



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

CERTIFICATION TEST REPORT

FOR

BROADCOM 802.11a/b/g/n WLAN + BLUETOOTH PCI-E MINI CARD

MODEL NUMBER: BCM943228HMB

**FCC ID: QDS-BRCM1058
IC: 4324A-BRCM1058**

REPORT NUMBER: 11U13795-1, Revision A

ISSUE DATE: JUNE 27, 2011

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS.....	5
2. TEST METHODOLOGY	6
3. FACILITIES AND ACCREDITATION.....	6
4. CALIBRATION AND UNCERTAINTY	6
4.1. MEASURING INSTRUMENT CALIBRATION	6
4.2. SAMPLE CALCULATION.....	6
4.3. MEASUREMENT UNCERTAINTY	6
5. EQUIPMENT UNDER TEST	7
5.1. DESCRIPTION OF EUT.....	7
5.2. MAXIMUM OUTPUT POWER.....	7
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	8
5.4. SOFTWARE AND FIRMWARE	9
5.5. WORST-CASE CONFIGURATION AND MODE.....	9
5.6. DESCRIPTION OF TEST SETUP.....	10
6. TEST AND MEASUREMENT EQUIPMENT	12
7. ANTENNA PORT TEST RESULTS	13
7.1. 802.11b MODE IN THE 2.4 GHz BAND	13
7.1.1. 6 dB BANDWIDTH	13
7.1.2. 99% BANDWIDTH	17
7.1.3. OUTPUT POWER	21
7.1.4. POWER SPECTRAL DENSITY	25
7.1.5. CONDUCTED SPURIOUS EMISSIONS.....	29
7.2. 802.11g MODE IN THE 2.4 GHz BAND.....	36
7.2.1. 6 dB BANDWIDTH	36
7.2.2. 99% BANDWIDTH	40
7.2.3. OUTPUT POWER	44
7.2.4. POWER SPECTRAL DENSITY	48
7.2.5. CONDUCTED SPURIOUS EMISSIONS.....	52
7.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND	59
7.3.1. 6 dB BANDWIDTH	59
7.3.2. 99% BANDWIDTH	66
7.3.3. OUTPUT POWER	73
7.3.4. AVERAGE POWER	80
7.3.5. POWER SPECTRAL DENSITY	81
7.3.6. CONDUCTED SPURIOUS EMISSIONS.....	88
7.4. 802.11n HT40 MODE IN THE 2.4 GHz BAND	101
7.4.1. 6 dB BANDWIDTH	101
7.4.2. 99% BANDWIDTH	108

7.4.3.	OUTPUT POWER	115
7.4.4.	POWER SPECTRAL DENSITY	122
7.4.5.	CONDUCTED SPURIOUS EMISSIONS.....	129
7.5.	<i>802.11a MODE IN THE 5.8 GHz BAND</i>	<i>142</i>
7.5.1.	6 dB BANDWIDTH	142
7.5.2.	99% BANDWIDTH	146
7.5.3.	OUTPUT POWER	150
7.5.4.	POWER SPECTRAL DENSITY	154
7.5.5.	CONDUCTED SPURIOUS EMISSIONS.....	158
7.6.	<i>802.11n HT20 MODE IN THE 5.8 GHz BAND</i>	<i>165</i>
7.6.1.	6 dB BANDWIDTH	165
7.6.2.	99% BANDWIDTH	172
7.6.3.	OUTPUT POWER	179
7.6.4.	POWER SPECTRAL DENSITY	186
7.6.5.	CONDUCTED SPURIOUS EMISSIONS.....	193
7.7.	<i>802.11n HT40 MODE IN THE 5.8 GHz BAND</i>	<i>206</i>
7.7.1.	6 dB BANDWIDTH	206
7.7.2.	99% BANDWIDTH	211
7.7.3.	OUTPUT POWER	216
7.7.4.	AVERAGE POWER	221
7.7.5.	POWER SPECTRAL DENSITY	222
7.7.6.	CONDUCTED SPURIOUS EMISSIONS.....	227
8.	RADIATED TEST RESULTS	236
8.1.	<i>LIMITS AND PROCEDURE</i>	<i>236</i>
8.2.	<i>TRANSMITTER ABOVE 1 GHz</i>	<i>237</i>
8.2.1.	TRANSMITTER ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND ..	237
8.2.2.	TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND ..	246
8.2.3.	TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 2.4 GHz BAND	255
8.2.4.	TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 2.4 GHz BAND	264
8.2.5.	TRANSMITTER ABOVE 1 GHz FOR 802.11a MODE IN THE 5.8 GHz BAND ..	273
8.2.6.	TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.8 GHz BAND	274
8.2.7.	TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.8 GHz BAND	275
8.2.8.	RECEIVER ABOVE 1 GHz	276
8.2.9.	RECEIVER ABOVE 1 GHz FOR 20 MHz	276
8.2.10.	RECEIVER ABOVE 1 GHz FOR 40 MHz BANDWIDTH	277
8.2.11.	WORST-CASE BELOW 1 GHz	278
9.	AC POWER LINE CONDUCTED EMISSIONS	279
10.	MAXIMUM PERMISSIBLE EXPOSURE	283
11.	SETUP PHOTOS	287

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, U.S.A.

EUT DESCRIPTION: Broadcom 802.11a/b/g/n WLAN + Bluetooth PCI-E Mini Card

MODEL: BCM943228HMB

SERIAL NUMBER: 1403514 (P305)

DATE TESTED: MAY 25 – JUNE 9, 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:

Tested By:



MICHAEL HECKROTTE
DIRECTOR OF ENGINEERING
UL CCS



TOM CHEN
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

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

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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g/n WLAN + Bluetooth PCI-E Mini card manufactured by Broadcom.

The radio module is manufactured by Broadcom.

5.2. MAXIMUM OUTPUT POWER

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

2400 to 2483.5 Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412- 2462	802.11b	21.22	132.43
2412- 2462	802.11g	27.60	575.44
2412- 2462	802.11n HT20	28.89	774.46
2422- 2452	802.11n HT40	24.76	299.23

5725 to 5825 Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5745-5825	802.11a	25.91	389.94
5745-5825	802.11n HT20	28.11	647.14
5755-5795	802.11n HT40	28.52	711.21

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an 802.11abgn WLAN antenna, with a maximum gain as table below;

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5745-5825	802.11a	25.91	389.94
5745-5825	802.11n HT20	28.11	647.14
5755-5795	802.11n HT40	28.52	711.21

	Antenna Gain		Antenna Gain		Antenna Gain	Antenna Gain
GHz	Ant 1 dBi	Ant 2 dBi	Ant 1 Numeric	Ant 2 Numeric	Combined Numeric	Combined dBi
2.4	3.90	3.90	2.45	2.45	4.91	6.91
5.8	4.20	4.20	2.63	2.63	5.26	7.21

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom, rev. 5.100.82.54.
The test utility software used during testing was BCM Internal, rev. 5.100.RC82.54.

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

For 2.4GHz Band:

All final tests in the 802.11b Legacy mode were made at 1 Mb/s.

All final tests in the 802.11g Legacy mode were made at 6 Mb/s.

All final tests in the 802.11n 20MHz & 40MHz CDD mode were made at MCS0.

For 5.8GHz Band:

All final tests in the 802.11a Mode (Legacy) were made at 6 Mb/s.

All final tests in the 802.11n 20MHz & 40MHz CDD mode were made at MCS0.

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

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

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	4446-38U	R8-CAD03	DoC
AC Adapter	Lenovo	ADP-65YB	11S42T4458Z1F4K96B09D	DoC
Adapter Board	Broadcom	BRCM05	N/A	N/A

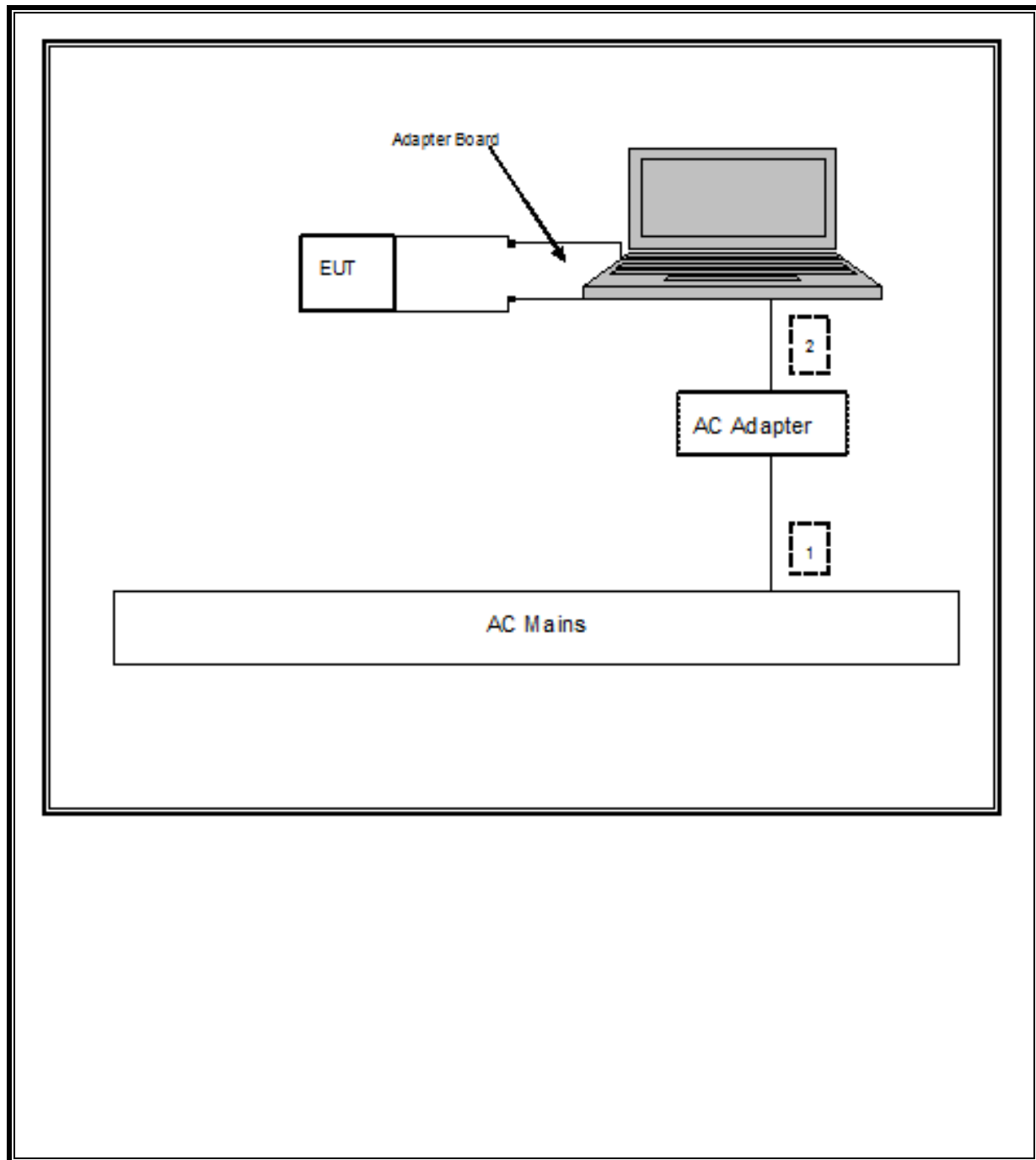
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US 115V	Shielded	1.5m	NA
2	DC	1	DC	Un-shielded	1.5m	Ferrite at laptop's end

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00996	10/29/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01171	07/14/11
Antenna, Horn, 18 GHz	EMCO	3115	C00872	07/29/11
Antenna, Horn, 26.5 GHz	ARA	MVH-1826/B	C00980	07/29/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00778	01/26/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	08/04/11
Peak Power Meter	Agilent / HP	E9327A	C00964	12/04/11
Peak Power Sensor	Agilent / HP	E4416A	C00963	12/04/11
EMI Receiver, 6.5 GHz	Agilent / HP	8546A	1963	08/19/11
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
Reject Filter, 5.725-5.825 GHz	Micro-Tronics	BRC13192	N02676	CNR
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	05/06/12
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/12

7. ANTENNA PORT TEST RESULTS

7.1. 802.11b MODE IN THE 2.4 GHz BAND

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

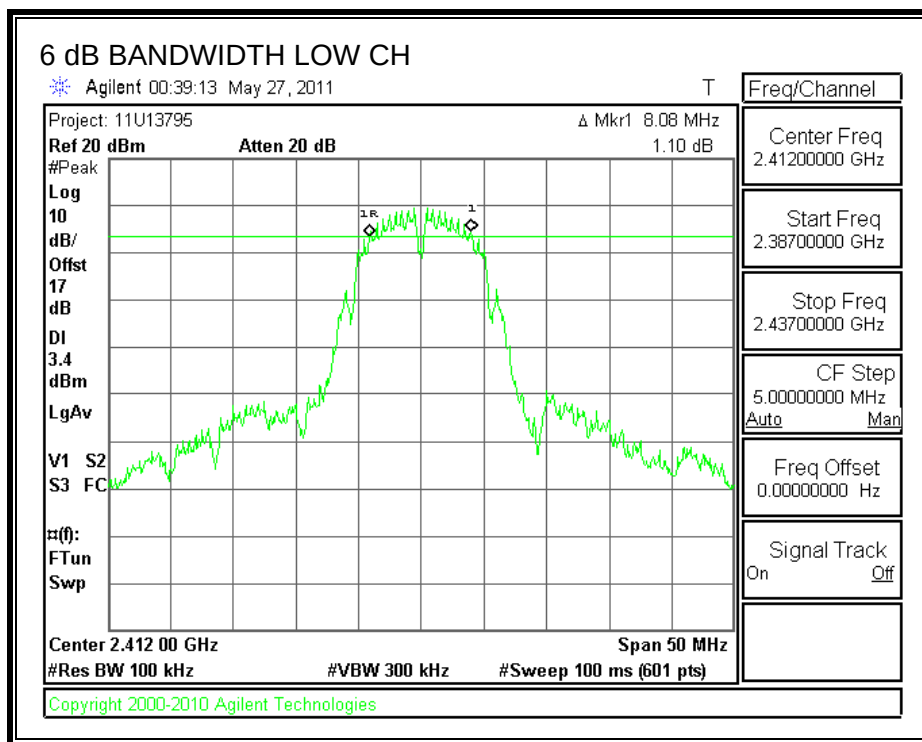
TEST PROCEDURE

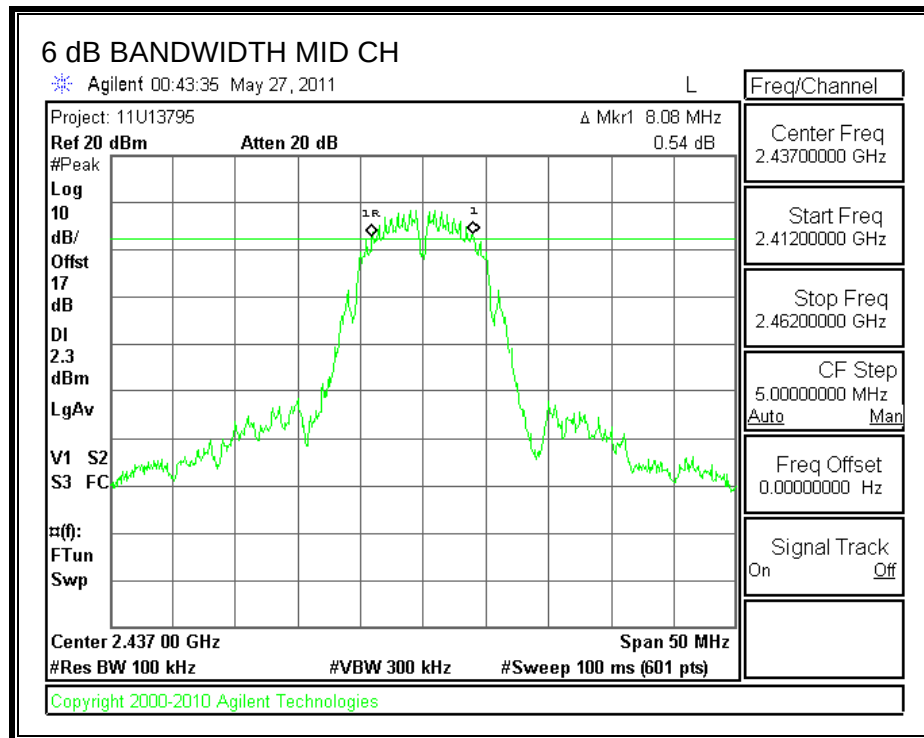
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

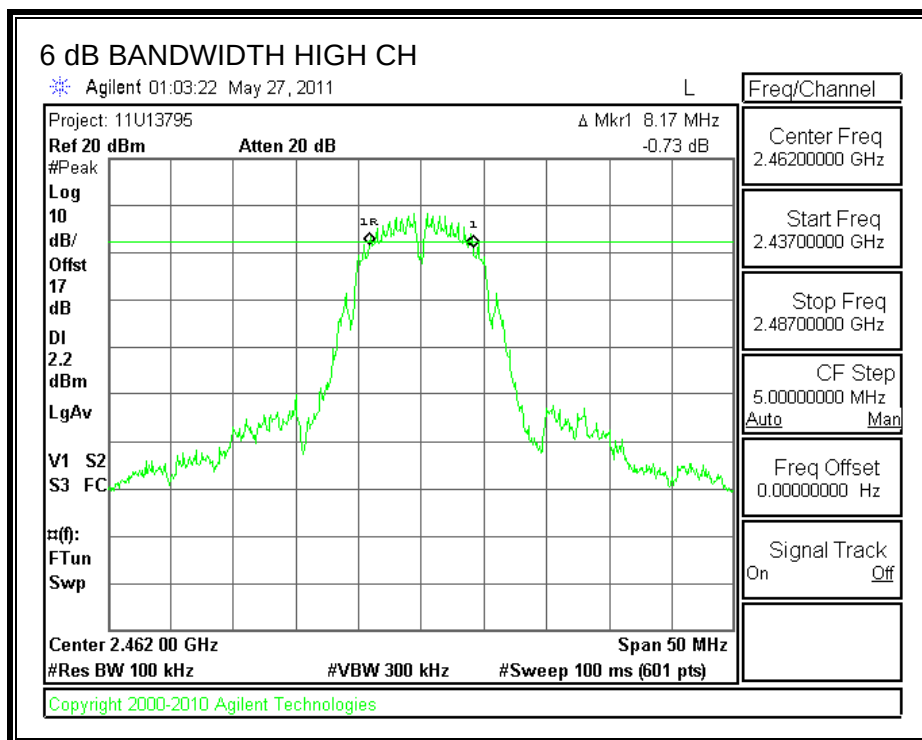
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	8.08	0.5
Middle	2437	8.08	0.5
High	2462	8.17	0.5

6 dB BANDWIDTH







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

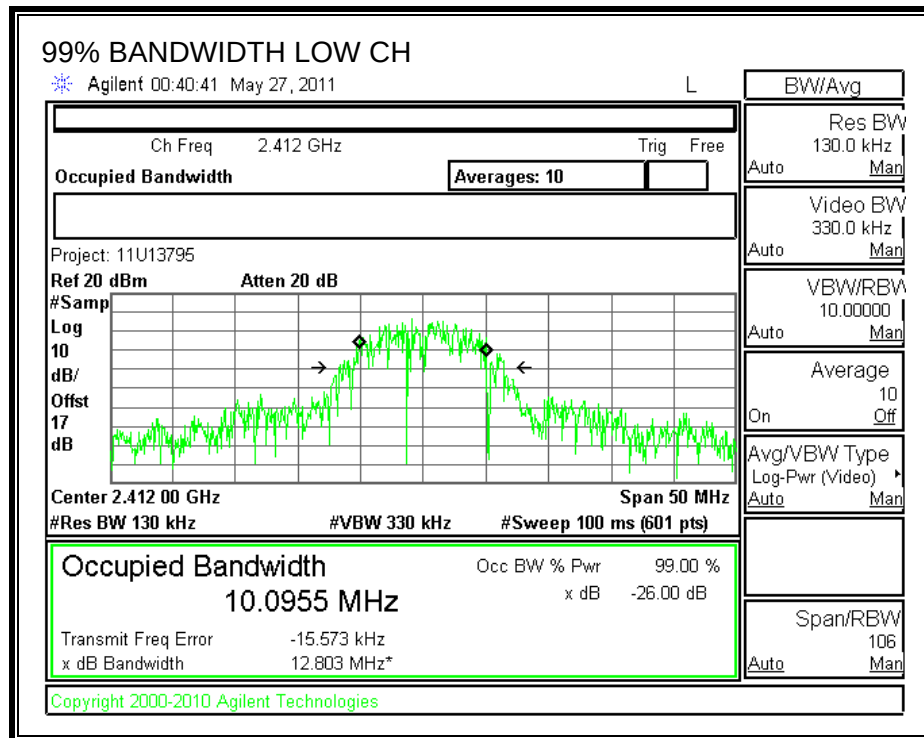
TEST PROCEDURE

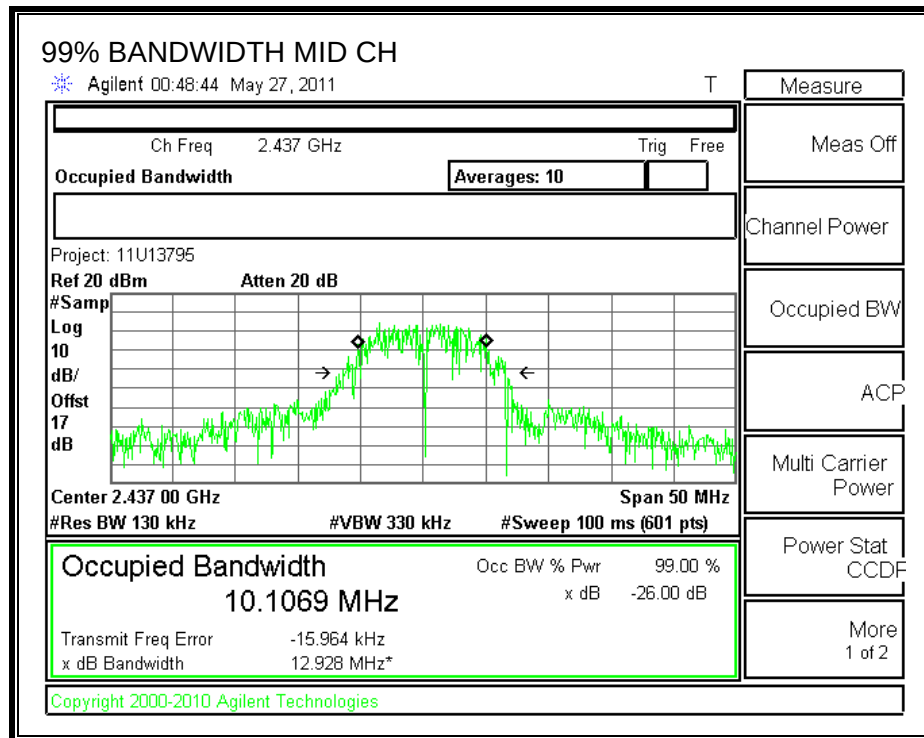
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

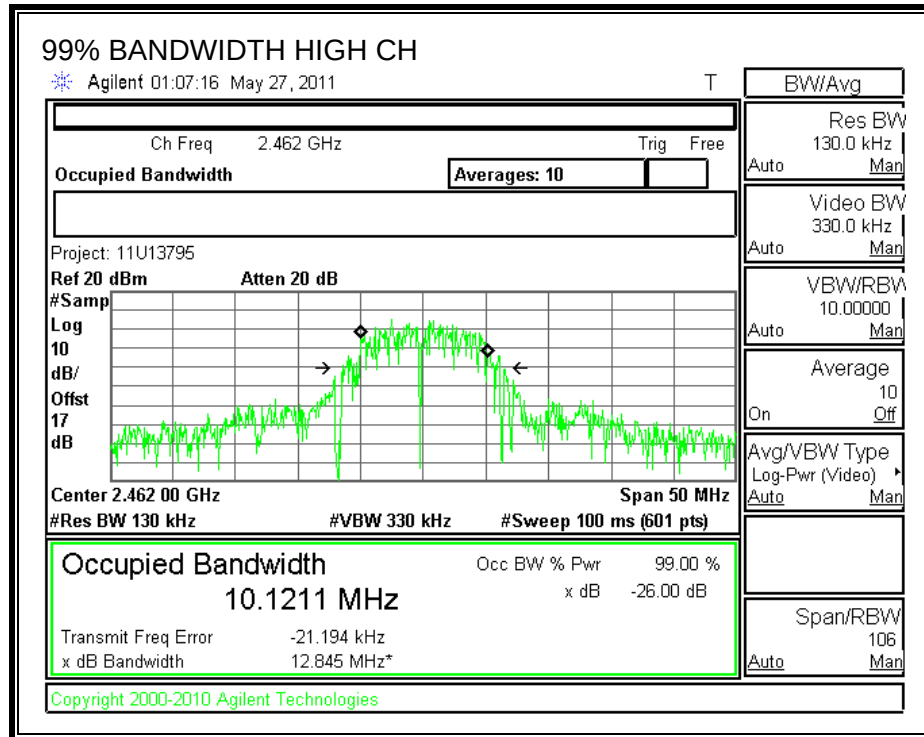
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	10.0955
Middle	2437	10.1069
High	2462	10.1211

99% BANDWIDTH







7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

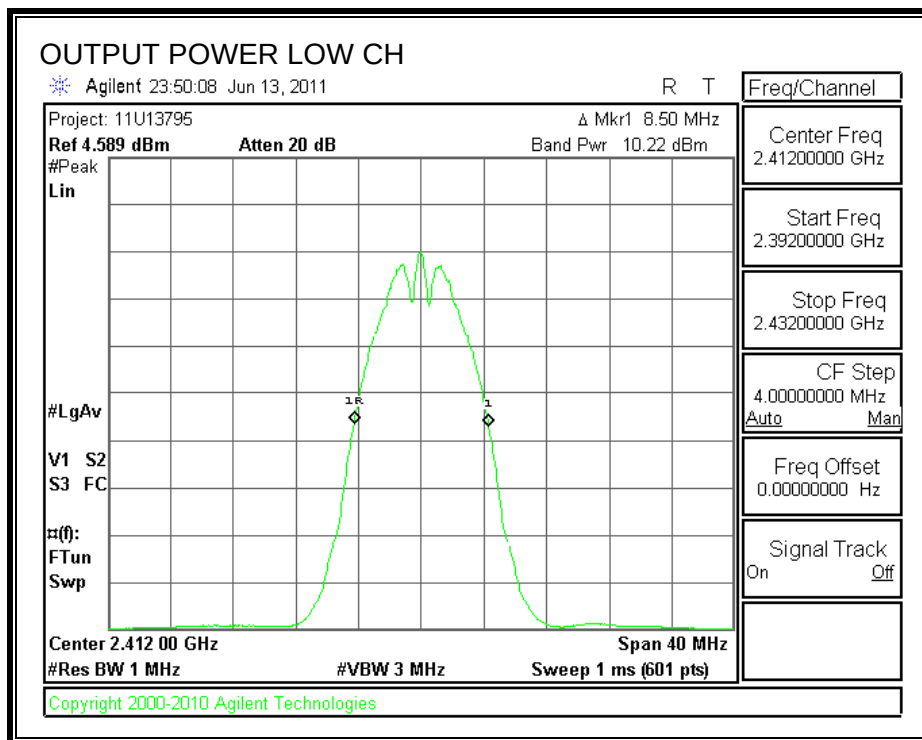
TEST PROCEDURE

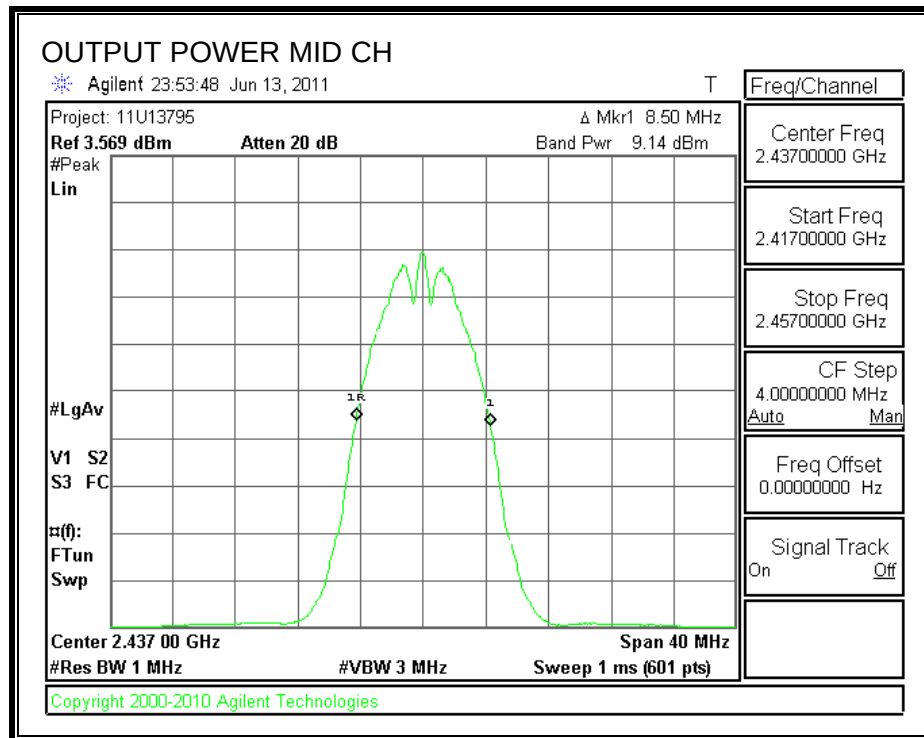
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

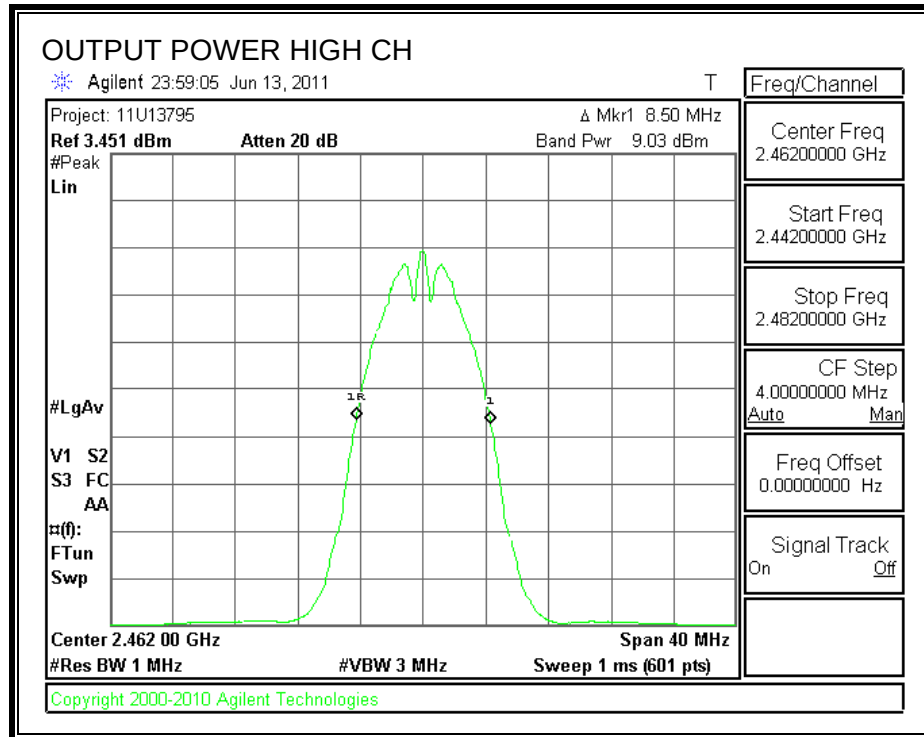
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	10.22	11	21.22	30	-8.78
Middle	2437	9.14	11	20.14	30	-9.86
High	2462	9.03	11	20.03	30	-9.97

OUTPUT POWER







7.1.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

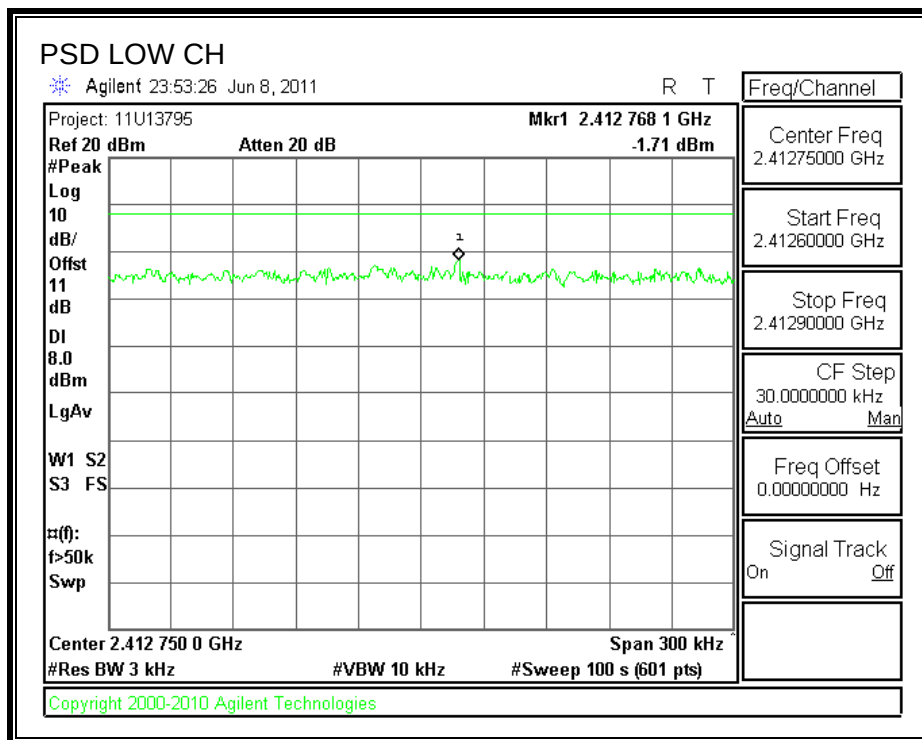
TEST PROCEDURE

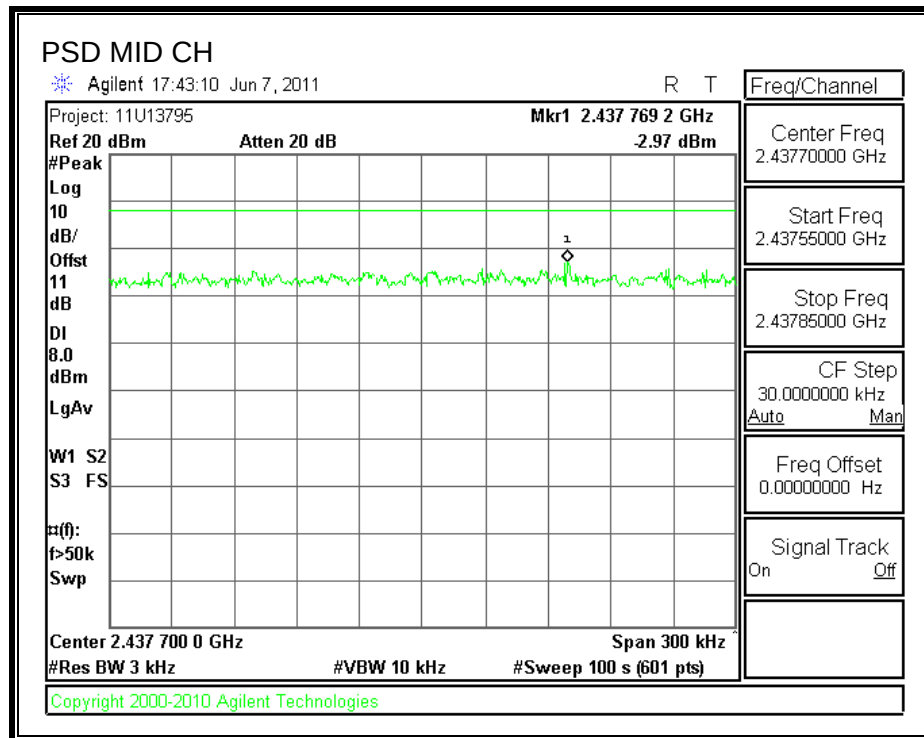
Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

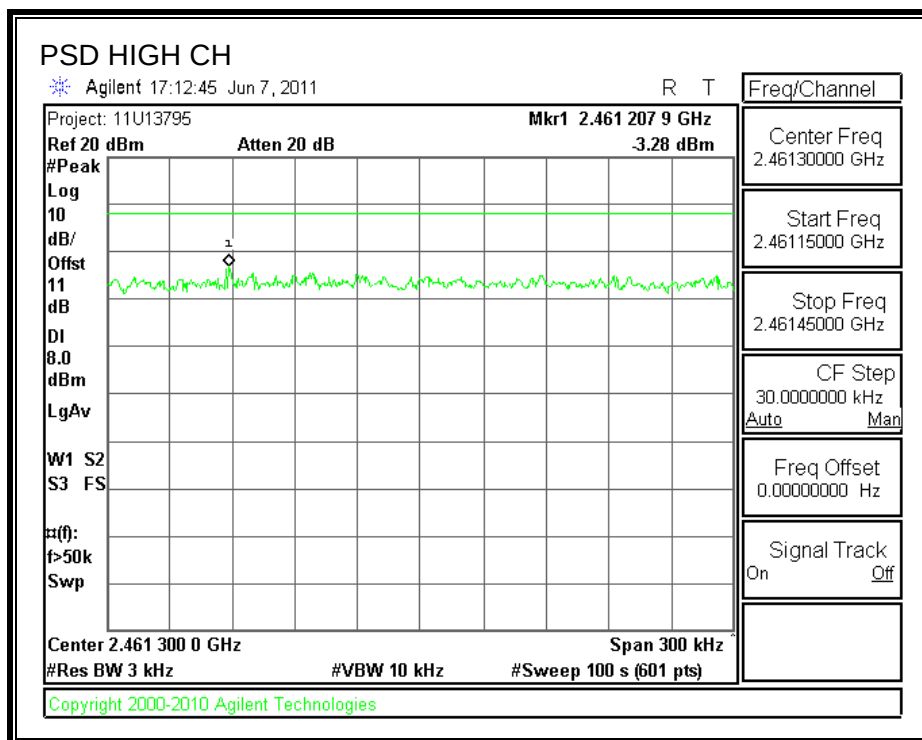
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-1.71	8	-9.71
Middle	2437	-2.97	8	-10.97
High	2462	-3.28	8	-11.28

POWER SPECTRAL DENSITY







7.1.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

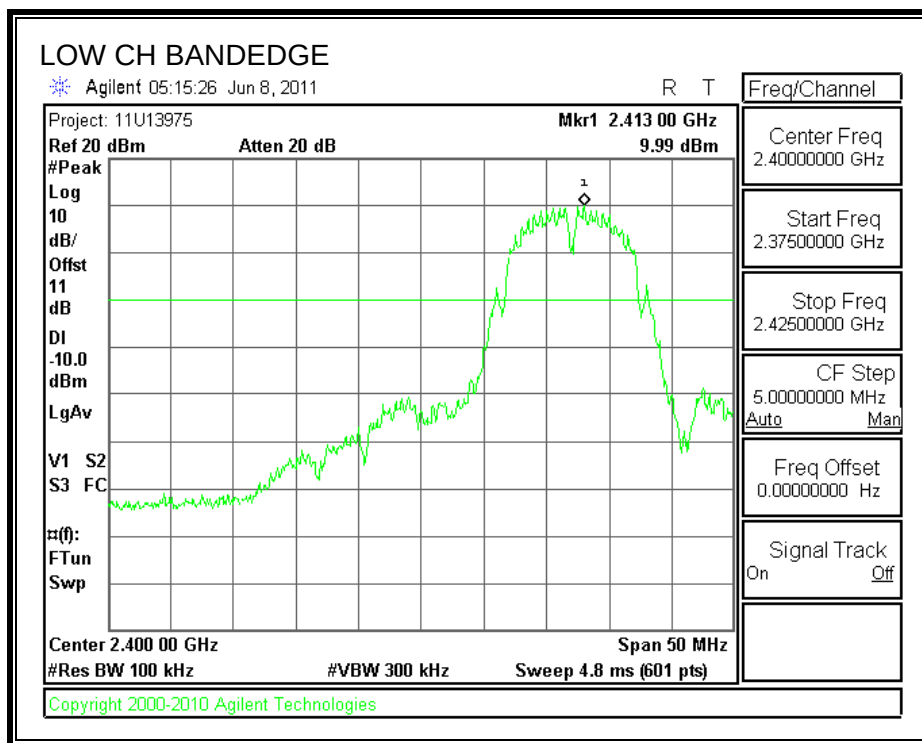
TEST PROCEDURE

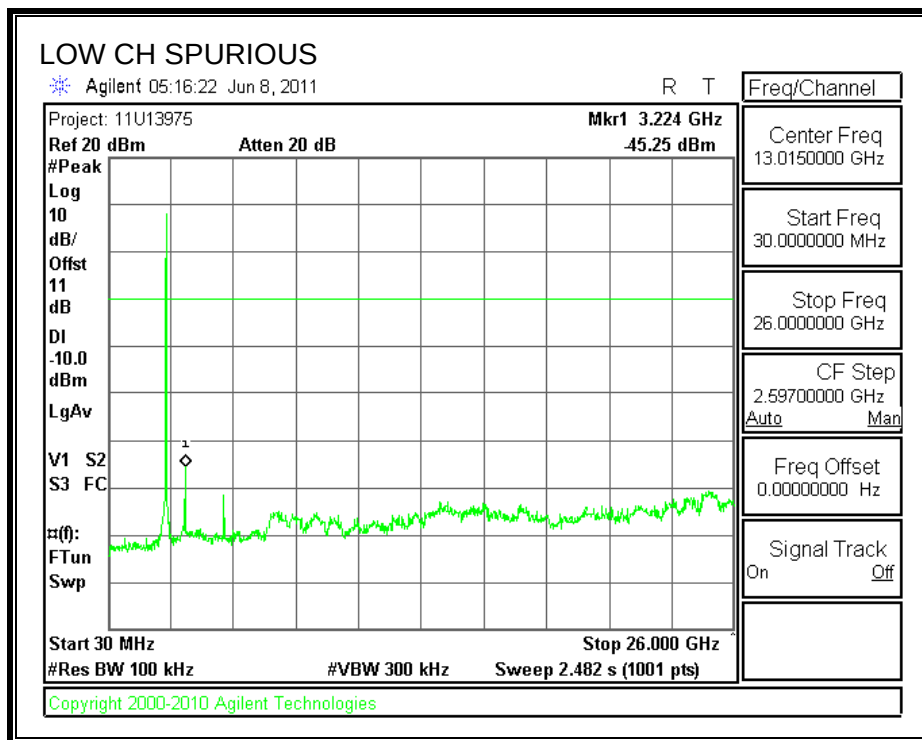
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

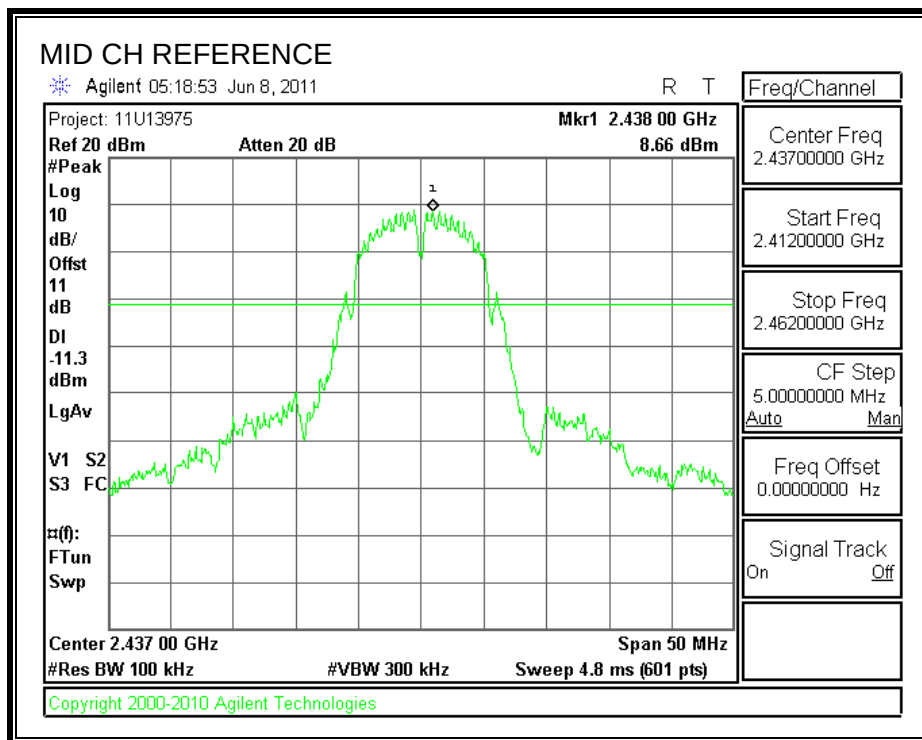
RESULTS

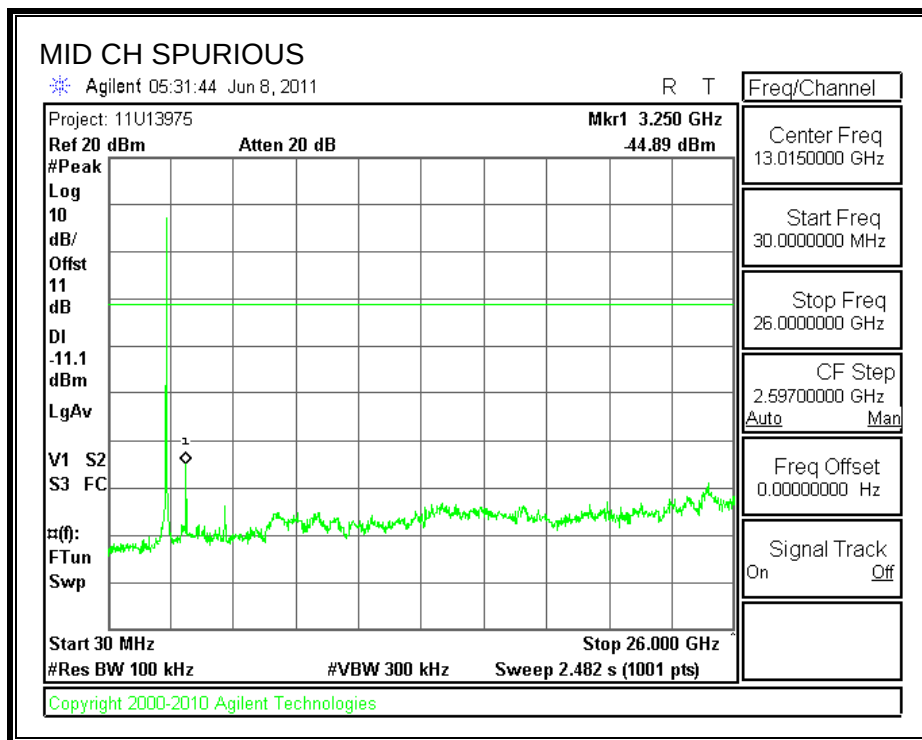
SPURIOUS EMISSIONS, LOW CHANNEL



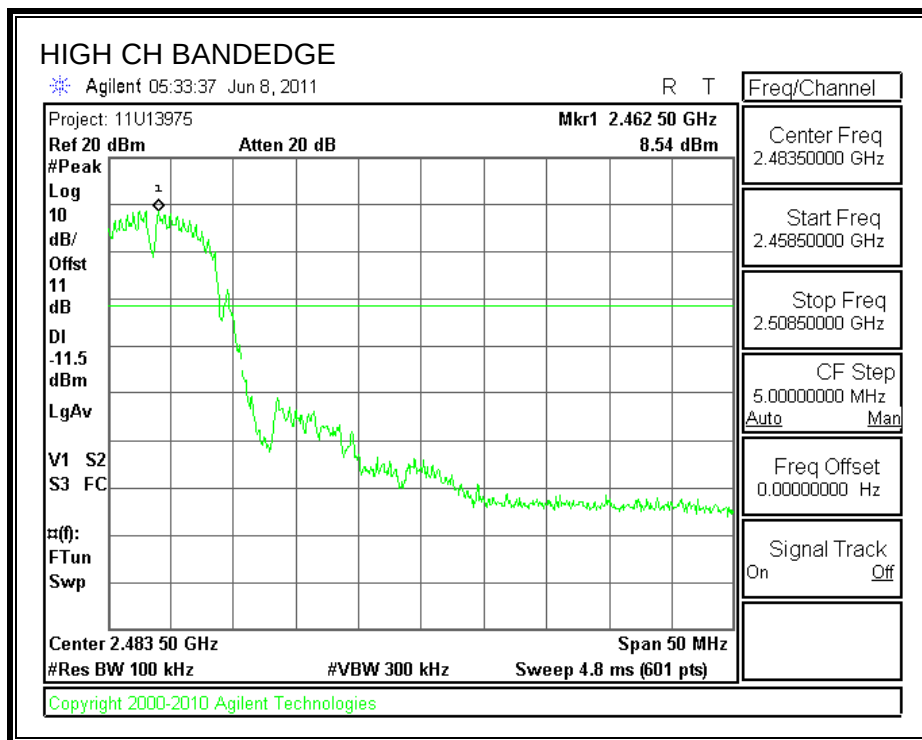


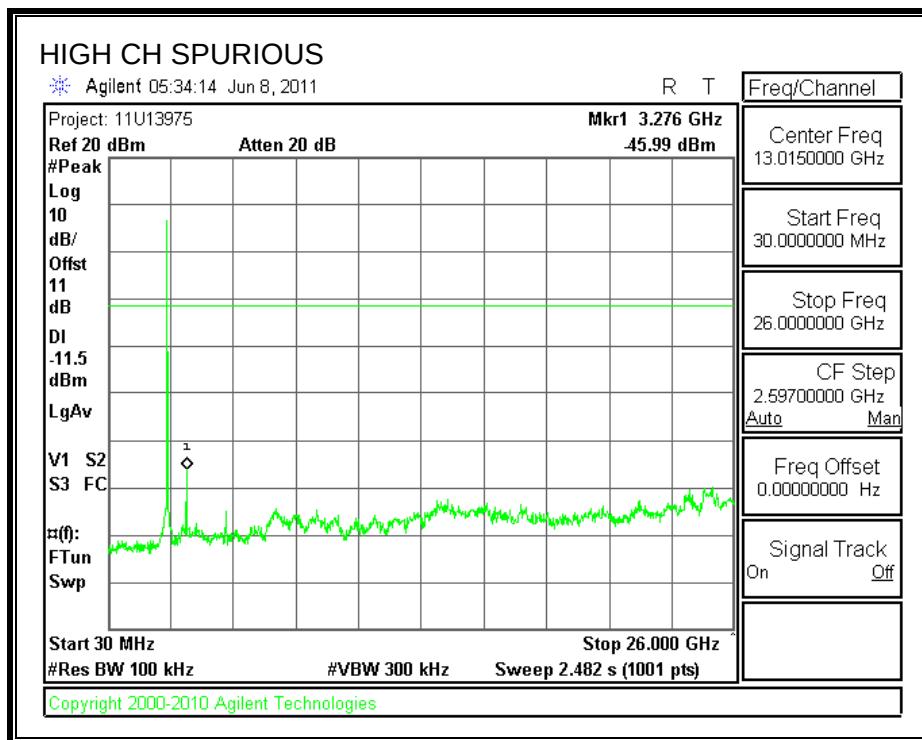
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.2. 802.11g MODE IN THE 2.4 GHz BAND

7.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

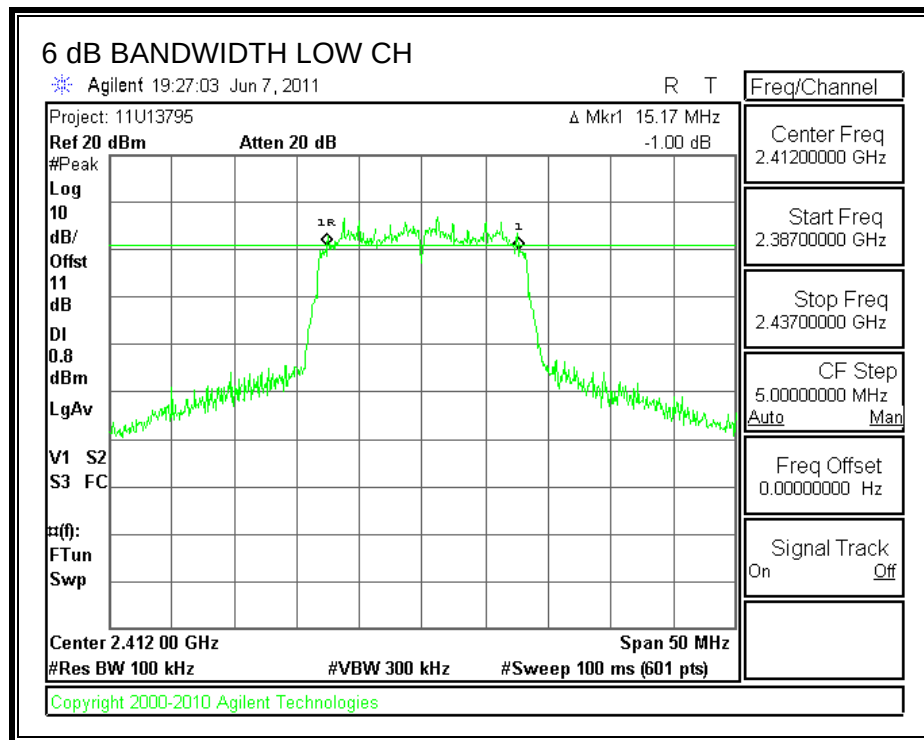
The minimum 6 dB bandwidth shall be at least 500 kHz.

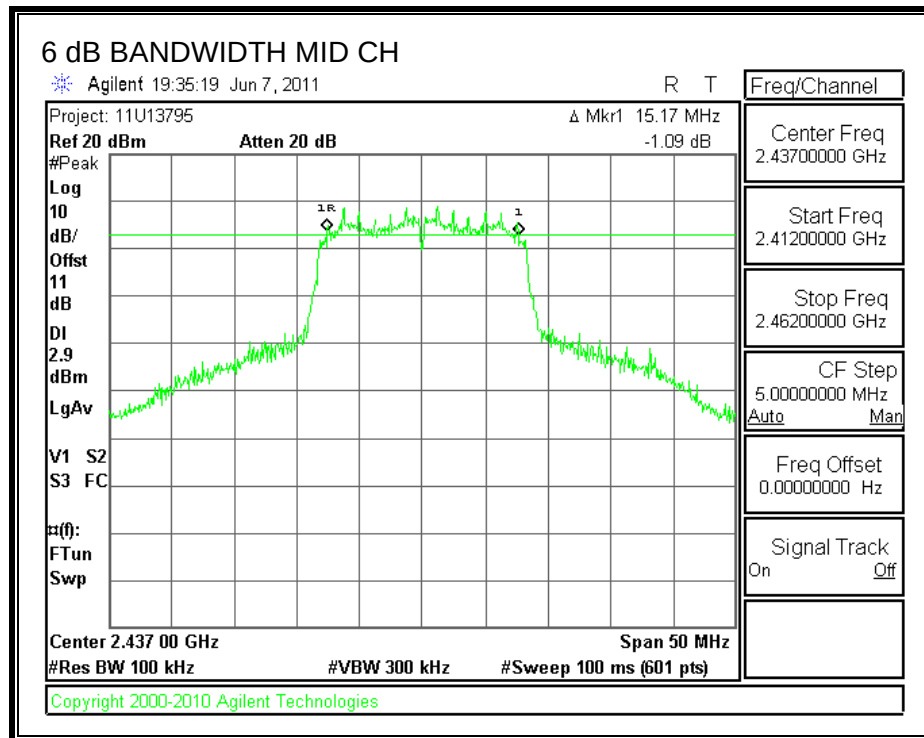
TEST PROCEDURE

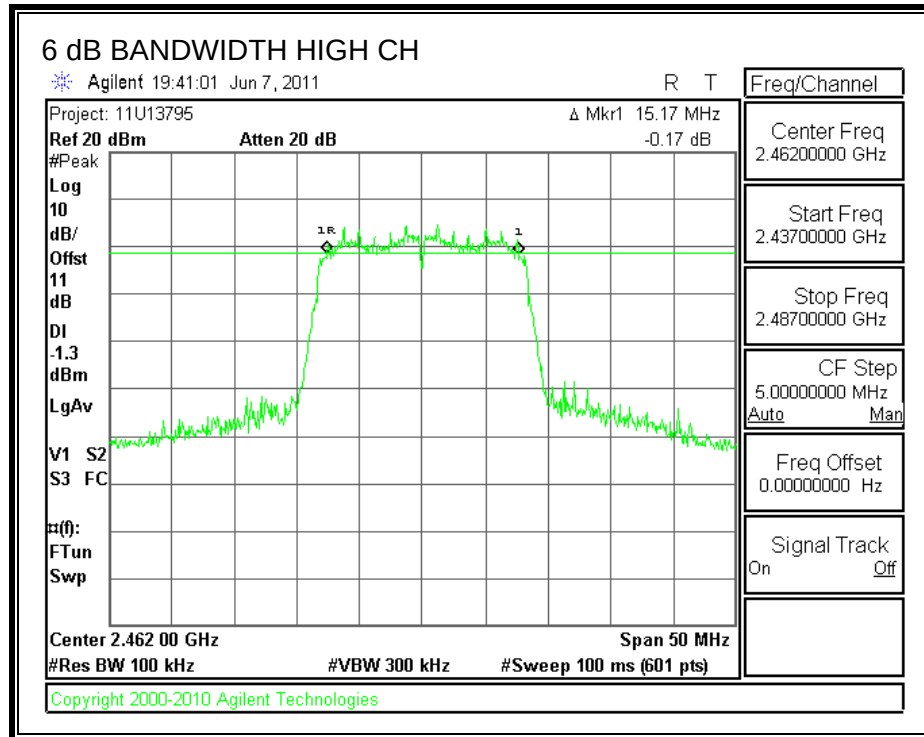
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.17	0.5
Middle	2437	15.17	0.5
High	2462	15.17	0.5







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

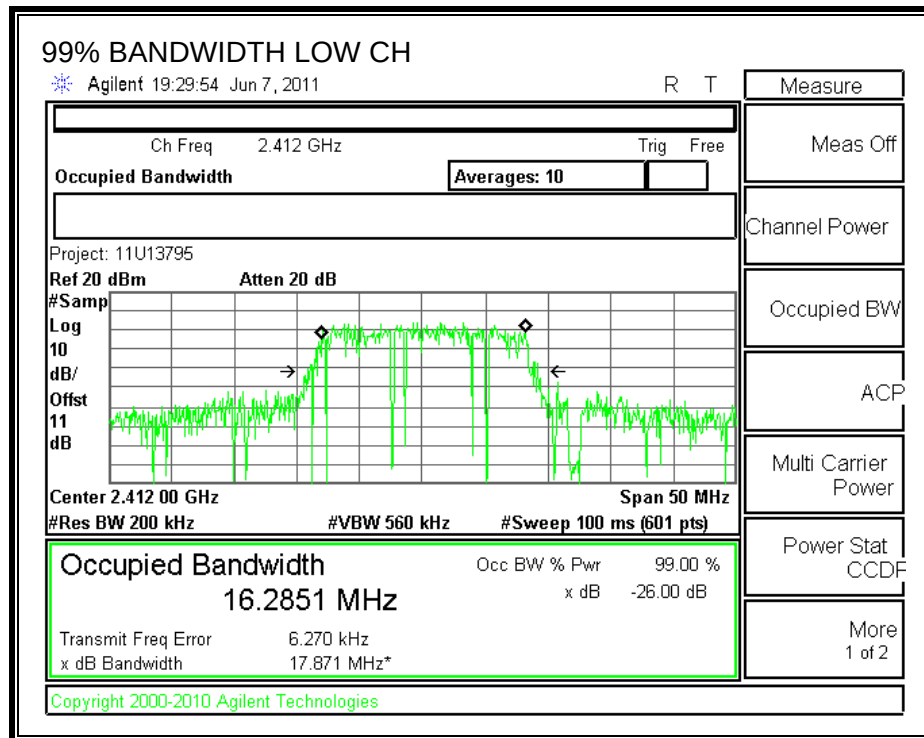
TEST PROCEDURE

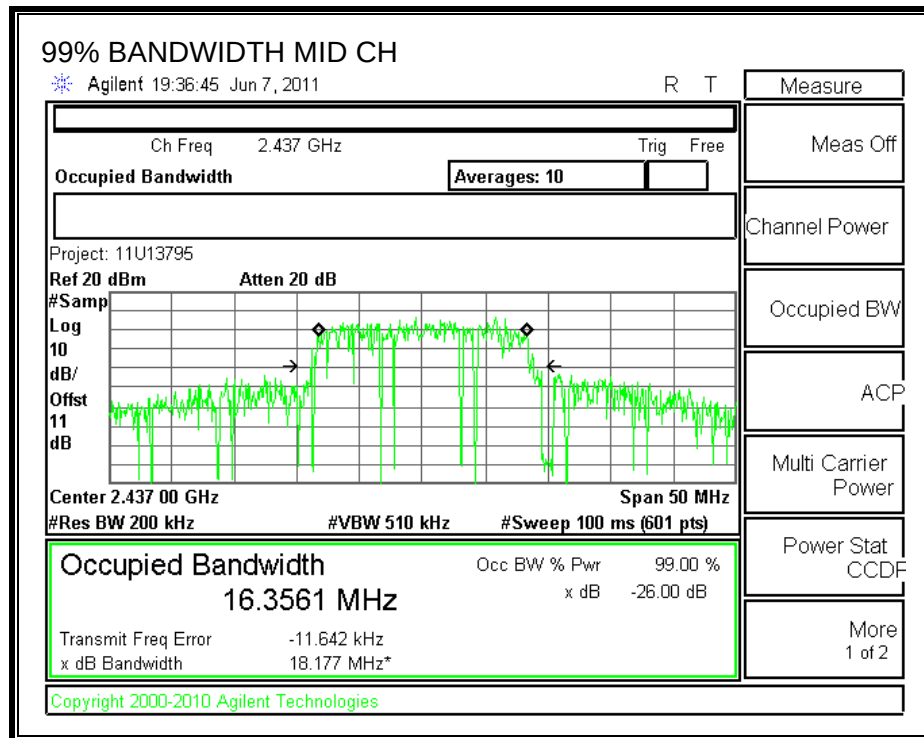
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

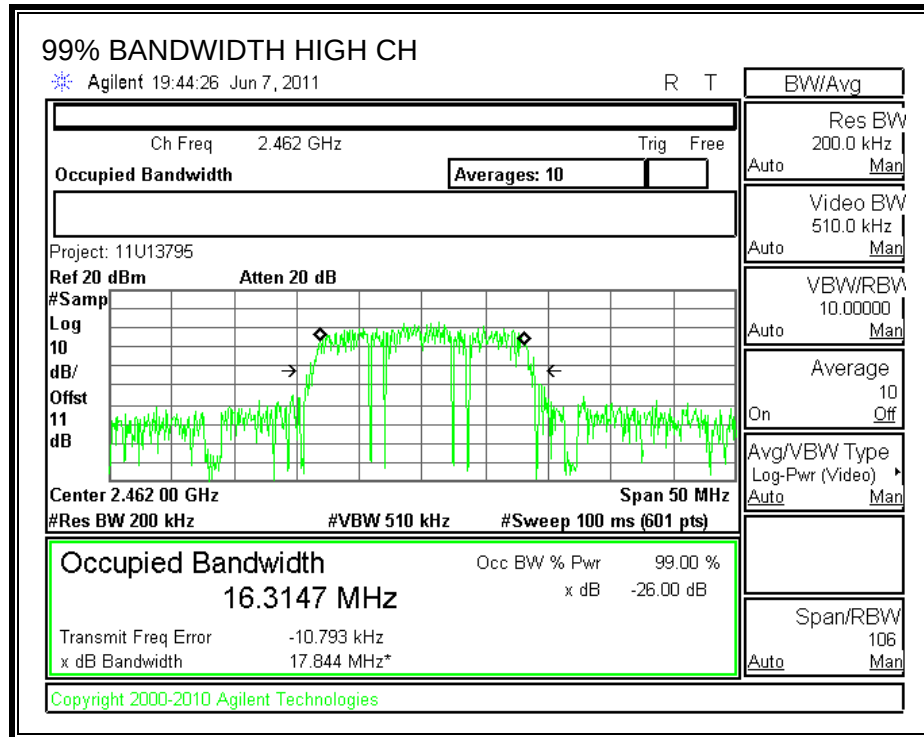
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.2851
Middle	2437	16.3561
High	2462	16.3147

