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

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER: BCM943228HMB

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

REPORT NUMBER: 11U13795-2, Revision A

ISSUE DATE: JUNE 27, 2011

Prepared for
BROADCOM CORPORATION
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	6/22/2011	Initial Issue	M. Heckrotte
A	06/27/2011	Updated table of contents section	A. Zaffar

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1. ATTESTATION OF TEST RESULTS

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

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

MODEL: BCM943228HMB

SERIAL NUMBER: 1403514 (P305)

DATE TESTED: MAY 16 –JUNE 3, 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:

MICHAEL HECKROTTE
DIRECTOR OF ENGINEERING
UL CCS

Tested By:

TOM CHEN
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

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

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

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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

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

The radio module is manufactured by Broadcom

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5150-5250 Band			
5180 - 5240	802.11a	13.97	24.95
5180 - 5240	802.11n HT20	12.28	16.90
5190 - 5230	802.11n HT40	12.78	18.97
5250-5350 Band			
5260 - 5320	802.11a	17.39	54.83
5260 - 5320	802.11n HT20	19.38	86.70
5270 - 5310	802.11n HT40	20.06	101.39
5470-5725 Band			
5500 - 5700	802.11a	17.37	54.58
5500 - 5700	802.11n HT20	19.73	93.97
5510 - 5670	802.11n HT40	20.65	116.14

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes 802.11abgn WLAN antennas, with maximum gains as table below;

	Antenna Gain		Antenna Gain		Antenna Gain	Antenna Gain
GHz	Ant 1 dBi	Ant 2 dBi	Ant 1 Numeric	Ant 2 Numeric	Combined Numeric	Combined dBi
5.2	5.60	5.60	3.63	3.63	7.26	**8.61**
5.3	5.60	5.60	3.63	3.63	7.26	**8.61**
5.5	4.20	4.20	2.63	2.63	5.26	**7.21**

5.4. SOFTWARE AND FIRMWARE

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

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

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

Worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was the mode and channel with the highest output power, that was determined to be 11n HT40 mode, mid channel.

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

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

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

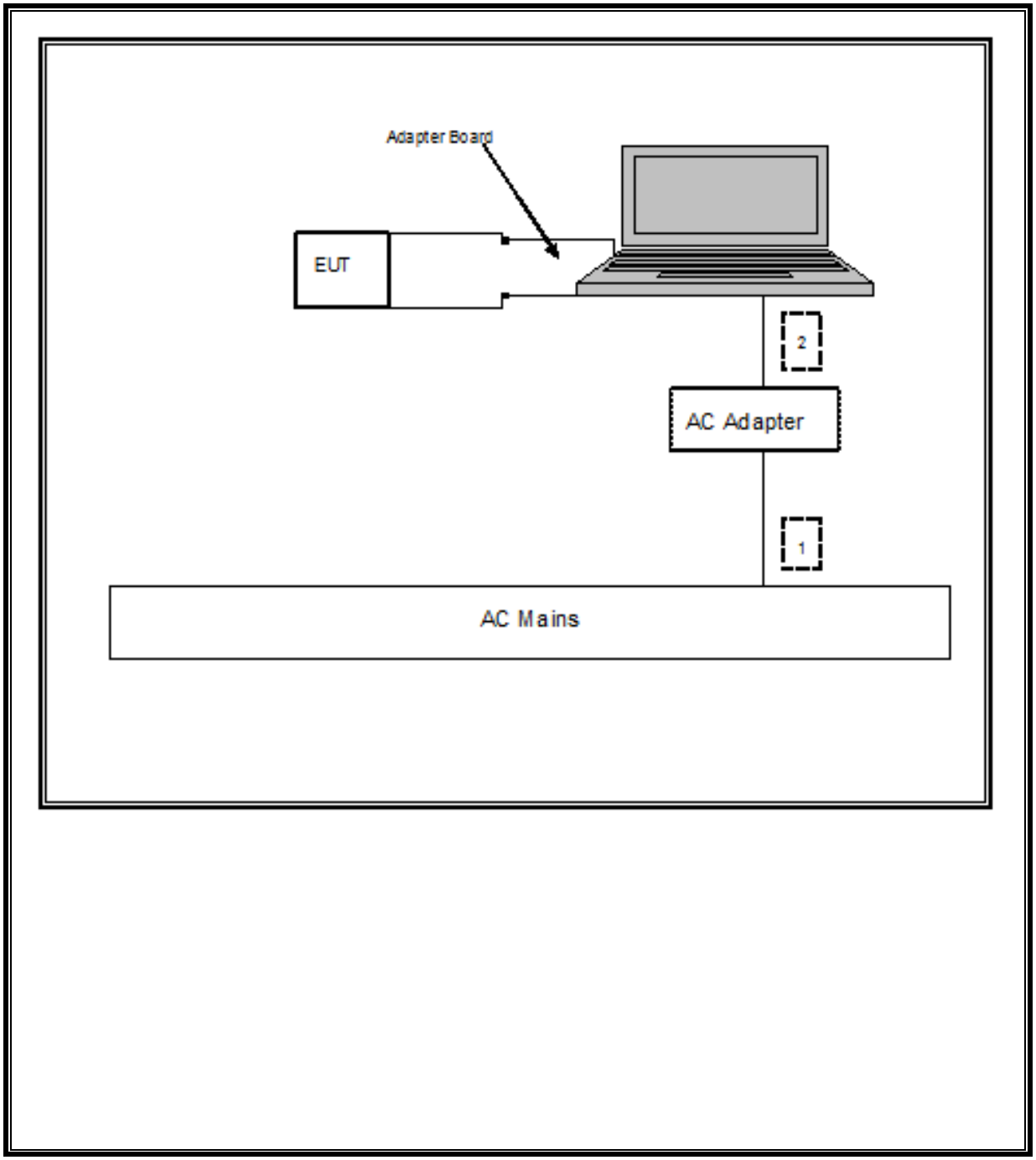
I/O CABLES

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

TEST SETUP

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

ETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00996	10/29/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01171	07/14/11
Antenna, Horn, 18 GHz	EMCO	3115	C00872	07/29/11
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	07/29/11
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	06/08/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00778	01/26/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	08/04/11
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	07/15/11
Peak Power Meter	Agilent / HP	E9327A	C00964	12/04/11
Peak Power Sensor	Agilent / HP	E4416A	C00963	12/04/11
EMI Receiver, 6.5 GHz	Agilent / HP	8546A	1963	08/19/11
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
High Pass Filter 5.2GHz-5.9GHz	Micro-Tronics	BRC13191	N02678	CNR
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	05/06/12
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/12

7. ANTENNA PORT TEST RESULTS

7.1. 802.11a MODE IN THE 5.2 GHz BAND

7.1.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

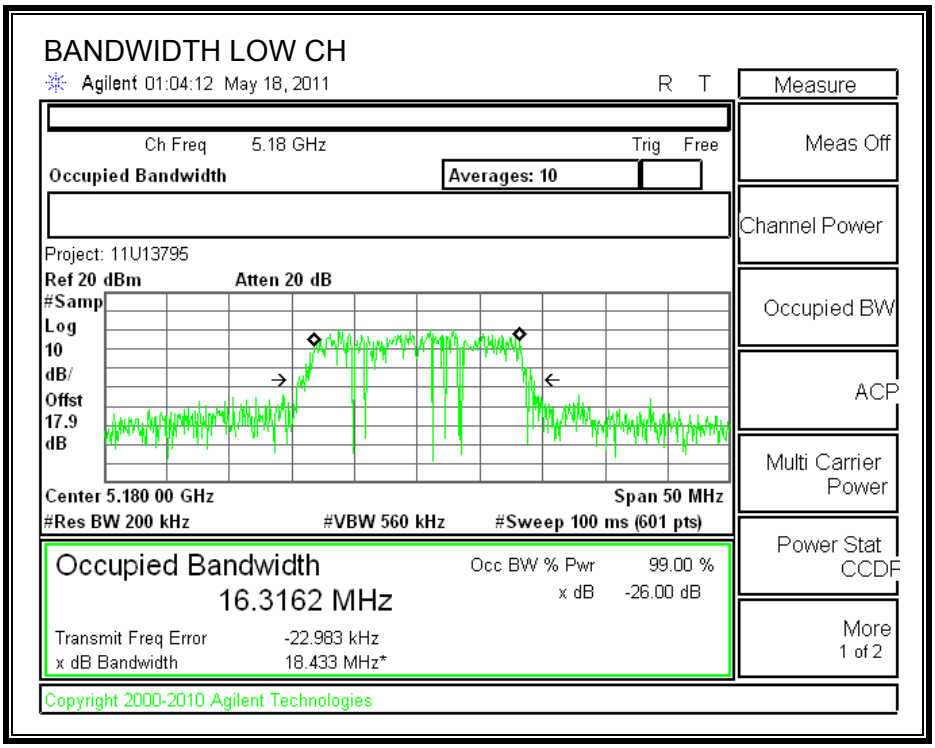
TEST PROCEDURE

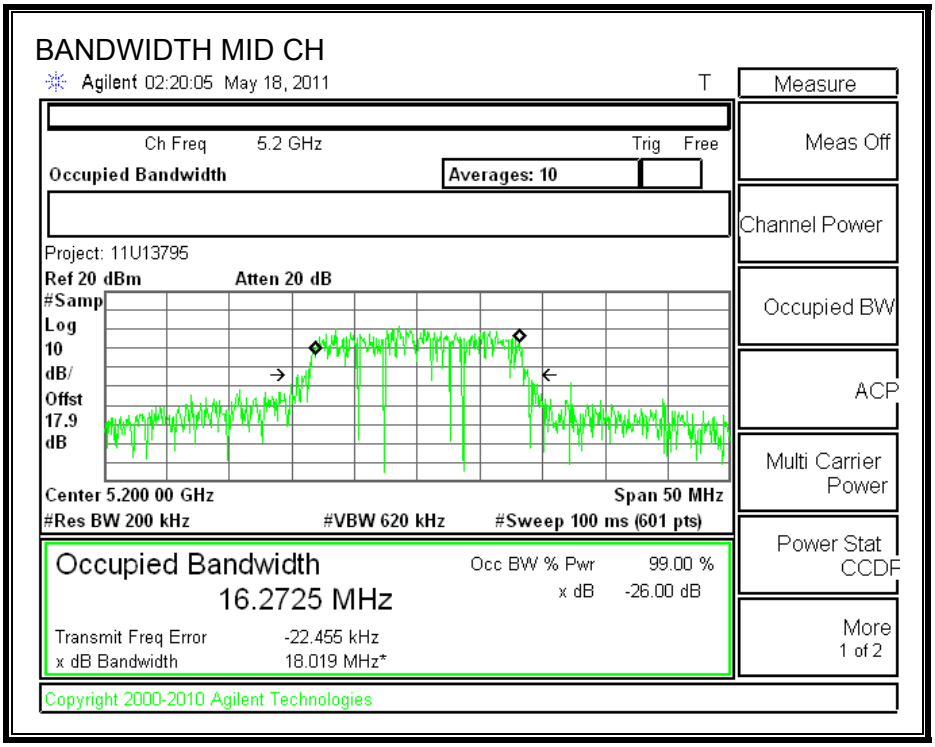
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

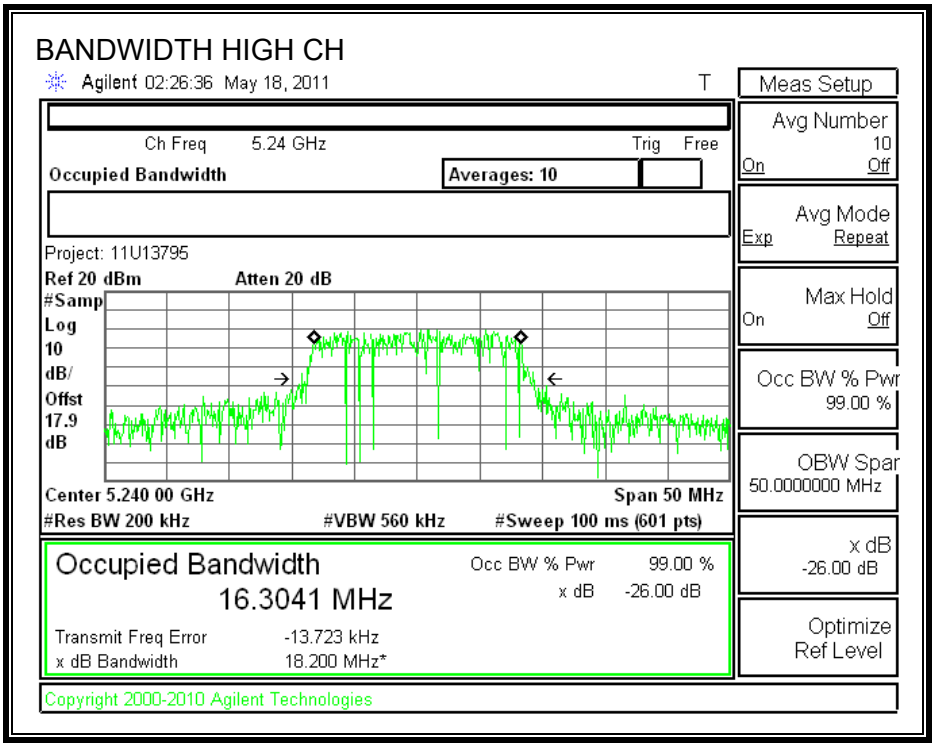
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	18.433	16.3162
Middle	5200	18.019	16.2725
High	5240	18.200	16.3041

26 dB and 99% BANDWIDTH







7.1.2. 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

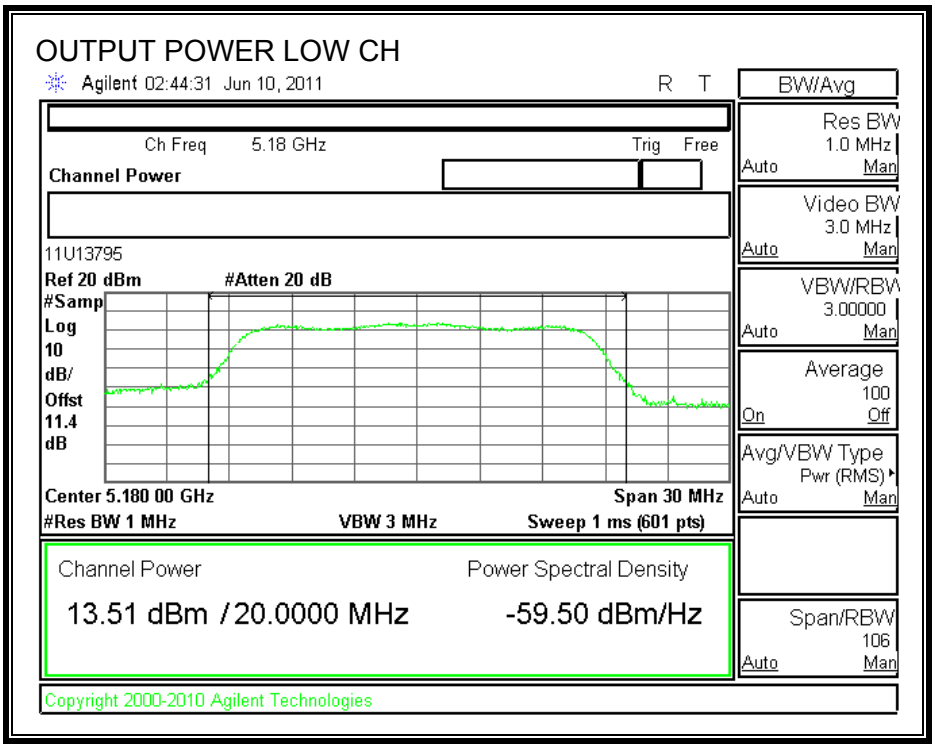
Limit

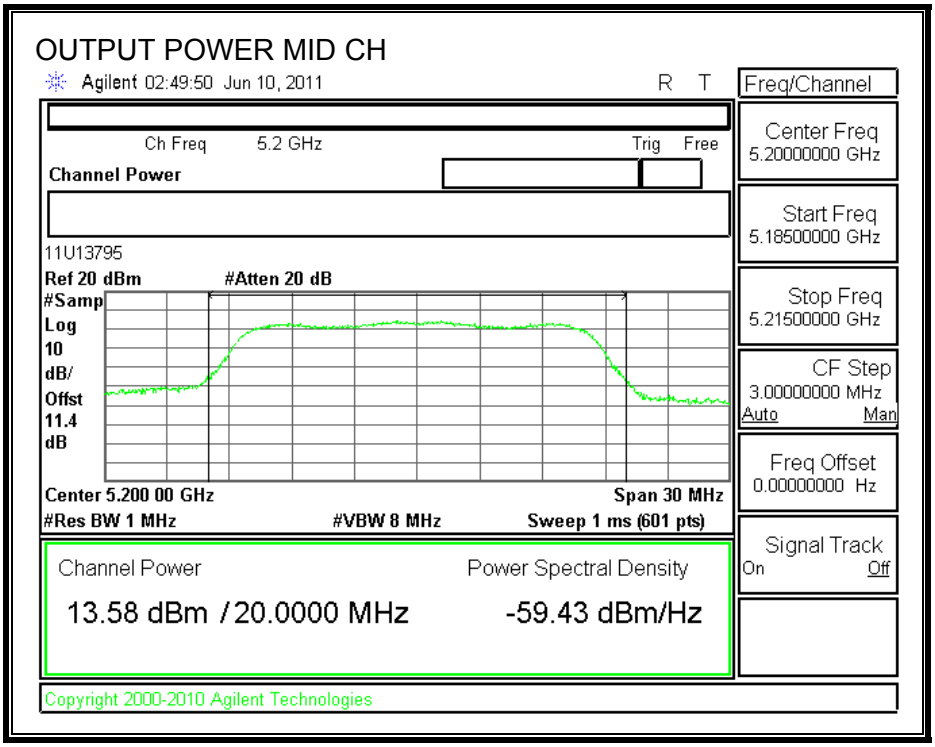
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	18.433	16.66	5.60	16.66
Mid	5200	17	18.019	16.56	5.60	16.56
High	5240	17	18.200	16.60	5.60	16.60

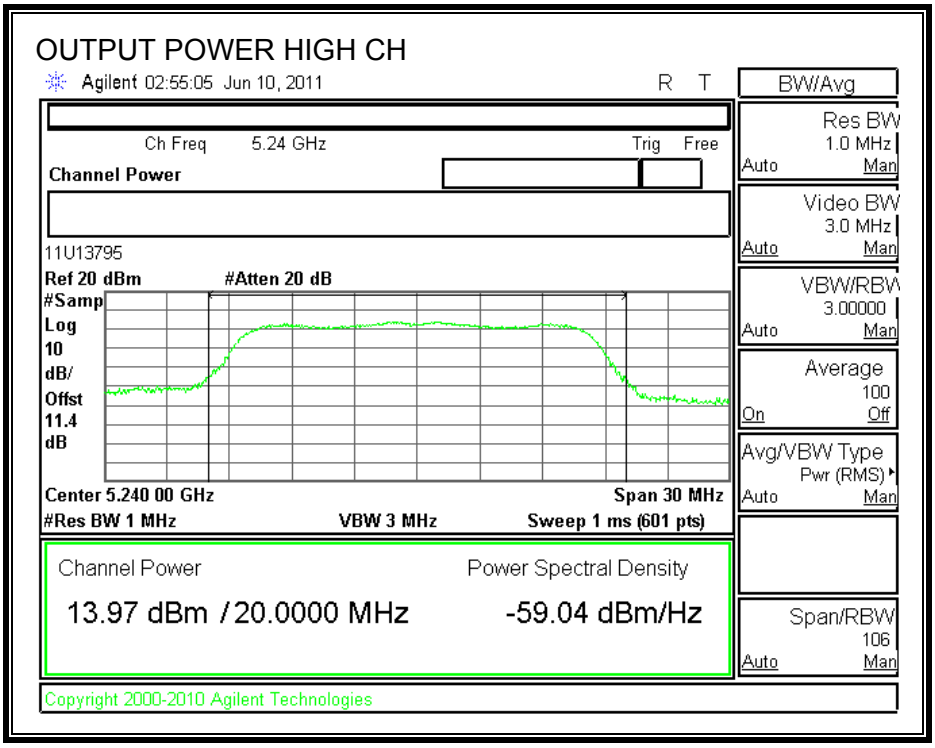
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	13.51	16.66	-3.15
Mid	5200	13.58	16.56	-2.98
High	5240	13.97	16.60	-2.63

OUTPUT POWER







7.1.3. 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.

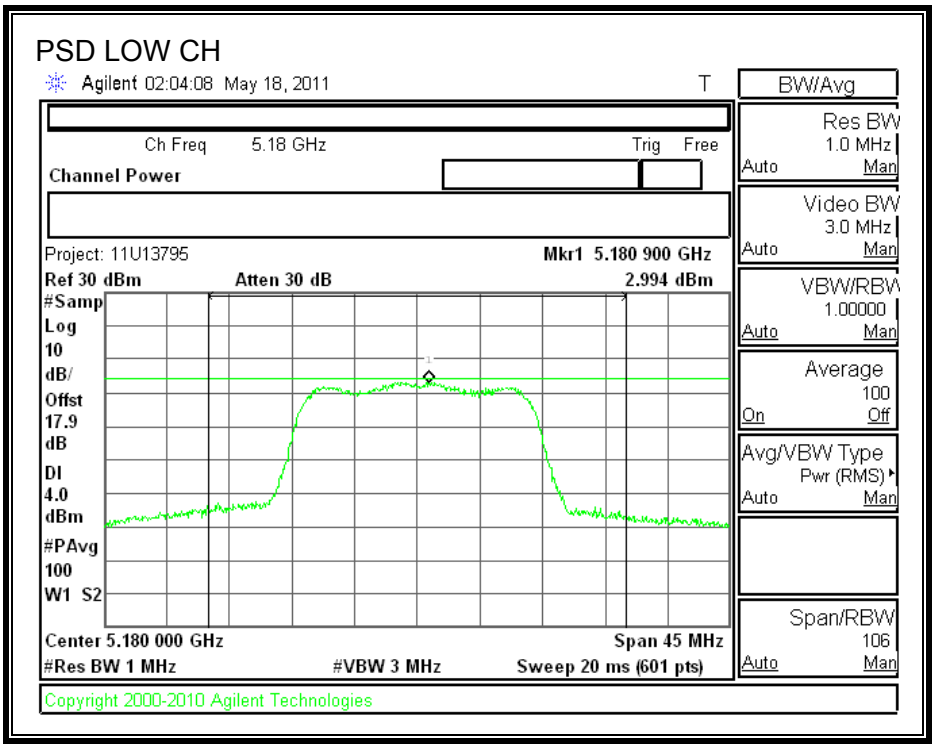
TEST PROCEDURE

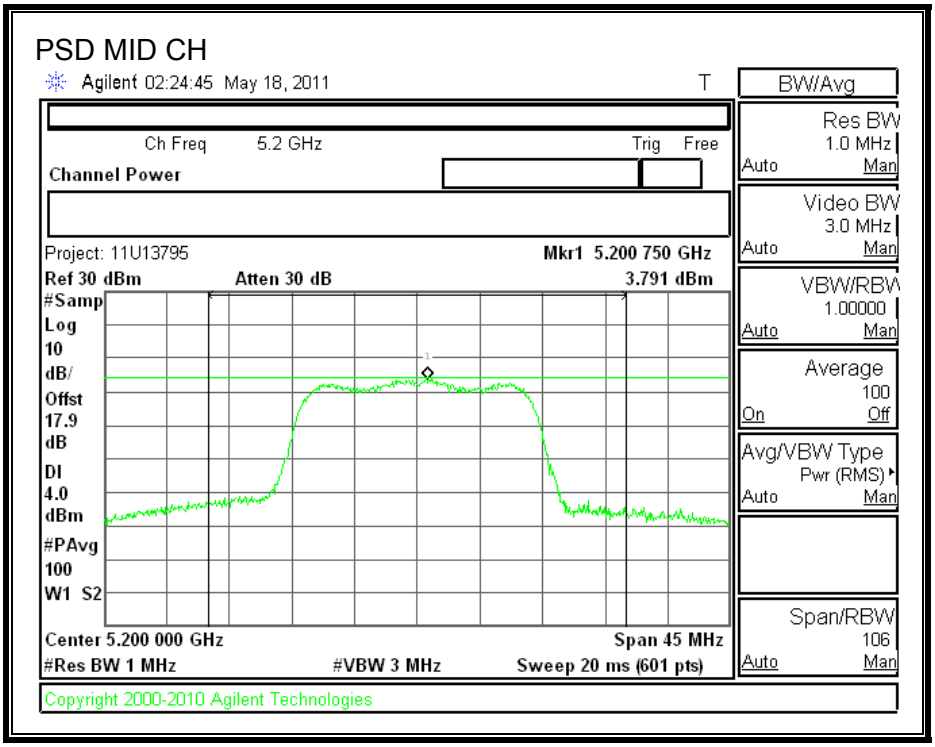
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

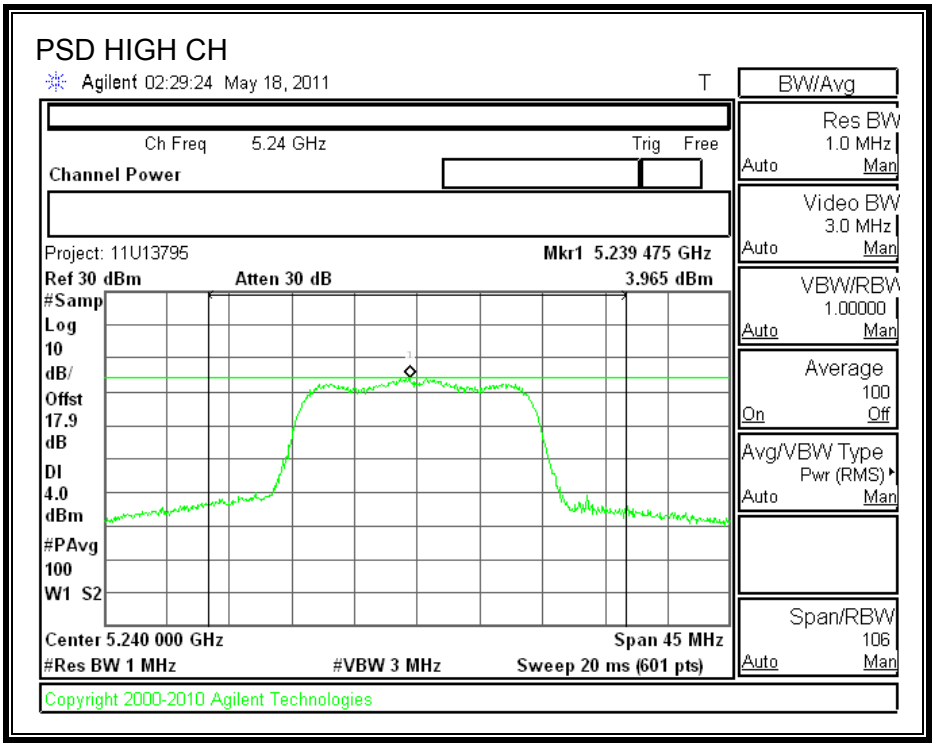
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	2.99	4	-1.01
Middle	5200	3.79	4	-0.21
High	5240	3.97	4	-0.04

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

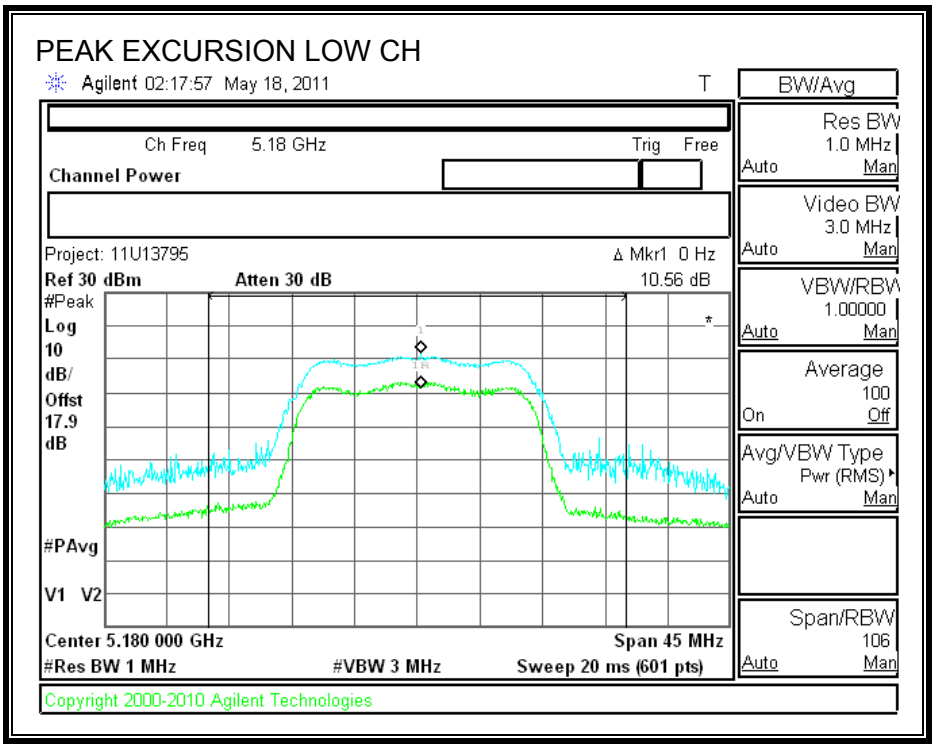
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

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

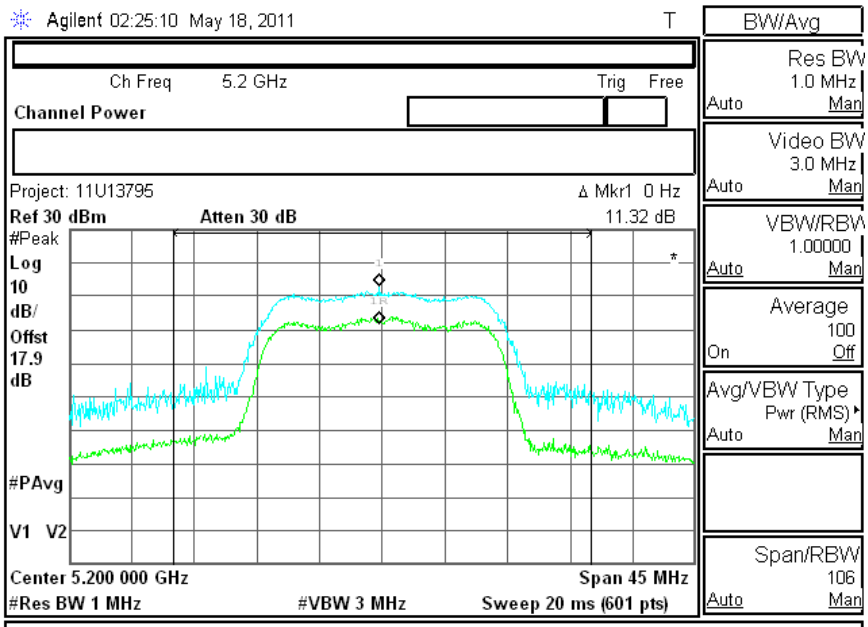
RESULTS

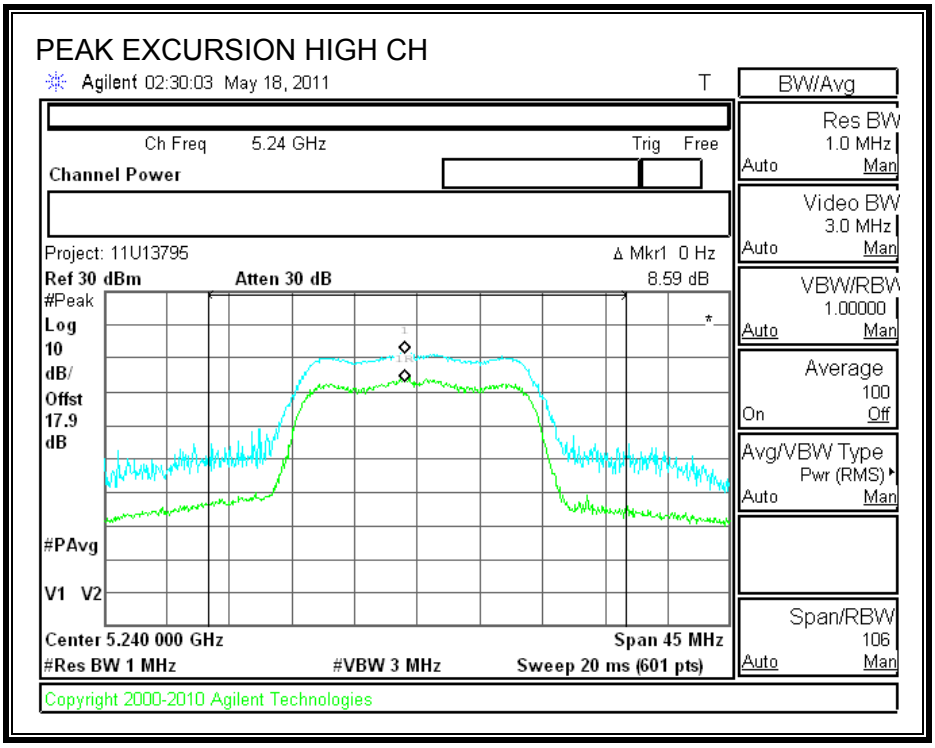
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.56	13	-2.44
Middle	5200	11.32	13	-1.68
High	5240	8.59	13	-4.41

PEAK EXCURSION



PEAK EXCURSION MID CH





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

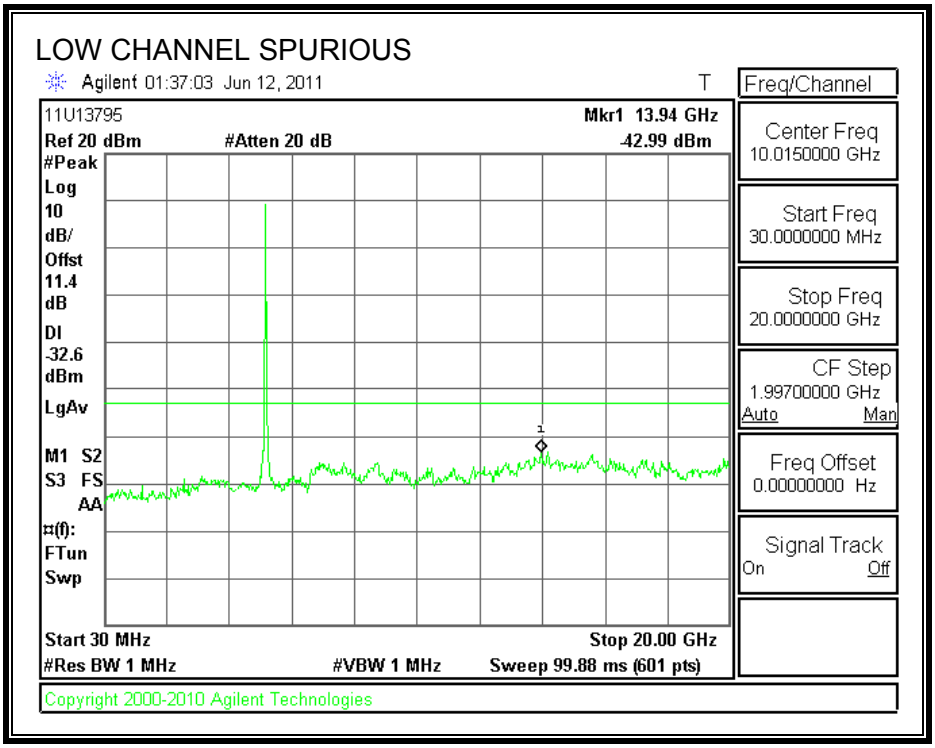
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

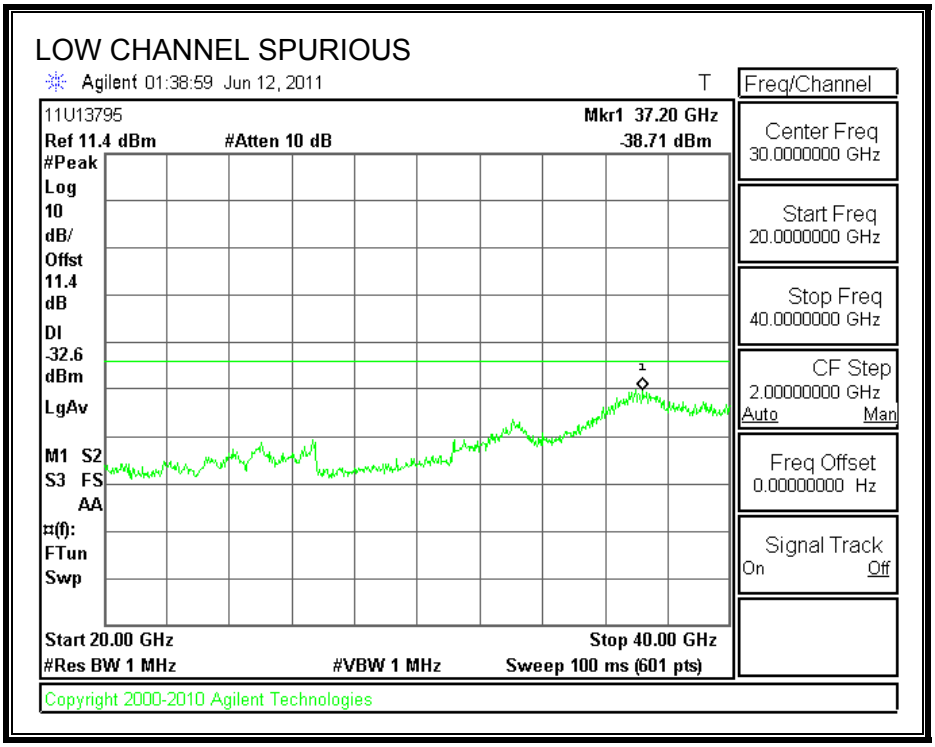
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

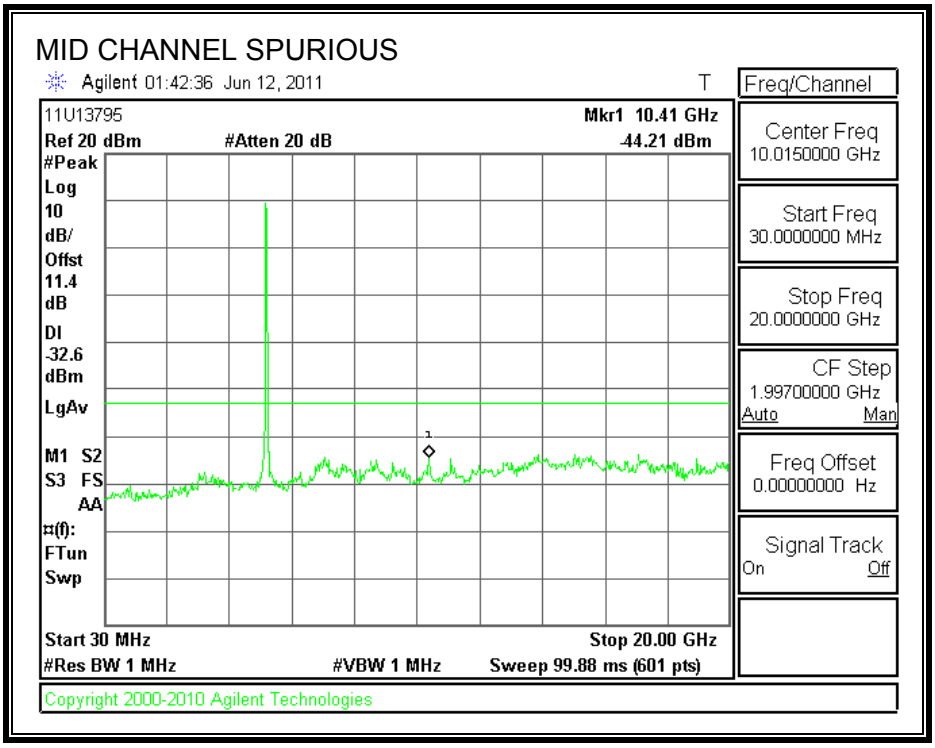
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

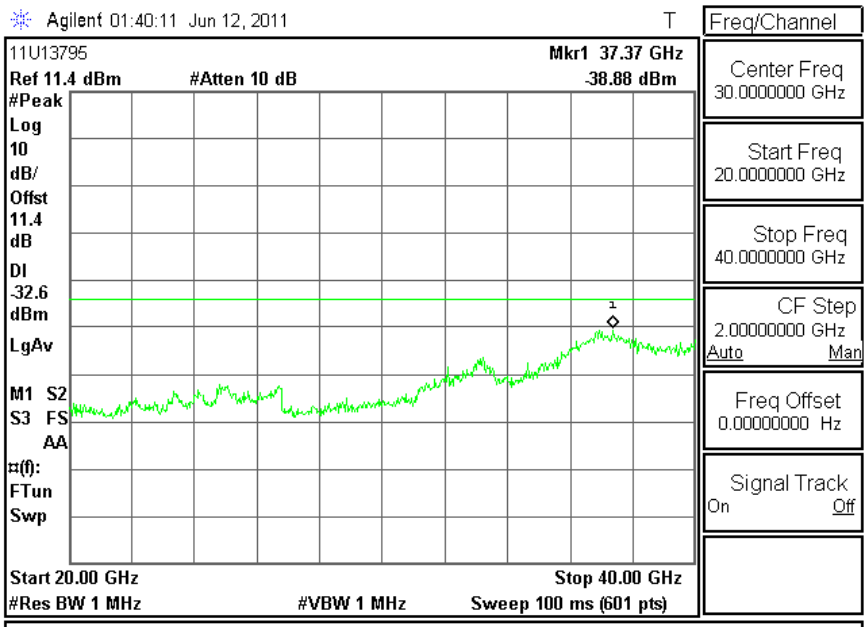
SPURIOUS EMISSIONS

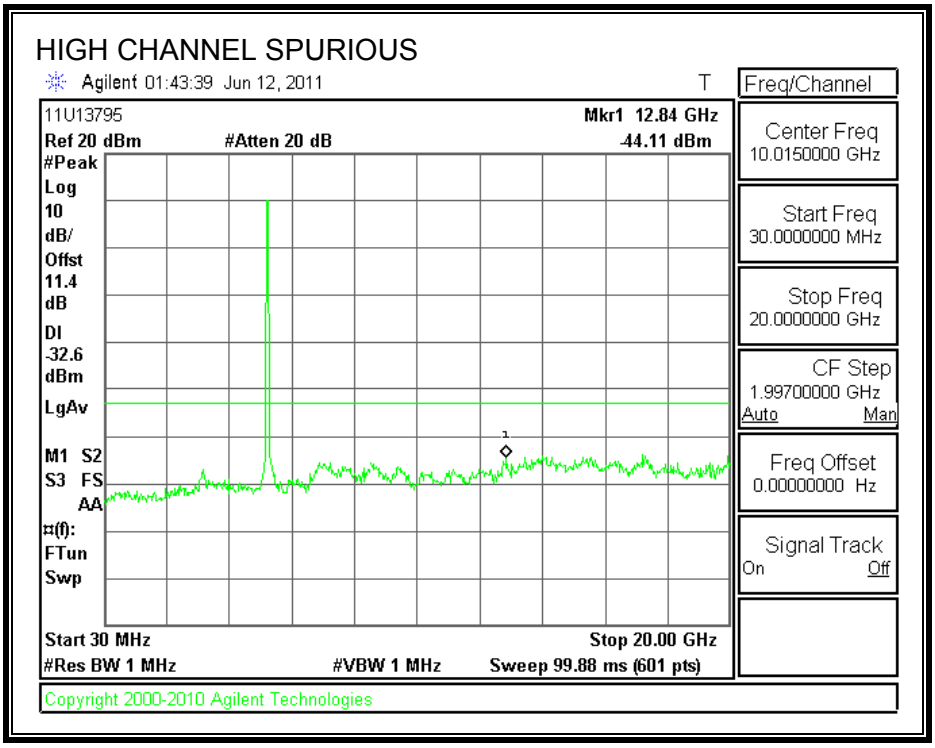




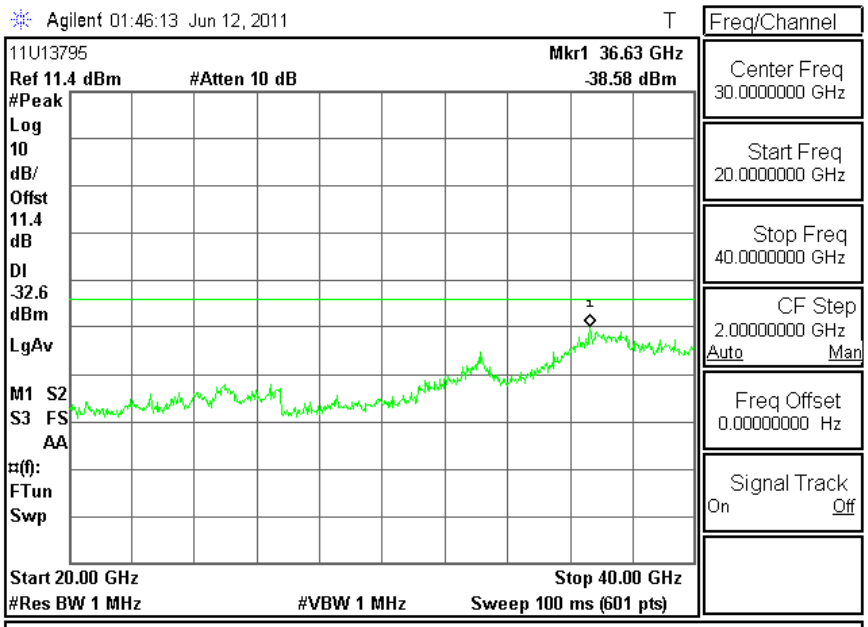


MID CHANNEL SPURIOUS





HIGH CHANNEL SPURIOUS



7.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

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

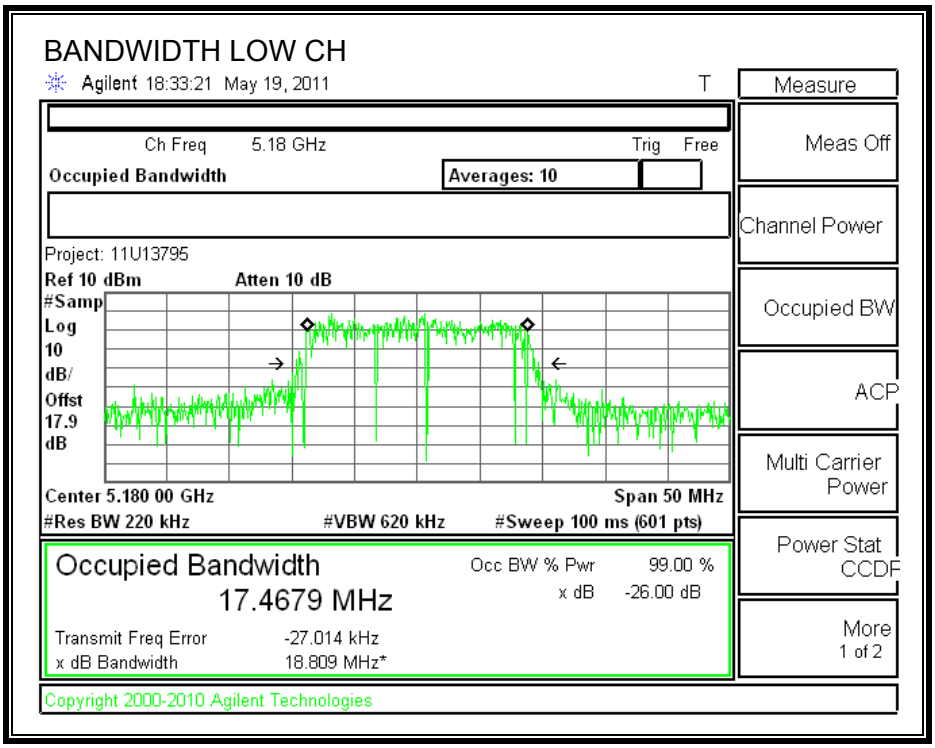
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	18.809	17.4679
Middle	5200	18.943	17.4845
High	5240	18.885	17.4645

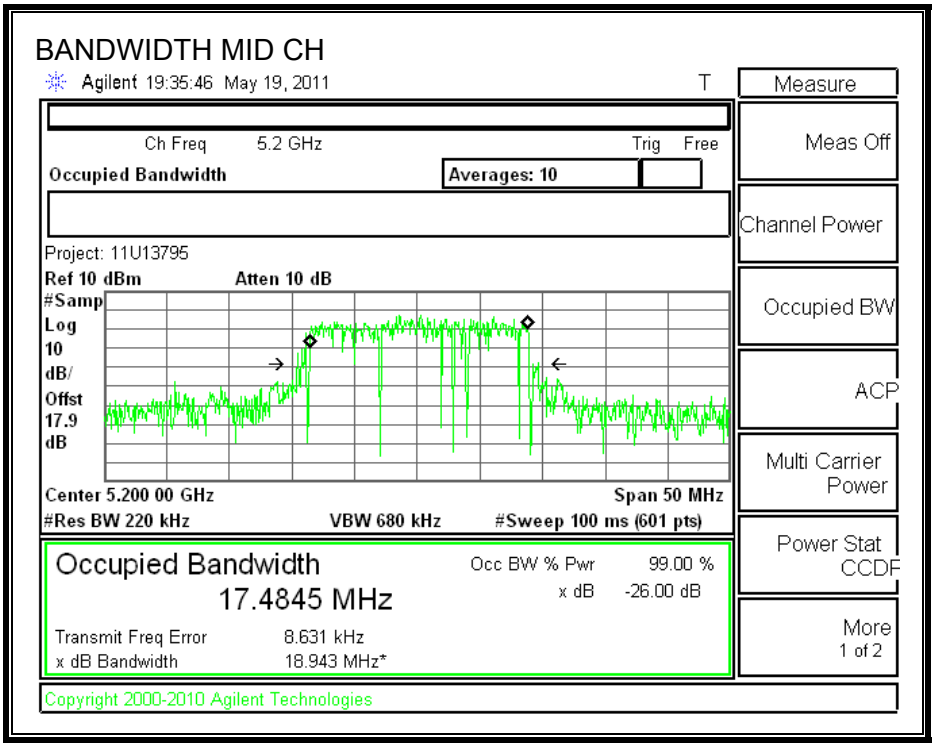
CHAIN 2

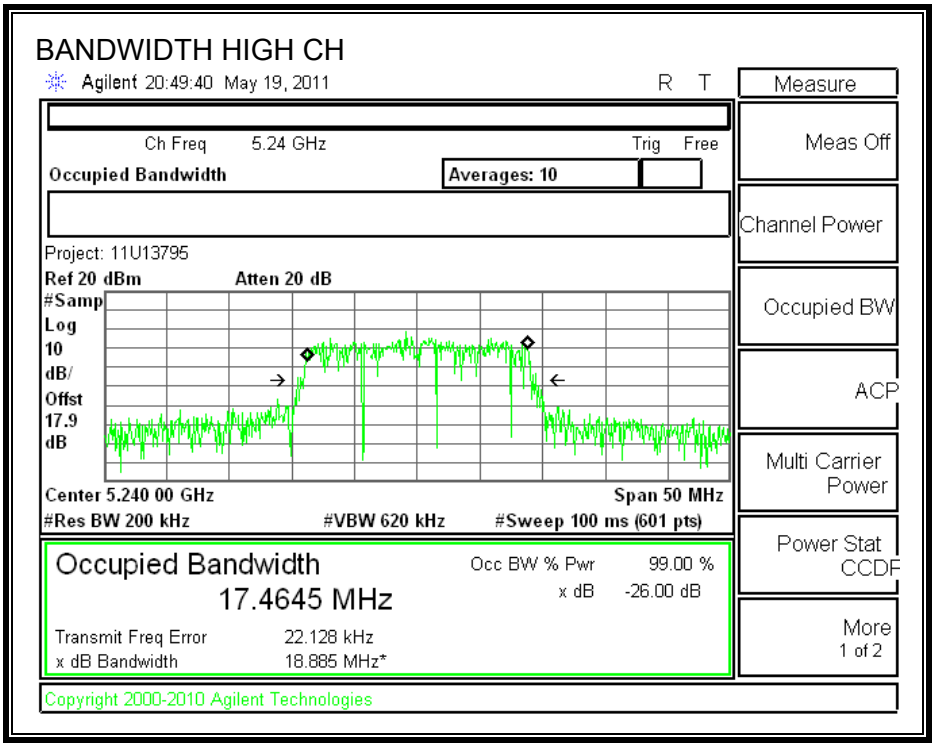
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	18.799	17.4365
Middle	5200	18.722	17.5506
High	5240	18.792	17.5169

CHAIN 1

26 dB and 99% BANDWIDTH

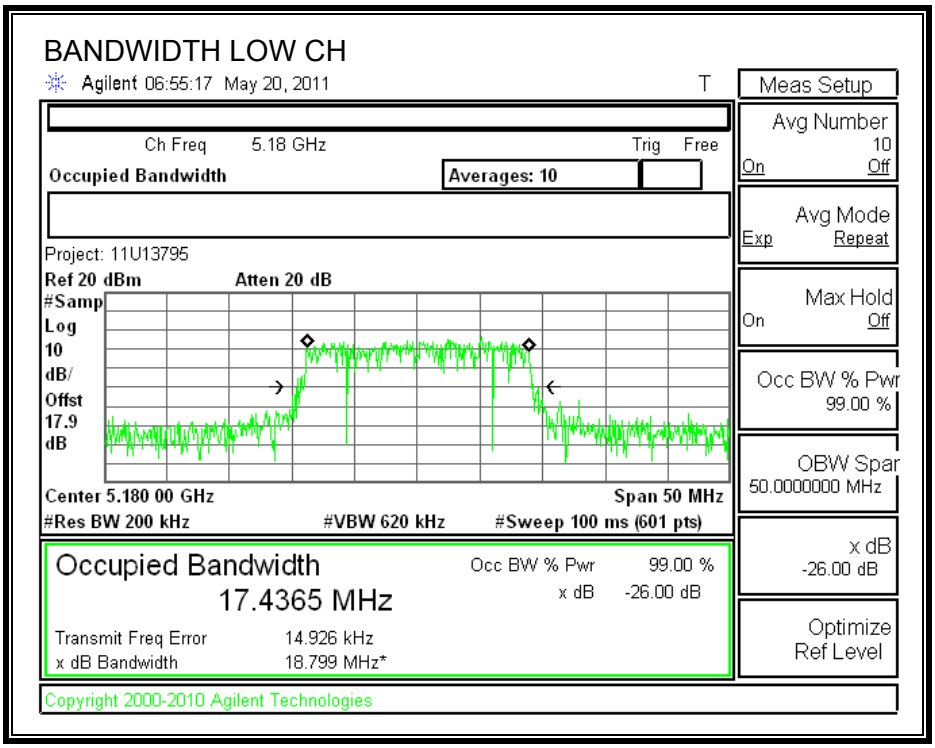


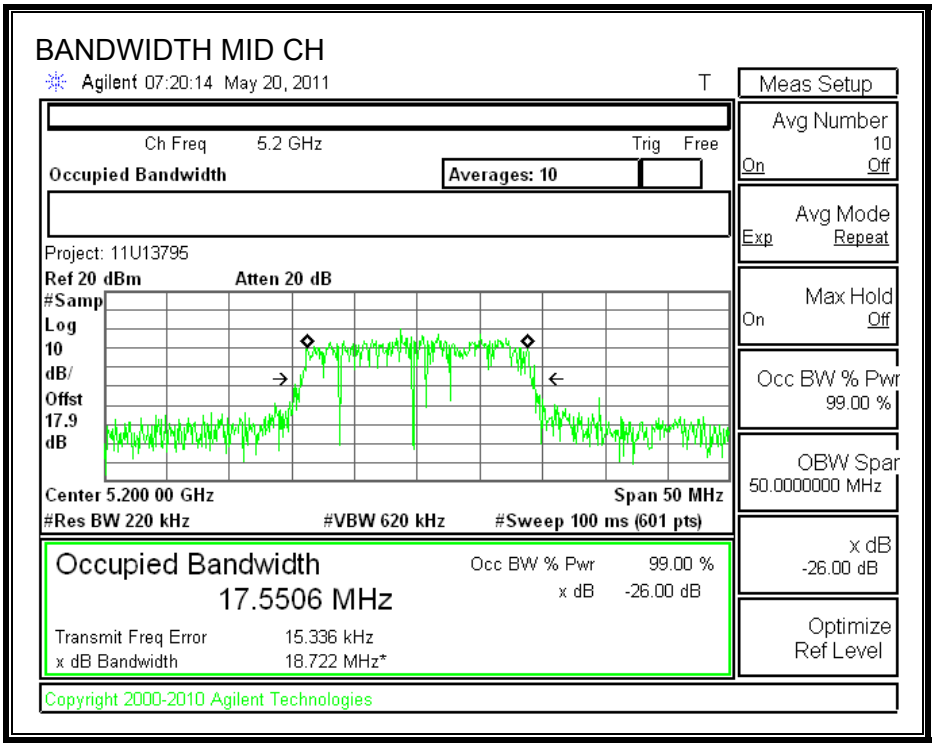


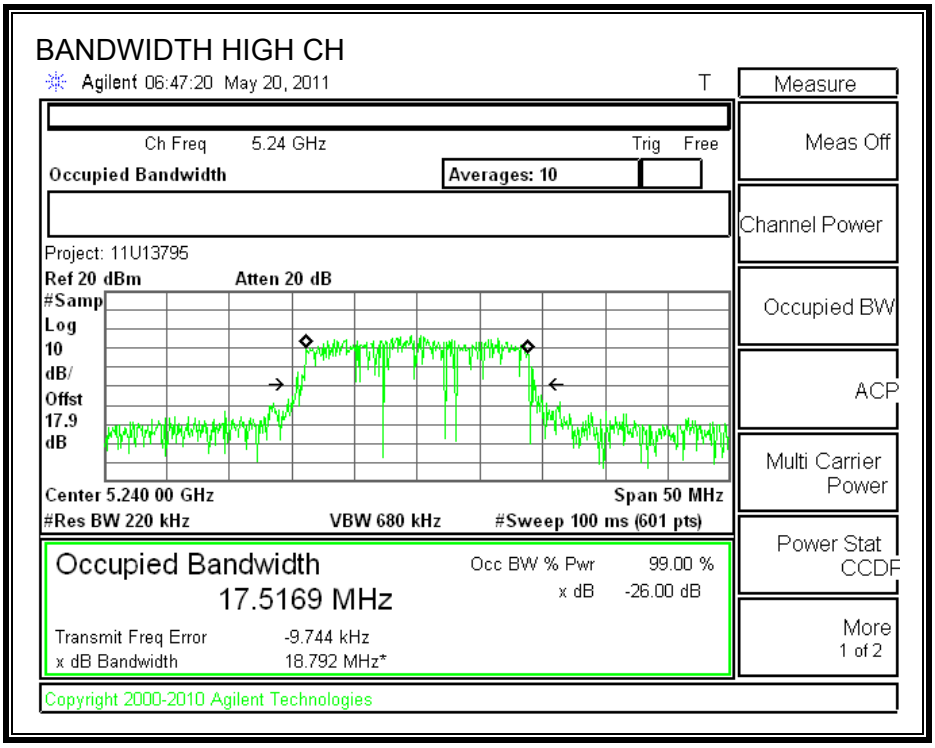


CHAIN 2

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 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

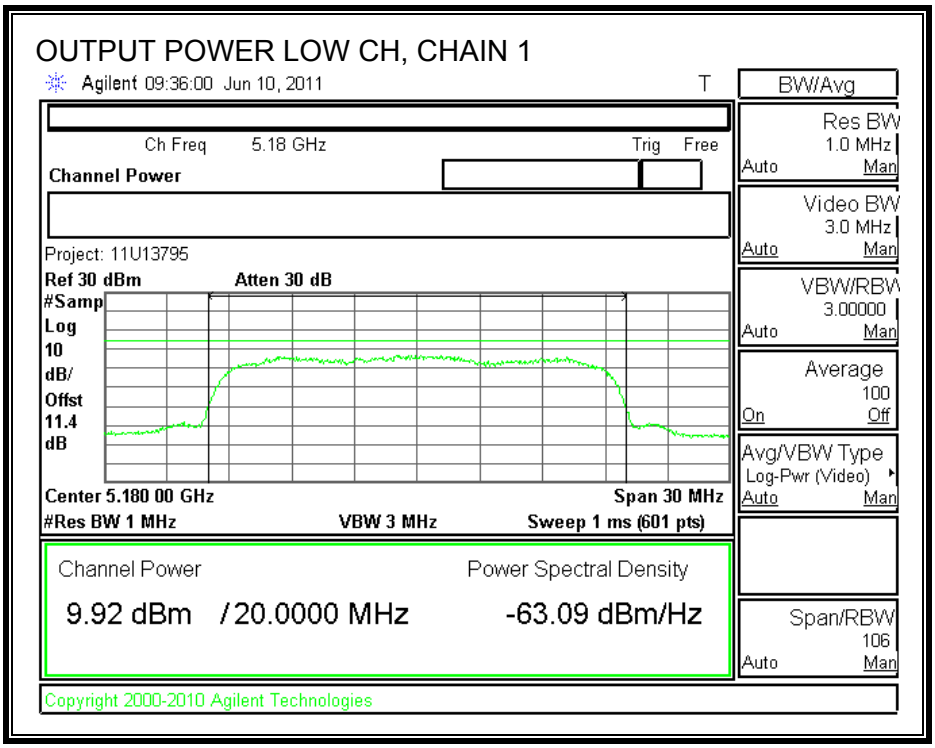
Limit

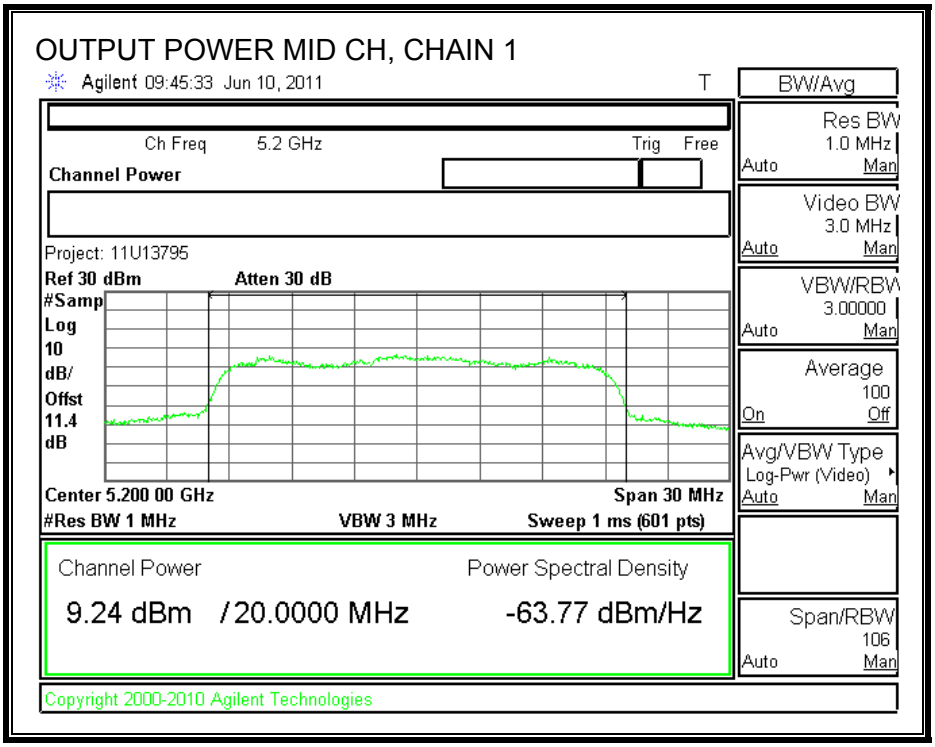
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	18.809	16.74	8.61	14.13
Mid	5200	17	18.943	16.77	8.61	14.16
High	5240	17	18.885	16.76	8.61	14.15

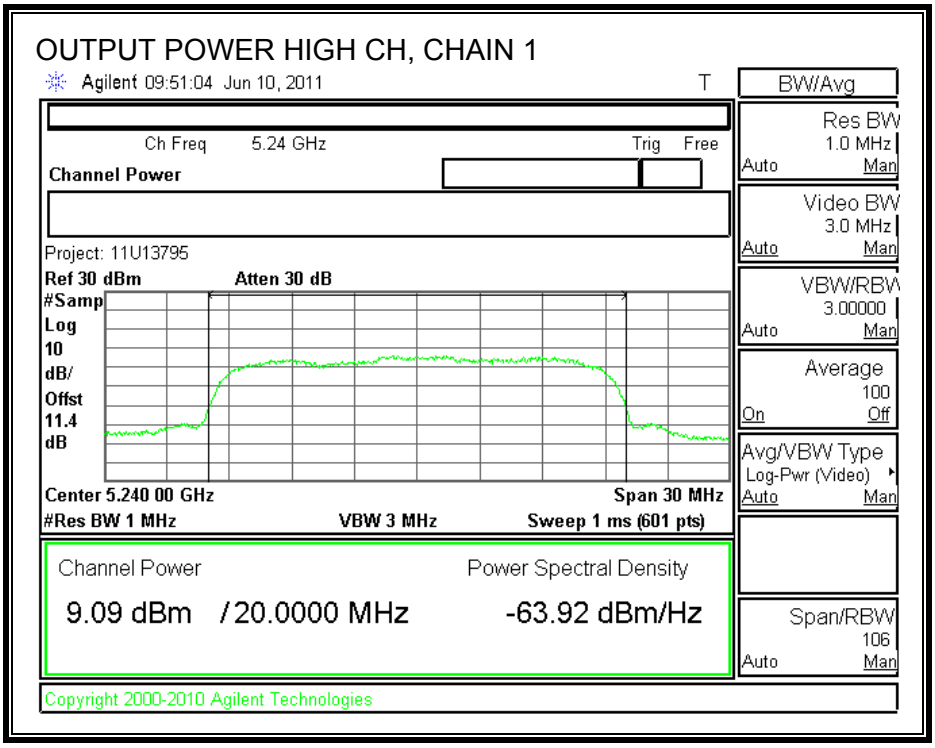
Individual Chain Results

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	9.92	8.51	12.28	14.13	-1.85
Mid	5200	9.24	7.74	11.56	14.16	-2.60
High	5240	9.09	8.56	11.84	14.15	-2.31

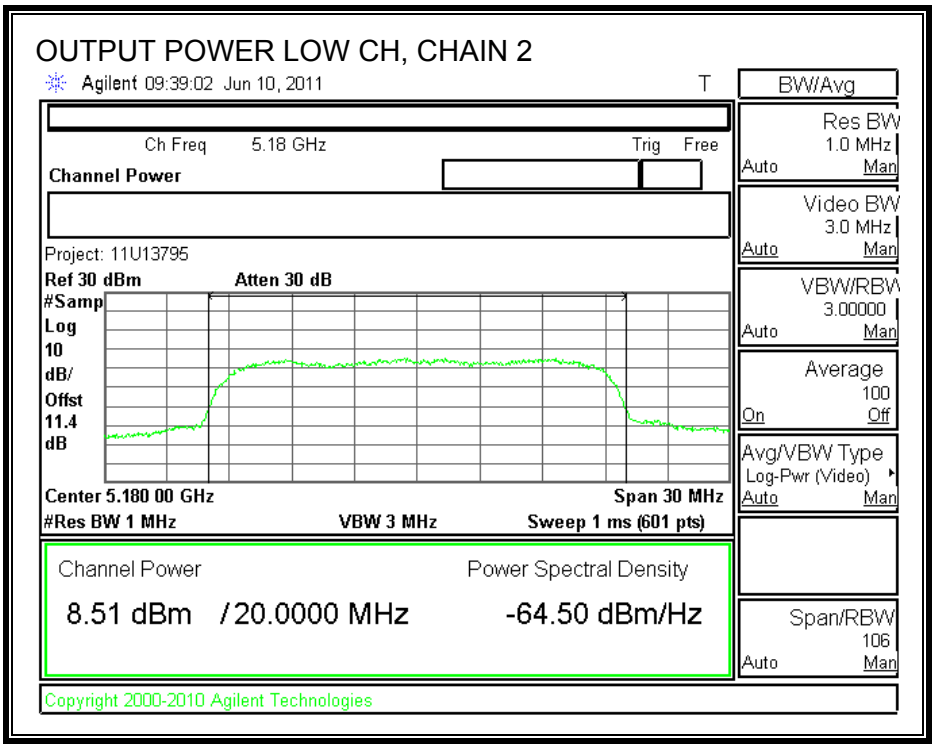
CHAIN 1 OUTPUT POWER

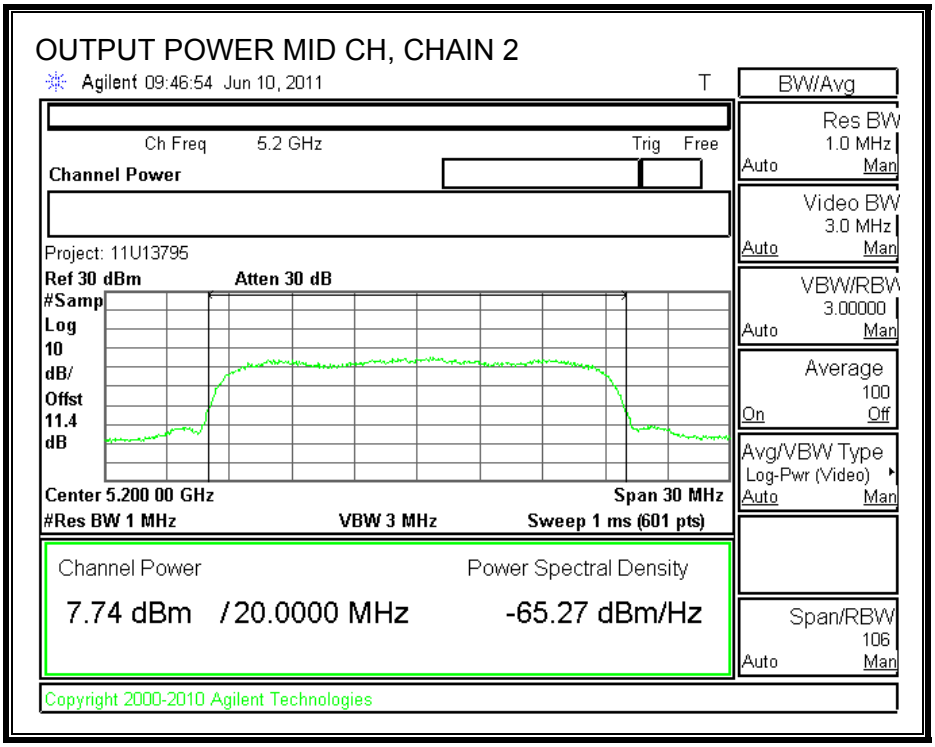


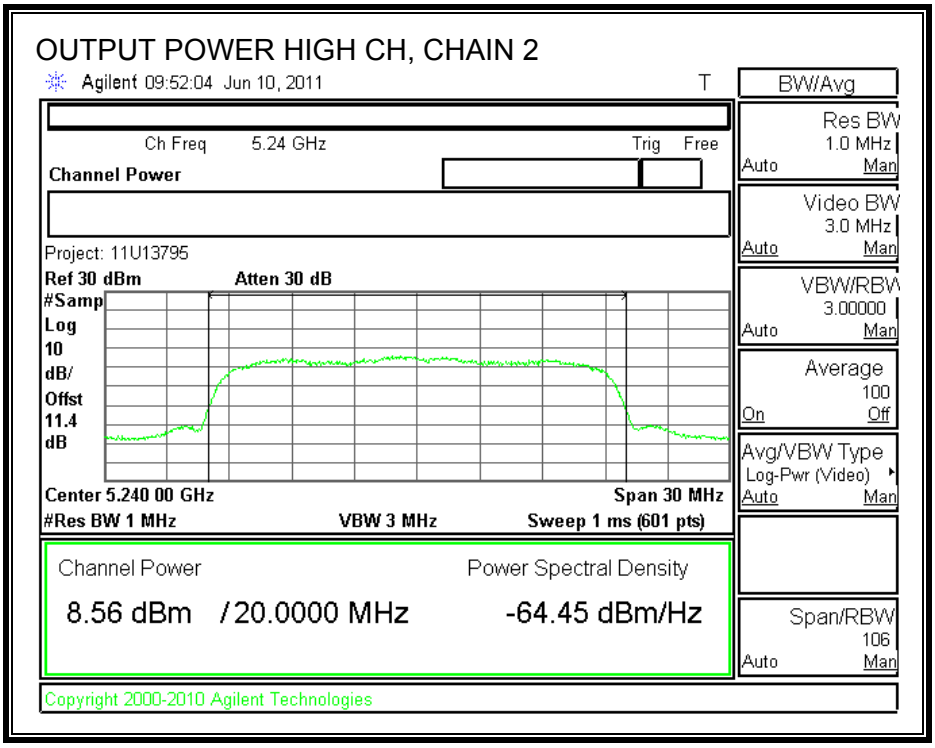




CHAIN 2 OUTPUT POWER







7.2.3. 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 8.61 dBi therefore the PSD limit is 1.39 dBm.

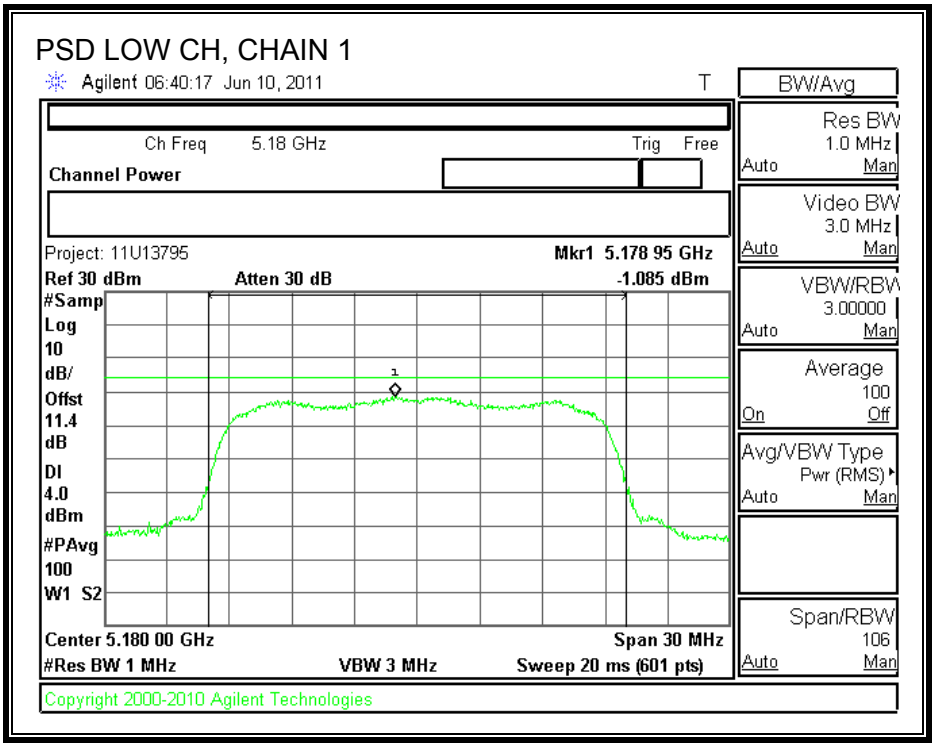
TEST PROCEDURE

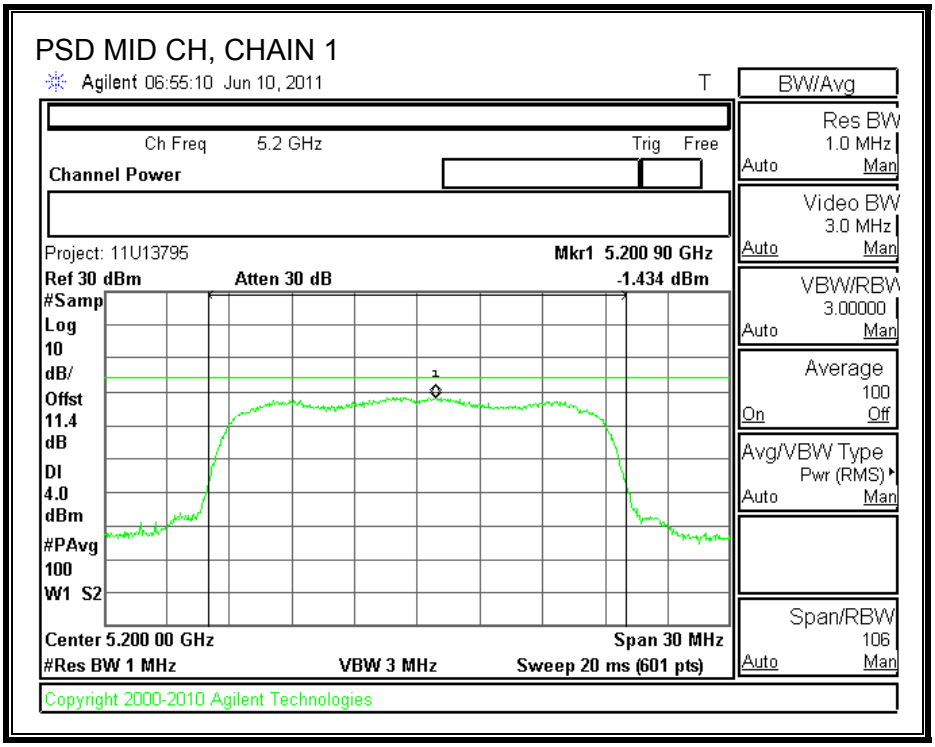
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

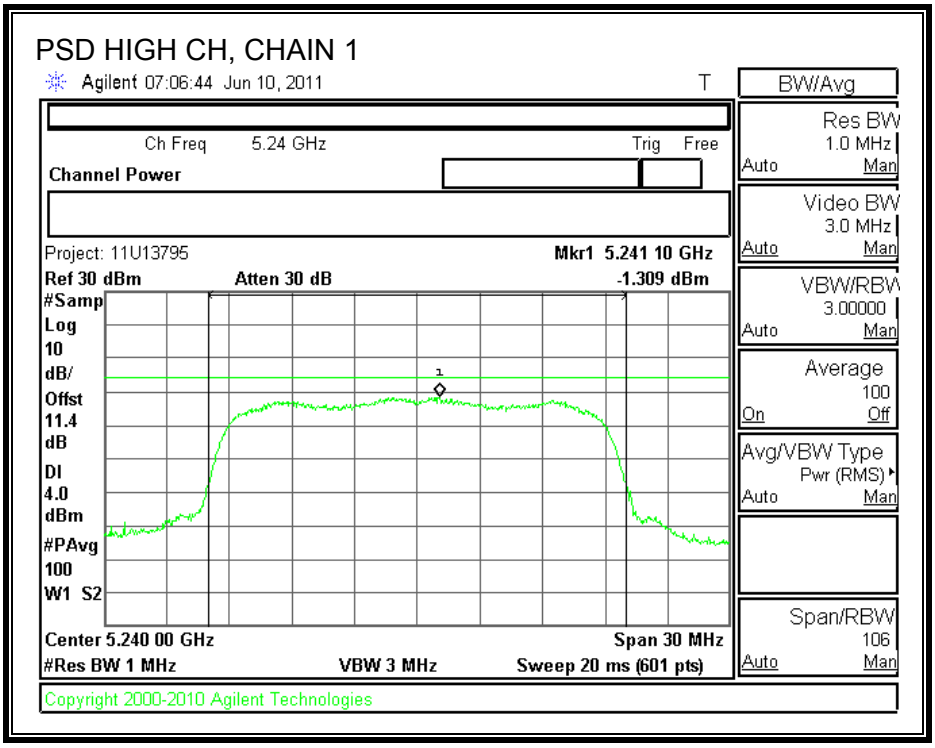
RESULTS

Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	-1.085	-2.47	1.29	1.39	-0.10
Middle	5200	-1.434	-2.16	1.23	1.39	-0.16
High	5240	-1.309	-2.41	1.19	1.39	-0.20

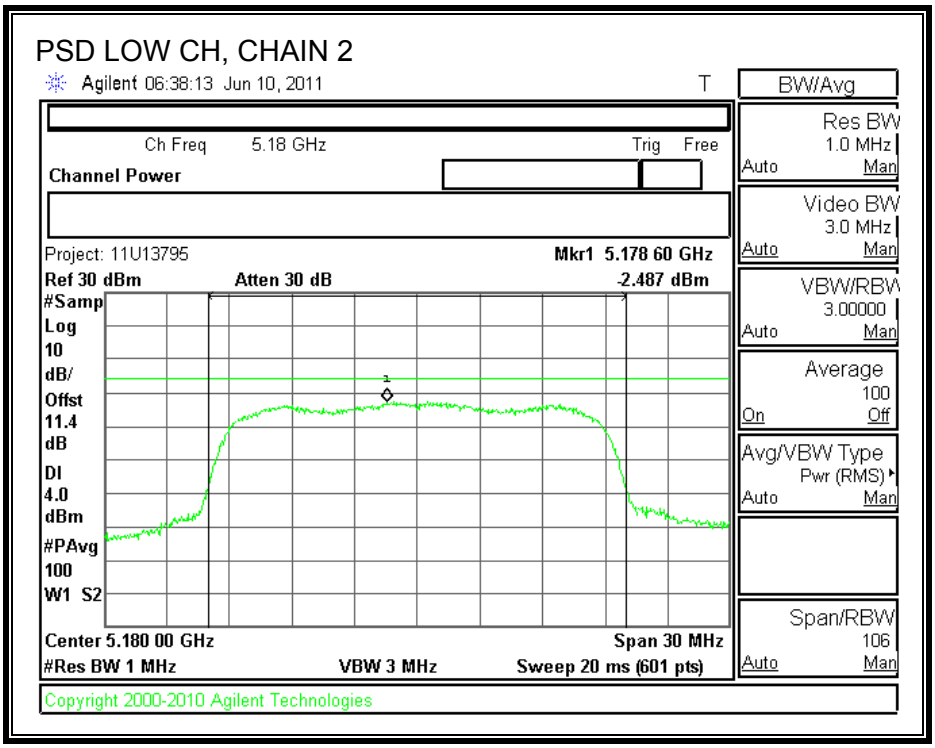
CHAIN 1 POWER SPECTRAL DENSITY

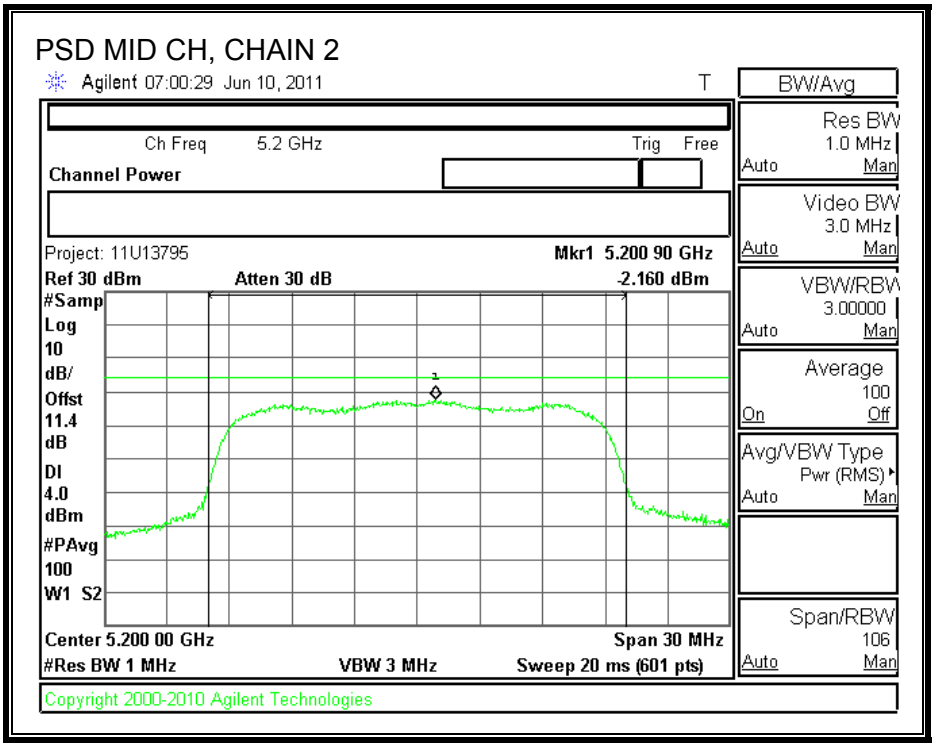


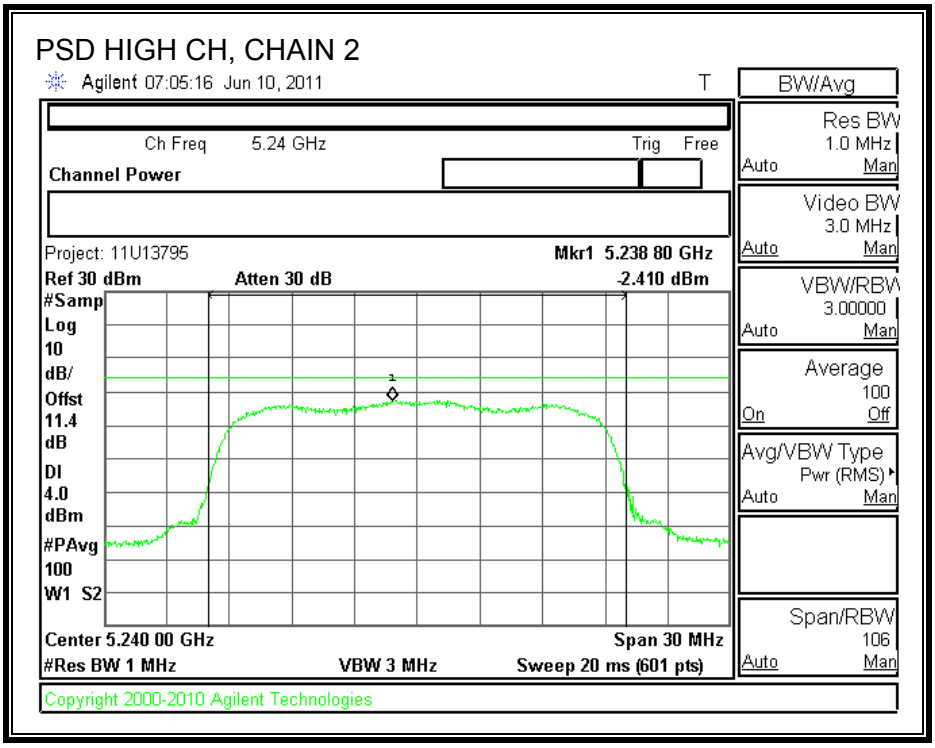




CHAIN 2 POWER SPECTRAL DENSITY







7.2.4. 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

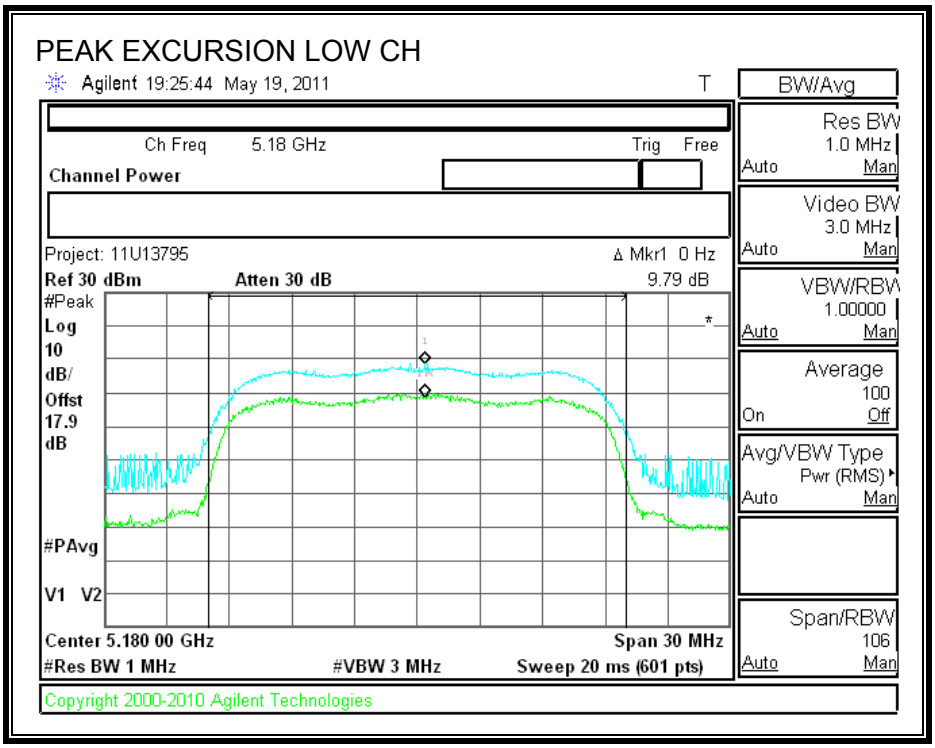
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.79	13	-3.21
Middle	5200	9.27	13	-3.73
High	5240	8.94	13	-4.06

