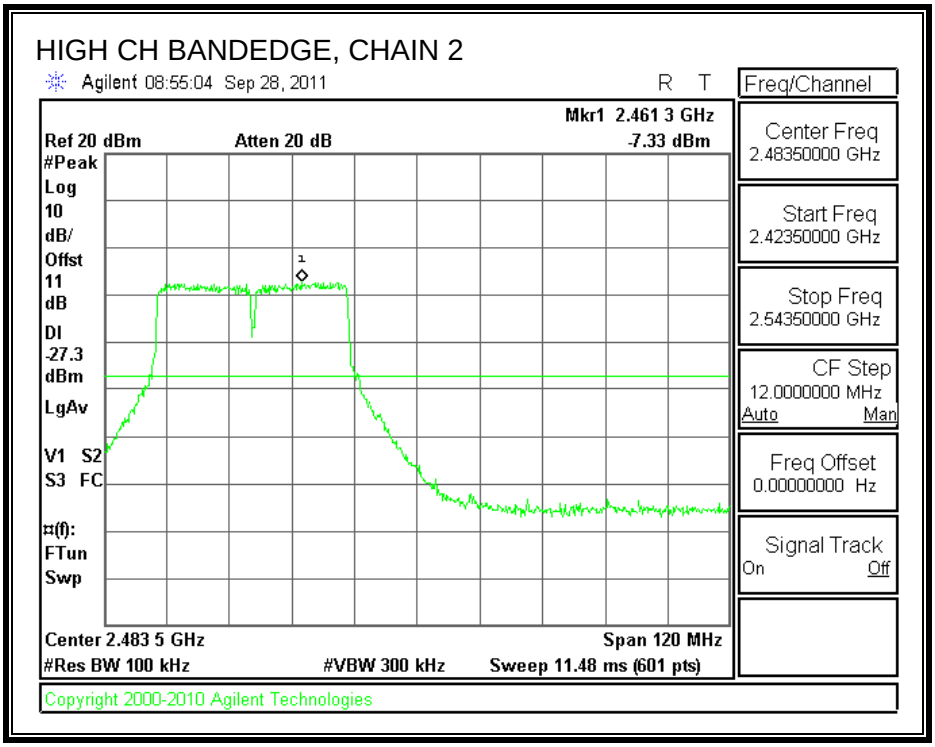
MID CH REFERENCE, CHAIN 2



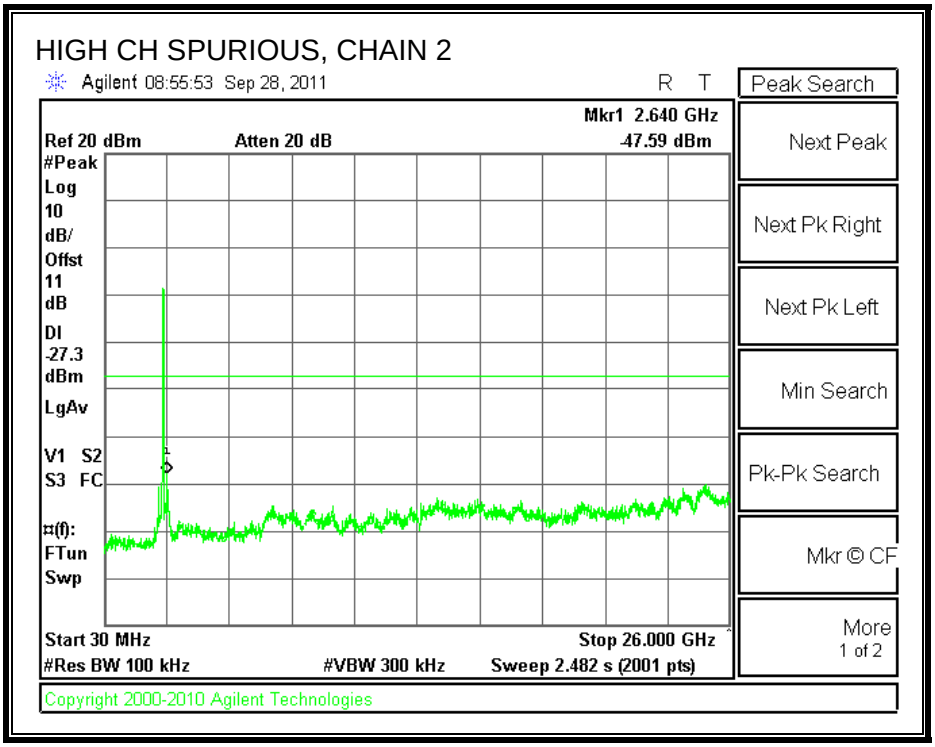
MID CH SPURIOUS, CHAIN 2



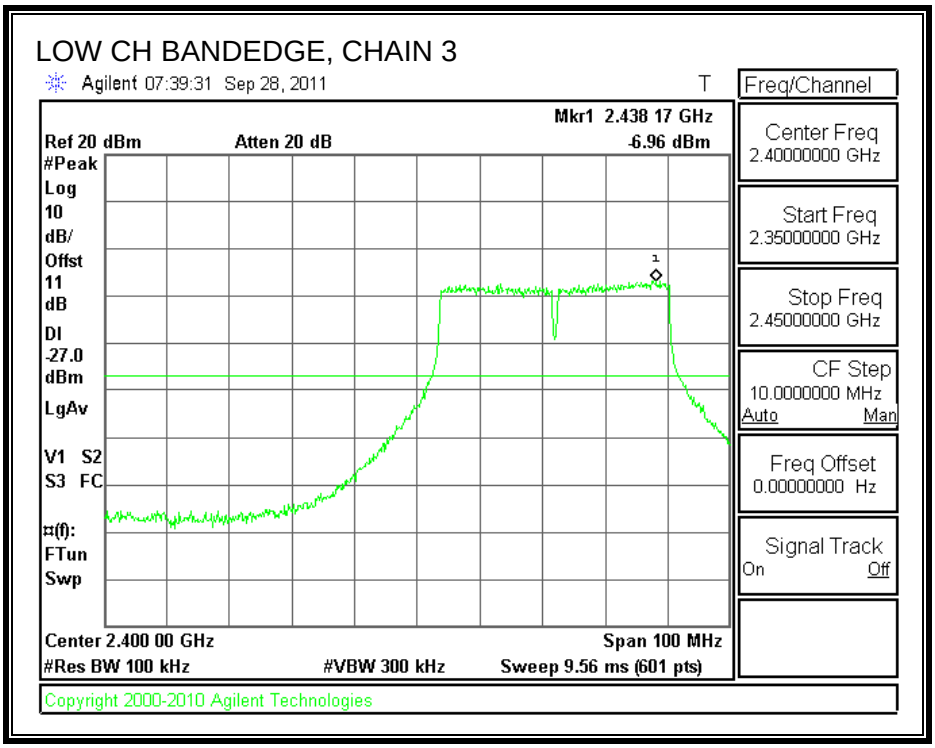
HIGH CH BANDEDGE, CHAIN 2

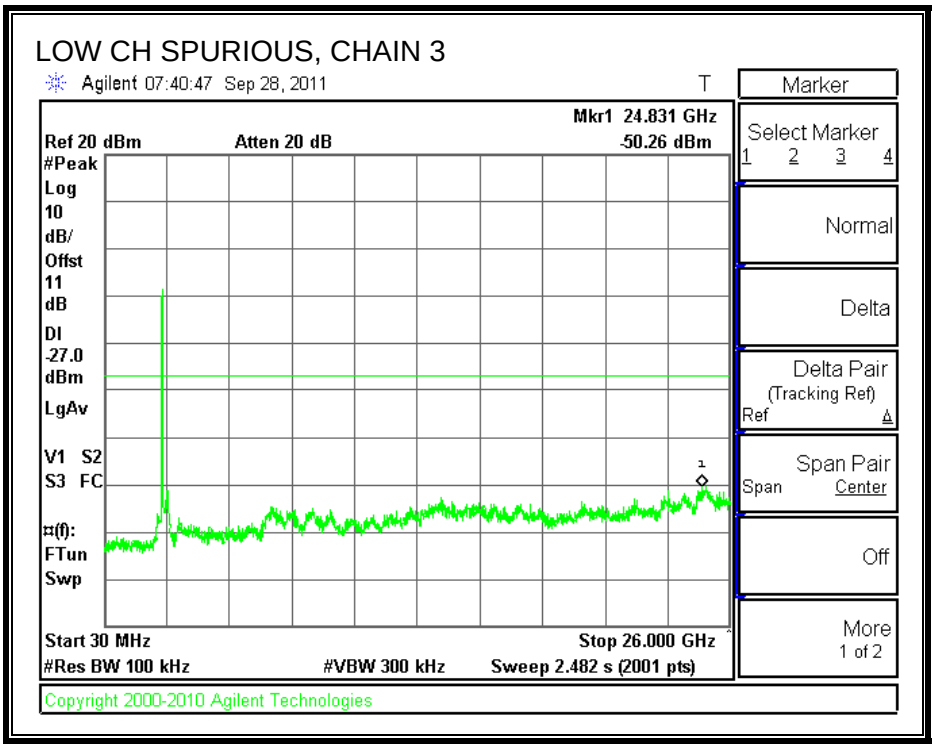


HIGH CH SPURIOUS, CHAIN 2

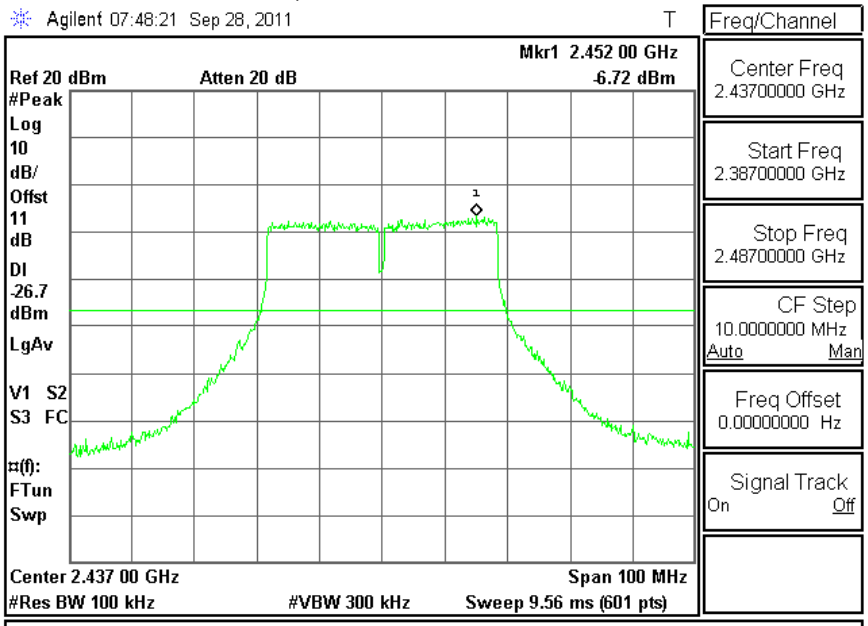


CHAIN 3 SPURIOUS EMISSIONS

