



**FCC CFR47 PART 15 SUBPART E
INDUSTRY CANADA RSS-210 ISSUE 7**

CERTIFICATION TEST REPORT

FOR

802.11abgn WLAN Module

MODEL NUMBER: DWM-W034

**FCC ID: EW4DWMW034
IC: 4250A-DWMW034**

REPORT NUMBER: 09J12784-2

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NVLAP LAB CODE 200065-0

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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	6
2. TEST METHODOLOGY	7
3. FACILITIES AND ACCREDITATION	7
4. CALIBRATION AND UNCERTAINTY	7
4.1. MEASURING INSTRUMENT CALIBRATION.....	7
4.2. SAMPLE CALCULATION.....	7
4.3. MEASUREMENT UNCERTAINTY.....	7
5. EQUIPMENT UNDER TEST	8
5.1. DESCRIPTION OF EUT.....	8
5.2. MAXIMUM OUTPUT POWER.....	8
5.3. DESCRIPTION OF AVAILABLE ANTENNAS.....	9
5.4. SOFTWARE AND FIRMWARE.....	9
5.5. WORST-CASE CONFIGURATION AND MODE	9
5.6. DESCRIPTION OF TEST SETUP.....	10
6. TEST AND MEASUREMENT EQUIPMENT	12
7. ANTENNA PORT TEST RESULTS	13
7.1. 802.11a DUAL CHAIN LEGACY MODE IN THE 5.2 GHz BAND	13
7.1.1. 26 dB and 99% BANDWIDTH	13
7.1.2. OUTPUT POWER	22
7.1.3. AVERAGE POWER	27
7.1.4. PEAK POWER SPECTRAL DENSITY.....	28
7.1.5. PEAK EXCURSION	31
7.1.6. CONDUCTED SPURIOUS EMISSIONS.....	36
7.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND.....	39
7.2.1. 26 dB and 99% BANDWIDTH	39
7.2.2. OUTPUT POWER	48
7.2.3. AVERAGE POWER	53
7.2.4. PEAK POWER SPECTRAL DENSITY.....	54
7.2.5. PEAK EXCURSION	57
7.2.6. CONDUCTED SPURIOUS EMISSIONS.....	62
7.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND.....	65
7.3.1. 26 dB and 99% BANDWIDTH	65
7.3.2. OUTPUT POWER	70
7.3.3. AVERAGE POWER	73
7.3.4. PEAK POWER SPECTRAL DENSITY.....	74
7.3.5. PEAK EXCURSION	76
7.3.6. CONDUCTED SPURIOUS EMISSIONS.....	79
7.4. 802.11a DUAL CHAIN LEGACY MODE IN THE 5.3 GHz BAND	81
7.4.1. 26 dB and 99% BANDWIDTH	81

7.4.2.	OUTPUT POWER	90
7.4.3.	AVERAGE POWER	95
7.4.4.	PEAK POWER SPECTRAL DENSITY	96
7.4.5.	PEAK EXCURSION	99
7.4.6.	CONDUCTED SPURIOUS EMISSIONS	104
7.5.	<i>802.11n HT20 MODE IN THE 5.3 GHz BAND</i>	107
7.5.1.	26 dB and 99% BANDWIDTH	107
7.5.2.	OUTPUT POWER	116
7.5.3.	AVERAGE POWER	121
7.5.4.	PEAK POWER SPECTRAL DENSITY	122
7.5.5.	PEAK EXCURSION	125
7.5.6.	CONDUCTED SPURIOUS EMISSIONS	130
7.6.	<i>802.11n HT40 MODE IN THE 5.3 GHz BAND</i>	133
7.6.1.	26 dB and 99% BANDWIDTH	133
7.6.2.	OUTPUT POWER	138
7.6.3.	AVERAGE POWER	141
7.6.4.	PEAK POWER SPECTRAL DENSITY	142
7.6.5.	PEAK EXCURSION	144
7.6.6.	CONDUCTED SPURIOUS EMISSIONS	147
7.7.	<i>802.11a DUAL CHAIN LEGACY MODE IN THE 5.6 GHz BAND</i>	149
7.7.1.	26 dB and 99% BANDWIDTH	149
7.7.2.	OUTPUT POWER	158
7.7.3.	AVERAGE POWER	163
7.7.4.	PEAK POWER SPECTRAL DENSITY	164
7.7.5.	PEAK EXCURSION	167
7.7.6.	CONDUCTED SPURIOUS EMISSIONS	172
7.8.	<i>802.11n HT20 MODE IN THE 5.6 GHz BAND</i>	175
7.8.1.	26 dB and 99% BANDWIDTH	175
7.8.2.	OUTPUT POWER	184
7.8.3.	AVERAGE POWER	189
7.8.4.	PEAK POWER SPECTRAL DENSITY	190
7.8.5.	PEAK EXCURSION	193
7.8.6.	CONDUCTED SPURIOUS EMISSIONS	198
7.9.	<i>802.11n HT40 MODE IN THE 5.6 GHz BAND</i>	201
7.9.1.	26 dB and 99% BANDWIDTH	201
7.9.2.	OUTPUT POWER	210
7.9.3.	AVERAGE POWER	215
7.9.4.	PEAK POWER SPECTRAL DENSITY	216
7.9.5.	PEAK EXCURSION	219
7.9.6.	CONDUCTED SPURIOUS EMISSIONS	224
8.	RADIATED TEST RESULTS	227
8.1.	<i>LIMITS AND PROCEDURE</i>	227
8.2.	<i>TRANSMITTER ABOVE 1 GHz</i>	228
8.2.1.	802.11a DUAL CHAIN LEGACY MODE IN THE LOWER 5.2 GHz BAND	228
8.2.2.	802.11n HT20 MODE IN THE LOWER 5.2 GHz BAND	234
8.2.3.	802.11n HT40 MODE IN THE LOWER 5.2 GHz BAND	240
8.2.4.	802.11a DUAL CHAIN LEGACY MODE IN THE UPPER 5.2 GHz BAND	246
8.2.5.	802.11n HT20 MODE IN THE UPPER 5.2 GHz BAND	252

8.2.6.	802.11n HT40 MODE IN THE UPPER 5.2 GHz BAND.....	258
8.2.7.	802.11a DUAL CHAIN LEGACY MODE IN THE 5.6 GHz BAND	264
8.2.8.	802.11n HT20 MODE IN THE 5.6 GHz BAND	272
8.2.9.	802.11n HT40 MODE IN THE 5.6 GHz BAND	280
8.3.	<i>RECEIVER ABOVE 1 GHz</i>	288
8.3.1.	20 MHz BANDWIDTH IN THE 5.2 GHz BAND	288
8.3.2.	20 MHz BANDWIDTH IN THE 5.2 GHz BAND	289
8.3.3.	40 MHz BANDWIDTH IN THE 5.2 GHz BAND	290
8.3.4.	40 MHz BANDWIDTH IN THE 5.2 GHz BAND	291
8.4.	<i>WORST-CASE BELOW 1 GHz</i>	292
9.	AC POWER LINE CONDUCTED EMISSIONS	298
10.	DYNAMIC FREQUENCY SELECTION	301
10.1.	<i>OVERVIEW</i>	301
10.1.1.	LIMITS.....	301
10.1.2.	TEST AND MEASUREMENT SYSTEM.....	305
10.1.3.	SETUP OF EUT	308
10.1.4.	DESCRIPTION OF EUT.....	309
10.2.	<i>RESULTS FOR 20 MHz BANDWIDTH</i>	310
10.2.1.	TEST CHANNEL AND RADAR WAVEFORM.....	310
10.2.2.	WLAN TRAFFIC WITH LINUX OPERATING SYSTEM	311
10.2.3.	MOVE AND CLOSING TIME WITH LINUX OPERATING SYSTEM.....	312
10.2.4.	WLAN TRAFFIC WITH WINDOWS OPERATING SYSTEM.....	317
10.2.5.	MOVE AND CLOSING TIME WITH WINDOWS OPERATING SYSTEM	318
10.3.	<i>RESULTS FOR 40 MHz BANDWIDTH</i>	323
10.3.1.	TEST CHANNEL AND RADAR WAVEFORM.....	323
10.3.2.	WLAN TRAFFIC WITH LINUX OPERATING SYSTEM	324
10.3.3.	MOVE AND CLOSING TIME WITH LINUX OPERATING SYSTEM.....	325
10.3.4.	NON-OCCUPANCY WITH LINUX OPERATING SYSTEM.....	330
10.3.5.	WLAN TRAFFIC WITH WINDOWS OPERATING SYSTEM.....	331
10.3.6.	MOVE AND CLOSING TIME WITH WINDOWS OPERATING SYSTEM	332
10.3.7.	NON-OCCUPANCY WITH WINDOWS OPERATING SYSTEM.....	337
11.	MAXIMUM PERMISSIBLE EXPOSURE	338
12.	SETUP PHOTOS	341

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MITSUMI ELECTRIC CO., LTD.
1601, SAKAI
ATSUGI-SHI
KANAGAWA, JAPAN, 243-8533

EUT DESCRIPTION: 802.11abgn WLAN Module

MODEL: DWM-W034

SERIAL NUMBER: 00A096_700D13

DATE TESTED: September 01 to October 02, 2009

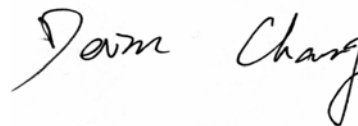
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 9	Pass
INDUSTRY CANADA RSS-GEN Issue 2	Pass

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:

Tested By:



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EMC MANAGER
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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, FCC 06-96, RSS-GEN Issue 2, and RSS-210 Issue 7.

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:

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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11abgn WLAN Module.

The radio module is manufactured by Atheros

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5180 - 5240	802.11a	13.87	24.38
5180 - 5240	802.11n HT20	14.28	26.79
5190 - 5230	802.11n HT40	16.95	49.55
5260 - 5320	802.11a	19.48	88.72
5260 - 5320	802.11n HT20	19.44	87.90
5270 - 5310	802.11n HT40	19.08	80.91
5500 - 5700	802.11a	19.28	84.72
5500 - 5700	802.11n HT20	19.28	84.72
5510 - 5670	802.11n HT40	18.79	75.68

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes the following antennas:

Dipole Antenna

	Black: ANT008		White: ANT007	
2.4GHz	1.67	H	1.92	H
5.15-5.25GHz	1.91	H	1.98	H
5.25-5.35GHz	1.91	H	1.98	H
5.4-5.725GHz	1.84	V	2.13	H
5.725-5.825GHz	1.32	H	2.05	H

PIFA Antenna

	Black: 1554396-1		White: 1554396-2	
2.4GHz	-2.54	H	-2.13	H
5.15-5.25GHz	-8.74	H	-10.71	H
5.25-5.35GHz	-6.45	H	-8.62	H
5.4-5.725GHz	-7.76	H	-5.79	V
5.725-5.825GHz	-6.71	H	-5.79	V

PIFA Antenna

	Black: 1554396-3		White: 1554396-4	
2.4GHz	-1.97	H	-2.85	H
5.15-5.25GHz	0.46	H	2.05	H
5.25-5.35GHz	0.46	H	1.55	H
5.4-5.725GHz	0.6	H	1.36	V
5.725-5.825GHz	2.88	H	1.36	V

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was ART, Revision 8, B122

5.5. WORST-CASE CONFIGURATION AND MODE

The 2x2 configuration was used for 2.4GHz and 5GHz testing in this report.
 The chain 1 is Black, chain 2 is White.

The worst-case data rate for each mode is determined to be as follows, based on input from the manufacturer of the radio.

All emissions tests were made with following data rates:

- 802.11a mode, 20 MHz Channel Bandwidth, 6 Mb/s, OFDM Modulation.
- 802.11n HT20 mode, 20 MHz Channel Bandwidth, MCS0, 6.5 Mb/s, OFDM Modulation.
- 802.11n HT40 mode, 40 MHz Channel Bandwidth, MCS0, 13.5 Mb/s, OFDM Modulation.

For radiated emissions below 1 GHz the worst-case configuration is determined to be the mode and channel with the highest output power.

Investigation that the Power Spectral Density and Conducted Spurious as measured through a combiner with both chains operating simultaneously is worst case.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop PC	HP	HP Pavilion dv1000	CNF62007RV	DOC
AC adaptor	HP	PPP009L	592C40ARGT2USB	DOC

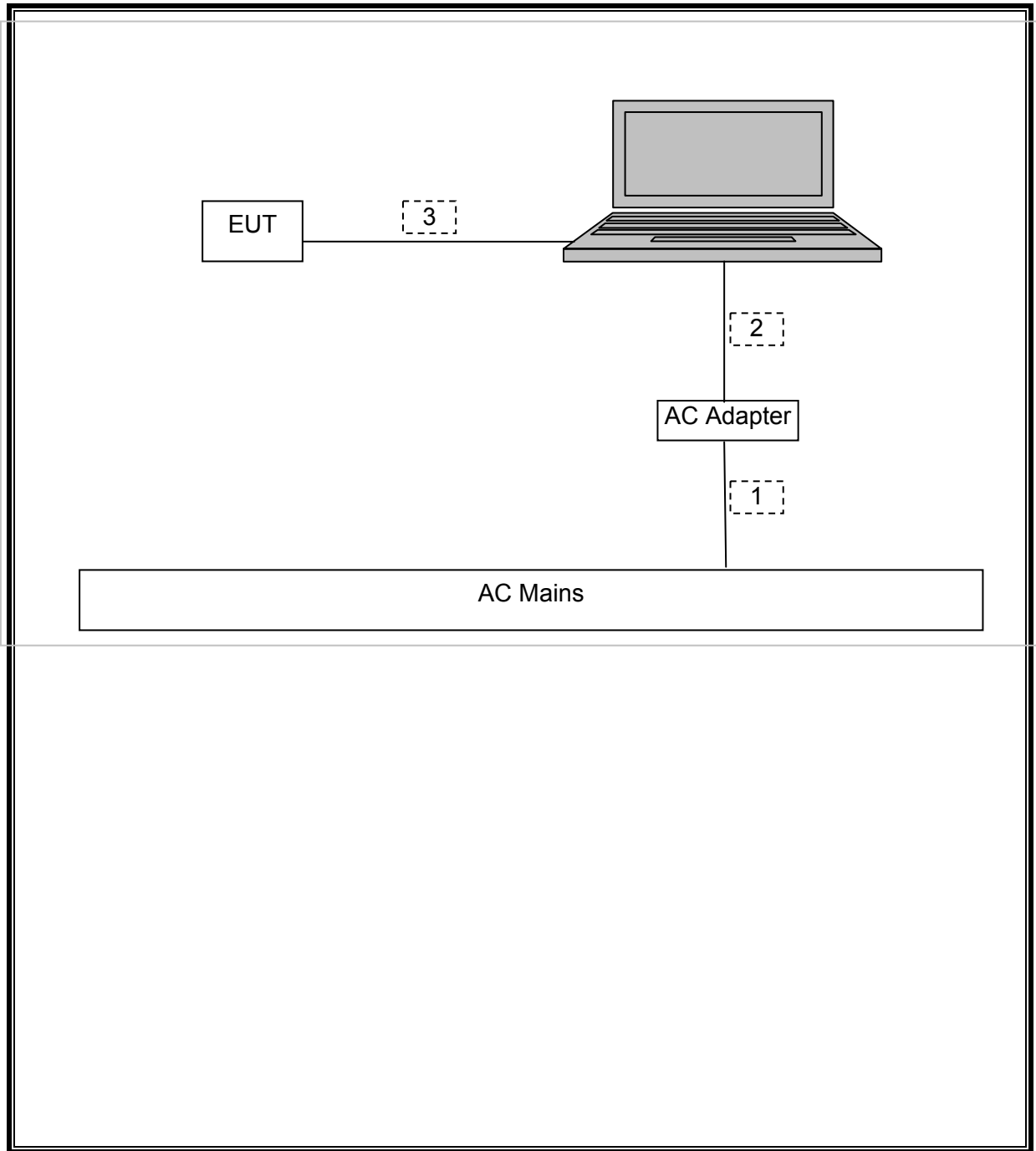
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	US 115V	Un-shielded	1.7 m	No
2	DC	3	DC	Un-shielded	1.7 m	No
3	USB	1	USB	Un-shielded	0.2m	No

TEST SETUP

The EUT is connected to a host laptop computer via USB cable during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	02/04/10
Antenna, Bilog, 2 GHz	Sundt Sciences	JB1	C01171	01/14/10
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	12/16/09
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	04/20/10
Antenna, Horn, 18 GHz	EMCO	3115	C00872	04/22/10
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/09
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	10/29/09
Peak Power Meter	Boonton	4541	N/A	01/15/10
Peak / Average Power Sensor	Boonton	57318	N/A	02/02/10
Highpass Filter, 7.6 GHz	Micro-Tronics	HPM13195	N02682	N/A

7. ANTENNA PORT TEST RESULTS

7.1. 802.11a DUAL 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

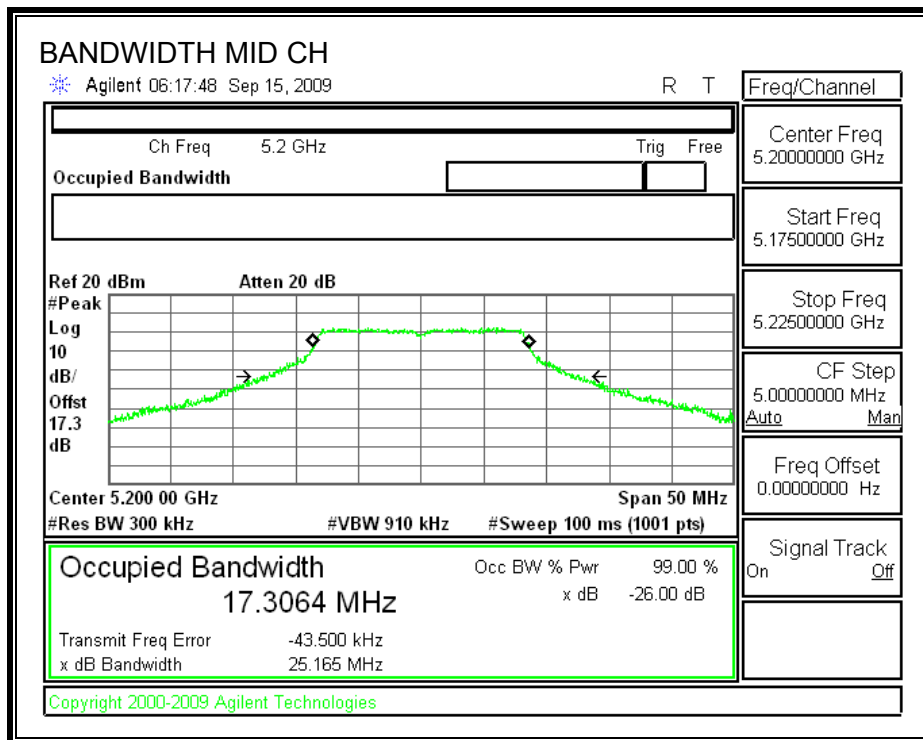
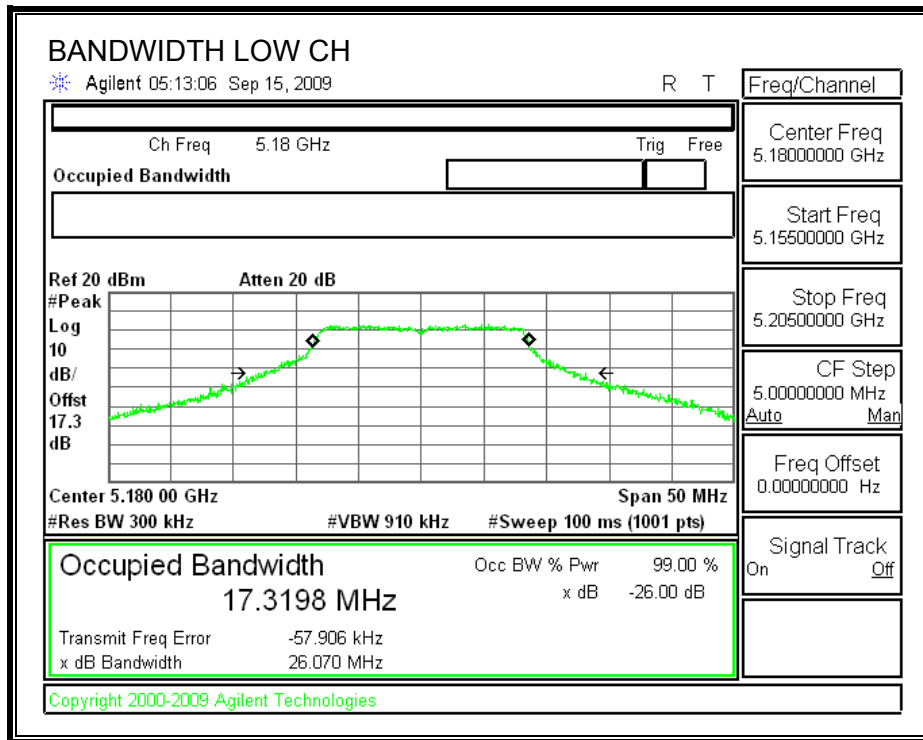
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	26.070	16.5272
Middle	5200	25.165	16.4828
High	5240	25.438	16.4456

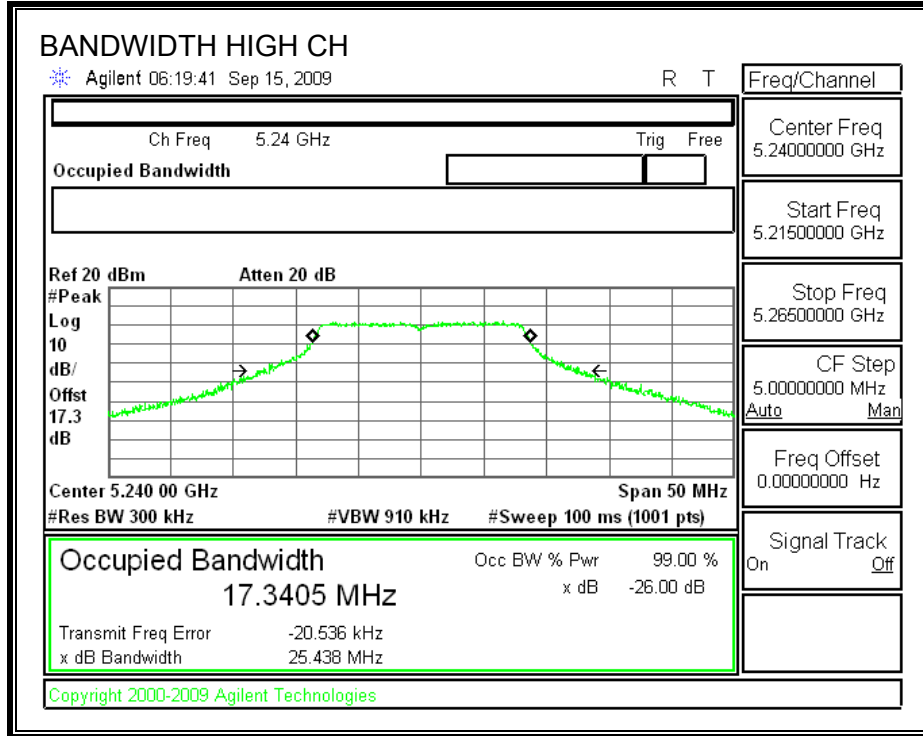
CHAIN 2

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	24.880	16.5855
Middle	5200	25.295	16.4657
High	5240	24.626	16.5478

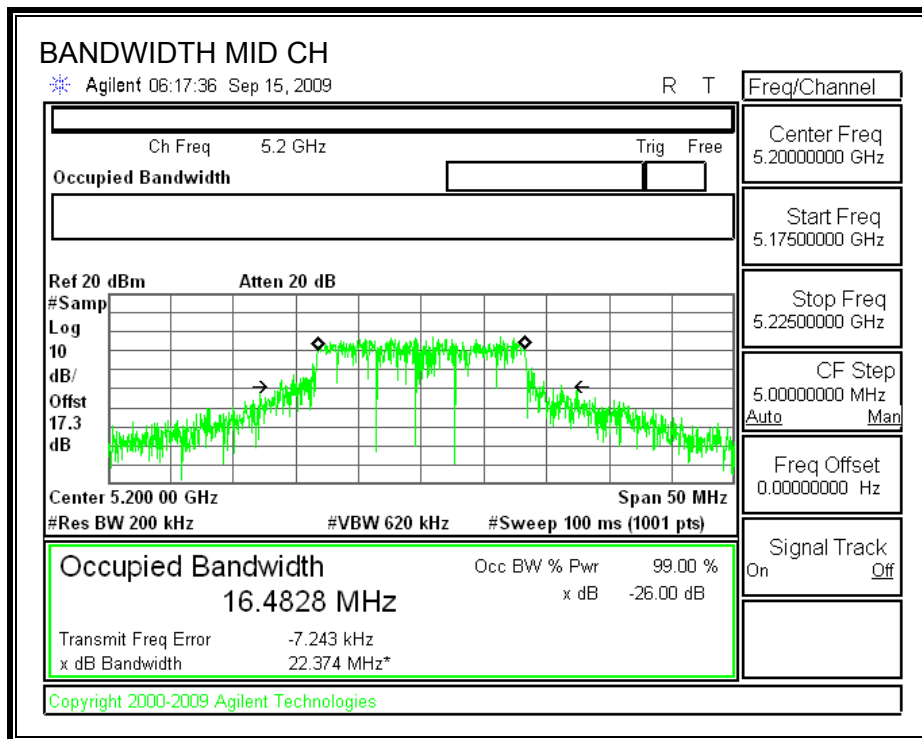
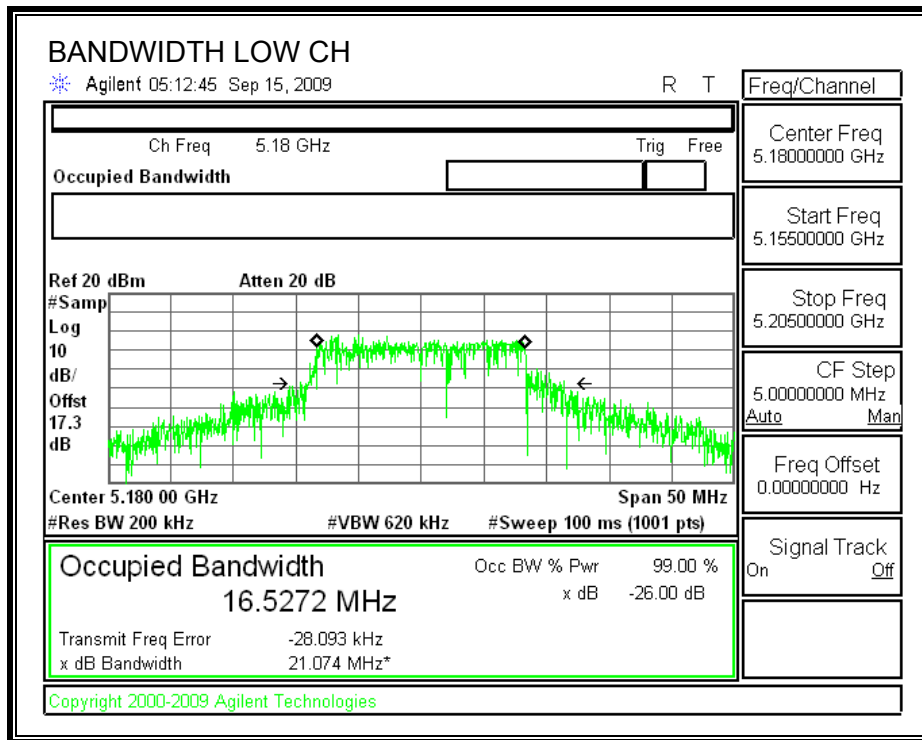
CHAIN 1

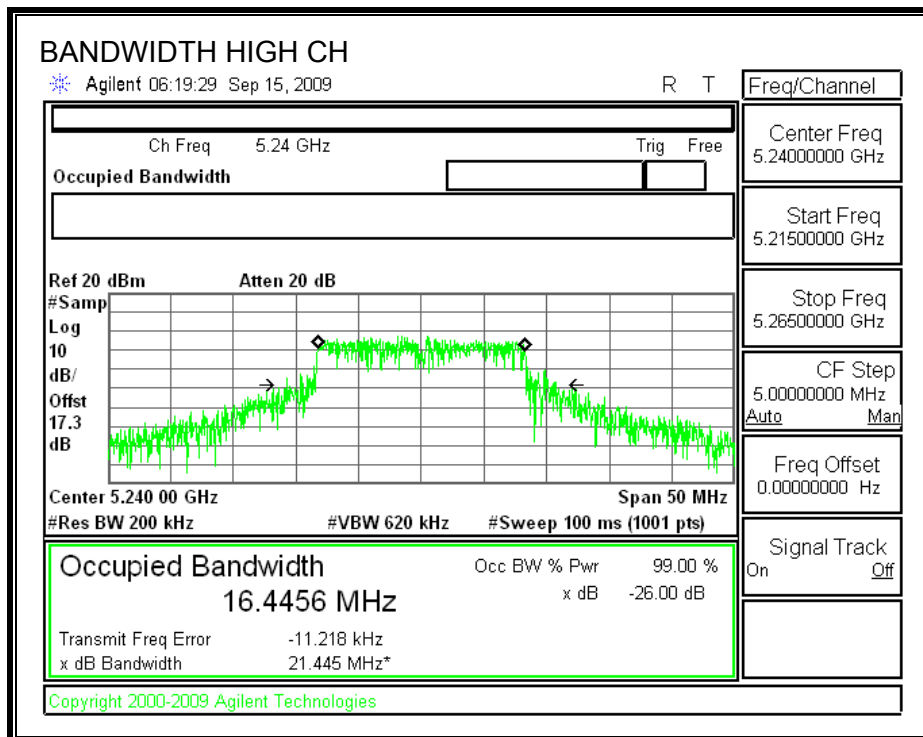
26 dB BANDWIDTH





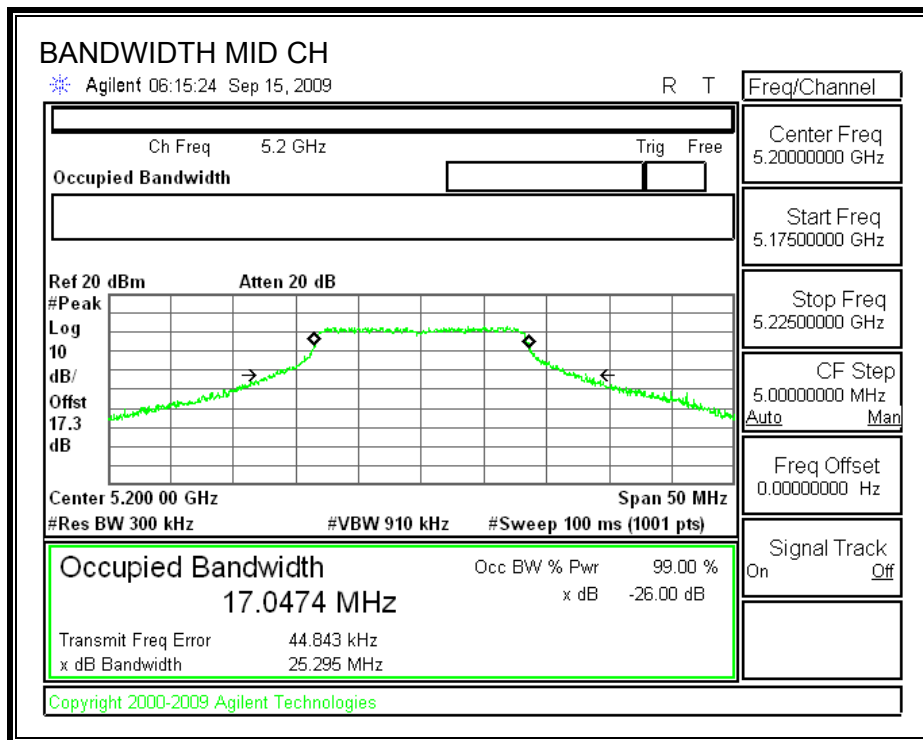
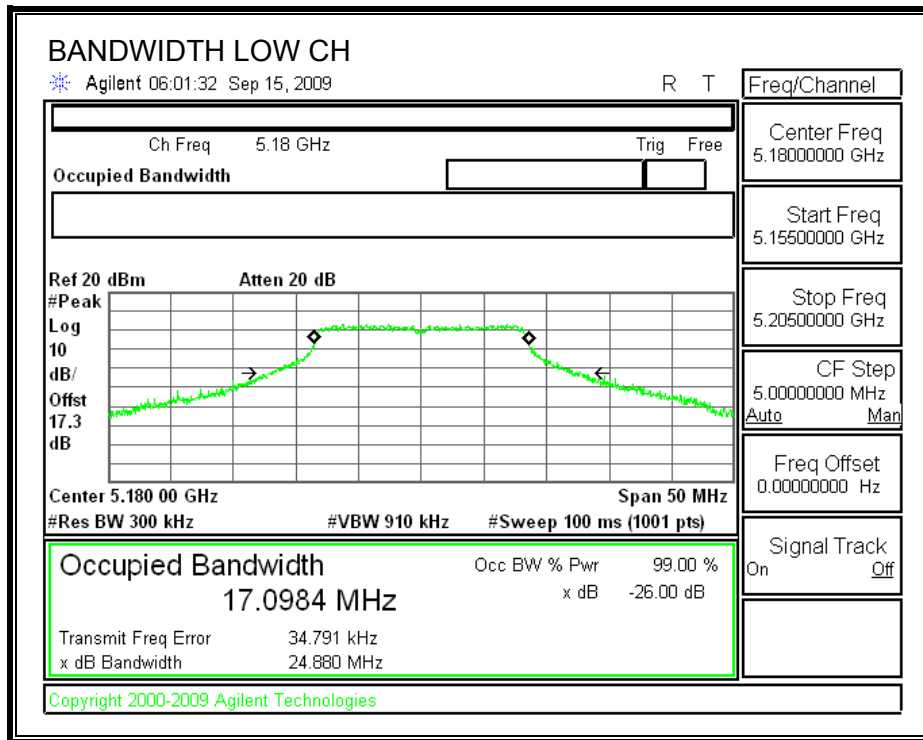
99% BANDWIDTH

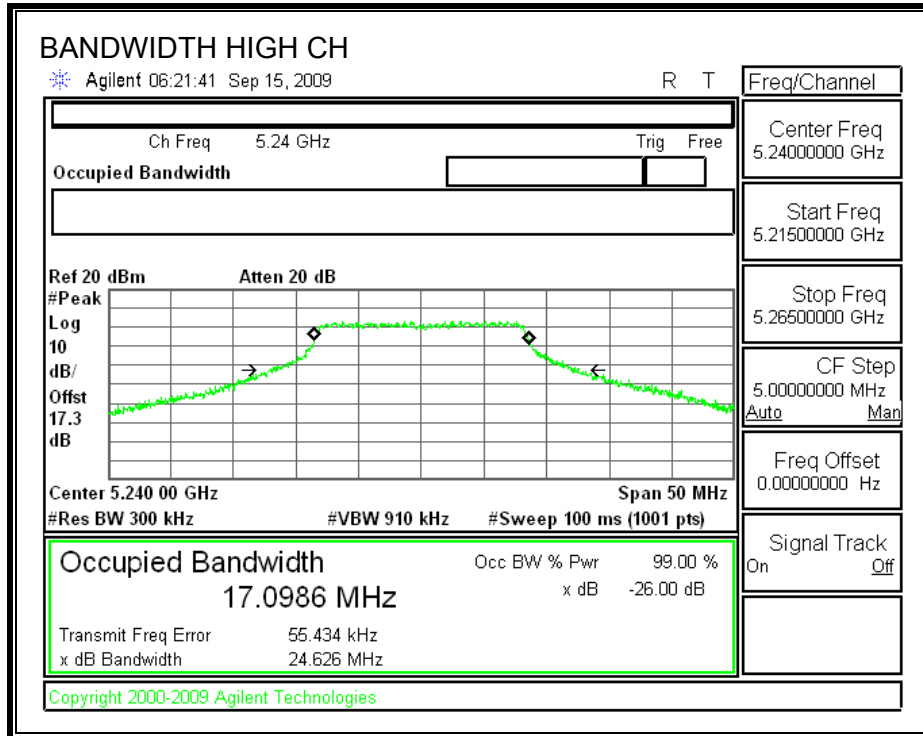




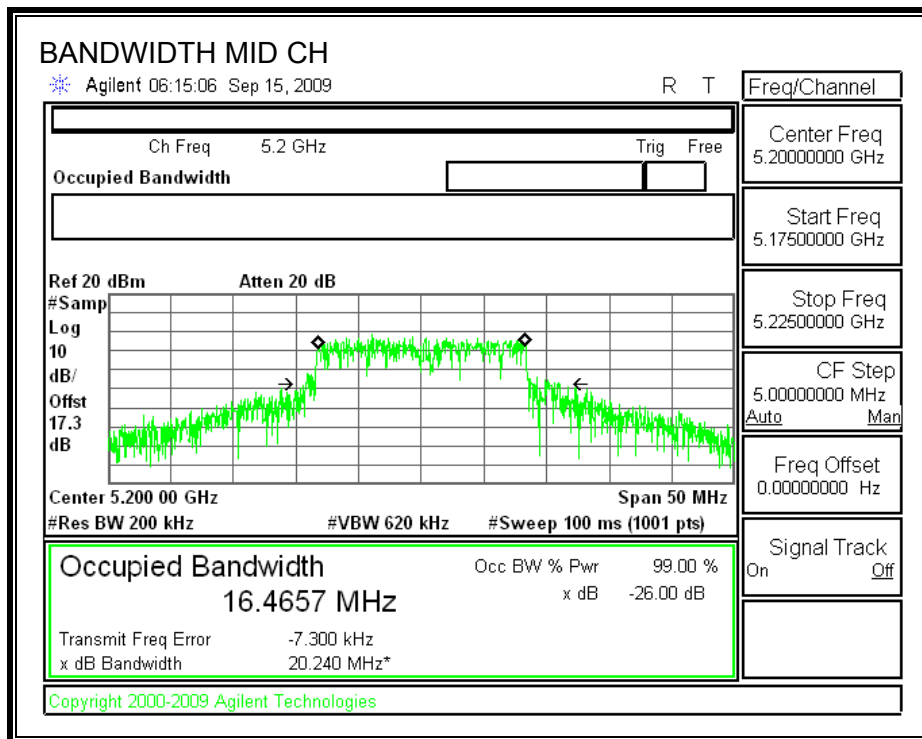
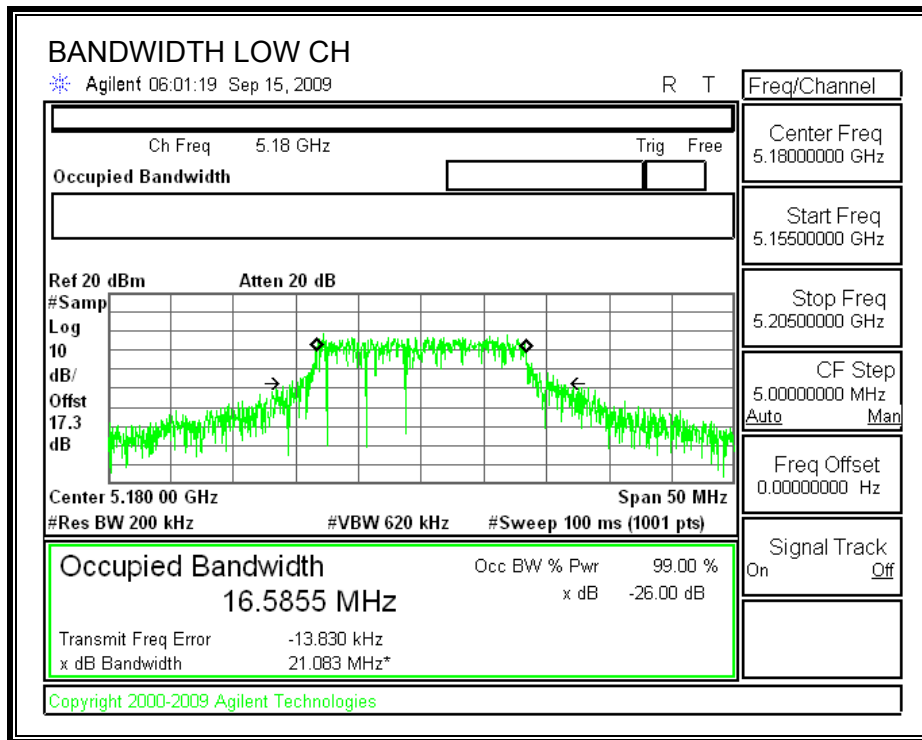
CHAIN 2

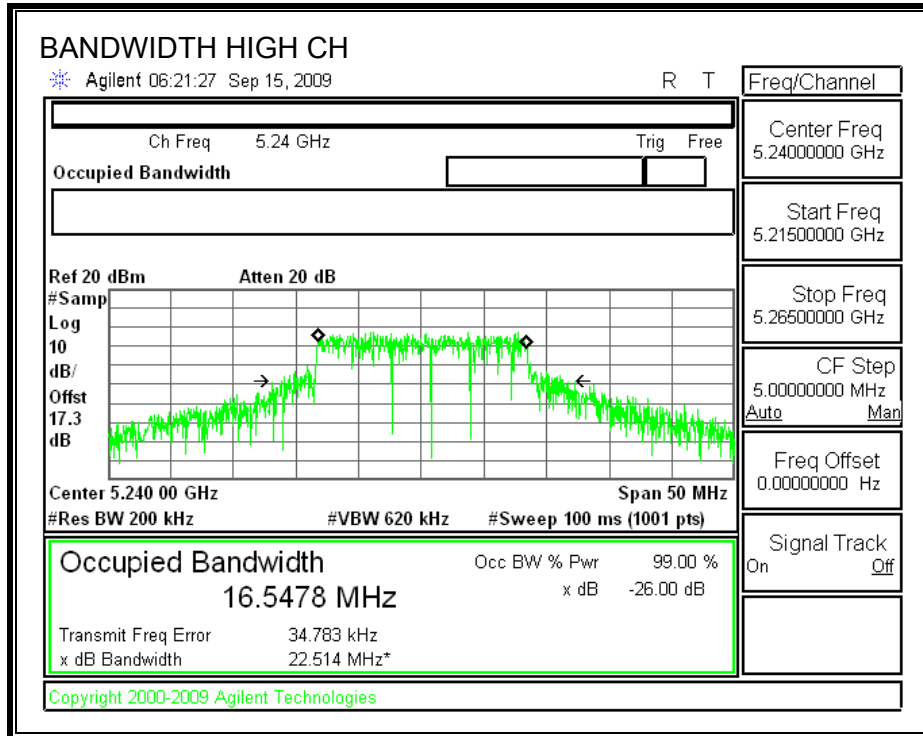
26 dB BANDWIDTH





99% BANDWIDTH





7.1.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

Antenna Gain (Chain 1) (dBi)	Antenna Gain (Chain 2) (dBi)	Effective Legacy Gain (dBi)
1.91	1.98	4.96

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

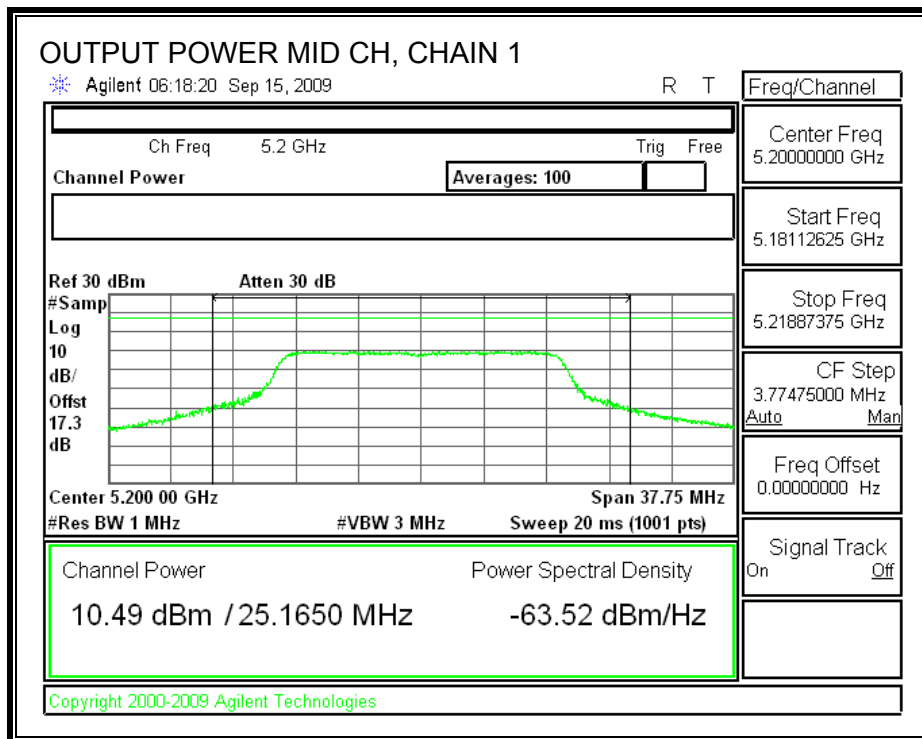
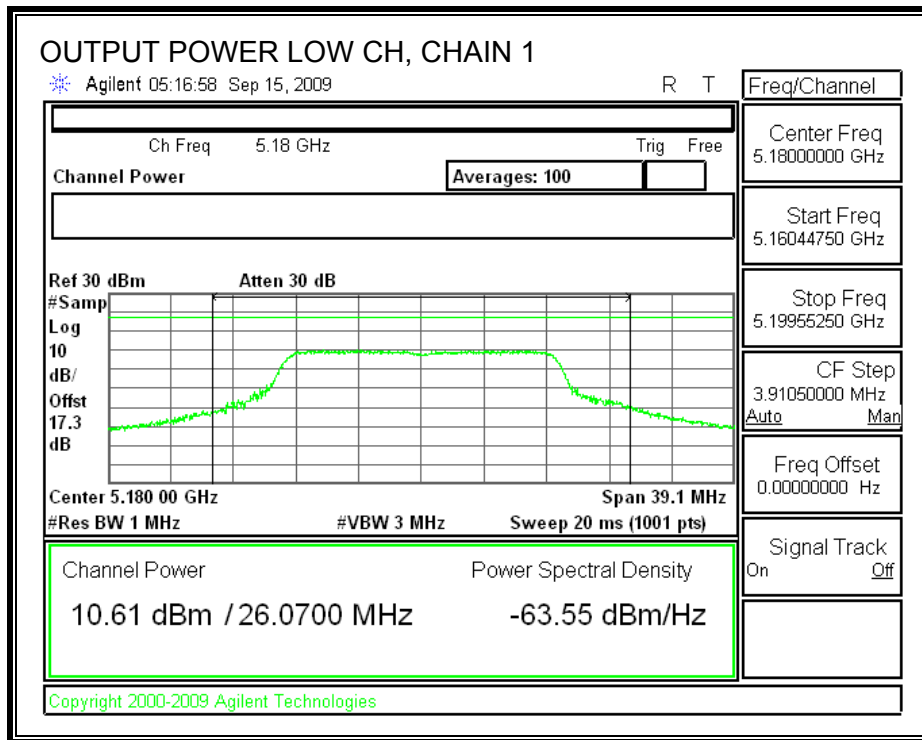
Limit

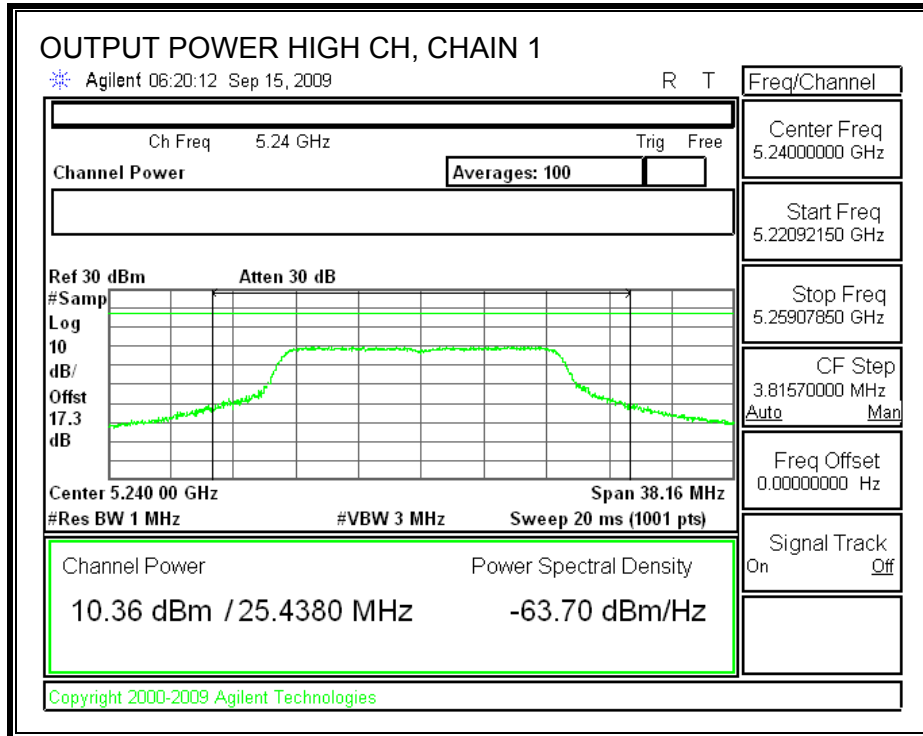
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	26.070	18.16	4.96	17.00
Mid	5200	17	25.165	18.01	4.96	17.00
High	5240	17	25.438	18.05	4.96	17.00

Individual Chain Results

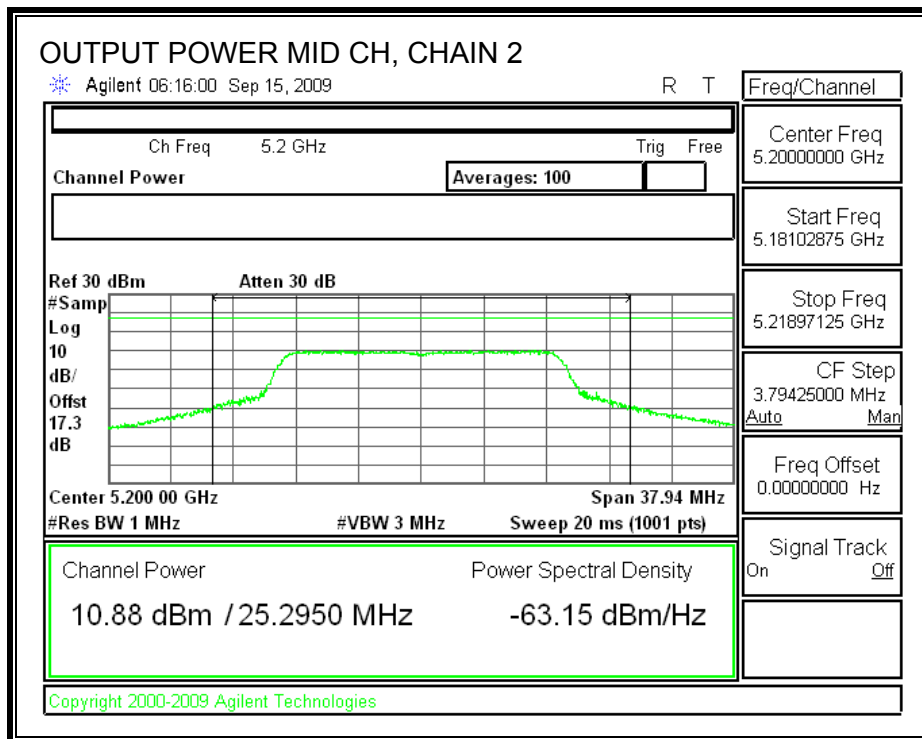
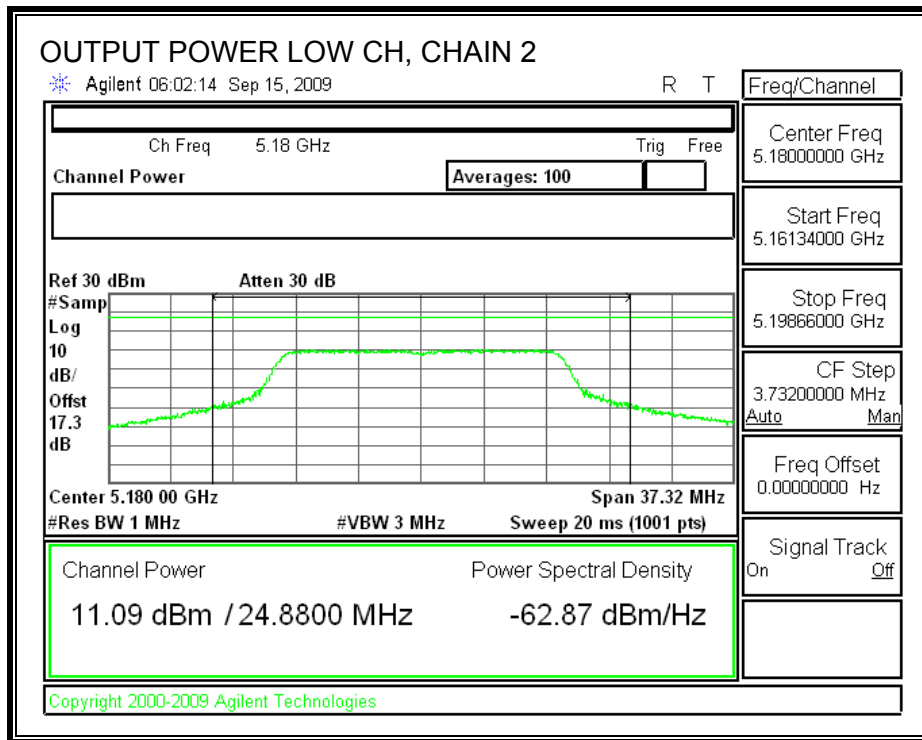
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	10.61	11.09	13.87	17.00	-3.13
Mid	5200	10.49	10.88	13.70	17.00	-3.30
High	5240	10.36	11.12	13.77	17.00	-3.23

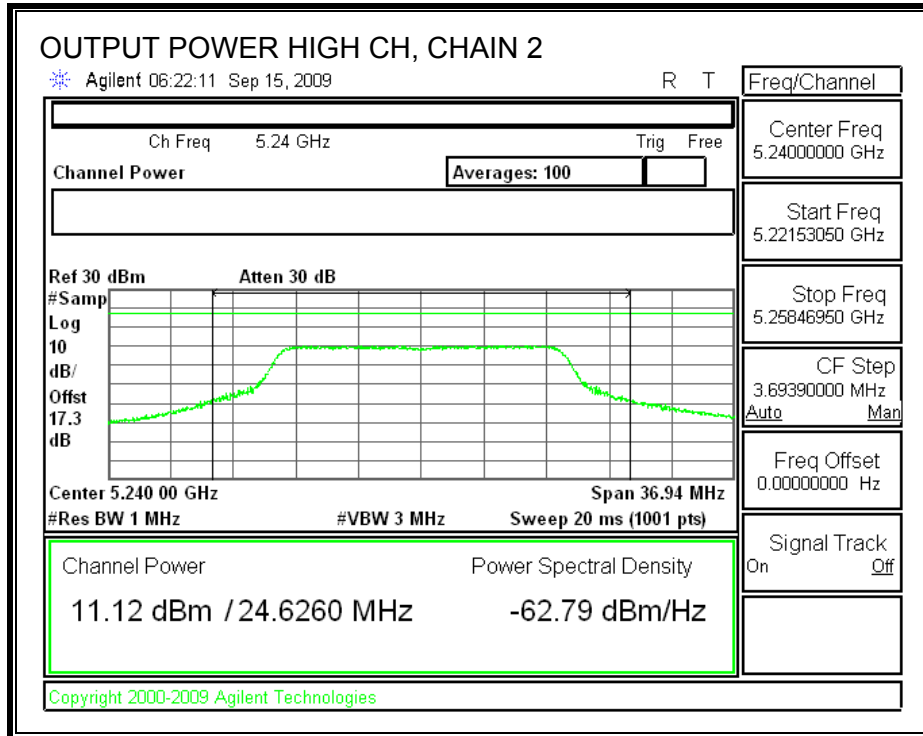
CHAIN 1 OUTPUT POWER





CHAIN 2 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 17.3 dB (including 10 dB pad and 7.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5180	10.97	11.38	14.19
Middle	5200	10.79	11.19	14.00
High	5240	10.75	11.54	14.17

7.1.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

Antenna Gain (Chain 1) (dBi)	Antenna Gain (Chain 2) (dBi)	Effective Legacy Gain (dBi)
1.91	1.98	4.96

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

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

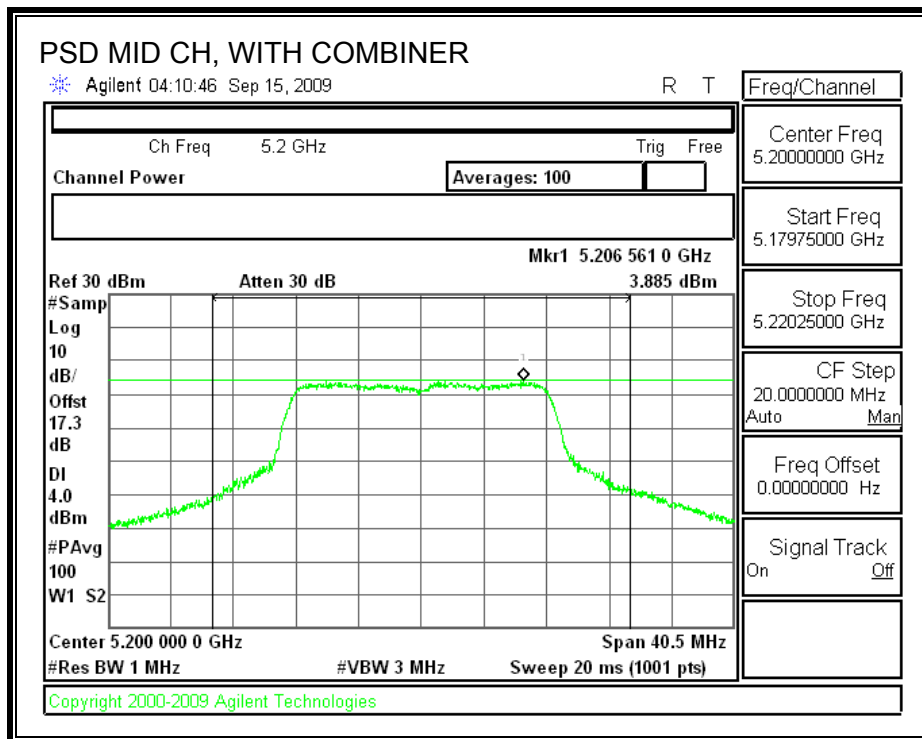
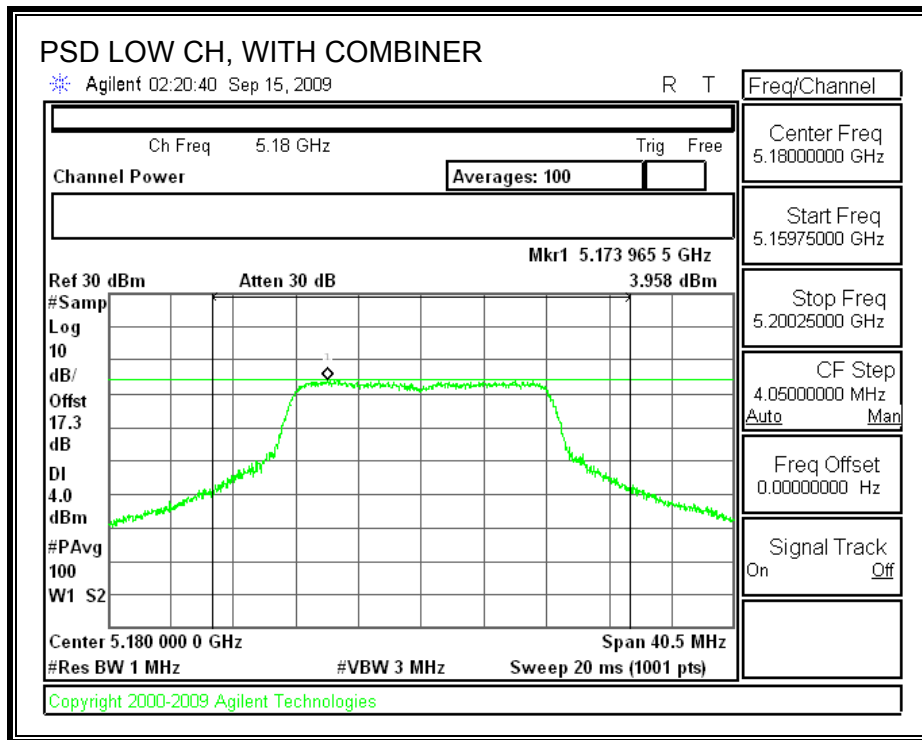
TEST PROCEDURE