CHAIN 2

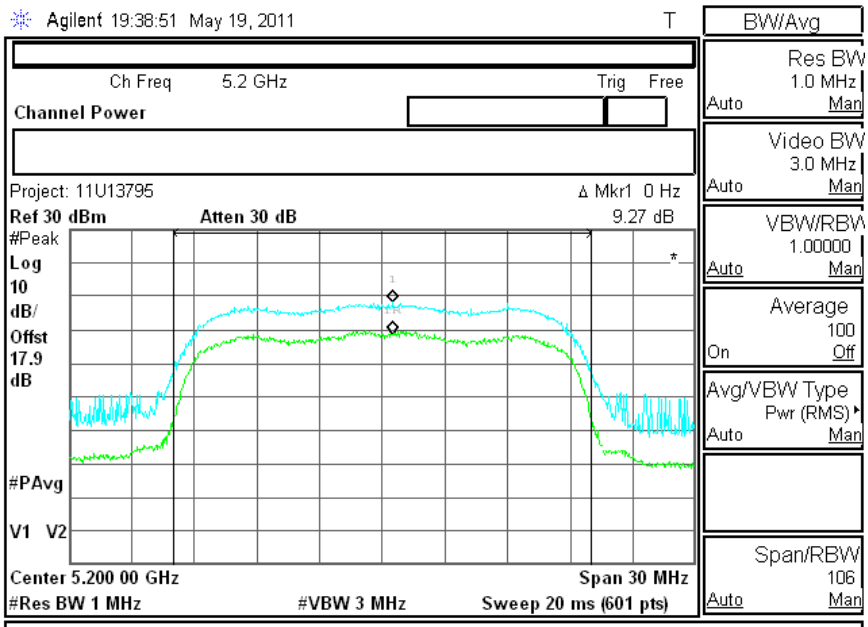
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.72	13	-3.28
Middle	5200	10.66	13	-2.34
High	5240	9.99	13	-3.01

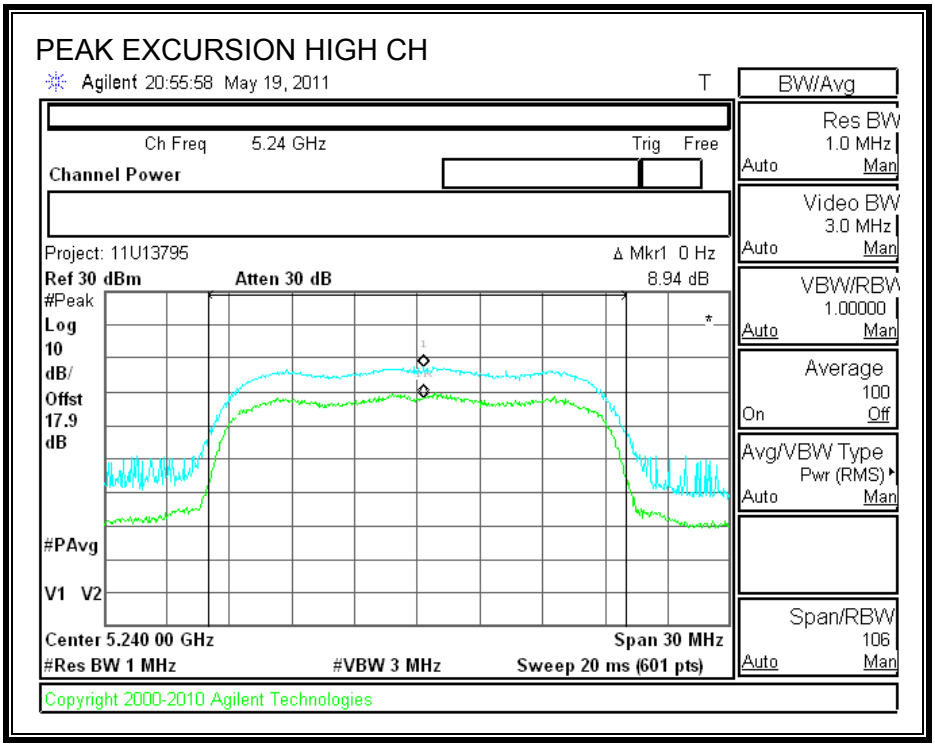
CHAIN 1

PEAK EXCURSION



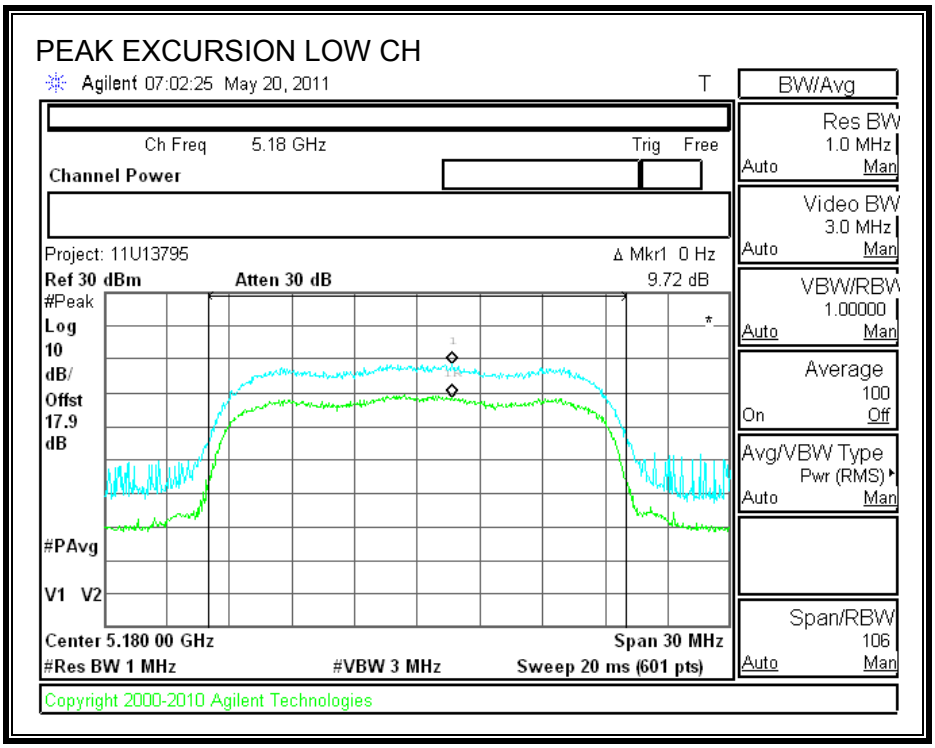
PEAK EXCURSION MID CH



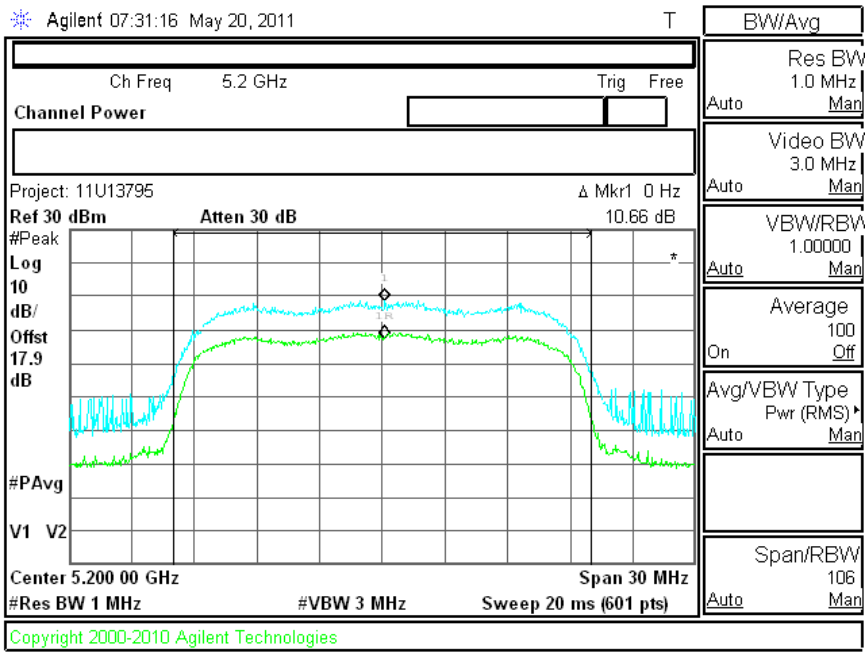


CHAIN 2

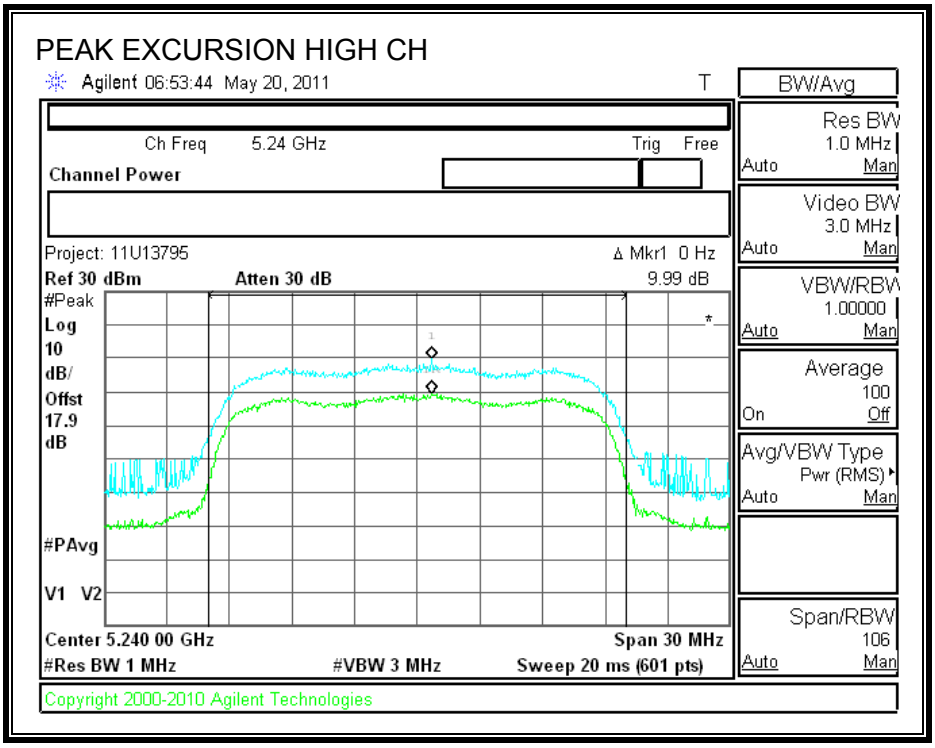
PEAK EXCURSION



PEAK EXCURSION MID CH



PEAK EXCURSION HIGH CH



7.2.5. 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

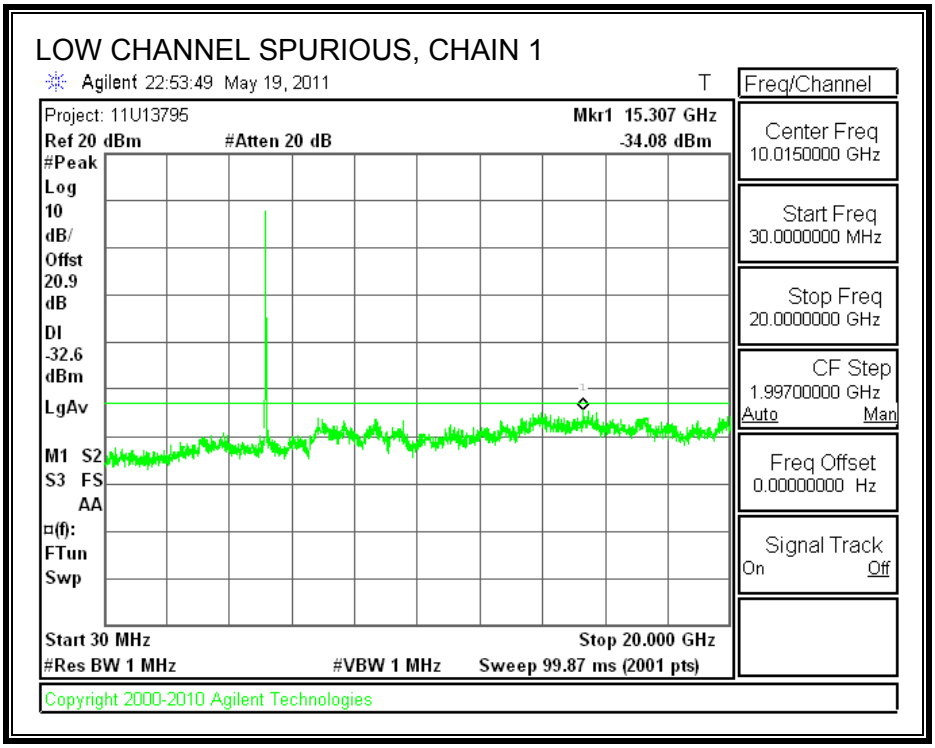
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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

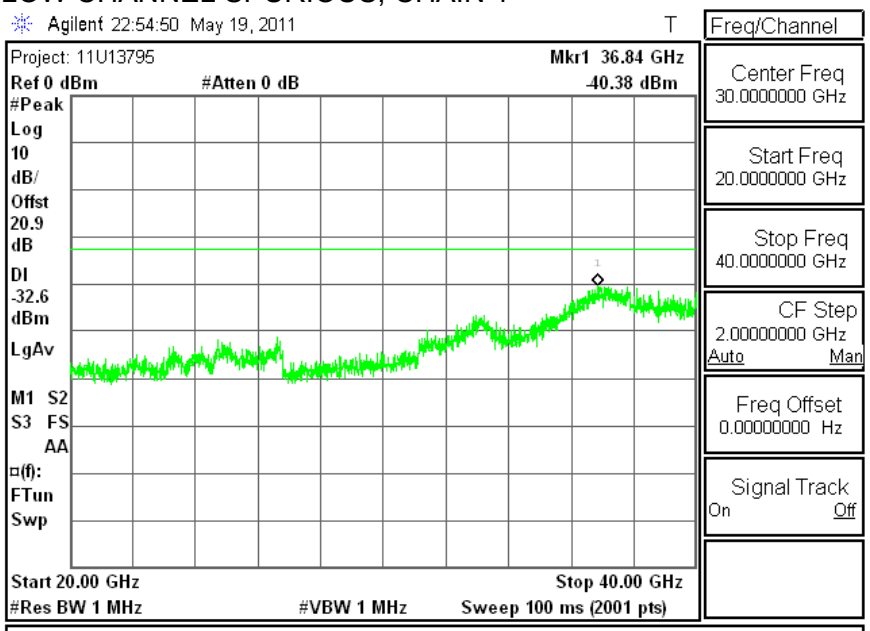
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

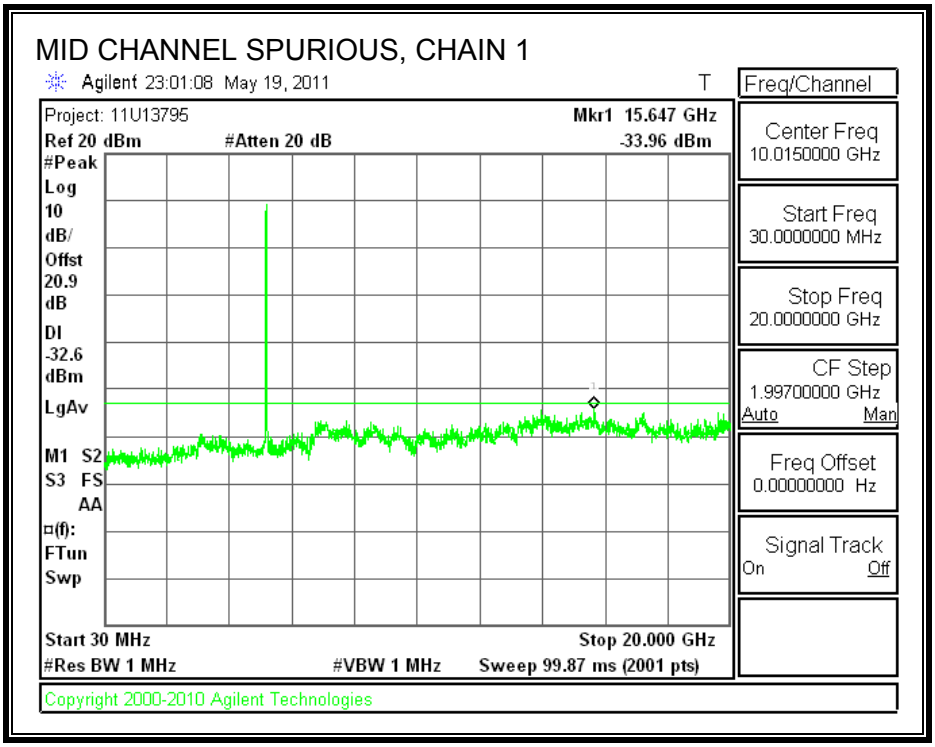
CHAIN 1 SPURIOUS EMISSIONS



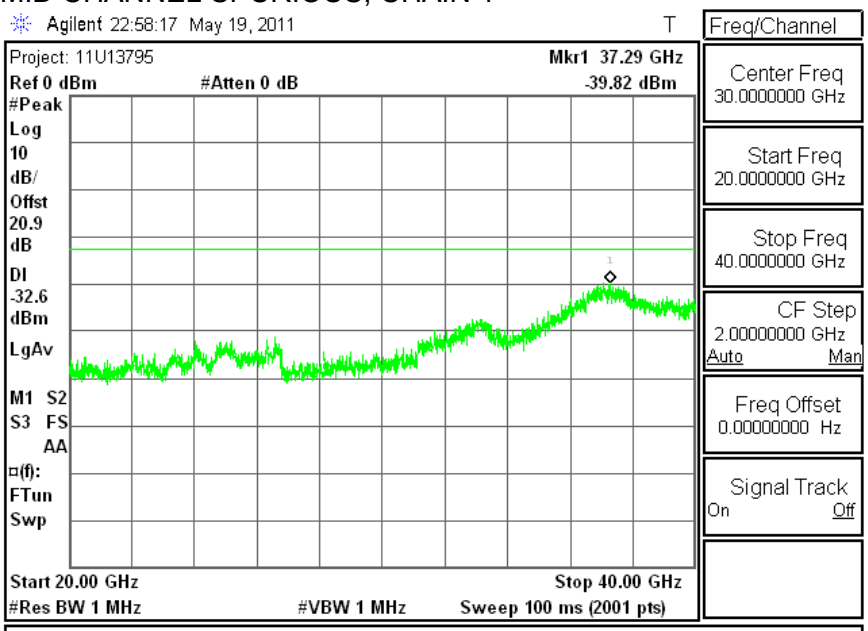
LOW CHANNEL SPURIOUS, CHAIN 1



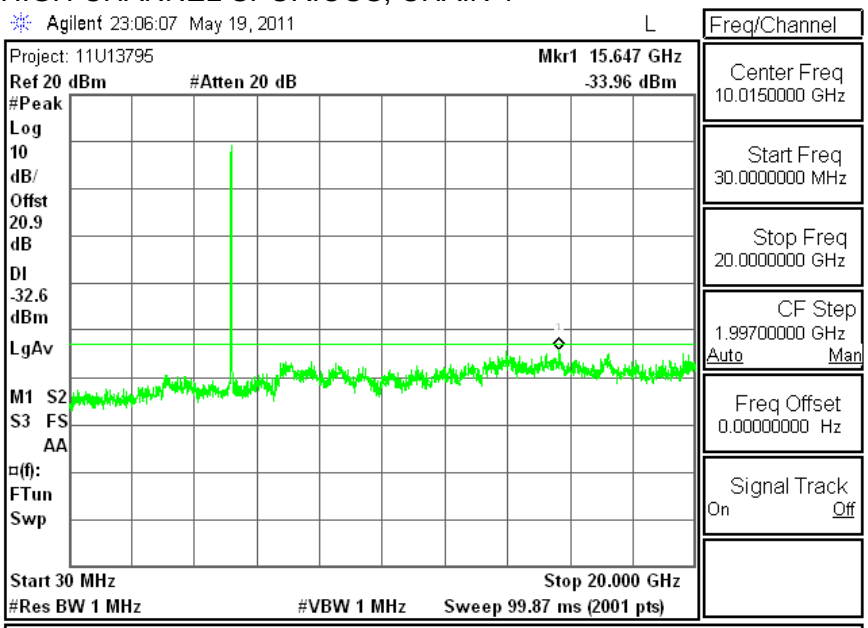
MID CHANNEL SPURIOUS, CHAIN 1



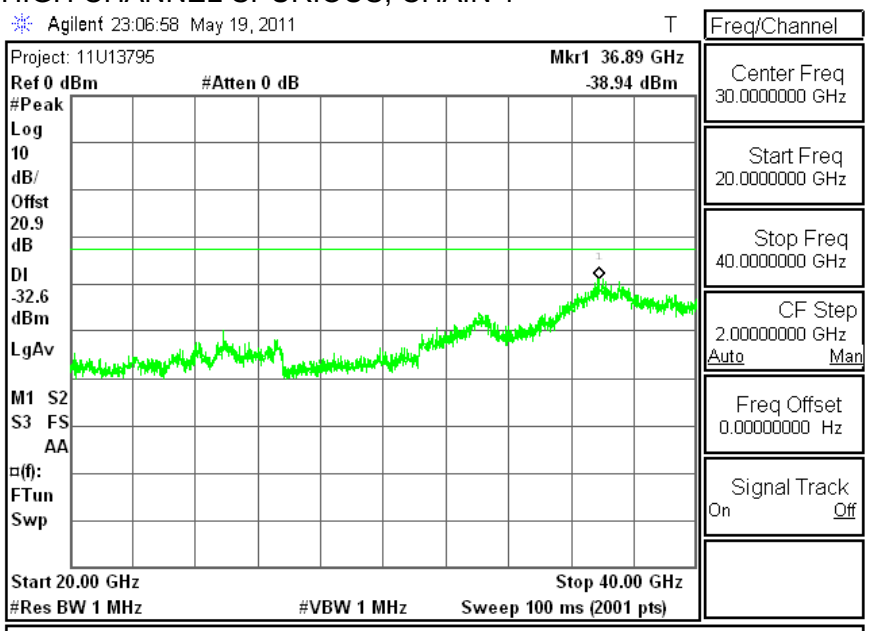
MID CHANNEL SPURIOUS, CHAIN 1



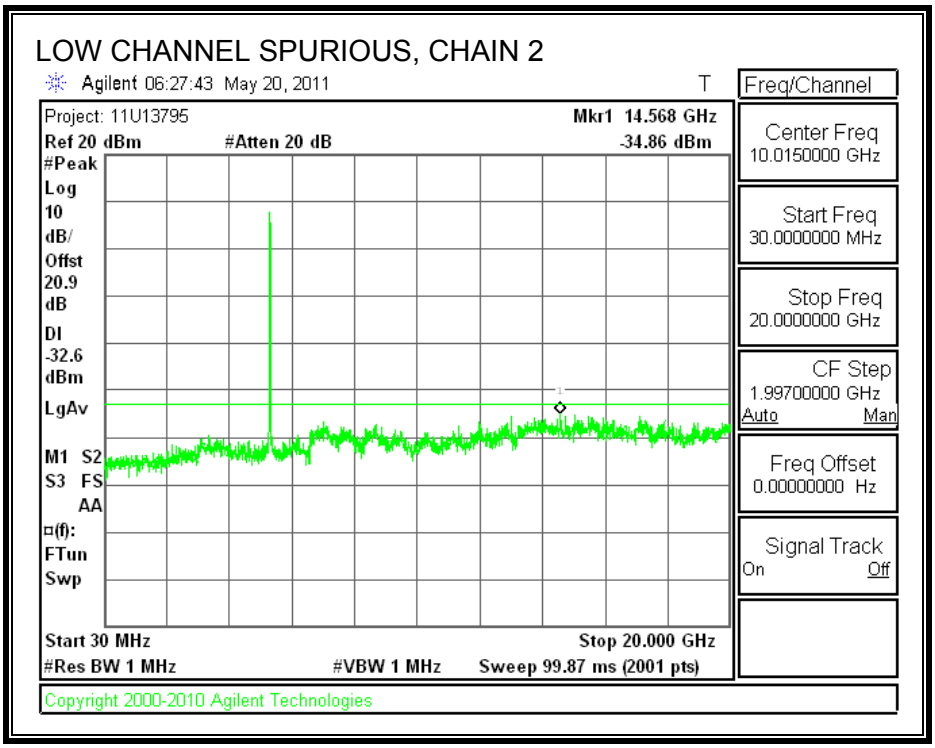
HIGH CHANNEL SPURIOUS, CHAIN 1



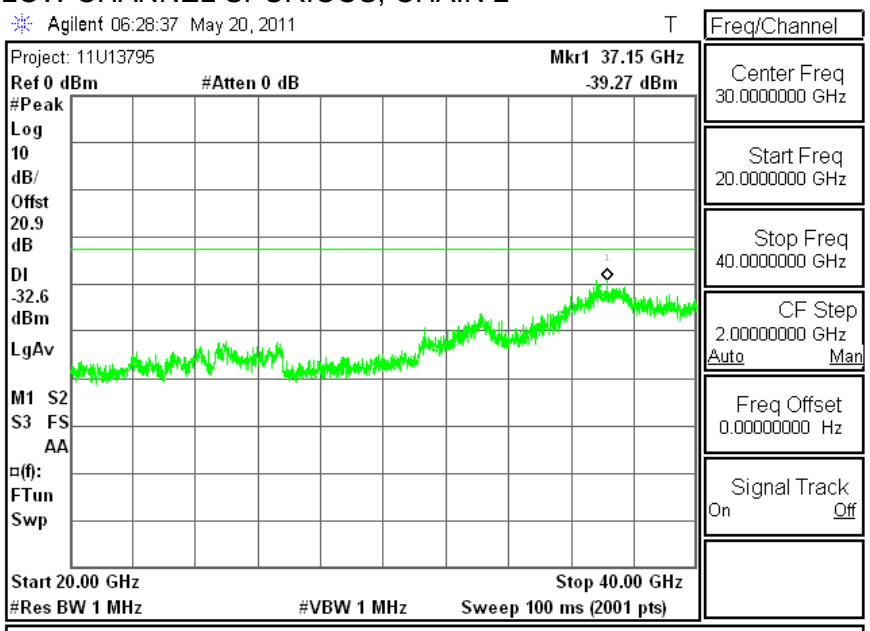
HIGH CHANNEL SPURIOUS, CHAIN 1

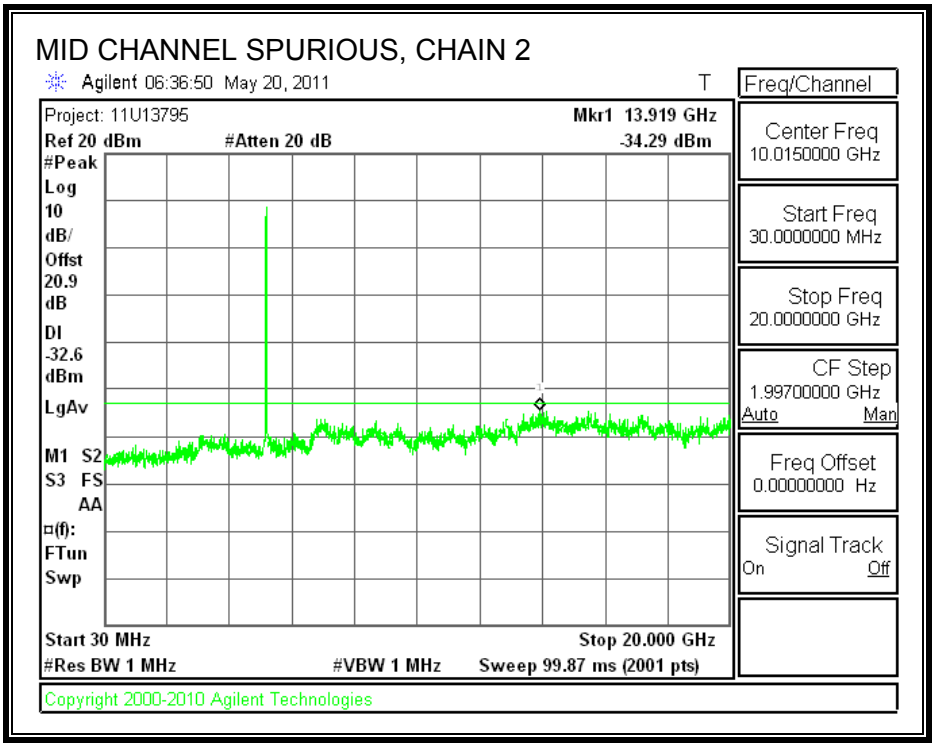


CHAIN 2 SPURIOUS EMISSIONS

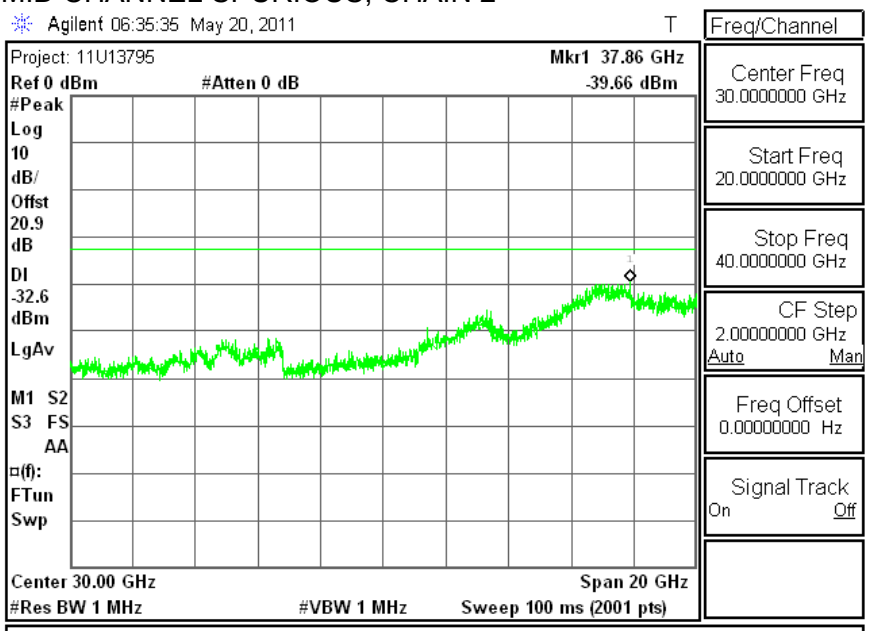


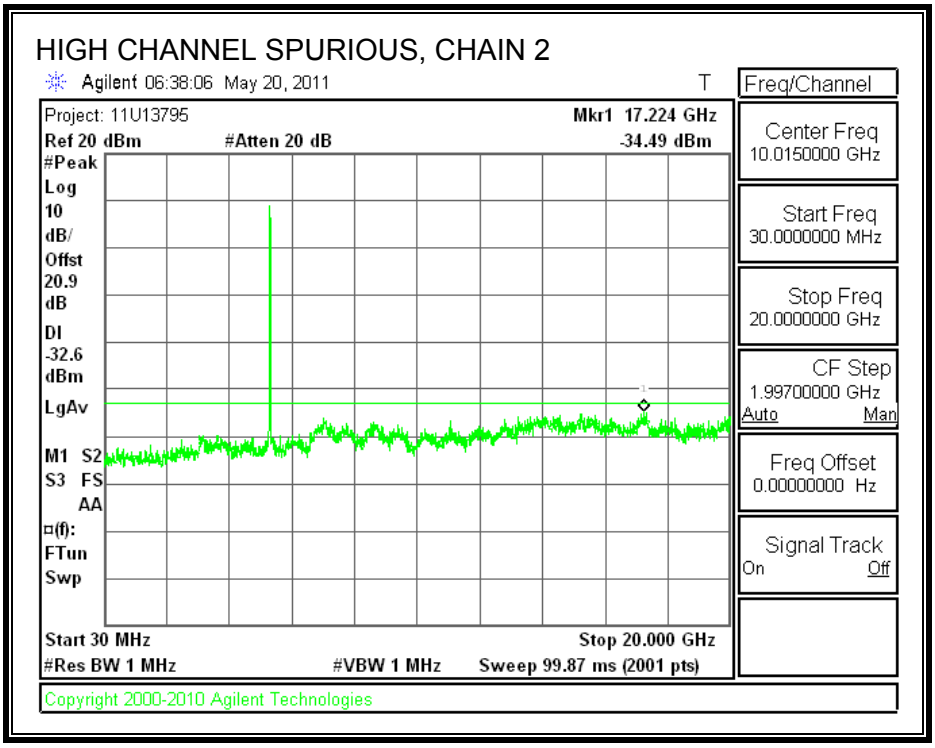
LOW CHANNEL SPURIOUS, CHAIN 2



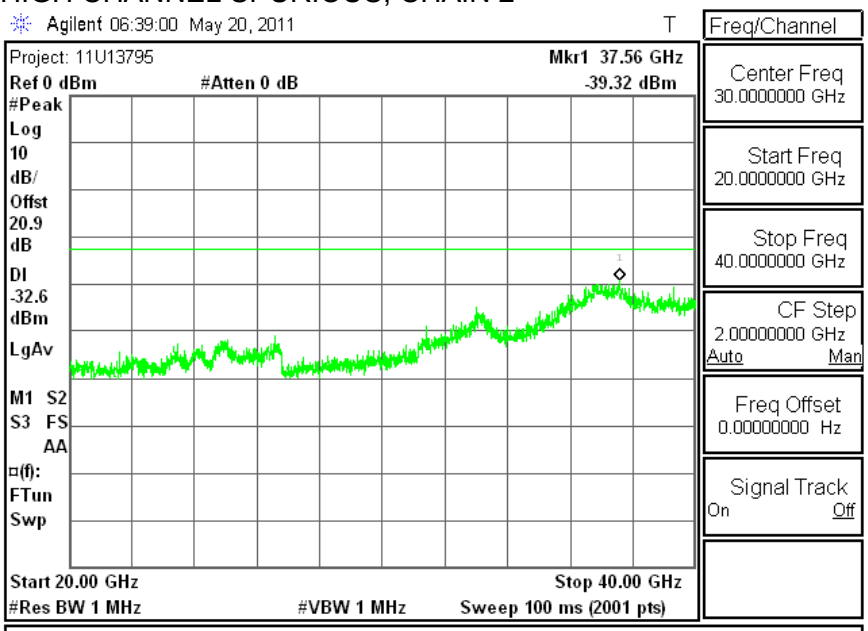


MID CHANNEL SPURIOUS, CHAIN 2





HIGH CHANNEL SPURIOUS, CHAIN 2



7.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

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

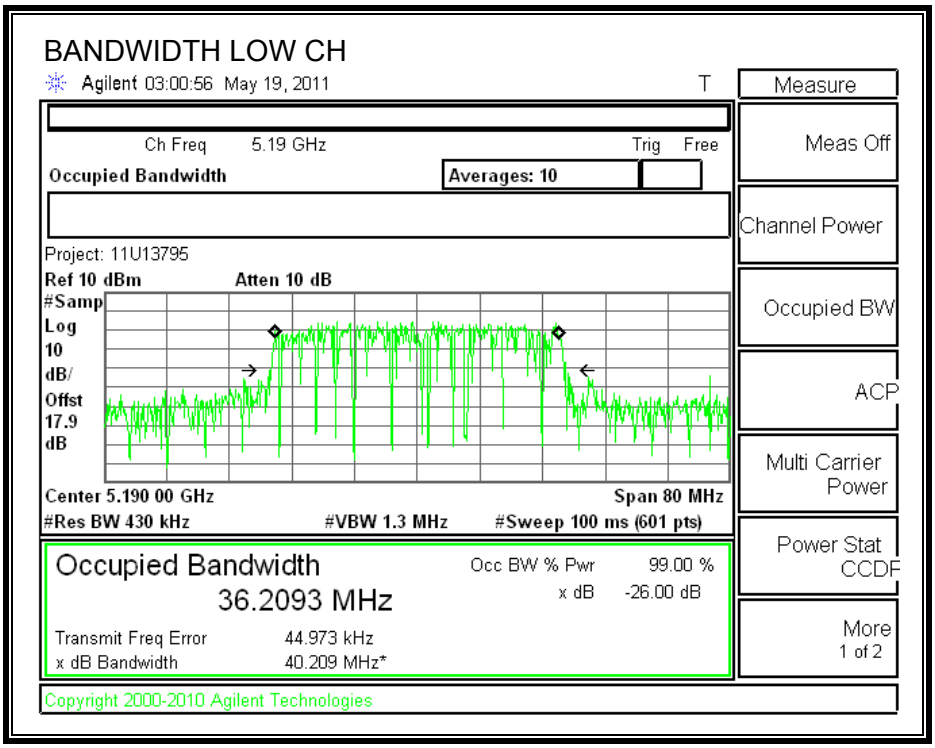
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	37.48	36.0148
High	5230	40.024	36.102

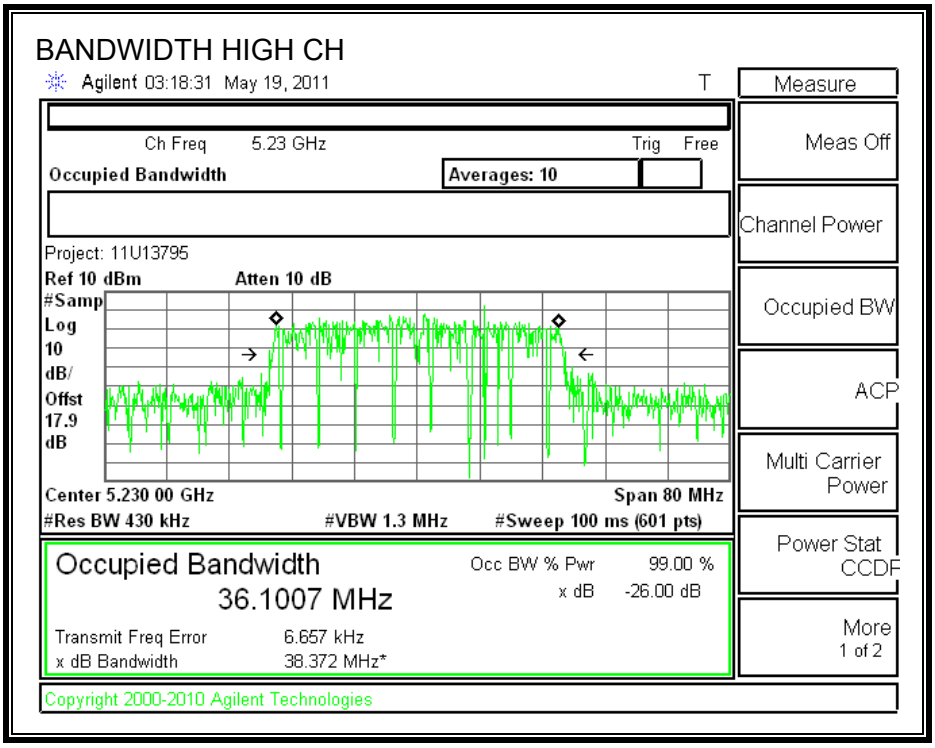
CHAIN 2

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	37.480	36.01480
High	5230	40.024	36.10200

CHAIN 1

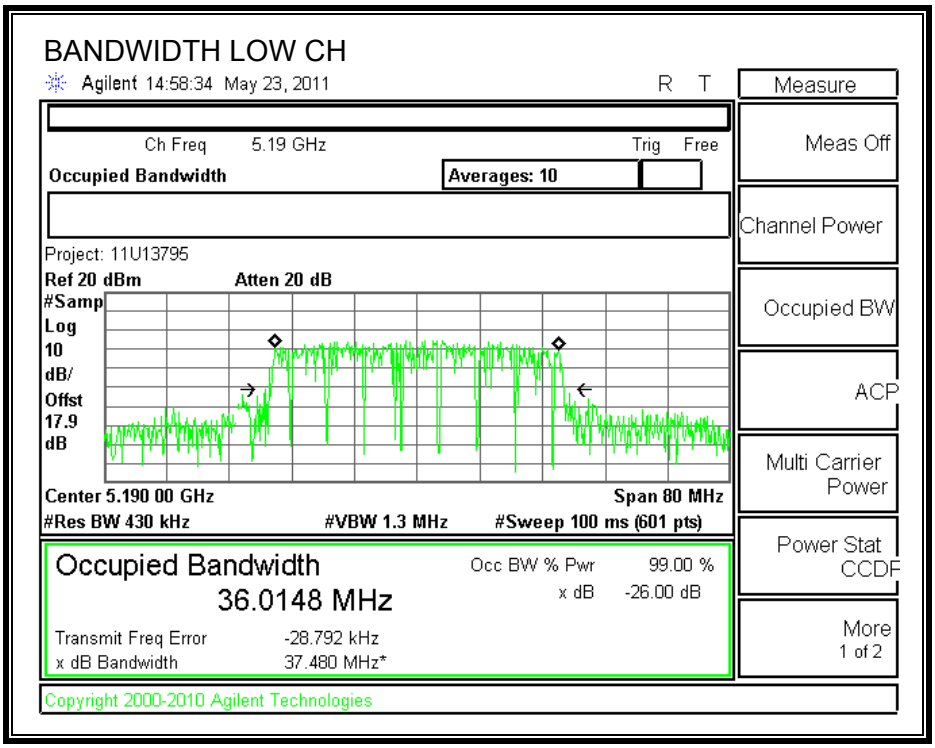
26 dB and 99% BANDWIDTH

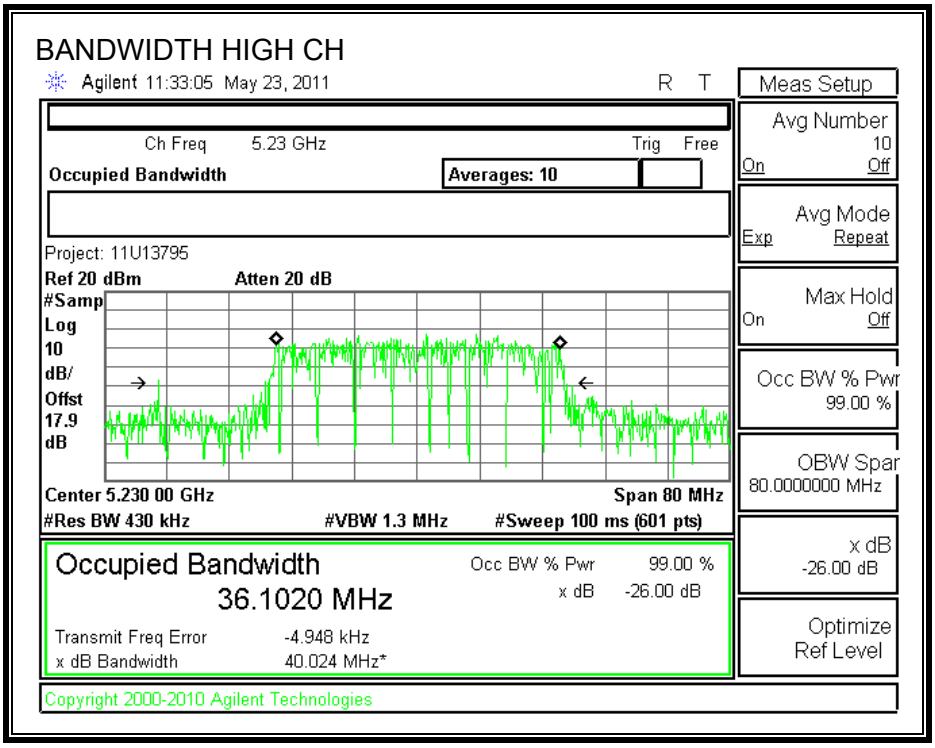




CHAIN 2

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 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

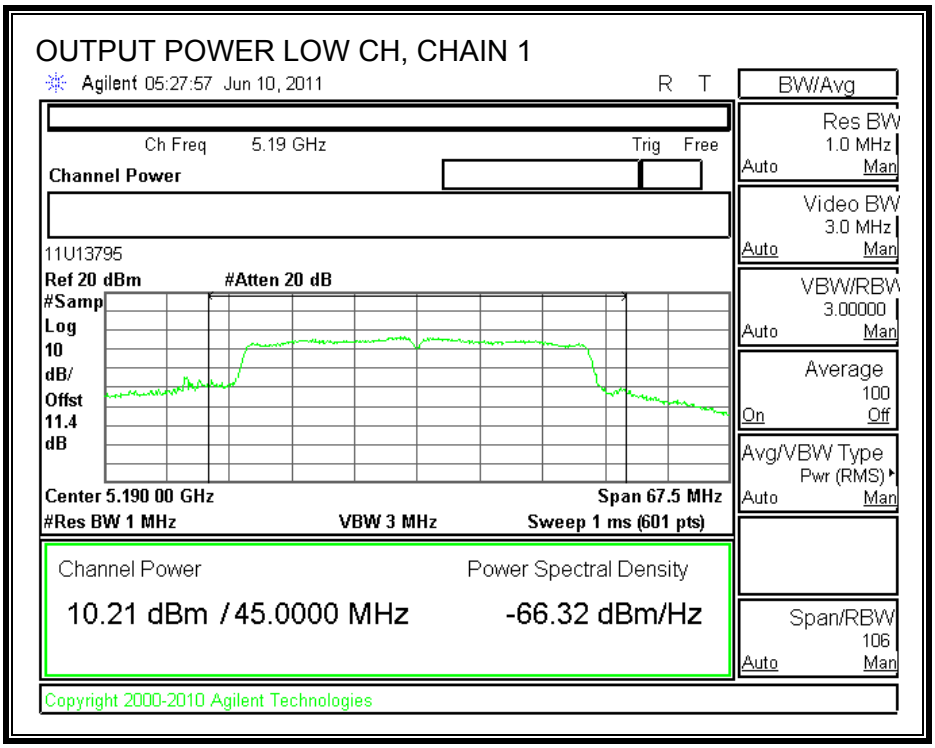
Limit

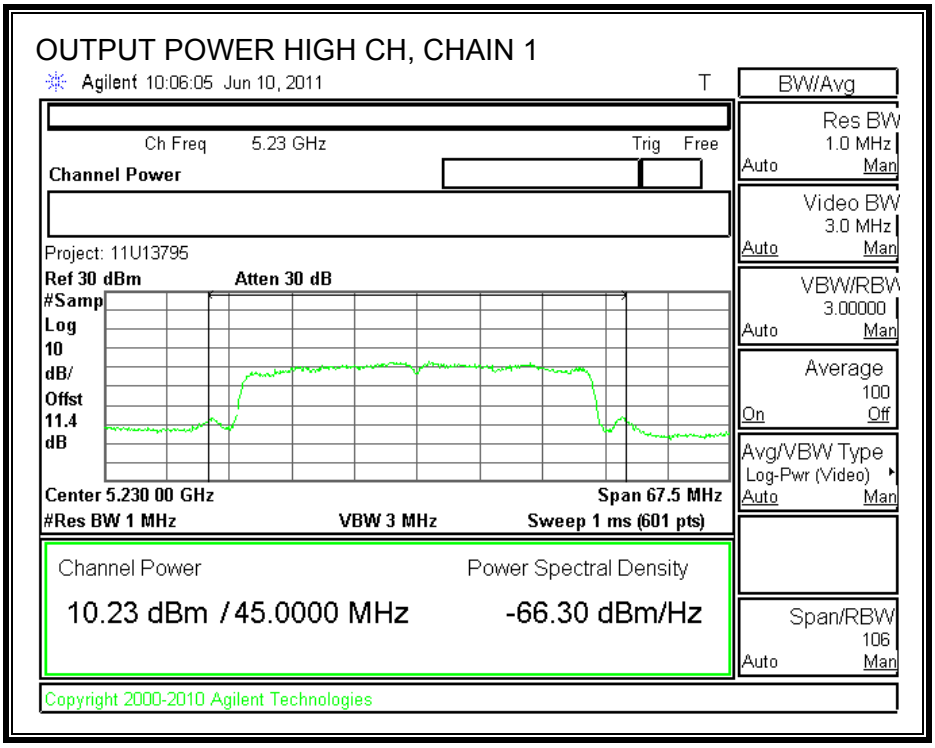
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5190	17	40.209	20.04	8.61	14.39
High	5230	17	40.024	20.02	8.61	14.39

Individual Chain Results

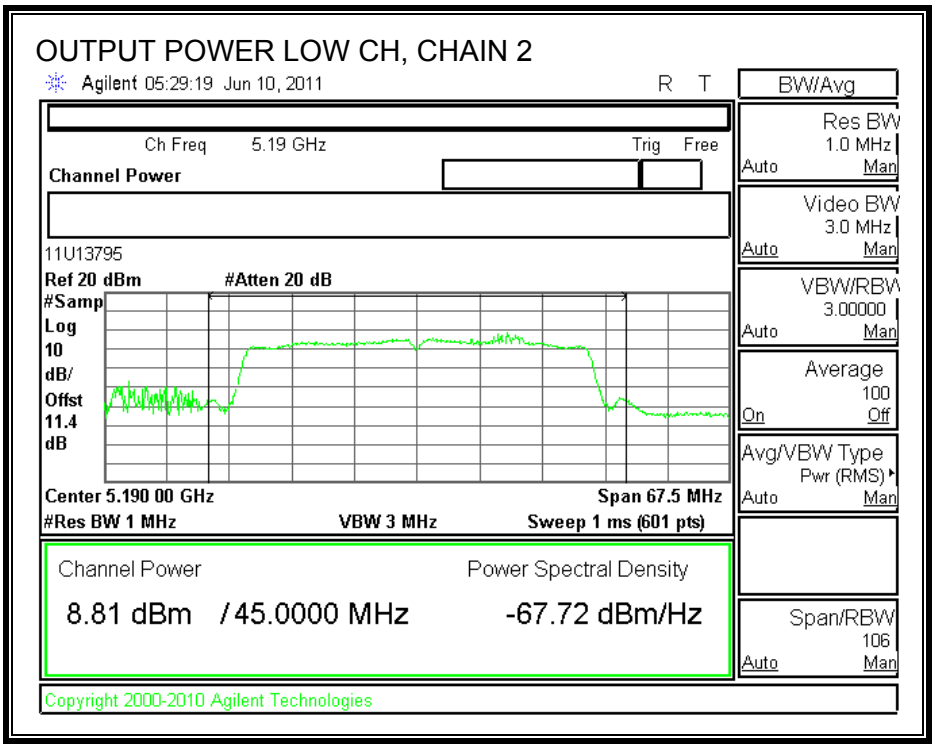
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5190	10.21	8.81	12.58	14.39	-1.81
High	5230	10.23	9.26	12.78	14.39	-1.61

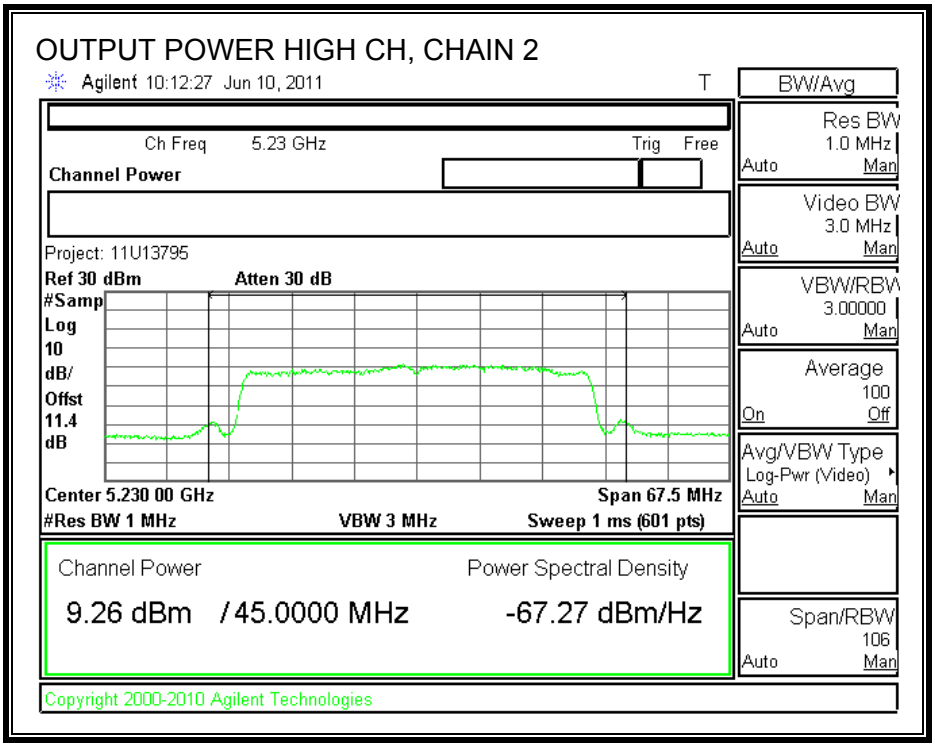
CHAIN 1 OUTPUT POWER





CHAIN 2 OUTPUT POWER





7.3.3. 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 8.61 dBi, therefore the limit is 1.39 dBm.

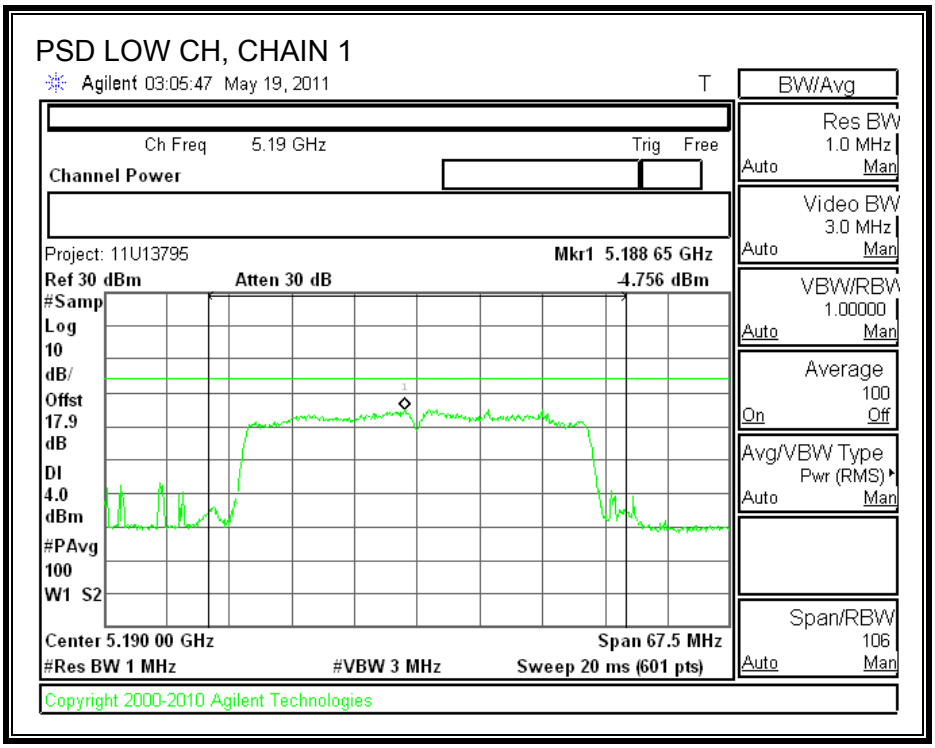
TEST PROCEDURE

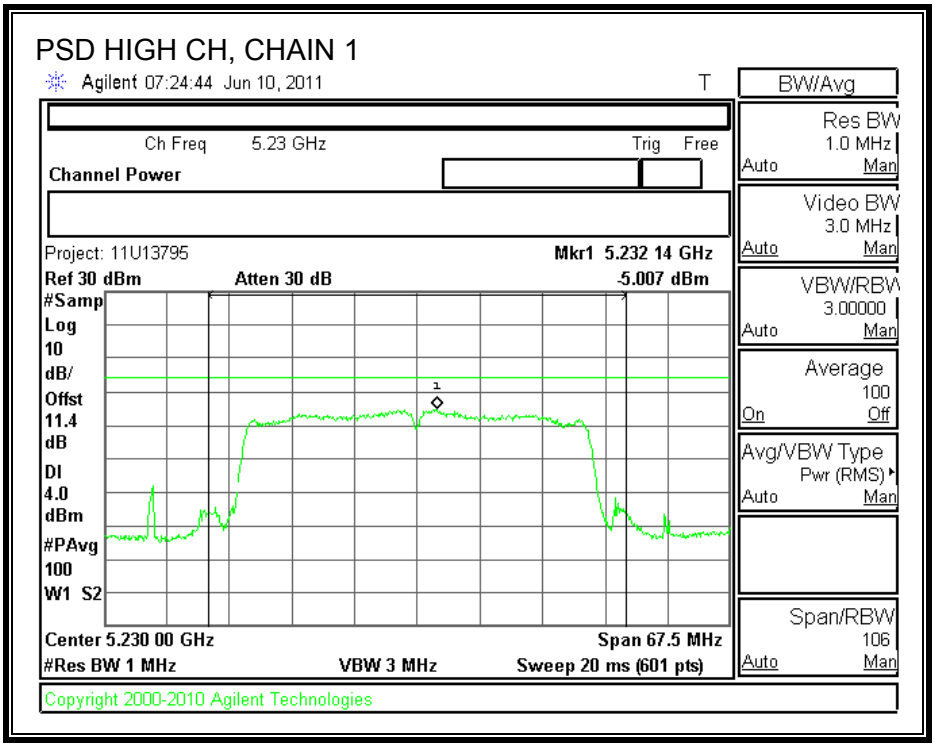
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

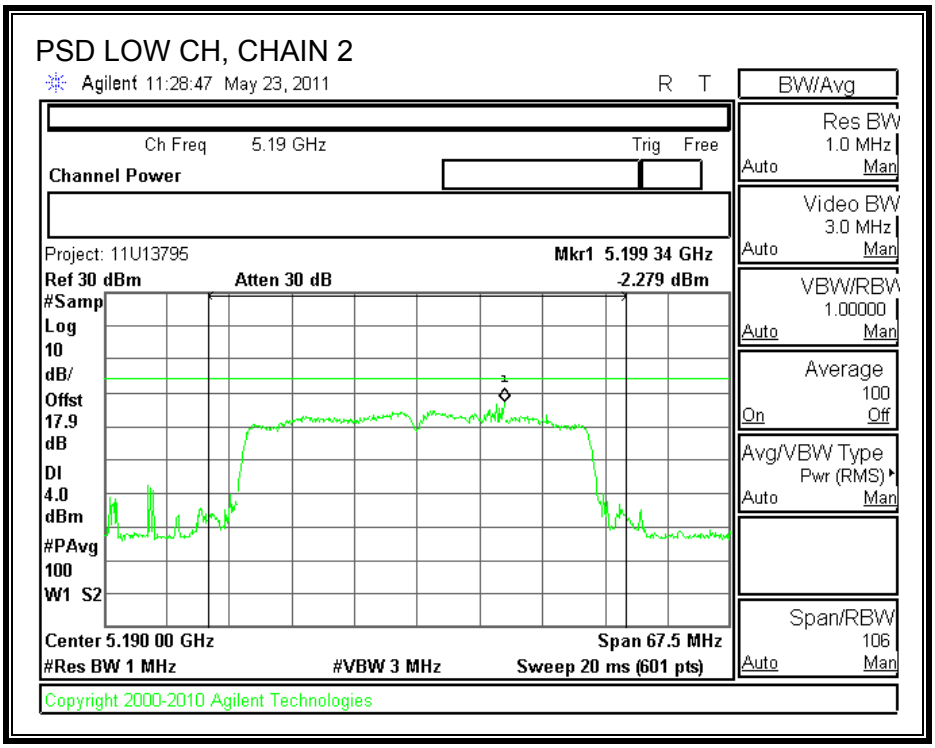
Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5190	-4.756	-2.279	-0.33	1.39	-1.72
High	5230	-1.789	-3.706	0.37	1.39	-1.02

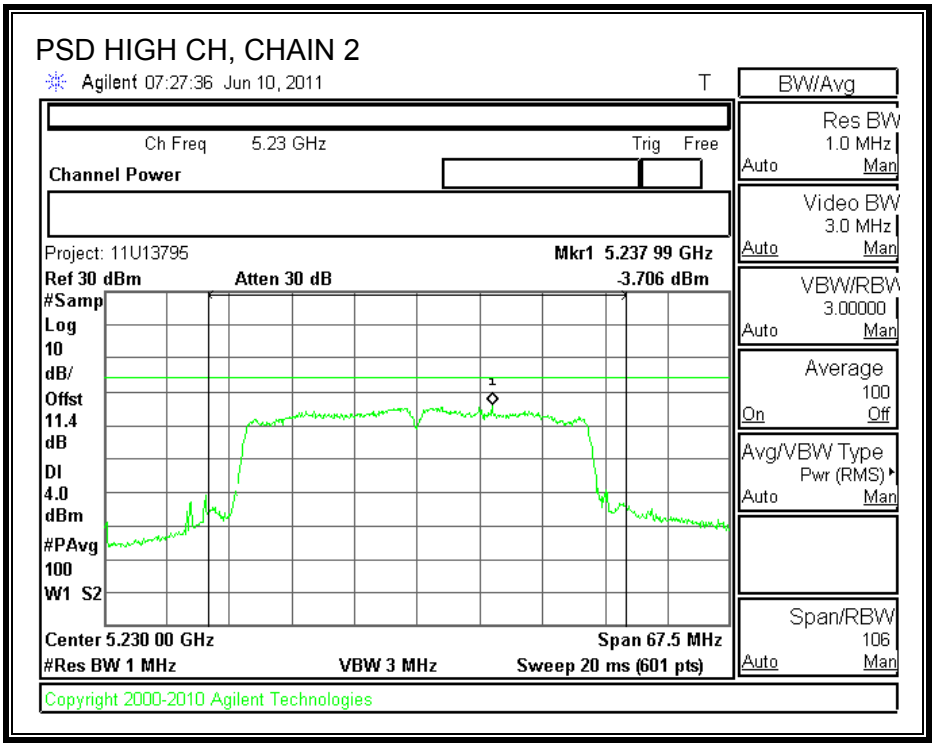
CHAIN 1 POWER SPECTRAL DENSITY





CHAIN 2 POWER SPECTRAL DENSITY





7.3.4. 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

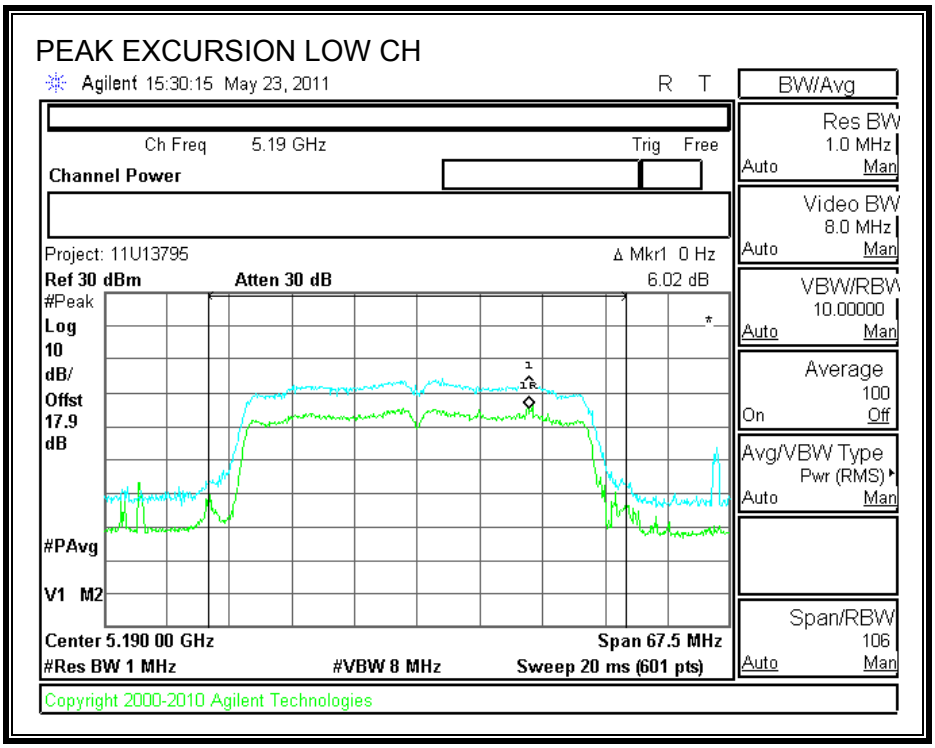
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	8.39	13	-4.61
High	5230	10.39	13	-2.61

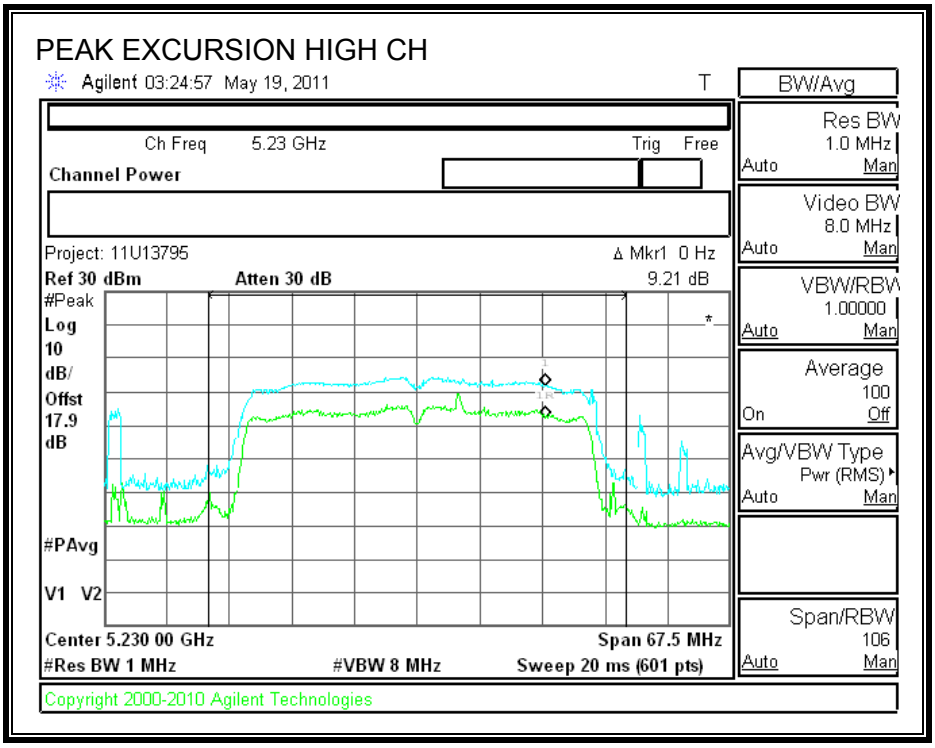
CHAIN 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	8.39	13	-4.61
High	5230	10.39	13	-2.61

CHAIN 1

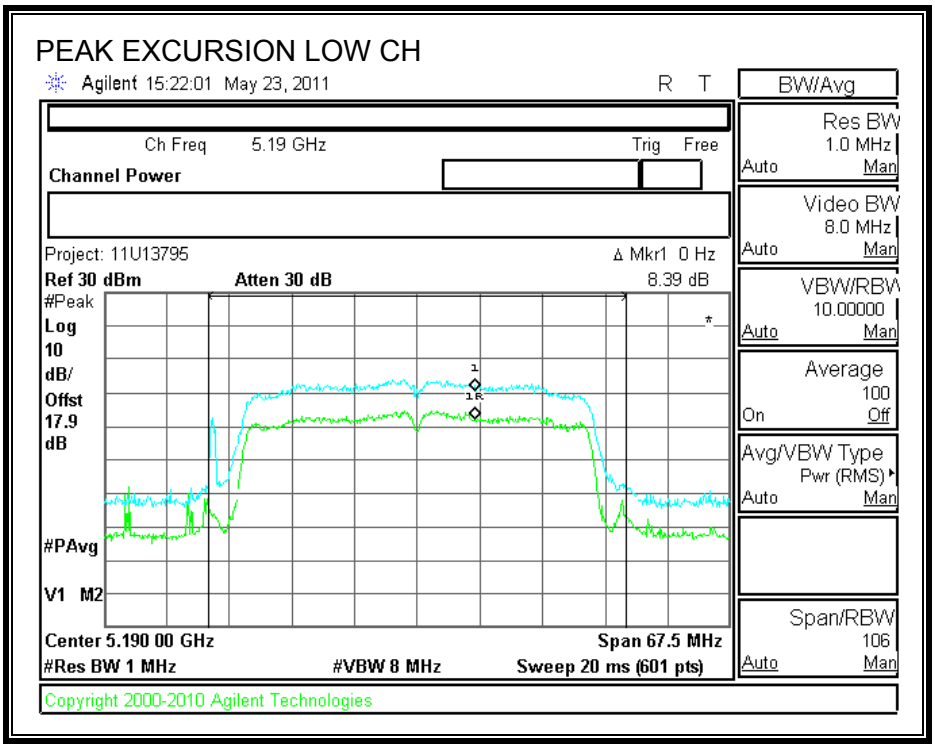
PEAK EXCURSION

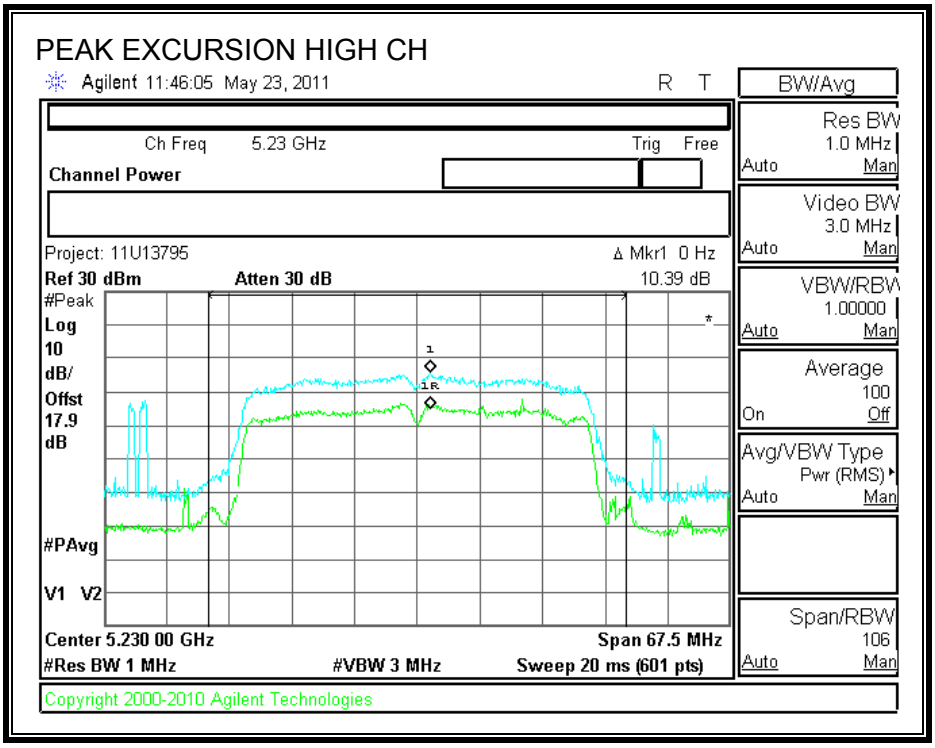




CHAIN 2

PEAK EXCURSION





7.3.5. 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

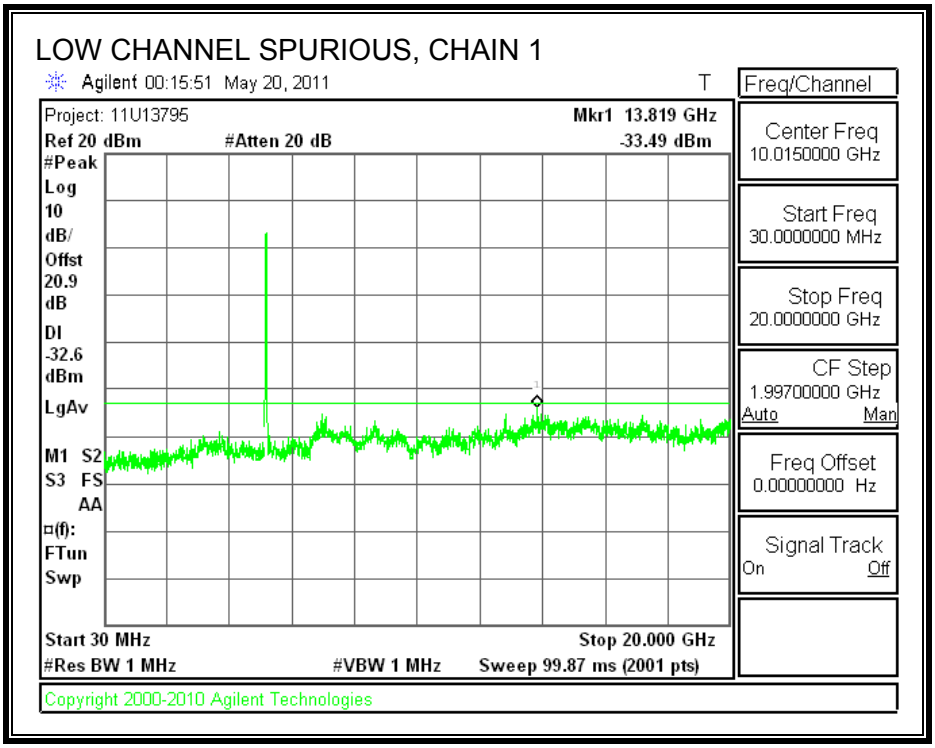
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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

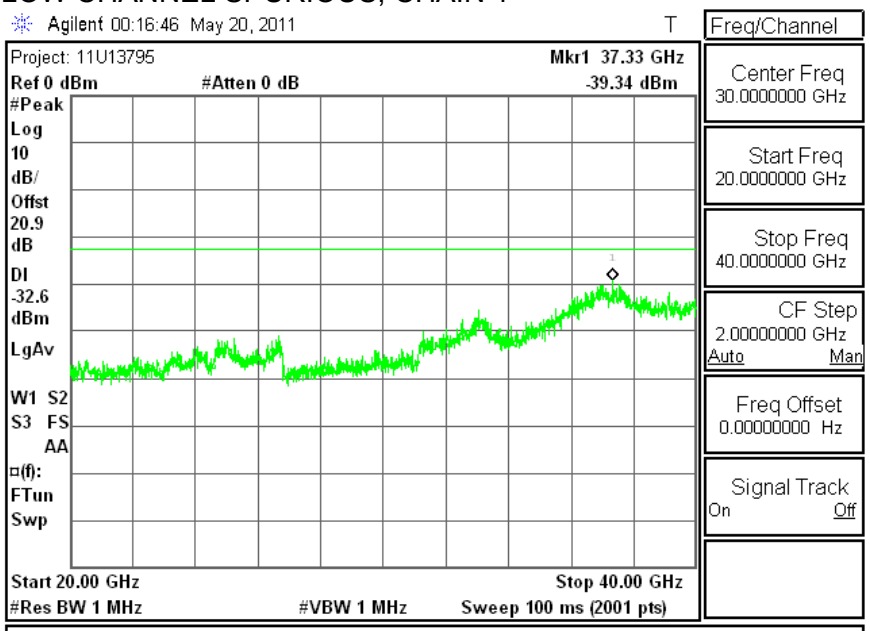
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

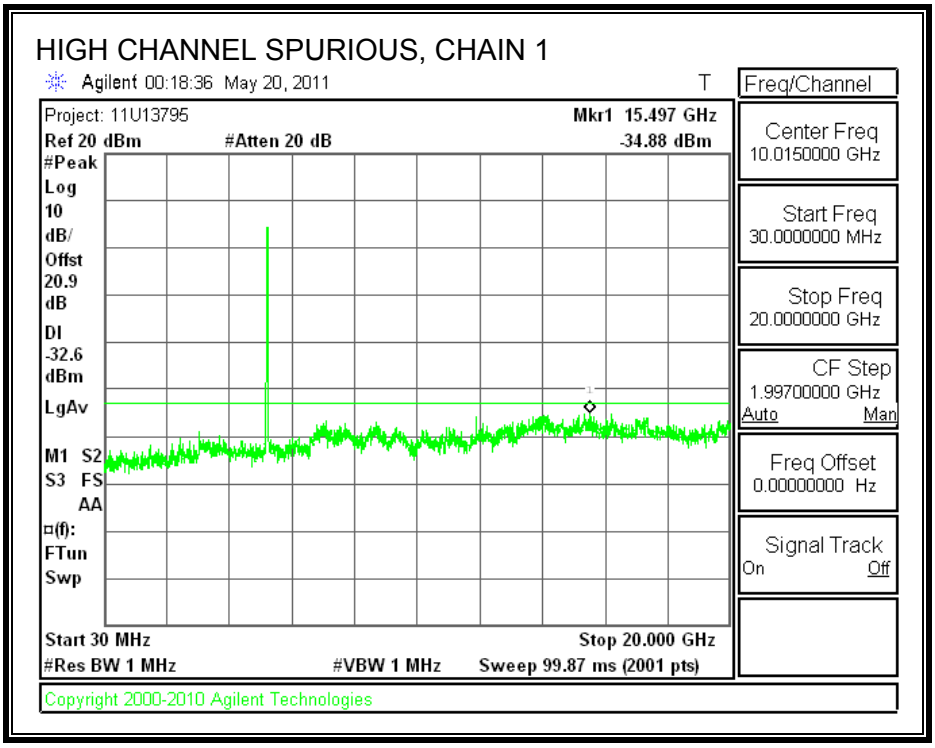
RESULTS

CHAIN 1 SPURIOUS EMISSIONS

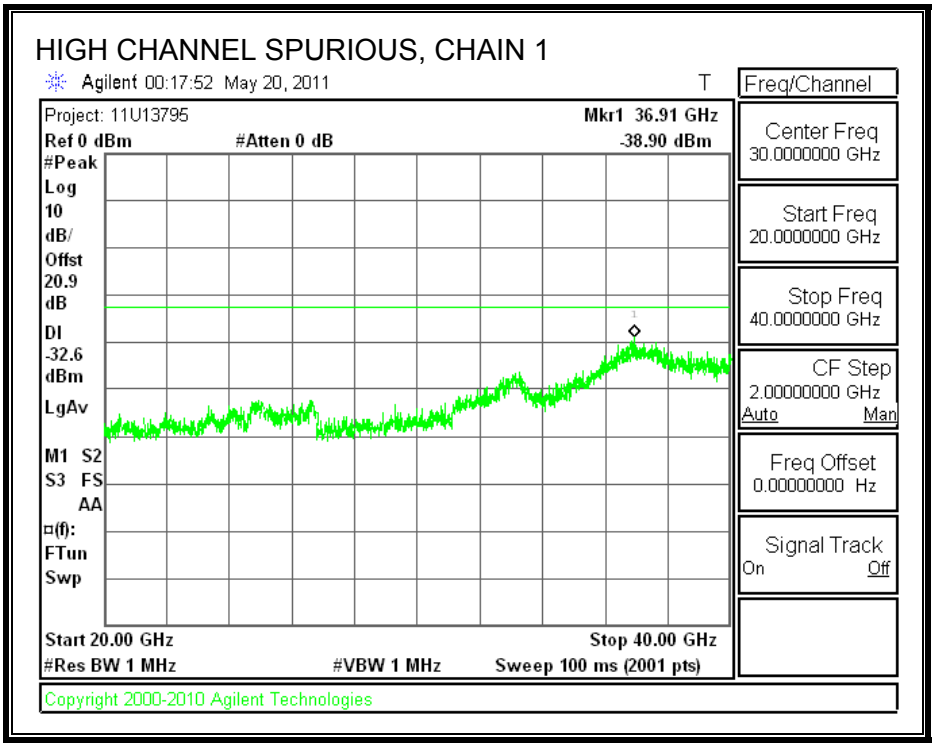


LOW CHANNEL SPURIOUS, CHAIN 1

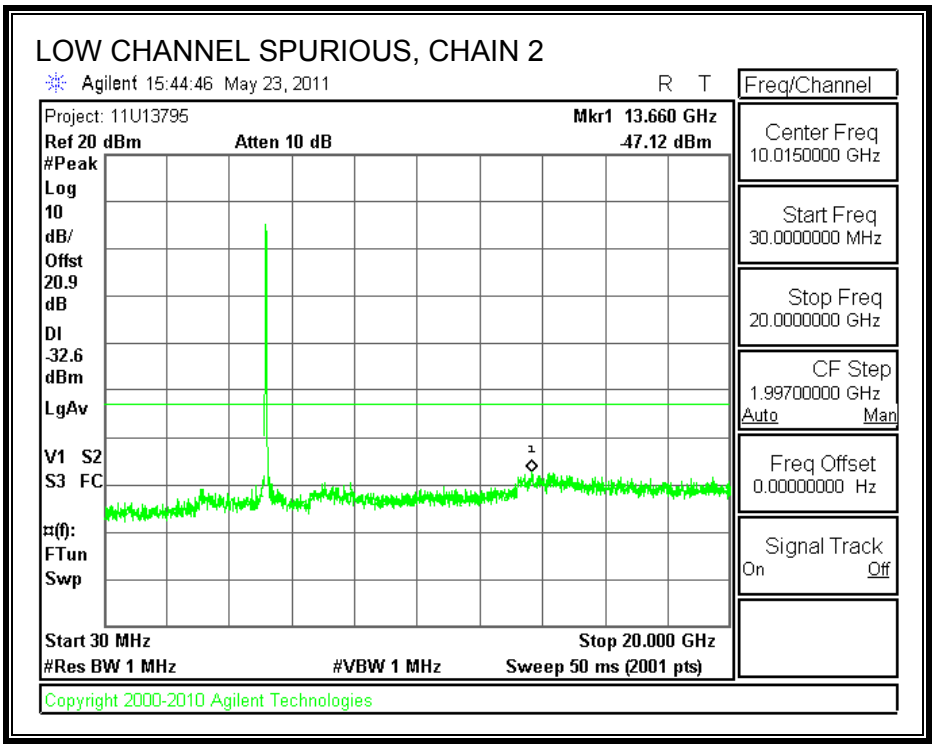




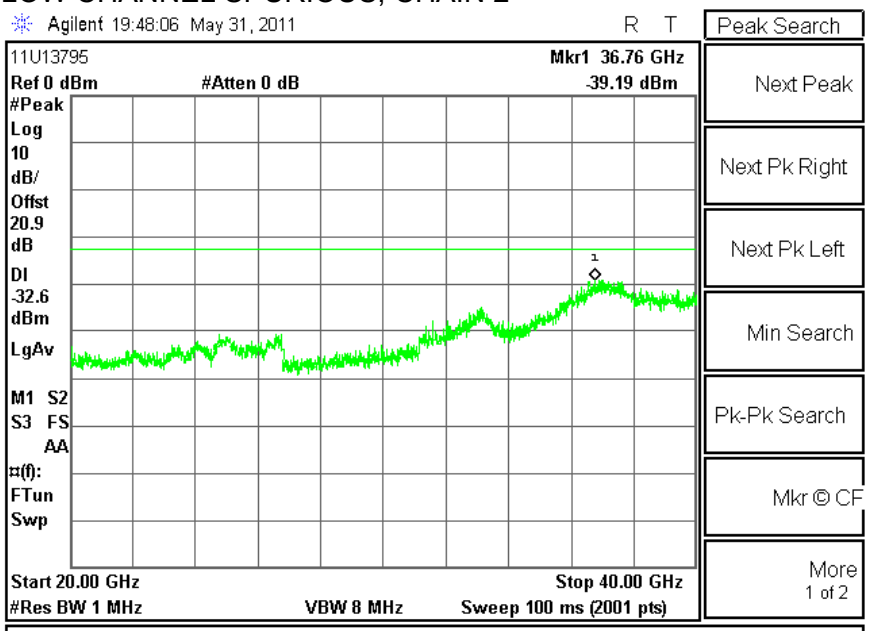
HIGH CHANNEL SPURIOUS, CHAIN 1



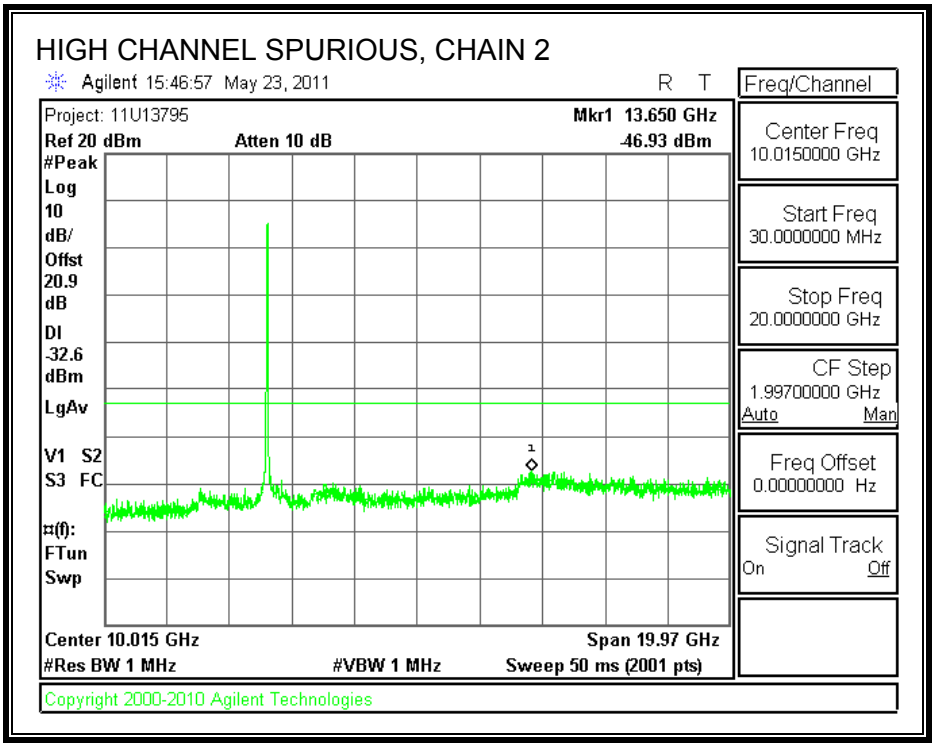
CHAIN 2 SPURIOUS EMISSIONS



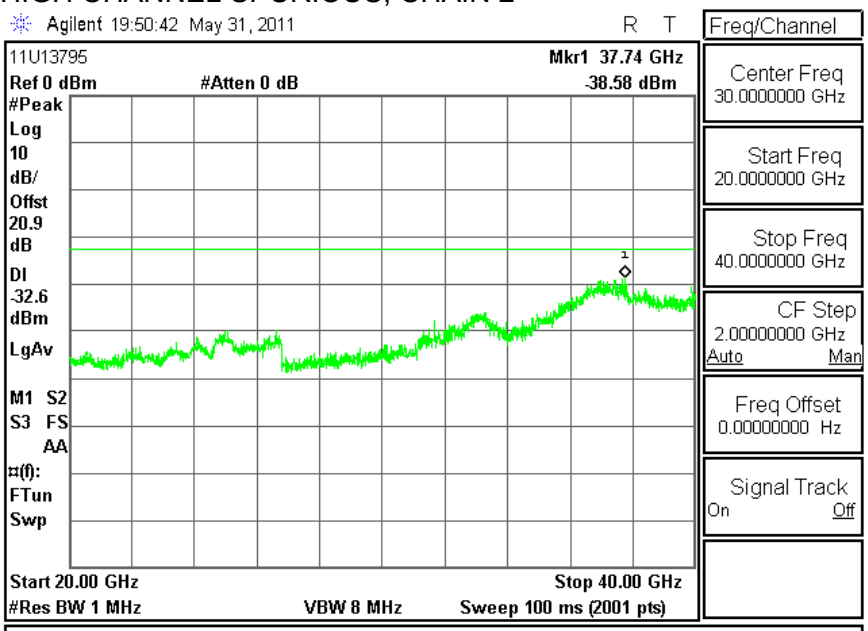
LOW CHANNEL SPURIOUS, CHAIN 2



HIGH CHANNEL SPURIOUS, CHAIN 2



HIGH CHANNEL SPURIOUS, CHAIN 2



7.4. 802.11a MODE IN THE 5.3 GHz BAND

7.4.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

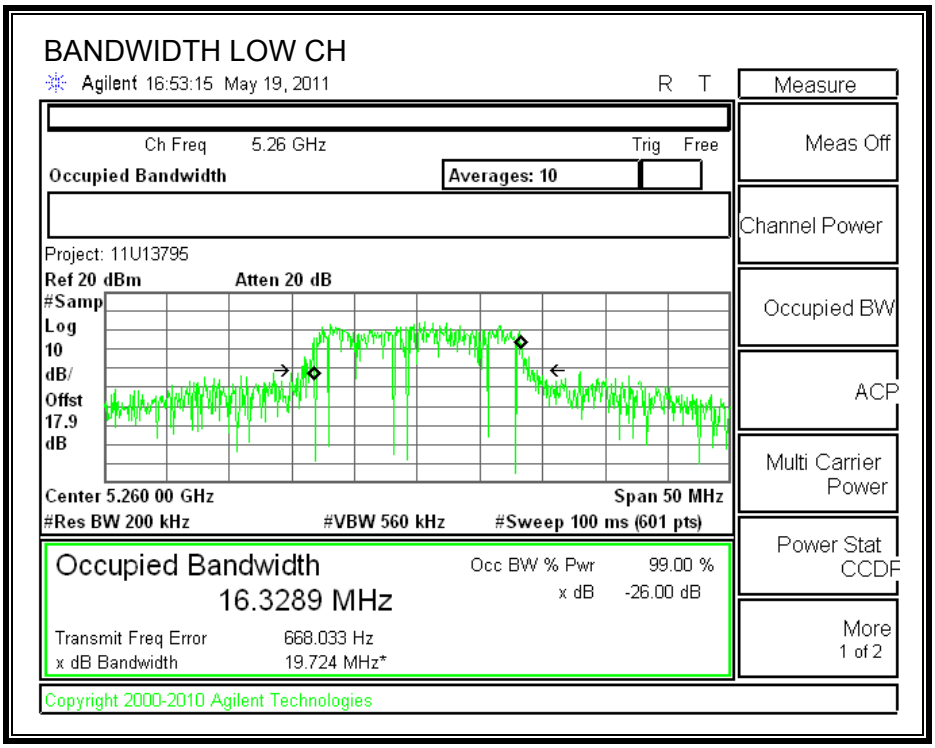
TEST PROCEDURE

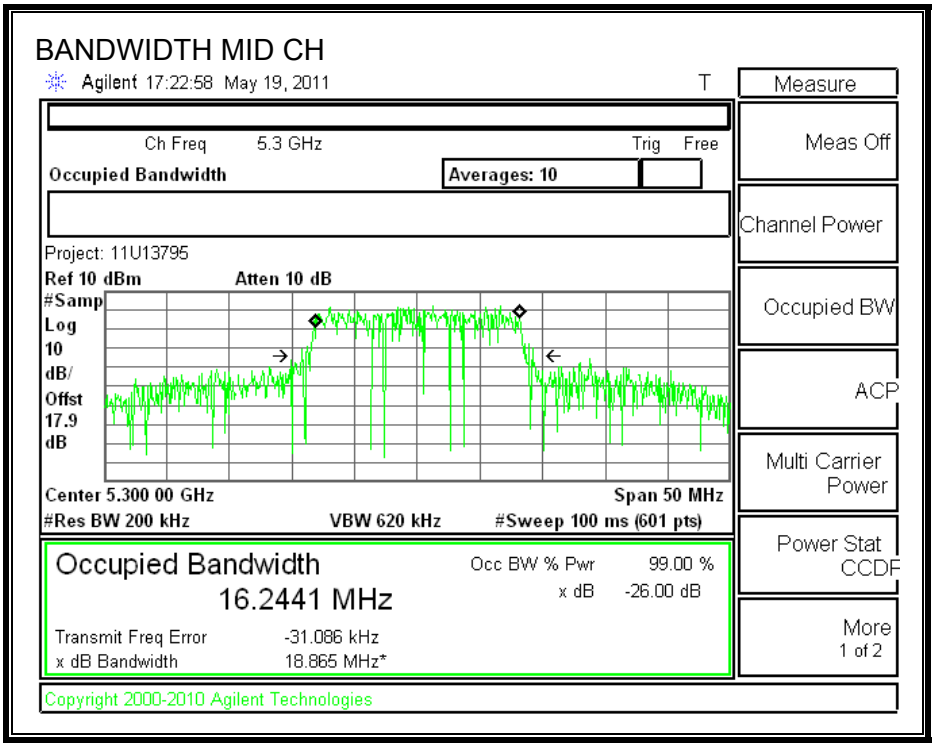
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

