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

CERTIFICATION TEST REPORT

FOR

Dual-Band 802.11 a/b/g/n Industrial Access Point with Integrated DOCSIS 3.0 Modem

MODEL NUMBER: ZoneFlex7761-CM

FCC ID: S9GZF7761CM
IC: 5912A-ZF7761CM

REPORT NUMBER: 10U13475-3

ISSUE DATE: MARCH 3, 2011

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	03/03/11	Initial Issue	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Ruckus Wireless
880 West Maude Ave., Suite 101
Sunnyvale, CA 94085, U.S.A

EUT DESCRIPTION: Dual-Band 802.11 a/b/g/n Industrial Access Point with Integrated DOCSIS 3.0 Modem

MODEL: ZoneFlex7761-CM

SERIAL NUMBER: C0C5200001BD

DATE TESTED: NOVEMBER 2, 2010 - MARCH 2, 2011

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

Compliance Certification Services, Inc. (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 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

WILLIAM ZHUANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

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

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 a Dual-Band 802.11 a/b/g/n Industrial Access Point with Integrated DOCSIS 3.0 Modem.

The radio module is manufactured by Ruckus Wireless.

5.2. MAXIMUM OUTPUT POWER

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

THREE CHAIN CONFIGURATION IN THE 5.2 GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5180 - 5240	802.11a	12.29	16.94
5180 - 5240	802.11n HT20	15.71	37.24
5190 - 5230	802.11n HT40	16.85	48.42

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes MIMO dual-band antenna with a maximum peak gain of **5 dBi** in the 2.4 GHz band and a MIMO Omni antenna for only 5 GHz band with maximum peak gain of **5.5 dBi** in the 5 GHz bands.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was version 9.0.0.0.65 and the cable modem firmware was version V92004.

The RF conducted testing used Atheros Radio Test software which we call “ART”. The version number is v0_5_b25ALL.

5.5. WORST-CASE CONFIGURATION AND MODE

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

Worst-case data rates as provided by the manufacturer are:

For 11a mode: 6Mbps
For 11n HT20 (5.2 GHz band): MCS8
For 11n HT40 (5.2 GHz band): MCS8

Peak Power Spectral Density was investigated for individual chains versus combiner, and it was determined that combiner is worst-case; therefore, all final measurements of PPSD were performed using a combiner.

RF Conducted Spurious was investigated for individual chains versus combiner, and it was determined that combiner is worst-case; therefore, all final measurements of RF conducted spurious were performed using a combiner.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	**Manufacturer**	**Model**	**Serial Number**
Laptop PC	IBM	2366	78-BWY97
AC/DC Adapter	IBM	02K6665	1Z0Z0500ZF
POE	RUCKUS	NPE-5818	10A282617
AC/DC Adapter	RUCKUS	PA1060-48 T1A125	1022
USB Mouse	Microsoft	X09-13962	N/A
AC/DC Adapter	RUCKUS	MPC-1200201	101

Note: AC/DC adapter MPC-1200201 was used to power the radio for radiated emissions 3-1000 MHz and power line conducted emissions tests.

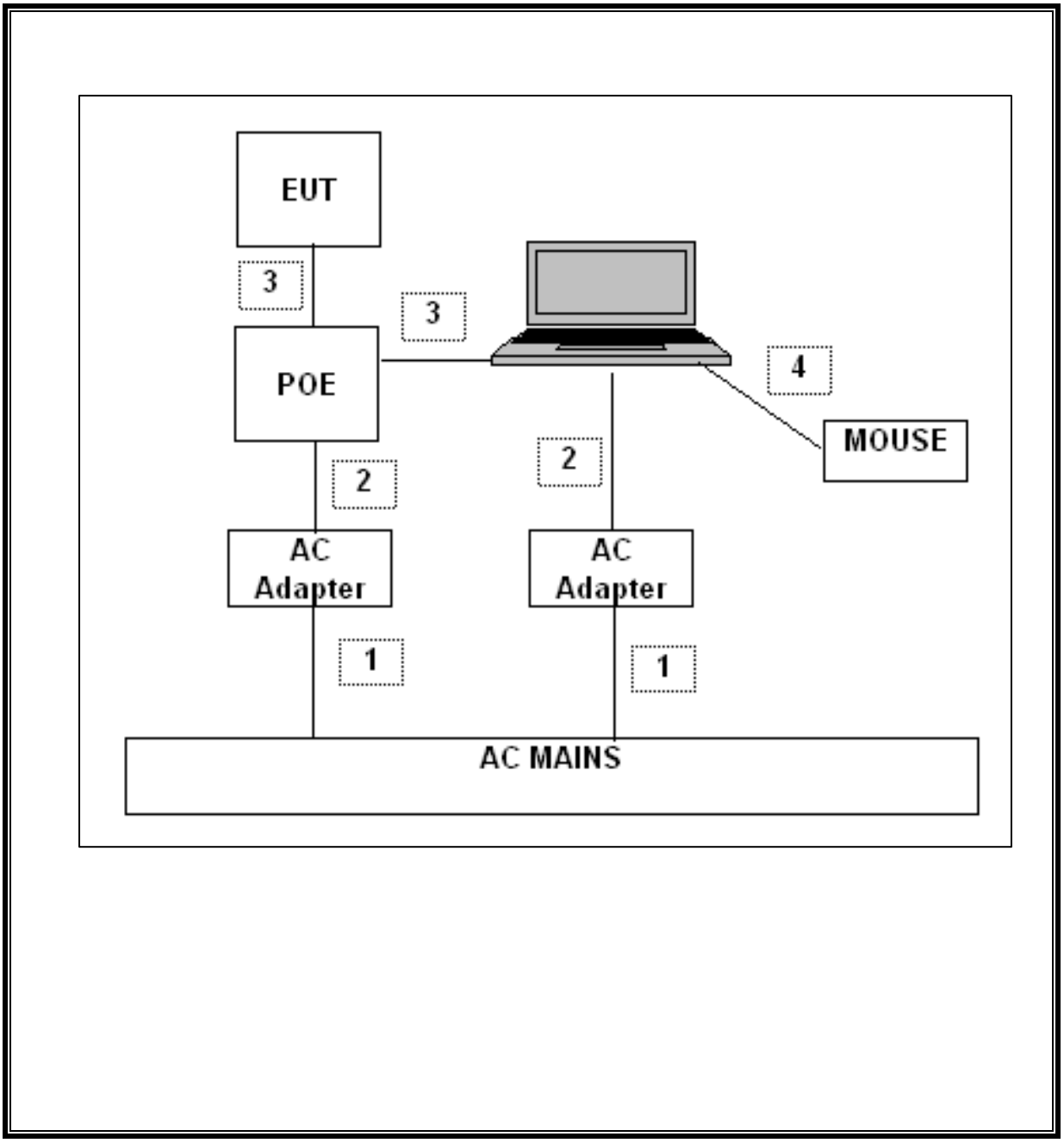
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC Input	2	AC	Un-Shielded	1.5m	N/A
2	DC Input	2	DC	Un-Shielded	1.8m	N/A
3	Ethernet	2	RJ45	Un-Shielded	1.5m	N/A
4	USB	1	USB	Un-Shielded	1.5m	N/A

TEST SETUP

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

SETUP DIAGRAM FOR RADIO TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01178	08/30/10
Peak Power Meter	Boonton	4541	C01185	03/01/10
Peak Power Sensor	Boonton	57006	C01203	02/24/10
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	07/12/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/06/12
Antenna, Horn, 18 GHz	EMCO	3115	C00945	06/29/11
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	07/14/11
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/11
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	11/10/11

7. ANTENNA PORT TEST RESULTS

7.1. 802.11a THREE CHAIN LEGACY 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 outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

CHAIN 1

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	22.434	16.3921
Middle	5200	20.997	16.4137
High	5240	20.336	16.4002

CHAIN 2

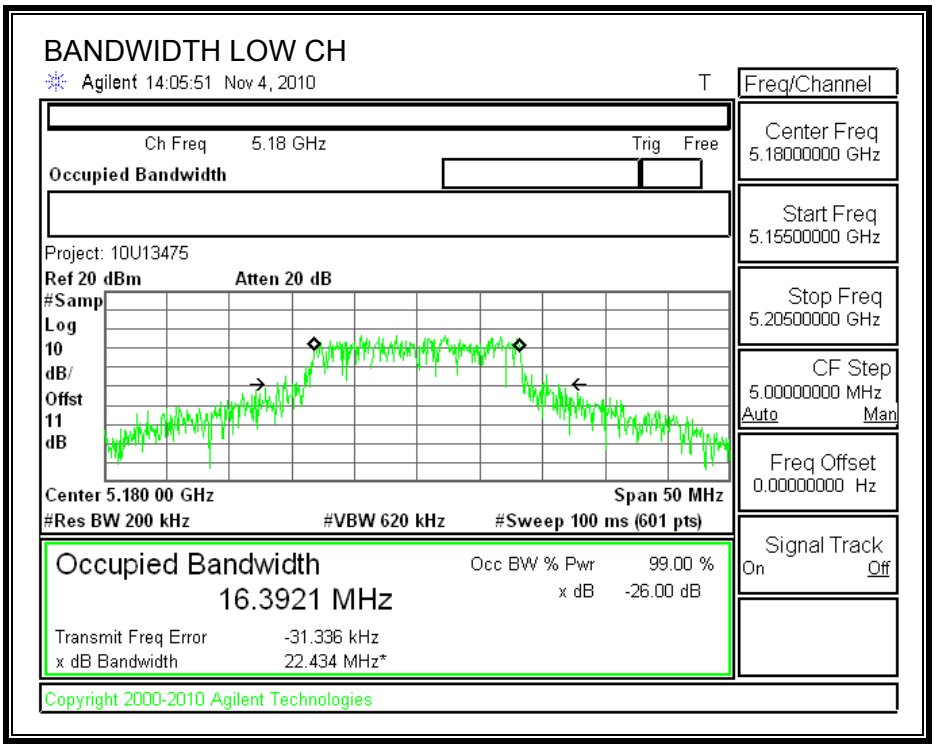
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	18.770	16.2711
Middle	5200	19.012	16.5410
High	5240	21.031	16.3638

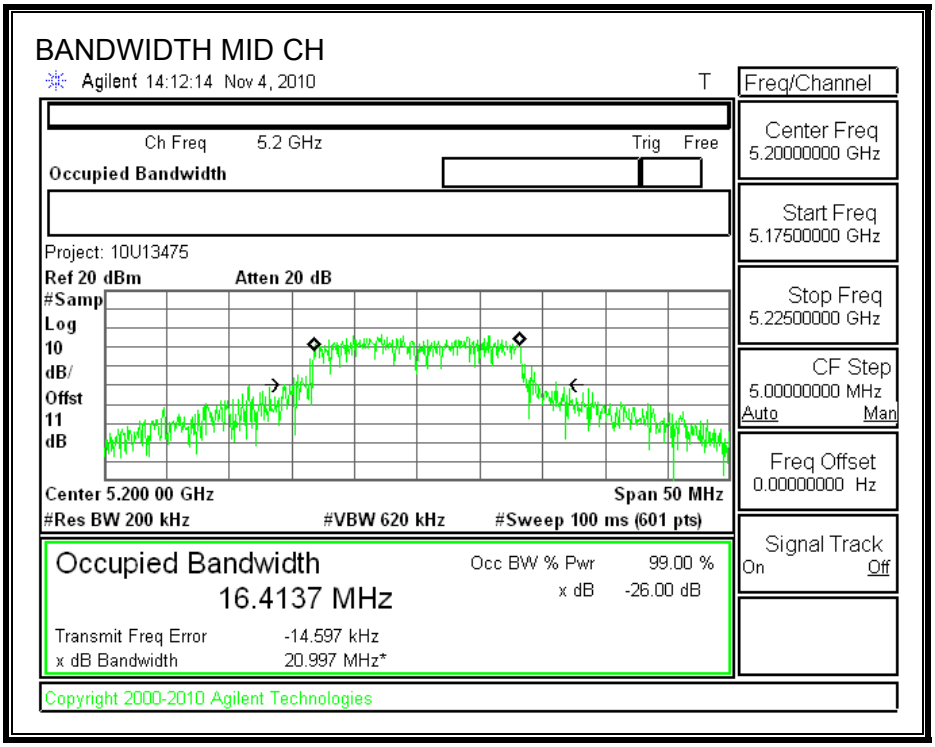
CHAIN 3

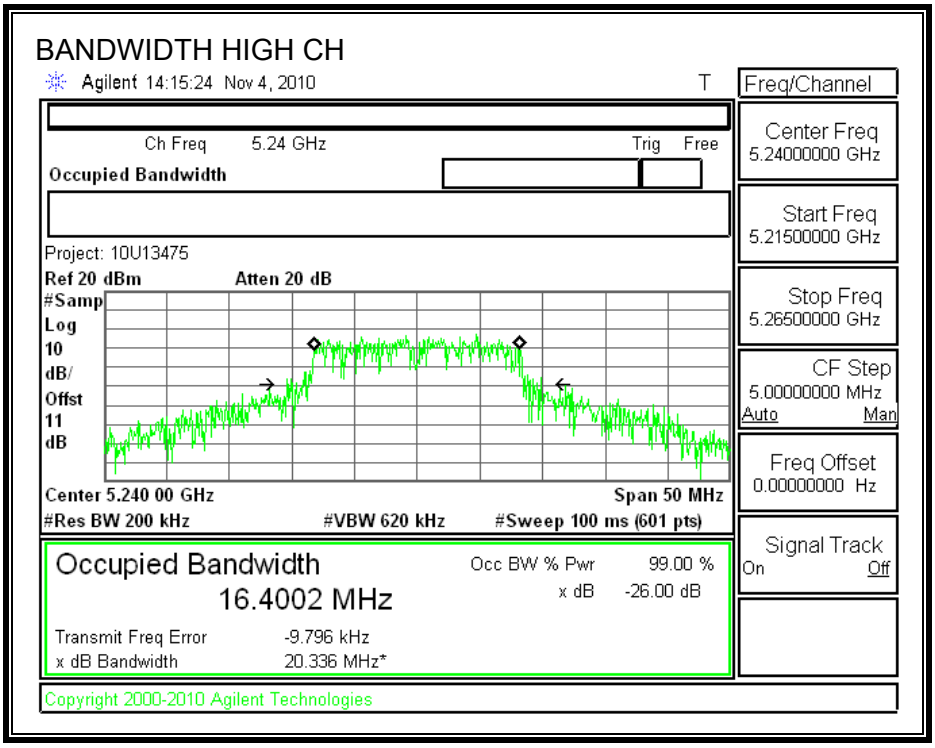
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	18.24	16.5538
Middle	5200	19.45	16.4851
High	5240	21.76	16.4216

CHAIN 1

26 dB and 99% BANDWIDTH

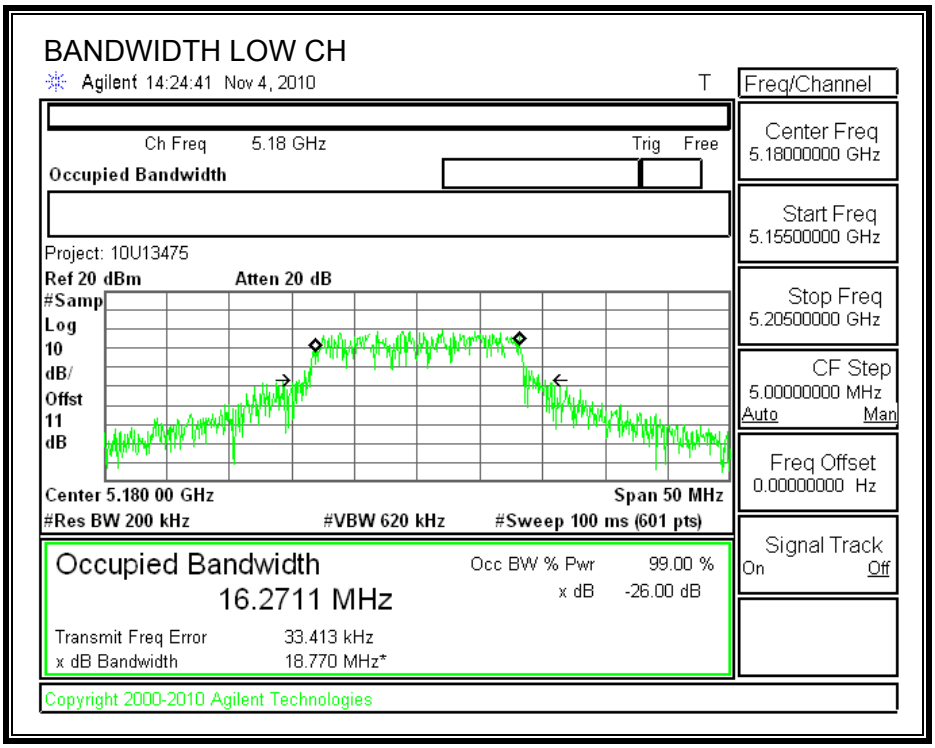


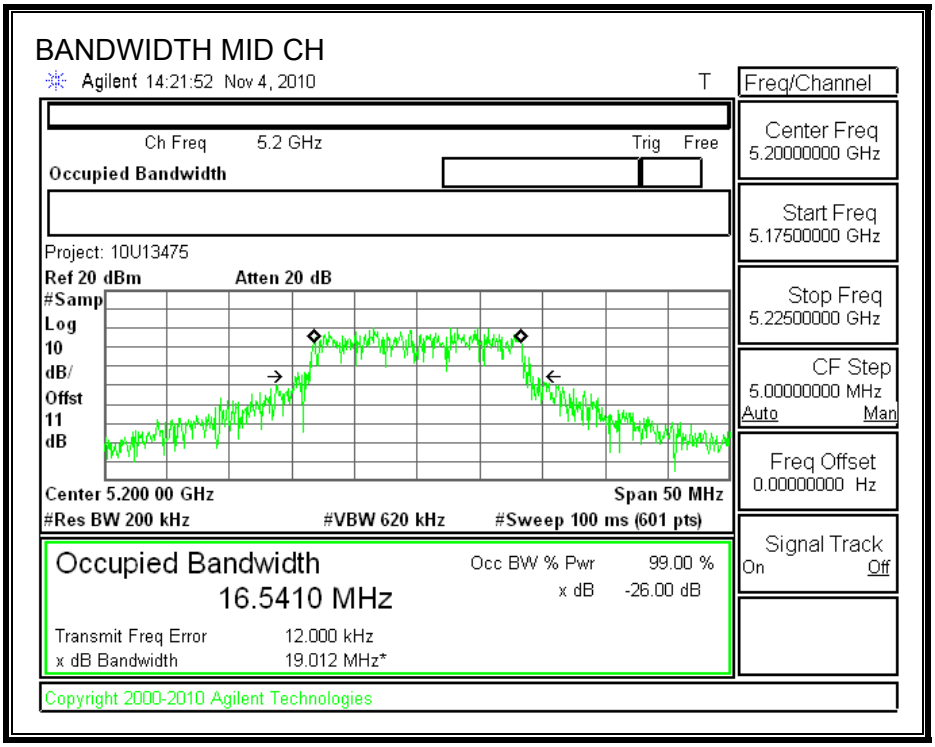


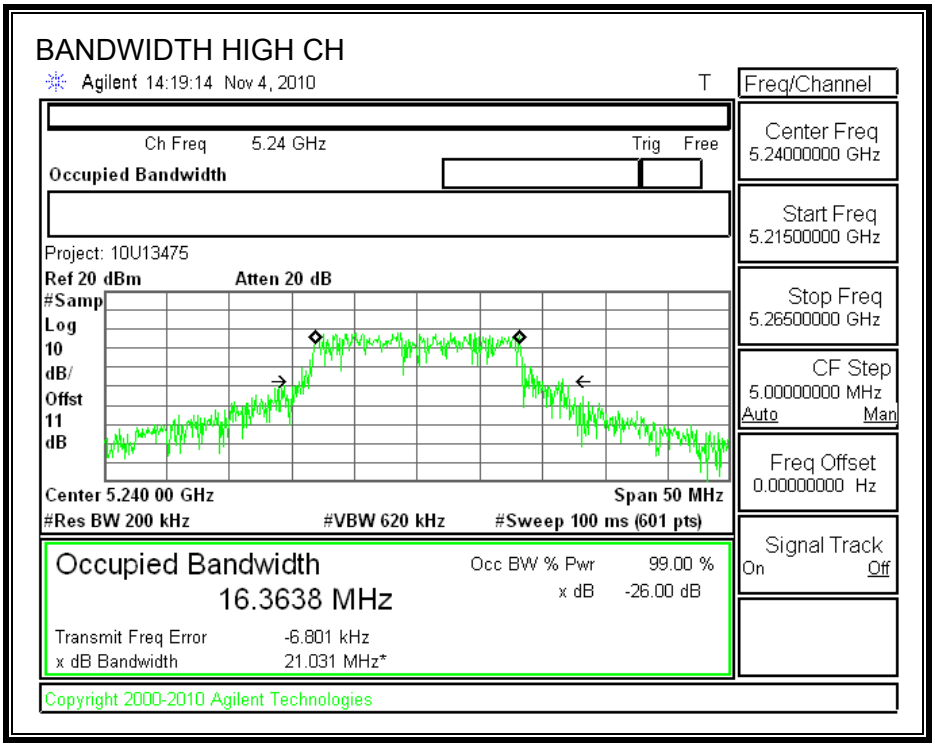


CHAIN 2

26 dB and 99% BANDWIDTH

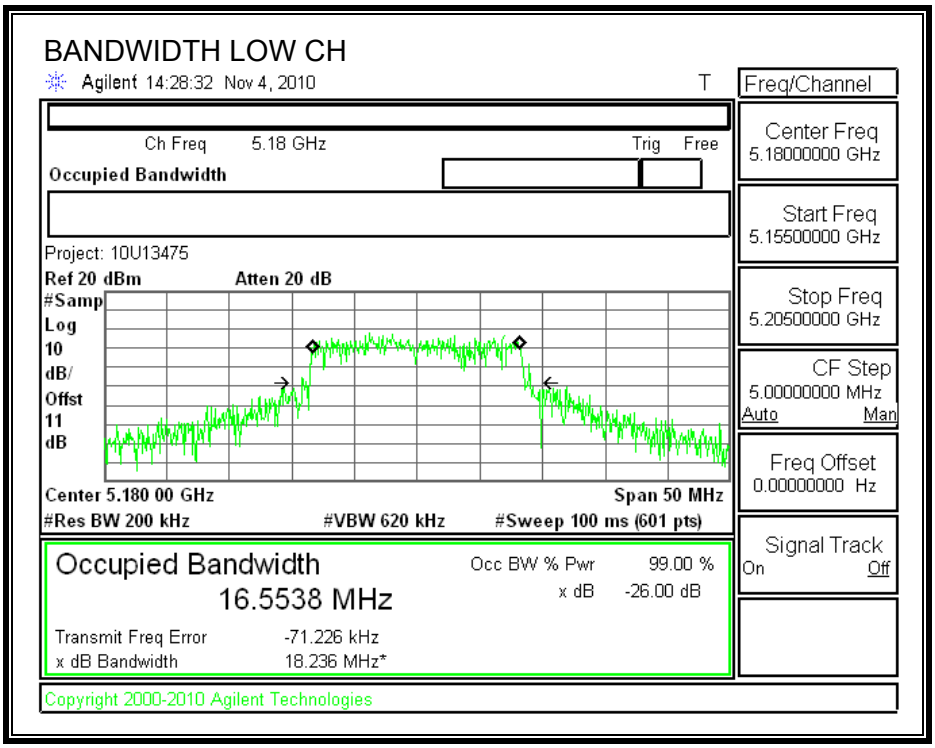


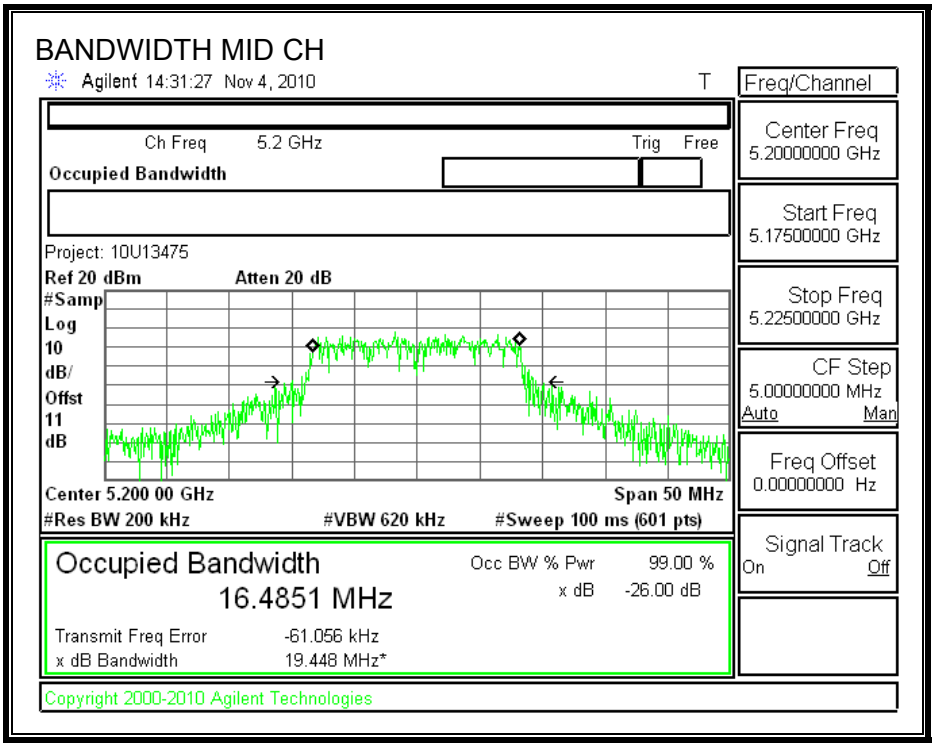


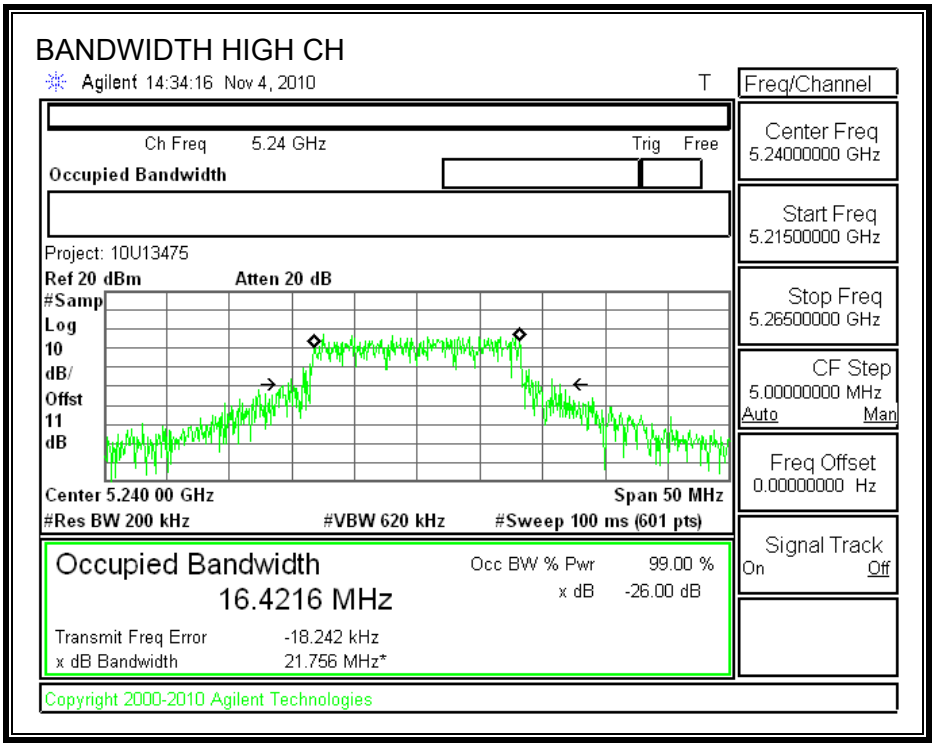


CHAIN 3

26 dB and 99% BANDWIDTH







7.1.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
5.5	4.77	10.27

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

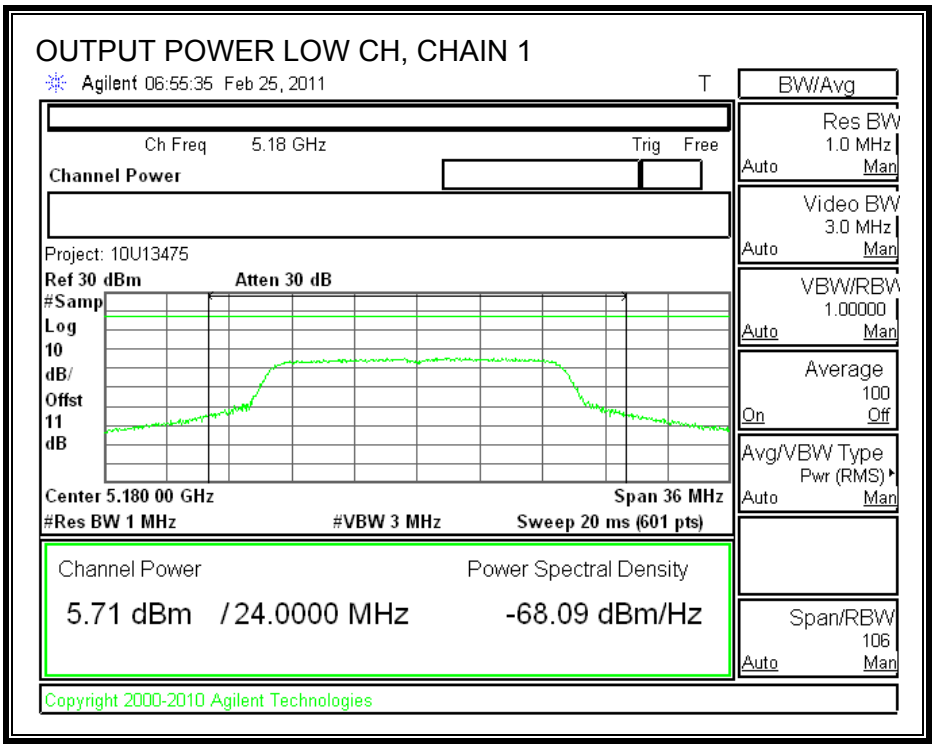
Limit

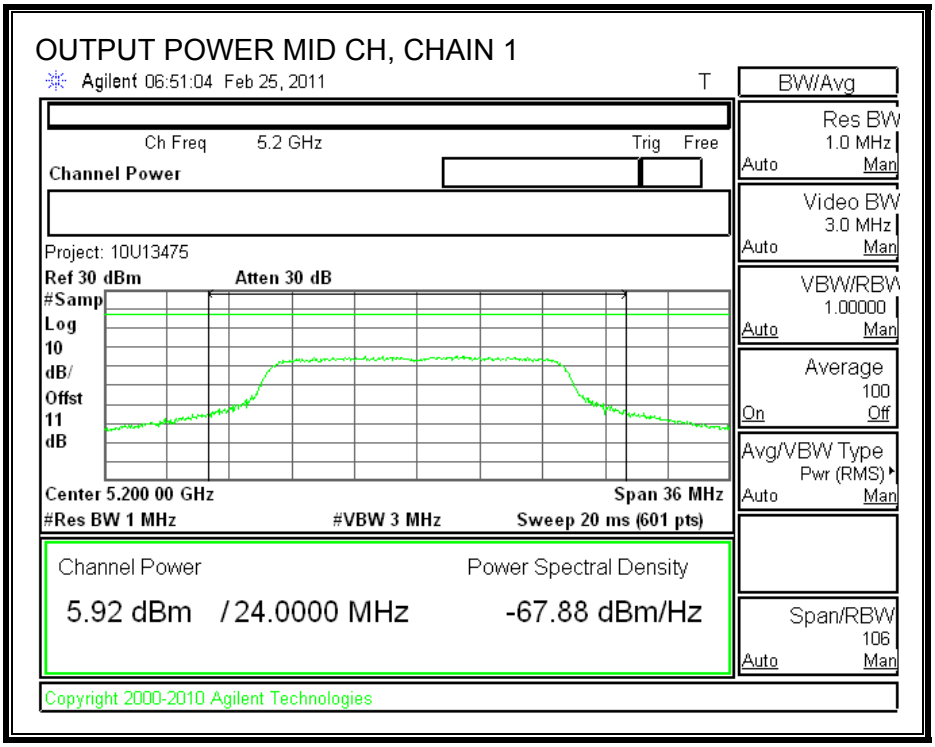
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Effective Ant. Gain (dBi)	Limit (dBm)
Low	5180	16.99	18.24	16.61	10.27	12.34
Mid	5200	16.99	19.012	16.79	10.27	12.52
High	5240	16.99	20.336	17.08	10.27	12.72