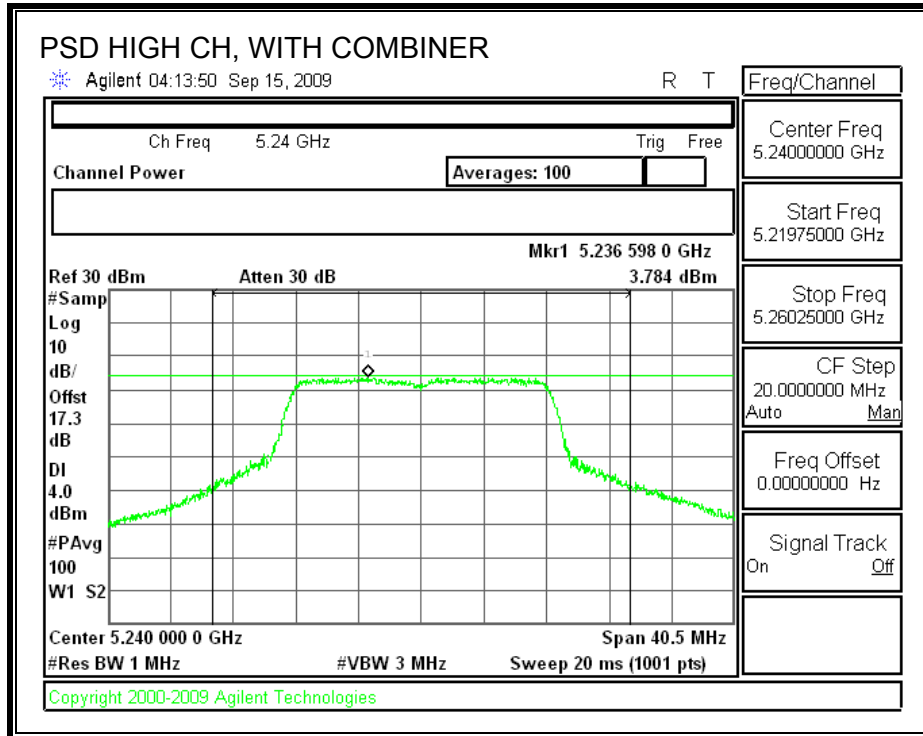
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.96	4	-0.04
Middle	5200	3.89	4	-0.12
High	5240	3.75	4	-0.25

POWER SPECTRAL DENSITY 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

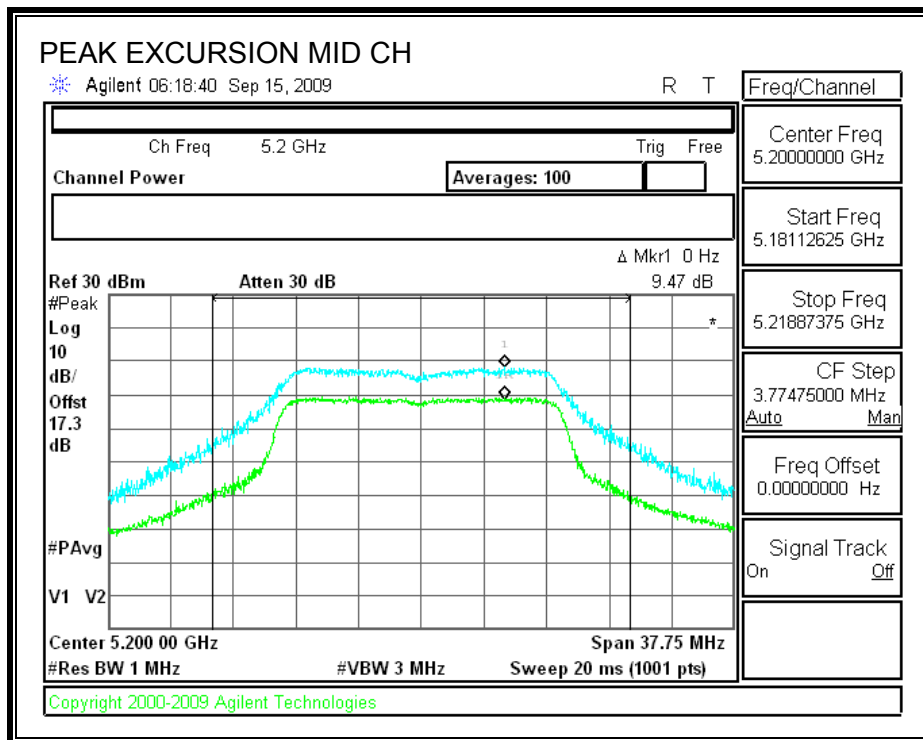
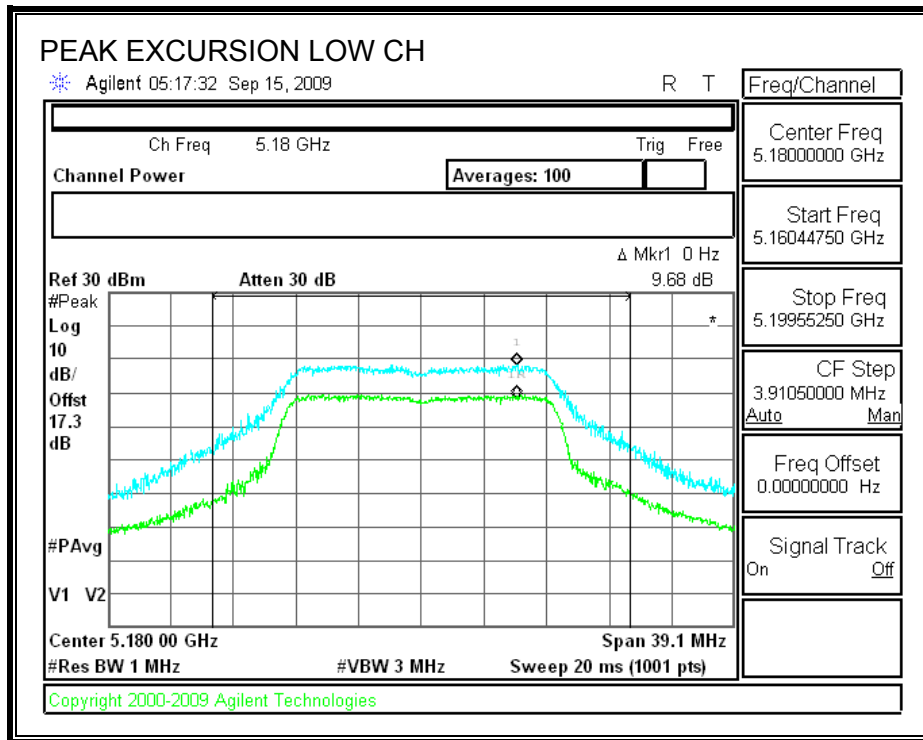
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.68	13	-3.32
Middle	5200	9.47	13	-3.53
High	5240	8.85	13	-4.15

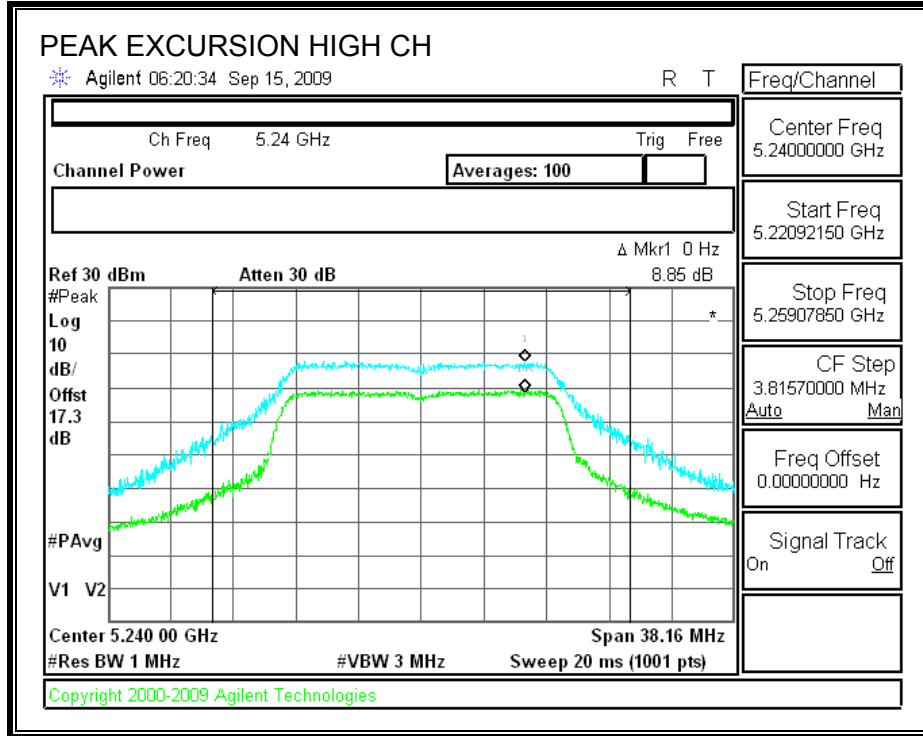
CHAIN 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.58	13	-3.42
Middle	5200	10.16	13	-2.84
High	5240	10.71	13	-2.29

CHAIN 1

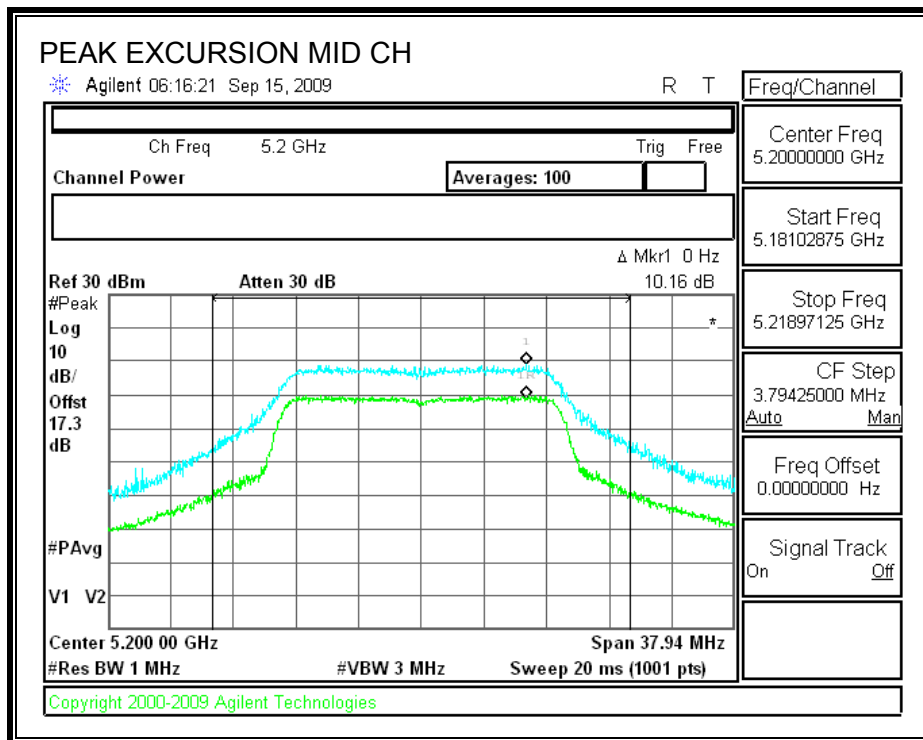
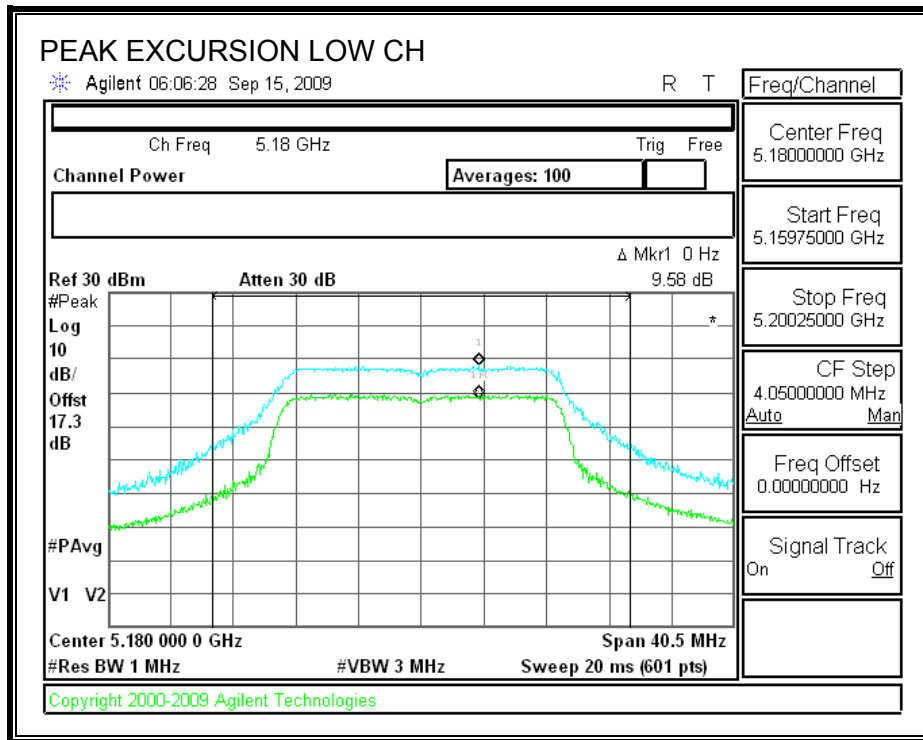
PEAK EXCURSION

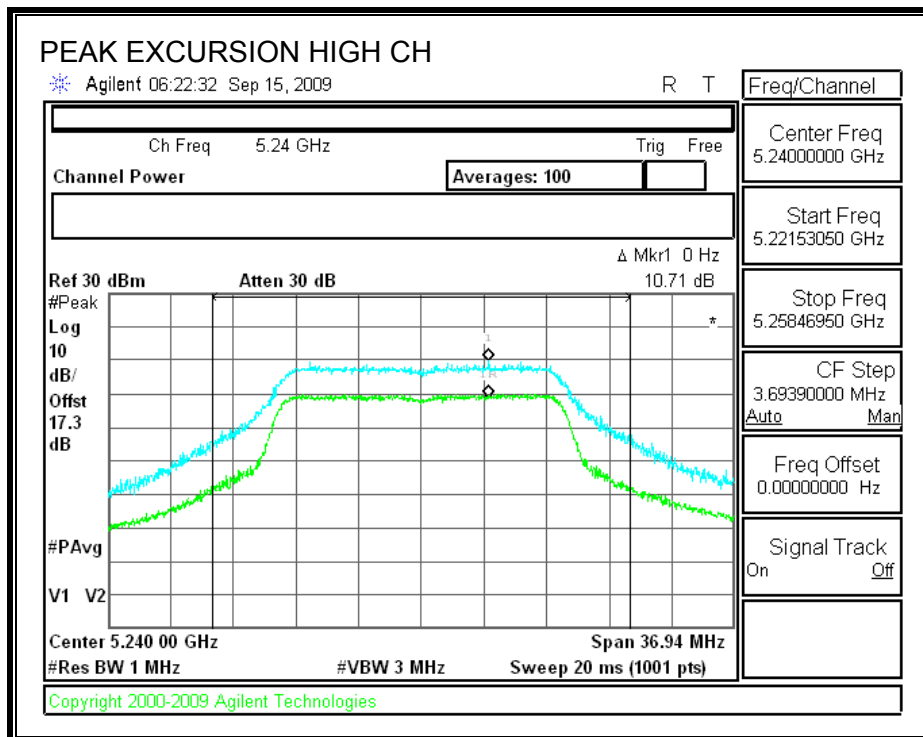




CHAIN 2

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

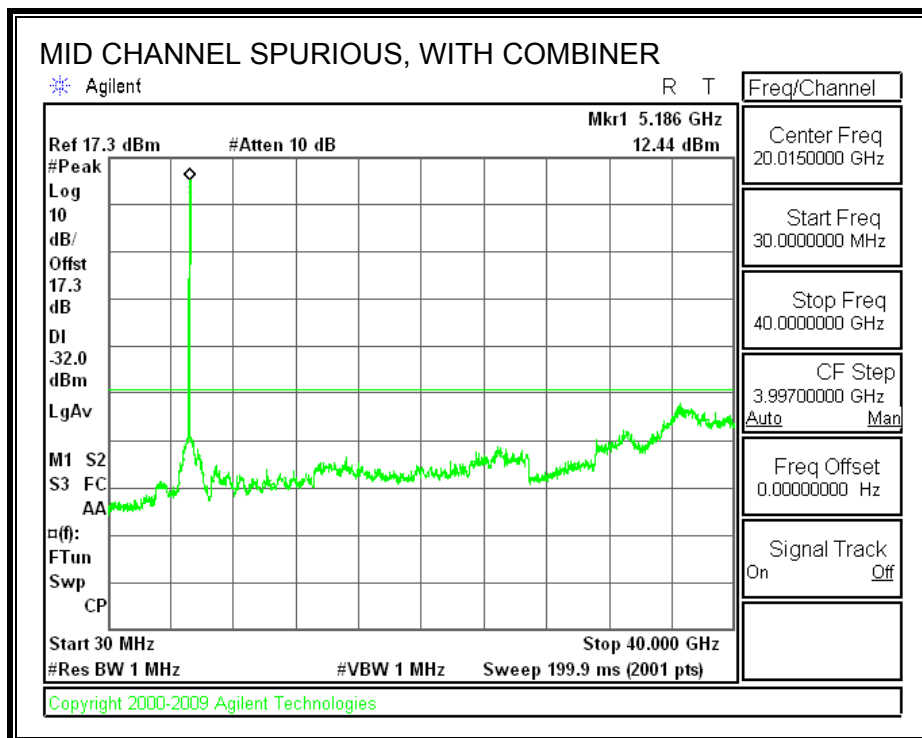
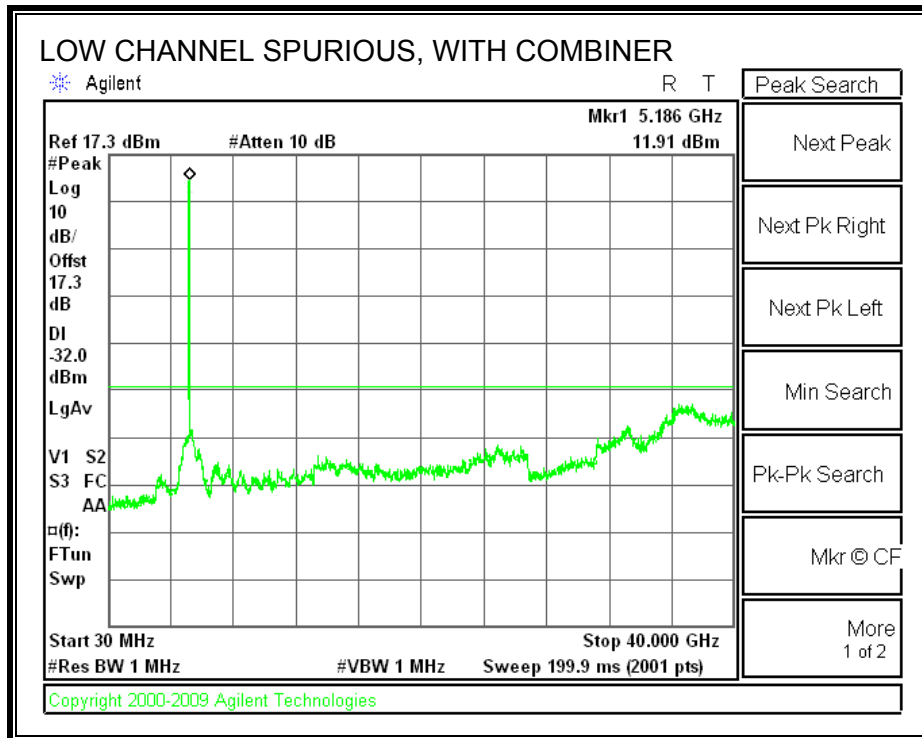
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

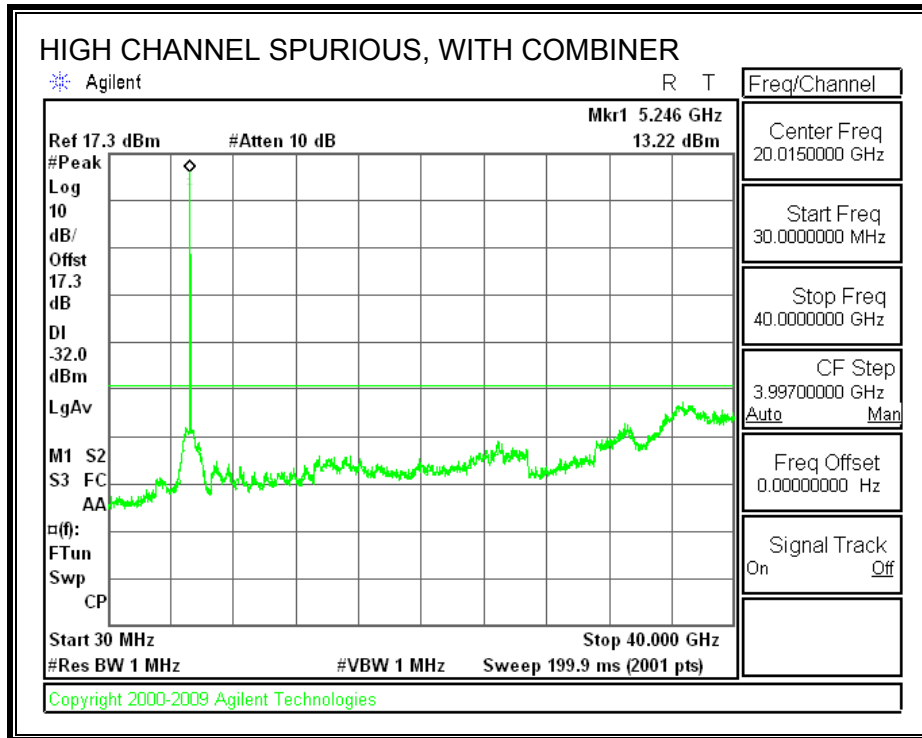
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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





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

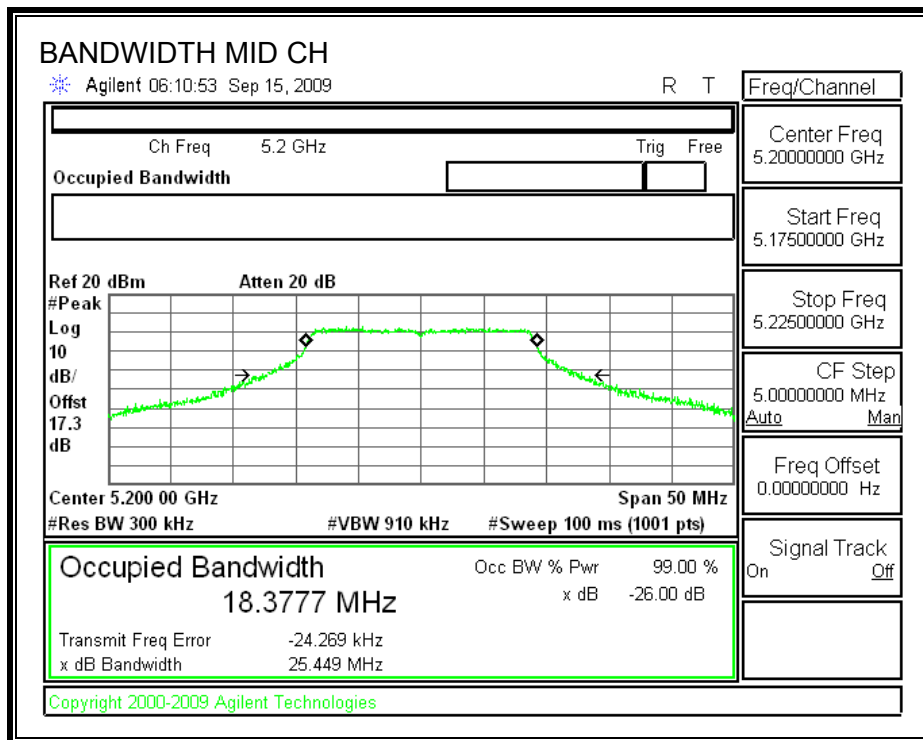
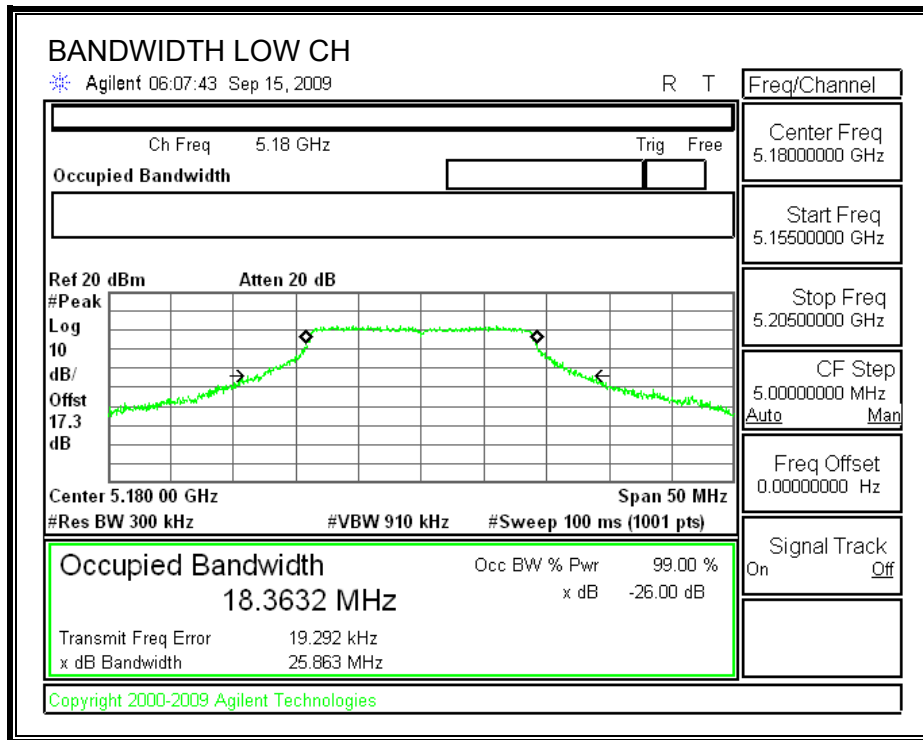
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	25.863	17.7480
Middle	5200	25.449	17.6675
High	5240	25.518	17.6990

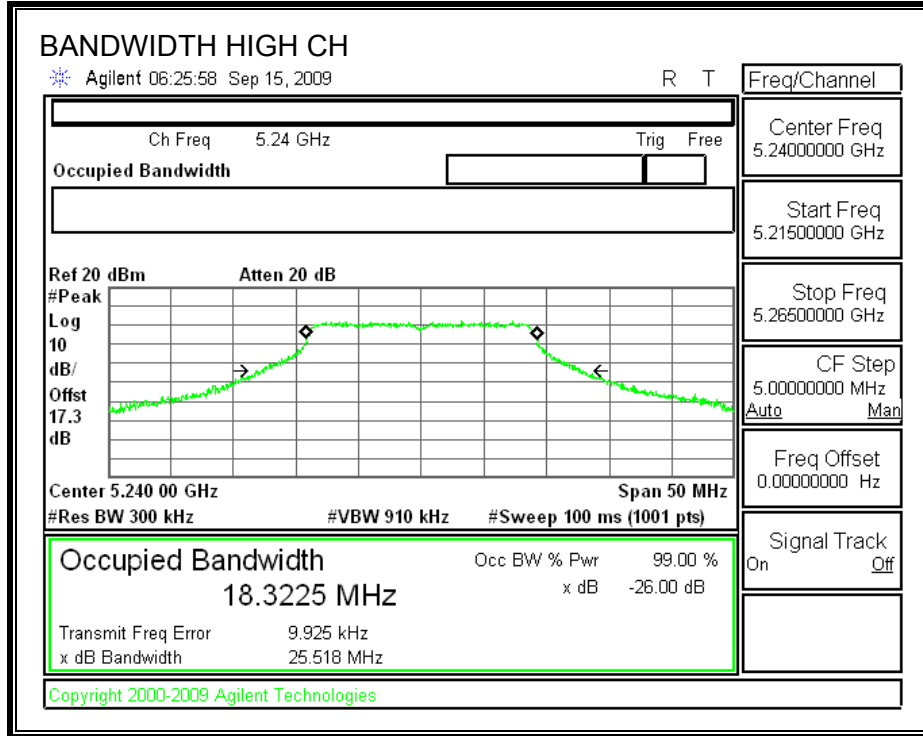
CHAIN 2

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	26.496	17.7586
Middle	5200	26.361	17.7369
High	5240	25.889	17.6385

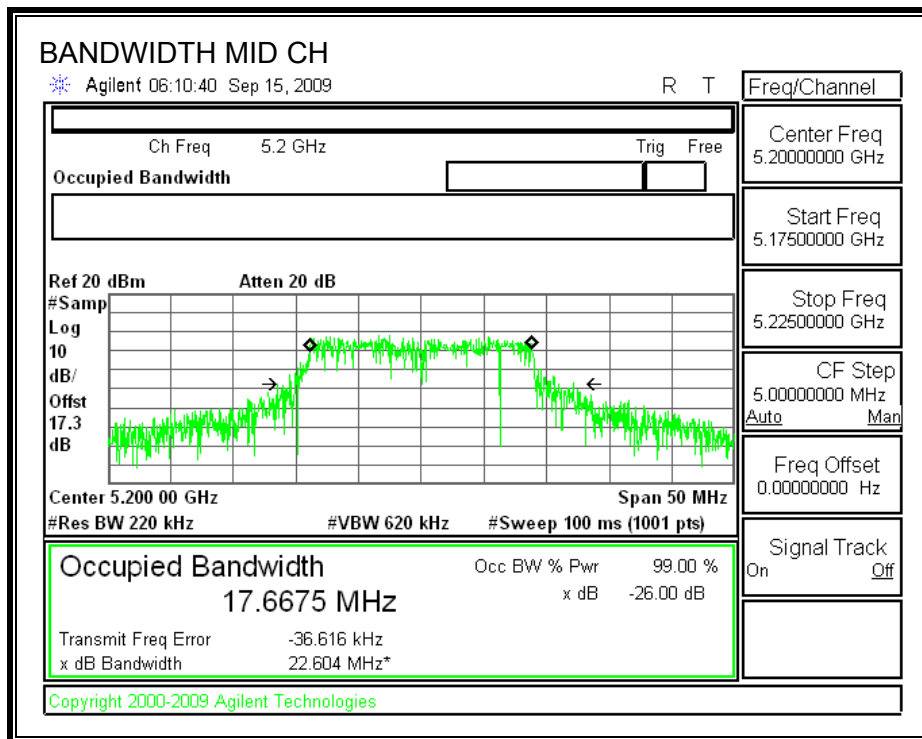
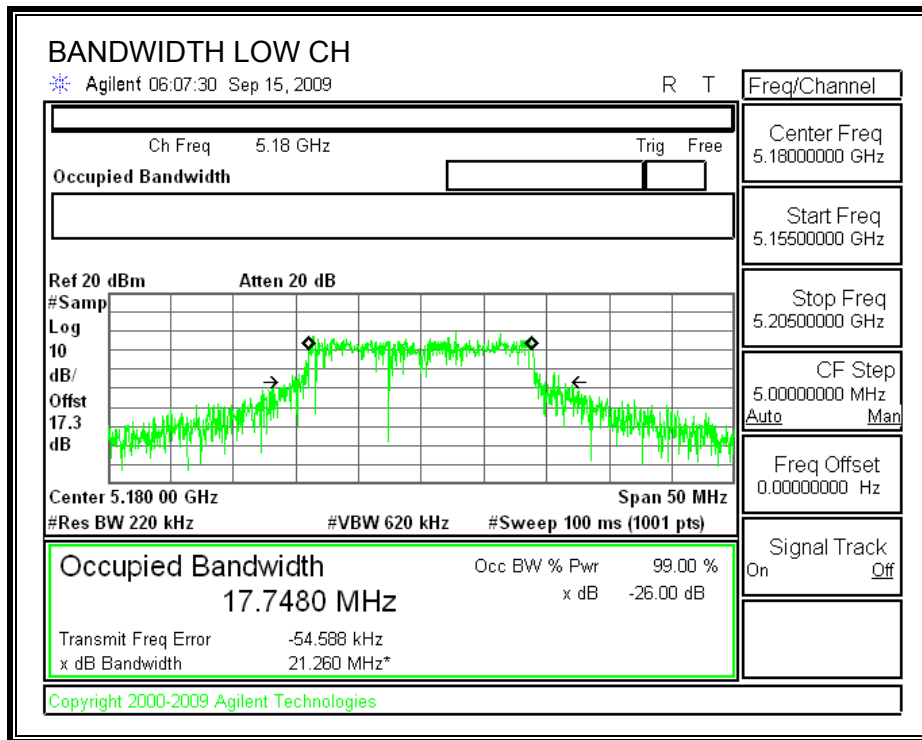
CHAIN 1

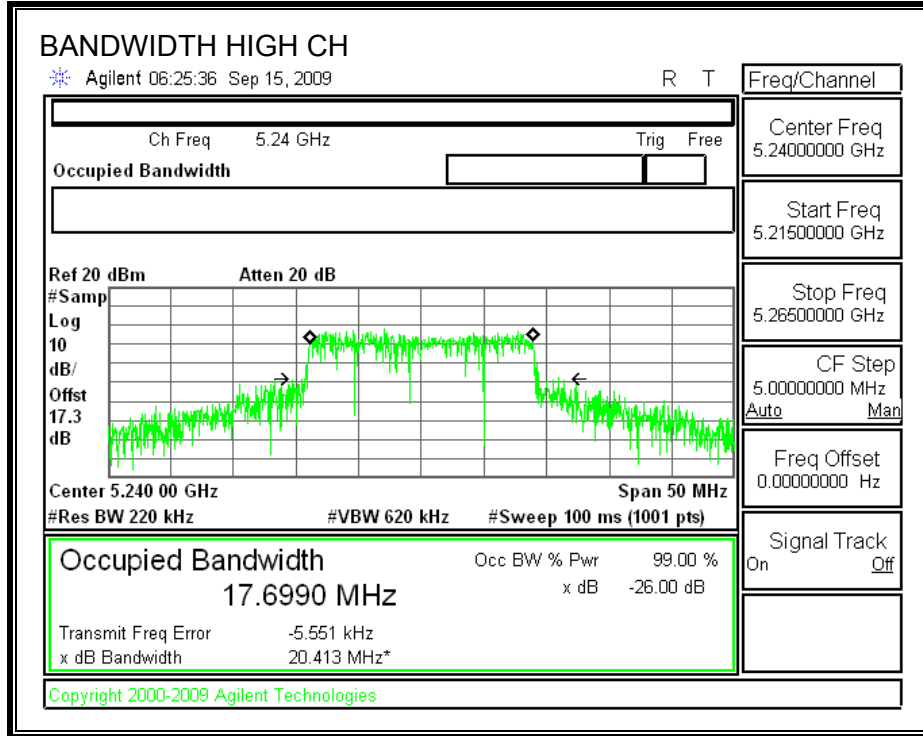
26 dB BANDWIDTH





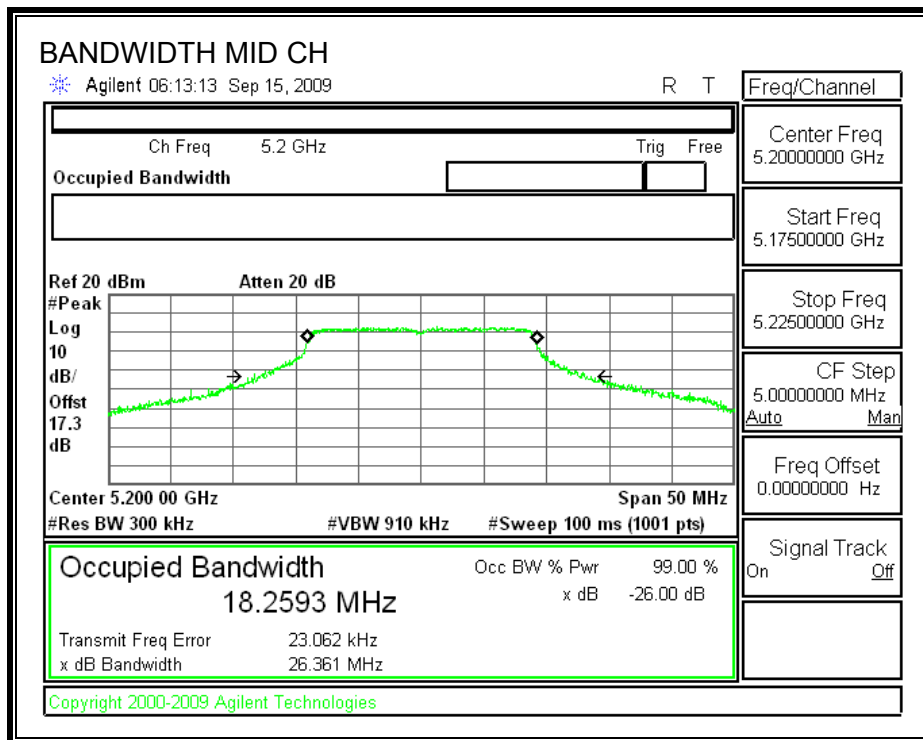
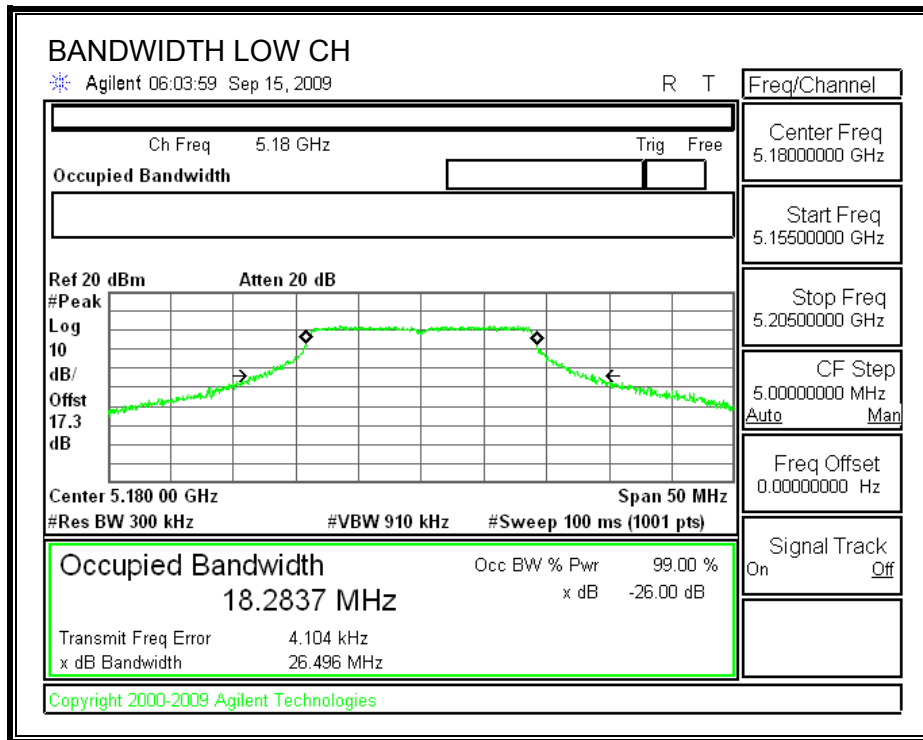
99% BANDWIDTH

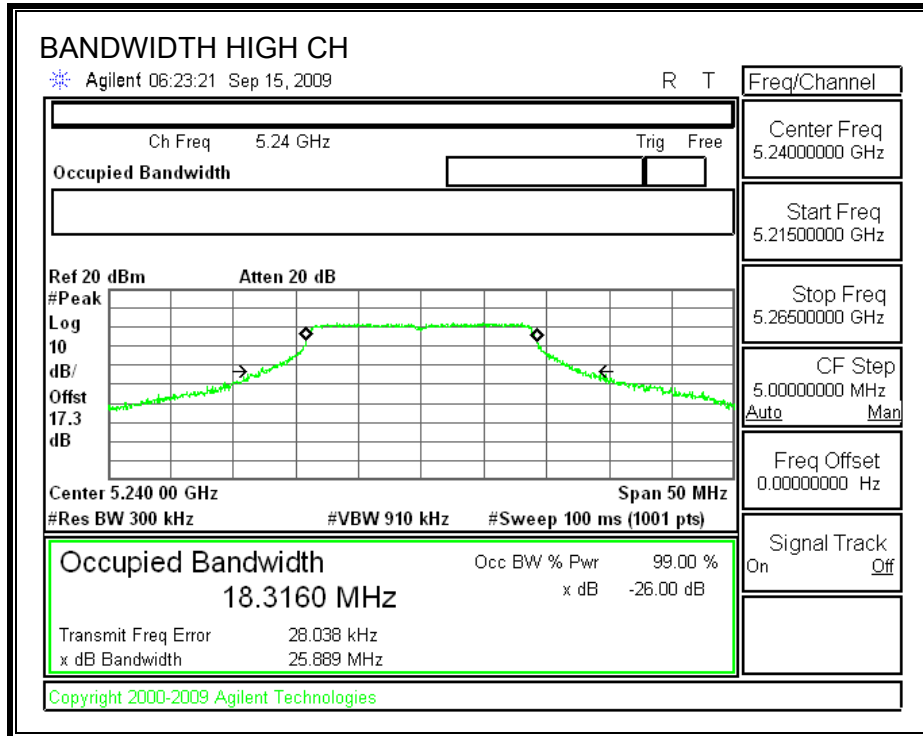




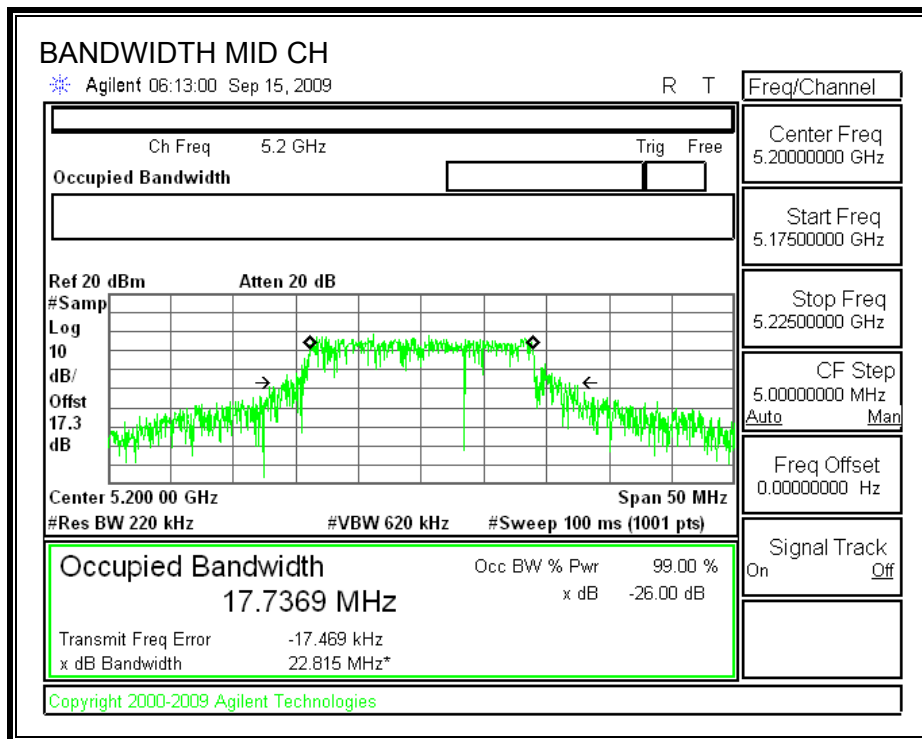
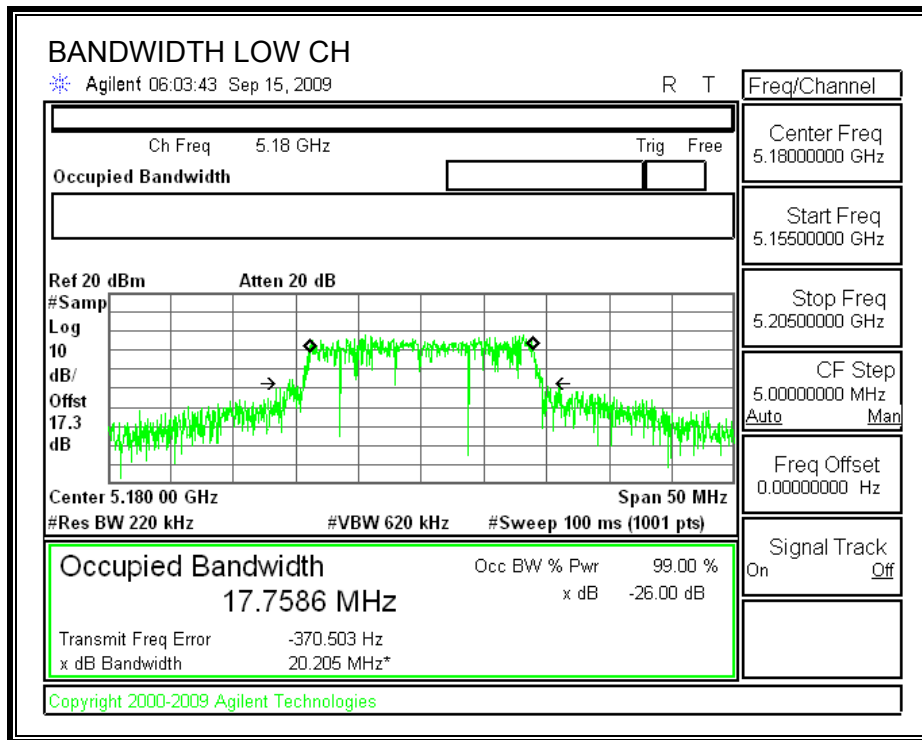
CHAIN 2

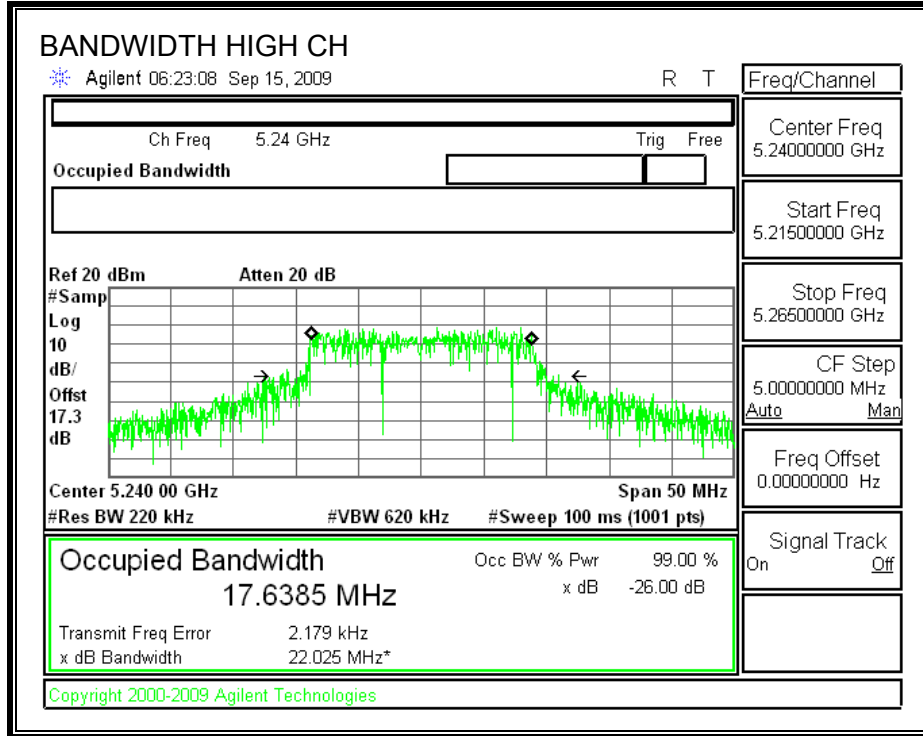
26 dB BANDWIDTH





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

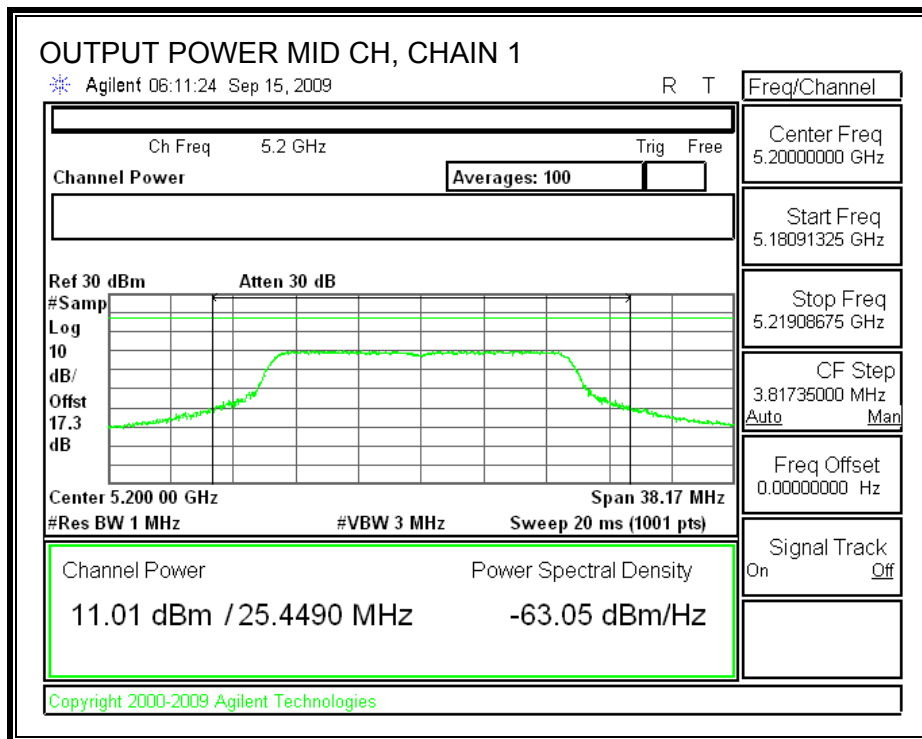
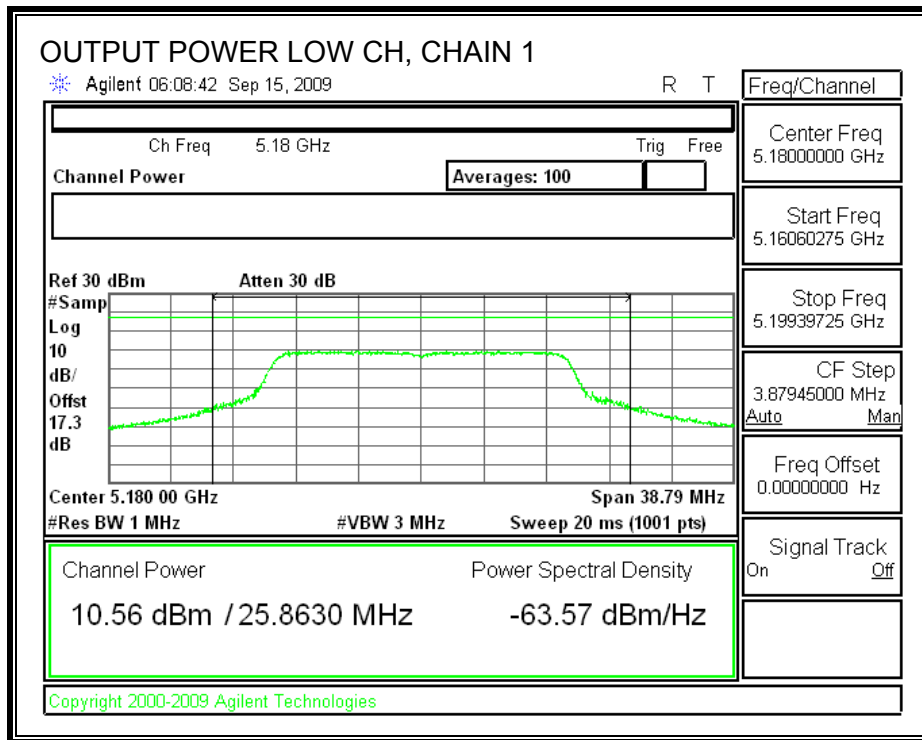
Limit

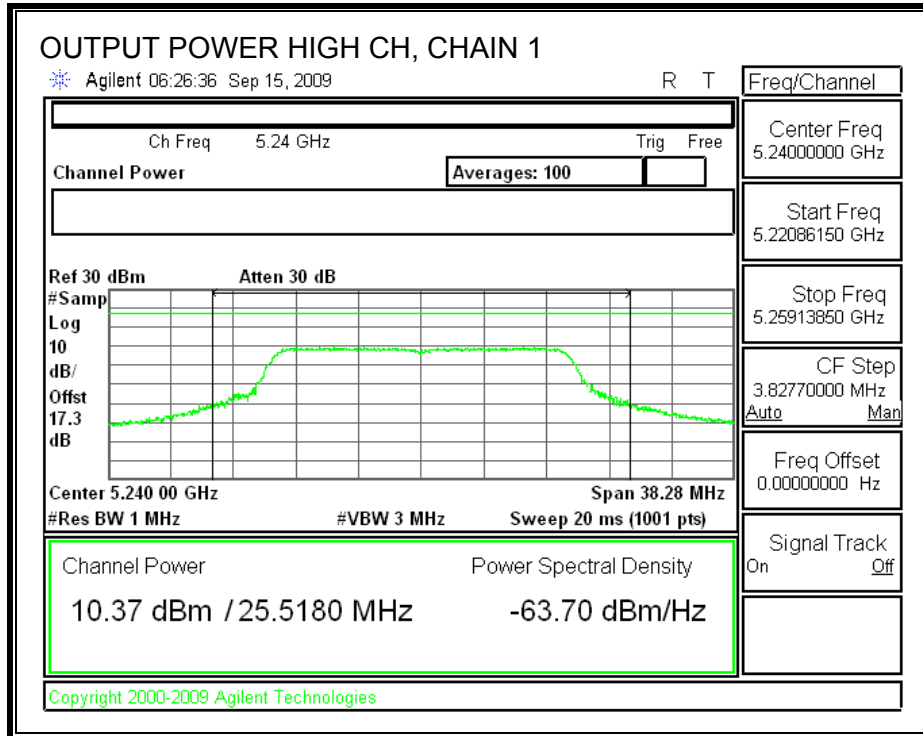
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	25.863	18.13	2.05	17.00
Mid	5200	17	25.449	18.06	2.05	17.00
High	5240	17	25.518	18.07	2.05	17.00

Individual Chain Results

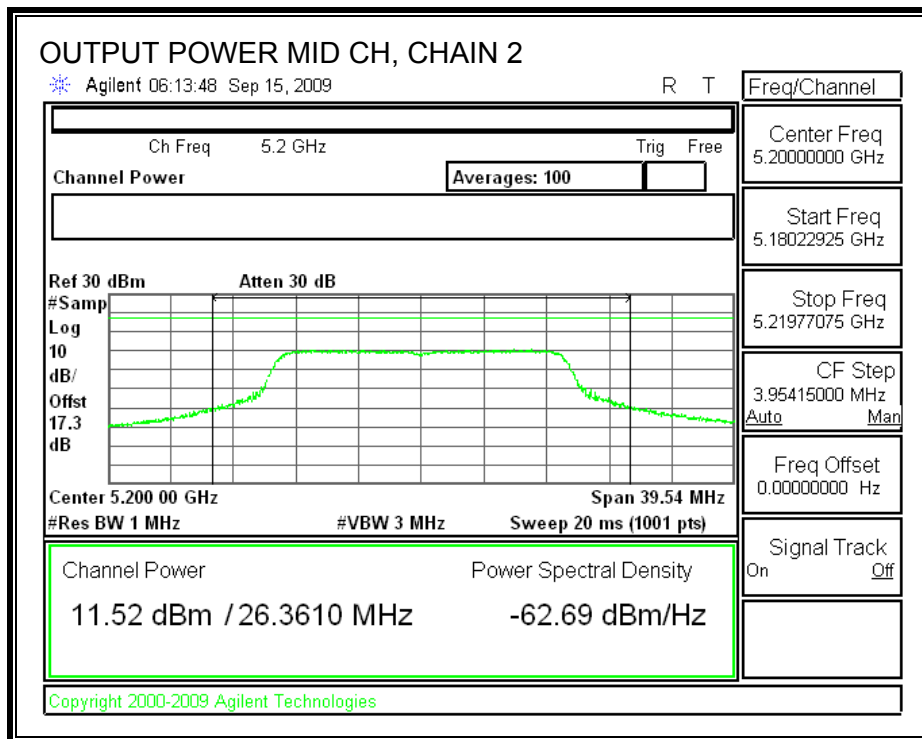
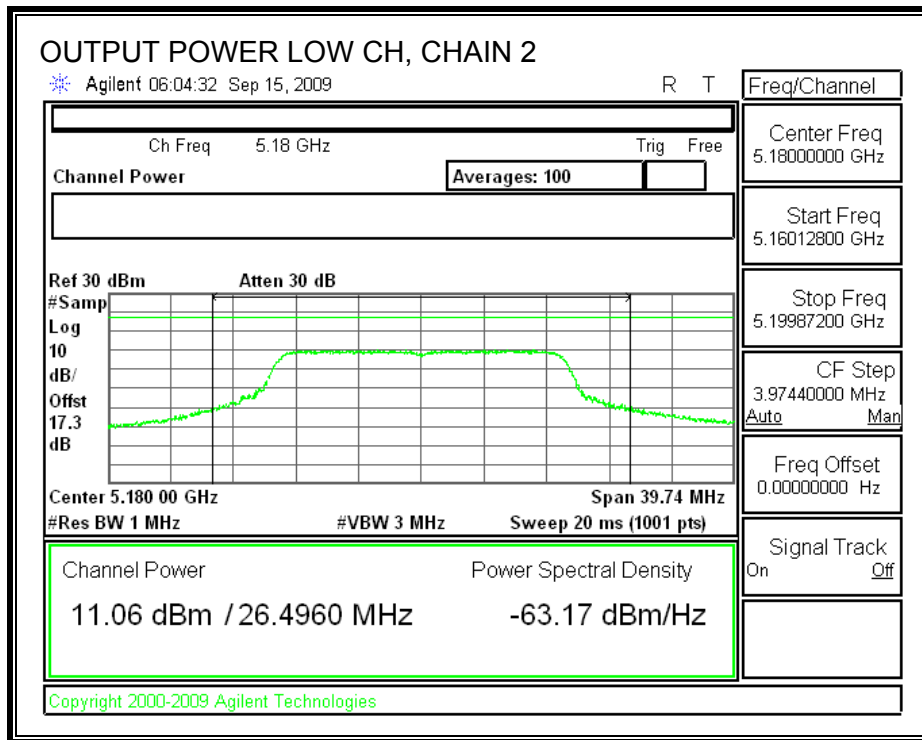
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	10.56	11.06	13.83	17.00	-3.17
Mid	5200	11.01	11.52	14.28	17.00	-5.99
High	5240	10.37	11.11	13.77	17.00	-6.63

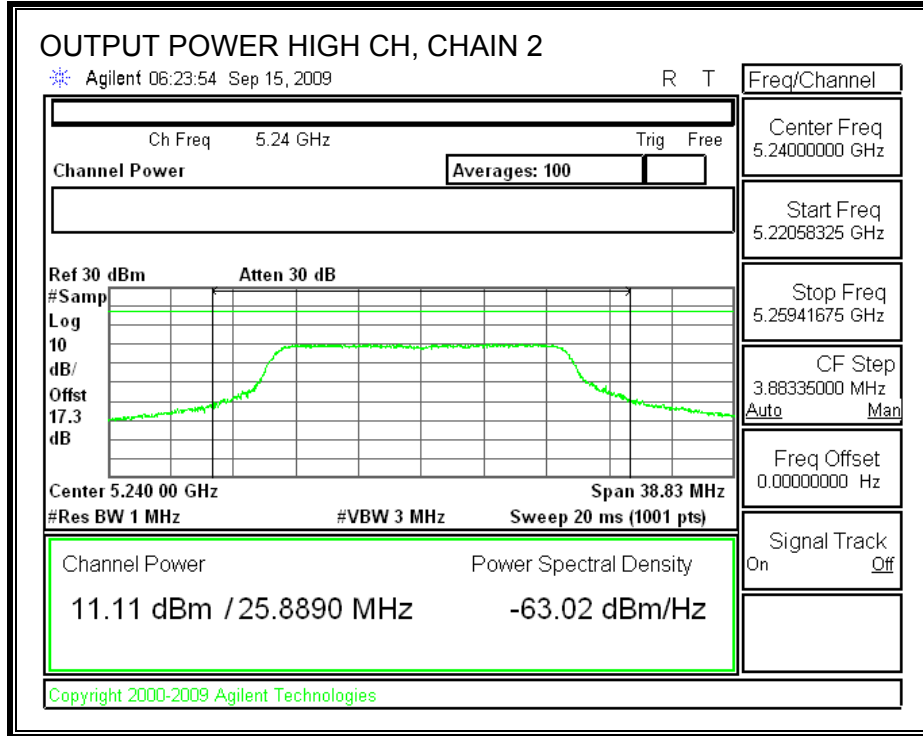
CHAIN 1 OUTPUT POWER





CHAIN 2 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 17.3 dB (including 10 dB pad and 7.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5180	10.92	11.46	14.21
Middle	5200	11.32	11.70	14.52
High	5240	10.72	11.52	14.15

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.