99% BANDWIDTH







7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

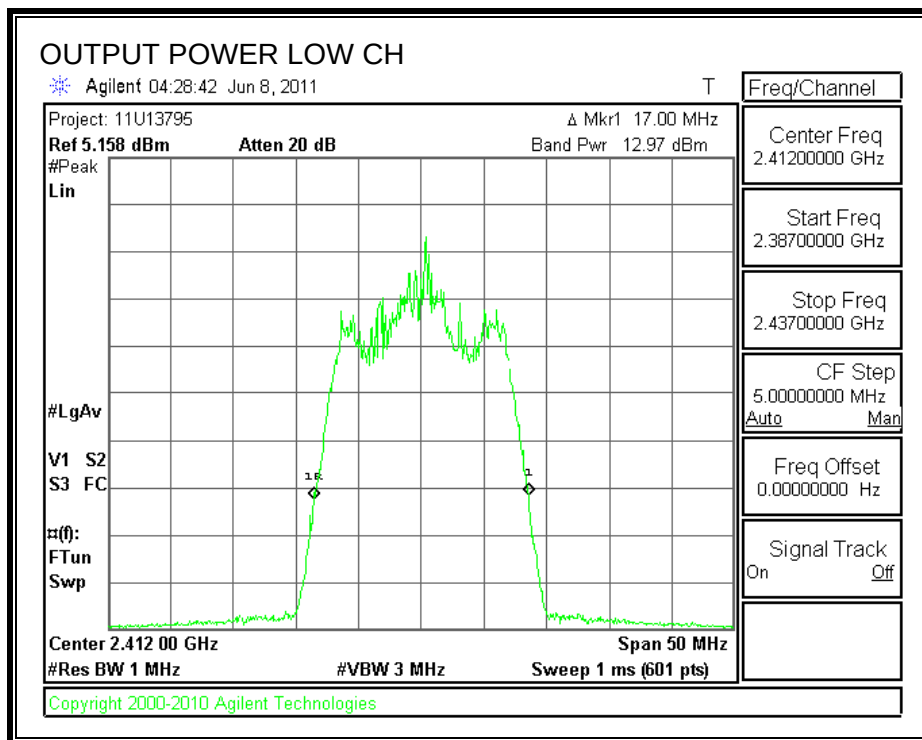
TEST PROCEDURE

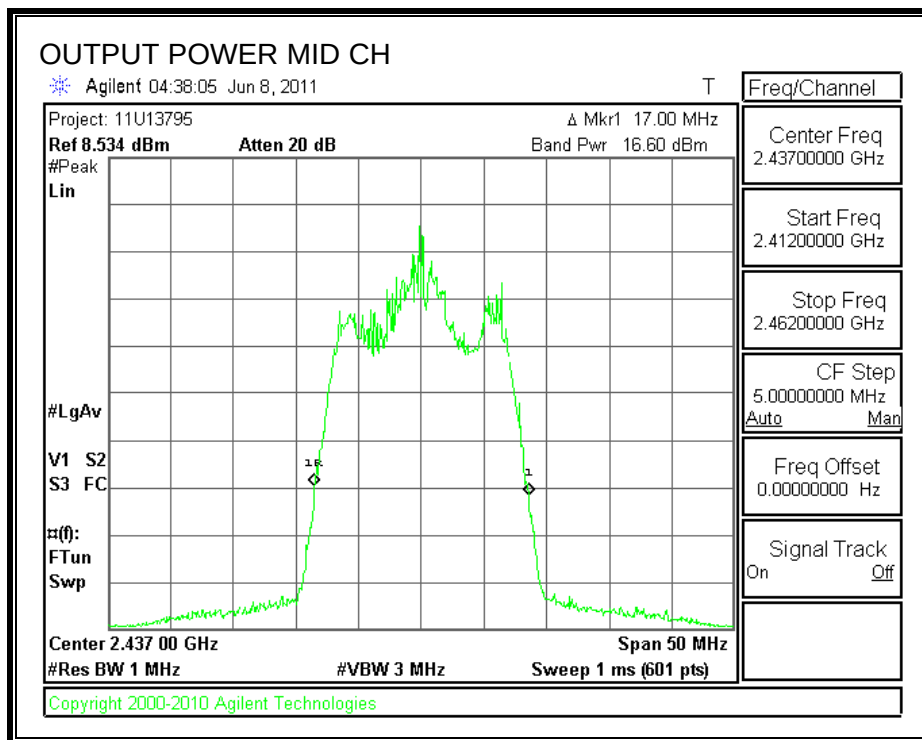
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

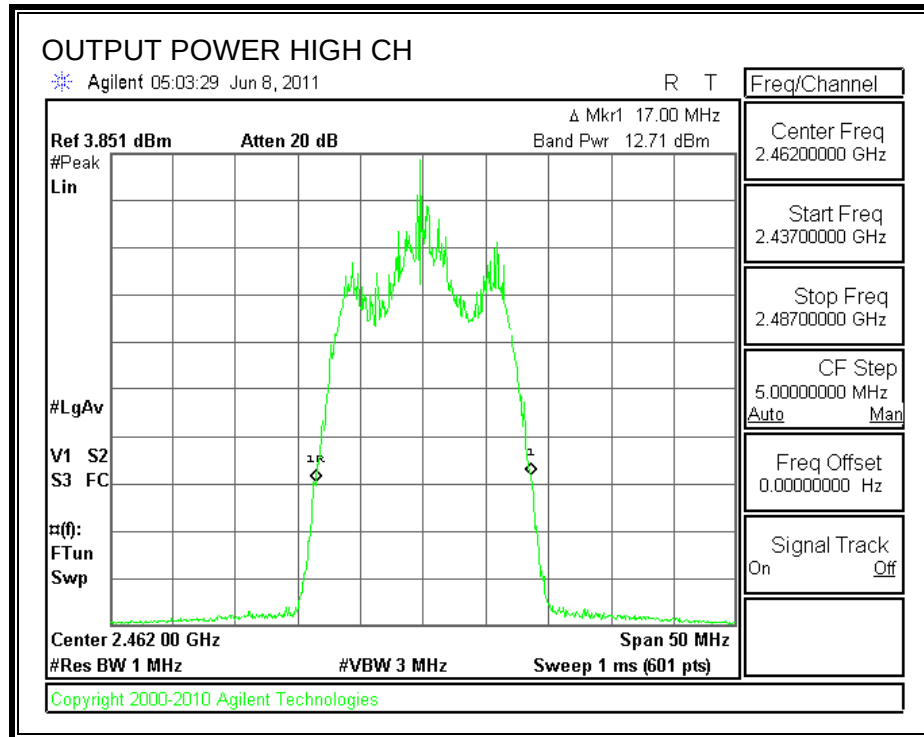
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	12.97	11	23.97	30	-6.03
Middle	2437	16.60	11	27.60	30	-2.40
High	2462	12.71	11	23.71	30	-6.29

OUTPUT POWER







7.2.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

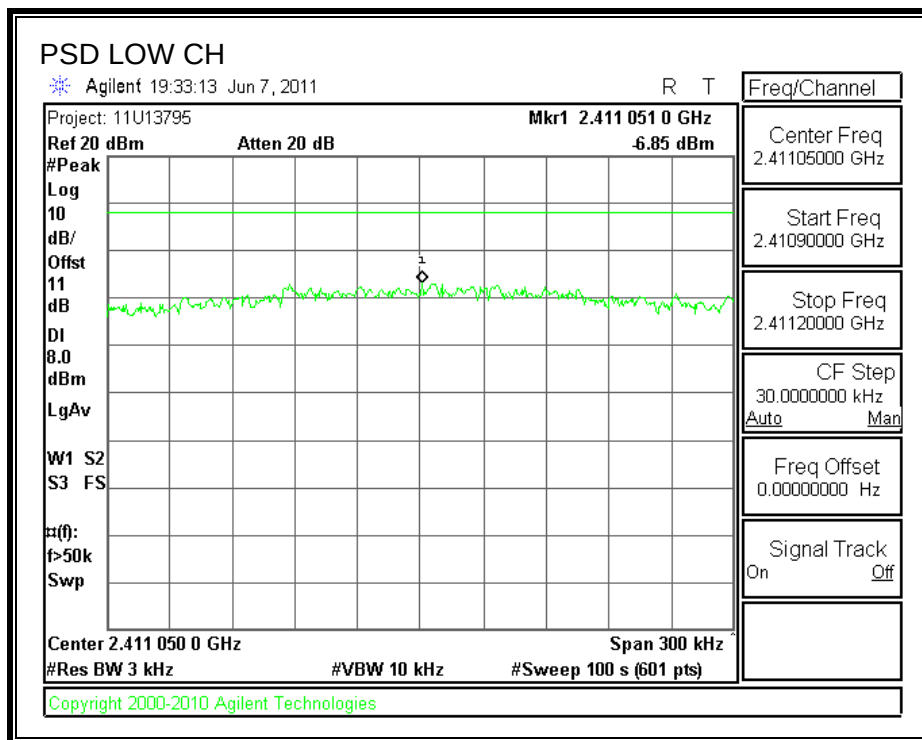
TEST PROCEDURE

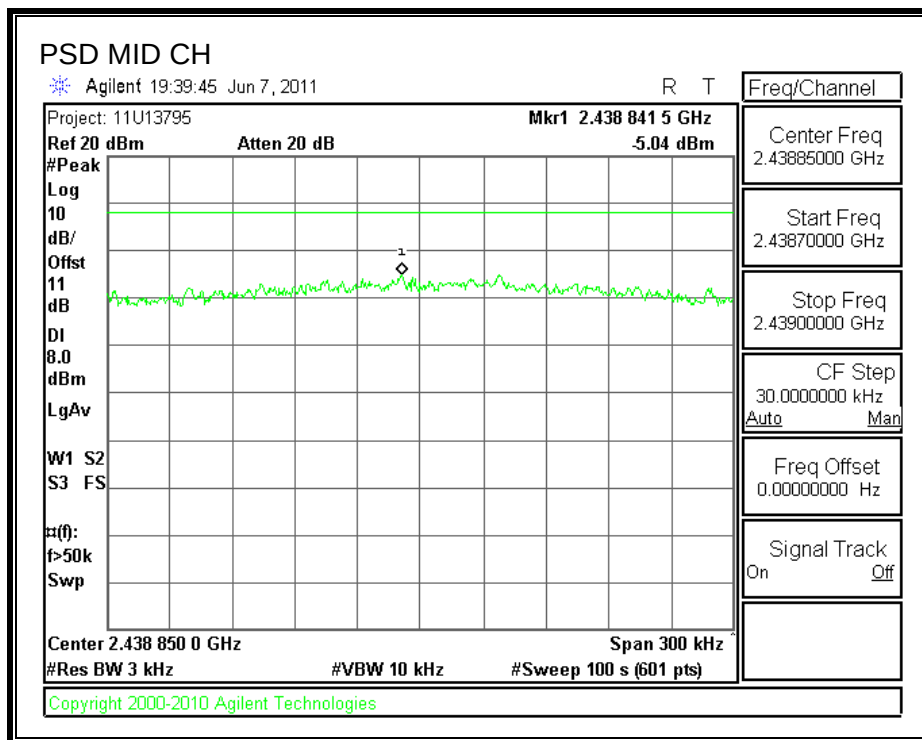
Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

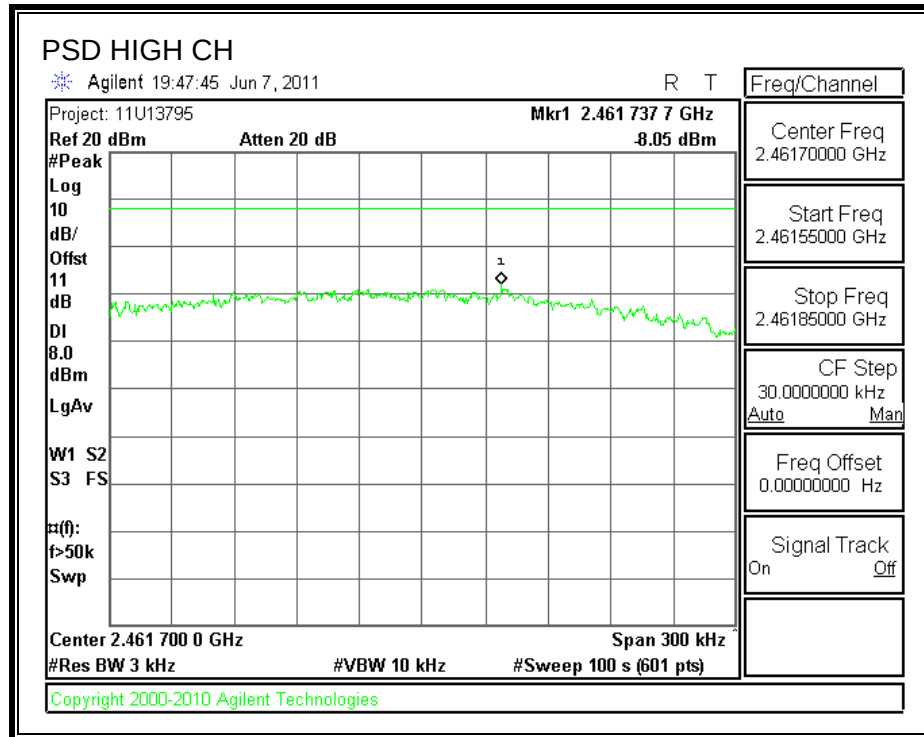
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-6.85	8	-14.85
Middle	2437	-5.04	8	-13.04
High	2462	-8.05	8	-16.05

POWER SPECTRAL DENSITY







7.2.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

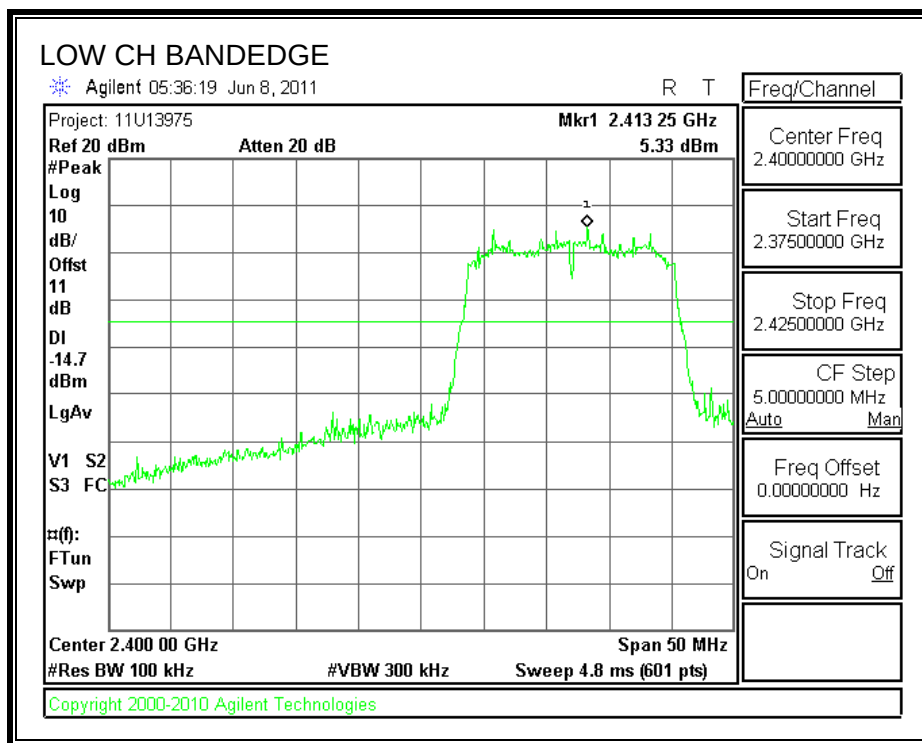
TEST PROCEDURE

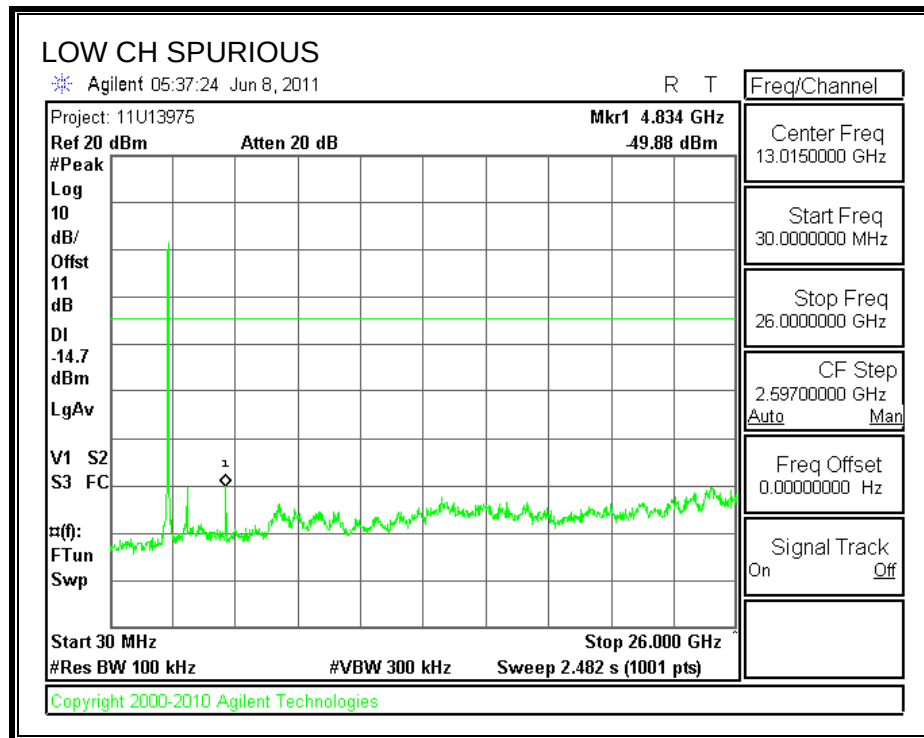
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

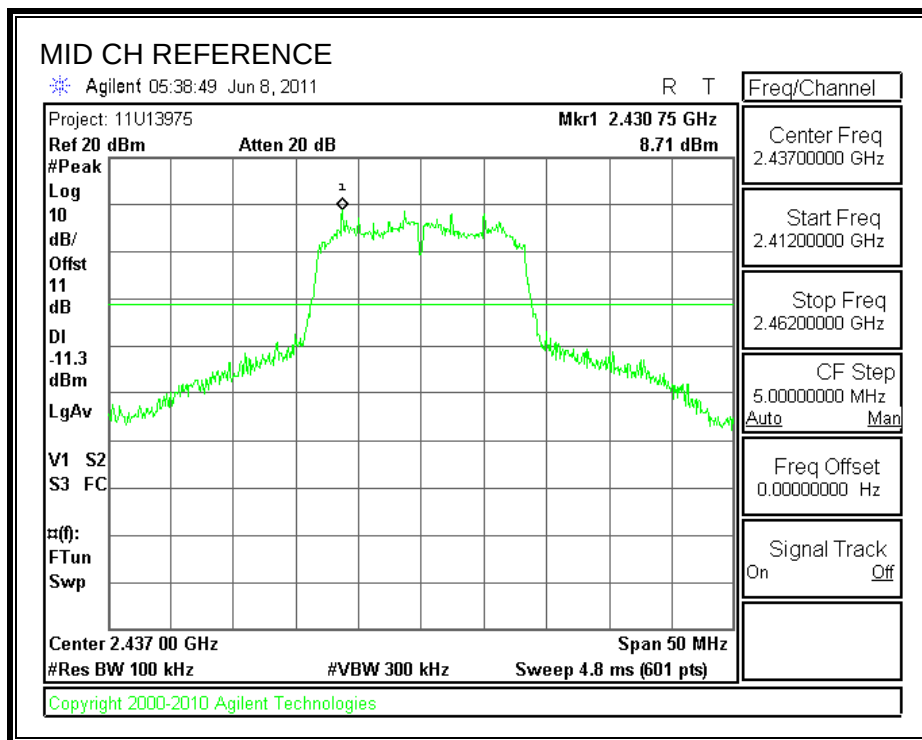
RESULTS

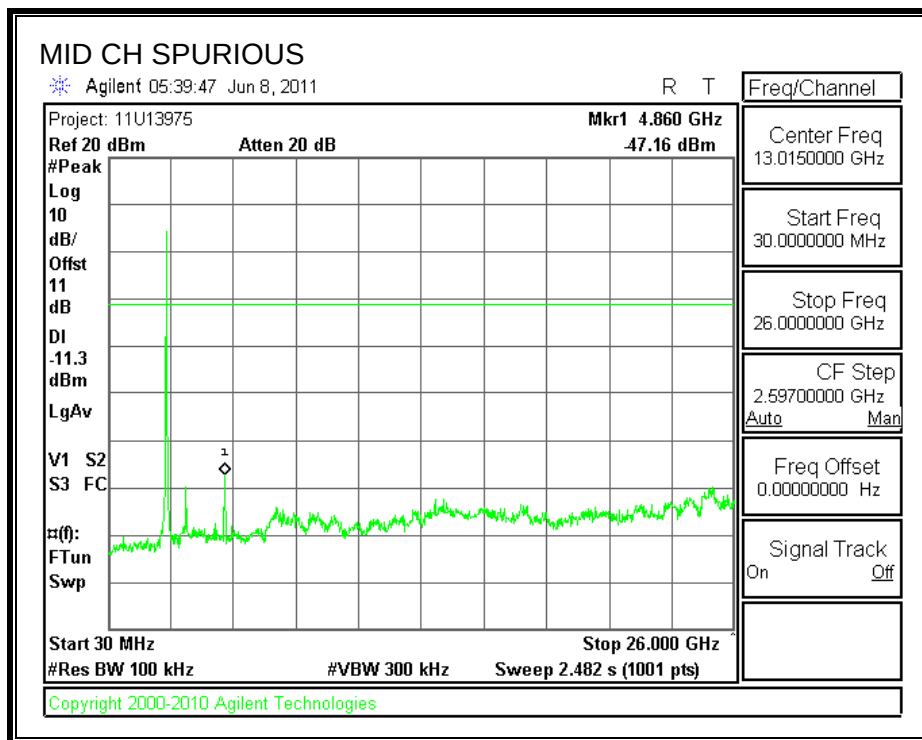
SPURIOUS EMISSIONS, LOW CHANNEL



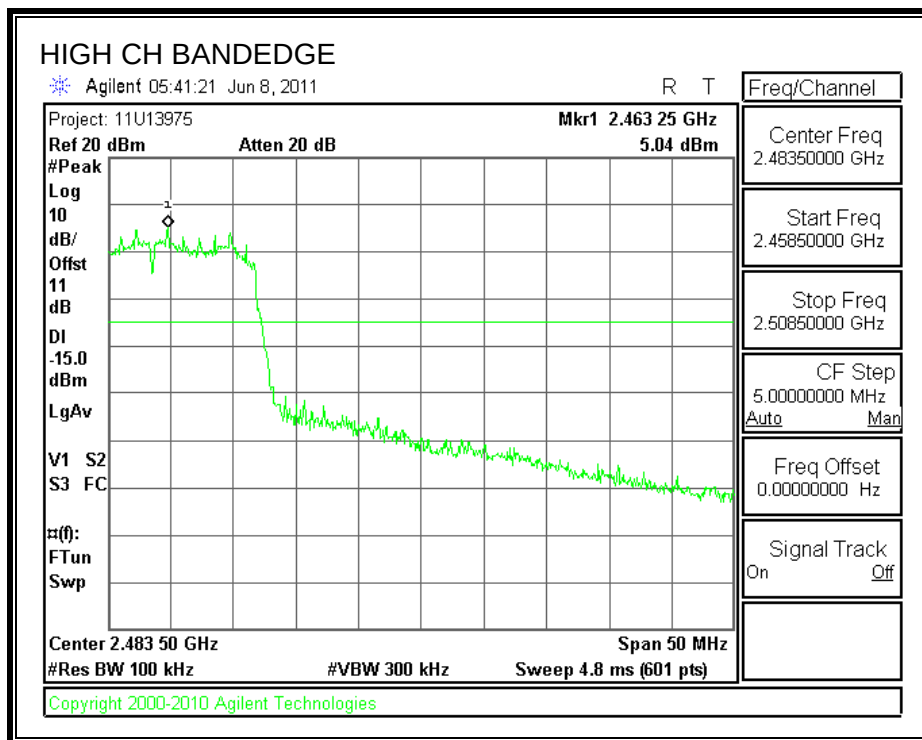


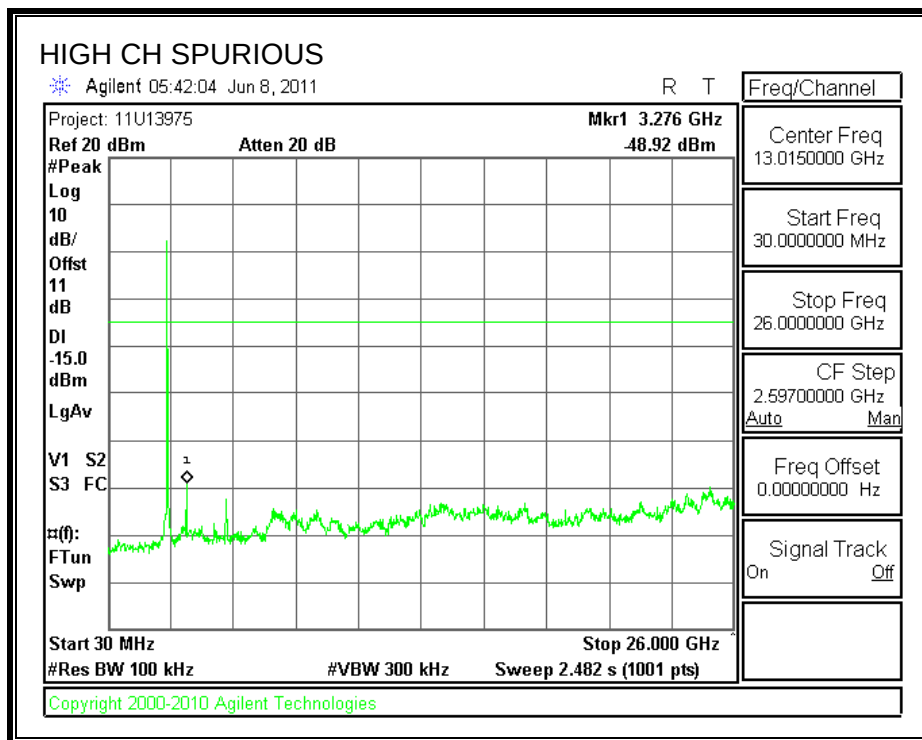
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

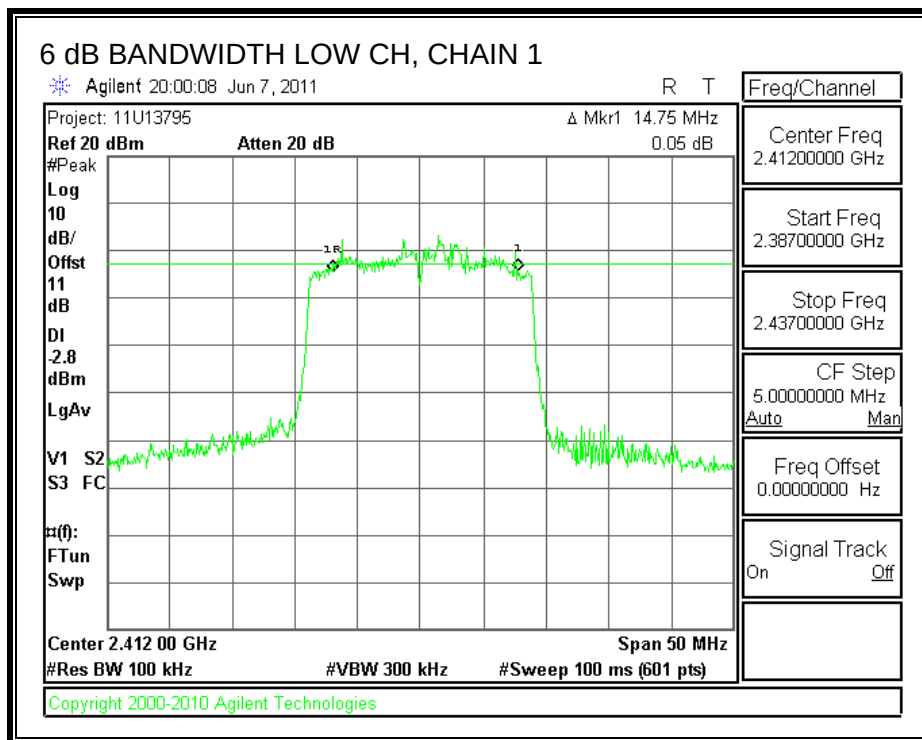
TEST PROCEDURE

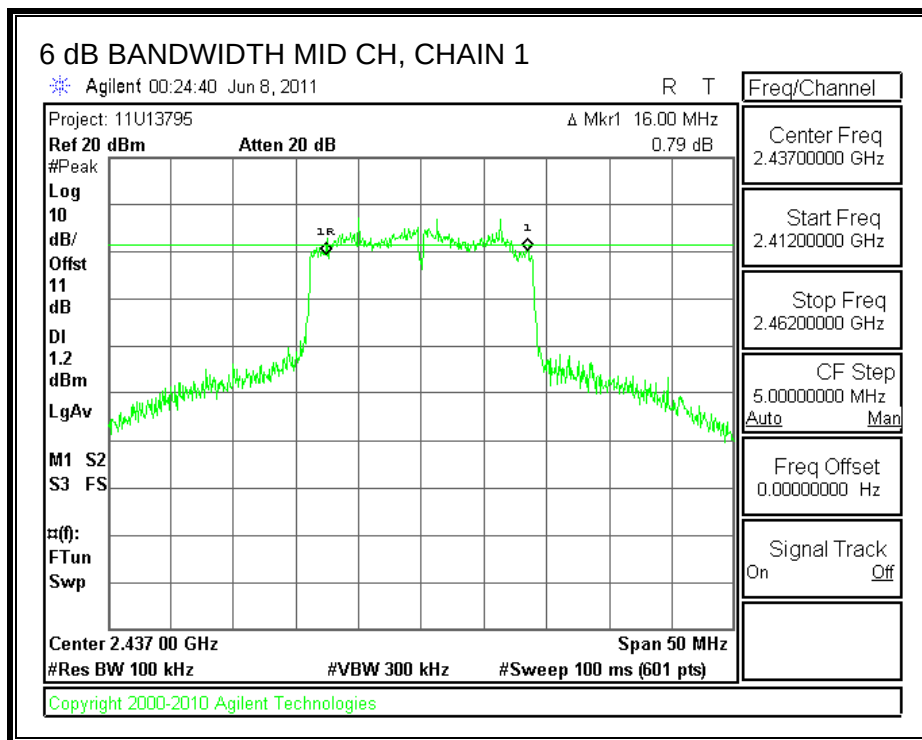
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

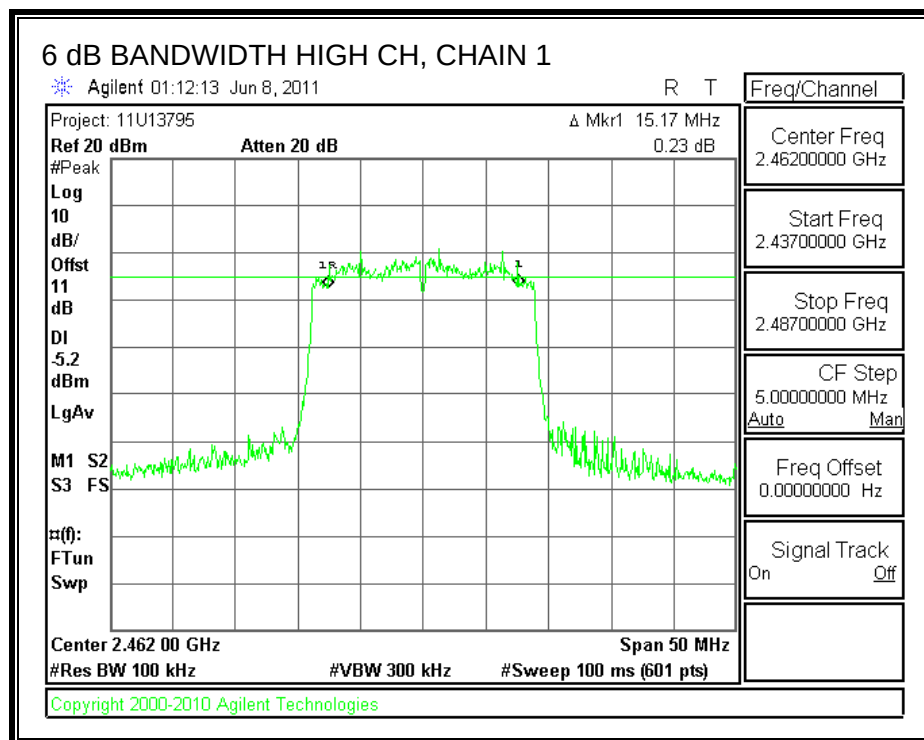
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	14.75	16.58	0.5
Middle	2437	16.00	16.17	0.5
High	2462	15.17	16.67	0.5

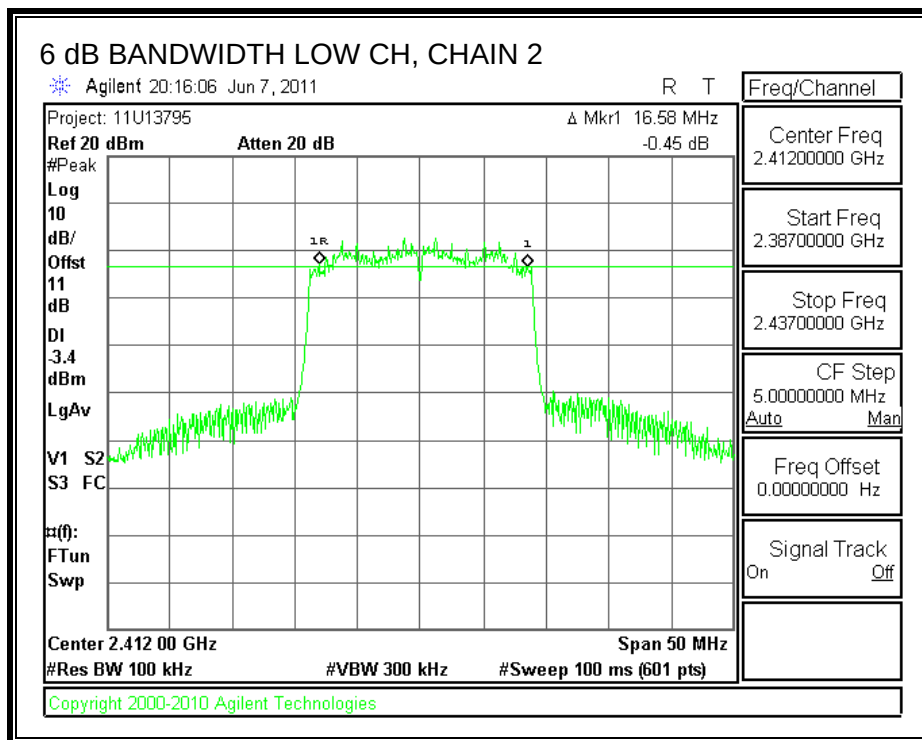
6 dB BANDWIDTH, CHAIN 1

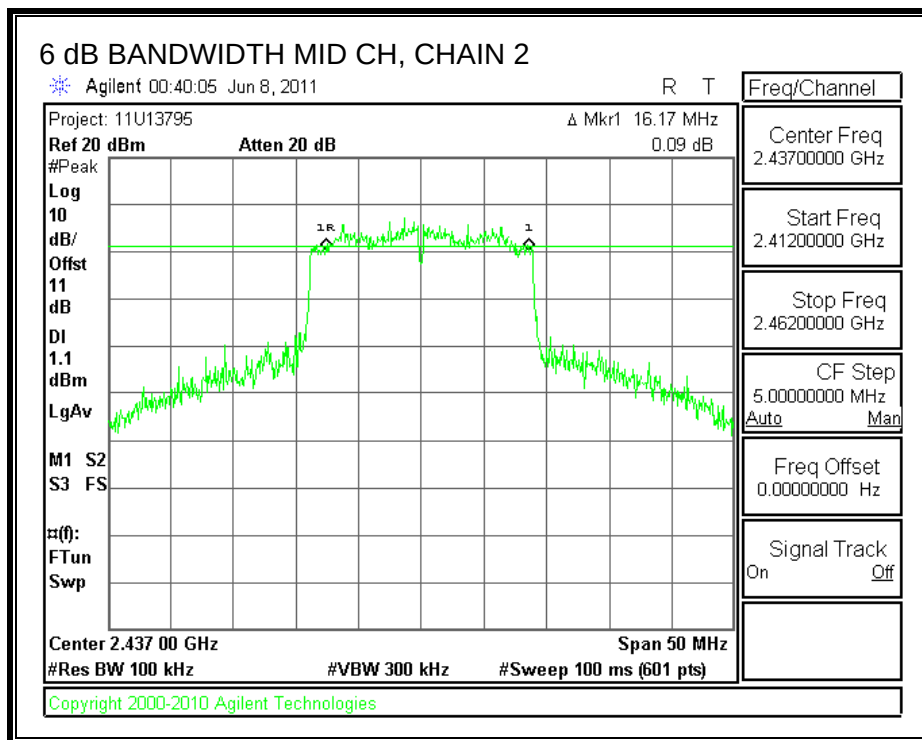


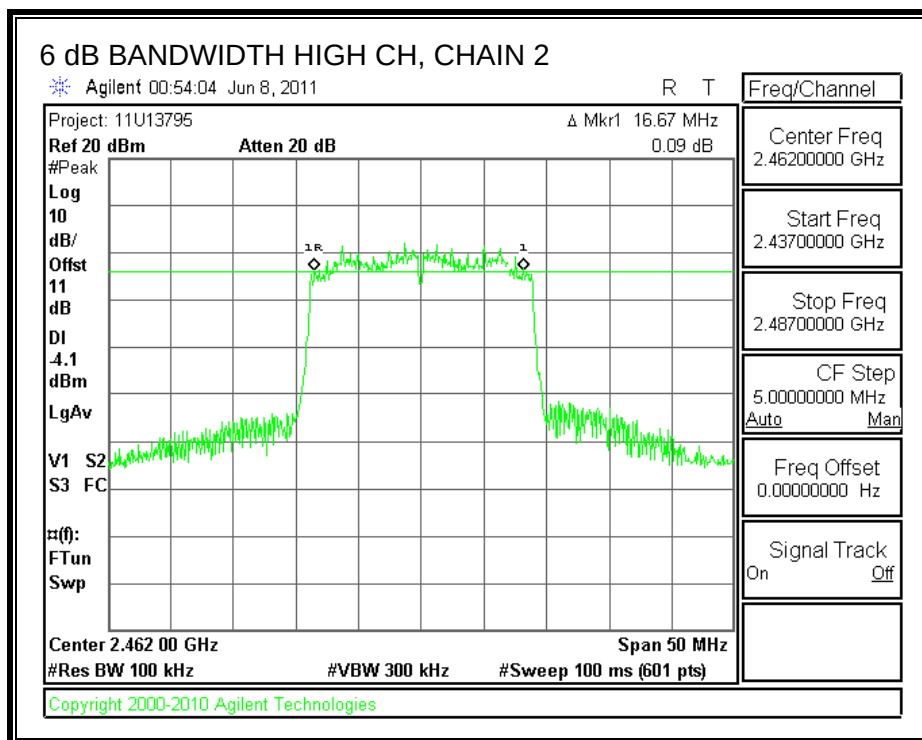




6 dB BANDWIDTH, CHAIN 2







7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

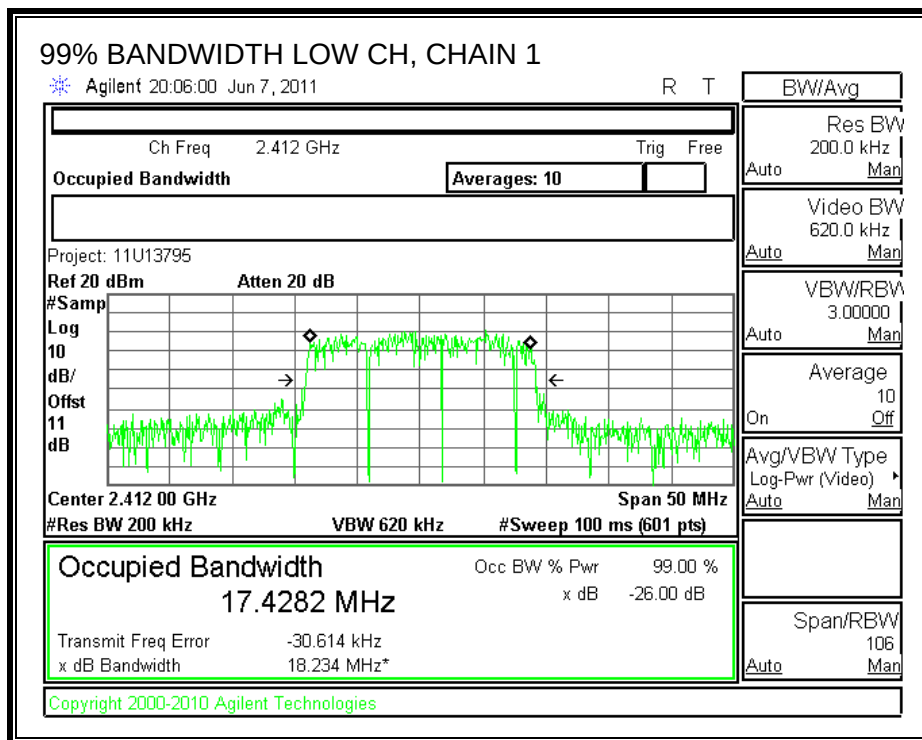
TEST PROCEDURE

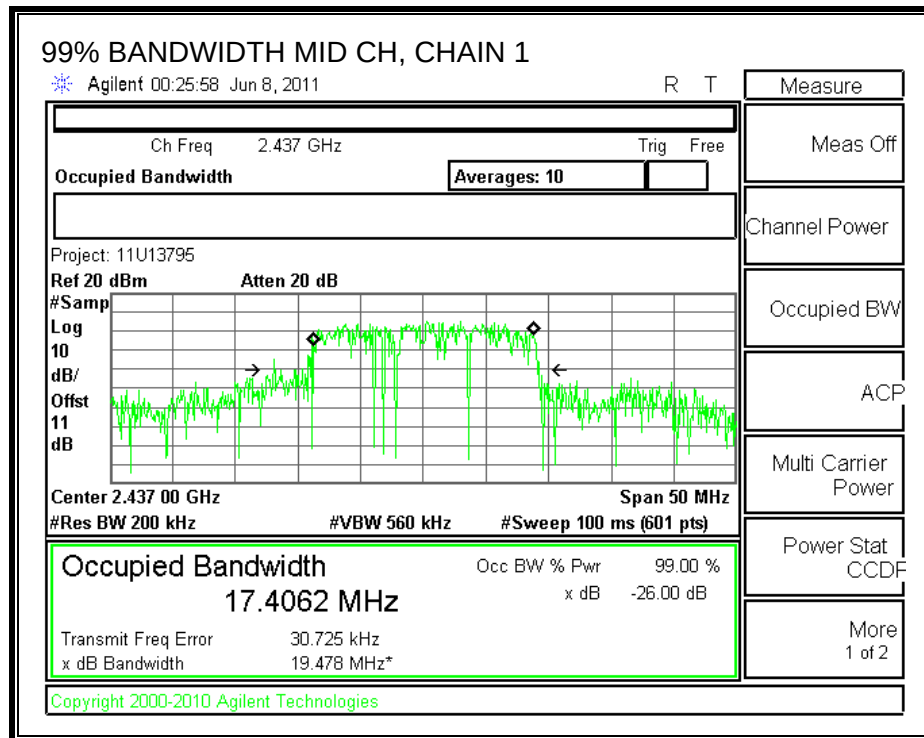
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

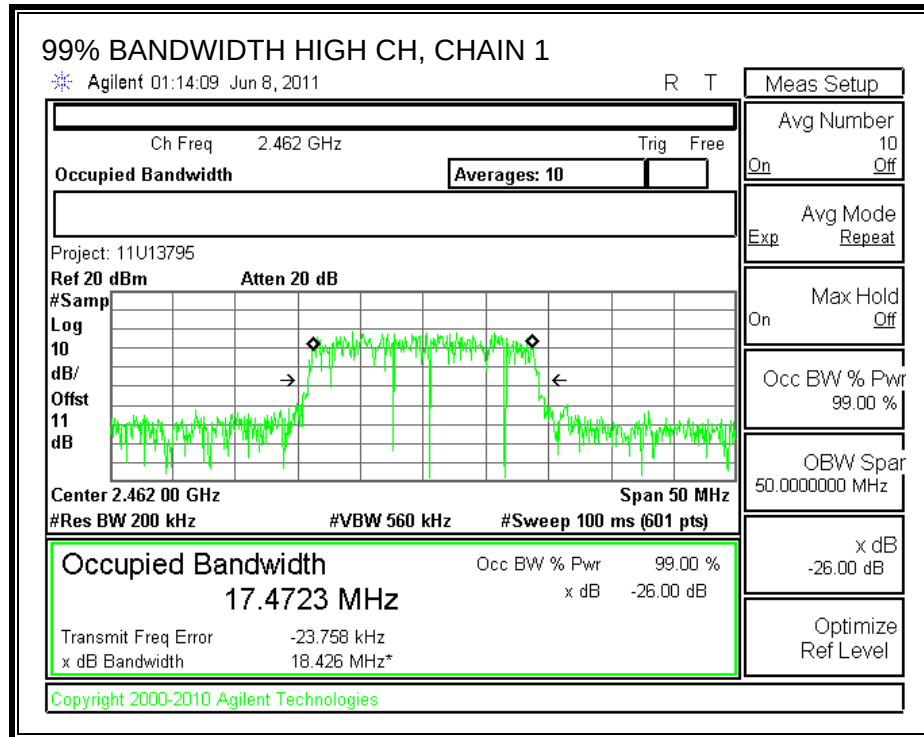
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	2412	17.4282	17.4521
Middle	2437	17.4062	17.5011
High	2462	17.4723	17.2552

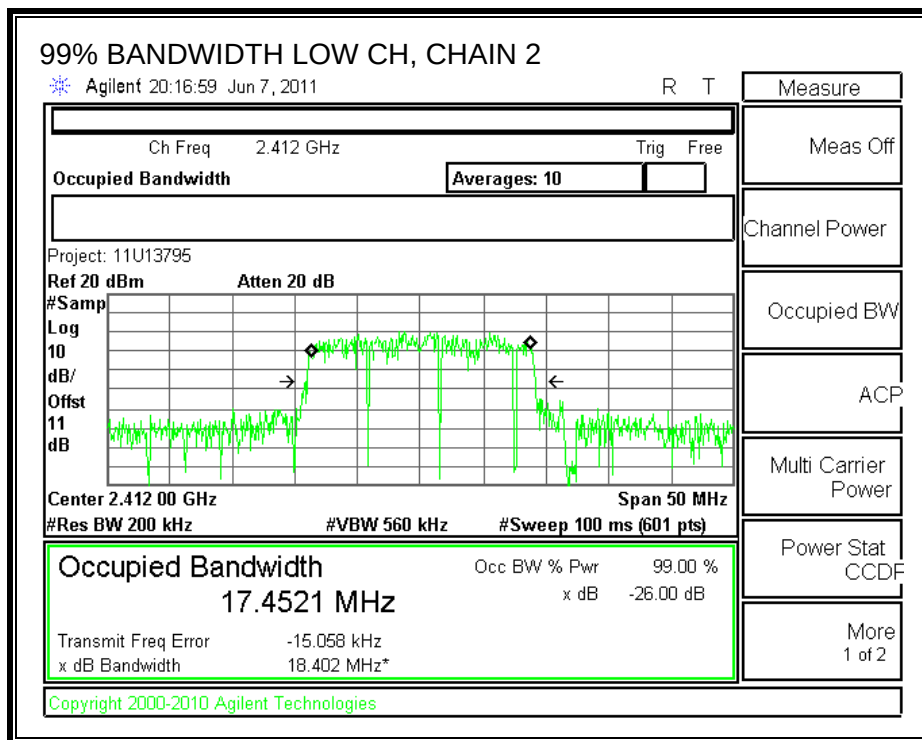
99% BANDWIDTH, CHAIN 1

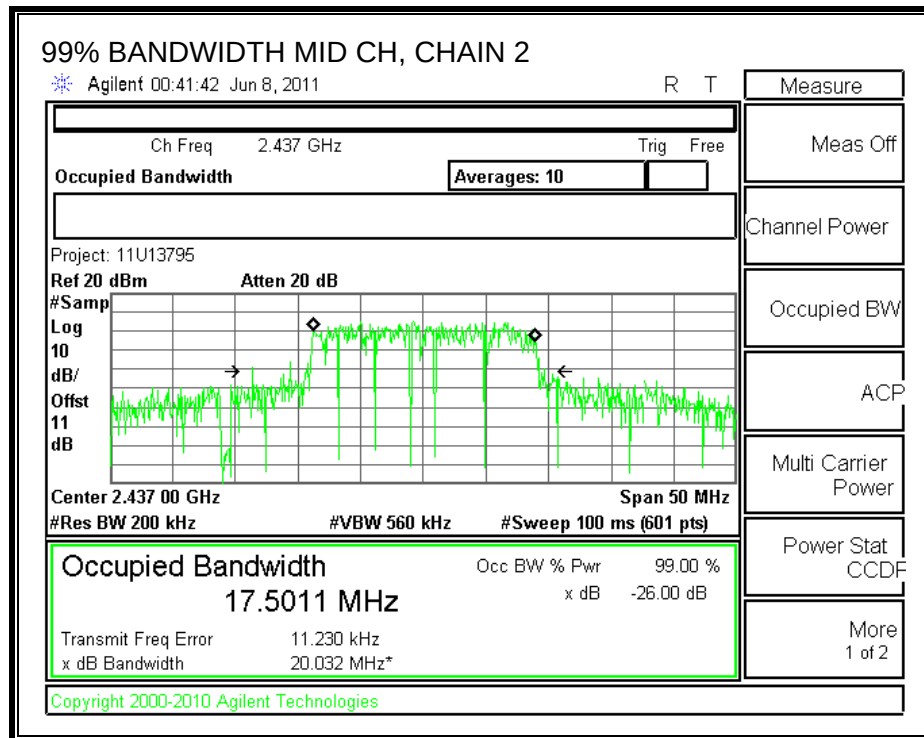


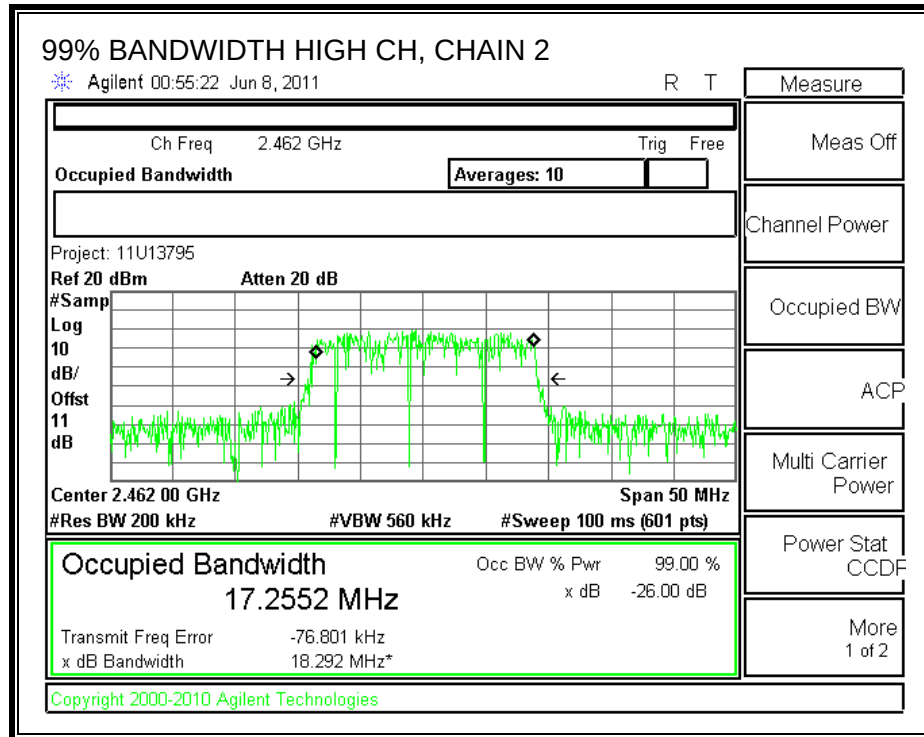




99% BANDWIDTH, CHAIN 2







7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The composite antenna gain is equal to 6.91 dBi, therefore the limit is 29.09 dBm.

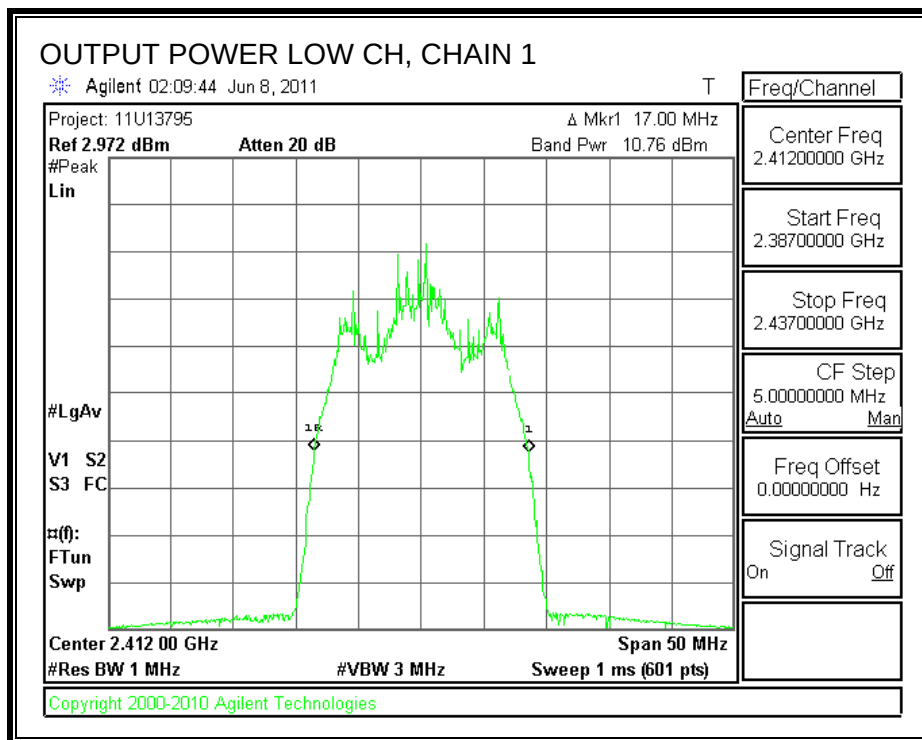
TEST PROCEDURE

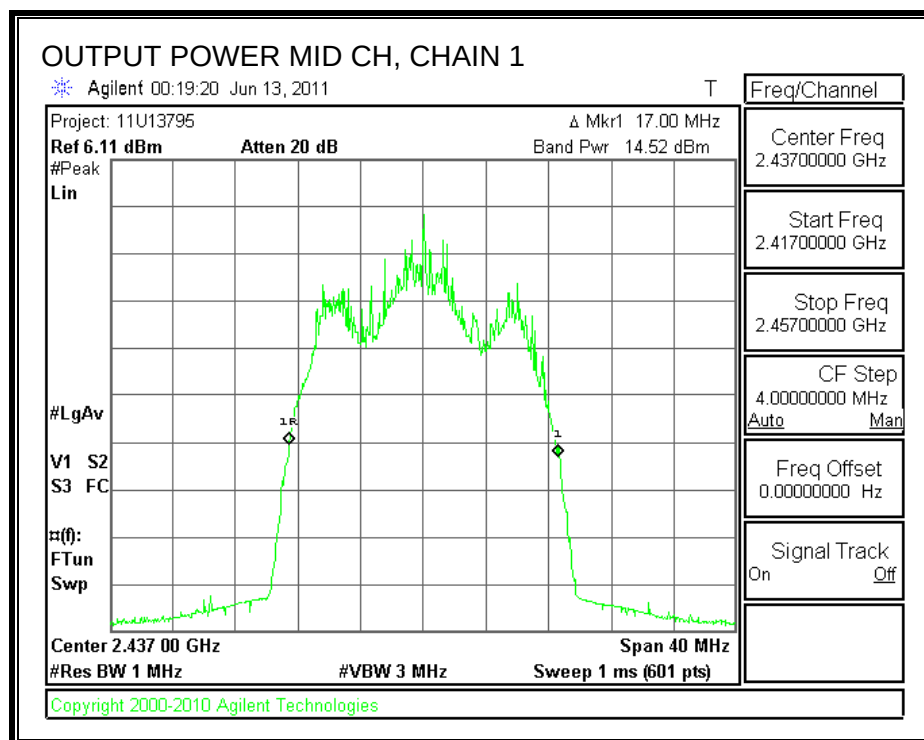
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

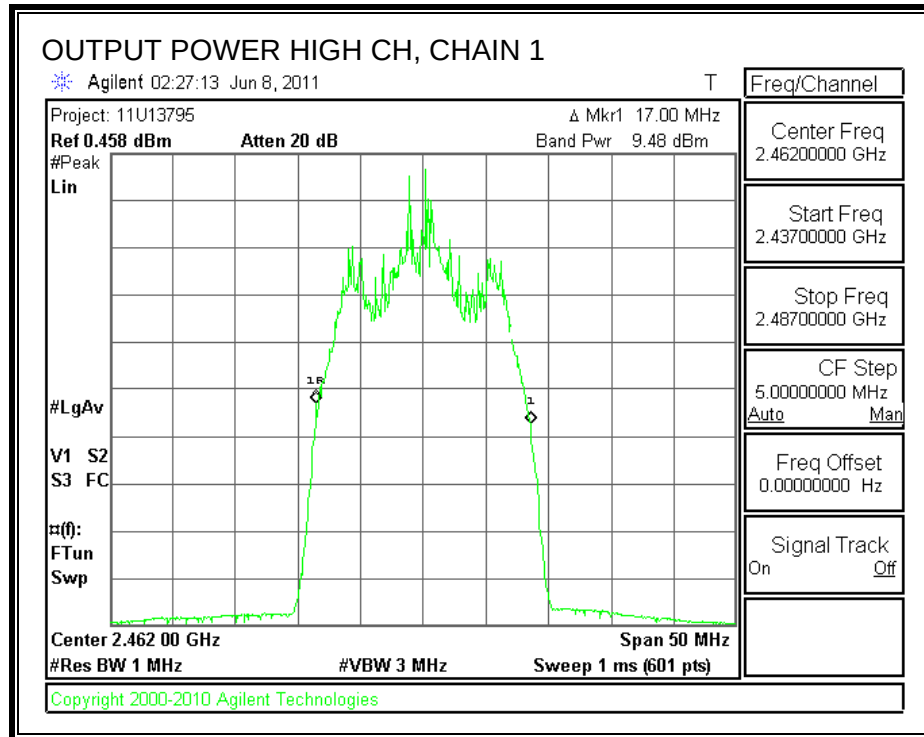
RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	10.76	10.83	11.00	24.81	29.09	-4.28
Mid	2437	14.52	15.22	11.00	28.89	29.09	-0.20
High	2462	9.48	10.70	11.00	24.14	29.09	-4.95

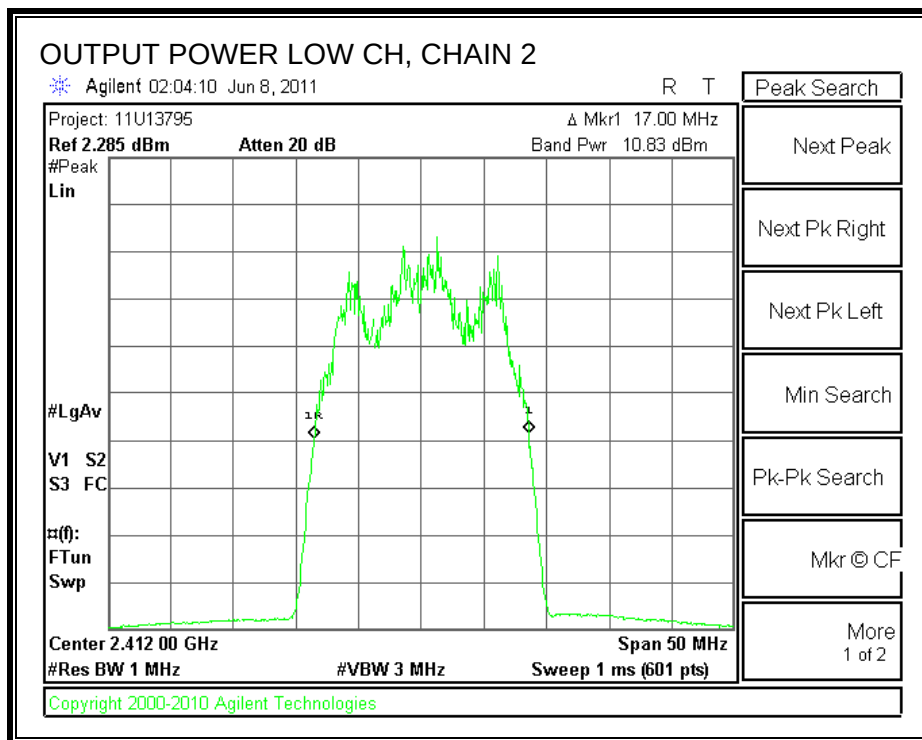
CHAIN 1 OUTPUT POWER

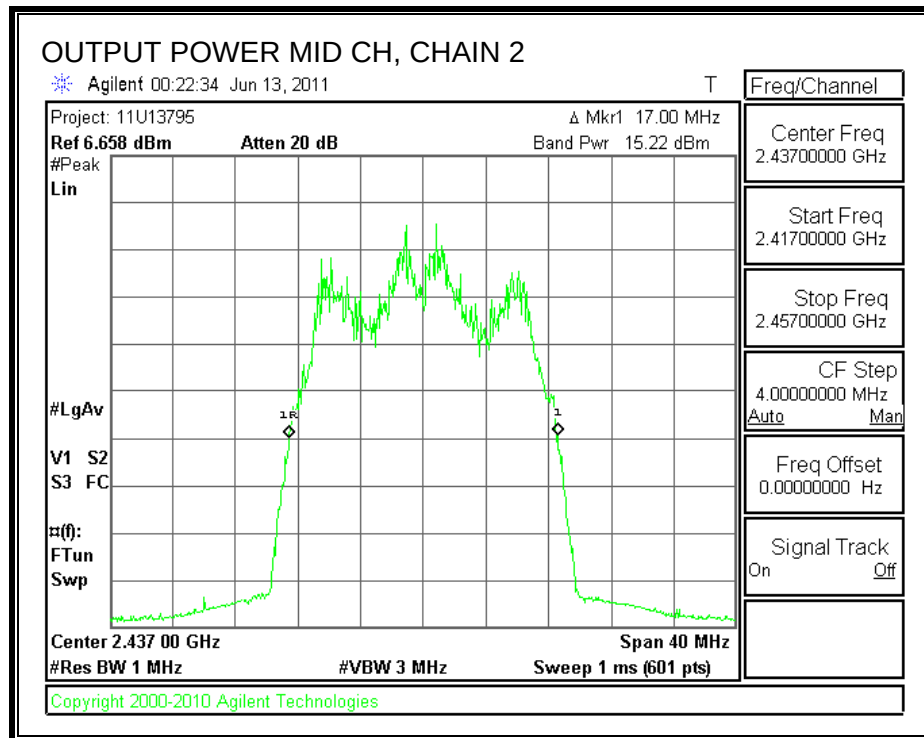


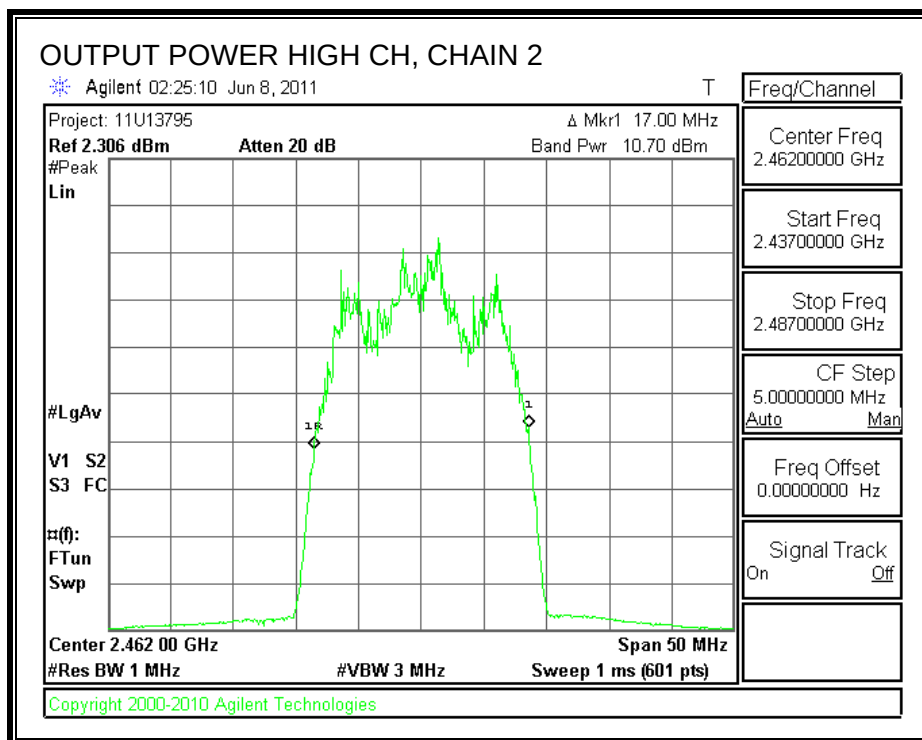




CHAIN 2 OUTPUT POWER







7.3.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Middle	2437	17.20	17.64	20.44

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.

