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

CERTIFICATION TEST REPORT

FOR

WIRELESS N NETWORKING ADAPTOR

MODEL NUMBER: 1398

FCC ID: C3K1398
IC: 3048A-1398

REPORT NUMBER: 09U12610-2, REVISION A

ISSUE DATE: SEPTEMBER 9, 2009

Prepared for
MICROSOFT CORPORATION
1 MICROSOFT WAY,
REDMOND, WA 98052, U.S.A.

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

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	08/14/09	Initial Issue	T. Chan
A	09/09/09	Revised 5.5 GHz band antenna gain specification and 20 MHz bandwidth maximum power	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MICROSOFT CORPORATION
1 Microsoft Way,
Redmond, WA 98052, U.S.A.

EUT DESCRIPTION: WIRELESS N NETWORKING ADAPTOR

MODEL: 1398

SERIAL NUMBER: 066

DATE TESTED: JULY 21 – AUGUST 10, 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

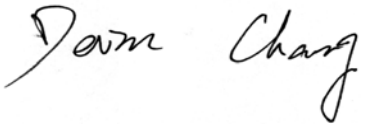
Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. Measurement Uncertainties 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:

THU CHAN
EMC MANAGER
COMPLIANCE CERTIFICATION SERVICES

Tested By:



DEVIN CHANG
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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an USB 2x2 Dual Band 802.11 a/b/g/n Radio.

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	14.66	29.24
5180 - 5240	802.11n HT20	15.08	32.21
5190 - 5230	802.11n HT40	16.30	42.66
5260 - 5320	802.11a	17.13	51.64
5260 - 5320	802.11n HT20	17.18	52.24
5270 - 5310	802.11n HT40	16.91	49.09
5500 - 5700	802.11a	17.24	52.97
5500 - 5700	802.11n HT20	17.17	52.12
5510 - 5670	802.11n HT40	17.01	50.23

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilize a dipole antennas with maximum gain of 2 dBi from 2400 – 2483.5 MHz, 3.84 dBi from 5150 – 5250 MHz, 3.84 dBi from 5250 – 5350 MHz, 4.92 dBi from 5470 – 5725 MHz, and 3.6 dBi from 5725 - 5850 MHz.

5.4. SOFTWARE AND FIRMWARE

The test utility and driver software used during testing was Art ANWI and Devlib Revision 0.8 Build #120 Art_11n.

5.5. WORST-CASE CONFIGURATION AND MODE

The 1x2 configuration was used for 5GHz testing in this report.

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**
NoteBook	DELL	PP10S	CN-0C8862-48643-57L-1789	DoC
AC Adaptor	DELL	N5825	CN-0N5825-48661-575-A028	DoC

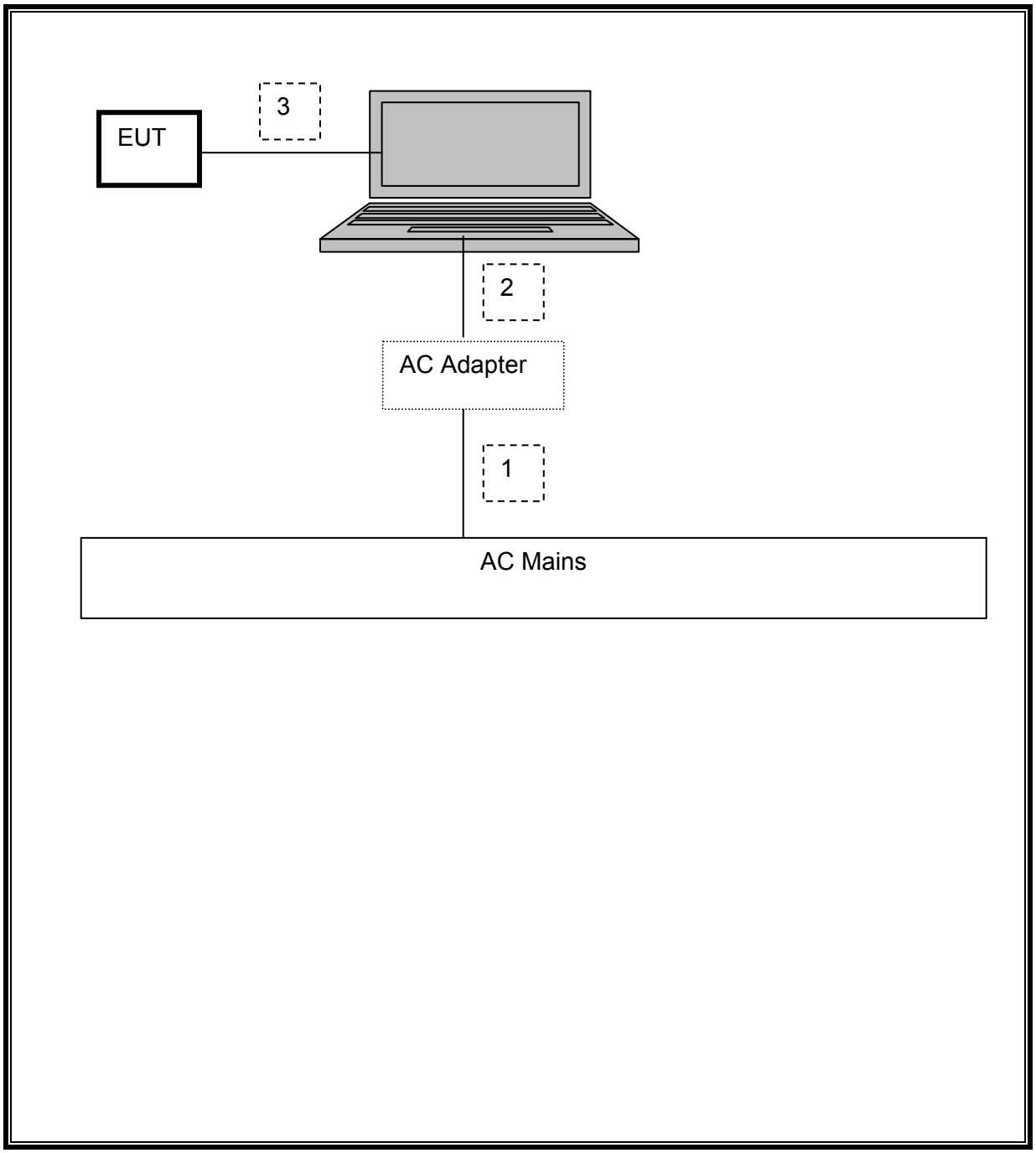
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	2	US 115V	Un-shielded	0.9 m	No
2	DC	3	DC	Un-shielded	1.8m	No
3	USB	1	USB	Un-shielded	1m	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	Sunol 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
Reject Filter, 5.15-5.35 GHz	Micro-Tronics	BRC13190	N02679	N/A
Reject Filter, 5.47-5.725 GHz	Micro-Tronics	BRC13191	N02678	N/A
Reject Filter, 5.725-5.825 GHz	Micro-Tronics	BRC13192	N02677	N/A
Highpass Filter, 7.6 GHz	Micro-Tronics	HPM13195	N02682	N/A

7. ANTENNA PORT TEST RESULTS

7.1. 802.11a MODE IN THE 5.2 GHz BAND

7.1.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

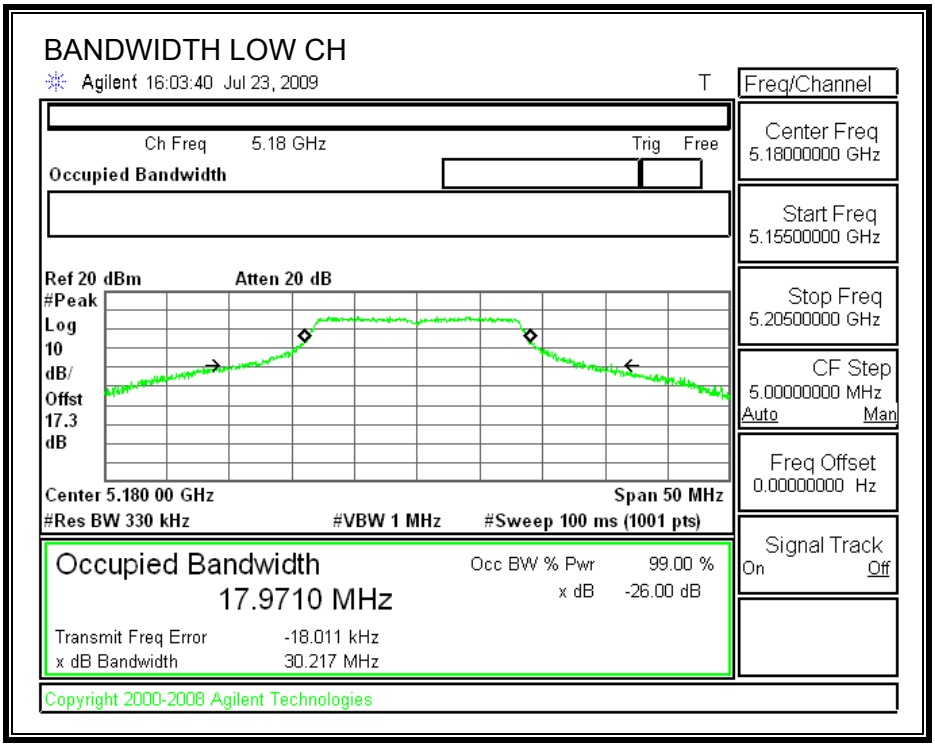
TEST PROCEDURE

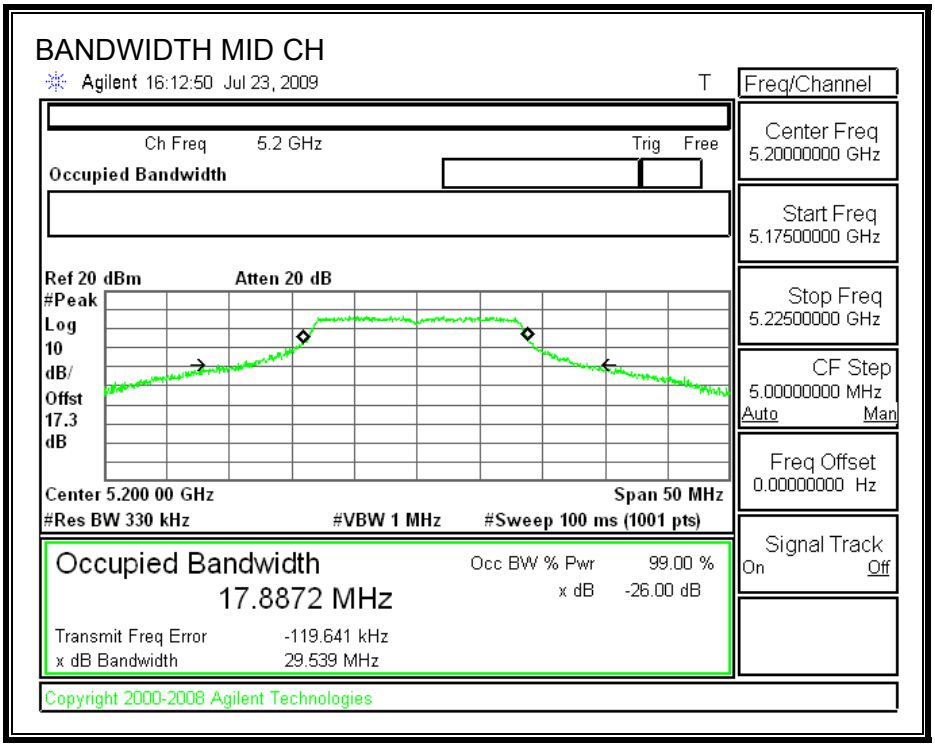
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

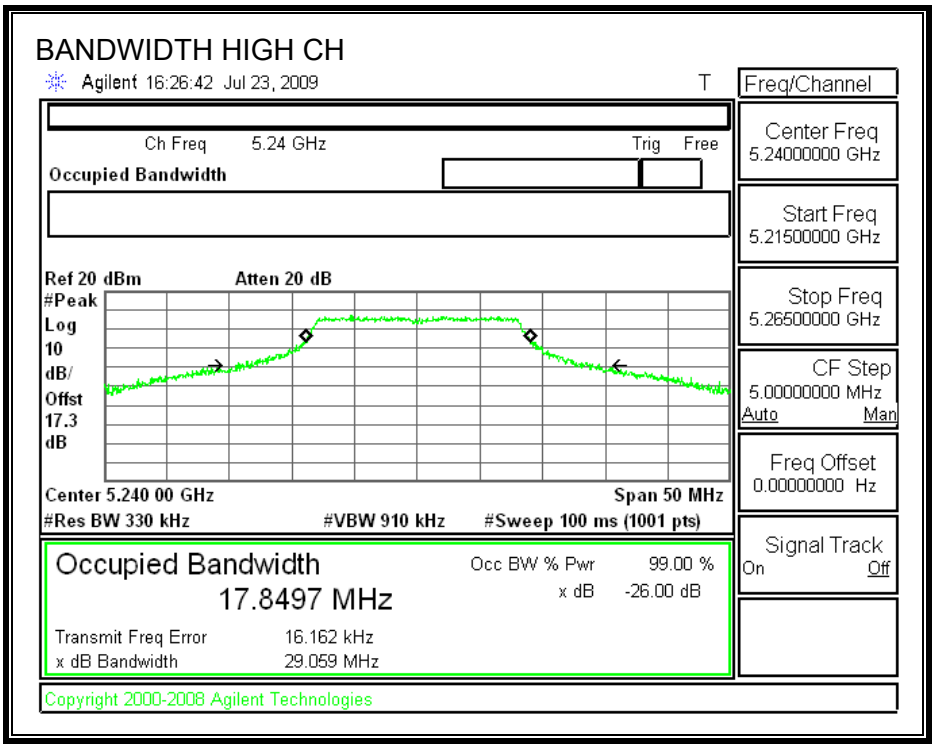
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	30.217	16.5977
Middle	5200	29.539	16.6470
High	5240	29.059	16.5318

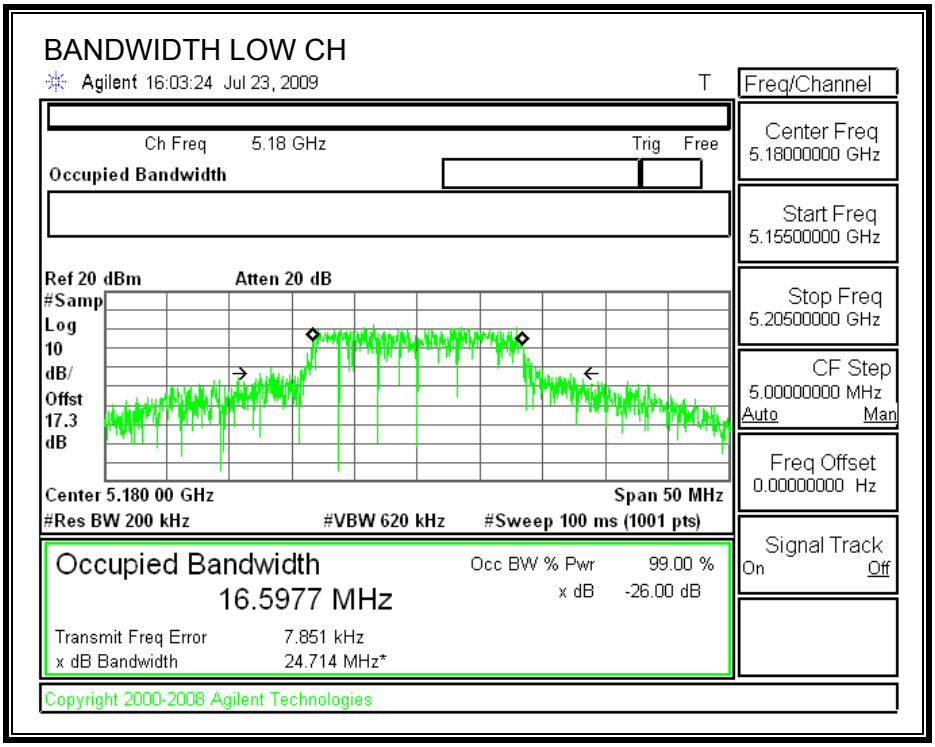
26 dB BANDWIDTH

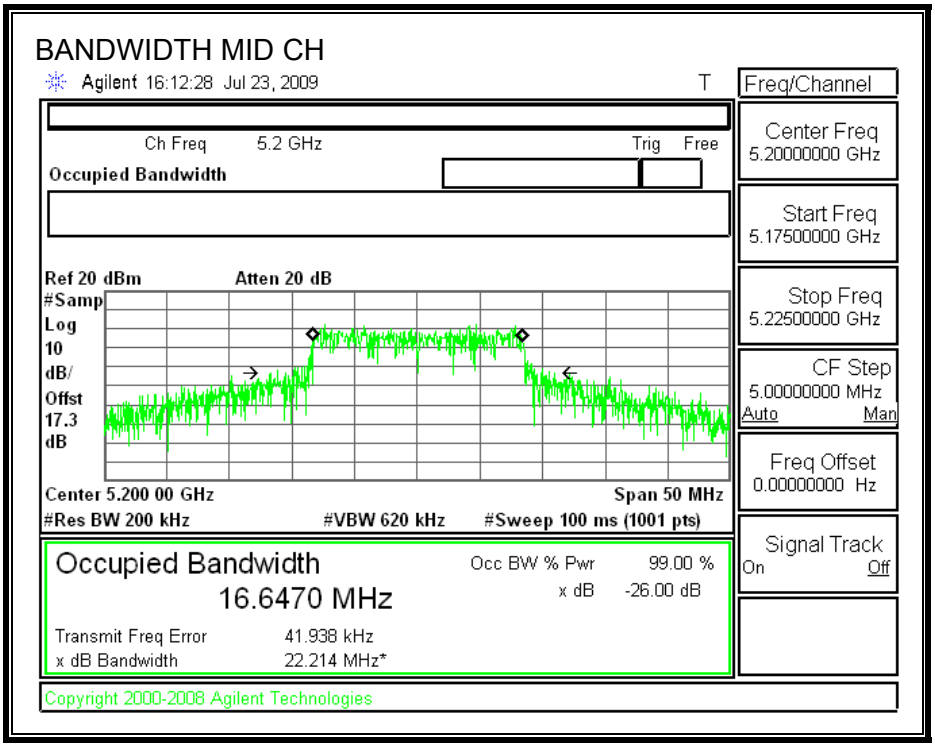


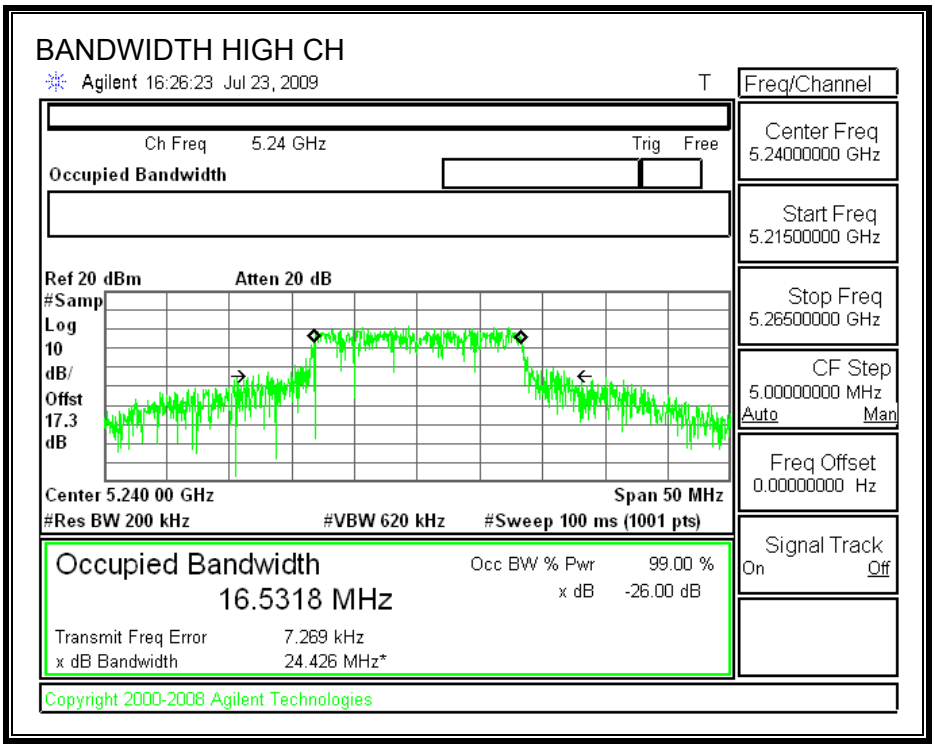




99% BANDWIDTH







7.1.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

TEST PROCEDURE

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

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

RESULTS

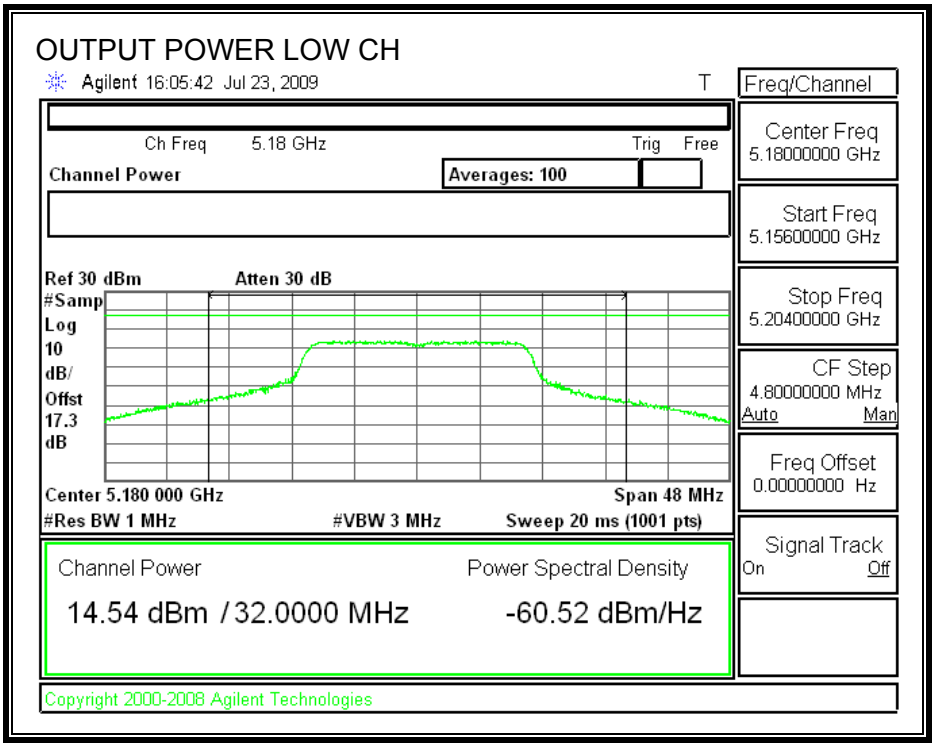
Limit

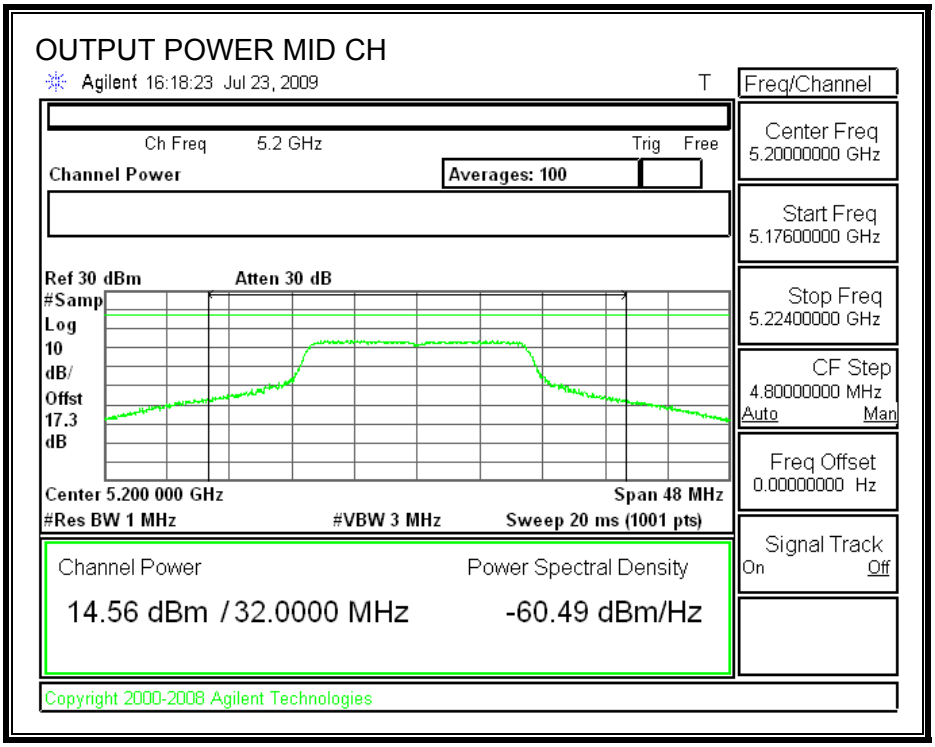
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	30.217	18.80	3.84	17.00
Mid	5200	17	29.539	18.70	3.84	17.00
High	5240	17	29.059	18.63	3.84	17.00

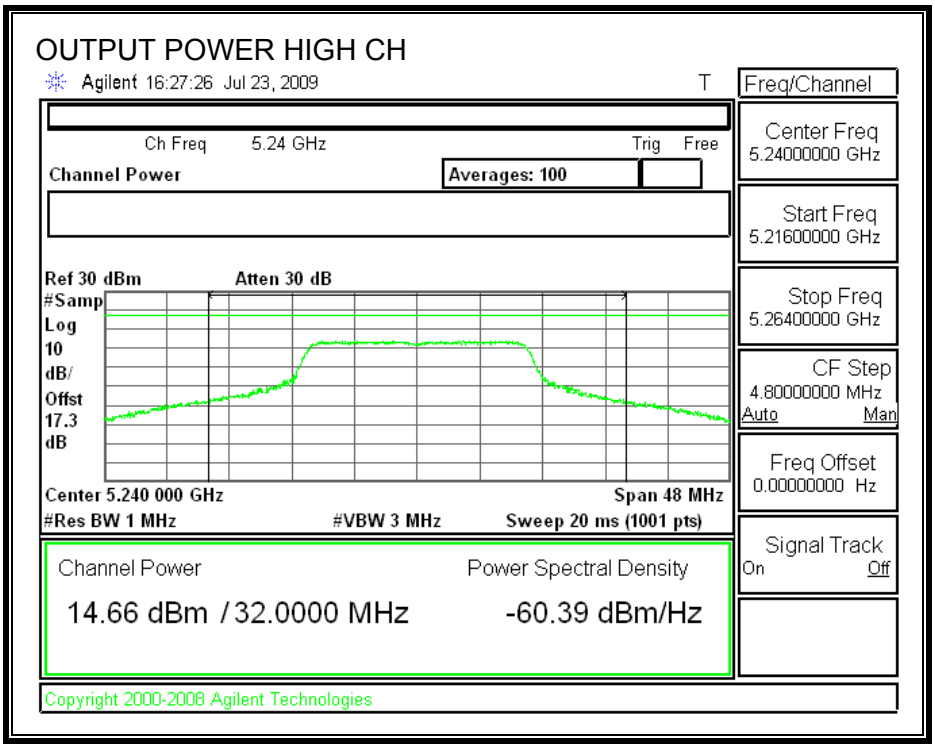
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	14.54	17.00	-2.46
Mid	5200	14.56	17.00	-2.44
High	5240	14.66	17.00	-2.34

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 16 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5180	14.71
Middle	5200	14.73
High	5240	14.84

7.1.4. 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

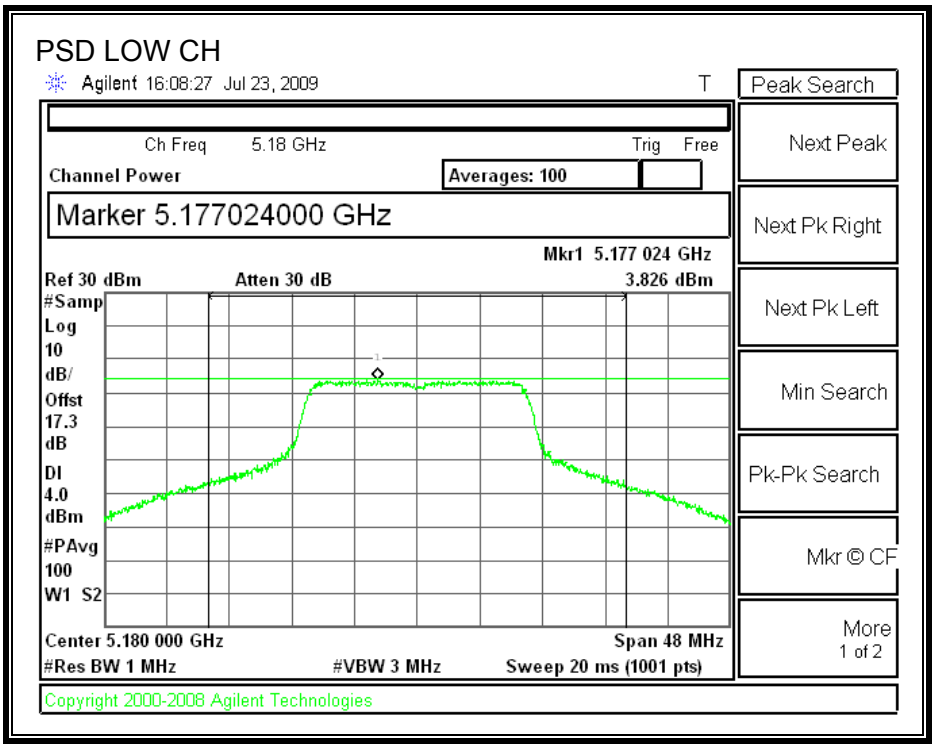
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

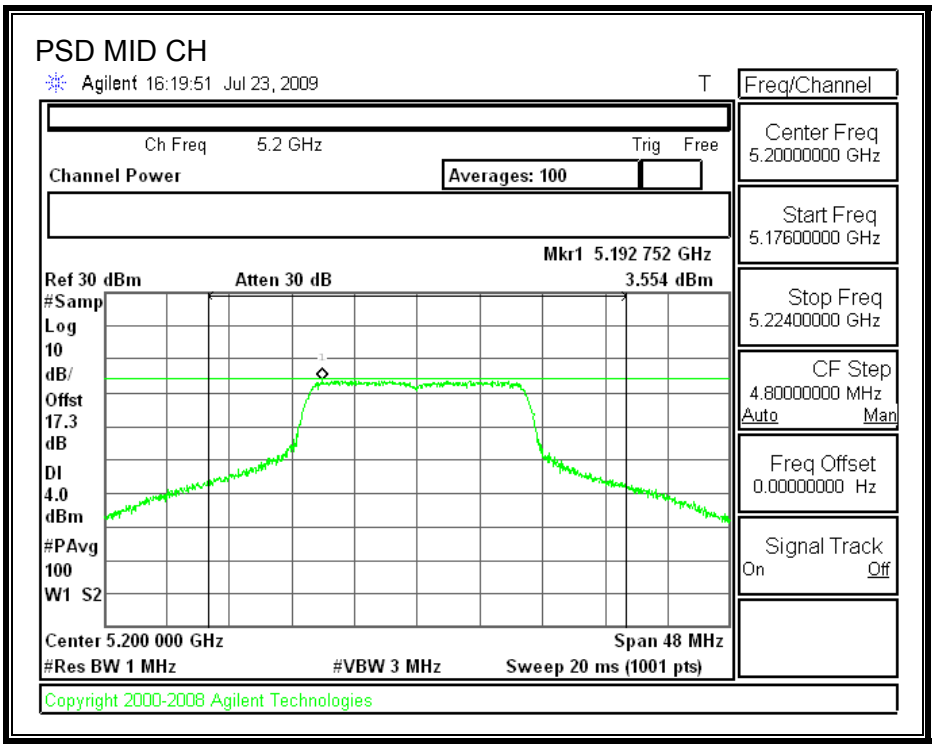
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.83	4	-0.17
Middle	5200	3.55	4	-0.45
High	5240	3.87	4	-0.13

POWER SPECTRAL DENSITY

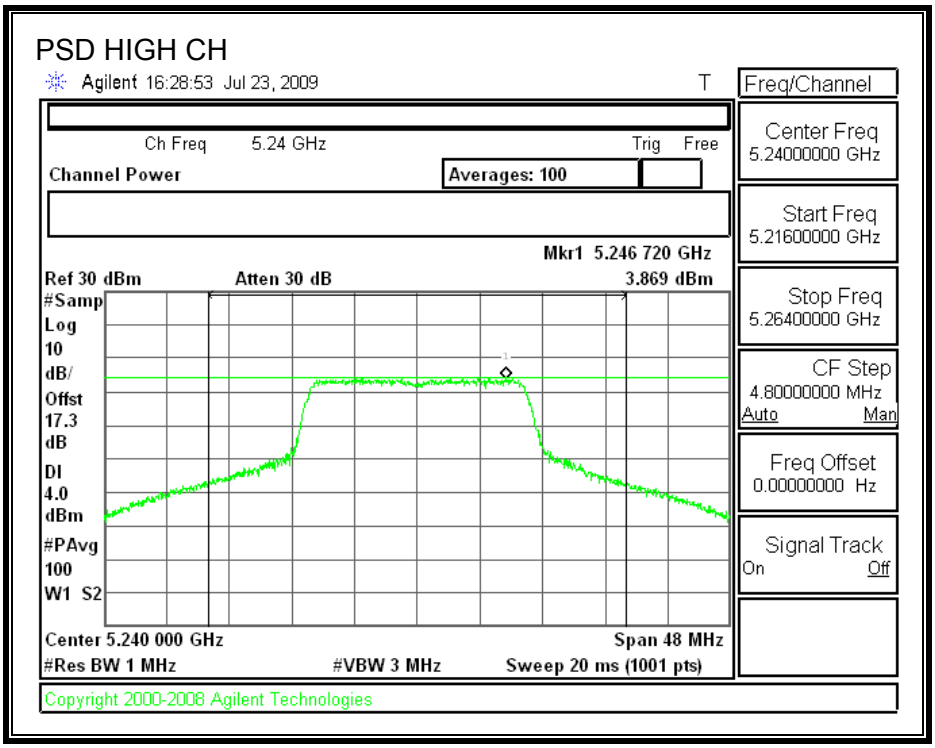
PSD LOW CH



PSD MID CH



PSD HIGH CH



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

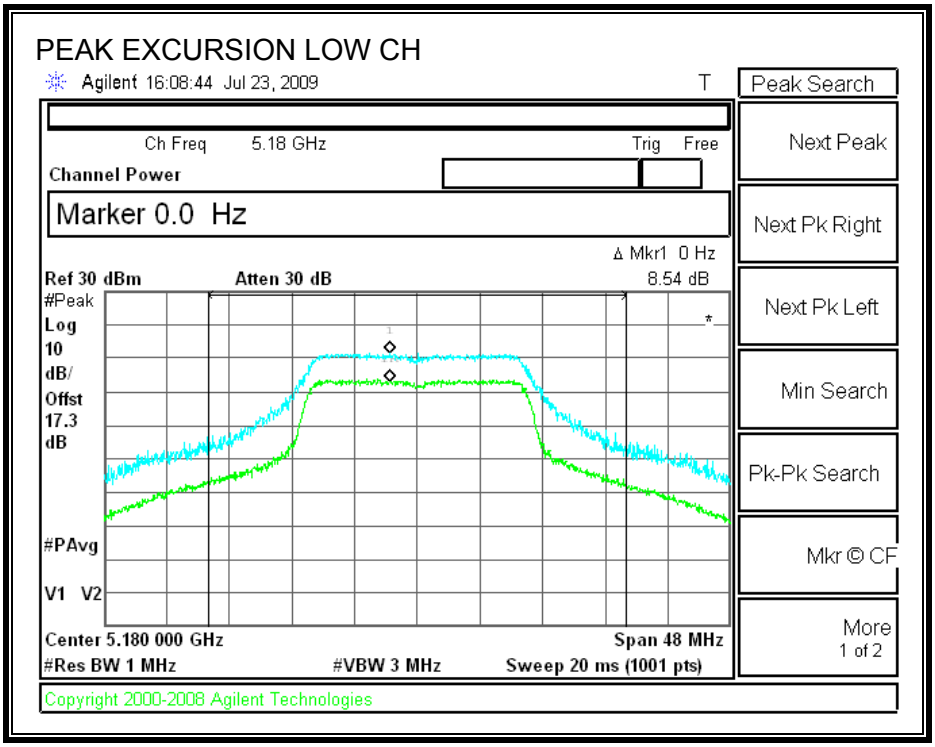
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

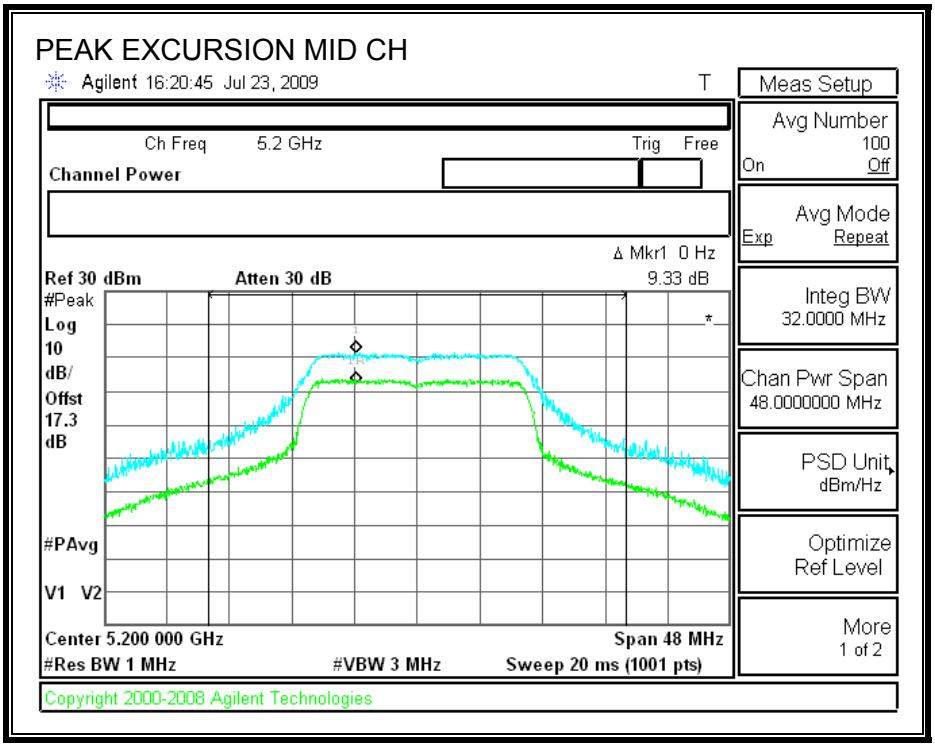
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

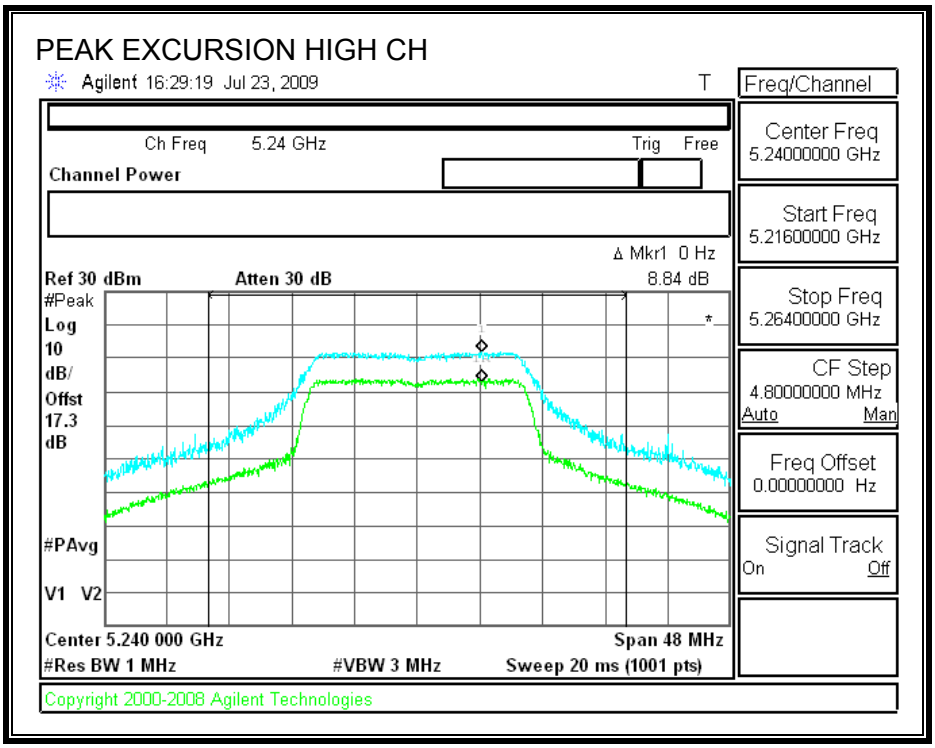
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	8.54	13	-4.46
Middle	5200	9.33	13	-3.67
High	5240	8.84	13	-4.16

PEAK EXCURSION





PEAK EXCURSION HIGH CH



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

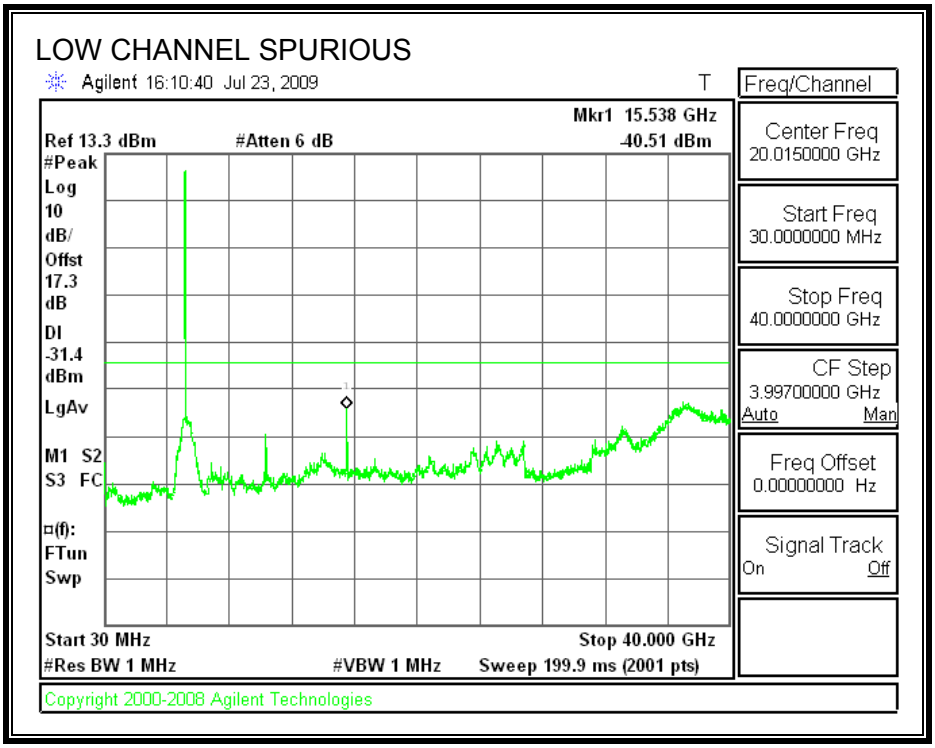
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

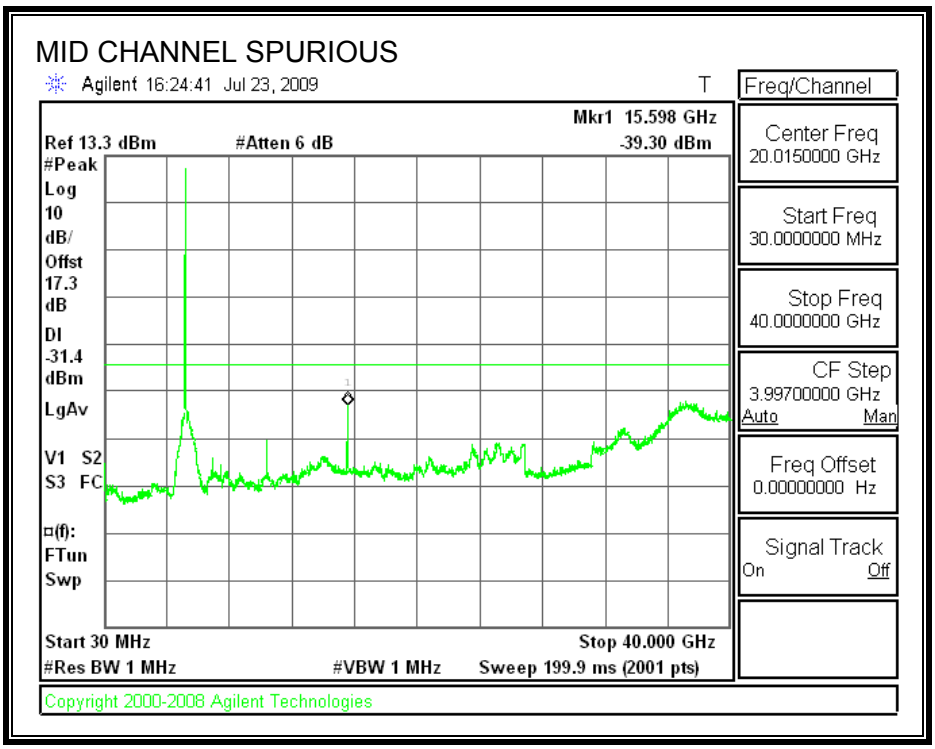
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

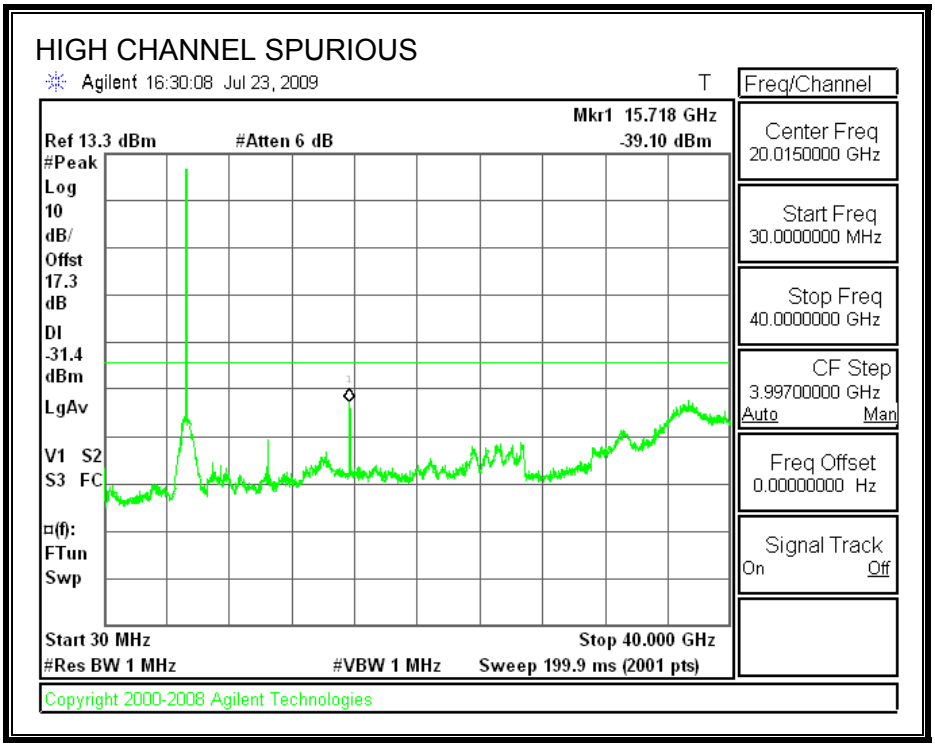
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

SPURIOUS EMISSIONS







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.

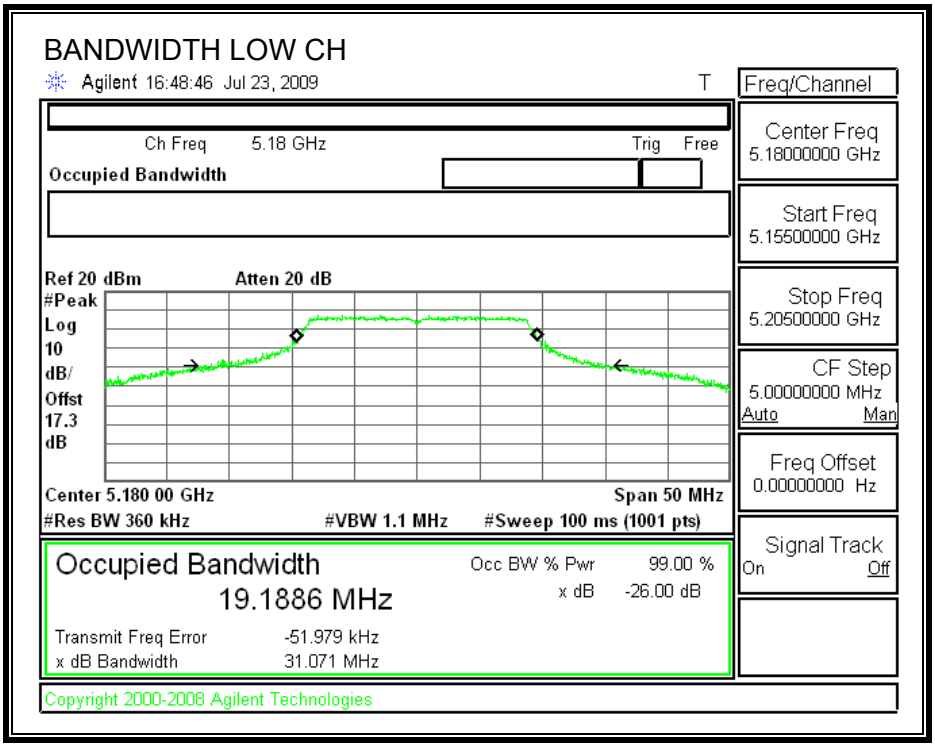
TEST PROCEDURE

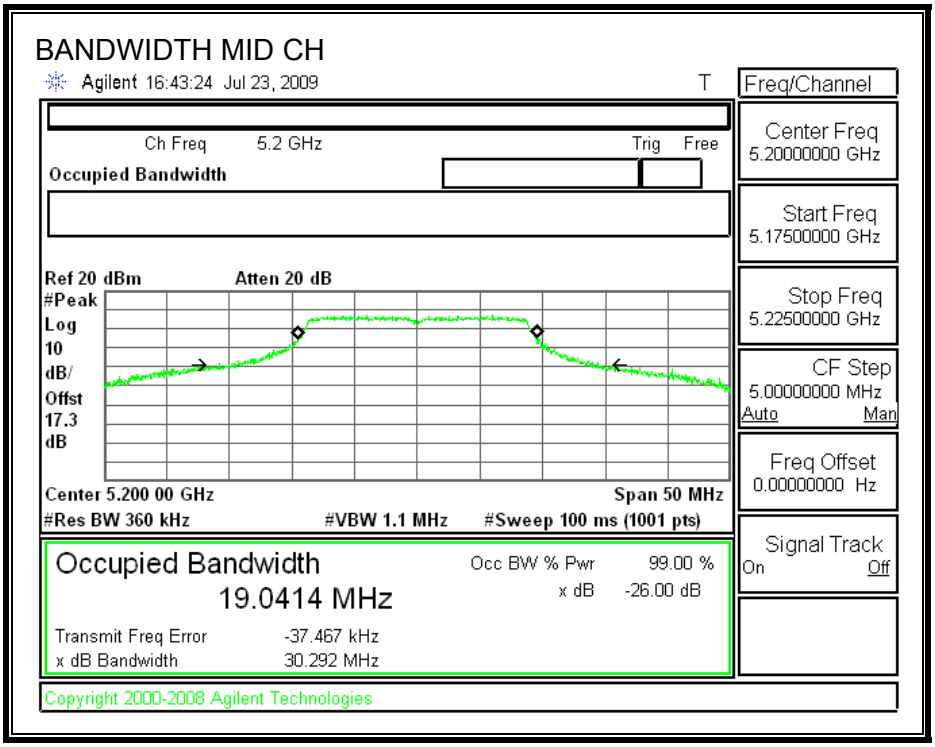
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

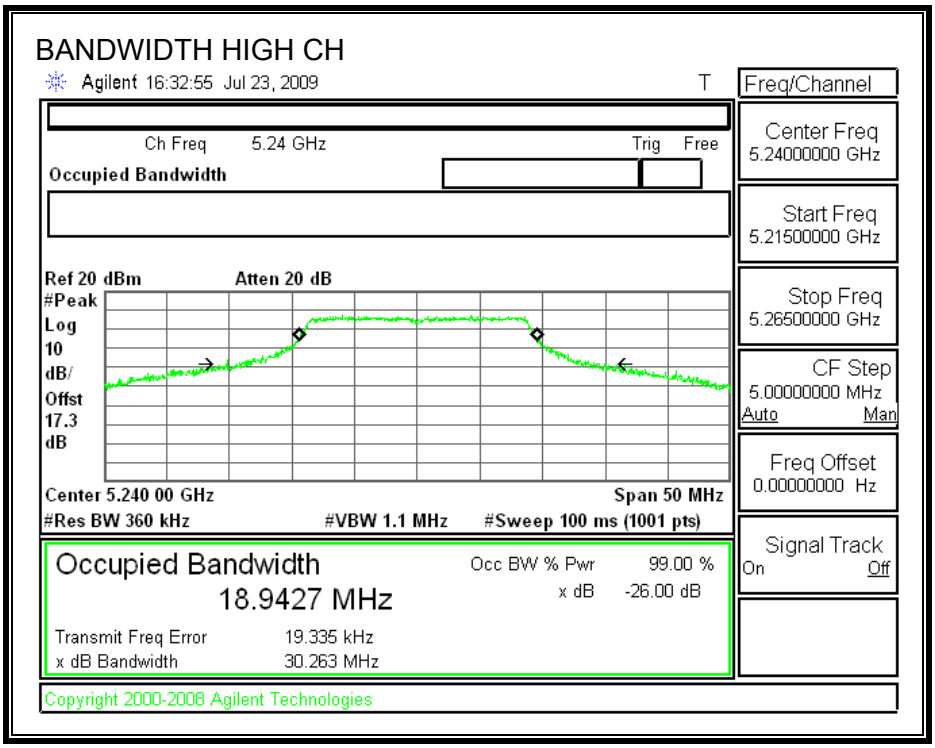
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	31.071	17.6654
Middle	5200	30.292	17.7380
High	5240	30.263	17.7770

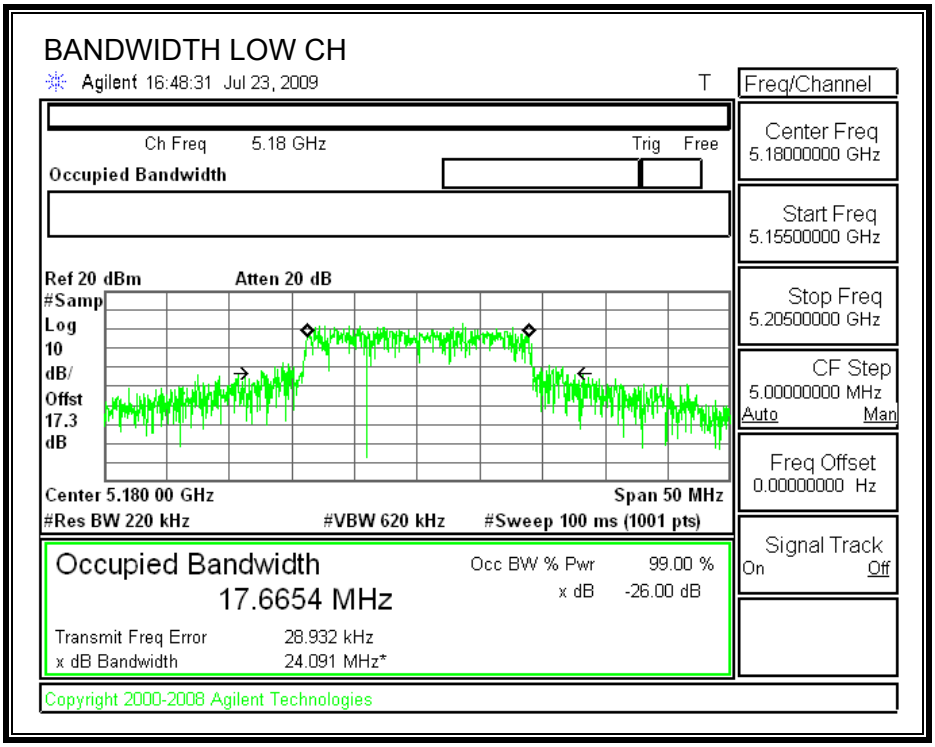
26 dB BANDWIDTH

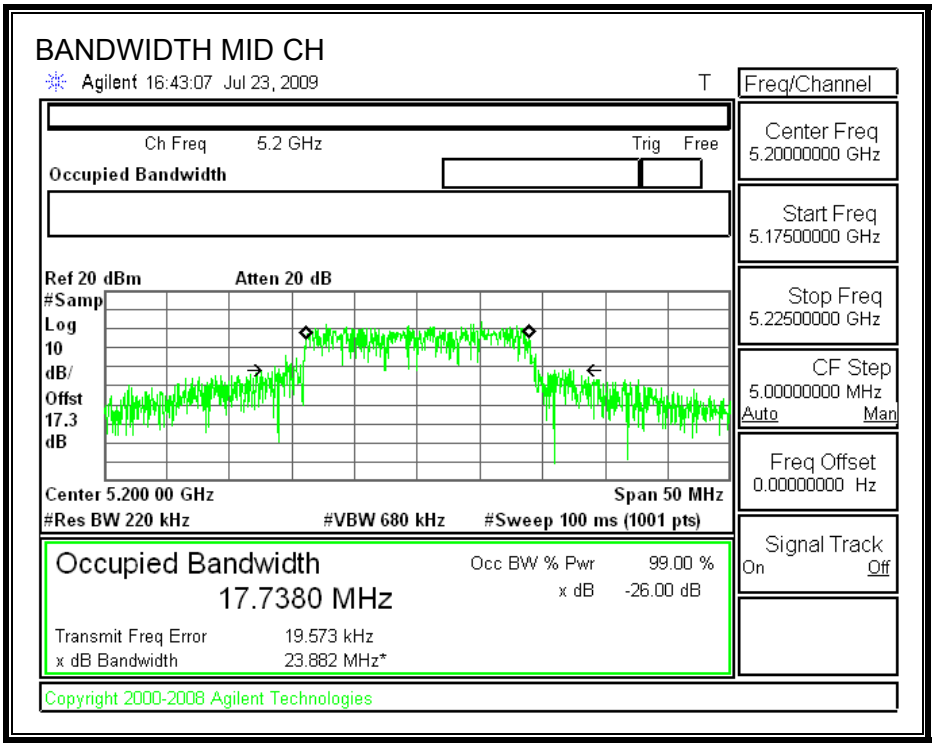


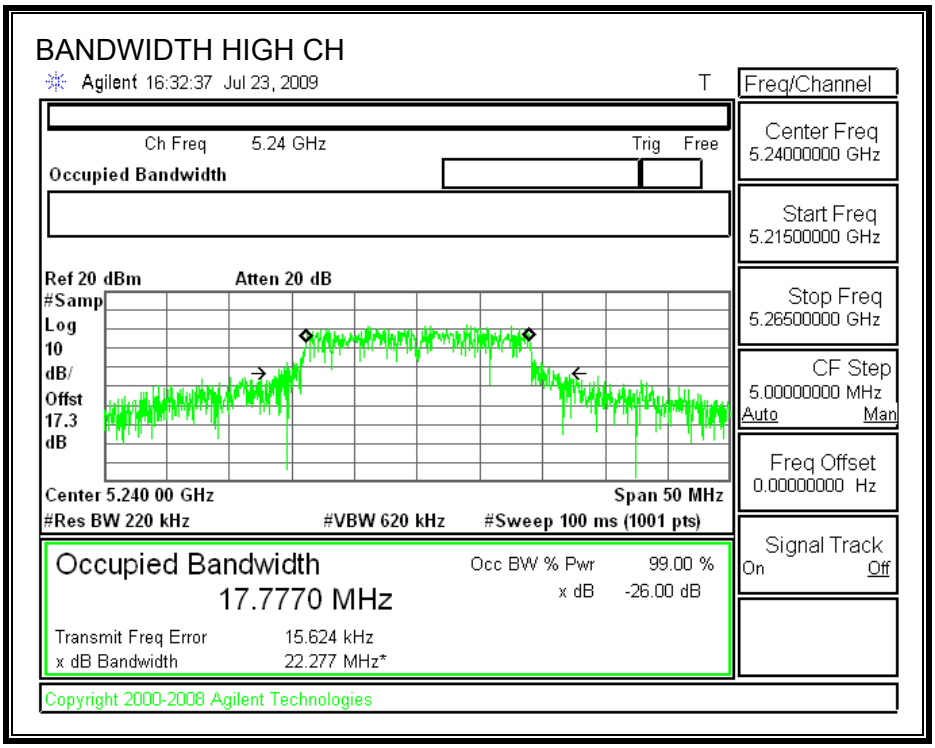




99% BANDWIDTH







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

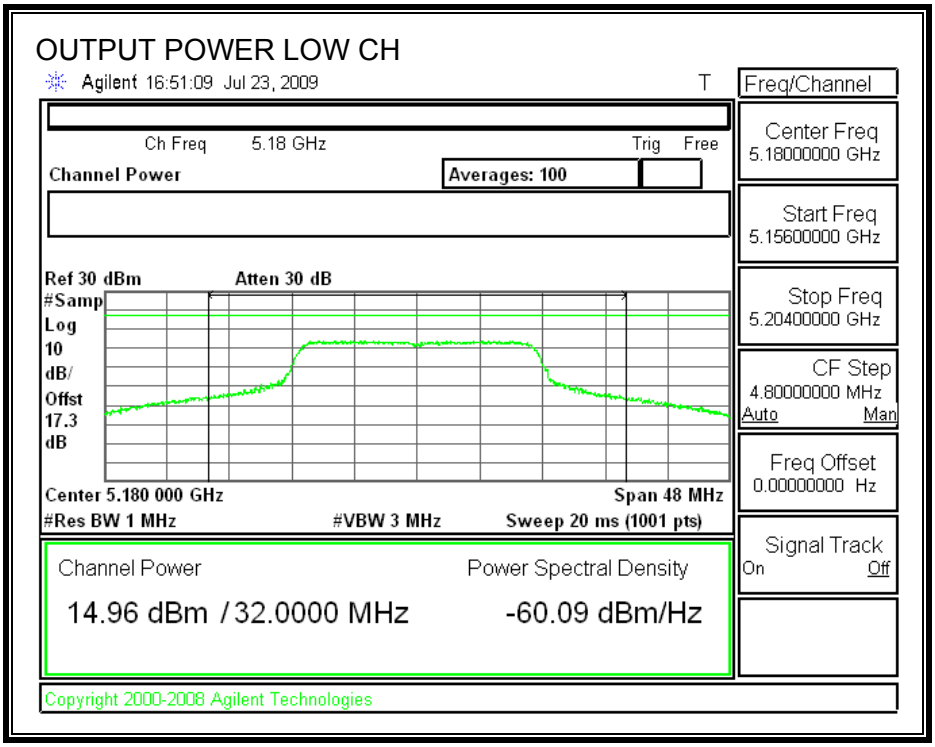
Limit

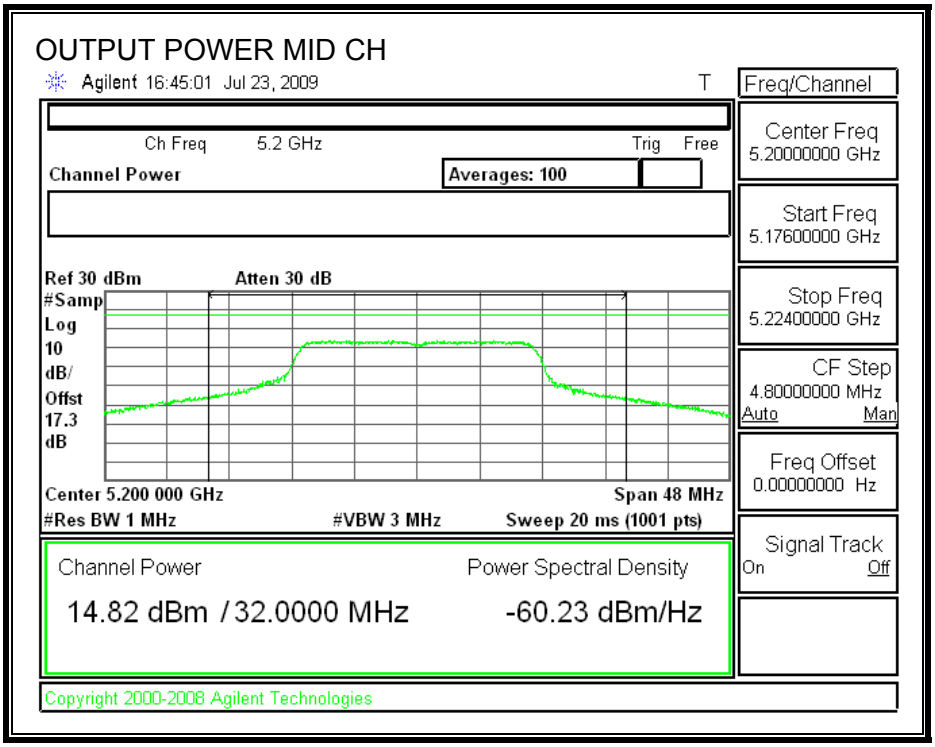
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	31.071	18.92	3.84	17.00
Mid	5200	17	30.292	18.81	3.84	17.00
High	5240	17	30.263	18.81	3.84	17.00