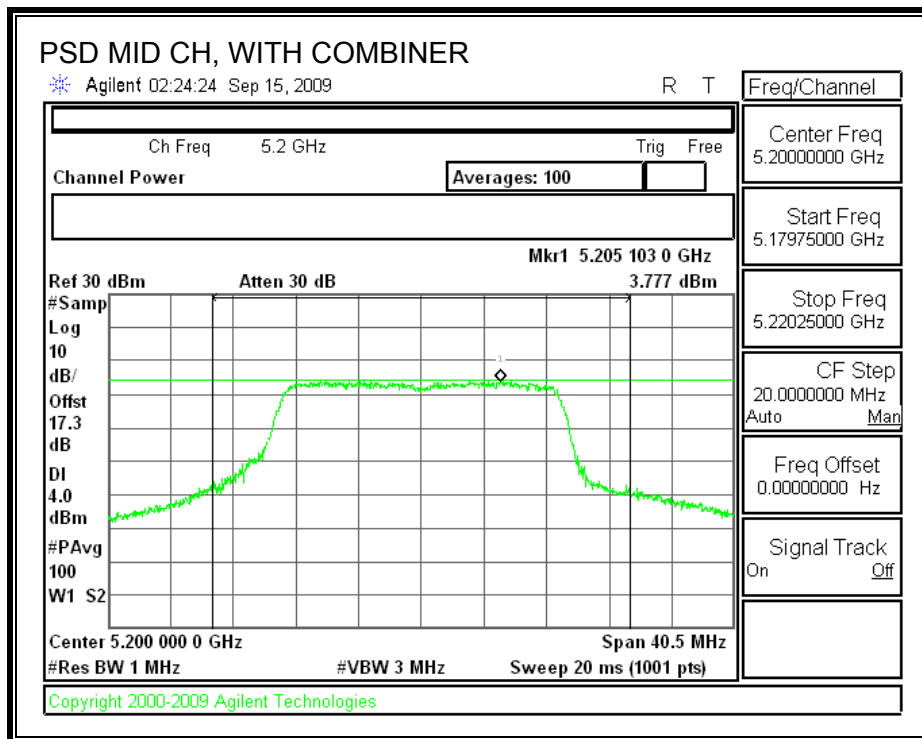
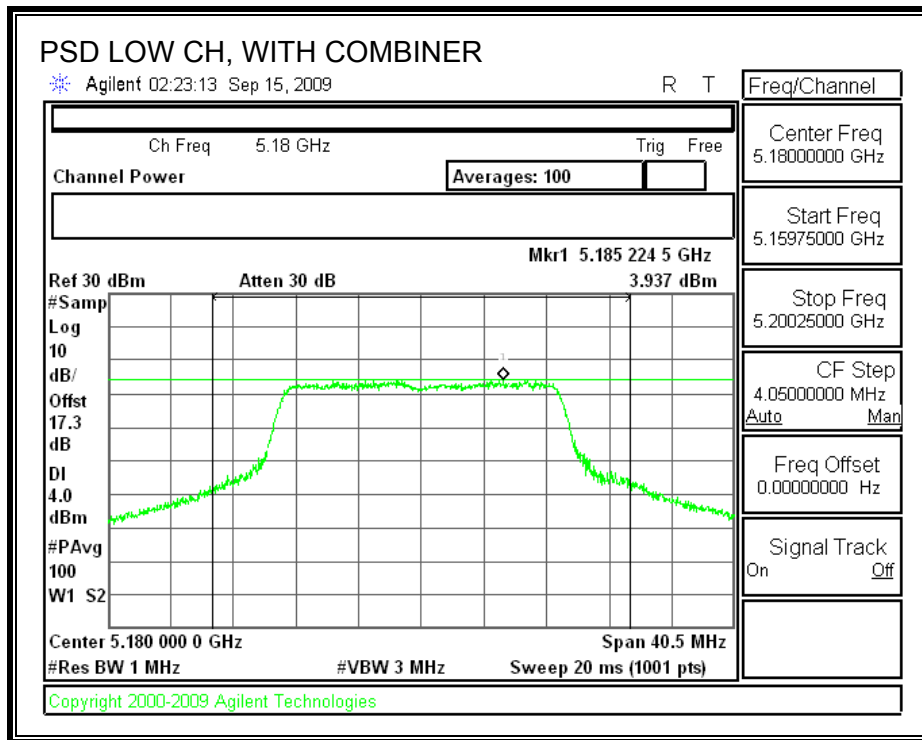
TEST PROCEDURE

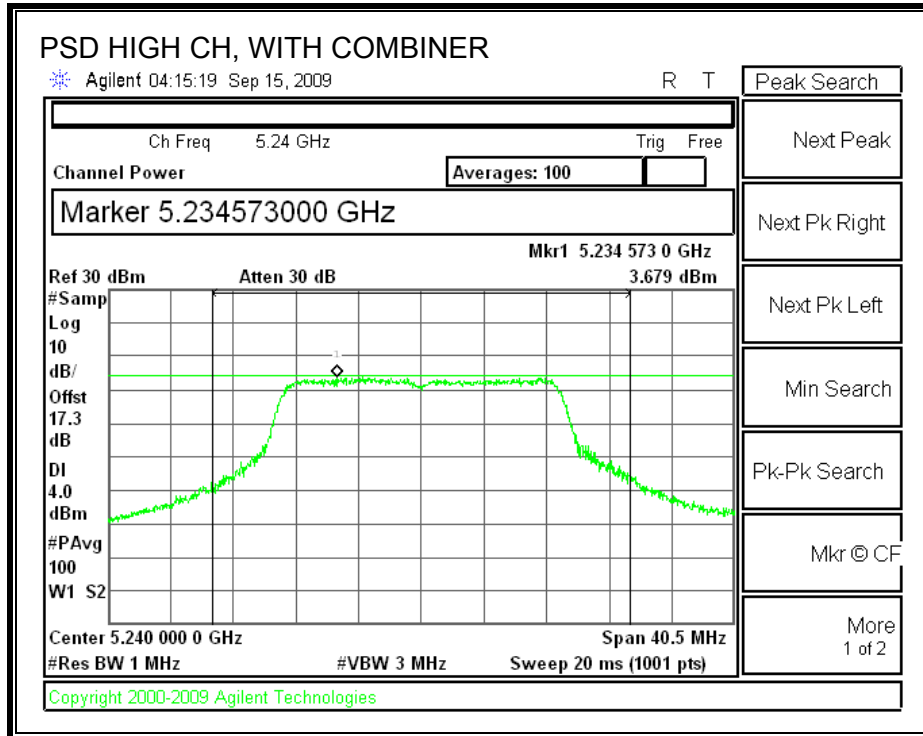
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.94	4	-0.06
Middle	5200	3.78	4	-0.22
High	5240	3.68	4	-0.32

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

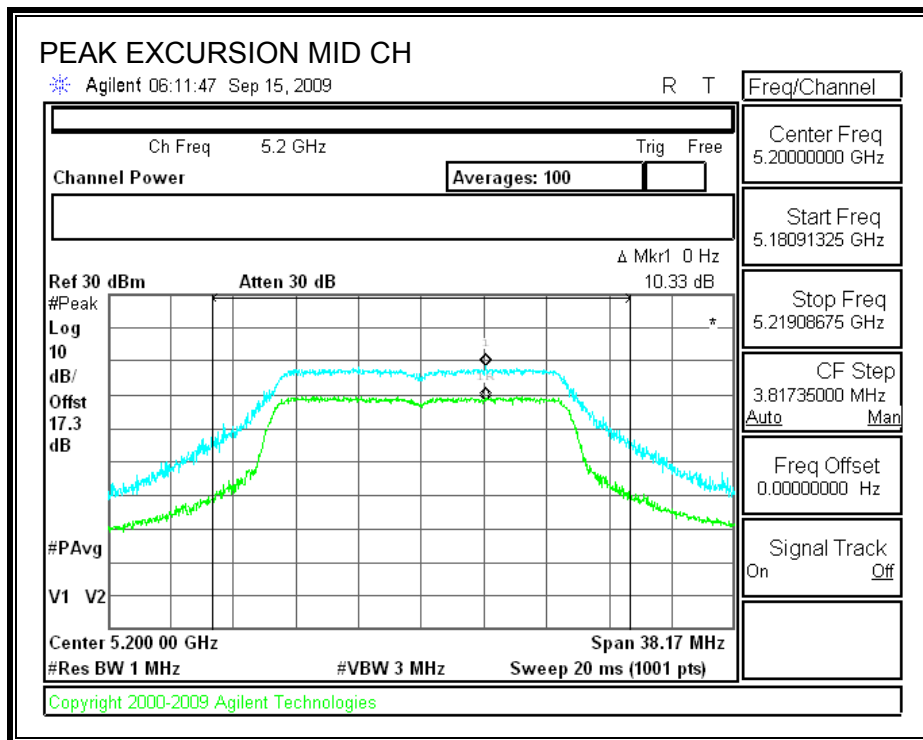
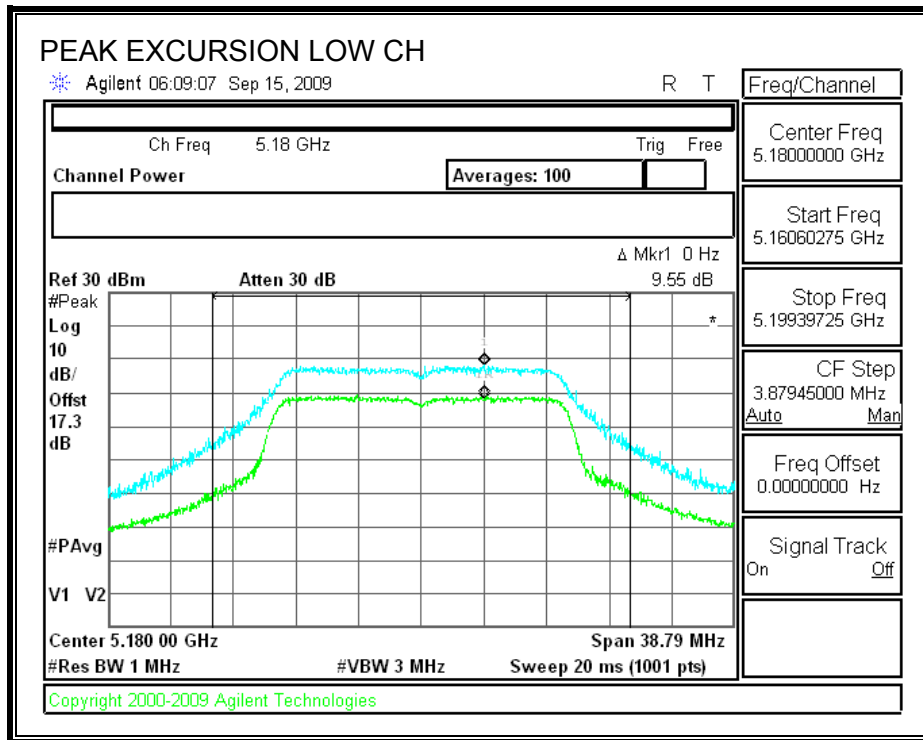
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.55	13	-3.45
Middle	5200	10.33	13	-2.67
High	5240	9.44	13	-3.56

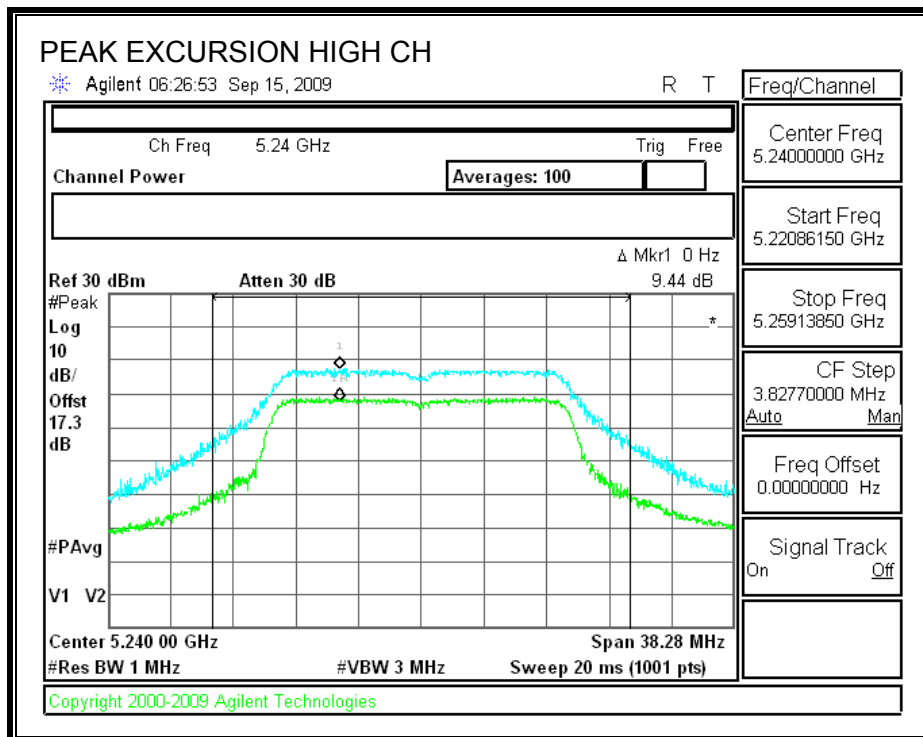
CHAIN 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	8.36	13	-4.64
Middle	5200	10.49	13	-2.51
High	5240	9.24	13	-3.76

CHAIN 1

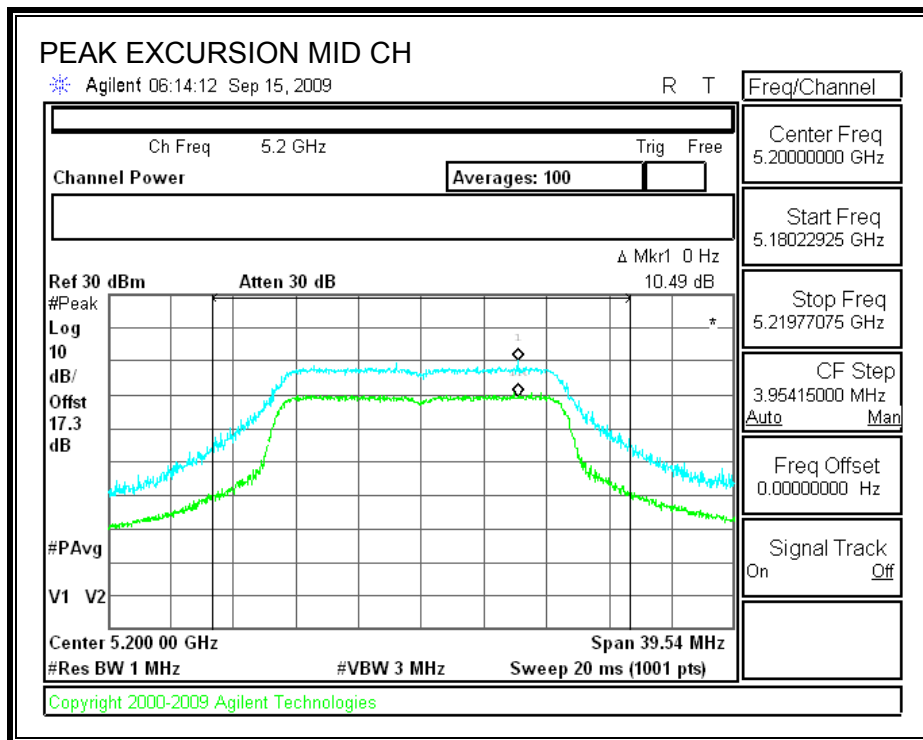
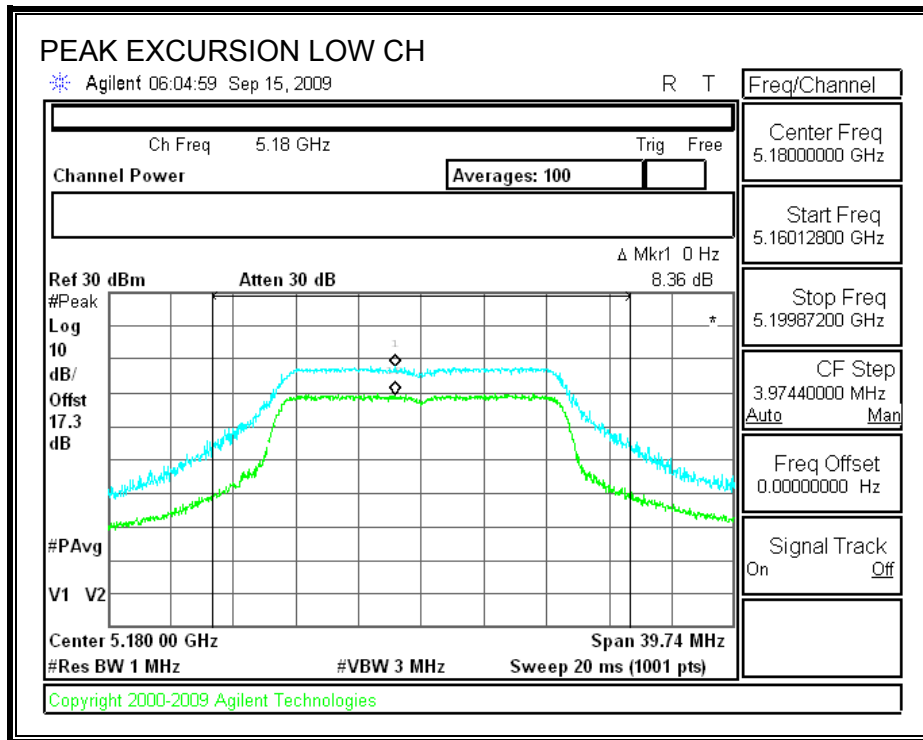
PEAK EXCURSION

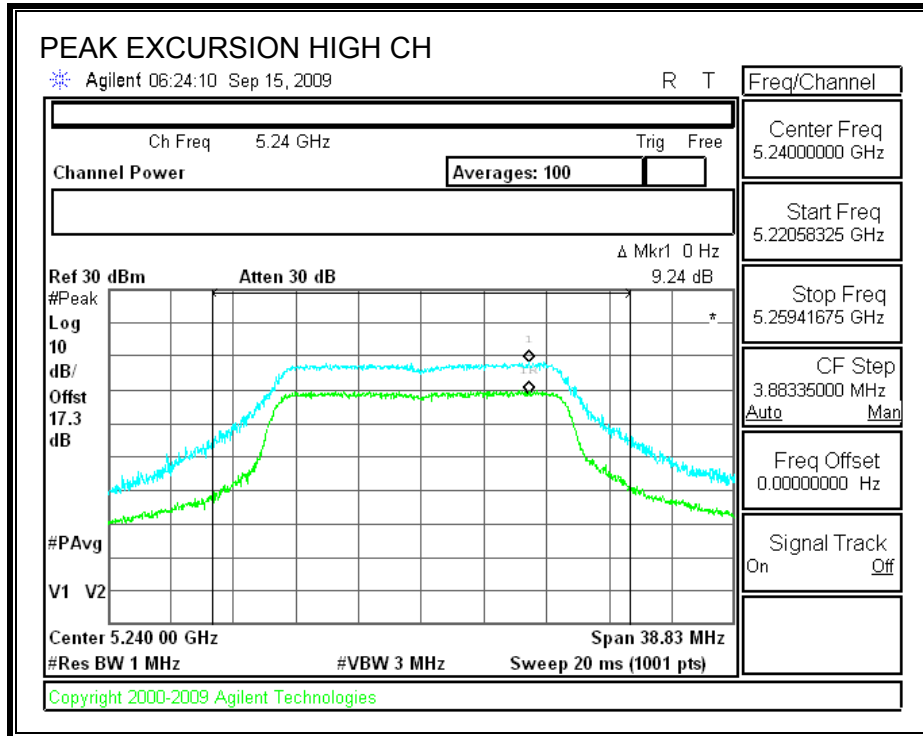




CHAIN 2

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

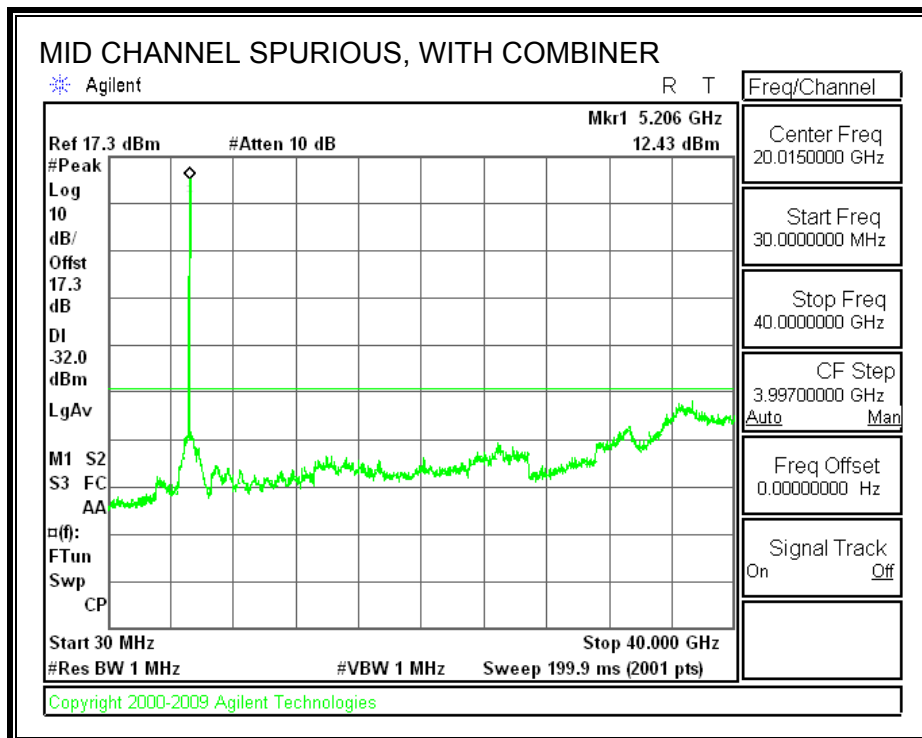
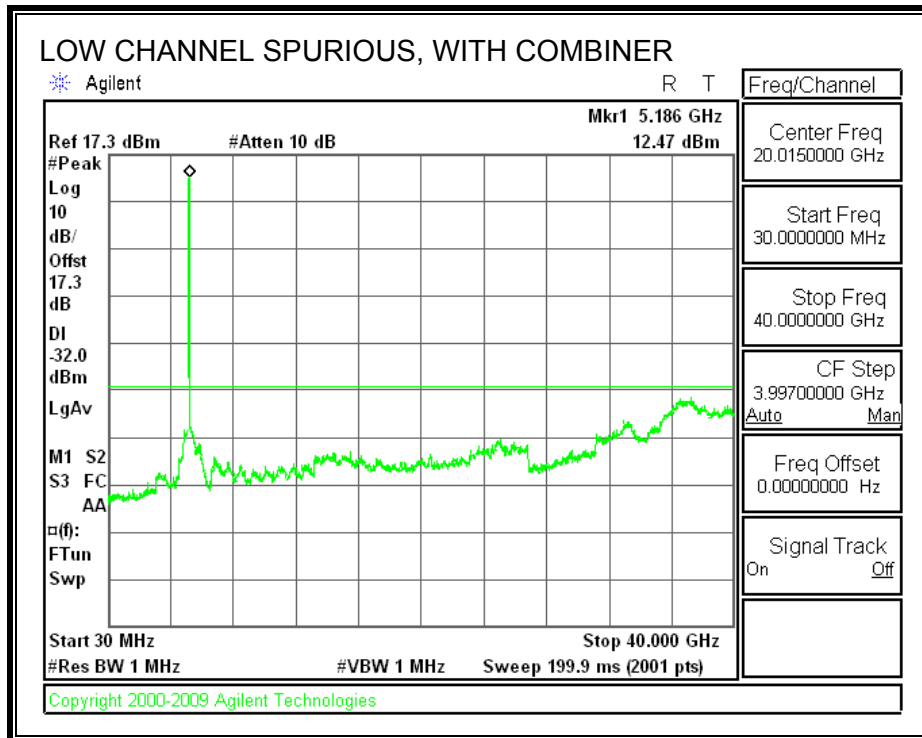
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

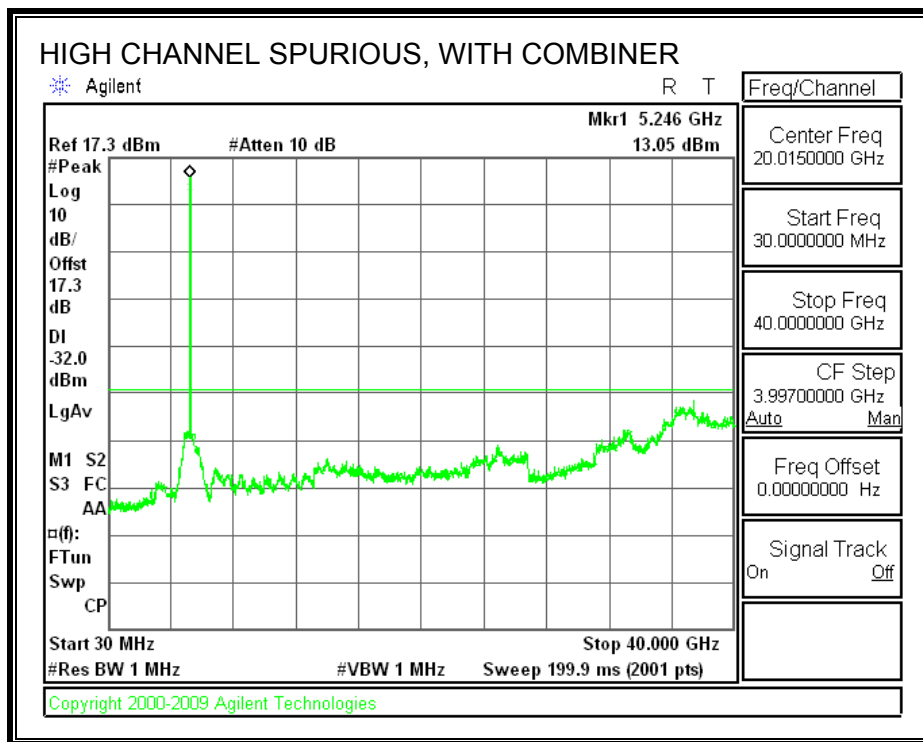
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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





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

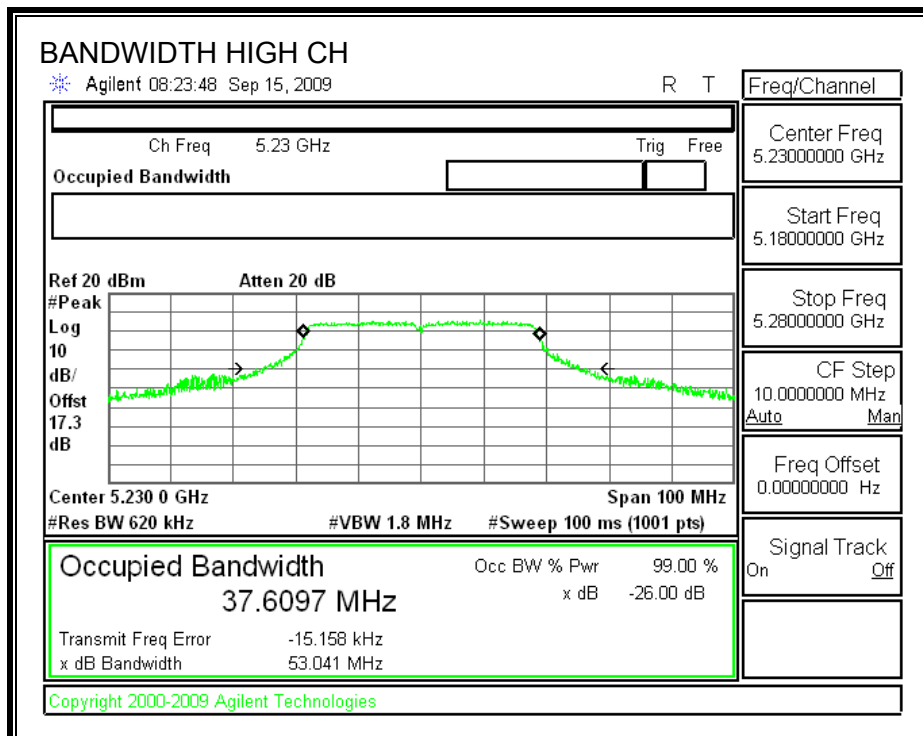
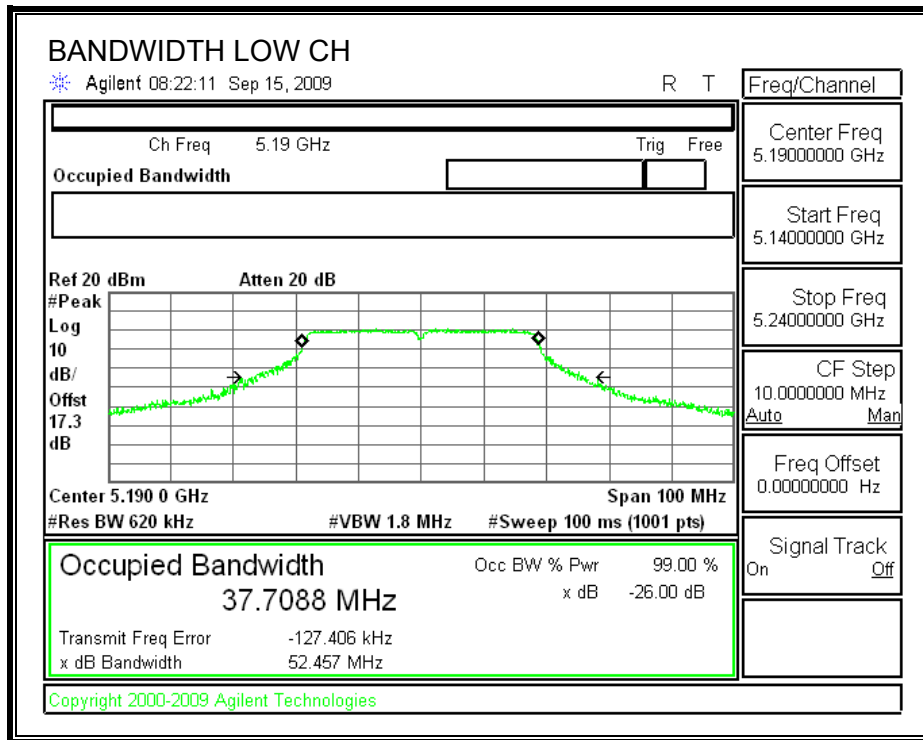
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	52.457	36.2391
High	5230	53.041	36.4096

CHAIN 2

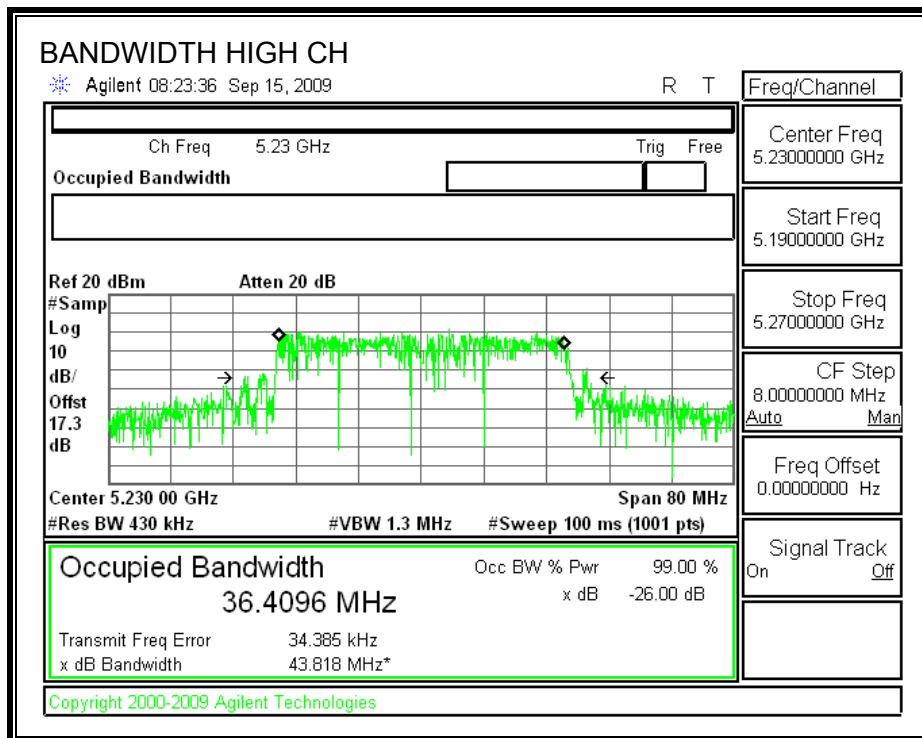
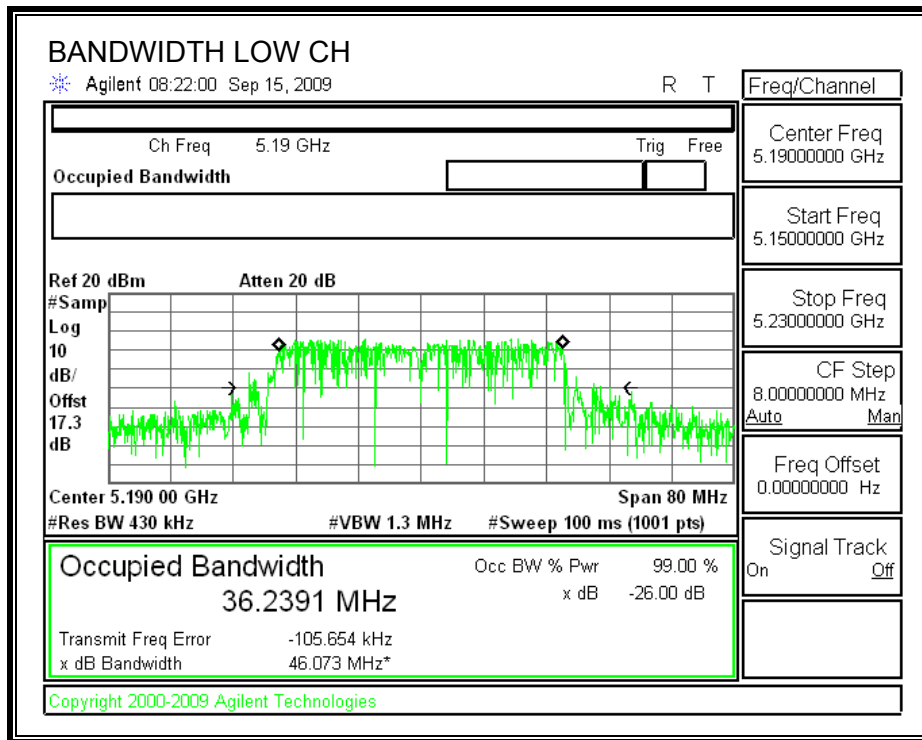
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	52.225	36.3033
High	5230	63.465	36.4264

CHAIN 1

26 dB BANDWIDTH

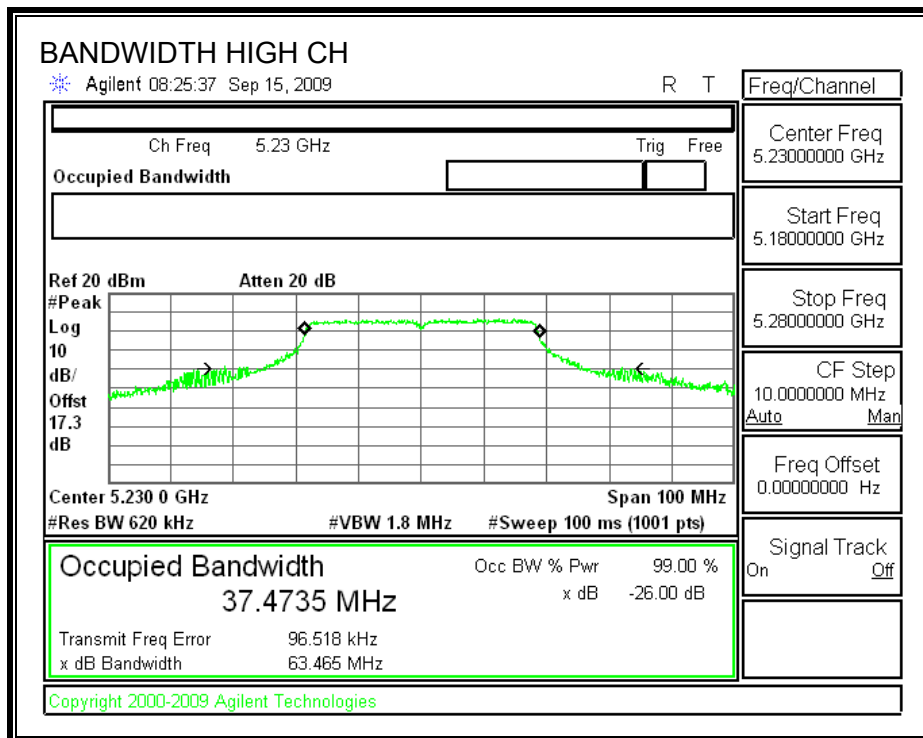
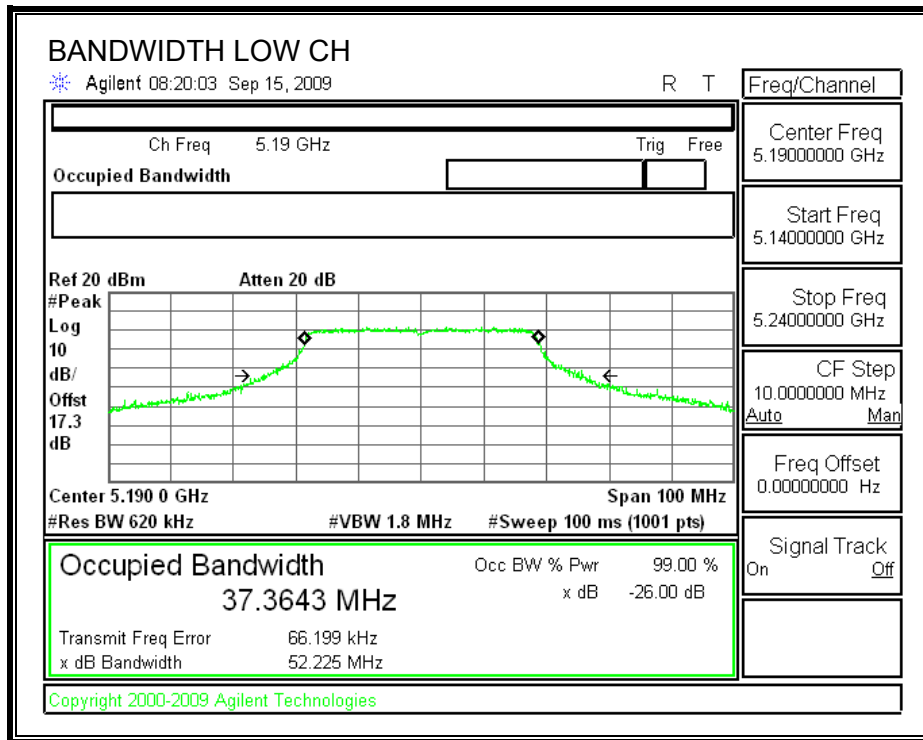


99% BANDWIDTH

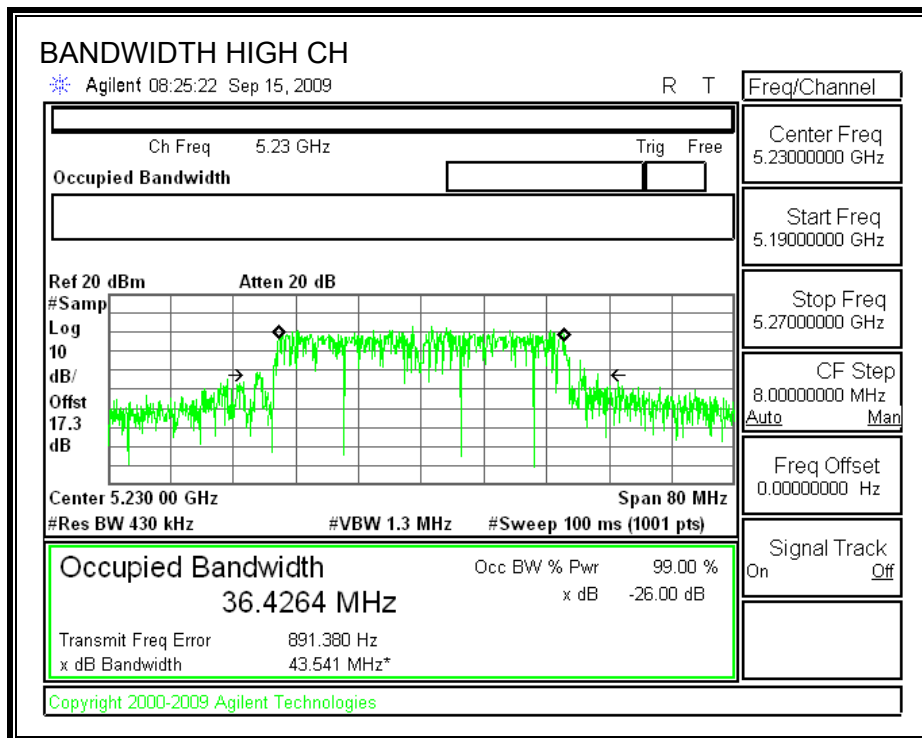
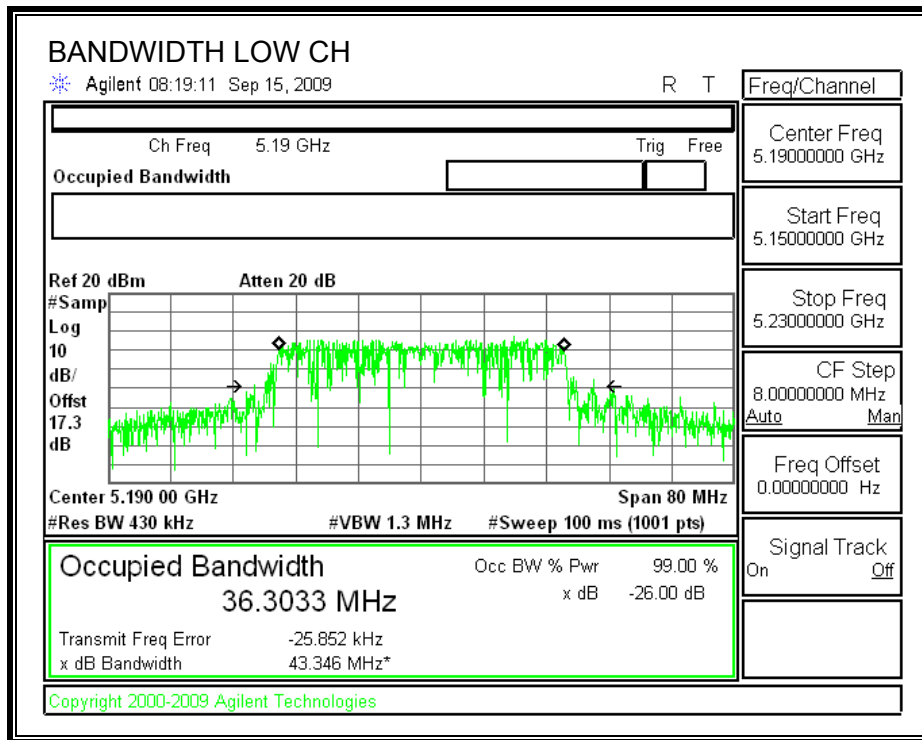


CHAIN 2

26 dB BANDWIDTH



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

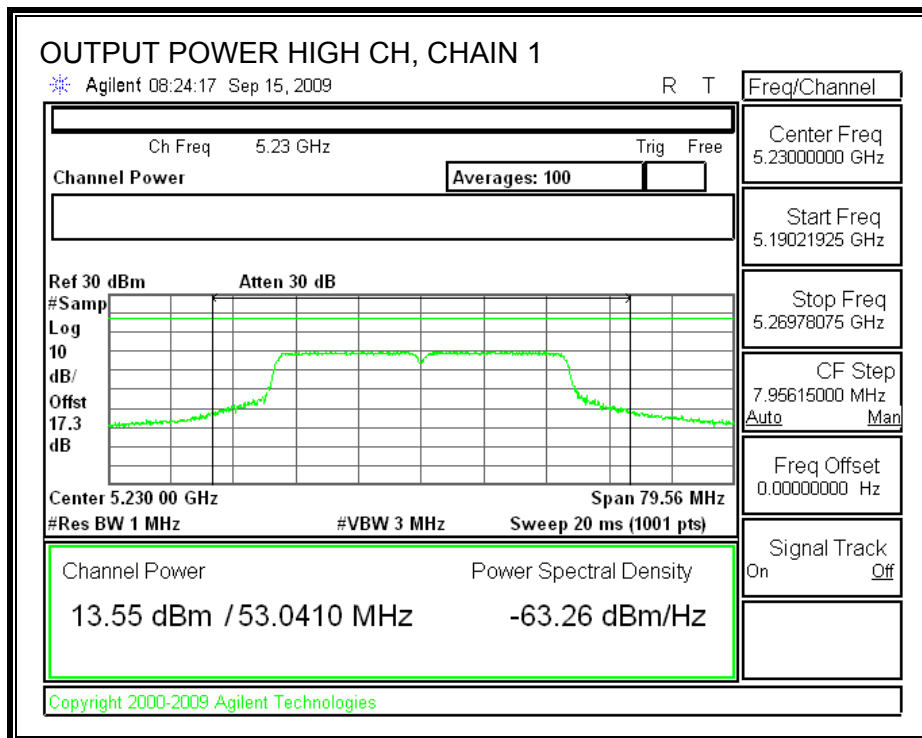
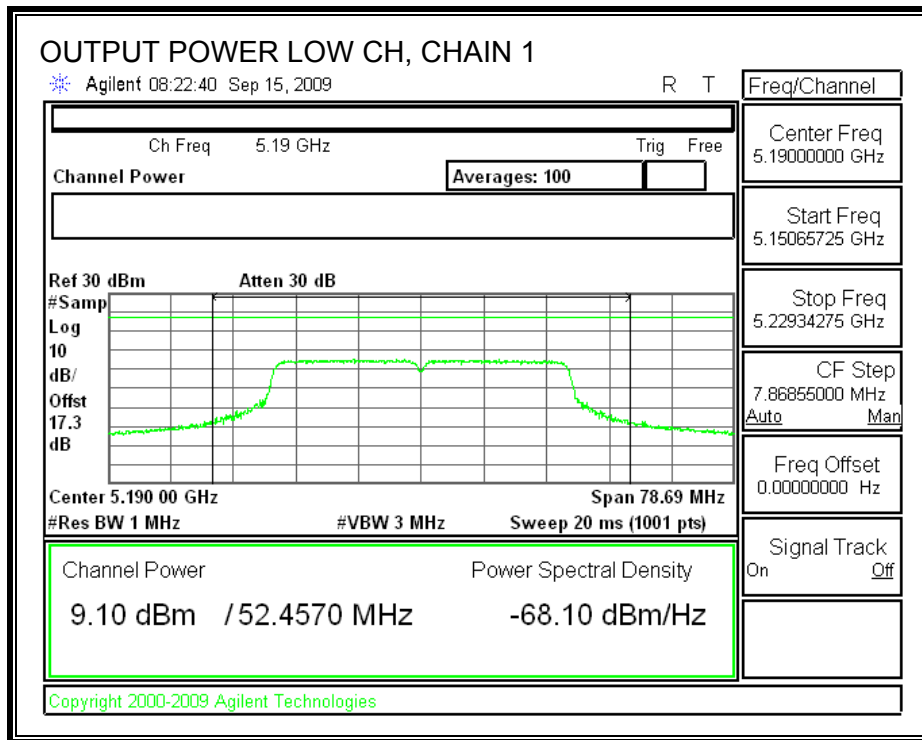
Limit

Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5190	17	52.457	21.20	2.05	17.00
High	5230	17	53.041	21.25	2.05	17.00

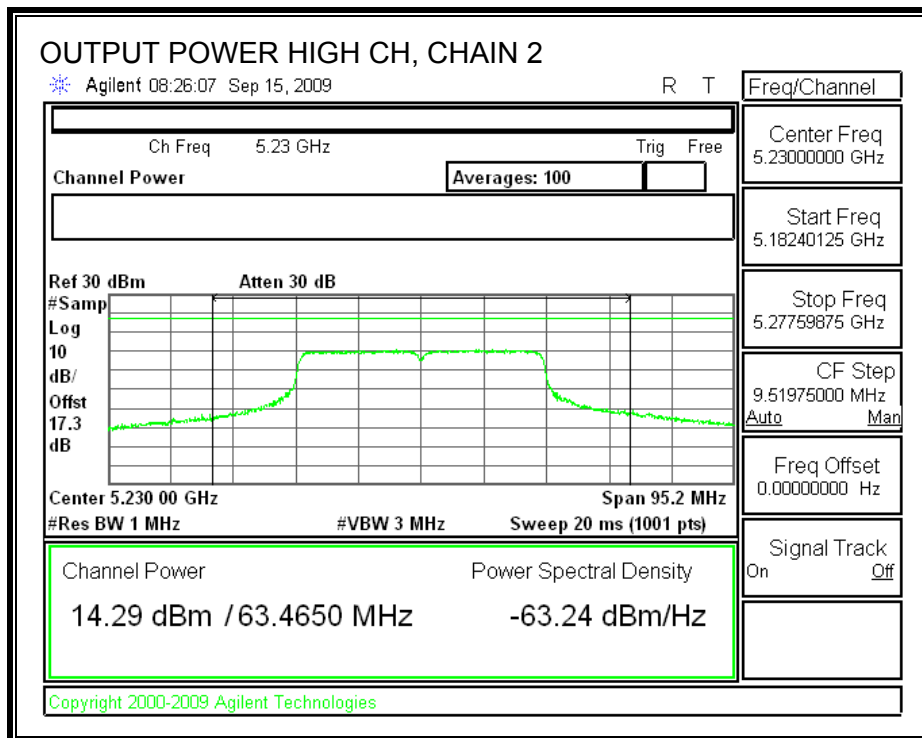
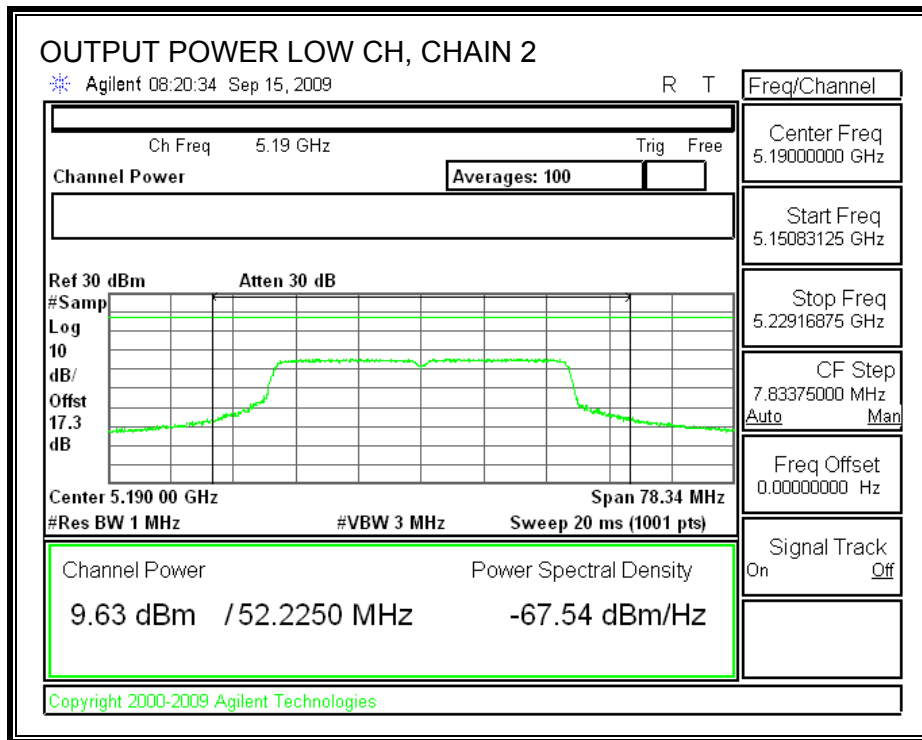
Individual Chain Results

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5190	9.10	9.63	12.38	17.00	-4.62
High	5230	13.55	14.29	16.95	17.00	-0.05

CHAIN 1 OUTPUT POWER



CHAIN 2 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 17.3 dB (including 10 dB pad and 7.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5190	9.44	9.92	12.70
High	5230	14.19	15.04	17.65

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.

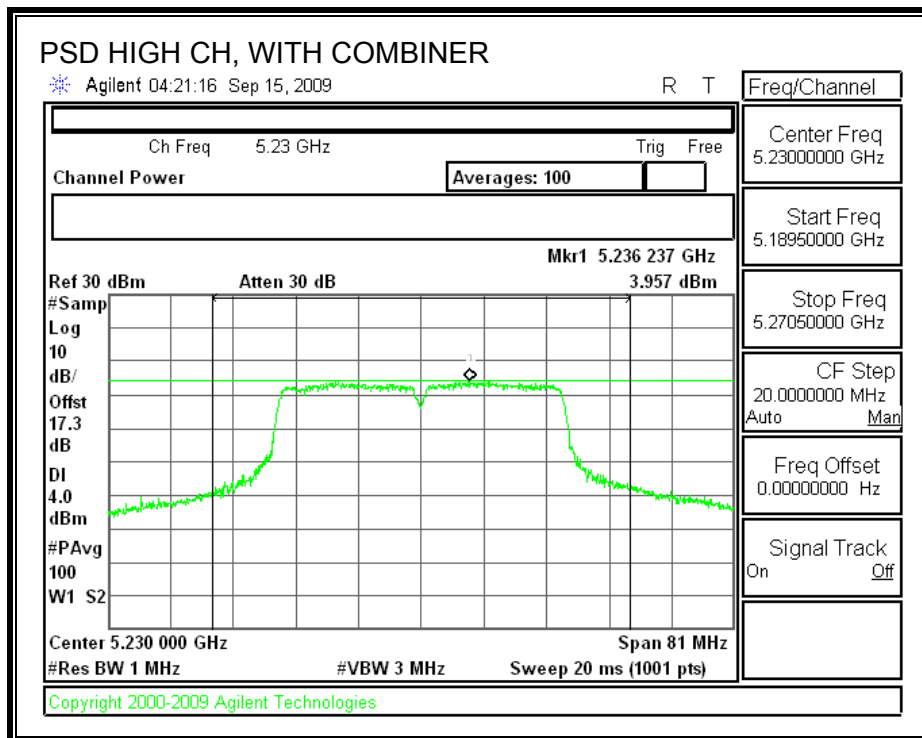
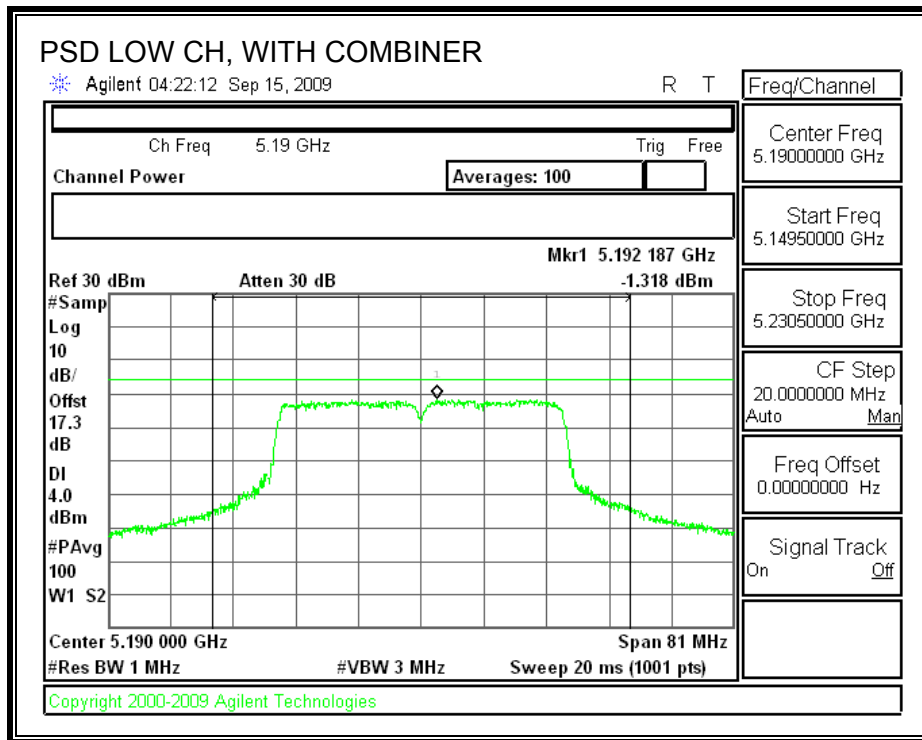
TEST PROCEDURE

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	-1.32	4	-5.32
High	5230	3.96	4	-0.04

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

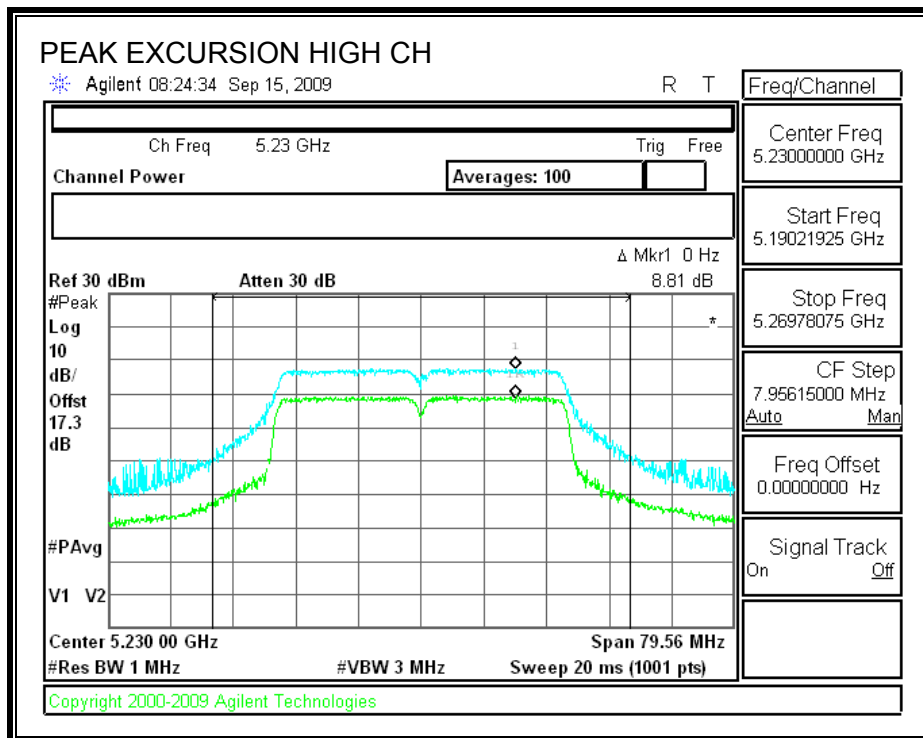
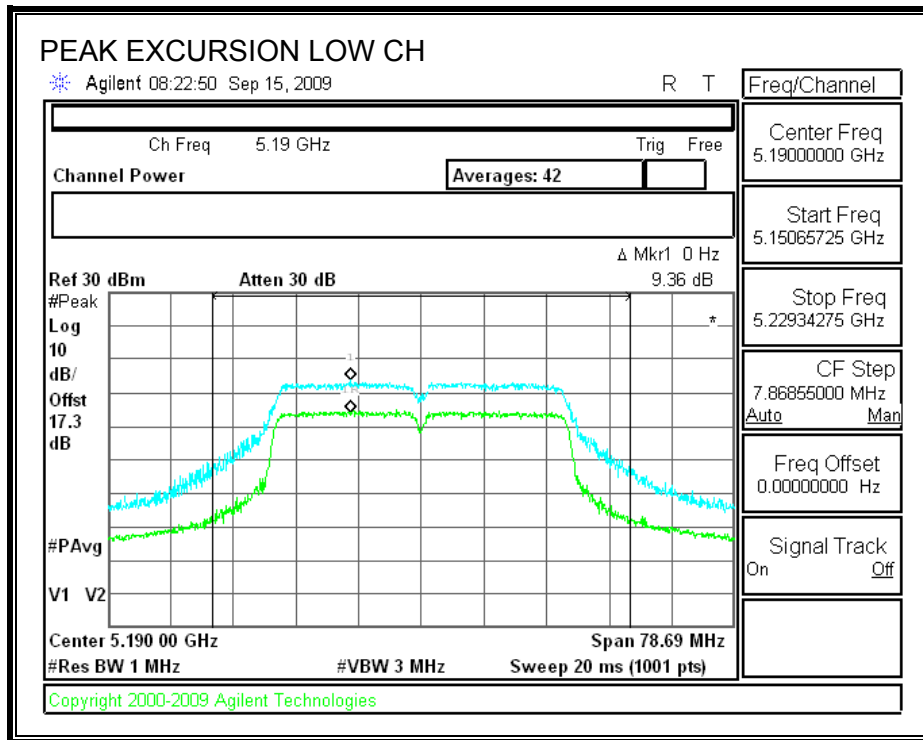
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	9.36	13	-3.64
High	5230	8.81	13	-4.19

CHAIN 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	10.19	13	-2.81
High	5230	9.55	13	-3.45

