



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

CERTIFICATION TEST REPORT

FOR

802.11a/b/g/n WLAN MODULE

MODEL NUMBER: SDGOB-1191, SDGOB-1192*

**FCC ID: B94SDGOB1191
IC: 466D-SDGOB191**

REPORT NUMBER: 11U13822-8, Revision C

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* Models differences are explained within the body of this report.



NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	07/15/11	Initial Issue	F. Ibrahim
A	07/25/11	Updated Frequency Range in section 5.1	A. Zaffar
B	07/27/11	Updated antenna gain in DFS section	A. Zaffar
C	08/24/11	Updated Band II frequency range.	A. Zaffar

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS.....	6
2. TEST METHODOLOGY	7
3. FACILITIES AND ACCREDITATION.....	7
4. CALIBRATION AND UNCERTAINTY	7
4.1. MEASURING INSTRUMENT CALIBRATION	7
4.2. SAMPLE CALCULATION.....	7
4.3. MEASUREMENT UNCERTAINTY	7
5. EQUIPMENT UNDER TEST	8
5.1. DESCRIPTION OF EUT.....	8
5.2. DESCRIPTION OF MODELS DIFFERENCES.....	9
5.3. MAXIMUM OUTPUT POWER.....	10
5.4. DESCRIPTION OF AVAILABLE ANTENNAS	11
5.5. SOFTWARE AND FIRMWARE	11
5.6. WORST-CASE CONFIGURATION AND MODE.....	11
5.7. DESCRIPTION OF TEST SETUP (Wireless Portion)	12
6. TEST AND MEASUREMENT EQUIPMENT	14
7. ANTENNA PORT TEST RESULTS	15
7.1. 802.11a MODE IN THE 5.2 GHz BAND.....	15
7.1.1. 26 dB and 99% BANDWIDTH	15
7.1.2. OUTPUT POWER	19
7.1.3. AVERAGE POWER	23
7.1.4. PEAK POWER SPECTRAL DENSITY	24
7.1.5. PEAK EXCURSION	28
7.1.6. CONDUCTED SPURIOUS EMISSIONS.....	32
7.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND.....	39
7.2.1. 26 dB and 99% BANDWIDTH	39
7.2.2. OUTPUT POWER	43
7.2.3. AVERAGE POWER	48
7.2.4. PEAK POWER SPECTRAL DENSITY	49
7.2.5. PEAK EXCURSION	53
7.2.6. CONDUCTED SPURIOUS EMISSIONS.....	57
7.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND.....	64
7.3.1. 26 dB and 99% BANDWIDTH	64
7.3.2. OUTPUT POWER	67
7.3.3. AVERAGE POWER	71
7.3.4. PEAK POWER SPECTRAL DENSITY	72
7.3.5. PEAK EXCURSION	75
7.3.6. CONDUCTED SPURIOUS EMISSIONS.....	78

7.4.	802.11a MODE IN THE 5.3 GHz BAND	83
7.4.1.	26 dB and 99% BANDWIDTH	83
7.4.2.	OUTPUT POWER	87
7.4.3.	AVERAGE POWER	91
7.4.4.	PEAK POWER SPECTRAL DENSITY	92
7.4.5.	PEAK EXCURSION	96
7.4.6.	CONDUCTED SPURIOUS EMISSIONS	100
7.5.	802.11n HT20 MODE IN THE 5.3 GHz BAND	107
7.5.1.	26 dB and 99% BANDWIDTH	107
7.5.2.	OUTPUT POWER	111
7.5.3.	AVERAGE POWER	116
7.5.4.	PEAK POWER SPECTRAL DENSITY	117
7.5.5.	PEAK EXCURSION	121
7.5.6.	CONDUCTED SPURIOUS EMISSIONS	125
7.6.	802.11n HT40 MODE IN THE 5.3 GHz BAND	132
7.6.1.	26 dB and 99% BANDWIDTH	132
7.6.2.	OUTPUT POWER	135
7.6.3.	AVERAGE POWER	138
7.6.4.	PEAK POWER SPECTRAL DENSITY	139
7.6.5.	PEAK EXCURSION	142
7.6.6.	CONDUCTED SPURIOUS EMISSIONS	145
7.7.	802.11a MODE IN THE 5.6 GHz BAND	150
7.7.1.	26 dB and 99% BANDWIDTH	150
7.7.2.	OUTPUT POWER	154
7.7.3.	AVERAGE POWER	158
7.7.4.	PEAK POWER SPECTRAL DENSITY	159
7.7.5.	PEAK EXCURSION	163
7.7.6.	CONDUCTED SPURIOUS EMISSIONS	167
7.8.	802.11n HT20 MODE IN THE 5.6 GHz BAND	174
7.8.1.	26 dB and 99% BANDWIDTH	174
7.8.2.	OUTPUT POWER	178
7.8.3.	AVERAGE POWER	182
7.8.4.	PEAK POWER SPECTRAL DENSITY	183
7.8.5.	PEAK EXCURSION	187
7.8.6.	CONDUCTED SPURIOUS EMISSIONS	191
7.9.	802.11n HT40 MODE IN THE 5.6 GHz BAND	198
7.9.1.	26 dB and 99% BANDWIDTH	198
7.9.2.	OUTPUT POWER	202
7.9.3.	AVERAGE POWER	206
7.9.4.	PEAK POWER SPECTRAL DENSITY	207
7.9.5.	PEAK EXCURSION	211
7.9.6.	CONDUCTED SPURIOUS EMISSIONS	215
8.	RADIATED TEST RESULTS	222
8.1.	LIMITS AND PROCEDURE	222
8.2.	TRANSMITTER ABOVE 1 GHz	223
8.2.1.	TX ABOVE 1 GHz FOR 802.11a MODE IN THE LOWER 5.2 GHz BAND	223
8.2.2.	TX ABOVE 1 GHz FOR HT20 MODE IN THE LOWER 5.2 GHz BAND	228
8.2.3.	TX ABOVE 1 GHz FOR HT40 MODE IN THE LOWER 5.2 GHz BAND	233