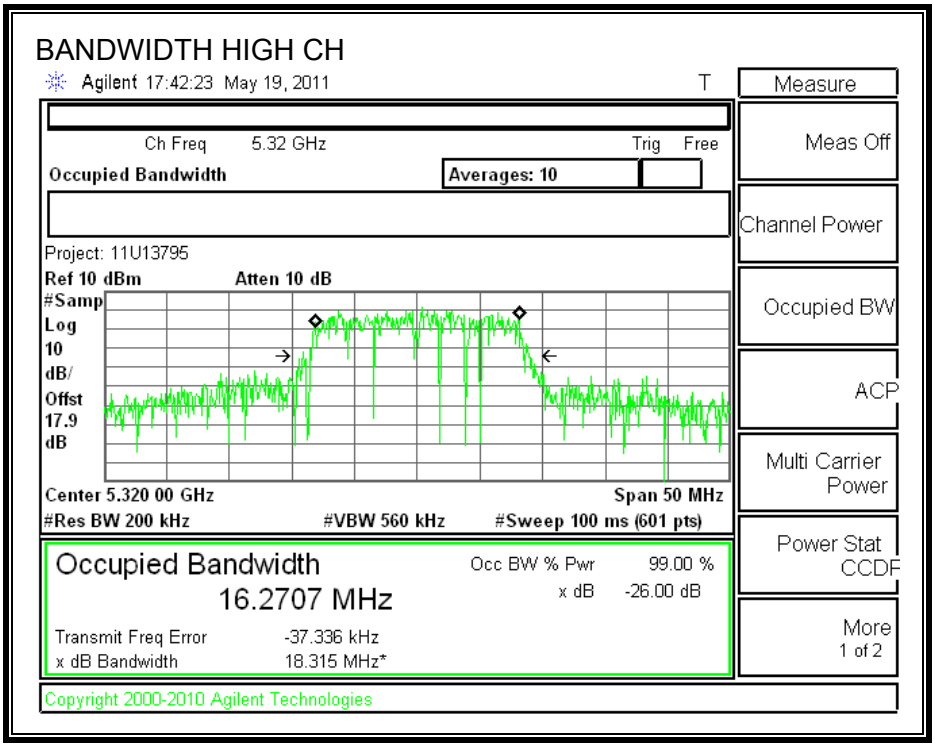
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5260	19.724	16.3289
Middle	5300	18.865	16.2441
High	5320	18.315	16.2707

26 dB and 99% BANDWIDTH







7.4.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25-5.35 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 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

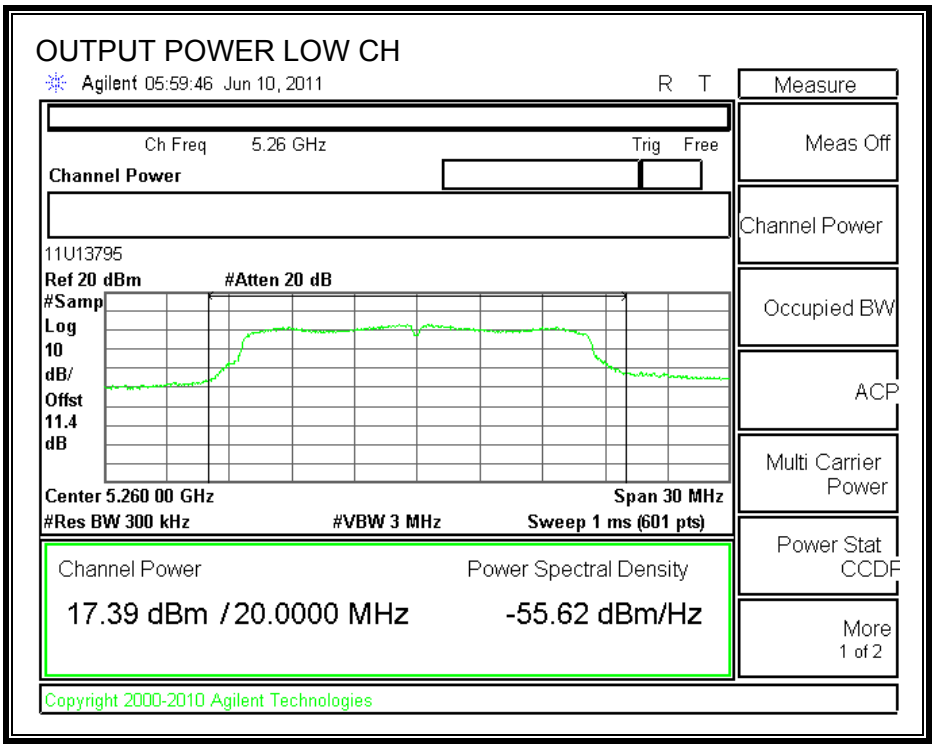
Limit

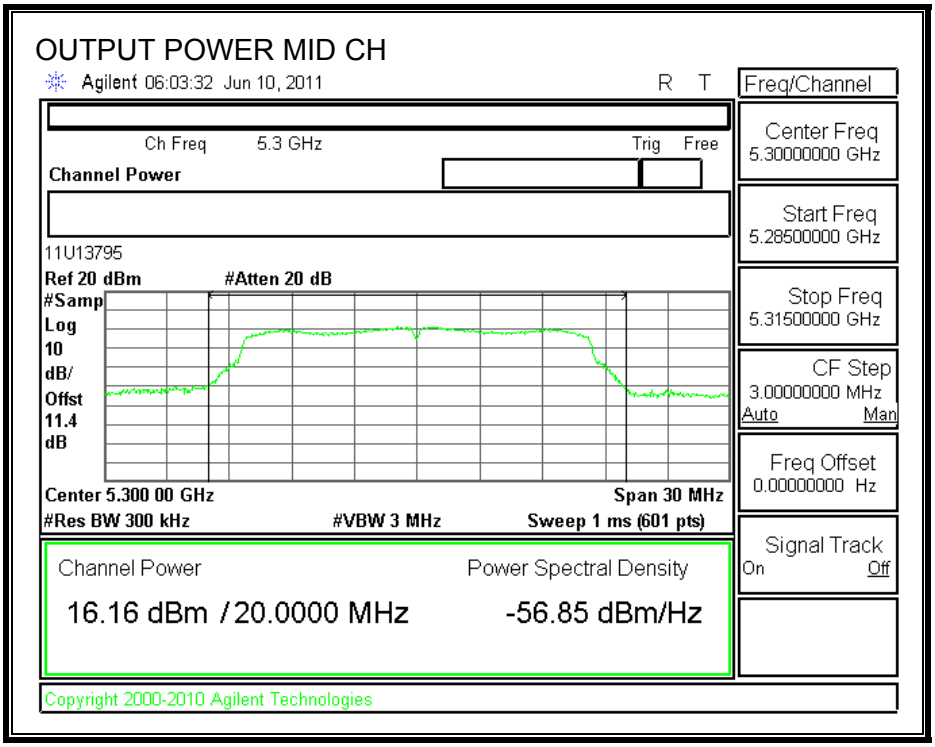
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5260	24	19.724	23.95	5.60	23.95
Mid	5300	24	18.865	23.76	5.60	23.76
High	5320	24	18.315	23.63	5.60	23.63

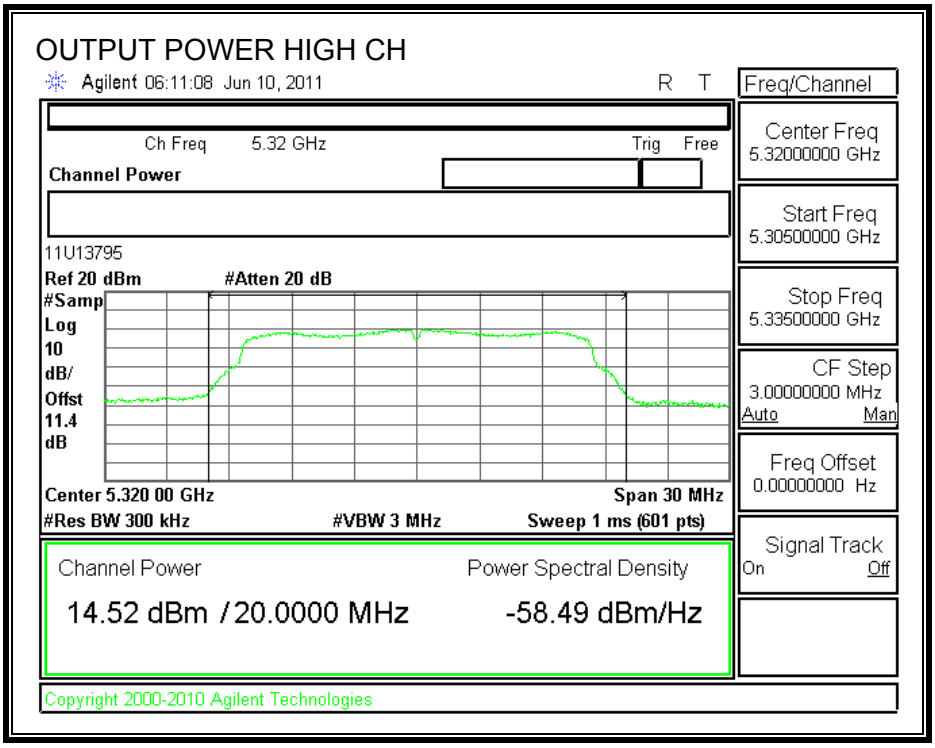
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5260	17.39	23.95	-6.56
Mid	5300	16.16	23.76	-7.60
High	5320	14.52	23.63	-9.11

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 17.9 dB (including 10 dB pad and 7.9 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5260	17.19

7.4.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25–5.35 GHz band, the peak power spectral density shall not exceed 11 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 6 dBi, therefore the limit is 11 dBm.

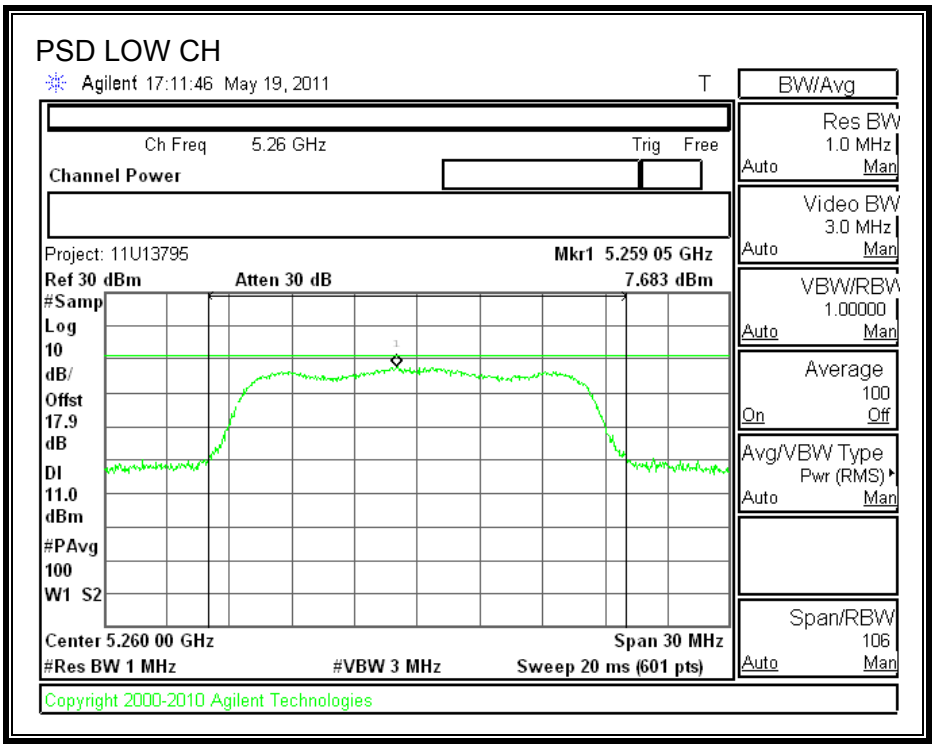
TEST PROCEDURE

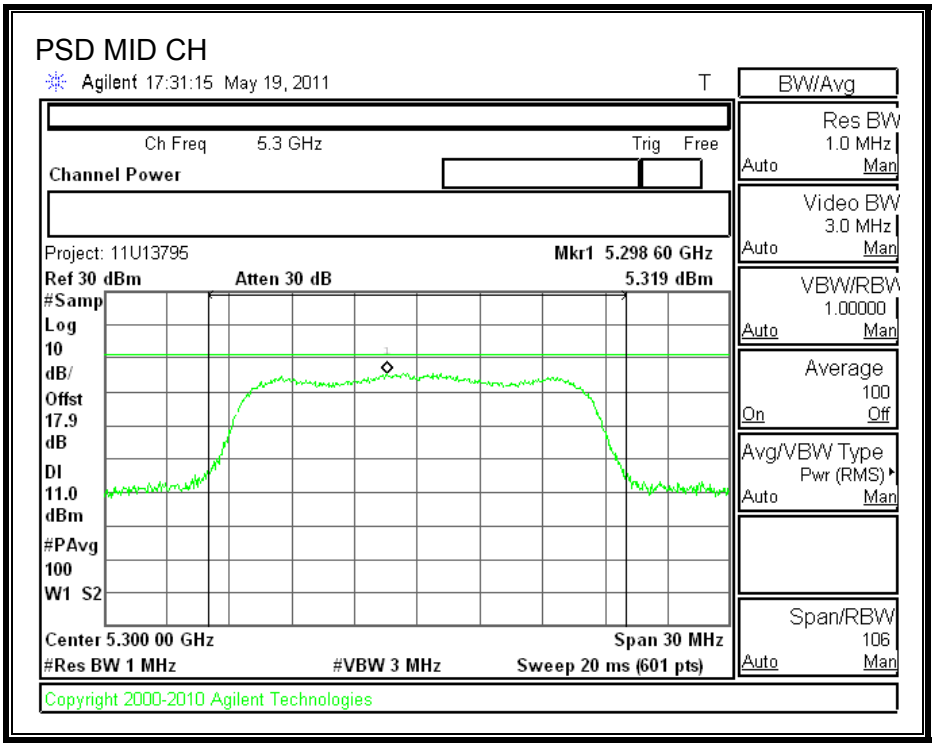
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

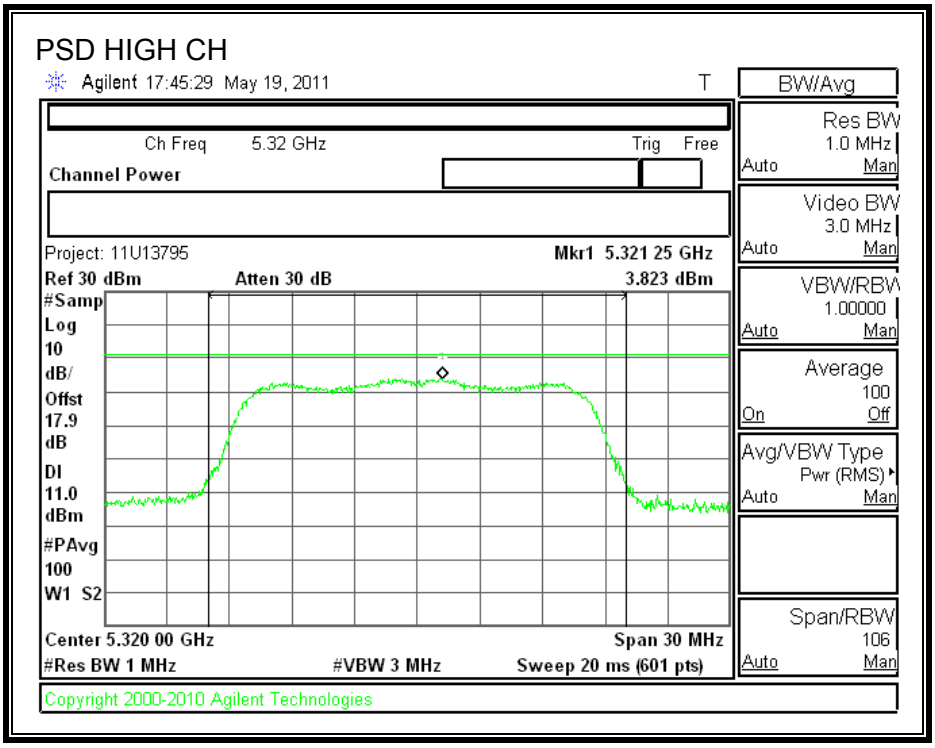
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5260	7.68	11.00	-3.32
Middle	5300	5.32	11.00	-5.68
High	5320	3.82	11.00	-7.18

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

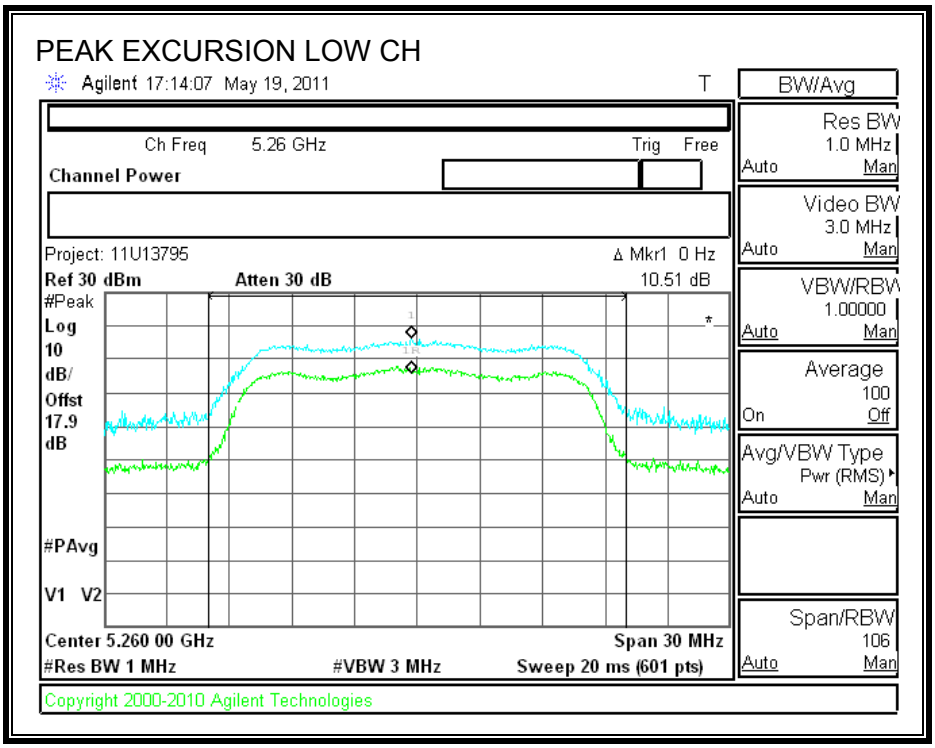
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

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

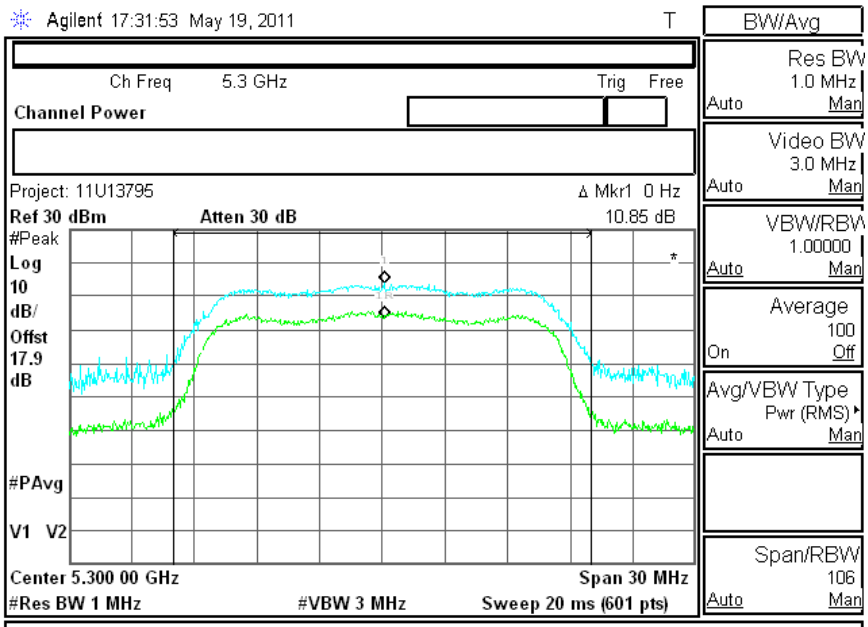
RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	10.51	13	-2.49
Middle	5300	10.85	13	-2.15
High	5320	10.90	13	-2.10

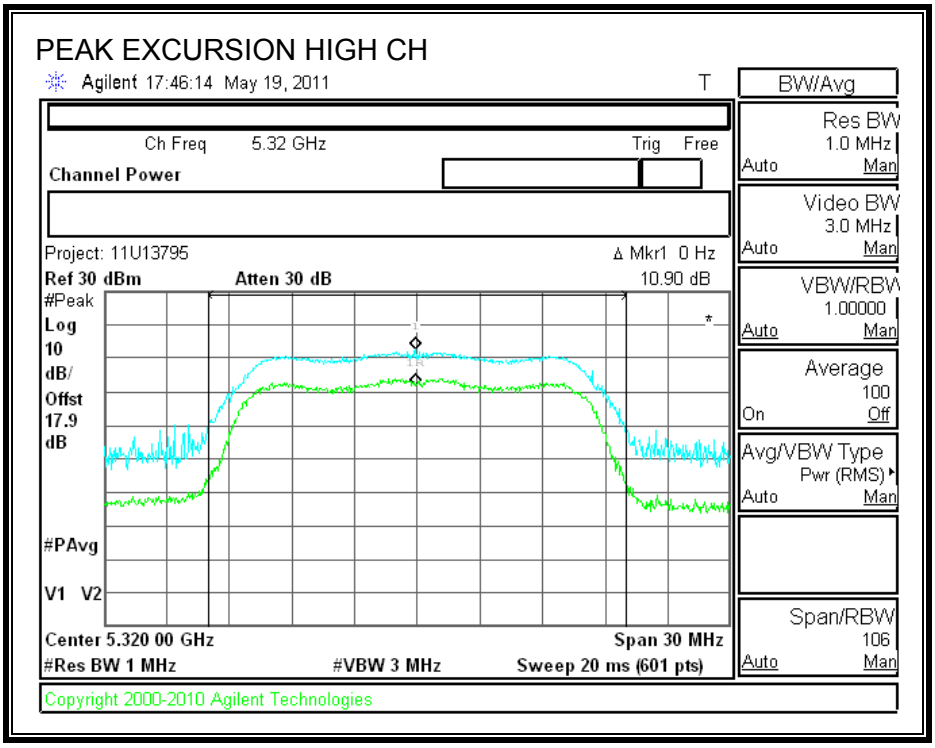
PEAK EXCURSION



PEAK EXCURSION MID CH



PEAK EXCURSION HIGH CH



7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (2)

IC RSS-210 A9.3 (2)

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

Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

TEST PROCEDURE

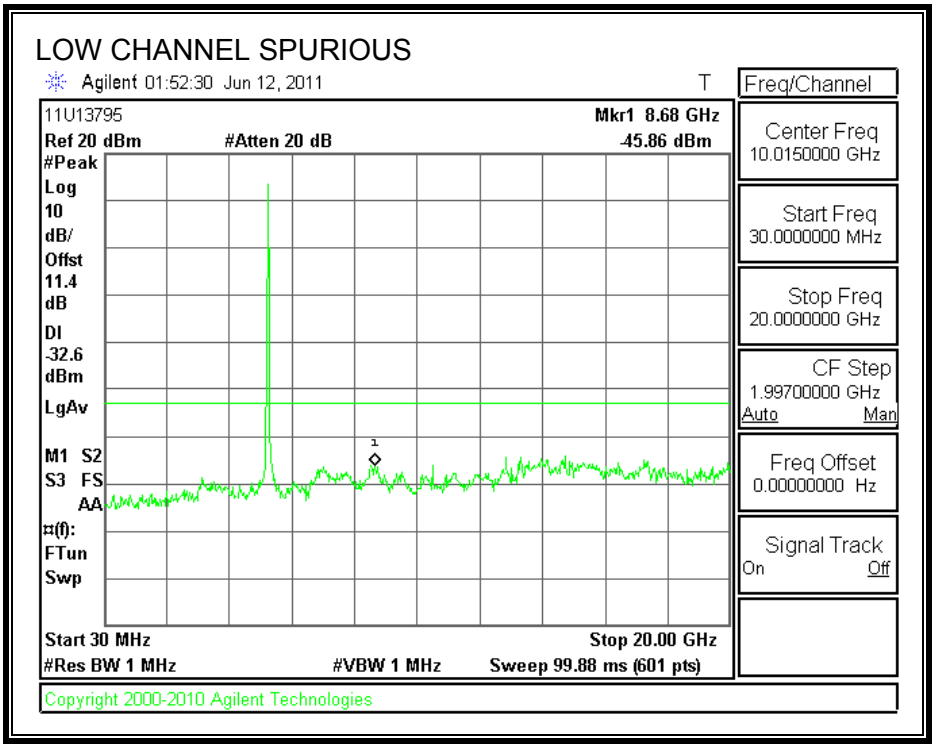
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

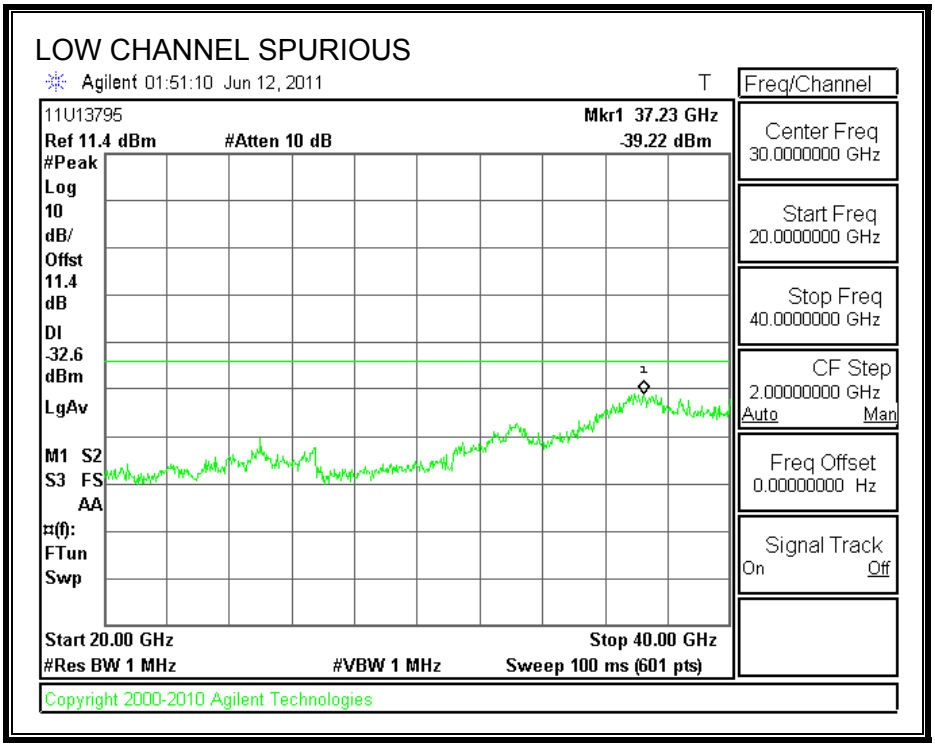
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

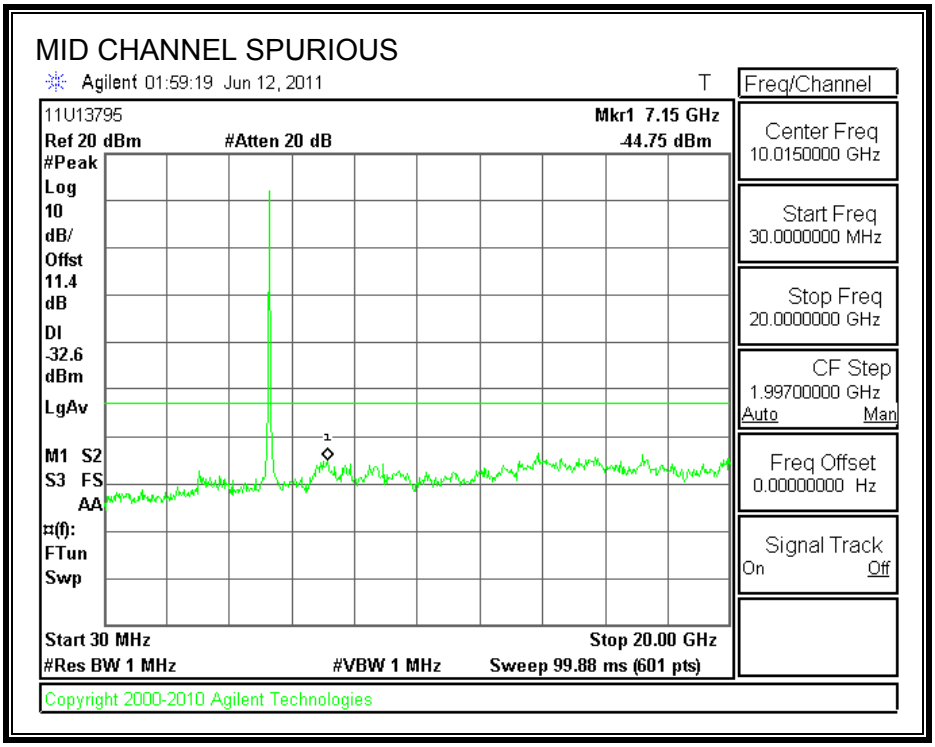
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

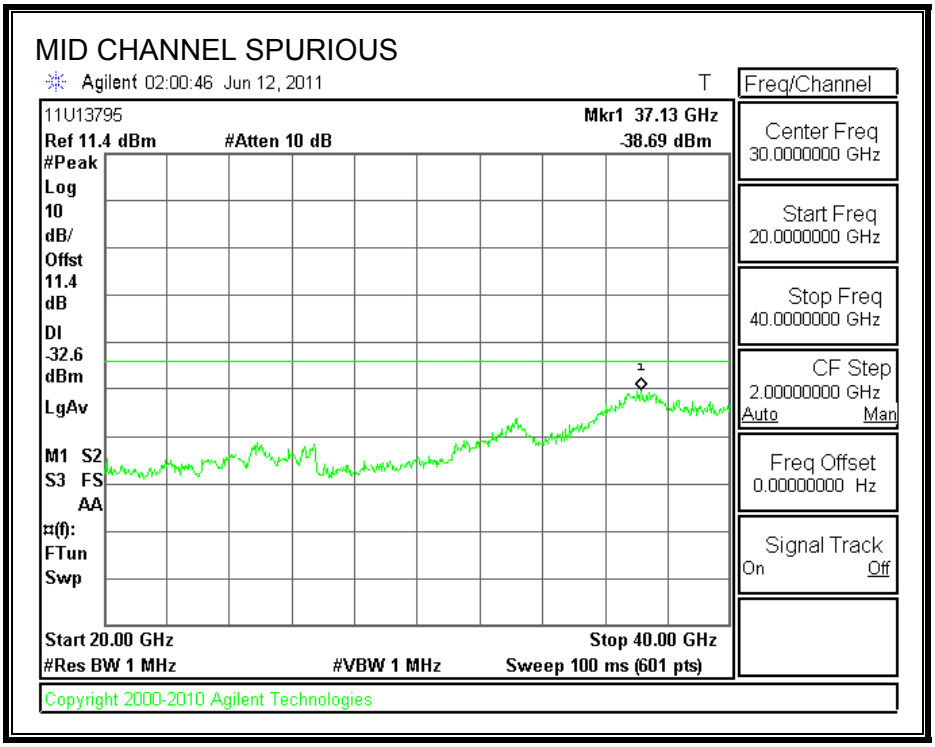
SPURIOUS EMISSIONS

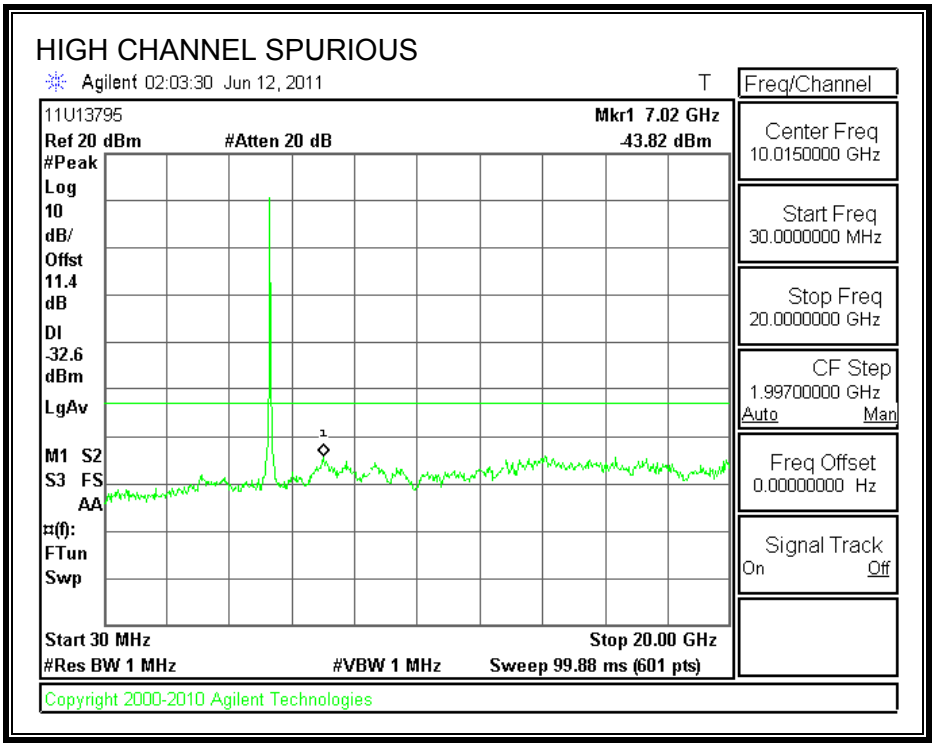




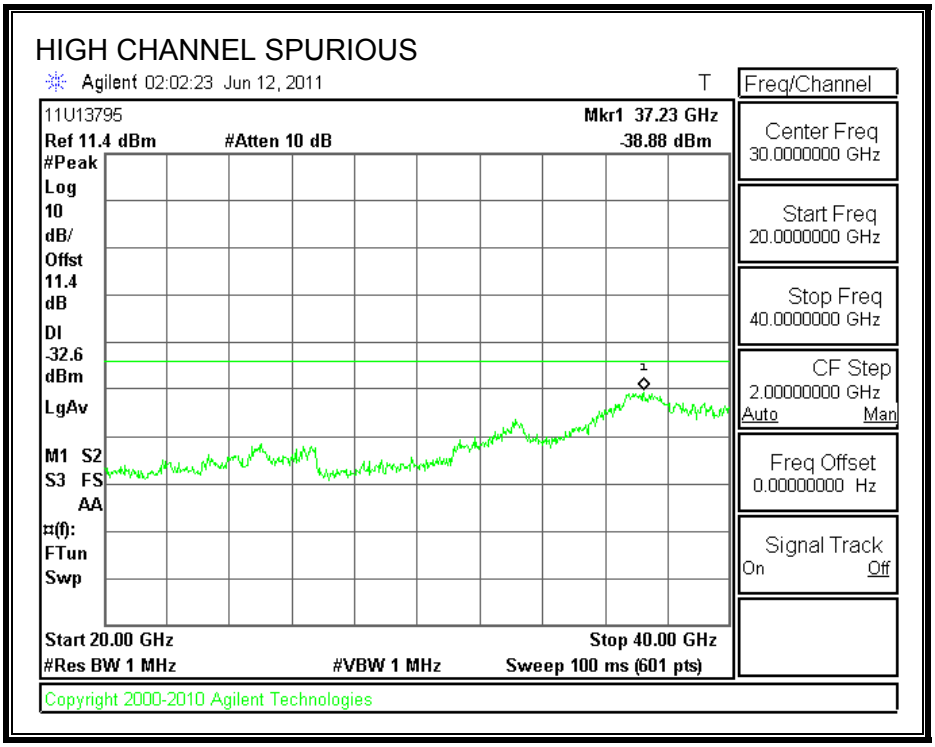


MID CHANNEL SPURIOUS





HIGH CHANNEL SPURIOUS



7.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

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

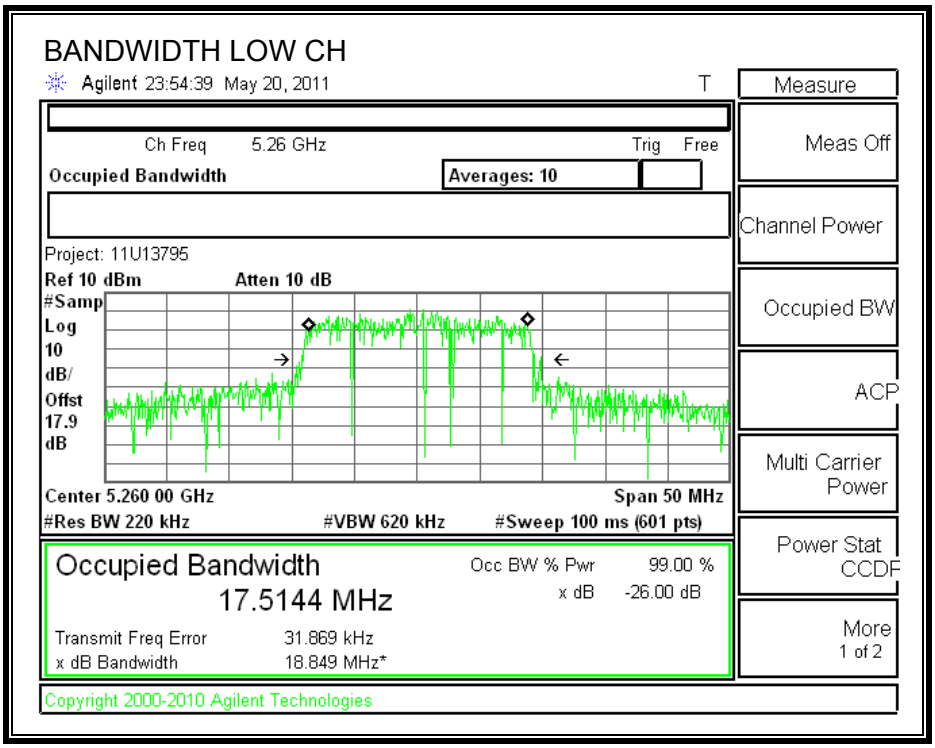
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5260	18.8490	17.5144
Middle	5300	19.3230	17.4950
High	5320	18.8570	17.4794

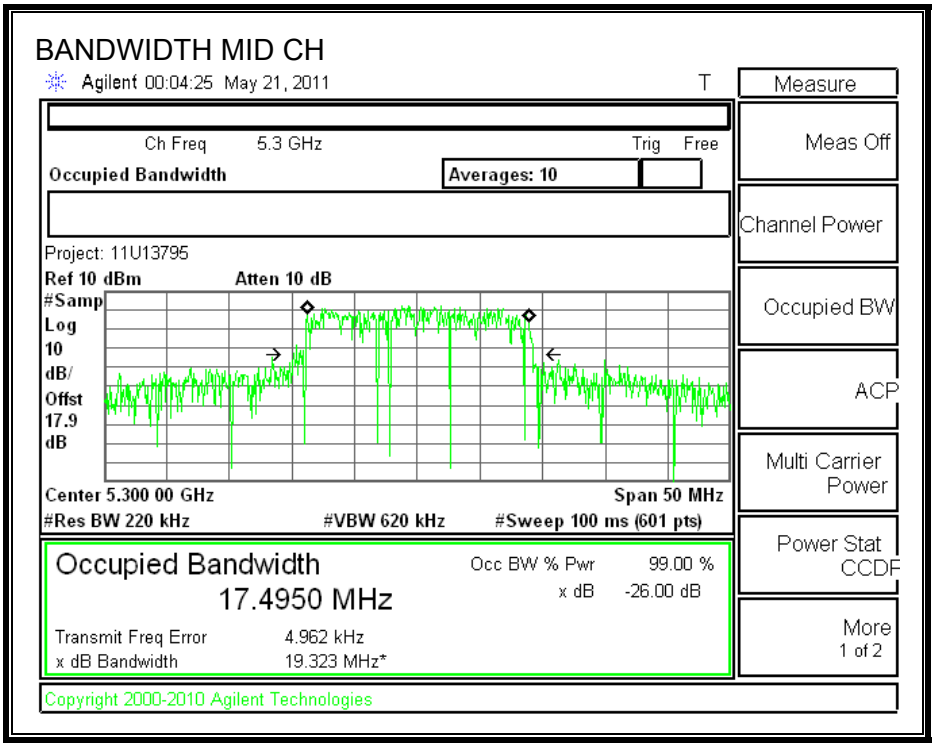
CHAIN 2

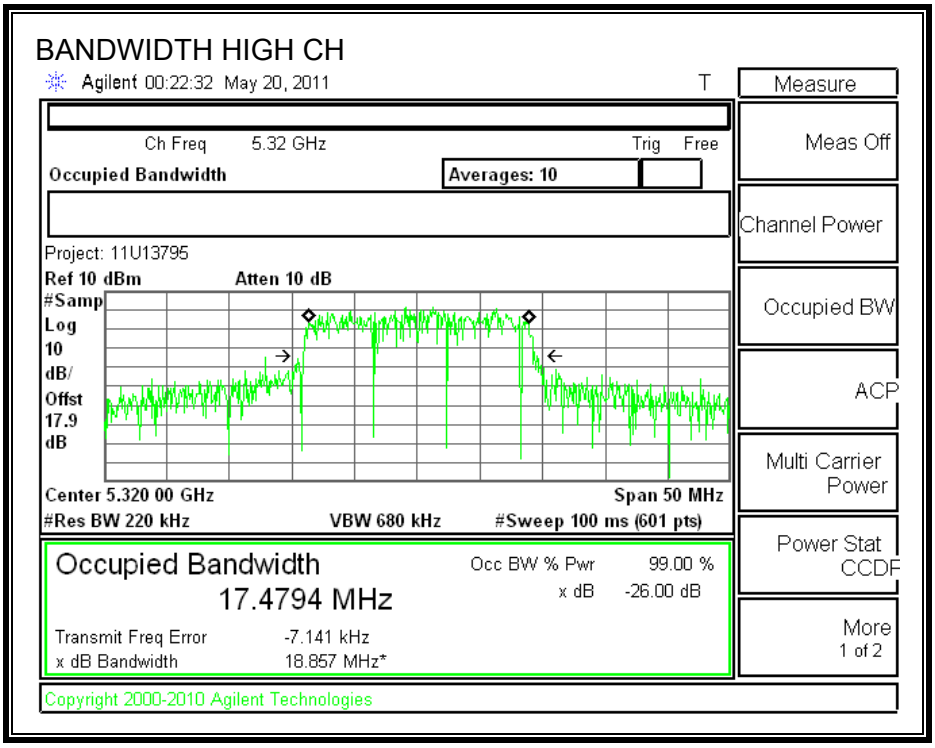
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5260	18.8030	17.5435
Middle	5300	19.0000	17.5076
High	5320	18.9570	17.4430

CHAIN 1

26 dB and 99% BANDWIDTH

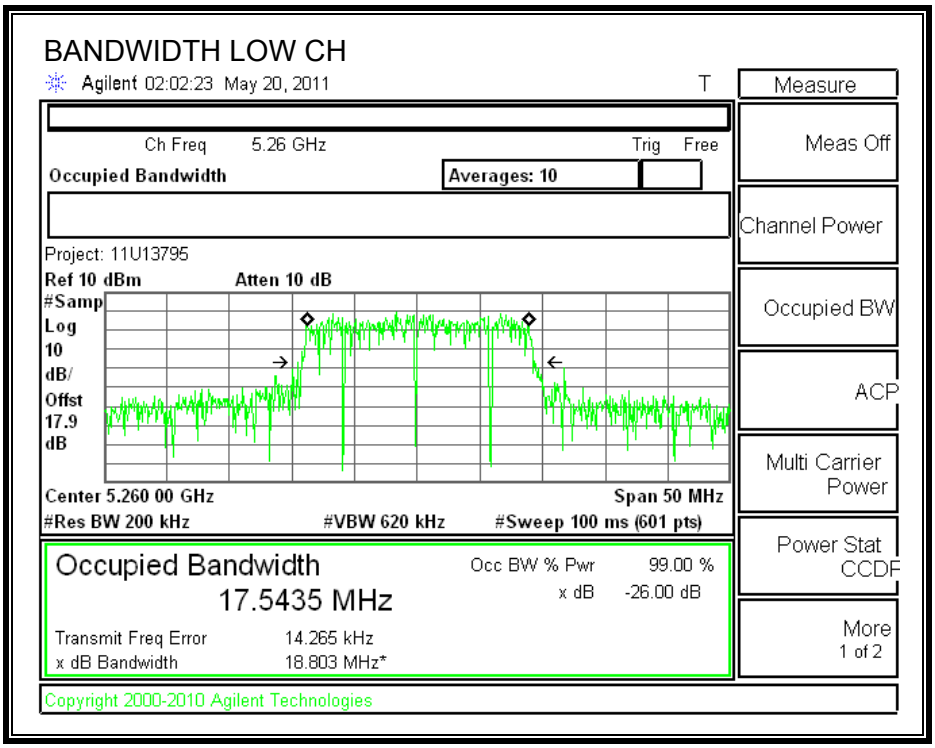


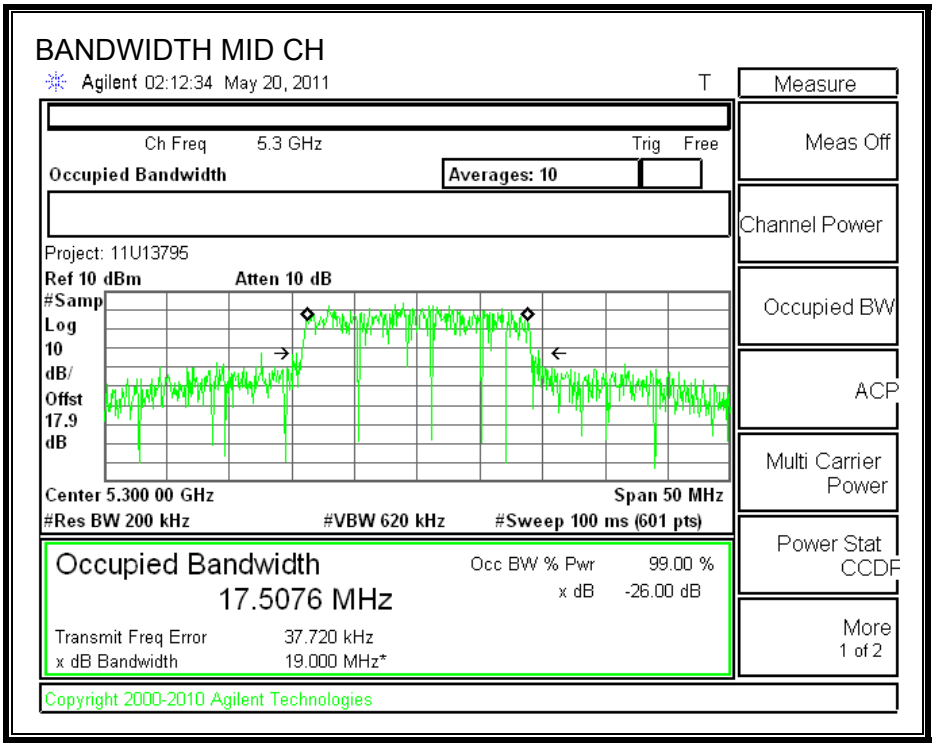


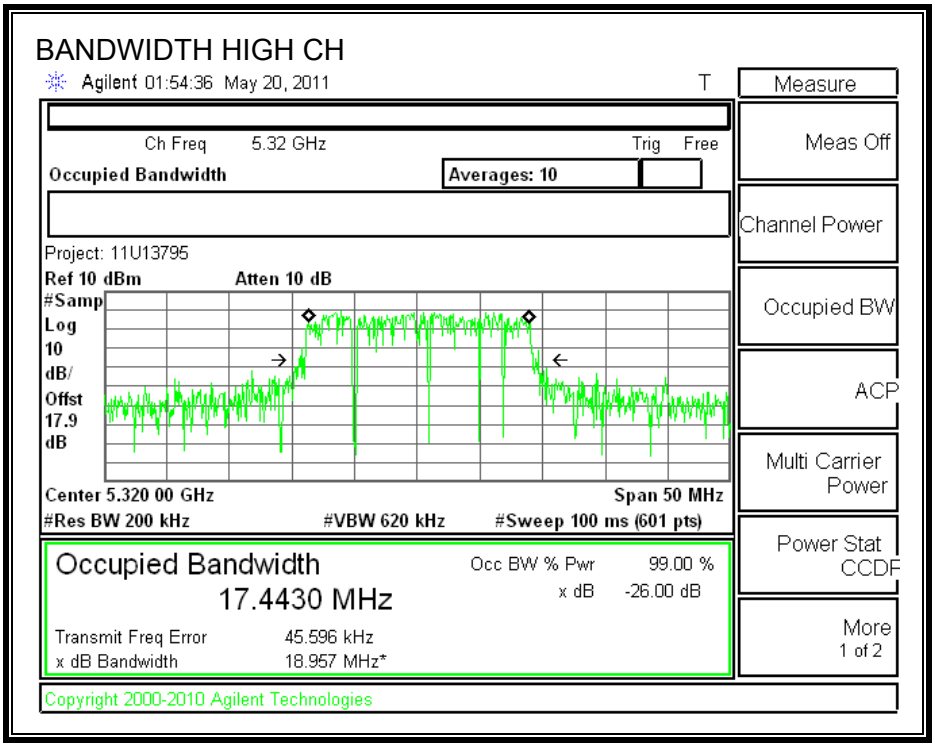


CHAIN 2

26 dB and 99% BANDWIDTH







7.5.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25-5.35 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 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

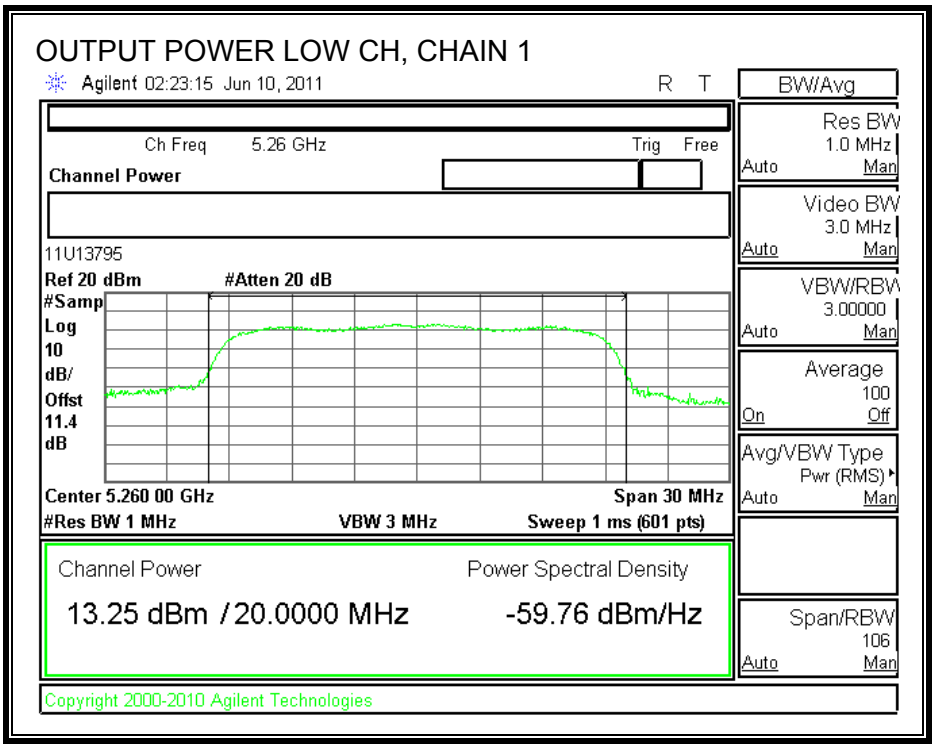
Limit

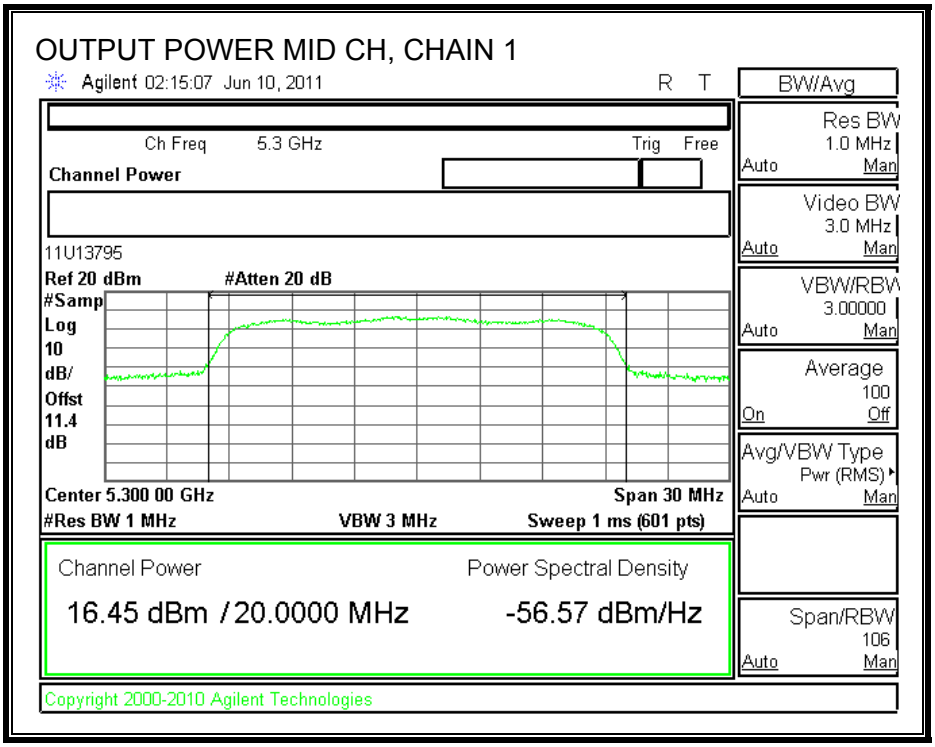
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5260	24	18.849	23.75	8.61	21.14
Mid	5300	24	19.323	23.86	8.61	21.25
High	5320	24	18.957	23.78	8.61	21.17

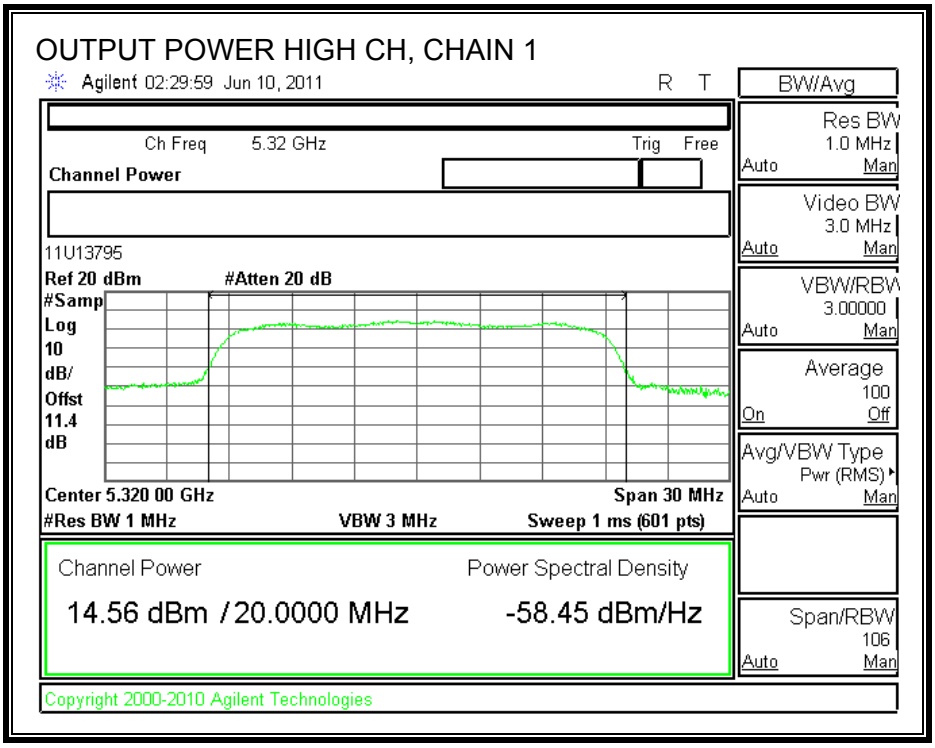
Individual Chain Results

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5260	13.25	13.33	16.30	21.14	-4.84
Mid	5300	16.45	16.29	19.38	21.25	-1.87
High	5320	14.56	14.36	17.47	21.17	-3.70

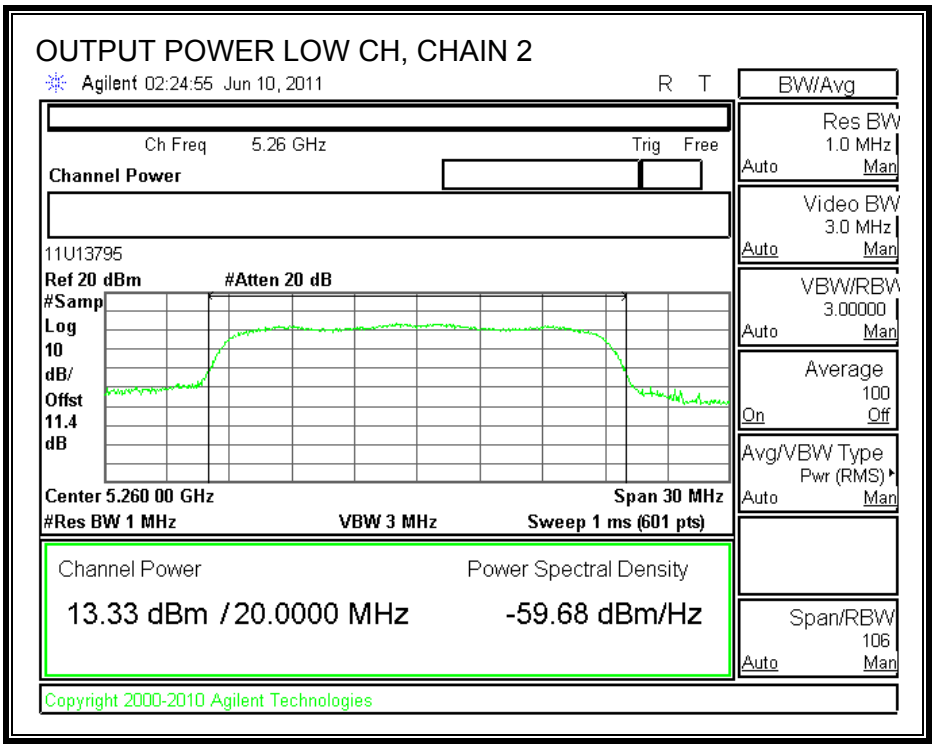
CHAIN 1 OUTPUT POWER

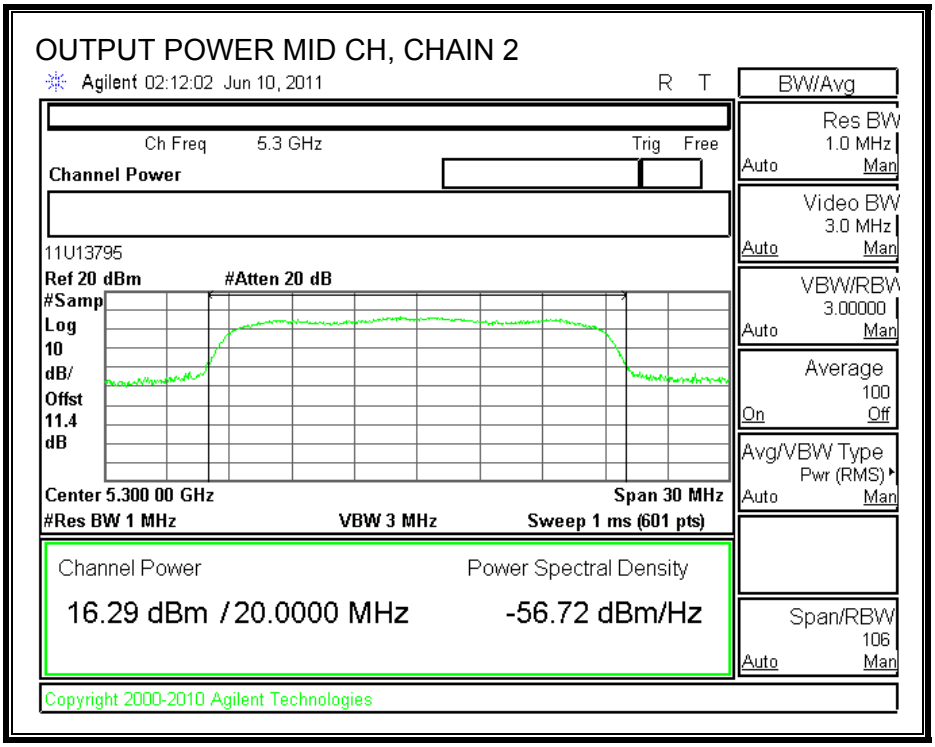


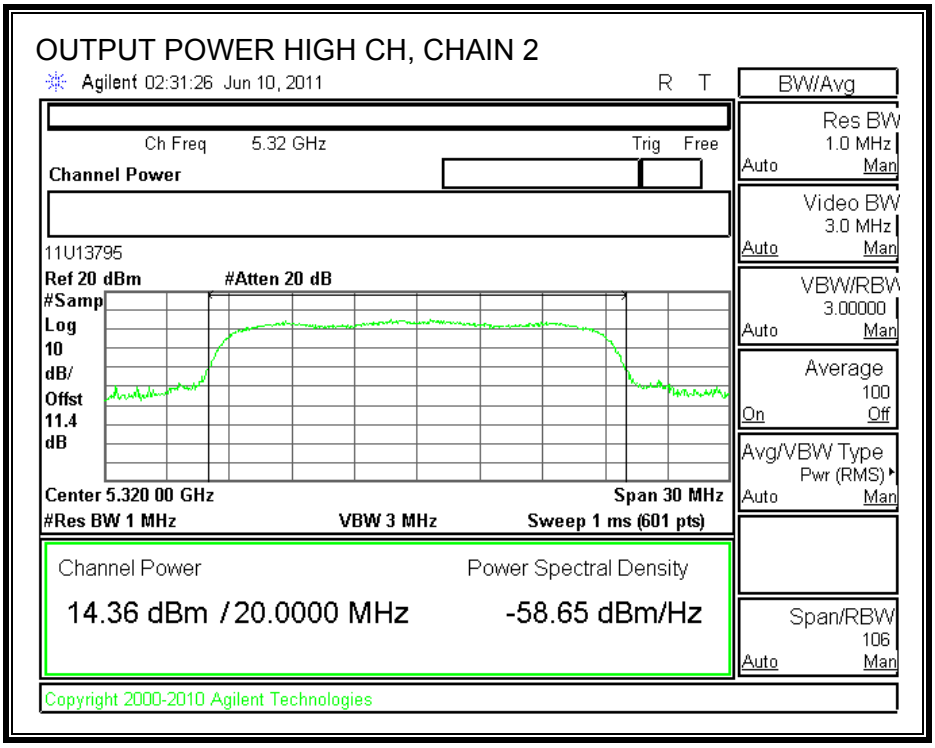




CHAIN 2 OUTPUT POWER







7.5.3. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25-5.35 GHz band, the peak power spectral density shall not exceed 11 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 8.61dBi, therefore the limit is 8.39 dBm.

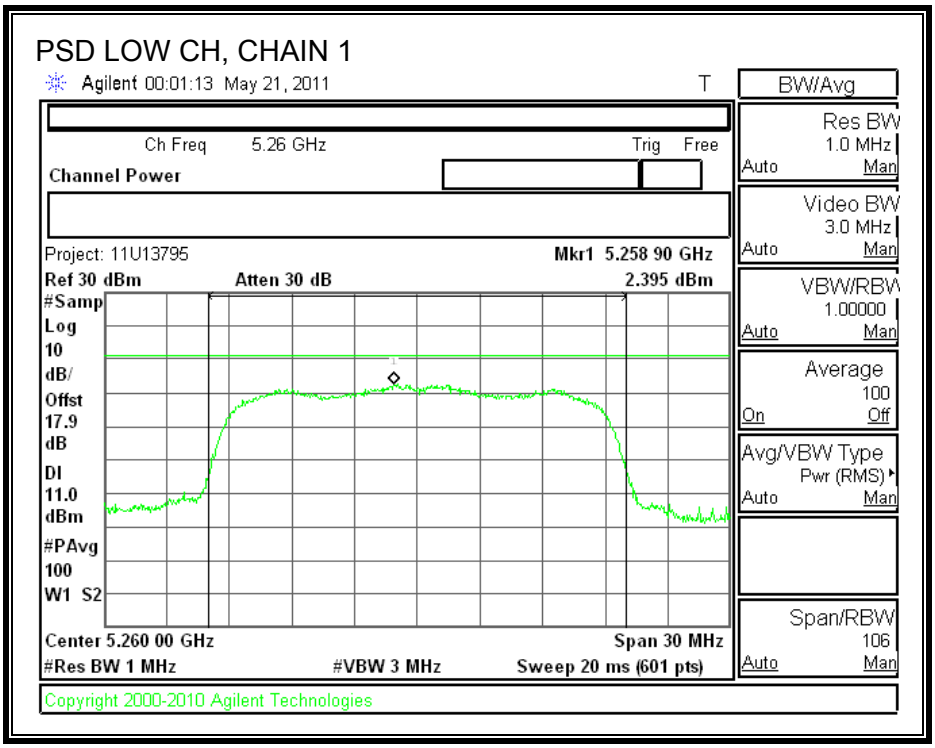
TEST PROCEDURE

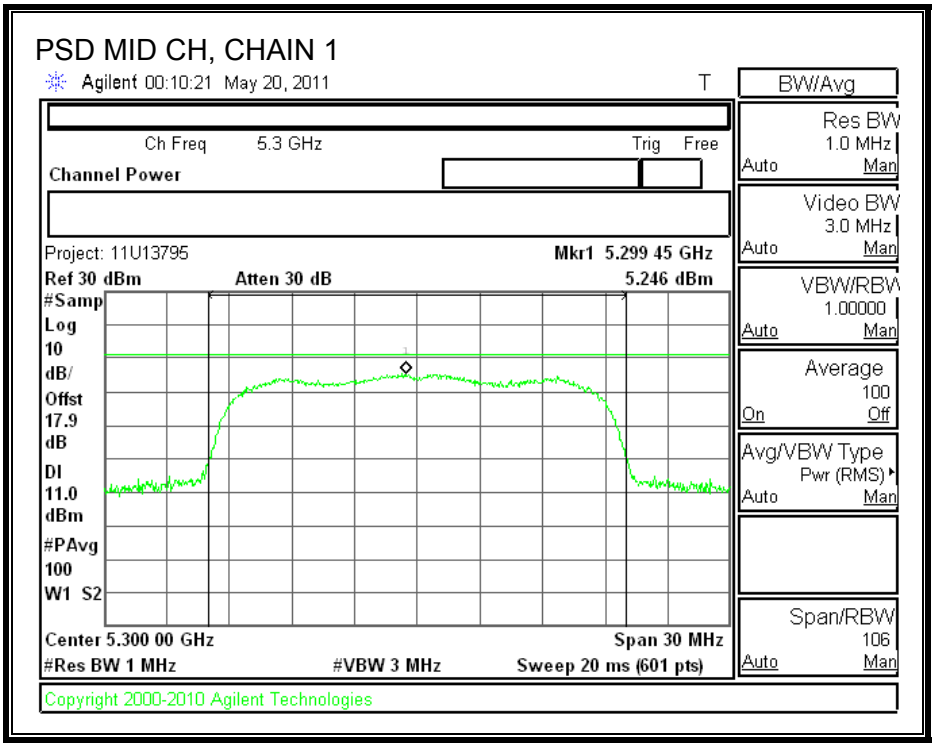
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

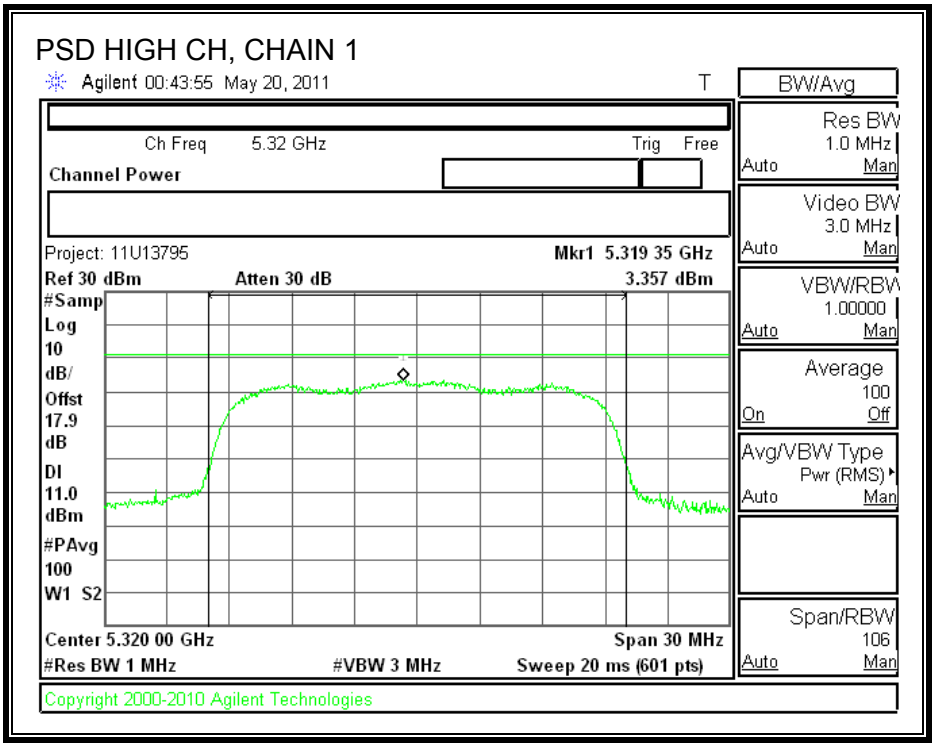
RESULTS

Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5260	2.395	2.035	5.23	8.39	-3.16
Middle	5300	5.246	1.877	6.89	8.39	-1.50
High	5320	3.357	3.515	6.45	8.39	-1.94

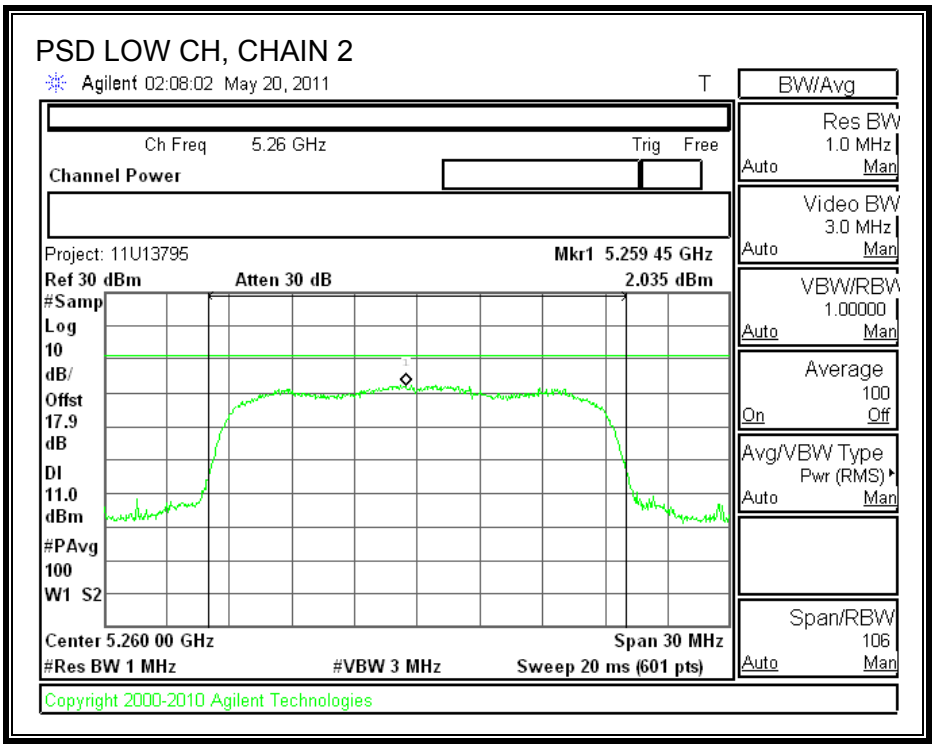
CHAIN 1 POWER SPECTRAL DENSITY

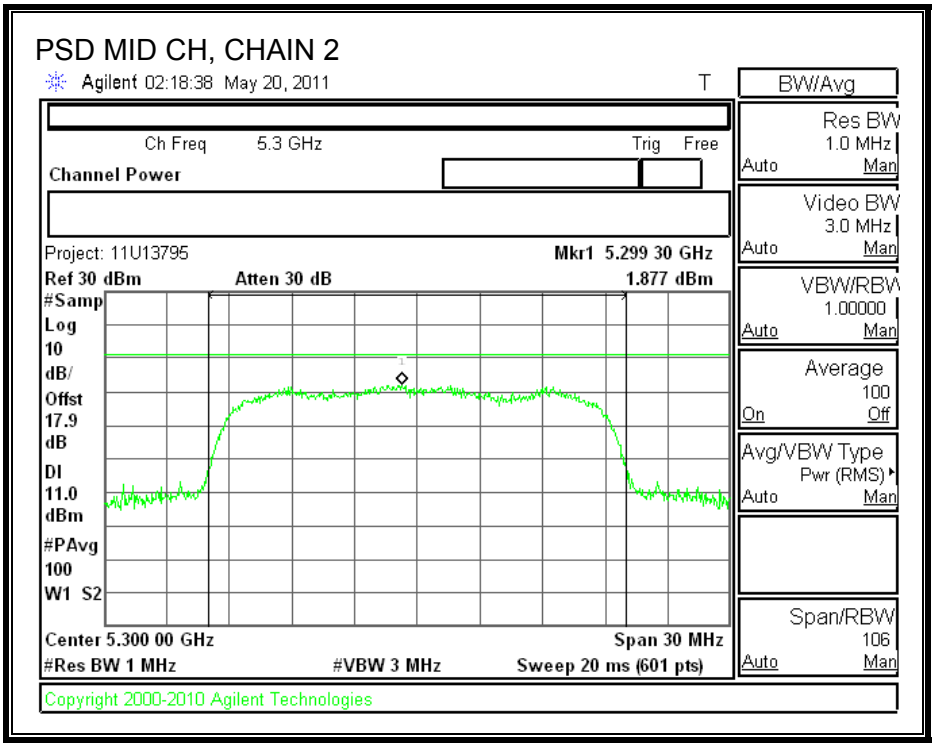


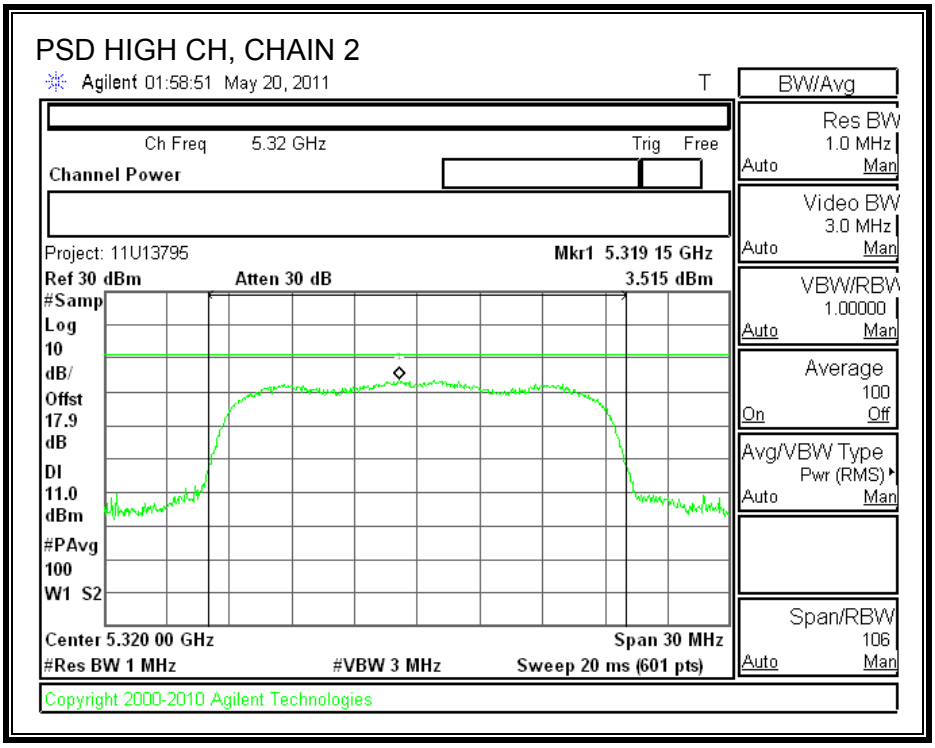




CHAIN 2 POWER SPECTRAL DENSITY







7.5.4. 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

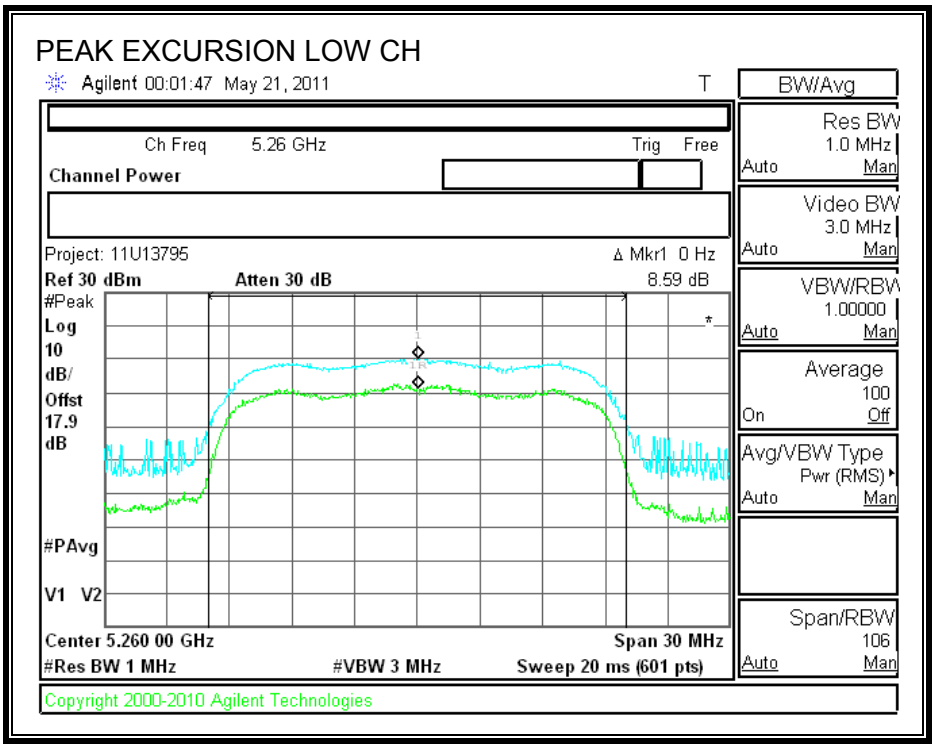
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	9.65	13	-3.35
Middle	5300	8.90	13	-4.10
High	5320	10.14	13	-2.86

CHAIN 2

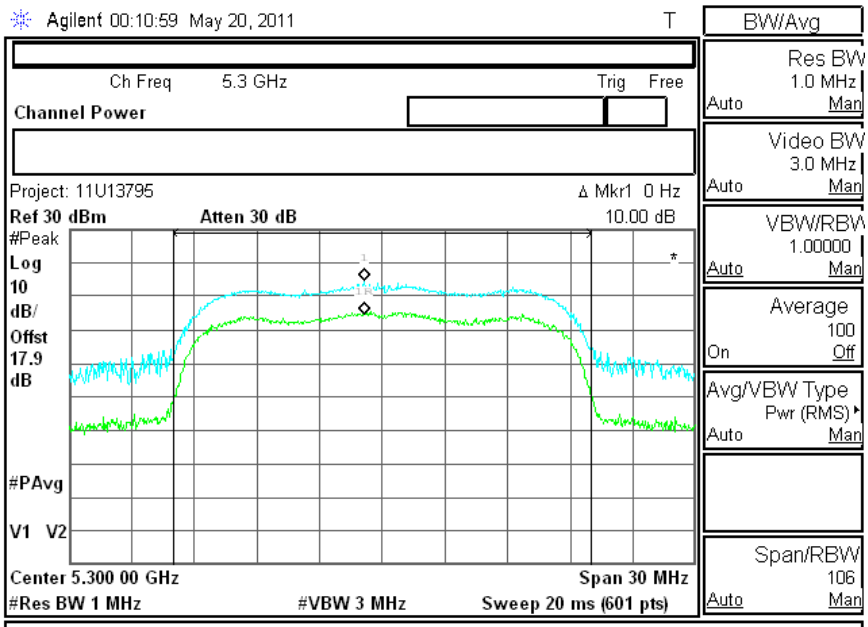
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	9.65	13	-3.35
Middle	5300	8.90	13	-4.10
High	5320	10.14	13	-2.86