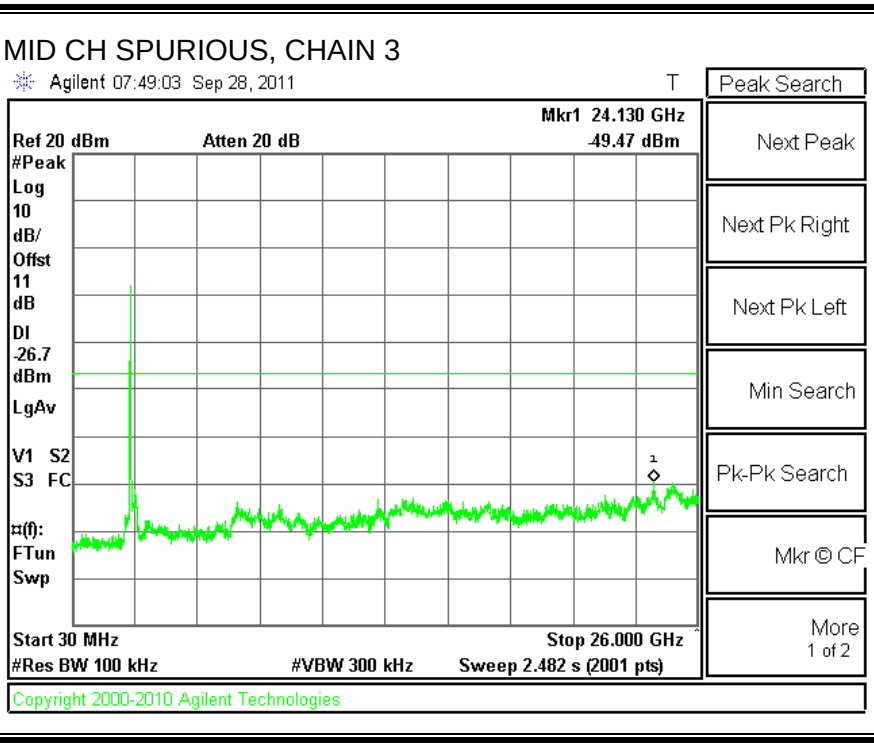




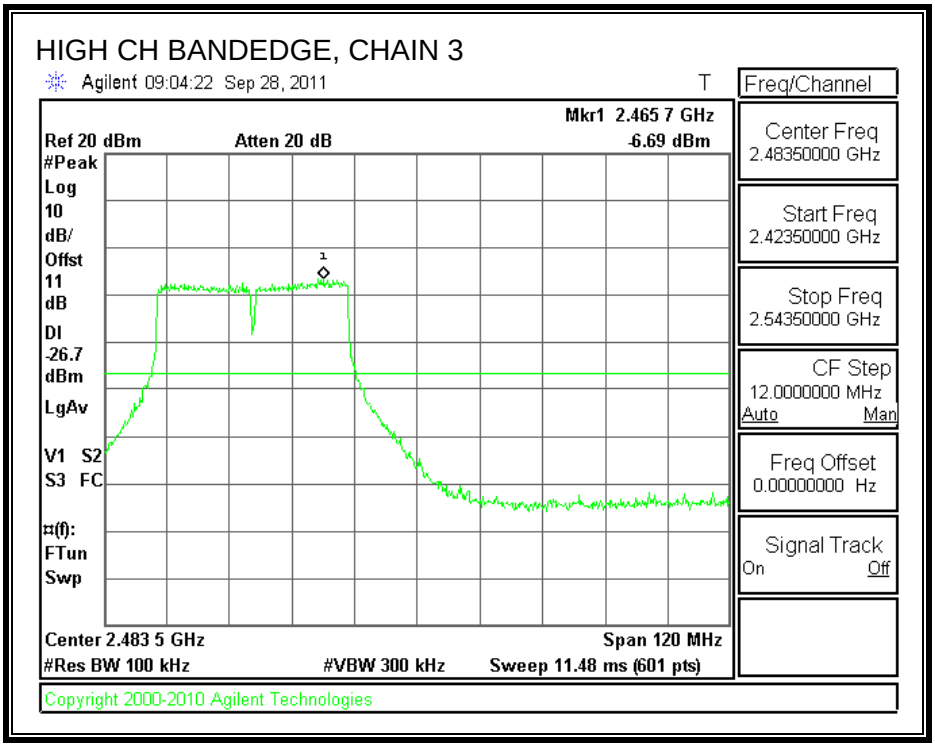
MID CH REFERENCE, CHAIN 3



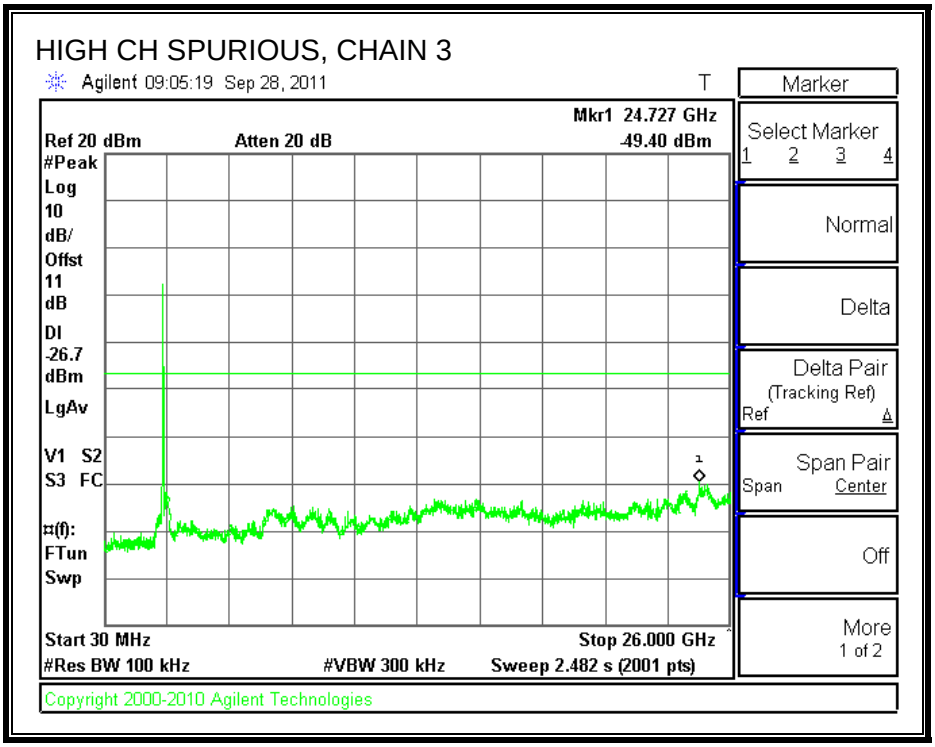
MID CH SPURIOUS, CHAIN 3



HIGH CH BANDEDGE, CHAIN 3



HIGH CH SPURIOUS, CHAIN 3



7.8. 802.11a 3TX MODE IN THE 5.8 GHz BAND

7.8.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

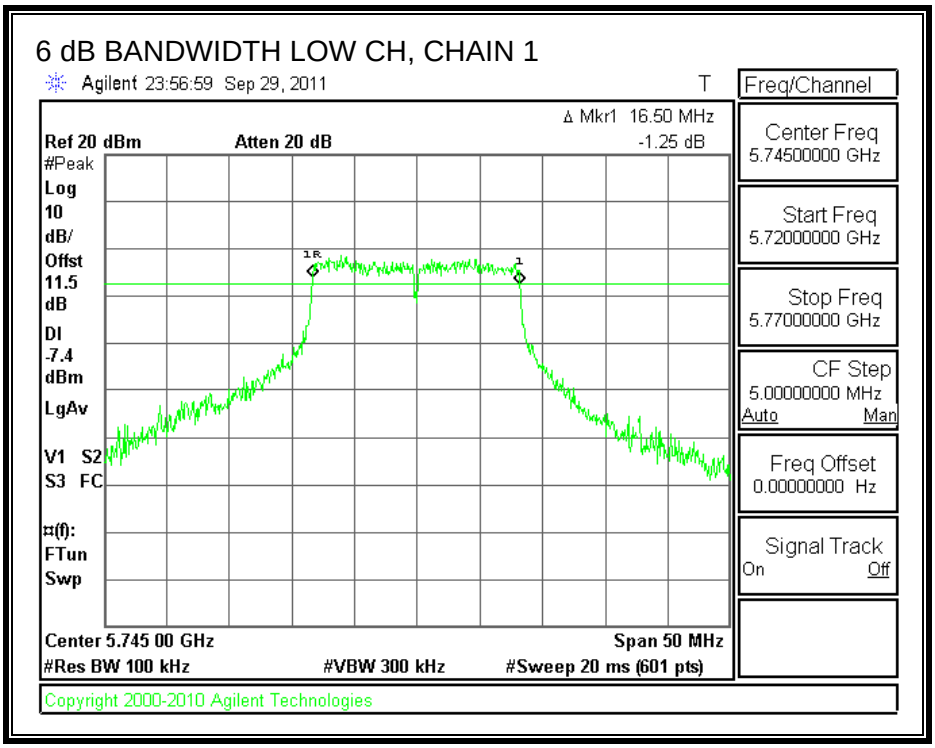