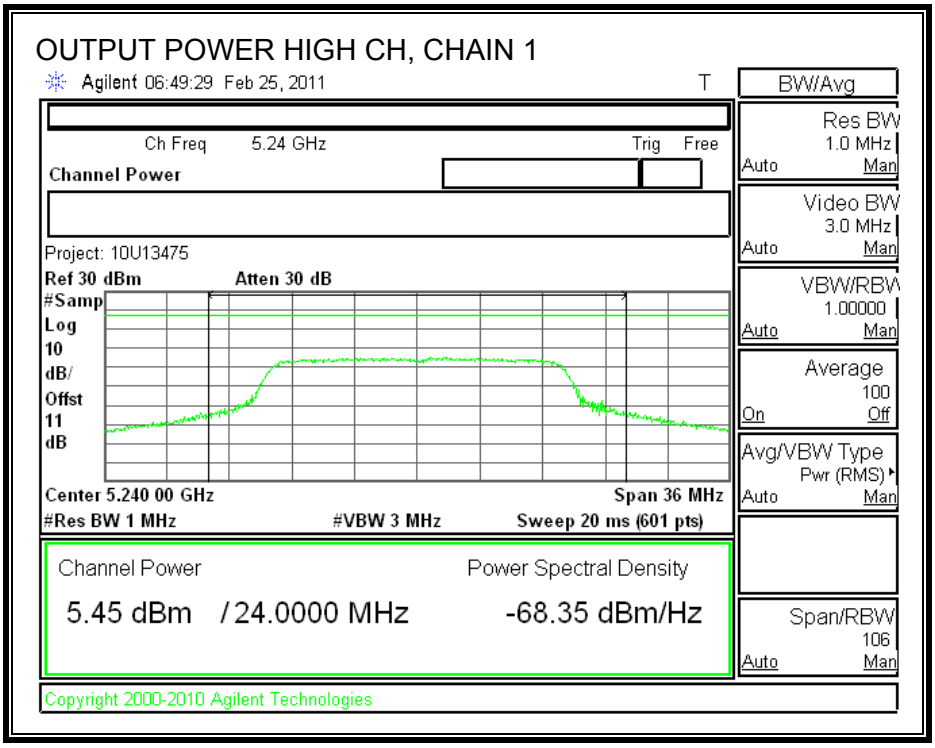
Individual Chain Results

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	5.71	9.14	6.95	12.27	12.34	-0.07
Mid	5200	5.92	8.54	7.70	12.29	12.52	-0.23
High	5240	5.45	8.63	7.77	12.25	12.72	-0.47

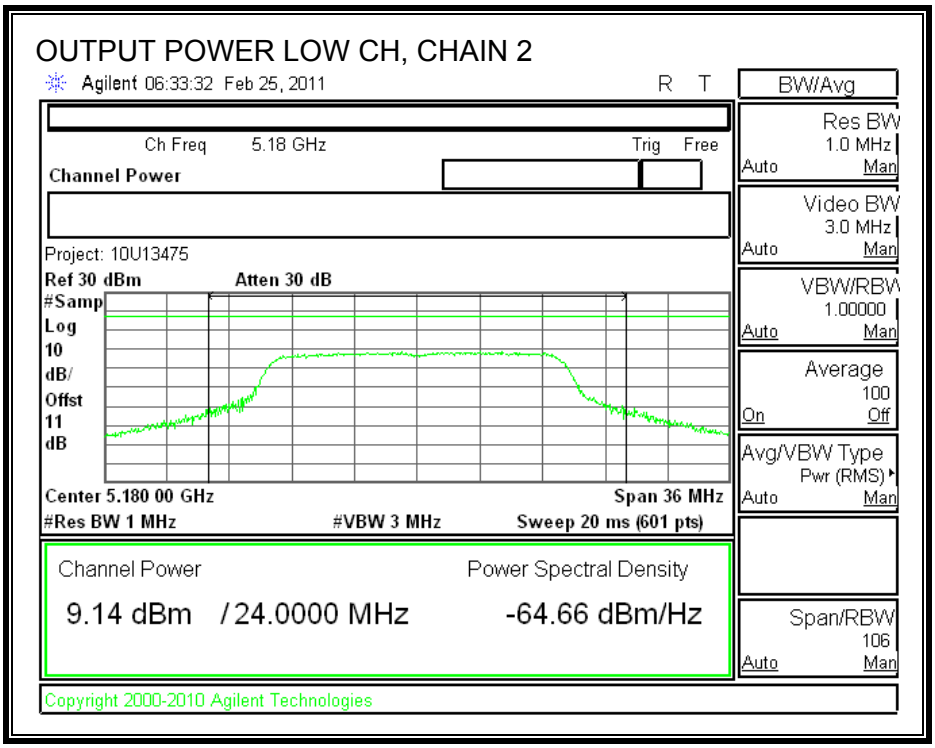
CHAIN 1 OUTPUT POWER

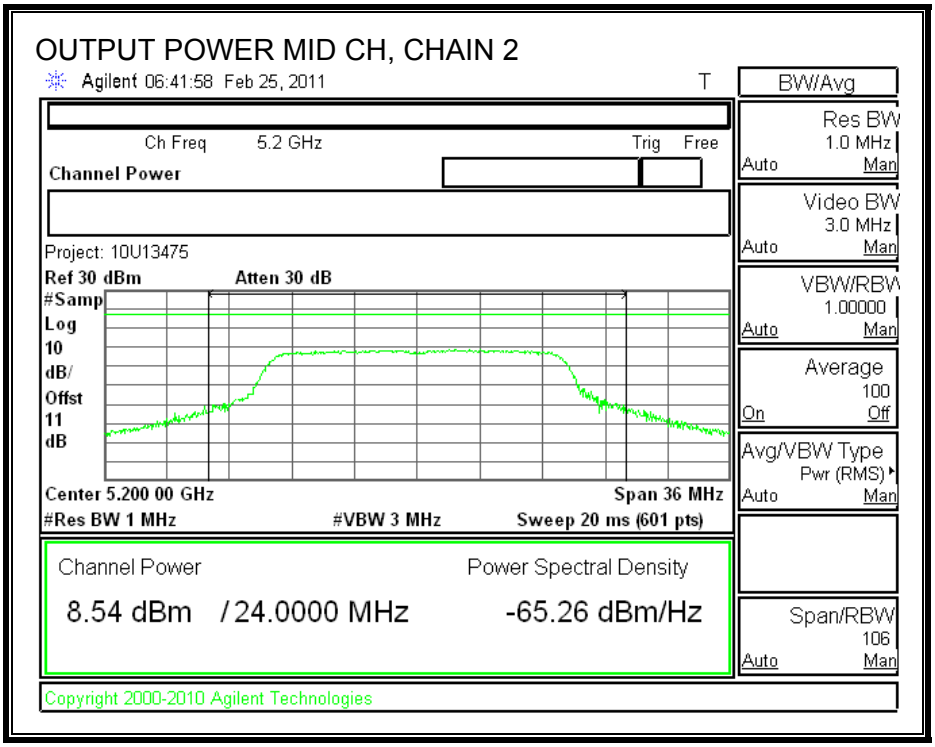


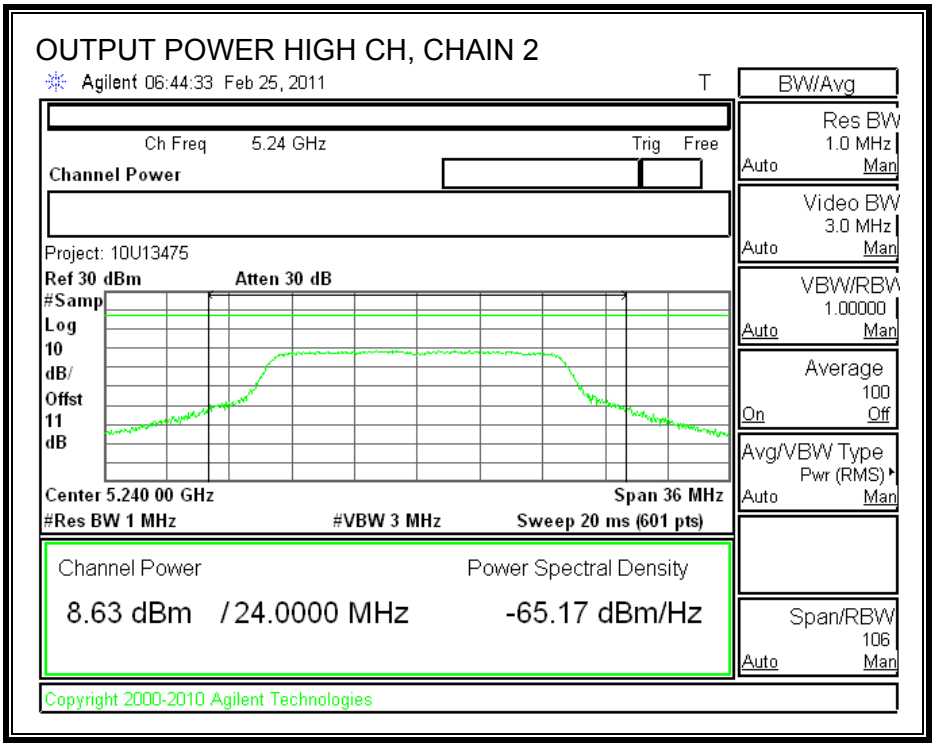




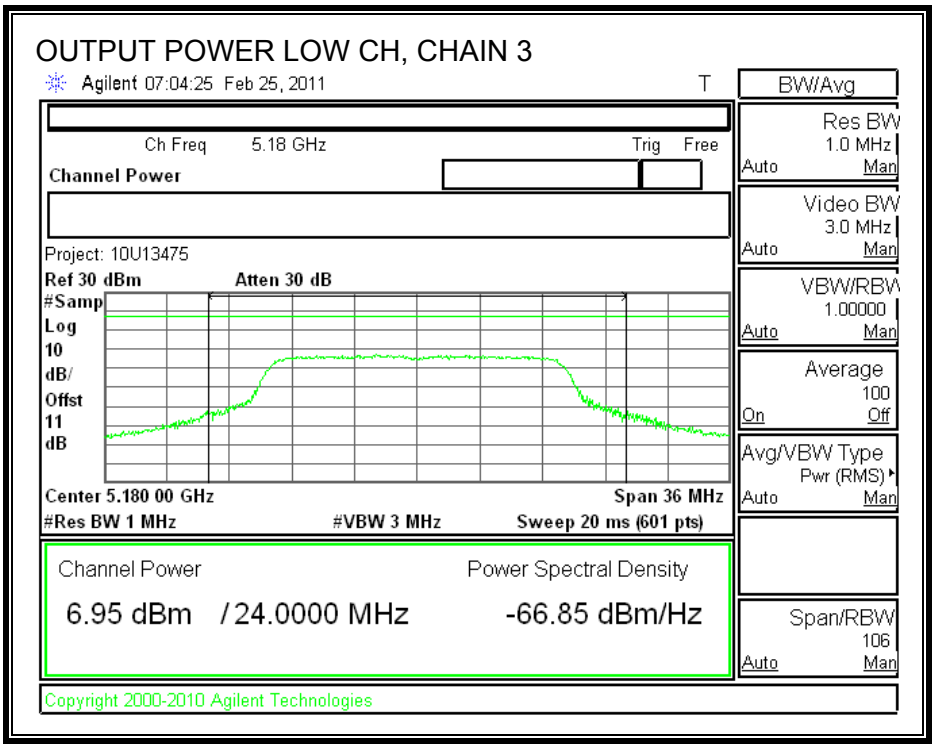
CHAIN 2 OUTPUT POWER

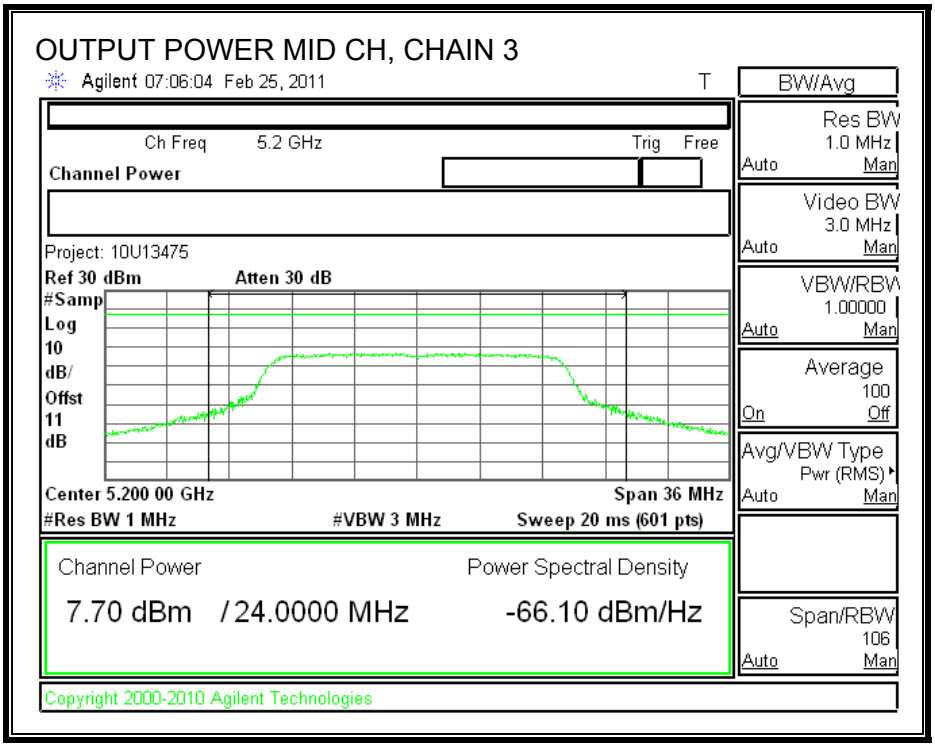


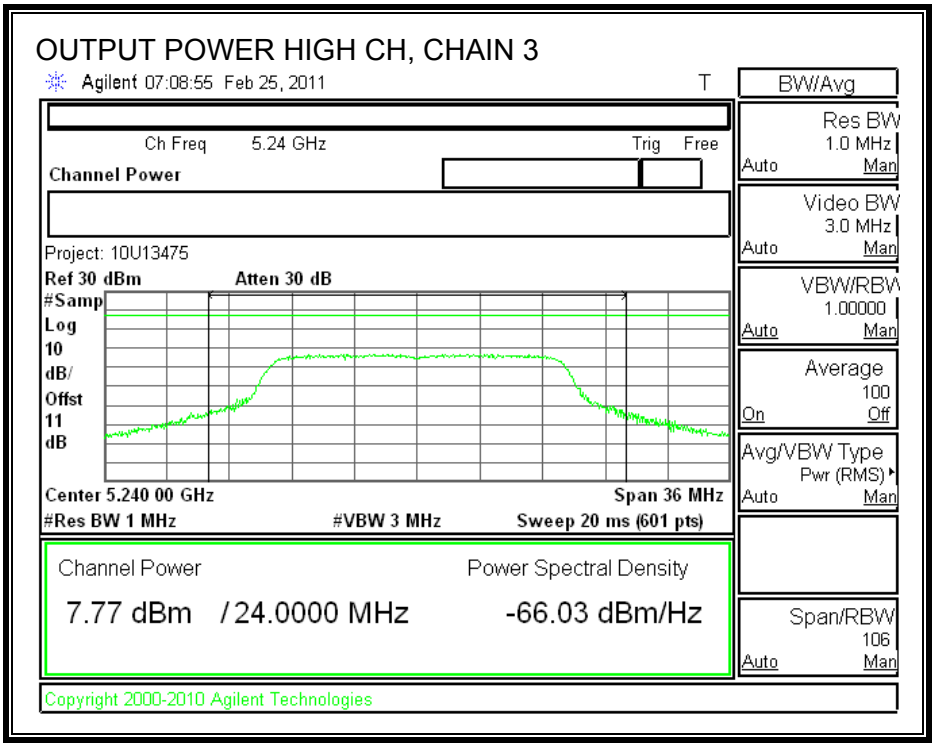




CHAIN 3 OUTPUT POWER







7.1.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	5180	5.47	8.54	7.32	12.06
Middle	5200	5.25	8.97	7.17	12.16
High	5240	5.17	9.05	7.36	12.25

7.1.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
5.5	4.77	10.27

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.

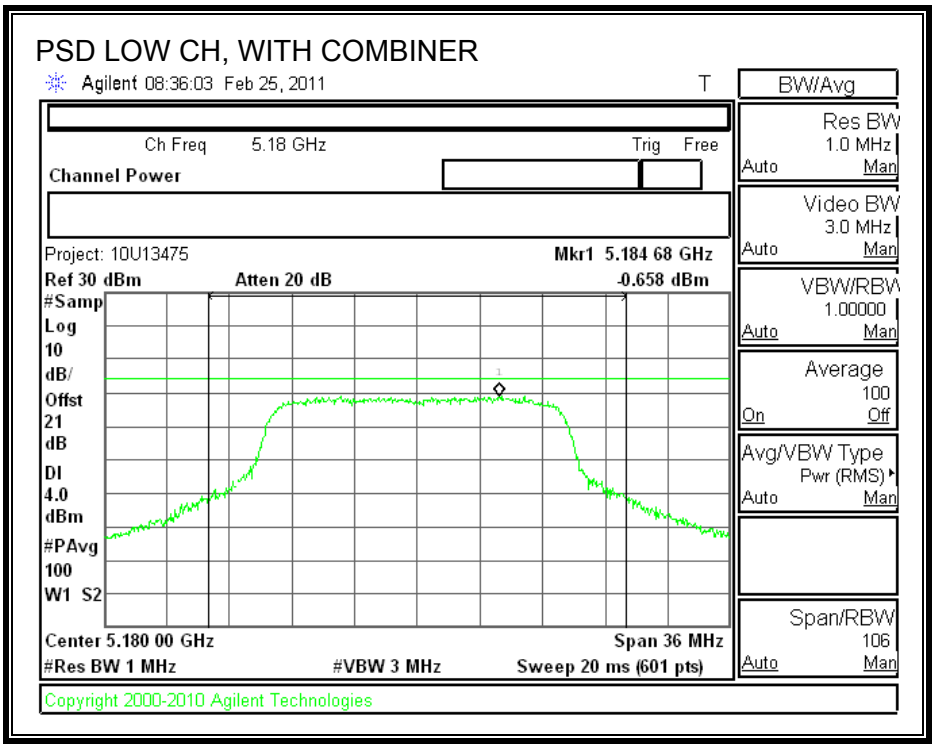
TEST PROCEDURE

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.

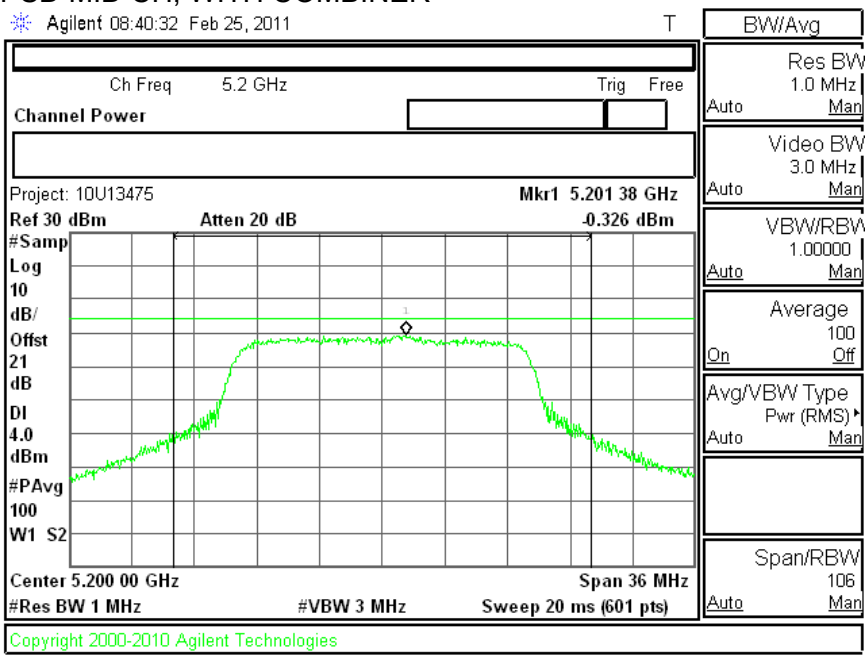
RESULTS

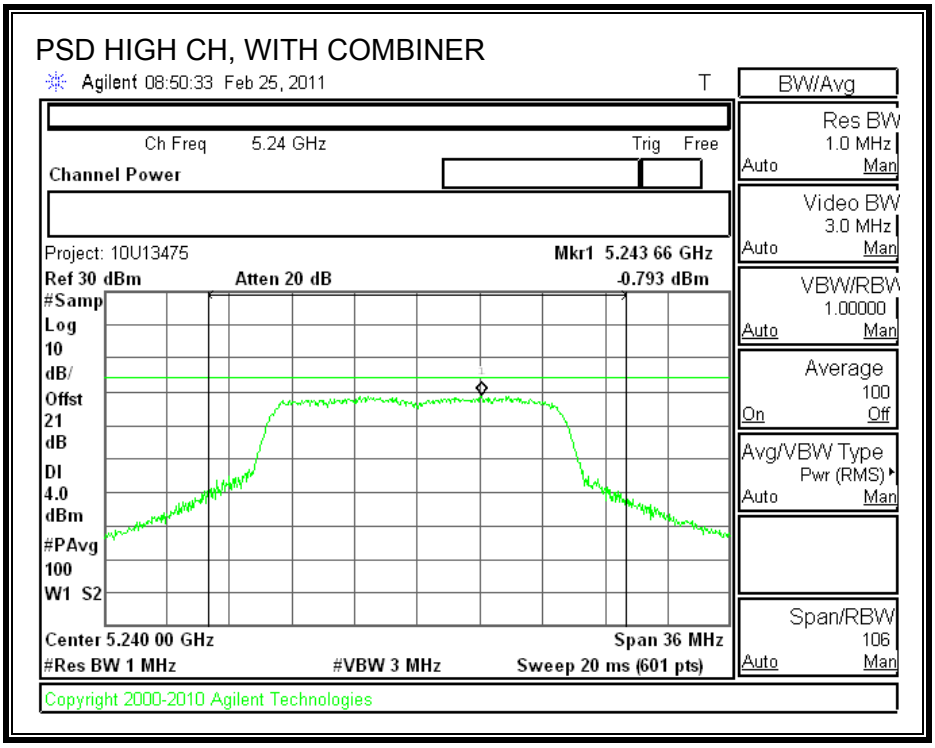
Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5180	-0.658	-0.27	-0.388
Middle	5200	-0.326	-0.27	-0.056
High	5240	-0.793	-0.27	-0.523

POWER SPECTRAL DENSITY WITH COMBINER



PSD MID CH, WITH COMBINER





7.1.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

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

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

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

RESULTS

CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.17	13	-3.83
Middle	5200	9.44	13	-3.56
High	5240	8.55	13	-4.45

CHAIN 2

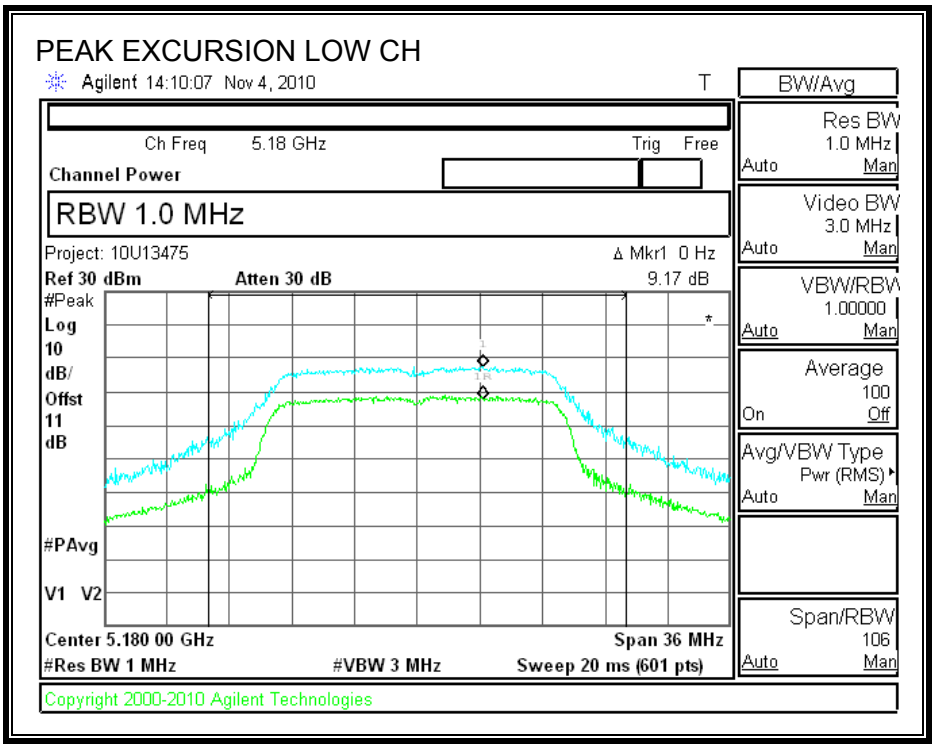
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.04	13	-2.96
Middle	5200	10.04	13	-2.96
High	5240	10.11	13	-2.89

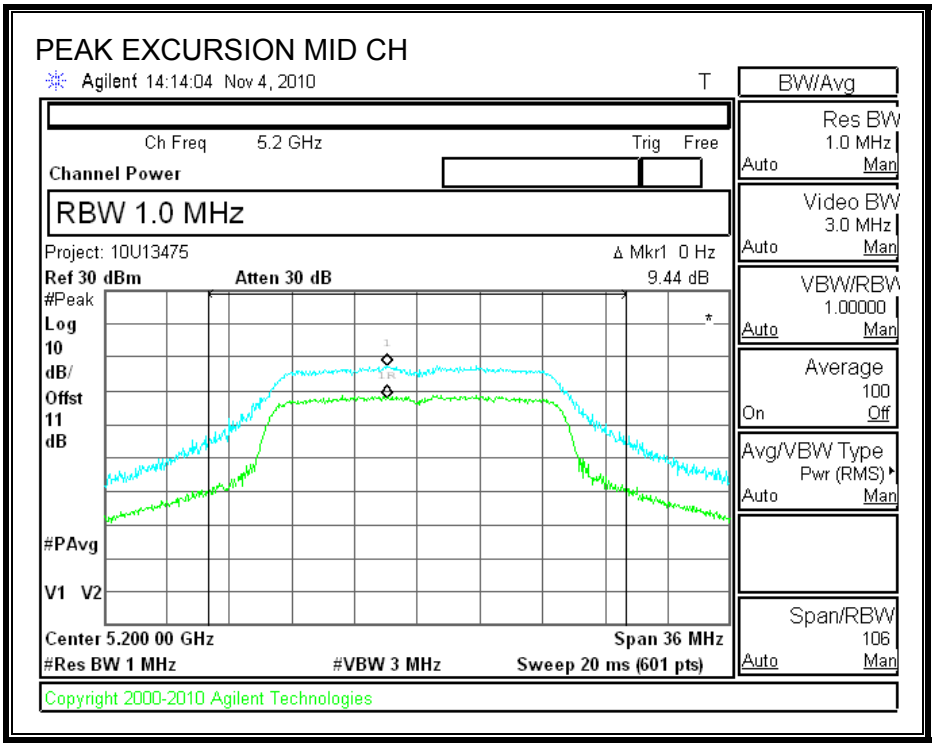
CHAIN 3

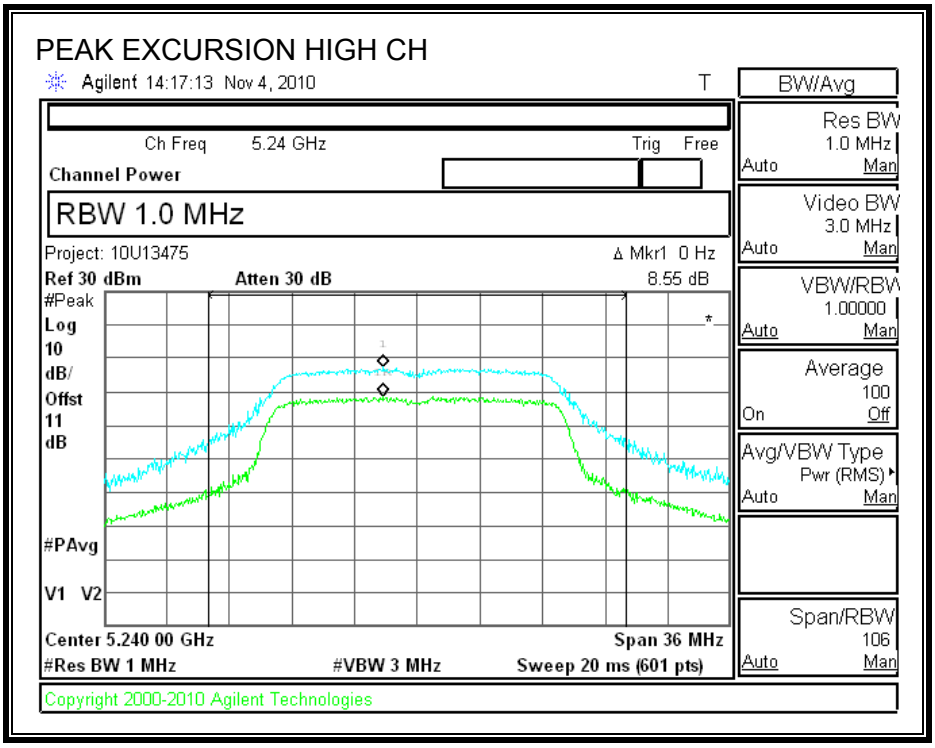
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.10	13	-2.90
Middle	5200	10.32	13	-2.68
High	5240	9.17	13	-3.83