CHAIN 1

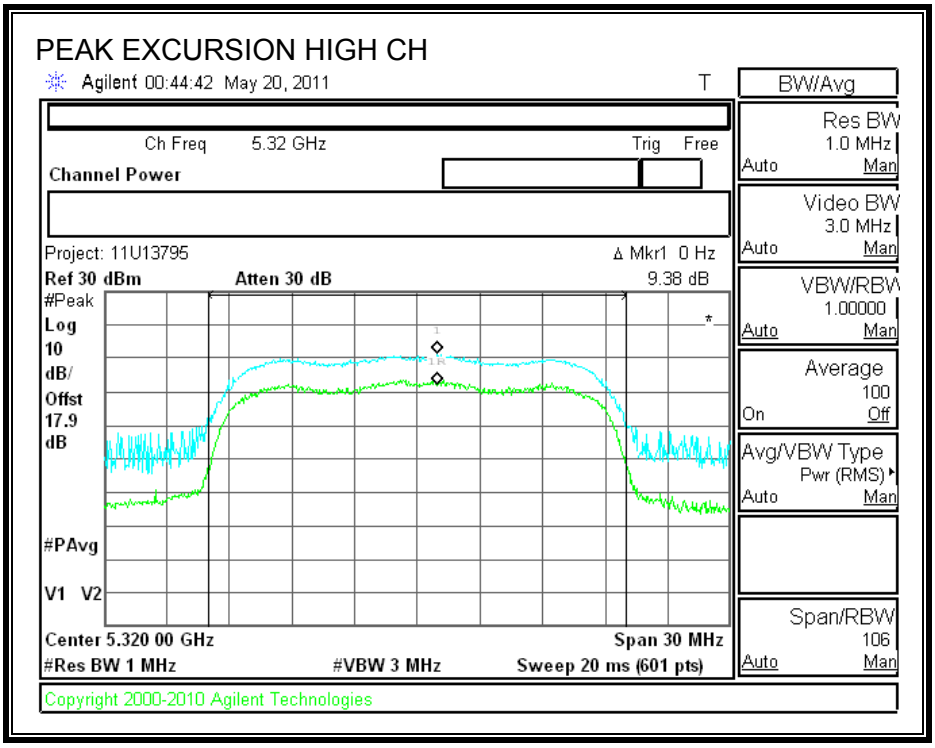
PEAK EXCURSION



PEAK EXCURSION MID CH

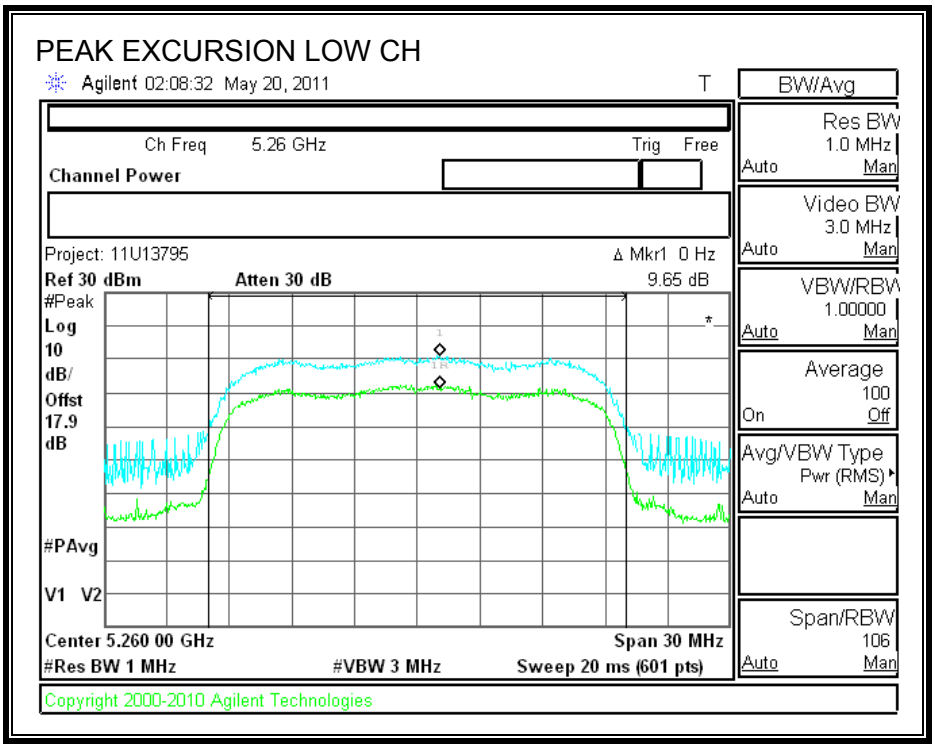


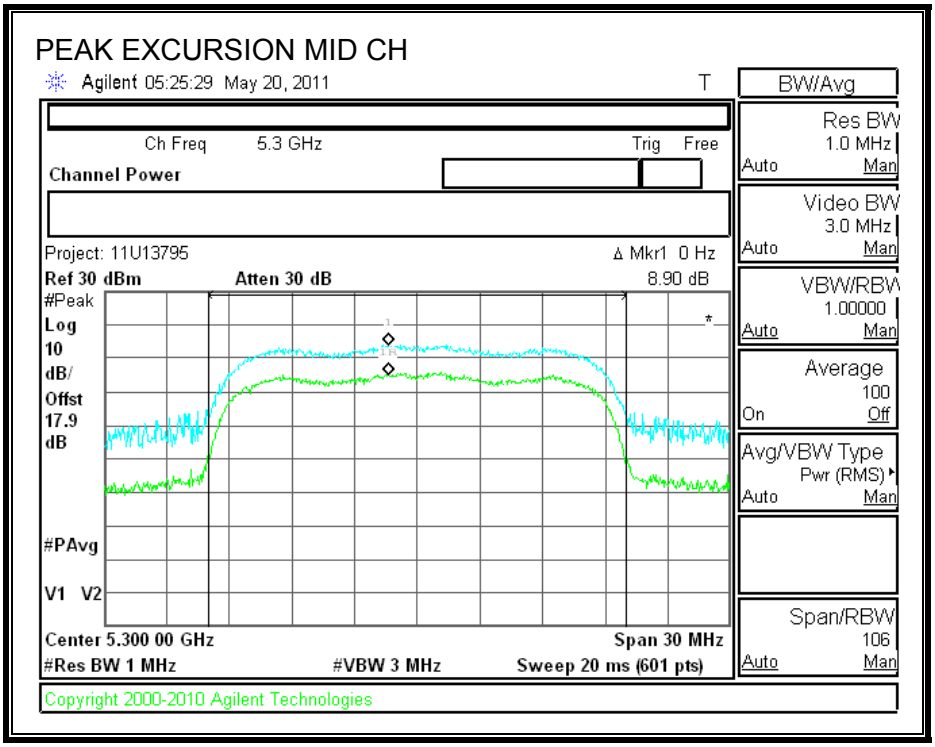
PEAK EXCURSION HIGH CH

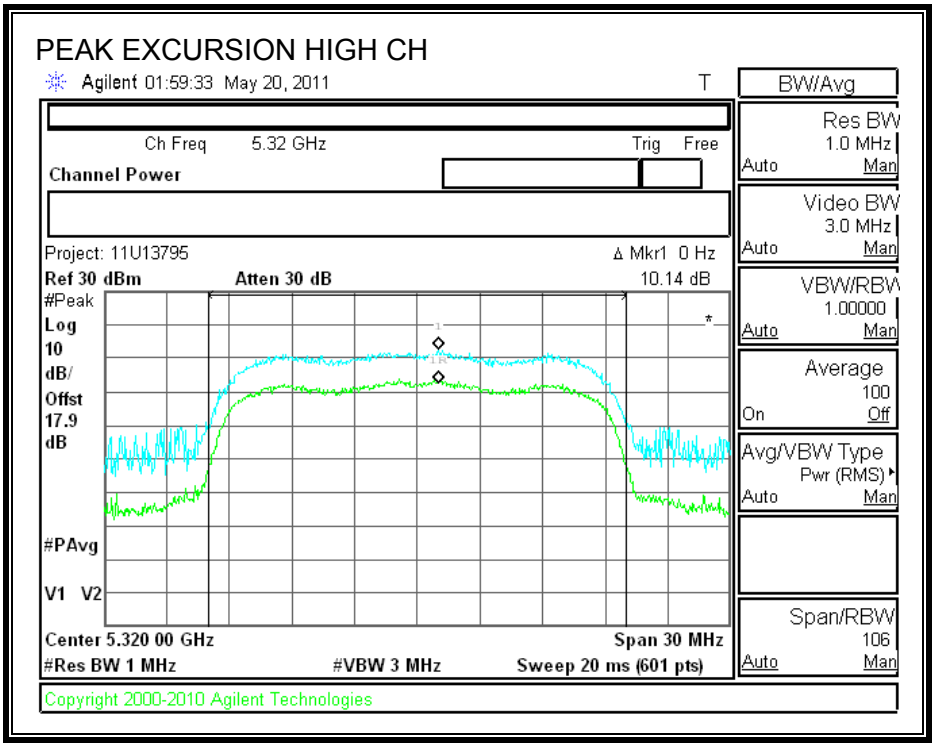


CHAIN 2

PEAK EXCURSION







7.5.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (2)

IC RSS-210 A9.3 (2)

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

Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

TEST PROCEDURE

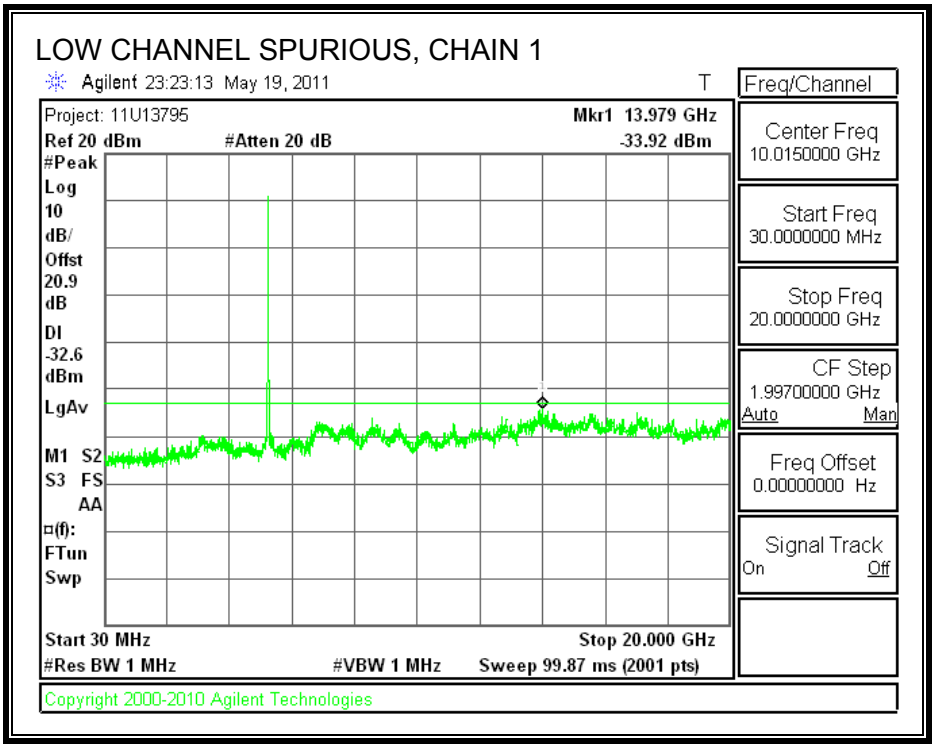
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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

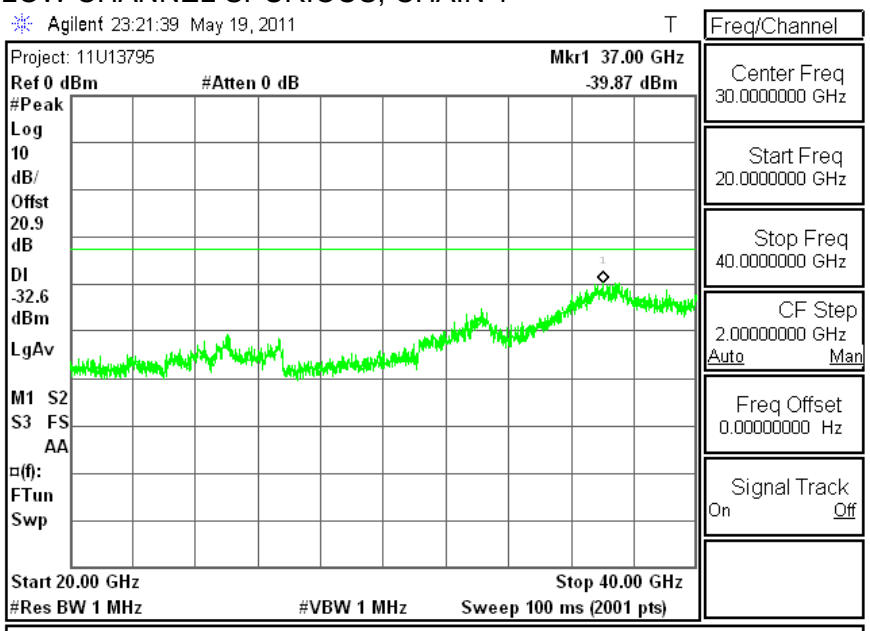
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

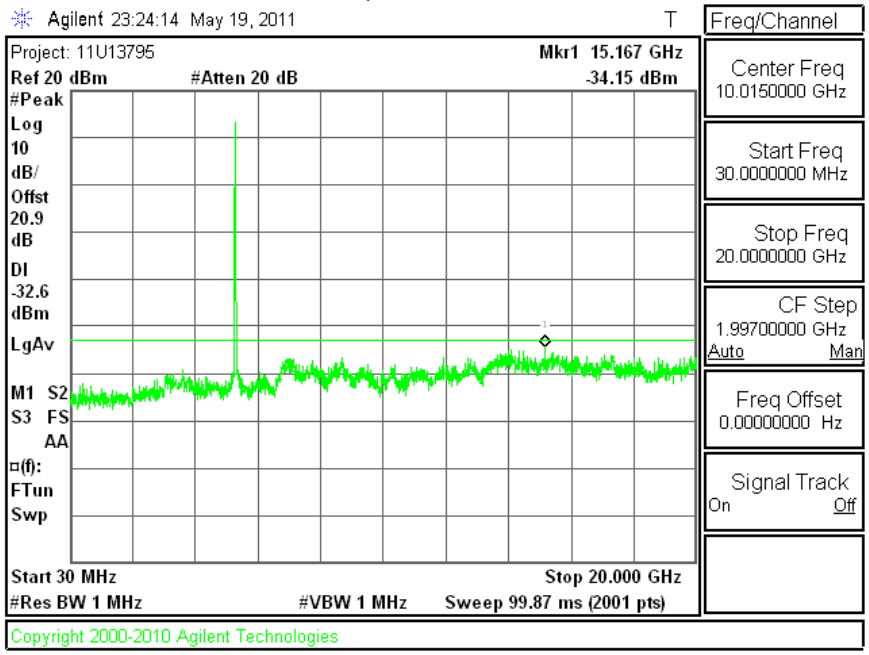
CHAIN 1 SPURIOUS EMISSIONS



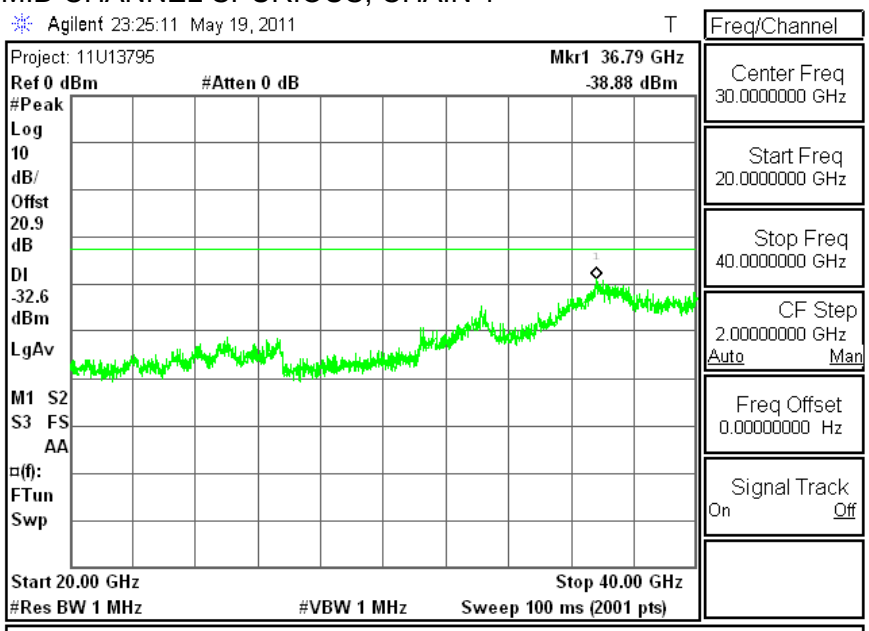
LOW CHANNEL SPURIOUS, CHAIN 1



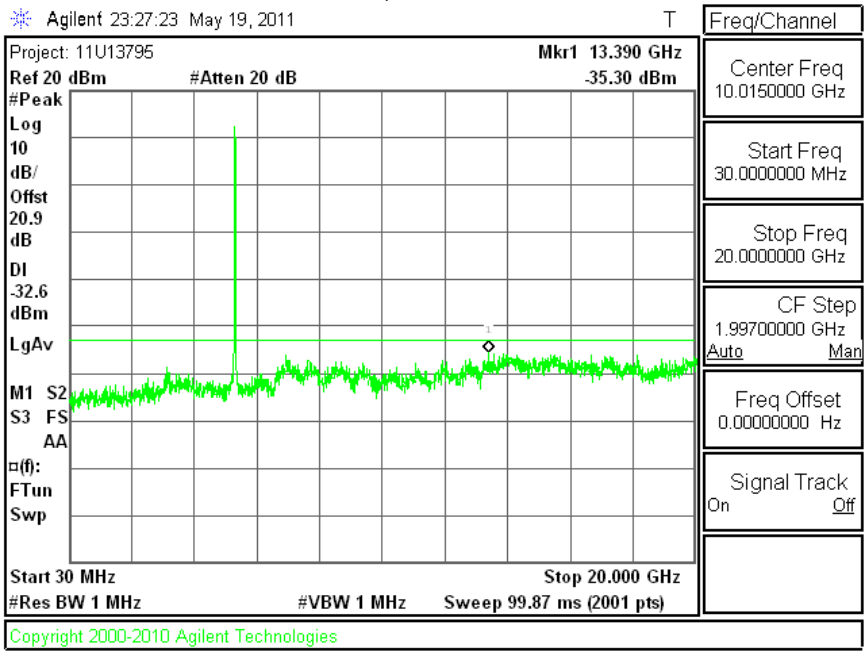
MID CHANNEL SPURIOUS, CHAIN 1



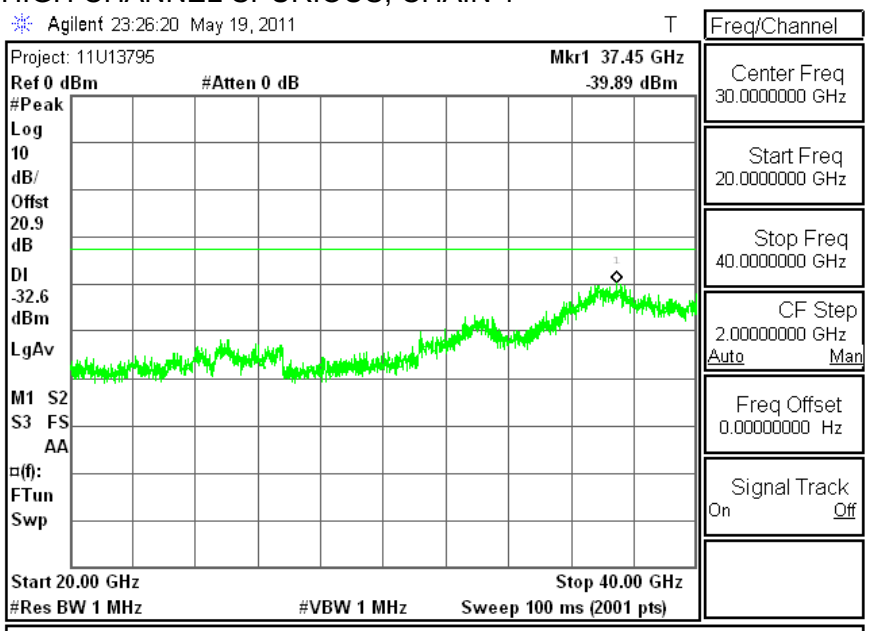
MID CHANNEL SPURIOUS, CHAIN 1



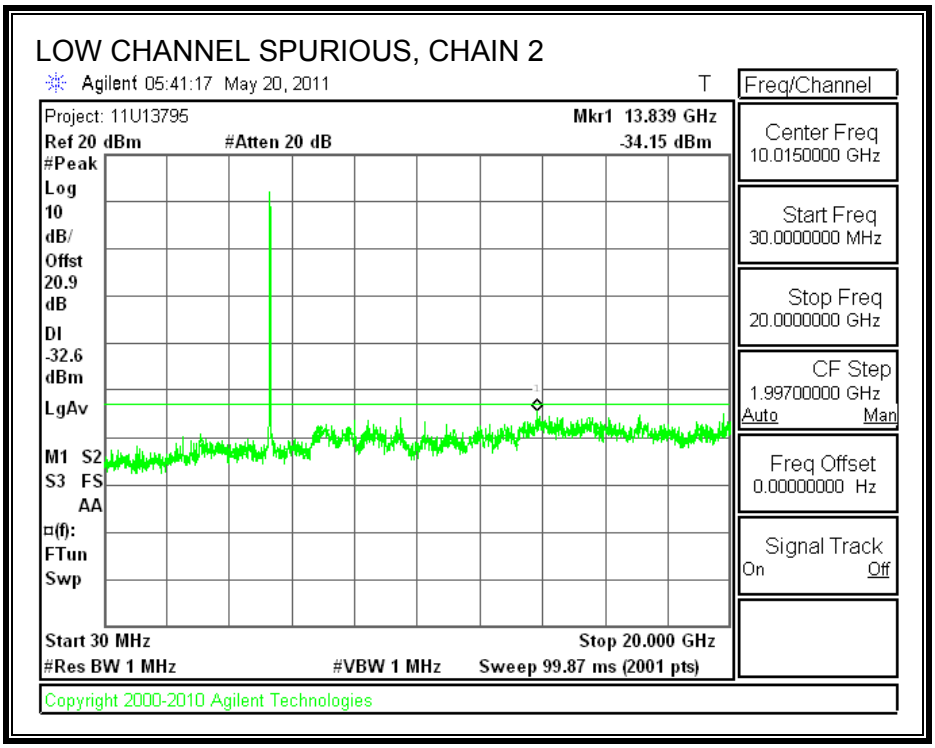
HIGH CHANNEL SPURIOUS, CHAIN 1



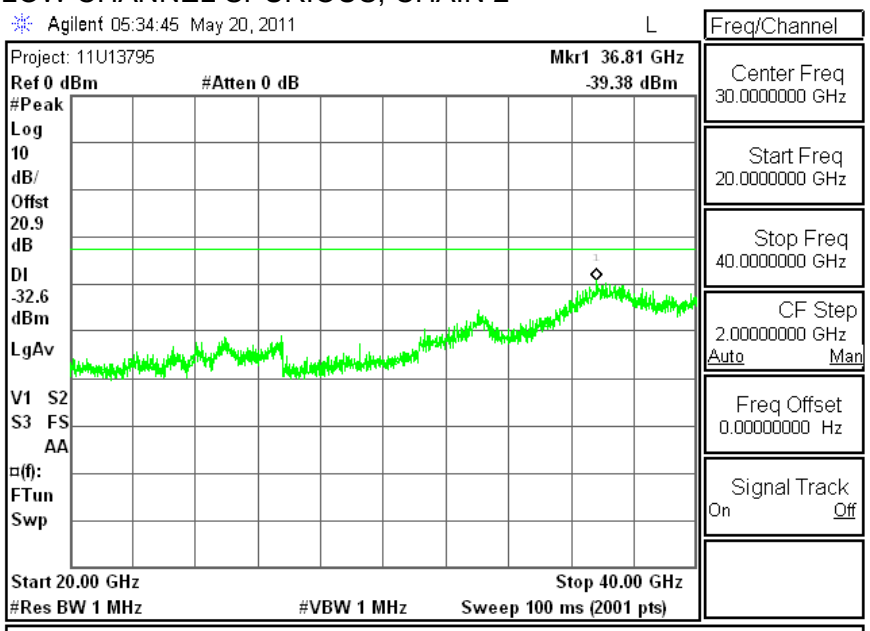
HIGH CHANNEL SPURIOUS, CHAIN 1



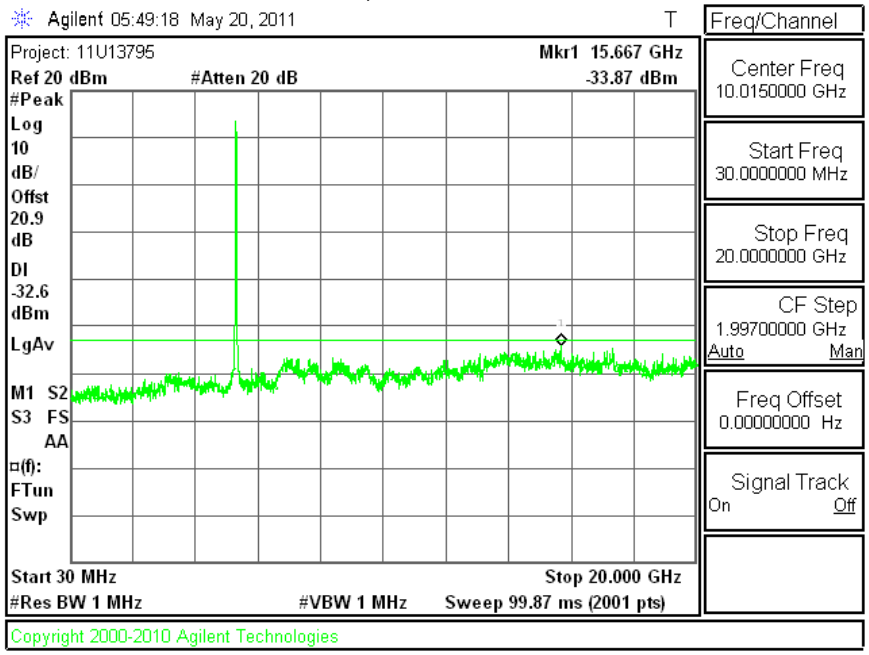
CHAIN 2 SPURIOUS EMISSIONS



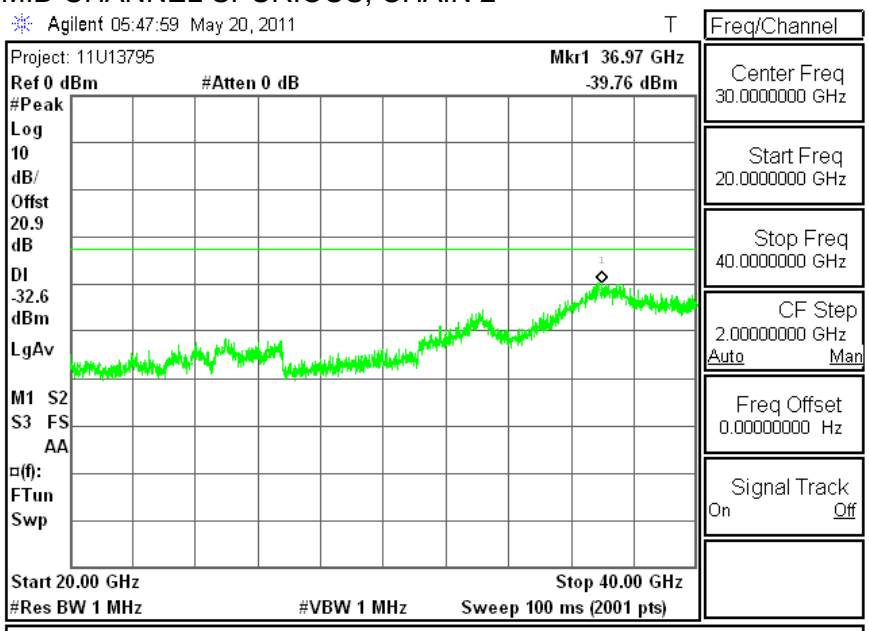
LOW CHANNEL SPURIOUS, CHAIN 2



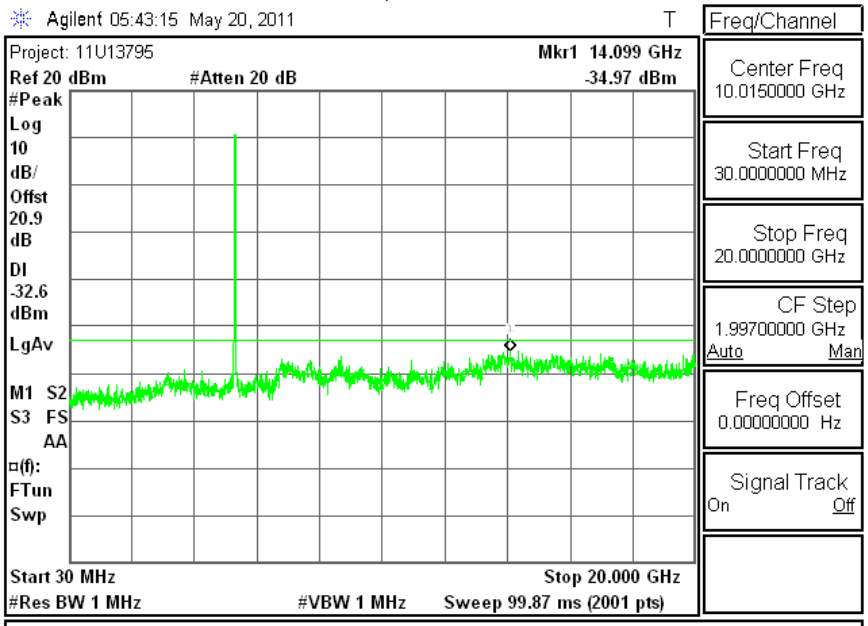
MID CHANNEL SPURIOUS, CHAIN 2



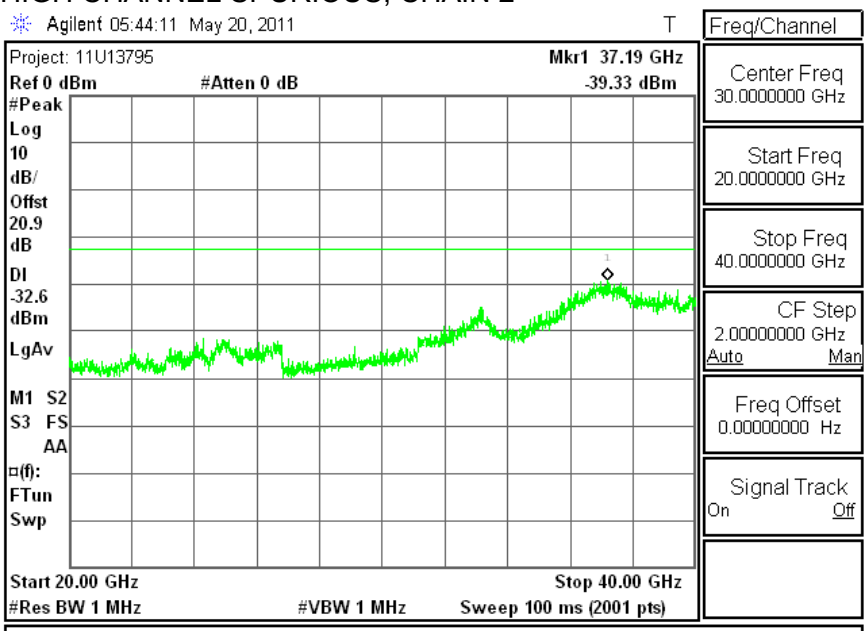
MID CHANNEL SPURIOUS, CHAIN 2



HIGH CHANNEL SPURIOUS, CHAIN 2



HIGH CHANNEL SPURIOUS, CHAIN 2



7.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND

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

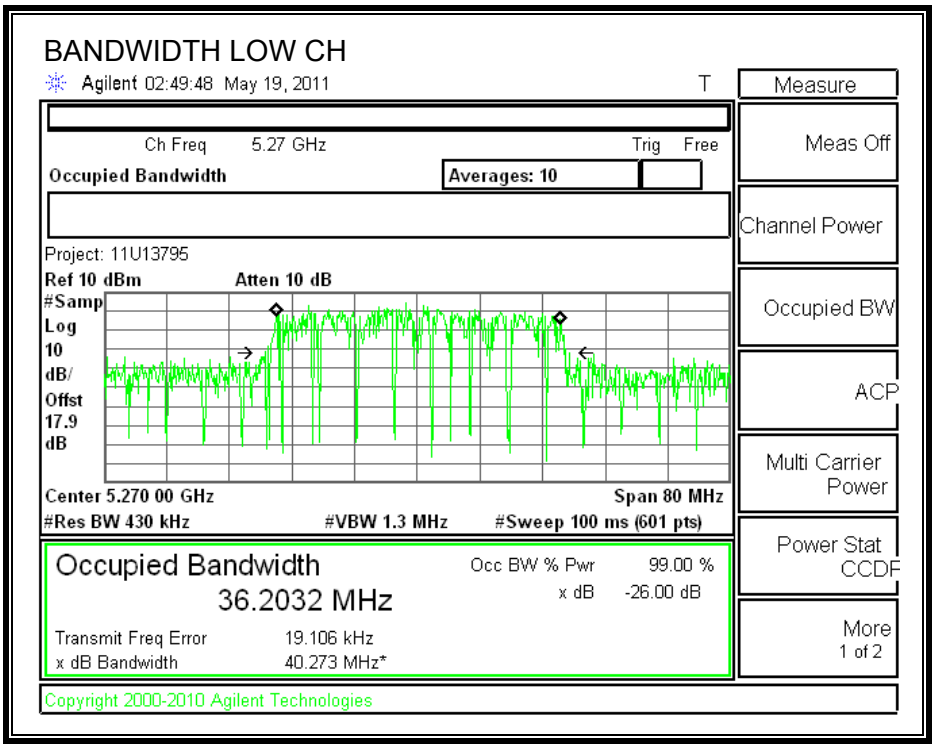
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5270	40.273	36.2032
High	5310	41.642	36.2693

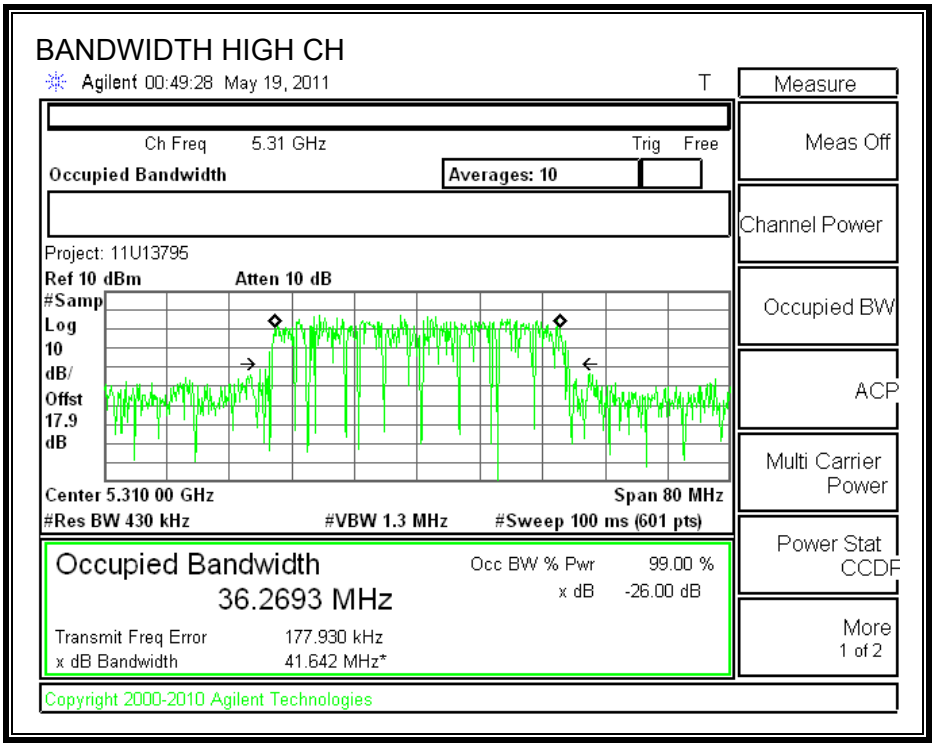
CHAIN 2

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5270	42.119	36.0835
High	5310	38.495	36.1565

CHAIN 1

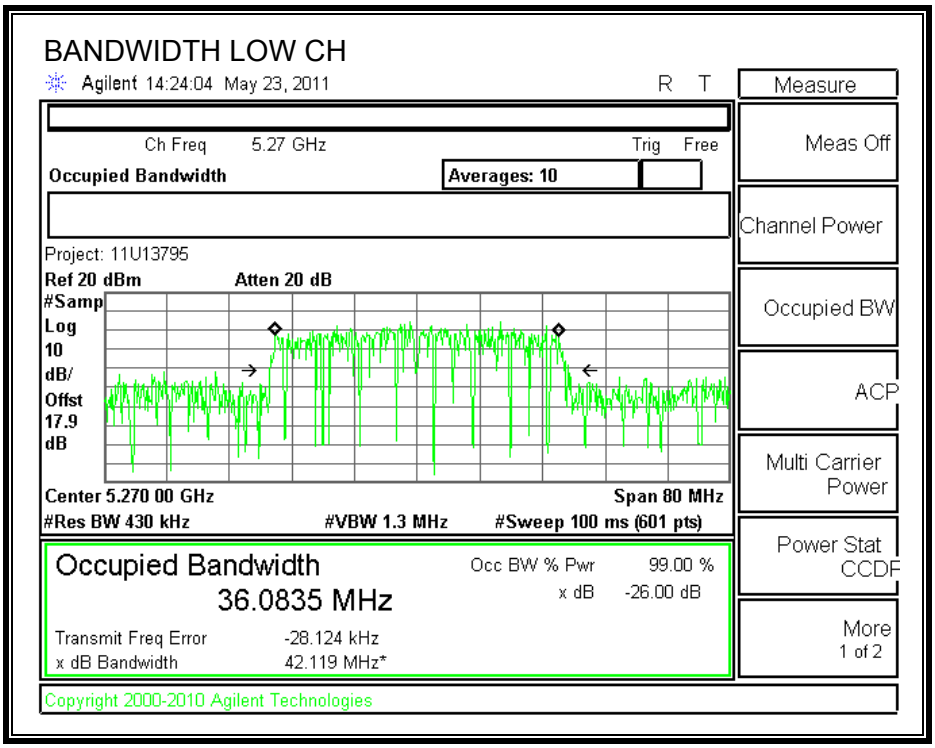
26 dB and 99% BANDWIDTH

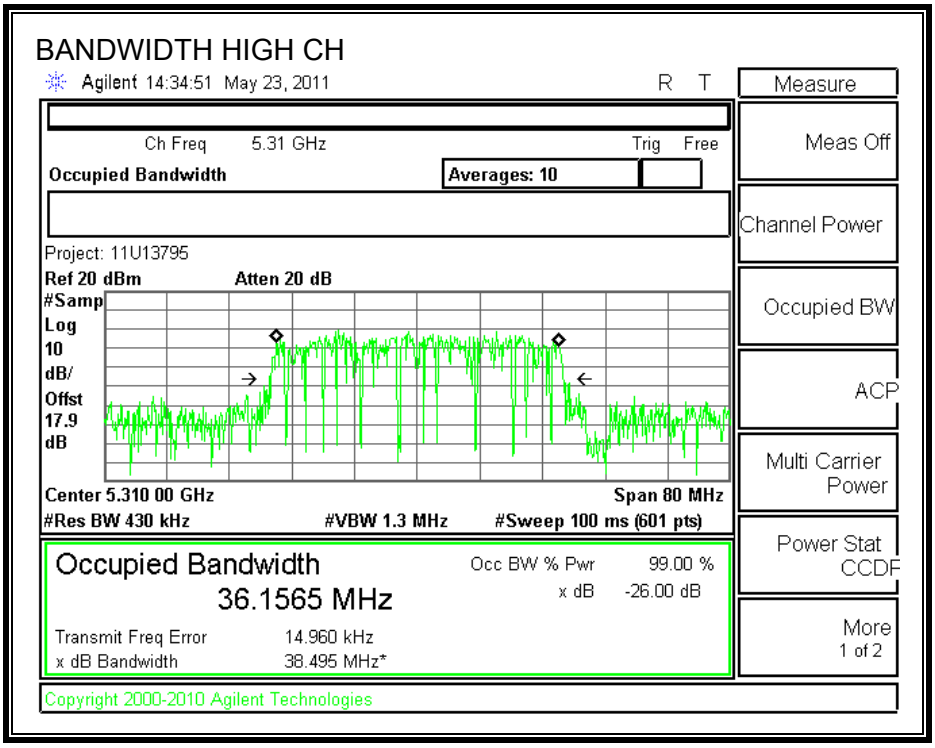




CHAIN 2

26 dB and 99% BANDWIDTH





7.6.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25-5.35 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 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

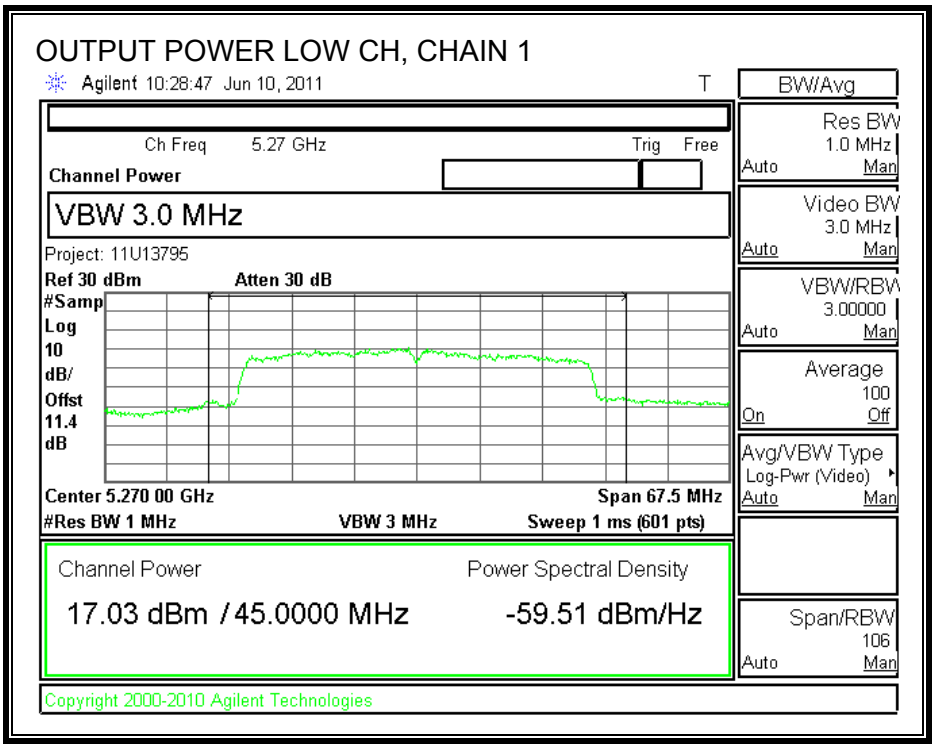
Limit

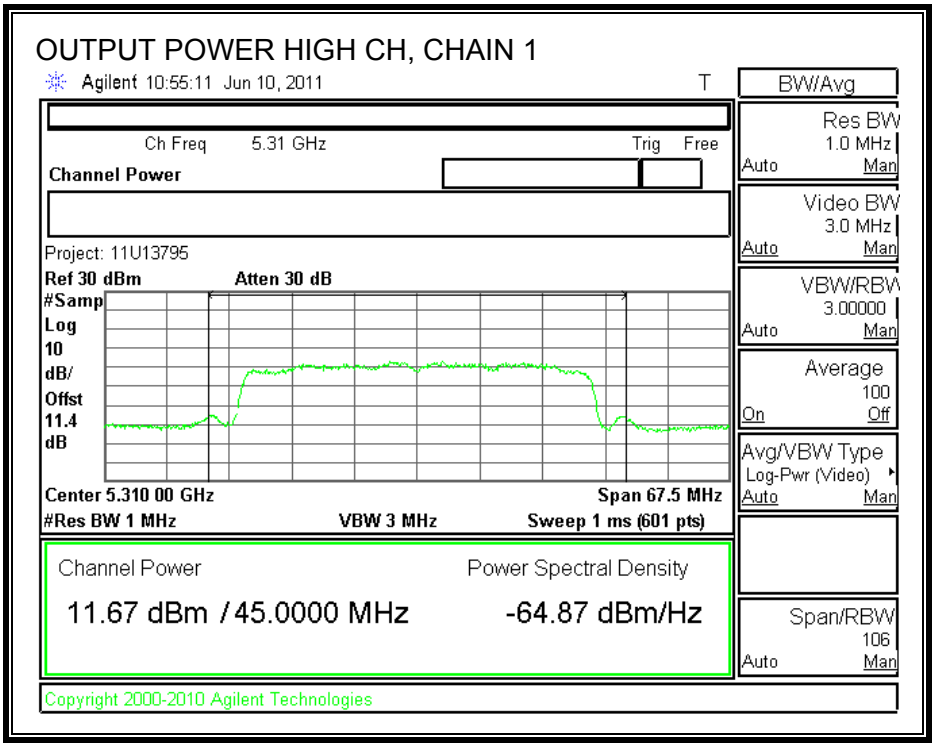
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5270	24	42.119	27.24	8.61	21.39
High	5310	24	41.642	27.20	8.61	21.39

Individual Chain Results

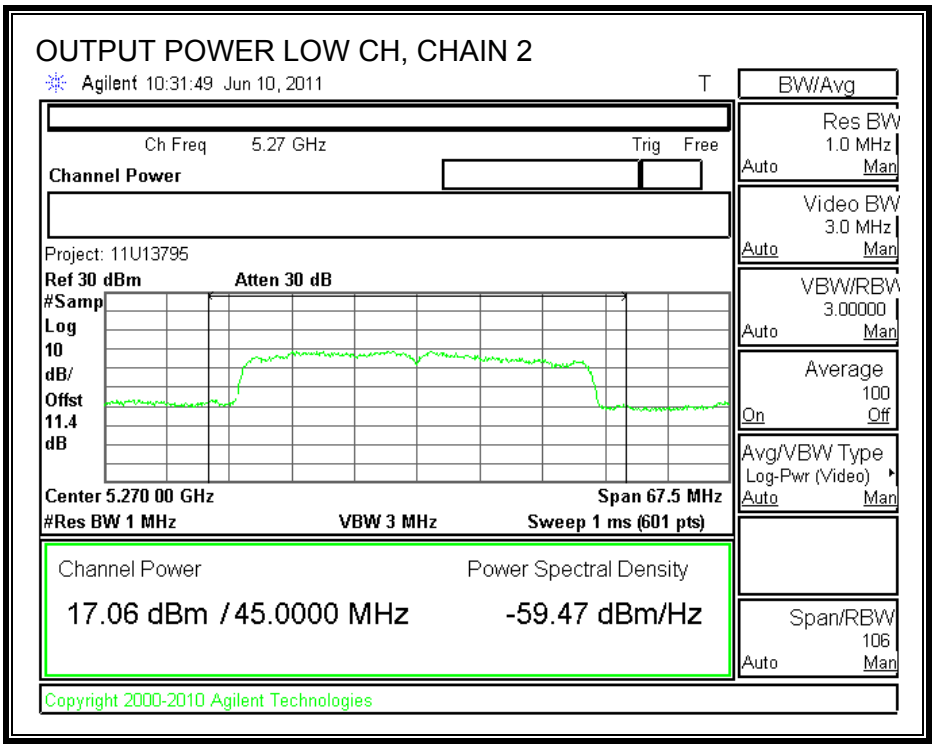
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5270	17.03	17.06	20.06	21.39	-1.33
High	5310	11.67	11.69	14.69	21.39	-6.70

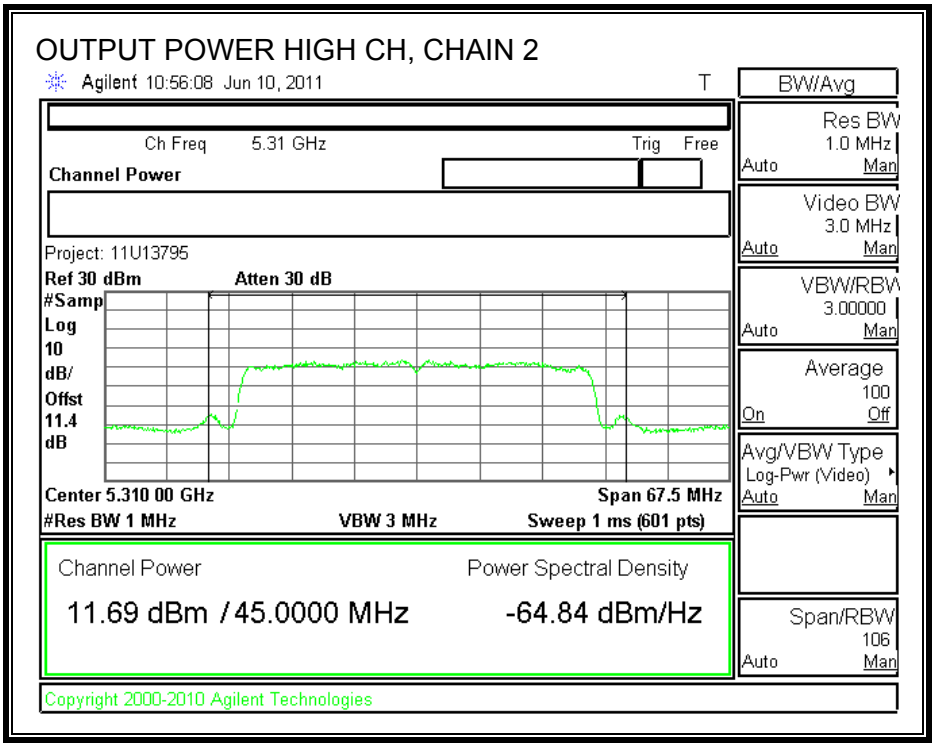
CHAIN 1 OUTPUT POWER





CHAIN 2 OUTPUT POWER





7.6.3. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25-5.35 GHz band, the peak power spectral density shall not exceed 11 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 8.61 dBi, therefore the limit is 8.39 dBm.

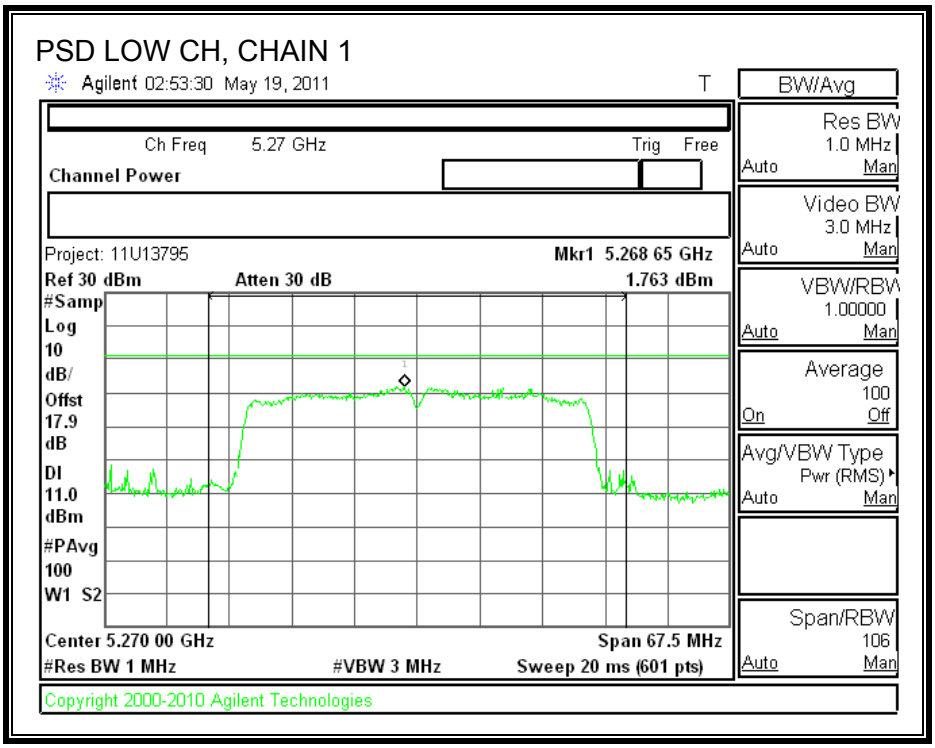
TEST PROCEDURE

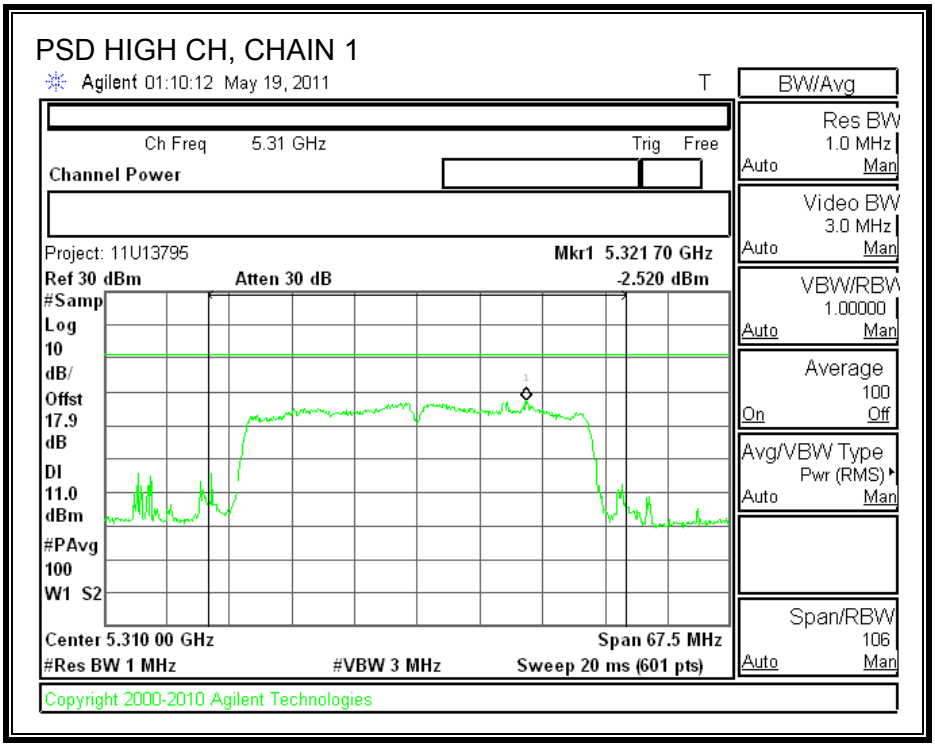
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

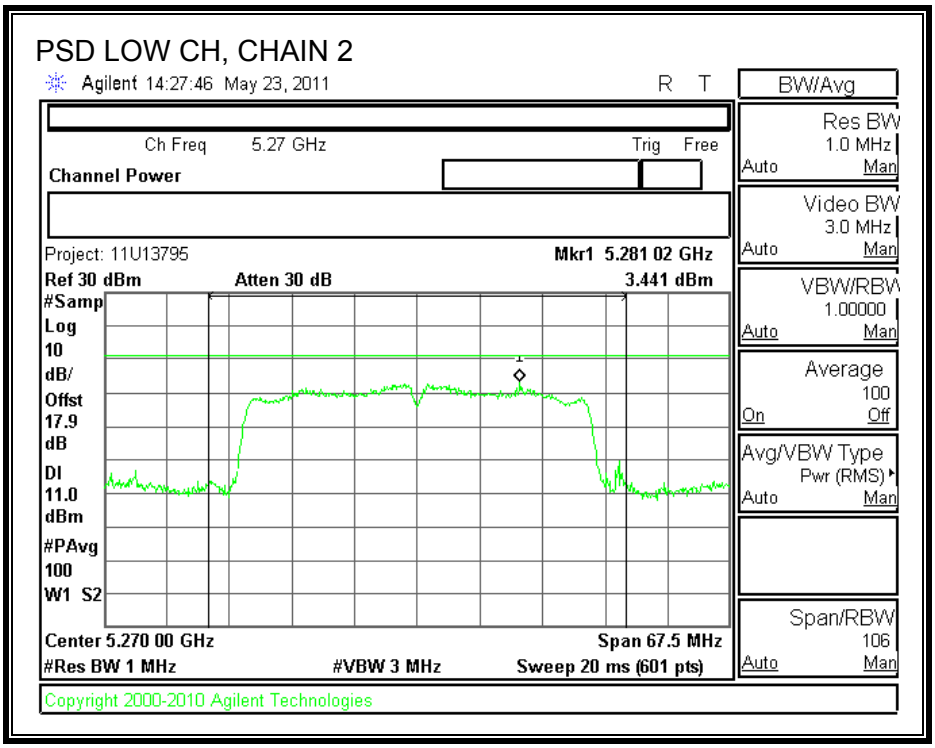
Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5270	1.763	3.441	5.69	8.39	-2.70
High	5310	-2.52	-0.843	1.41	8.39	-6.98

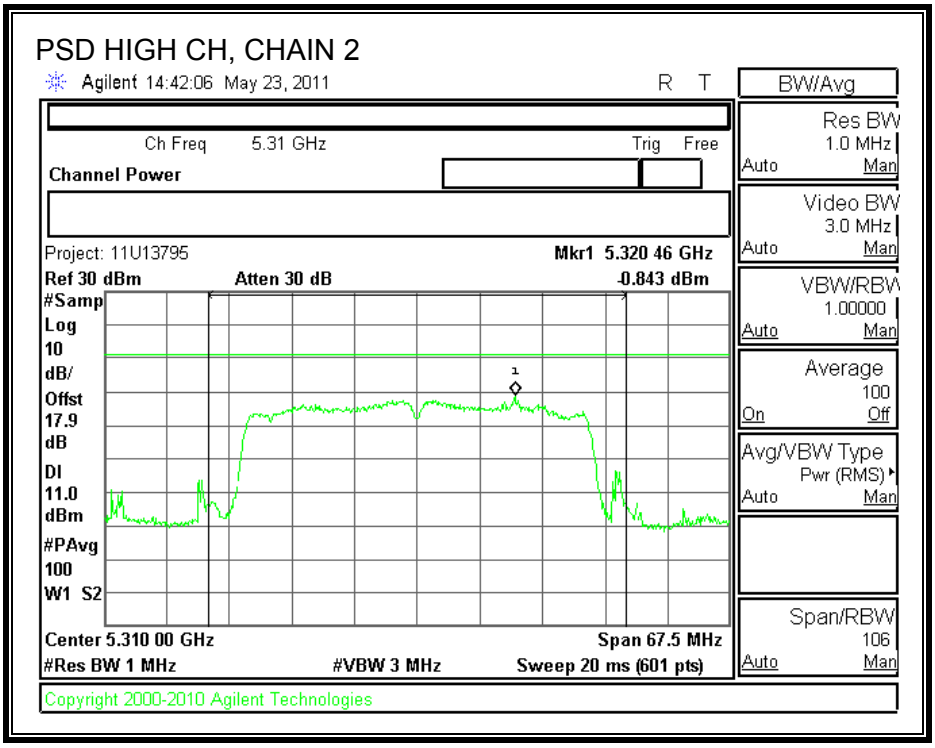
CHAIN 1 POWER SPECTRAL DENSITY





CHAIN 2 POWER SPECTRAL DENSITY





7.6.4. 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

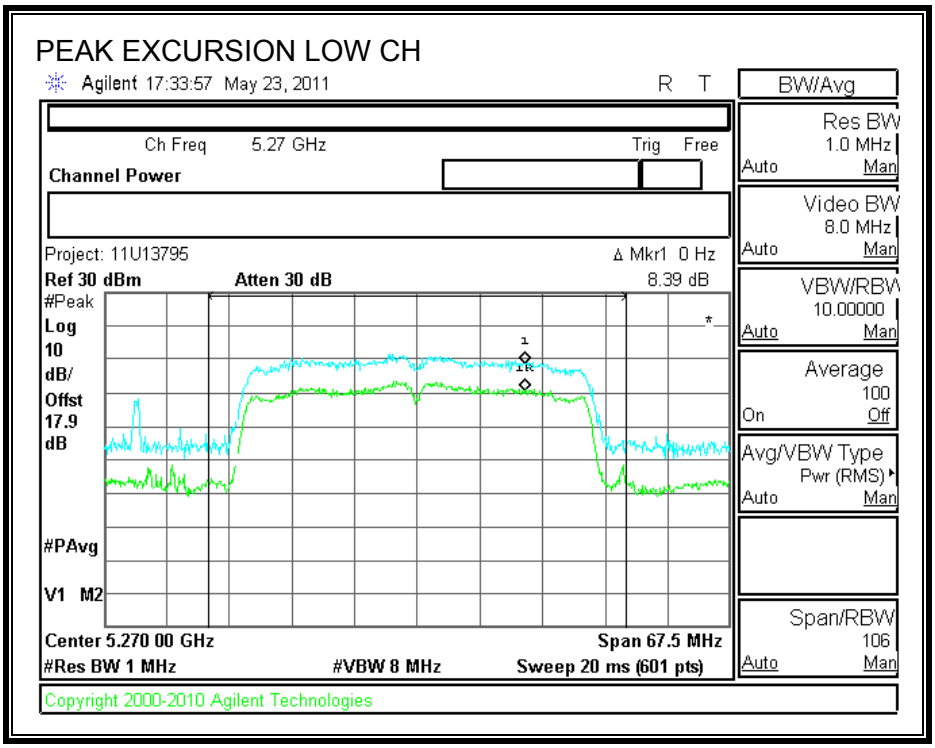
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5270	8.39	13	-4.61
High	5310	9.63	13	-3.37

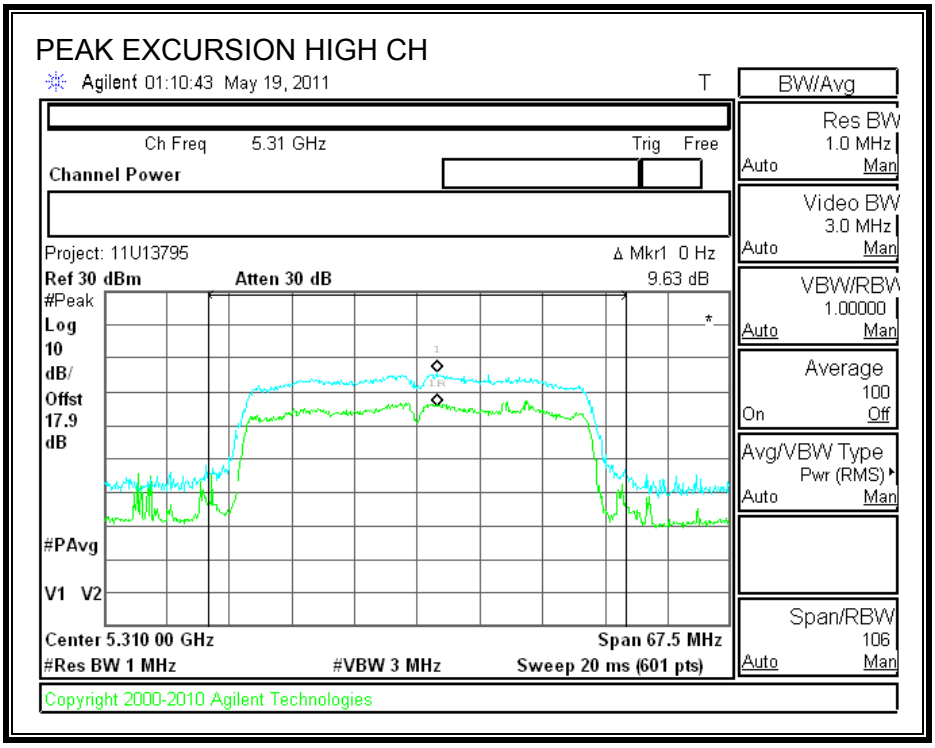
CHAIN 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5270	8.52	13	-4.48
High	5310	7.81	13	-5.19

CHAIN 1

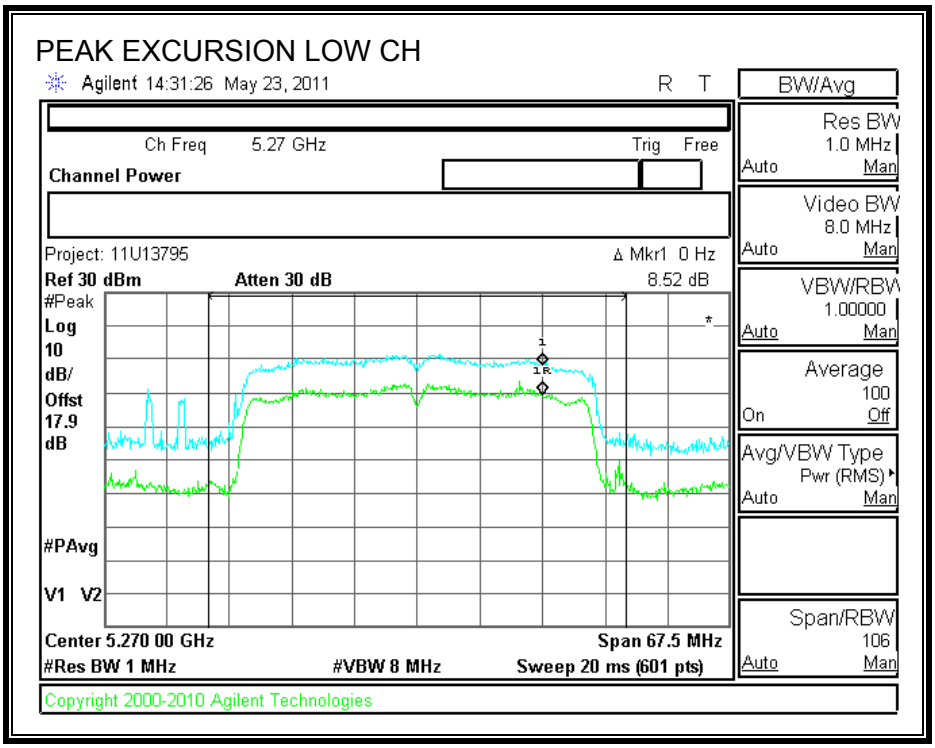
PEAK EXCURSION

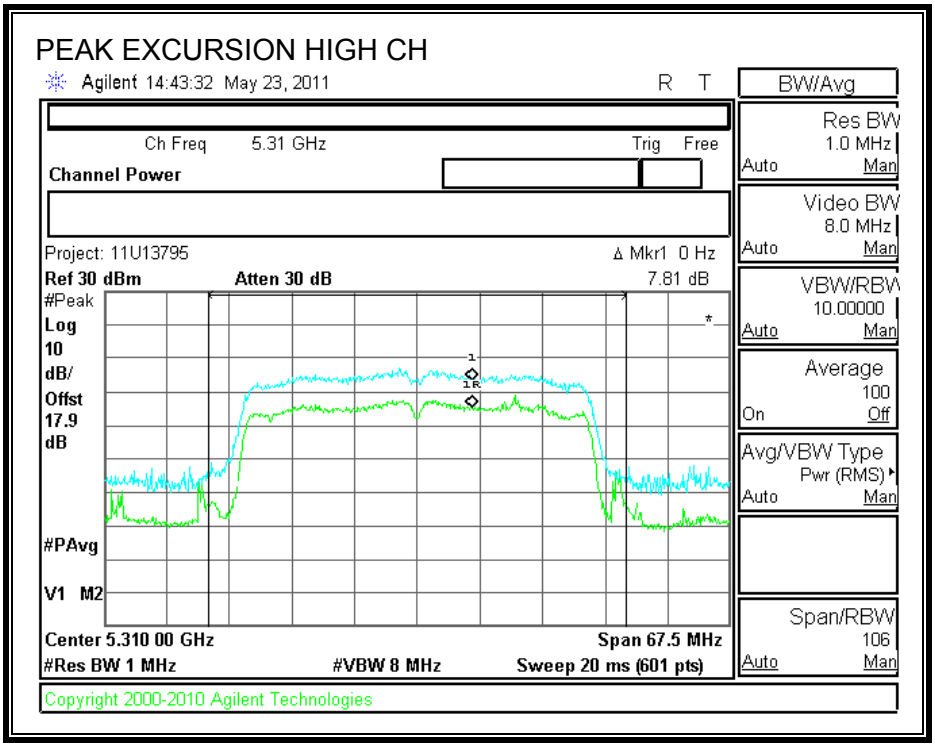




CHAIN 2

PEAK EXCURSION





7.6.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (2)

IC RSS-210 A9.3 (2)

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

Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

TEST PROCEDURE

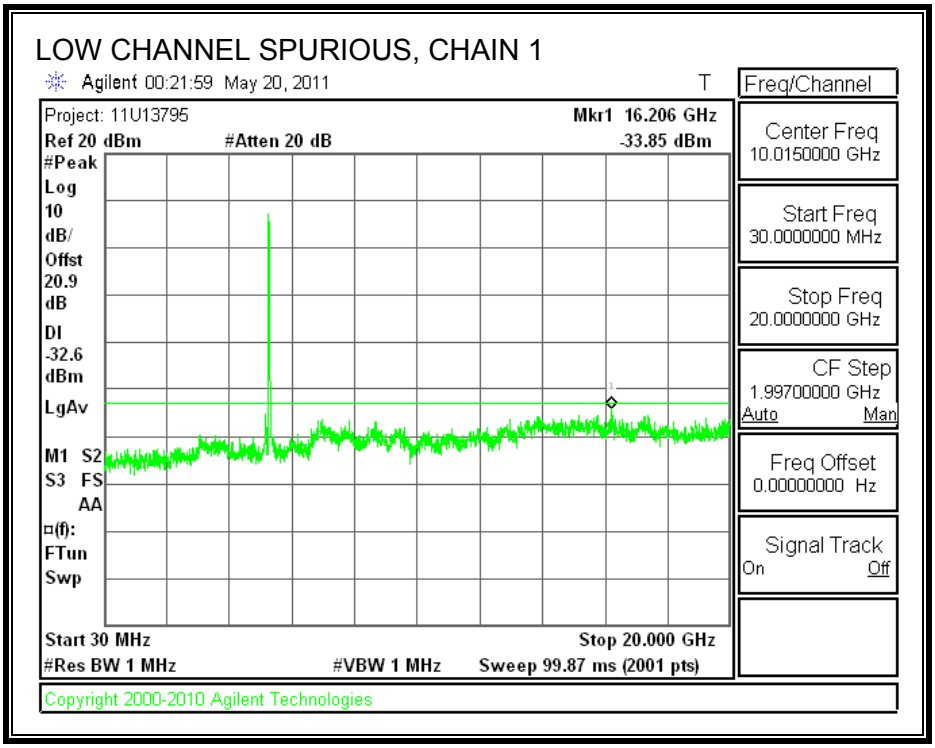
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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

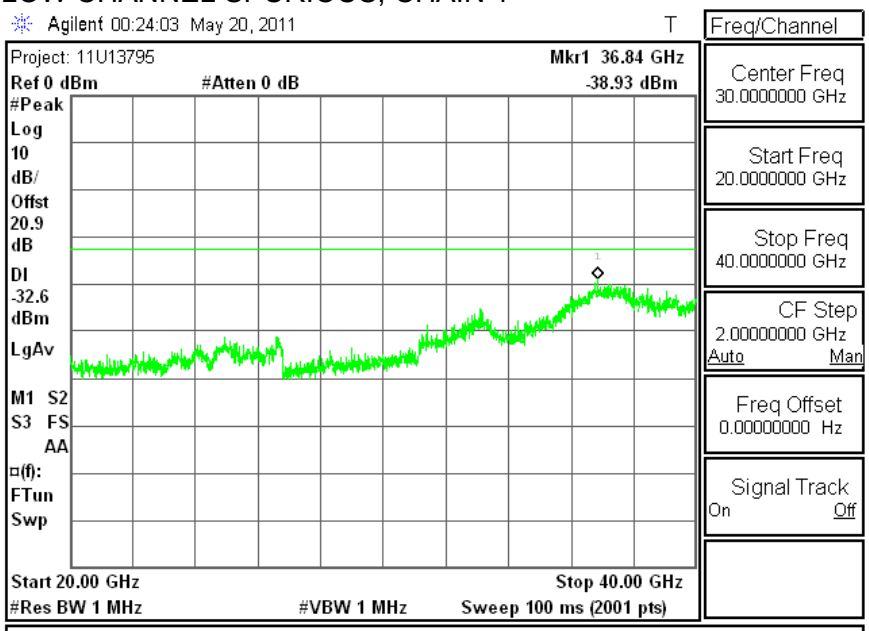
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

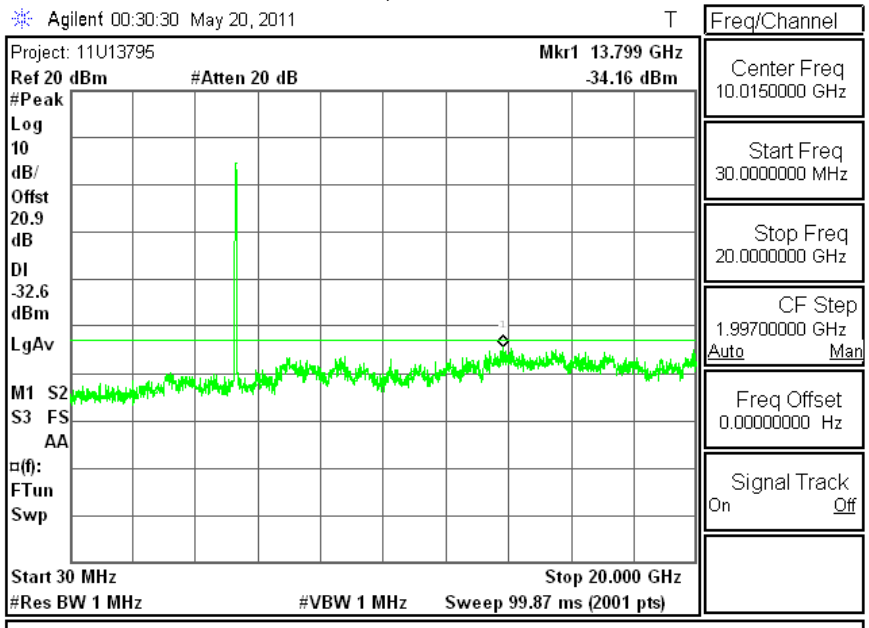
CHAIN 1 SPURIOUS EMISSIONS



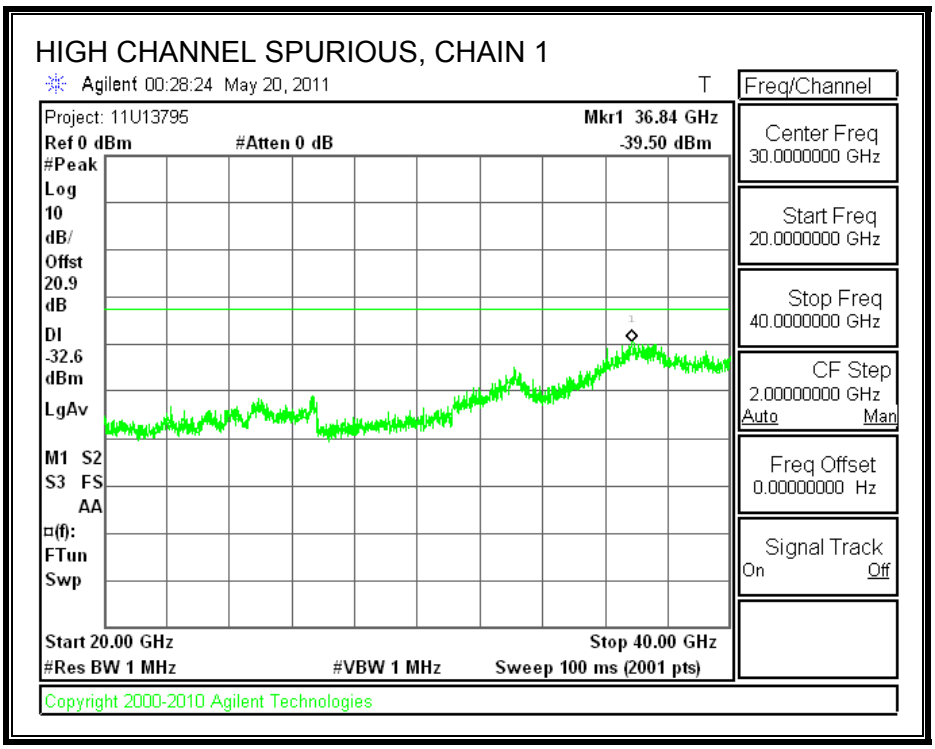
LOW CHANNEL SPURIOUS, CHAIN 1



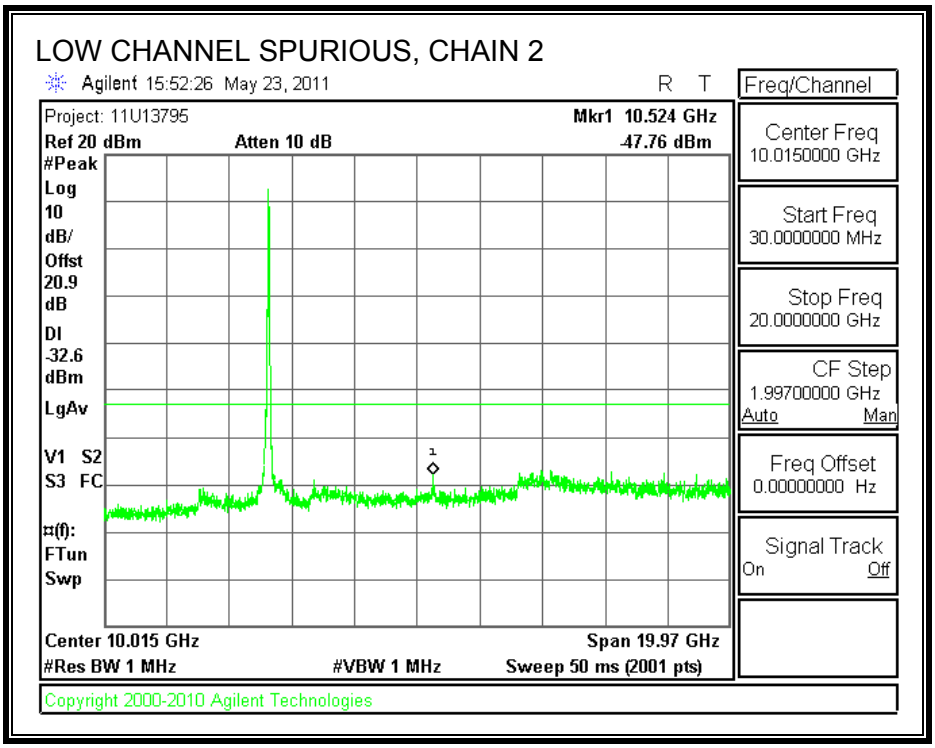
HIGH CHANNEL SPURIOUS, CHAIN 1



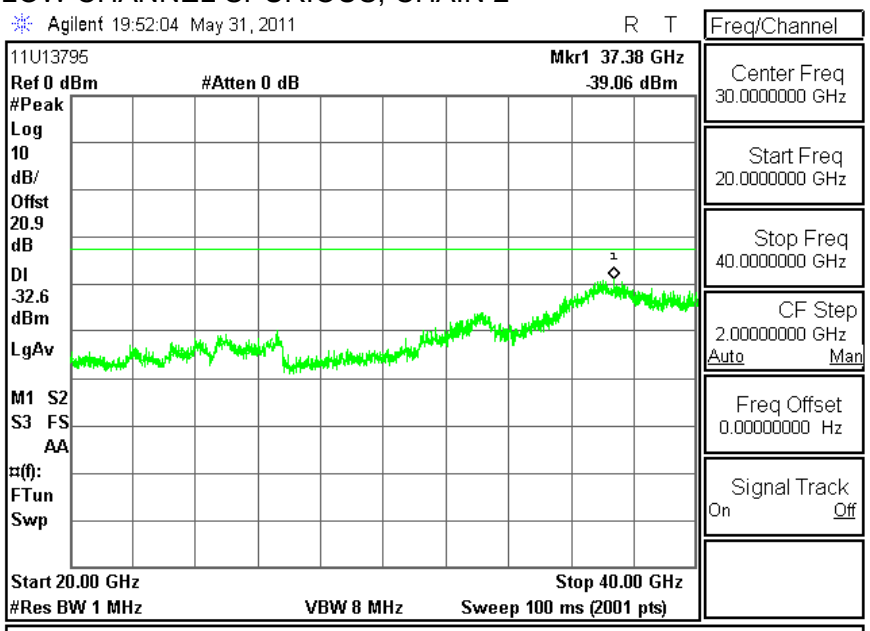
HIGH CHANNEL SPURIOUS, CHAIN 1



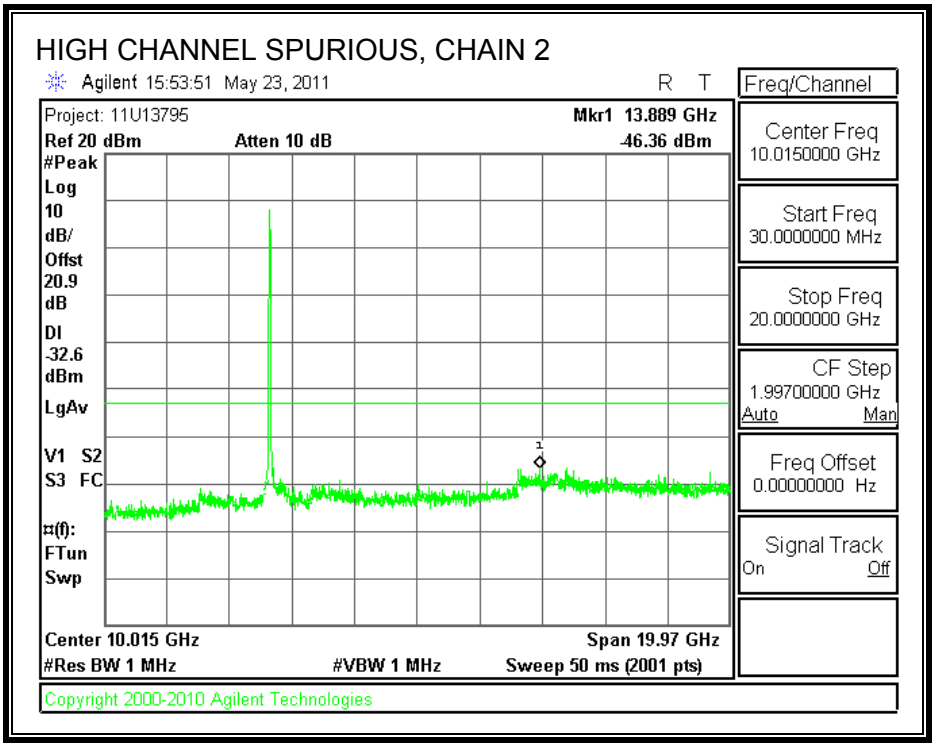
CHAIN 2 SPURIOUS EMISSIONS



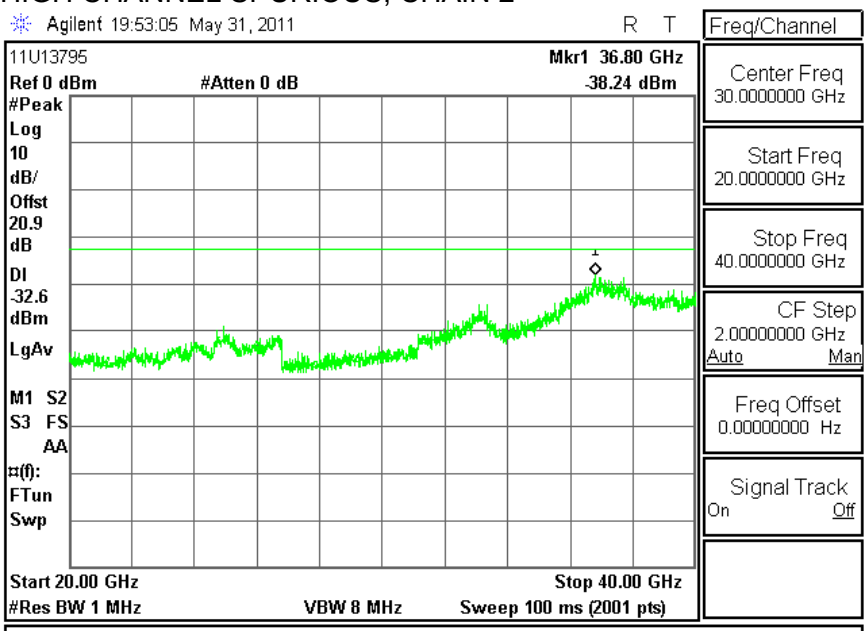
LOW CHANNEL SPURIOUS, CHAIN 2



HIGH CHANNEL SPURIOUS, CHAIN 2



HIGH CHANNEL SPURIOUS, CHAIN 2



7.7. 802.11a MODE IN THE 5.6 GHz BAND

7.7.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

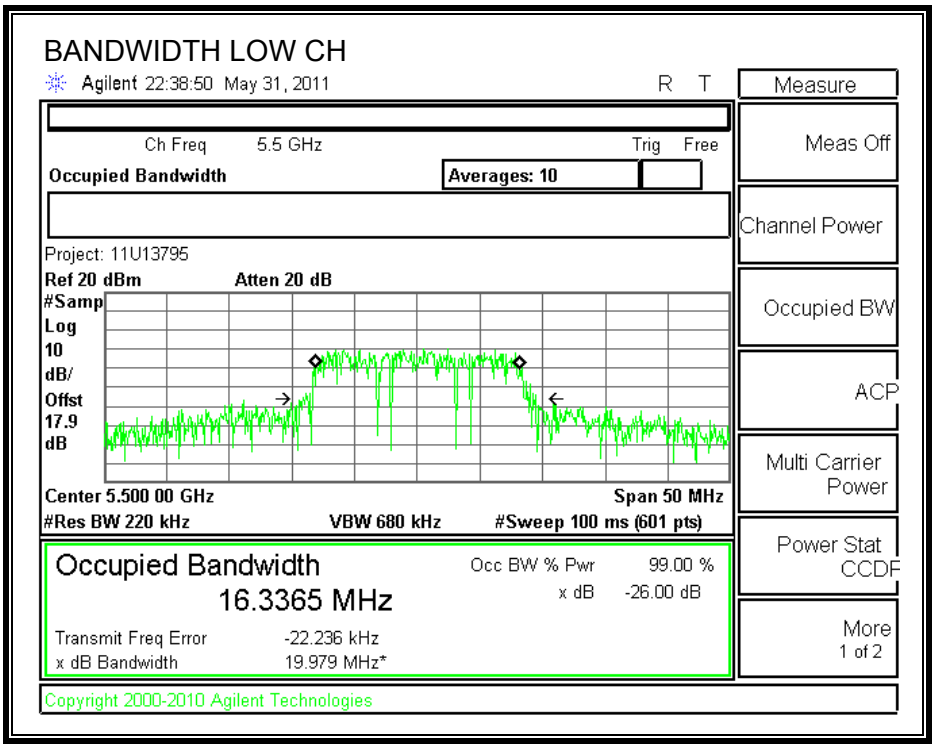
TEST PROCEDURE

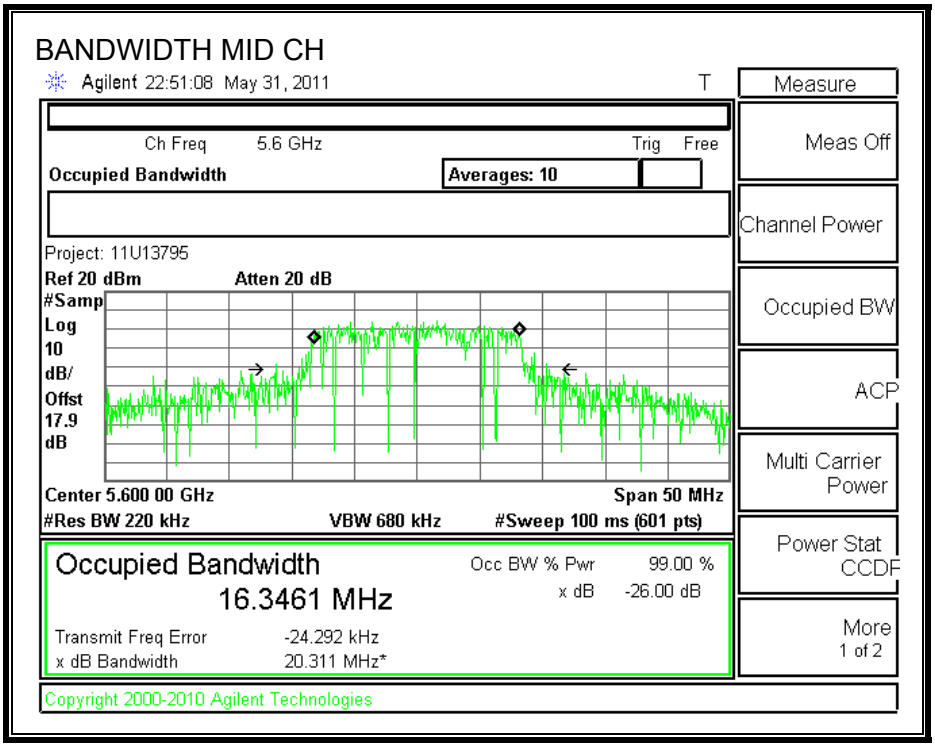
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

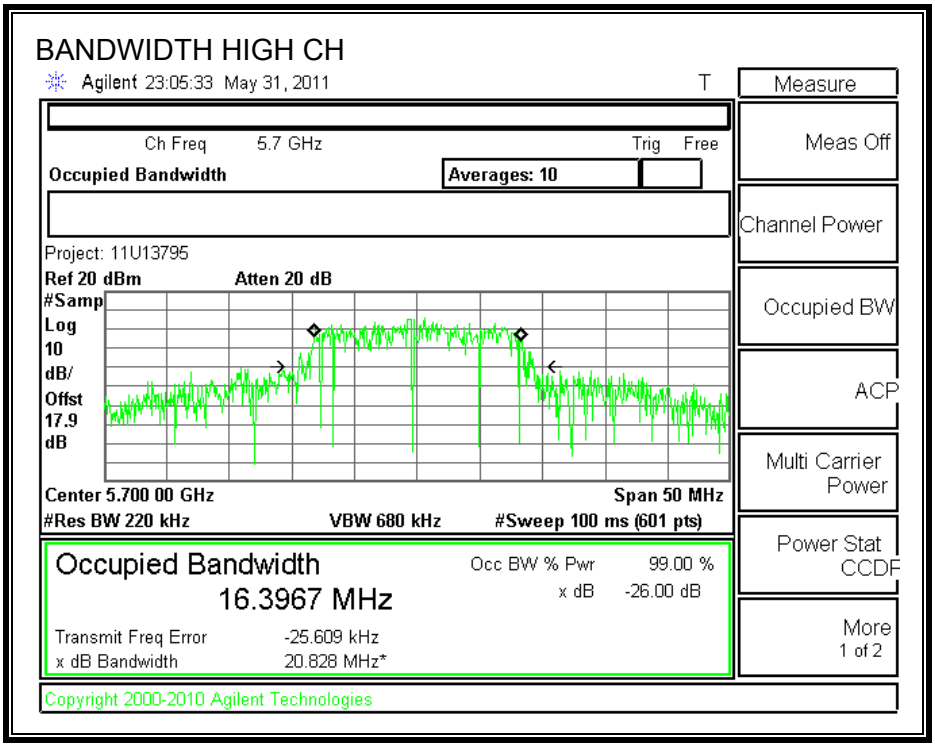
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5500	19.979	16.3365
Middle	5580	20.311	16.3461
High	5700	20.828	16.3967

26 dB and 99% BANDWIDTH







7.7.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 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

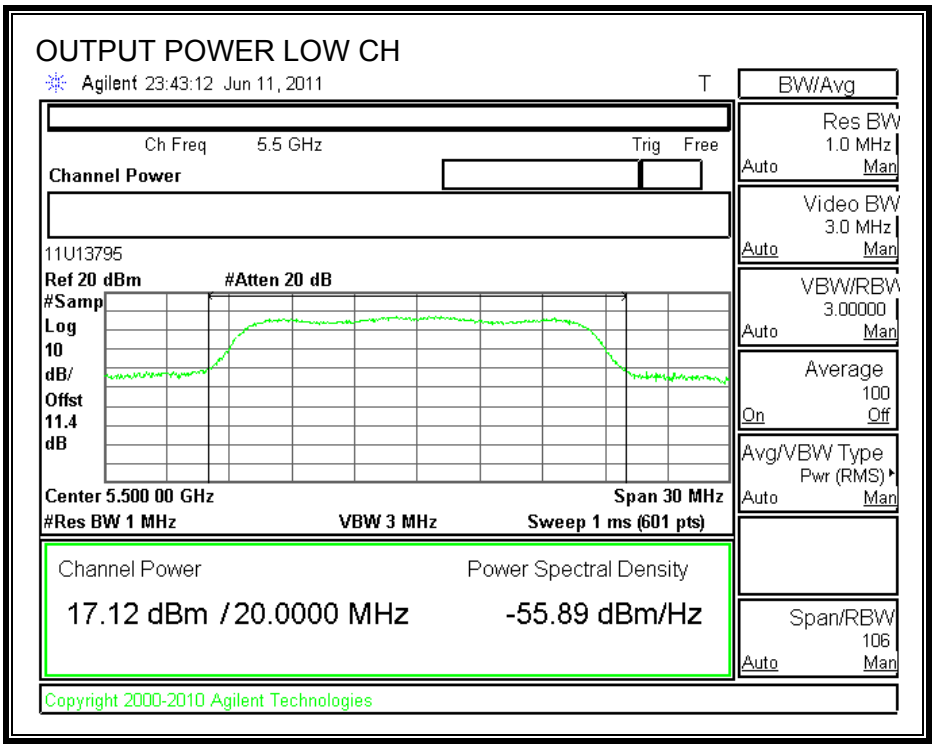
Limit

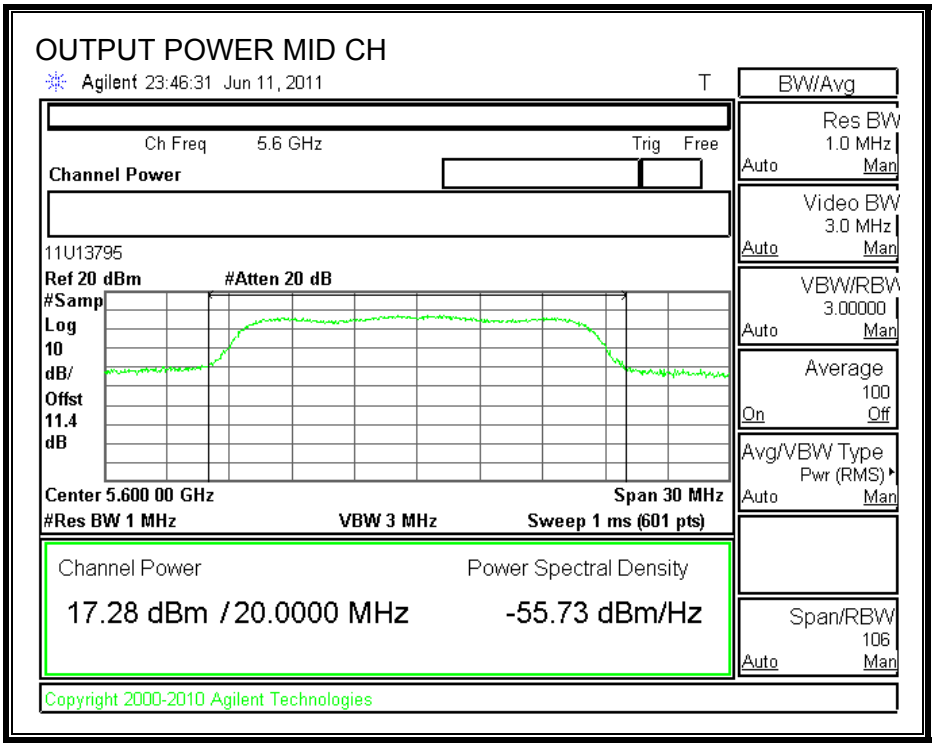
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5500	24	19.979	24.01	4.20	24.00
Mid	5580	24	20.311	24.08	4.20	24.00
High	5700	24	20.828	24.19	4.20	24.00

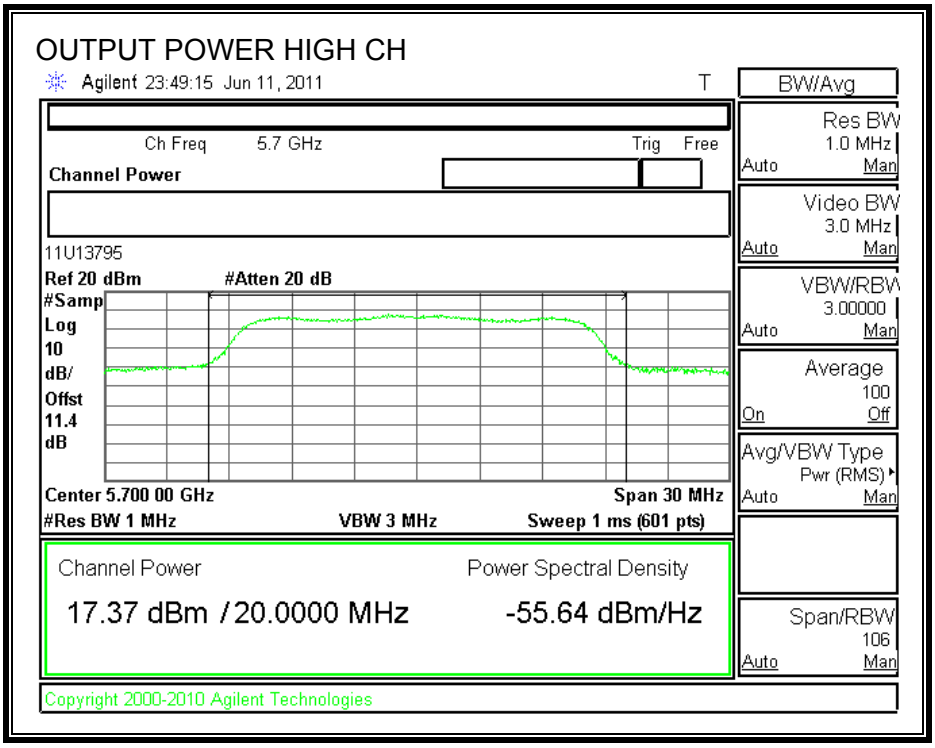
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	17.12	24.00	-6.88
Mid	5580	17.28	24.00	-6.72
High	5700	17.37	24.00	-6.63

OUTPUT POWER







7.7.3. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the peak power spectral density shall not exceed 11 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 11 dBm.