8.2.4.	TX ABOVE 1 GHz FOR 802.11a MODE IN THE UPPER 5.2 GHz BAND.....	238
8.2.5.	TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE UPPER 5.2 GHz BAND	243
8.2.6.	TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE UPPER 5.2 GHz BAND	248
8.2.7.	TX ABOVE 1 GHz FOR 802.11a MODE IN THE 5.6 GHz BAND	253
8.2.8.	TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.6 GHz BAND	260
8.2.9.	TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.6 GHz BAND	267
8.3.	RECEIVER ABOVE 1 GHz.....	274
8.3.1.	RECEIVER ABOVE 1 GHz FOR 20 MHz BANDWIDTH.....	274
8.3.2.	RECEIVER ABOVE 1 GHz FOR 40 MHz BANDWIDTH.....	275
8.4.	WORST-CASE BELOW 1 GHz	276
9.	AC POWER LINE CONDUCTED EMISSIONS	279
10.	DYNAMIC FREQUENCY SELECTION	283
10.1.	OVERVIEW.....	283
10.1.1.	LIMITS	283
10.1.2.	TEST AND MEASUREMENT SYSTEM	286
10.1.3.	SETUP OF EUT.....	289
10.1.4.	DESCRIPTION OF EUT	290
10.2.	RESULTS FOR 20 MHz BANDWIDTH.....	292
10.2.1.	TEST CHANNEL	292
10.2.2.	RADAR WAVEFORM AND TRAFFIC	292
10.2.3.	OVERLAPPING CHANNEL TESTS	294
10.2.4.	MOVE AND CLOSING TIME	294
10.3.	RESULTS FOR 40 MHz BANDWIDTH.....	299
10.3.1.	TEST CHANNEL	299
10.3.2.	RADAR WAVEFORM AND TRAFFIC	299
10.3.3.	OVERLAPPING CHANNEL TESTS	301
10.3.4.	MOVE AND CLOSING TIME	301
10.3.5.	NON-OCCUPANCY PERIOD	306
11.	MAXIMUM PERMISSIBLE EXPOSURE	307
12.	SETUP PHOTOS	311
12.1.	ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP	311
12.2.	RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION ..	312
12.3.	POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP.....	318
12.4.	DYNAMIC FREQUENCY SELECTION MEASUREMENT SETUP.....	320

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Hewlett Packard Company
3000 Hanover Street
Palo Alto, CA 94304, U.S.A.

EUT DESCRIPTION: 802.11a/b/g/n WLAN MODULE

MODEL: SDGOB-1191 (Part # 1150-7953)

SERIAL NUMBER: 00 50 43 21 2C CF

DATE TESTED: JUNE 3 - JULY 13, 2011

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

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

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

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EMC SUPERVISOR
UL CCS

Tested By:



THANH NGUYEN
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g/n SISO MODULE.

Product	802.11 a/b/g/n WLAN Module
Model No.	SDGOB-1191, SDGOB-1192
Type of Equipment	Data transmission equipment operating in 2.4GHz ISM band and 5GHz UNII and DTS band using spread spectrum techniques
Power Supply	3.3 V DC from the host equipment
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64 QAM, 16 QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0/5.5/2.0/1.0 Mbps 802.11g: 54.0/48.0/36.0/24.0/18.0/12.0/9.0/6.0 Mbps 802.11n: upto 150 Mbps
Frequency Range	2412 MHz - 2462 MHz 5150 MHz - 5350 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (20MHz) in 2.4G 7 for 802.11n (40MHz) in 2.4G 20 for 802.11a, 802.11n (20MHz) and 802.11n (40MHz) in 5G
Antenna Type	PCB PIFA like antenna with maximum gain of 2.5 dB in 2G and 3.75 dB in 5G

5.2. DESCRIPTION OF MODELS DIFFERENCES

Brand	Product Name	Model #	Part #	Description
HP	802.11 a/b/g/n WLAN Module	SDGOB-1191	1150-7951	USB right angle, top mount
HP	802.11 a/b/g/n WLAN Module	SDGOB-1191	1150-7953	USB straight, bottom mount (worst case)
HP	802.11 a/b/g/n WLAN Module	SDGOB-1191	1150-7957	USB straight shrouded, bottom mount
HP	802.11 a/b/g/n WLAN Module	SDGOB-1192	1150-7952	SDIO straight, bottom mount
HP	802.11 a/b/g/n WLAN Module	SDGOB-1192	1150-7954	SDIO right angle, top mount

These 5 parts have the same radio module and antenna; the only difference is the digital input interface and the way they are mounted.

Both Main Antenna and Aux Antenna of the EUT were investigated for output power and radiated emissions (harmonics and bandedge), it was determined that the main antenna on Model # SDGOB-1191 , Part # 1150-7953 is the worst case of the 5 parts in the above table. Therefore, final testing was done on the main antenna on Model # SDGOB-1191 , Part # 1150-7953.

5.3. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.2 GHz band			
5180 - 5240	802.11a	14.53	28.38
5180 - 5240	802.11n HT20	13.74	23.66
5190 - 5230	802.11n HT40	11.93	15.60
5.3 GHz band			
5260 - 5320	802.11a	15.10	32.36
5260 - 5320	802.11n HT20	14.28	26.79
5270 - 5310	802.11n HT40	11.72	14.86
5.6 GHz band			
5500 - 5700	802.11a	14.74	29.79
5500 - 5700	802.11n HT20	13.77	23.82
5510 - 5670	802.11n HT40	11.64	14.59

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

- Dual 2.4/5 GHz PCB Antennas
- Orthogonal antenna orientation for optimal coverage (Diversity)
- 2.4-2.5, 5.1-5.9 GHz Frequency Range
- VSWR Better than 2:1 across Frequency Range
- Measured Efficiency > 65% across Frequency Range
- Typical Gain 2.4-2.5 GHz: 2.50 DBI across Frequency Range
- Typical Gain 5.1-5.9 GHz: 3.75 DBI across Frequency Range

5.5. SOFTWARE AND FIRMWARE

The firmware version 14.0.11.26 was installed in the EUT during testing.