CHAIN 1

PEAK EXCURSION

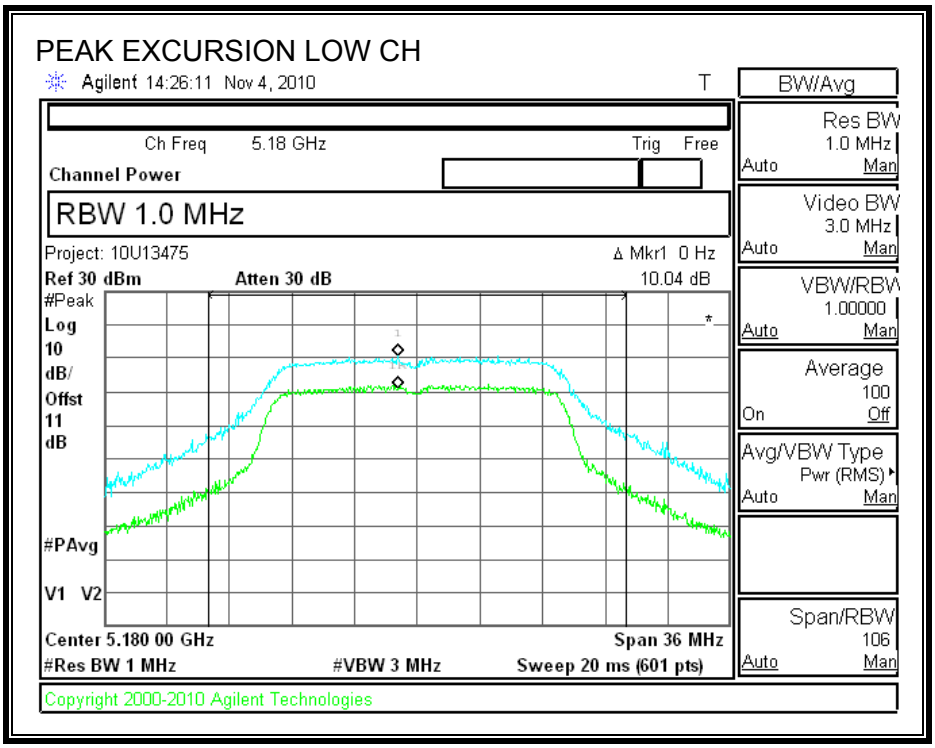




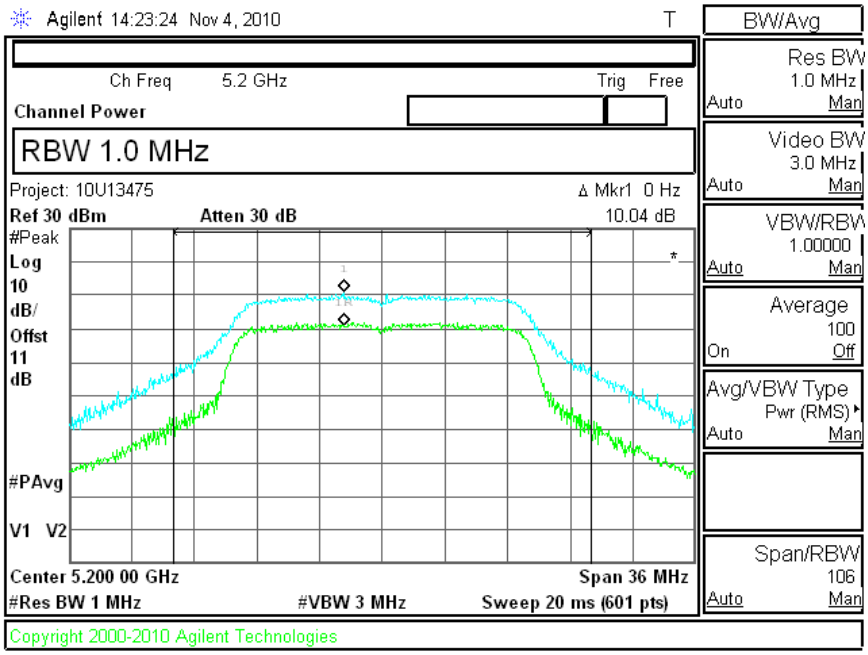


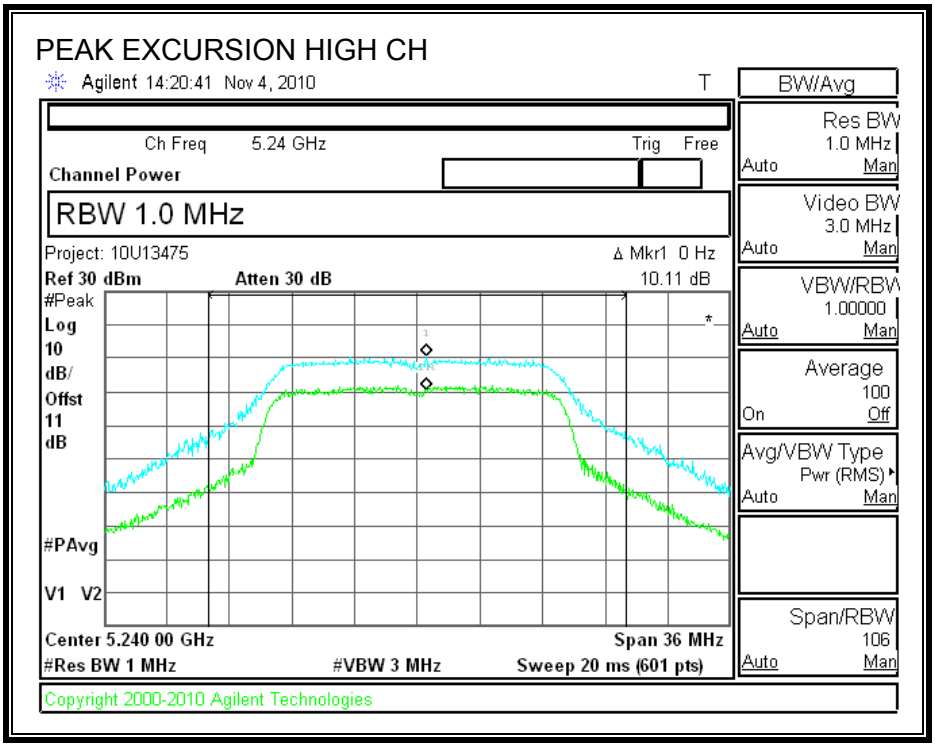
CHAIN 2

PEAK EXCURSION



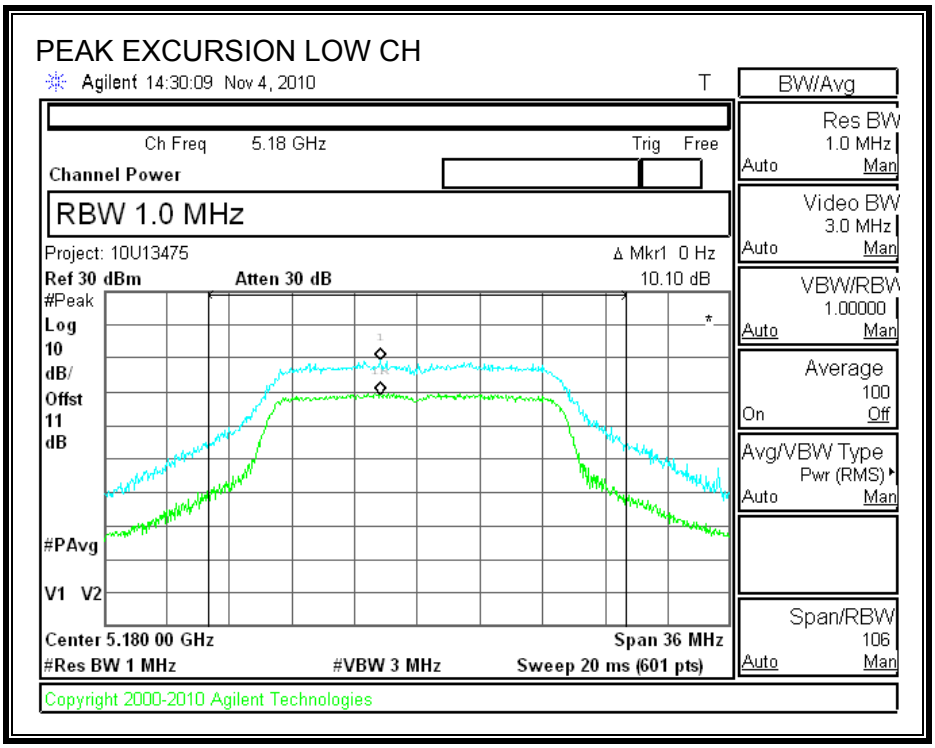
PEAK EXCURSION MID CH

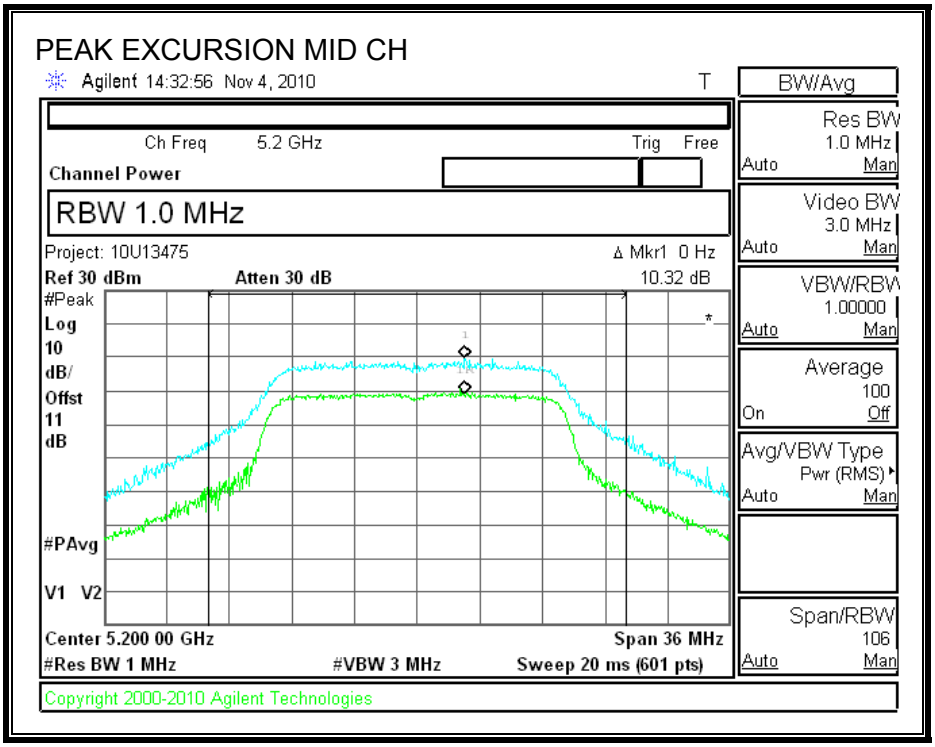


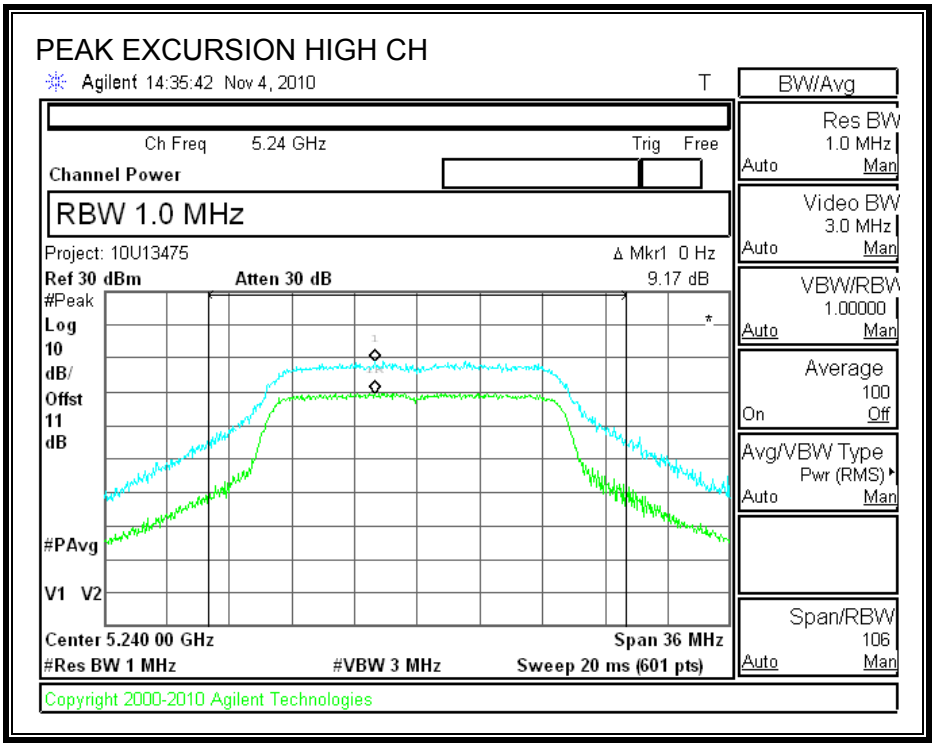


CHAIN 3

PEAK EXCURSION







7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

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

TEST PROCEDURE

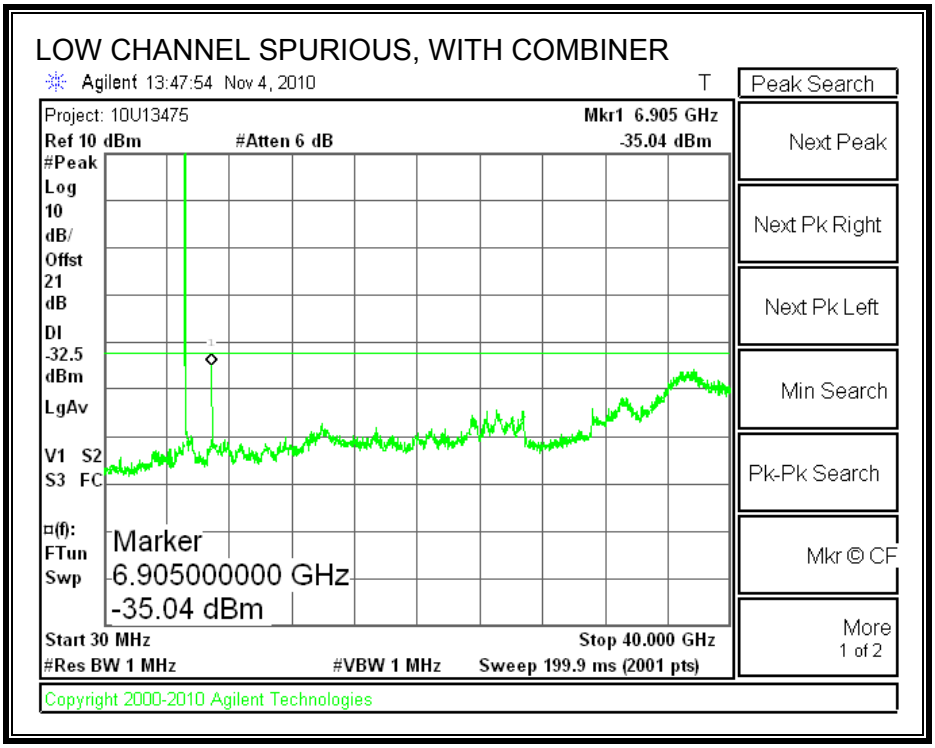
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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

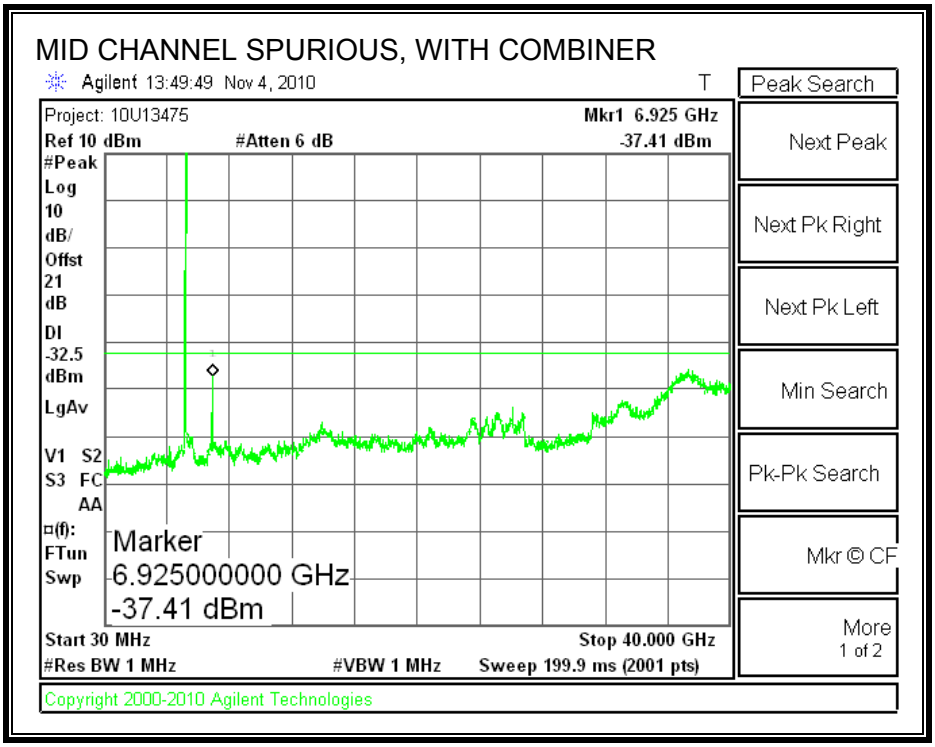
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

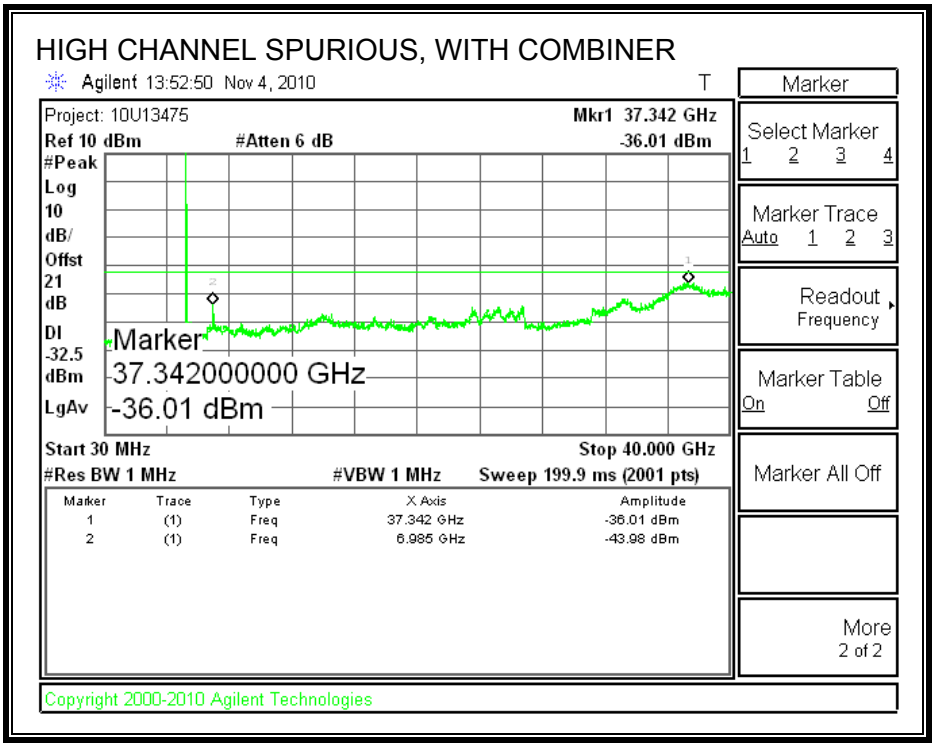
SPURIOUS EMISSIONS WITH COMBINER



MID CHANNEL SPURIOUS, WITH COMBINER



HIGH CHANNEL SPURIOUS, WITH COMBINER



7.2. 802.11n THREE CHAINS 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	20.028	17.4629
Middle	5200	20.142	17.6717
High	5240	19.635	17.5555

CHAIN 2

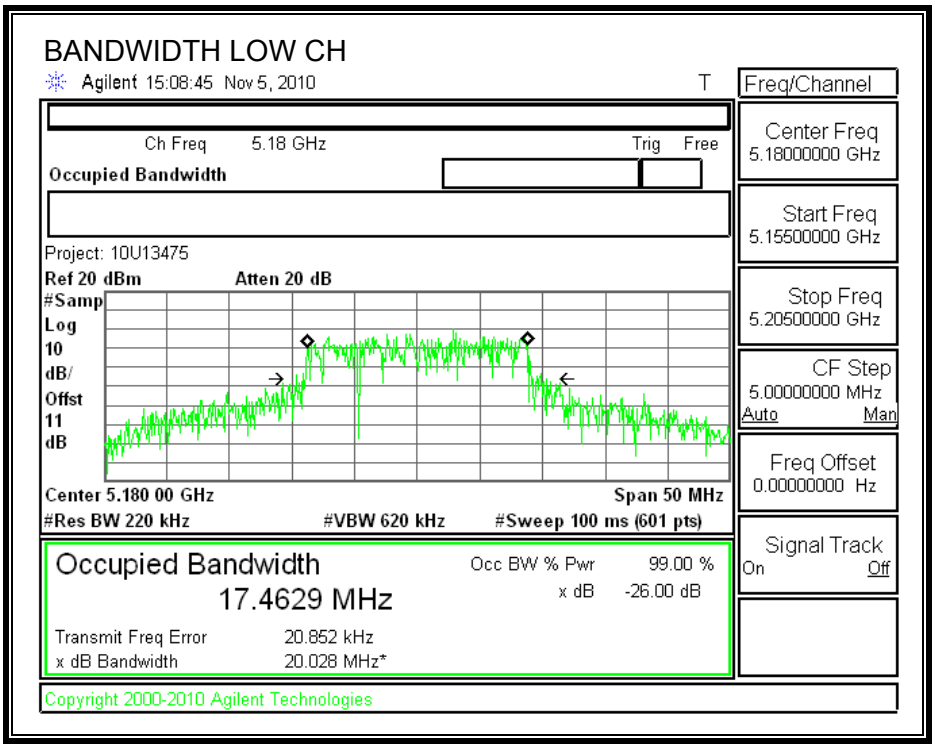
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	19.665	17.6511
Middle	5200	19.579	17.5286
High	5240	19.124	17.7595

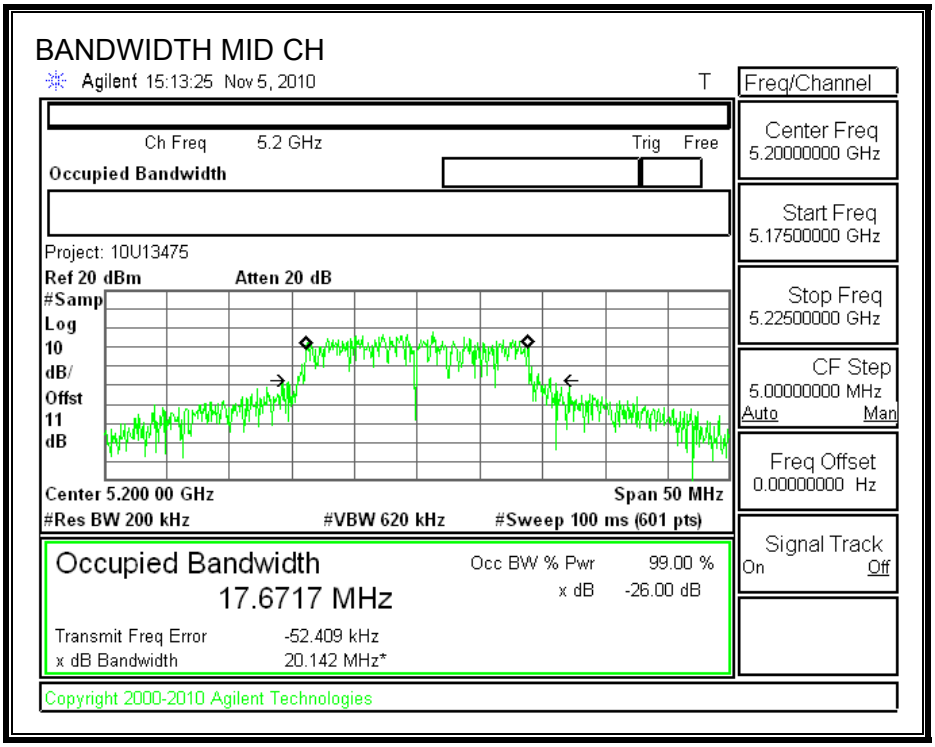
CHAIN 3

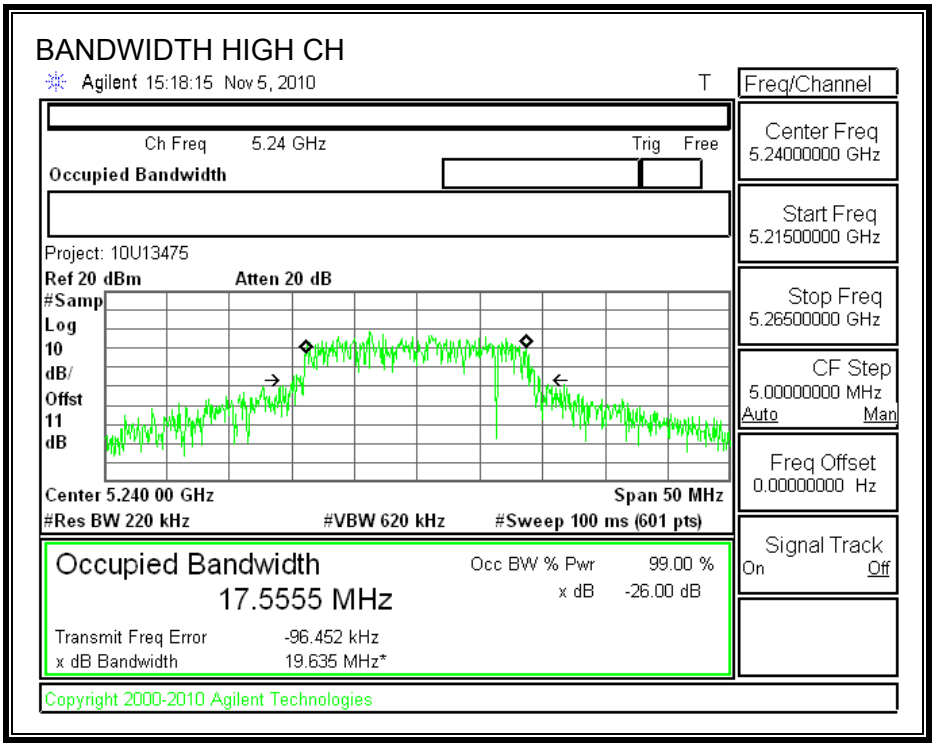
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	20.732	17.6570
Middle	5200	19.699	17.4910
High	5240	19.445	17.5278