TEST PROCEDURE

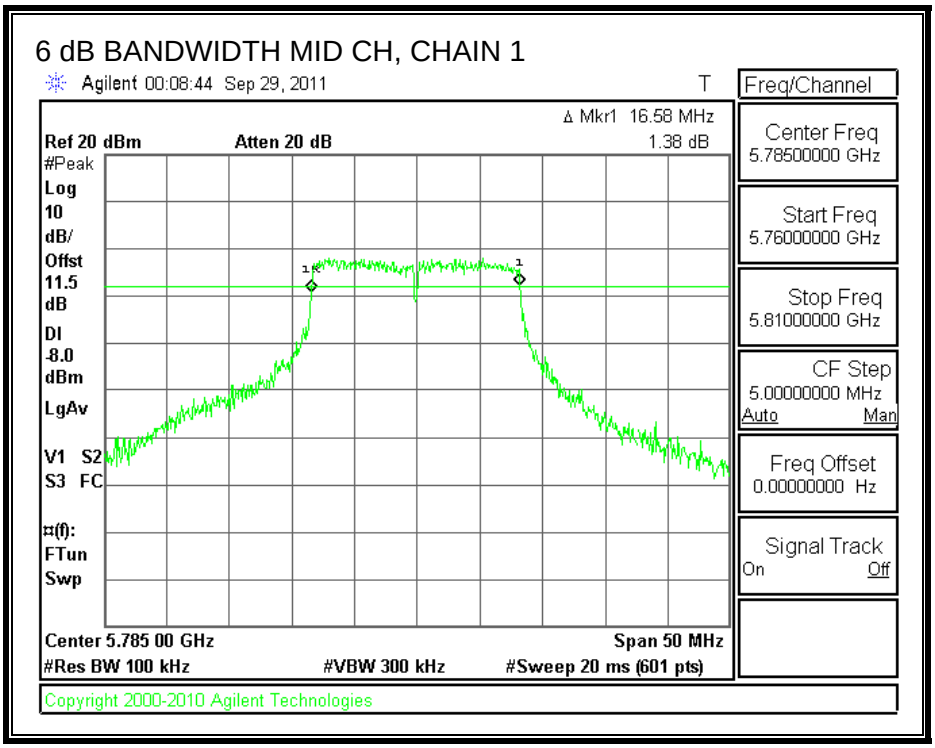
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

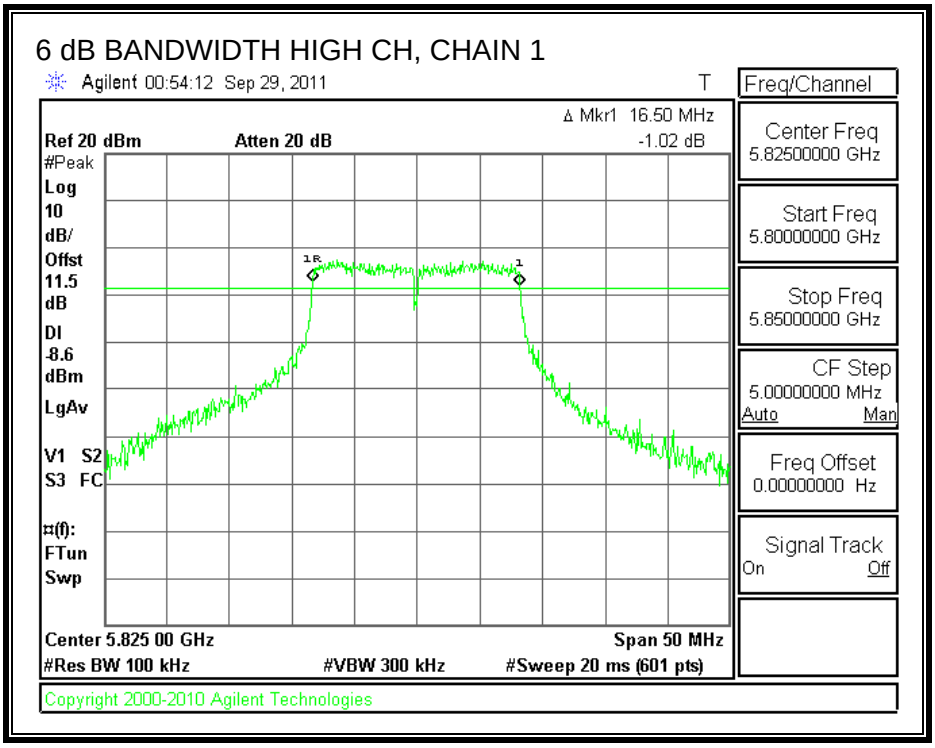
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Chain 3 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5745	16.50	16.58	16.50	0.5
Middle	5785	16.58	16.50	16.50	0.5
High	5825	16.50	16.50	16.58	0.5