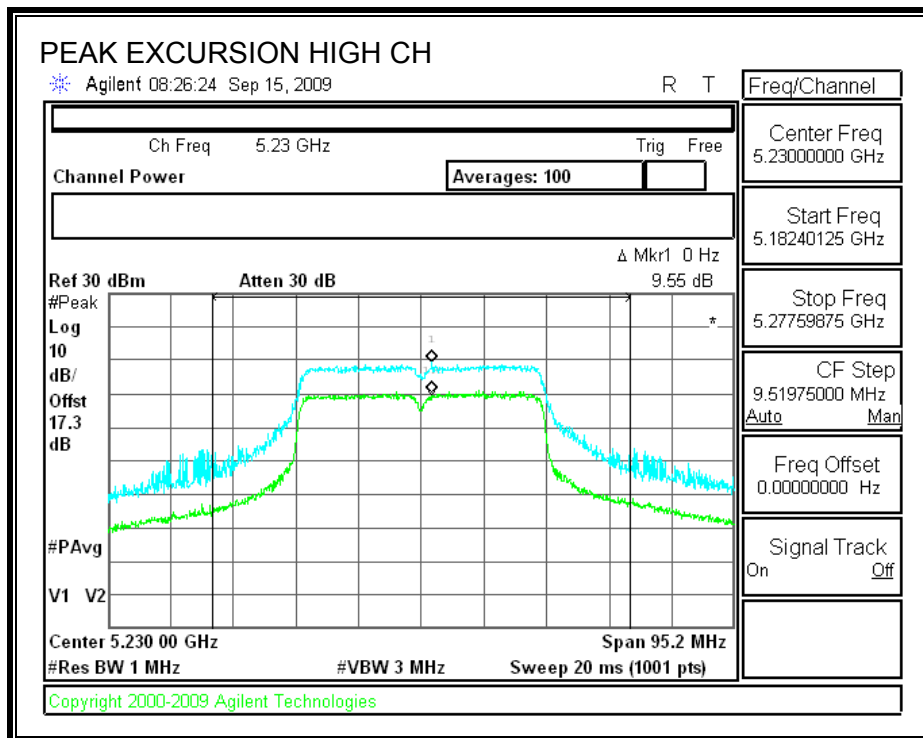
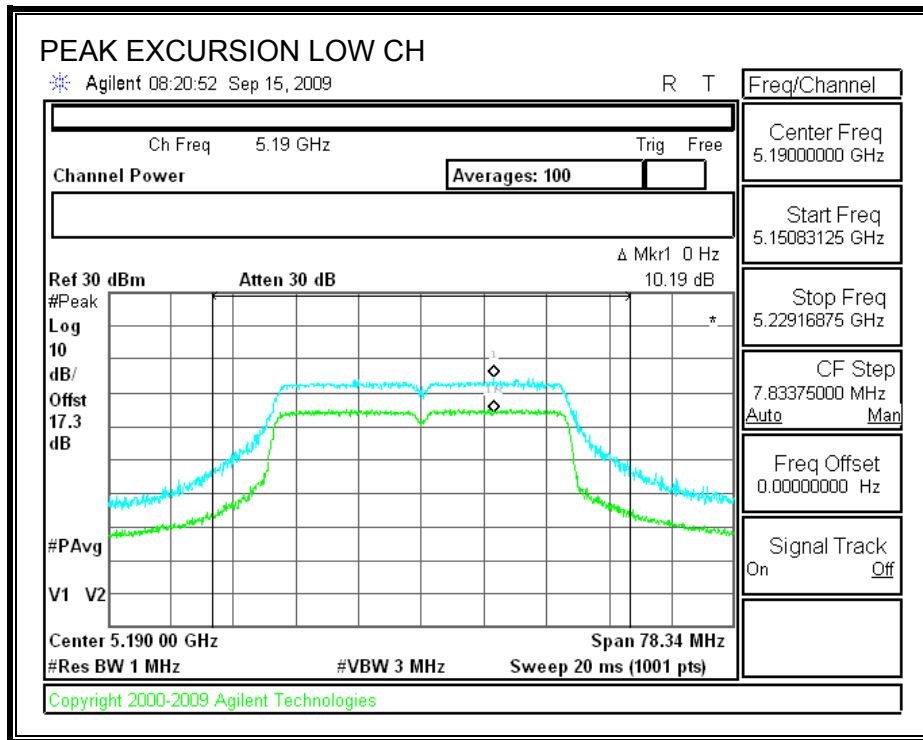
CHAIN 1

PEAK EXCURSION



CHAIN 2

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

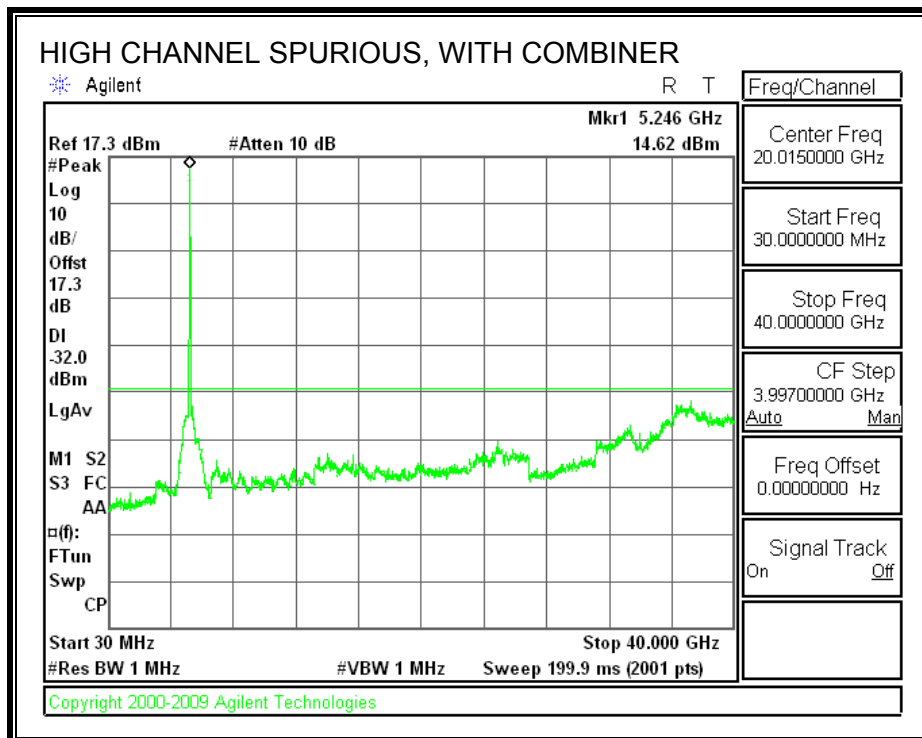
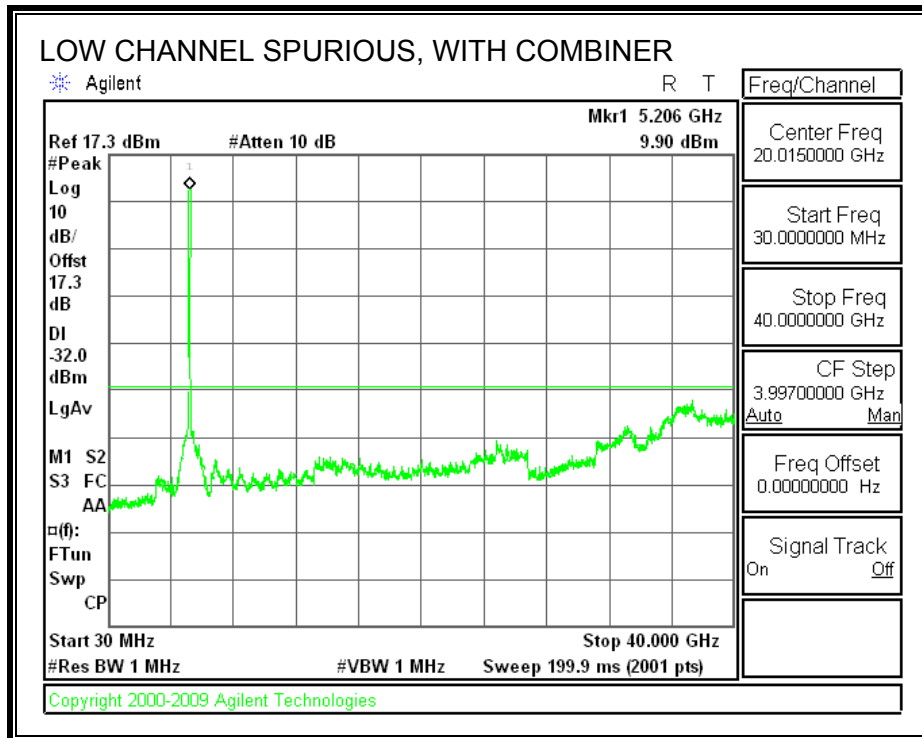
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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



7.4.802.11a DUAL CHAIN LEGACY 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 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

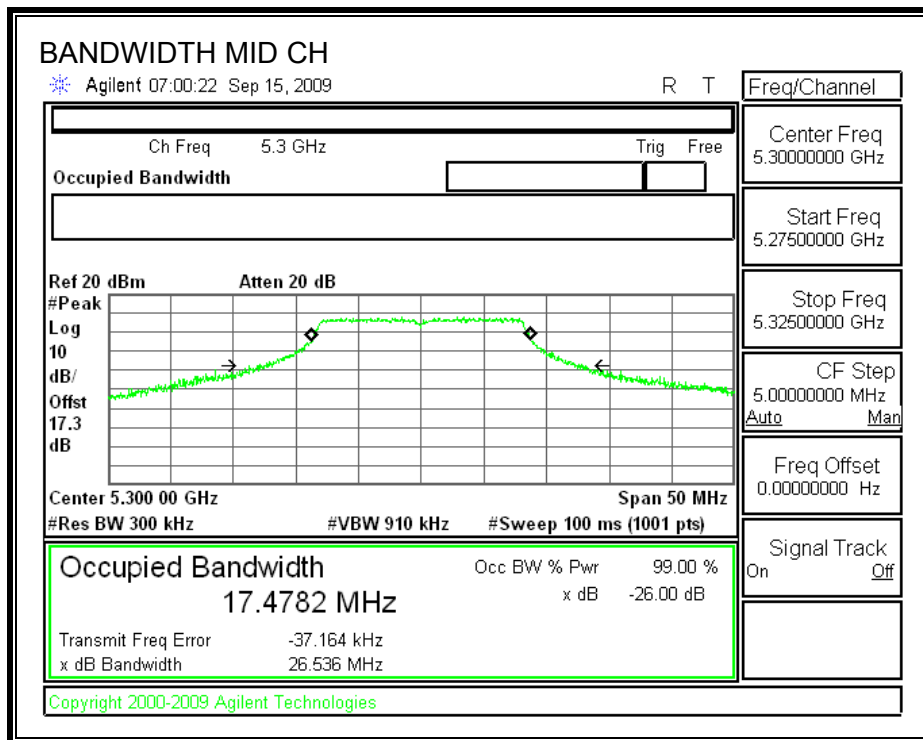
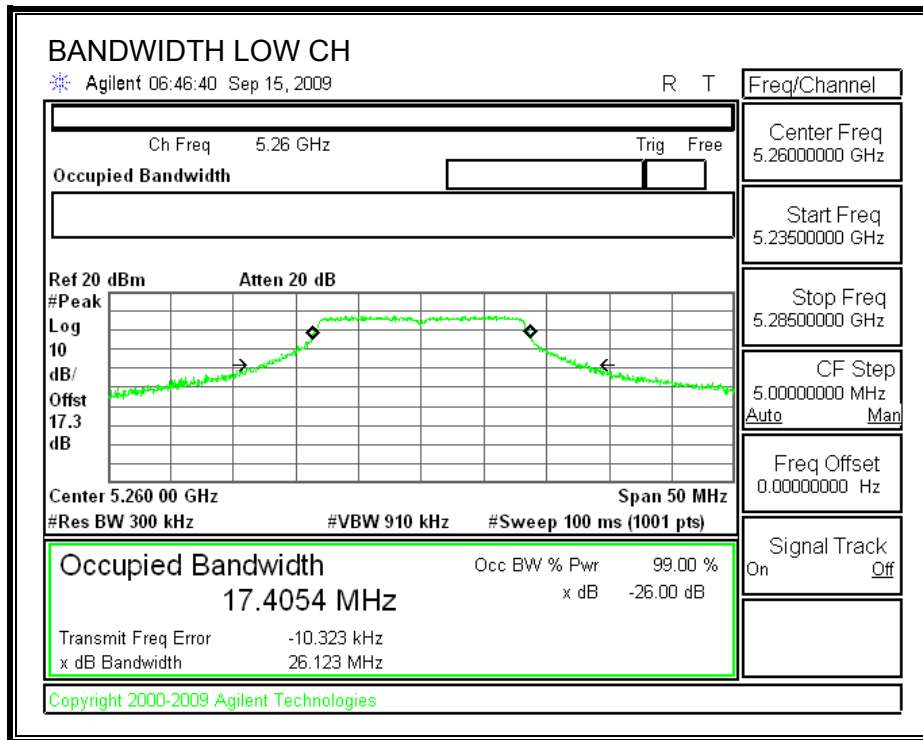
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5260	26.123	16.4685
Middle	5300	26.536	16.4998
High	5320	25.472	16.4769

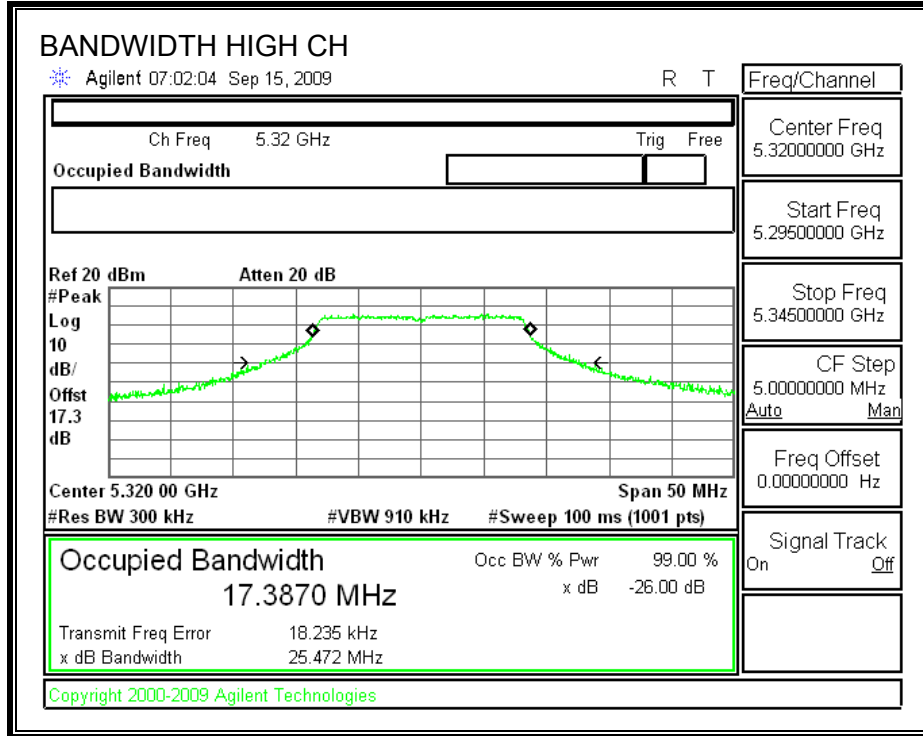
CHAIN 2

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5260	26.841	16.5447
Middle	5300	26.213	16.5435
High	5320	25.433	16.4485

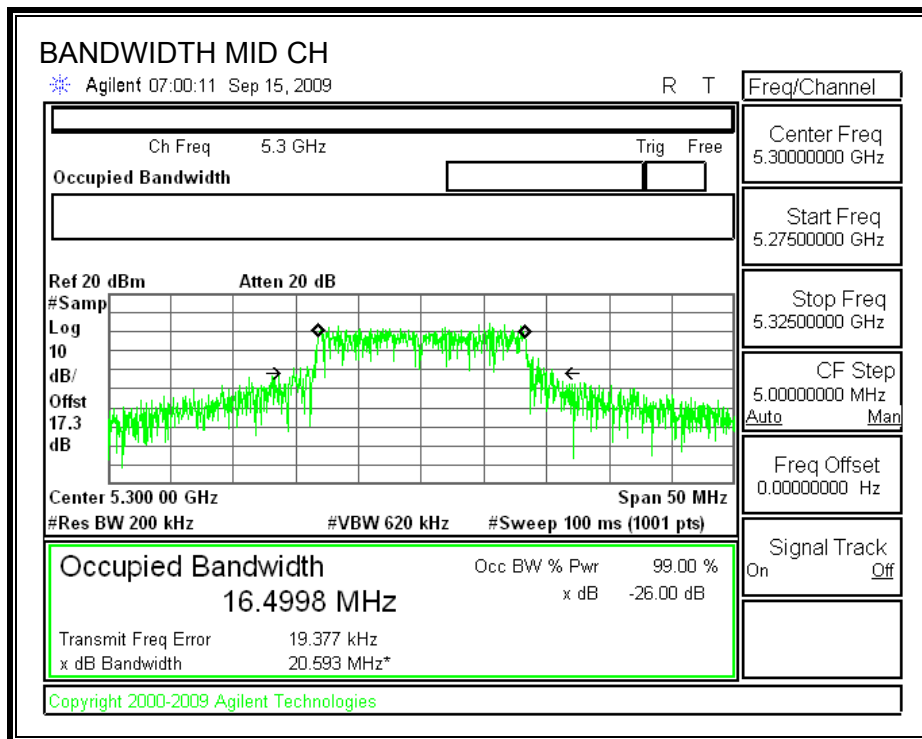
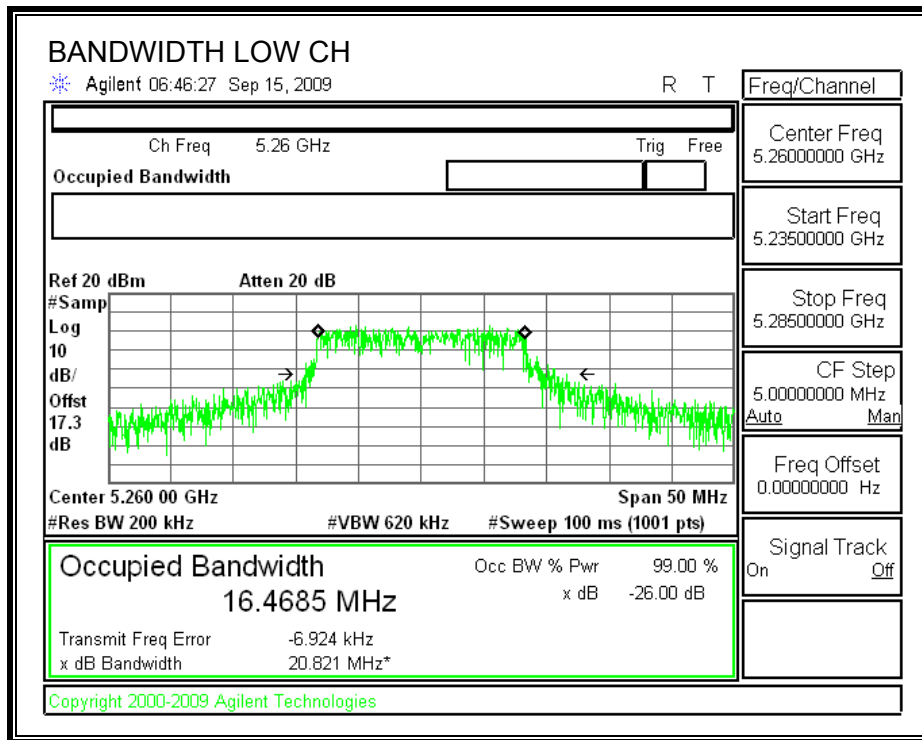
CHAIN 1

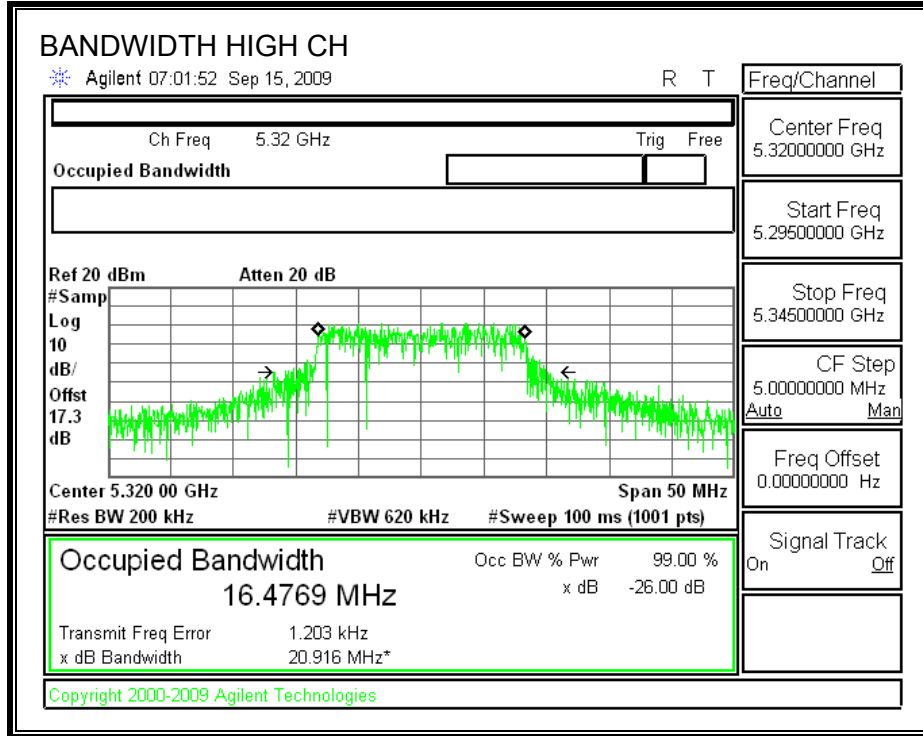
26 dB BANDWIDTH





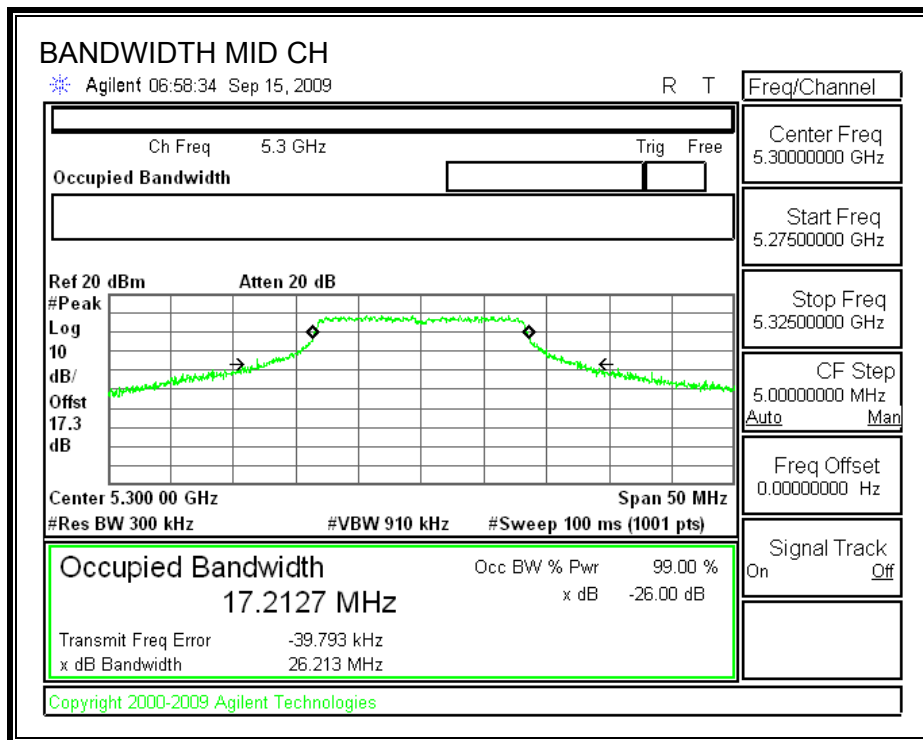
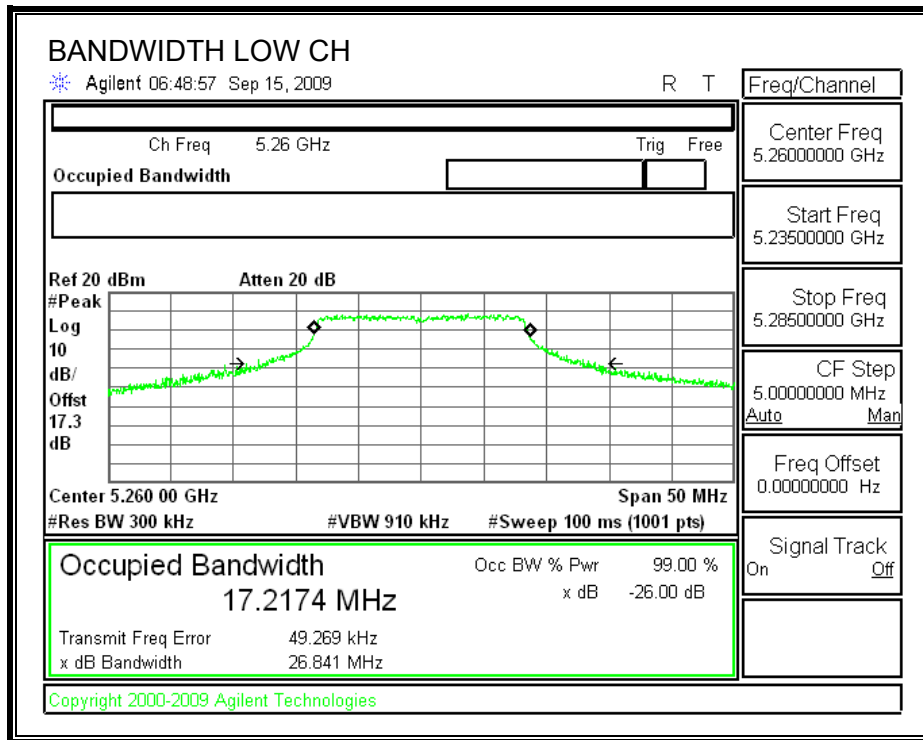
99% BANDWIDTH

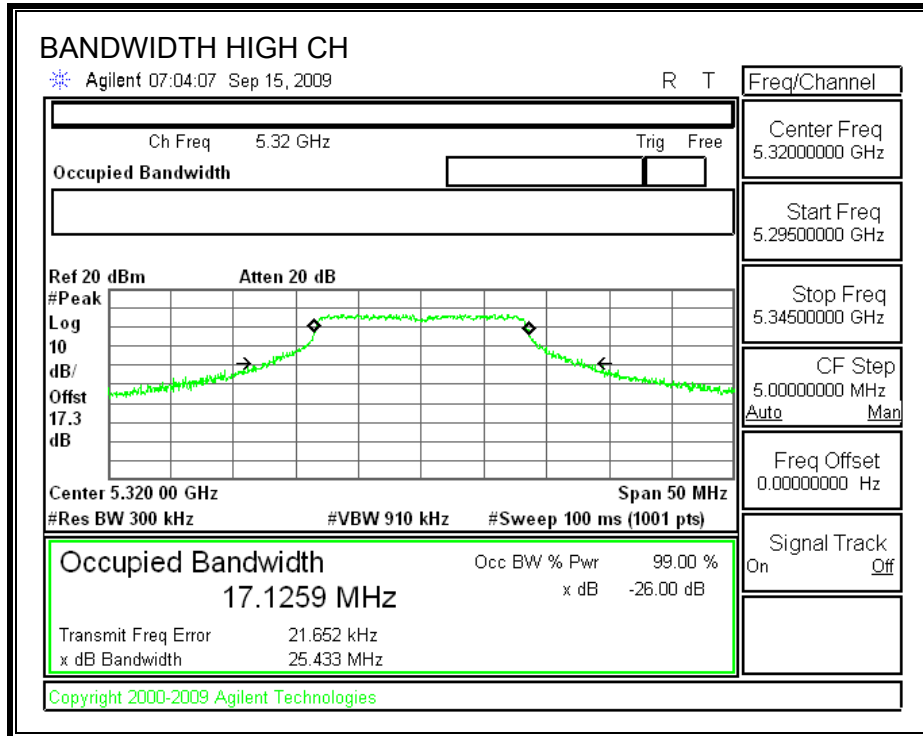




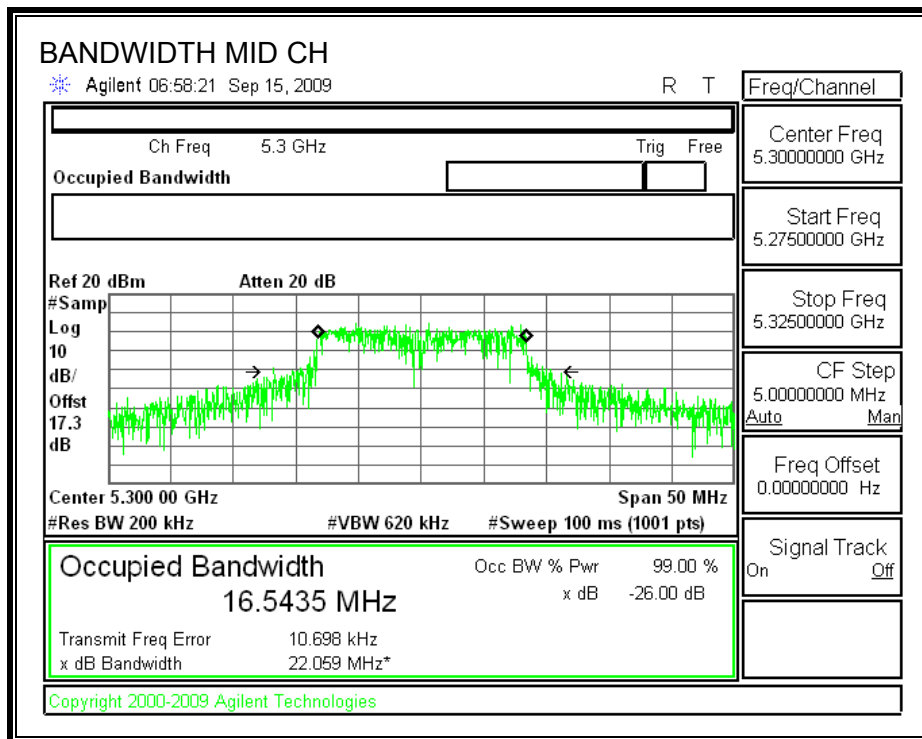
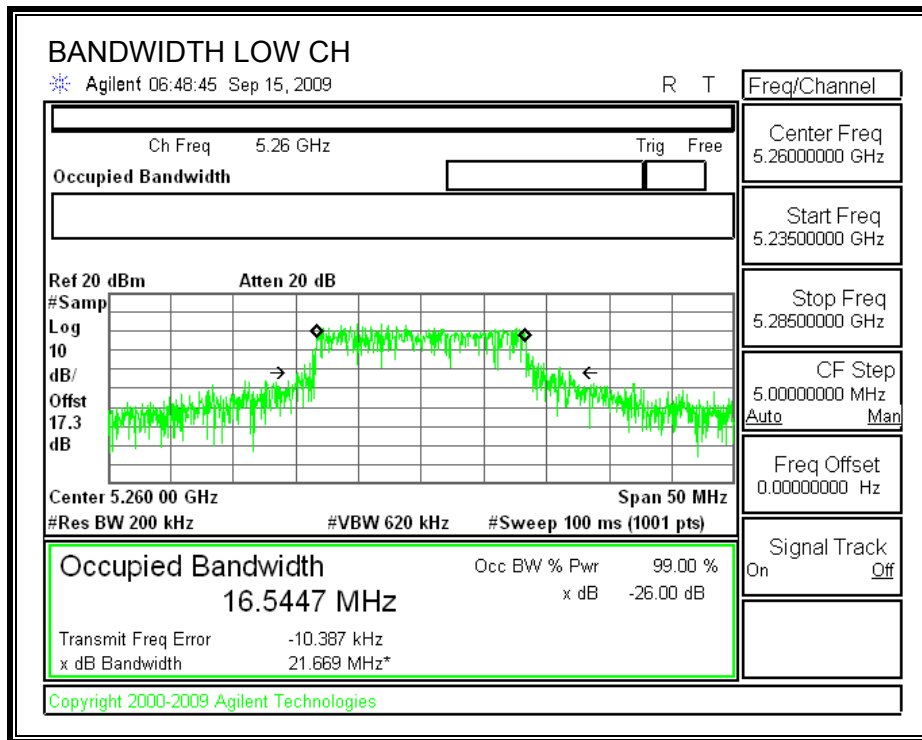
CHAIN 2

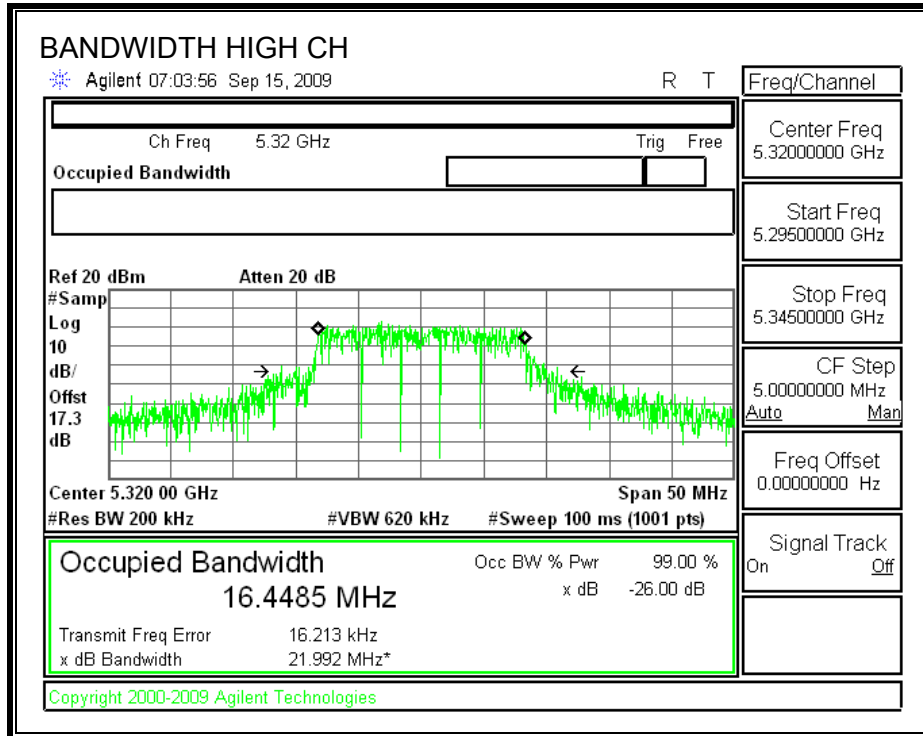
26 dB BANDWIDTH





99% BANDWIDTH





7.4.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

Antenna Gain (Chain 1) (dBi)	Antenna Gain (Chain 2) (dBi)	Effective Legacy Gain (dBi)
1.91	1.98	4.96

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

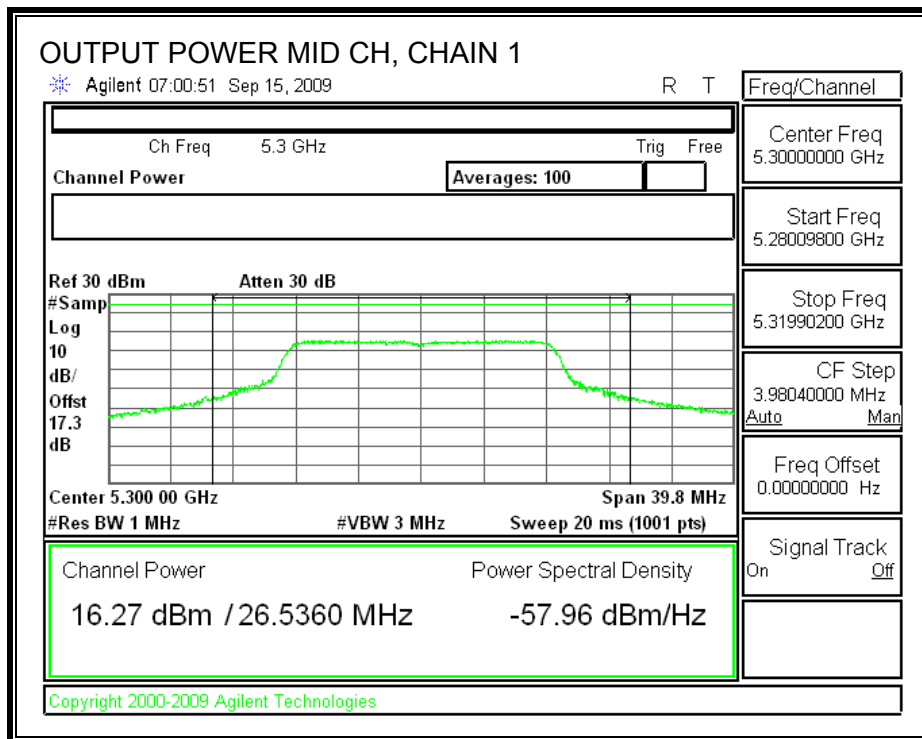
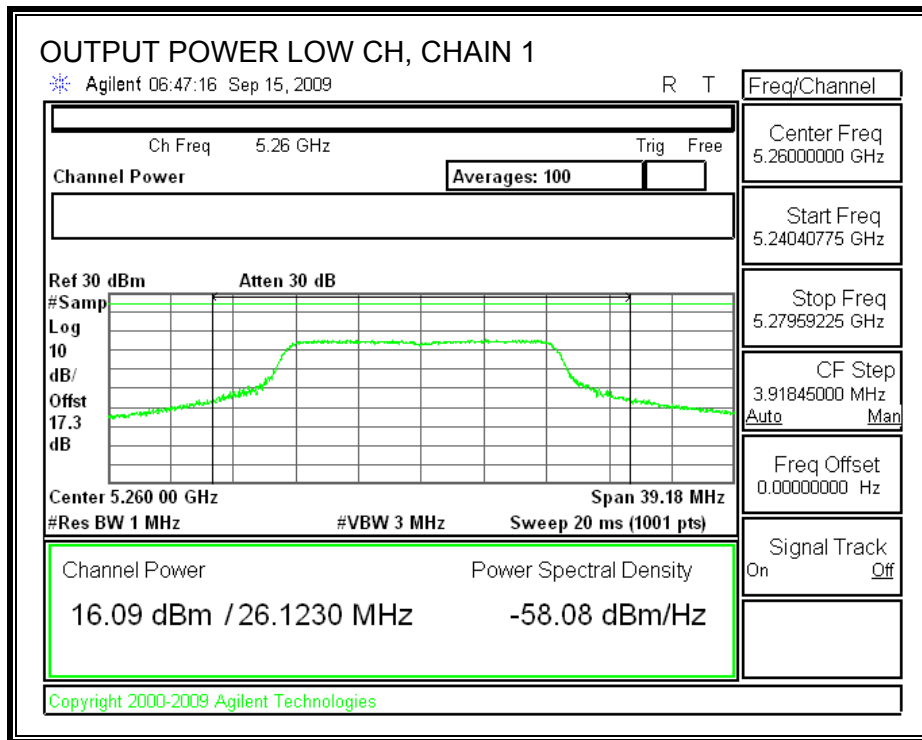
Limit

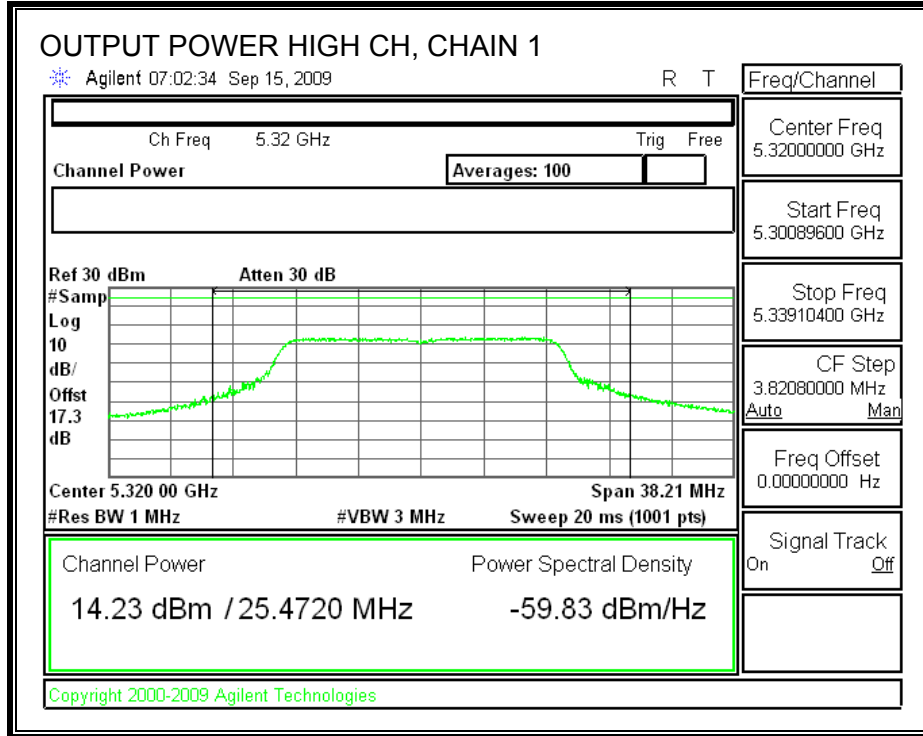
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Effective Ant Gain (dBi)	Limit (dBm)
Low	5260	24	26.123	25.17	4.96	24.00
Mid	5300	24	26.536	25.24	4.96	24.00
High	5320	24	25.472	25.06	4.96	24.00

Individual Chain Results

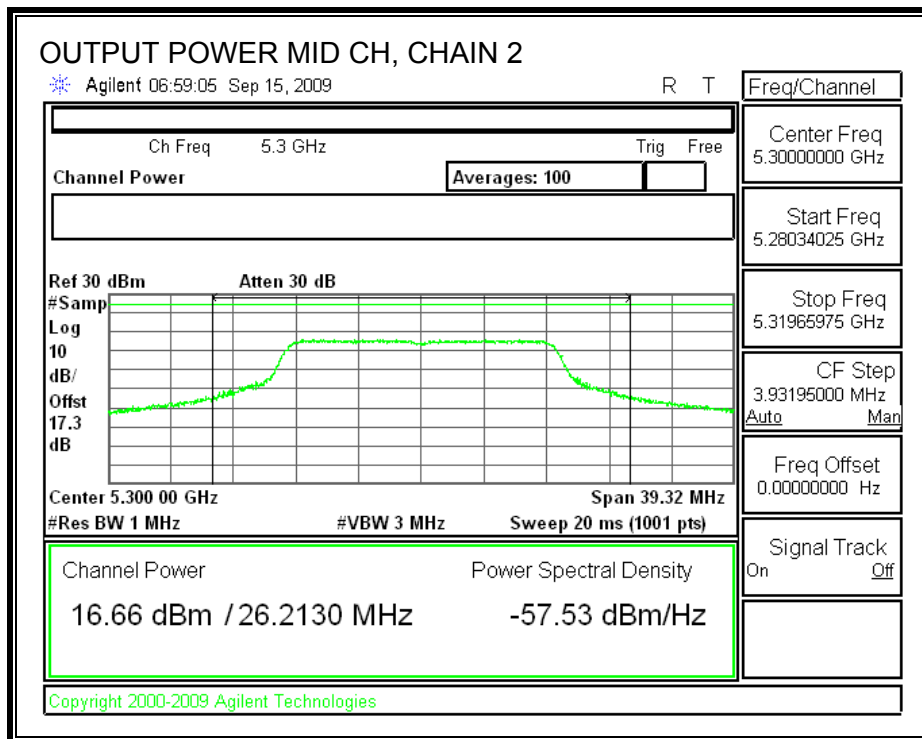
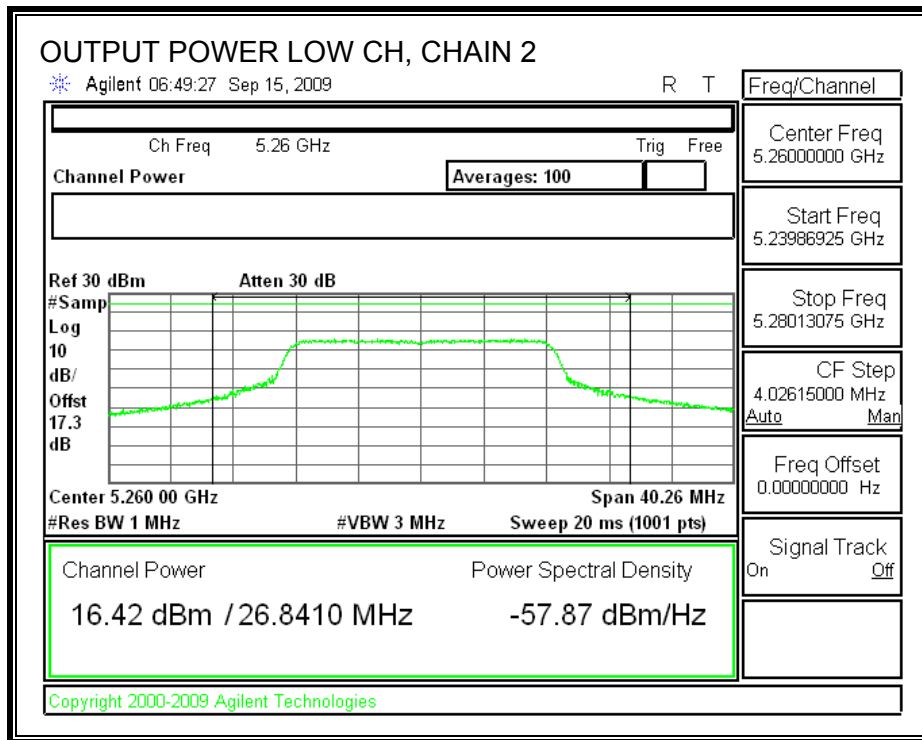
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5260	16.09	16.42	19.27	24.00	-4.73
Mid	5300	16.27	16.66	19.48	24.00	-4.52
High	5320	14.23	15.13	17.71	24.00	-6.29

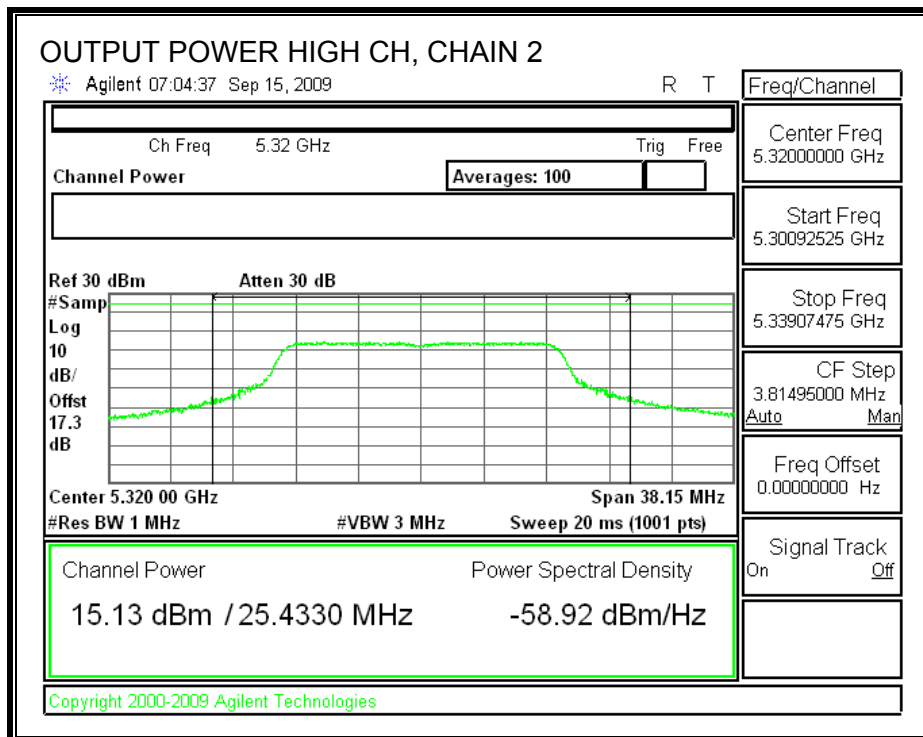
CHAIN 1 OUTPUT POWER





CHAIN 2 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 17.3 dB (including 10 dB pad and 7.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5260	16.45	16.64	19.56
Middle	5300	16.78	16.96	19.88
High	5320	14.56	15.56	18.10

7.4.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

Antenna Gain (Chain 1) (dBi)	Antenna Gain (Chain 2) (dBi)	Effective Legacy Gain (dBi)
1.91	1.98	4.96

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 effective antenna gain is less than or equal to 6 dBi, therefore the limit is 11 dBm.

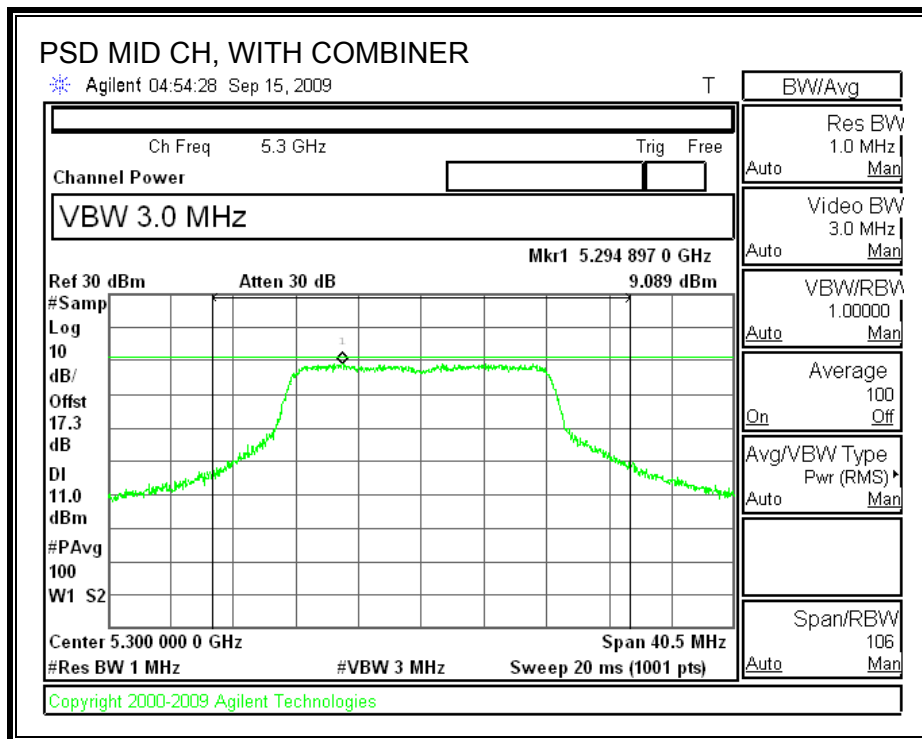
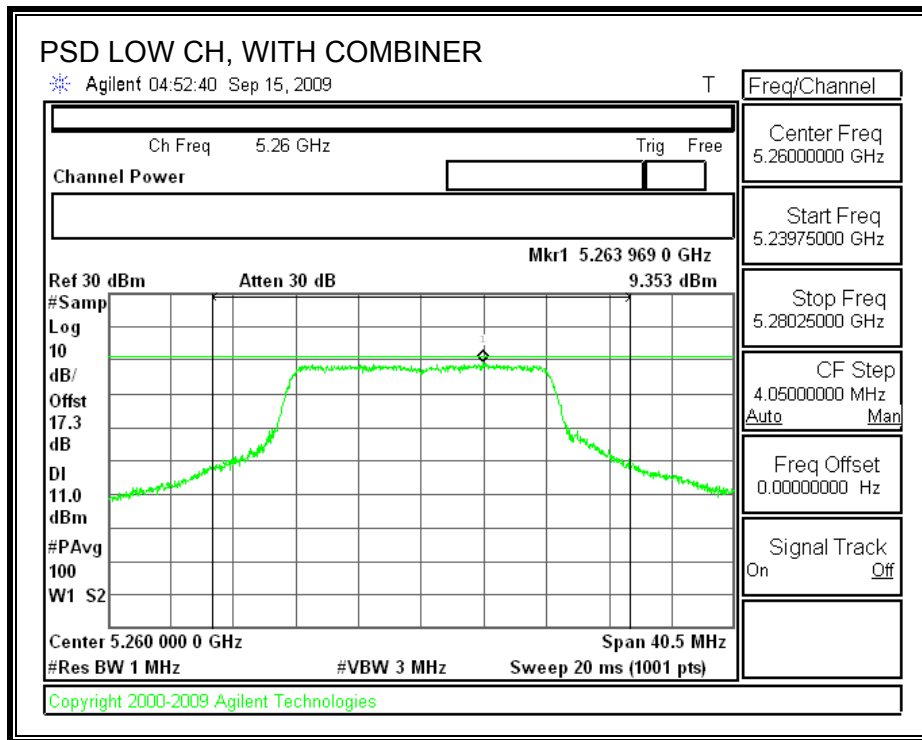
TEST PROCEDURE

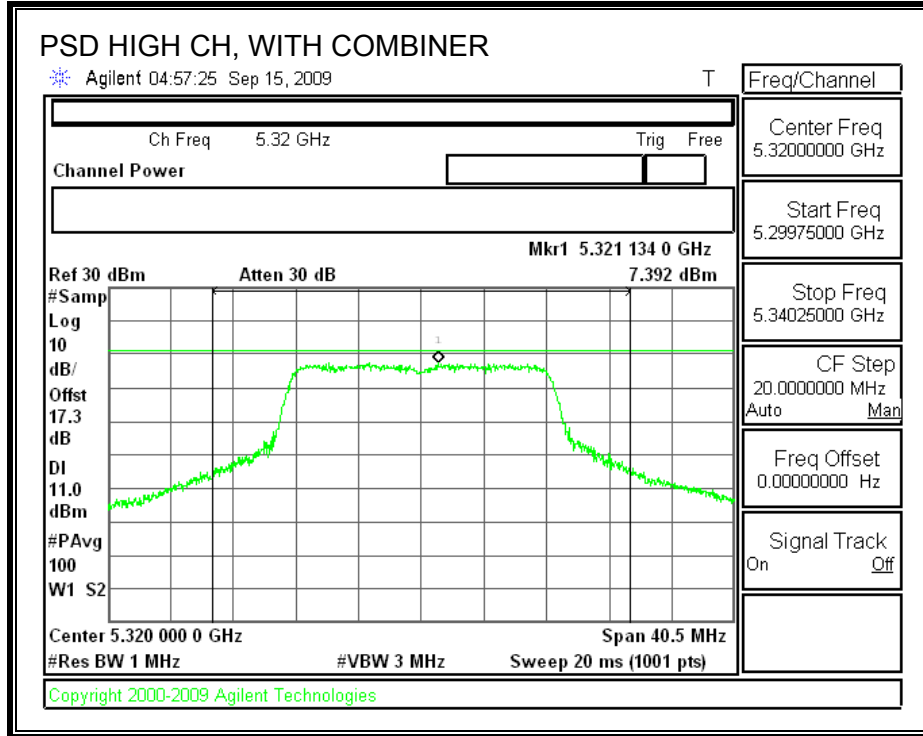
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5260	9.35	11	-1.65
Middle	5300	9.09	11	-1.91
High	5320	7.39	11	-3.61

POWER SPECTRAL DENSITY WITH COMBINER





7.4.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

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

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

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

RESULTS

CHAIN 1

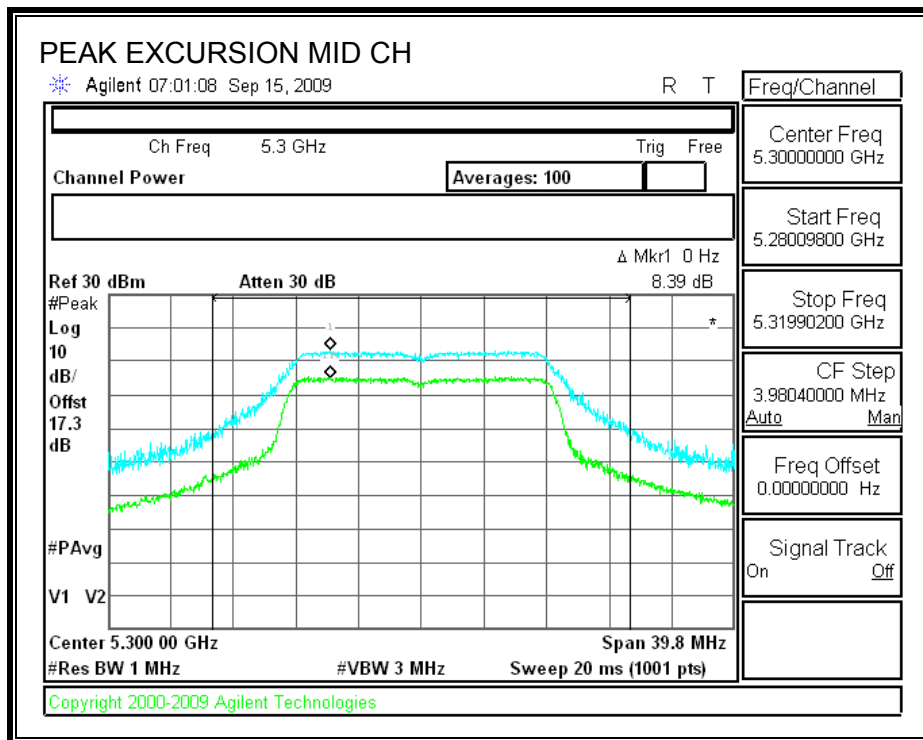
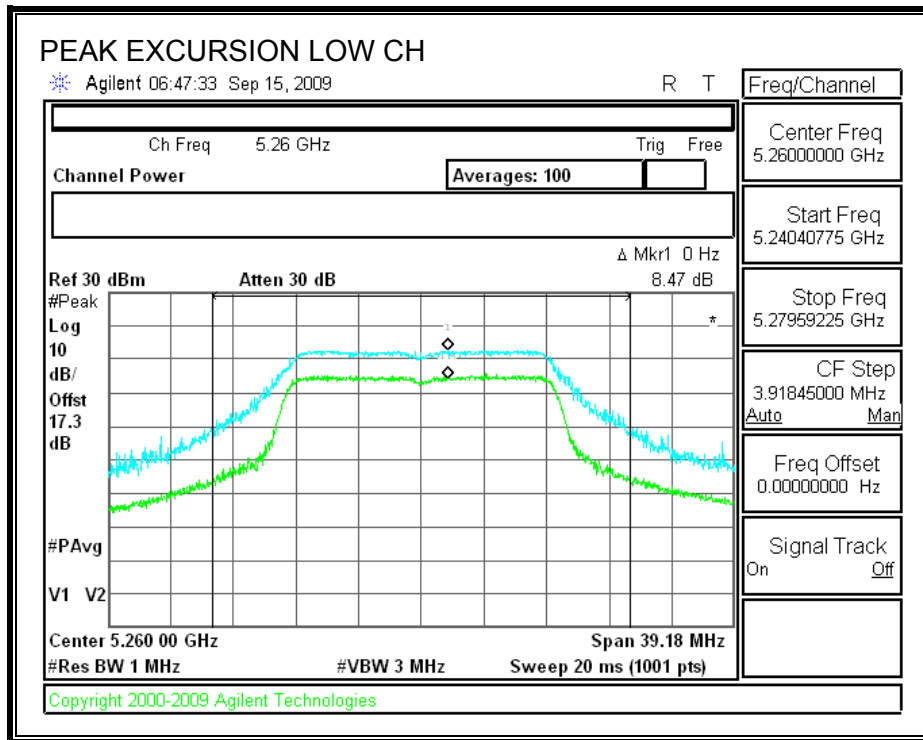
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	8.47	13	-4.53
Middle	5300	8.39	13	-4.61
High	5320	7.92	13	-5.08

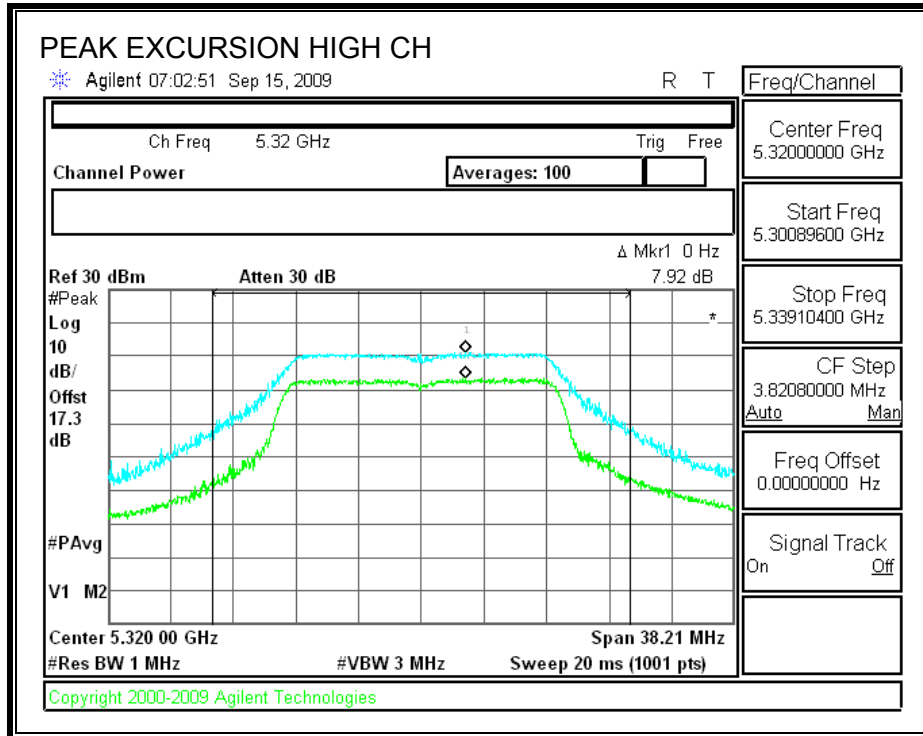
CHAIN 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	10.42	13	-2.58
Middle	5300	10.33	13	-2.67
High	5320	9.64	13	-3.36