CHAIN 1

26 dB and 99% BANDWIDTH

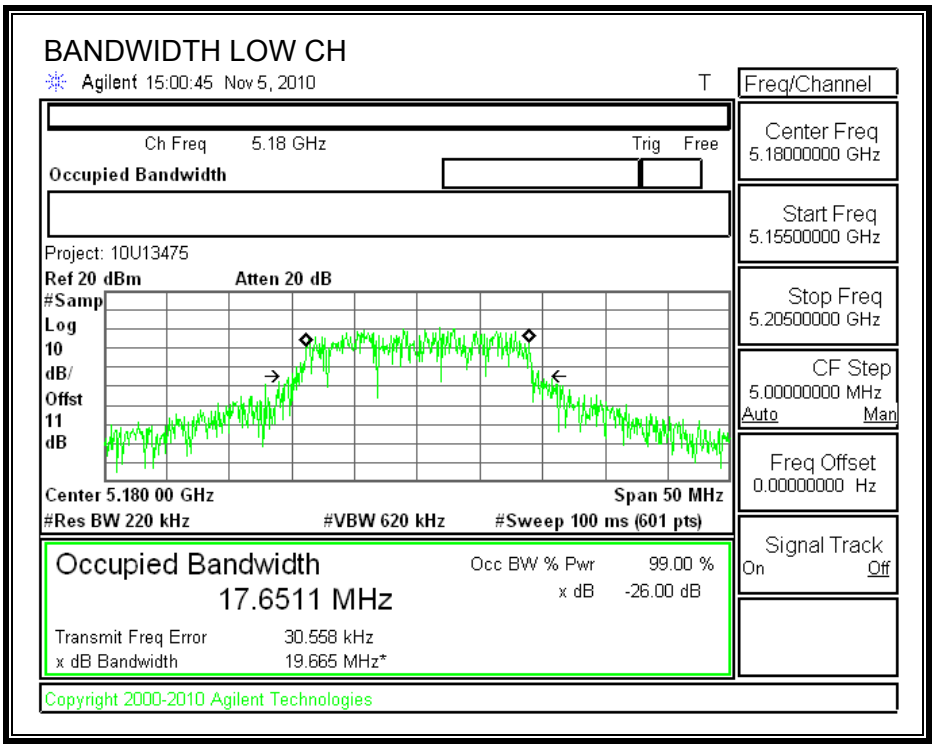


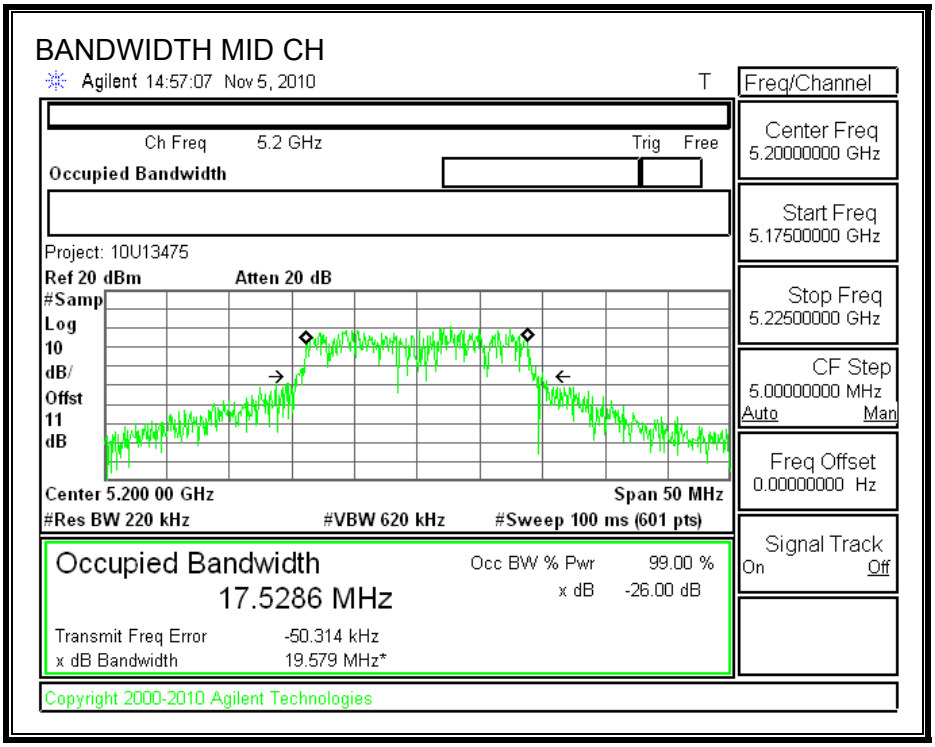


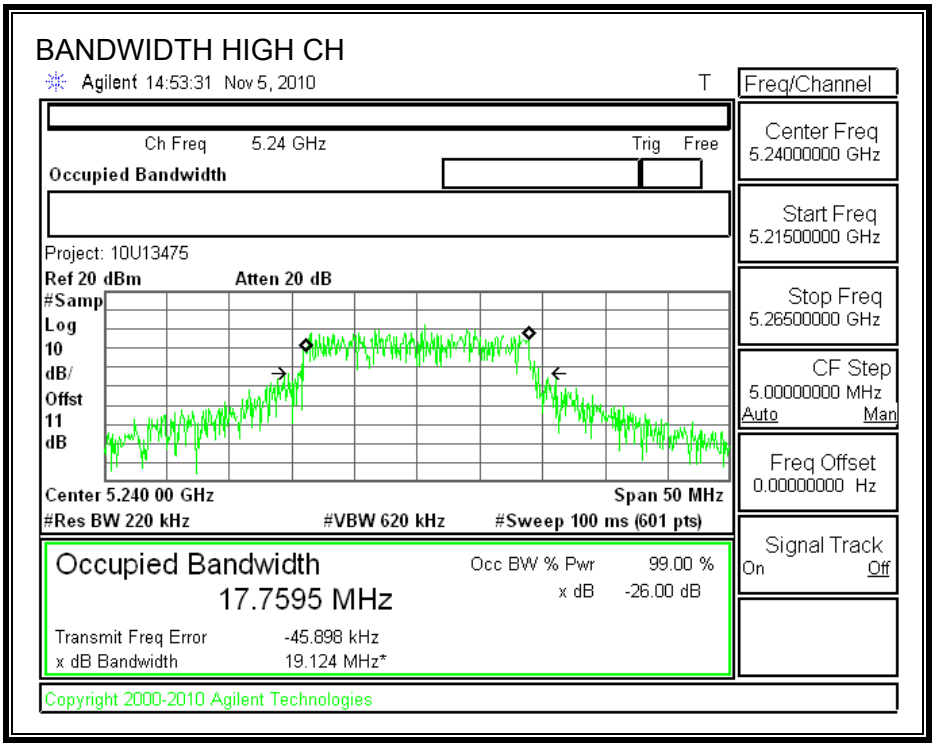


CHAIN 2

26 dB and 99% BANDWIDTH

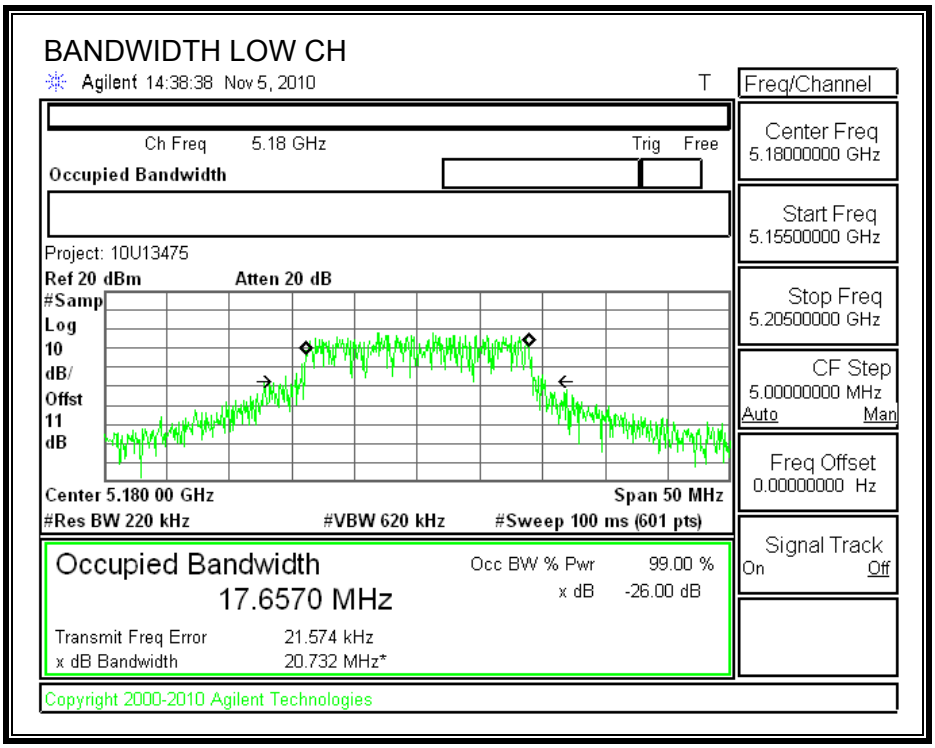


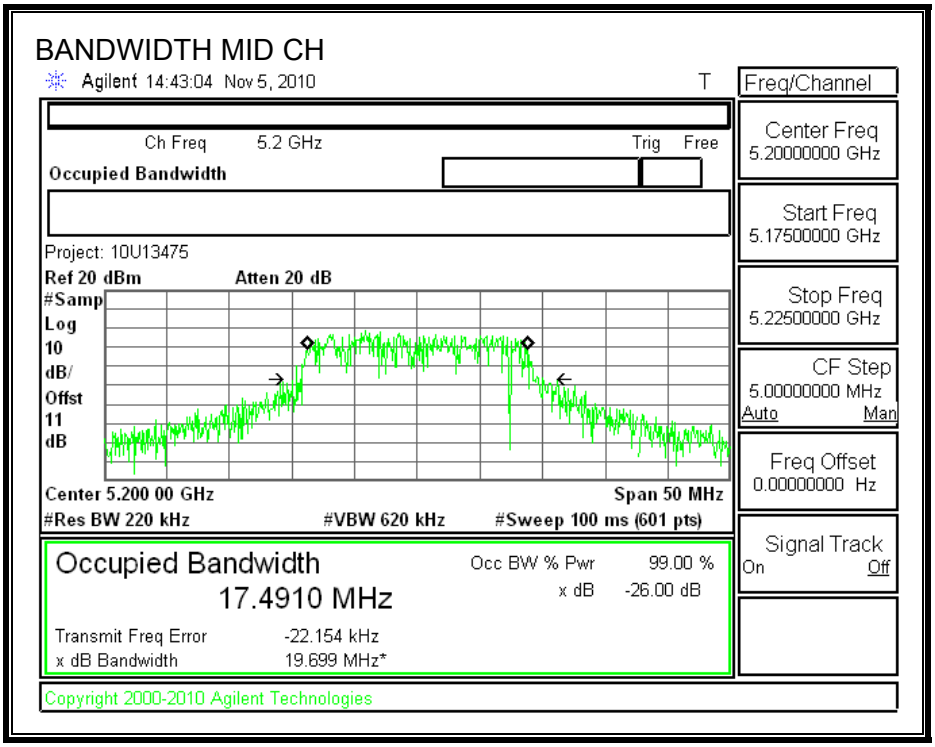


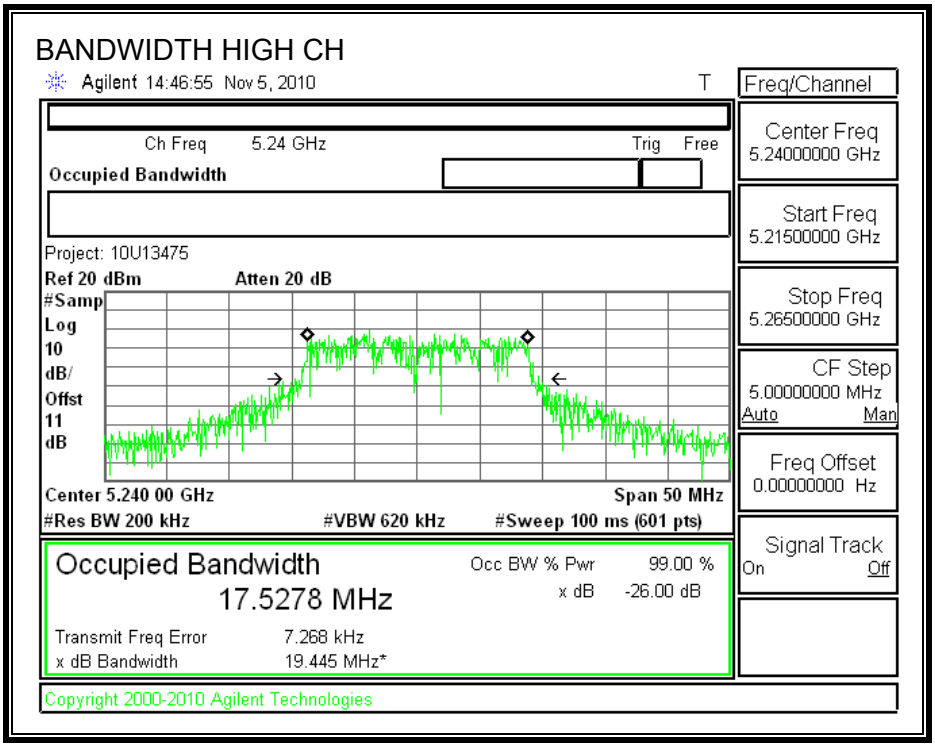


CHAIN 3

26 dB and 99% BANDWIDTH







7.2.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

TEST PROCEDURE

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

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

RESULTS

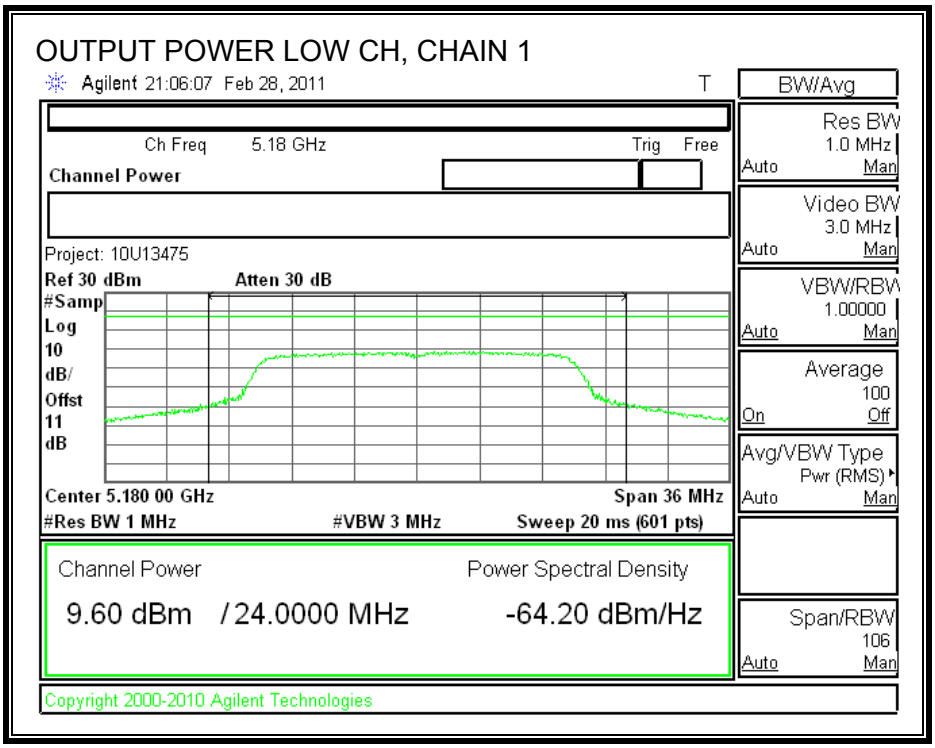
Limit

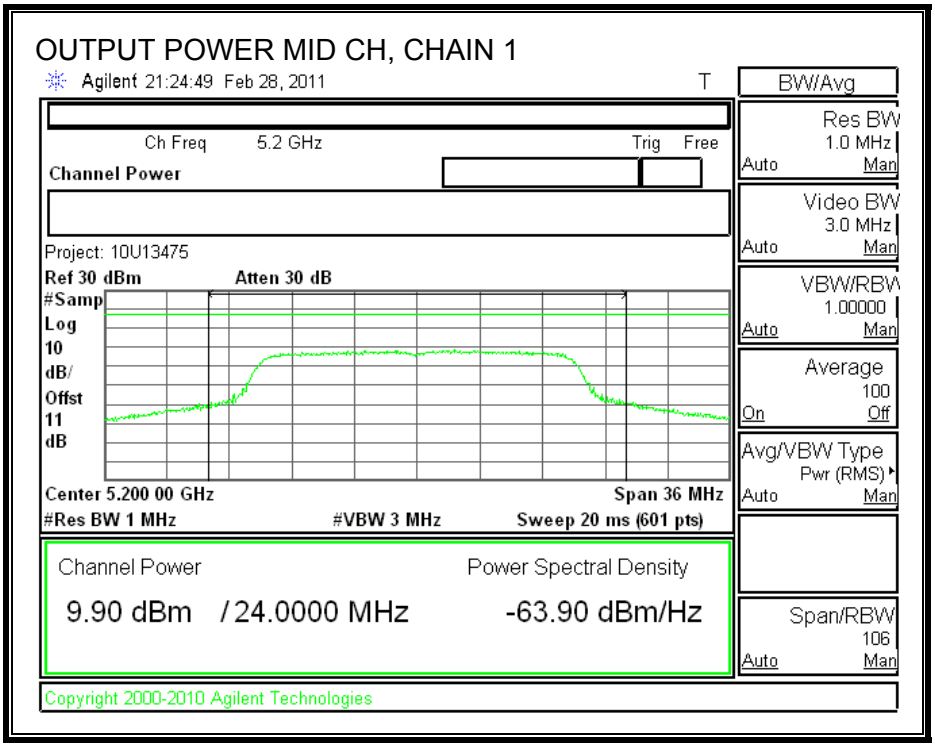
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	16.99	19.665	16.94	5.50	16.94
Mid	5200	16.99	19.579	16.92	5.50	16.92
High	5240	16.99	19.124	16.82	5.50	16.82

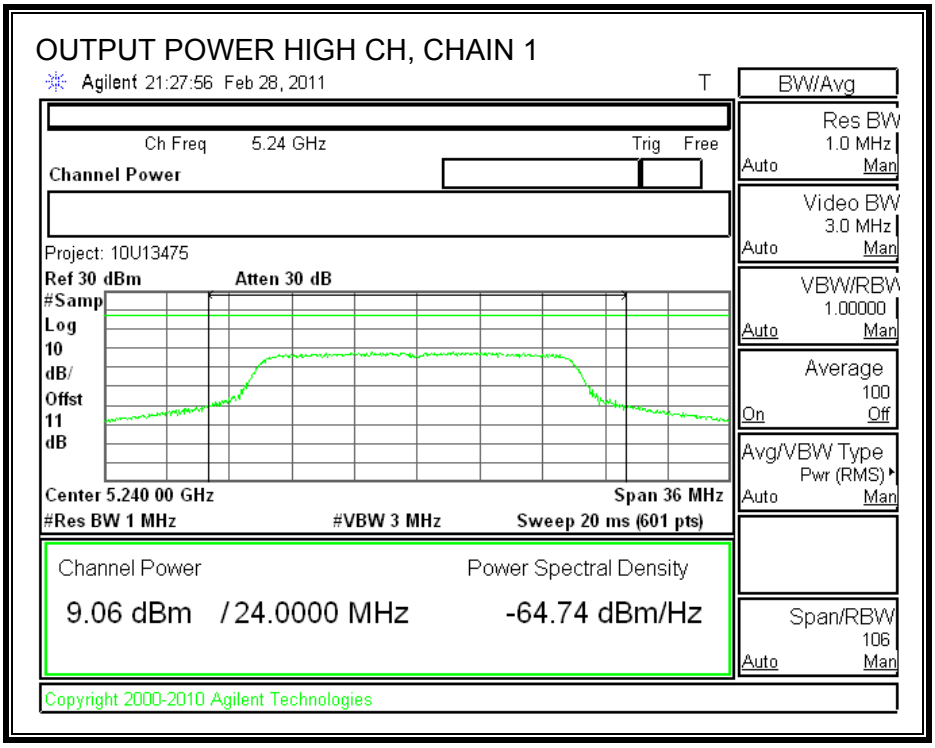
Individual Chain Results

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	9.60	12.23	10.44	15.67	16.94	-1.27
Mid	5200	9.90	12.35	10.14	15.71	16.92	-1.20
High	5240	9.06	12.19	10.29	15.48	16.82	-1.34

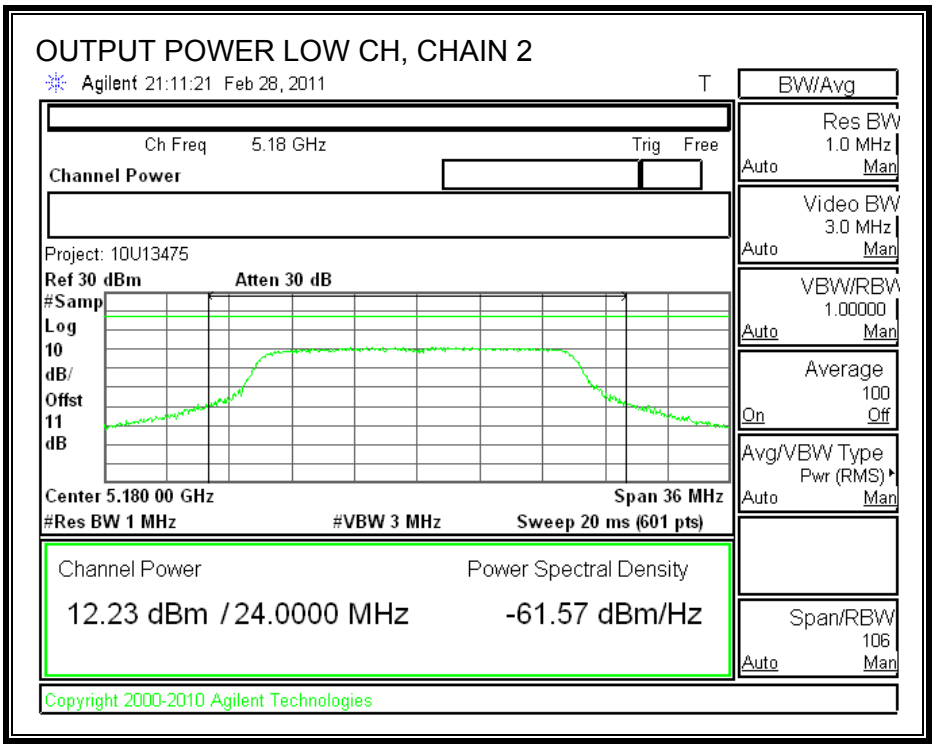
CHAIN 1 OUTPUT POWER

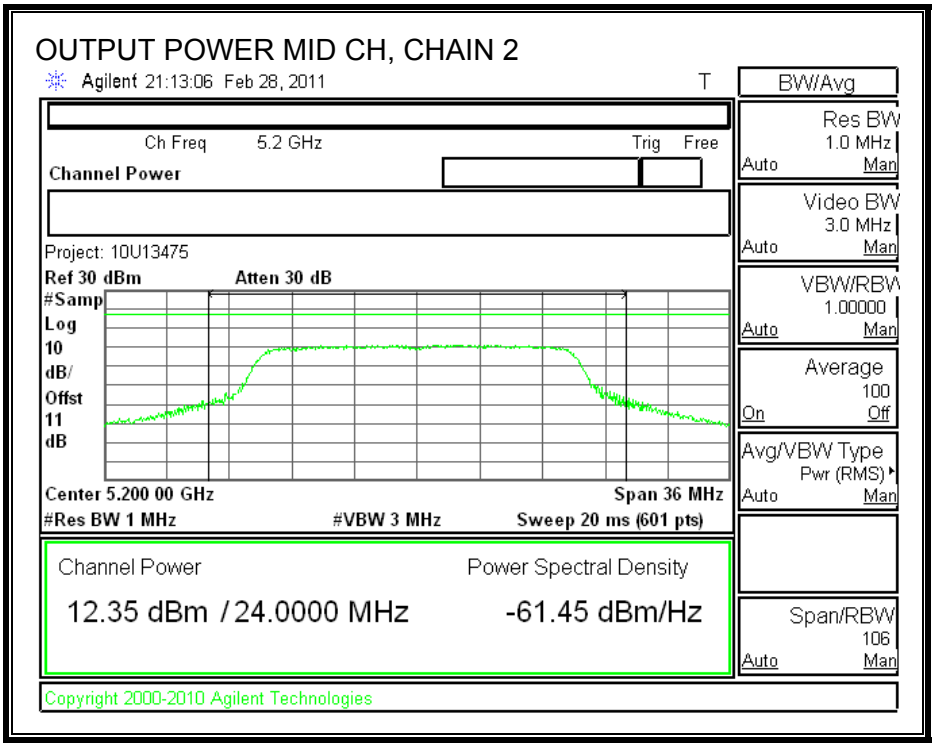


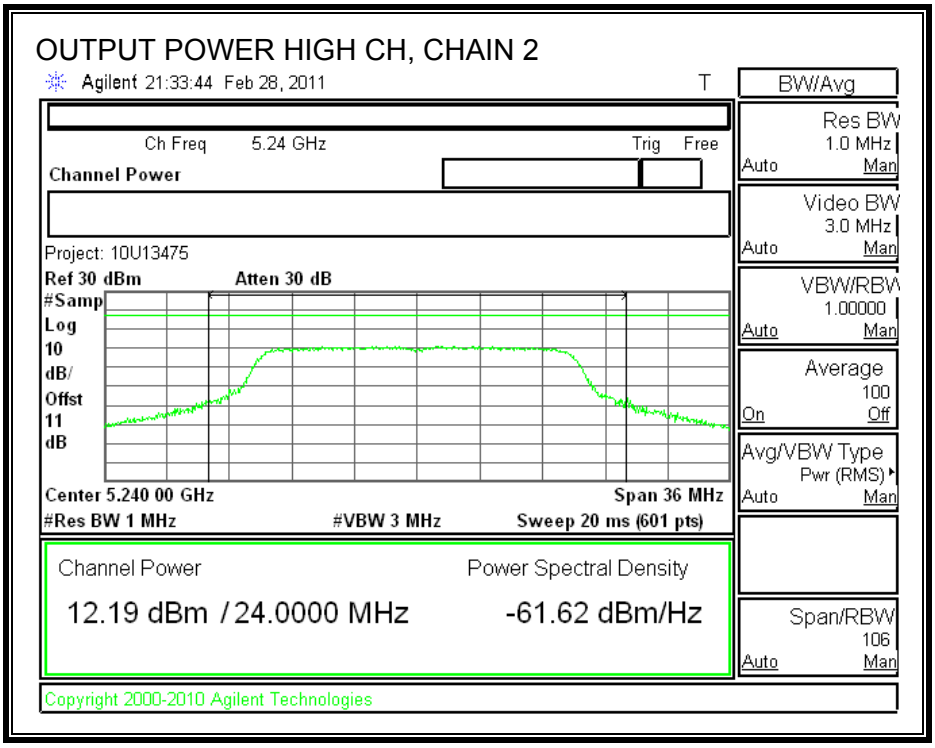




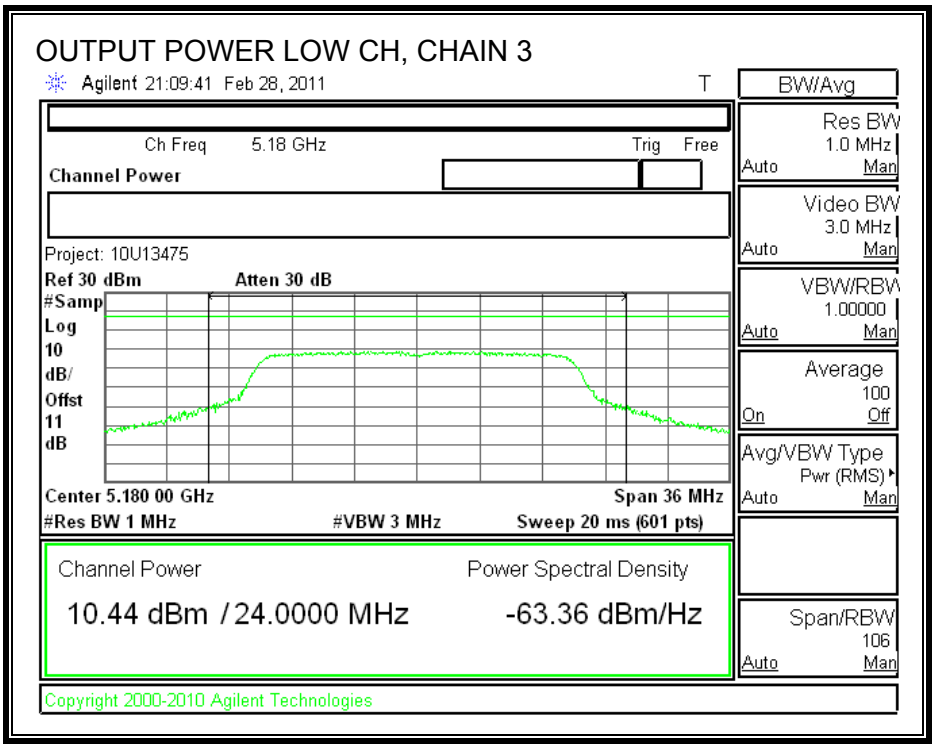
CHAIN 2 OUTPUT POWER

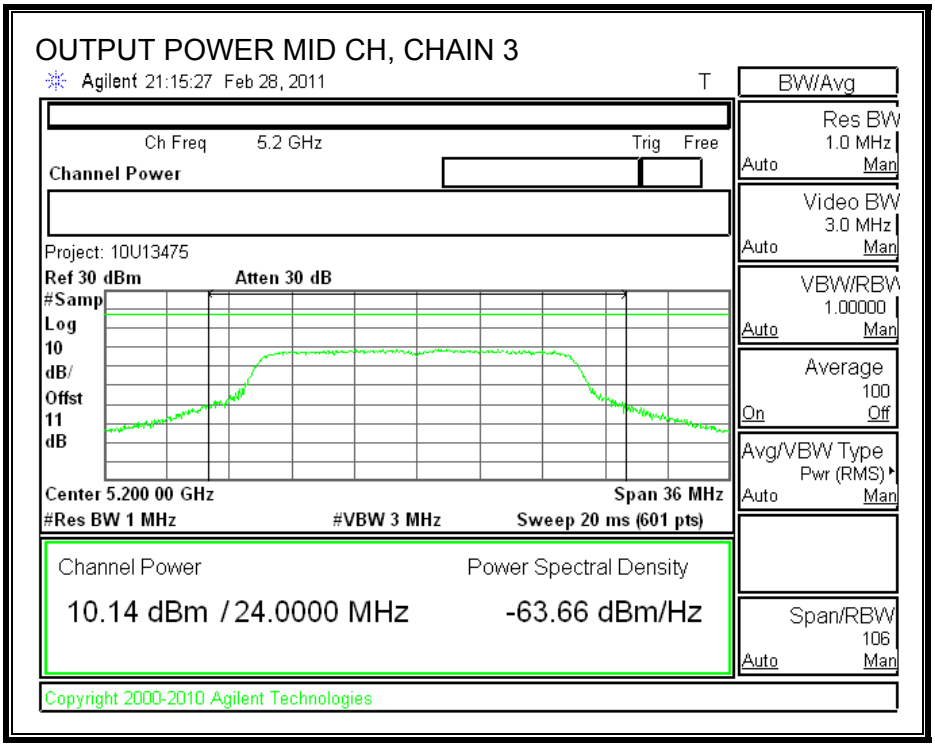


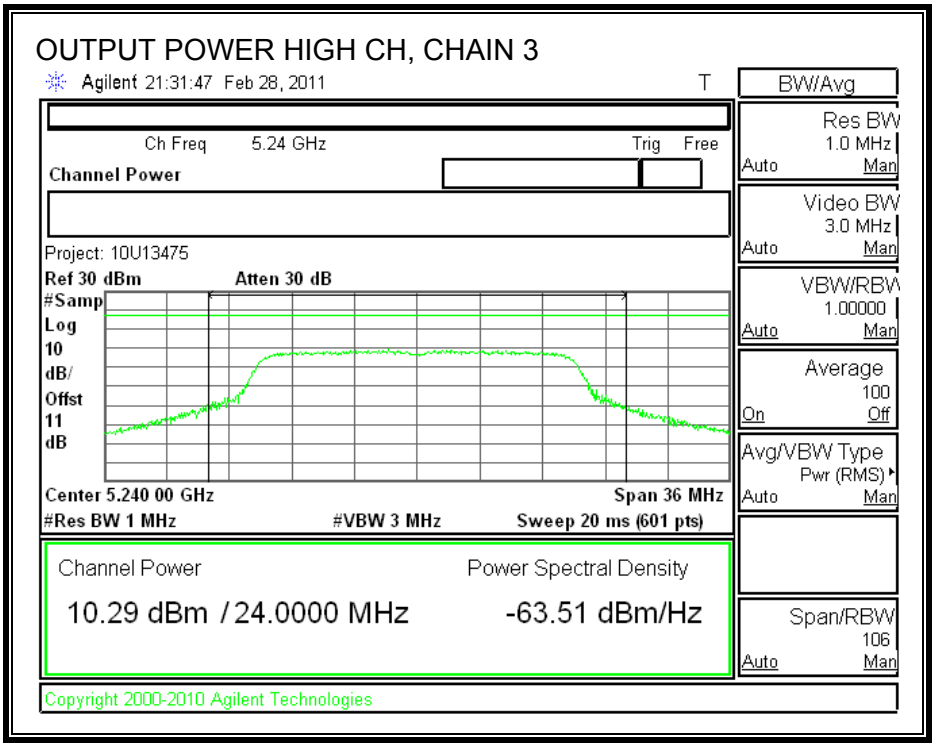




CHAIN 3 OUTPUT POWER







7.2.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	5180	9.31	12.03	10.07	15.40
Middle	5200	9.32	11.91	10.11	15.36
High	5240	9.01	11.52	10.12	15.11

7.2.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

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

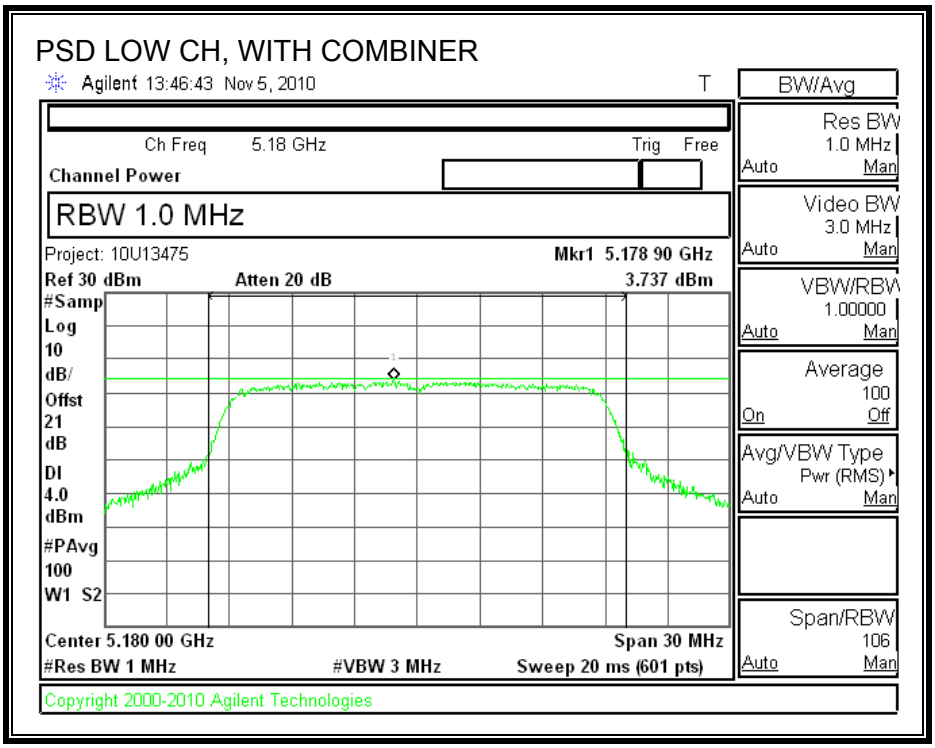
TEST PROCEDURE

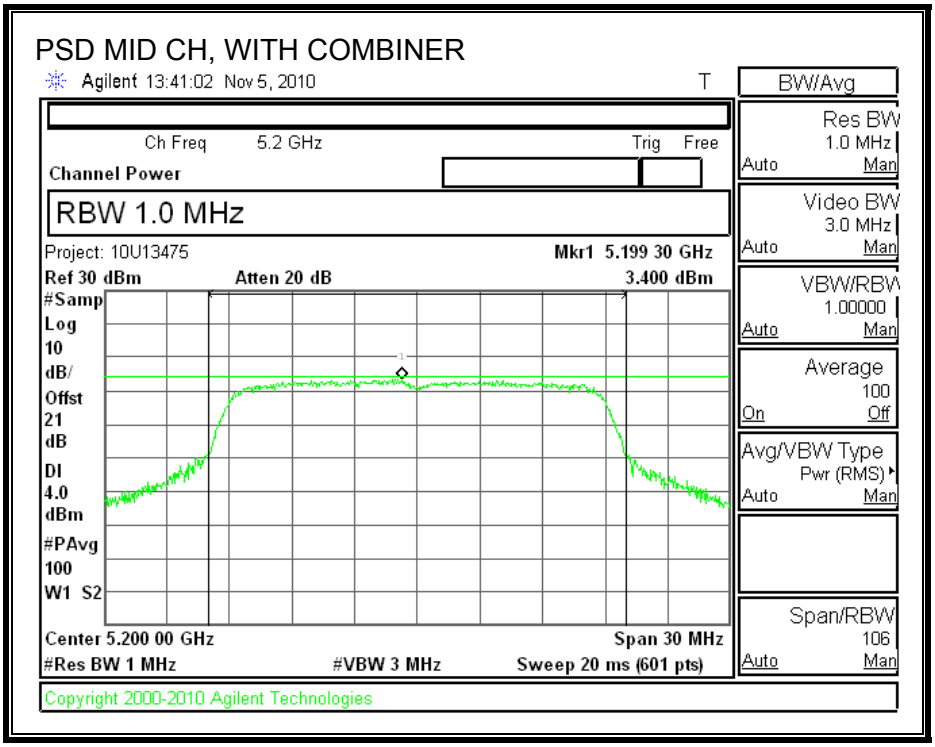
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

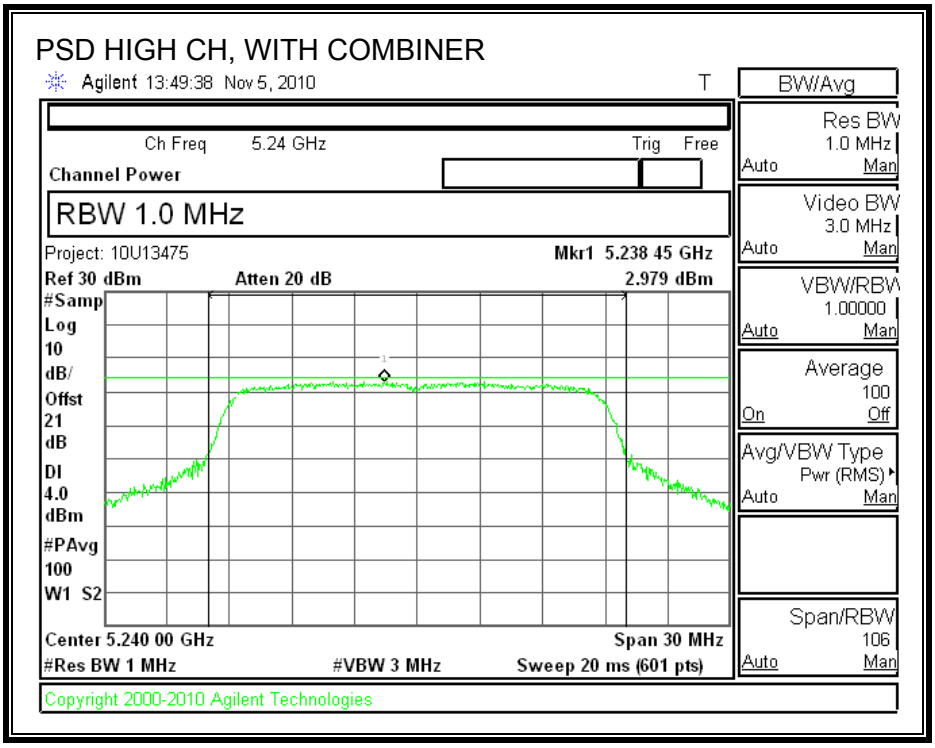
RESULTS

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.74	4	-0.26
Middle	5200	3.40	4	-0.60
High	5240	2.98	4	-1.02

POWER SPECTRAL DENSITY WITH COMBINER







7.2.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

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

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

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

RESULTS

CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.50	13	-2.50
Middle	5200	10.47	13	-2.53
High	5240	10.16	13	-2.84

CHAIN 2

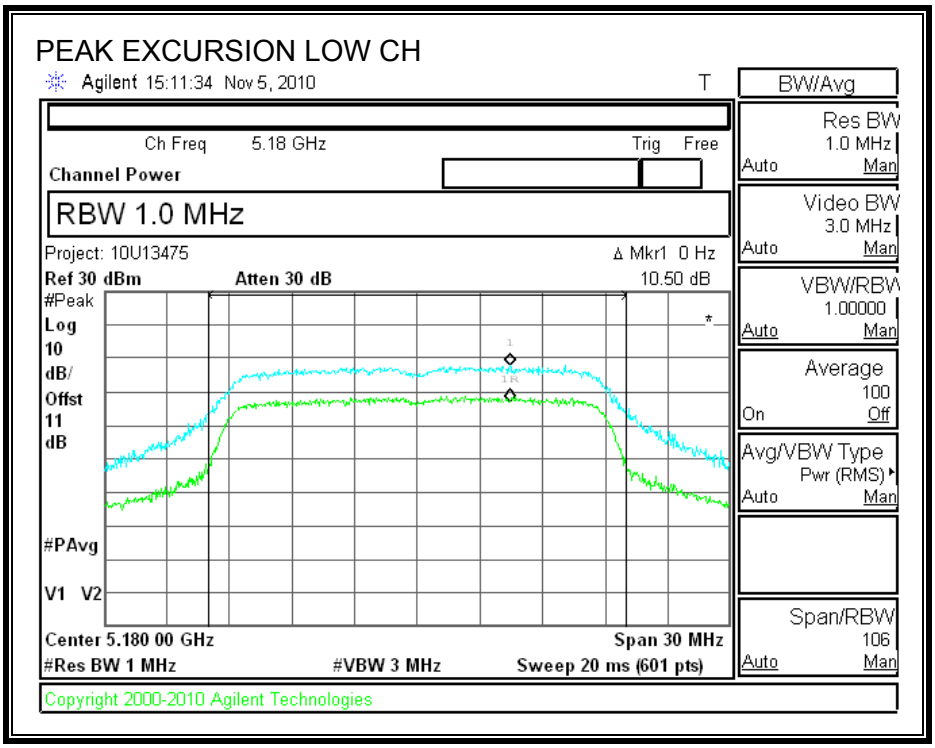
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.64	13	-3.36
Middle	5200	9.23	13	-3.77
High	5240	9.52	13	-3.48