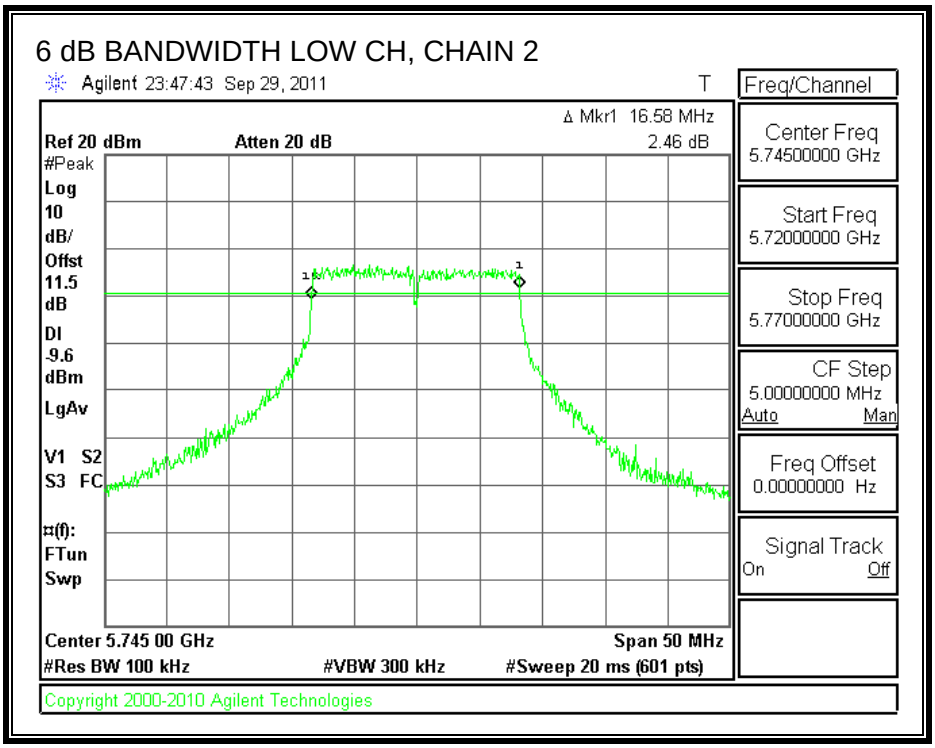
6 dB BANDWIDTH, CHAIN 1

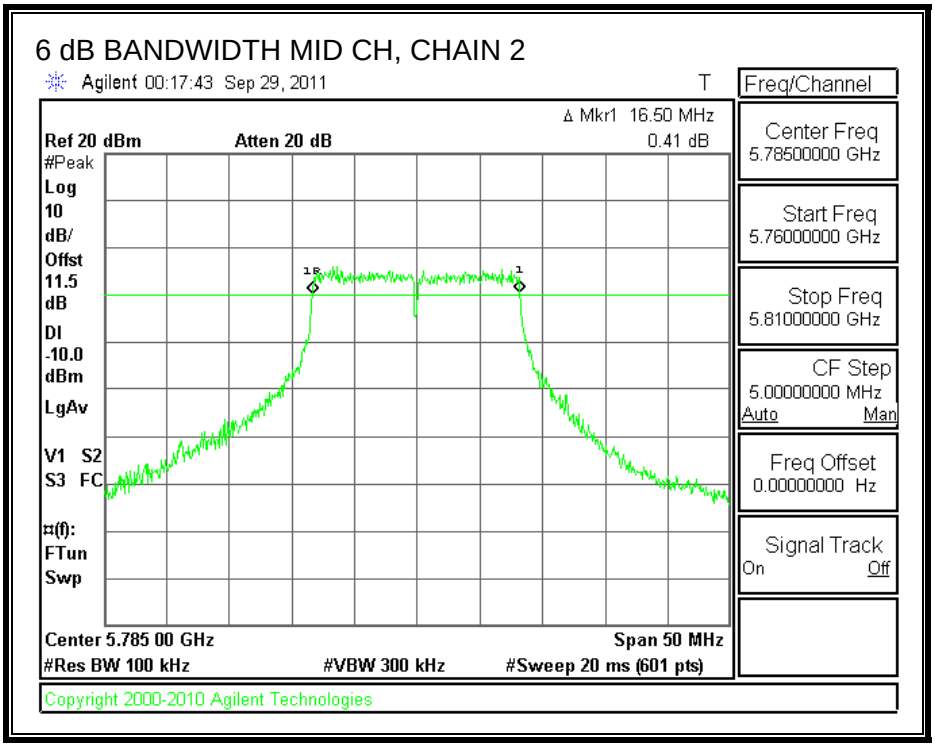


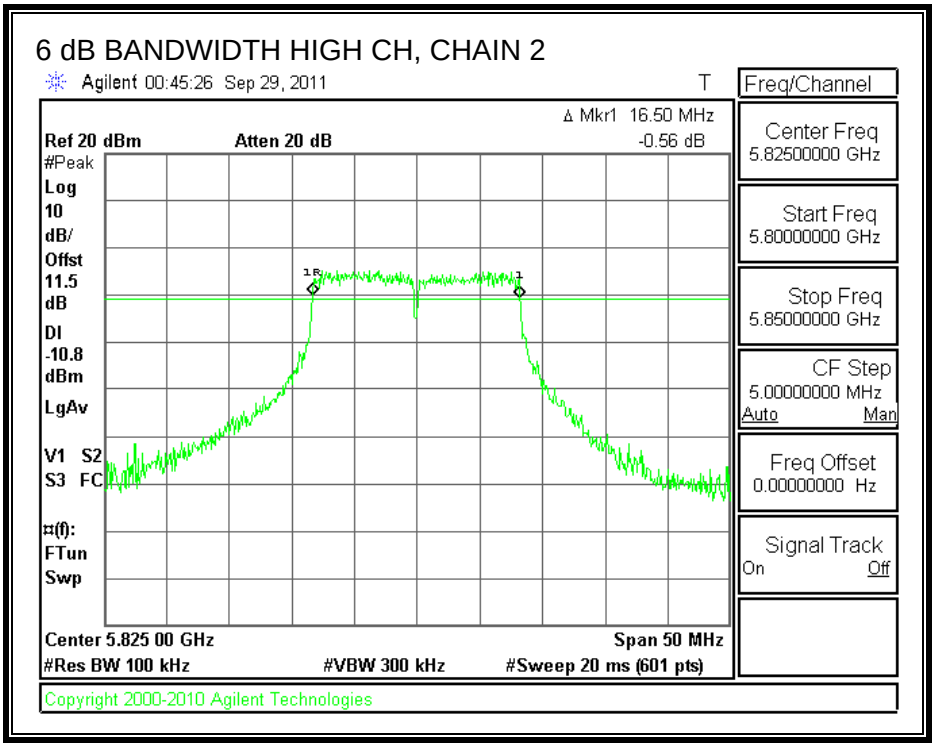




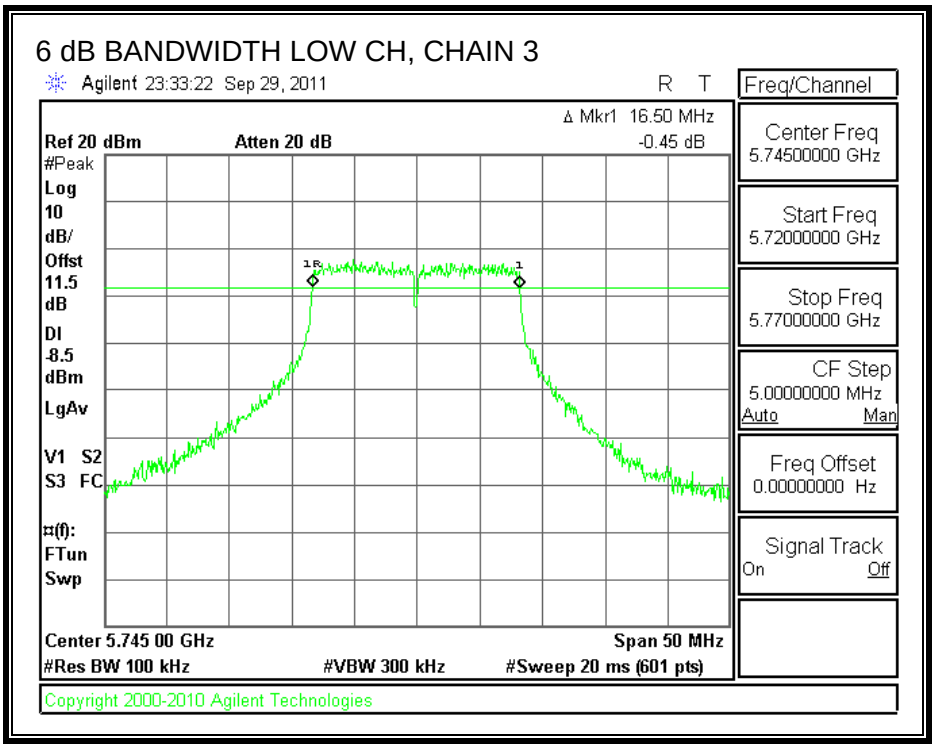
6 dB BANDWIDTH, CHAIN 2

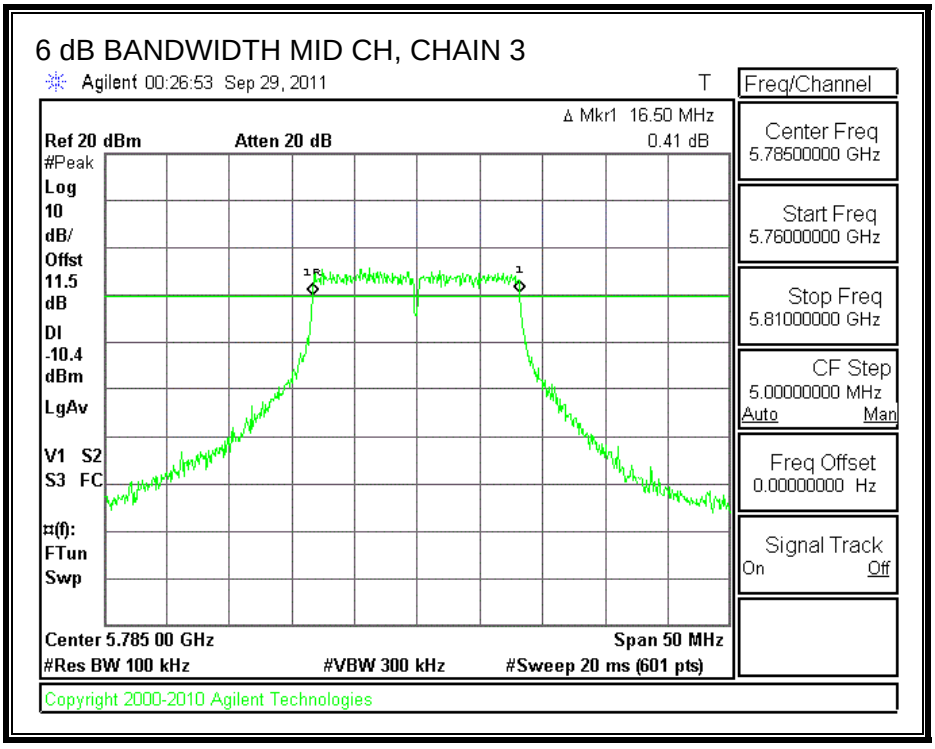


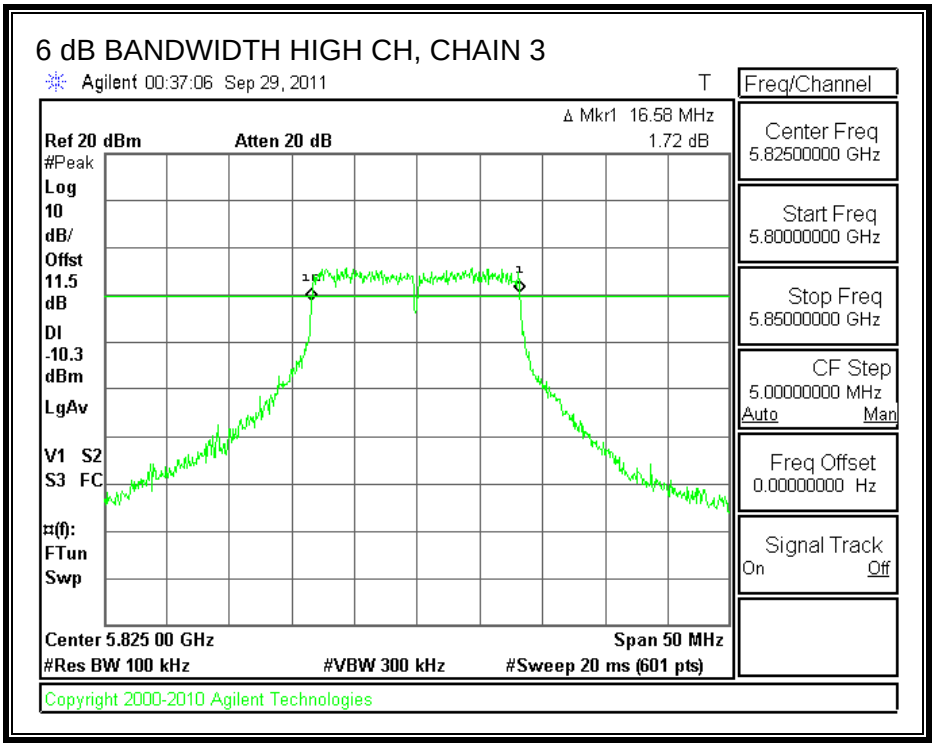




6 dB BANDWIDTH, CHAIN 3







7.8.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

