



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

CERTIFICATION TEST REPORT

FOR

802.11agn 3x3 MIMO PCIe Mini Card

MODEL NUMBER: WPEA-127N

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

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Prepared for
**VARIAN MEDICAL SYSTEMS, INC. X-RAY PRODUCTS
1678 SOUTH PIONEER ROAD
SALT LAKE CITY, UT84104**

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



NVLAP LAB CODE 200065-0

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--	11/08/11	Initial Issue	F. Ibrahim
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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: 802.11agn 3x3 MIMO PCIe Mini Card

MODEL: WPEA-127N

SERIAL NUMBER: 11735M1100680

DATE TESTED: SEPTEMBER 20 to OCTOBER 13, 2011

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 9	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

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

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

Approved & Released For UL CCS By:



FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

Tested By:



WILLIAM ZHUANG
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, 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:

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

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/g/n 3x3 MIMO transceiver 3x3 module.

The radio module is manufactured by SparkLAN.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5180 - 5240	802.11a CDD	10.68	11.69
5180 - 5240	802.11n HT20 CDD MCS0	14.70	29.51
5180 - 5240	802.11n HT20 CDD MCS8	14.65	29.17
5180 - 5240	802.11n HT20 CDD MCS16	14.75	29.85
5190 - 5230	802.11n HT40 CDD MCS0	16.96	49.66
5190 - 5230	802.11n HT40 CDD MCS8	16.99	50.00
5190 - 5230	802.11n HT40 CDD MCS16	16.97	49.77

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The EUT can be used with the following antennas:

- Monopole Antenna with the following gains:
2.4 GHz band = 4 dBi
5.2 GHz band = 5 dBi
5.8 GHz band = 4.5 dBi
- Fractal/stacked-patch Antenna with the following gains:
2.4 GHz band = -6 dBi
5.2 GHz band = 3 dBi
5.8 GHz band = -1 dBi

5.4. SOFTWARE AND FIRMWARE

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

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

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

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

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

2.4 GHz Band:

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

5.2 GHz Band:

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

5.8 GHz Band:

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

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

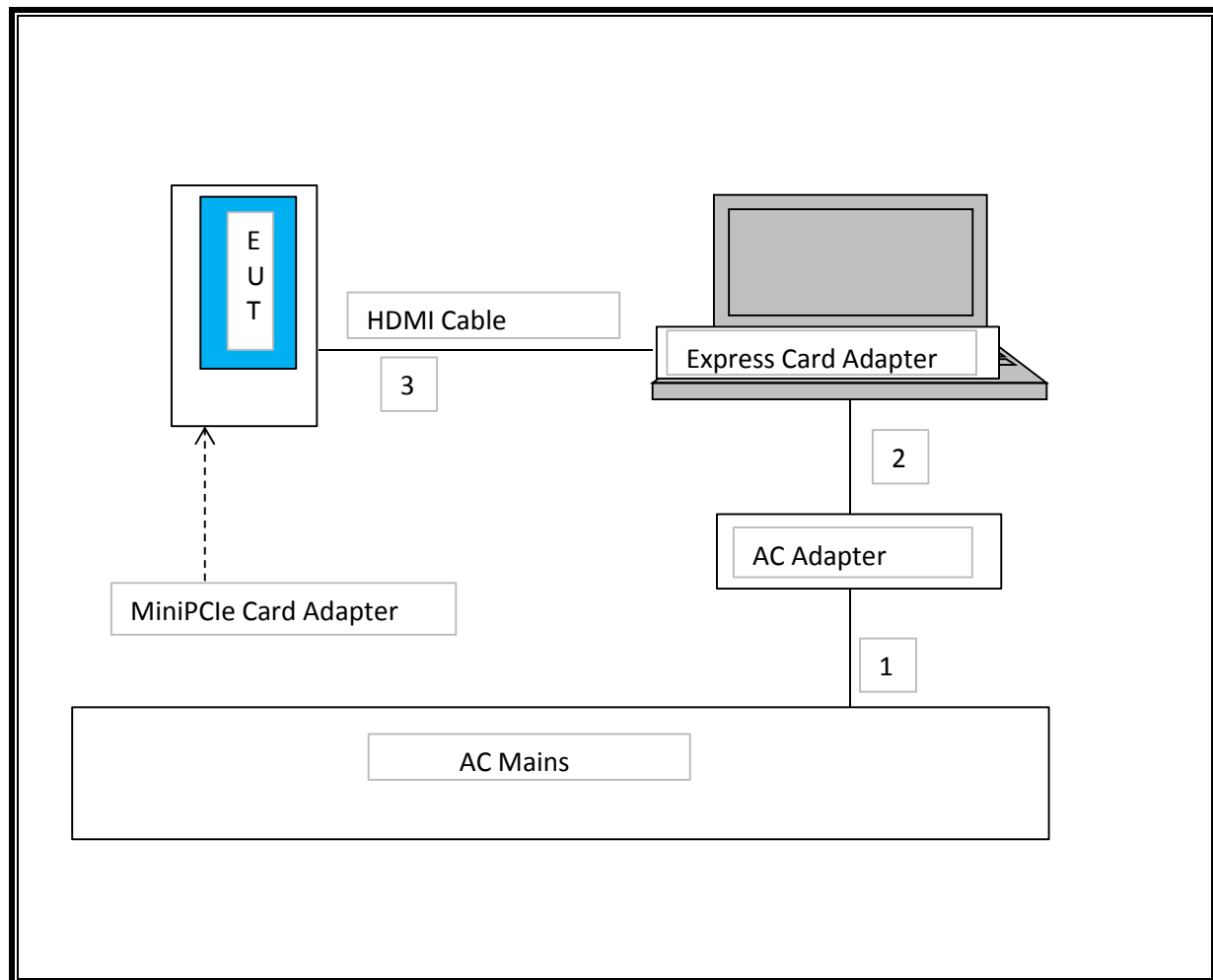
I/O CABLES

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

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	12/17/10	12/17/12
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/30/10	08/30/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	07/12/10	07/16/12
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/10	06/29/12
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	01/29/10	07/29/12
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	06/29/10	06/14/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/14/10	01/27/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/27/11	01/27/12
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	07/14/10	8/2/2012
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/10	11/10/11
Reject Filter, 5.15-5.35 GHz	Micro-Tronics	BRC13190	N02680	CNR	CNR
Power Meter	HP	437B	CCS-154	07/29/11	10/29/12
Power Sensor, 18 GHz	HP	8481A	CCS-157	07/29/11	10/29/12

7. ANTENNA PORT TEST RESULTS

7.1. 802.11a 3TX MODE

7.1.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	21.837	16.6900
Middle	5200	21.334	16.6605
High	5240	21.662	16.6903

CHAIN 2

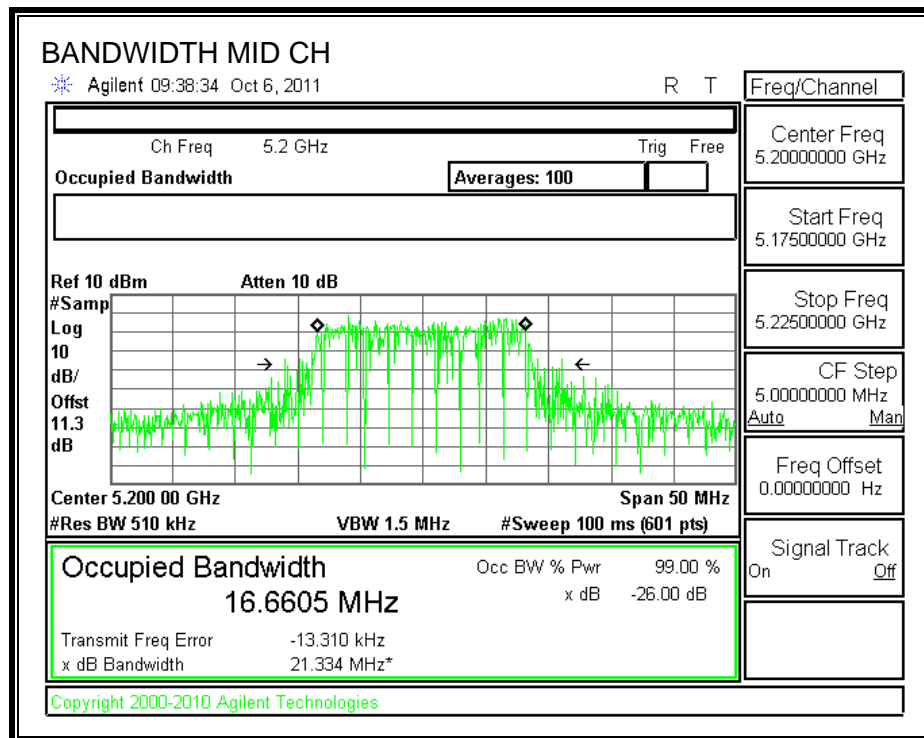
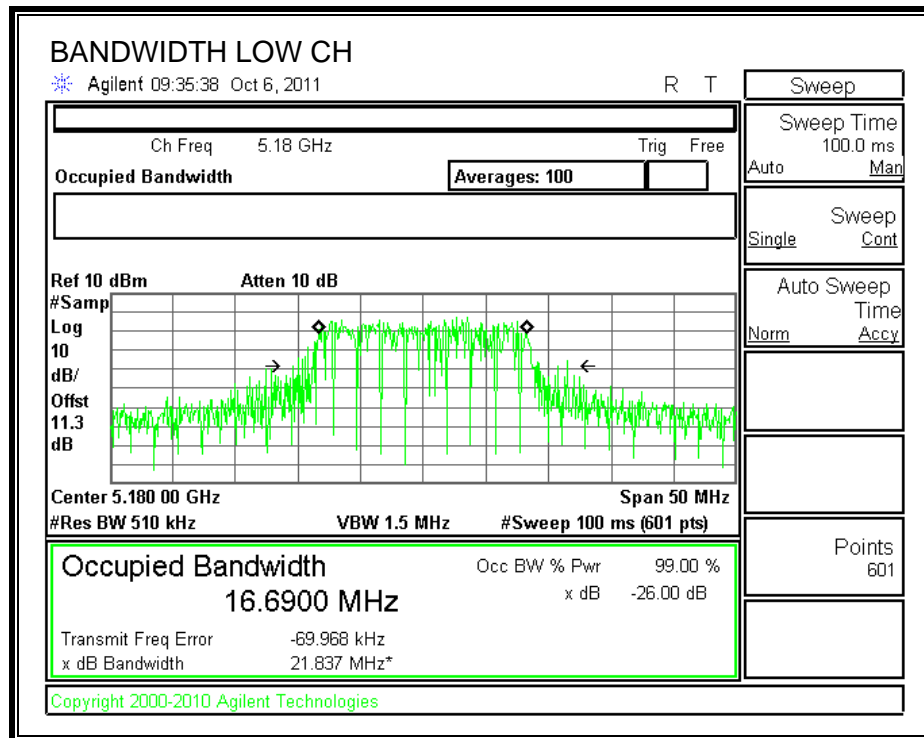
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	21.974	16.7056
Middle	5200	21.300	16.6598
High	5240	21.421	16.7092

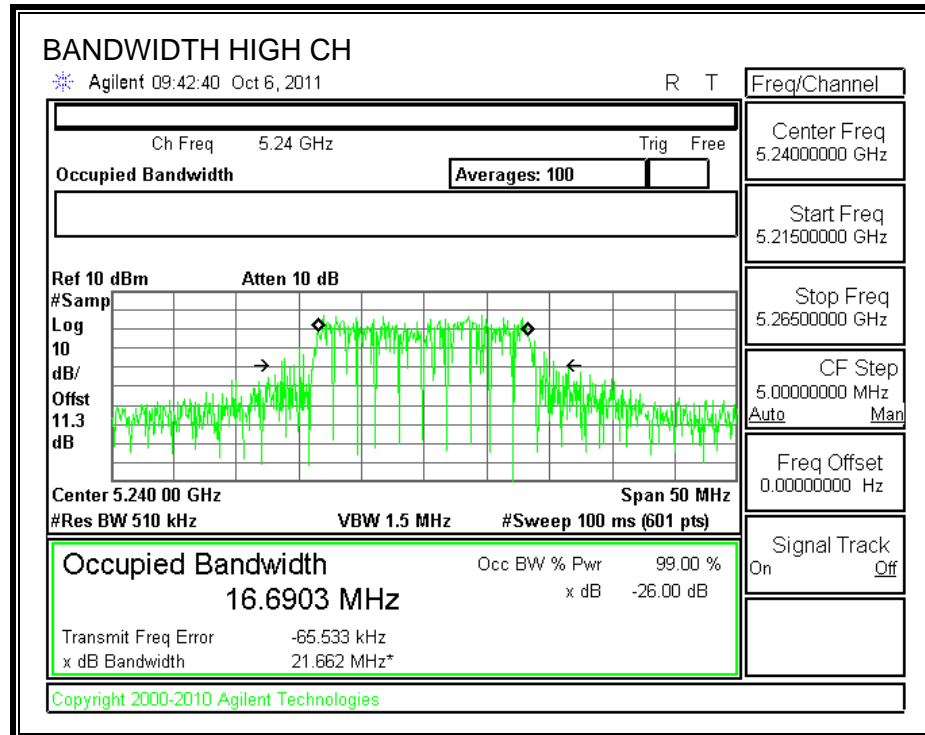
CHAIN 3

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	21.352	16.6729
Middle	5200	21.574	16.6614
High	5240	21.365	16.7030

CHAIN 1

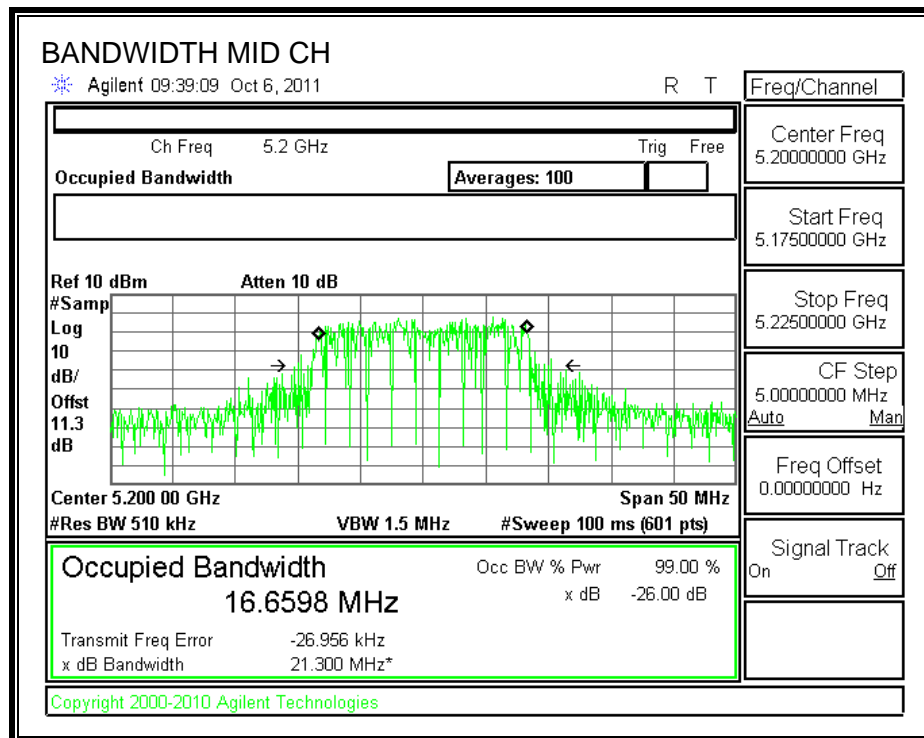
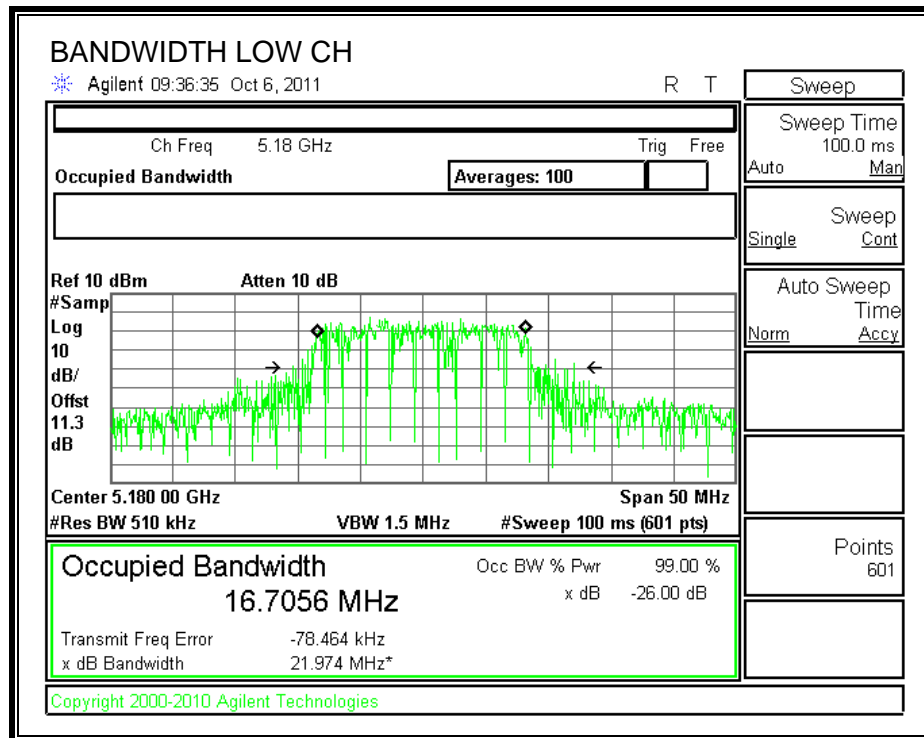
26 dB and 99% BANDWIDTH

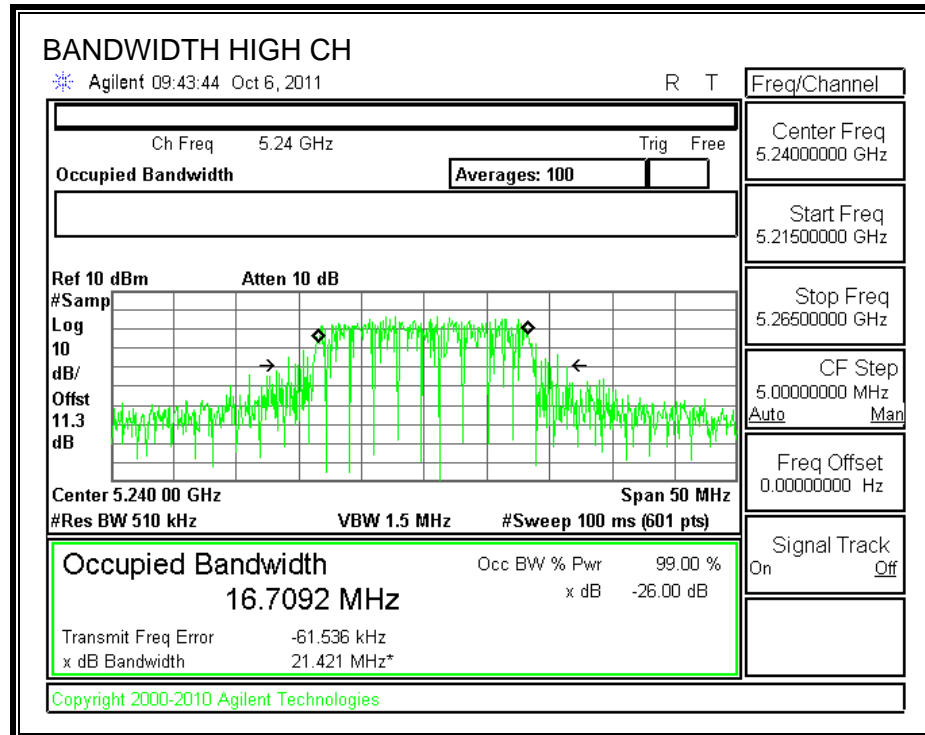




CHAIN 2

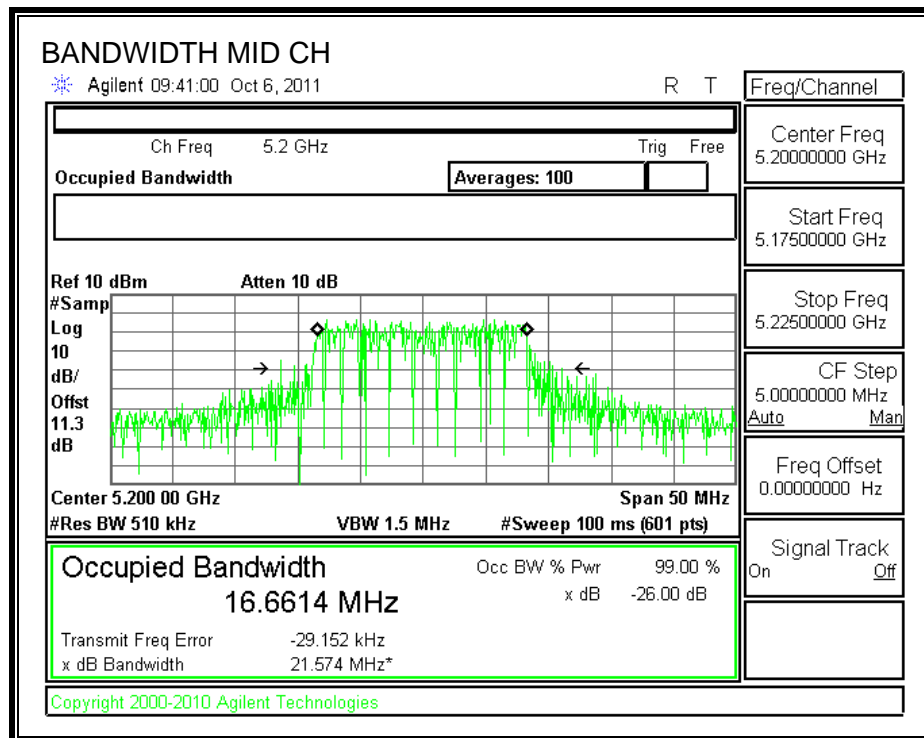
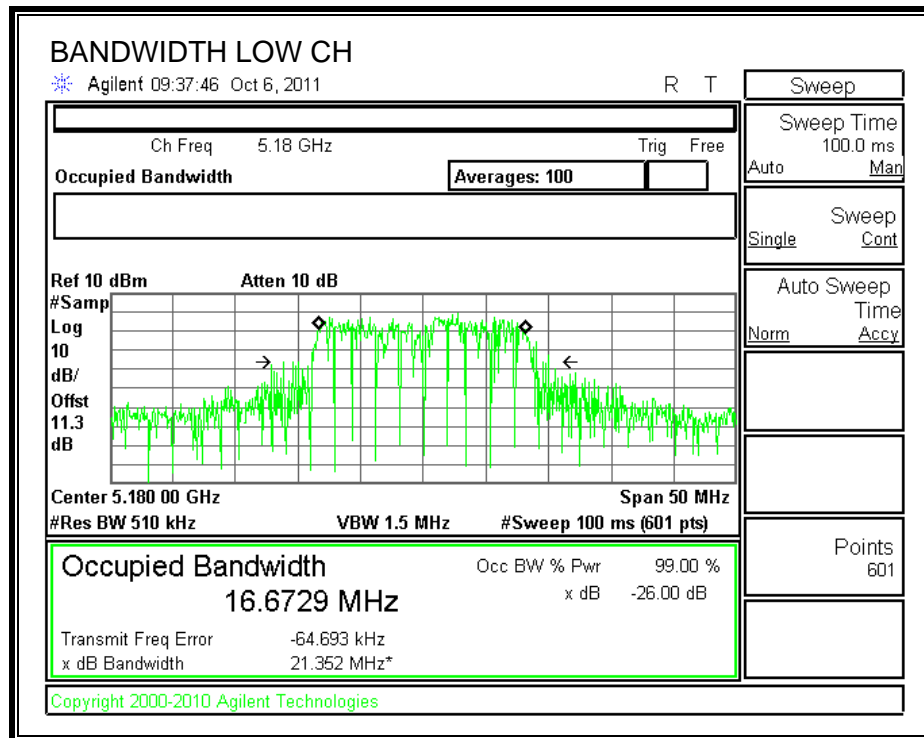
26 dB and 99% BANDWIDTH

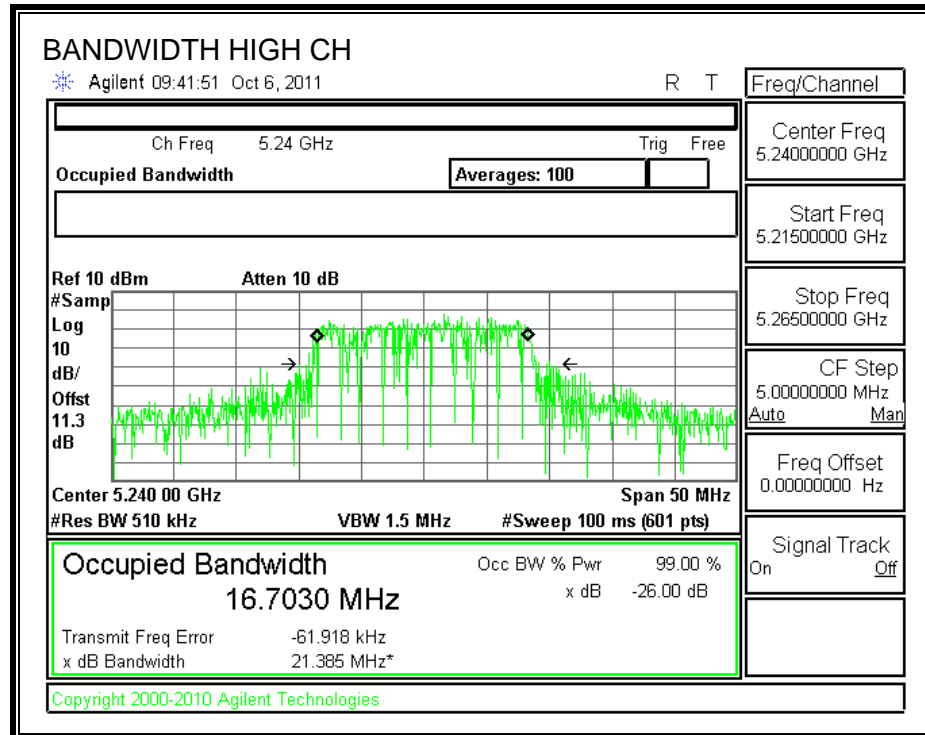




CHAIN 3

26 dB and 99% BANDWIDTH





7.1.1. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
5	4.77	9.77

For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

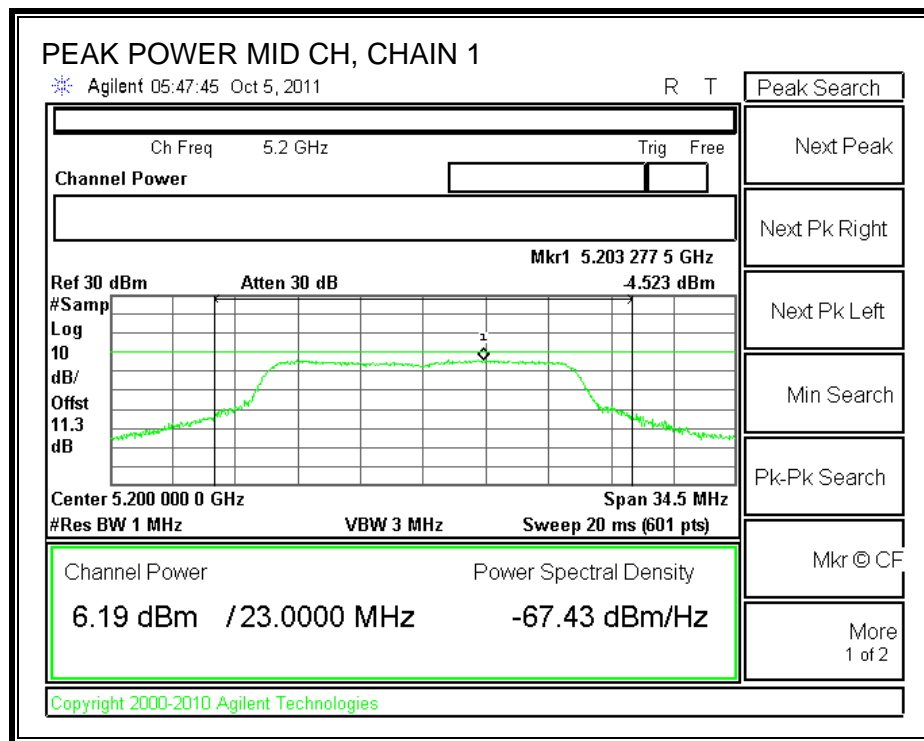
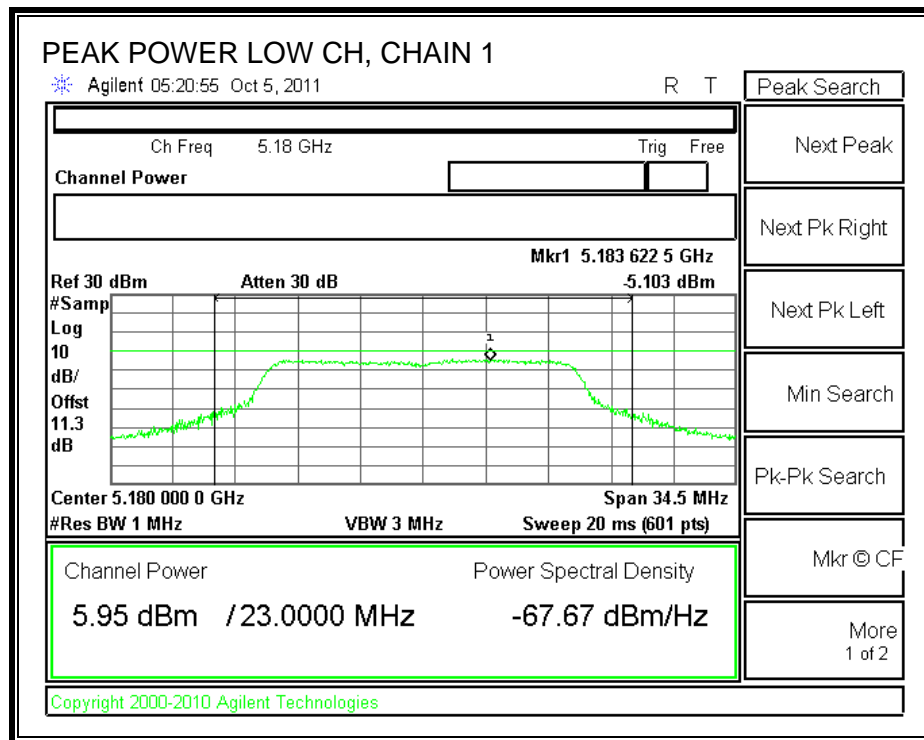
Limit

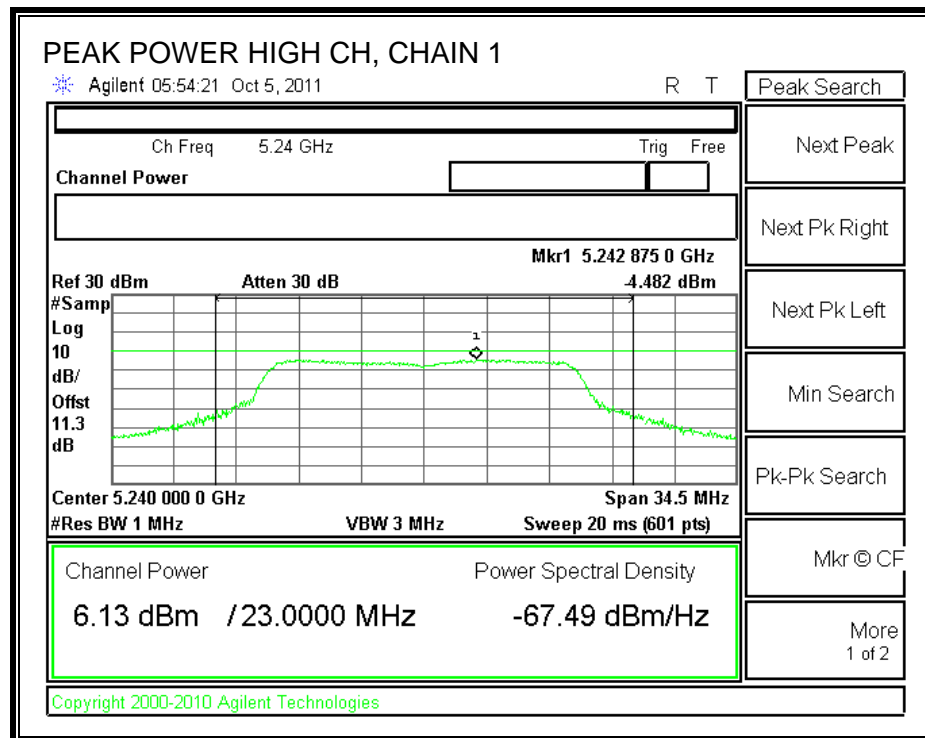
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Effective Ant. Gain (dBi)	Limit (dBm)
Low	5180	16.99	21.974	17.42	9.77	13.22
Mid	5200	16.99	21.3	17.28	9.77	13.22
High	5240	16.99	21.365	17.30	9.77	13.22

Individual Chain Results

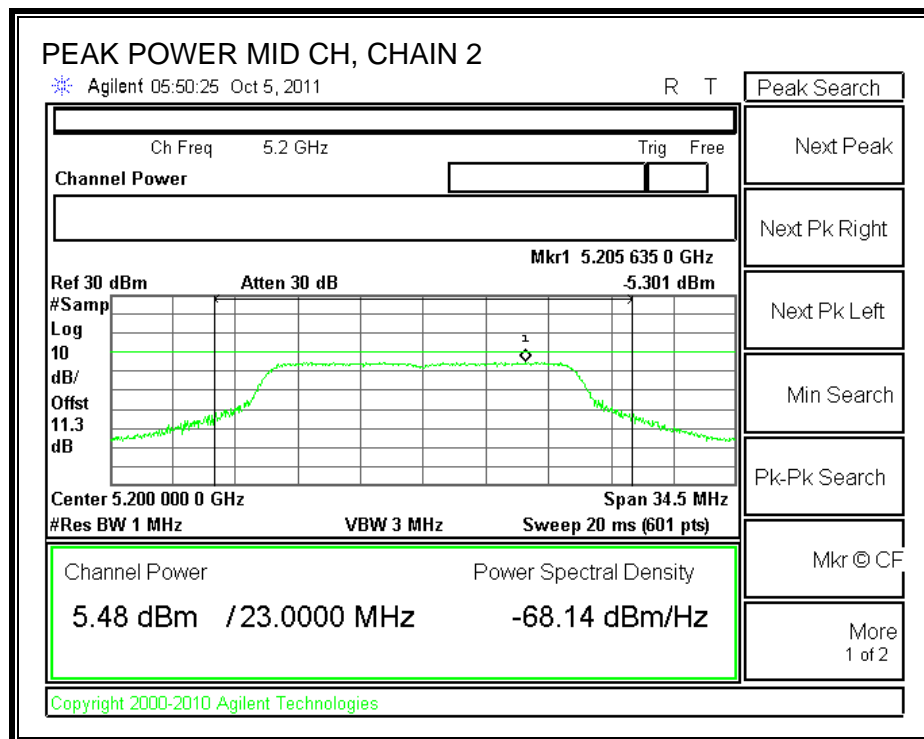
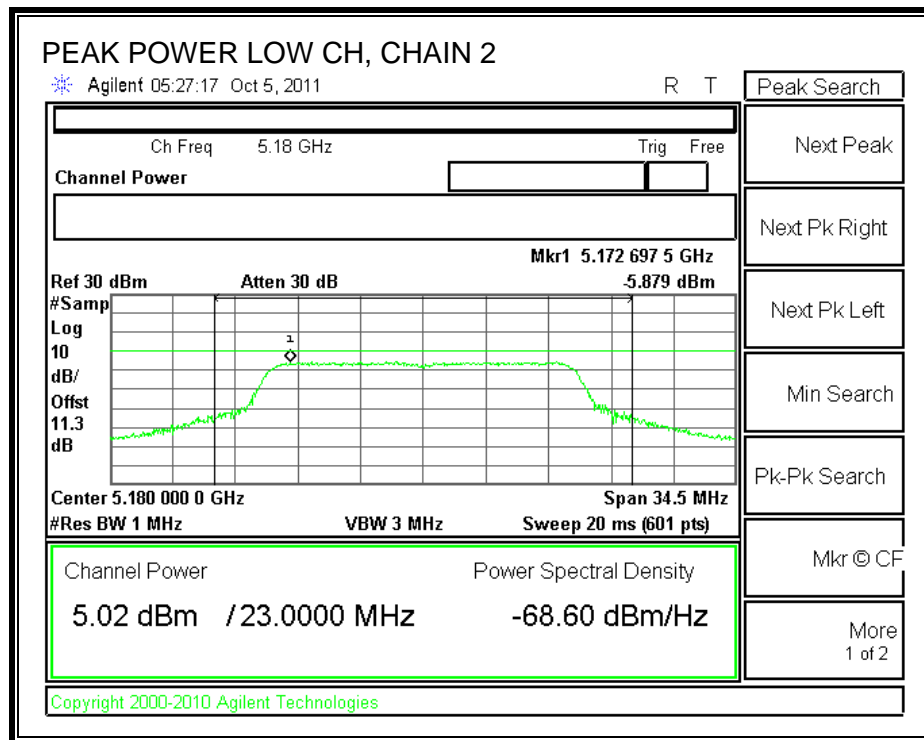
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	5.95	5.02	6.40	10.60	13.22	-2.62
Mid	5200	6.19	5.48	5.51	10.51	13.22	-2.71
High	5240	6.13	5.49	6.07	10.68	13.22	-2.54

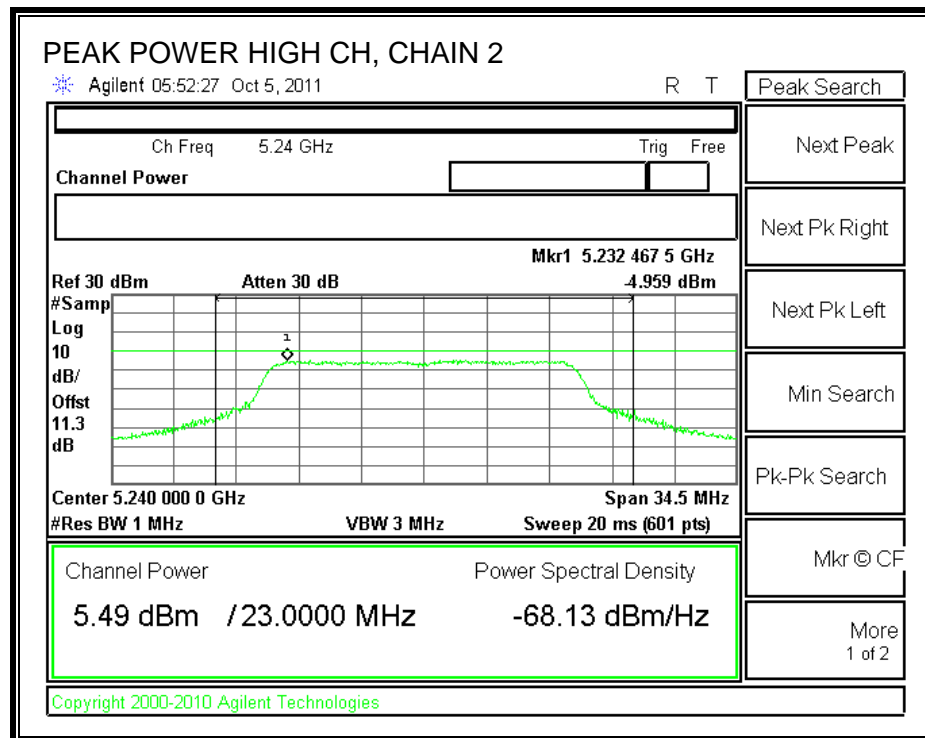
CHAIN 1 OUTPUT POWER



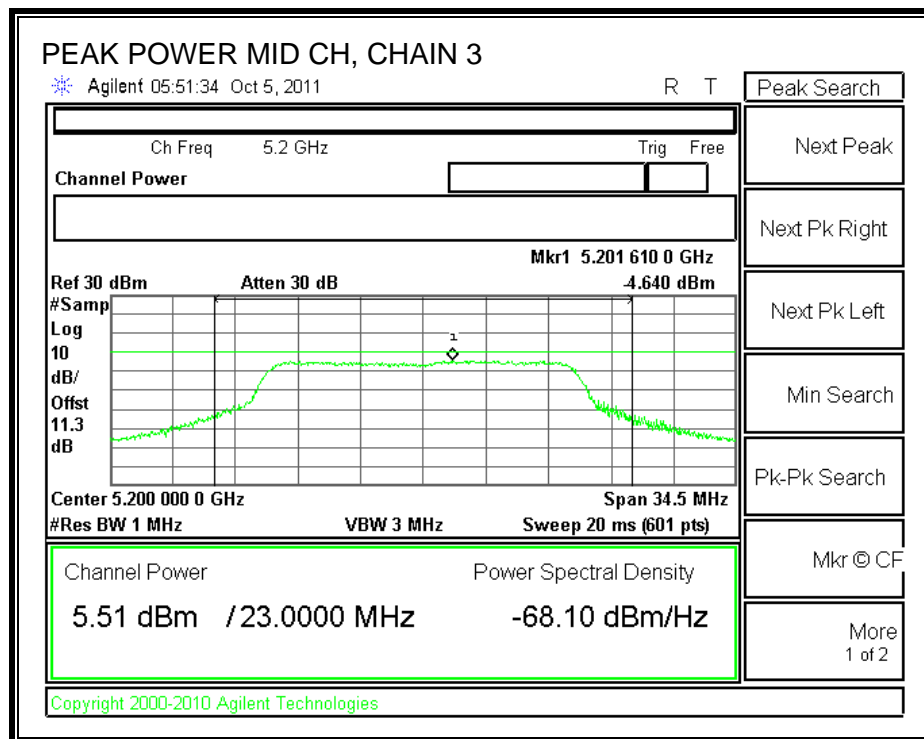
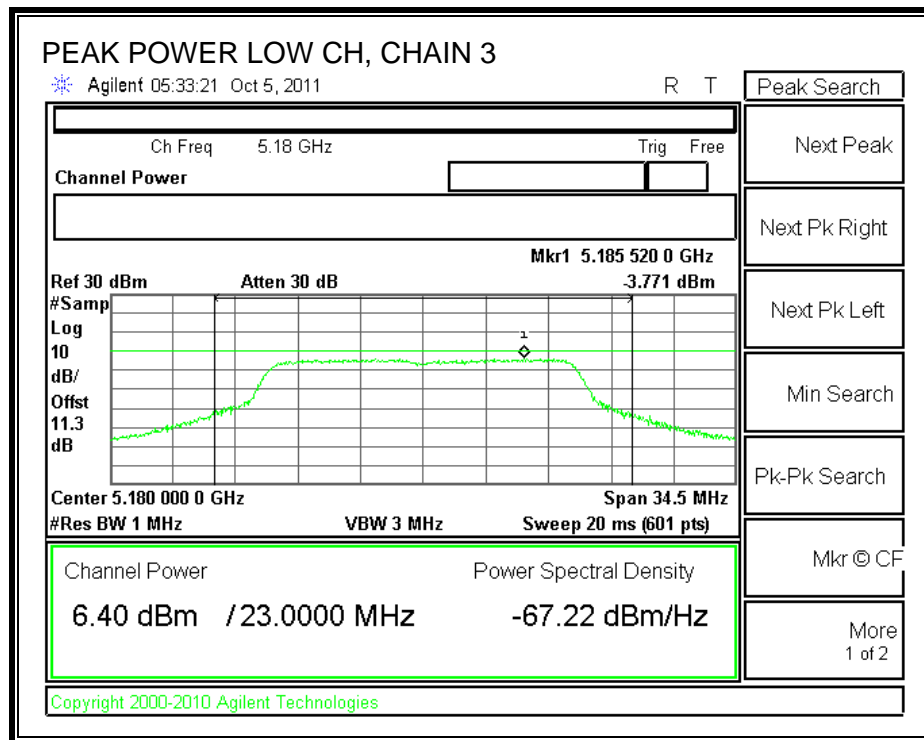


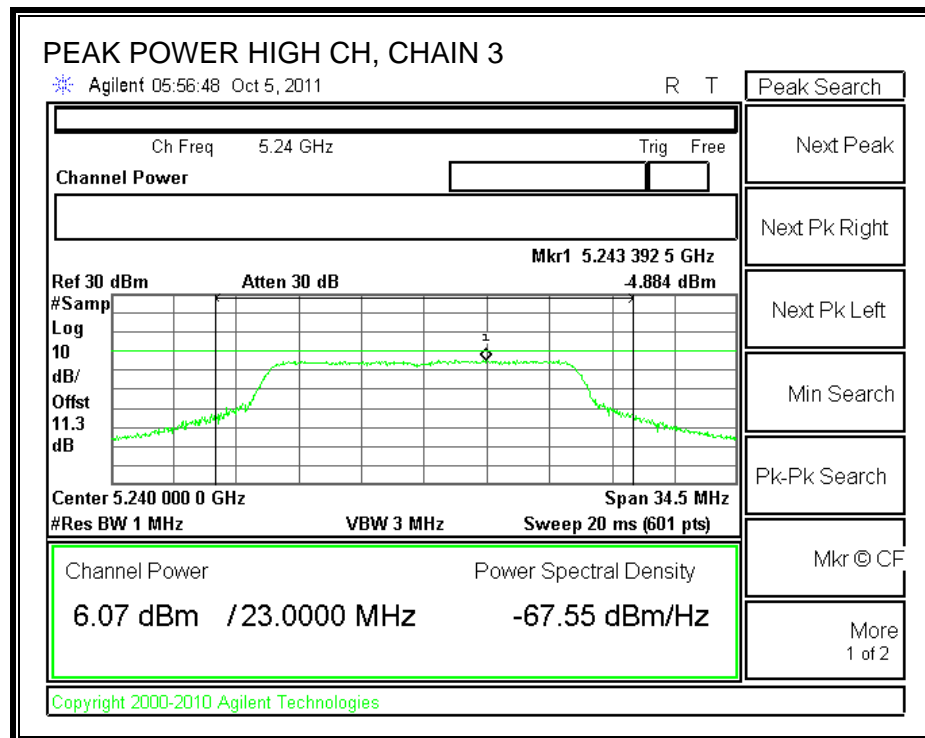
CHAIN 2 OUTPUT POWER





CHAIN 3 OUTPUT POWER





7.1.2. 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 11.3dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	5180	5.83	5.10	6.20	10.50
Middle	5200	5.97	5.34	5.90	10.52
High	5240	5.90	5.30	5.75	10.43

7.1.3. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
5	4.77	9.77

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum effective antenna gain is 9.77 dBi, therefore the limit is 0.23 dBm.

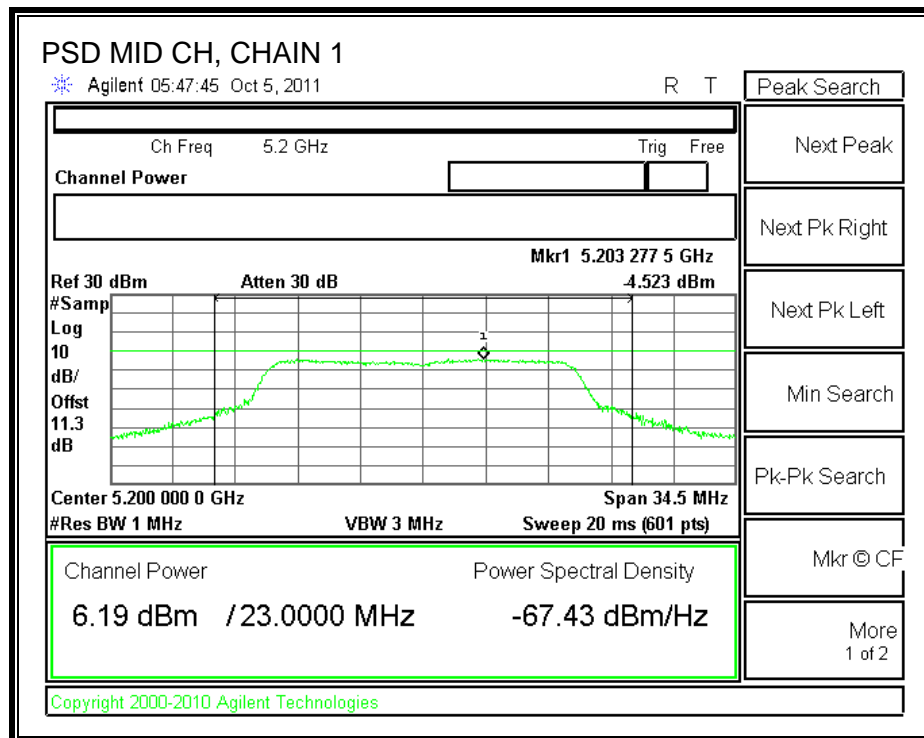
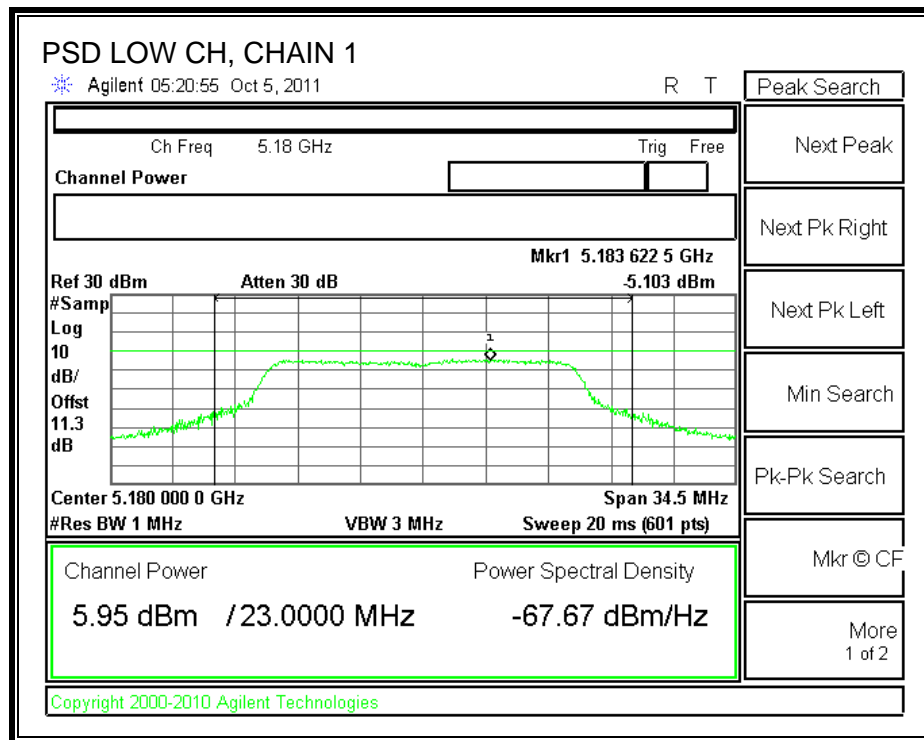
TEST PROCEDURE

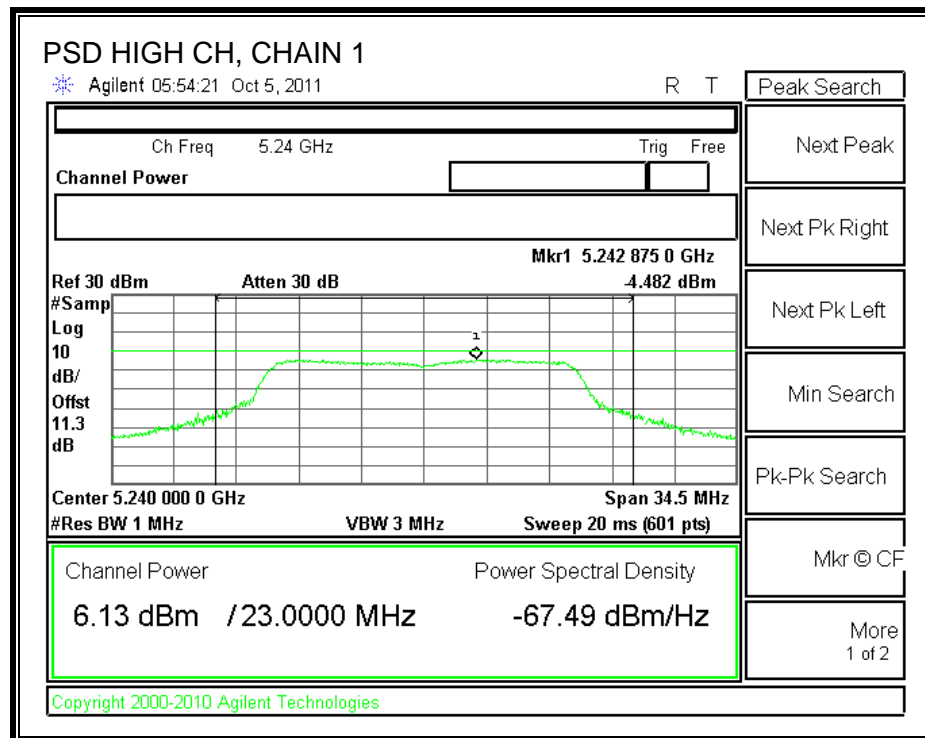
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

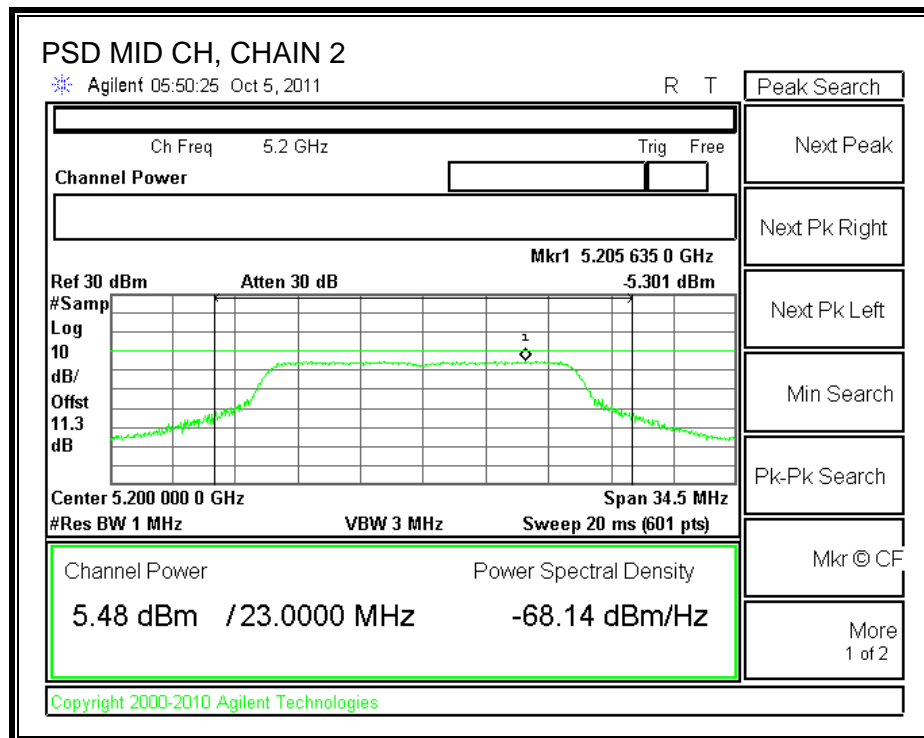
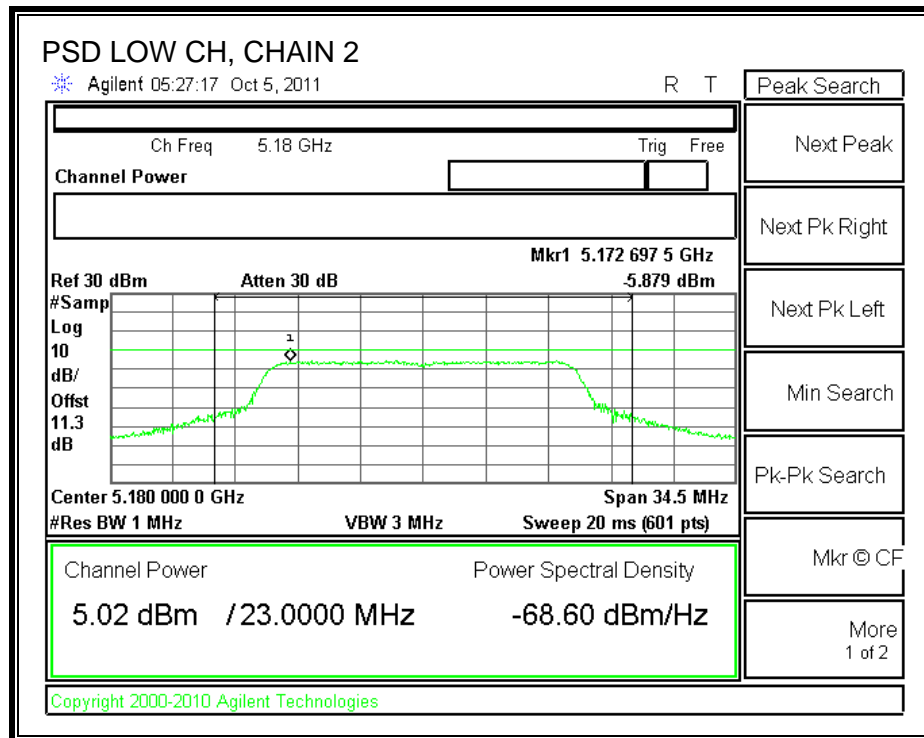
Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Chain 3 PPSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	-5.103	-5.879	-3.771	-0.06	0.23	-0.29
Middle	5200	-4.523	-5.301	-4.640	-0.04	0.23	-0.27
High	5240	-4.482	-4.959	-4.884	0.00	0.23	-0.23

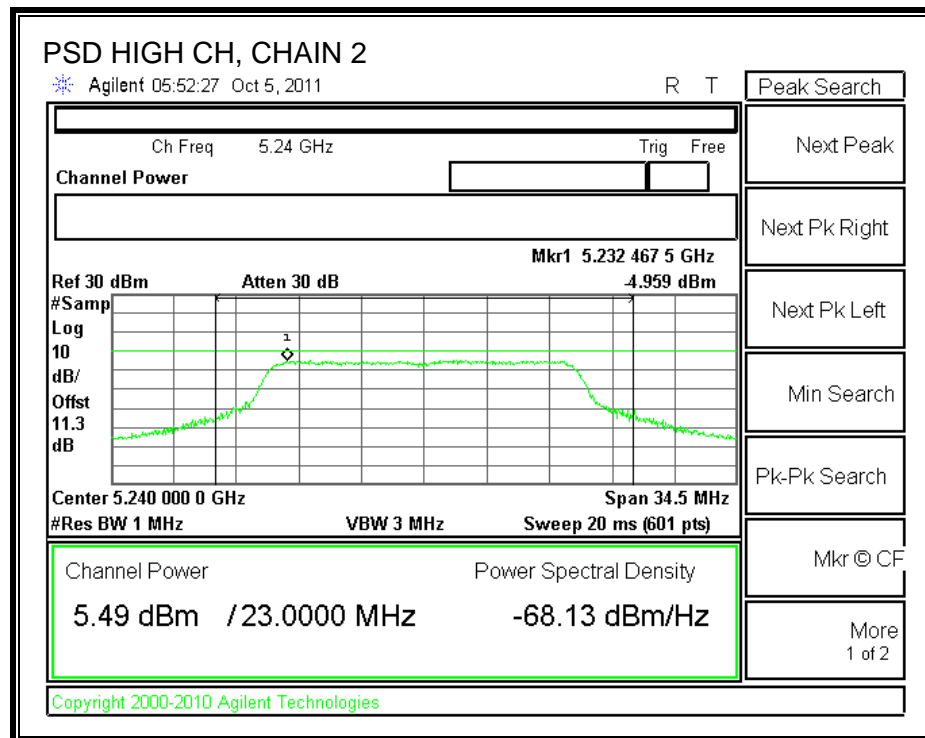
CHAIN 1 POWER SPECTRAL DENSITY



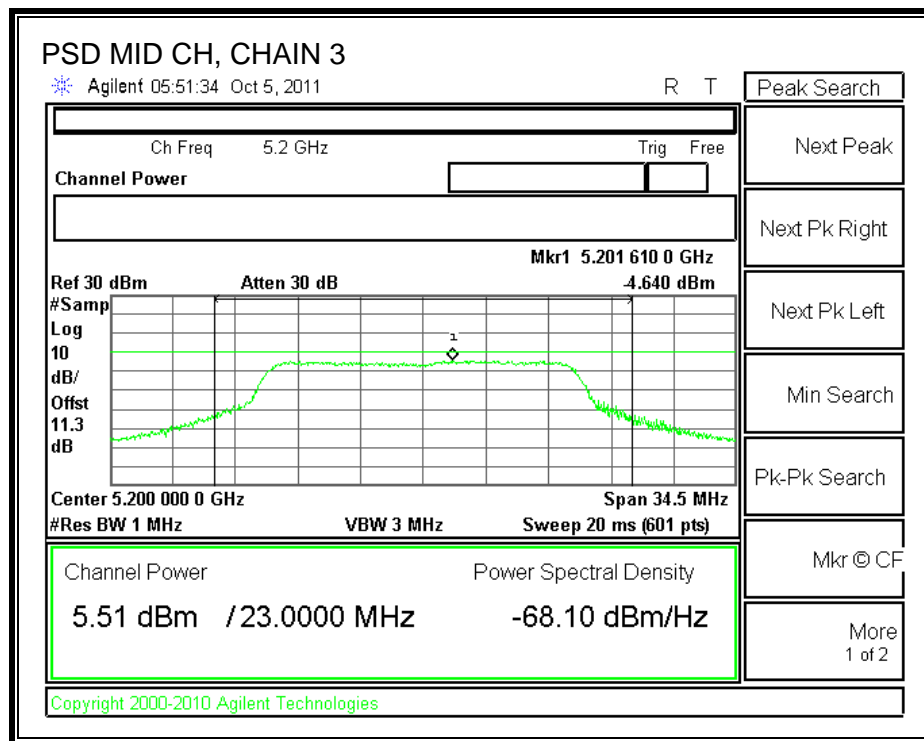
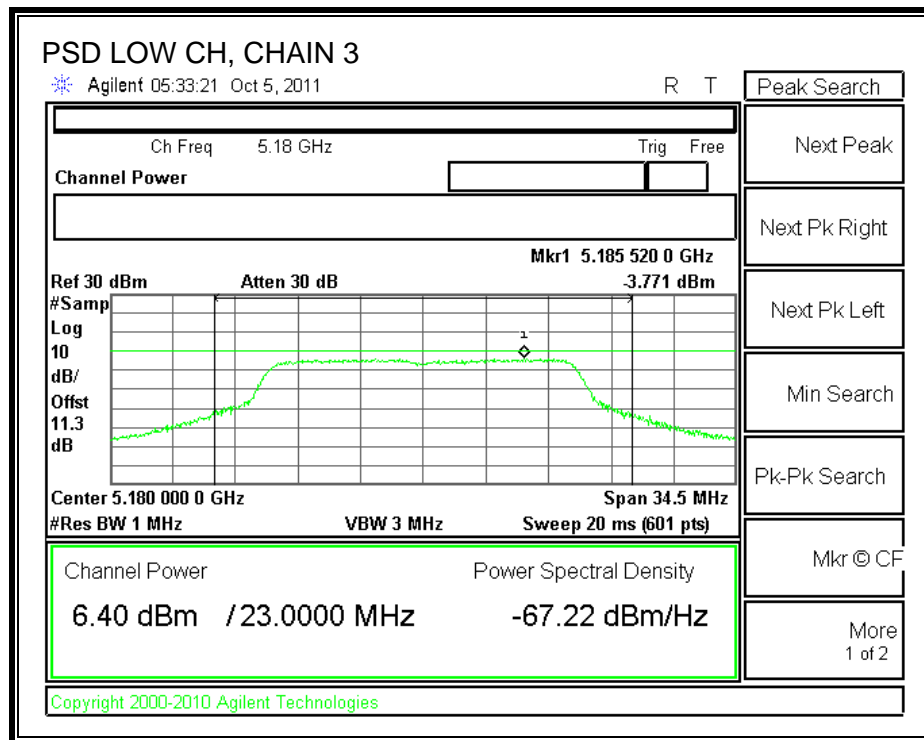


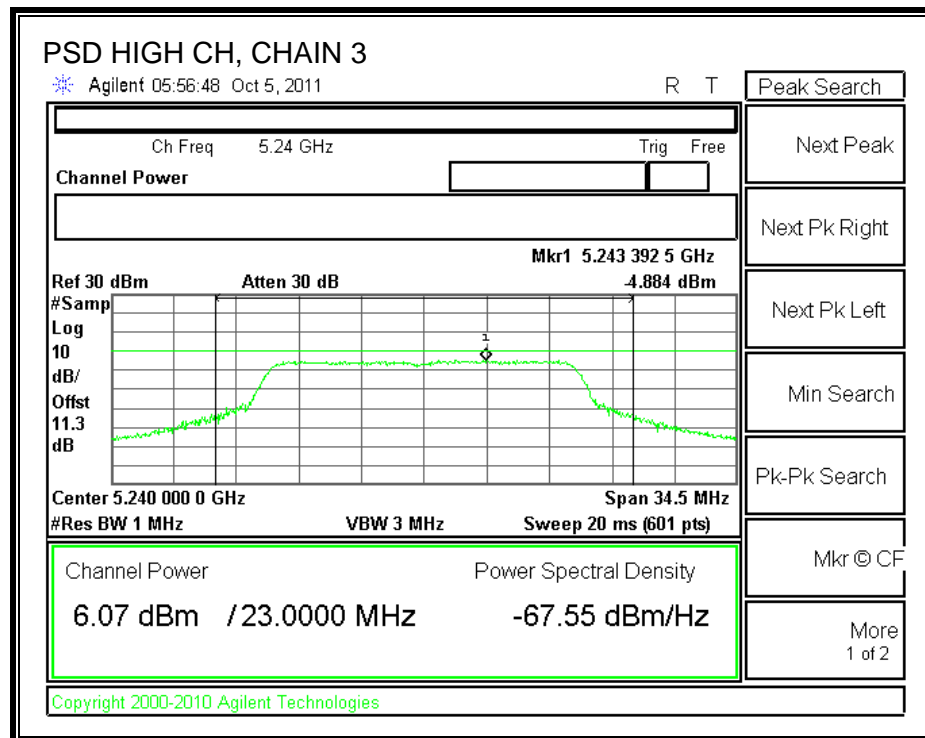
CHAIN 2 POWER SPECTRAL DENSITY





CHAIN 3 POWER SPECTRAL DENSITY





7.1.4. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	11.31	13	-1.69
Middle	5200	9.38	13	-3.62
High	5240	10.81	13	-2.19

CHAIN 2

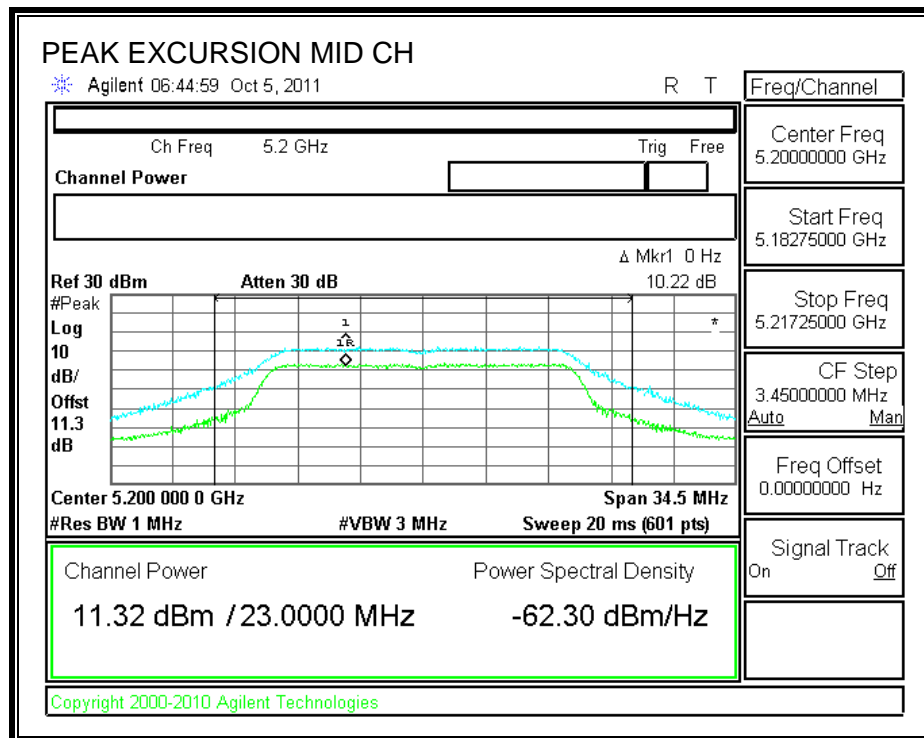
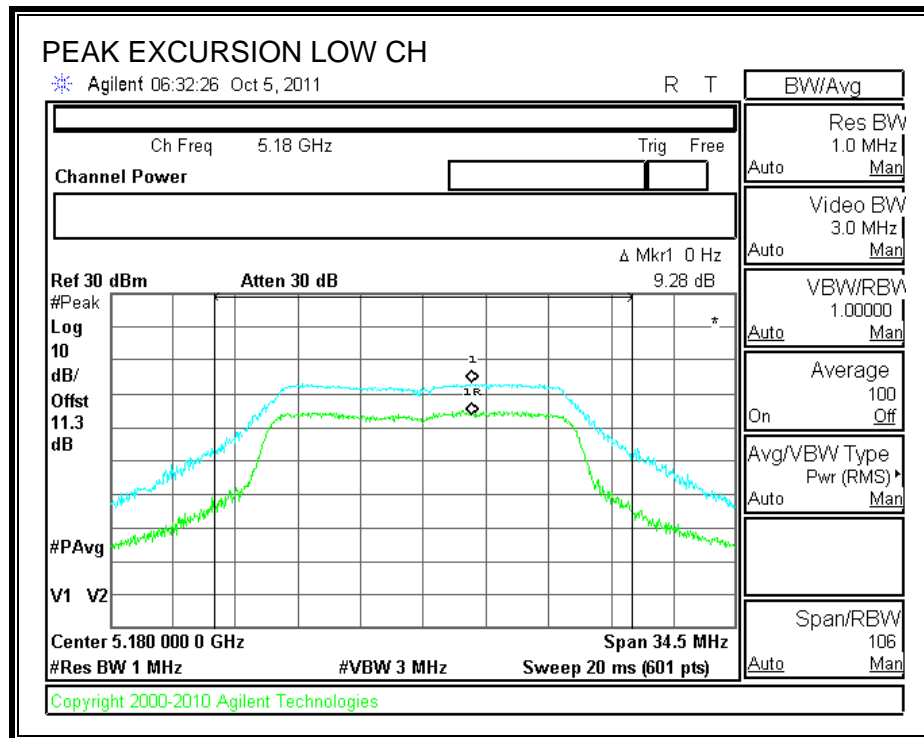
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.39	13	-2.61
Middle	5200	10.76	13	-2.24
High	5240	10.41	13	-2.59

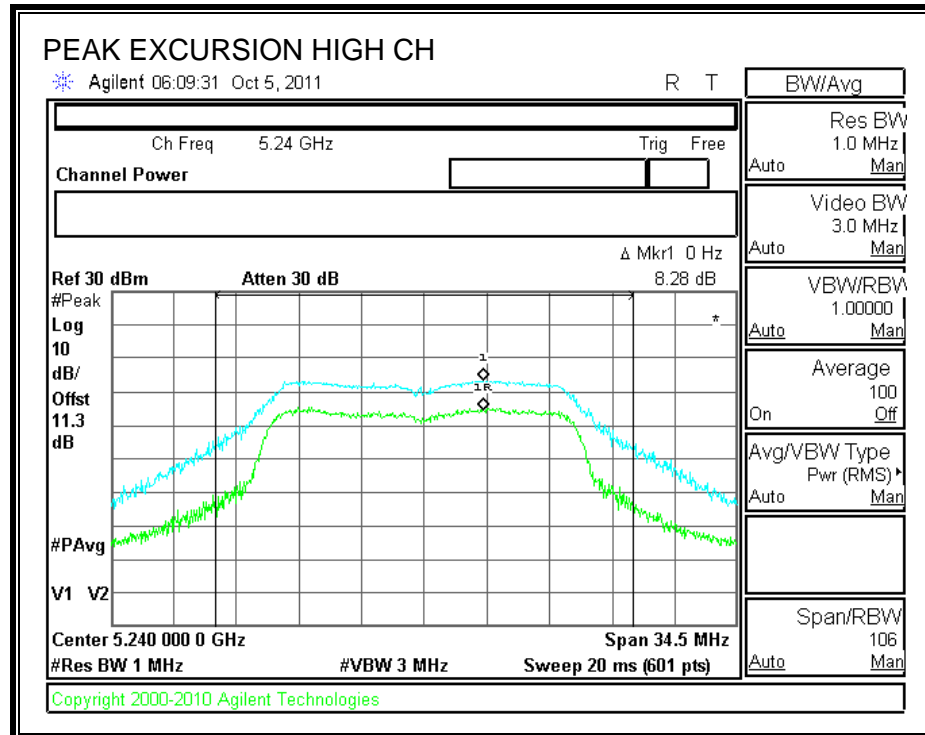
CHAIN 3

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.39	13	-2.61
Middle	5200	10.76	13	-2.24
High	5240	10.41	13	-2.59

CHAIN 1

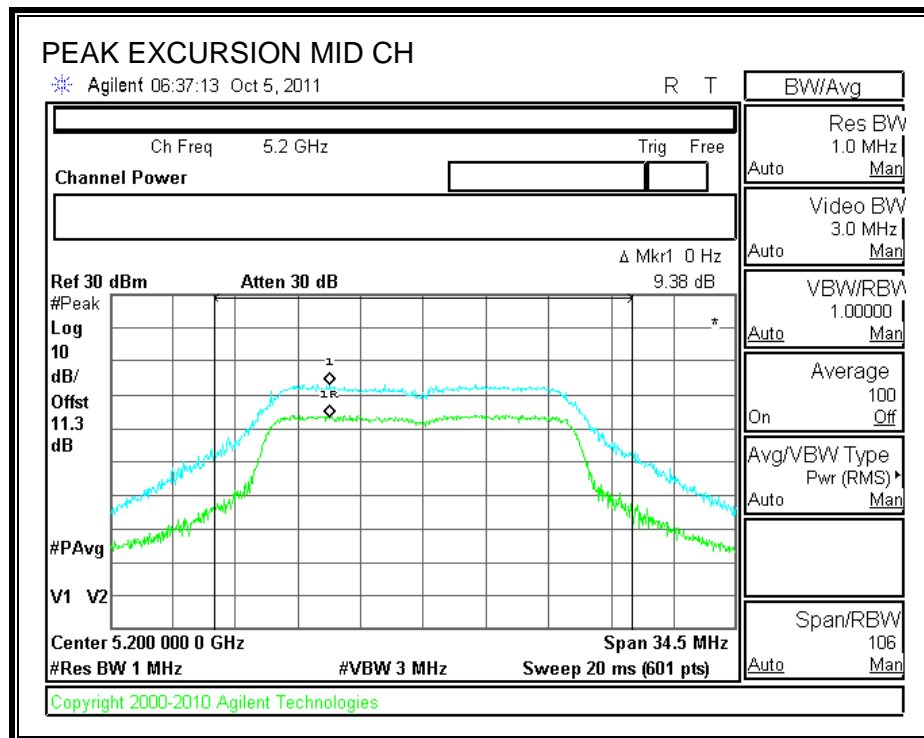
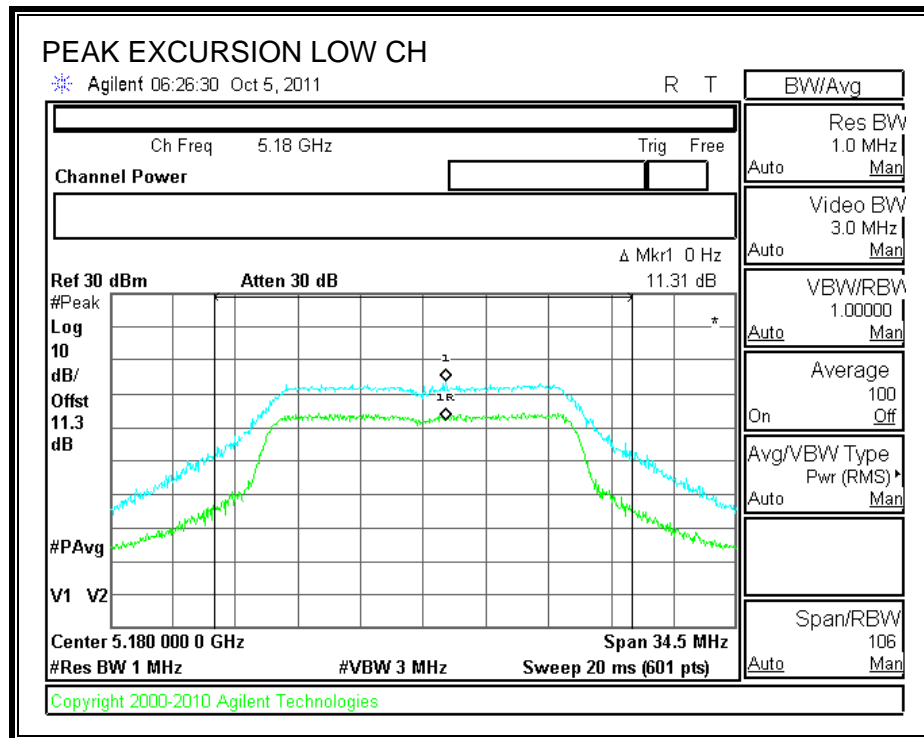
PEAK EXCURSION

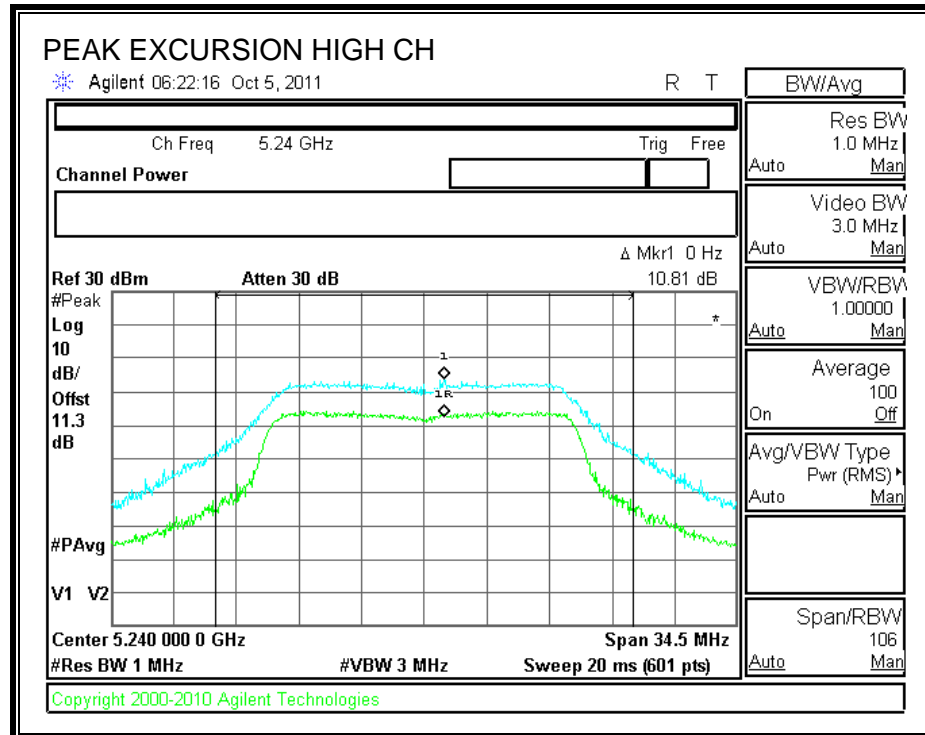




CHAIN 2

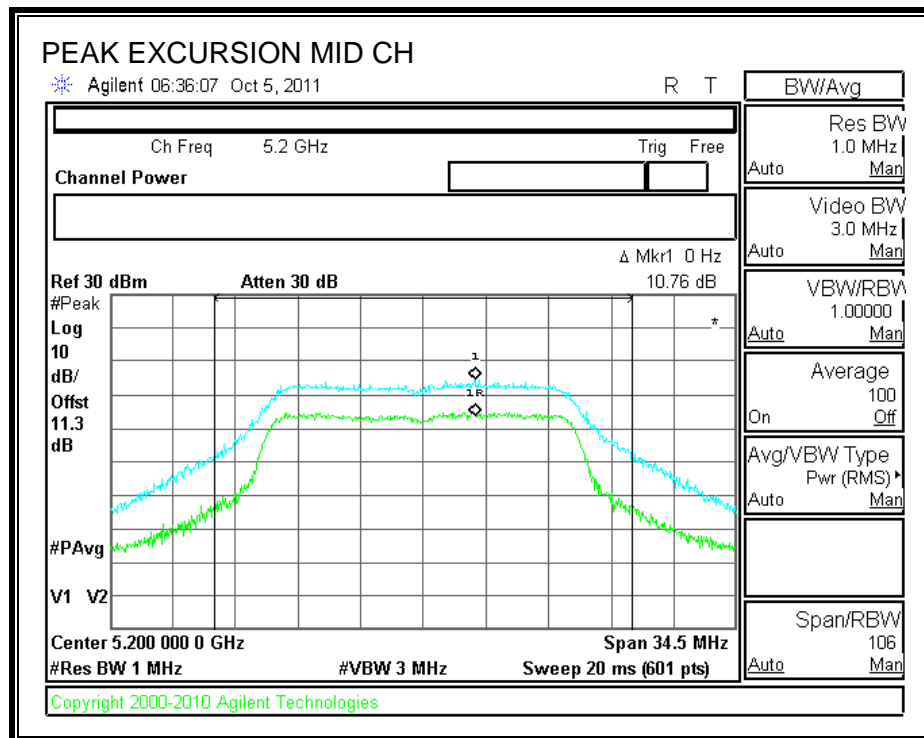
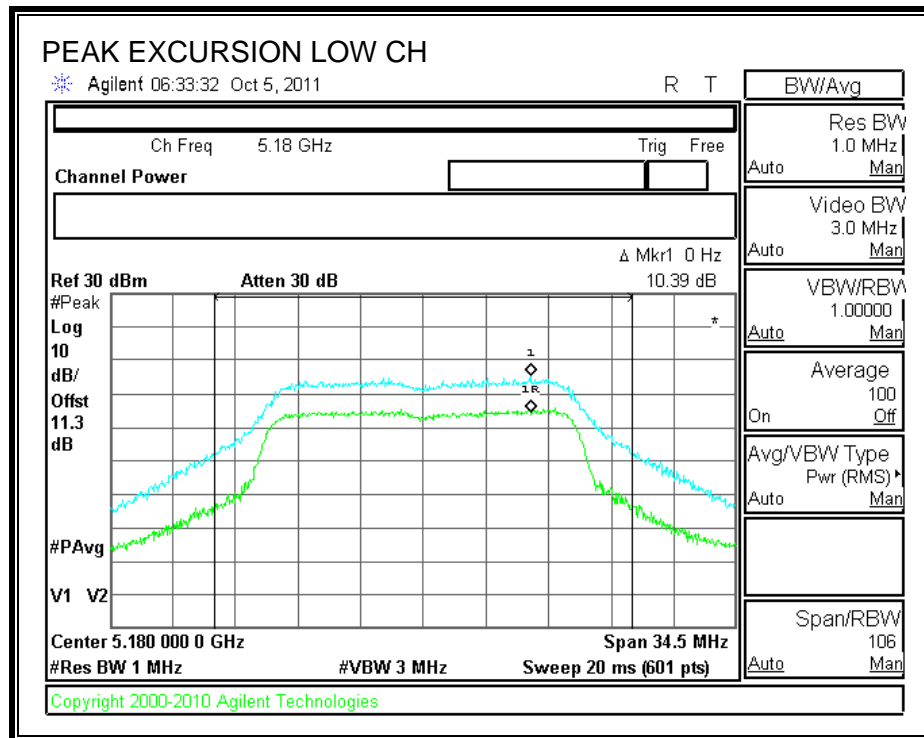
PEAK EXCURSION

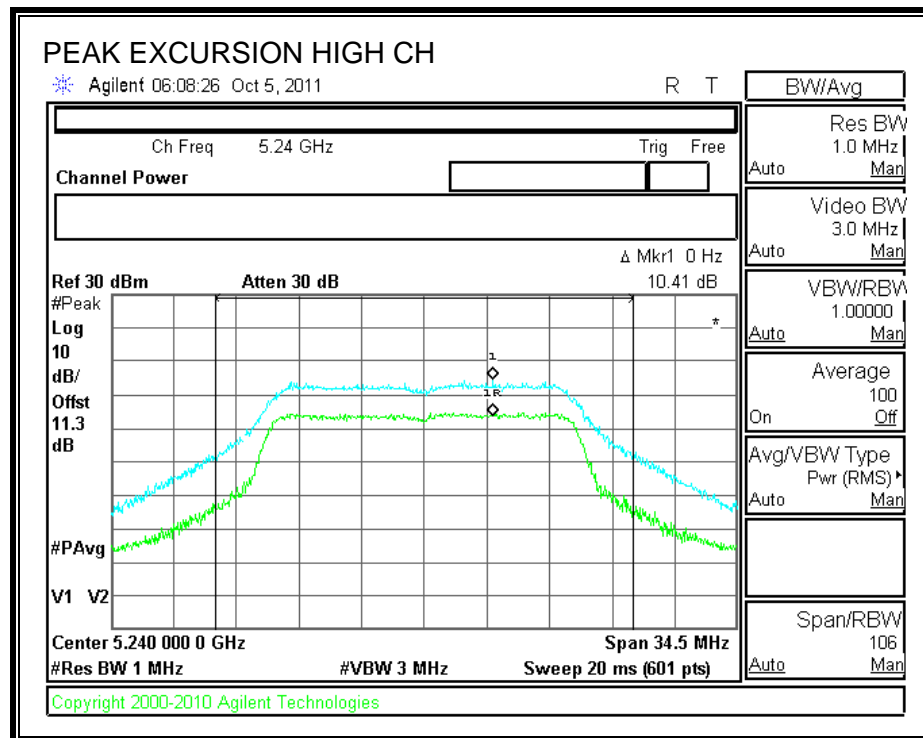




CHAIN 3

PEAK EXCURSION





7.1.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 3 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

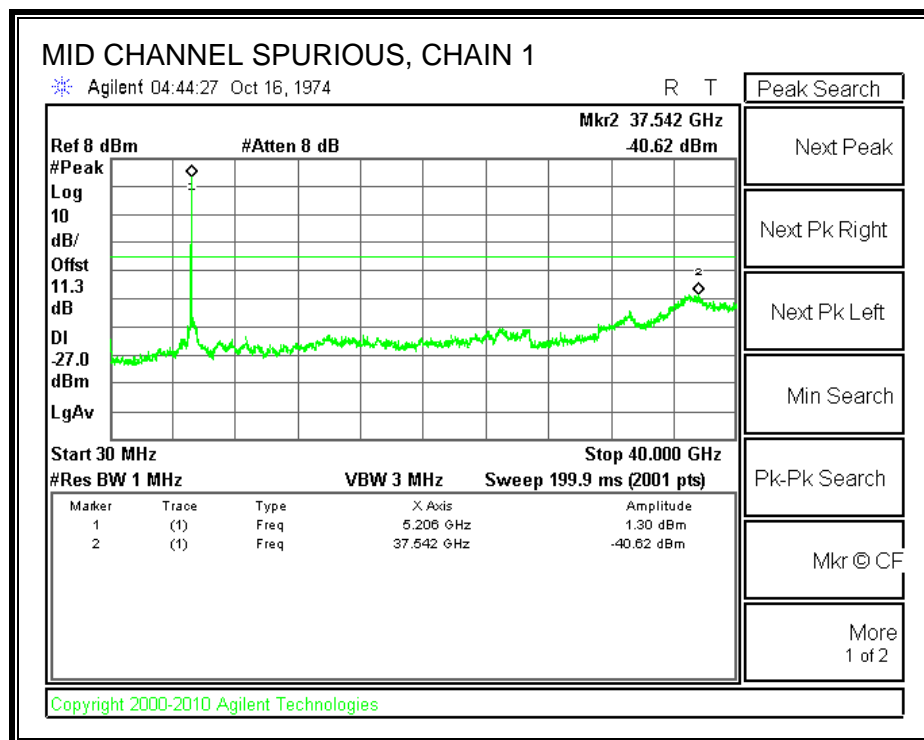
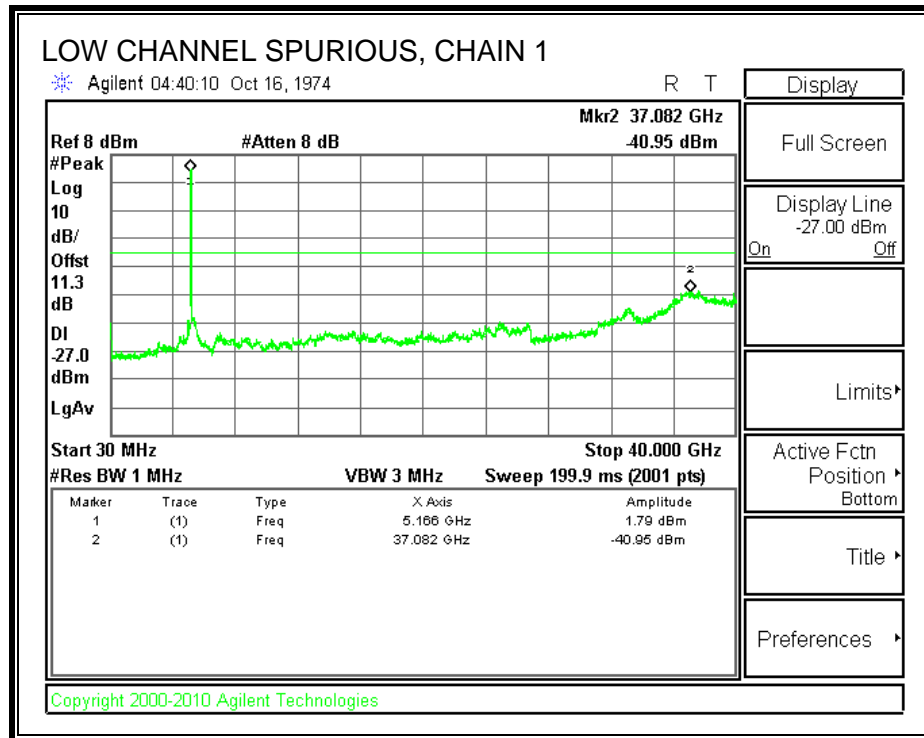
RESULTS

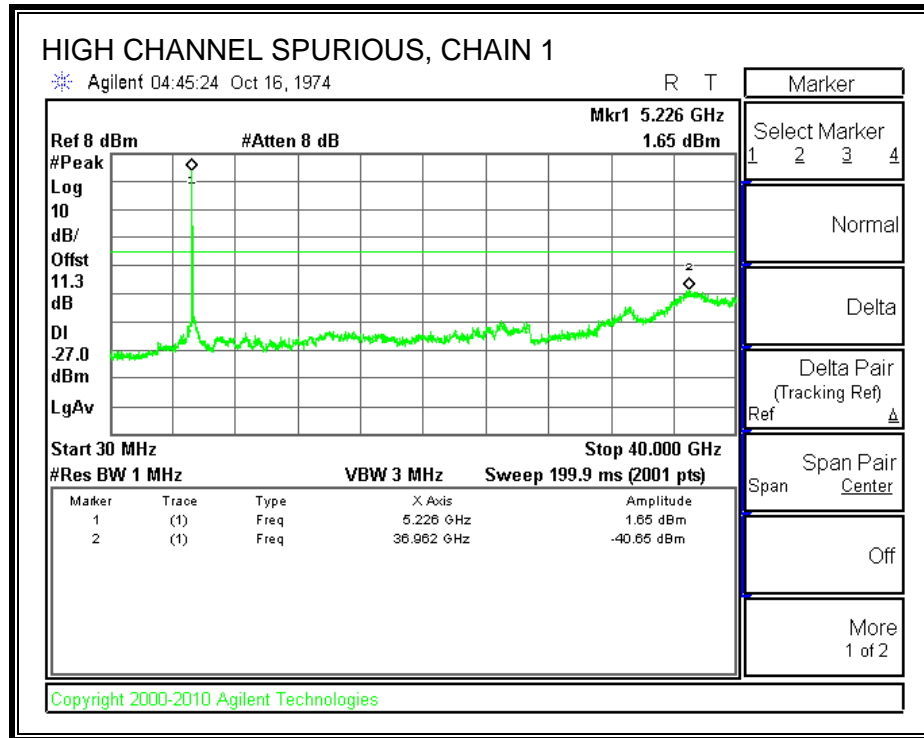
Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	10Log (N)	Cond Spur Level (dBm)	Limit (dBm)
37.082	-40.95	5.00	4.77	-31.18	-27.00
37.542	-40.62	5.00	4.77	-30.85	-27.00
36.962	-40.65	5.00	4.77	-30.88	-27.00

Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
36.782	-40.49	5.00	4.77	-30.72	-27.00
36.842	-40.20	5.00	4.77	-30.43	-27.00
36.942	-41.08	5.00	4.77	-31.31	-27.00

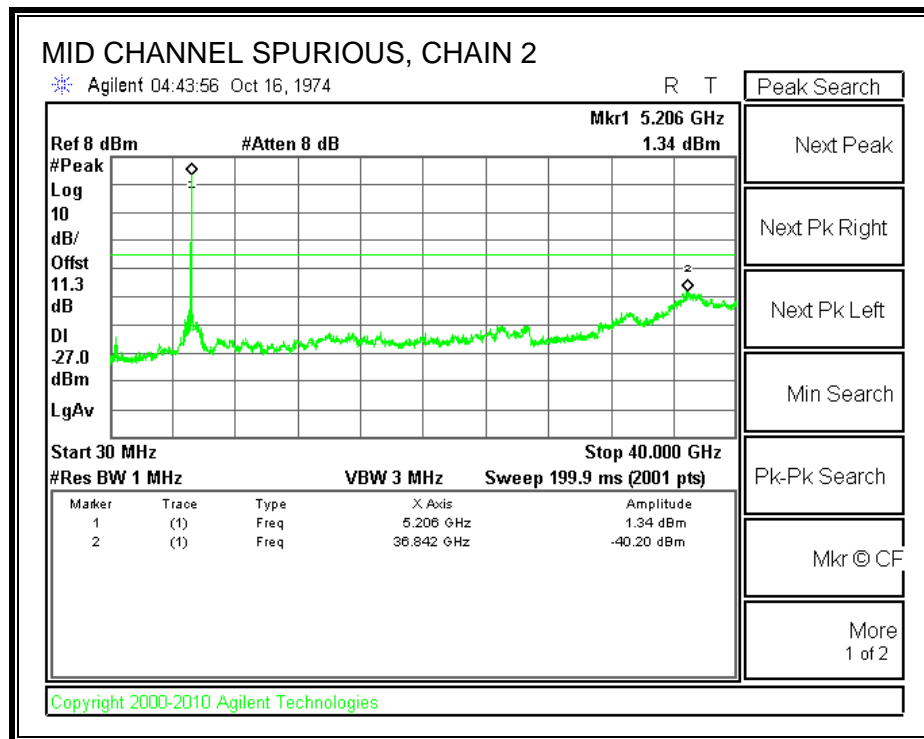
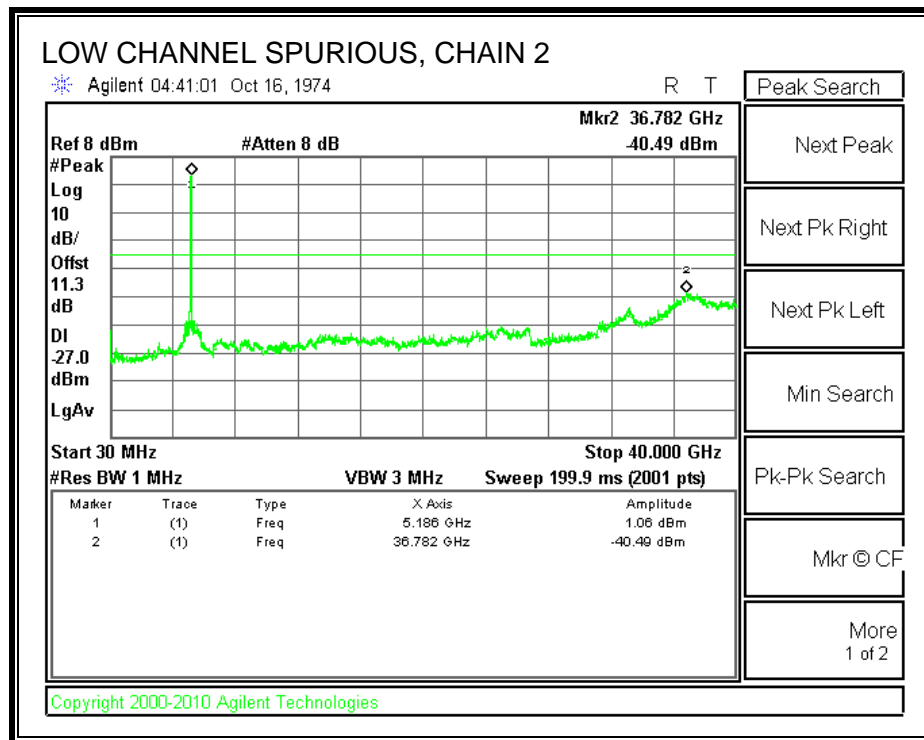
Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
36.842	-40.22	5.00	4.77	-30.45	-27.00
36.822	-40.77	5.00	4.77	-31.00	-27.00
37.202	-40.22	5.00	4.77	-30.45	-27.00

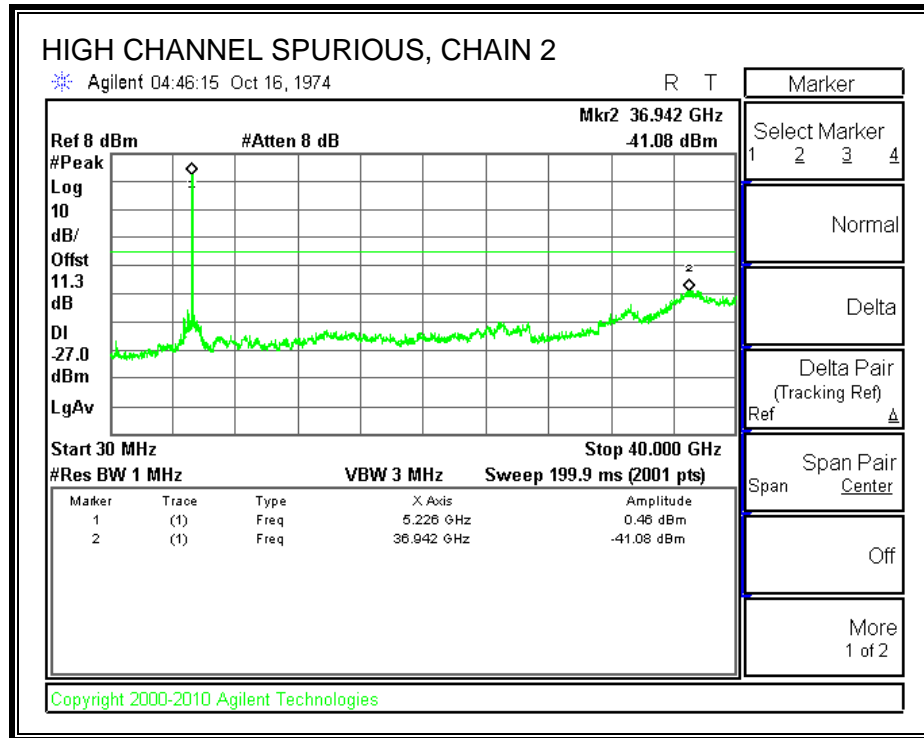
CHAIN 1 SPURIOUS EMISSIONS



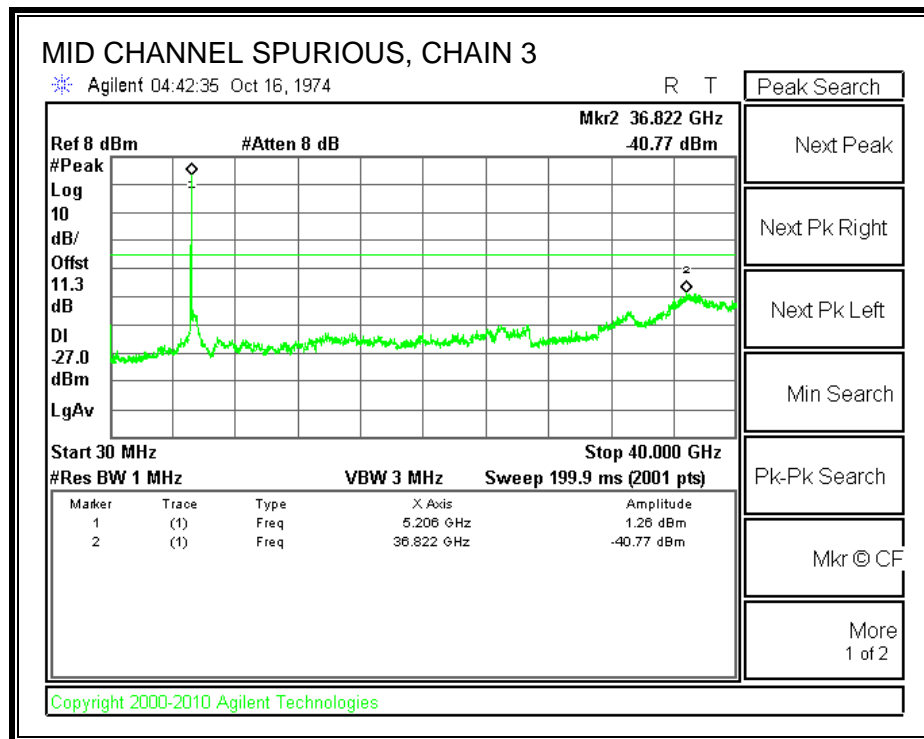
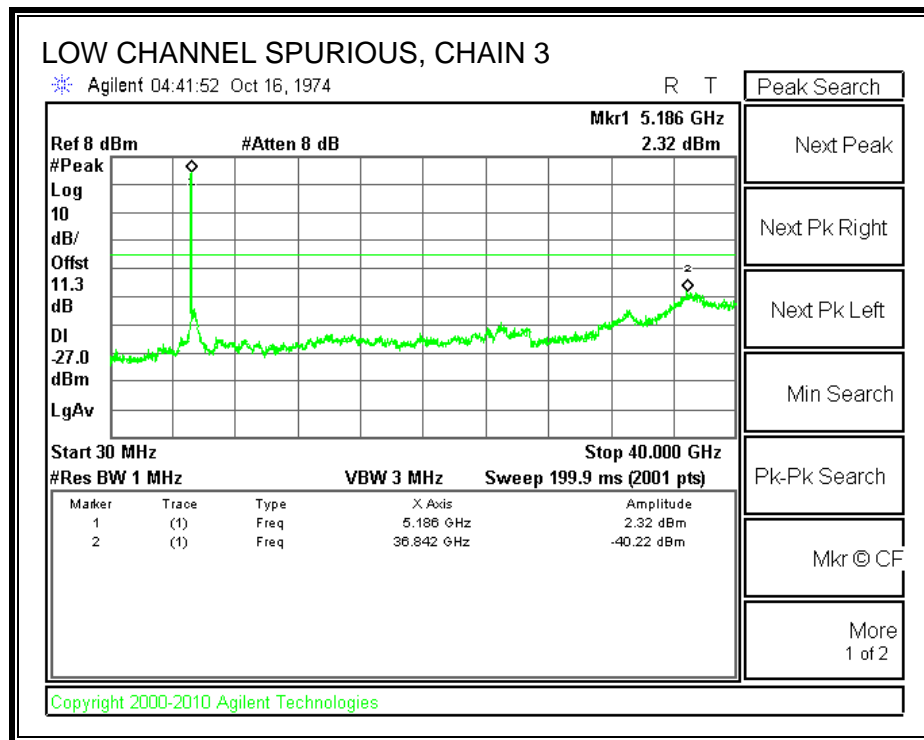


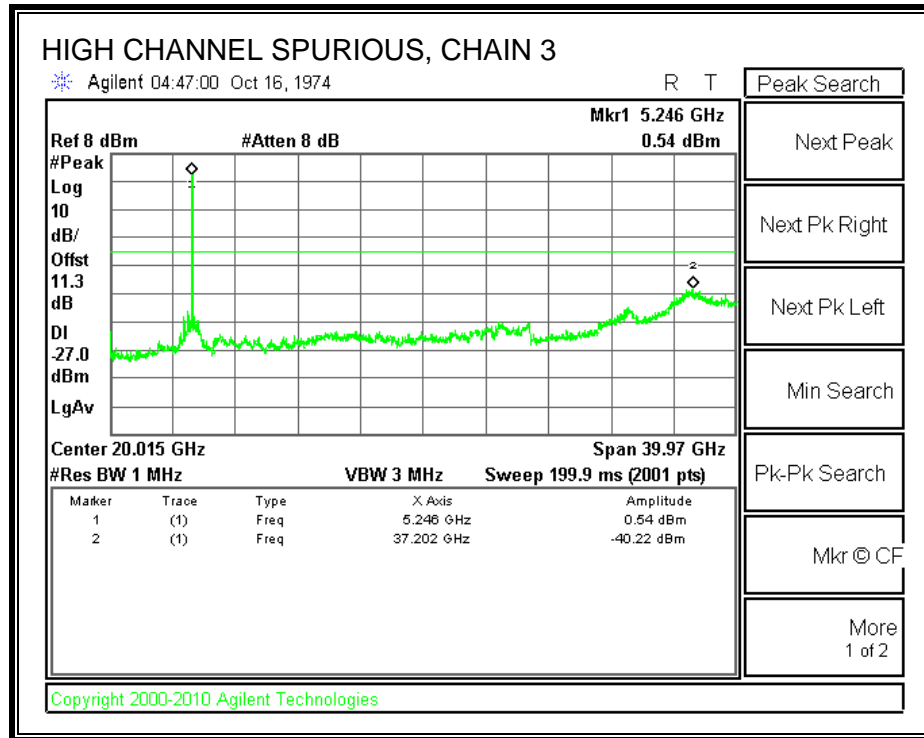
CHAIN 2 SPURIOUS EMISSIONS





CHAIN 3 SPURIOUS EMISSIONS





7.2. 802.11n HT20 MCS0 3TX MODE

7.2.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	22.499	17.8904
Middle	5200	22.561	17.8391
High	5240	22.553	17.8353