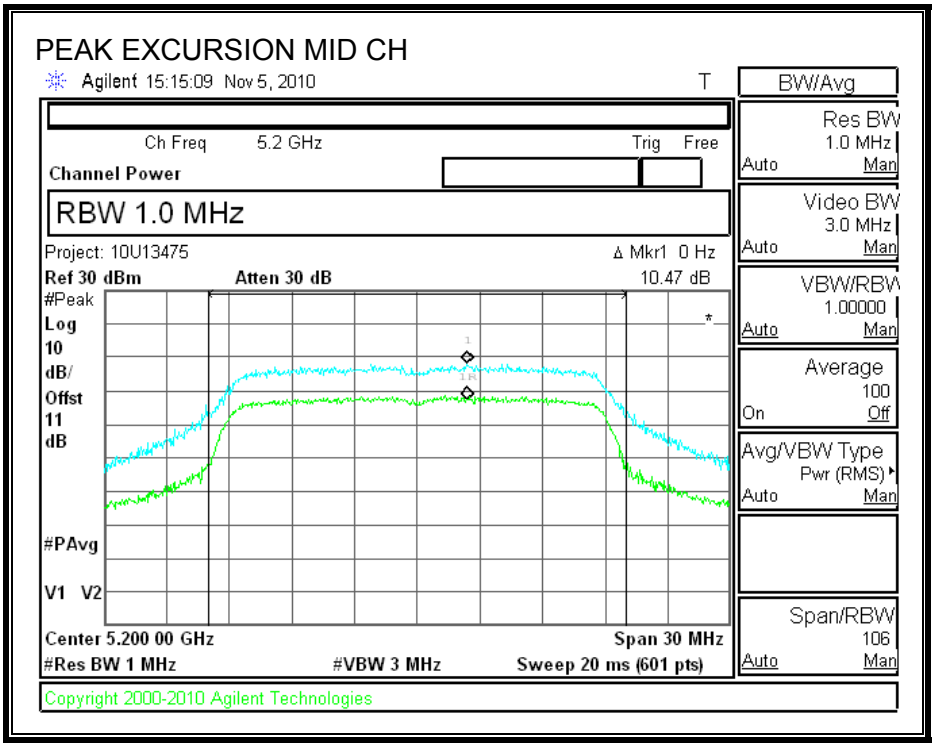
CHAIN 3

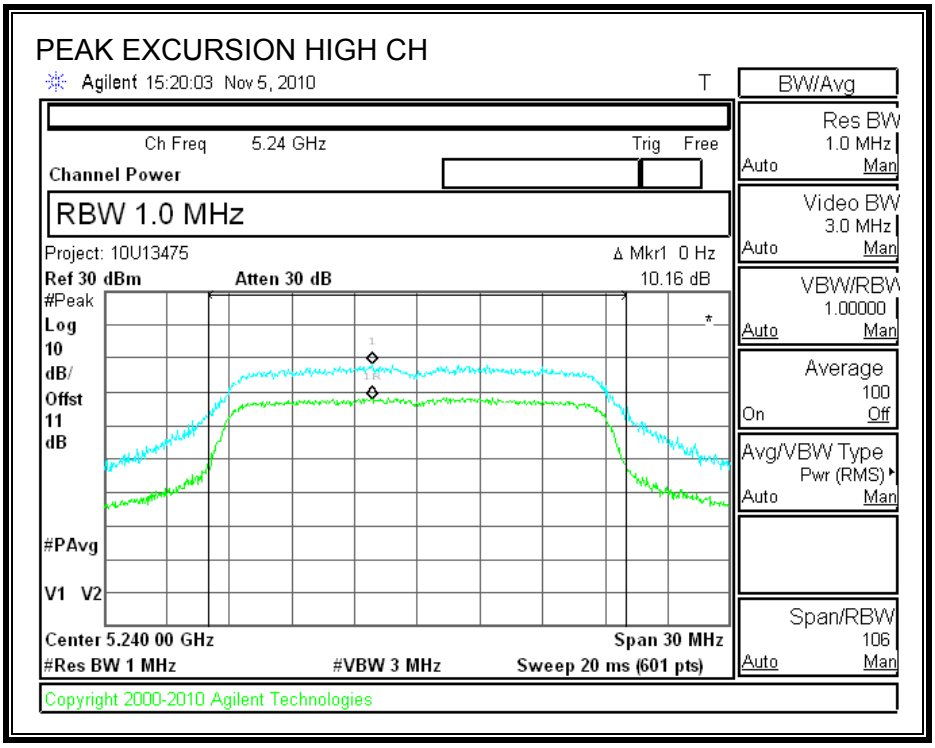
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.33	13	-2.67
Middle	5200	11.84	13	-1.16
High	5240	10.36	13	-2.64

CHAIN 1

PEAK EXCURSION

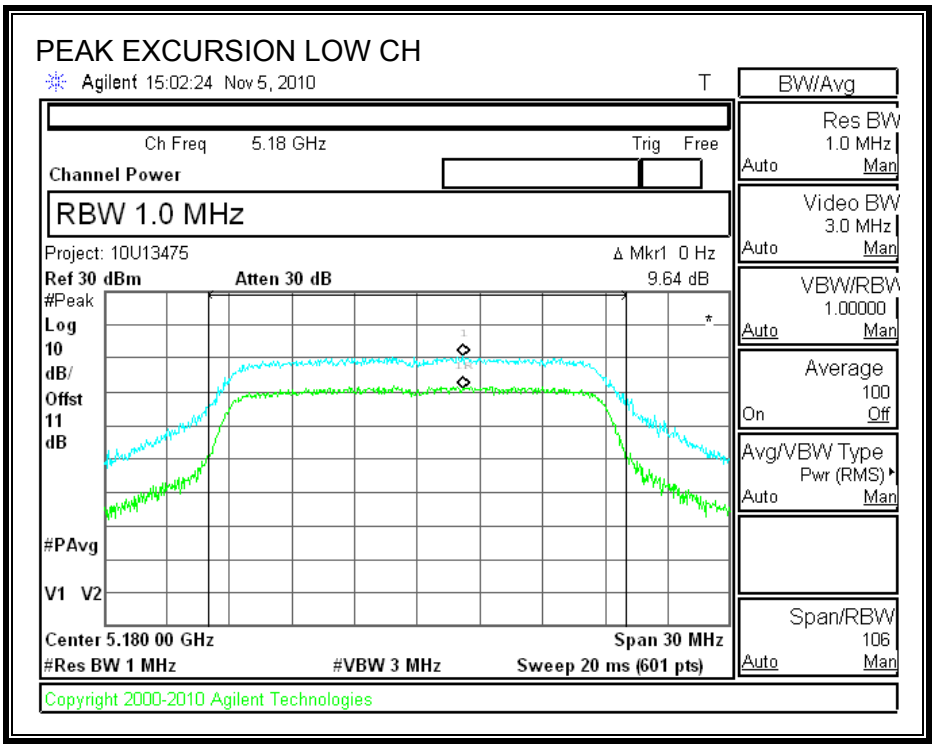


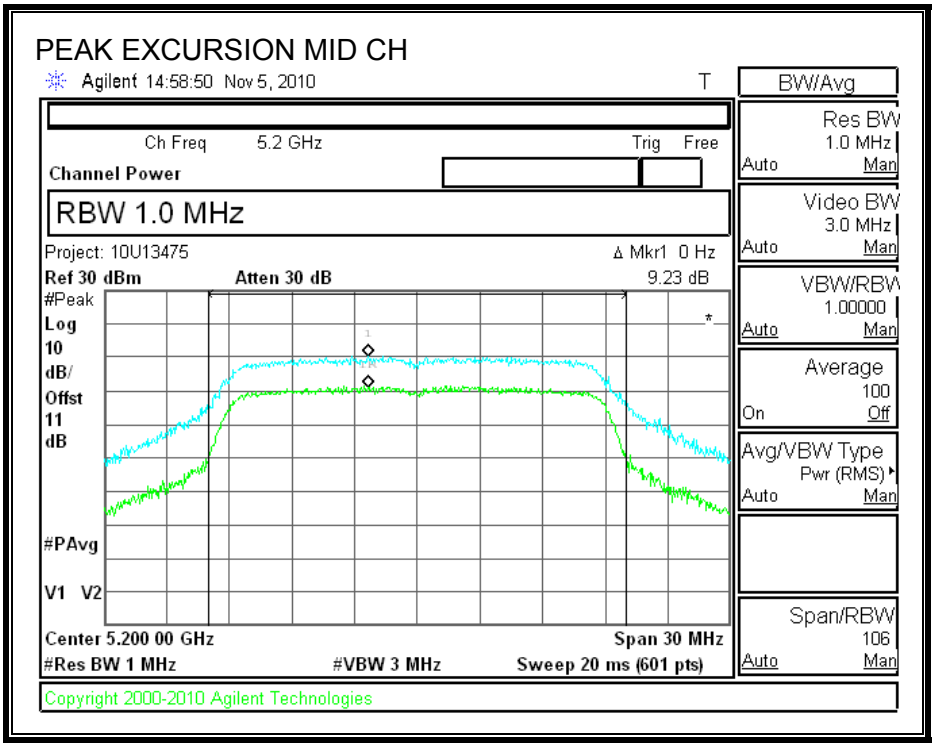


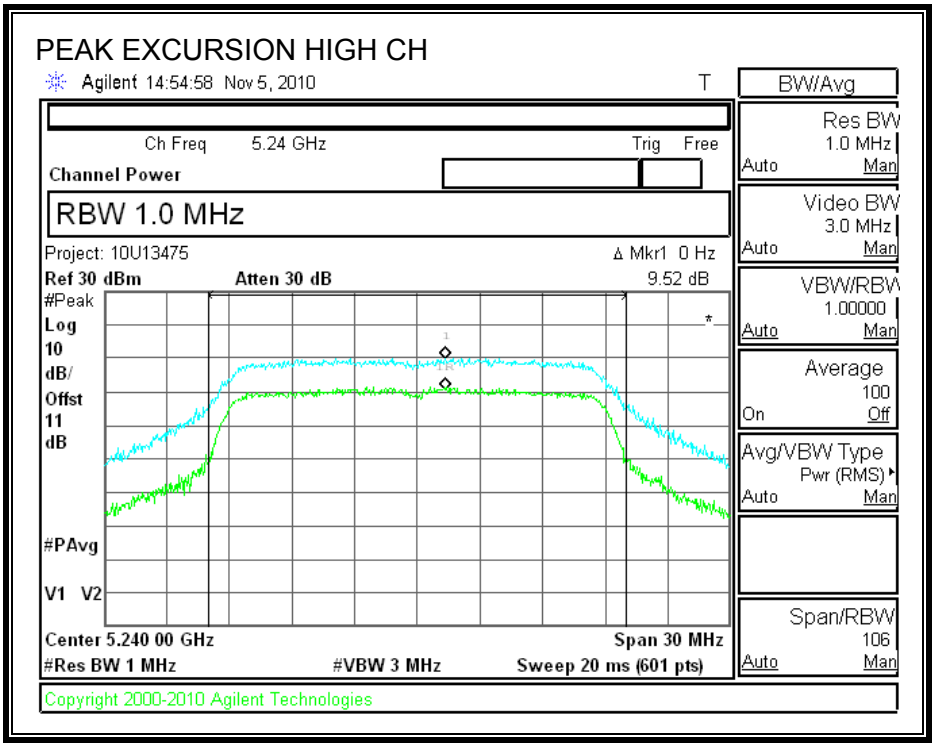


CHAIN 2

PEAK EXCURSION

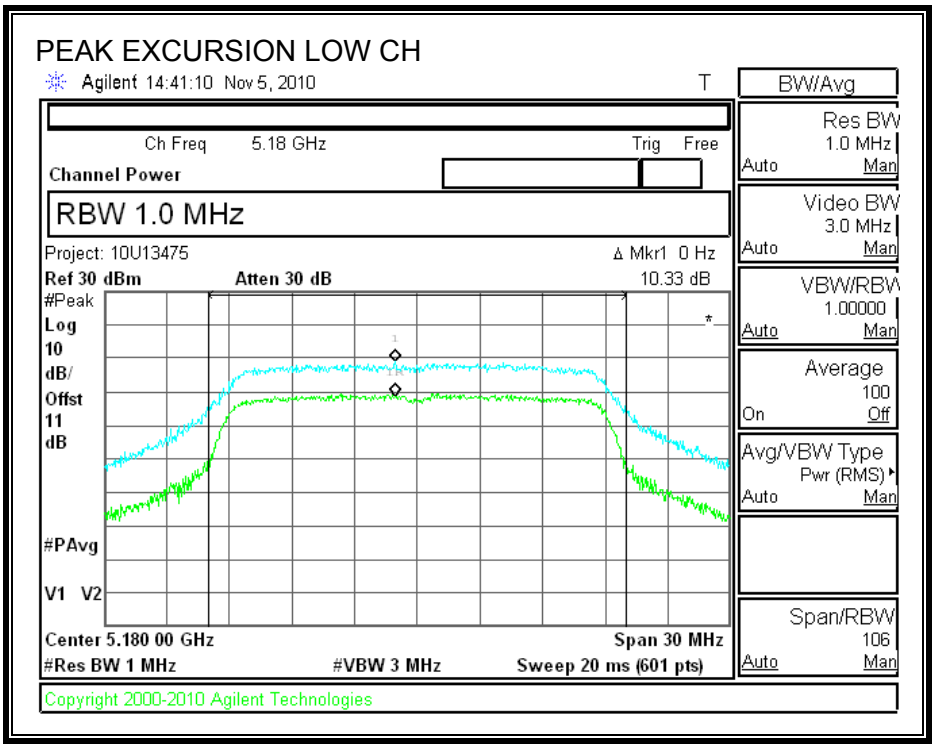


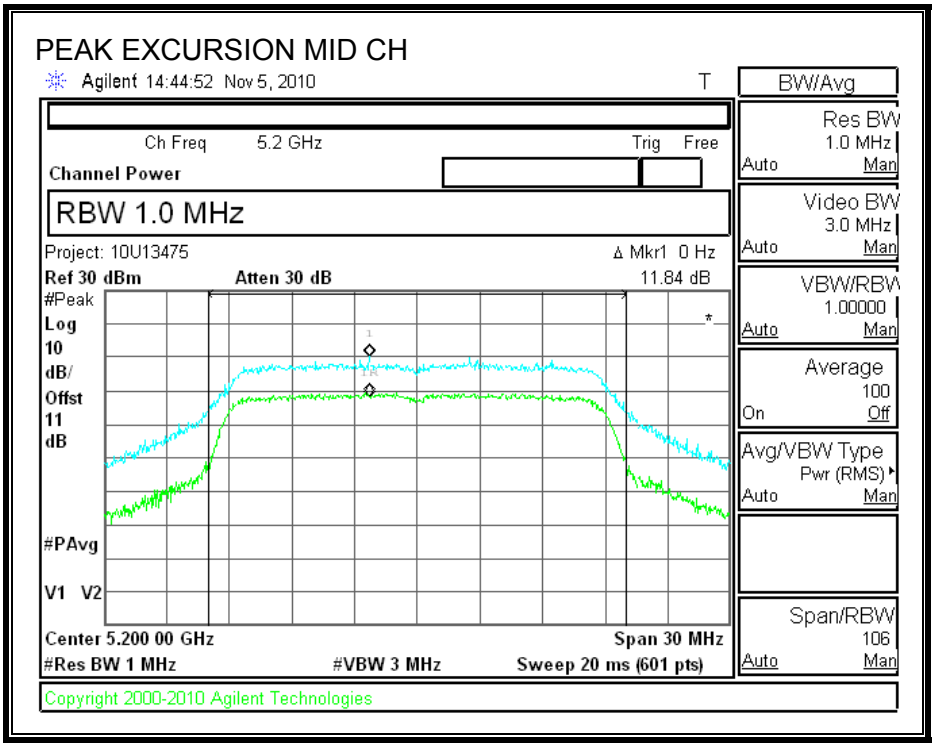


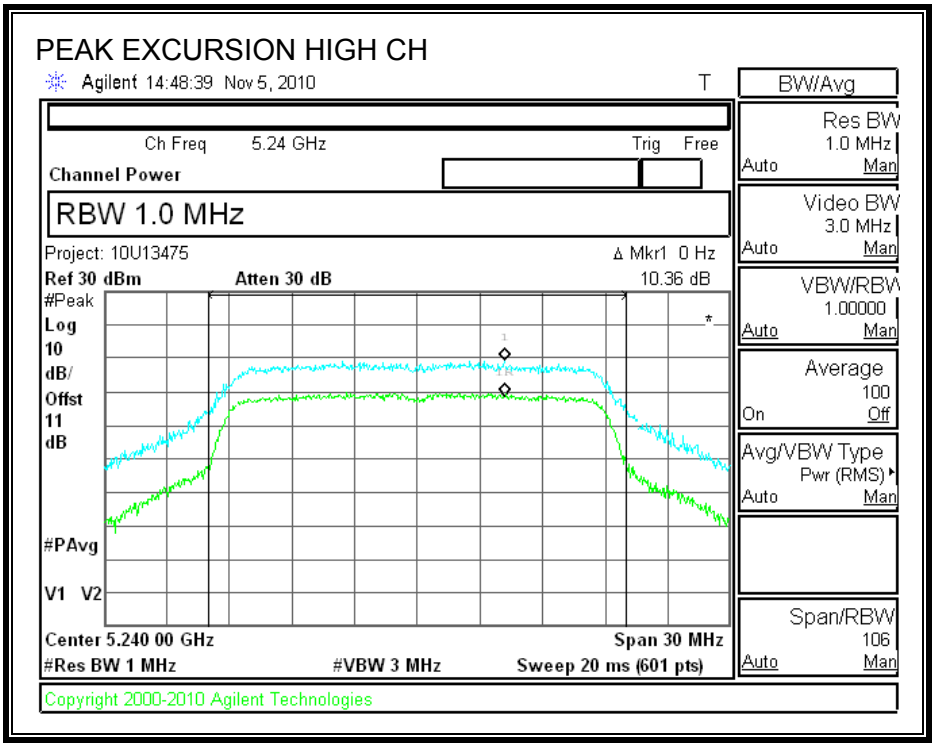


CHAIN 3

PEAK EXCURSION







7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

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

TEST PROCEDURE

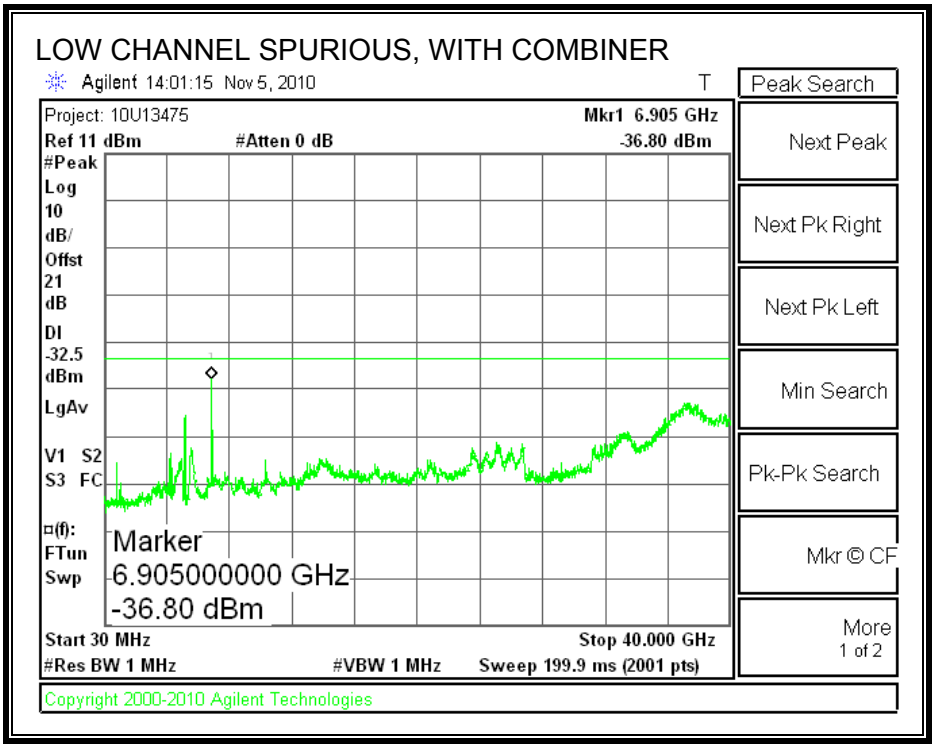
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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

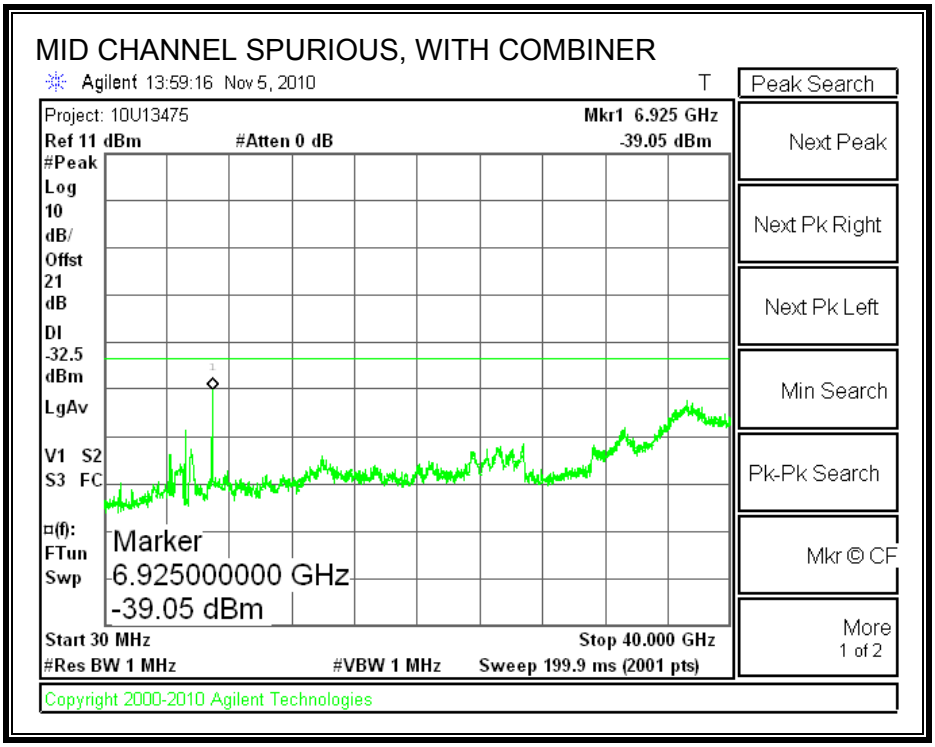
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

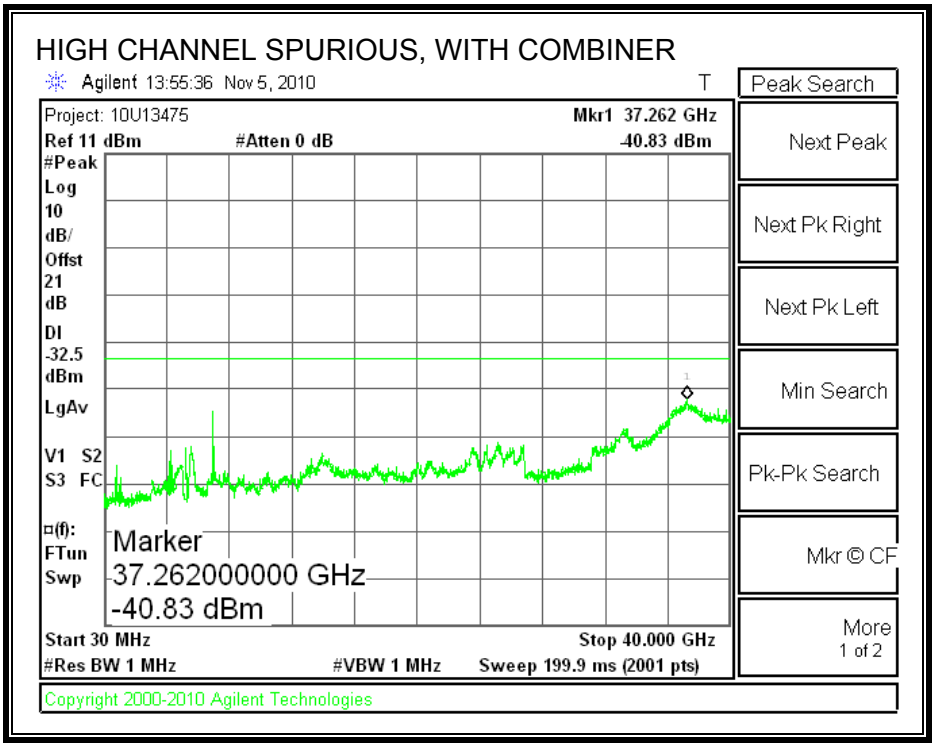
SPURIOUS EMISSIONS WITH COMBINER



MID CHANNEL SPURIOUS, WITH COMBINER



HIGH CHANNEL SPURIOUS, WITH COMBINER



7.3. 802.11n THREE CHAINS 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	38.101	36.3802
High	5230	39.237	36.1201

CHAIN 2

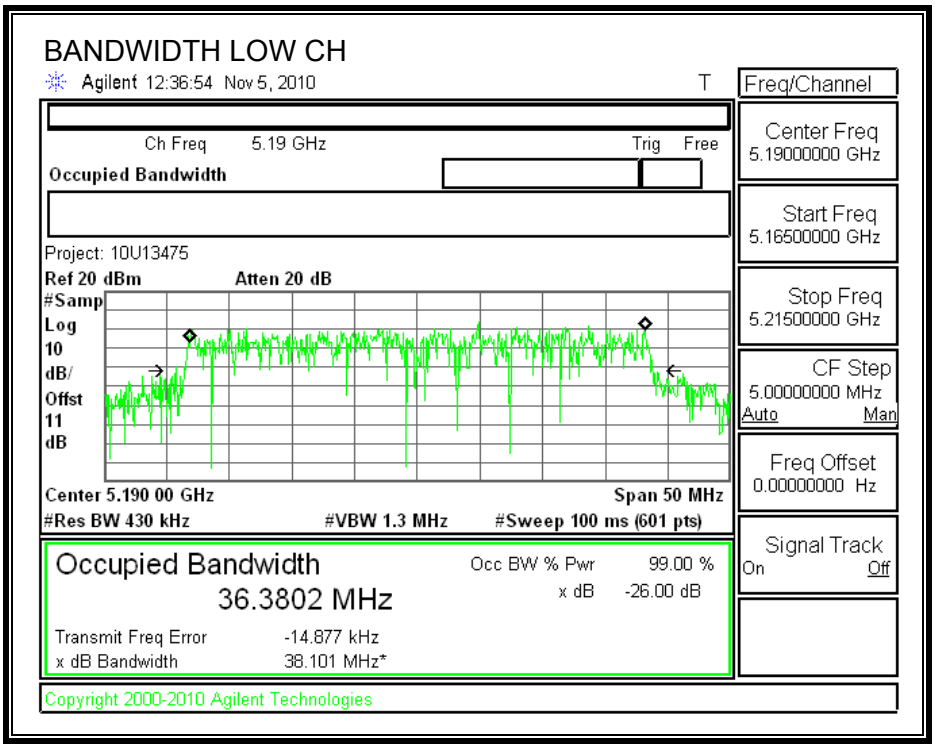
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	38.814	36.1397
High	5230	37.375	36.3575

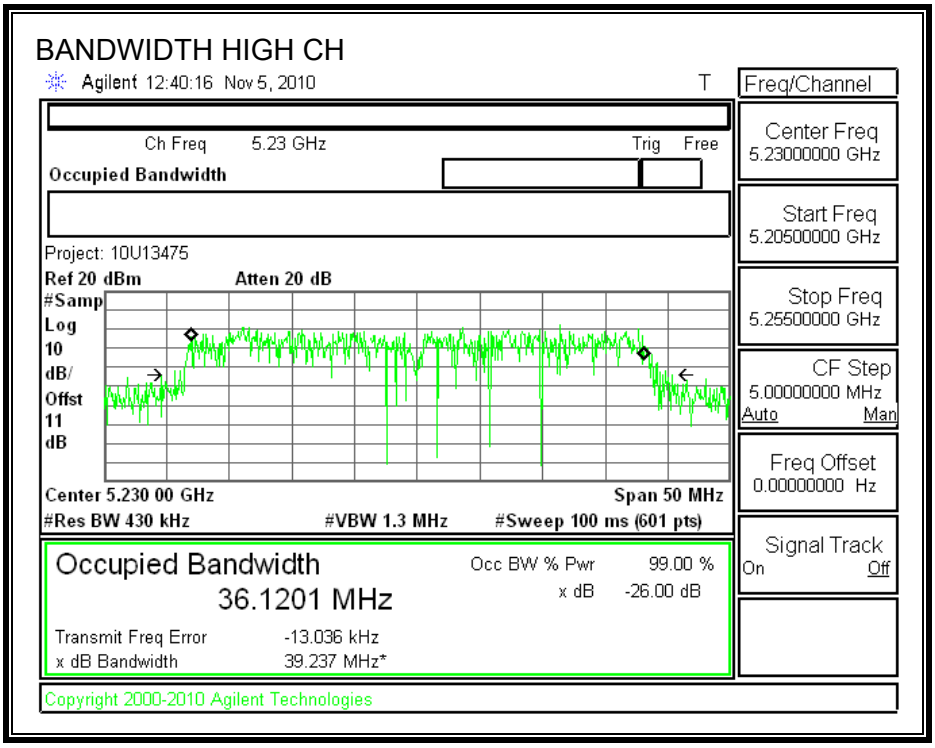
CHAIN 3

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	38.534	35.9210
High	5230	40.760	36.3548