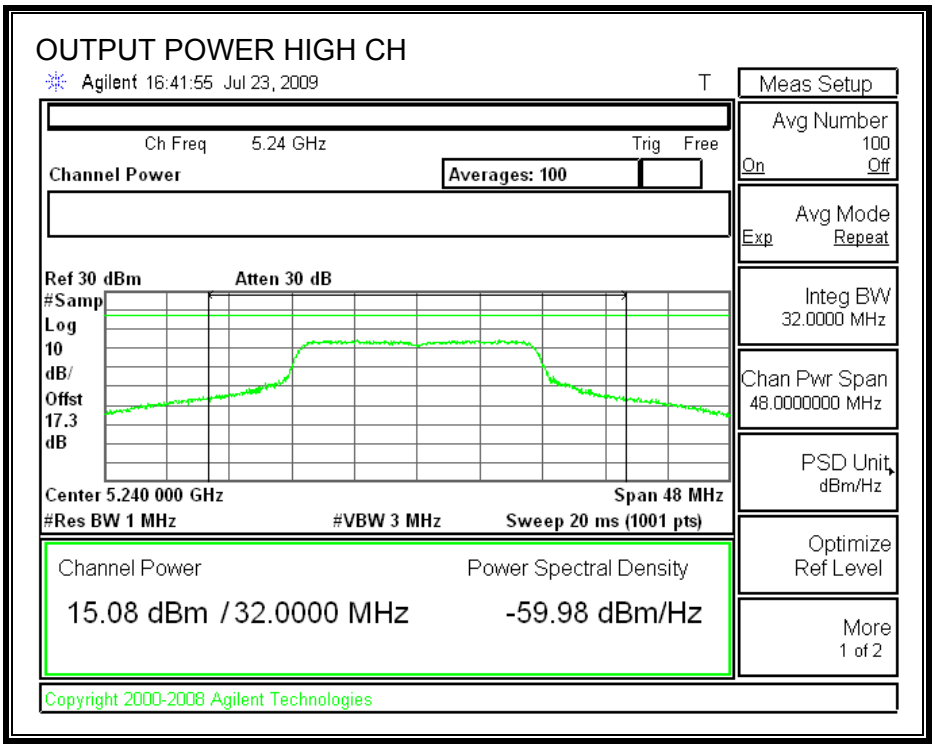
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	14.96	17.00	-2.04
Mid	5200	14.82	17.00	-2.18
High	5240	15.08	17.00	-1.92

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 16 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5180	15.13
Middle	5200	14.98
High	5240	15.22

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

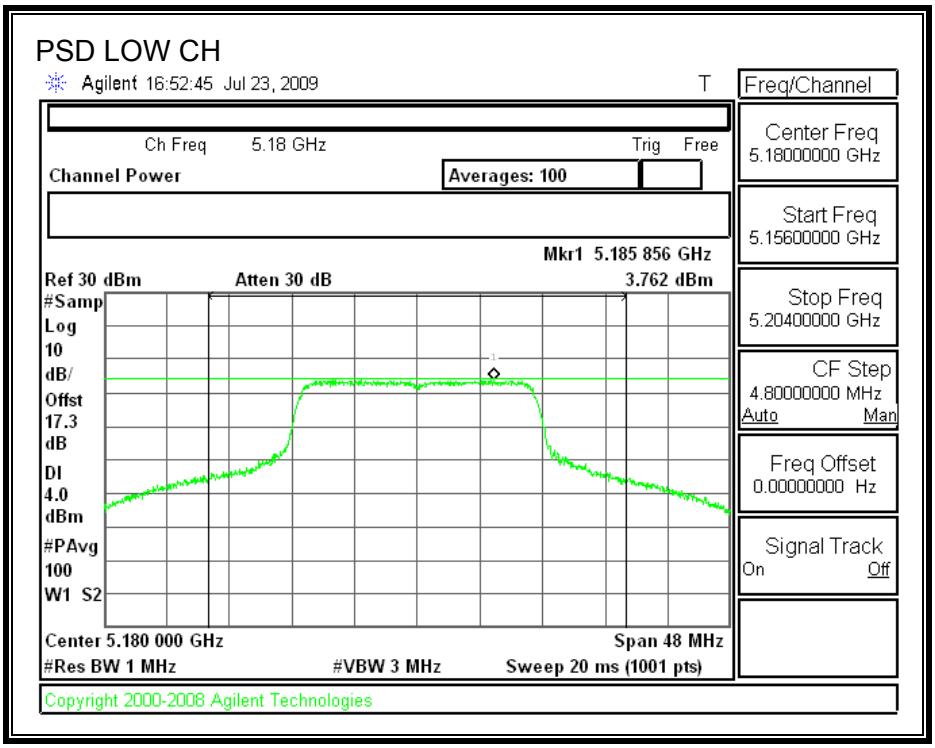
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

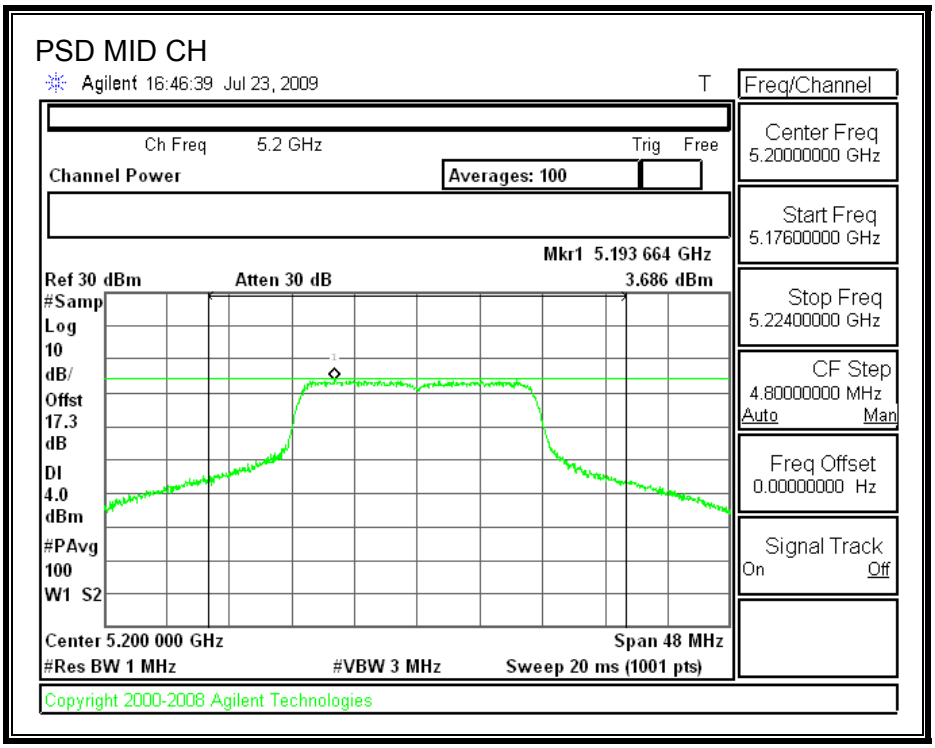
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.76	4	-0.24
Middle	5200	3.69	4	-0.31
High	5240	3.89	4	-0.11

POWER SPECTRAL DENSITY

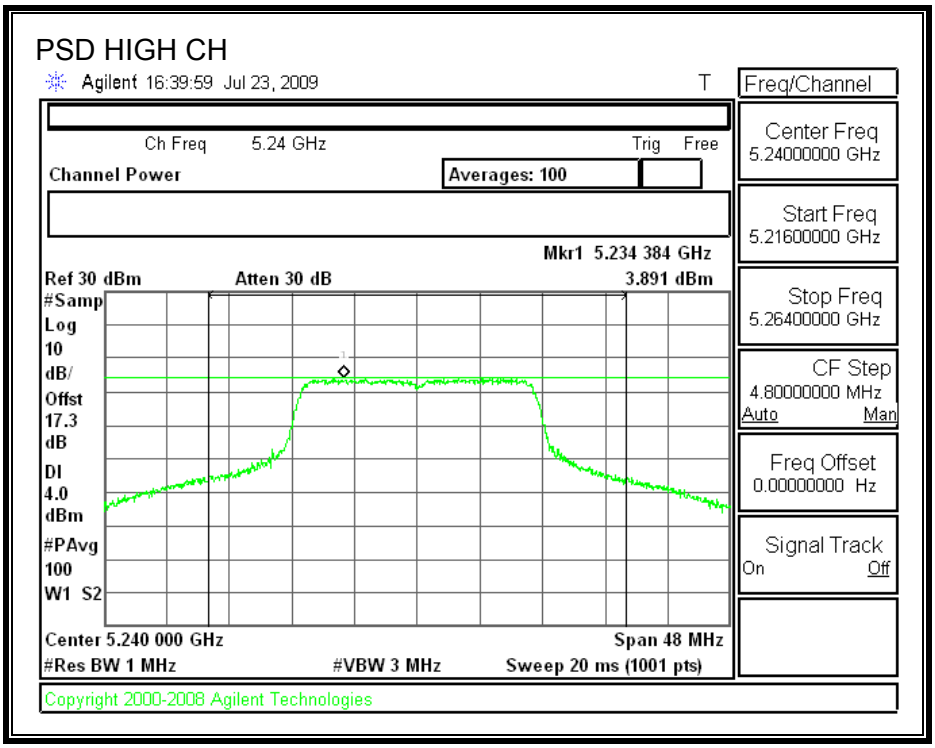
PSD LOW CH



PSD MID CH



PSD HIGH CH



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

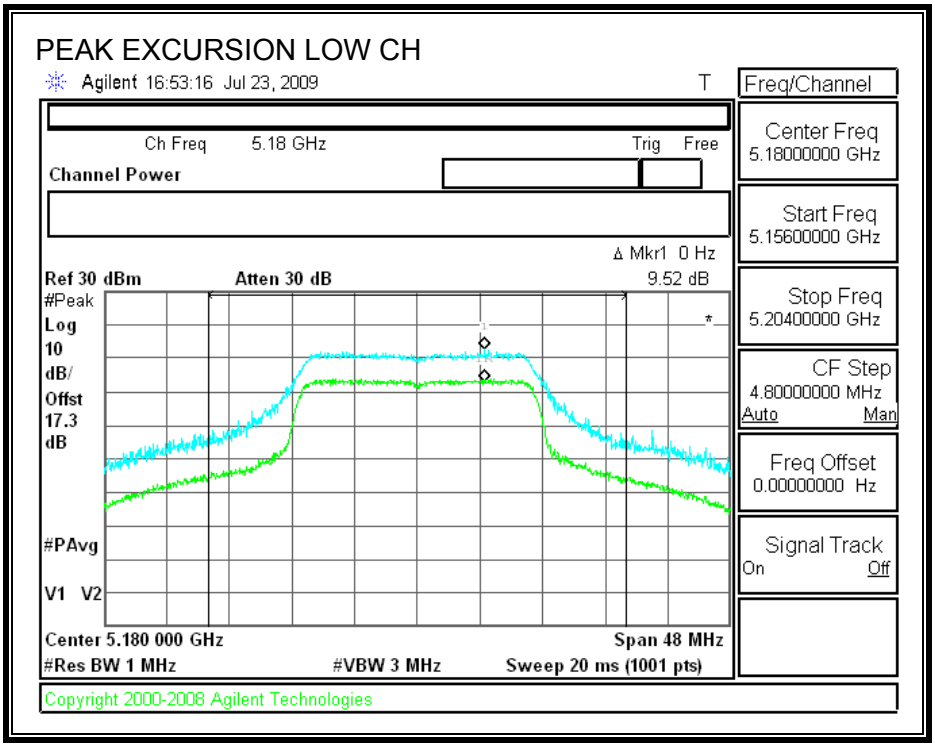
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

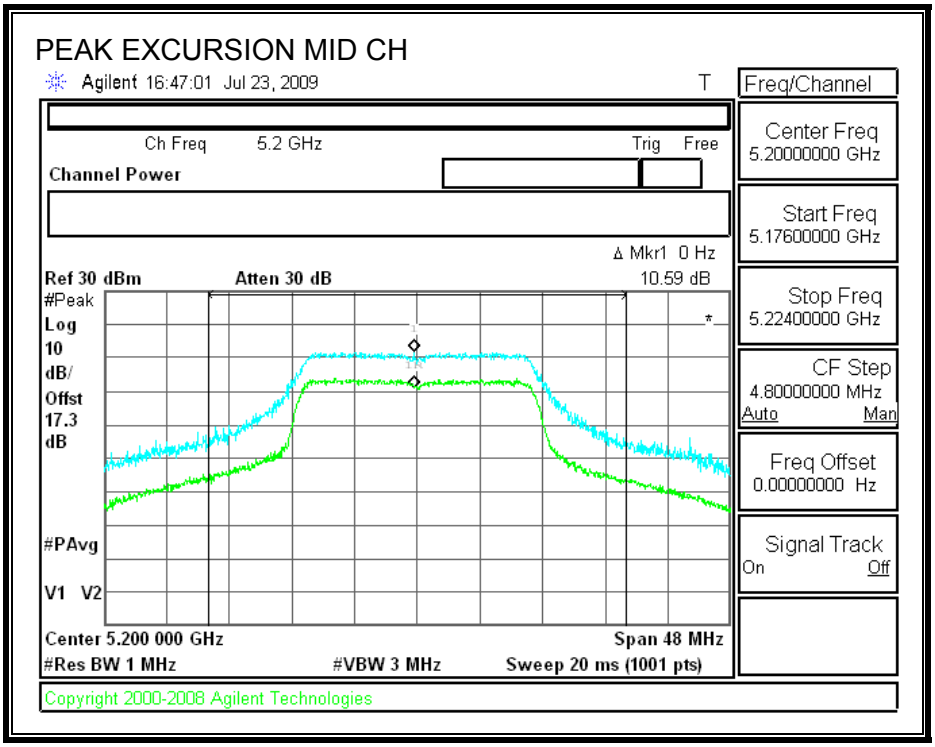
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

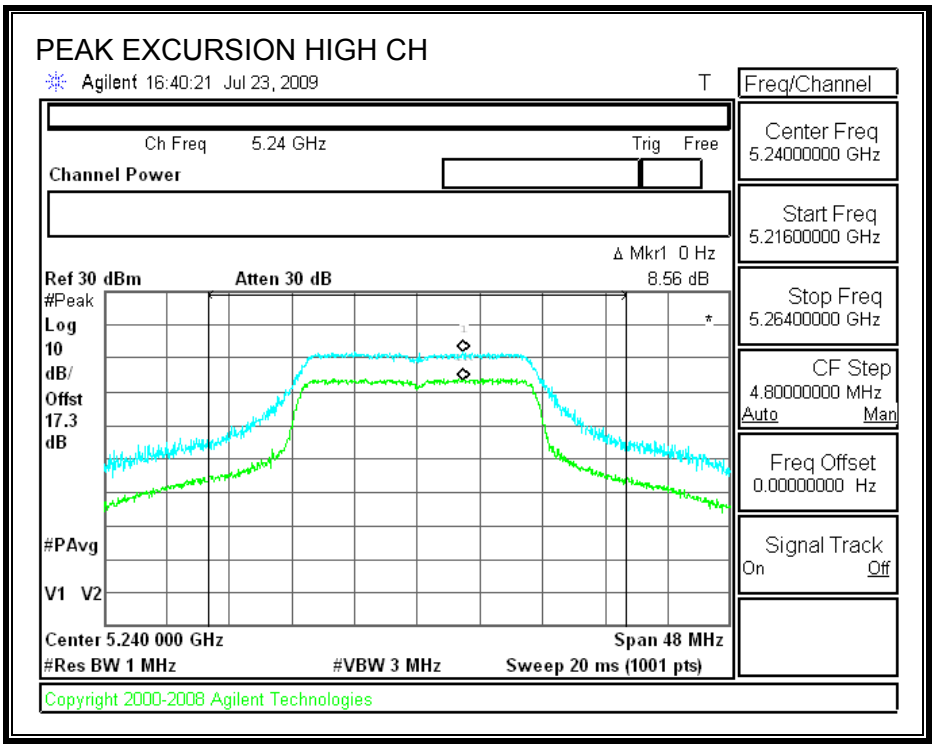
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.52	13	-3.48
Middle	5200	10.59	13	-2.41
High	5240	8.56	13	-4.44

PEAK EXCURSION





PEAK EXCURSION HIGH CH



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

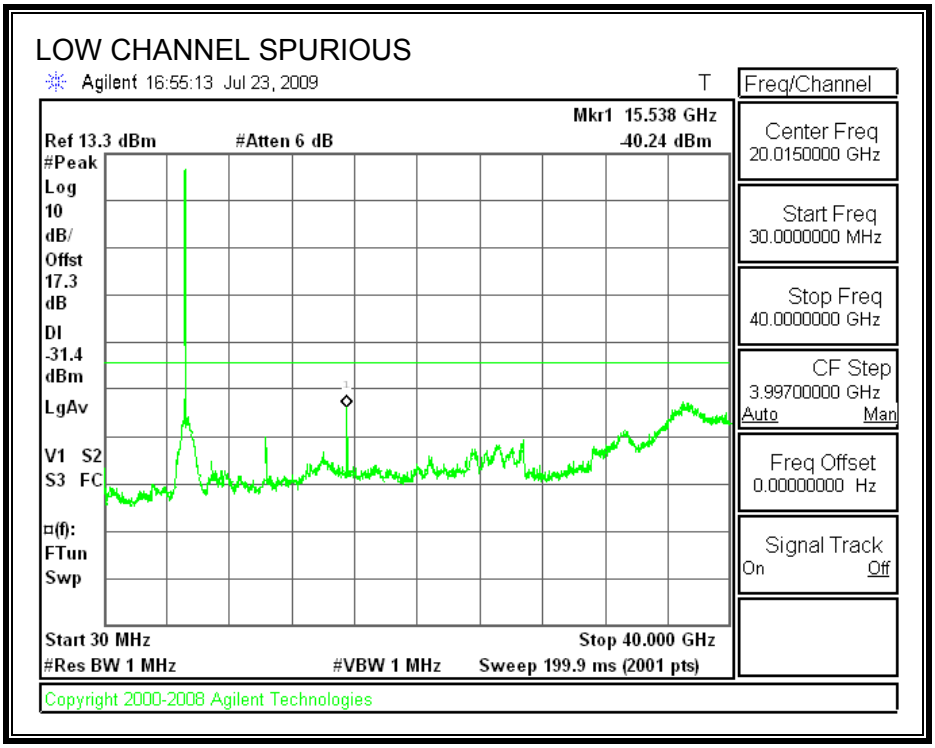
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

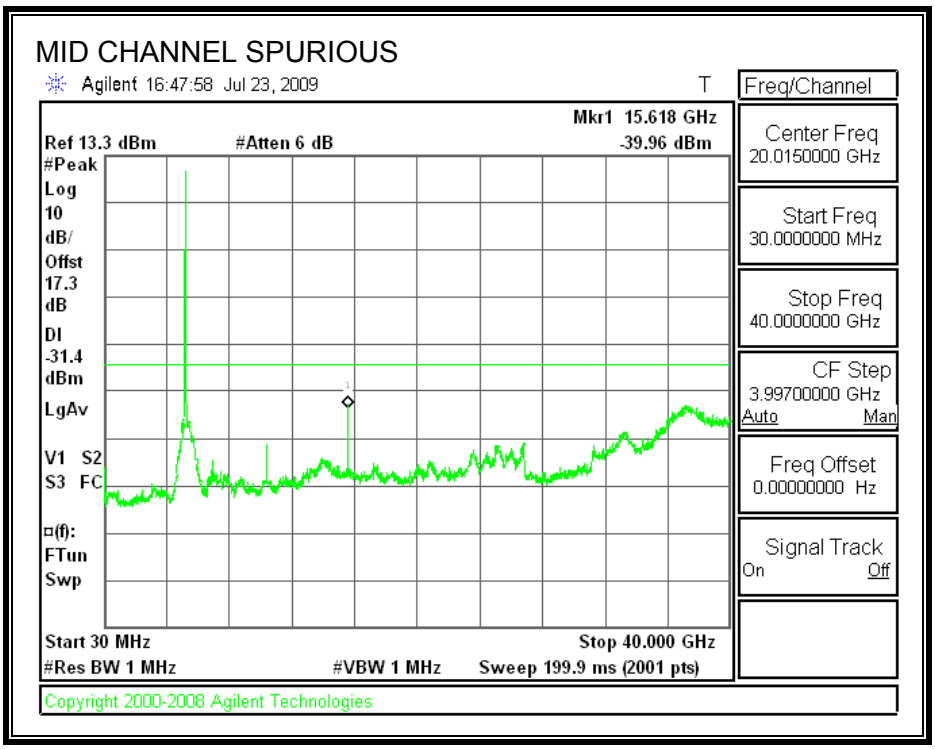
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

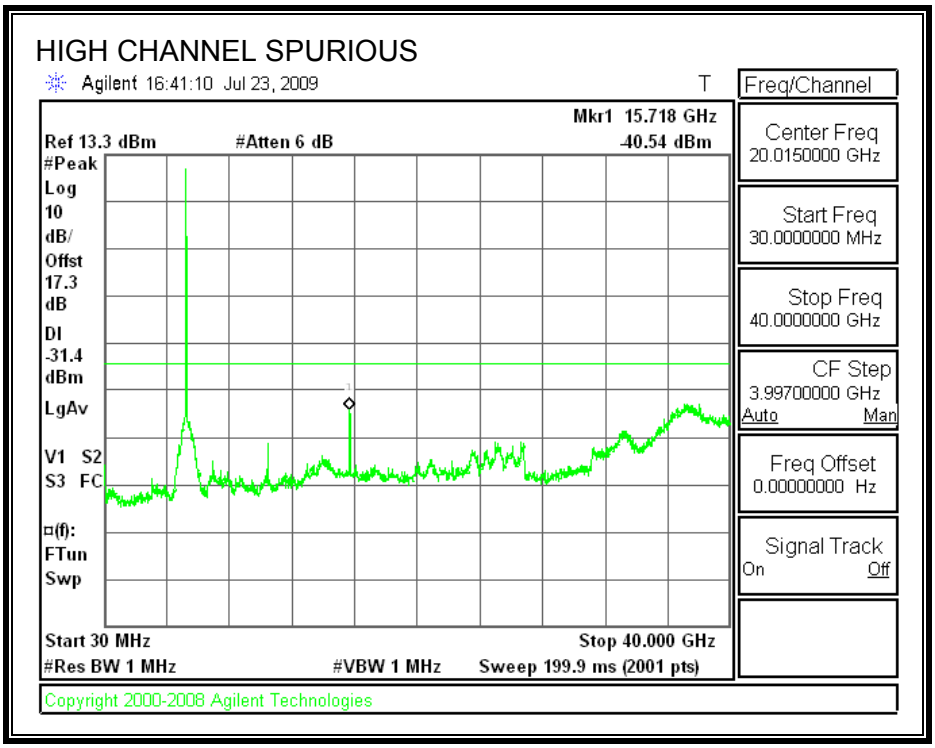
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

SPURIOUS EMISSIONS







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.

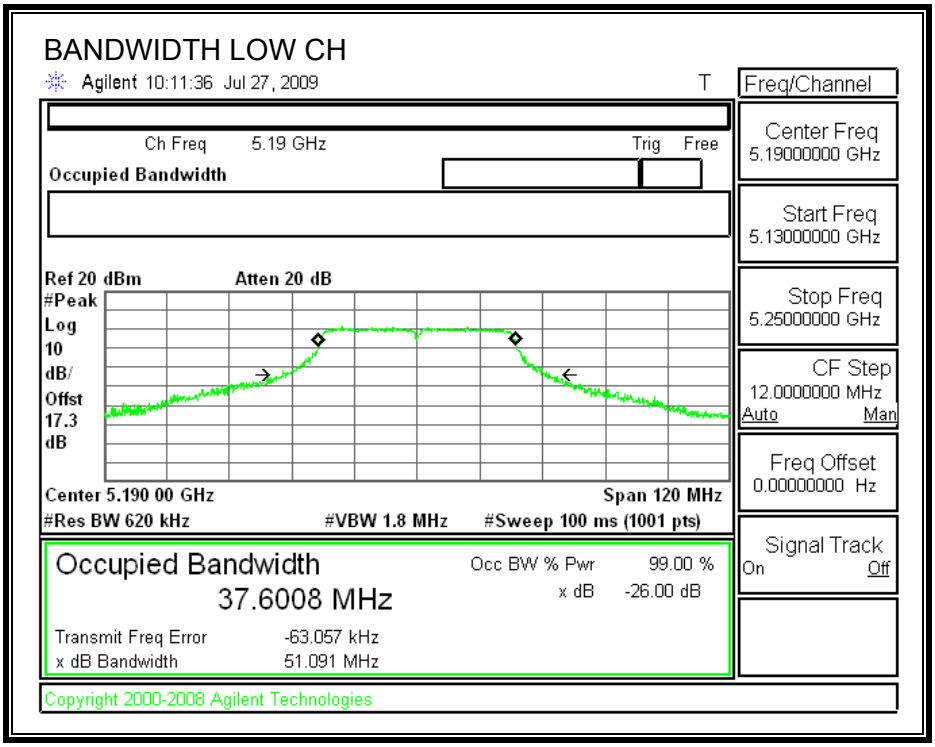
TEST PROCEDURE

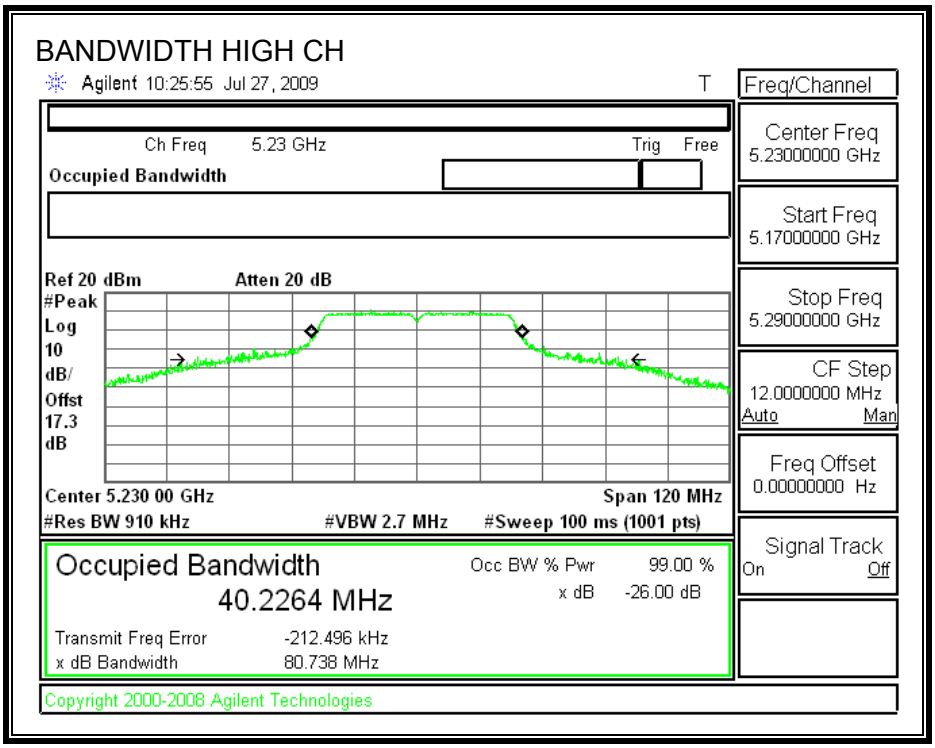
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

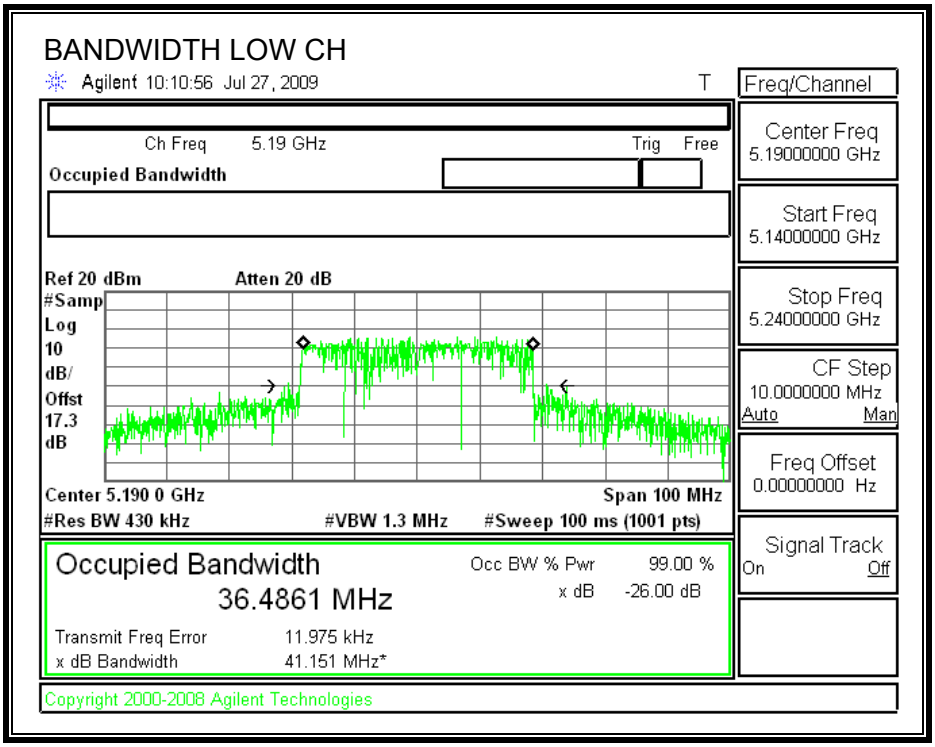
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	51.091	36.4861
High	5230	80.738	36.3330

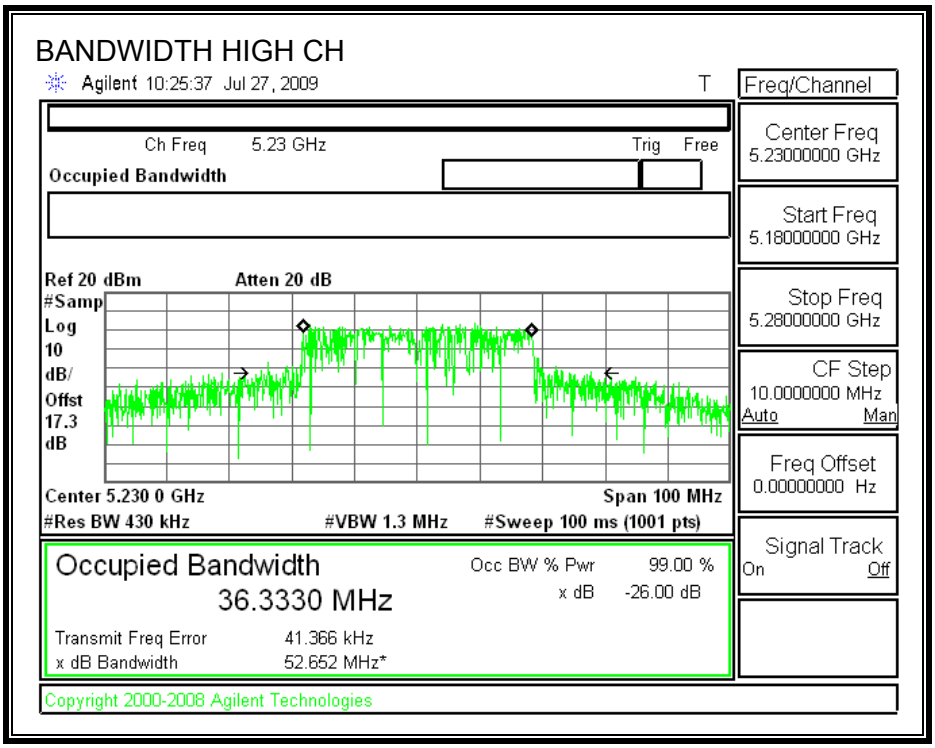
26 dB BANDWIDTH





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

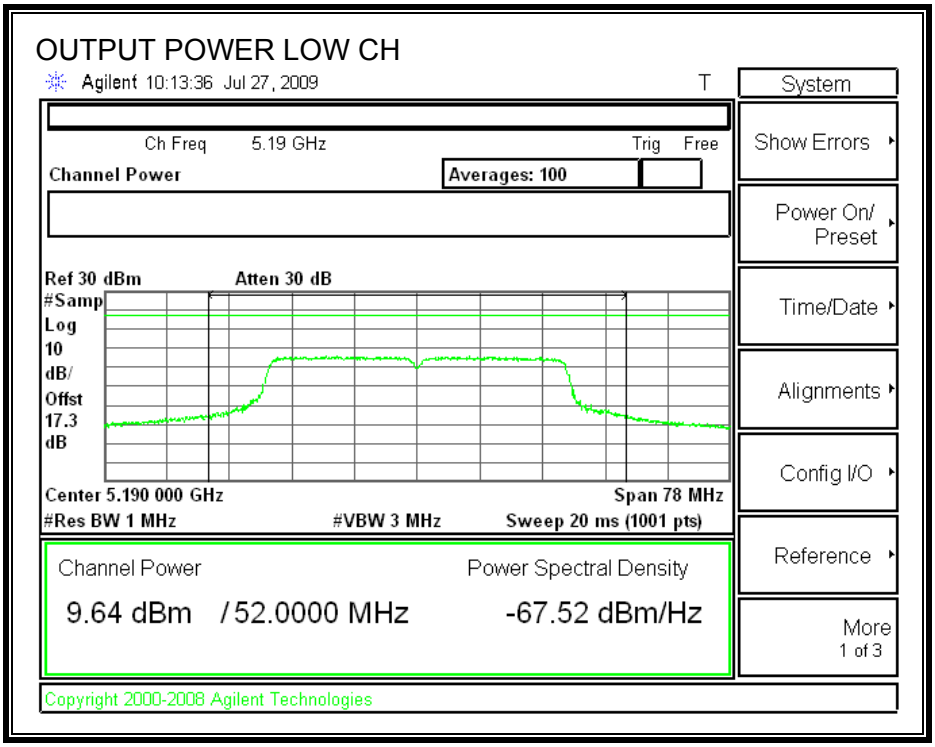
Limit

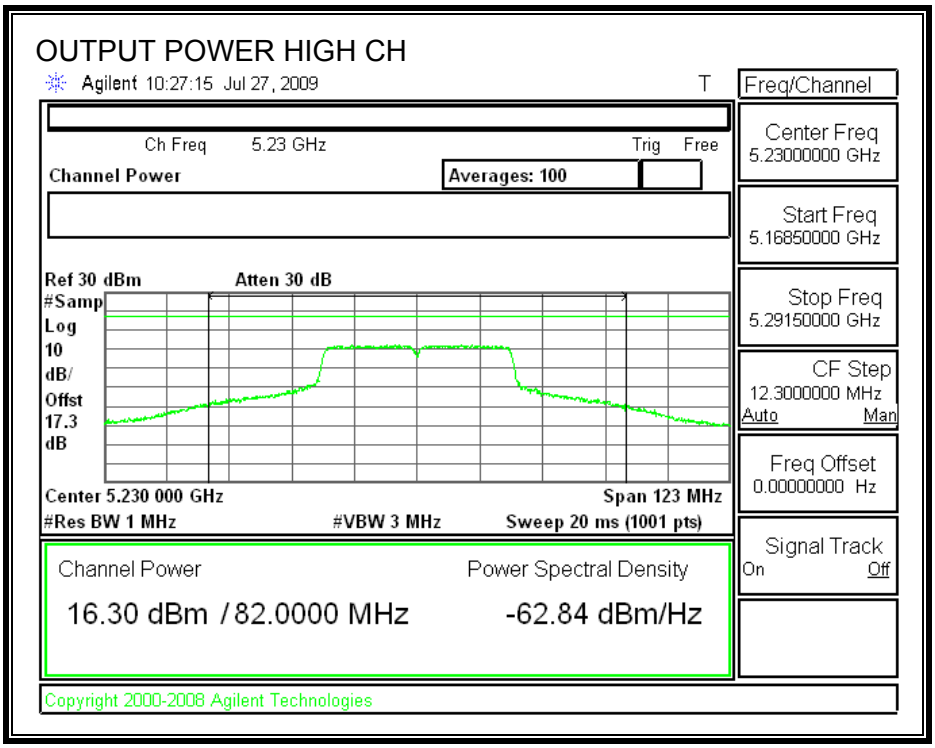
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5190	17	51.091	21.08	3.84	17.00
High	5230	17	80.738	23.07	3.84	17.00

Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5190	9.64	17.00	-7.36
High	5230	16.30	17.00	-0.70

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 16 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5190	9.73
High	5230	16.54

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

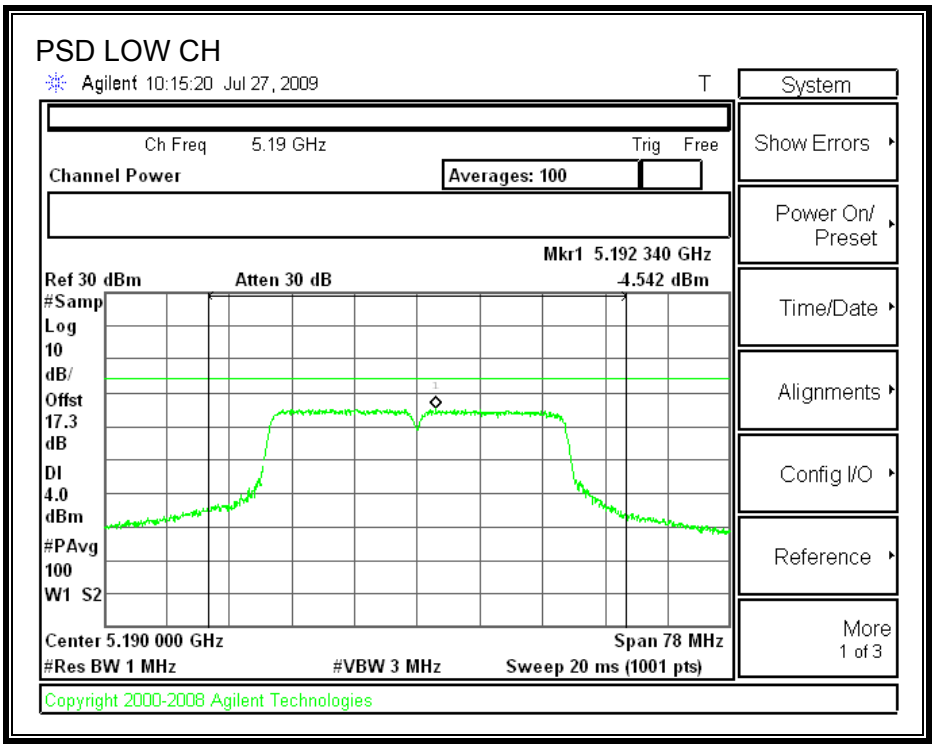
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

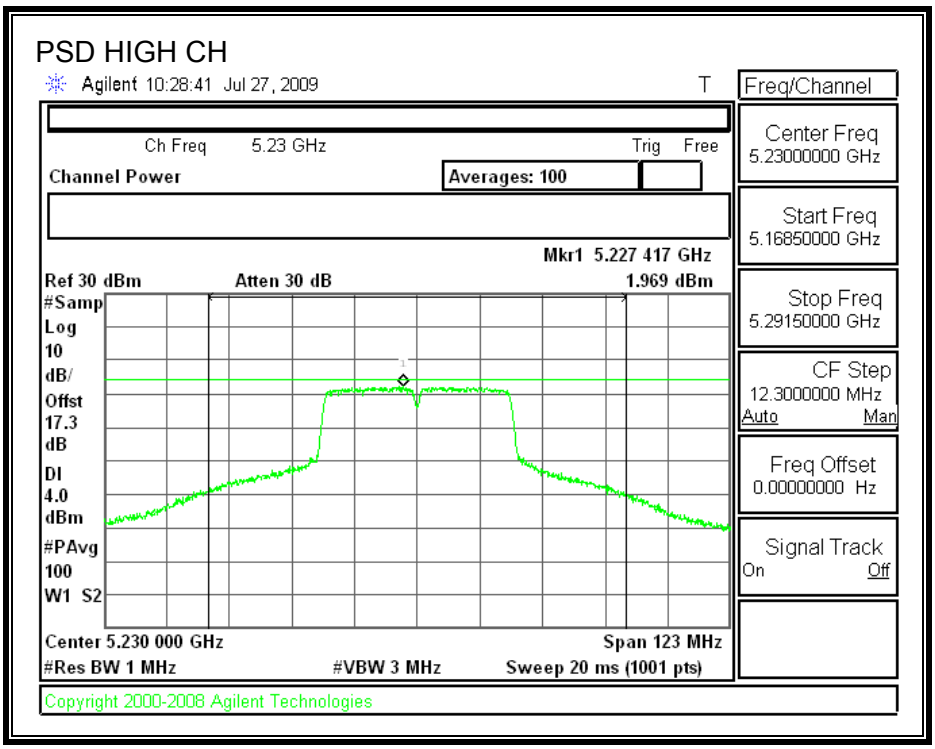
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5190	-4.54	4	-8.54
High	5230	1.97	4	-2.03

POWER SPECTRAL DENSITY

PSD LOW CH



PSD HIGH CH



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

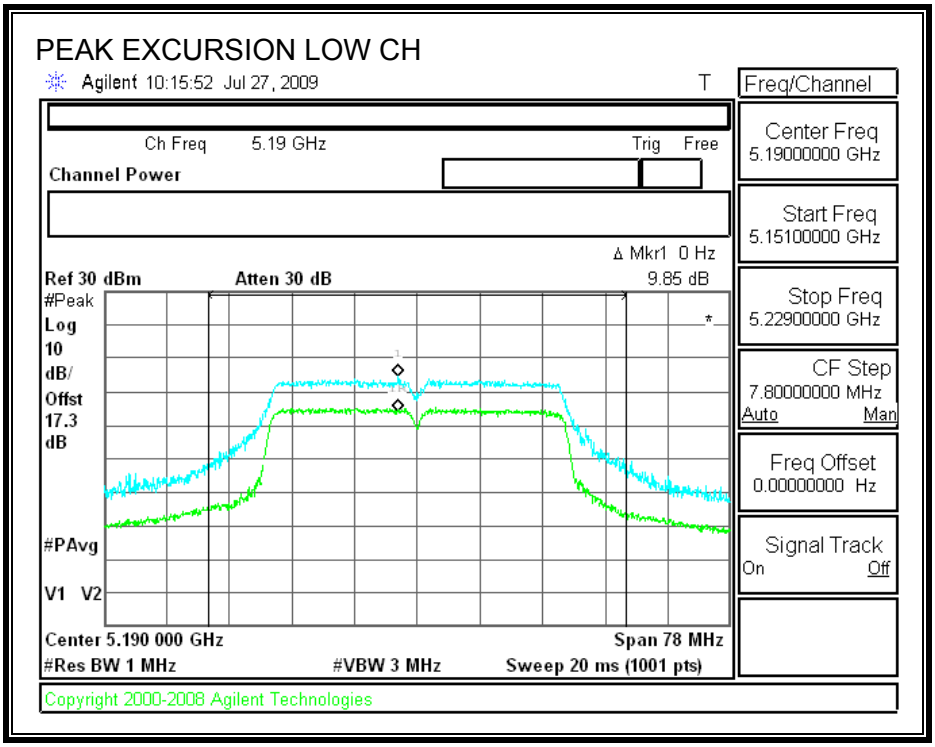
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

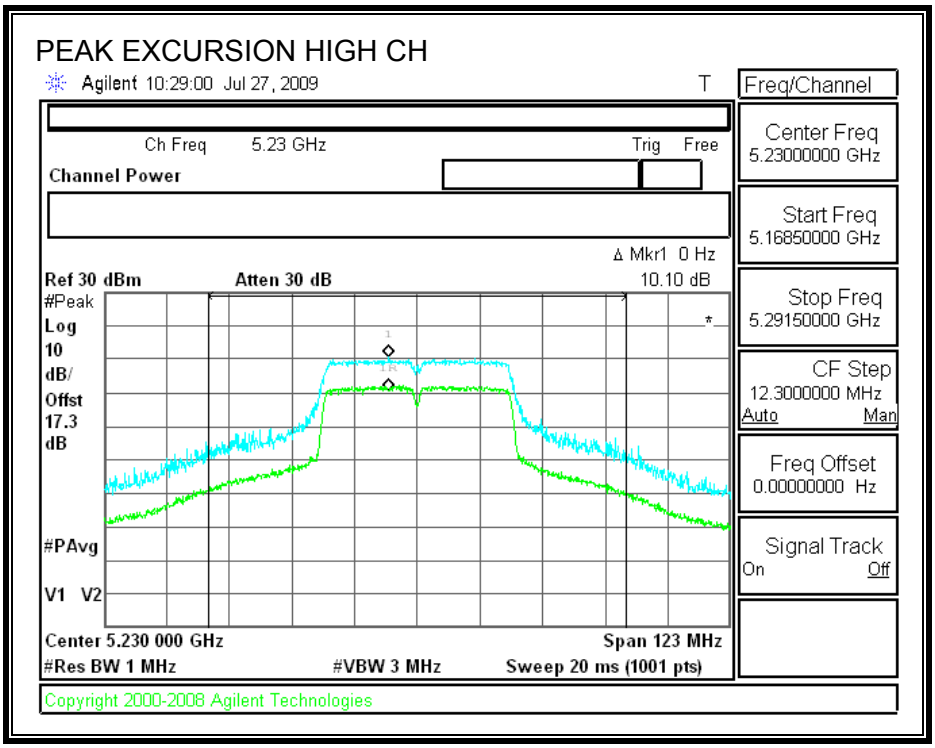
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	9.85	13	-3.15
High	5230	10.10	13	-2.90

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

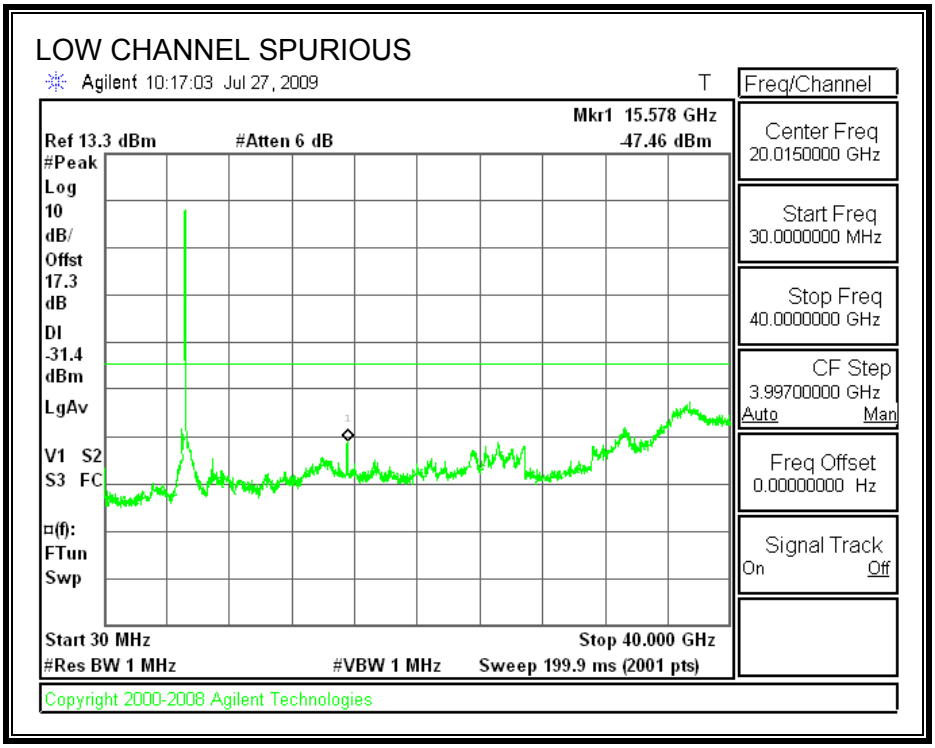
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

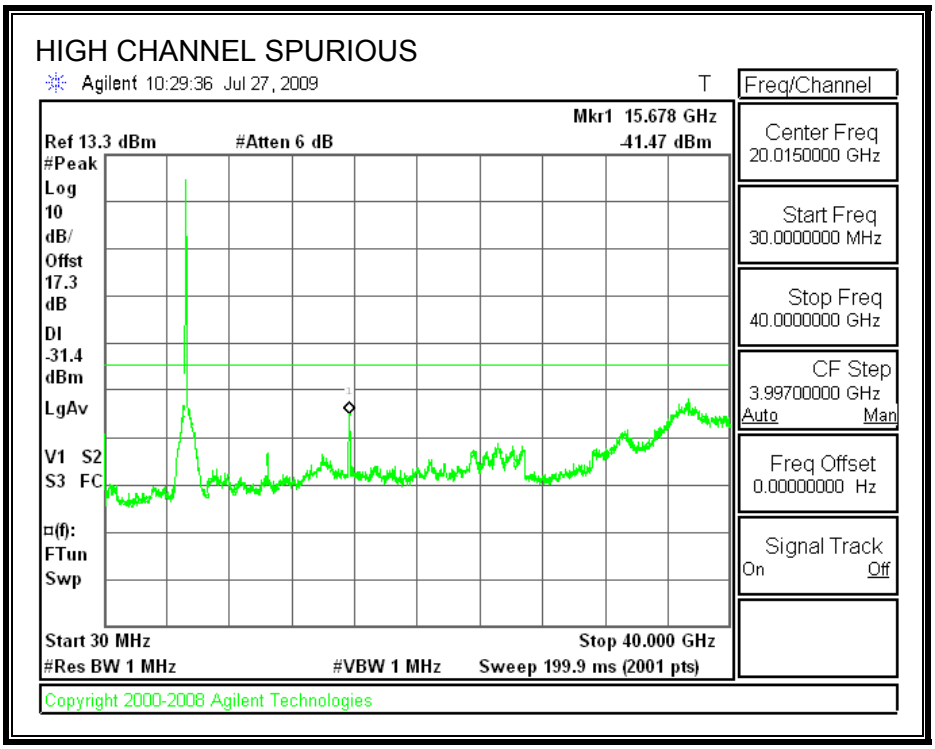
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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





7.4. 802.11a MODE IN THE 5.3 GHz BAND

7.4.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

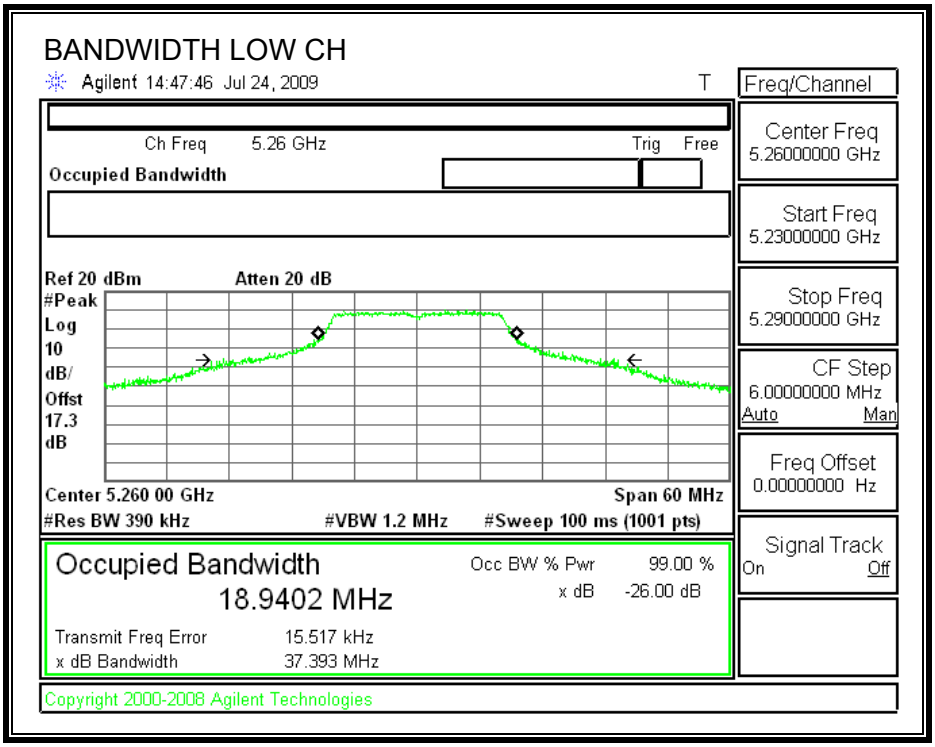
TEST PROCEDURE

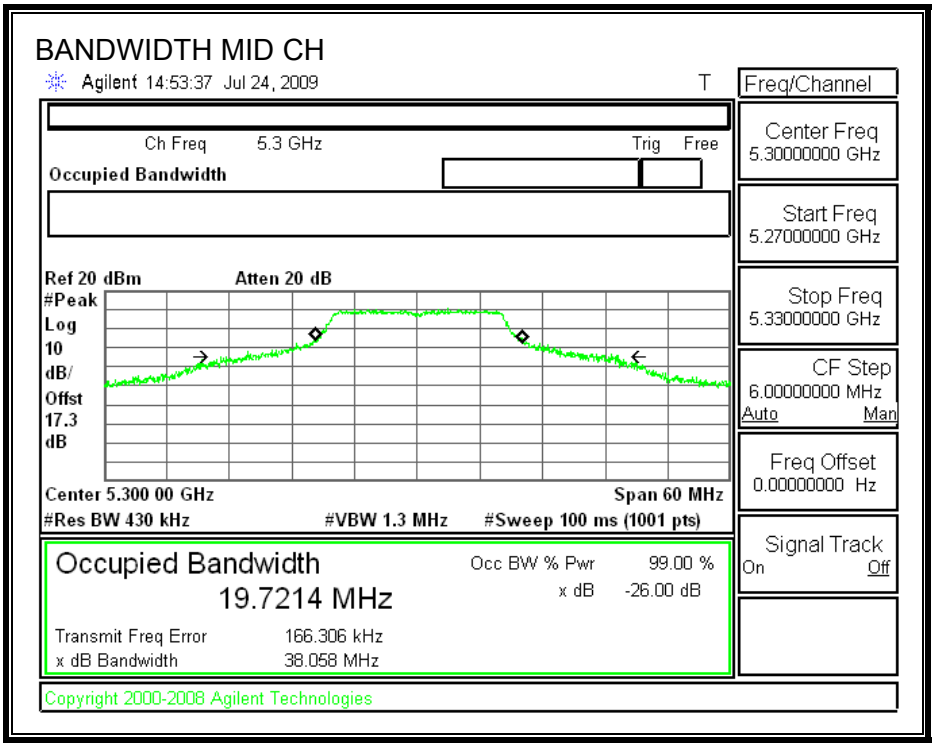
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

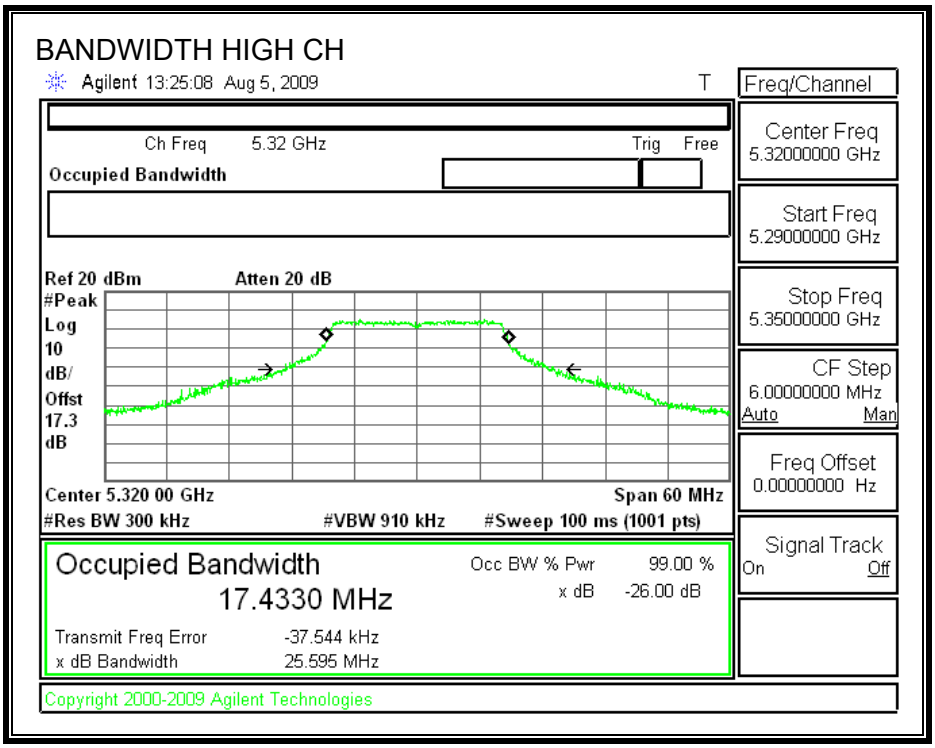
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5260	37.393	16.5904
Middle	5300	38.058	16.6330
High	5320	25.595	16.4295

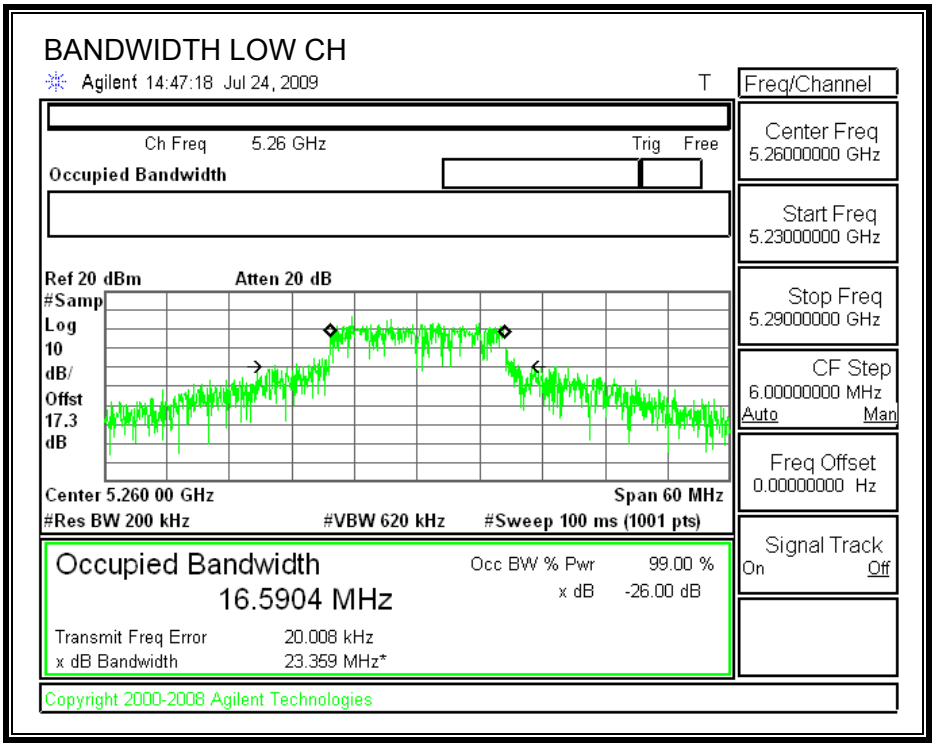
26 dB BANDWIDTH

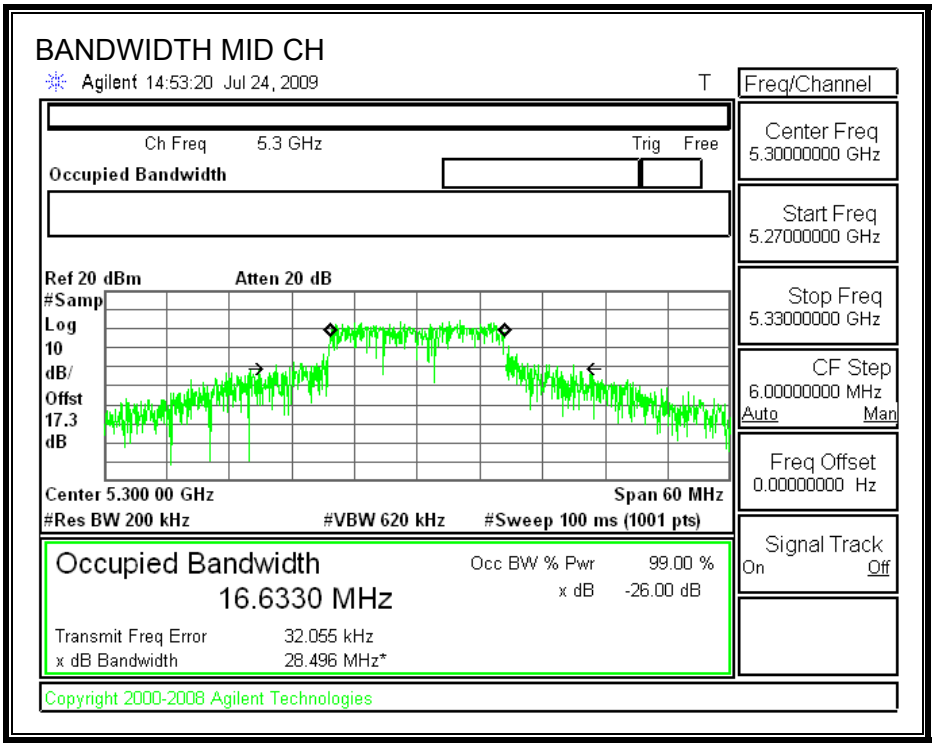


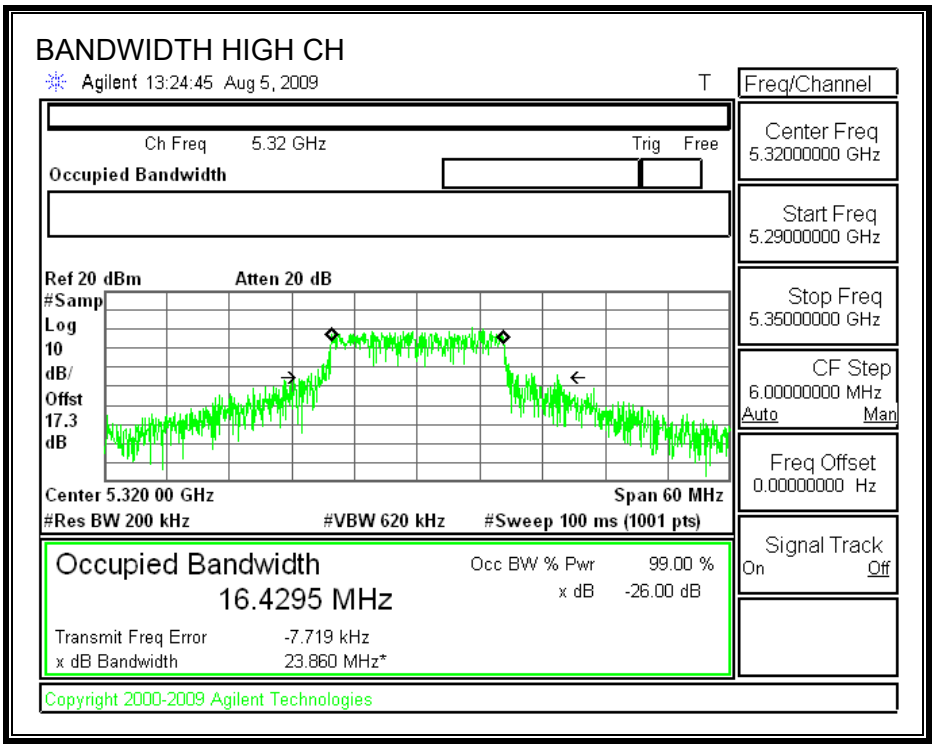




99% BANDWIDTH







7.4.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25-5.35 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