The EUT driver software installed during testing was USB Labtool DLL version 1.0.7.7

The test utility software used during testing was DutApiBRIDGEETH8782.exe.

5.6. WORST-CASE CONFIGURATION AND MODE

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

The following worst-case data rates based on an input from the client were used:

802.11a: 6Mbps

802.11n: MCS0

EUT was investigated in three orthogonal orientations X,Y and Z, it was found that Y orientation is worst-case; therefore, all final testing was performed with the EUT laid down in the Y orientation.

5.7. DESCRIPTION OF TEST SETUP (Wireless Portion)

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	Manufacturer	Model	Serial Number
Support Laptop	DELL	VOSTRO 1000	WSH0765
AC/DC Adapter	DELL	PA 12	CN0928G4-71615-06E-0D24-A00
USB Interface Box	SHEEVA PLUG	003-SP1001	1043-002836
Test JIG	MARVELL	N/A	14628-PCA087

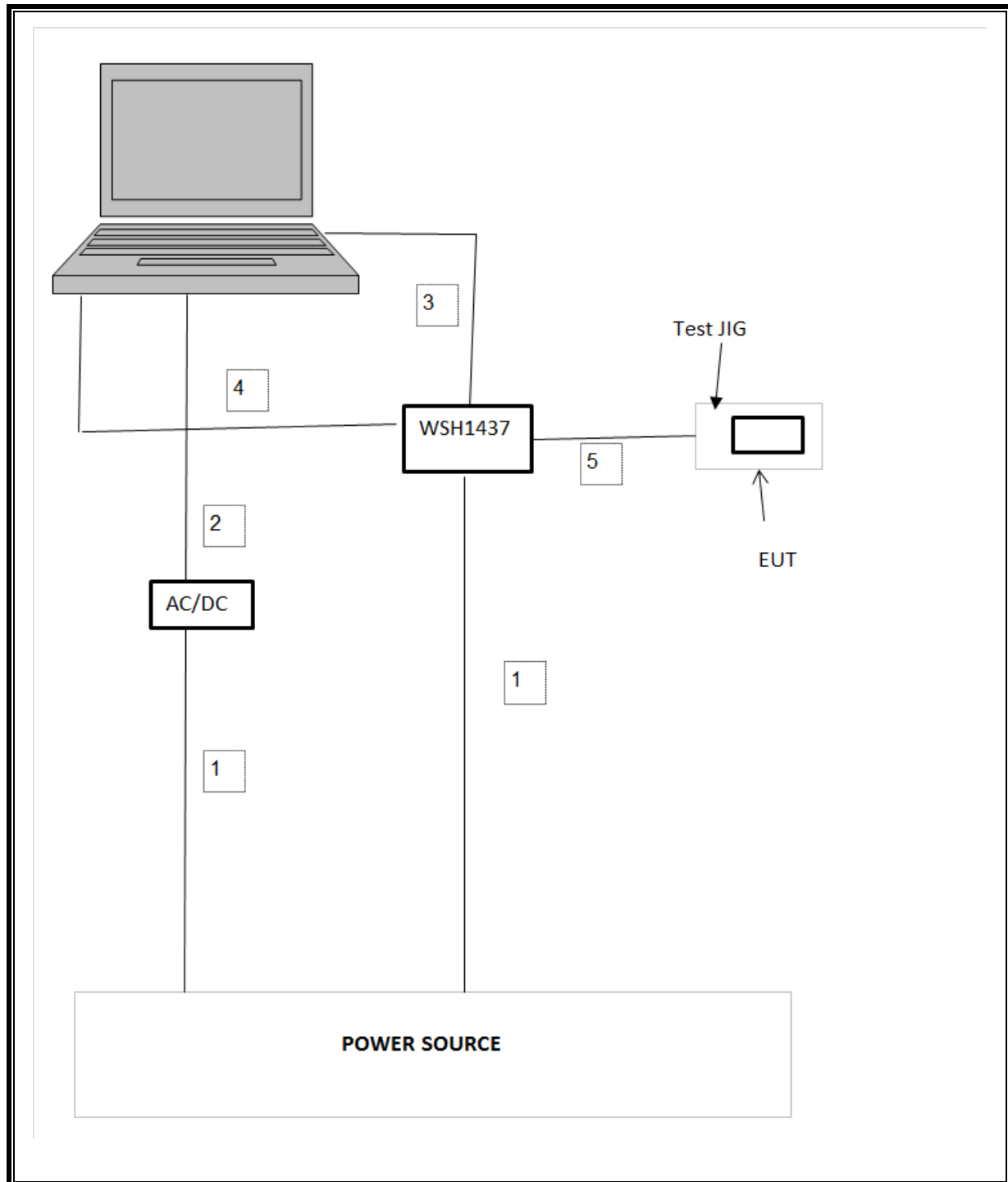
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	US115VAC	Unshield	1.5m	Power for Laptop and USB
2	DC	1	DC Plug	Unshield	1.5m	Power for Laptop
3	LAN	1	RJ45	Unshield	1.5m	Connected to Laptop LAN
4	USB	1	USB	Shielded	1m	To test JIG and Laptop
5	USB	1	USB	Shielded	1m	EUT to WSH

TEST SETUP

The EUT is plugged to a test JIG card, connected to the USB Sheeva plug and a laptop computer 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 Date
EMI Receiver, 2.9 GHz	Agilent / HP	85462A	C00147	8/19/2011
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	7/10/2011
Preamplifier, 1GHz	Agilent / HP	8447D	C00885	1/27/2012
Antenna, Horn, 18 GHz	EMCO	3115	C00872	7/15/2011
Antenna, Horn, 18 -26GHz	ARA	SWH 28	C01015	8/15/2011
Antenna, Horn, 26-40GHz	ARA	SWH 2640	1029	10/15/2011
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	8/3/2011
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	10/4/2011
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	11/10/2011
EMI Test Receiver	R & S	ESC17	1000741	7/2/2011
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/2011
Peak Power Meter	Agilent / HP	E4416A	C00963	3/22/2012
Peak / Average Power Sensor	Agilent	E9327A	C00964	4/13/2012
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	8/11/2012

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.