CHAIN 2

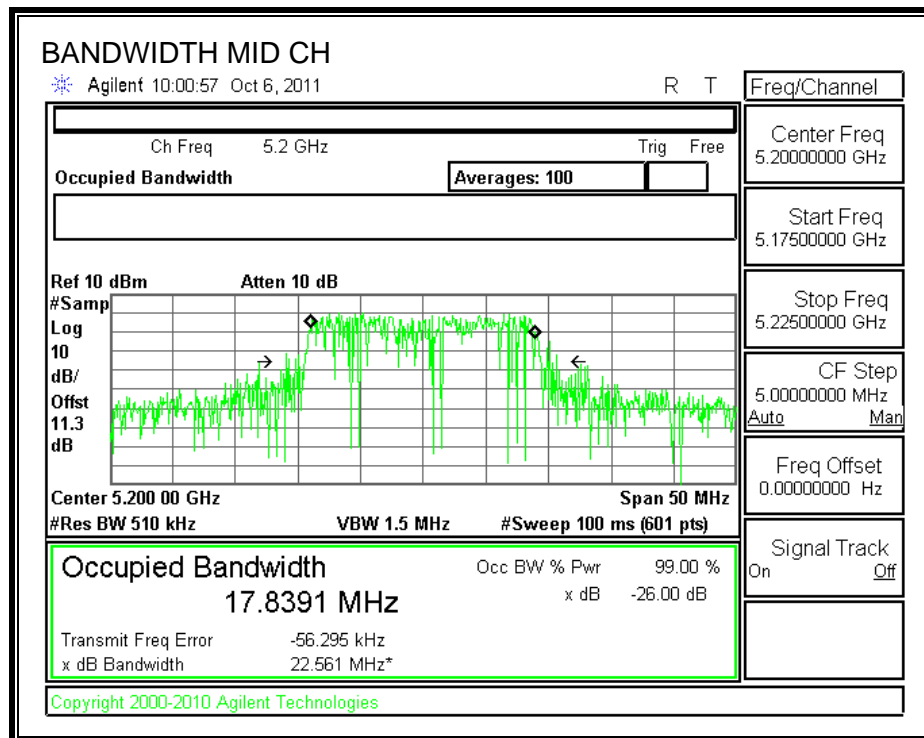
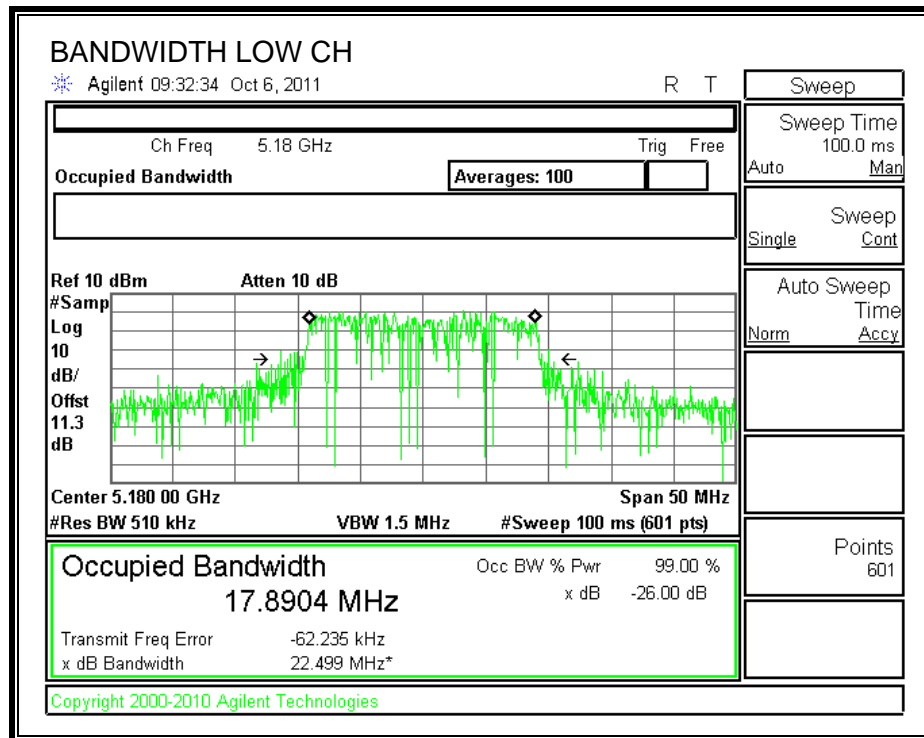
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	22.598	17.8915
Middle	5200	22.690	17.8498
High	5240	22.594	17.8739

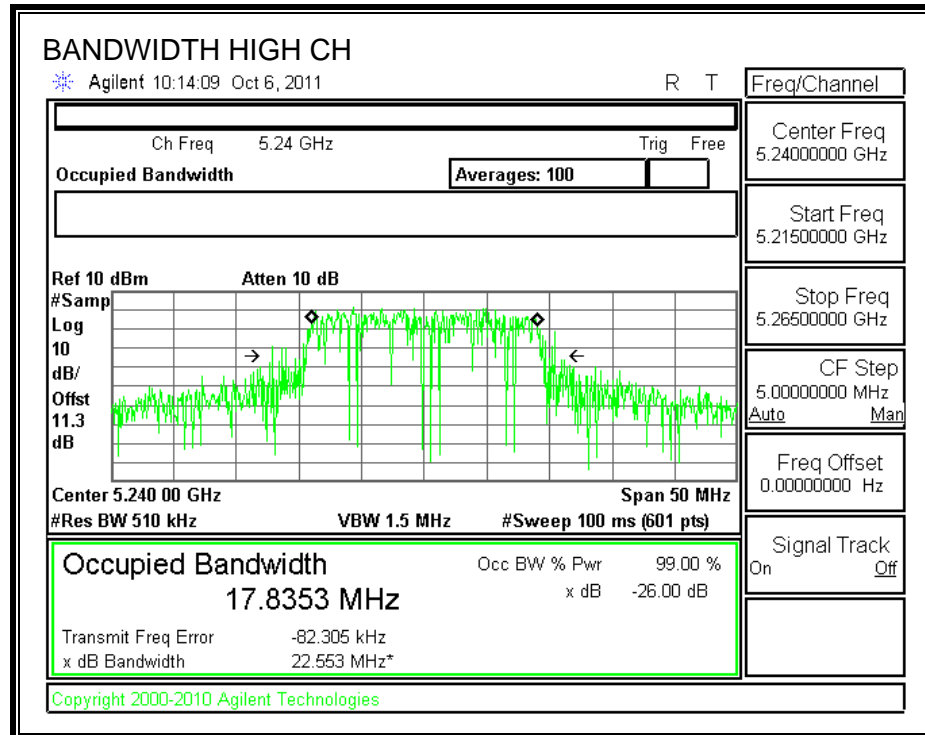
CHAIN 3

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	22.601	17.8936
Middle	5200	22.129	17.8462
High	5240	22.592	17.8703

CHAIN 1

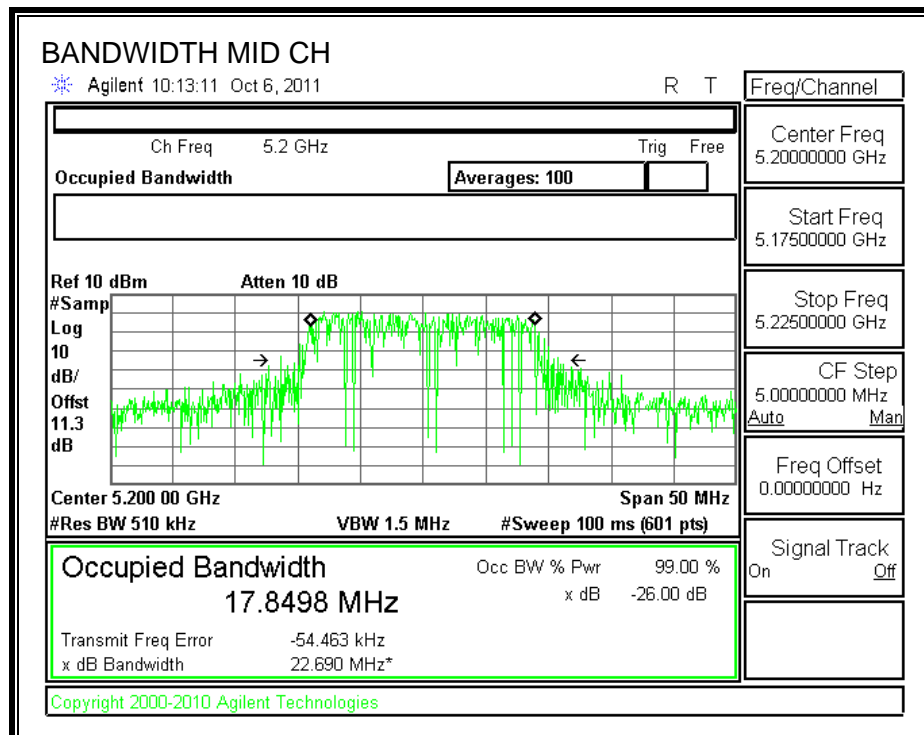
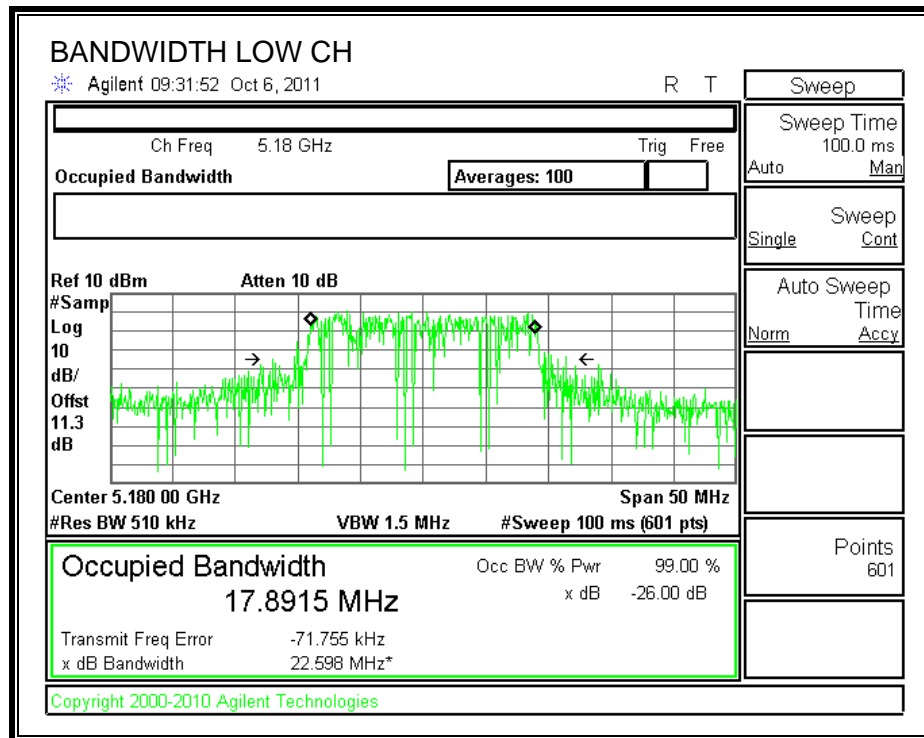
26dB and 99% BANDWIDTH

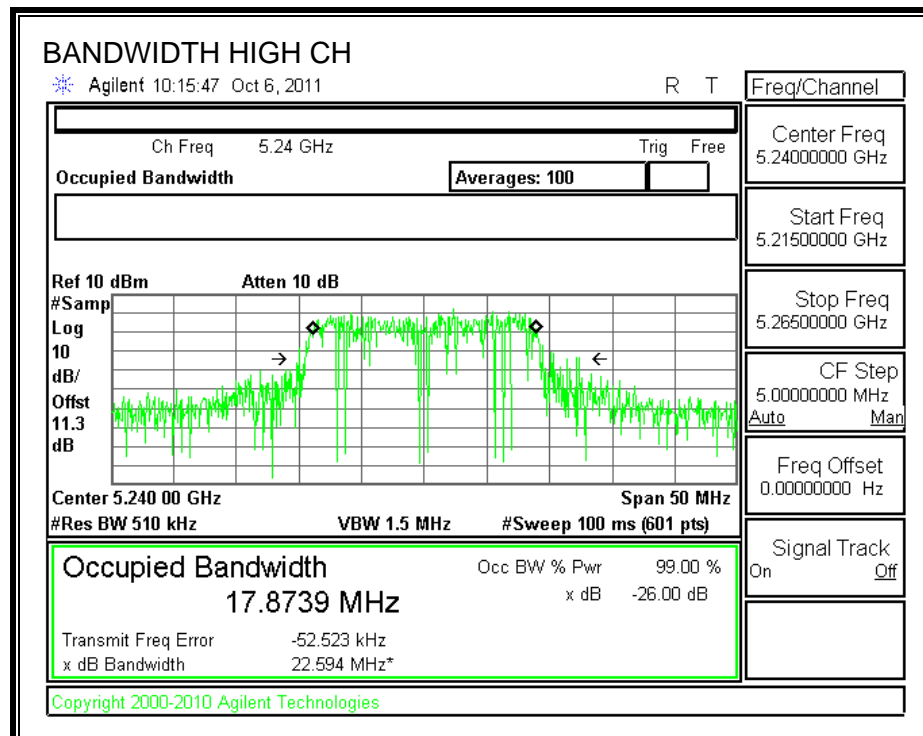




CHAIN 2

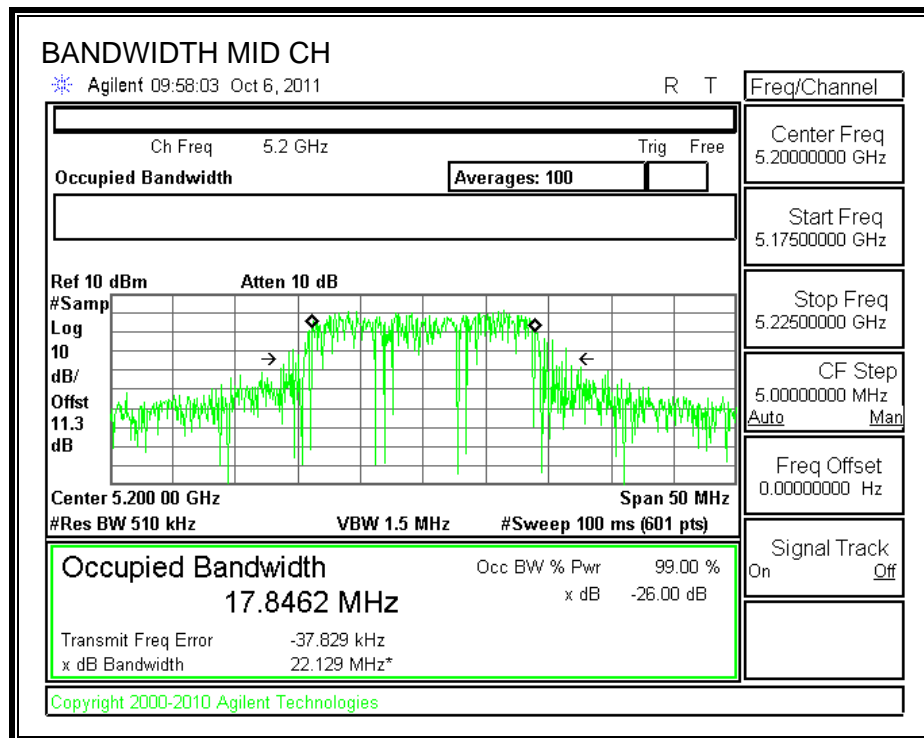
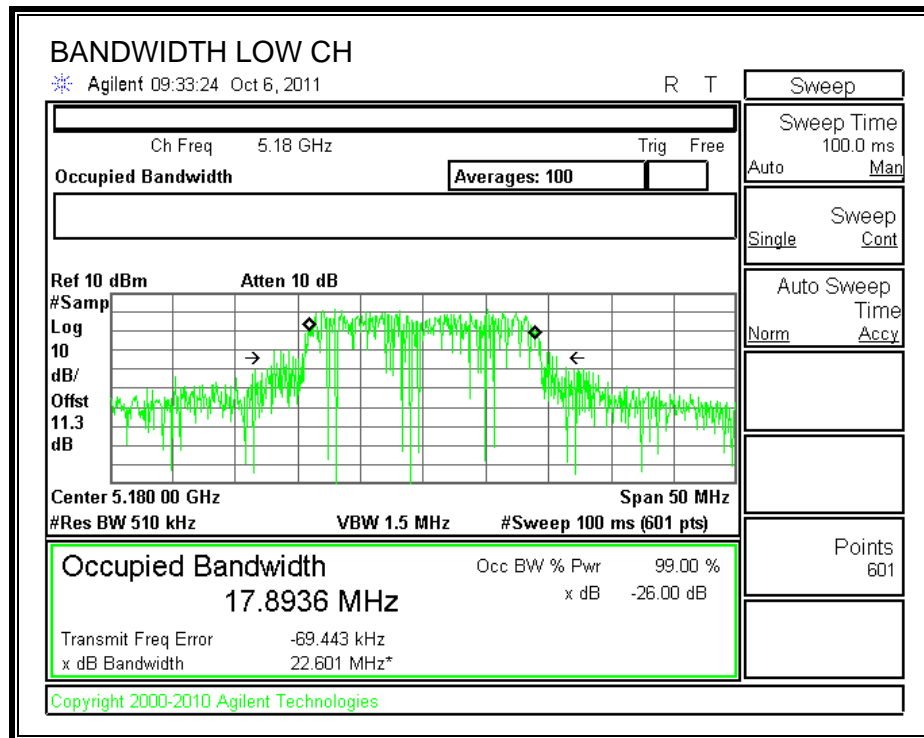
26 dB and 99% BANDWIDTH

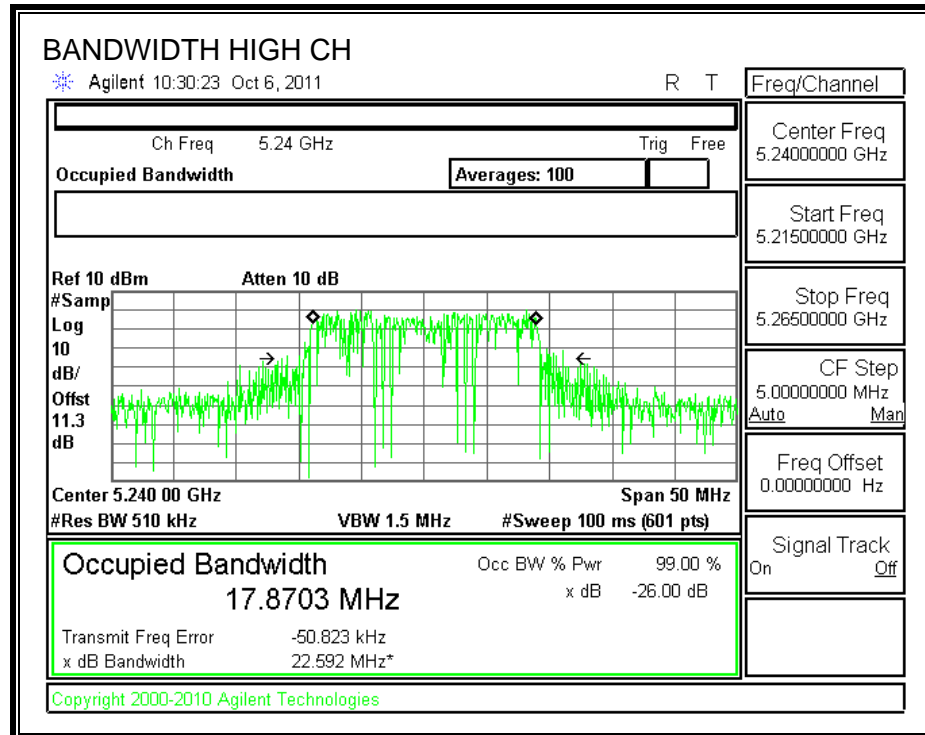




CHAIN 3

26 dB and 99% BANDWIDTH





7.2.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

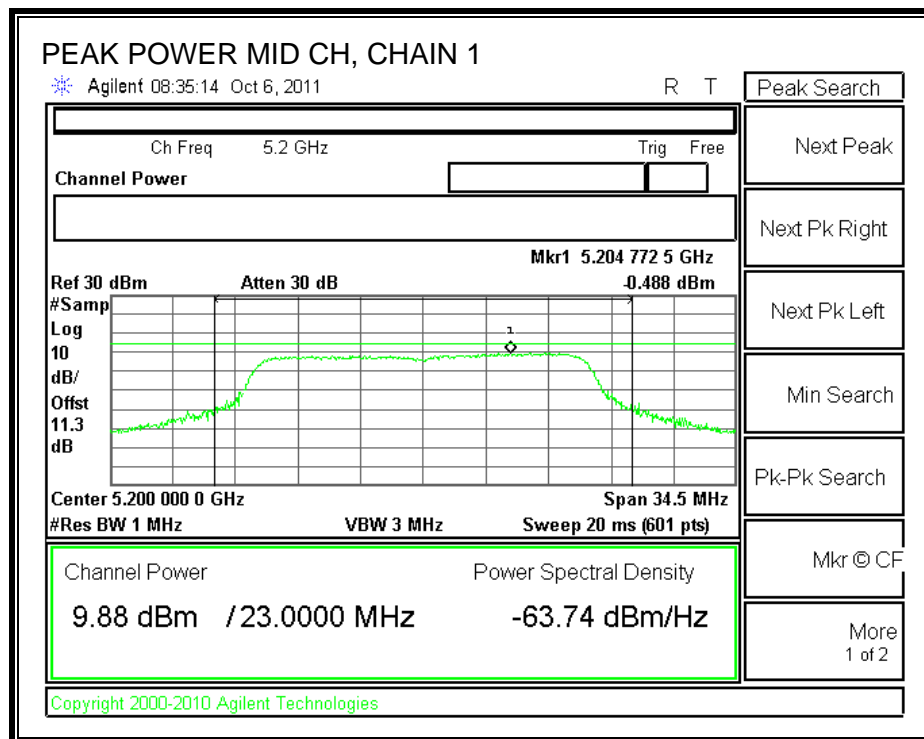
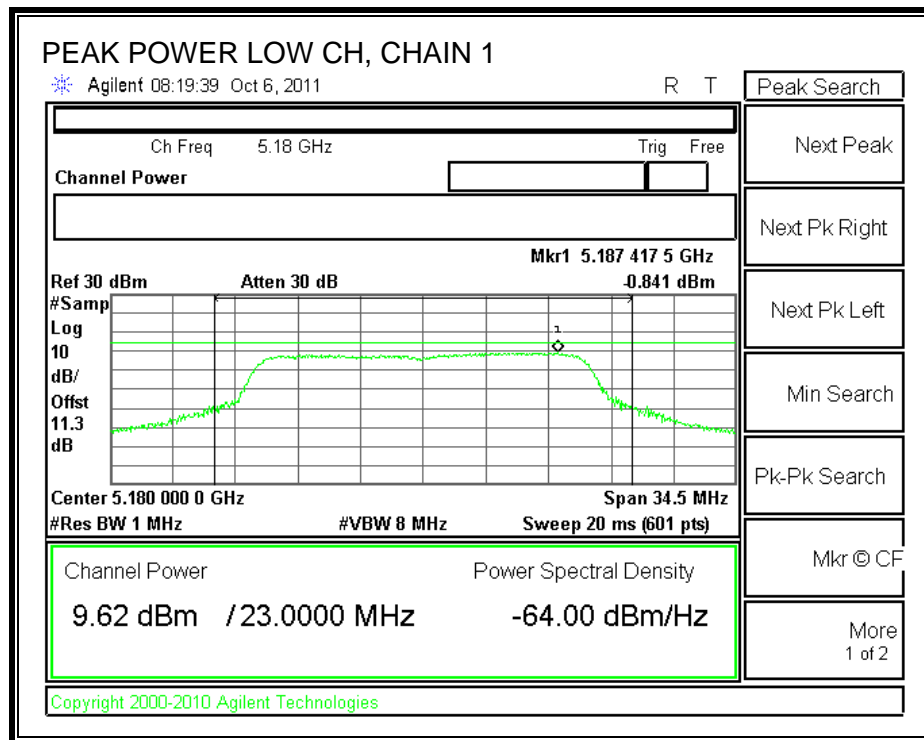
Limit

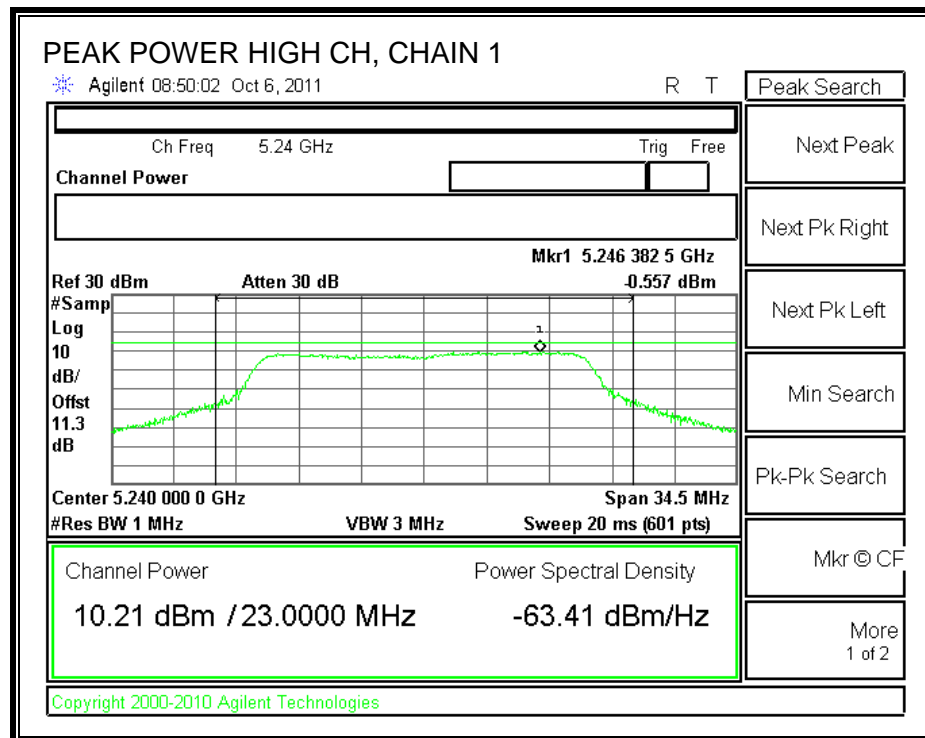
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Effective Ant. Gain (dBi)	Limit (dBm)
Low	5180	16.99	22.499	17.52	5.00	16.99
Mid	5200	16.99	22.129	17.45	5.00	16.99
High	5240	16.99	22.553	17.53	5.00	16.99

Individual Chain Results

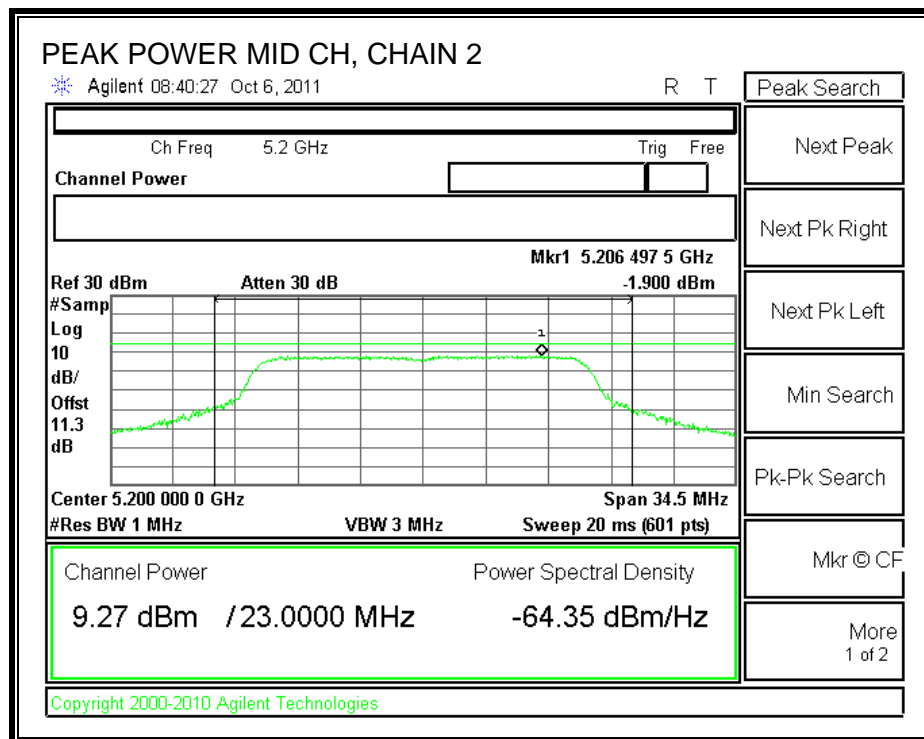
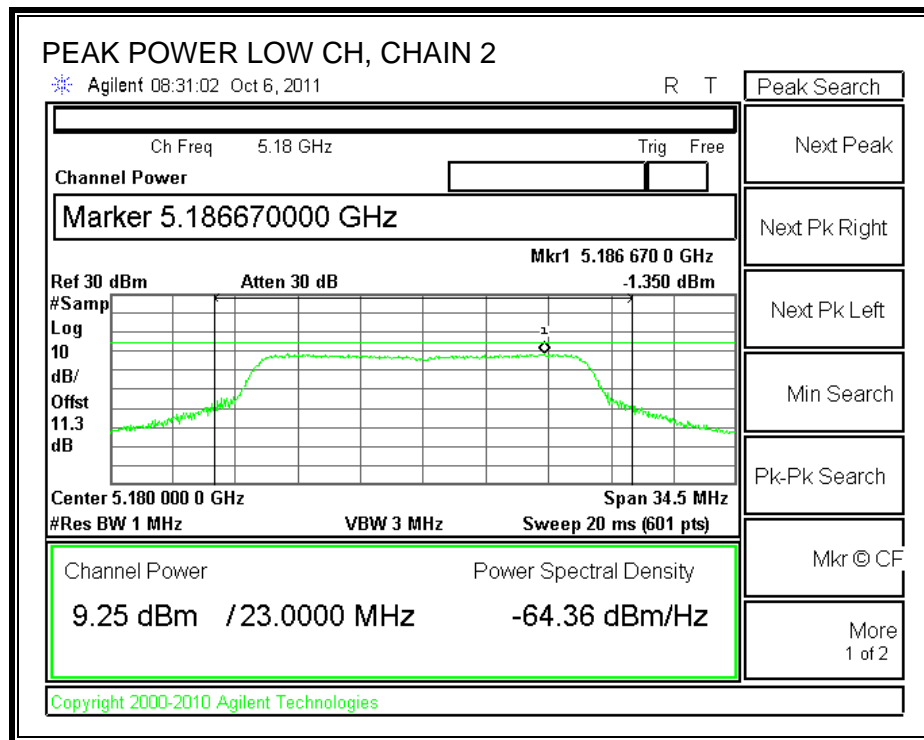
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	9.62	9.25	10.16	14.46	16.99	-2.53
Mid	5200	9.88	9.27	10.03	14.51	16.99	-2.48
High	5240	10.21	9.50	10.04	14.70	16.99	-2.29

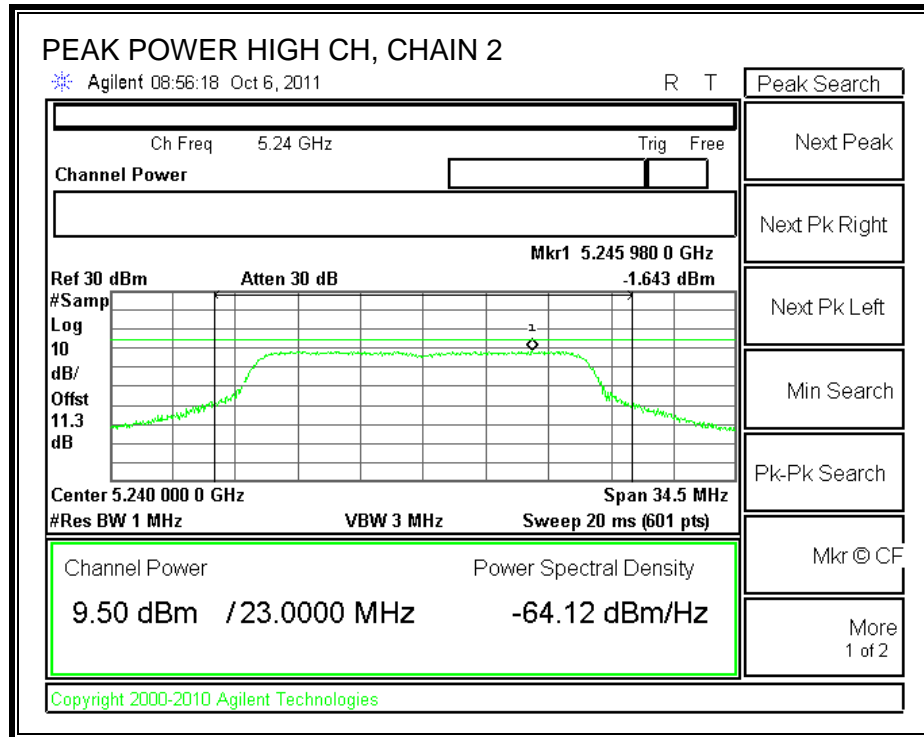
CHAIN 1 OUTPUT POWER



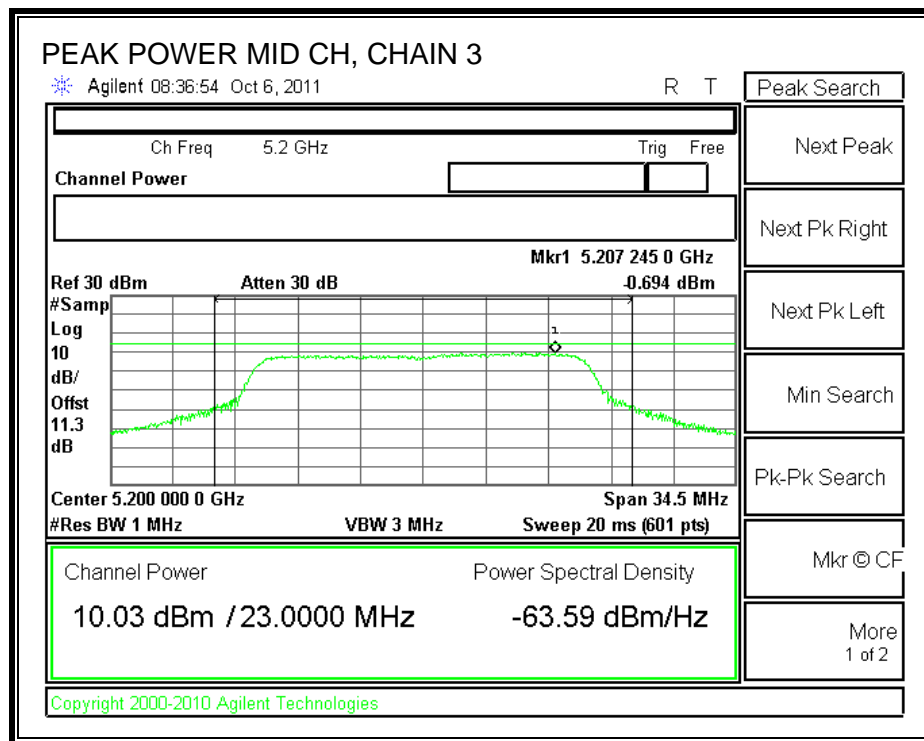
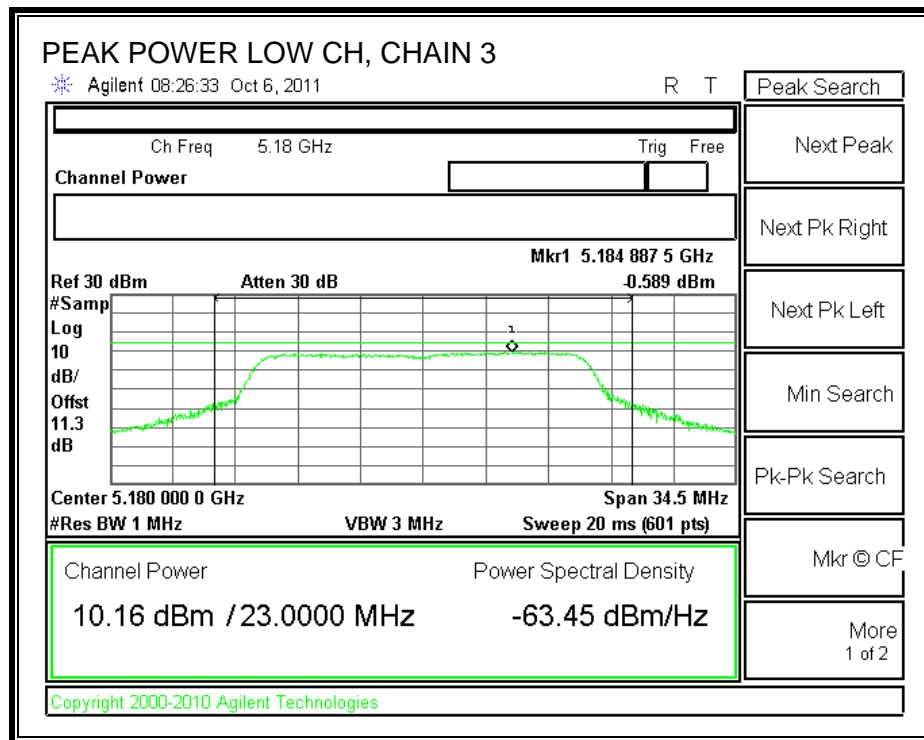


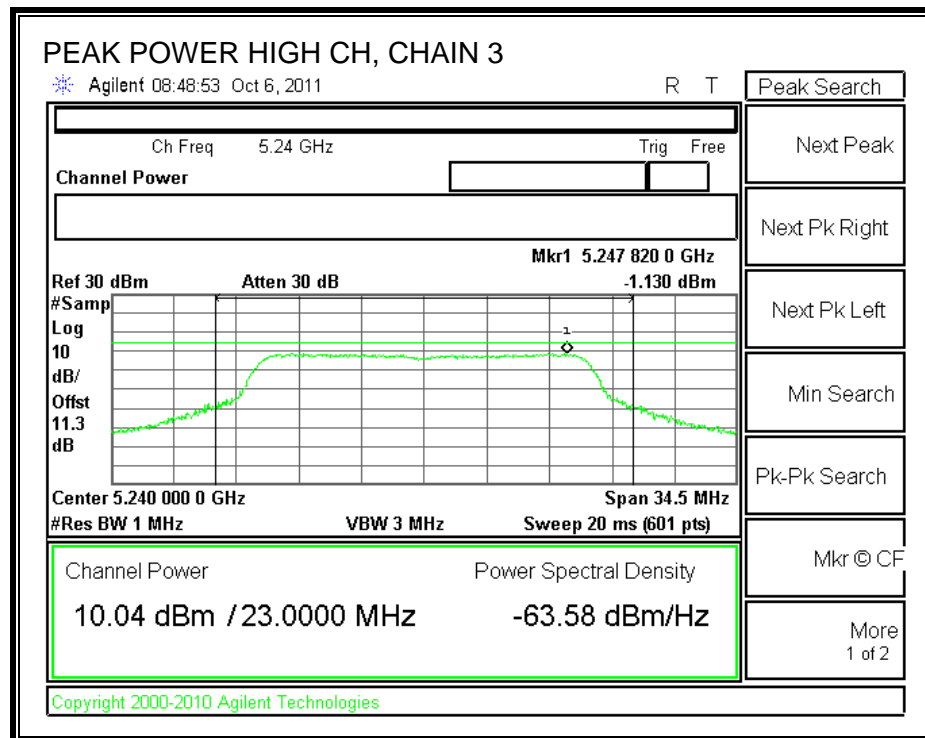
CHAIN 2 OUTPUT POWER





CHAIN 3 OUTPUT POWER





7.2.3. 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 11.3dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	5180	9.50	8.95	10.00	14.28
Middle	5200	9.70	9.00	9.82	14.29
High	5240	9.90	9.30	9.60	14.38

7.2.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum effective antenna gain is 5 dBi, therefore the limit is 4 dBm.

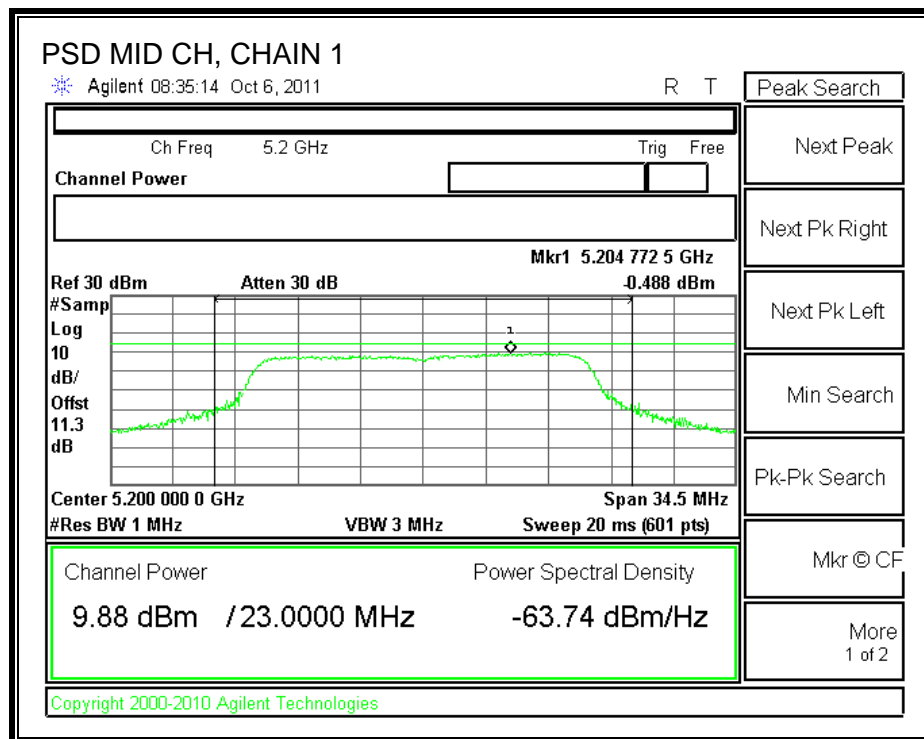
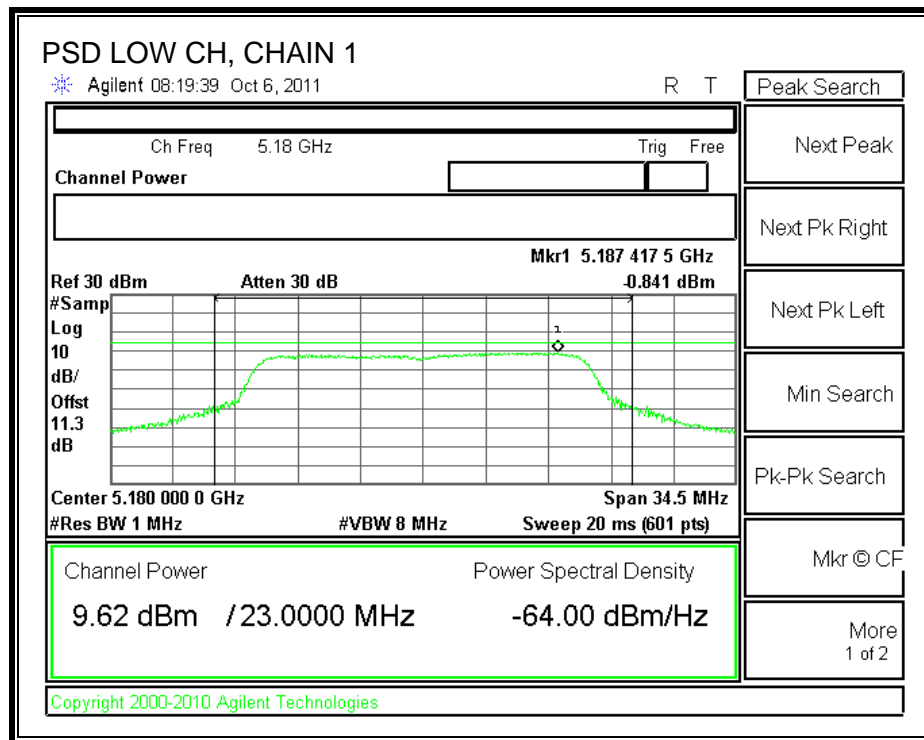
TEST PROCEDURE

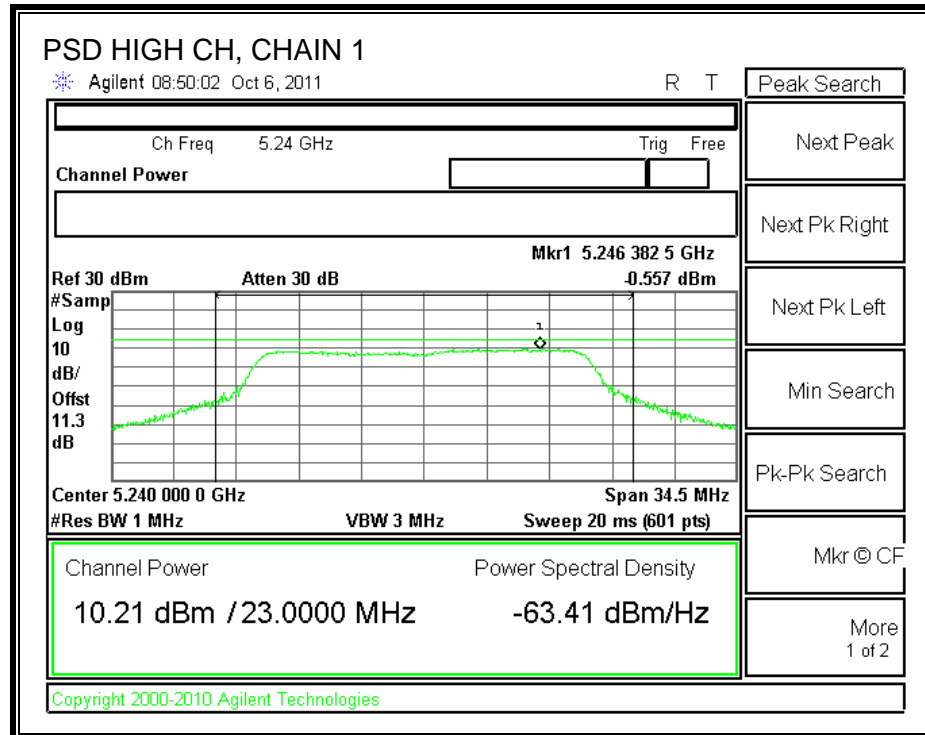
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

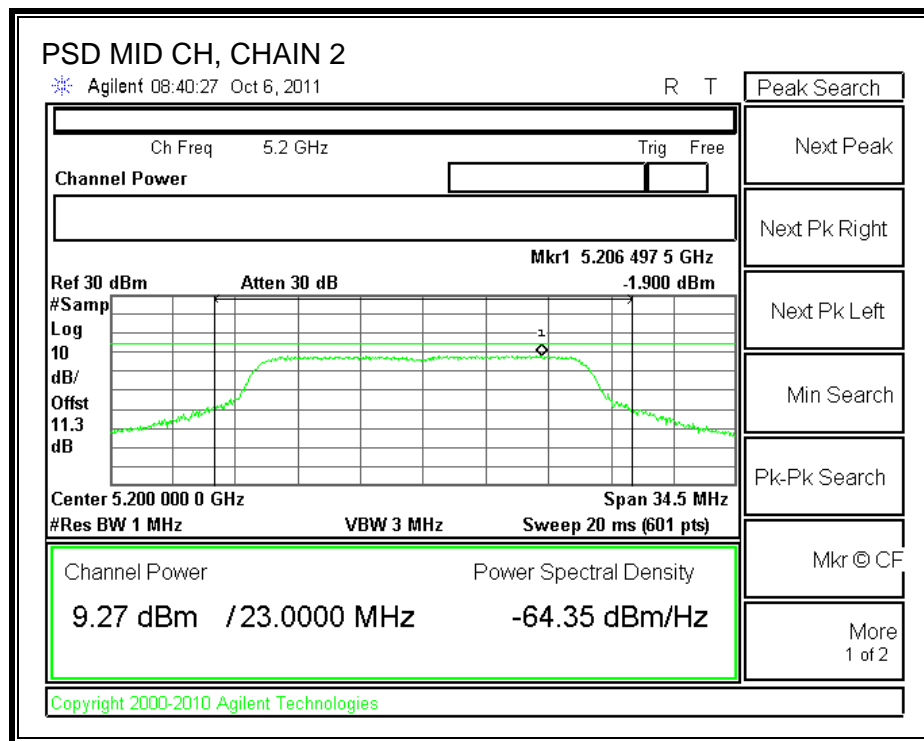
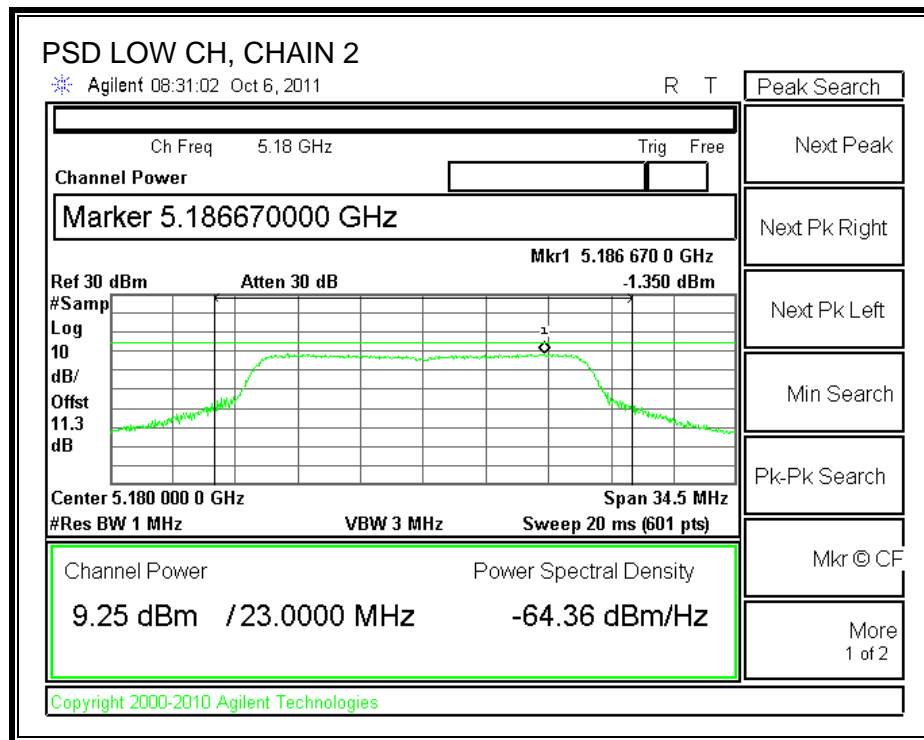
Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Chain 3 PPSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	-0.841	-1.350	-0.589	3.86	4.00	-0.14
Middle	5200	-0.488	-1.900	-0.694	3.79	4.00	-0.21
High	5240	-0.557	-1.643	-1.130	3.68	4.00	-0.32

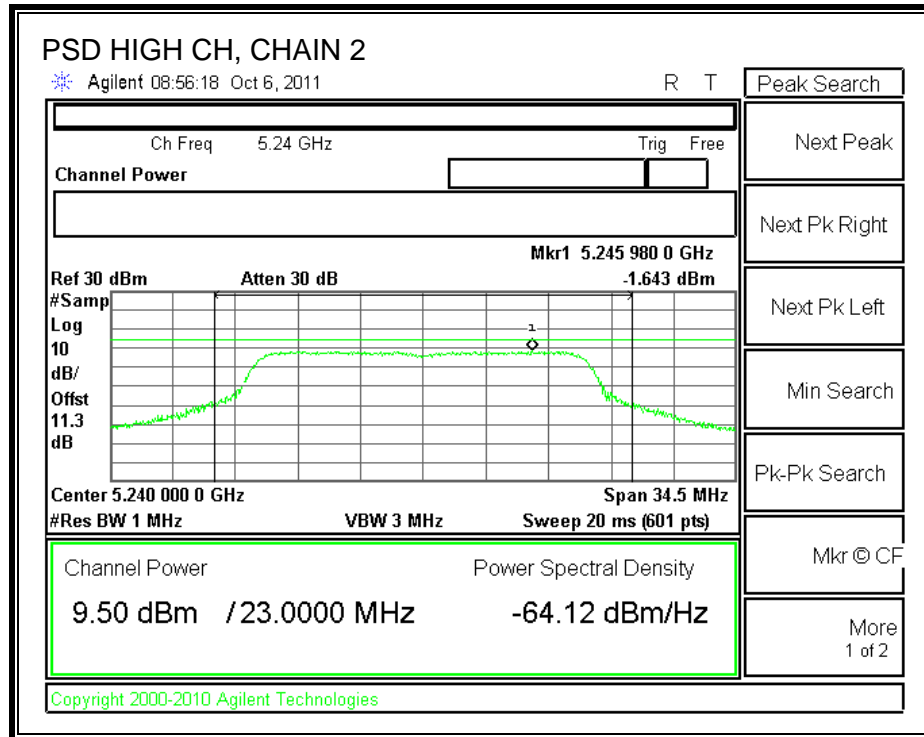
CHAIN 1 POWER SPECTRAL DENSITY



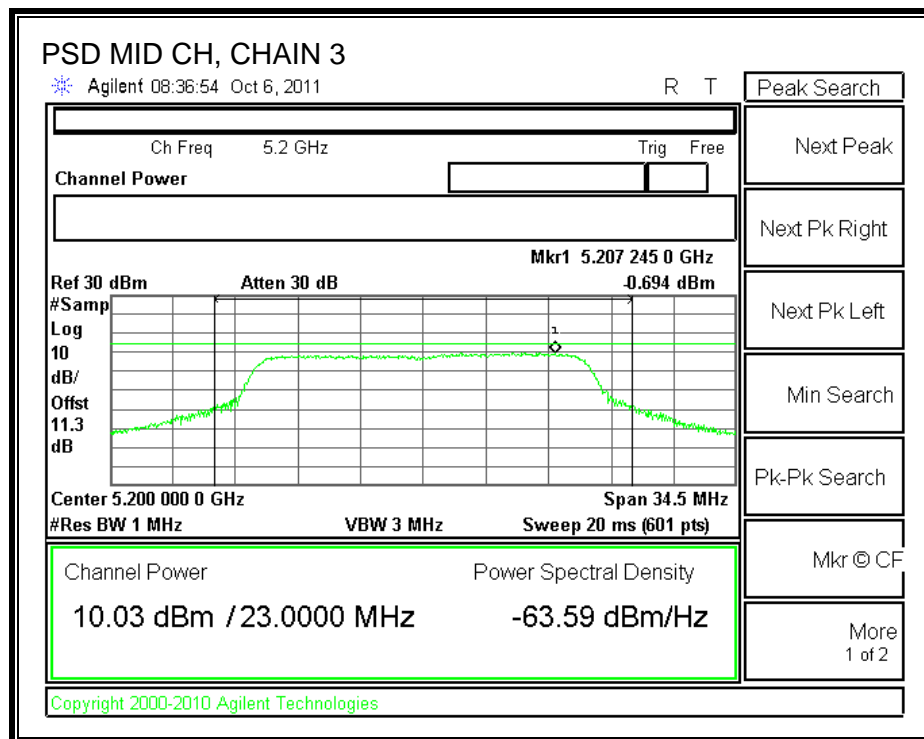
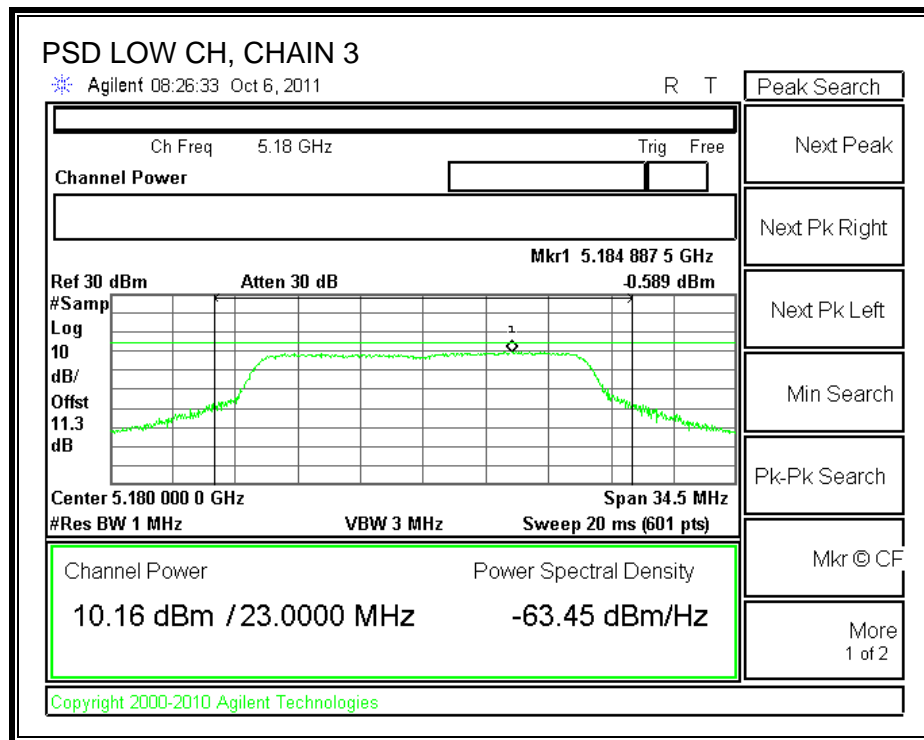


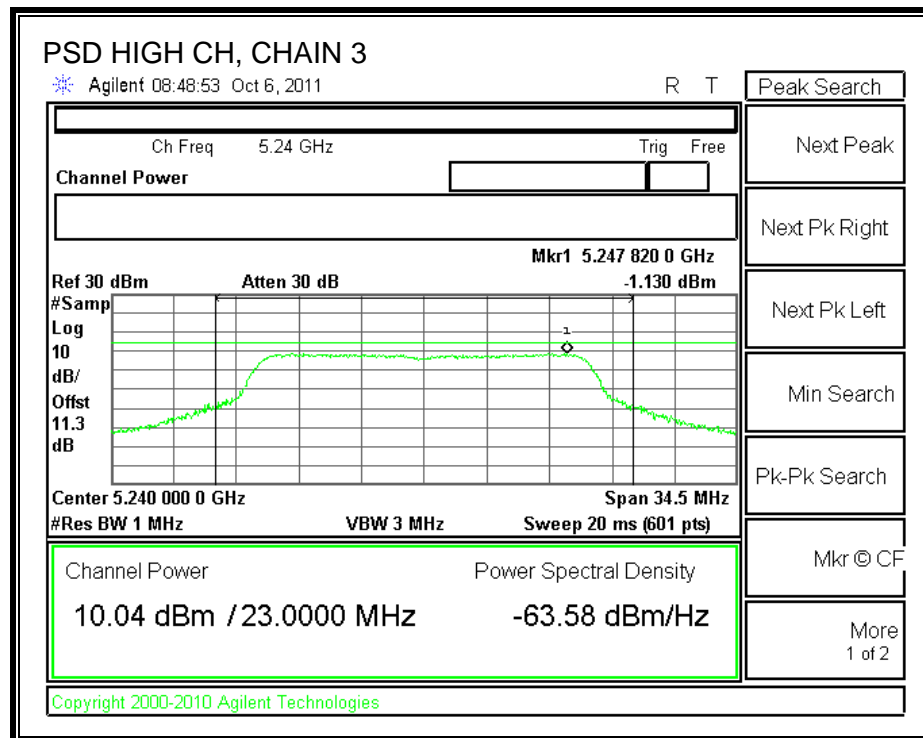
CHAIN 2 POWER SPECTRAL DENSITY





CHAIN 3 POWER SPECTRAL DENSITY





7.2.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.35	13	-3.65
Middle	5200	10.26	13	-2.74
High	5240	10.41	13	-2.59

CHAIN 2

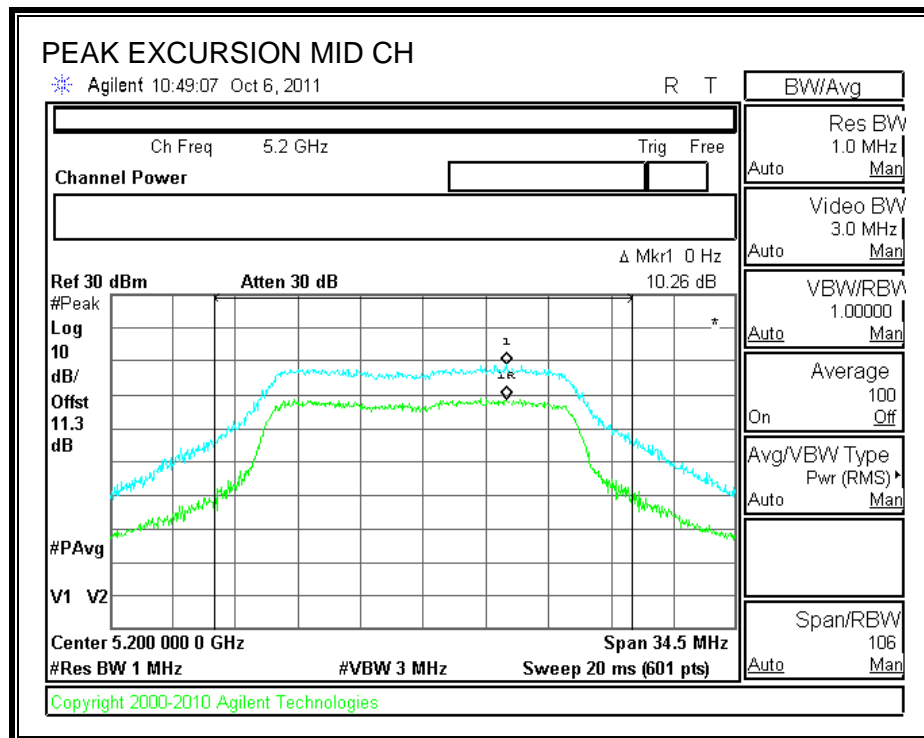
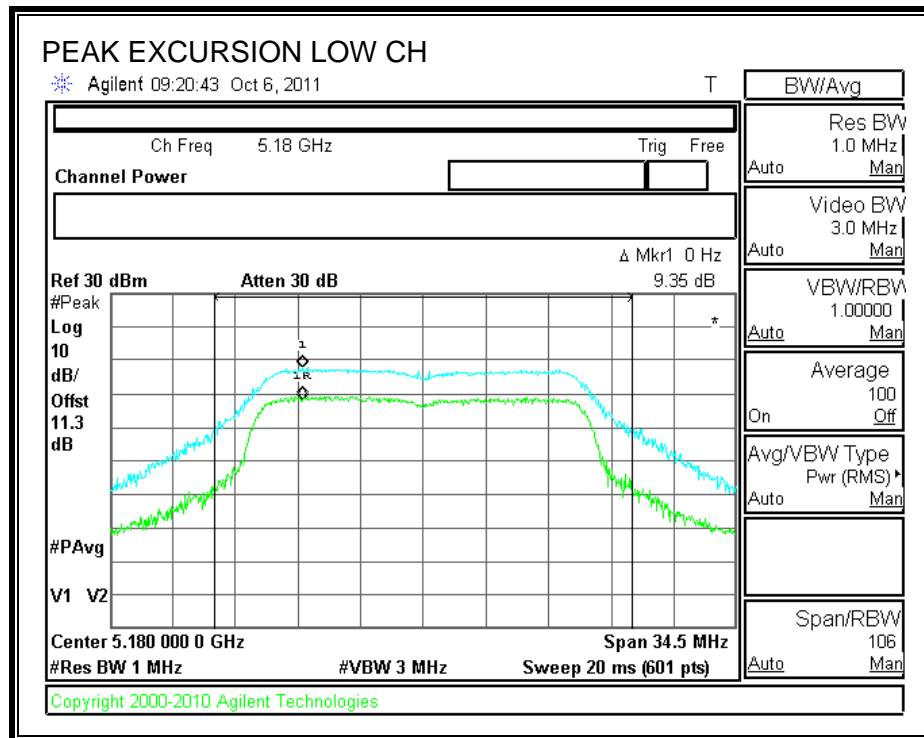
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.90	13	-3.10
Middle	5200	10.38	13	-2.62
High	5240	10.53	13	-2.47

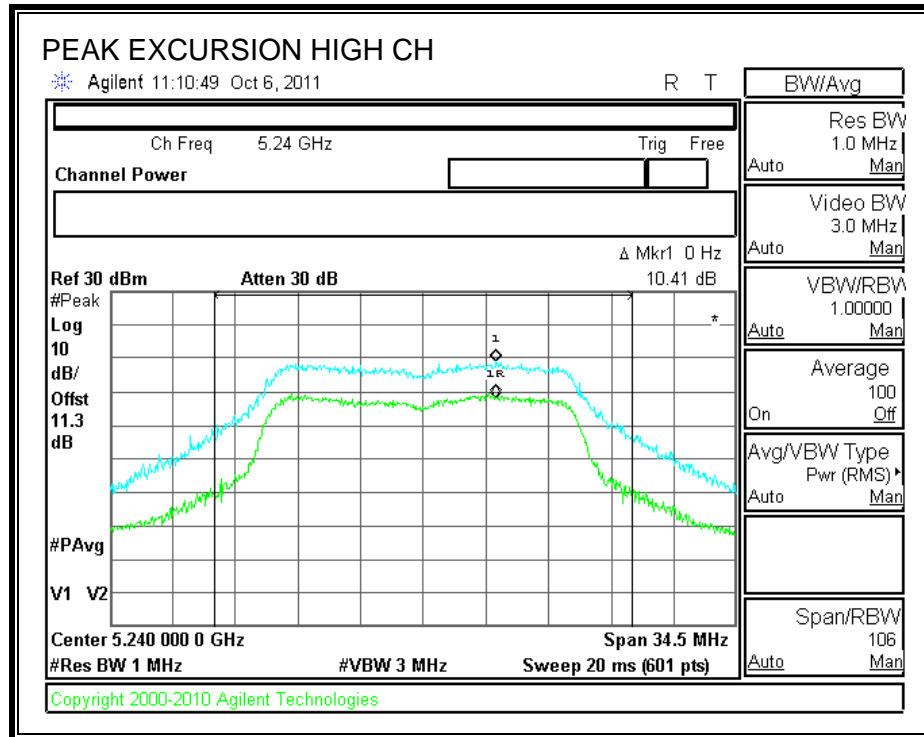
CHAIN 3

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	11.18	13	-1.82
Middle	5200	11.36	13	-1.64
High	5240	9.96	13	-3.04

CHAIN 1

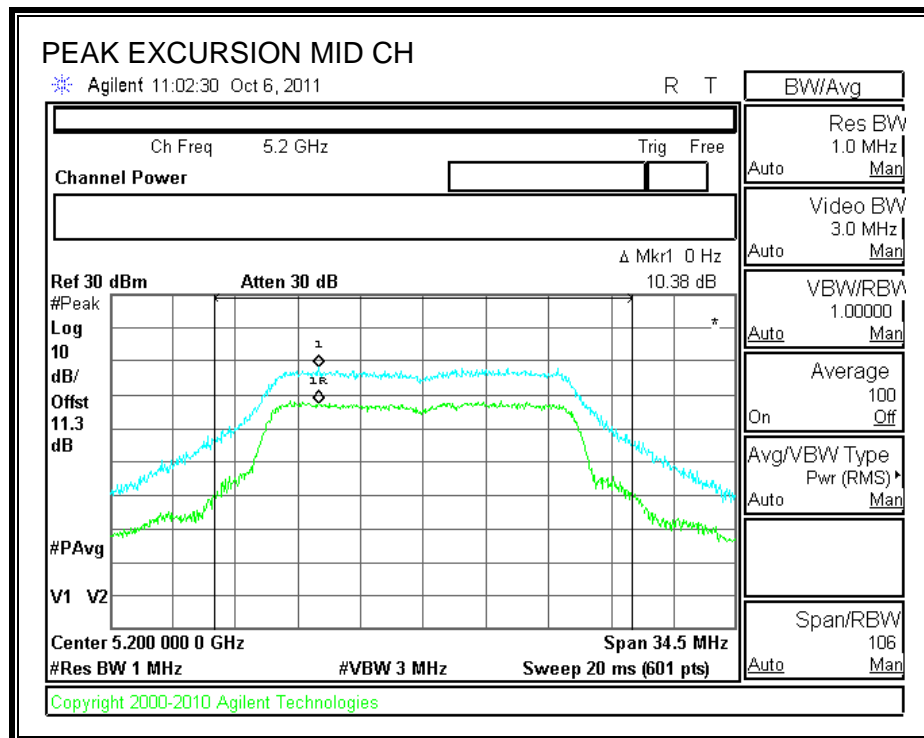
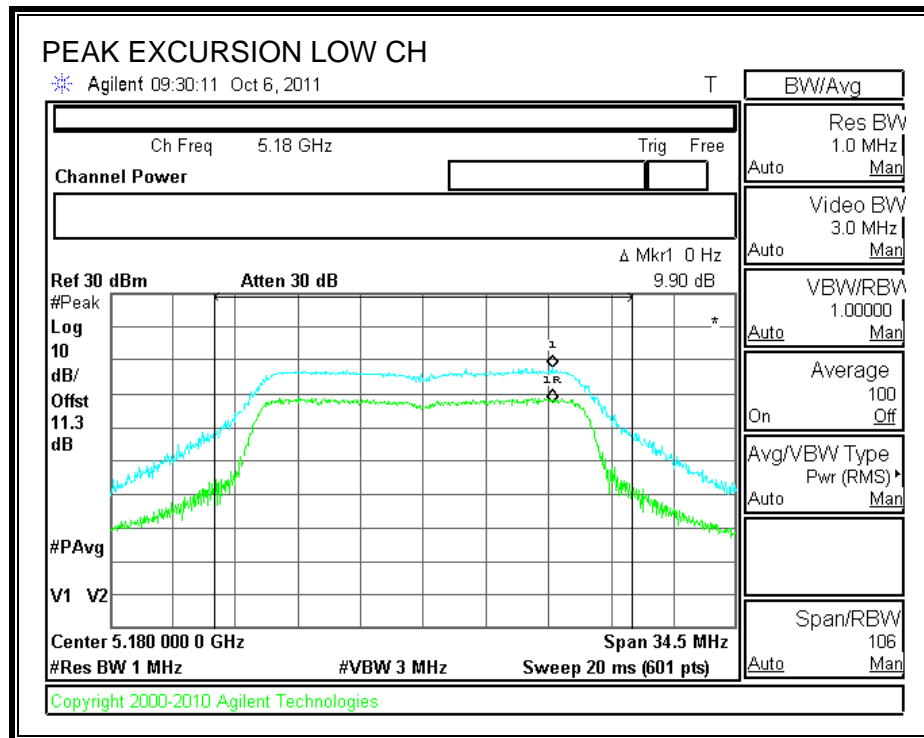
PEAK EXCURSION

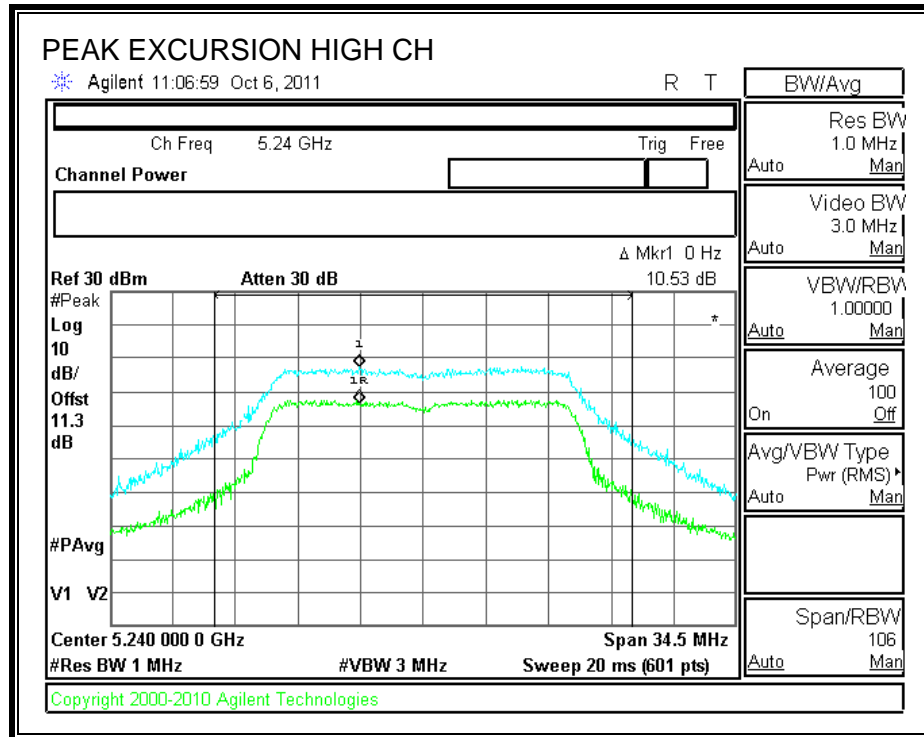




CHAIN 2

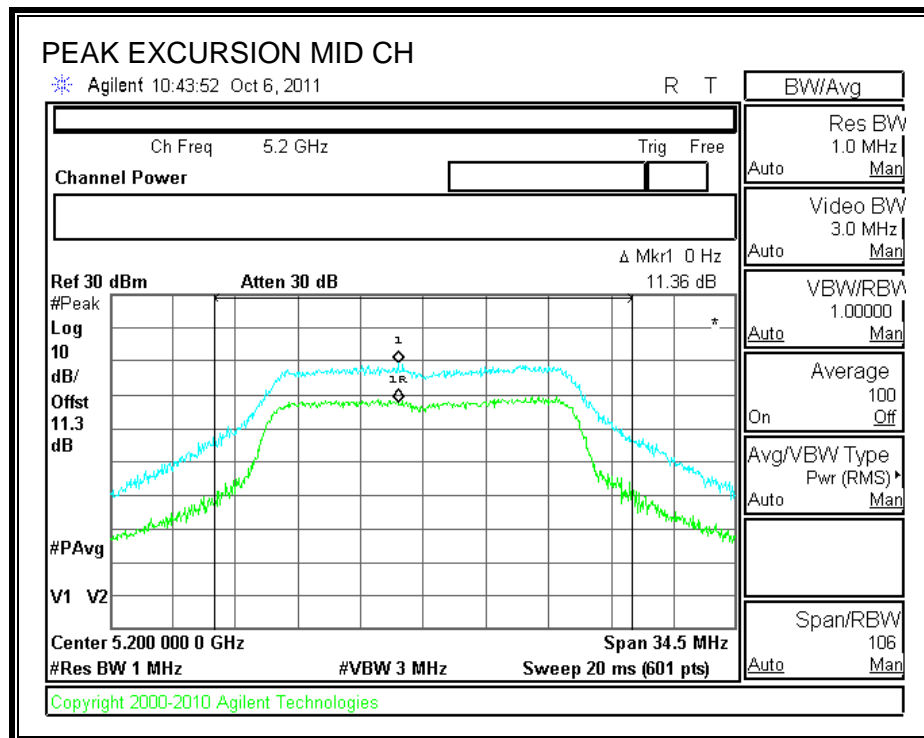
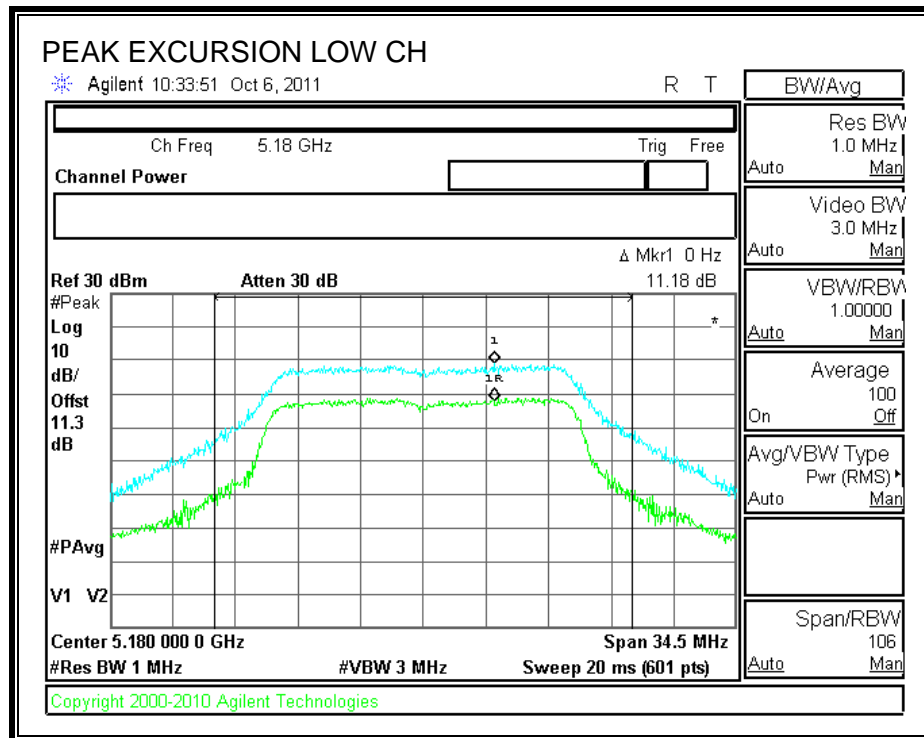
PEAK EXCURSION

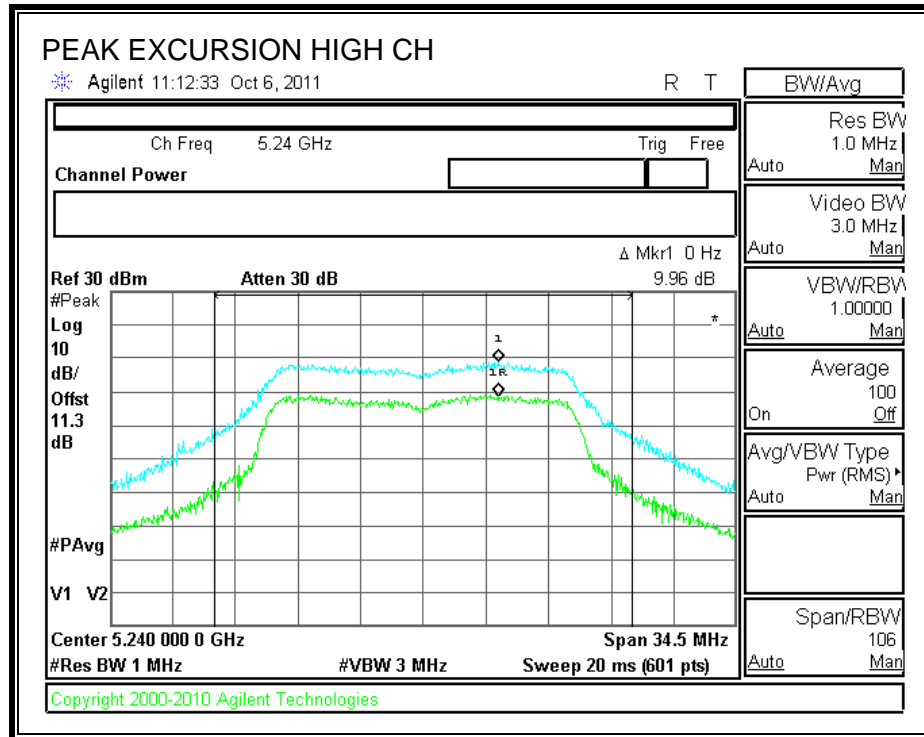




CHAIN 3

PEAK EXCURSION





7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 3 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

Chain 1

Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	10Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	36.842	-37.76	5.00	4.77	-27.99	-27.00
Middle	36.842	-38.13	5.00	4.77	-28.36	-27.00
High	36.942	-40.04	5.00	4.77	-30.27	-27.00

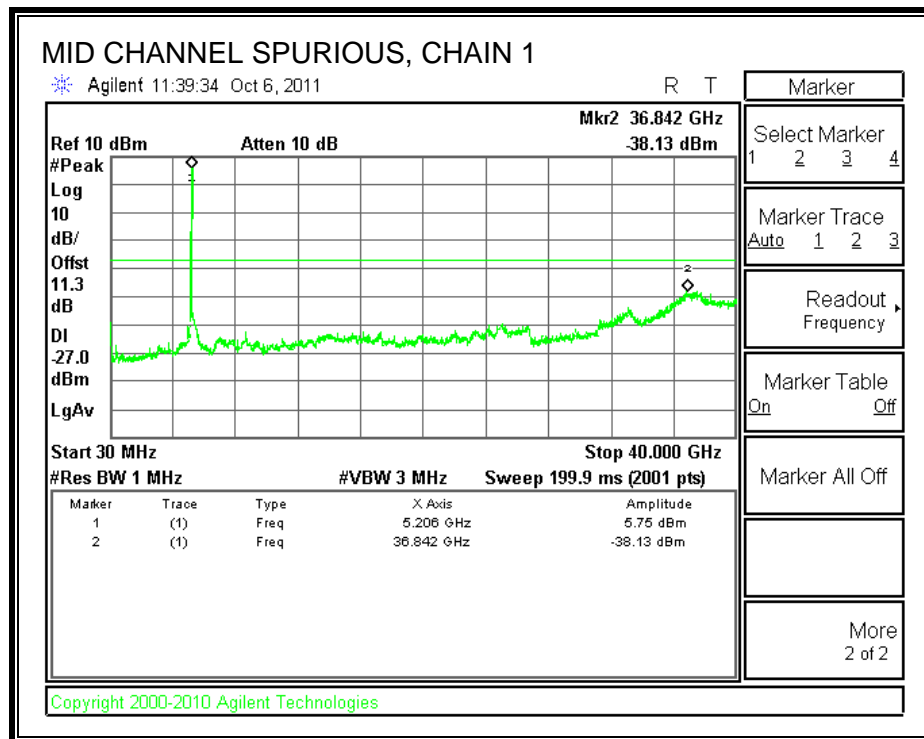
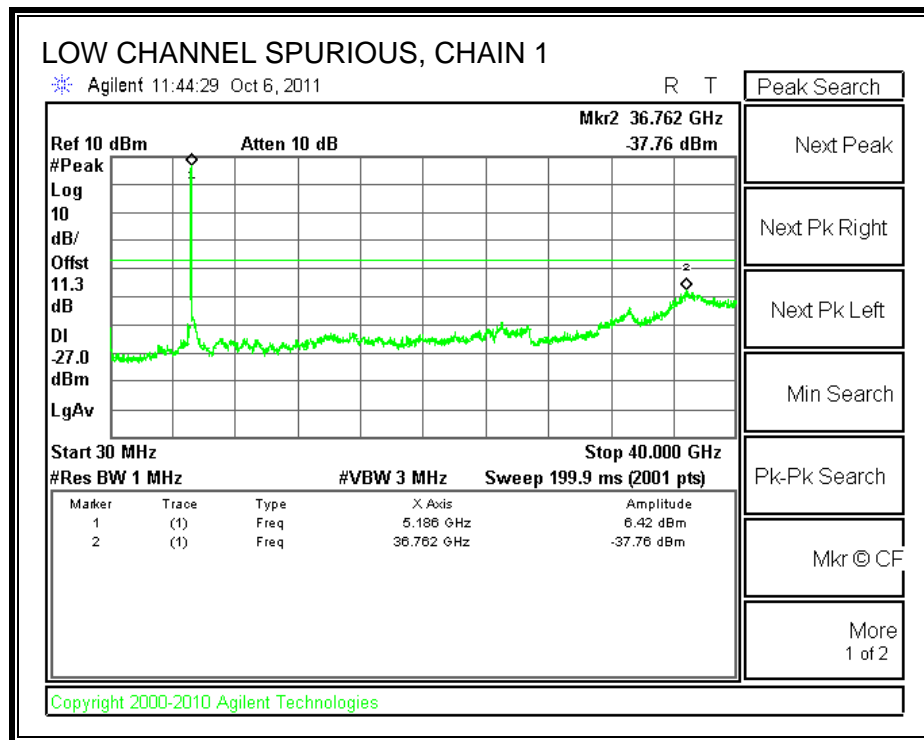
Chain 2

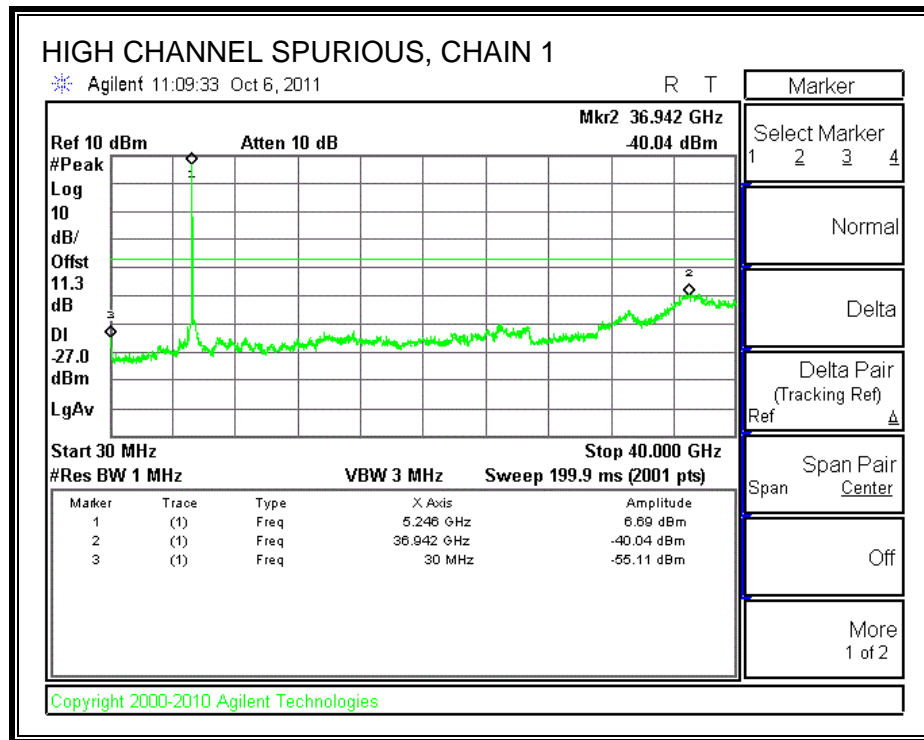
Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	36.842	-39.06	5.00	4.77	-29.29	-27.00
Middle	36.822	-39.30	5.00	4.77	-29.53	-27.00
High	36.962	-38.43	5.00	4.77	-28.66	-27.00

Chain 3

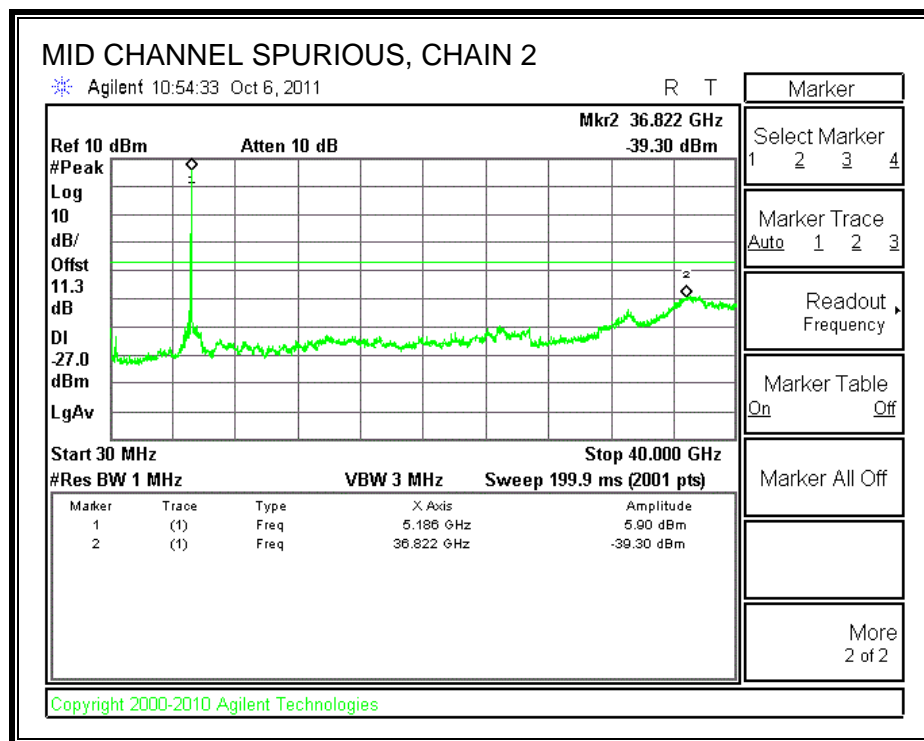
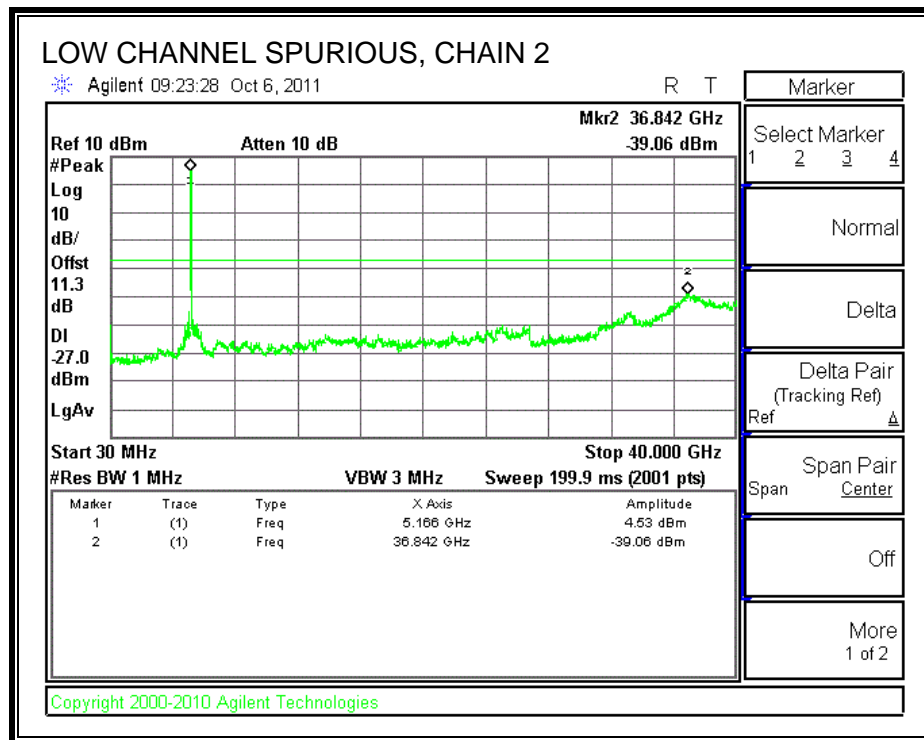
Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	36.210	-38.21	5.00	4.77	-28.44	-27.00
Middle	36.882	-38.24	5.00	4.77	-28.47	-27.00
High	36.822	-38.19	5.00	4.77	-28.42	-27.00

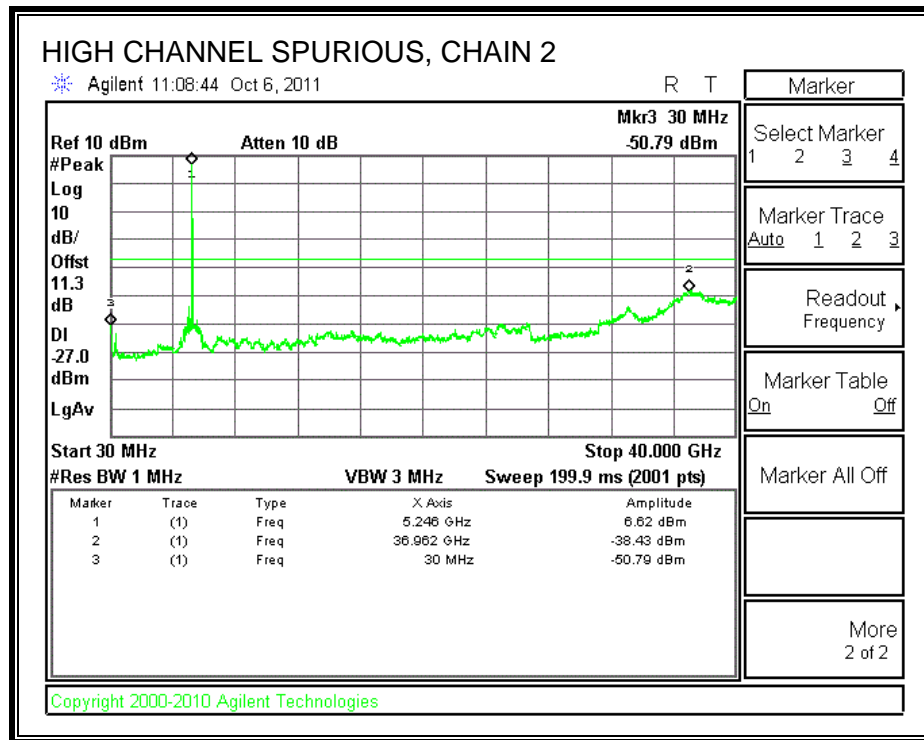
CHAIN 1 SPURIOUS EMISSIONS



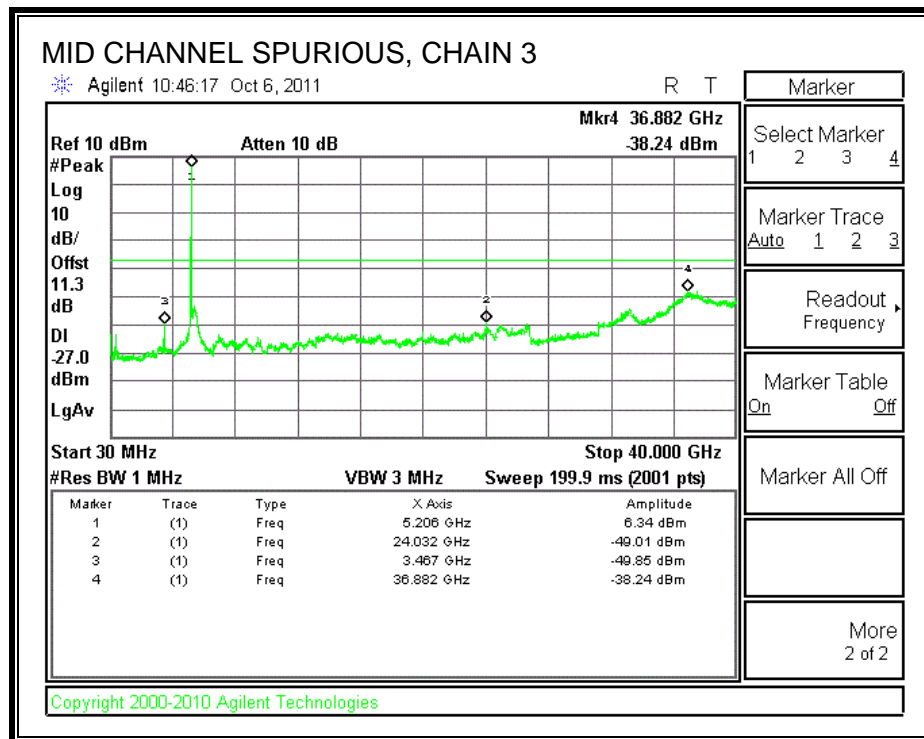
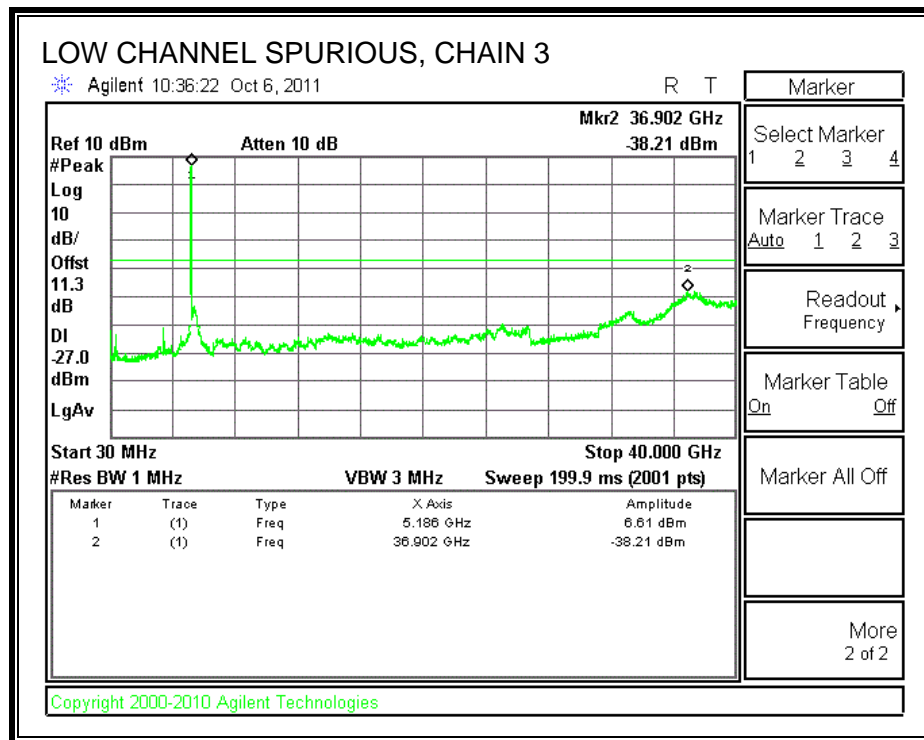


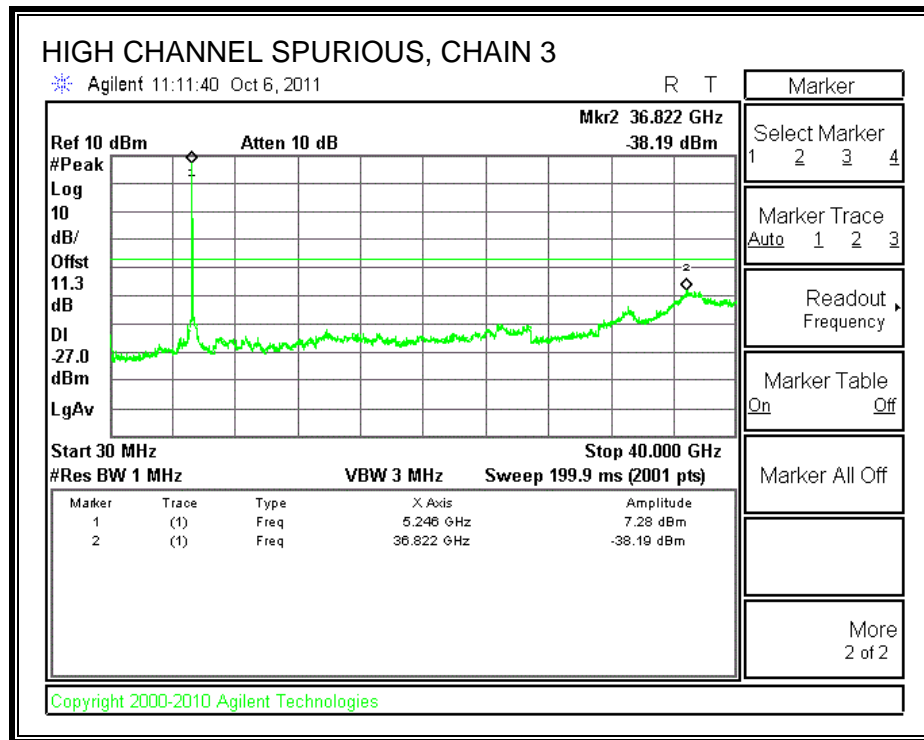
CHAIN 2 SPURIOUS EMISSIONS





CHAIN 3 SPURIOUS EMISSIONS





7.3. 802.11n HT20 MCS8 3TX MODE

7.3.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	21.897	17.8208
Middle	5200	21.946	17.8593
High	5240	22.131	17.8346

CHAIN 2

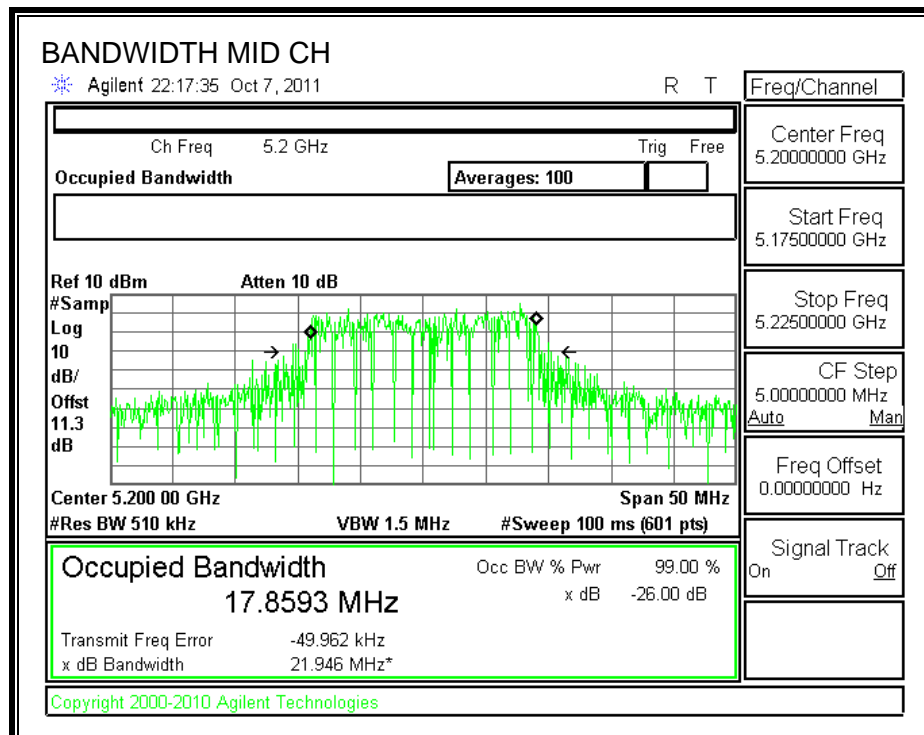
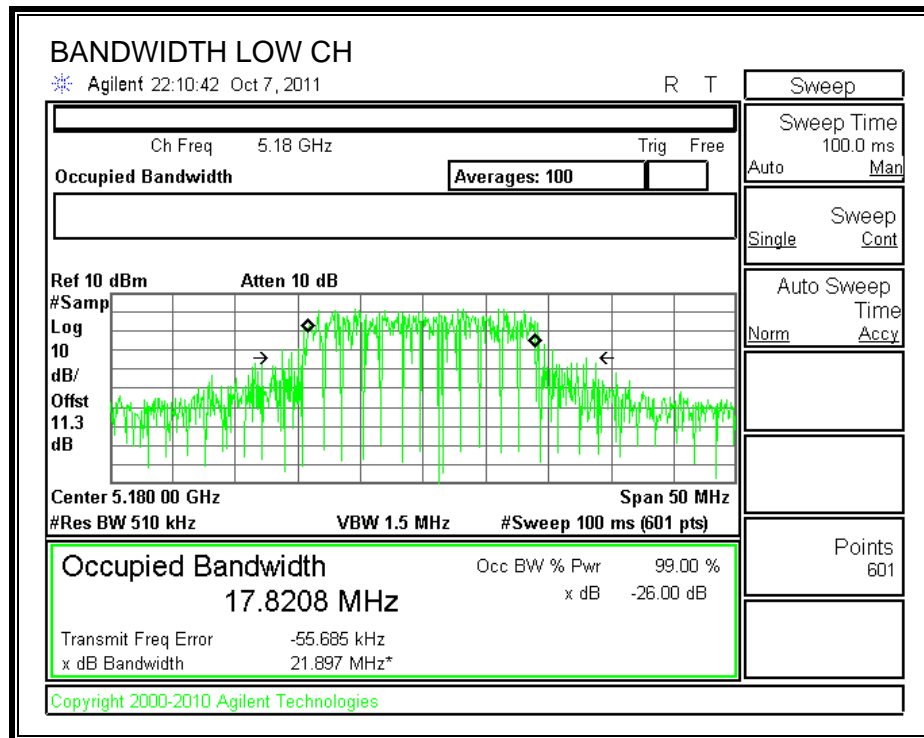
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	22.036	17.8649
Middle	5200	22.199	17.8133
High	5240	22.021	17.8637

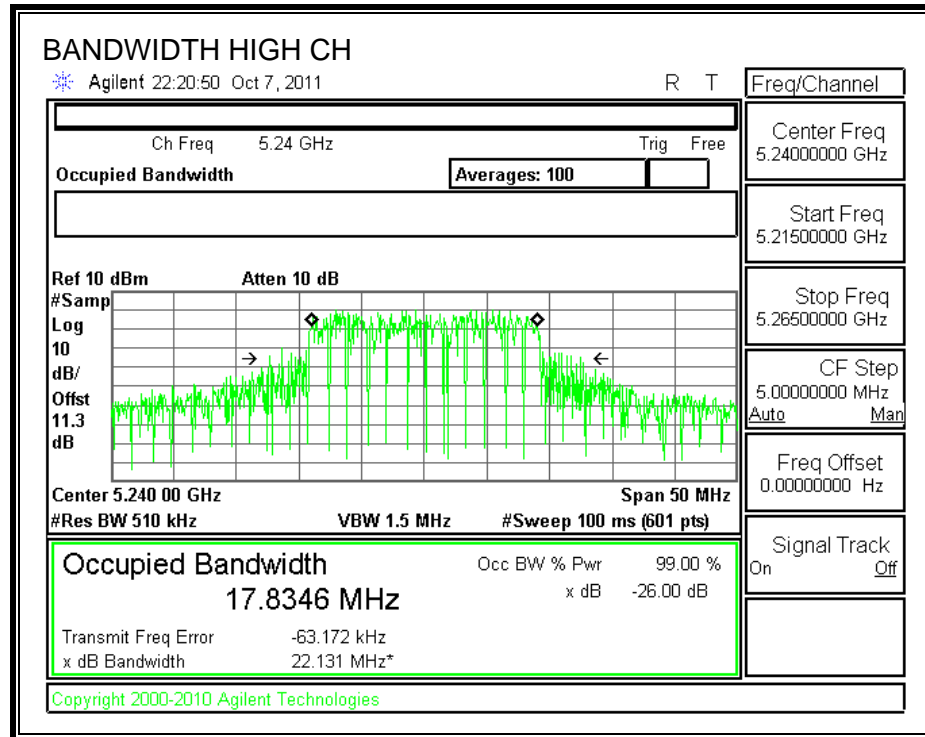
CHAIN 3

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	22.176	17.8509
Middle	5200	22.114	17.8269
High	5240	22.000	17.8381