CHAIN 1

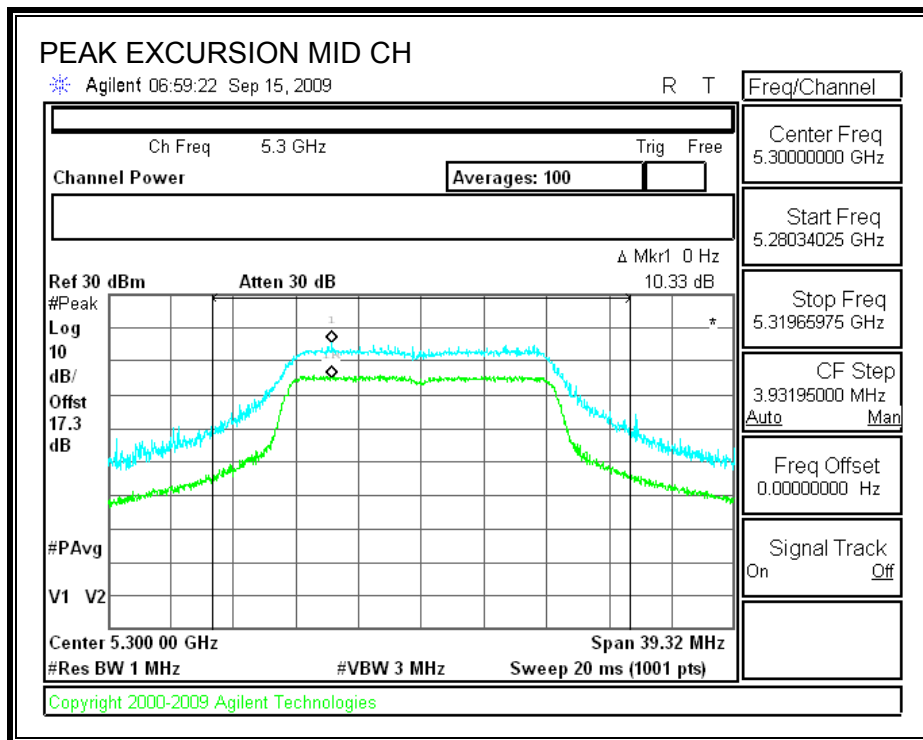
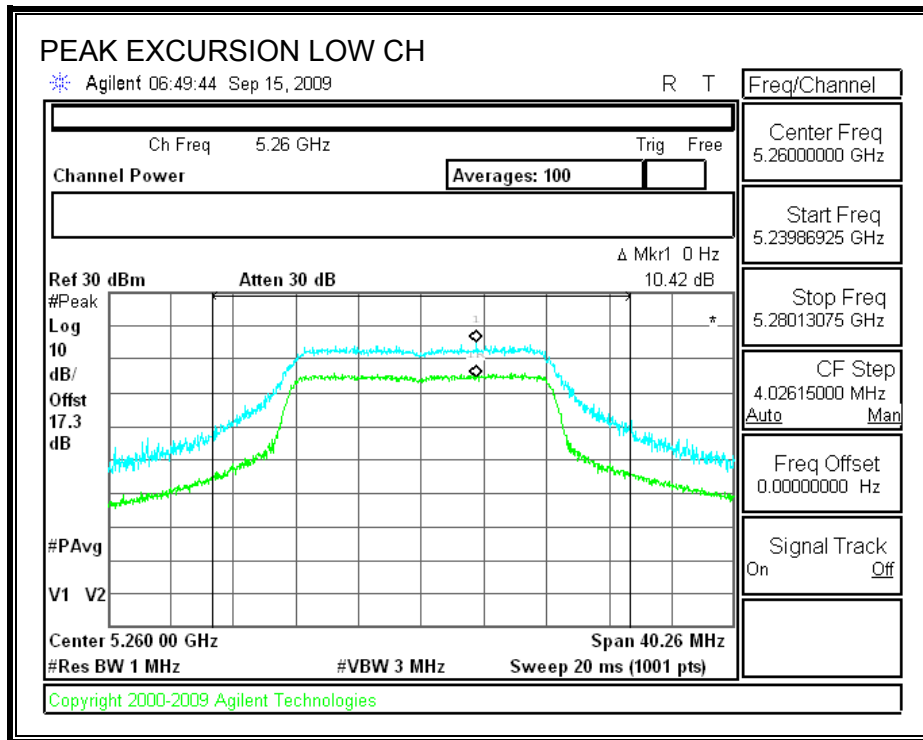
PEAK EXCURSION

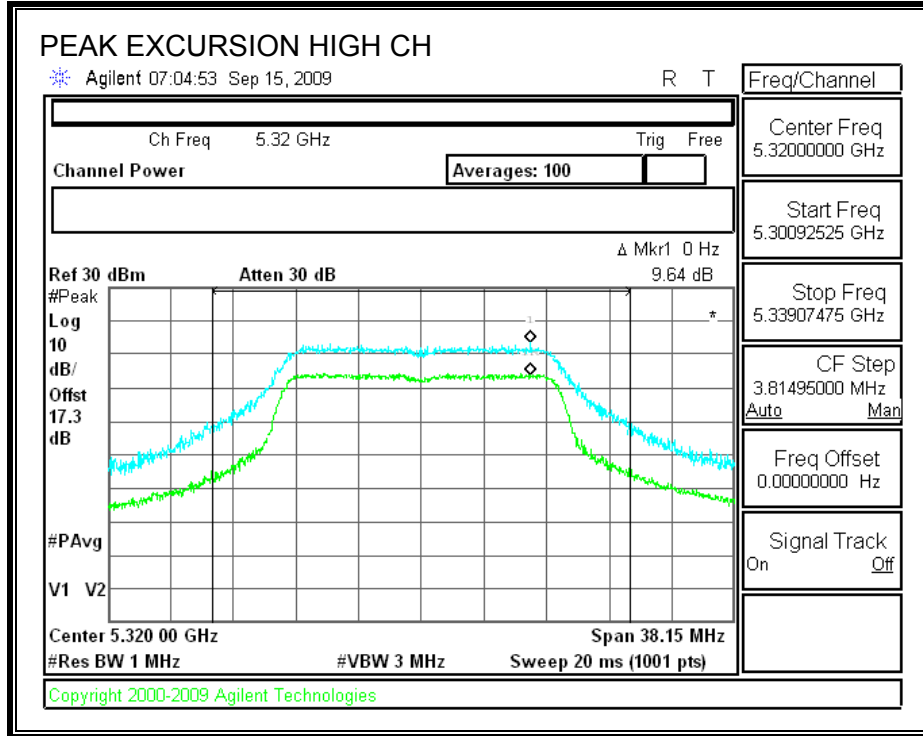




CHAIN 2

PEAK EXCURSION





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

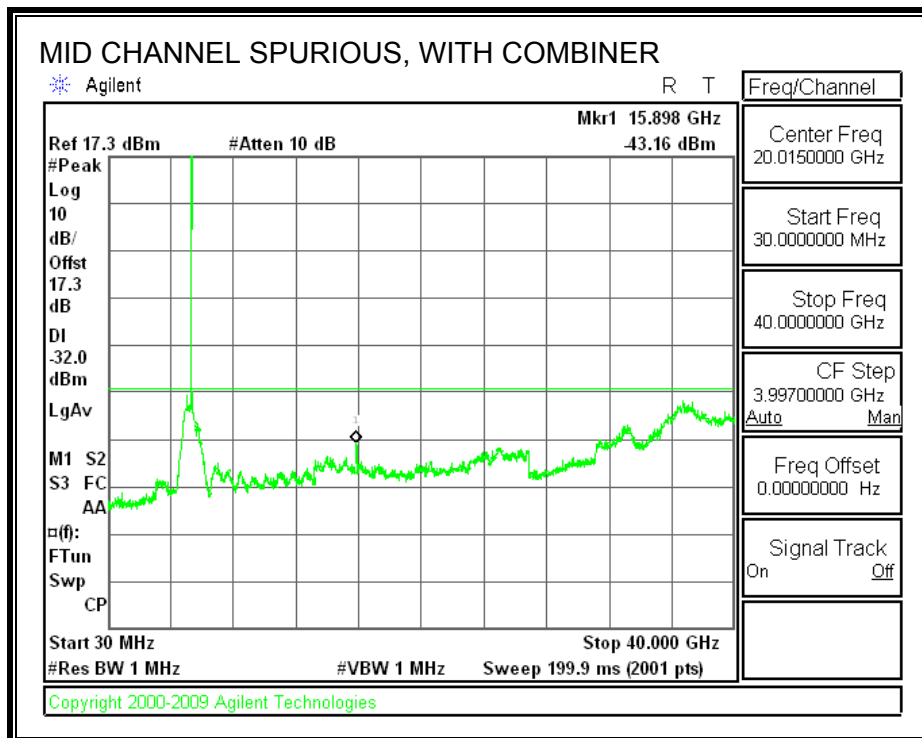
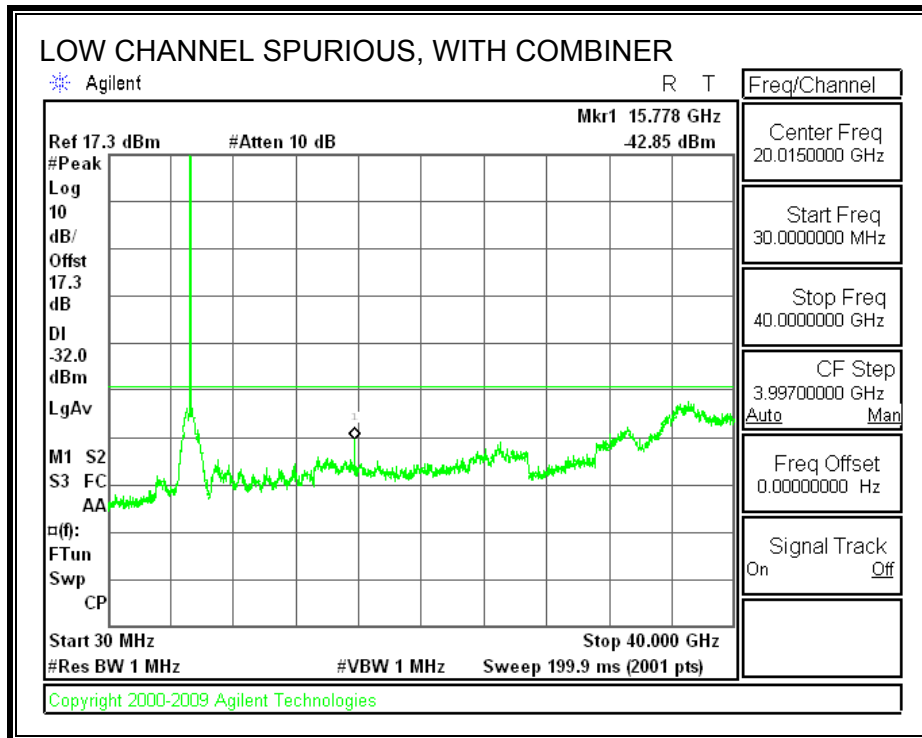
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

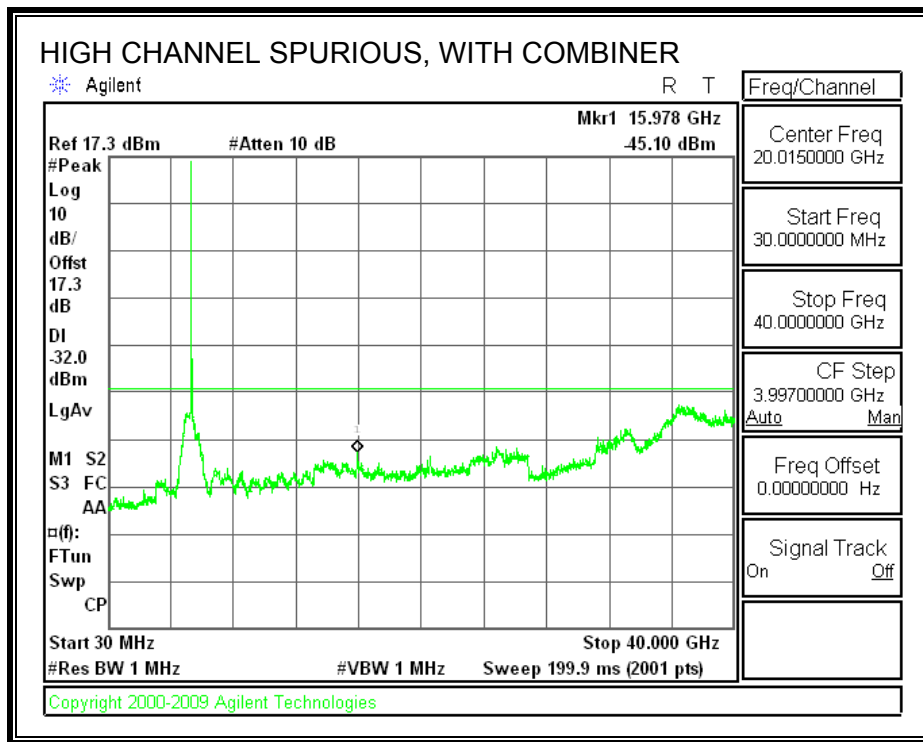
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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 WITH COMBINER





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

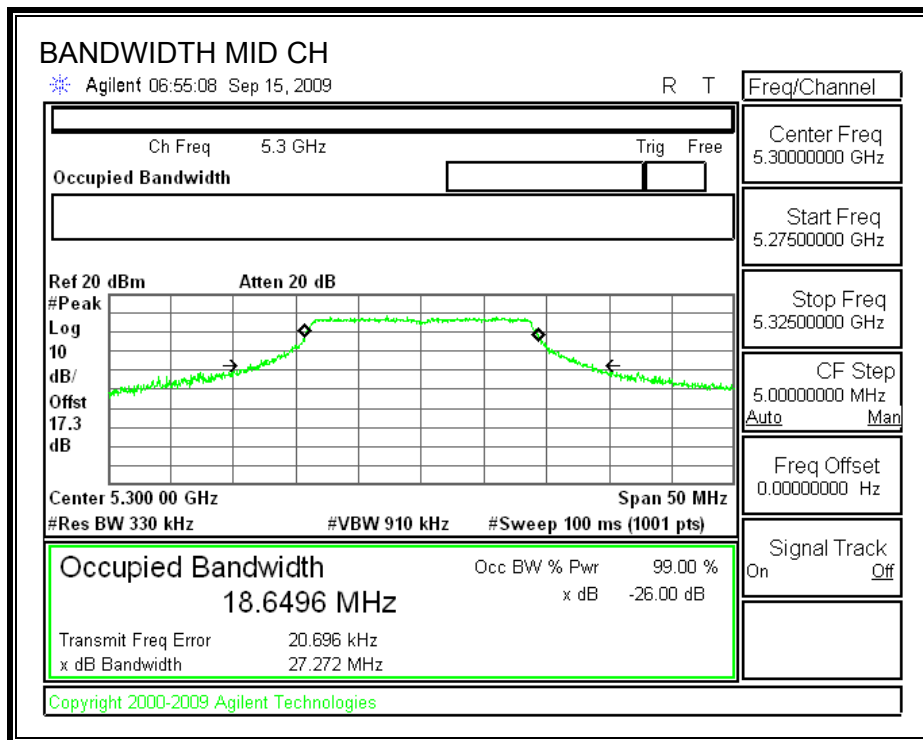
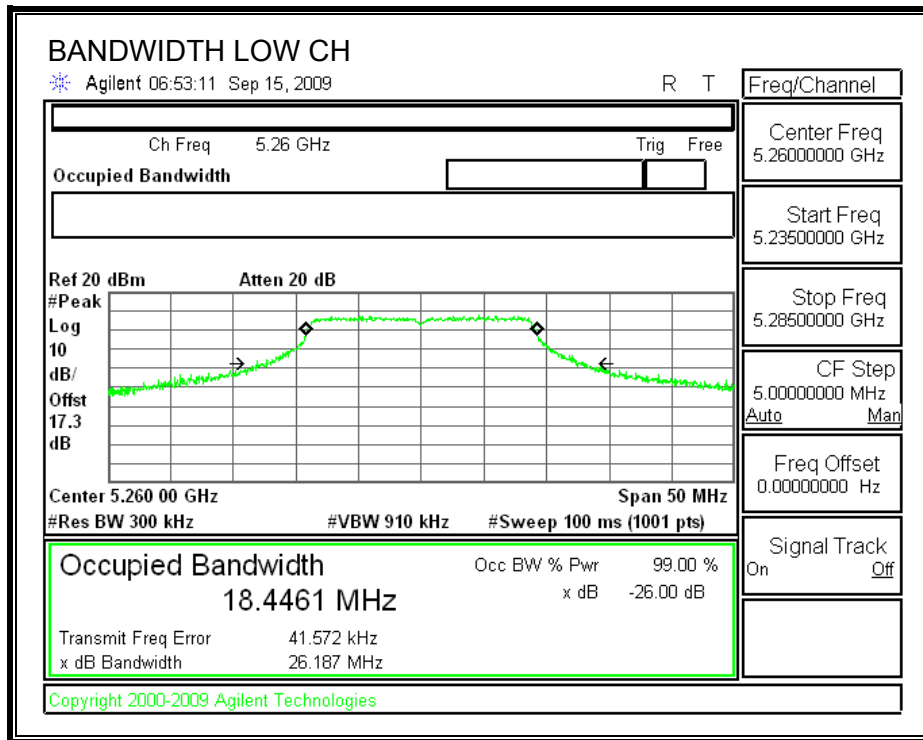
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5260	26.187	17.7343
Middle	5300	27.272	17.6301
High	5320	25.401	17.7218

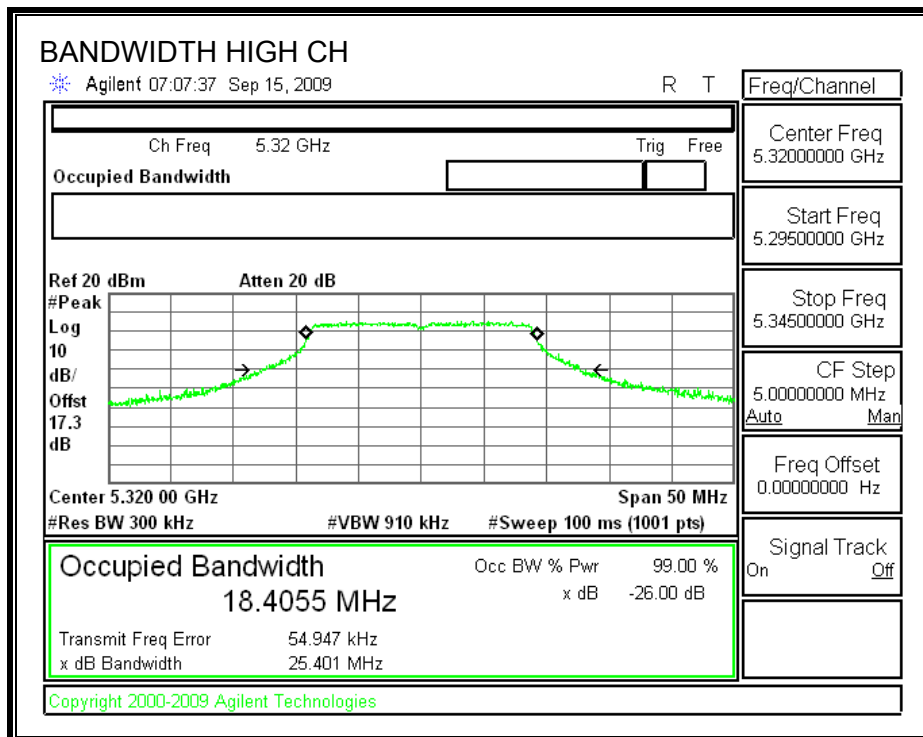
CHAIN 2

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5260	27.715	17.7316
Middle	5300	27.125	17.7803
High	5320	26.076	17.7470

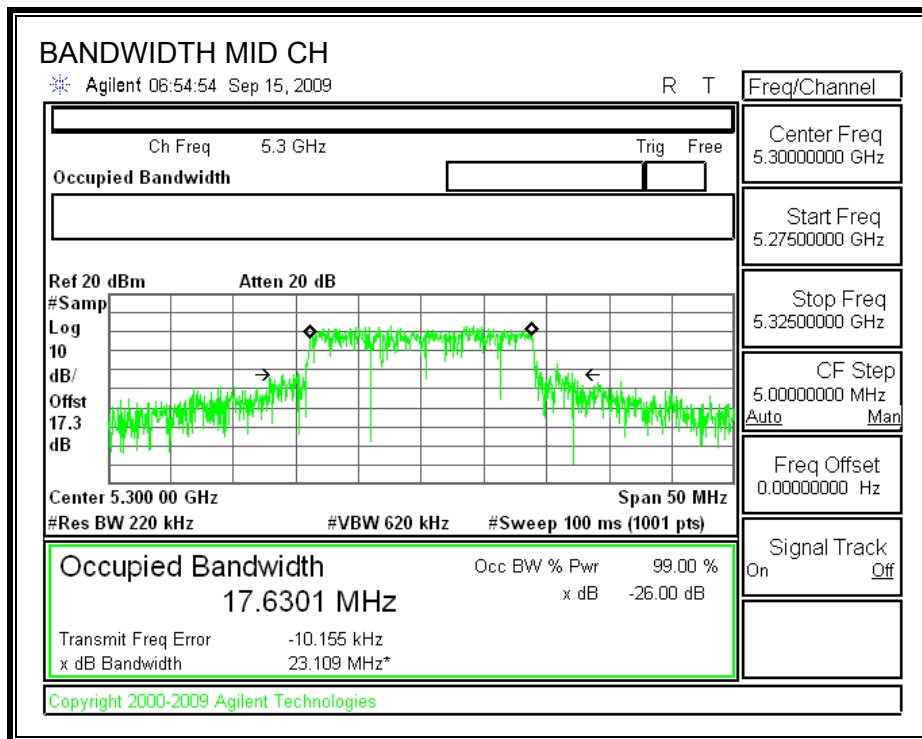
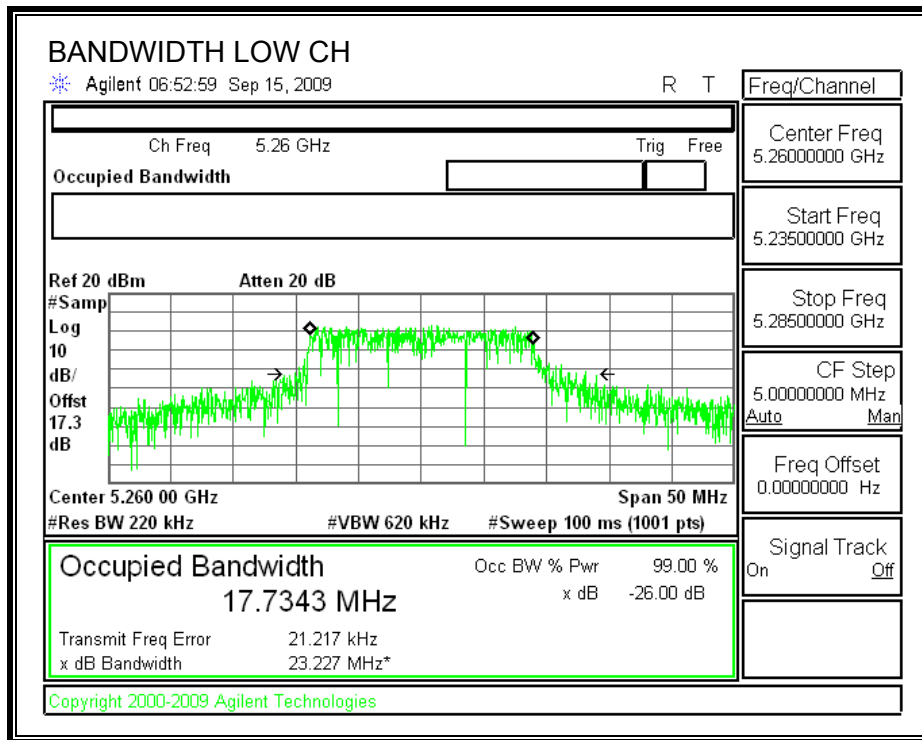
CHAIN 1

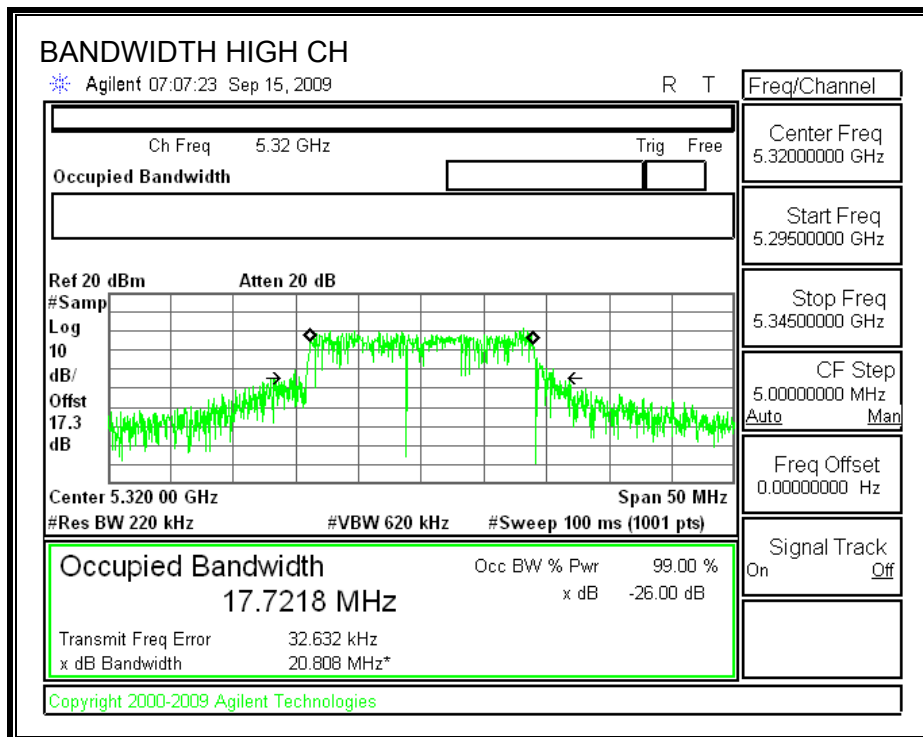
26 dB BANDWIDTH





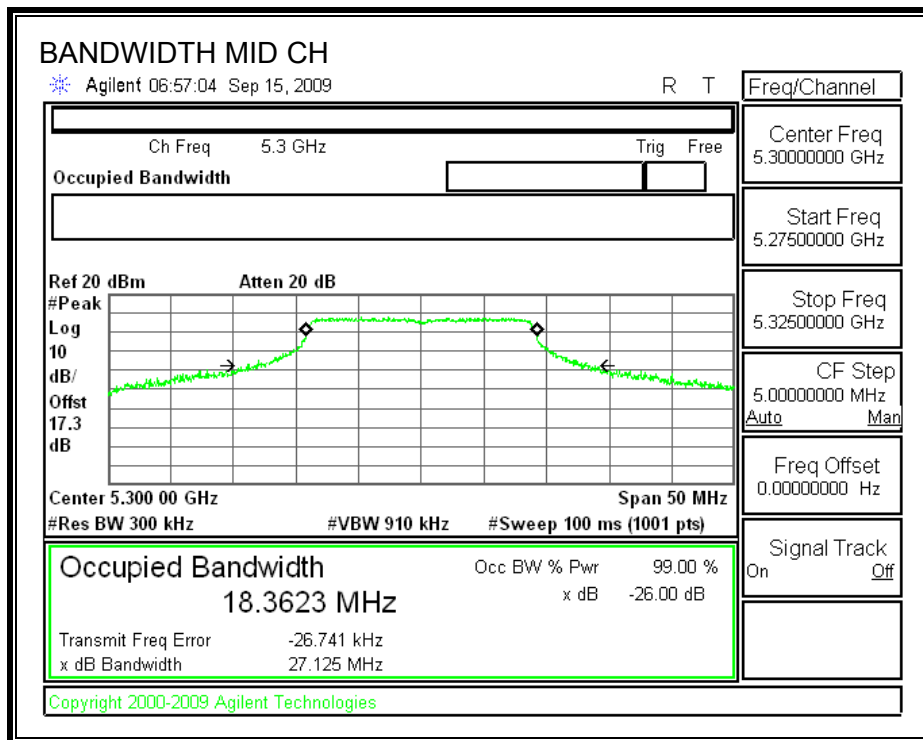
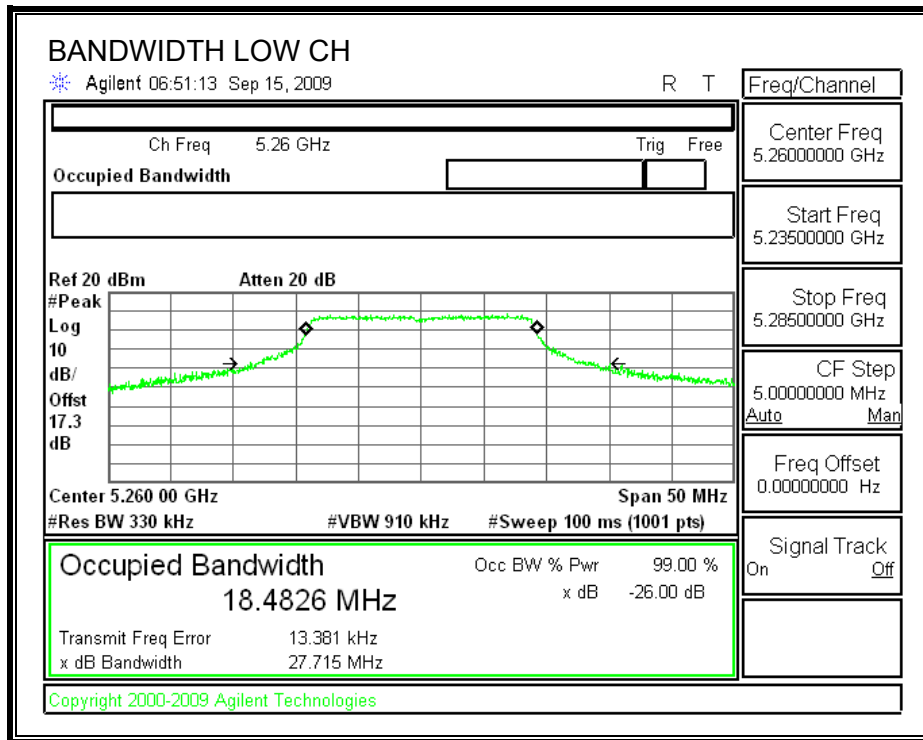
99% BANDWIDTH

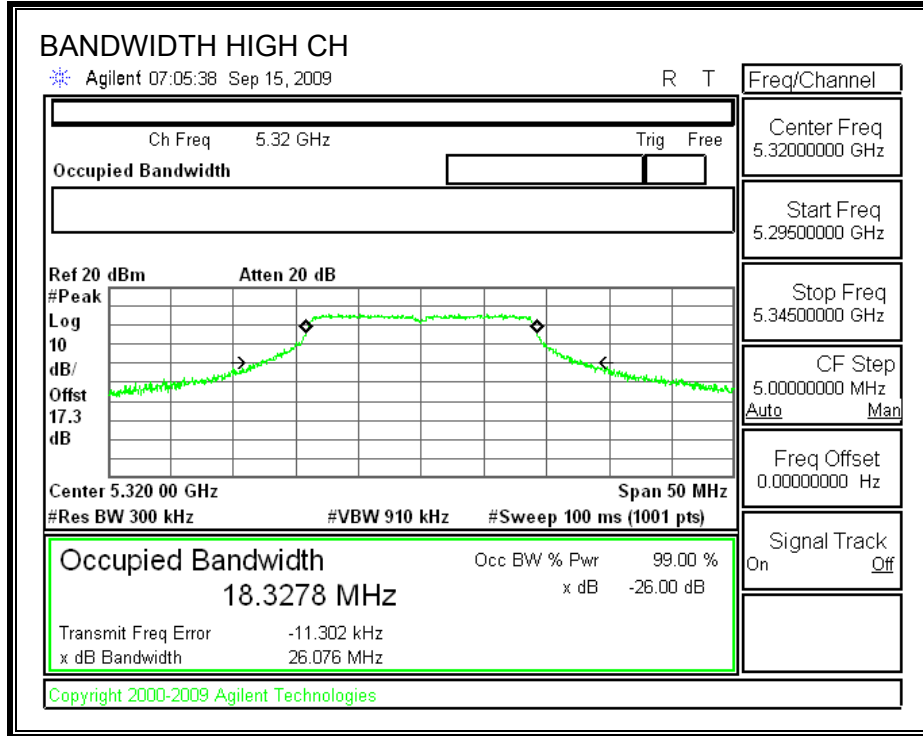




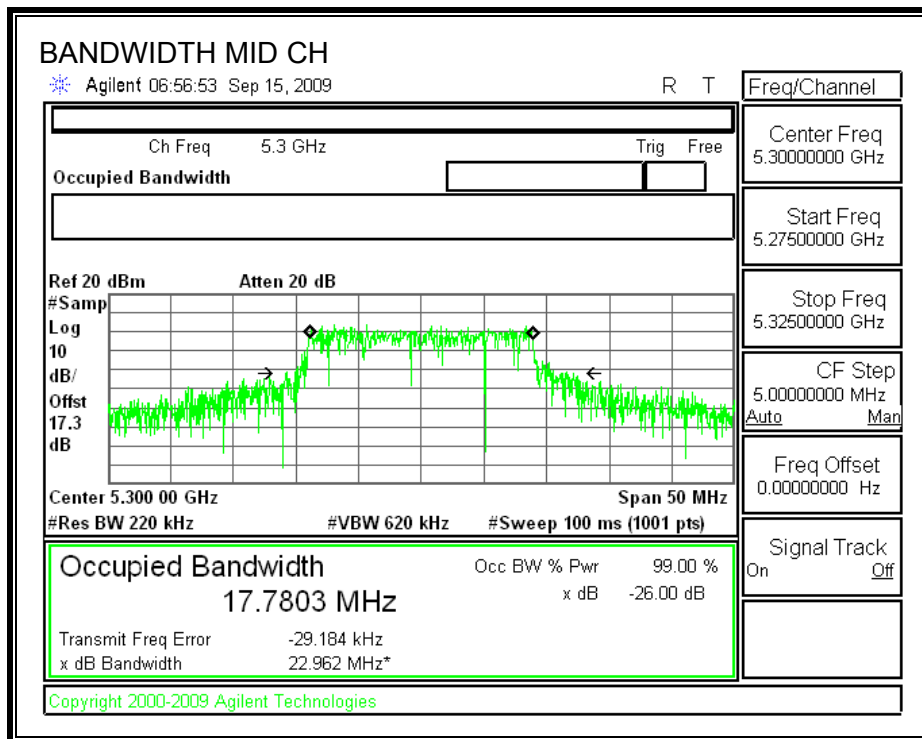
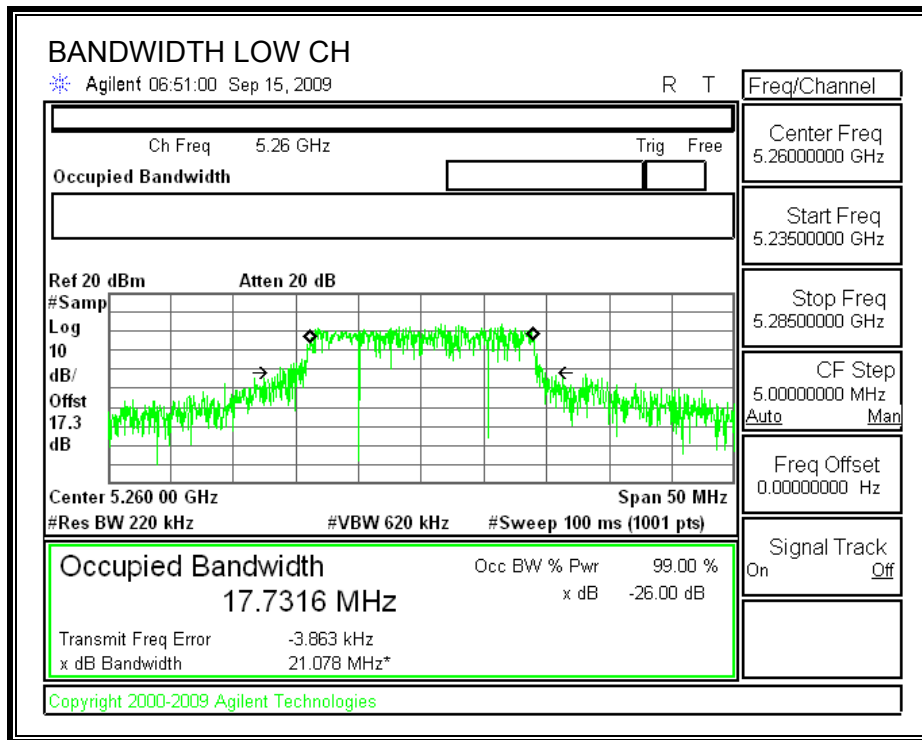
CHAIN 2

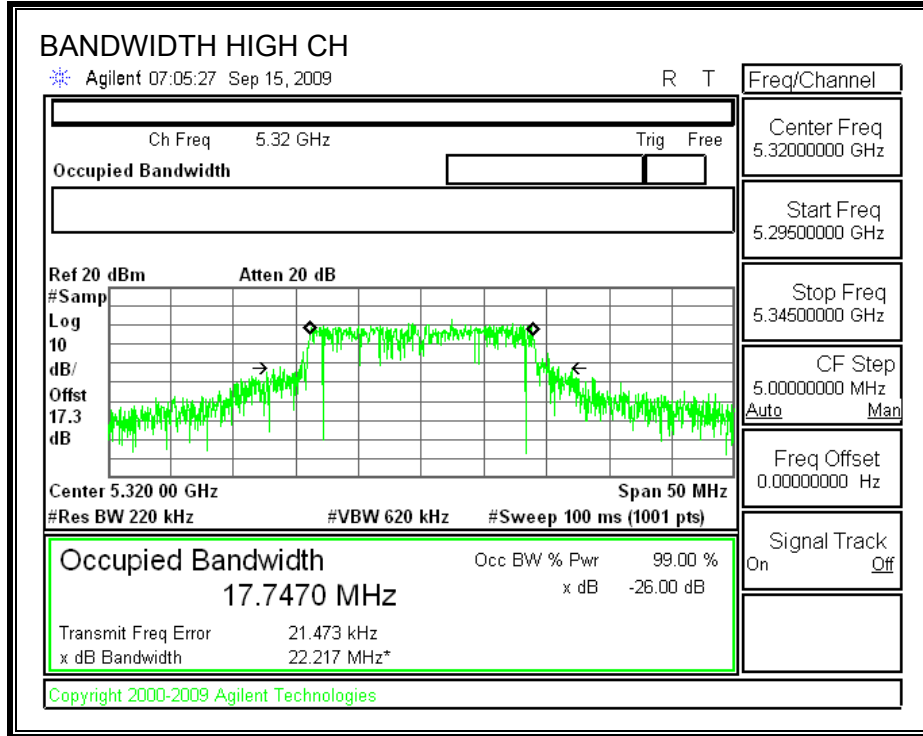
26 dB BANDWIDTH





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

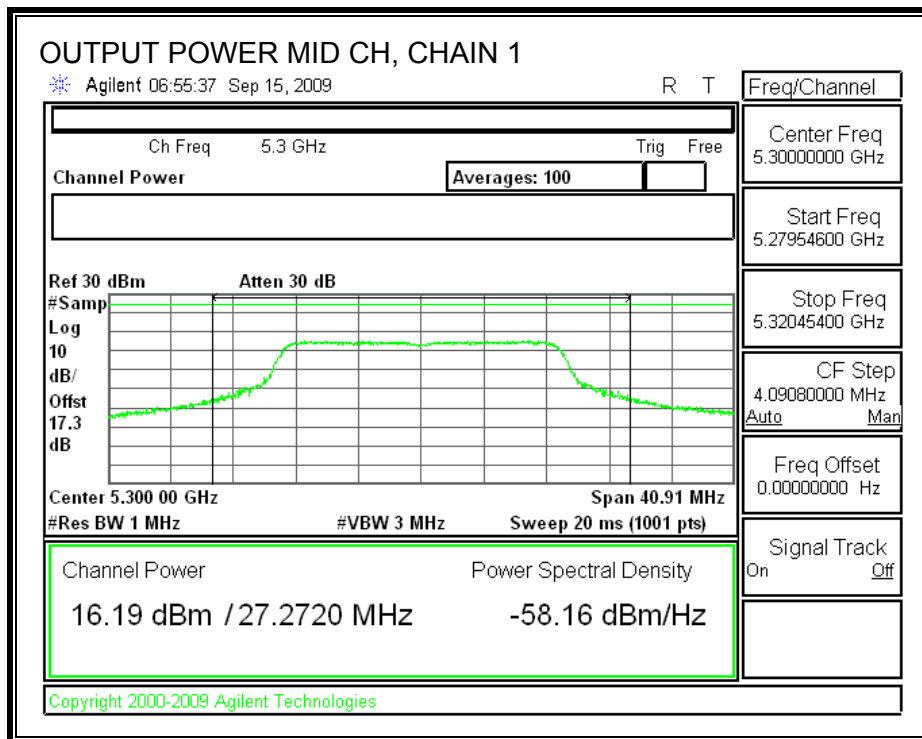
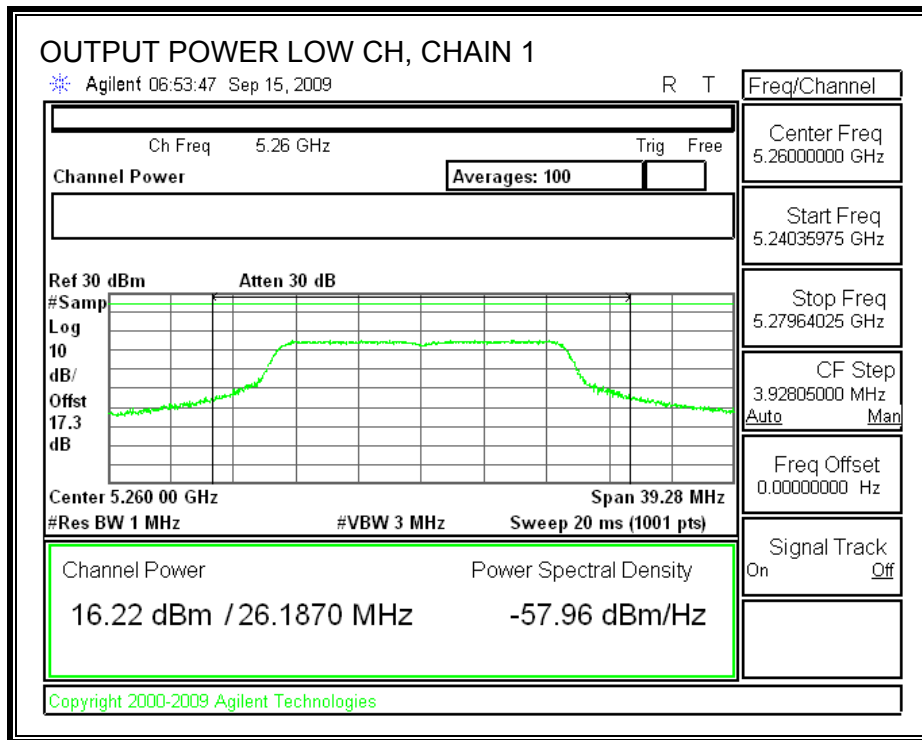
Limit

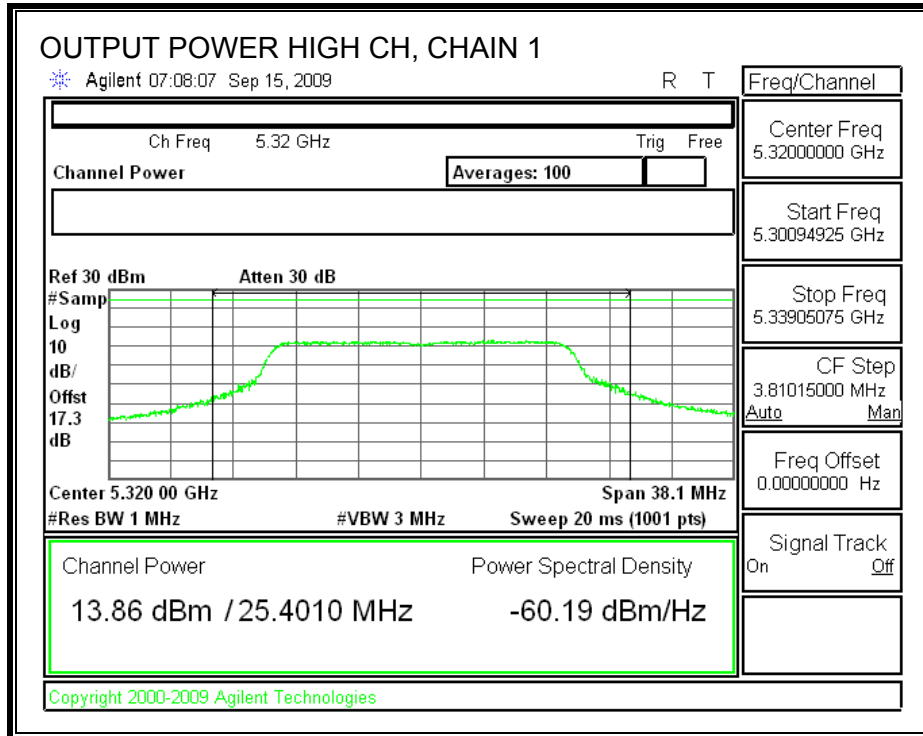
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5260	24	26.187	25.18	1.98	24.00
Mid	5300	24	27.272	25.36	1.98	24.00
High	5320	24	25.401	25.05	1.98	24.00

Individual Chain Results

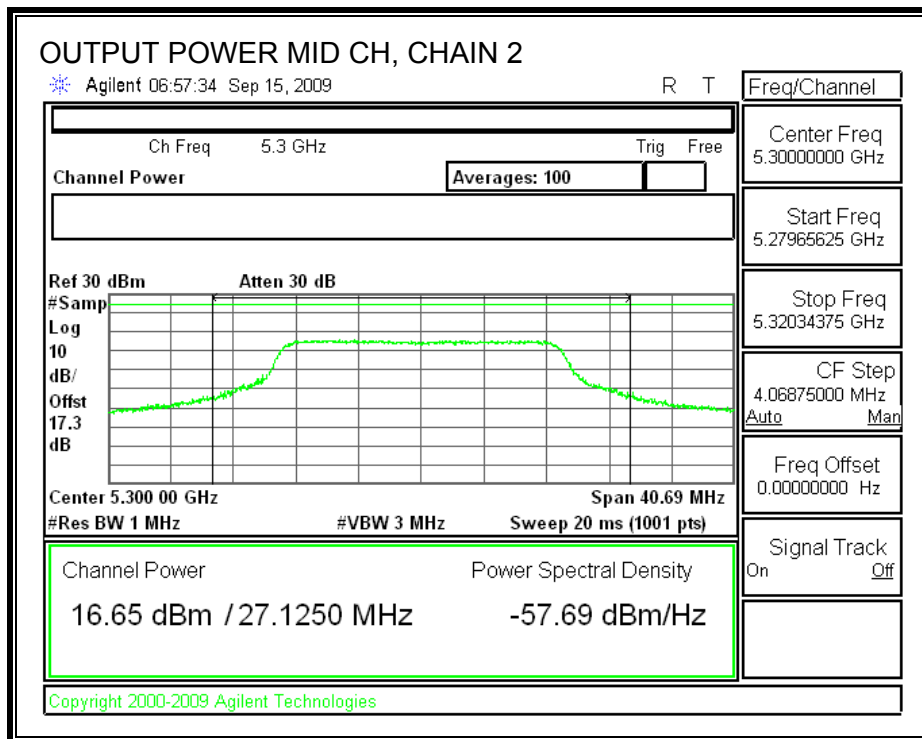
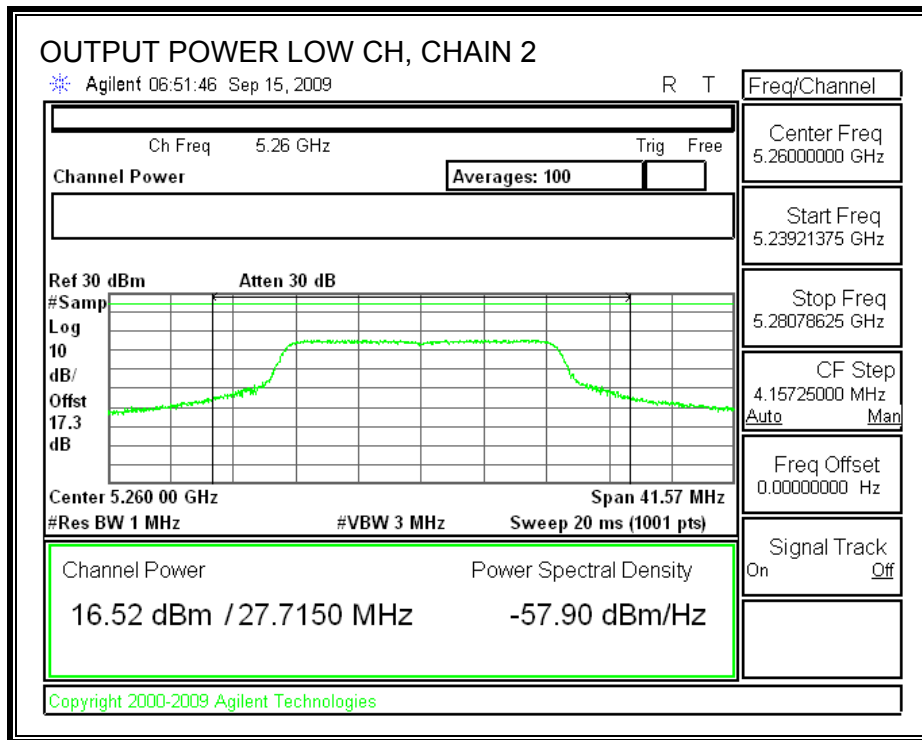
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5260	16.22	16.52	19.38	24.00	-4.62
Mid	5300	16.19	16.65	19.44	24.00	-4.56
High	5320	13.86	14.62	17.27	24.00	-6.73

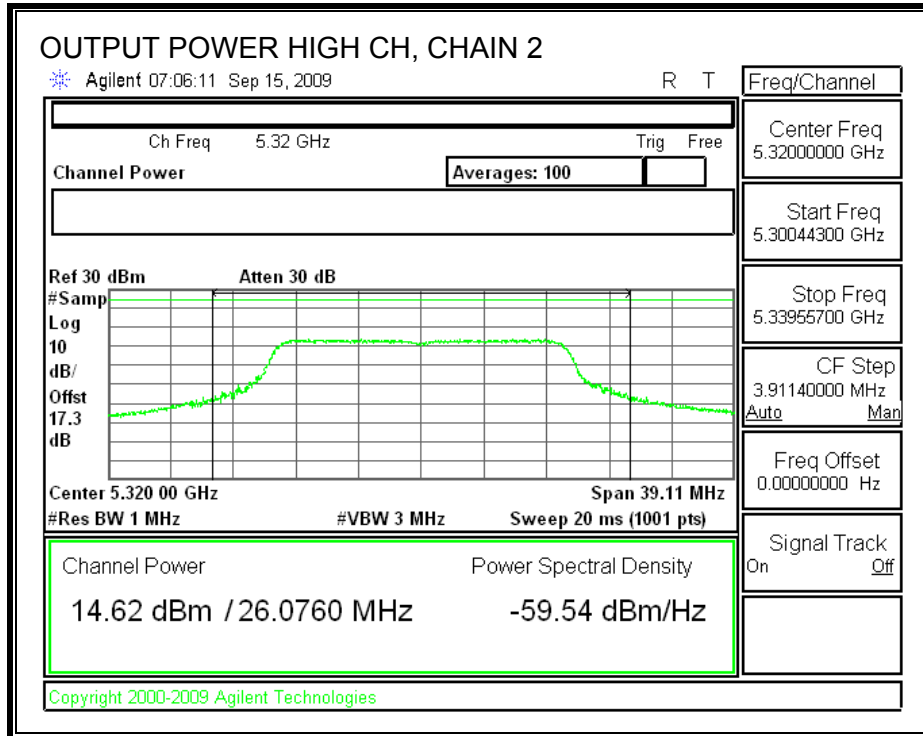
CHAIN 1 OUTPUT POWER





CHAIN 2 OUTPUT POWER





7.5.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 17.3 dB (including 10 dB pad and 7.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5260	16.62	16.91	19.78
Middle	5300	16.54	17.07	19.82
High	5320	14.26	14.99	17.65

7.5.4. 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 or equal to 6 dBi, therefore the limit is 11 dBm.

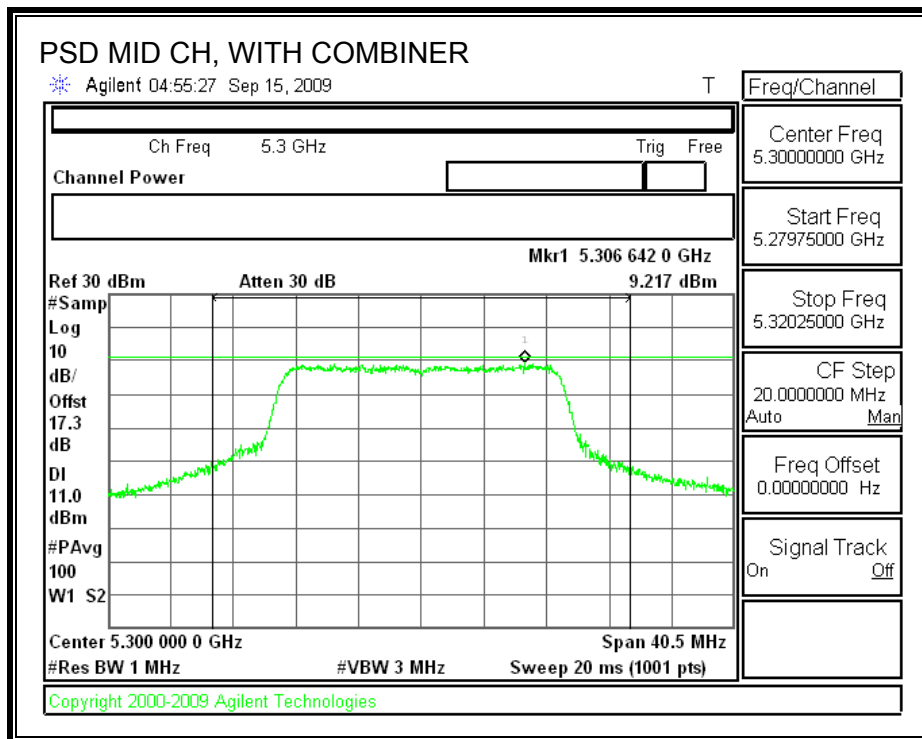
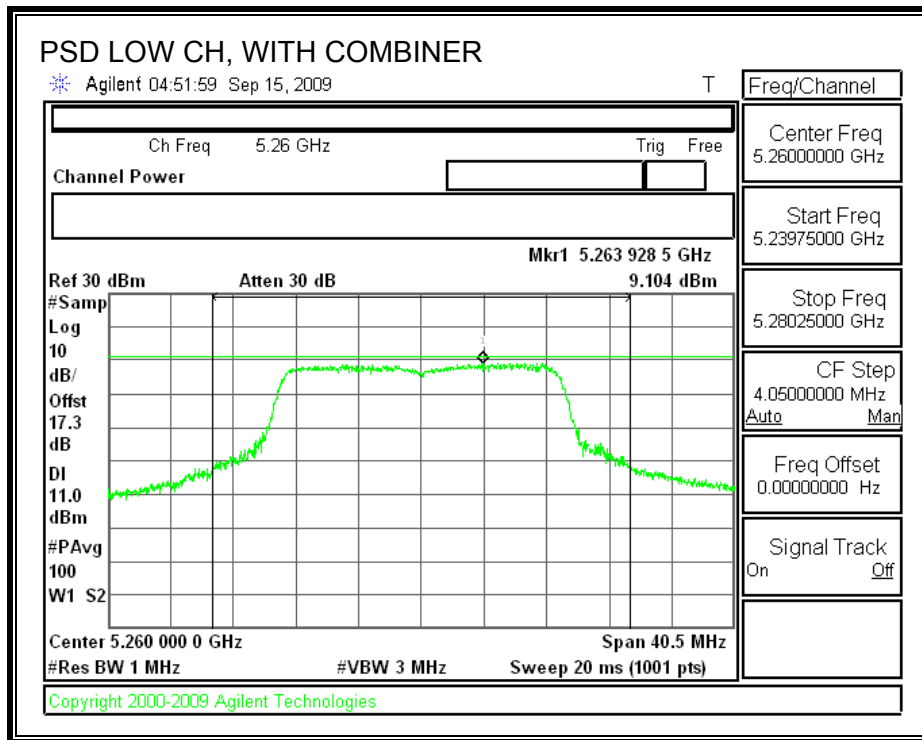
TEST PROCEDURE

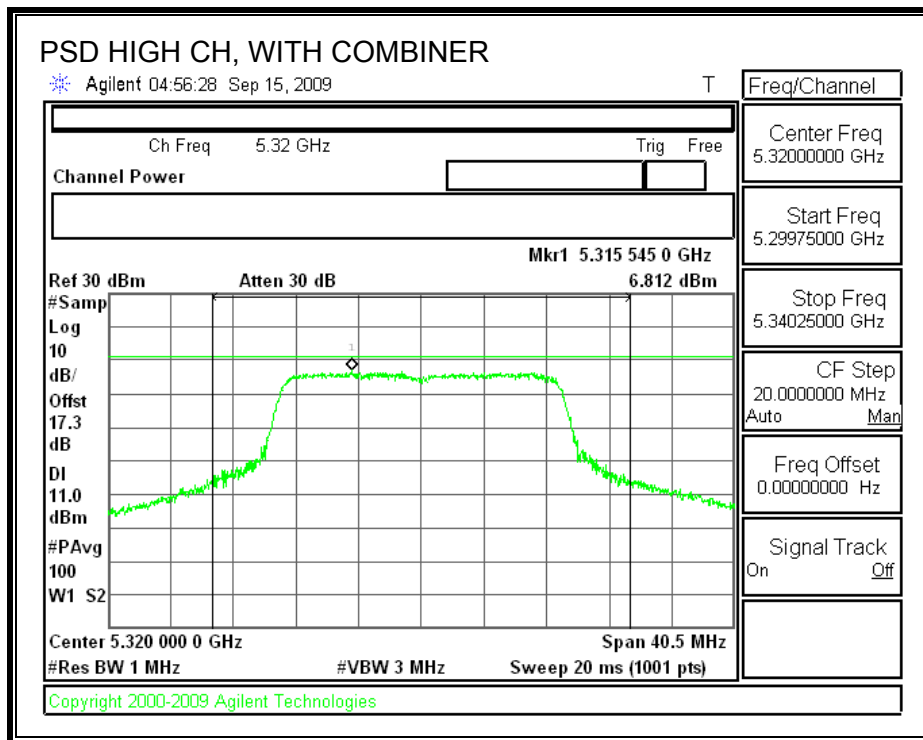
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5260	9.10	11	-1.90
Middle	5300	9.22	11	-1.78
High	5320	6.81	11	-4.19

POWER SPECTRAL DENSITY WITH COMBINER





7.5.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

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

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

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

RESULTS

CHAIN 1

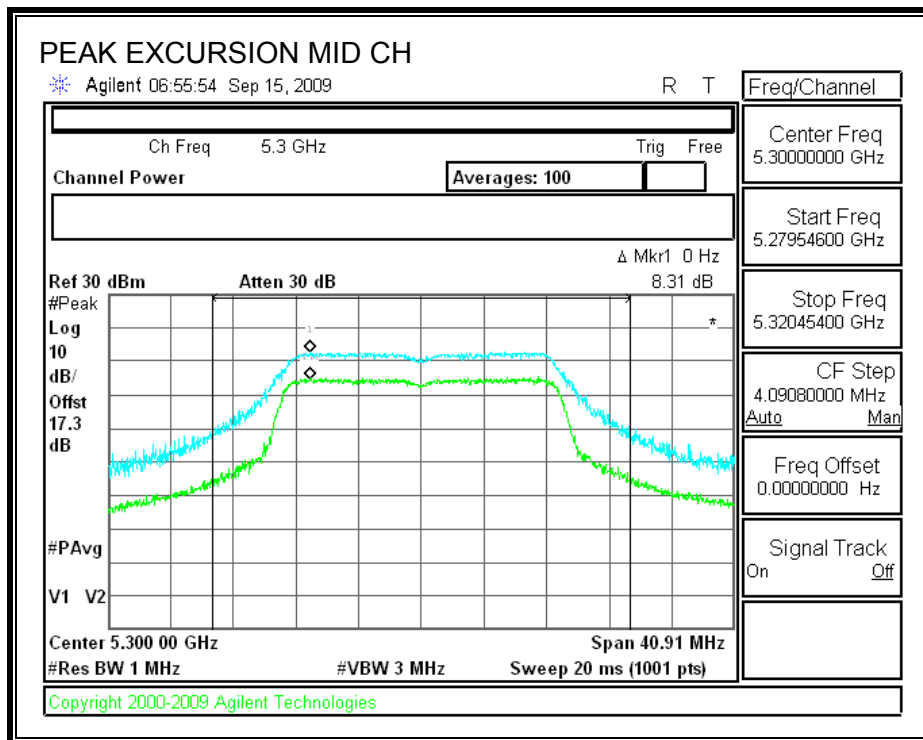
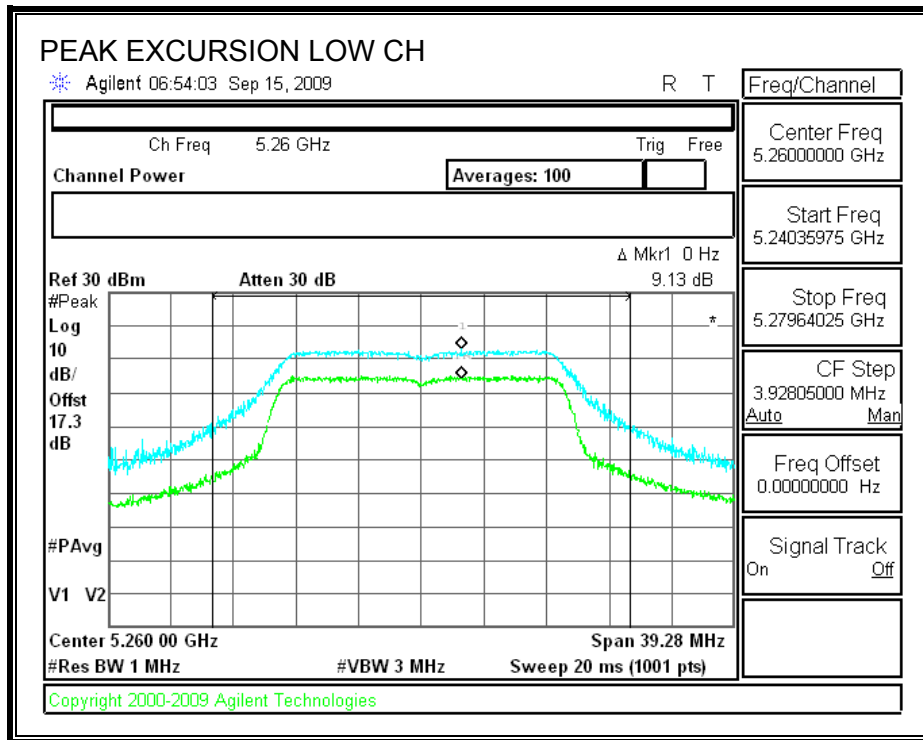
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	9.13	13	-3.87
Middle	5300	8.31	13	-4.69
High	5320	9.62	13	-3.38