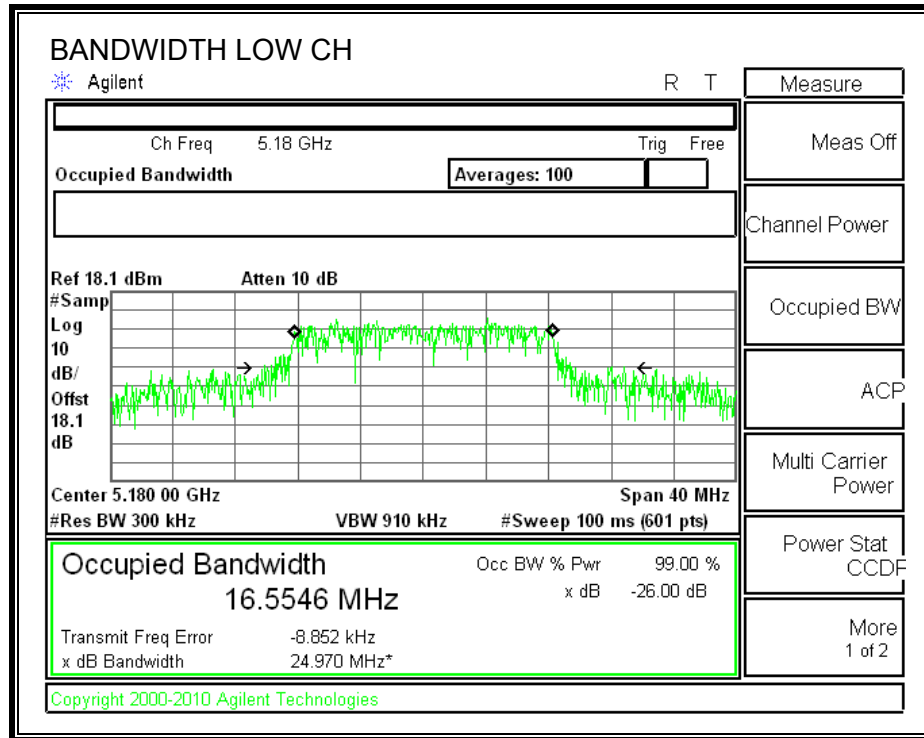
TEST PROCEDURE

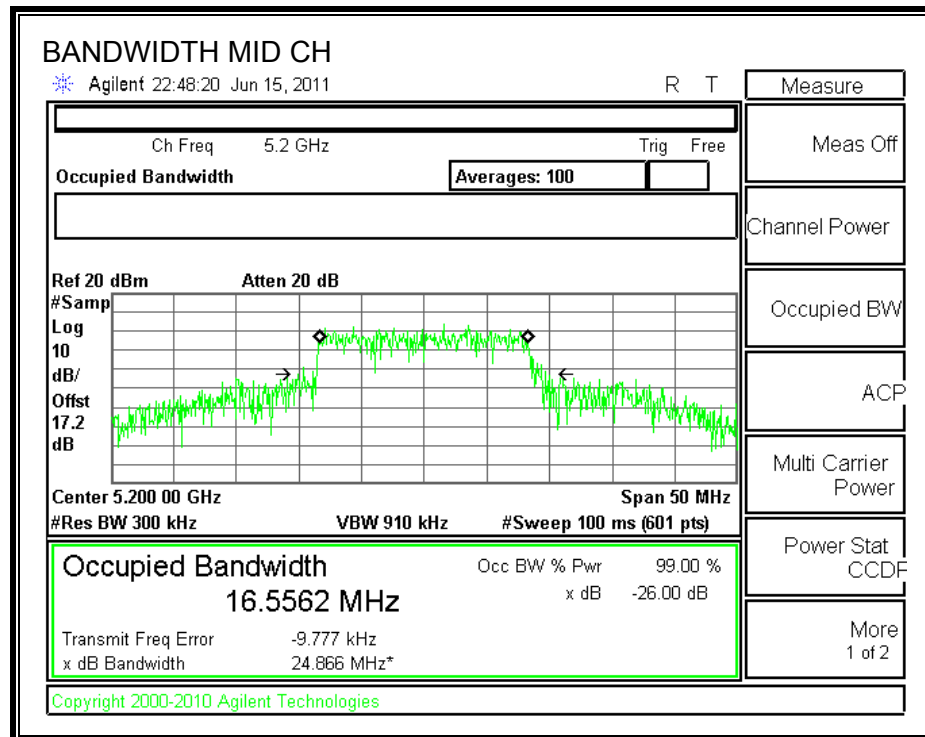
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

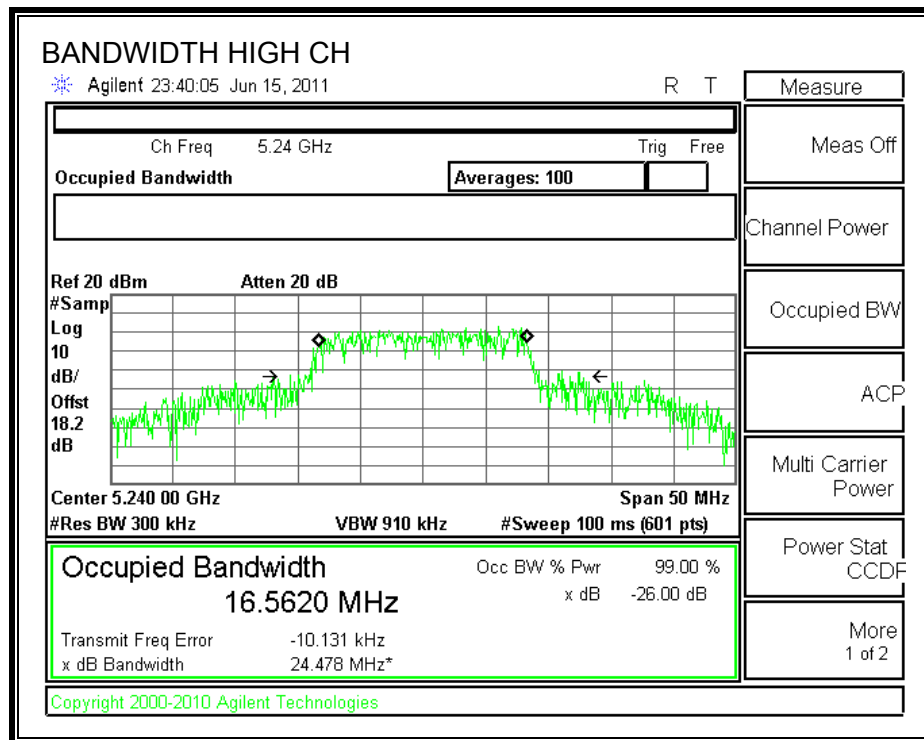
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	24.97	16.5546
Middle	5200	24.866	16.5562
High	5240	24.478	16.562