CHAIN 1

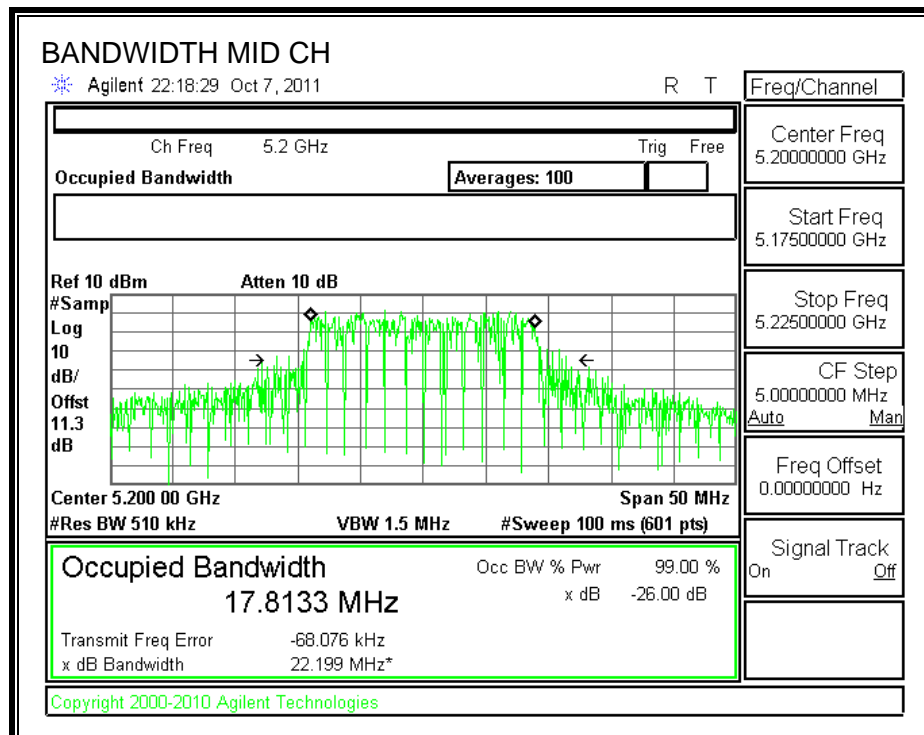
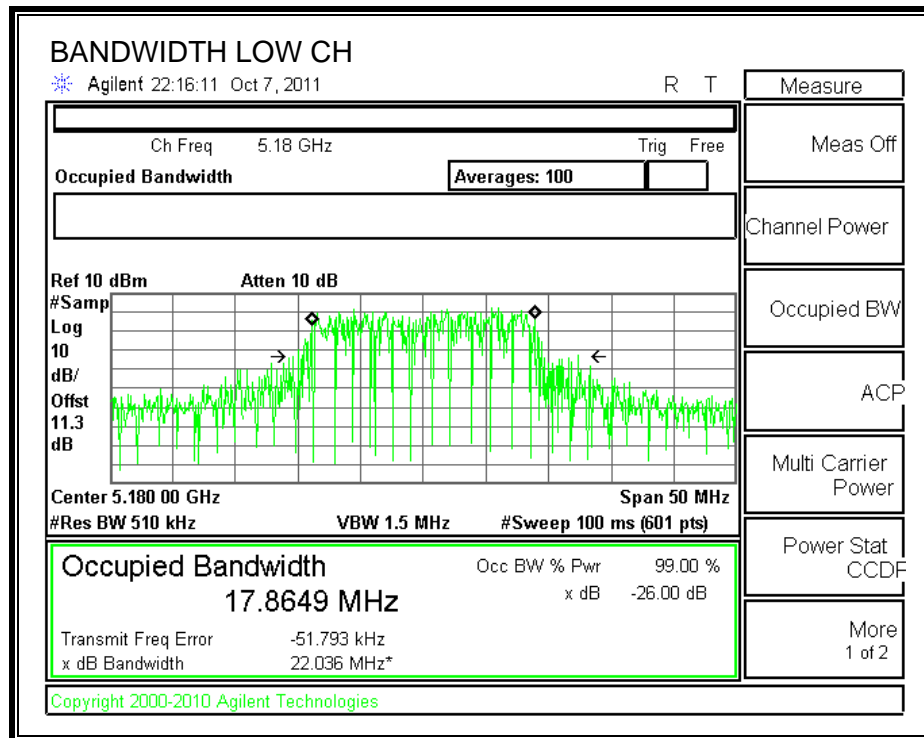
26 dB and 99% BANDWIDTH

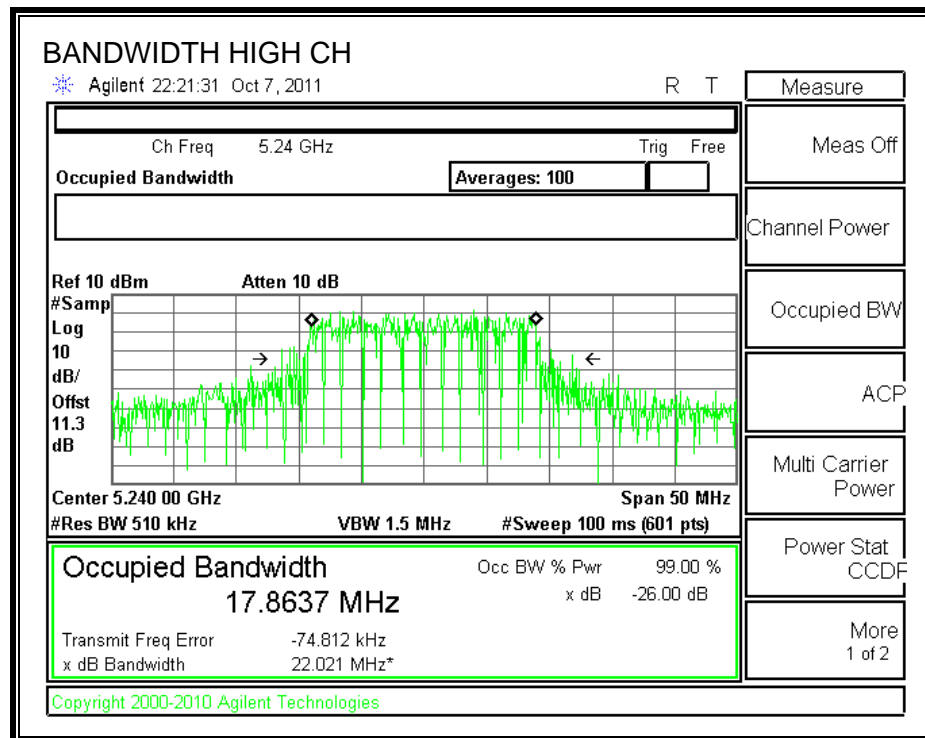




CHAIN 2

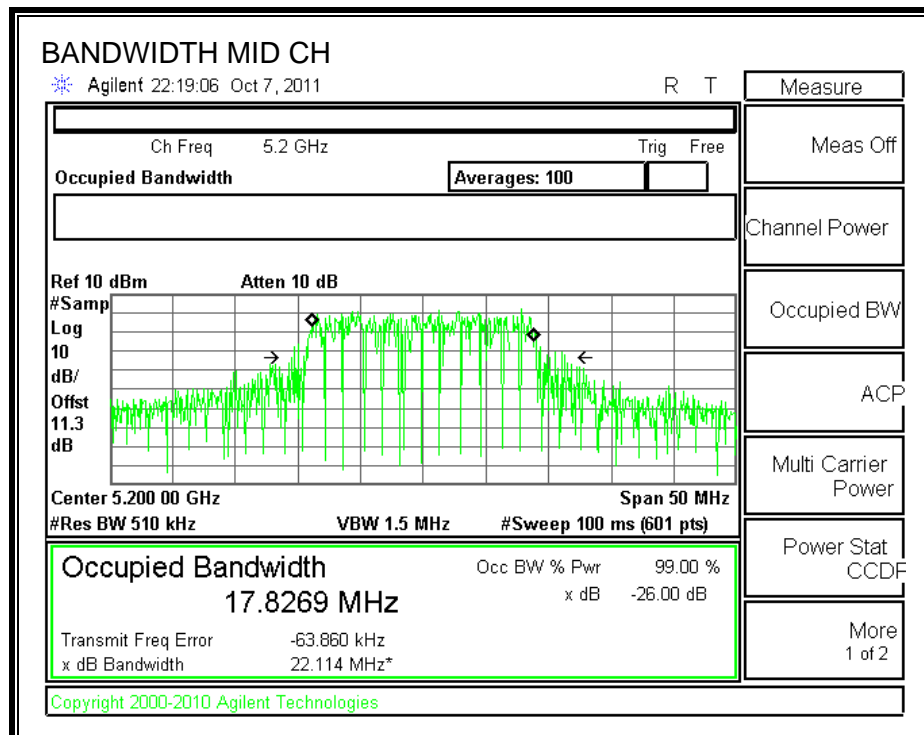
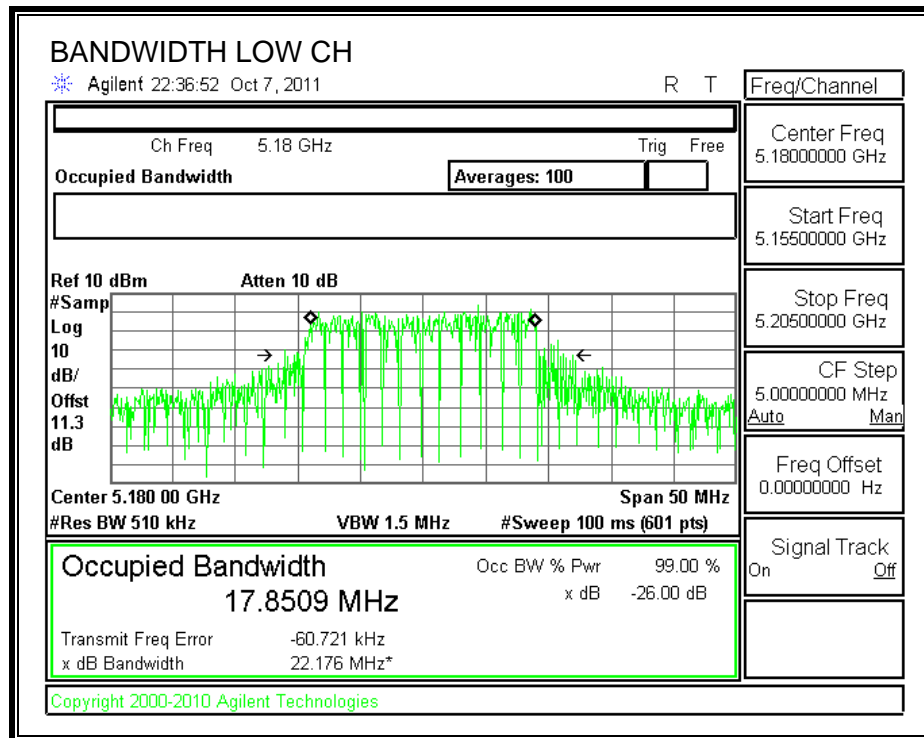
26 dB and 99% BANDWIDTH

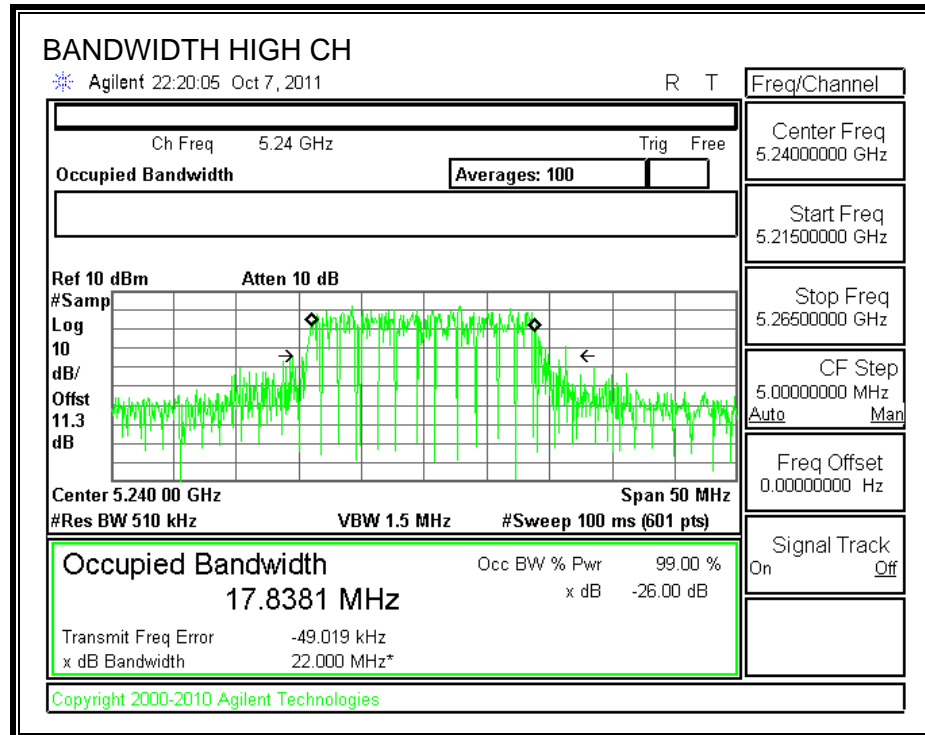




CHAIN 3

26 dB and 99% BANDWIDTH





7.3.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

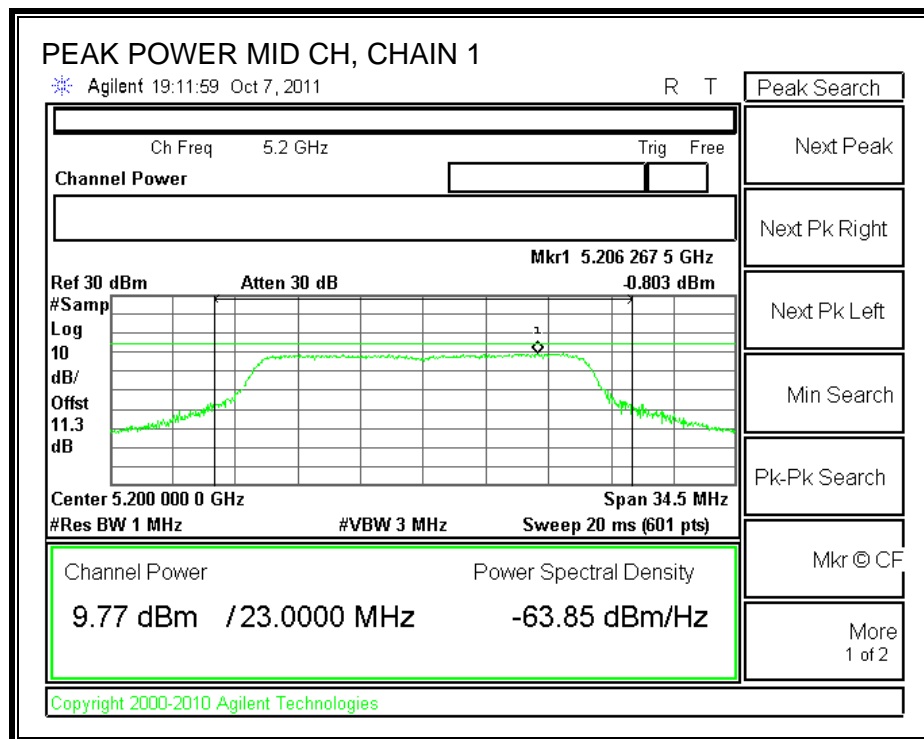
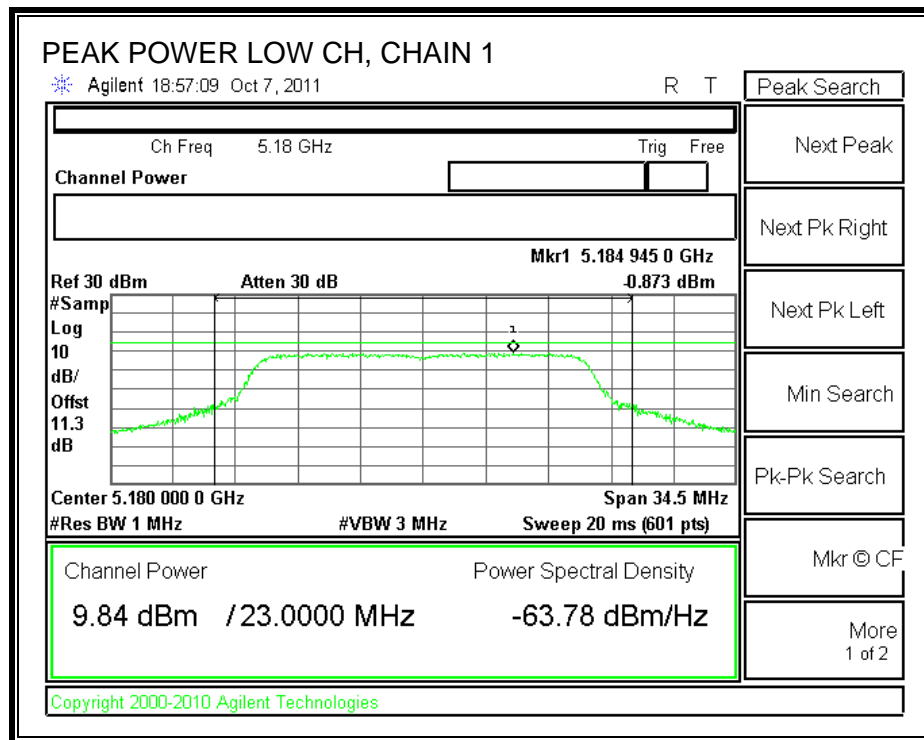
Limit

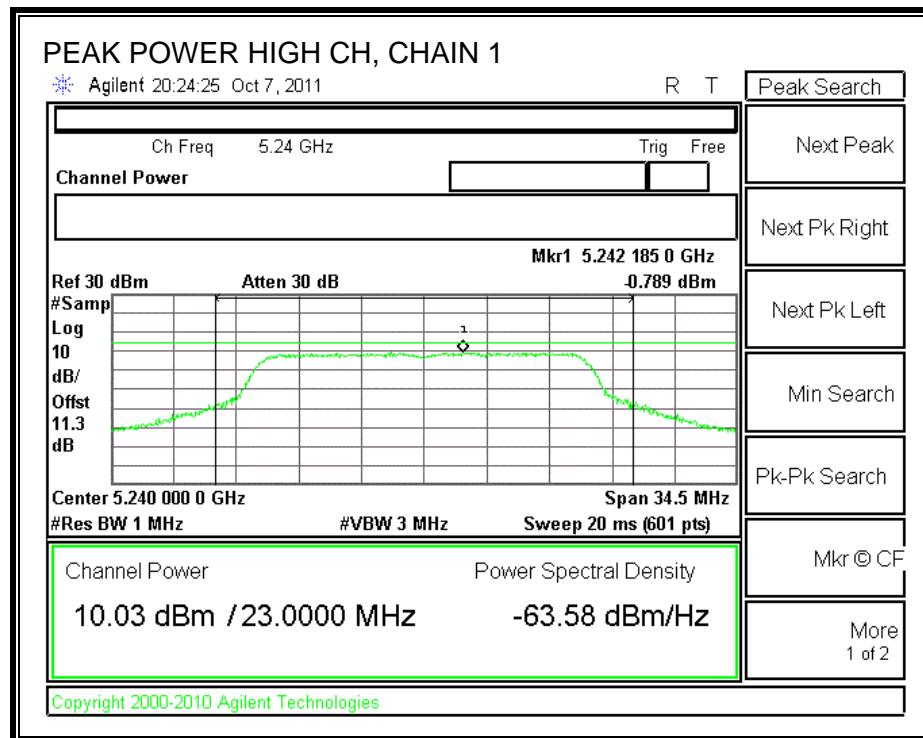
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	16.99	21.897	17.40	5.00	16.99
Mid	5200	16.99	21.946	17.41	5.00	16.99
High	5240	16.99	22.000	17.42	5.00	16.99

Individual Chain Results

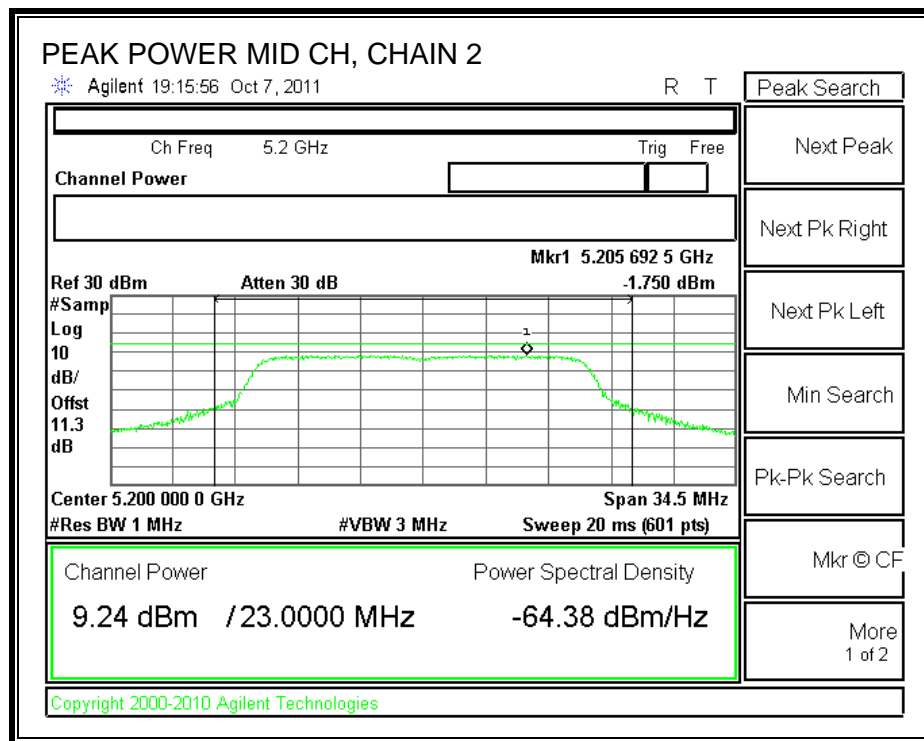
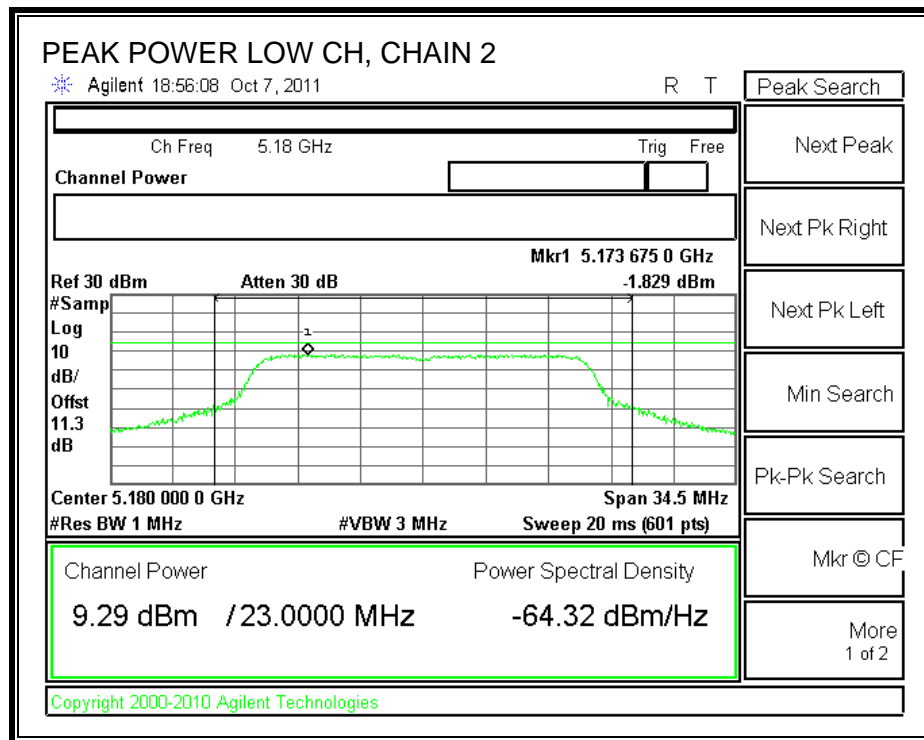
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	9.84	9.29	10.42	14.65	16.99	-2.34
Mid	5200	9.77	9.24	10.36	14.59	16.99	-2.40
High	5240	10.03	9.57	9.91	14.61	16.99	-2.38

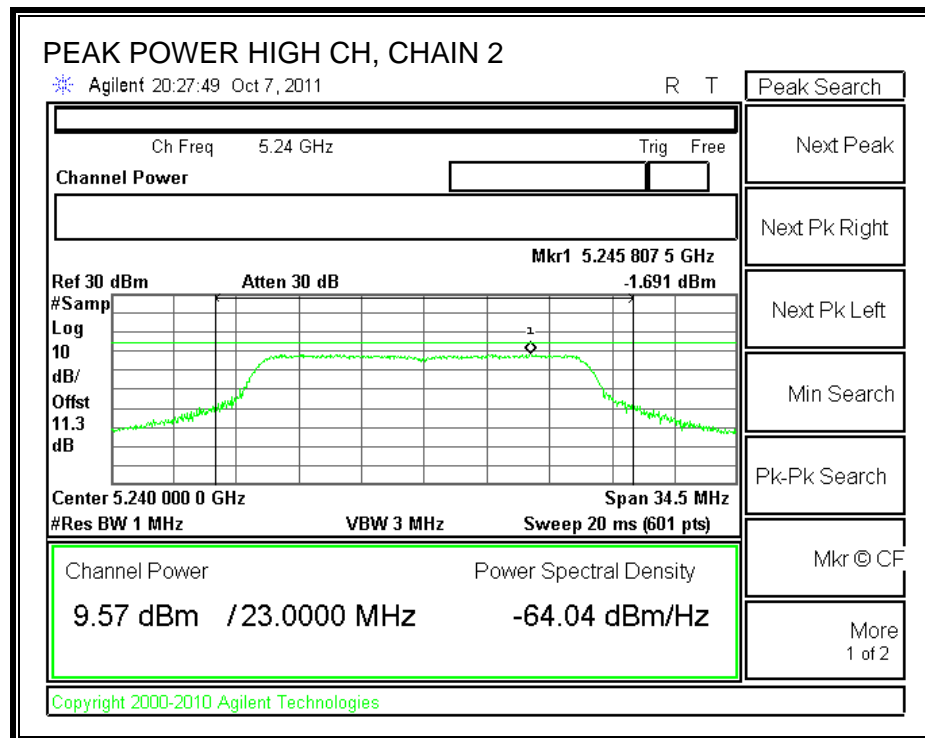
CHAIN 1 OUTPUT POWER



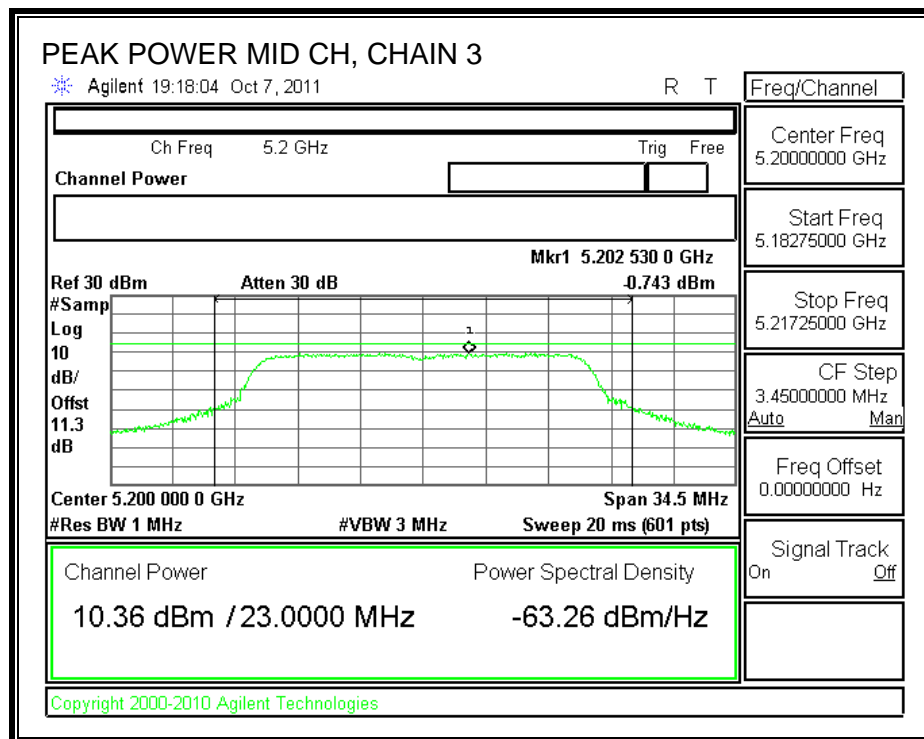
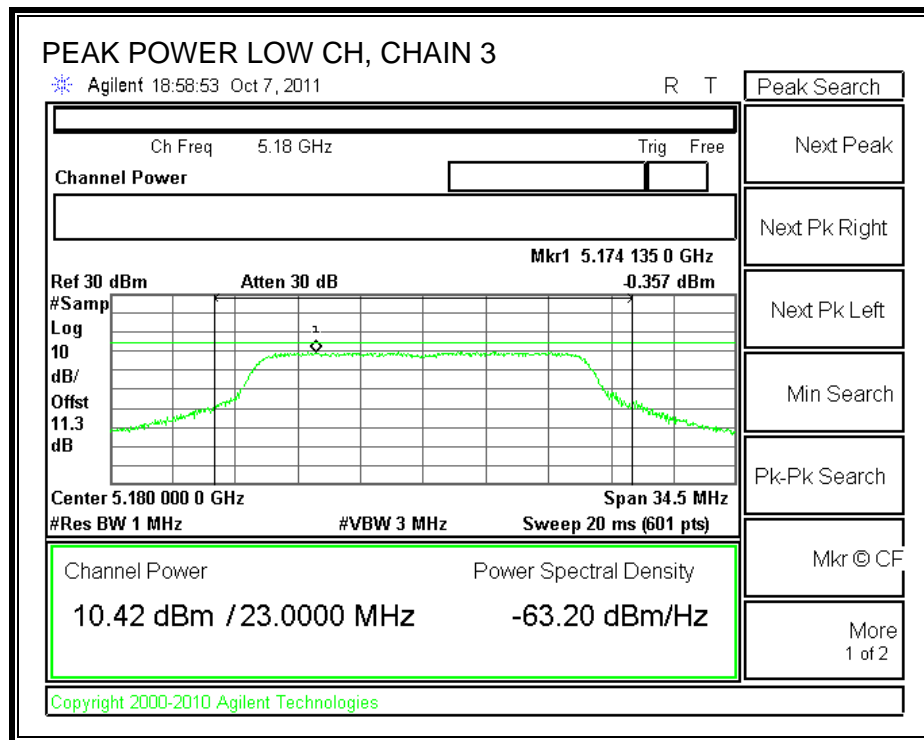


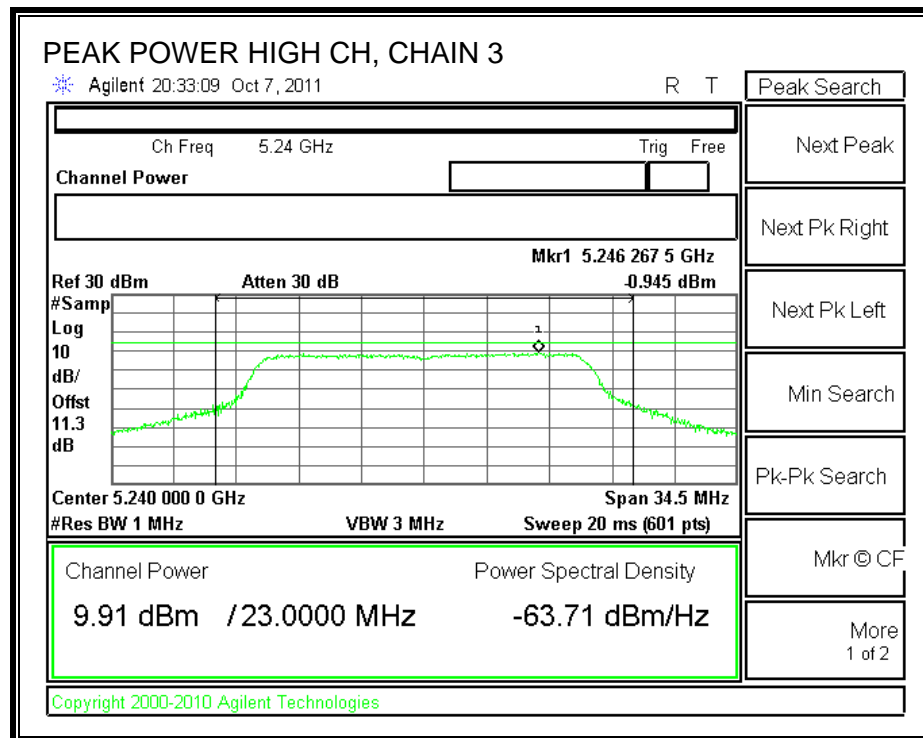
CHAIN 2 OUTPUT POWER





CHAIN 3 OUTPUT POWER





7.3.3. 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 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	5180	9.60	9.00	10.20	14.40
Middle	5200	9.70	9.20	10.00	14.42
High	5240	9.90	9.40	9.60	14.41

7.3.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum effective antenna gain is 5 dBi, therefore the limit is 4 dBm.

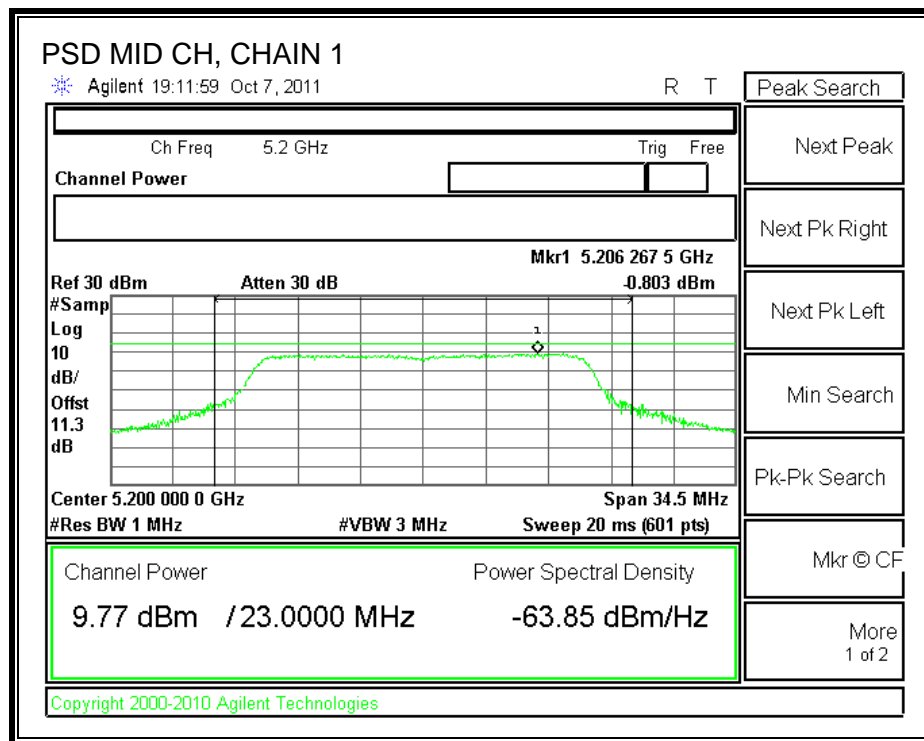
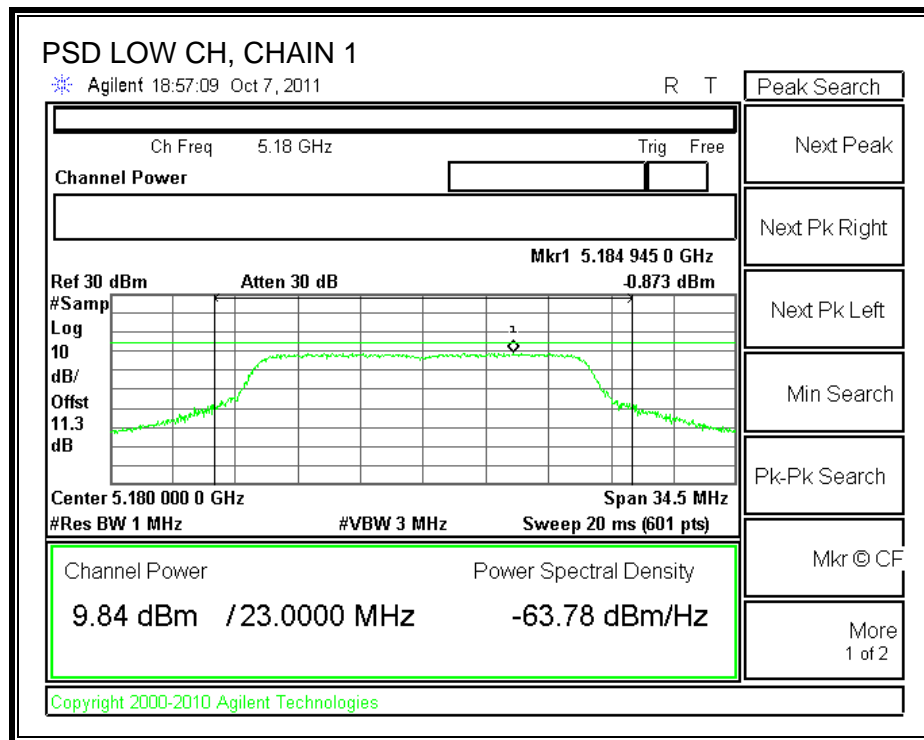
TEST PROCEDURE

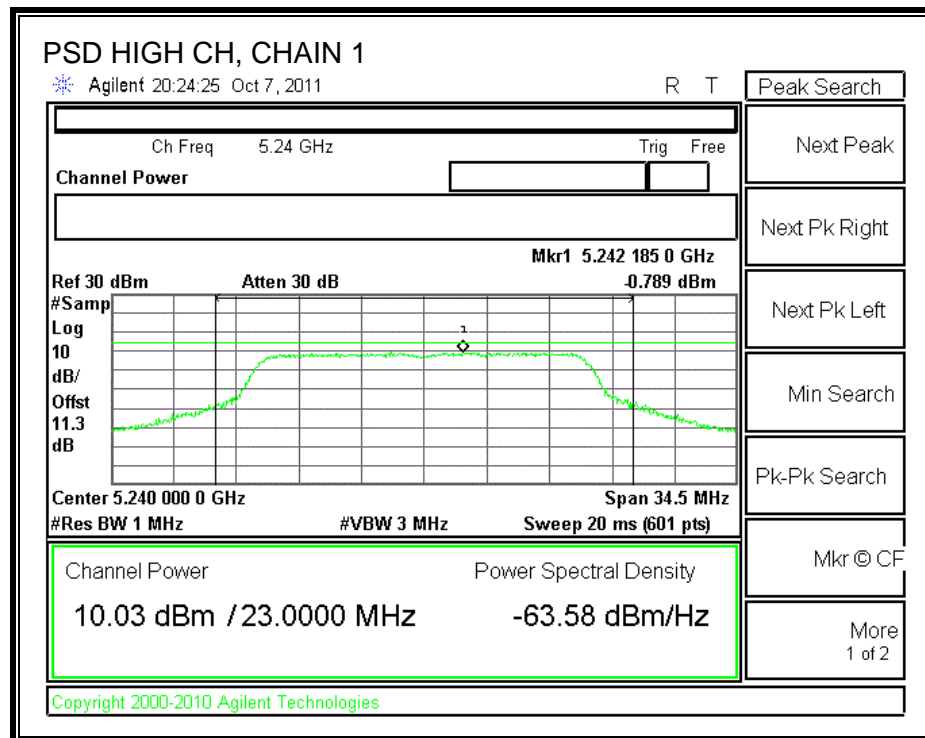
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

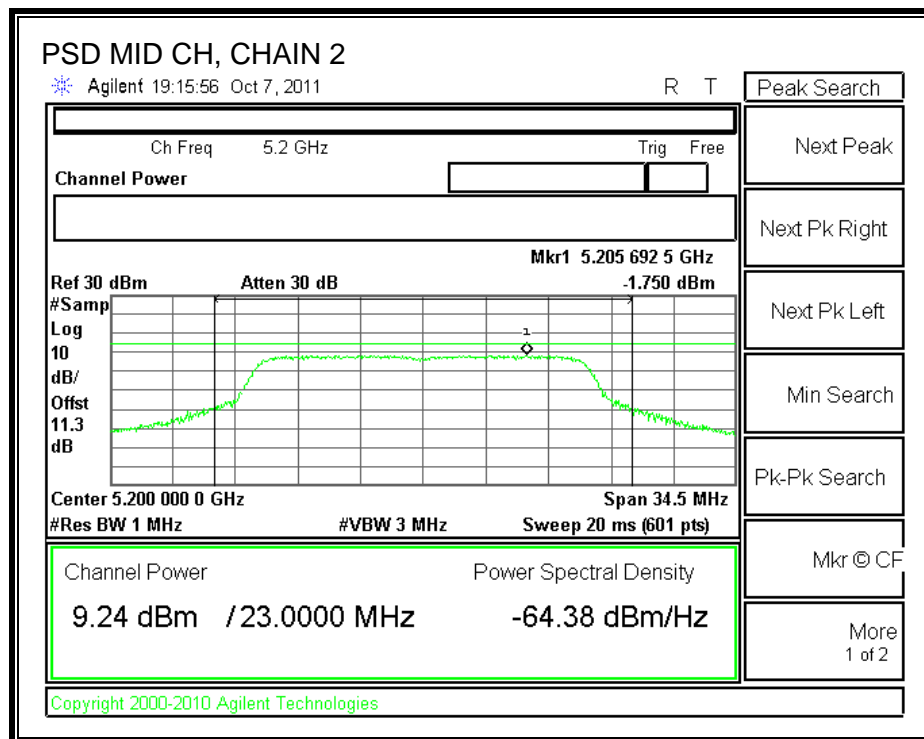
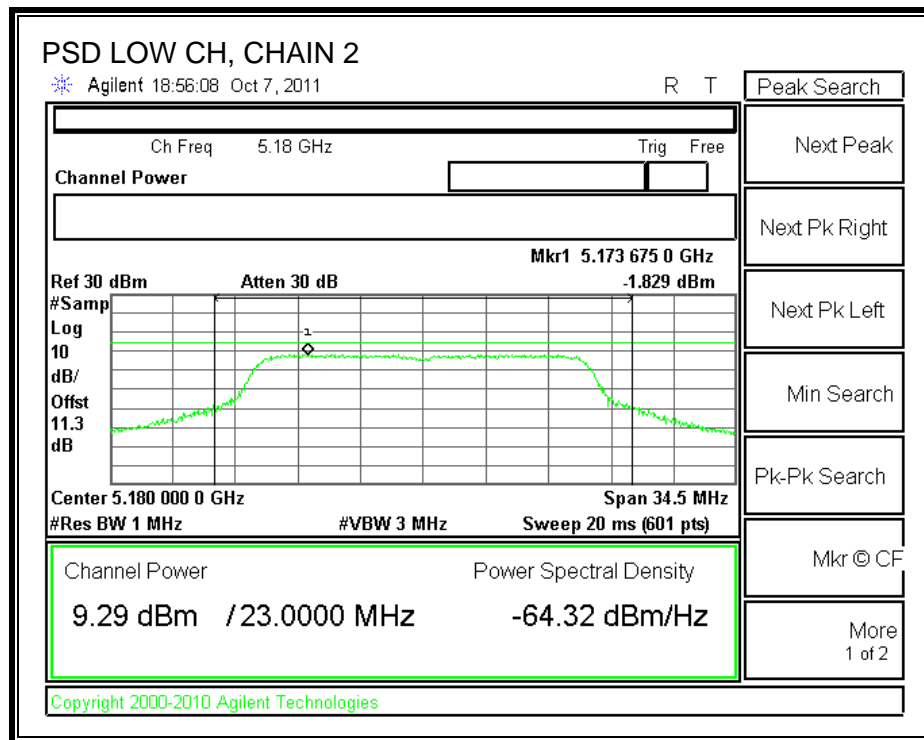
Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Chain 3 PPSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	-0.873	-1.829	-0.357	3.79	4.00	-0.21
Middle	5200	-0.803	-1.750	-0.743	3.70	4.00	-0.30
High	5240	-0.789	-1.691	-0.945	3.65	4.00	-0.35

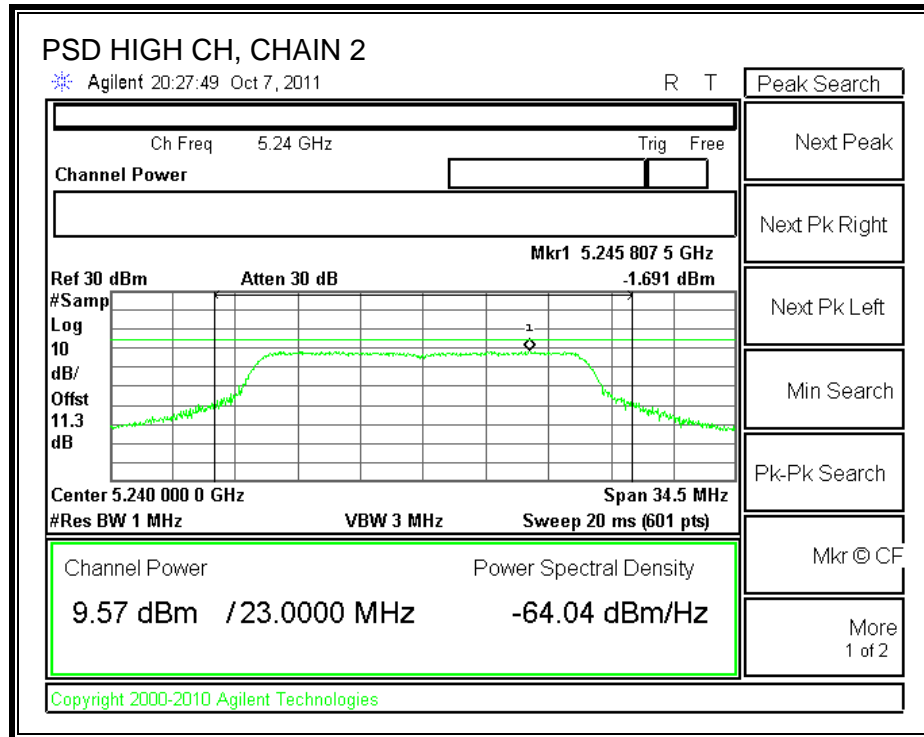
CHAIN 1 POWER SPECTRAL DENSITY



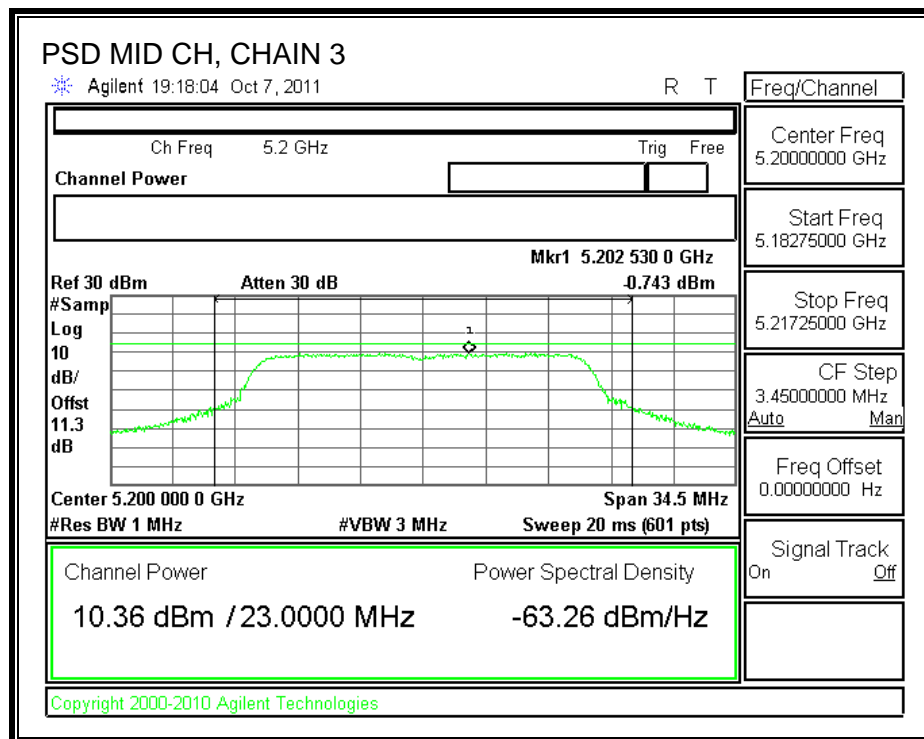
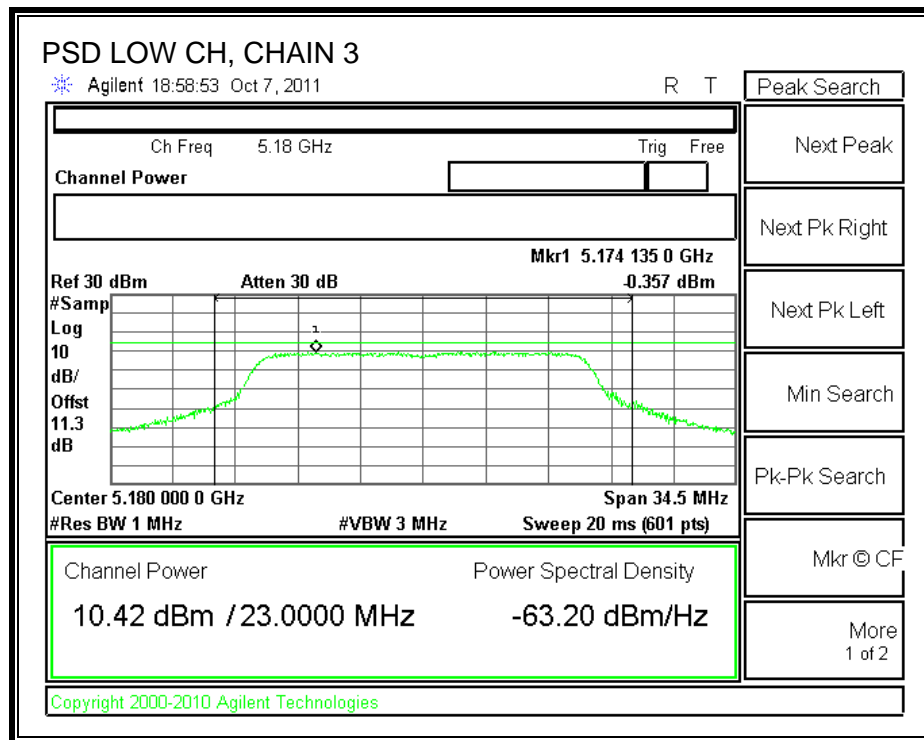


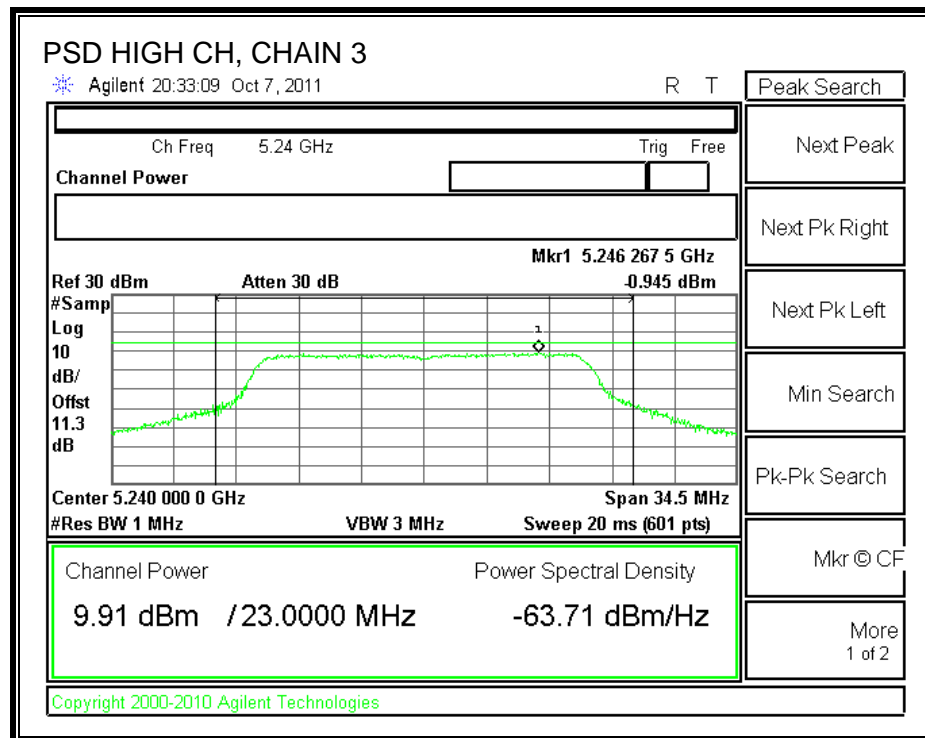
CHAIN 2 POWER SPECTRAL DENSITY





CHAIN 3 POWER SPECTRAL DENSITY





7.3.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.17	13	-2.83
Middle	5200	10.96	13	-2.04
High	5240	10.27	13	-2.73

CHAIN 2

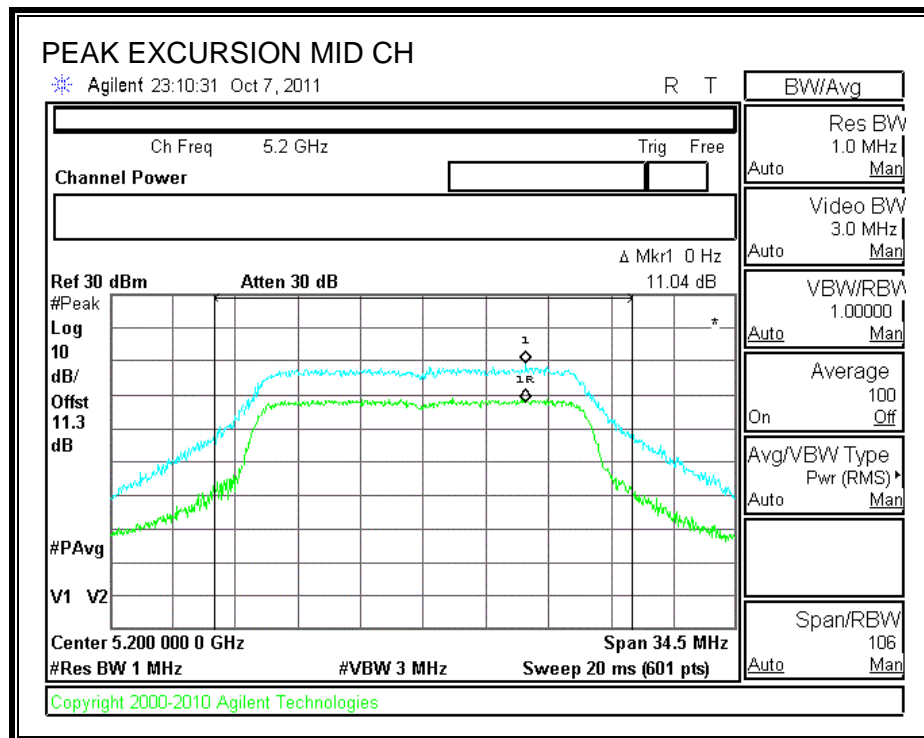
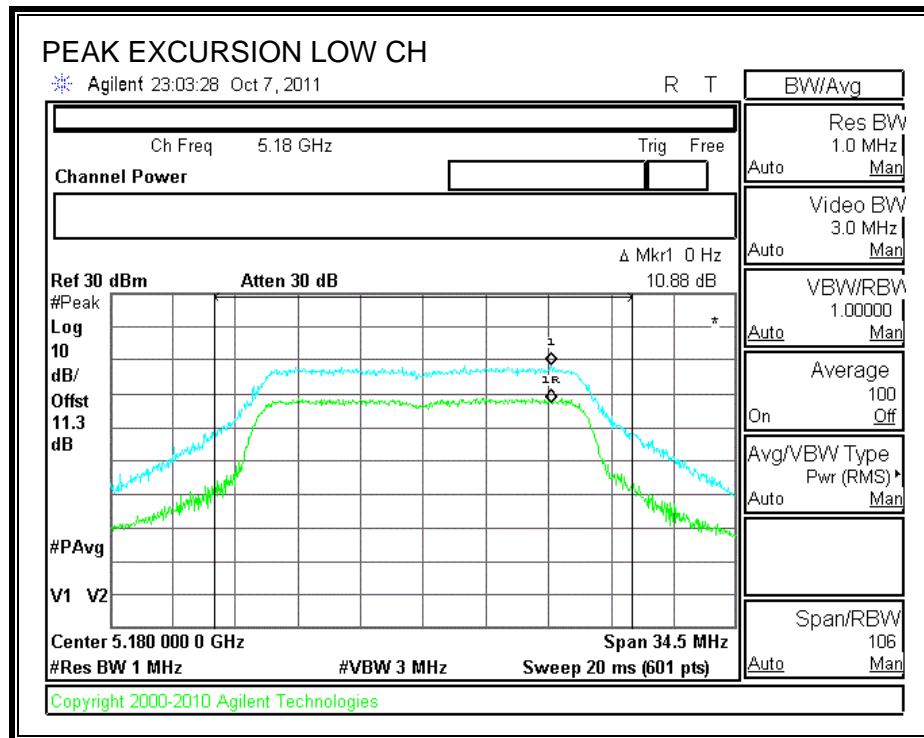
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.38	13	-2.62
Middle	5200	10.41	13	-2.59
High	5240	10.24	13	-2.76

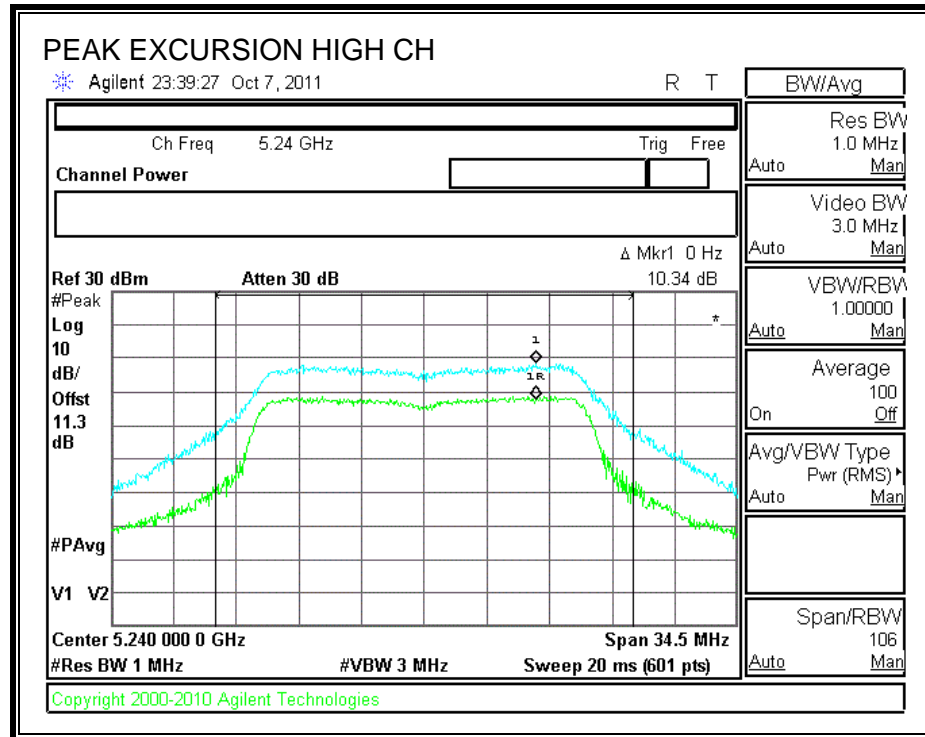
CHAIN 3

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.38	13	-2.62
Middle	5200	10.41	13	-2.59
High	5240	10.24	13	-2.76

CHAIN 1

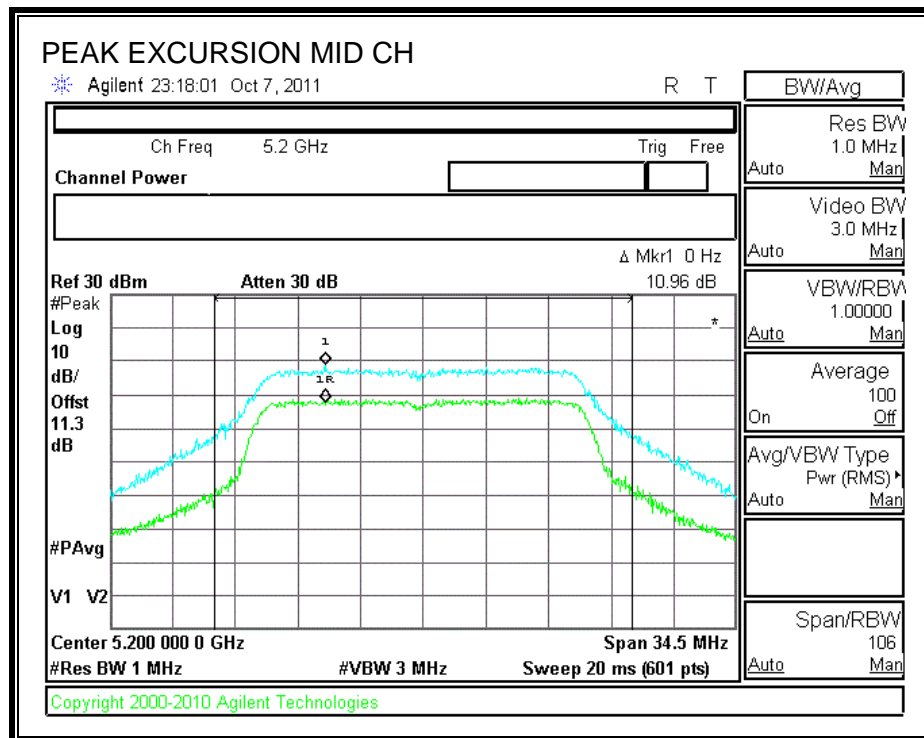
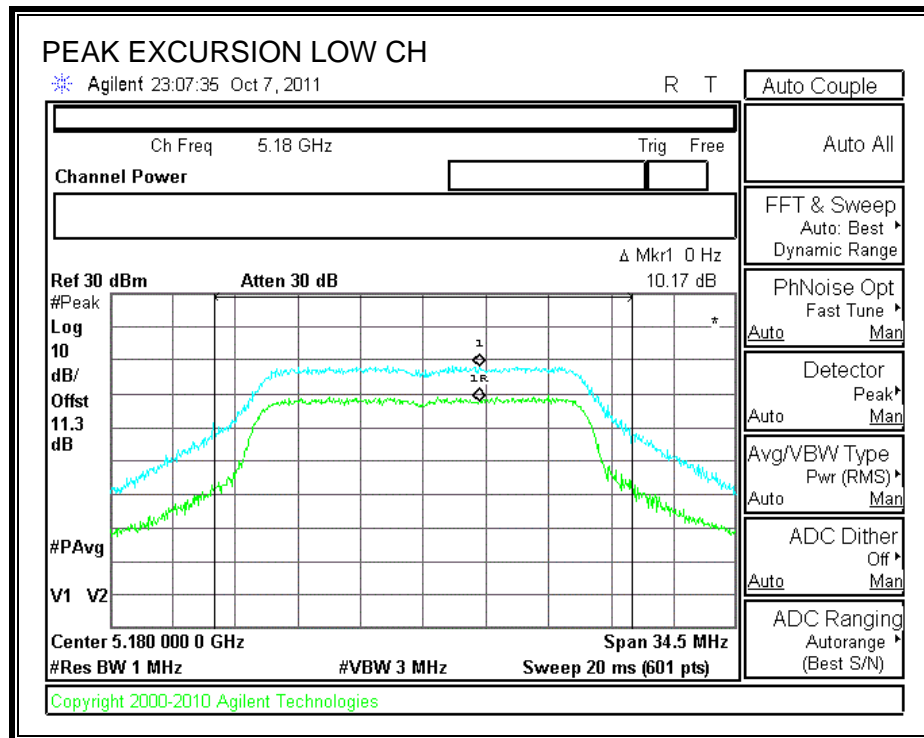
PEAK EXCURSION

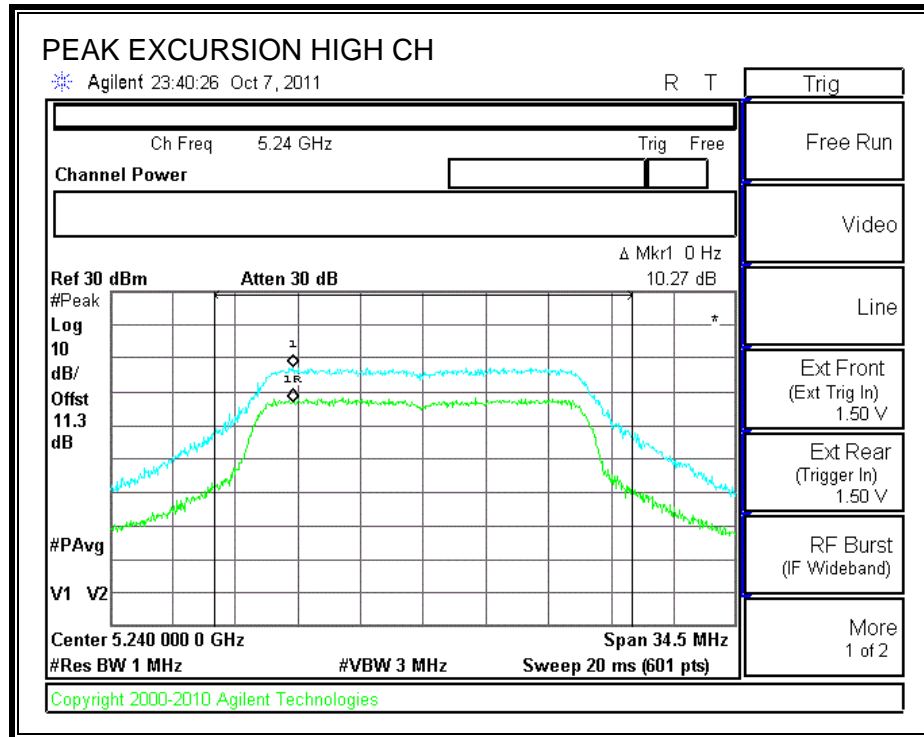




CHAIN 2

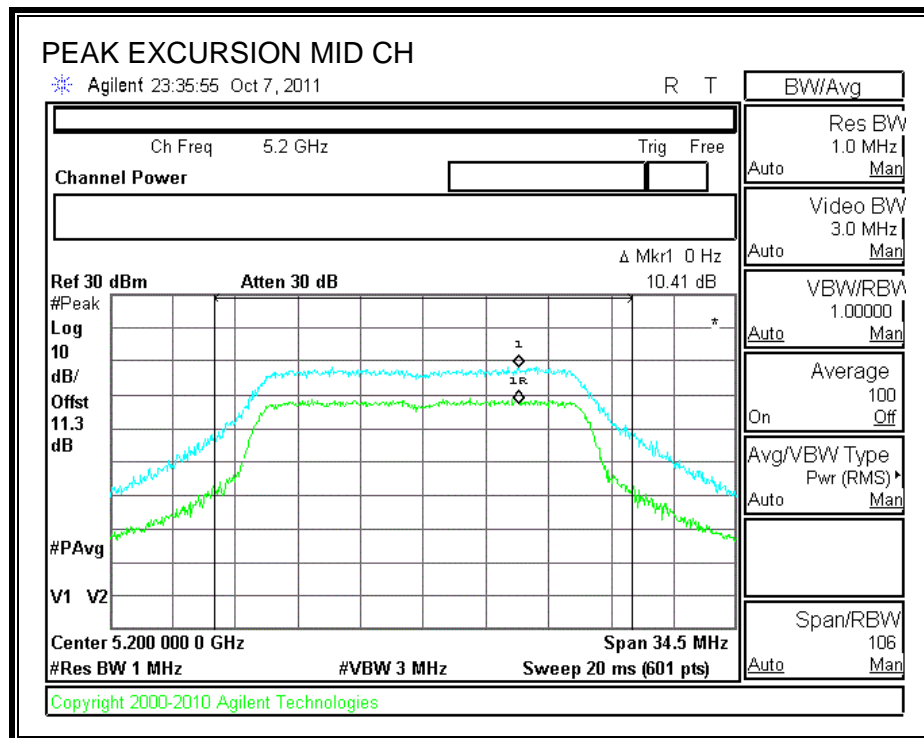
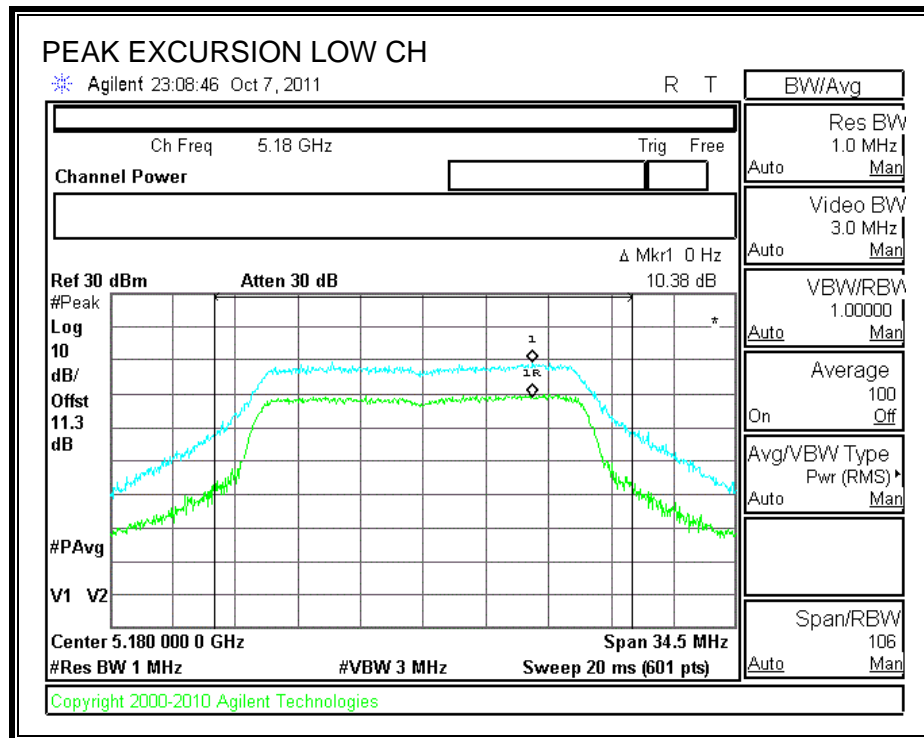
PEAK EXCURSION

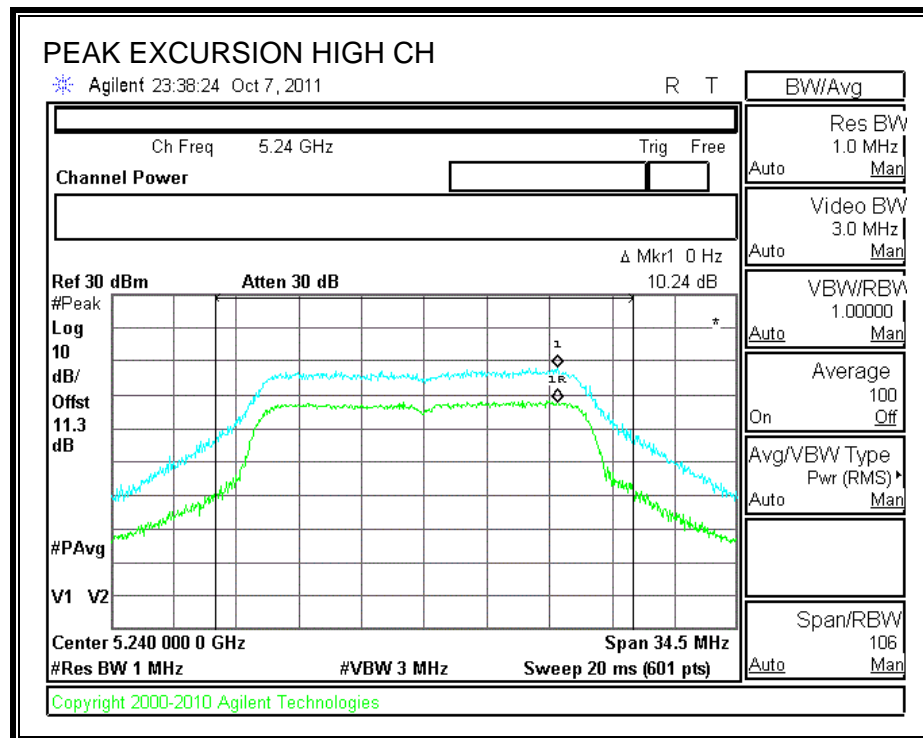




CHAIN 3

PEAK EXCURSION





7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 3 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

Chain 1

Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	10Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	36.90	-47.45	5.00	4.77	-37.68	-27.00
Middle	36.87	-48.95	5.00	4.77	-39.18	-27.00
High	37.34	-48.46	5.00	4.77	-38.69	-27.00

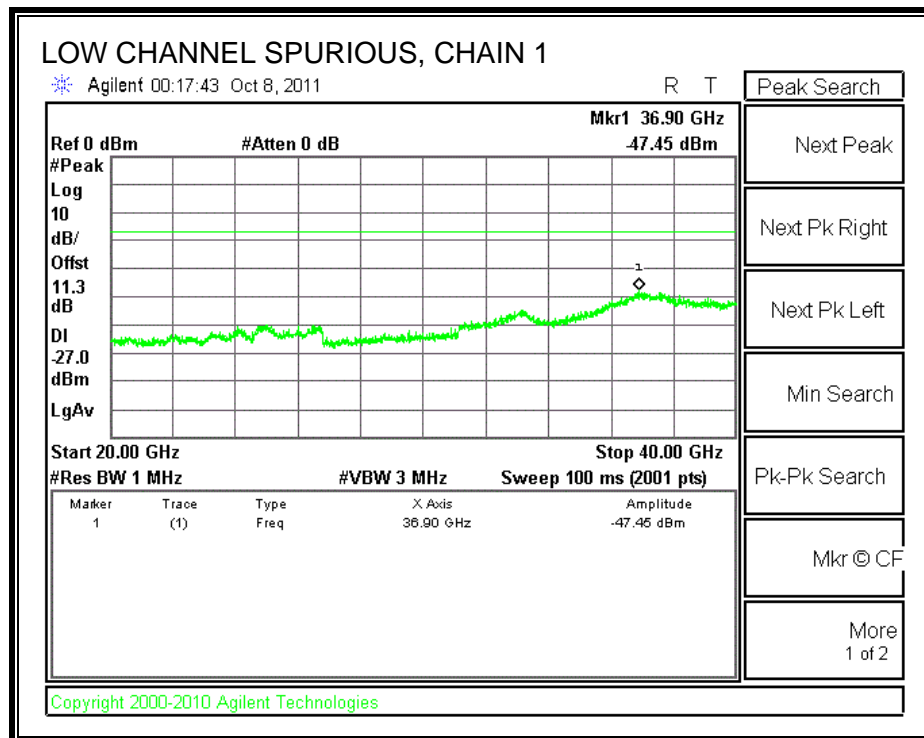
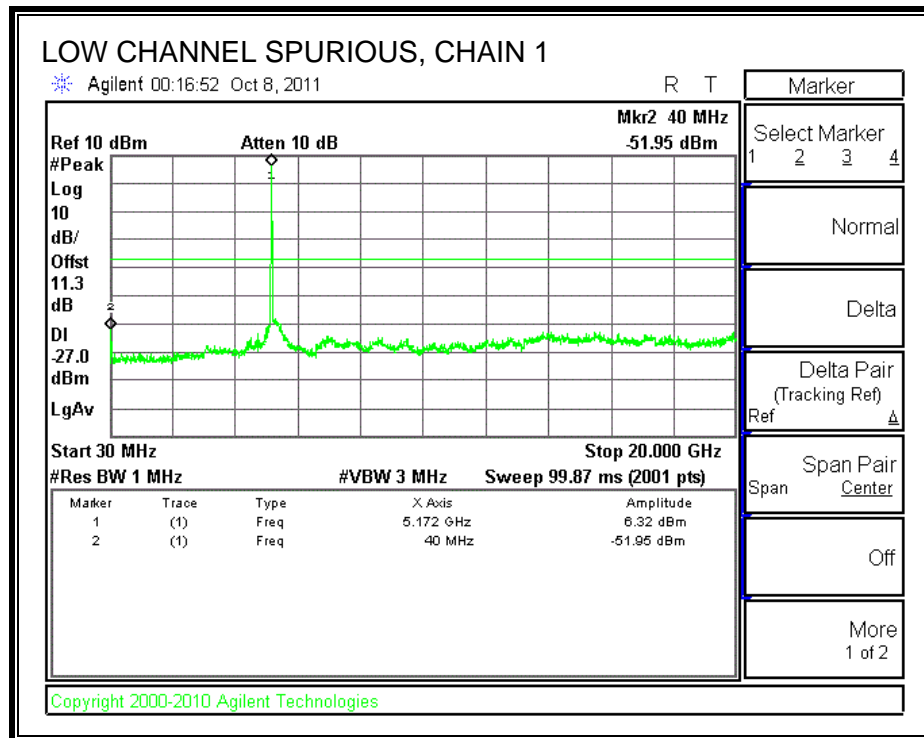
Chain 2

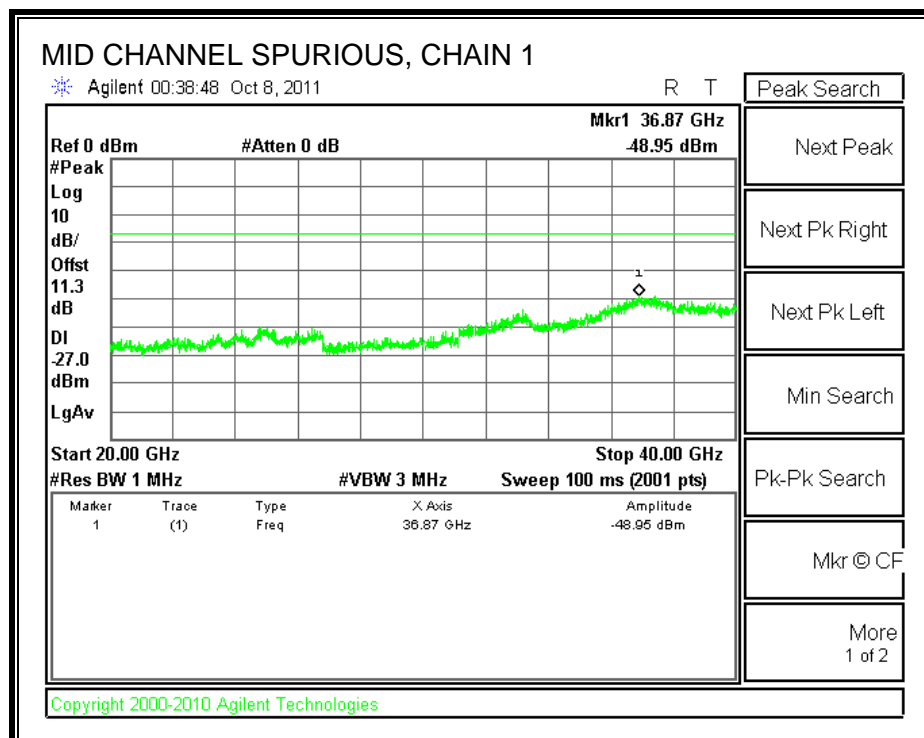
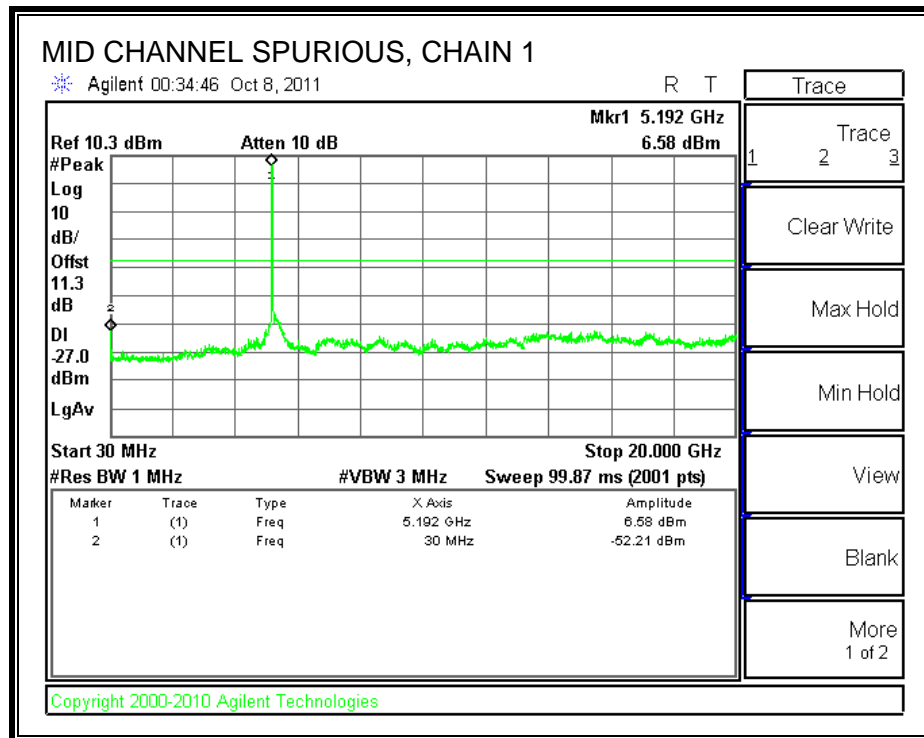
Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	37.42	-48.43	5.00	4.77	-38.66	-27.00
Middle	36.92	-47.29	5.00	4.77	-37.52	-27.00
High	36.76	-47.75	5.00	4.77	-37.98	-27.00

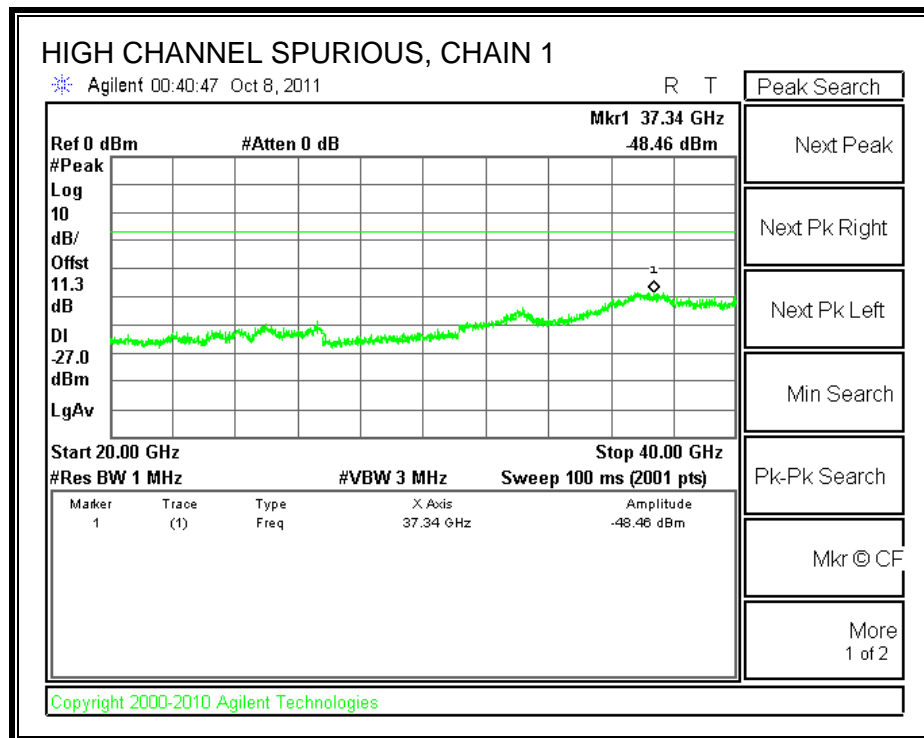
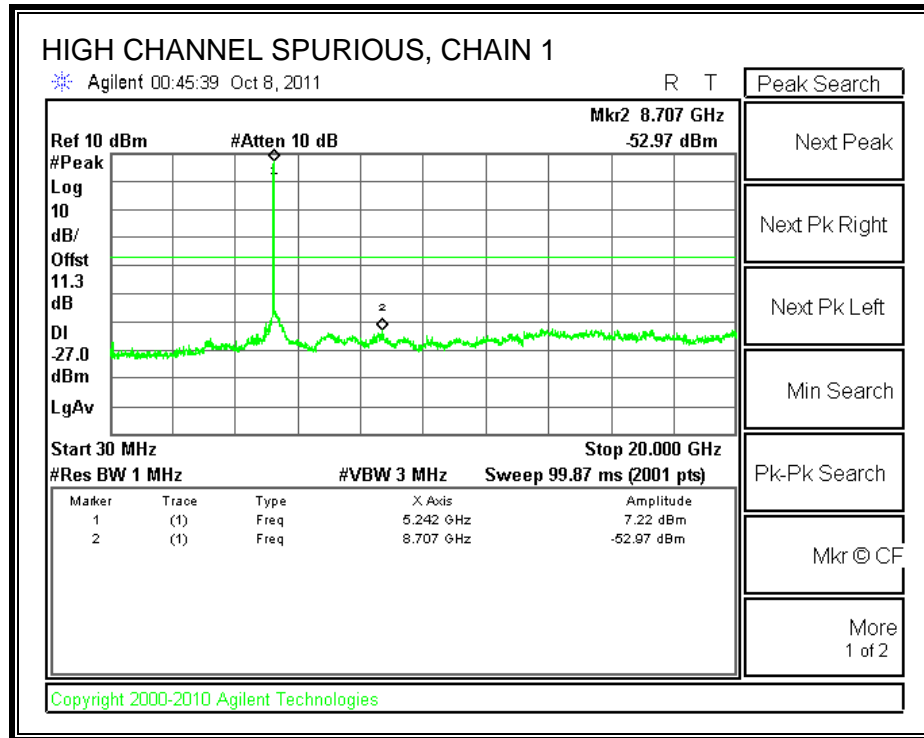
Chain 3

Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	37.14	-48.42	5.00	4.77	-38.65	-27.00
Middle	36.87	-48.11	5.00	4.77	-38.34	-27.00
High	37.58	-47.58	5.00	4.77	-37.81	-27.00

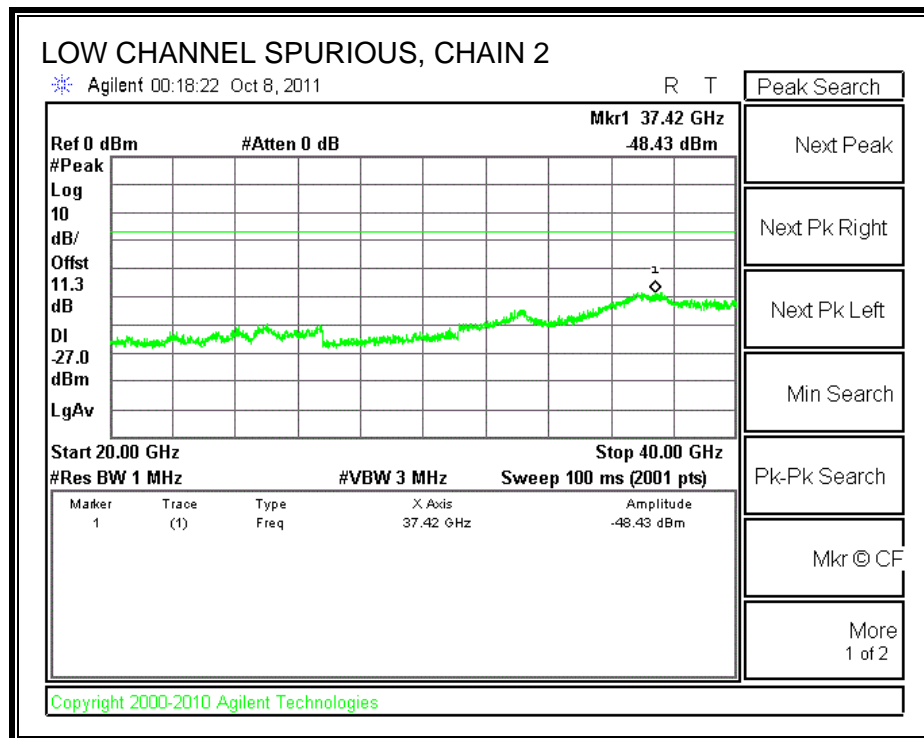
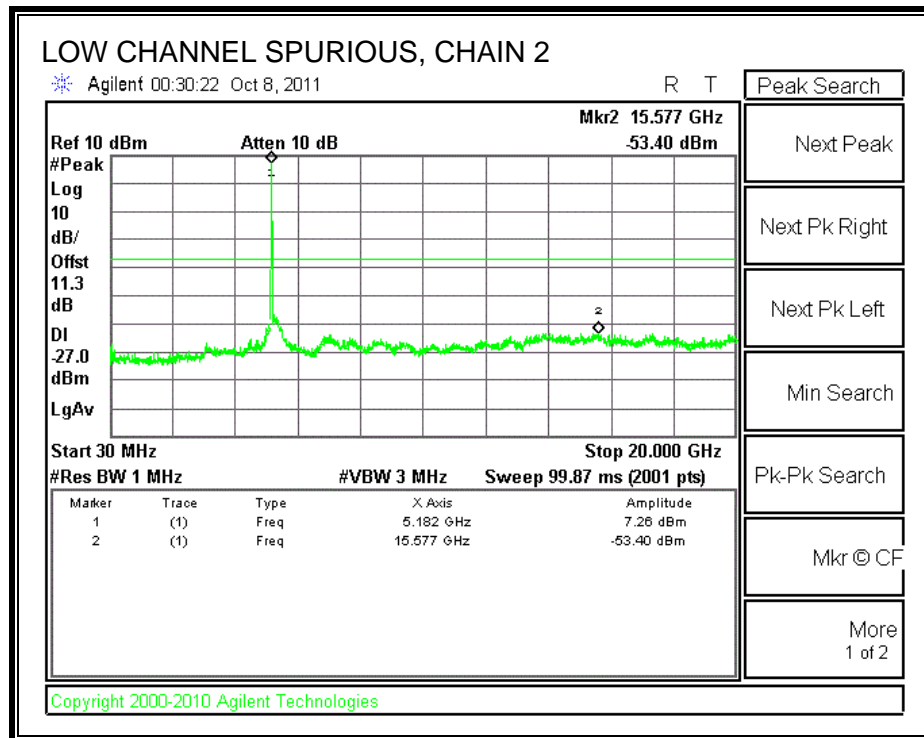
CHAIN 1 SPURIOUS EMISSIONS

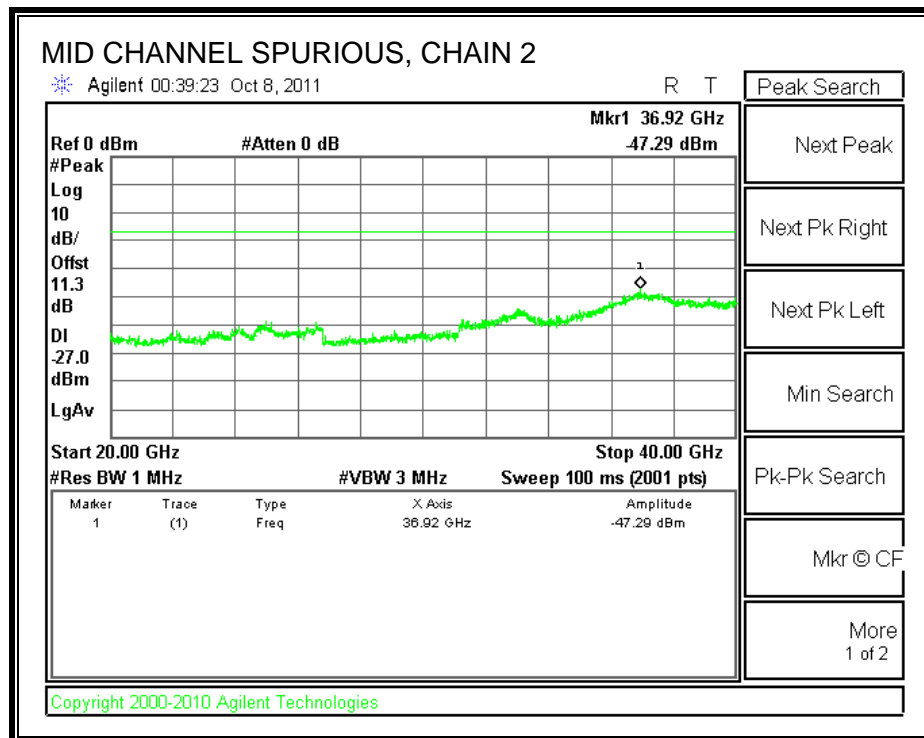
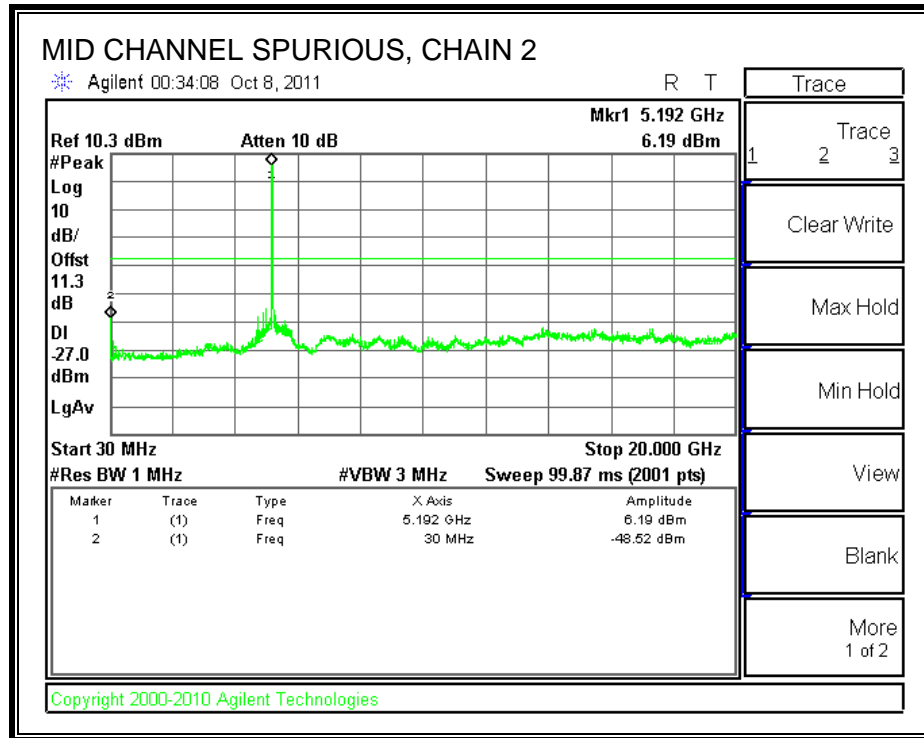


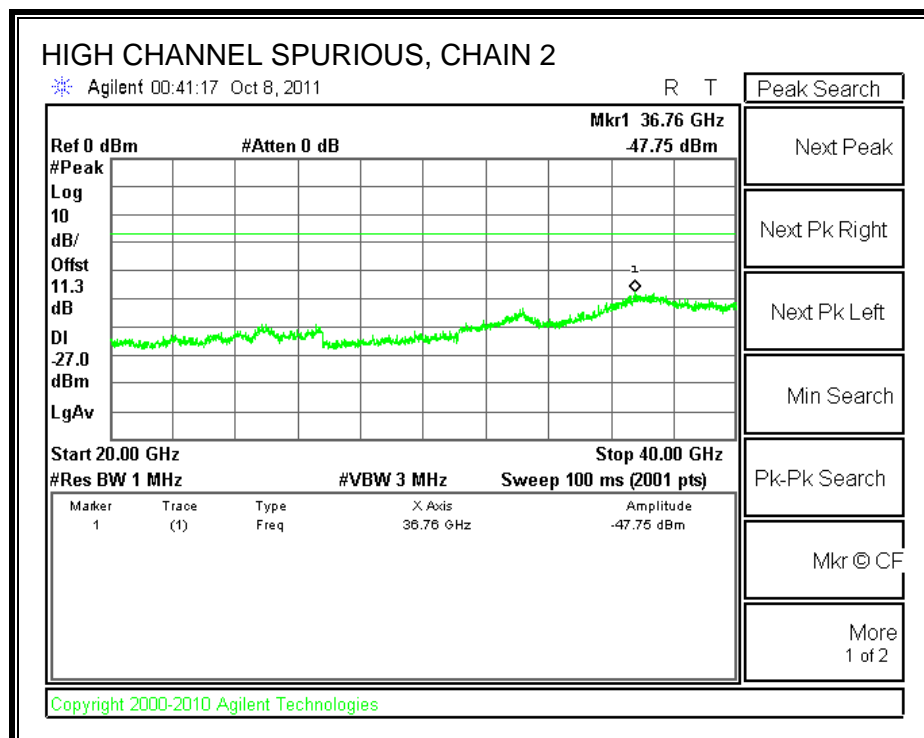
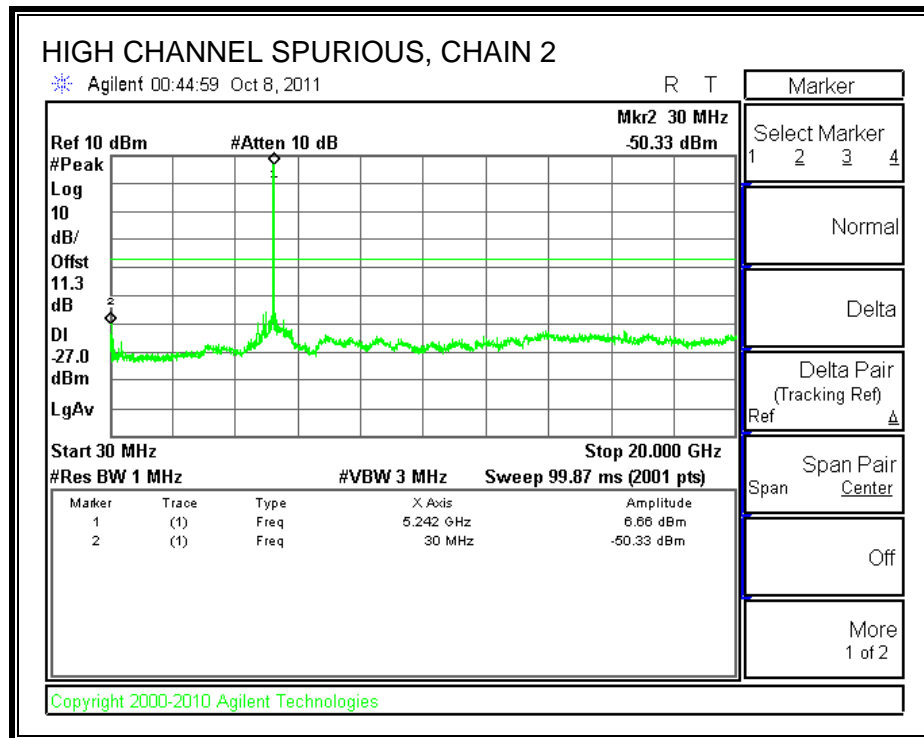




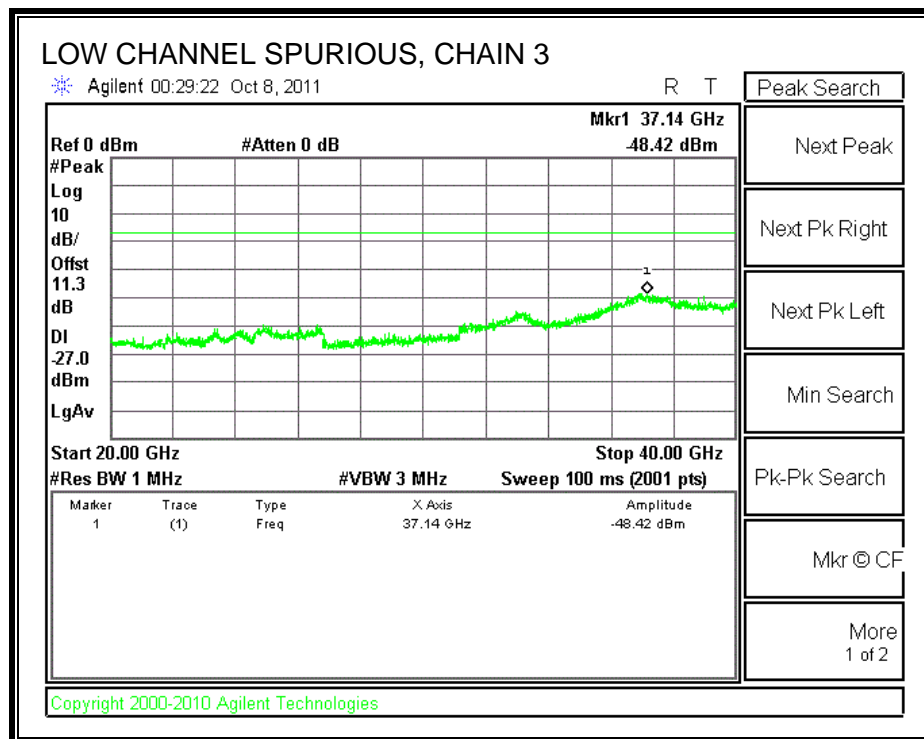
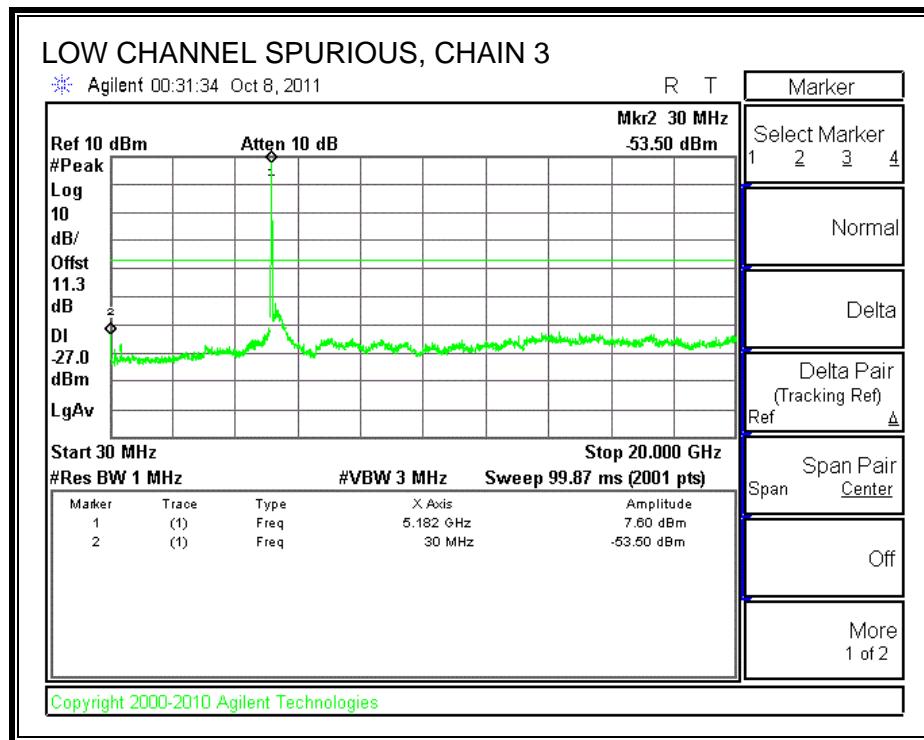
CHAIN 2 SPURIOUS EMISSIONS