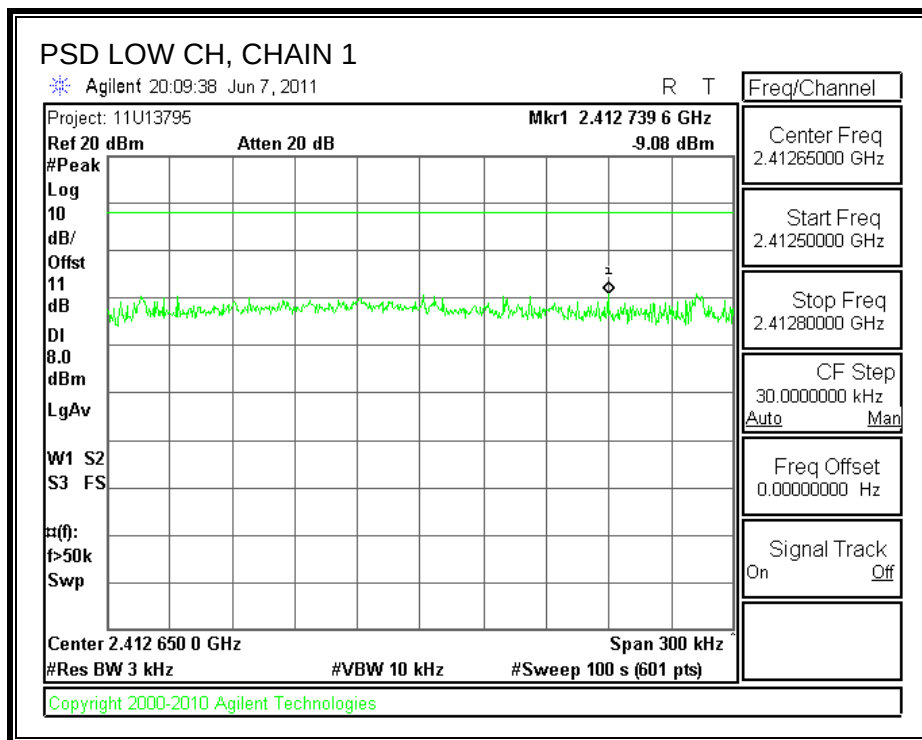
TEST PROCEDURE

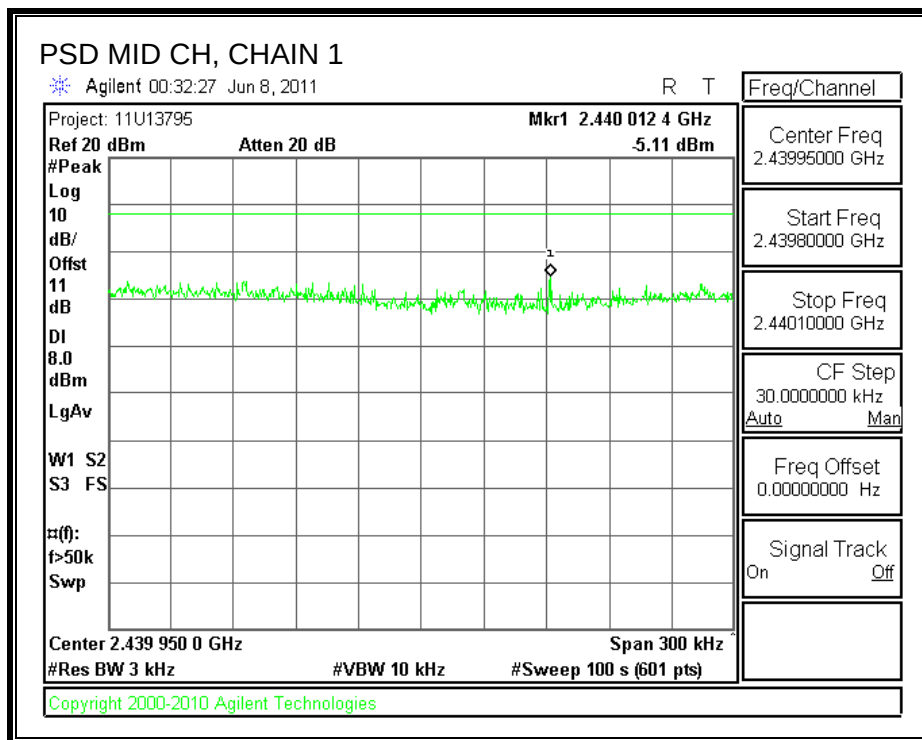
Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

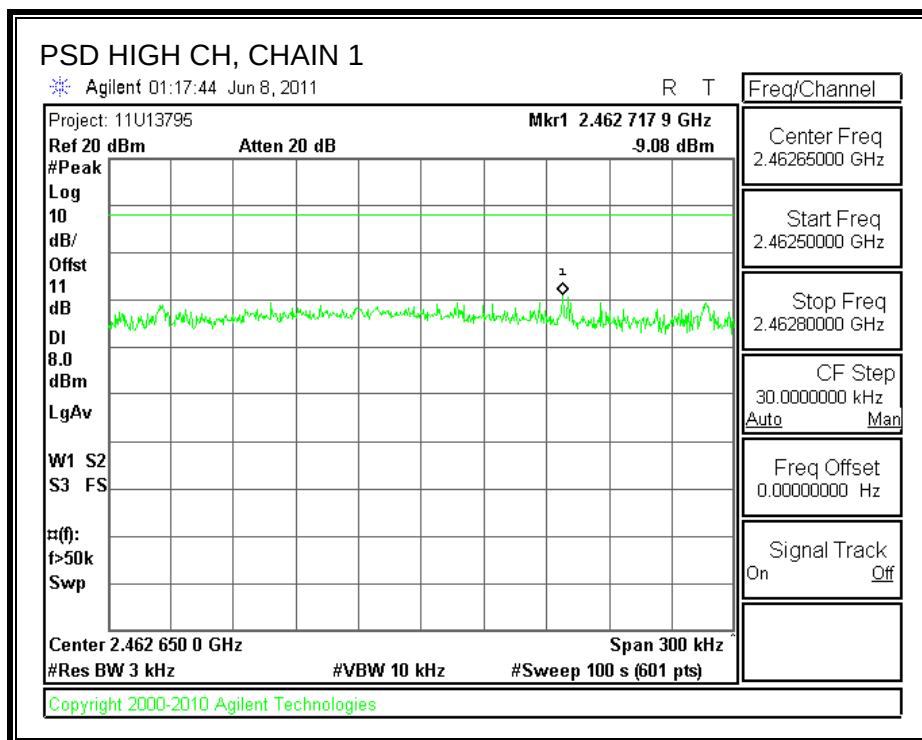
RESULTS

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.08	-10.77	-6.83	8	-14.83
Middle	2437	-5.11	-3.92	-1.46	8	-9.46
High	2462	-9.08	-11.91	-7.26	8	-15.26

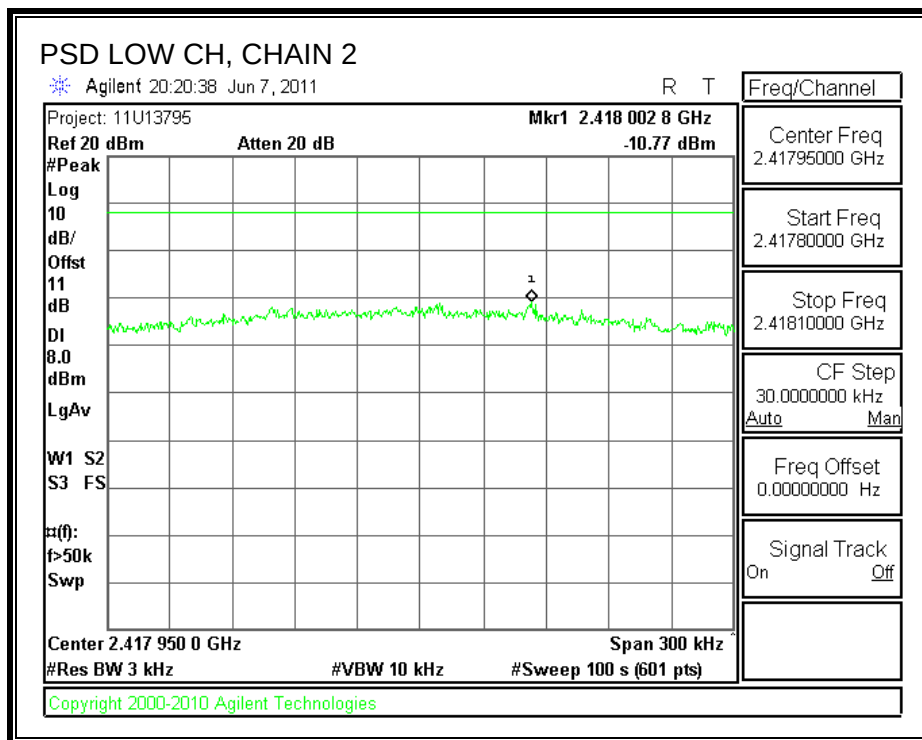
POWER SPECTRAL DENSITY, CHAIN 1

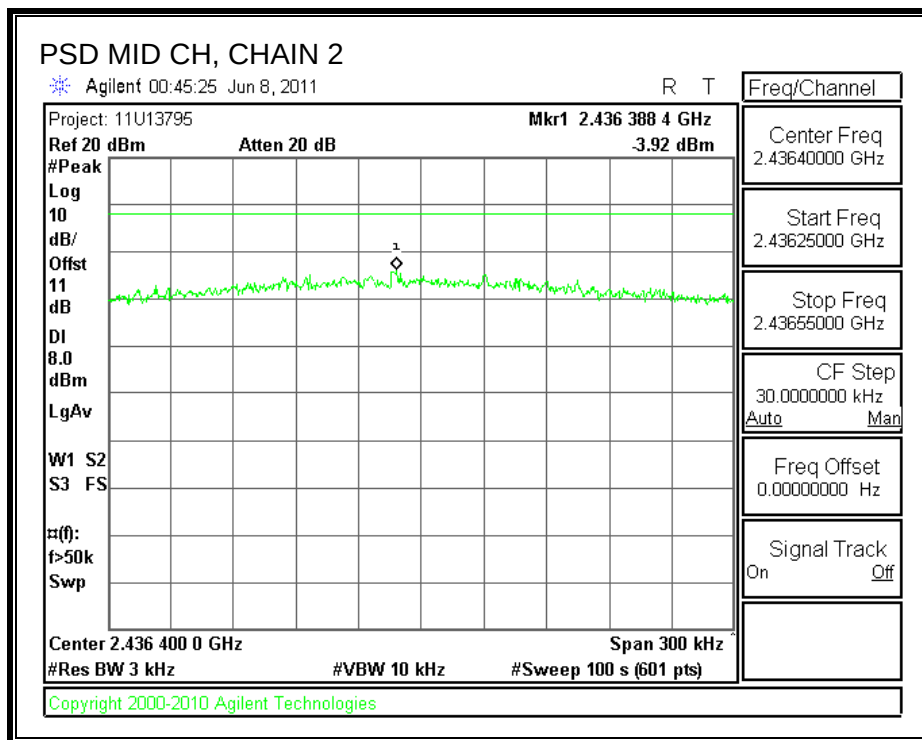


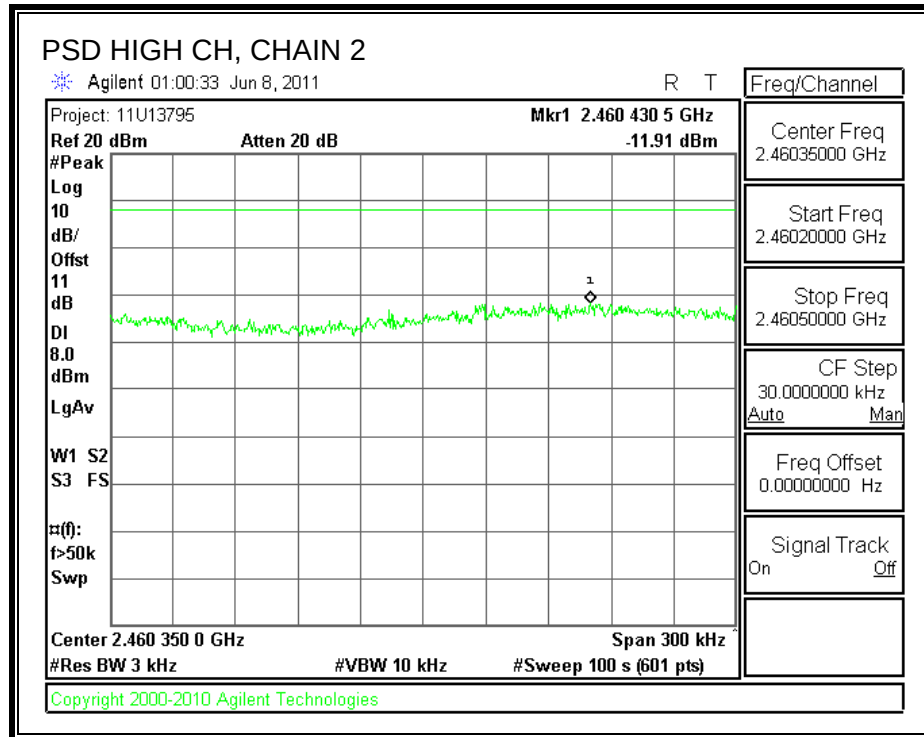




POWER SPECTRAL DENSITY, CHAIN 2







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.

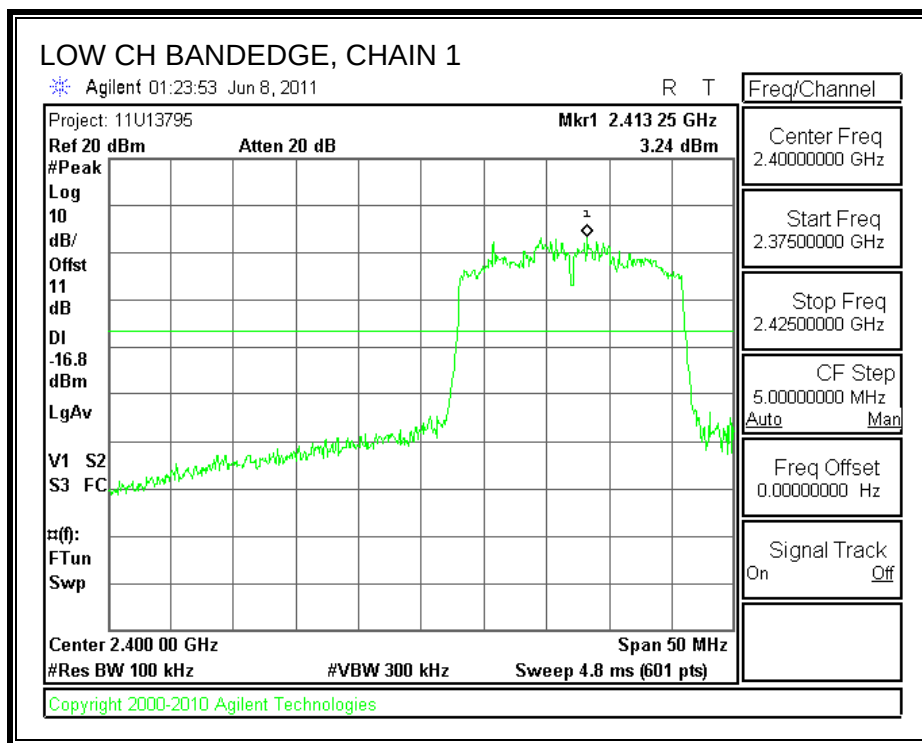
TEST PROCEDURE

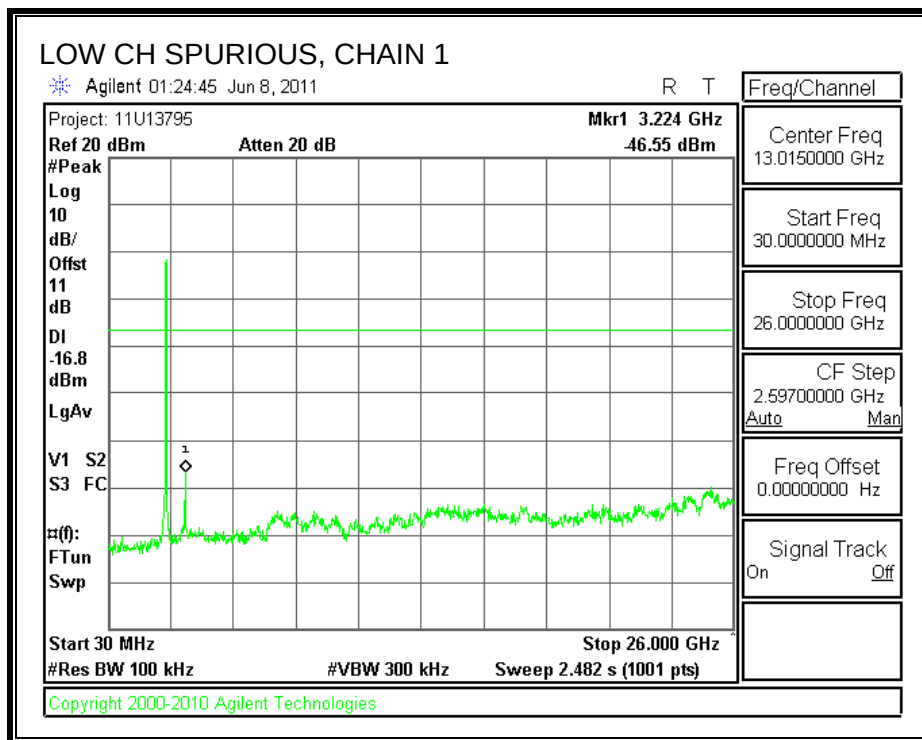
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

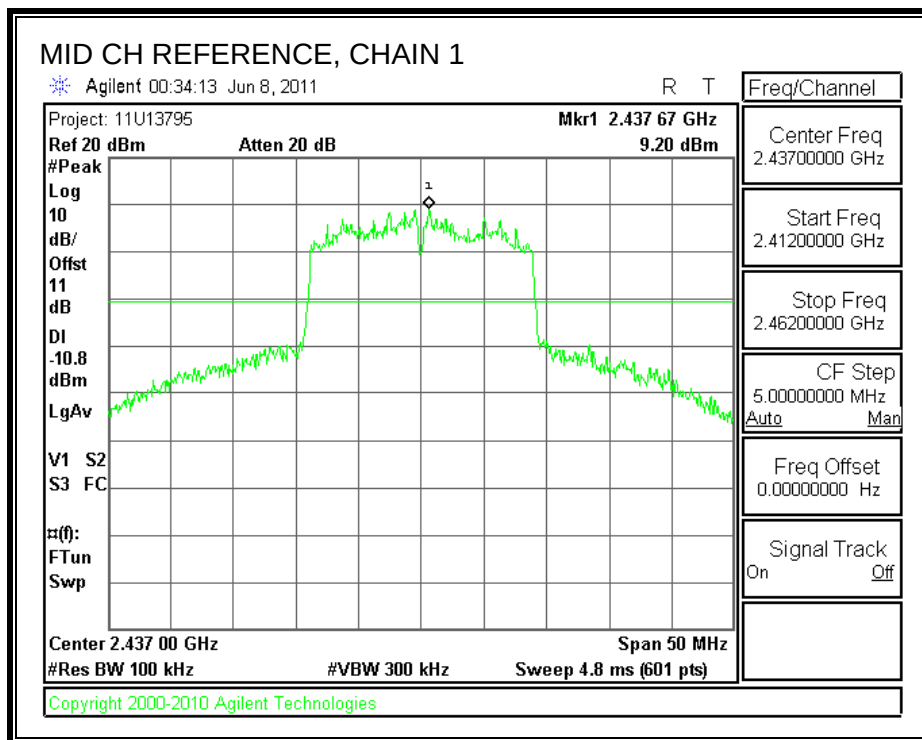
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

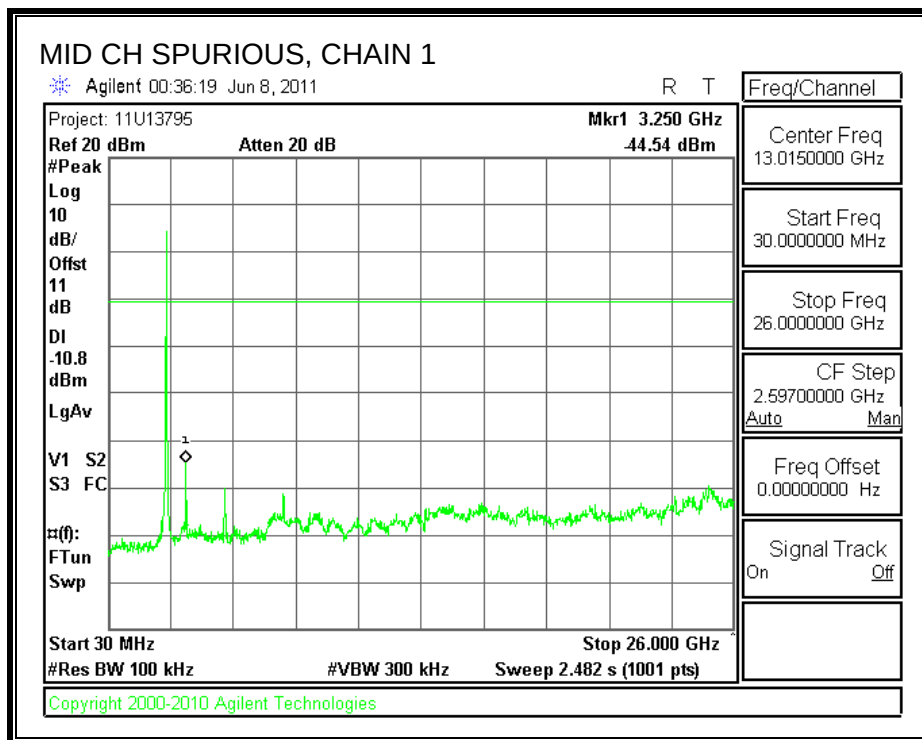
RESULTS

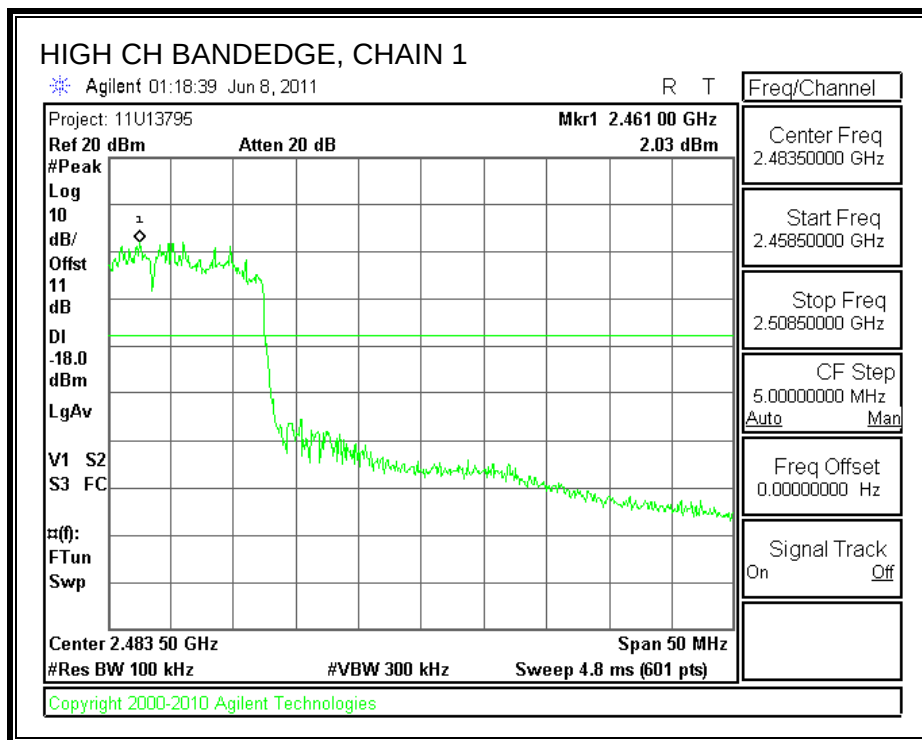
CHAIN 1 SPURIOUS EMISSIONS

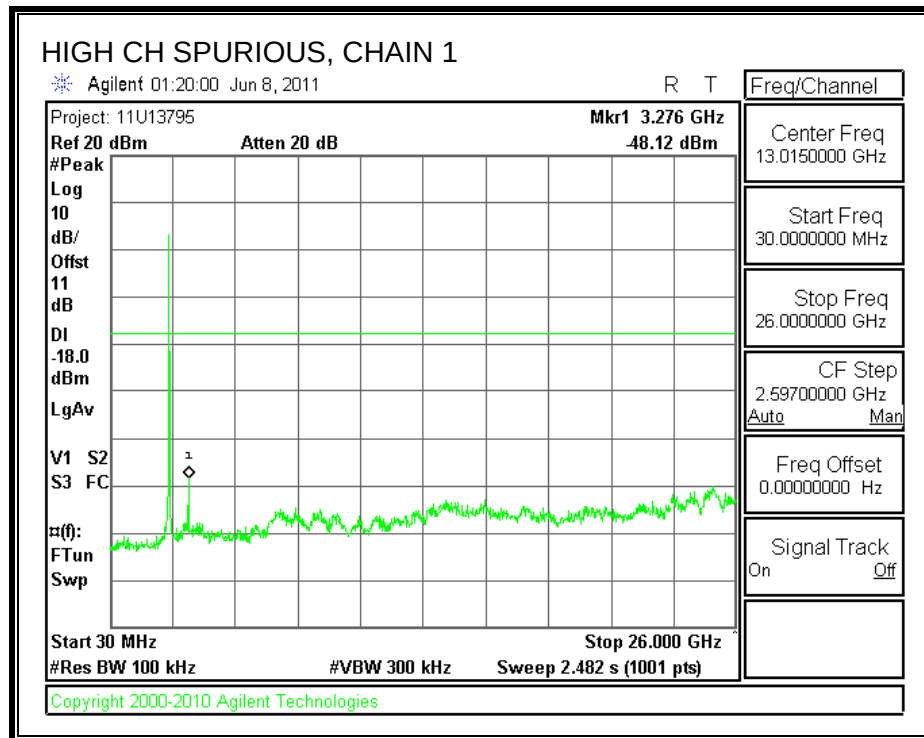




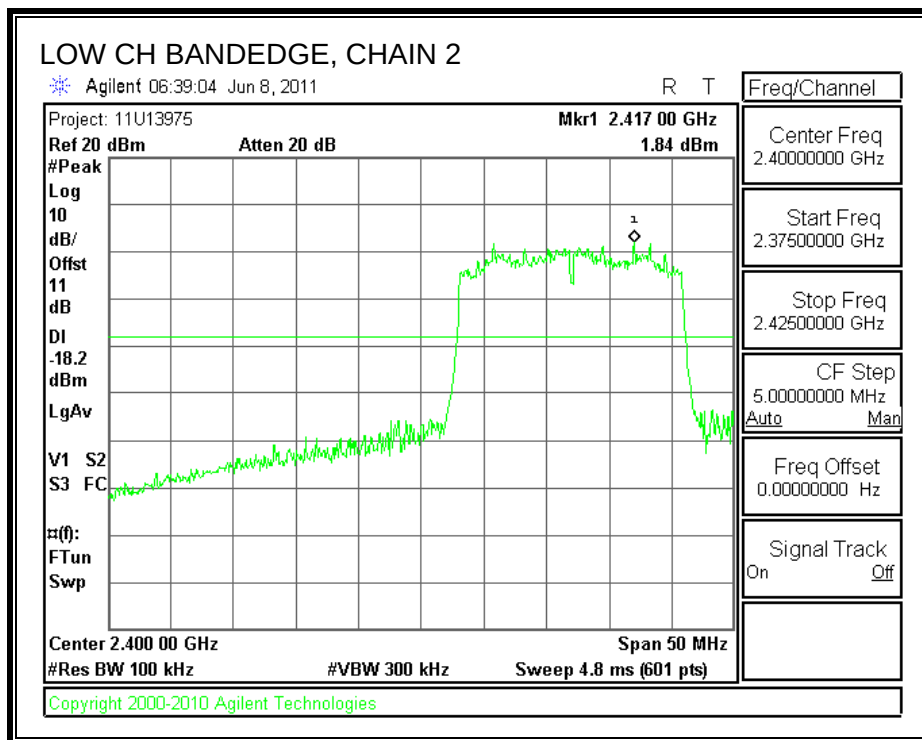


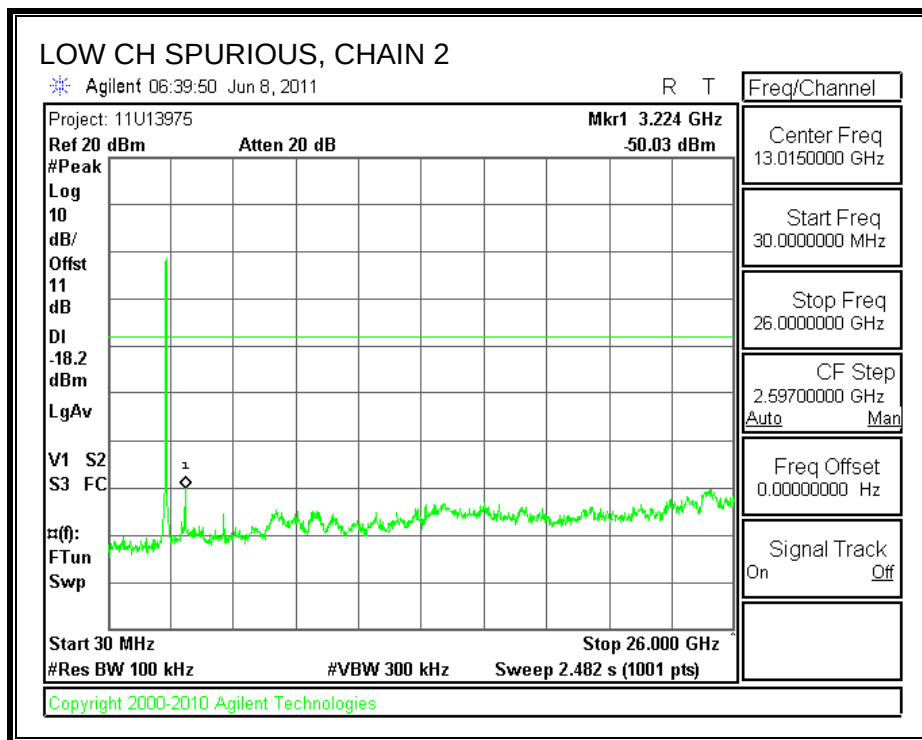


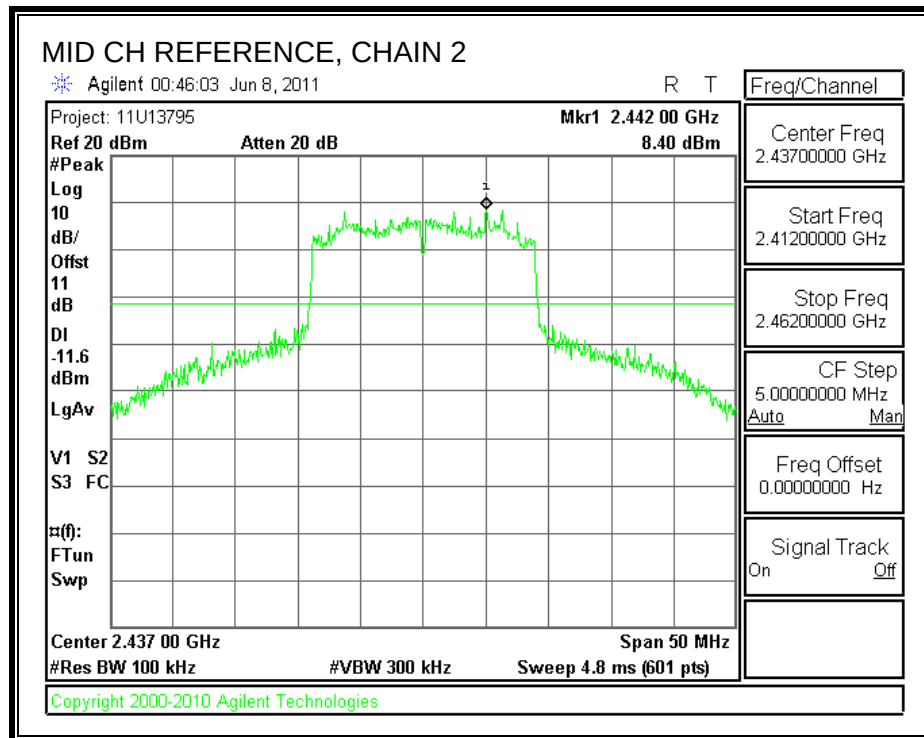


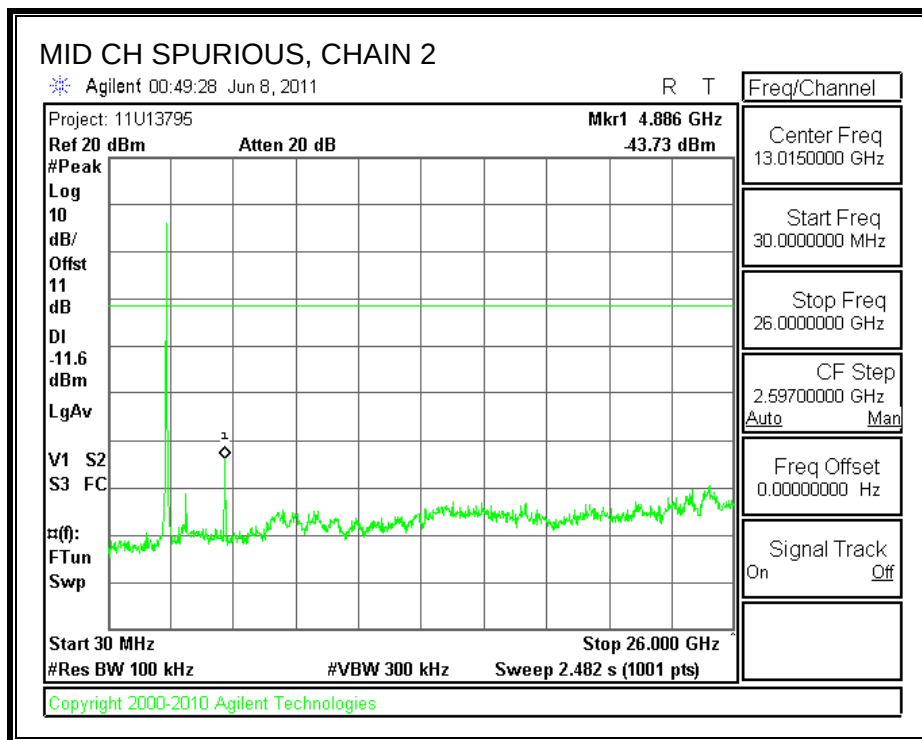


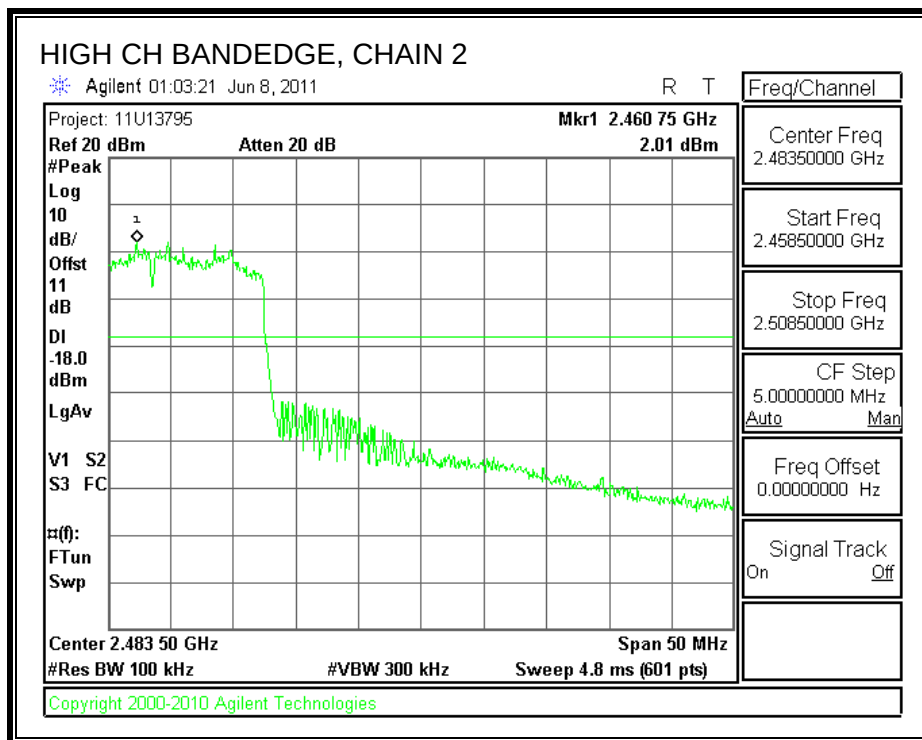
CHAIN 2 SPURIOUS EMISSIONS

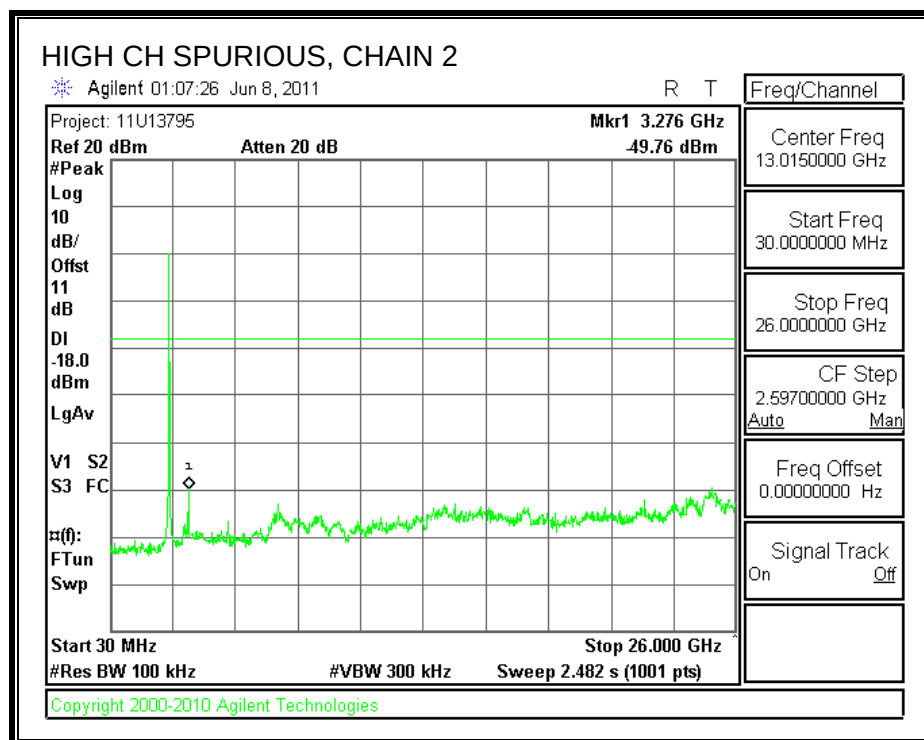












7.4. 802.11n HT40 MODE IN THE 2.4 GHz BAND

7.4.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

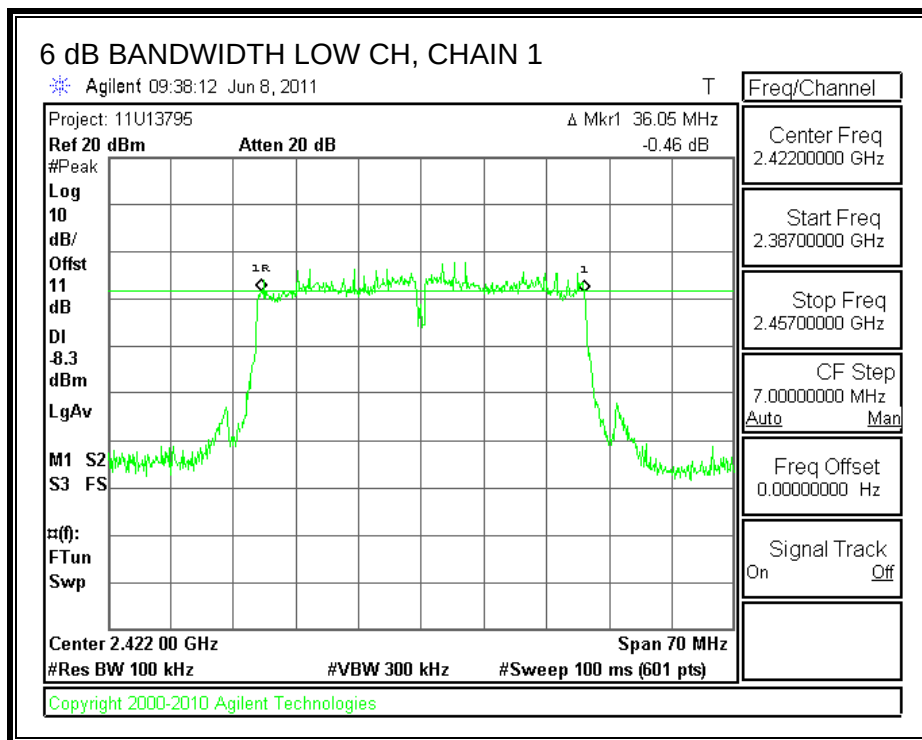
TEST PROCEDURE

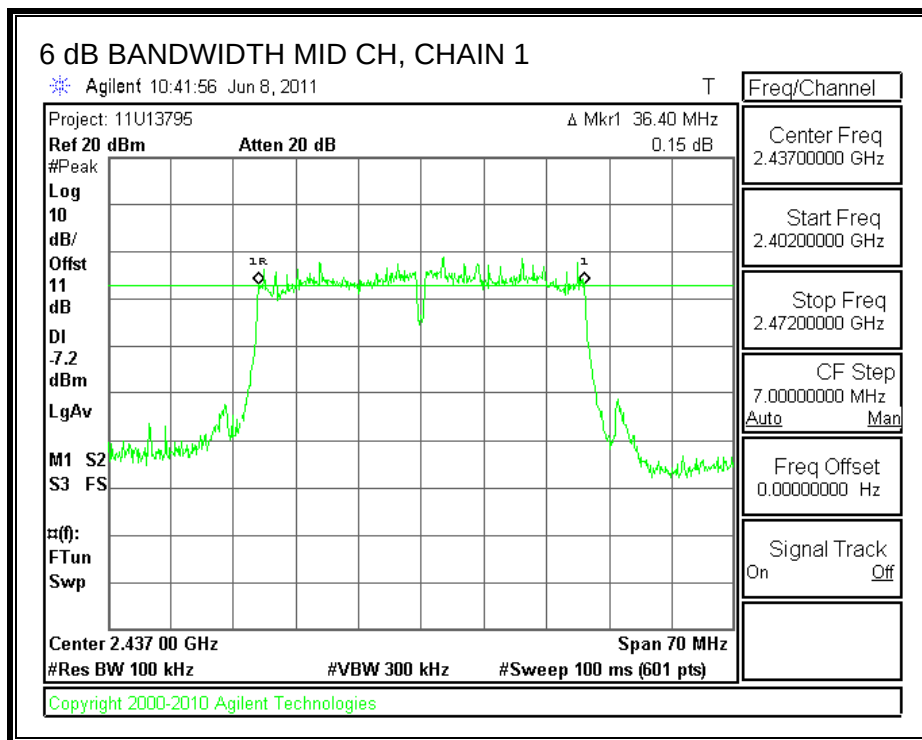
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

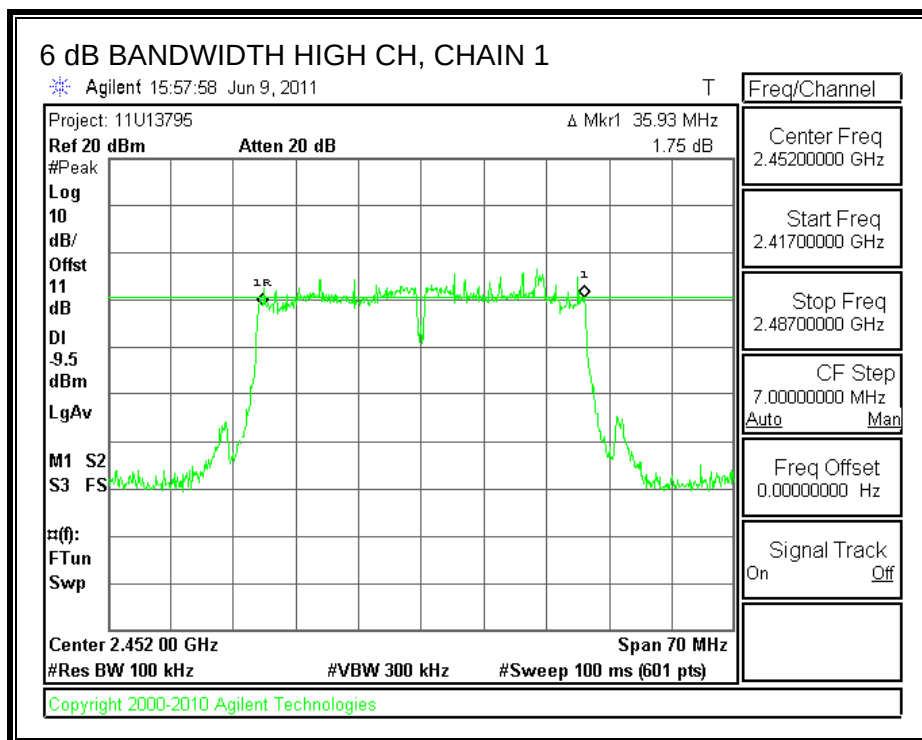
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2422	36.05	36.52	0.5
Middle	2437	36.40	36.40	0.5
High	2452	35.93	36.40	0.5

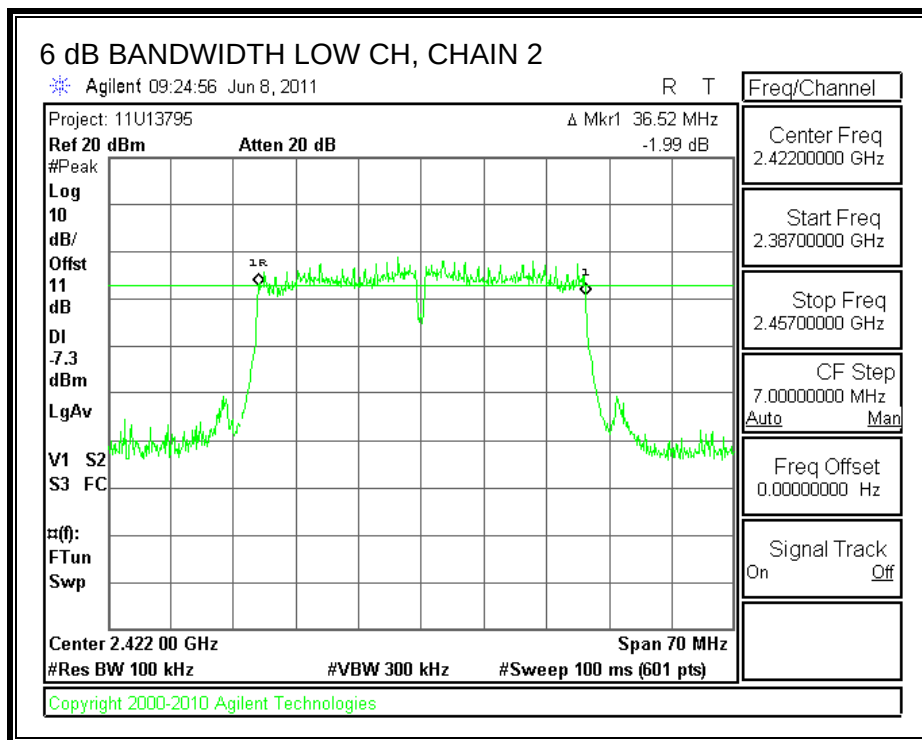
6 dB BANDWIDTH, CHAIN 1

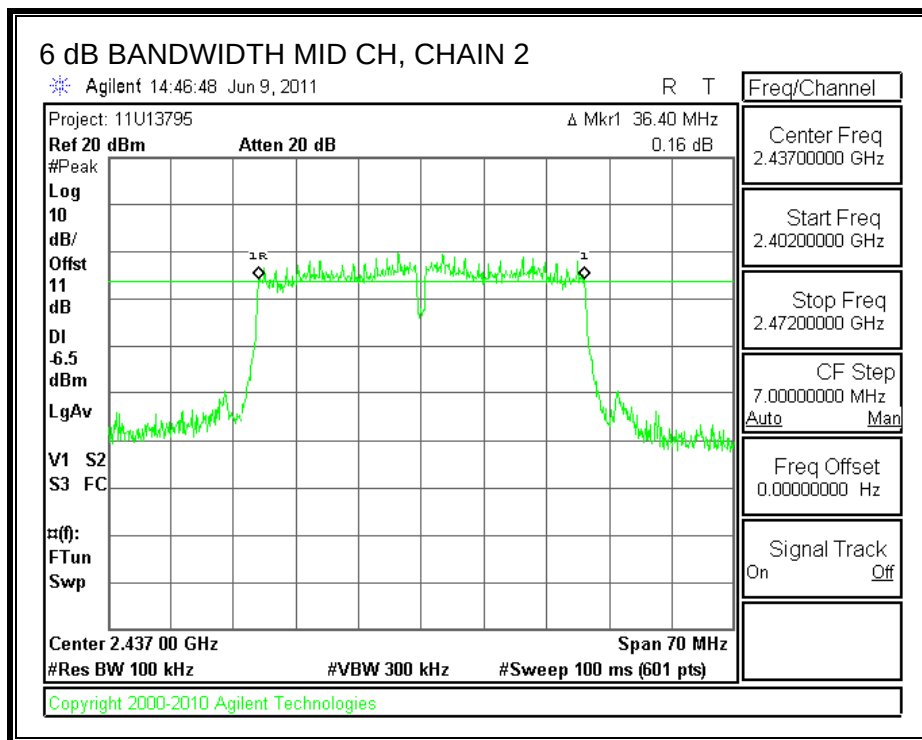


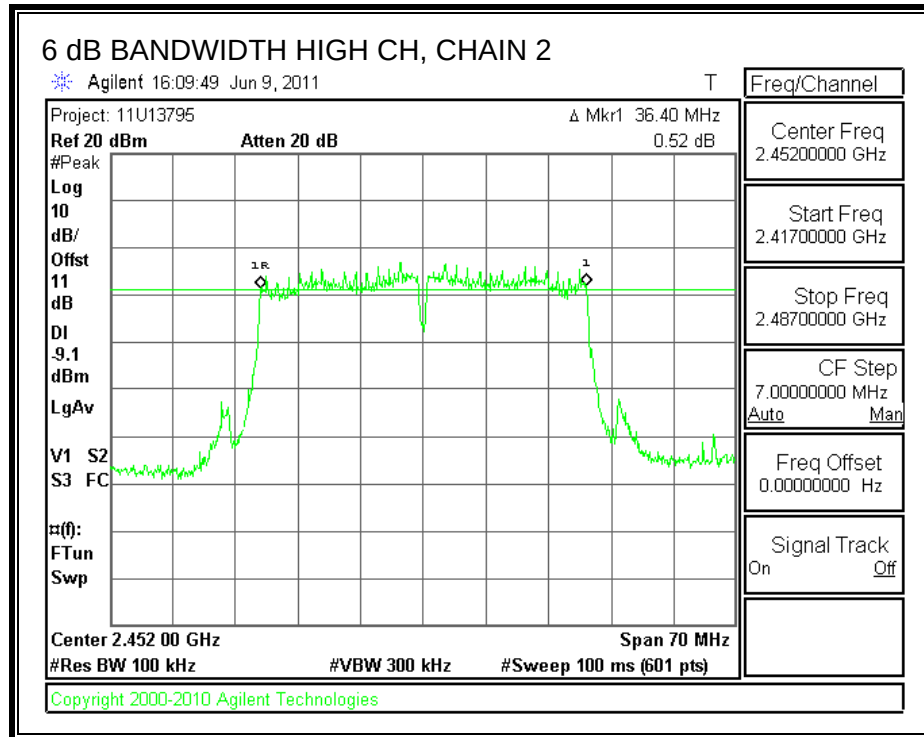




6 dB BANDWIDTH, CHAIN 2







7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

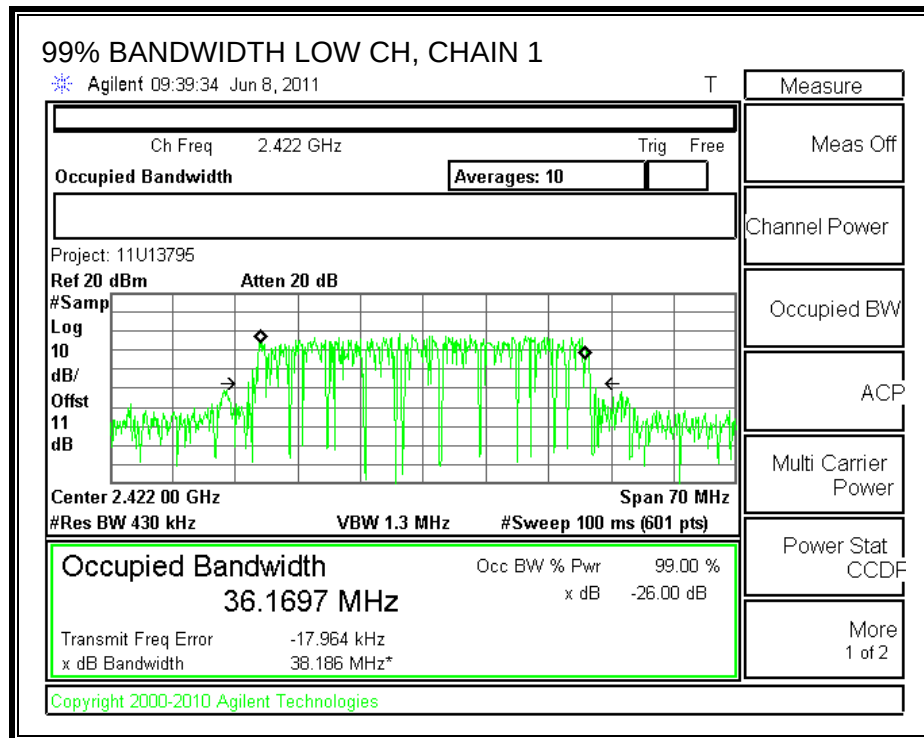
TEST PROCEDURE

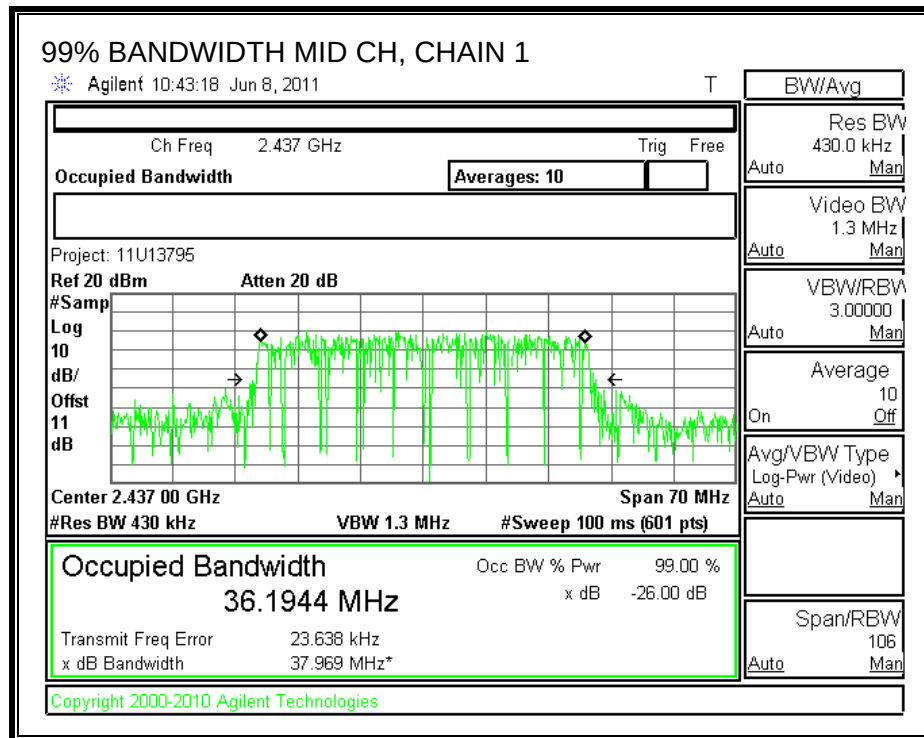
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

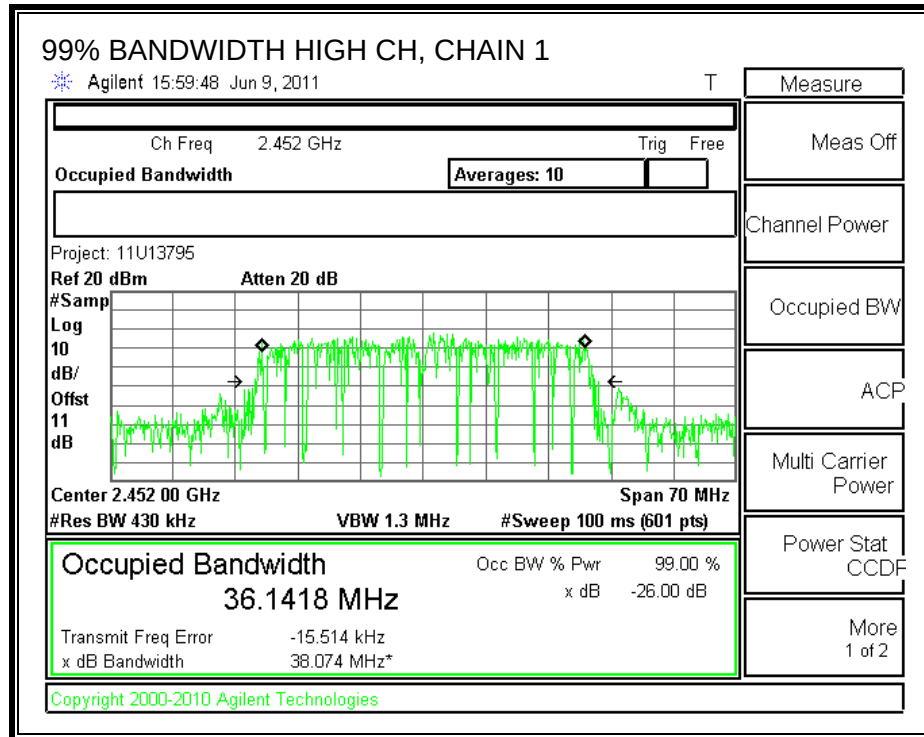
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	2422	36.1697	36.2094
Middle	2437	36.1944	36.1327
High	2452	36.1418	36.0291

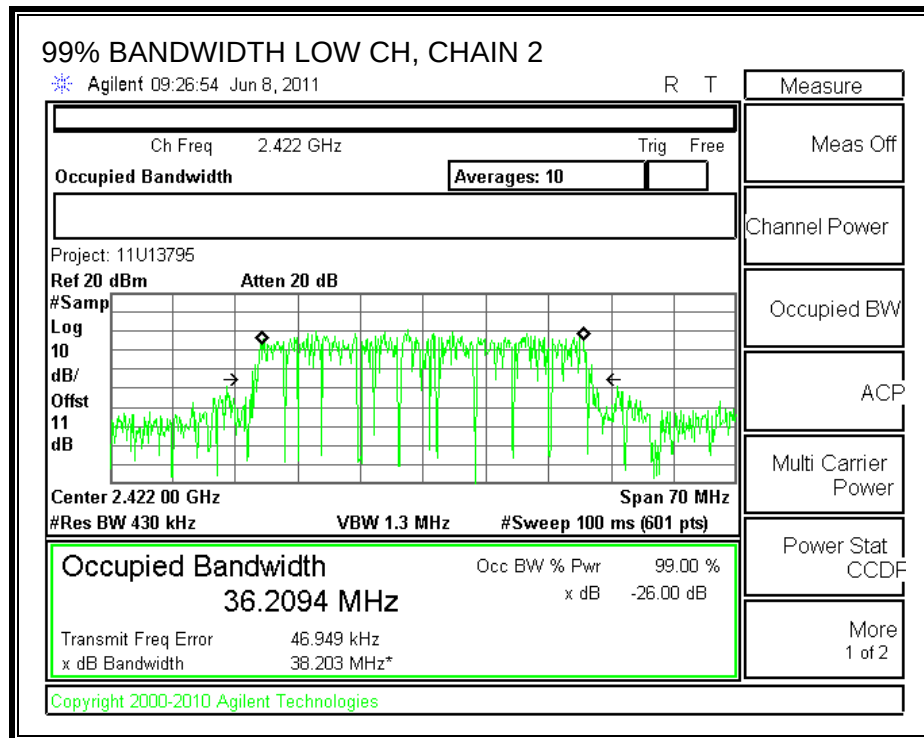
99% BANDWIDTH, CHAIN 1

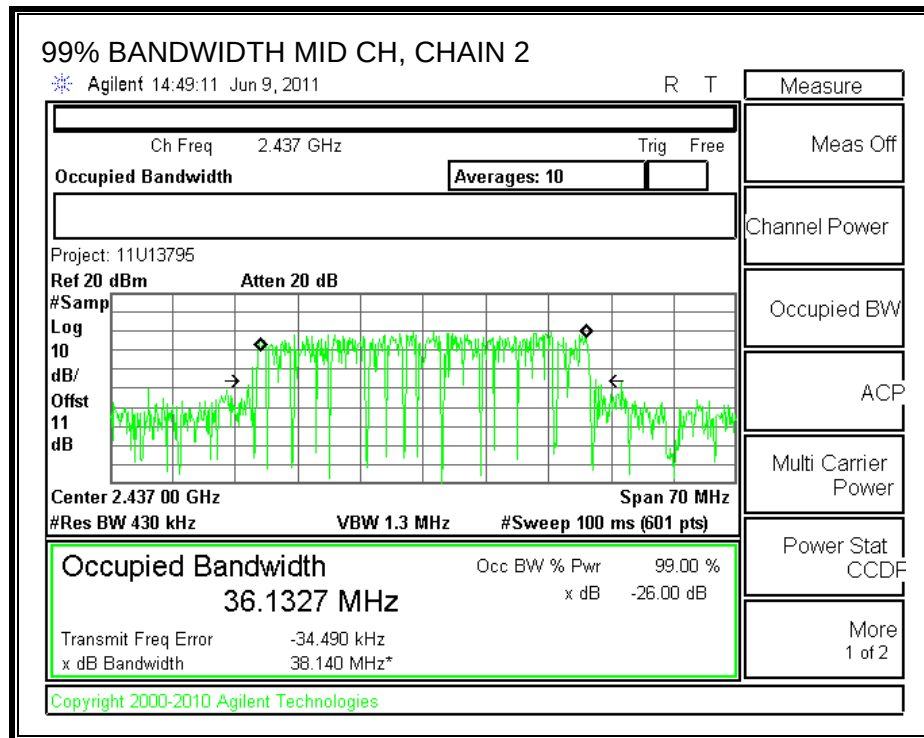


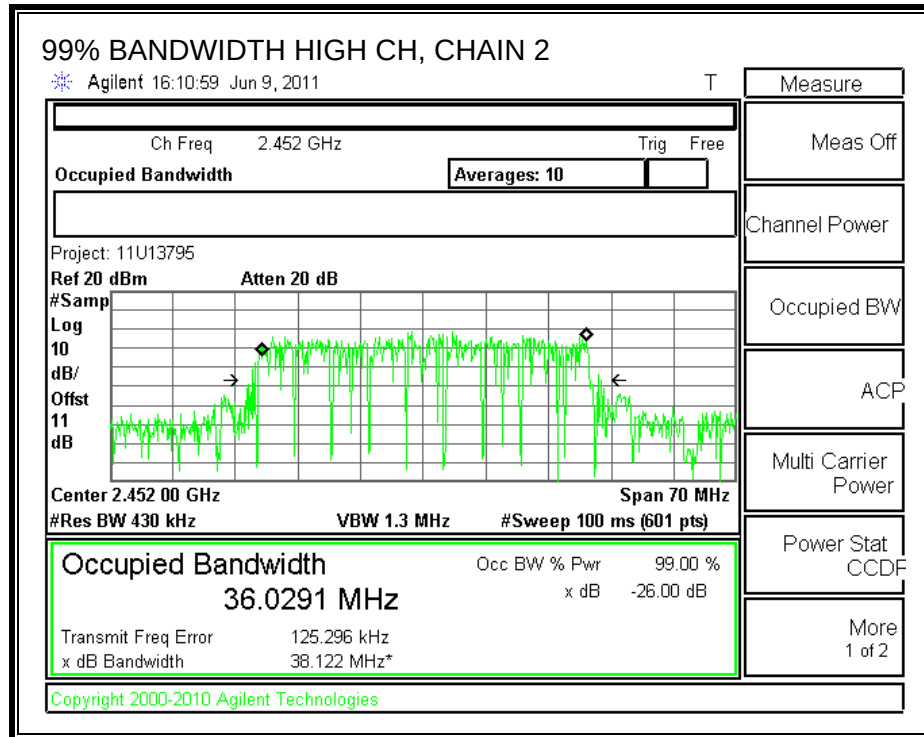




99% BANDWIDTH, CHAIN 2







7.4.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

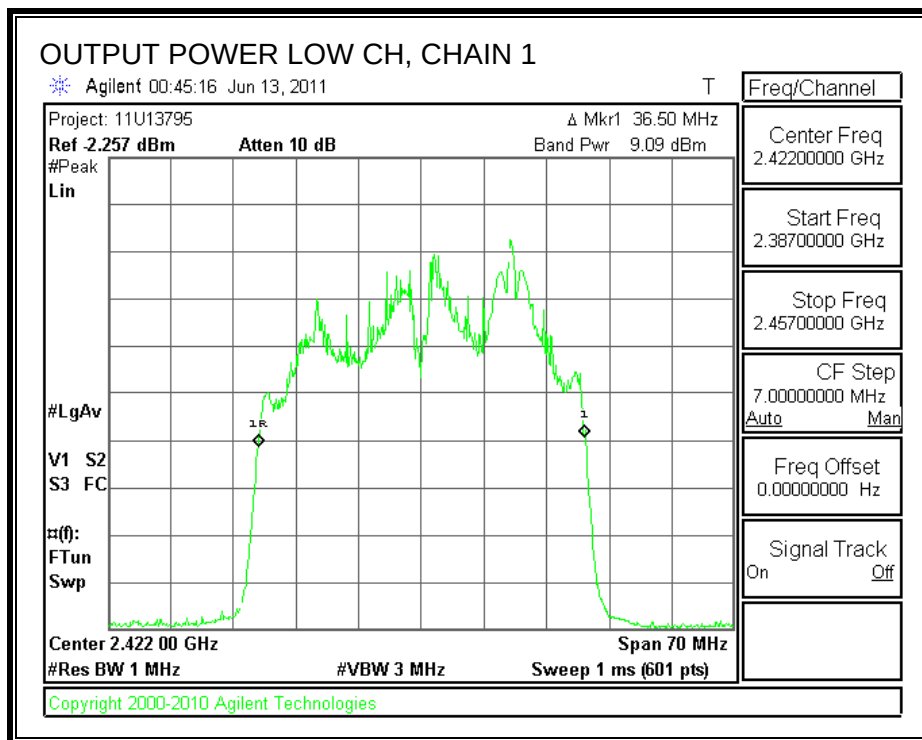
TEST PROCEDURE

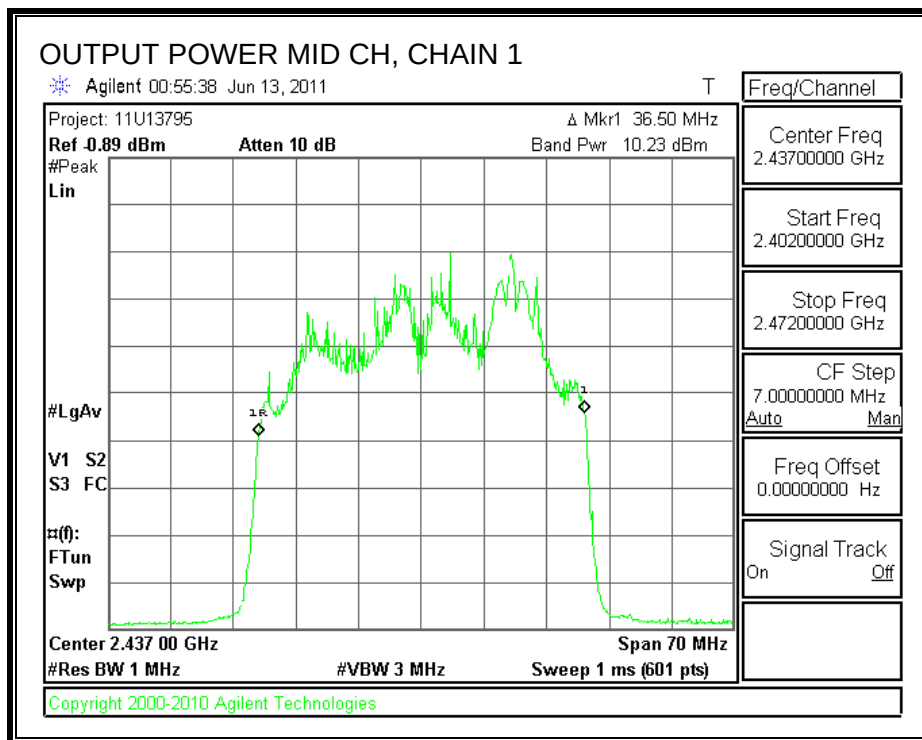
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