26 dB and 99% BANDWIDTH







7.1.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

TEST PROCEDURE

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

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

RESULTS

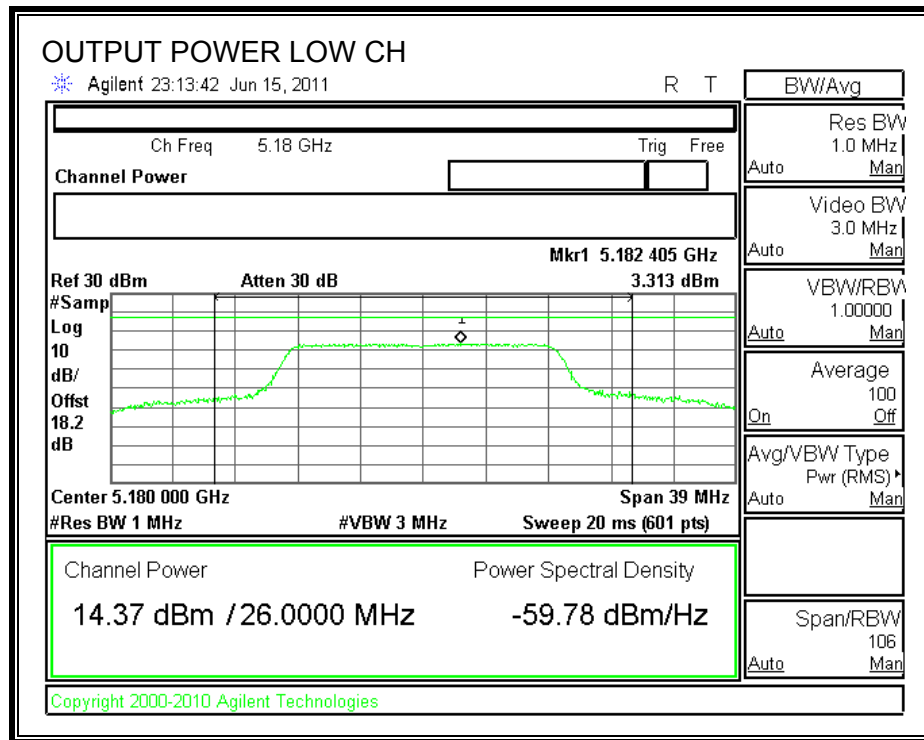
Limit

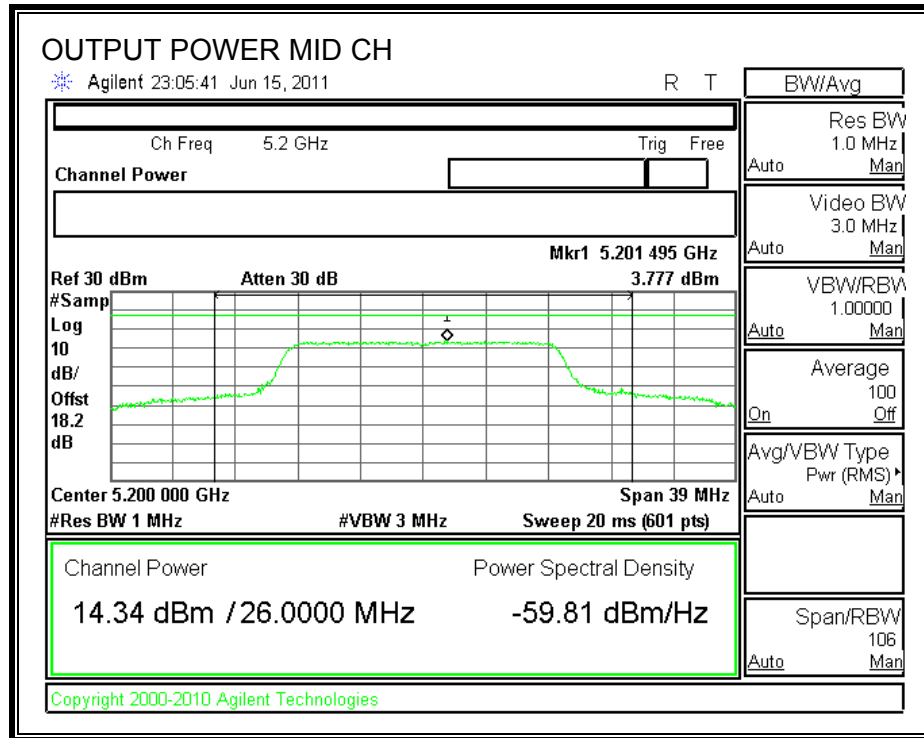
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	24.97	17.97	3.75	17.00
Mid	5200	17	24.866	17.96	3.75	17.00
High	5240	17	24.478	17.89	3.75	17.00