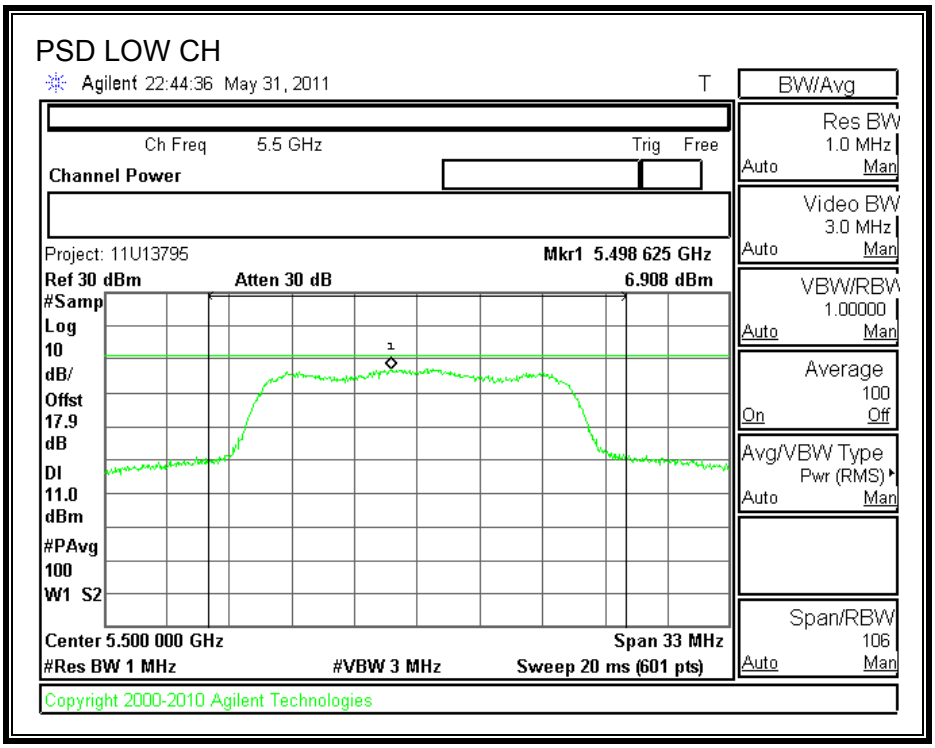
TEST PROCEDURE

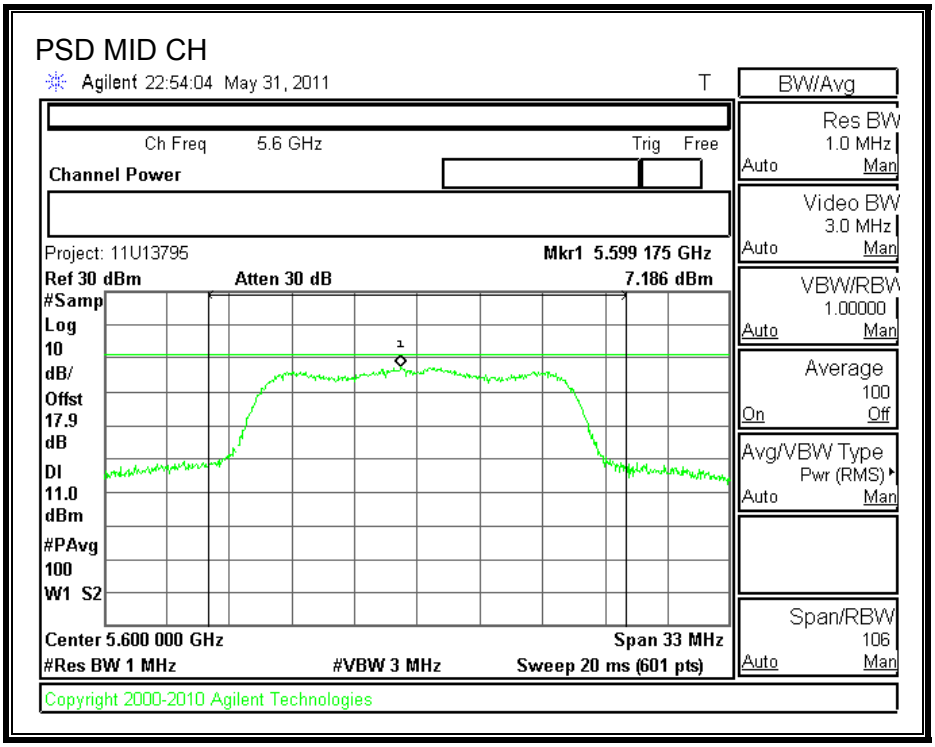
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

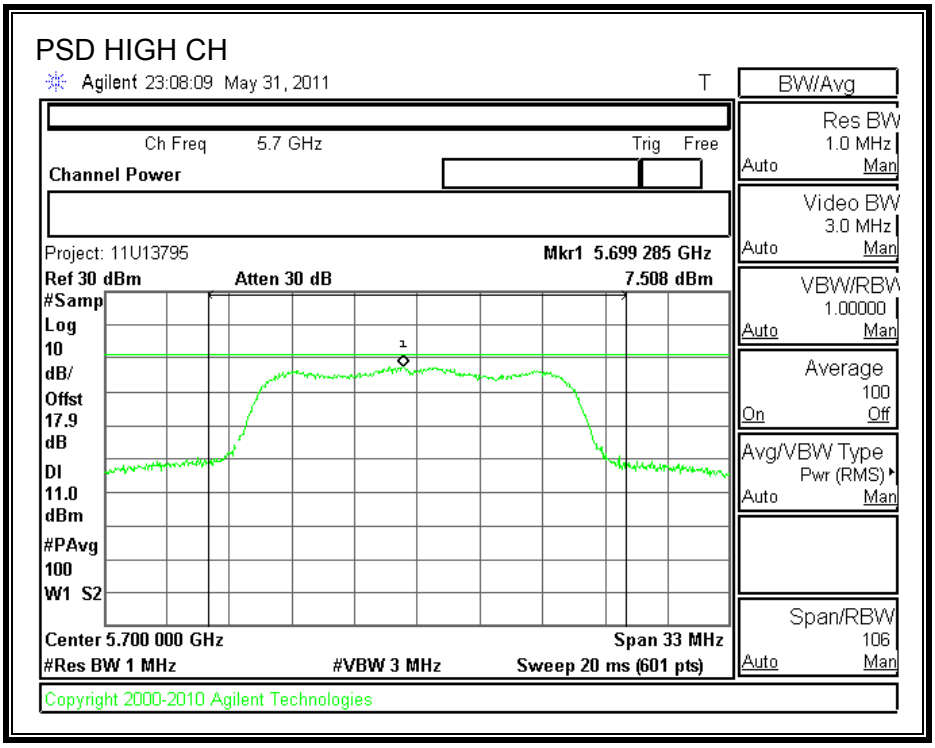
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5500	6.91	11	-4.09
Middle	5580	7.19	11	-3.81
High	5700	7.51	11	-3.49

POWER SPECTRAL DENSITY







7.7.4. 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

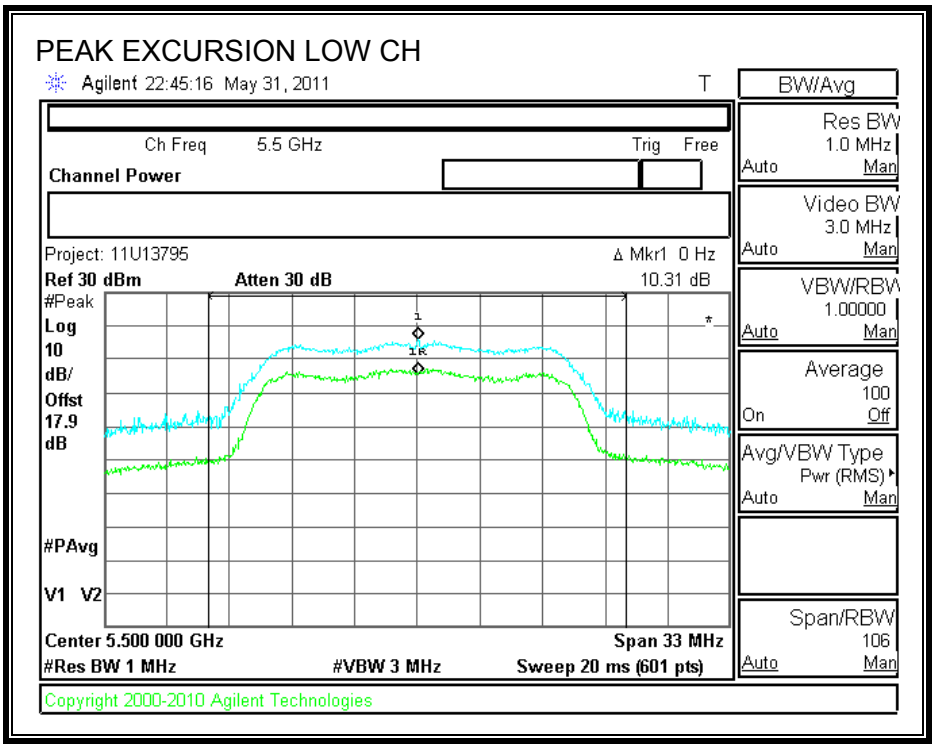
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

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

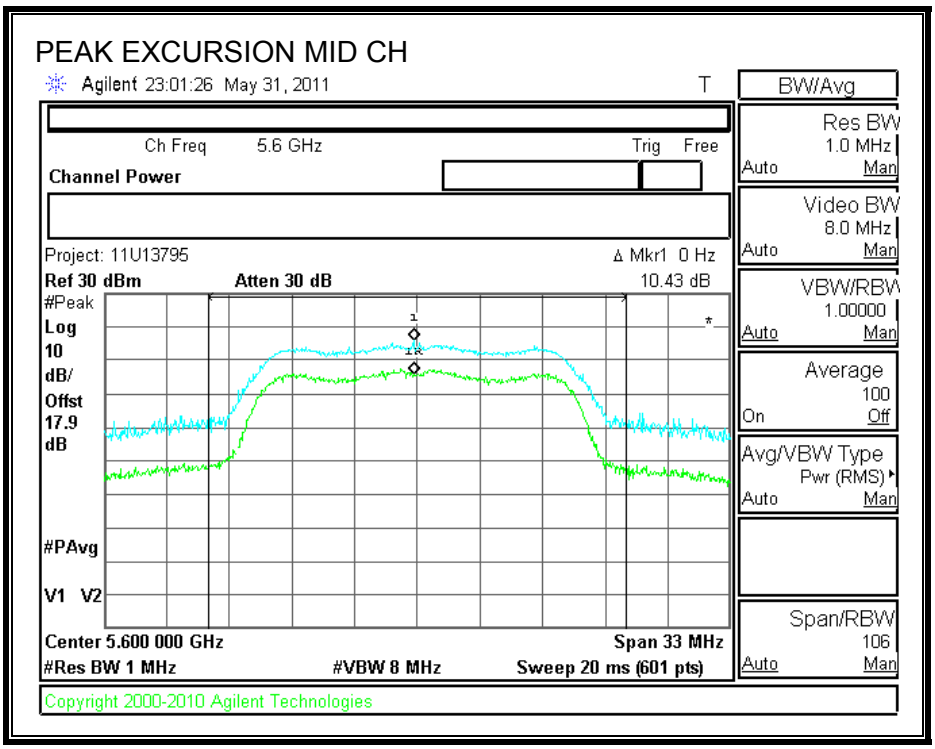
RESULTS

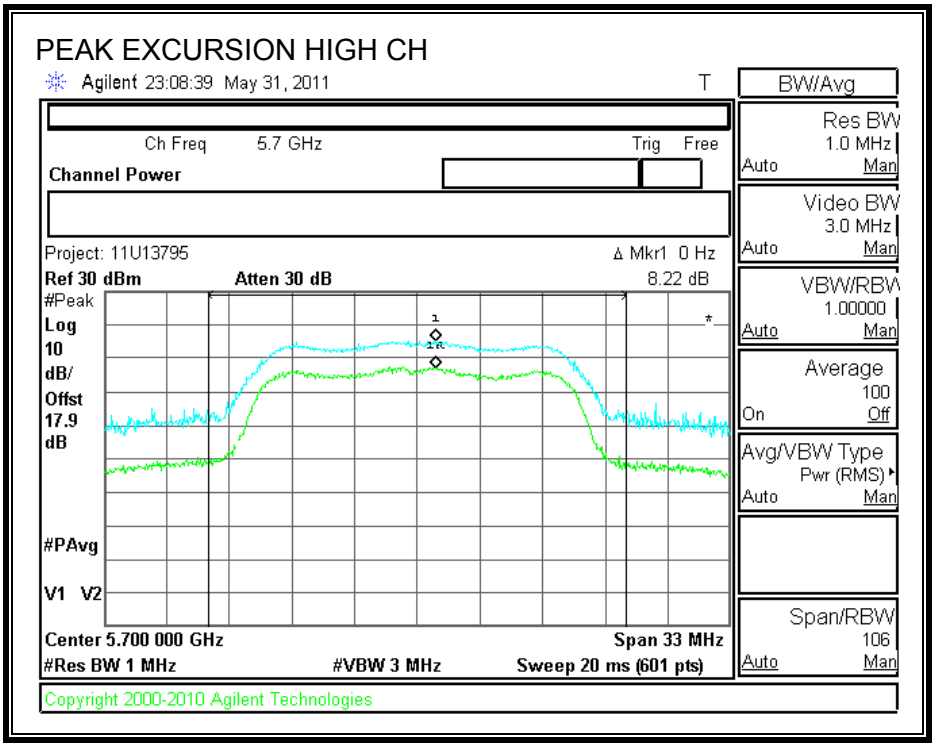
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	10.31	13	-2.69
Middle	5580	10.43	13	-2.57
High	5700	8.22	13	-4.78

PEAK EXCURSION



PEAK EXCURSION MID CH





7.7.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

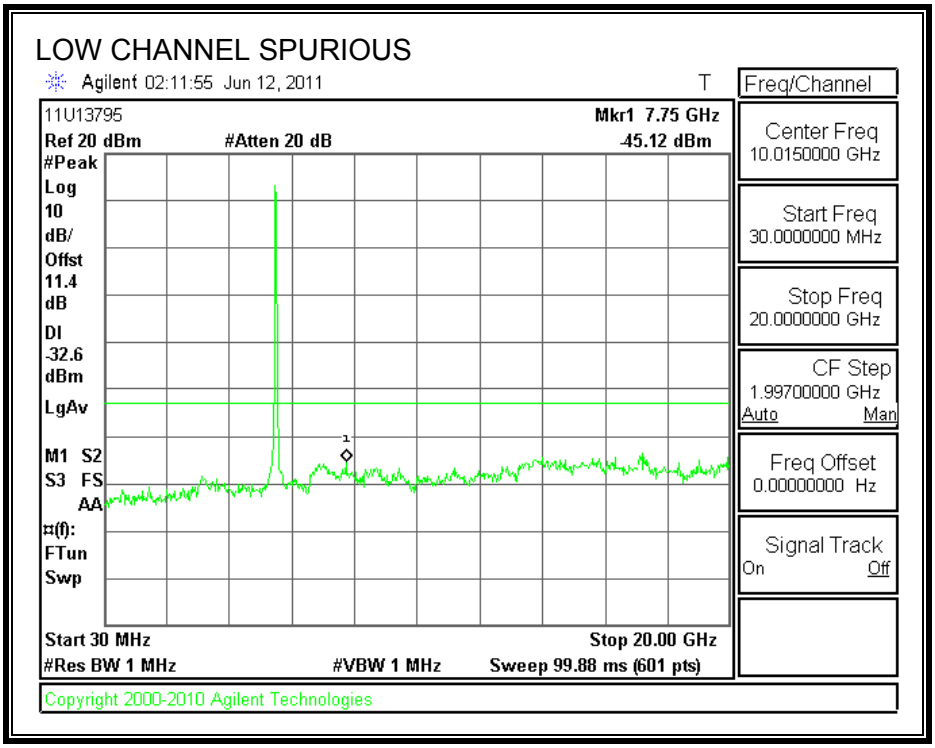
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

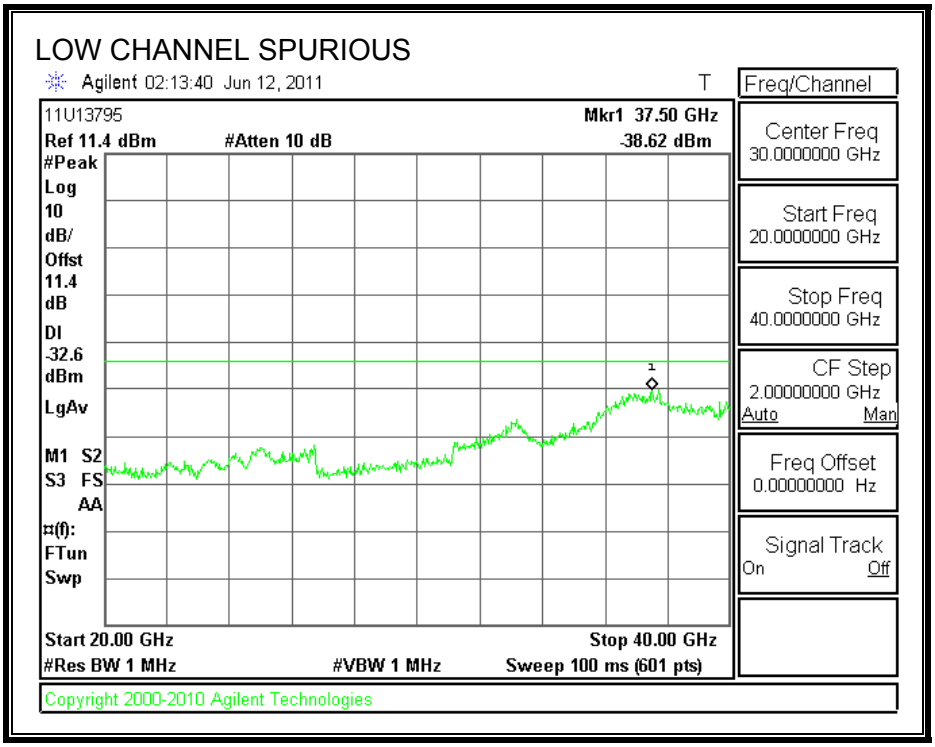
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

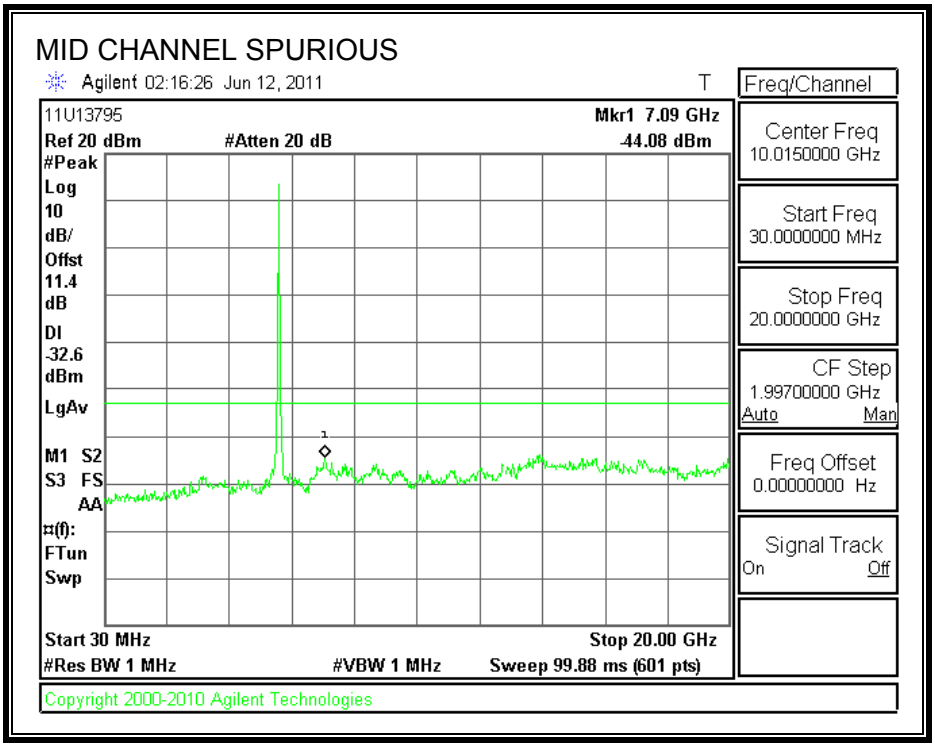
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

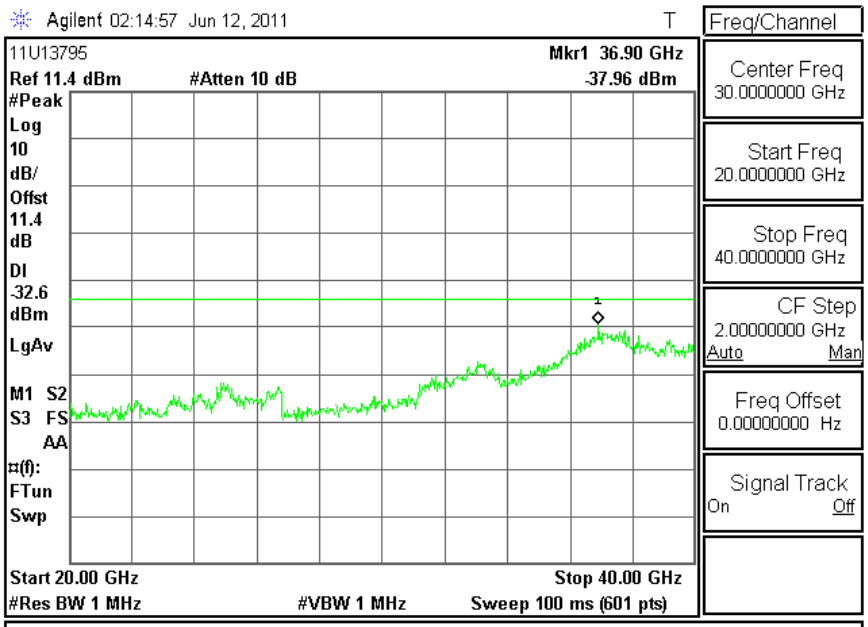
SPURIOUS EMISSIONS



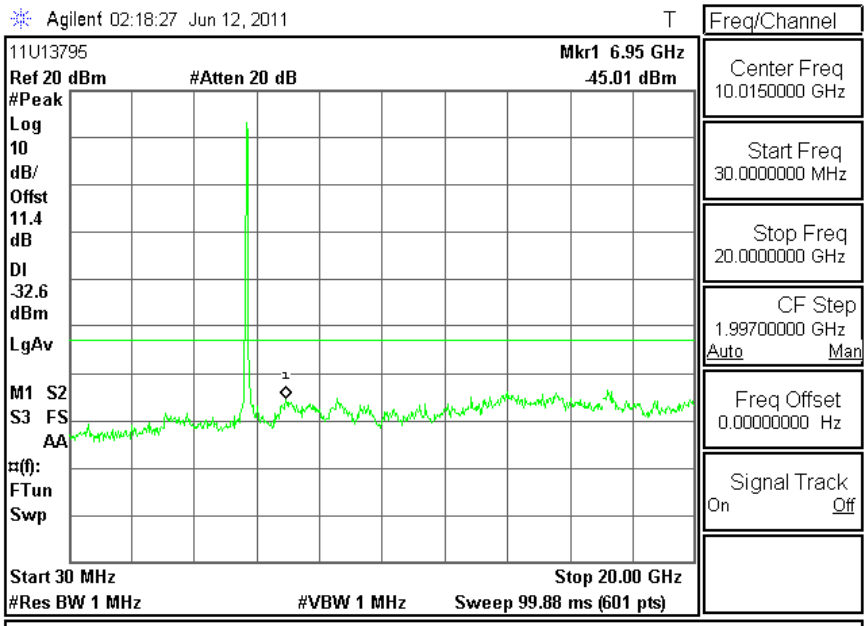




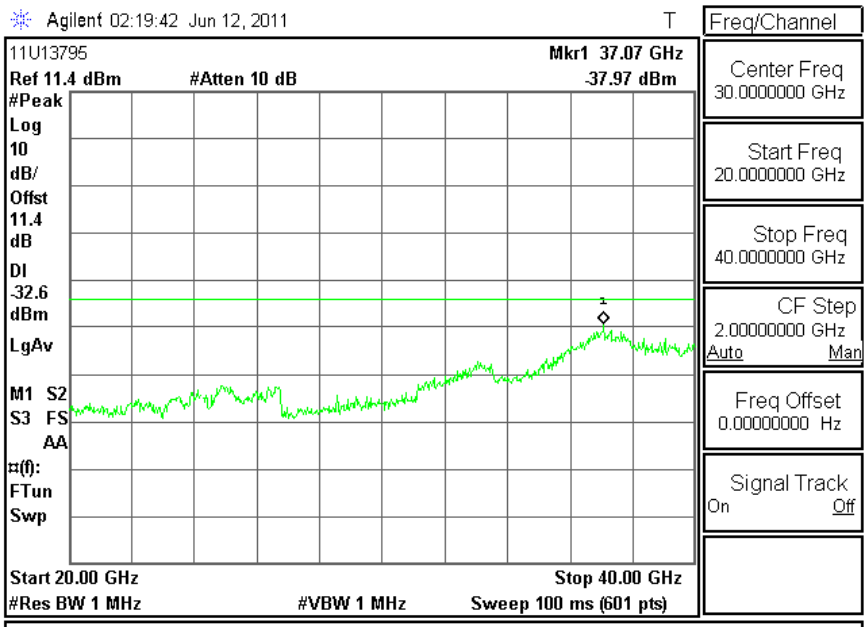
MID CHANNEL SPURIOUS



HIGH CHANNEL SPURIOUS



HIGH CHANNEL SPURIOUS



7.8. 802.11n HT20 MODE IN THE 5.6 GHz BAND

7.8.1. 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

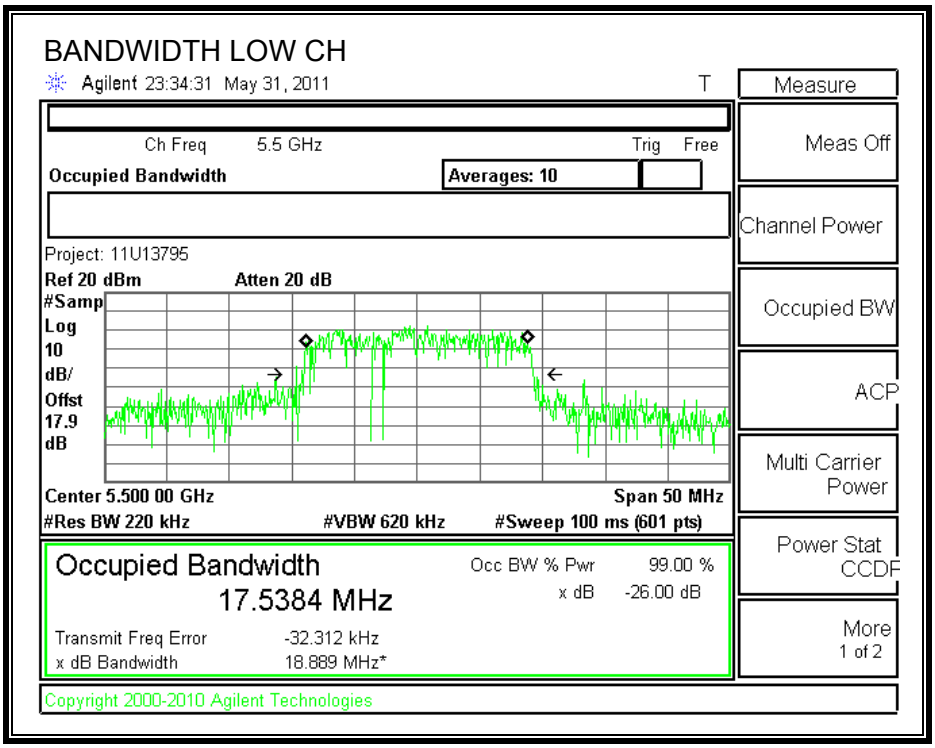
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5500	18.889	17.5384
Middle	5600	19.725	17.5683
High	5700	18.761	17.5198

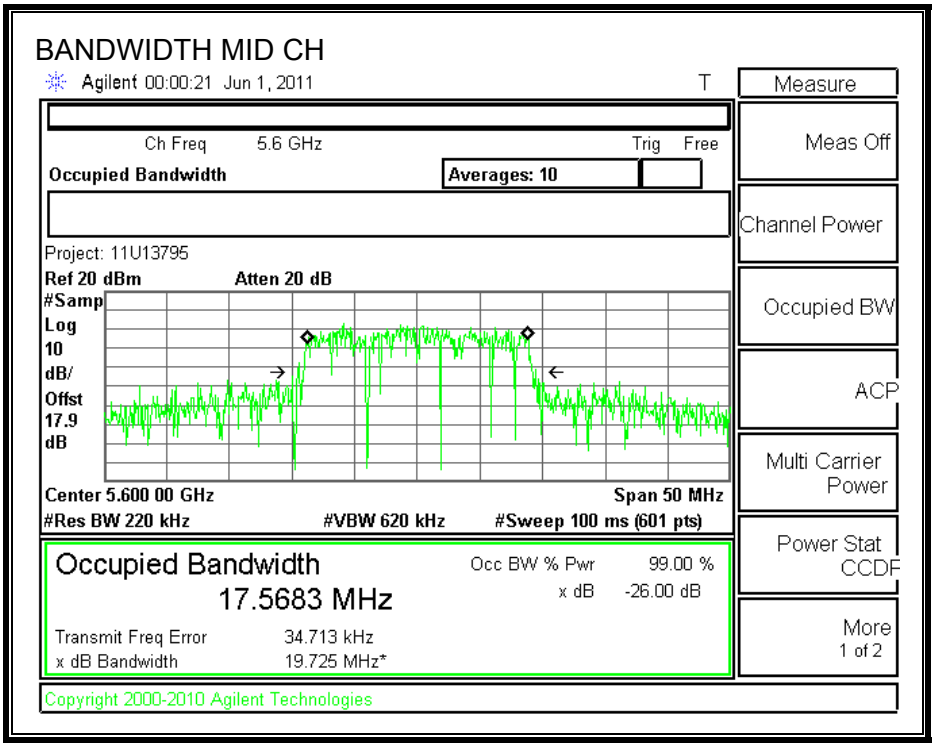
CHAIN 2

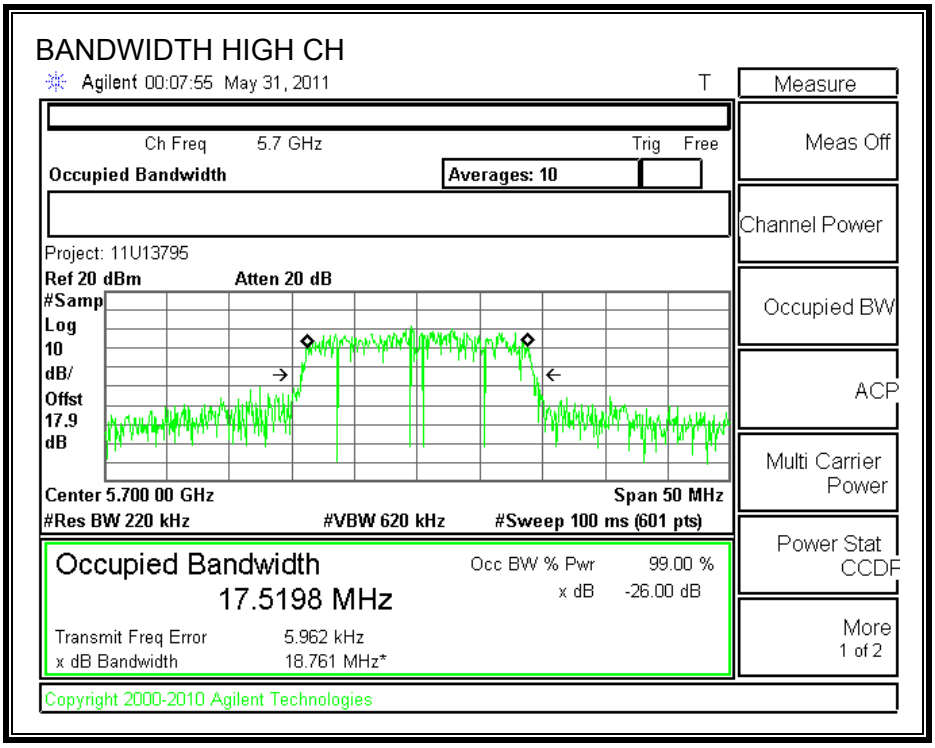
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5500	18.826	17.5485
Middle	5600	19.218	17.532
High	5700	18.75	17.4876

CHAIN 1

26 dB and 99% BANDWIDTH

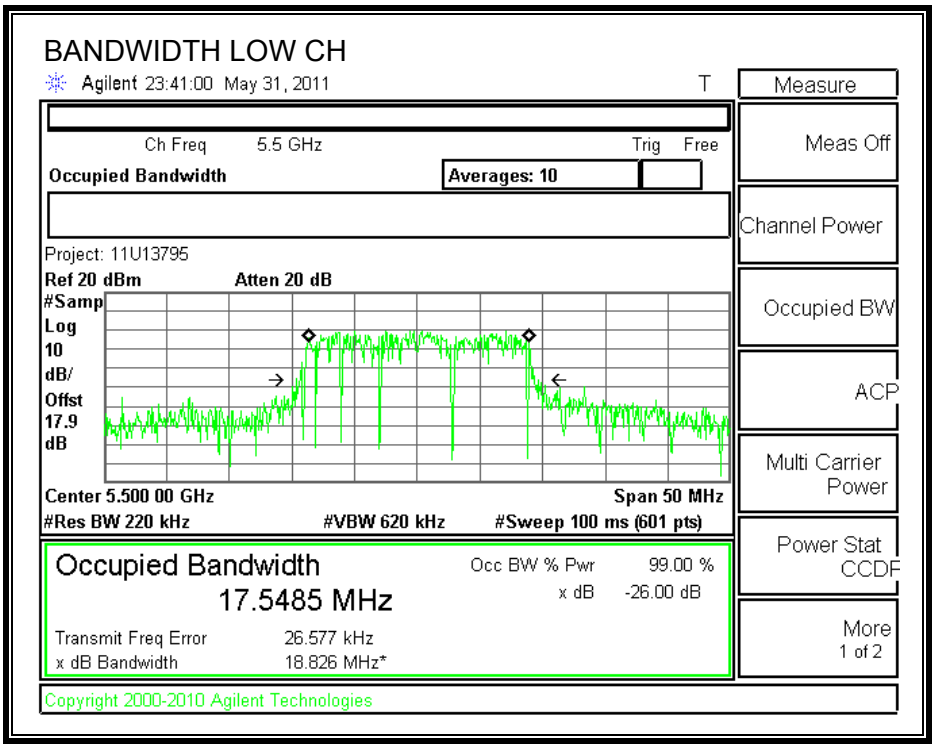


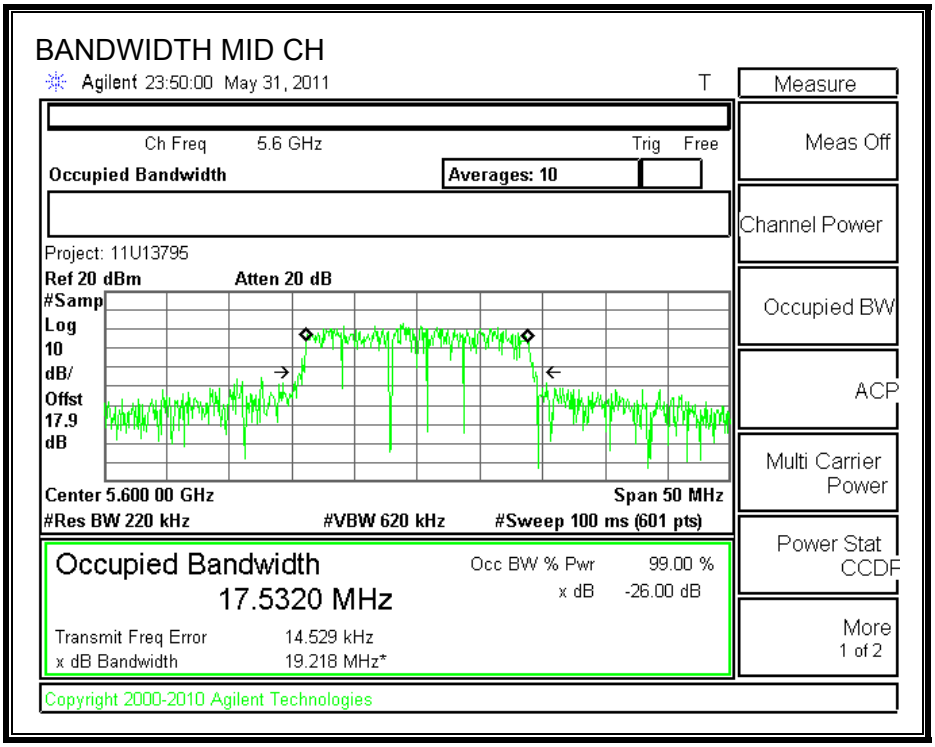


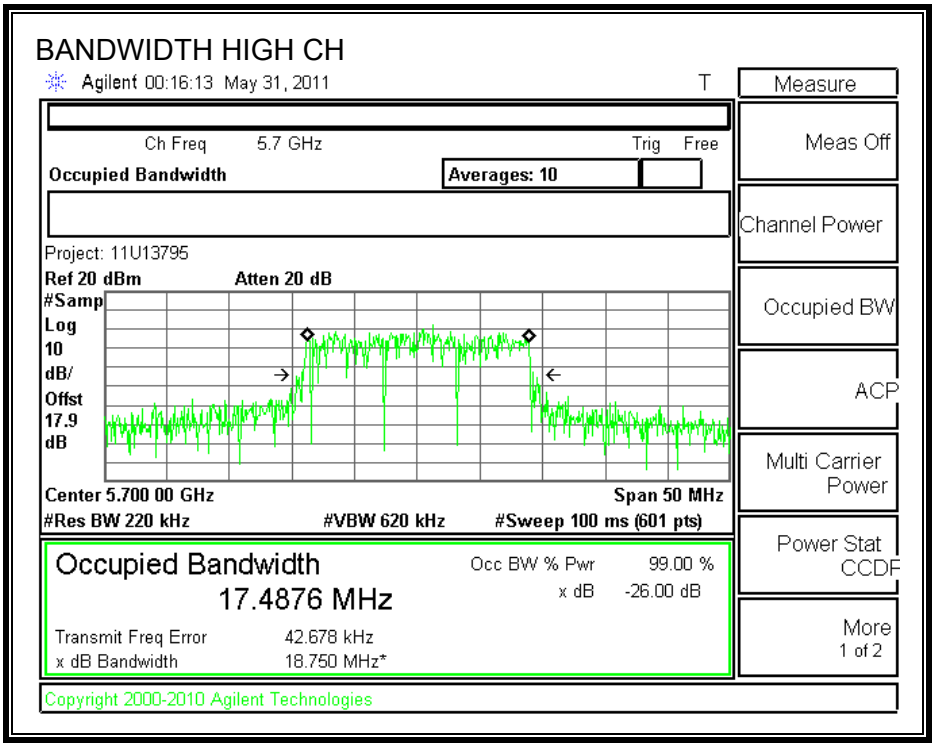


CHAIN 2

26 dB and 99% BANDWIDTH







7.8.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 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

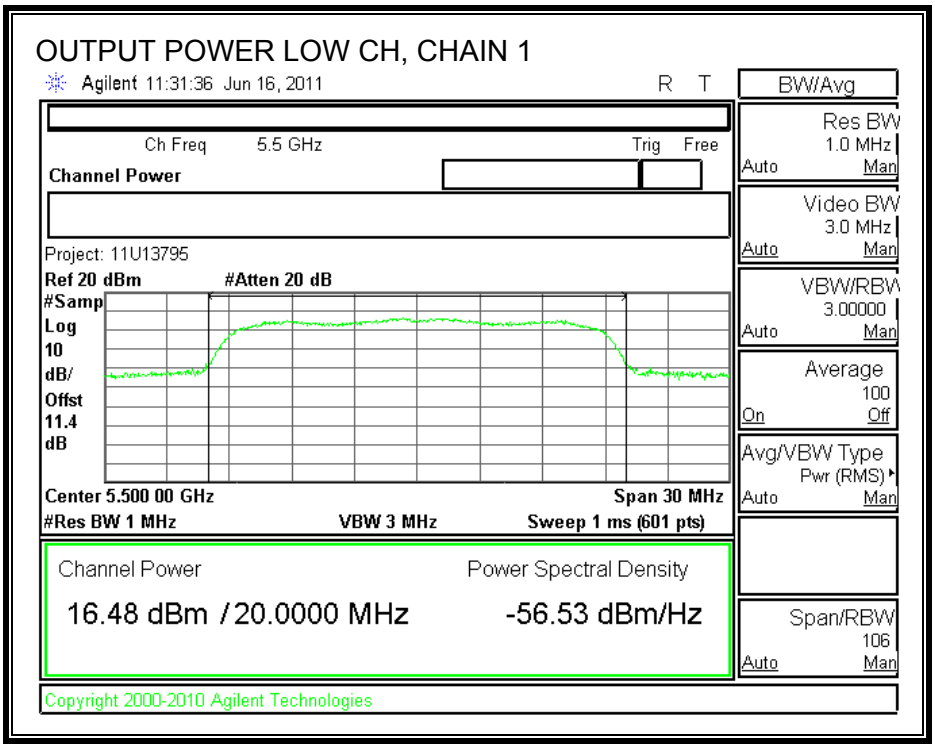
Limit

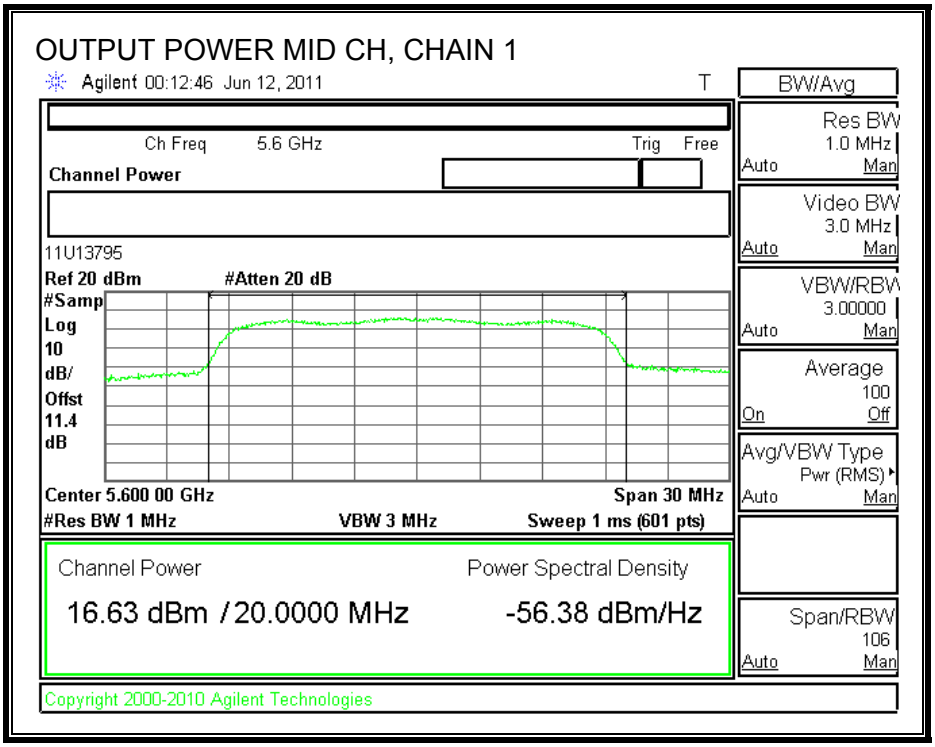
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5500	24	18.889	23.76	7.21	22.55
Mid	5800	24	19.725	23.95	7.21	22.74
High	5700	24	18.761	23.73	7.21	22.52

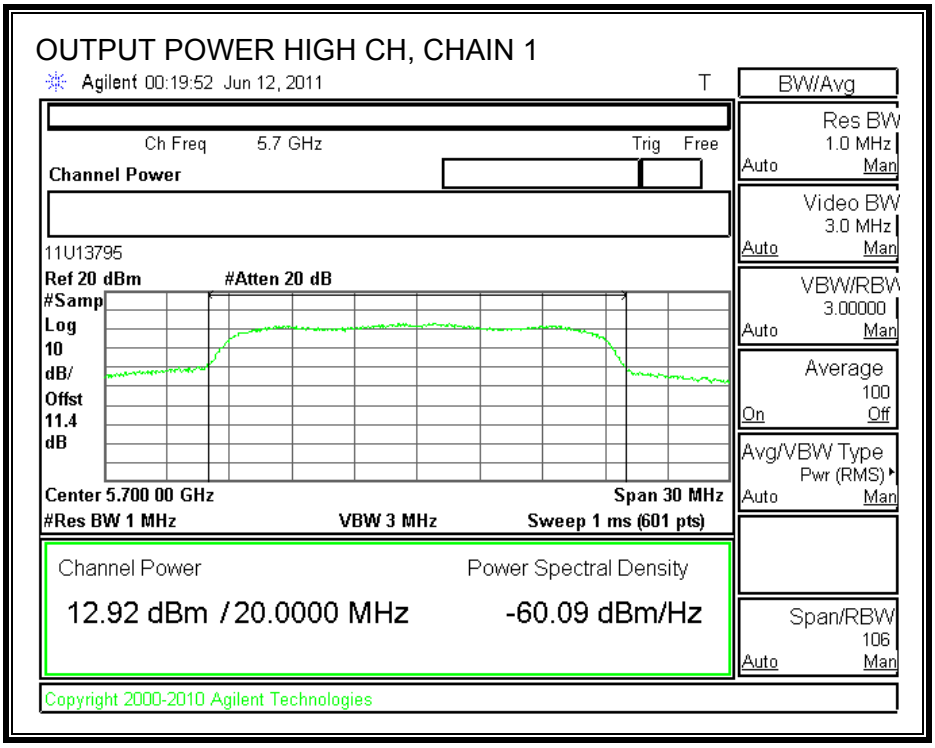
Individual Chain Results

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	16.48	16.11	19.31	22.55	-3.24
Mid	5800	16.63	16.81	19.73	22.74	-3.01
High	5700	12.92	13.55	16.26	22.52	-6.27

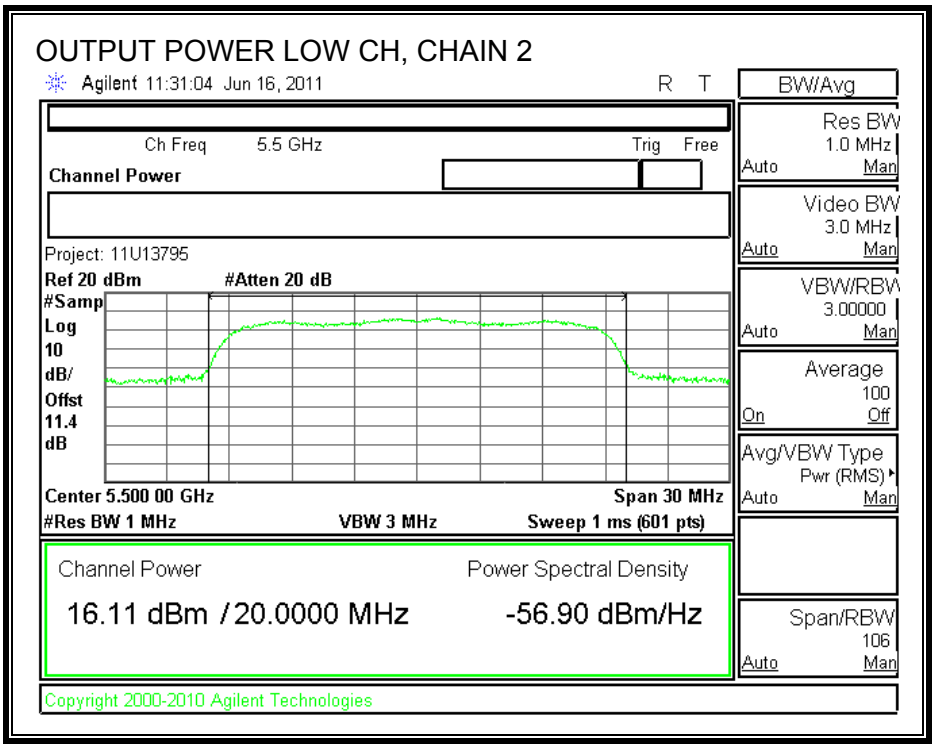
CHAIN 1 OUTPUT POWER

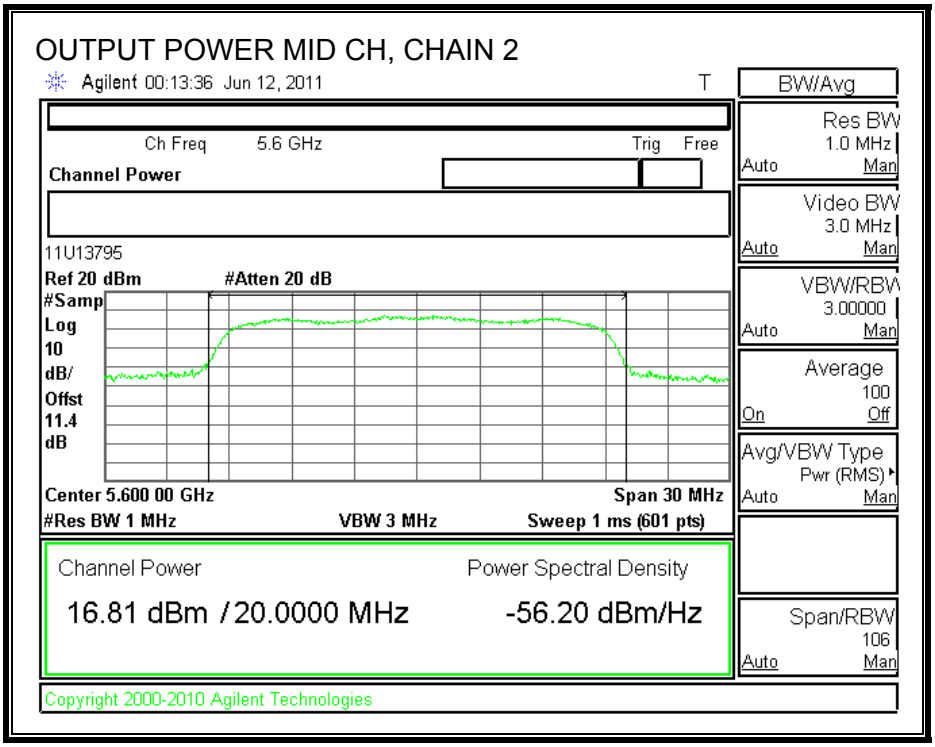


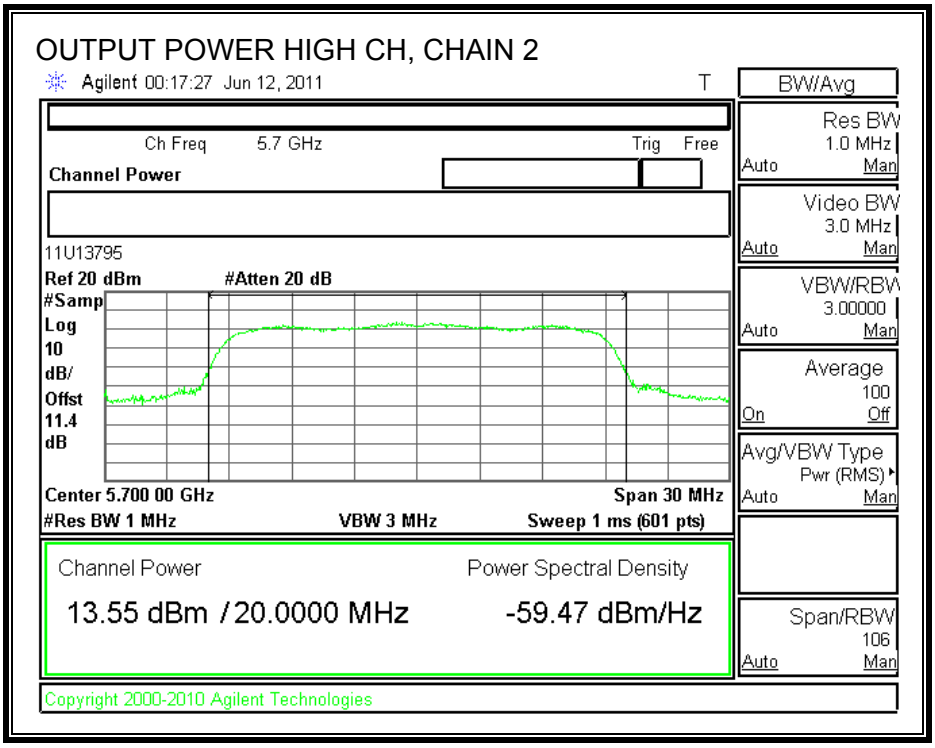




CHAIN 2 OUTPUT POWER







7.8.3. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the peak power spectral density shall not exceed 11 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 7.21 dBi, therefore the limit is 9.79 dBm.

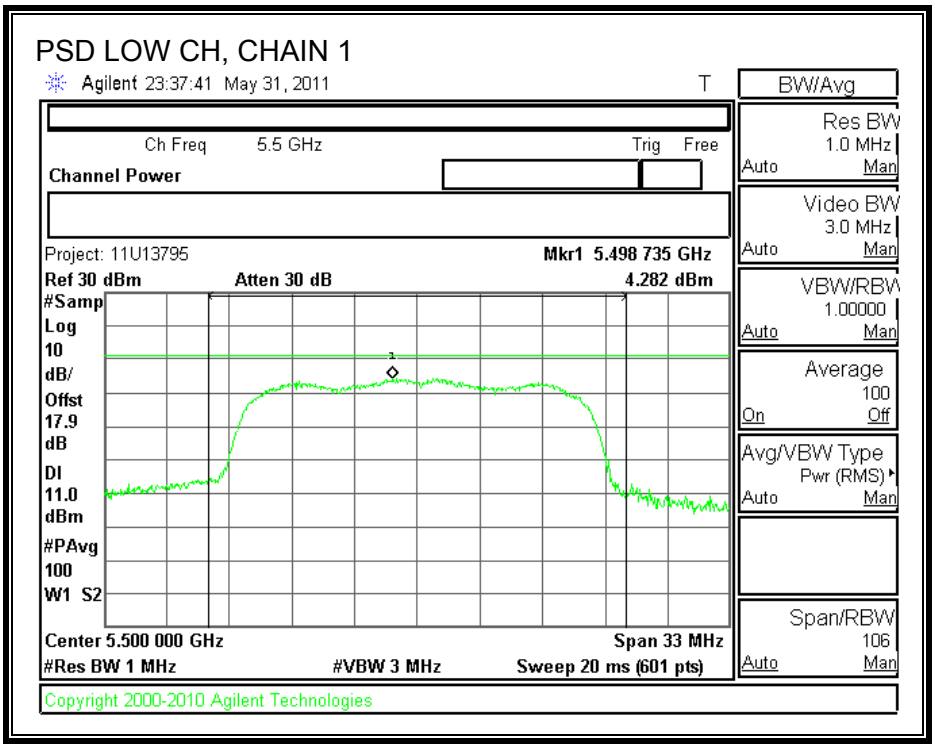
TEST PROCEDURE

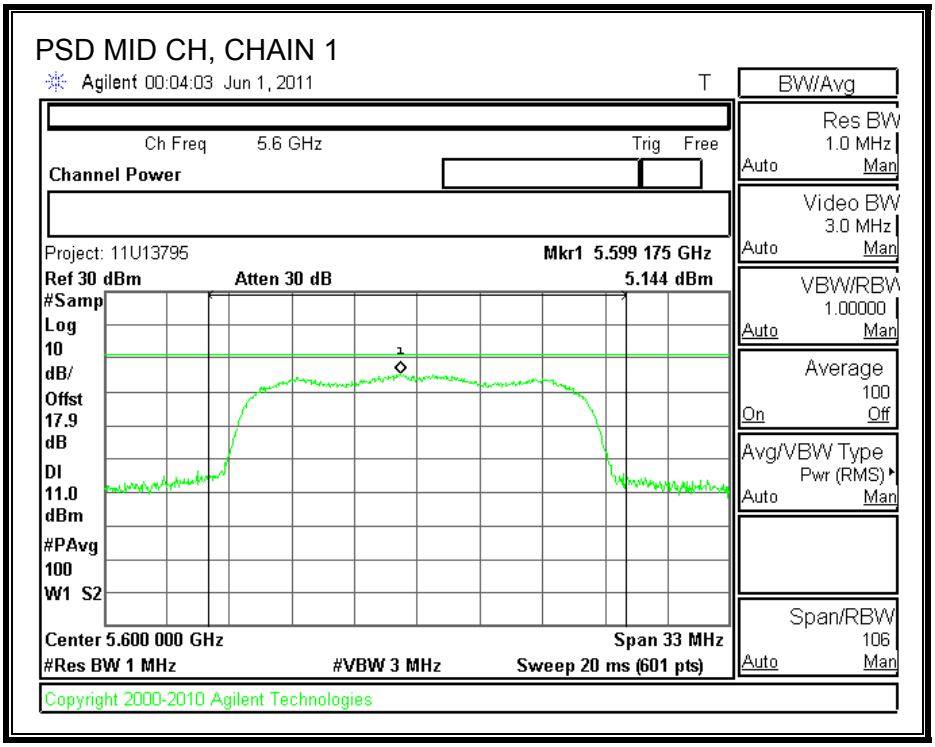
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

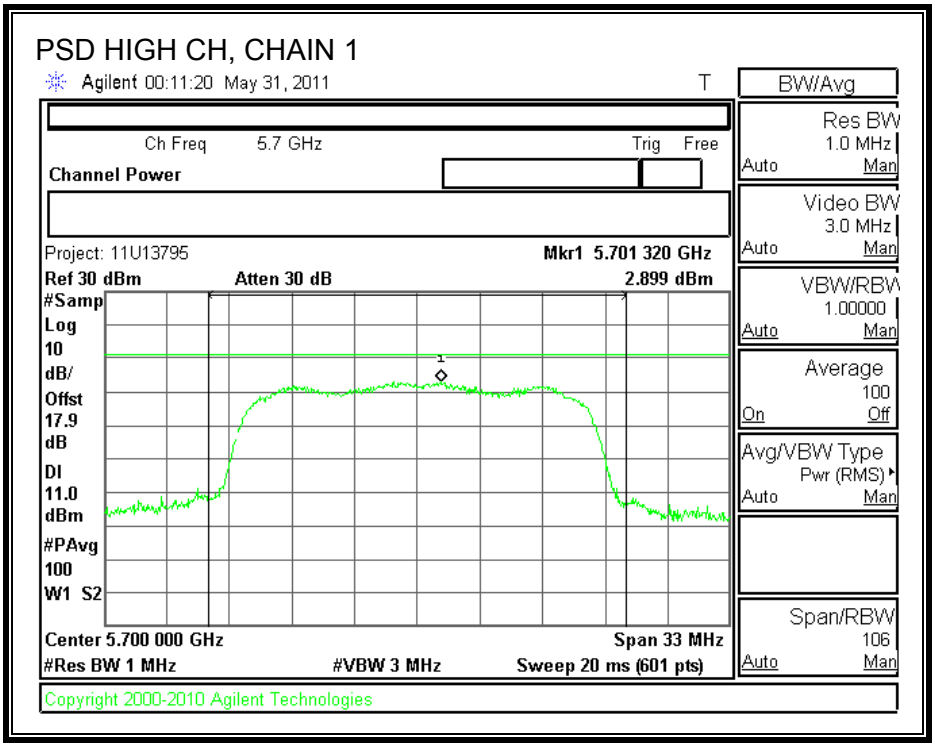
RESULTS

Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5500	4.282	3.376	6.86	9.79	-2.93
Middle	5580	5.144	5.316	8.24	9.79	-1.55
High	5700	2.899	3.292	6.11	9.79	-3.68

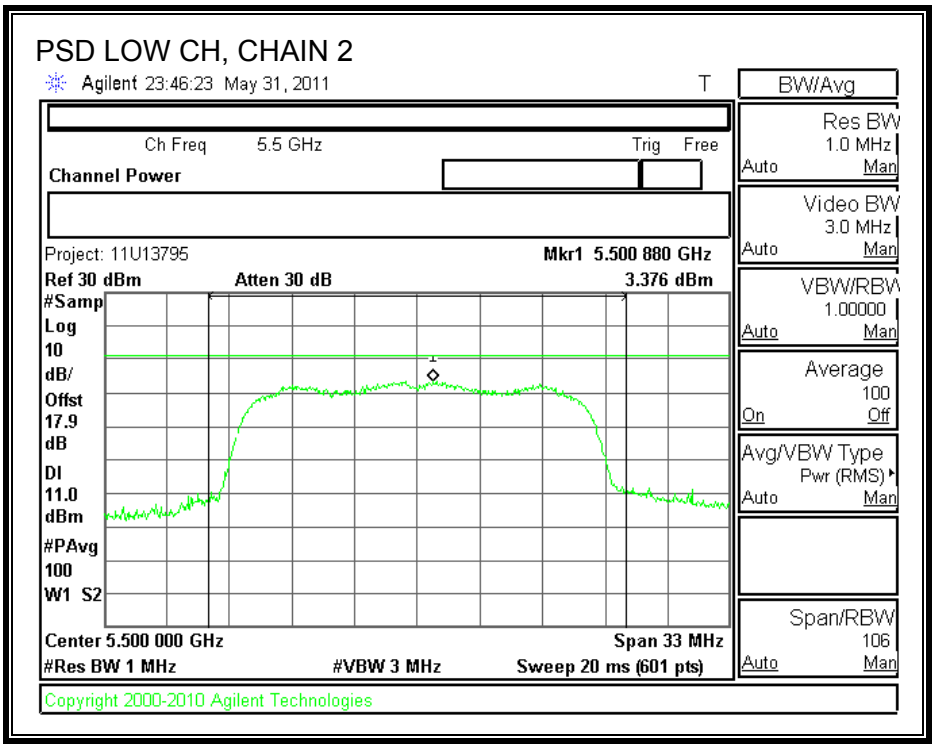
CHAIN 1 POWER SPECTRAL DENSITY

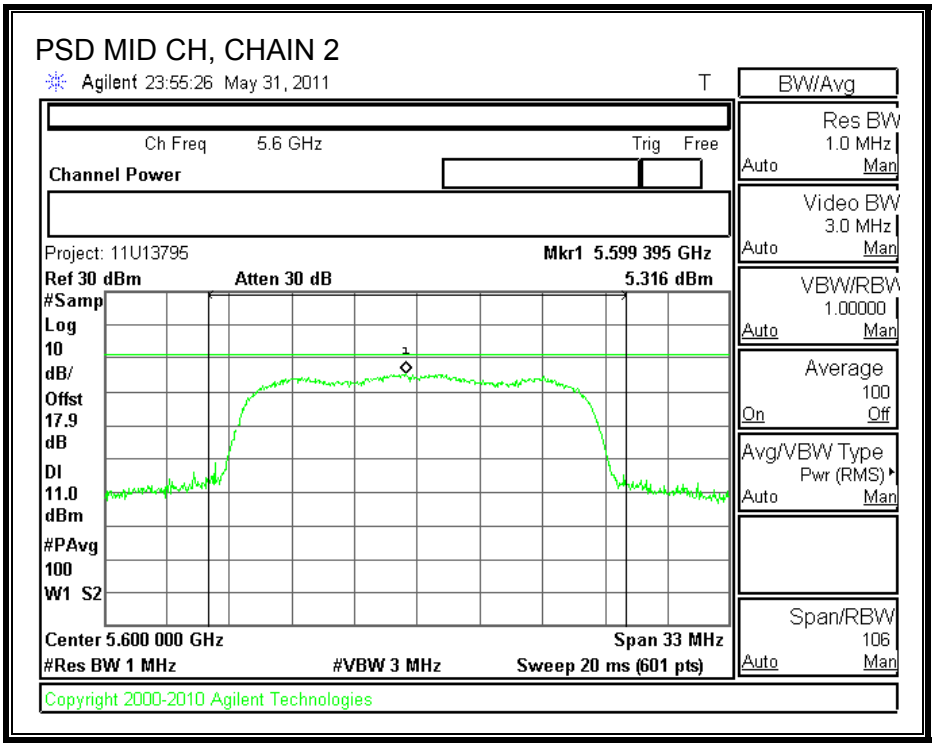


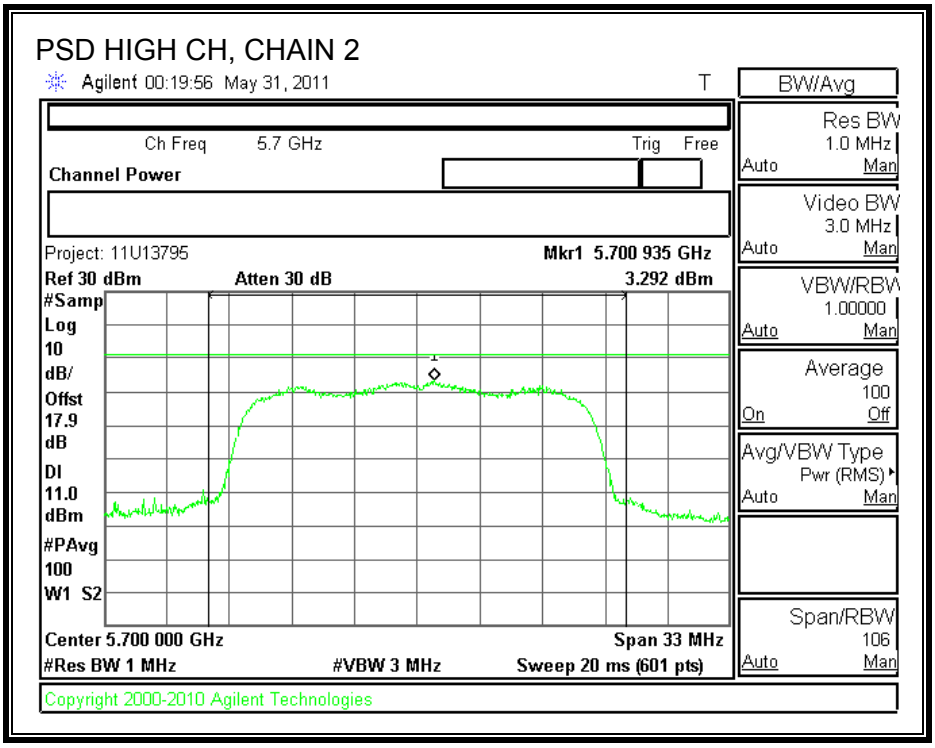




CHAIN 2 POWER SPECTRAL DENSITY







7.8.4. 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

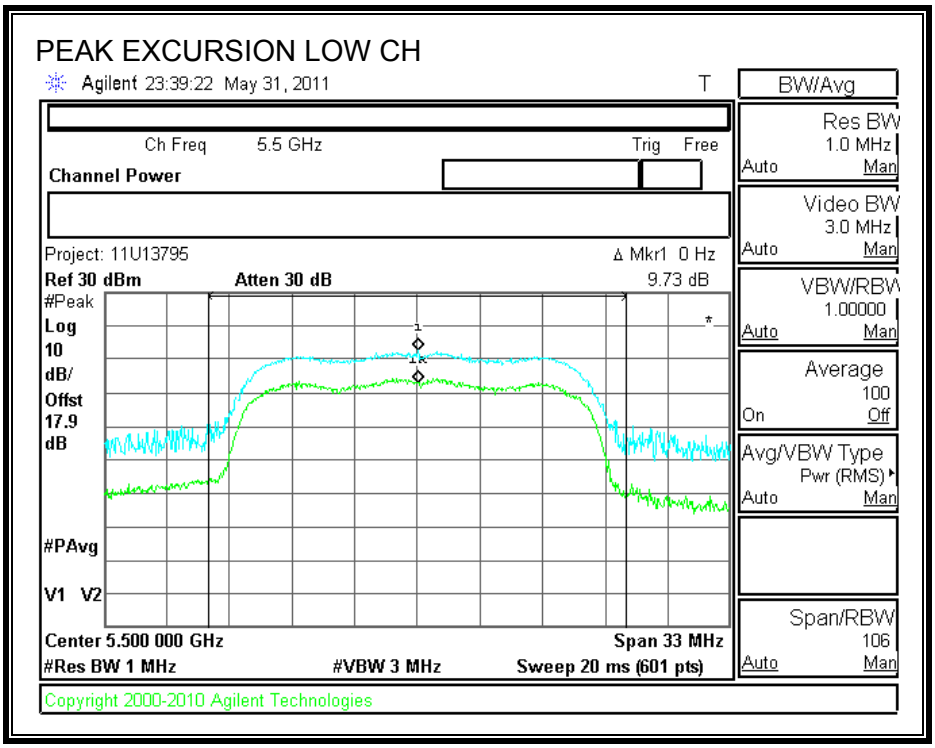
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	9.73	13	-3.27
Middle	5600	9.51	13	-3.49
High	5700	9.43	13	-3.57

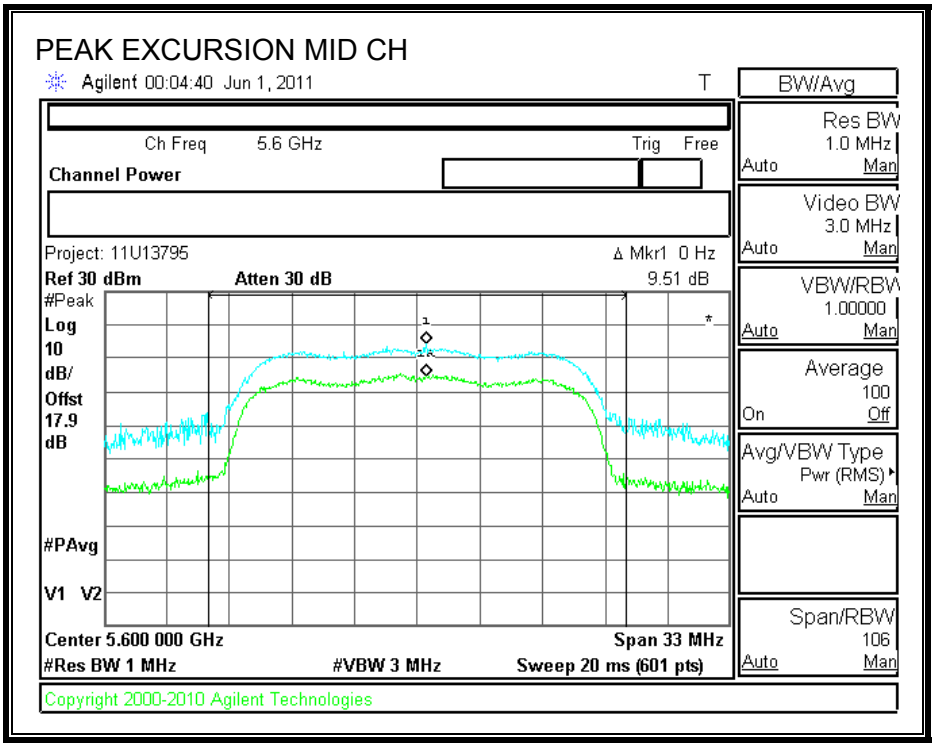
CHAIN 2

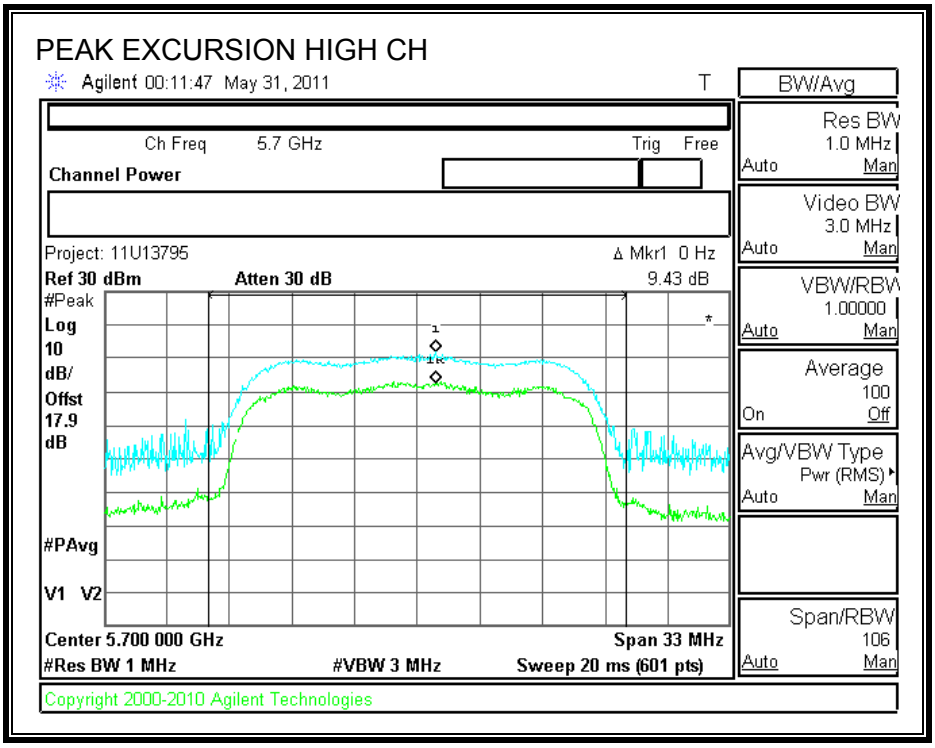
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	8.38	13	-4.62
Middle	5600	9.93	13	-3.07
High	5700	8.78	13	-4.22

CHAIN 1

PEAK EXCURSION

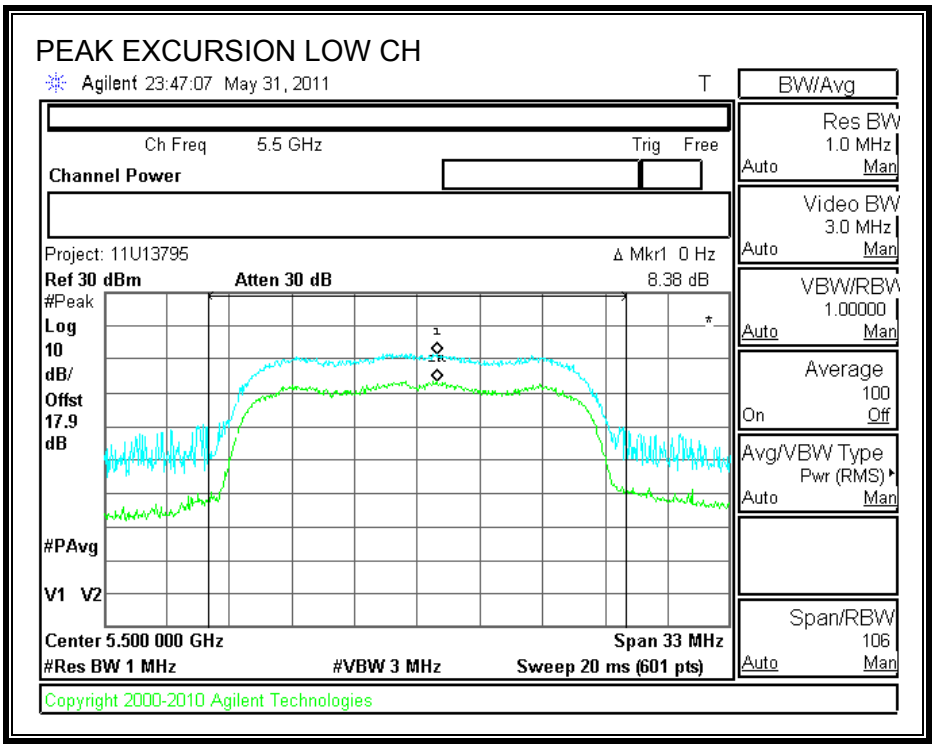




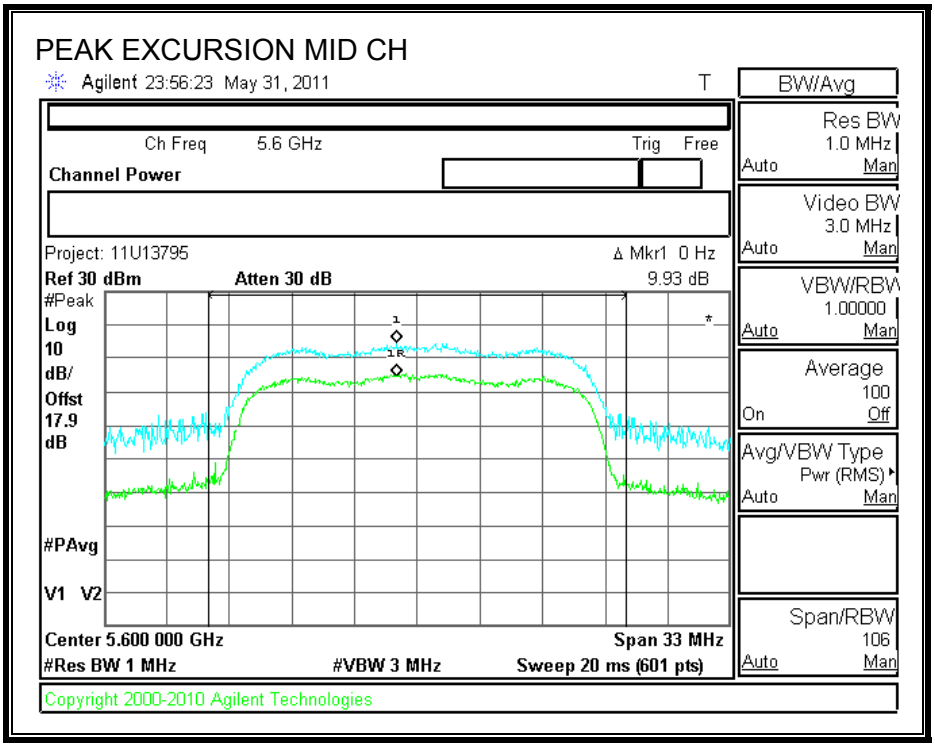


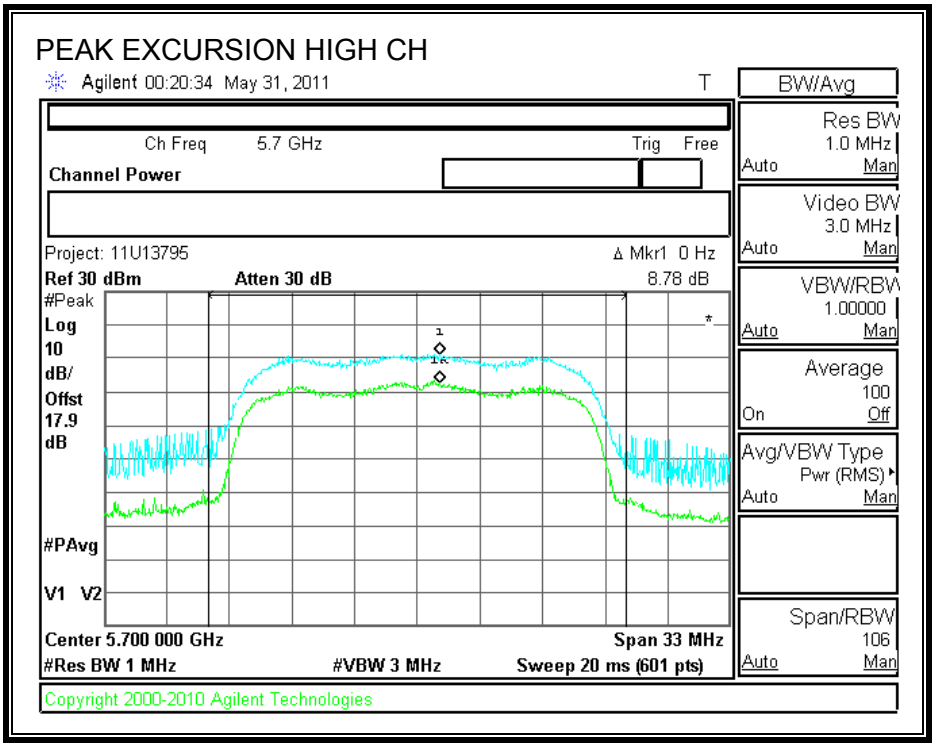
CHAIN 2

PEAK EXCURSION



PEAK EXCURSION MID CH





7.8.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

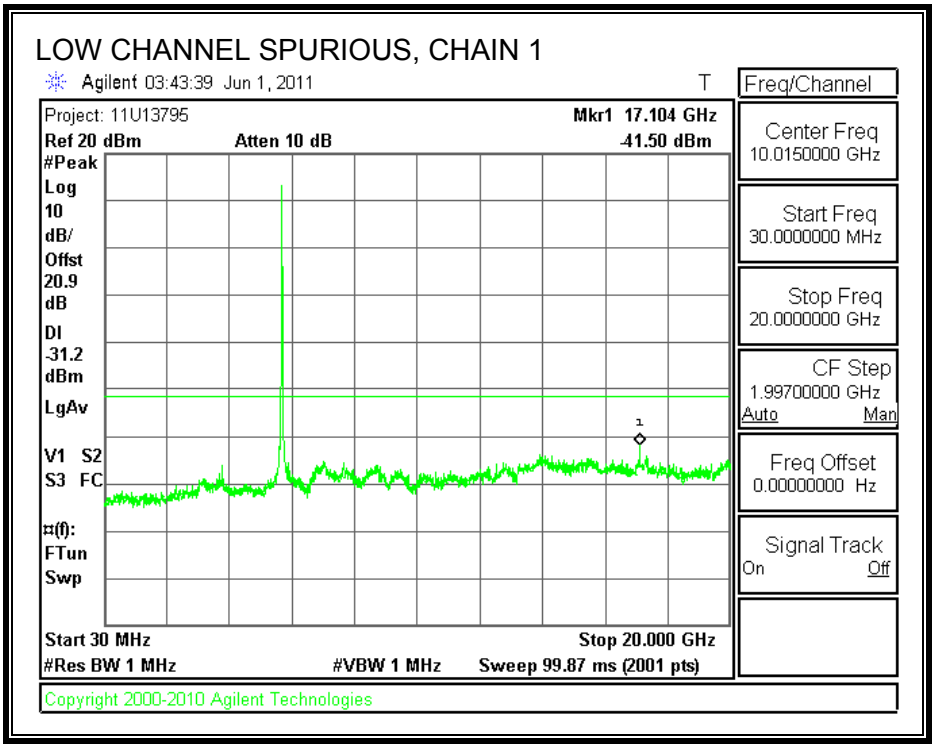
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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