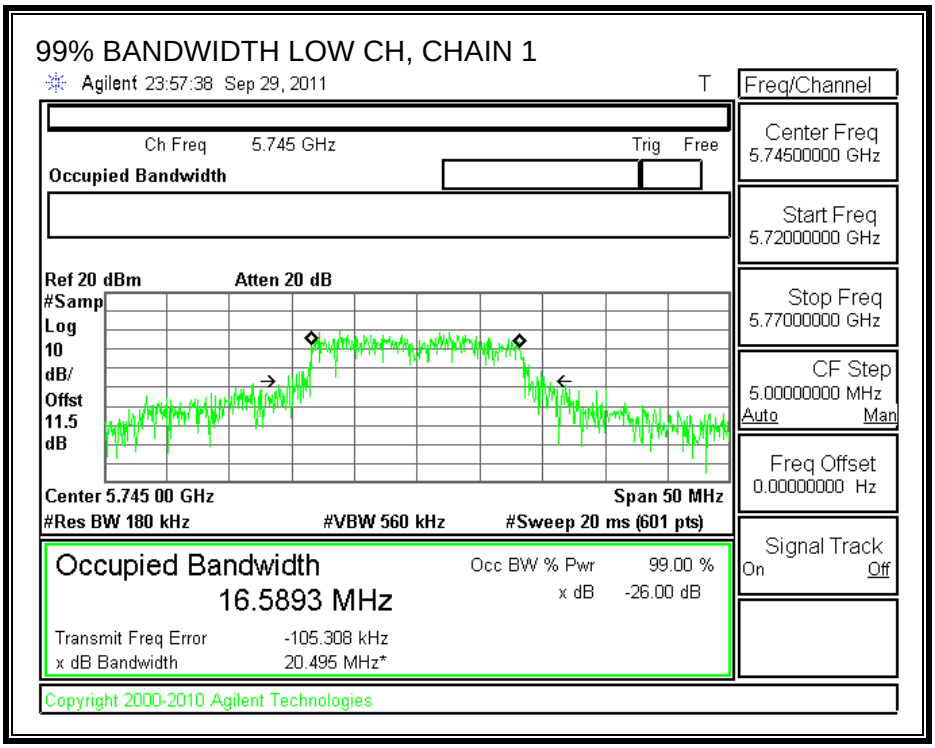
TEST PROCEDURE

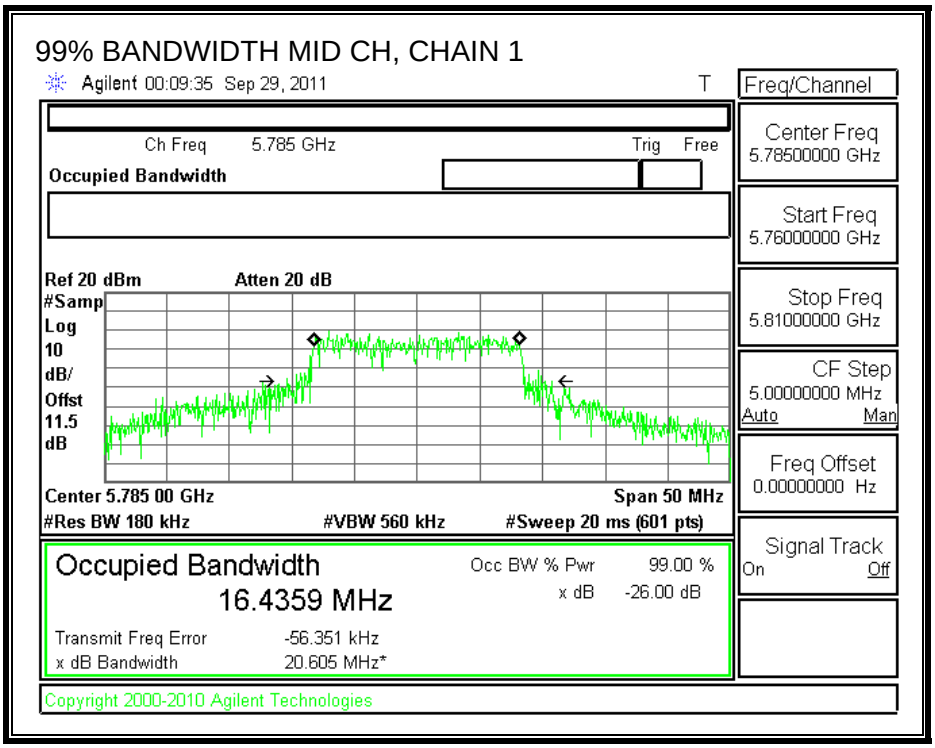
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

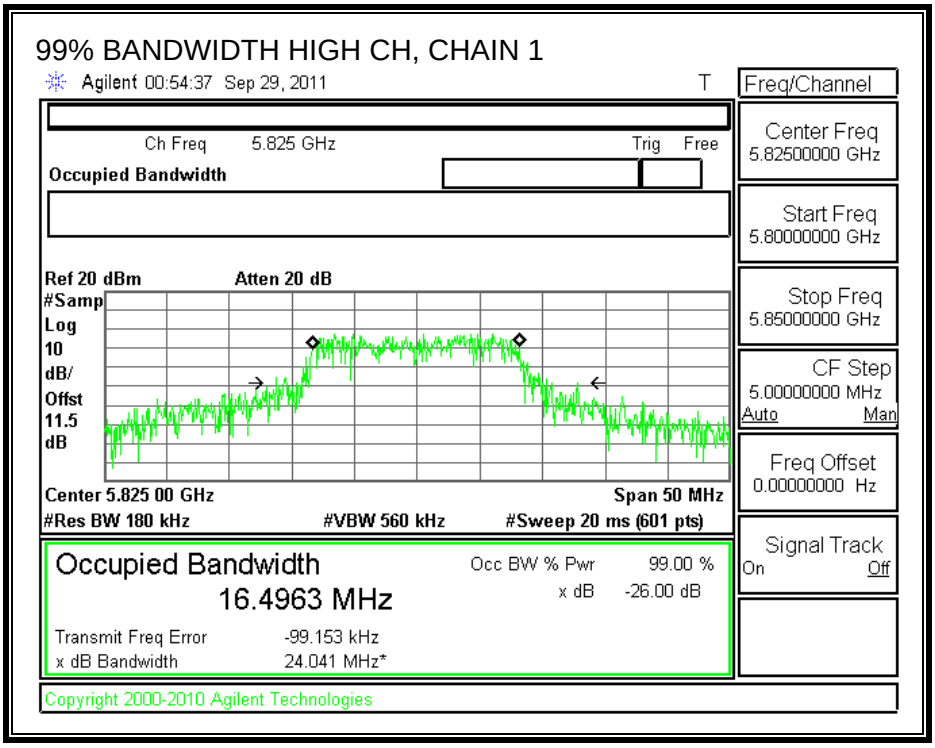
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)	Chain 3 99% Bandwidth (MHz)
Low	5745	16.5893	16.4259	16.5217
Middle	5785	16.4359	16.4286	16.4849
High	5825	16.4963	16.4292	16.5485