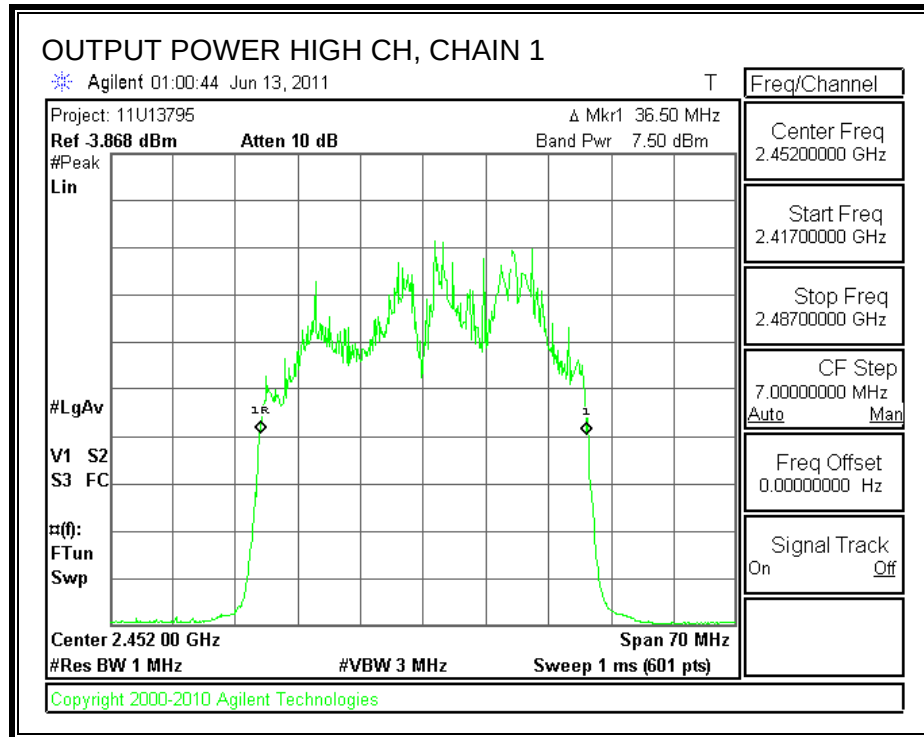
RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	9.09	10.68	11.00	23.97	29.09	-5.12
Mid	2437	10.23	11.22	11.00	24.76	29.09	-4.33
High	2452	7.50	8.11	11.00	21.83	29.09	-7.26

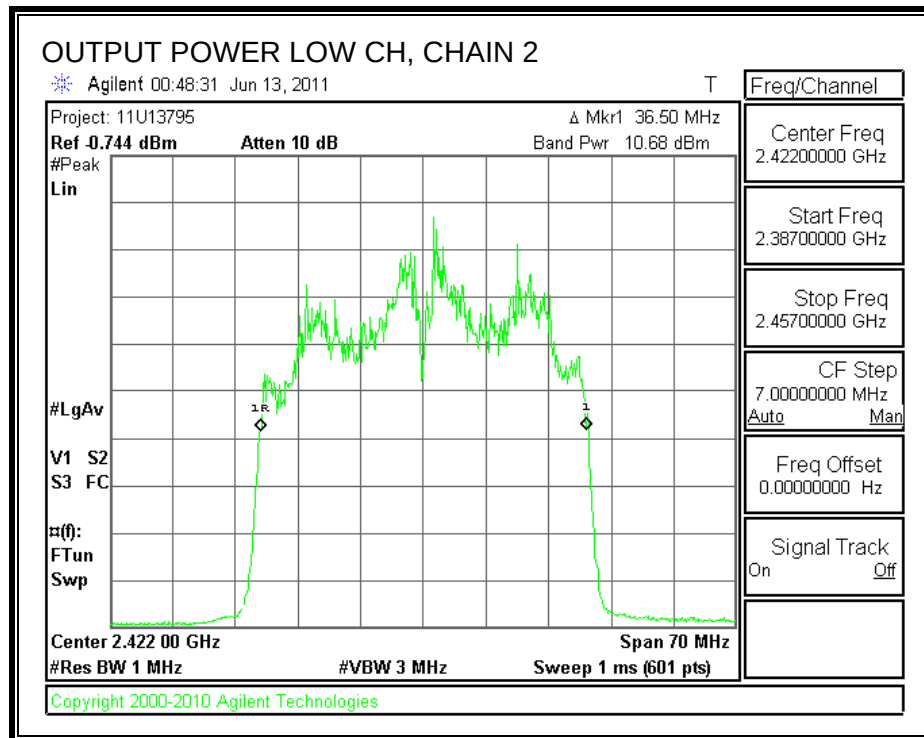
CHAIN 1 OUTPUT POWER

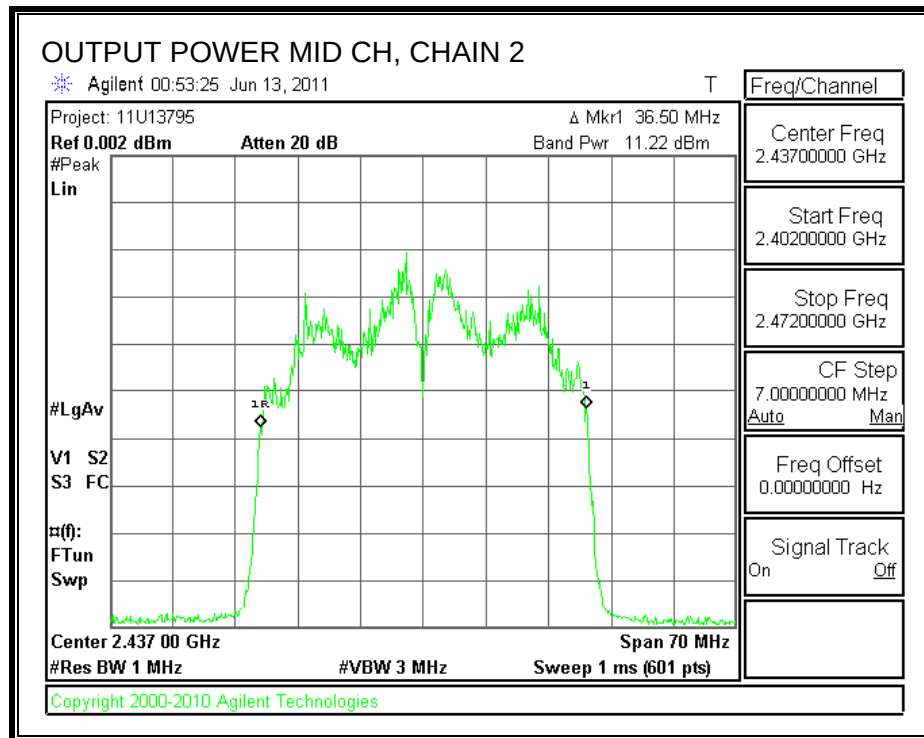


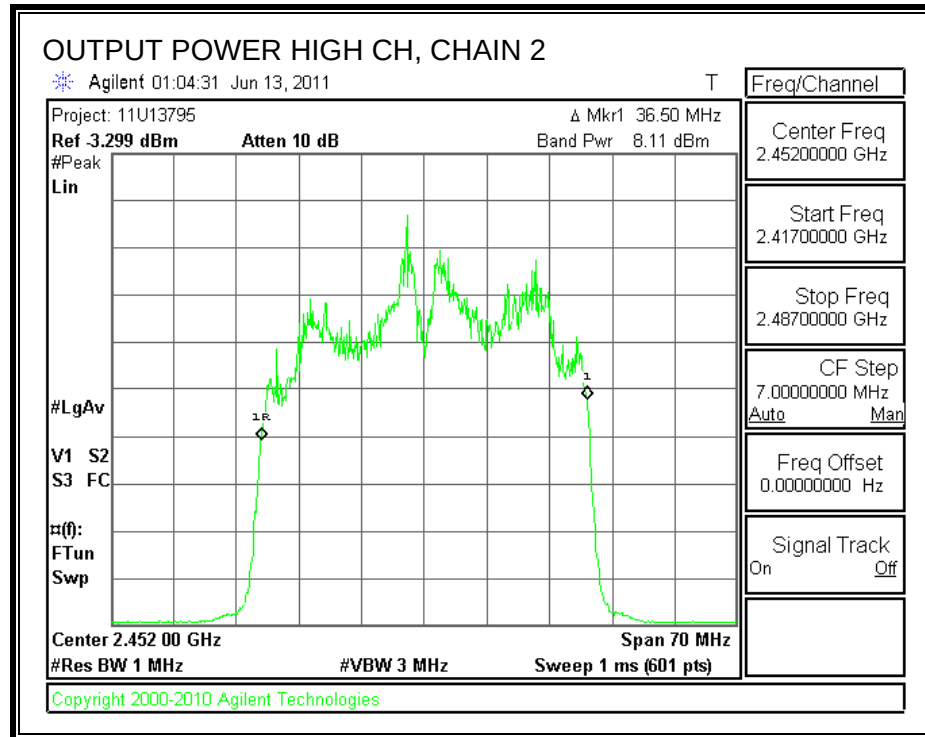




CHAIN 2 OUTPUT POWER







7.4.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

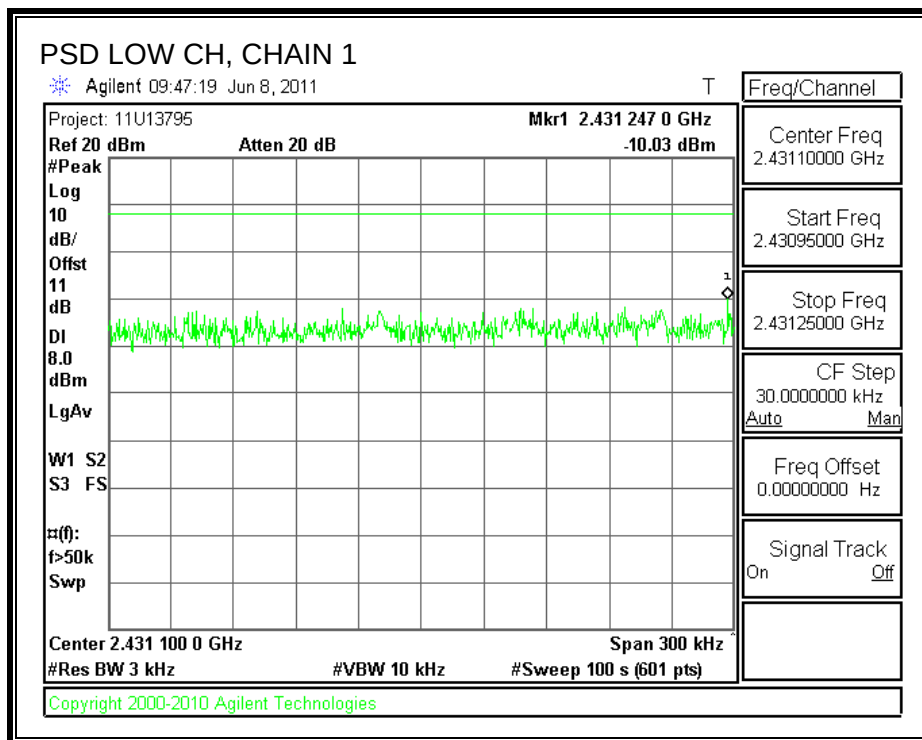
TEST PROCEDURE

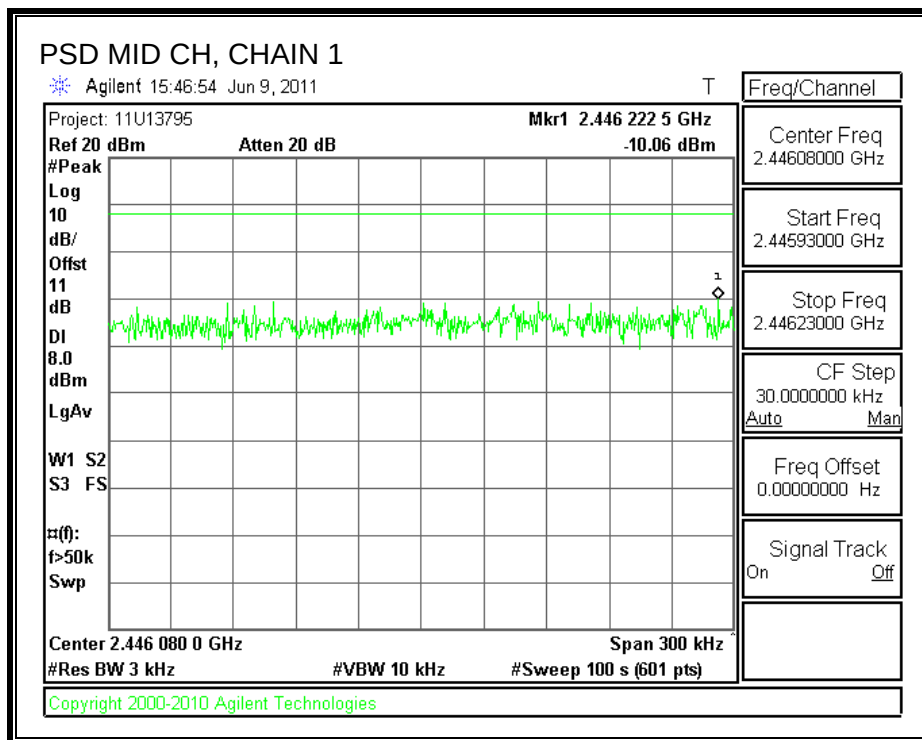
Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

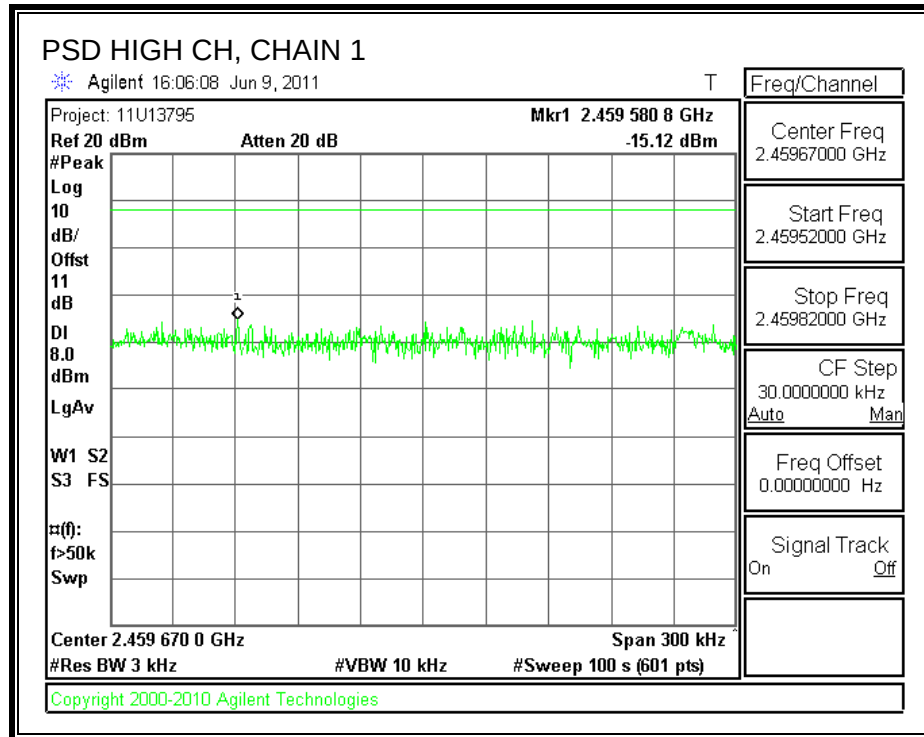
RESULTS

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-10.03	-14.46	-8.69	8	-16.69
Middle	2437	-10.06	-13.52	-8.44	8	-16.44
High	2452	-15.12	-16.40	-12.70	8	-20.70

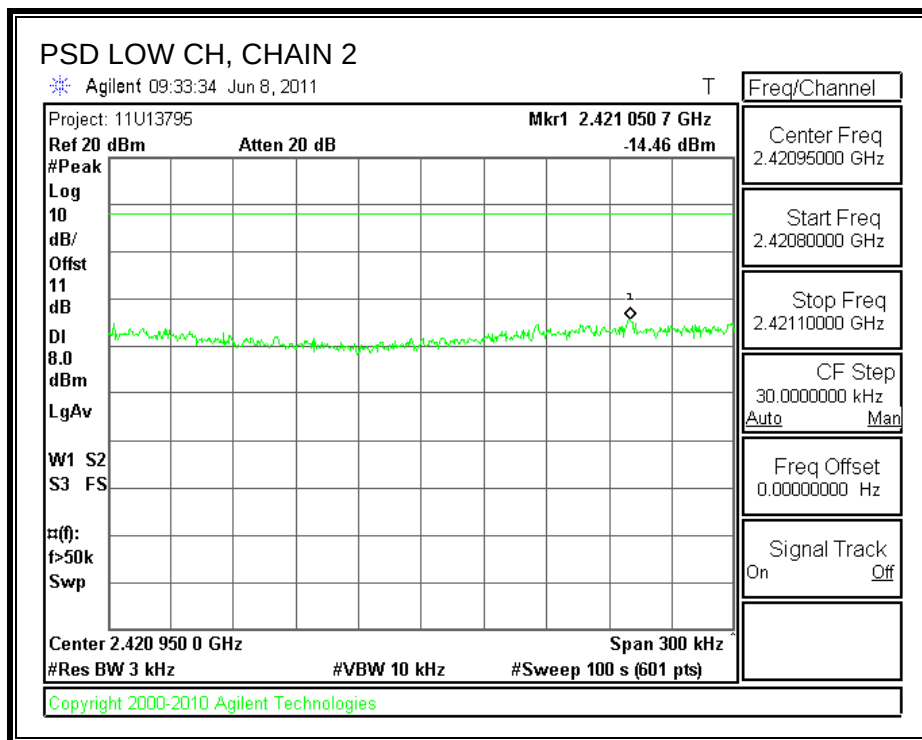
POWER SPECTRAL DENSITY, CHAIN 1

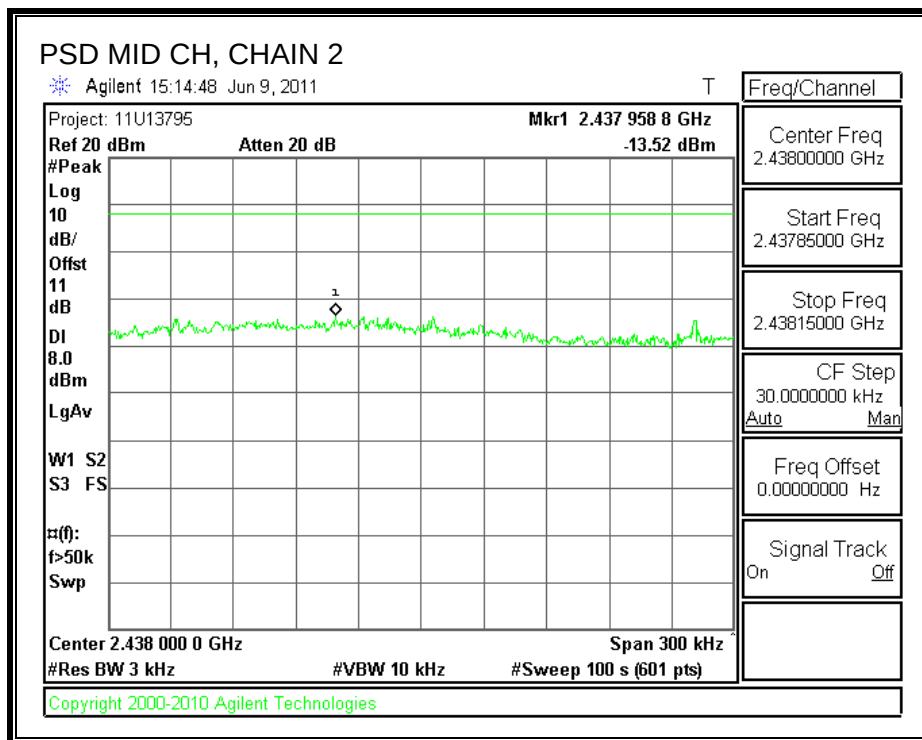


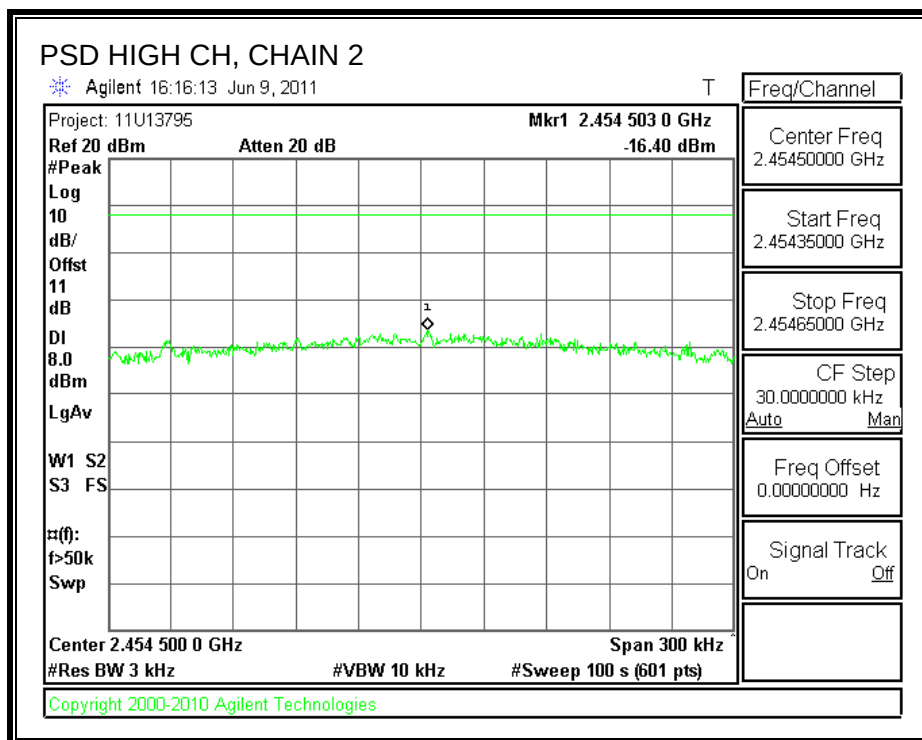




POWER SPECTRAL DENSITY, CHAIN 2







7.4.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

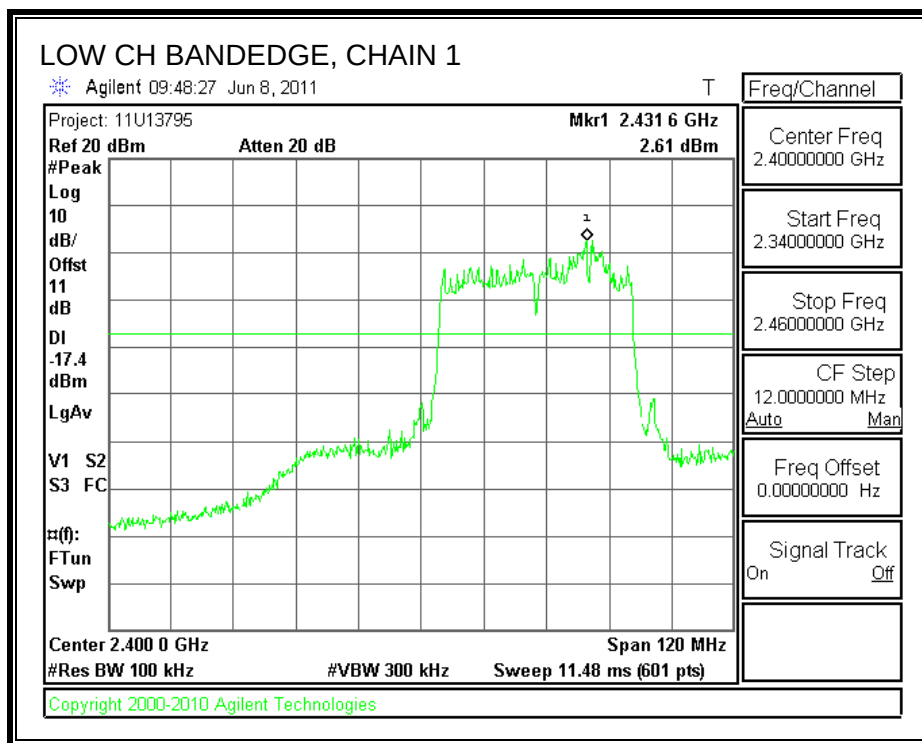
TEST PROCEDURE

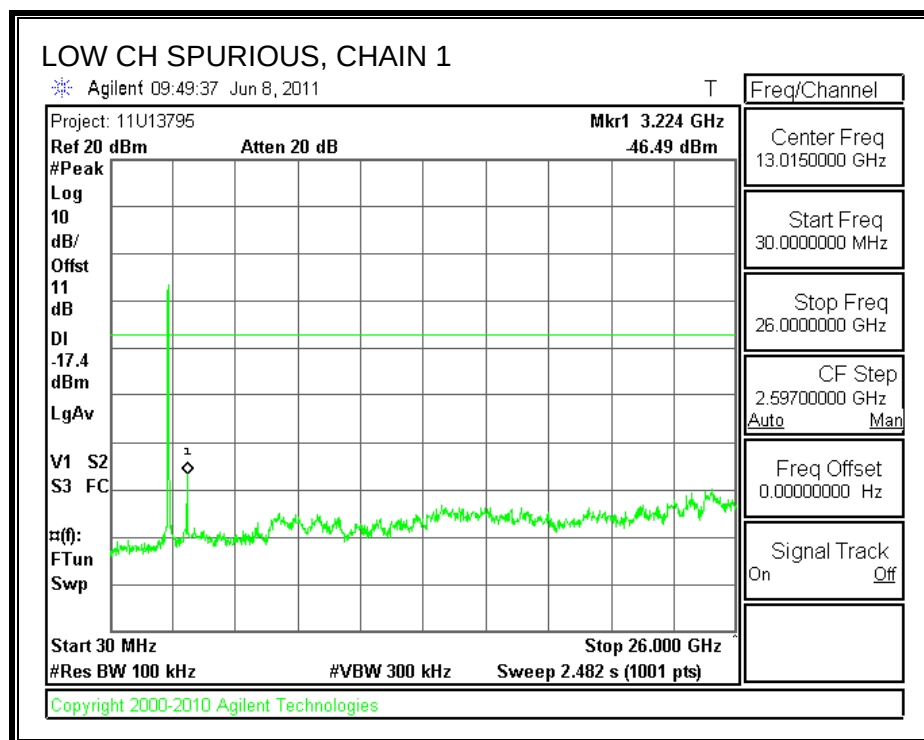
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

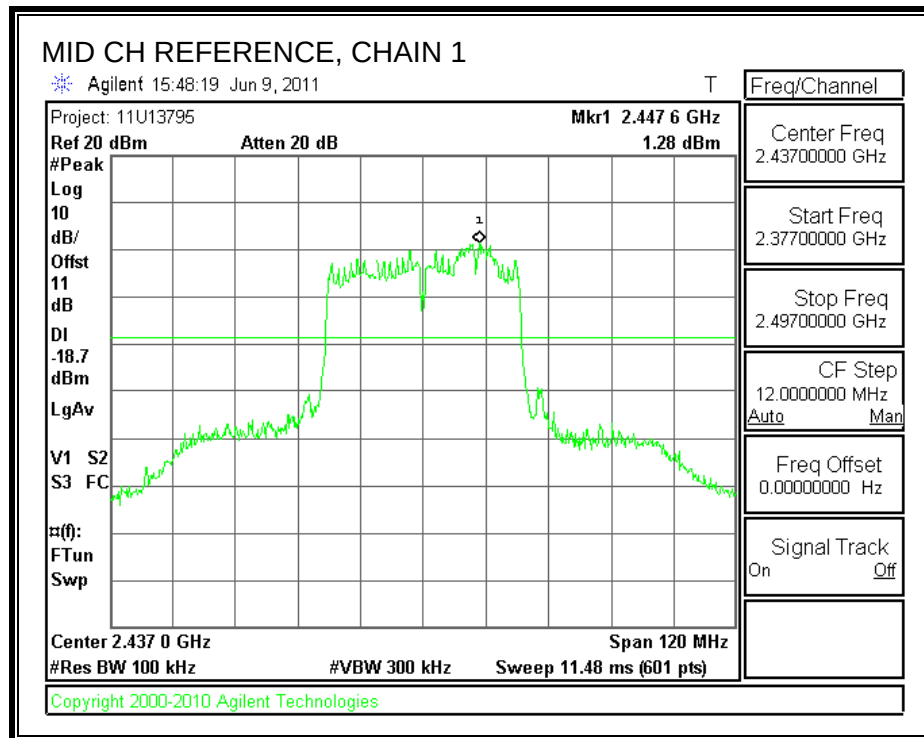
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

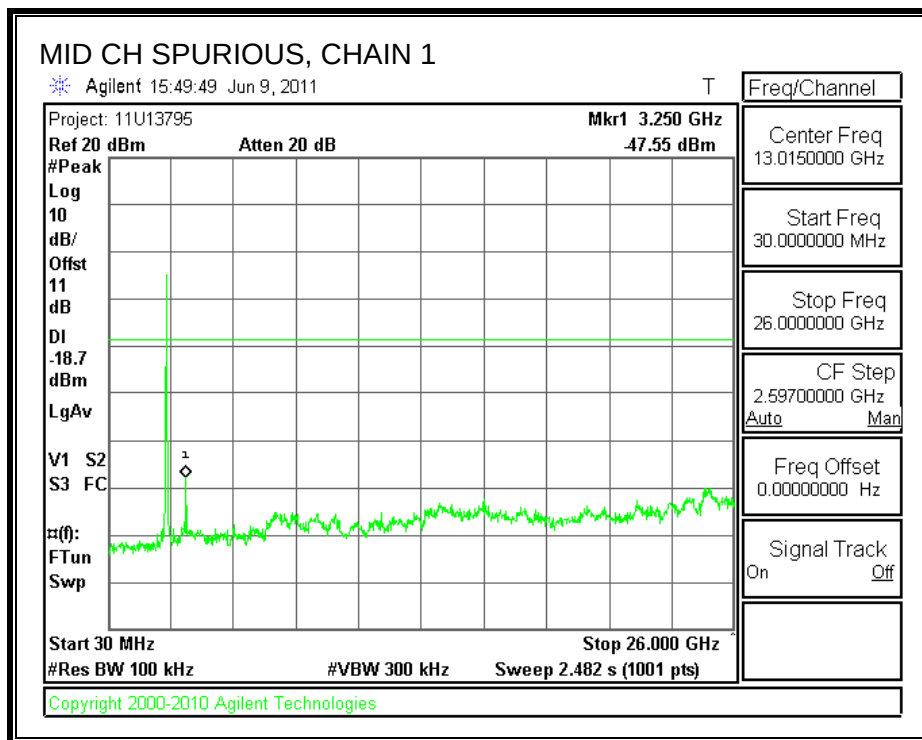
RESULTS

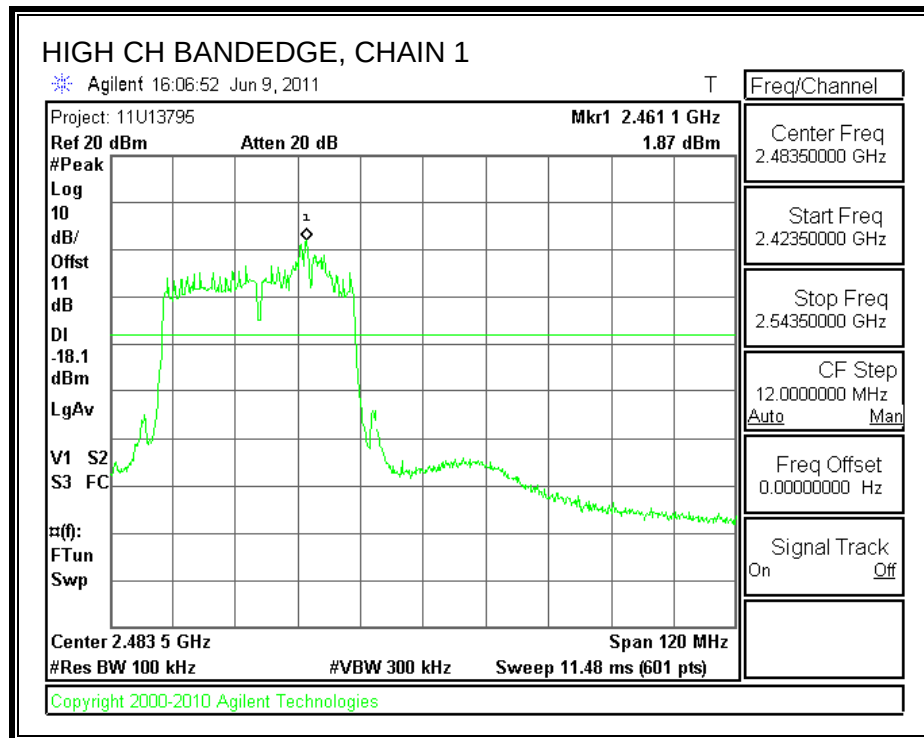
CHAIN 1 SPURIOUS EMISSIONS

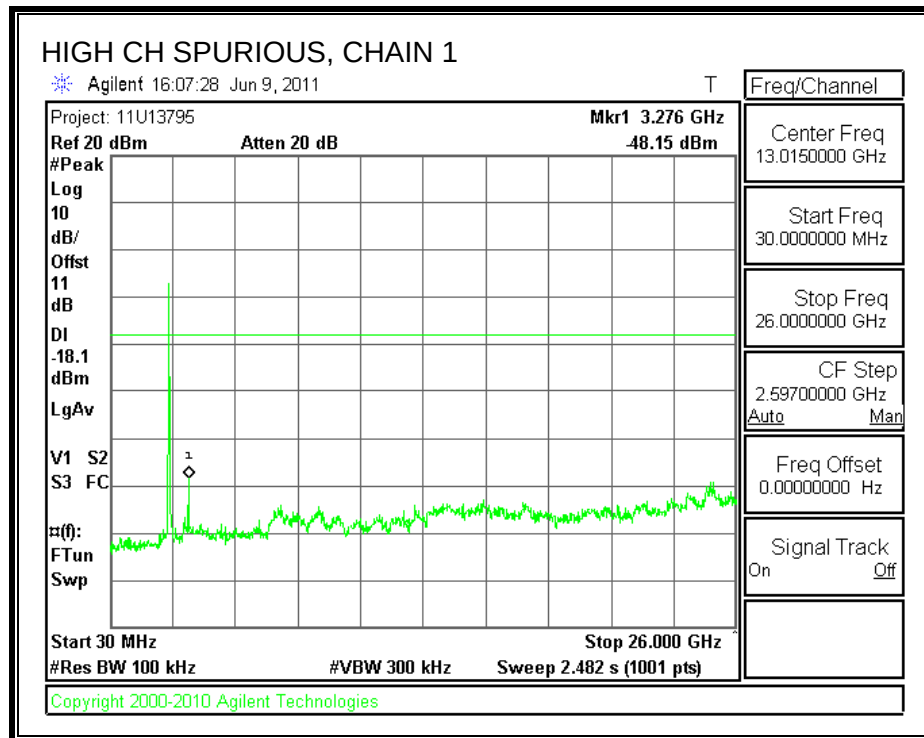




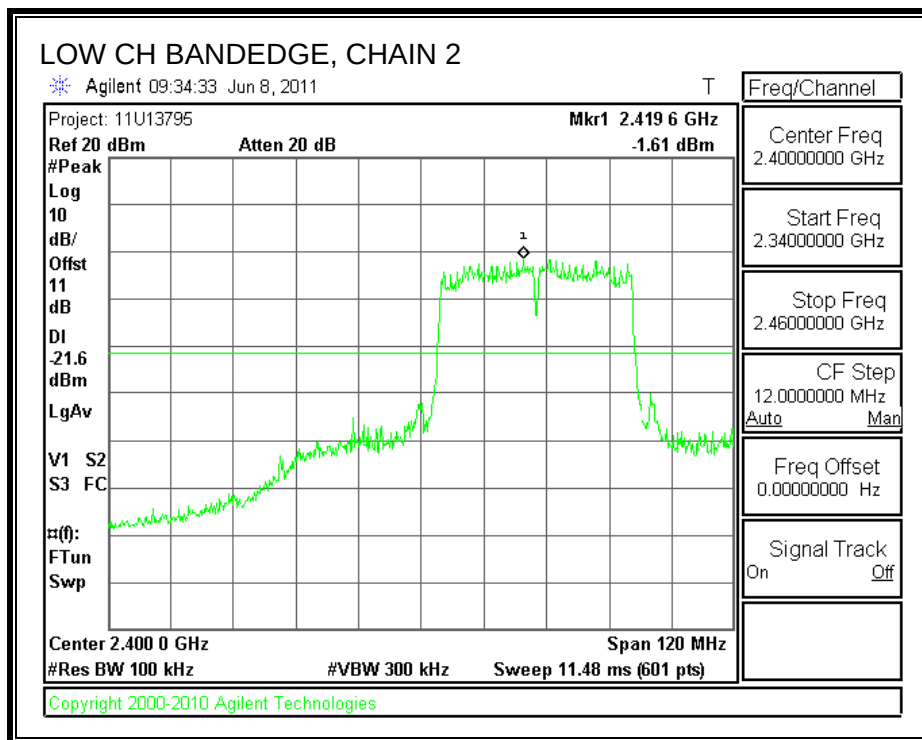


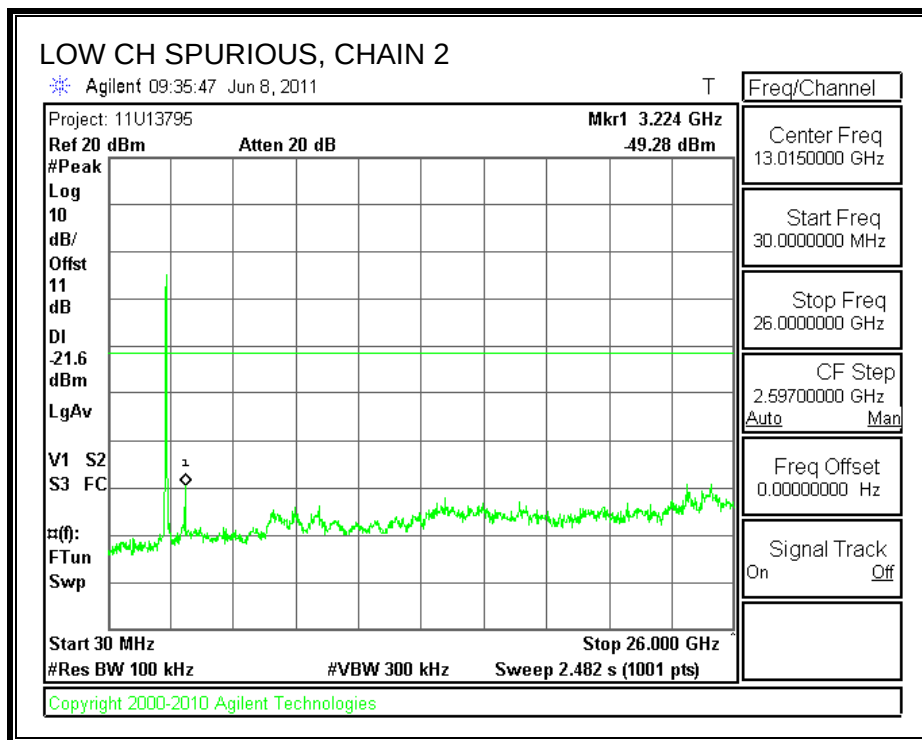


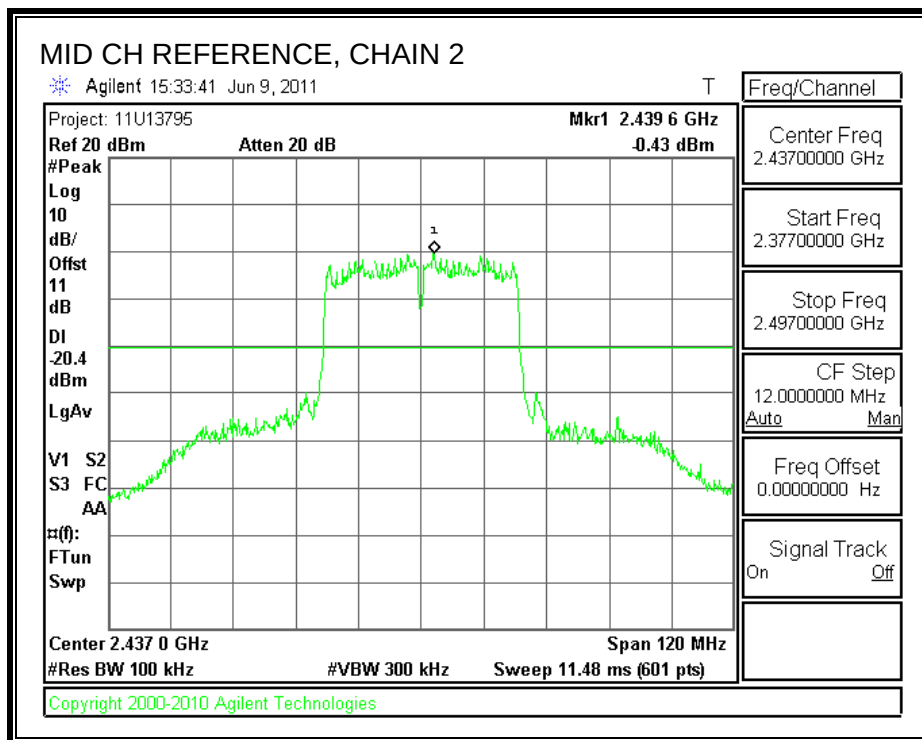


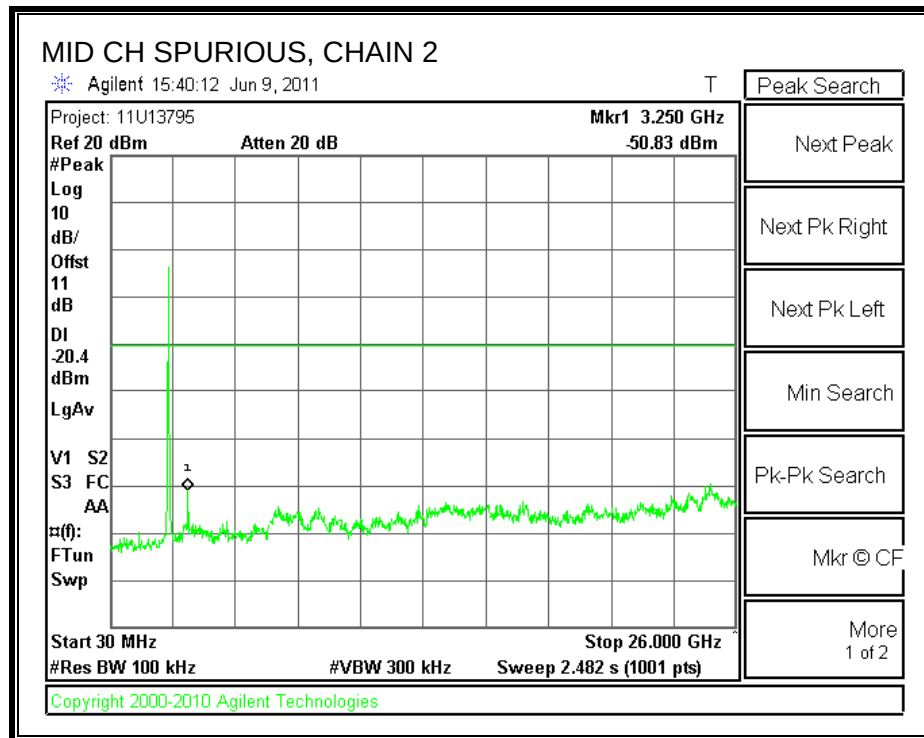


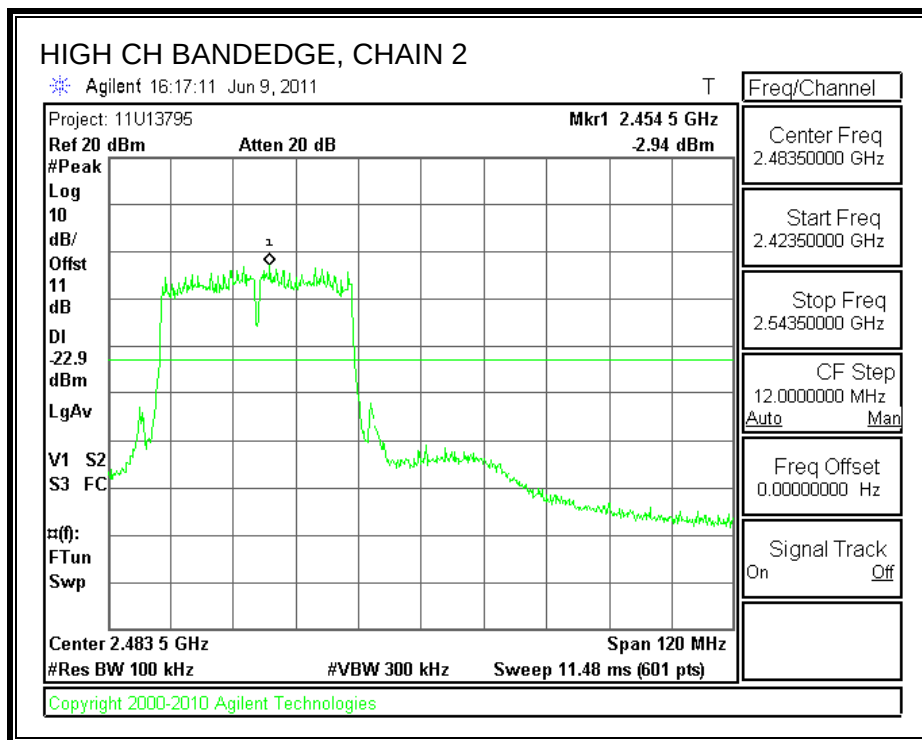
CHAIN 2 SPURIOUS EMISSIONS

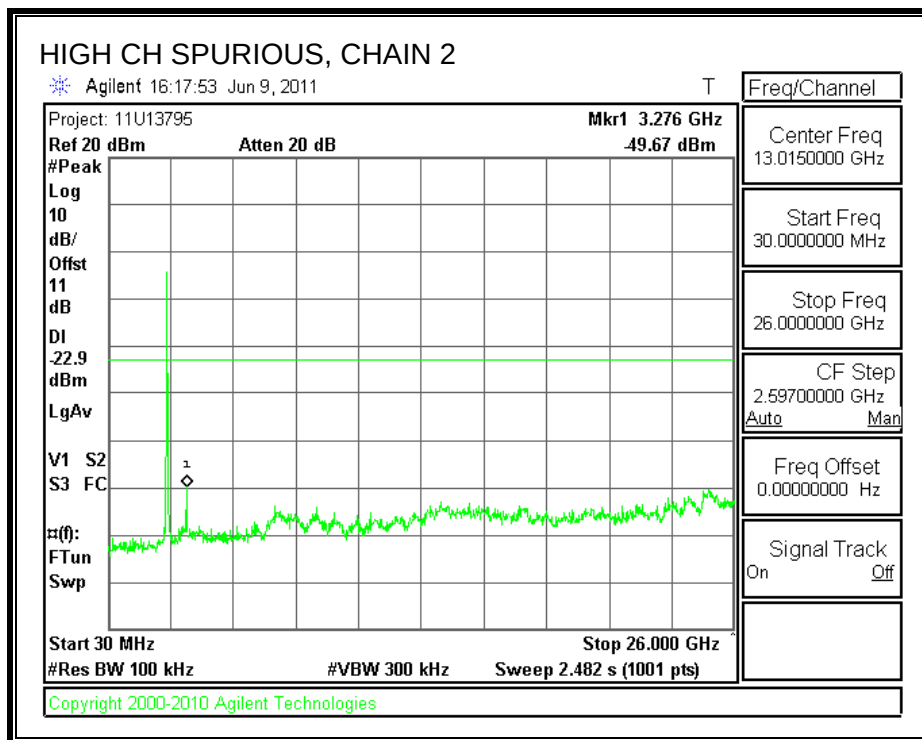












7.5. 802.11a MODE IN THE 5.8 GHz BAND

7.5.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

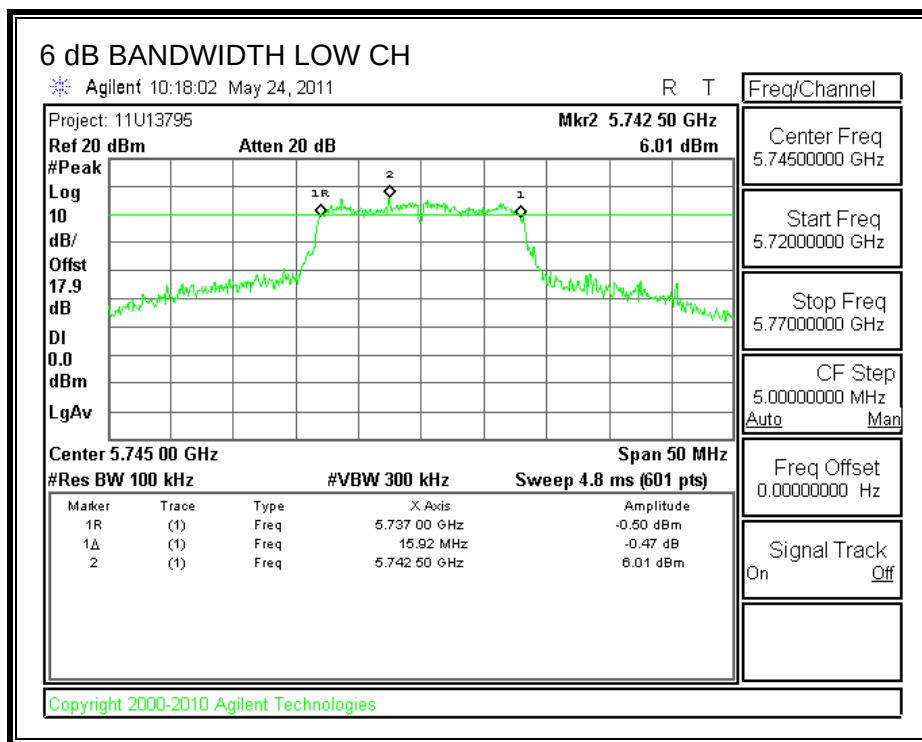
TEST PROCEDURE

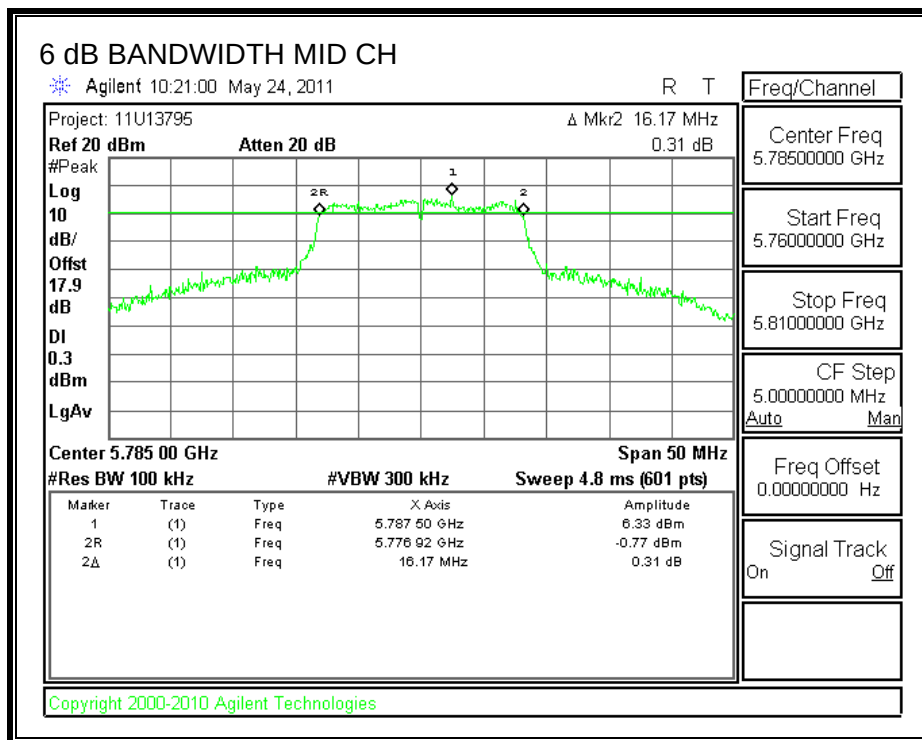
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

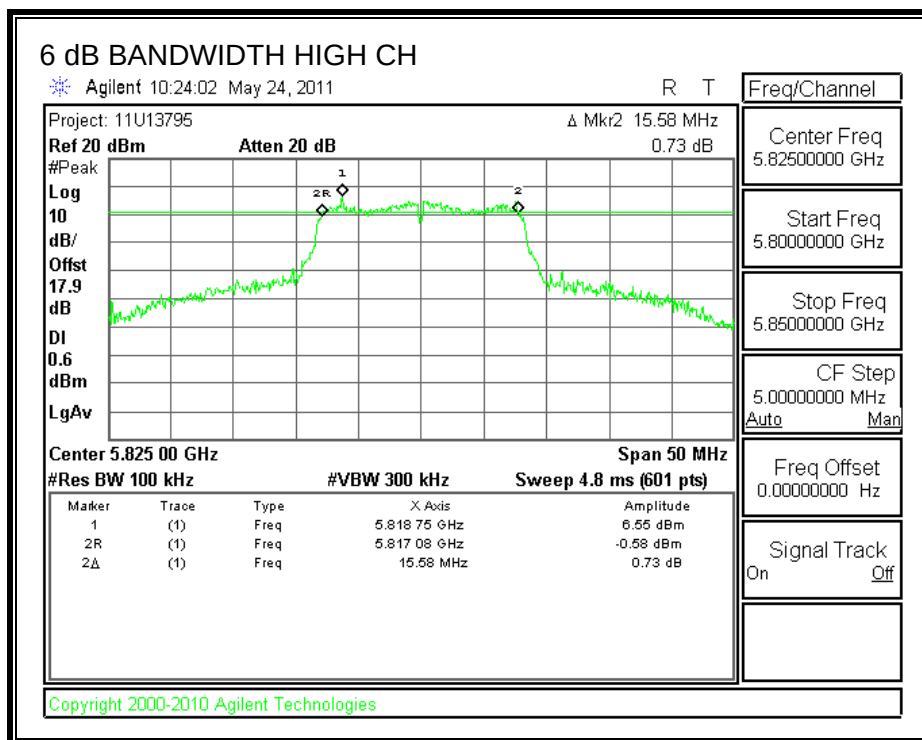
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	15.92	0.5
Middle	5785	16.17	0.5
High	5825	15.58	0.5

6 dB BANDWIDTH







7.5.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

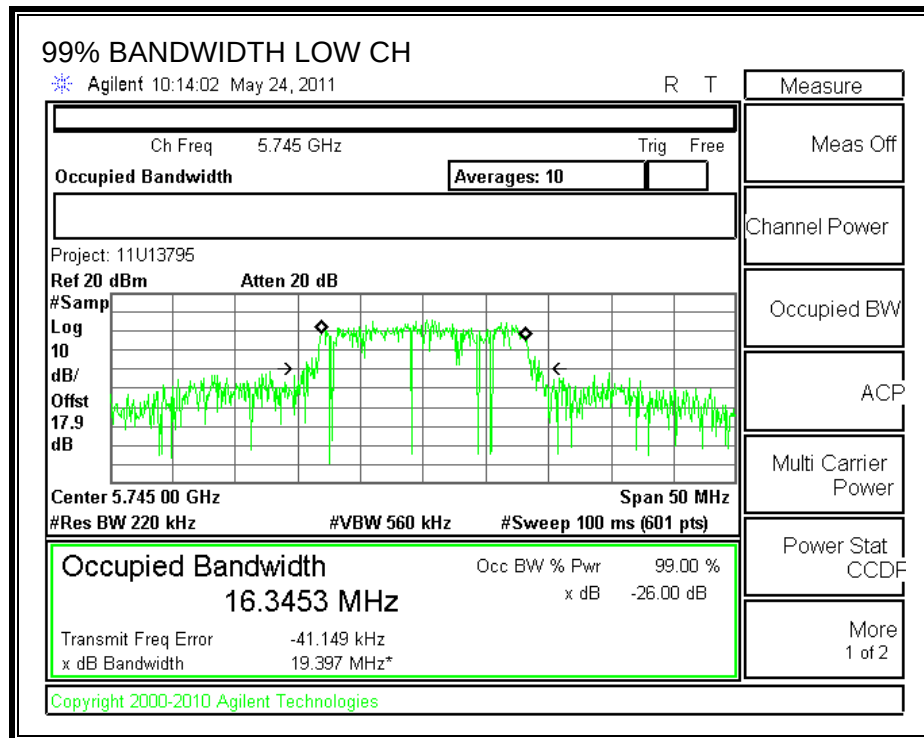
TEST PROCEDURE

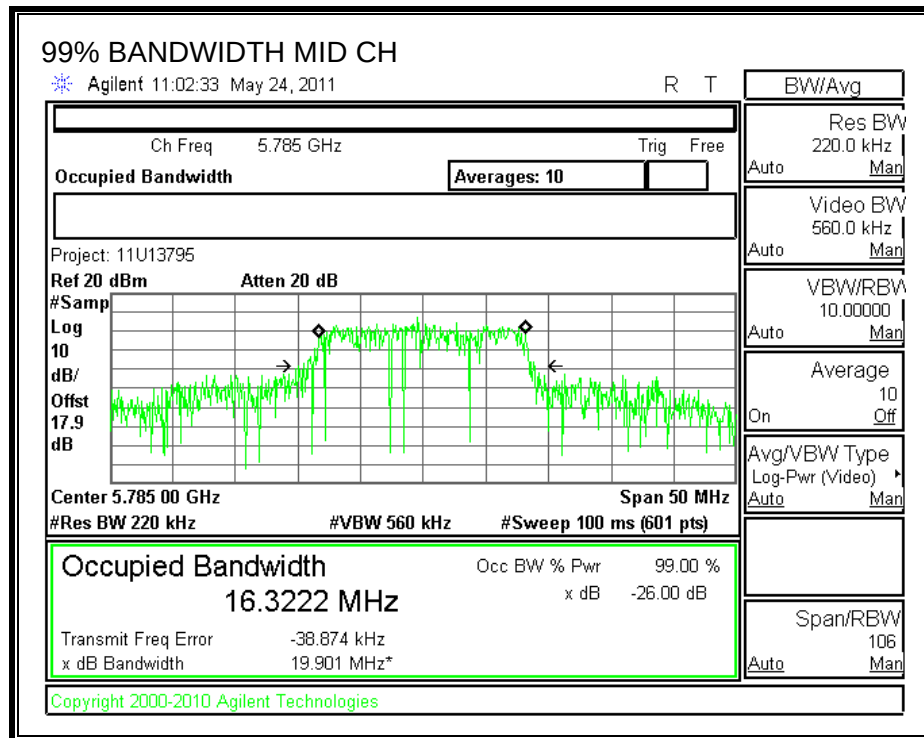
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

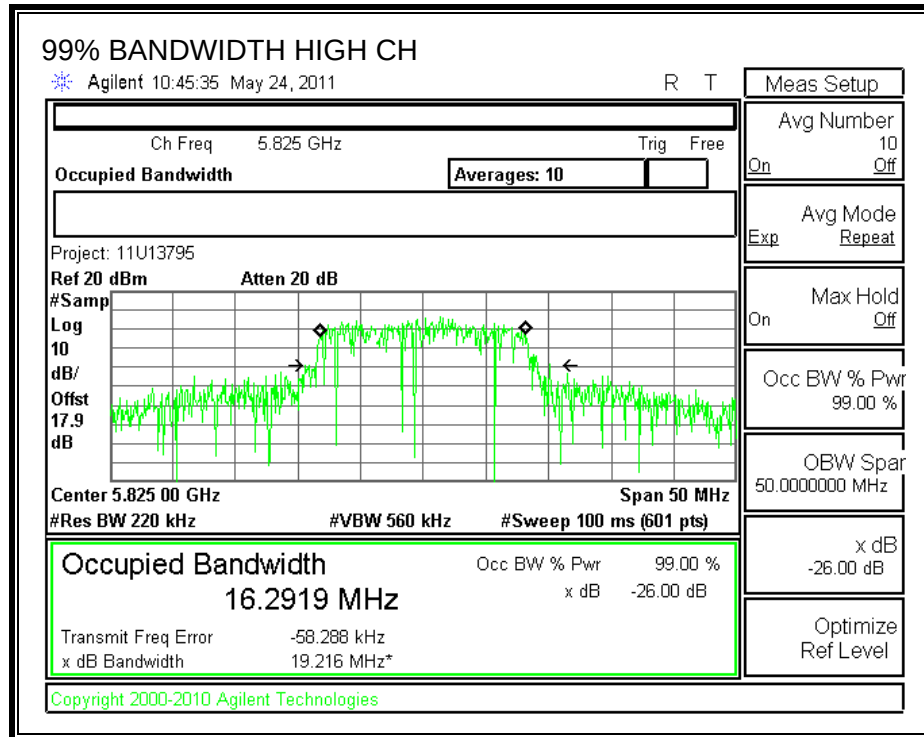
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	16.3453
Middle	5785	16.3222
High	5825	16.2919