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

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

RESULTS

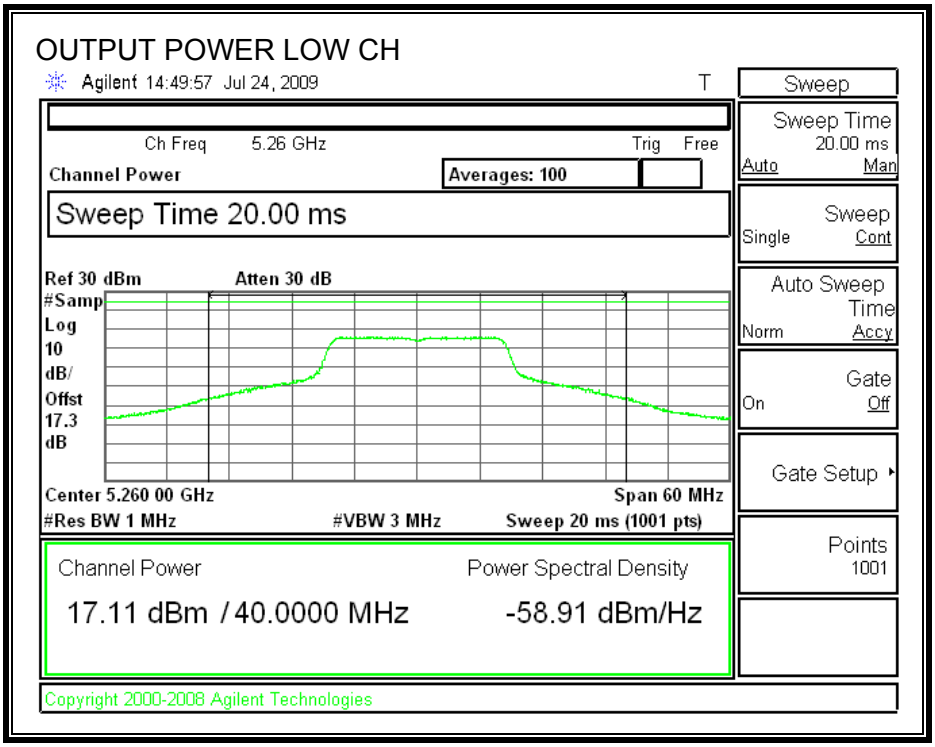
Limit

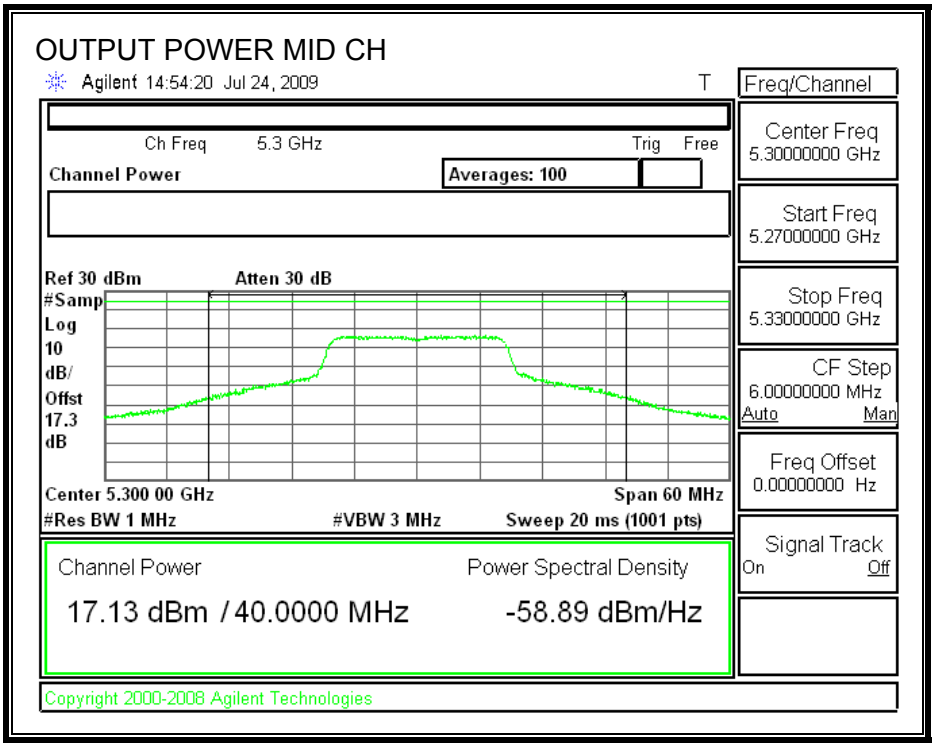
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5260	24	37.393	26.73	3.84	24.00
Mid	5300	24	38.058	26.80	3.84	24.00
High	5320	24	25.595	25.08	3.84	24.00

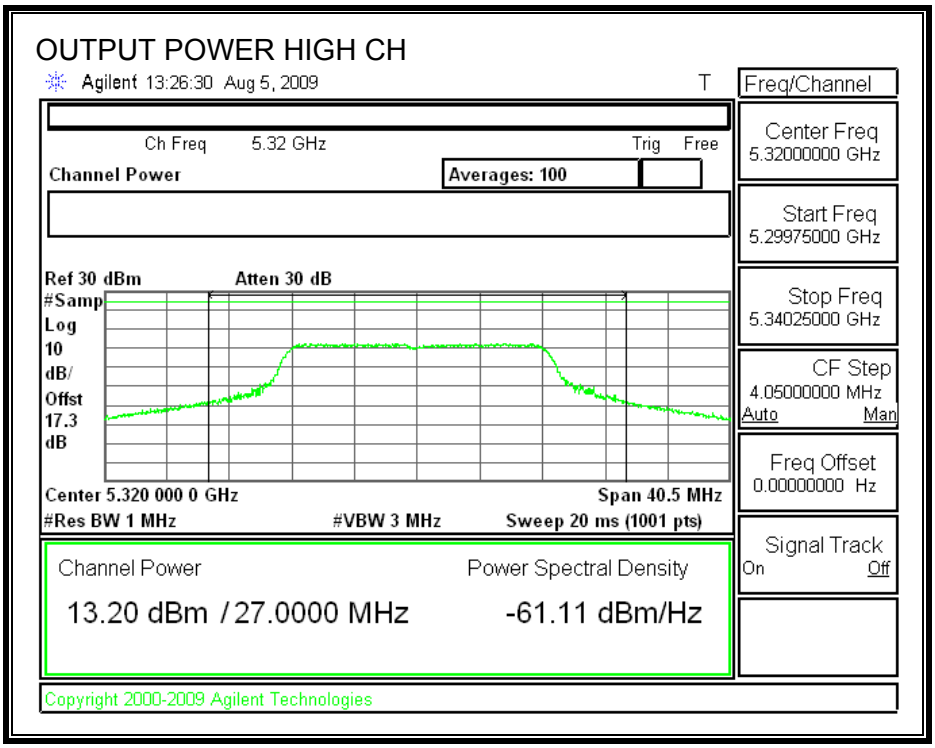
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5260	17.11	24.00	-6.89
Mid	5300	17.13	24.00	-6.87
High	5320	13.20	24.00	-10.80

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 16 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5260	17.30
Middle	5300	17.36
High	5320	13.42

7.4.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25–5.35 GHz band, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

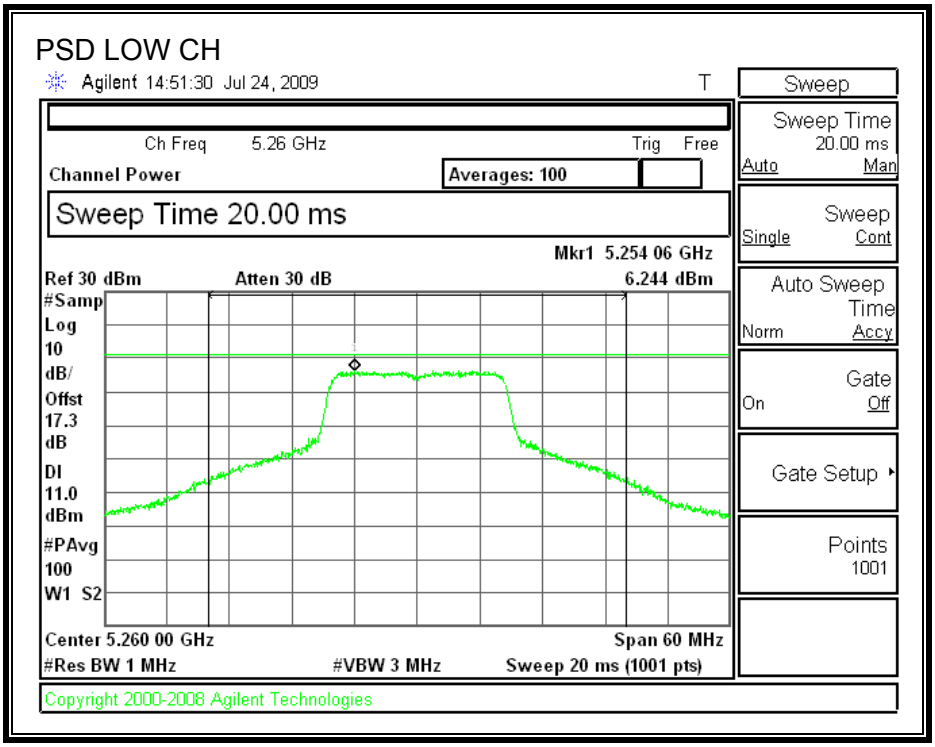
TEST PROCEDURE

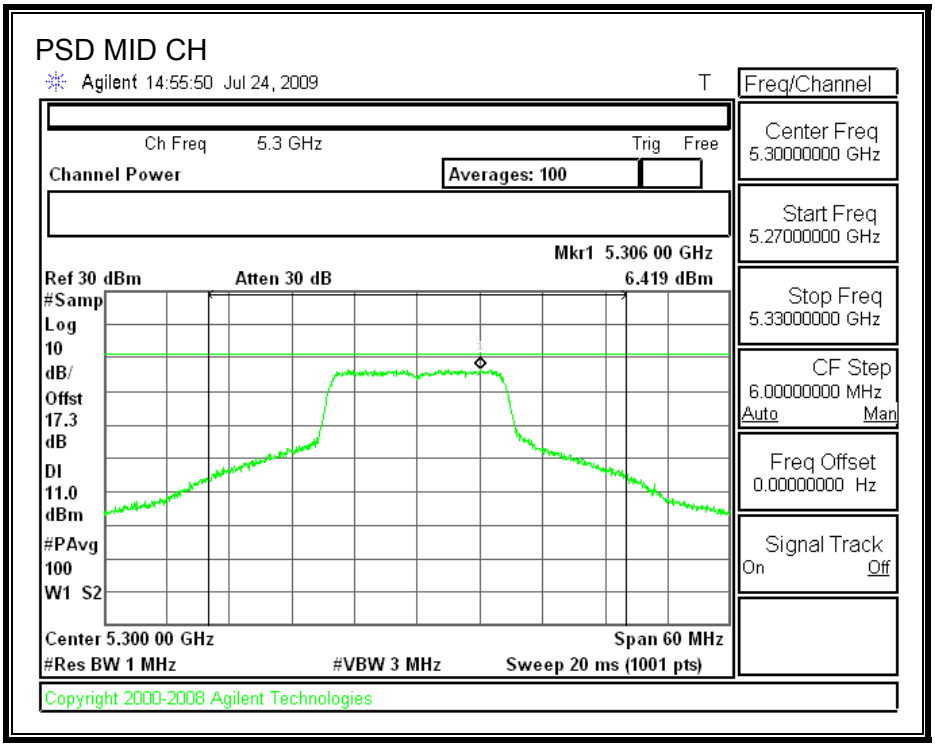
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

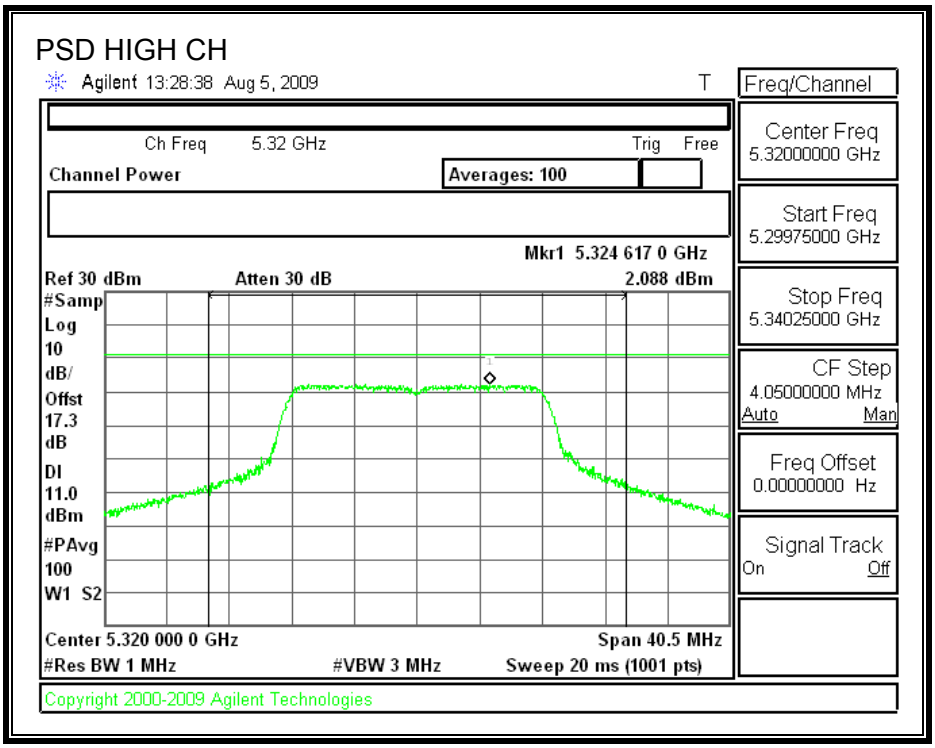
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5260	6.24	11	-4.76
Middle	5300	6.42	11	-4.58
High	5320	2.09	11	-8.91

POWER SPECTRAL DENSITY







7.4.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

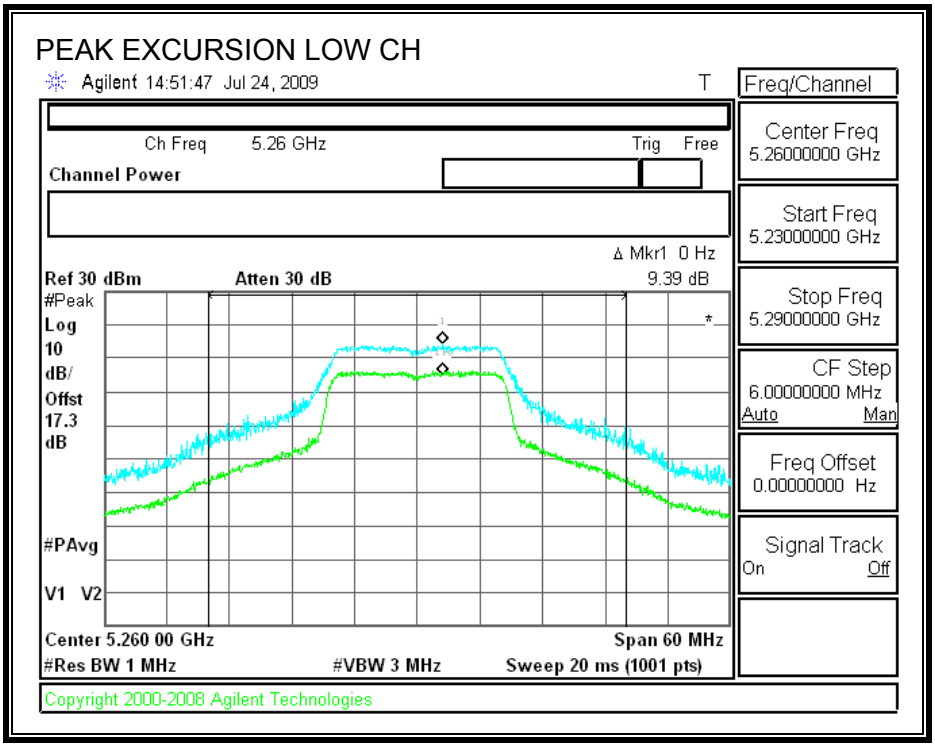
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

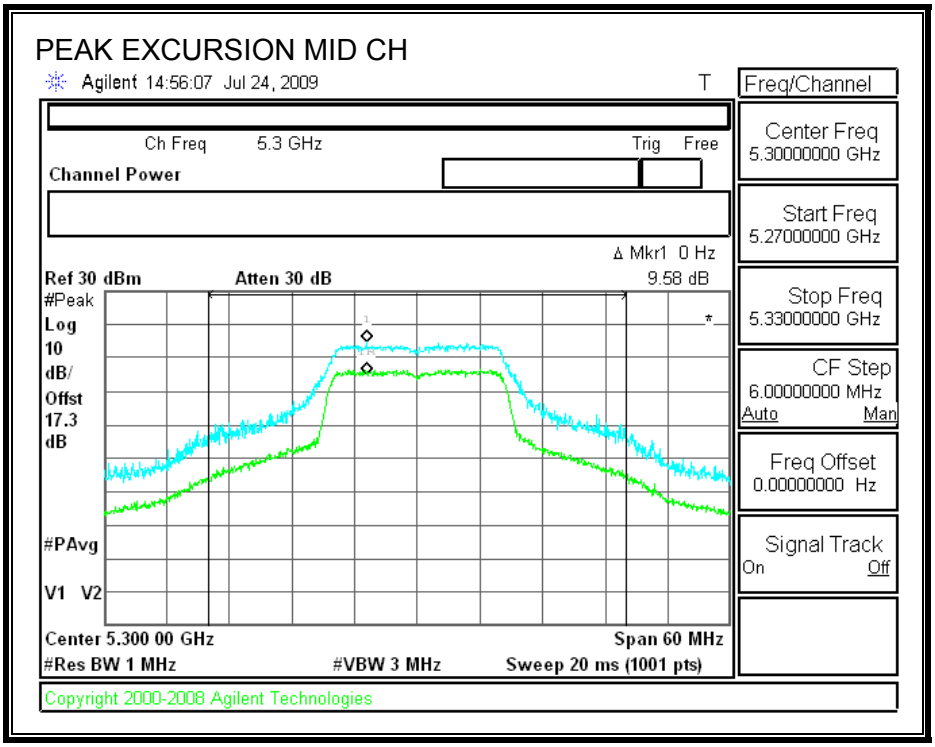
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

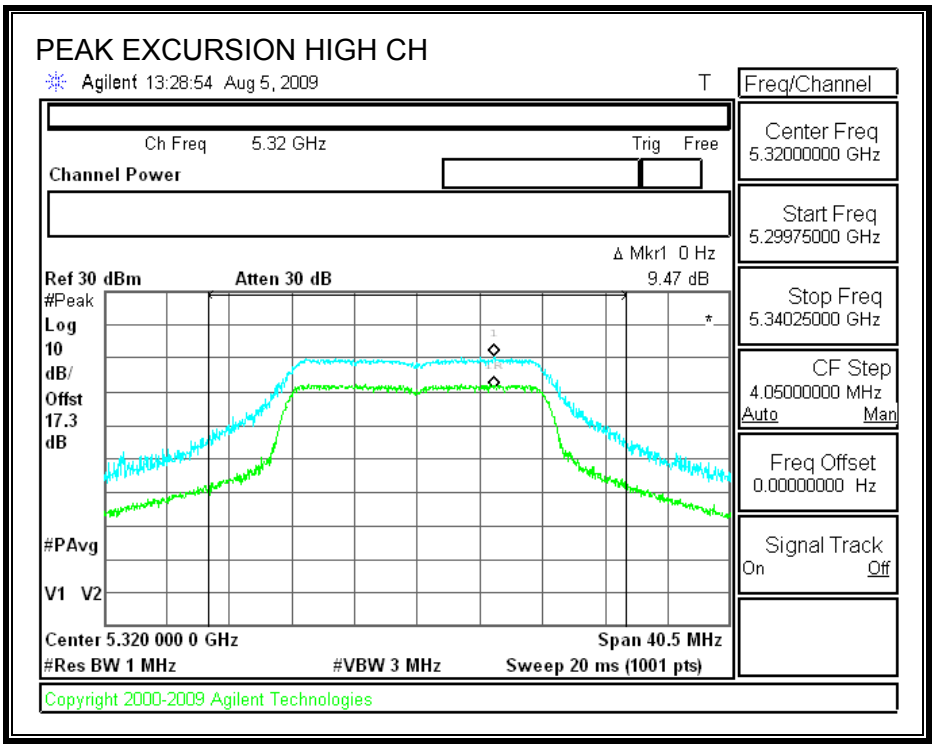
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	9.39	13	-3.61
Middle	5300	9.58	13	-3.42
High	5320	9.47	13	-3.53

PEAK EXCURSION





PEAK EXCURSION HIGH CH



7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (2)

IC RSS-210 A9.3 (2)

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

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

TEST PROCEDURE

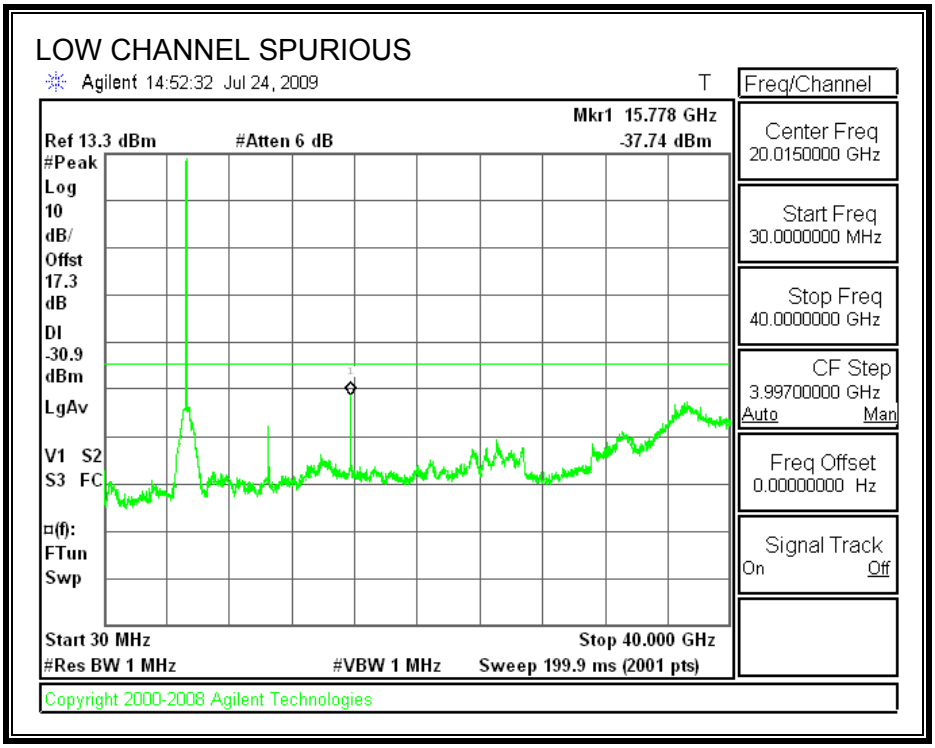
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

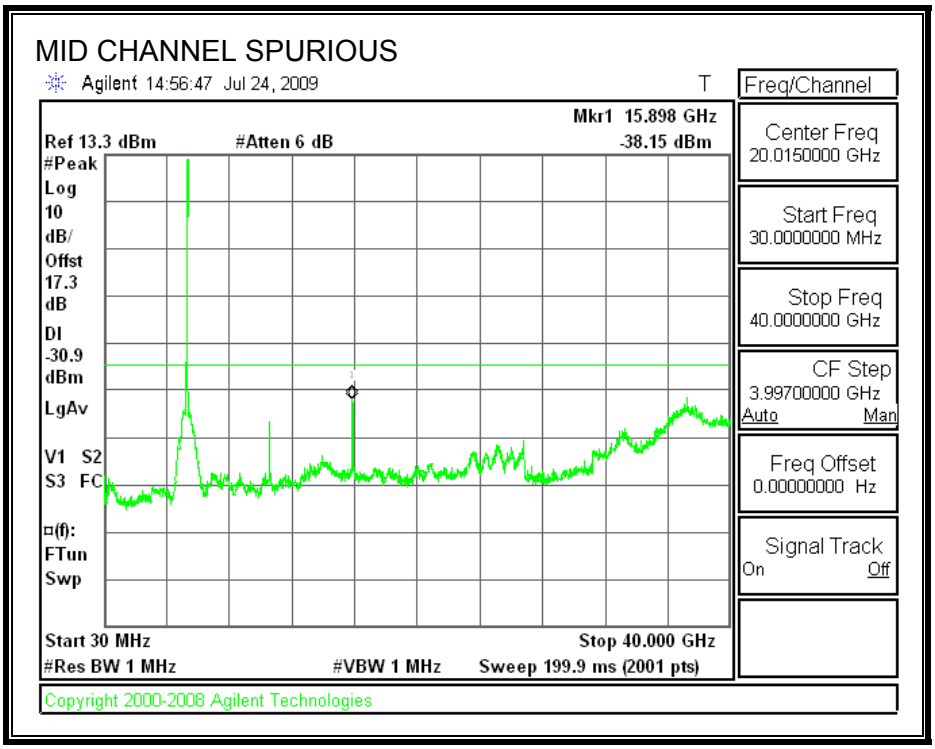
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

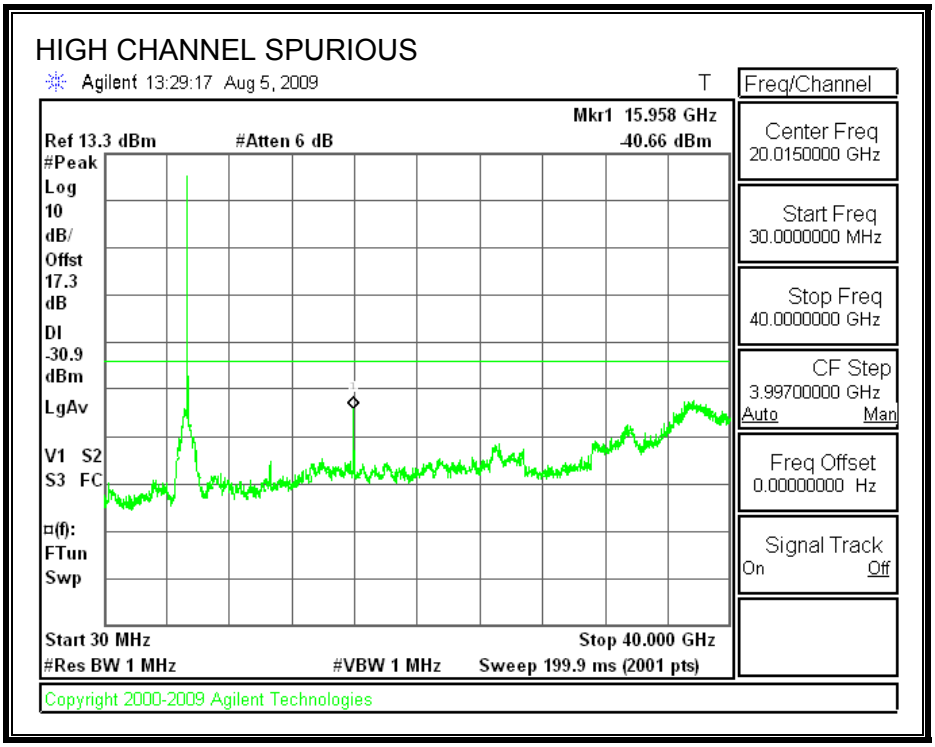
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

SPURIOUS EMISSIONS







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.

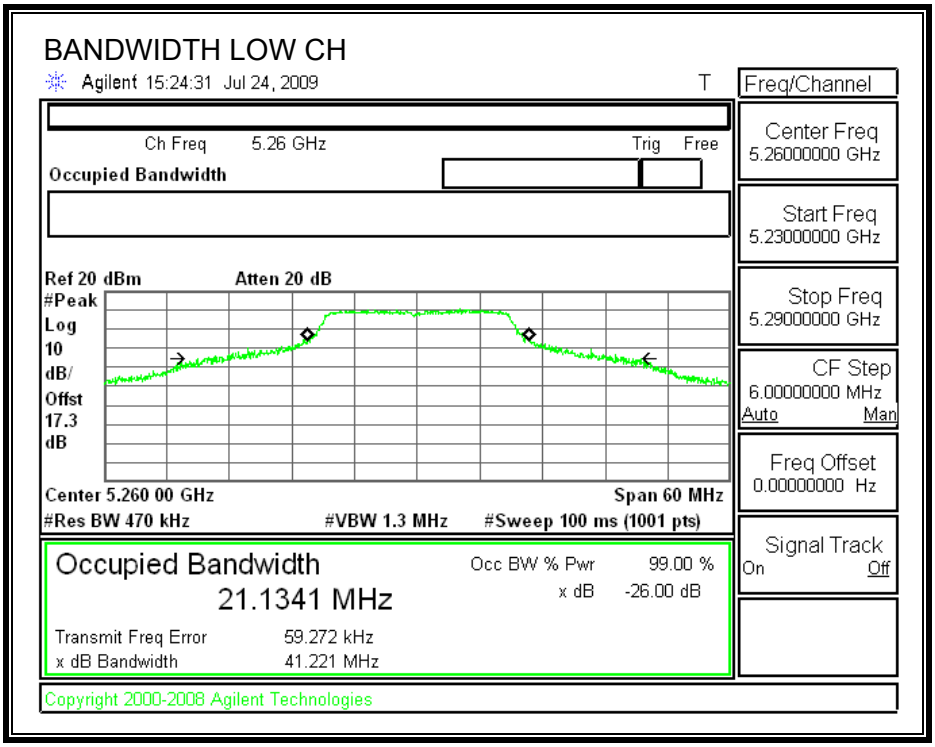
TEST PROCEDURE

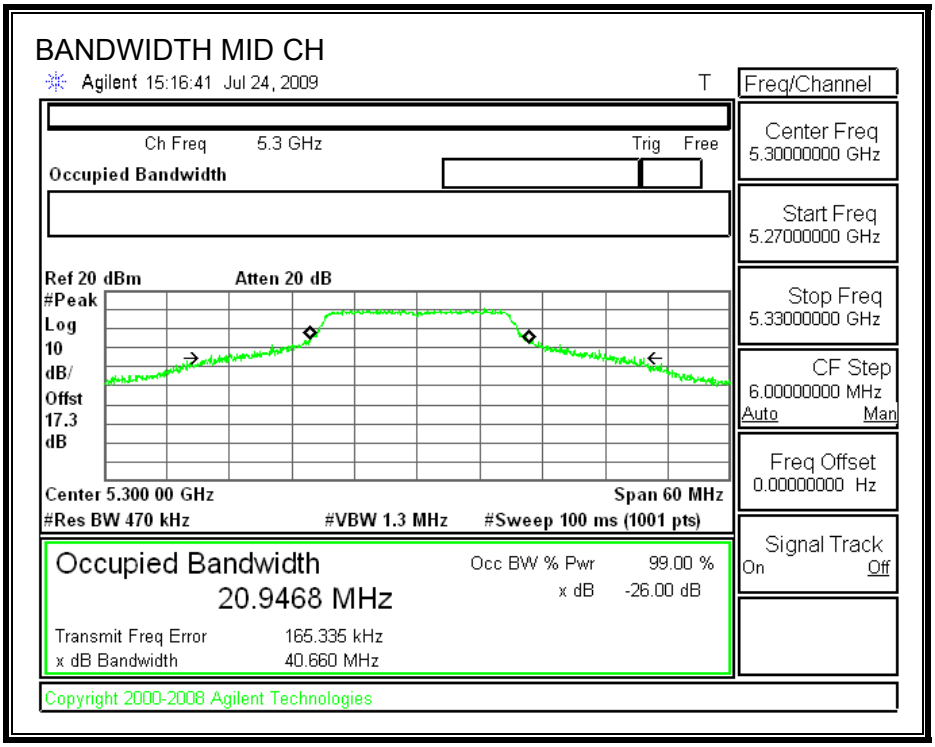
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

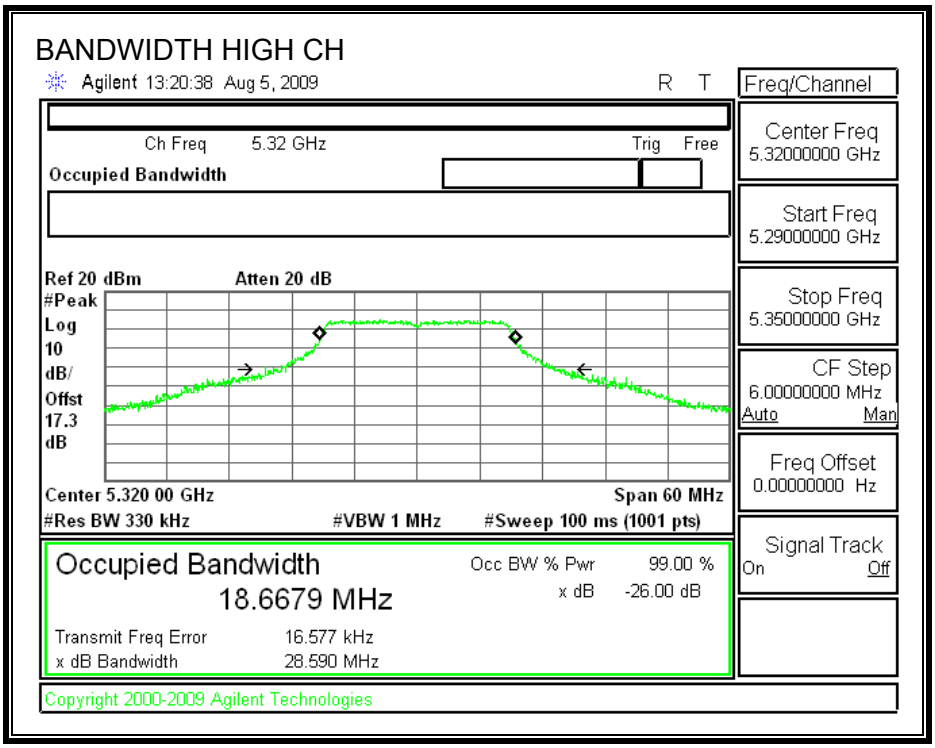
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5260	41.221	17.8294
Middle	5300	40.660	17.7723
High	5320	28.590	17.9184

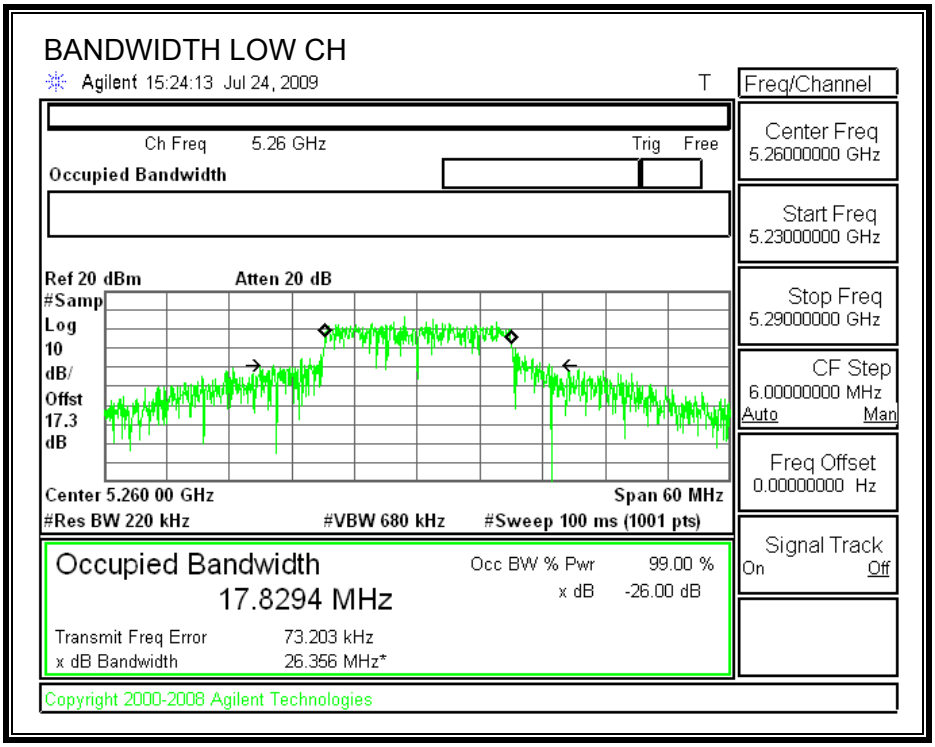
26 dB BANDWIDTH

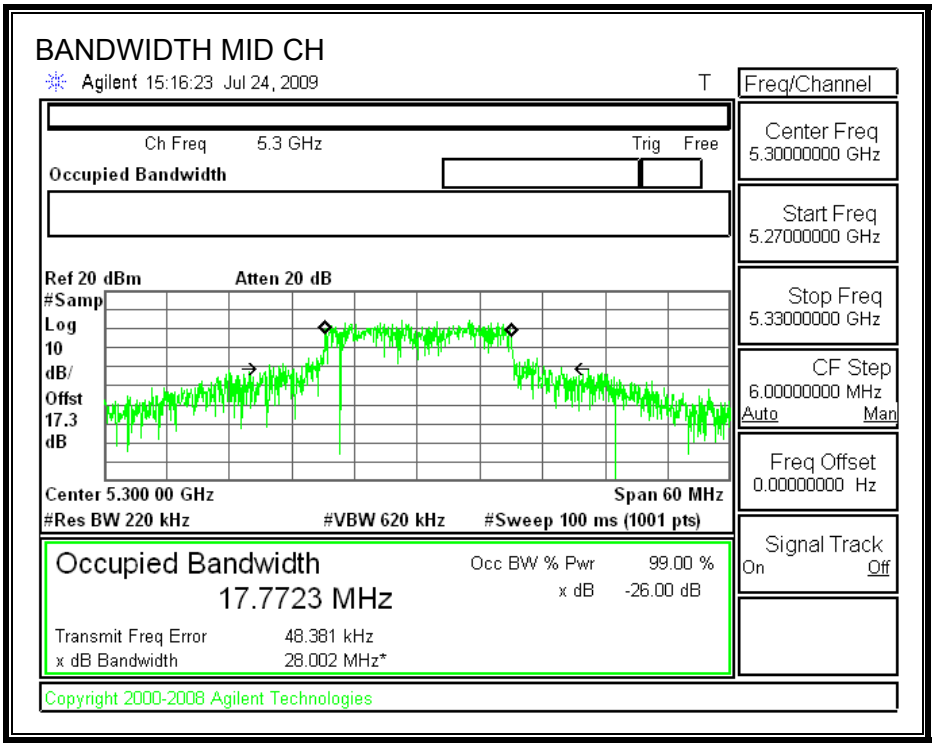


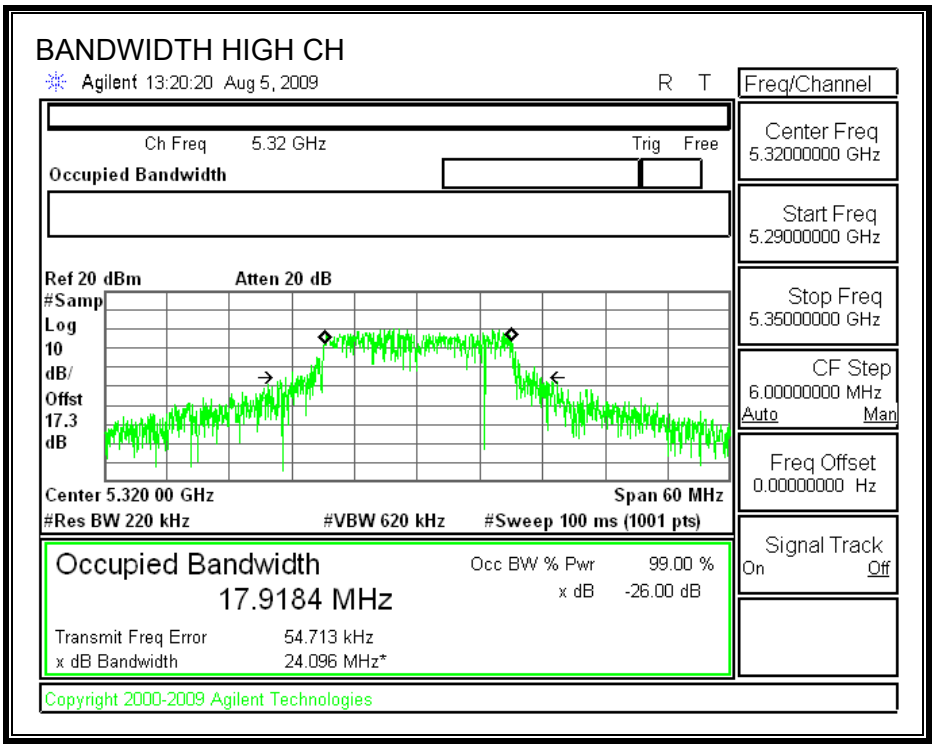




99% BANDWIDTH







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

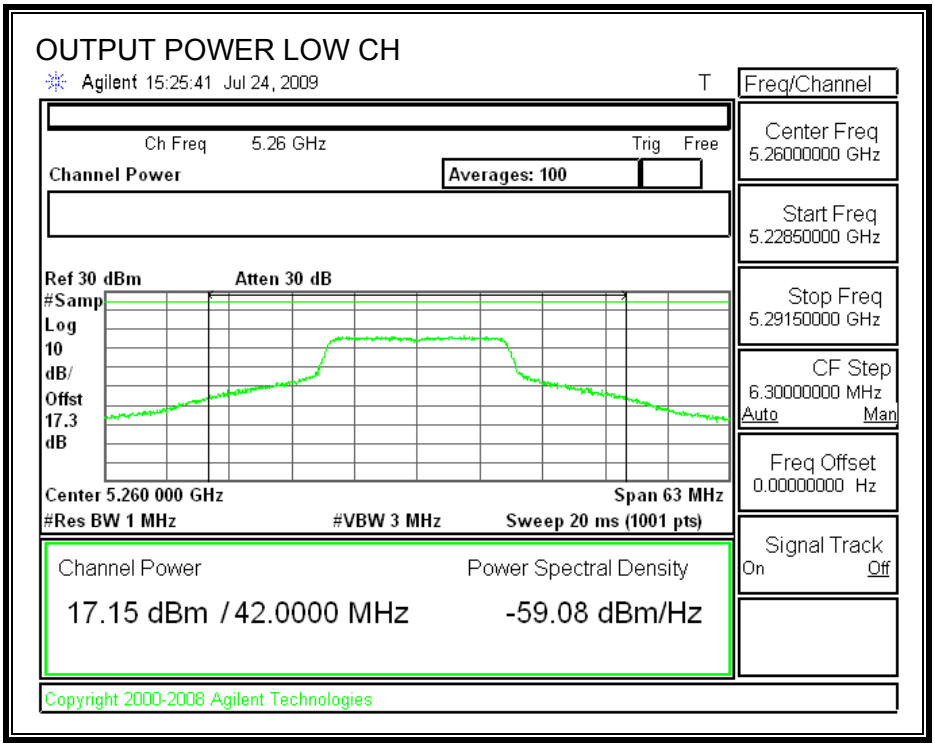
Limit

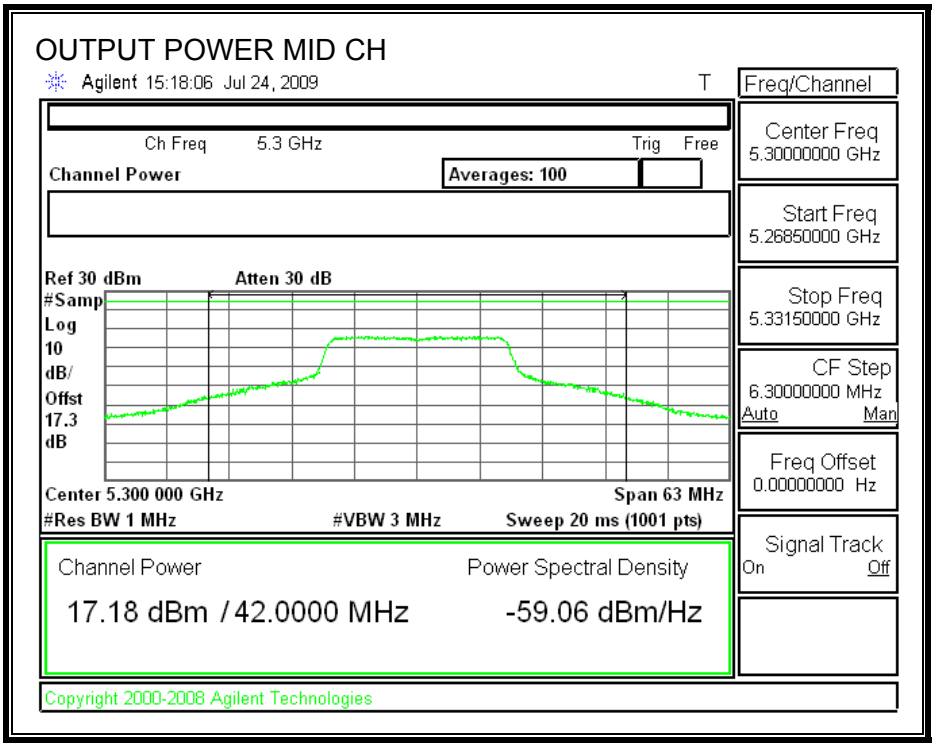
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5260	24	41.221	27.15	3.84	24.00
Mid	5300	24	40.660	27.09	3.84	24.00
High	5320	24	28.590	25.56	3.84	24.00

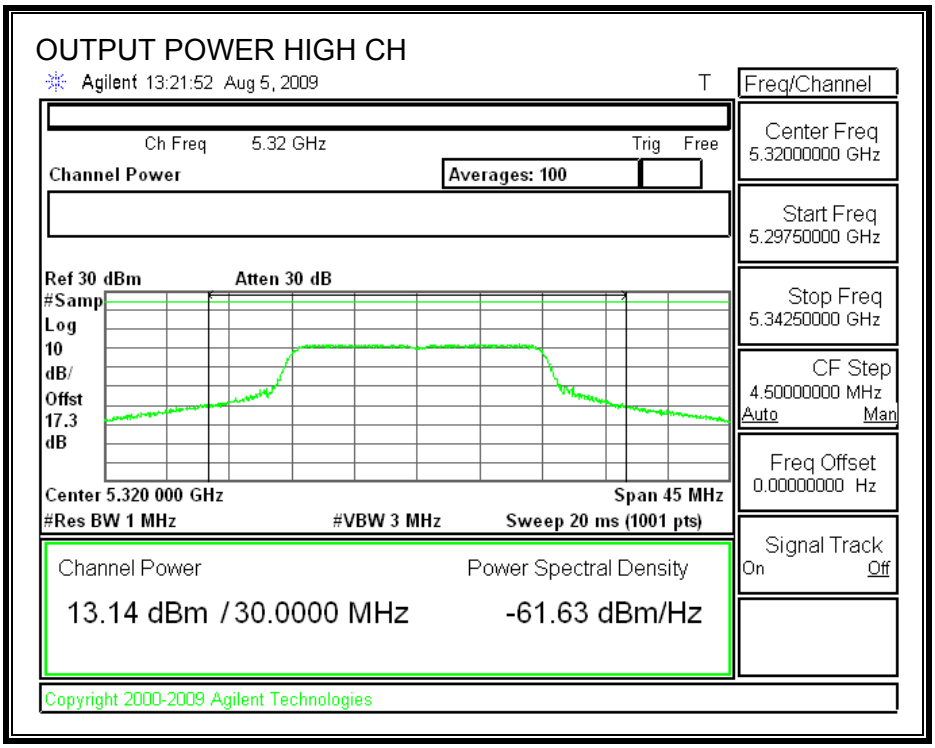
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5260	17.15	24.00	-6.85
Mid	5300	17.18	24.00	-6.82
High	5320	13.14	24.00	-10.86

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 16 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5260	17.28
Middle	5300	17.31
High	5320	13.29

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.

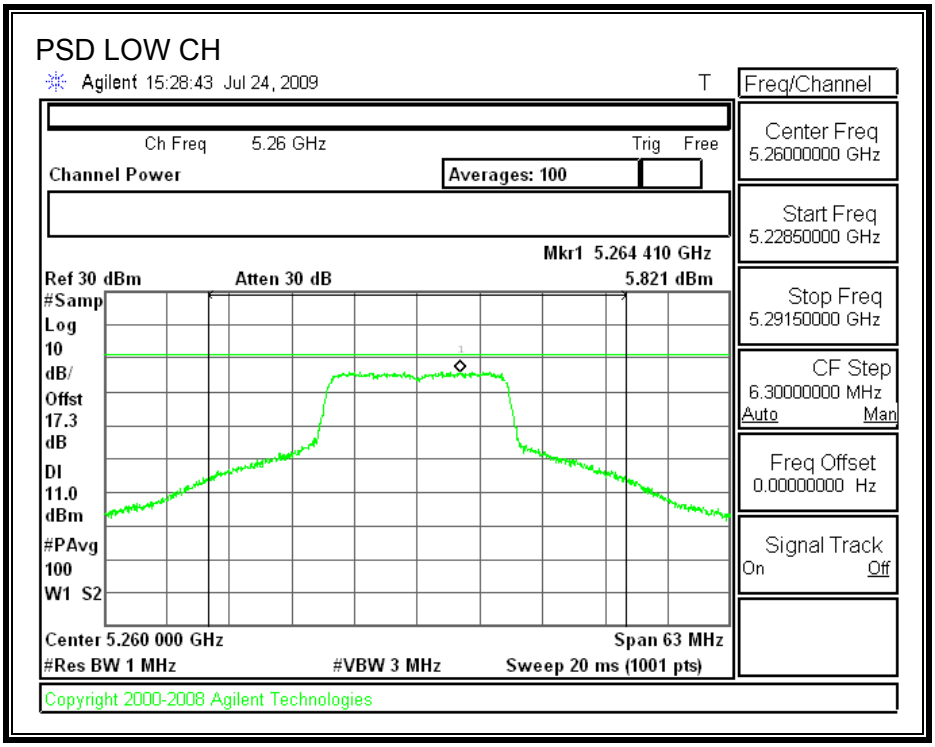
TEST PROCEDURE

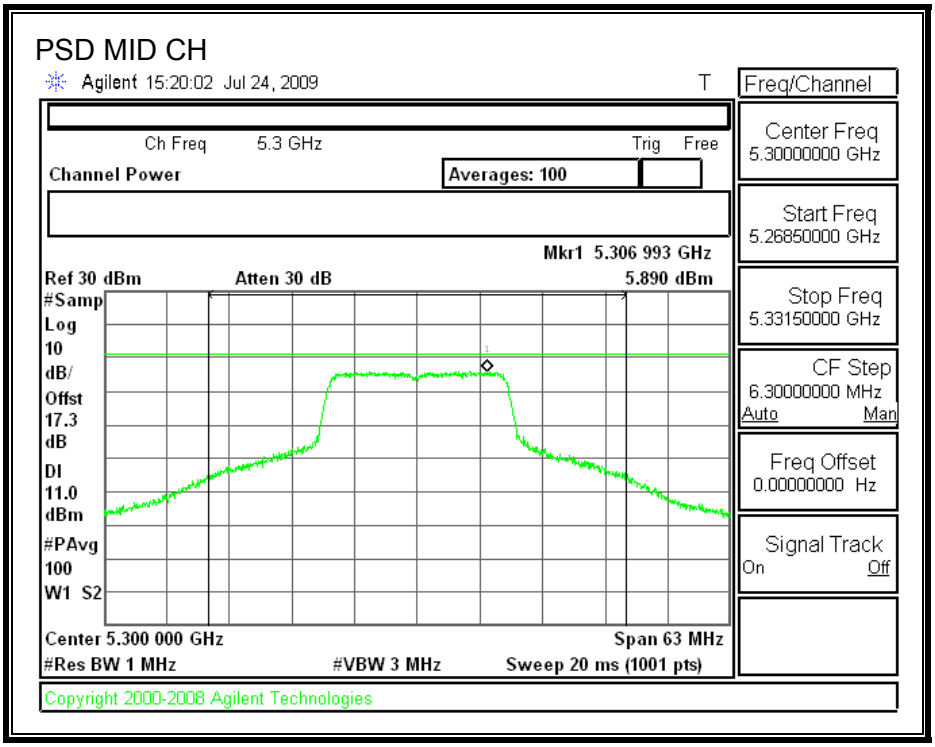
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

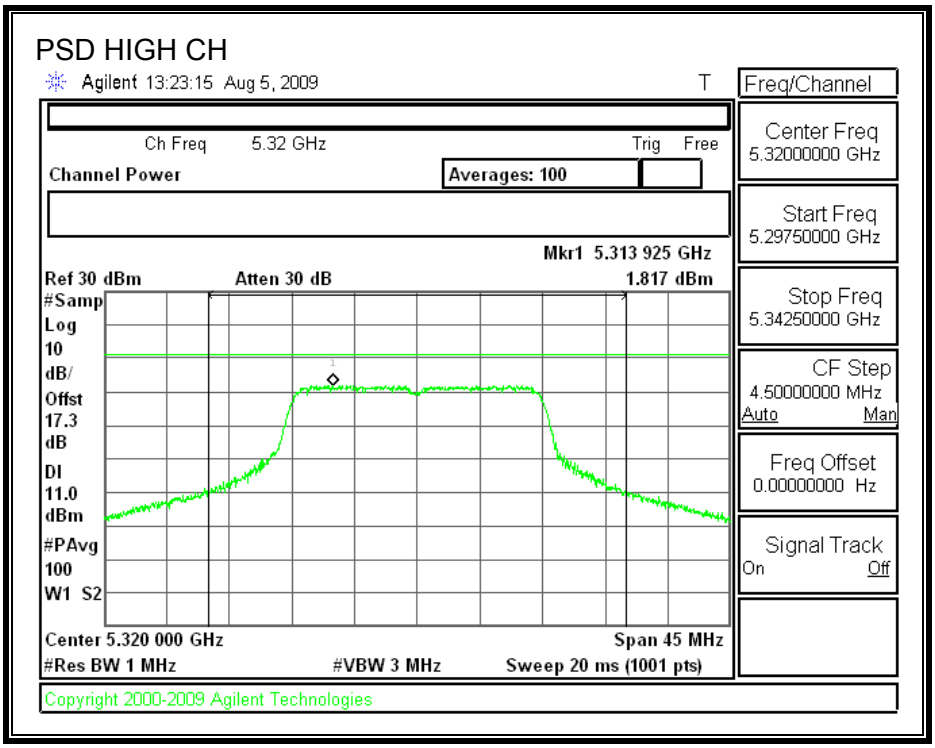
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5260	5.82	11	-5.18
Middle	5300	5.89	11	-5.11
High	5320	1.82	11	-9.18

POWER SPECTRAL DENSITY







7.5.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

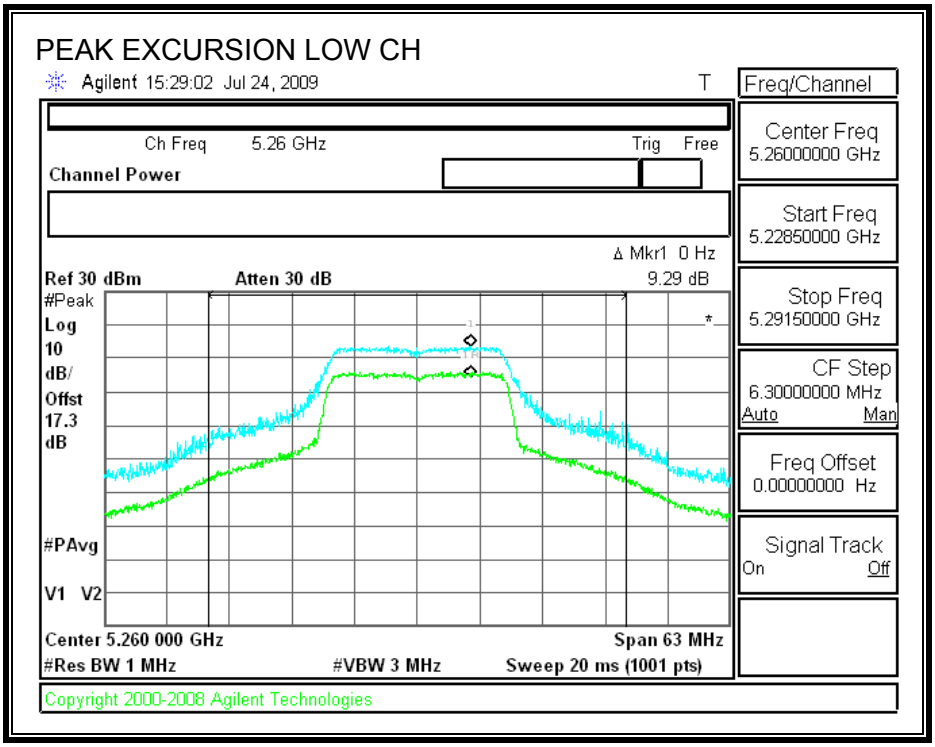
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

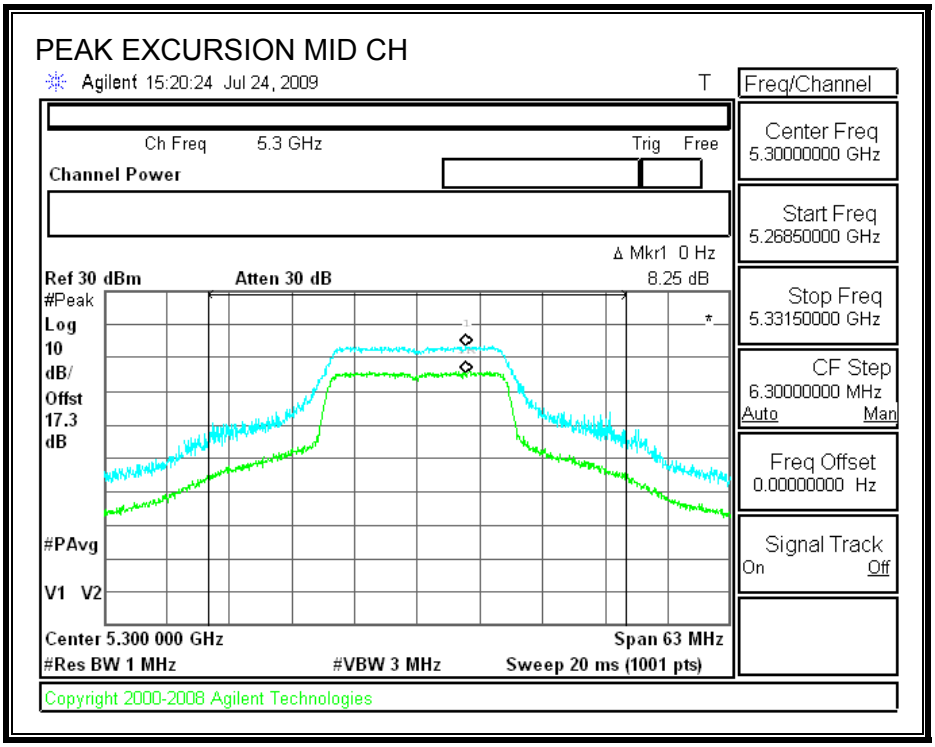
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

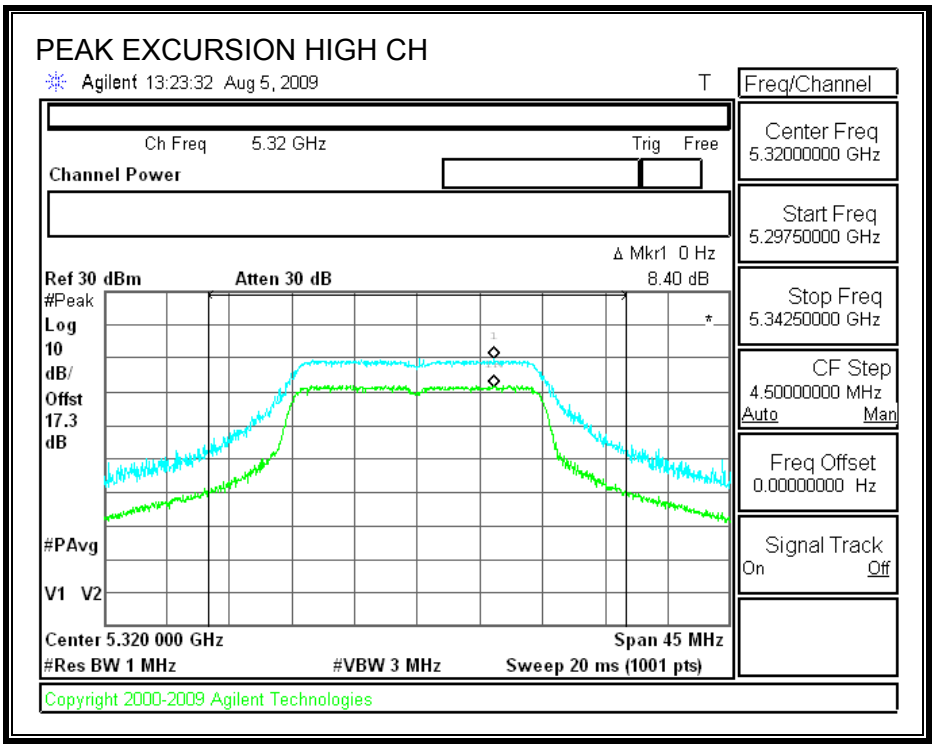
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	9.29	13	-3.71
Middle	5300	8.25	13	-4.75
High	5320	8.40	13	-4.60

PEAK EXCURSION





PEAK EXCURSION HIGH CH



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

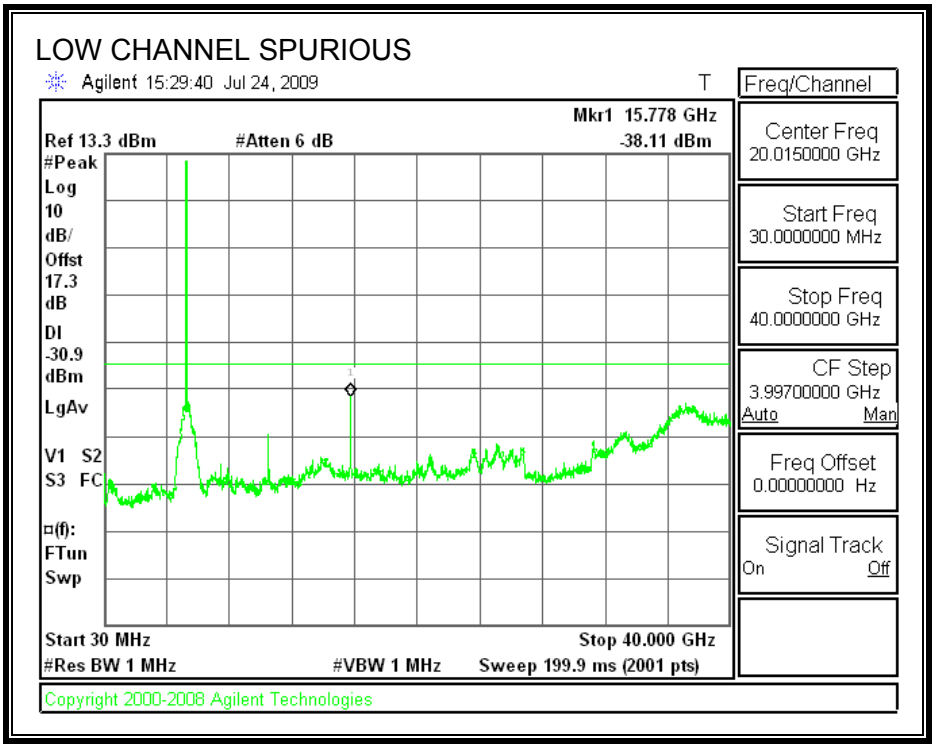
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

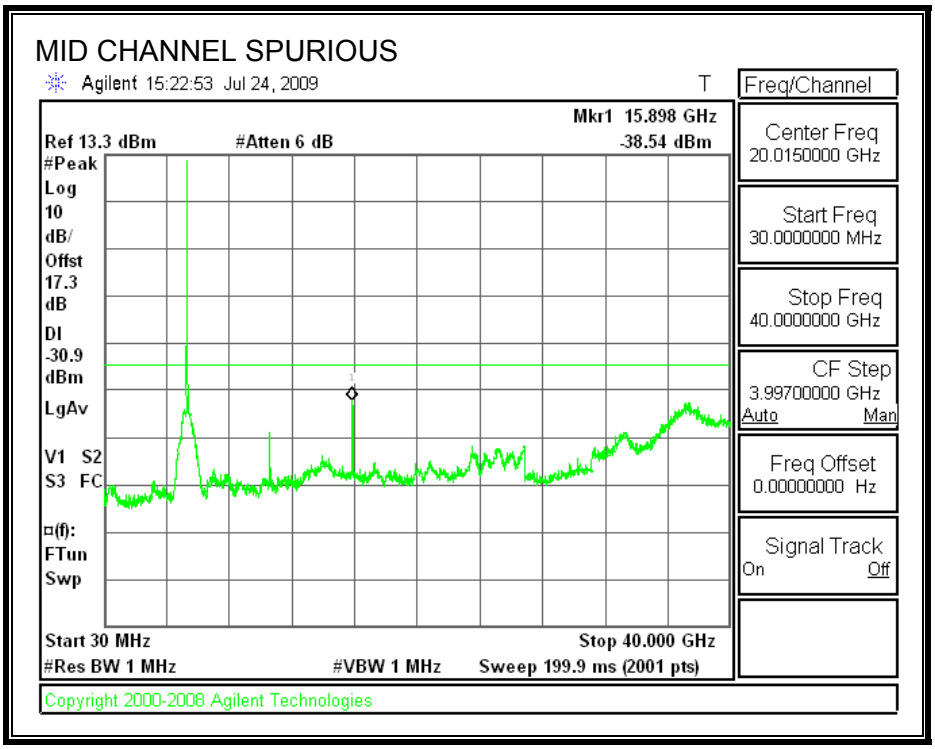
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

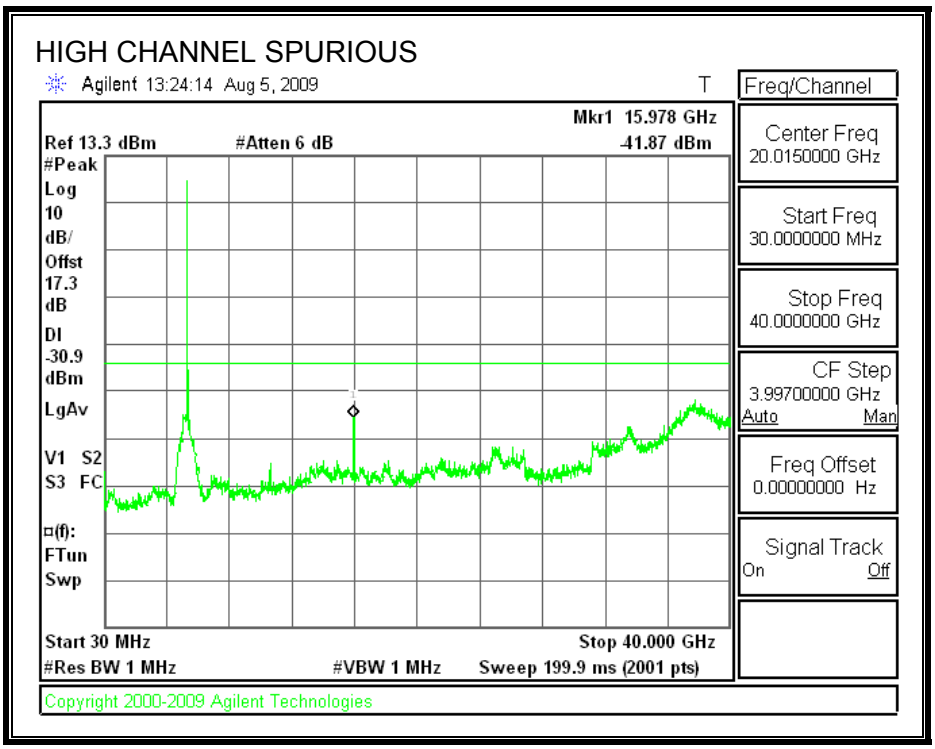
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

SPURIOUS EMISSIONS







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.