CHAIN 1

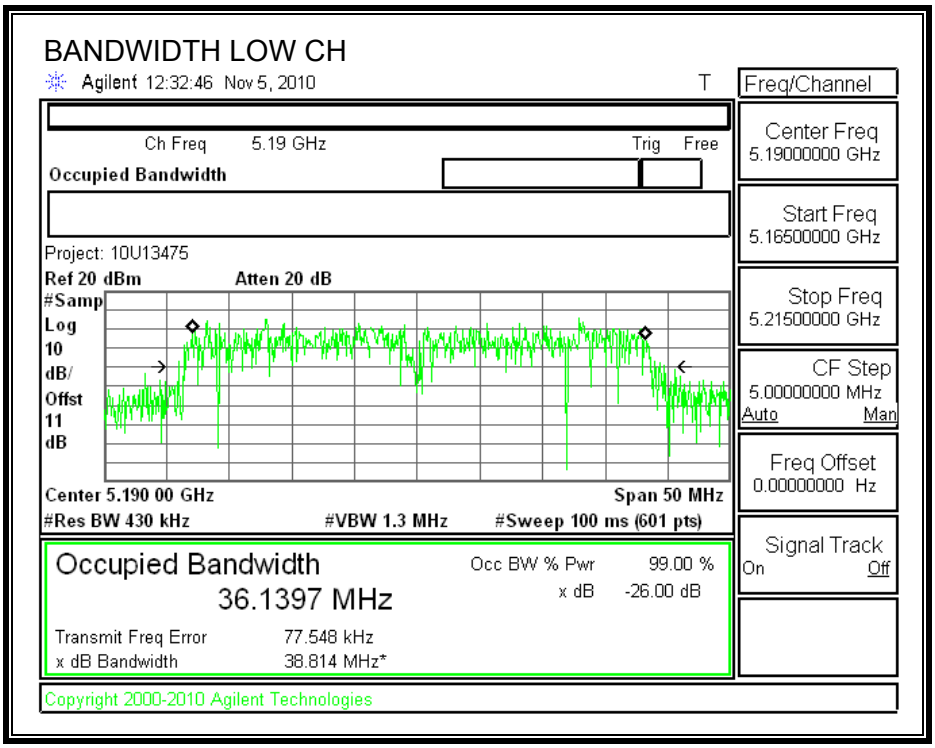
26 dB and 99% BANDWIDTH

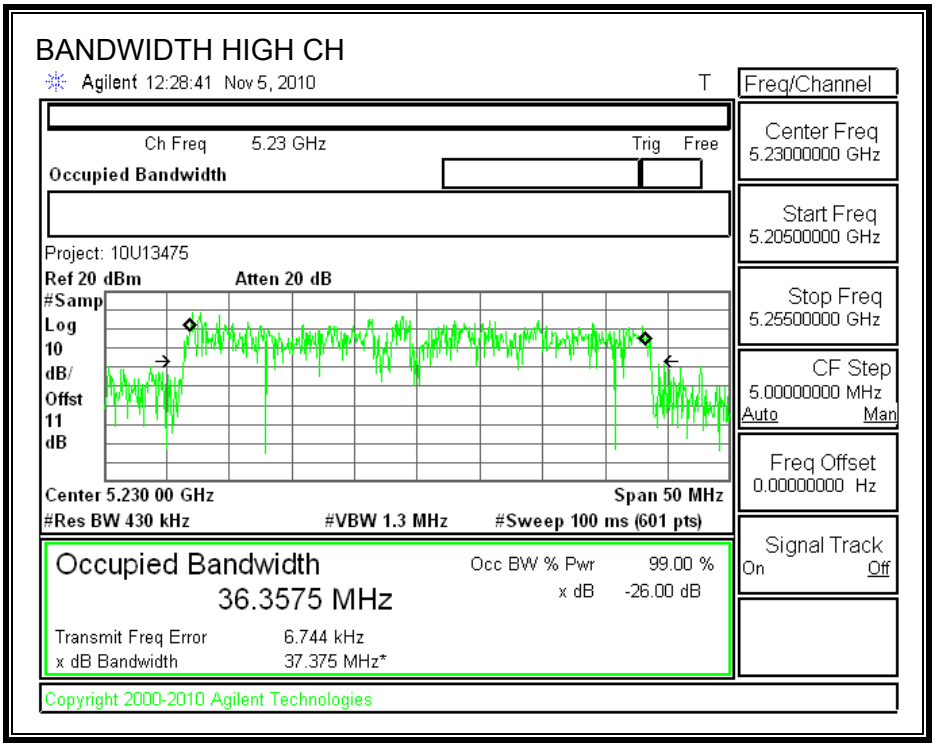




CHAIN 2

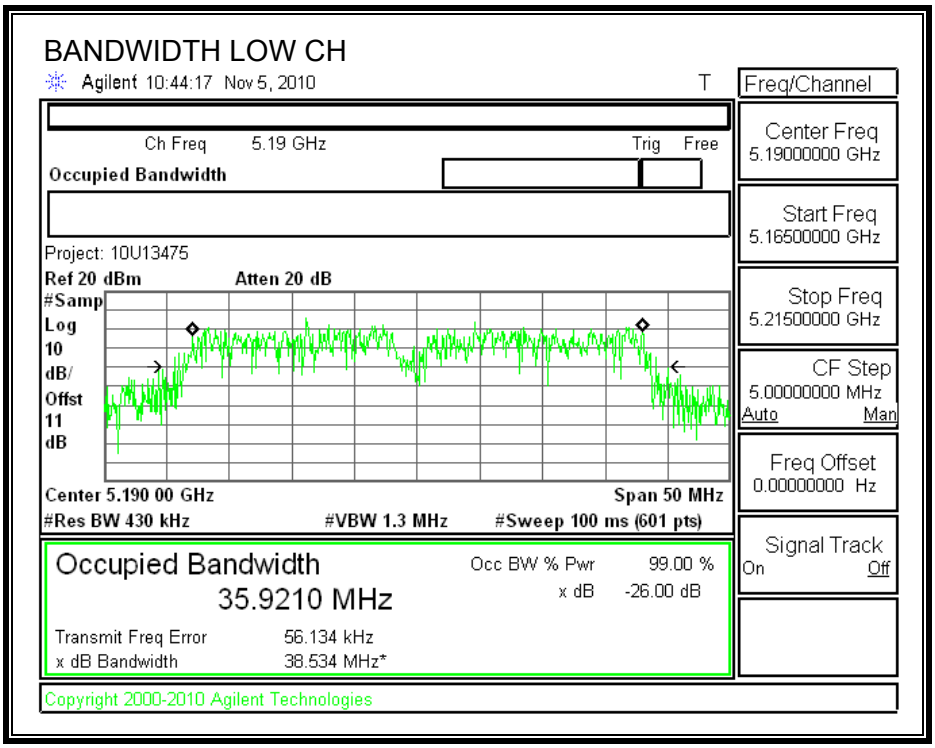
26 dB and 99% BANDWIDTH

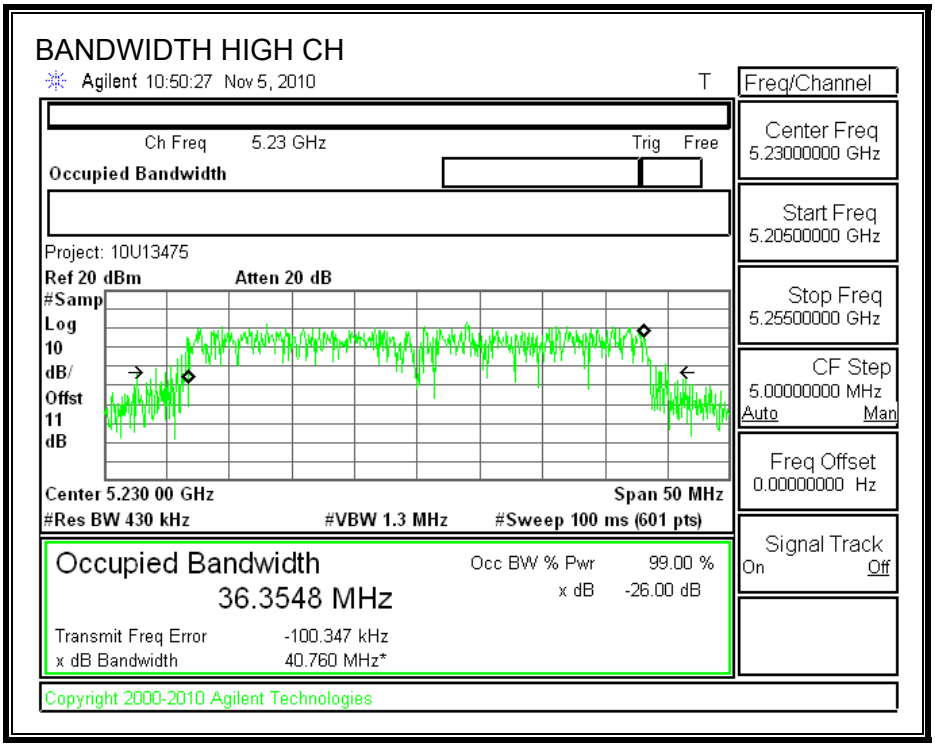




CHAIN 3

26 dB and 99% BANDWIDTH





7.3.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

TEST PROCEDURE

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

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

RESULTS

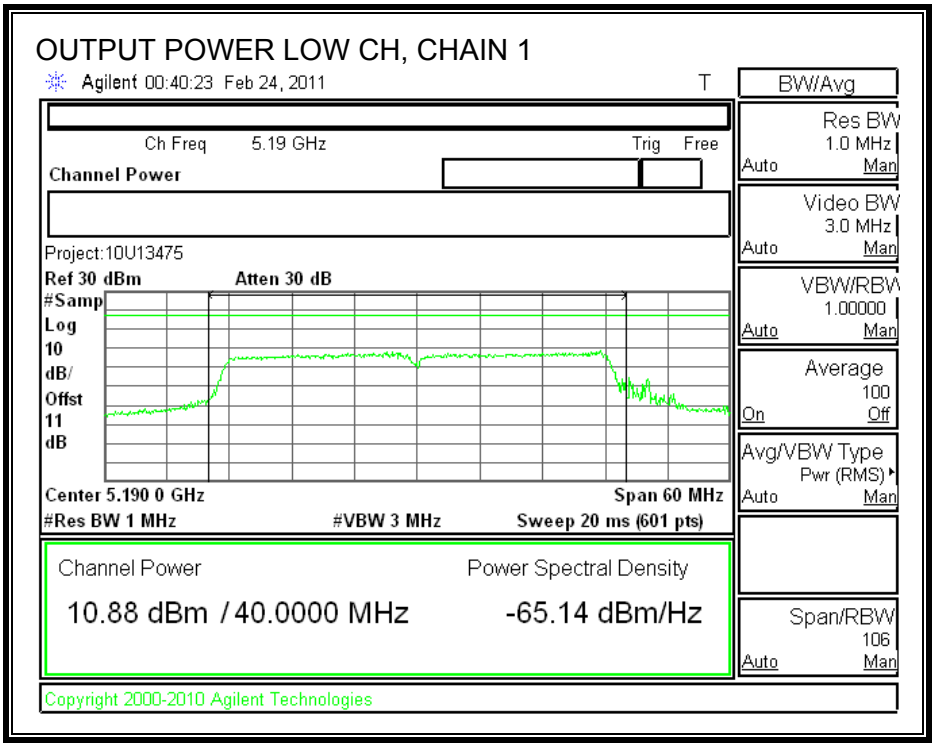
Limit

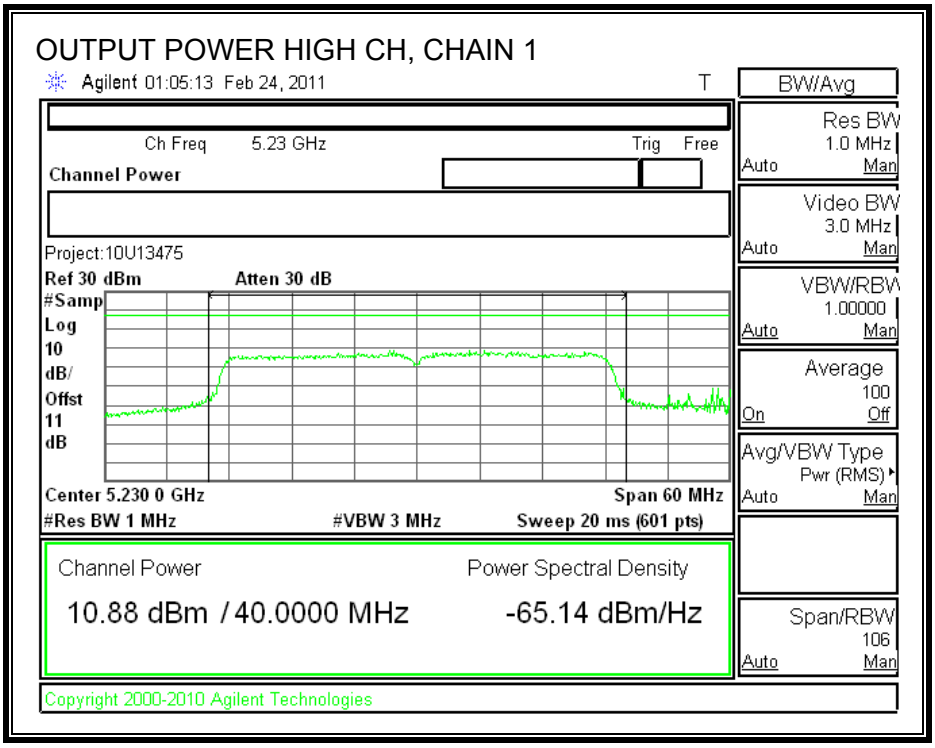
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5190	16.99	38.101	19.81	5.50	16.99
High	5230	16.99	37.275	19.71	5.50	16.99

Individual Chain Results

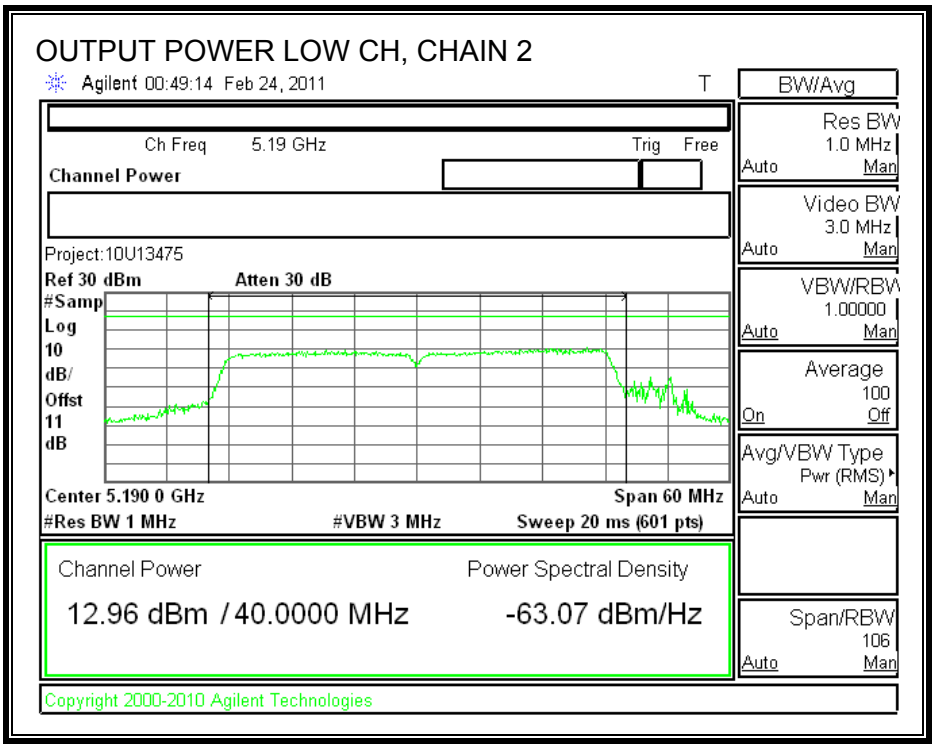
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5190	10.88	12.96	11.83	16.74	16.99	-0.25
High	5230	10.88	13.50	11.40	16.85	16.99	-0.14

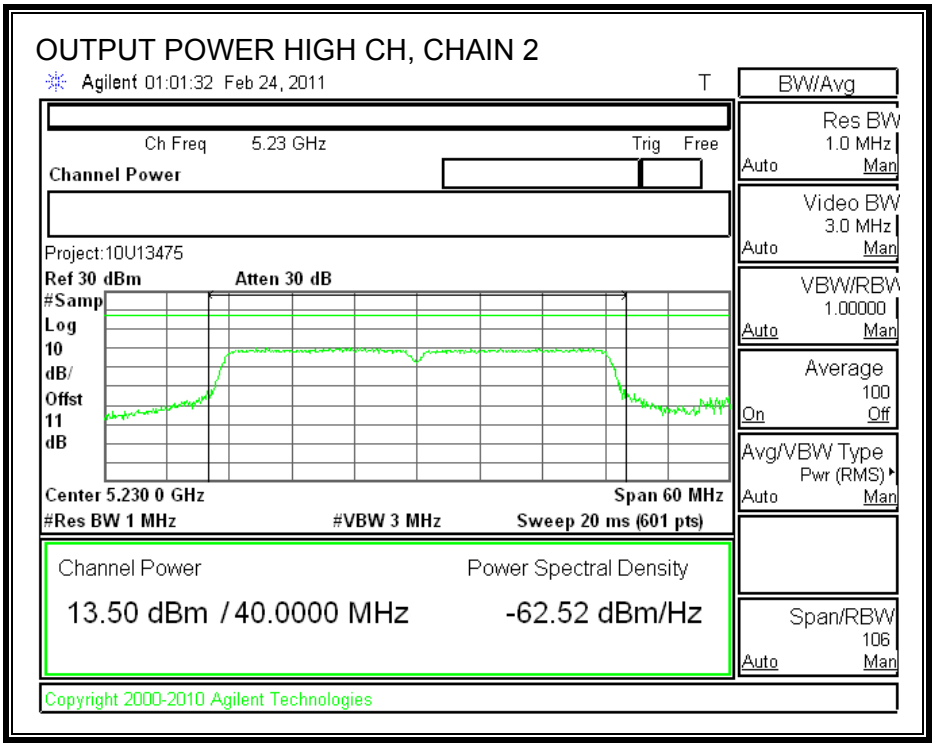
CHAIN 1 OUTPUT POWER



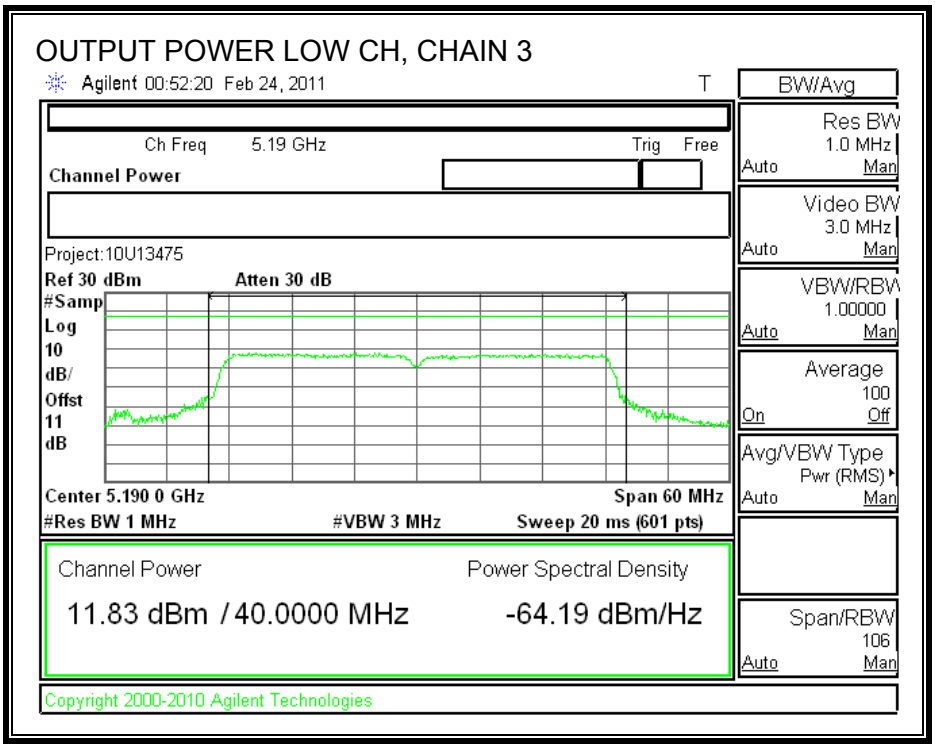


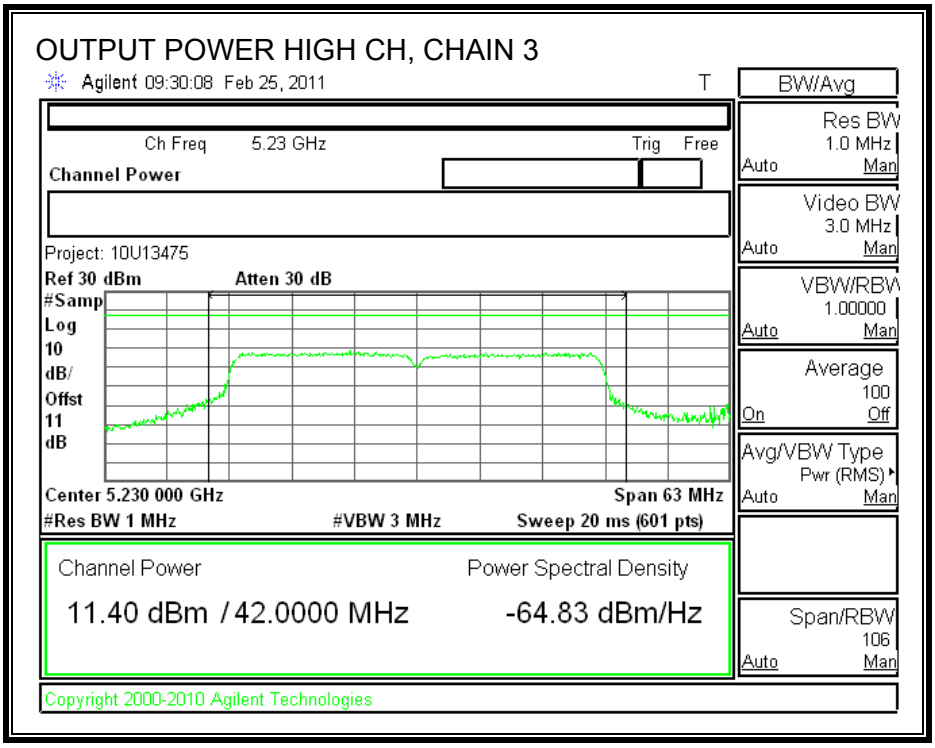
CHAIN 2 OUTPUT POWER





CHAIN 3 OUTPUT POWER





7.3.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)
Low	5190	10.18	12.11	11.21	16.01
High	5230	10.03	13.02	11.47	16.45

7.3.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

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

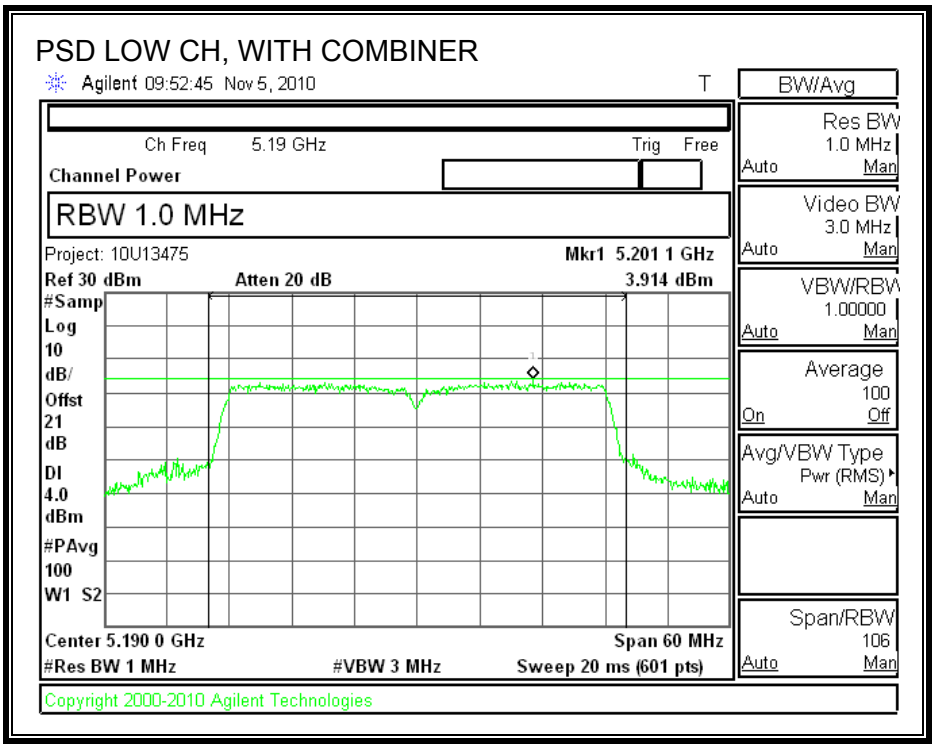
TEST PROCEDURE

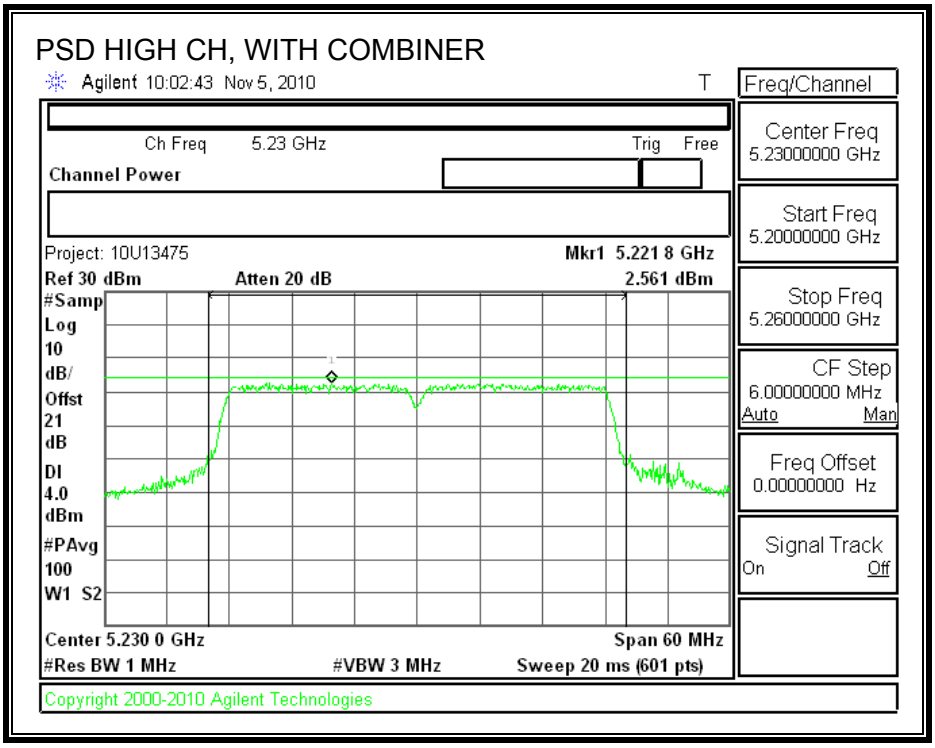
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5190	3.914	4	-0.086
High	5230	2.561	4	-1.439

POWER SPECTRAL DENSITY WITH COMBINER





7.3.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

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

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

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

RESULTS

CHAIN 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	11.18	13	-1.82
High	5230	11.64	13	-1.36

CHAIN 2

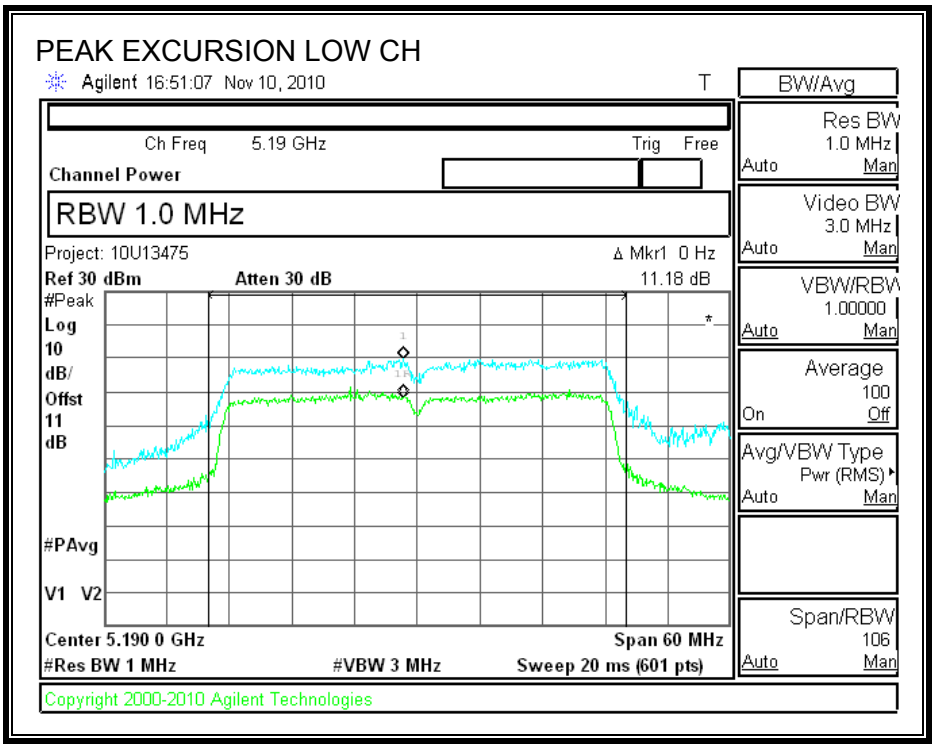
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	12.28	13	-0.72
High	5230	12.79	13	-0.21

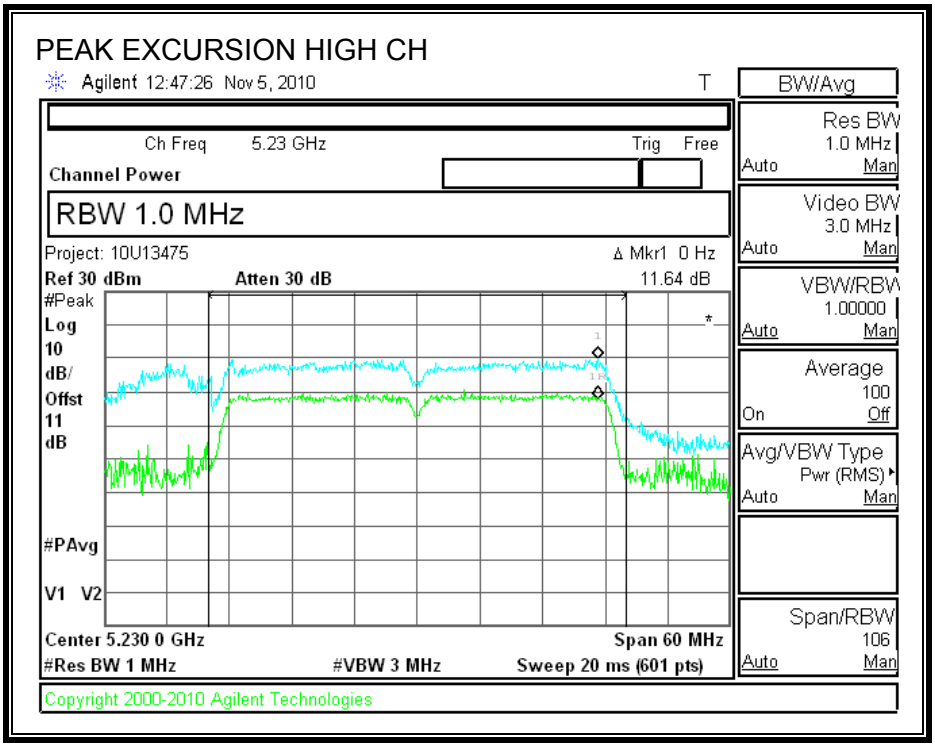
CHAIN 3

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	11.65	13	-1.35
High	5230	11.94	13	-1.06

CHAIN 1

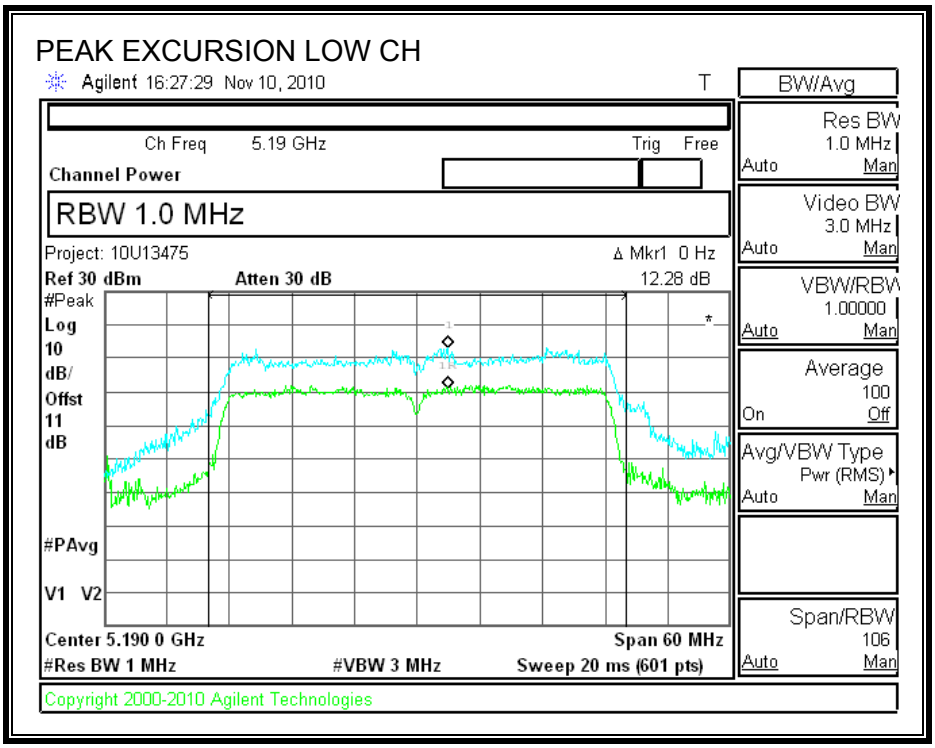
PEAK EXCURSION

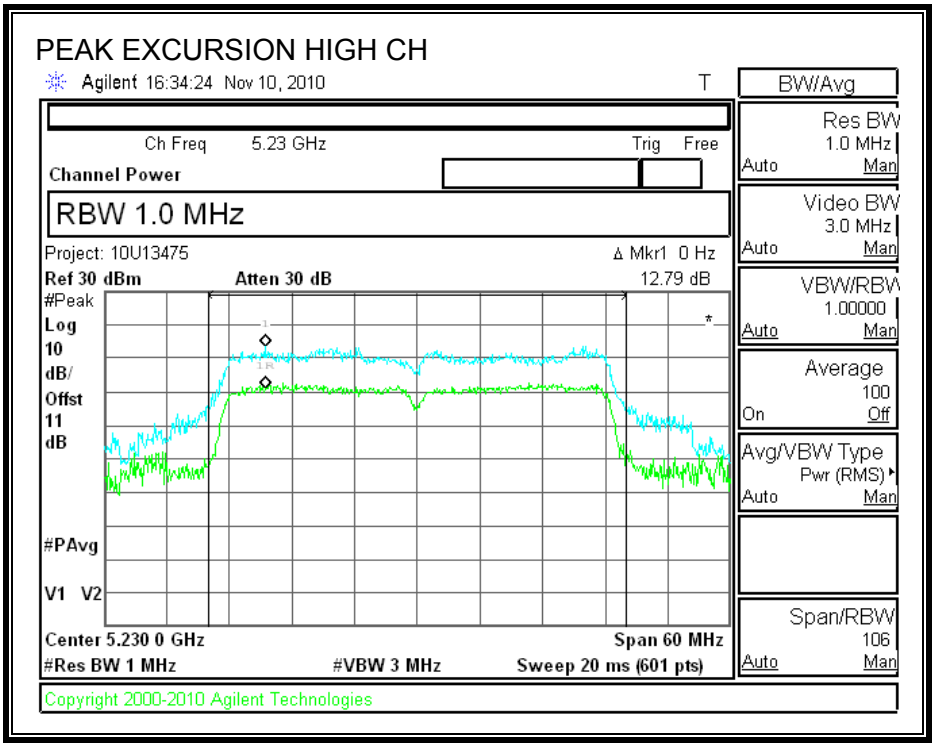




CHAIN 2

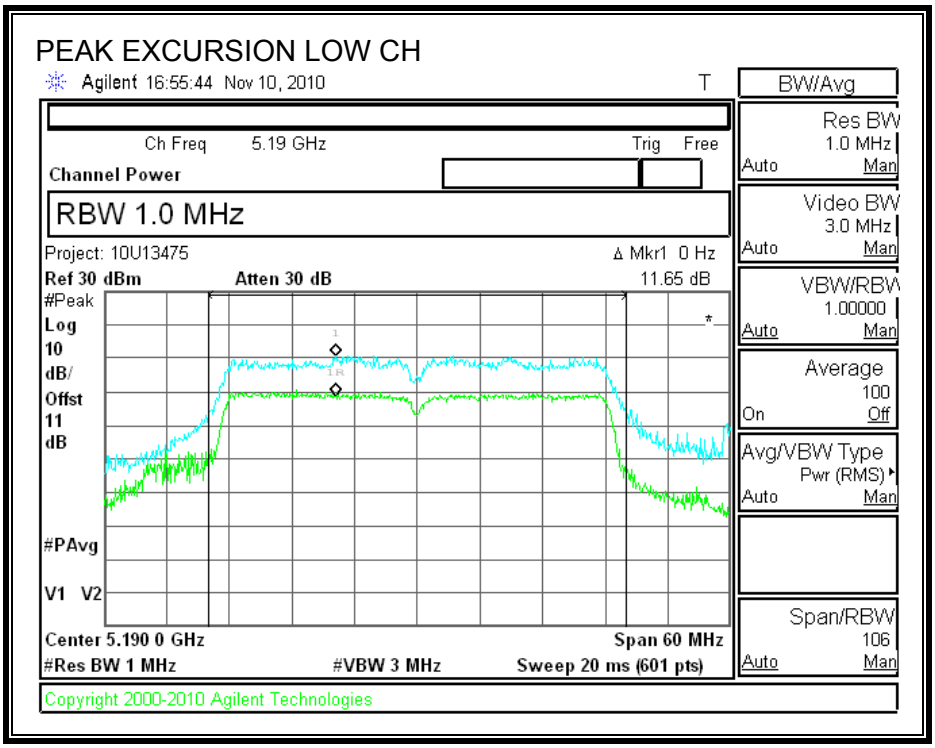
PEAK EXCURSION

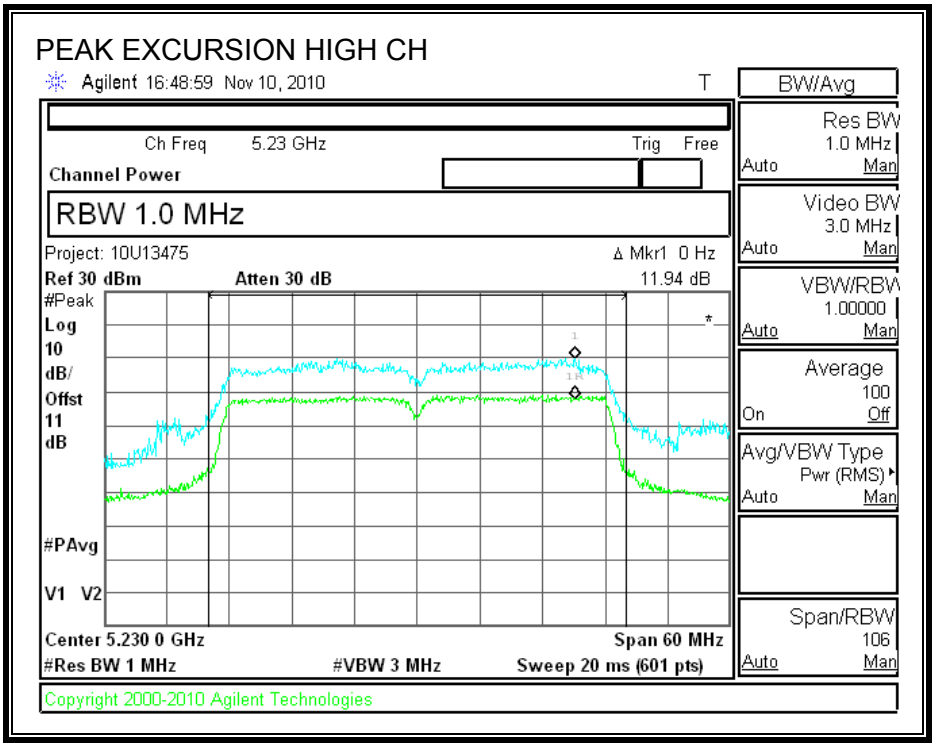




CHAIN 3

PEAK EXCURSION





7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

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

TEST PROCEDURE

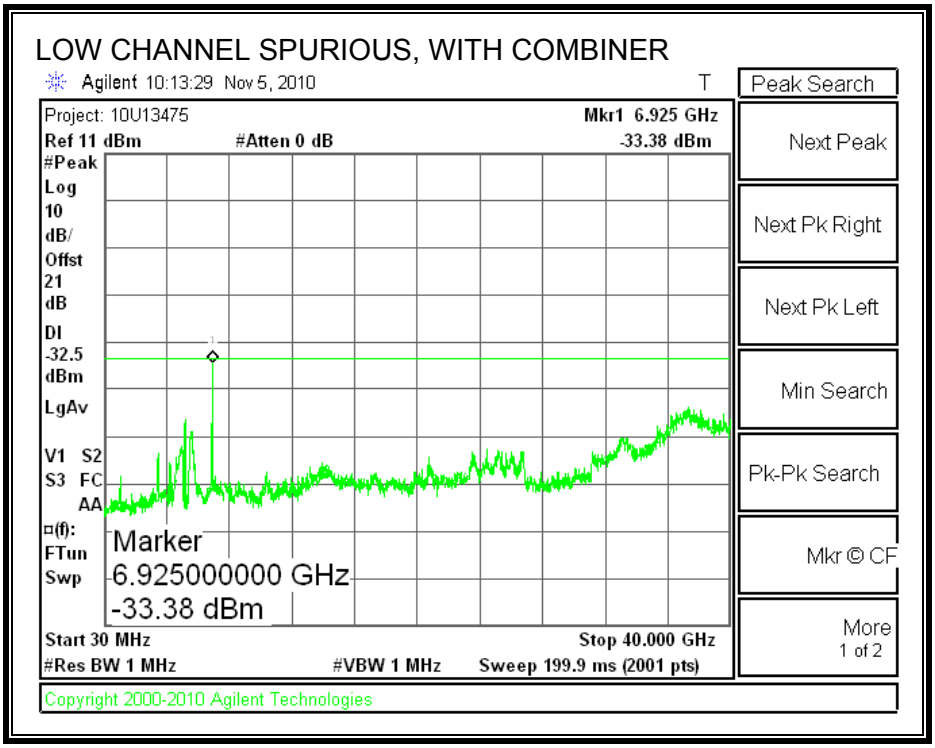
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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