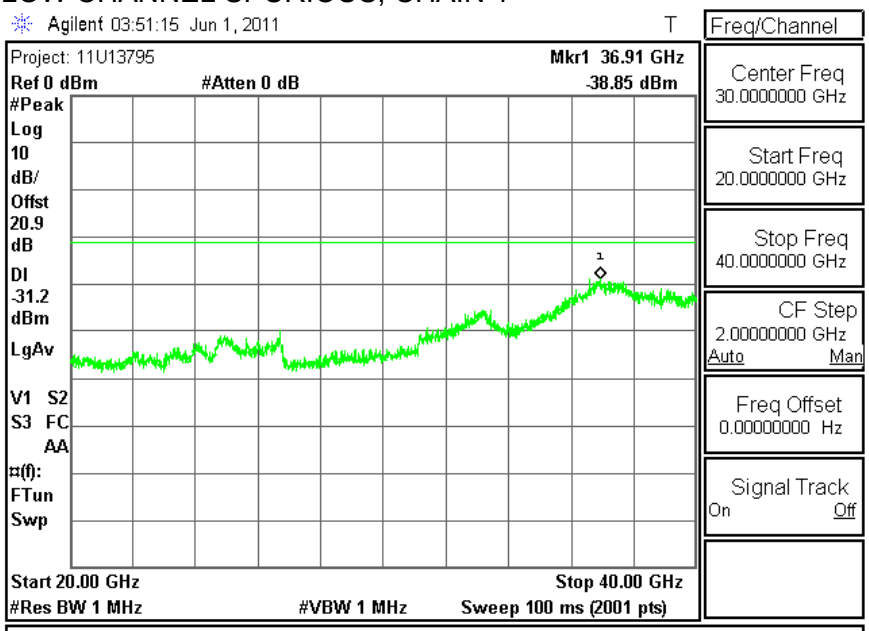
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

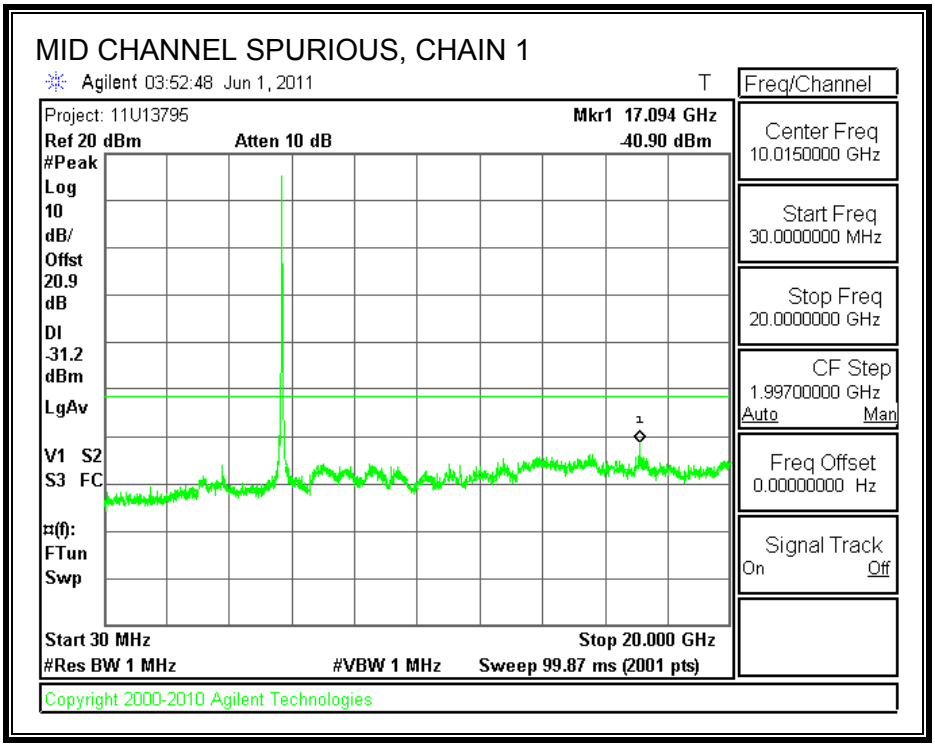
CHAIN 1 SPURIOUS EMISSIONS



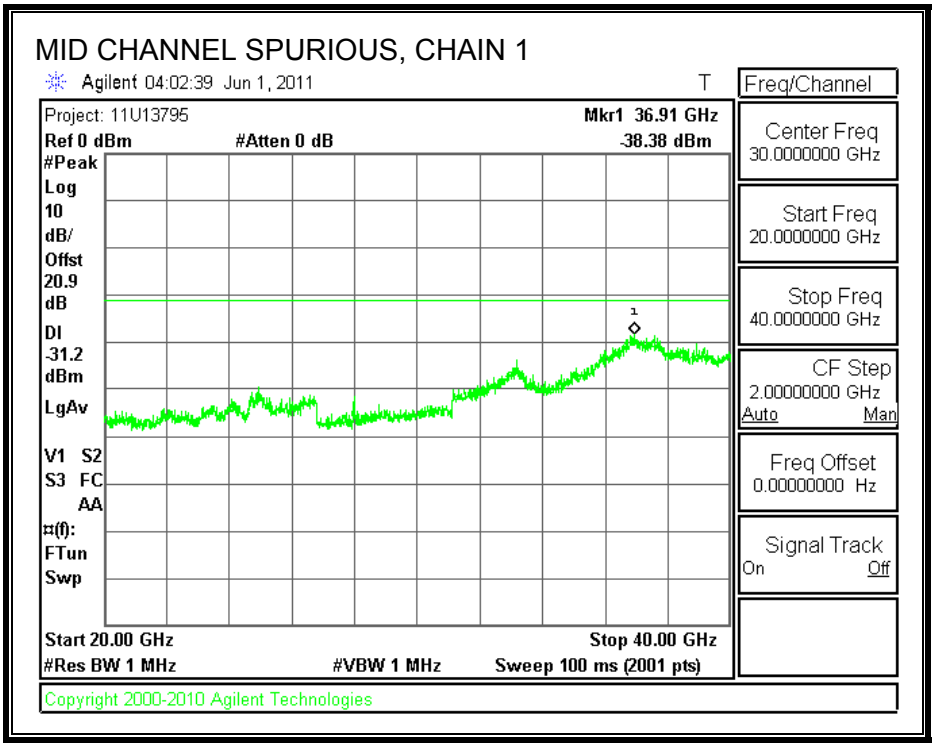
LOW CHANNEL SPURIOUS, CHAIN 1



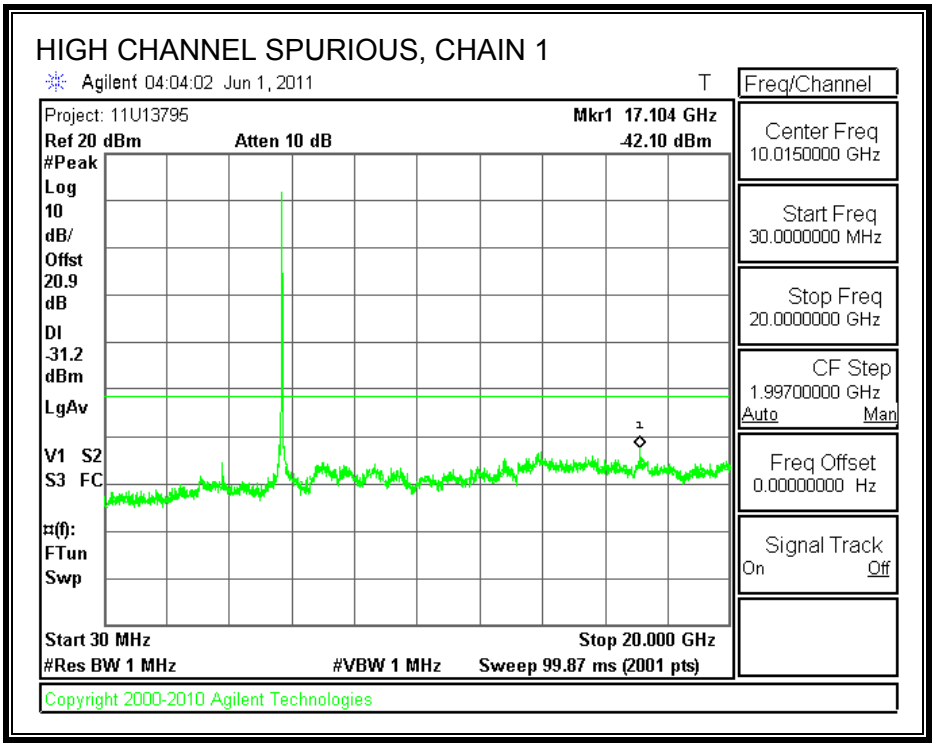
MID CHANNEL SPURIOUS, CHAIN 1



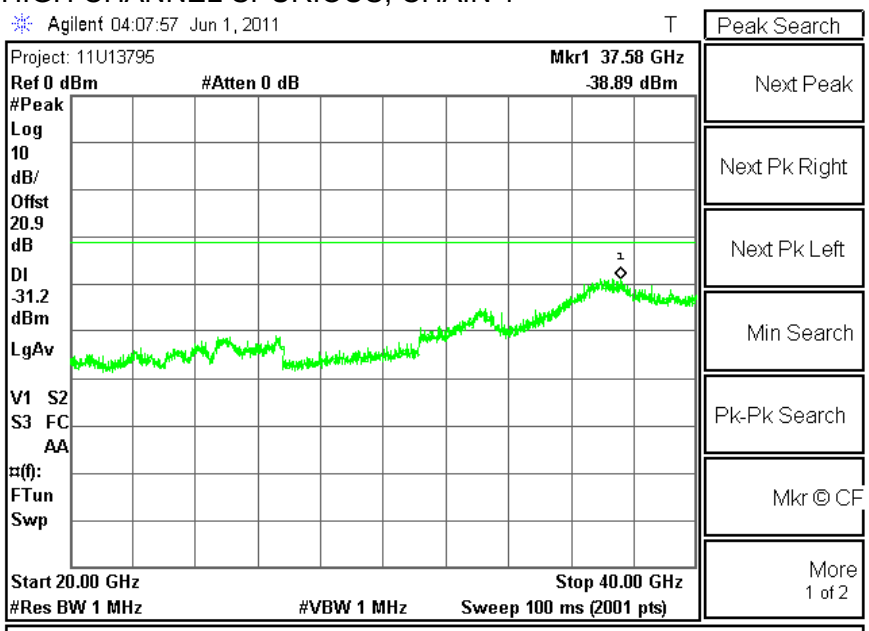
MID CHANNEL SPURIOUS, CHAIN 1



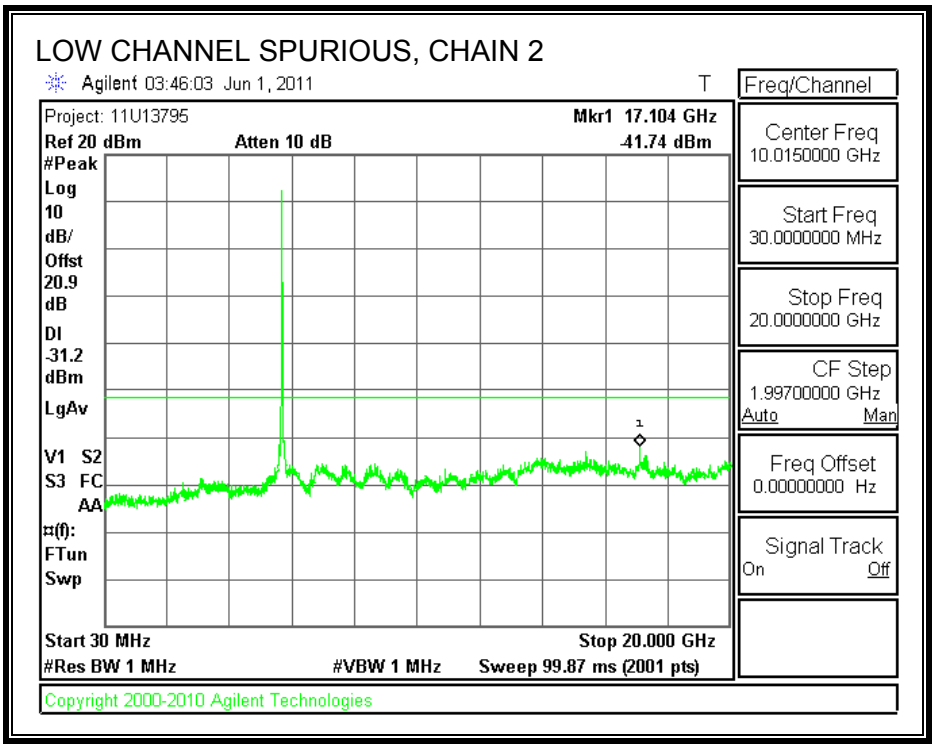
HIGH CHANNEL SPURIOUS, CHAIN 1



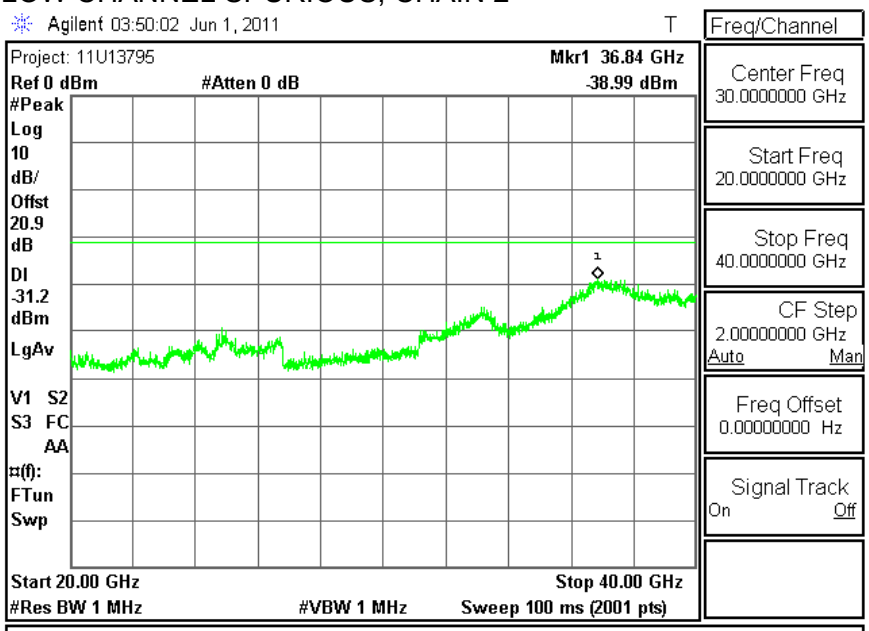
HIGH CHANNEL SPURIOUS, CHAIN 1



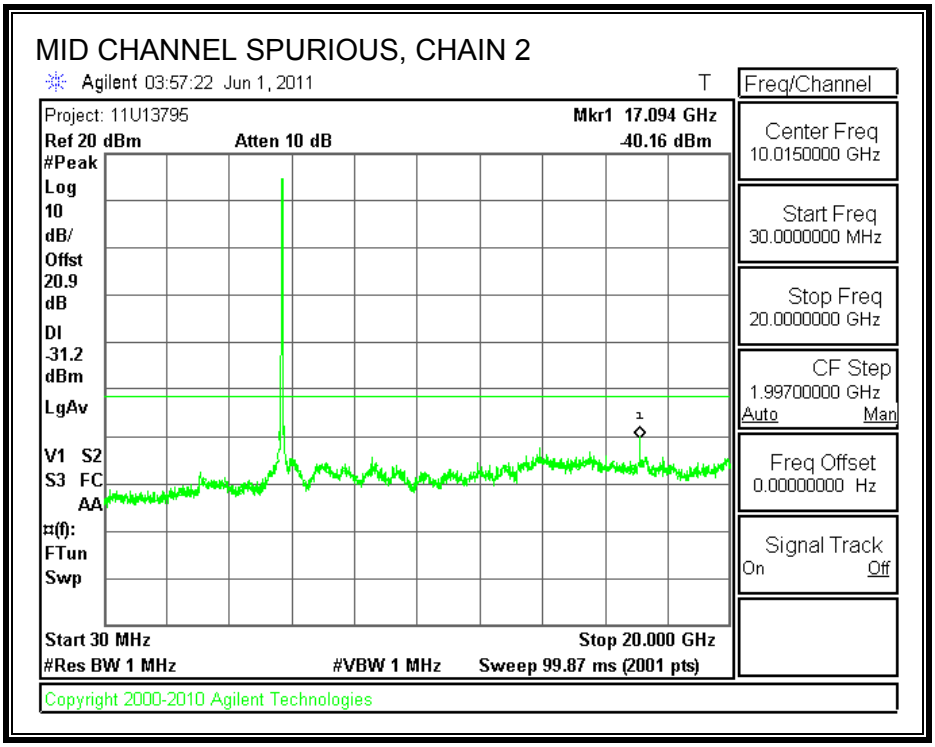
CHAIN 2 SPURIOUS EMISSIONS



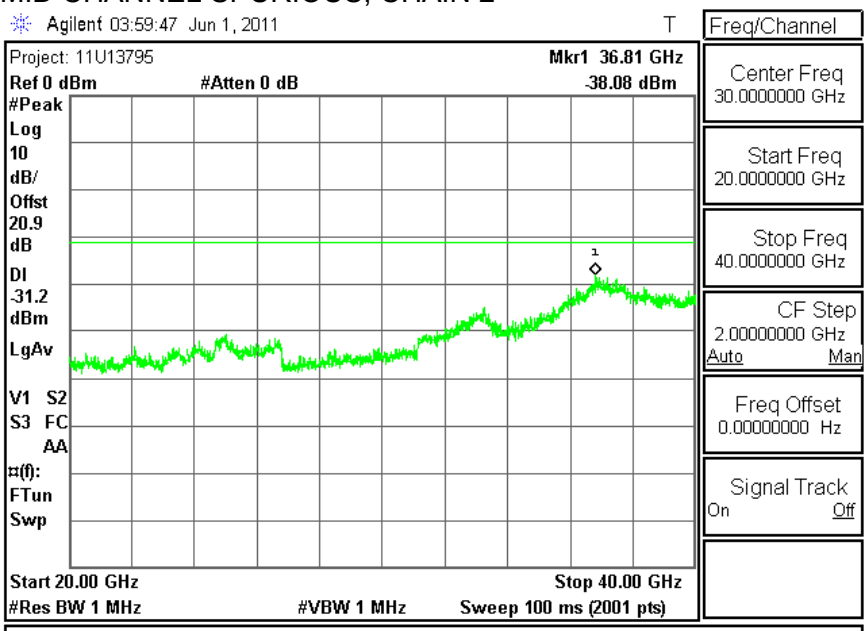
LOW CHANNEL SPURIOUS, CHAIN 2



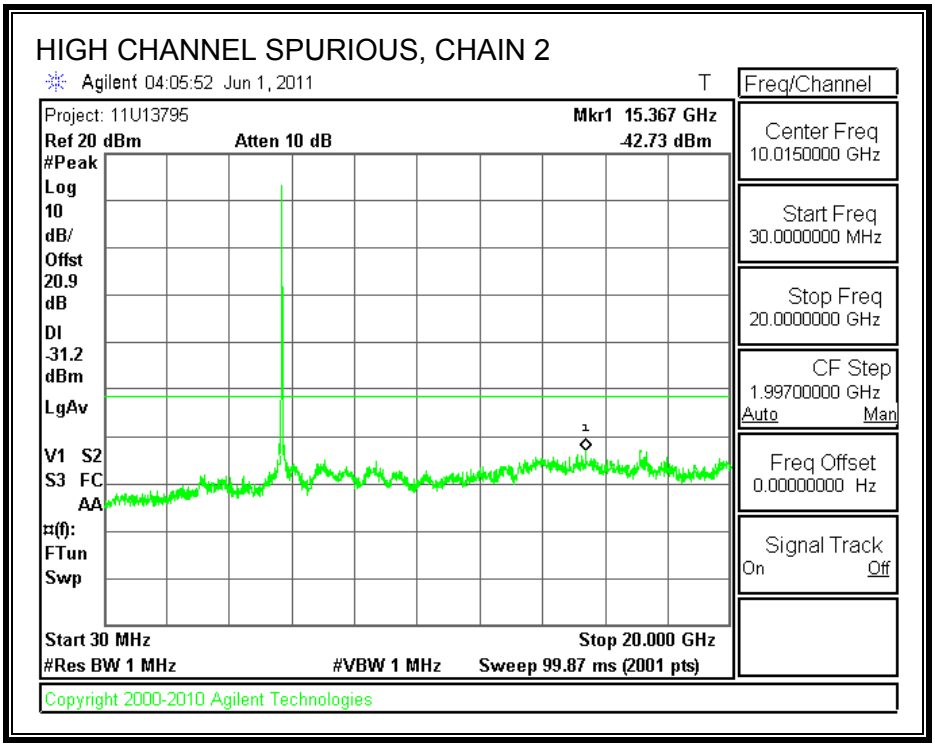
MID CHANNEL SPURIOUS, CHAIN 2



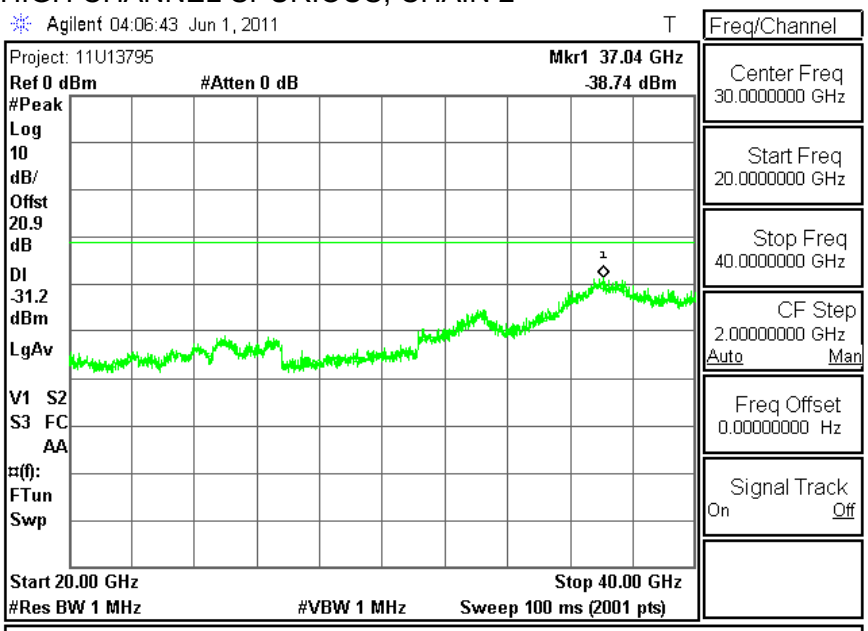
MID CHANNEL SPURIOUS, CHAIN 2



HIGH CHANNEL SPURIOUS, CHAIN 2



HIGH CHANNEL SPURIOUS, CHAIN 2



7.9. 802.11n HT40 MODE IN THE 5.6 GHz BAND

7.9.1. 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

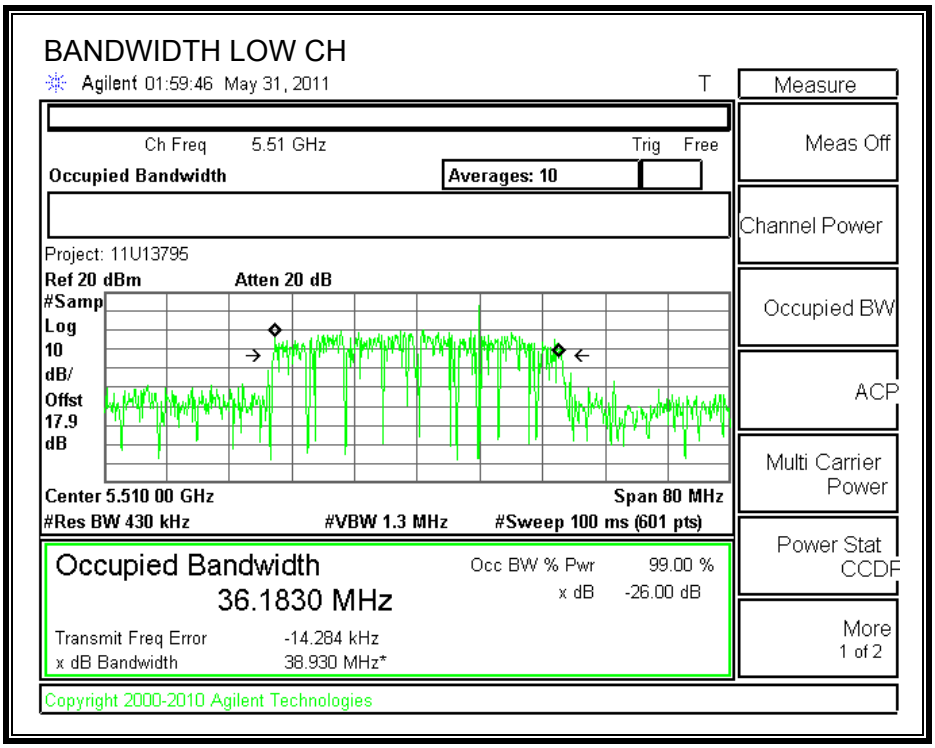
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5510	38.93	36.183
Middle	5590	77.581	38.252
High	5670	76.832	37.3304

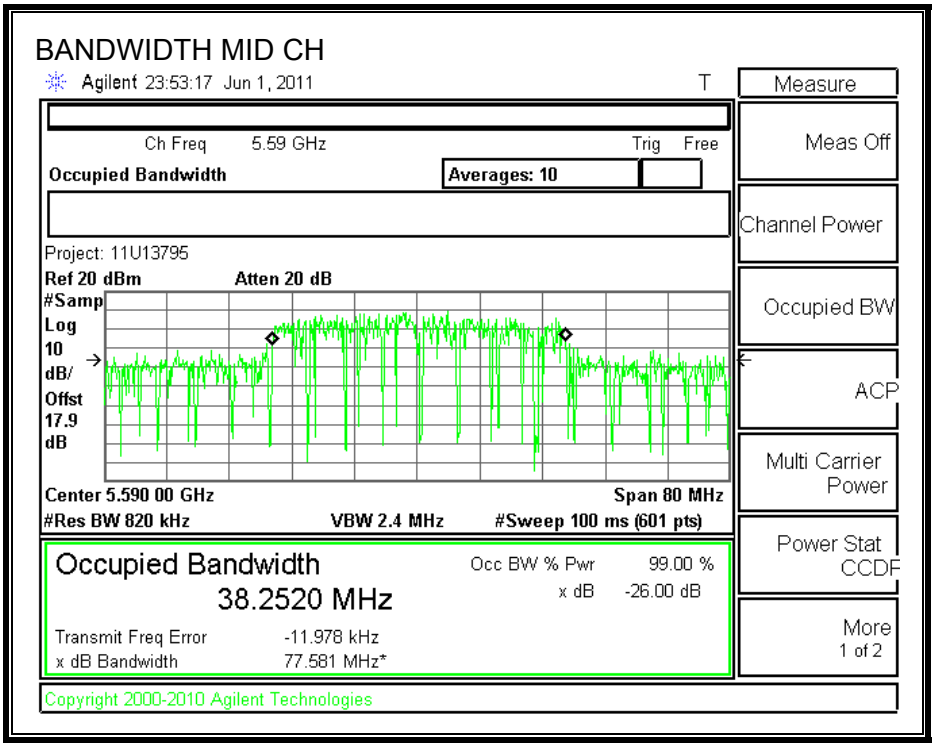
CHAIN 2

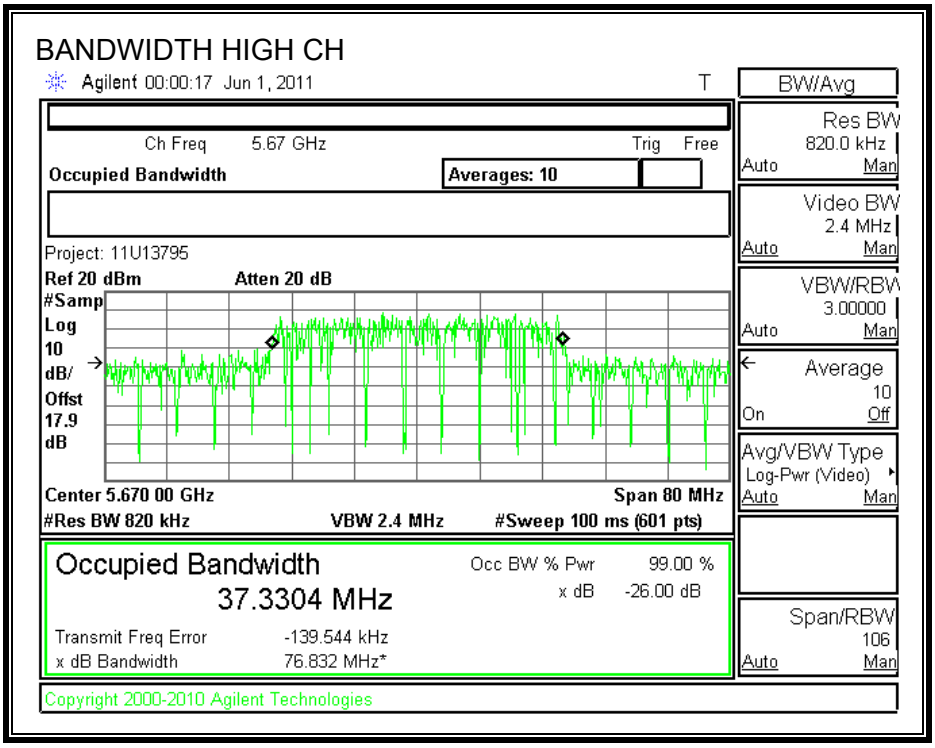
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5510	39.891	36.0956
Middle	5590	68.595	37.0774
High	5670	69.617	36.605

CHAIN 1

26 dB and 99% BANDWIDTH

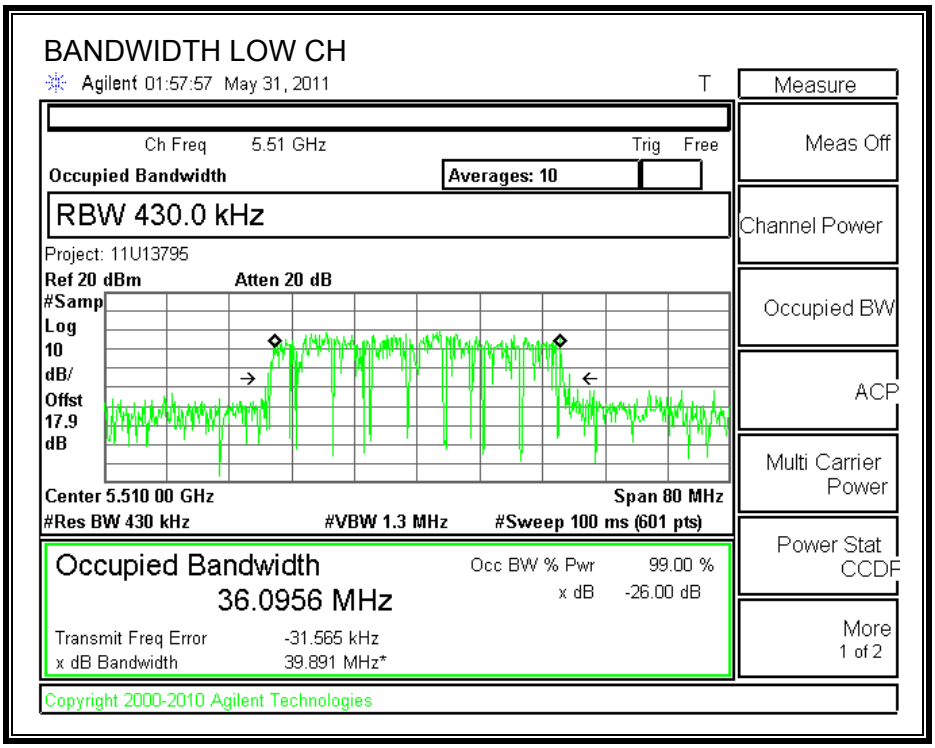


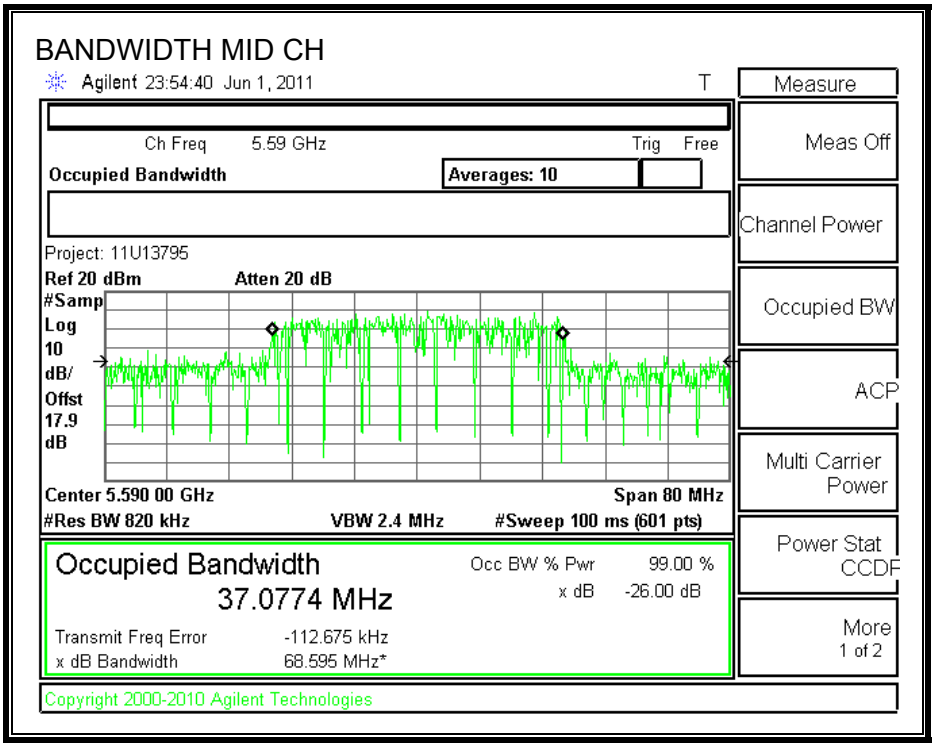


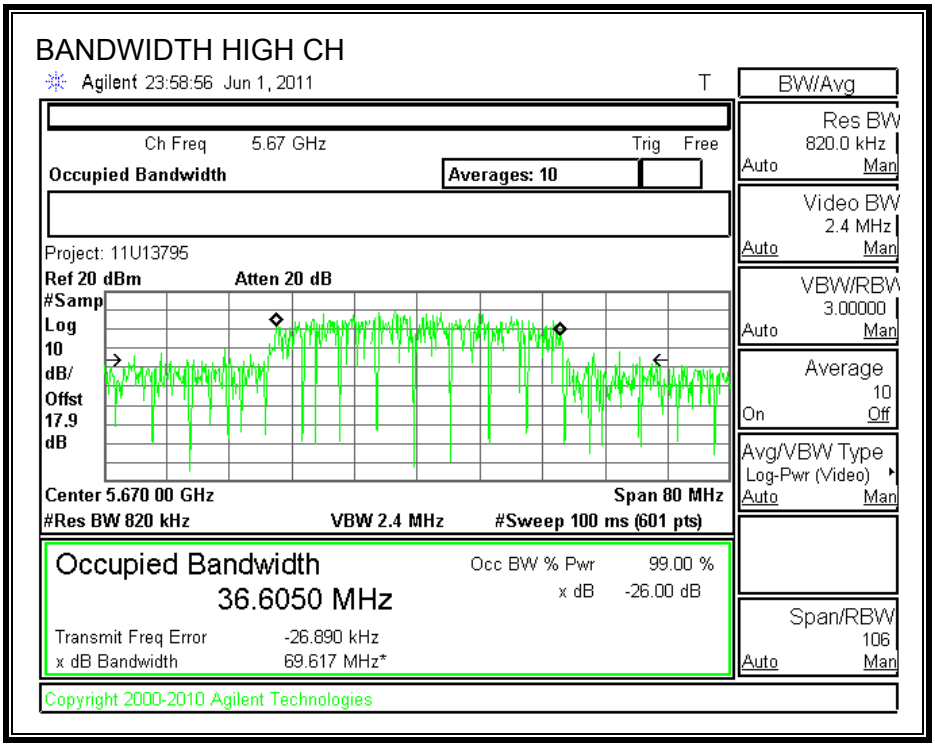


CHAIN 2

26 dB and 99% BANDWIDTH







7.9.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 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

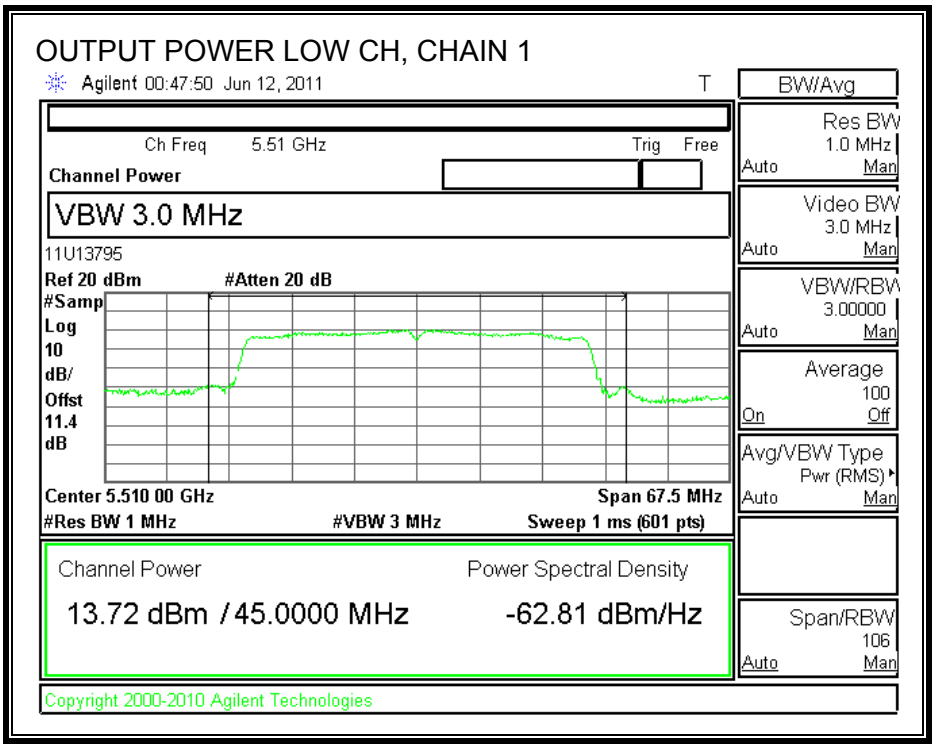
Limit

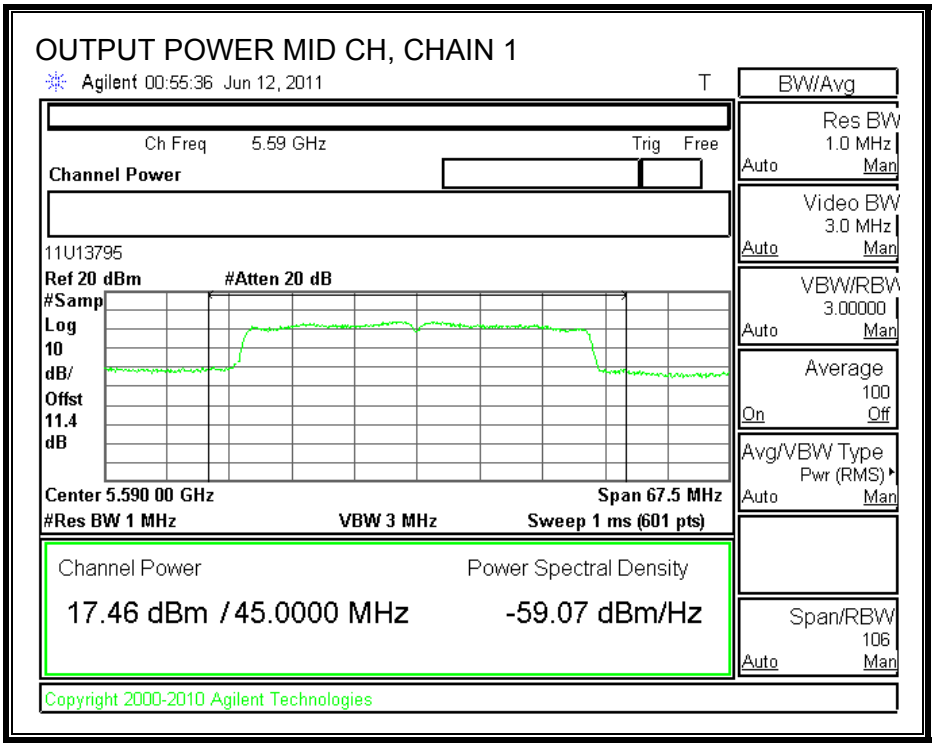
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5510	24	39.891	27.01	7.21	22.79
Mid	5590	24	67.317	29.28	7.21	22.79
High	5670	24	71.311	29.53	7.21	22.79

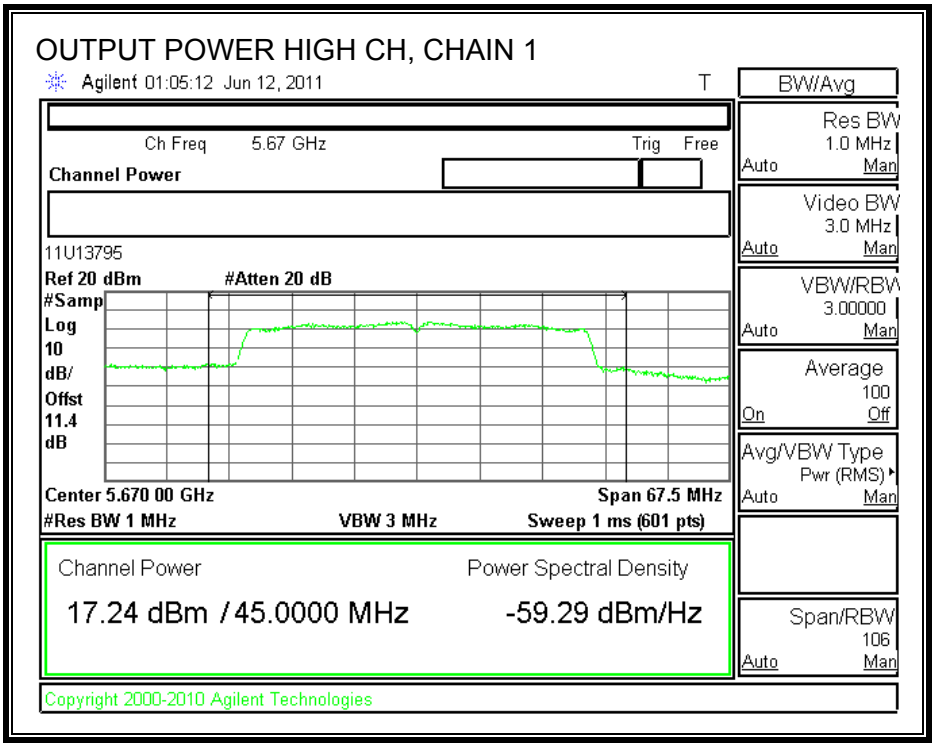
Individual Chain Results

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5510	13.72	12.75	16.27	22.79	-6.52
Mid	5590	17.46	17.61	20.55	22.79	-2.24
High	5670	17.24	18.01	20.65	22.79	-2.14

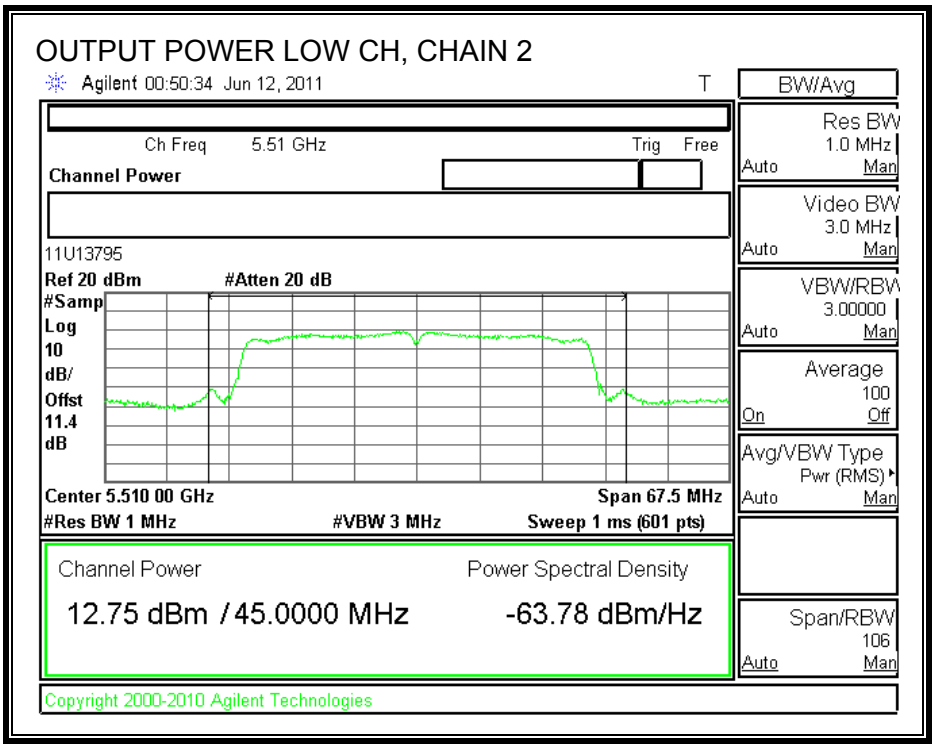
CHAIN 1 OUTPUT POWER

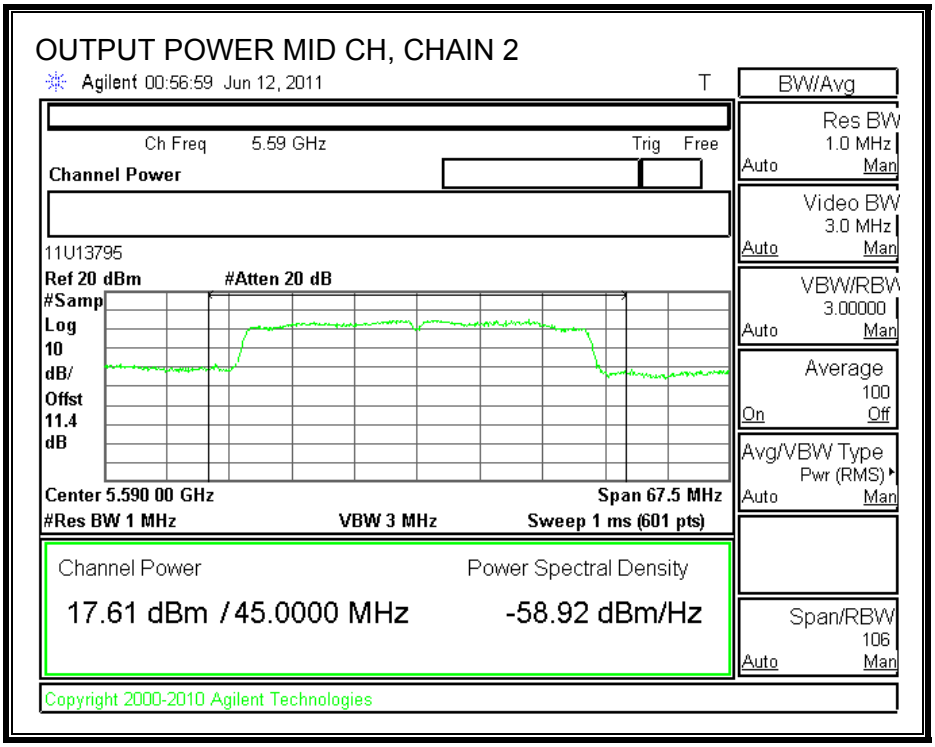


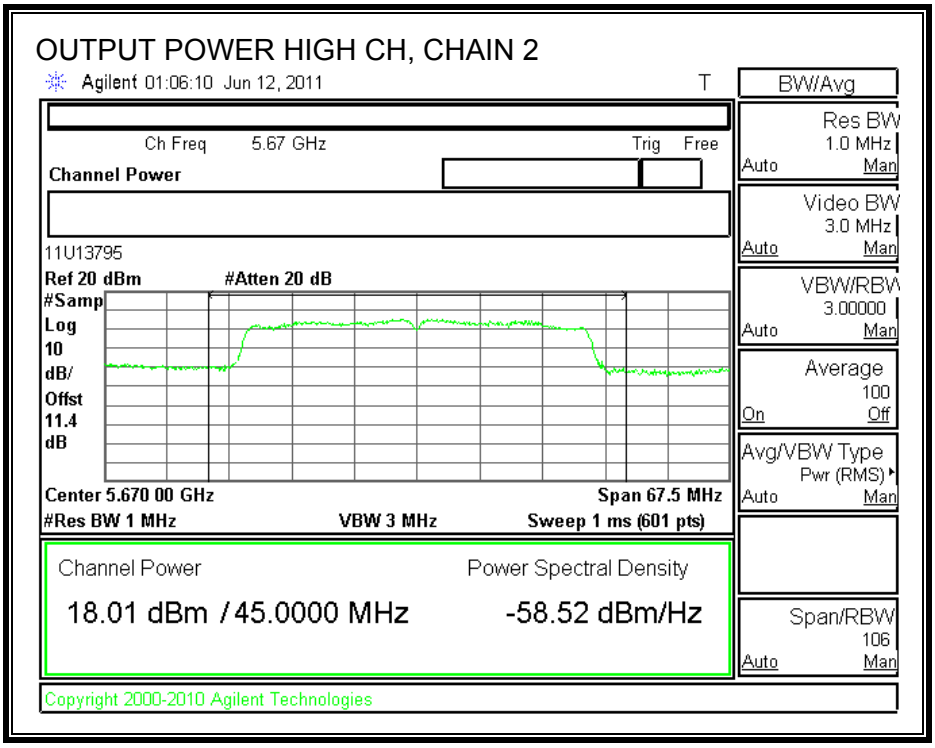




CHAIN 2 OUTPUT POWER







7.9.3. 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 17.9 dB (including 10 dB pad and 7.9 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
High	5670	16.89	17.68	20.31

7.9.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the peak power spectral density shall not exceed 11 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 7.21 dBi, therefore the limit is 9.79 dBm.

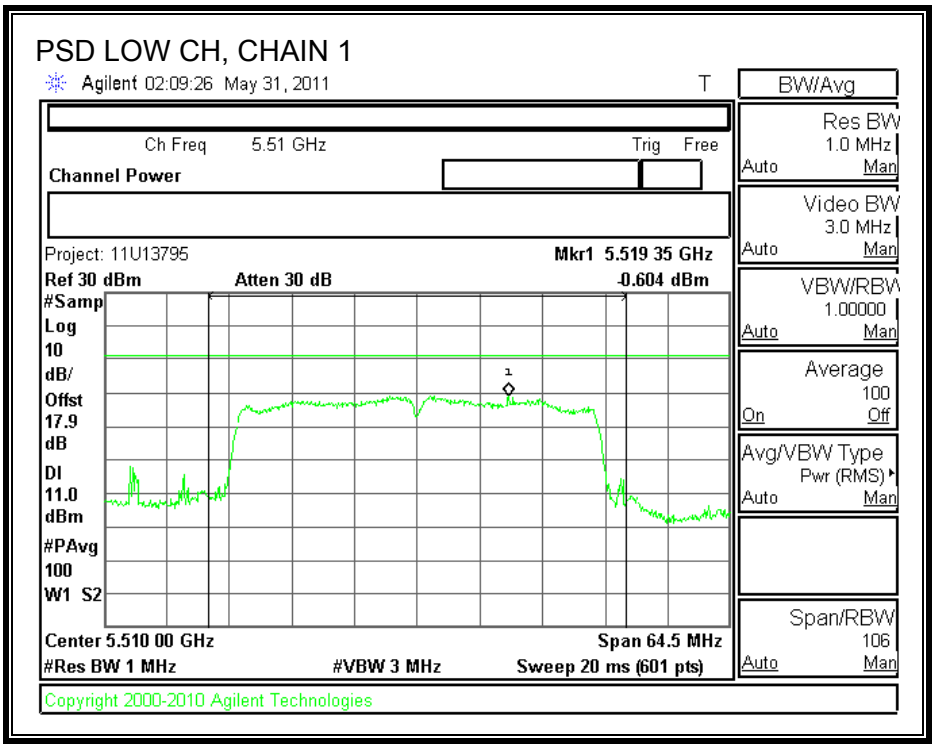
TEST PROCEDURE

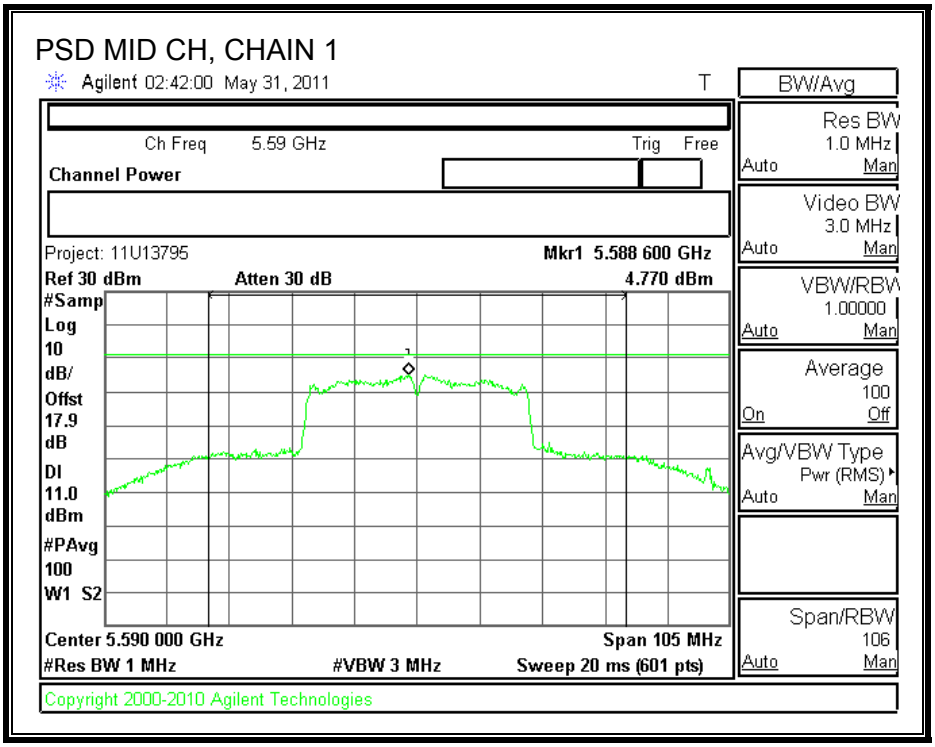
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

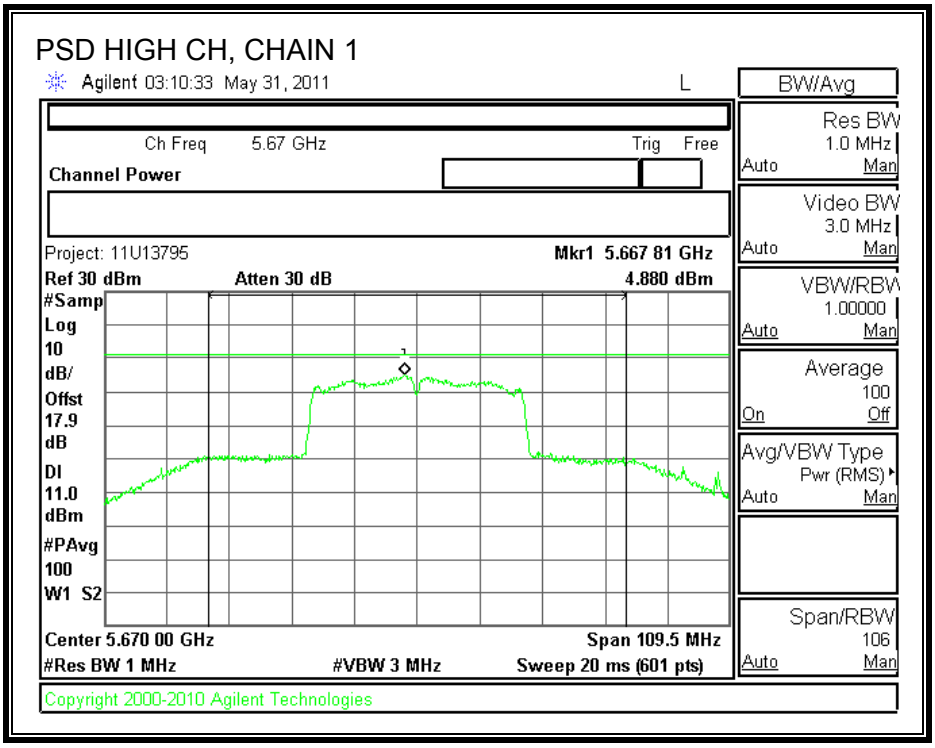
RESULTS

Channel	Frequency (MHz)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5510	-0.604	-1.444	2.01	9.79	-7.78
Middle	5550	4.77	5.283	8.04	9.79	-1.75
High	5670	4.88	4.619	7.76	9.79	-2.03

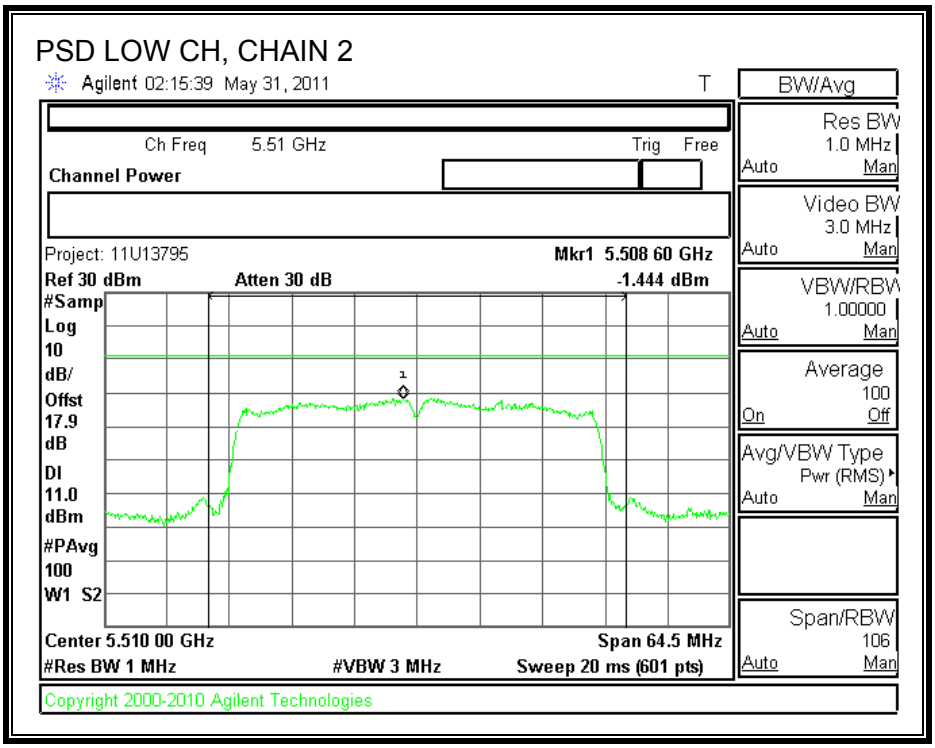
CHAIN 1 POWER SPECTRAL DENSITY

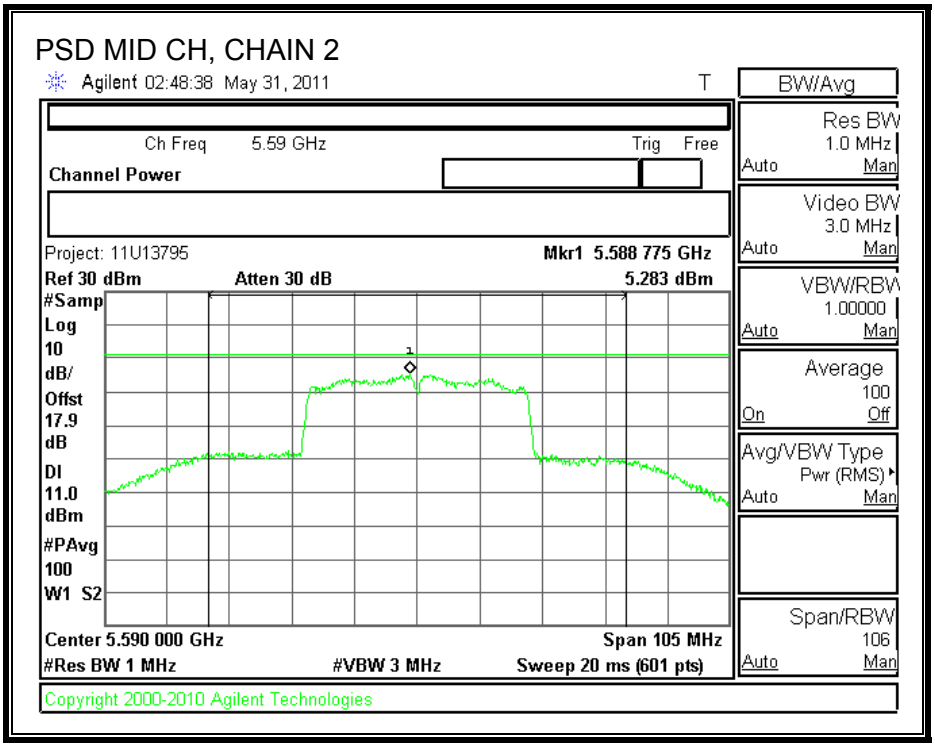


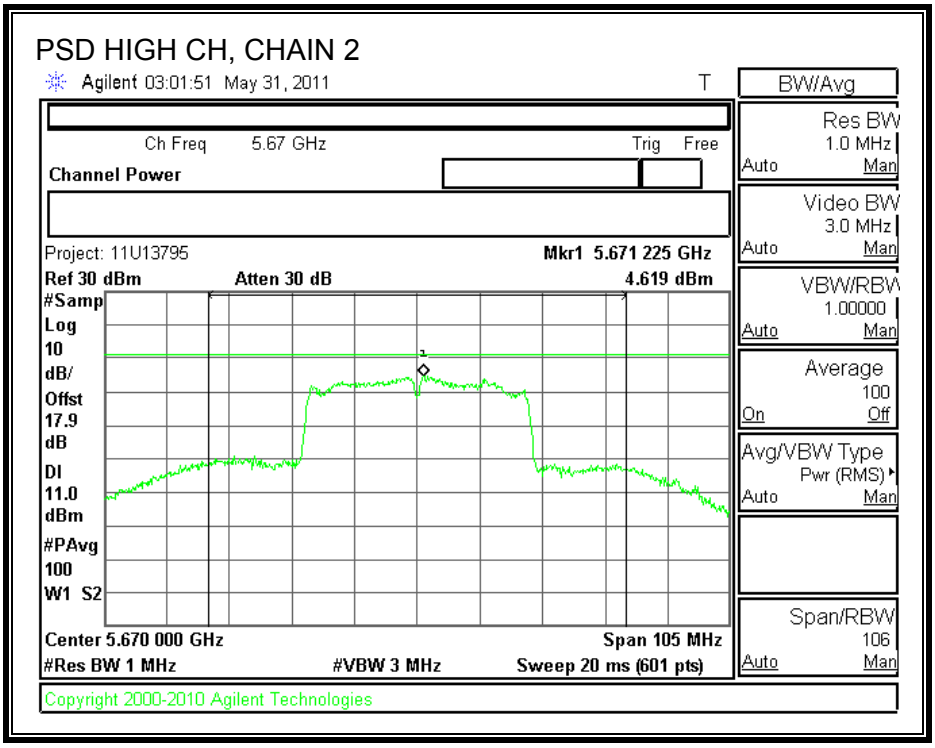




CHAIN 2 POWER SPECTRAL DENSITY







7.9.5. 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

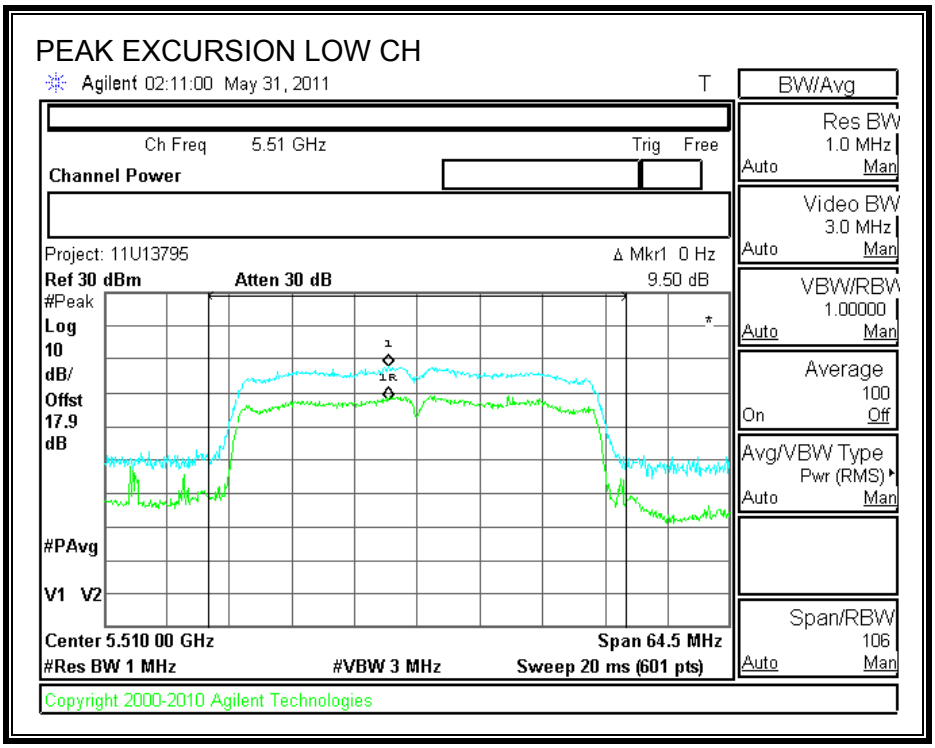
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5510	9.50	13	-3.50
Middle	5590	8.95	13	-4.05
High	5670	8.35	13	-4.65

CHAIN 2

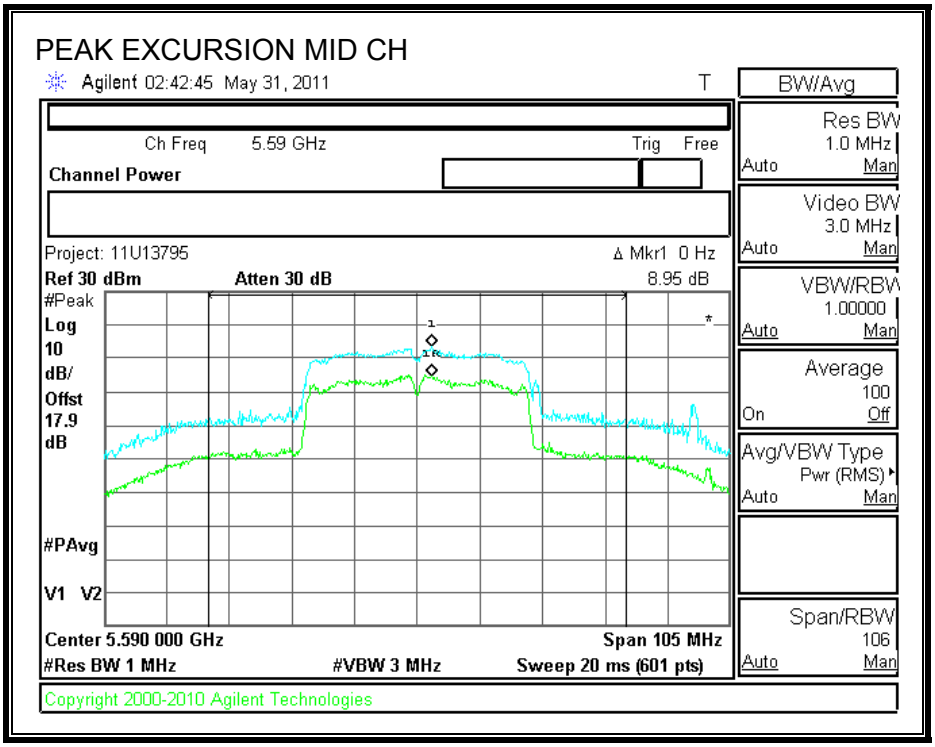
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5510	9.68	13	-3.32
Middle	5590	9.29	13	-3.71
High	5670	9.53	13	-3.47

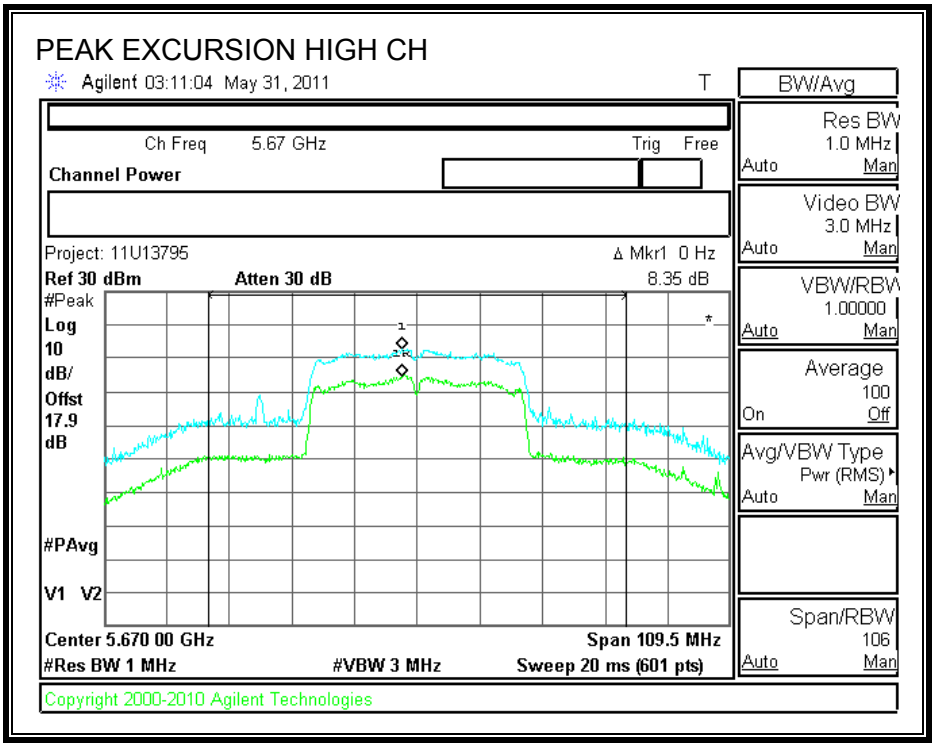
CHAIN 1

PEAK EXCURSION



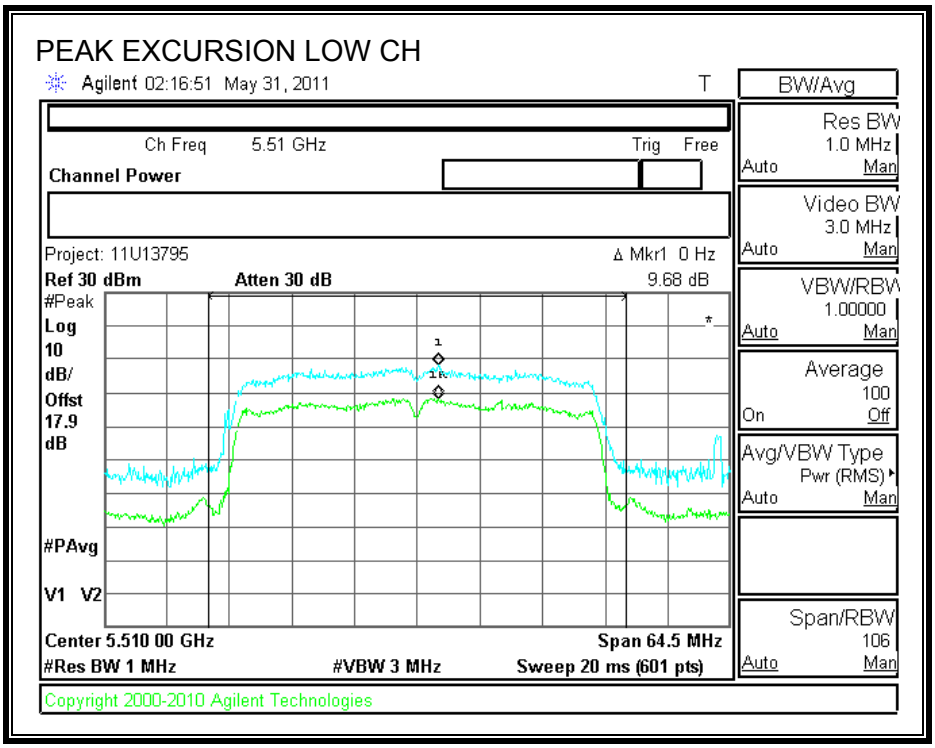
PEAK EXCURSION MID CH



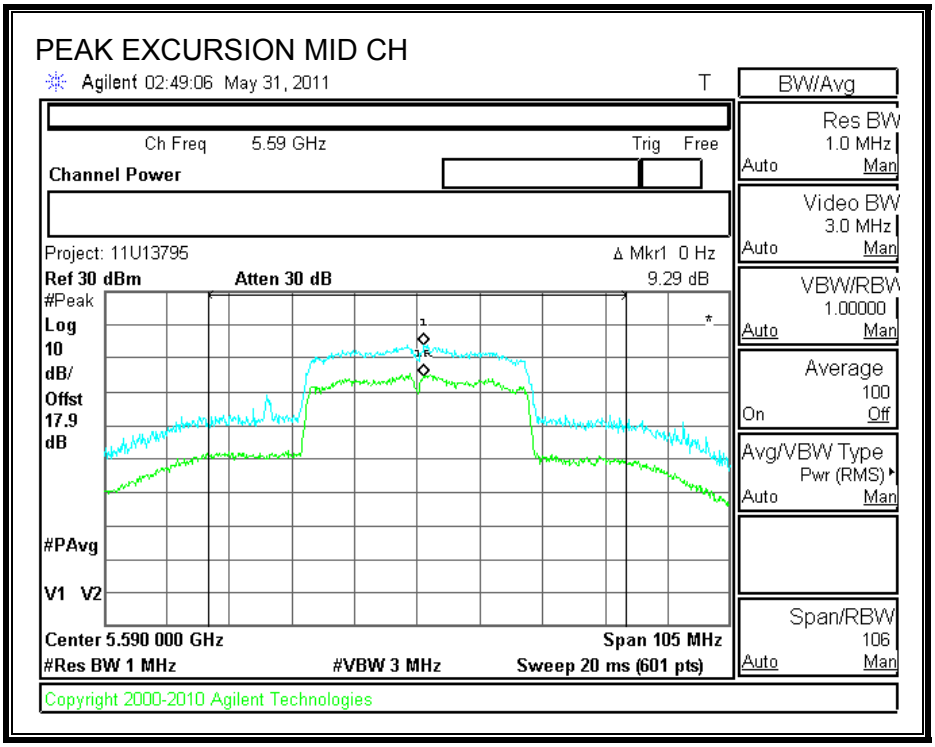


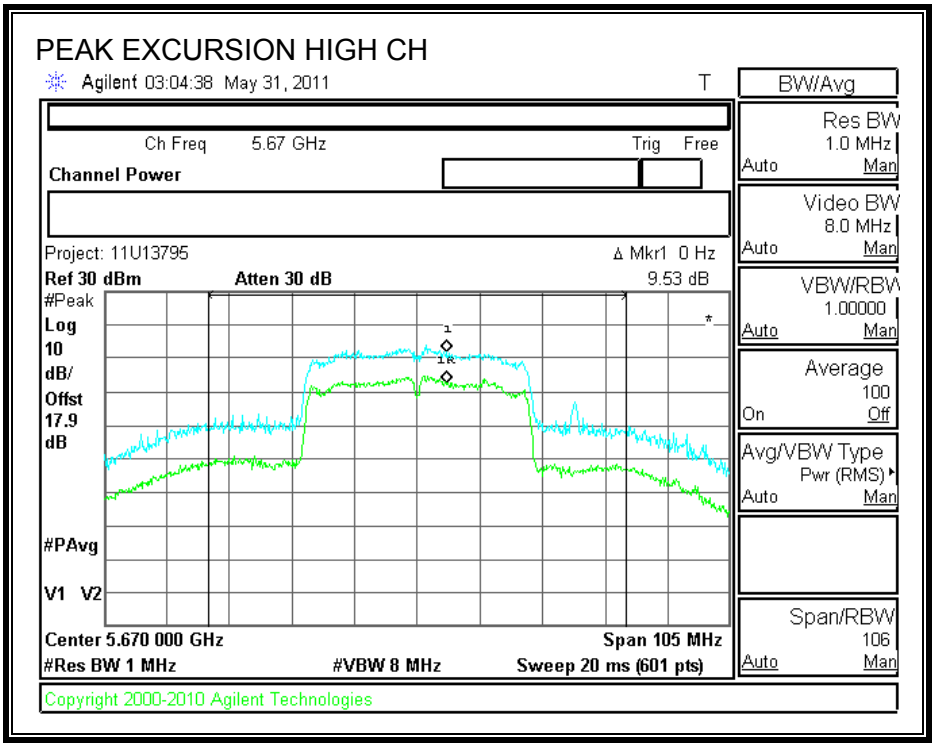
CHAIN 2

PEAK EXCURSION



PEAK EXCURSION MID CH





7.9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

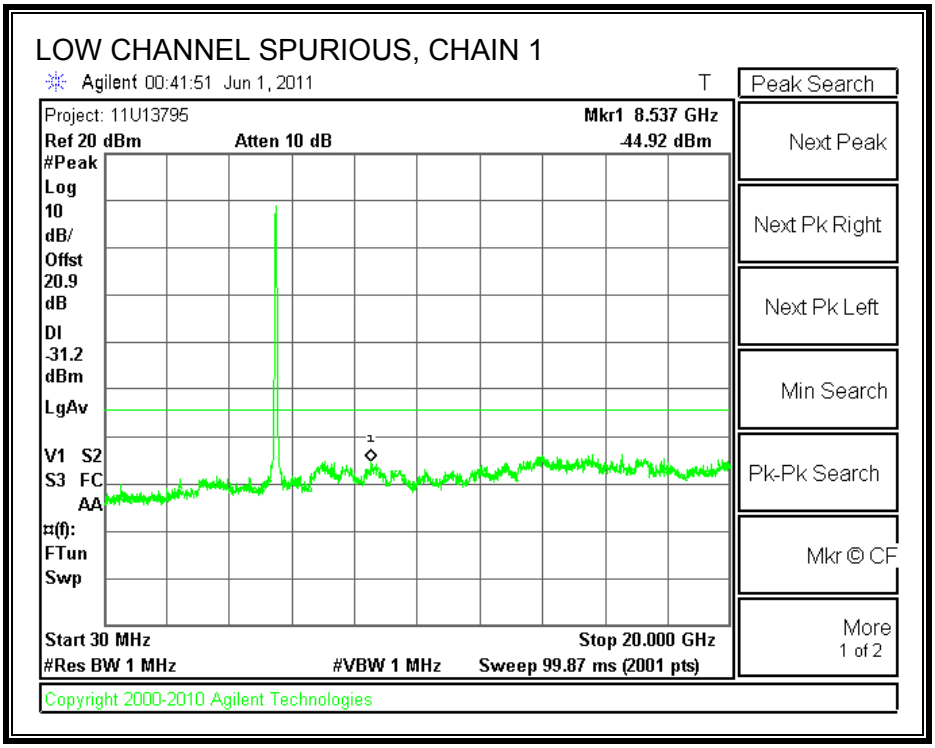
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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

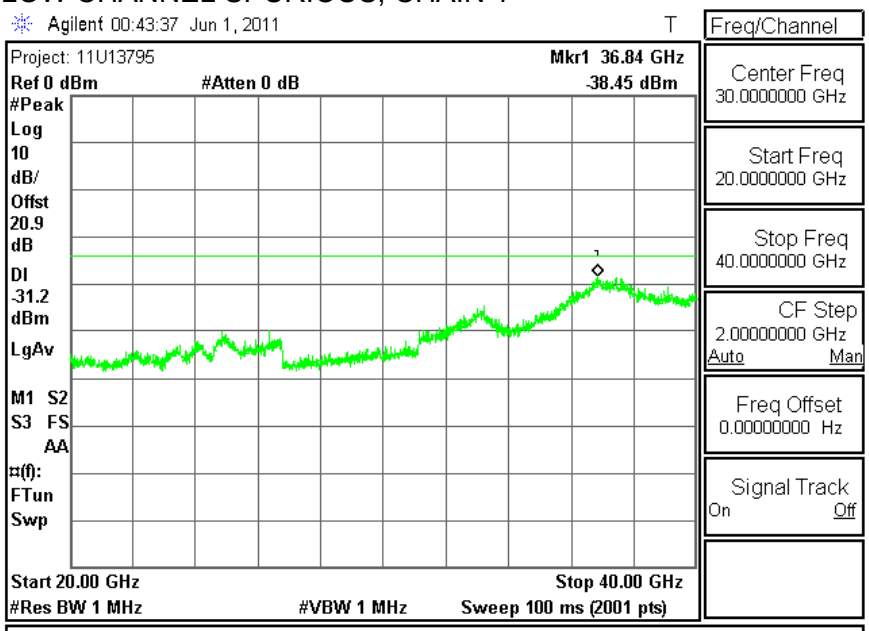
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