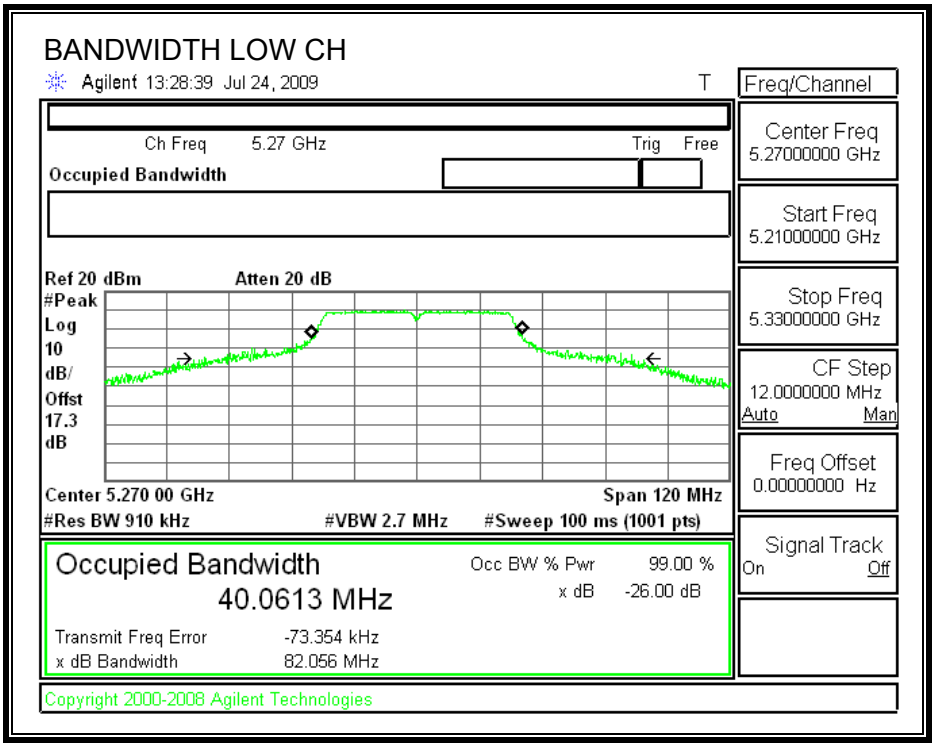
TEST PROCEDURE

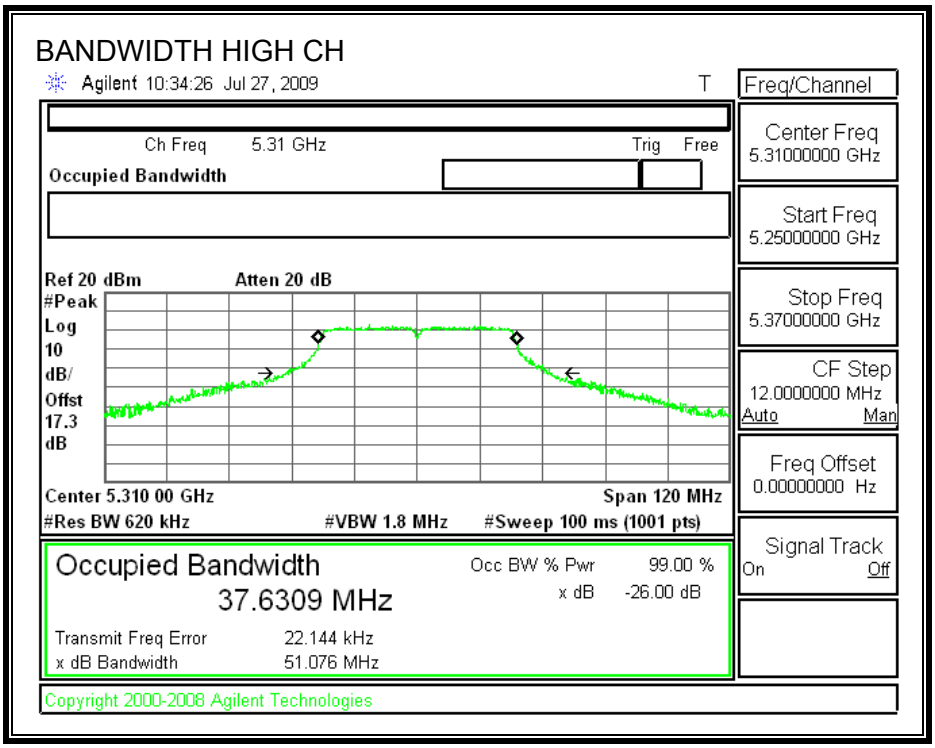
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

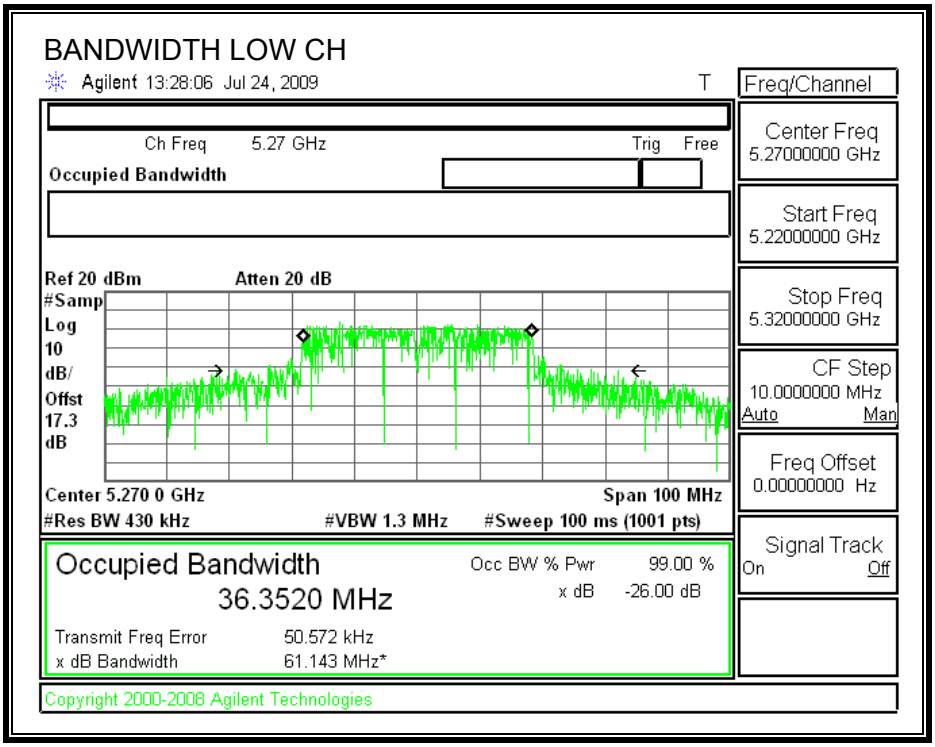
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5270	82.056	36.3520
High	5310	51.076	36.3070

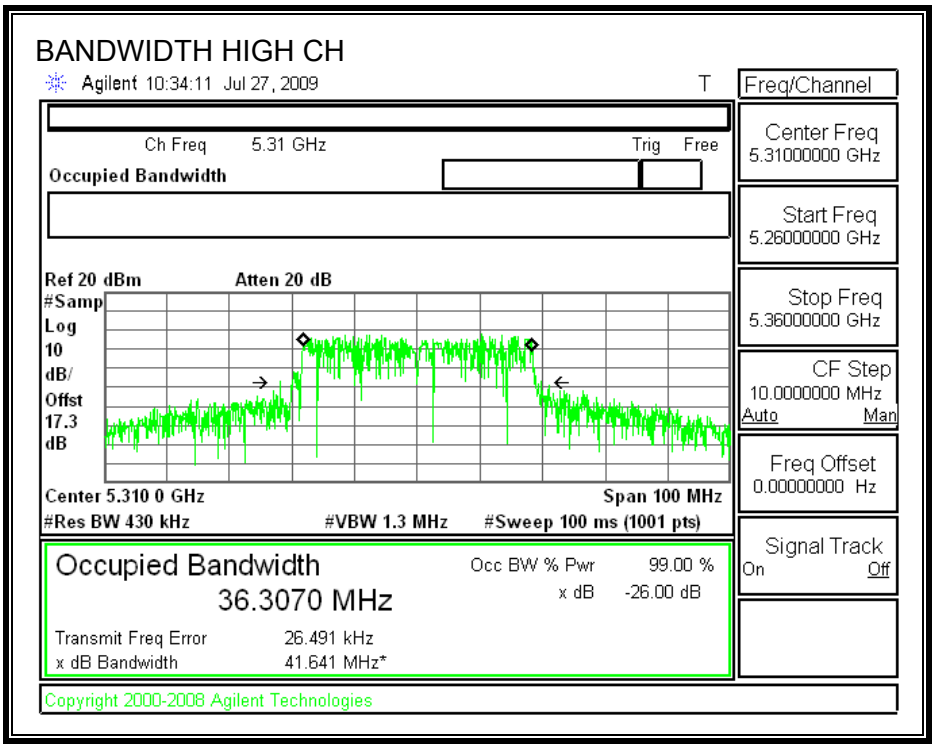
26 dB BANDWIDTH





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 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

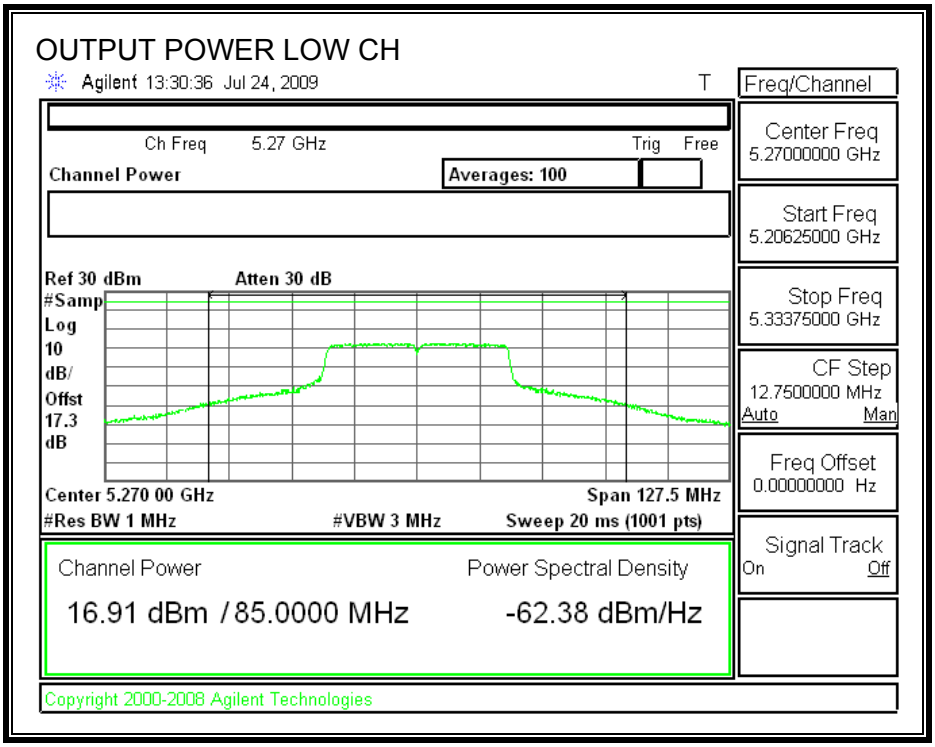
Limit

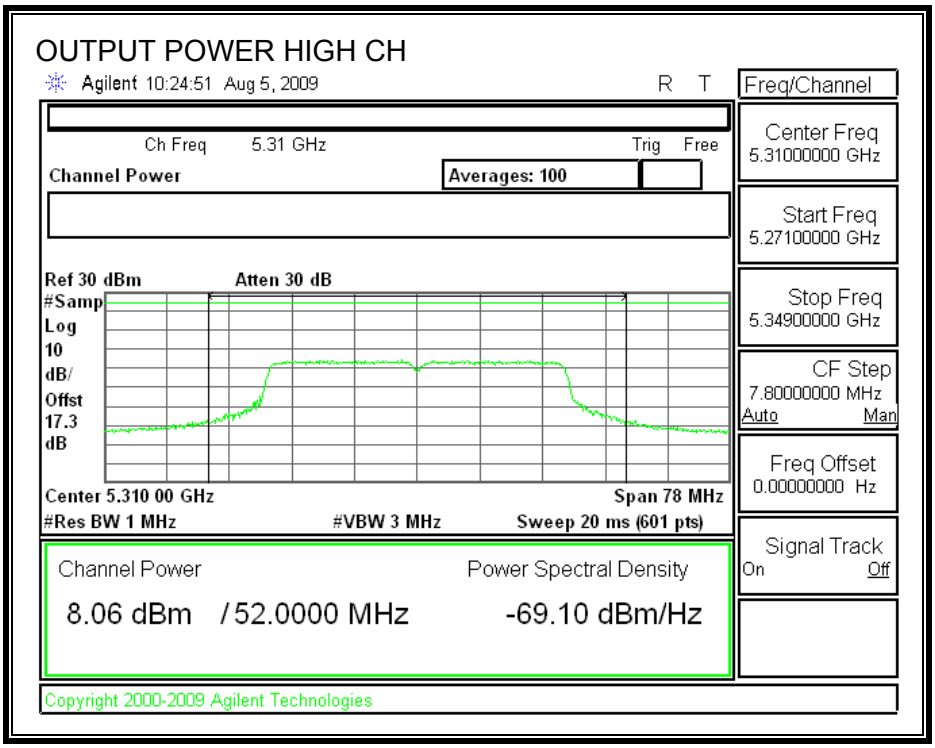
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5270	24	82.056	30.14	3.84	24.00
High	5310	24	51.076	28.08	3.84	24.00

Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5270	16.91	24.00	-7.09
High	5310	8.06	24.00	-15.94

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 16 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5270	17.18
High	5310	8.24

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.

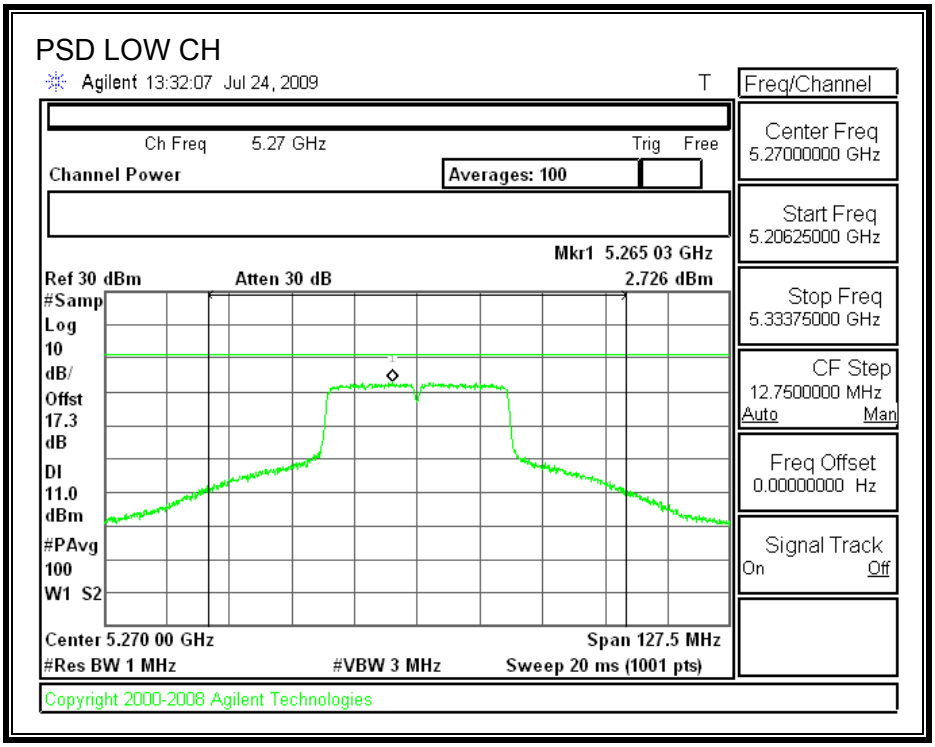
TEST PROCEDURE

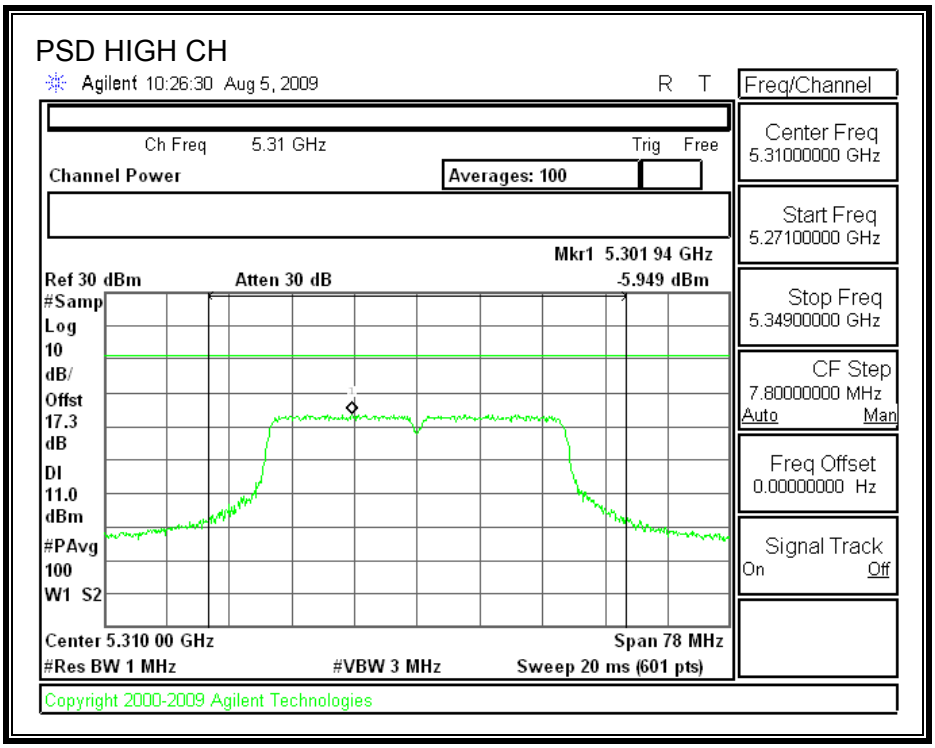
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5270	2.73	11	-8.27
High	5310	-5.95	11	-16.95

POWER SPECTRAL DENSITY





7.6.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

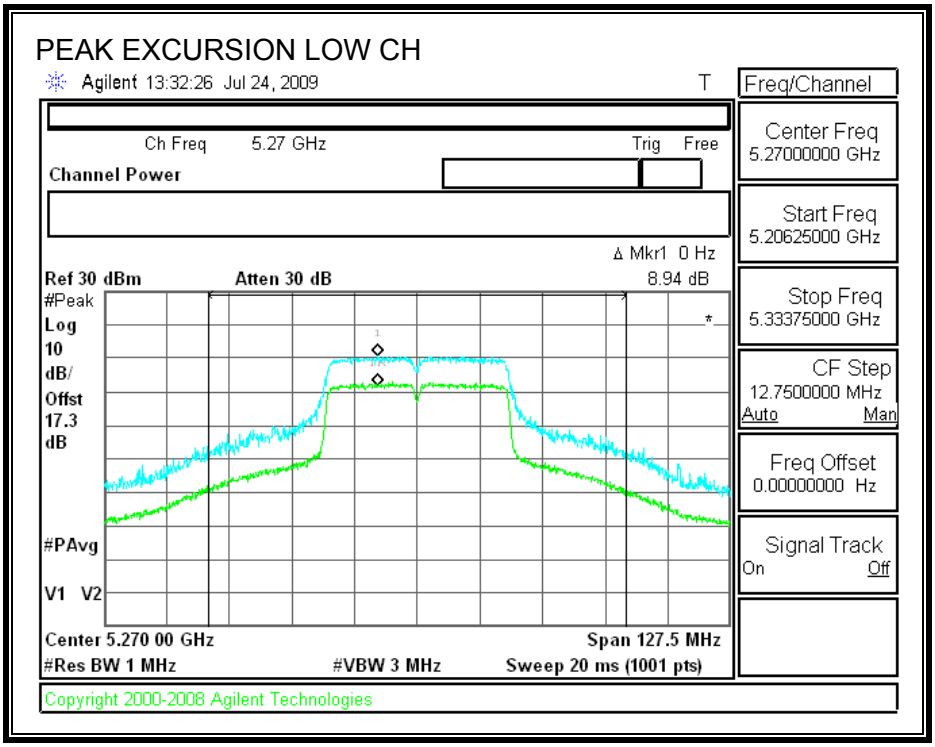
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

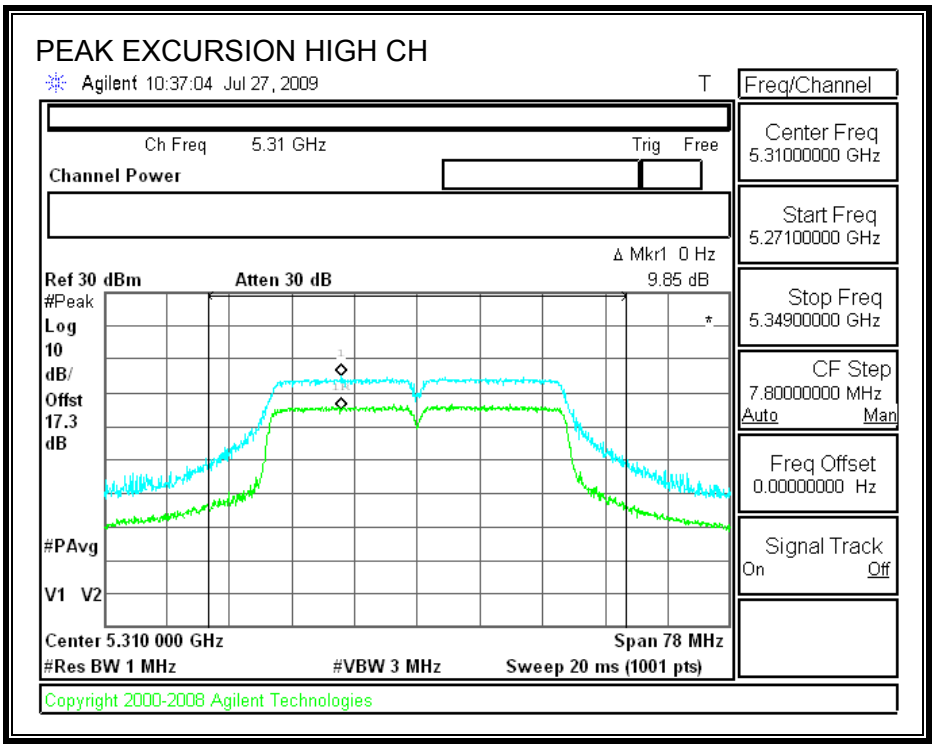
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5270	8.94	13	-4.06
High	5310	9.85	13	-3.15

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

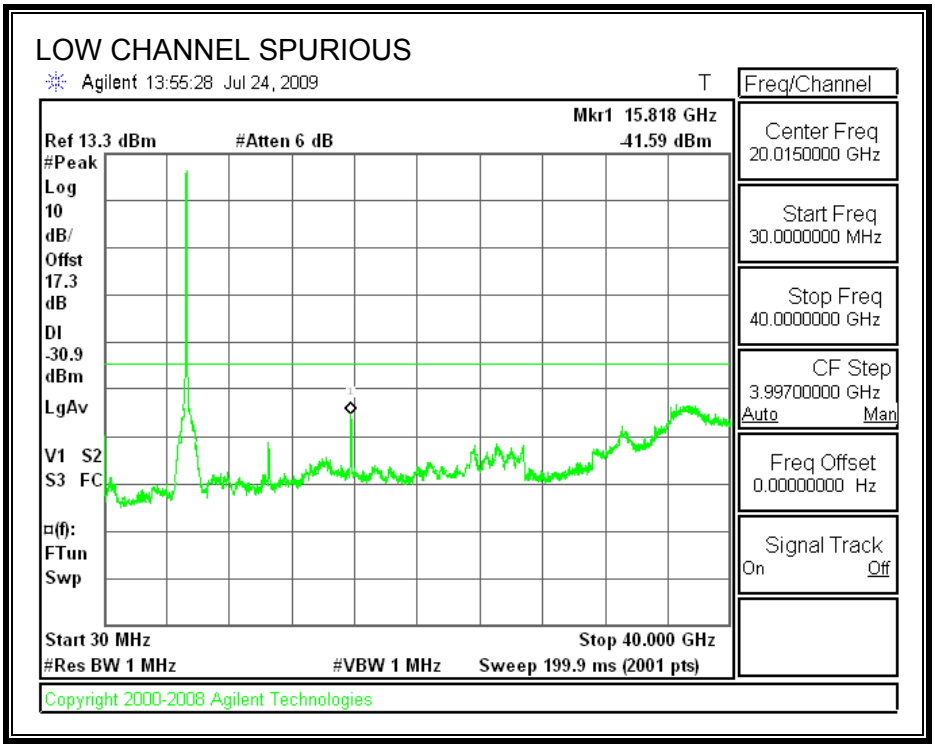
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

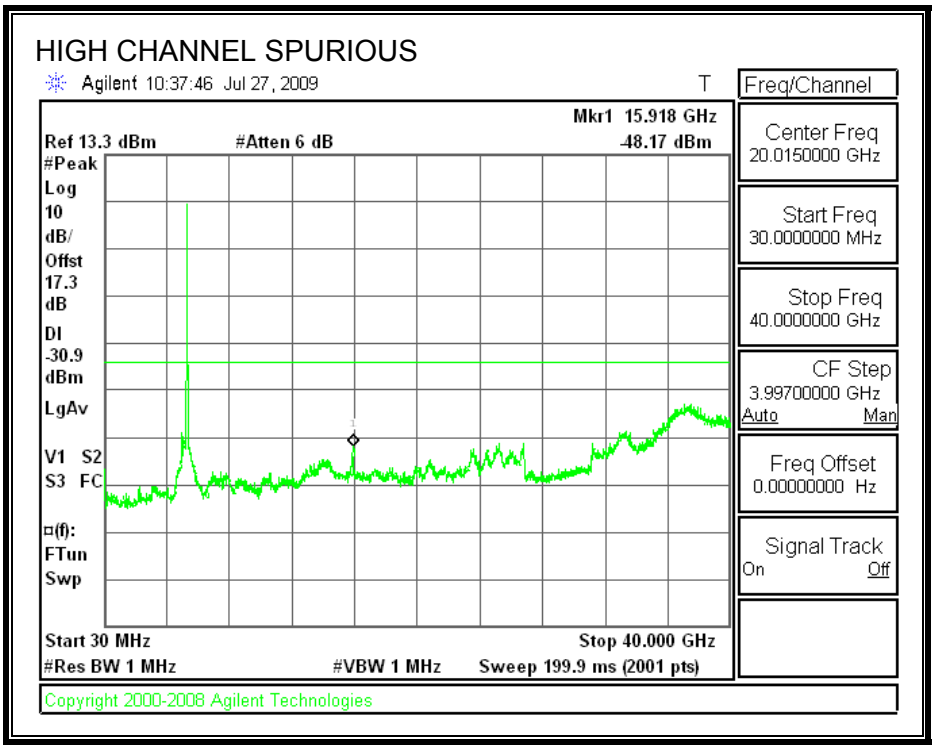
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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





7.7. 802.11a MODE IN THE 5.6 GHz BAND

7.7.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

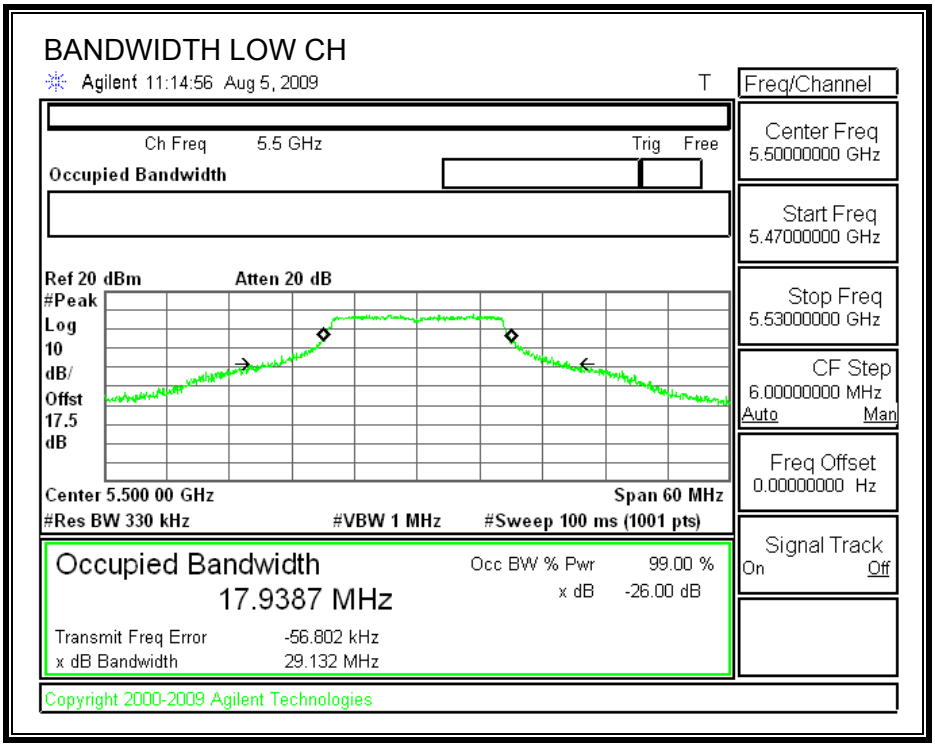
TEST PROCEDURE

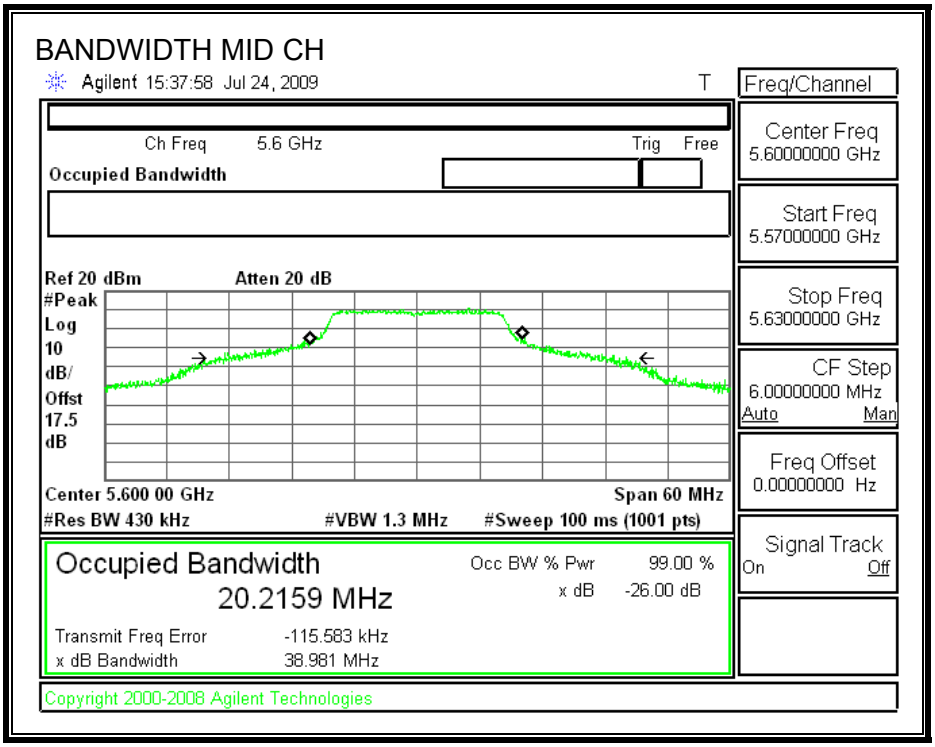
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

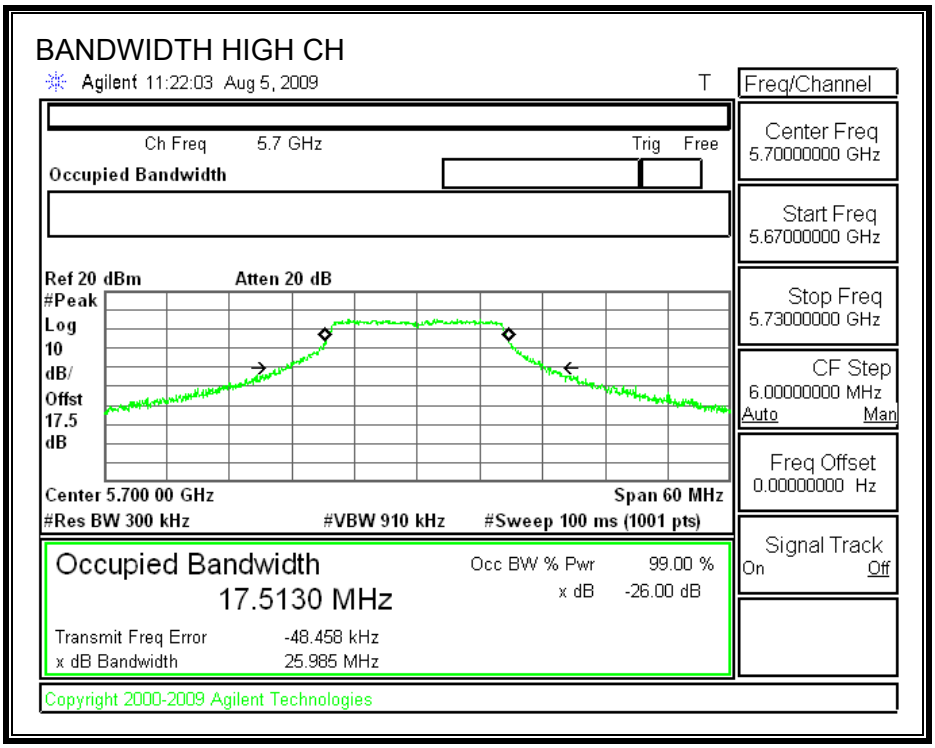
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5500	29.132	16.5001
Middle	5600	38.981	16.5563
High	5700	25.985	16.4918

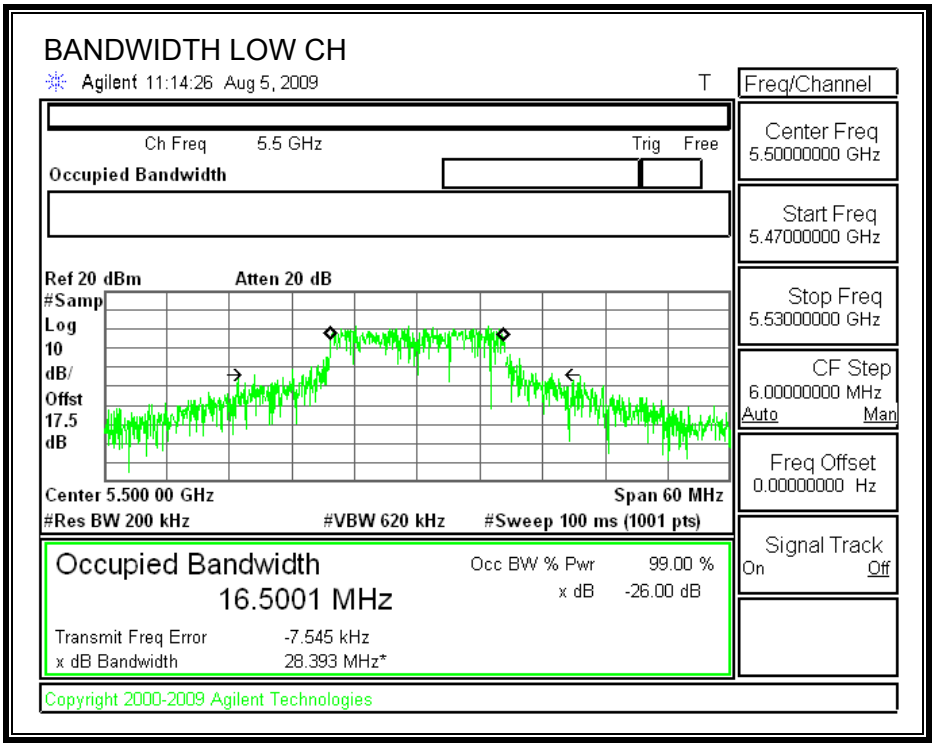
26 dB BANDWIDTH

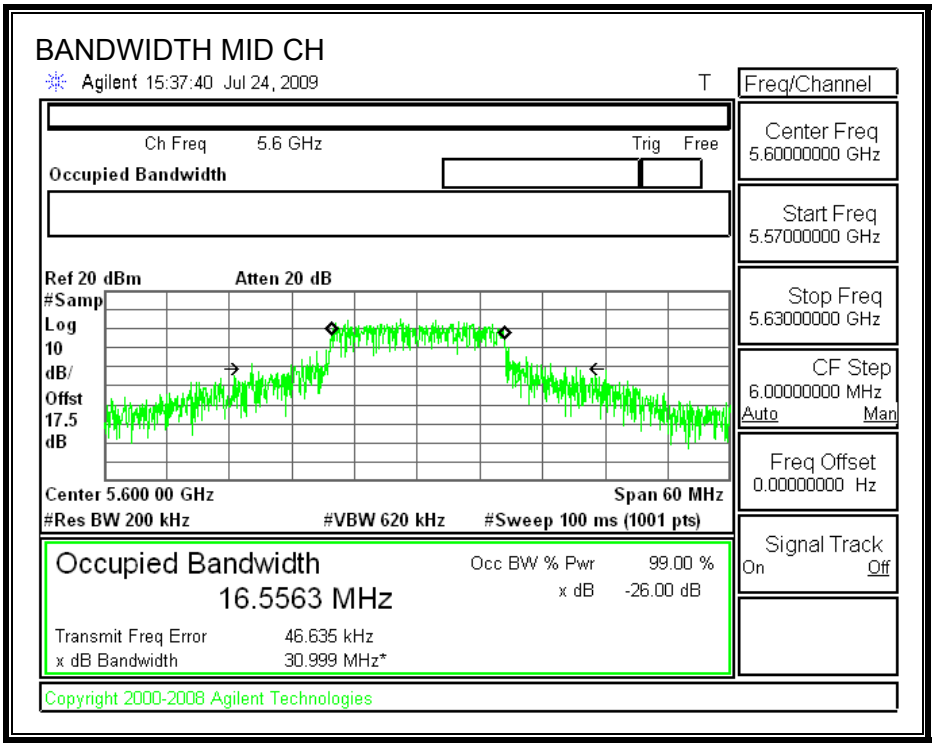


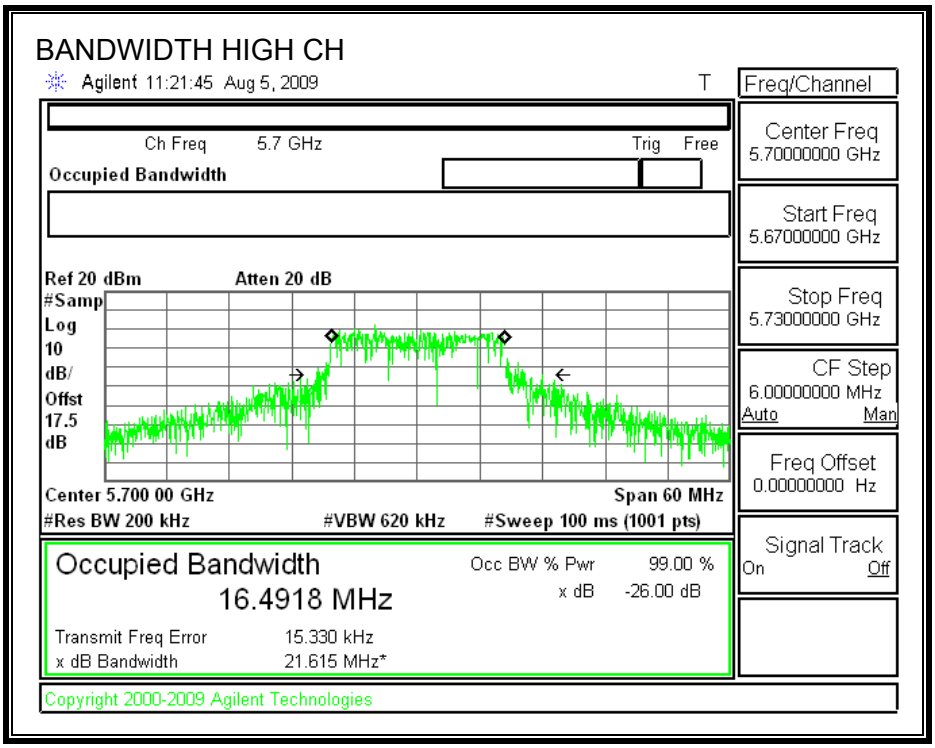




99% BANDWIDTH







7.7.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

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

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

RESULTS

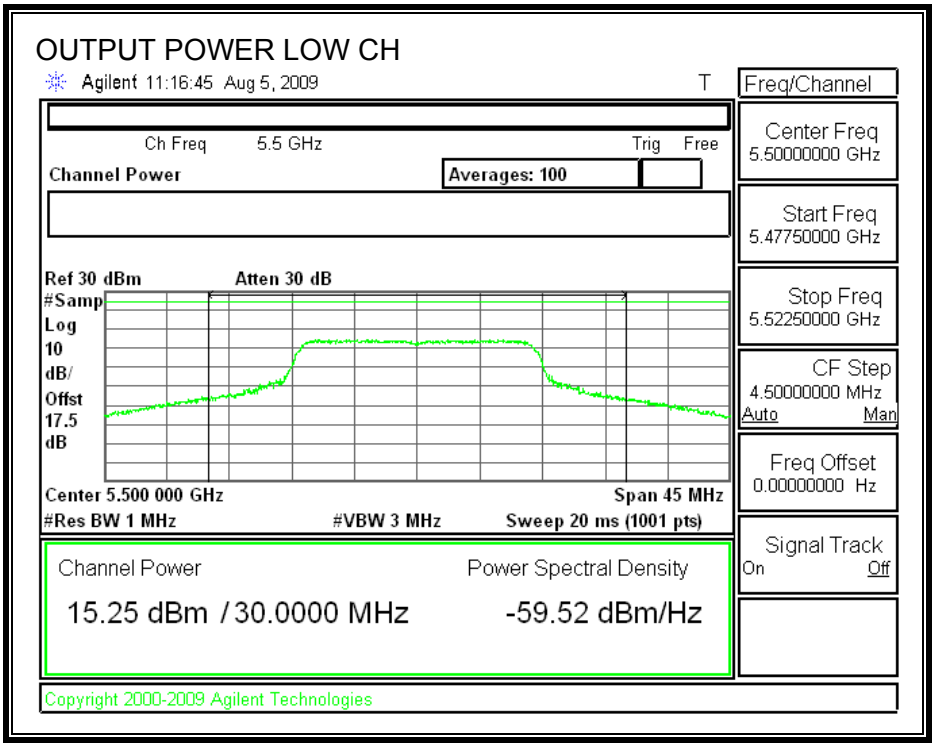
Limit

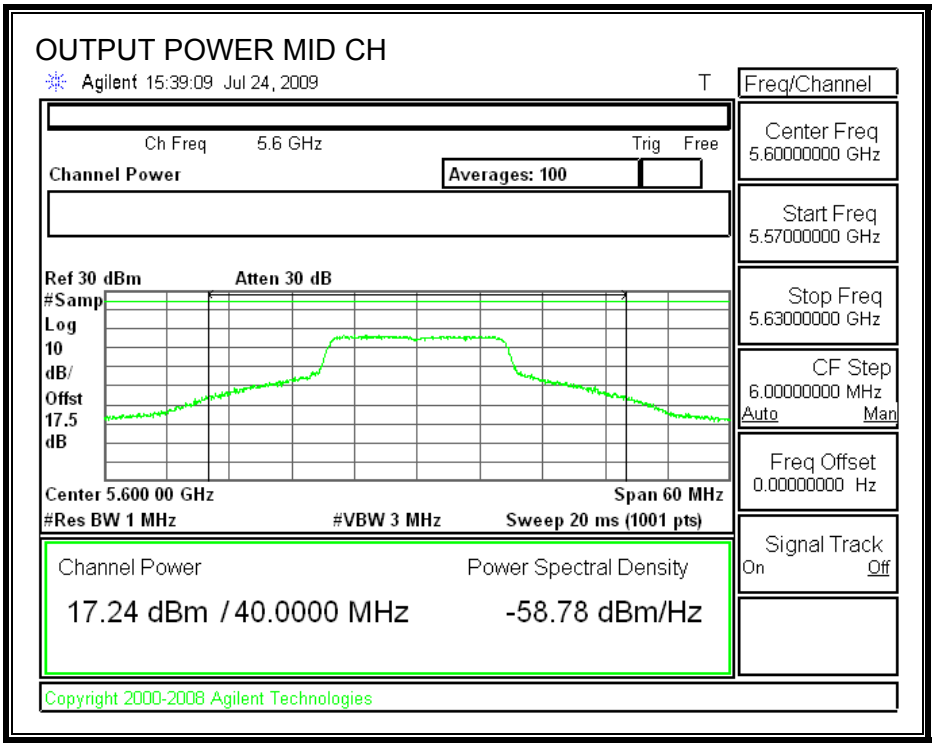
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5500	24	29.132	25.64	4.92	24.00
Mid	5600	24	38.981	26.91	4.92	24.00
High	5700	24	25.985	25.15	4.92	24.00

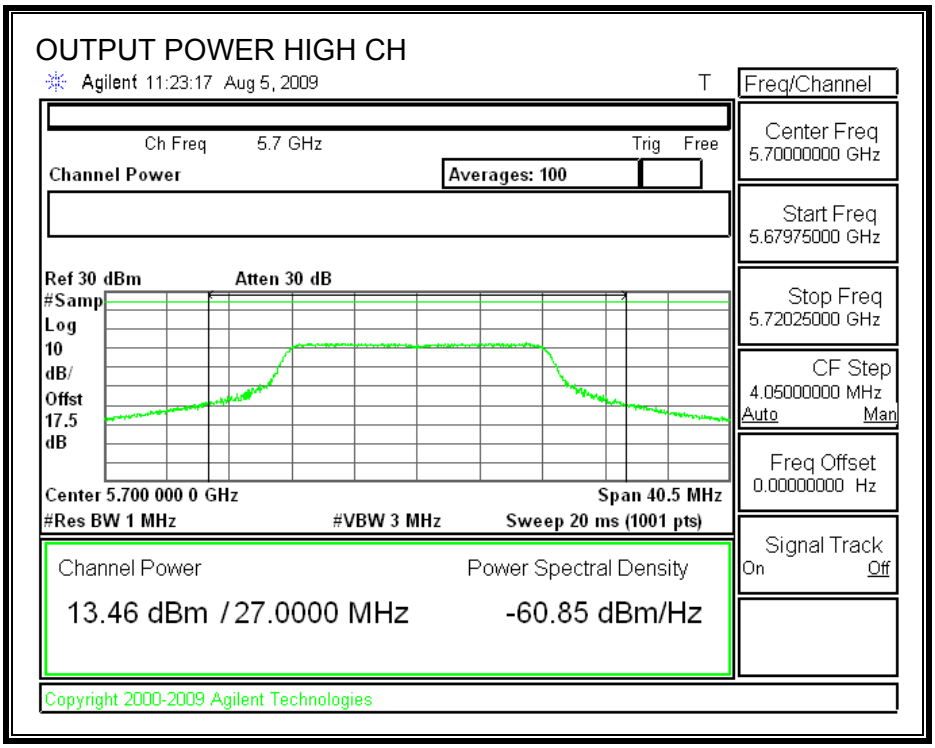
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	15.25	24.00	-8.75
Mid	5600	17.24	24.00	-6.76
High	5700	13.46	24.00	-10.54

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 16 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5500	15.36
Middle	5600	17.31
High	5700	13.59

7.7.4. 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.

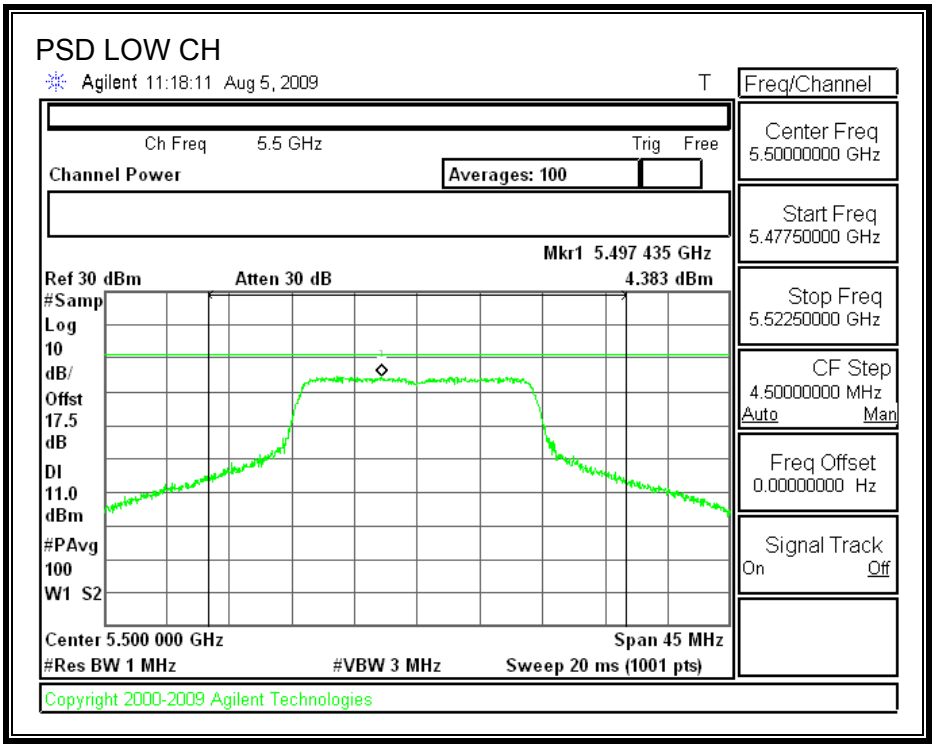
TEST PROCEDURE

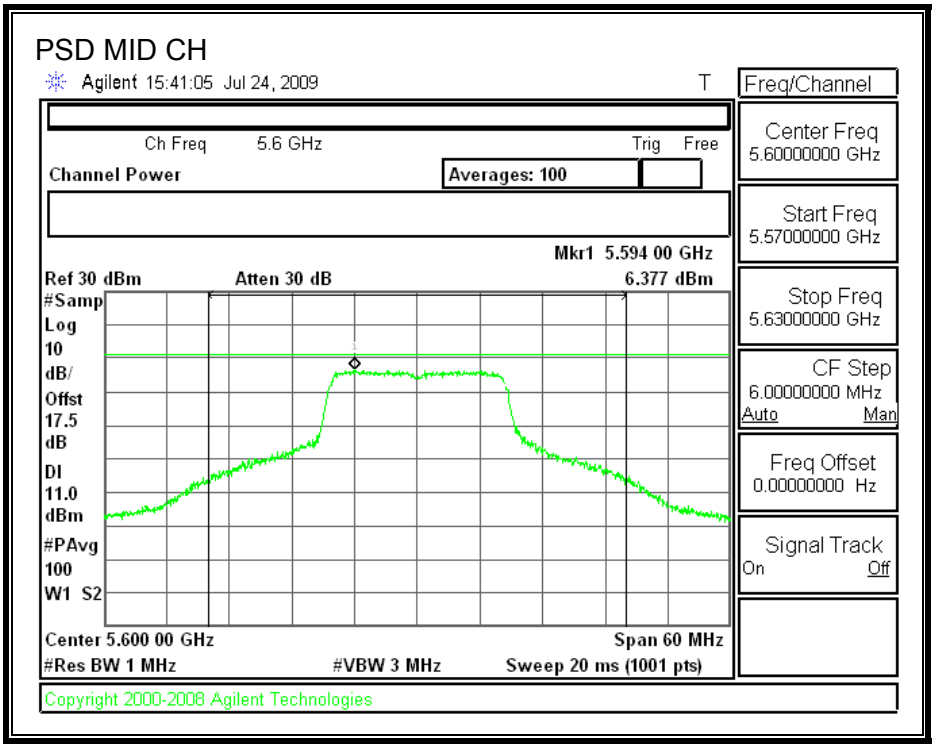
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

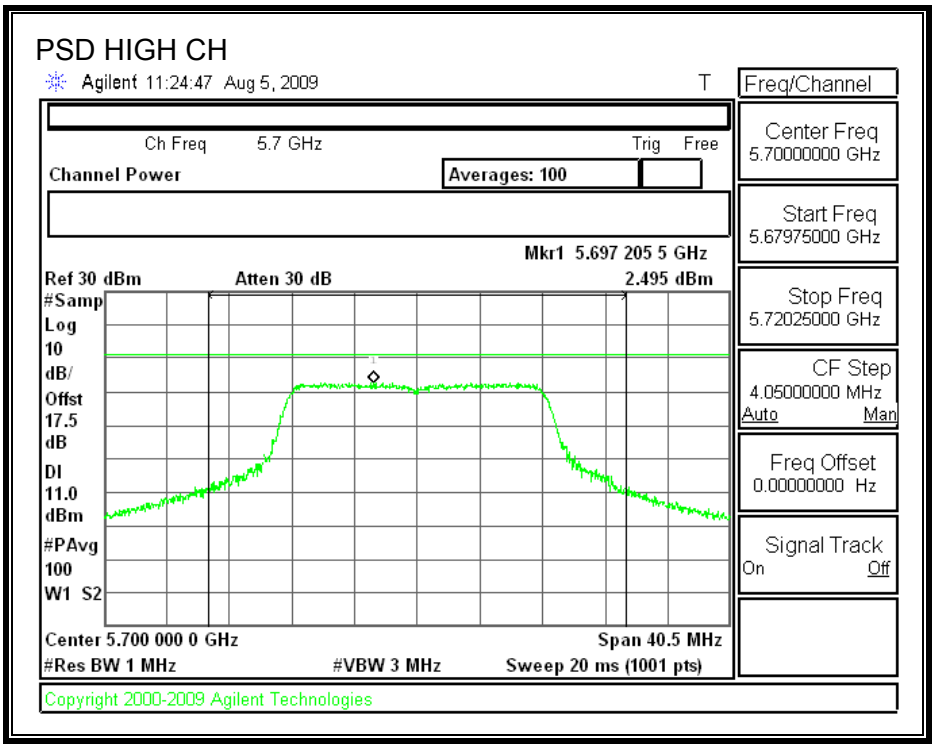
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5500	4.38	11	-6.62
Middle	5600	6.38	11	-4.62
High	5700	2.50	11	-8.51

POWER SPECTRAL DENSITY







7.7.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

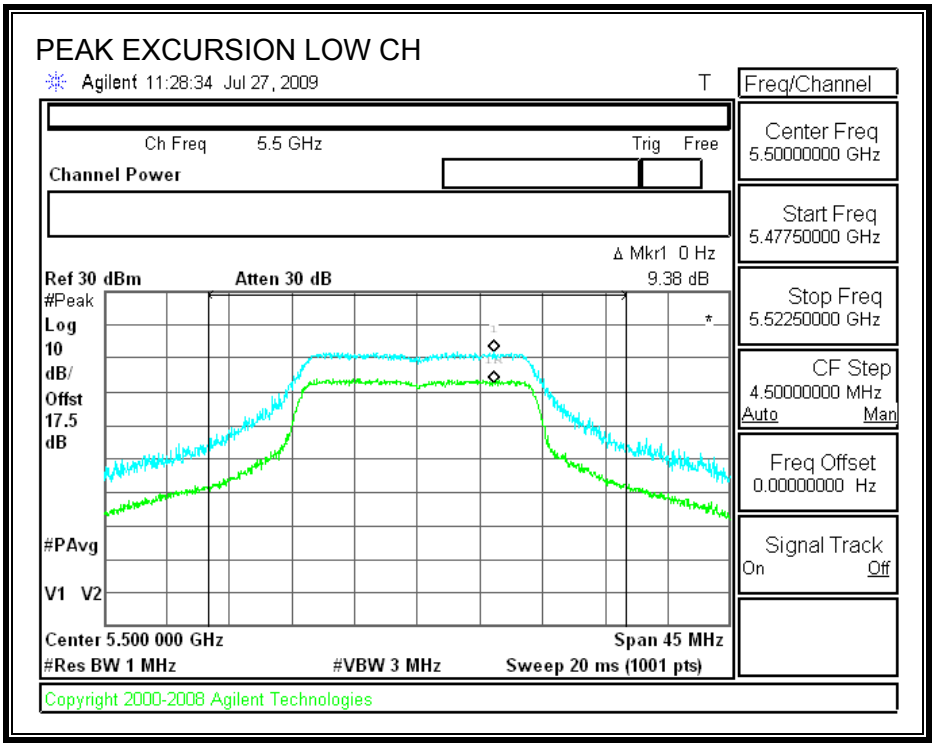
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

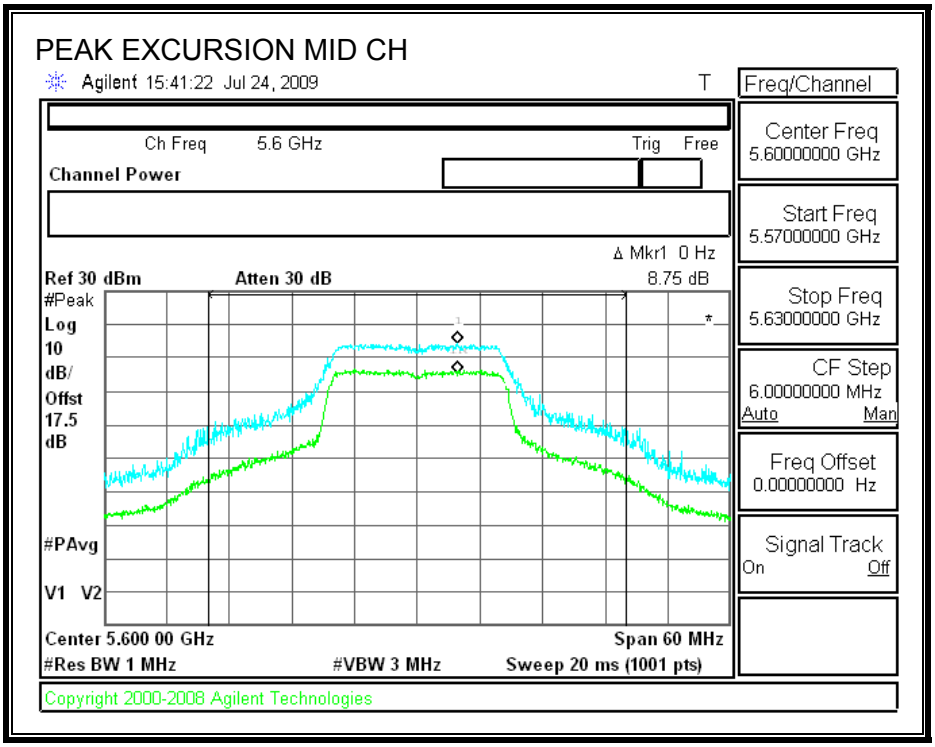
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

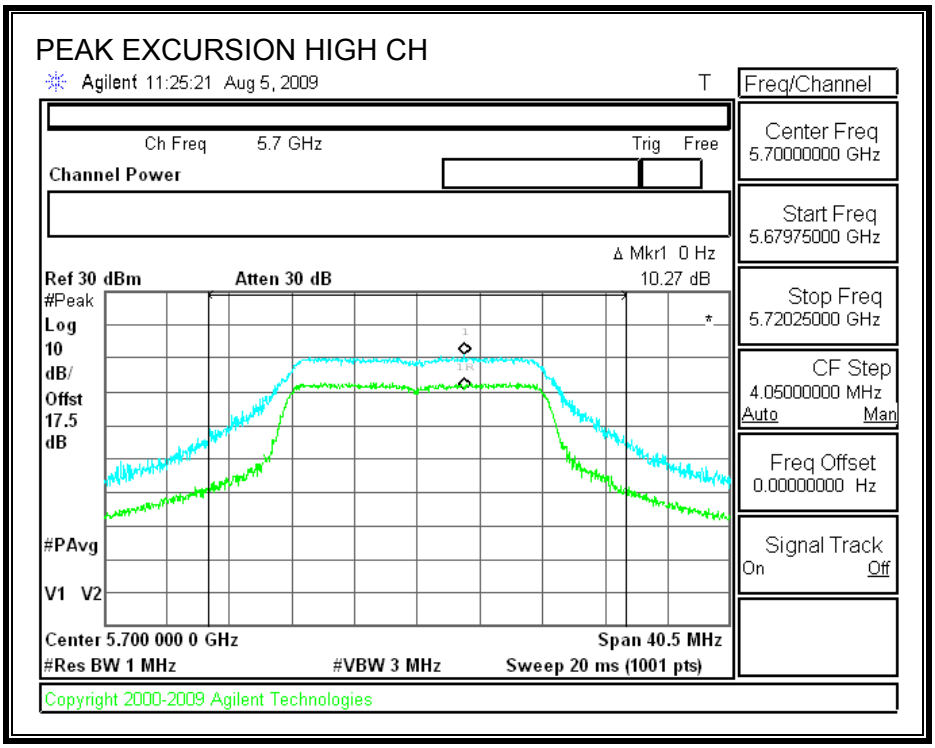
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	9.38	13	-3.62
Middle	5600	8.75	13	-4.25
High	5700	10.27	13	-2.73

PEAK EXCURSION





PEAK EXCURSION HIGH CH



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.