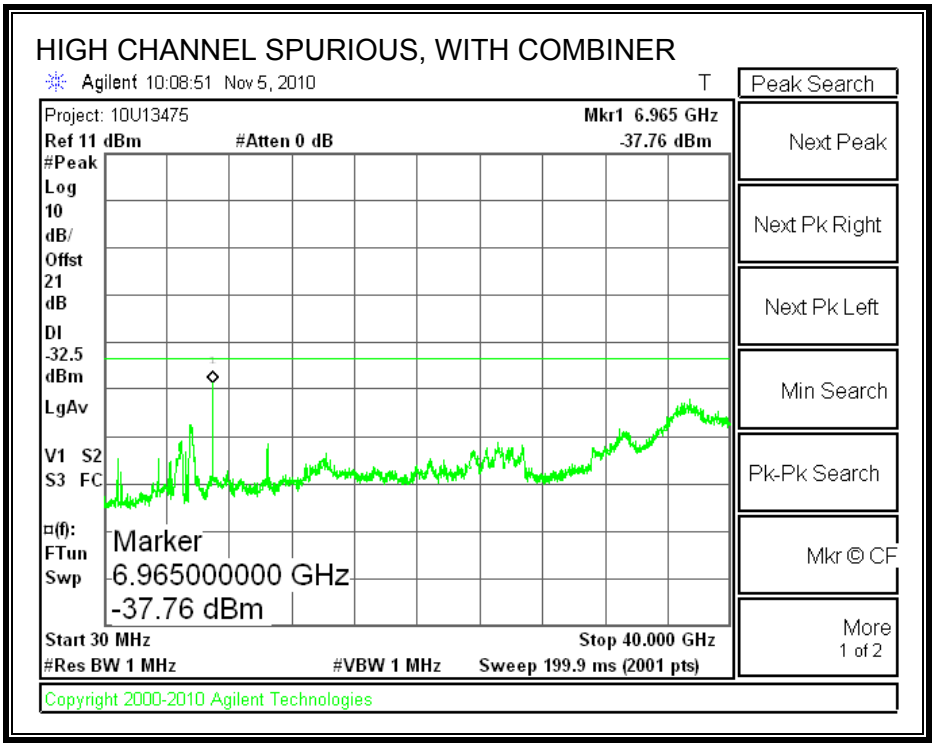
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

SPURIOUS EMISSIONS WITH COMBINER



HIGH CHANNEL SPURIOUS, WITH COMBINER



7.4. RECEIVER CONDUCTED SPURIOUS EMISSIONS

LIMITS

IC RSS-GEN 7.2.3.1

Antenna Conducted Measurement: Receiver spurious emissions at any discrete frequency shall not exceed 2 nanowatts (-57 dBm) in the band 30-1000 MHz, or 5 nanowatts (-53 dBm) above 1 GHz.

TEST PROCEDURE

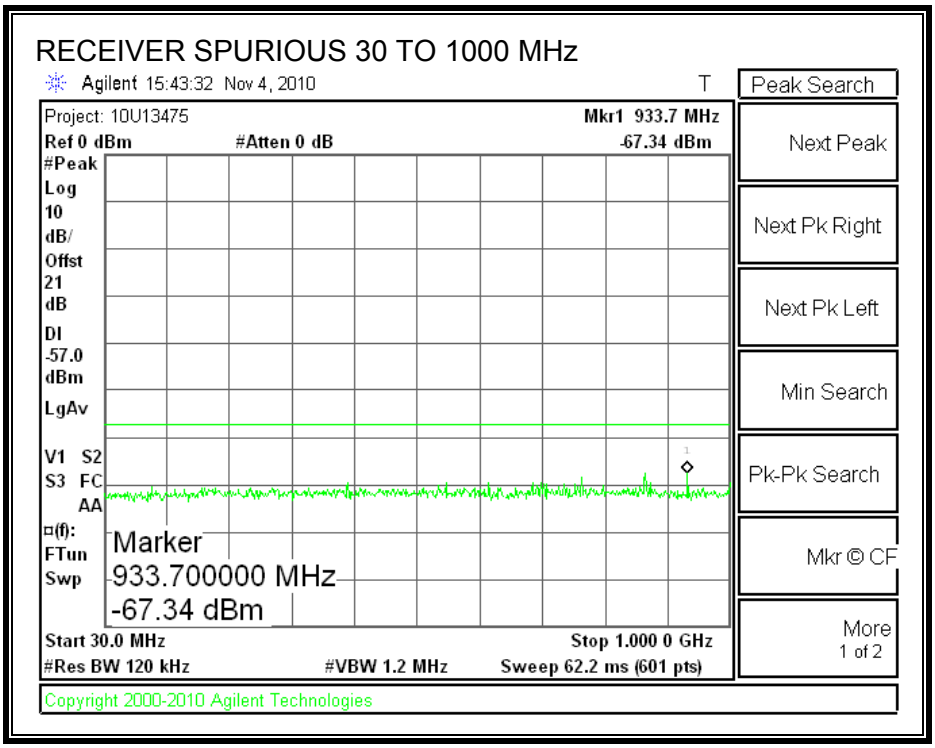
IC RSS-GEN 4.10, Conducted Method

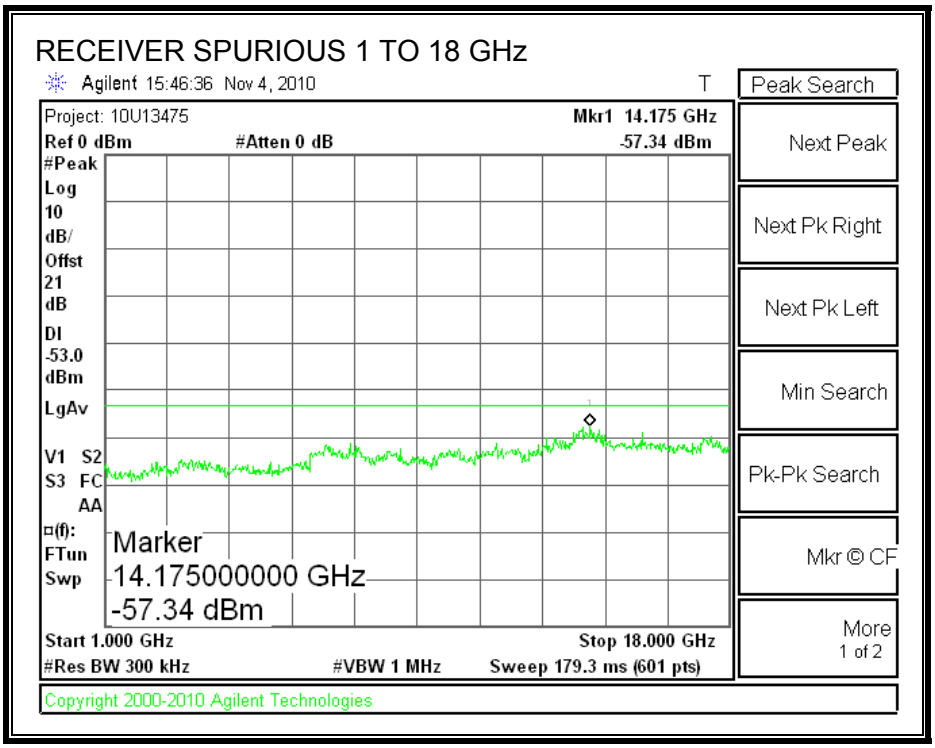
The receiver antenna port is connected to a spectrum analyzer.

The spectrum from 30 MHz to 18 GHz is investigated with the receiver set to the middle channel of each 5 GHz band.

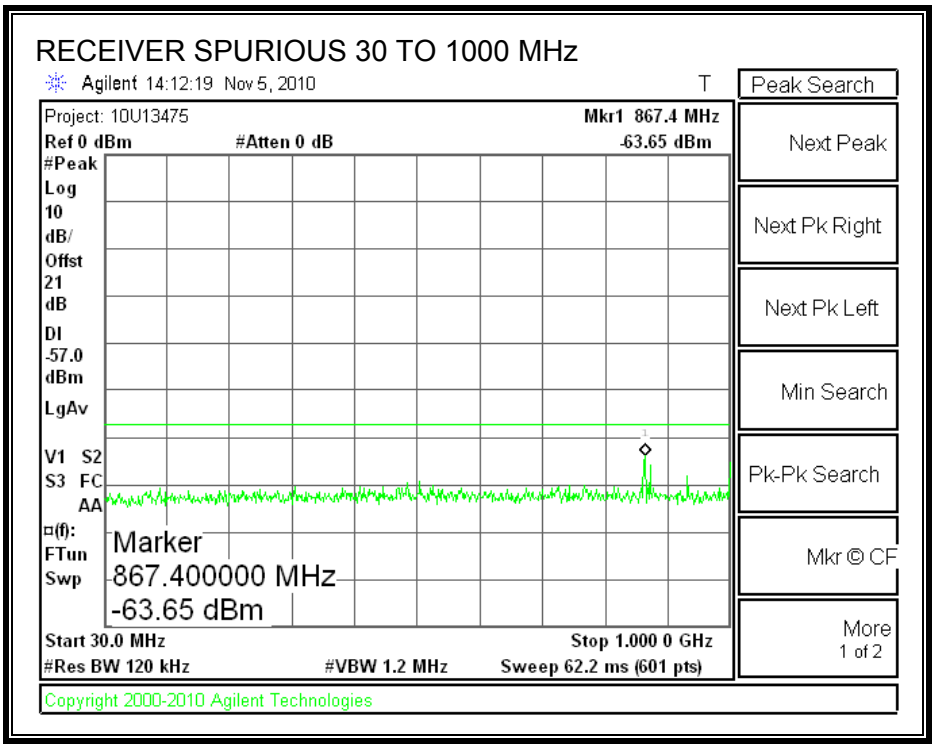
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

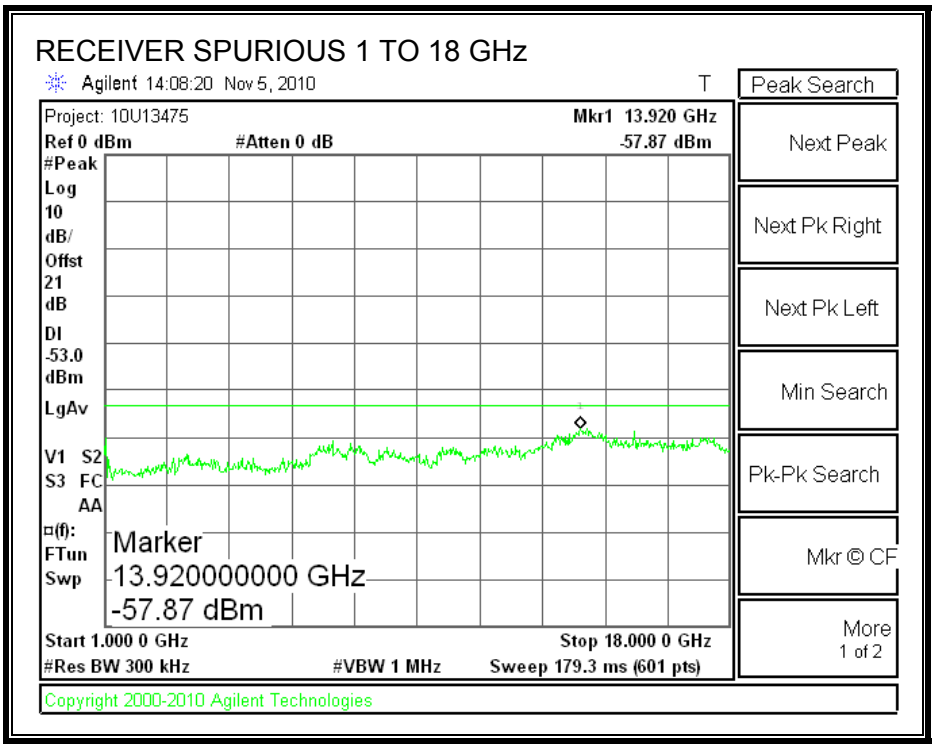
RECEIVER SPURIOUS EMISSIONS FOR 802.11a MODE IN THE 5.2 GHz BAND



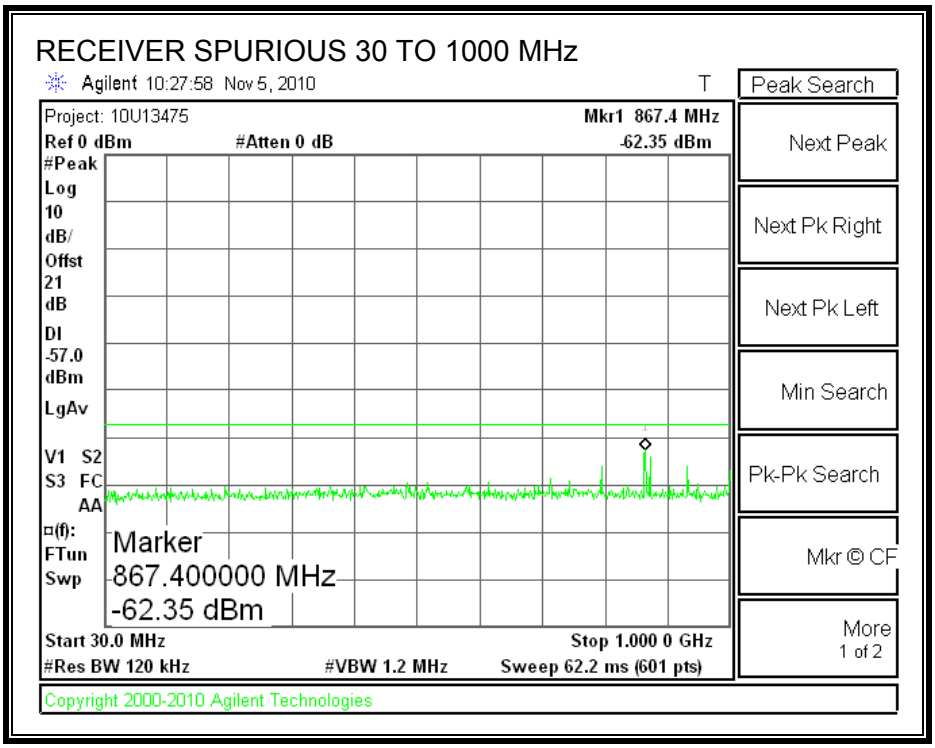


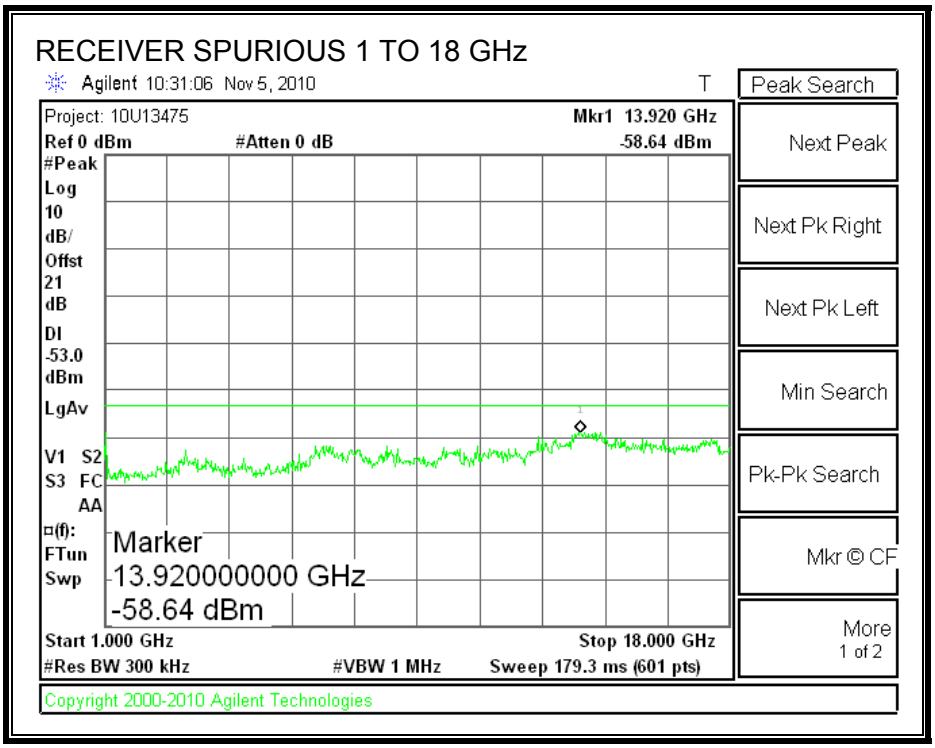
RECEIVER SPURIOUS EMISSIONS FOR 802.11n HT20 MODE IN THE 5.2 GHz BAND





RECEIVER SPURIOUS EMISSIONS FOR 802.11n HT40 MODE IN THE 5.2 GHz BAND





8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

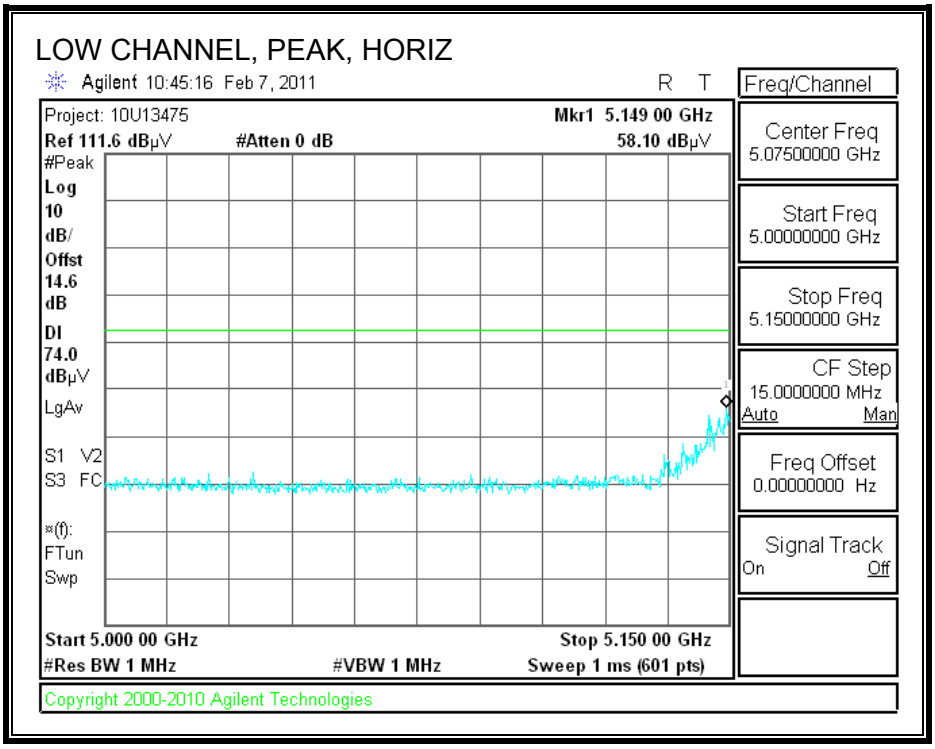
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

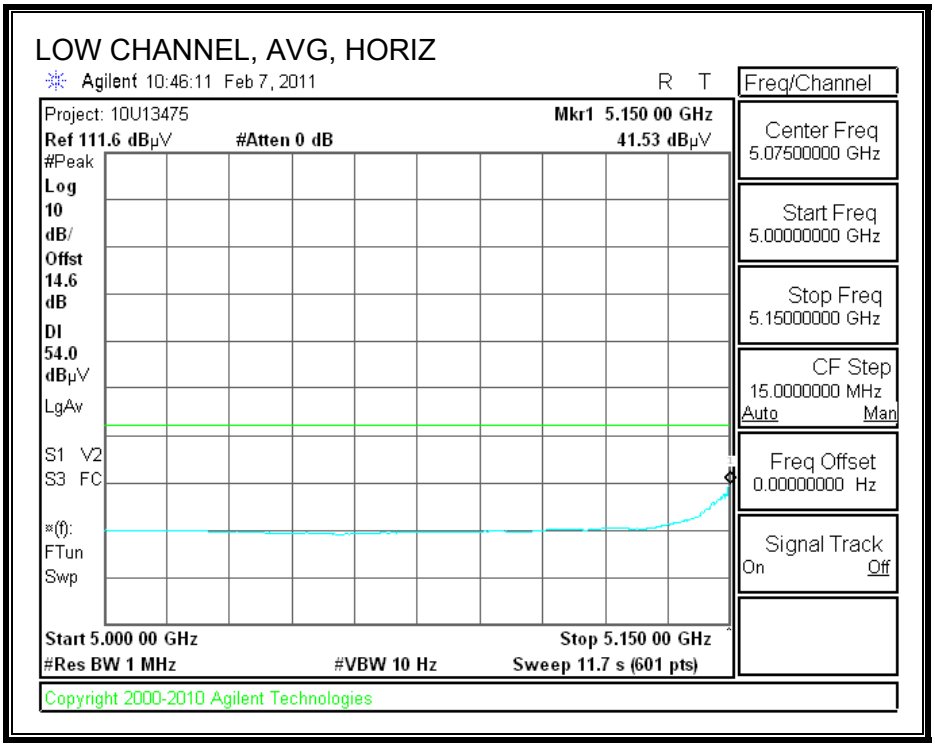
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

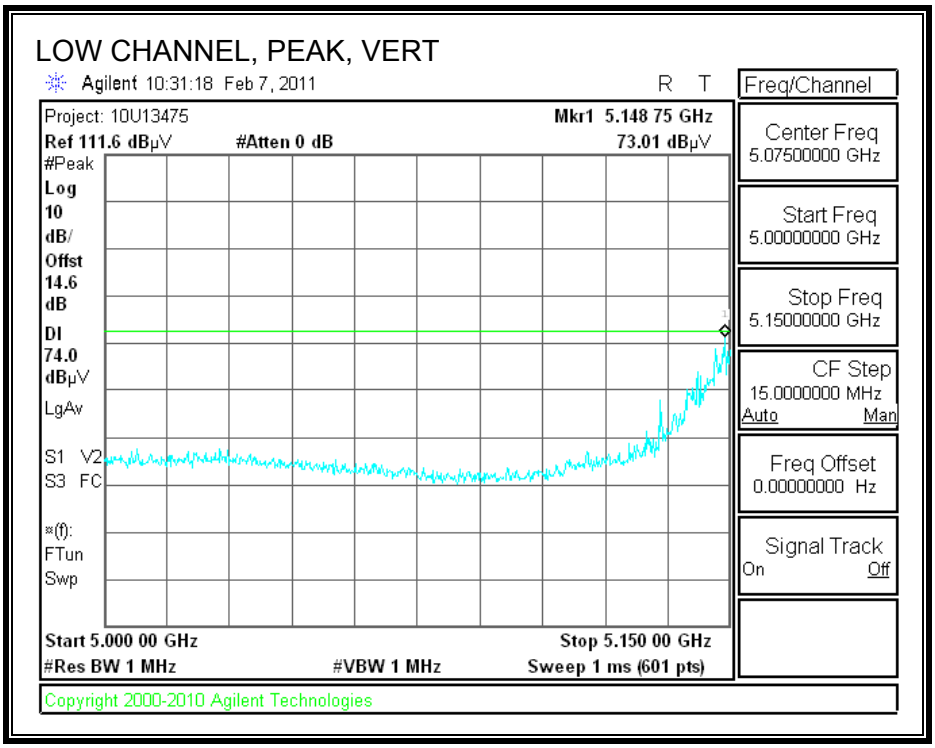
8.2.1. TX ABOVE 1 GHz FOR 802.11a MODE IN THE 5.2 GHz BAND

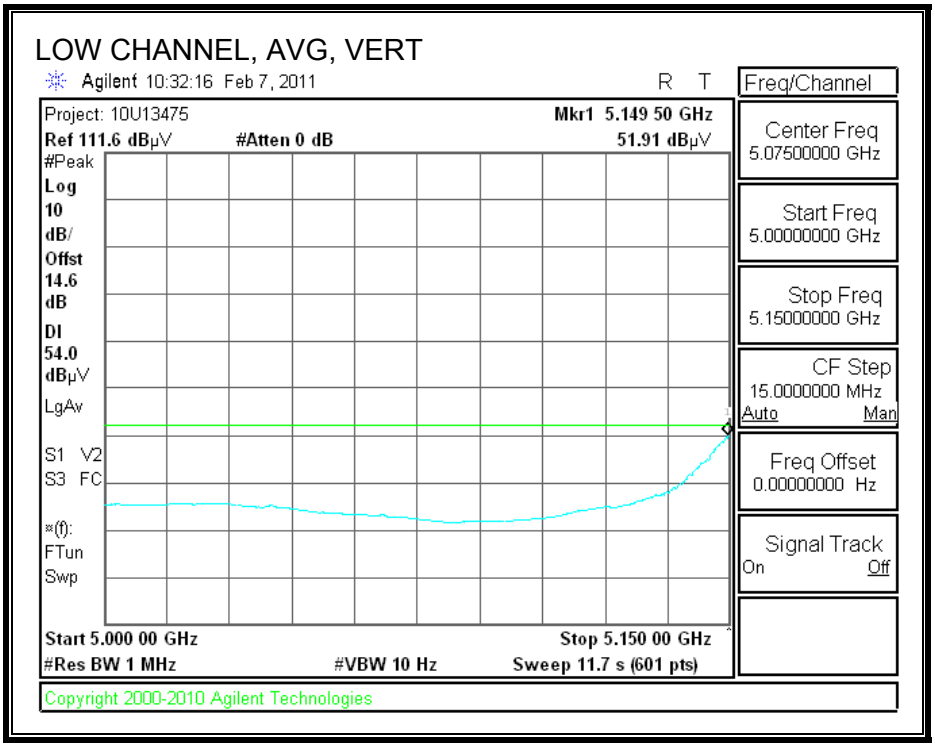
AUTHORIZED BANDEDGE (LOW CHANNEL, HORIZONTAL)





AUTHORIZED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 02/02/11
Project #: 10U13475
Company: Ruckus
Test Target: FCC 15.247
Mode Oper: Tx On, 5.2 GHz band, a Mode

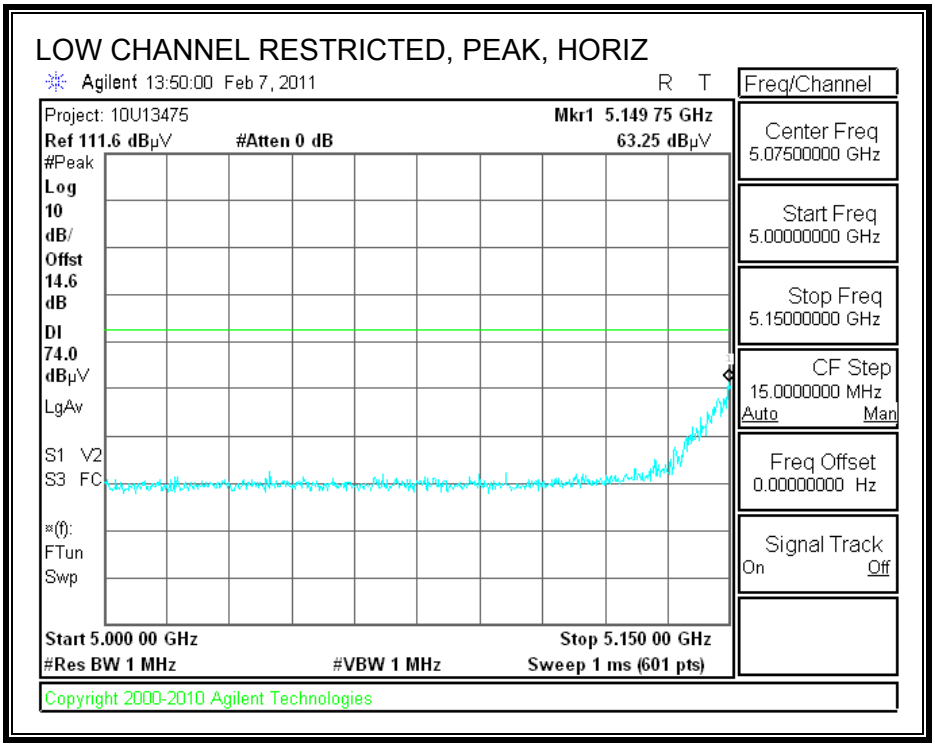
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