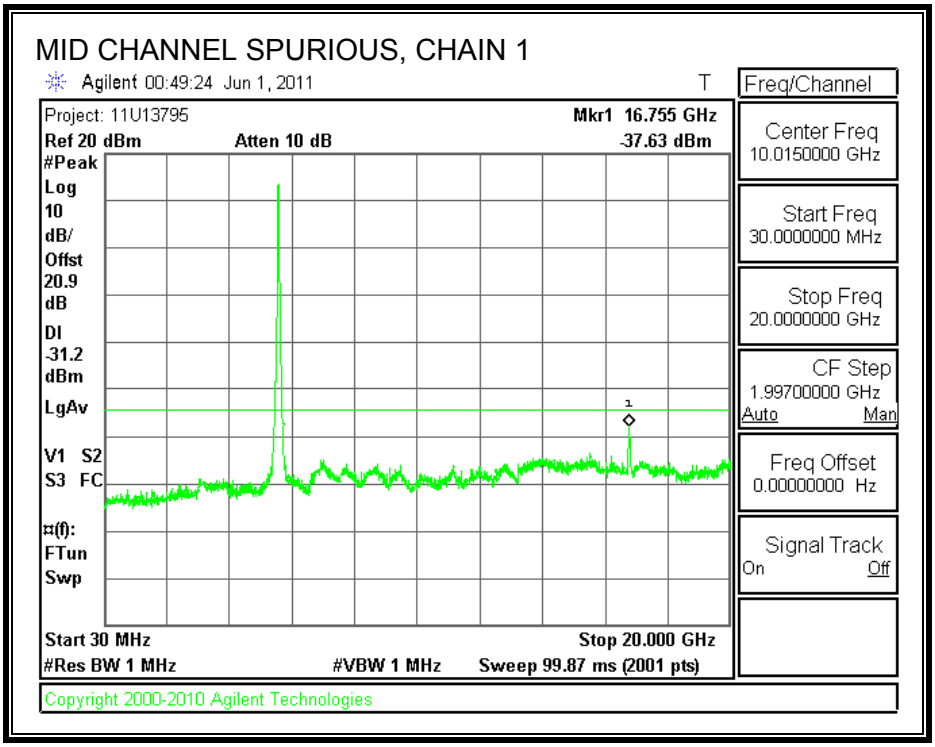
CHAIN 1 SPURIOUS EMISSIONS



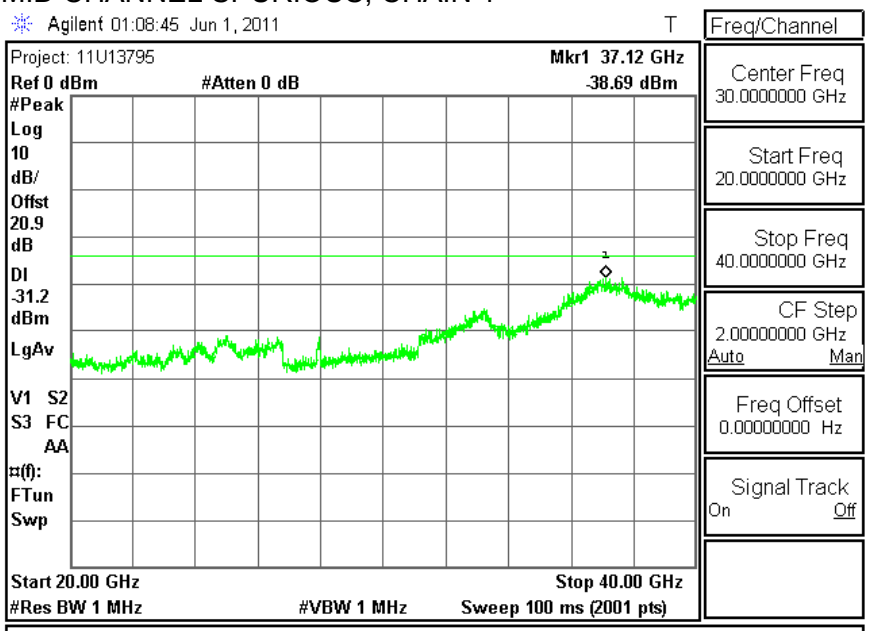
LOW CHANNEL SPURIOUS, CHAIN 1



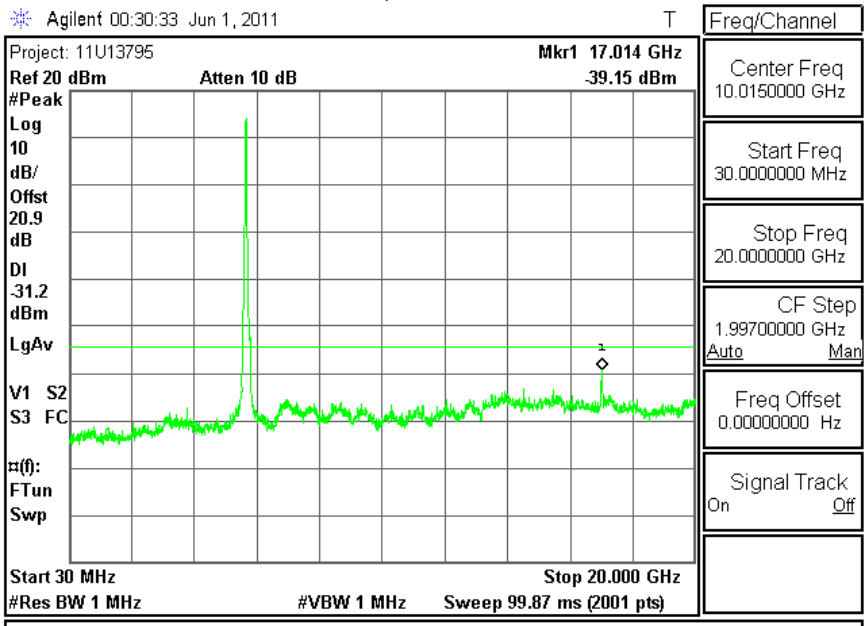
MID CHANNEL SPURIOUS, CHAIN 1



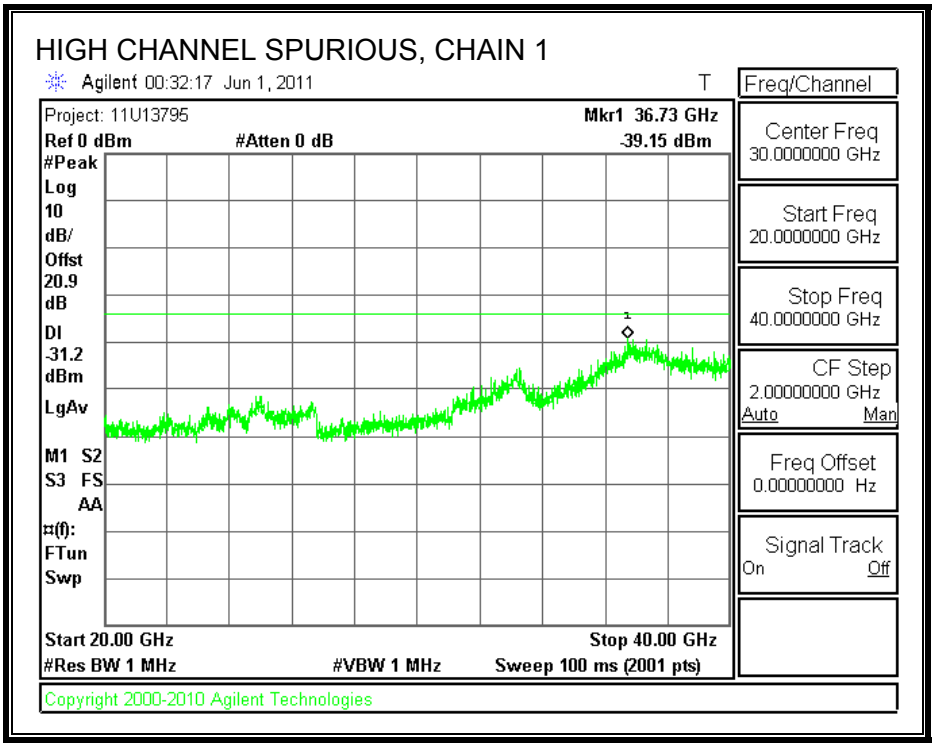
MID CHANNEL SPURIOUS, CHAIN 1



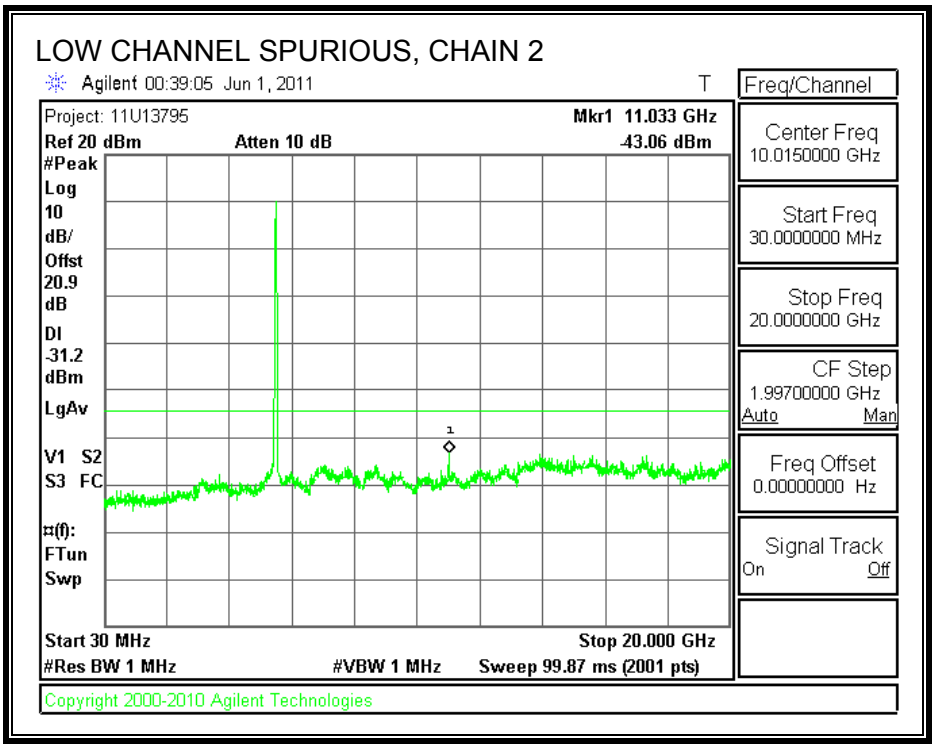
HIGH CHANNEL SPURIOUS, CHAIN 1



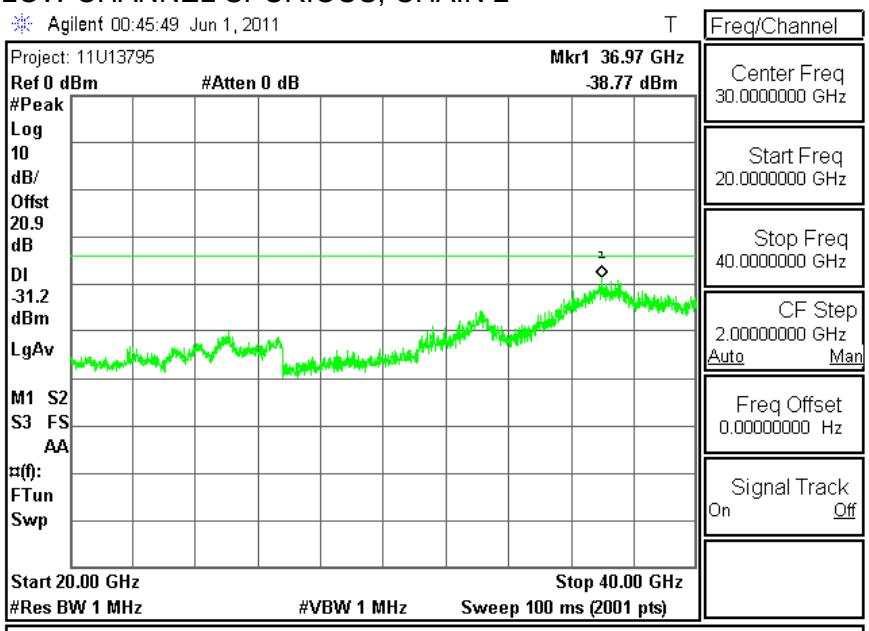
HIGH CHANNEL SPURIOUS, CHAIN 1



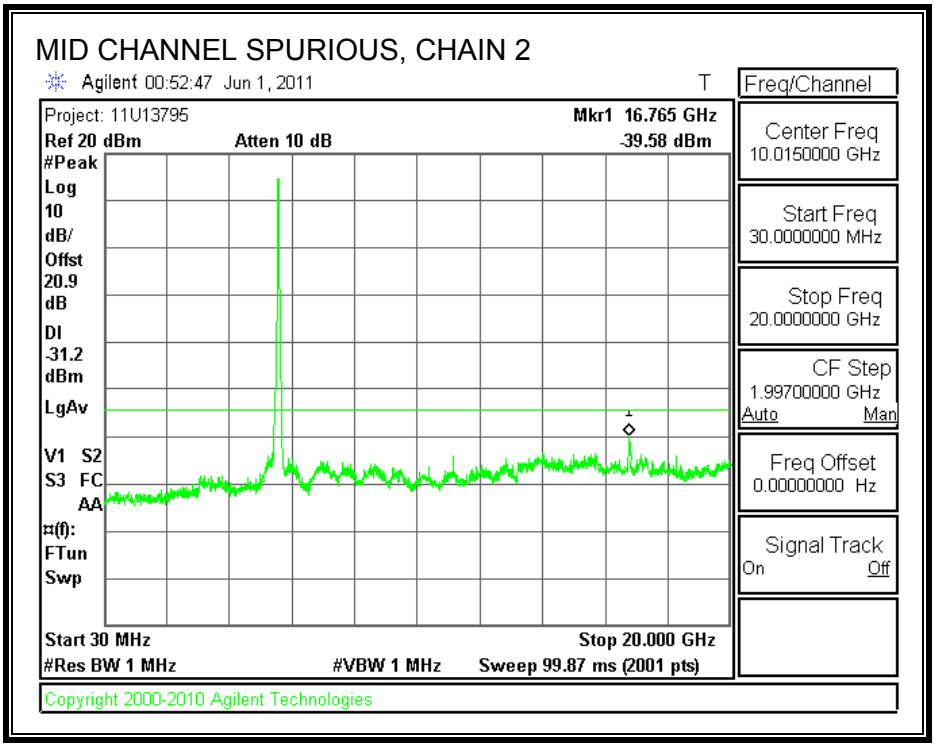
CHAIN 2 SPURIOUS EMISSIONS



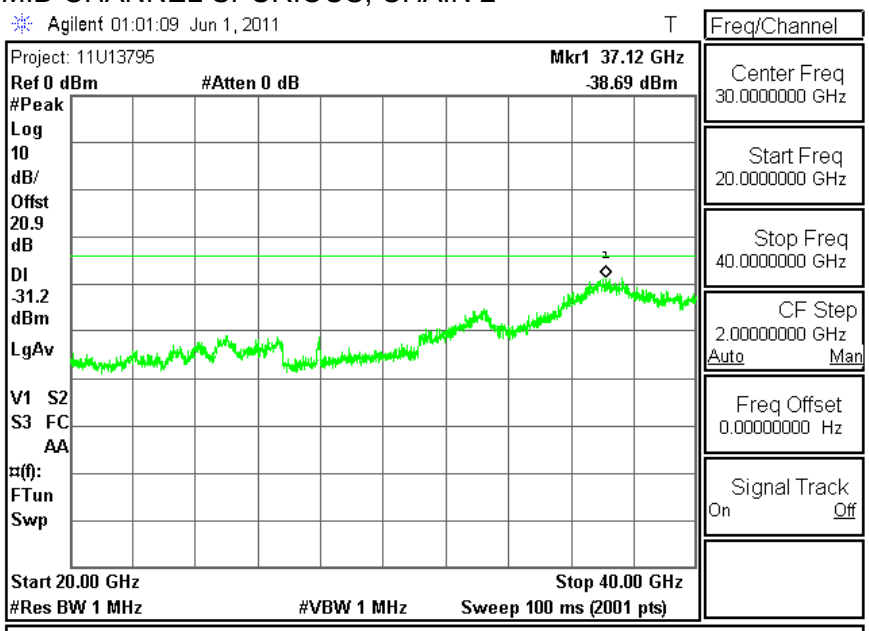
LOW CHANNEL SPURIOUS, CHAIN 2



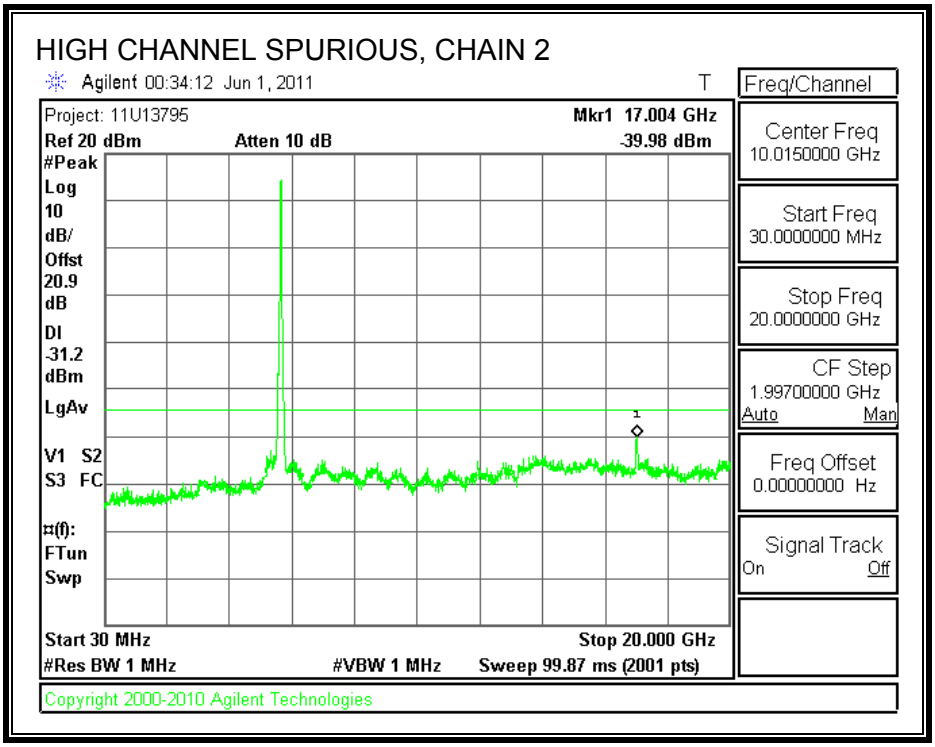
MID CHANNEL SPURIOUS, CHAIN 2



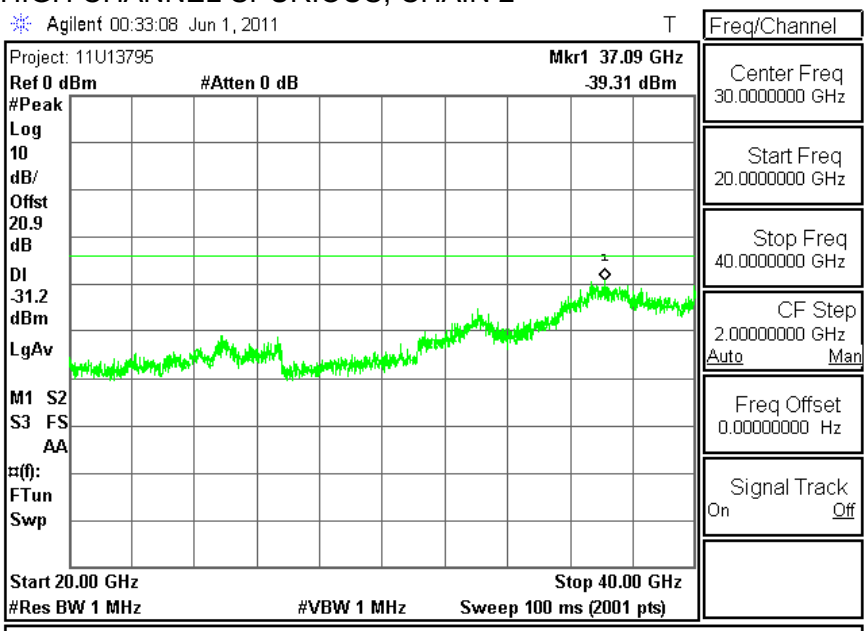
MID CHANNEL SPURIOUS, CHAIN 2



HIGH CHANNEL SPURIOUS, CHAIN 2



HIGH CHANNEL SPURIOUS, CHAIN 2



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.

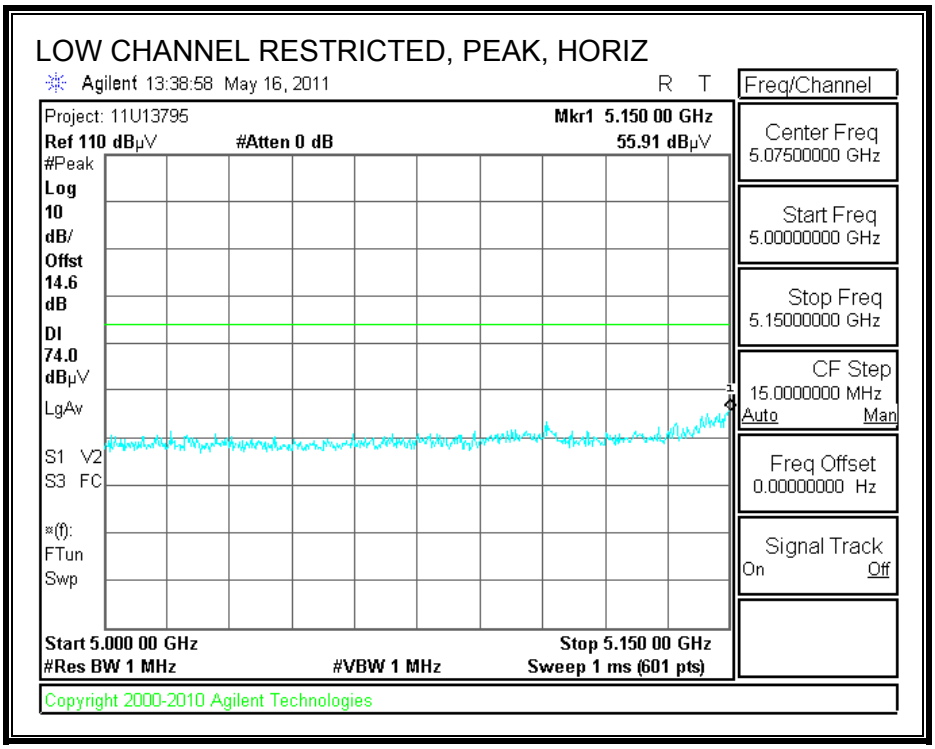
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each appplicable band.

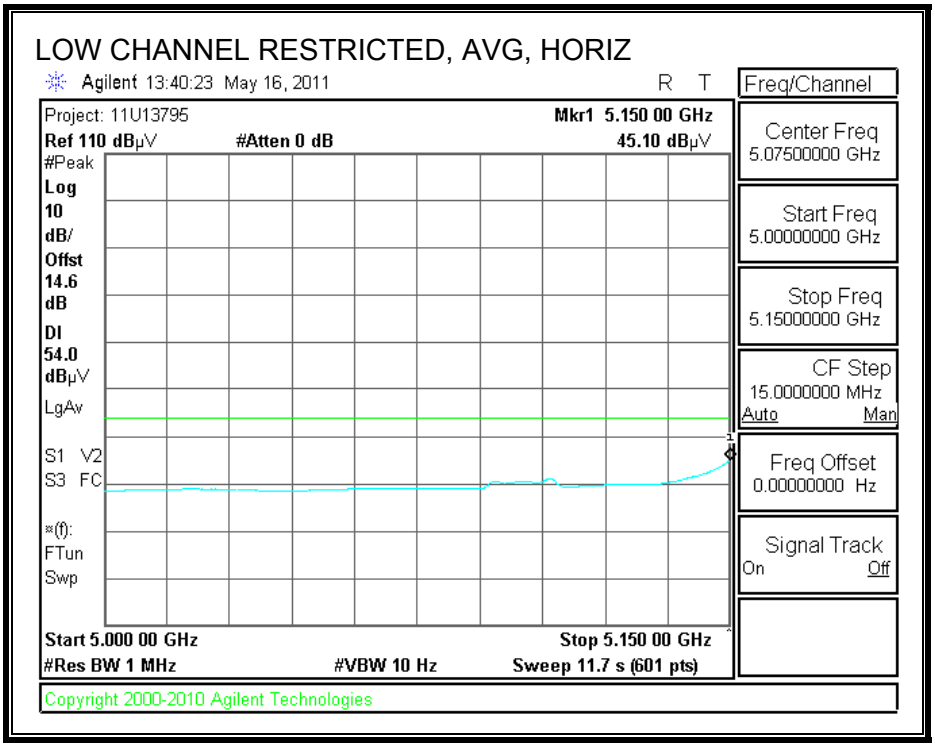
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

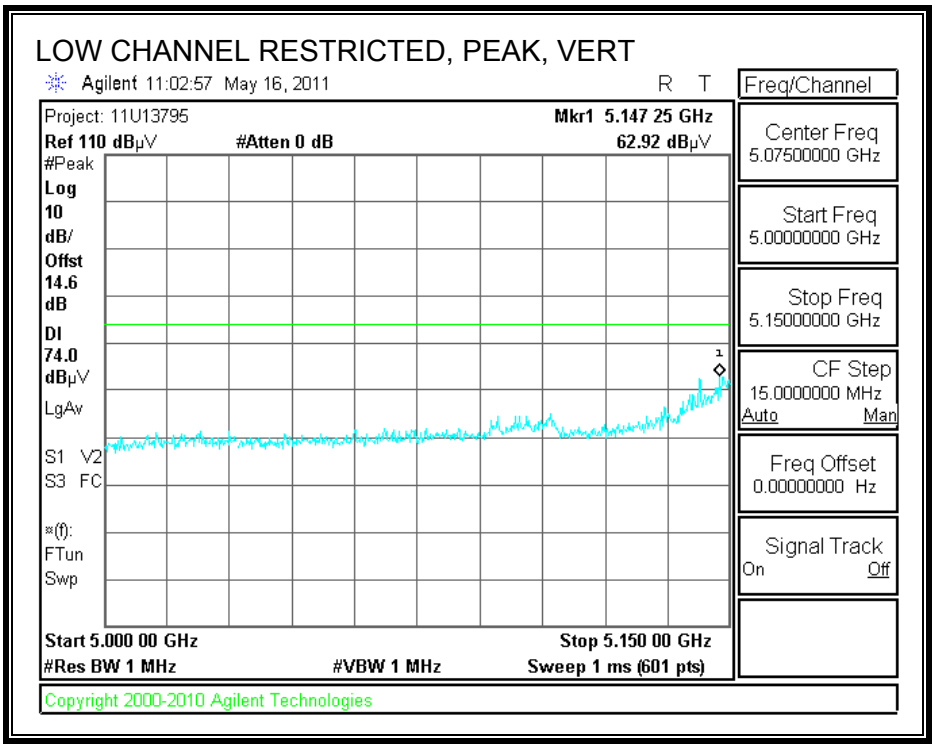
8.2.1. TX ABOVE 1 GHz FOR 802.11a MODE IN THE LOWER 5.2 GHz BAND

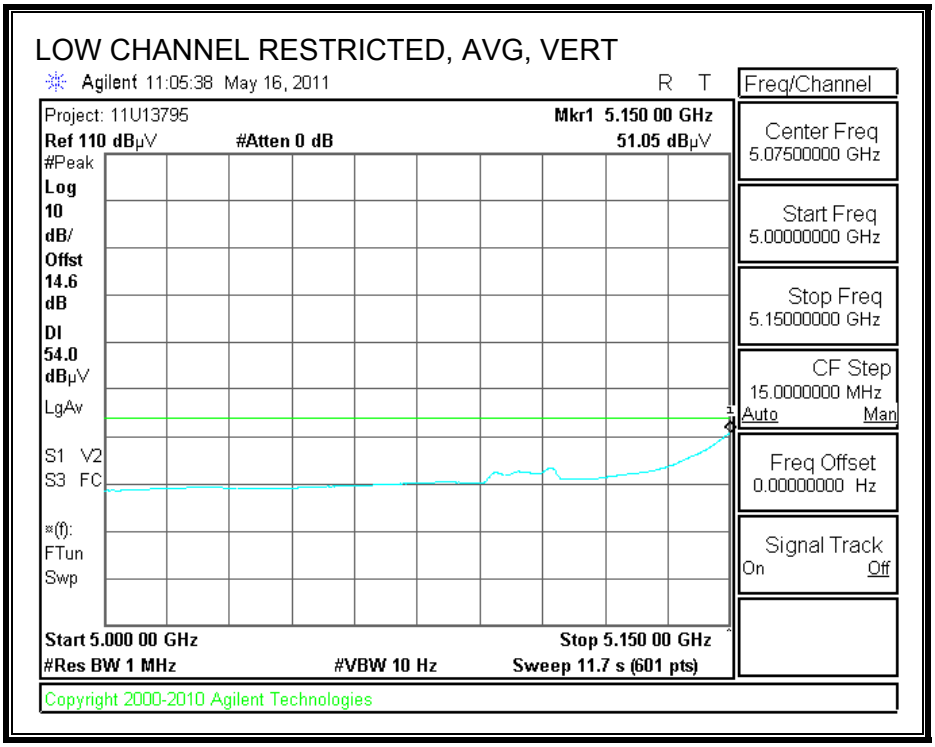
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

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

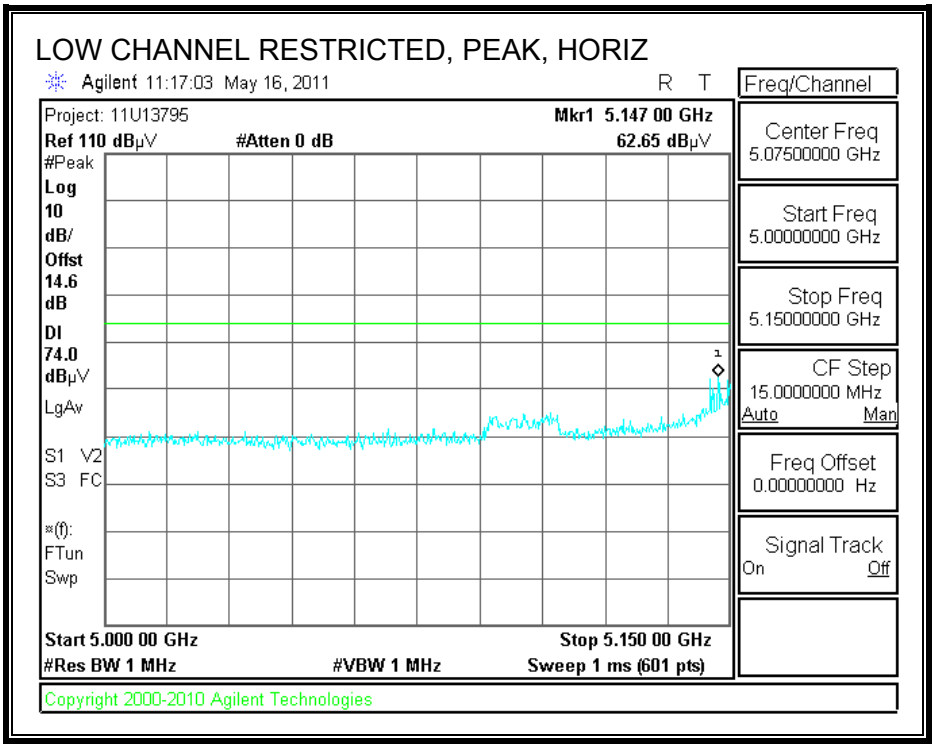
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

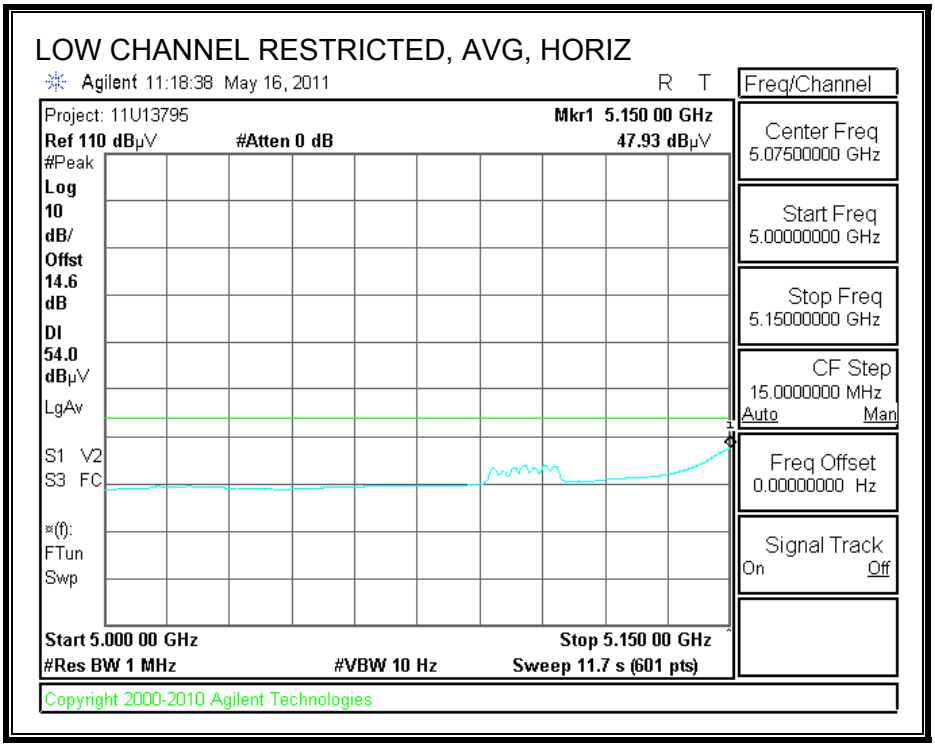
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
5180MHz 11a, main															
15.540	3.0	39.1	38.5	11.3	-32.2	0.0	0.0	56.7	74.0	-17.3	V	P	101.0	198.0	Y pos
15.540	3.0	24.4	38.5	11.3	-32.2	0.0	0.0	42.0	54.0	-12.0	V	A	101.0	198.0	Y pos
15.540	3.0	38.0	38.5	11.3	-32.2	0.0	0.0	55.6	74.0	-18.4	H	P	104.0	260.0	Y pos
15.540	3.0	24.4	38.5	11.3	-32.2	0.0	0.0	42.1	54.0	-12.0	H	A	104.0	260.0	Y pos
5200MHz 11a, main															
15.600	3.0	36.8	38.3	11.4	-32.2	0.0	0.0	54.3	74.0	-19.7	H	P	98.0	265.0	Y pos
15.600	3.0	22.4	38.3	11.4	-32.2	0.0	0.0	39.9	54.0	-14.1	H	A	98.0	265.0	Y pos
15.600	3.0	40.0	38.3	11.4	-32.2	0.0	0.0	57.5	74.0	-16.5	V	P	100.0	198.0	Y pos
15.600	3.0	25.7	38.3	11.4	-32.2	0.0	0.0	43.2	54.0	-10.8	V	A	100.0	198.0	Y pos
5240MHz 11a, main															
15.720	3.0	35.8	38.0	11.4	-32.2	0.0	0.0	53.0	74.0	-21.0	V	P	100.0	199.0	Y pos
15.720	3.0	23.0	38.0	11.4	-32.2	0.0	0.0	40.2	54.0	-13.8	V	A	100.0	199.0	Y pos
15.720	3.0	33.4	38.0	11.4	-32.2	0.0	0.0	50.7	74.0	-23.3	H	P	132.0	316.0	Y pos
15.720	3.0	21.0	38.0	11.4	-32.2	0.0	0.0	38.3	54.0	-15.7	H	A	132.0	316.0	Y pos

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

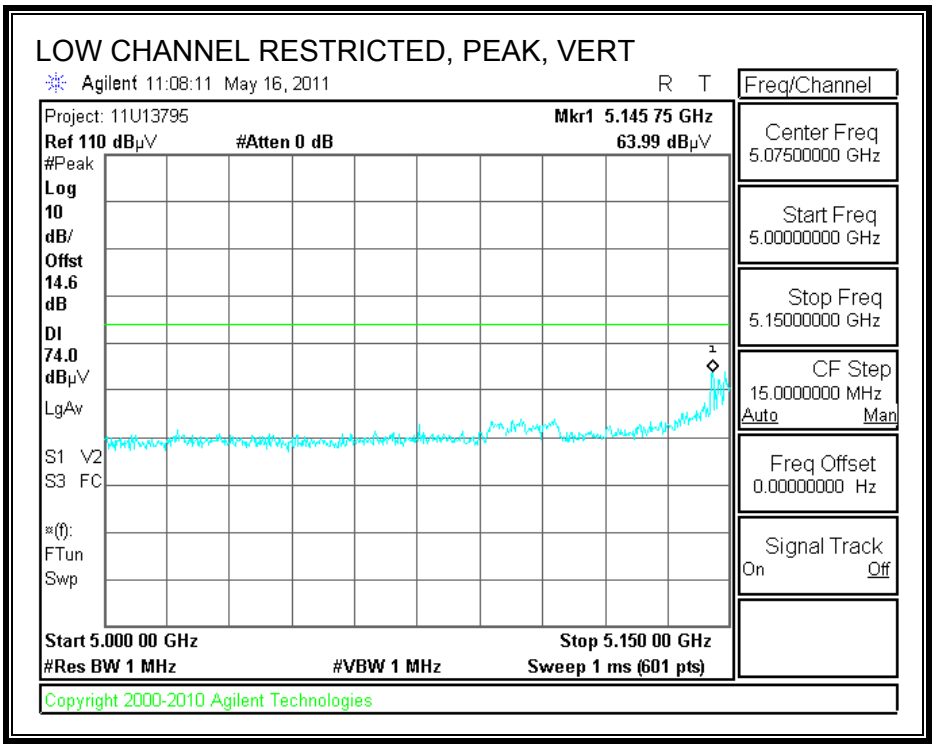
8.2.2. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE LOWER 5.2 GHz BAND

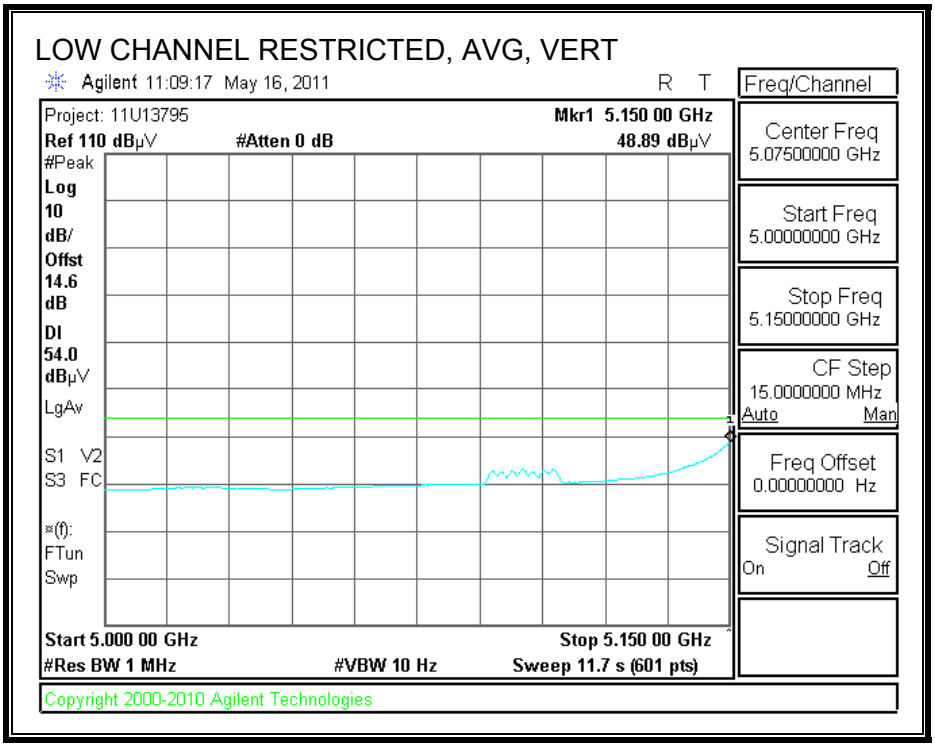
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

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

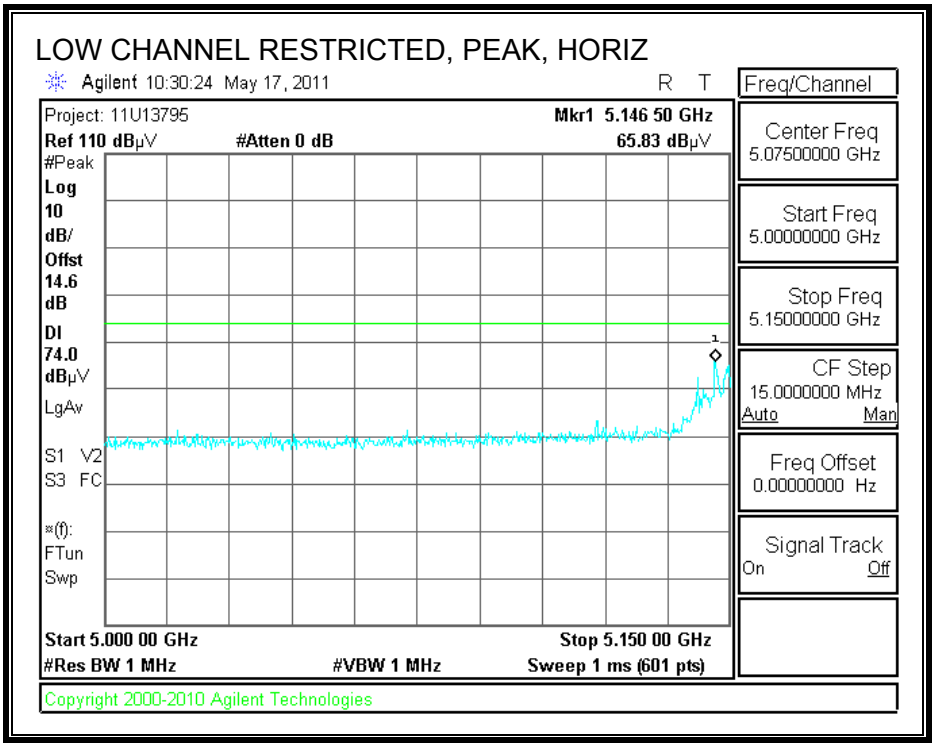
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

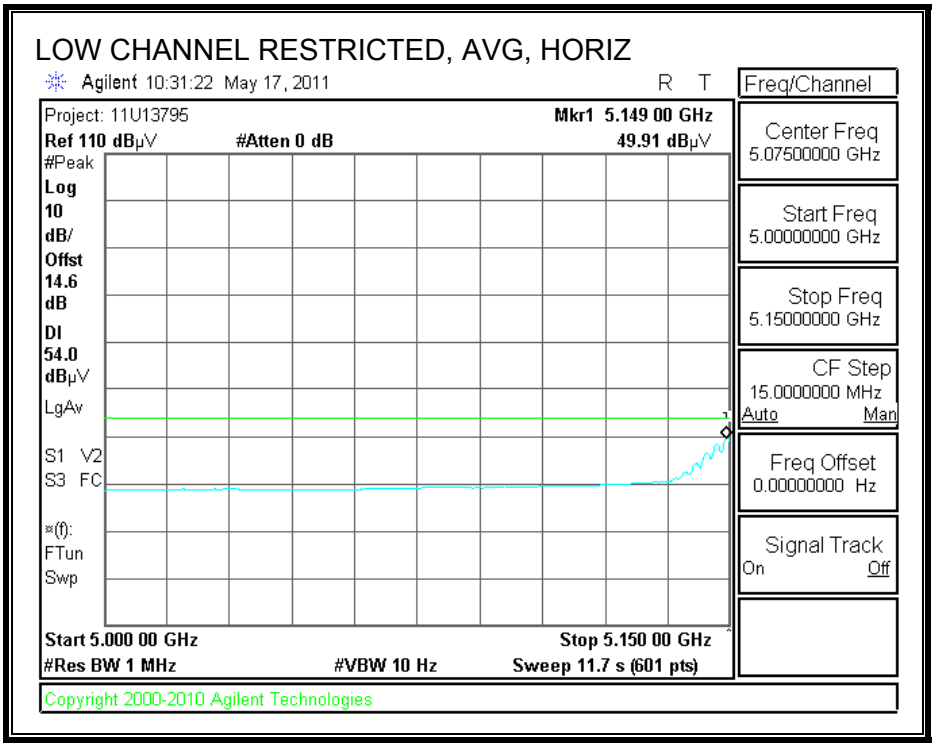
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5180MHz 11n, HT20													
15.540	3.0	34.7	38.5	11.3	-32.2	0.0	0.0	52.4	74.0	-21.6	H	P	
15.540	3.0	21.5	38.5	11.3	-32.2	0.0	0.0	39.2	54.0	-14.8	H	A	
15.540	3.0	34.6	38.5	11.3	-32.2	0.0	0.0	52.2	74.0	-21.8	V	P	
15.540	3.0	22.3	38.5	11.3	-32.2	0.0	0.0	39.9	54.0	-14.1	V	A	
5200MHz 11n, HT20													
15.600	3.0	34.8	38.3	11.4	-32.2	0.0	0.0	52.3	74.0	-21.7	V	P	
15.600	3.0	22.3	38.3	11.4	-32.2	0.0	0.0	39.8	54.0	-14.2	V	A	
15.600	3.0	33.9	38.3	11.4	-32.2	0.0	0.0	51.4	74.0	-22.6	H	P	
15.600	3.0	20.8	38.3	11.4	-32.2	0.0	0.0	38.3	54.0	-15.7	H	A	
5240MHz 11n, HT20													
15.720	3.0	32.8	38.0	11.4	-32.2	0.0	0.0	50.1	74.0	-23.9	H	P	
15.720	3.0	21.0	38.0	11.4	-32.2	0.0	0.0	38.2	54.0	-15.8	H	A	
15.720	3.0	34.1	38.0	11.4	-32.2	0.0	0.0	51.4	74.0	-22.6	V	P	
15.720	3.0	21.1	38.0	11.4	-32.2	0.0	0.0	38.3	54.0	-15.7	V	A	

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

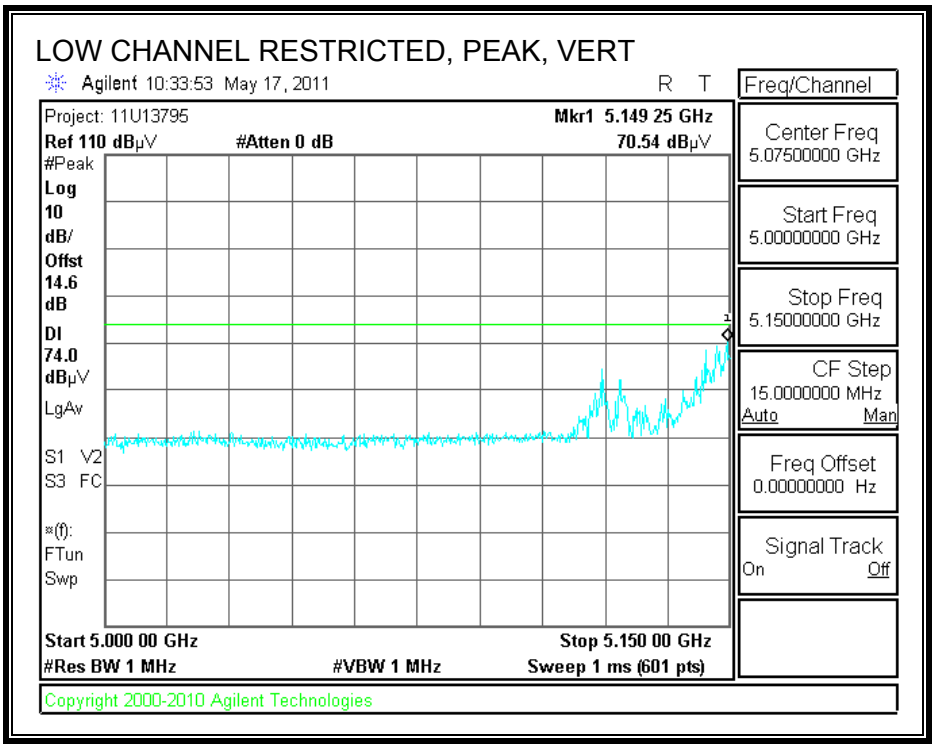
8.2.3. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE LOWER 5.2 GHz BAND

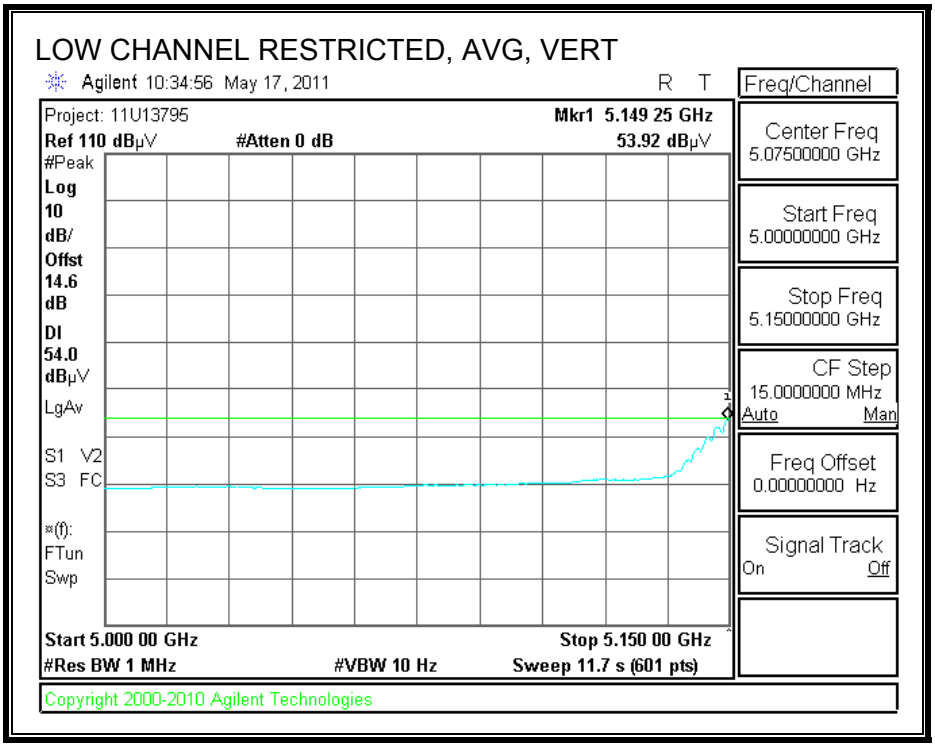
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

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

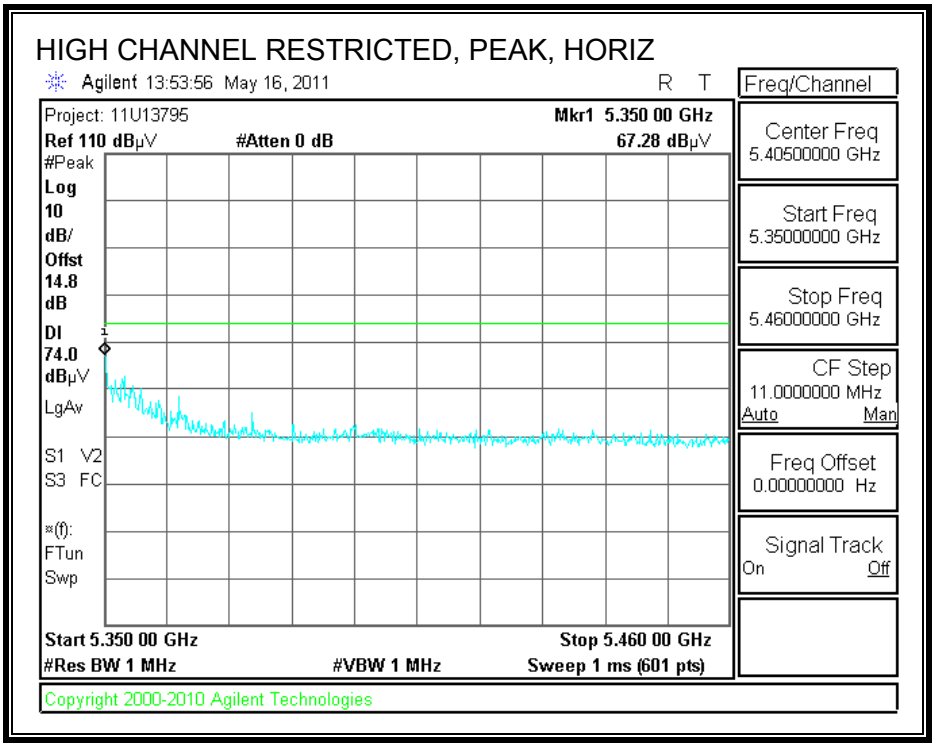
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

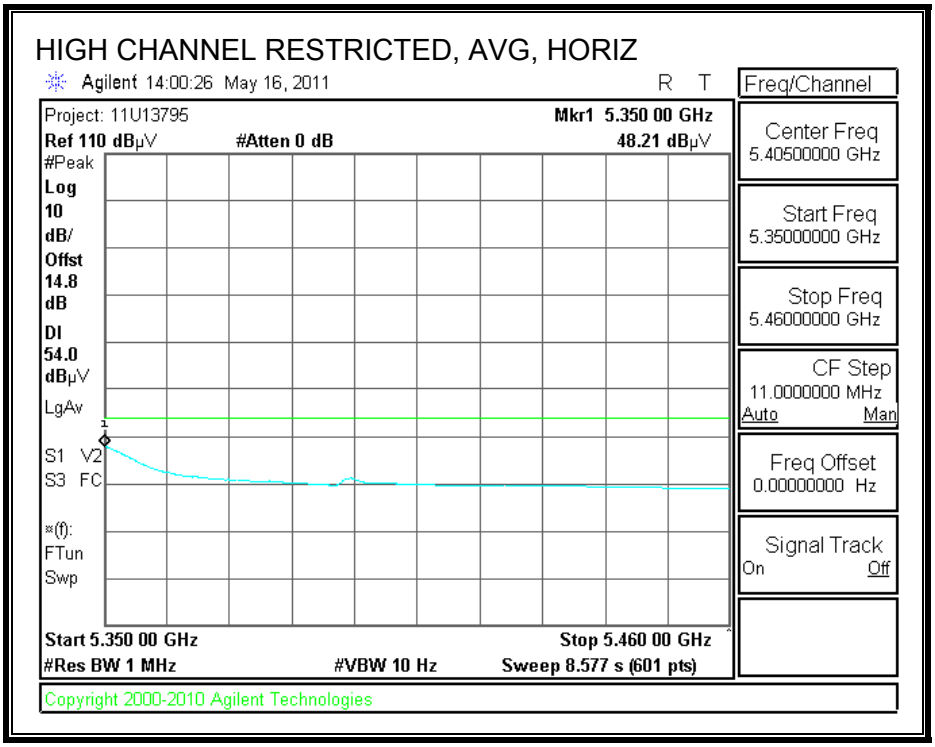
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5190MHz 11n, HT40													
15.570	3.0	33.7	38.4	11.4	-32.2	0.0	0.0	51.3	74.0	-22.7	V	P	
15.570	3.0	21.1	38.4	11.4	-32.2	0.0	0.0	38.7	54.0	-15.3	V	A	
15.570	3.0	33.4	38.4	11.4	-32.2	0.0	0.0	51.0	74.0	-23.0	H	P	
15.570	3.0	21.0	38.4	11.4	-32.2	0.0	0.0	38.6	54.0	-15.4	H	A	
5230MHz 11n, HT40													
20.920	3.0	32.6	39.1	13.7	-33.2	0.0	0.0	52.2	74.0	-21.8	H	P	
20.920	3.0	20.5	39.1	13.7	-33.2	0.0	0.0	40.1	54.0	-13.9	H	A	
15.690	3.0	33.2	38.1	11.4	-32.2	0.0	0.0	50.6	74.0	-23.5	V	P	
15.690	3.0	21.0	38.1	11.4	-32.2	0.0	0.0	38.3	54.0	-15.7	V	A	

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

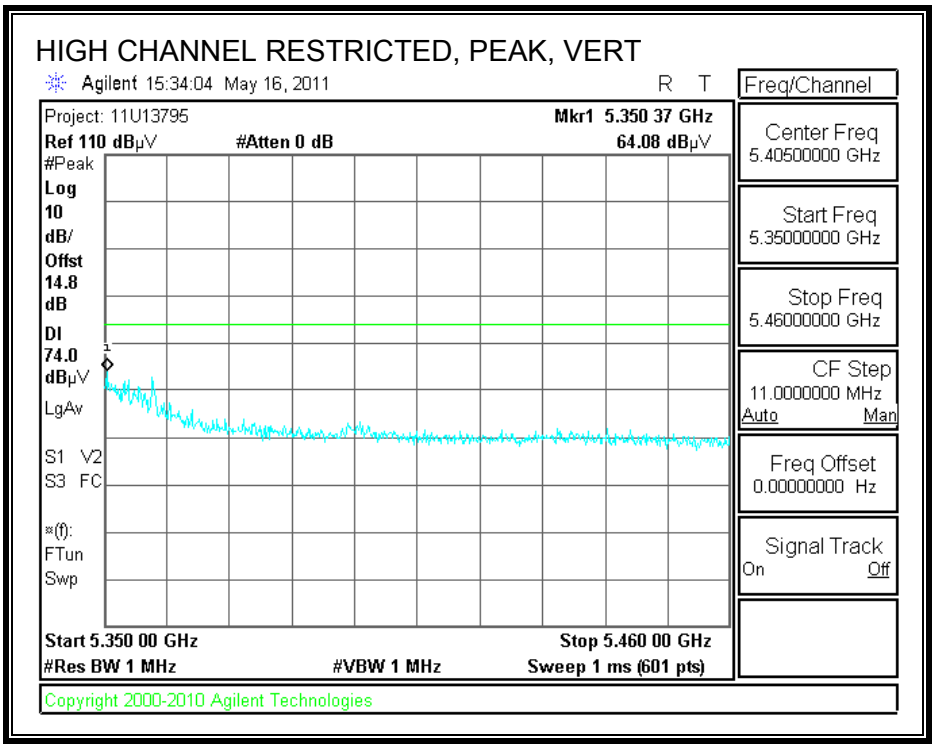
8.2.4. TX ABOVE 1 GHz FOR 802.11a MODE IN THE UPPER 5.2 GHz BAND

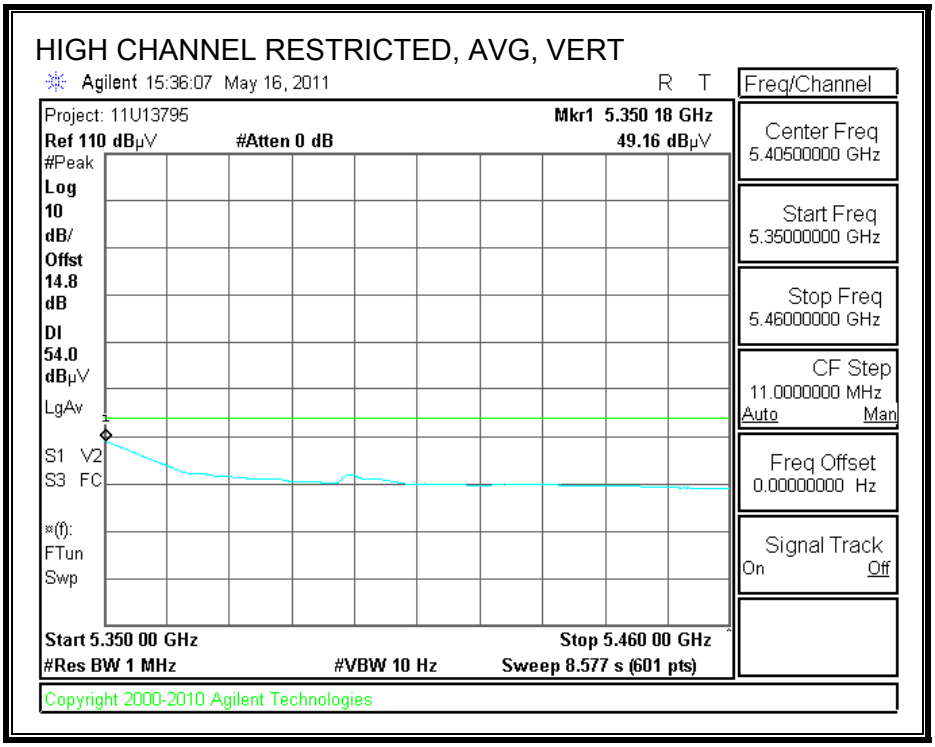
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

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

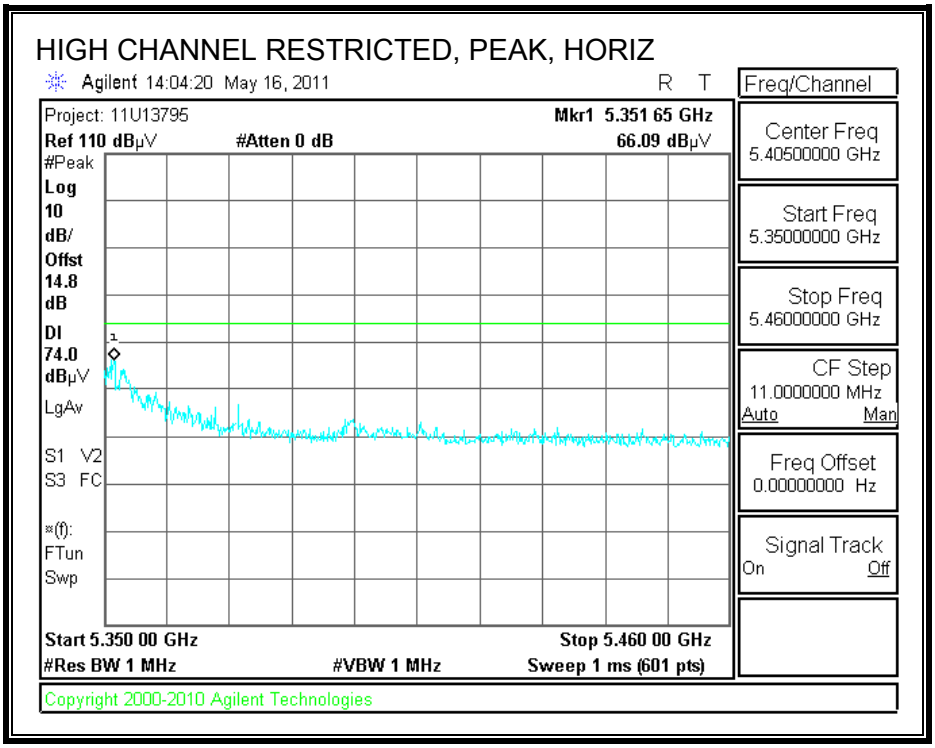
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

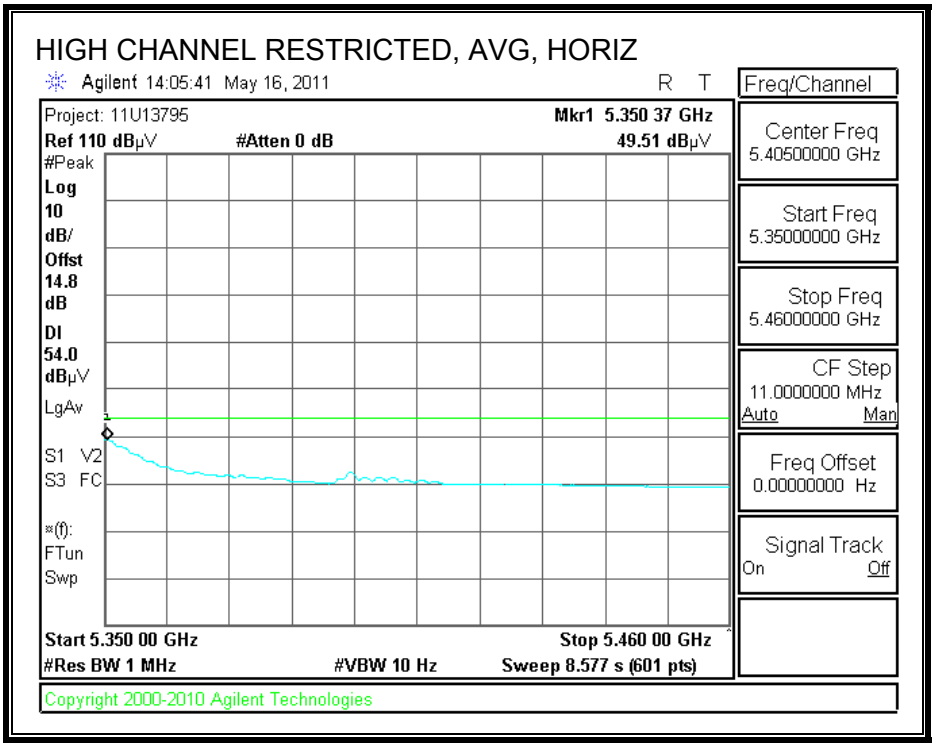
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5260 MHz 11a main													
15.780	3.0	38.0	37.8	11.5	-32.2	0.0	0.7	55.8	74.0	-18.2	H	P	
15.780	3.0	25.5	37.8	11.5	-32.2	0.0	0.7	43.4	54.0	-10.6	H	A	
15.780	3.0	41.5	37.8	11.5	-32.2	0.0	0.7	59.3	74.0	-14.7	V	P	
15.780	3.0	28.6	37.8	11.5	-32.2	0.0	0.7	46.5	54.0	-7.5	V	A	
5300MHz 11a main													
10.600	3.0	41.6	37.6	9.0	-32.6	0.0	0.8	56.4	74.0	-17.6	H	P	
10.600	3.0	26.4	37.6	9.0	-32.6	0.0	0.8	41.2	54.0	-12.8	H	A	
15.900	3.0	33.9	37.5	11.5	-32.1	0.0	0.7	51.4	74.0	-22.6	H	P	
15.900	3.0	21.6	37.5	11.5	-32.1	0.0	0.7	39.1	54.0	-14.9	H	A	
5300MHz 11a main													
10.600	3.0	43.4	37.6	9.0	-32.6	0.0	0.8	58.2	74.0	-15.8	V	P	
10.600	3.0	29.6	37.6	9.0	-32.6	0.0	0.8	44.4	54.0	-9.6	V	A	
15.900	3.0	39.3	37.5	11.5	-32.1	0.0	0.7	56.9	74.0	-17.1	V	P	
15.900	3.0	25.4	37.5	11.5	-32.1	0.0	0.7	43.0	54.0	-11.0	V	A	
5320MHz 11a main													
10.640	3.0	42.4	37.6	9.1	-32.6	0.0	0.8	57.1	74.0	-16.9	V	P	
10.640	3.0	27.5	37.6	9.1	-32.6	0.0	0.8	42.3	54.0	-11.7	V	A	
15.960	3.0	34.6	37.3	11.5	-32.1	0.0	0.7	52.0	74.0	-22.0	V	P	
15.960	3.0	22.5	37.3	11.5	-32.1	0.0	0.7	39.9	54.0	-14.1	V	A	
5320MHz 11a main													
10.640	3.0	36.3	37.6	9.1	-32.6	0.0	0.8	51.1	74.0	-22.9	H	P	
10.640	3.0	23.9	37.6	9.1	-32.6	0.0	0.8	38.7	54.0	-15.3	H	A	
15.960	3.0	34.0	37.3	11.5	-32.1	0.0	0.7	51.4	74.0	-22.6	H	P	
15.960	3.0	21.6	37.3	11.5	-32.1	0.0	0.7	39.0	54.0	-15.0	H	A	

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

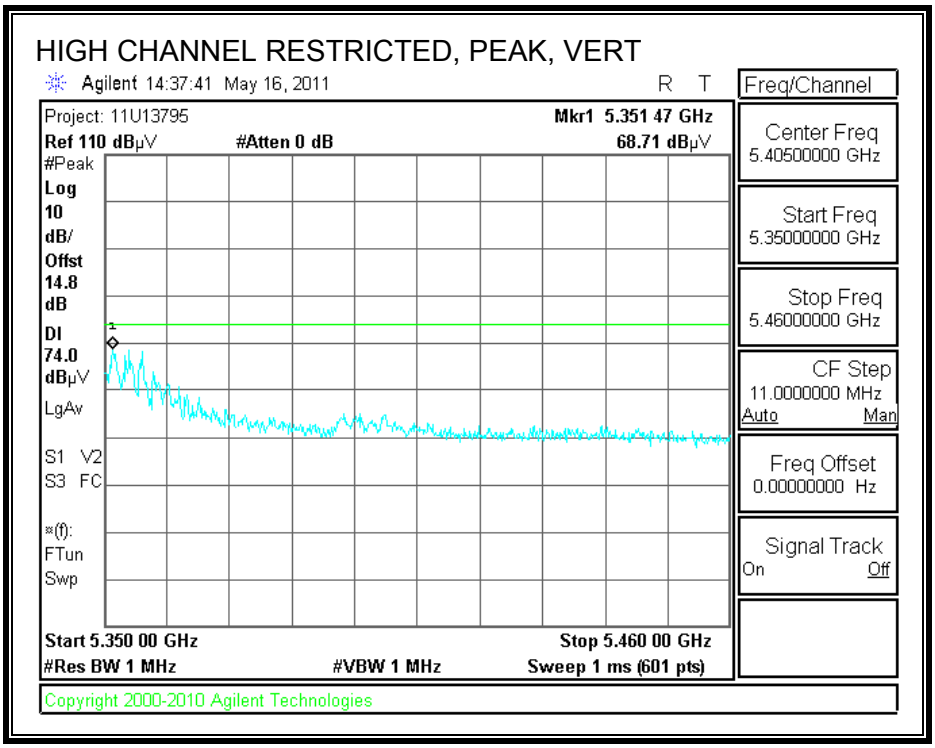
8.2.5. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE UPPER 5.2 GHz BAND

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

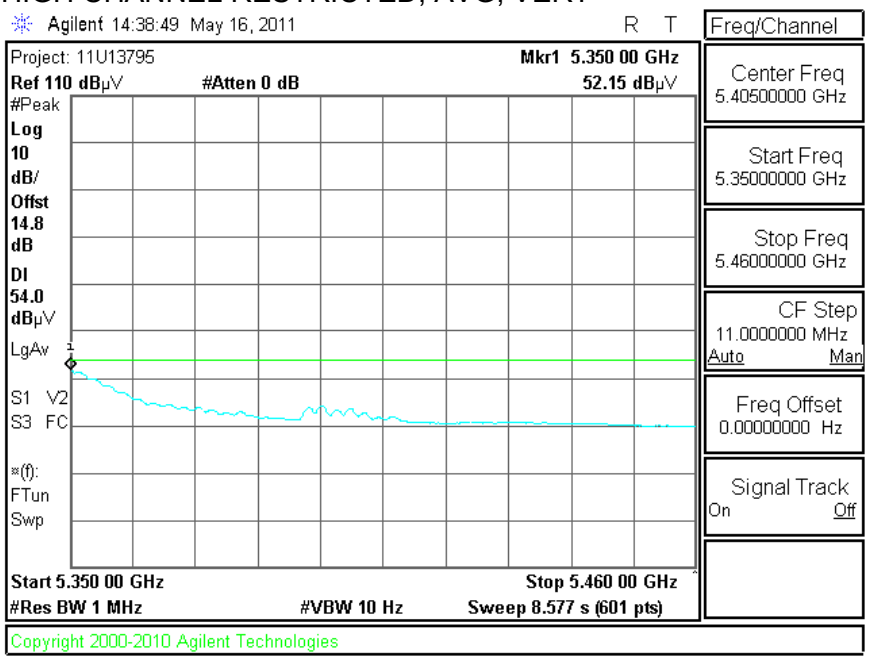




RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

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

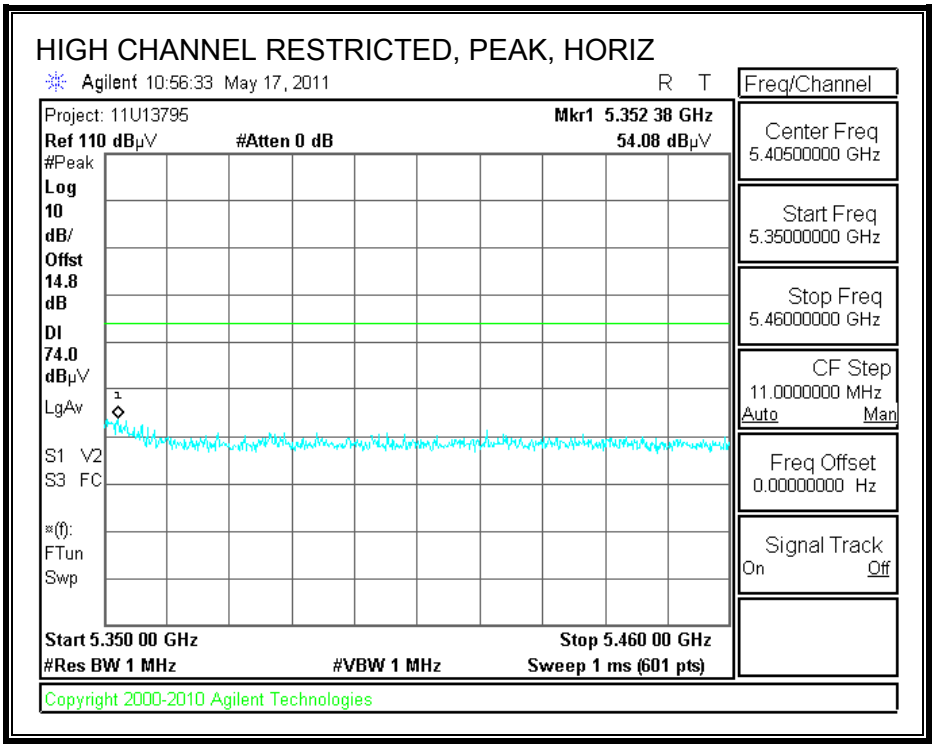
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

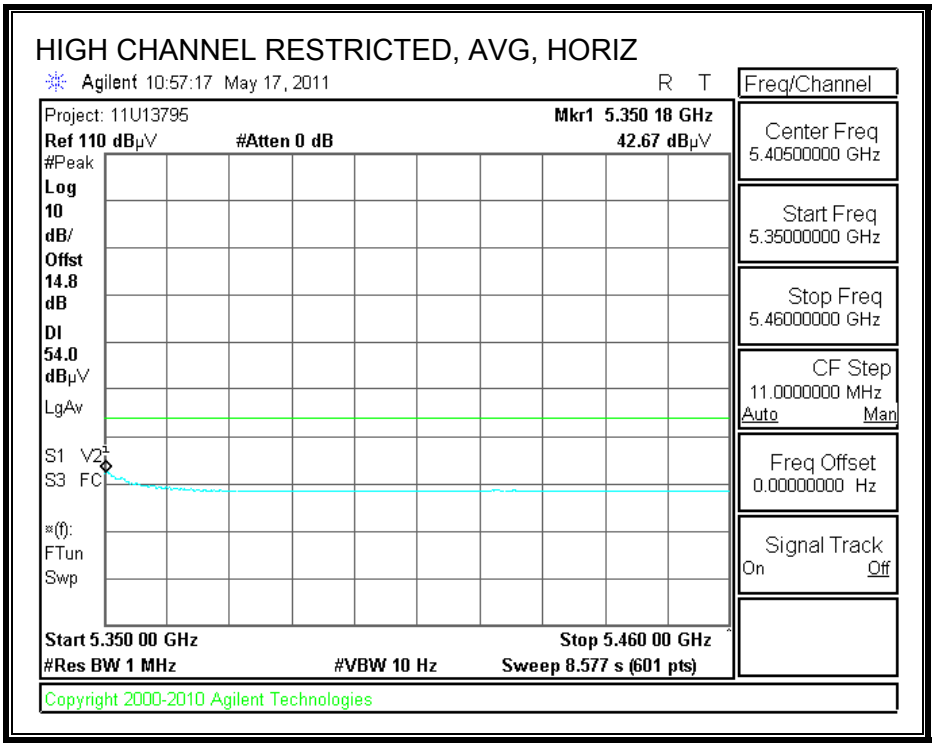
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5260MHz 11n, HT20													
15.780	3.0	38.0	37.8	11.5	-32.2	0.0	0.0	55.1	74.0	-18.9	V	P	
15.780	3.0	23.3	37.8	11.5	-32.2	0.0	0.0	40.4	54.0	-13.6	V	A	
5260MHz 11n, HT20													
15.780	3.0	33.0	37.8	11.5	-32.2	0.0	0.0	50.1	74.0	-23.9	H	P	
15.780	3.0	21.0	37.8	11.5	-32.2	0.0	0.0	38.1	54.0	-15.9	H	A	
5300MHz 11n, HT20													
10.600	3.0	48.3	37.6	9.0	-32.6	0.0	0.0	62.3	74.0	-11.7	V	P	
10.600	3.0	32.7	37.6	9.0	-32.6	0.0	0.0	46.7	54.0	-7.3	V	A	
15.900	3.0	40.2	37.5	11.5	-32.1	0.0	0.0	57.0	74.0	-17.0	V	P	
15.900	3.0	26.5	37.5	11.5	-32.1	0.0	0.0	43.4	54.0	-10.6	V	A	
5300MHz 11n, HT20													
15.900	3.0	34.3	37.5	11.5	-32.1	0.0	0.0	51.1	74.0	-22.9	H	P	
15.900	3.0	22.5	37.5	11.5	-32.1	0.0	0.0	39.3	54.0	-14.7	H	A	
10.600	3.0	38.3	37.6	9.0	-32.6	0.0	0.0	52.3	74.0	-21.7	H	P	
10.600	3.0	25.3	37.6	9.0	-32.6	0.0	0.0	39.3	54.0	-14.7	H	A	
5320MHz 11n, HT20													
10.640	3.0	36.2	37.6	9.1	-32.6	0.0	0.0	50.2	74.0	-23.8	H	P	
10.640	3.0	23.2	37.6	9.1	-32.6	0.0	0.0	37.2	54.0	-16.8	H	A	
15.960	3.0	33.7	37.3	11.5	-32.1	0.0	0.0	50.4	74.0	-23.6	H	P	
15.960	3.0	21.5	37.3	11.5	-32.1	0.0	0.0	38.2	54.0	-15.8	H	A	
5320MHz 11n, HT20													
10.640	3.0	44.0	37.6	9.1	-32.6	0.0	0.0	58.0	74.0	-16.0	V	P	
10.640	3.0	29.2	37.6	9.1	-32.6	0.0	0.0	43.3	54.0	-10.7	V	A	
15.960	3.0	35.3	37.3	11.5	-32.1	0.0	0.0	52.0	74.0	-22.0	V	P	
15.960	3.0	23.1	37.3	11.5	-32.1	0.0	0.0	39.8	54.0	-14.2	V	A	

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

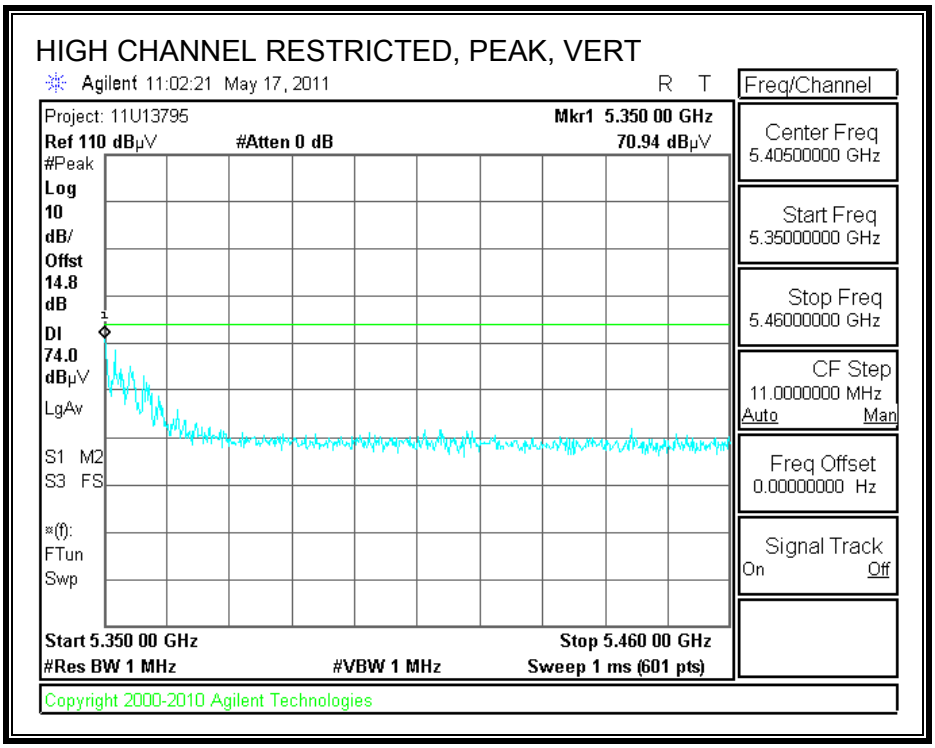
8.2.6. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE UPPER 5.2 GHz BAND

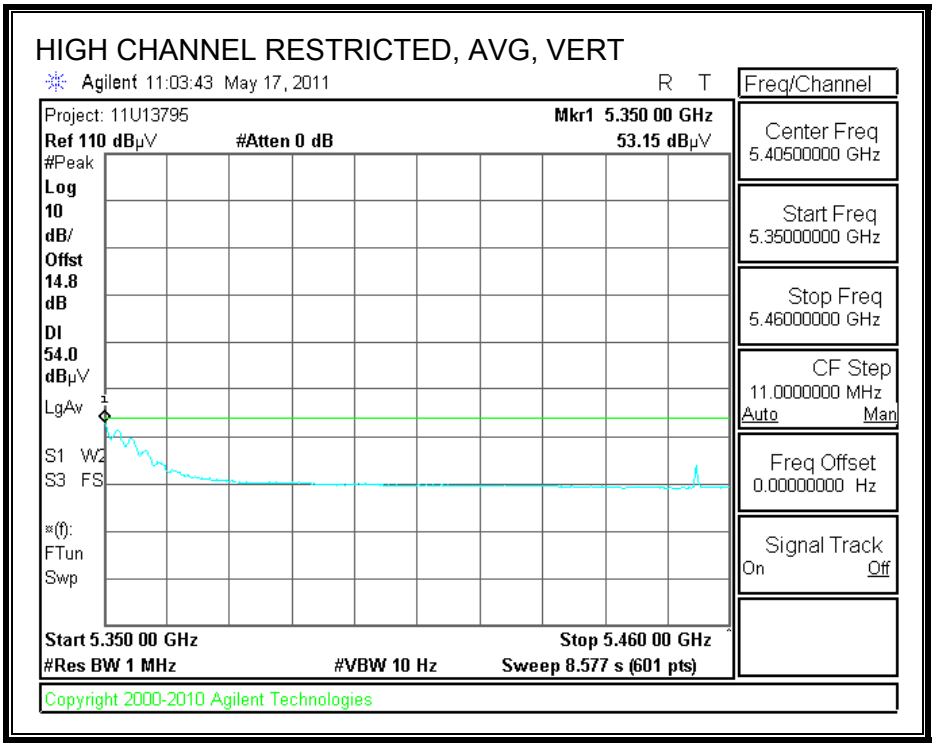
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

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

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

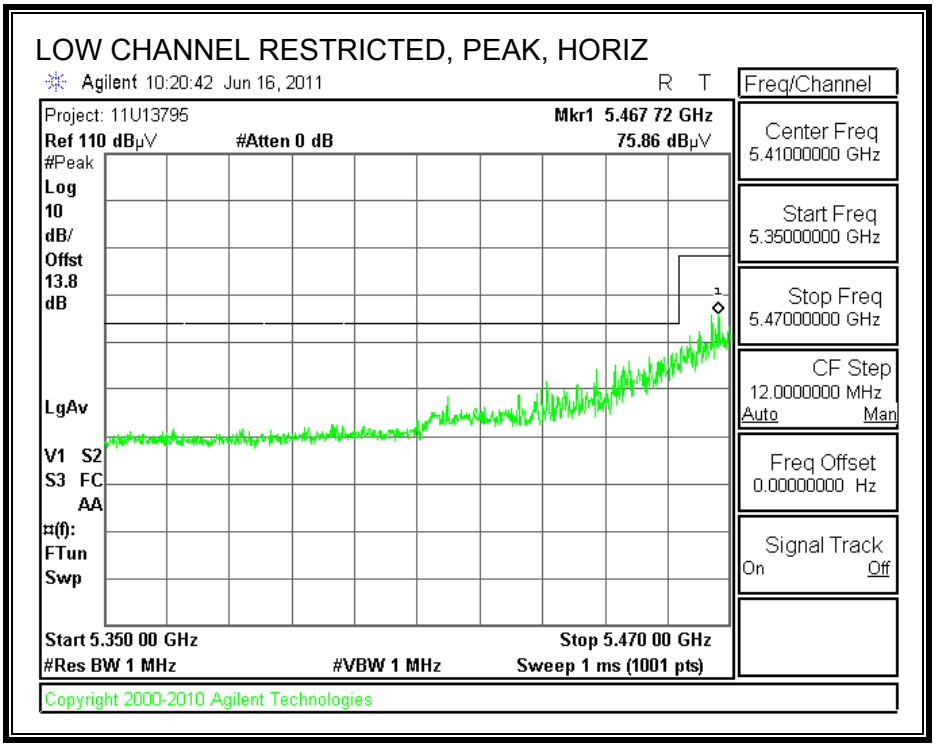
Average Field Strength Limit
Peak Field Strength Limit
Margin vs. Average Limit
Margin vs. Peak Limit

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5270MHz 11n, HT40													
15.810	3.0	35.7	37.7	11.5	-32.2	0.0	0.0	52.8	74.0	-21.2	V	P	
15.810	3.0	23.4	37.7	11.5	-32.2	0.0	0.0	40.4	54.0	-13.6	V	A	
15.810	3.0	33.8	37.7	11.5	-32.2	0.0	0.0	50.8	74.0	-23.2	H	P	
15.810	3.0	21.9	37.7	11.5	-32.2	0.0	0.0	38.9	54.0	-15.1	H	A	
5310MHz 11n, HT40													
10.620	3.0	34.7	37.6	9.1	-32.6	0.0	0.0	48.7	74.0	-25.3	H	P	
10.620	3.0	22.4	37.6	9.1	-32.6	0.0	0.0	36.4	54.0	-17.6	H	A	
15.930	3.0	33.8	37.4	11.5	-32.1	0.0	0.0	50.5	74.0	-23.5	H	P	
15.930	3.0	21.4	37.4	11.5	-32.1	0.0	0.0	38.2	54.0	-15.8	H	A	
5310MHz 11n, HT40													
10.620	3.0	39.9	37.6	9.1	-32.6	0.0	0.0	53.9	74.0	-20.1	V	P	
10.620	3.0	23.3	37.6	9.1	-32.6	0.0	0.0	37.3	54.0	-16.7	V	A	
15.930	3.0	33.6	37.4	11.5	-32.1	0.0	0.0	50.4	74.0	-23.6	V	P	
15.930	3.0	21.5	37.4	11.5	-32.1	0.0	0.0	38.3	54.0	-15.7	V	A	

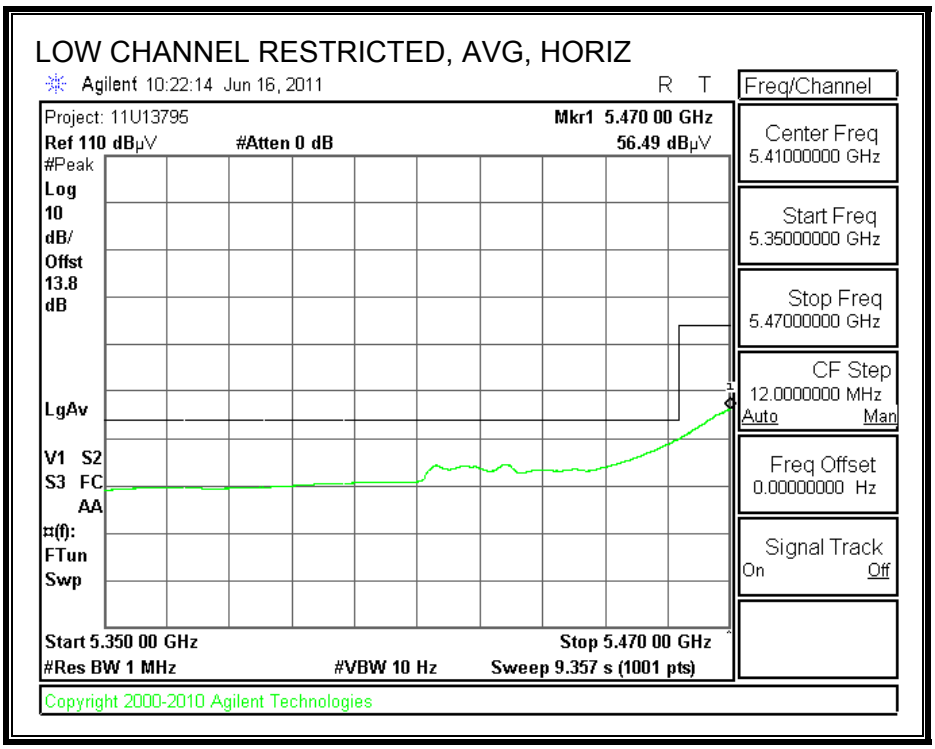
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

8.2.7. TX ABOVE 1 GHz FOR 802.11a MODE IN THE 5.6 GHz BAND

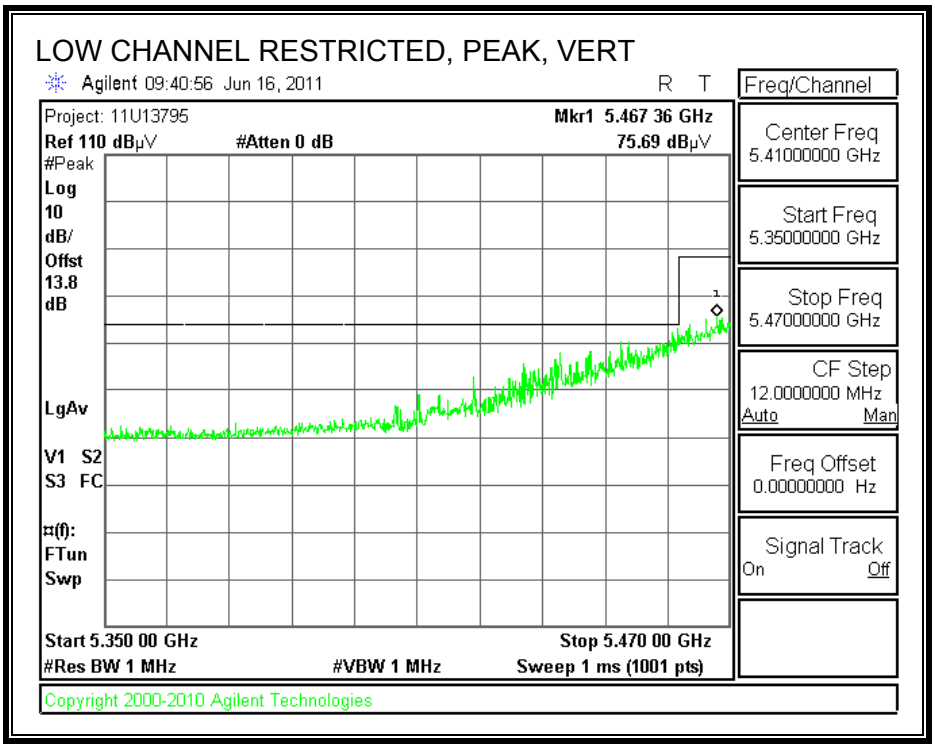
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