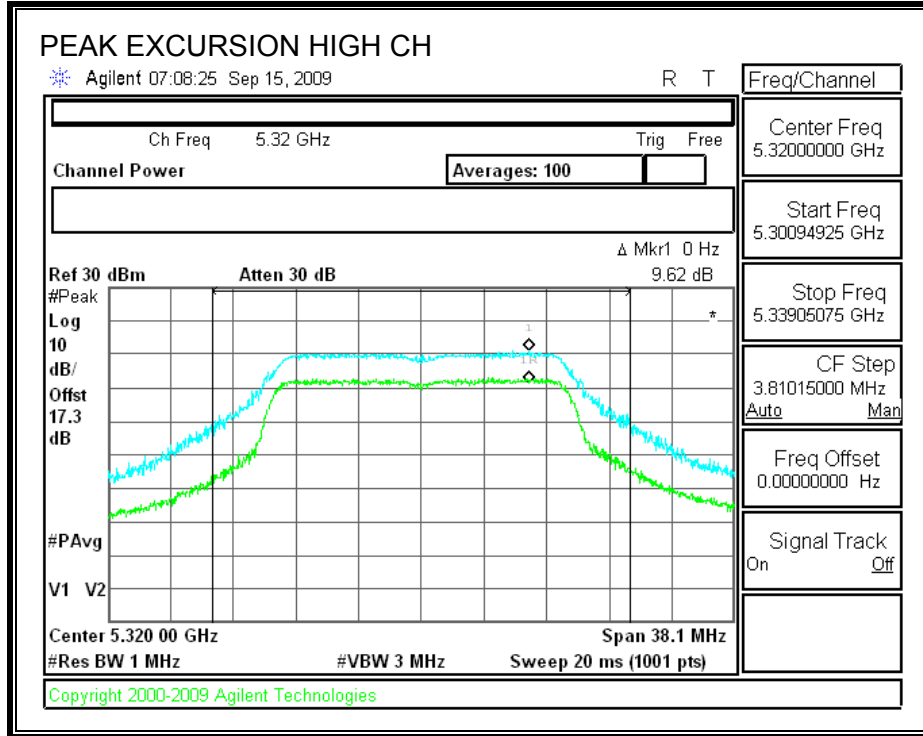
CHAIN 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	10.05	13	-2.95
Middle	5300	8.54	13	-4.46
High	5320	9.38	13	-3.62

CHAIN 1

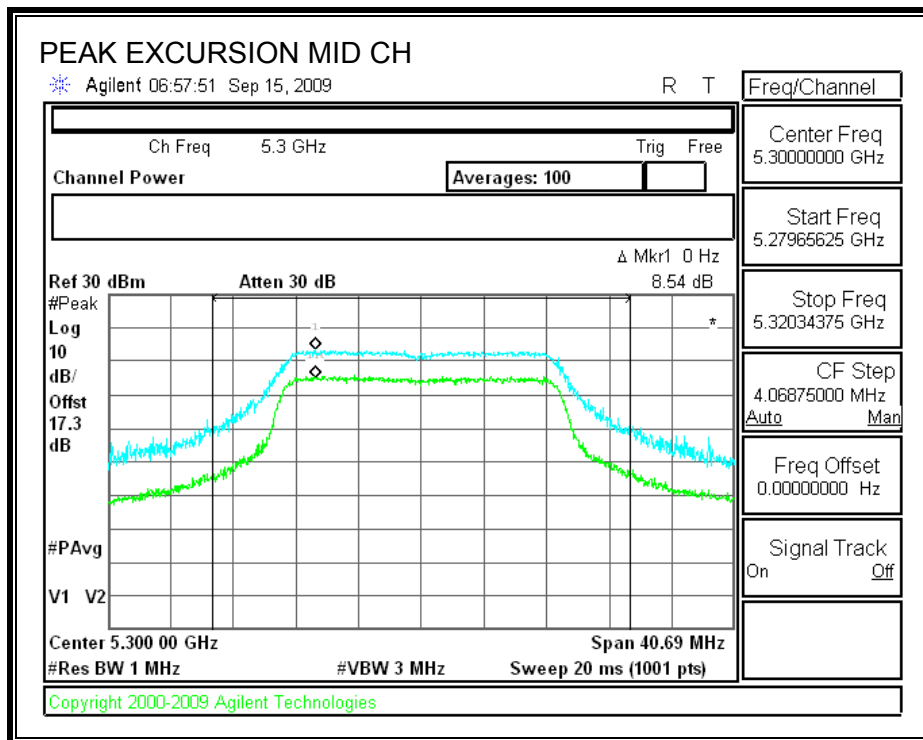
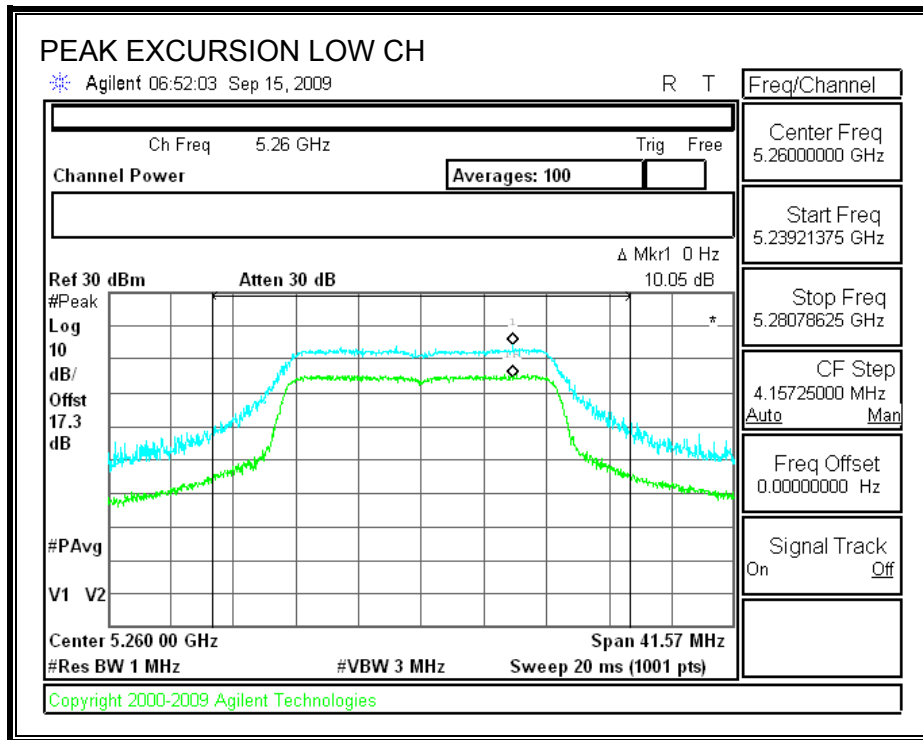
PEAK EXCURSION

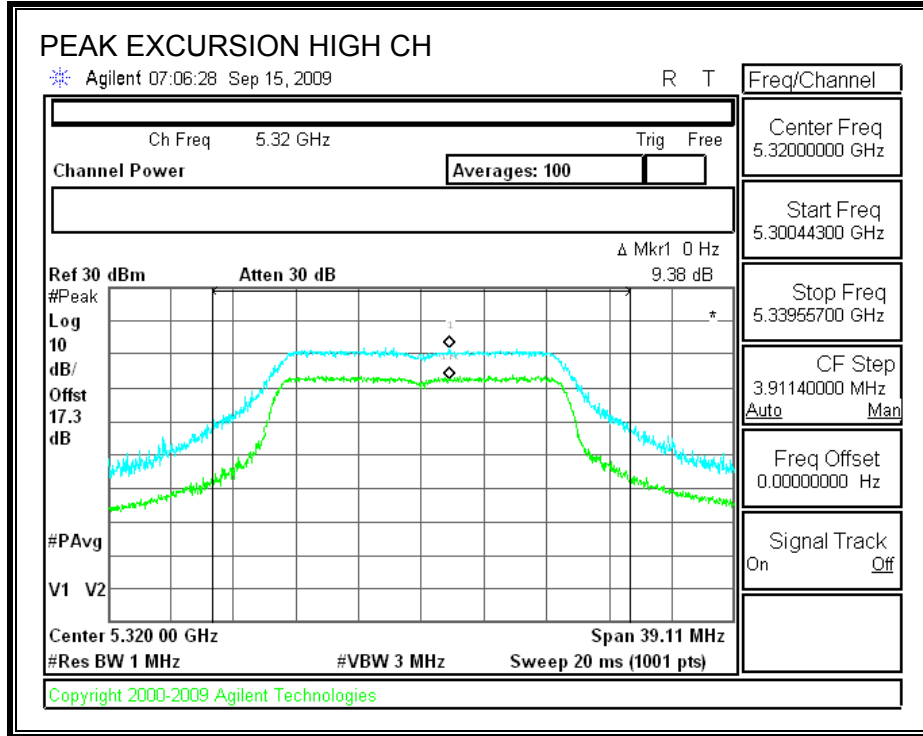




CHAIN 2

PEAK EXCURSION





7.5.6. 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

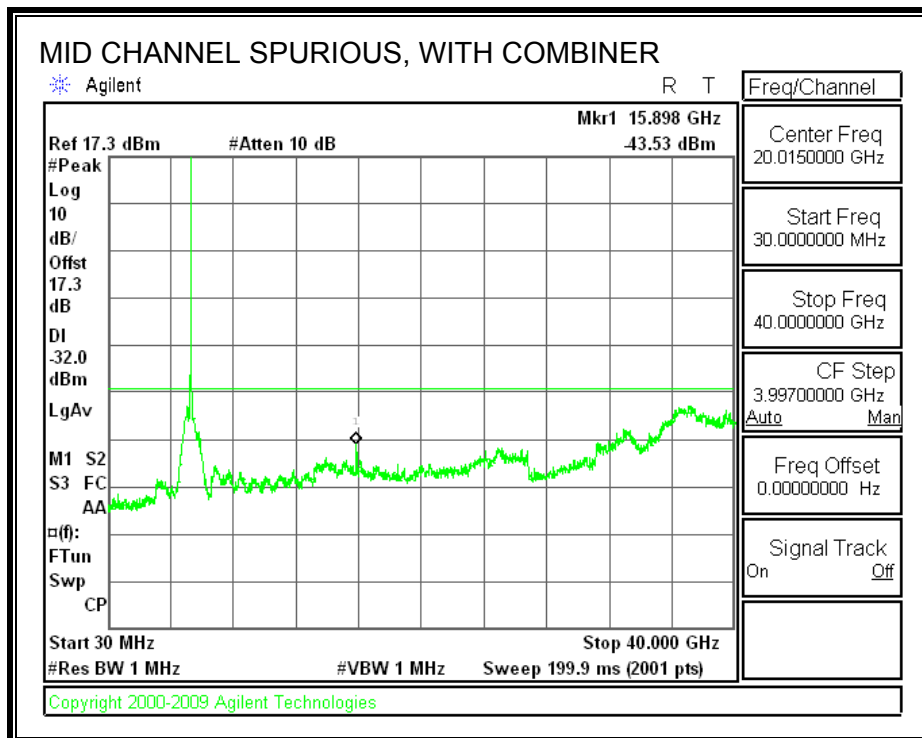
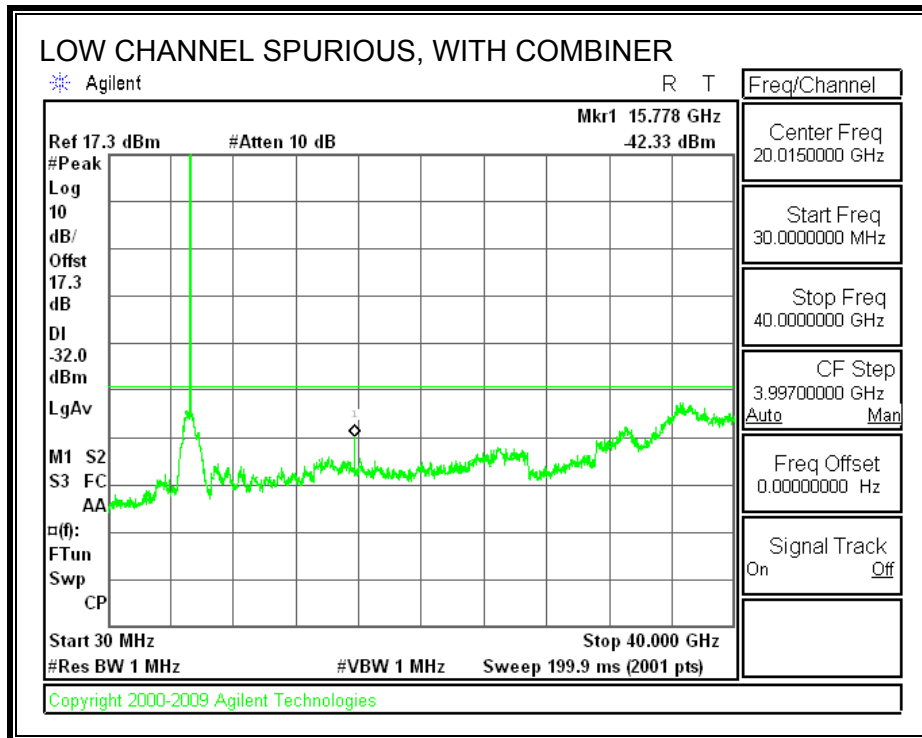
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

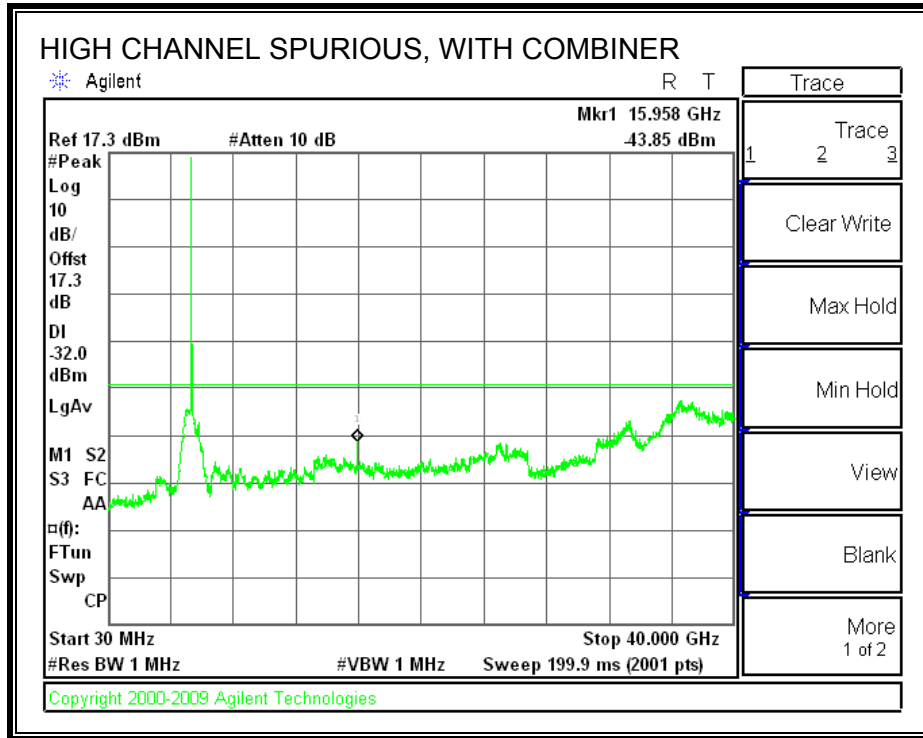
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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 WITH COMBINER





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

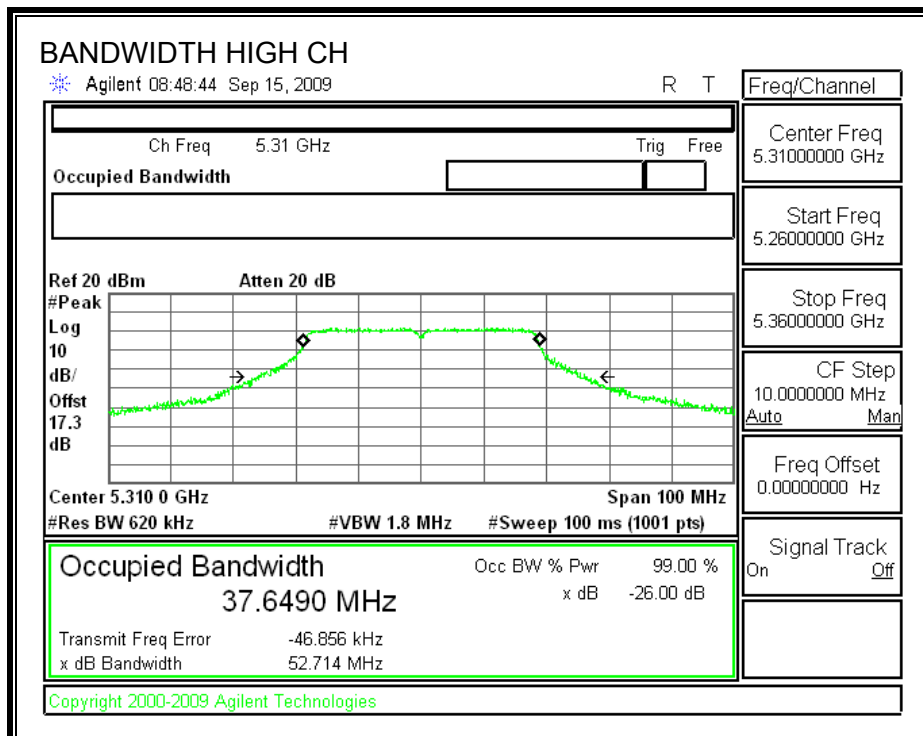
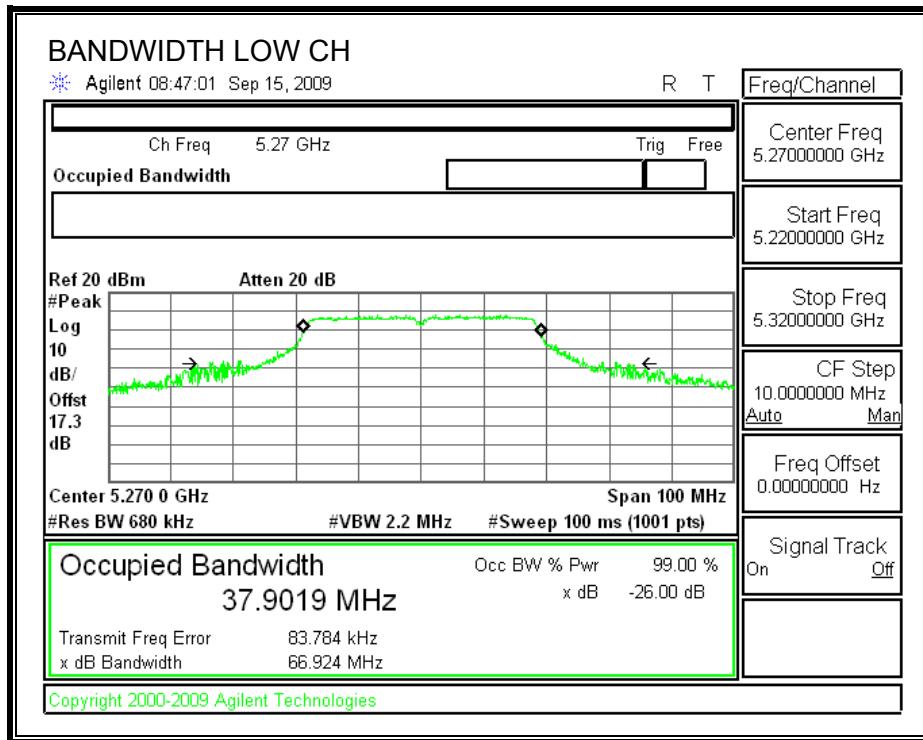
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5270	66.924	36.4102
High	5310	52.714	36.2734

CHAIN 2

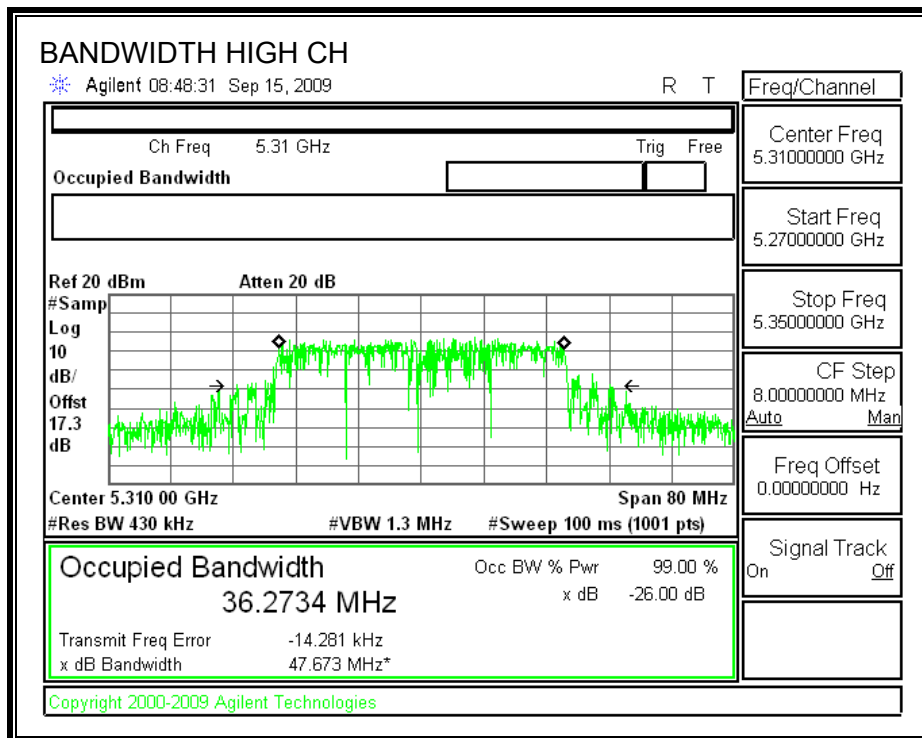
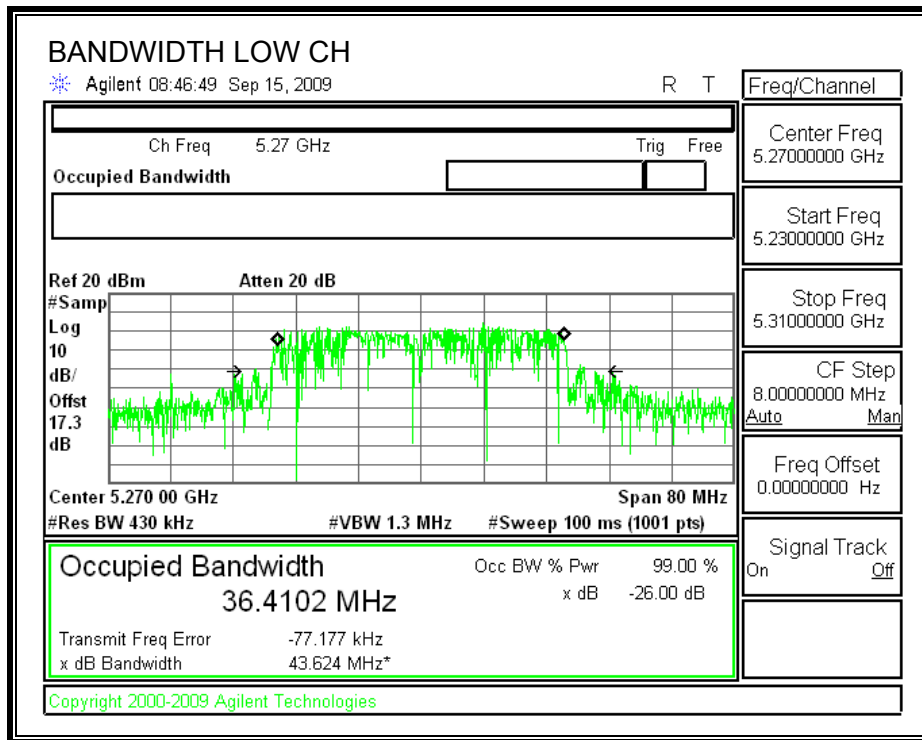
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5270	67.608	36.2226
High	5310	50.798	36.2406

CHAIN 1

26 dB BANDWIDTH

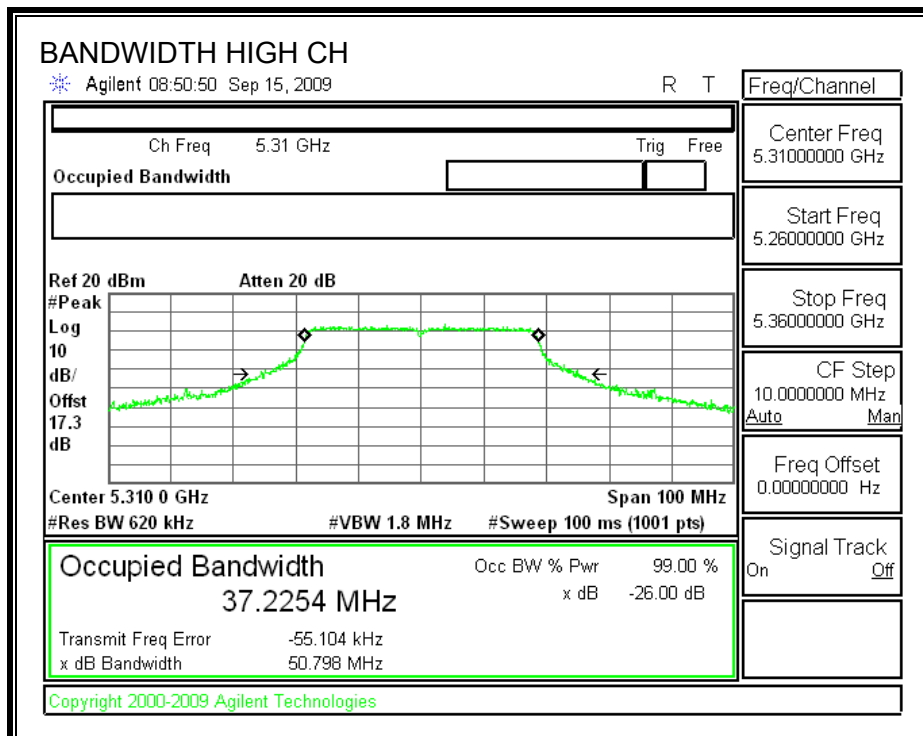
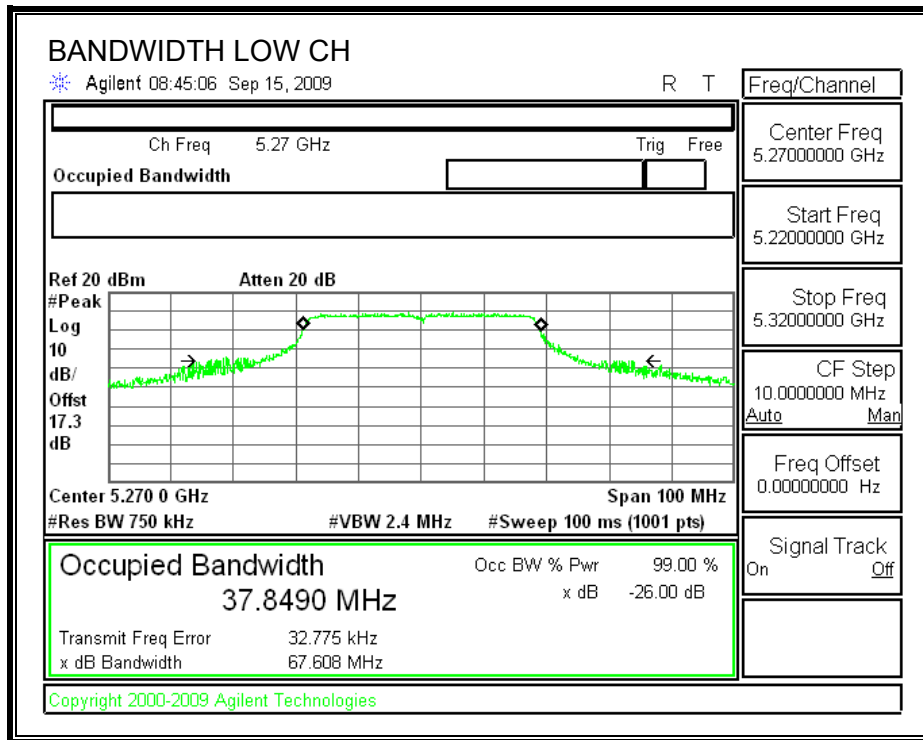


99% BANDWIDTH

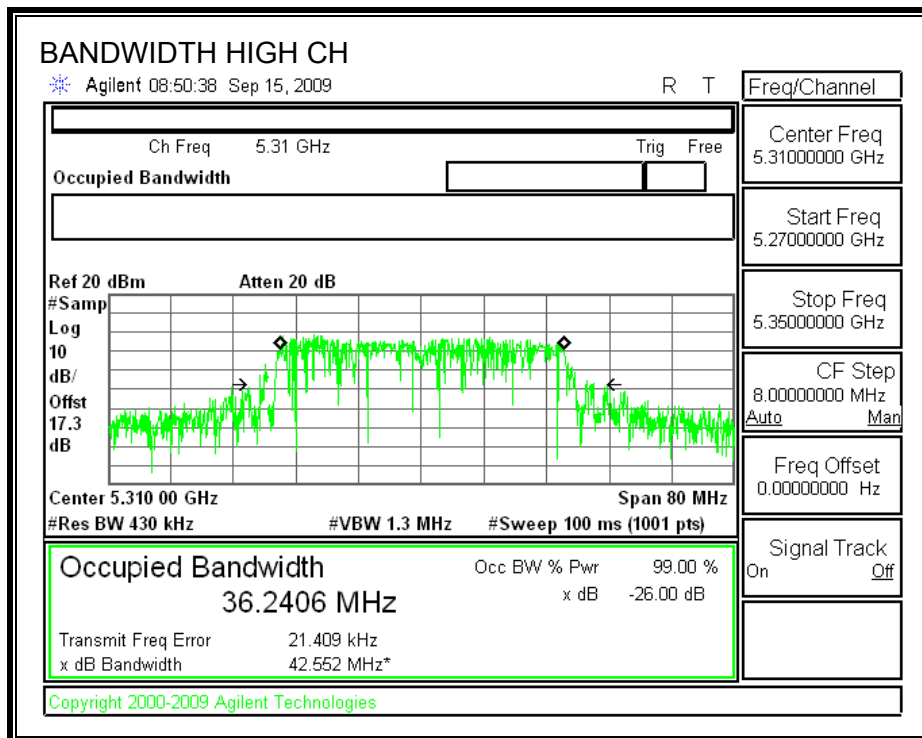
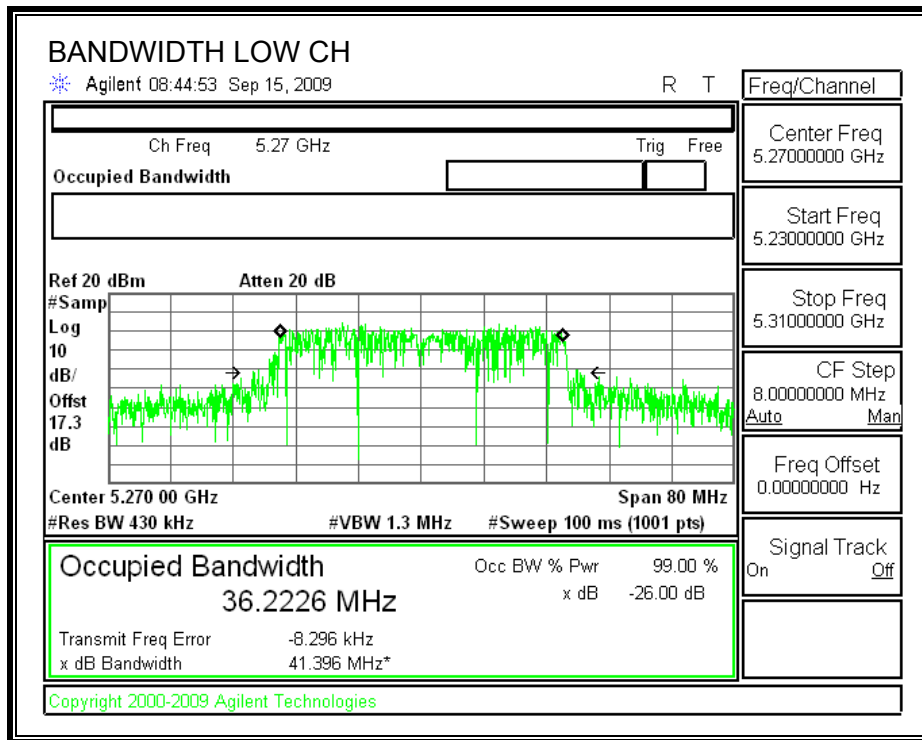


CHAIN 2

26 dB BANDWIDTH



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 $11 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

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

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

RESULTS

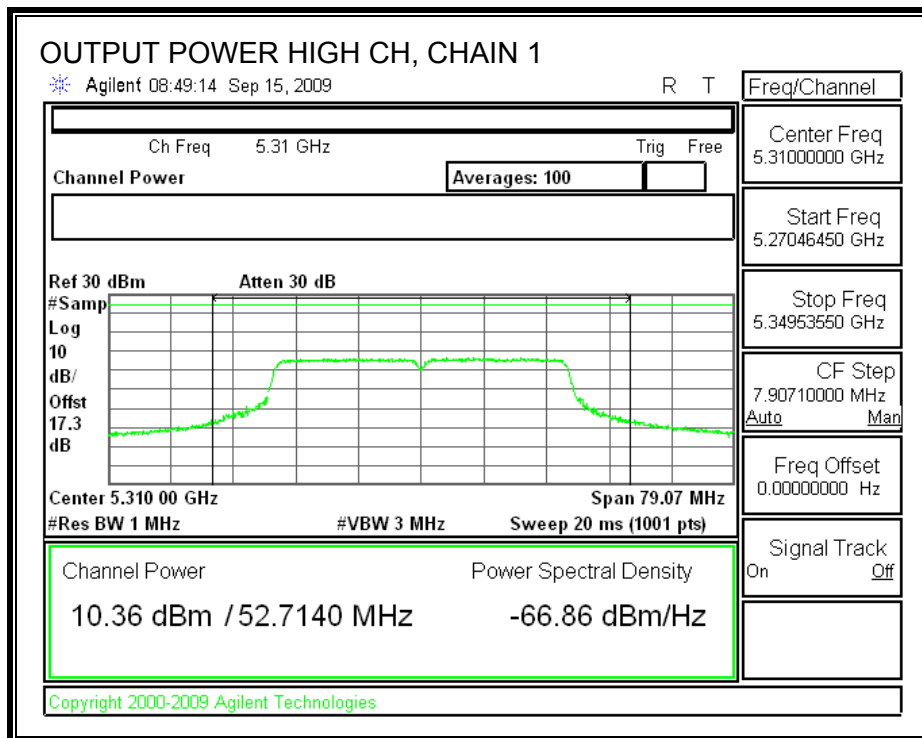
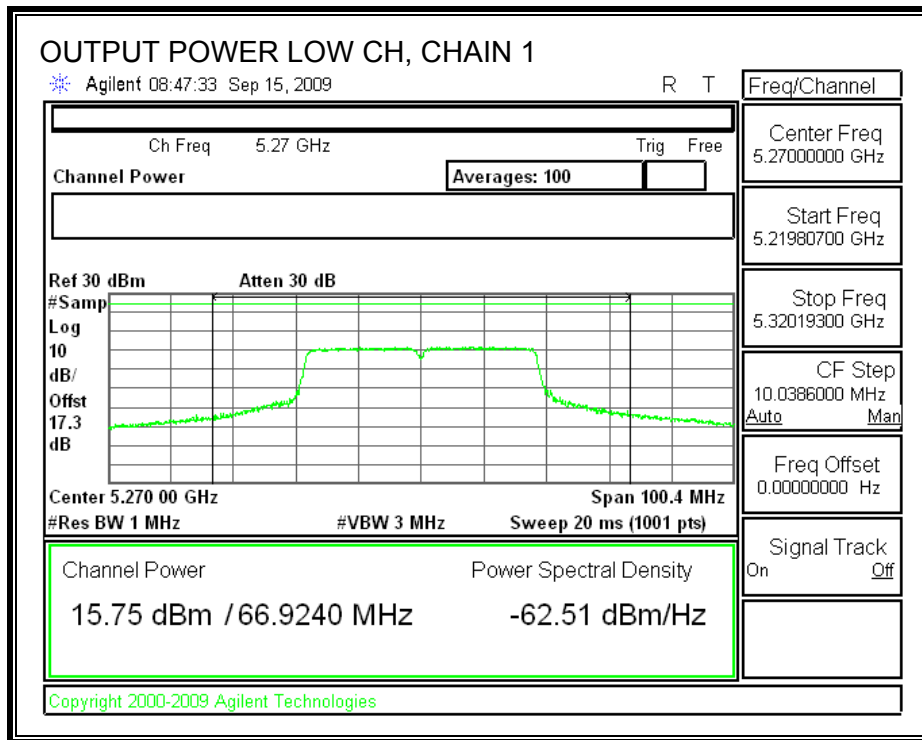
Limit

Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5270	24	66.924	29.26	1.98	24.00
High	5310	24	52.714	28.22	1.98	24.00

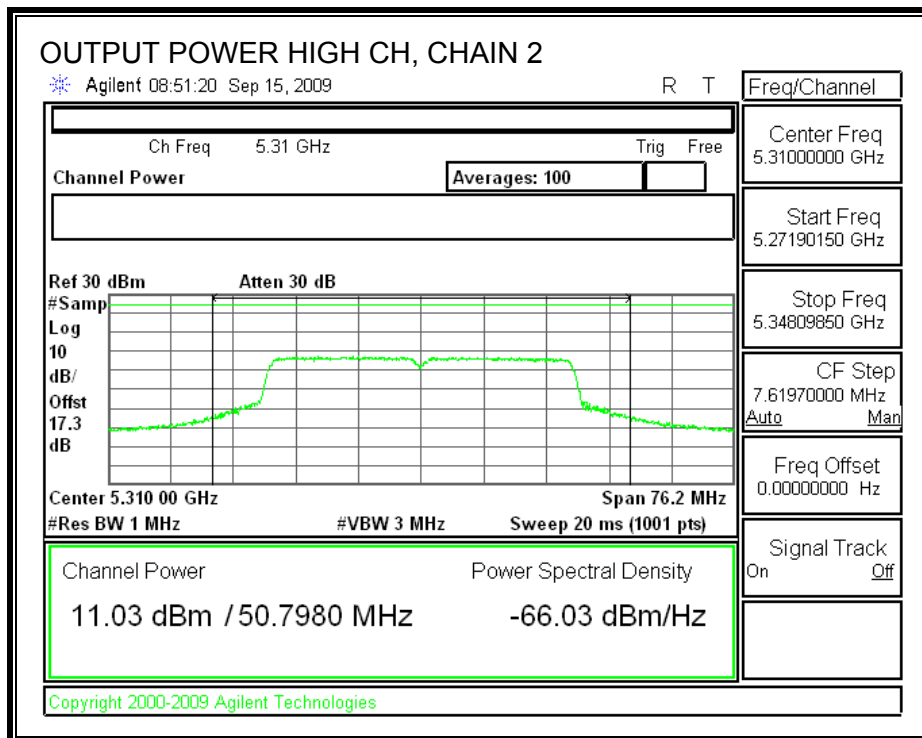
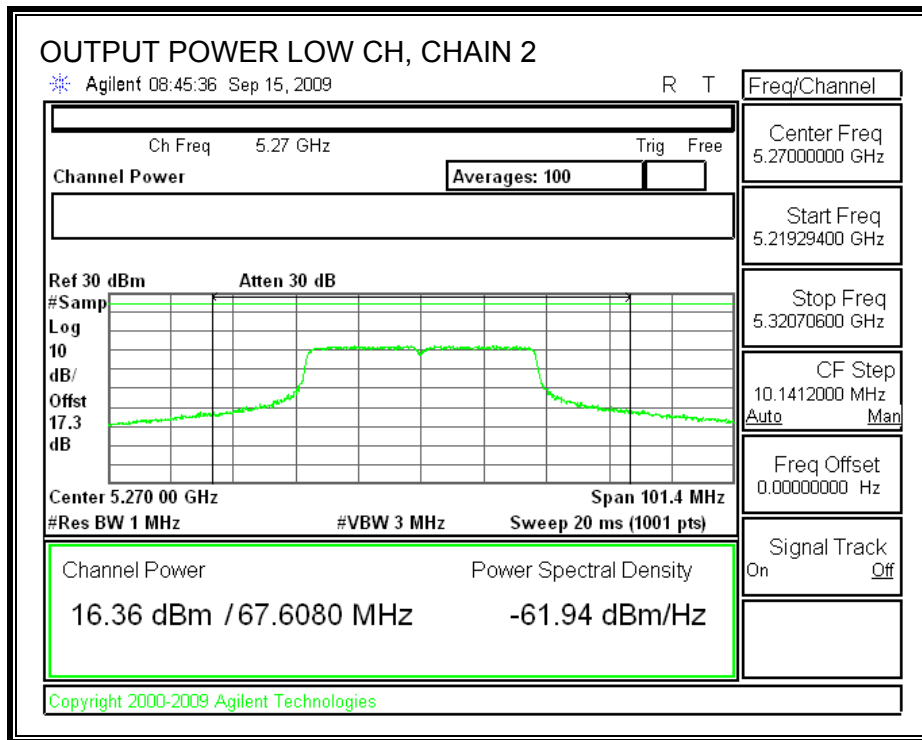
Individual Chain Results

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5270	15.75	16.36	19.08	24.00	-4.92
High	5310	10.36	11.03	13.72	24.00	-10.28

CHAIN 1 OUTPUT POWER



CHAIN 2 OUTPUT POWER



7.6.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 17.3 dB (including 10 dB pad and 7.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5270	15.89	16.52	19.23
High	5310	10.61	11.23	13.94

7.6.4. 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 or equal to 6 dBi, therefore the limit is 11 dBm.

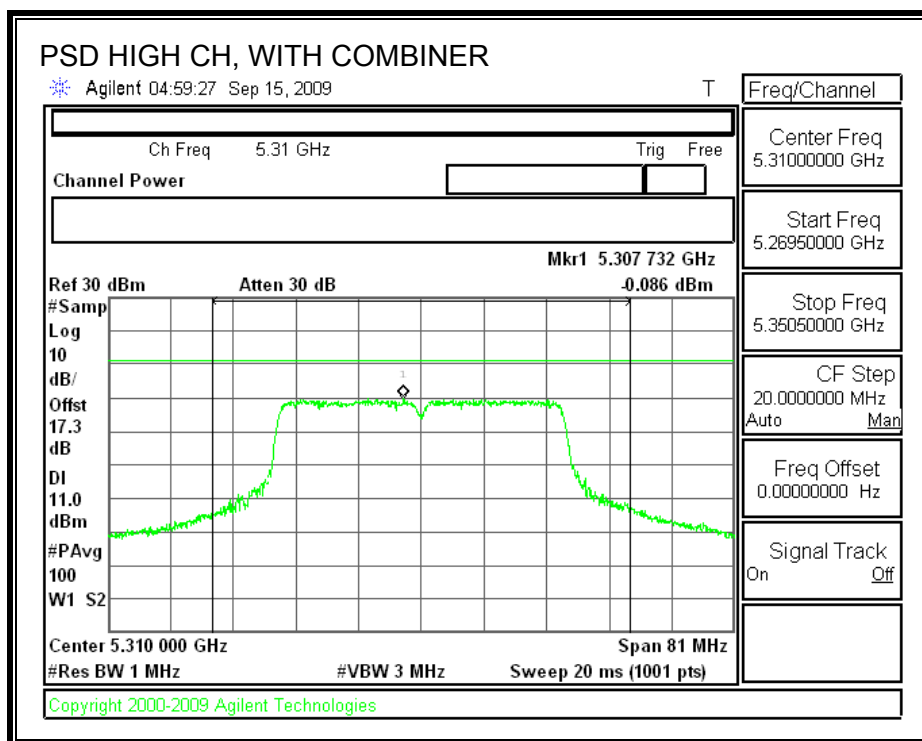
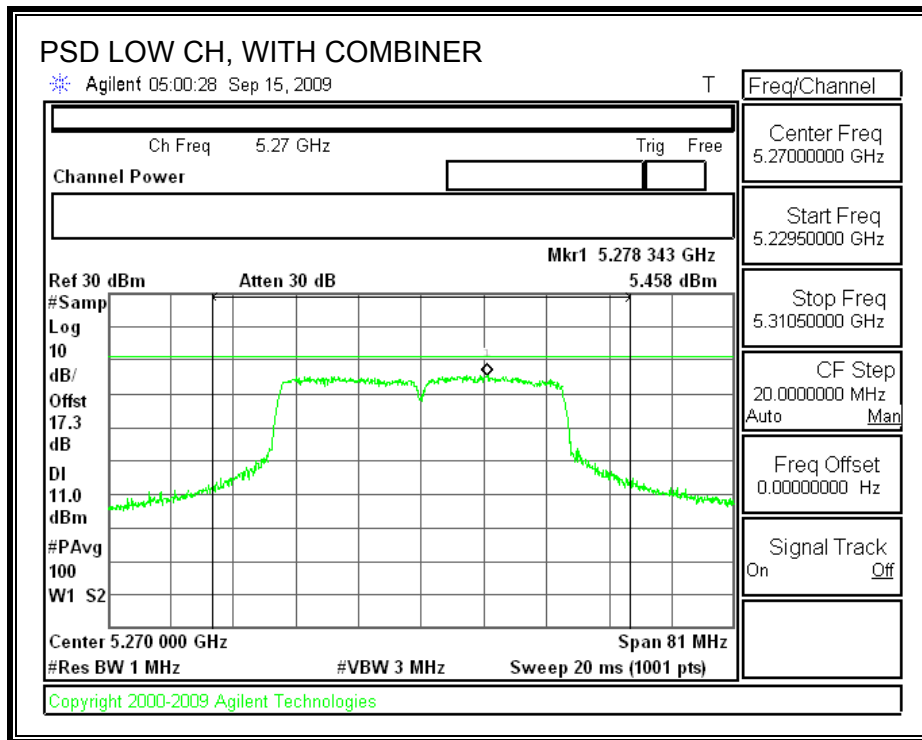
TEST PROCEDURE

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 With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5270	5.46	11	-5.54
High	5310	-0.09	11	-11.09

POWER SPECTRAL DENSITY WITH COMBINER



7.6.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

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

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

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

RESULTS

CHAIN 1

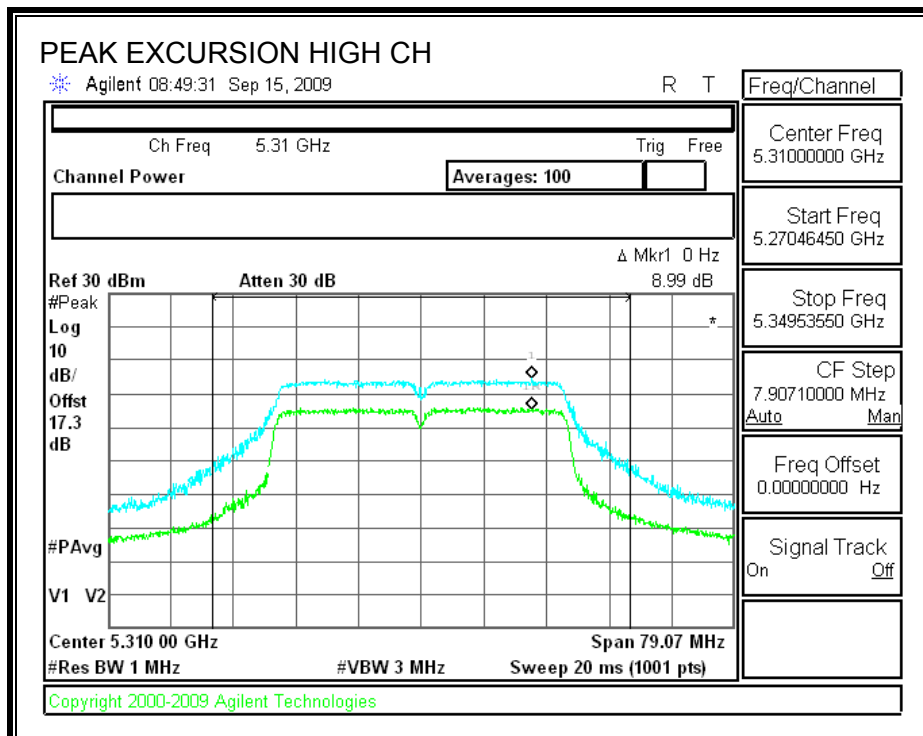
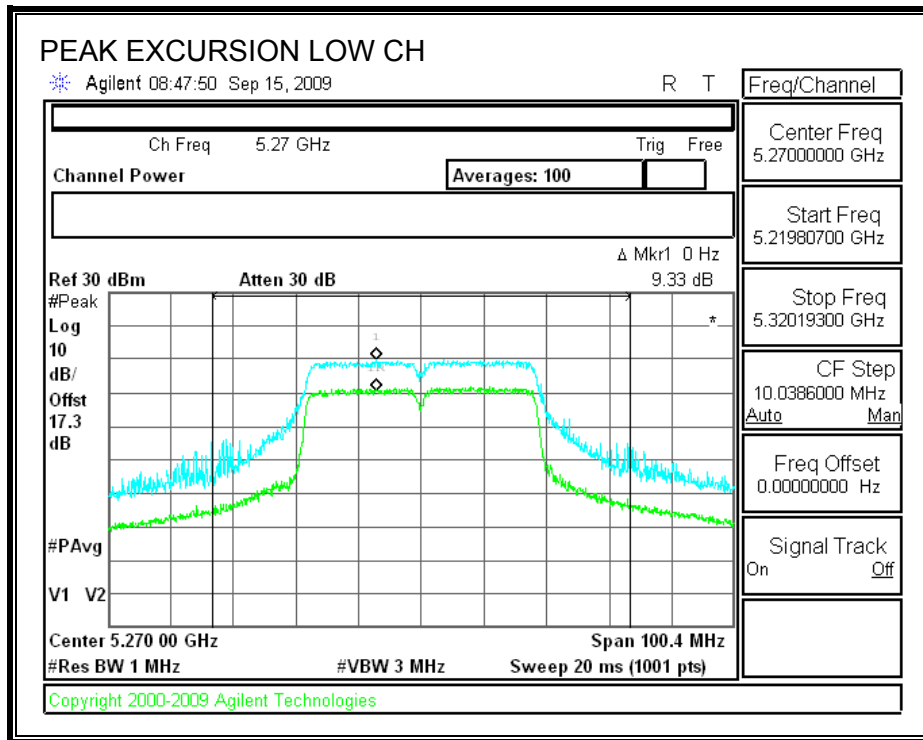
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5270	9.33	13	-3.67
High	5310	8.99	13	-4.01

CHAIN 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5270	9.23	13	-3.77
High	5310	9.94	13	-3.06

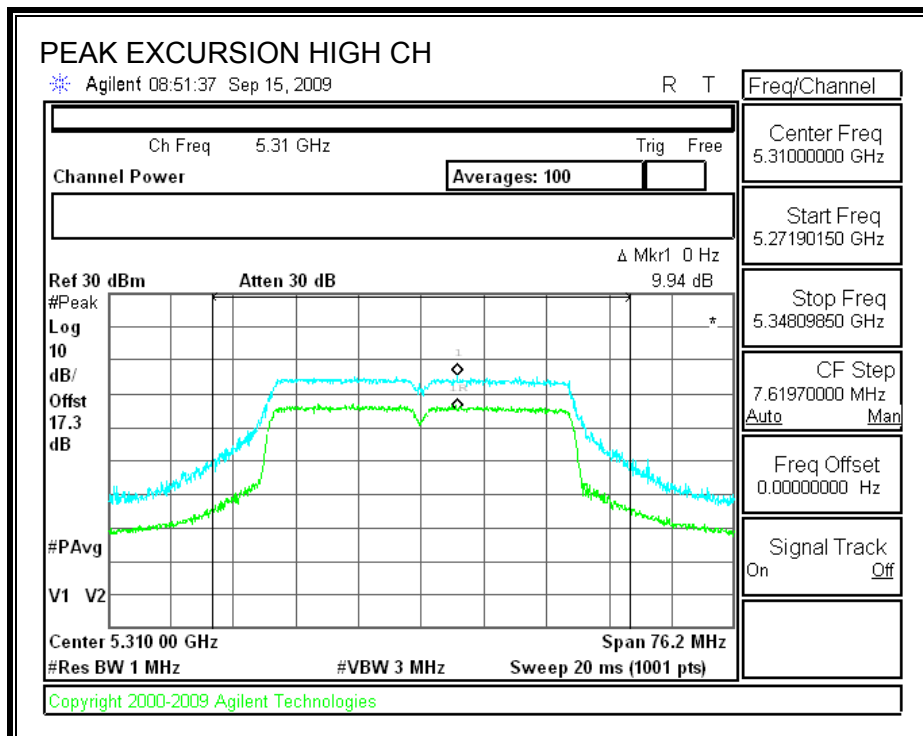
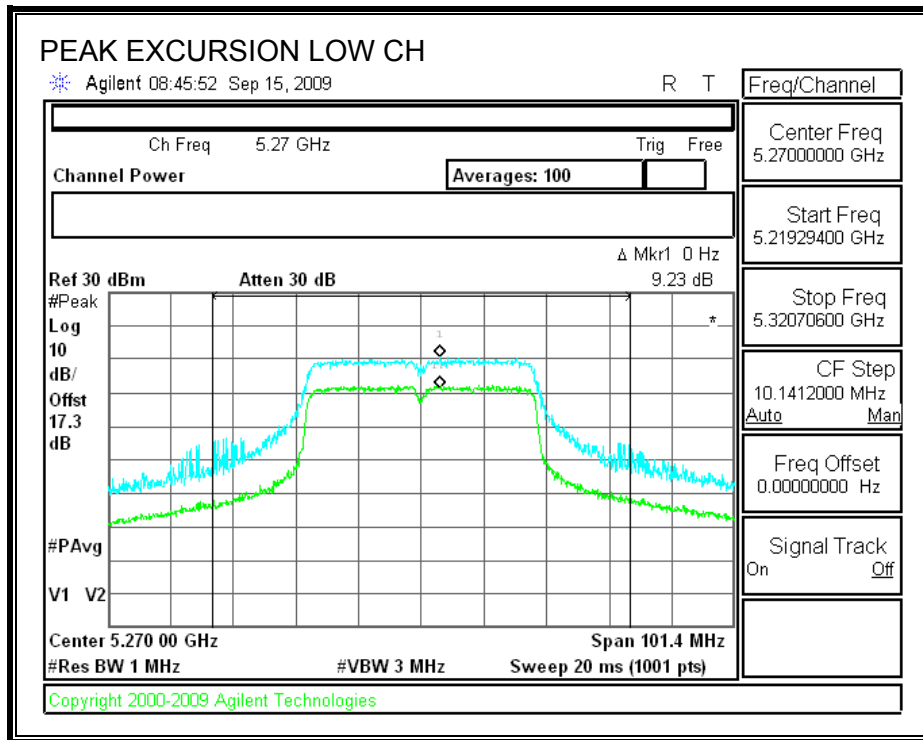
CHAIN 1

PEAK EXCURSION



CHAIN 2

PEAK EXCURSION



7.6.6. 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

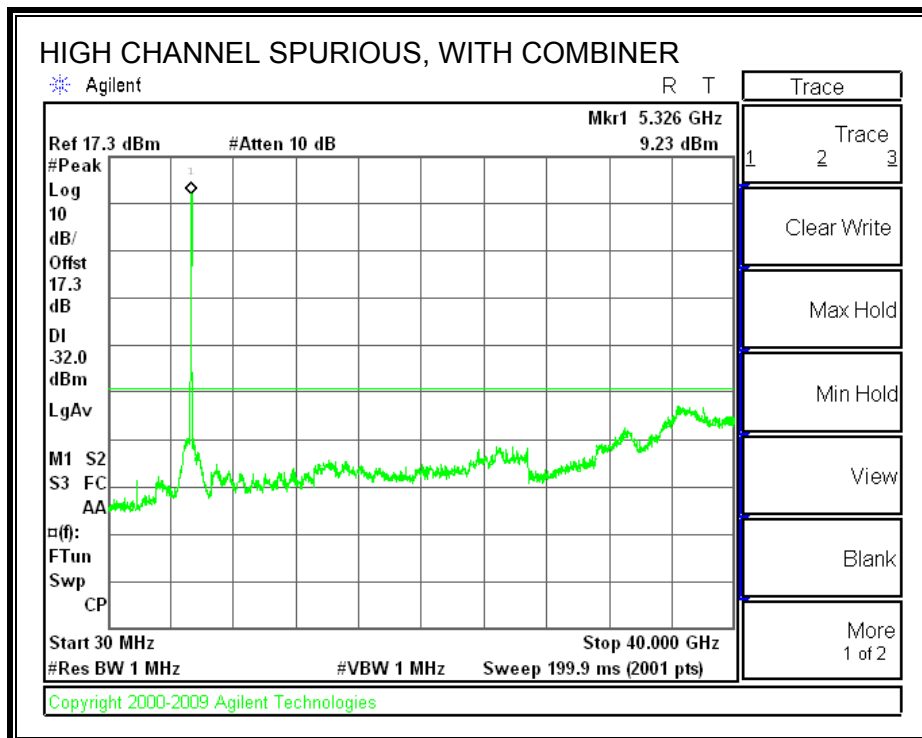
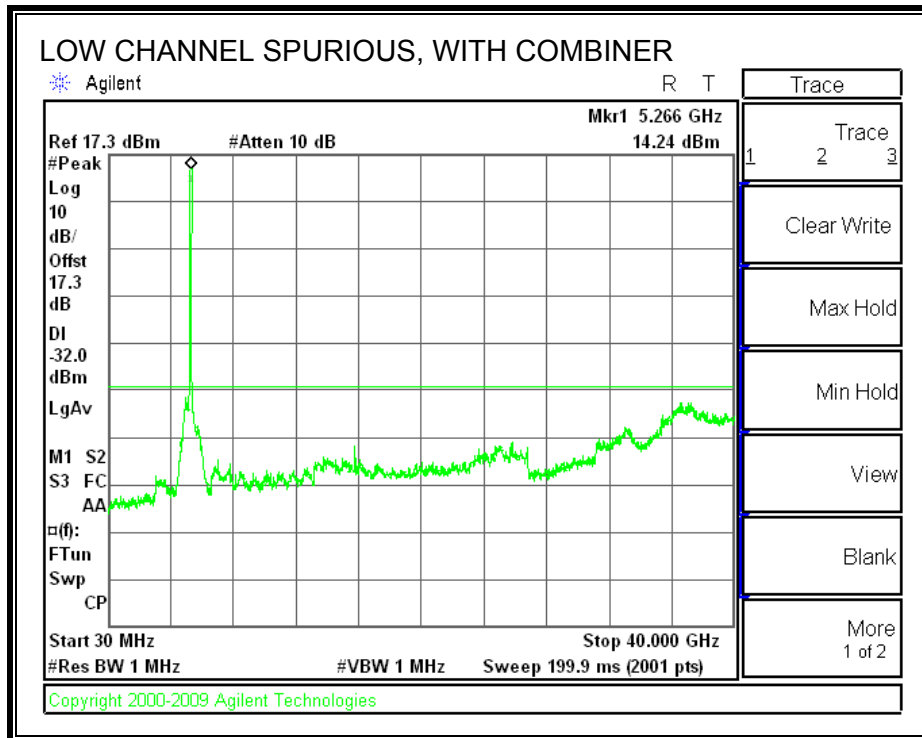
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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 WITH COMBINER



7.7. 802.11a DUAL CHAIN LEGACY 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 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

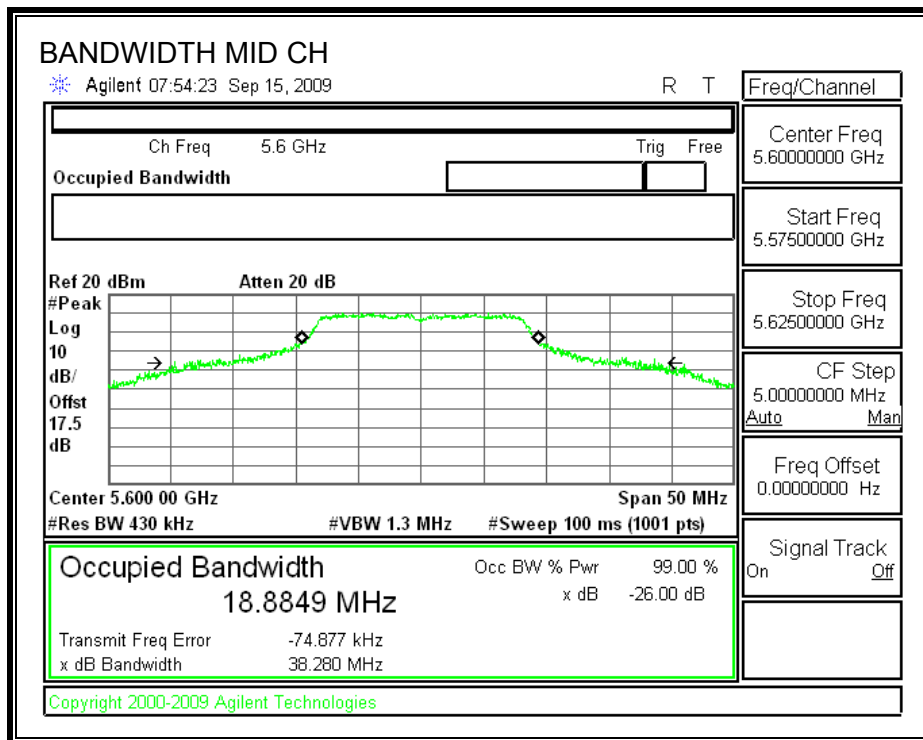
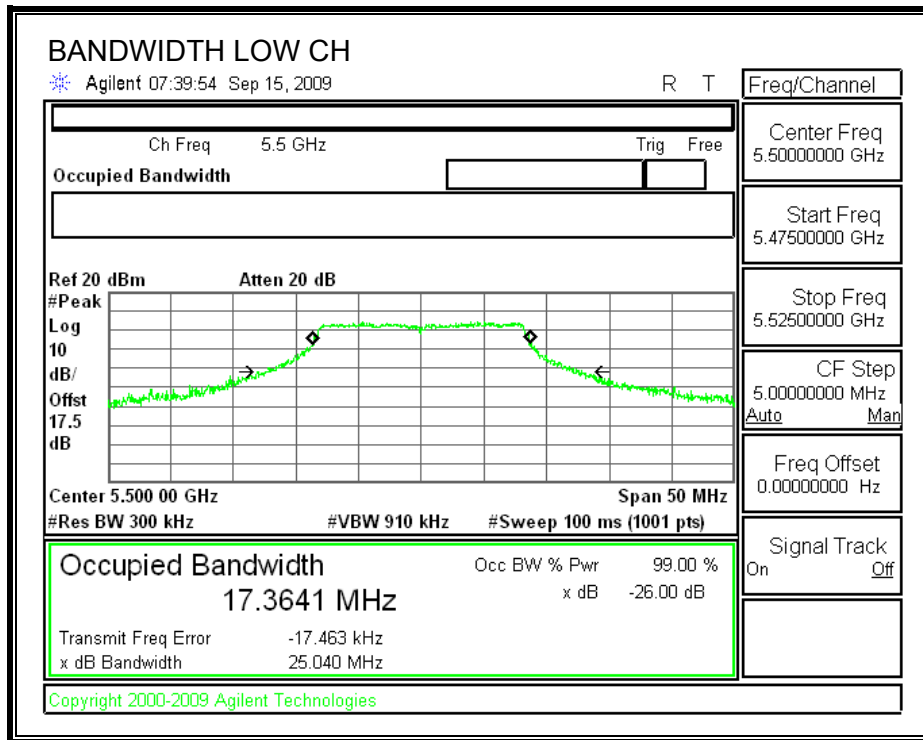
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5500	25.040	16.5159
Middle	5600	38.280	16.5702
High	5700	24.668	16.2821