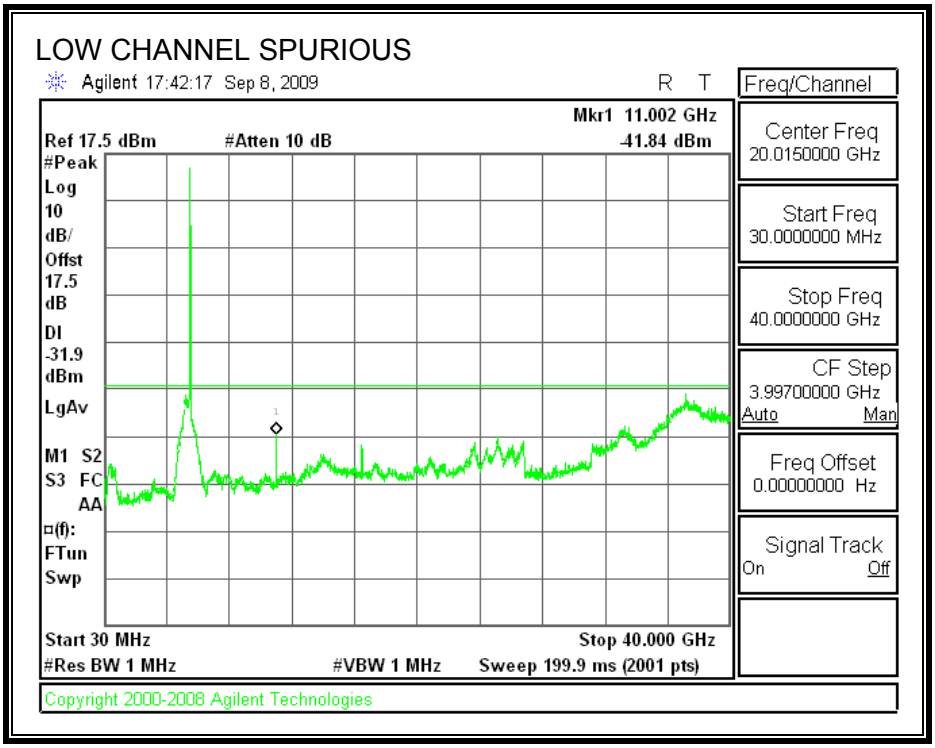
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

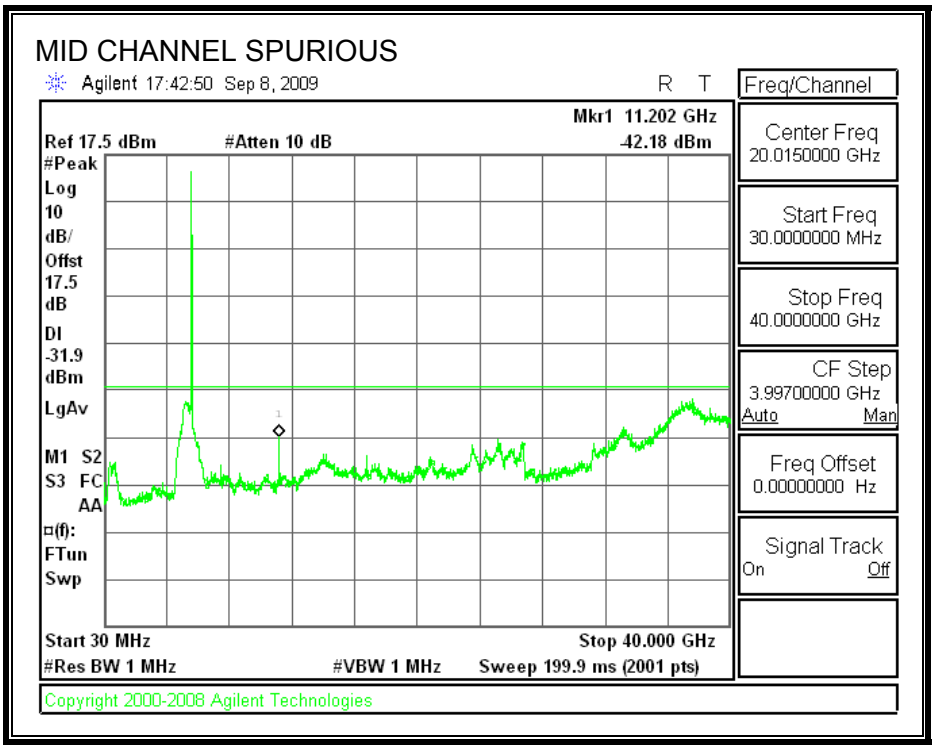
RESULTS

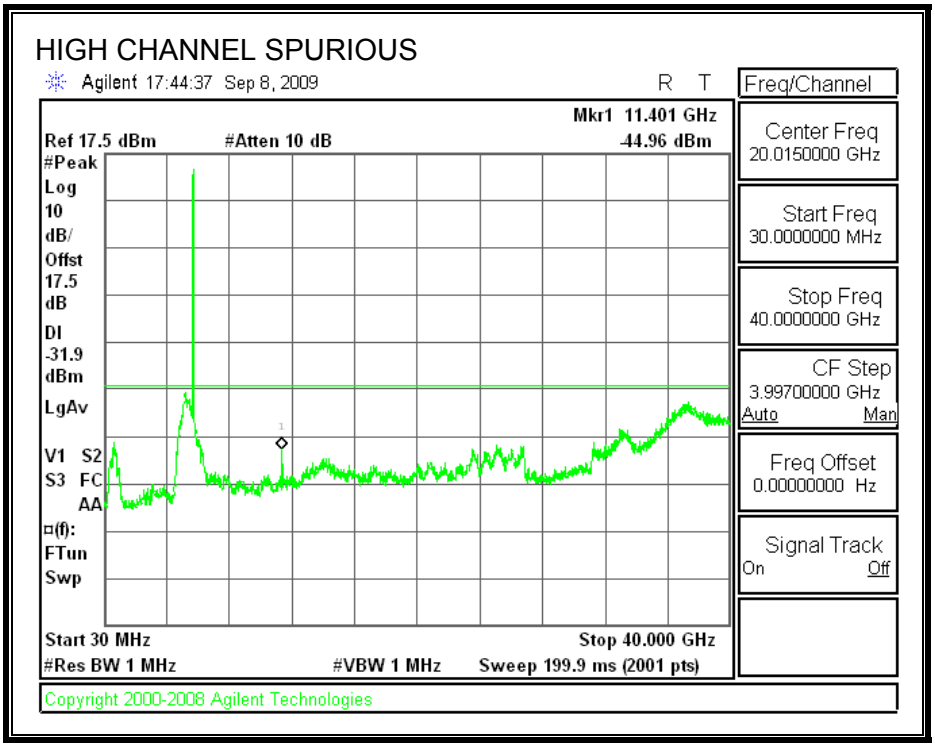
SPURIOUS EMISSIONS

LOW CHANNEL SPURIOUS



MID CHANNEL SPURIOUS





7.8. 802.11n HT20 MODE IN THE 5.6 GHz BAND

7.8.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

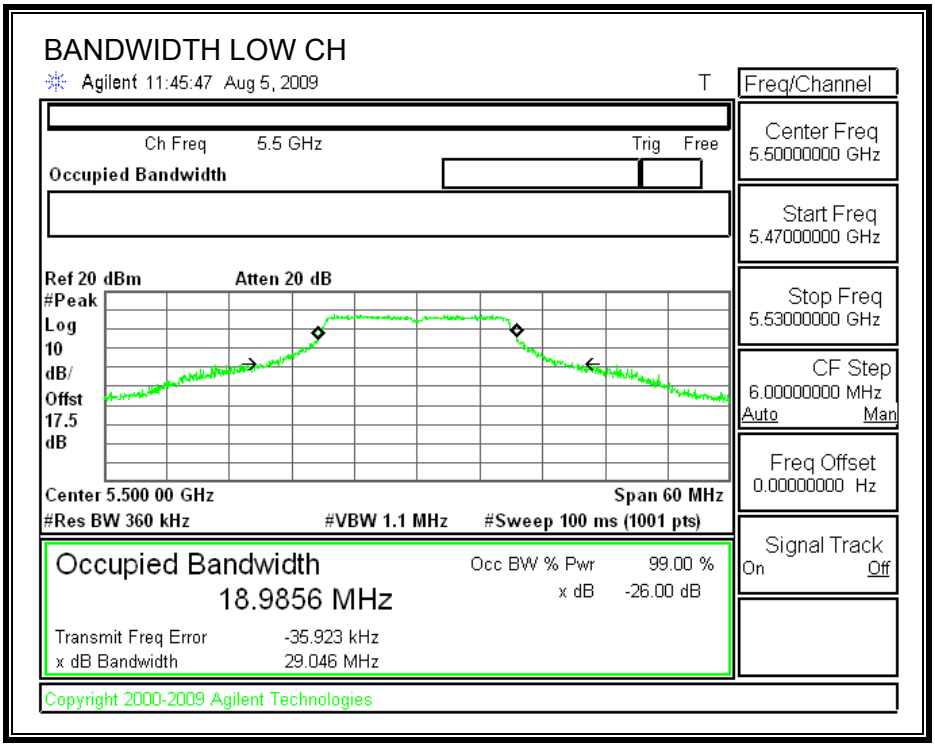
TEST PROCEDURE

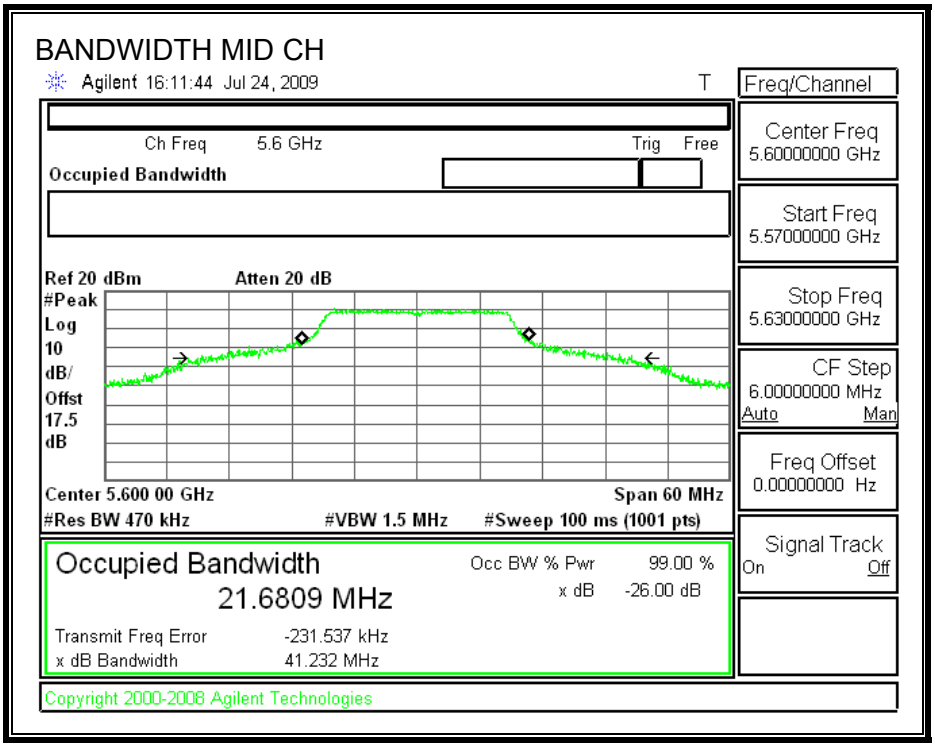
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

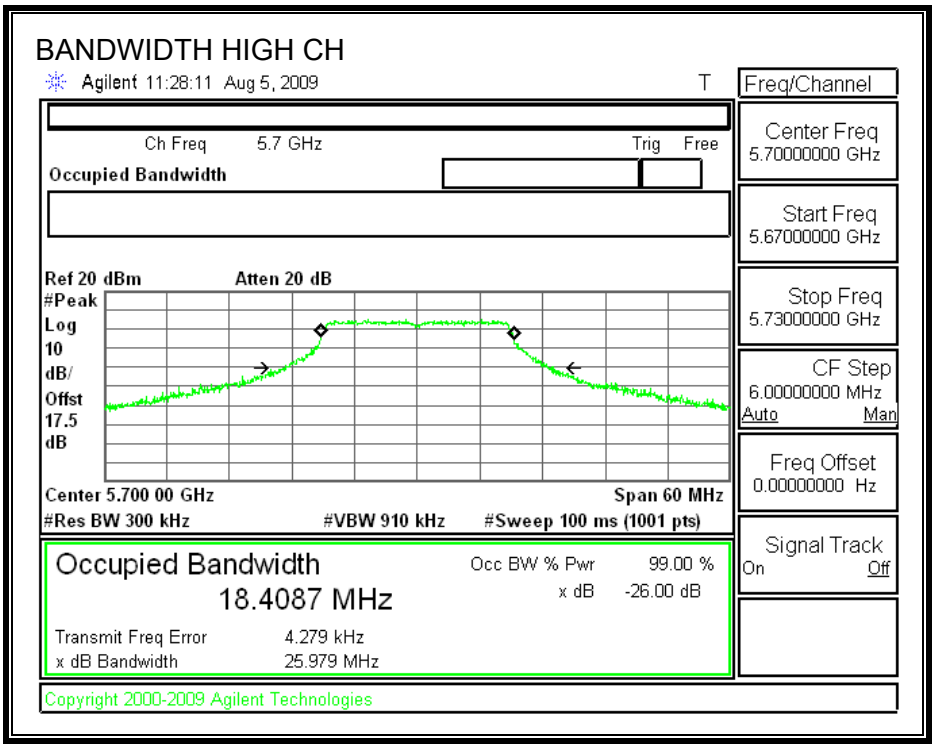
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5500	29.046	17.7789
Middle	5600	41.232	17.7601
High	5700	25.979	17.6288

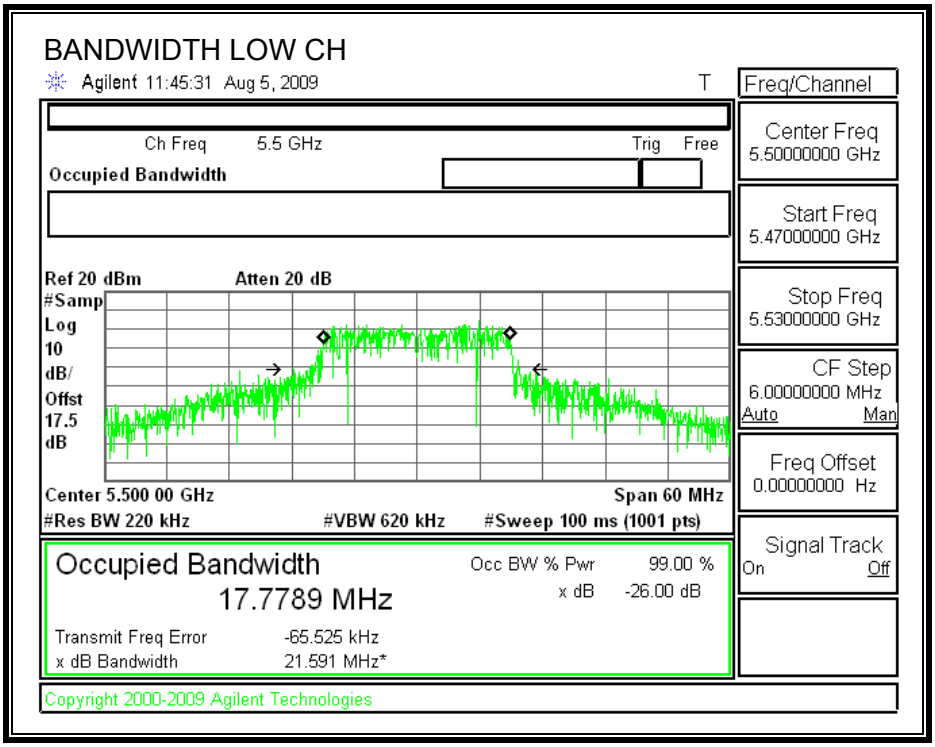
26 dB BANDWIDTH

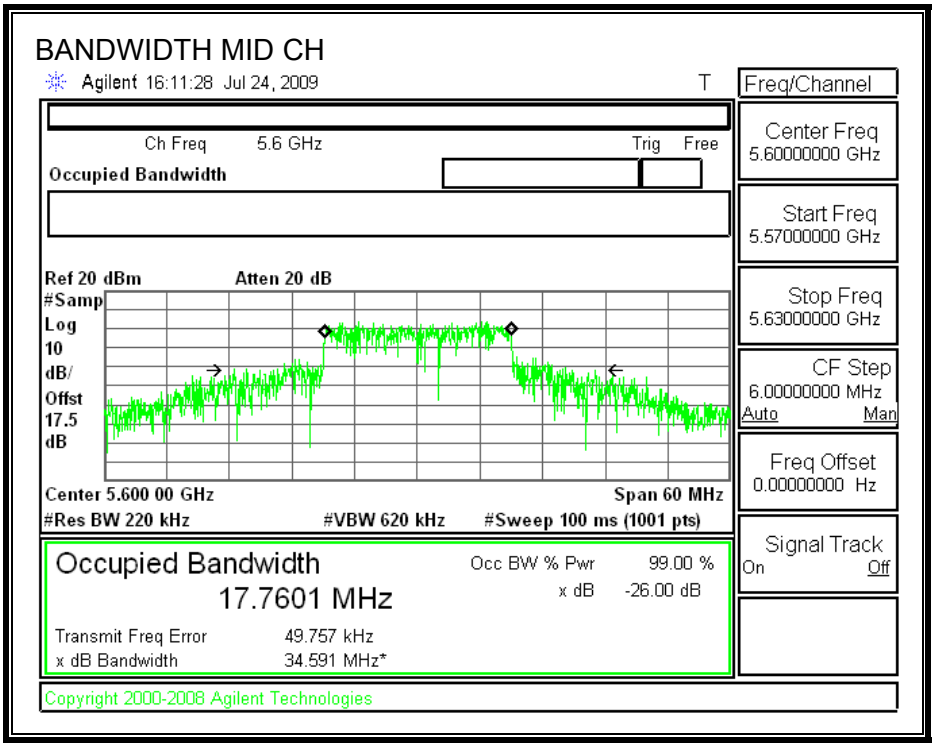


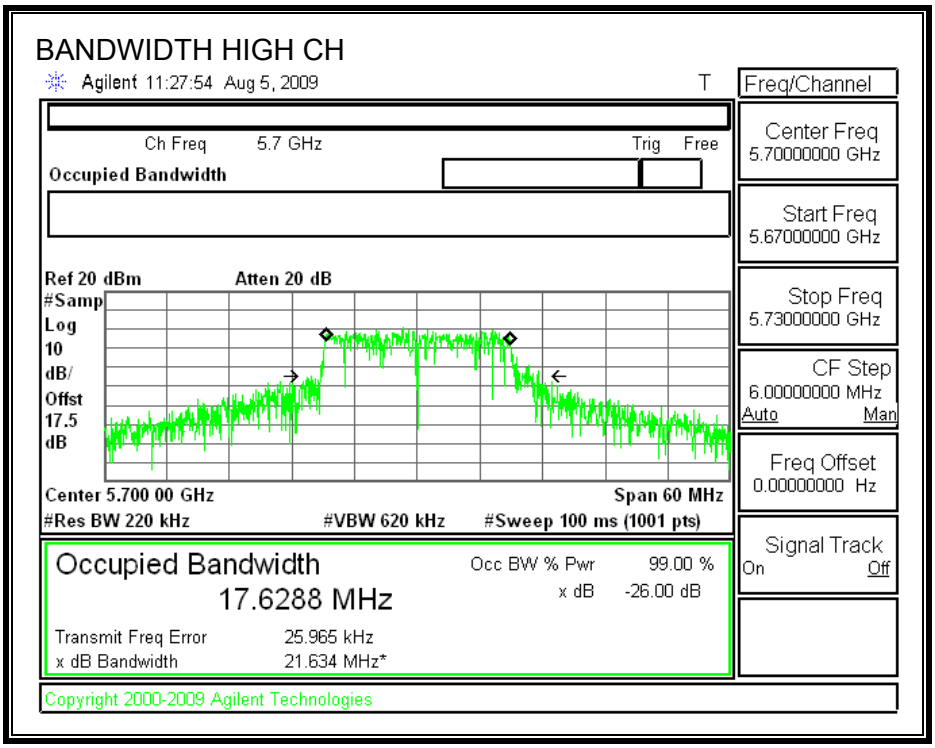




99% BANDWIDTH







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

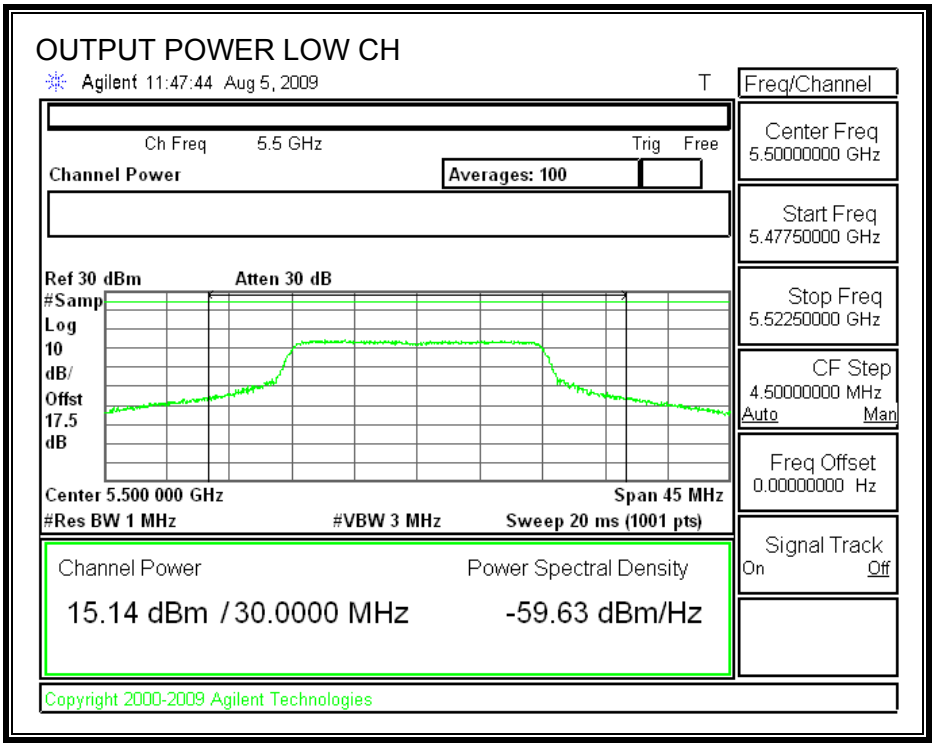
Limit

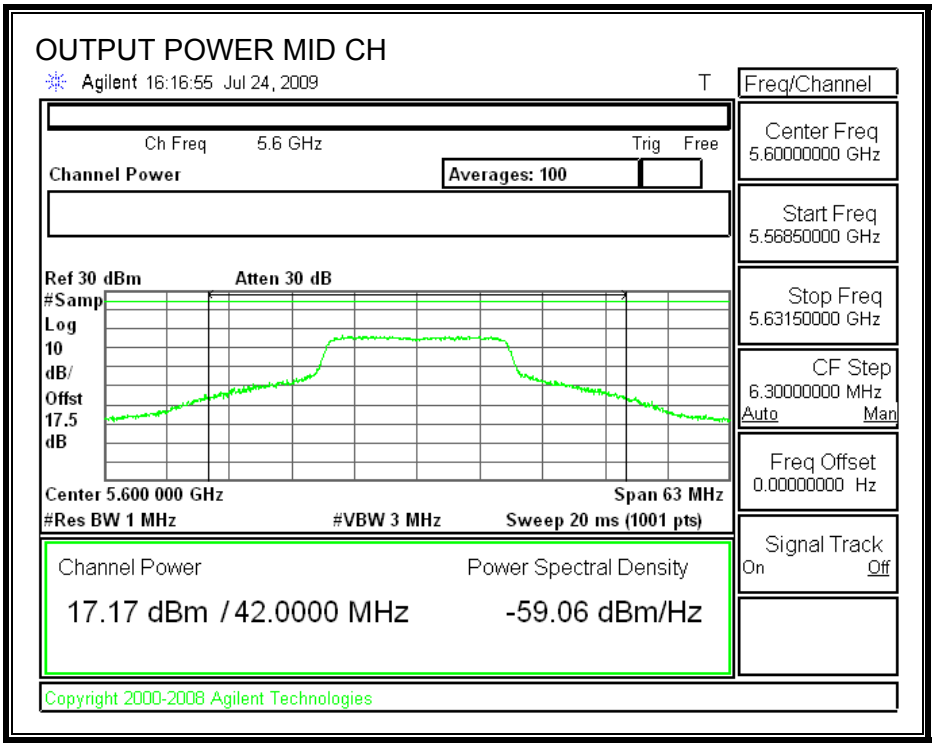
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5500	24	29.046	25.63	4.92	24.00
Mid	5600	24	41.232	27.15	4.92	24.00
High	5700	24	25.979	25.15	4.92	24.00

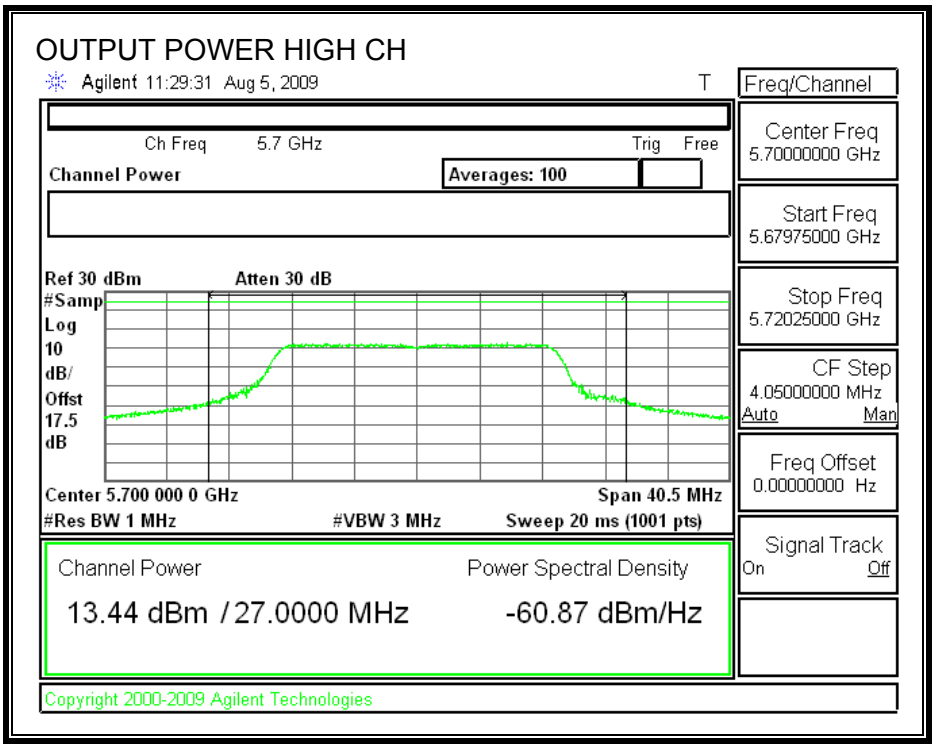
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	15.14	24.00	-8.86
Mid	5600	17.17	24.00	-6.83
High	5700	13.44	24.00	-10.56

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 16 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5500	15.33
Middle	5600	17.36
High	5700	13.59

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.

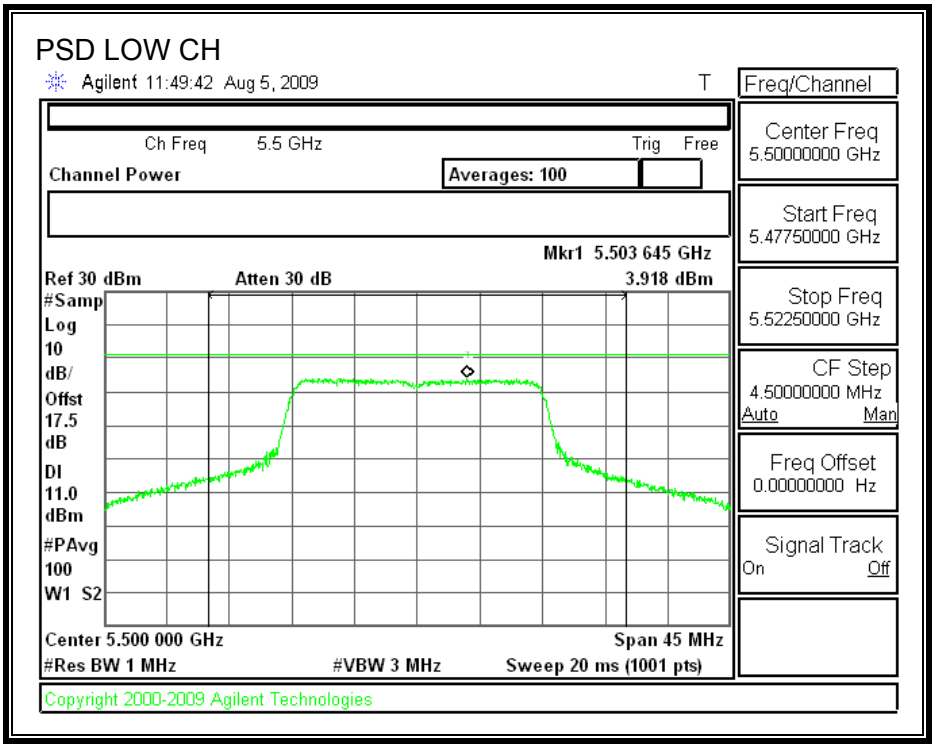
TEST PROCEDURE

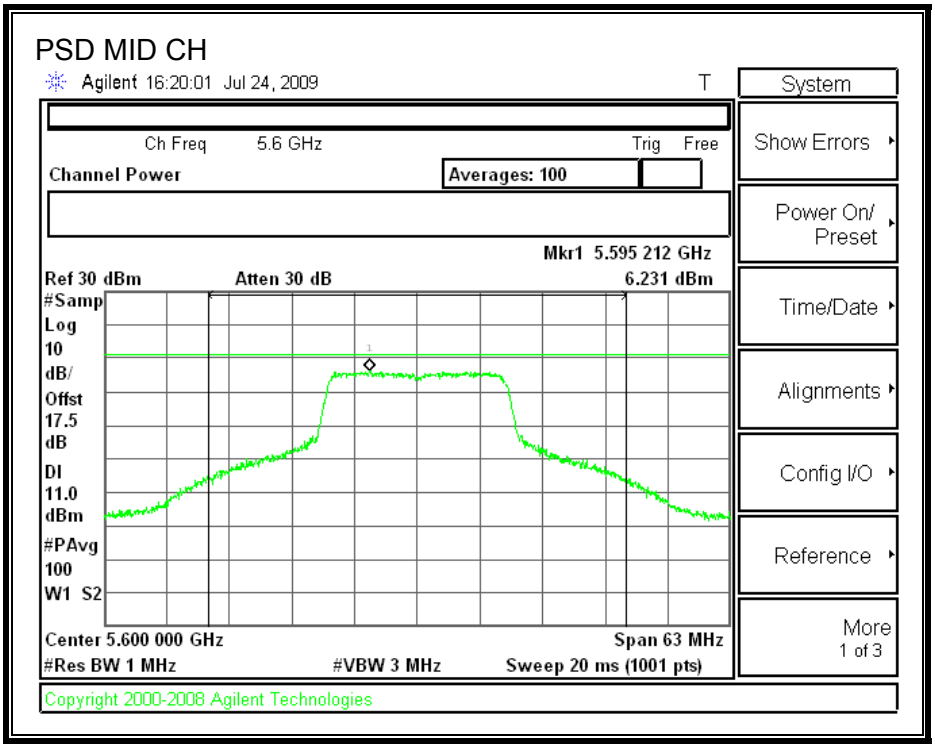
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

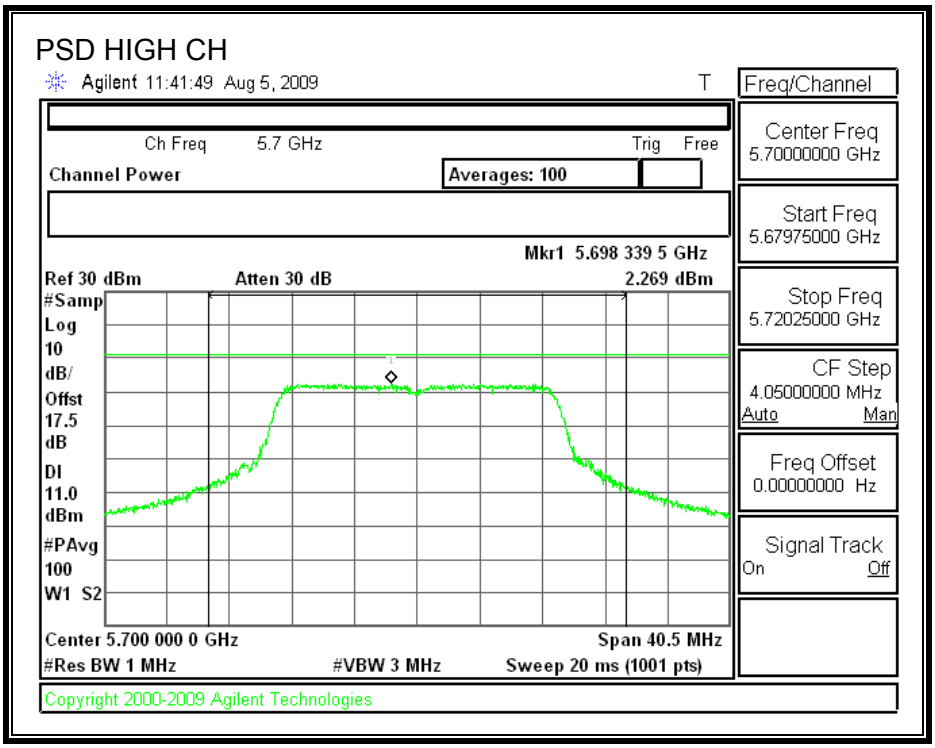
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5500	3.92	11	-7.08
Middle	5600	6.23	11	-4.77
High	5700	2.27	11	-8.73

POWER SPECTRAL DENSITY







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

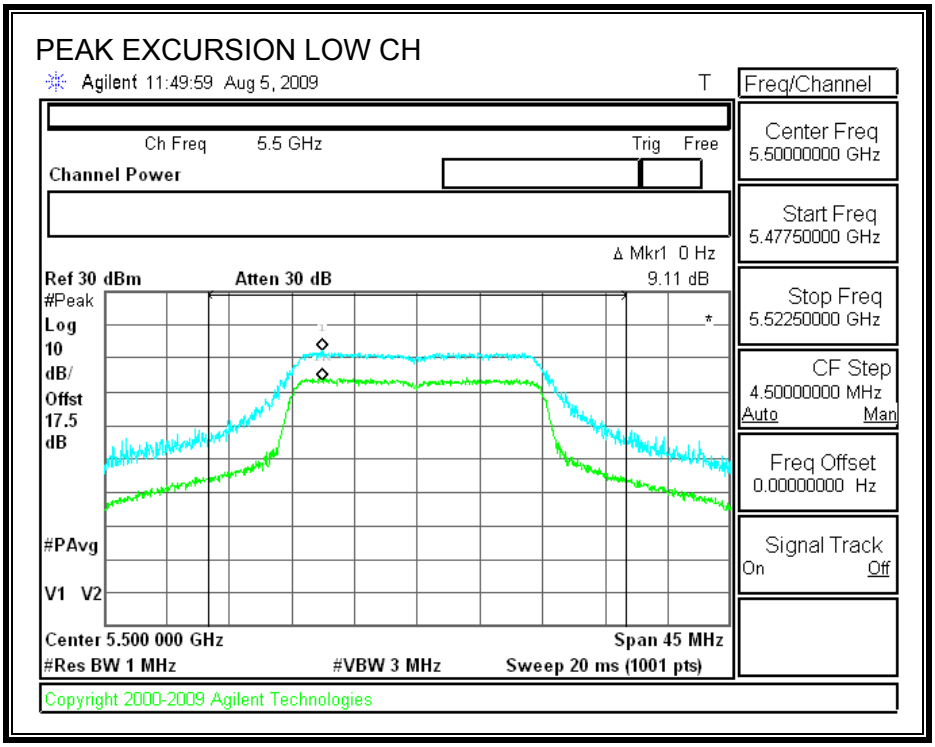
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

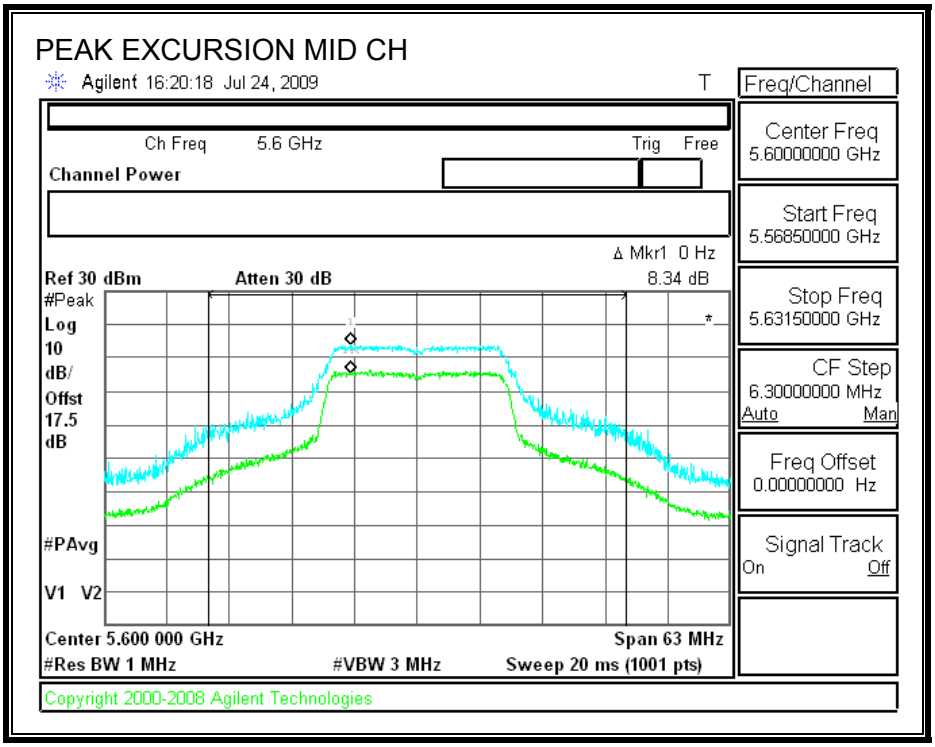
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

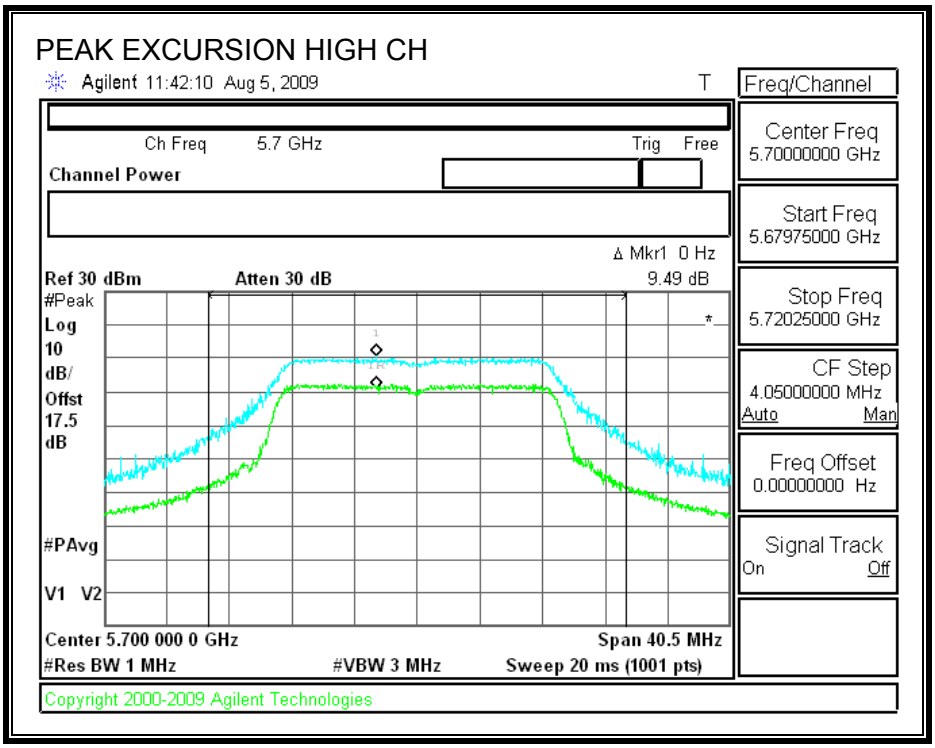
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	9.11	13	-3.89
Middle	5600	8.34	13	-4.66
High	5700	9.49	13	-3.51

PEAK EXCURSION





PEAK EXCURSION HIGH CH



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

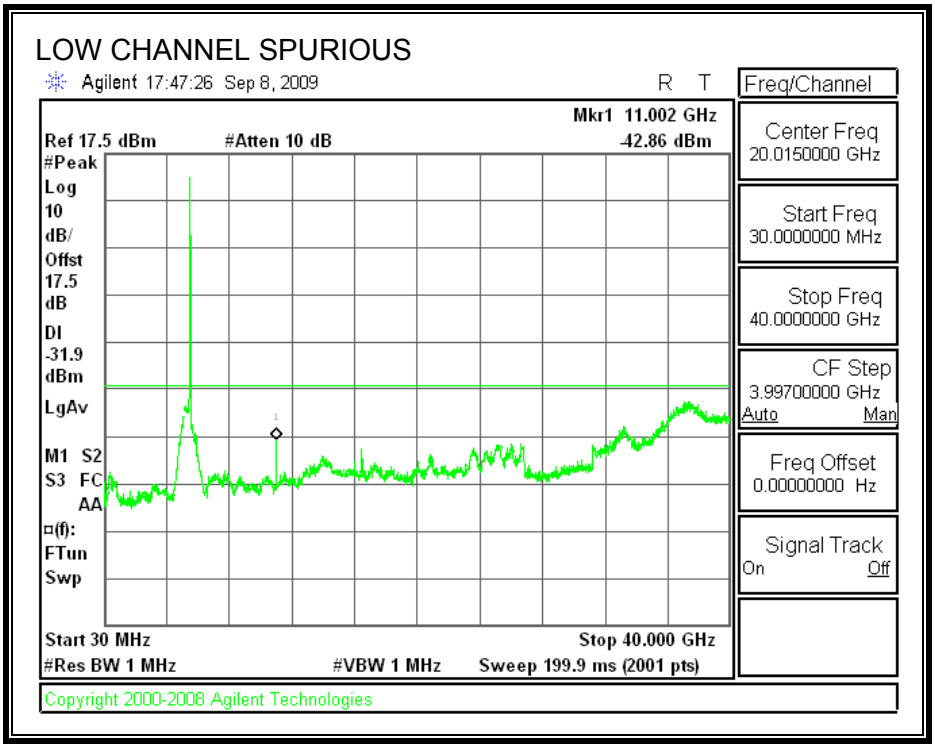
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

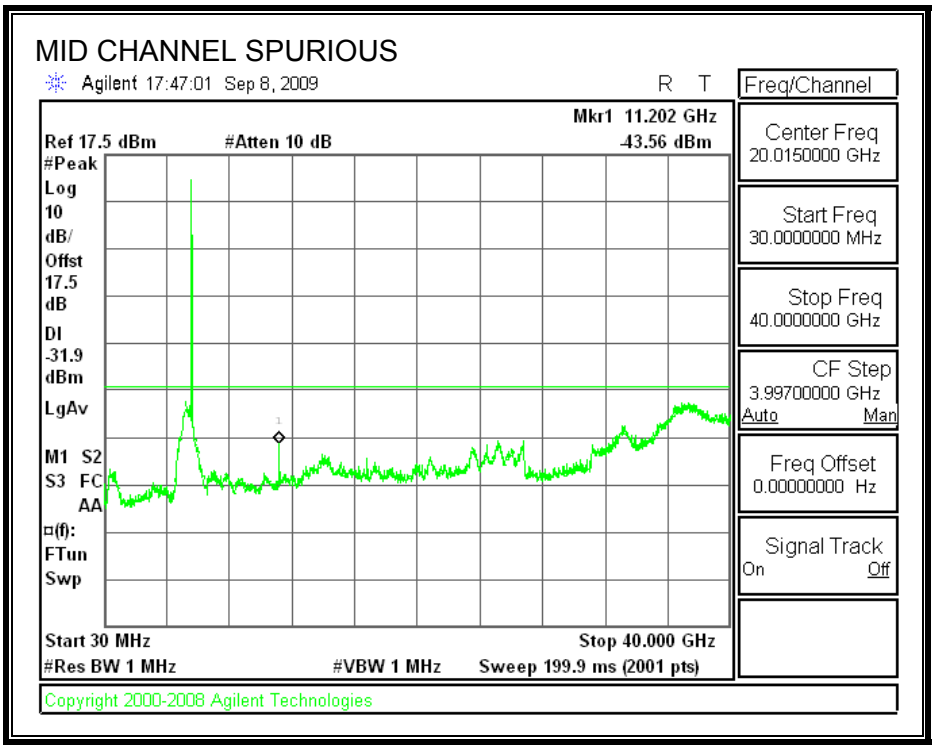
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

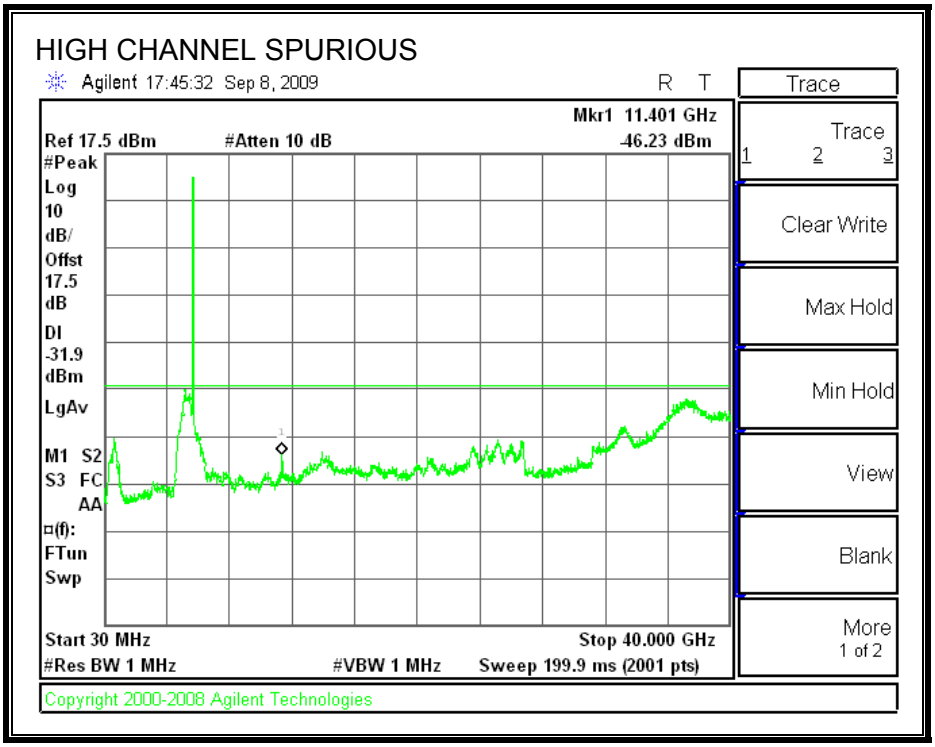
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

SPURIOUS EMISSIONS







7.9. 802.11n HT40 MODE IN THE 5.6 GHz BAND

7.9.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

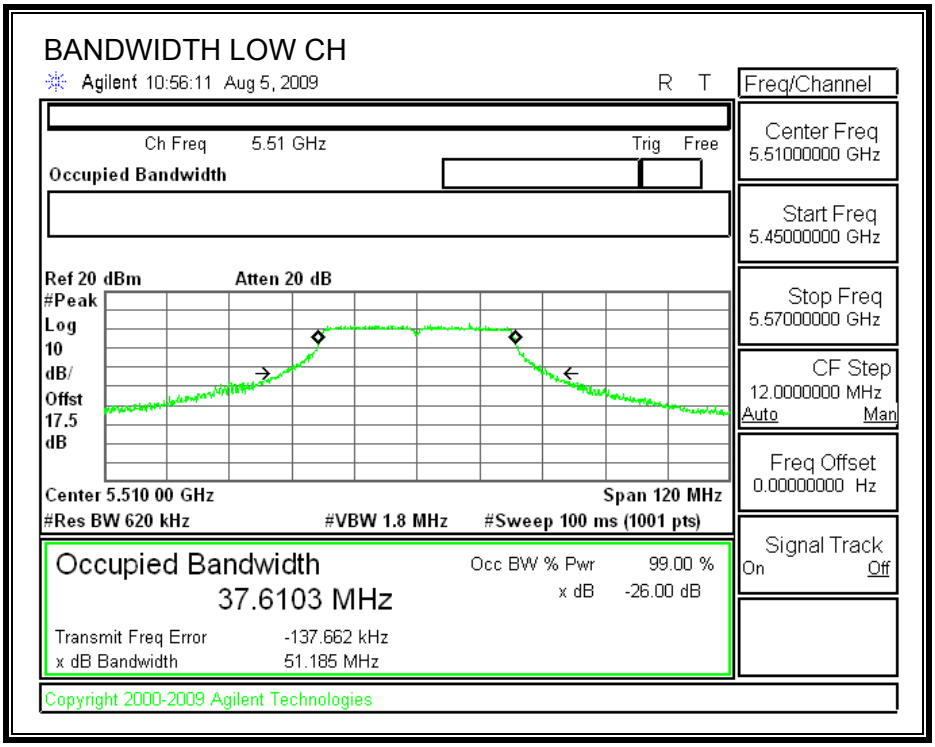
TEST PROCEDURE

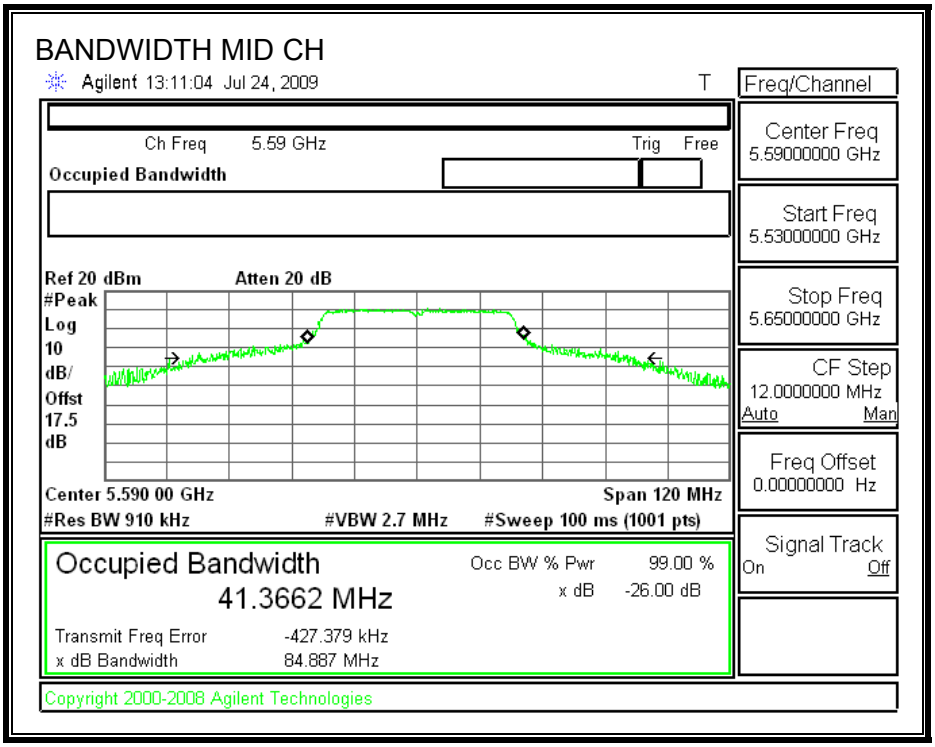
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

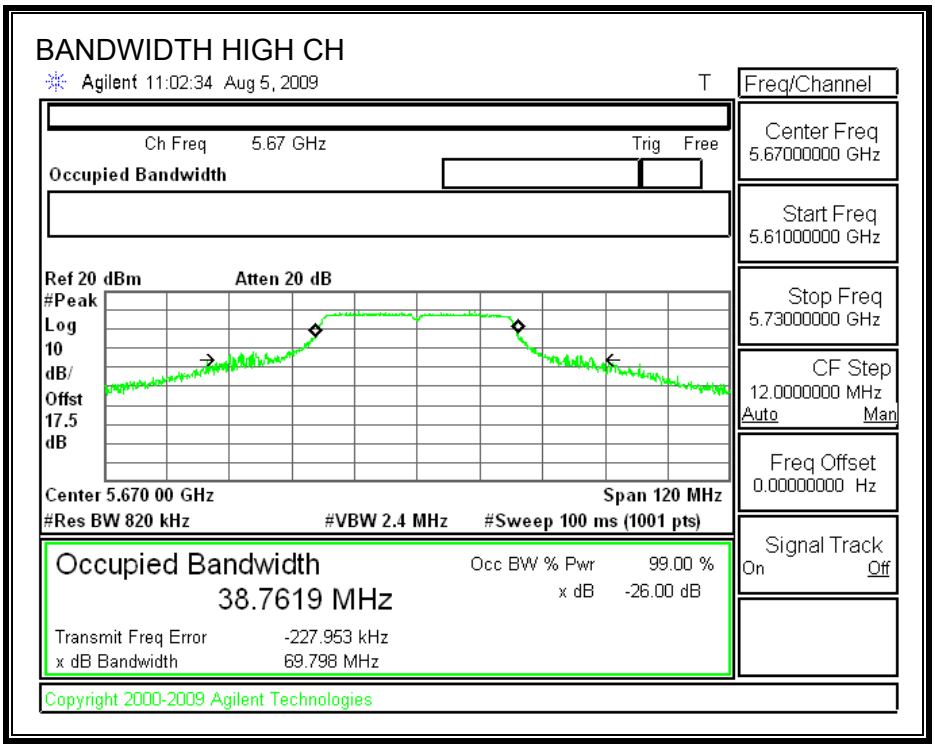
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5510	51.185	36.0970
Middle	5590	84.887	36.4388
High	5670	69.798	36.3401

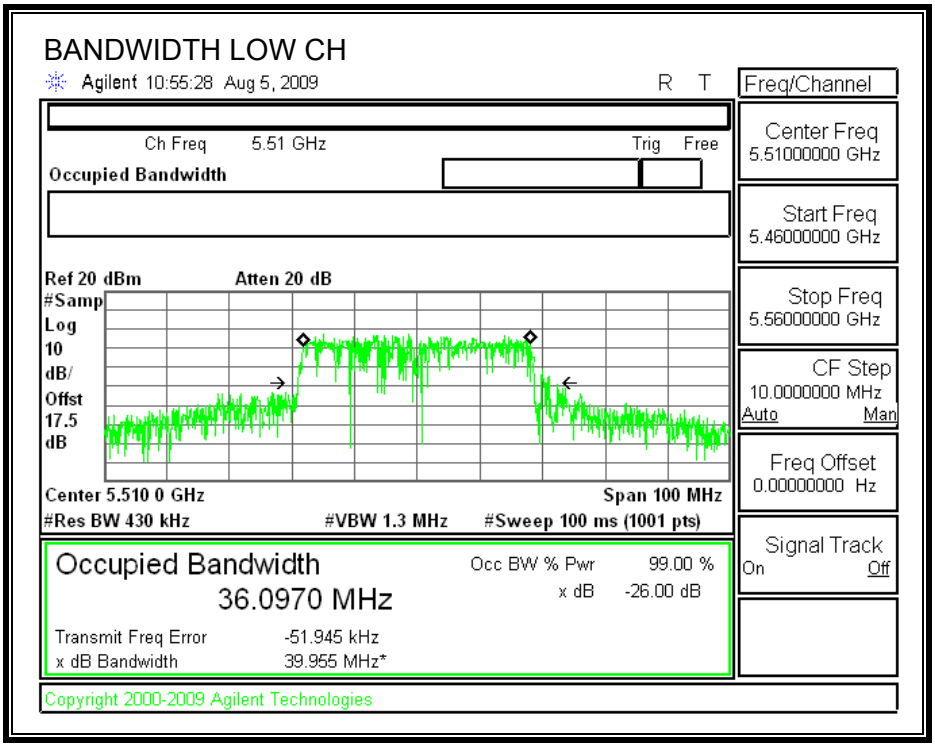
26 dB BANDWIDTH

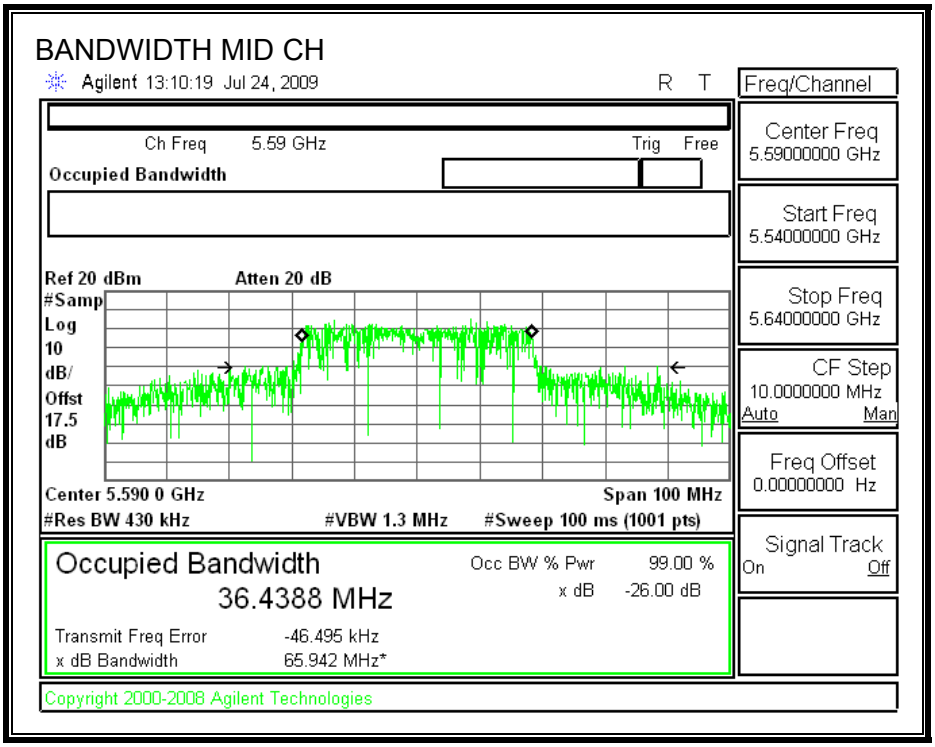


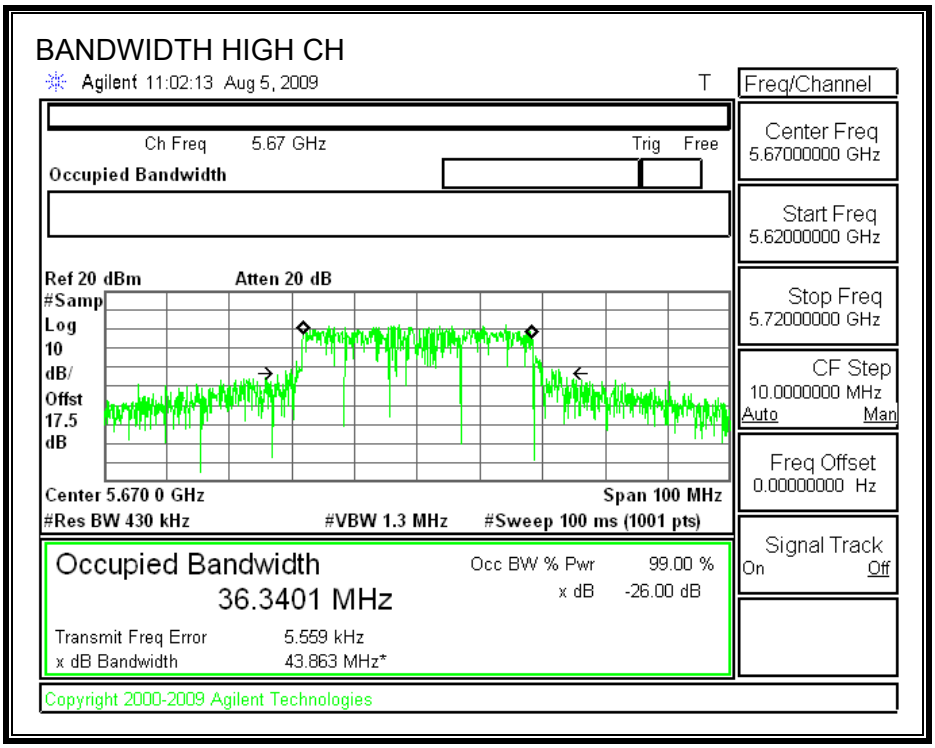




99% BANDWIDTH







7.9.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

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

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

RESULTS

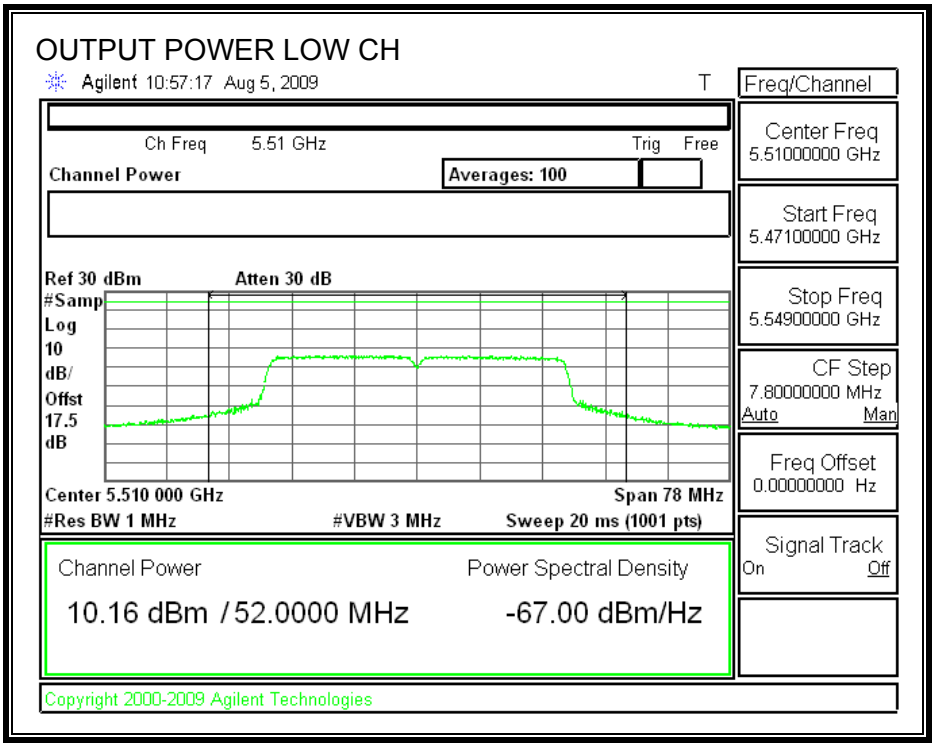
Limit

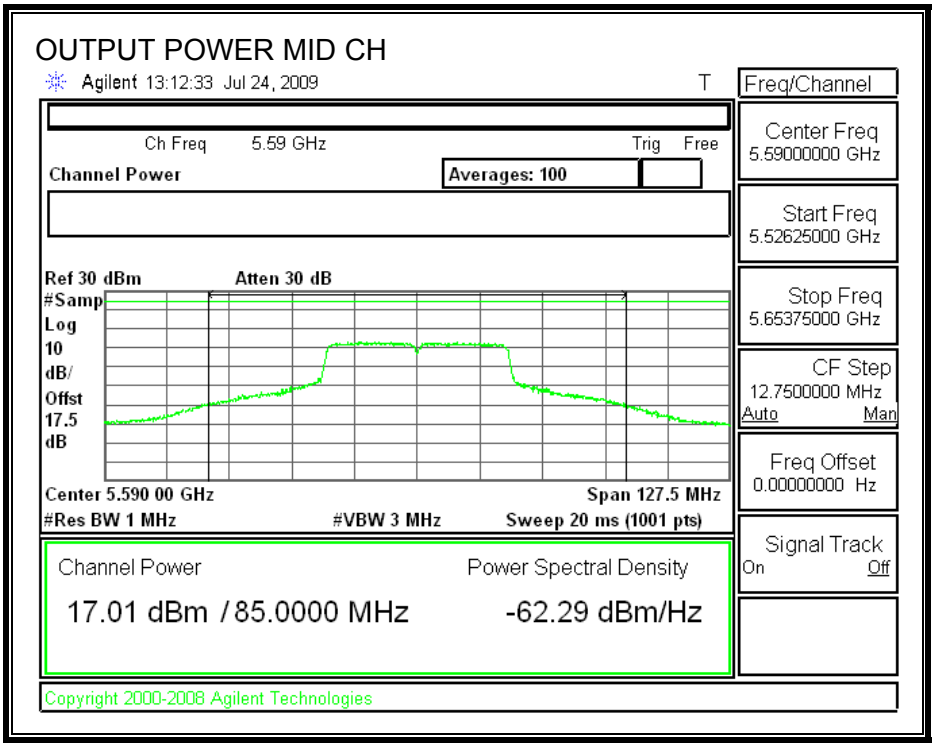
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5510	24	51.185	28.09	4.92	24.00
Mid	5590	24	84.887	30.29	4.92	24.00
High	5670	24	69.798	29.44	4.92	24.00