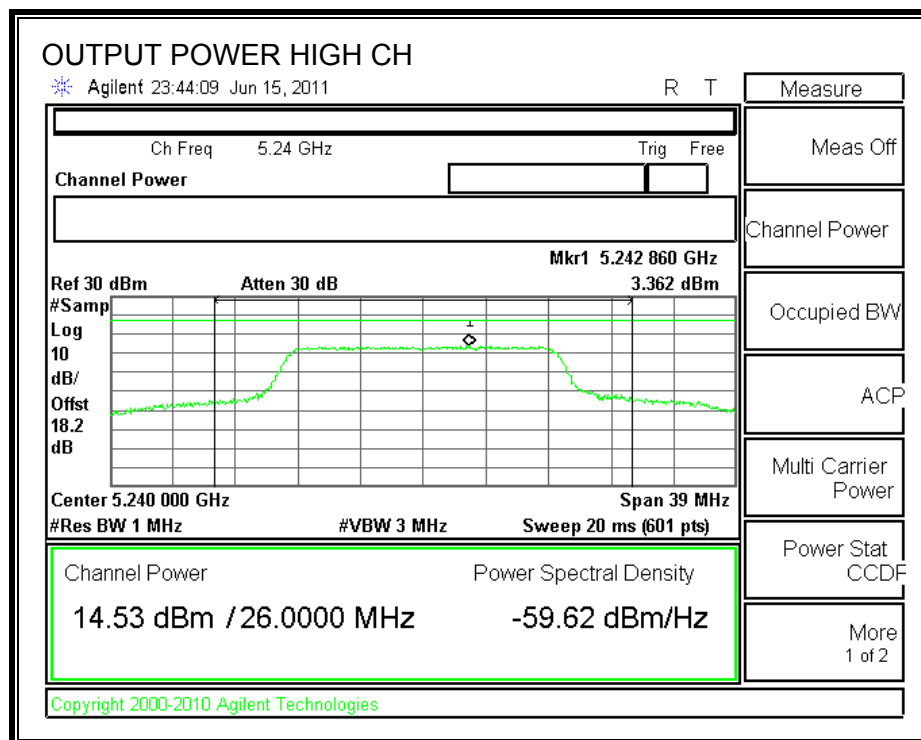
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	14.37	17.00	-2.63
Mid	5200	14.34	17.00	-2.66
High	5240	14.53	17.00	-2.47

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 18.2 dB (including 10 dB pad and 8.2 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	14.12
Middle	5200	14.17
High	5240	14.23

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.

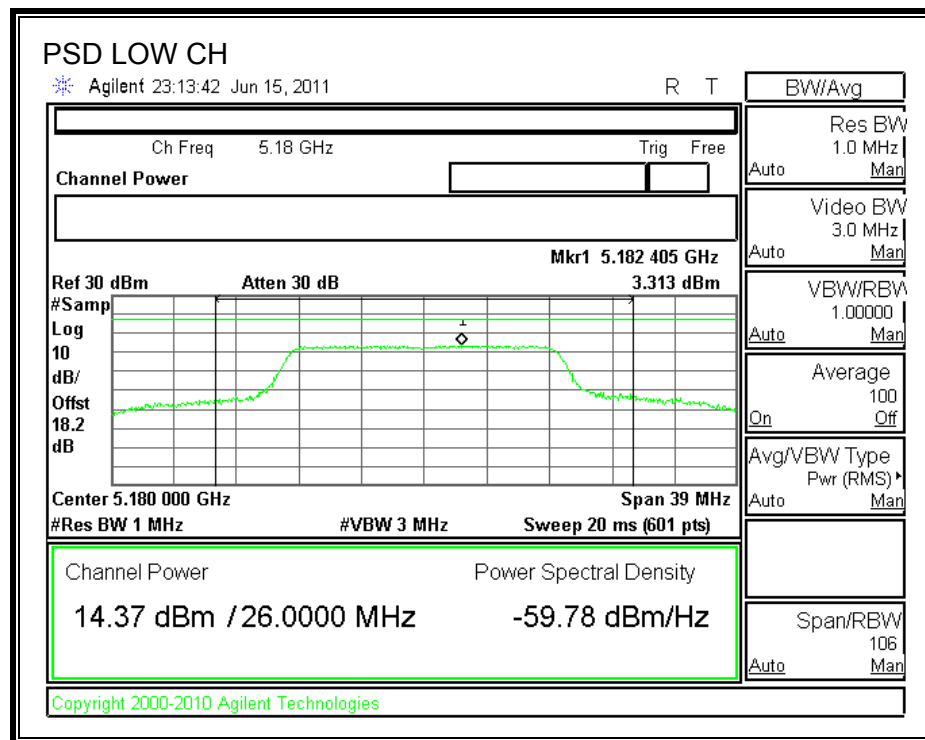
TEST PROCEDURE

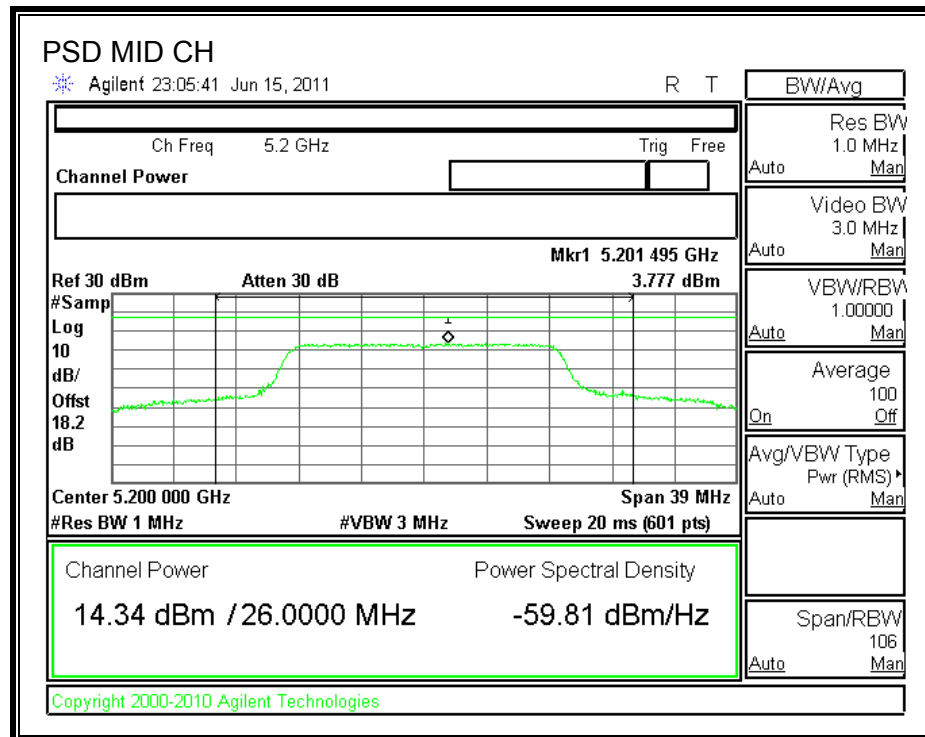
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