99% BANDWIDTH







7.5.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

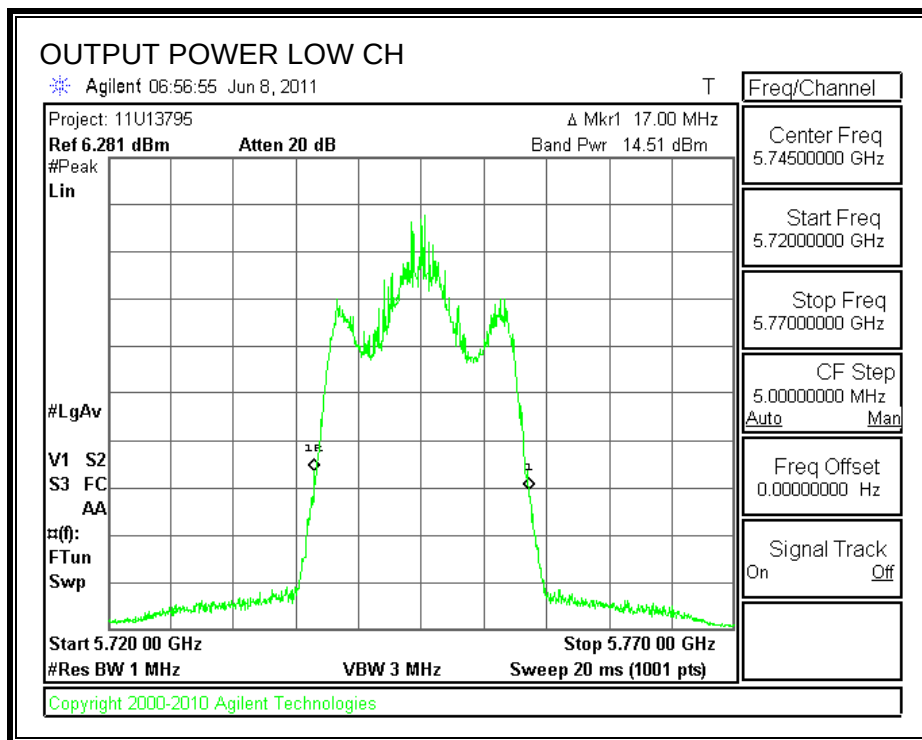
TEST PROCEDURE

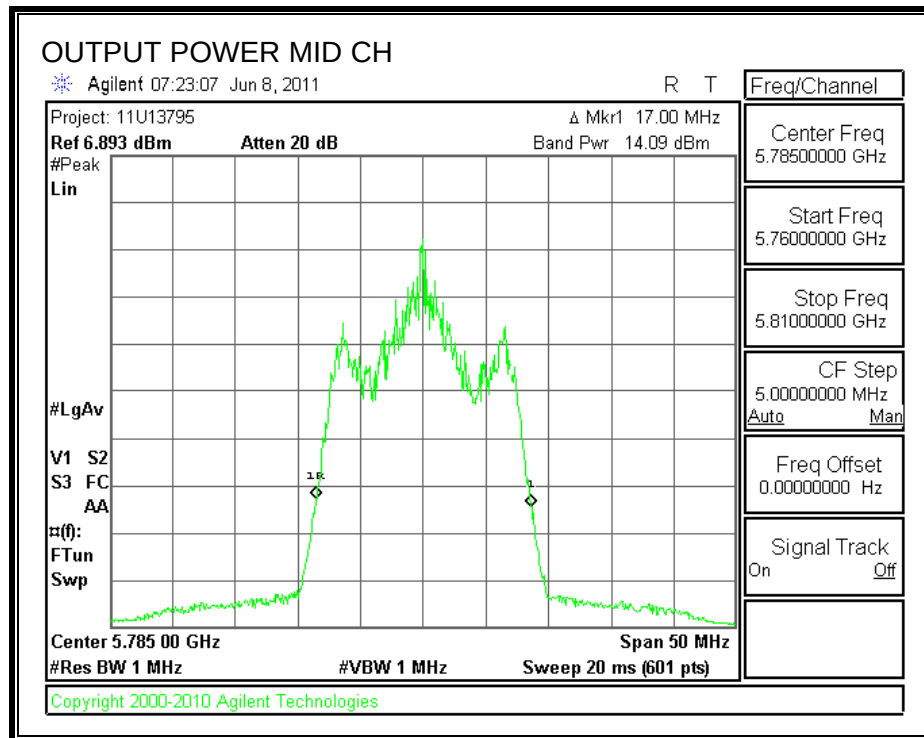
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

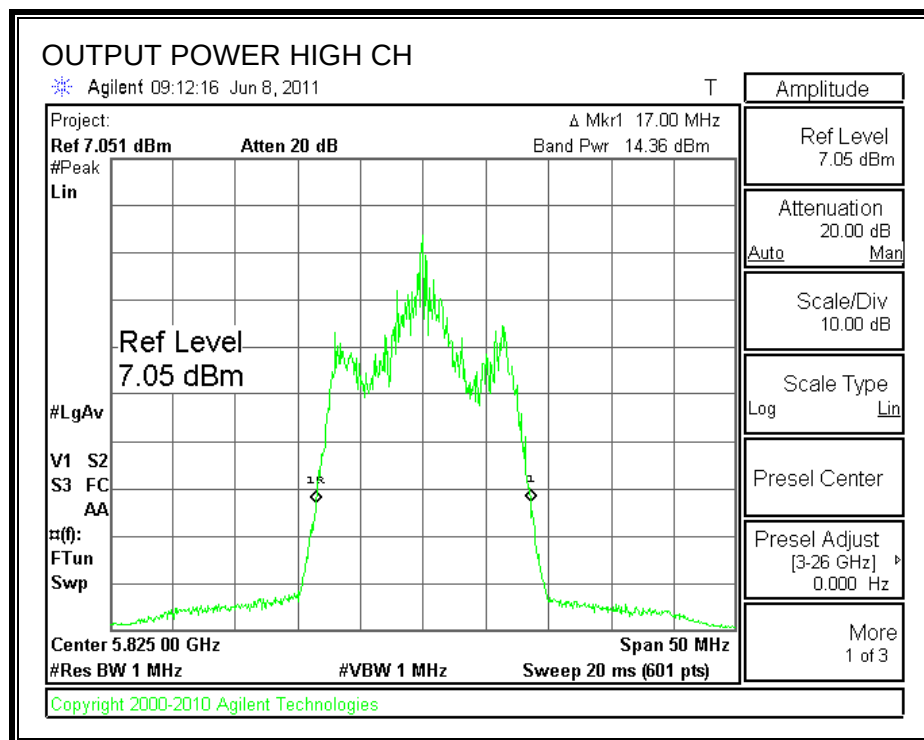
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	14.51	11.4	25.91	30	-4.09
Middle	5785	14.09	11.4	25.49	30	-4.51
High	5825	14.36	11.4	25.76	30	-4.24

OUTPUT POWER







7.5.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

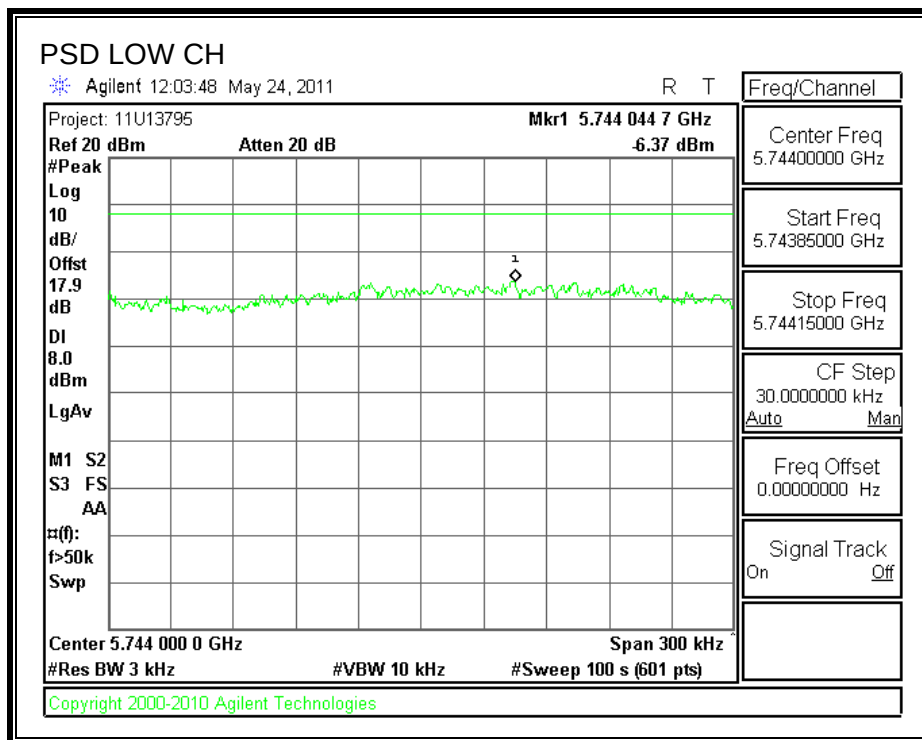
TEST PROCEDURE

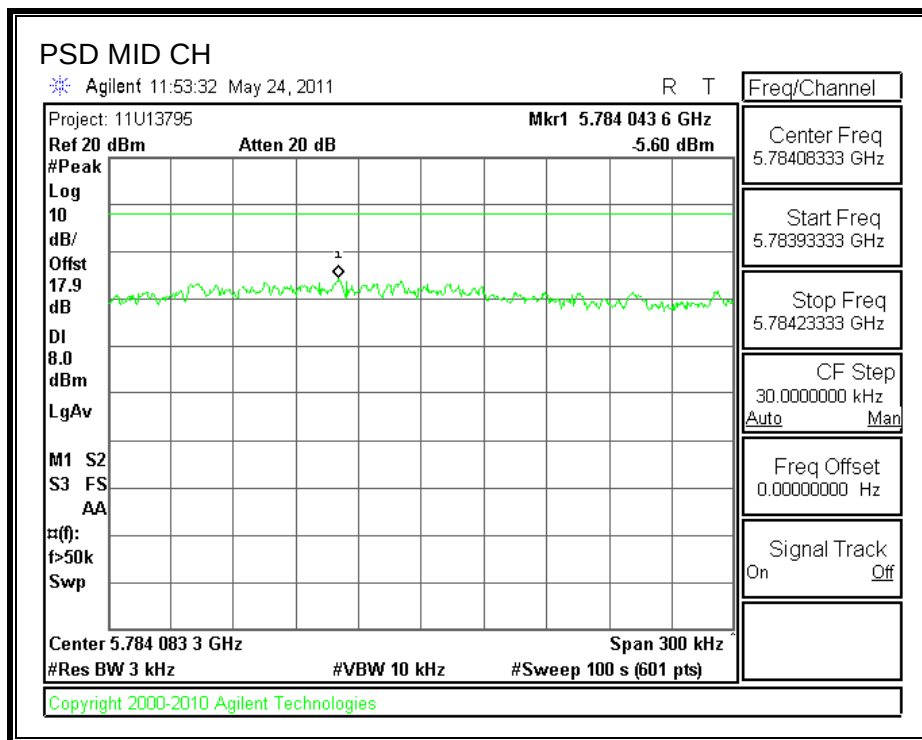
Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

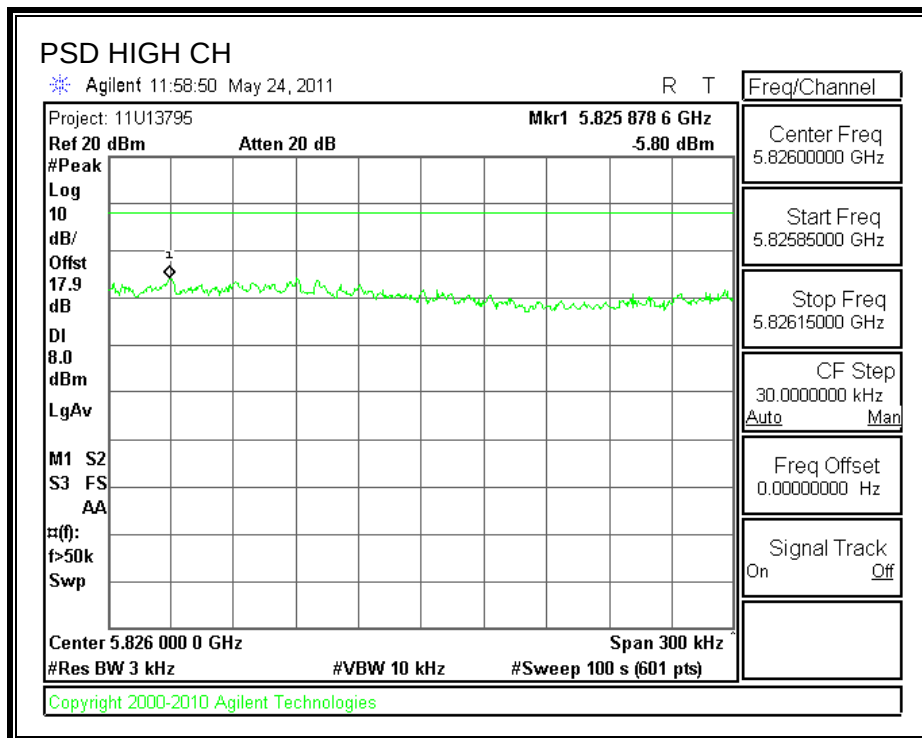
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-6.37	8	-14.37
Middle	5785	-5.60	8	-13.60
High	5825	-5.80	8	-13.80

POWER SPECTRAL DENSITY







7.5.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

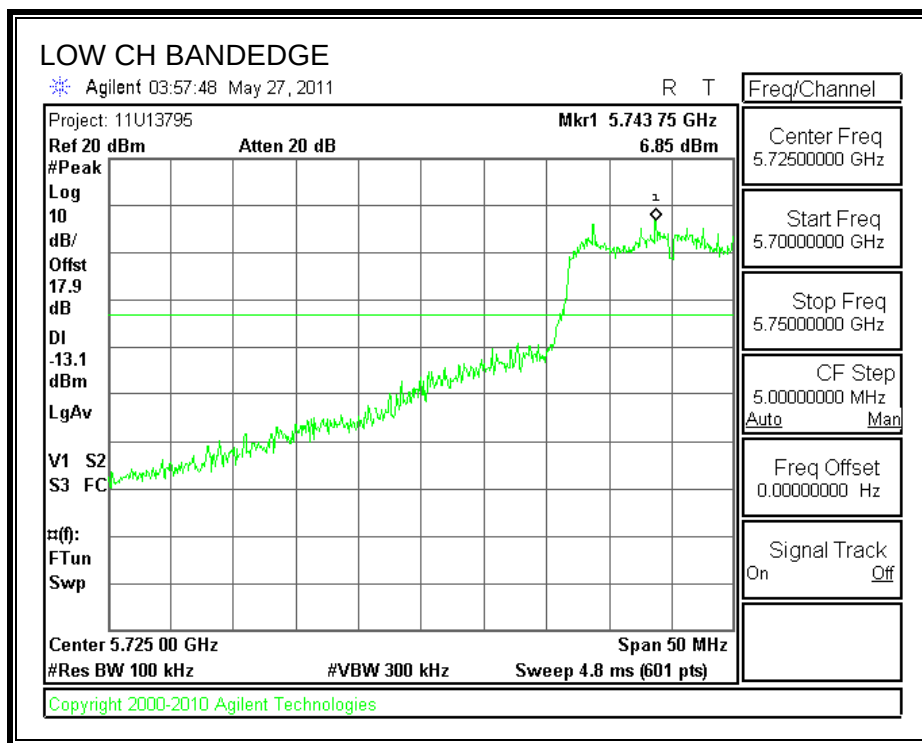
TEST PROCEDURE

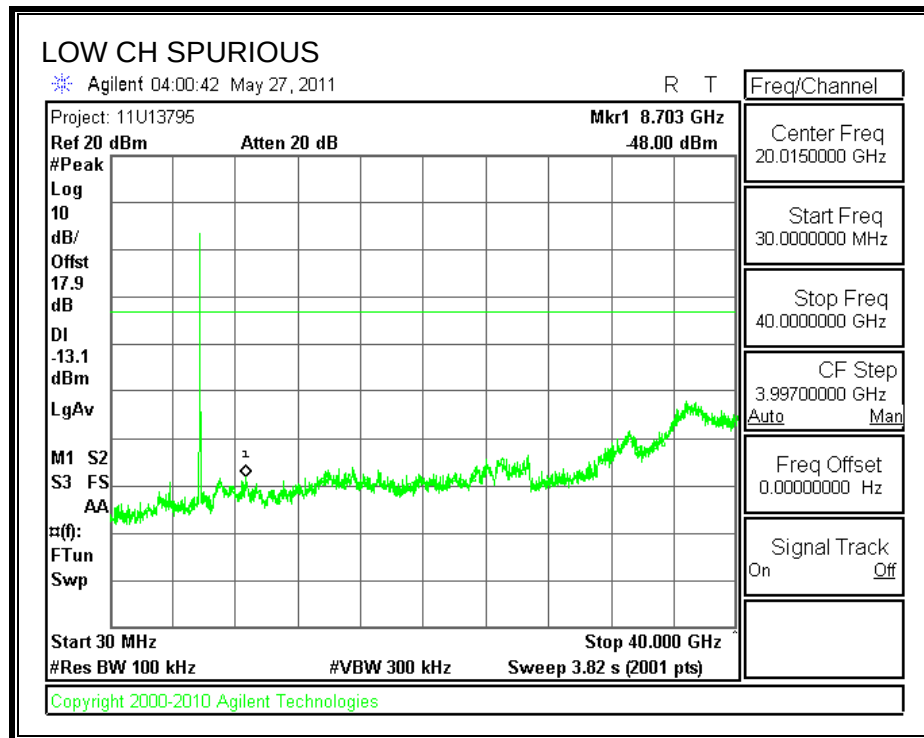
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

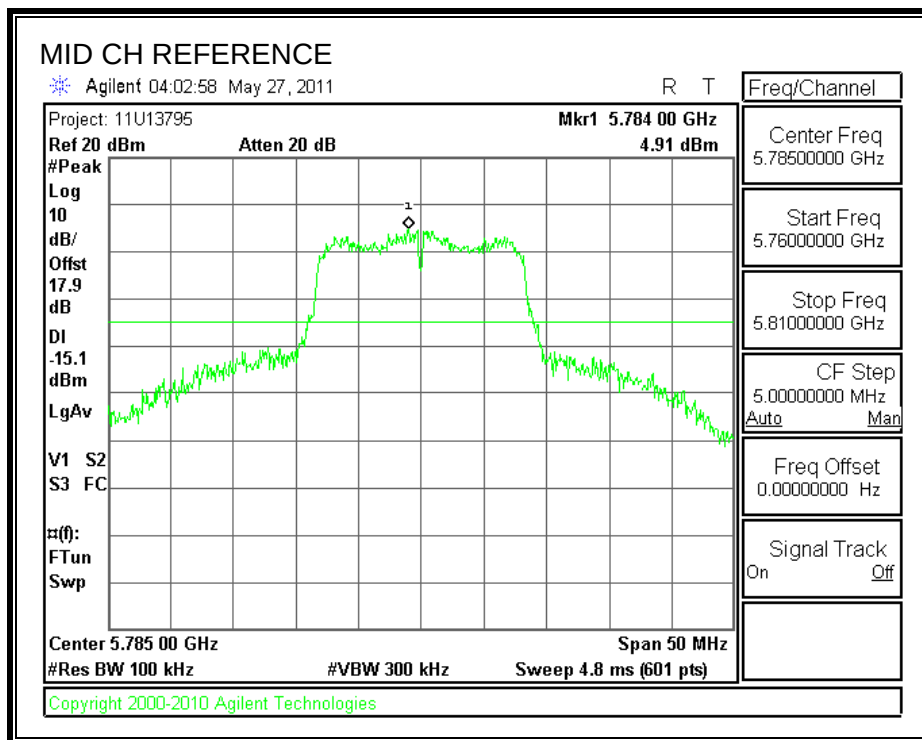
RESULTS

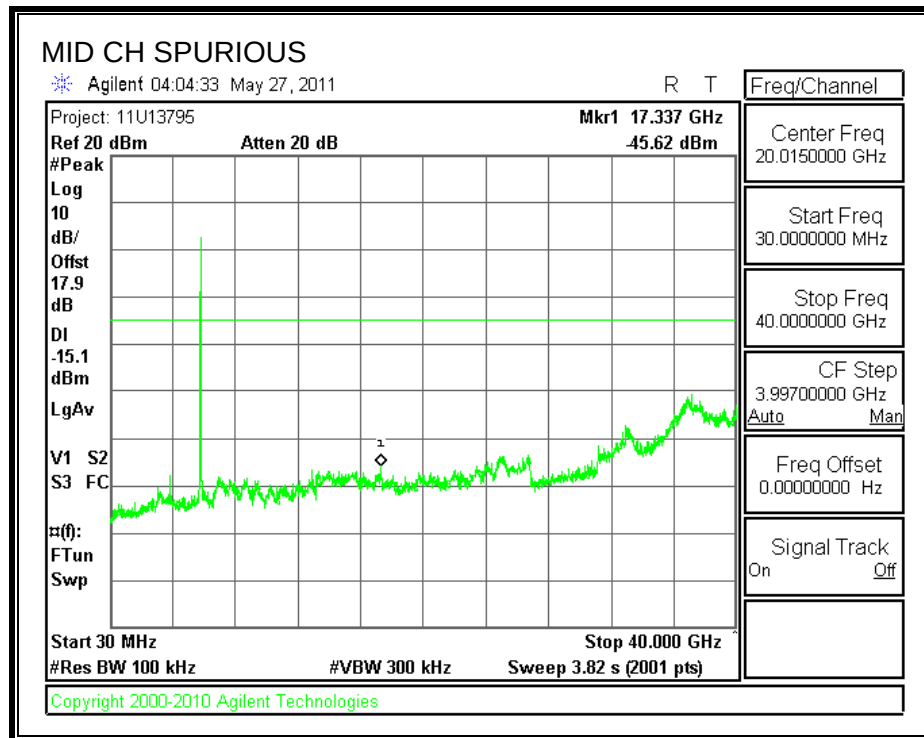
SPURIOUS EMISSIONS, LOW CHANNEL



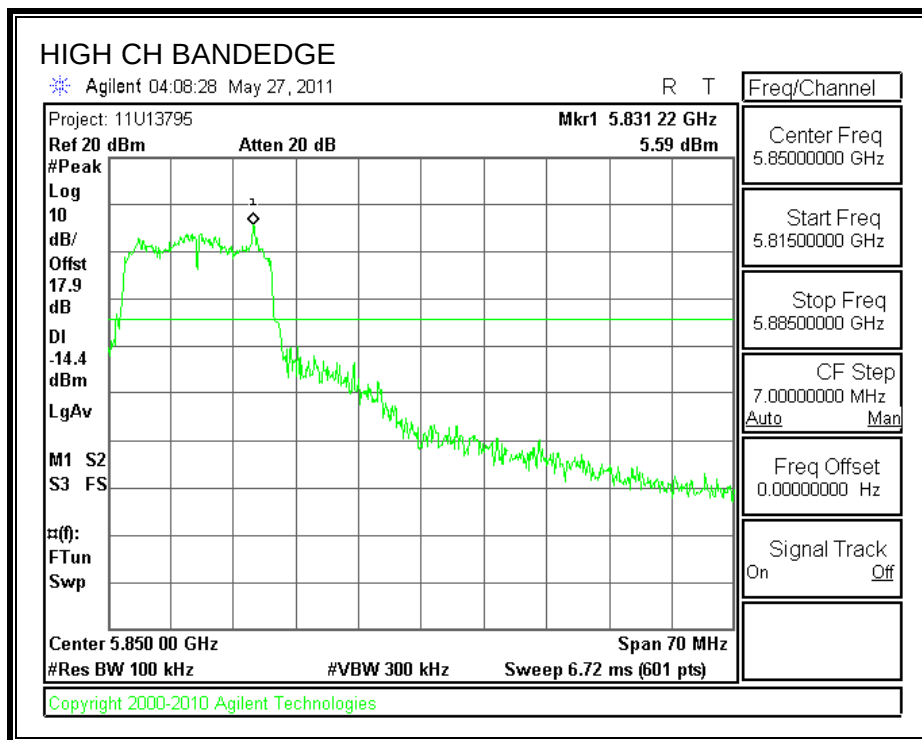


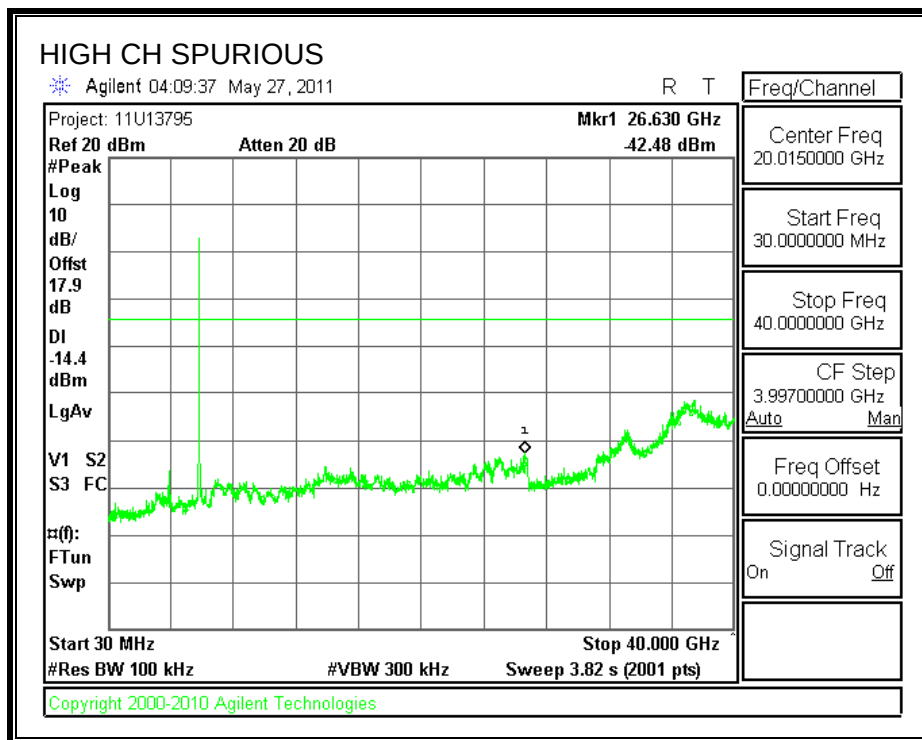
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.6. 802.11n HT20 MODE IN THE 5.8 GHz BAND

7.6.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

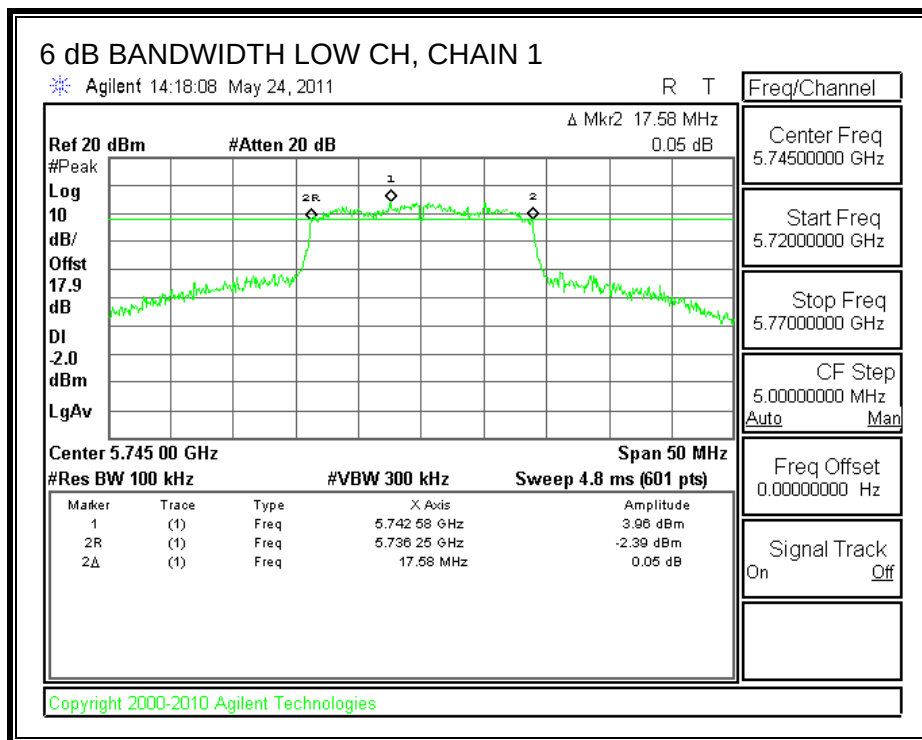
TEST PROCEDURE

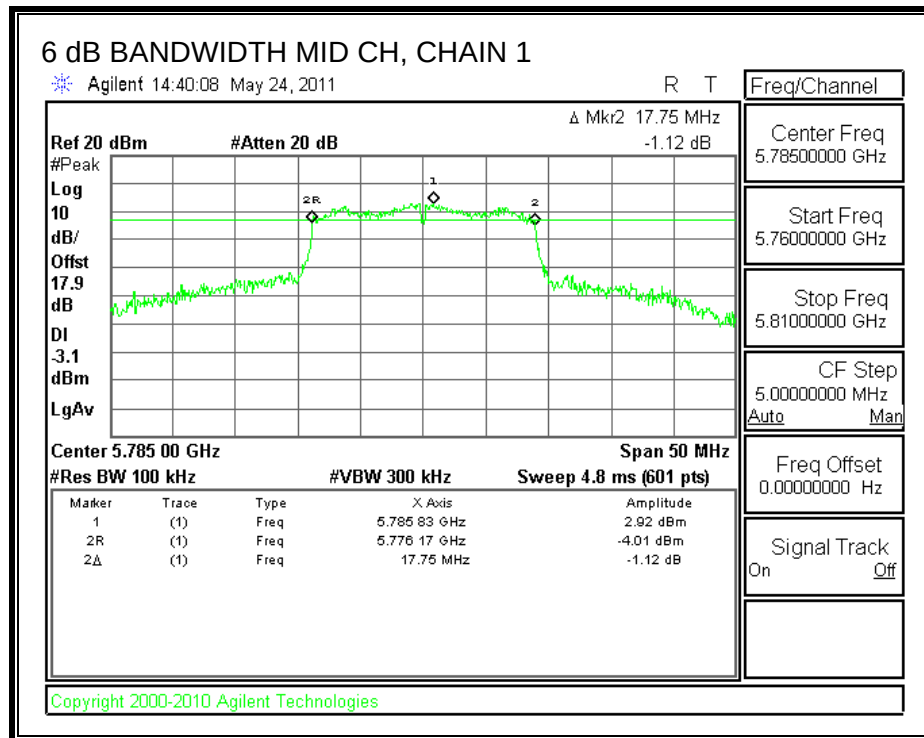
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

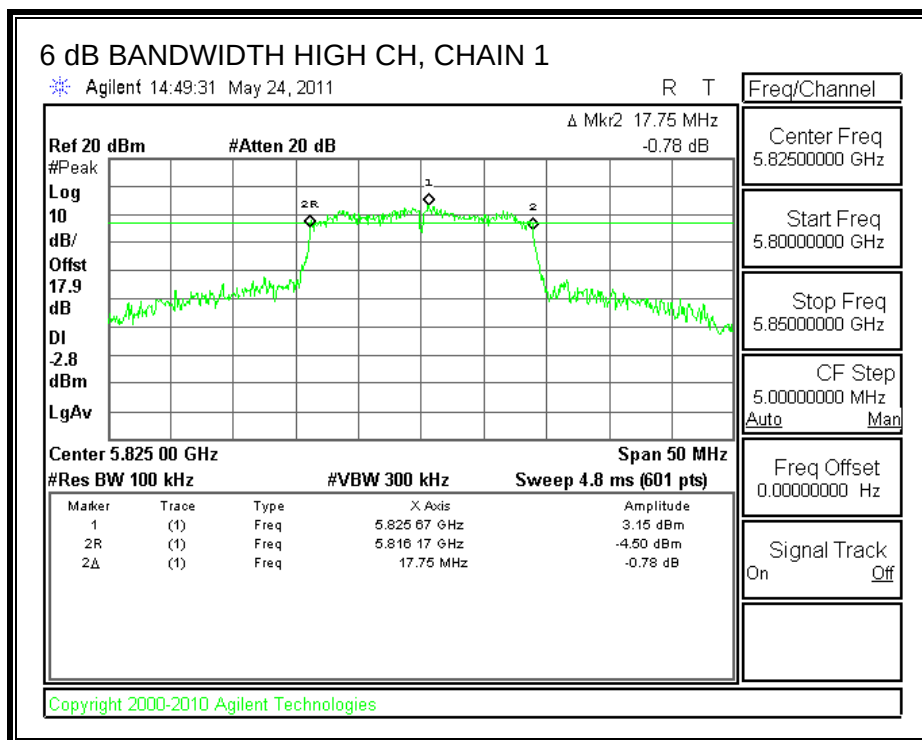
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5745	17.58	17.58	0.5
Middle	5785	17.75	17.50	0.5
High	5825	17.75	17.58	0.5

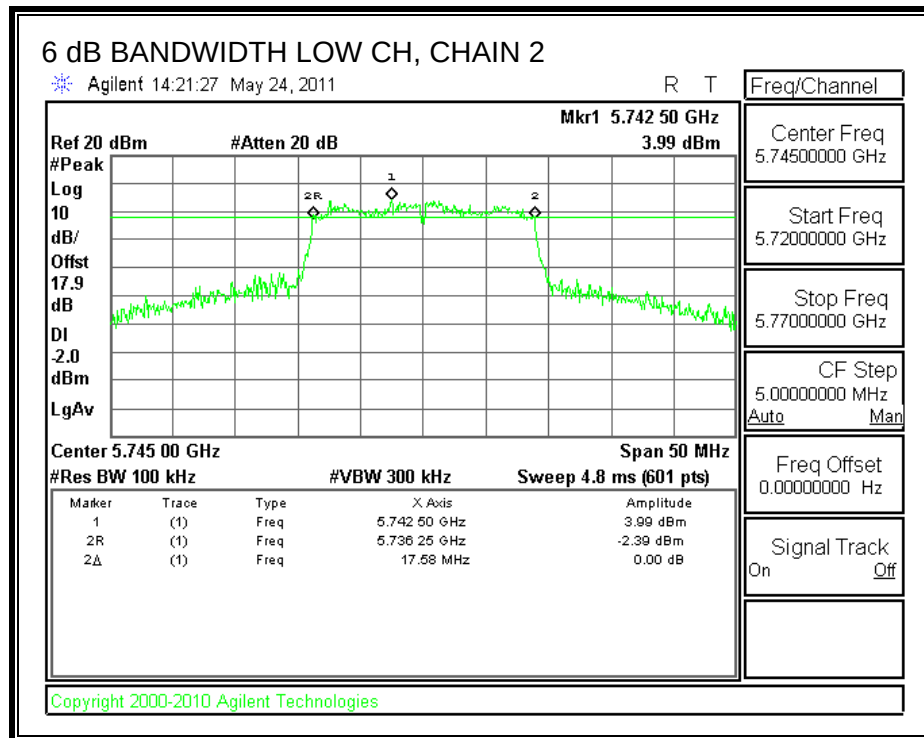
6 dB BANDWIDTH, CHAIN 1

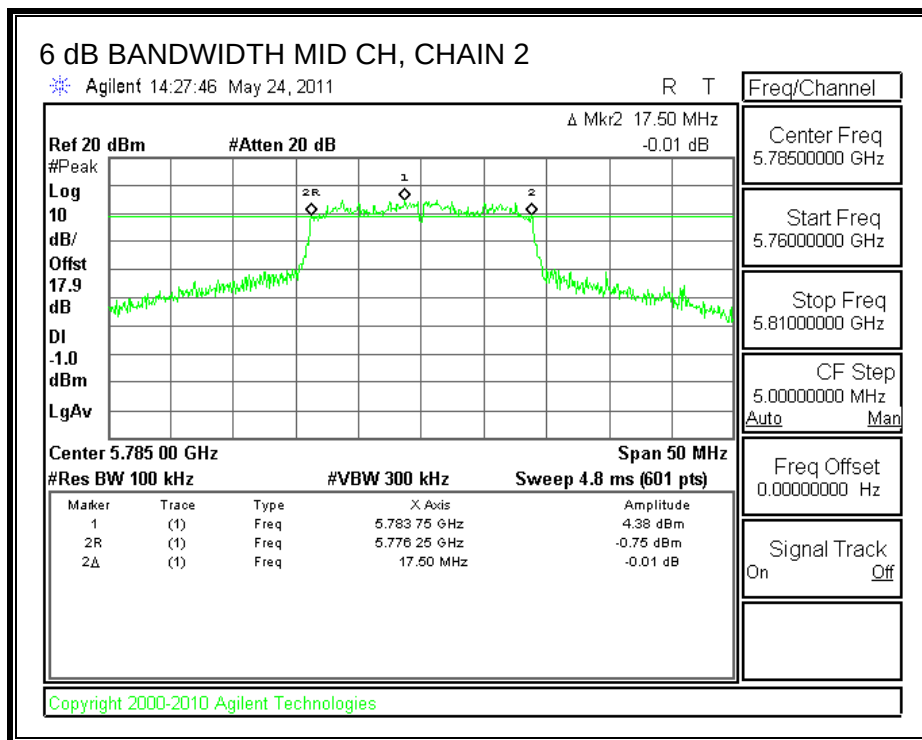


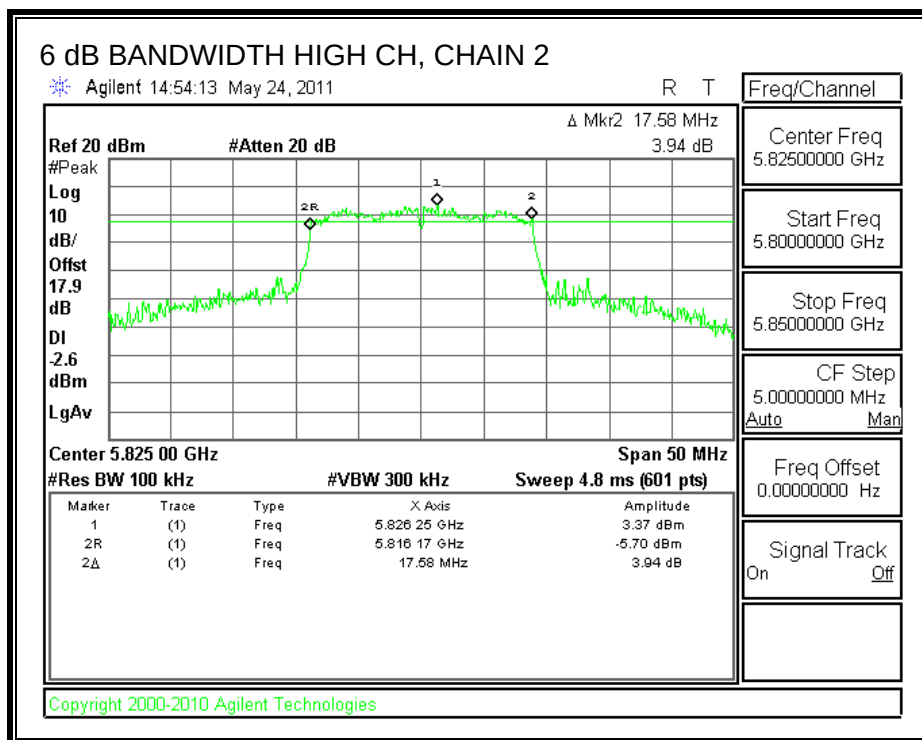




6 dB BANDWIDTH, CHAIN 2







7.6.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

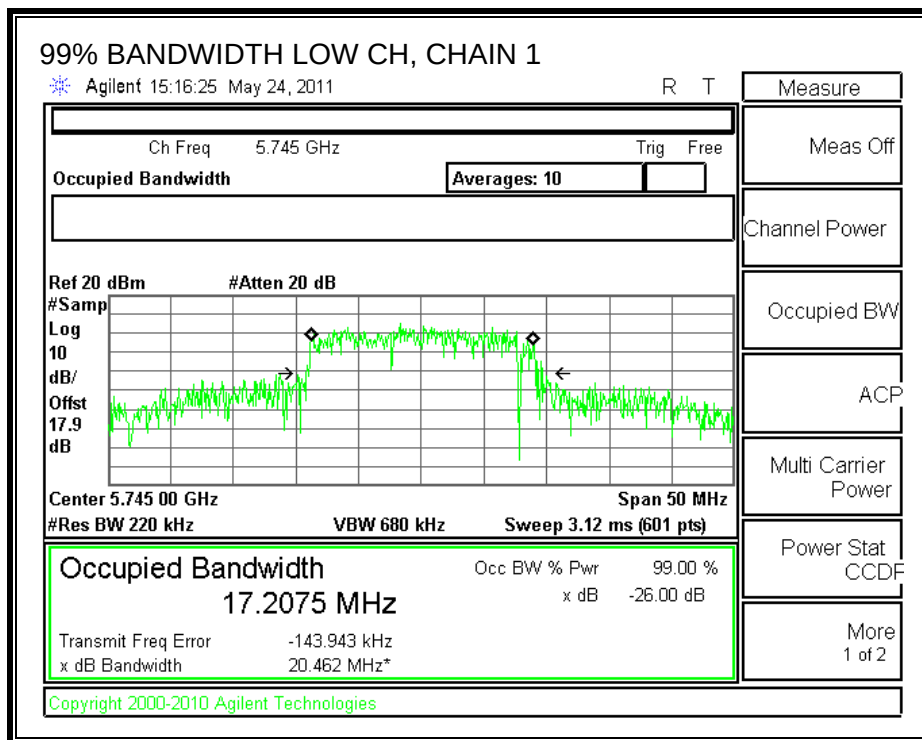
TEST PROCEDURE

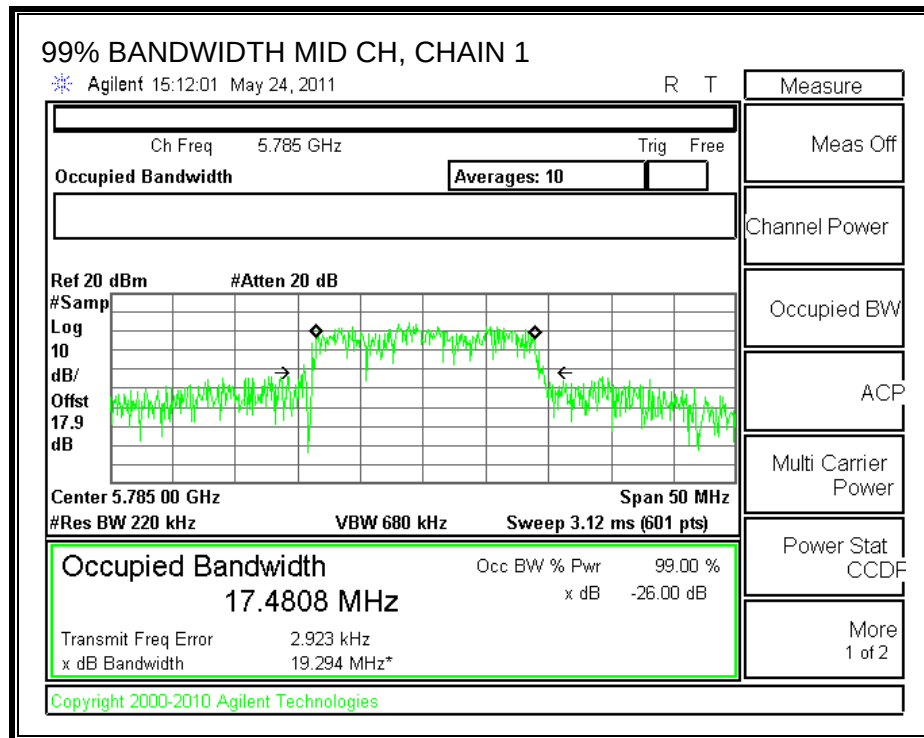
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

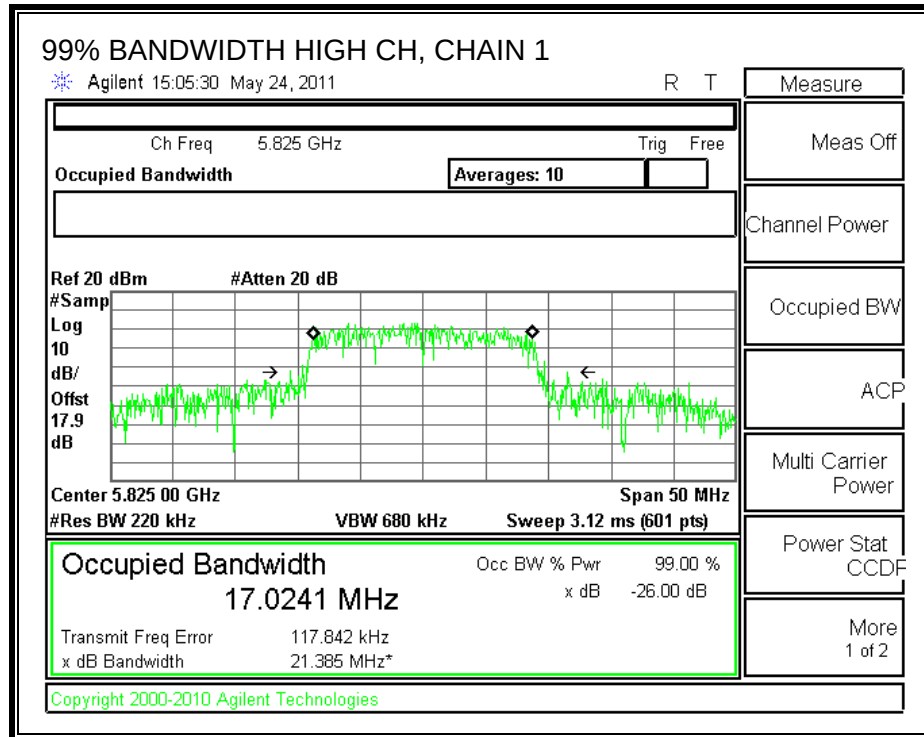
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	5745	17.2075	17.4868
Middle	5785	17.4808	17.4308
High	5825	17.0241	17.5560

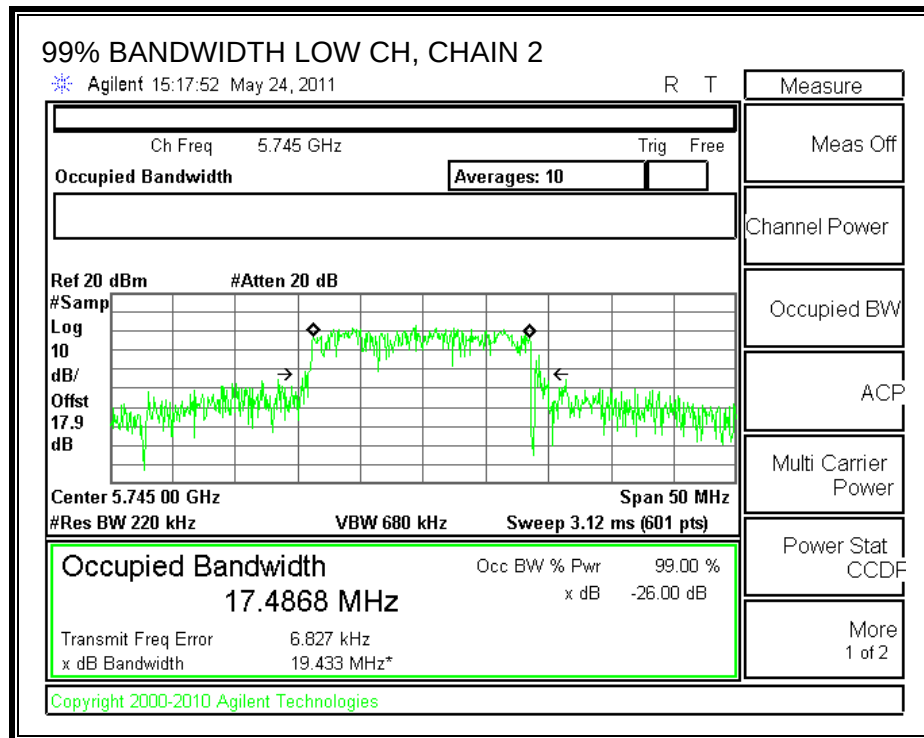
99% BANDWIDTH, CHAIN 1

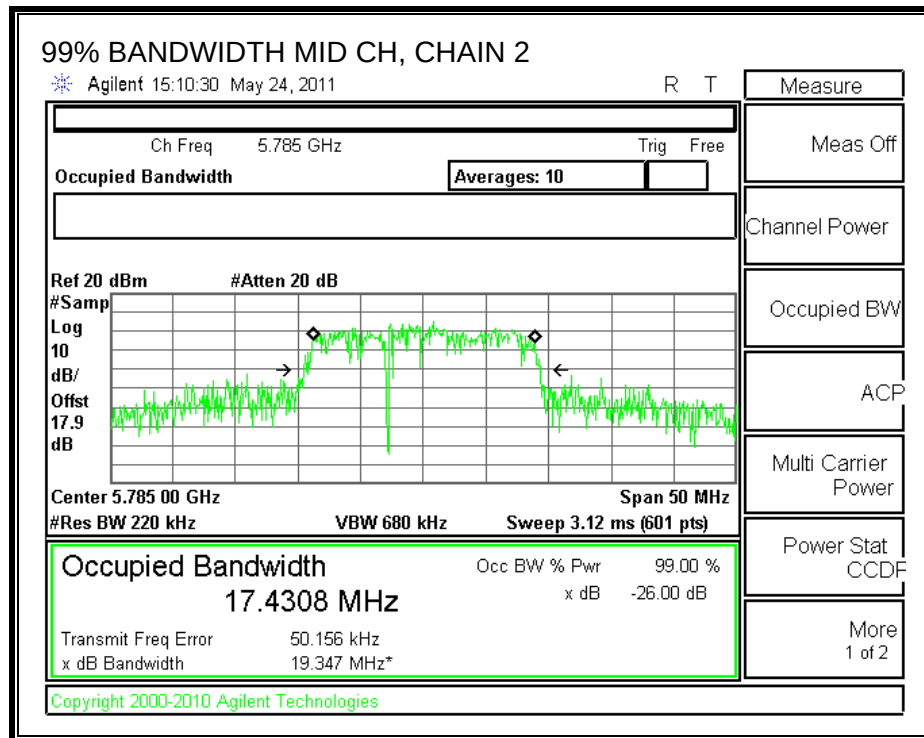


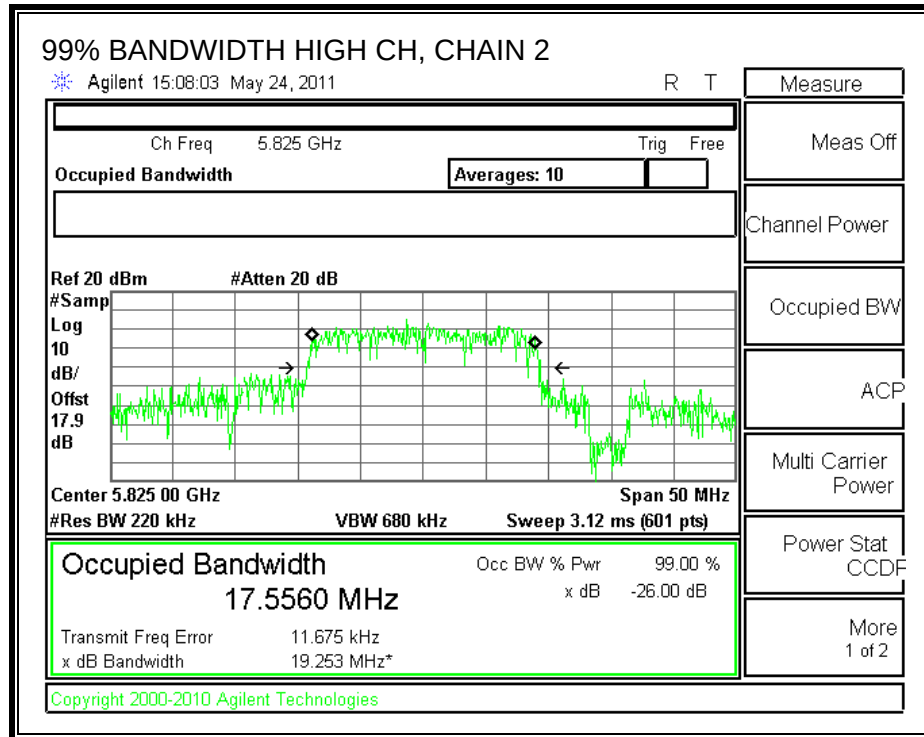




99% BANDWIDTH, CHAIN 2







7.6.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

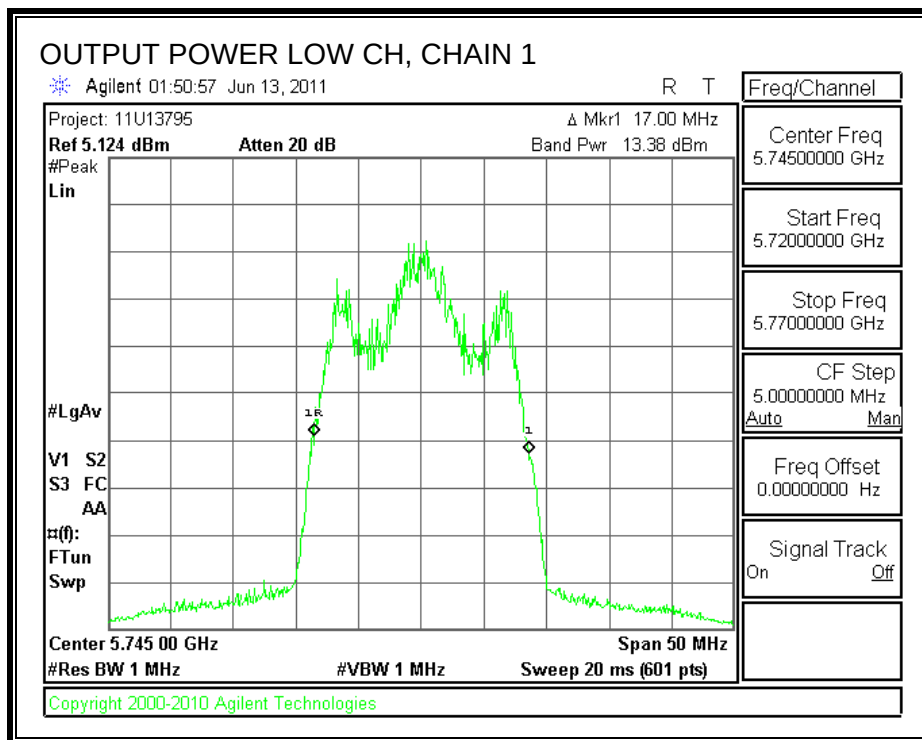
TEST PROCEDURE

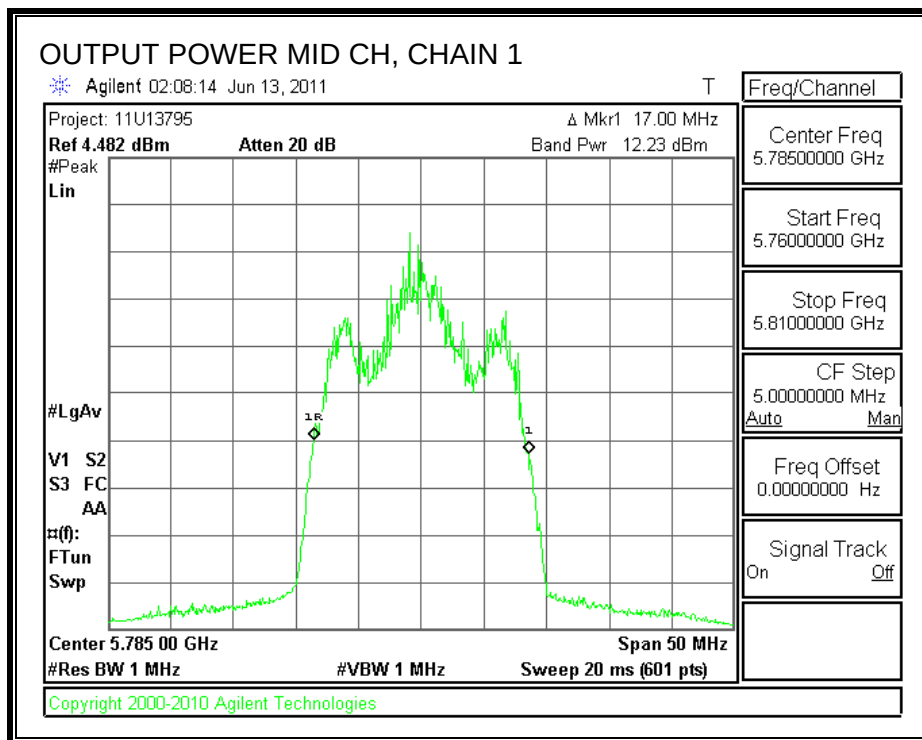
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

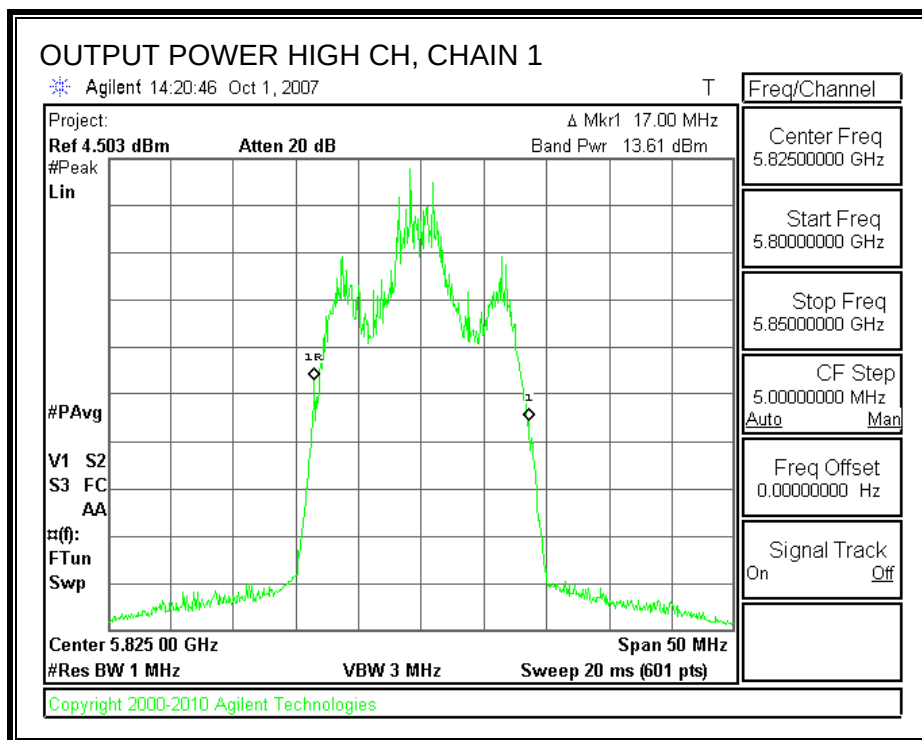
RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	13.38	13.99	11.40	28.11	28.79	-0.68
Mid	5785	12.23	12.75	11.40	26.91	28.79	-1.88
High	5825	13.61	13.74	11.40	28.09	28.79	-0.70

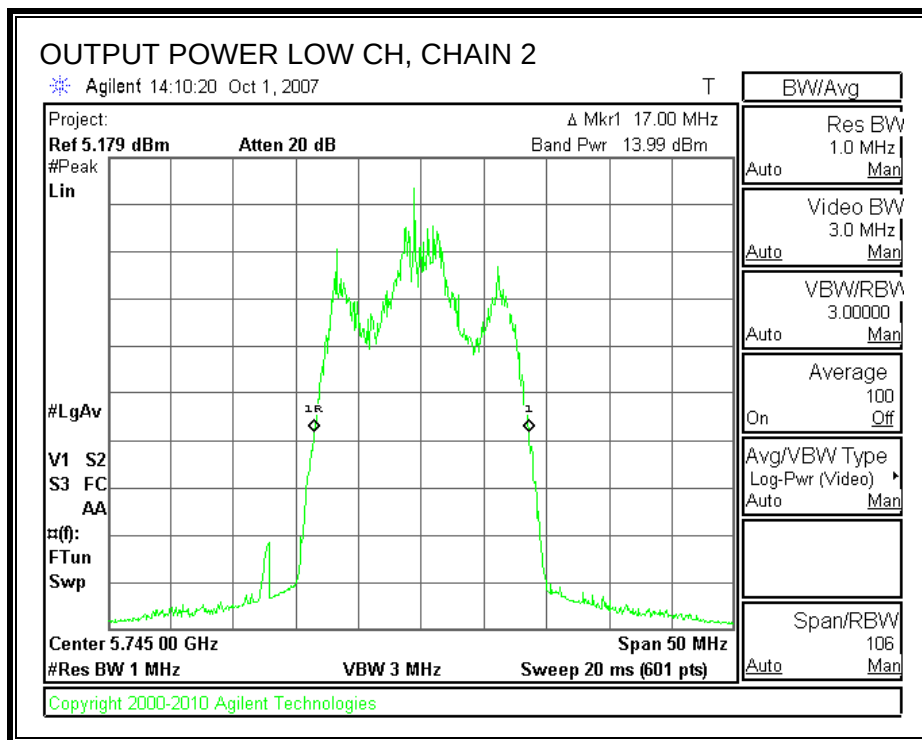
CHAIN 1 OUTPUT POWER

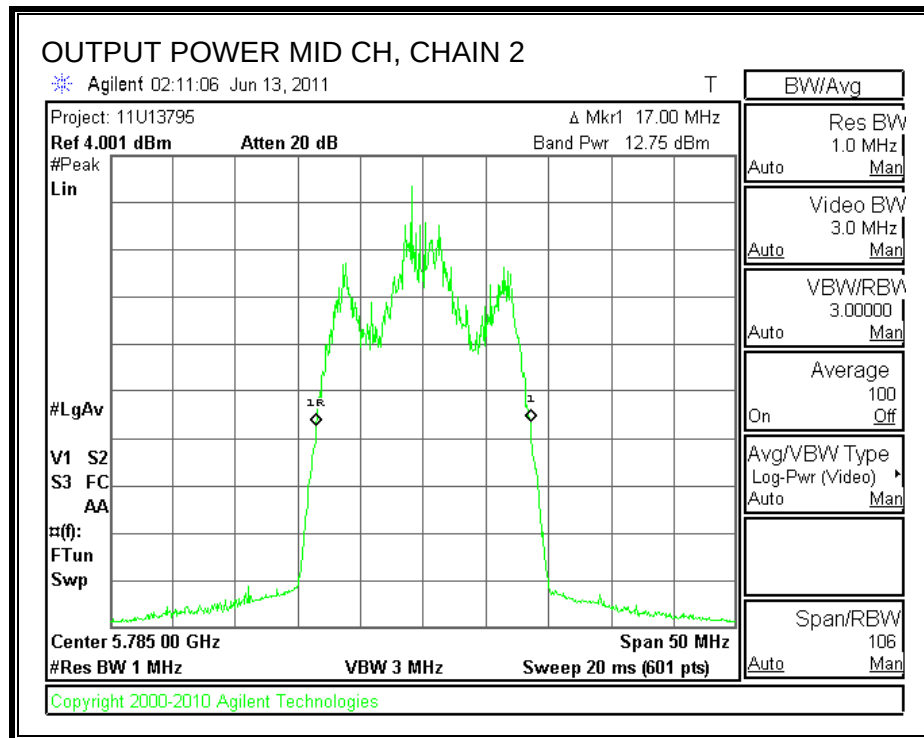


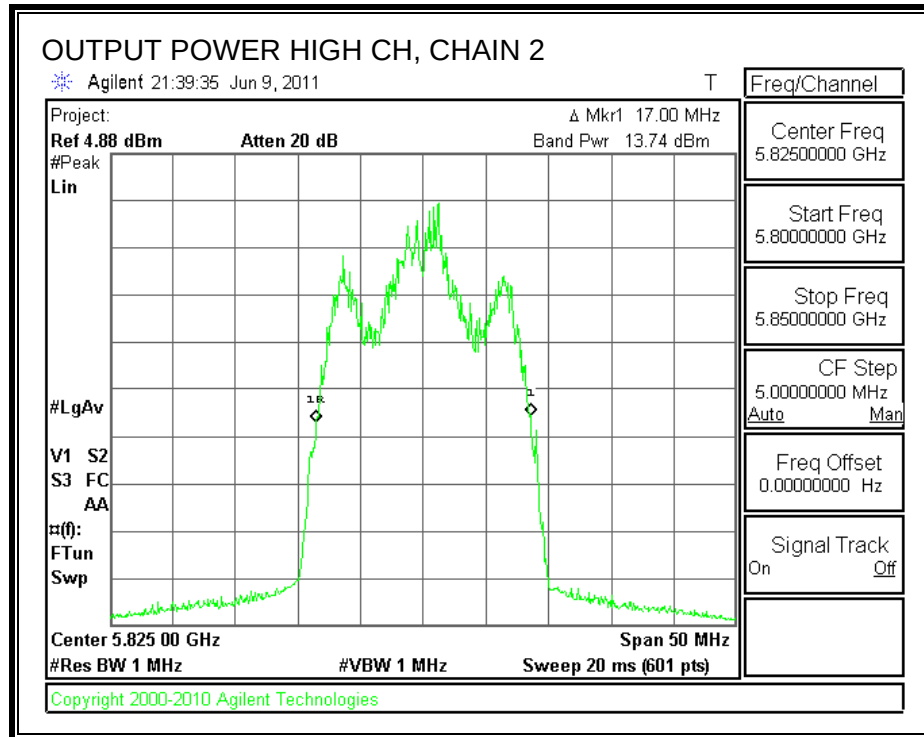




CHAIN 2 OUTPUT POWER







7.6.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

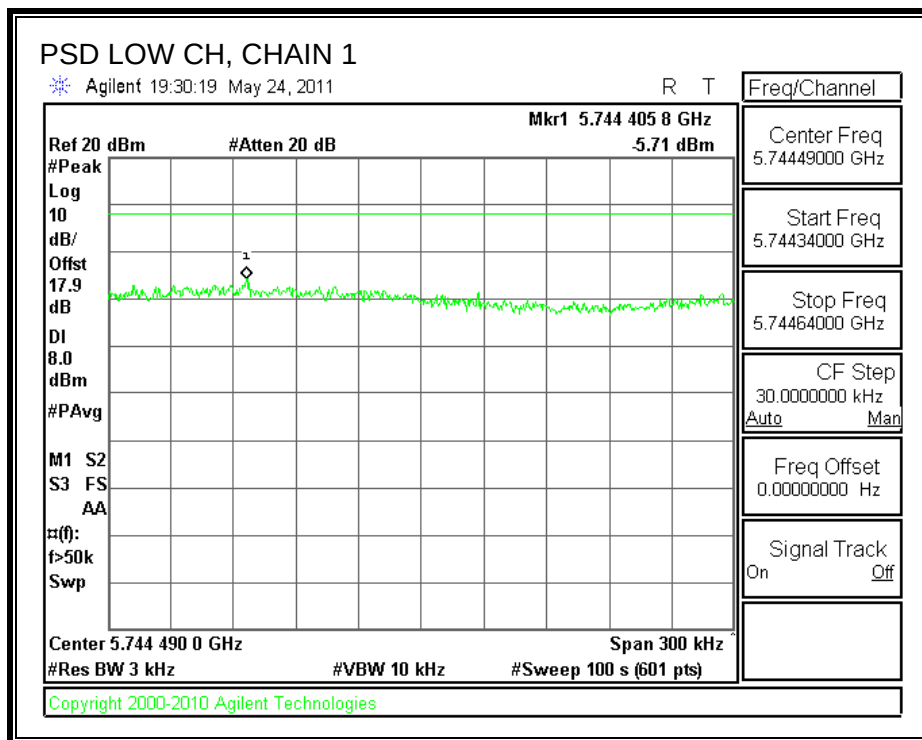
TEST PROCEDURE

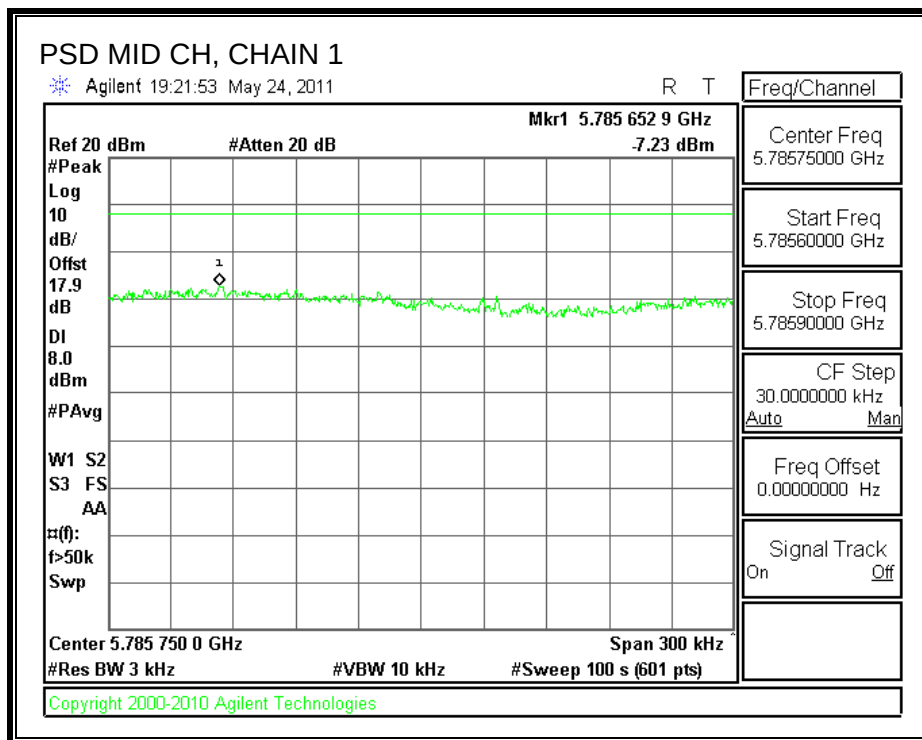
Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