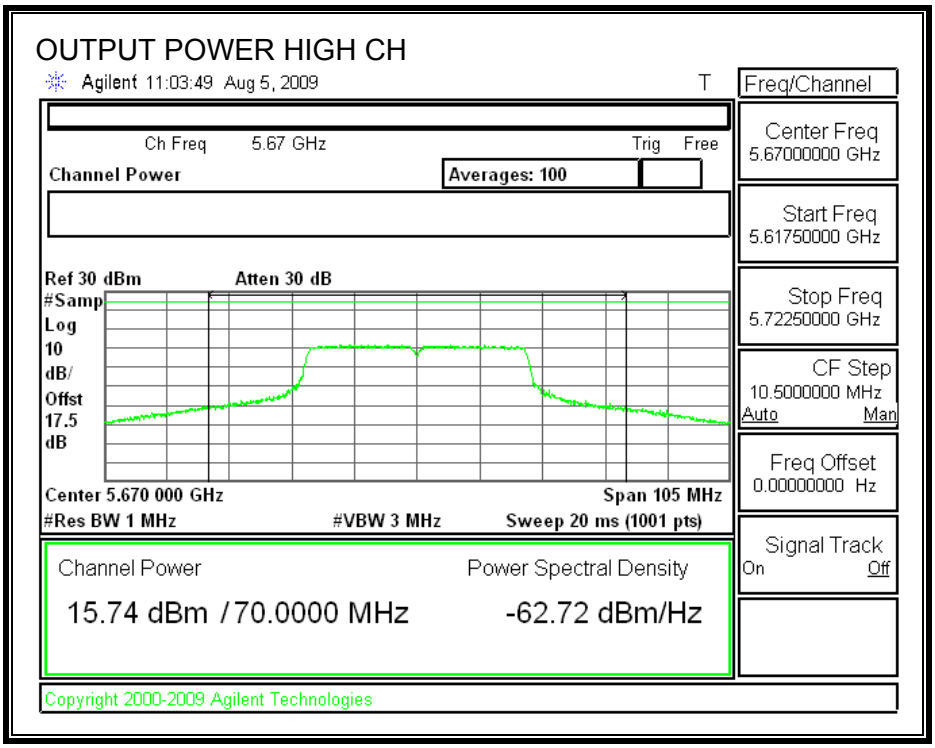
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5510	10.16	24.00	-13.84
Mid	5590	17.01	24.00	-6.99
High	5670	15.74	24.00	-8.26

OUTPUT POWER







7.9.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 17.5 dB (including 16 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5510	10.30
Middle	5590	17.25
High	5670	15.89

7.9.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

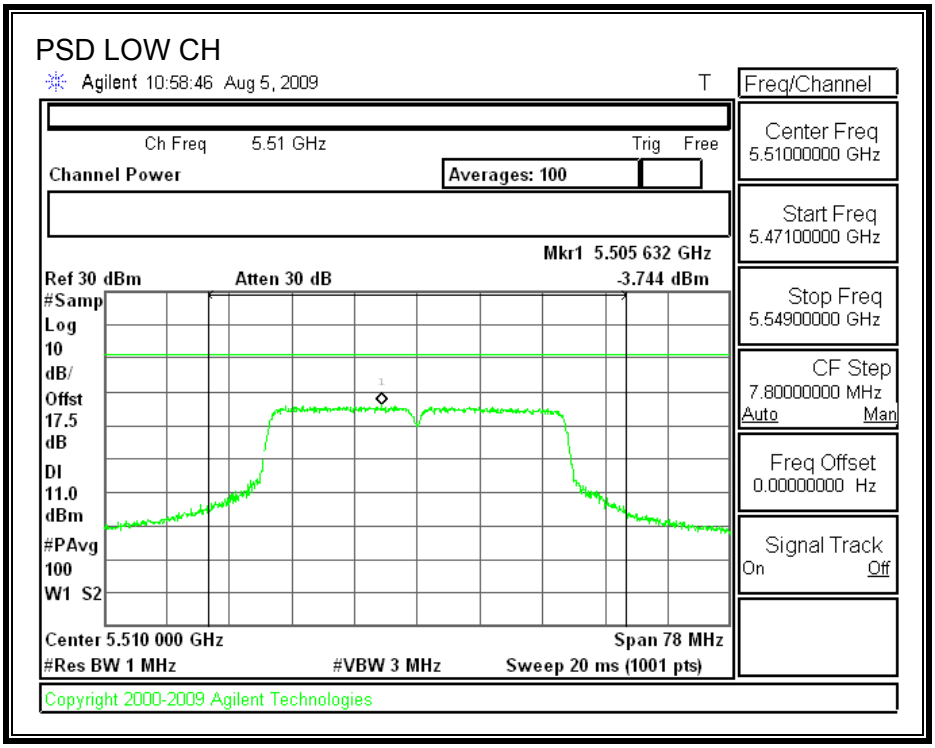
TEST PROCEDURE

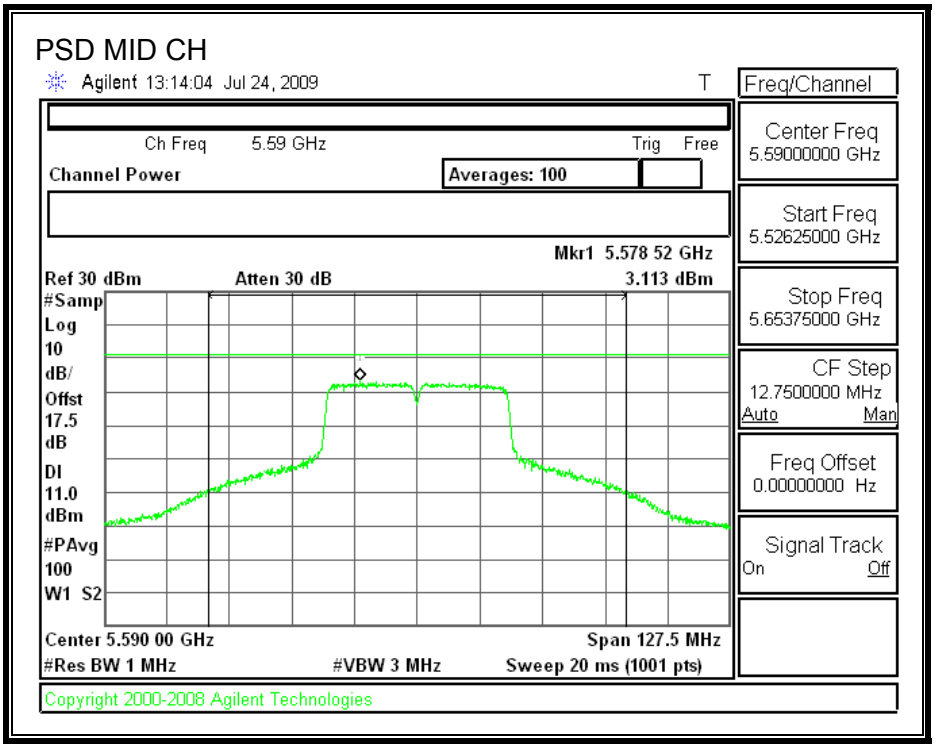
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

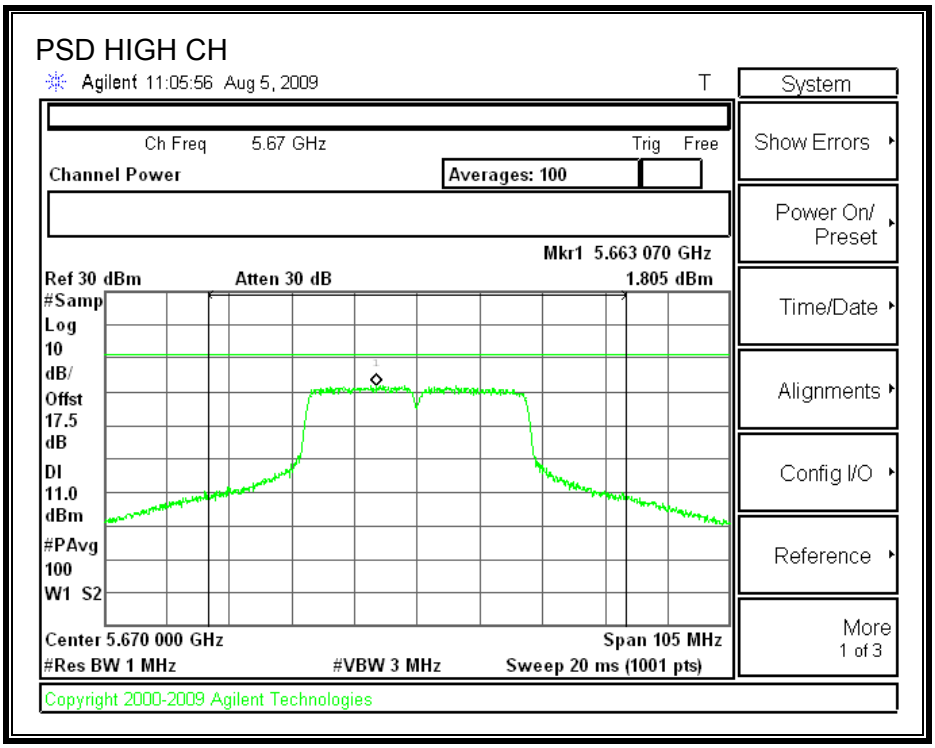
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5510	-3.74	11	-14.74
Middle	5590	3.11	11	-7.89
High	5670	1.81	11	-9.20

POWER SPECTRAL DENSITY







7.9.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

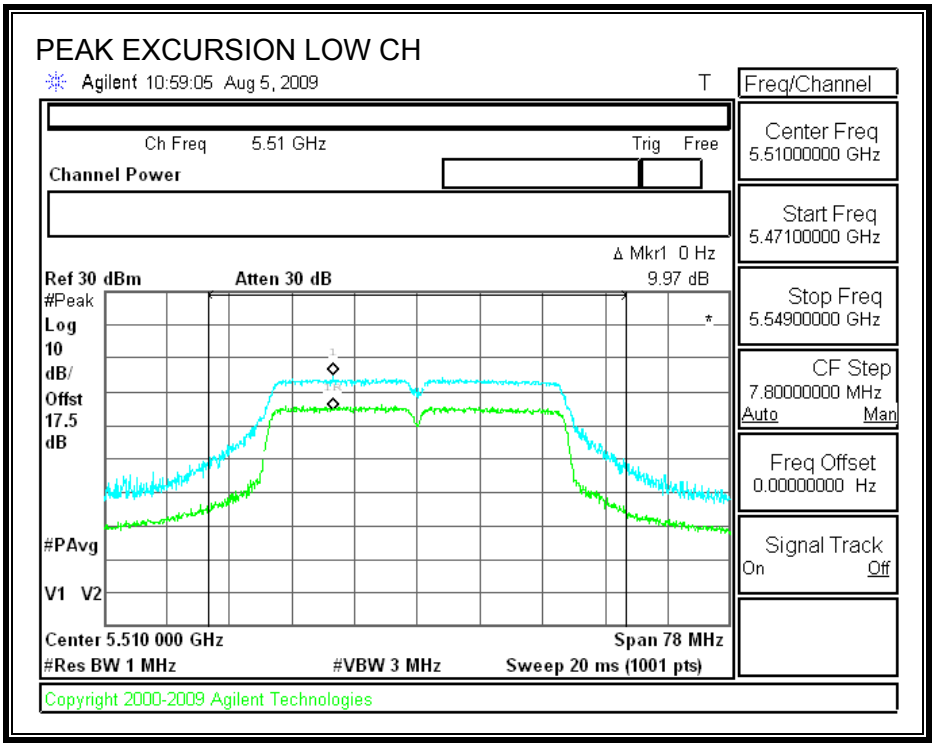
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

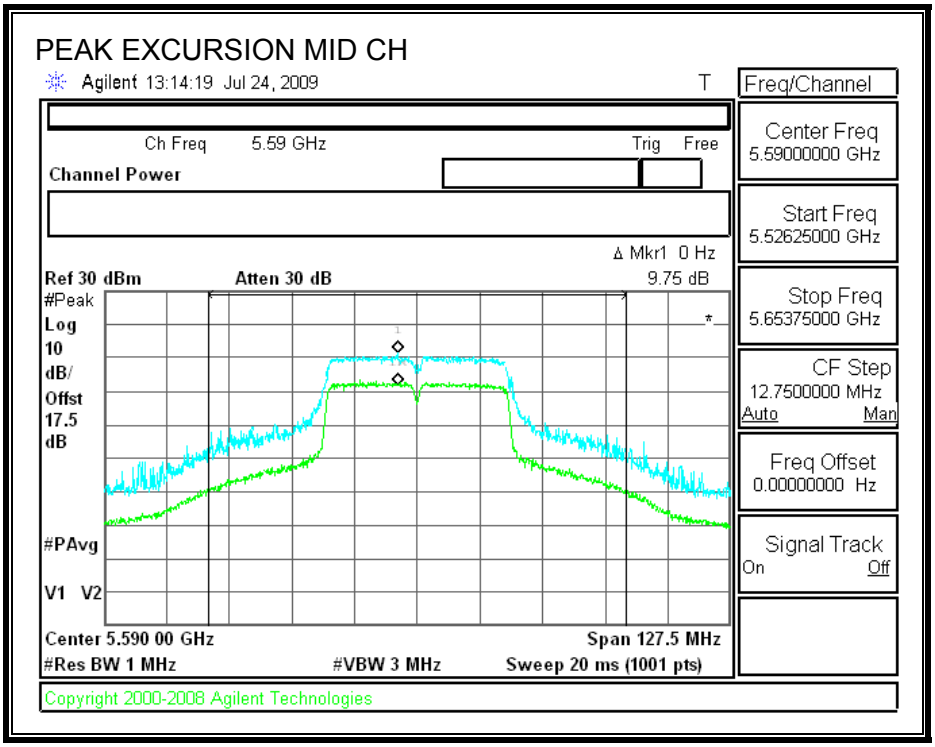
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

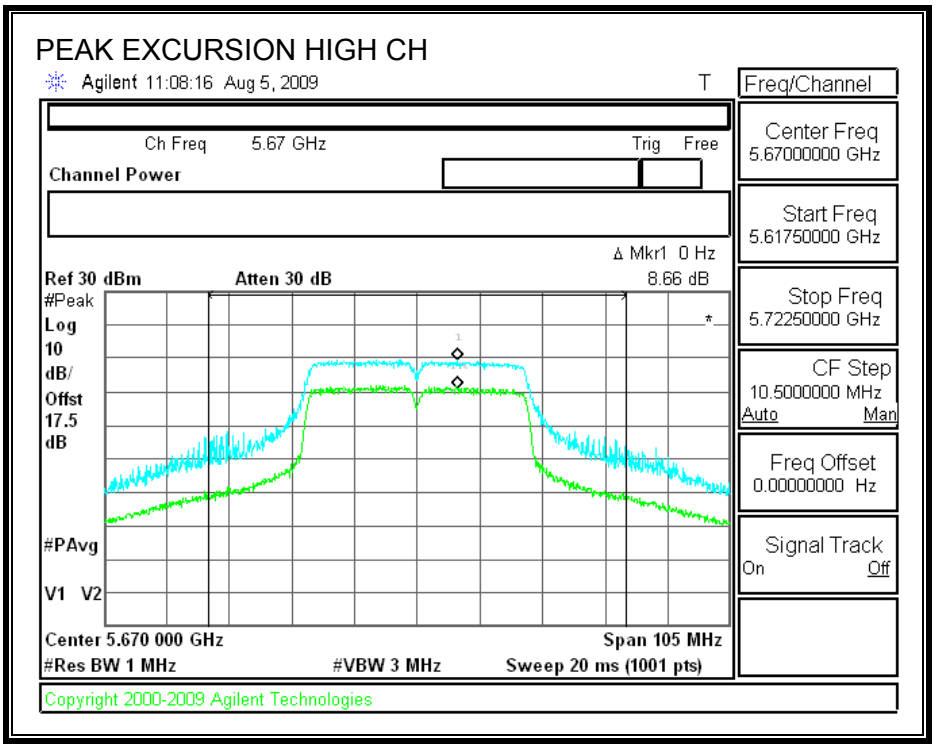
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5510	9.97	13	-3.03
Middle	5590	9.75	13	-3.25
High	5670	8.66	13	-4.34

PEAK EXCURSION





PEAK EXCURSION HIGH CH



7.9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

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

TEST PROCEDURE

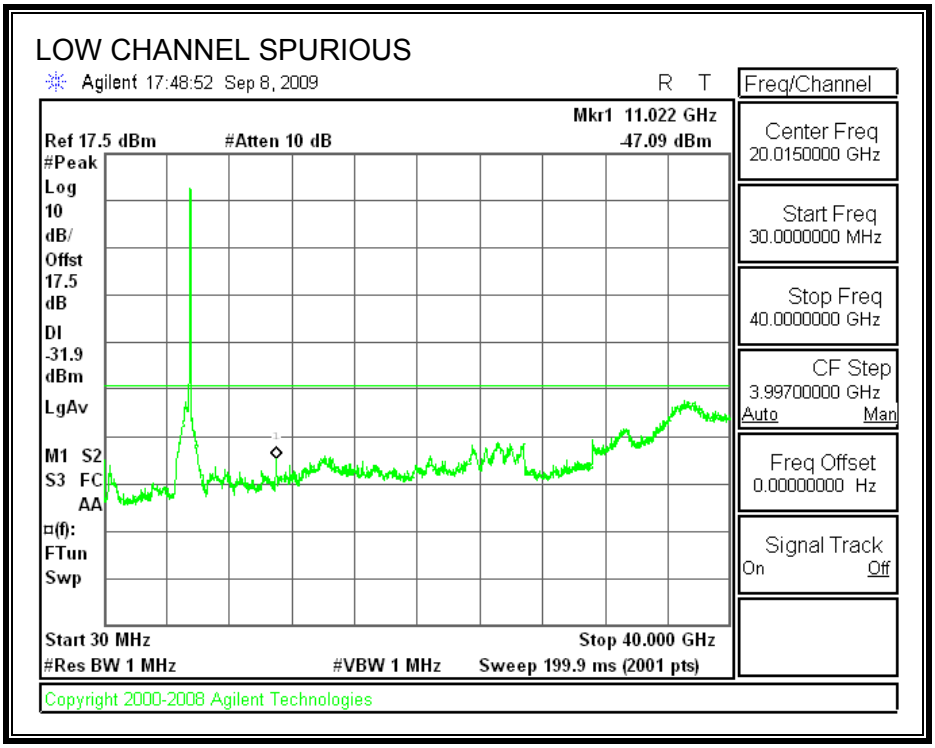
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

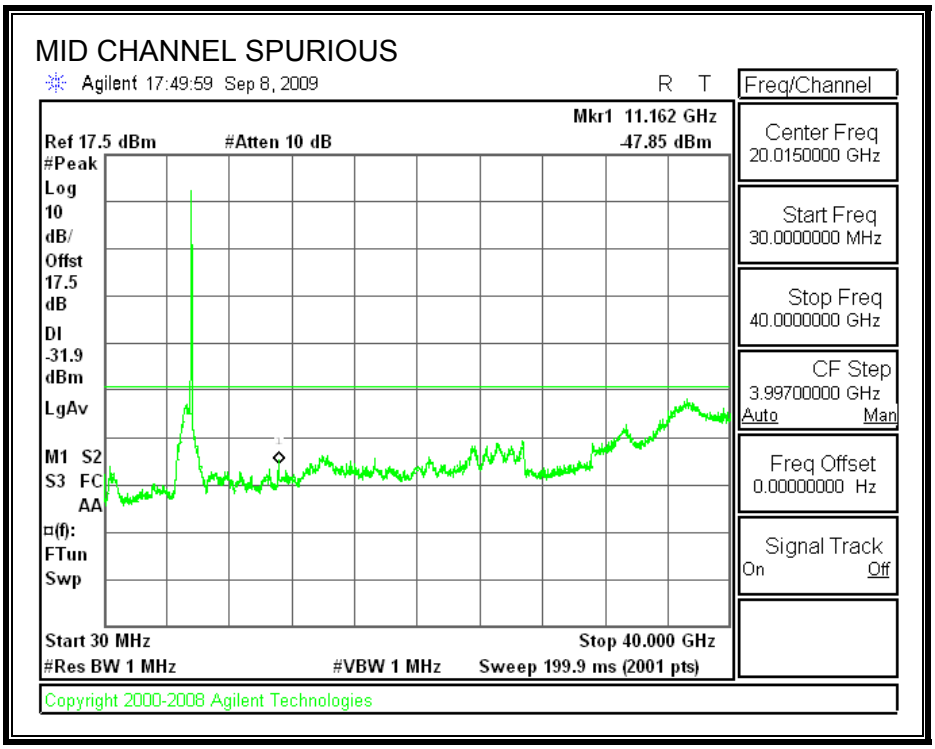
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

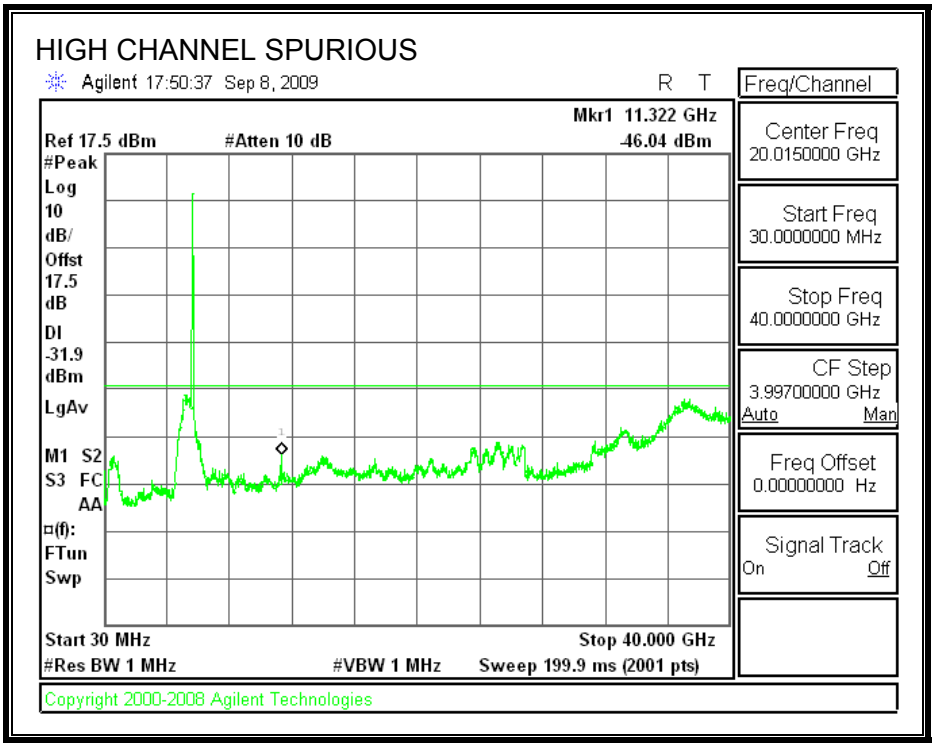
RESULTS

SPURIOUS EMISSIONS





HIGH CHANNEL SPURIOUS



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

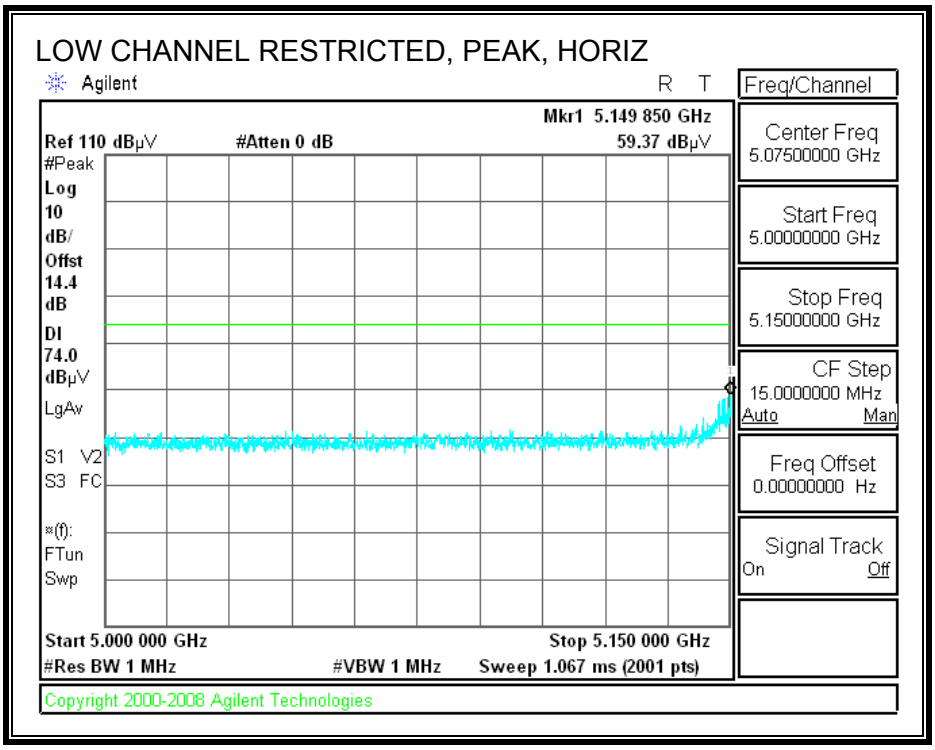
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each appplicable band.

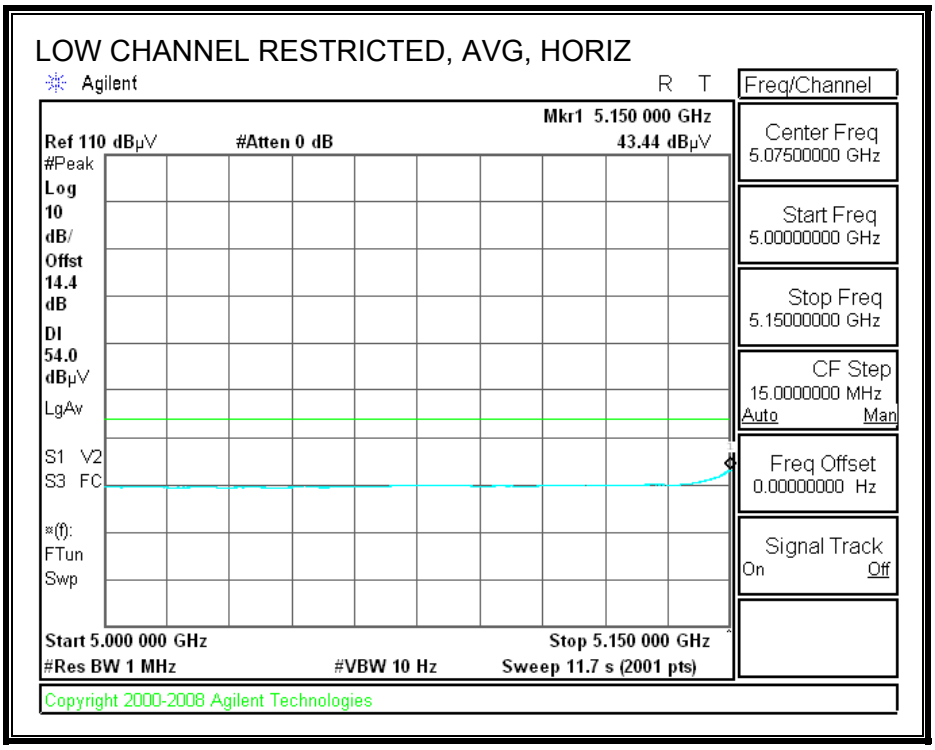
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2.TRANSMITTER ABOVE 1 GHz

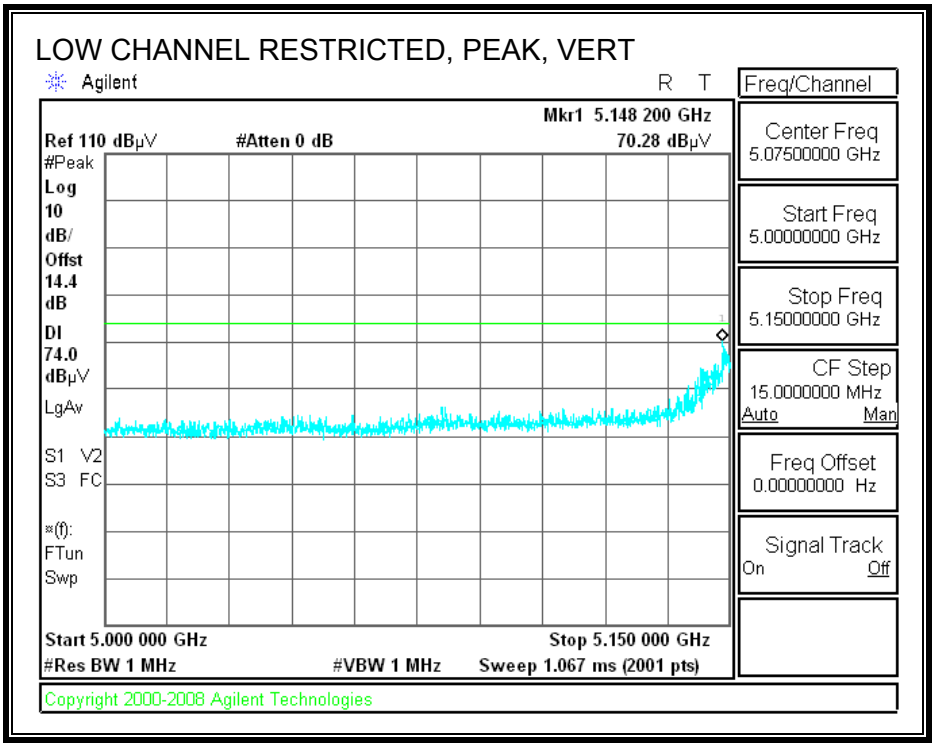
8.2.1. TX ABOVE 1 GHz FOR 802.11a MODE IN THE 5.2 GHz BAND

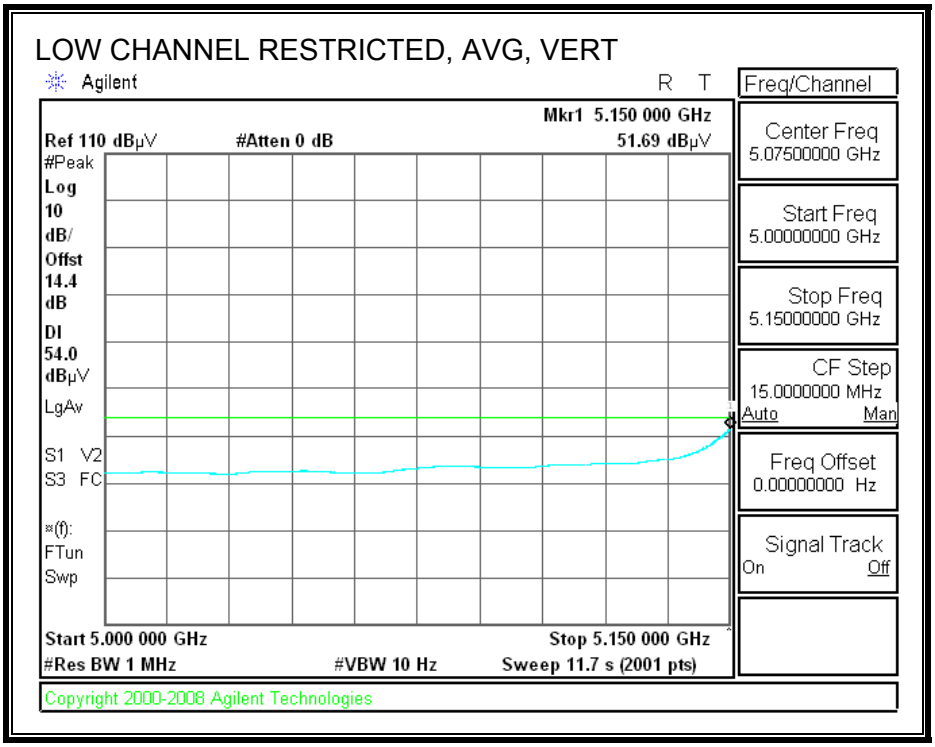
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 07/26/09
Project #: 09U12610
Company: Microsoft
EUT M/N: Omni N
Test Target: Harmonic
Mode Oper: Tx_ a mode

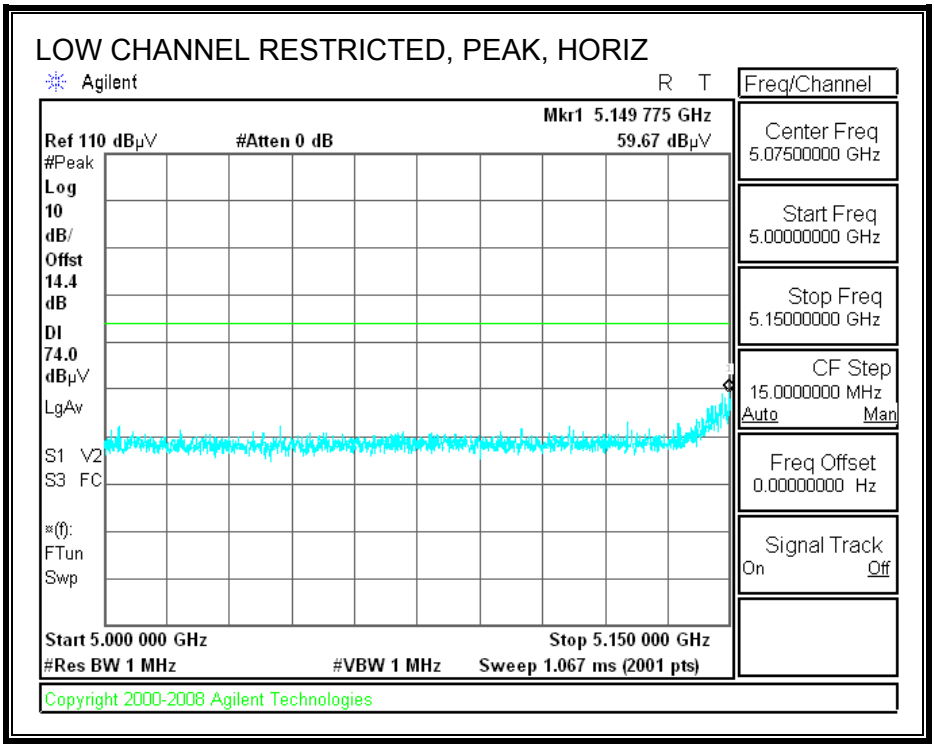
	f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
	Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
	Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
	AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

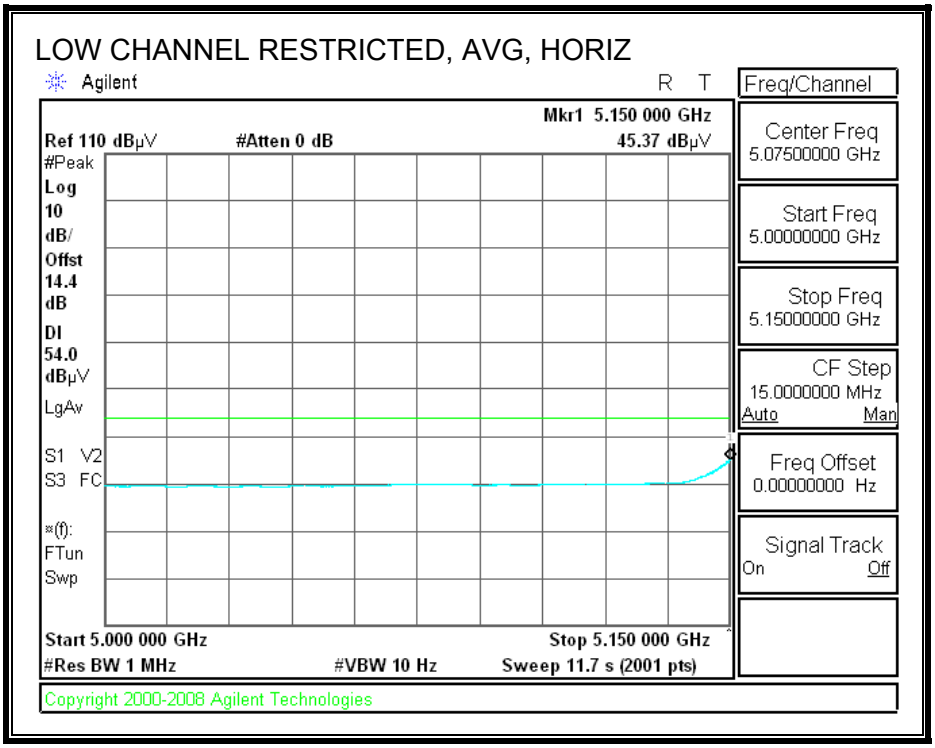
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5180MHz													
10.360	3.0	42.2	37.4	8.9	-36.8	0.0	0.0	51.7	68.2	-16.5	V	P	
15.540	3.0	40.7	38.9	11.3	-34.8	0.0	0.0	56.0	74.0	-18.0	V	P	
15.540	3.0	27.1	38.9	11.3	-34.8	0.0	0.0	42.4	54.0	-11.6	V	A	
10.360	3.0	39.8	37.4	8.9	-36.8	0.0	0.0	49.4	68.2	-18.8	H	P	
15.540	3.0	44.2	38.9	11.3	-34.8	0.0	0.0	59.6	74.0	-14.4	H	P	
15.540	3.0	30.3	38.9	11.3	-34.8	0.0	0.0	45.6	54.0	-8.4	H	A	
5200MHz													
10.400	3.0	43.5	37.5	8.9	-36.8	0.0	0.0	53.1	68.2	-15.1	V	P	
15.600	3.0	39.8	38.7	11.4	-34.8	0.0	0.0	55.1	74.0	-18.9	V	P	
15.600	3.0	26.9	38.7	11.4	-34.8	0.0	0.0	42.2	54.0	-11.8	V	A	
10.400	3.0	40.3	37.5	8.9	-36.8	0.0	0.0	50.0	68.2	-18.2	H	P	
15.600	3.0	44.1	38.7	11.4	-34.8	0.0	0.0	59.4	74.0	-14.6	H	P	
15.600	3.0	30.3	38.7	11.4	-34.8	0.0	0.0	45.7	54.0	-8.3	H	A	
5240MHz													
10.480	3.0	40.1	37.5	9.0	-36.7	0.0	0.0	49.8	68.2	-18.4	V	P	
15.720	3.0	38.7	38.4	11.4	-34.7	0.0	0.0	53.8	74.0	-20.2	V	P	
15.720	3.0	26.1	38.4	11.4	-34.7	0.0	0.0	41.3	54.0	-12.7	V	A	
10.480	3.0	40.8	37.5	9.0	-36.7	0.0	0.0	50.6	68.2	-17.6	H	P	
15.720	3.0	43.0	38.4	11.4	-34.7	0.0	0.0	58.1	74.0	-15.9	H	P	
15.720	3.0	29.1	38.4	11.4	-34.7	0.0	0.0	44.3	54.0	-9.7	H	A	

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

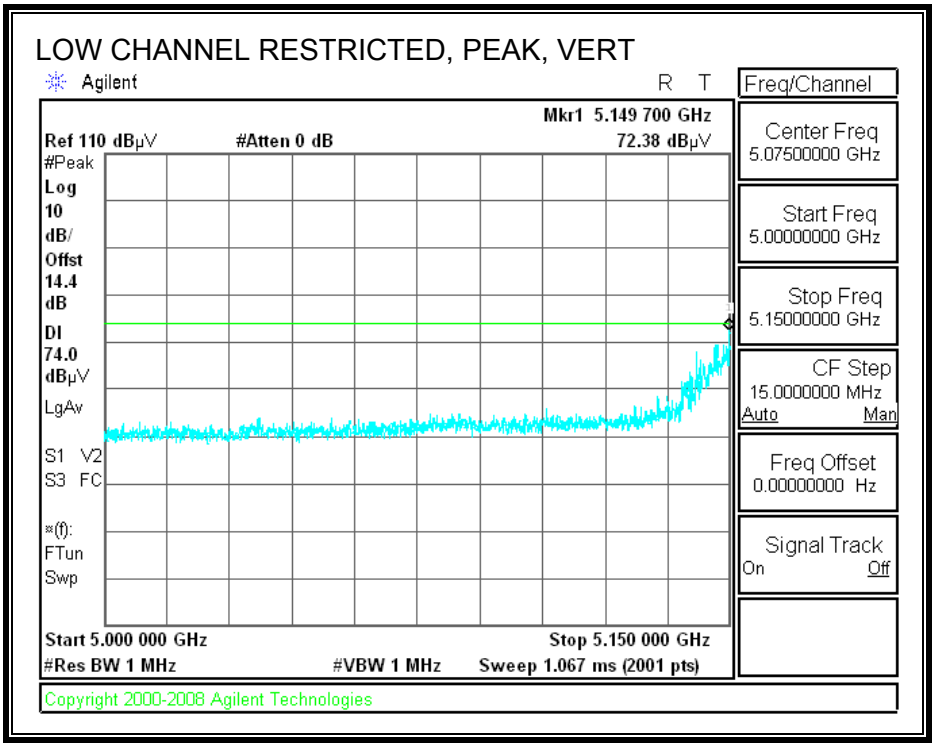
8.2.2. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.2 GHz BAND

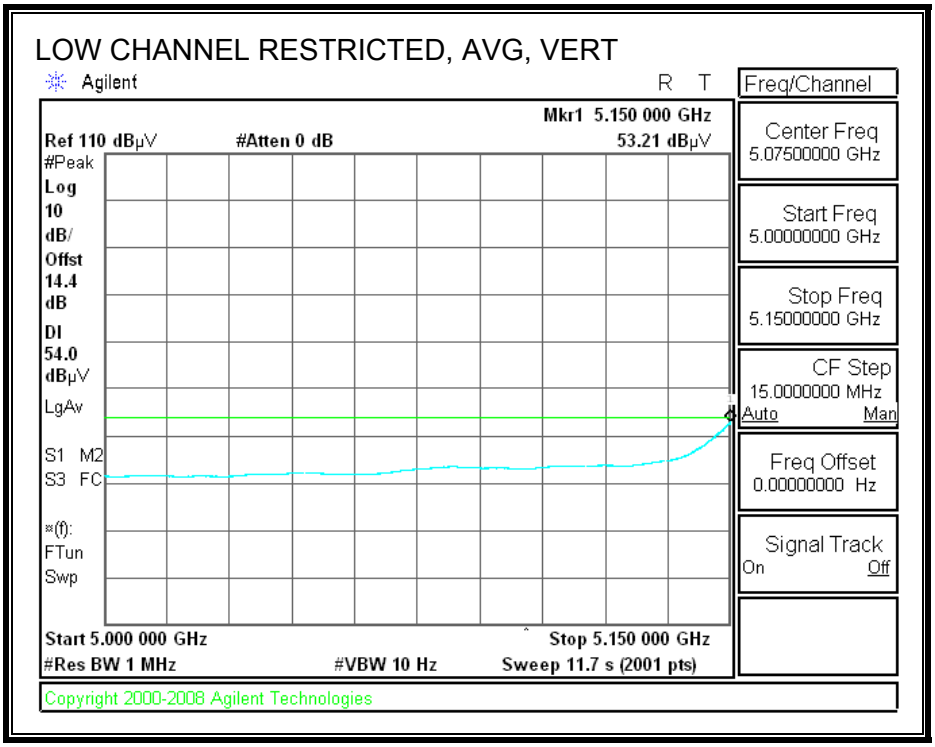
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 07/26/09
Project #: 09U12610
Company: Microsoft
EUT M/N: Omni N
Test Target: Harmonic
Mode Oper: Tx_ HT20

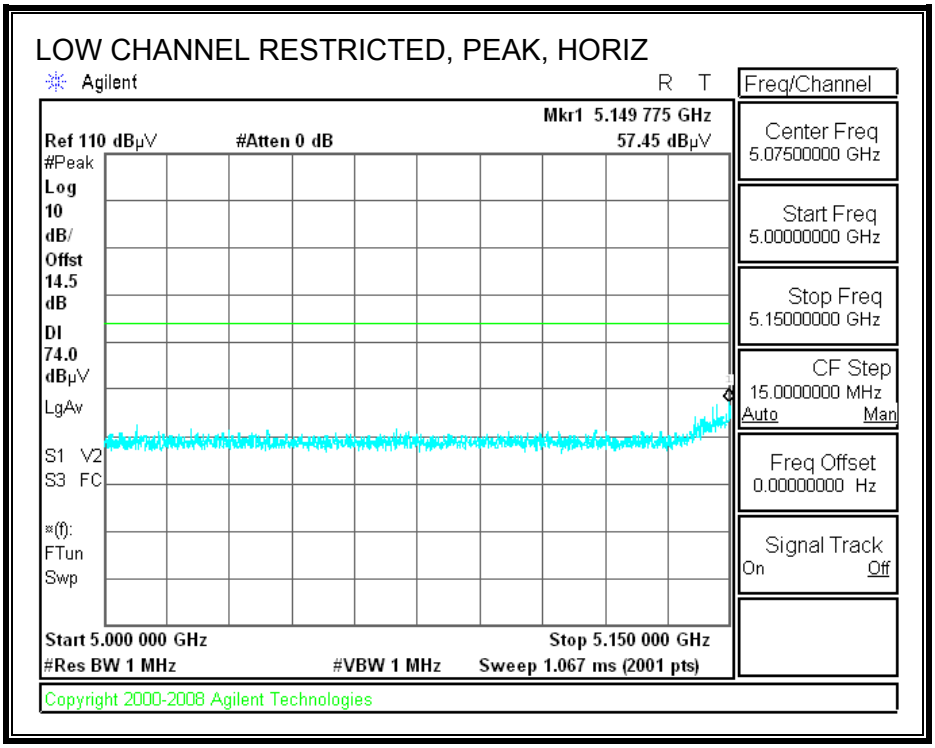
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

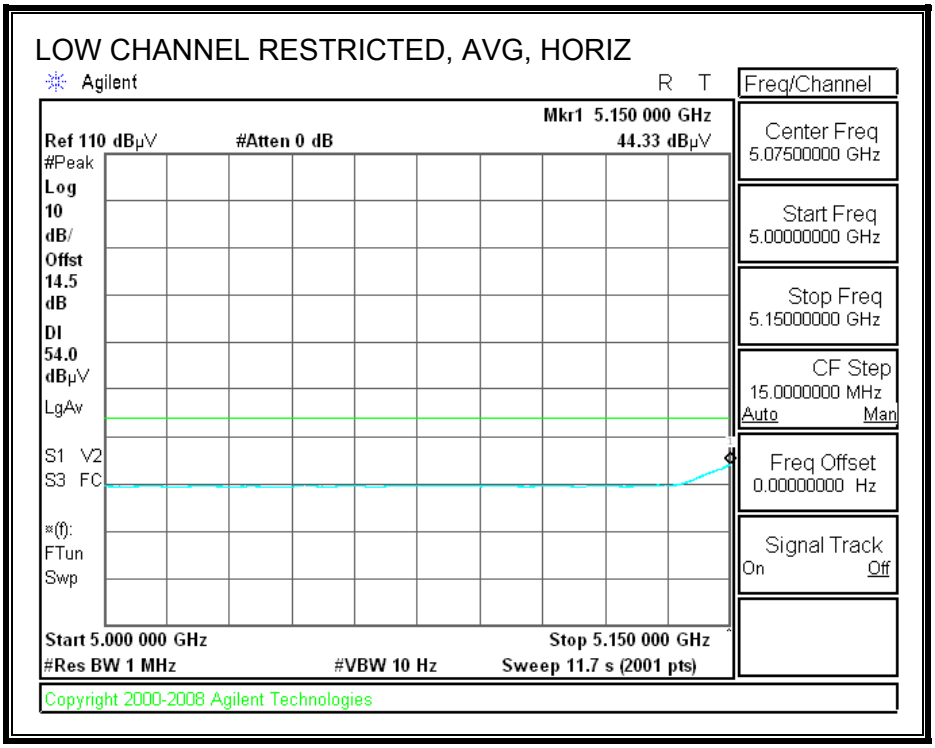
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5180MHz													
10.360	3.0	41.8	37.4	8.9	-34.6	0.0	0.0	53.6	68.2	-14.6	V	P	
15.540	3.0	40.3	38.9	11.3	-32.3	0.0	0.0	58.2	74.0	-15.8	V	P	
15.540	3.0	27.1	38.9	11.3	-32.3	0.0	0.0	45.1	54.0	-8.9	V	A	
10.360	3.0	40.0	37.4	8.9	-34.6	0.0	0.0	51.7	68.2	-16.5	H	P	
15.540	3.0	42.9	38.9	11.3	-32.3	0.0	0.0	60.8	74.0	-13.2	H	P	
15.540	3.0	29.3	38.9	11.3	-32.3	0.0	0.0	47.2	54.0	-6.8	H	A	
5200MHz													
10.400	3.0	42.9	37.5	8.9	-34.6	0.0	0.0	54.8	68.2	-13.4	V	P	
15.600	3.0	40.7	38.7	11.4	-32.3	0.0	0.0	58.5	74.0	-15.5	V	P	
15.600	3.0	26.8	38.7	11.4	-32.3	0.0	0.0	44.6	54.0	-9.4	V	A	
10.400	3.0	38.7	37.5	8.9	-34.6	0.0	0.0	50.5	68.2	-17.7	H	P	
15.600	3.0	43.6	38.7	11.4	-32.3	0.0	0.0	61.4	74.0	-12.6	H	P	
15.600	3.0	30.1	38.7	11.4	-32.3	0.0	0.0	47.9	54.0	-6.1	H	A	
5240MHz													
10.480	3.0	43.6	37.5	9.0	-34.5	0.0	0.0	55.6	68.2	-12.6	V	P	
15.720	3.0	38.7	38.4	11.4	-32.3	0.0	0.0	56.2	74.0	-17.8	V	P	
15.720	3.0	25.5	38.4	11.4	-32.3	0.0	0.0	43.1	54.0	-10.9	V	A	
10.480	3.0	39.0	37.5	9.0	-34.5	0.0	0.0	51.0	68.2	-17.2	H	P	
15.720	3.0	42.1	38.4	11.4	-32.3	0.0	0.0	59.7	74.0	-14.3	H	P	
15.720	3.0	28.7	38.4	11.4	-32.3	0.0	0.0	46.3	54.0	-7.7	H	A	

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

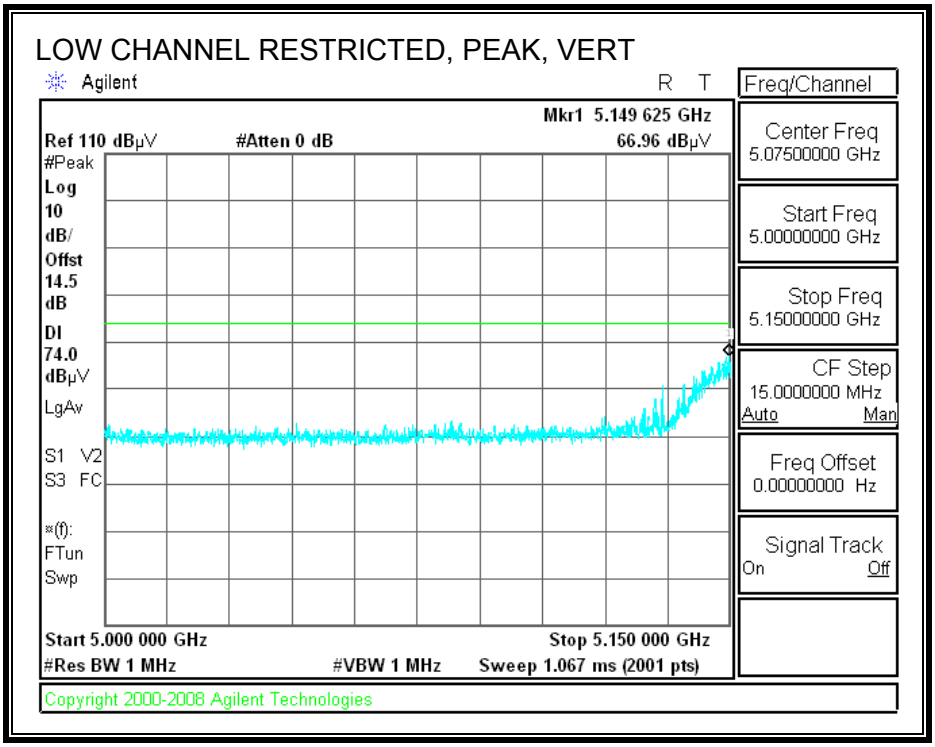
8.2.3. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.2 GHz BAND

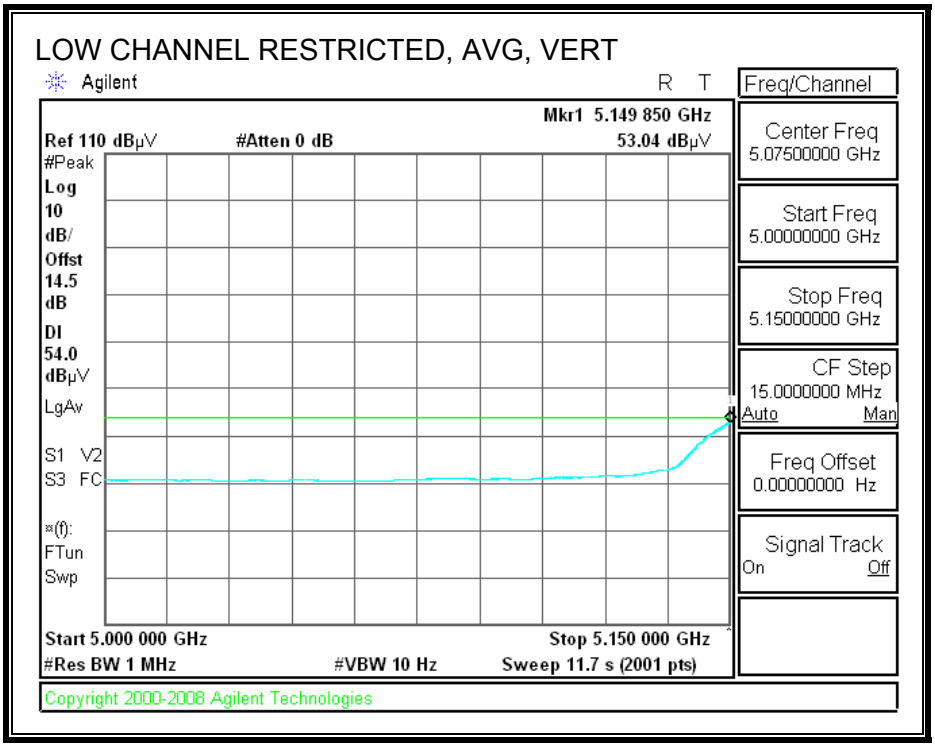
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 07/26/09
Project #: 09U12610
Company: Microsoft
EUT M/N: Omni N
Test Target: Harmonic
Mode Oper: Tx_ HT40

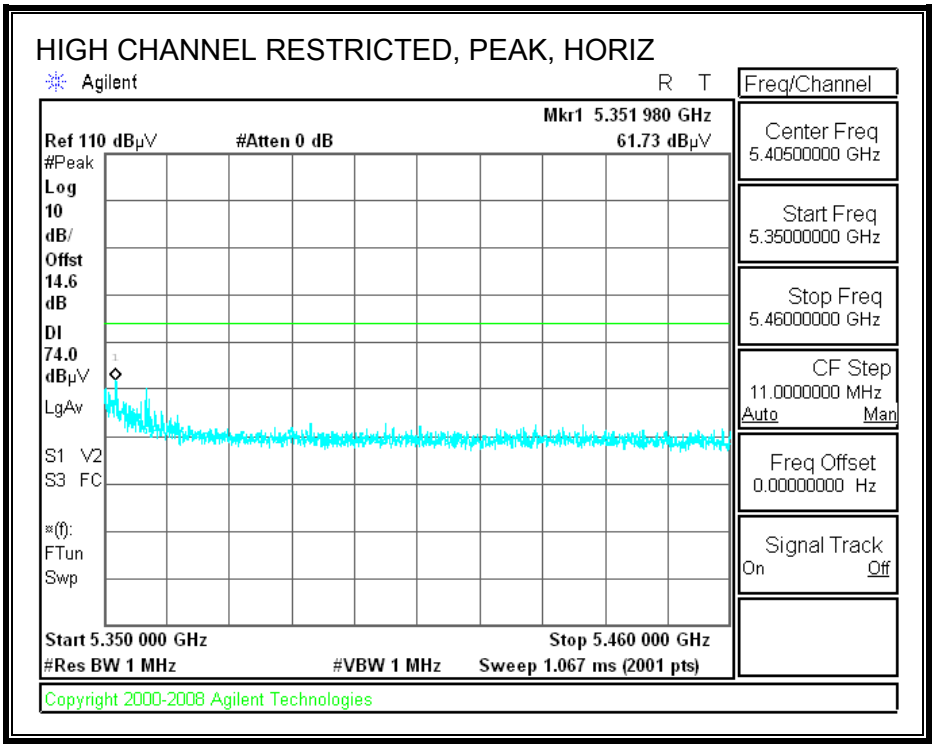
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

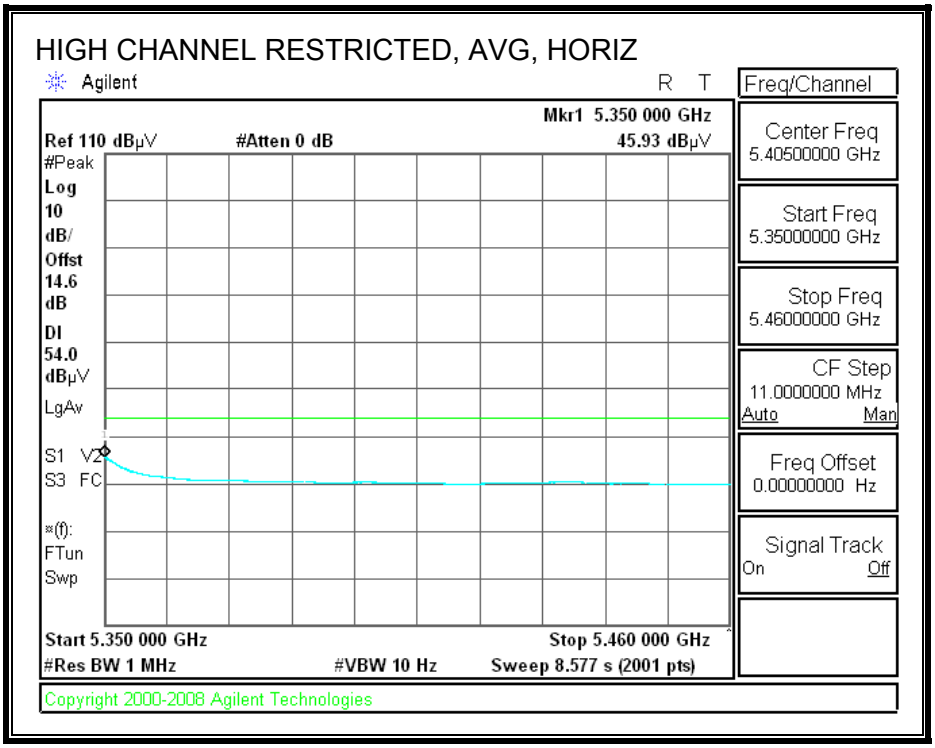
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5190MHz													
10.380	3.0	39.7	37.4	8.9	-36.8	0.0	0.0	49.3	68.2	-19.0	V	P	
15.570	3.0	37.2	38.8	11.4	-34.8	0.0	0.0	52.5	74.0	-21.5	V	P	
15.570	3.0	23.8	38.8	11.4	-34.8	0.0	0.0	39.2	54.0	-14.8	V	A	
10.380	3.0	36.3	37.4	8.9	-36.8	0.0	0.0	45.9	68.2	-22.3	H	P	
15.570	3.0	39.1	38.8	11.4	-34.8	0.0	0.0	54.4	74.0	-19.6	H	P	
15.570	3.0	26.5	38.8	11.4	-34.8	0.0	0.0	41.9	54.0	-12.1	H	A	
5230MHz													
10.460	3.0	38.8	37.5	9.0	-36.7	0.0	0.0	48.5	68.2	-19.7	V	P	
15.690	3.0	36.6	38.5	11.4	-34.7	0.0	0.0	51.8	74.0	-22.2	V	P	
15.690	3.0	24.0	38.5	11.4	-34.7	0.0	0.0	39.2	54.0	-14.8	V	A	
10.460	3.0	36.8	37.5	9.0	-36.7	0.0	0.0	46.6	68.2	-21.6	H	P	
15.690	3.0	37.3	38.5	11.4	-34.7	0.0	0.0	52.5	74.0	-21.5	H	P	
15.690	3.0	25.2	38.5	11.4	-34.7	0.0	0.0	40.4	54.0	-13.6	H	A	

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

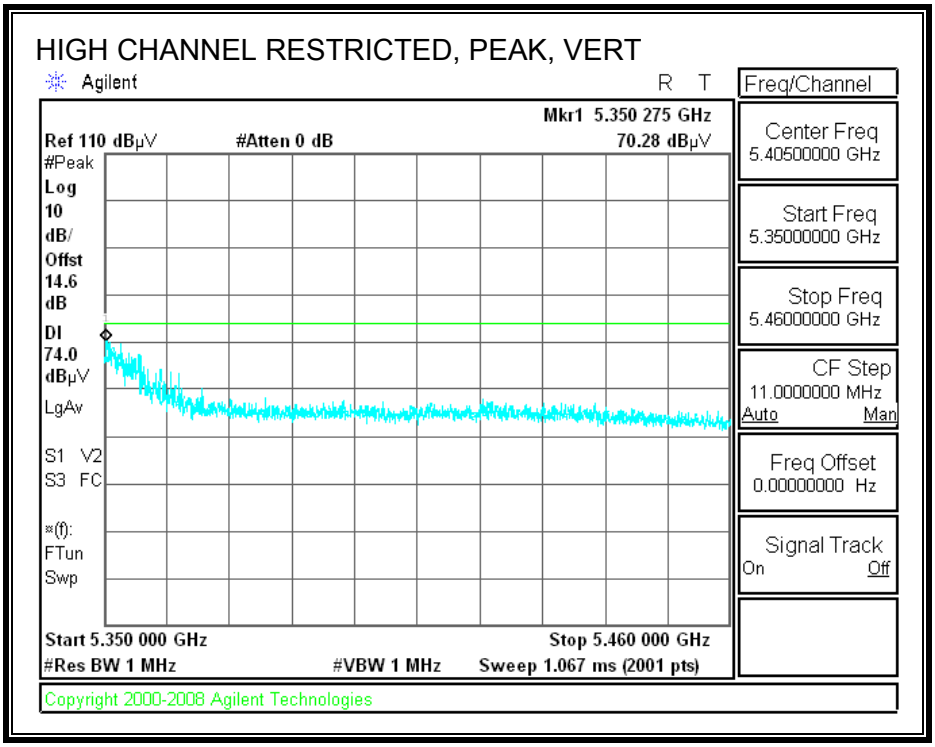
8.2.4. TX ABOVE 1 GHz FOR 802.11a MODE IN THE 5.3 GHz BAND