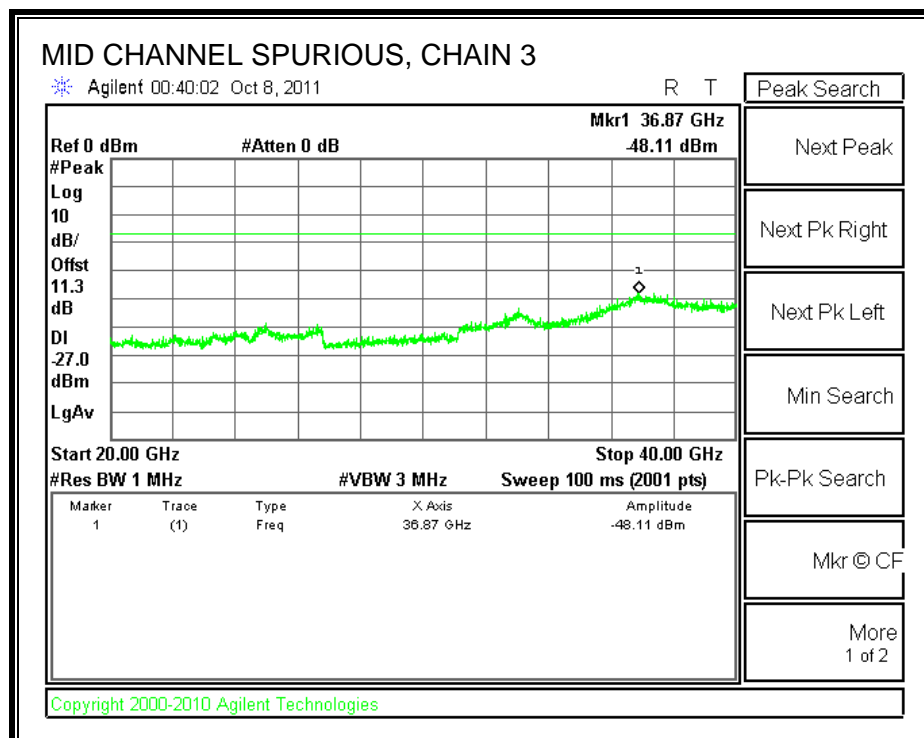
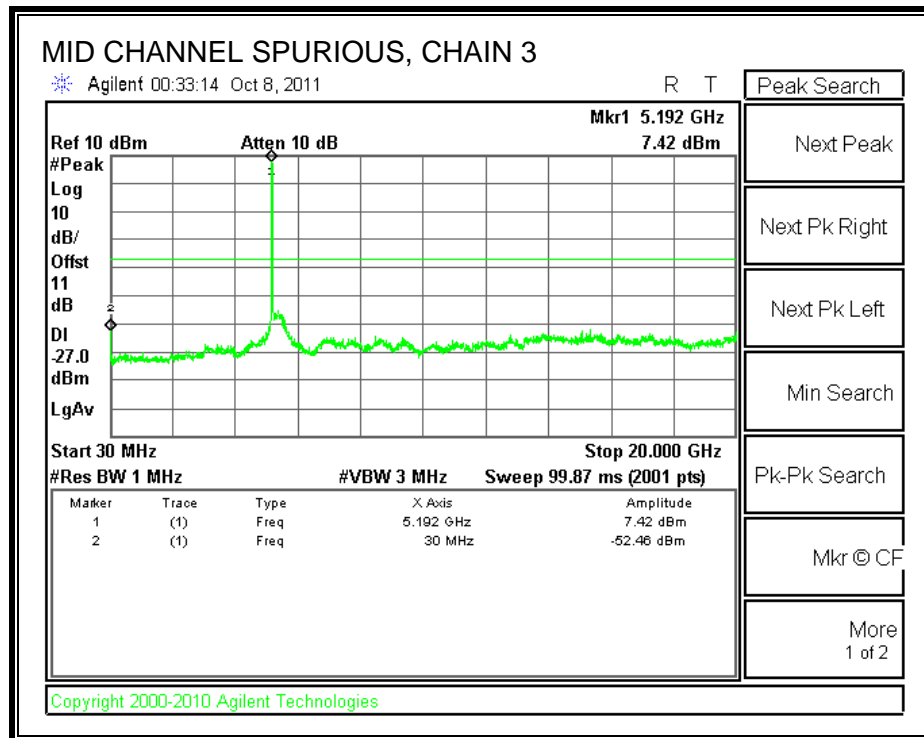


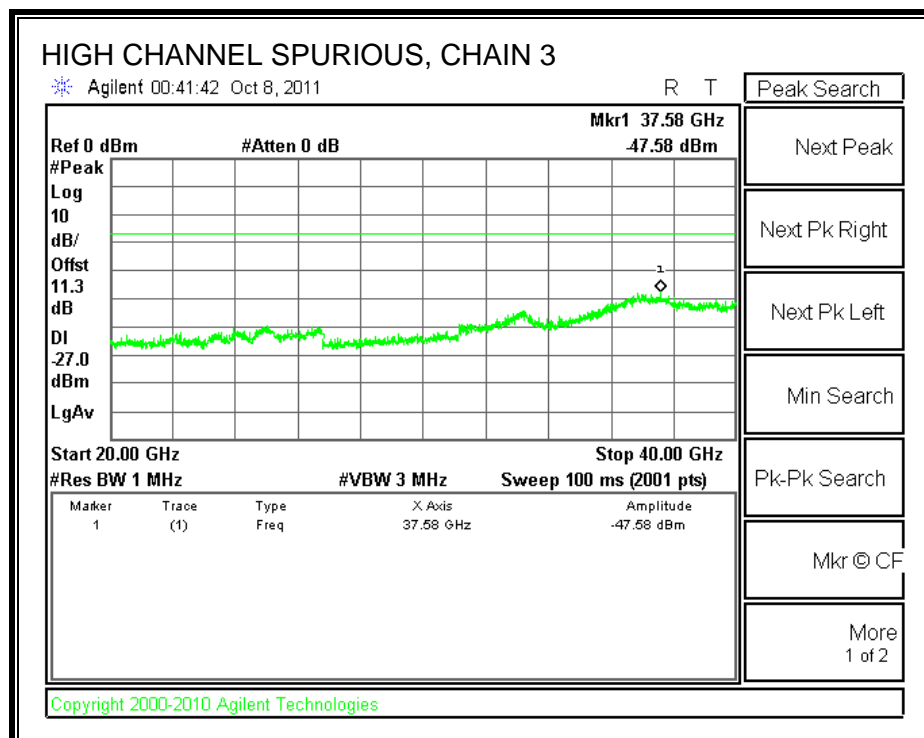
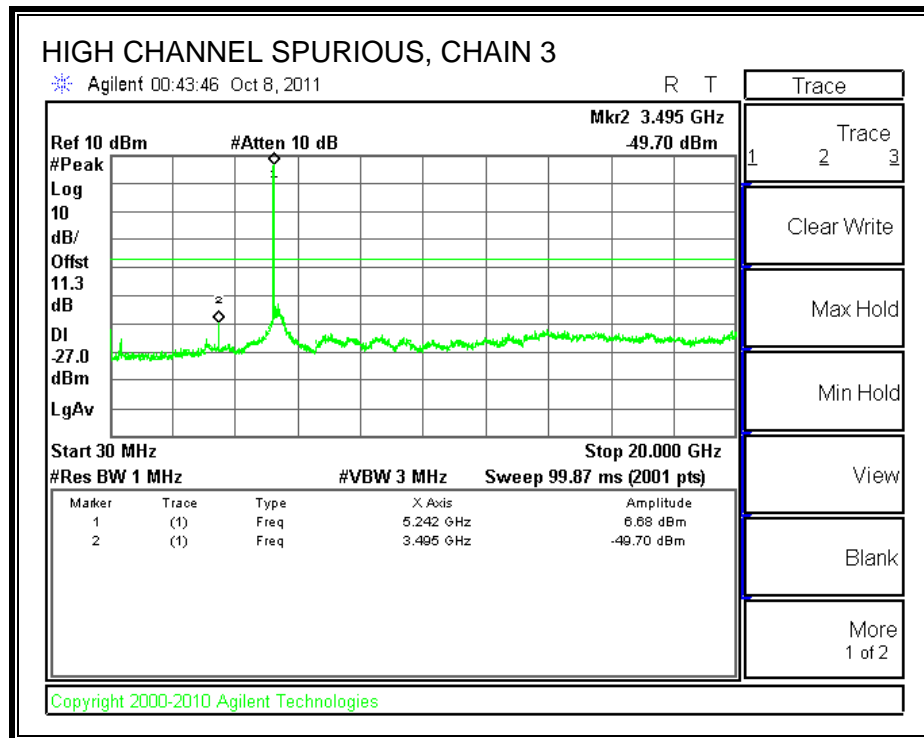




CHAIN 3 SPURIOUS EMISSIONS







7.4. 802.11n HT20 MCS16 3TX MODE

7.4.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	22.063	17.8259
Middle	5200	22.567	17.8411
High	5240	22.092	17.8447

CHAIN 2

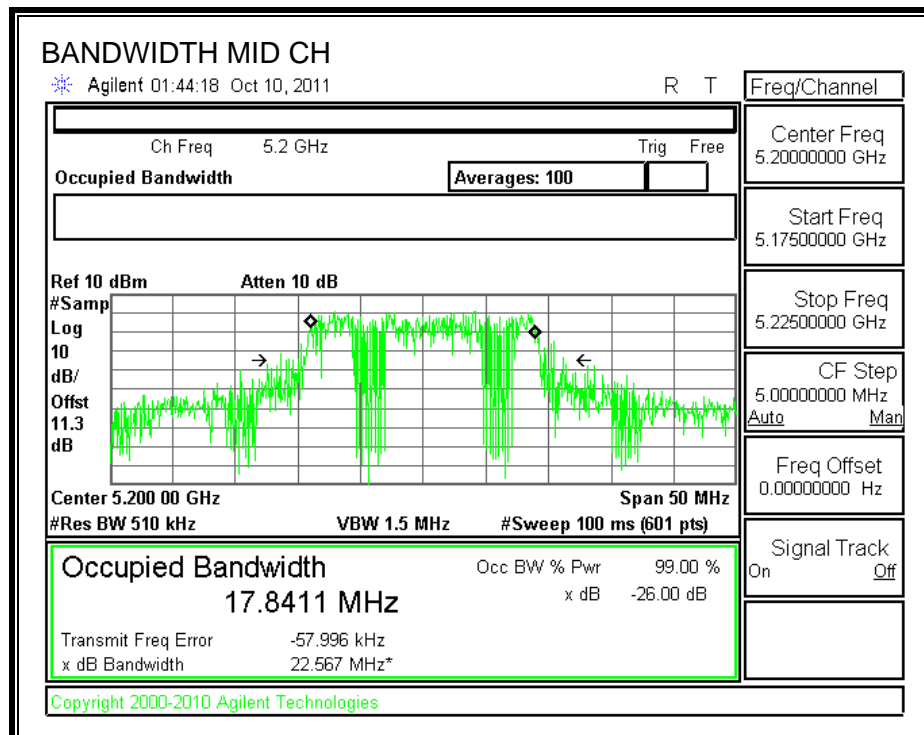
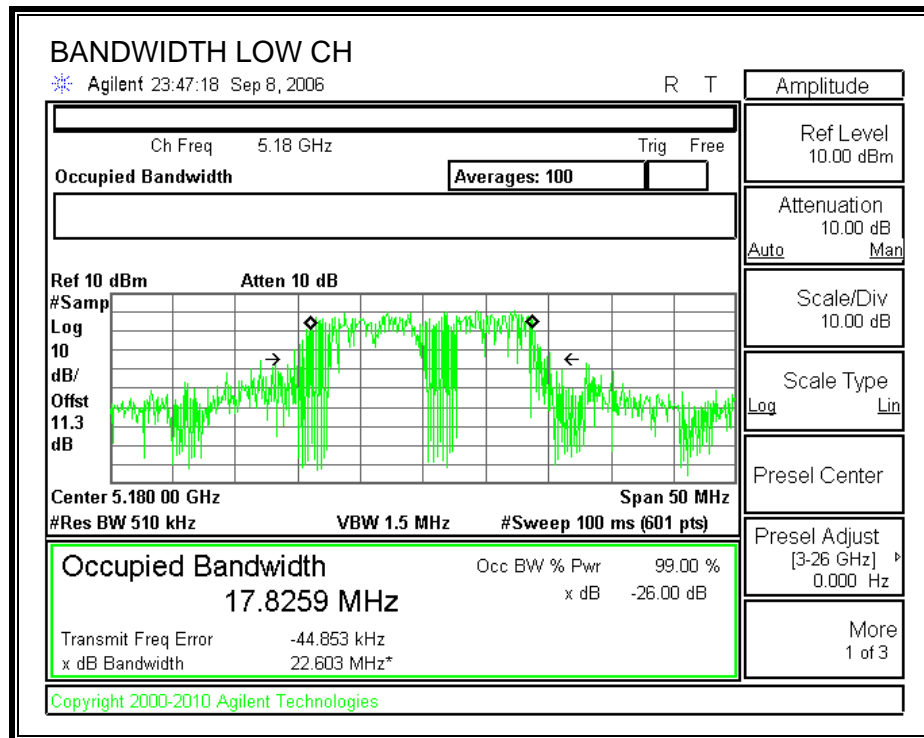
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	22.259	17.8363
Middle	5200	22.167	17.8523
High	5240	22.136	17.8333

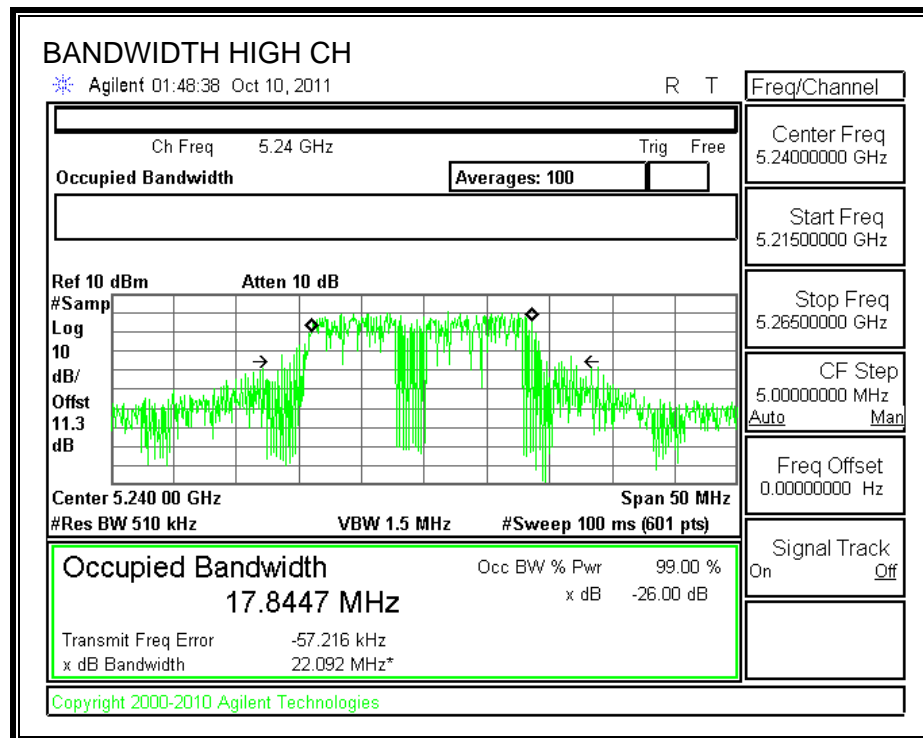
CHAIN 3

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	22.038	17.8476
Middle	5200	22.590	17.8215
High	5240	22.005	17.8369

CHAIN 1

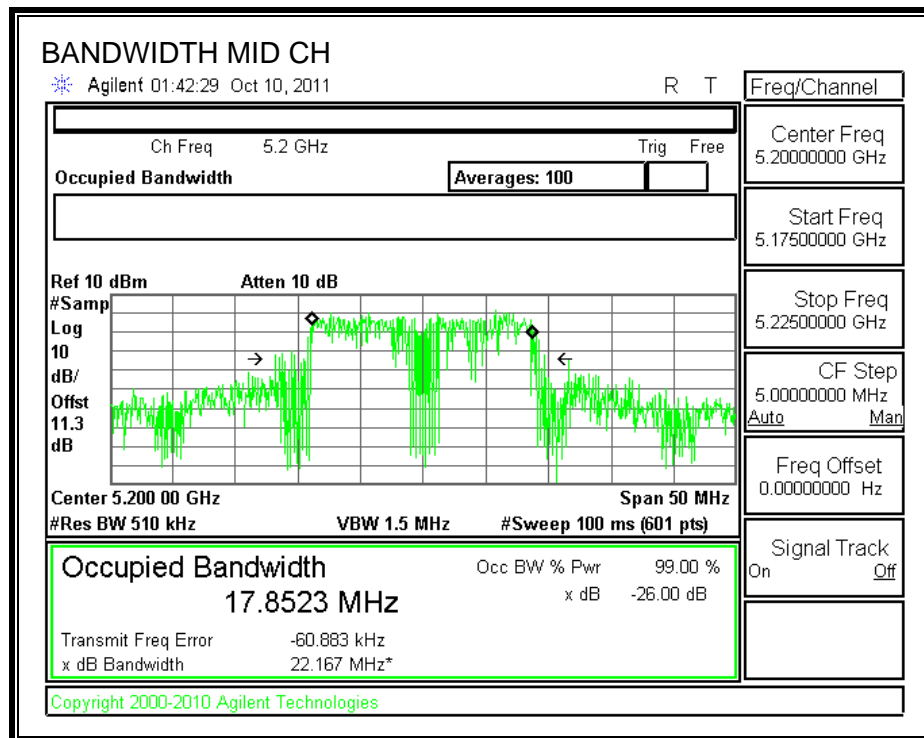
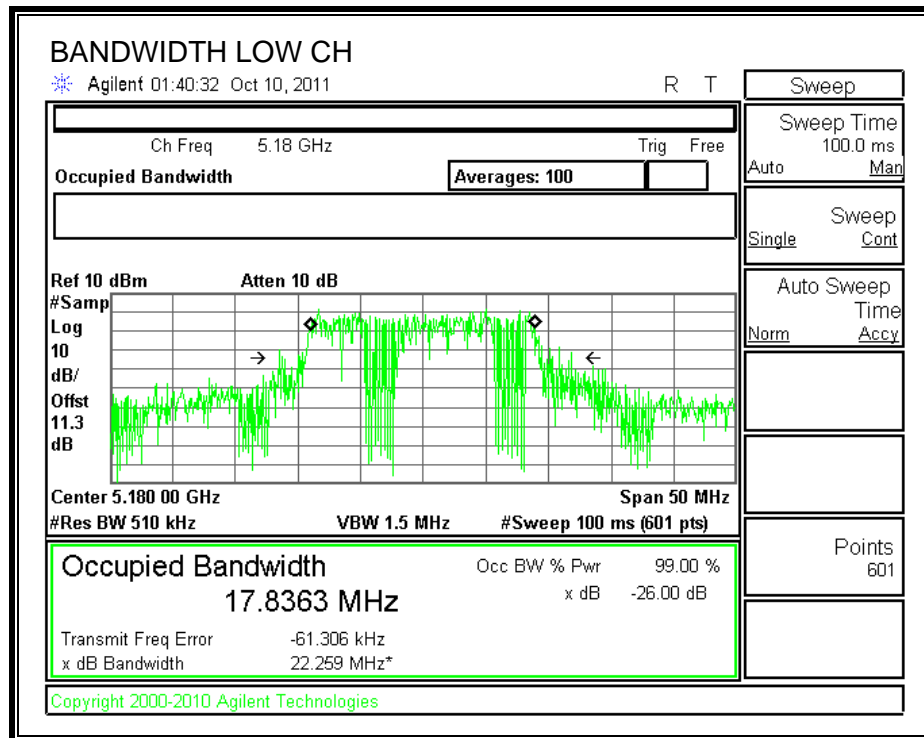
26 dB and 99% BANDWIDTH

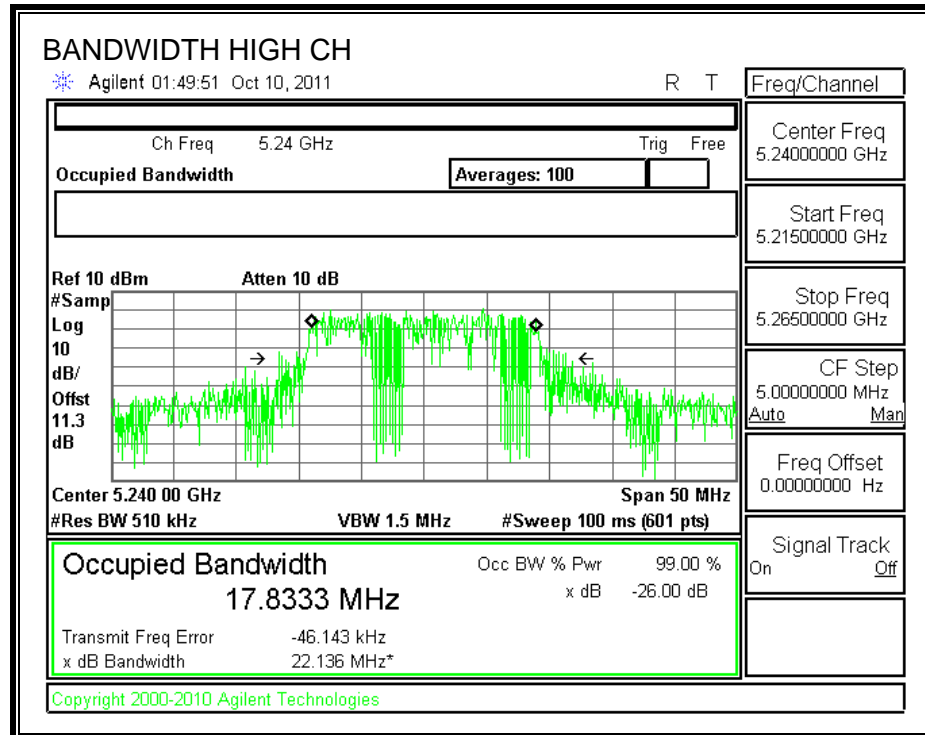




CHAIN 2

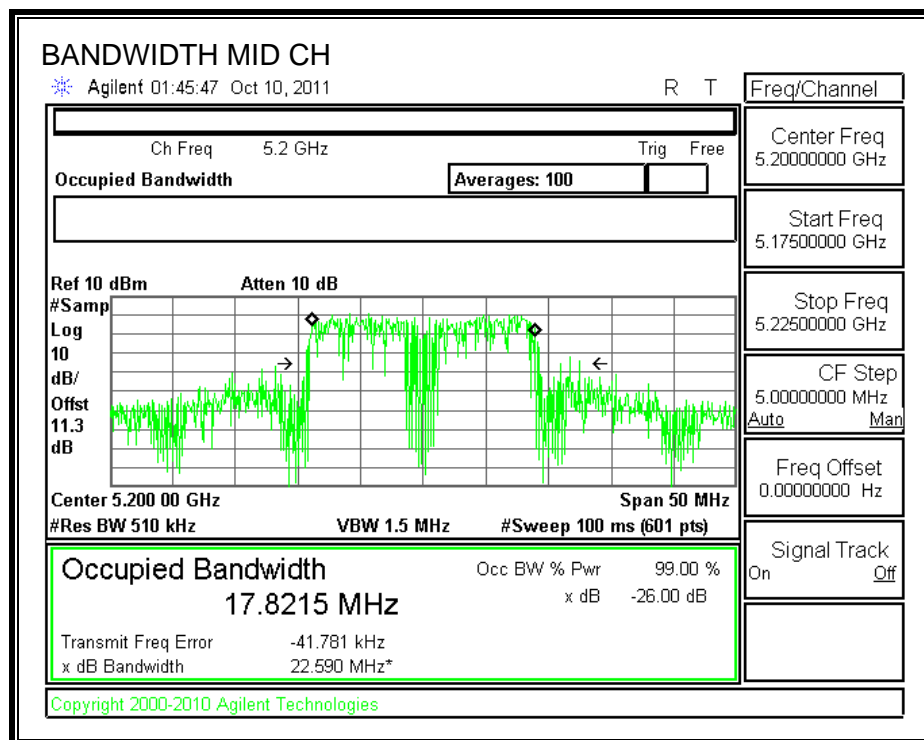
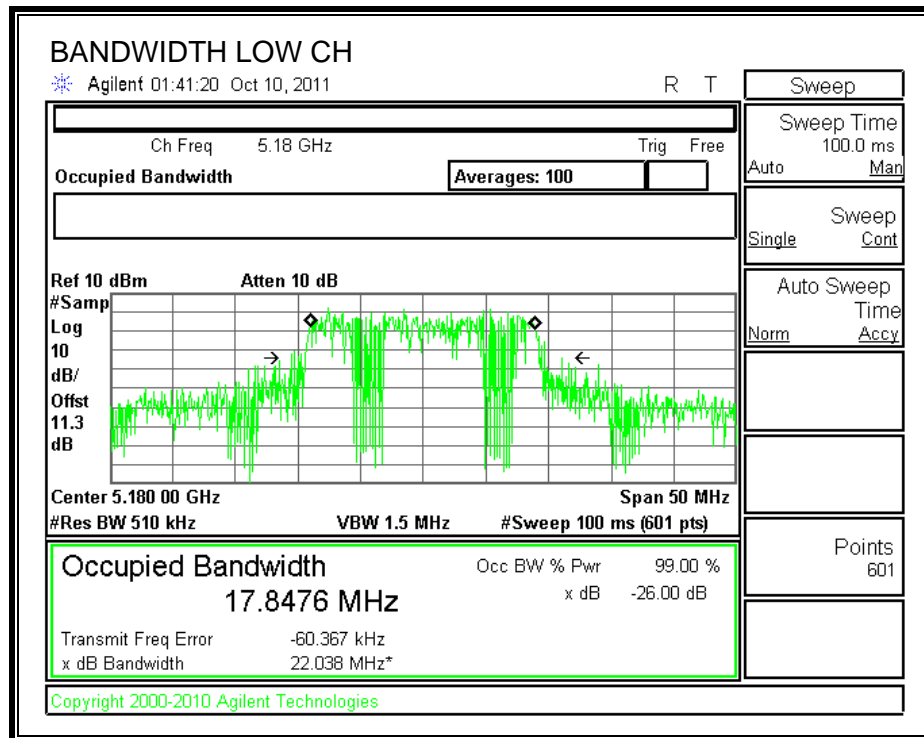
26 dB and 99% BANDWIDTH

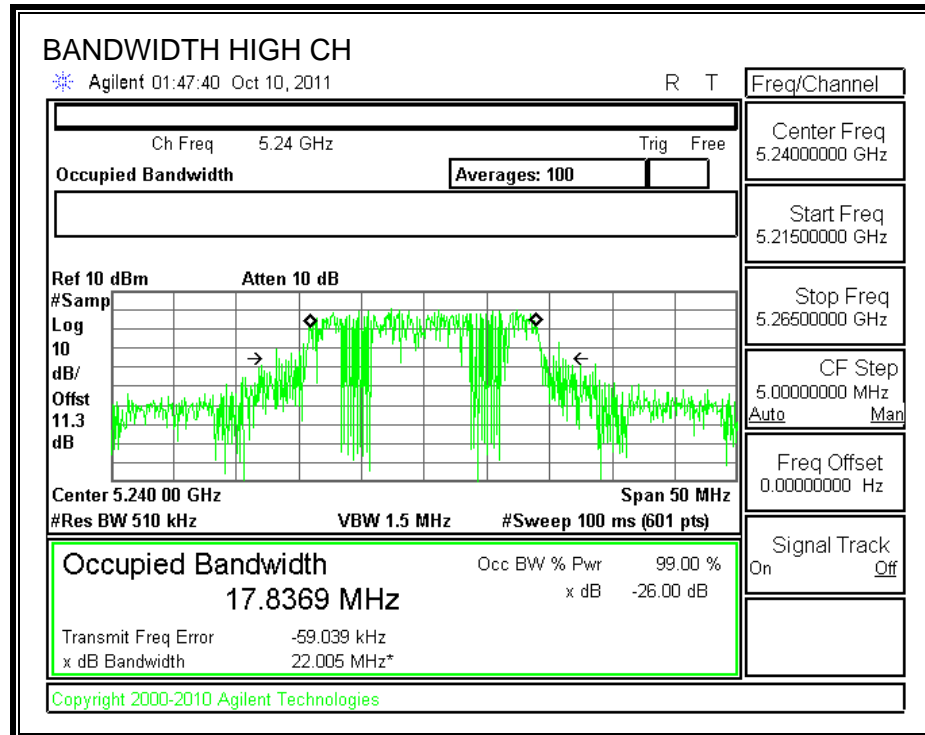




CHAIN 3

26 dB and 99% BANDWIDTH





7.4.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

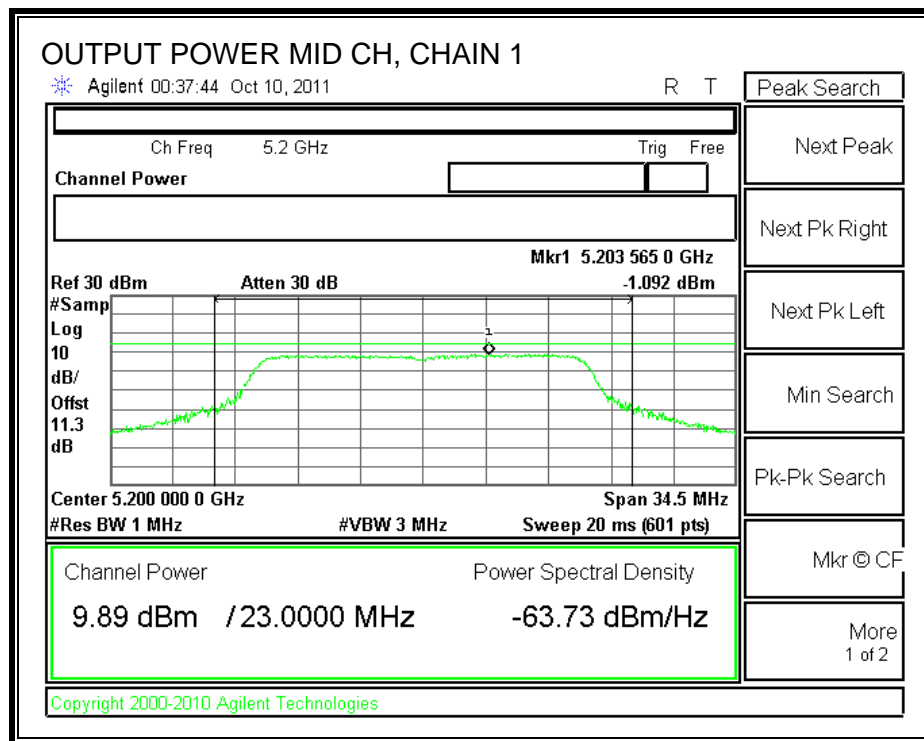
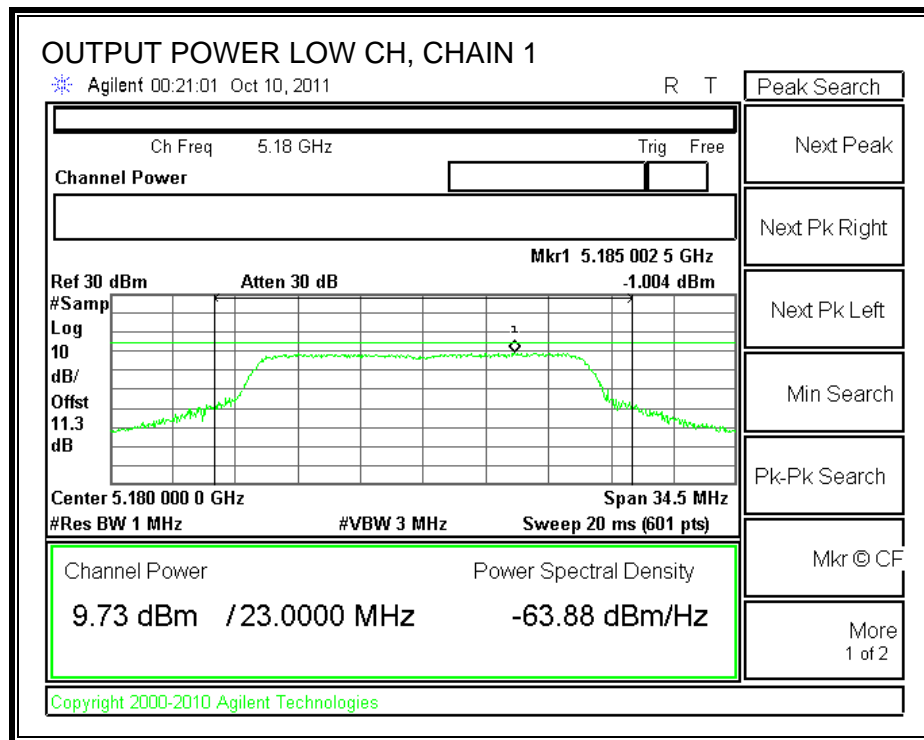
Limit

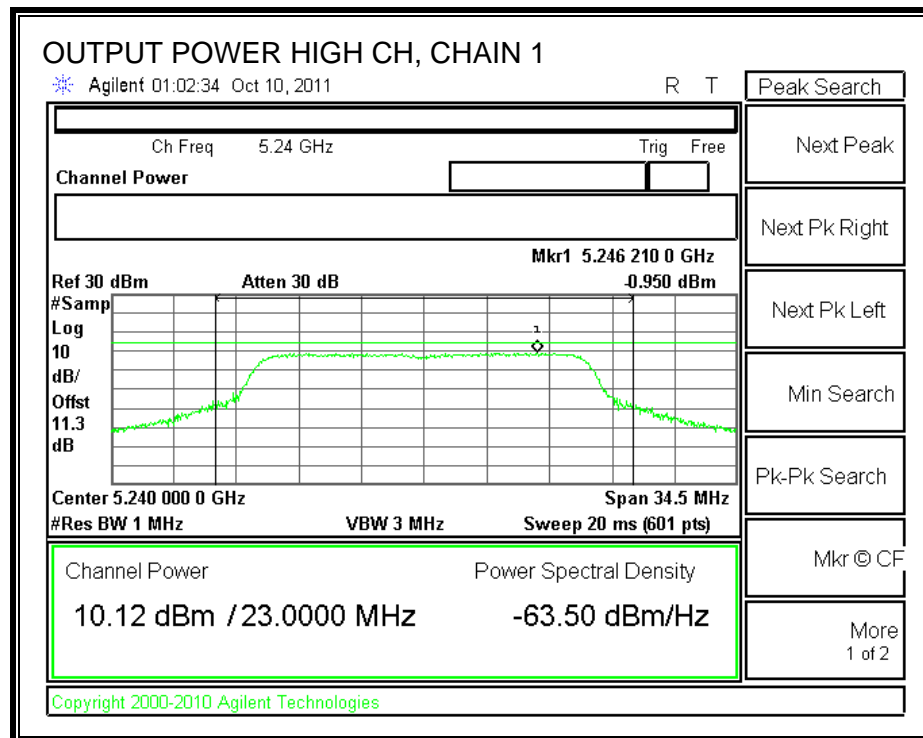
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	16.99	22.038	17.43	5.00	16.99
Mid	5200	16.99	22.167	17.46	5.00	16.99
High	5240	16.99	22.005	17.43	5.00	16.99

Individual Chain Results

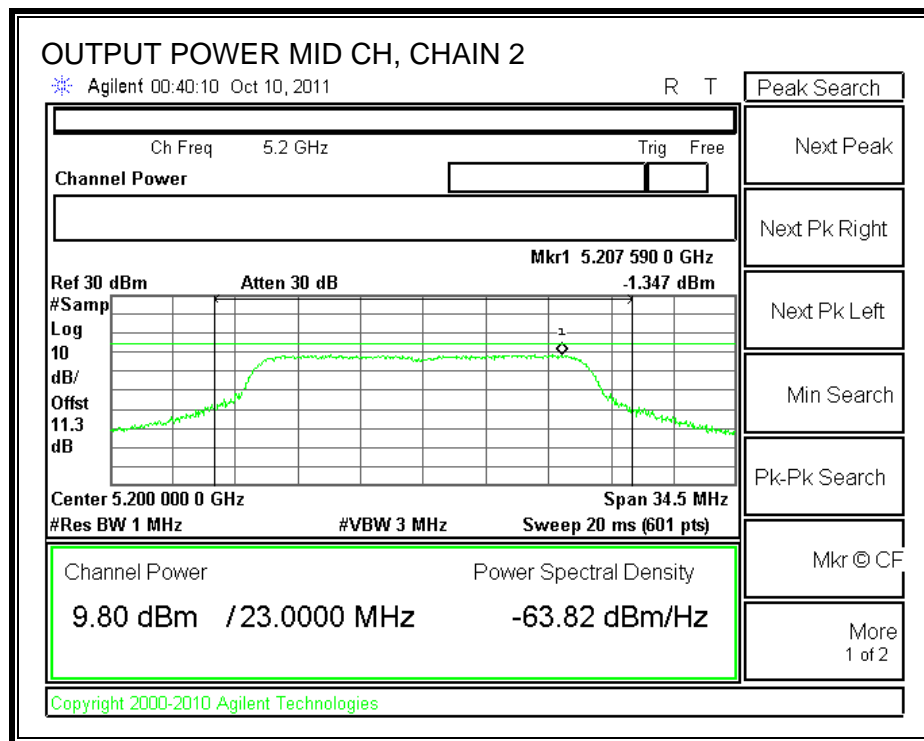
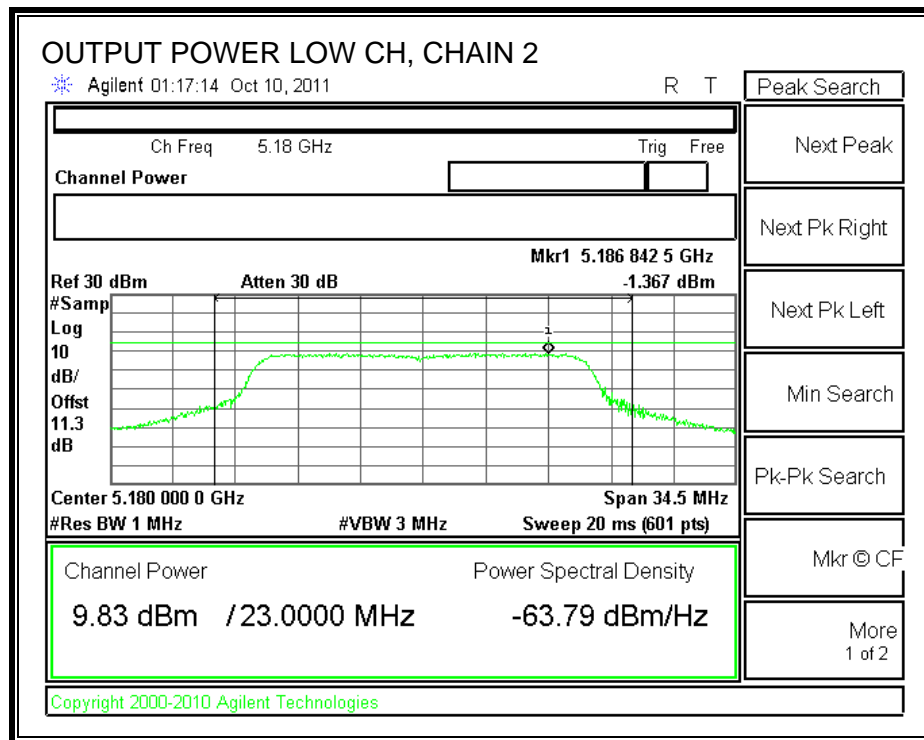
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	9.73	9.83	10.36	14.75	16.99	-2.24
Mid	5200	9.89	9.80	10.15	14.72	16.99	-2.27
High	5240	10.12	9.80	9.83	14.69	16.99	-2.30

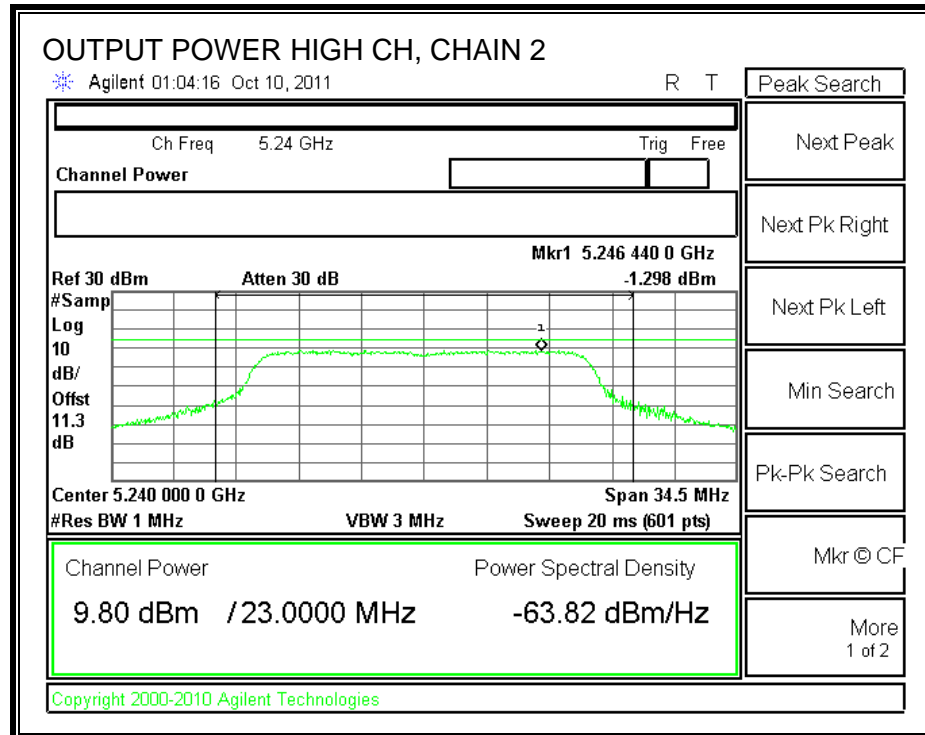
CHAIN 1 OUTPUT POWER



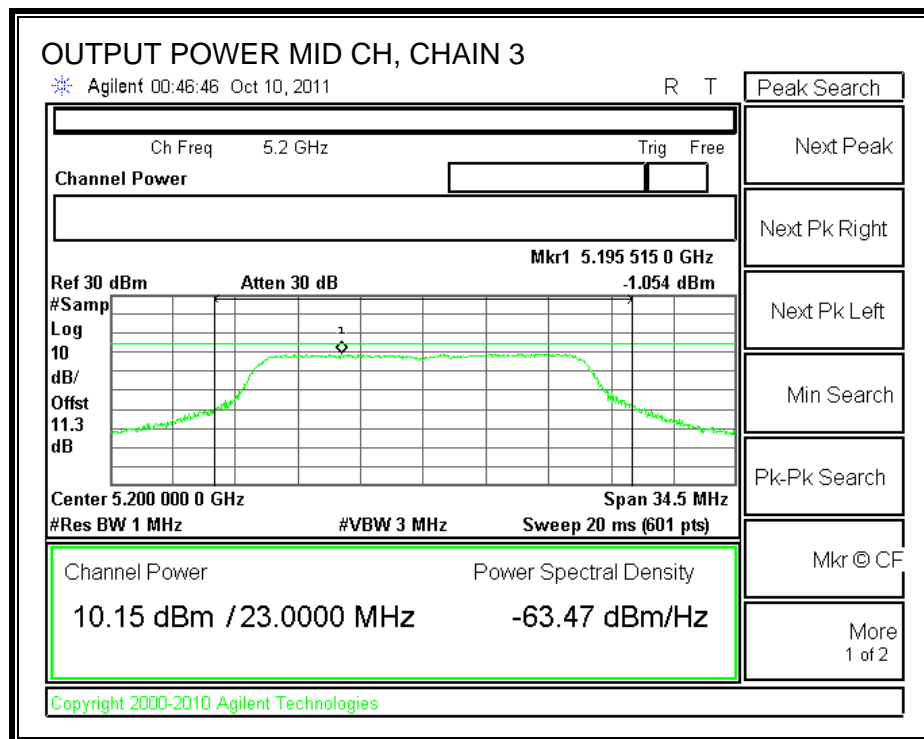
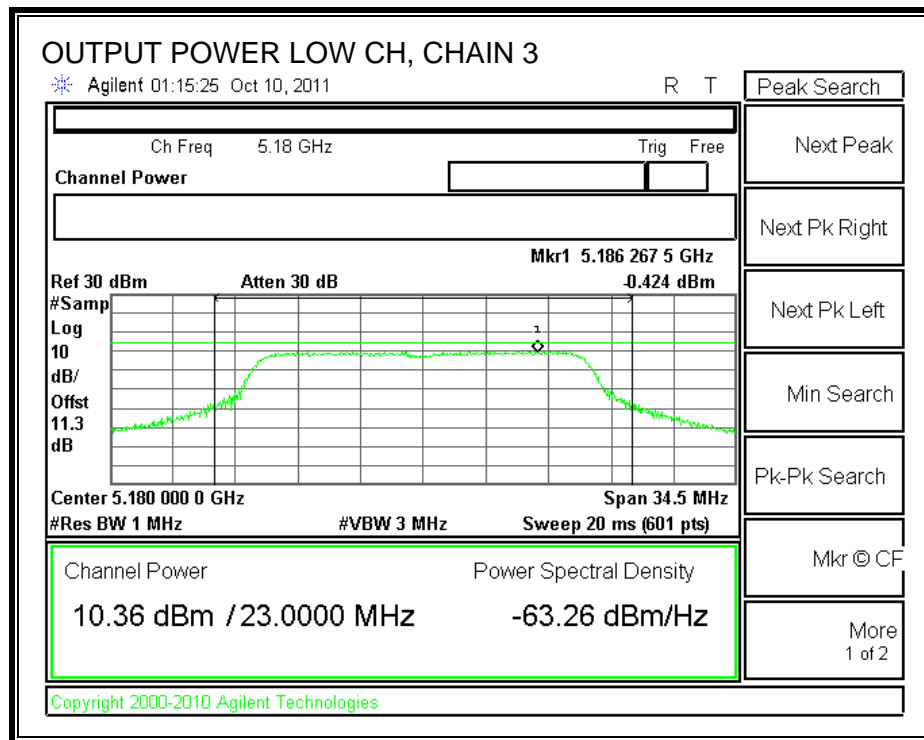


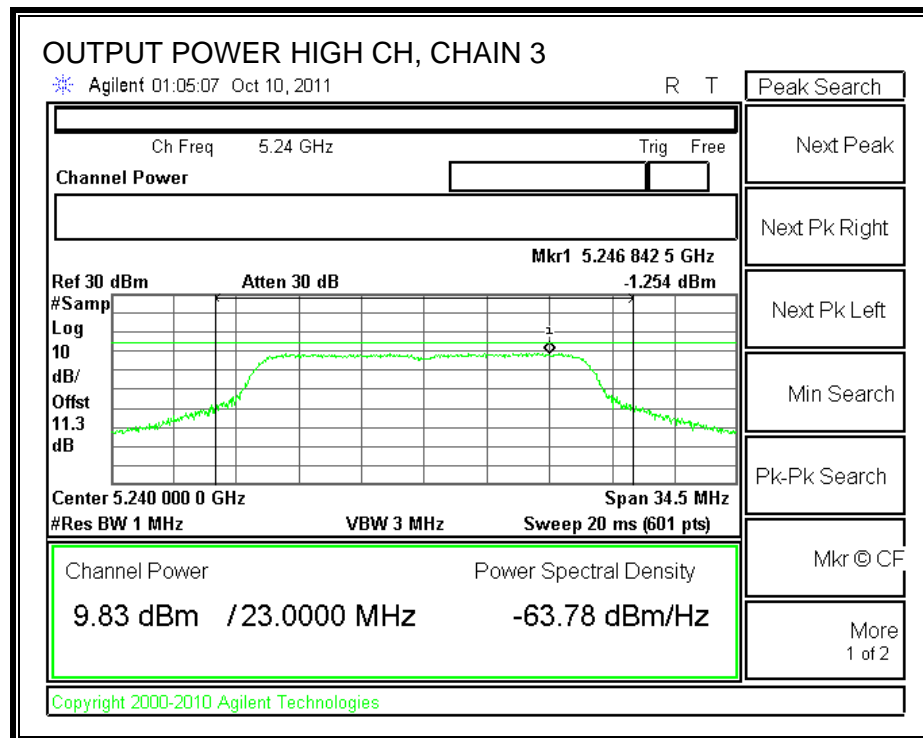
CHAIN 2 OUTPUT POWER





CHAIN 3 OUTPUT POWER





7.4.3. 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 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	5180	9.60	9.30	10.20	14.49
Middle	5200	9.50	9.40	9.90	14.38
High	5240	9.80	9.60	9.60	14.44

7.4.4. PEAK POWER SPECTRAL DENSITY LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 4 dBm.

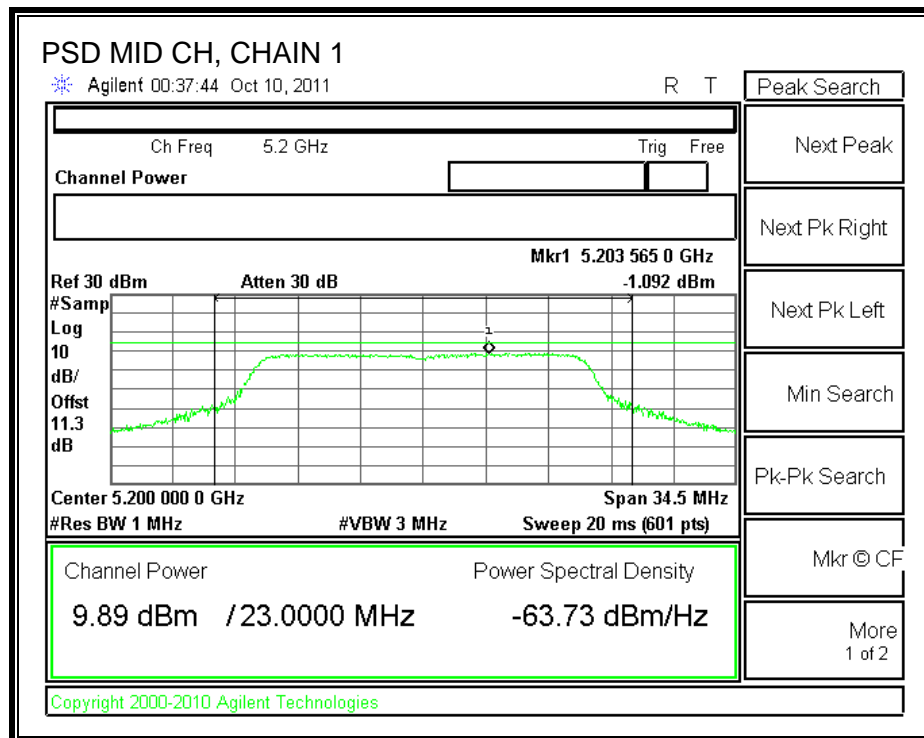
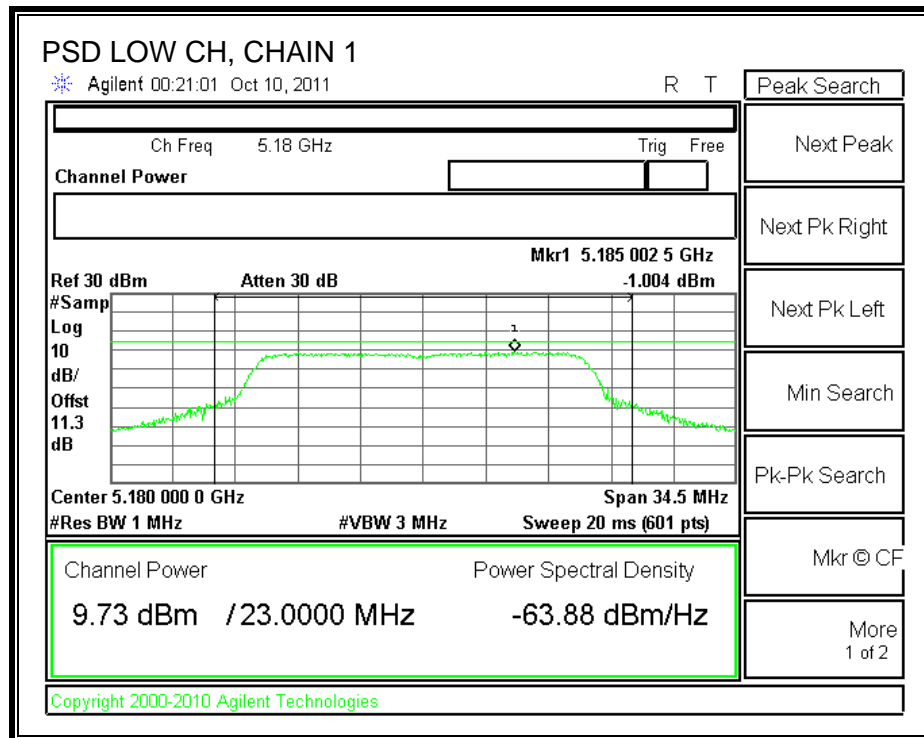
TEST PROCEDURE

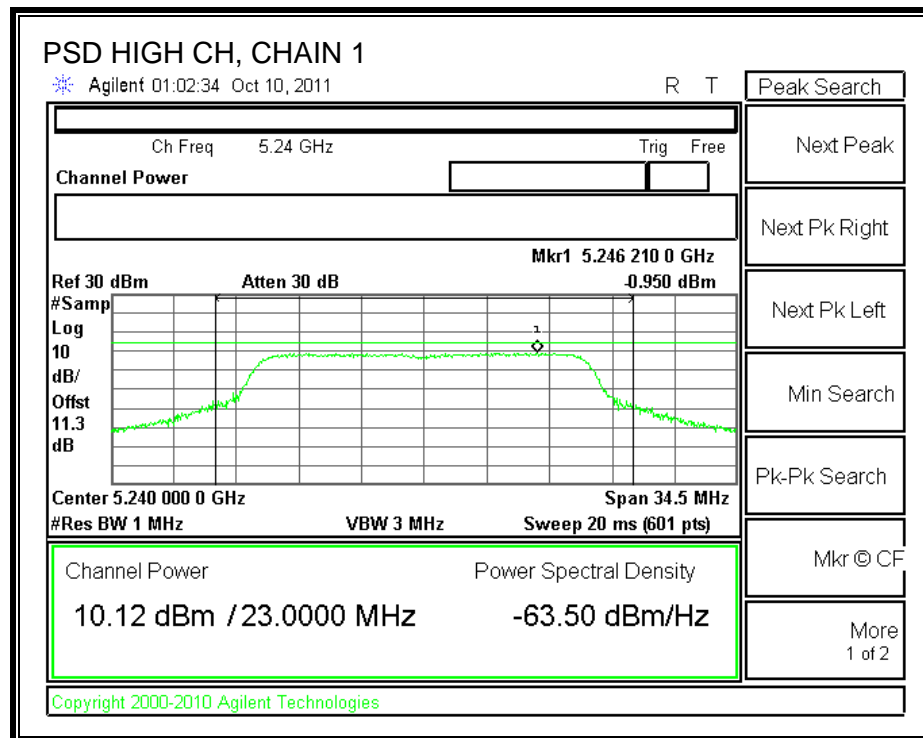
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

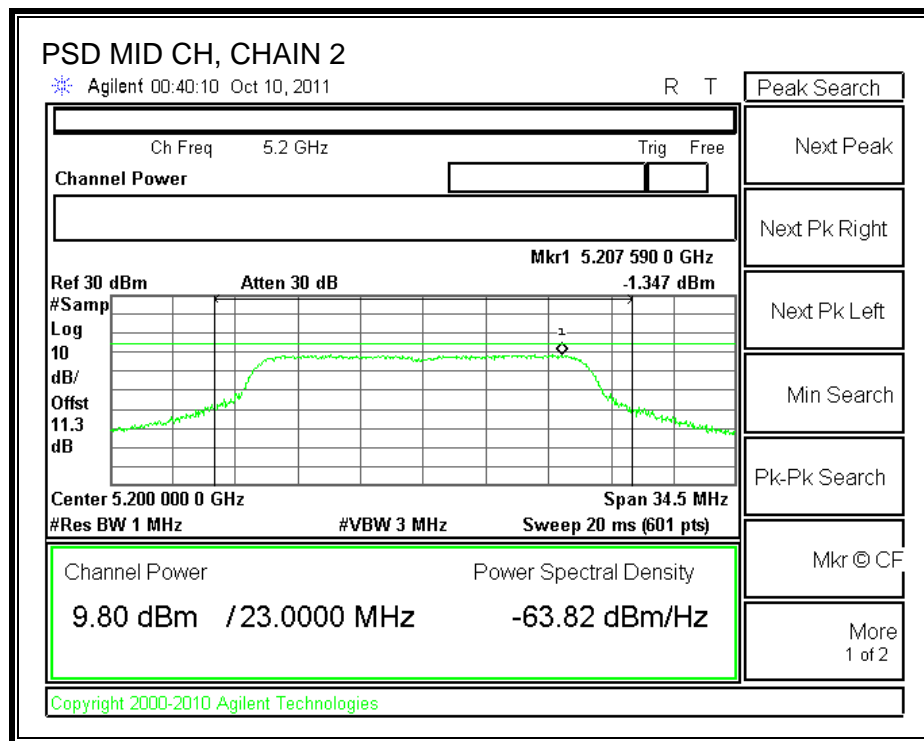
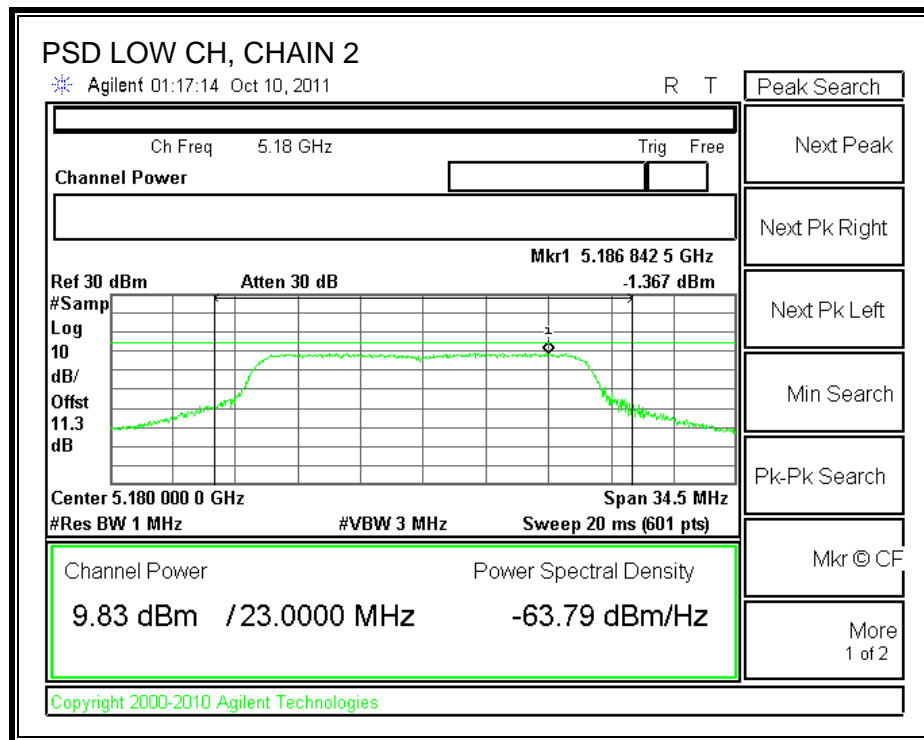
Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Chain 3 PPSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	-1.004	-1.367	-0.424	3.86	4	-0.14
Middle	5200	-1.092	-1.347	-1.054	3.61	4	-0.39
High	5240	-0.950	-1.298	-1.254	3.61	4	-0.39

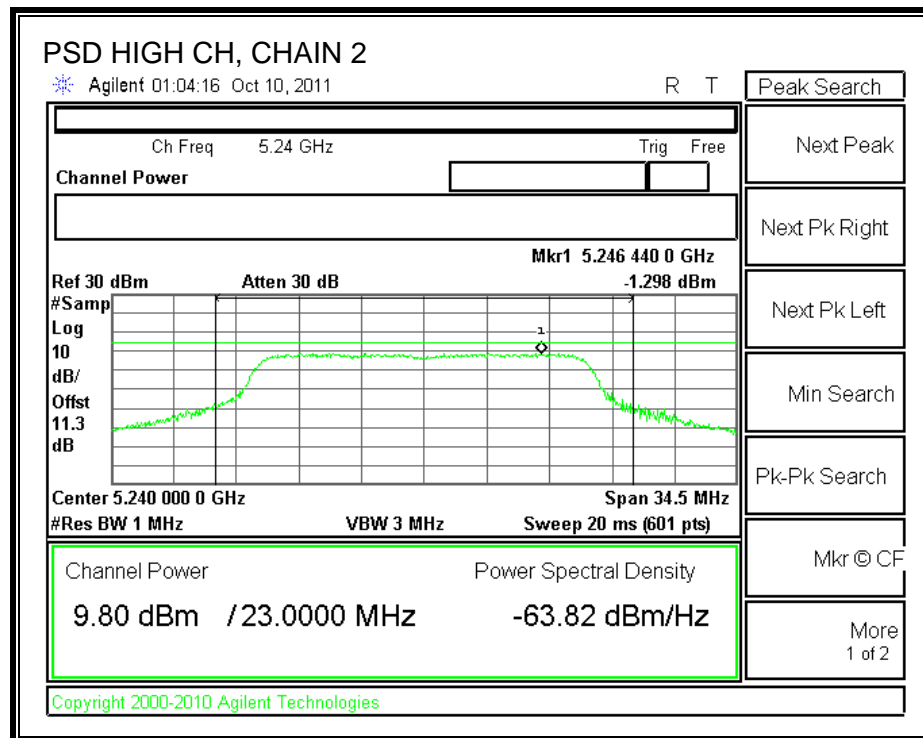
CHAIN 1 POWER SPECTRAL DENSITY



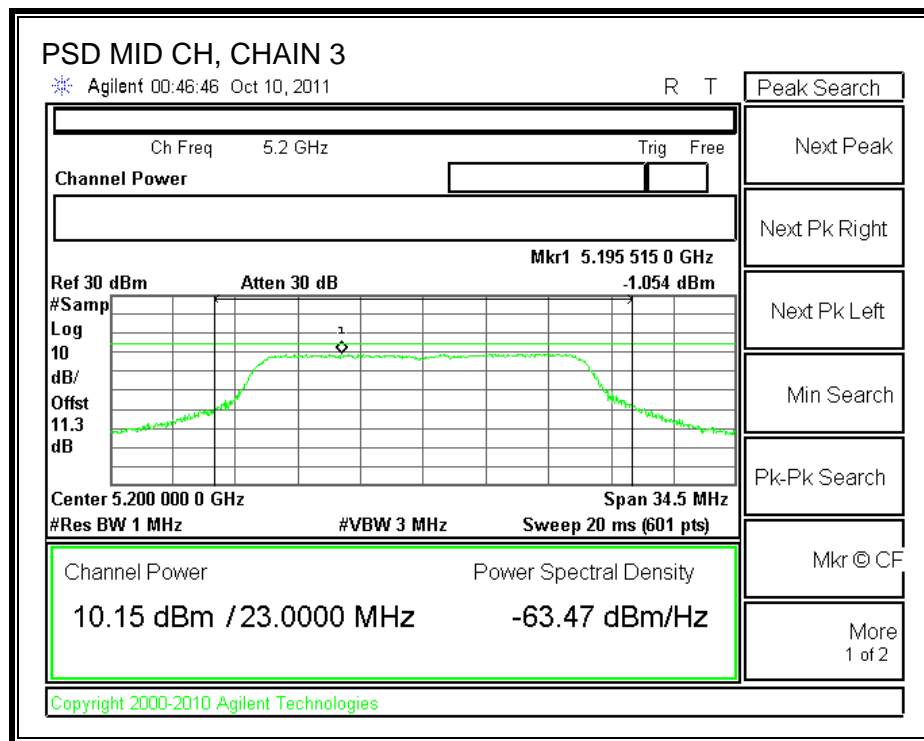
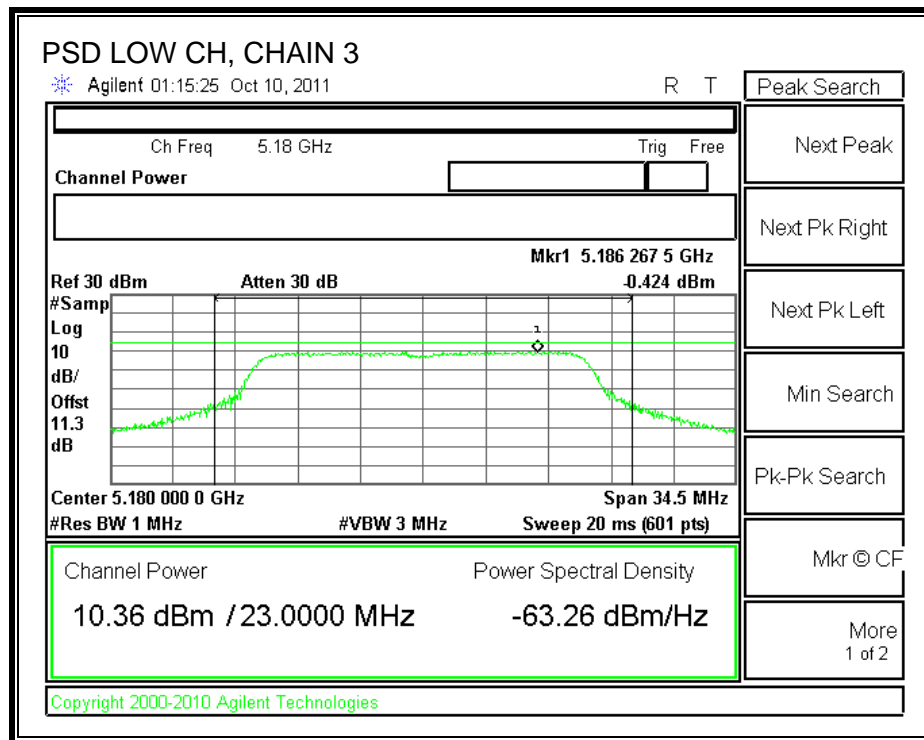


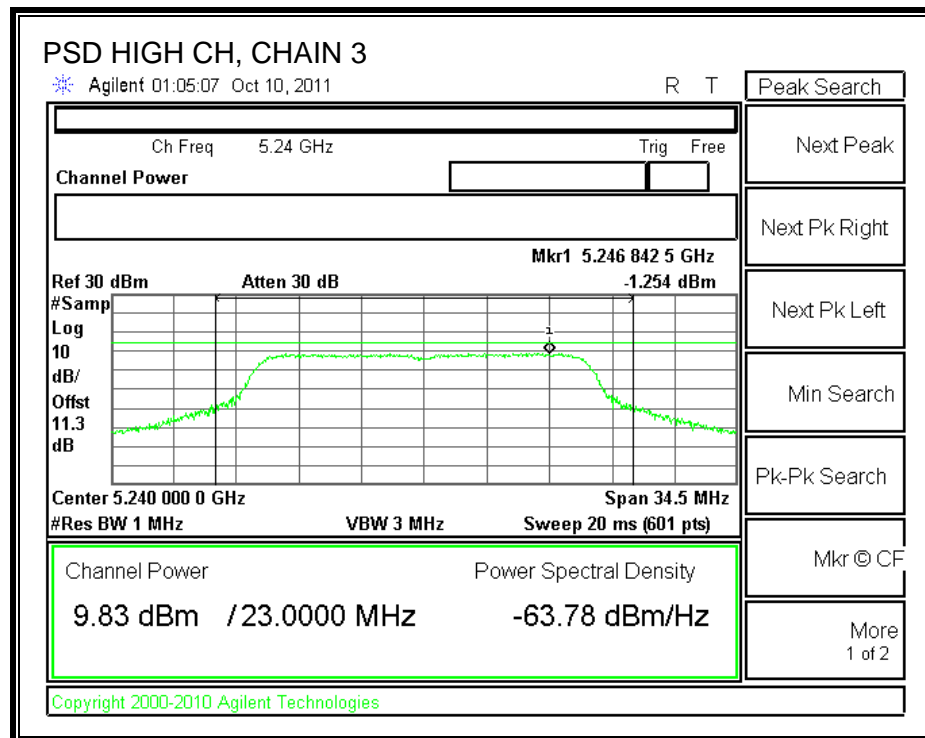
CHAIN 2 POWER SPECTRAL DENSITY





CHAIN 3 POWER SPECTRAL DENSITY





7.4.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.23	13	-3.77
Middle	5200	11.53	13	-1.47
High	5240	9.92	13	-3.08

CHAIN 2

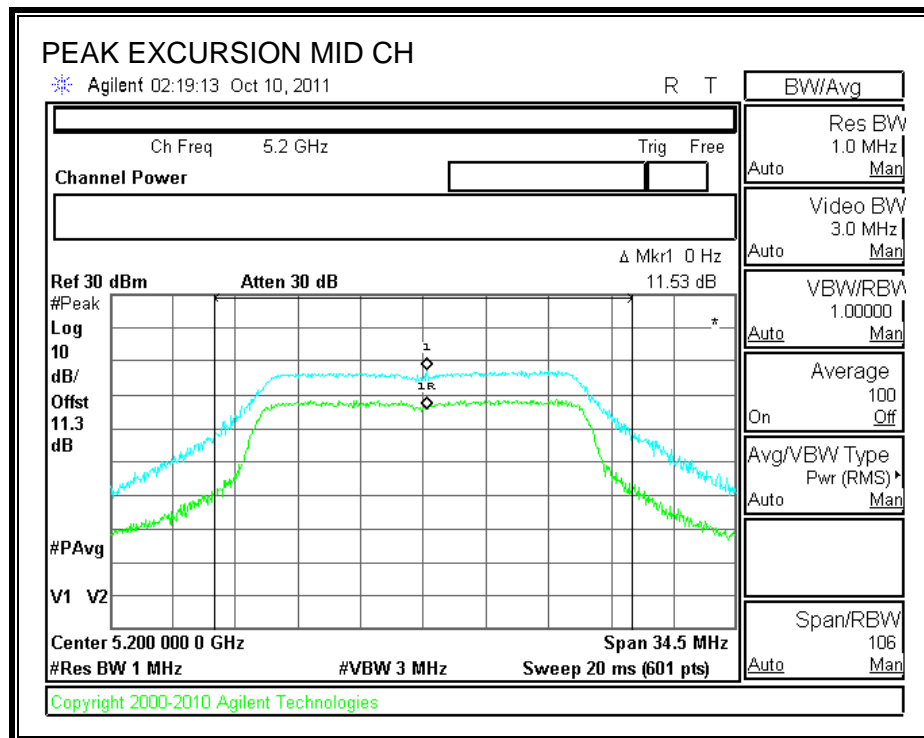
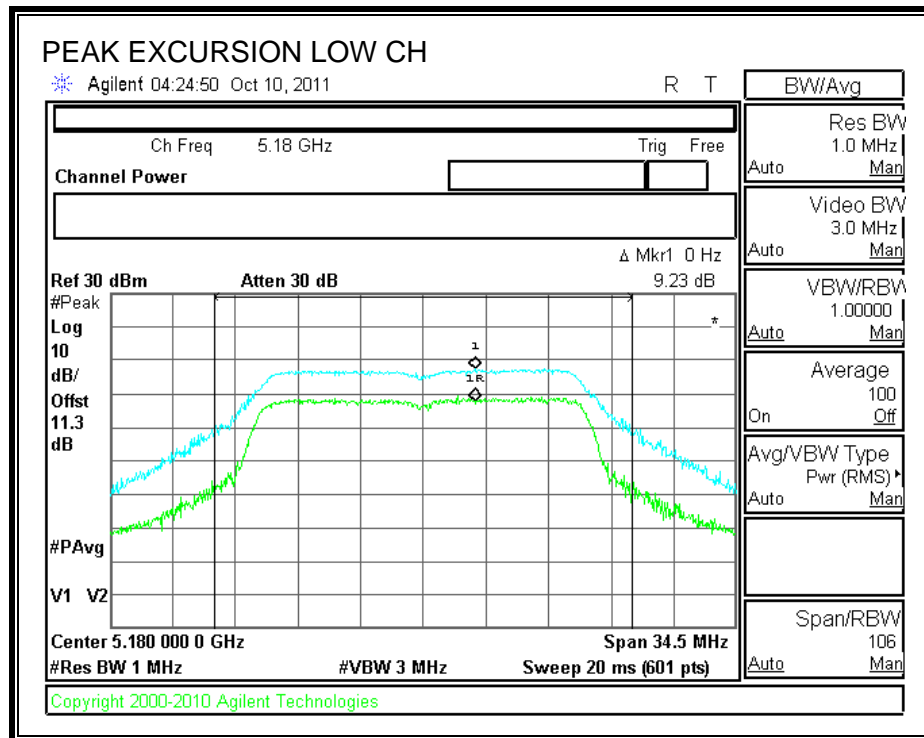
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.05	13	-2.95
Middle	5200	9.72	13	-3.28
High	5240	10.70	13	-2.30

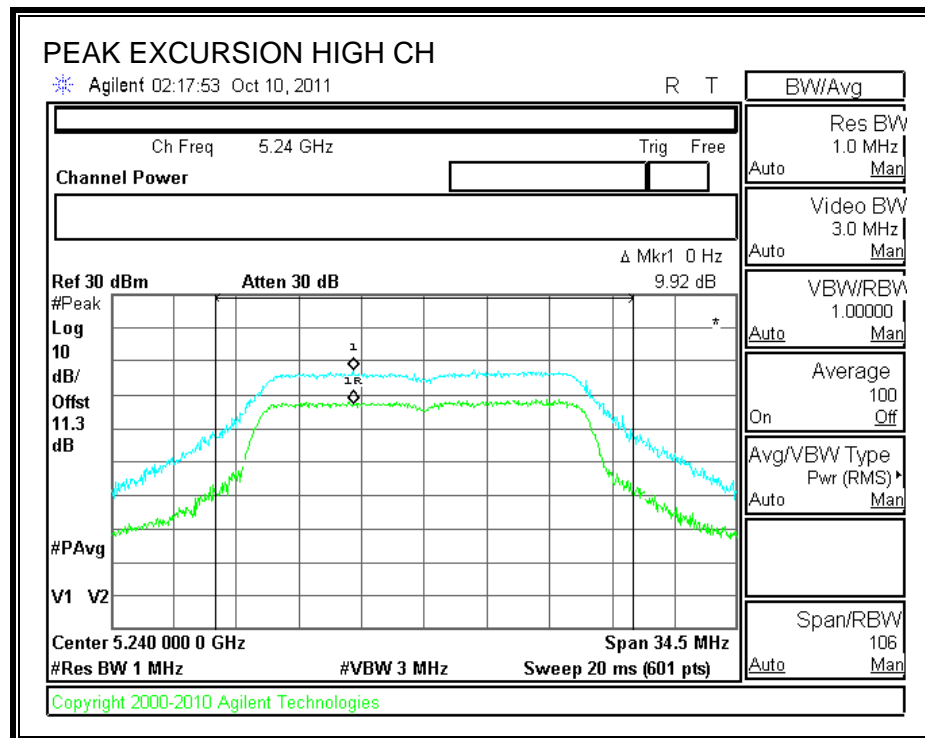
CHAIN 3

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.85	13	-2.15
Middle	5200	10.61	13	-2.39
High	5240	9.69	13	-3.31

CHAIN 1

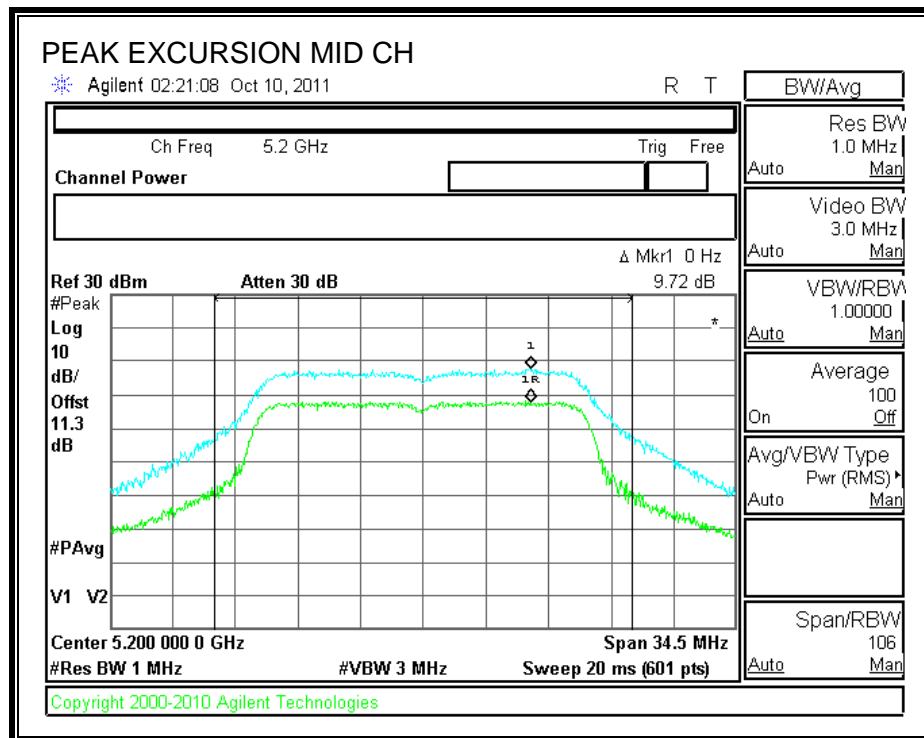
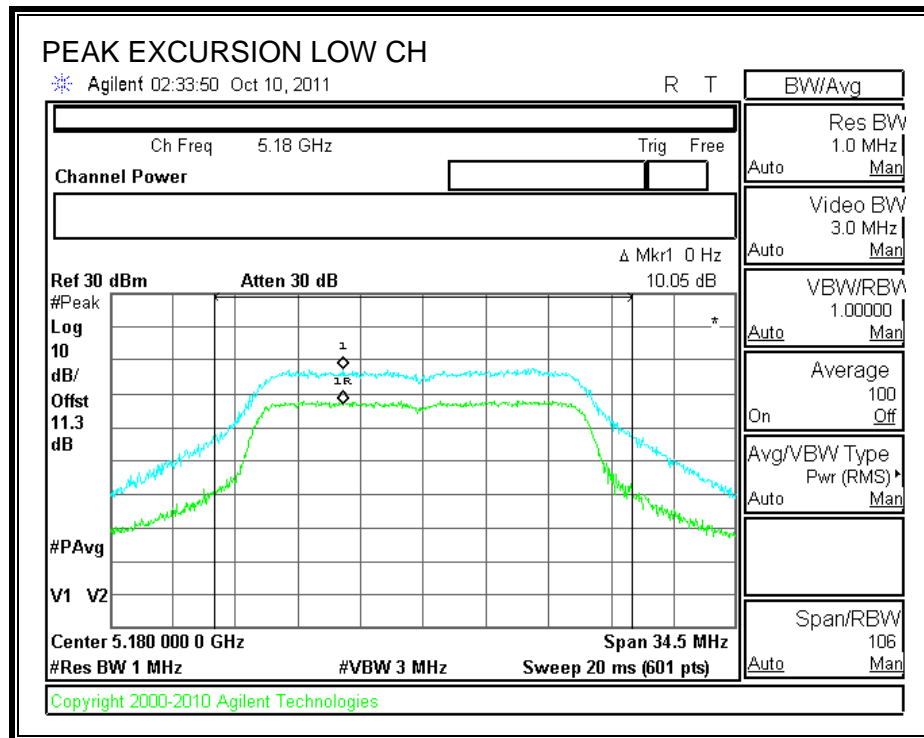
PEAK EXCURSION

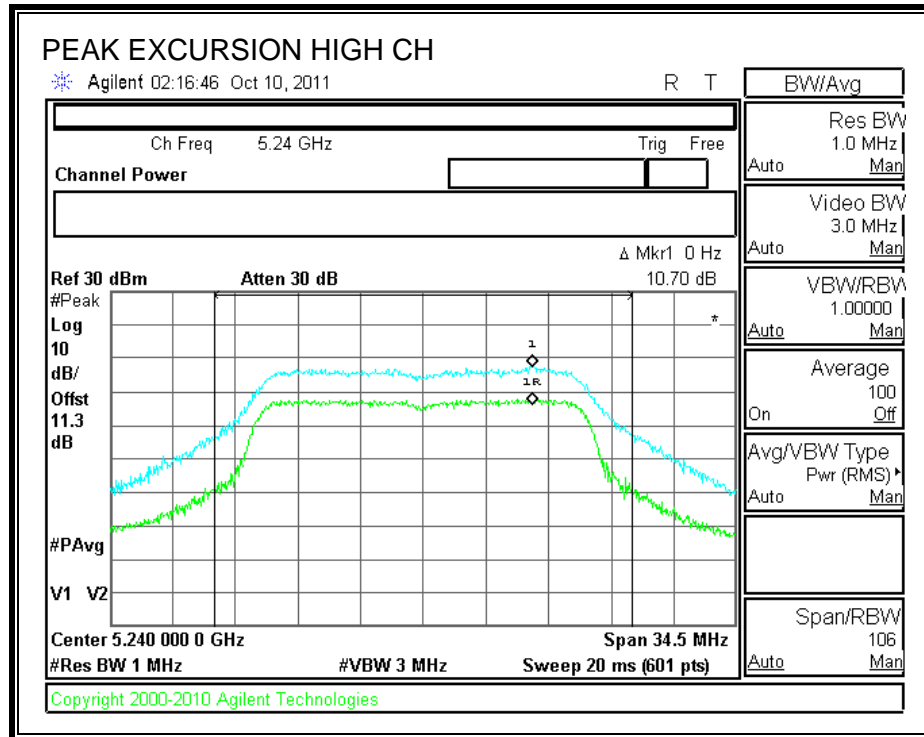




CHAIN 2

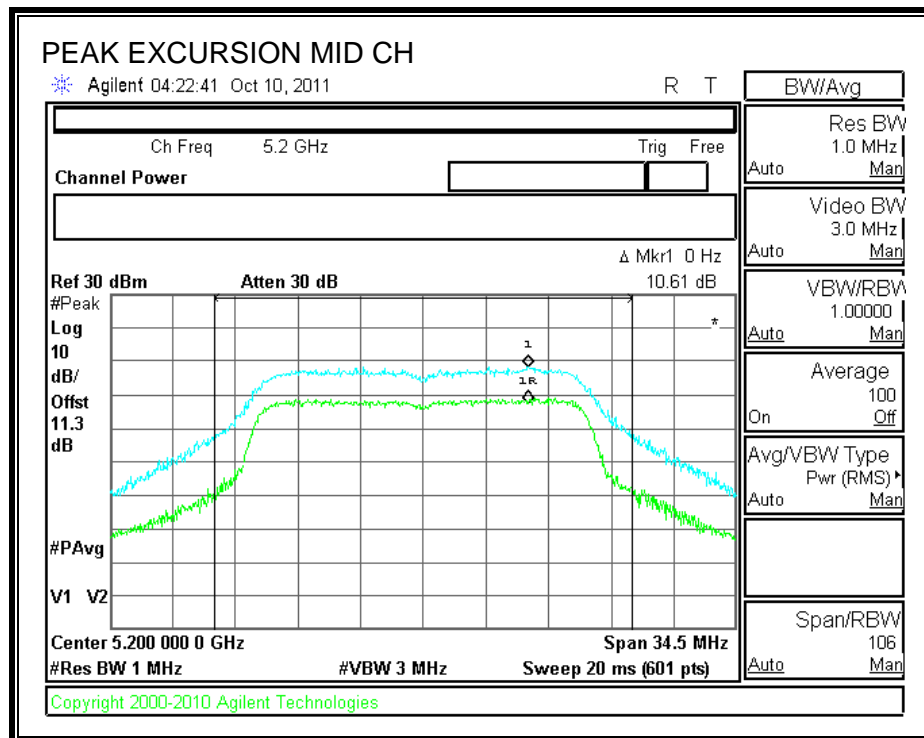
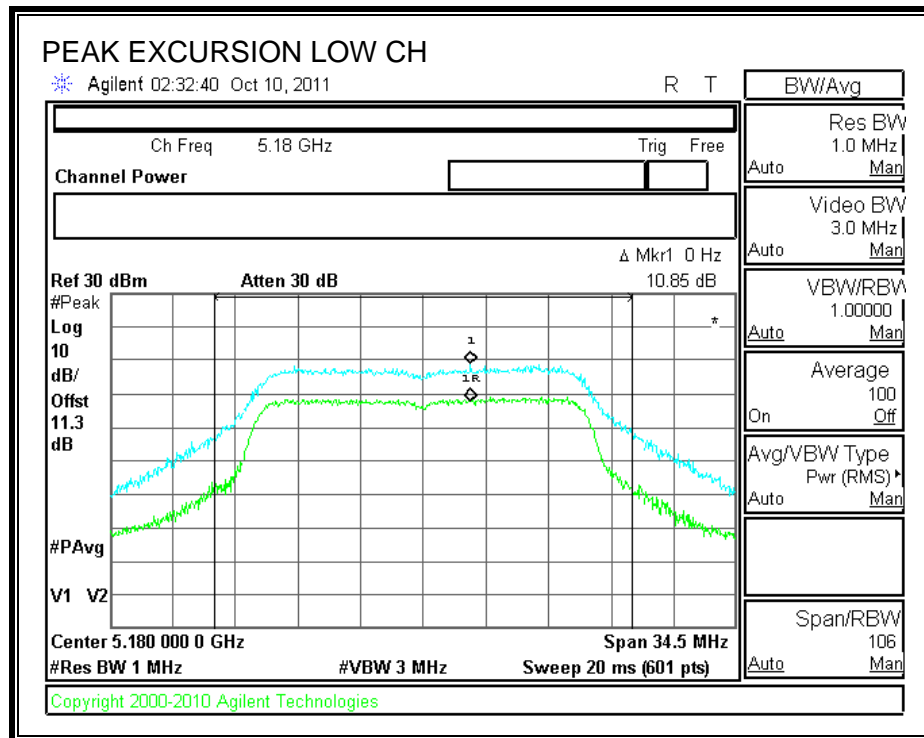
PEAK EXCURSION

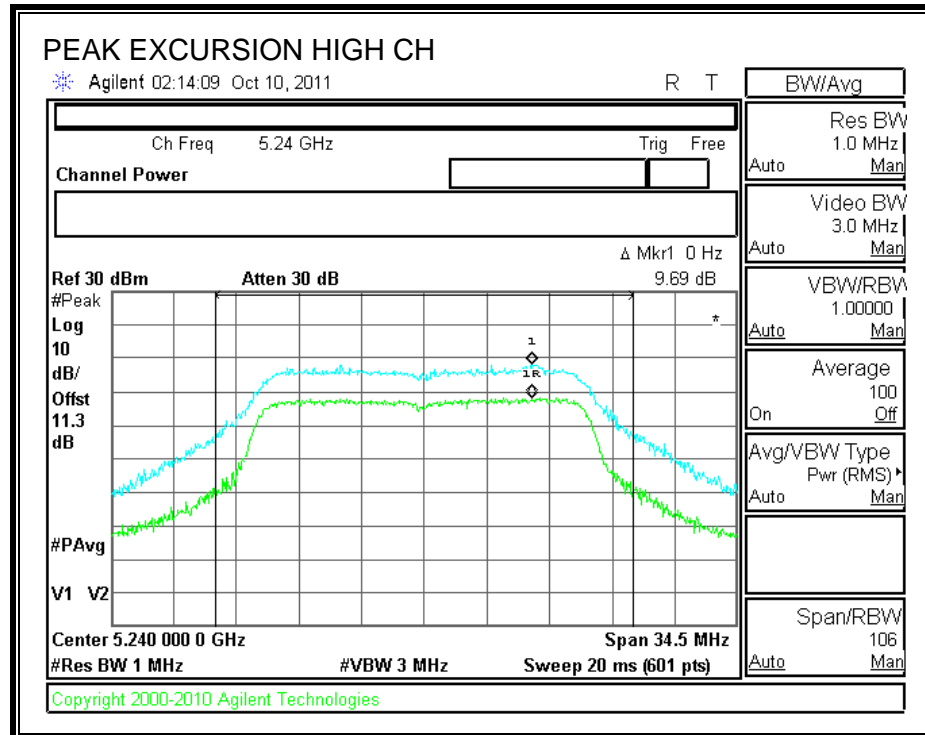




CHAIN 3

PEAK EXCURSION





7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 3 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

Chain 1

Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	10Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	37250	-47.16	5.00	4.77	-37.39	-27.00
Middle	37040	-45.97	5.00	4.77	-36.20	-27.00
High	36800	-47.35	5.00	4.77	-37.58	-27.00

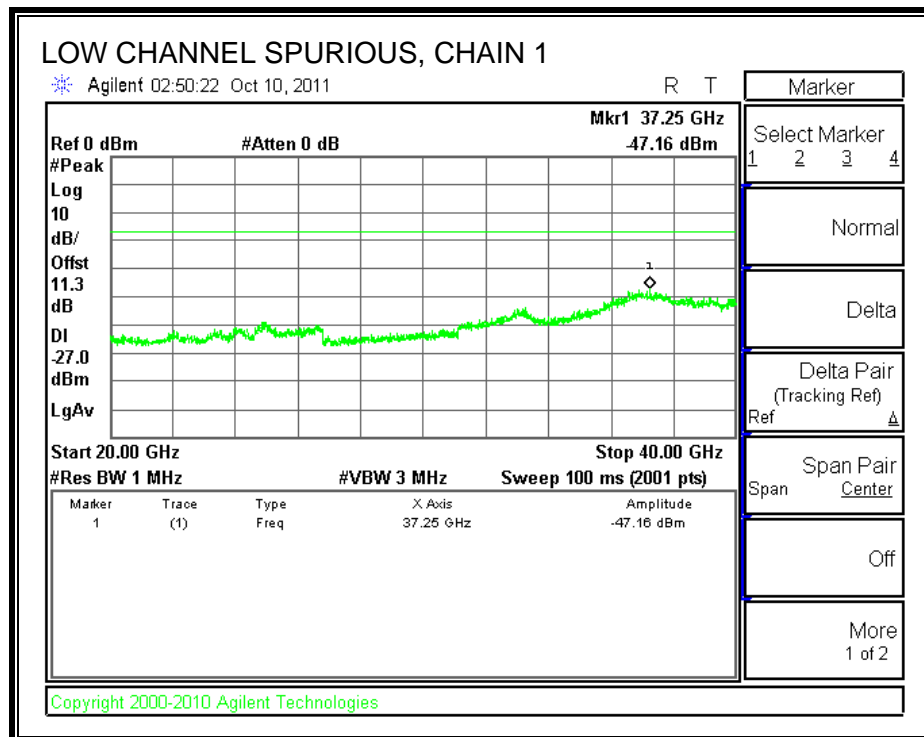
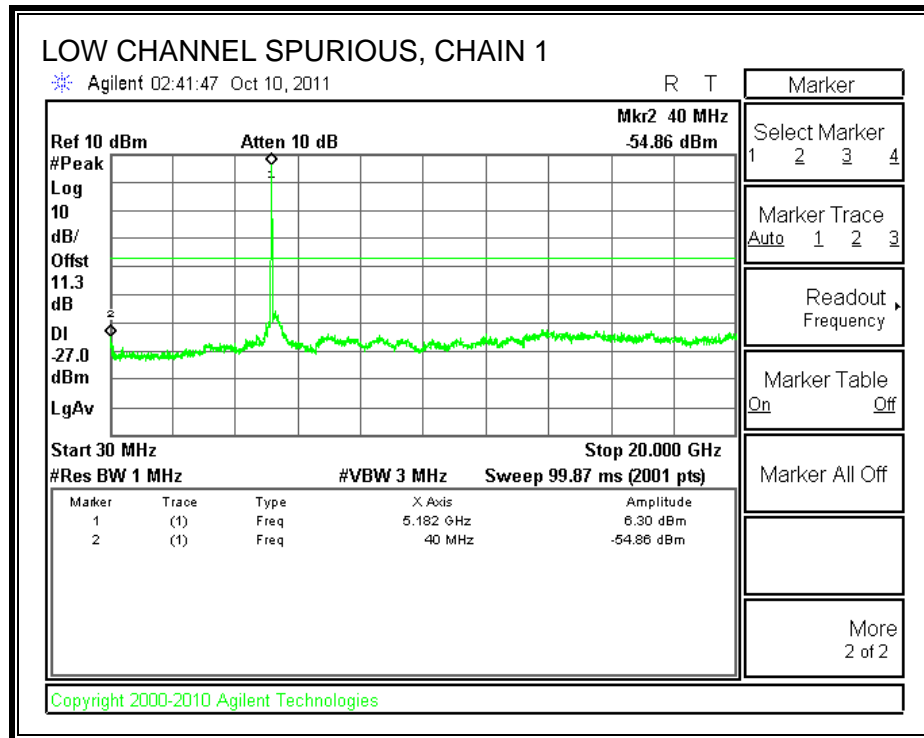
Chain 1

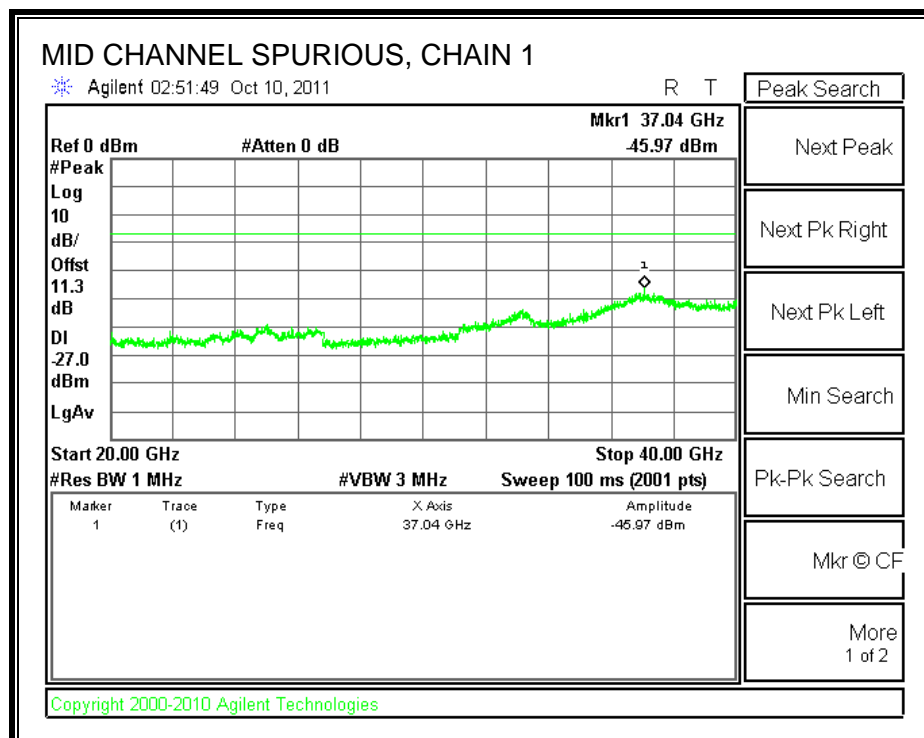
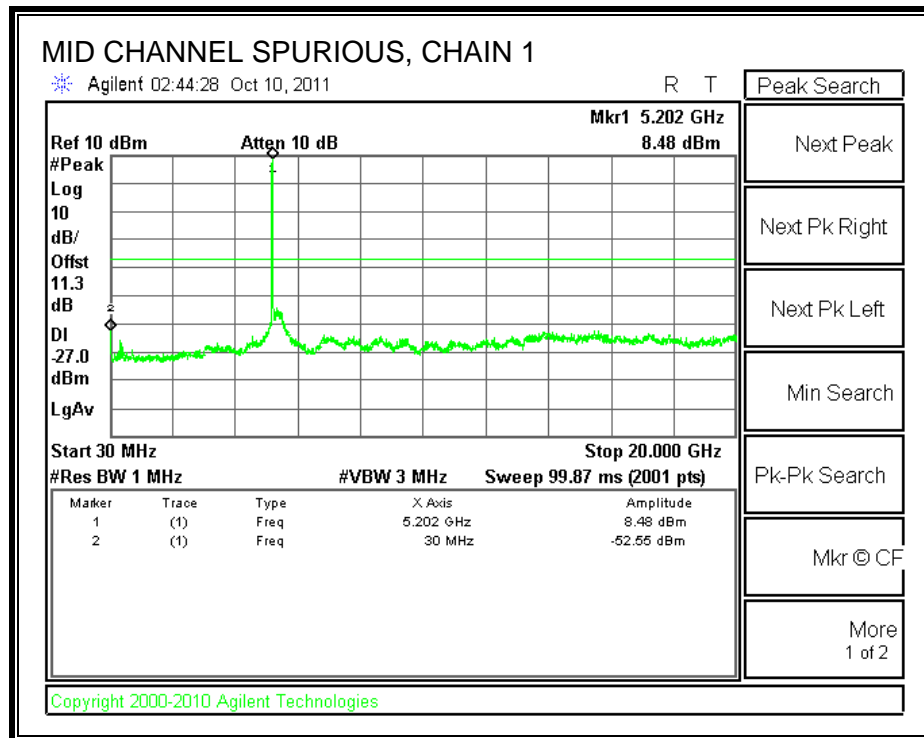
Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	37110	47.82	5.00	4.77	57.59	-27.00
Middle	36970	-46.97	5.00	4.77	-37.20	-27.00
High	36890	-47.97	5.00	4.77	-38.20	-27.00

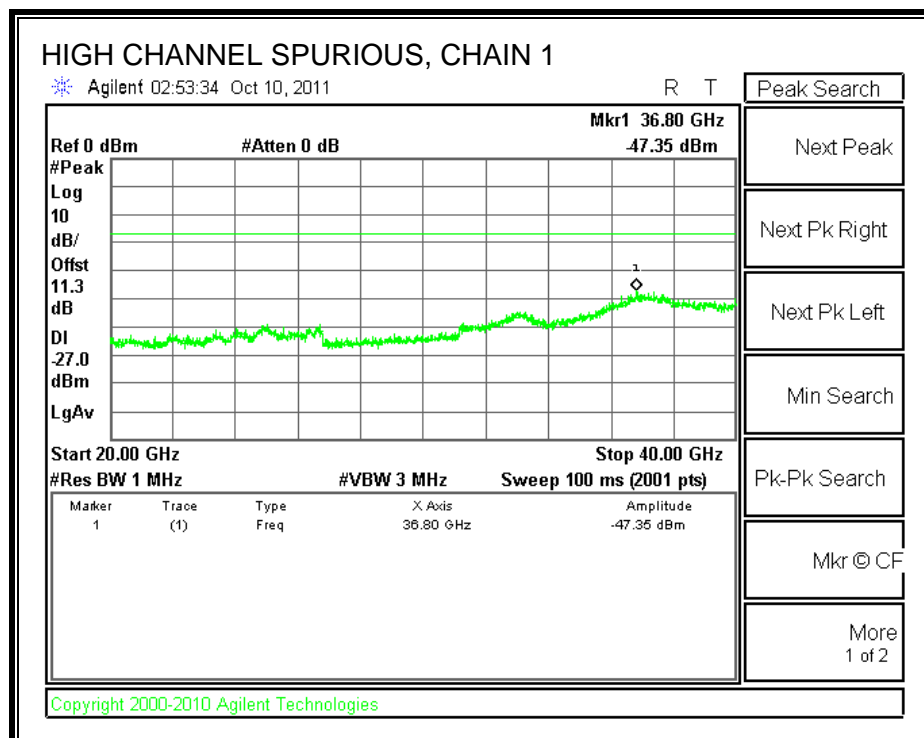
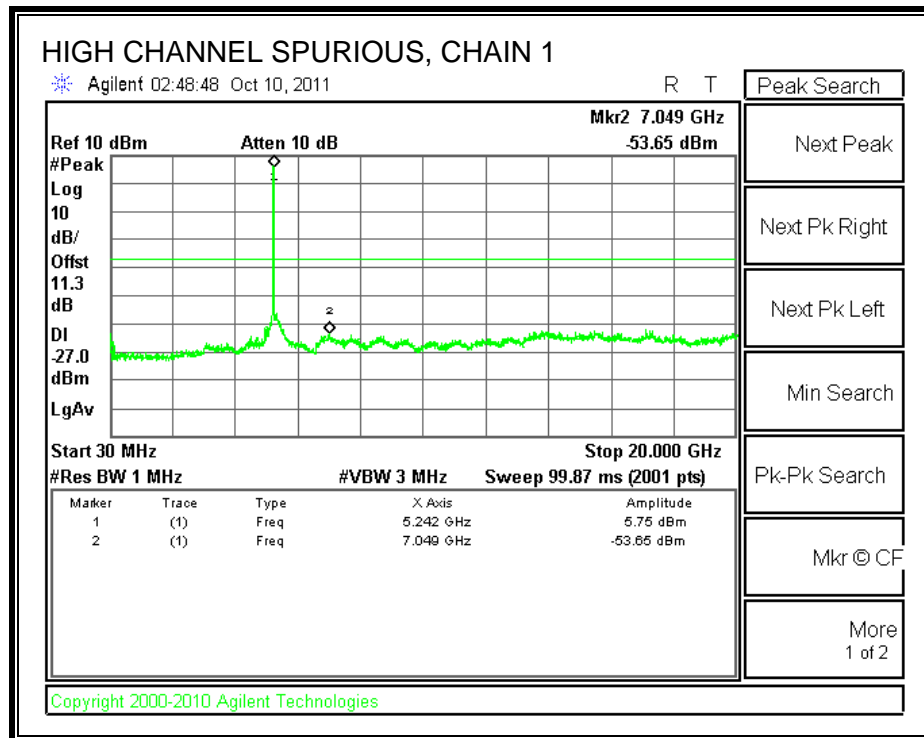
Chain 3

Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	37620	-48.00	5.00	4.77	-38.23	-27.00
Middle	36810	-47.04	5.00	4.77	-37.27	-27.00
High	37050	-48.13	5.00	4.77	-38.36	-27.00

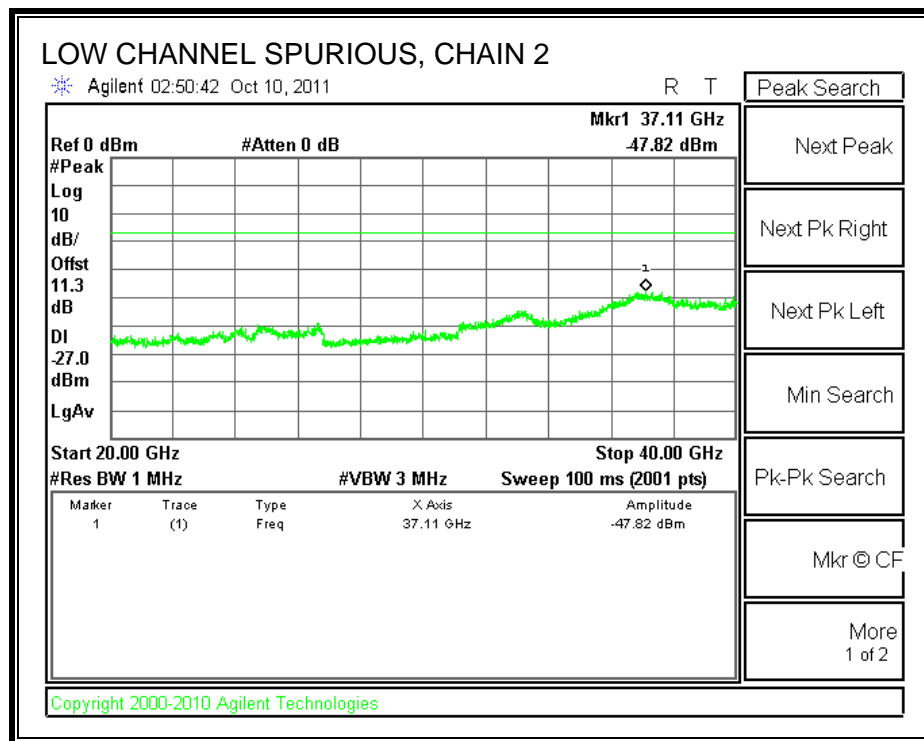
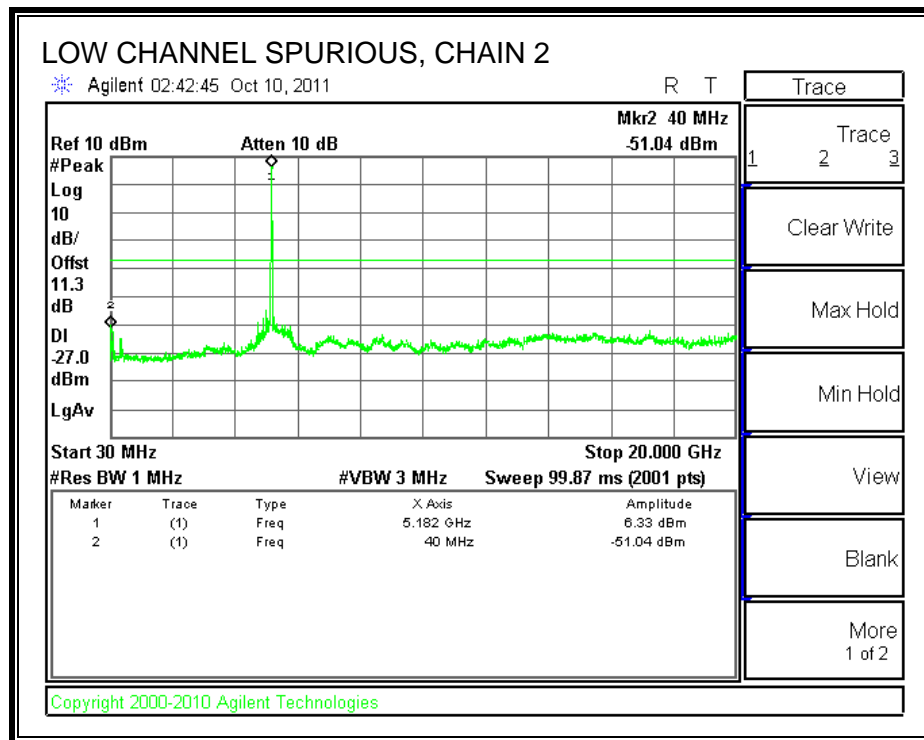
CHAIN 1 SPURIOUS EMISSIONS