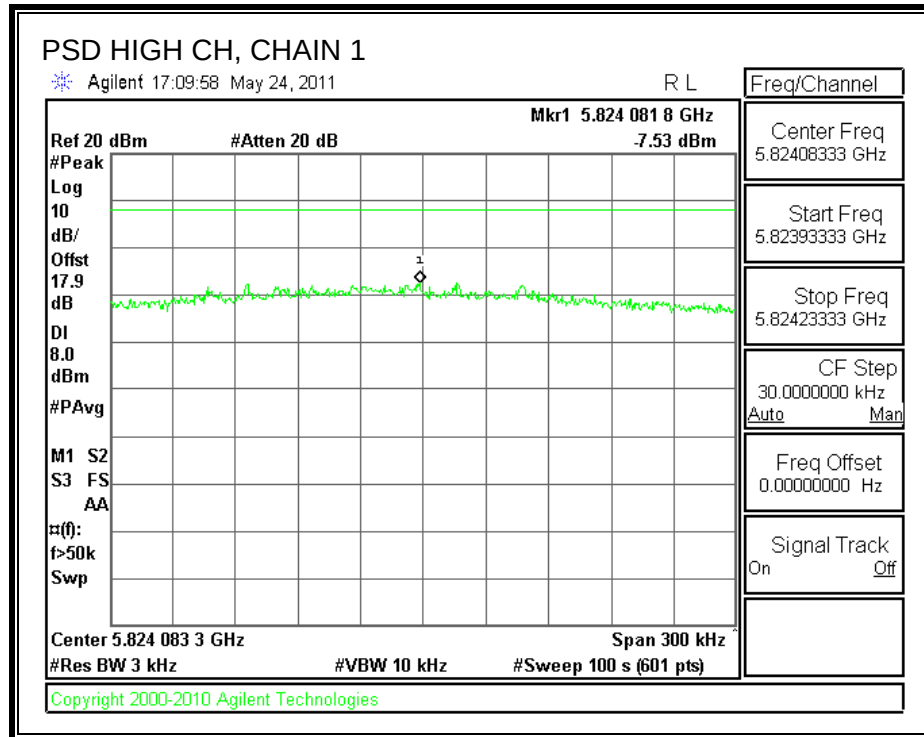
RESULTS:

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-5.71	-7.06	-3.32	8	-11.32
Middle	5785	-7.23	-7.17	-4.19	8	-12.19
High	5825	-7.53	-7.67	-4.59	8	-12.59

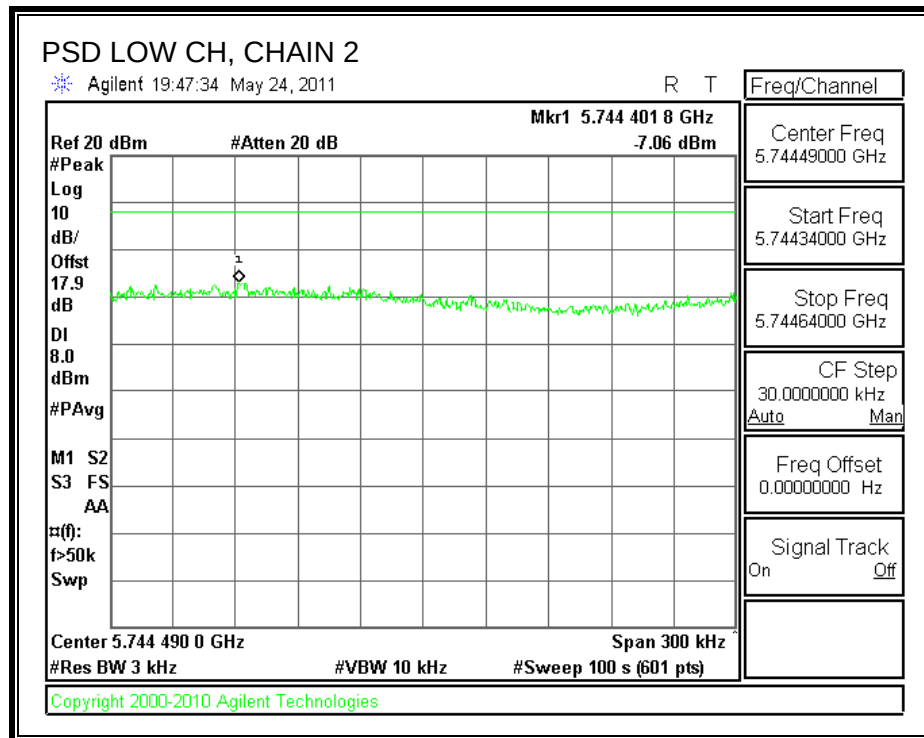
POWER SPECTRAL DENSITY, CHAIN 1

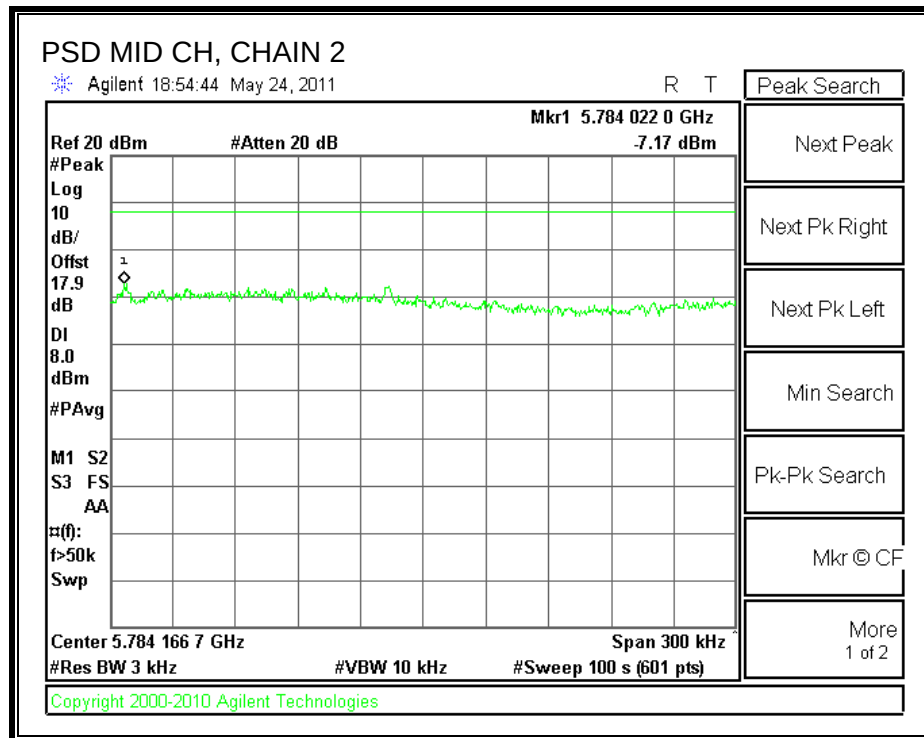


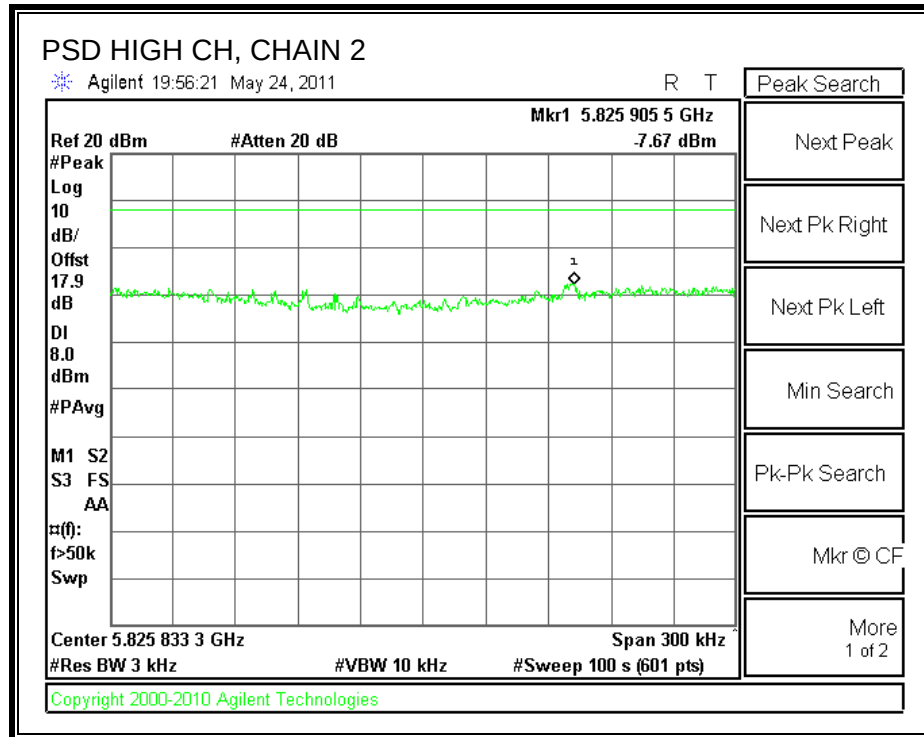




POWER SPECTRAL DENSITY, CHAIN 2







7.6.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

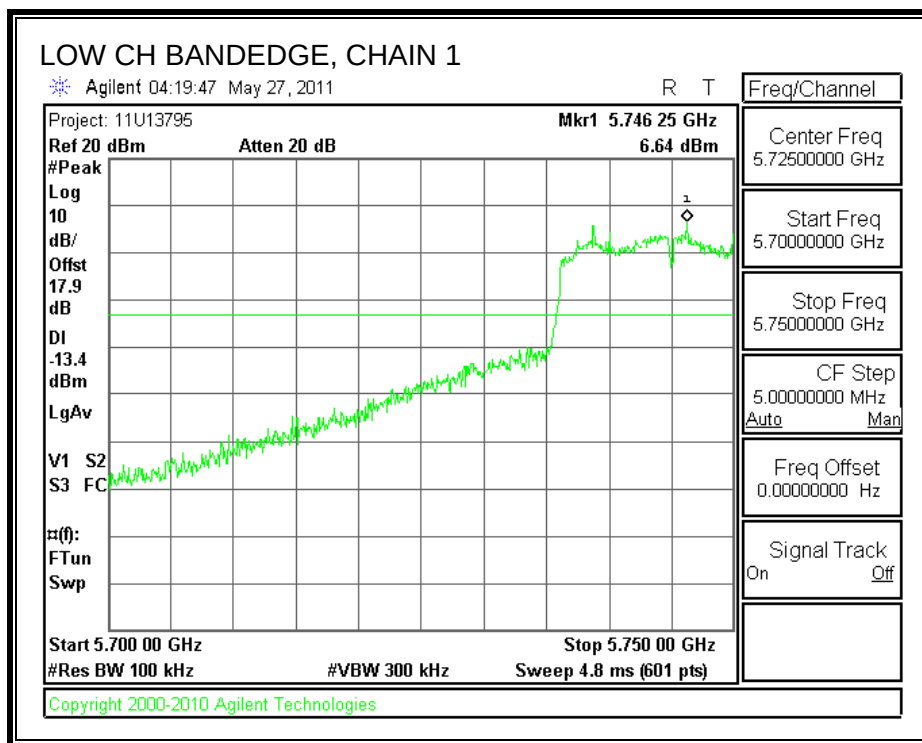
TEST PROCEDURE

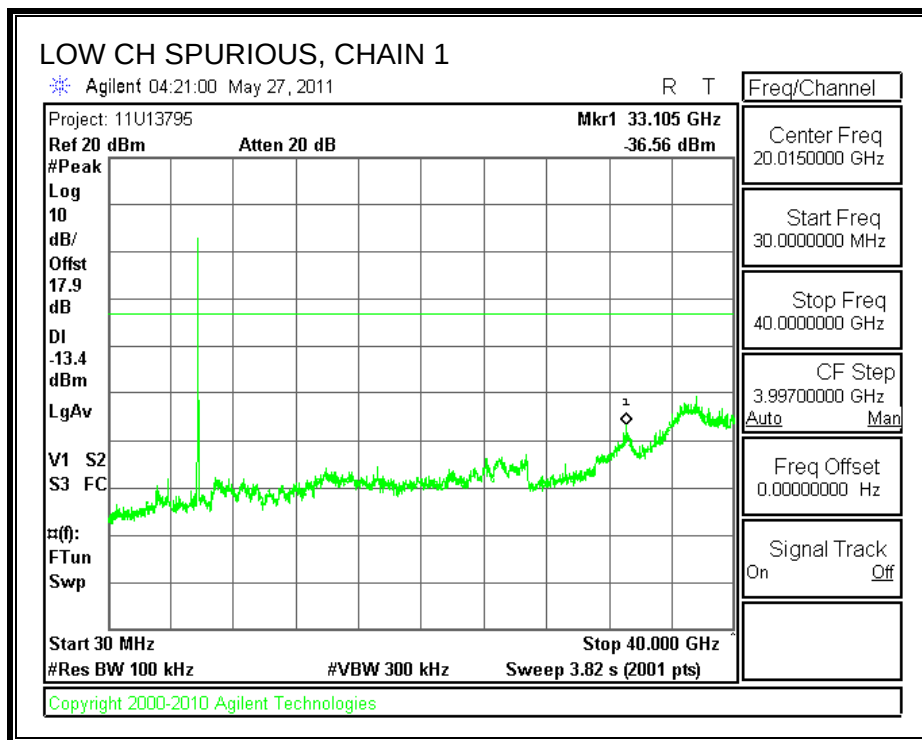
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

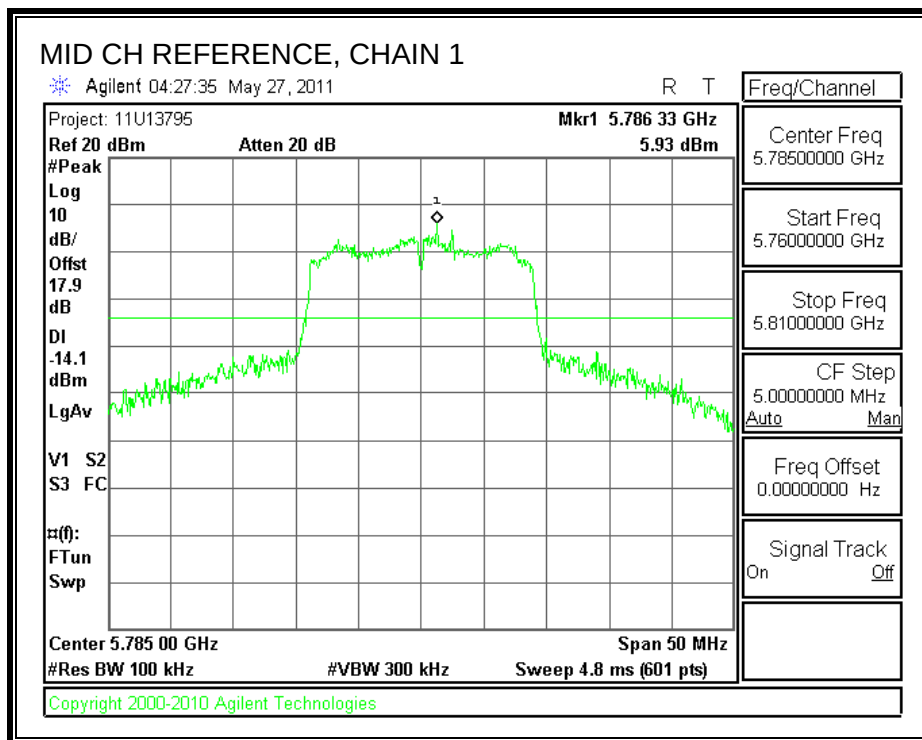
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

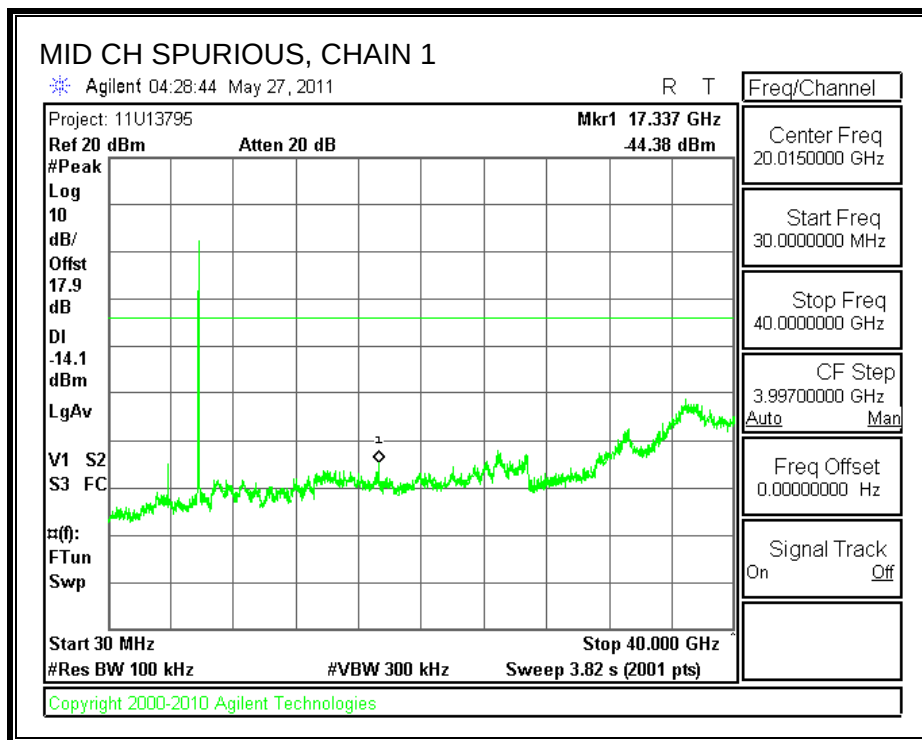
RESULTS

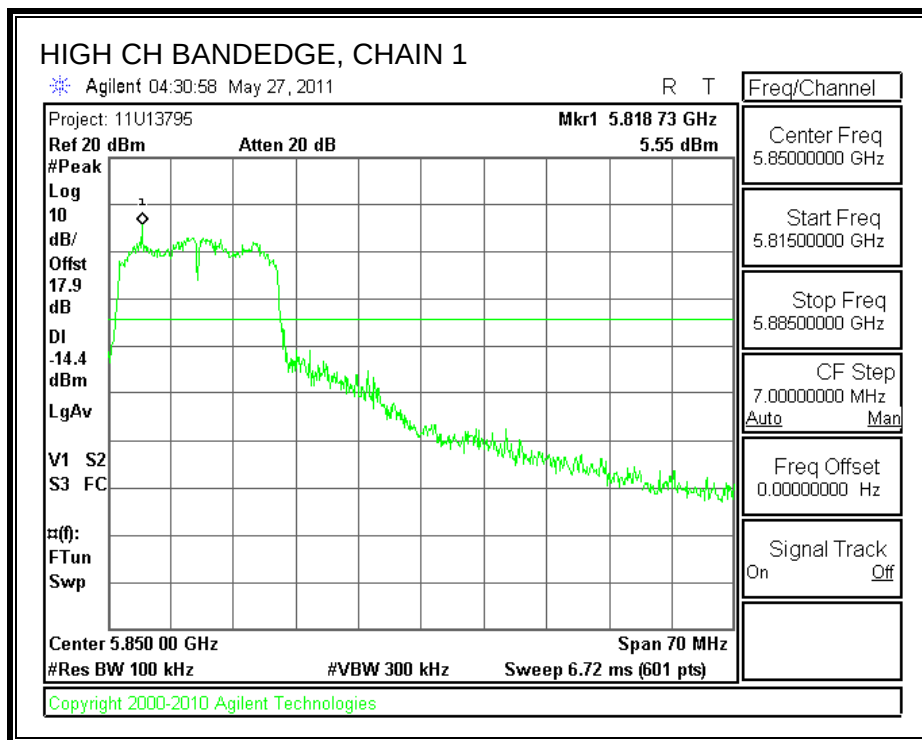
CHAIN 1 SPURIOUS EMISSIONS

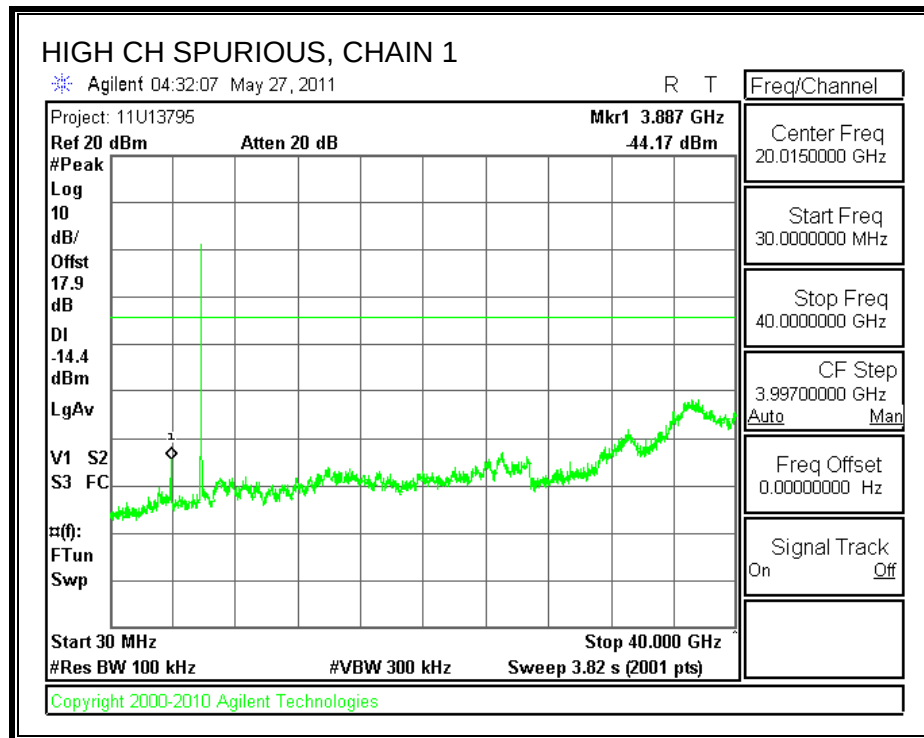




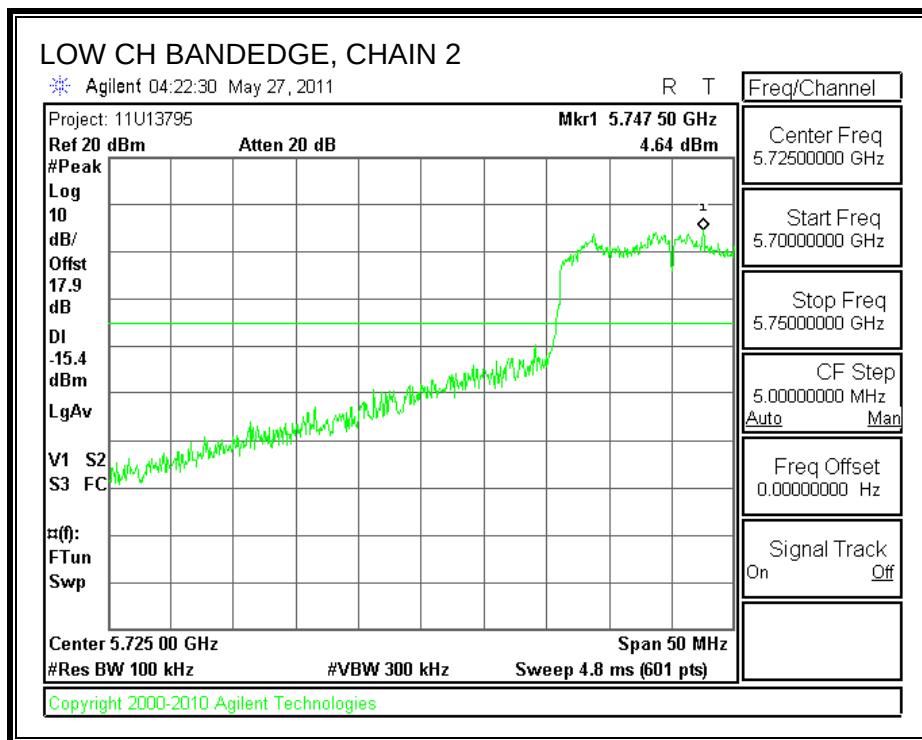


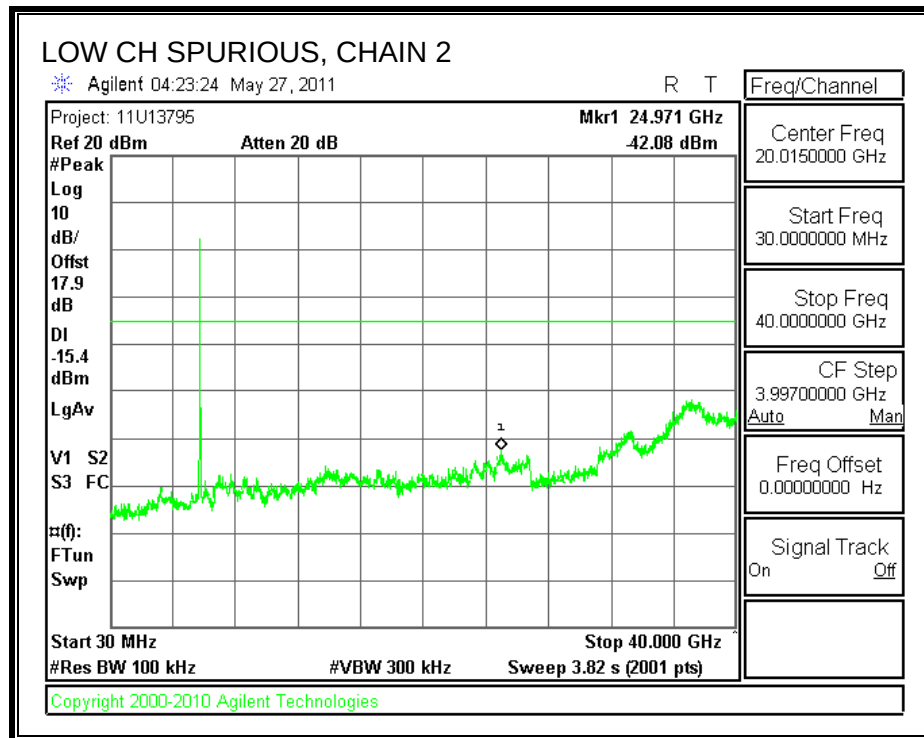


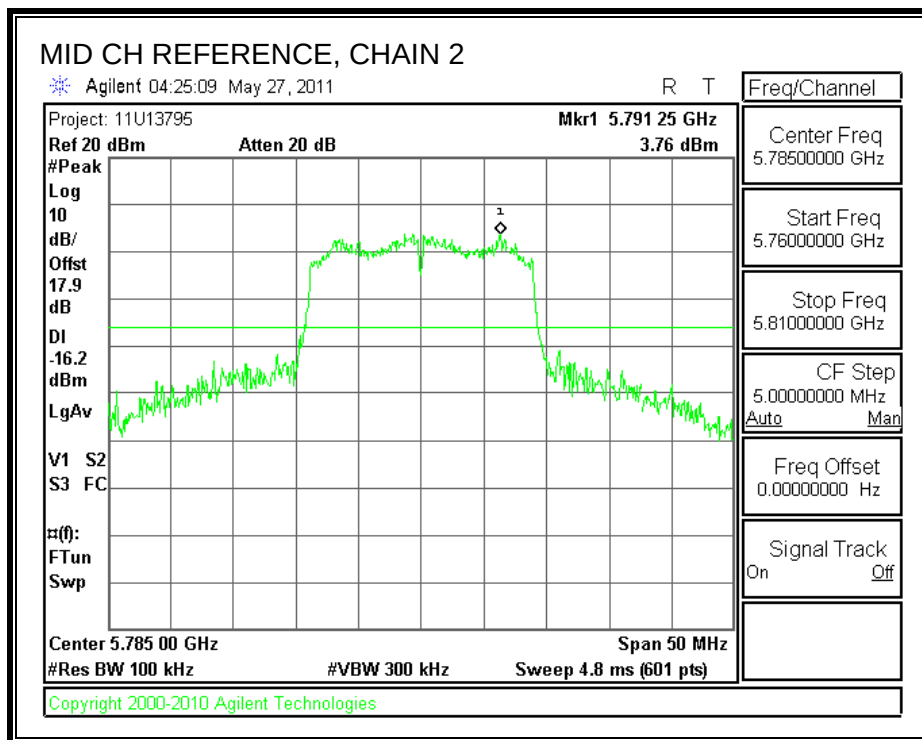


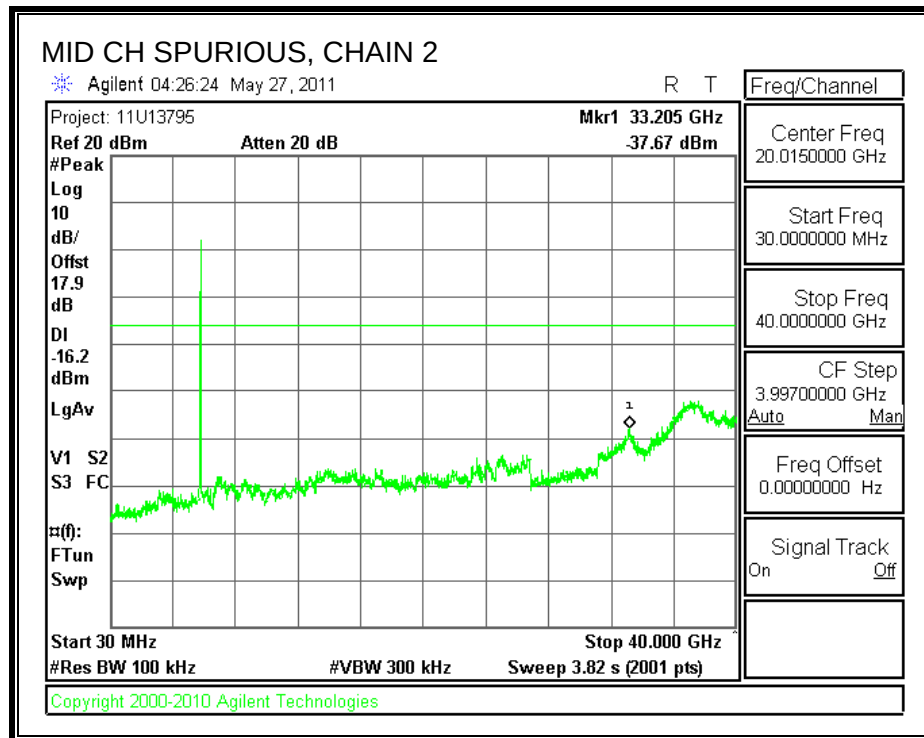


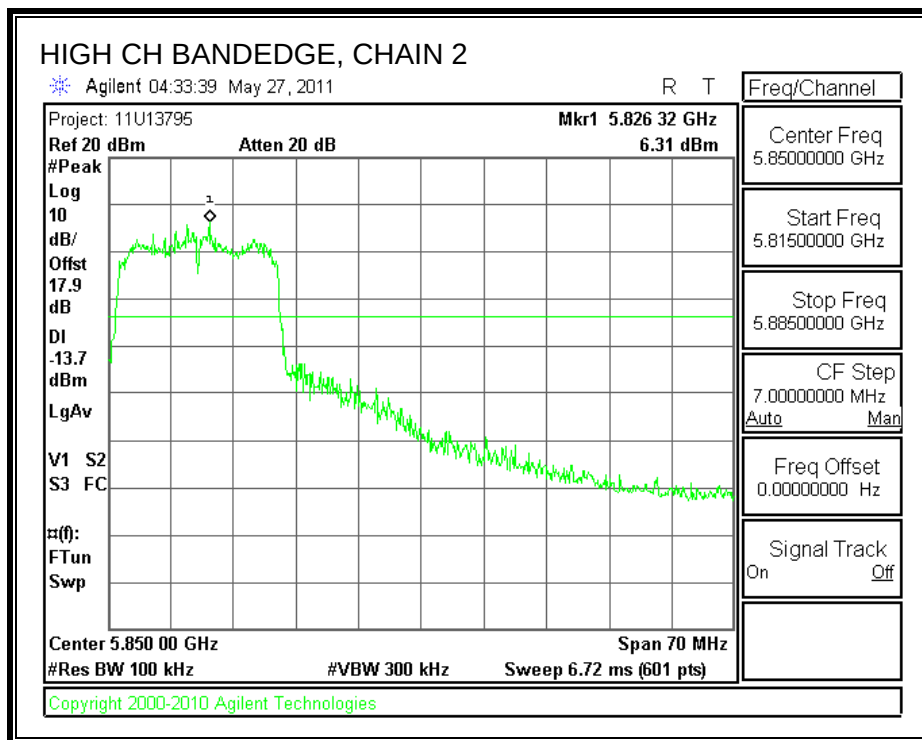
CHAIN 2 SPURIOUS EMISSIONS

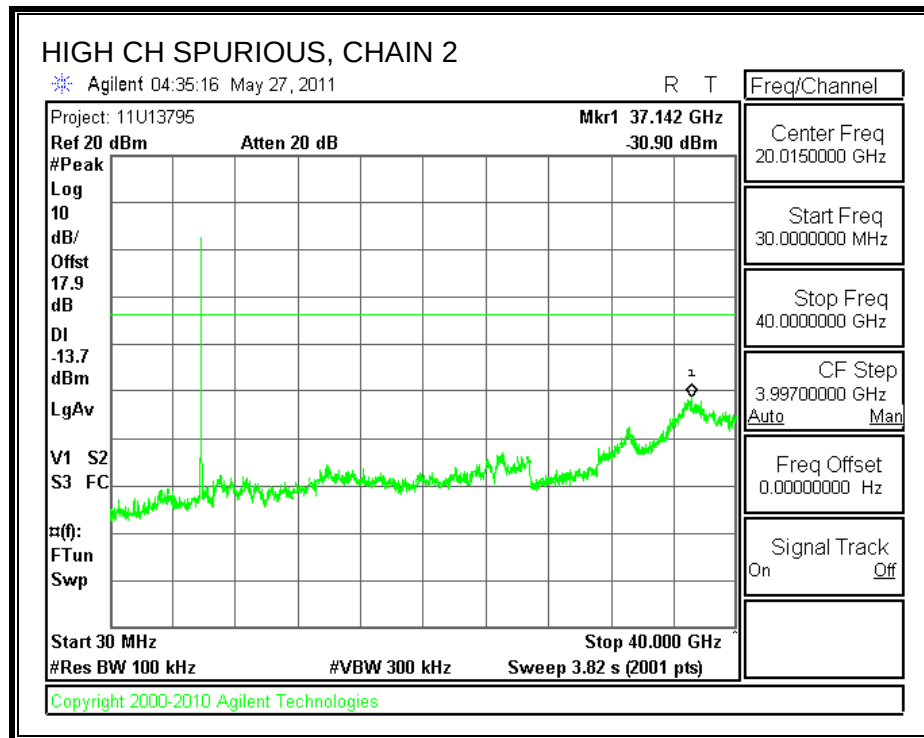












7.7. 802.11n HT40 MODE IN THE 5.8 GHz BAND

7.7.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

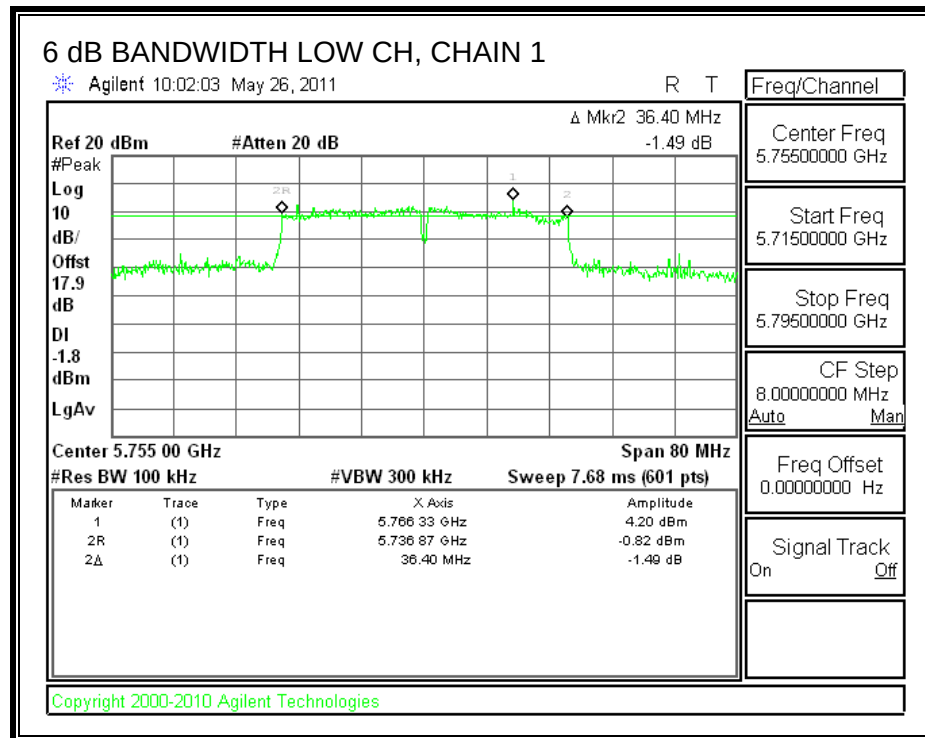
The minimum 6 dB bandwidth shall be at least 500 kHz.

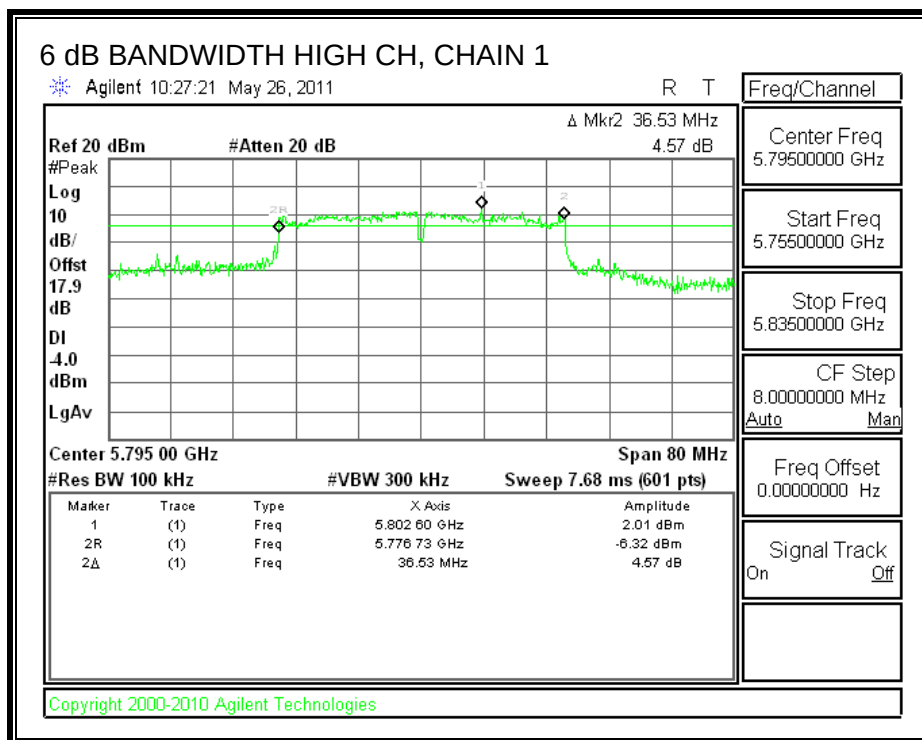
TEST PROCEDURE

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

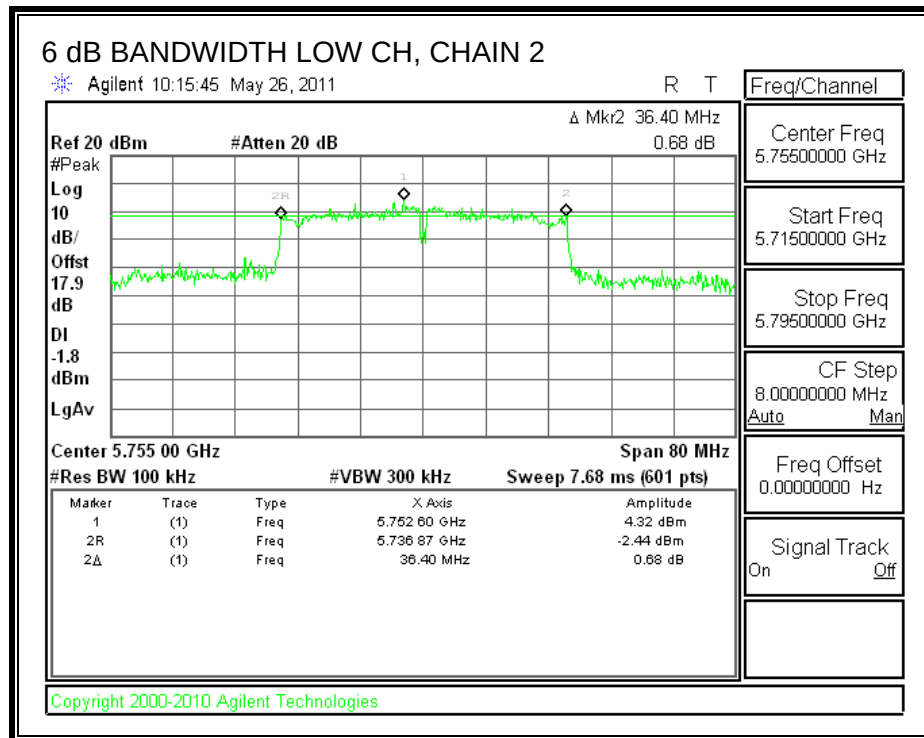
RESULTS

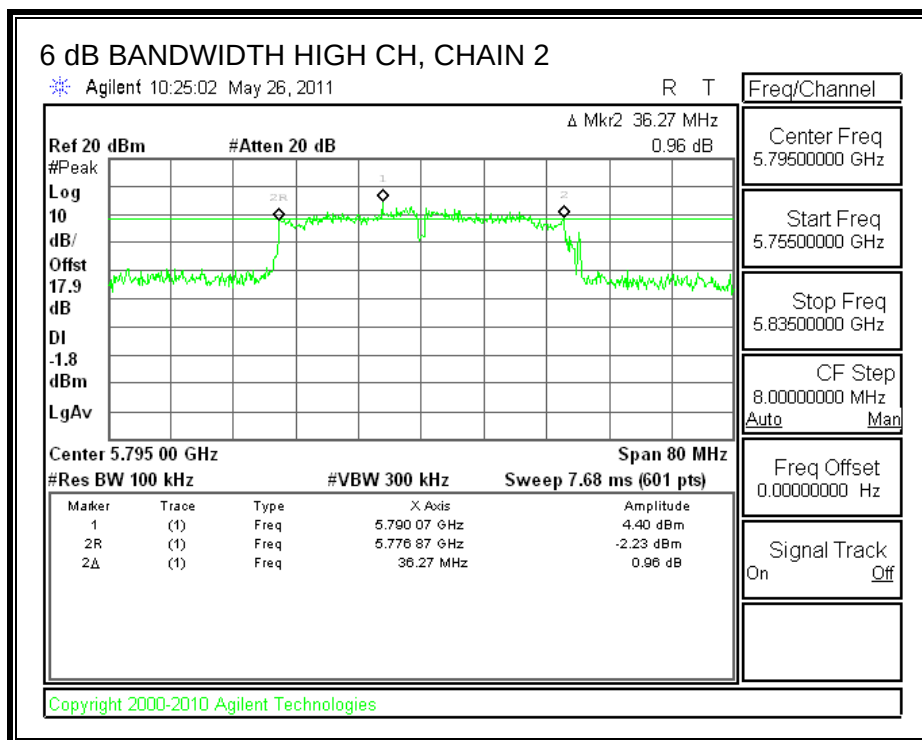
Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5755	36.4	36.4	0.5
High	5795	36.53	36.27	0.5





6 dB BANDWIDTH, CHAIN 2





7.7.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

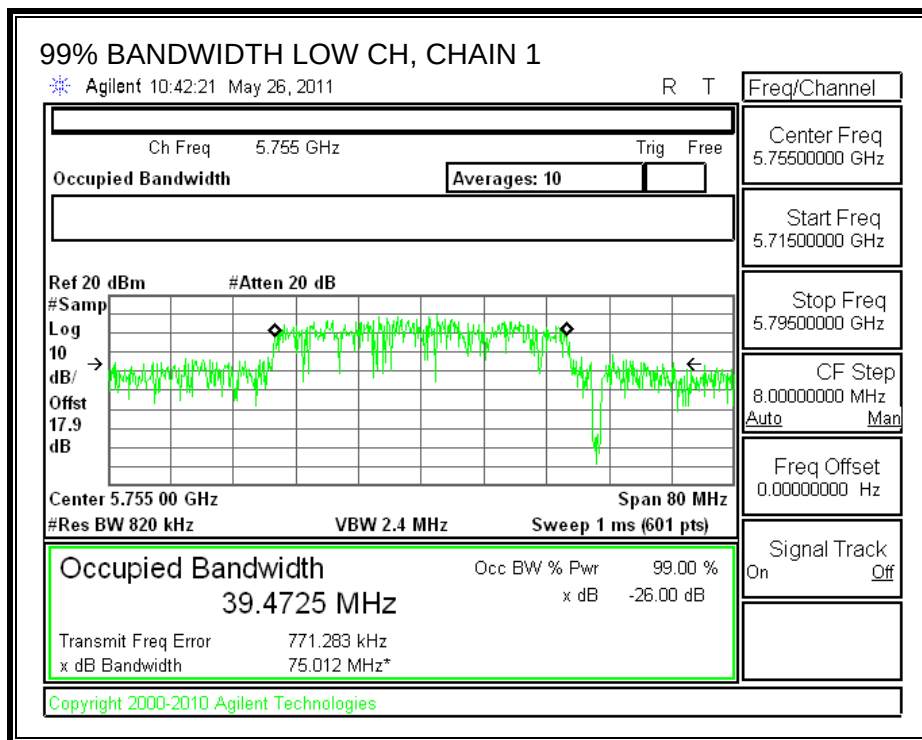
TEST PROCEDURE

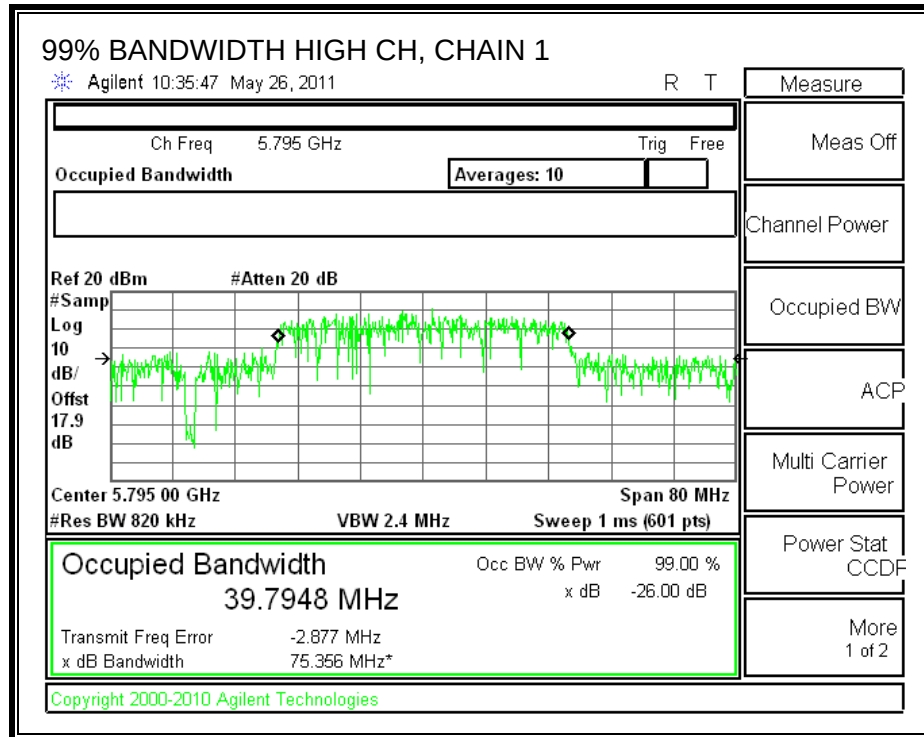
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

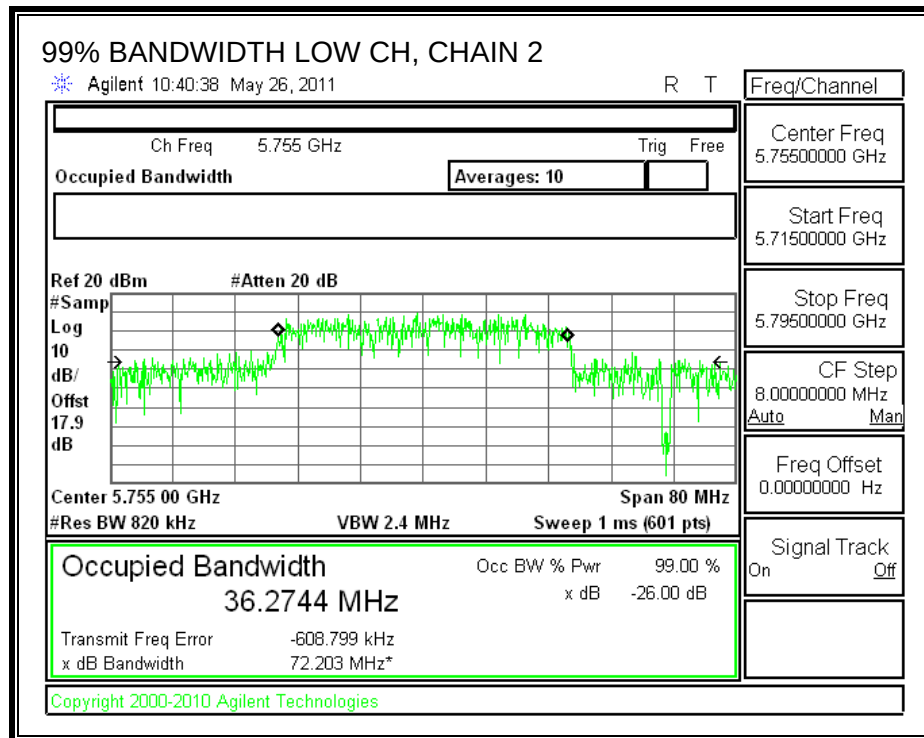
Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	5755	39.4725	36.2744
High	5795	39.7948	36.4881

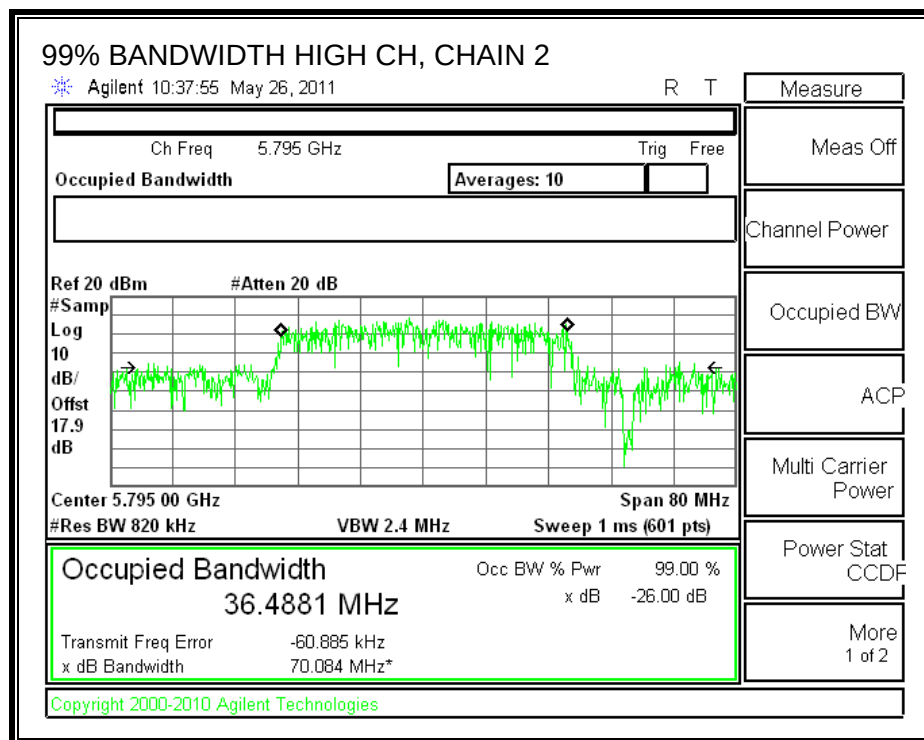
99% BANDWIDTH, CHAIN 1





99% BANDWIDTH, CHAIN 2





7.7.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

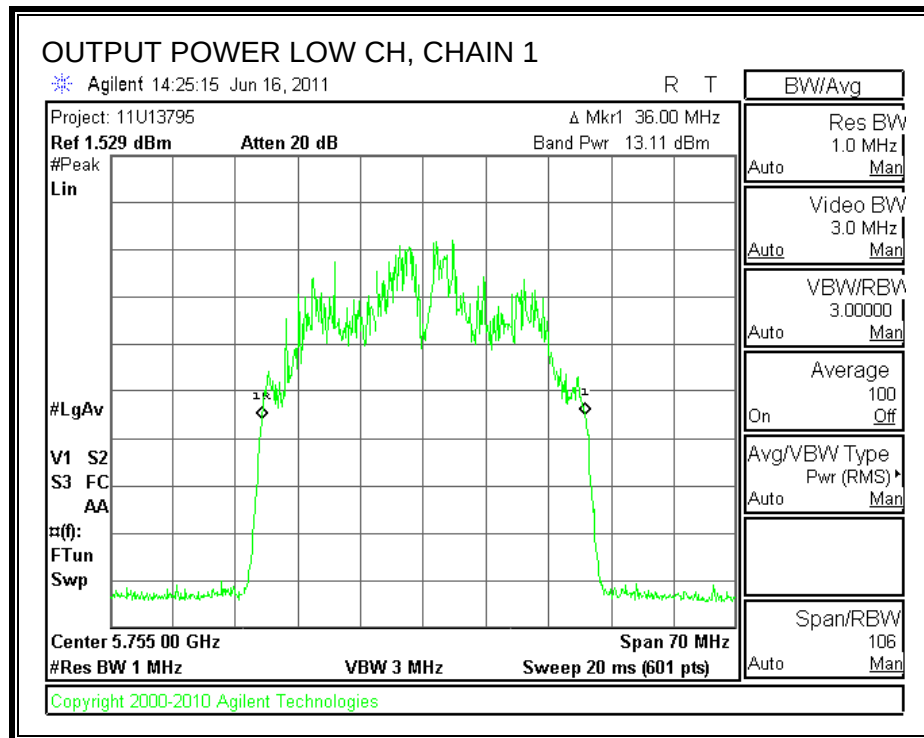
TEST PROCEDURE

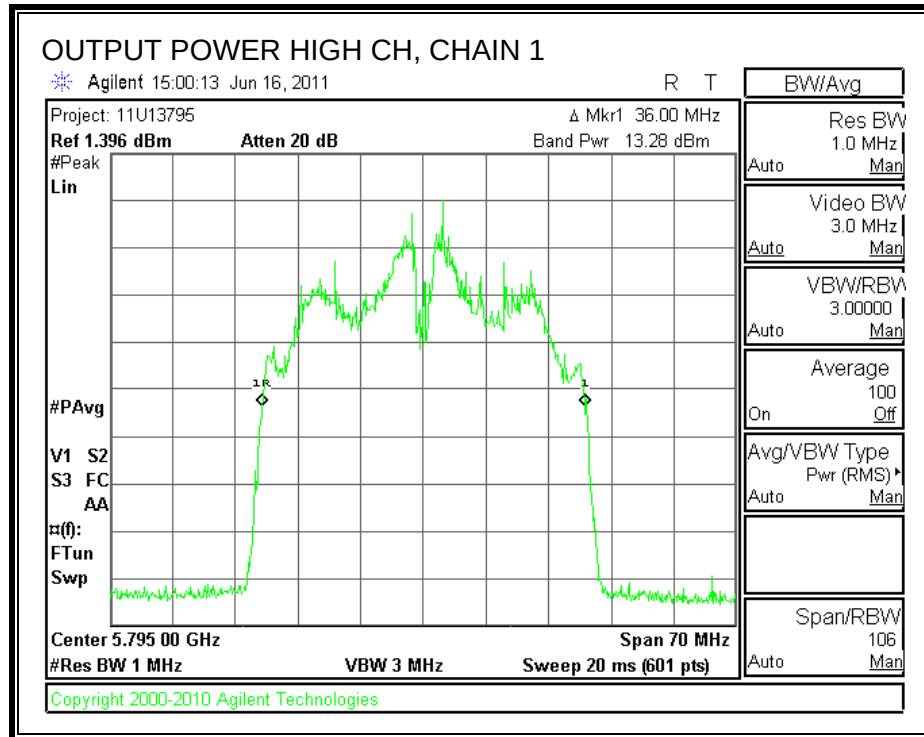
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

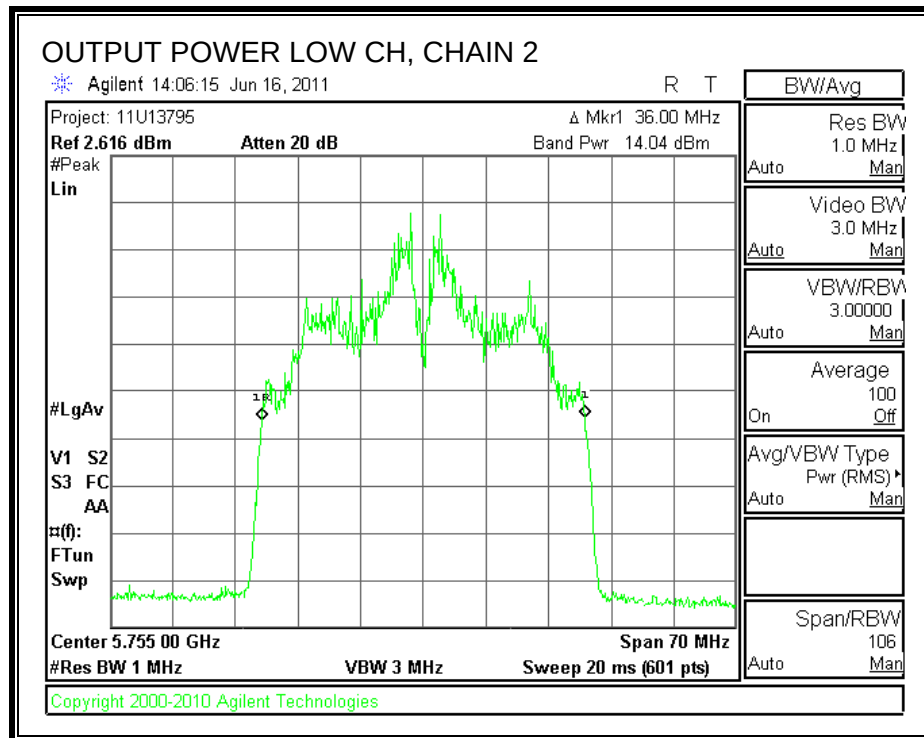
Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5755	13.11	14.04	11.40	28.01	28.79	-0.78
High	5795	13.28	14.81	11.40	28.52	28.79	-0.27

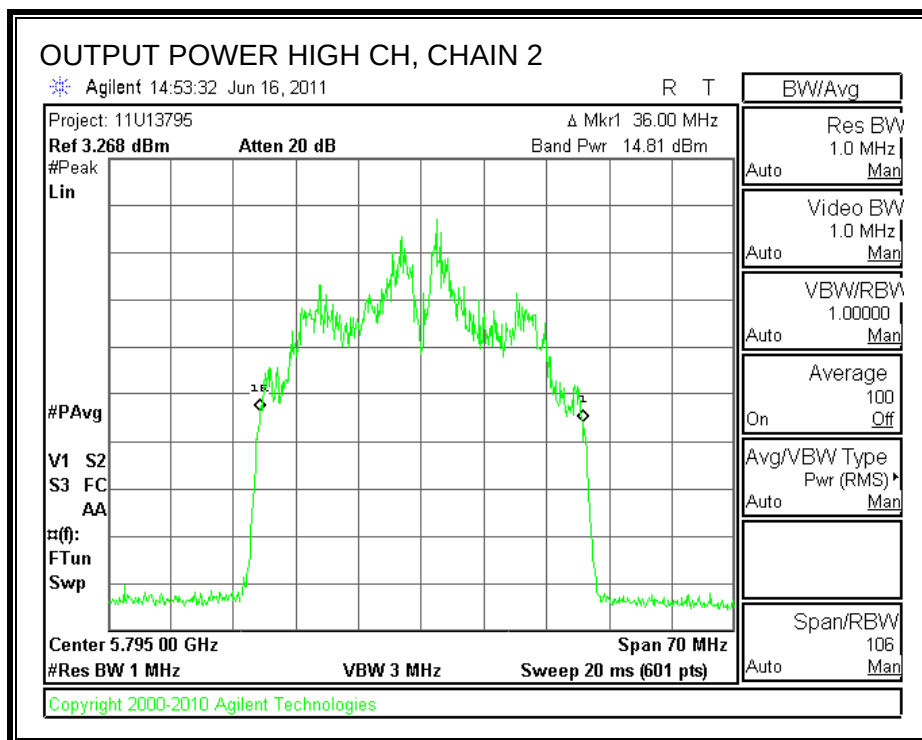
CHAIN 1 OUTPUT POWER





CHAIN 2 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 17.9 dB (including 10 dB pad and 7.9 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)	Total Power (dBm)
High	5795	16.00	16.63	19.34

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.