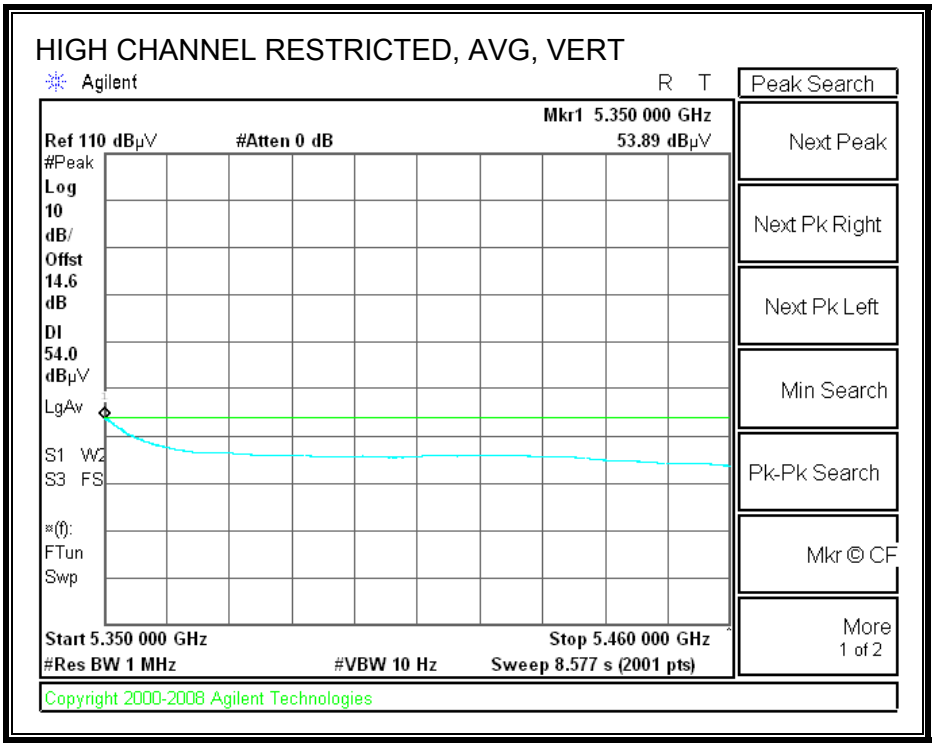
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 08/03/09
Project #: 09U12610
Company: Microsoft
EUT M/N: Omni N
Test Target: Harmonic
Mode Oper: Tx_ a mode

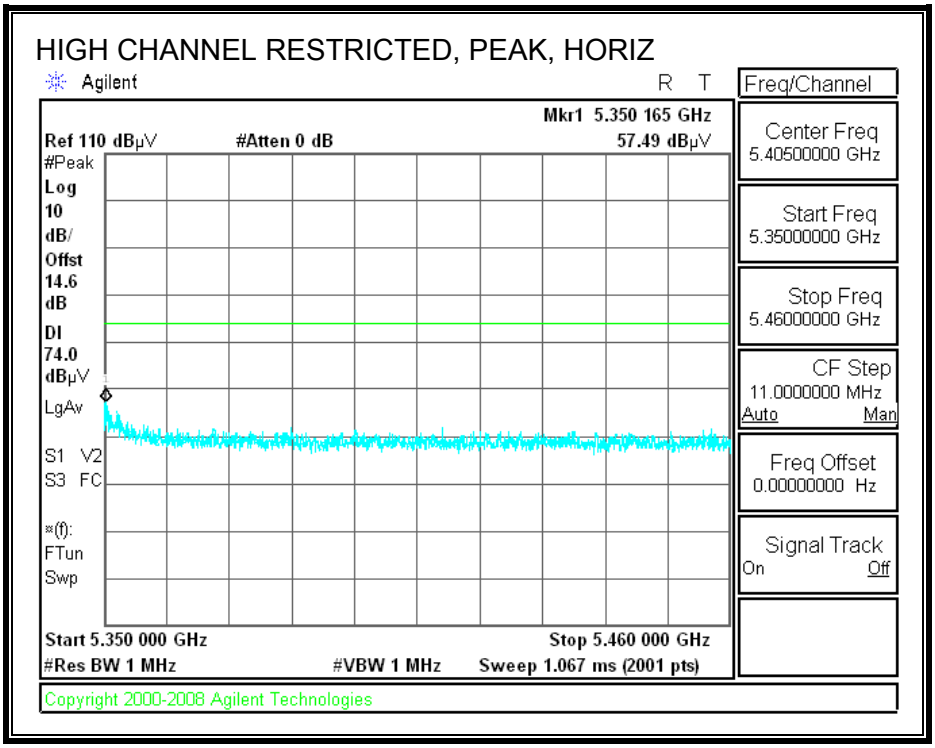
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

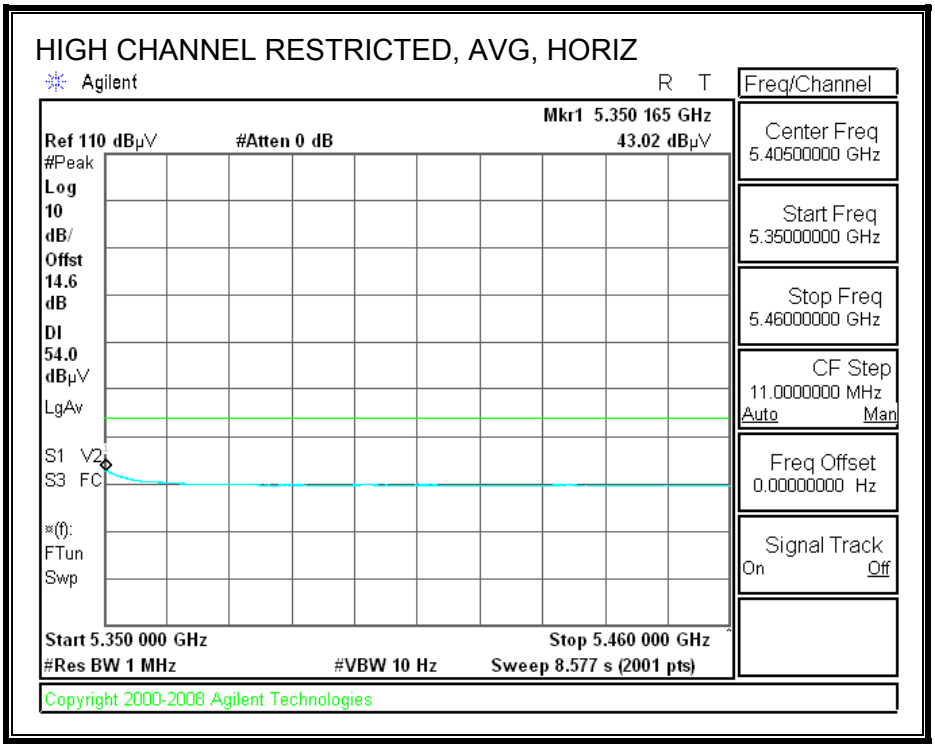
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5260MHz													
10.520	3.0	50.4	37.5	9.0	-34.4	0.0	0.8	63.3	68.2	-4.9	V	P	
15.780	3.0	43.7	38.2	11.5	-32.2	0.0	0.7	61.8	74.0	-12.2	V	P	
15.780	3.0	30.2	38.2	11.5	-32.2	0.0	0.7	48.4	54.0	-5.6	V	A	
10.520	3.0	43.9	37.5	9.0	-34.4	0.0	0.8	56.7	68.2	-11.5	H	P	
15.780	3.0	37.9	38.2	11.5	-32.2	0.0	0.7	56.0	74.0	-18.0	H	P	
15.780	3.0	25.1	38.2	11.5	-32.2	0.0	0.7	43.3	54.0	-10.7	H	A	
5300MHz													
10.600	3.0	47.2	37.5	9.0	-34.3	0.0	0.8	60.3	74.0	-13.7	V	P	
10.600	3.0	34.9	37.5	9.0	-34.3	0.0	0.8	47.9	54.0	-6.1	V	A	
15.900	3.0	40.4	37.9	11.5	-32.2	0.0	0.7	58.3	74.0	-15.7	V	P	
15.900	3.0	27.4	37.9	11.5	-32.2	0.0	0.7	45.3	54.0	-8.7	V	A	
10.600	3.0	40.0	37.5	9.0	-34.3	0.0	0.8	53.0	74.0	-21.0	H	P	
10.600	3.0	28.5	37.5	9.0	-34.3	0.0	0.8	41.6	54.0	-12.4	H	A	
15.900	3.0	38.1	37.9	11.5	-32.2	0.0	0.7	56.0	74.0	-18.0	H	P	
15.900	3.0	25.4	37.9	11.5	-32.2	0.0	0.7	43.4	54.0	-10.6	H	A	
5320MHz													
10.640	3.0	48.6	37.6	9.1	-34.2	0.0	0.8	61.8	74.0	-12.2	V	P	
10.640	3.0	35.3	37.6	9.1	-34.2	0.0	0.8	48.4	54.0	-5.6	V	A	
15.960	3.0	41.3	37.7	11.5	-32.2	0.0	0.7	59.1	74.0	-14.9	V	P	
15.960	3.0	27.4	37.7	11.5	-32.2	0.0	0.7	45.2	54.0	-8.8	V	A	
10.640	3.0	41.1	37.6	9.1	-34.2	0.0	0.8	54.2	74.0	-19.8	H	P	
10.640	3.0	29.3	37.6	9.1	-34.2	0.0	0.8	42.4	54.0	-11.6	H	A	
15.960	3.0	39.6	37.7	11.5	-32.2	0.0	0.7	57.4	74.0	-16.6	H	P	
15.960	3.0	26.1	37.7	11.5	-32.2	0.0	0.7	43.9	54.0	-10.1	H	A	

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

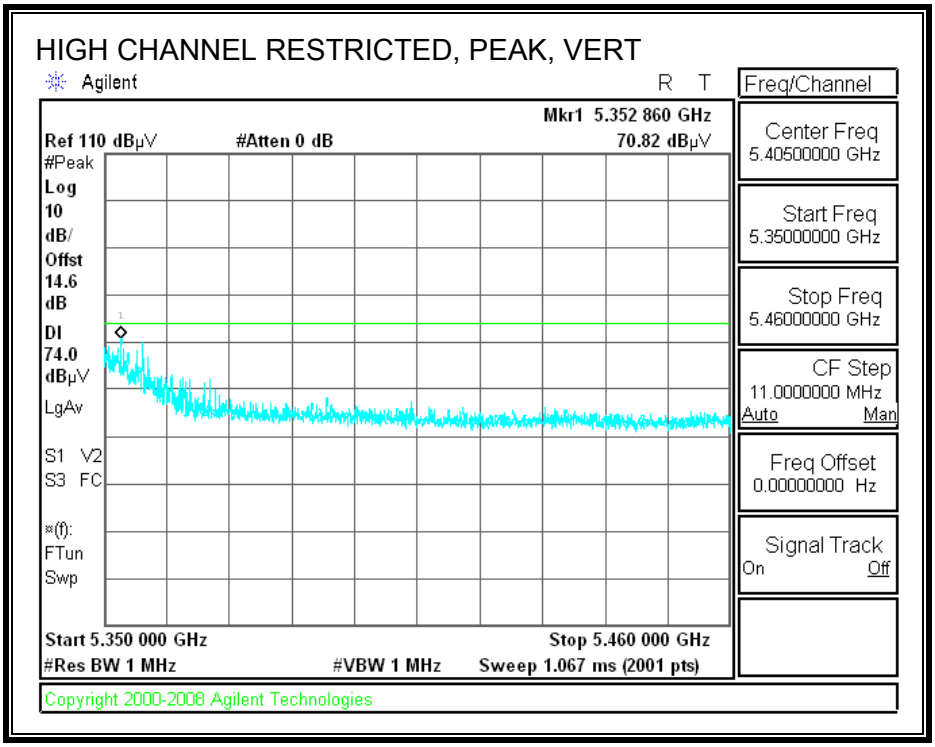
8.2.5. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.3 GHz BAND

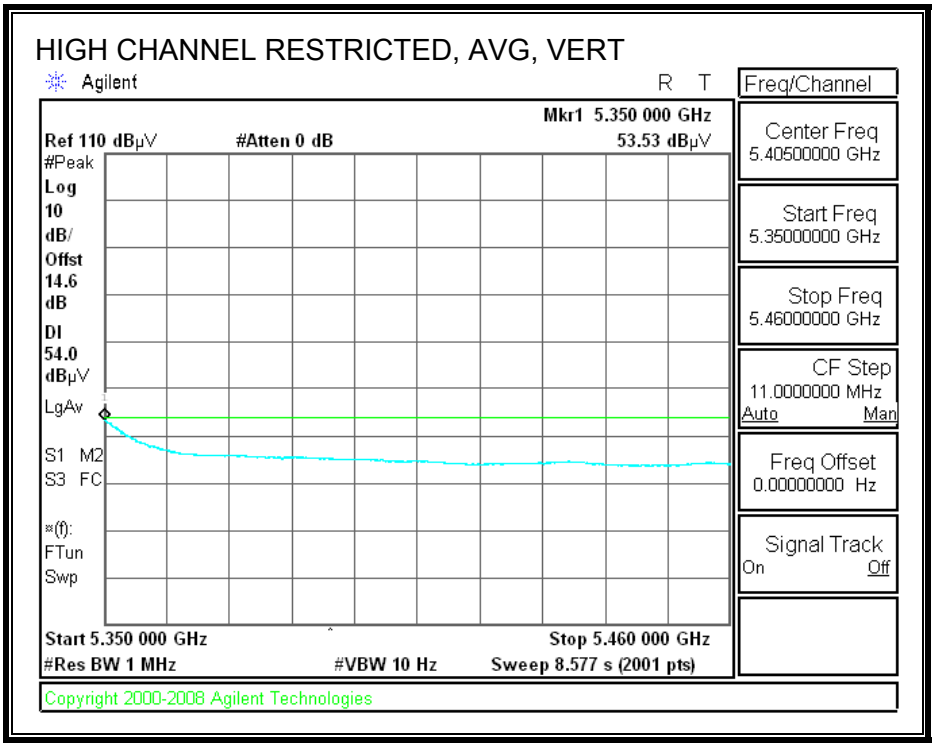
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 08/03/09
Project #: 09U12610
Company: Microsoft
EUT M/N: Omni N
Test Target: Harmonic
Mode Oper: Tx_ HT20

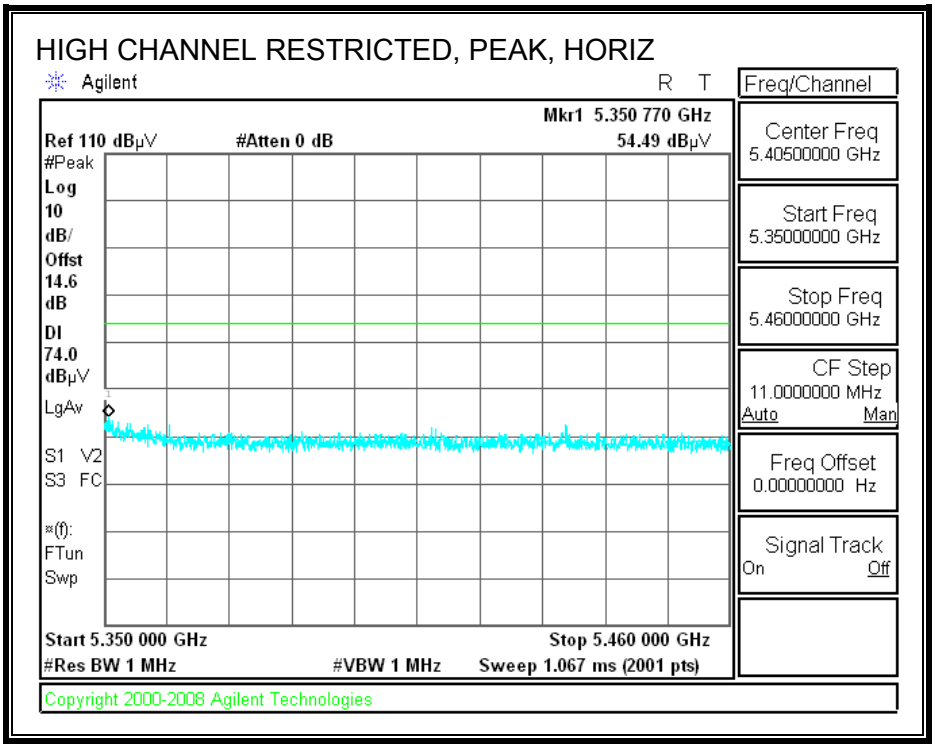
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

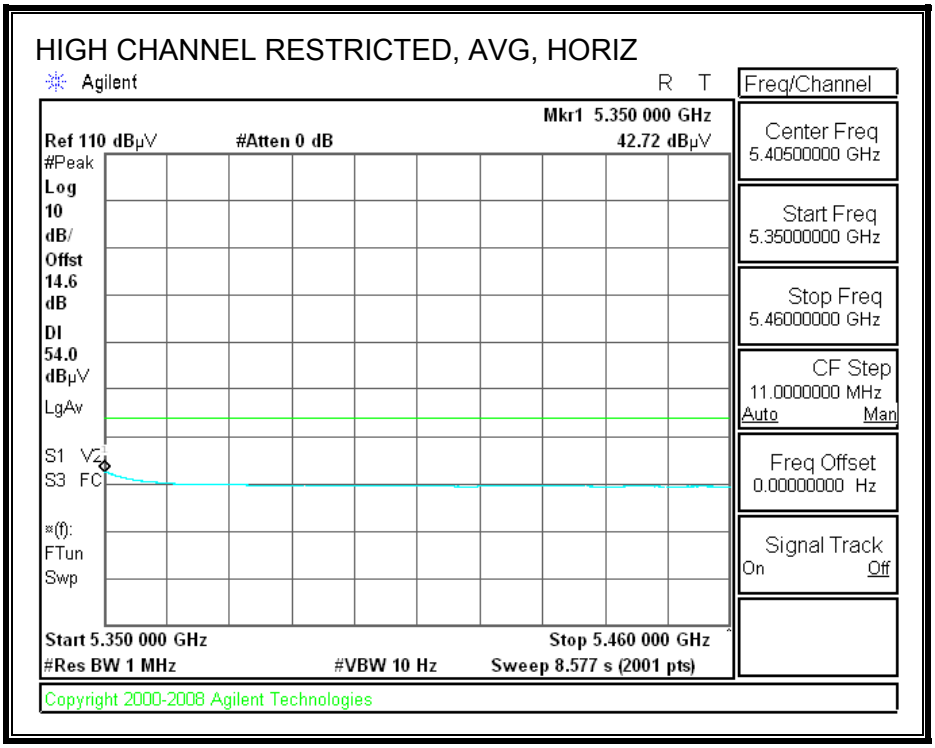
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5260MHz													
10.520	3.0	51.5	37.5	9.0	-34.4	0.0	0.8	64.4	68.2	-3.8	V	P	
15.780	3.0	43.3	38.2	11.5	-32.2	0.0	0.7	61.5	74.0	-12.5	V	P	
15.780	3.0	30.0	38.2	11.5	-32.2	0.0	0.7	48.2	54.0	-5.8	V	A	
10.520	3.0	42.5	37.5	9.0	-34.4	0.0	0.8	55.4	68.2	-12.8	H	P	
15.780	3.0	37.4	38.2	11.5	-32.2	0.0	0.7	55.6	74.0	-18.4	H	P	
15.780	3.0	25.3	38.2	11.5	-32.2	0.0	0.7	43.5	54.0	-10.5	H	A	
5300MHz													
10.600	3.0	48.1	37.6	9.1	-34.2	0.0	0.8	61.2	74.0	-12.8	V	P	
10.600	3.0	35.5	37.6	9.1	-34.2	0.0	0.8	48.7	54.0	-5.3	V	A	
15.900	3.0	40.3	37.7	11.5	-32.2	0.0	0.7	58.1	74.0	-15.9	V	P	
15.900	3.0	27.6	37.7	11.5	-32.2	0.0	0.7	45.4	54.0	-8.6	V	A	
10.600	3.0	40.8	37.6	9.1	-34.2	0.0	0.8	53.9	74.0	-20.1	H	P	
10.600	3.0	28.7	37.6	9.1	-34.2	0.0	0.8	41.9	54.0	-12.1	H	A	
15.900	3.0	38.5	37.7	11.5	-32.2	0.0	0.7	56.3	74.0	-17.7	H	P	
15.900	3.0	25.8	37.7	11.5	-32.2	0.0	0.7	43.6	54.0	-10.4	H	A	
5320MHz													
10.640	3.0	35.1	37.6	9.1	-34.2	0.0	0.8	48.2	74.0	-25.8	V	P	
10.640	3.0	22.9	37.6	9.1	-34.2	0.0	0.8	36.0	54.0	-18.0	V	A	
15.960	3.0	34.9	37.7	11.5	-32.2	0.0	0.7	52.7	74.0	-21.3	V	P	
15.960	3.0	22.8	37.7	11.5	-32.2	0.0	0.7	40.6	54.0	-13.4	V	A	
10.640	3.0	34.8	37.6	9.1	-34.2	0.0	0.8	47.9	74.0	-26.1	H	P	
10.640	3.0	22.9	37.6	9.1	-34.2	0.0	0.8	36.0	54.0	-18.0	H	A	
15.960	3.0	35.5	37.7	11.5	-32.2	0.0	0.7	53.3	74.0	-20.7	H	P	
15.960	3.0	22.8	37.7	11.5	-32.2	0.0	0.7	40.6	54.0	-13.4	H	A	

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

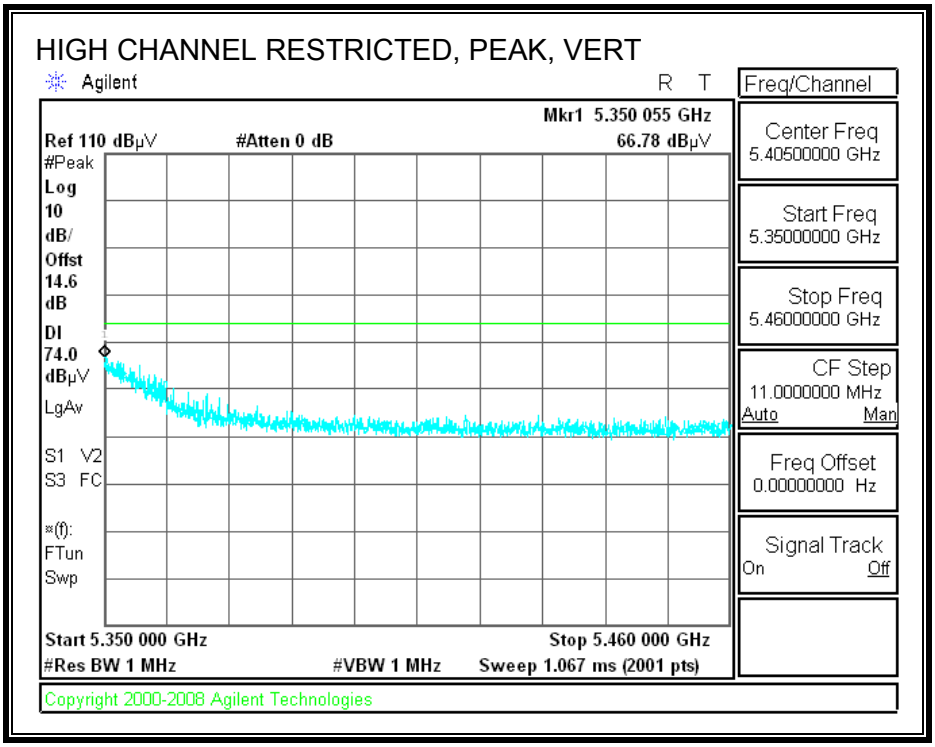
8.2.6. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.3 GHz BAND

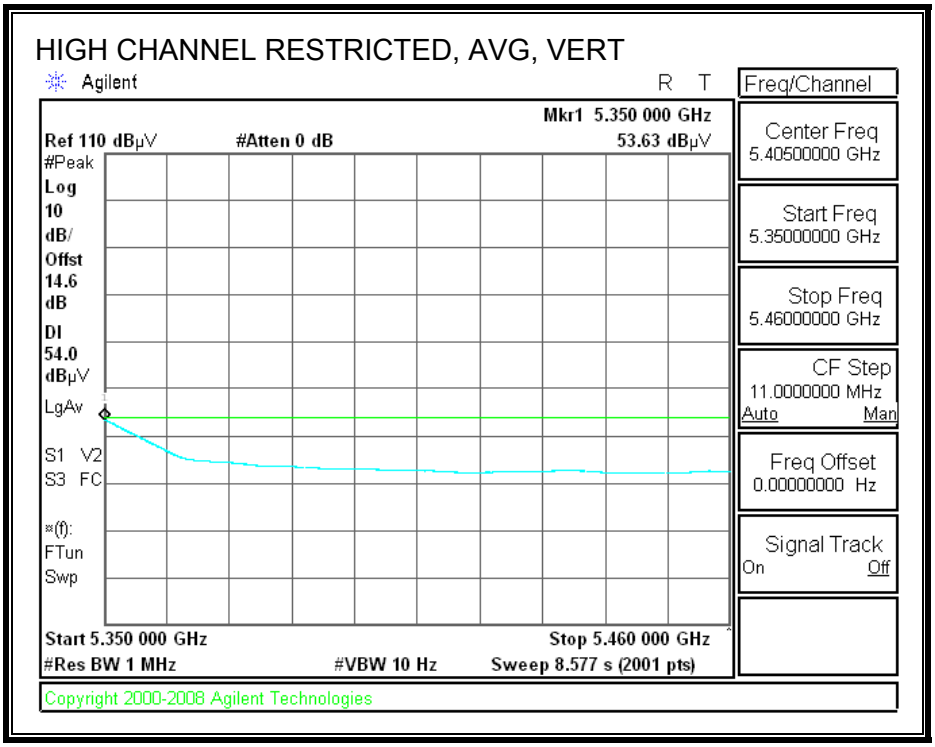
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 08/03/09
Project #: 09U12610
Company: Microsoft
EUT M/N: Omni N
Test Target: Harmonic
Mode Oper: Tx_ HT40

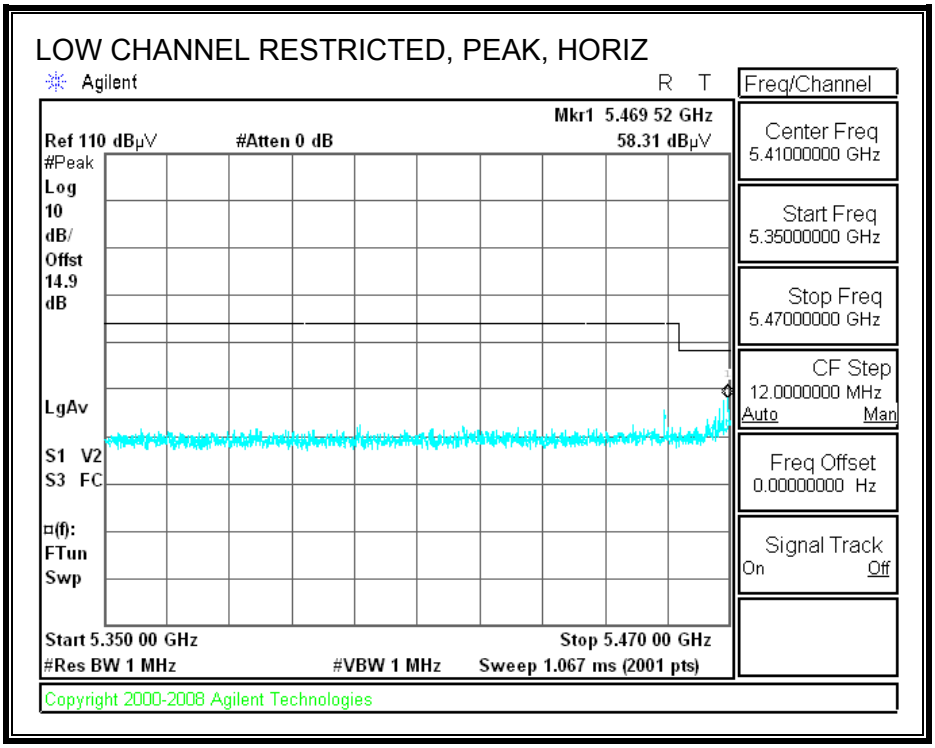
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

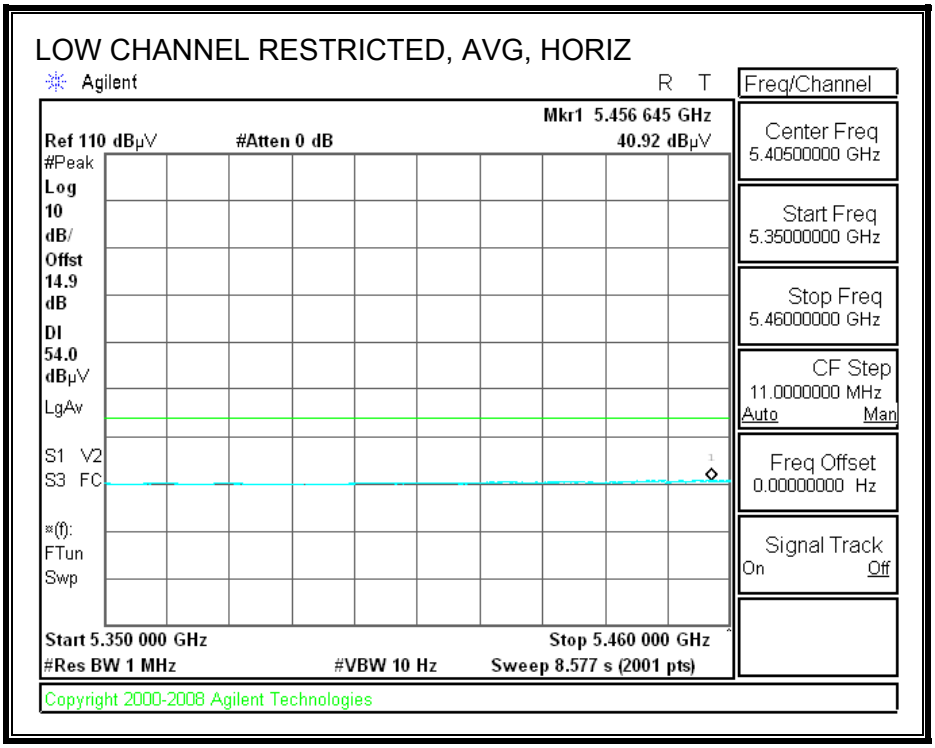
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5270MHz													
10.540	3.0	46.5	37.5	9.0	-34.4	0.0	0.8	59.4	68.2	-8.8	V	P	
15.810	3.0	38.8	38.2	11.5	-32.2	0.0	0.7	56.9	74.0	-17.1	V	P	
15.810	3.0	26.7	38.2	11.5	-32.2	0.0	0.7	44.8	54.0	-9.2	V	A	
10.540	3.0	40.2	37.5	9.0	-34.4	0.0	0.8	53.1	68.2	-15.1	H	P	
15.810	3.0	36.1	38.2	11.5	-32.2	0.0	0.7	54.2	74.0	-19.8	H	P	
15.810	3.0	24.1	38.2	11.5	-32.2	0.0	0.7	42.2	54.0	-11.8	H	A	
5310MHz													
10.620	3.0	46.4	37.5	9.1	-34.3	0.0	0.8	59.5	74.0	-14.5	V	P	
10.620	3.0	34.0	37.5	9.1	-34.3	0.0	0.8	47.1	54.0	-6.9	V	A	
15.930	3.0	38.5	37.8	11.5	-32.2	0.0	0.7	56.4	74.0	-17.6	V	P	
15.930	3.0	26.4	37.8	11.5	-32.2	0.0	0.7	44.2	54.0	-9.8	V	A	
10.620	3.0	39.7	37.5	9.1	-34.3	0.0	0.8	52.7	74.0	-21.3	H	P	
10.620	3.0	27.3	37.5	9.1	-34.3	0.0	0.8	40.4	54.0	-13.6	H	A	
15.930	3.0	37.0	37.8	11.5	-32.2	0.0	0.7	54.9	74.0	-19.1	H	P	
15.930	3.0	24.1	37.8	11.5	-32.2	0.0	0.7	41.9	54.0	-12.1	H	A	

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

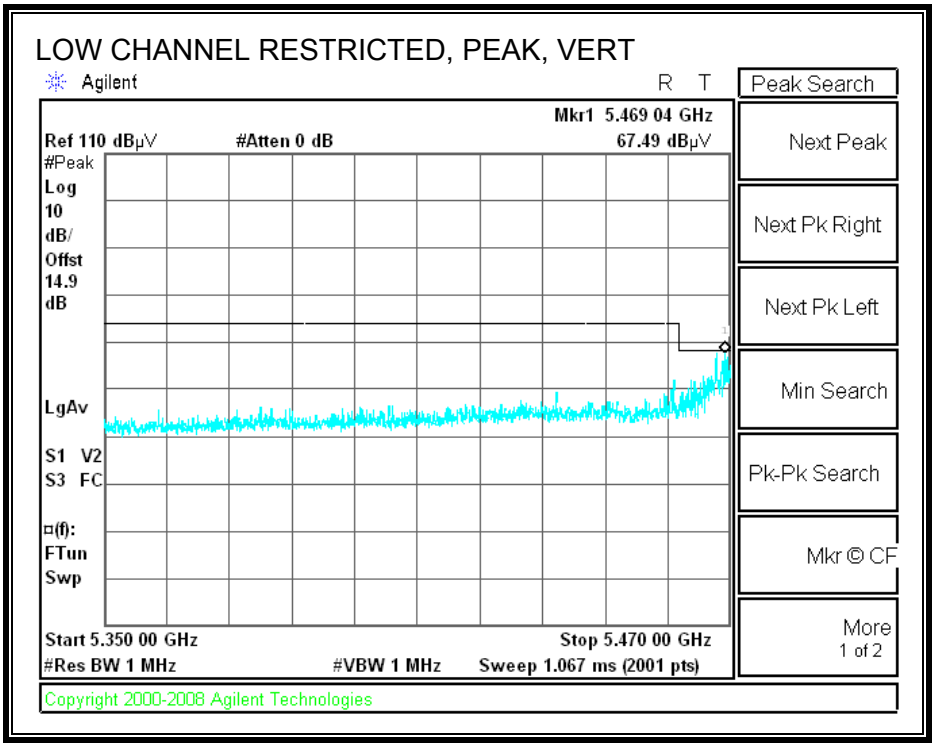
8.2.7. TX ABOVE 1 GHz FOR 802.11a MODE IN THE 5.6 GHz BAND

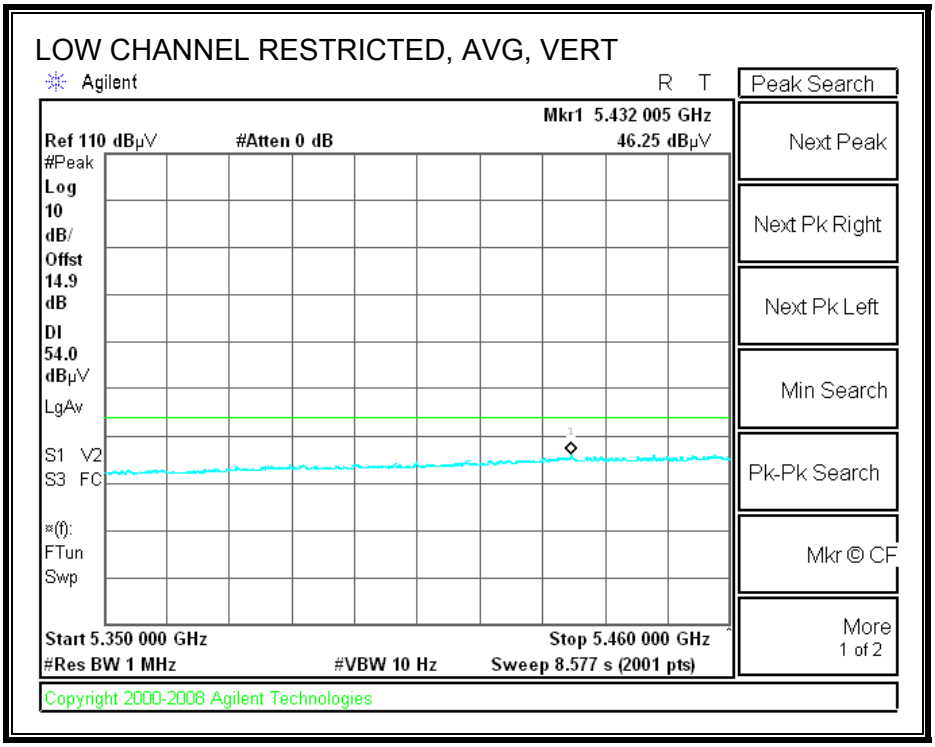
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



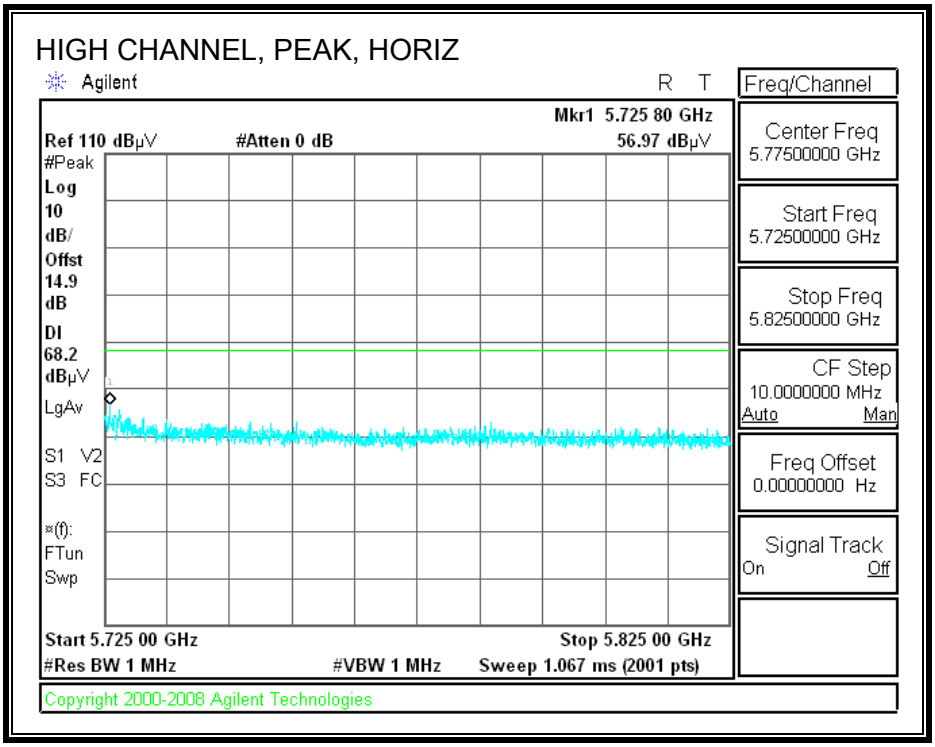


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

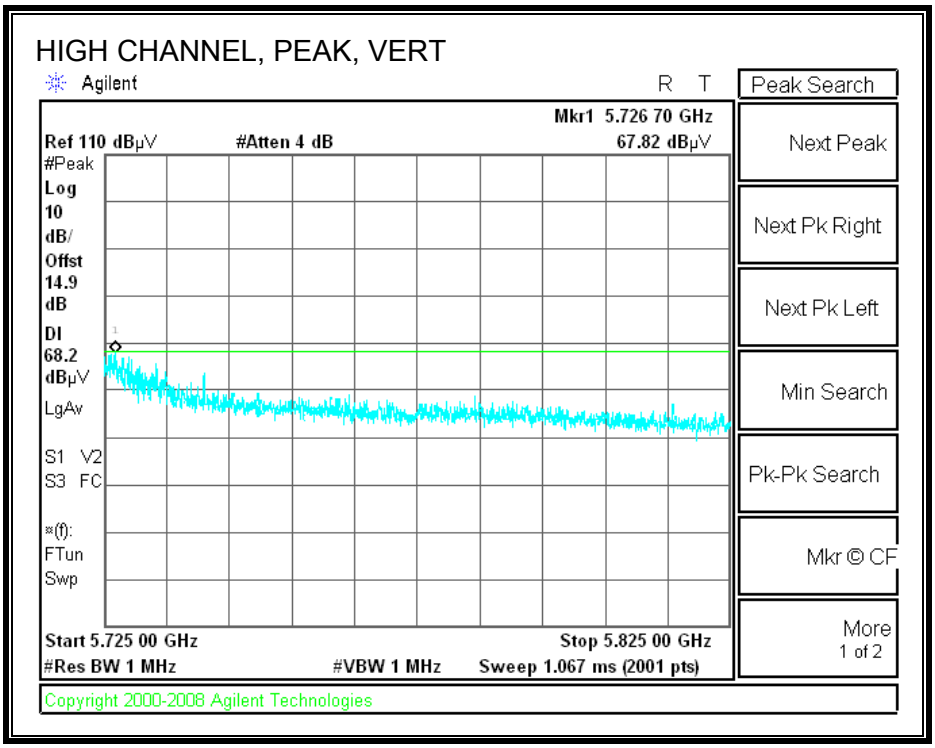




AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 08/03/09
Project #: 09U12610
Company: Microsoft
EUT M/N: Omni N
Test Target: Harmonic
Mode Oper: Tx_ a mode

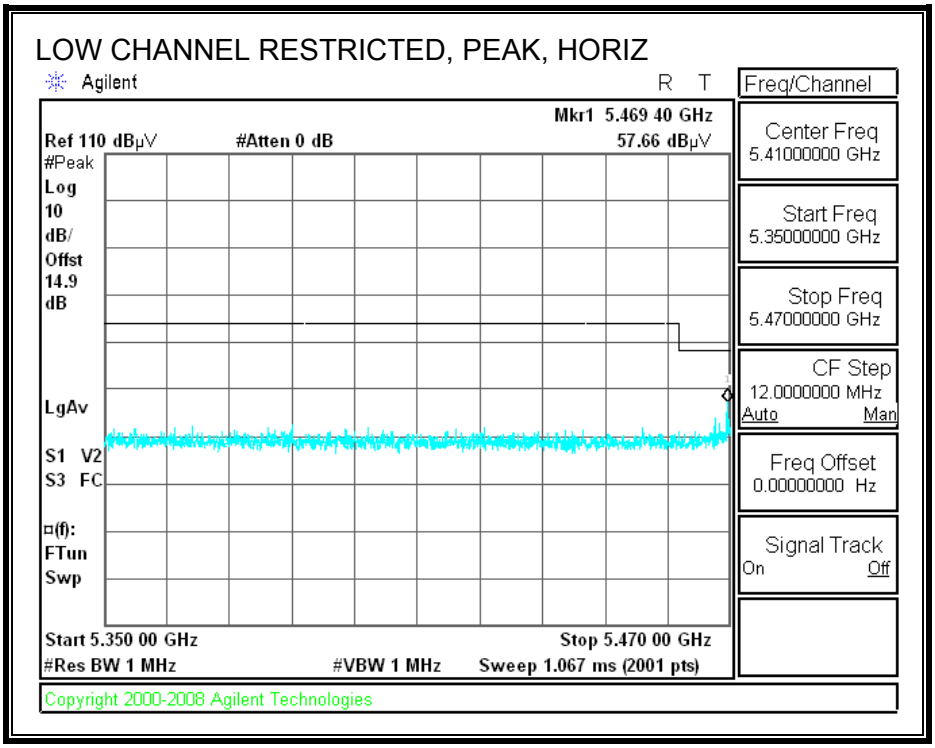
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

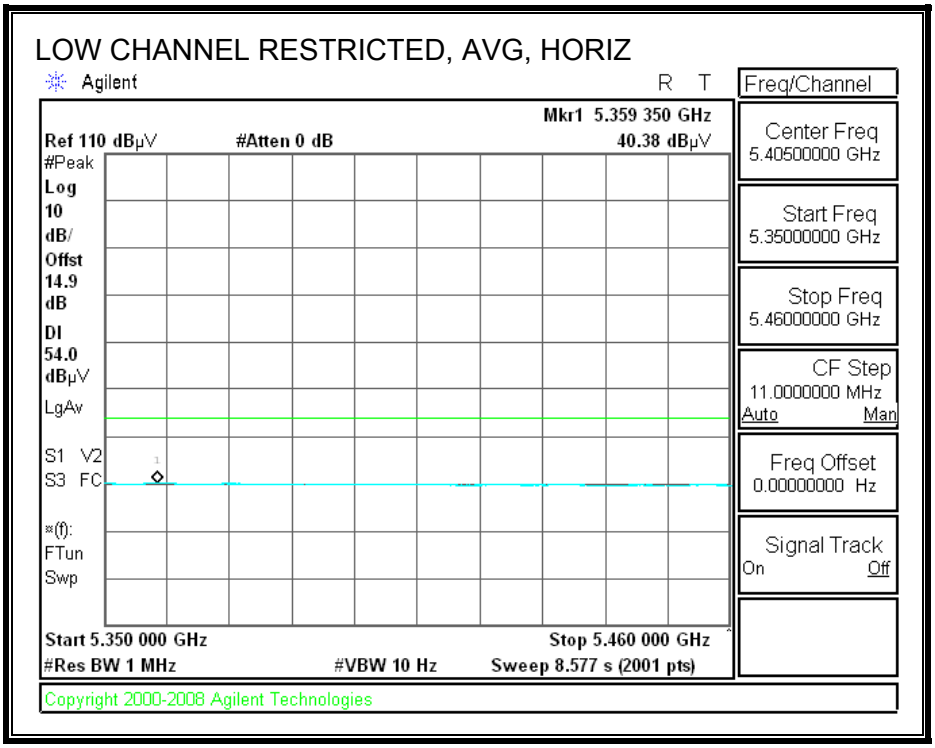
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5500MHz													
11.000	3.0	42.0	37.7	9.2	-33.8	0.0	0.7	55.9	74.0	-18.1	V	P	
11.000	3.0	29.0	37.7	9.2	-33.8	0.0	0.7	42.9	54.0	-11.1	V	A	
11.000	3.0	37.0	37.7	9.2	-33.8	0.0	0.7	50.9	74.0	-23.1	H	P	
11.000	3.0	24.8	37.7	9.2	-33.8	0.0	0.7	38.7	54.0	-15.3	H	A	
16.500	3.0	35.8	39.7	11.8	-32.1	0.0	0.7	55.9	68.2	-12.3	H	P	
16.500	3.0	36.8	39.7	11.8	-32.1	0.0	0.7	56.9	68.2	-11.3	V	P	
5600MHz													
11.200	3.0	47.7	37.9	9.3	-33.5	0.0	0.7	62.1	74.0	-11.9	V	P	
11.200	3.0	34.4	37.9	9.3	-33.5	0.0	0.7	48.9	54.0	-5.1	V	A	
16.800	3.0	35.2	40.9	12.0	-32.0	0.0	0.7	56.7	68.2	-11.5	V	P	
11.200	3.0	39.0	37.9	9.3	-33.5	0.0	0.7	53.5	74.0	-20.5	H	P	
11.200	3.0	27.1	37.9	9.3	-33.5	0.0	0.7	41.5	54.0	-12.5	H	A	
16.800	3.0	35.7	40.9	12.0	-32.0	0.0	0.7	57.2	68.2	-11.0	H	P	
5700MHz													
11.400	3.0	46.0	38.0	9.4	-33.2	0.0	0.7	61.0	74.0	-13.0	V	P	
11.400	3.0	33.1	38.0	9.4	-33.2	0.0	0.7	48.1	54.0	-6.0	V	A	
17.100	3.0	35.8	42.2	12.1	-32.0	0.0	0.7	58.7	68.2	-9.5	V	P	
11.400	3.0	41.9	38.0	9.4	-33.2	0.0	0.7	56.8	74.0	-17.2	H	P	
11.400	3.0	30.2	38.0	9.4	-33.2	0.0	0.7	45.1	54.0	-8.9	H	A	
17.100	3.0	37.3	42.2	12.1	-32.0	0.0	0.7	60.2	68.2	-8.0	H	P	

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

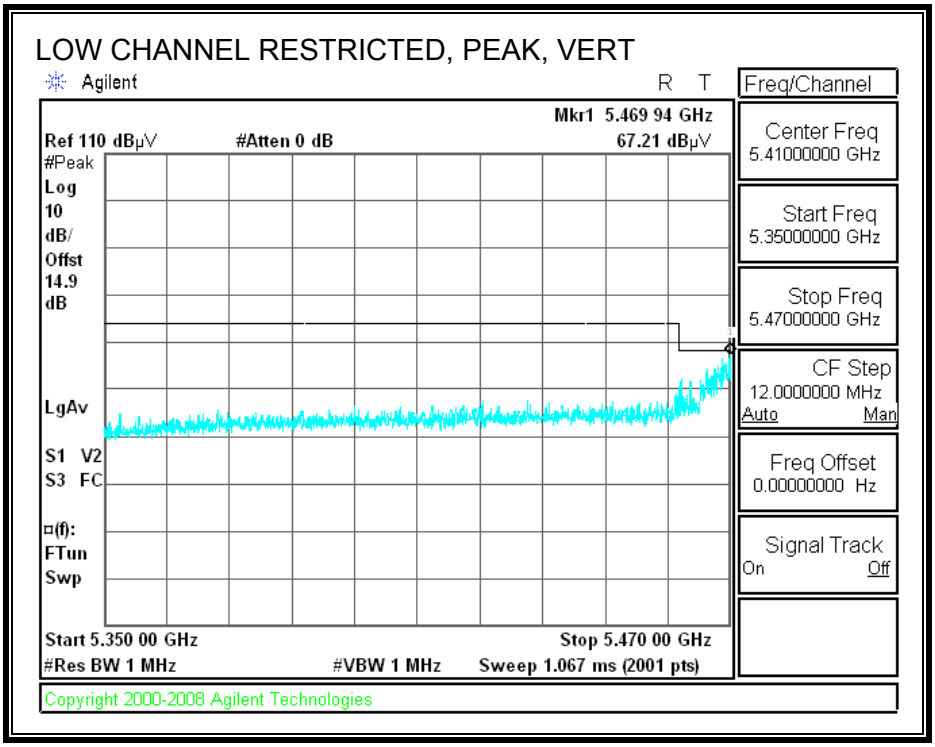
8.2.8. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.6 GHz BAND

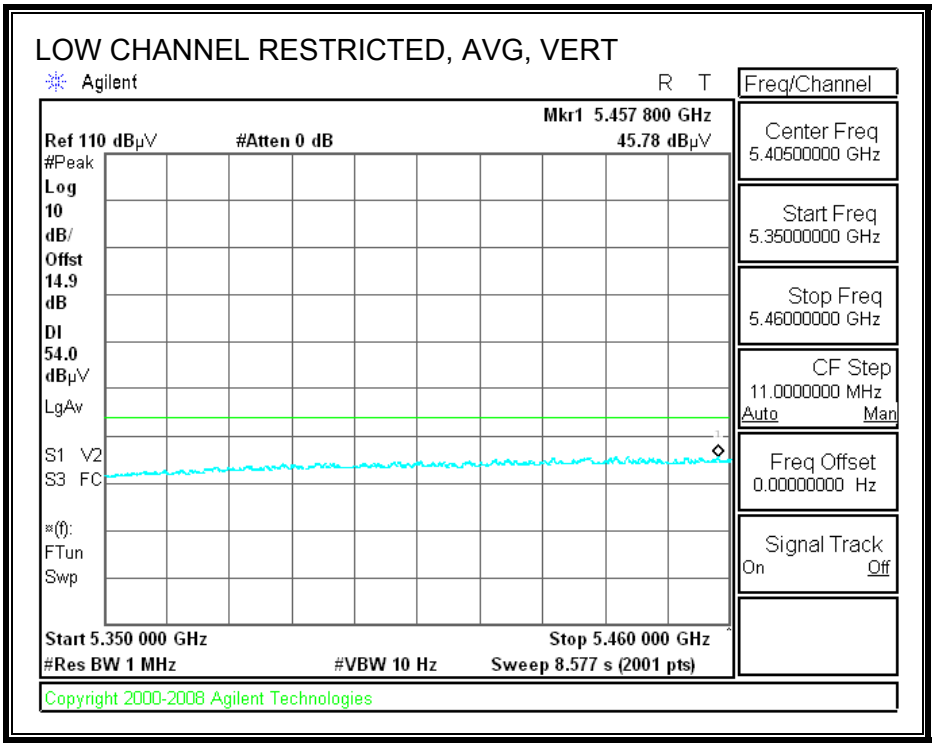
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



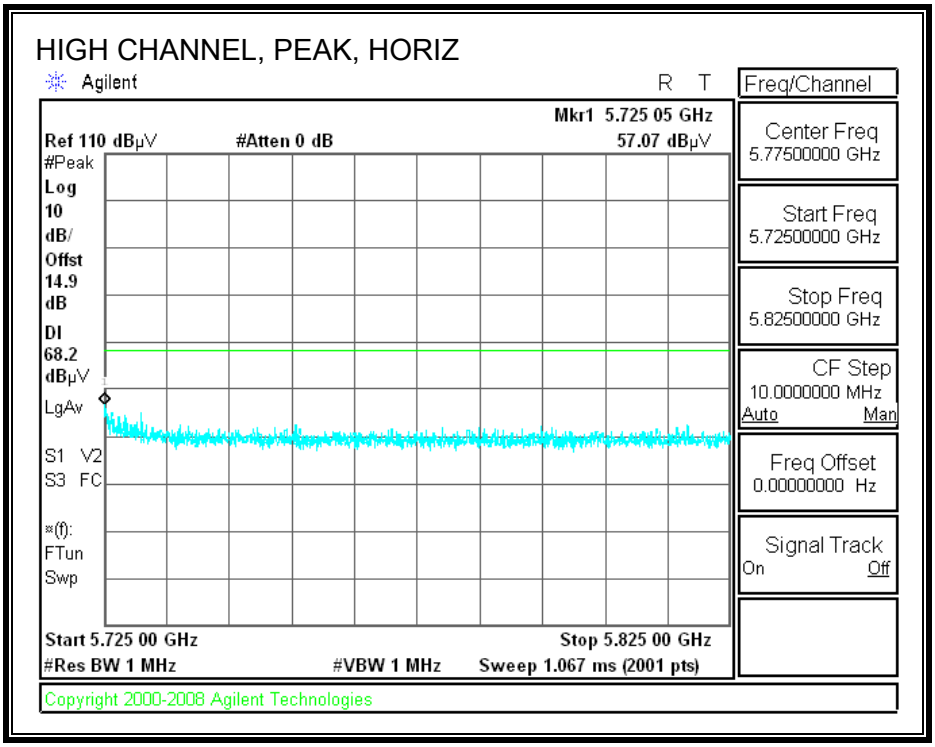


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

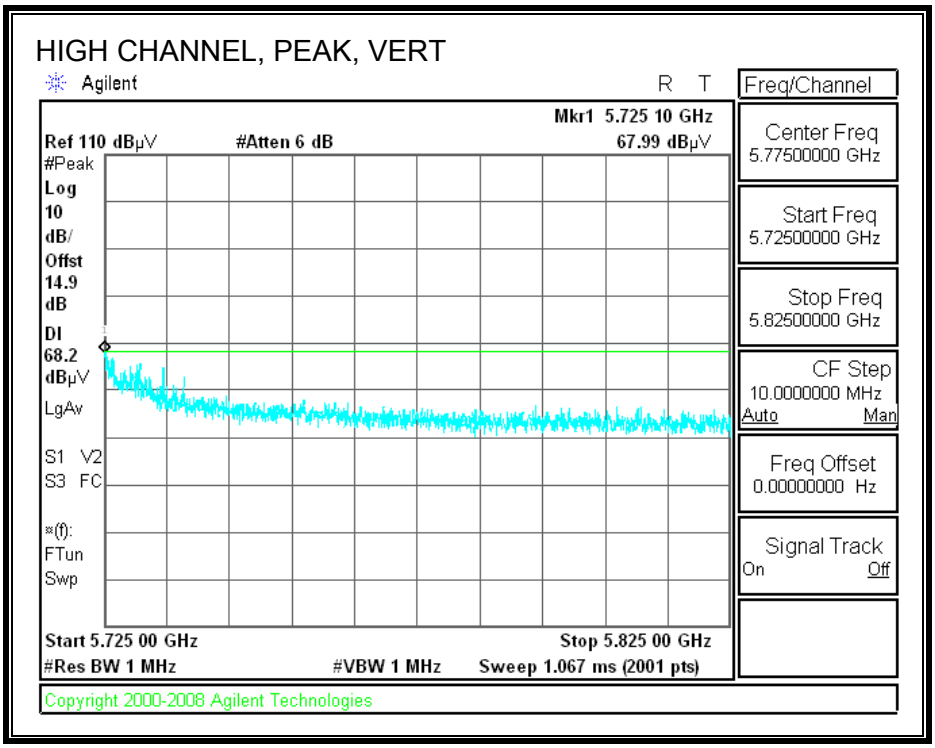




AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 08/03/09
Project #: 09U12610
Company: Microsoft
EUT M/N: Omni N
Test Target: Harmonic
Mode Oper: Tx_ HT20

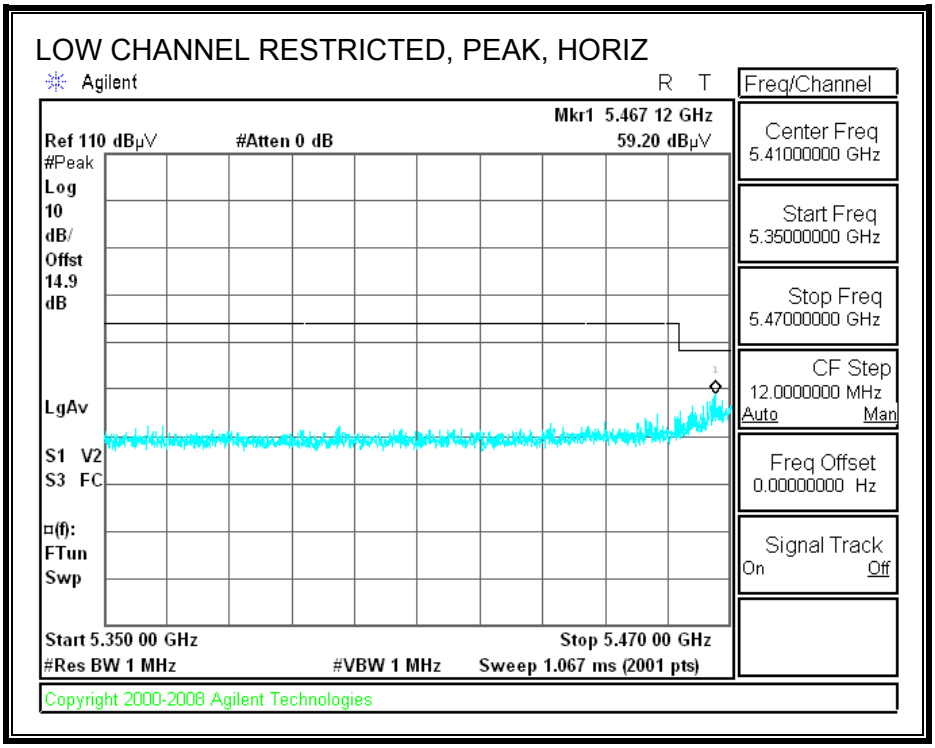
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

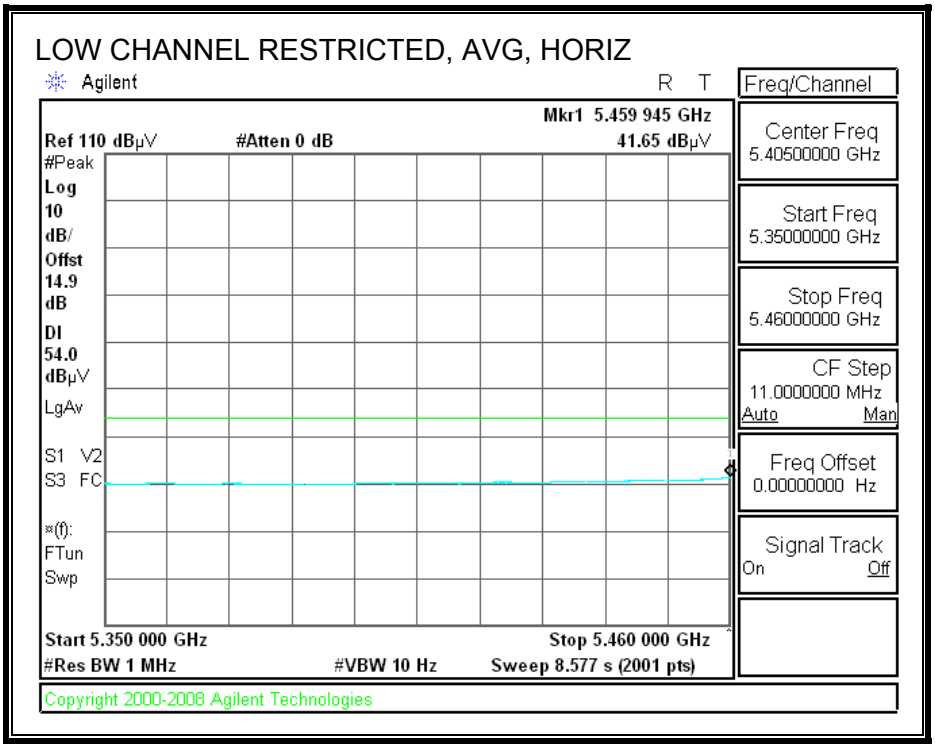
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5500MHz													
11.000	3.0	43.0	37.7	9.2	-33.8	0.0	0.7	56.9	74.0	-17.1	V	P	
11.000	3.0	29.2	37.7	9.2	-33.8	0.0	0.7	43.1	54.0	-10.9	V	A	
16.500	3.0	36.9	39.7	11.8	-32.1	0.0	0.7	57.0	68.2	-11.2	V	P	
11.000	3.0	38.0	37.7	9.2	-33.8	0.0	0.7	51.9	74.0	-22.1	H	P	
11.000	3.0	25.6	37.7	9.2	-33.8	0.0	0.7	39.5	54.0	-14.5	H	A	
16.500	3.0	36.4	39.7	11.8	-32.1	0.0	0.7	56.5	68.2	-11.7	H	P	
5600MHz													
11.200	3.0	45.9	37.9	9.3	-33.5	0.0	0.7	60.4	74.0	-13.6	V	P	
11.200	3.0	34.2	37.9	9.3	-33.5	0.0	0.7	48.6	54.0	-5.4	V	A	
16.800	3.0	34.9	40.9	12.0	-32.0	0.0	0.7	56.5	68.2	-11.7	V	P	
11.200	3.0	38.4	37.9	9.3	-33.5	0.0	0.7	52.9	74.0	-21.1	H	P	
11.200	3.0	25.9	37.9	9.3	-33.5	0.0	0.7	40.3	54.0	-13.7	H	A	
16.800	3.0	35.0	40.9	12.0	-32.0	0.0	0.7	56.5	68.2	-11.7	H	P	
5700MHz													
11.400	3.0	47.8	38.0	9.4	-33.2	0.0	0.7	62.7	74.0	-11.3	V	P	
11.400	3.0	34.0	38.0	9.4	-33.2	0.0	0.7	49.0	54.0	-5.0	V	A	
11.400	3.0	47.8	38.0	9.4	-33.2	0.0	0.7	62.8	68.2	-5.4	V	P	
11.400	3.0	42.4	38.0	9.4	-33.2	0.0	0.7	57.3	74.0	-16.7	H	P	
11.400	3.0	30.3	38.0	9.4	-33.2	0.0	0.7	45.3	54.0	-8.7	H	A	
11.400	3.0	42.8	38.0	9.4	-33.2	0.0	0.7	57.7	68.2	-10.5	H	P	

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

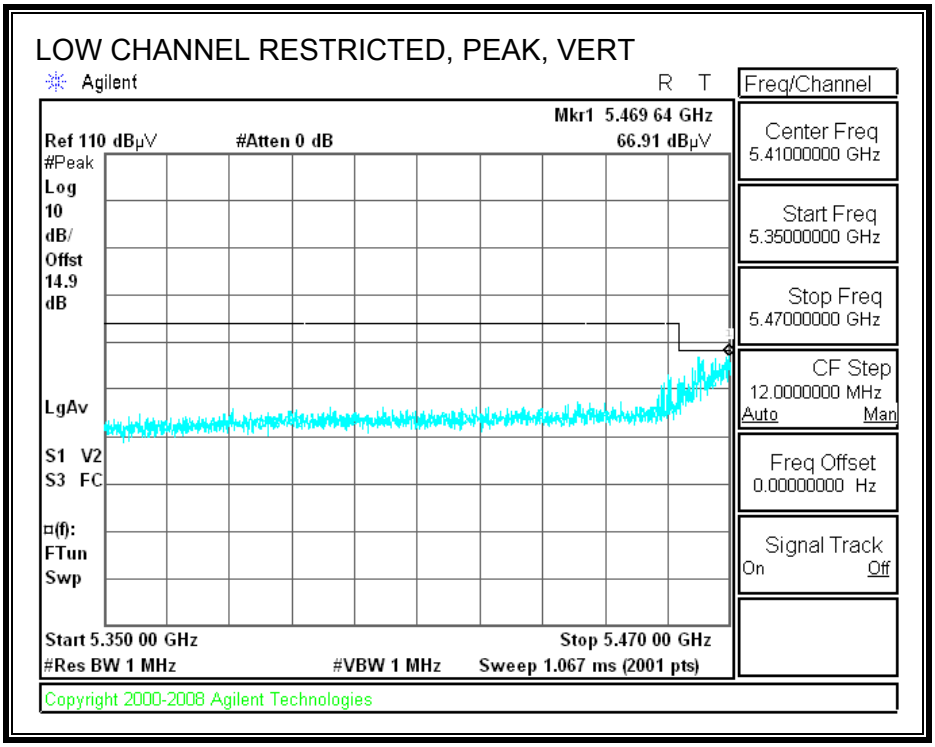
8.2.9. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.6 GHz BAND