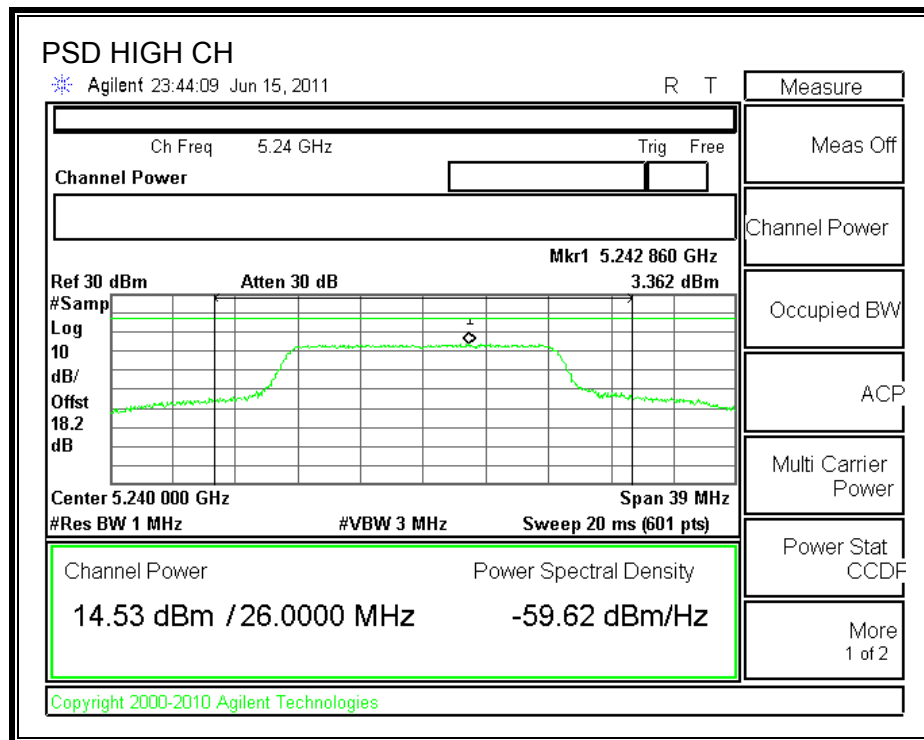
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.313	4	-0.69
Middle	5200	3.777	4	-0.22
High	5240	3.362	4	-0.64

POWER SPECTRAL DENSITY







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

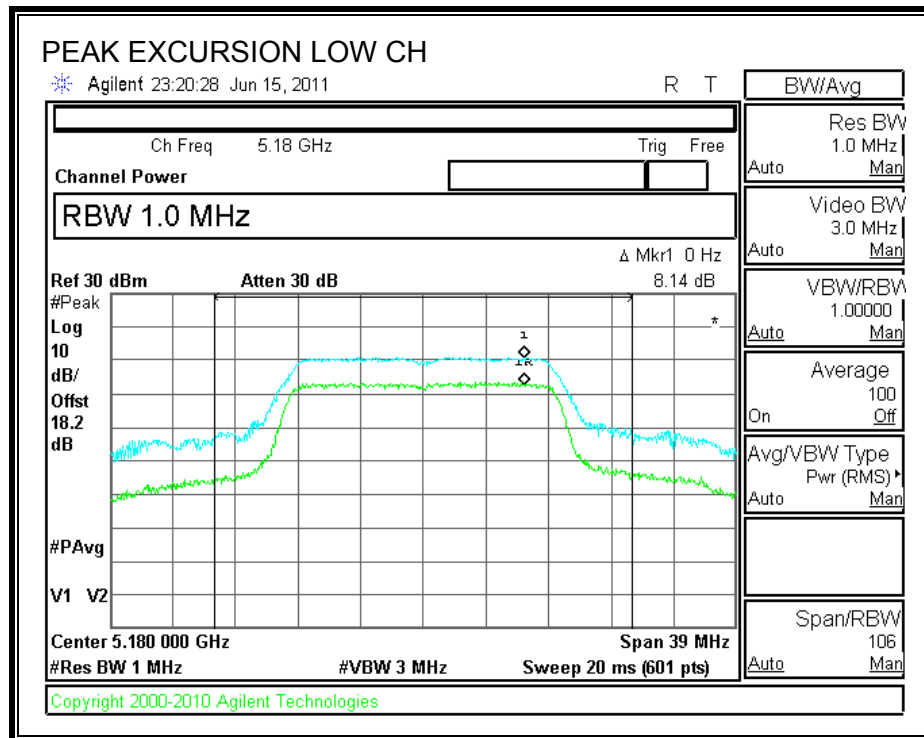
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