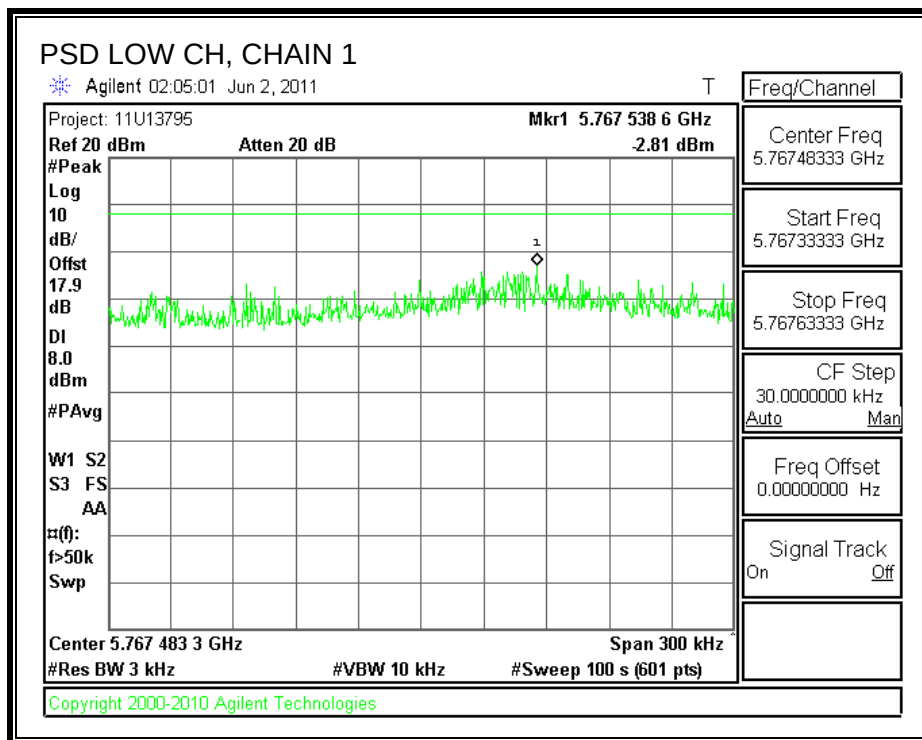
TEST PROCEDURE

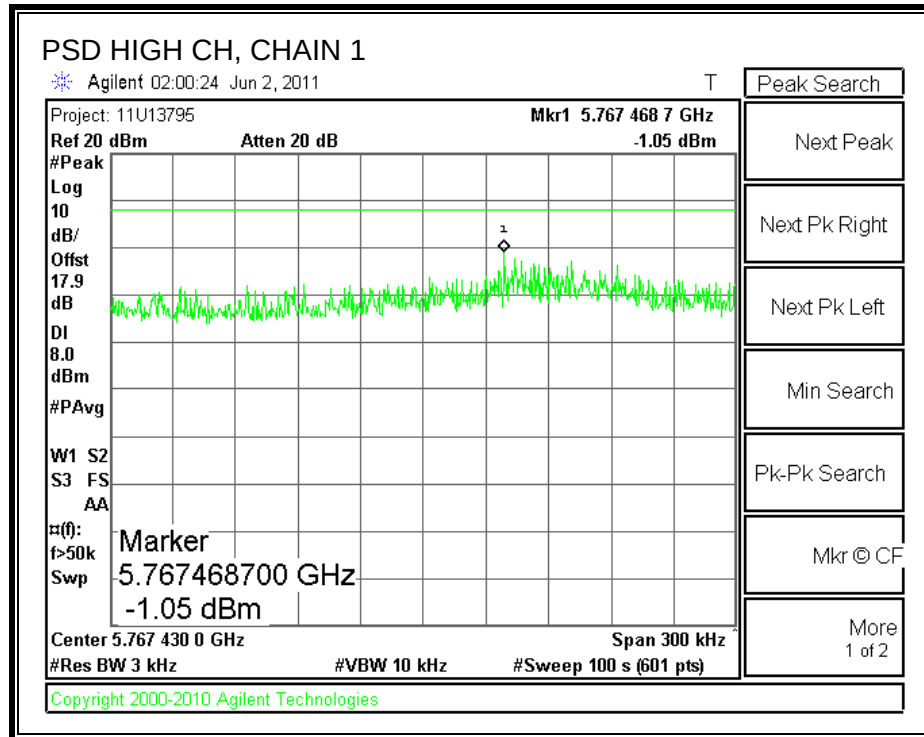
Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS:

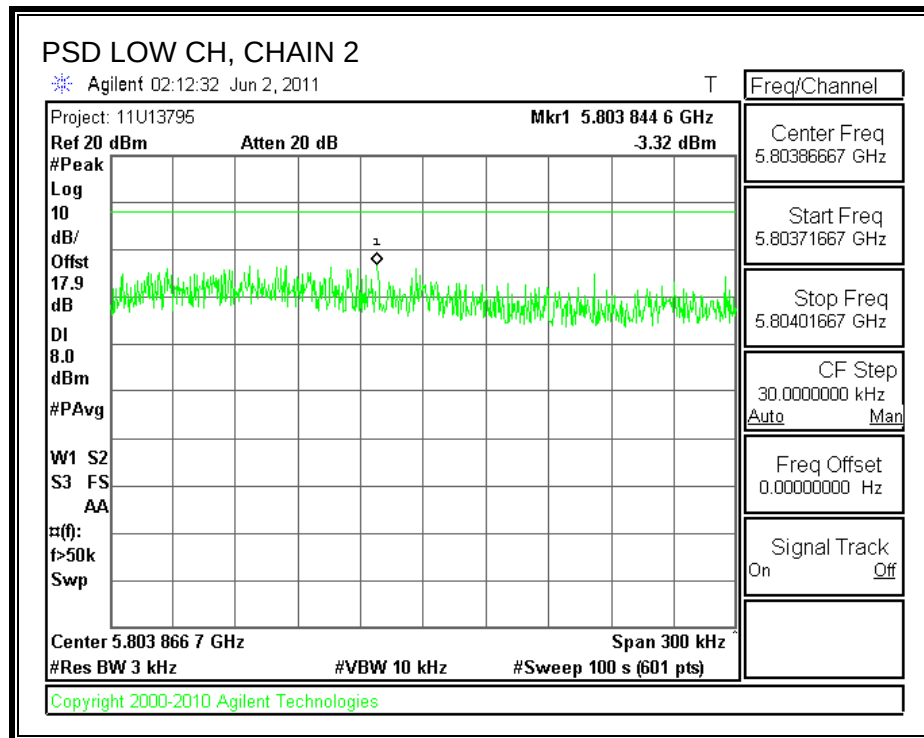
Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5755	-2.81	-1.05	1.17	8	-6.83
High	5795	-3.32	-1.56	0.66	8	-7.34

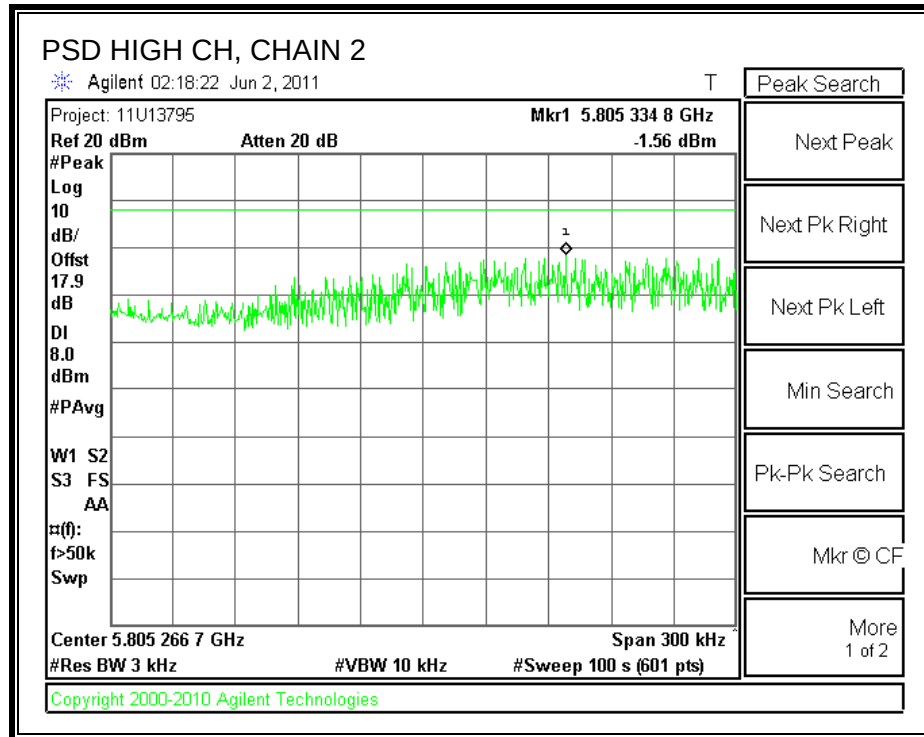
POWER SPECTRAL DENSITY, CHAIN 1





POWER SPECTRAL DENSITY, CHAIN 2





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.

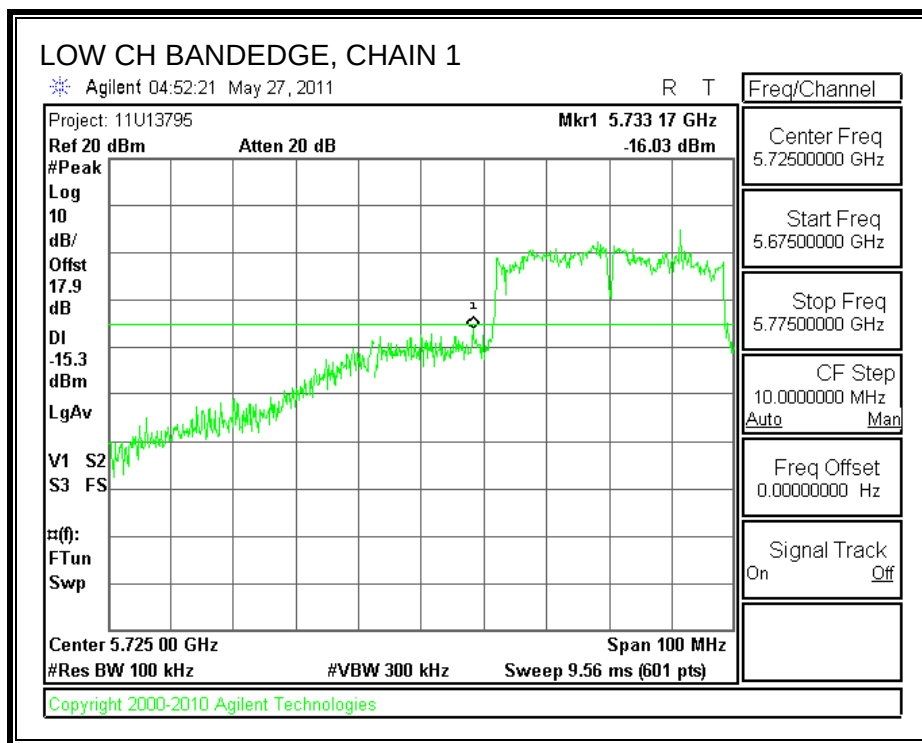
TEST PROCEDURE

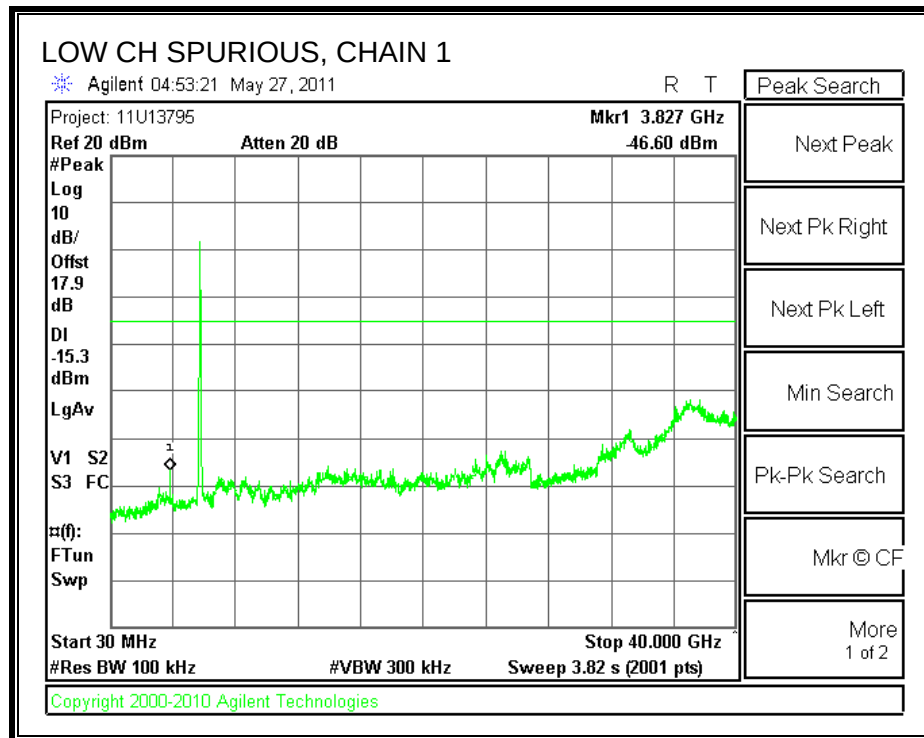
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

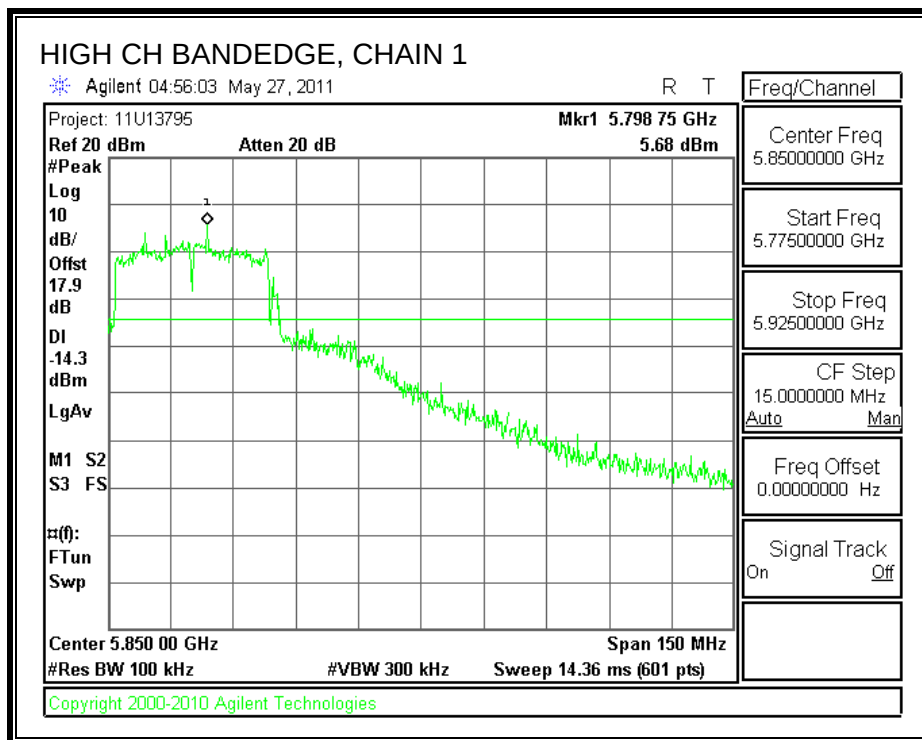
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest and highest channels.

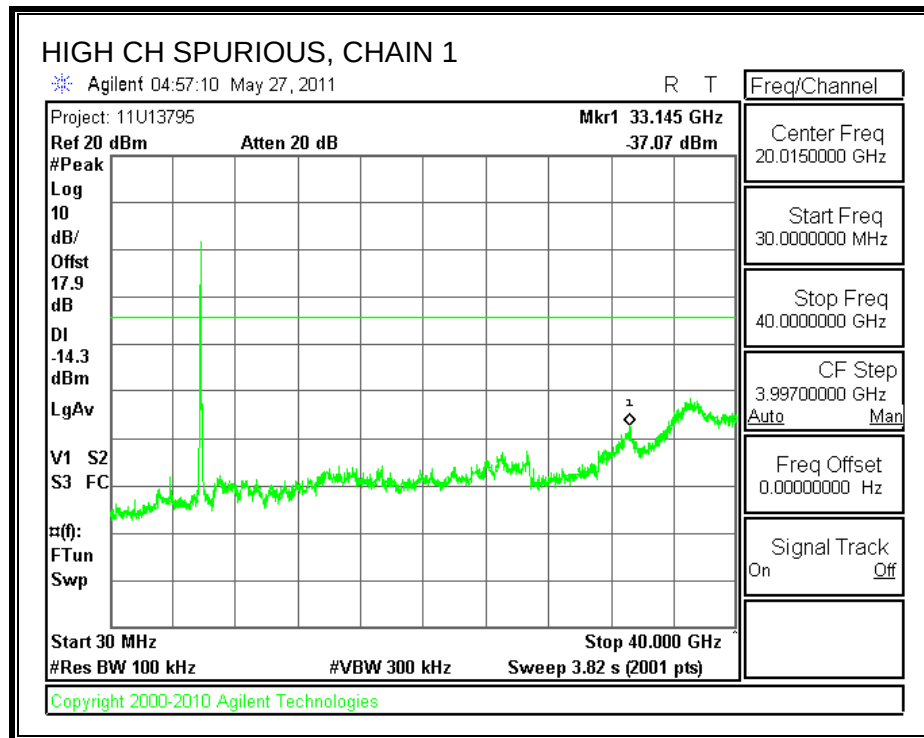
RESULTS

CHAIN 1 SPURIOUS EMISSIONS

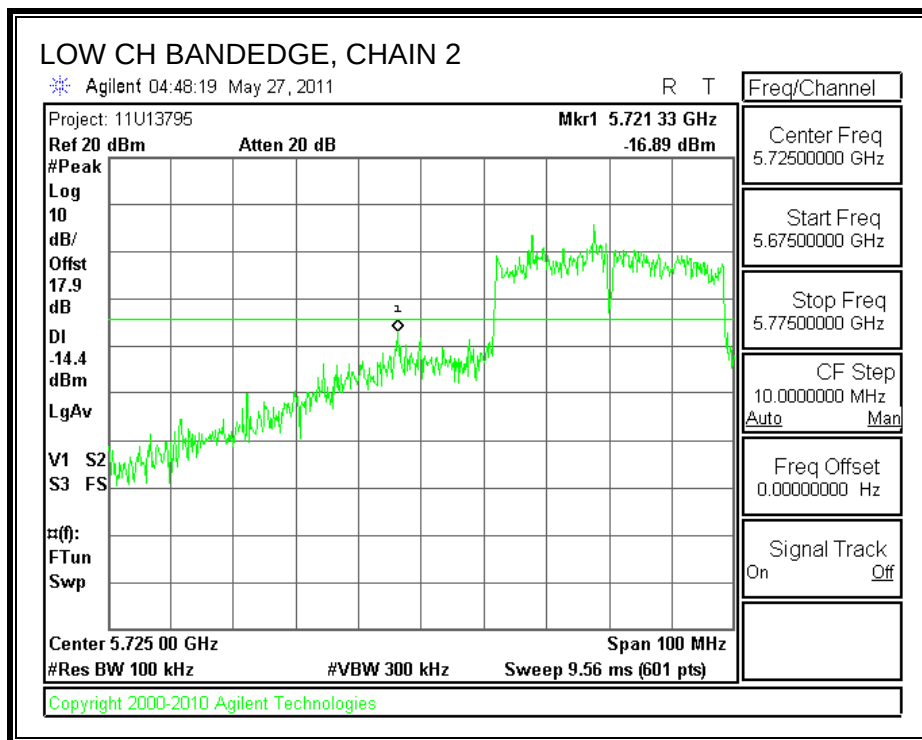


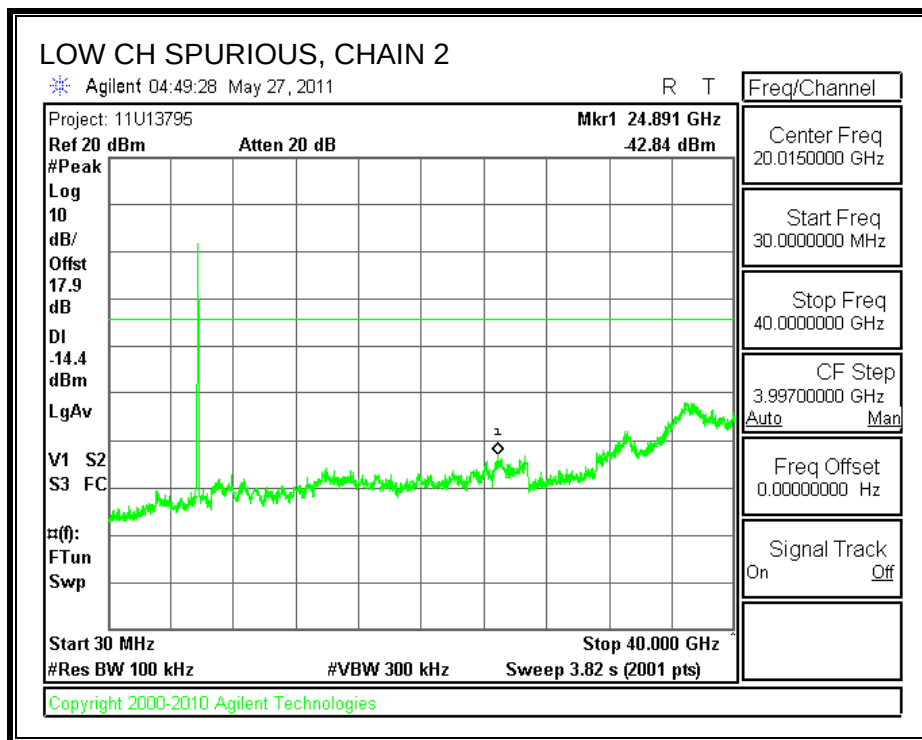


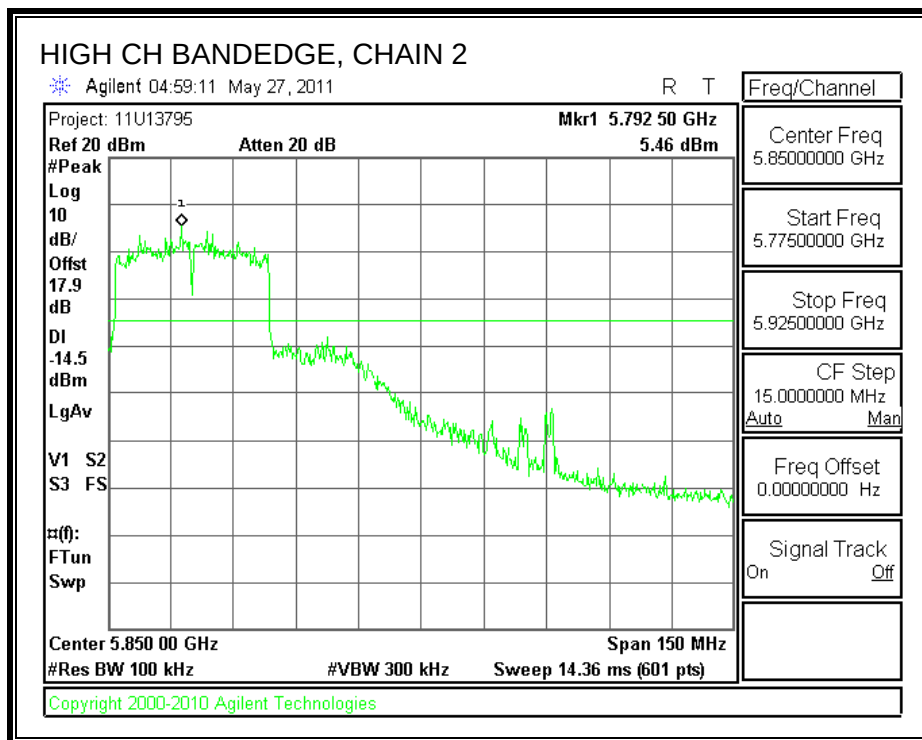


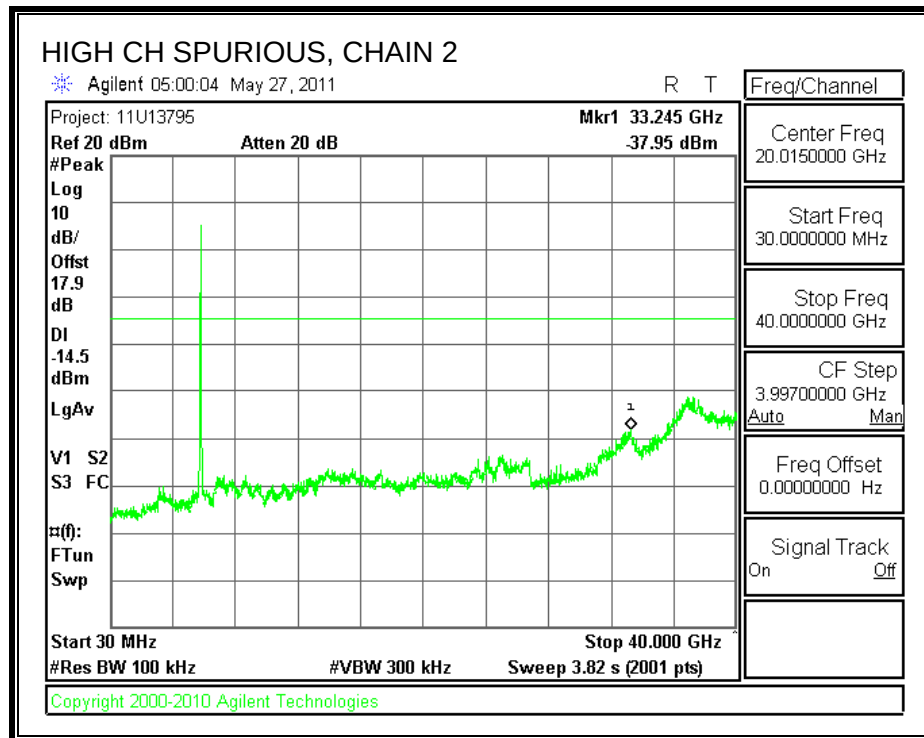


CHAIN 2 SPURIOUS EMISSIONS









8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

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

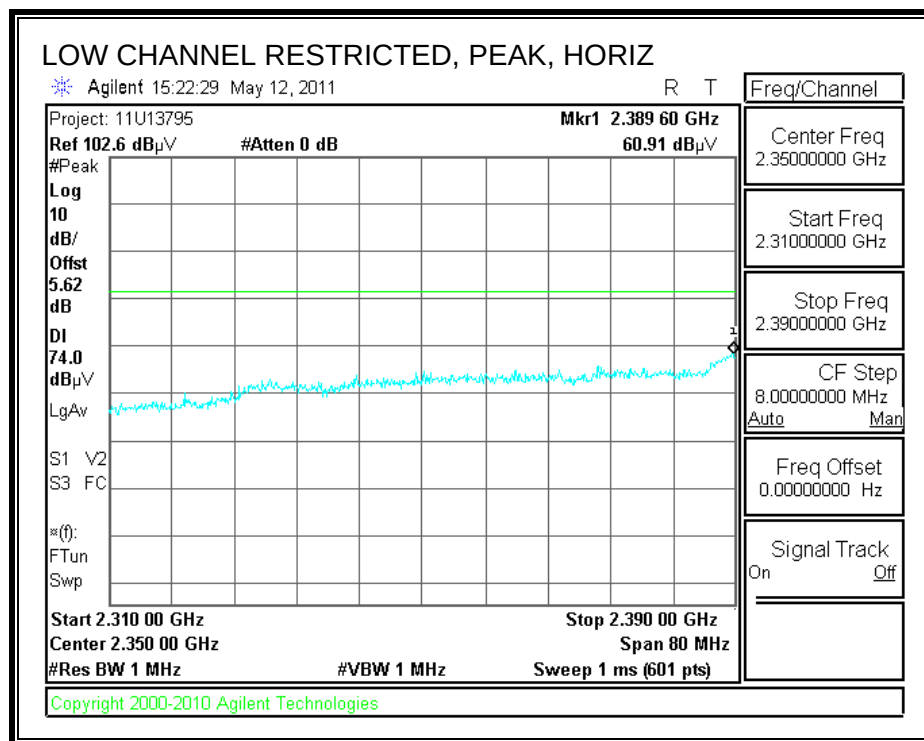
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

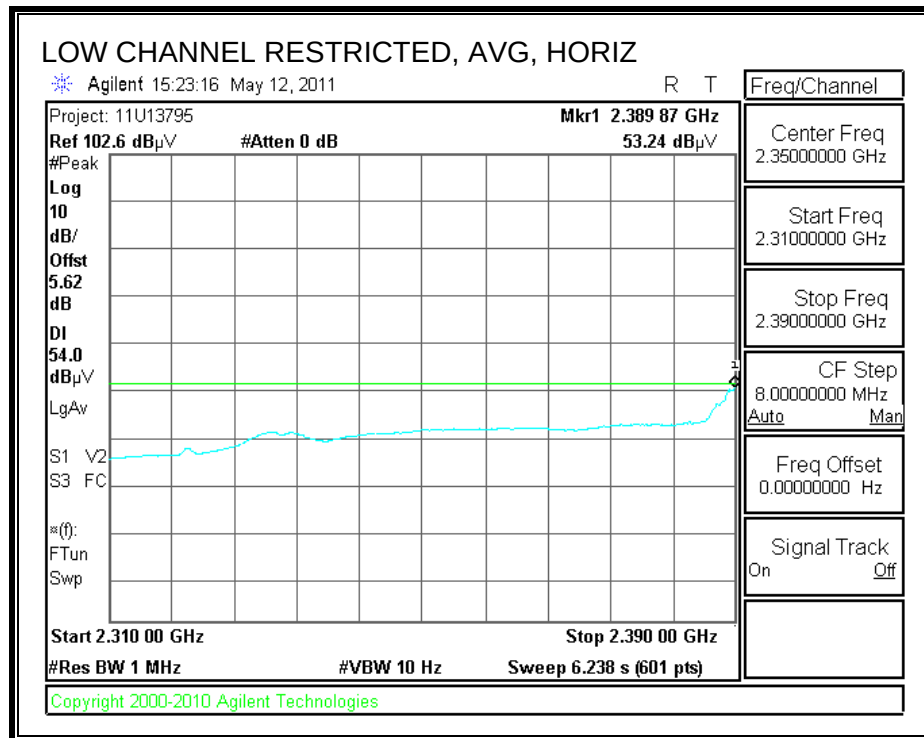
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

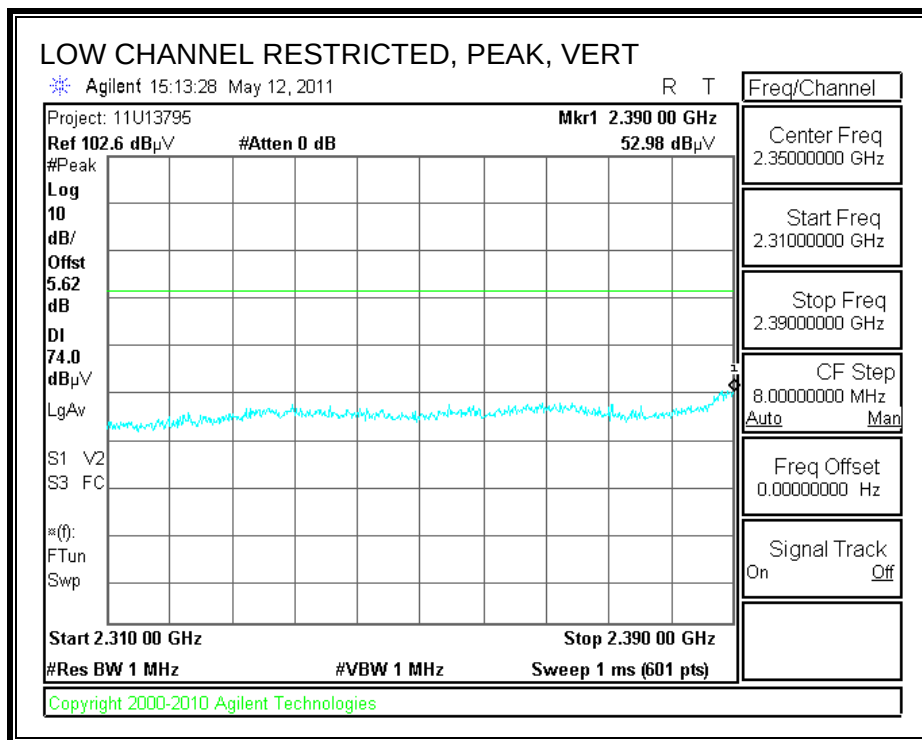
8.2.1. TRANSMITTER ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

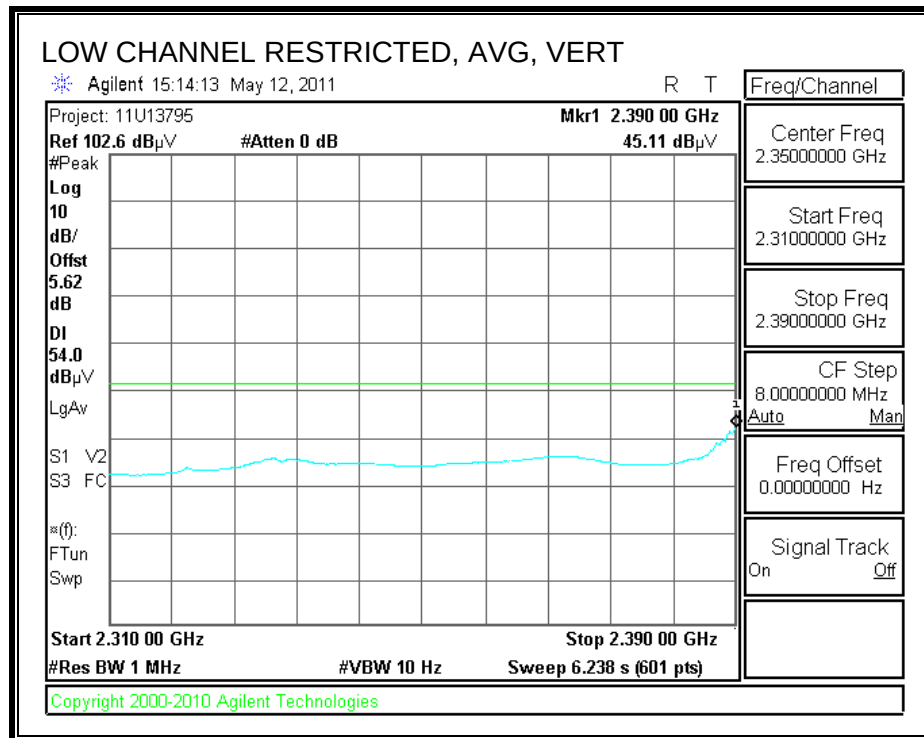
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



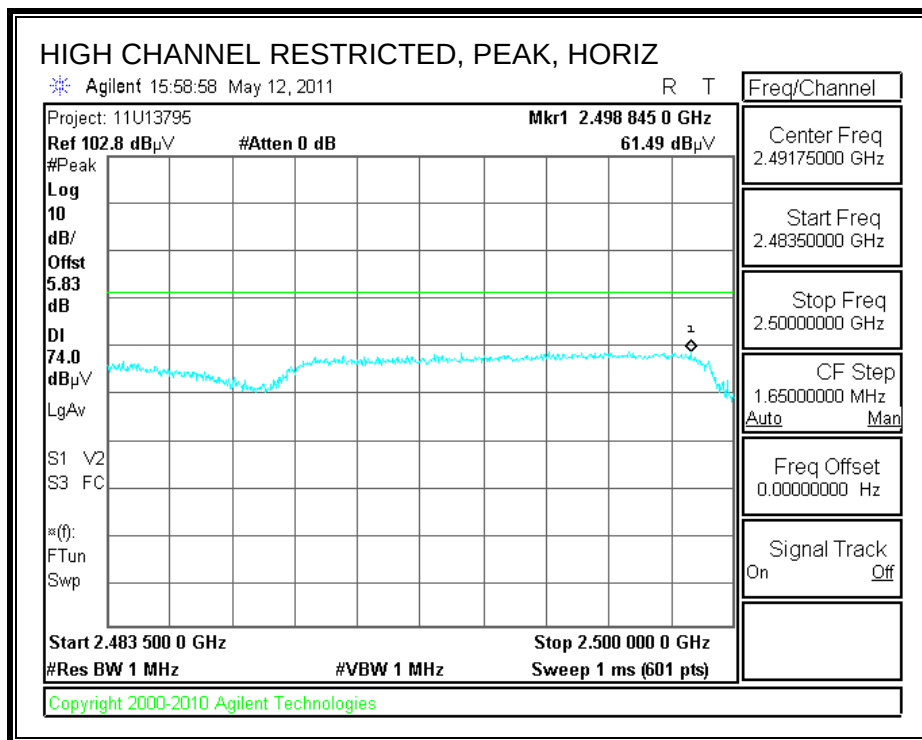


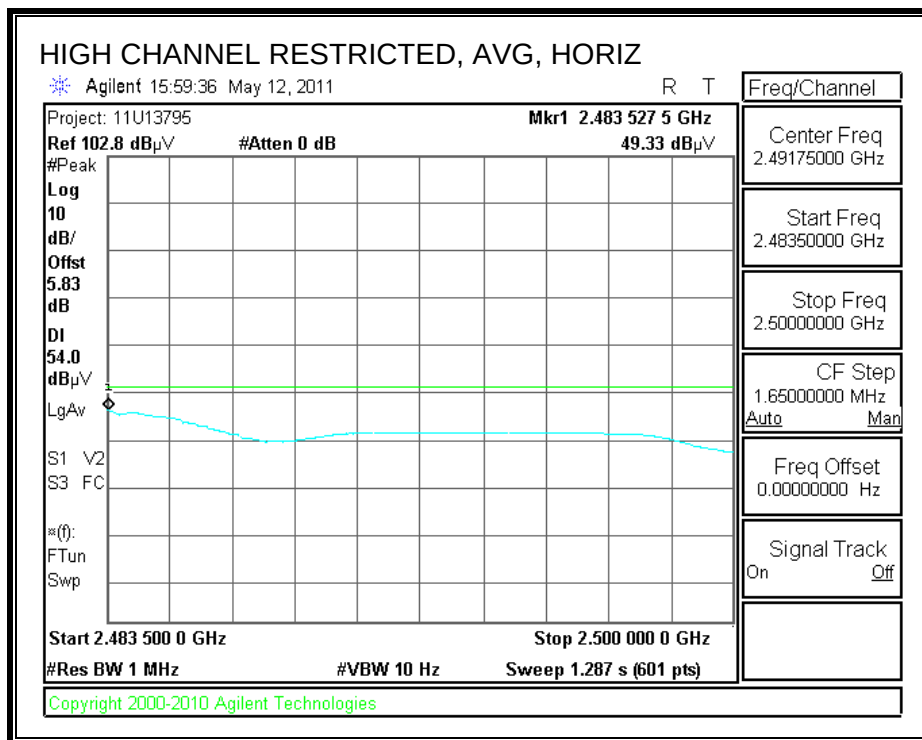
RESTRICTED BANEDGE (LOW CHANNEL, VERTICAL)



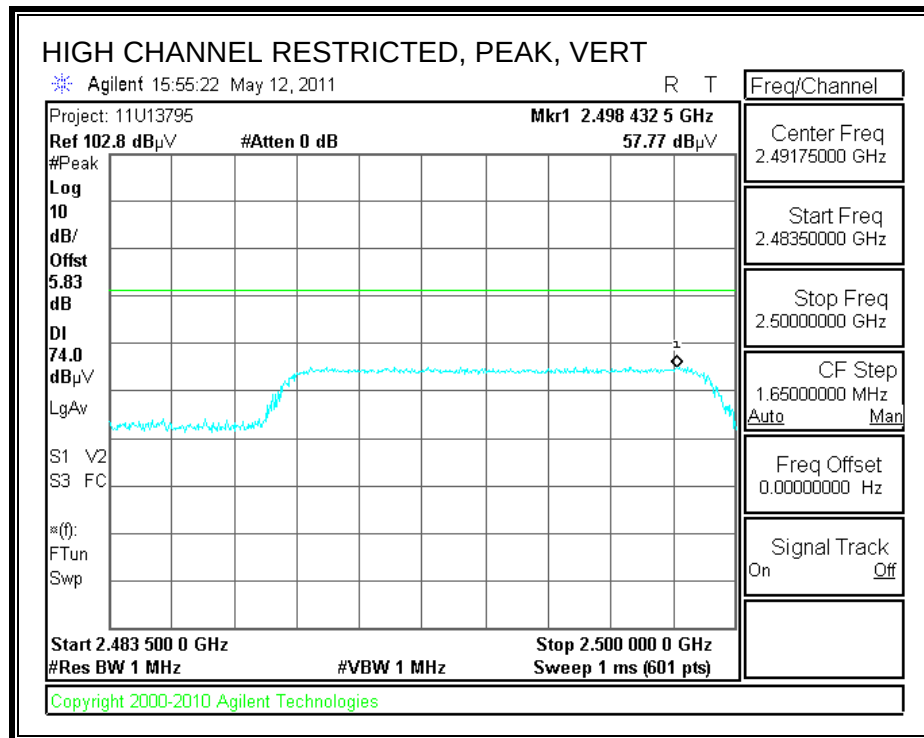


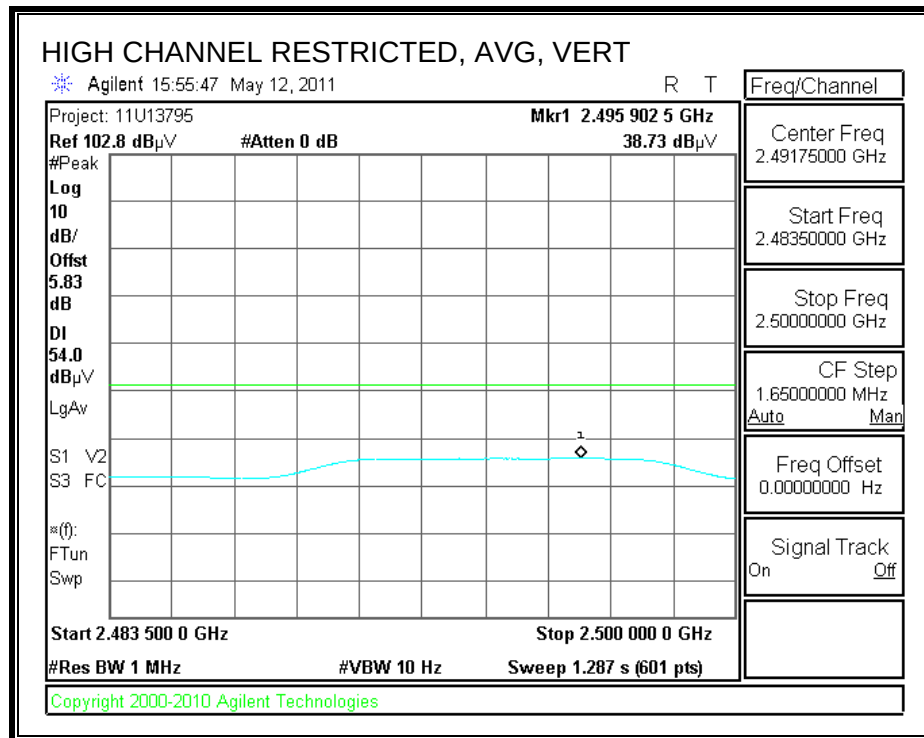
RESTRICTED BANEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/27/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: b mode, TX, EUT: P305

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

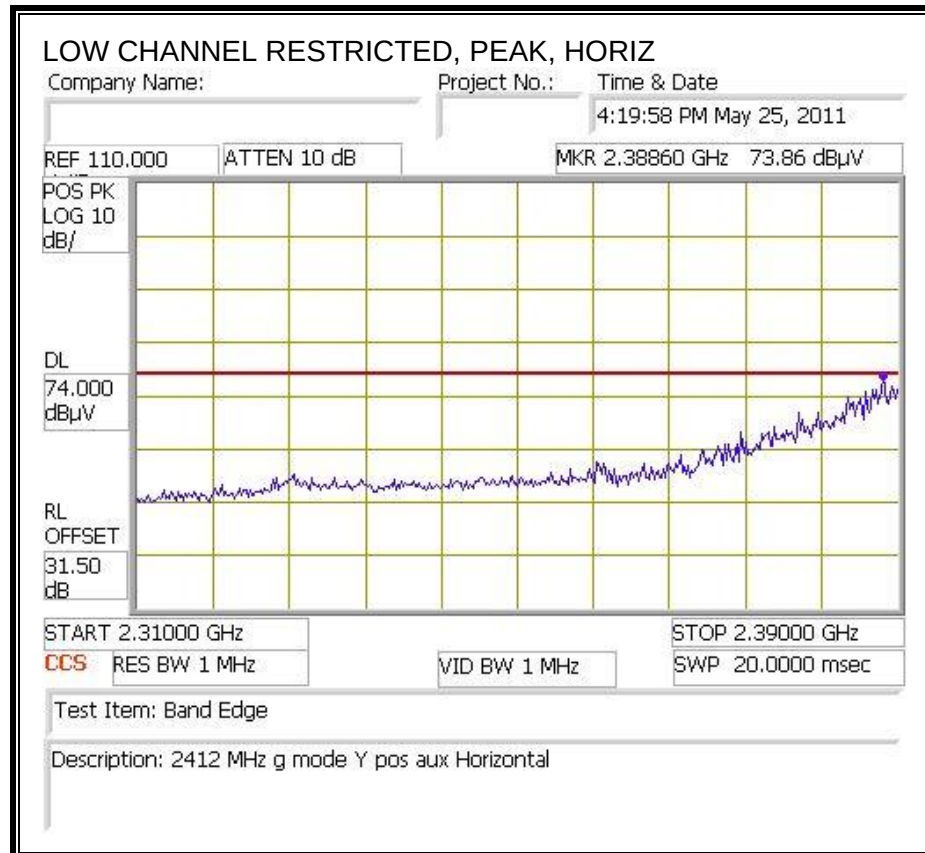
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412 MHz b mode													
4.824	3.0	48.4	32.7	5.8	-34.8	0.0	0.0	52.0	74.0	-22.0	H	P	
4.824	3.0	45.8	32.7	5.8	-34.8	0.0	0.0	49.4	54.0	-4.6	H	A	
4.824	3.0	49.2	32.7	5.8	-34.8	0.0	0.0	52.9	74.0	-21.1	V	P	
4.824	3.0	46.8	32.7	5.8	-34.8	0.0	0.0	50.4	54.0	-3.6	V	A	
2437 MHz b mode													
4.874	3.0	48.8	32.7	5.8	-34.8	0.0	0.0	52.5	74.0	-21.5	H	P	
4.874	3.0	46.3	32.7	5.8	-34.8	0.0	0.0	50.1	54.0	-3.9	H	A	
7.311	3.0	40.0	35.5	7.3	-34.1	0.0	0.0	48.6	74.0	-25.4	H	P	
7.311	3.0	33.1	35.5	7.3	-34.1	0.0	0.0	41.8	54.0	-12.2	H	A	
2437 MHz b mode													
4.874	3.0	51.7	32.7	5.8	-34.8	0.0	0.0	55.4	74.0	-18.6	V	P	
4.874	3.0	49.4	32.7	5.8	-34.8	0.0	0.0	53.1	54.0	-0.9	V	A	
7.311	3.0	39.0	35.5	7.3	-34.1	0.0	0.0	47.6	74.0	-26.4	V	P	
7.311	3.0	30.8	35.5	7.3	-34.1	0.0	0.0	39.5	54.0	-14.6	V	A	
2462 MHz b mode													
4.924	3.0	42.3	32.7	5.9	-34.8	0.0	0.0	46.1	74.0	-27.9	V	P	
4.924	3.0	38.5	32.7	5.9	-34.8	0.0	0.0	42.3	54.0	-11.7	V	A	
7.386	3.0	38.9	35.6	7.3	-34.1	0.0	0.0	47.7	74.0	-26.3	V	P	
7.386	3.0	31.4	35.6	7.3	-34.1	0.0	0.0	40.2	54.0	-13.8	V	A	
2462 MHz b mode													
4.924	3.0	47.8	32.7	5.9	-34.8	0.0	0.0	51.6	74.0	-22.4	H	P	
4.924	3.0	45.1	32.7	5.9	-34.8	0.0	0.0	48.9	54.0	-5.1	H	A	
7.386	3.0	38.6	35.6	7.3	-34.1	0.0	0.0	47.4	74.0	-26.6	H	P	
7.386	3.0	30.4	35.6	7.3	-34.1	0.0	0.0	39.1	54.0	-14.9	H	A	

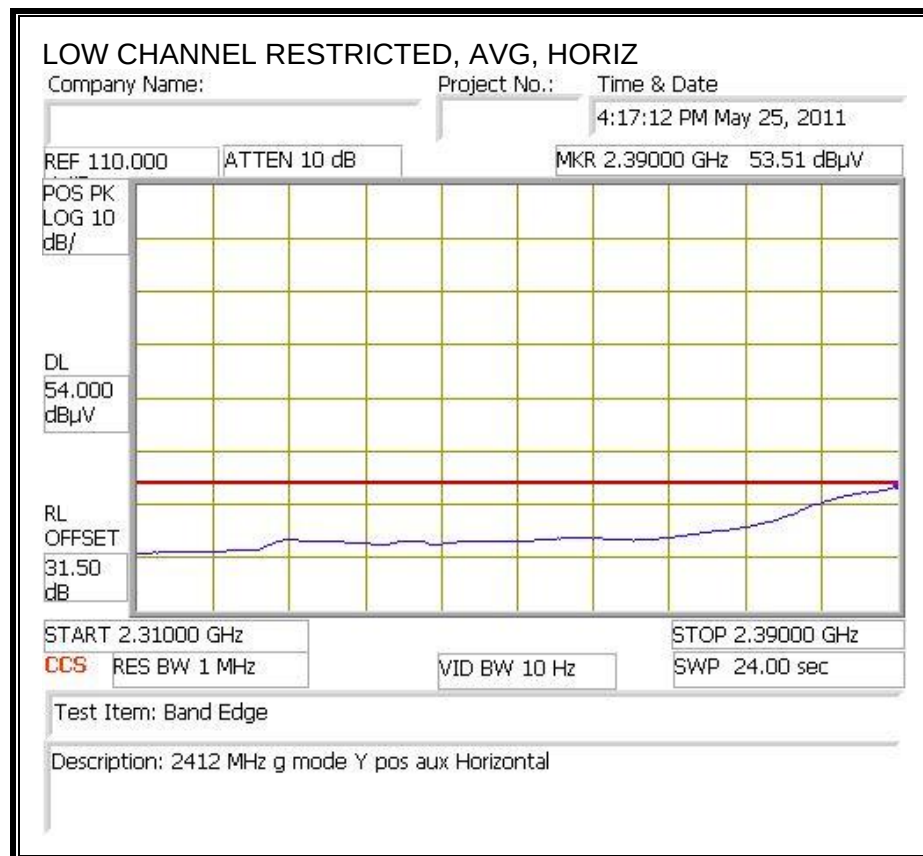
Rev. 4.1.2.7

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

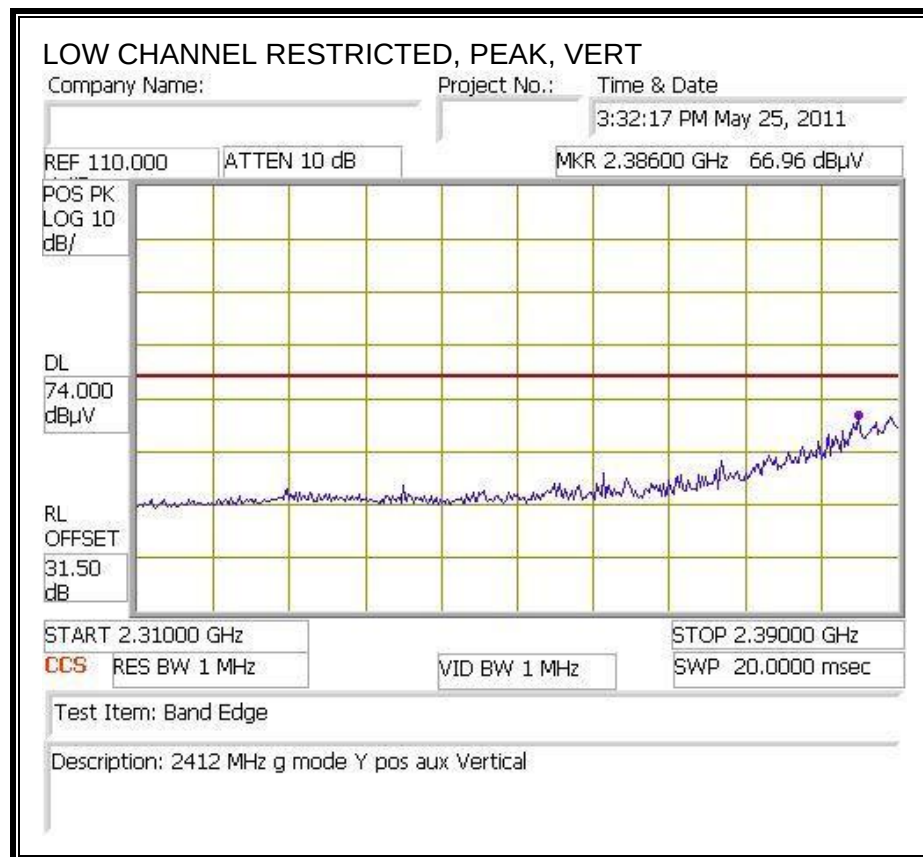
8.2.2. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

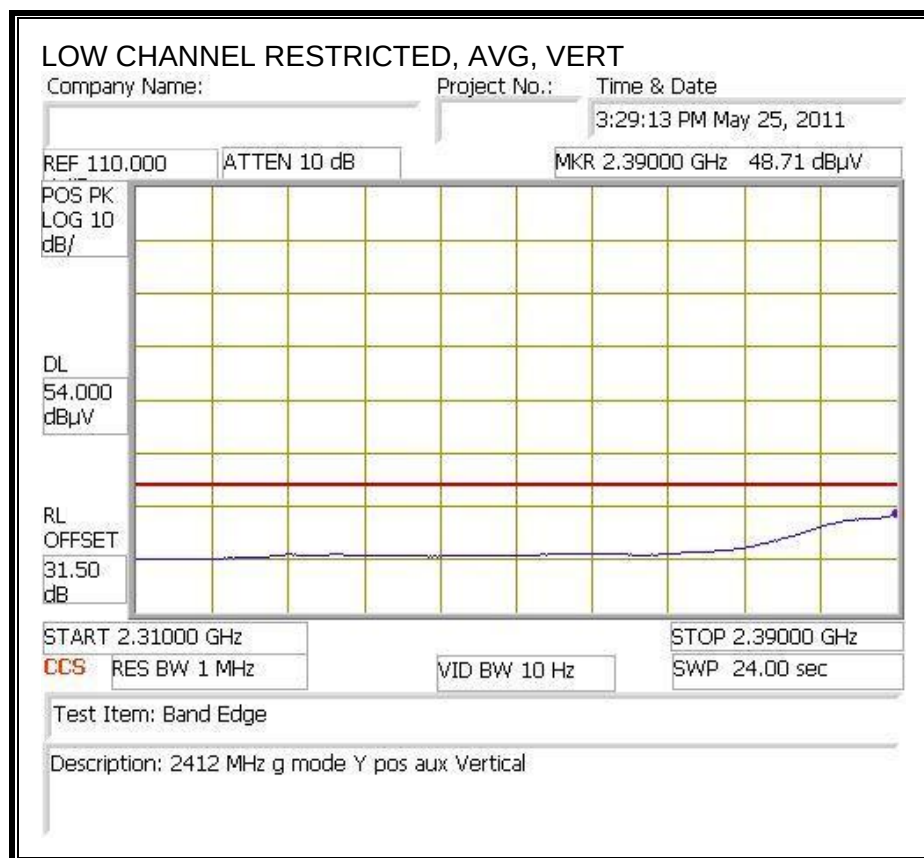
RESTRICTED BANEDGE (LOW CHANNEL, HORIZONTAL)



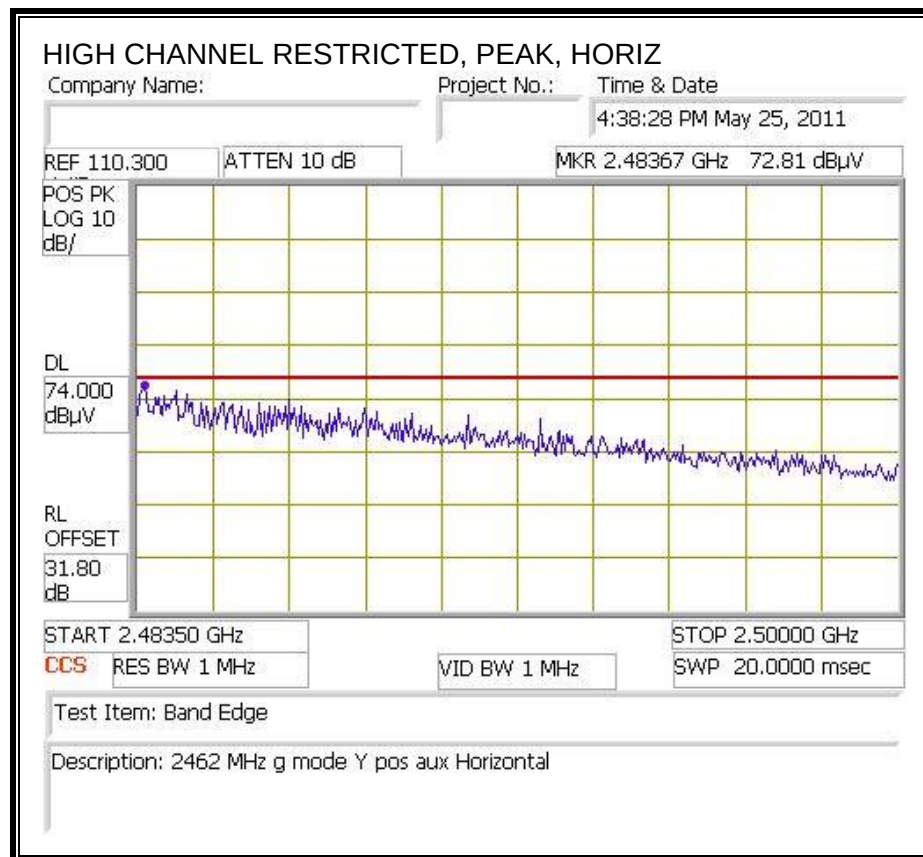


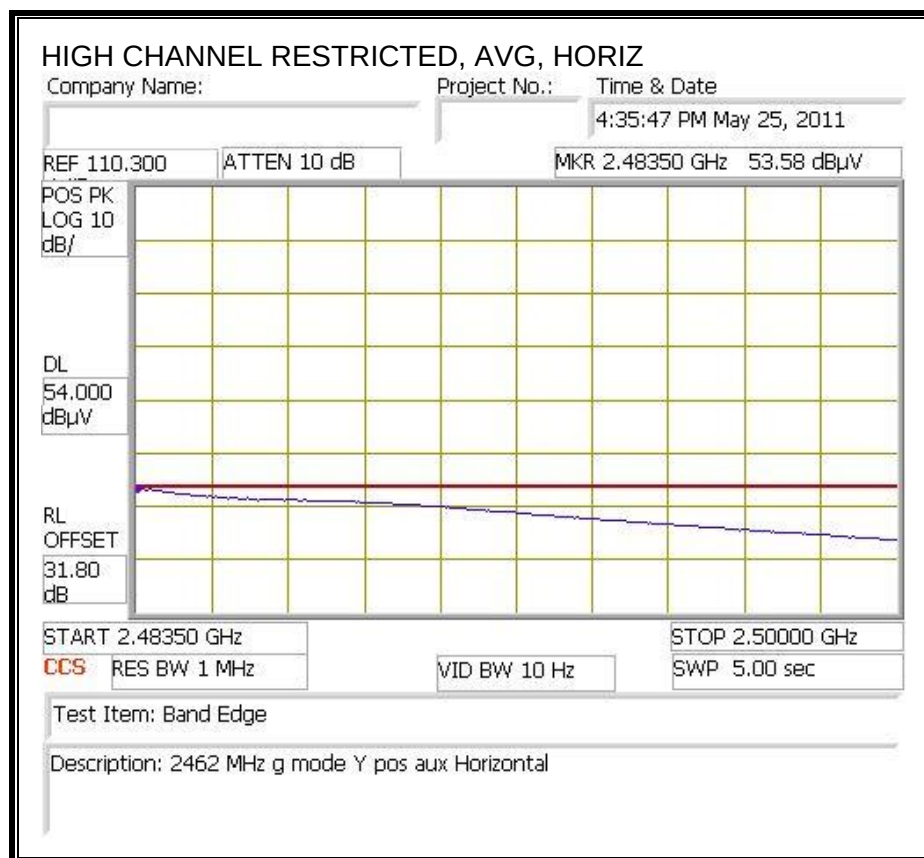
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



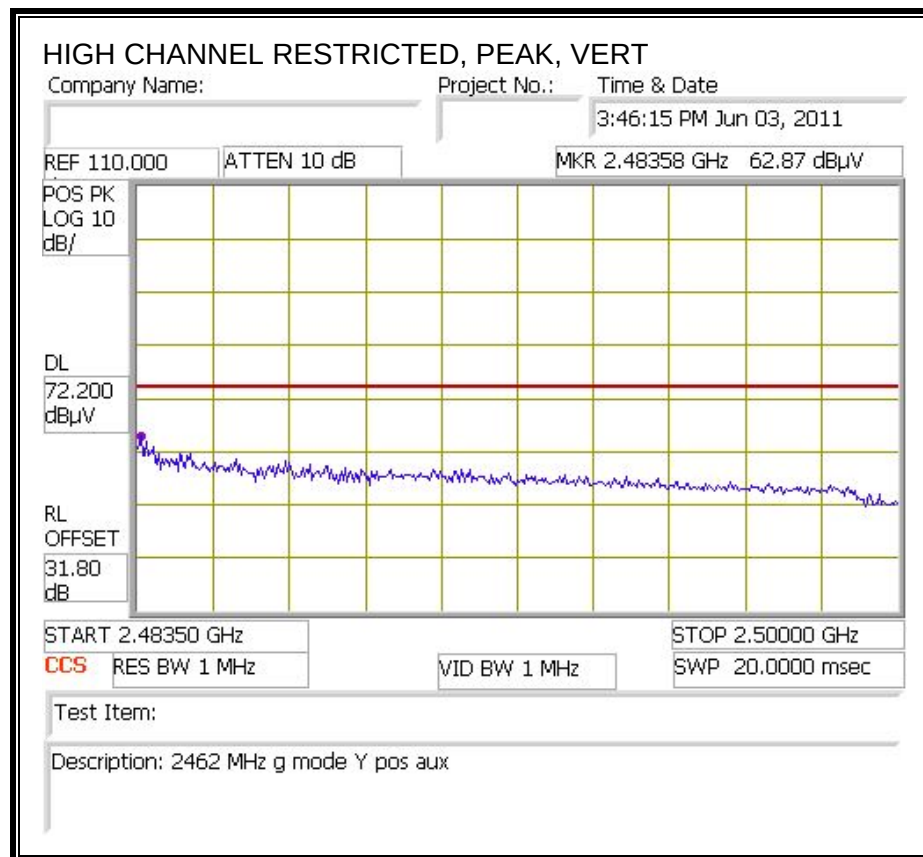


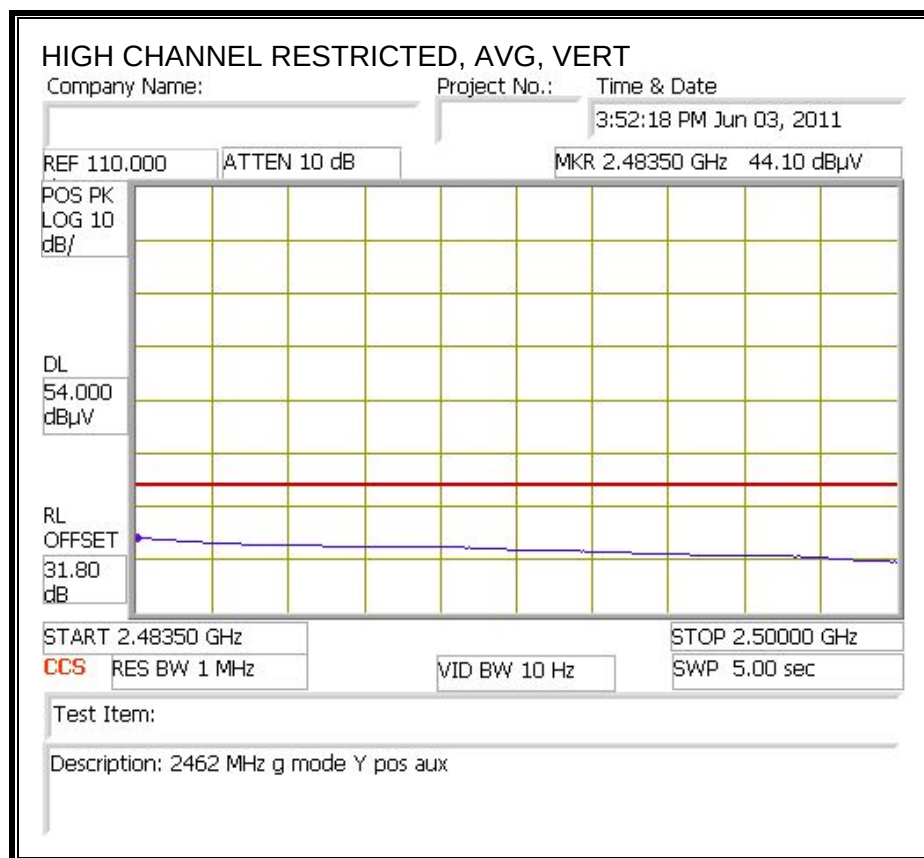
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/11/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: g mode, TX, EUT: P305