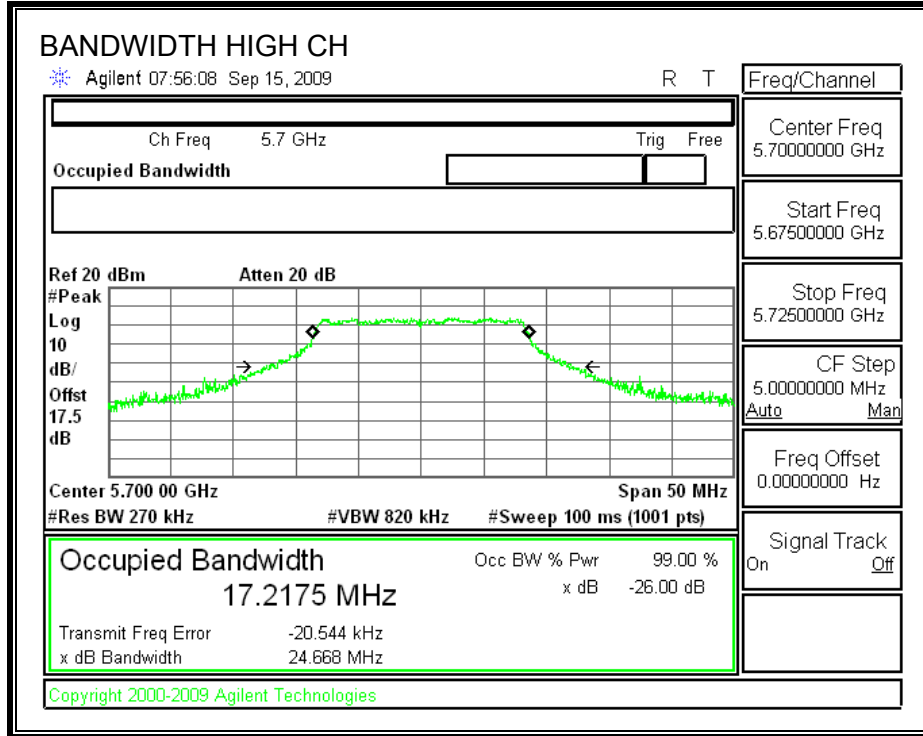
CHAIN 2

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5500	24.612	16.6265
Middle	5600	39.106	16.6962
High	5700	24.036	16.5359

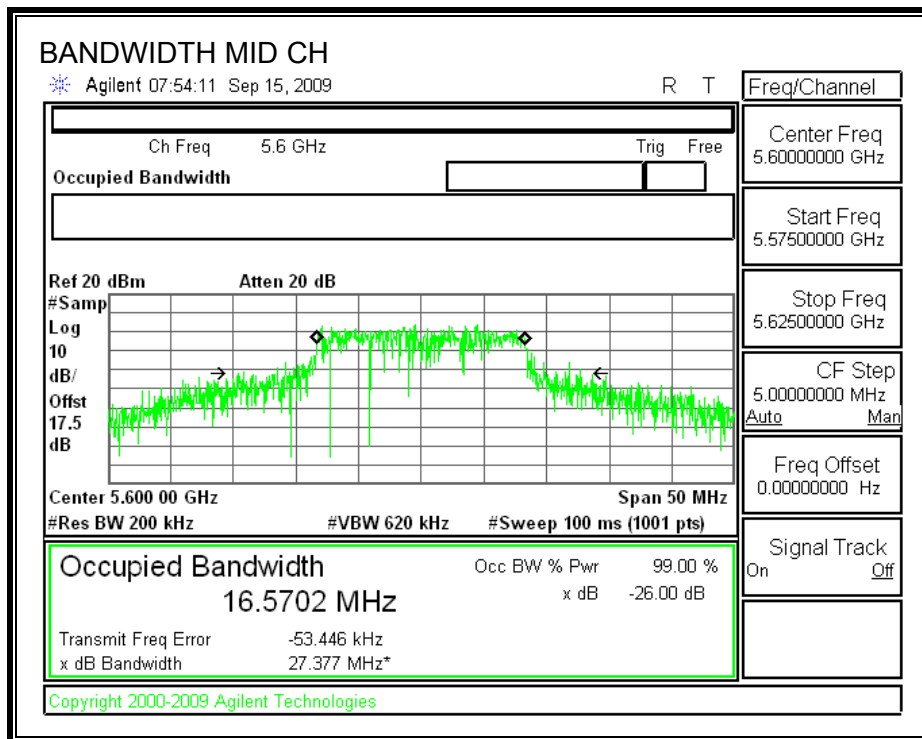
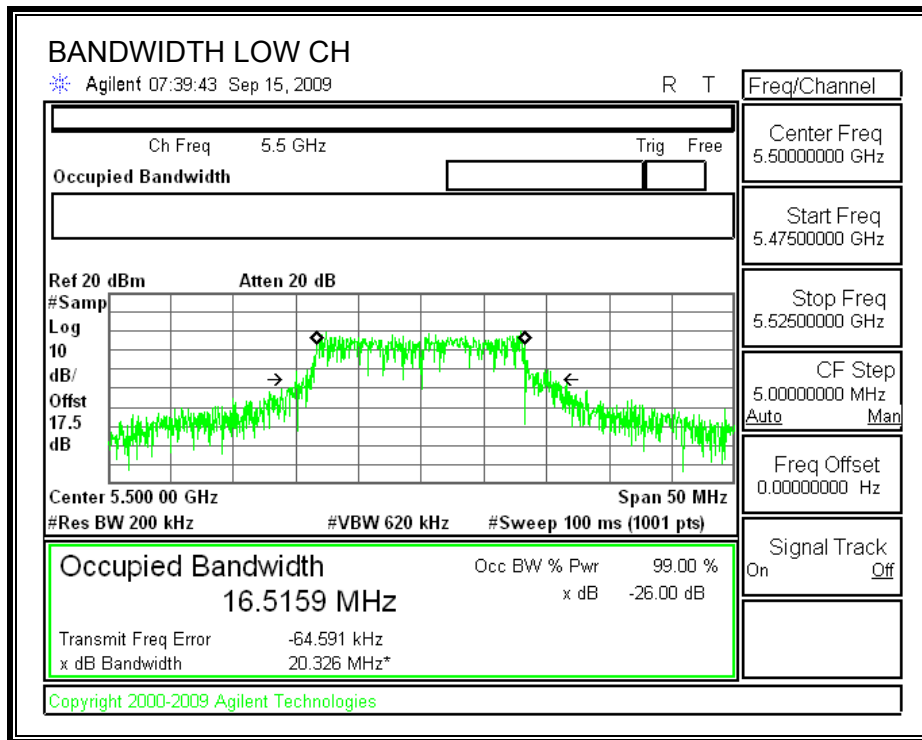
CHAIN 1

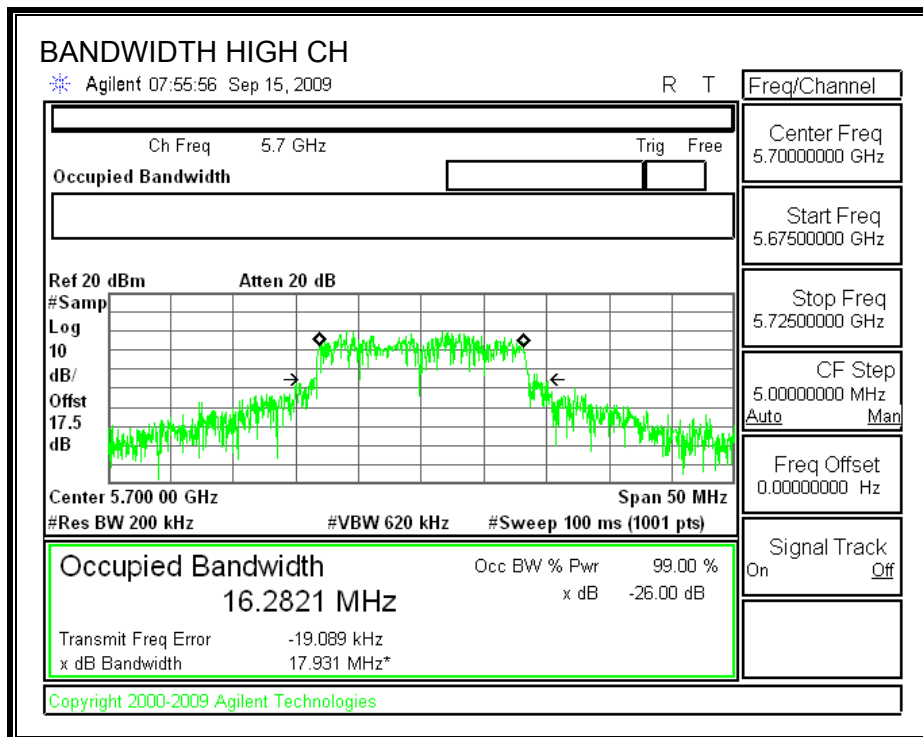
26 dB BANDWIDTH





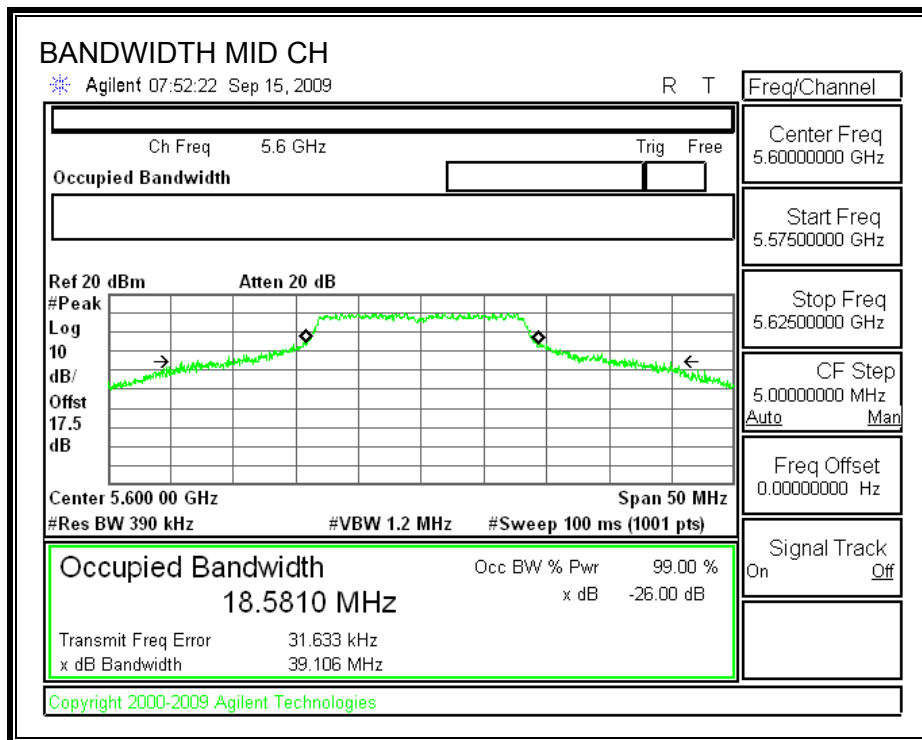
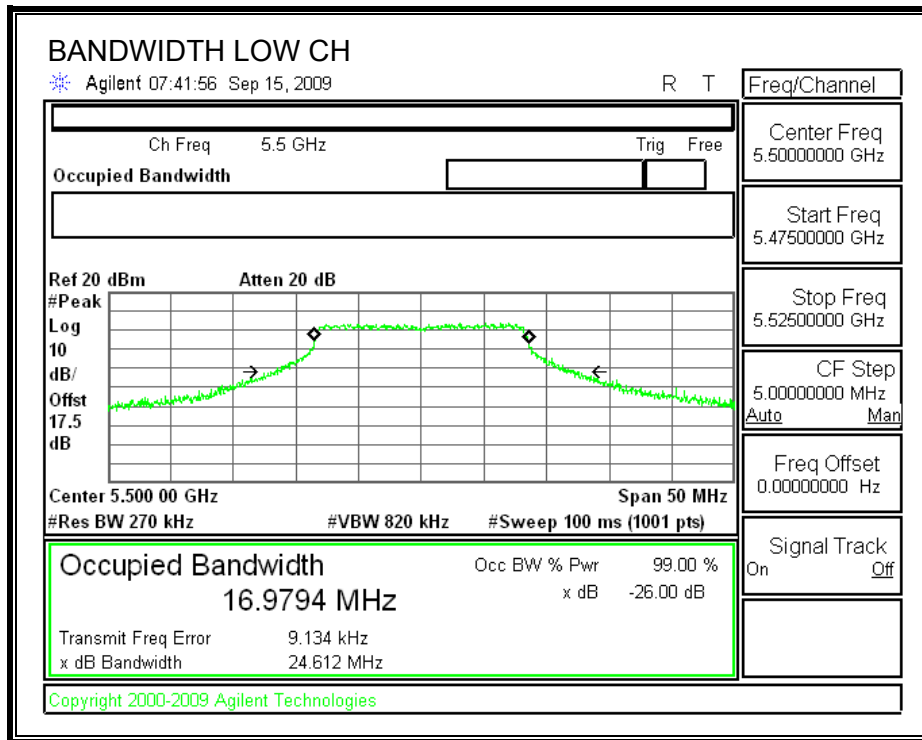
99% BANDWIDTH

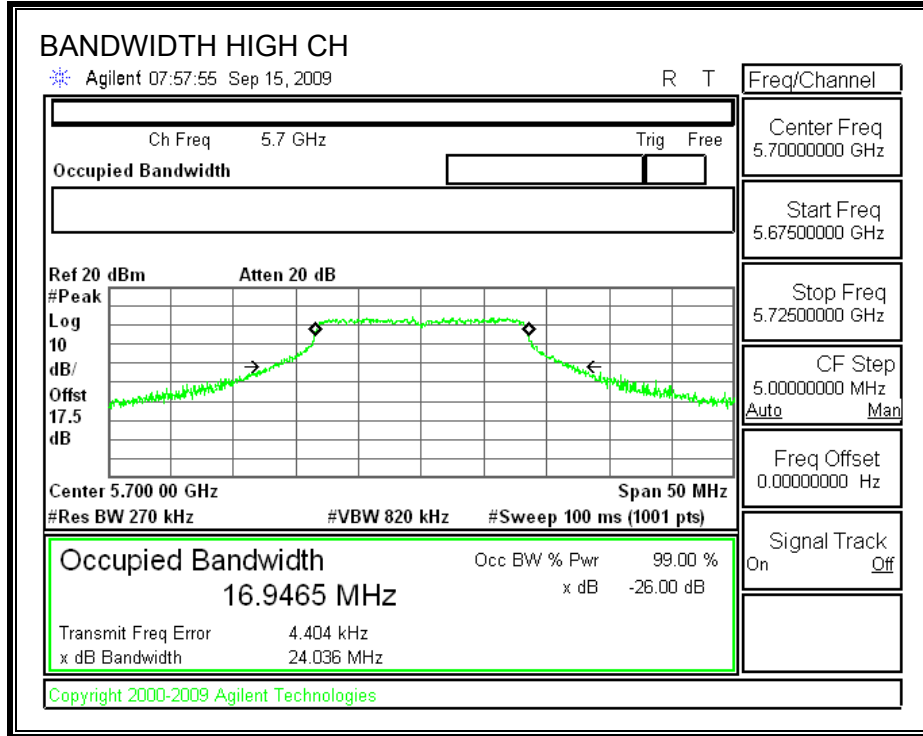




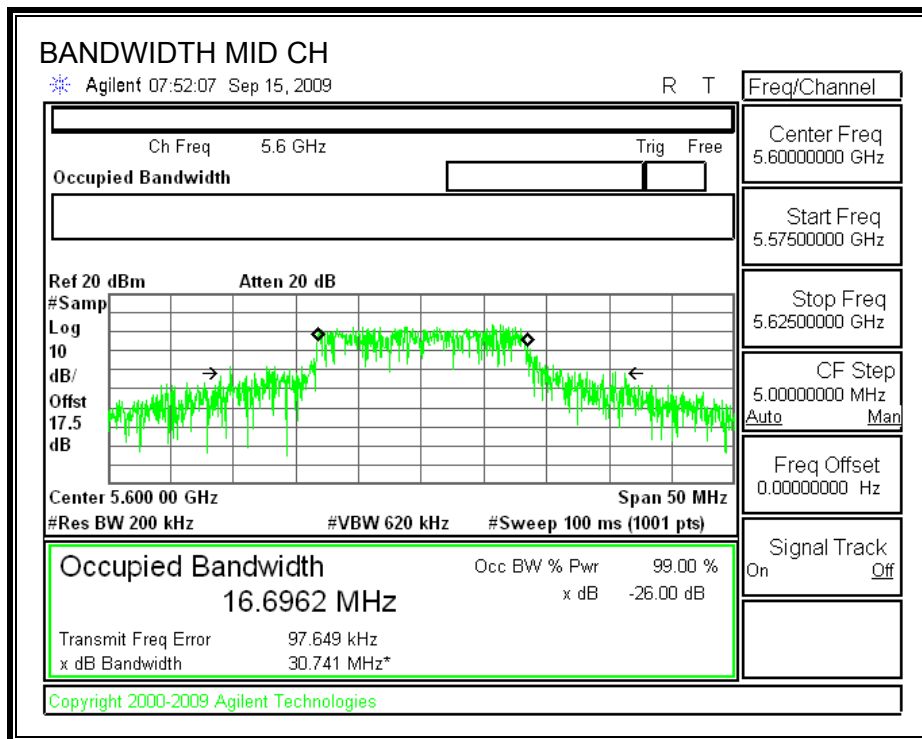
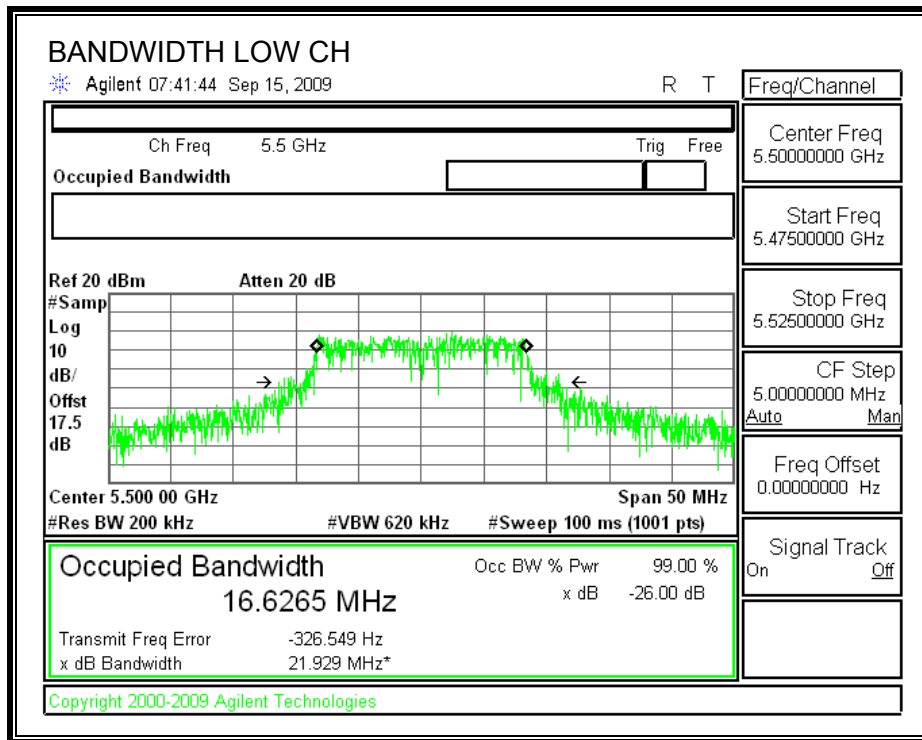
CHAIN 2

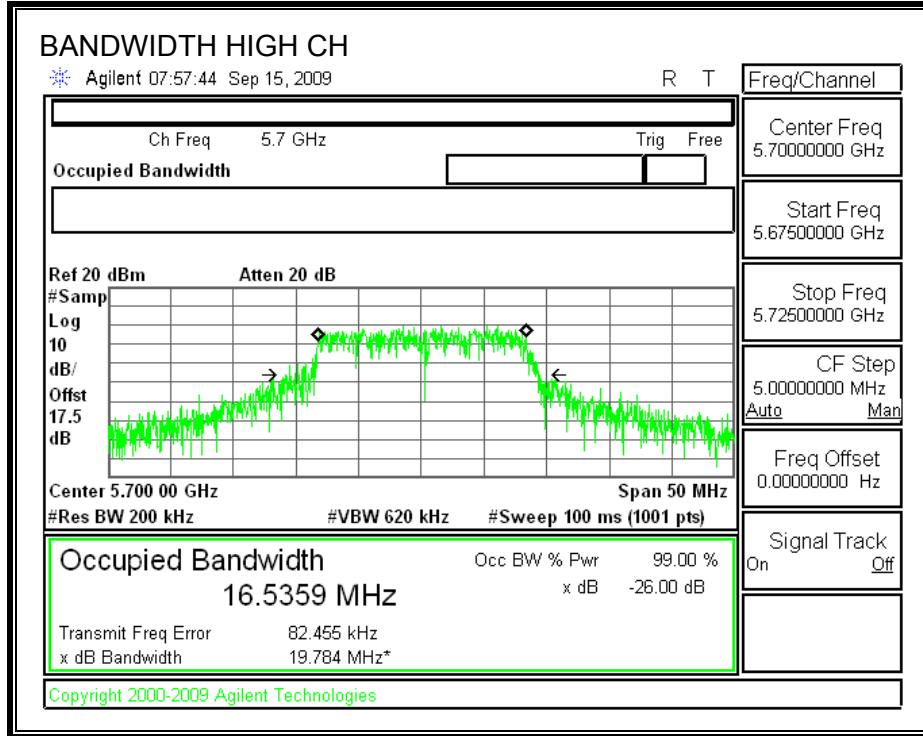
26 dB BANDWIDTH





99% BANDWIDTH





7.7.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

Antenna Gain (Chain 1) (dBi)	Antenna Gain (Chain 2) (dBi)	Effective Legacy Gain (dBi)
1.84	2.13	5.00

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

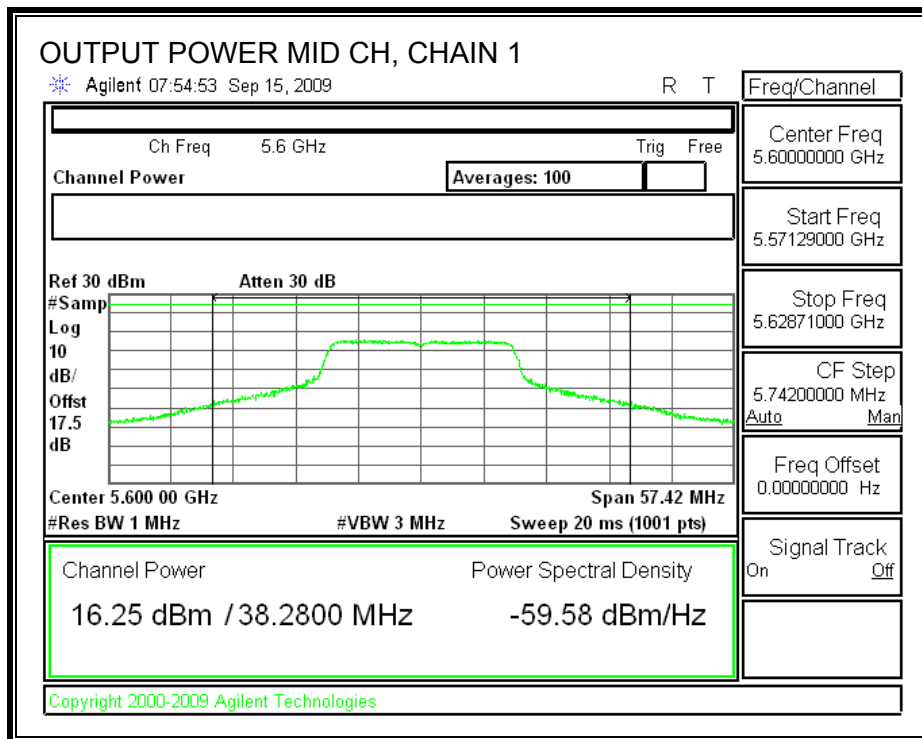
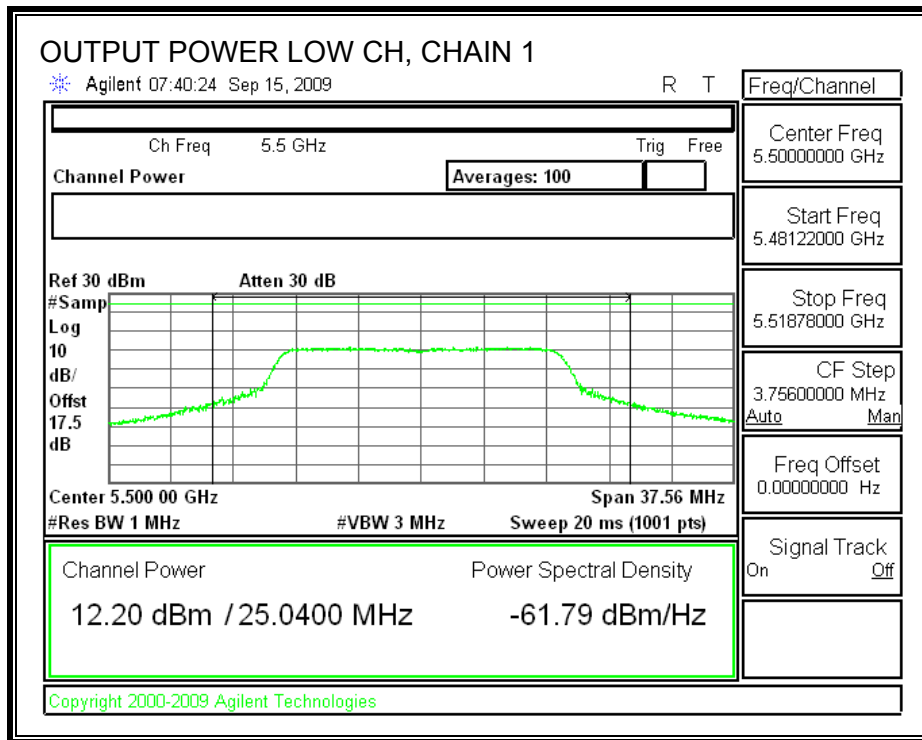
Limit

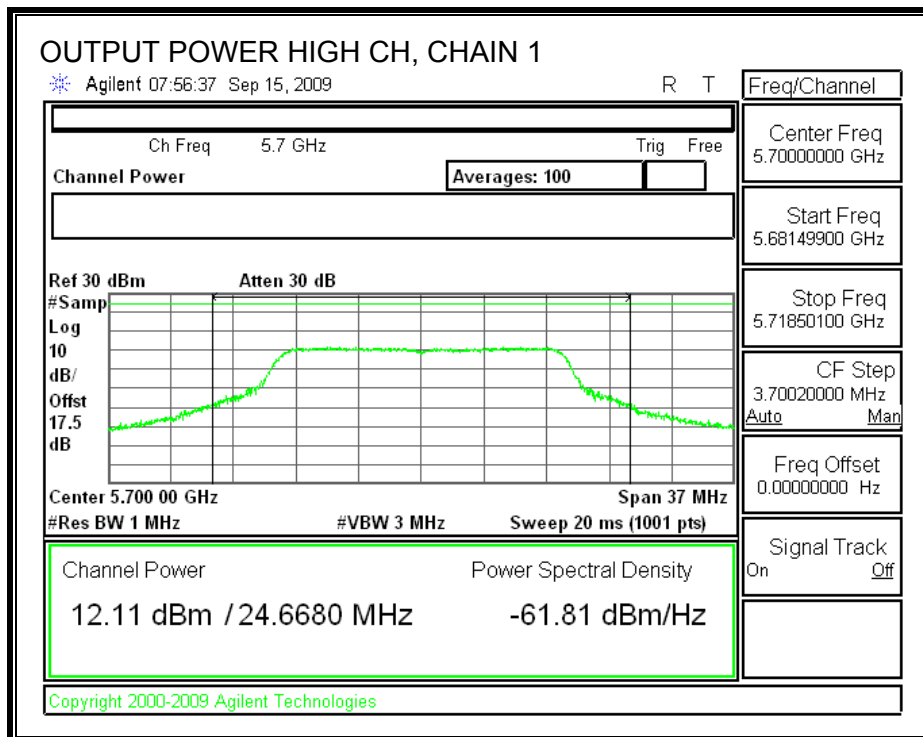
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Effective Ant Gain (dBi)	Limit (dBm)
Low	5500	24	25.040	24.99	5.00	24.00
Mid	5600	24	38.280	26.83	5.00	24.00
High	5700	24	24.668	24.92	5.00	24.00

Individual Chain Results

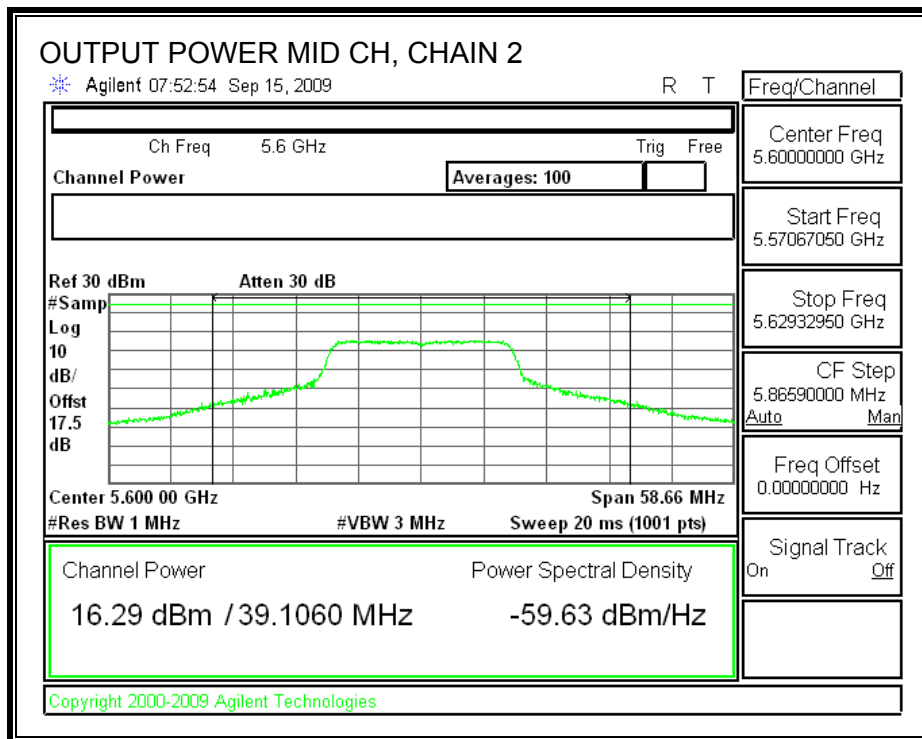
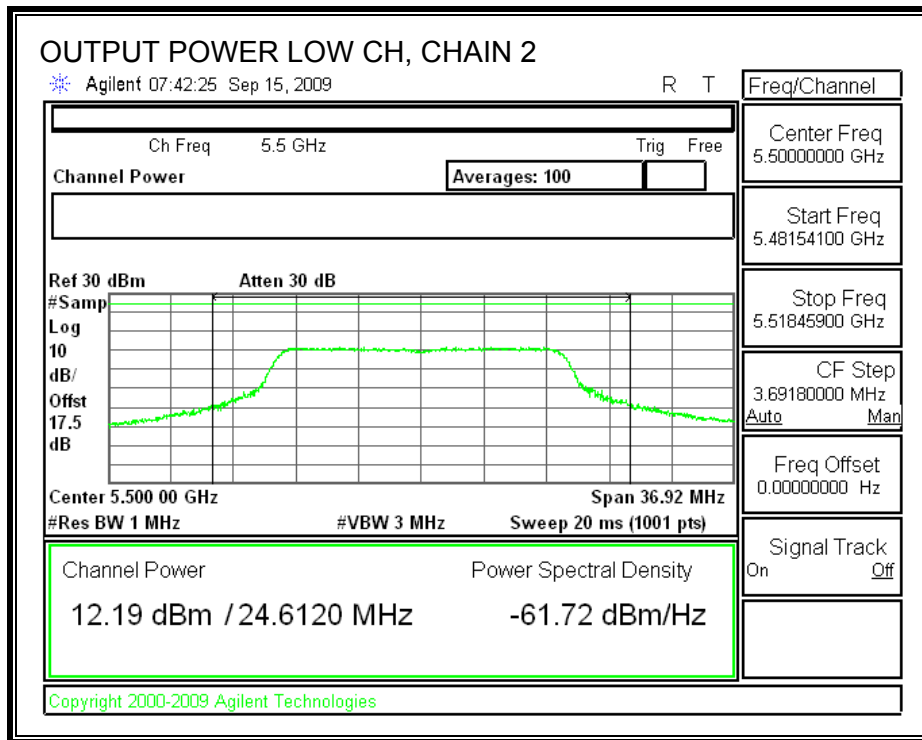
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	12.20	12.19	15.21	24.00	-11.80
Mid	5600	16.25	16.29	19.28	24.00	-7.75
High	5700	12.11	12.69	15.42	24.00	-11.89

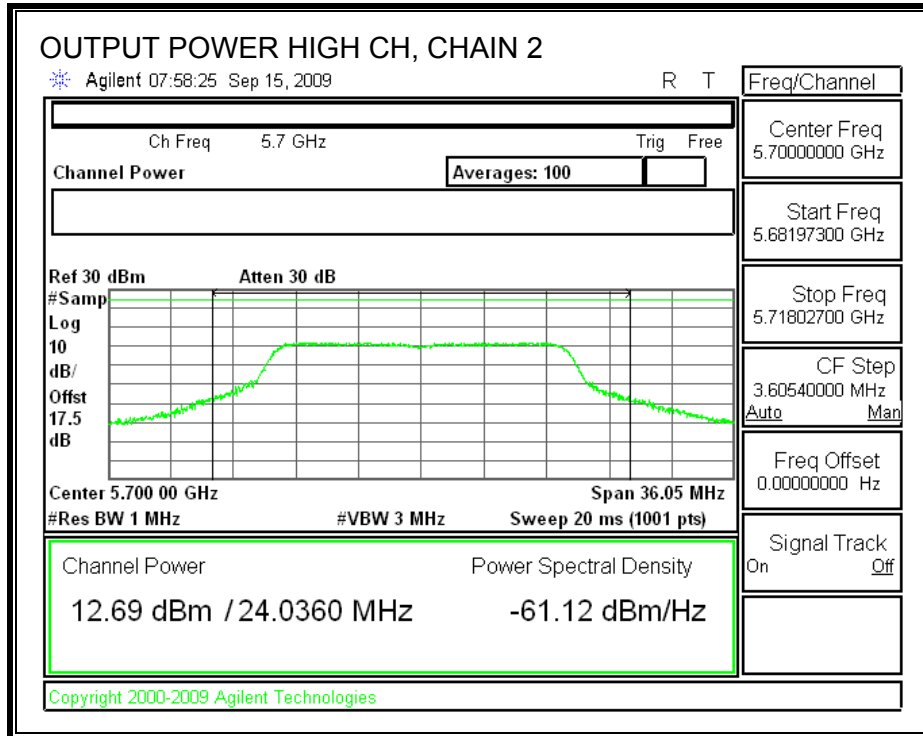
CHAIN 1 OUTPUT POWER





CHAIN 2 OUTPUT POWER





7.7.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 17.5 dB (including 10 dB pad and 7.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5500	12.84	12.87	15.87
Middle	5600	16.72	16.87	19.81
High	5700	11.91	12.58	15.27

7.7.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

Antenna Gain (Chain 1) (dBi)	Antenna Gain (Chain 2) (dBi)	Effective Legacy Gain (dBi)
1.84	2.13	5.00

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 effective antenna gain is less than or equal to 6 dBi, therefore the limit is 11 dBm.

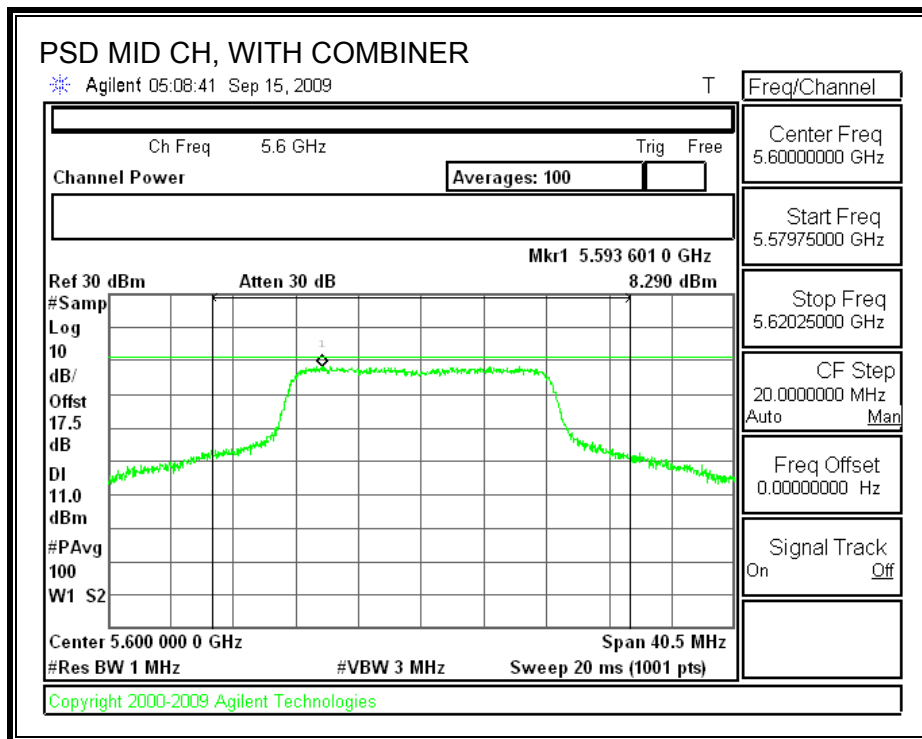
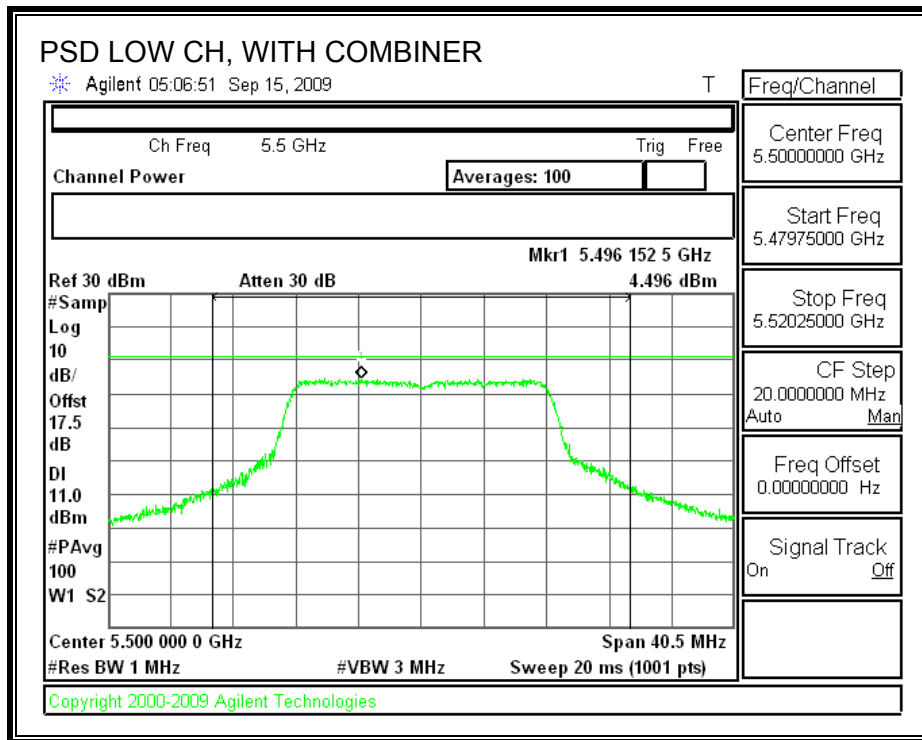
TEST PROCEDURE

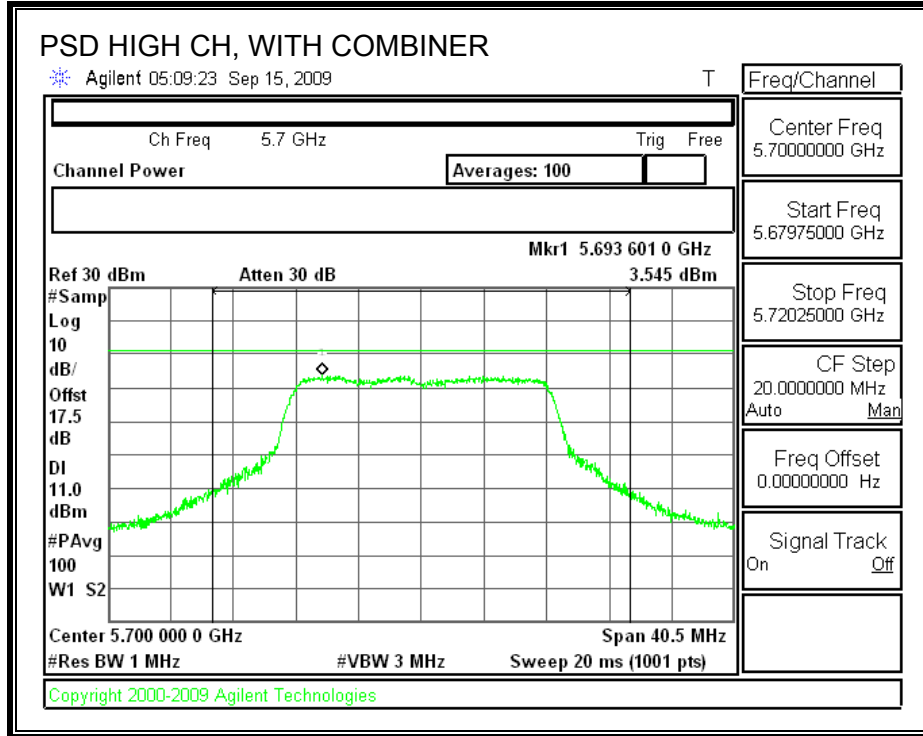
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5500	4.50	11	-6.50
Middle	5600	8.29	11	-2.71
High	5700	3.55	11	-7.46

POWER SPECTRAL DENSITY WITH COMBINER





7.7.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

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

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

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

RESULTS

CHAIN 1

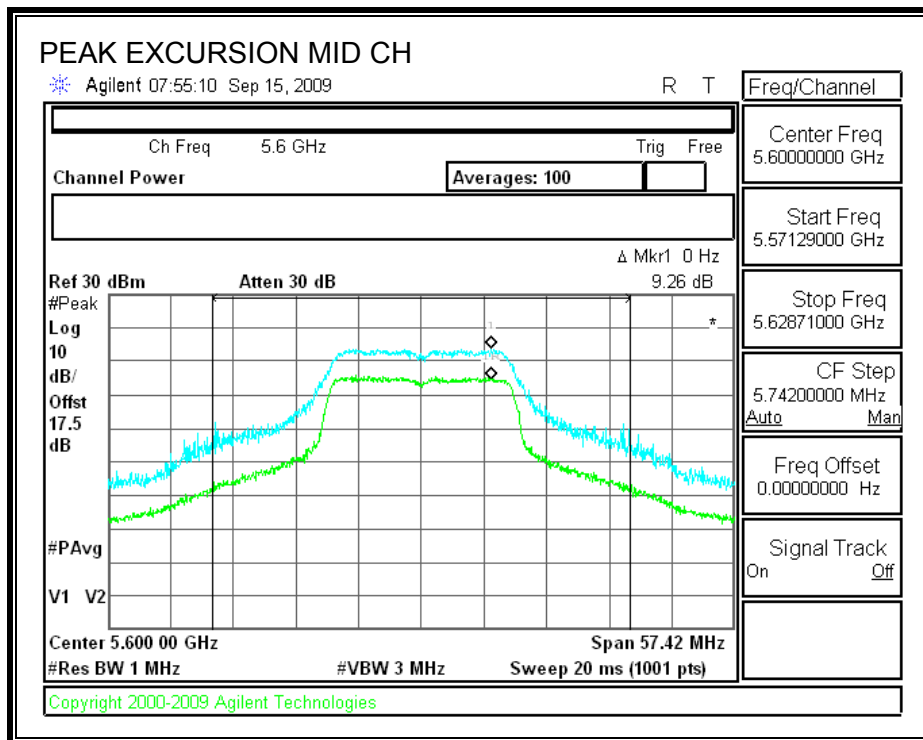
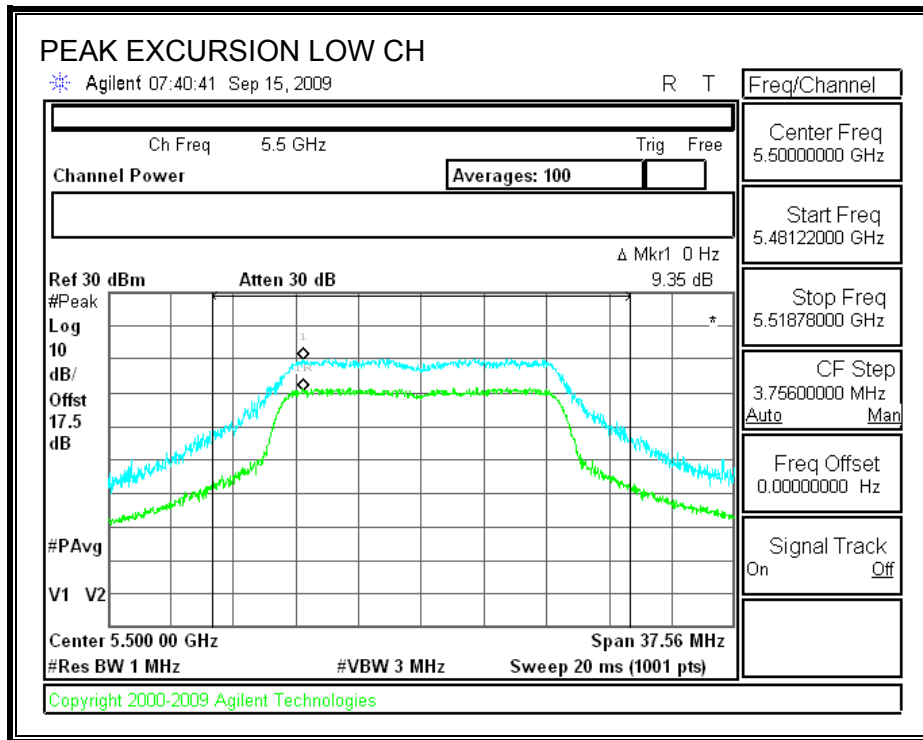
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	9.35	13	-3.65
Middle	5600	9.26	13	-3.74
High	5700	9.31	13	-3.69

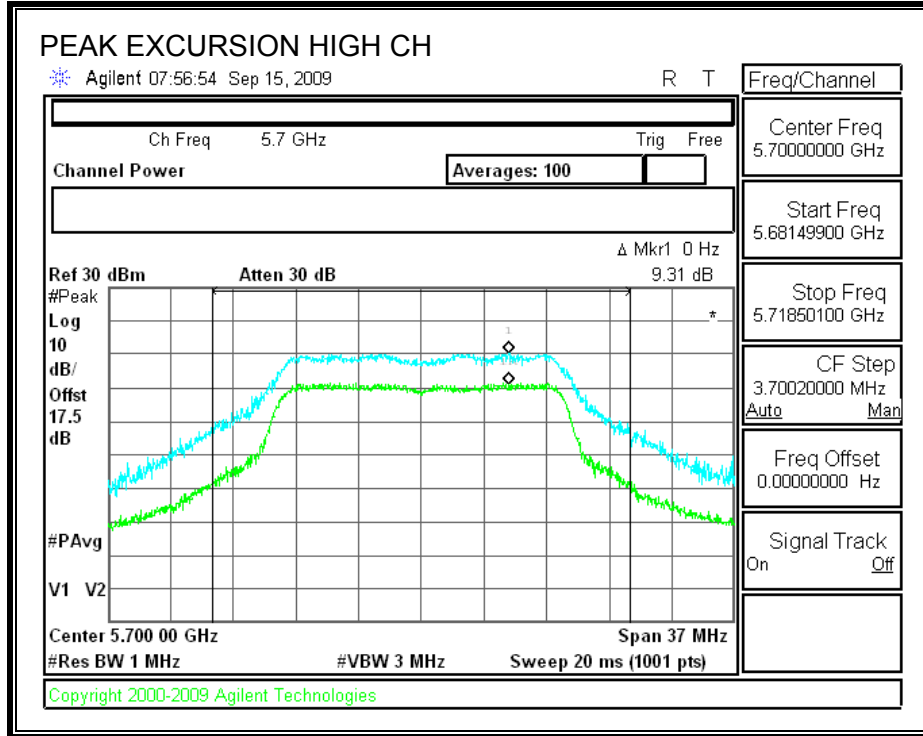
CHAIN 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	10.93	13	-2.07
Middle	5600	10.22	13	-2.78
High	5700	10.40	13	-2.60

CHAIN 1

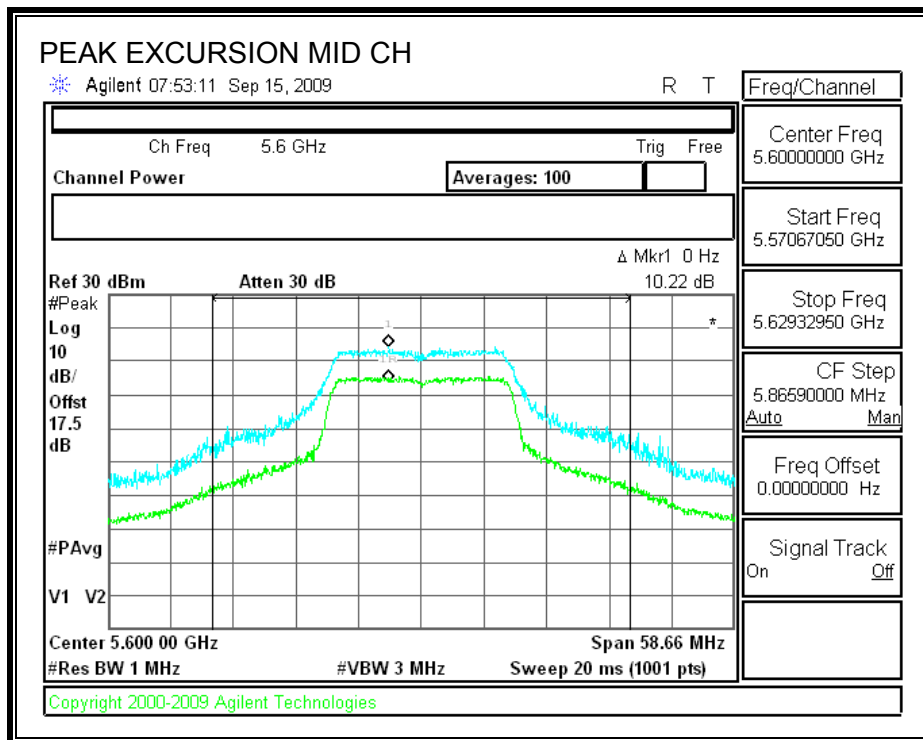
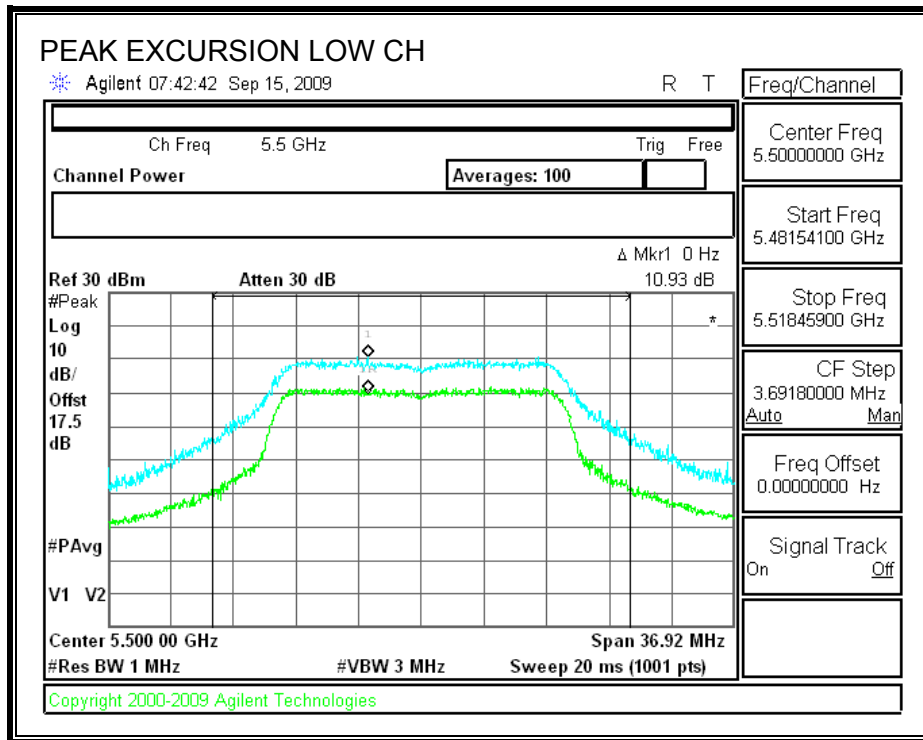
PEAK EXCURSION

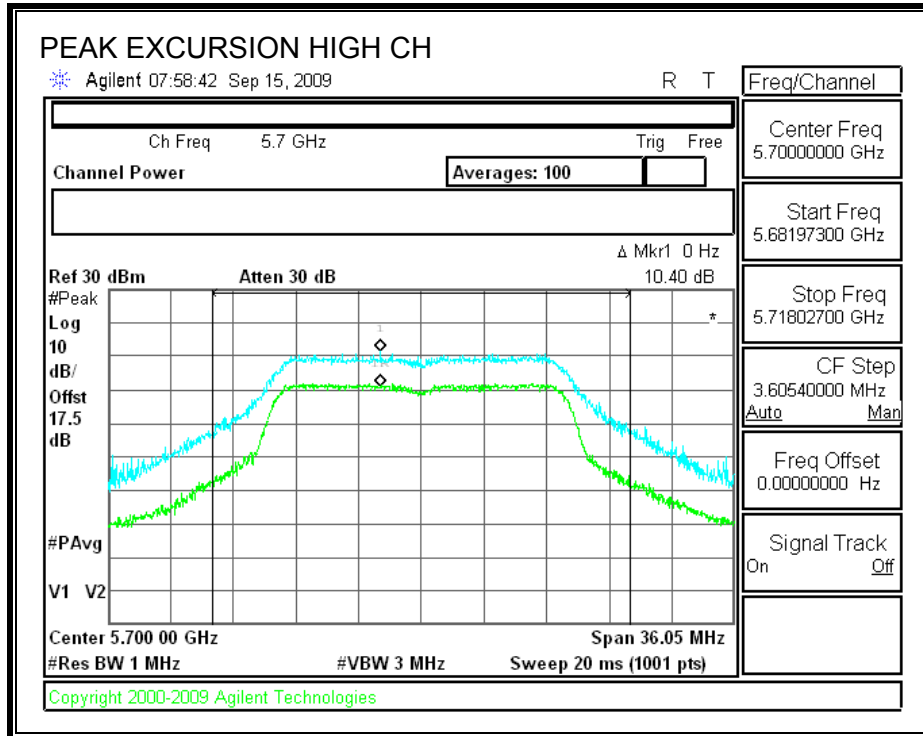




CHAIN 2

PEAK EXCURSION





7.7.6. 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

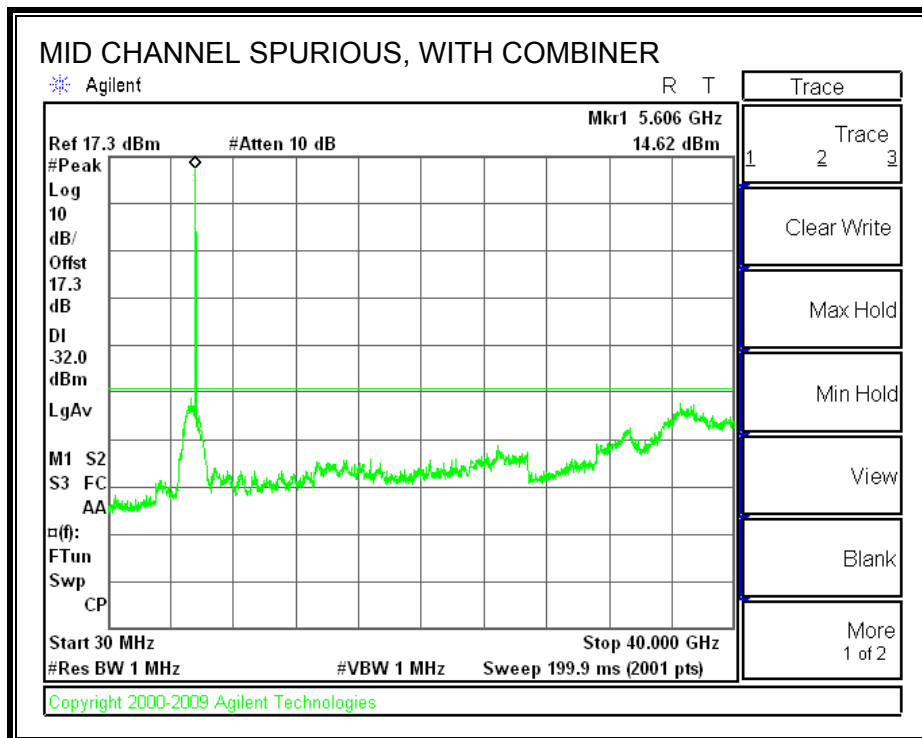
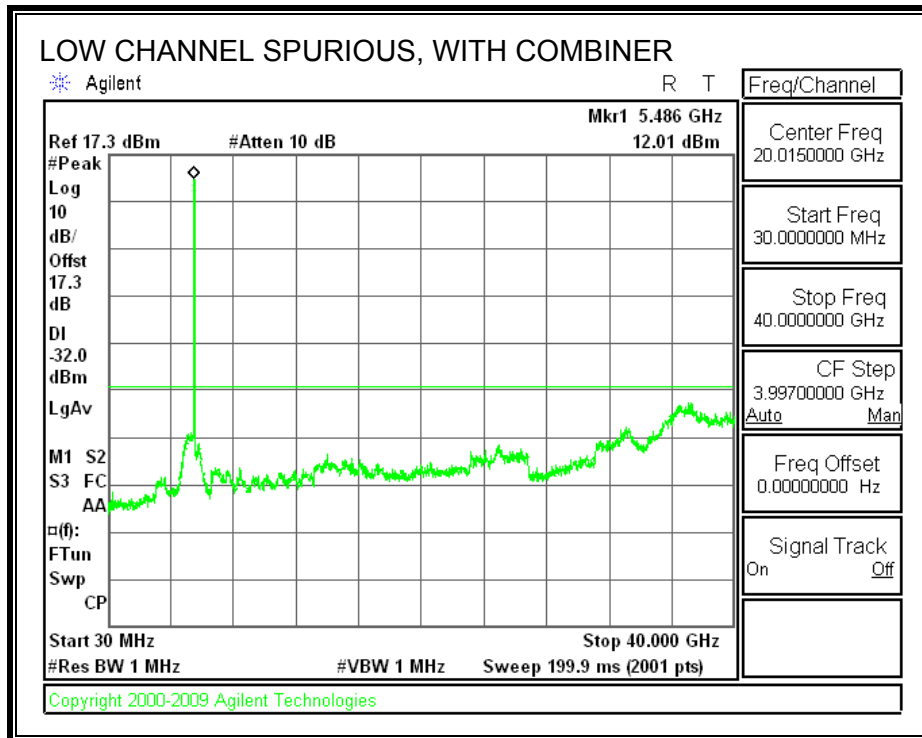
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