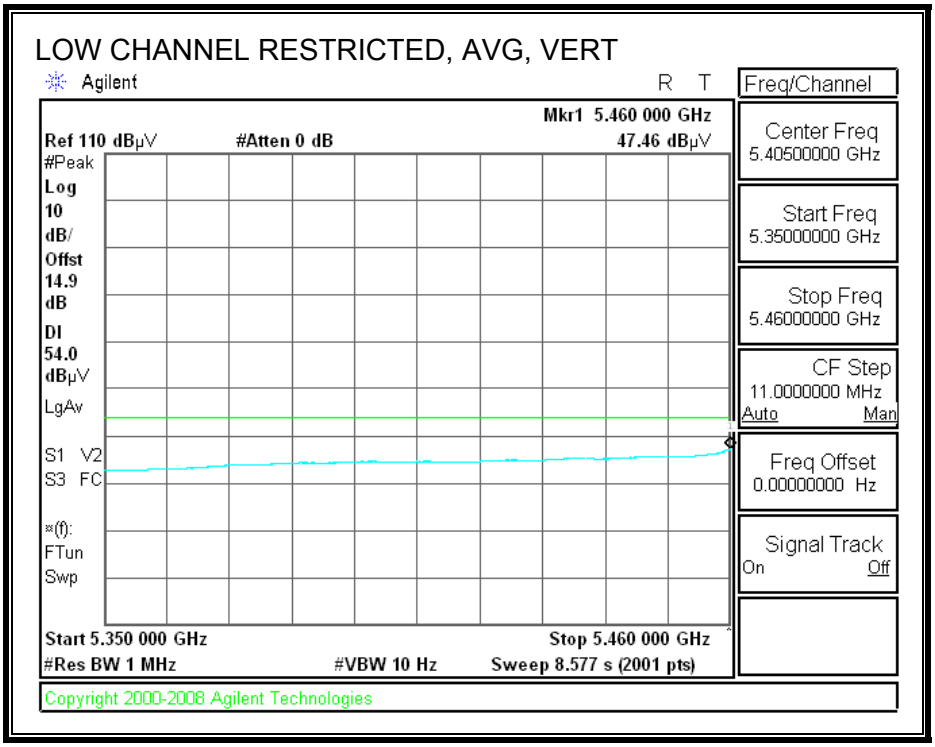
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



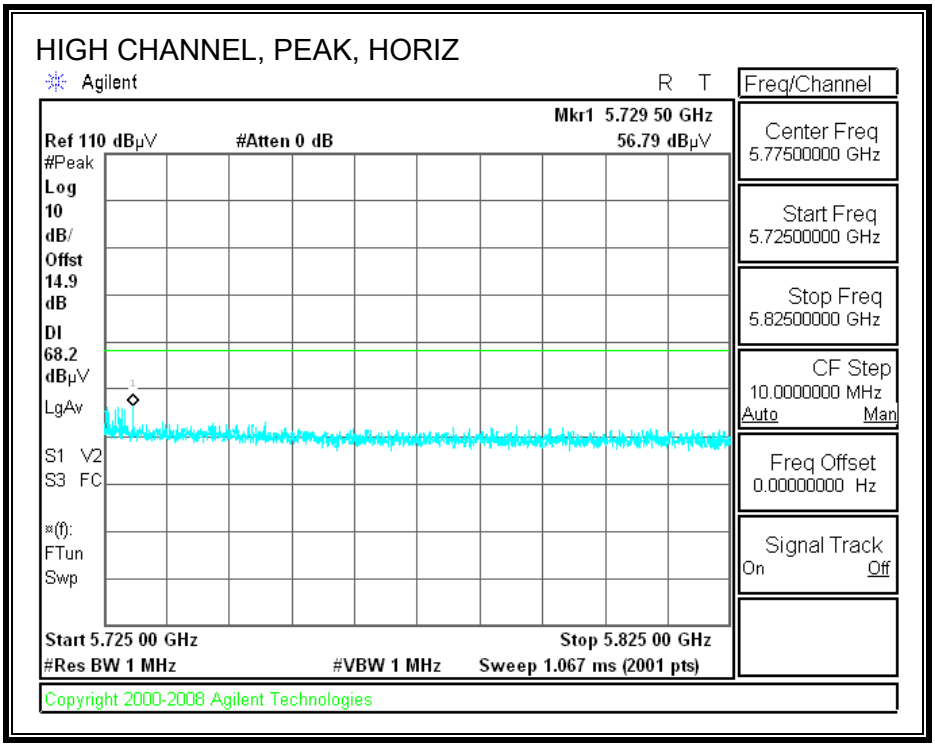


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

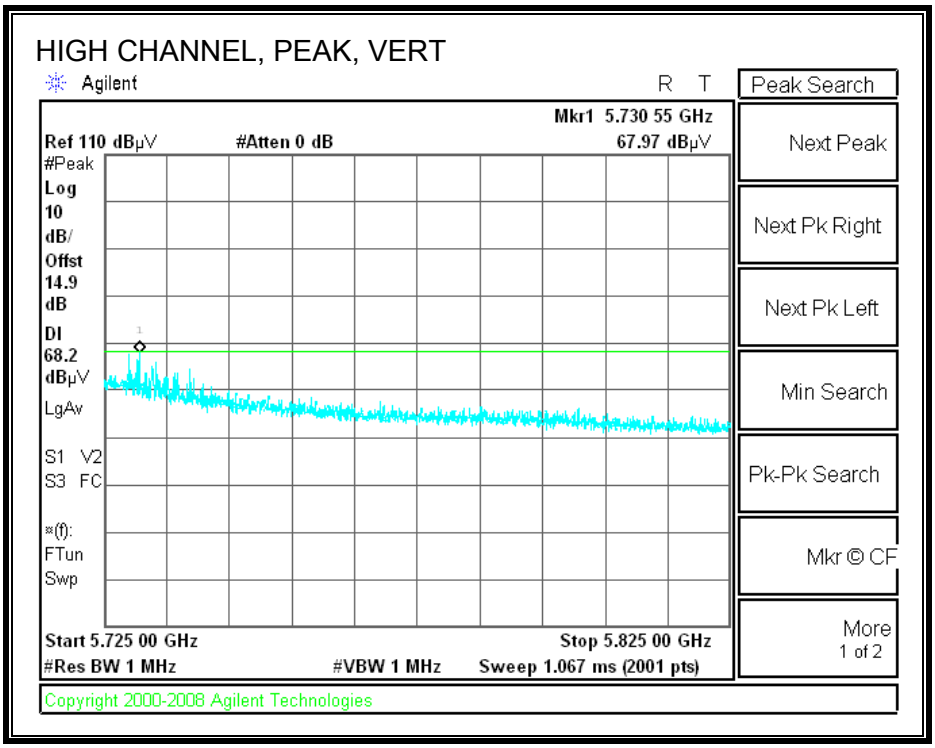




AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 08/03/09
Project #: 09U12610
Company: Microsoft
EUT M/N: Omni N
Test Target: Harmonic
Mode Oper: Tx_ HT40

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5510MHz													
11.020	3.0	39.1	37.7	9.2	-33.7	0.0	0.7	53.1	74.0	-20.9	V	P	
11.020	3.0	27.0	37.7	9.2	-33.7	0.0	0.7	40.9	54.0	-13.1	V	A	
16.530	3.0	37.0	39.8	11.8	-32.1	0.0	0.7	57.3	68.2	-10.9	V	P	
11.020	3.0	38.1	37.7	9.2	-33.7	0.0	0.7	52.1	74.0	-21.9	H	P	
11.020	3.0	24.5	37.7	9.2	-33.7	0.0	0.7	38.4	54.0	-15.6	H	A	
16.530	3.0	35.2	39.8	11.8	-32.1	0.0	0.7	55.5	68.2	-12.7	H	P	
5590MHz													
11.180	3.0	42.9	37.8	9.3	-33.5	0.0	0.7	57.3	74.0	-16.7	V	P	
11.180	3.0	30.7	37.8	9.3	-33.5	0.0	0.7	45.1	54.0	-8.9	V	A	
16.770	3.0	34.4	40.8	11.9	-32.1	0.0	0.7	55.7	68.2	-12.5	V	P	
11.180	3.0	36.7	37.8	9.3	-33.5	0.0	0.7	51.1	74.0	-22.9	H	P	
11.180	3.0	24.7	37.8	9.3	-33.5	0.0	0.7	39.1	54.0	-14.9	H	A	
16.770	3.0	34.8	40.8	11.9	-32.1	0.0	0.7	56.2	68.2	-12.0	H	P	
5670MHz													
11.340	3.0	45.0	38.0	9.4	-33.3	0.0	0.7	59.7	74.0	-14.3	V	P	
11.340	3.0	31.9	38.0	9.4	-33.3	0.0	0.7	46.7	54.0	-7.3	V	A	
17.010	3.0	35.9	41.8	12.1	-32.0	0.0	0.7	58.5	68.2	-9.7	V	P	
11.340	3.0	38.2	38.0	9.4	-33.3	0.0	0.7	53.0	74.0	-21.0	H	P	
11.340	3.0	25.9	38.0	9.4	-33.3	0.0	0.7	40.7	54.0	-13.3	H	A	
17.010	3.0	36.6	41.8	12.1	-32.0	0.0	0.7	59.1	68.2	-9.1	H	P	

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

8.3. RECEIVER ABOVE 1 GHz

8.3.1. RECEIVER ABOVE 1 GHz FOR 20 MHz BANDWIDTH

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 08/01/09
Project #: 09U12610
Company: Microsoft
EUT M/N: Omni N
Test Target: Harmonic
Mode Oper: Rx mode

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
1.325	3.0	60.7	25.6	2.7	-39.0	0.0	0.0	49.9	74.0	-24.1	V	P	
1.325	3.0	42.6	25.6	2.7	-39.0	0.0	0.0	31.8	54.0	-22.2	V	A	
1.325	3.0	54.8	25.6	2.7	-39.0	0.0	0.0	44.1	74.0	-29.9	H	P	
1.325	3.0	38.9	25.6	2.7	-39.0	0.0	0.0	28.2	54.0	-25.9	H	A	
1.663	3.0	58.2	26.7	3.1	-38.5	0.0	0.0	49.5	74.0	-24.5	H	P	
1.663	3.0	42.1	26.7	3.1	-38.5	0.0	0.0	33.4	54.0	-20.6	H	A	
1.663	3.0	58.2	26.7	3.1	-38.5	0.0	0.0	49.4	74.0	-24.6	H	P	
1.663	3.0	42.0	26.7	3.1	-38.5	0.0	0.0	33.3	54.0	-20.7	H	A	

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

8.3.2. RECEIVER ABOVE 1 GHz FOR 40 MHz BANDWIDTH

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 08/01/09
Project #: 09U12610
Company: Microsoft
EUT M/N: Omni N
Test Target: Harmonic
Mode Oper: 5GHz_Rx mode

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

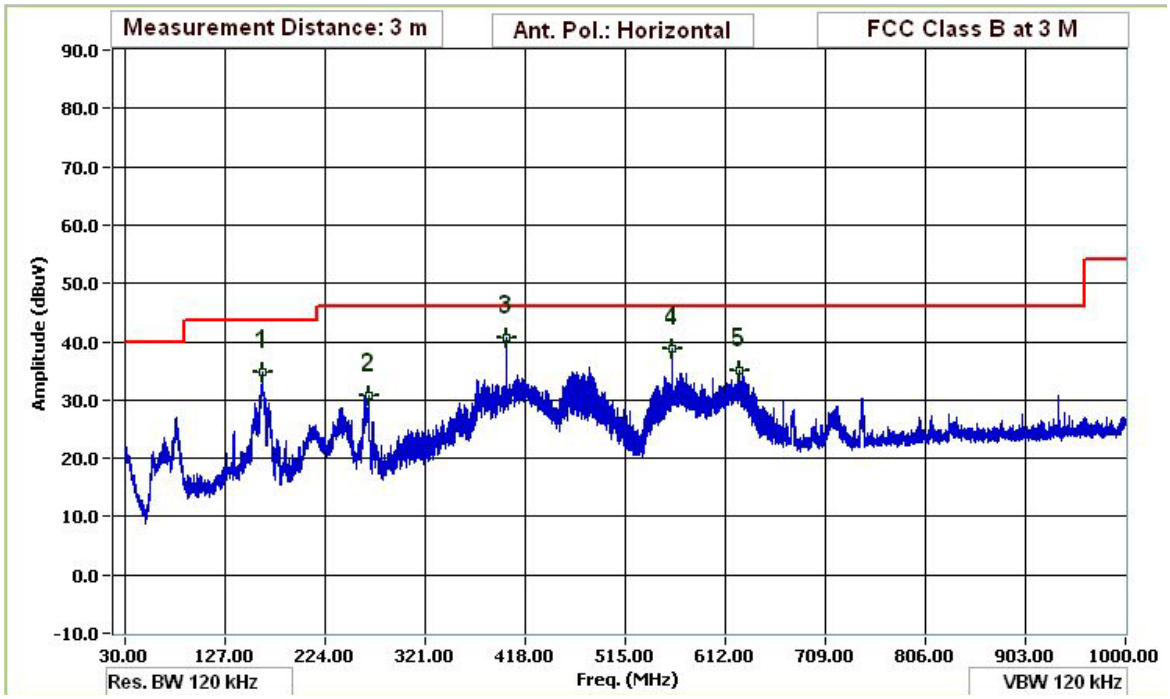
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
1.325	3.0	59.6	25.6	2.7	-39.0	0.0	0.0	48.9	74.0	-25.1	V	P	
1.325	3.0	43.6	25.6	2.7	-39.0	0.0	0.0	32.9	54.0	-21.1	V	A	
1.663	3.0	54.5	26.7	3.1	-38.5	0.0	0.0	45.7	74.0	-28.3	V	P	
1.663	3.0	41.0	26.7	3.1	-38.5	0.0	0.0	32.2	54.0	-21.8	V	A	
1.325	3.0	55.2	25.6	2.7	-39.0	0.0	0.0	44.5	74.0	-29.5	H	P	
1.325	3.0	39.0	25.6	2.7	-39.0	0.0	0.0	28.3	54.0	-25.7	H	A	
1.663	3.0	58.6	26.7	3.1	-38.5	0.0	0.0	49.8	74.0	-24.2	H	P	
1.663	3.0	43.1	26.7	3.1	-38.5	0.0	0.0	34.3	54.0	-19.7	H	A	

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

8.4. WORST-CASE BELOW 1 GHz

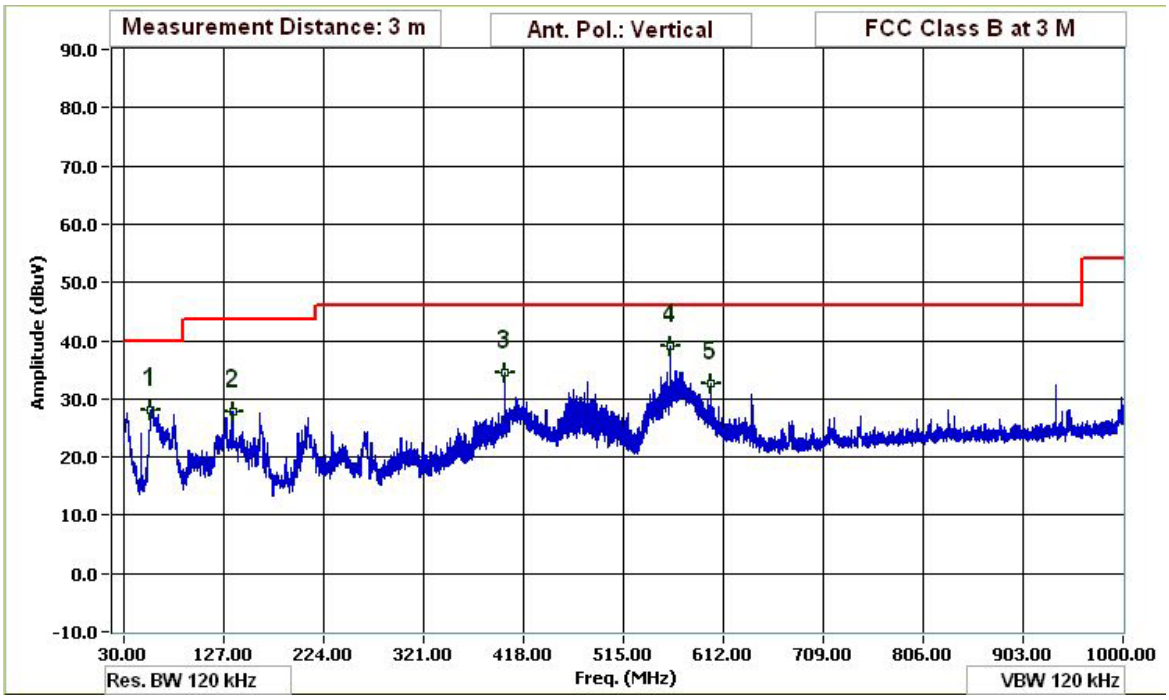
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



DATA

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

Test Engr: Devin Chang
Date: 07/31/09
Project #: 09U12610
Company: Microsoft
EUT M/N: Omni N
Test Target: Harmonic
Mode Oper: Tx_a mode

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

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
56.041	3.0	47.8	8.1	0.7	28.4	0.0	0.0	28.2	40.0	-11.8	V	P	
135.484	3.0	41.7	13.4	1.1	28.3	0.0	0.0	27.9	43.5	-15.6	V	P	
399.975	3.0	46.0	14.9	1.8	28.1	0.0	0.0	34.6	46.0	-11.4	V	P	
559.942	3.0	46.7	17.7	2.2	27.6	0.0	0.0	38.9	46.0	-7.1	V	P	
600.024	3.0	39.5	18.4	2.2	27.5	0.0	0.0	32.6	46.0	-13.4	V	P	
163.446	3.0	50.4	11.4	1.1	28.2	0.0	0.0	34.6	43.5	-8.9	H	P	
267.130	3.0	45.3	12.3	1.4	28.2	0.0	0.0	30.9	46.0	-15.1	H	P	
399.975	3.0	52.0	14.9	1.8	28.1	0.0	0.0	40.6	46.0	-5.4	H	P	
559.942	3.0	46.6	17.7	2.2	27.6	0.0	0.0	38.8	46.0	-7.2	H	P	
625.225	3.0	41.3	18.7	2.3	27.4	0.0	0.0	34.9	46.0	-11.1	H	P	

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

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

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

RESULTS

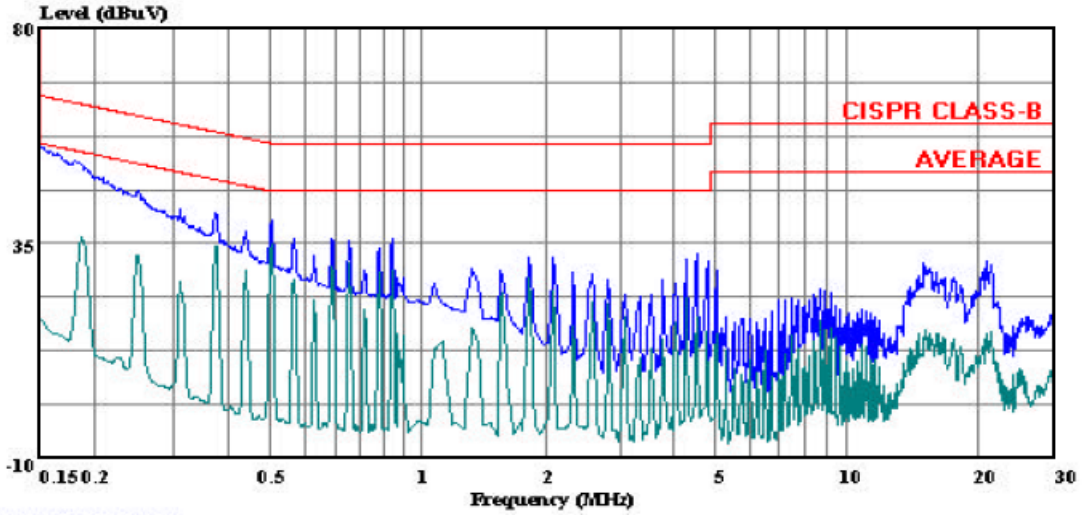
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.19	51.45	--	36.26	0.00	64.17	54.17	-12.72	-17.91	L1
0.38	41.40	--	3.40	0.00	58.35	48.35	-16.95	-44.95	L1
0.50	39.91	--	36.03	0.00	56.02	46.02	-16.11	-9.99	L1
0.19	52.28	--	35.83	0.00	64.17	54.17	-11.89	-18.34	L2
0.50	37.89	--	34.48	0.00	56.02	46.02	-18.13	-11.54	L2
0.94	35.12	--	33.02	0.00	56.00	46.00	-20.88	-12.98	L2
6 Worst Data									

LINE 1 RESULTS

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

Data#: 14 File#: 09U12610.EMI Date: 08-01-2009 Time: 10:41:49



(Line Conduction)

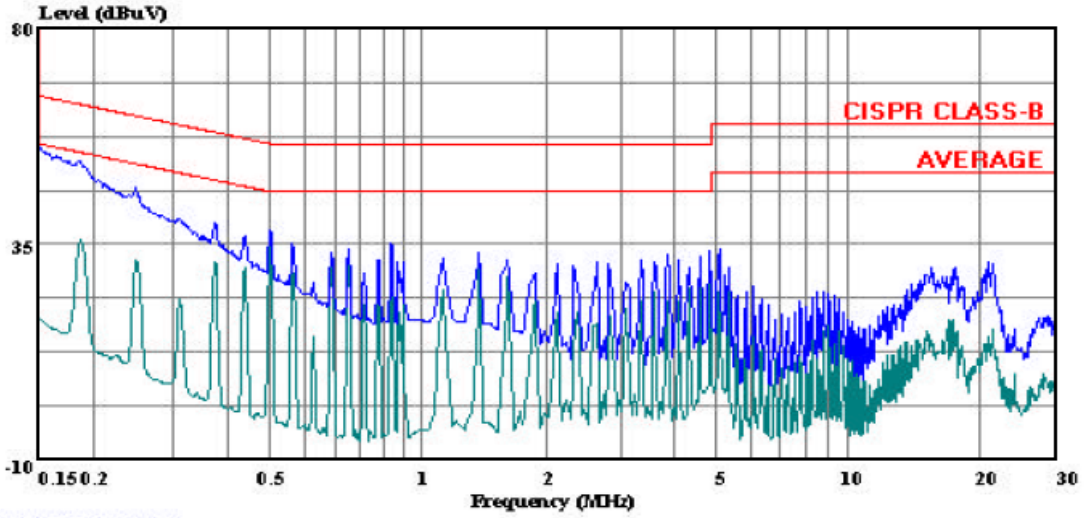
Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Devin Chang
Project #: : 09U12610
Company: : Microsoft
EUT Description:: EUT with Laptop
Mode: : Tx mode
Target: : FCC Class B
Voltage: : 115VAC/60Hz
: L1: Peak (Blue) , Average (Green)

LINE 2 RESULTS

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

Data#: 7 File#: 09U12610.EMI Date: 08-01-2009 Time: 10:19:13



(Line Conduction)

Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Devin Chang
Project #: : 09U12610
Company: : Microsoft
EUT Description:: EUT with Laptop
Mode: : Tx mode
Target: : FCC Class B
Voltage: : 115VAC/60Hz
: L2: Peak (Blue) , Average (Green)

10. DYNAMIC FREQUENCY SELECTION

10.1. OVERVIEW

10.1.1. LIMITS

INDUSTRY CANADA

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

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

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

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

FCC

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

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

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

Table 2: Applicability of DFS requirements during normal operation

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

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

Maximum Transmit Power	Value (see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.		

Table 4: DFS Response requirement values

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

Table 5 – Short Pulse Radar Test Waveforms

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

Table 6 – Long Pulse Radar Test Signal

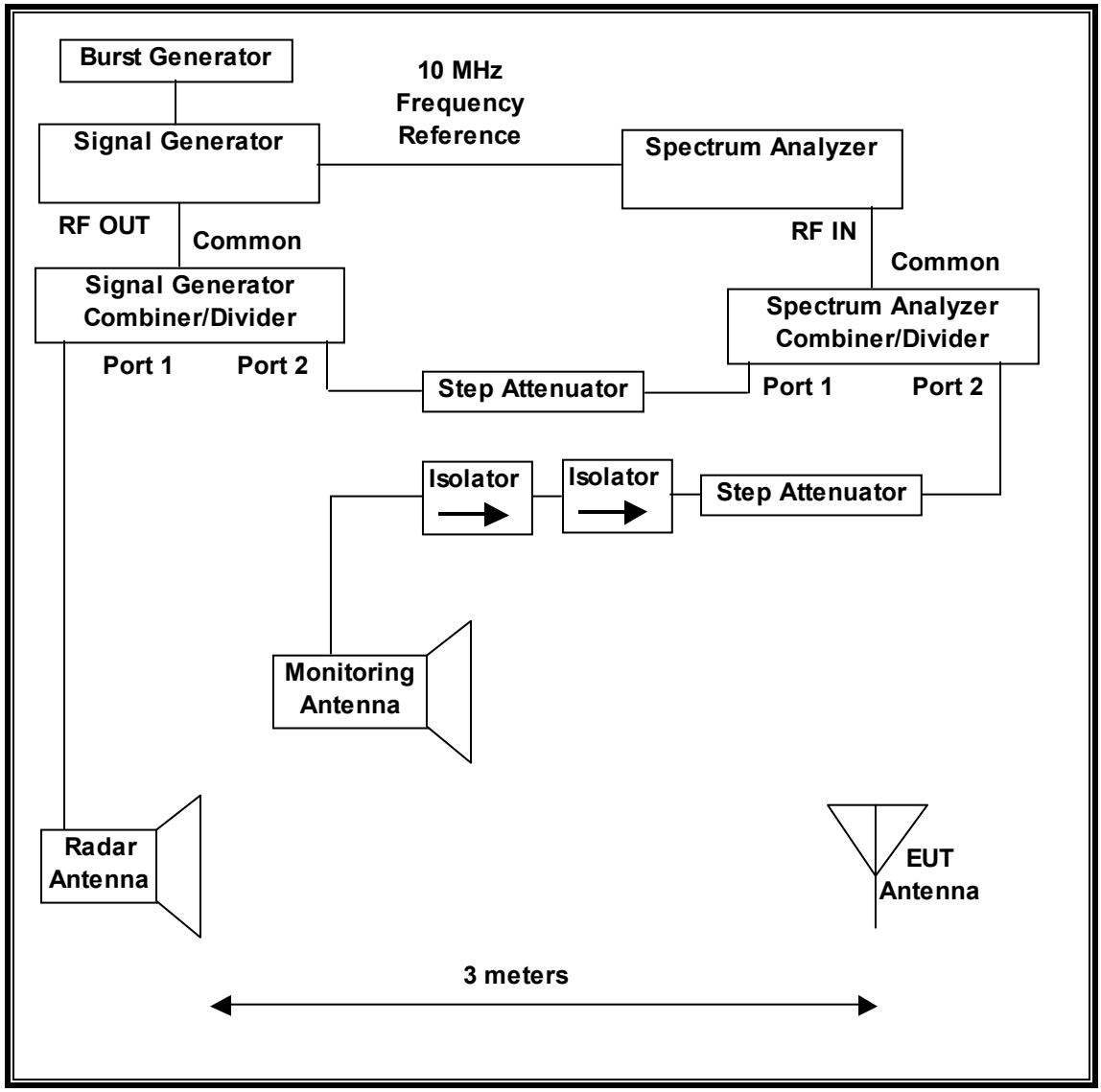
Radar Waveform	Bursts	Pulses per Burst	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

Table 7 – Frequency Hopping Radar Test Signal

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

10.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



SYSTEM OVERVIEW

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

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

SYSTEM CALIBRATION

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

Without changing any of the instrument settings, the spectrum analyer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. Measure the amplitude and calculate the difference from –64 dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference.

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

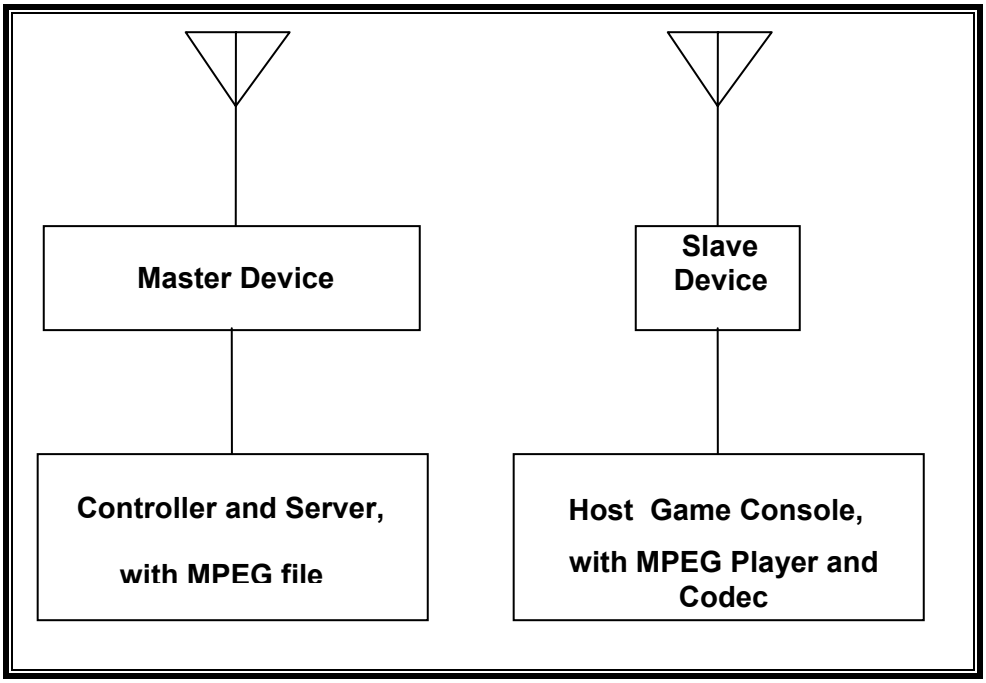
TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset Number**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	02/03/10
Vector signal generator, 20GHz	Agilent / HP	E8267C	C01066	11/16/09

10.1.3. SETUP OF EUT

RADIATED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

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

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Wireless Access Point (Master Device)	Cisco	AIR-AP1252AG-A-K9	FTX120690N2	LDK102061
AC Adapter (Master AP)	Delta	EADP-45BB B	DTH112490BD	DoC
Notebook PC (Host)	Dell	PP04X	CN-0HN241-48643-8AR-1704	DoC
AC Adapter (Host PC)	Dell	DA90-PS1-00	CN-0MM545-48661-88J-HZAH	DoC
Game Console	Microsoft	XBOX 360 Game	029071284807	DoC
AC Adapter (Game Console)	Microsoft	DPSN-186EB A	9902D234813627	DoC
Monitor (EUT)	Samsung	910MD S	MZ19HCHY60261	DoC
Handheld Game Controller (EUT)	Microsoft	XBOX 360 Game Controller	02060000424533	DoC

10.1.4. DESCRIPTION OF EUT

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

The EUT is a Slave Device without Radar Detection.

The highest power level within these bands is 21.02 dBm EIRP in the 5250-5350 MHz band and 22.16 dBm EIRP in the 5470-5725 MHz band.

The antenna assembly utilized with the EUT has a gain of 3.84 dBi in the 5250-5350 MHz band and 4.92 dBi in the 5470-5725 MHz band.

Two identical antennas are utilized to meet the diversity and MIMO operational requirements.

The EUT uses two transmitter/receiver chains, each connected to an antenna for radiated testing.

WLAN traffic is generated by streaming the video file TestFile.mp2 “6 ½ Magic Hours” from the Master to the Slave in full motion video mode. The test file is on the Master device server computer and is displayed on the Slave device host console.

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

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

The software installed in the Slave Device is Nomni revision 2.0.1.51.

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

The Master Device is a Cisco Access Point, FCC ID: LDK102061. The minimum antenna gain for the Master Device is 3.5 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is –63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides margin to the limit.

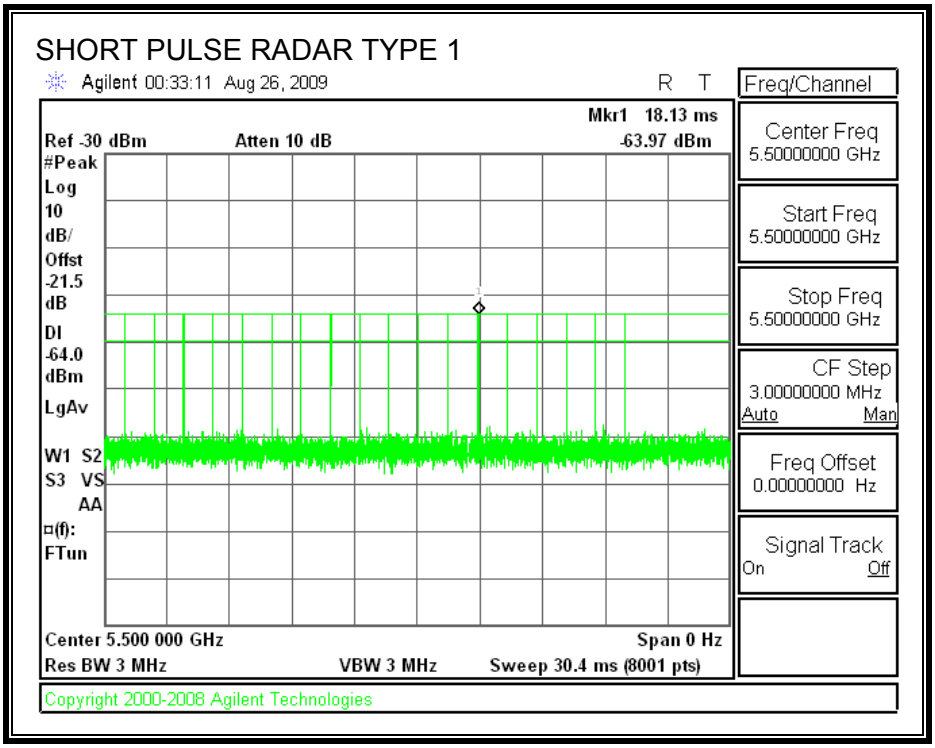
10.2. RESULTS FOR 20 MHz BANDWIDTH

10.2.1. TEST CHANNEL

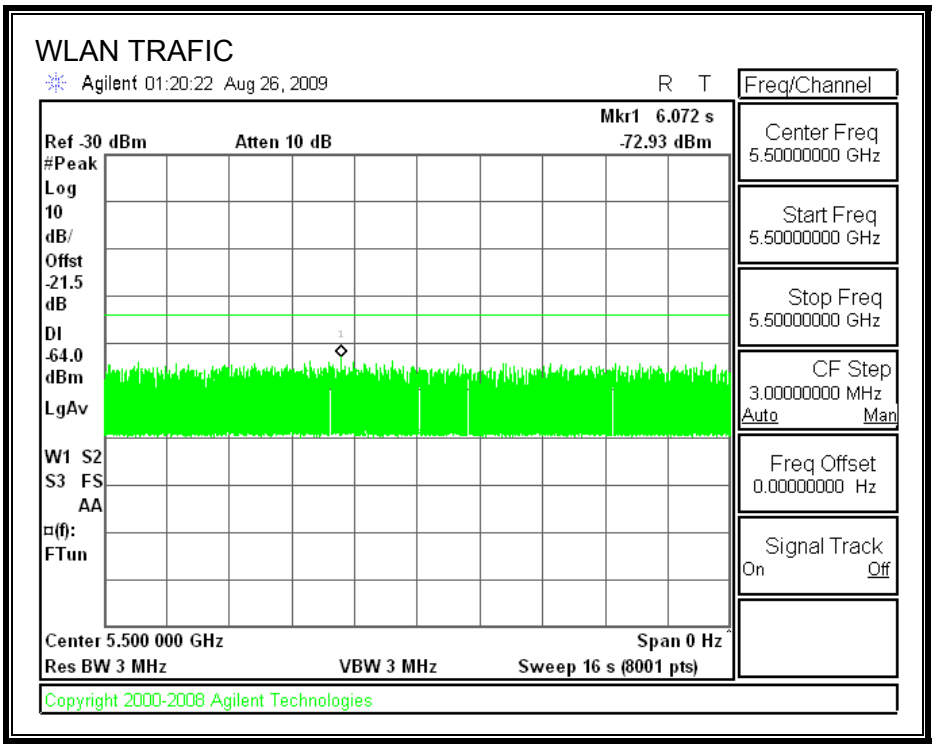
All tests were performed at a channel center frequency of 5500 MHz.

10.2.2. PLOTS OF RADAR WAVEFORM AND WLAN TRAFFIC

PLOTS OF RADAR WAVEFORM



PLOT OF WLAN TRAFFIC



10.2.3. MOVE AND CLOSING TIME

REPORTING NOTES

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

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

The aggregate channel closing transmission time is calculated as follows:

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

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

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

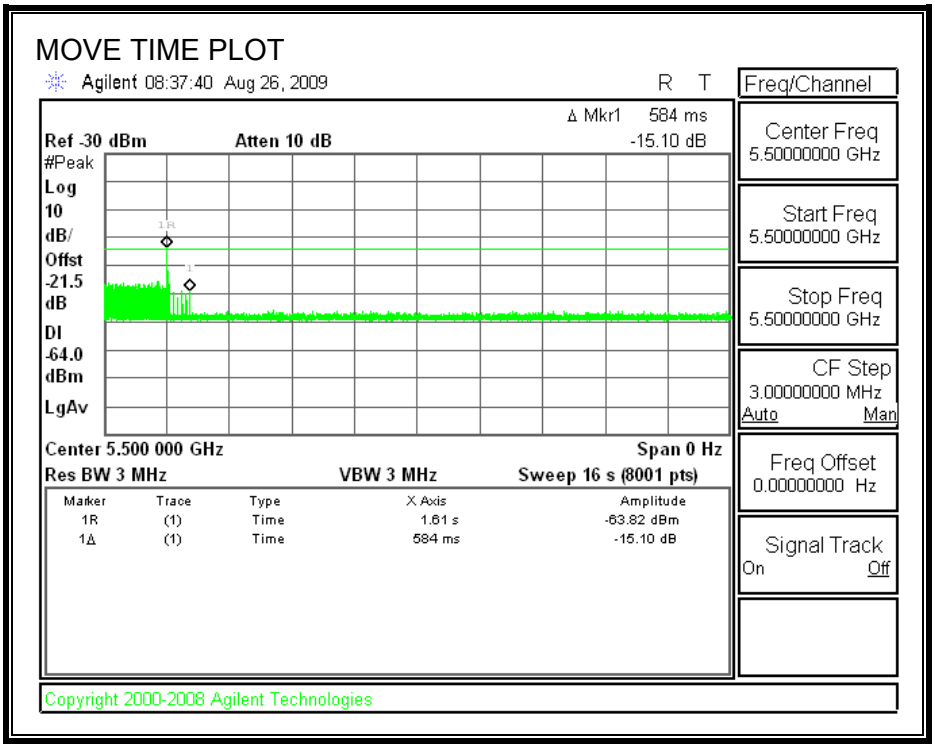
RESULTS

Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.584	10

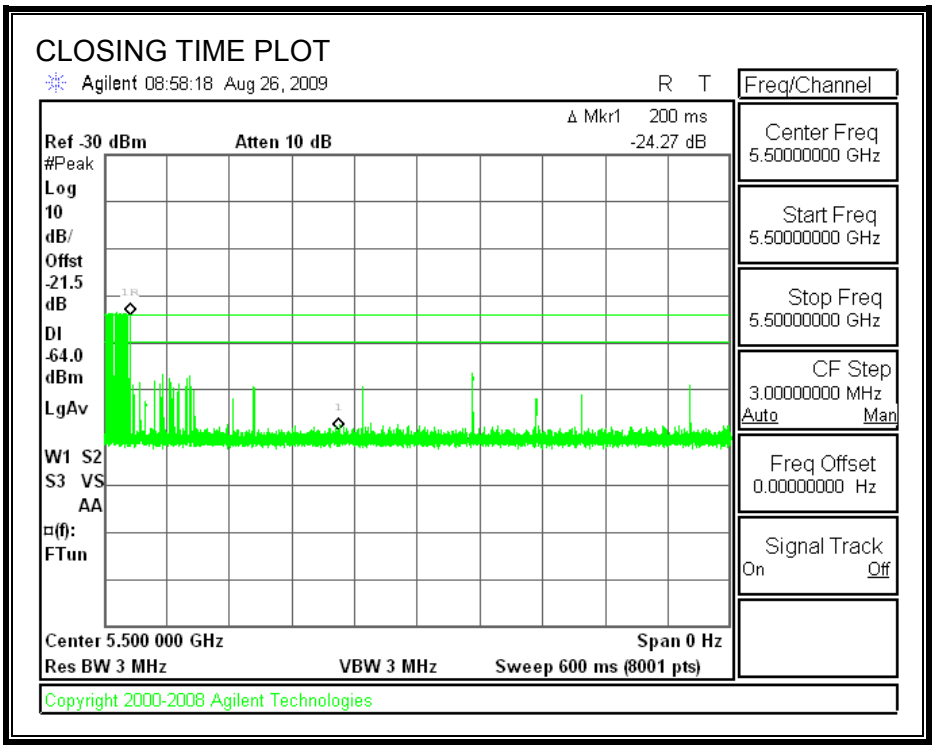
Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	16.0	60
IC	50.0	260

MOVE TIME

MOVE TIME PLOT



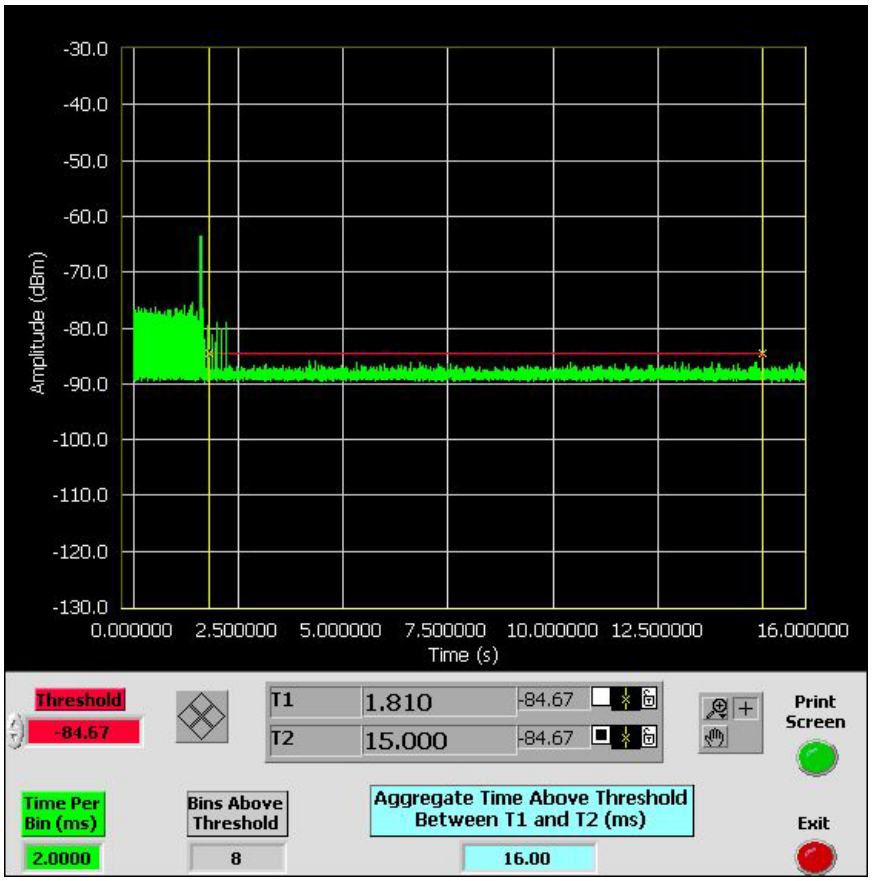
CHANNEL CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

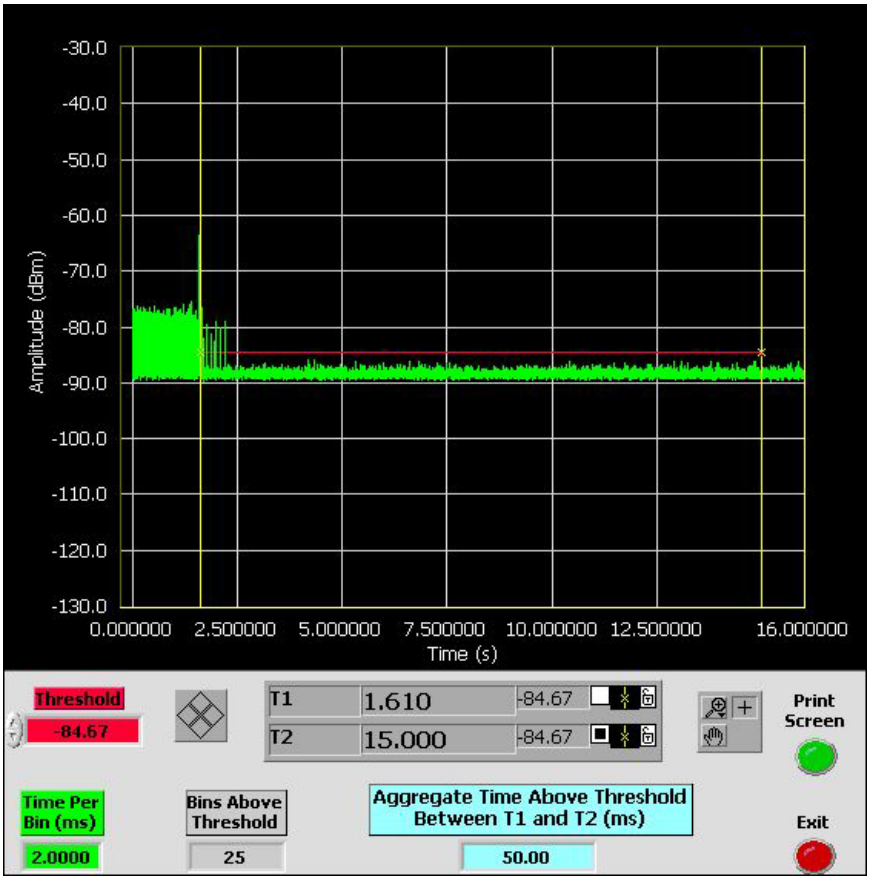
Only intermittent transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME PLOT



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

IC AGGREGATE CLOSING TIME PLOT



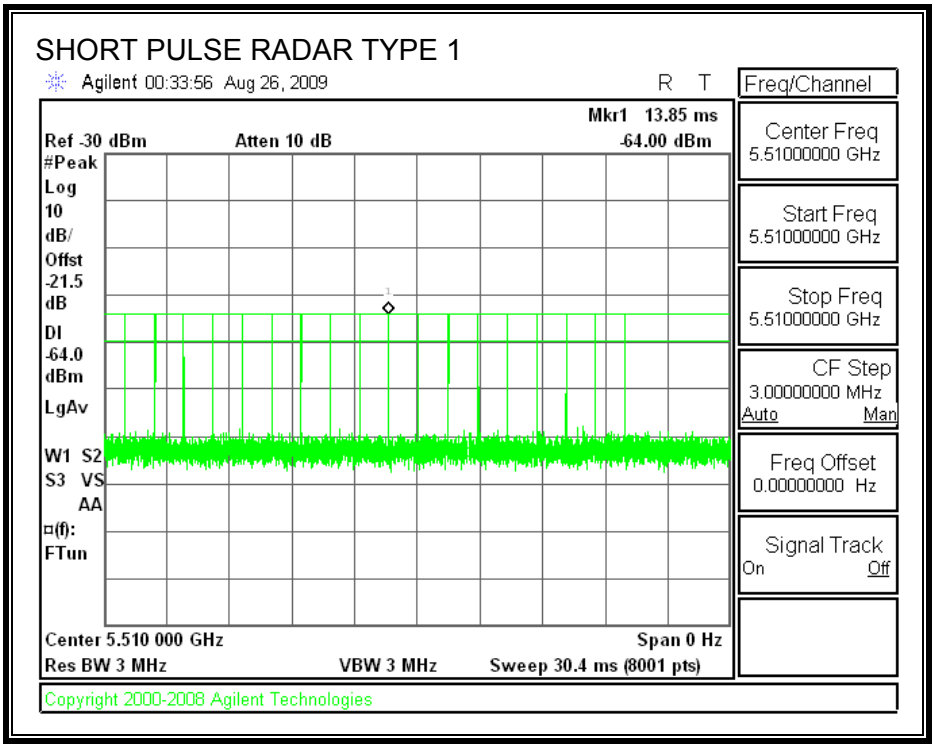
10.3. RESULTS FOR 40 MHz BANDWIDTH

10.3.1. TEST CHANNEL

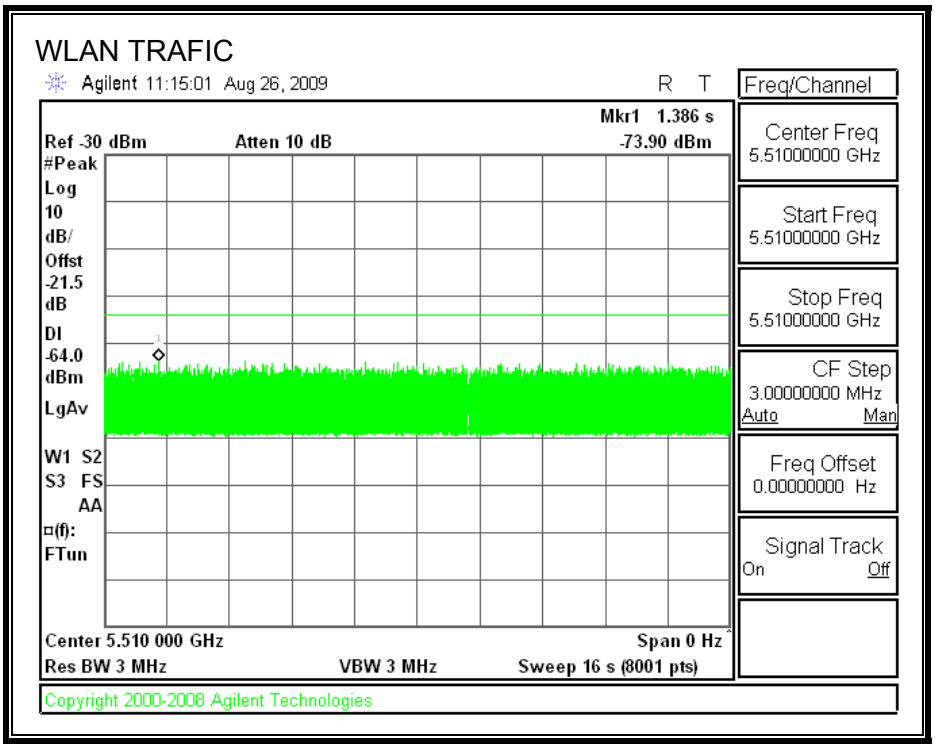
All tests were performed at a channel center frequency of 5510 MHz.

10.3.2. PLOTS OF RADAR WAVEFORM AND WLAN TRAFFIC

PLOTS OF RADAR WAVEFORM



PLOT OF WLAN TRAFFIC



10.3.3. MOVE AND CLOSING TIME

REPORTING NOTES

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

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

The aggregate channel closing transmission time is calculated as follows:

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

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

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

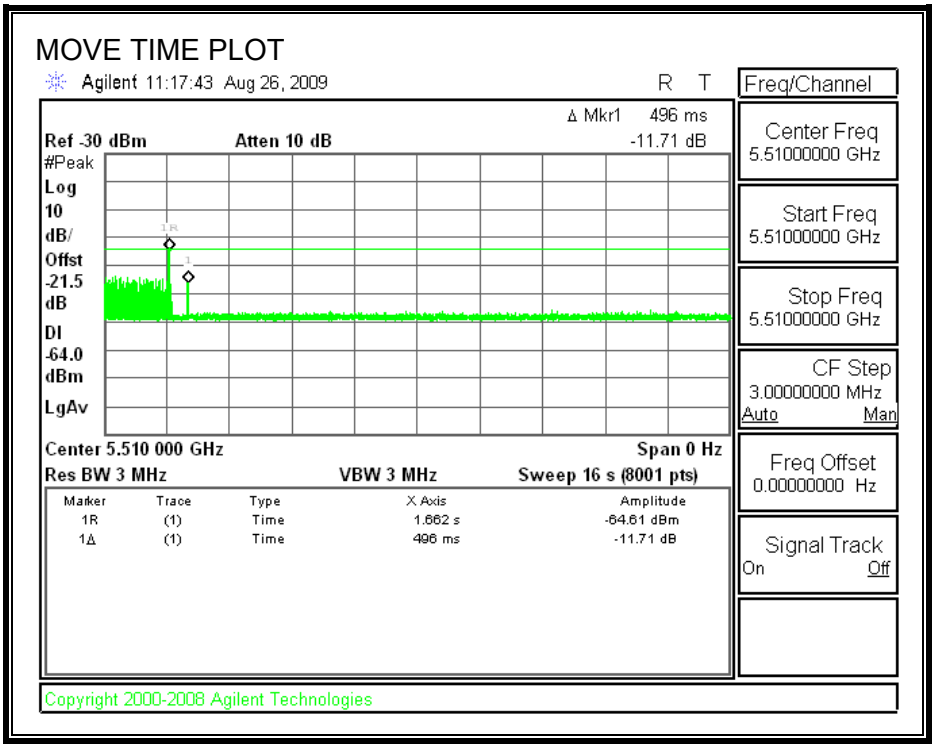
RESULTS

Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.496	10

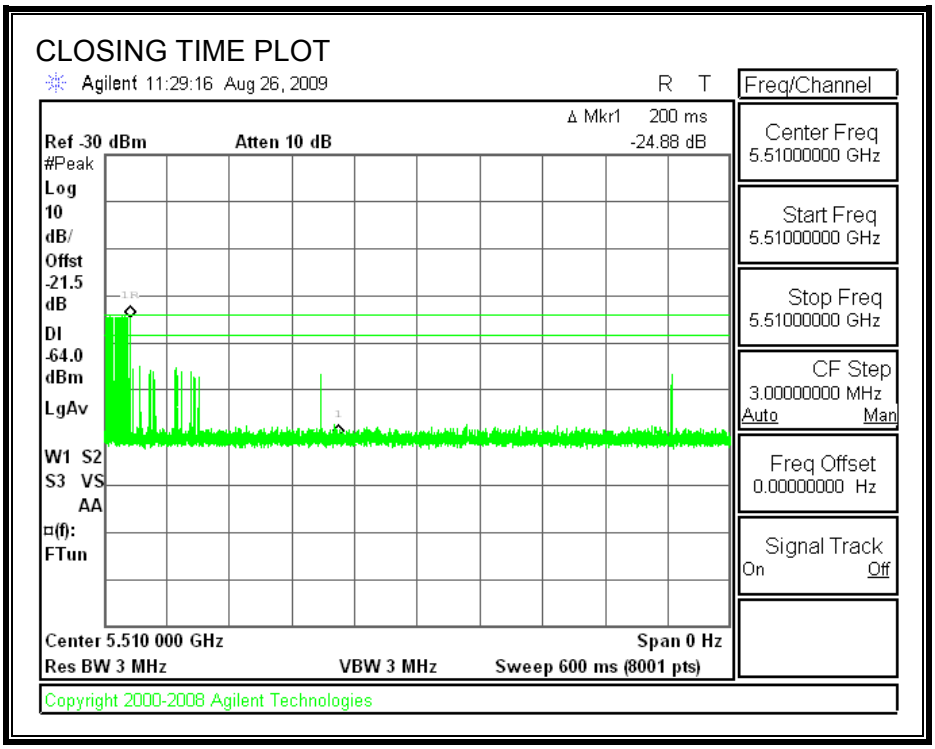
Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	4.0	60
IC	8.0	260

MOVE TIME

MOVE TIME PLOT



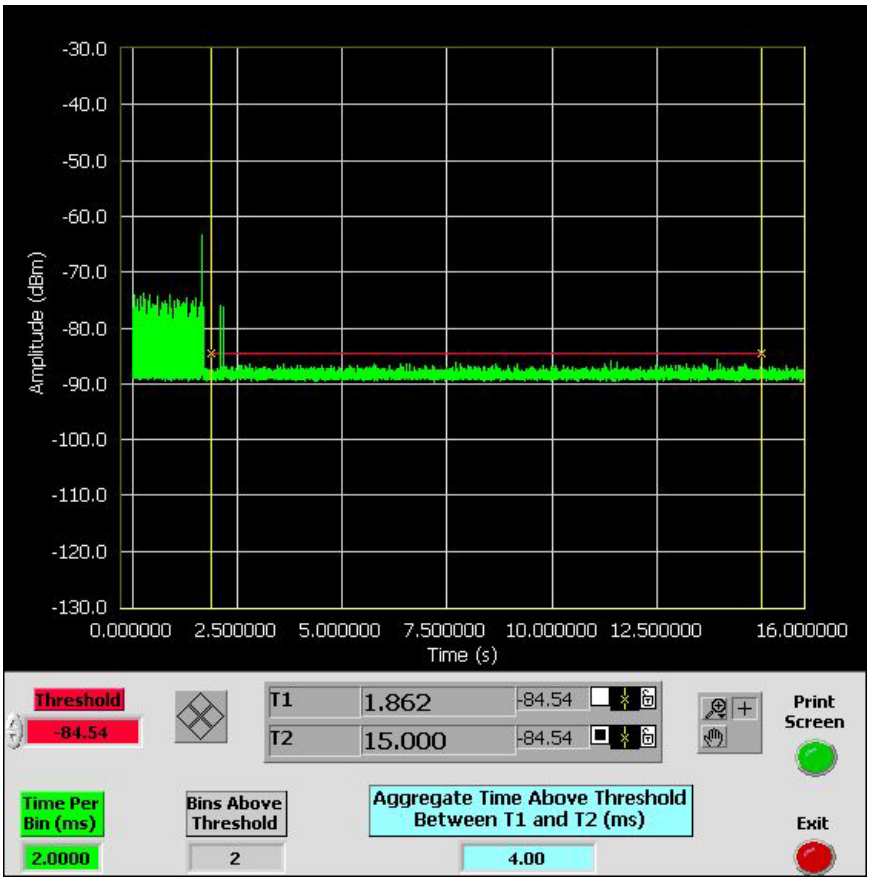
CHANNEL CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

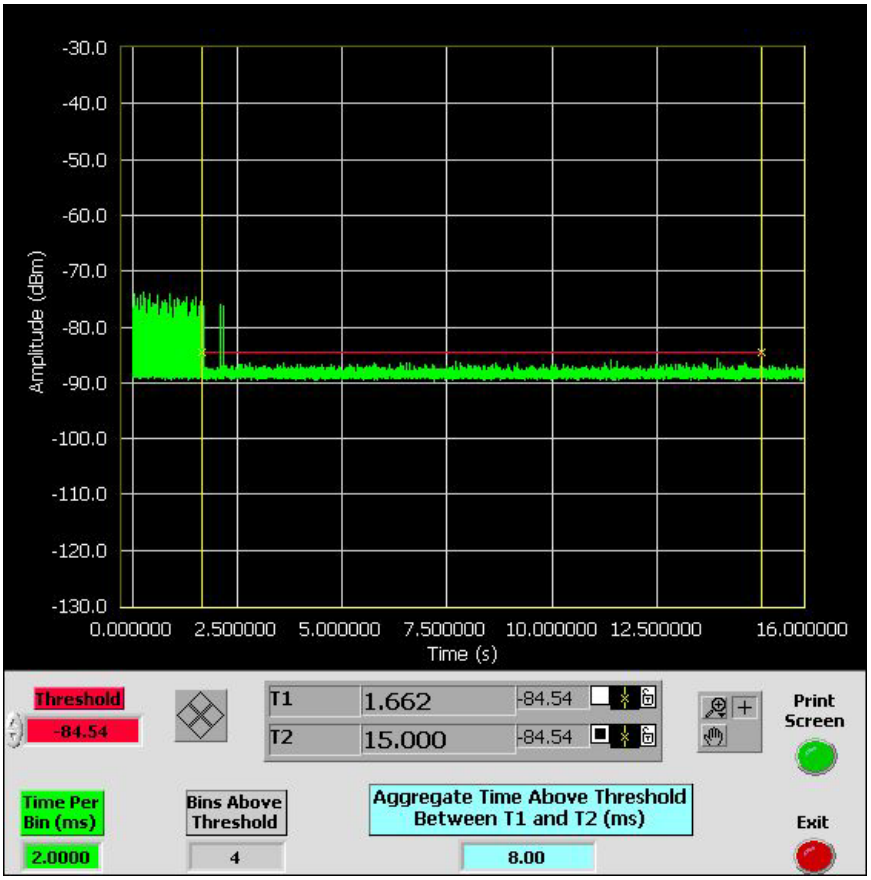
Only intermittent transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME PLOT



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

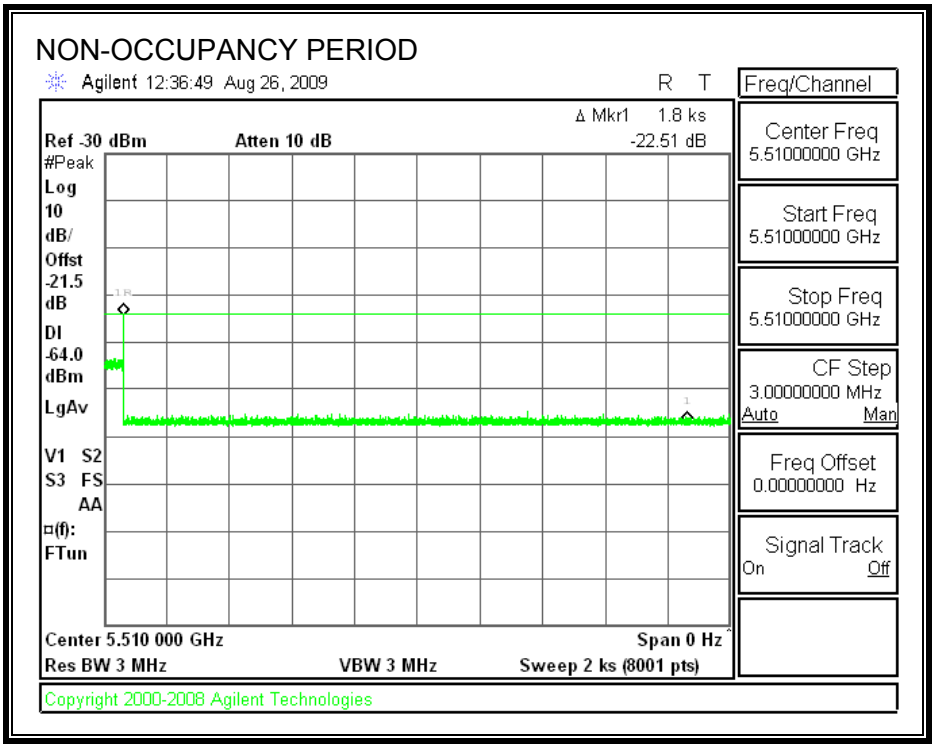
IC AGGREGATE CLOSING TIME PLOT



10.3.4. NON-OCCUPANCY

RESULTS

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



11. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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

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

f = frequency in MHz
* = Plane-wave equivalent power density
NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC RULES

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

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

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

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

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

EQUATIONS

Power density is given by:

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

where

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

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

Distance is given by:

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

where

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

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

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

where

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

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

LIMITS

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

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

RESULTS

(MPE distance equals 20 cm)

Band	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m^2)	FCC Power Density (mW/cm^2)
5150 - 5250	0.20	16.30	3.84	0.21	0.021
5250 - 5350	0.20	17.18	3.84	0.25	0.025
5470 - 5725	0.20	17.24	4.92	0.33	0.033