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

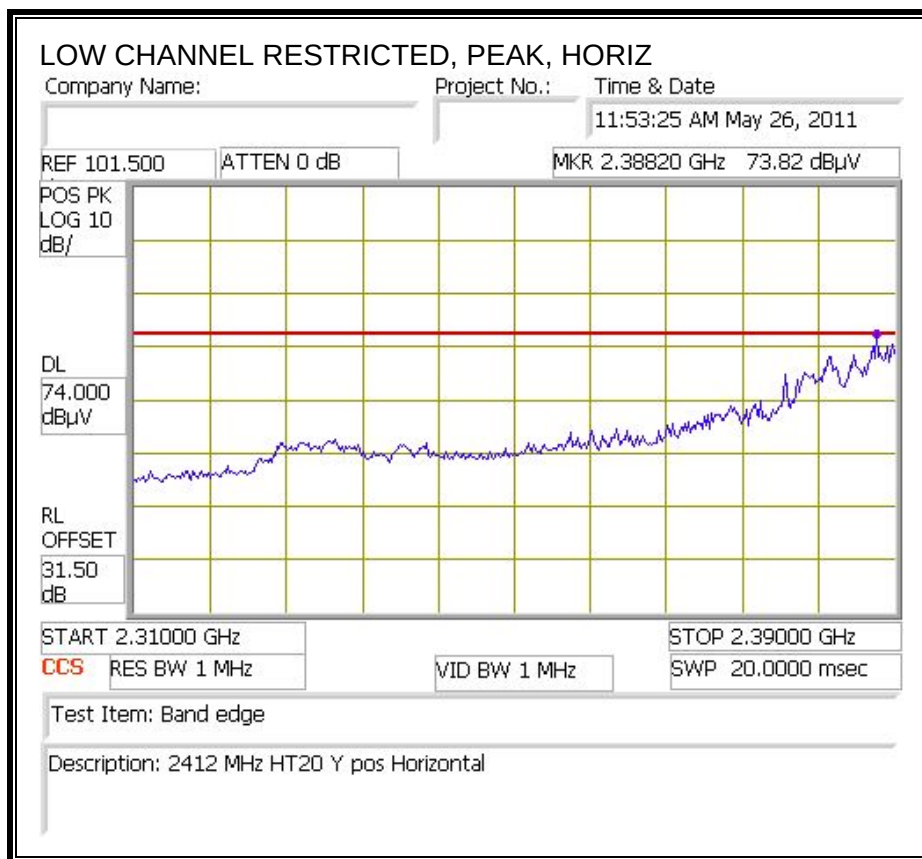
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412MHz g mode													
4.824	3.0	52.1	32.7	5.8	-34.8	0.0	0.0	55.8	74.0	-18.2	V	P	
4.824	3.0	37.8	32.7	5.8	-34.8	0.0	0.0	41.4	54.0	-12.6	V	A	
4.824	3.0	47.4	32.7	5.8	-34.8	0.0	0.0	51.0	74.0	-23.0	H	P	
4.824	3.0	33.0	32.7	5.8	-34.8	0.0	0.0	36.7	54.0	-17.3	H	A	
2437MHz g mode, AUX													
4.874	3.0	49.4	32.7	5.8	-34.8	0.0	0.0	53.2	74.0	-20.8	H	P	
4.874	3.0	37.0	32.7	5.8	-34.8	0.0	0.0	40.7	54.0	-13.3	H	A	
7.311	3.0	55.2	35.5	7.3	-34.1	0.0	0.0	63.8	74.0	-10.2	H	P	
7.311	3.0	41.4	35.5	7.3	-34.1	0.0	0.0	50.0	54.0	-4.0	H	A	
2437MHz g mode, AUX													
7.311	3.0	49.3	35.5	7.3	-34.1	0.0	0.0	58.0	74.0	-16.0	V	P	
7.311	3.0	36.1	35.5	7.3	-34.1	0.0	0.0	44.7	54.0	-9.3	V	A	
4.874	3.0	53.6	32.7	5.8	-34.8	0.0	0.0	57.3	74.0	-16.7	V	P	
4.874	3.0	40.1	32.7	5.8	-34.8	0.0	0.0	43.8	54.0	-10.2	V	A	
2462MHz g mode, AUX													
4.924	3.0	50.0	32.7	5.9	-34.8	0.0	0.0	53.8	74.0	-20.2	V	P	
4.924	3.0	35.4	32.7	5.9	-34.8	0.0	0.0	39.2	54.0	-14.8	V	A	
7.386	3.0	36.3	35.6	7.3	-34.1	0.0	0.0	45.1	74.0	-28.9	V	P	
7.386	3.0	24.0	35.6	7.3	-34.1	0.0	0.0	32.8	54.0	-21.2	V	A	
2462MHz g mode, AUX													
4.924	3.0	47.7	32.7	5.9	-34.8	0.0	0.0	51.5	74.0	-22.5	H	P	
4.924	3.0	33.5	32.7	5.9	-34.8	0.0	0.0	37.3	54.0	-16.7	H	A	
7.386	3.0	48.1	35.6	7.3	-34.1	0.0	0.0	56.9	74.0	-17.1	H	P	
7.386	3.0	31.9	35.6	7.3	-34.1	0.0	0.0	40.7	54.0	-13.3	H	A	

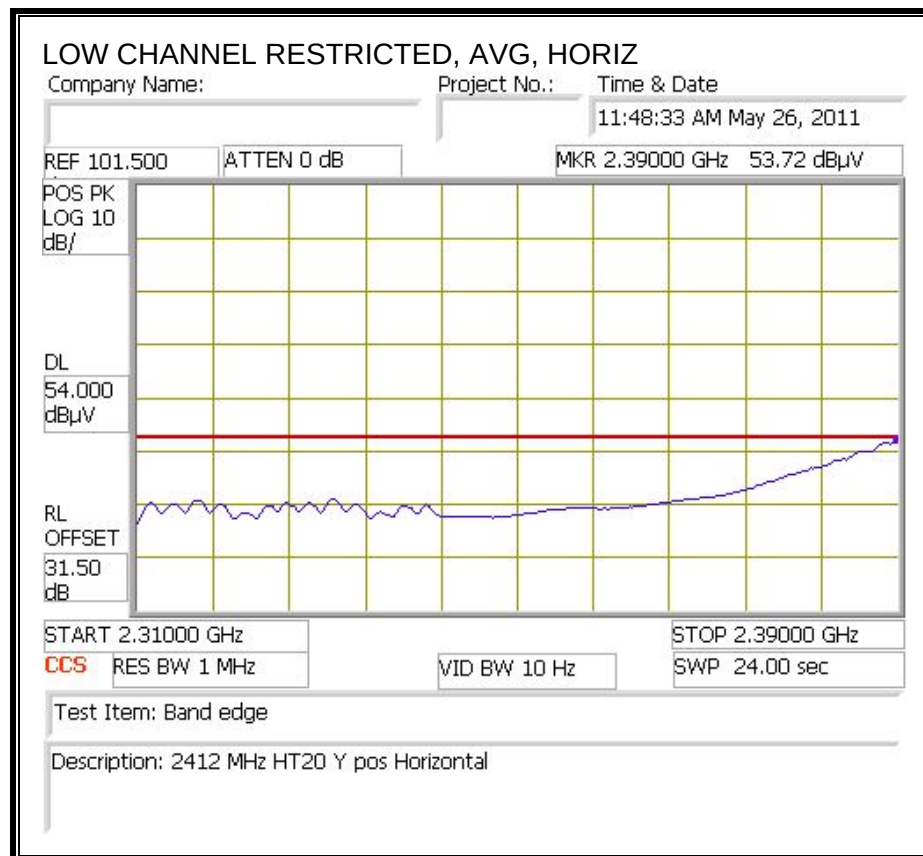
Rev. 4.1.2.7

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

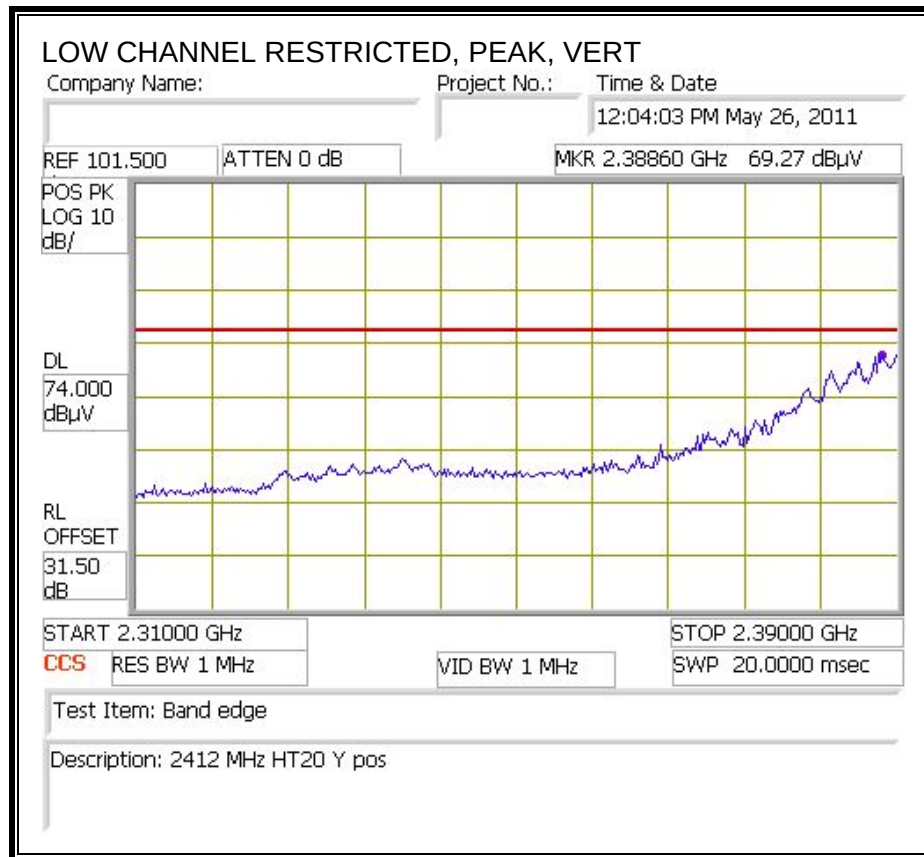
8.2.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 2.4 GHz BAND

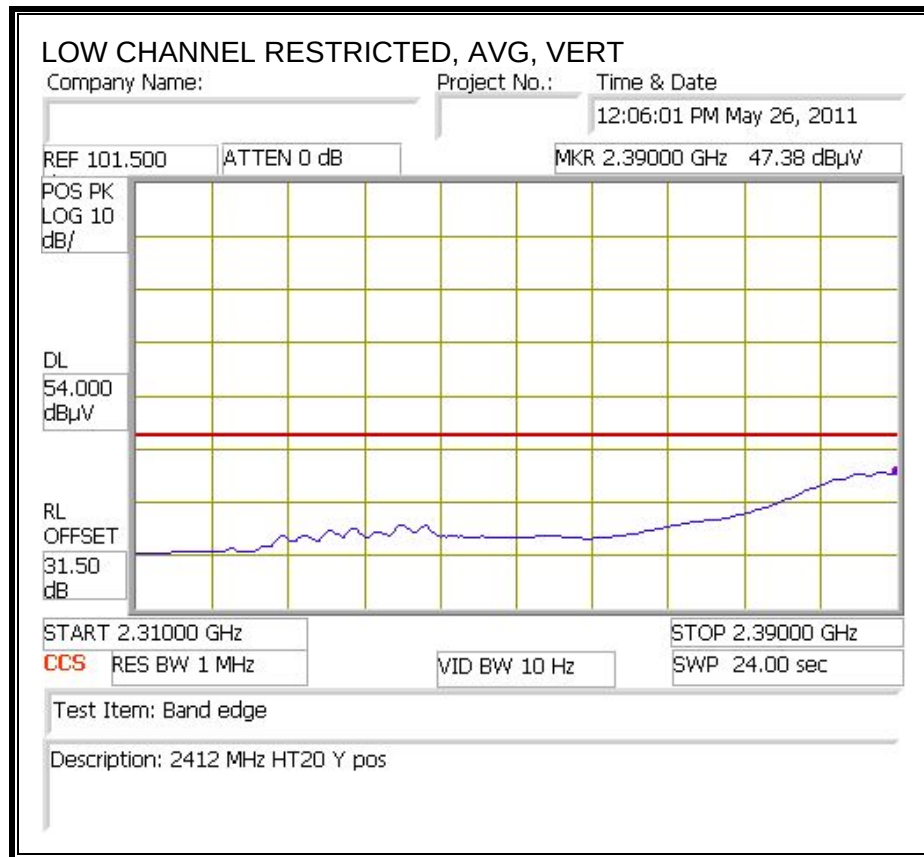
RESTRICTED BANEDGE (LOW CHANNEL, HORIZONTAL)



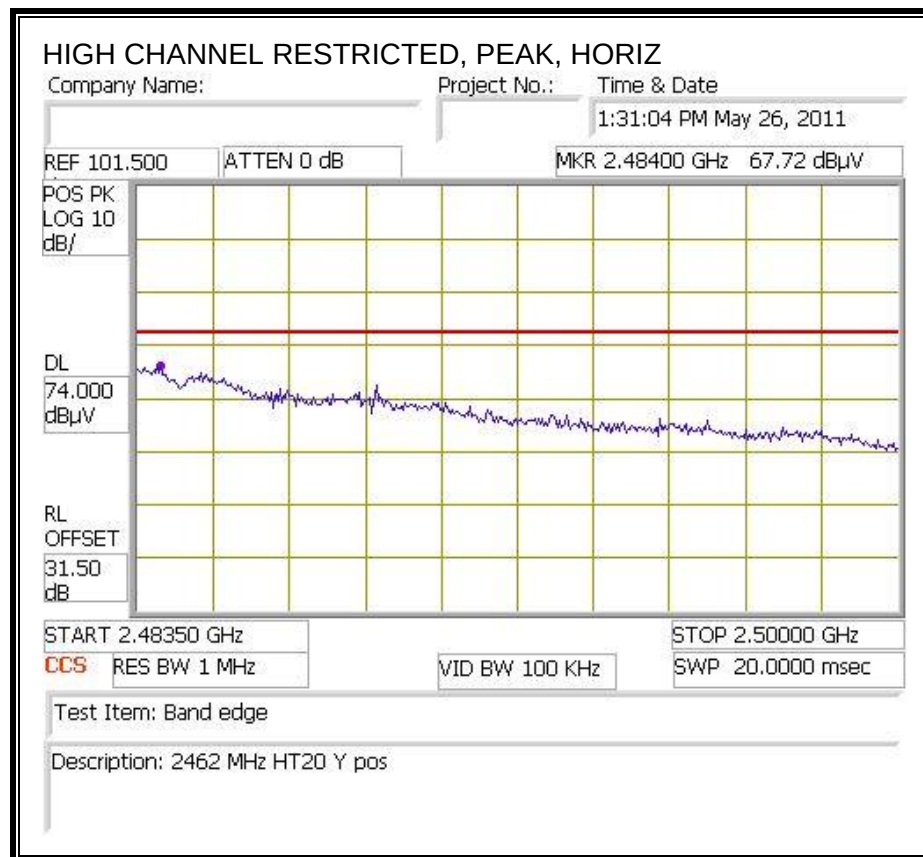


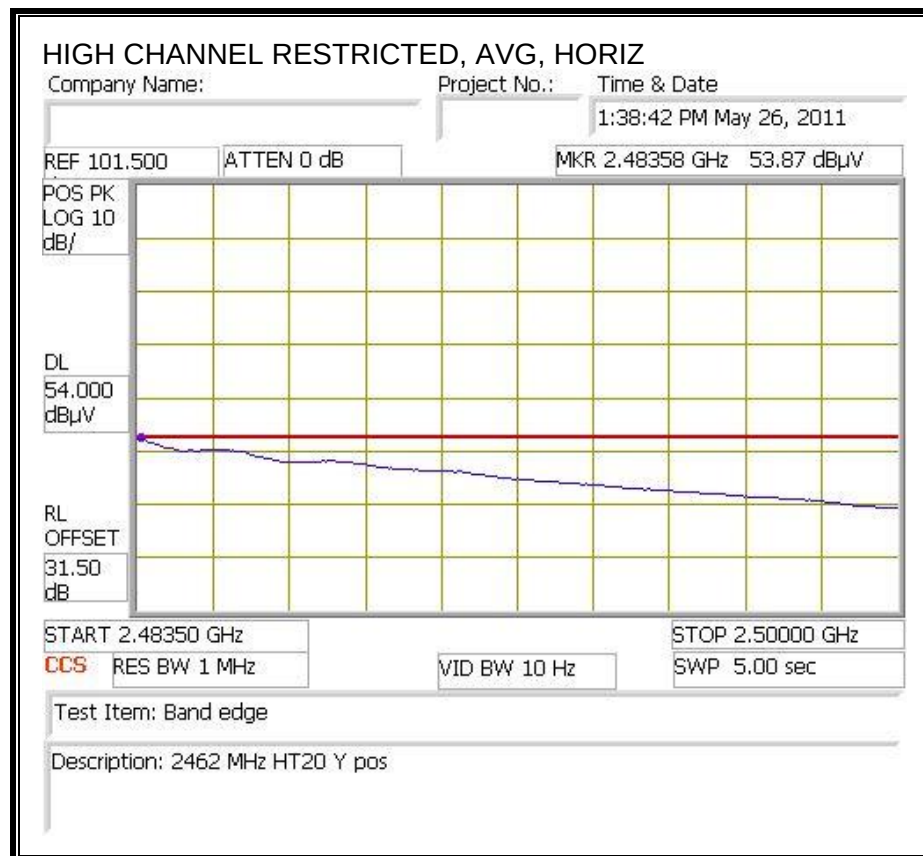
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



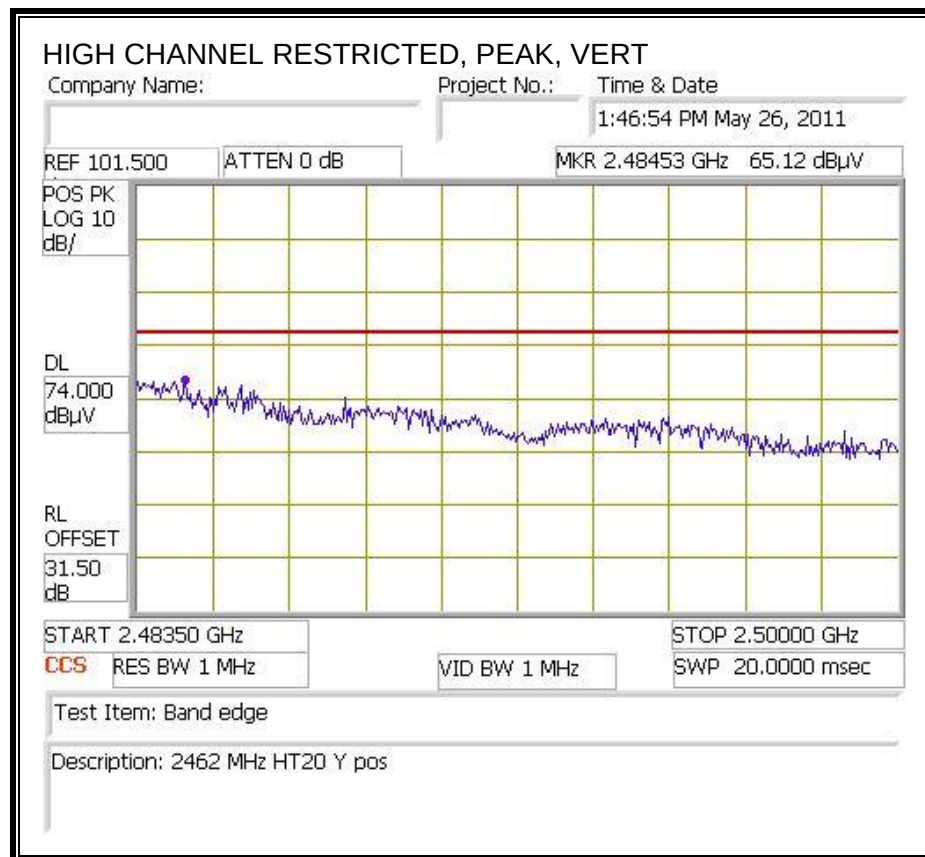


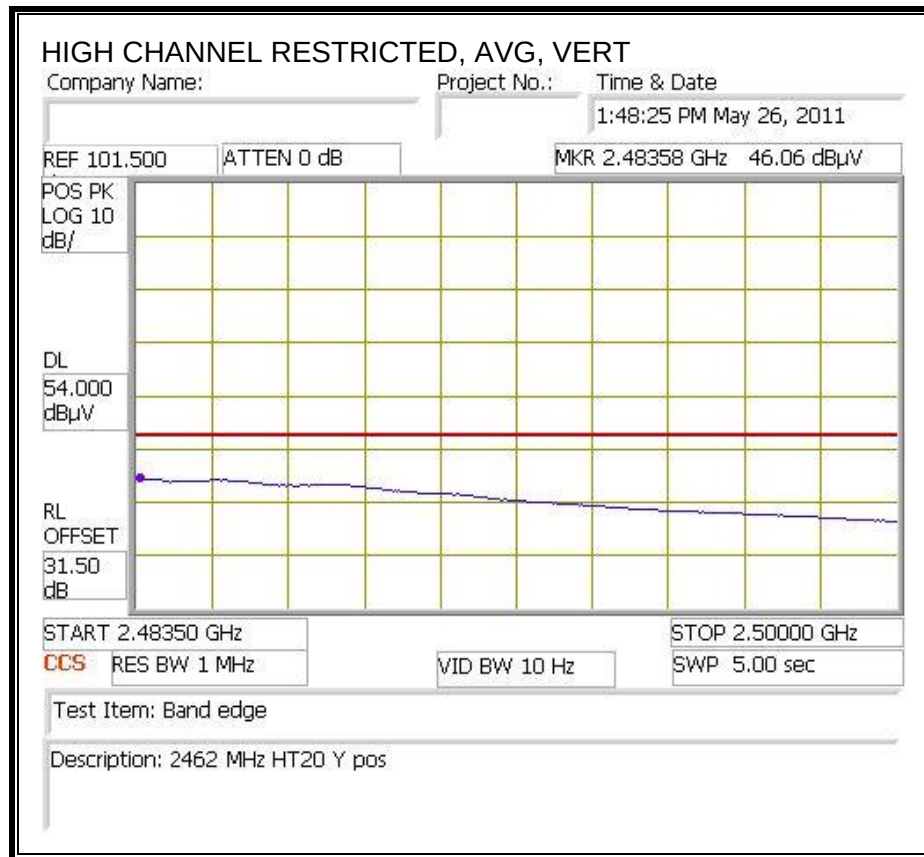
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/09/11
Project #: 11U13795
Company: Broadcom
Test Target:
Mode Oper: HT20 mode, TX, EUT: P305

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

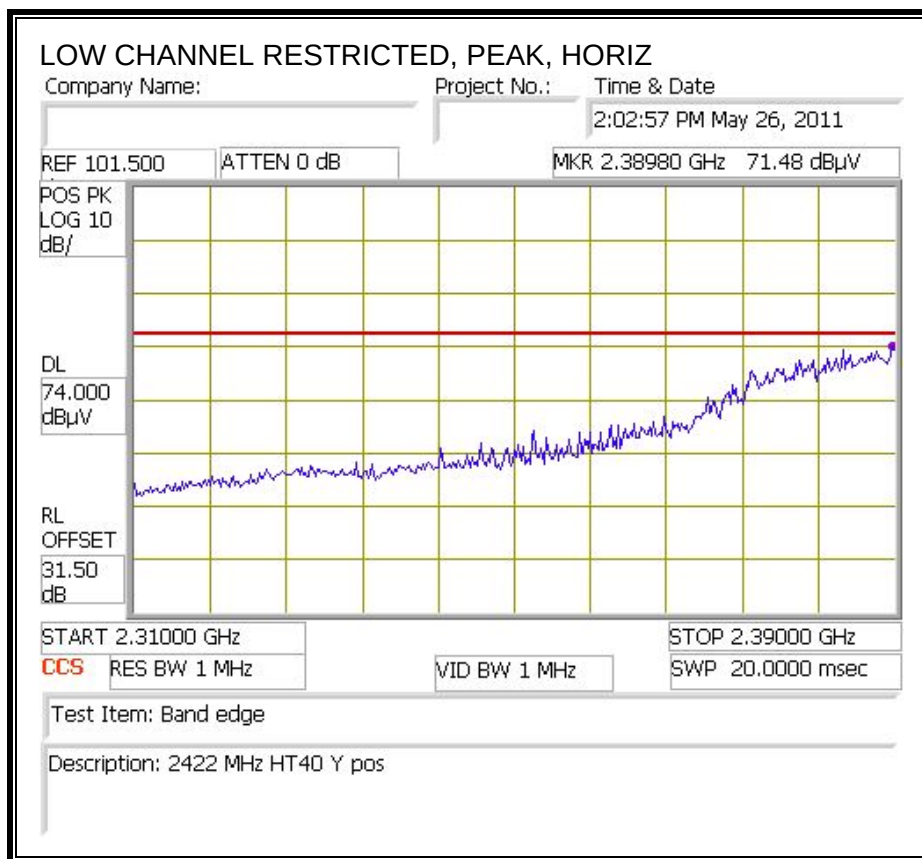
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412 MHz HT20 mode													
4.824	3.0	53.5	32.7	5.8	-34.8	0.0	0.0	57.1	74.0	-16.9	V	P	
4.824	3.0	36.7	32.7	5.8	-34.8	0.0	0.0	40.3	54.0	-13.7	V	A	
2412 MHz HT20 mode													
4.824	3.0	51.8	32.7	5.8	-34.8	0.0	0.0	55.5	74.0	-18.5	H	P	
4.824	3.0	37.4	32.7	5.8	-34.8	0.0	0.0	41.1	54.0	-12.9	H	A	
2437 MHz HT20 mode													
4.874	3.0	59.7	32.7	5.8	-34.8	0.0	0.0	63.4	74.0	-10.6	H	P	
4.874	3.0	46.3	32.7	5.8	-34.8	0.0	0.0	50.1	54.0	-3.9	H	A	
7.311	3.0	53.0	35.5	7.3	-34.1	0.0	0.0	61.7	74.0	-12.3	H	P	
7.311	3.0	40.1	35.5	7.3	-34.1	0.0	0.0	48.7	54.0	-5.3	H	A	
2437 MHz HT20 mode													
4.874	3.0	57.2	32.7	5.8	-34.8	0.0	0.0	61.0	74.0	-13.0	V	P	
4.874	3.0	44.7	32.7	5.8	-34.8	0.0	0.0	48.4	54.0	-5.6	V	A	
7.311	3.0	52.8	35.5	7.3	-34.1	0.0	0.0	61.4	74.0	-12.6	V	P	
7.311	3.0	39.7	35.5	7.3	-34.1	0.0	0.0	48.3	54.0	-5.7	V	A	
2462 MHz HT20 mode													
4.924	3.0	53.6	32.7	5.9	-34.8	0.0	0.0	57.4	74.0	-16.6	H	P	
4.924	3.0	37.1	32.7	5.9	-34.8	0.0	0.0	40.9	54.0	-13.1	H	A	
7.386	3.0	42.8	35.6	7.3	-34.1	0.0	0.0	51.6	74.0	-22.4	H	P	
7.386	3.0	28.2	35.6	7.3	-34.1	0.0	0.0	37.0	54.0	-17.0	H	A	
2462 MHz HT20 mode													
4.924	3.0	50.3	32.7	5.9	-34.8	0.0	0.0	54.1	74.0	-19.9	V	P	
4.924	3.0	35.6	32.7	5.9	-34.8	0.0	0.0	39.4	54.0	-14.6	V	A	
7.386	3.0	42.0	35.6	7.3	-34.1	0.0	0.0	50.8	74.0	-23.2	V	P	
7.386	3.0	27.8	35.6	7.3	-34.1	0.0	0.0	36.6	54.0	-17.4	V	A	

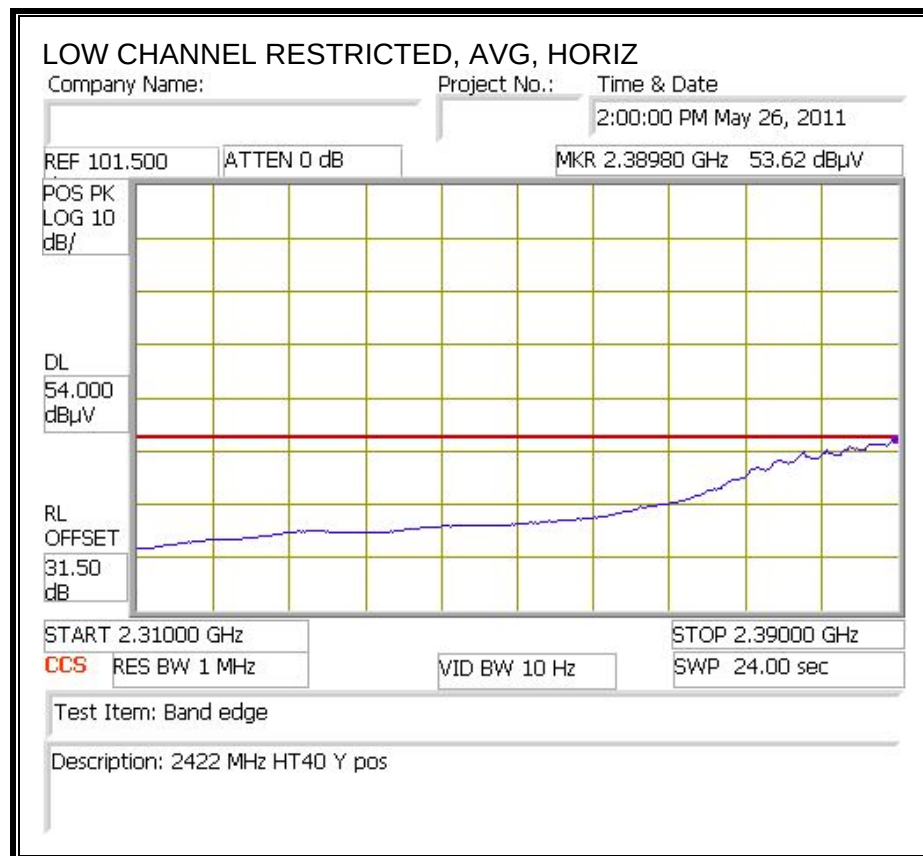
Rev. 4.1.2.7

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

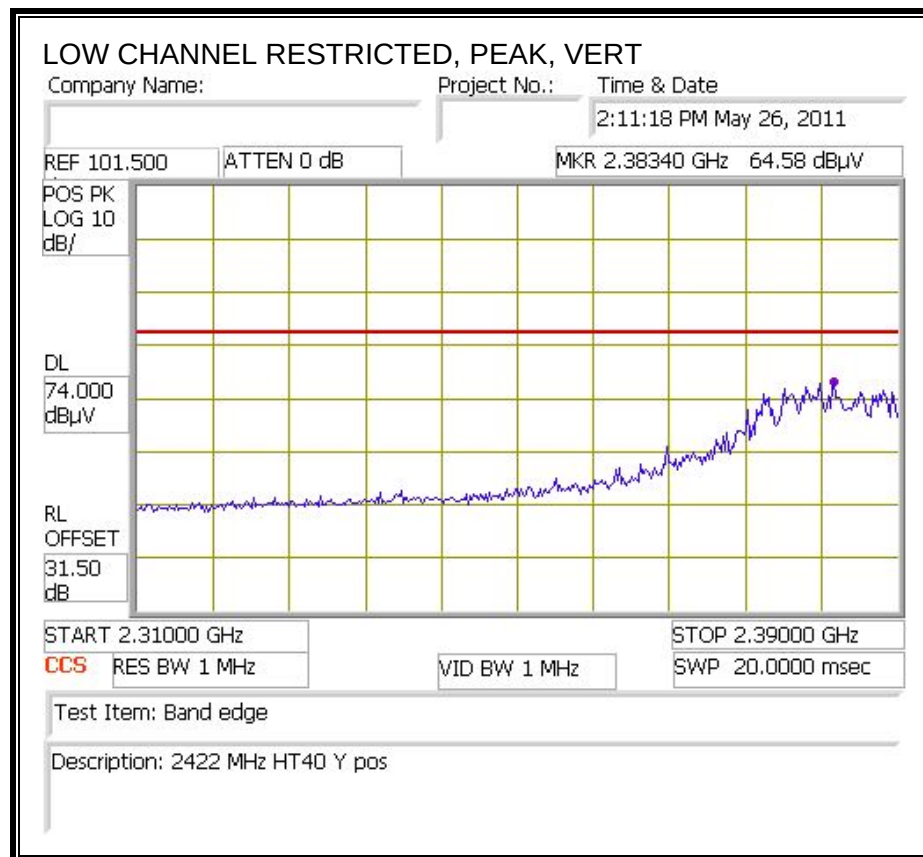
8.2.4. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 2.4 GHz BAND

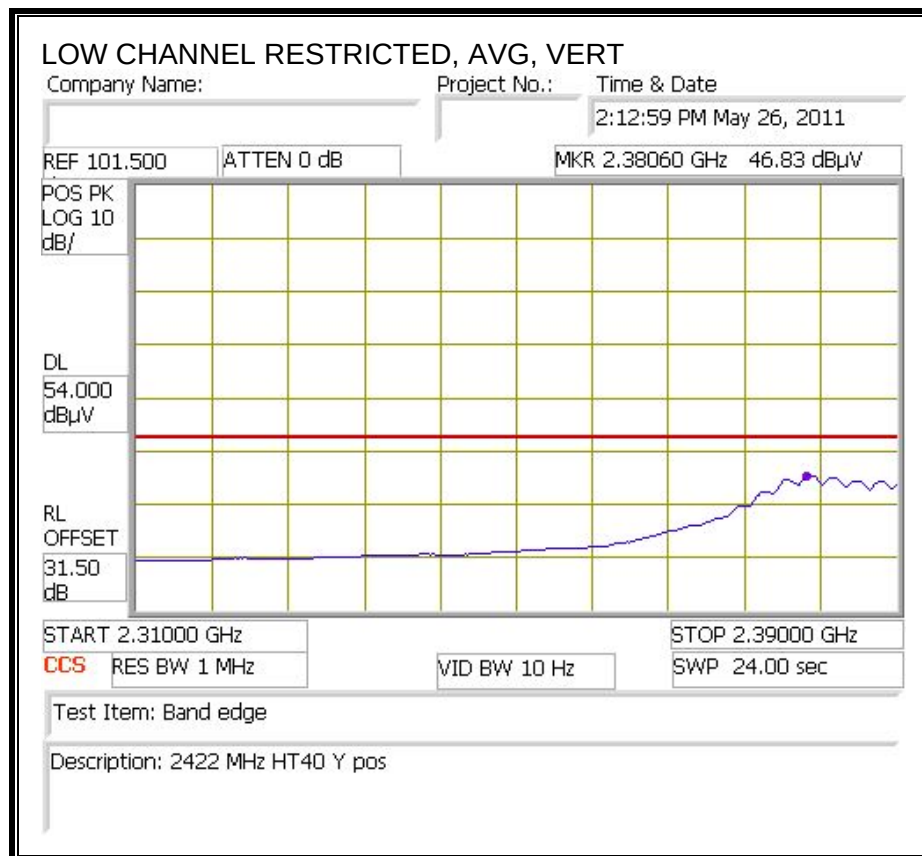
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



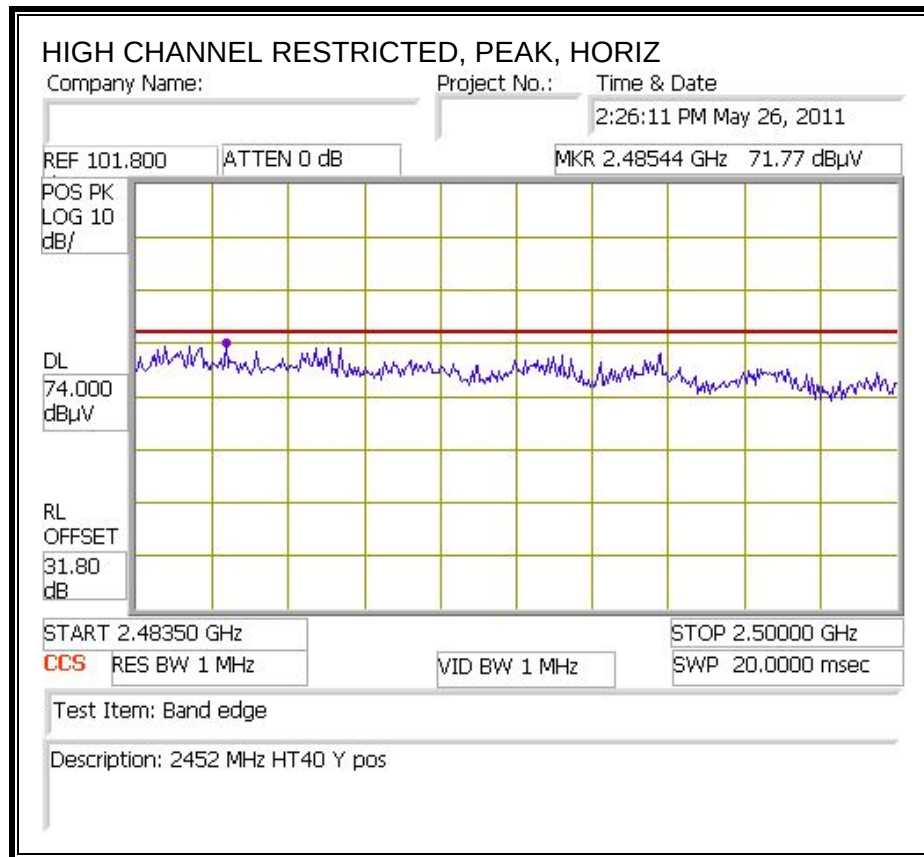


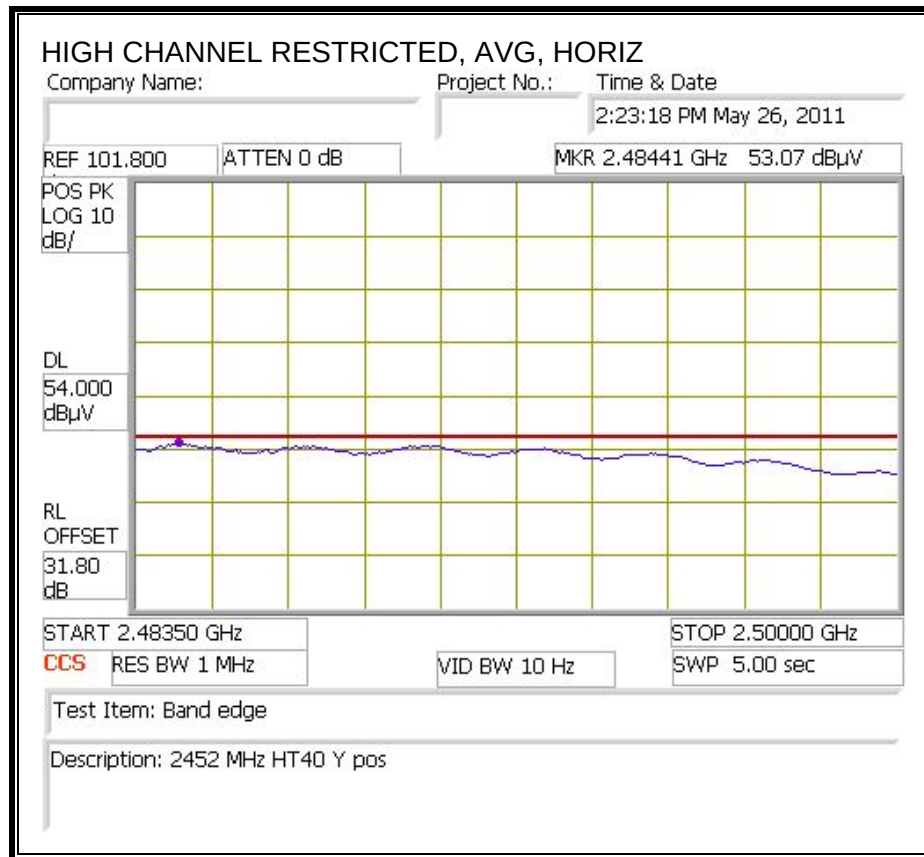
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



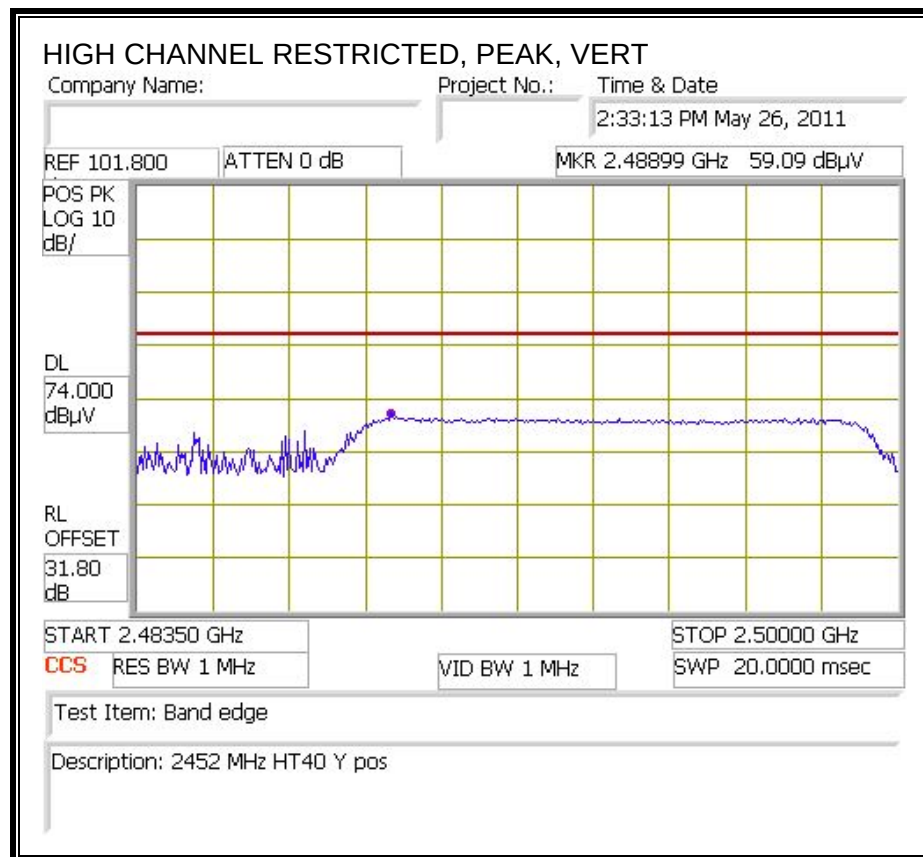


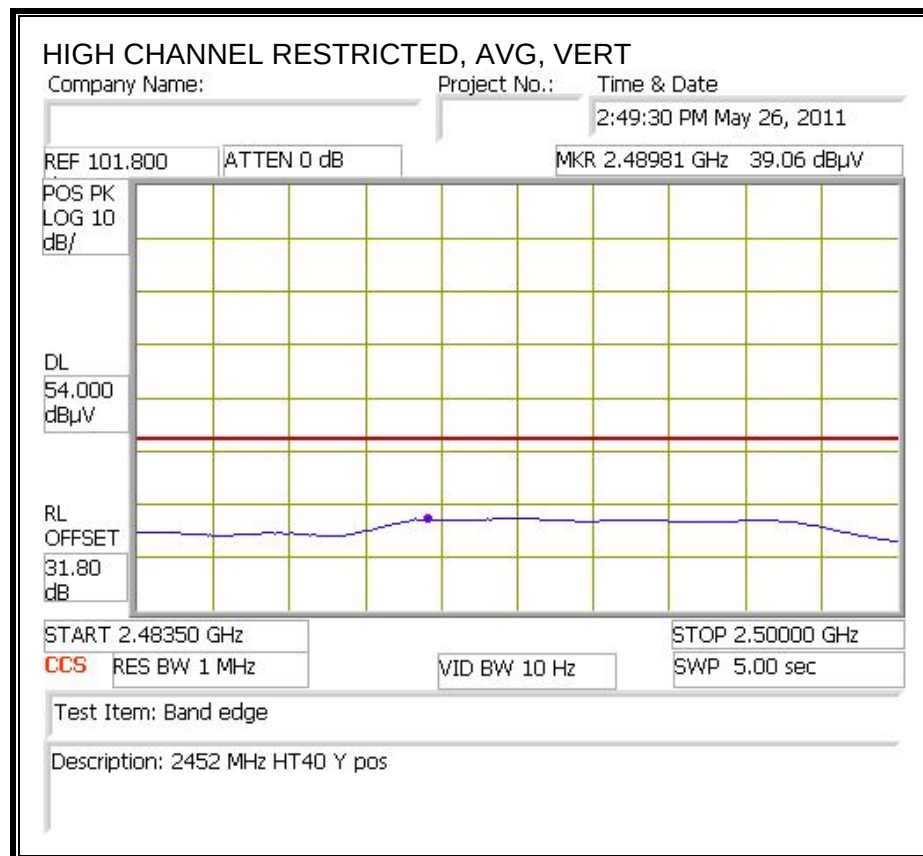
RESTRICTED BANDEGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 06/03/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: HT40, TX, EUT: P305

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2422 MHz HT40													
4.844	3.0	46.8	32.8	5.8	-34.8	0.0	0.0	50.6	74.0	-23.4	V	P	
4.844	3.0	32.3	32.8	5.8	-34.8	0.0	0.0	36.1	54.0	-17.9	V	A	
7.266	3.0	36.7	35.1	7.2	-34.1	0.0	0.0	45.0	74.0	-29.0	V	P	
7.266	3.0	23.5	35.1	7.2	-34.1	0.0	0.0	31.7	54.0	-22.3	V	A	
2422 MHz HT40													
4.844	3.0	41.4	32.8	5.8	-34.8	0.0	0.0	45.2	74.0	-28.8	H	P	
4.844	3.0	28.5	32.8	5.8	-34.8	0.0	0.0	32.2	54.0	-21.8	H	A	
7.266	3.0	37.0	35.1	7.2	-34.1	0.0	0.0	45.2	74.0	-28.8	H	P	
7.266	3.0	23.6	35.1	7.2	-34.1	0.0	0.0	31.8	54.0	-22.2	H	A	
2437 MHz HT40													
4.874	3.0	39.4	32.8	5.8	-34.8	0.0	0.0	43.2	74.0	-30.8	H	P	
4.874	3.0	26.1	32.8	5.8	-34.8	0.0	0.0	29.9	54.0	-24.1	H	A	
4.874	3.0	43.8	32.8	5.8	-34.8	0.0	0.0	47.6	74.0	-26.4	V	P	
4.874	3.0	30.9	32.8	5.8	-34.8	0.0	0.0	34.7	54.0	-19.3	V	A	
2452 MHz HT40													
4.904	3.0	36.0	32.8	5.9	-34.8	0.0	0.0	39.9	74.0	-34.1	H	P	
4.904	3.0	24.0	32.8	5.9	-34.8	0.0	0.0	27.9	54.0	-26.1	H	A	
4.904	3.0	42.1	32.8	5.9	-34.8	0.0	0.0	46.0	74.0	-28.0	V	P	
4.904	3.0	29.3	32.8	5.9	-34.8	0.0	0.0	33.2	54.0	-20.8	V	A	

Rev. 4.1.2.7

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

8.2.5. TRANSMITTER ABOVE 1 GHz FOR 802.11a MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/09/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: TX mode, 11a main

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5785 MHz 11a main													
11.570	3.0	46.6	38.1	9.5	-32.5	0.0	0.7	62.4	74.0	-11.6	V	P	
11.570	3.0	33.3	38.1	9.5	-32.5	0.0	0.7	49.1	54.0	-4.9	V	A	
11.570	3.0	43.7	38.1	9.5	-32.5	0.0	0.7	59.5	74.0	-14.5	H	P	
11.570	3.0	30.1	38.1	9.5	-32.5	0.0	0.7	45.9	54.0	-8.1	H	A	
5745MHz 11a main													
11.490	3.0	47.1	38.0	9.5	-32.5	0.0	0.0	62.1	74.0	-11.9	V	P	
11.490	3.0	33.8	38.0	9.5	-32.5	0.0	0.0	48.8	54.0	-5.2	V	A	
11.490	3.0	43.1	38.0	9.5	-32.5	0.0	0.0	58.1	74.0	-15.9	H	P	
11.490	3.0	30.1	38.0	9.5	-32.5	0.0	0.0	45.1	54.0	-8.9	H	A	
5825MHz 11a main													
11.650	3.0	41.4	38.2	9.6	-32.5	0.0	0.0	56.6	74.0	-17.4	H	P	
11.650	3.0	28.6	38.2	9.6	-32.5	0.0	0.0	43.9	54.0	-10.1	H	A	
11.650	3.0	42.1	38.2	9.6	-32.5	0.0	0.0	57.4	74.0	-16.6	V	P	
11.650	3.0	29.0	38.2	9.6	-32.5	0.0	0.0	44.2	54.0	-9.8	V	A	

Rev. 4.1.2.7

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

8.2.6. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber													
Test Engr:		Tom Chen											
Date:		05/09/11											
Project #:		11U13795											
Company:		Broadcom											
Test Target:		FCC Class B											
Mode Oper:		TX mode, UNII band 5.8GHz 11n											
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit									
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit									
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit									
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs. Peak Limit									
CL	Cable Loss	HPF	High Pass Filter										
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5745MHz HT20													
11.490	3.0	42.4	38.0	9.5	-32.5	0.0	0.7	58.1	74.0	-15.9	H	P	
11.490	3.0	28.7	38.0	9.5	-32.5	0.0	0.7	44.4	54.0	-9.6	H	A	
11.490	3.0	44.8	38.0	9.5	-32.5	0.0	0.7	60.5	74.0	-13.5	V	P	
11.490	3.0	33.4	38.0	9.5	-32.5	0.0	0.7	49.1	54.0	-4.9	V	A	
5785MHz HT20													
11.570	3.0	42.8	38.1	9.5	-32.5	0.0	0.7	58.6	74.0	-15.4	V	P	
11.570	3.0	29.2	38.1	9.5	-32.5	0.0	0.7	45.0	54.0	-9.0	V	A	
11.570	3.0	41.0	38.1	9.5	-32.5	0.0	0.7	56.8	74.0	-17.2	H	P	
11.570	3.0	28.5	38.1	9.5	-32.5	0.0	0.7	44.3	54.0	-9.7	H	A	
5825MHz HT20													
11.650	3.0	37.9	38.2	9.6	-32.5	0.0	0.7	53.9	74.0	-20.1	H	P	
11.650	3.0	26.4	38.2	9.6	-32.5	0.0	0.7	42.3	54.0	-11.7	H	A	
11.650	3.0	38.7	38.2	9.6	-32.5	0.0	0.7	54.6	74.0	-19.4	V	P	
11.650	3.0	25.7	38.2	9.6	-32.5	0.0	0.7	41.6	54.0	-12.4	V	A	
Rev. 4.1.2.7													
Note: No other emissions were detected above the system noise floor.													

8.2.7. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/10/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: TX mode, UNII band 5.8GHz 11n HT40

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5755MHz HT40													
11.510	3.0	40.9	38.1	9.5	-32.5	0.0	0.7	56.7	74.0	-17.3	V	P	
11.510	3.0	27.9	38.1	9.5	-32.5	0.0	0.7	43.6	54.0	-10.4	V	A	
11.510	3.0	40.5	38.1	9.5	-32.5	0.0	0.7	56.2	74.0	-17.8	H	P	
11.510	3.0	28.4	38.1	9.5	-32.5	0.0	0.7	44.1	54.0	-9.9	H	A	
5795MHz HT40													
11.590	3.0	40.8	38.1	9.5	-32.5	0.0	0.7	56.6	74.0	-17.4	H	P	
11.590	3.0	28.5	38.1	9.5	-32.5	0.0	0.7	44.4	54.0	-9.6	H	A	
11.590	3.0	46.1	38.1	9.5	-32.5	0.0	0.7	61.9	74.0	-12.1	V	P	
11.590	3.0	32.5	38.1	9.5	-32.5	0.0	0.7	48.3	54.0	-5.7	V	A	

Rev. 4.1.2.7

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

8.2.8. RECEIVER ABOVE 1 GHz

8.2.9. RECEIVER ABOVE 1 GHz FOR 20 MHz

High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber																	
Company:		Broadcom															
Project #:		11U13795															
Date:		5/27/2011															
Test Engineer:		Tom Chen															
Configuration:		EUT with support Laptop PC															
Mode:		RX mode, HT20															
Test Equipment:																	
Horn 1-18GHz				Pre-amplifier 1-26GHz				Pre-amplifier 26-40GHz				Horn > 18GHz				Limit	
T60; S/N: 2238 @3m				T34 HP 8449B												RX RSS 210	
Hi Frequency Cables																	
3' cable 22807700				12' cable 22807600				20' cable 22807500				HPF				Reject Filter	
3' cable 22807700				12' cable 22807600				20' cable 22807500									
Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz																	
f	Dist	Read Pk	Read Avg	AF	CL	Amp	D Corr	Ftr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes		
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)		
1.390	3.0	50.1	31.0	25.8	2.8	-37.7	0.0	0.0	41.0	21.9	74	54	-33.0	-32.1	H		
1.495	3.0	49.5	27.3	26.1	2.9	-37.6	0.0	0.0	41.0	18.7	74	54	-33.0	-35.3	H		
2.500	3.0	59.4	27.9	28.3	3.9	-36.3	0.0	0.0	55.4	23.9	74	54	-18.6	-30.1	H		
1.195	3.0	55.3	33.6	25.1	2.6	-38.0	0.0	0.0	45.0	23.3	74	54	-29.0	-30.7	V		
1.300	3.0	52.0	31.1	25.5	2.7	-37.8	0.0	0.0	42.3	21.5	74	54	-31.7	-32.5	V		
2.500	3.0	57.3	29.0	28.3	3.9	-36.3	0.0	0.0	53.3	25.0	74	54	-20.7	-29.0	V		
Rev. 07.22.09																	
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit				
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit				
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit				
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit				
CL	Cable Loss					HPF	High Pass Filter										

8.2.10. RECEIVER ABOVE 1 GHz FOR 40 MHz BANDWIDTH

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber																
Company:		Broadcom														
Project #:		11U13795														
Date:		5/27/2011														
Test Engineer:		Tom Chen														
Configuration:		EUT with support Laptop PC														
Mode:		RX mode, HT40														
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T60; S/N: 2238 @3m			T34 HP 8449B									RX RSS 210				
Hi Frequency Cables																
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz	
3' cable 22807700			12' cable 22807600			20' cable 22807500									Average Measurements RBW=1MHz ; VBW=10Hz	
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fitr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
1.195	3.0	49.7	29.0	25.1	2.6	-38.0	0.0	0.0	39.4	18.7	74	54	-34.6	-35.3	H	
2.440	3.0	51.2	31.3	28.2	3.9	-36.3	0.0	0.0	46.9	27.0	74	54	-27.1	-27.0	H	
2.500	3.0	62.1	27.9	28.3	3.9	-36.3	0.0	0.0	58.1	23.9	74	54	-15.9	-30.1	H	
1.330	3.0	51.7	33.6	25.6	2.7	-37.8	0.0	0.0	42.2	24.1	74	54	-31.8	-29.9	V	
1.885	3.0	49.5	29.4	27.4	3.3	-37.0	0.0	0.0	43.2	23.2	74	54	-30.8	-30.8	V	
2.485	3.0	60.0	29.0	28.3	3.9	-36.3	0.0	0.0	55.9	24.9	74	54	-18.1	-29.1	V	
Rev. 07.22.09																
f	Measurement Frequency			Amp	Preamp Gain			Avg Lim	Average Field Strength Limit							
Dist	Distance to Antenna			D Corr	Distance Correct to 3 meters			Pk Lim	Peak Field Strength Limit							
Read	Analyzer Reading			Avg	Average Field Strength @ 3 m			Avg Mar	Margin vs. Average Limit							
AF	Antenna Factor			Peak	Calculated Peak Field Strength			Pk Mar	Margin vs. Peak Limit							
CL	Cable Loss			HPF	High Pass Filter											

8.2.11. WORST-CASE BELOW 1 GHz

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

HORIZONTAL AND VERTICAL DATA

30-1000 MHz HORIZONTAL

Test Frequency	Meter Reading	Detector	Cable [dB]	T15 PreAmp [dB]	Bilog T185 [dB]	dB[uVolt s/meter]	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
64.9317	52.94	QP	0.9	-28.2	8.1	33.74	40	-6.26	138	Horz
98.1283	52.19	QP	1	-28.1	9	34.09	43.5	-9.41	168	Horz
143.1853	42.2	QP	1.2	-27.9	13	28.5	43.5	-15	201	Horz
182.5837	48.76	PK	1.3	-27.5	11	33.56	43.5	-9.94	99	Horz
240.2398	53.66	PK	1.5	-28.1	11.9	38.96	46	-7.04	99	Horz
299.6669	52.54	PK	1.8	-28.5	13.6	39.44	46	-6.56	99	Horz
499.8001	50.1	PK	2.2	-27.3	16.8	41.8	46	-4.2	151	Horz
597.6016	47.35	PK	2.5	-28.2	18.4	40.05	46	-5.95	99	Horz
699.4004	46.93	PK	2.7	-28.3	18.9	40.23	46	-5.77	99	Horz

30-1000 MHz VERTICAL

Test Frequency	Meter Reading	Detector	Cable [dB]	T15 PreAmp [dB]	Bilog T185 [dB]	dB[uVolt s/meter]	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
35.6922	45.37	PK	0.7	-28.2	17	34.87	40	-5.13	100	Vert
57.6962	53.89	PK	0.8	-28.1	7.9	34.49	40	-5.51	100	Vert
99.8351	53.74	PK	1	-28.1	9.3	35.94	43.5	-7.56	100	Vert
144.013	46.48	PK	1.2	-27.7	13	32.98	43.5	-10.52	100	Vert
230.3797	50.74	PK	1.5	-27.9	11.9	36.24	46	-9.76	251	Vert
498.7342	49.46	PK	2.2	-28.1	15	38.56	46	-7.44	151	Vert
597.6016	47.13	PK	2.5	-27.7	18.4	40.33	46	-5.67	101	Vert
697.002	45.18	PK	2.7	-27.3	18.9	39.48	46	-6.52	101	Vert
899.0007	43.24	PK	3.2	-27.7	22.1	40.84	46	-5.16	101	Vert

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

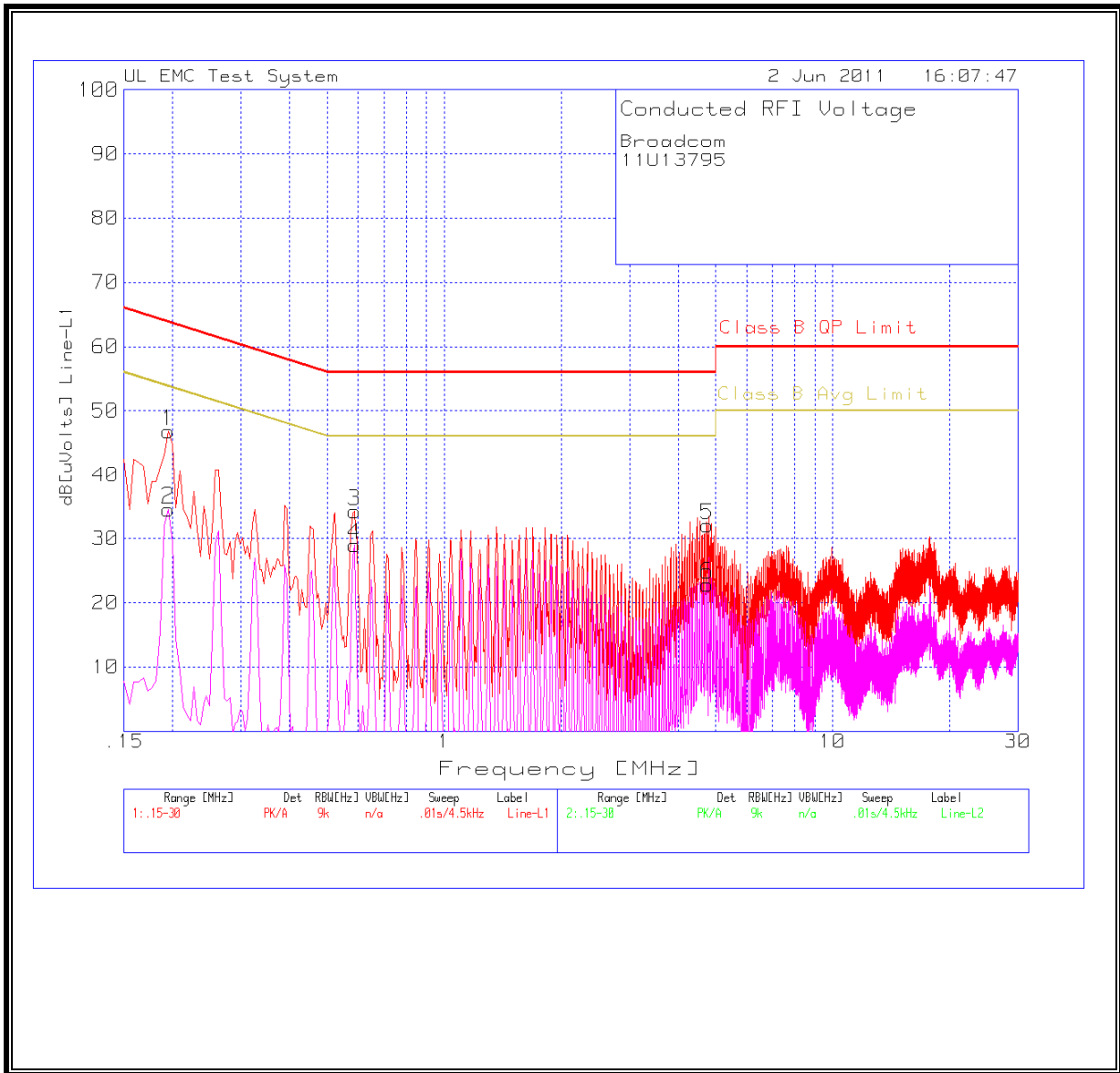
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

6 WORST EMISSIONS

Line-L1 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN [dB]	Conducted Emission Cable [dB]	dB[uVolts]	Class B QP Limit	Margin	Class B Avg Limit	Margin
0.195	46.84	PK	0	0	46.84	63.8	-16.96	53.8	-6.96
0.195	34.56	Av	0	0	34.56	63.8	-29.24	53.8	-19.24
0.5865	34.25	PK	0	0	34.25	56	-21.75	46	-11.75
0.5865	29.01	Av	0	0	29.01	56	-26.99	46	-16.99
4.749	32.05	PK	0	0	32.05	56	-23.95	46	-13.95
4.749	22.87	Av	0	0	22.87	56	-33.13	46	-23.13
Line-L2 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN [dB]	Conducted Emission Cable [dB]	dB[uVolts]	Class B QP Limit	Margin	Class B Avg Limit	Margin
0.195	48.51	PK	0	0	48.51	63.8	-15.29	53.8	-5.29
0.195	35.39	Av	0	0	35.39	63.8	-28.41	53.8	-18.41
0.5235	35.05	PK	0	0	35.05	56	-20.95	46	-10.95
0.5235	24.28	Av	0	0	24.28	56	-31.72	46	-21.72
4.749	35.15	PK	0	0	35.15	56	-20.85	46	-10.85
4.749	19.59	Av	0	0	19.59	56	-36.41	46	-26.41

LINE 1 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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

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

f = frequency in MHz

* = Plane-wave equivalent power density

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

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

IC RULES

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

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

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

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

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

EQUATIONS

Power density is given by:

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

where

S = Power density in W/m²

EIRP = Equivalent Isotropic Radiated Power in W

D = Separation distance in m

Power density in units of W/m² is converted to units of mW/cm² by dividing by 10.

Distance is given by:

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

where

D = Separation distance in m

EIRP = Equivalent Isotropic Radiated Power in W

S = Power density in W/m²

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

$$\text{Total EIRP} = (P_1 * G_1) + (P_2 * G_2) + \dots + (P_n * G_n)$$

where

P_x = Power of transmitter x

G_x = Numeric gain of antenna x

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

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm²

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m²

RESULTS

Band	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	IC Power Density (W/m ²)	FCC Power Density (mW/cm ²)
2.4 GHz						
Chain 1		17.20	3.90	21.10		
Chain 2		17.64	3.90	21.54		
Total	0.20			24.34	0.54	0.054
5.8 GHz						
Chain 1		16.00	4.20	20.20		
Chain 2		16.63	4.20	20.83		
Total	0.20			23.54	0.45	0.045