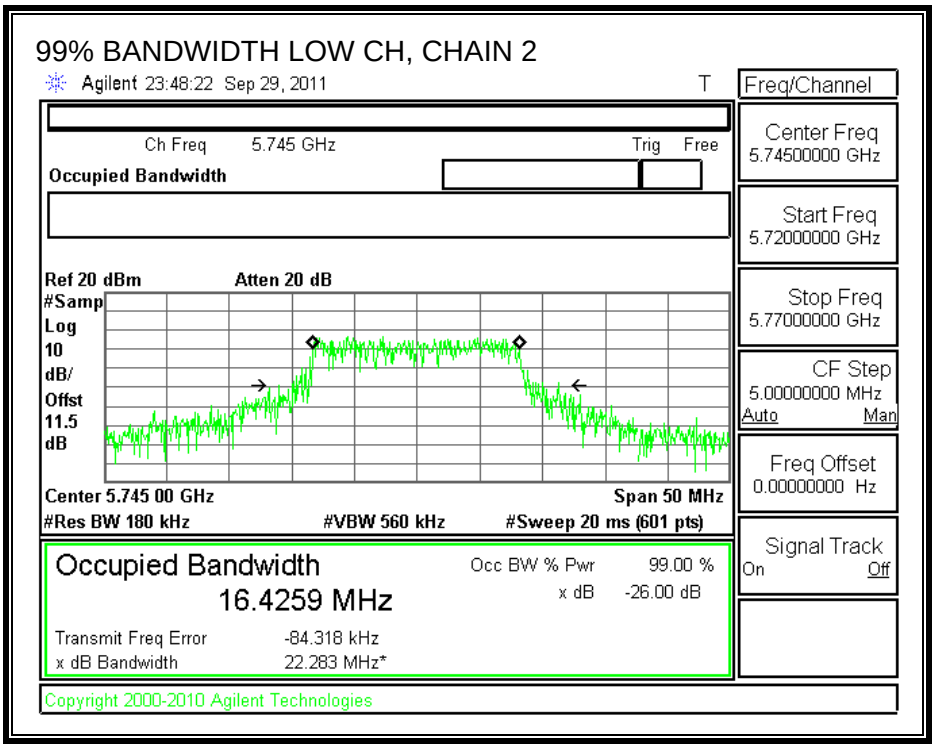
99% BANDWIDTH, CHAIN 1

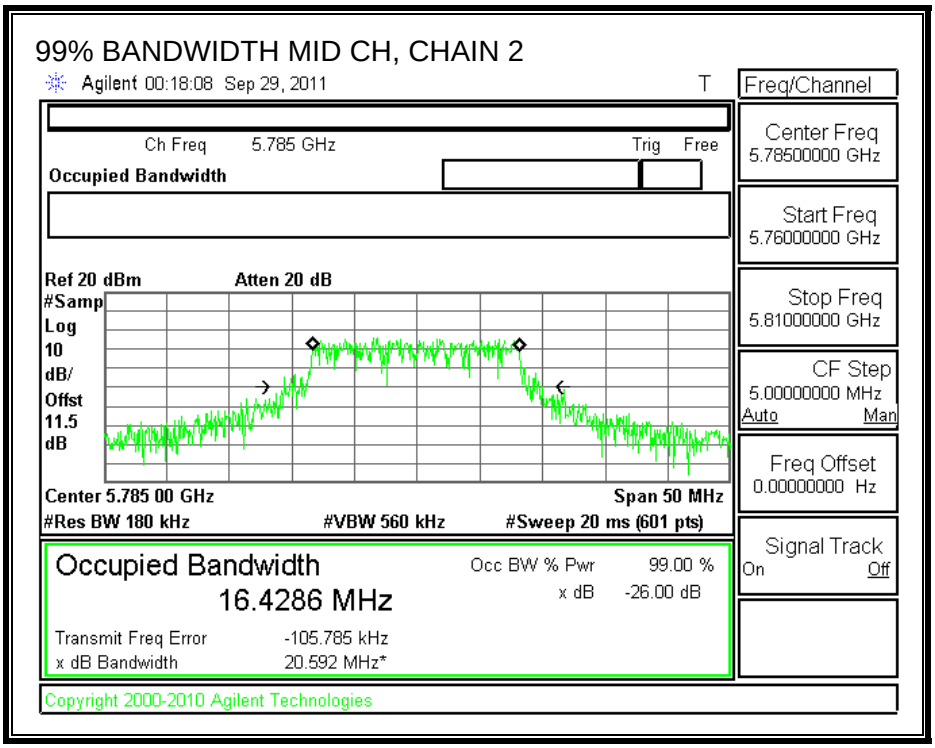


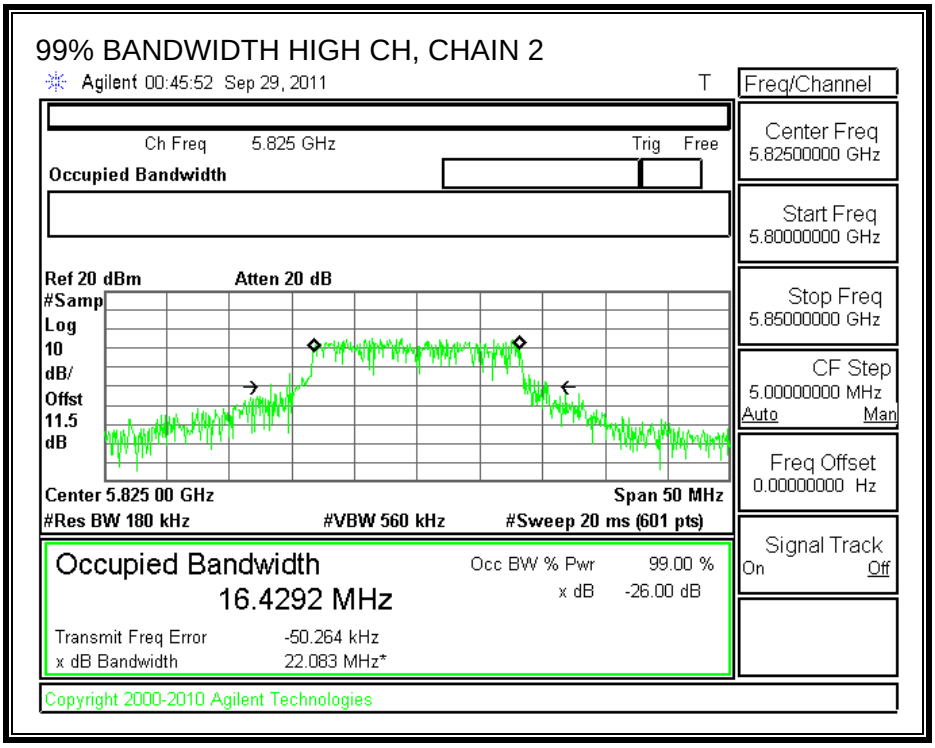




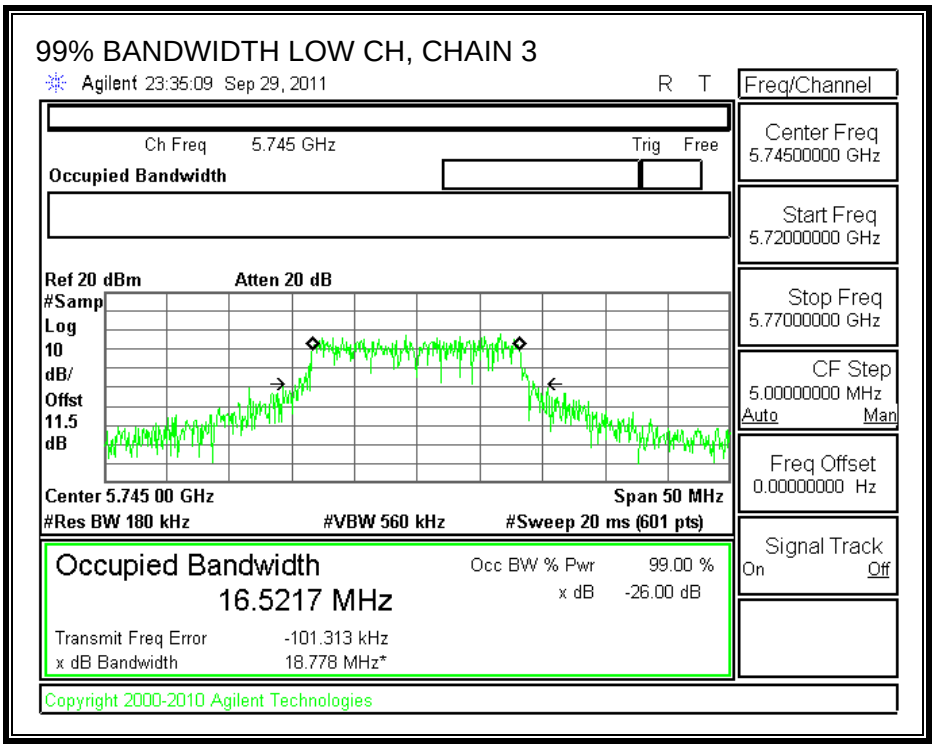
99% BANDWIDTH, CHAIN 2

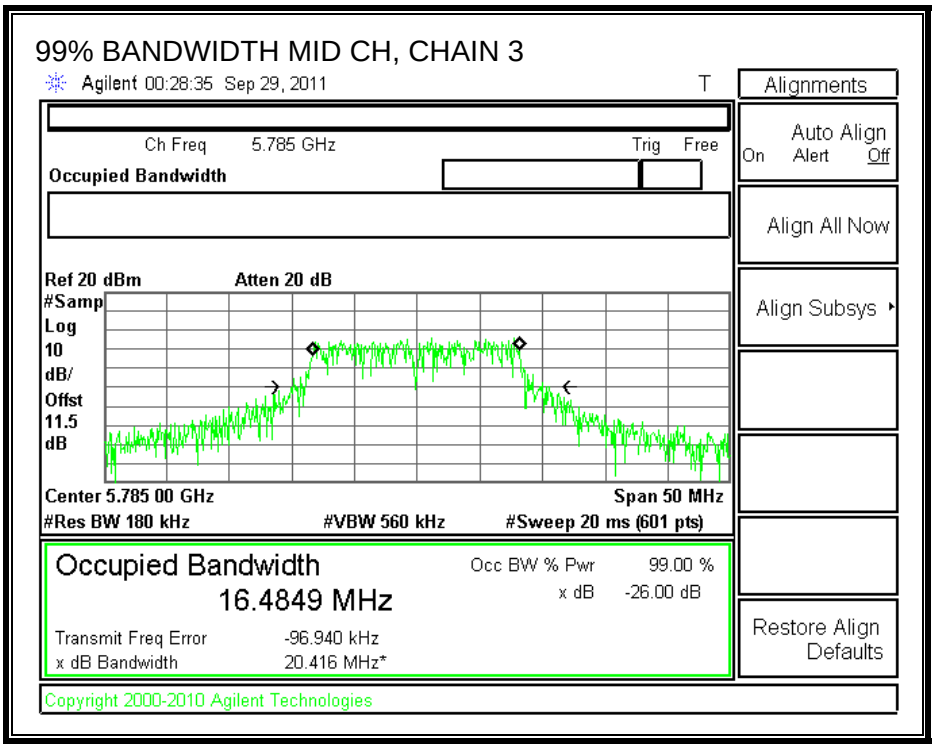


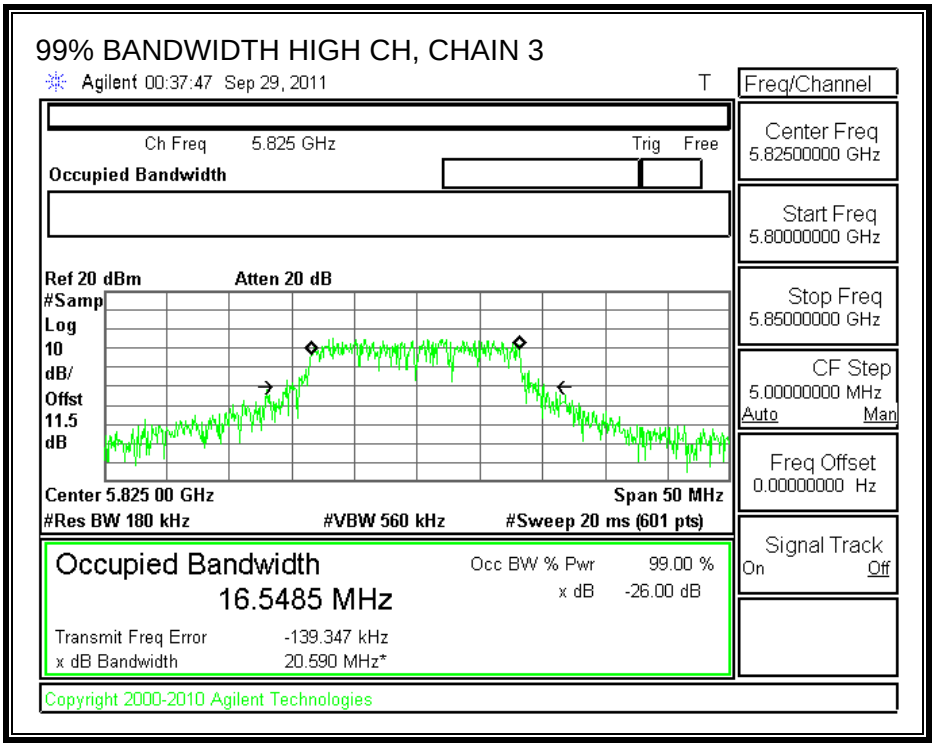




99% BANDWIDTH, CHAIN 3







7.8.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
4.5	4.77	9.27

The maximum effective legacy gain is 9.27 dBi for other than fixed, point-to-point operations, therefore the limit is 26.73 dBm.