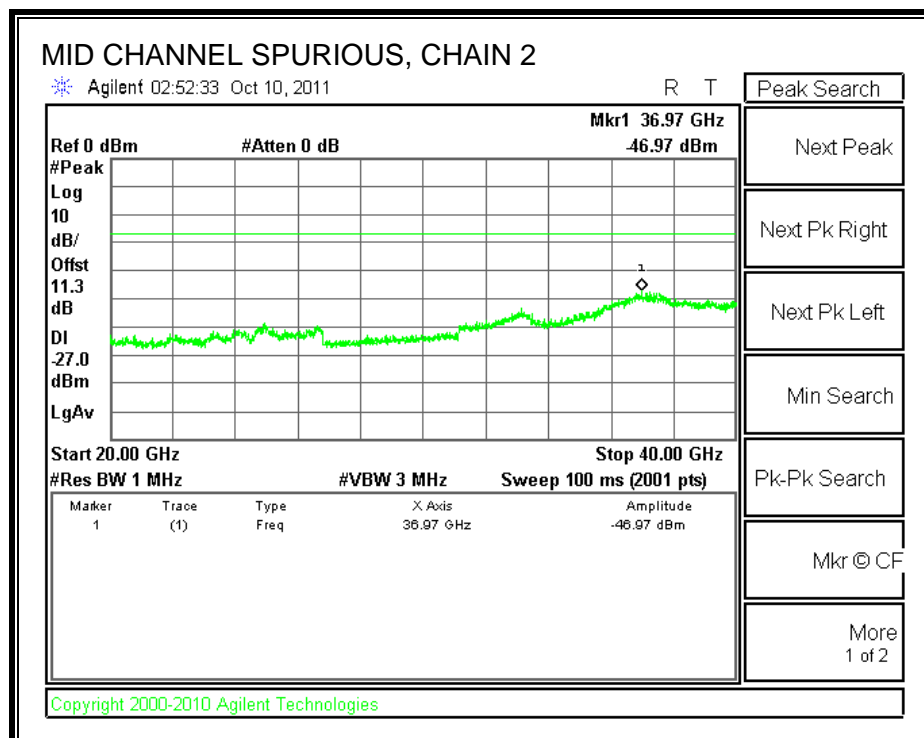
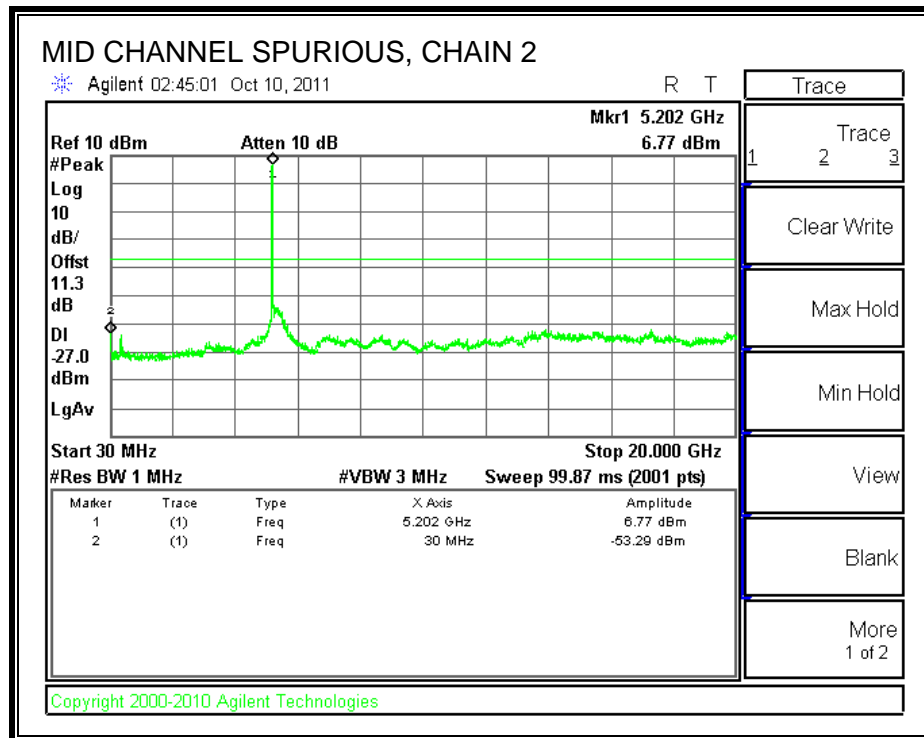


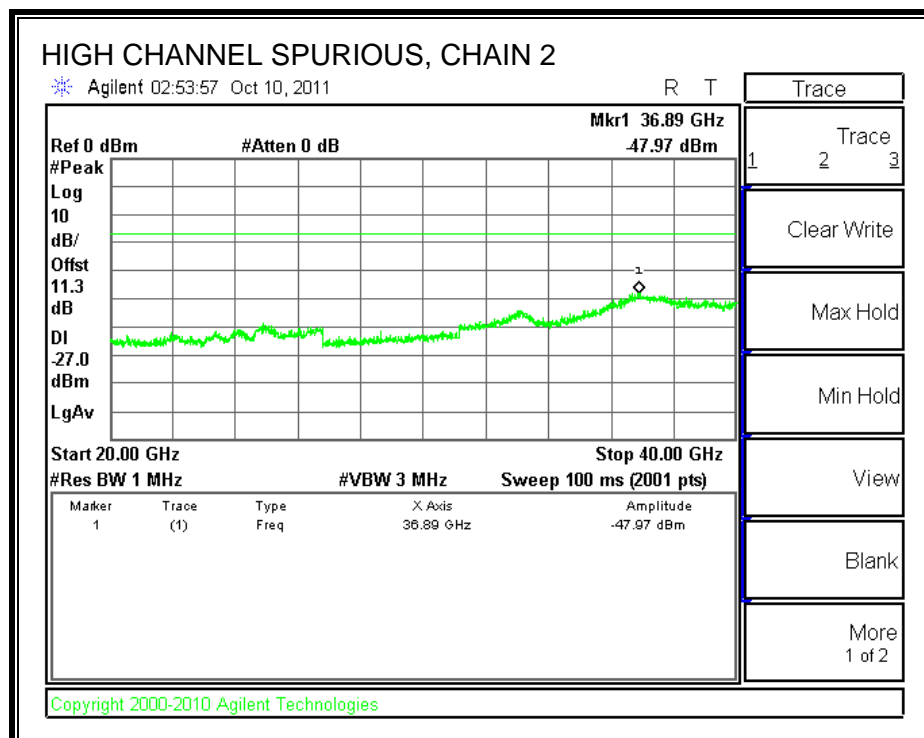
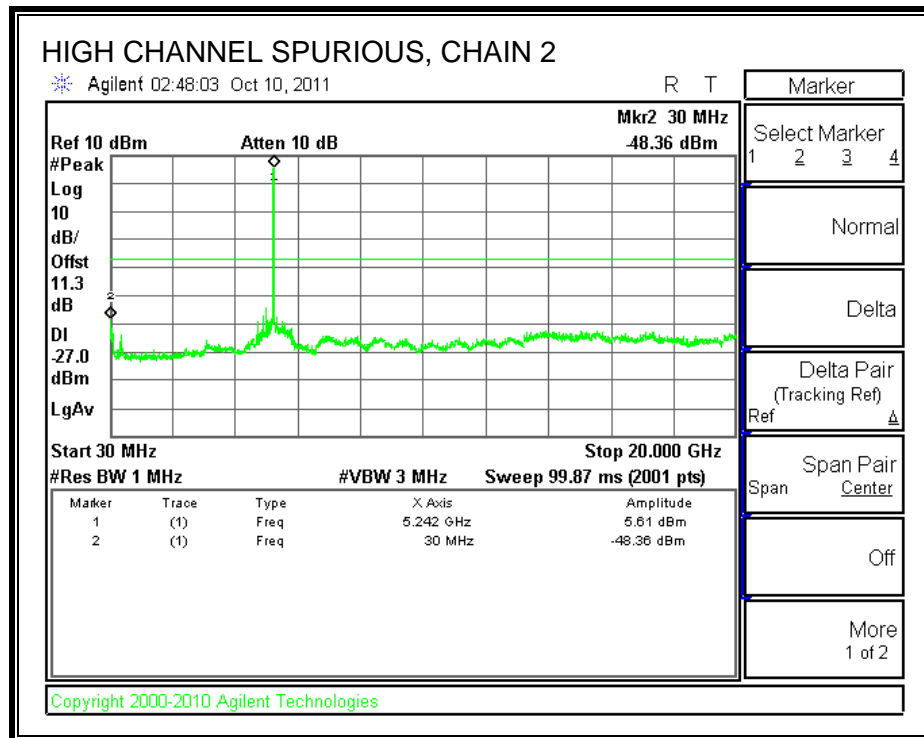




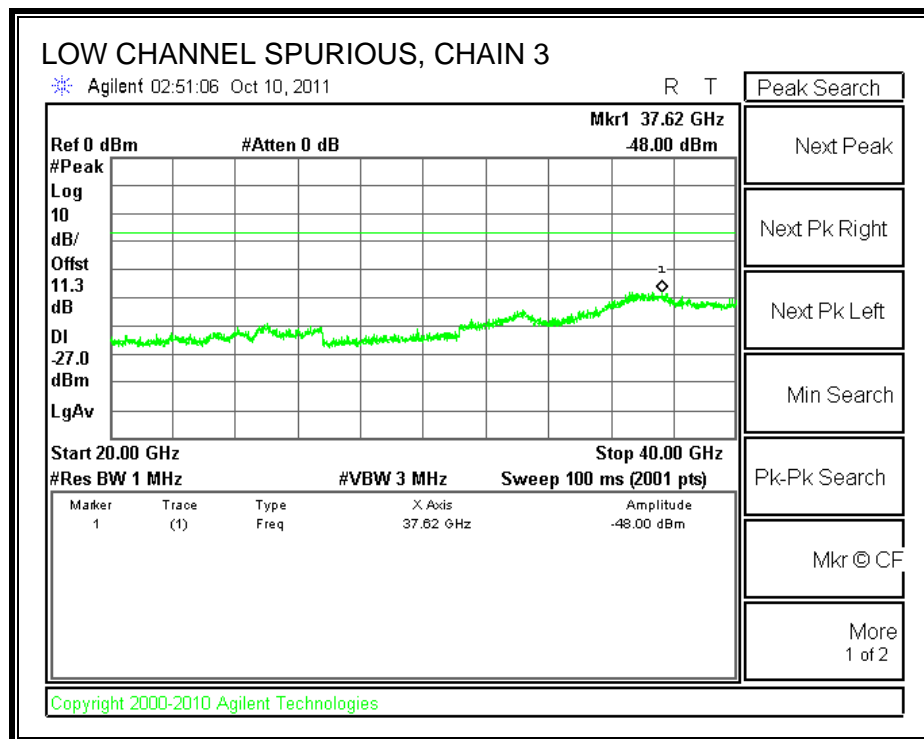
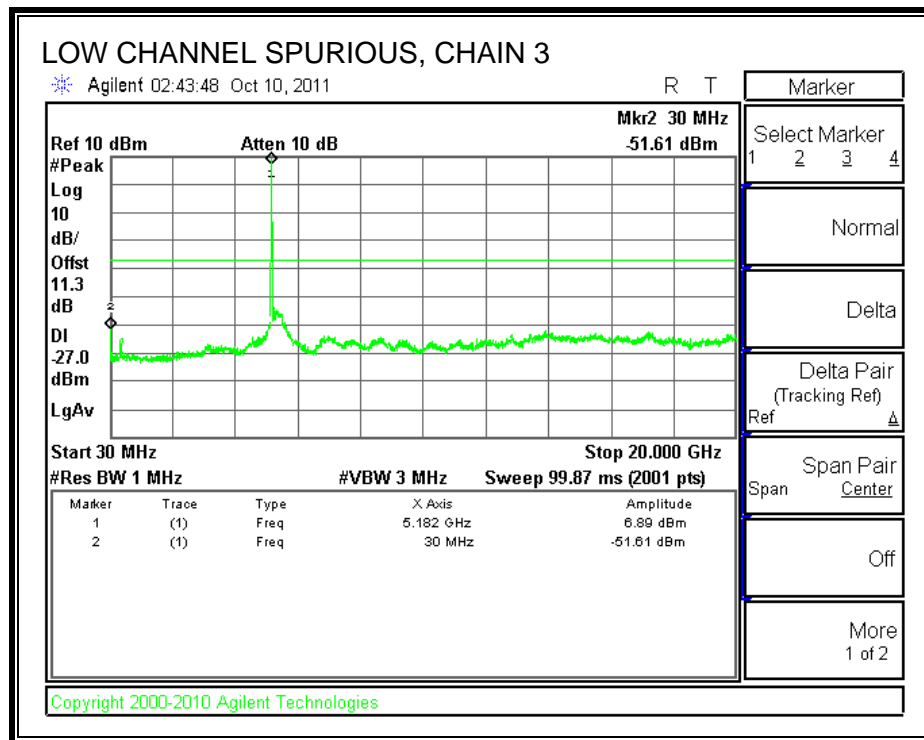
CHAIN 2 SPURIOUS EMISSIONS

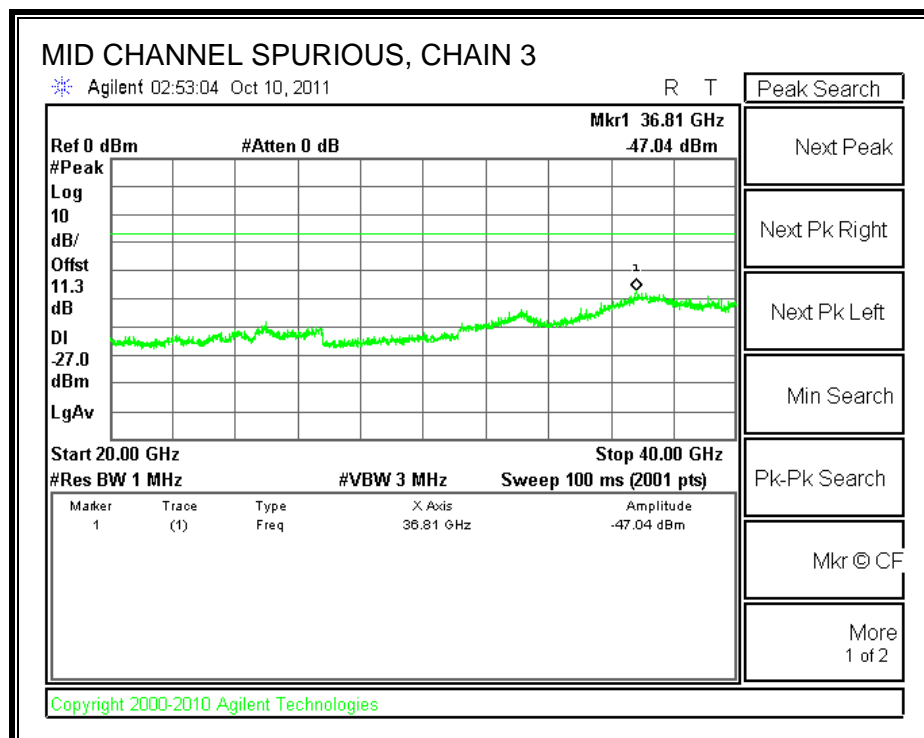
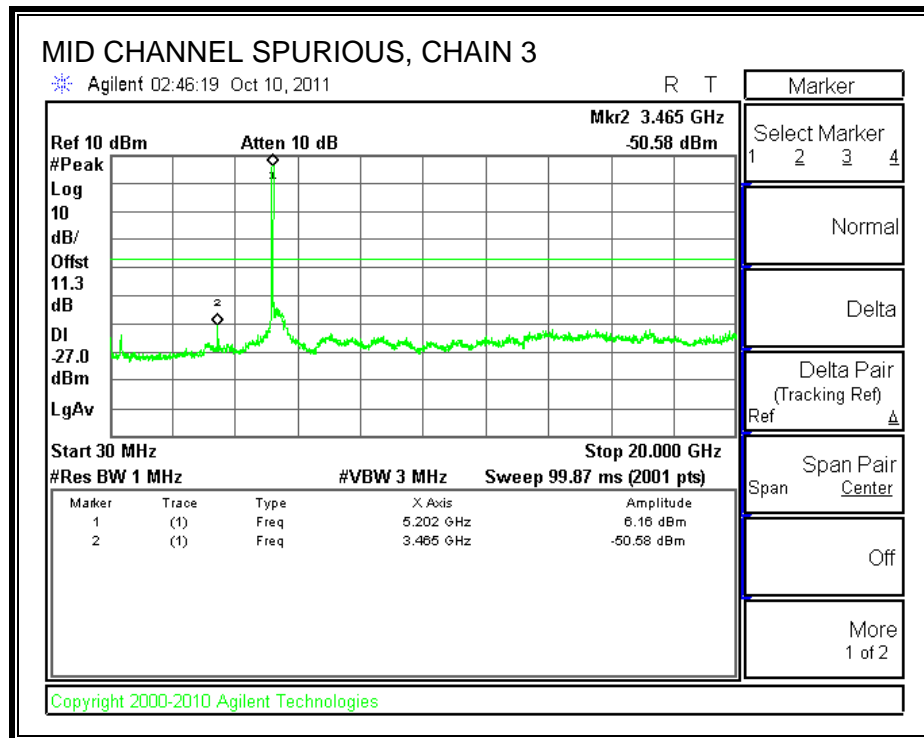


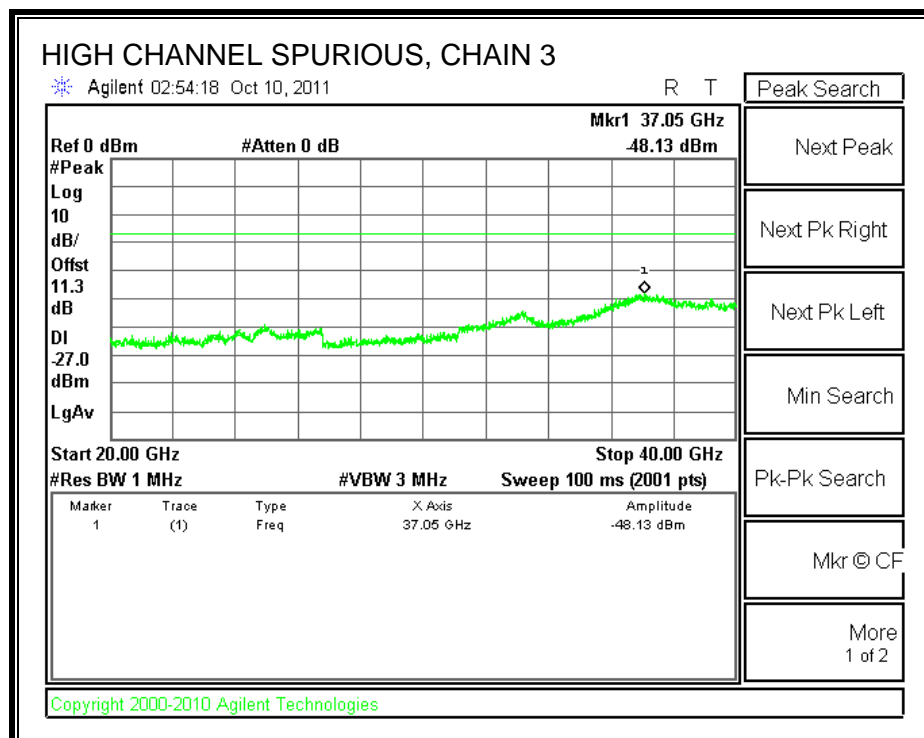
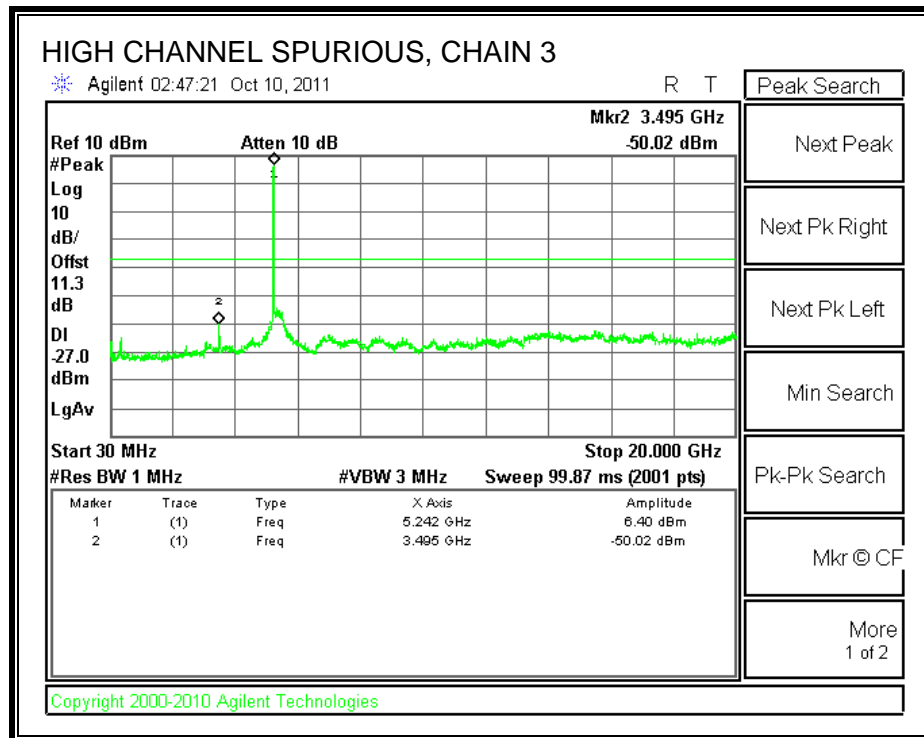




CHAIN 3 SPURIOUS EMISSIONS







7.5. 802.11n HT40 MCS0 3TX MODE

7.5.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	43.026	36.5926
High	5230	43.418	36.4905

CHAIN 2

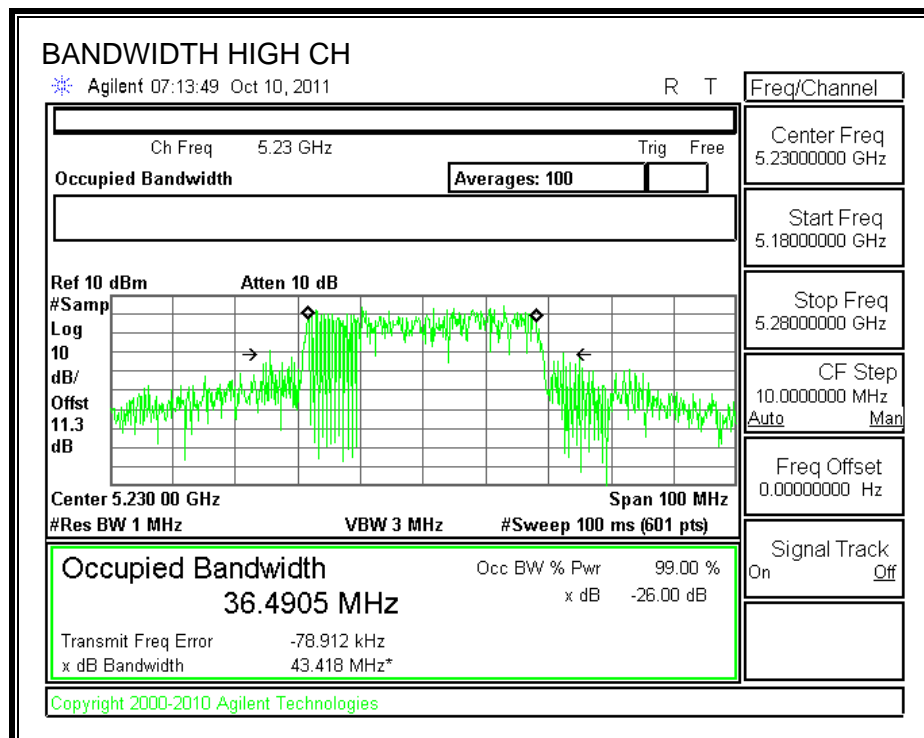
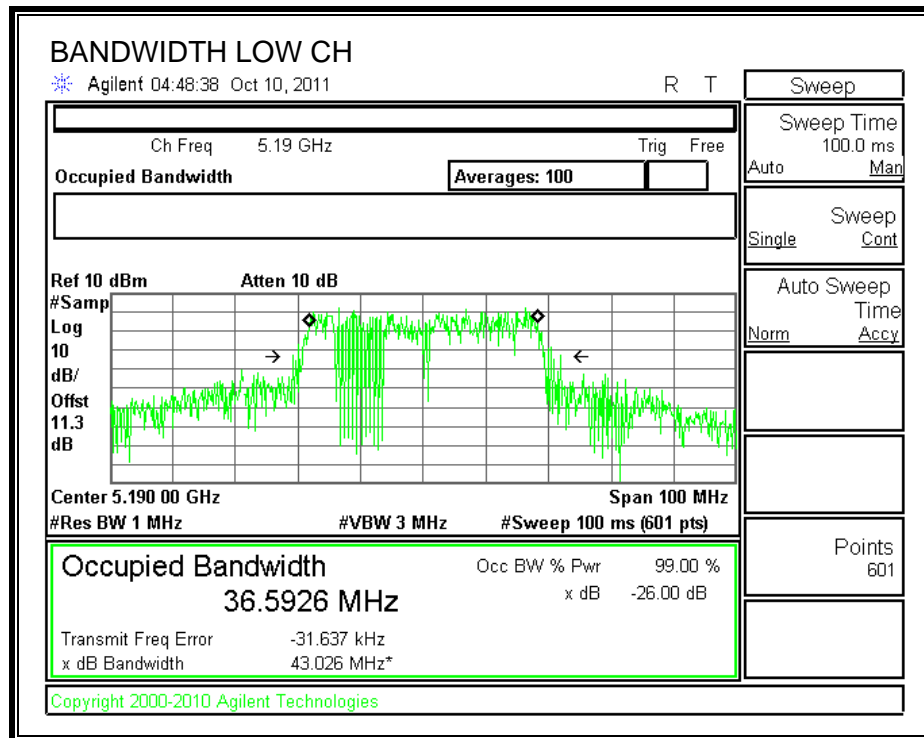
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	43.752	36.4881
High	5230	42.538	36.5748

CHAIN 3

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	43.423	36.4858
High	5230	42.734	36.5086

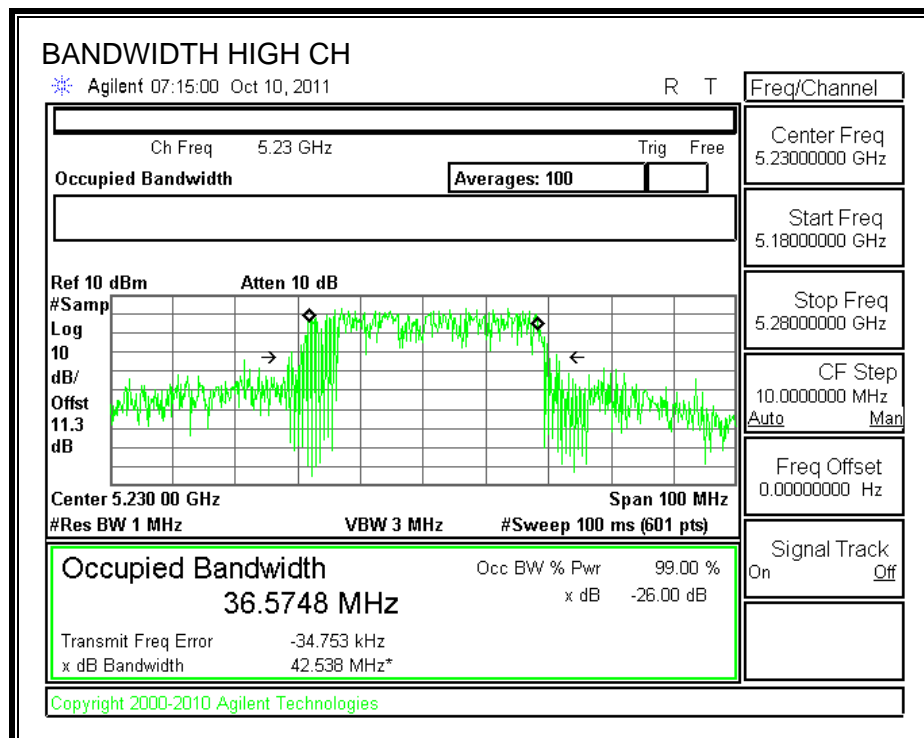
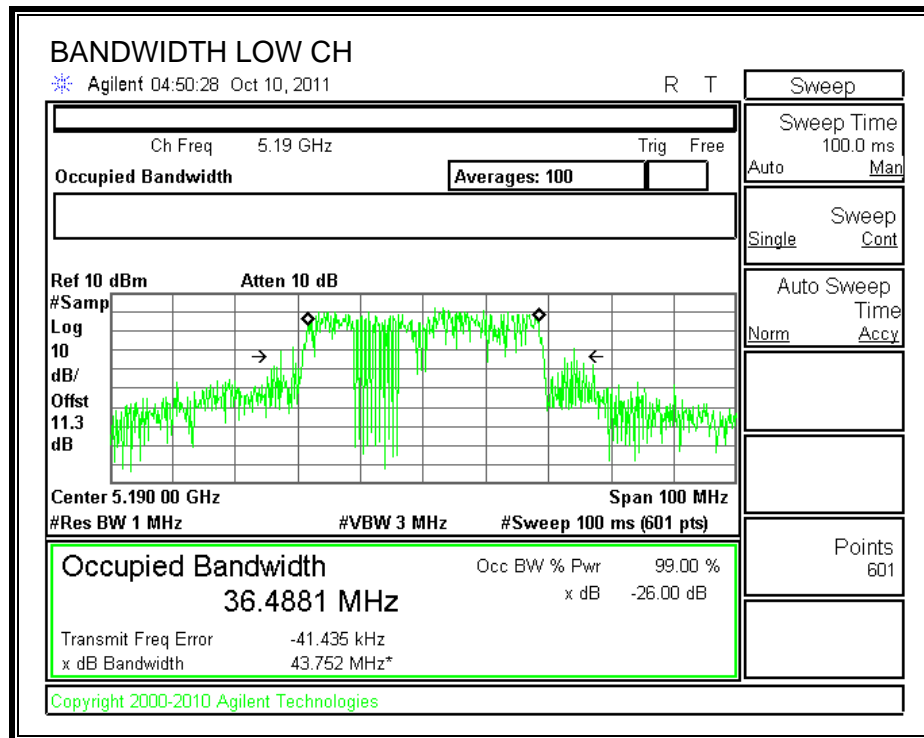
CHAIN 1

26 dB and 99% BANDWIDTH



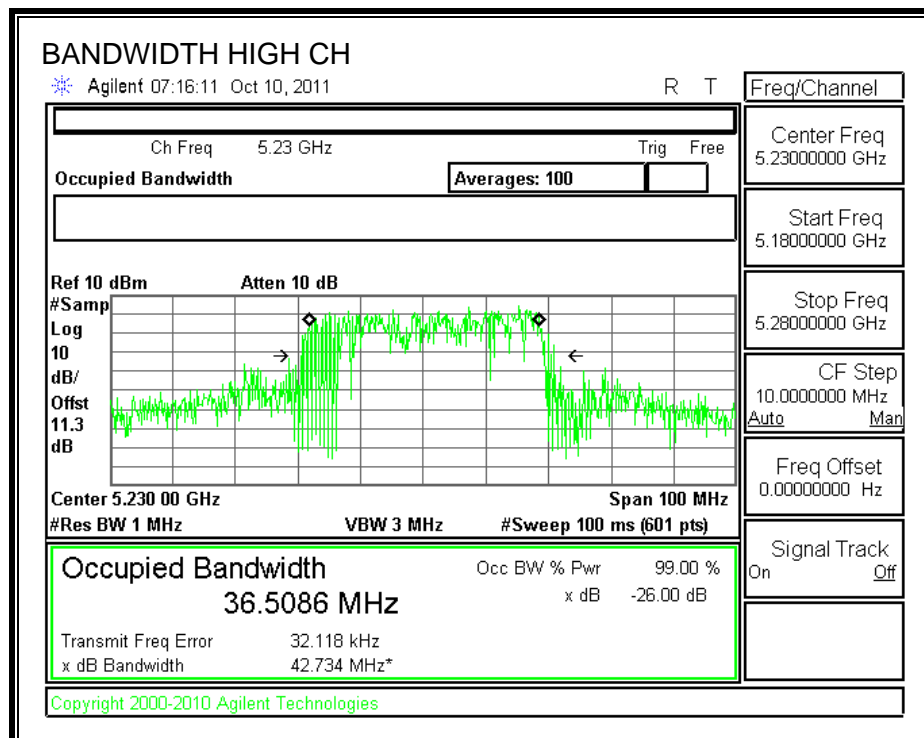
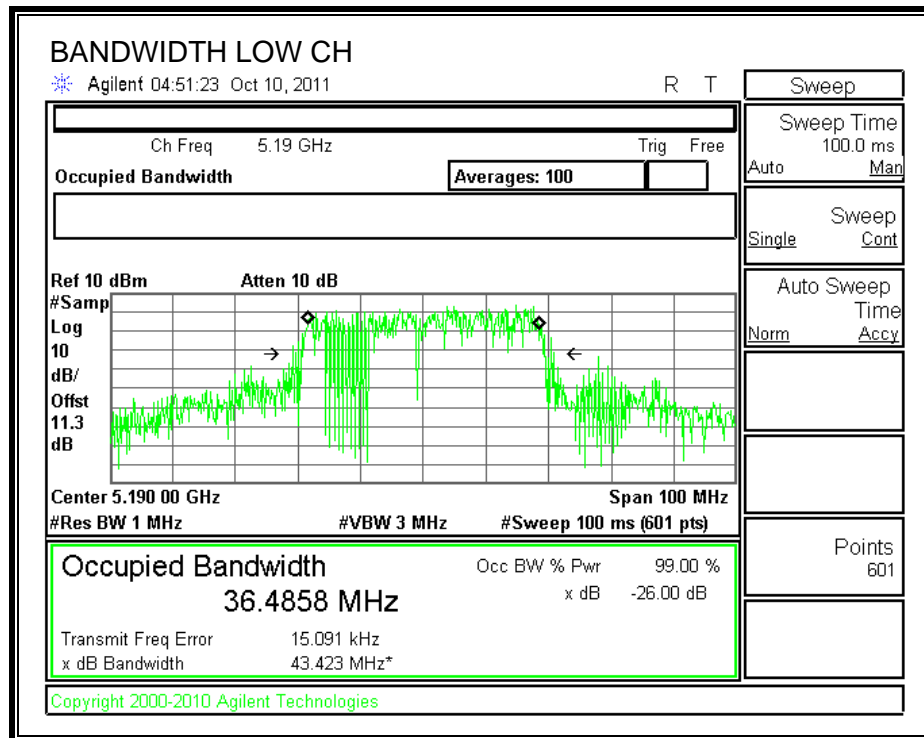
CHAIN 2

26 dB and 99% BANDWIDTH



CHAIN 3

26 dB and 99% BANDWIDTH



7.5.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

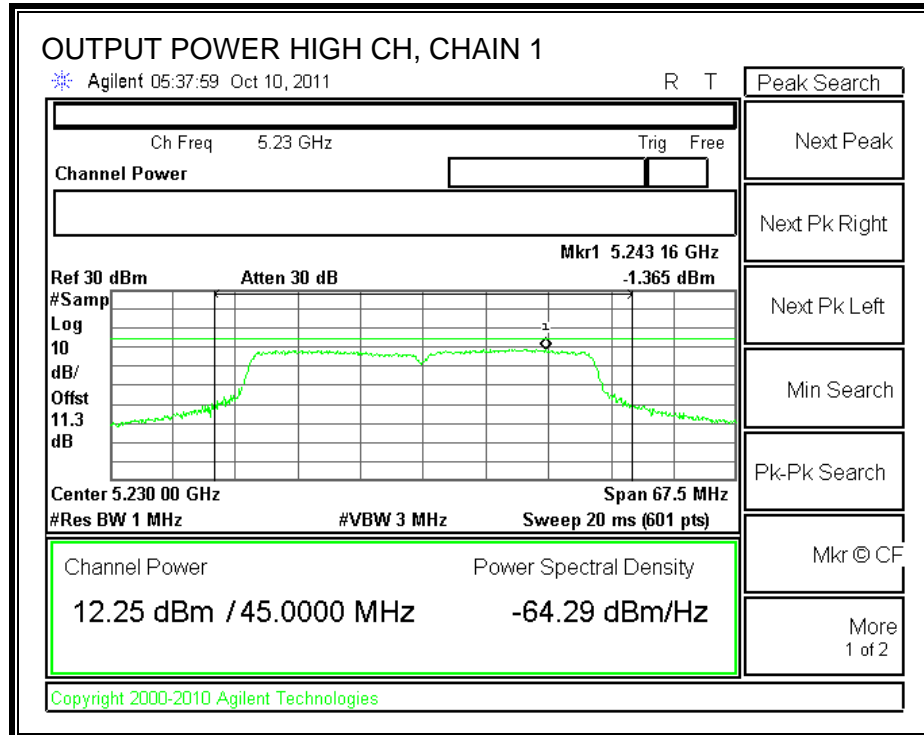
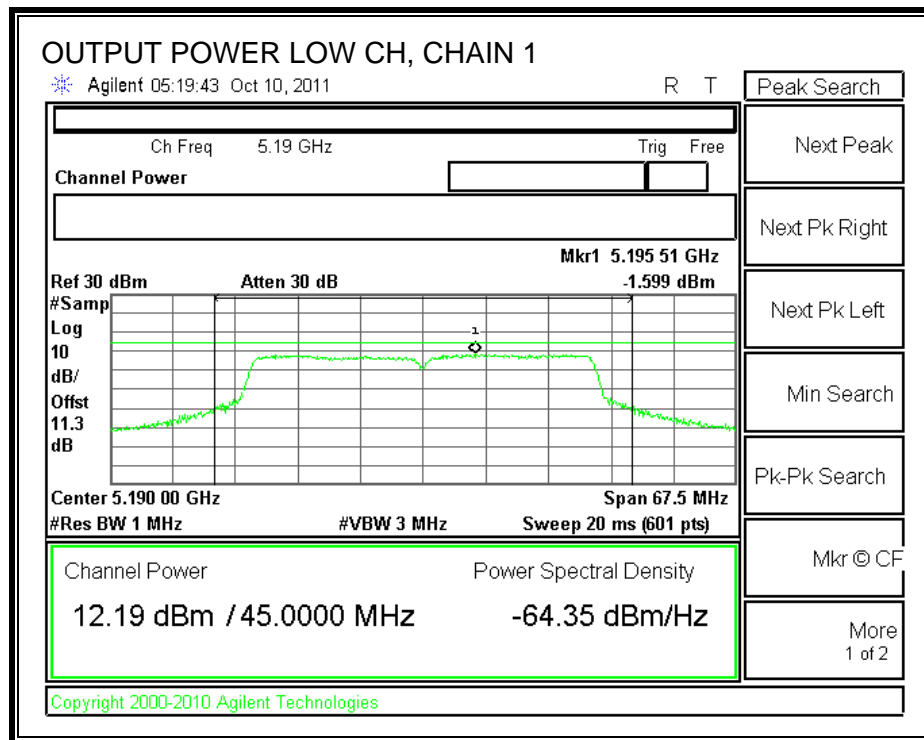
Limit

Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5190	16.99	43.026	20.34	5.00	16.99
High	5230	16.99	42.538	20.29	5.00	16.99

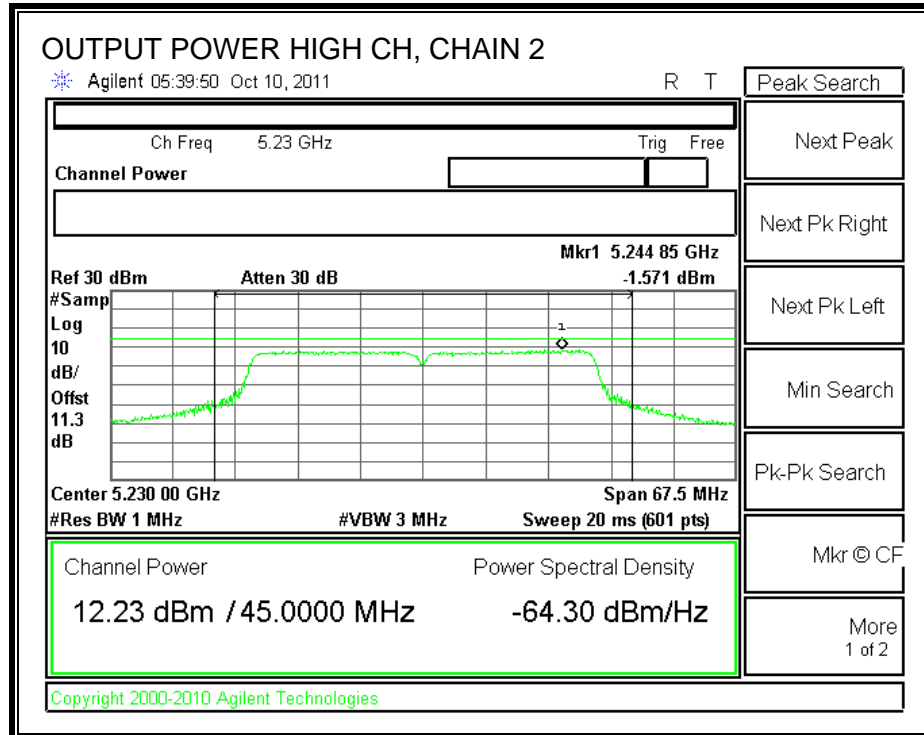
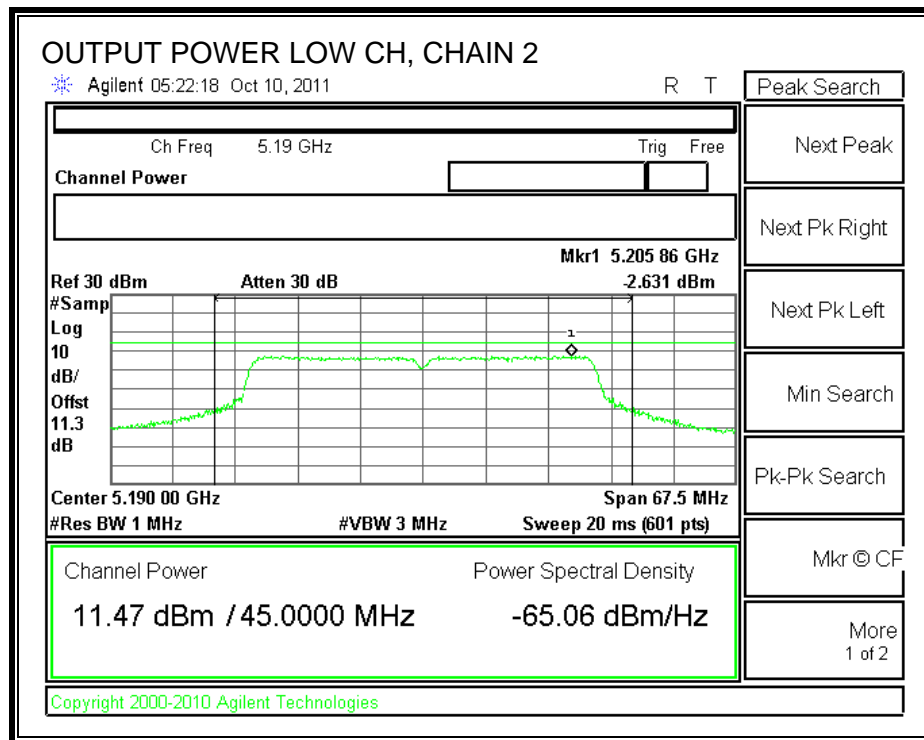
Individual Chain Results

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5190	12.19	11.47	12.55	16.86	16.99	-0.13
High	5230	12.25	12.23	12.08	16.96	16.99	-0.03

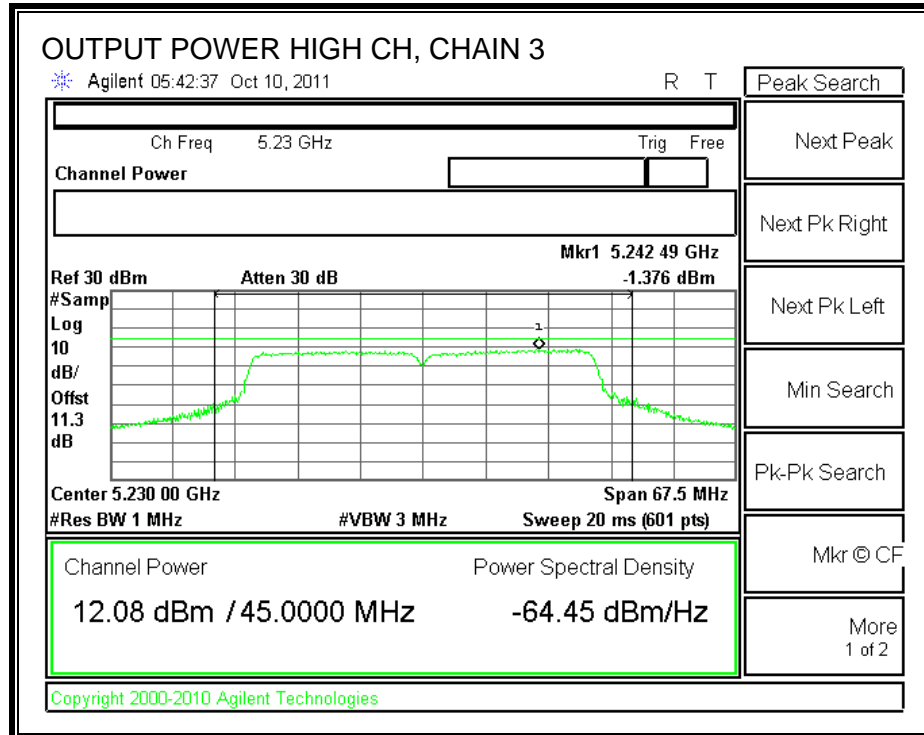
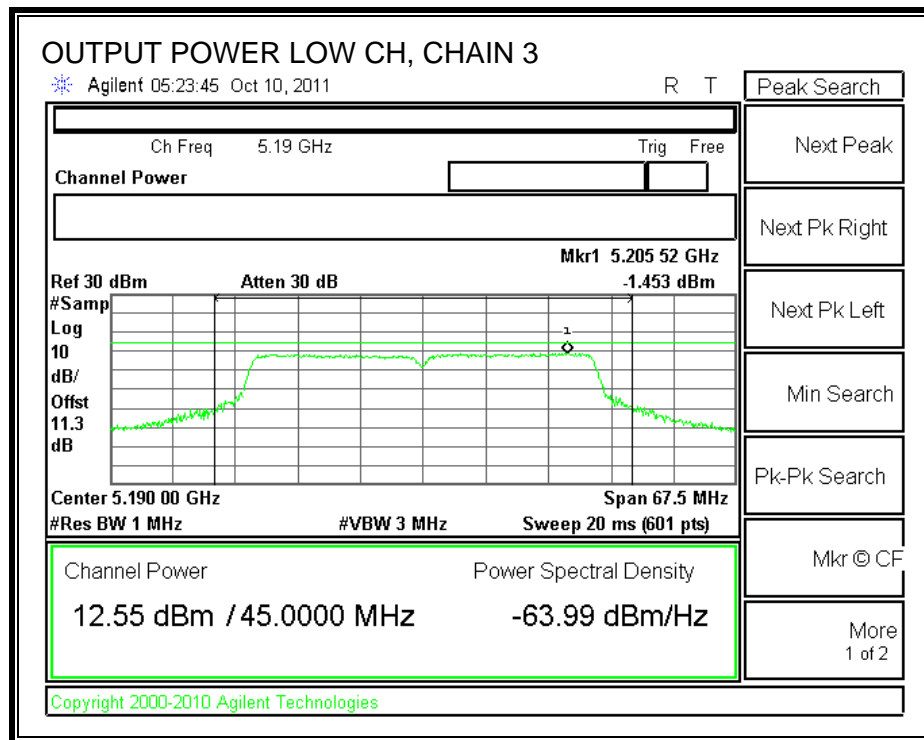
CHAIN 1 OUTPUT POWER



CHAIN 2 OUTPUT POWER



CHAIN 3 OUTPUT POWER



7.5.3. 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 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	5190	12.10	11.30	12.40	16.73
High	5230	12.10	12.00	11.90	16.77

7.5.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 4 dBm.

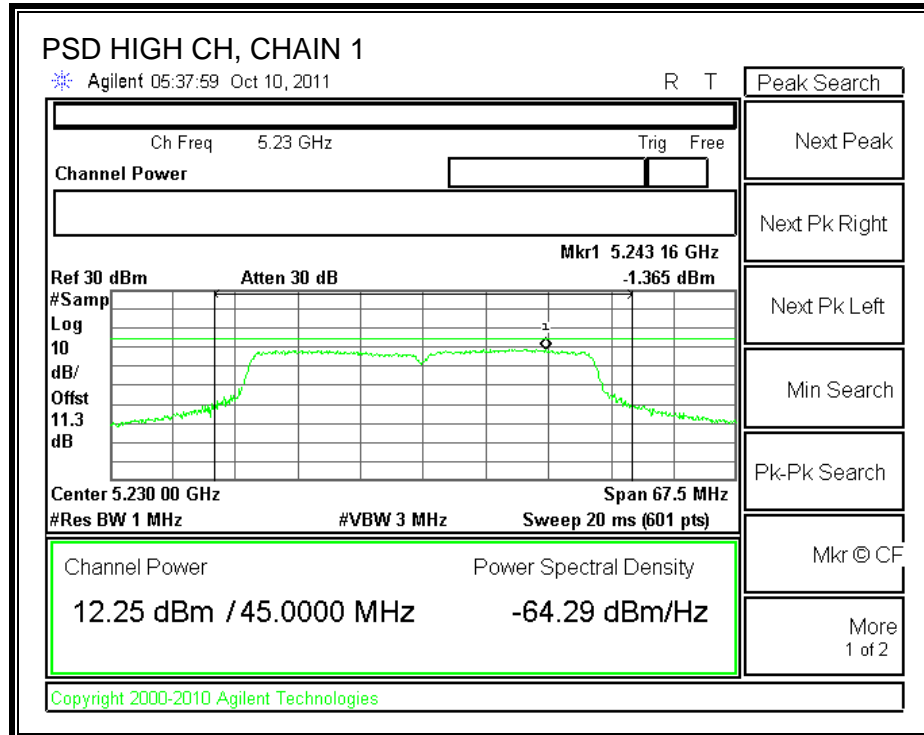
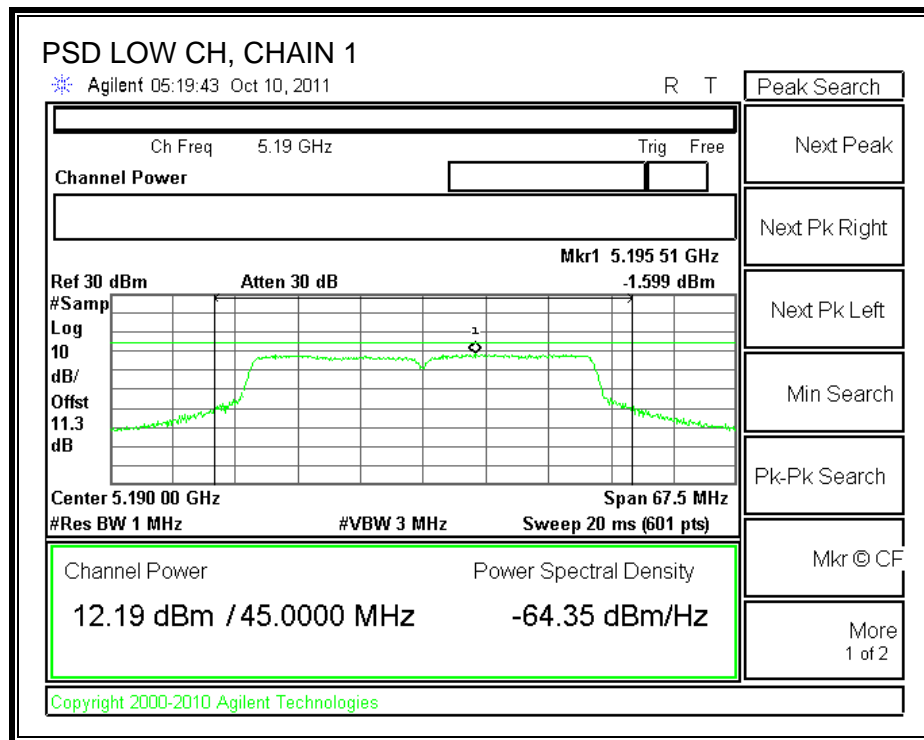
TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

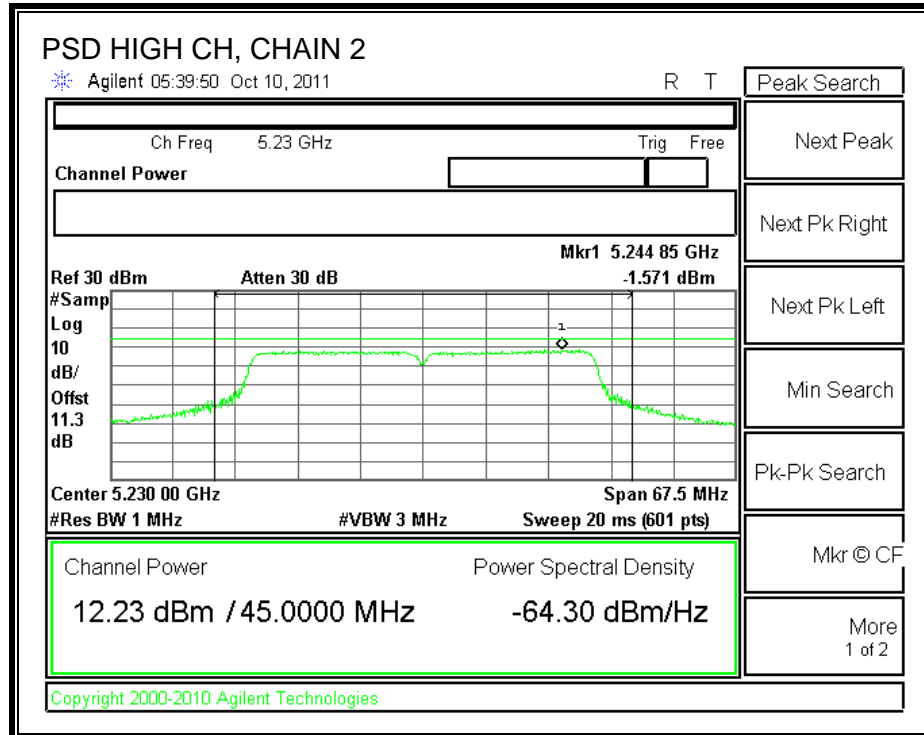
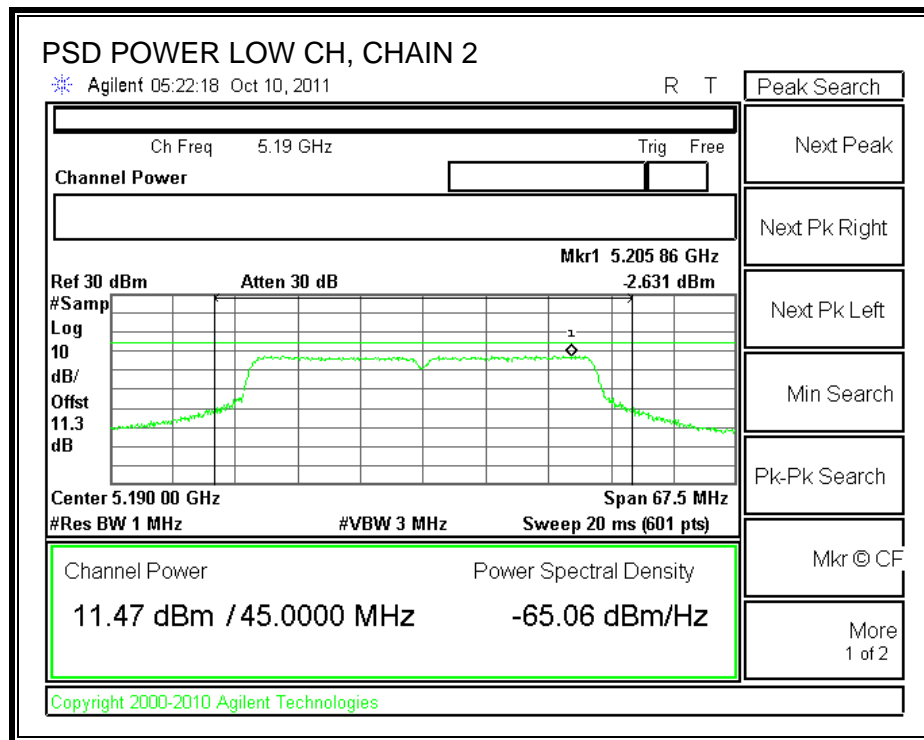
RESULTS

Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Chain 3 PPSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5190	-1.599	-2.631	-1.453	2.91	4	-1.09
High	5230	-1.365	-1.571	-1.376	3.33	4	-0.67

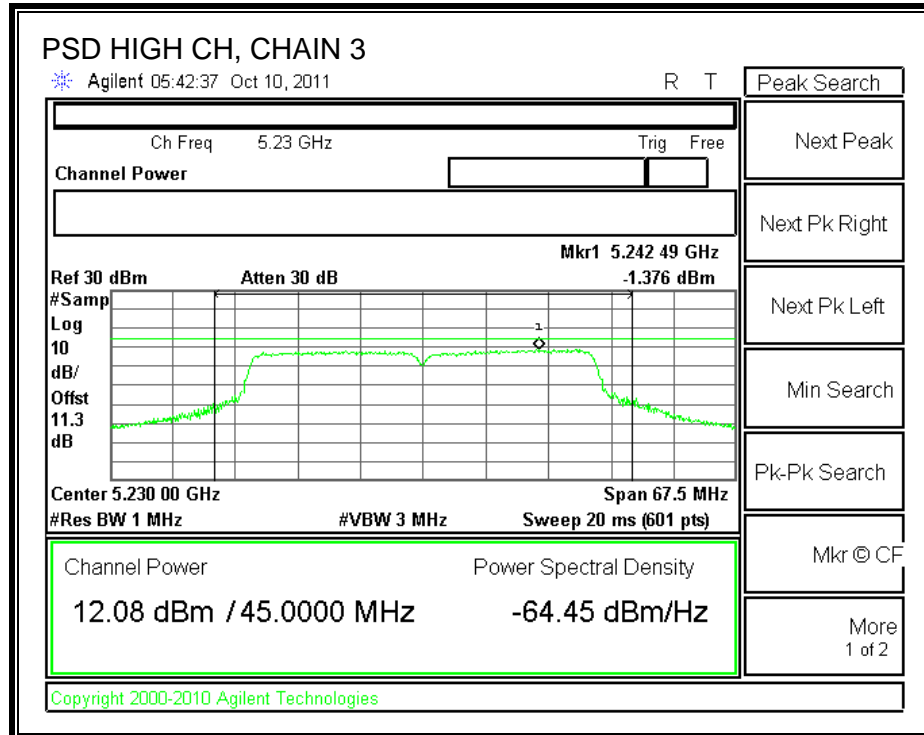
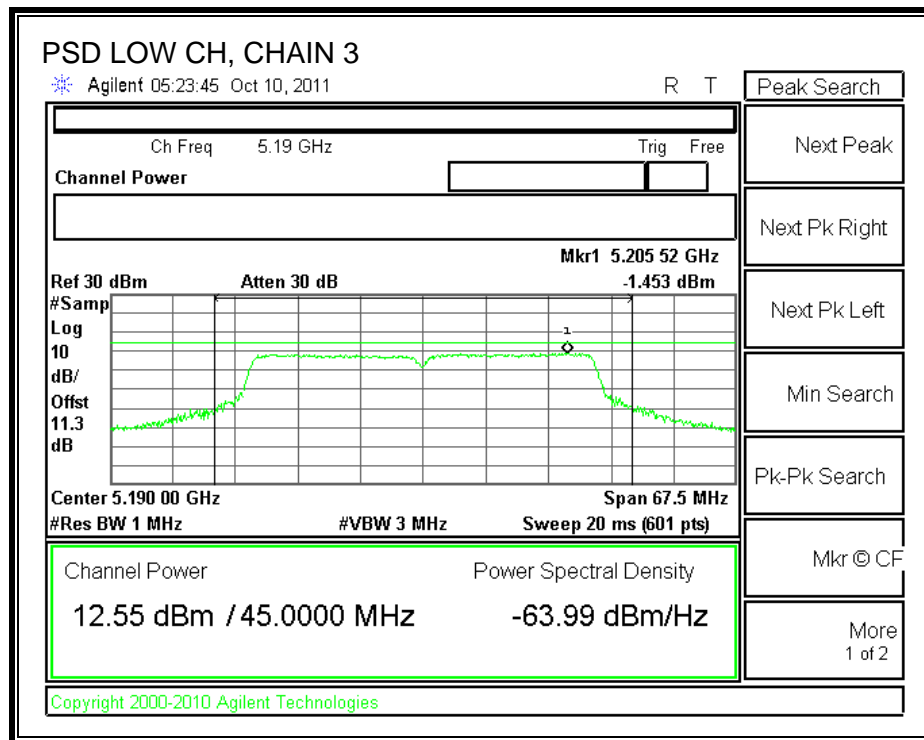
CHAIN 1 POWER SPECTRAL DENSITY



CHAIN 2 POWER SPECTRAL DENSITY



CHAIN 3 POWER SPECTRAL DENSITY



7.5.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	9.35	13	-3.65
High	5230	8.97	13	-4.03

CHAIN 2

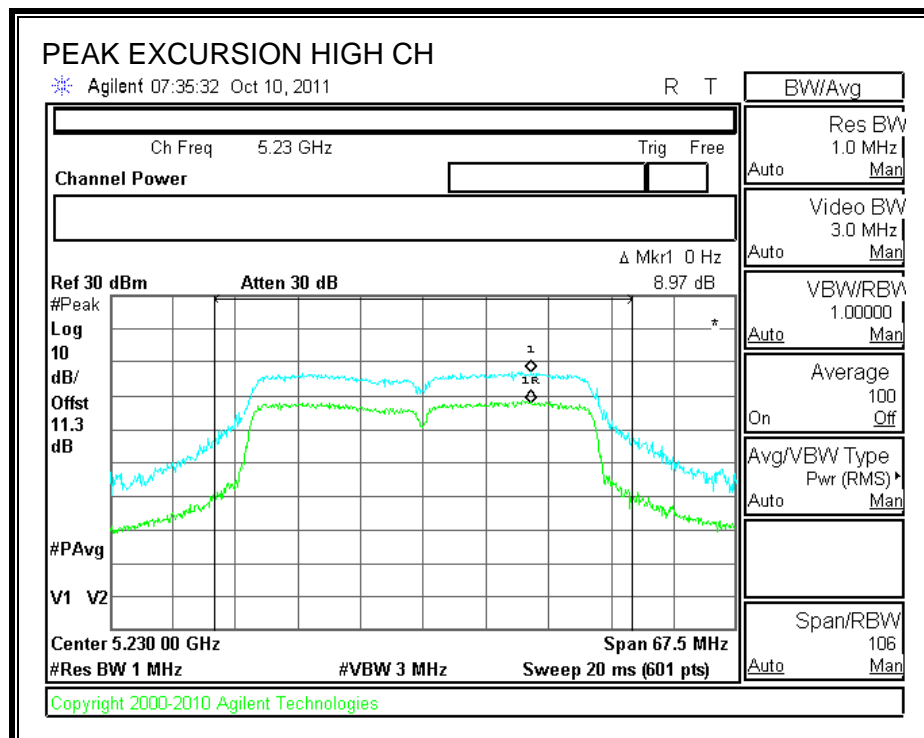
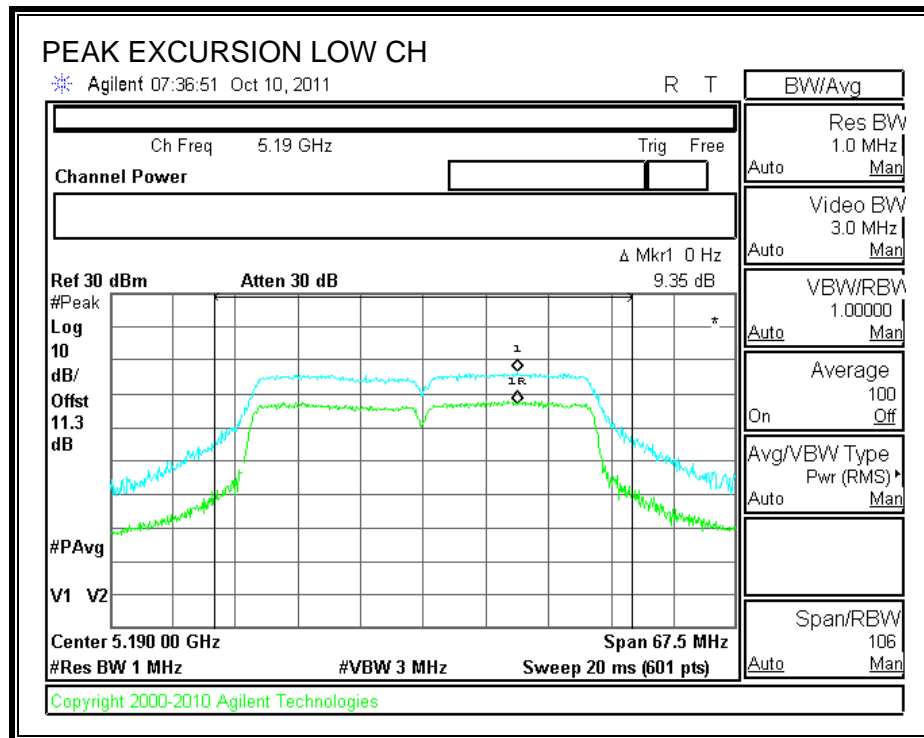
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	9.96	13	-3.04
High	5230	9.97	13	-3.03

CHAIN 3

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	9.32	13	-3.68
High	5230	9.56	13	-3.44

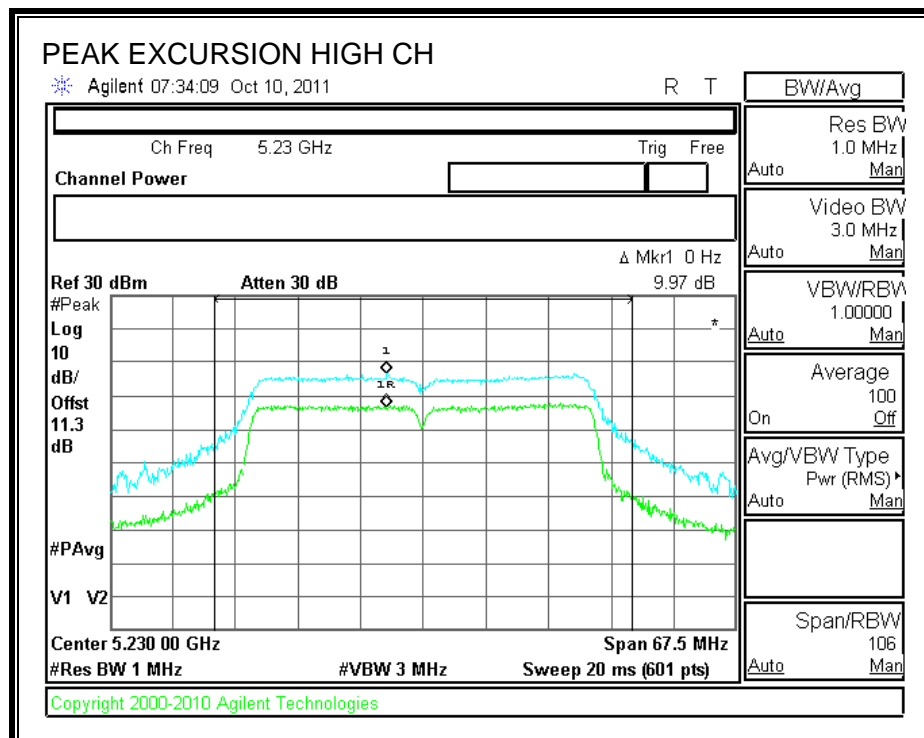
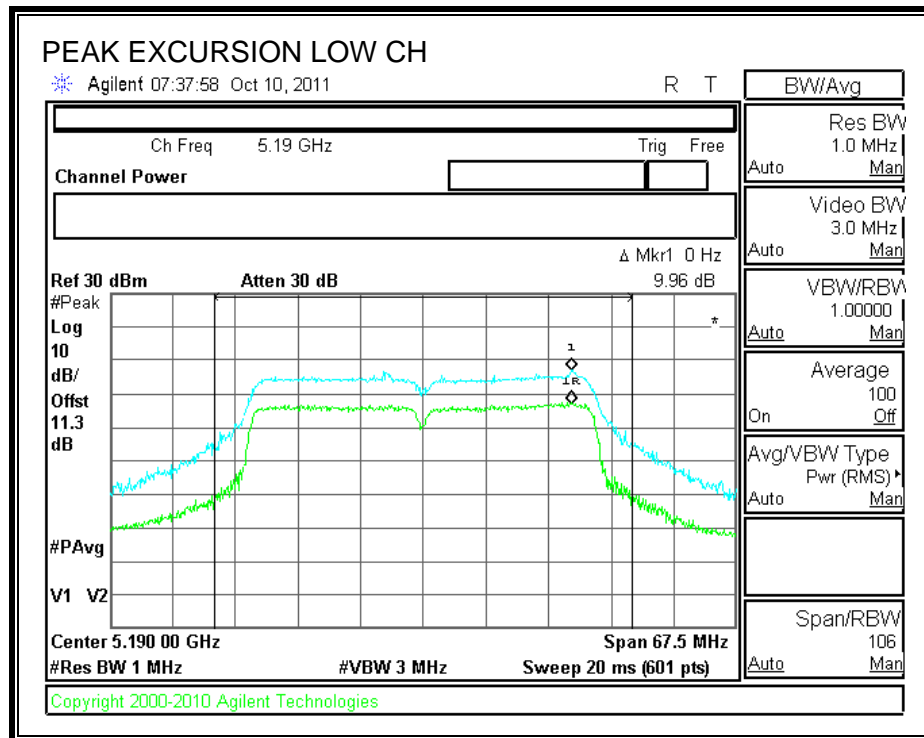
CHAIN 1

PEAK EXCURSION



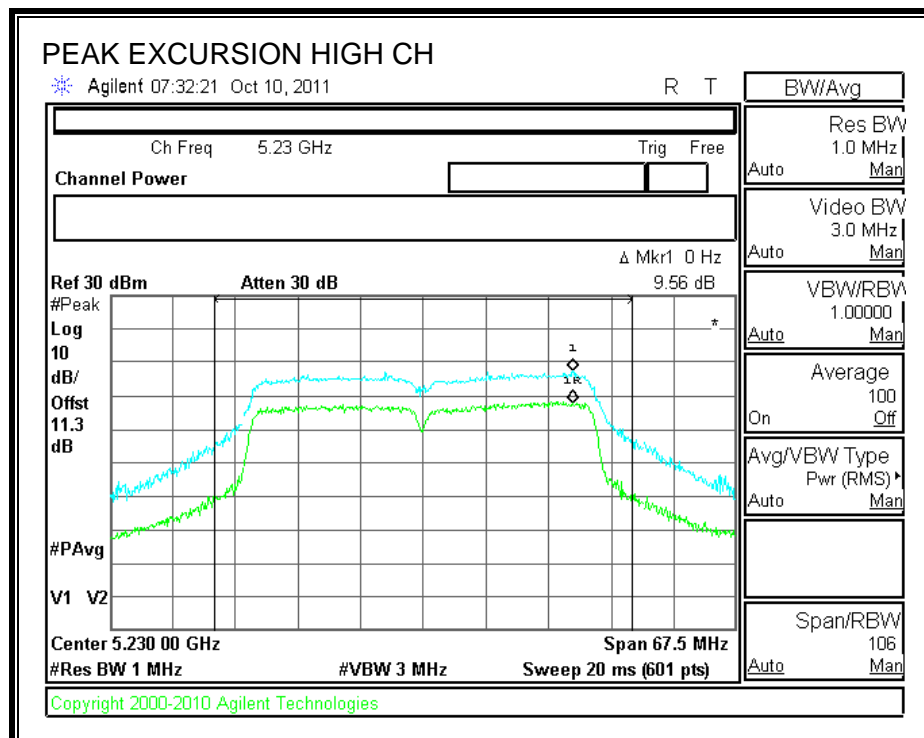
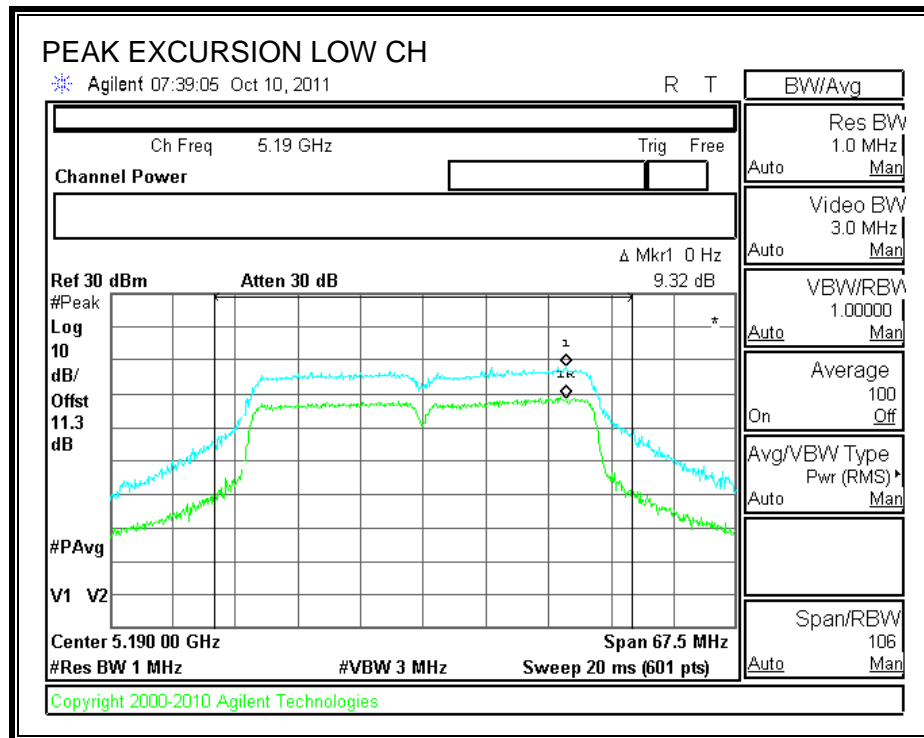
CHAIN 2

PEAK EXCURSION



CHAIN 3

PEAK EXCURSION



7.5.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 3 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

Chain 1

Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	10Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	37640	-48.11	5.00	4.77	-38.34	-27.00
High	36910	-47.74	5.00	4.77	-37.97	-27.00

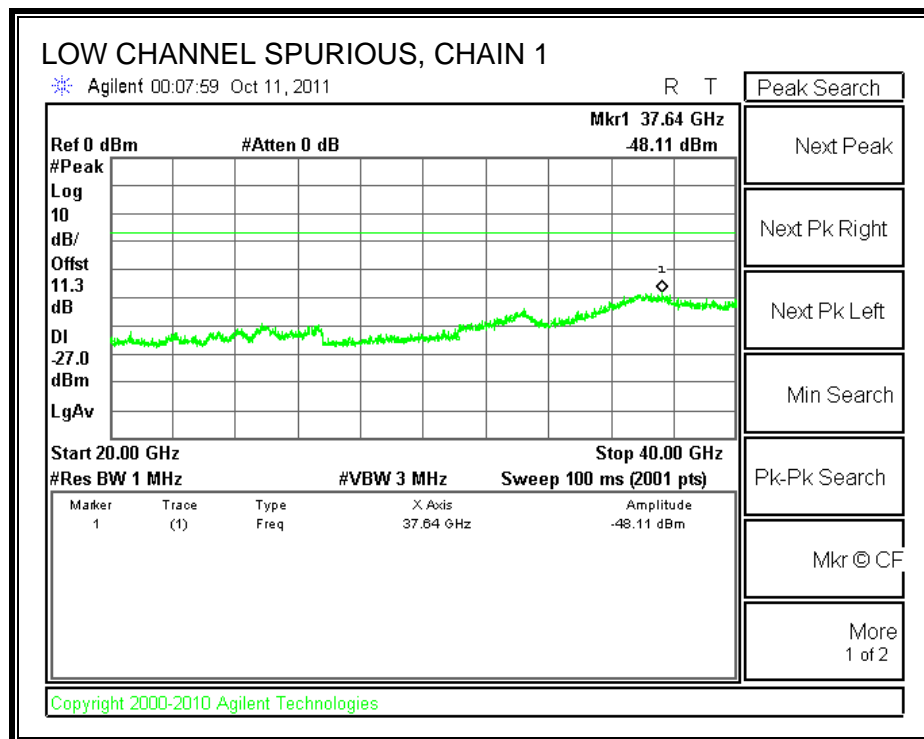
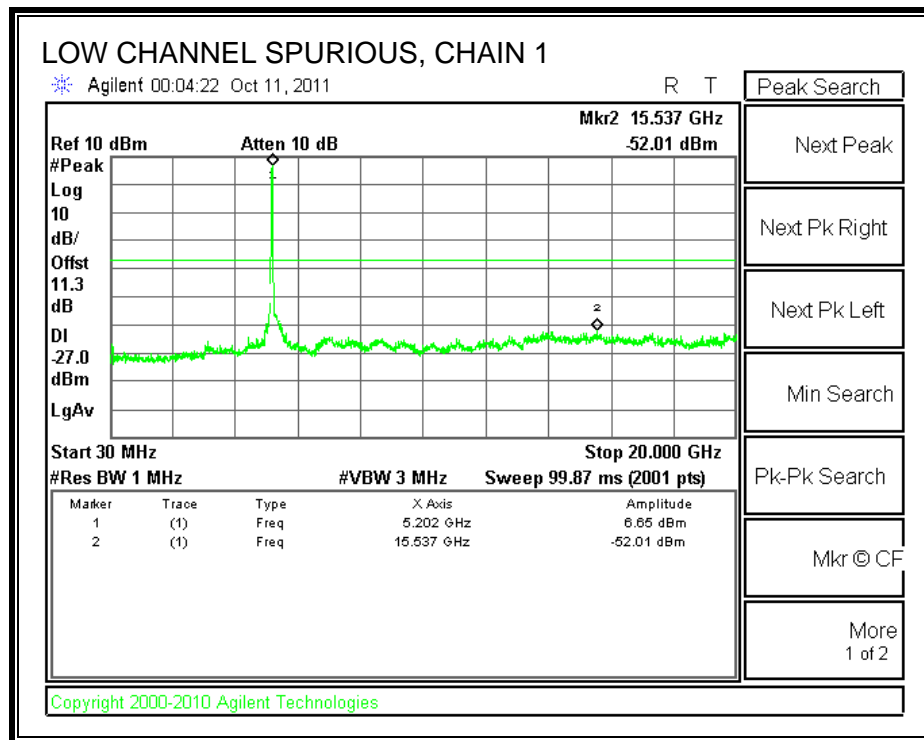
Chain 2

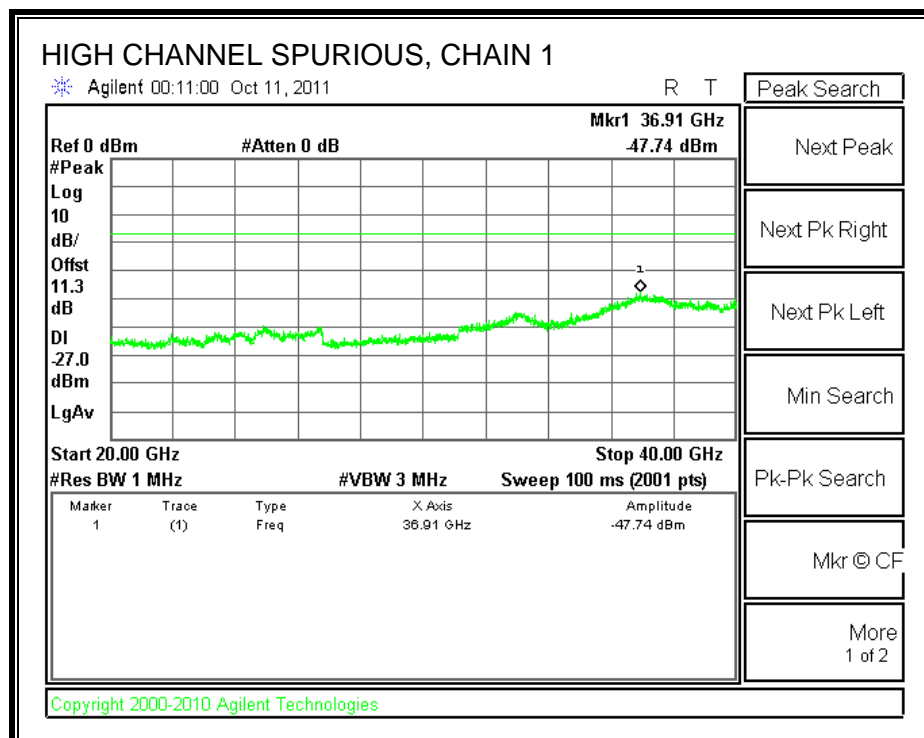
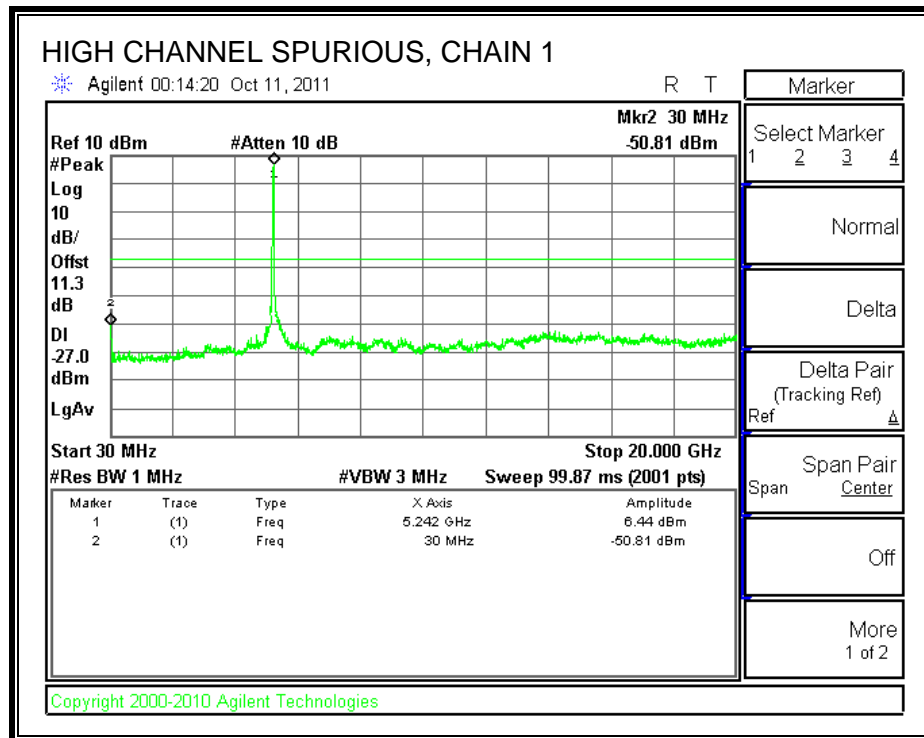
Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	37070	-47.66	5.00	4.77	-37.89	-27.00
High	36900	-47.72	5.00	4.77	-37.95	-27.00

Chain 3

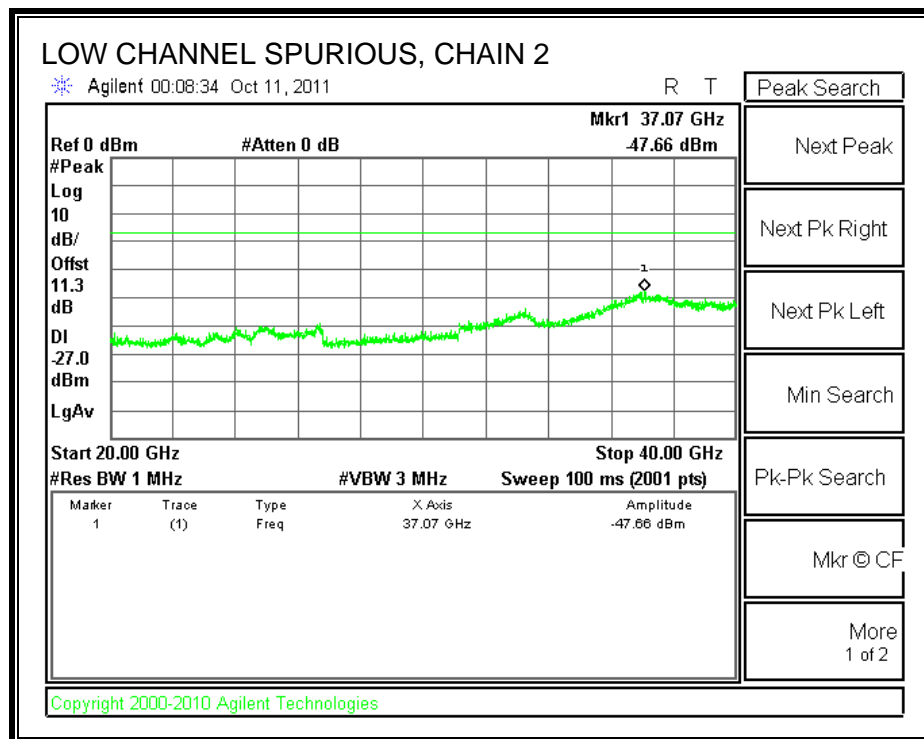
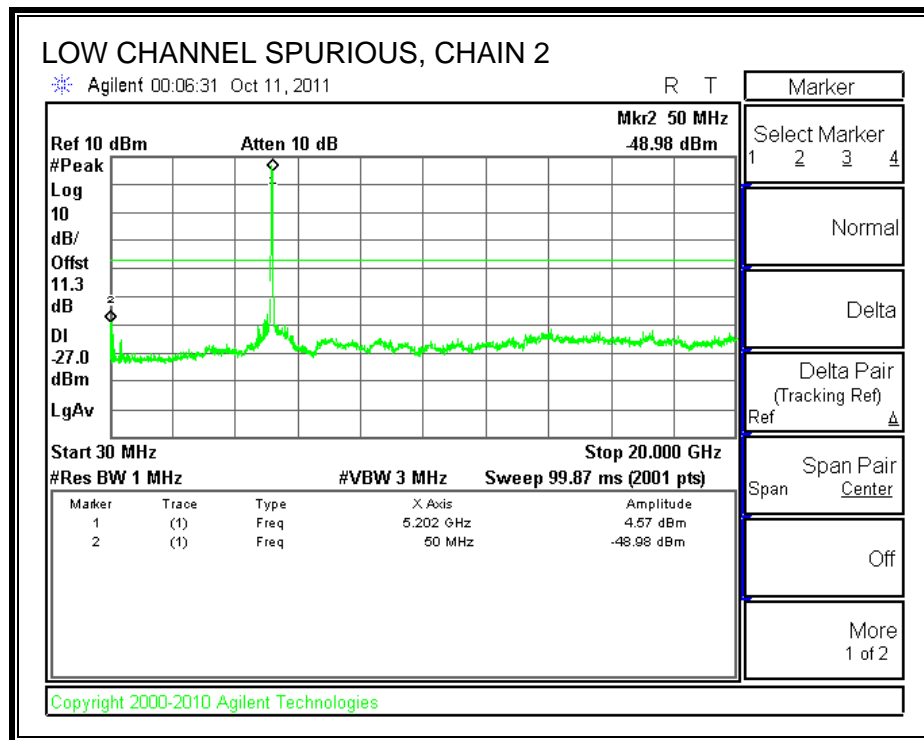
Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	36940	-47.46	5.00	4.77	-37.69	-27.00
High	37350	-47.59	5.00	4.77	-37.82	-27.00

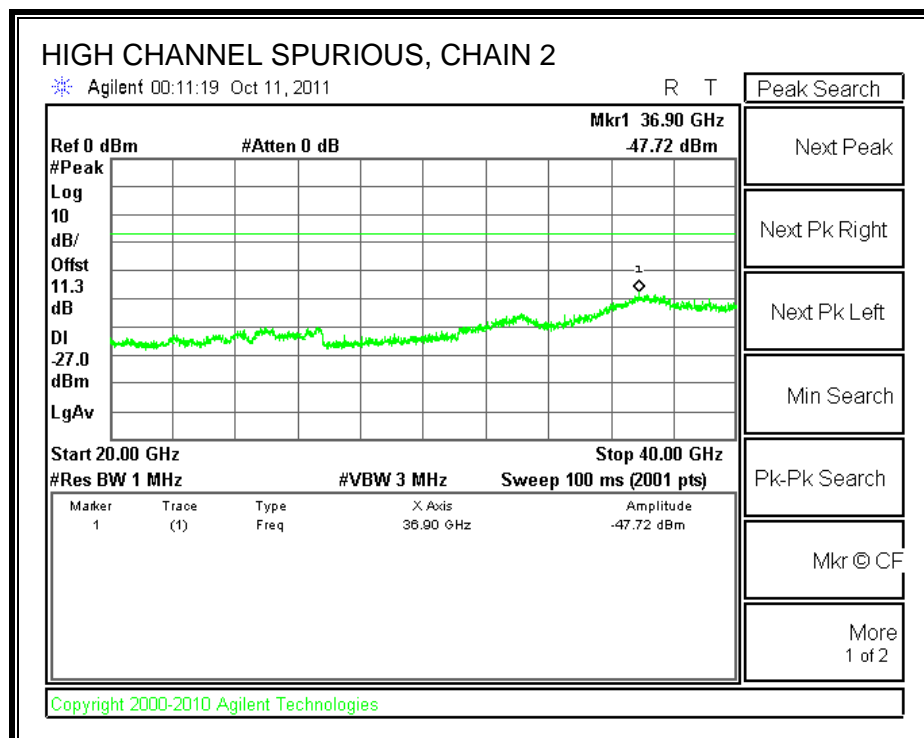
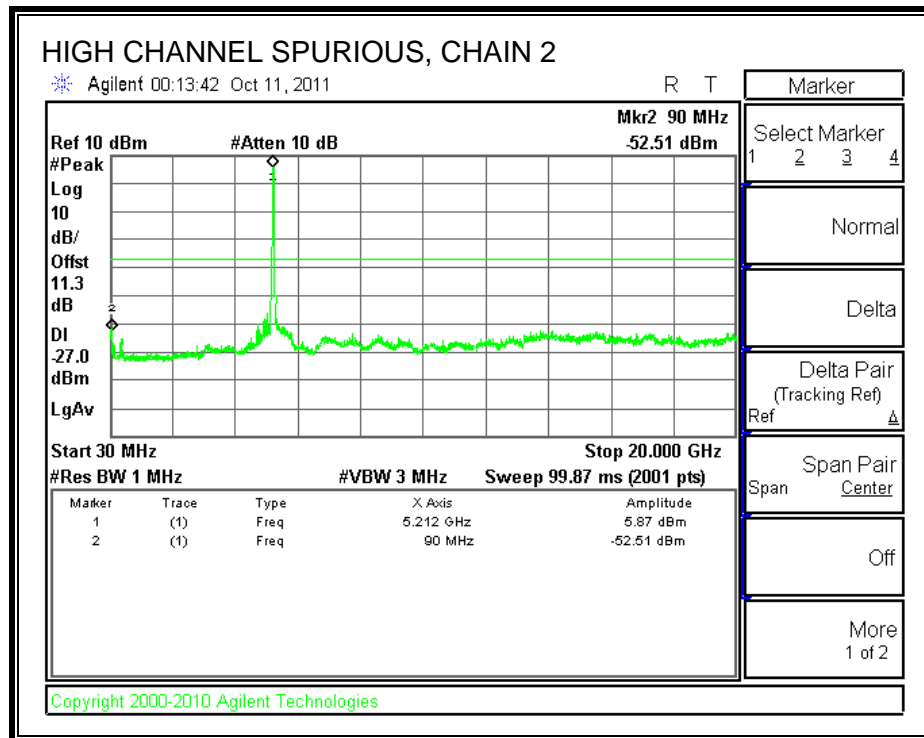
CHAIN 1 SPURIOUS EMISSIONS



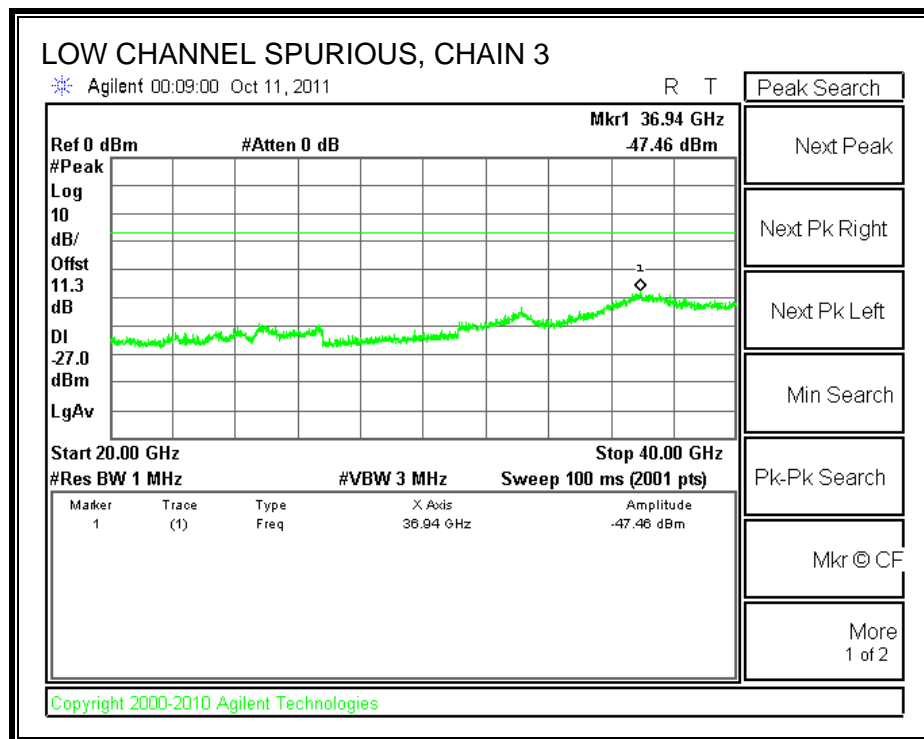
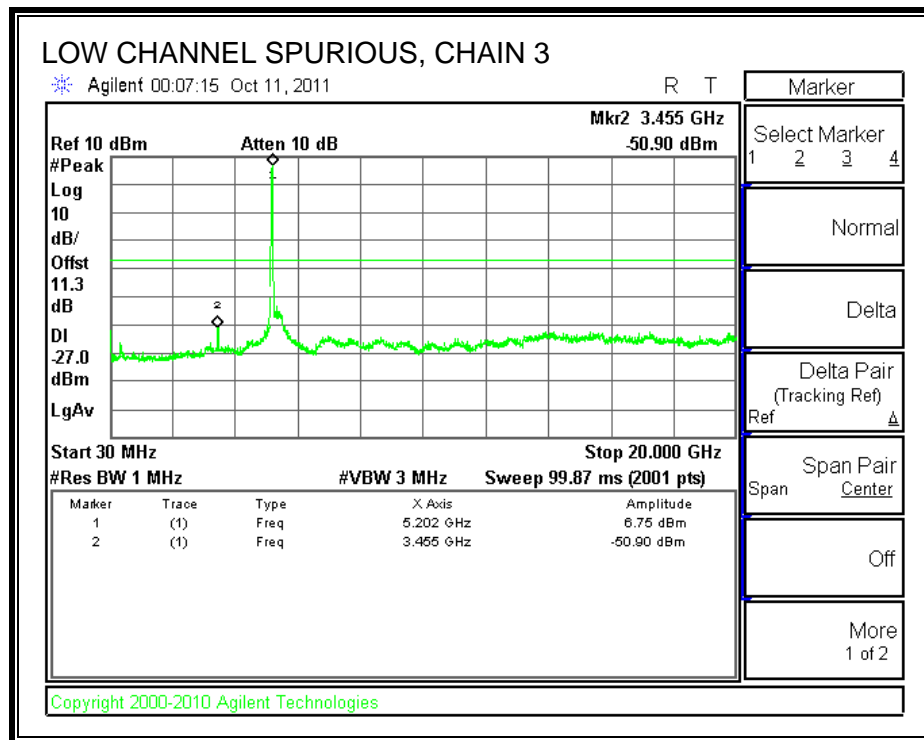


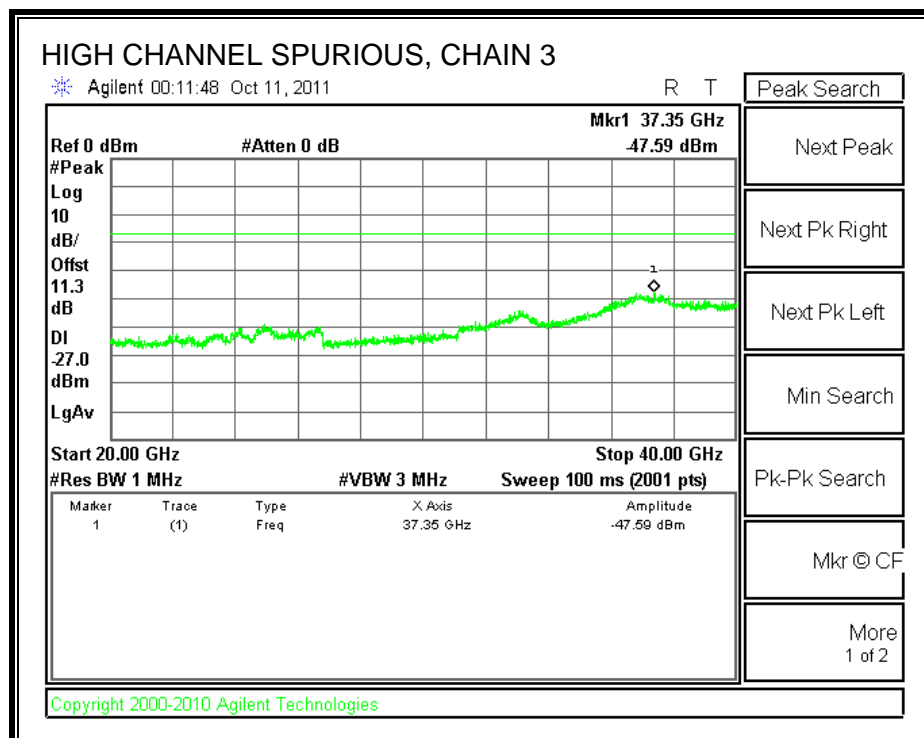
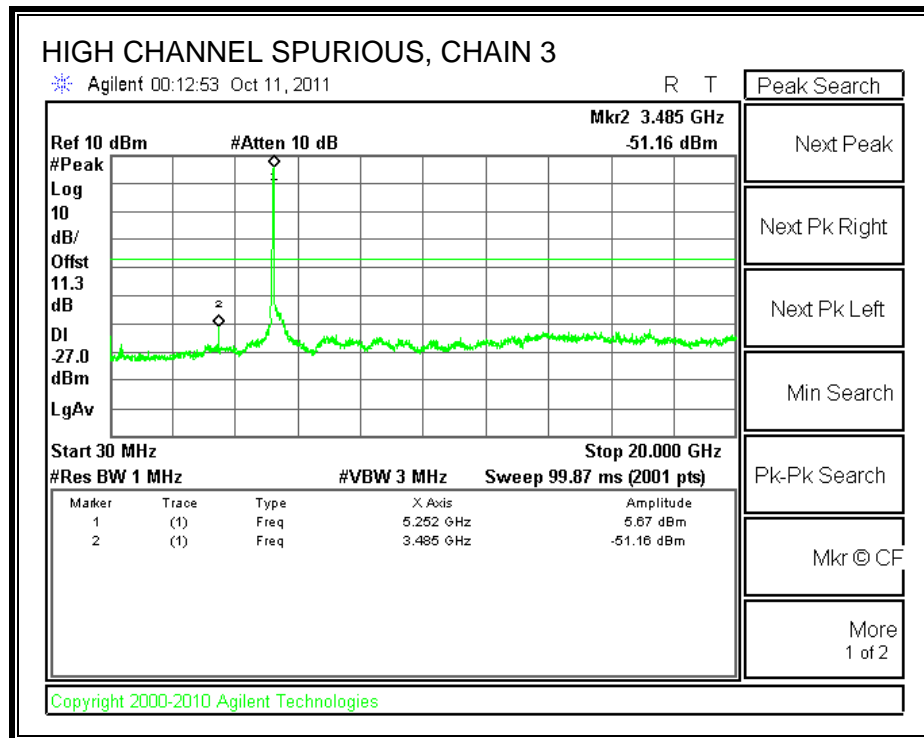
CHAIN 2 SPURIOUS EMISSIONS





CHAIN 3 SPURIOUS EMISSIONS





7.6. 802.11n HT40 MCS8 3TX MODE

7.6.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	43.238	36.5451
High	5230	44.351	36.5816

CHAIN 2

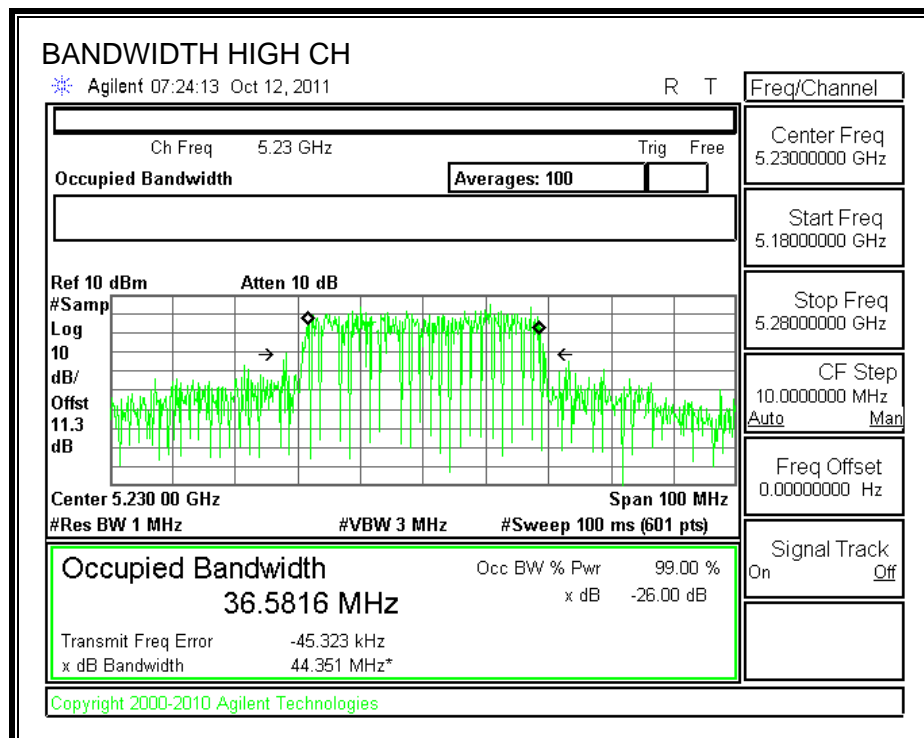
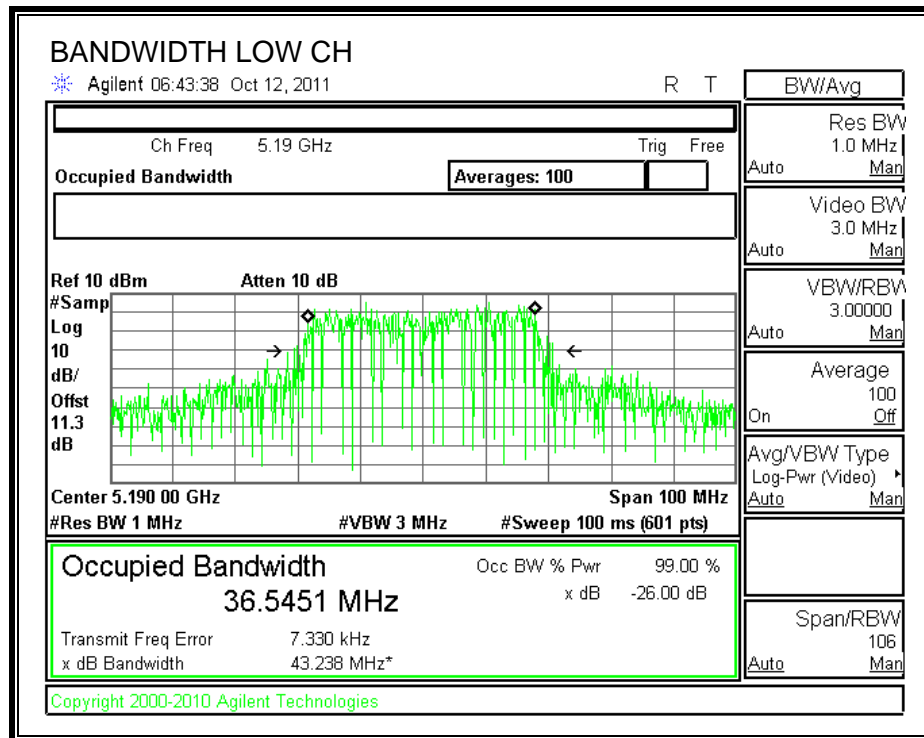
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	43.117	36.5671
High	5230	43.146	36.5562

CHAIN 3

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	43.203	36.5174
High	5230	42.719	36.5524

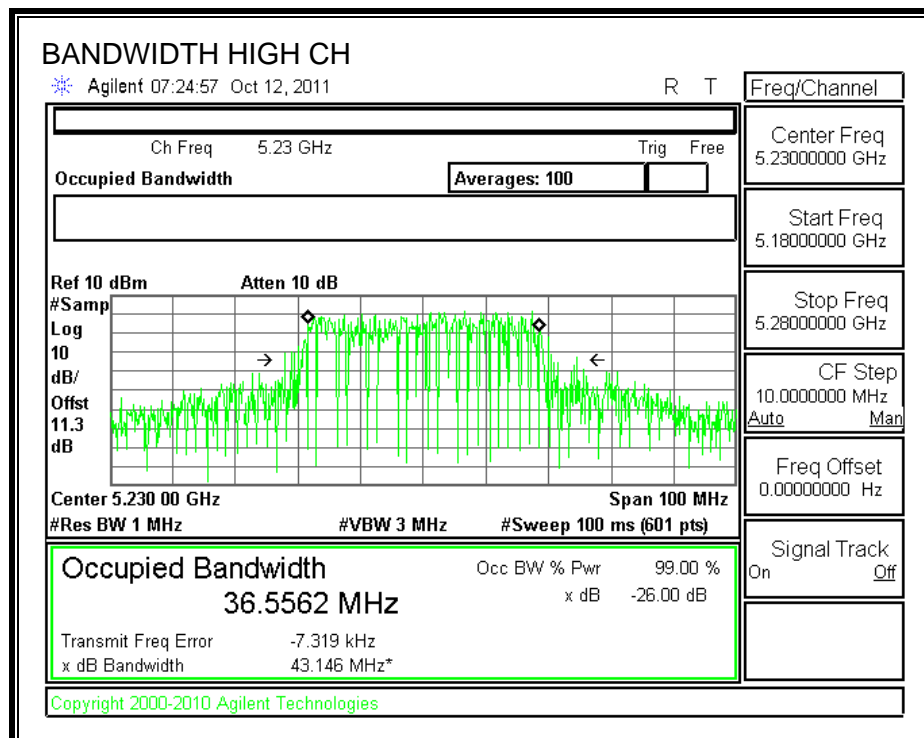
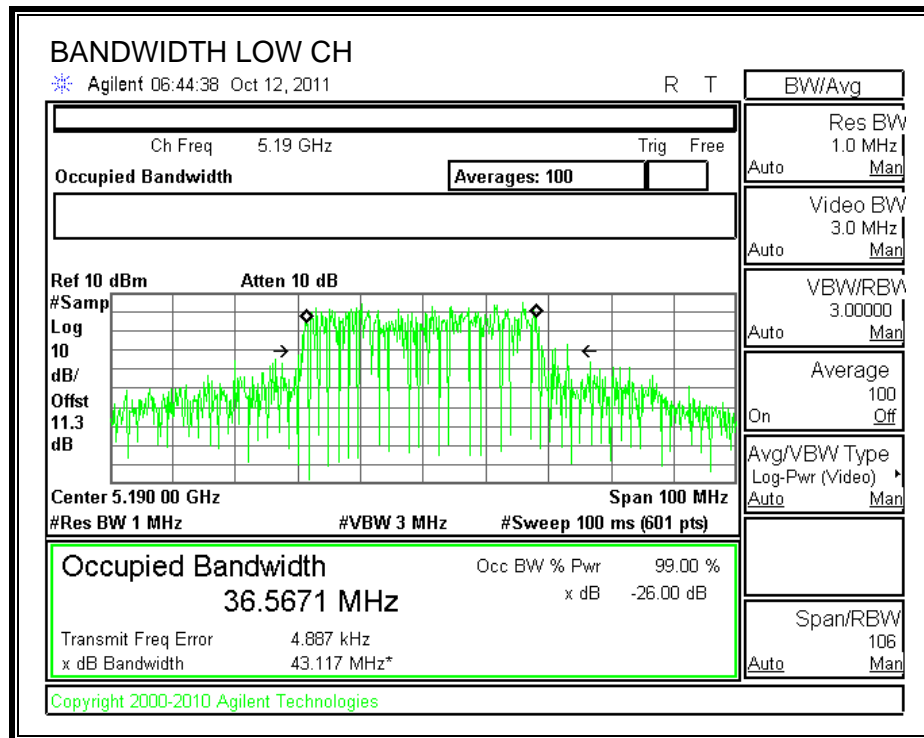
CHAIN 1