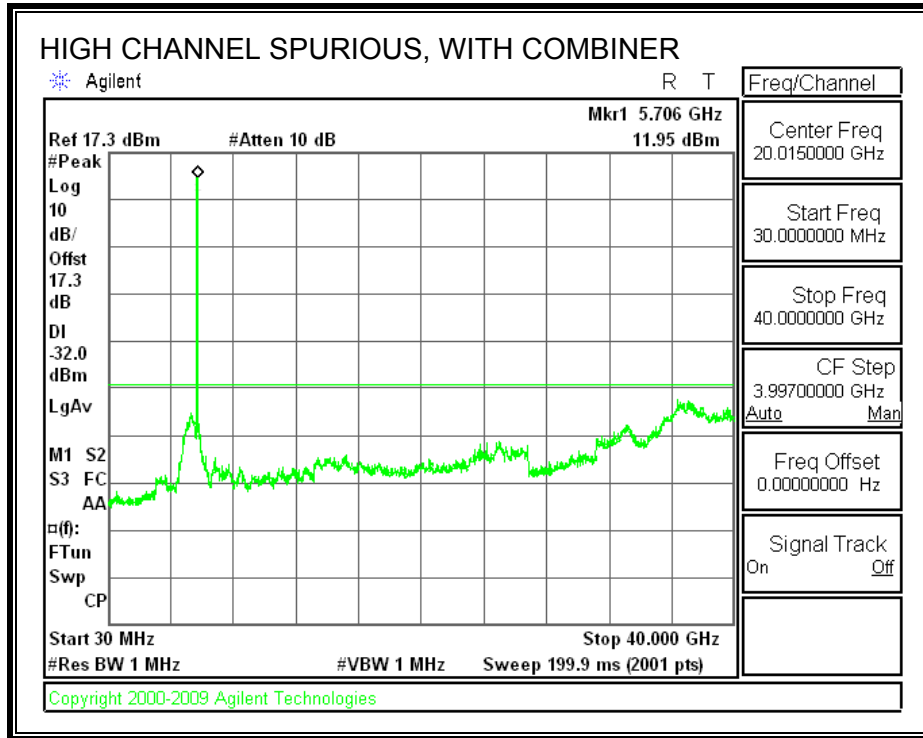
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

RESULTS

SPURIOUS EMISSIONS WITH COMBINER





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

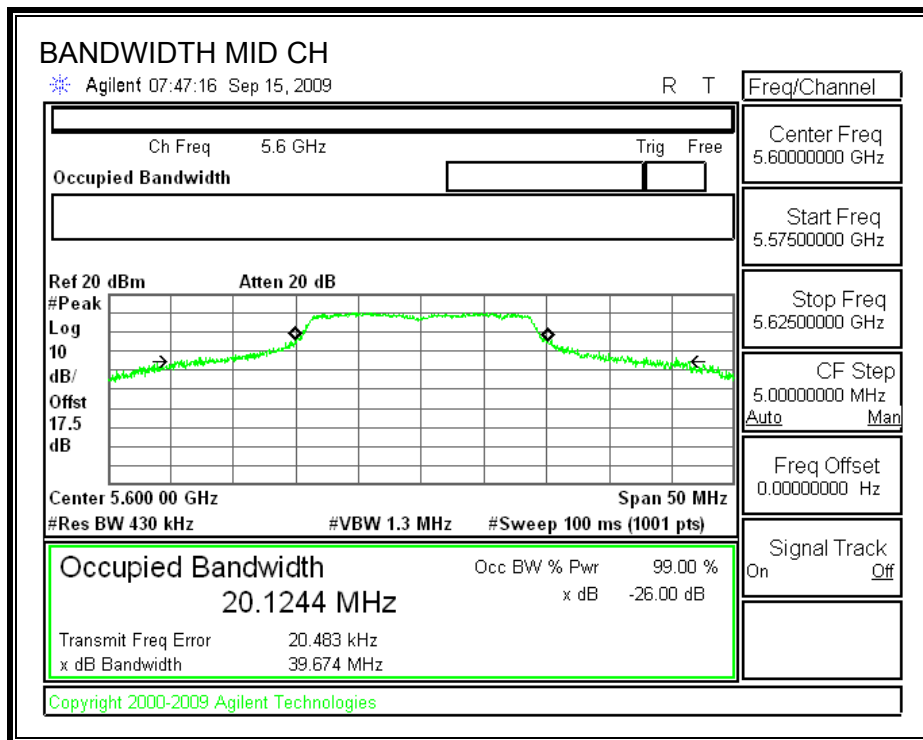
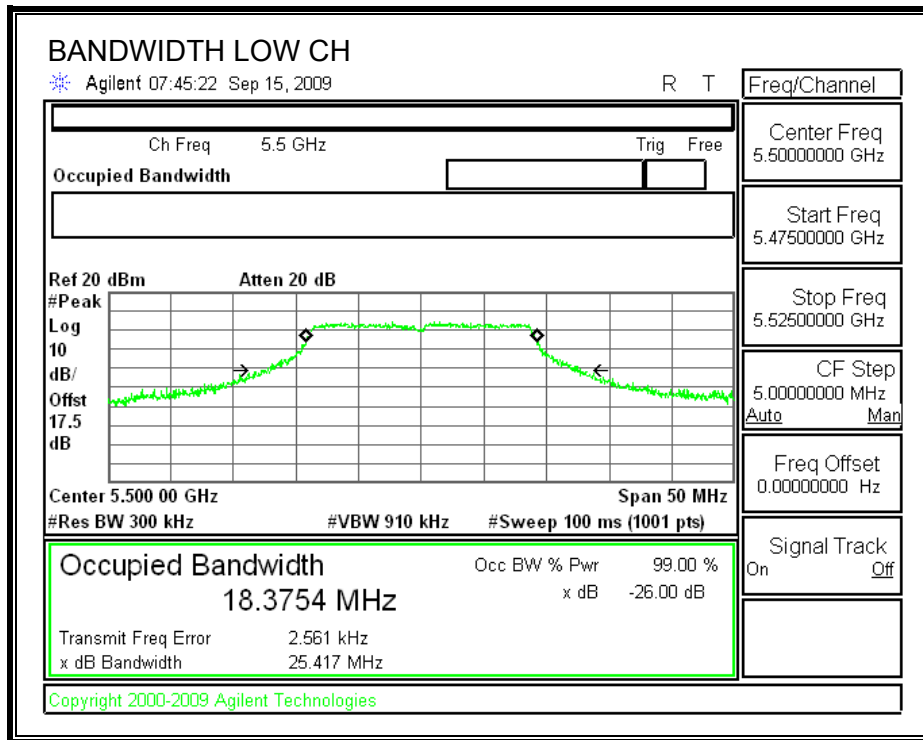
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5500	25.417	17.7742
Middle	5600	39.674	17.7981
High	5700	25.181	17.4199

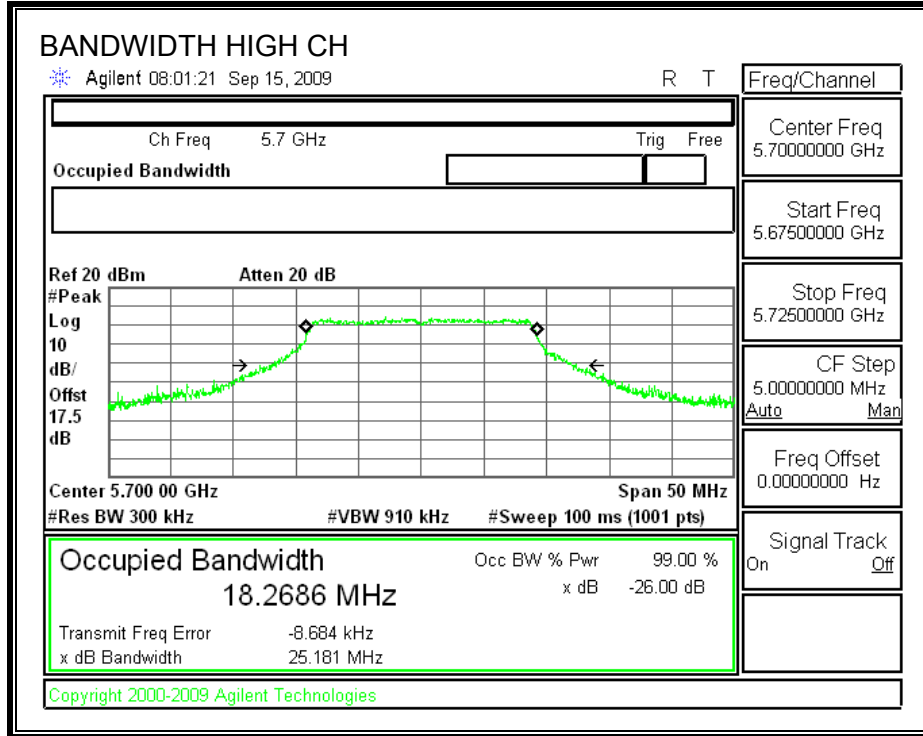
CHAIN 2

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5500	25.599	17.7072
Middle	5600	38.430	17.7444
High	5700	24.928	17.6812

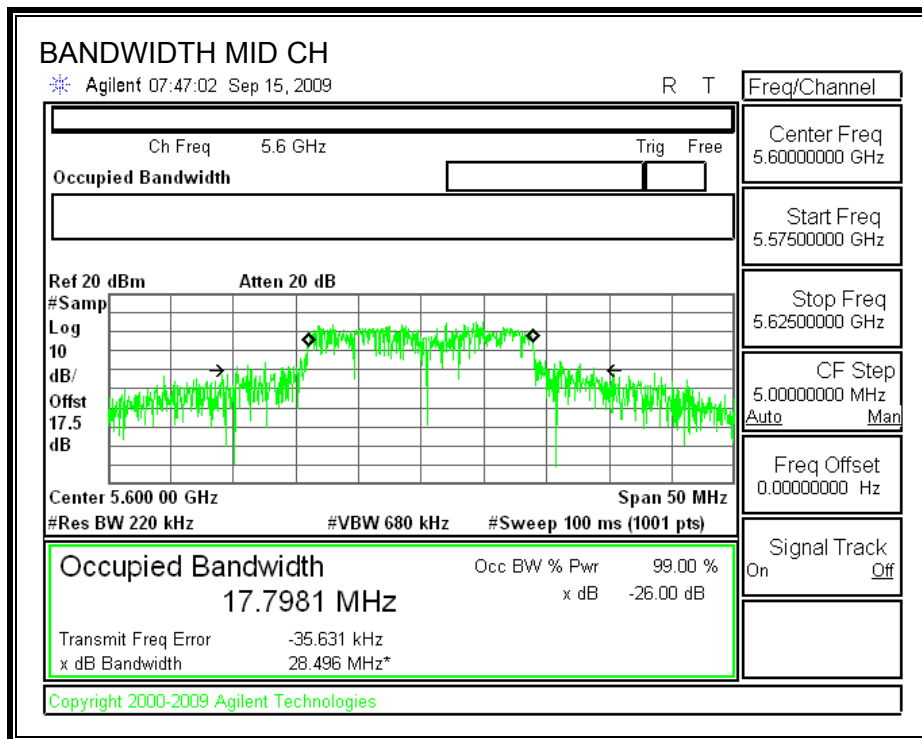
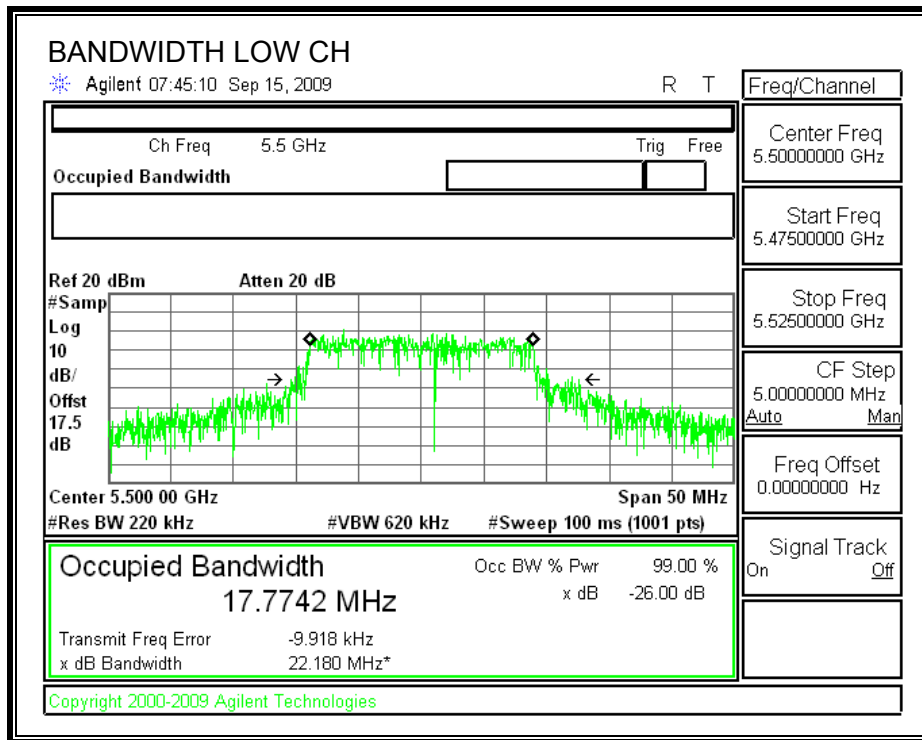
CHAIN 1

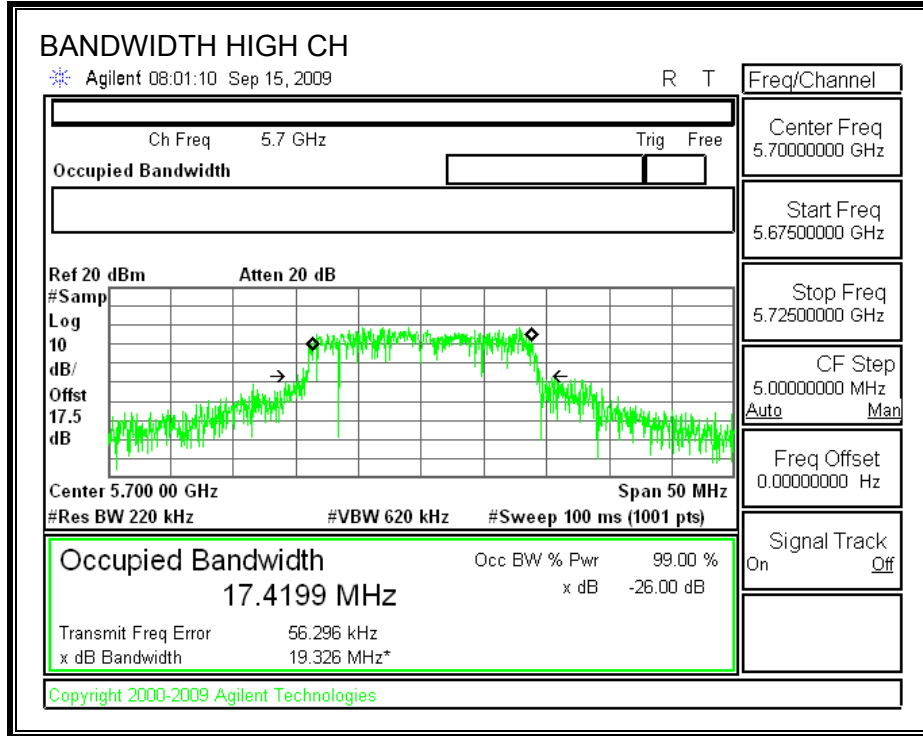
26 dB BANDWIDTH





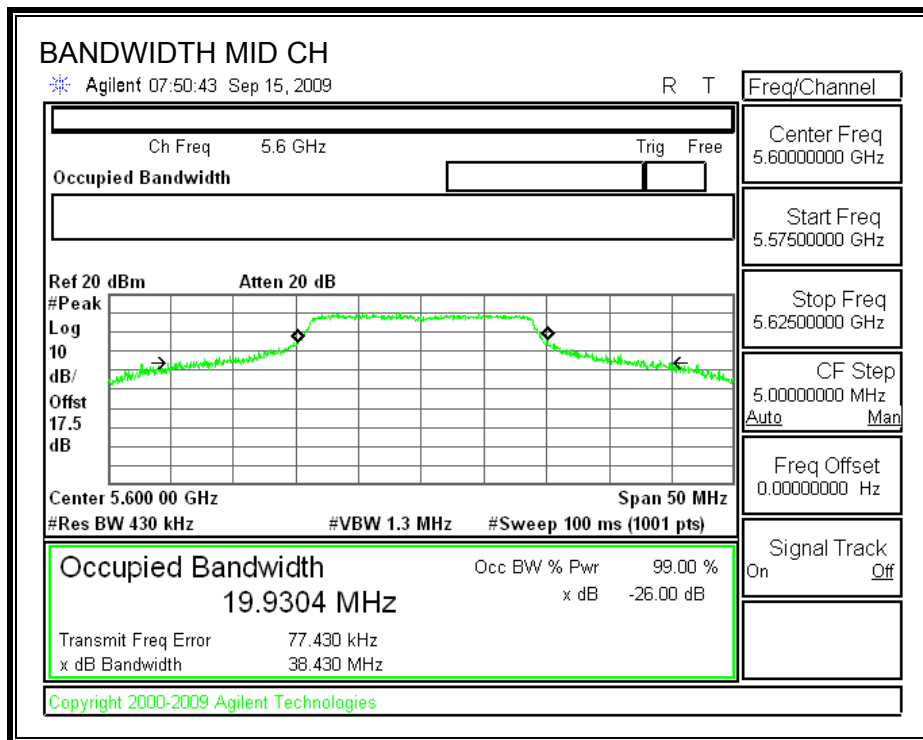
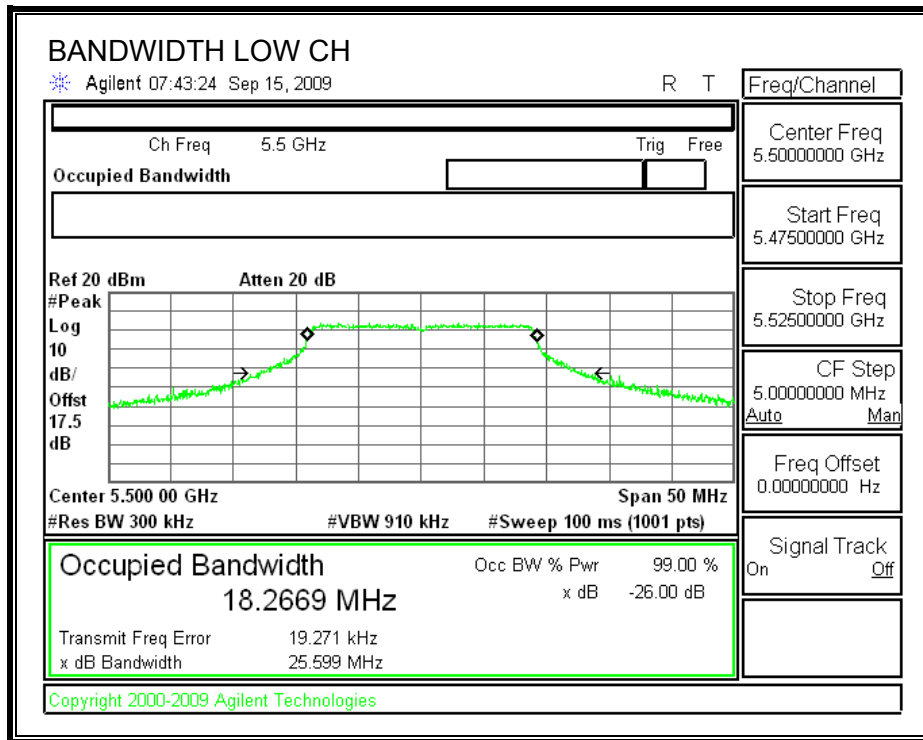
99% BANDWIDTH

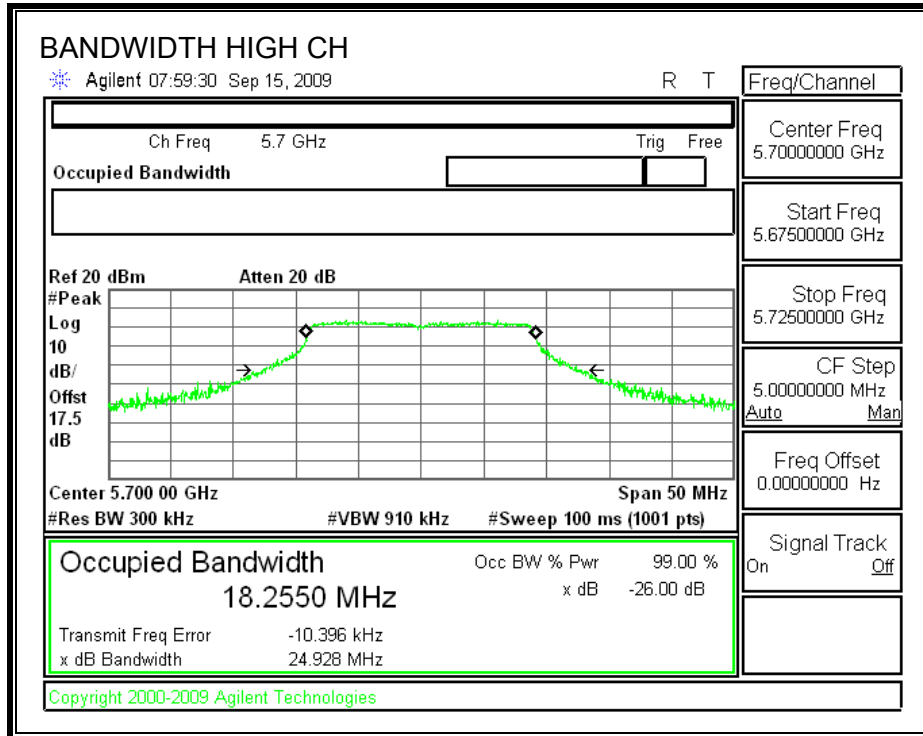




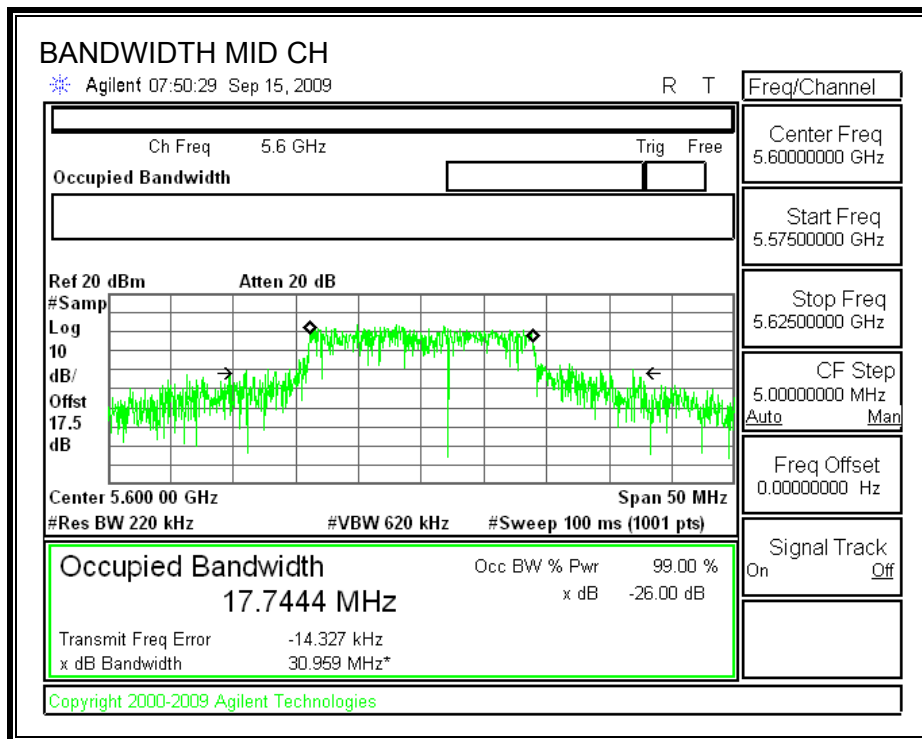
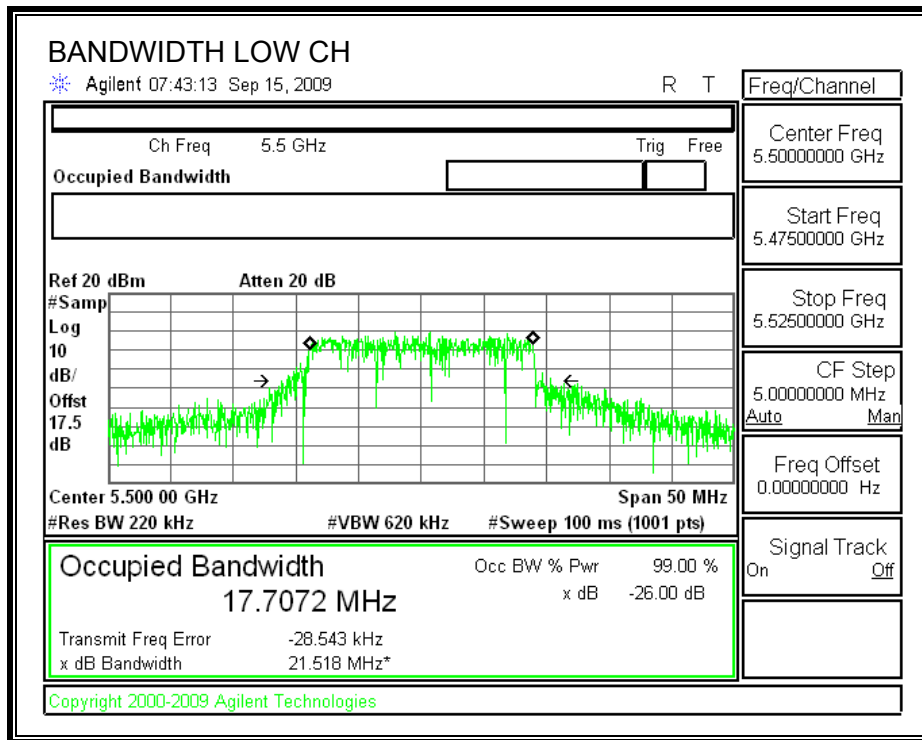
CHAIN 2

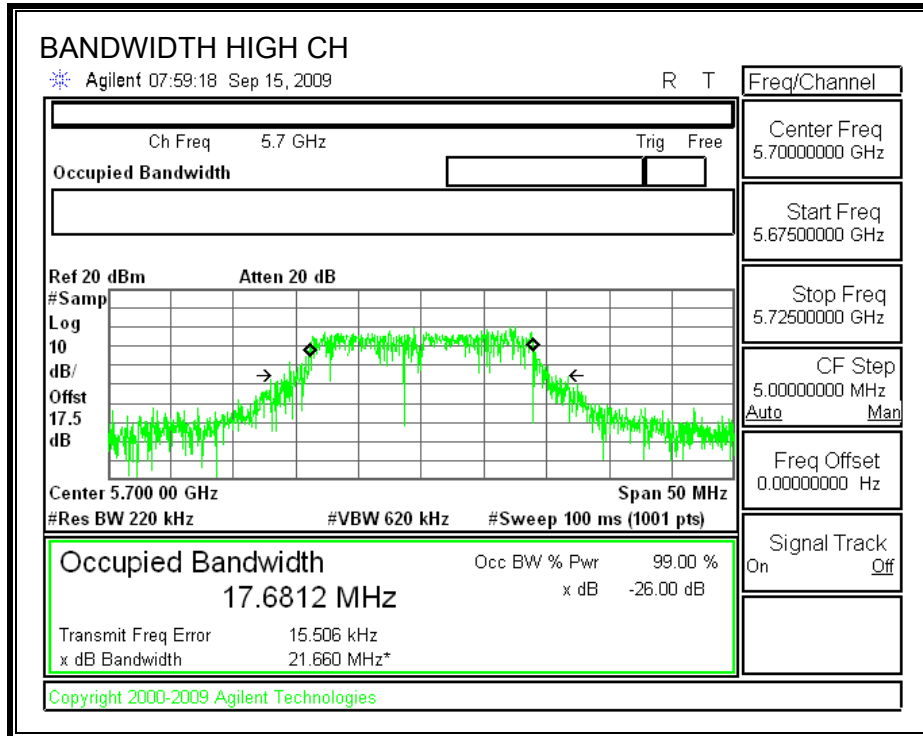
26 dB BANDWIDTH





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

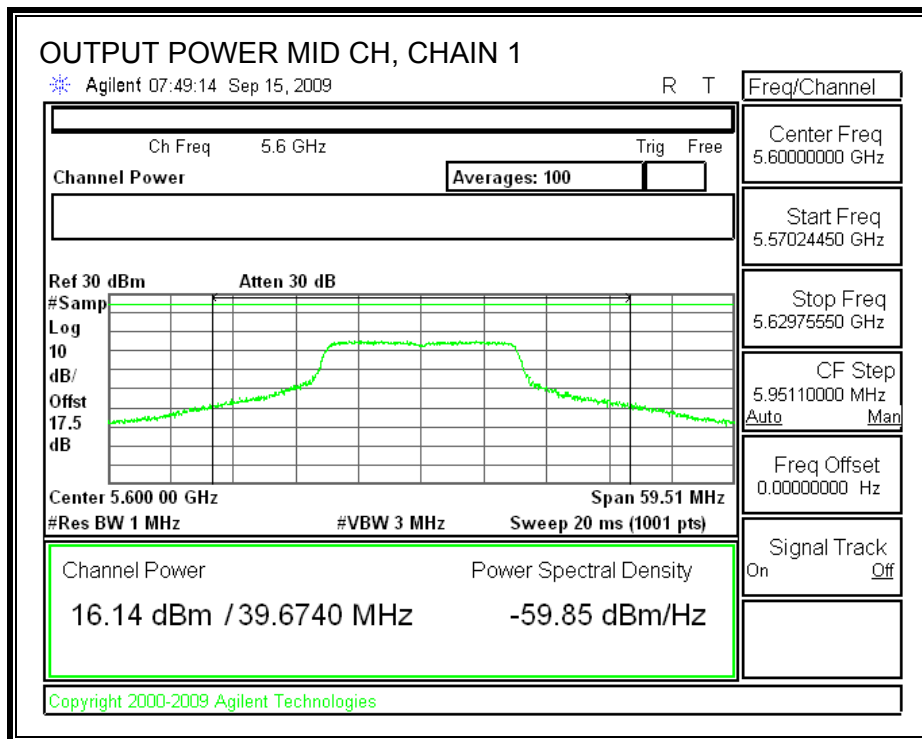
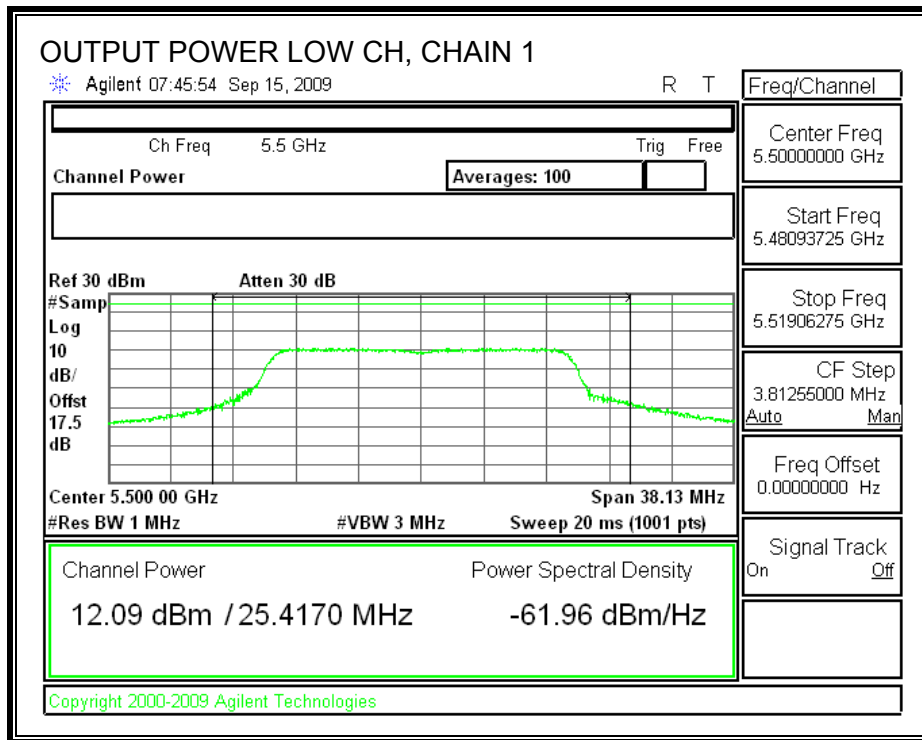
Limit

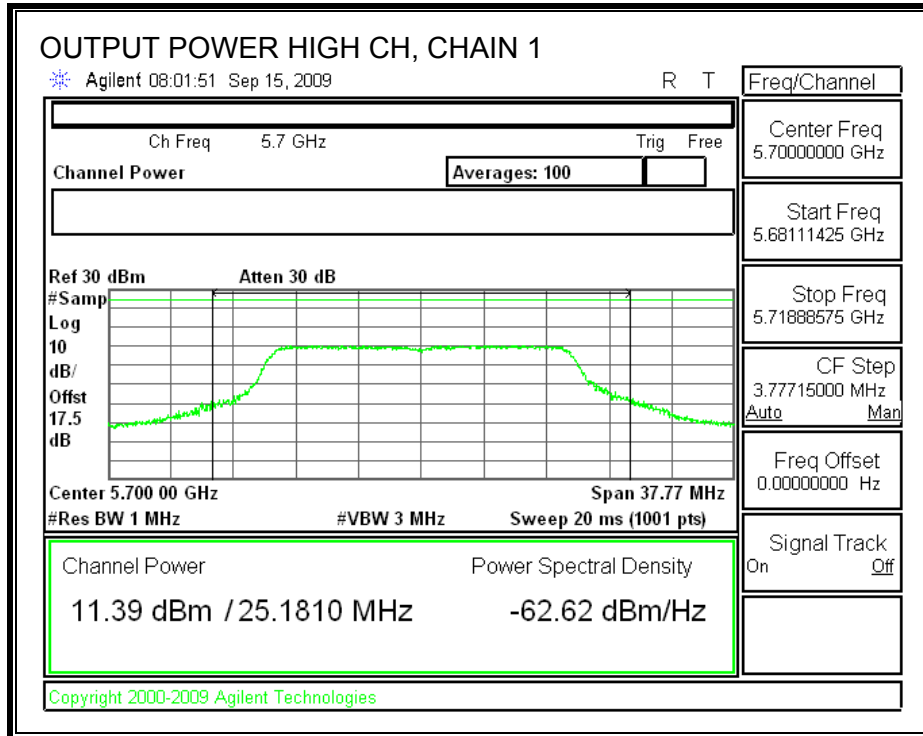
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5500	24	25.417	25.05	2.13	24.00
Mid	5600	24	39.674	26.99	2.13	24.00
High	5700	24	25.181	25.01	2.13	24.00

Individual Chain Results

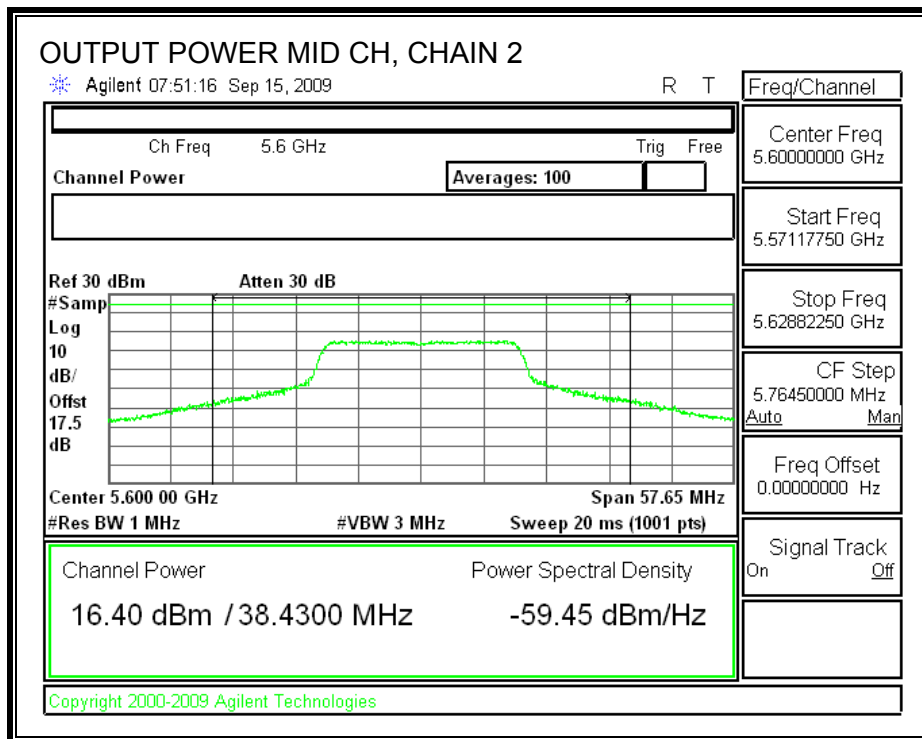
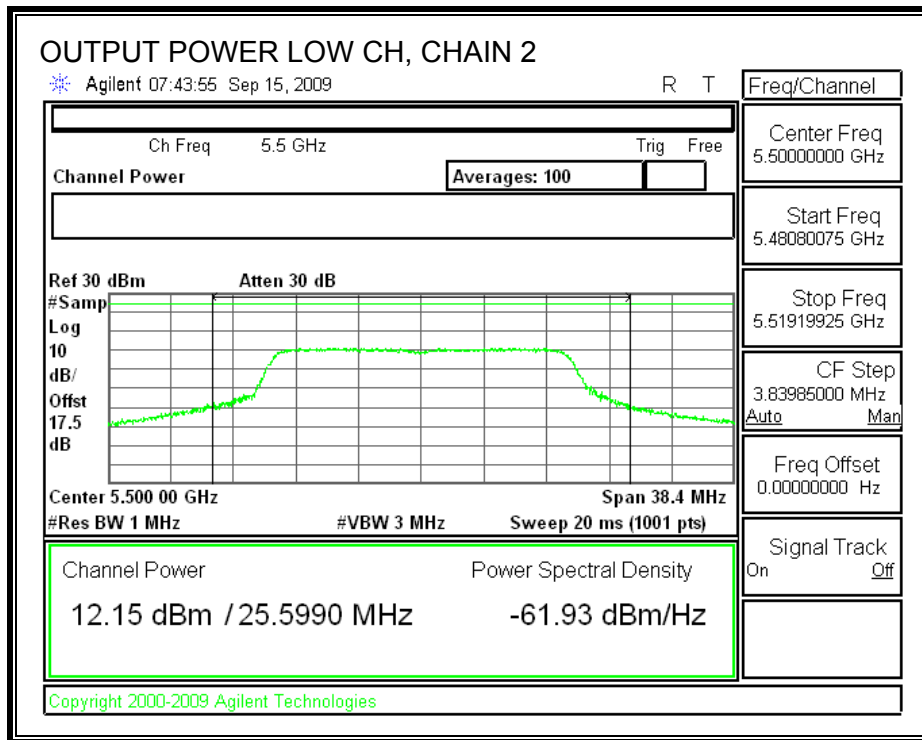
Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	12.09	12.15	15.13	24.00	-11.91
Mid	5600	16.14	16.40	19.28	24.00	-7.86
High	5700	11.39	11.96	14.69	24.00	-12.61

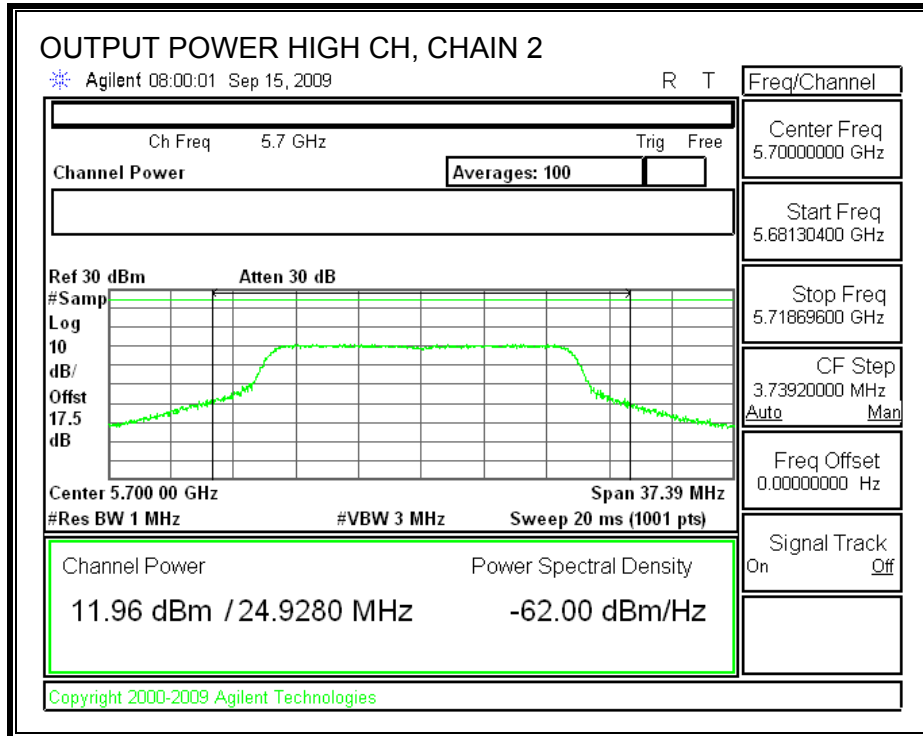
CHAIN 1 OUTPUT POWER





CHAIN 2 OUTPUT POWER





7.8.3. 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 17.5 dB (including 10 dB pad and 7.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5500	12.80	12.85	15.84
Middle	5600	16.76	16.78	19.78
High	5700	11.24	11.82	14.55

7.8.4. 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 less than or equal to 6 dBi, therefore the limit is 11 dBm.

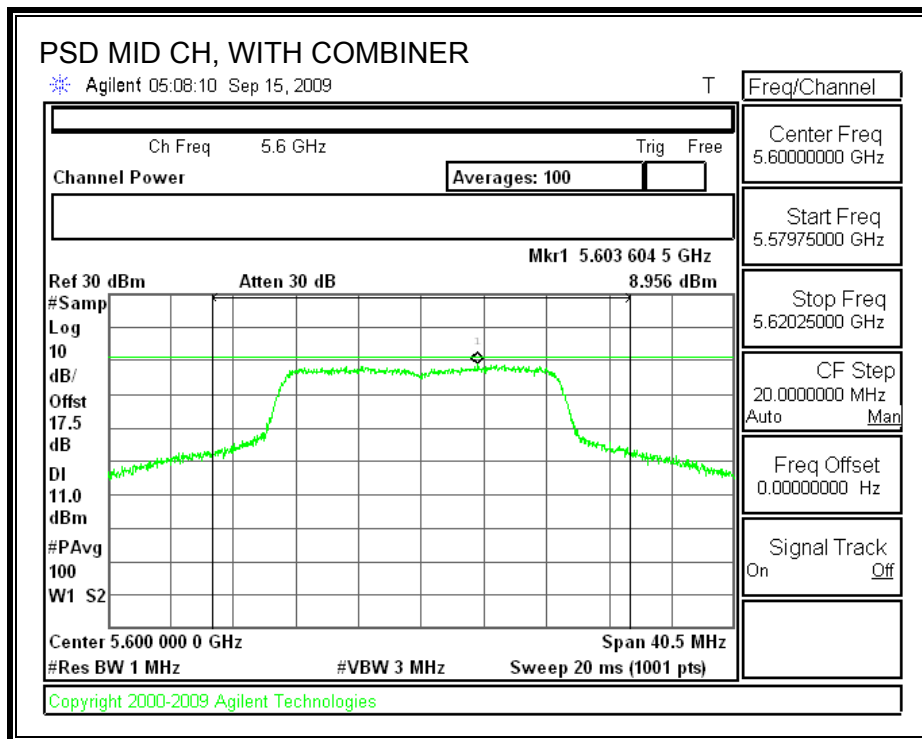
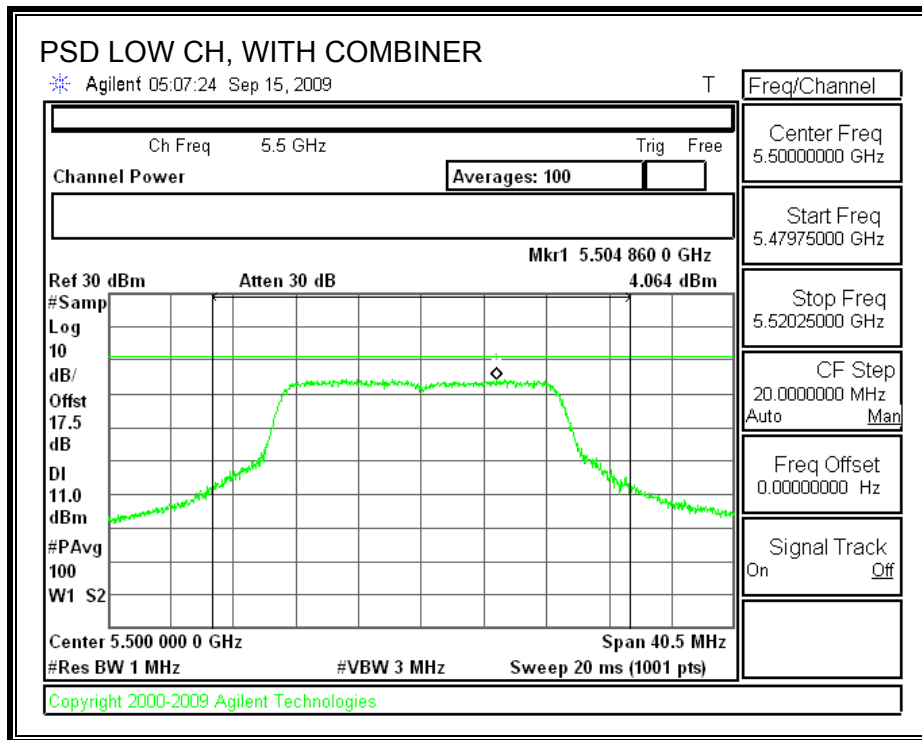
TEST PROCEDURE

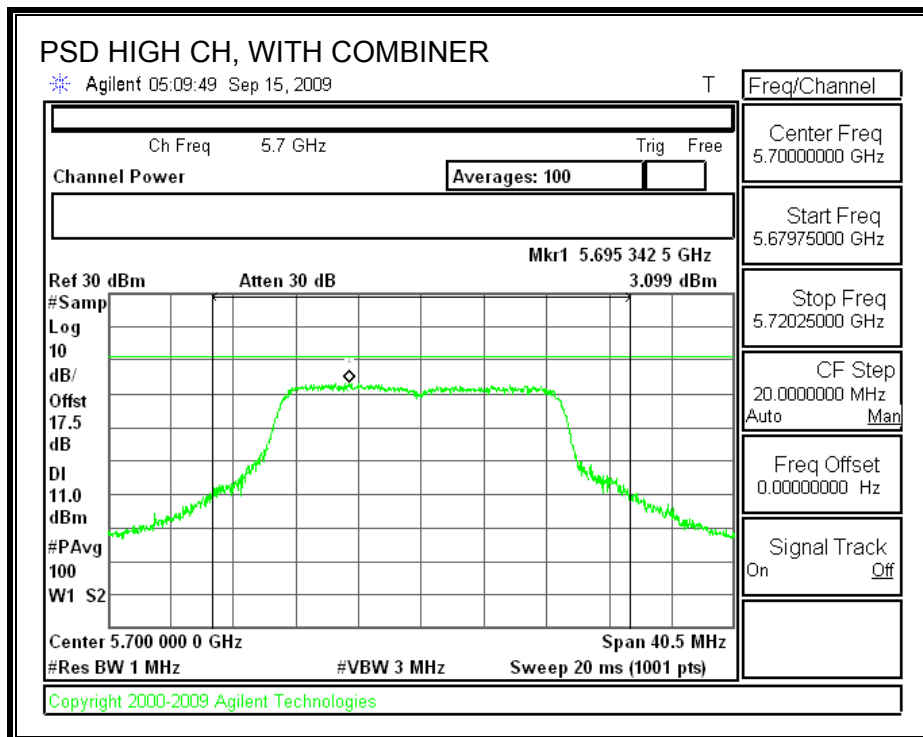
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5500	4.06	11	-6.94
Middle	5600	8.96	11	-2.04
High	5700	3.10	11	-7.90

POWER SPECTRAL DENSITY WITH COMBINER





7.8.5. 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

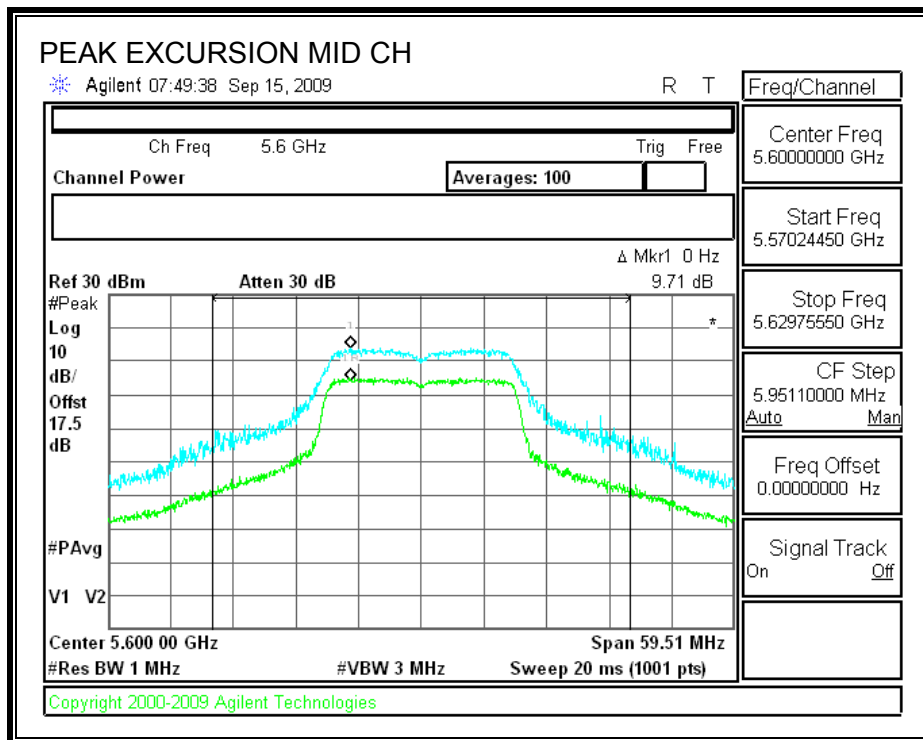
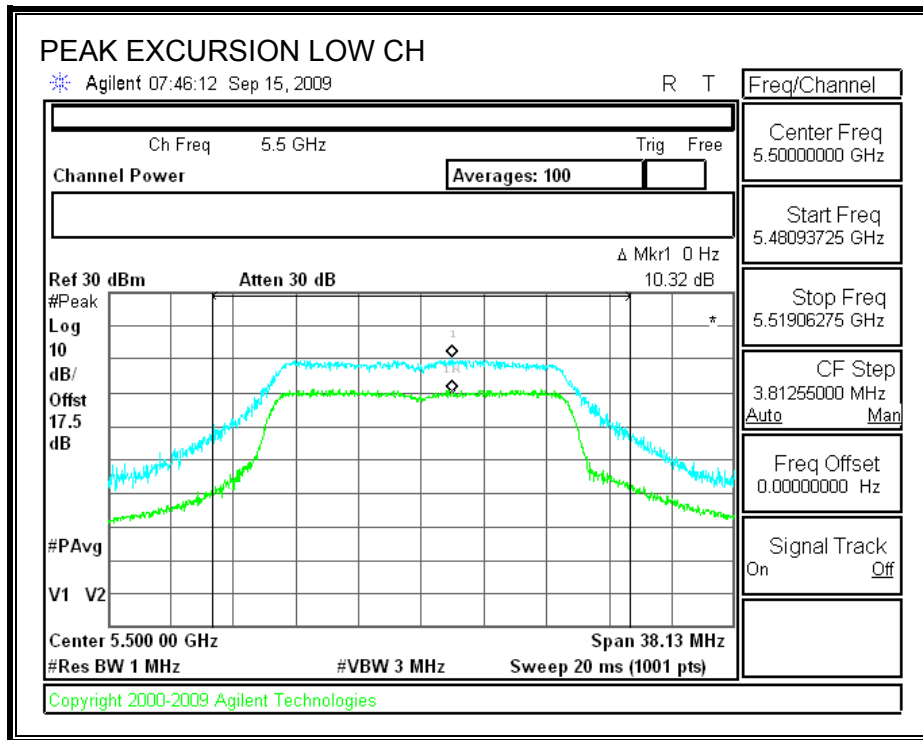
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	10.32	13	-2.68
Middle	5600	9.71	13	-3.29
High	5700	10.14	13	-2.86

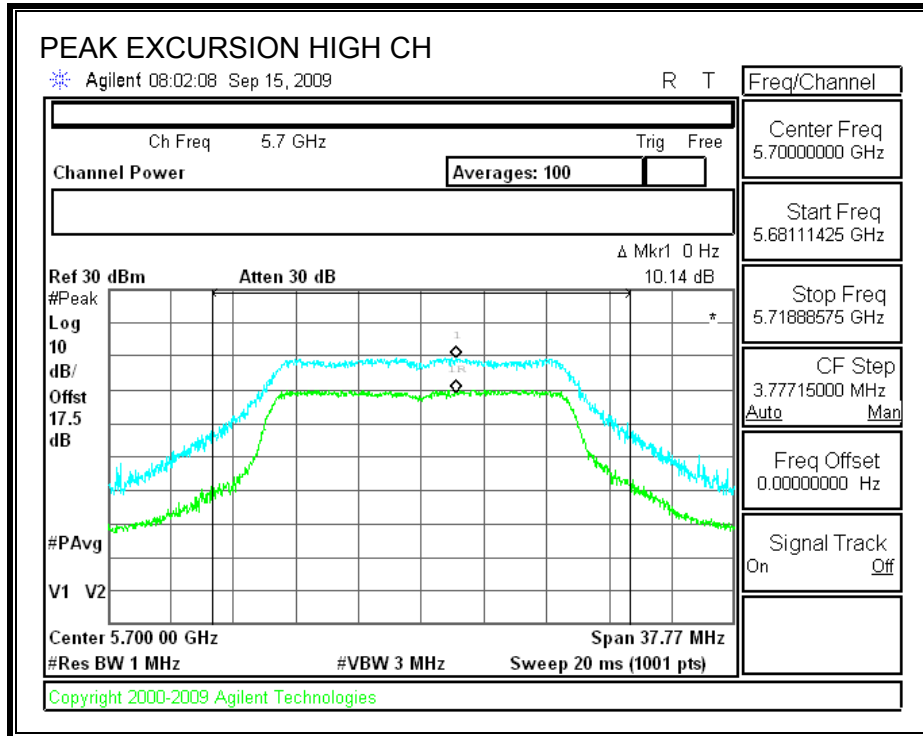
CHAIN 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	9.09	13	-3.91
Middle	5600	9.50	13	-3.50
High	5700	8.64	13	-4.36

CHAIN 1

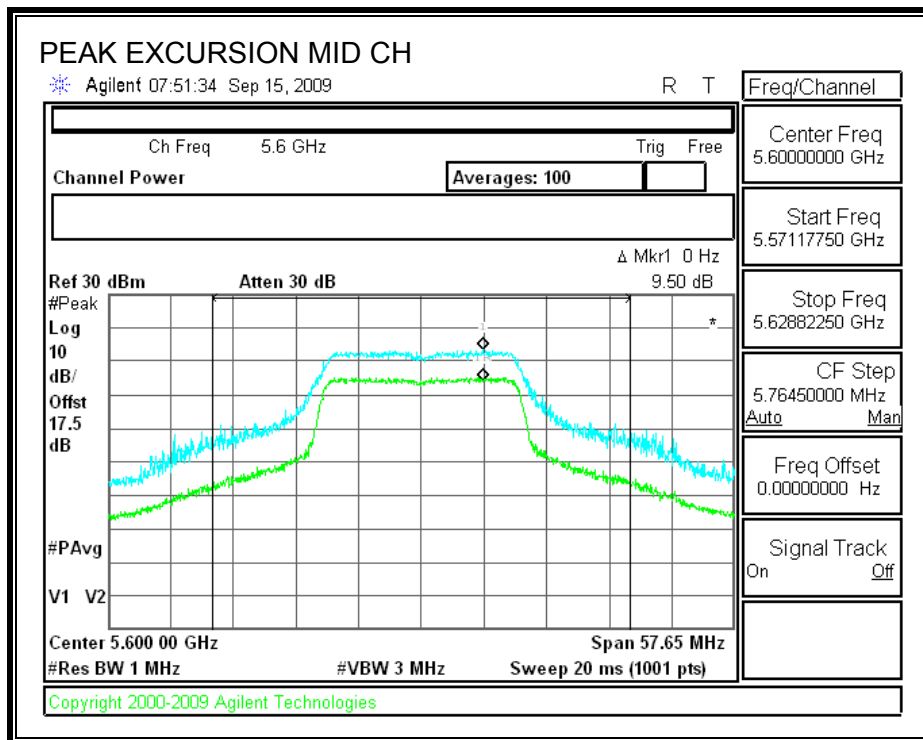
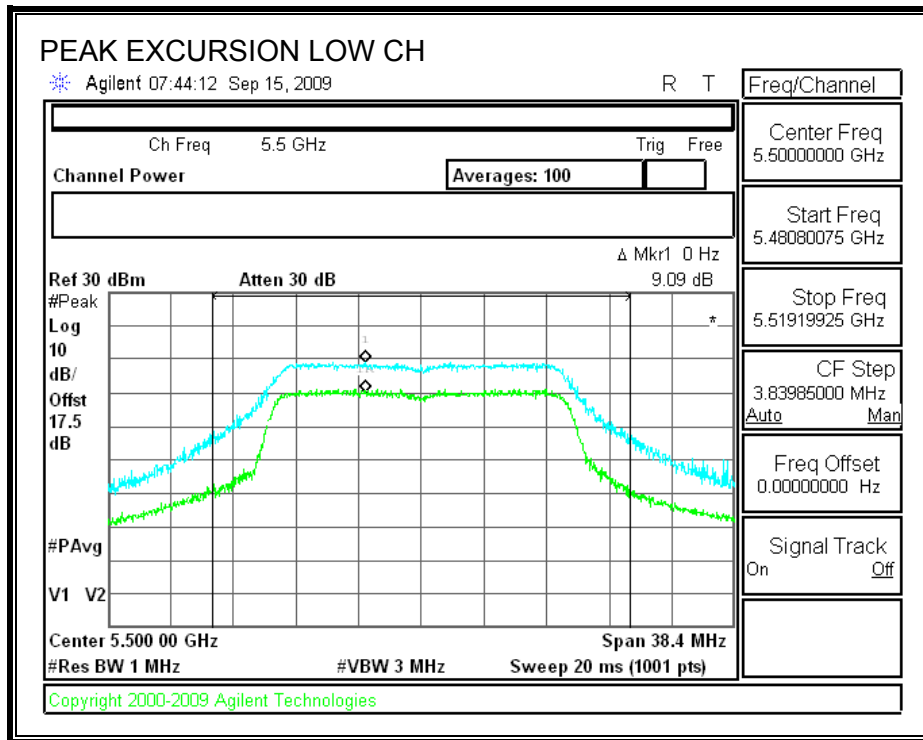
PEAK EXCURSION

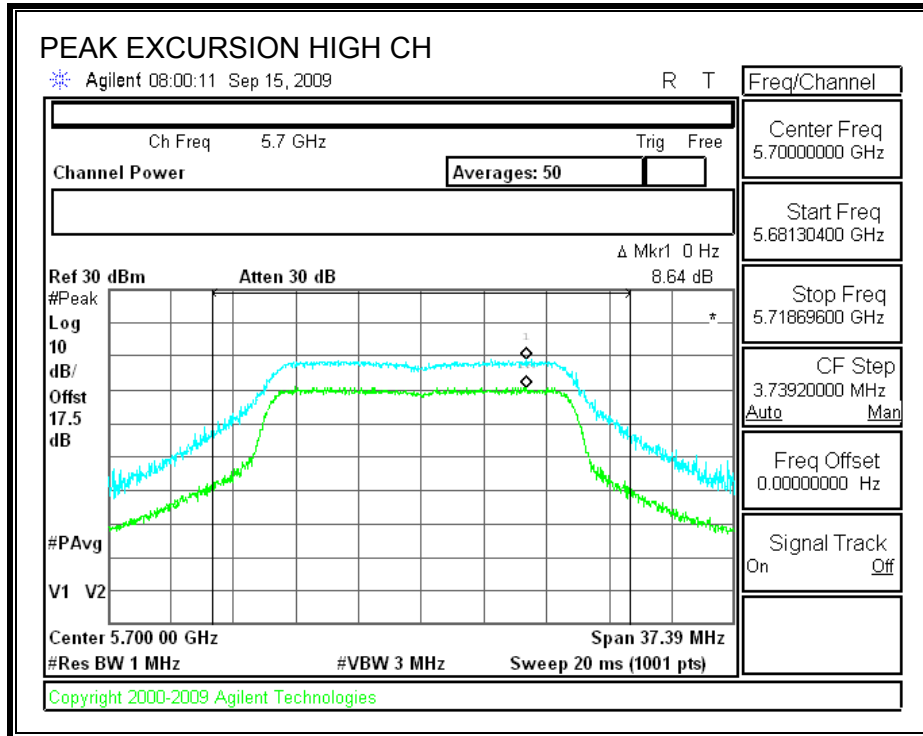




CHAIN 2

PEAK EXCURSION





7.8.6. 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

SPURIOUS EMISSIONS WITH COMBINER