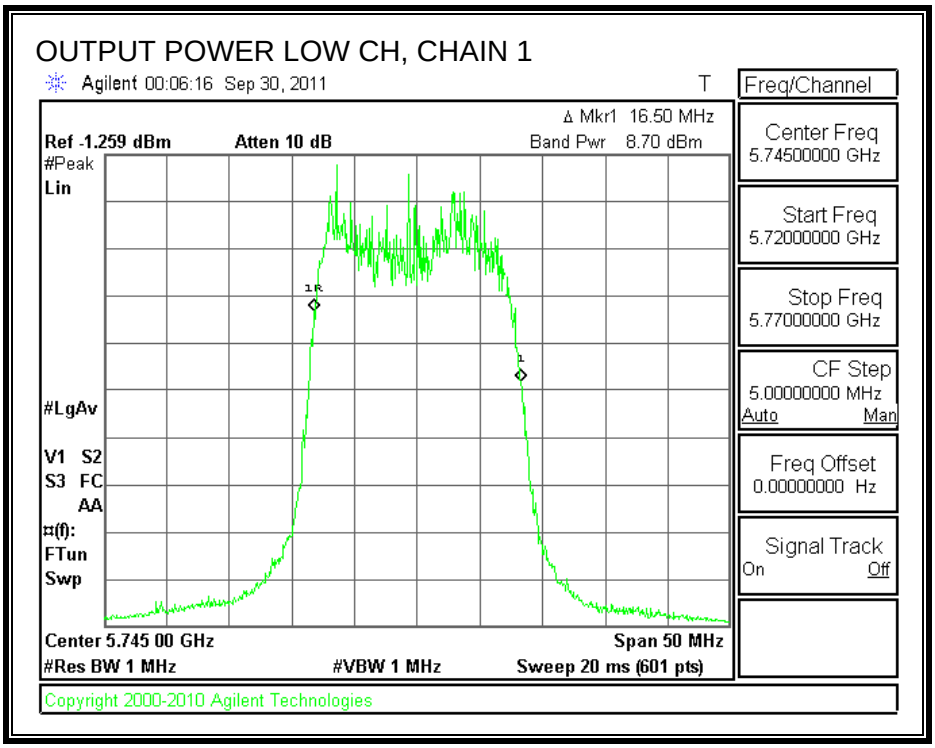
TEST PROCEDURE

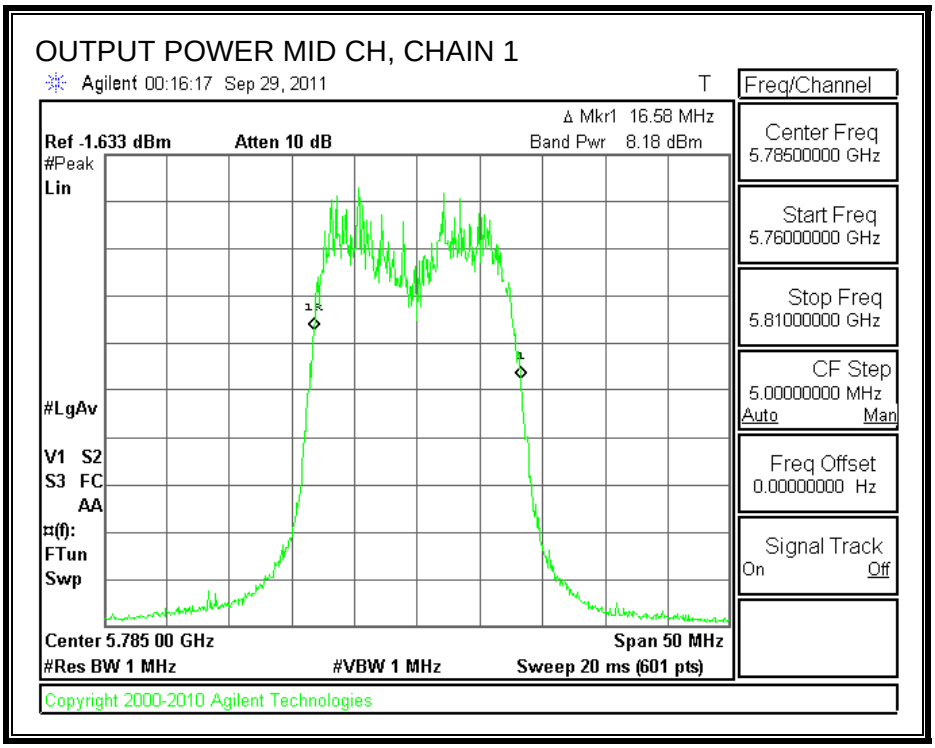
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

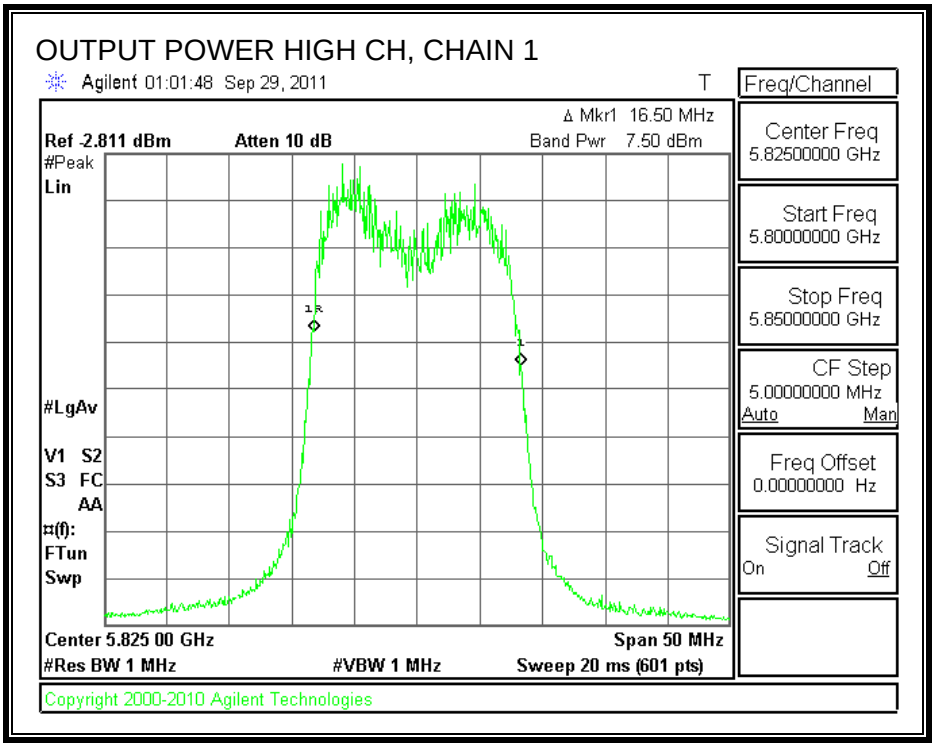
RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Chain 3 PK Power (dBm)	Attenuator + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	8.70	7.40	7.11	11.50	24.06	26.73	-2.67
Mid	5785	8.18	6.89	6.76	11.50	23.60	26.73	-3.13
High	5825	7.50	6.62	6.37	11.50	23.13	26.73	-3.60