26 dB and 99% BANDWIDTH



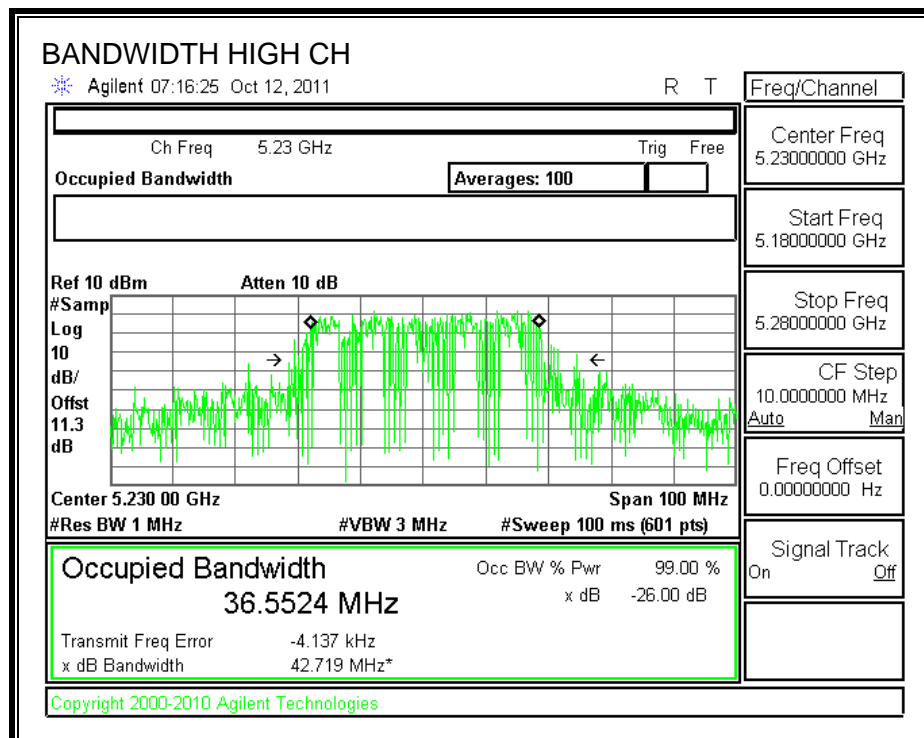
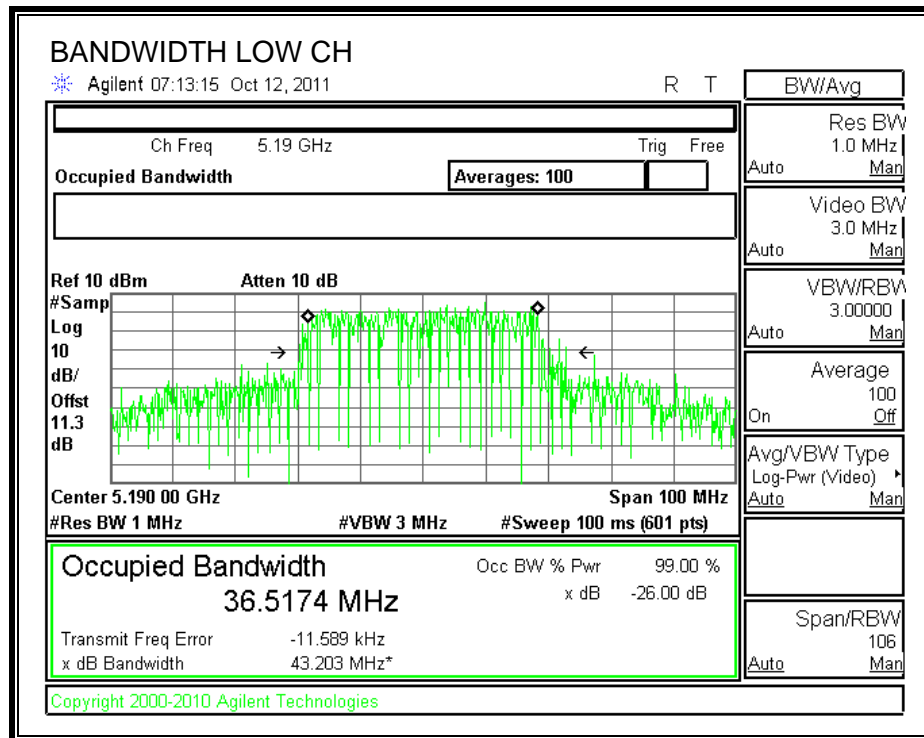
CHAIN 2

26 dB and 99% BANDWIDTH



CHAIN 3

26 dB and 99% BANDWIDTH



7.6.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

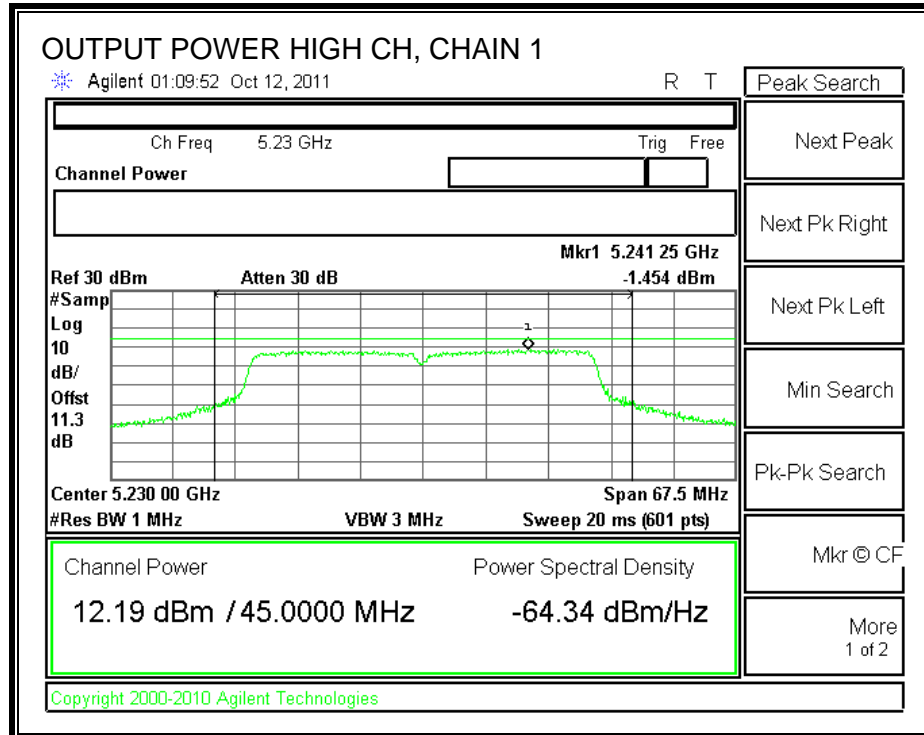
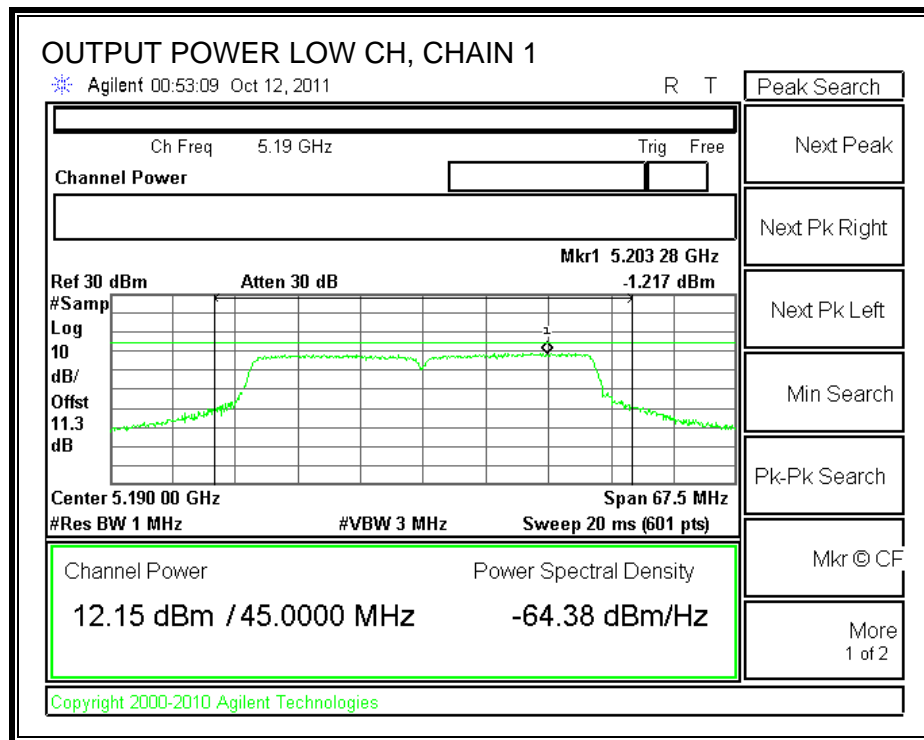
Limit

Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5190	16.99	43.117	20.35	5.00	16.99
High	5230	16.99	42.719	20.31	5.00	16.99

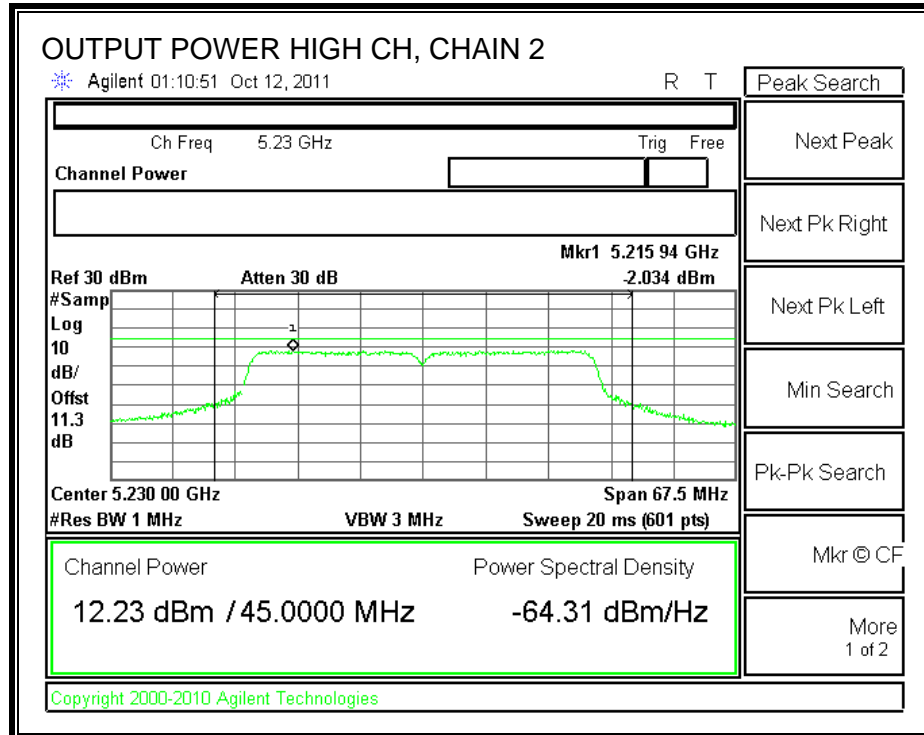
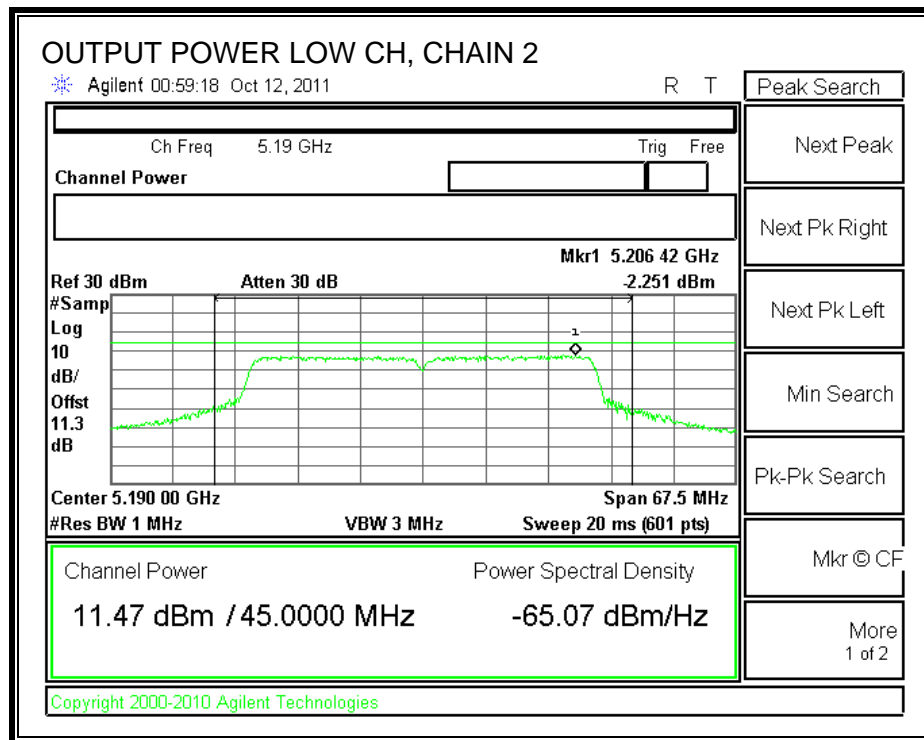
Individual Chain Results

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5190	12.15	11.47	12.69	16.90	16.99	-0.09
High	5230	12.19	12.23	12.24	16.99	16.99	0.00

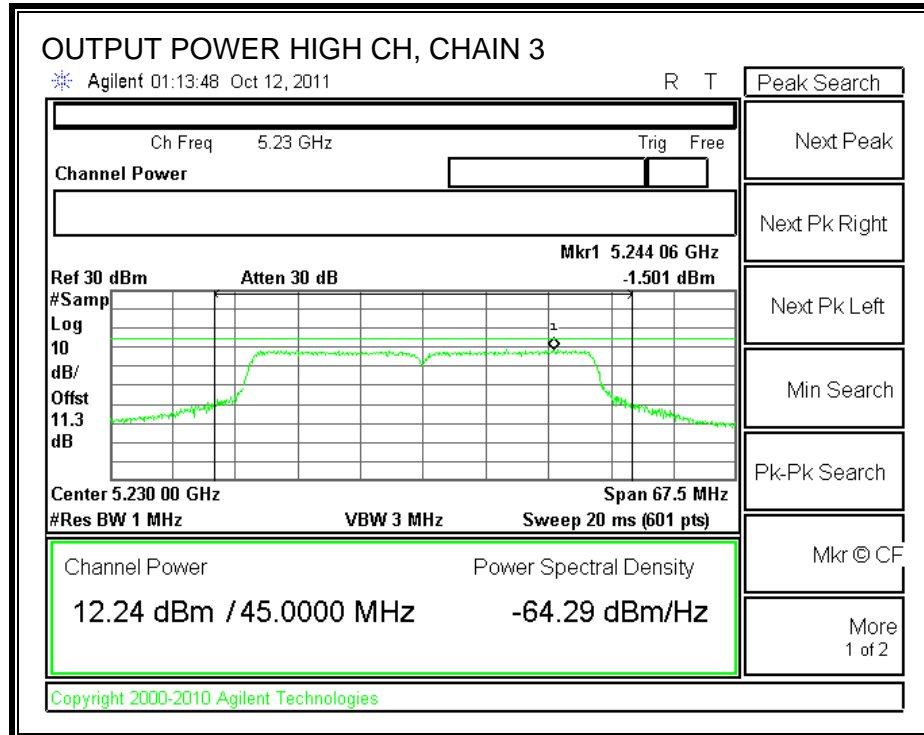
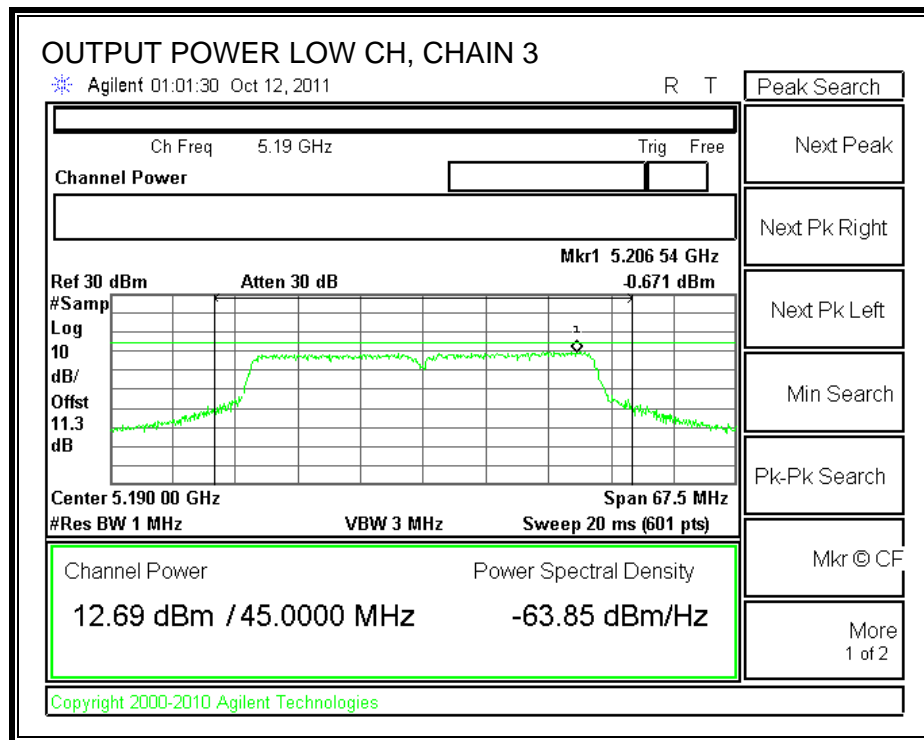
CHAIN 1 OUTPUT POWER



CHAIN 2 OUTPUT POWER



CHAIN 3 OUTPUT POWER



7.6.3. 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 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	5190	12.00	11.30	12.60	16.77
High	5230	12.00	12.00	11.90	16.74

7.6.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 4 dBm.

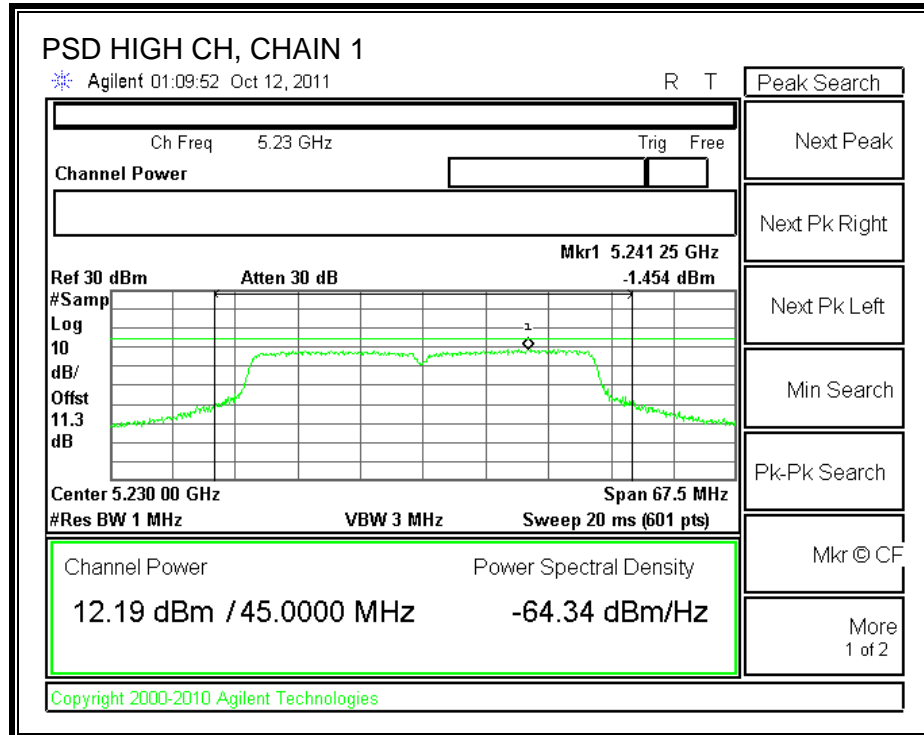
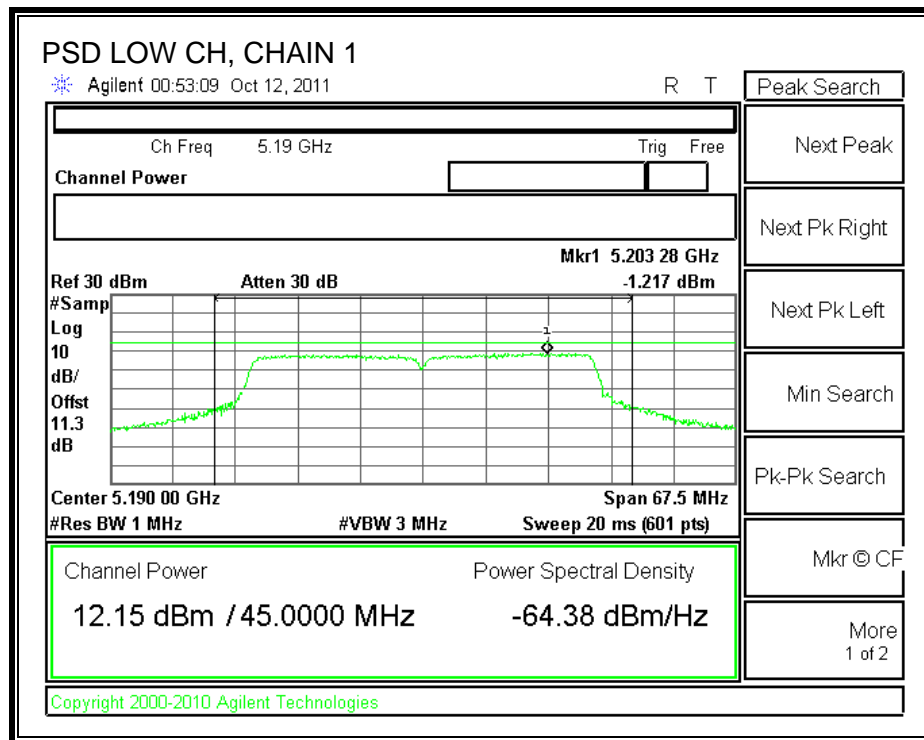
TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

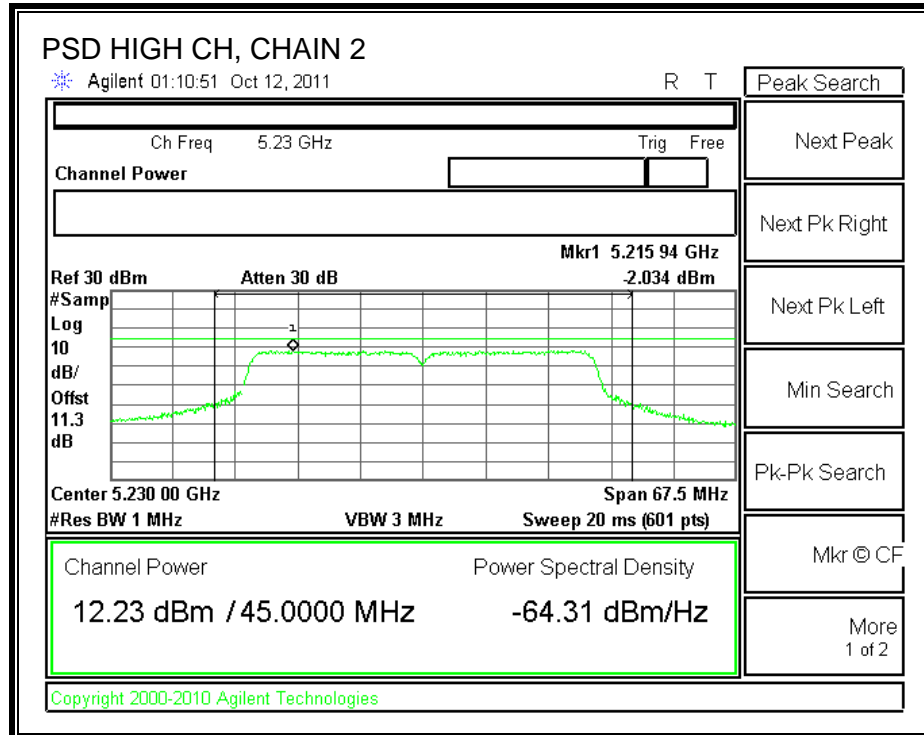
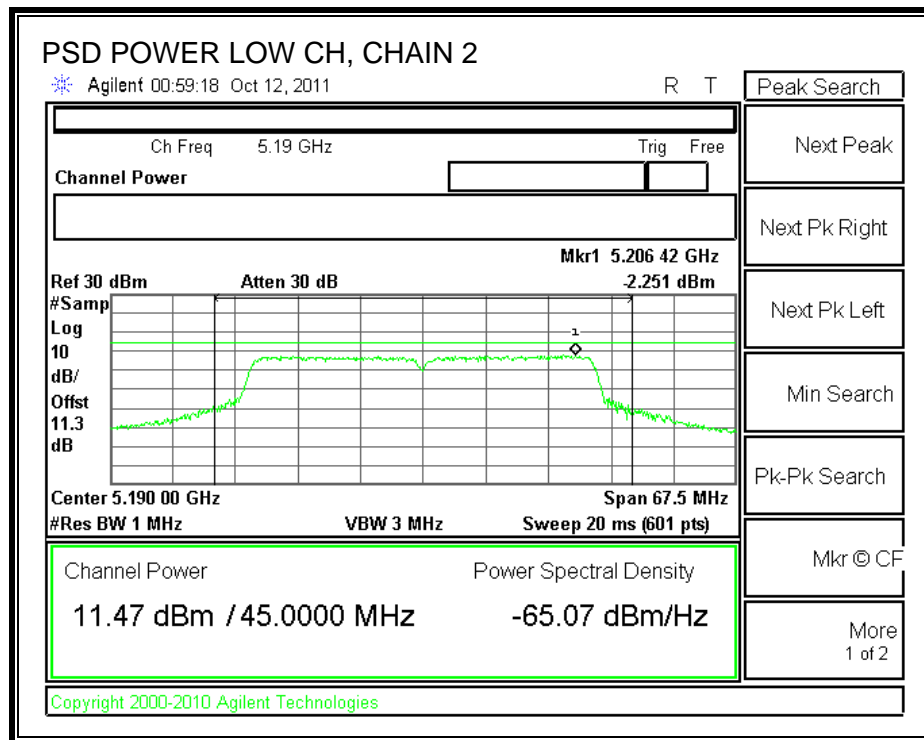
RESULTS

Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Chain 3 PPSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5190	-1.217	-2.251	-0.671	3.44	4	-0.56
High	5230	-1.454	-2.034	-1.501	3.12	4	-0.88

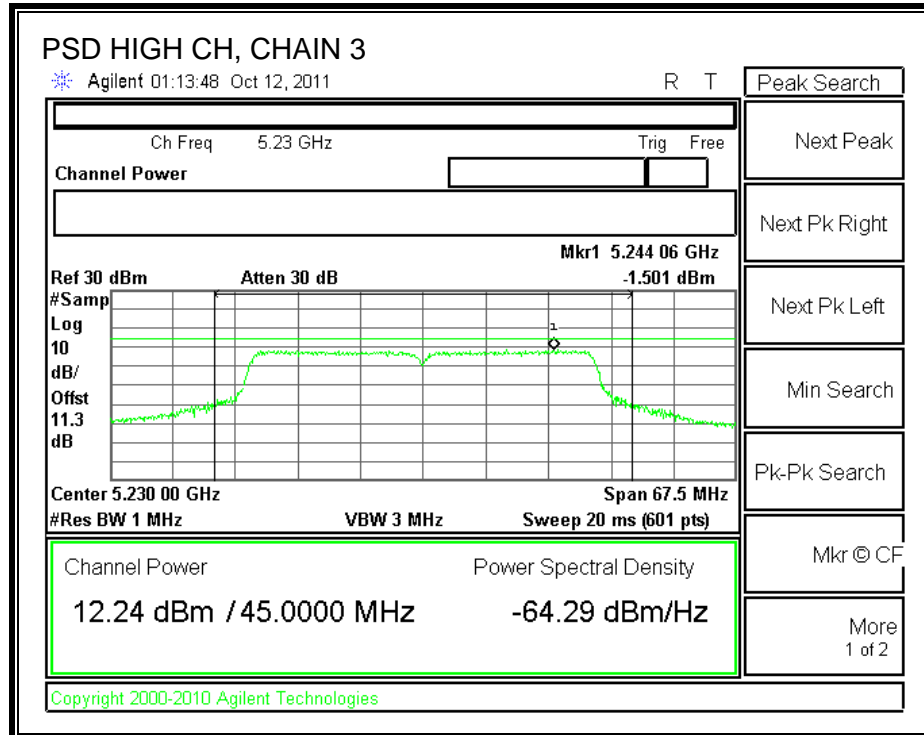
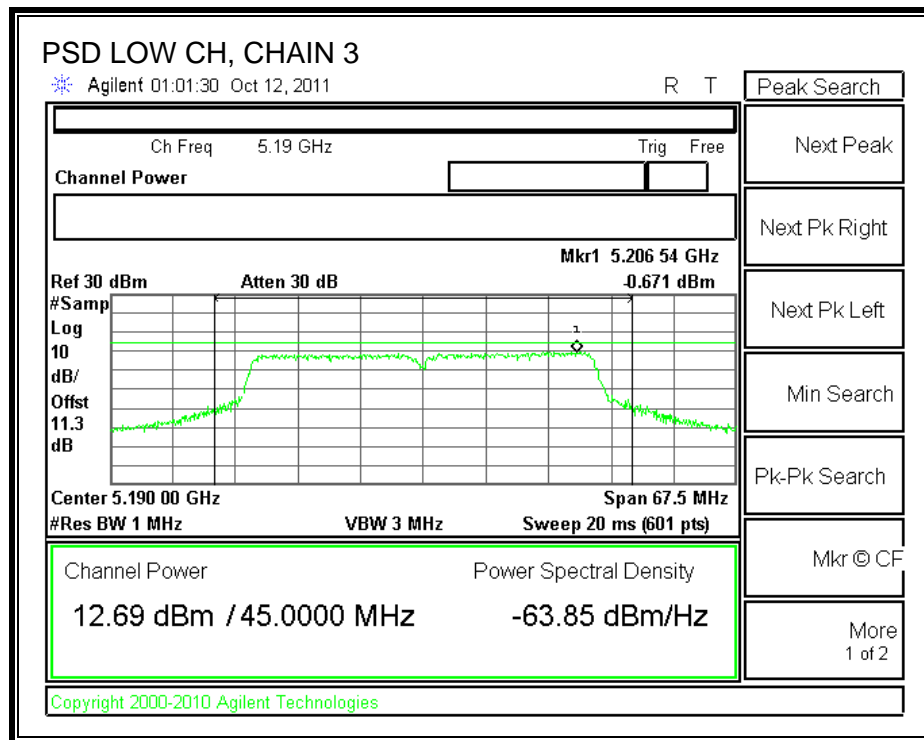
CHAIN 1 POWER SPECTRAL DENSITY



CHAIN 2 POWER SPECTRAL DENSITY



CHAIN 3 POWER SPECTRAL DENSITY



7.6.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	10.60	13	-2.40
High	5230	10.97	13	-2.03

CHAIN 2

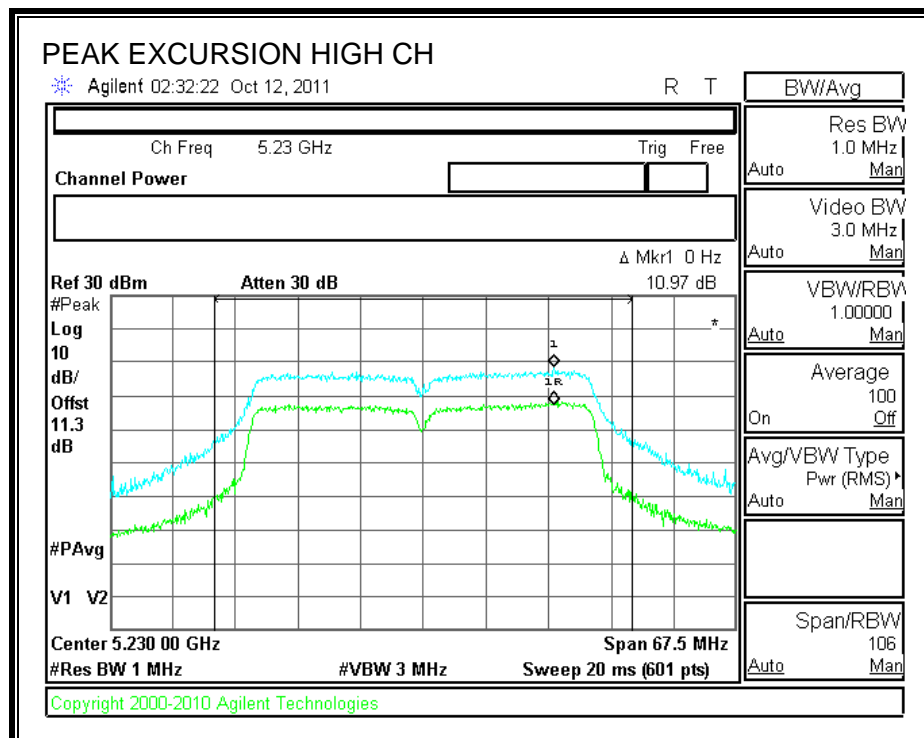
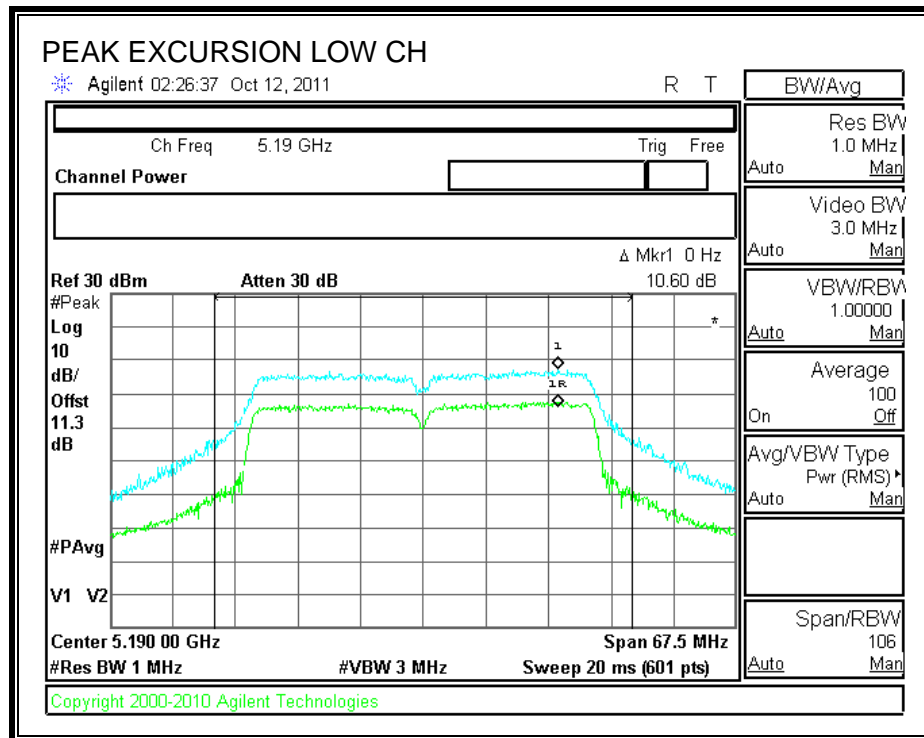
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	10.21	13	-2.79
High	5230	10.20	13	-2.80

CHAIN 3

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	10.54	13	-2.46
High	5230	10.98	13	-2.02

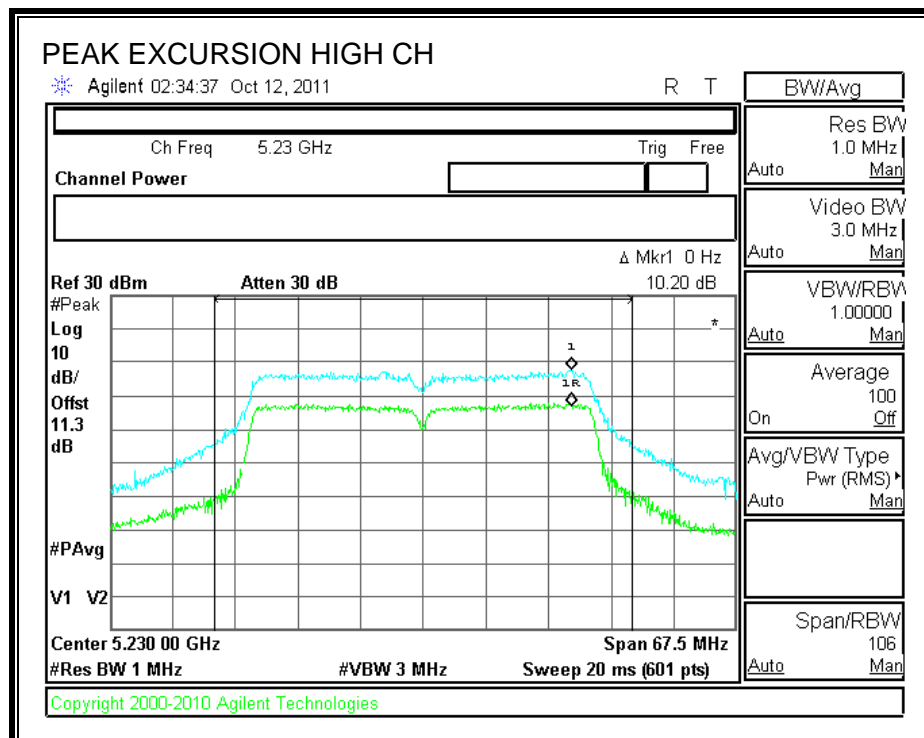
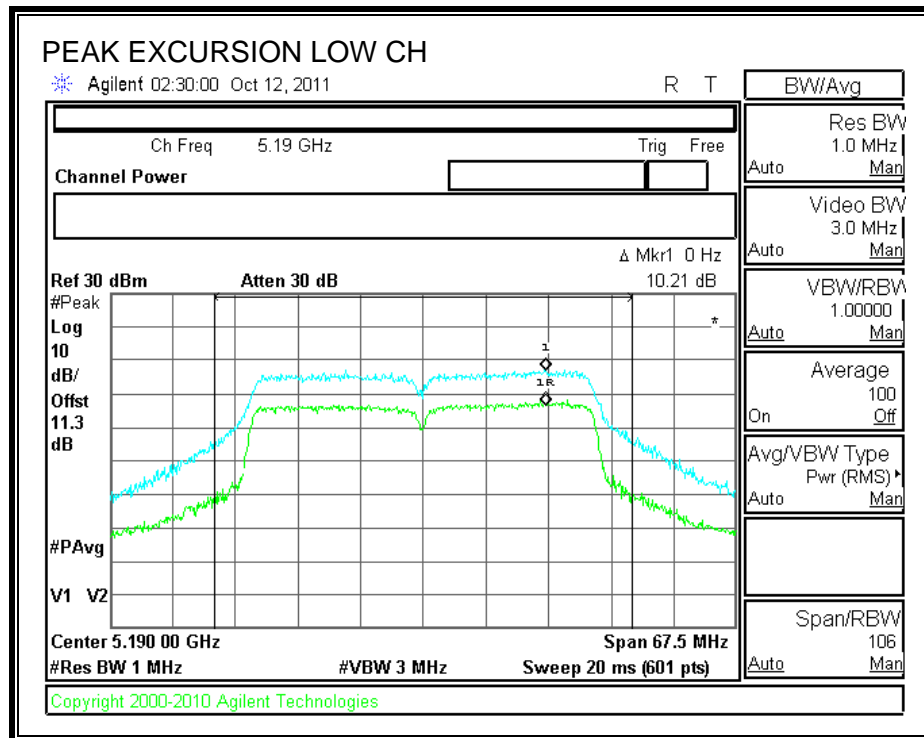
CHAIN 1

PEAK EXCURSION



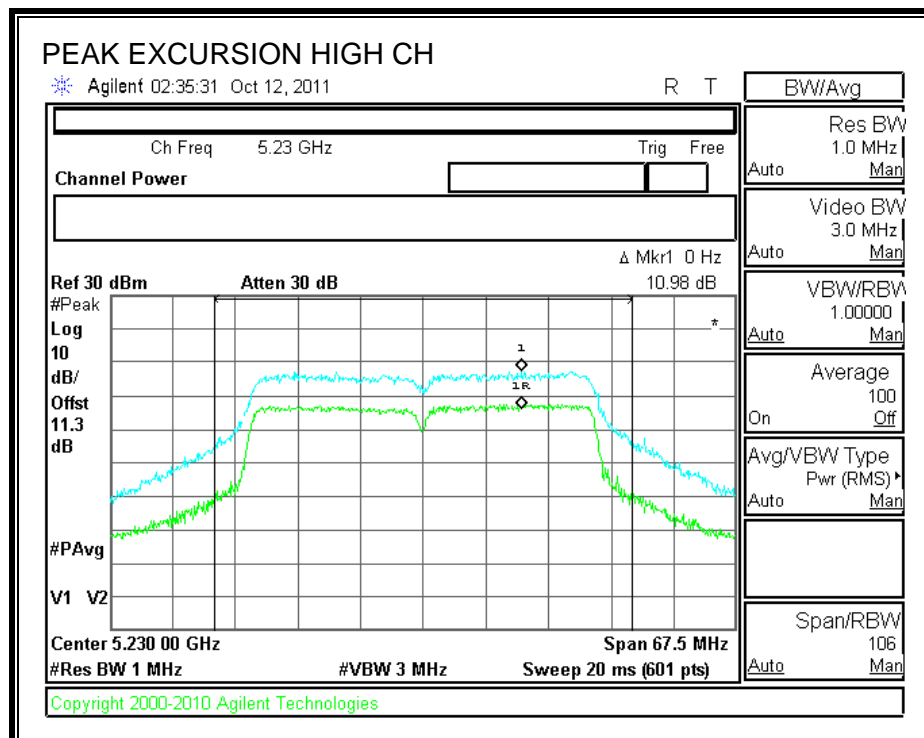
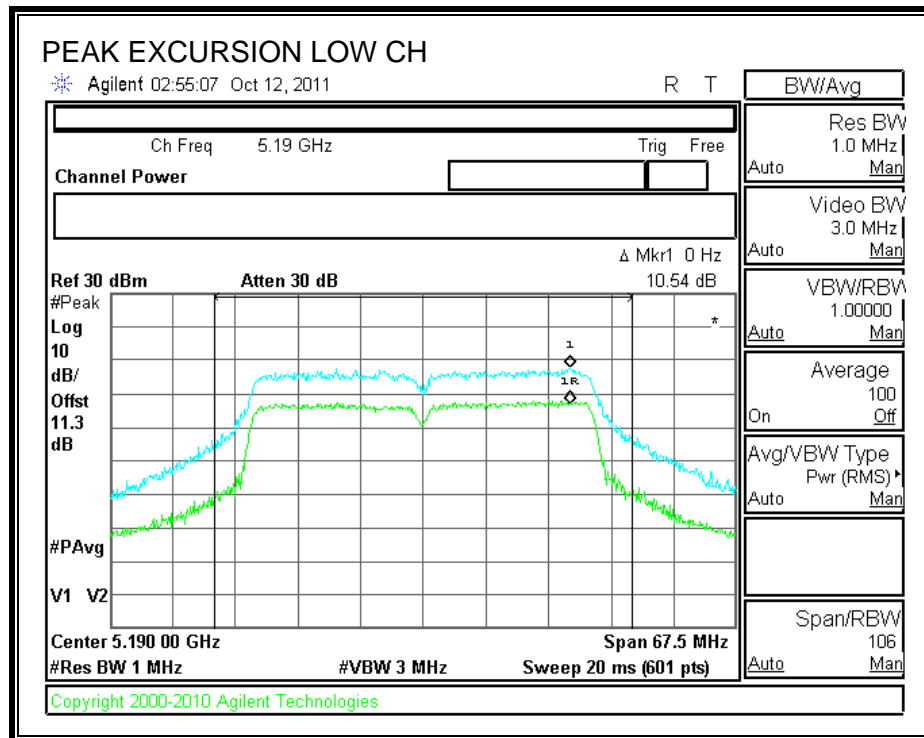
CHAIN 2

PEAK EXCURSION



CHAIN 3

PEAK EXCURSION



7.6.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 3 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

Chain 1

Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	10Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	37330	-48.00	5.00	4.77	-38.23	-27.00
High	36810	-47.71	5.00	4.77	-37.94	-27.00

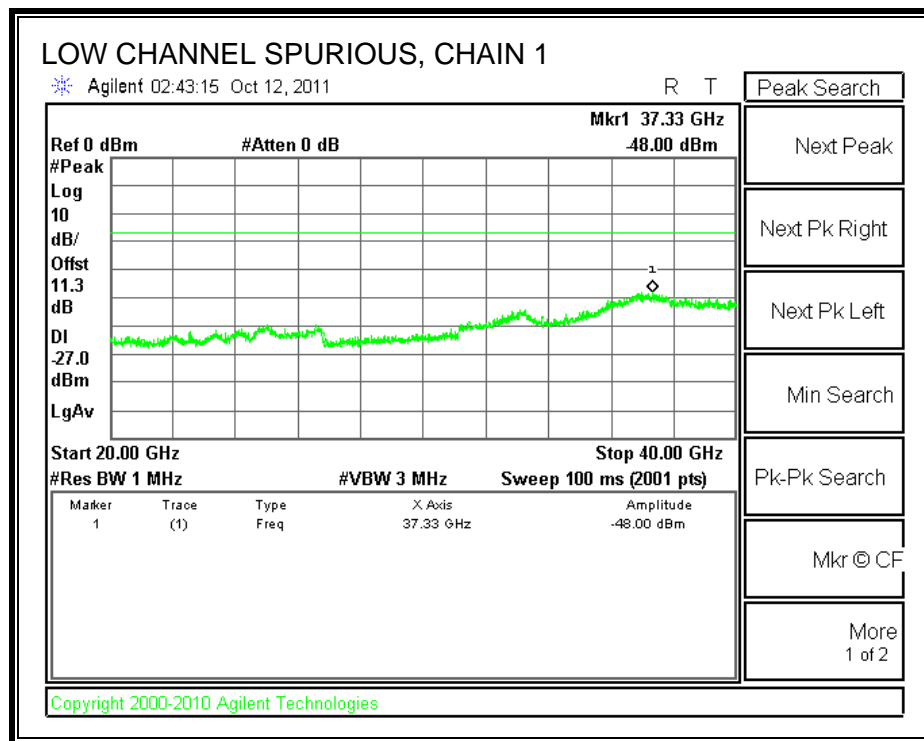
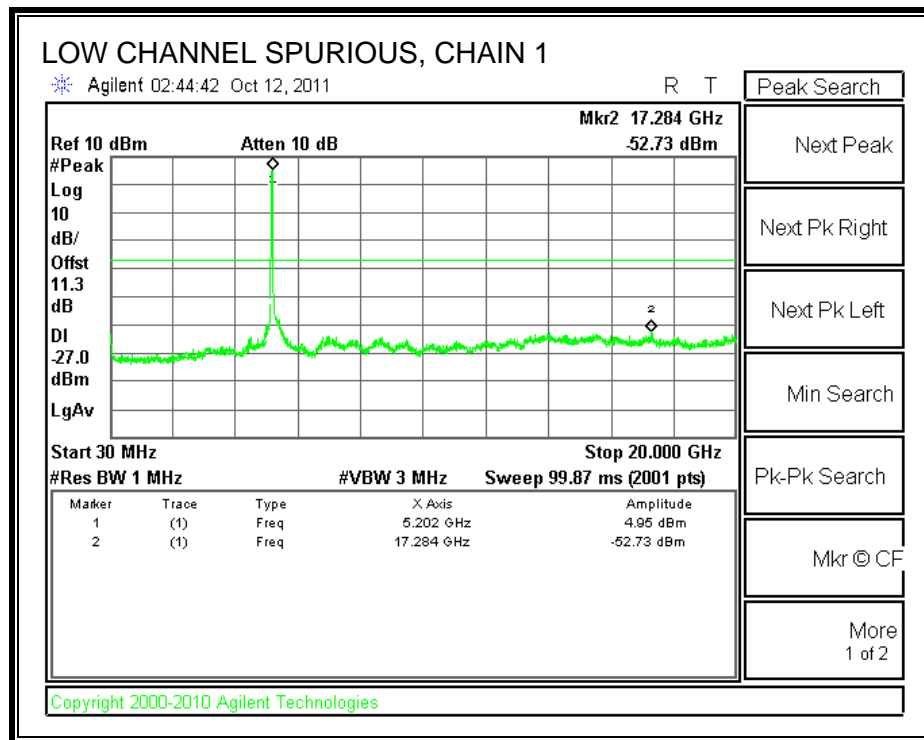
Chain 2

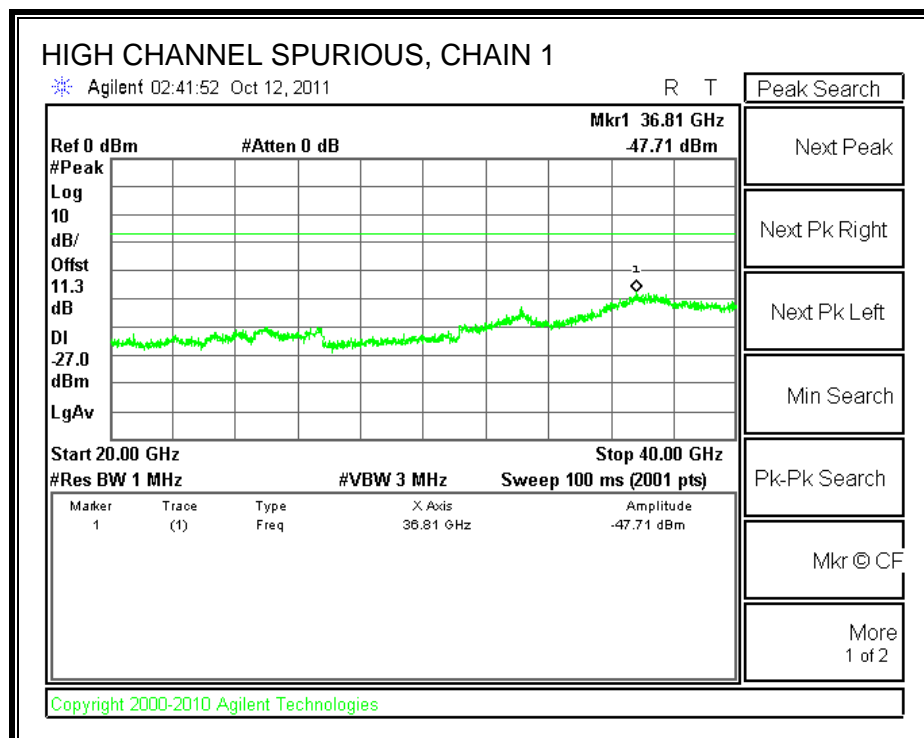
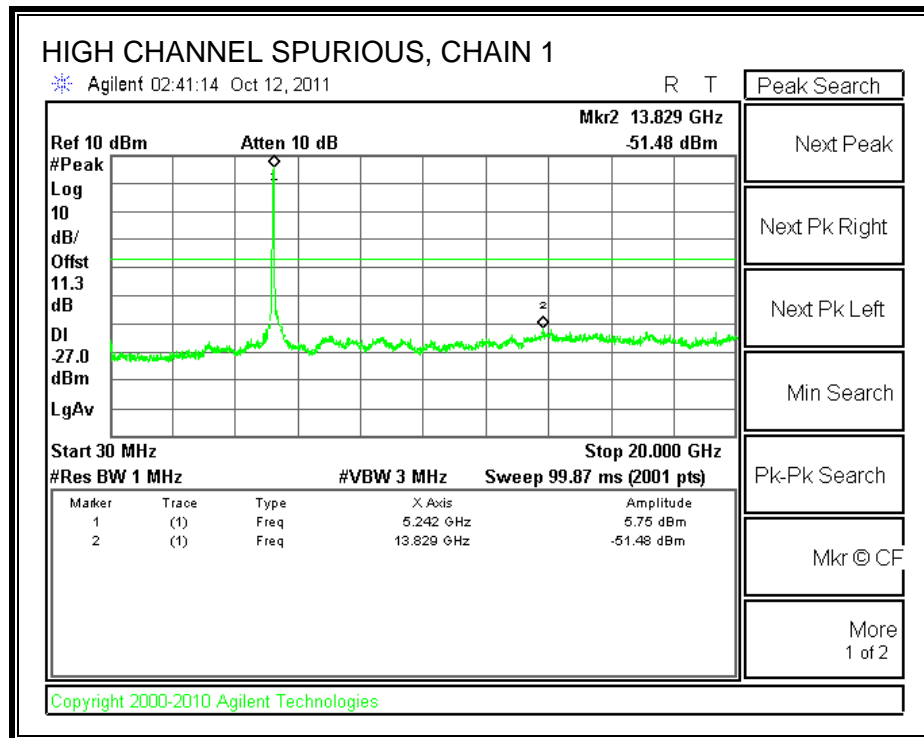
Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	36800	-47.93	5.00	4.77	-38.16	-27.00
High	37220	-47.93	5.00	4.77	-38.16	-27.00

Chain 3

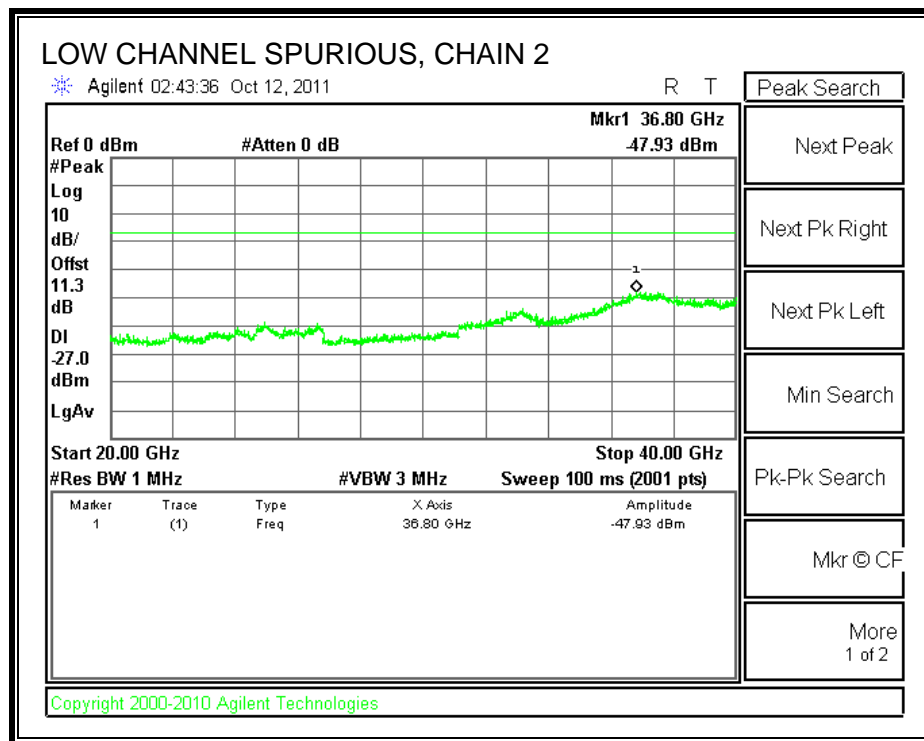
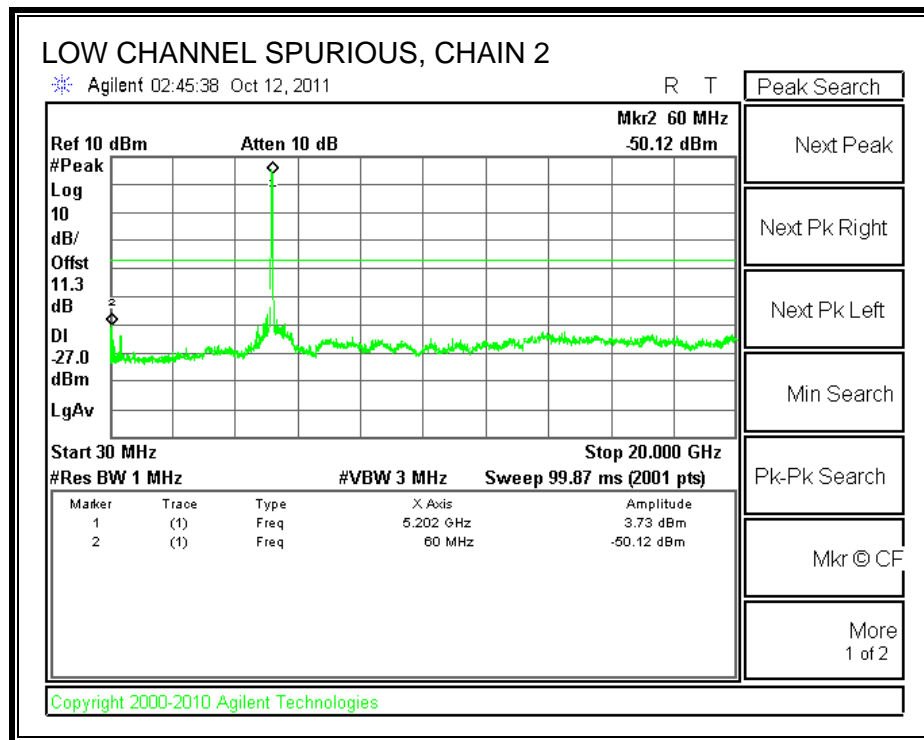
Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	37000	-47.05	5.00	4.77	-37.28	-27.00
High	36800	-47.61	5.00	4.77	-37.84	-27.00

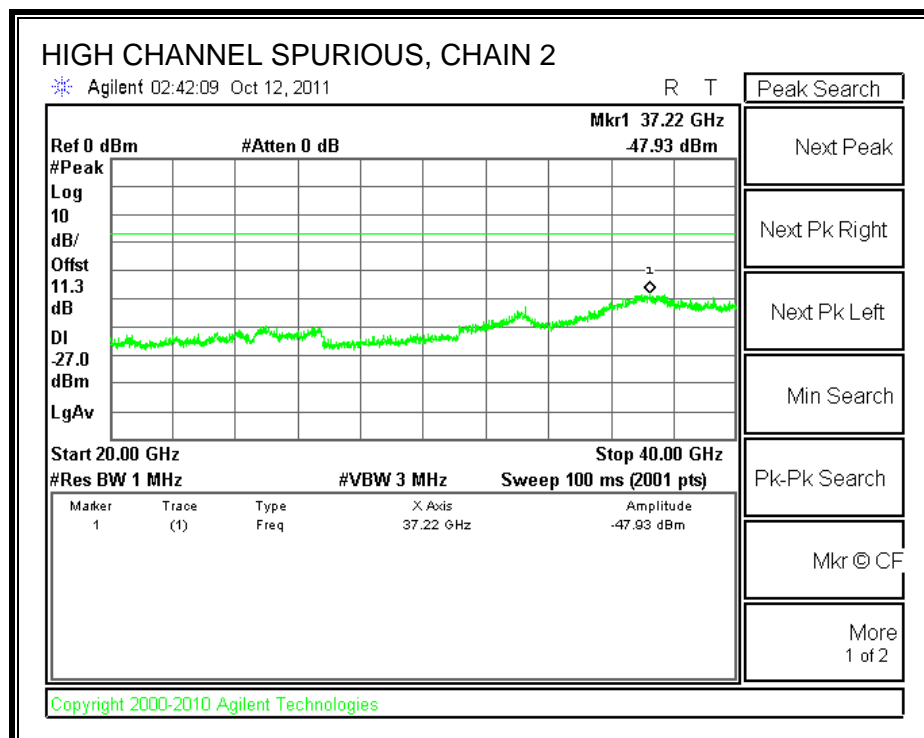
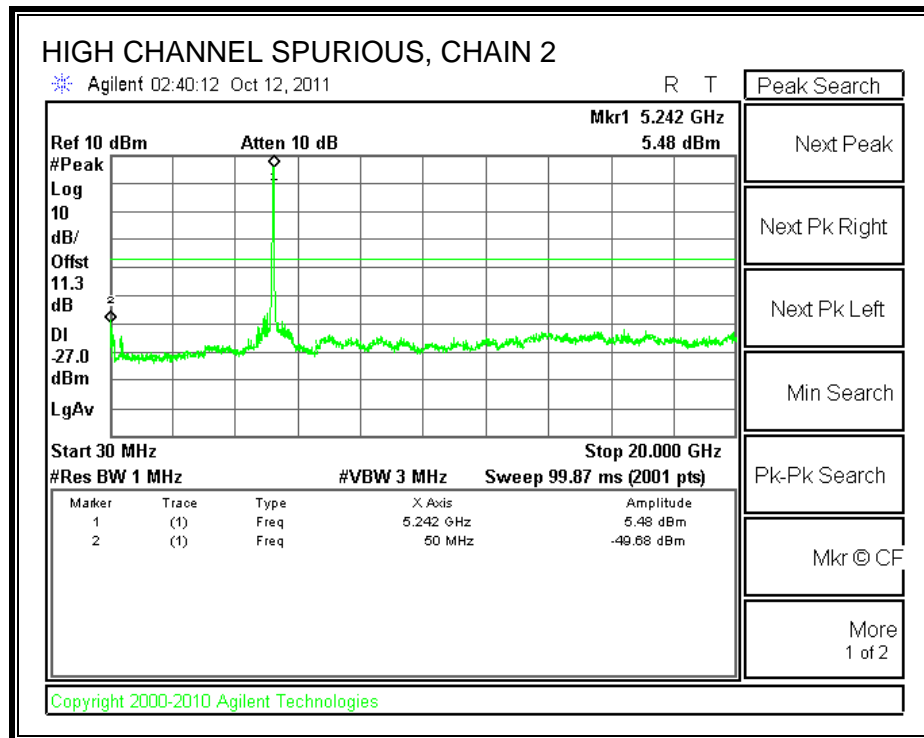
CHAIN 1 SPURIOUS EMISSIONS



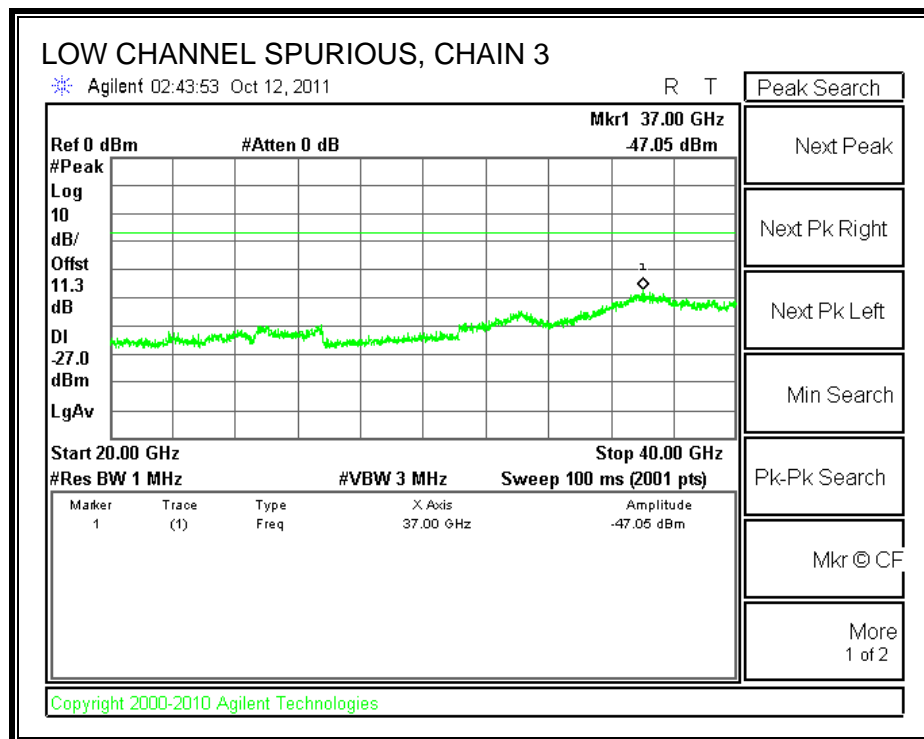
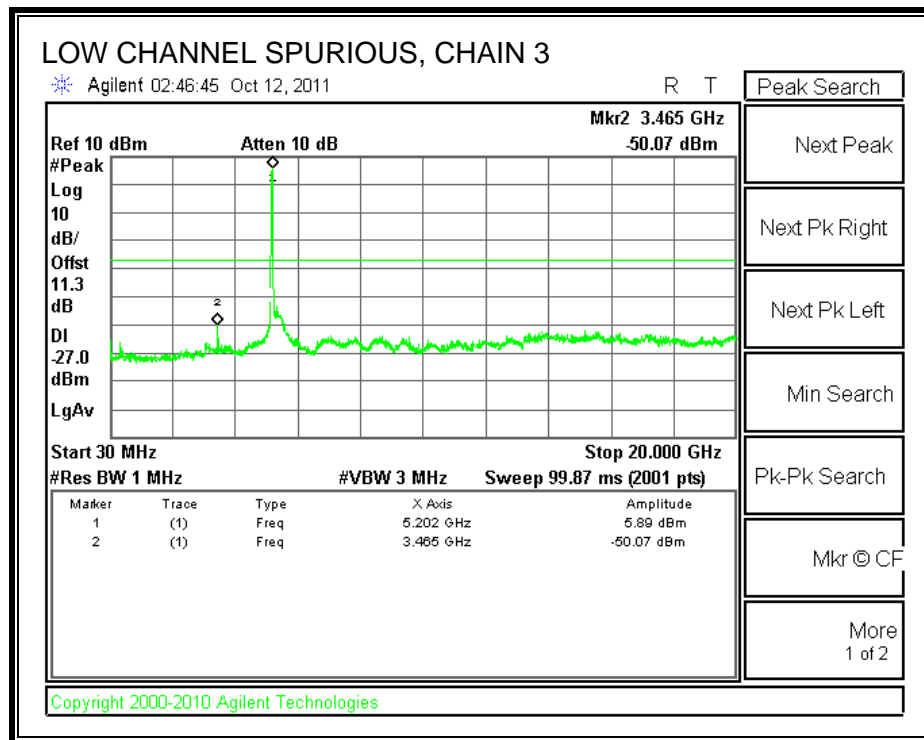


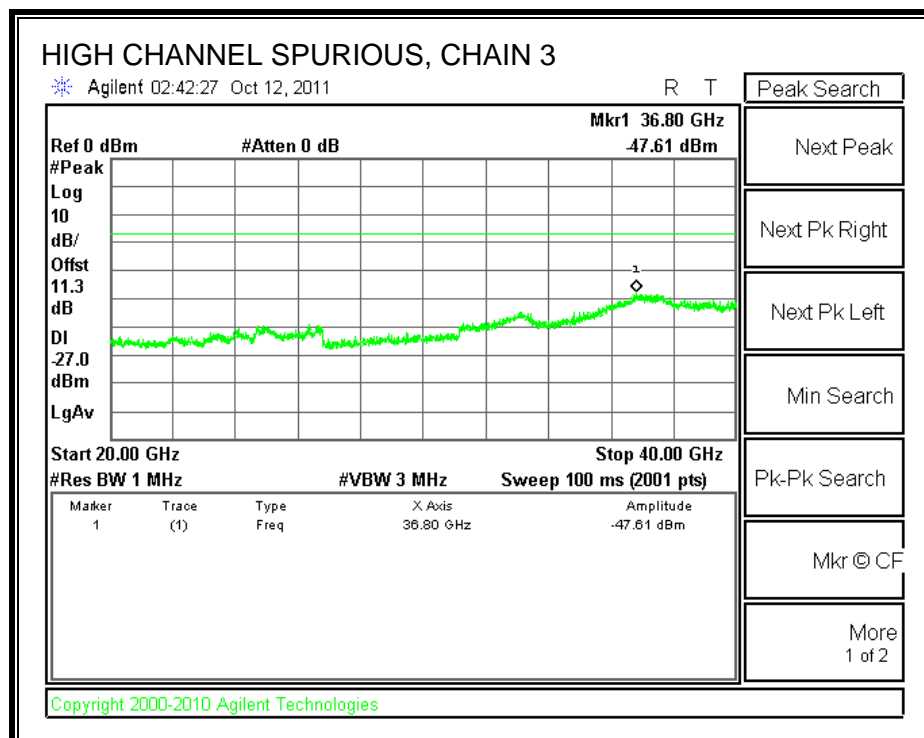
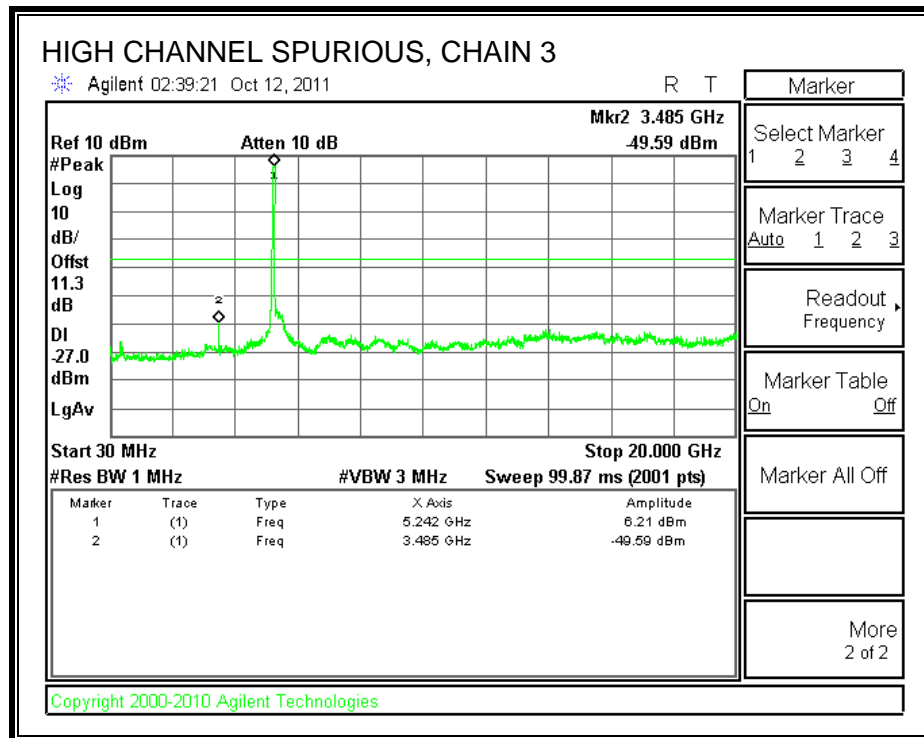
CHAIN 2 SPURIOUS EMISSIONS





CHAIN 3 SPURIOUS EMISSIONS





7.7. 802.11n HT40 MCS16 3TX MODE

7.7.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	44.353	36.5816
High	5230	44.010	36.5907

CHAIN 2

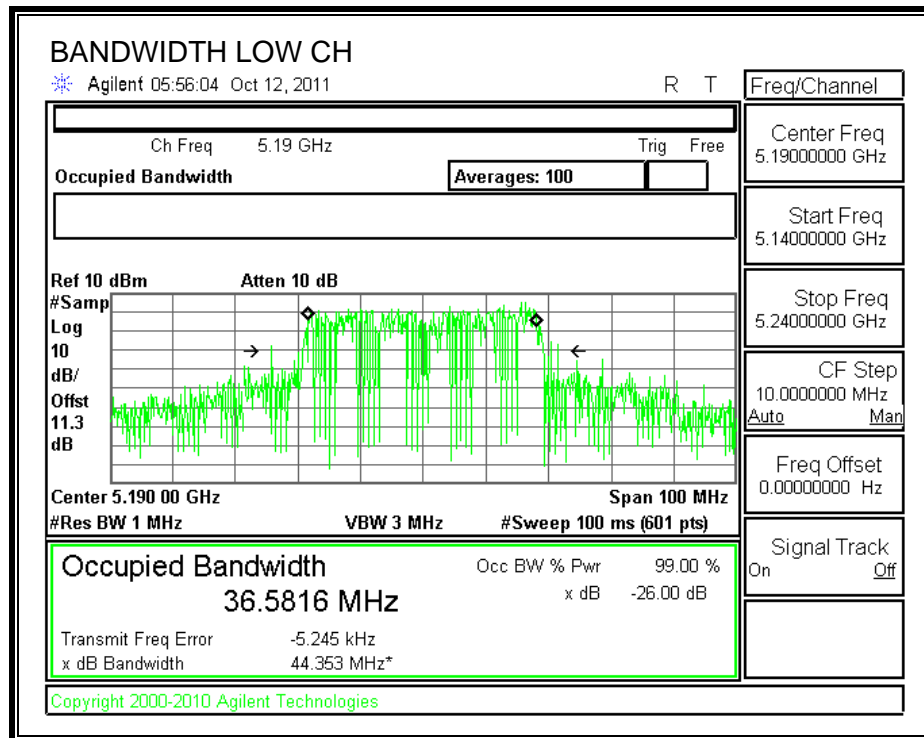
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	44.558	36.5355
High	5230	43.620	36.5755

CHAIN 3

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	44.030	36.528
High	5230	43.885	36.575

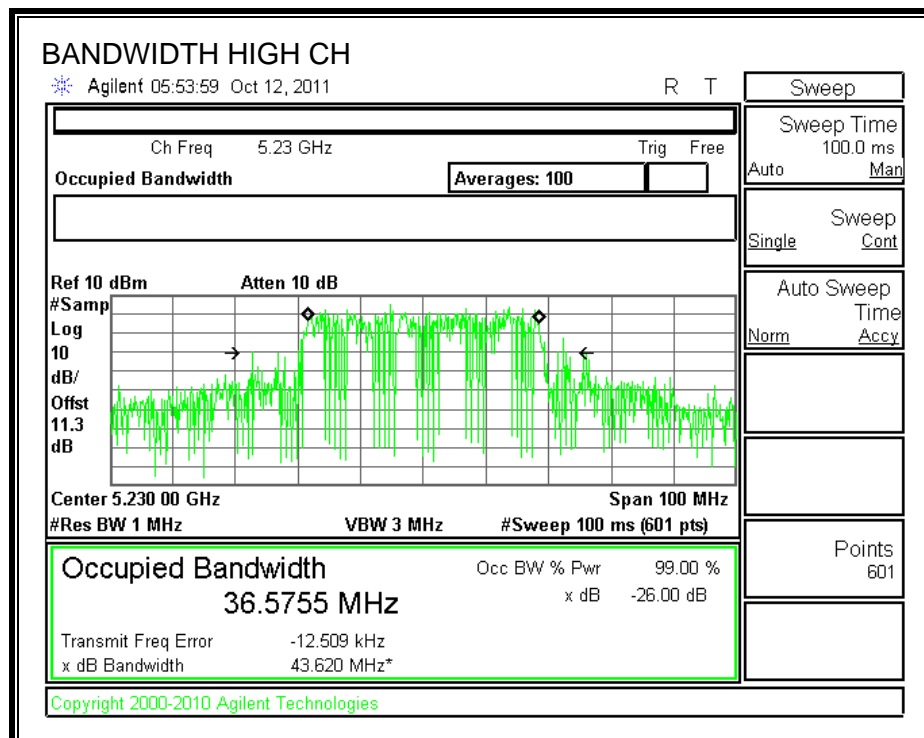
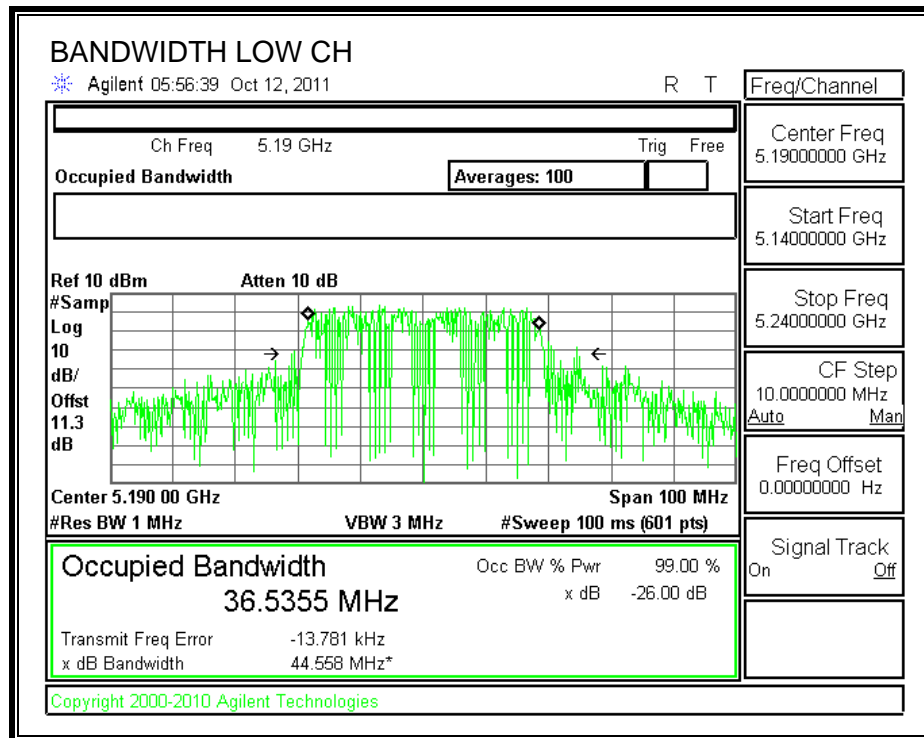
CHAIN 1

26 dB and 99% BANDWIDTH



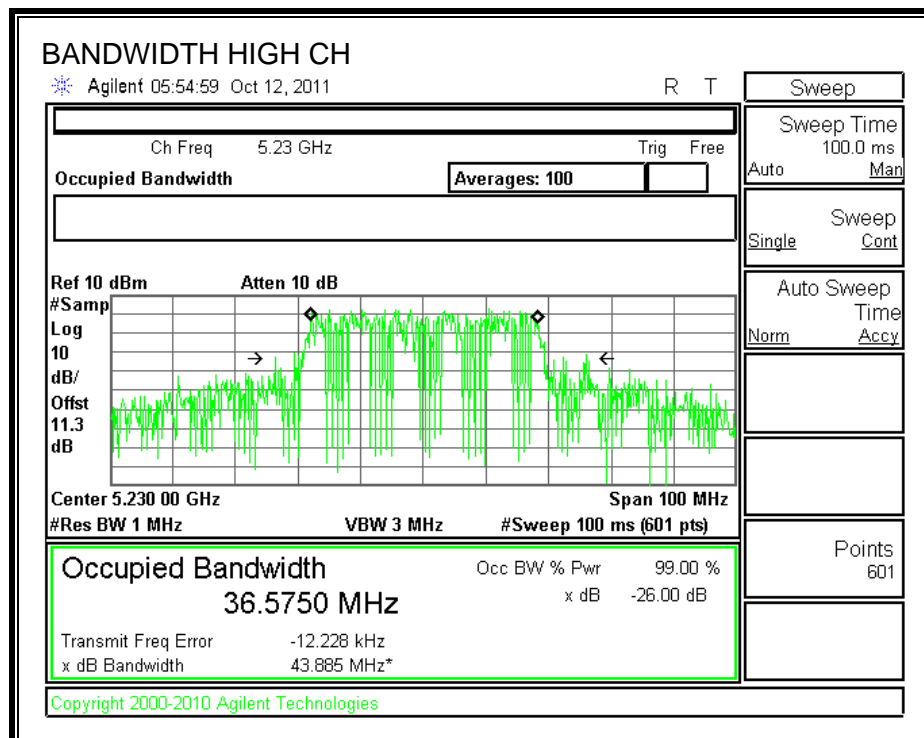
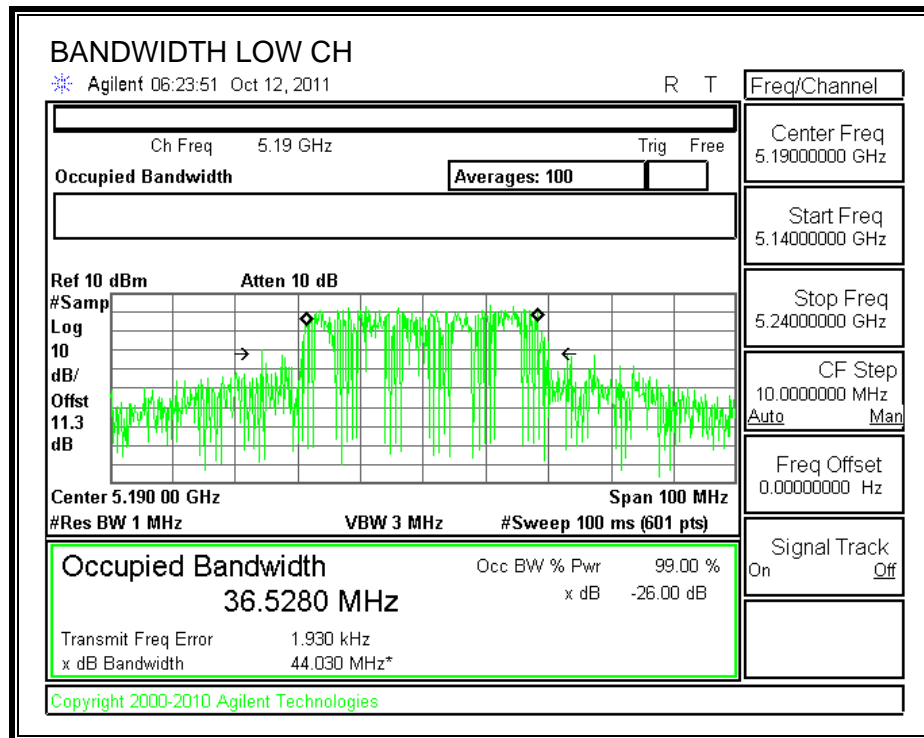
CHAIN 2

26 dB and 99% BANDWIDTH



CHAIN 3

26 dB and 99% BANDWIDTH



7.7.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

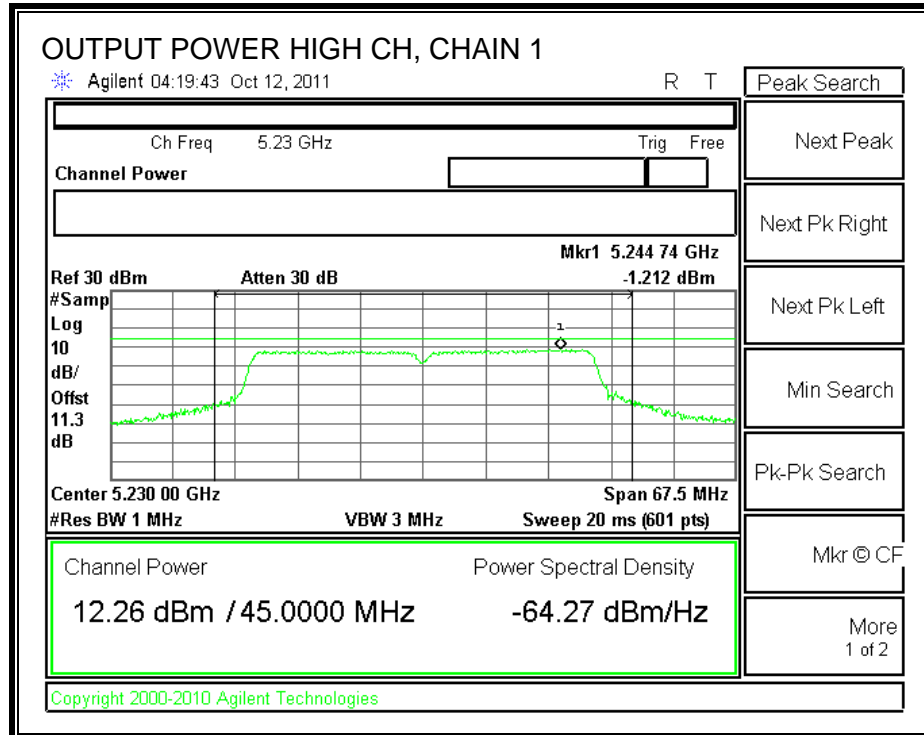
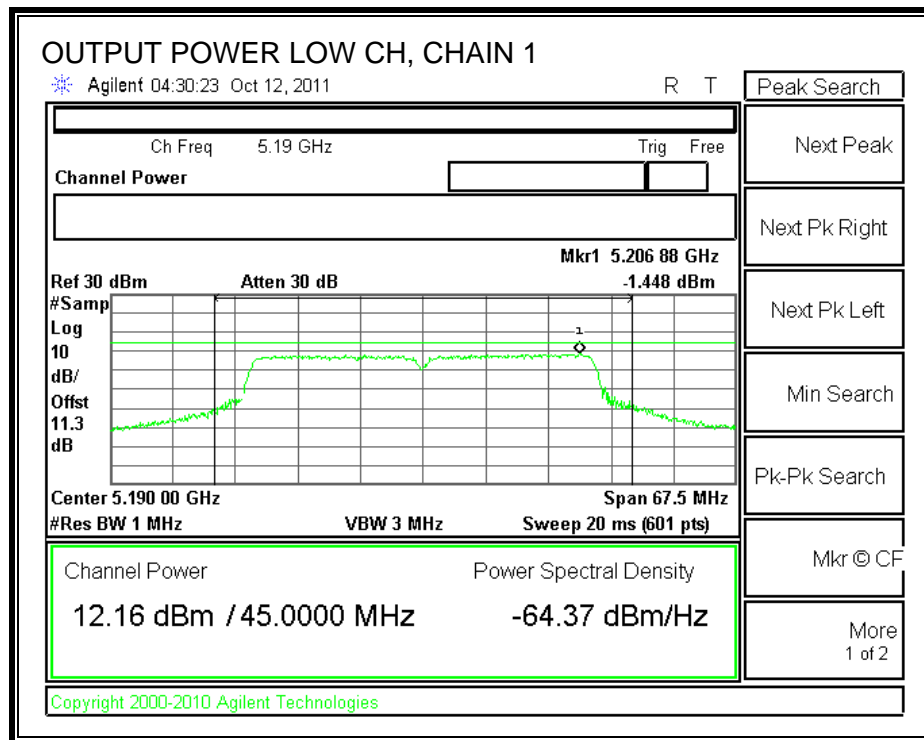
Limit

Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5190	16.99	44.03	20.44	5.00	16.99
High	5230	16.99	43.620	20.40	5.00	16.99

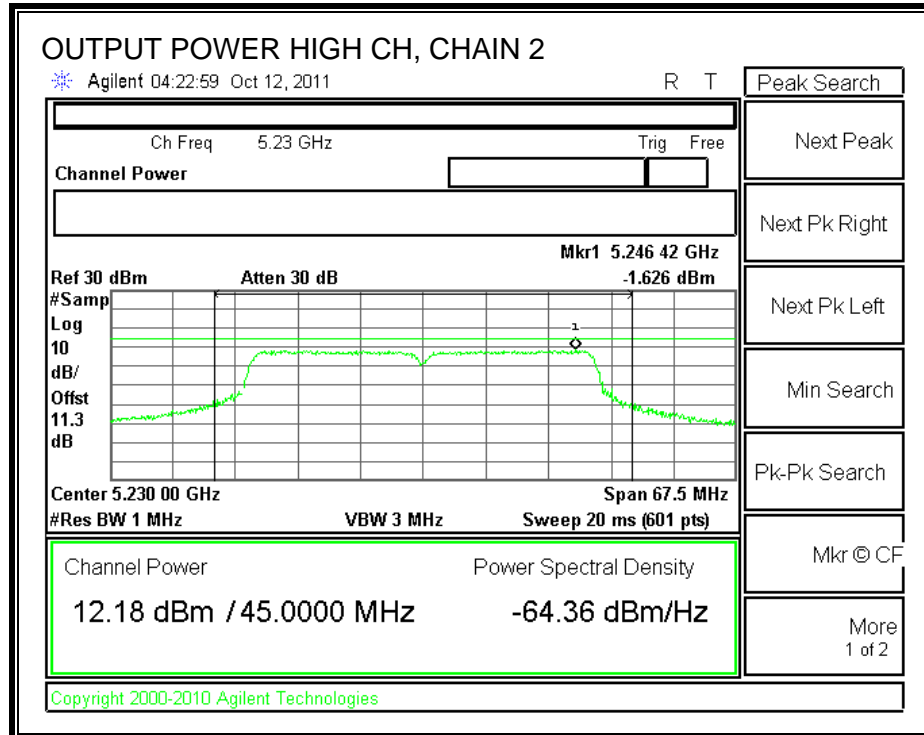
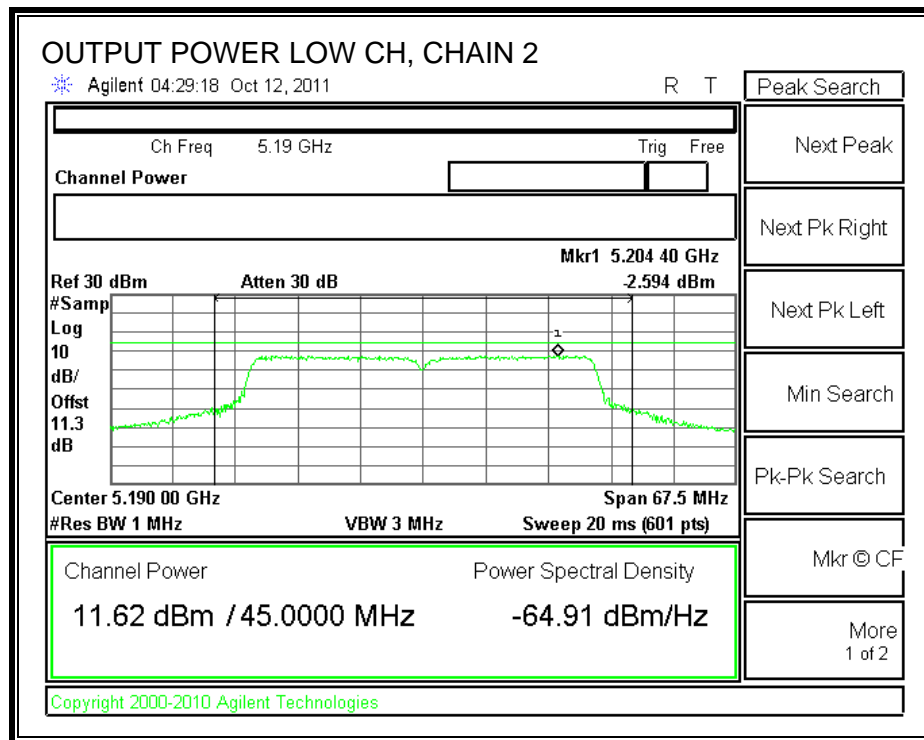
Individual Chain Results

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5190	12.16	11.62	12.75	16.97	16.99	-0.02
High	5230	12.26	12.18	12.16	16.97	16.99	-0.02

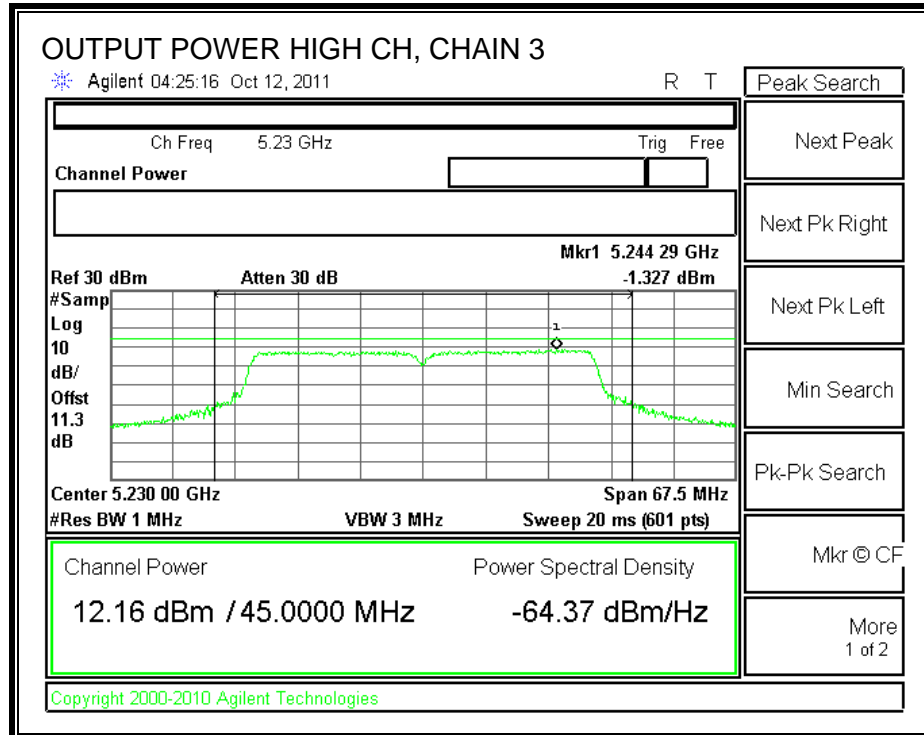
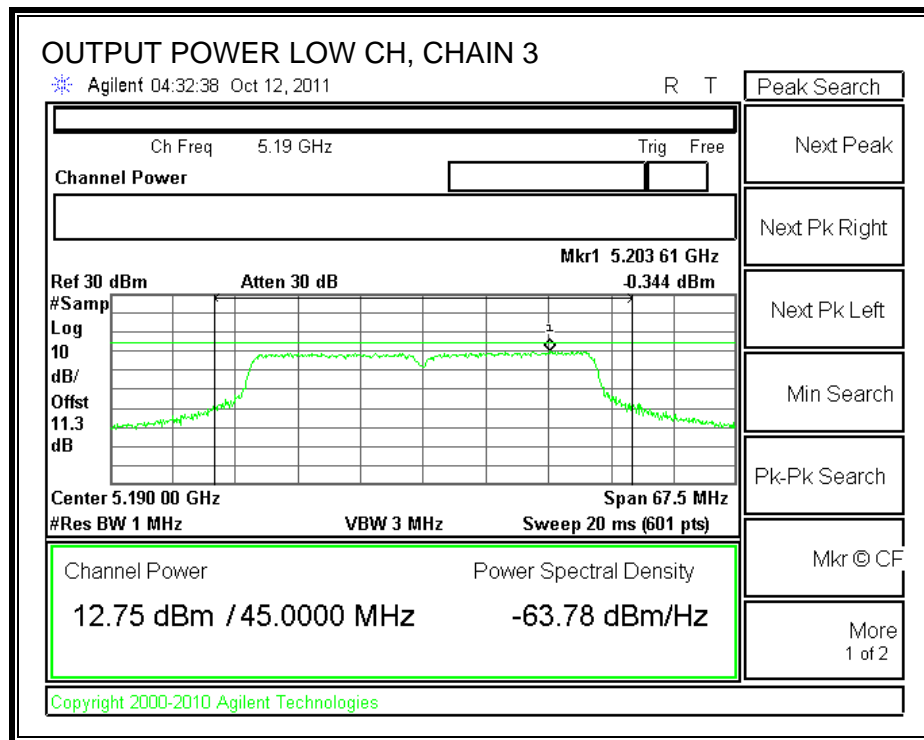
CHAIN 1 OUTPUT POWER



CHAIN 2 OUTPUT POWER



CHAIN 3 OUTPUT POWER



7.7.3. 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 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	5190	12.00	11.35	12.50	16.75
High	5230	12.10	12.00	12.00	16.80

7.7.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 4 dBm.