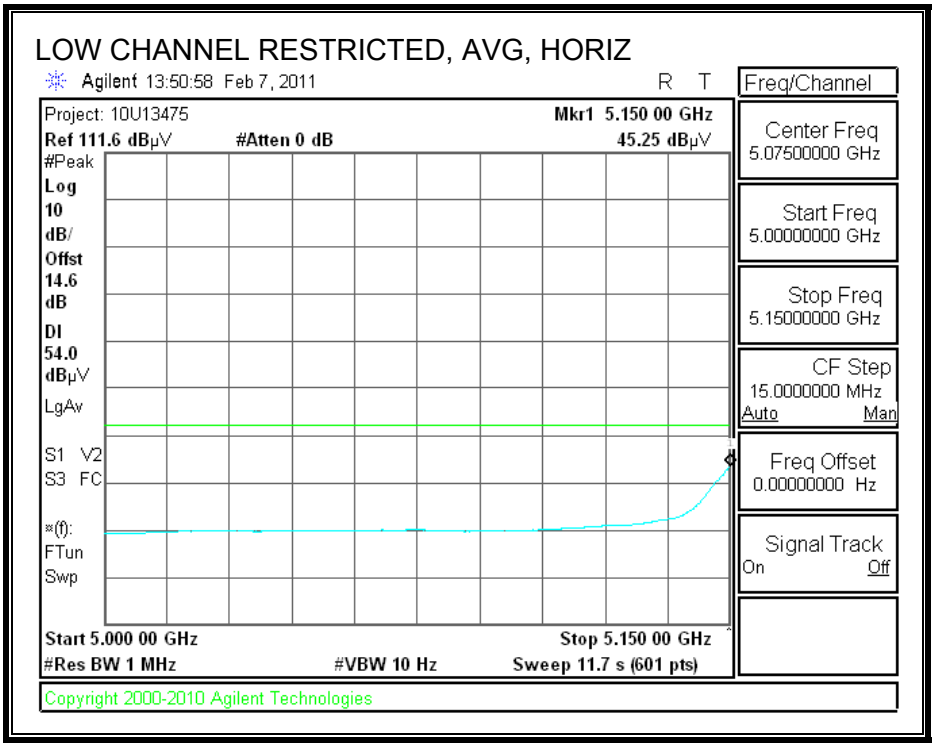
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5180 MHz															
15.540	3.0	47.3	38.5	11.3	-32.2	0.0	0.7	65.7	74.0	-8.3	V	P	101.0	190.0	
15.540	3.0	31.0	38.5	11.3	-32.2	0.0	0.7	49.4	54.0	-4.6	V	A	101.0	190.0	
15.540	3.0	45.9	38.5	11.3	-32.2	0.0	0.7	64.3	74.0	-9.7	H	P	98.0	196.0	
15.540	3.0	30.6	38.5	11.3	-32.2	0.0	0.7	48.9	54.0	-5.1	H	A	98.0	196.0	
Mid Ch. 5200 MHz															
15.600	3.0	45.8	38.3	11.4	-32.2	0.0	0.7	64.1	74.0	-9.9	V	P	98.0	169.0	
15.600	3.0	31.2	38.3	11.4	-32.2	0.0	0.7	49.5	54.0	-4.5	V	A	98.0	169.0	
15.600	3.0	45.4	38.3	11.4	-32.2	0.0	0.7	63.7	74.0	-10.3	H	P	98.0	185.0	
15.600	3.0	31.7	38.3	11.4	-32.2	0.0	0.7	49.9	54.0	-4.1	H	A	98.0	185.0	
High Ch. 5240 MHz															
15.720	3.0	45.8	38.0	11.4	-32.2	0.0	0.7	63.7	74.0	-10.3	H	P	98.0	173.0	
15.720	3.0	32.2	38.0	11.4	-32.2	0.0	0.7	50.2	54.0	-3.8	H	A	98.0	173.0	
15.720	3.0	48.5	38.0	11.4	-32.2	0.0	0.7	66.4	74.0	-7.6	V	P	111.0	186.0	
15.720	3.0	34.9	38.0	11.4	-32.2	0.0	0.7	52.8	54.0	-1.2	V	A	111.0	186.0	

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

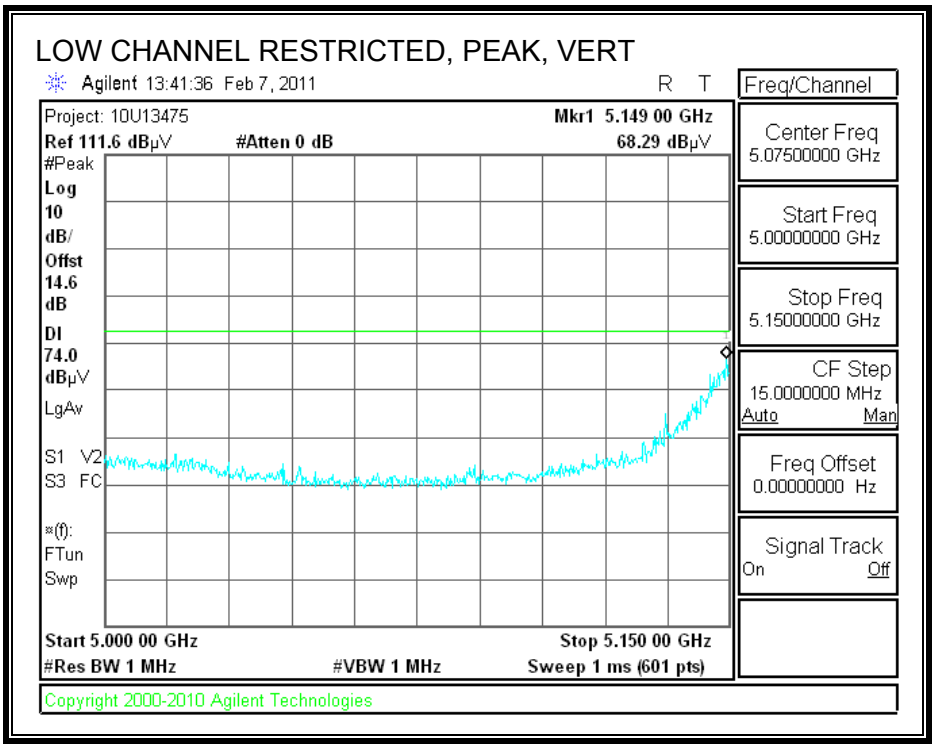
8.2.2. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.2 GHz BAND

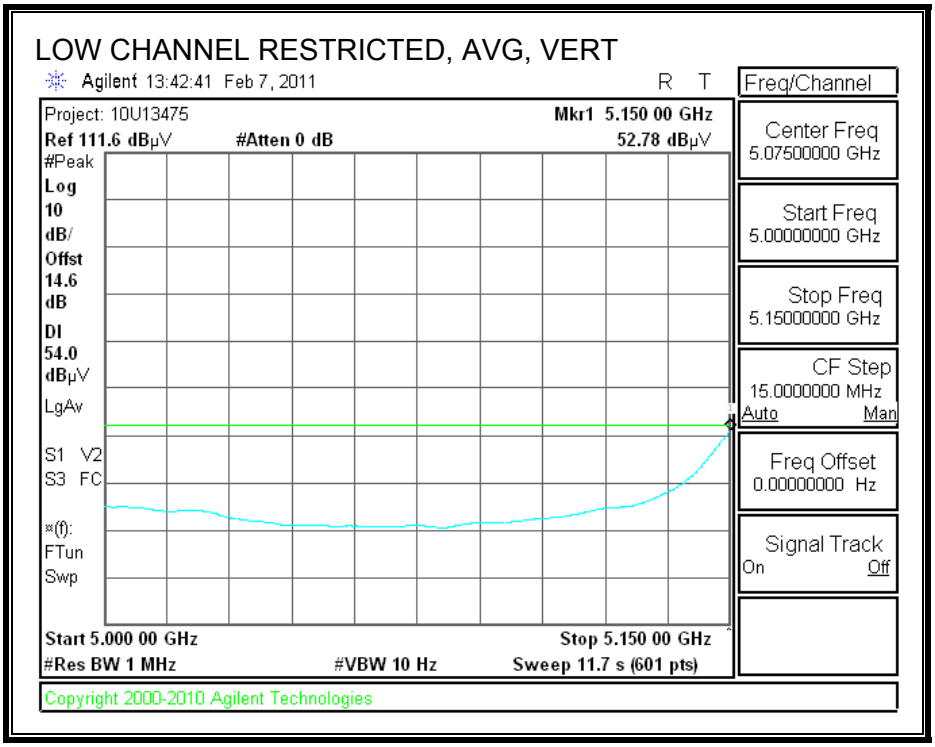
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 02/03/11
Project #: 10U13475
Company: Ruckus
Test Target: FCC 15.247
Mode Oper: Tx On, 5.2 GHz band, HT20 MCS8

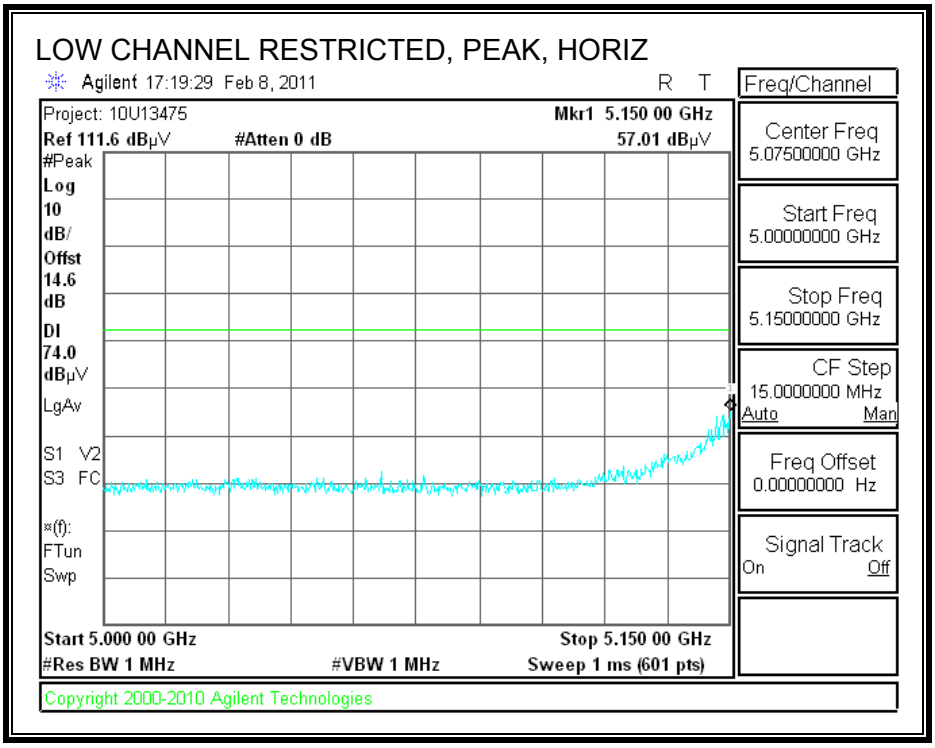
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

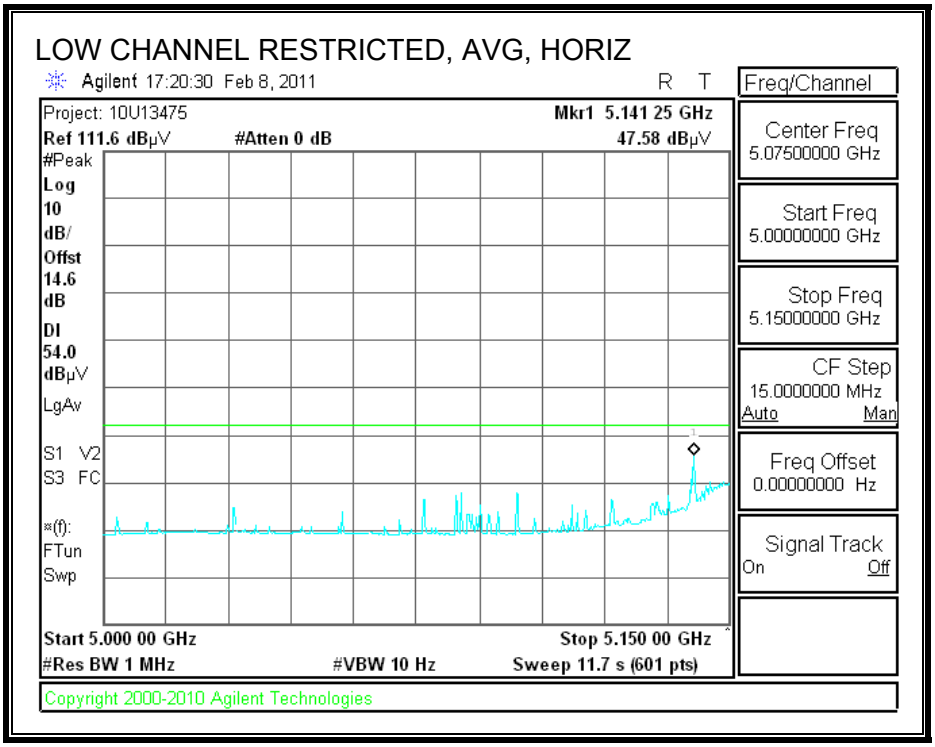
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5180 MHz															
15.540	3.0	43.0	38.5	11.3	-32.2	0.0	0.7	61.4	74.0	-12.6	H	P	100.0	185.0	
15.540	3.0	31.1	38.5	11.3	-32.2	0.0	0.7	49.5	54.0	-4.5	H	A	100.0	185.0	
15.540	3.0	45.2	38.5	11.3	-32.2	0.0	0.7	63.6	74.0	-10.4	V	P	98.0	340.0	
15.540	3.0	31.6	38.5	11.3	-32.2	0.0	0.7	50.0	54.0	-4.0	V	A	98.0	340.0	
Mid Ch. 5200 MHz															
15.600	3.0	43.6	38.3	11.4	-32.2	0.0	0.7	61.8	74.0	-12.2	H	P	98.0	356.0	
15.600	3.0	30.8	38.3	11.4	-32.2	0.0	0.7	49.0	54.0	-5.0	H	A	98.0	356.0	
15.600	3.0	45.5	38.3	11.4	-32.2	0.0	0.7	63.7	74.0	-10.3	V	P	98.0	177.0	
15.600	3.0	32.6	38.3	11.4	-32.2	0.0	0.7	50.9	54.0	-3.1	V	A	98.0	177.0	
High Ch. 5240 MHz															
15.720	3.0	43.6	38.0	11.4	-32.2	0.0	0.7	61.6	74.0	-12.4	H	P	98.0	29.0	
15.720	3.0	30.3	38.0	11.4	-32.2	0.0	0.7	48.2	54.0	-5.8	H	A	98.0	29.0	
15.720	3.0	41.8	38.0	11.4	-32.2	0.0	0.7	59.8	74.0	-14.2	V	P	98.0	177.0	
15.720	3.0	30.0	38.0	11.4	-32.2	0.0	0.7	48.0	54.0	-6.0	V	A	98.0	177.0	

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

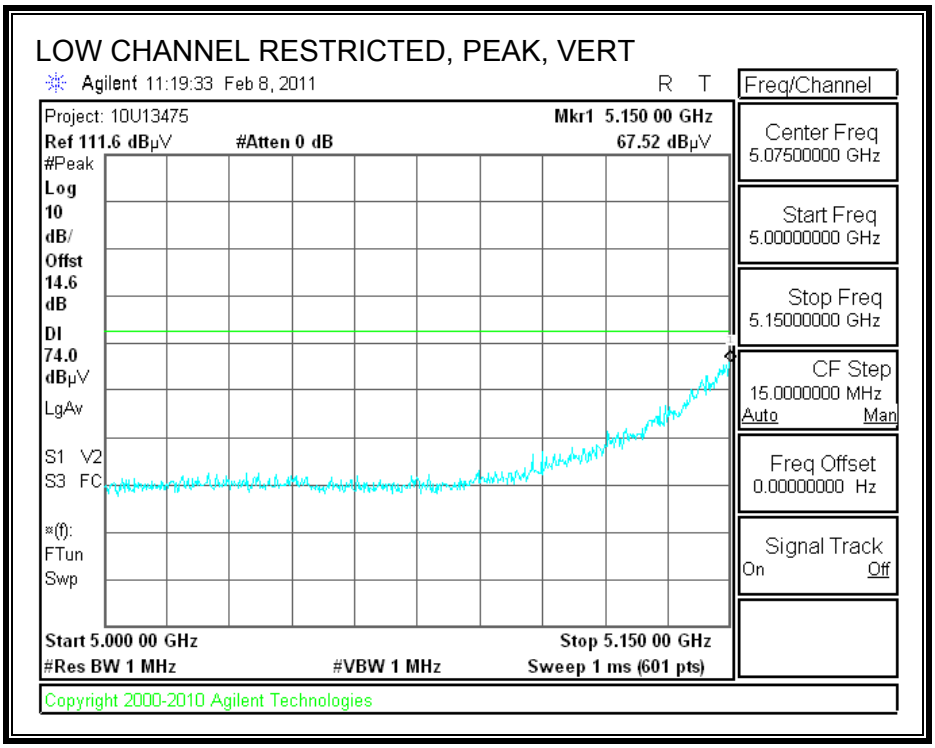
8.2.3. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.2 GHz BAND

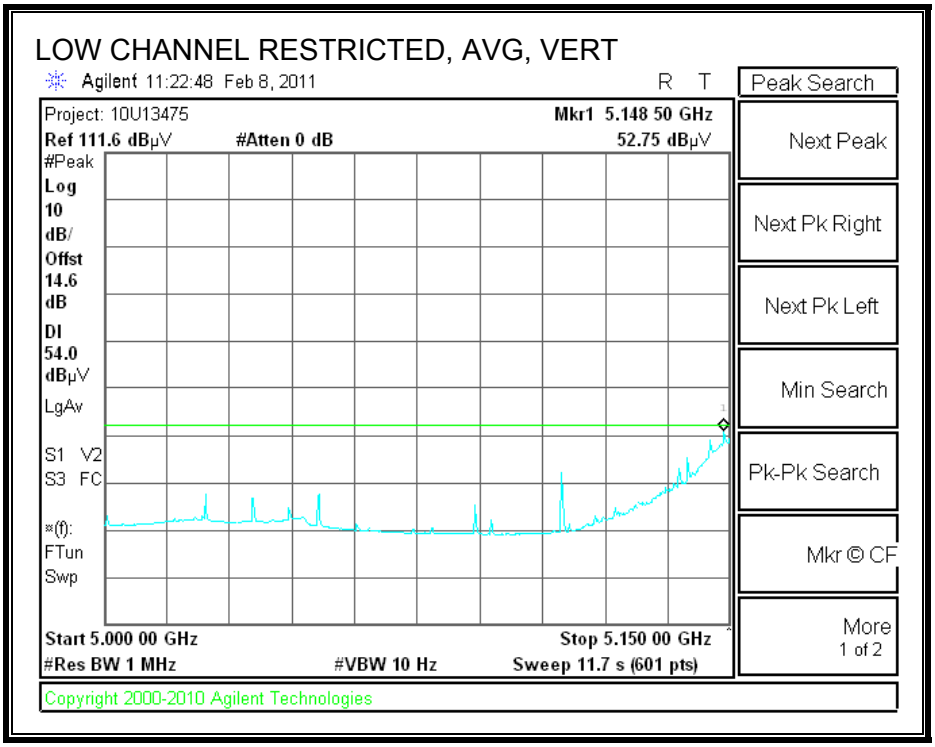
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 02/03/11
Project #: 10U13475
Company: Ruckus
Test Target: FCC 15.247
Mode Oper: Tx On, 5.2 GHz band, HT40 MCS8

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

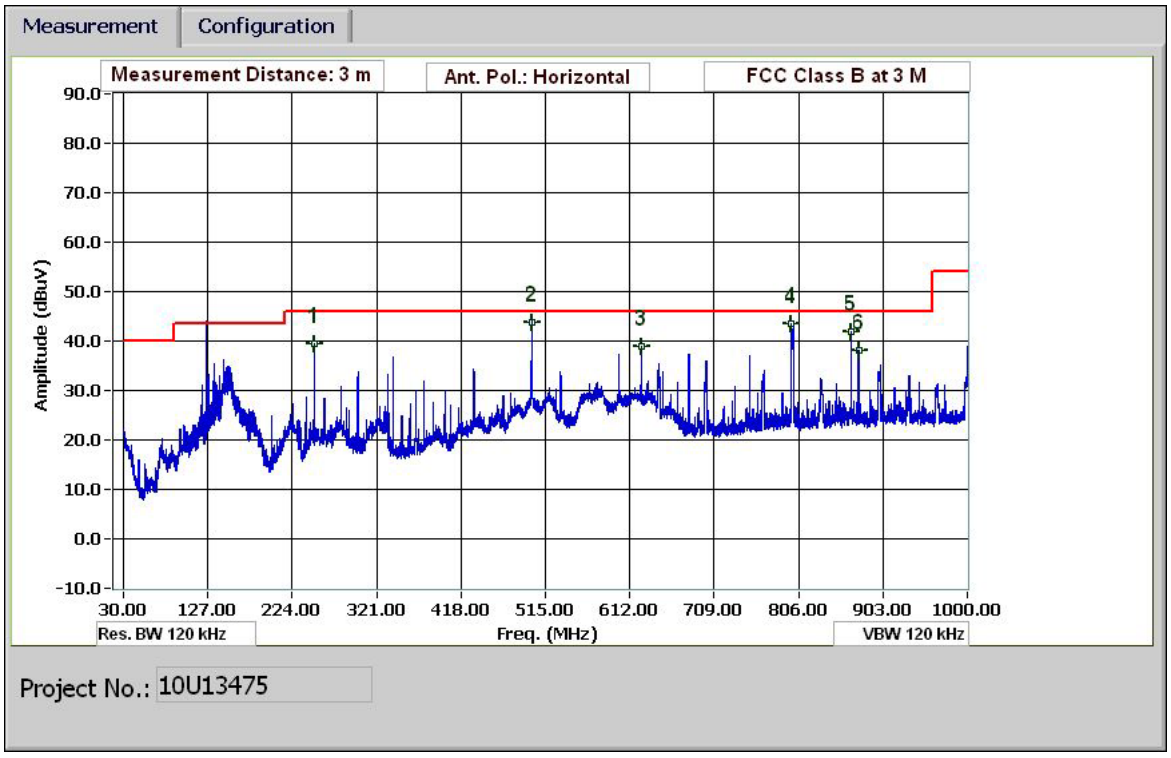
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Ch. 5190 MHz															
15.570	3.0	38.8	38.4	11.4	-32.2	0.0	0.7	57.1	74.0	-16.9	H	P	98.0	351.0	
15.570	3.0	26.0	38.4	11.4	-32.2	0.0	0.7	44.3	54.0	-9.7	H	A	98.0	351.0	
15.570	3.0	43.1	38.4	11.4	-32.2	0.0	0.7	61.4	74.0	-12.6	V	P	108.0	173.0	
15.570	3.0	27.5	38.4	11.4	-32.2	0.0	0.7	45.8	54.0	-8.2	V	A	108.0	173.0	
High Ch. 5230 MHz															
15.690	3.0	42.8	38.1	11.4	-32.2	0.0	0.7	60.8	74.0	-13.2	H	P	98.0	2.0	
15.690	3.0	29.0	38.1	11.4	-32.2	0.0	0.7	47.0	54.0	-7.0	H	A	98.0	2.0	
15.690	3.0	40.7	38.1	11.4	-32.2	0.0	0.7	58.8	74.0	-15.2	V	P	98.0	198.0	
15.690	3.0	28.1	38.1	11.4	-32.2	0.0	0.7	46.2	54.0	-7.8	V	A	98.0	198.0	

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

8.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



HORIZONTAL DATA

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

Test Engr: William Zhuang
Date: 03/02/11
Project #: 10U13475
Company: Ruckus Wireless
Test Target: FCC-B
Mode Oper: Tx On, Worst Case

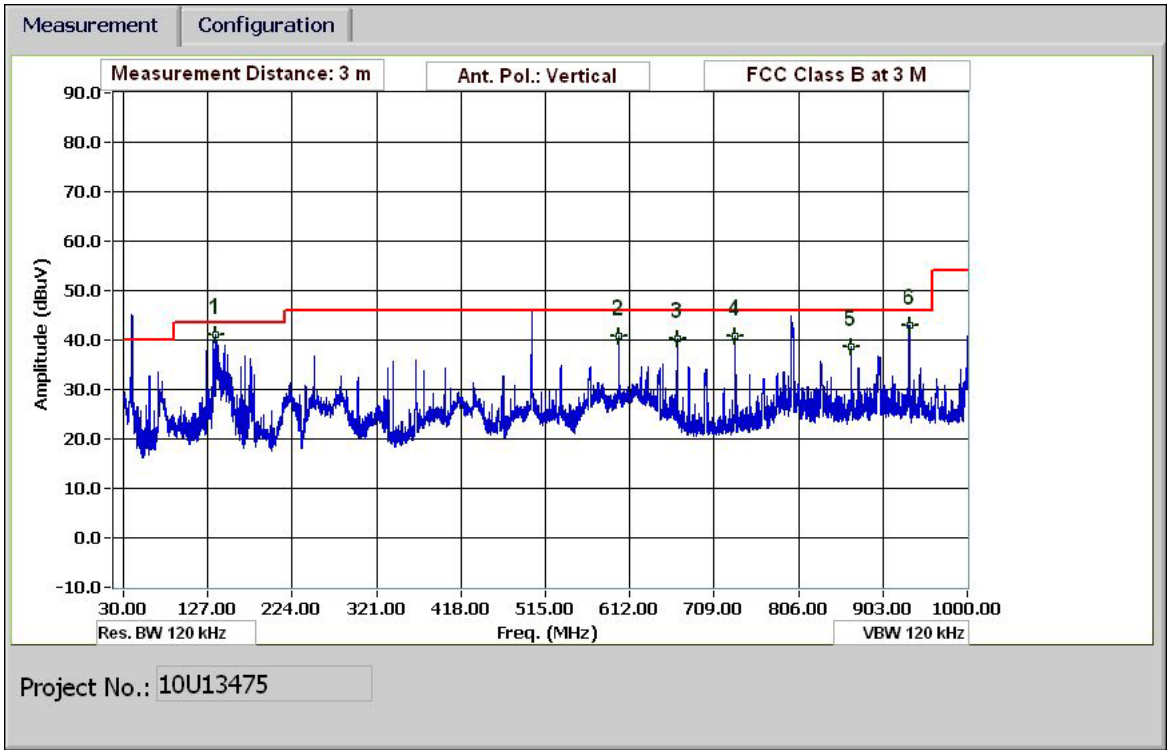
f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant. High cm	Table Angle Degree	Notes
Horizontal															
249.969	3.0	54.6	11.8	1.4	28.2	0.0	0.0	39.6	46.0	-6.4	H	P	100.0	0 - 360	
499.939	3.0	53.0	16.7	2.0	27.8	0.0	0.0	43.9	46.0	-2.1	H	P	100.0	0 - 360	
624.985	3.0	45.2	18.7	2.3	27.4	0.0	0.0	38.8	46.0	-7.2	H	P	100.0	0 - 360	
798.152	3.0	47.3	20.9	2.6	27.4	0.0	0.0	43.4	46.0	-2.6	H	P	100.0	0 - 360	
866.675	3.0	45.1	21.6	2.8	27.7	0.0	0.0	41.8	46.0	-4.2	H	P	100.0	0 - 360	
874.955	3.0	41.4	21.6	2.8	27.7	0.0	0.0	38.1	46.0	-7.9	H	P	100.0	0 - 360	

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.

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

VERTICAL PLOT



Note: The signal over the 40 dBuV/m limit line below point 1 is not from the radio portion, this signal is covered under class A digital report.

VERTICAL DATA

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

Test Engr: William Zhuang
Date: 03/02/11
Project #: 10U13475
Company: Ruckus Wireless
Test Target: FCC-B
Mode Oper: Tx On, Worst Case

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant. High cm	Table Angle Degree	Notes
Vertical															
135.604	3.0	54.9	13.4	1.1	28.3	0.0	0.0	41.1	43.5	-2.4	V	P	100.0	0 - 360	
600.024	3.0	47.7	18.4	2.2	27.5	0.0	0.0	40.9	46.0	-5.1	V	P	100.0	0 - 360	
666.626	3.0	46.1	19.2	2.4	27.3	0.0	0.0	40.4	46.0	-5.6	V	P	100.0	0 - 360	
733.349	3.0	45.4	20.0	2.5	27.3	0.0	0.0	40.7	46.0	-5.3	V	P	100.0	0 - 360	
866.675	3.0	42.0	21.6	2.8	27.7	0.0	0.0	38.7	46.0	-7.3	V	P	100.0	0 - 360	
933.277	3.0	46.0	22.1	2.9	27.8	0.0	0.0	43.1	46.0	-2.9	V	P	100.0	0 - 360	

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

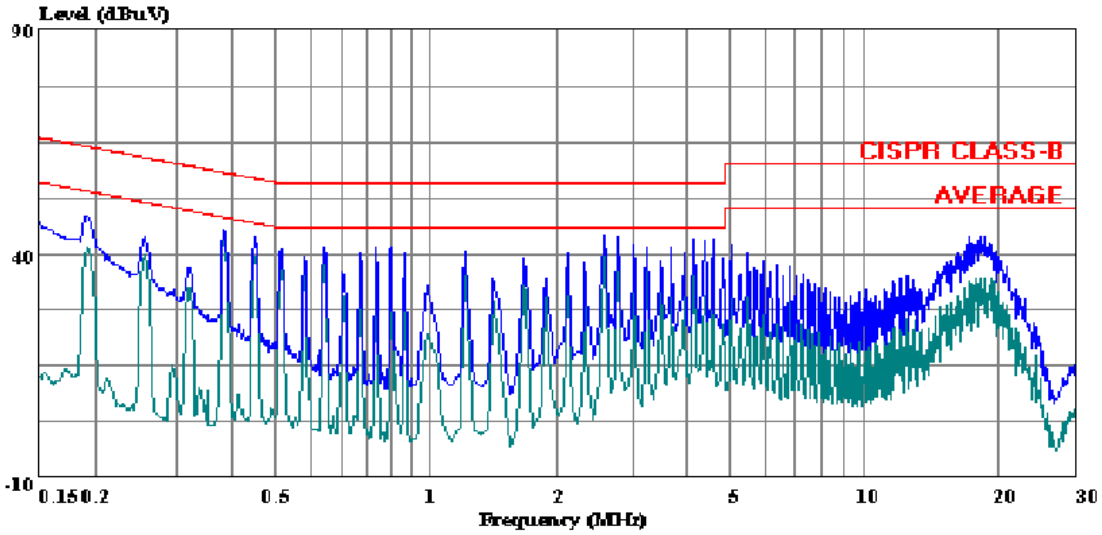
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.39	45.56	--	43.98	0.00	58.17	48.17	-12.61	-4.19	L1
0.45	43.56	--	39.16	0.00	56.84	46.84	-13.28	-7.68	L1
2.69	44.19	--	39.28	0.00	56.00	46.00	-11.81	-6.72	L1
0.39	44.38	--	42.91	0.00	58.17	48.17	-13.79	-5.26	L2
0.45	43.54	--	35.69	0.00	56.89	46.89	-13.35	-11.20	L2
2.69	43.37	--	36.36	0.00	56.00	46.00	-12.63	-9.64	L2
6 Worst Data									

LINE 1 RESULTS

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

Data#: 7 File#: 10U13475.EMI Date: 03-02-2011 Time: 13:20:22



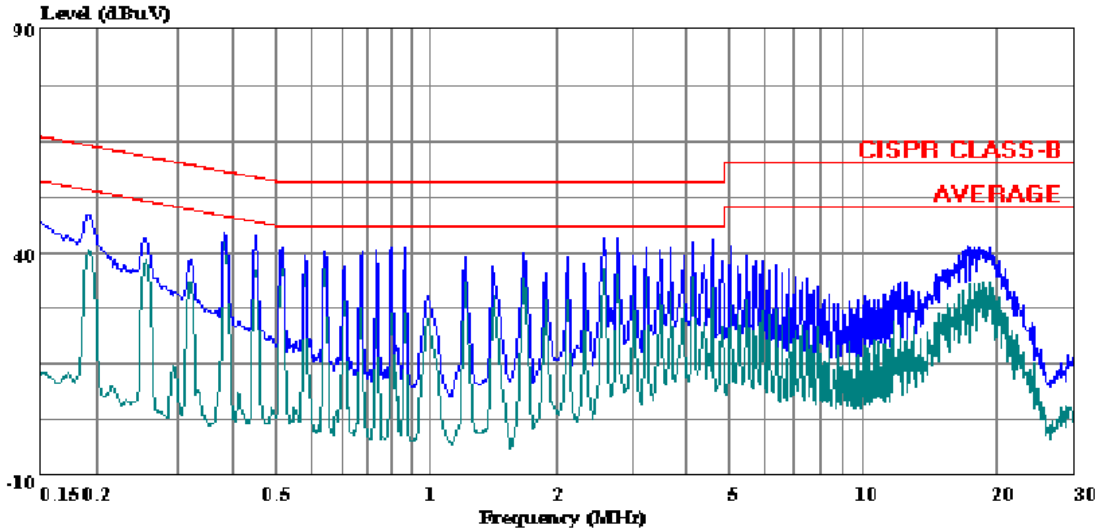
Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: William Zhuang
Project # : 10U13475
Company : Ruckus Wireless
Configuration: EUT with Support Equipment
EUT Descript : AP
: ZoneFlex7761-CM
Mode : Normal
Target : FCC Class B
Voltage : 115VAC / 60Hz
: L1: Blue (Peak), Green (Average)

LINE 2 RESULTS

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

Data#: 14 File#: 10U13475.EMI Date: 03-02-2011 Time: 13:27:41



Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: William Zhuang
Project # : 10U13475
Company : Ruckus Wireless
Configuration: EUT with Support Equipment
EUT Descript : AP
: ZoneFlex7761-CM
Mode : Normal
Target : FCC Class B
Voltage : 115VAC / 60Hz
: L2: Blue (Peak), Green (Average)

10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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

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

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

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

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

IC RULES

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

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

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

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

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

EQUATIONS

Power density is given by:

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

where

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

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

Distance is given by:

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

where

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

For multiple 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	Band	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)	IC Power Density (W/m^2)
WLAN, 11a, 20M	5.2 GHz	20.0	12.29	10.27	0.04	0.36
WLAN, 11n HT20	5.2 GHz	20.0	15.71	5.50	0.03	0.26
WLAN, 11n HT40	5.2 GHz	20.0	16.85	5.50	0.03	0.34

Notes:
Antenna Gain for 11a is the combined antenna gain for multiple chains.
Antenna gain for HT20 and HT40 is the maximum antenna gain of multiple chains.
Output power is the combined output power for multiple chains.