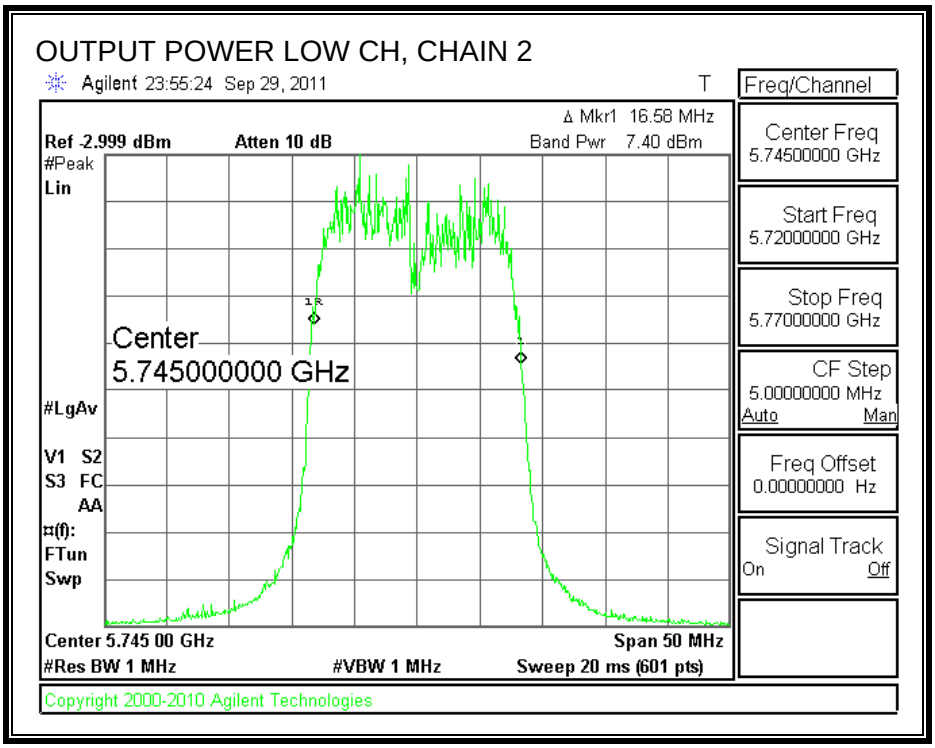
CHAIN 1 OUTPUT POWER

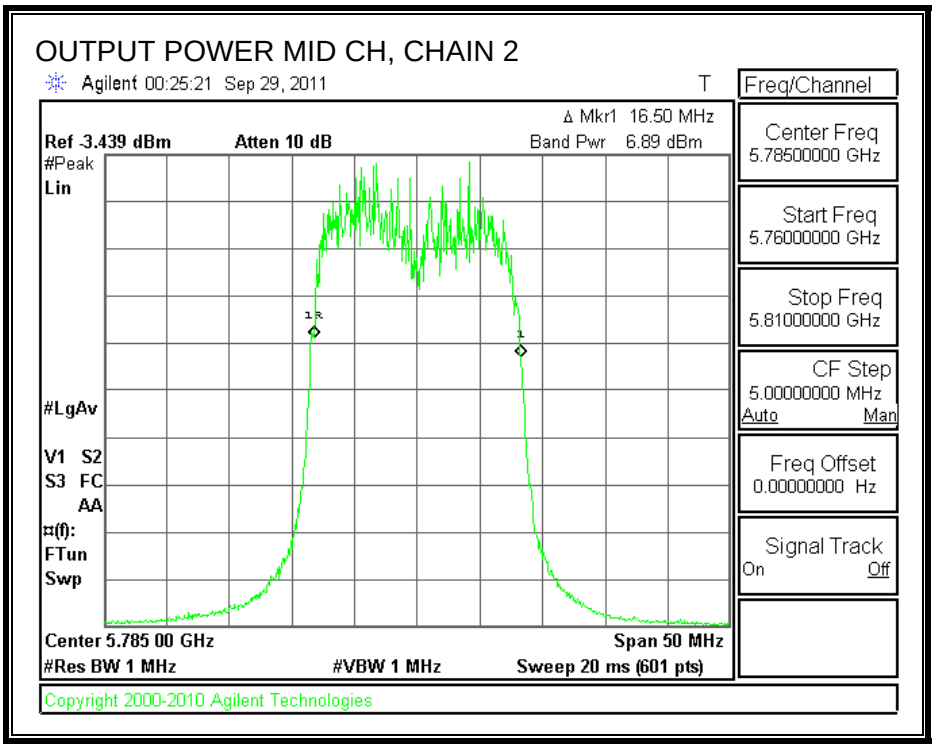


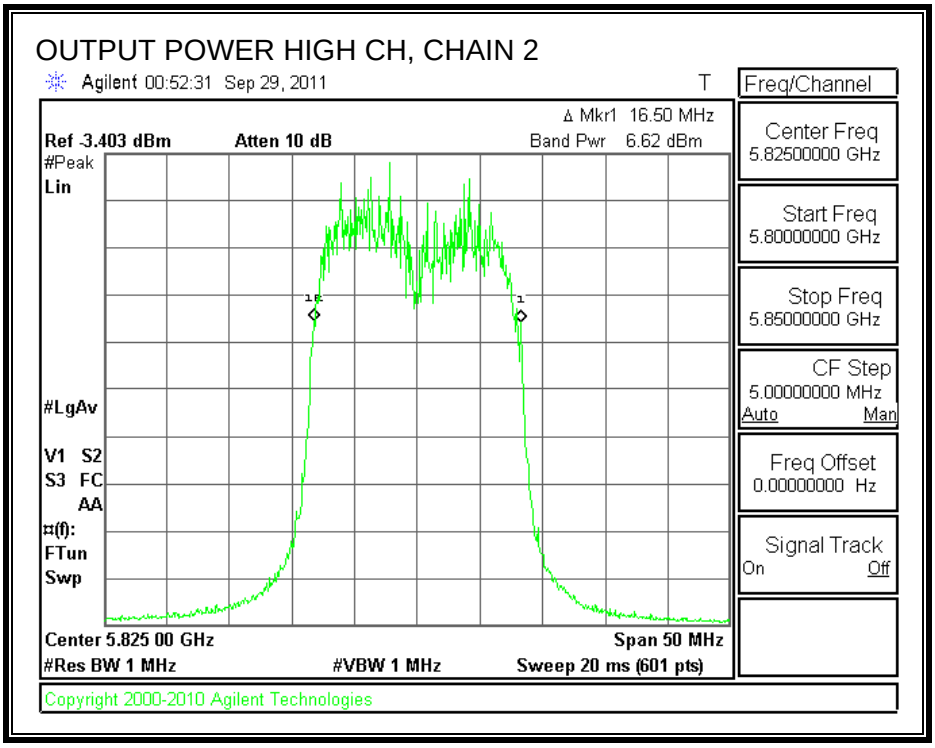




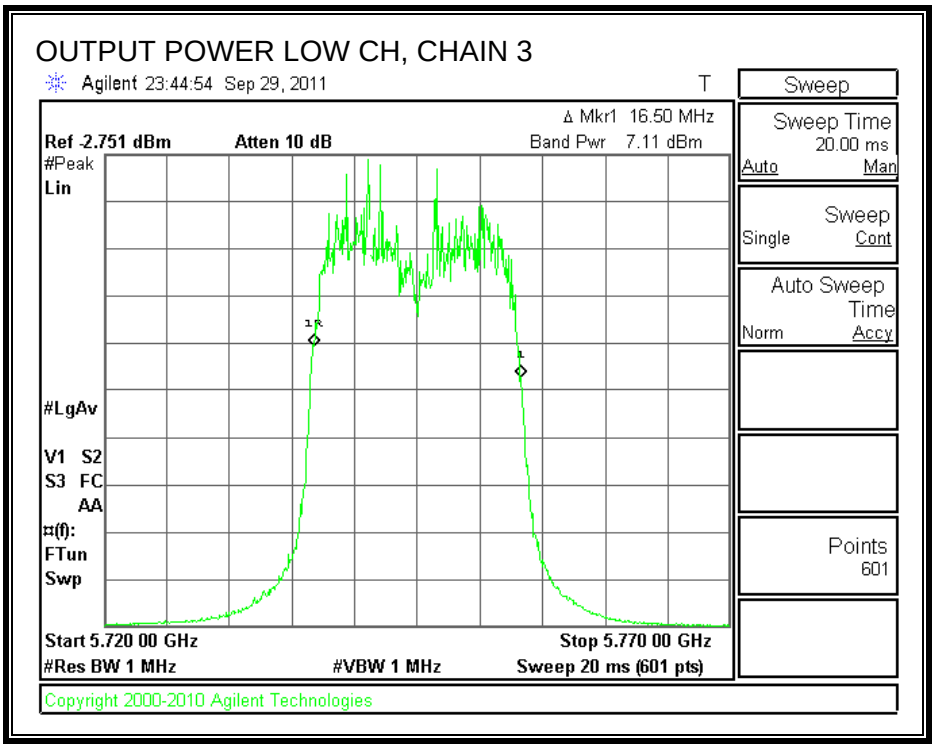
CHAIN 2 OUTPUT POWER

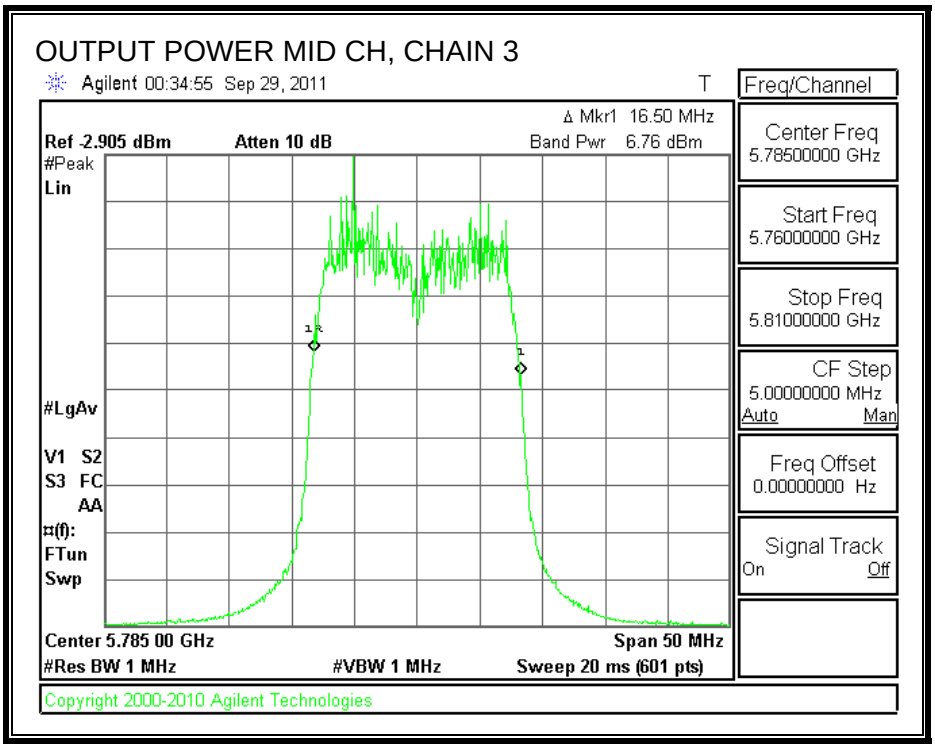


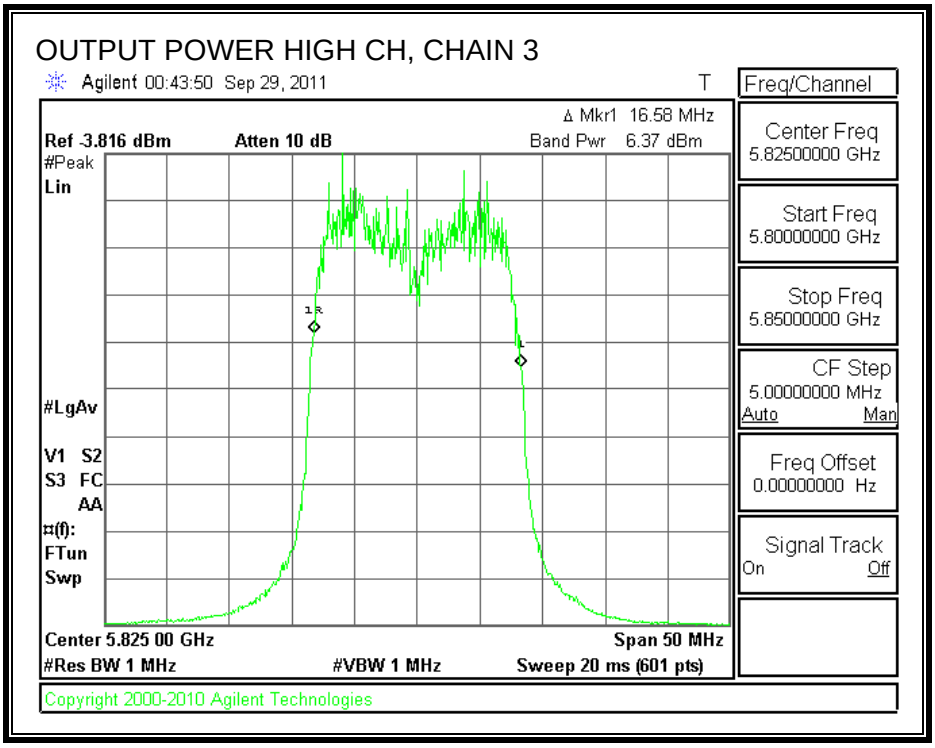




CHAIN 3 OUTPUT POWER







7.8.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	5745	15.50	15.50	15.50	20.27
Middle	5785	15.50	15.50	15.50	20.27
High	5825	15.50	15.50	15.50	20.27

7.8.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

TEST PROCEDURE

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

RESULTS:

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-11.51	-13.85	-13.49	-8.05	8	-16.05
Middle	5785	-11.87	-14.30	-14.32	-8.57	8	-16.57
High	5825	-12.78	-14.95	-15.41	-9.45	8	-17.45

POWER SPECTRAL DENSITY, CHAIN 1