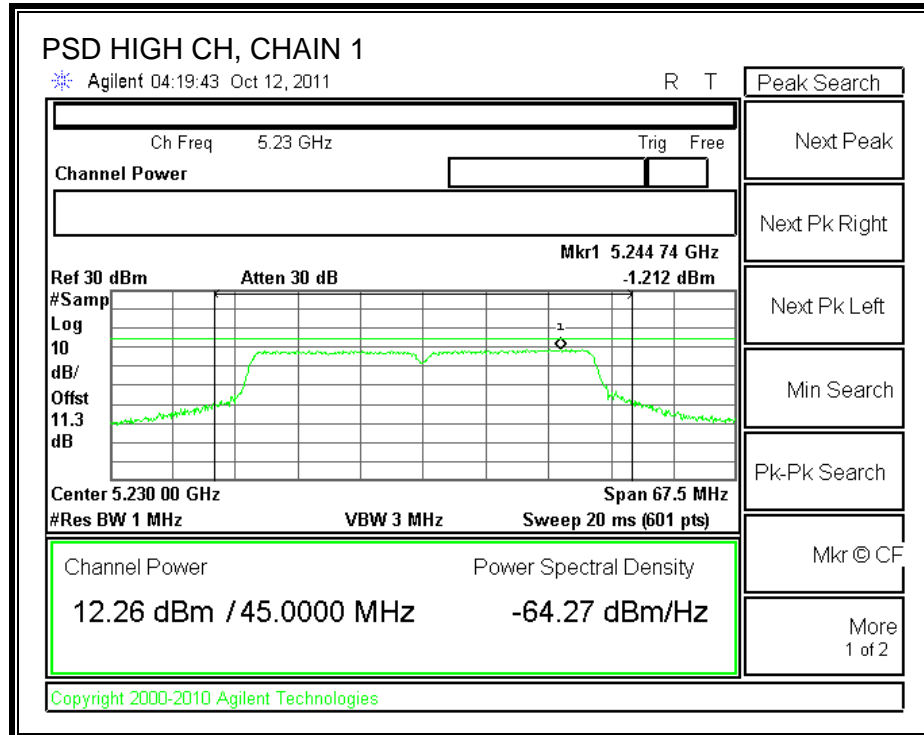
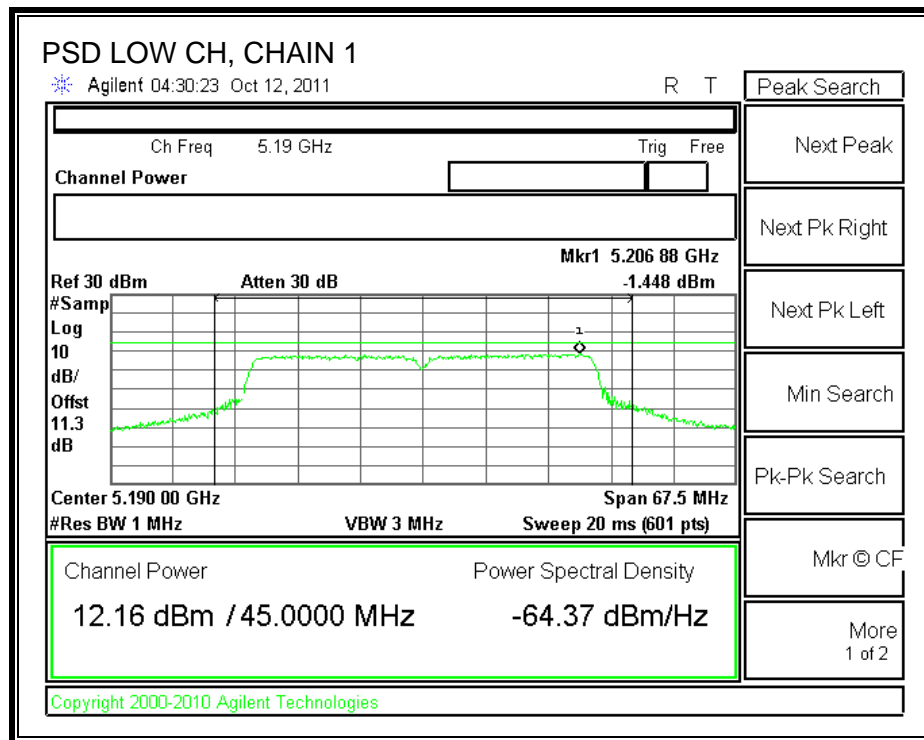
TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

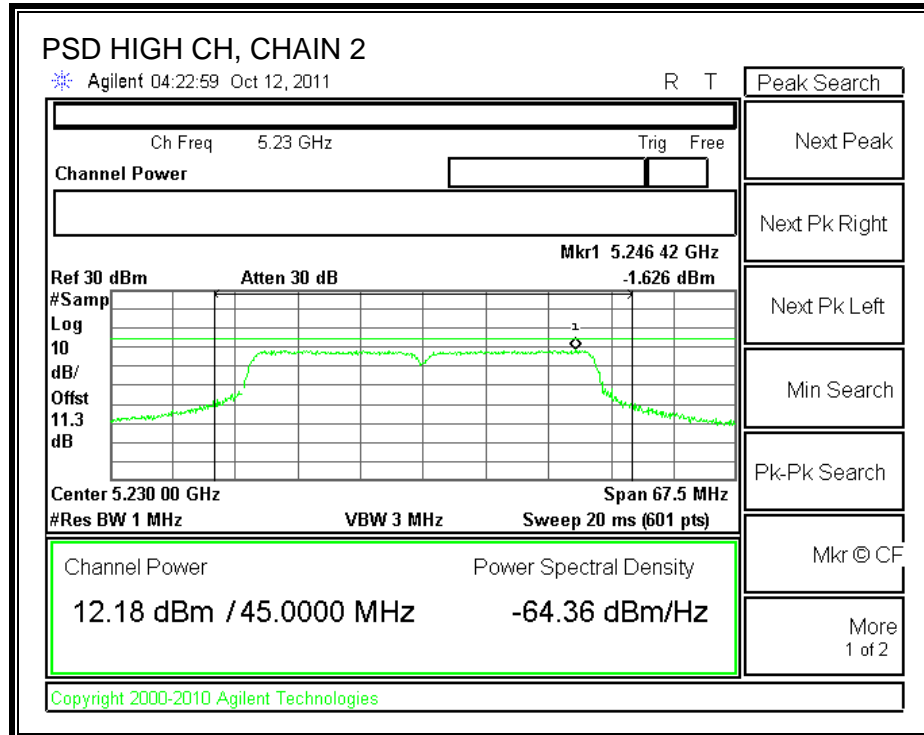
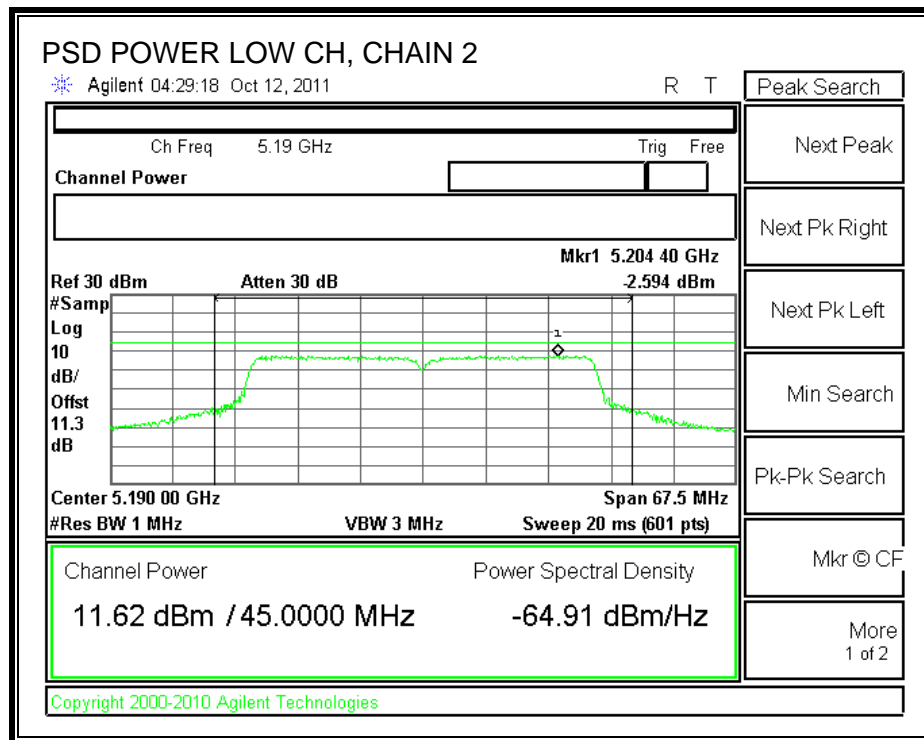
RESULTS

Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Chain 3 PPSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5190	-1.448	-2.594	-0.344	3.41	4	-0.59
High	5230	-1.212	-1.626	-1.327	3.39	4	-0.61

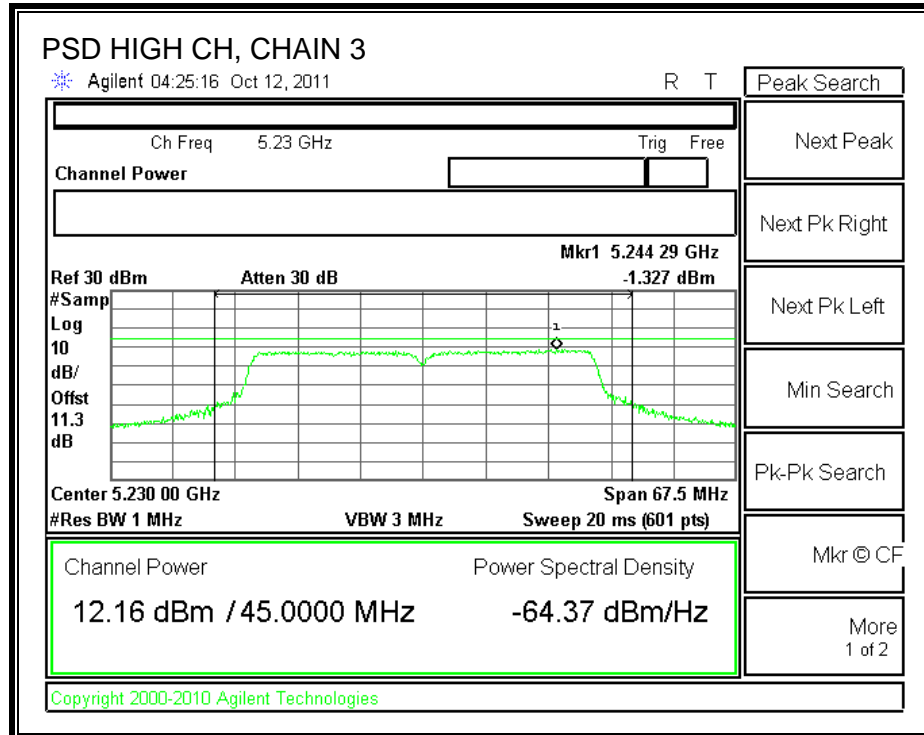
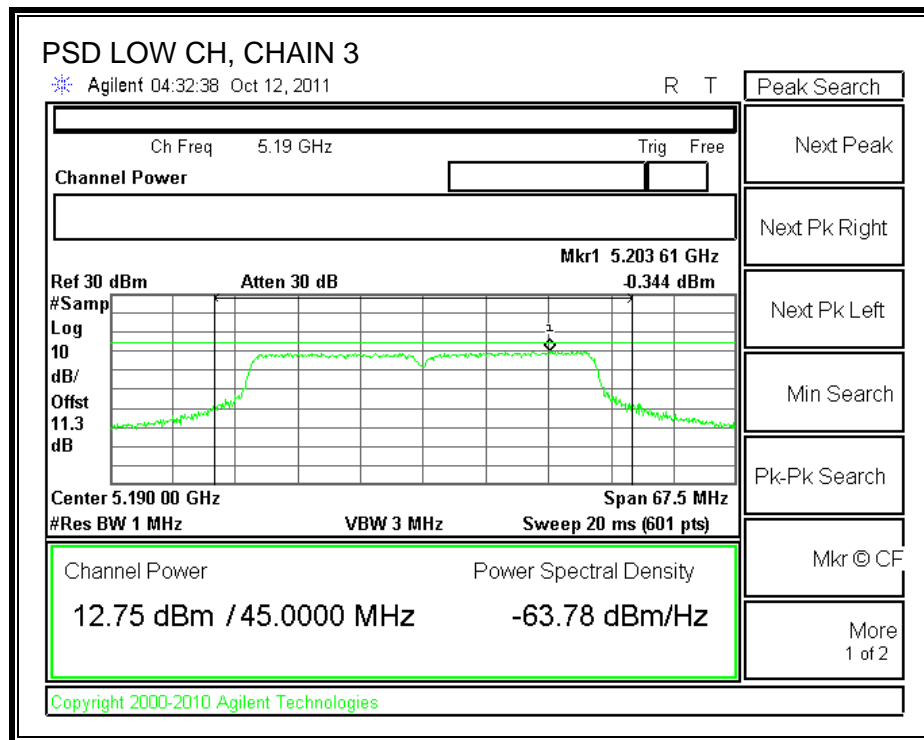
CHAIN 1 POWER SPECTRAL DENSITY



CHAIN 2 POWER SPECTRAL DENSITY



CHAIN 3 POWER SPECTRAL DENSITY



7.7.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	9.74	13	-3.26
High	5230	10.67	13	-2.33

CHAIN 2

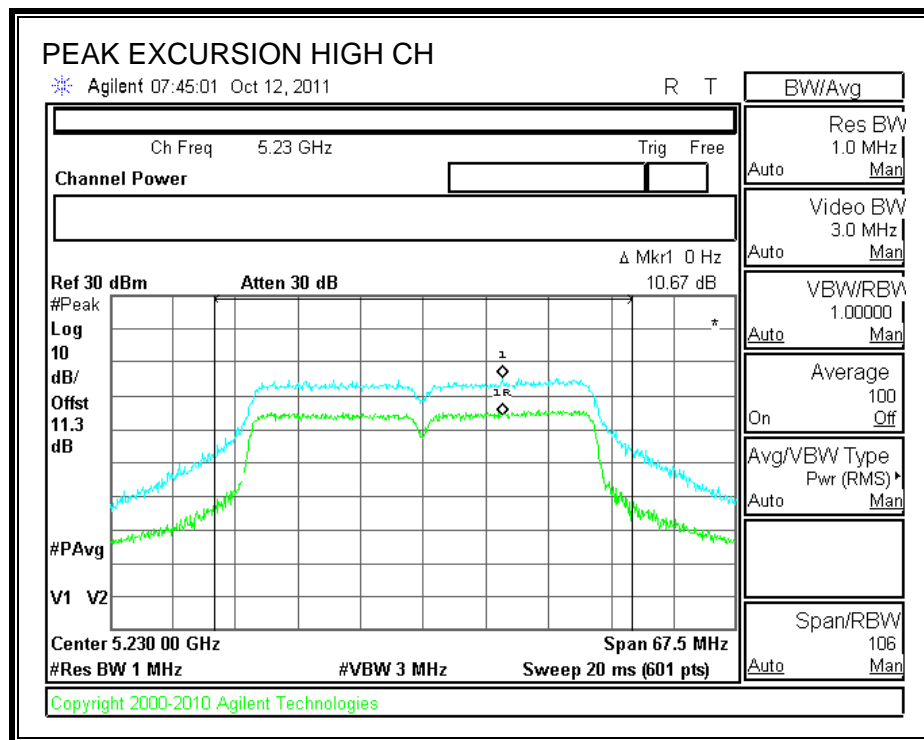
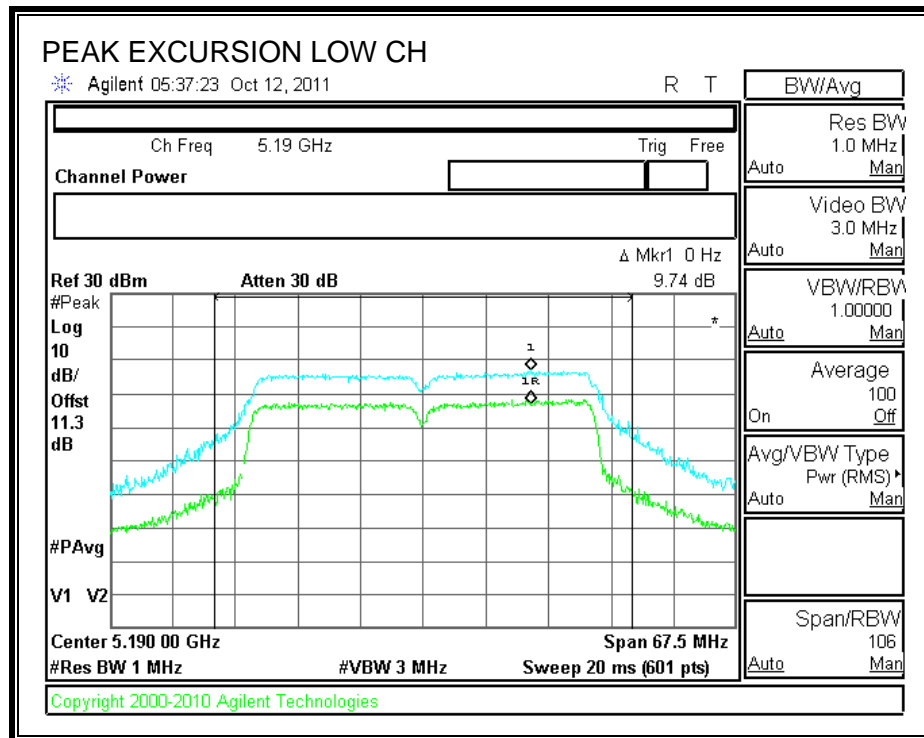
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	9.48	13	-3.52
High	5230	10.99	13	-2.01

CHAIN 3

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	9.66	13	-3.34
High	5230	9.54	13	-3.46

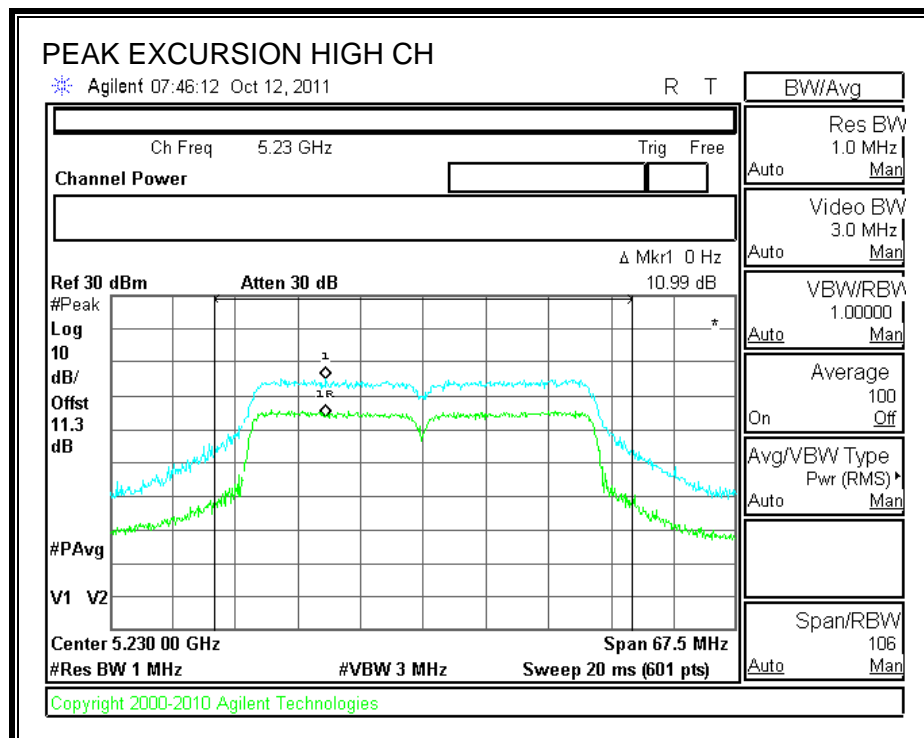
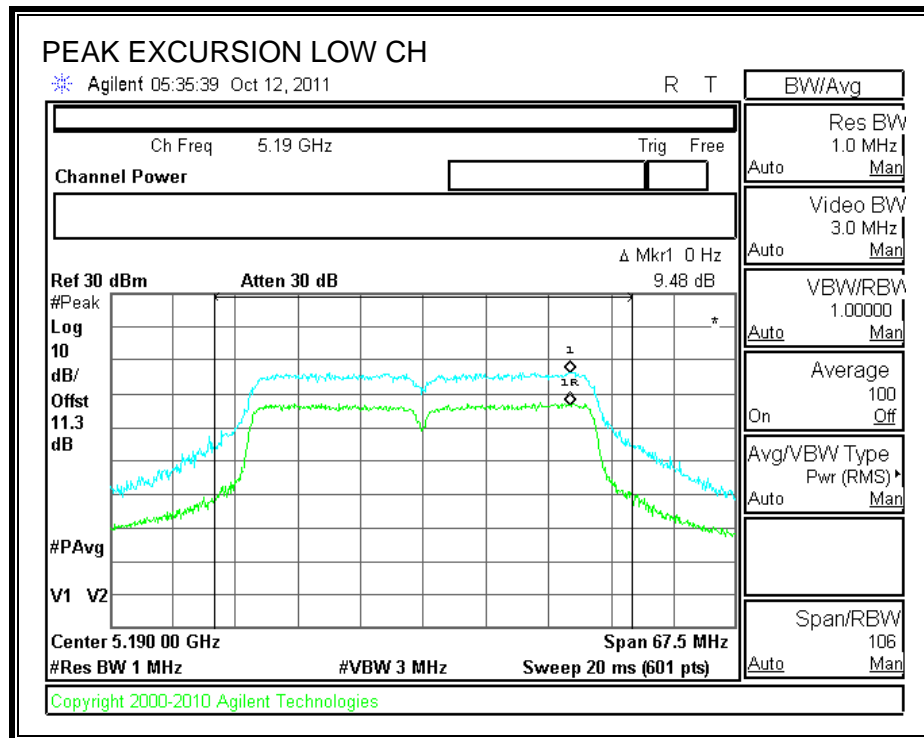
CHAIN 1

PEAK EXCURSION



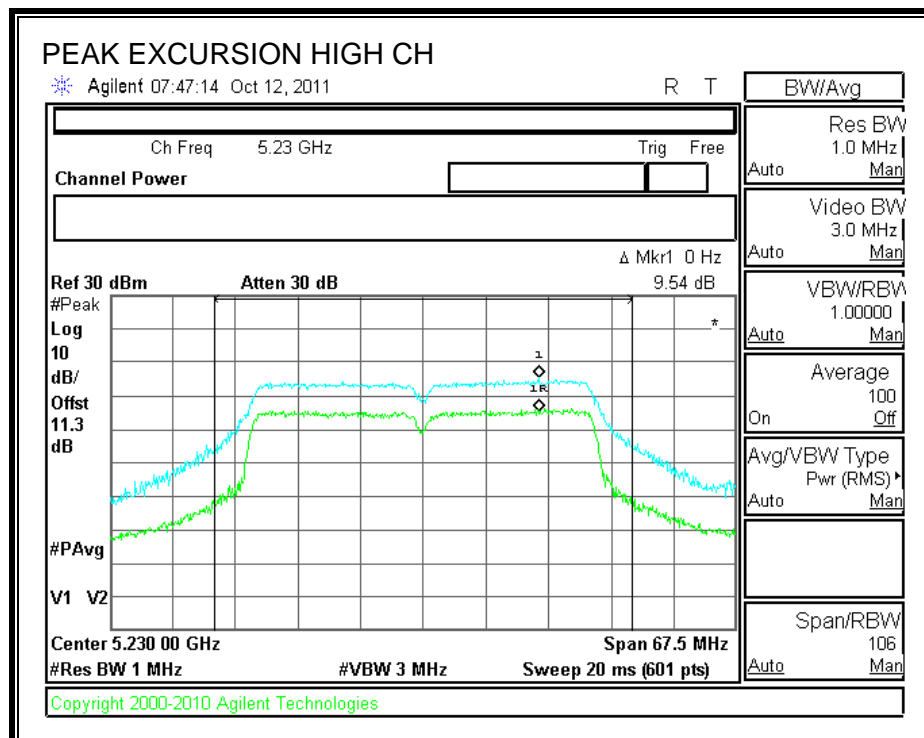
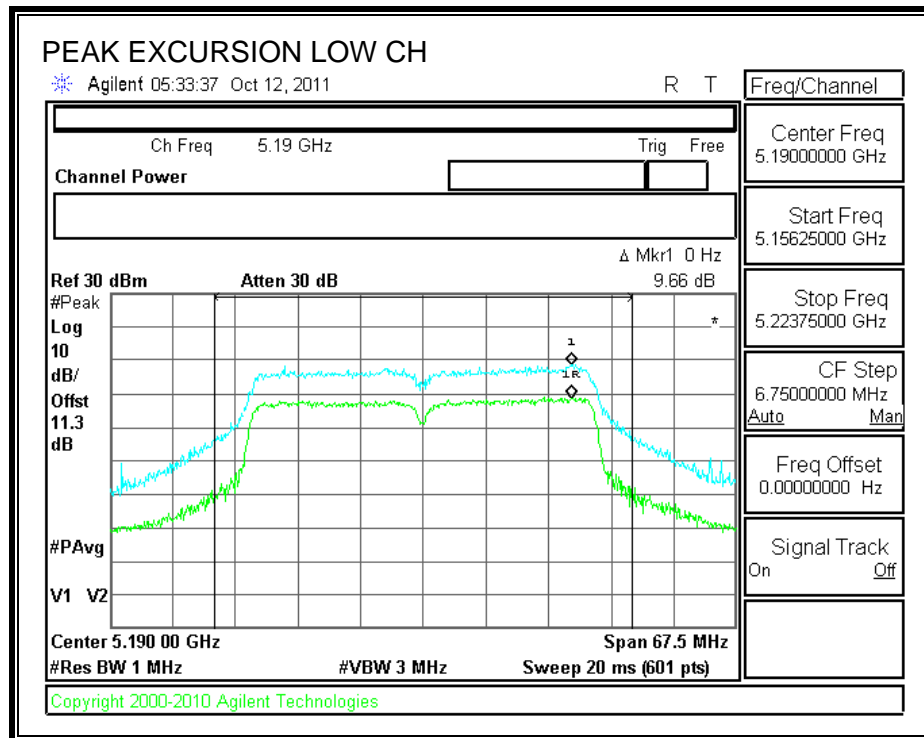
CHAIN 2

PEAK EXCURSION



CHAIN 3

PEAK EXCURSION



7.7.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 3 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

Chain 1

Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	10Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	36880	-47.19	5.00	4.77	-37.42	-27.00
High	37300	-48.21	5.00	4.77	-38.44	-27.00

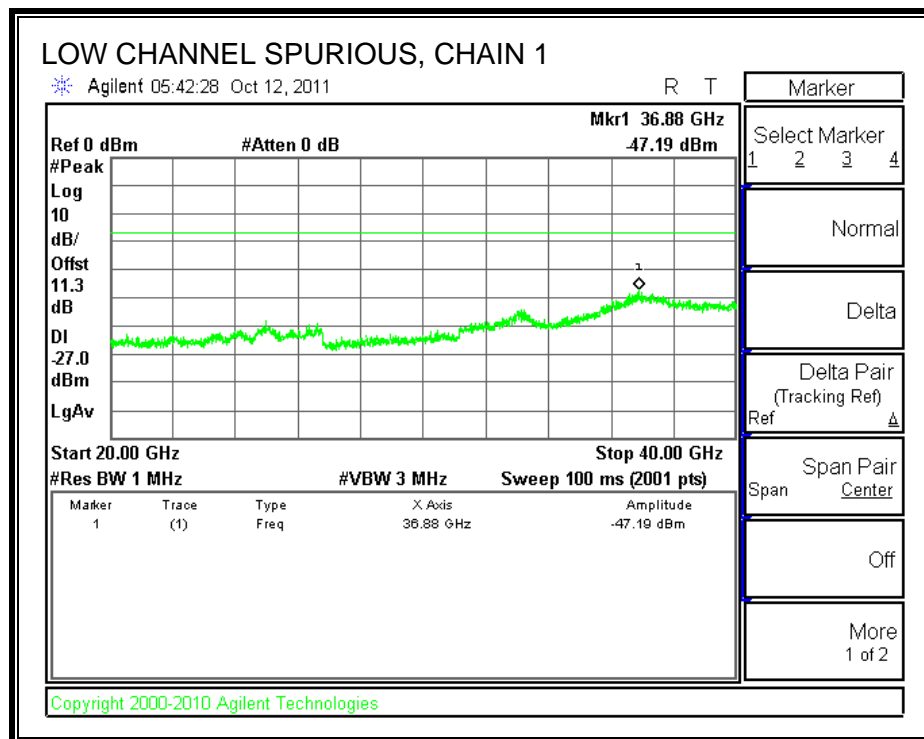
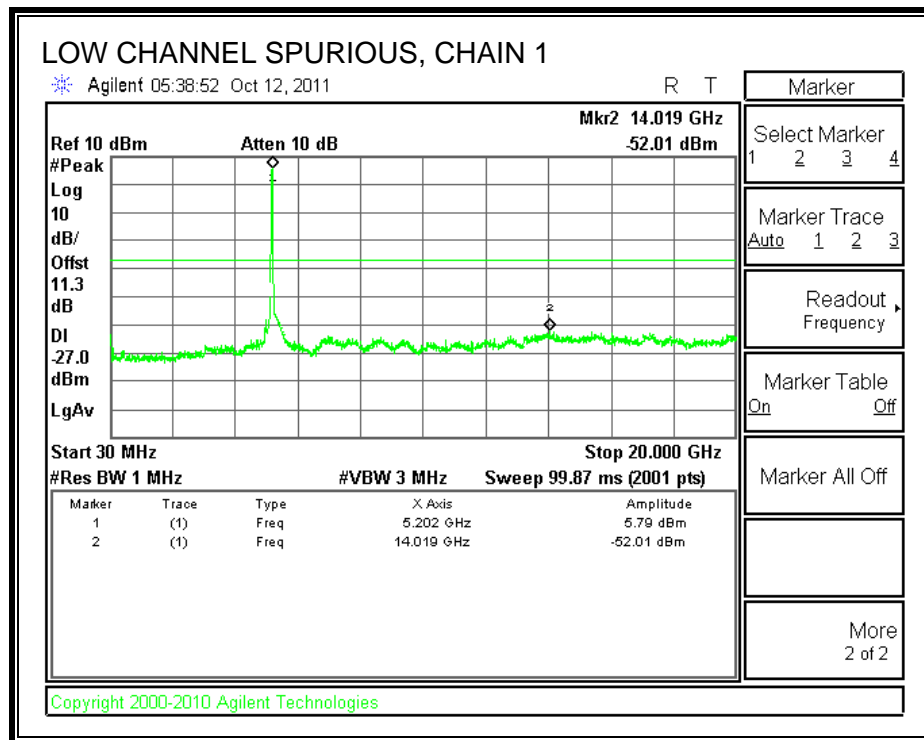
Chain 2

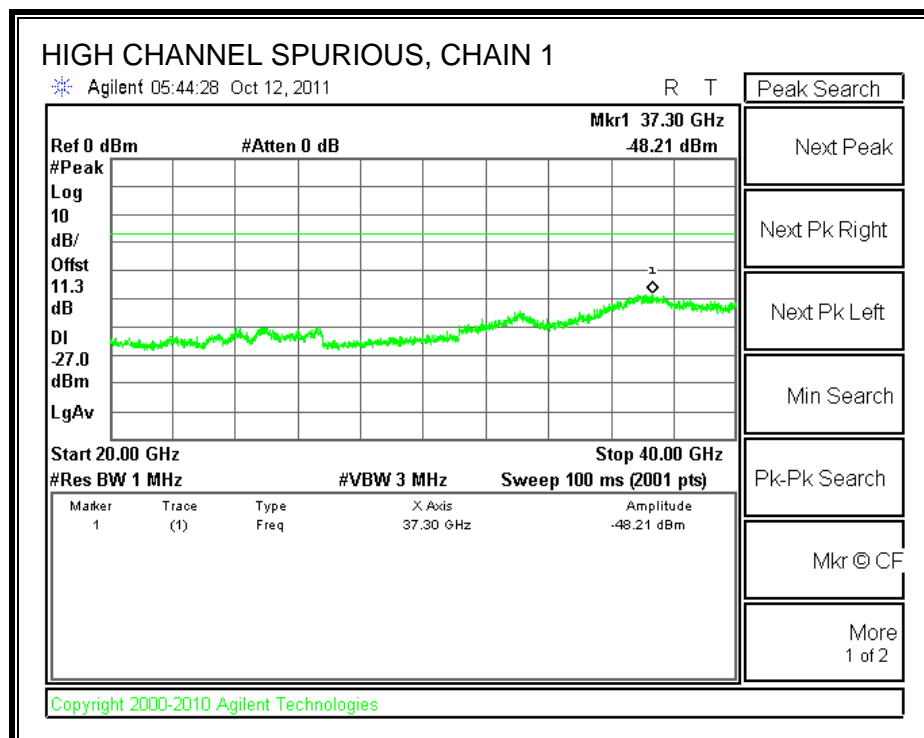
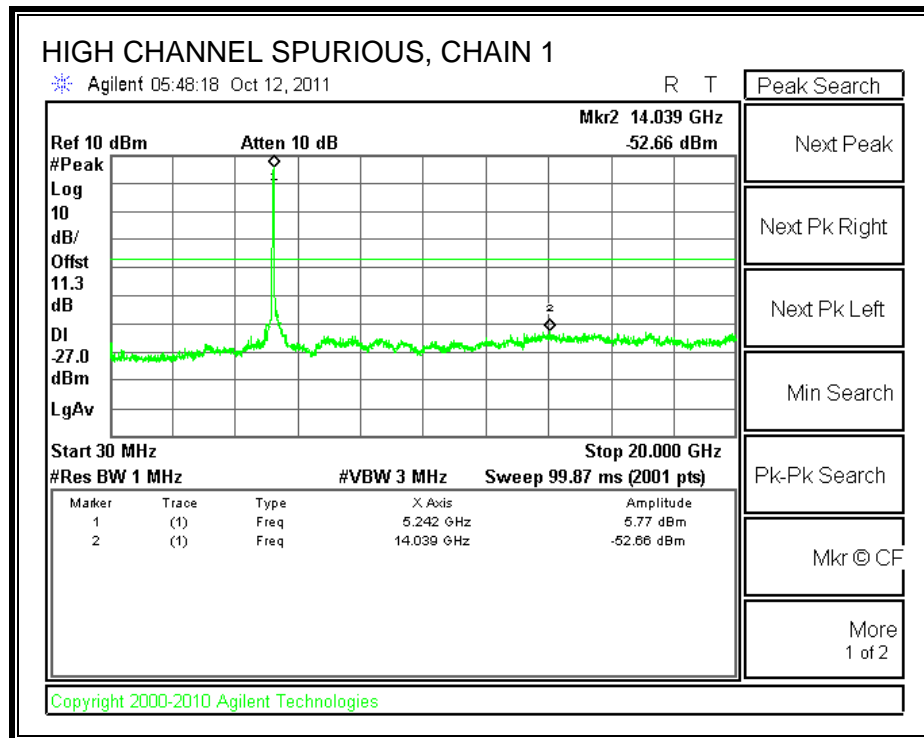
Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	36960	-48.51	5.00	4.77	-38.74	-27.00
High	37460	-48.49	5.00	4.77	-38.72	-27.00

Chain 3

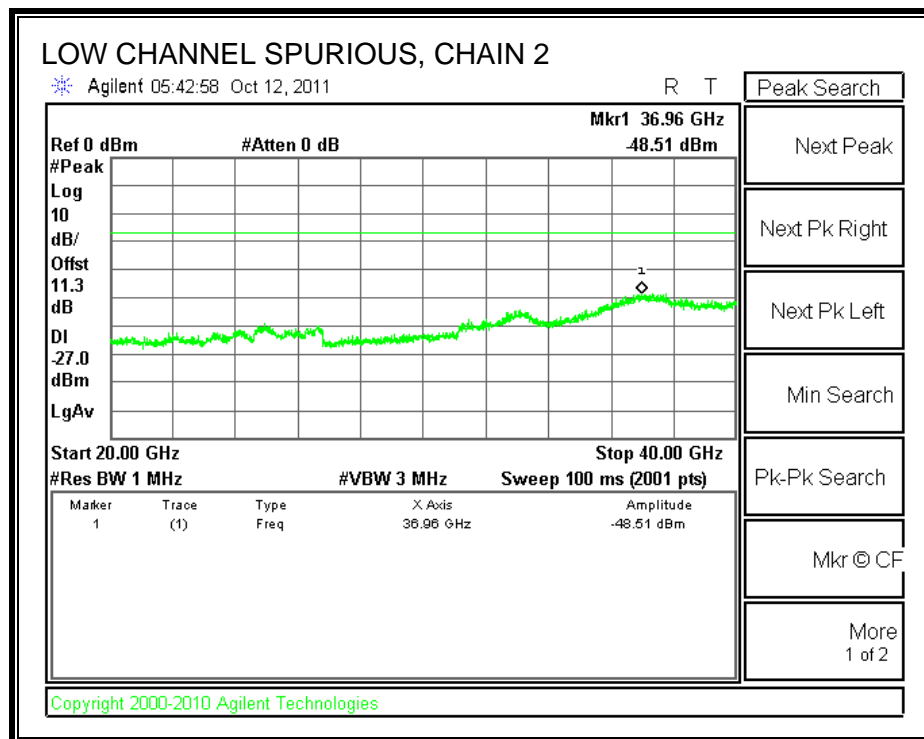
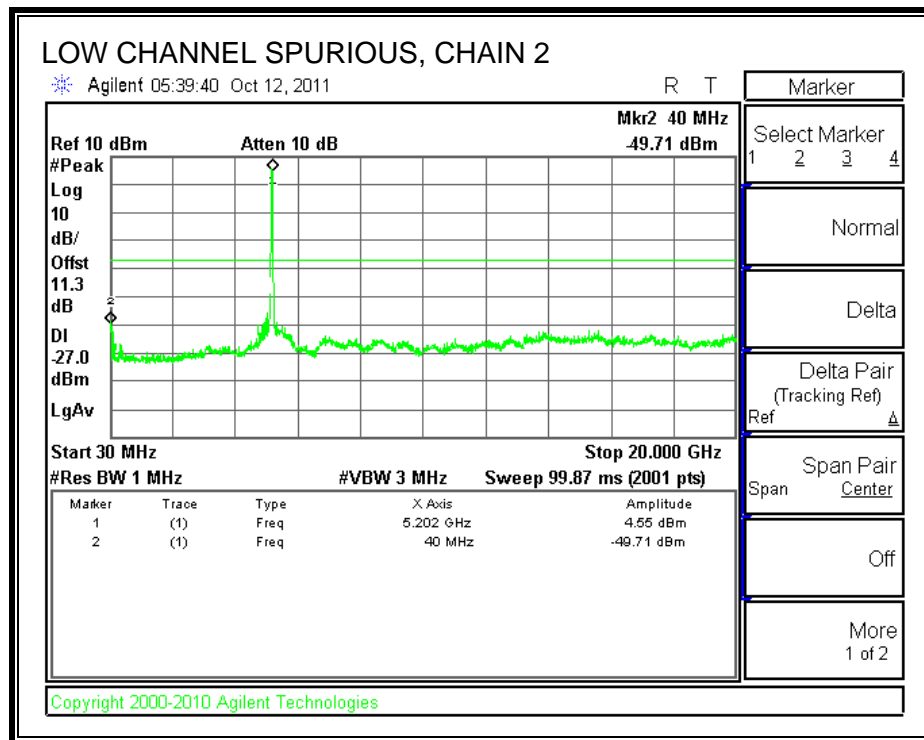
Channel	Frequency (GHz)	Analyzer Reading (dBm)	AG (dBi)	Log (N)	Cond Spur Level (dBm)	Limit (dBm)
Low	37700	-47.91	5.00	4.77	-38.14	-27.00
High	36920	-48.43	5.00	4.77	-38.66	-27.00

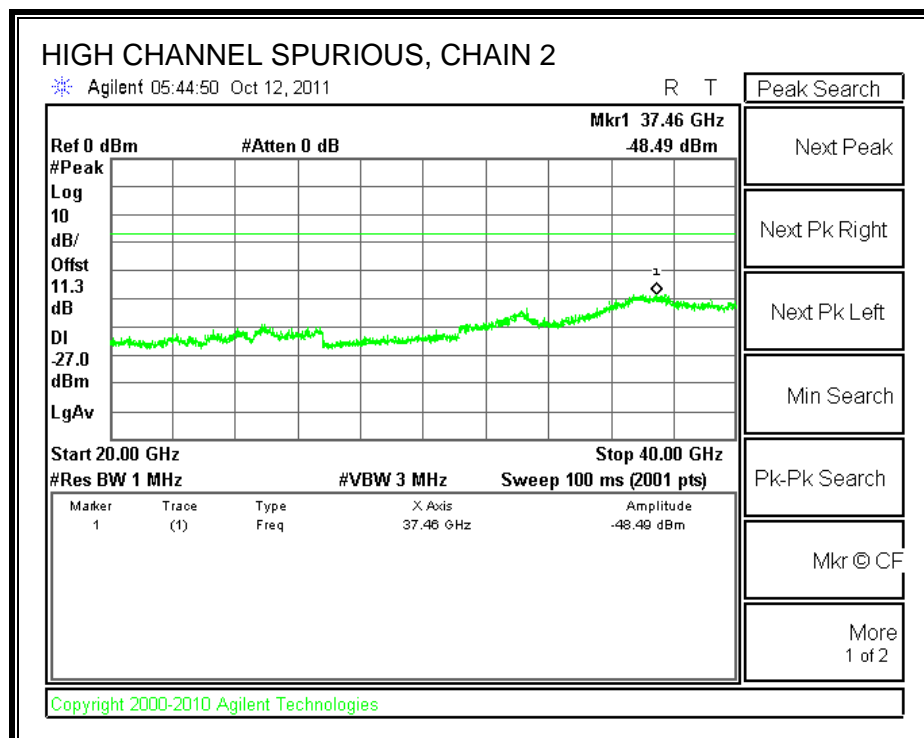
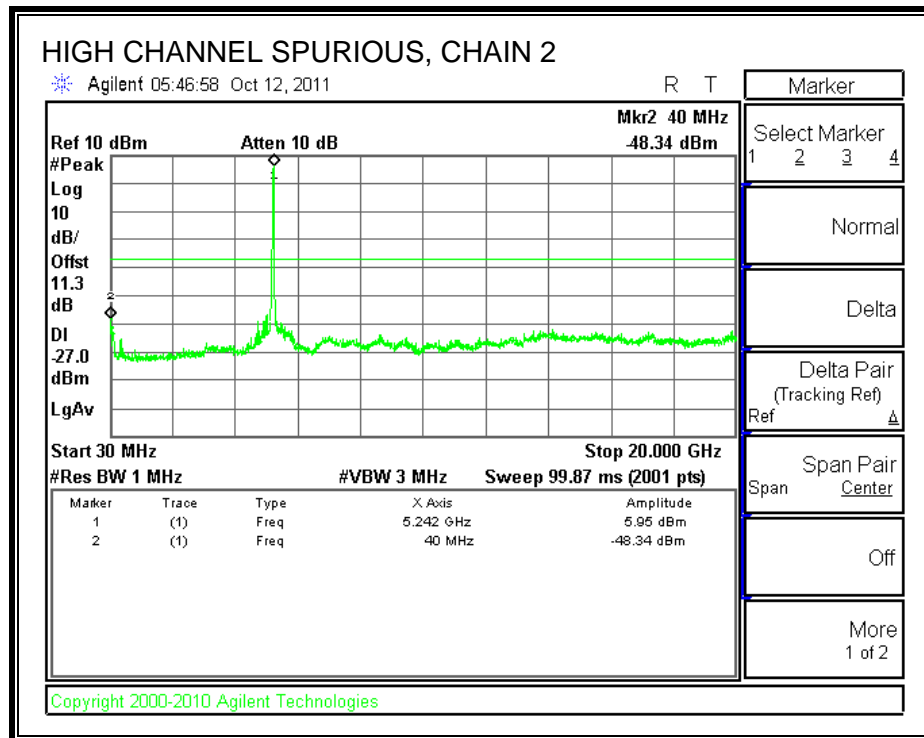
CHAIN 1 SPURIOUS EMISSIONS



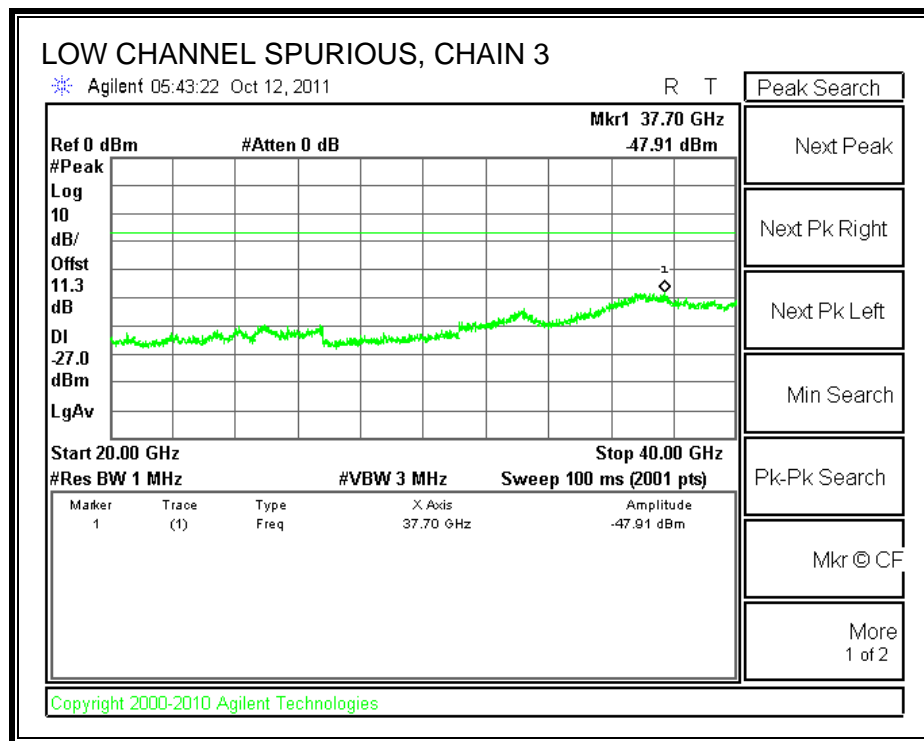
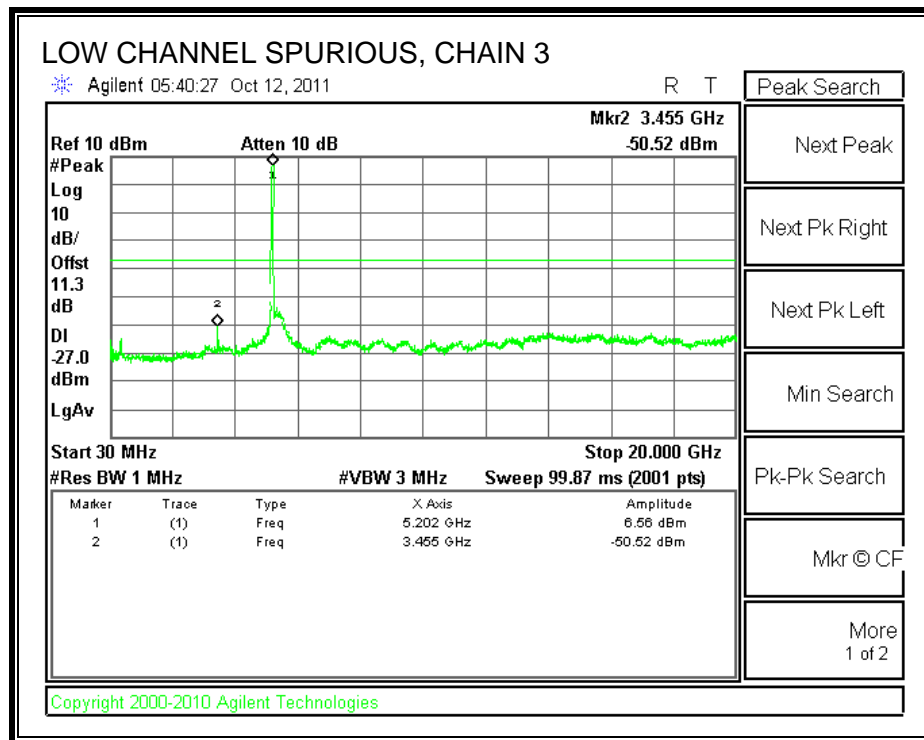


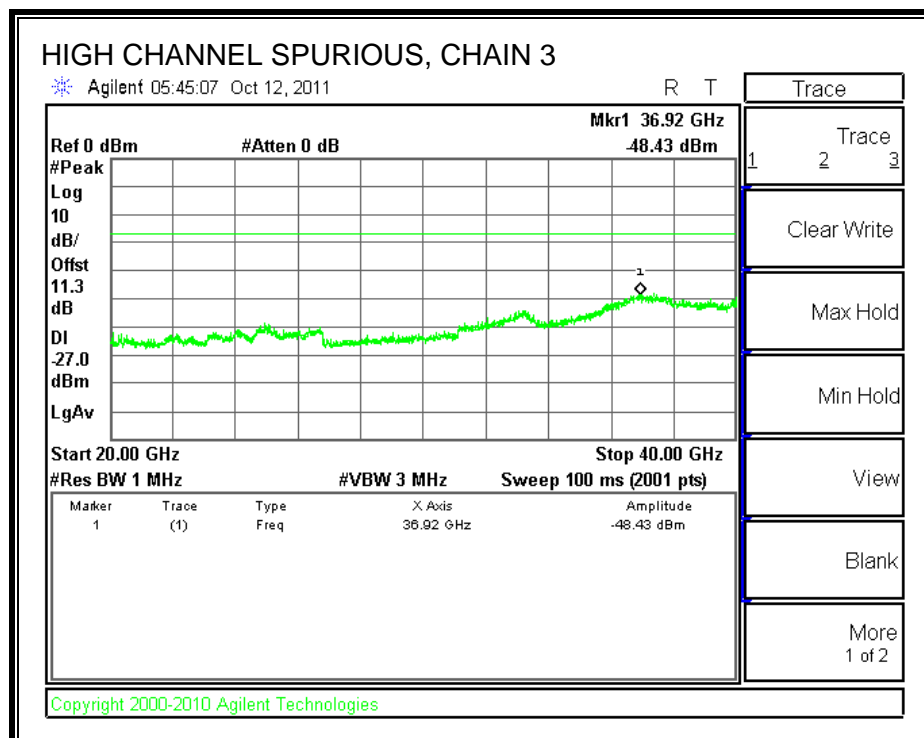
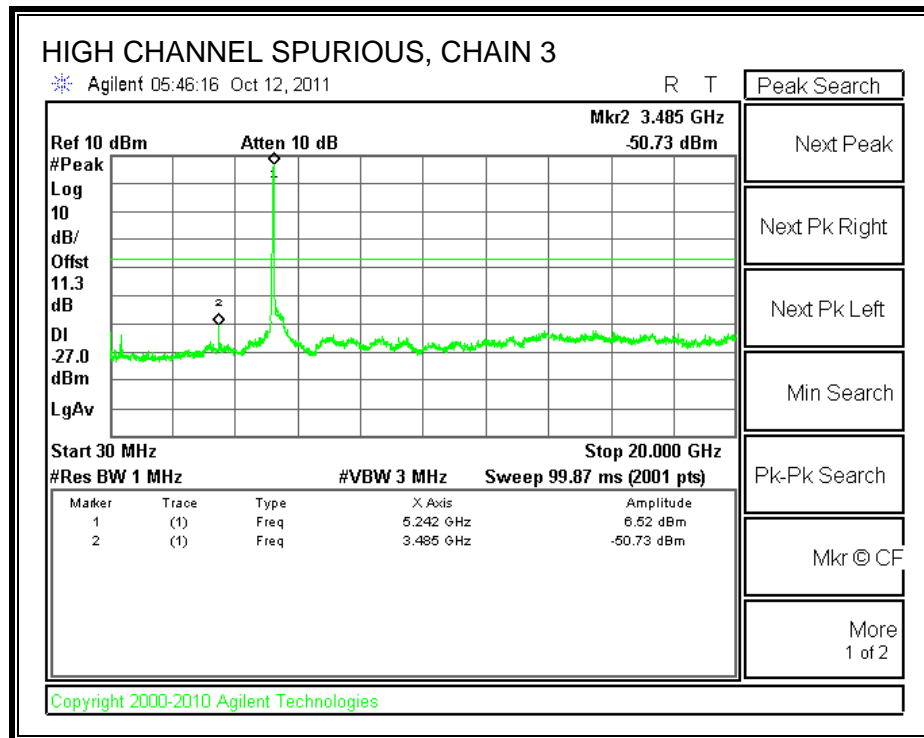
CHAIN 2 SPURIOUS EMISSIONS





CHAIN 3 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 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

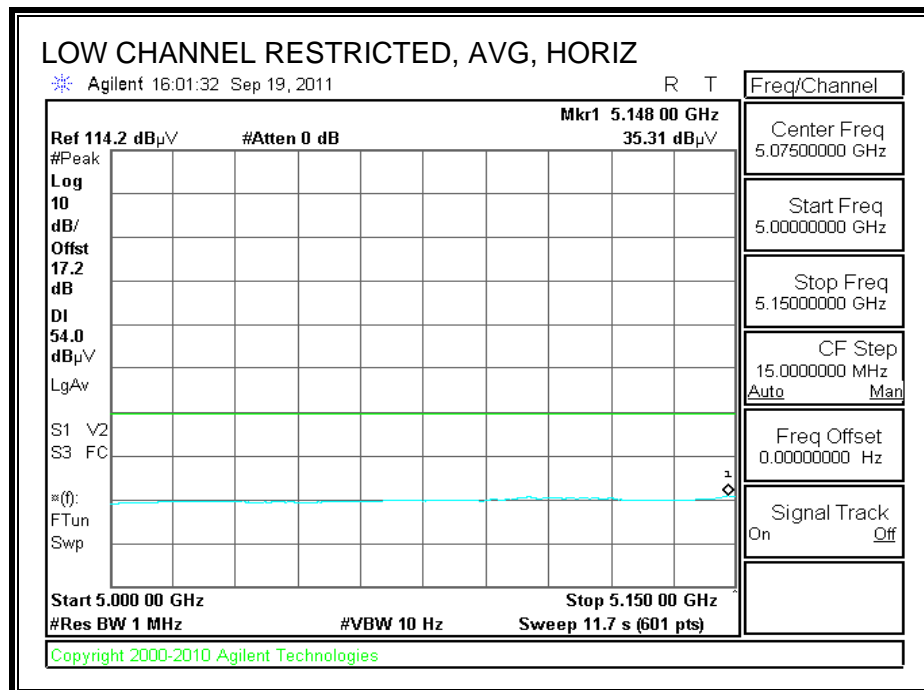
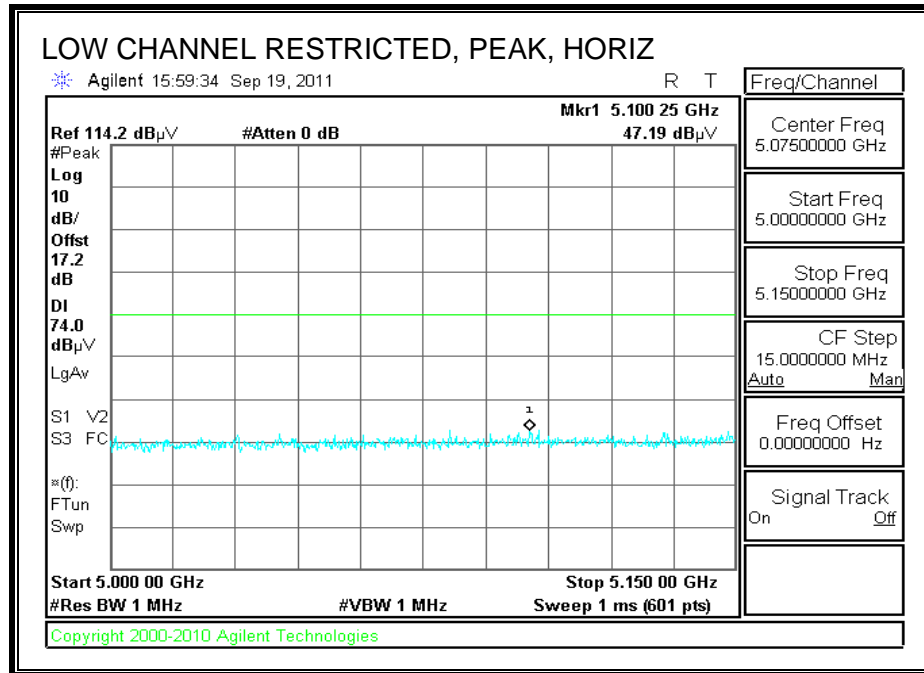
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

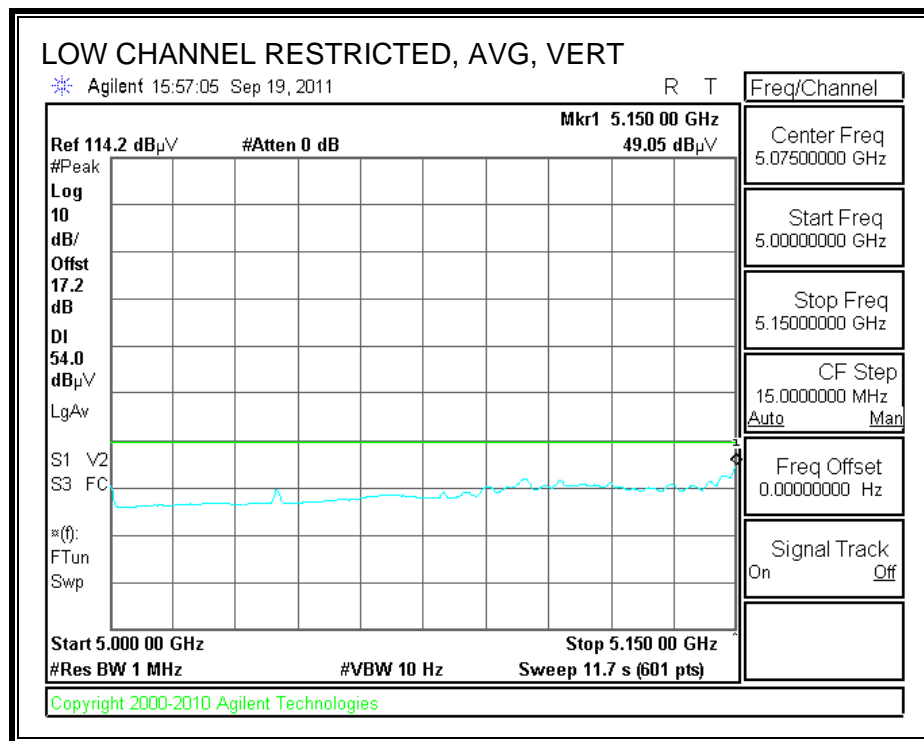
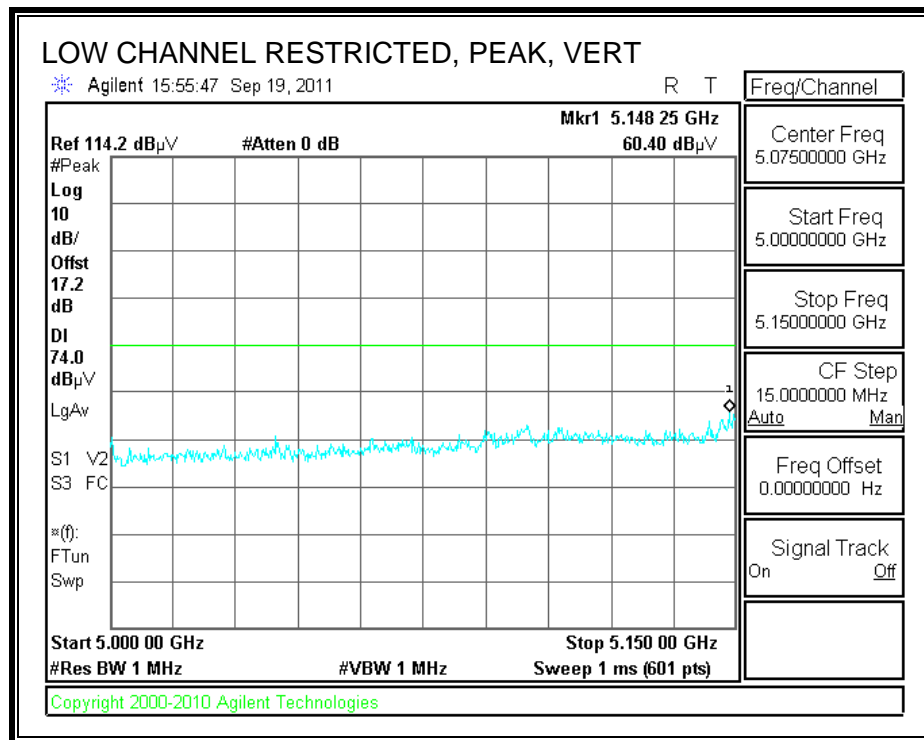
MONOPOLE ANTENNA; 5dBi

8.2.1. 802.11a 3TX MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/20/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_11a CDD Mode

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

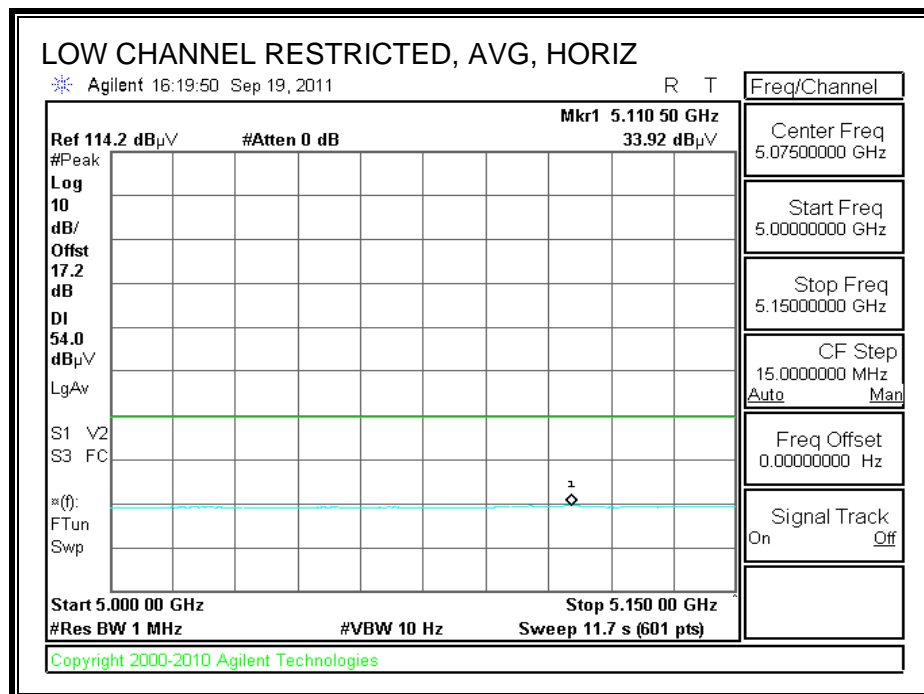
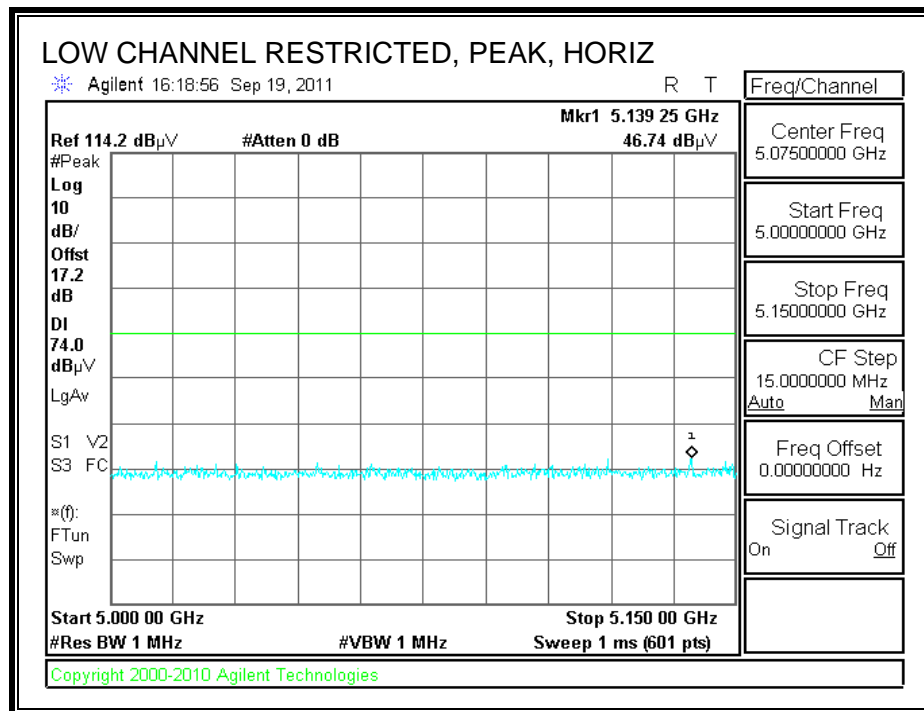
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5180 MHz															
15.540	3.0	33.0	39.7	13.0	-31.9	0.0	0.0	53.7	74.0	-20.3	V	P	98.0	352.0	
15.540	3.0	21.1	39.7	13.0	-31.9	0.0	0.0	41.8	54.0	-12.2	V	A	98.0	352.0	
15.540	3.0	33.6	39.7	13.0	-31.9	0.0	0.0	54.3	74.0	-19.7	H	P	151.0	89.0	
15.540	3.0	21.1	39.7	13.0	-31.9	0.0	0.0	41.8	54.0	-12.2	H	A	151.0	89.0	
Mid Ch. 5200 MHz															
15.600	3.0	33.1	39.6	13.0	-31.9	0.0	0.0	53.8	74.0	-20.2	V	P	122.0	27.0	
15.600	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	V	A	122.0	27.0	
15.600	3.0	32.8	39.6	13.0	-31.9	0.0	0.0	53.5	74.0	-20.5	H	P	98.0	146.0	
15.600	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	H	A	98.0	146.0	
High Ch. 5240 MHz															
15.720	3.0	32.7	39.4	13.1	-31.9	0.0	0.0	53.3	74.0	-20.7	V	P	105.0	14.0	
15.720	3.0	20.5	39.4	13.1	-31.9	0.0	0.0	41.1	54.0	-12.9	V	A	105.0	14.0	
15.720	3.0	32.8	39.4	13.1	-31.9	0.0	0.0	53.4	74.0	-20.6	H	P	102.0	208.0	
15.720	3.0	20.5	39.4	13.1	-31.9	0.0	0.0	41.1	54.0	-12.9	H	A	102.0	208.0	

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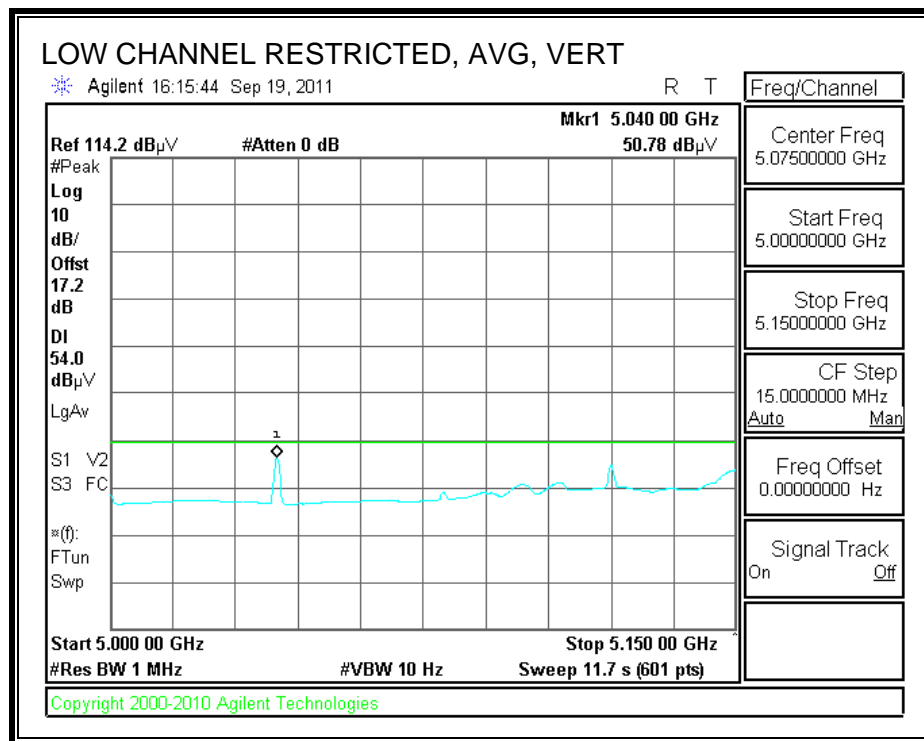
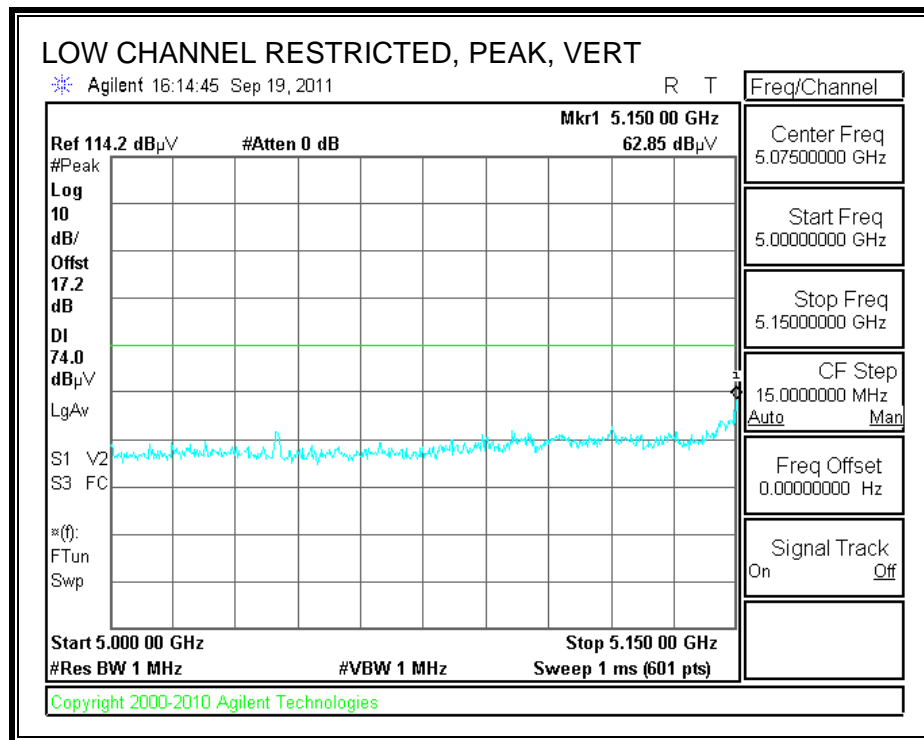
Note: No other emissions were detected above the system noise floor.

8.2.2. 802.11n HT20 MCS0 3TX MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/20/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_HT20 CDD MCS0 Mode

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

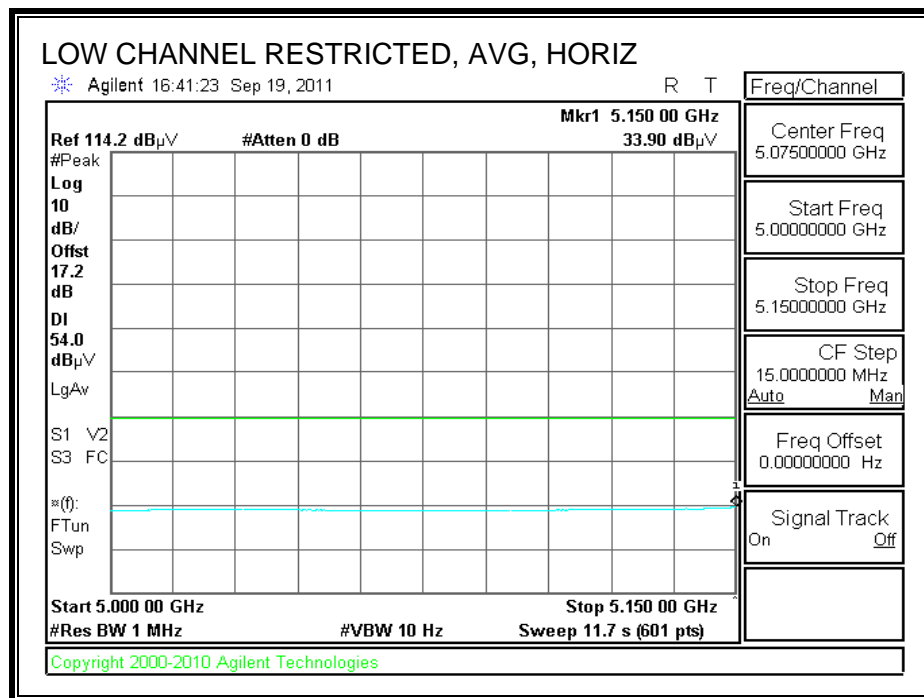
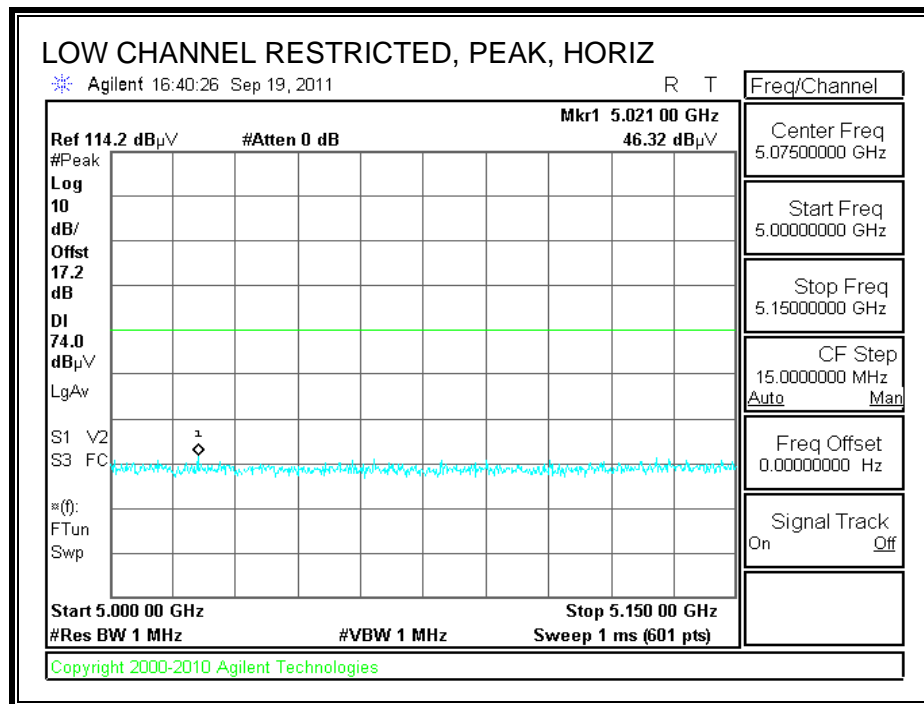
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5180 MHz															
15.540	3.0	33.3	39.7	13.0	-31.9	0.0	0.0	54.0	74.0	-20.0	V	P	98.0	200.0	
15.540	3.0	20.9	39.7	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	V	A	98.0	200.0	
15.540	3.0	32.9	39.7	13.0	-31.9	0.0	0.0	53.7	74.0	-20.3	H	P	98.0	334.0	
15.540	3.0	21.0	39.7	13.0	-31.9	0.0	0.0	41.7	54.0	-12.3	H	A	98.0	334.0	
Mid Ch. 5200 MHz															
15.600	3.0	33.0	39.6	13.0	-31.9	0.0	0.0	53.7	74.0	-20.3	V	P	149.0	220.0	
15.600	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	V	A	149.0	220.0	
15.600	3.0	33.0	39.6	13.0	-31.9	0.0	0.0	53.7	74.0	-20.3	H	P	196.0	134.0	
15.600	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.5	54.0	-12.5	H	A	196.0	134.0	
High Ch. 5240 MHz															
15.720	3.0	32.4	39.4	13.1	-31.9	0.0	0.0	53.0	74.0	-21.0	V	P	149.0	337.0	
15.720	3.0	20.4	39.4	13.1	-31.9	0.0	0.0	41.1	54.0	-12.9	V	A	149.0	337.0	
15.720	3.0	32.4	39.4	13.1	-31.9	0.0	0.0	53.0	74.0	-21.0	H	P	170.0	71.0	
15.720	3.0	20.4	39.4	13.1	-31.9	0.0	0.0	41.0	54.0	-13.0	H	A	170.0	71.0	

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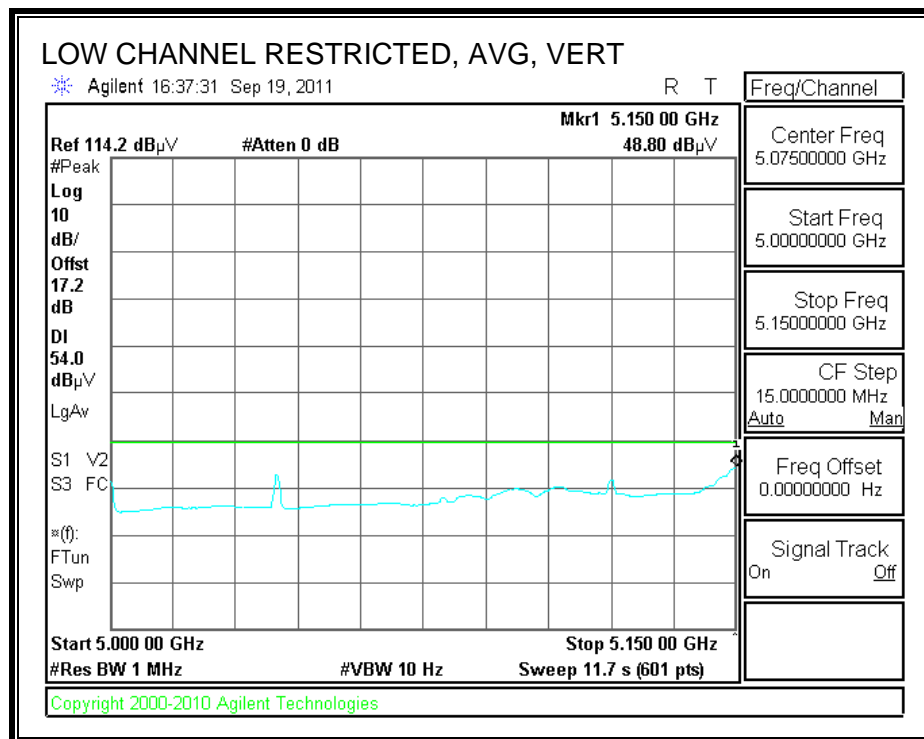
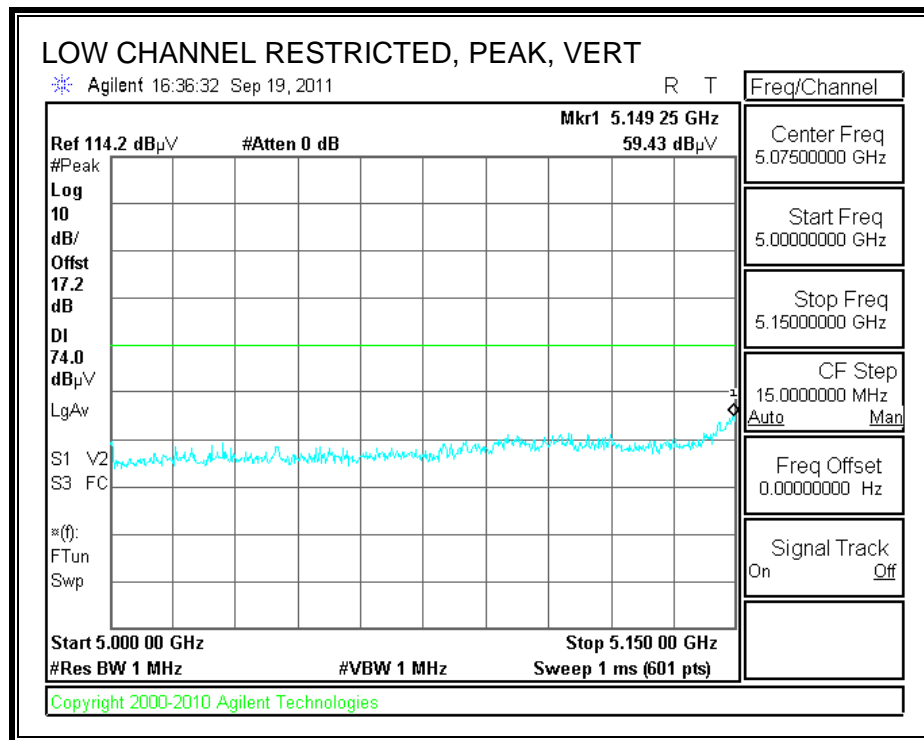
Note: No other emissions were detected above the system noise floor.

8.2.3. 802.11n HT20 MCS8 3TX MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/20/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_HT20 CDD MCS8 Mode

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

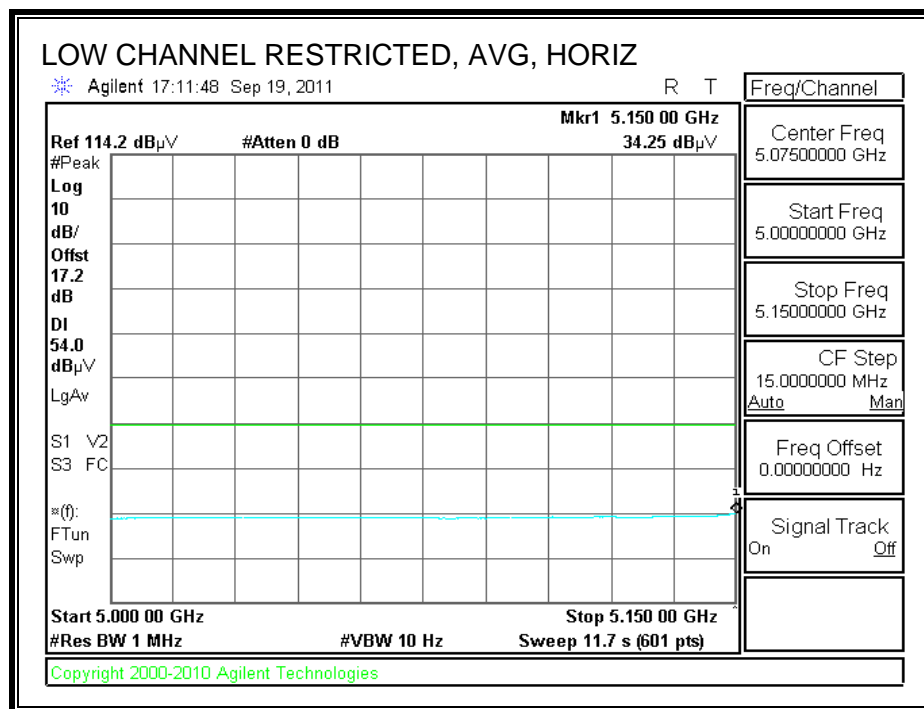
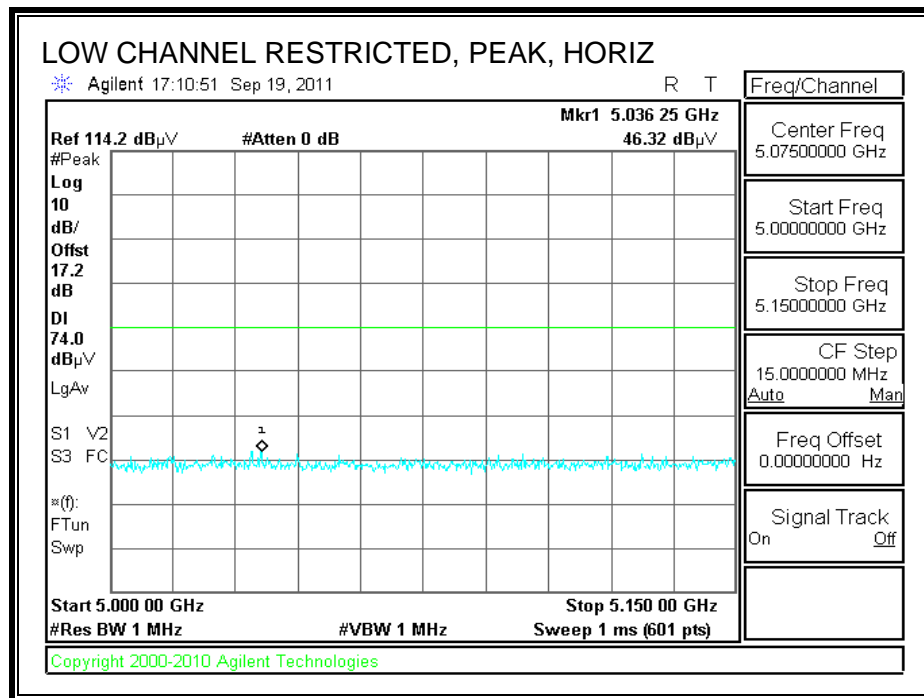
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5180 MHz															
15.540	3.0	33.6	39.7	13.0	-31.9	0.0	0.0	54.3	74.0	-19.7	V	P	98.0	246.0	
15.540	3.0	21.0	39.7	13.0	-31.9	0.0	0.0	41.7	54.0	-12.3	V	A	98.0	246.0	
15.540	3.0	33.5	39.7	13.0	-31.9	0.0	0.0	54.2	74.0	-19.8	H	P	99.0	362.0	
15.540	3.0	21.0	39.7	13.0	-31.9	0.0	0.0	41.7	54.0	-12.3	H	A	99.0	362.0	
Mid Ch. 5200 MHz															
15.600	3.0	33.5	39.6	13.0	-31.9	0.0	0.0	54.2	74.0	-19.8	V	P	131.0	338.0	
15.600	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.5	54.0	-12.5	V	A	131.0	338.0	
15.600	3.0	33.5	39.6	13.0	-31.9	0.0	0.0	54.1	74.0	-19.9	H	P	172.0	61.0	
15.600	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	H	A	172.0	61.0	
High Ch. 5240 MHz															
15.720	3.0	32.5	39.4	13.1	-31.9	0.0	0.0	53.1	74.0	-20.9	V	P	132.0	73.0	
15.720	3.0	20.5	39.4	13.1	-31.9	0.0	0.0	41.1	54.0	-12.9	V	A	132.0	73.0	
15.720	3.0	32.4	39.4	13.1	-31.9	0.0	0.0	53.0	74.0	-21.0	H	P	102.0	70.0	
15.720	3.0	20.4	39.4	13.1	-31.9	0.0	0.0	41.1	54.0	-12.9	H	A	102.0	70.0	

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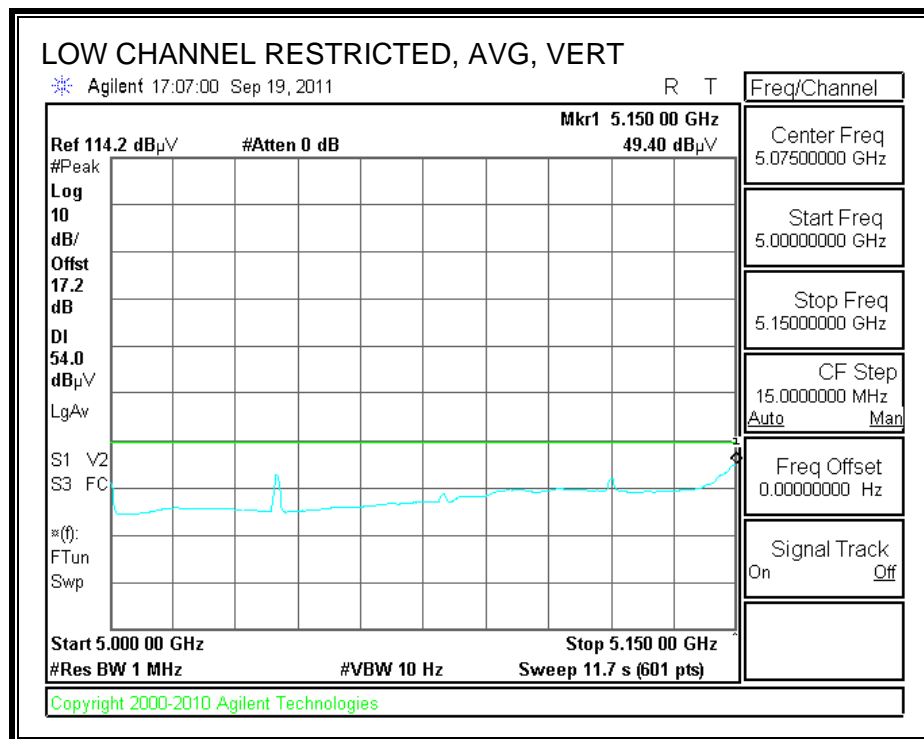
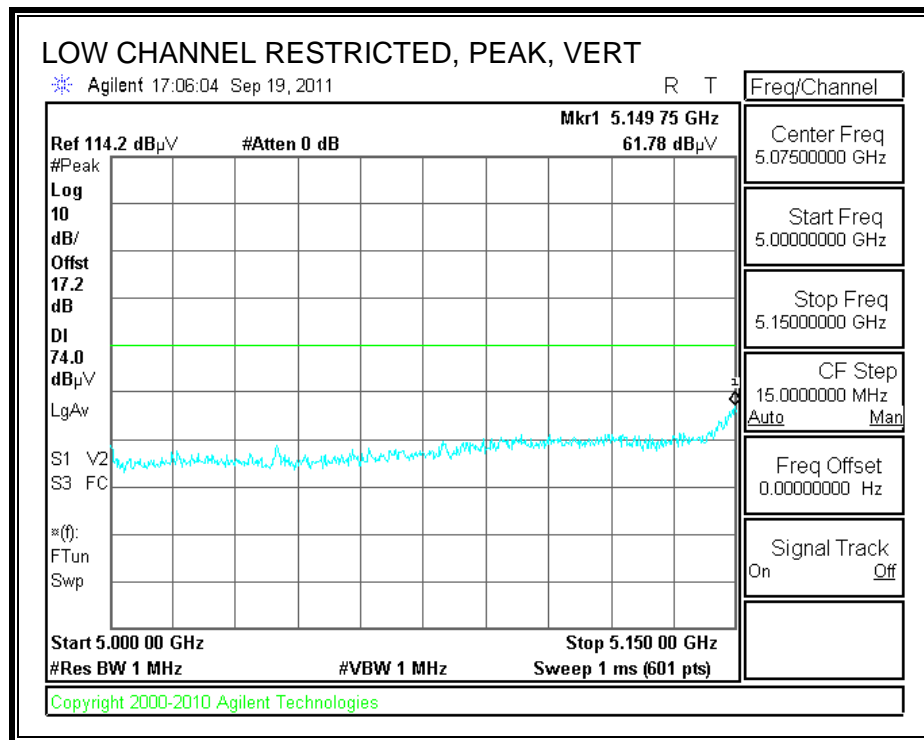
Note: No other emissions were detected above the system noise floor.

8.2.4. 802.11n HT20 MCS16 3TX MODE

RESTRICTED BANEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/20/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_HT20 CDD MCS16 Mode

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

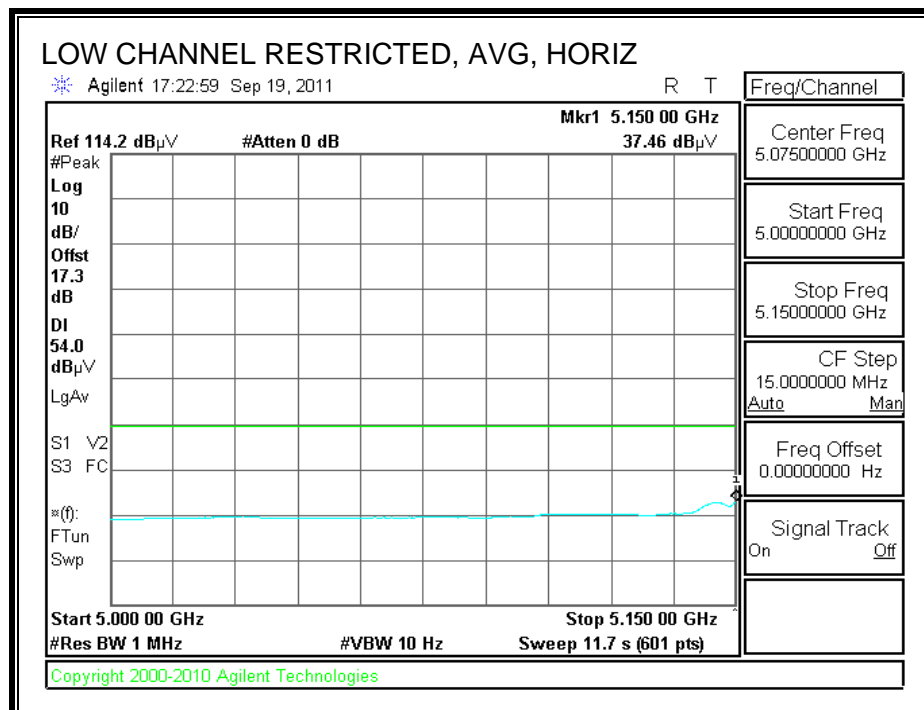
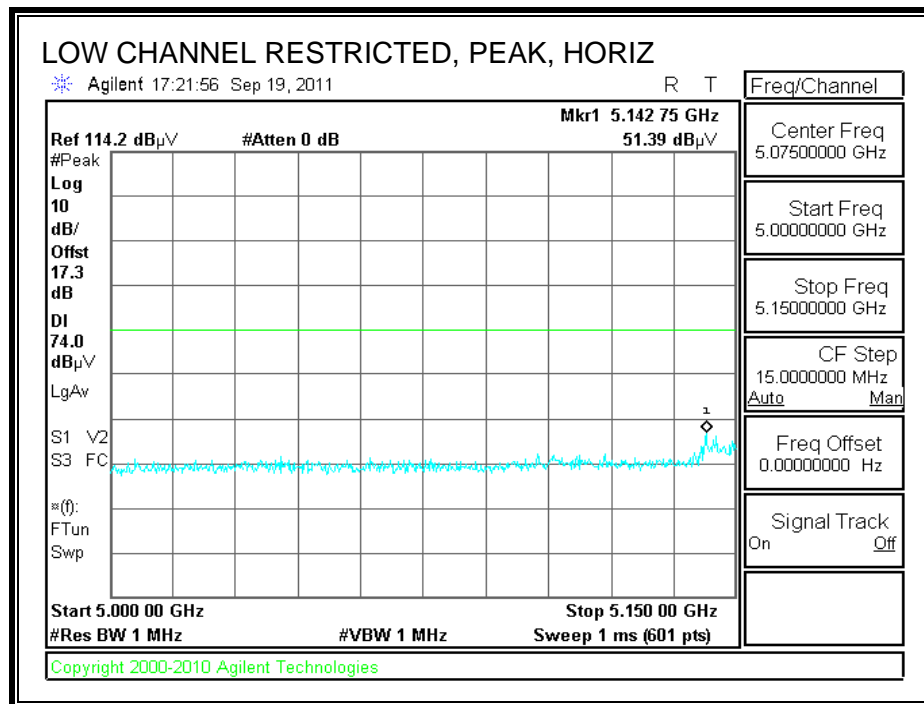
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5180 MHz															
15.540	3.0	33.1	39.7	13.0	-31.9	0.0	0.0	53.8	74.0	-20.2	V	P	165.0	22.0	
15.540	3.0	21.0	39.7	13.0	-31.9	0.0	0.0	41.7	54.0	-12.3	V	A	165.0	22.0	
15.540	3.0	33.2	39.7	13.0	-31.9	0.0	0.0	53.9	74.0	-20.1	H	P	142.0	278.0	
15.540	3.0	21.0	39.7	13.0	-31.9	0.0	0.0	41.7	54.0	-12.3	H	A	142.0	278.0	
Mid Ch. 5200 MHz															
15.600	3.0	33.0	39.6	13.0	-31.9	0.0	0.0	53.6	74.0	-20.4	V	P	150.0	75.0	
15.600	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	V	A	150.0	75.0	
15.600	3.0	33.9	39.6	13.0	-31.9	0.0	0.0	54.6	74.0	-19.4	H	P	98.0	257.0	
15.600	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	H	A	98.0	257.0	
High Ch. 5240 MHz															
15.720	3.0	32.8	39.4	13.1	-31.9	0.0	0.0	53.4	74.0	-20.6	V	P	98.0	17.0	
15.720	3.0	20.5	39.4	13.1	-31.9	0.0	0.0	41.1	54.0	-12.9	V	A	98.0	17.0	
15.720	3.0	33.4	39.4	13.1	-31.9	0.0	0.0	54.0	74.0	-20.0	H	P	98.0	353.0	
15.720	3.0	20.5	39.4	13.1	-31.9	0.0	0.0	41.1	54.0	-12.9	H	A	98.0	353.0	

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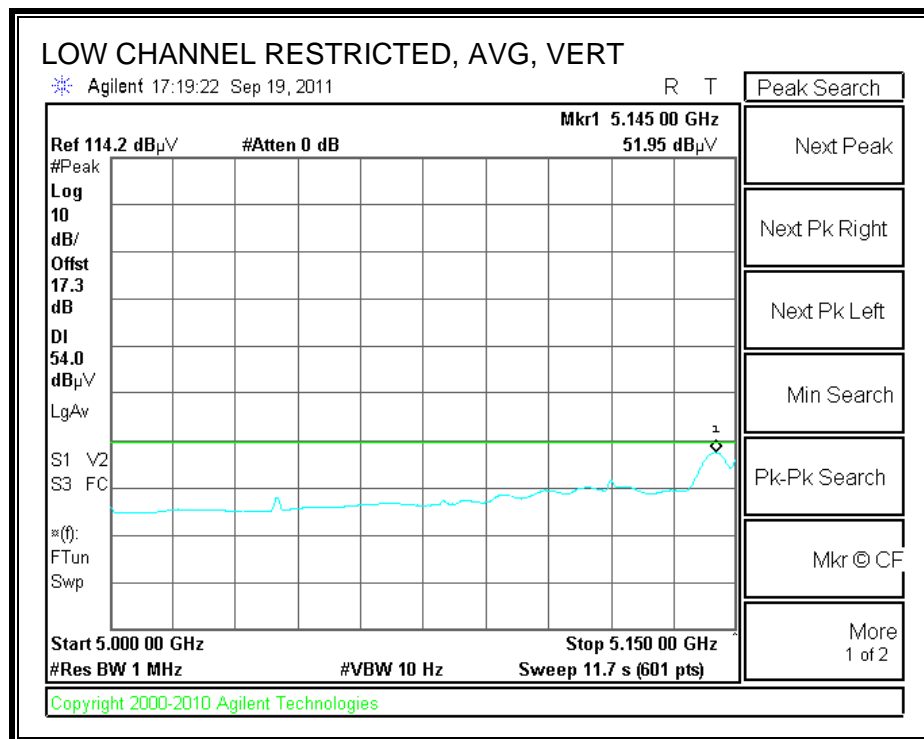
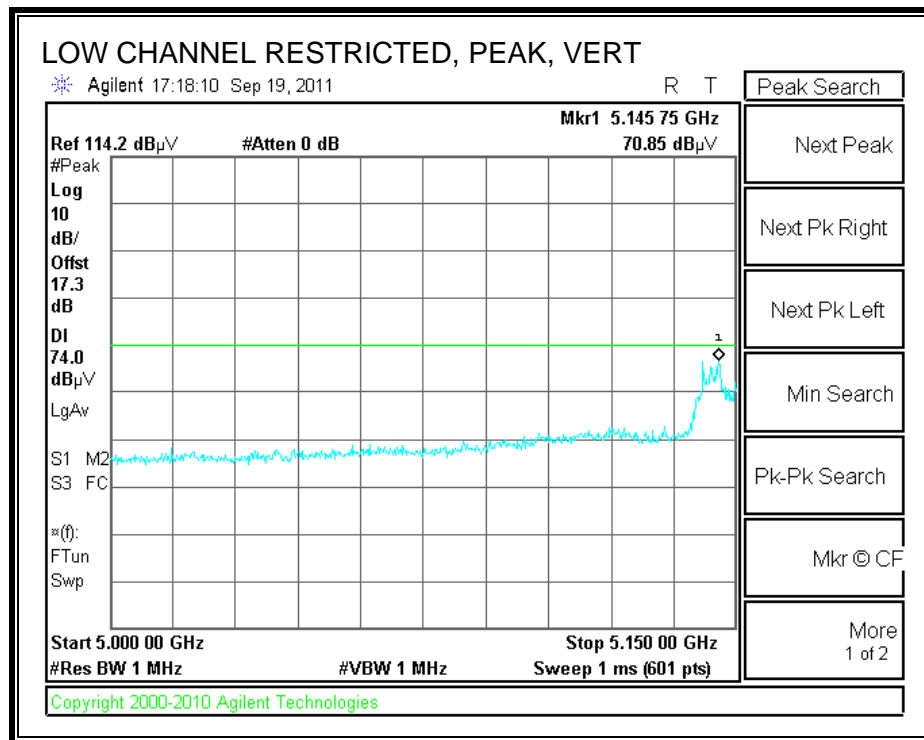
Note: No other emissions were detected above the system noise floor.

8.2.5. 802.11n HT40 MCS0 3TX MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/20/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_HT40 CDD MCS0 Mode

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

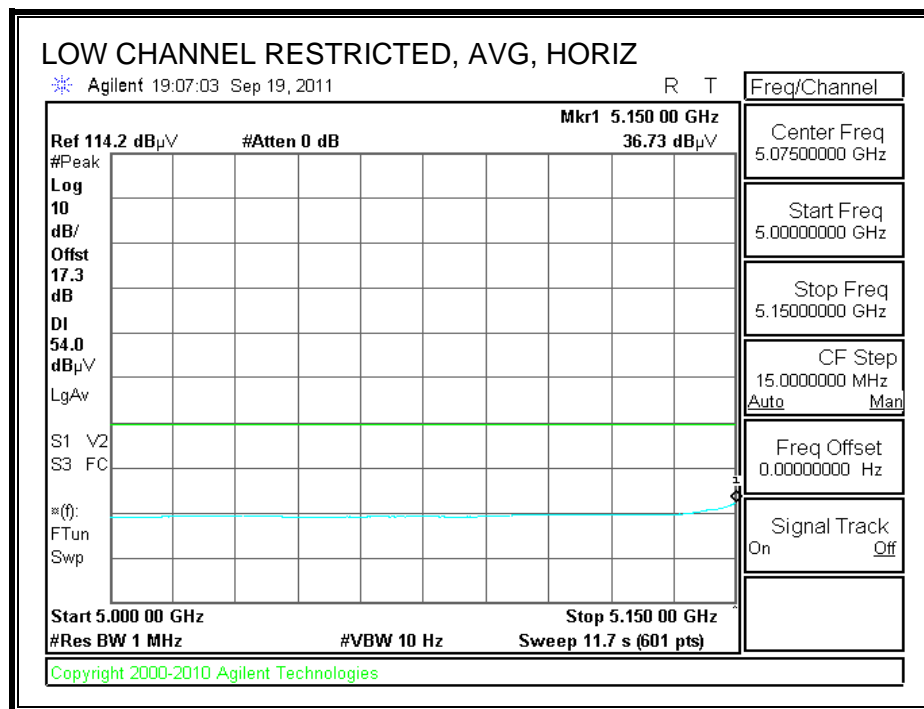
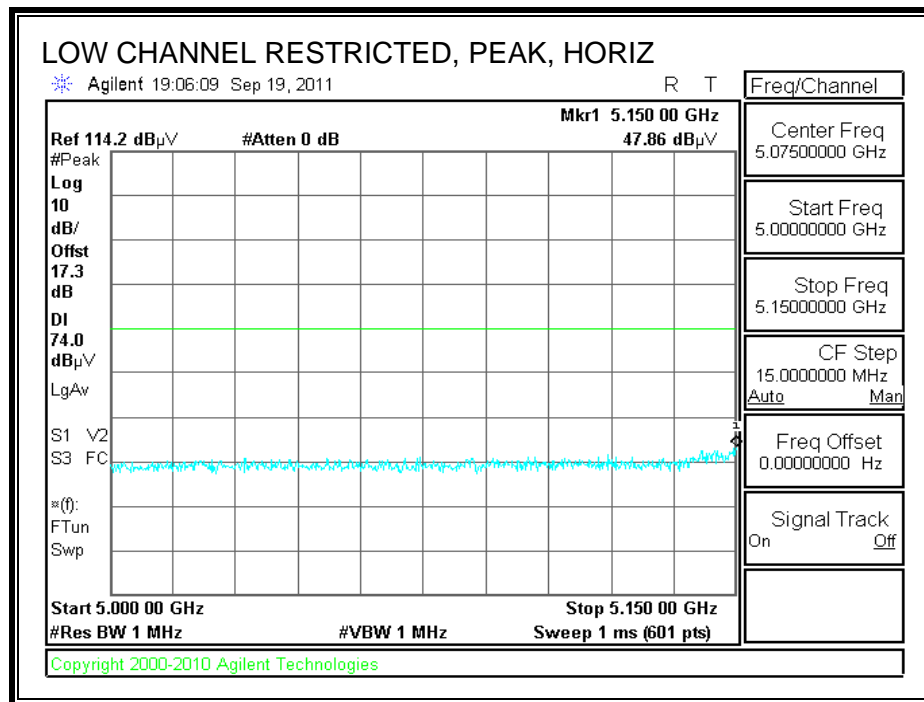
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5190 MHz															
15.570	3.0	33.7	39.6	13.0	-31.9	0.0	0.0	54.4	74.0	-19.6	V	P	117.0	72.0	
15.570	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	V	A	117.0	72.0	
15.570	3.0	33.6	39.6	13.0	-31.9	0.0	0.0	54.3	74.0	-19.7	H	P	106.0	133.0	
15.570	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	H	A	106.0	133.0	
High Ch. 5230 MHz															
15.690	3.0	34.6	39.5	13.0	-31.9	0.0	0.0	55.2	74.0	-18.8	V	P	137.0	249.0	
15.690	3.0	20.7	39.5	13.0	-31.9	0.0	0.0	41.3	54.0	-12.7	V	A	137.0	249.0	
15.690	3.0	32.8	39.5	13.0	-31.9	0.0	0.0	53.5	74.0	-20.5	H	P	138.0	350.0	
15.690	3.0	20.6	39.5	13.0	-31.9	0.0	0.0	41.3	54.0	-12.7	H	A	138.0	350.0	

Rev. 4.1.2.7

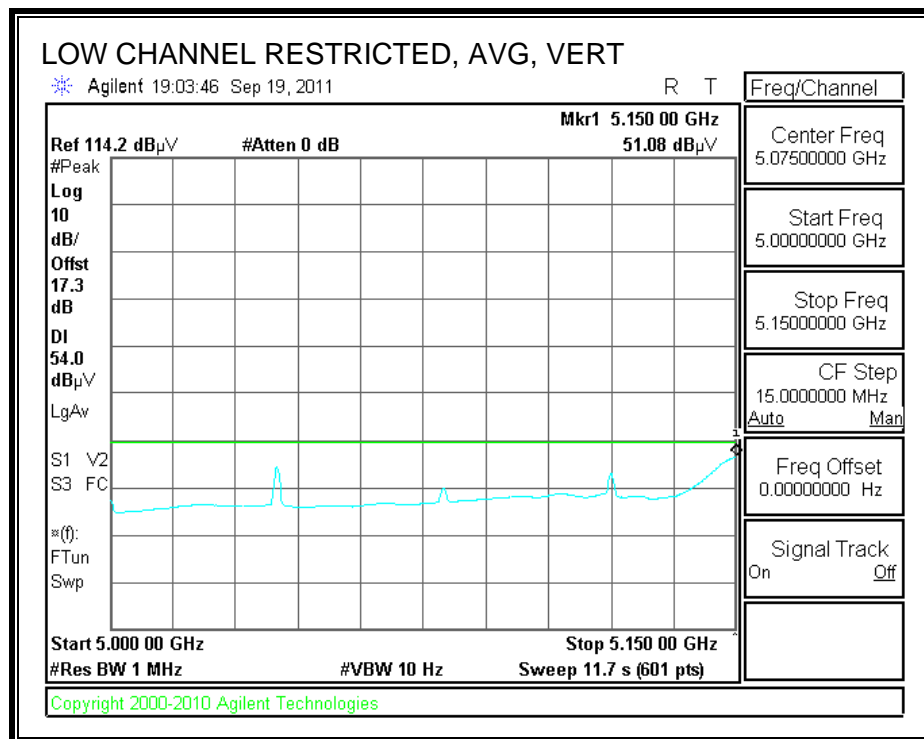
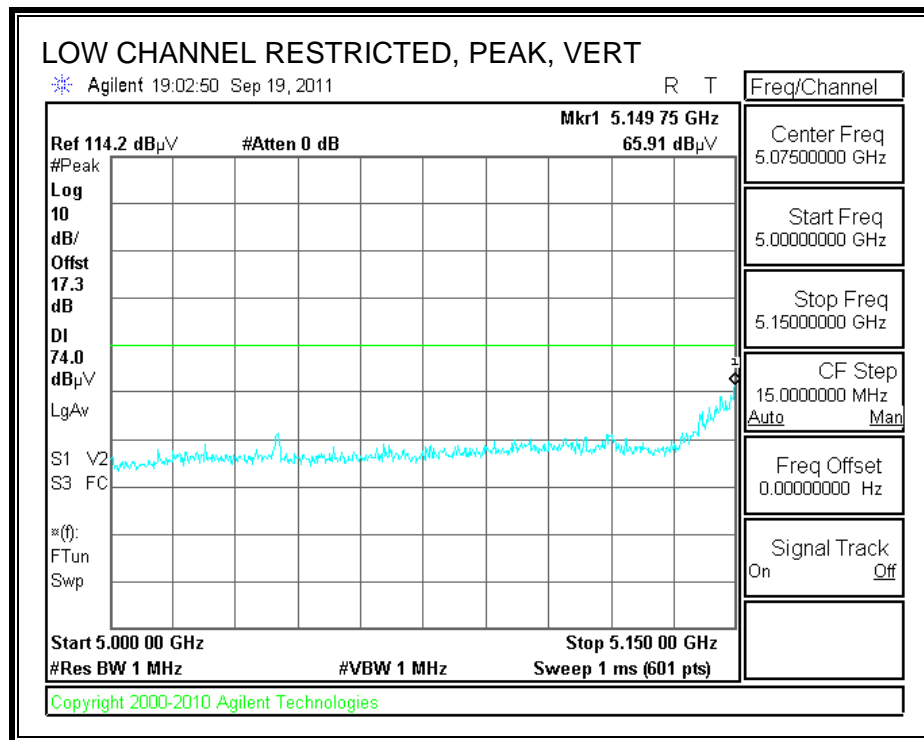
Note: No other emissions were detected above the system noise floor.

8.2.6. 802.11n HT40 MCS8 3TX MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/20/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_HT40 CDD MCS8 Mode

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

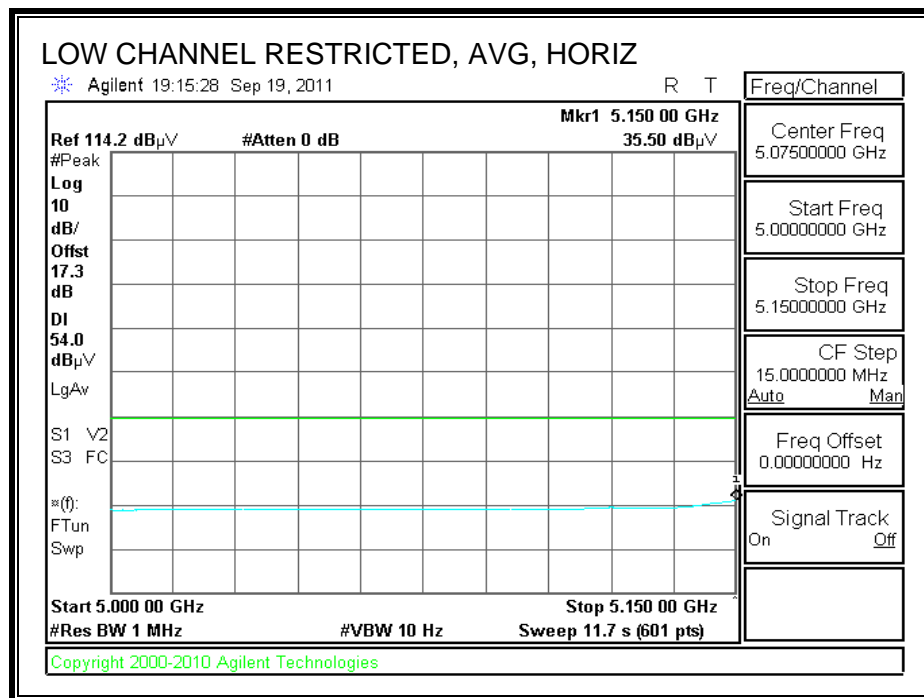
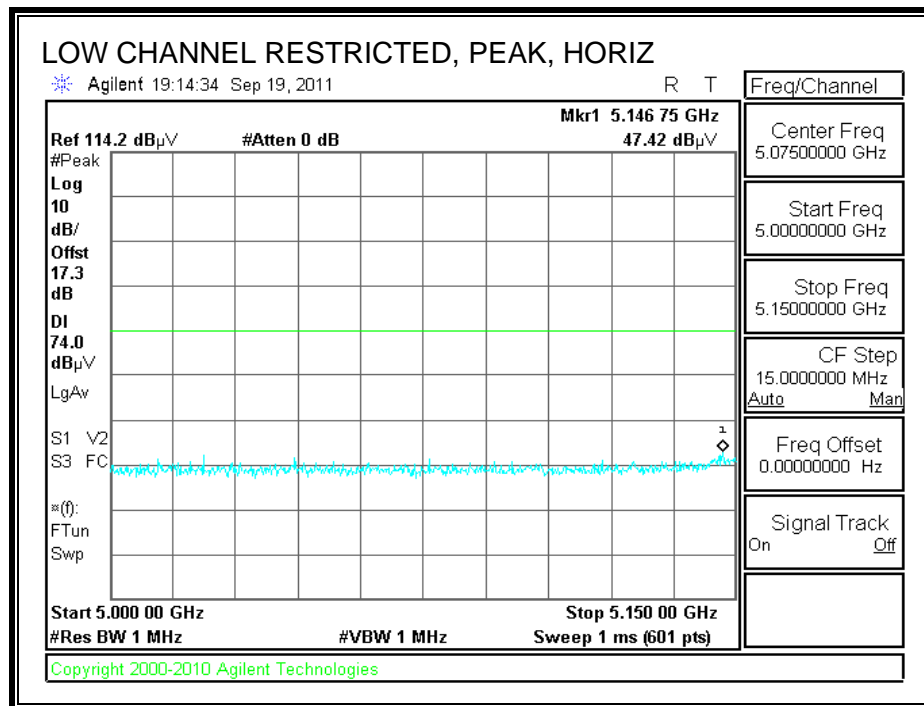
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5190 MHz															
15.570	3.0	33.2	39.6	13.0	-31.9	0.0	0.0	53.9	74.0	-20.1	V	P	98.0	37.0	
15.570	3.0	21.0	39.6	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	V	A	98.0	37.0	
15.570	3.0	33.7	39.6	13.0	-31.9	0.0	0.0	54.4	74.0	-19.6	H	P	98.0	37.0	
15.570	3.0	21.0	39.6	13.0	-31.9	0.0	0.0	41.7	54.0	-12.3	H	A	98.0	37.0	
High Ch. 5230 MHz															
15.690	3.0	33.2	39.5	13.0	-31.9	0.0	0.0	53.8	74.0	-20.2	V	P	142.0	336.0	
15.690	3.0	20.6	39.5	13.0	-31.9	0.0	0.0	41.3	54.0	-12.7	V	A	142.0	336.0	
15.690	3.0	33.1	39.5	13.0	-31.9	0.0	0.0	53.8	74.0	-20.2	H	P	98.0	178.0	
15.690	3.0	20.7	39.5	13.0	-31.9	0.0	0.0	41.3	54.0	-12.7	H	A	98.0	178.0	

Rev. 4.1.2.7

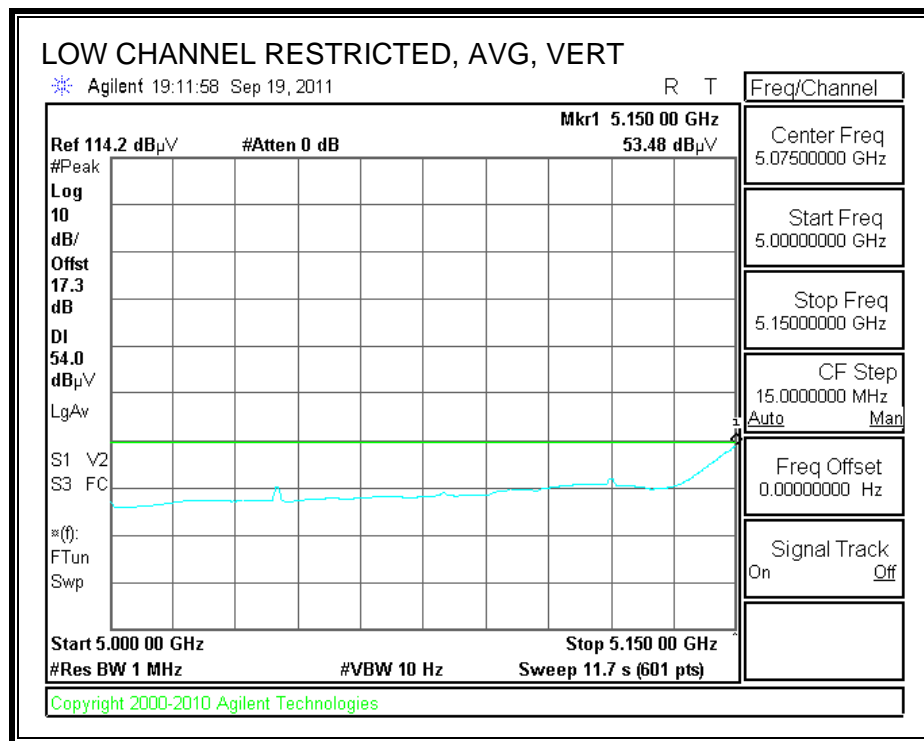
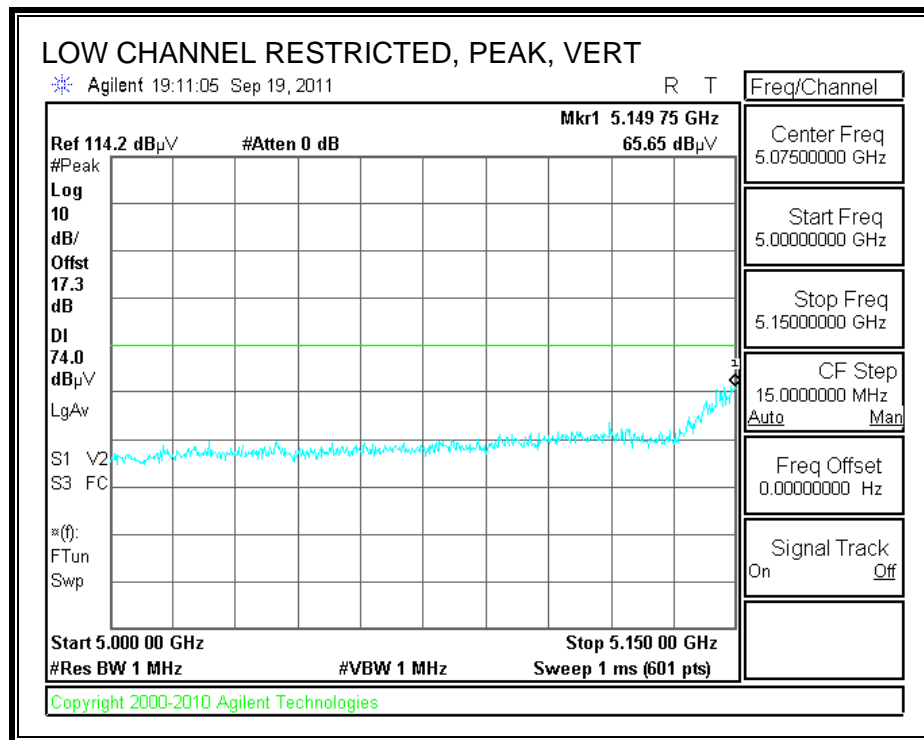
Note: No other emissions were detected above the system noise floor.