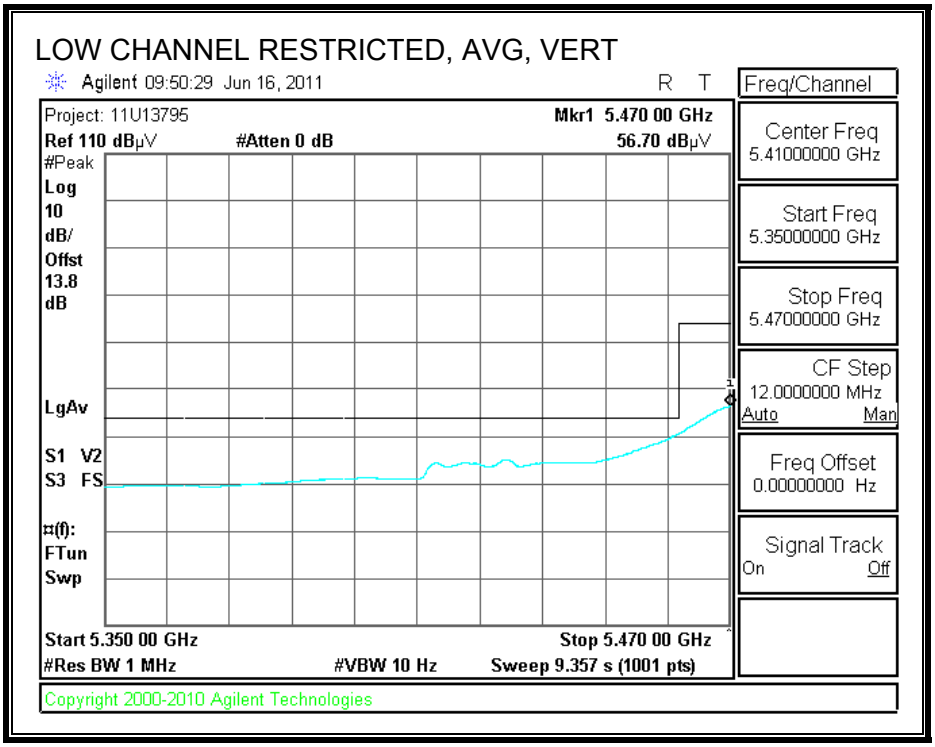


LOW CHANNEL RESTRICTED, AVG, HORIZ

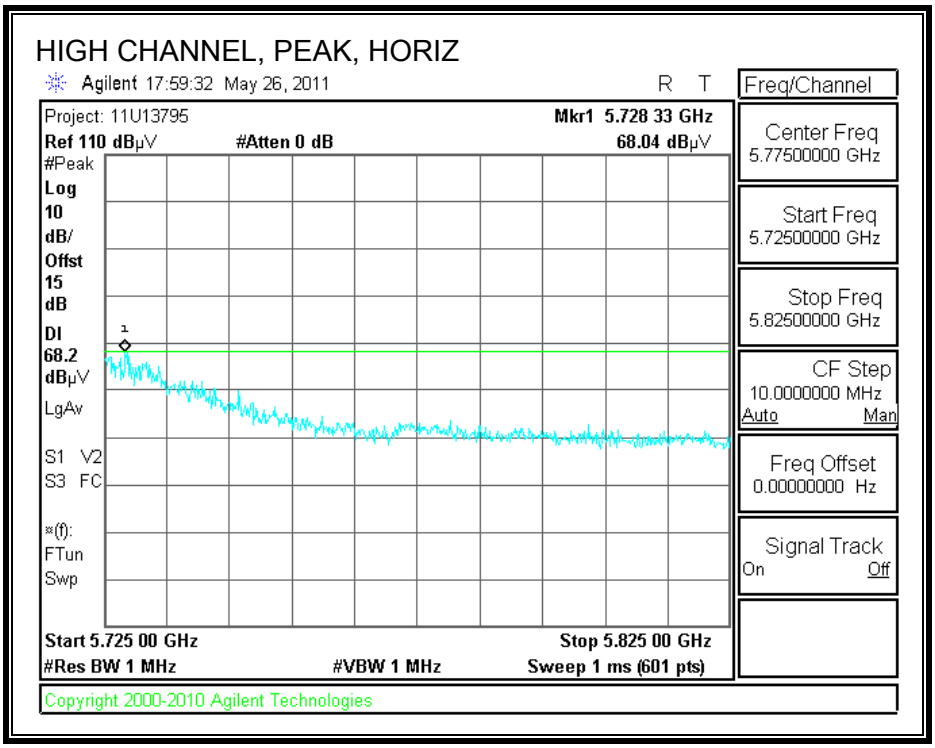


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

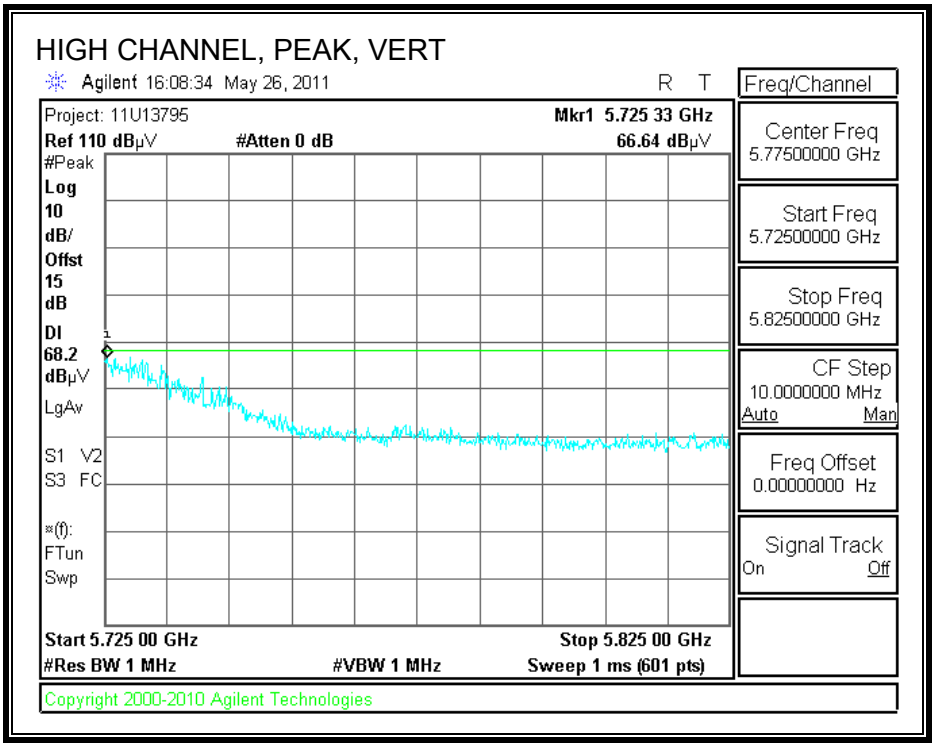




AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/09/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: TX mode, UNII band 5.5GHz 11a

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

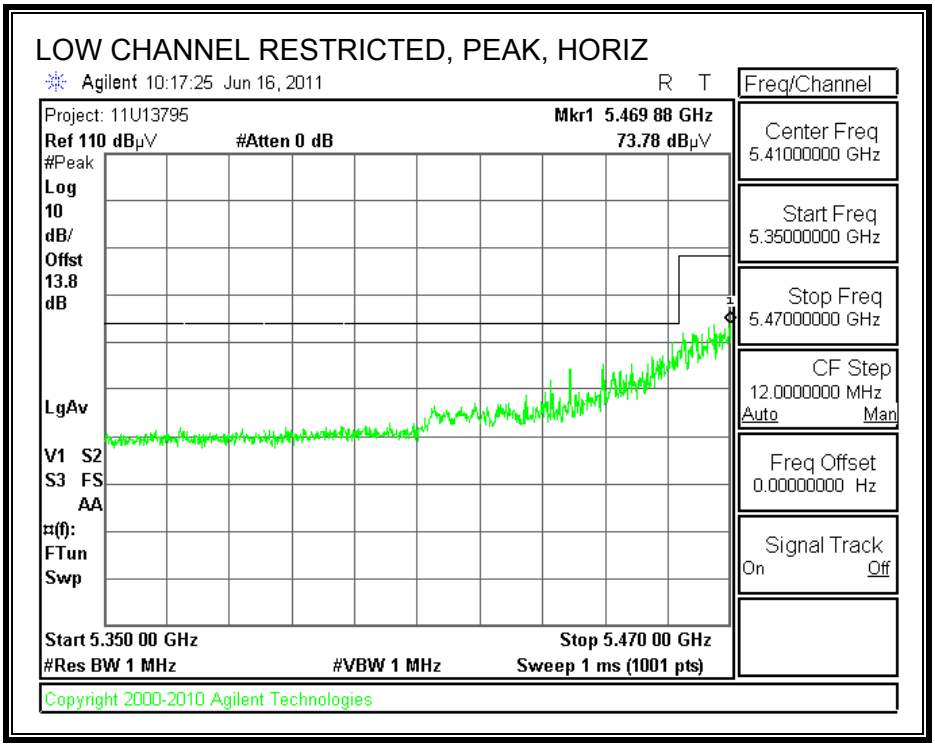
Average Field Strength Limit
Peak Field Strength Limit
Margin vs. Average Limit
Margin vs. Peak Limit

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5500MHz 11a main													
11.000	3.0	48.1	37.6	9.2	-32.6	0.0	0.0	62.3	74.0	-11.7	V	P	
11.000	3.0	34.4	37.6	9.2	-32.6	0.0	0.0	48.6	54.0	-5.4	V	A	
11.000	3.0	38.2	37.6	9.2	-32.6	0.0	0.0	52.4	74.0	-21.6	H	P	
11.000	3.0	24.7	37.6	9.2	-32.6	0.0	0.0	39.0	54.0	-15.0	H	A	
5600MHz 11a main													
11.200	3.0	41.3	37.8	9.3	-32.6	0.0	0.0	55.9	74.0	-18.1	H	P	
11.200	3.0	28.2	37.8	9.3	-32.6	0.0	0.0	42.8	54.0	-11.2	H	A	
11.200	3.0	46.7	37.8	9.3	-32.6	0.0	0.0	61.2	74.0	-12.8	V	P	
11.200	3.0	33.9	37.8	9.3	-32.6	0.0	0.0	48.4	54.0	-5.6	V	A	
5700MHz 11a main													
11.400	3.0	45.2	38.0	9.4	-32.5	0.0	0.0	60.1	74.0	-13.9	V	P	
11.400	3.0	32.4	38.0	9.4	-32.5	0.0	0.0	47.2	54.0	-6.8	V	A	
11.400	3.0	39.0	38.0	9.4	-32.5	0.0	0.0	53.8	74.0	-20.2	H	P	
11.400	3.0	26.2	38.0	9.4	-32.5	0.0	0.0	41.0	54.0	-13.0	H	A	

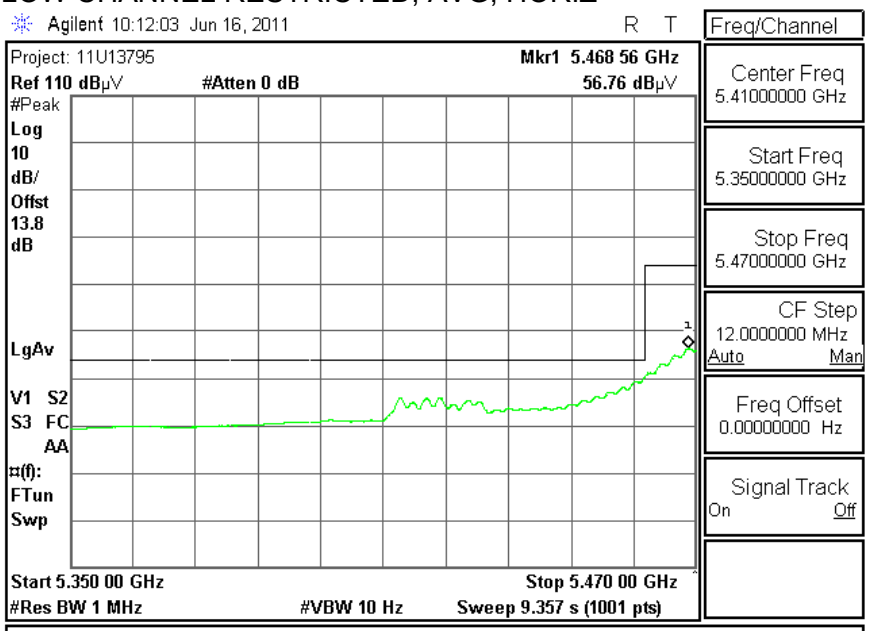
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

8.2.8. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.6 GHz BAND

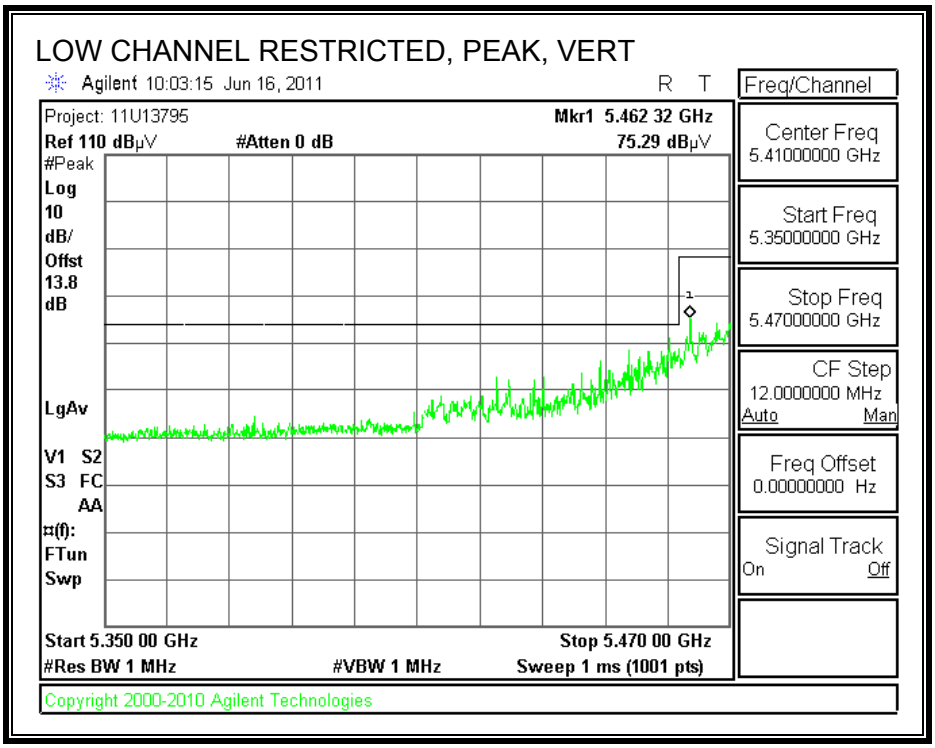
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

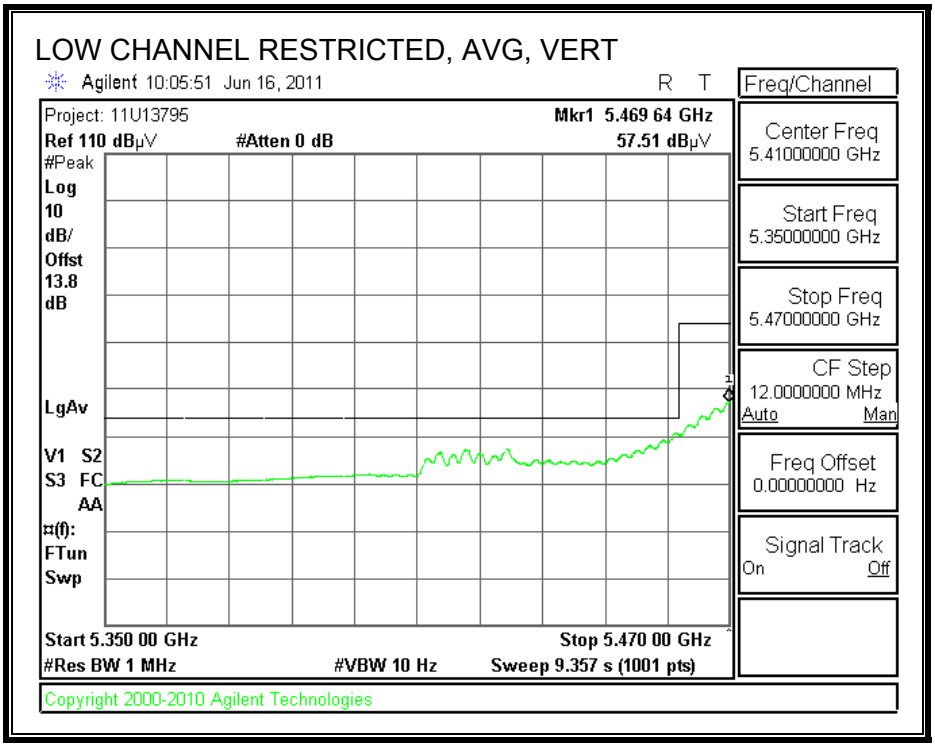


LOW CHANNEL RESTRICTED, AVG, HORIZ

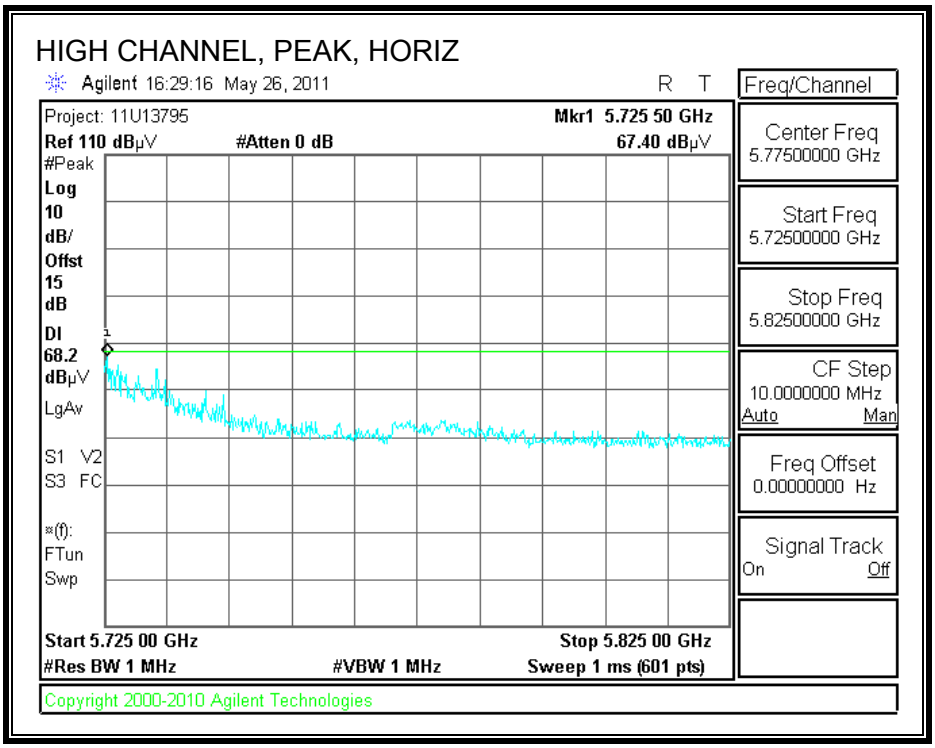


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

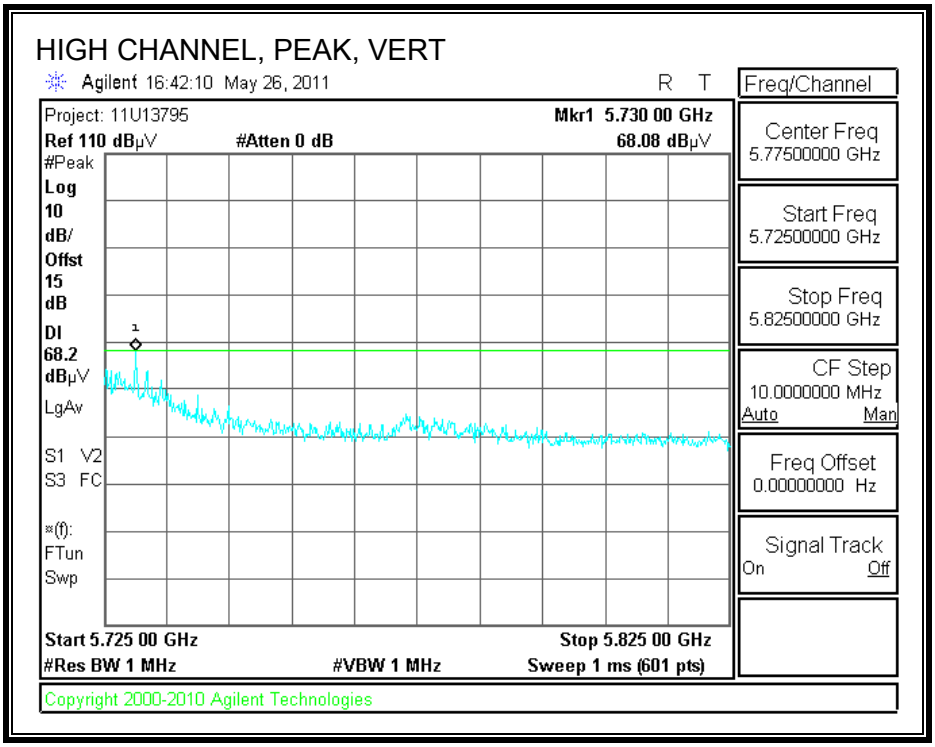




AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/10/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: TX mode, UNII band 5.5GHz 11n HT20

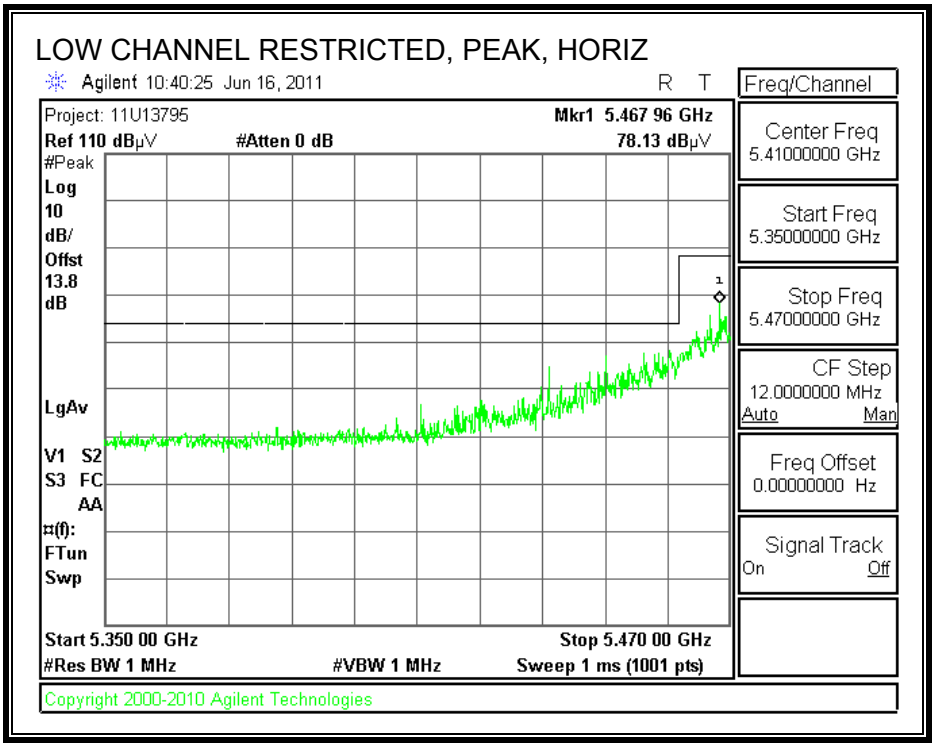
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5500MHz HT20													
11.000	3.0	44.7	37.6	9.2	-32.6	0.0	0.7	59.6	74.0	-14.4	V	P	
11.000	3.0	31.3	37.6	9.2	-32.6	0.0	0.7	46.3	54.0	-7.7	V	A	
5500MHz HT20													
11.000	3.0	38.8	37.6	9.2	-32.6	0.0	0.7	53.8	74.0	-20.2	H	P	
11.000	3.0	25.1	37.6	9.2	-32.6	0.0	0.7	40.1	54.0	-13.9	H	A	
5600MHz HT20													
11.200	3.0	41.2	37.8	9.3	-32.6	0.0	0.7	56.5	74.0	-17.5	H	P	
11.200	3.0	27.9	37.8	9.3	-32.6	0.0	0.7	43.2	54.0	-10.9	H	A	
5600MHz HT20													
11.200	3.0	48.6	37.8	9.3	-32.6	0.0	0.7	63.8	74.0	-10.2	V	P	
11.200	3.0	34.3	37.8	9.3	-32.6	0.0	0.7	49.6	54.0	-4.4	V	A	
5700MHz HT20													
11.400	3.0	33.0	38.0	9.4	-32.5	0.0	0.7	48.6	74.0	-25.4	V	P	
11.400	3.0	21.2	38.0	9.4	-32.5	0.0	0.7	36.7	54.0	-17.3	V	A	
5700MHz HT20													
11.400	3.0	33.2	38.0	9.4	-32.5	0.0	0.7	48.8	74.0	-25.2	H	P	
11.400	3.0	21.2	38.0	9.4	-32.5	0.0	0.7	36.8	54.0	-17.2	H	A	

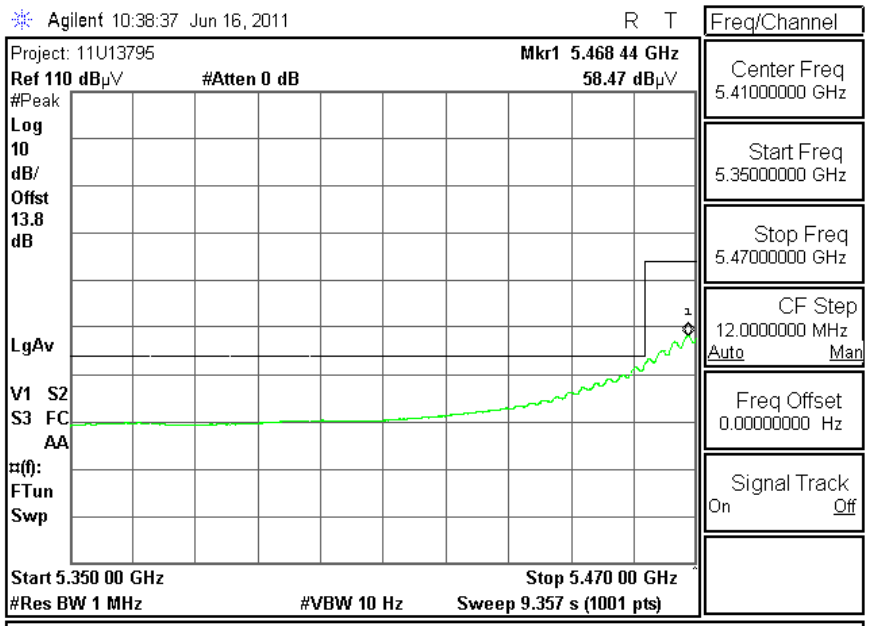
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

8.2.9. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.6 GHz BAND

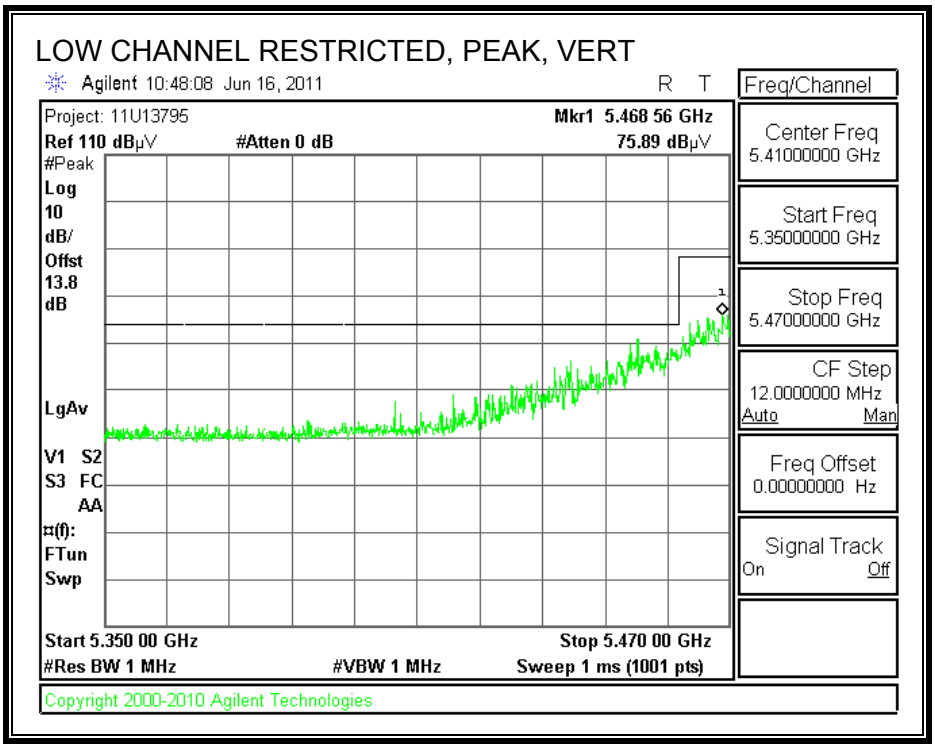
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

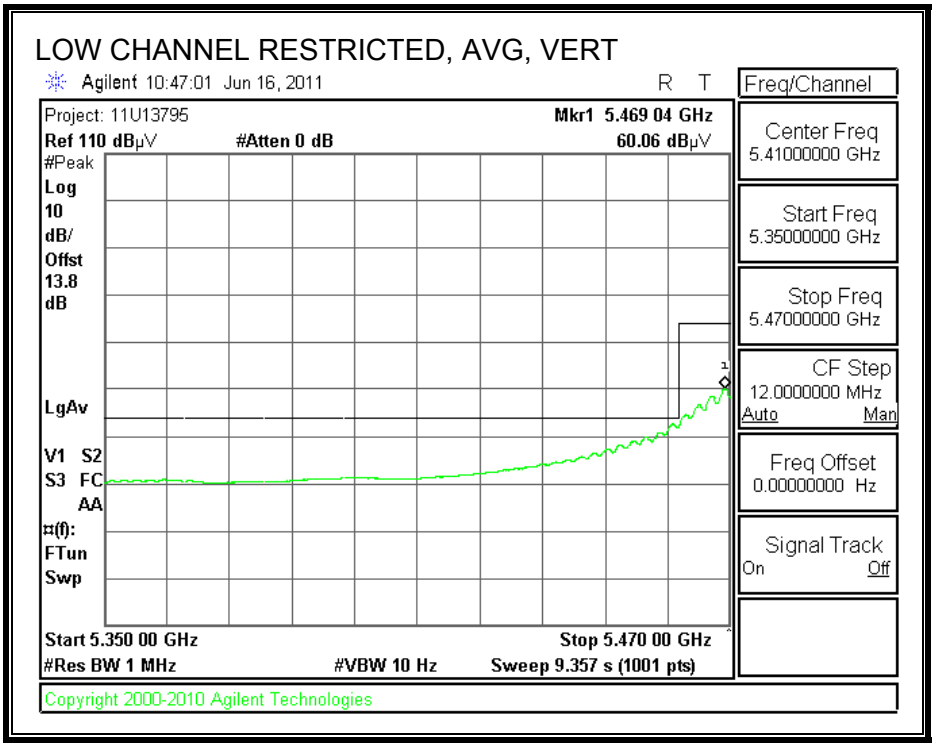


LOW CHANNEL RESTRICTED, AVG, HORIZ

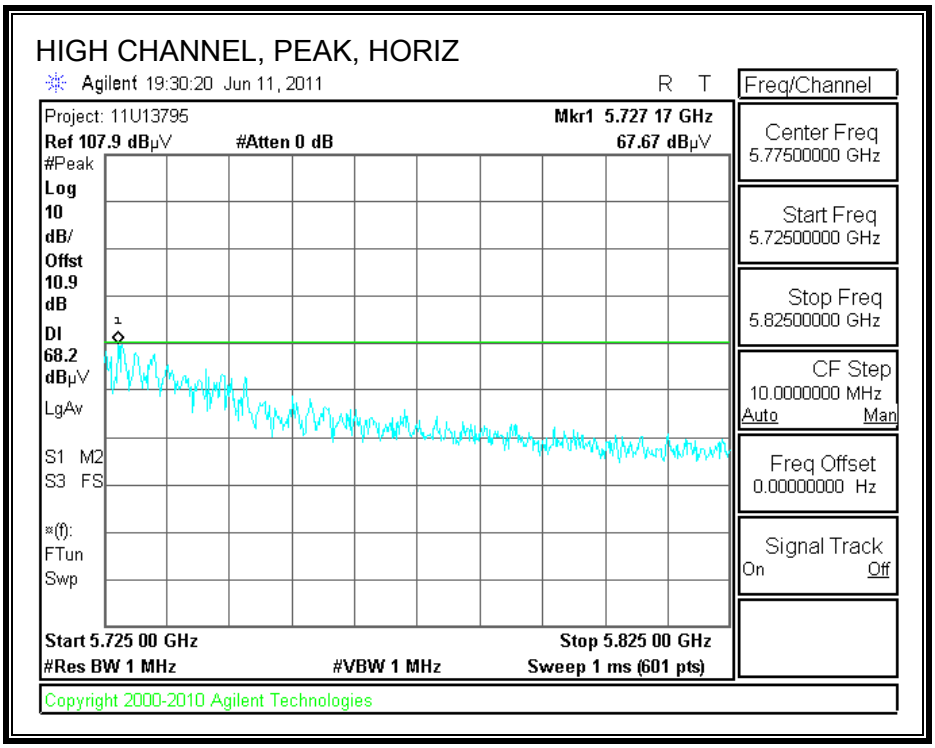


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

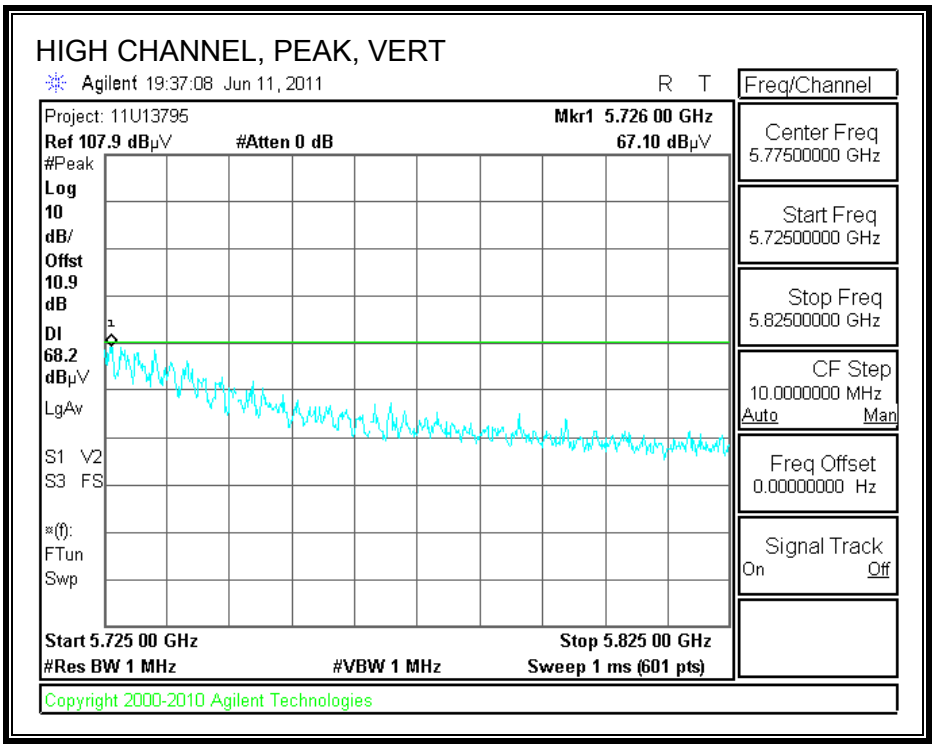




AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 05/10/11
Project #: 11U13795
Company: Broadcom
Test Target: FCC Class B
Mode Oper: TX mode, UNII band 5.5GHz 11n HT40

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5510MHz HT40													
11.020	3.0	35.8	37.6	9.2	-32.6	0.0	0.7	50.8	74.0	-23.2	V	P	
11.020	3.0	22.4	37.6	9.2	-32.6	0.0	0.7	37.4	54.0	-16.6	V	A	
11.020	3.0	35.6	37.6	9.2	-32.6	0.0	0.7	50.6	74.0	-23.4	H	P	
11.020	3.0	21.9	37.6	9.2	-32.6	0.0	0.7	36.9	54.0	-17.1	H	A	
5590MHz HT40													
11.180	3.0	40.7	37.7	9.3	-32.6	0.0	0.7	55.9	74.0	-18.1	H	P	
11.180	3.0	27.7	37.7	9.3	-32.6	0.0	0.7	43.0	54.0	-11.0	H	A	
11.180	3.0	49.8	37.7	9.3	-32.6	0.0	0.7	65.1	74.0	-8.9	V	P	
11.180	3.0	36.4	37.7	9.3	-32.6	0.0	0.7	51.6	54.0	-2.4	V	A	
5670MHz HT40													
11.340	3.0	42.0	37.9	9.4	-32.6	0.0	0.7	57.5	74.0	-16.5	V	P	
11.340	3.0	28.2	37.9	9.4	-32.6	0.0	0.7	43.7	54.0	-10.3	V	A	
11.340	3.0	37.5	37.9	9.4	-32.6	0.0	0.7	52.9	74.0	-21.1	H	P	
11.340	3.0	24.1	37.9	9.4	-32.6	0.0	0.7	39.6	54.0	-14.4	H	A	

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

8.3. RECEIVER ABOVE 1 GHz

8.3.1. RECEIVER ABOVE 1 GHz FOR 20 MHz BANDWIDTH

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Broadcom
Project #: 11U13795
Date: 6/3/2011
Test Engineer: Tom Chen
Configuration: EUT with support Laptop PC
Mode: RX mode, HT20

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B			RX RSS 210

Hi Frequency Cables

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

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.408	3.0	54.2	39.1	25.8	2.8	-37.7	0.0	0.0	45.2	30.1	74	54	-28.8	-23.9	H
2.200	3.0	49.8	31.2	27.9	3.6	-36.6	0.0	0.0	44.8	26.2	74	54	-29.2	-27.8	H
2.488	3.0	61.7	47.1	28.3	3.9	-36.3	0.0	0.0	57.7	43.0	74	54	-16.3	-11.0	H
1.336	3.0	55.7	38.7	25.6	2.8	-37.8	0.0	0.0	46.2	29.2	74	54	-27.8	-24.8	V
1.504	3.0	57.6	35.8	26.1	2.9	-37.6	0.0	0.0	49.1	27.4	74	54	-24.9	-26.6	V
2.488	3.0	62.0	45.2	28.3	3.9	-36.3	0.0	0.0	57.9	41.2	74	54	-16.1	-12.8	V

Rev. 07.22.09

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

8.3.2. RECEIVER ABOVE 1 GHz FOR 40 MHz BANDWIDTH

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Broadcom
Project #: 11U13795
Date: 6/3/2011
Test Engineer: Tom Chen
Configuration: EUT with support Laptop PC
Mode: RX mode, HT40

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B			RX RSS 210

Hi Frequency Cables

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

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.384	3.0	53.2	30.1	25.7	2.8	-37.7	0.0	0.0	44.0	20.9	74	54	-30.0	-33.1	H
2.008	3.0	49.5	29.3	27.8	3.5	-36.9	0.0	0.0	43.9	23.7	74	54	-30.1	-30.3	H
2.488	3.0	59.9	44.4	28.3	3.9	-36.3	0.0	0.0	55.8	40.3	74	54	-18.2	-13.7	H
1.336	3.0	54.2	31.3	25.6	2.8	-37.8	0.0	0.0	44.8	21.8	74	54	-29.2	-32.2	V
1.504	3.0	53.9	29.4	26.1	2.9	-37.6	0.0	0.0	45.4	21.0	74	54	-28.6	-33.0	V
2.008	3.0	53.6	31.6	27.8	3.5	-36.9	0.0	0.0	48.1	26.1	74	54	-25.9	-27.9	V
2.488	3.0	63.5	47.1	28.3	3.9	-36.3	0.0	0.0	59.5	43.1	74	54	-14.5	-10.9	V

Rev. 07.22.09

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

8.4. WORST-CASE BELOW 1 GHz

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

HORIZONTAL AND VERTICAL DATA

30-1000 MHz HORIZONTAL

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

30-1000 MHz VERTICAL

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

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

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

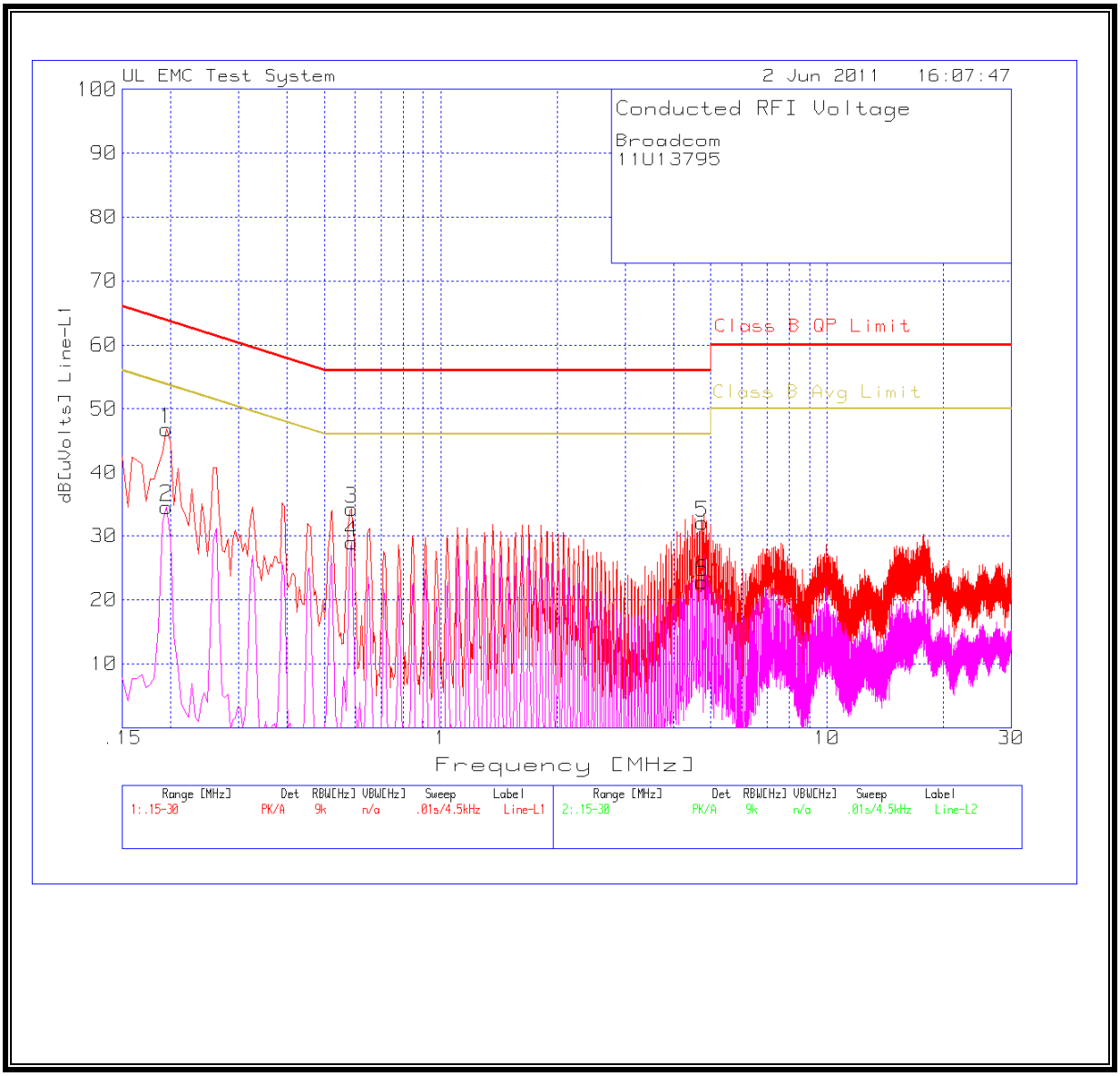
RESULTS

6 WORST EMISSIONS

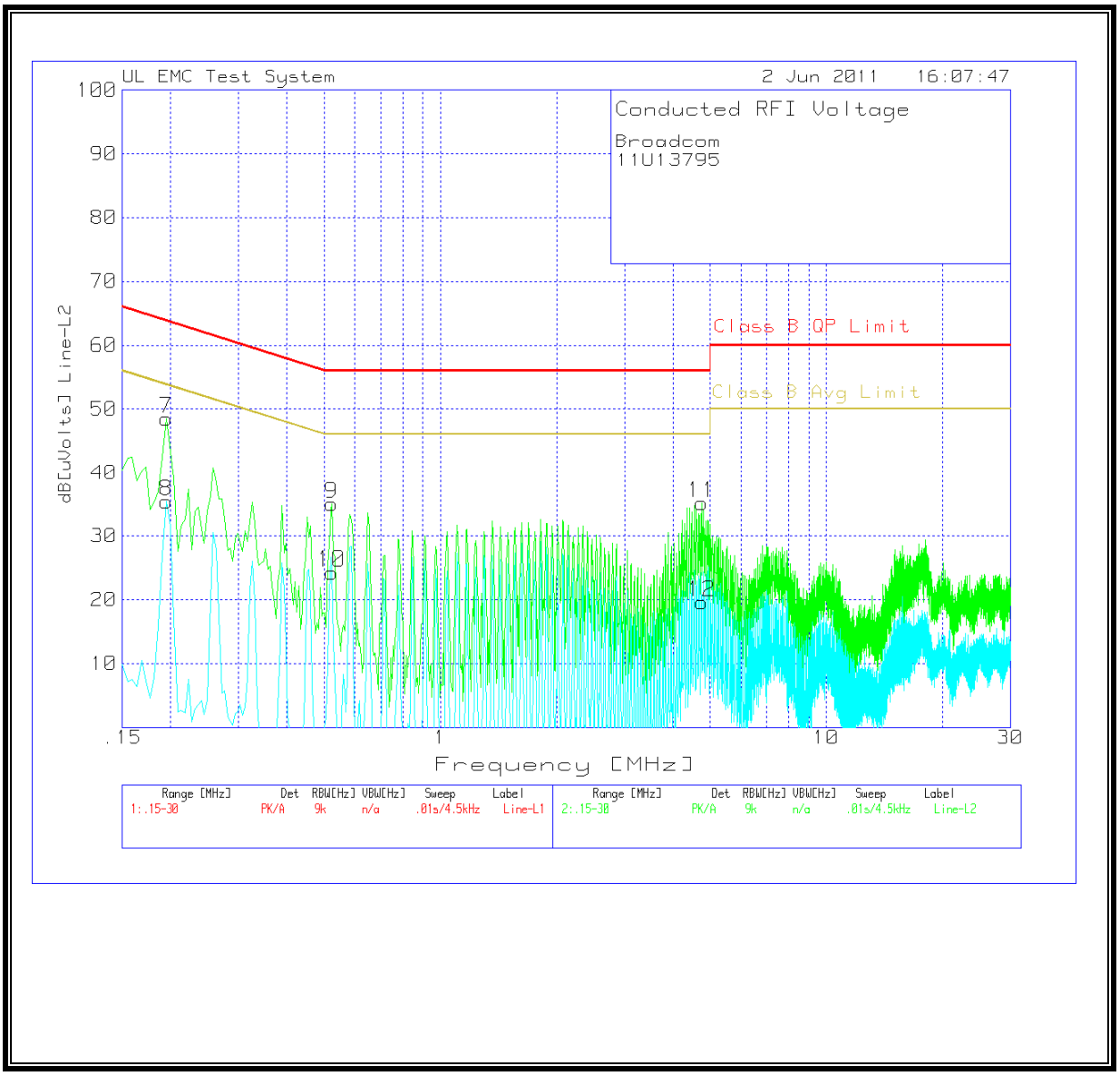
Line-L1 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN [dB]	Conducted Emission Cable [dB]	dB[uVolts]	Class B QP Limit	Margin	Class B Avg Limit	Margin
0.195	46.84	PK	0	0	46.84	63.8	-16.96	53.8	-6.96
0.195	34.56	Av	0	0	34.56	63.8	-29.24	53.8	-19.24
0.5865	34.25	PK	0	0	34.25	56	-21.75	46	-11.75
0.5865	29.01	Av	0	0	29.01	56	-26.99	46	-16.99
4.749	32.05	PK	0	0	32.05	56	-23.95	46	-13.95
4.749	22.87	Av	0	0	22.87	56	-33.13	46	-23.13

Line-L2 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN [dB]	Conducted Emission Cable [dB]	dB[uVolts]	Class B QP Limit	Margin	Class B Avg Limit	Margin
0.195	48.51	PK	0	0	48.51	63.8	-15.29	53.8	-5.29
0.195	35.39	Av	0	0	35.39	63.8	-28.41	53.8	-18.41
0.5235	35.05	PK	0	0	35.05	56	-20.95	46	-10.95
0.5235	24.28	Av	0	0	24.28	56	-31.72	46	-21.72
4.749	35.15	PK	0	0	35.15	56	-20.85	46	-10.85
4.749	19.59	Av	0	0	19.59	56	-36.41	46	-26.41

LINE 1 RESULTS



LINE 2 RESULTS



10. DYNAMIC FREQUENCY SELECTION

10.1. OVERVIEW

10.1.1. LIMITS

INDUSTRY CANADA

IC RSS-210 is closely harmonized with FCC Part 15 DFS rules. The deviations are as follows:

RSS-210 Issue 7 A9.4 (b) (ii) **Channel Availability Check Time:** …

Additional requirements for the band 5600-5650 MHz: Until further notice, devices subject to this Section shall not be capable of transmitting in the band 5600-5650 MHz, so that Environment Canada weather radars operating in this band are protected.

RSS-210 Issue 7 A9.4 (b) (iv) **Channel closing time:** the maximum channel closing time is 260 ms.

FCC

§15.407 (h) and FCC 06-96 APPENDIX "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVCIES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION".

Table 1: Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode		
	Master	Client (without radar detection)	Client (with radar detection)
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
Uniform Spreading	Yes	Not required	Not required

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client **(without DFS)**	Client **(with DFS)**
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes

Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.

Table 4: DFS Response requirement values

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds
Channel Closing Transmission Time	200 milliseconds + approx. 60 milliseconds over remaining 10 second period
The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows: For the Short pulse radar Test Signals this instant is the end of the *Burst*. For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated. For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission. The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.	

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (Microseconds)	PRI (Microseconds)	Pulses	Minimum Percentage of Successful Detection	Minimum Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Table 6 – Long Pulse Radar Test Signal

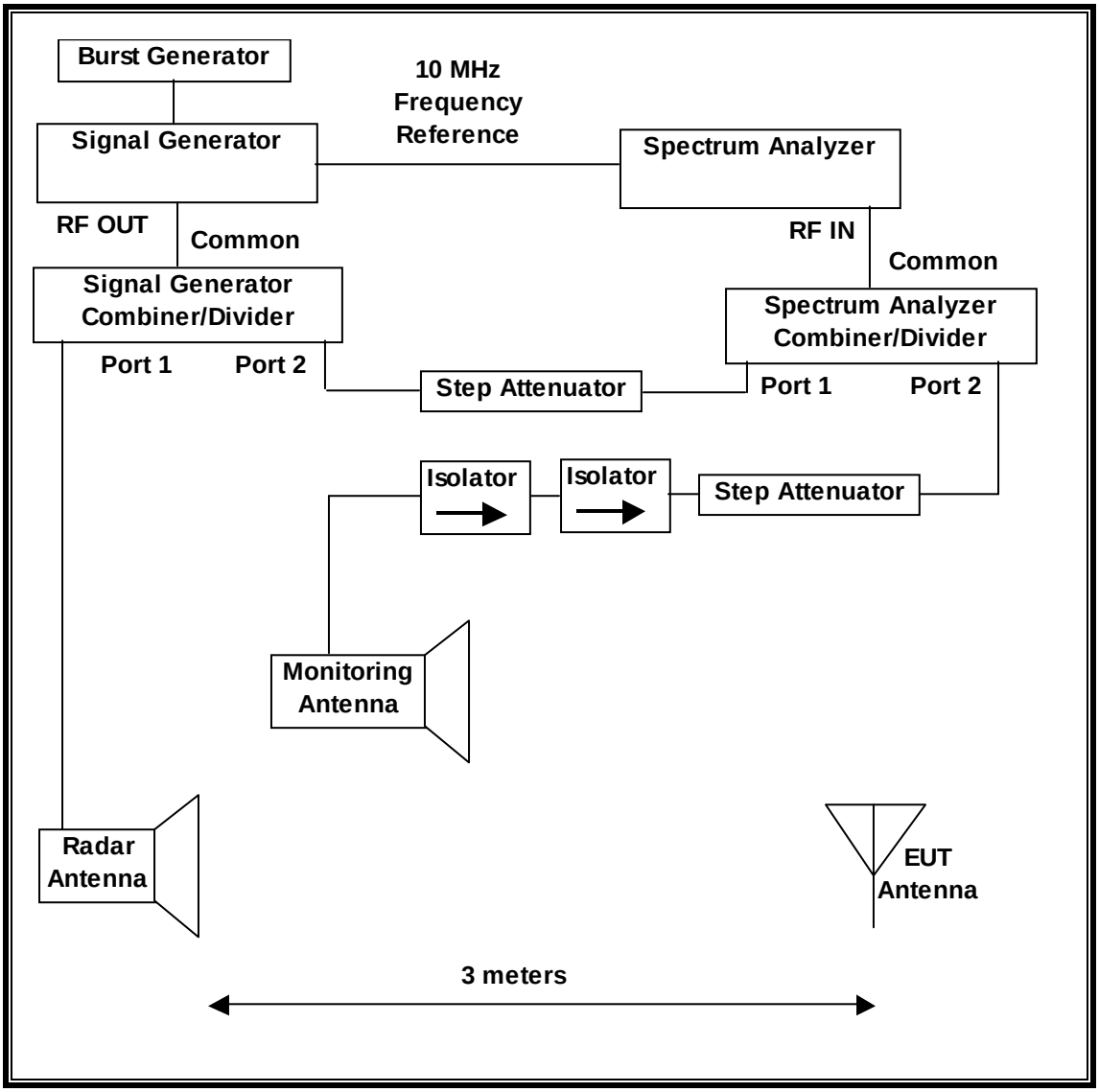
Radar Waveform	Bursts	Pulses per Burst	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

Table 7 – Frequency Hopping Radar Test Signal

Radar Waveform	Pulse Width (µsec)	PRI (µsec)	Burst Length (ms)	Pulses per Hop	Hopping Rate (kHz)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	300	9	.333	70%	30

10.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Freqeuncy Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from F_L to F_H for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. The Reference Level Offset of the spectrum analyzer is adjusted so that the displayed amplitude of the signal is –64 dBm.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the distance between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. The video test file is streamed to generate WLAN traffic. The monitoring antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

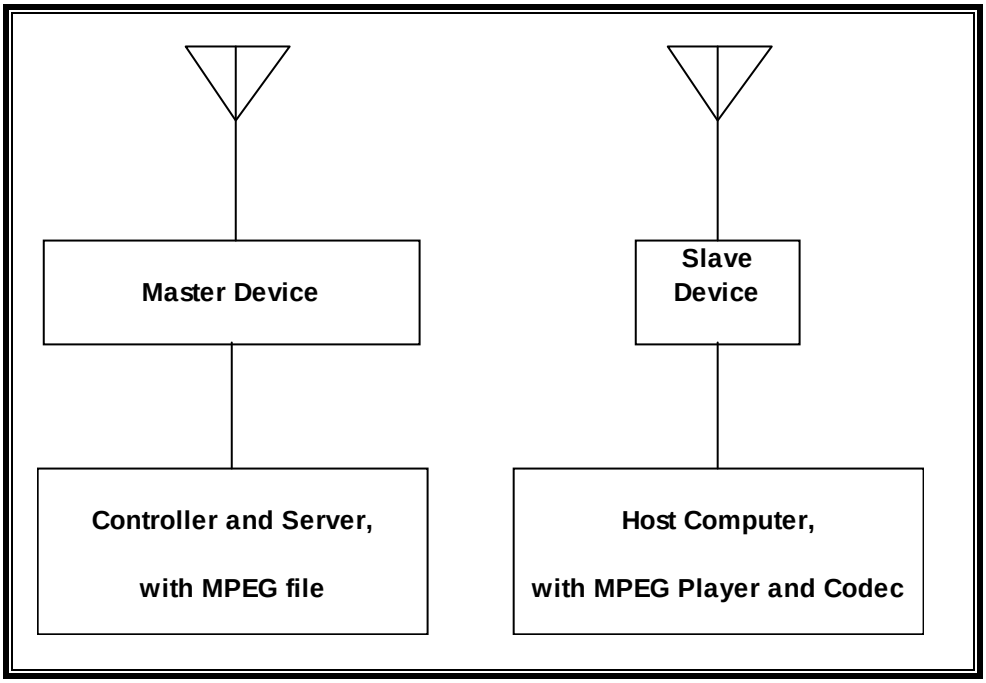
TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00169	04/07/12
Vector Signal Generator, 20GHz	Agilent / HP	E8267C	C01066	02/12/12

10.1.3. SETUP OF EUT

RADIATED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

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

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter (Slave)	Lenovo	PA-1650-56LC	11S36001651	DOC
Laptop (Slave)	Lenovo	G560	CBU4493771	DOC
AC Adapter (Master Laptop)	HP	PPP017L	5400986601	DOC
Laptop(Master)	HP	ZV6000	CND52904S1	DOC
Master AP	Netgear	N600	2BK311730FF6B	PY309300116
AC Adapter (Master AP)	Netgear	FA-1201500S5A	332-10209-01	DOC

10.1.4. DESCRIPTION OF EUT

The EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges.

The EUT is a Slave Device without Radar Detection.

The highest power level within these bands is 25.7 dBm EIRP.

The antenna assembly utilized with the EUT has a gain of 5.6 dBi in the 5250-5350 MHz band and 4.2 dBi in the 5470-5725 MHz band.

The EUT uses two transmitter/receiver chains each connected to an antenna to perform radiated tests.

WLAN traffic is generated by streaming the video file TestFile.mp2 “6 ½ Magic Hours” from the Master to the Slave in full motion video mode using the media player with the V2.61 Codec package.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm), however TPC is implemented.

The EUT utilizes the 802.11a/n architecture. Two nominal channel bandwidths are implemented: 20 MHz and 40 MHz.

The EUT driver software installed during testing was Broadcom revision 5.100.82.20.

MANUFACTURER’S STATEMENT REGARDING UNIFORM CHANNEL SPREADING

This is not Applicable for Slave Devices.

OVERVIEW OF MASTER DEVICE WITH RESPECT TO §15.407 (h) REQUIREMENTS

The Master Device is a Netgear N600 Dual Band Router, FCC ID: PY30930116. The DFS software installed in the Master Device is Linux revision 5.22.84.0. The minimum antenna gain for the Master Device is 2.73 dBi.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm.

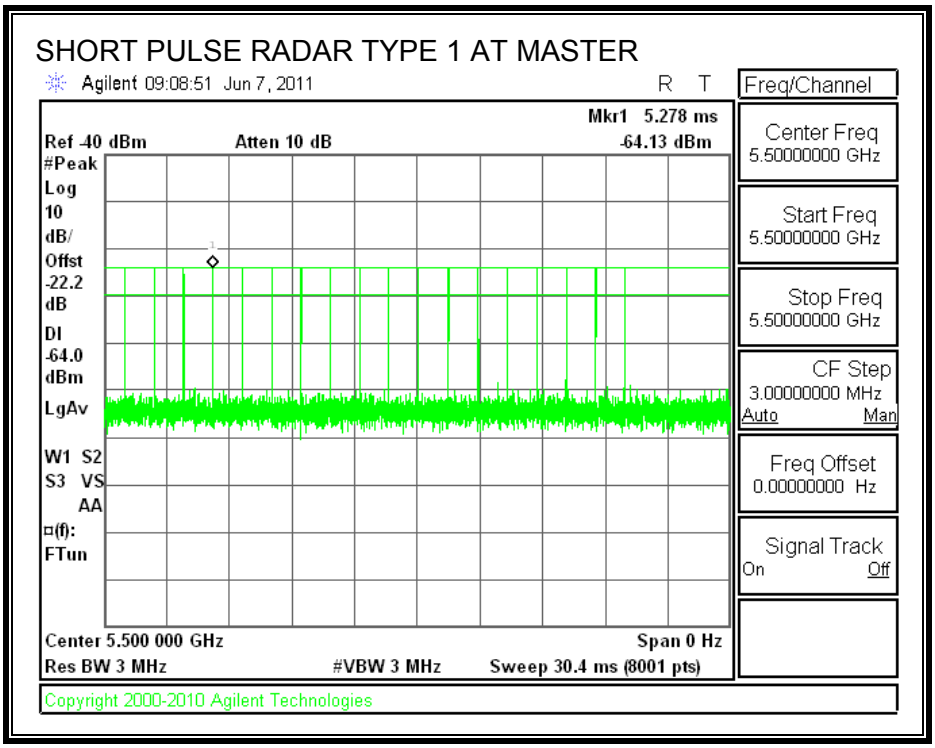
10.2. RESULTS FOR 20 MHz BANDWIDTH

10.2.1. TEST CHANNEL

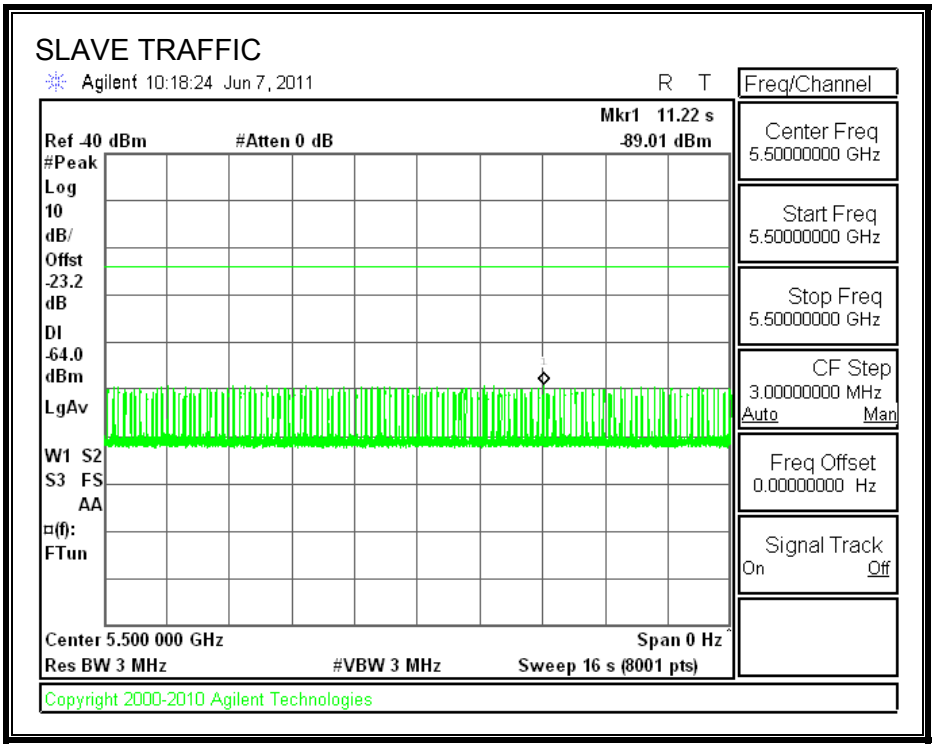
All tests were performed at a channel center frequency of 5500 MHz.

10.2.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



TRAFFIC



10.2.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

10.2.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

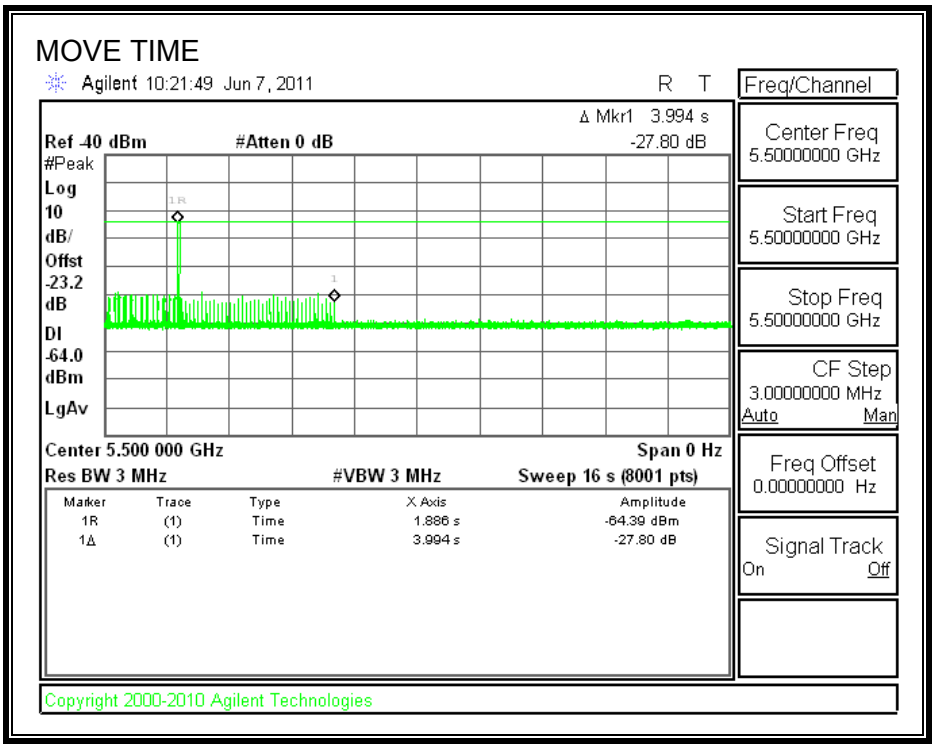
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

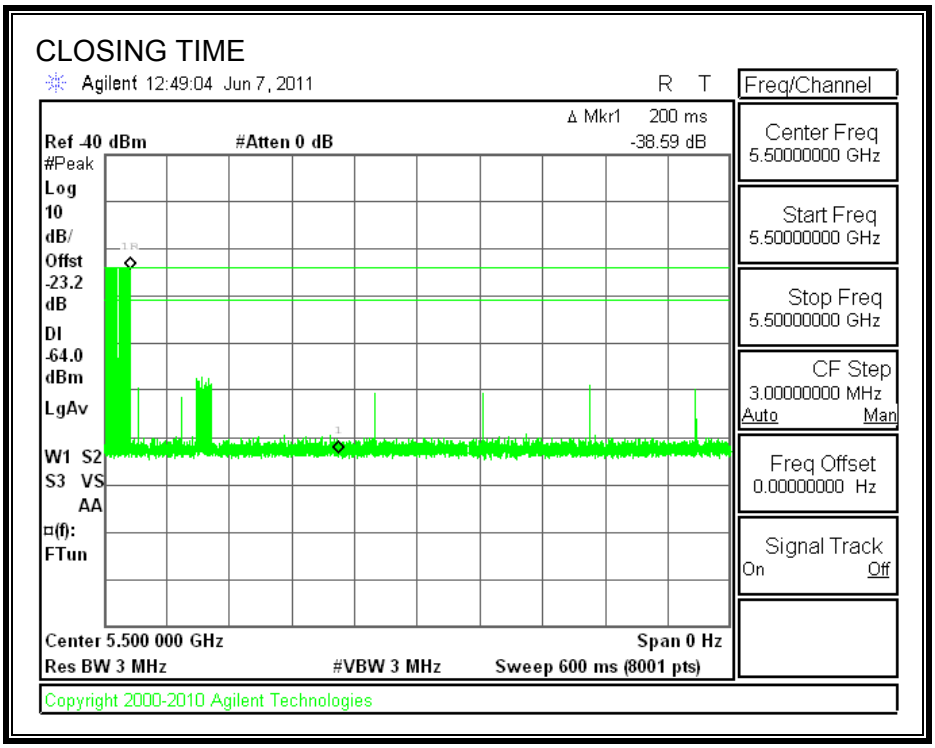
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	3.994	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	24.4	60
IC	37.5	260

MOVE TIME



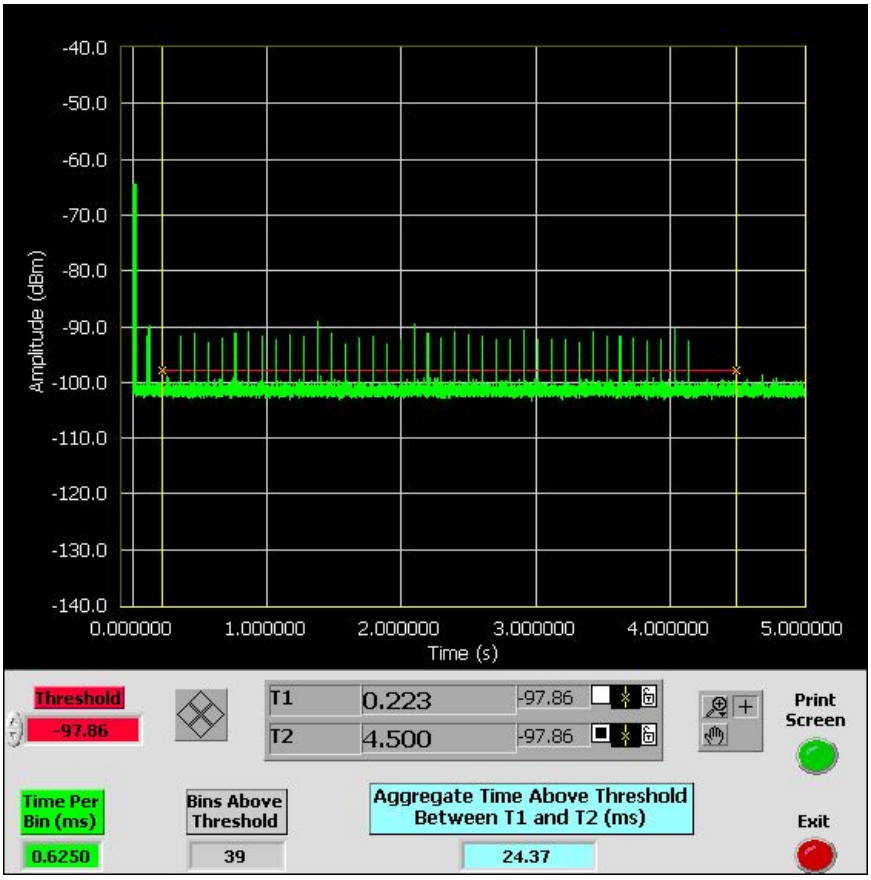
CHANNEL CLOSING TIME



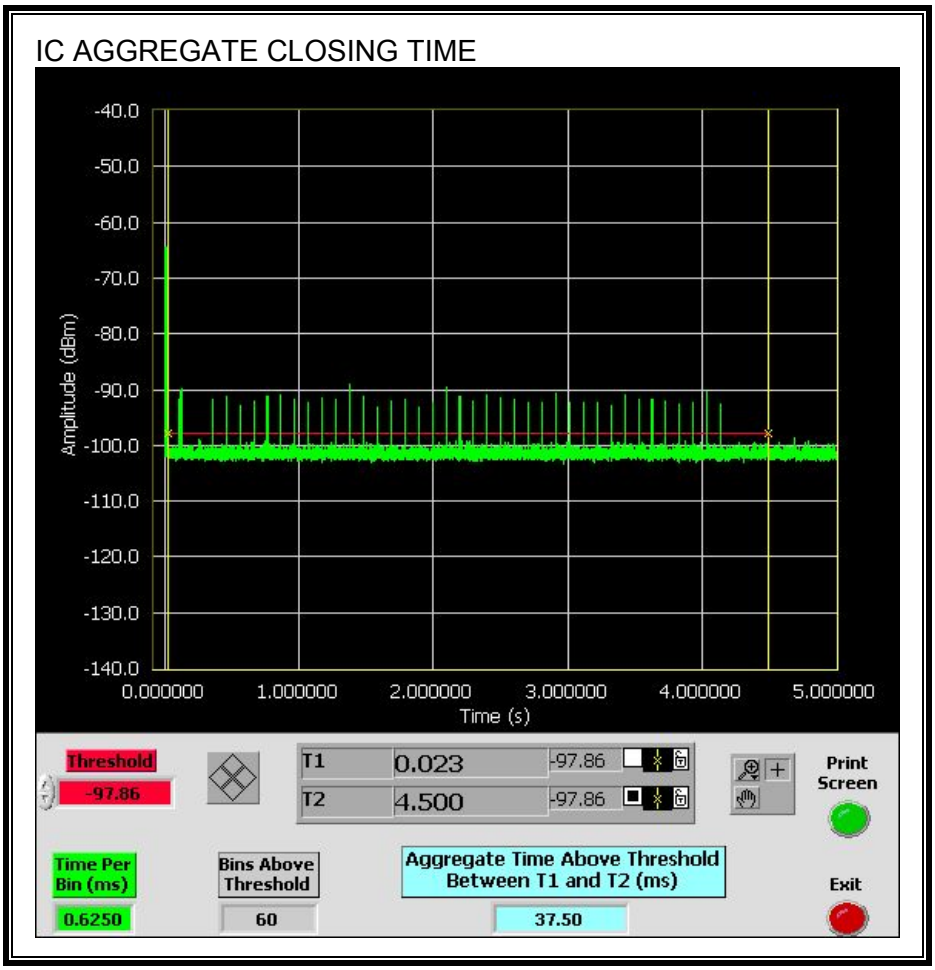
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

Only intermittent transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME



Only intermittent transmissions are observed during the IC aggregate monitoring period.



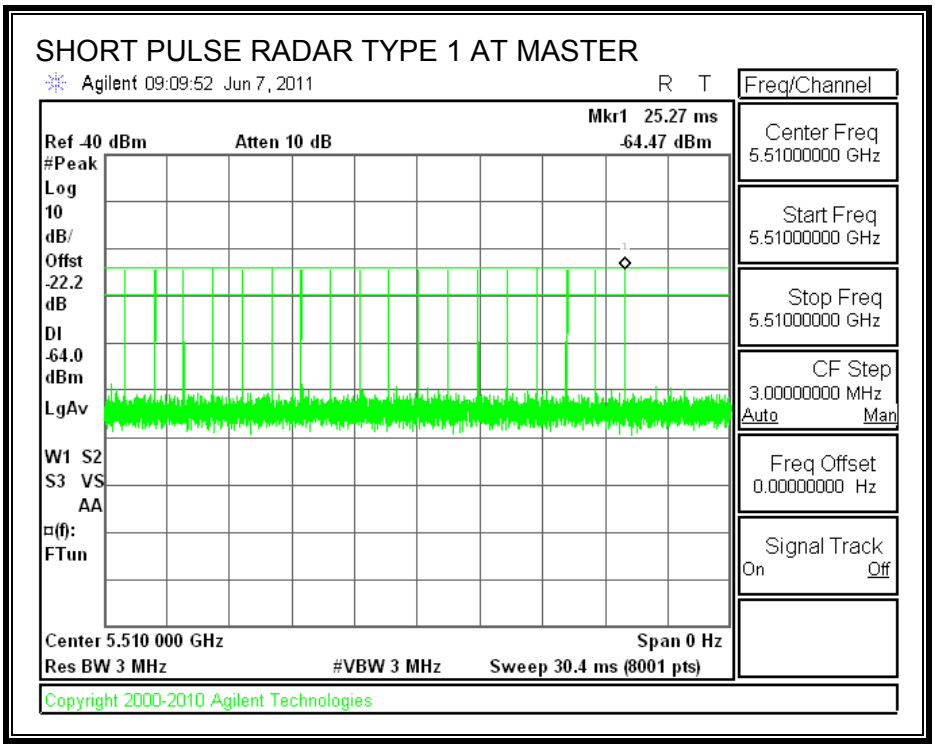
10.3. RESULTS FOR 40 MHz BANDWIDTH

10.3.1. TEST CHANNEL

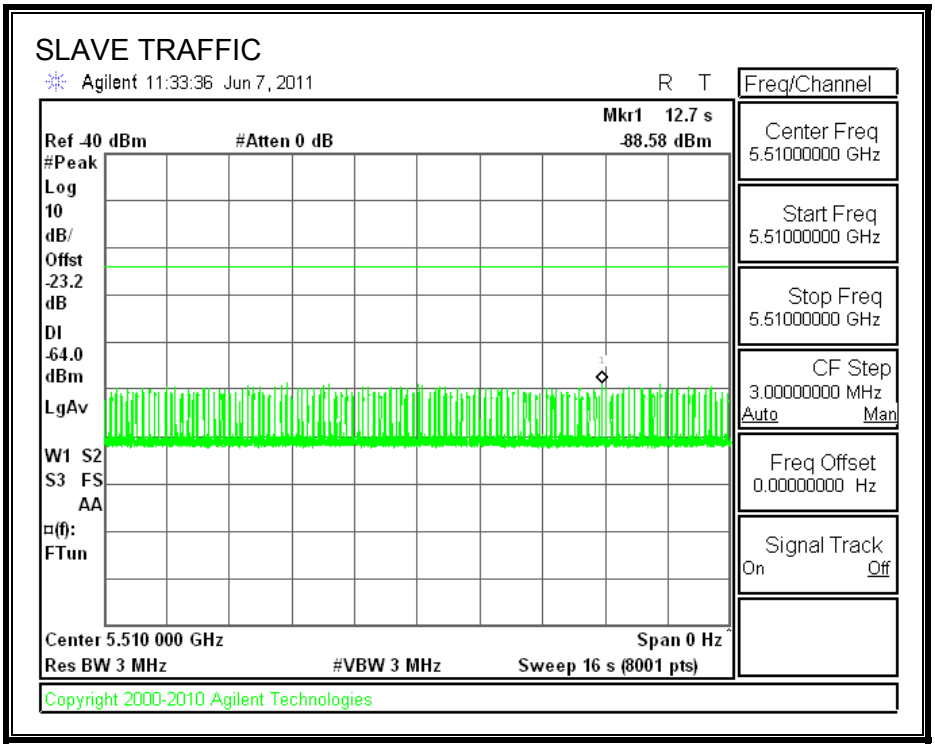
All tests were performed at a channel center frequency of 5510 MHz.

10.3.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



TRAFFIC



10.3.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

10.3.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

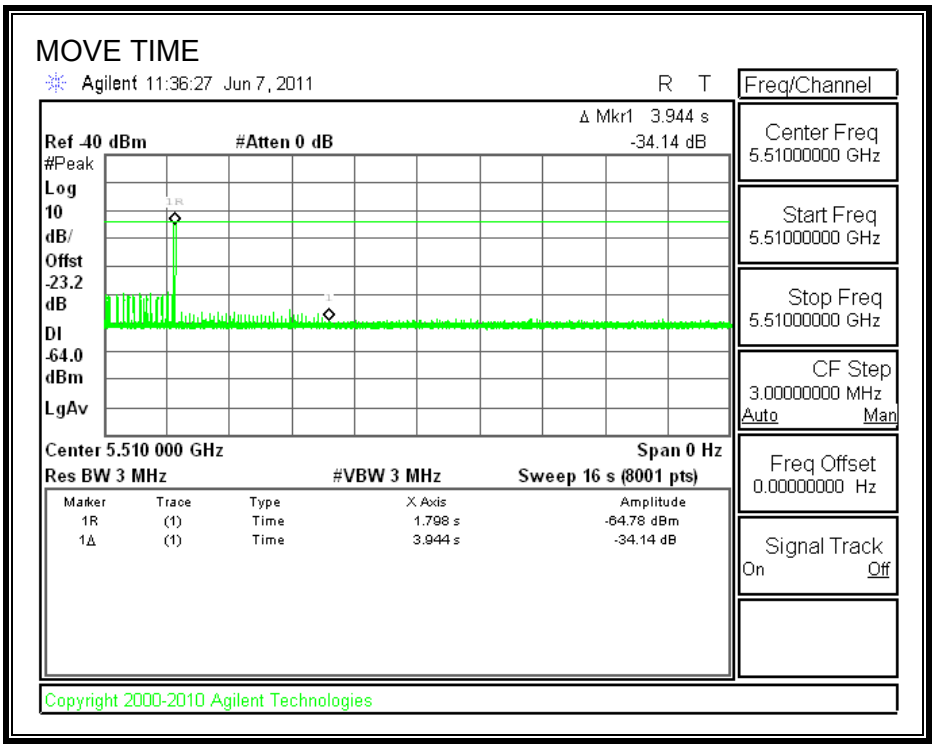
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

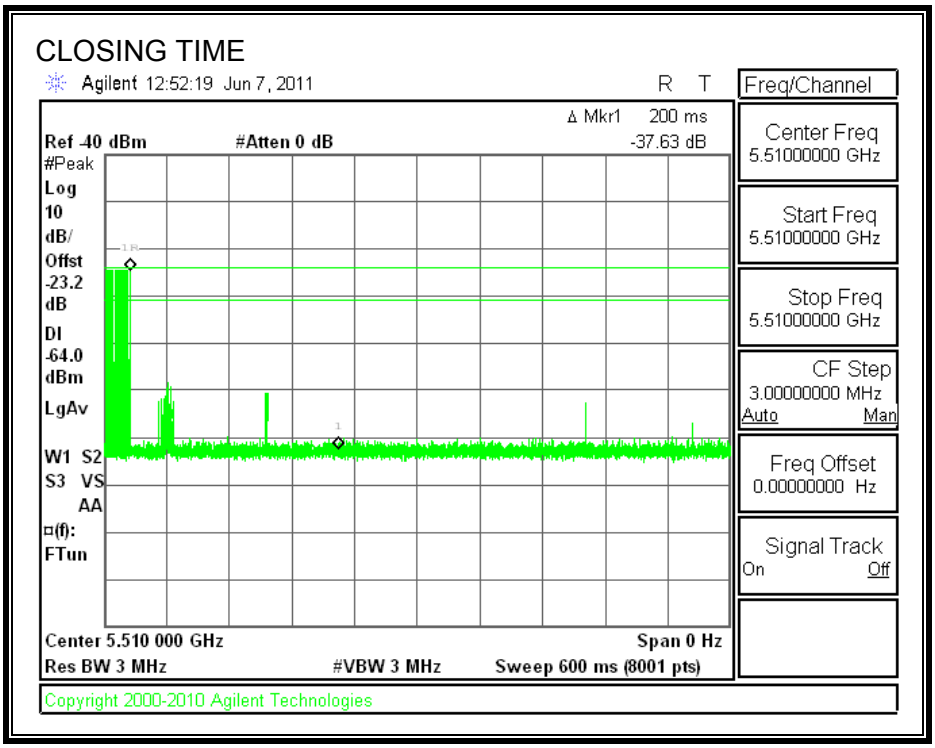
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	3.944	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	25.0	60
IC	25.6	260

MOVE TIME

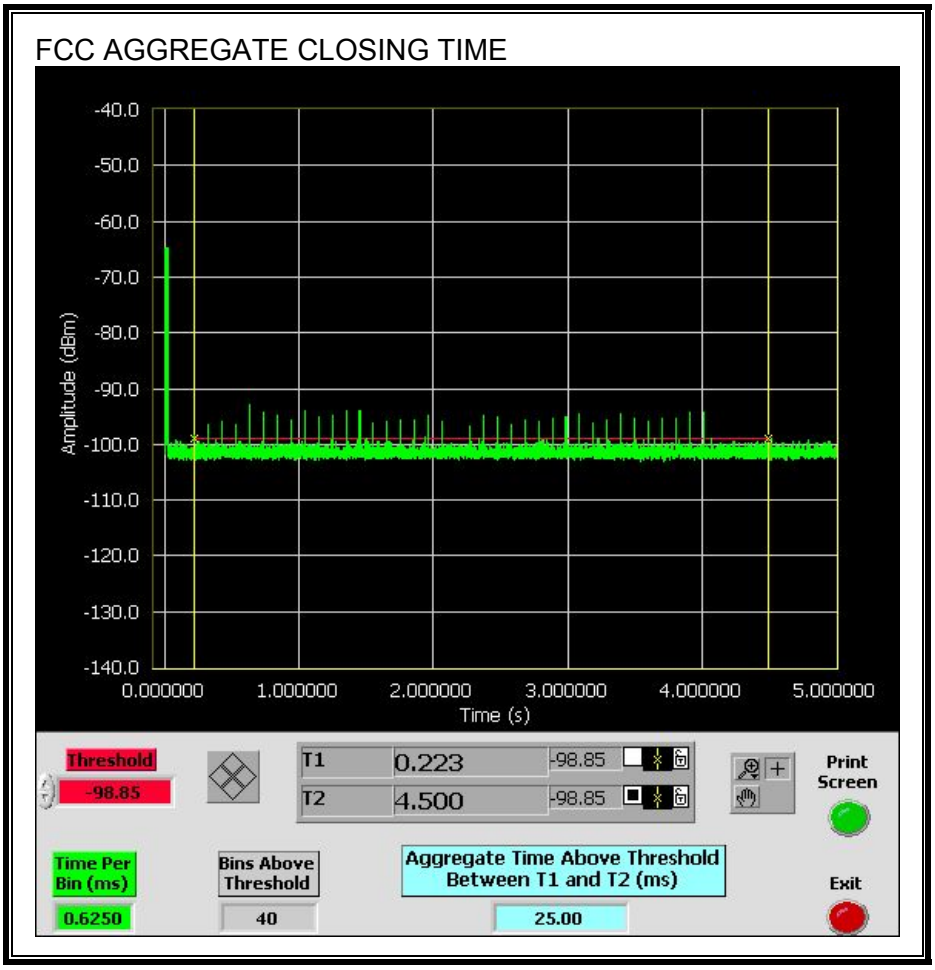


CHANNEL CLOSING TIME

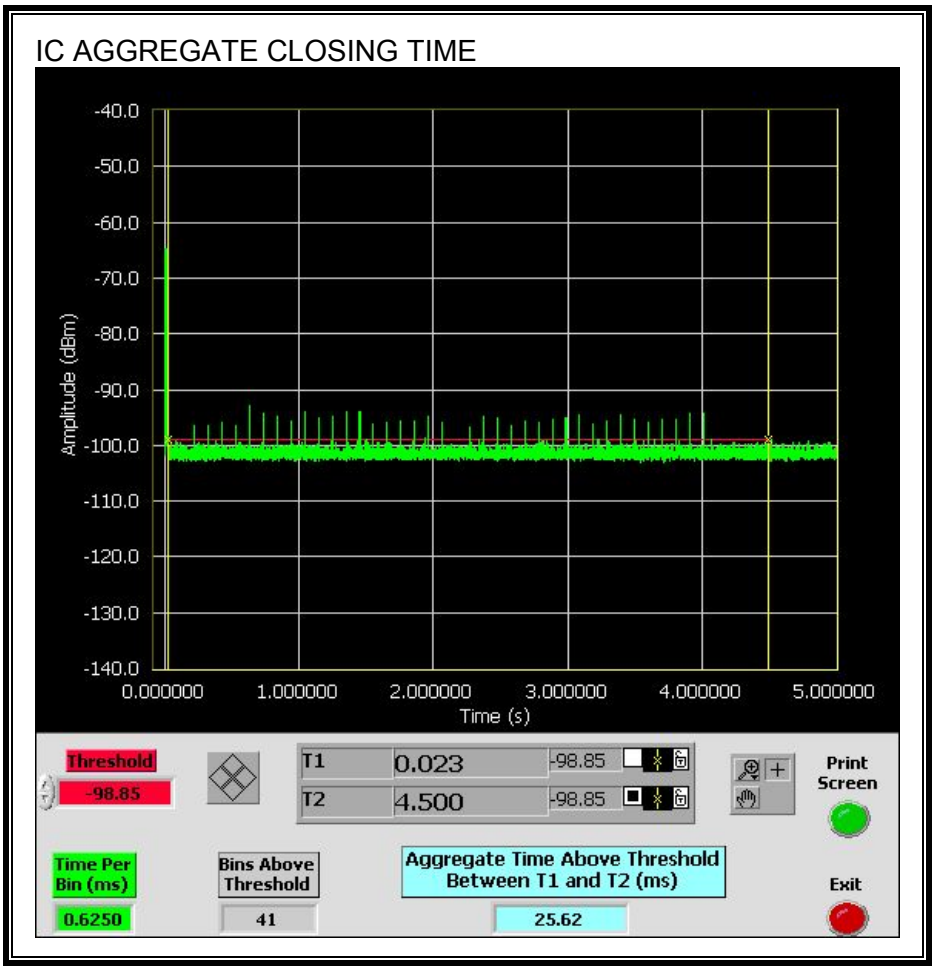


AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

Only intermittent transmissions are observed during the FCC aggregate monitoring period.



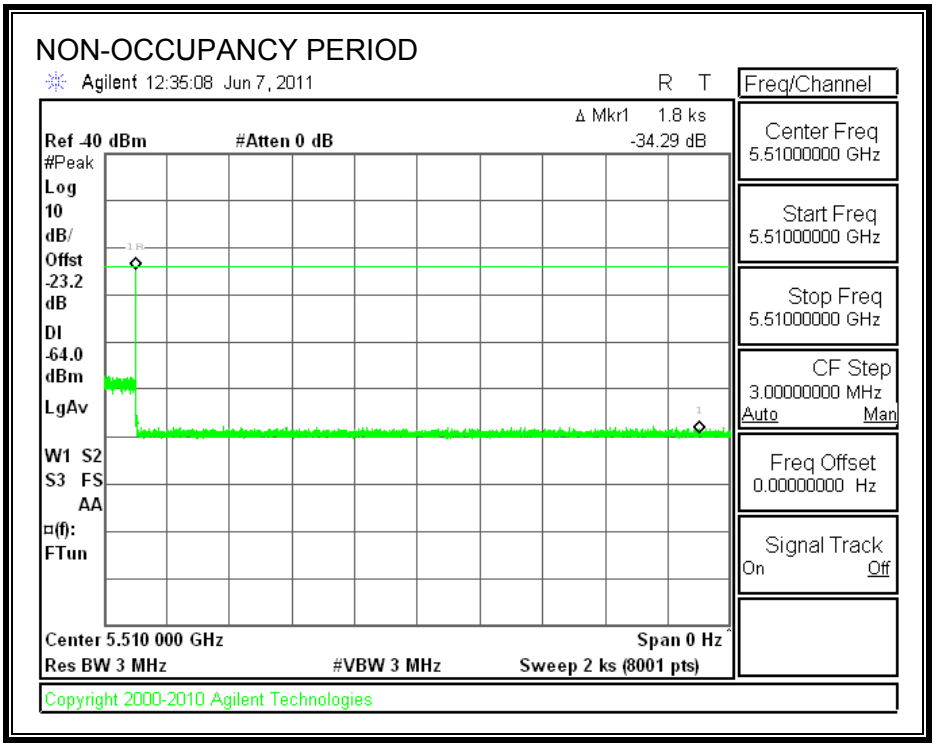
Only intermittent transmissions are observed during the IC aggregate monitoring period.



10.3.5. NON-OCCUPANCY PERIOD

RESULTS

No EUT transmissions were observed on the test channel during the 30-minute observation time.



11. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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

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

f = frequency in MHz
* = Plane-wave equivalent power density

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

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

IC RULES

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

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

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

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

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

EQUATIONS

Power density is given by:

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

where

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

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

Distance is given by:

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

where

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

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

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

where

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

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

LIMITS

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

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

RESULTS

Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	IC Power Density (W/m^2)	FCC Power Density (mW/cm^2)
Legacy	0.20	17.19	5.60	22.79	0.38	0.038
Chain 1		16.89	4.20	21.09		
Chain 2		17.68	4.20	21.88		
Total	0.20			24.51	0.56	0.056