8.2.7. 802.11n HT40 MCS16 3TX MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/20/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_HT40 CDD MCS16 Mode

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fldr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5190 MHz															
15.570	3.0	34.4	39.6	13.0	-31.9	0.0	0.0	55.1	74.0	-18.9	V	P	181.0	170.0	
15.570	3.0	21.0	39.6	13.0	-31.9	0.0	0.0	41.7	54.0	-12.4	V	A	181.0	170.0	
15.570	3.0	34.4	39.6	13.0	-31.9	0.0	0.0	55.1	74.0	-18.9	H	P	98.0	215.0	
15.570	3.0	21.0	39.6	13.0	-31.9	0.0	0.0	41.7	54.0	-12.3	H	A	98.0	215.0	
High Ch. 5230 MHz															
15.690	3.0	32.5	39.5	13.0	-31.9	0.0	0.0	53.2	74.0	-20.8	V	P	185.0	219.0	
15.690	3.0	20.7	39.5	13.0	-31.9	0.0	0.0	41.4	54.0	-12.6	V	A	185.0	219.0	
15.690	3.0	34.0	39.5	13.0	-31.9	0.0	0.0	54.6	74.0	-19.4	H	P	158.0	23.0	
15.690	3.0	20.7	39.5	13.0	-31.9	0.0	0.0	41.4	54.0	-12.6	H	A	158.0	23.0	

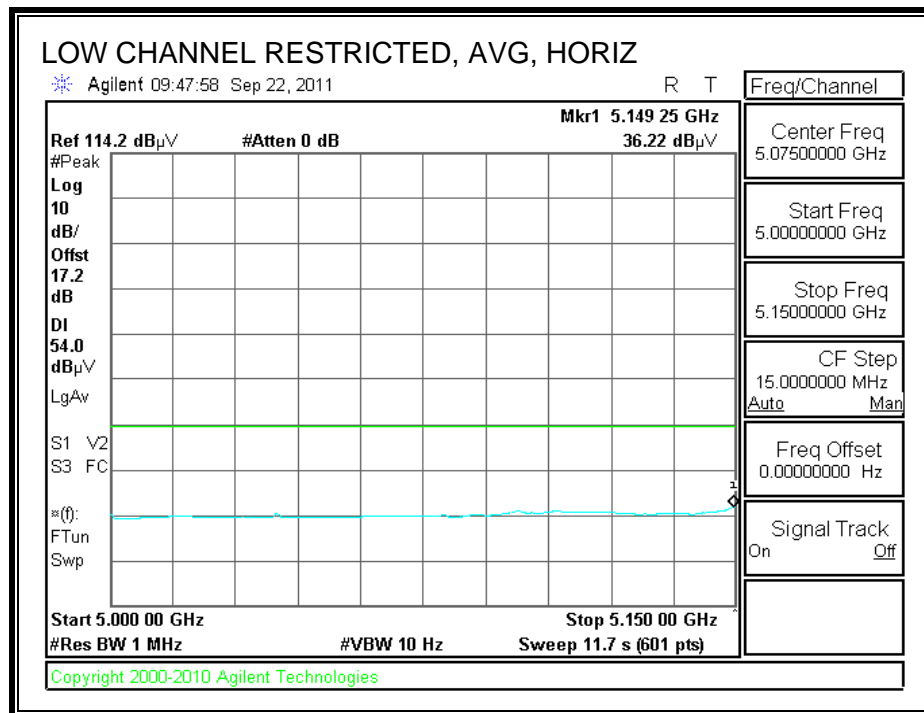
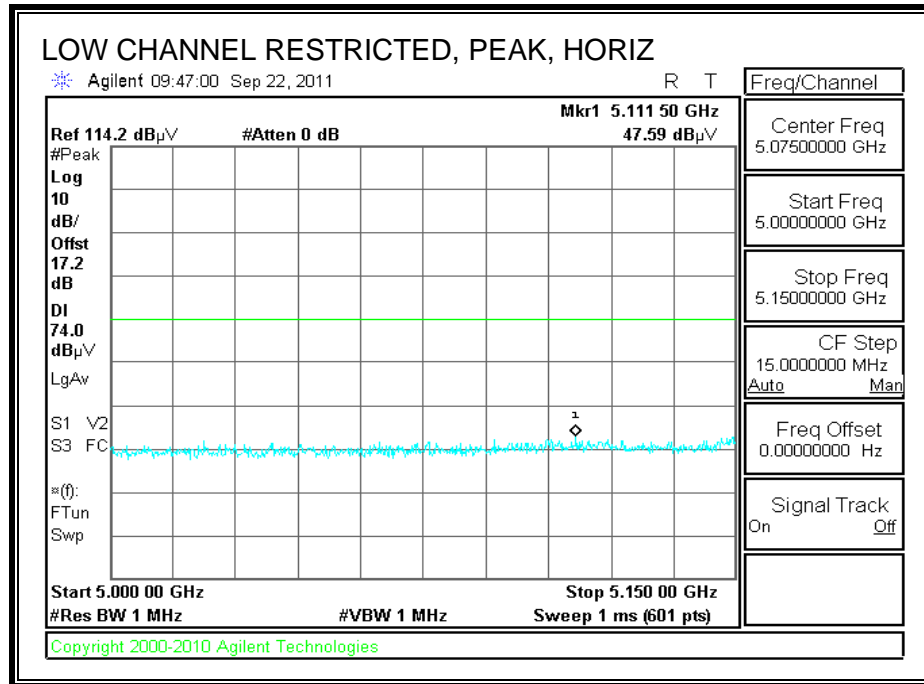
Rev. 4.1.2.7

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

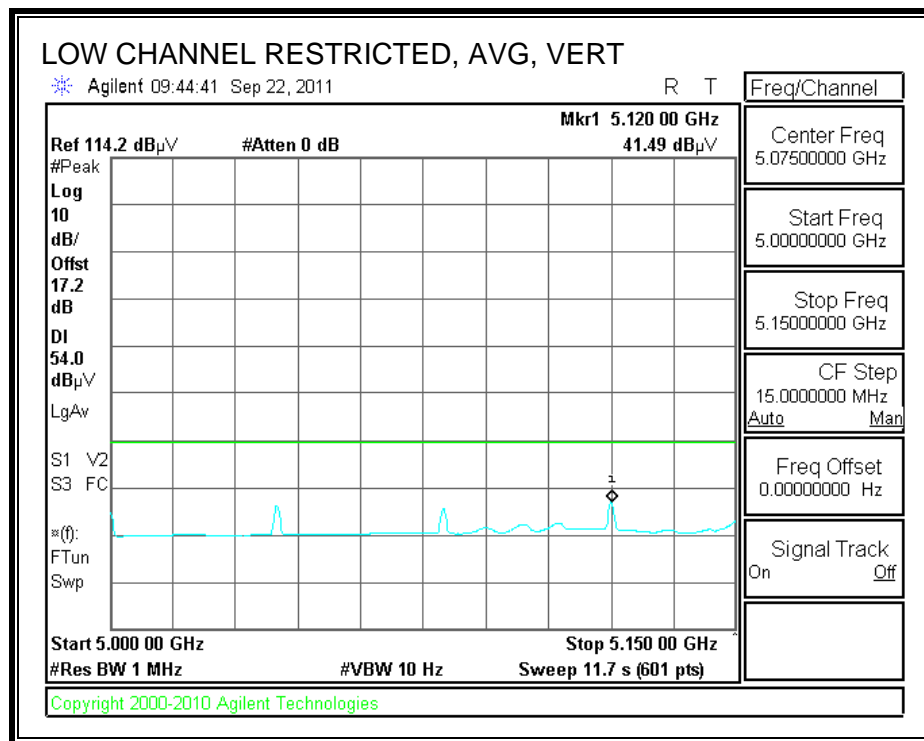
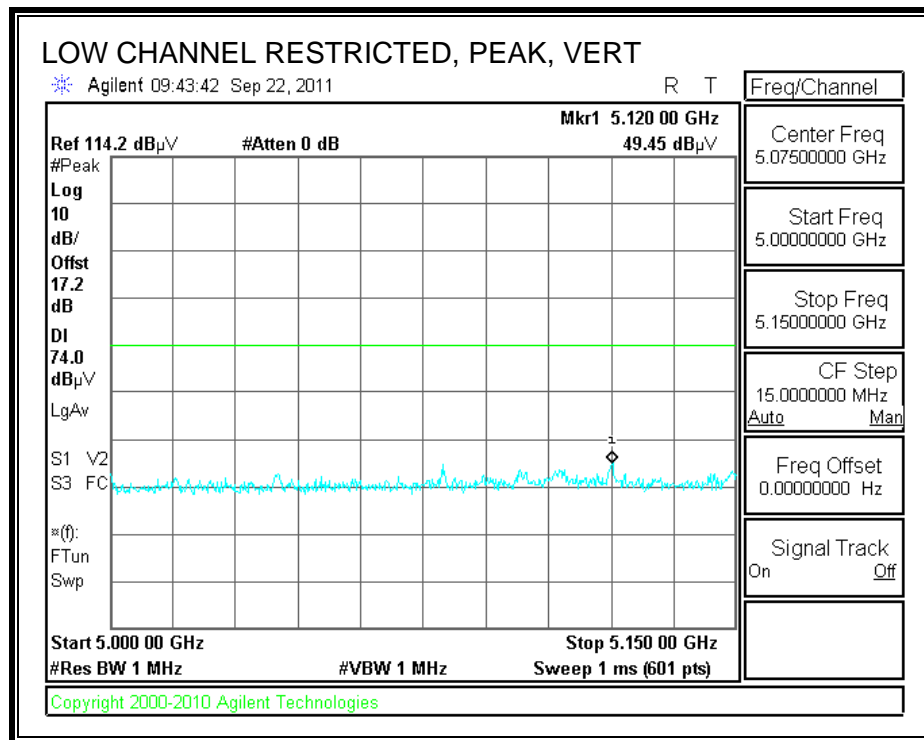
FRACTAL ANTENNA; 3dBi

8.2.8. 802.11a 3TX MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/23/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_11a CDD Mode

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

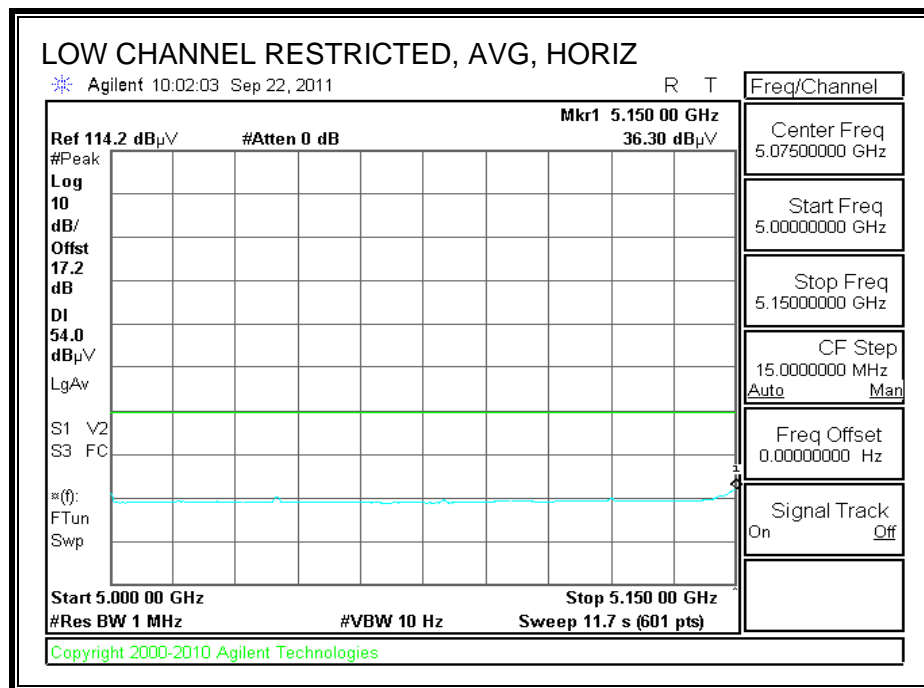
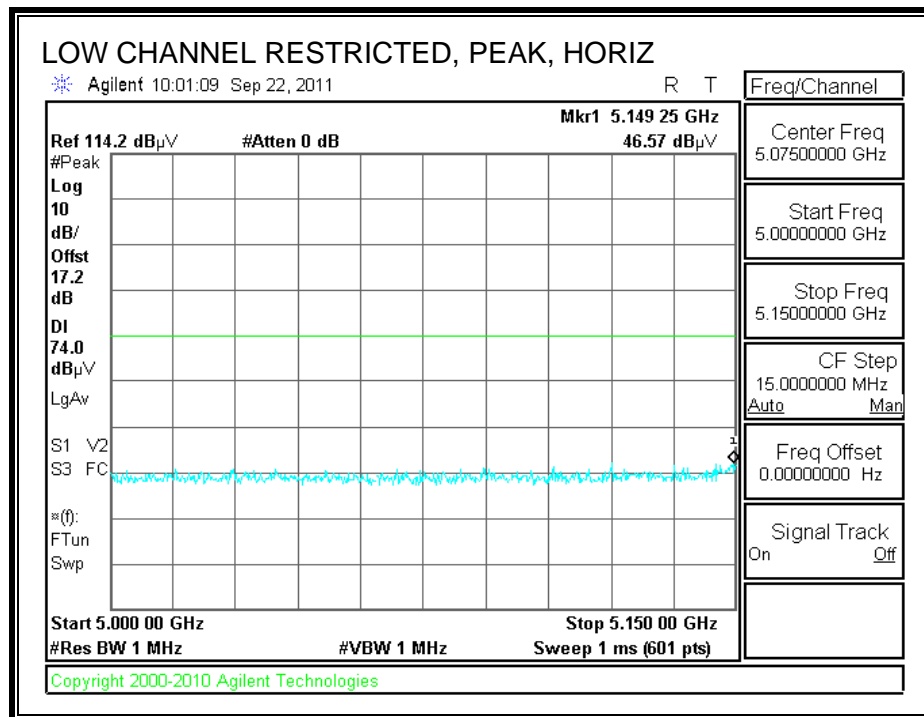
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5180 MHz															
15.540	3.0	33.8	39.7	13.0	-31.9	0.0	0.0	54.5	74.0	-19.5	V	P	98.0	84.0	
15.540	3.0	21.2	39.7	13.0	-31.9	0.0	0.0	41.9	54.0	-12.1	V	A	98.0	84.0	
15.540	3.0	33.6	39.7	13.0	-31.9	0.0	0.0	54.3	74.0	-19.7	H	P	190.0	232.0	
15.540	3.0	21.1	39.7	13.0	-31.9	0.0	0.0	41.8	54.0	-12.2	H	A	190.0	232.0	
Mid Ch. 5200 MHz															
15.600	3.0	33.3	39.6	13.0	-31.9	0.0	0.0	54.0	74.0	-20.0	H	P	0.0	38.0	
15.600	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.5	54.0	-12.5	H	A	0.0	38.0	
15.600	3.0	33.1	39.6	13.0	-31.9	0.0	0.0	53.8	74.0	-20.2	V	P	198.0	314.0	
15.600	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.5	54.0	-12.5	V	A	198.0	314.0	
High Ch. 5240 MHz															
15.720	3.0	32.9	39.4	13.1	-31.9	0.0	0.0	53.5	74.0	-20.5	V	P	98.0	88.0	
15.720	3.0	20.4	39.4	13.1	-31.9	0.0	0.0	41.0	54.0	-13.0	V	A	98.0	88.0	
15.720	3.0	31.9	39.4	13.1	-31.9	0.0	0.0	52.5	74.0	-21.5	H	P	147.0	248.0	
15.720	3.0	20.3	39.4	13.1	-31.9	0.0	0.0	40.9	54.0	-13.1	H	A	147.0	248.0	

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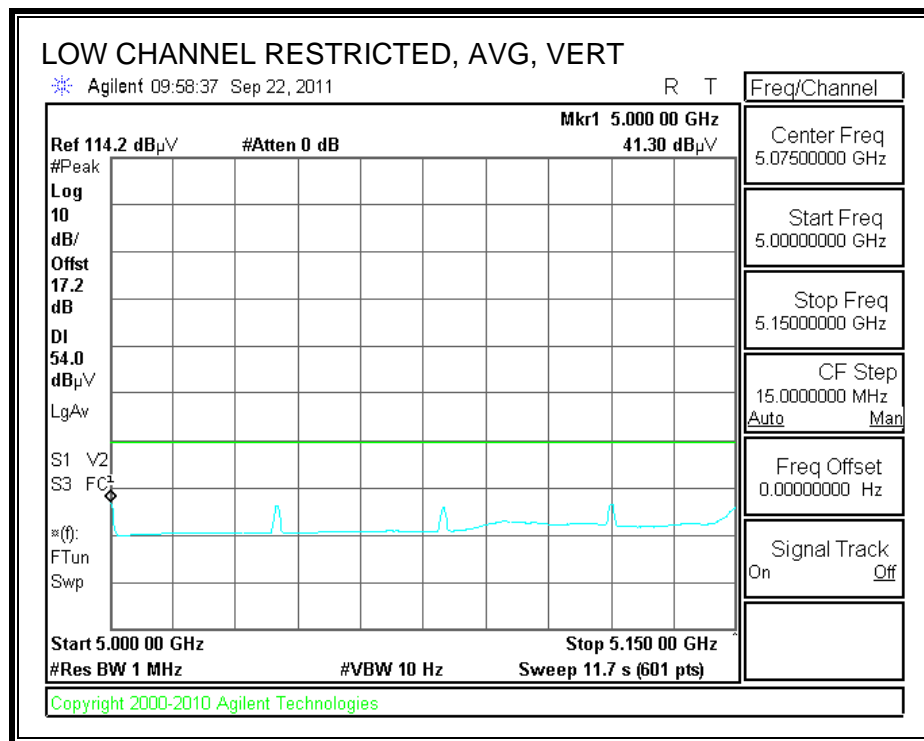
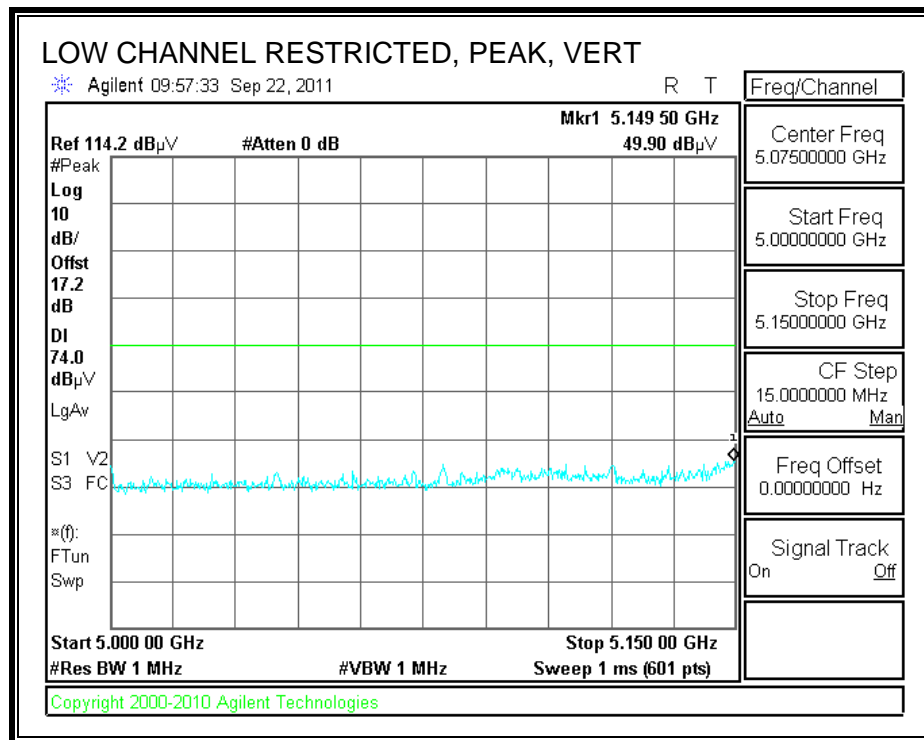
Note: No other emissions were detected above the system noise floor.

8.2.9. 802.11n HT20 CDD MCS0 MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/23/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_HT20 CDD MCS0 Mode

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

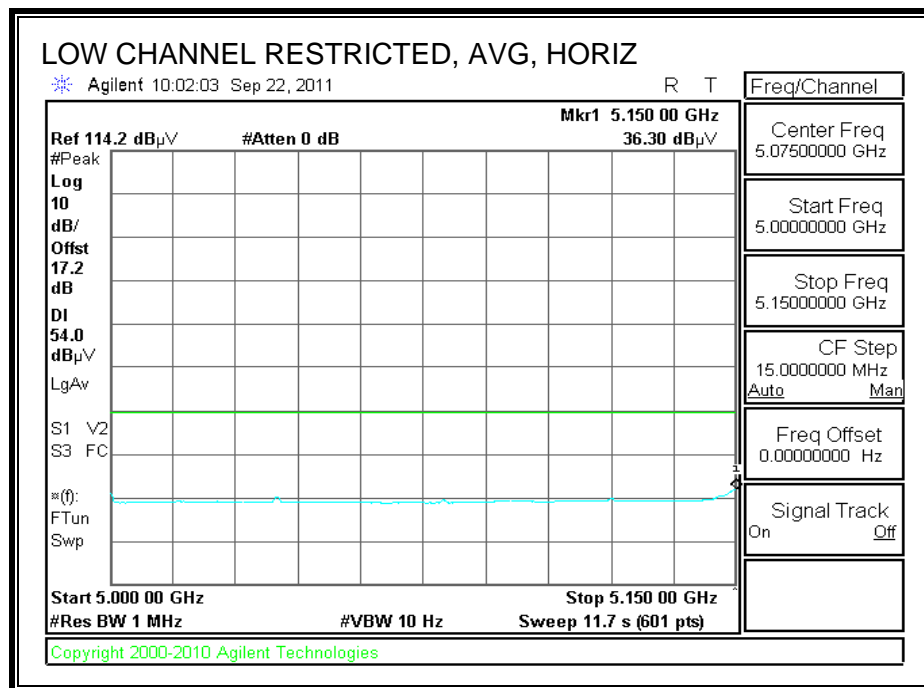
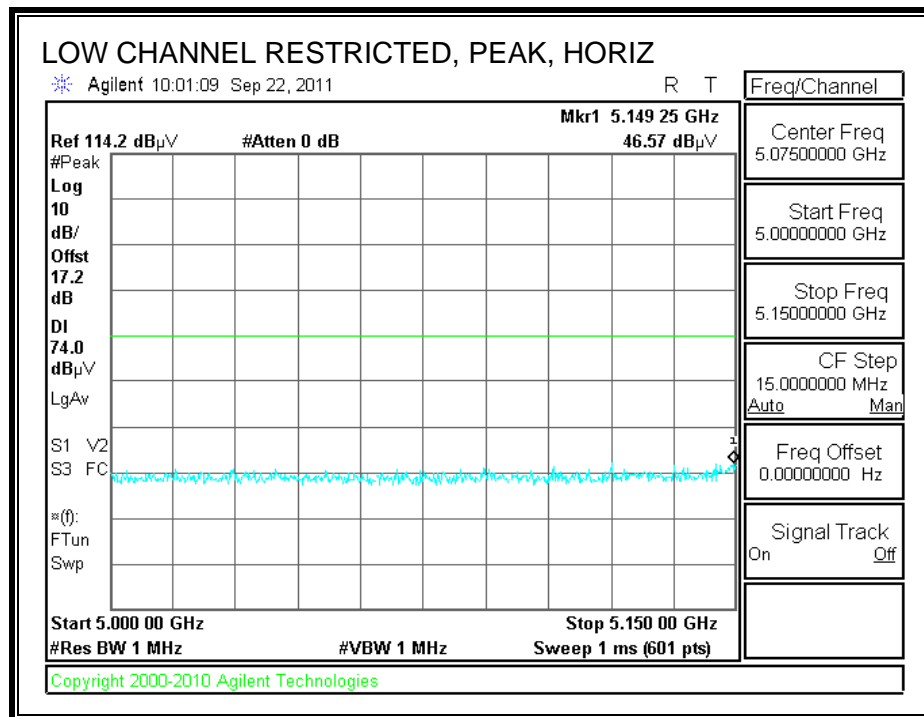
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5180 MHz															
15.540	3.0	32.5	39.7	13.0	-31.9	0.0	0.0	53.2	74.0	-20.8	V	P	129.0	362.0	
15.540	3.0	20.8	39.7	13.0	-31.9	0.0	0.0	41.5	54.0	-12.5	V	A	129.0	362.0	
15.540	3.0	33.1	39.7	13.0	-31.9	0.0	0.0	53.8	74.0	-20.2	H	P	198.0	160.0	
15.540	3.0	20.8	39.7	13.0	-31.9	0.0	0.0	41.5	54.0	-12.5	H	A	198.0	160.0	
Mid Ch. 5200 MHz															
15.600	3.0	32.9	39.6	13.0	-31.9	0.0	0.0	53.6	74.0	-20.4	H	P	176.0	206.0	
15.600	3.0	20.7	39.6	13.0	-31.9	0.0	0.0	41.4	54.0	-12.6	H	A	176.0	206.0	
15.600	3.0	33.2	39.6	13.0	-31.9	0.0	0.0	53.9	74.0	-20.1	V	P	172.0	59.0	
15.600	3.0	20.8	39.6	13.0	-31.9	0.0	0.0	41.4	54.0	-12.6	V	A	172.0	59.0	
High Ch. 5240 MHz															
15.720	3.0	32.9	39.4	13.1	-31.9	0.0	0.0	53.5	74.0	-20.5	V	P	120.0	115.0	
15.720	3.0	20.3	39.4	13.1	-31.9	0.0	0.0	40.9	54.0	-13.1	V	A	120.0	115.0	
15.720	3.0	32.8	39.4	13.1	-31.9	0.0	0.0	53.5	74.0	-20.5	H	P	108.0	146.0	
15.720	3.0	20.3	39.4	13.1	-31.9	0.0	0.0	41.0	54.0	-13.0	H	A	108.0	146.0	

Rev. 4.1.2.7

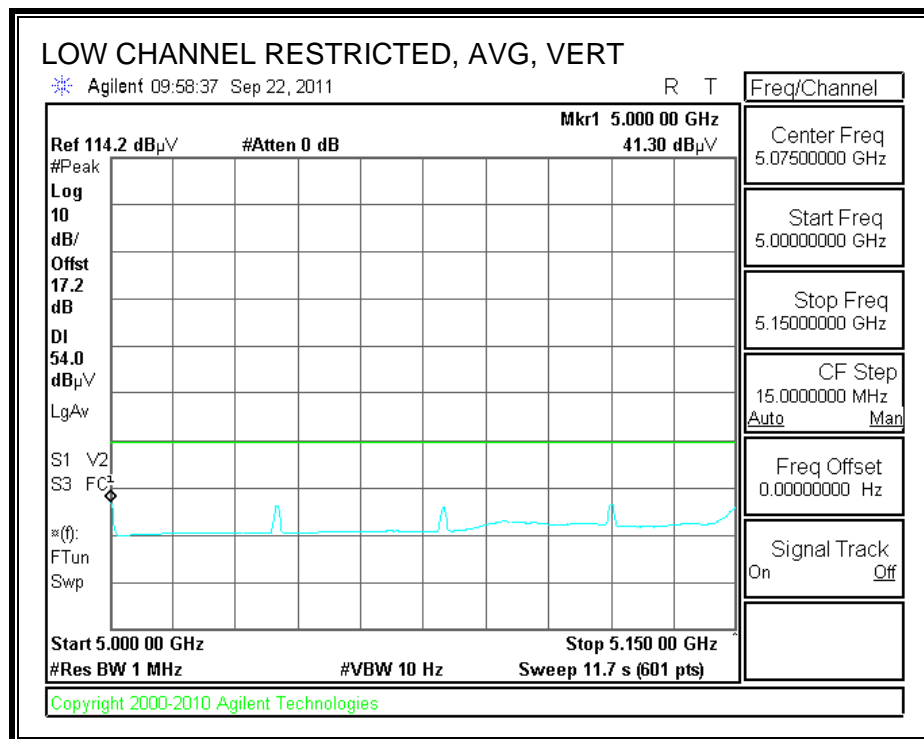
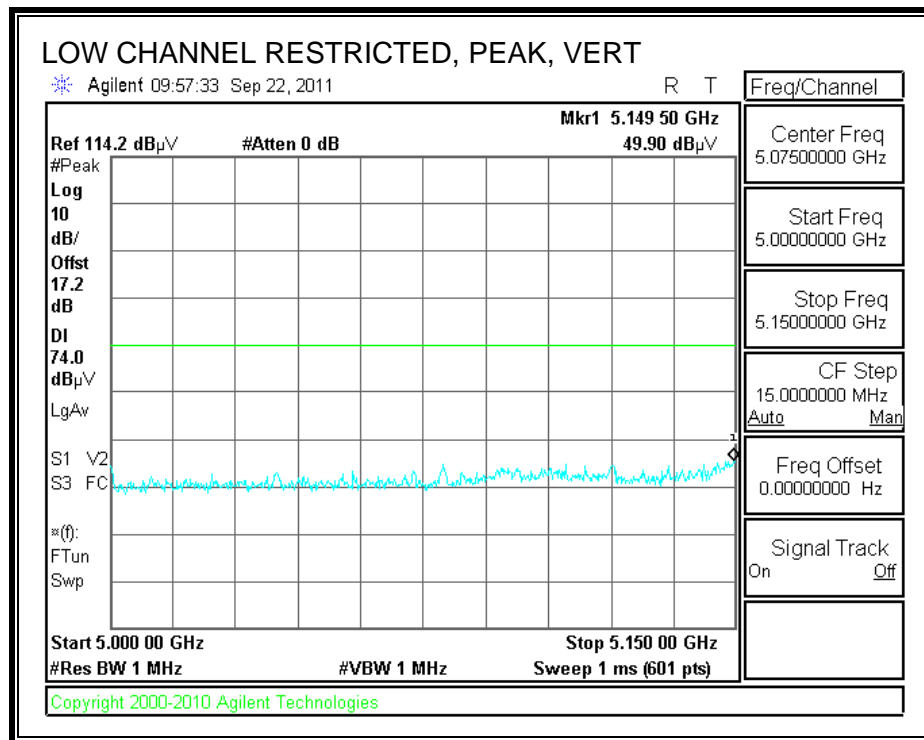
Note: No other emissions were detected above the system noise floor.

8.2.10. 802.11n HT20 MCS8 3TX MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/23/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_HT20 CDD MCS0 Mode

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

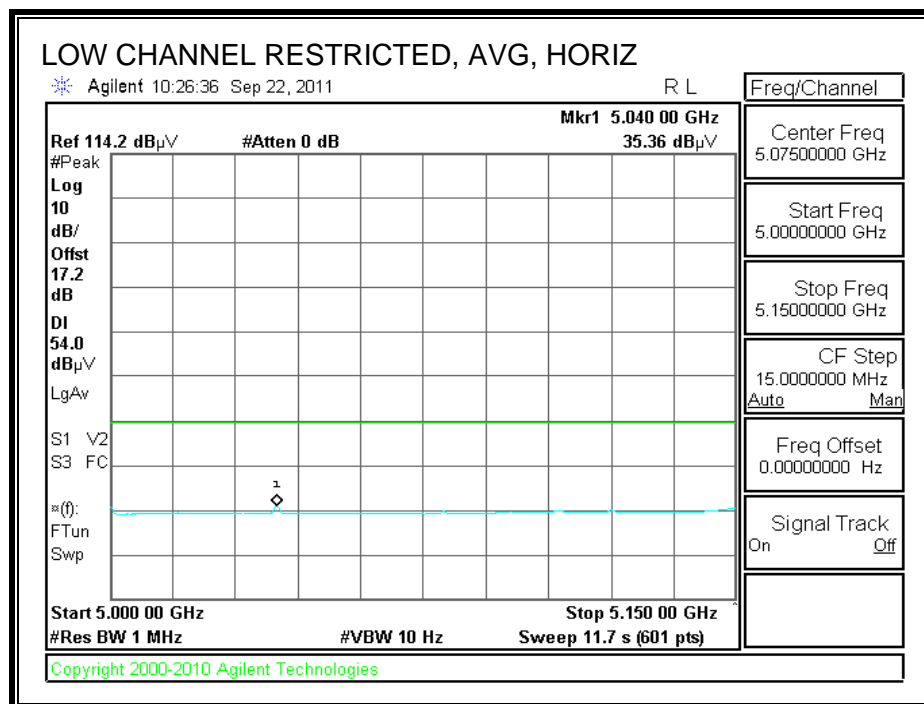
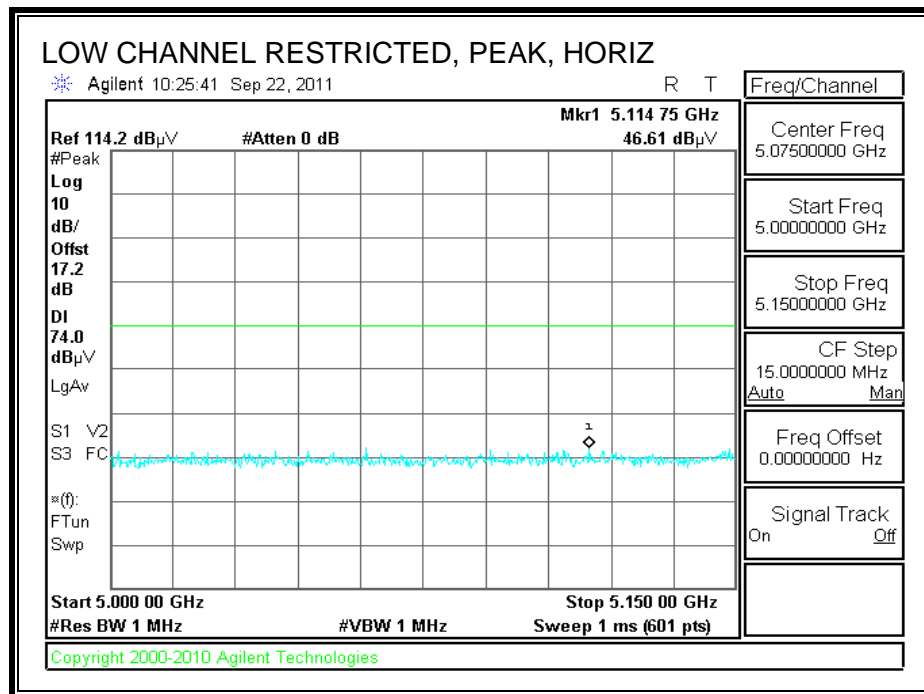
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fldr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5180 MHz															
15.540	3.0	32.5	39.7	13.0	-31.9	0.0	0.0	53.2	74.0	-20.8	V	P	129.0	362.0	
15.540	3.0	20.8	39.7	13.0	-31.9	0.0	0.0	41.5	54.0	-12.5	V	A	129.0	362.0	
15.540	3.0	33.1	39.7	13.0	-31.9	0.0	0.0	53.8	74.0	-20.2	H	P	198.0	160.0	
15.540	3.0	20.8	39.7	13.0	-31.9	0.0	0.0	41.5	54.0	-12.5	H	A	198.0	160.0	
Mid Ch. 5200 MHz															
15.600	3.0	32.9	39.6	13.0	-31.9	0.0	0.0	53.6	74.0	-20.4	H	P	176.0	206.0	
15.600	3.0	20.7	39.6	13.0	-31.9	0.0	0.0	41.4	54.0	-12.6	H	A	176.0	206.0	
15.600	3.0	33.2	39.6	13.0	-31.9	0.0	0.0	53.9	74.0	-20.1	V	P	172.0	59.0	
15.600	3.0	20.8	39.6	13.0	-31.9	0.0	0.0	41.4	54.0	-12.6	V	A	172.0	59.0	
High Ch. 5240 MHz															
15.720	3.0	32.9	39.4	13.1	-31.9	0.0	0.0	53.5	74.0	-20.5	V	P	120.0	115.0	
15.720	3.0	20.3	39.4	13.1	-31.9	0.0	0.0	40.9	54.0	-13.1	V	A	120.0	115.0	
15.720	3.0	32.8	39.4	13.1	-31.9	0.0	0.0	53.5	74.0	-20.5	H	P	108.0	146.0	
15.720	3.0	20.3	39.4	13.1	-31.9	0.0	0.0	41.0	54.0	-13.0	H	A	108.0	146.0	

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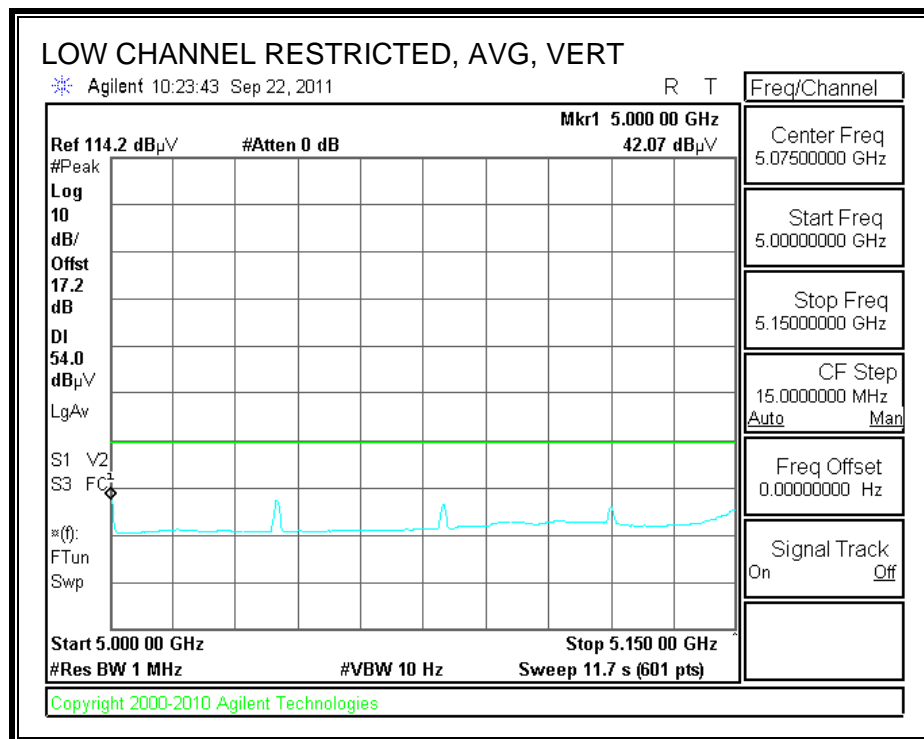
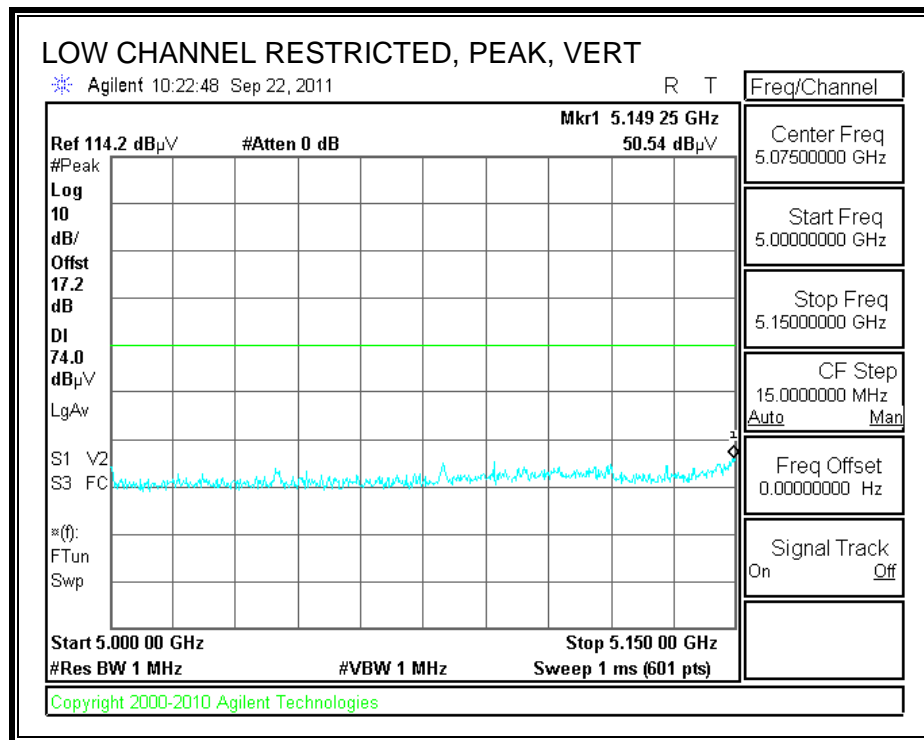
Note: No other emissions were detected above the system noise floor.

8.2.11. 802.11n HT20 MCS16 3TX MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/23/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_HT10 CDD MCS16 Mode

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

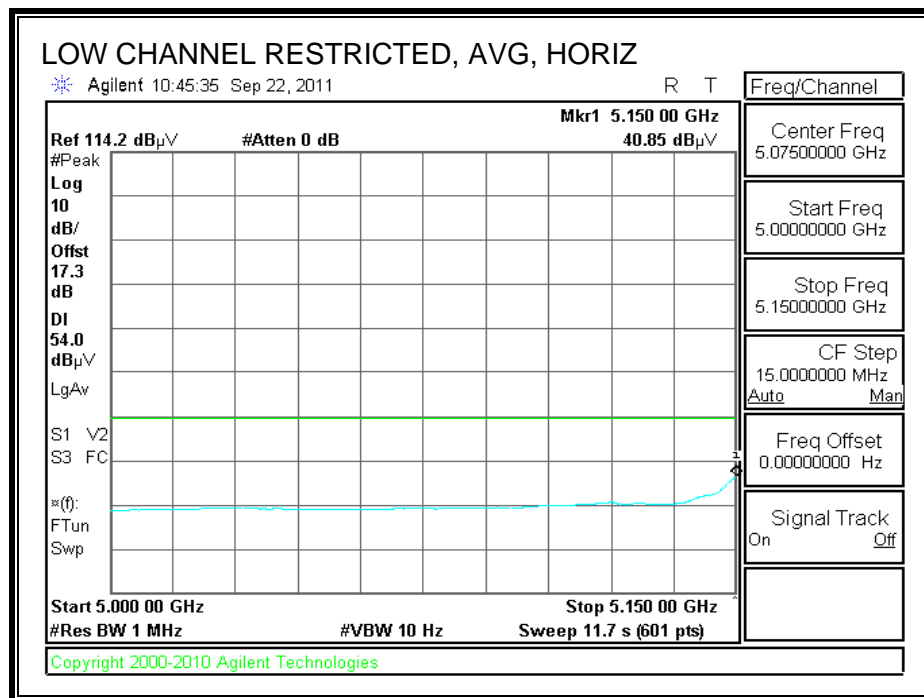
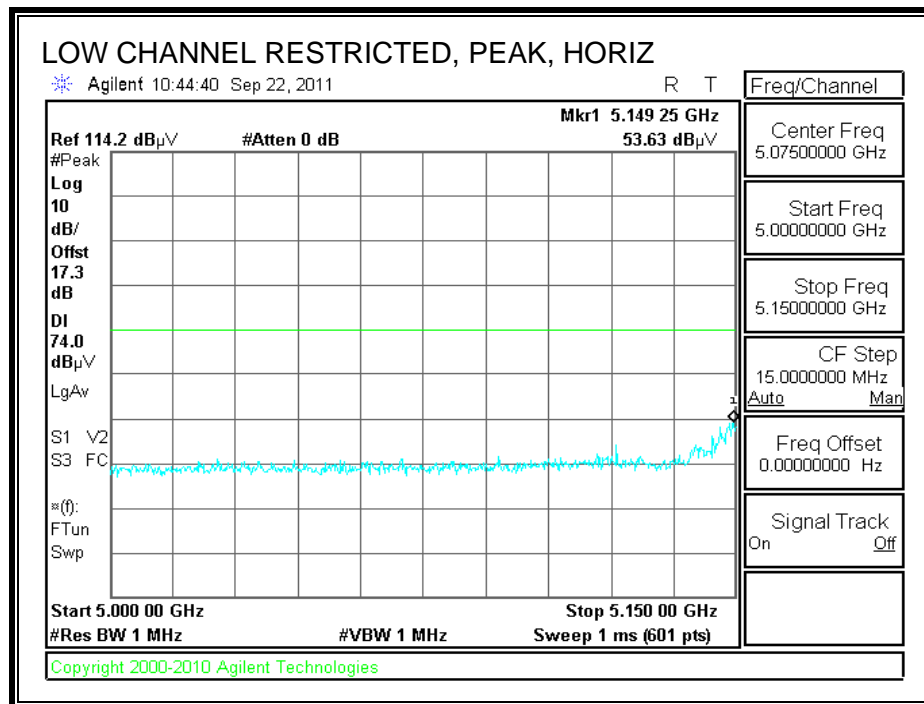
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5180 MHz															
15.540	3.0	33.2	39.7	13.0	-31.9	0.0	0.0	53.9	74.0	-20.1	V	P	197.0	83.0	
15.540	3.0	20.8	39.7	13.0	-31.9	0.0	0.0	41.5	54.0	-12.5	V	A	197.0	83.0	
15.540	3.0	33.1	39.7	13.0	-31.9	0.0	0.0	53.8	74.0	-20.2	H	P	130.0	139.0	
15.540	3.0	20.9	39.7	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	H	A	130.0	139.0	
Mid Ch. 5200 MHz															
15.600	3.0	34.1	39.6	13.0	-31.9	0.0	0.0	54.8	74.0	-19.2	H	P	122.0	194.0	
15.600	3.0	20.7	39.6	13.0	-31.9	0.0	0.0	41.4	54.0	-12.6	H	A	122.0	194.0	
15.600	3.0	33.8	39.6	13.0	-31.9	0.0	0.0	54.5	74.0	-19.5	V	P	189.0	320.0	
15.600	3.0	20.7	39.6	13.0	-31.9	0.0	0.0	41.4	54.0	-12.6	V	A	189.0	320.0	
High Ch. 5240 MHz															
15.720	3.0	32.4	39.4	13.1	-31.9	0.0	0.0	53.1	74.0	-21.0	V	P	98.0	105.0	
15.720	3.0	20.3	39.4	13.1	-31.9	0.0	0.0	40.9	54.0	-13.1	V	A	98.0	105.0	
15.720	3.0	33.4	39.4	13.1	-31.9	0.0	0.0	54.0	74.0	-20.0	H	P	178.0	187.0	
15.720	3.0	20.3	39.4	13.1	-31.9	0.0	0.0	41.0	54.0	-13.0	H	A	178.0	187.0	

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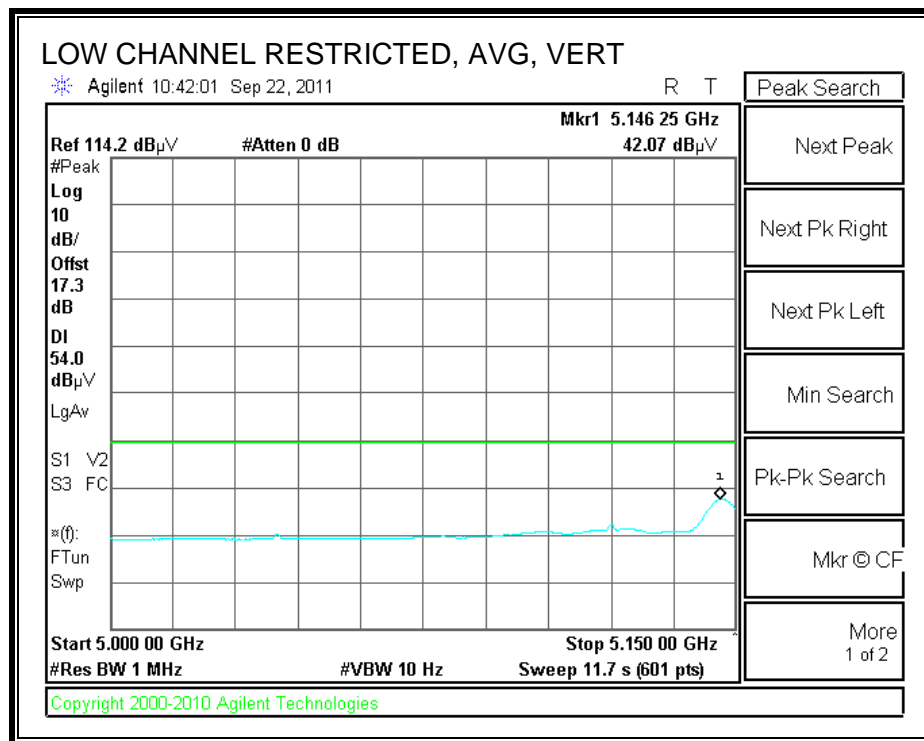
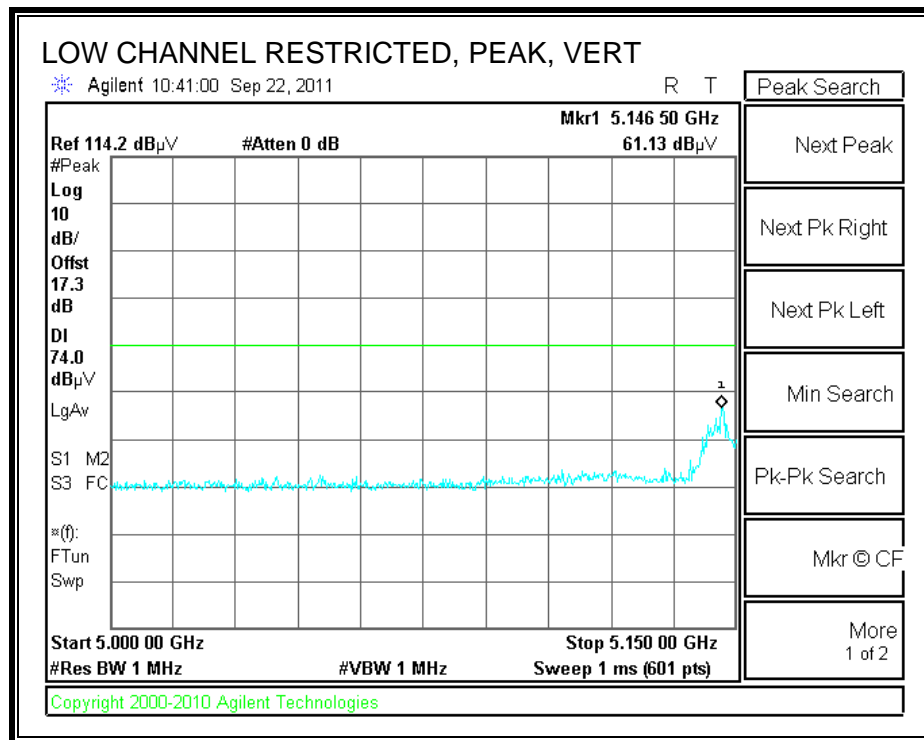
Note: No other emissions were detected above the system noise floor.

8.2.12. 802.11n HT40 MCS0 3TX MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/23/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_HT40 CDD MCS0 Mode

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

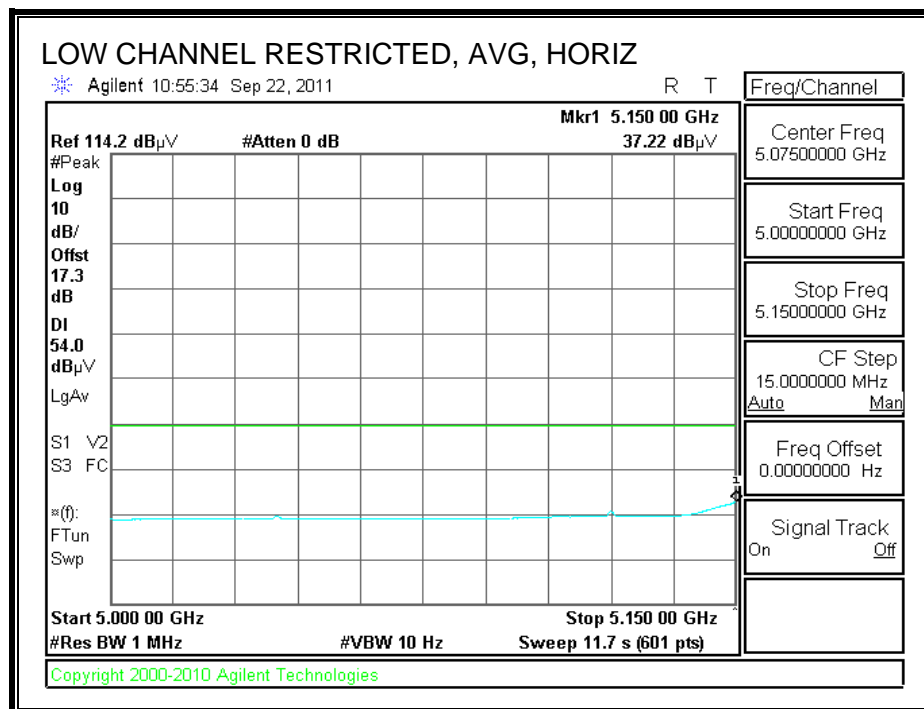
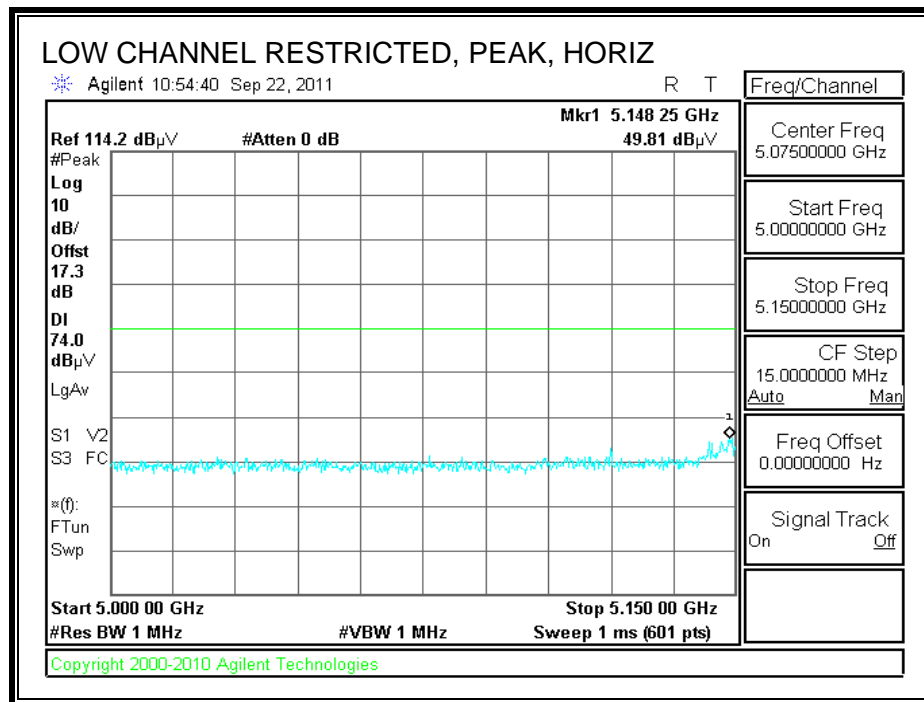
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5190 MHz															
15.570	3.0	32.8	39.6	13.0	-31.9	0.0	0.0	53.5	74.0	-20.5	V	P	108.0	221.0	
15.570	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	V	A	108.0	221.0	
15.570	3.0	33.0	39.6	13.0	-31.9	0.0	0.0	53.7	74.0	-20.3	H	P	98.0	54.0	
15.570	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	H	A	98.0	54.0	
High Ch. 5230 MHz															
15.690	3.0	32.9	39.5	13.0	-31.9	0.0	0.0	53.6	74.0	-20.4	H	P	118.0	245.0	
15.690	3.0	20.6	39.5	13.0	-31.9	0.0	0.0	41.3	54.0	-12.8	H	A	118.0	245.0	
15.690	3.0	33.0	39.5	13.0	-31.9	0.0	0.0	53.6	74.0	-20.4	V	P	182.0	249.0	
15.690	3.0	20.6	39.5	13.0	-31.9	0.0	0.0	41.2	54.0	-12.8	V	A	182.0	249.0	

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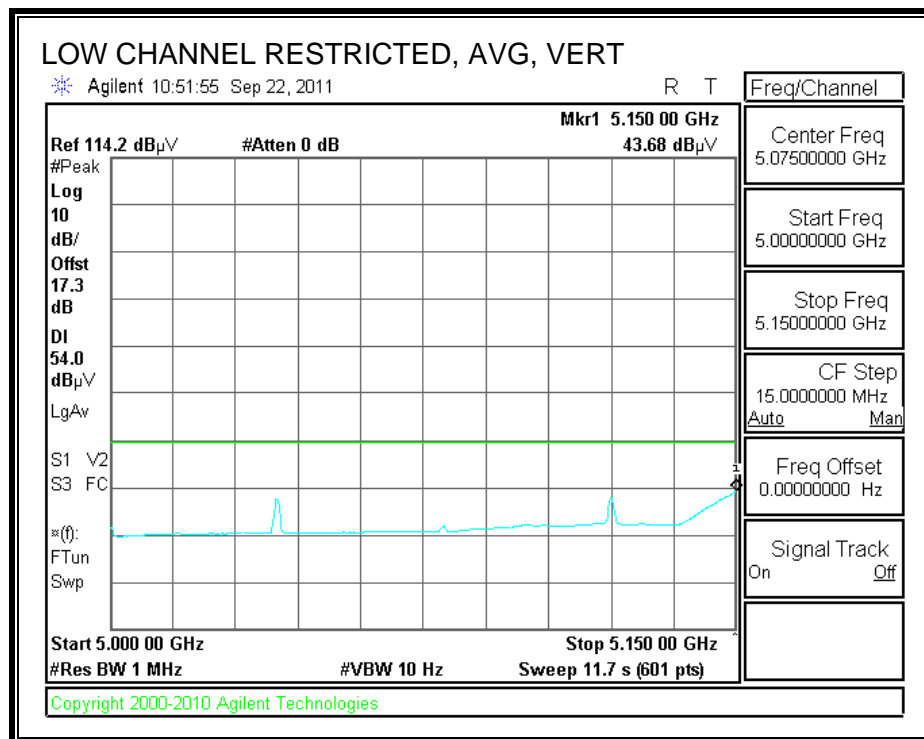
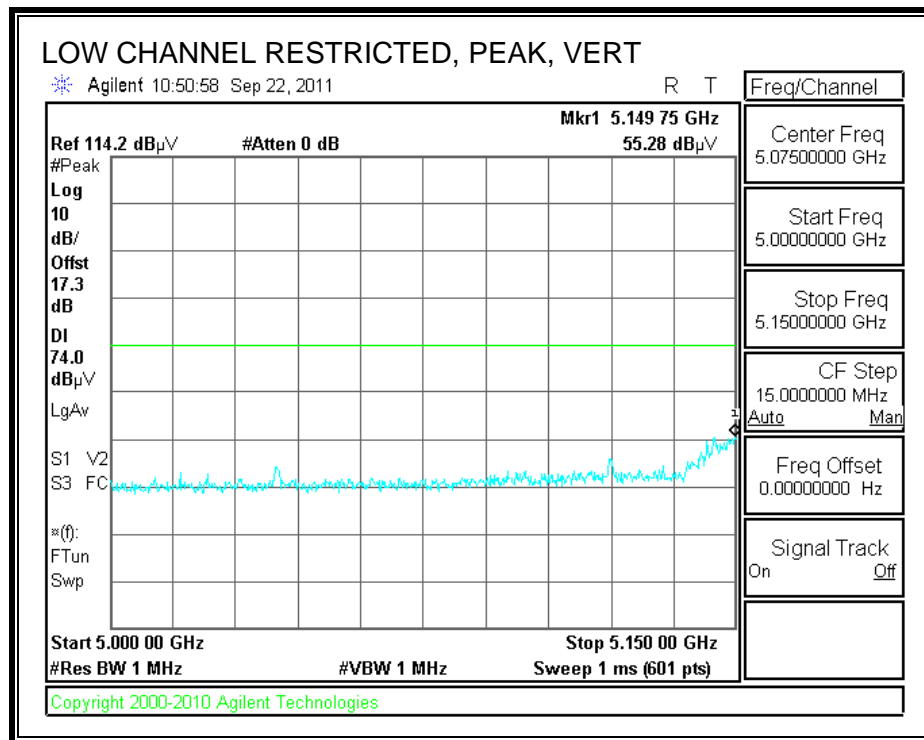
Note: No other emissions were detected above the system noise floor.

8.2.13. 802.11n HT40 MCS8 3TX MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/23/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_HT40 CDD MCS8 Mode

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

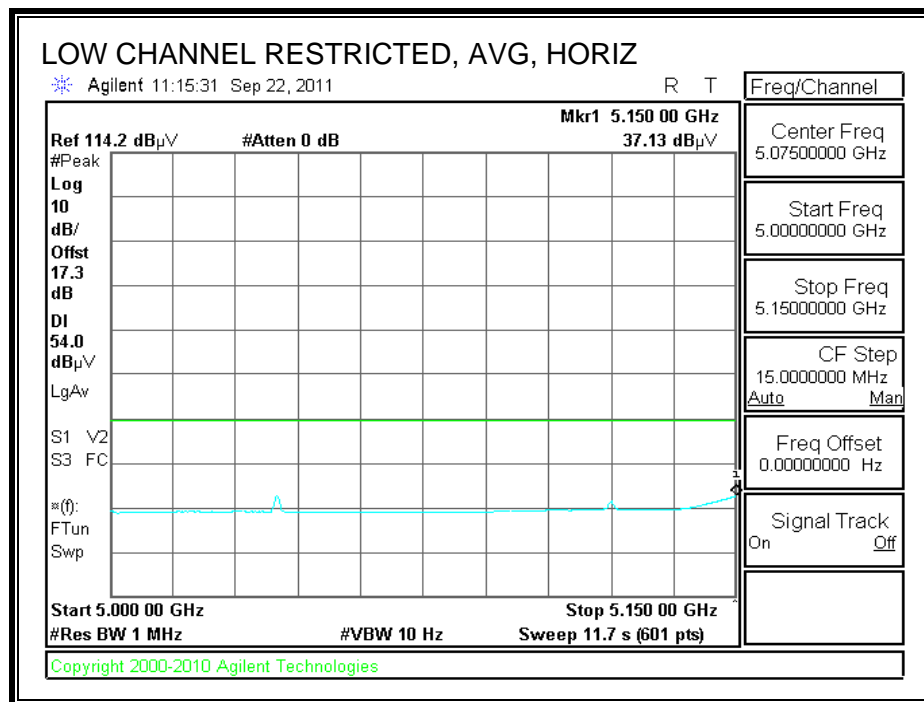
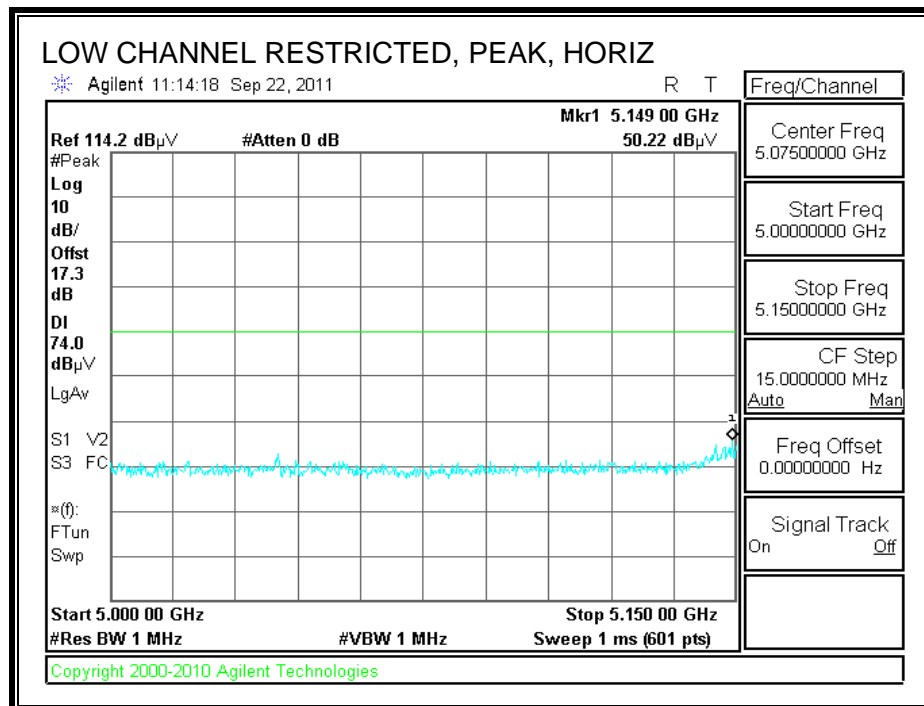
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5190 MHz															
15.570	3.0	32.9	39.6	13.0	-31.9	0.0	0.0	53.6	74.0	-20.4	V	P	179.0	13.0	
15.570	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	V	A	179.0	13.0	
15.570	3.0	33.9	39.6	13.0	-31.9	0.0	0.0	54.6	74.0	-19.4	H	P	103.0	27.0	
15.570	3.0	20.9	39.6	13.0	-31.9	0.0	0.0	41.6	54.0	-12.4	H	A	103.0	27.0	
High Ch. 5230 MHz															
15.690	3.0	32.8	39.5	13.0	-31.9	0.0	0.0	53.5	74.0	-20.5	H	P	145.0	56.0	
15.690	3.0	20.6	39.5	13.0	-31.9	0.0	0.0	41.2	54.0	-12.8	H	A	145.0	56.0	
15.690	3.0	32.3	39.5	13.0	-31.9	0.0	0.0	53.0	74.0	-21.0	V	P	151.0	333.0	
15.690	3.0	20.6	39.5	13.0	-31.9	0.0	0.0	41.3	54.0	-12.7	V	A	151.0	333.0	

Rev. 4.1.2.7

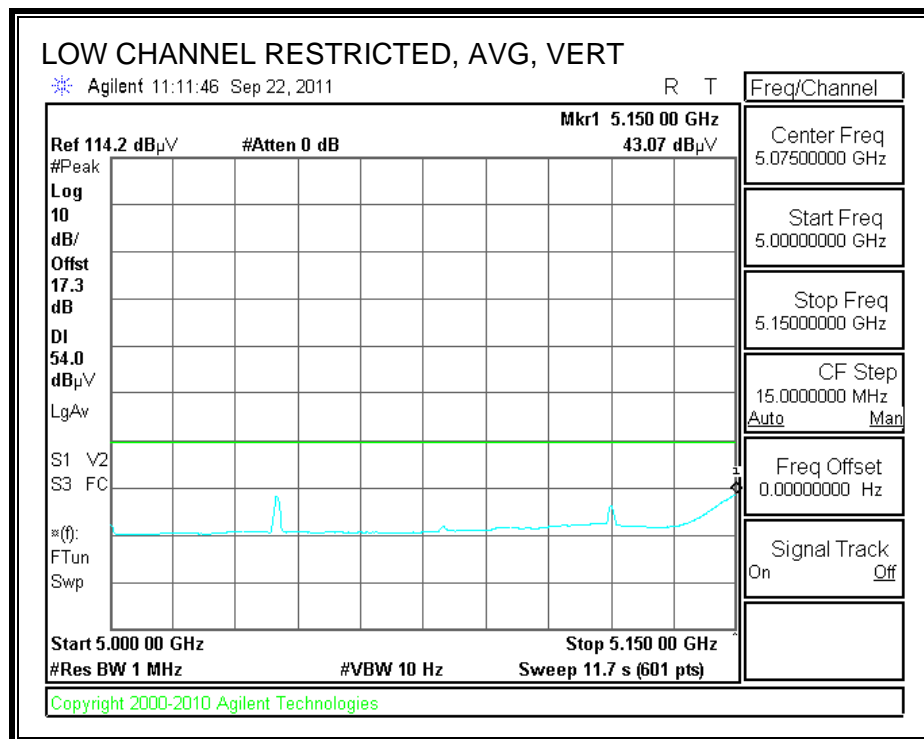
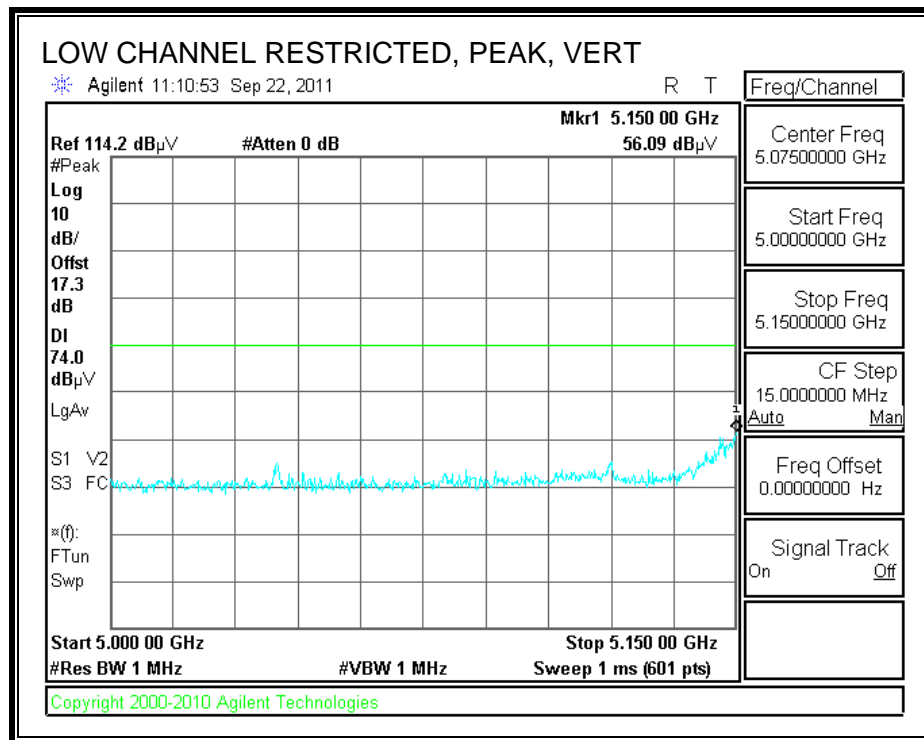
Note: No other emissions were detected above the system noise floor.

8.2.14. 802.11n HT40 MCS16 3TX MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/23/11
Project #: 11U13957
Company: Varian Card Access
Test Target: FCC Class B
Mode Oper: Tx 5.2 GHz_HT40 CDD MCS16 Mode

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

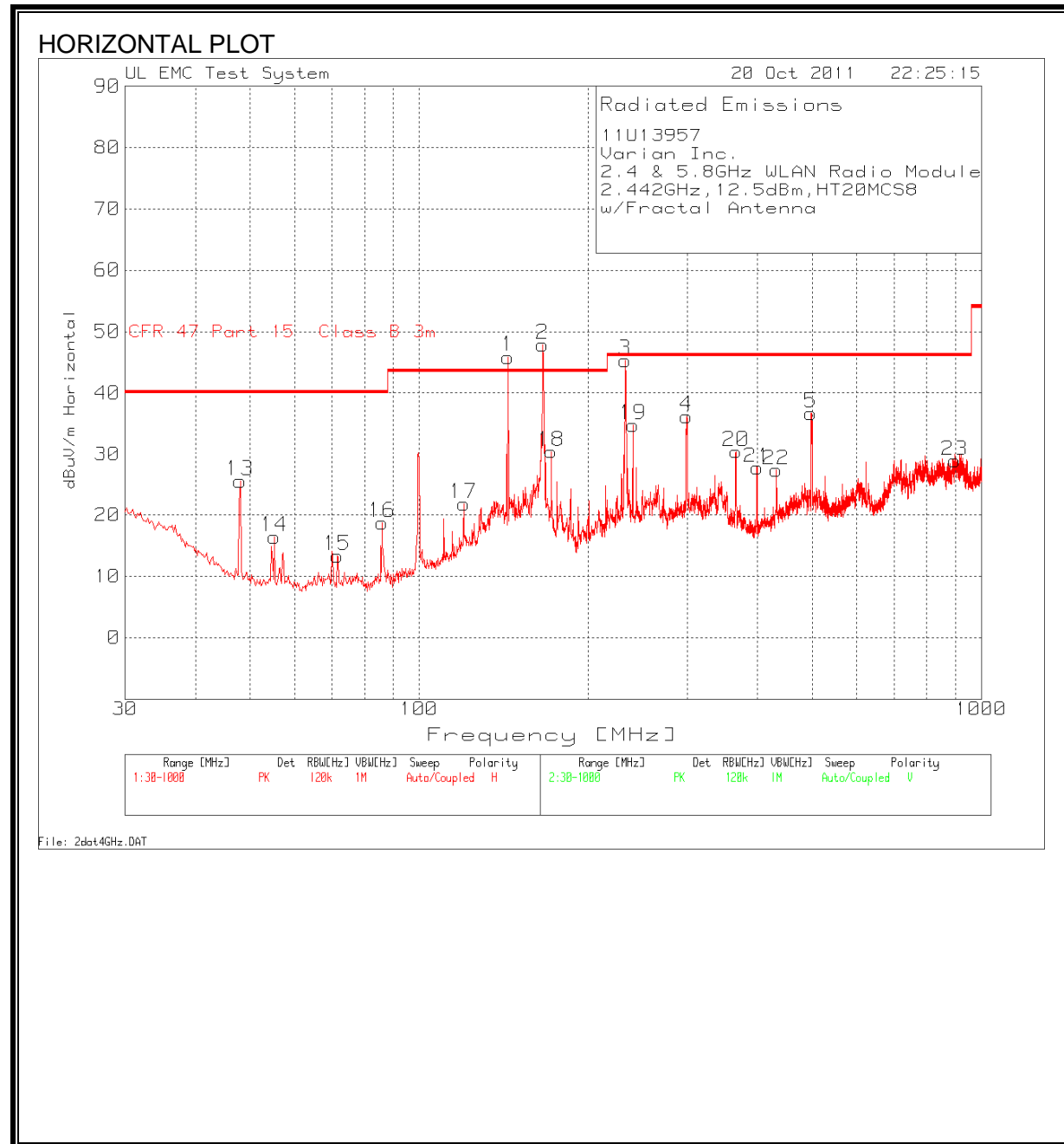
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5190 MHz															
15.570	3.0	32.7	39.6	13.0	-31.9	0.0	0.0	53.4	74.0	-20.6	V	P	157.0	249.0	
15.570	3.0	20.7	39.6	13.0	-31.9	0.0	0.0	41.4	54.0	-12.6	V	A	157.0	249.0	
15.570	3.0	32.9	39.6	13.0	-31.9	0.0	0.0	53.6	74.0	-20.4	H	P	174.0	312.0	
15.570	3.0	20.8	39.6	13.0	-31.9	0.0	0.0	41.4	54.0	-12.6	H	A	174.0	312.0	
High Ch. 5230 MHz															
15.690	3.0	33.3	39.5	13.0	-31.9	0.0	0.0	54.0	74.0	-20.0	H	P	177.0	153.0	
15.690	3.0	20.5	39.5	13.0	-31.9	0.0	0.0	41.1	54.0	-12.9	H	A	177.0	153.0	
15.690	3.0	33.0	39.5	13.0	-31.9	0.0	0.0	53.6	74.0	-20.4	V	P	185.0	230.0	
15.690	3.0	20.5	39.5	13.0	-31.9	0.0	0.0	41.1	54.0	-12.9	V	A	185.0	230.0	

Rev. 4.1.2.7

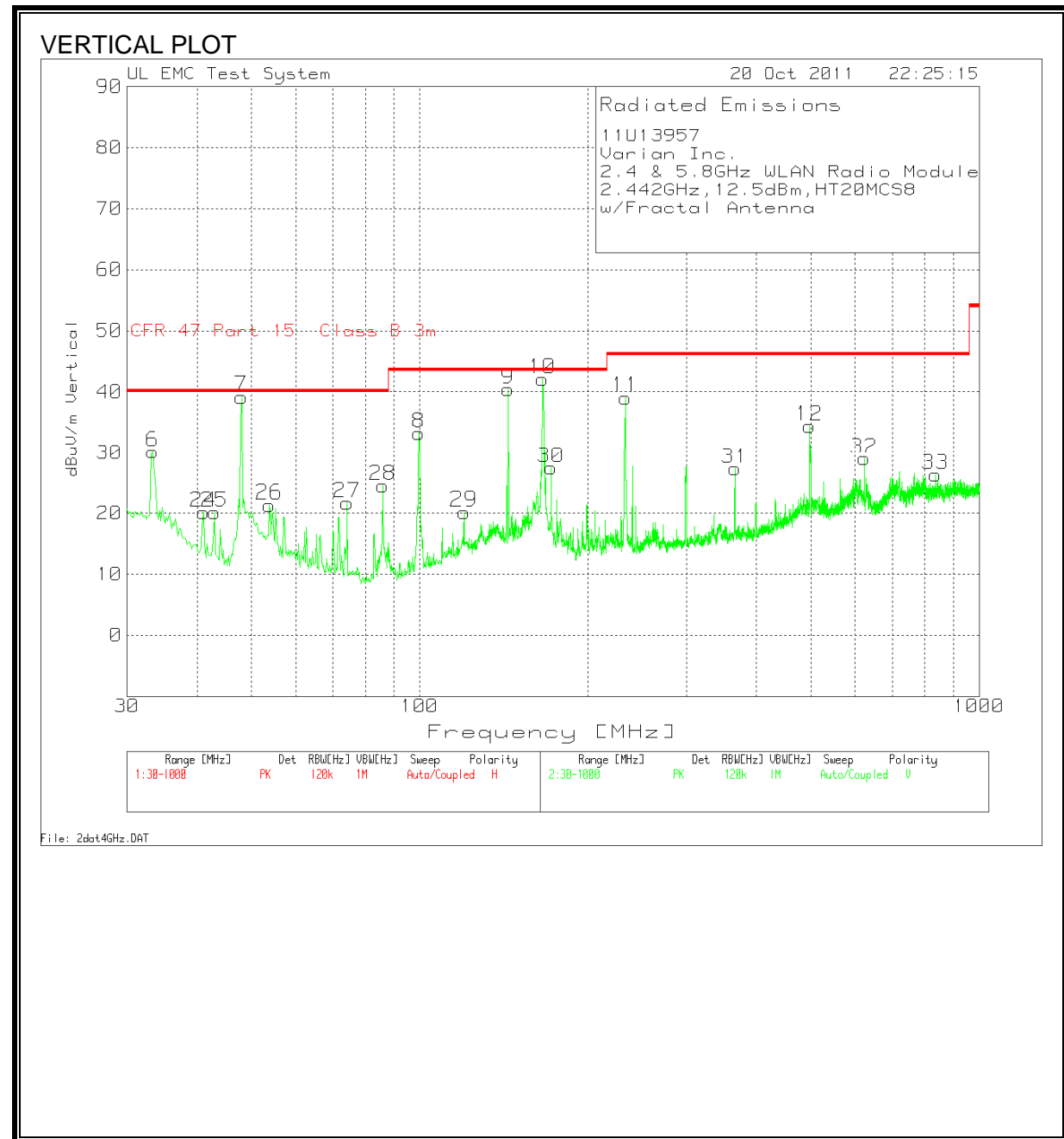
Note: No other emissions were detected above the system noise floor.

8.3. WORST-CASE BELOW 1 GHz

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



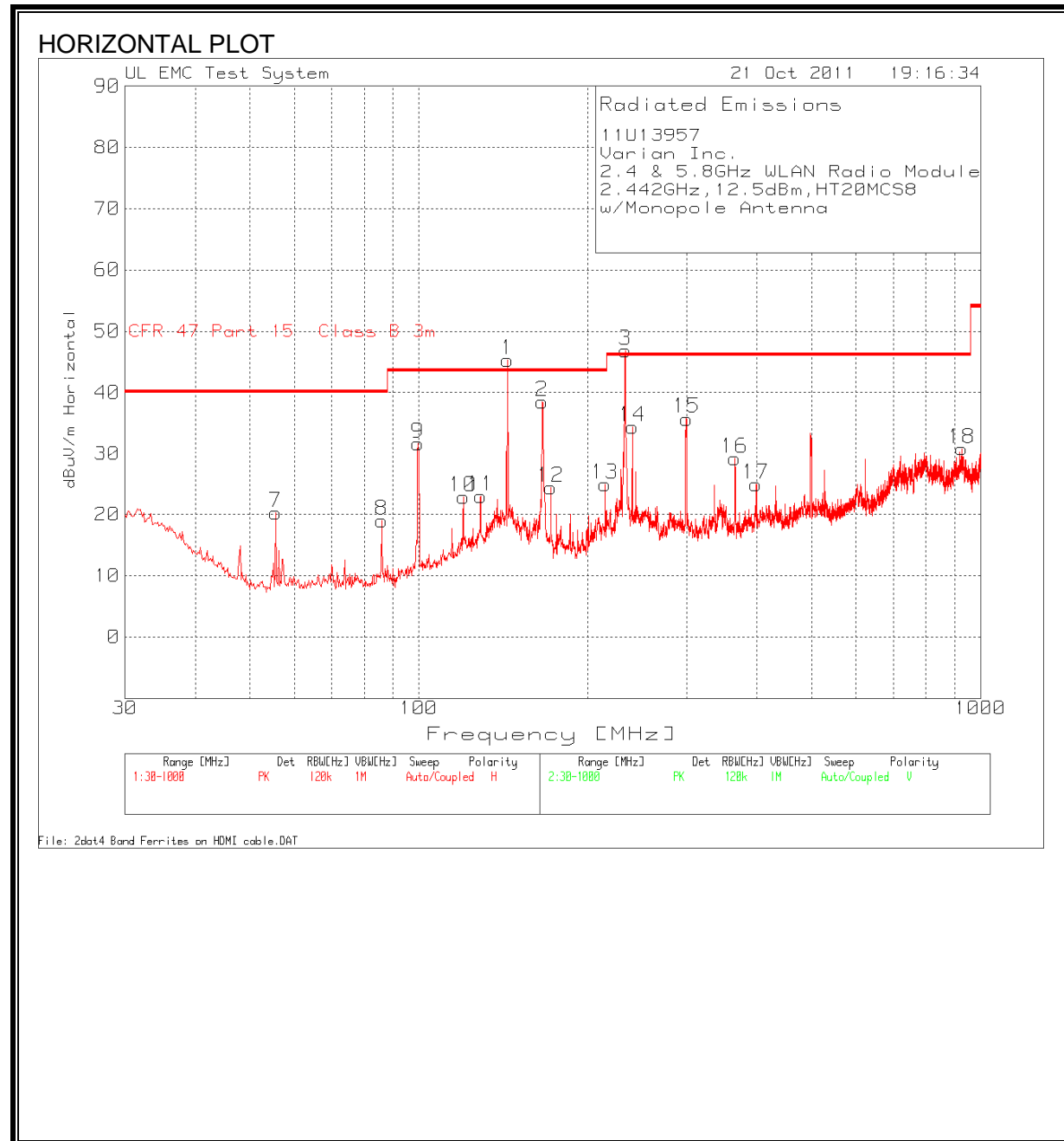
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, FRACTAL ANTENNA)



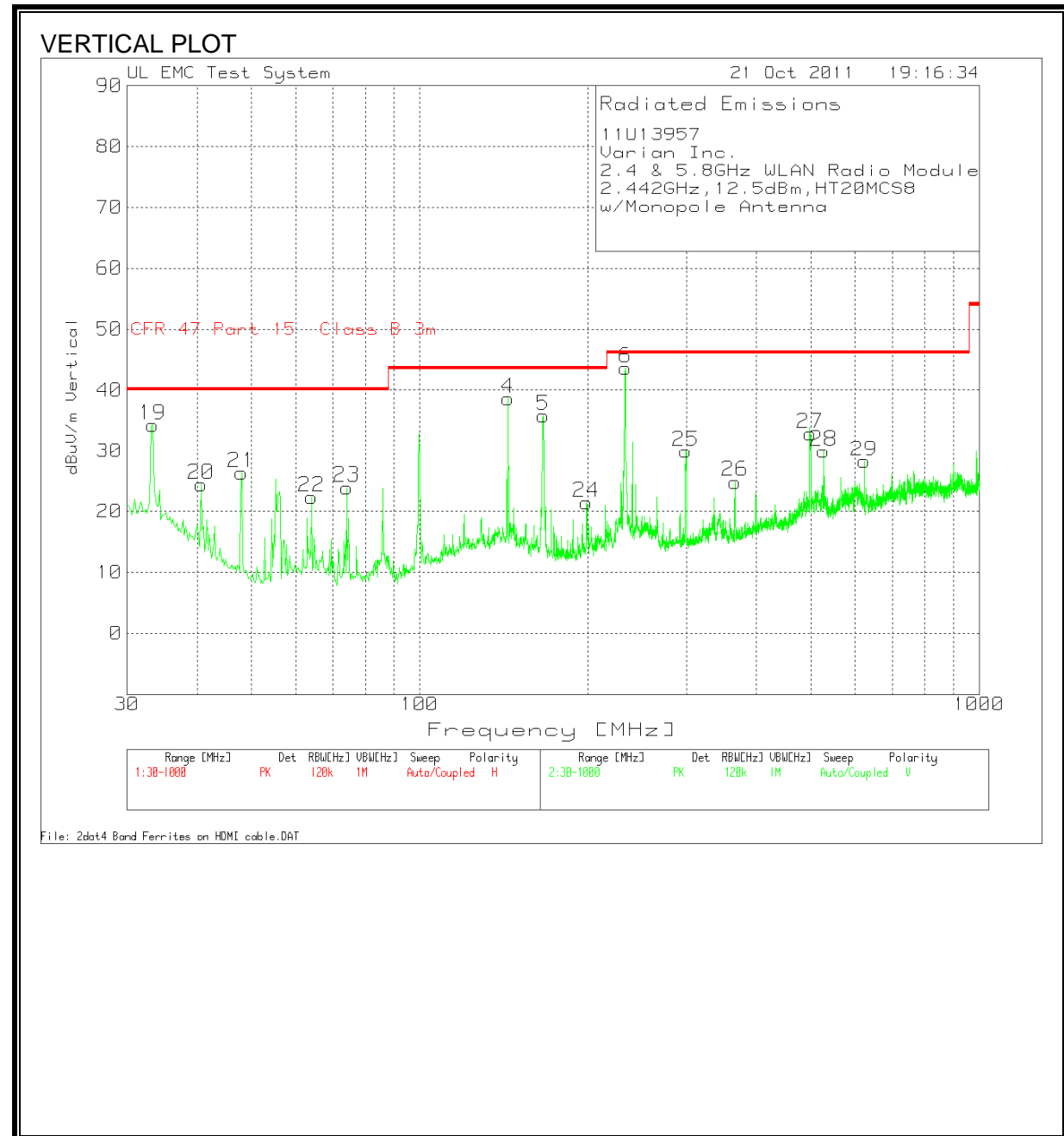
HORIZONTAL AND VERTICAL TABULAR DATA (FRACTAL ANTENNA)

11U13957										
Varian Inc.										
2.4 & 5.8GHz WLAN Radio Module										
2.442GHz,12.5dBm,HT20MCS8										
w/Fractal Antenna										
Test Frequency (MHz)	Analyzer Reading (dBuV)	Detector Type	5m A Cable Factor (dB)	5m A T64 PreAmp Factor (dB)	5m A T122 Bilog Antenna Factor (dB)	Corrected Reading (dBuV)	CFR 47 Part 15 Class B 3m Limit (dBuV)	Margin to Limit (dBuV)	Height [cm]	Polarity (Deg)
Range 1 30 - 1000MHz										
55.1998	35.79	PK	0.8	-28.3	8.1	16.39	40	-23.61	300	Horz
71.4828	32.76	PK	0.9	-28.2	7.9	13.36	40	-26.64	200	Horz
119.944	35.24	PK	1.2	-28.2	13.6	21.84	43.5	-21.66	300	Horz
171.7006	46.43	PK	1.4	-28.1	10.7	30.43	43.5	-13.07	200	Horz
239.9341	49.4	PK	1.7	-28.1	11.8	34.8	46	-11.2	100	Horz
298.6691	48.9	PK	1.9	-28	13.4	36.2	46	-9.8	100	Horz
366.3209	41.85	PK	2.1	-27.9	14.4	30.45	46	-15.55	300	Horz
399.6623	38.42	PK	2.2	-27.8	14.9	27.72	46	-18.28	100	Horz
431.8405	37.31	PK	2.3	-27.8	15.5	27.31	46	-18.69	200	Horz
898.0376	31.09	PK	3.3	-27.4	21.9	28.89	46	-17.11	100	Horz
Range 2 30 - 1000MHz										
33.2954	39.2	PK	0.6	-28.3	18.7	30.2	40	-9.8	100	Vert
41.0492	34.51	PK	0.7	-28.3	13.2	20.11	40	-19.89	200	Vert
42.9876	35.69	PK	0.7	-28.3	12	20.09	40	-19.91	100	Vert
53.8429	40.65	PK	0.8	-28.3	8.2	21.35	40	-18.65	100	Vert
74.1966	41.3	PK	0.9	-28.2	7.7	21.7	40	-18.3	200	Vert
119.944	33.59	PK	1.2	-28.2	13.6	20.19	43.5	-23.31	100	Vert
171.7006	43.48	PK	1.4	-28.1	10.7	27.48	43.5	-16.02	100	Vert
624.1347	34.77	PK	2.8	-27.3	18.7	28.97	46	-17.03	100	Vert
836.3949	29.07	PK	3.2	-27.3	21.3	26.27	46	-19.73	100	Vert
PK - Peak detector										

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



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



HORIZONTAL AND VERTICAL TABULAR DATA (MONOPOLE ANTENNA)

11U13957										
Varian Inc.										
2.4 & 5.8GHz WLAN Radio Module										
2.442GHz, 12.5dBm, HT20MCS8										
w/Monopole Antenna										
Test Frequency (MHz)	Analyzer Reading (dBuV)	Detector Type	5m A Cable Factor (dB)	5m A T64 PreAmp Factor (dB)	5m A T122 Bilog Antenna Factor (dB)	Corrected Reading (dBuV)	CFR 47 Part 15 Class B 3m Limit (dBuV)	Margin to Limit (dBuV)	Height (cm)	Polarity (Deg)
Range 1 30 - 1000MHz										
85.8273	38.72	PK	1	-28.2	7.4	18.92	40	-21.08	200	Horz
119.944	36.18	PK	1.2	-28.2	13.6	22.78	43.5	-20.72	300	Horz
171.7006	40.4	PK	1.4	-28.1	10.7	24.4	43.5	-19.1	200	Horz
239.9341	49.03	PK	1.7	-28.1	11.8	34.43	46	-11.57	100	Horz
364.964	40.59	PK	2.1	-27.9	14.4	29.19	46	-16.81	200	Horz
398.1115	35.54	PK	2.2	-27.8	14.9	24.84	46	-21.16	100	Horz
925.5635	32.89	PK	3.4	-27.5	22	30.79	46	-15.21	100	Horz
Range 2 30 - 1000MHz										
33.2954	43.22	PK	0.6	-28.3	18.7	34.22	40	-5.78	100	Vert
40.6615	38.43	PK	0.7	-28.3	13.5	24.33	40	-15.67	100	Vert
74.0028	43.42	PK	0.9	-28.2	7.8	23.92	40	-16.08	100	Vert
366.3209	36.22	PK	2.1	-27.9	14.4	24.82	46	-21.18	100	Vert
499.6863	41.35	PK	2.5	-27.7	16.7	32.85	46	-13.15	100	Vert
527.9876	37.85	PK	2.5	-27.6	17.2	29.95	46	-16.05	100	Vert
624.1347	34.01	PK	2.8	-27.3	18.7	28.21	46	-17.79	100	Vert
PK - Peak detector										

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.

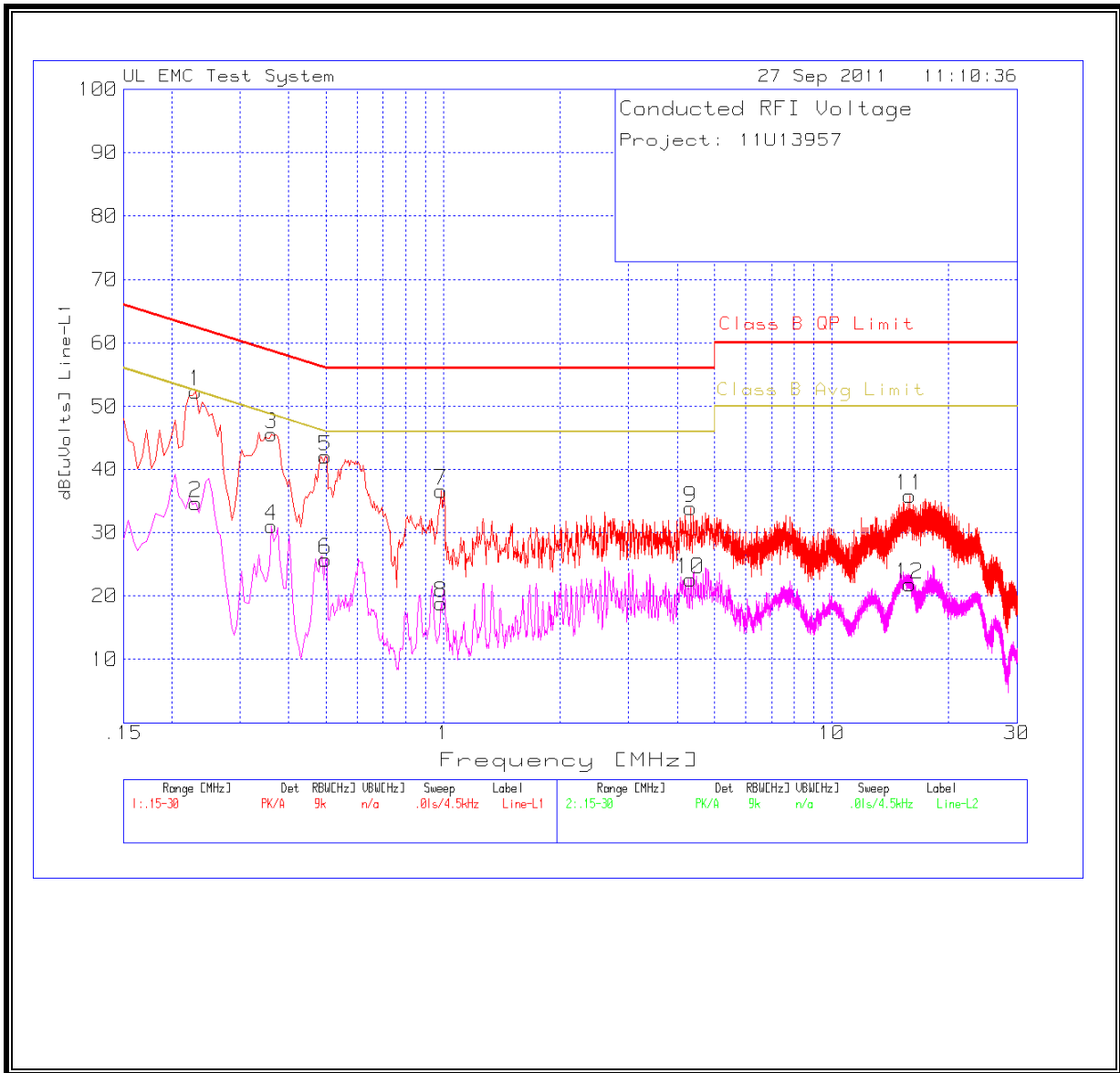
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

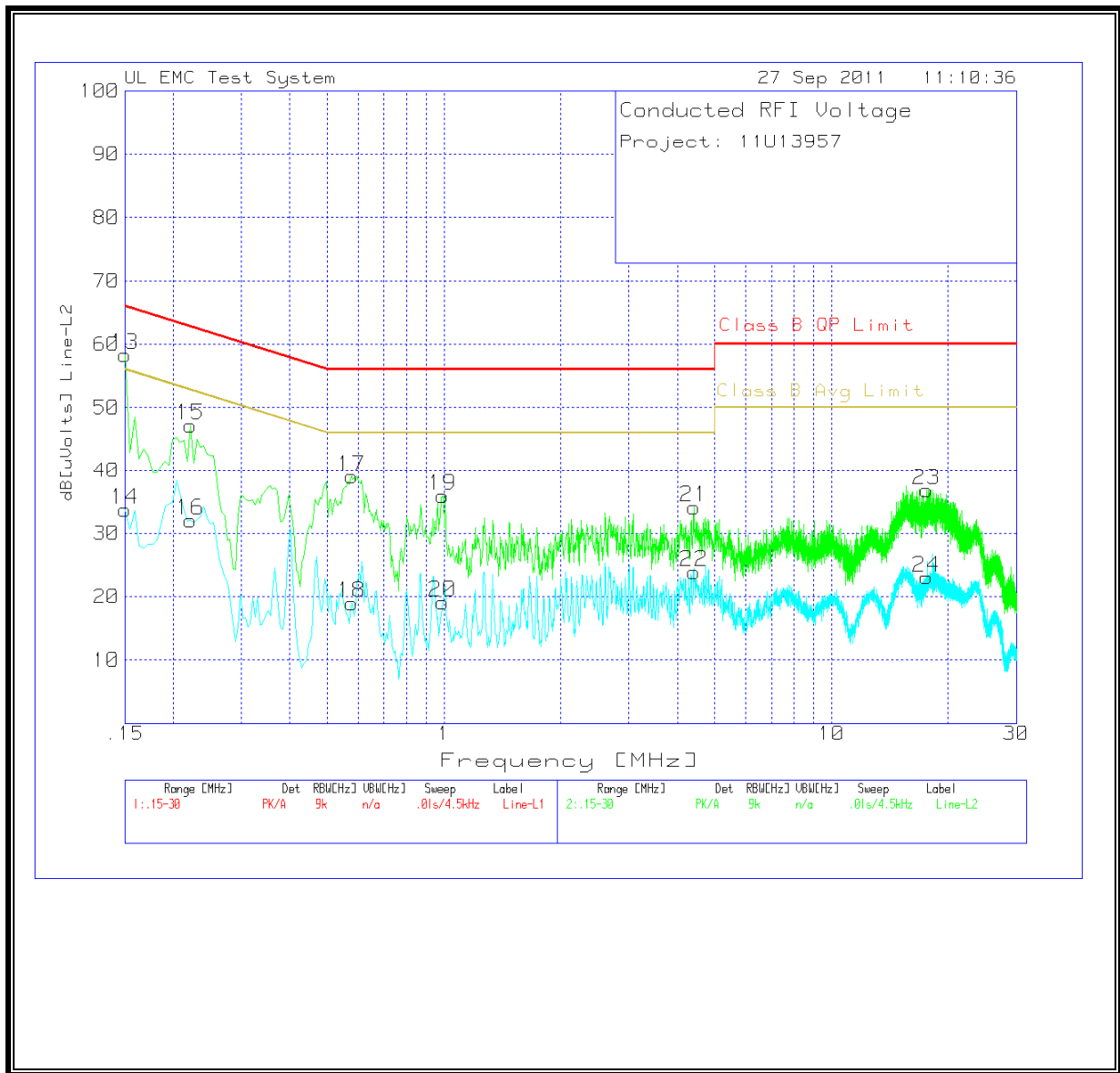
6 WORST EMISSIONS

COMPANY: Varian									
PROJECT #: 11U13957									
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
0.231	52.41	PK	0	0	52.41	62.4	-9.99	52.4	0.01
0.231	34.68	Av	0	0	34.68	62.4	-27.72	52.4	-17.72
0.3615	45.62	PK	0	0	45.62	58.7	-13.08	48.7	-3.08
0.3615	31.01	Av	0	0	31.01	58.7	-27.69	48.7	-17.69
0.4965	42.08	PK	0	0	42.08	56.1	-14.02	46.1	-4.02
0.4965	25.70	Av	0	0	25.70	56.1	-30.40	46.1	-20.40
0.987	36.55	PK	0	0	36.55	56.0	-19.45	46.0	-9.45
0.987	18.79	Av	0	0	18.79	56.0	-37.21	46.0	-27.21
4.3395	33.89	PK	0	0	33.89	56.0	-22.11	46.0	-12.11
4.3395	22.60	Av	0	0	22.60	56.0	-33.40	46.0	-23.40
15.8685	35.77	PK	0	0	35.77	60.0	-24.23	50.0	-14.23
15.8685	21.79	Av	0	0	21.79	60.0	-38.21	50.0	-28.21
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
0.15	58.31	PK	0	0	58.31	66.0	-7.69	56.0	2.31
0.15	33.77	Av	0	0	33.77	66.0	-32.23	56.0	-22.23
0.222	47.14	PK	0	0	47.14	62.7	-15.56	52.7	-5.56
0.222	32.00	Av	0	0	32.00	62.7	-30.70	52.7	-20.70
0.5775	39.00	PK	0	0	39.00	56.0	-17.00	46.0	-7.00
0.5775	18.93	Av	0	0	18.93	56.0	-37.07	46.0	-27.07
0.9915	35.96	PK	0	0	35.96	56.0	-20.04	46.0	-10.04
0.9915	19.16	Av	0	0	19.16	56.0	-36.84	46.0	-26.84
4.4115	34.08	PK	0	0	34.08	56.0	-21.92	46.0	-11.92
4.4115	23.94	Av	0	0	23.94	56.0	-32.06	46.0	-22.06
17.6055	36.79	PK	0	0	36.79	60.0	-23.21	50.0	-13.21
17.6055	23.05	Av	0	0	23.05	60.0	-36.95	50.0	-26.95
PK - Peak detector									
QP - Quasi-Peak detector									
LnAv - Linear Average detector									
LgAv - Log Average detector									
Av - Average detector									
CAV - CISPR Average detector									
RMS - RMS detection									
CRMS - CISPR RMS detection									
Text File: LC3.TXT									

LINE 1 RESULTS



LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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

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

f = frequency in MHz

* = Plane-wave equivalent power density

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

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

IC RULES

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

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

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

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

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

EQUATIONS

Power density is given by:

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

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

Multiple chain or colocated transmitters									
Band	Mode	Chain for MIMO	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	IC Power Density (W/m ²)	FCC Power Density (mW/cm ²)
5 GHz	WLAN	1		12.10	5.00	17.10	0.05		
5 GHz	WLAN	2		12.00	5.00	17.00	0.05		
5 GHz	WLAN	3		12.60	5.00	17.60	0.06		
Combined			0.20				0.16	0.32	0.032