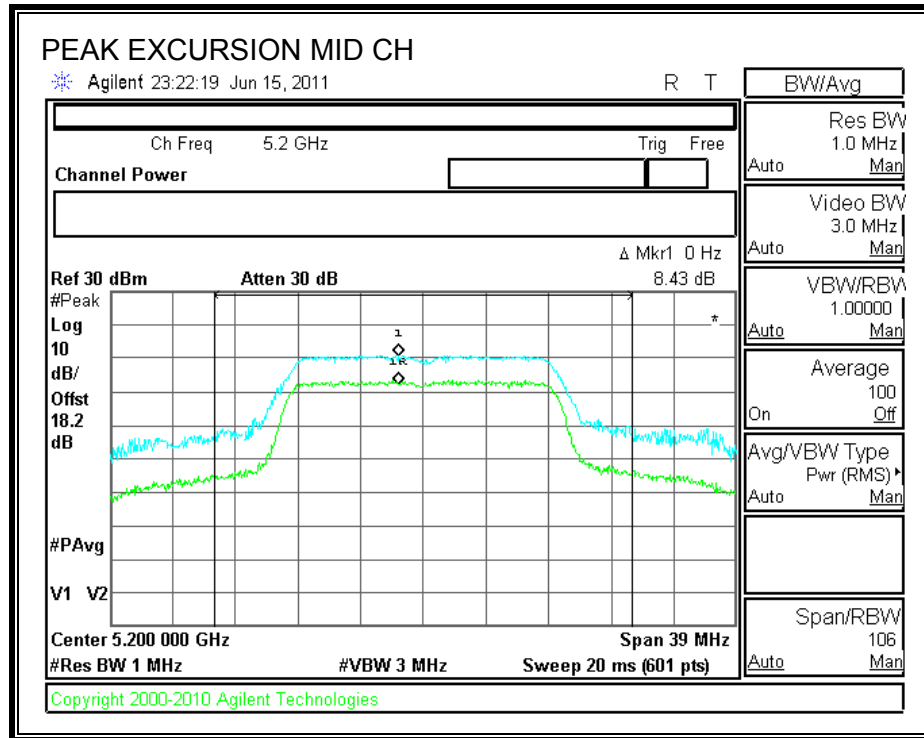
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

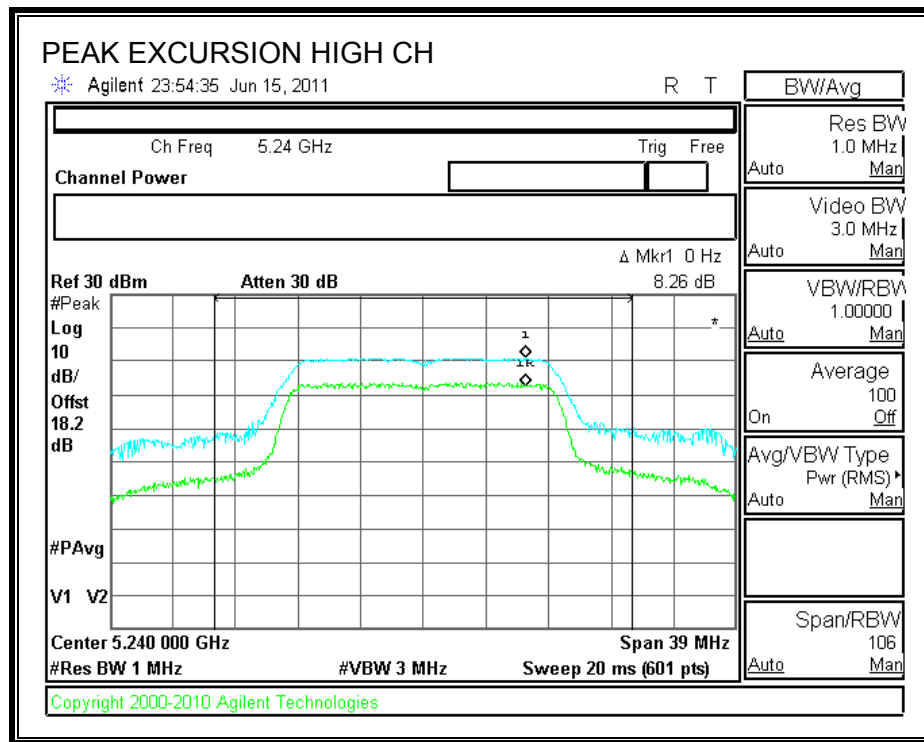
RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	8.14	13	-4.86
Middle	5200	8.43	13	-4.57
High	5240	8.26	13	-4.74

PEAK EXCURSION







7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

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

TEST PROCEDURE

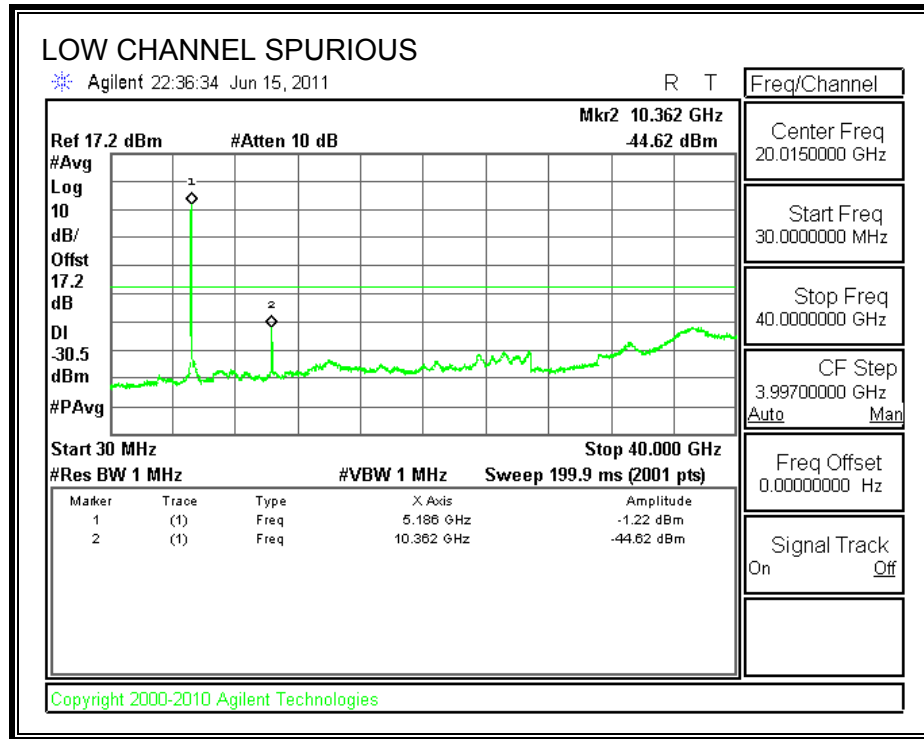
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

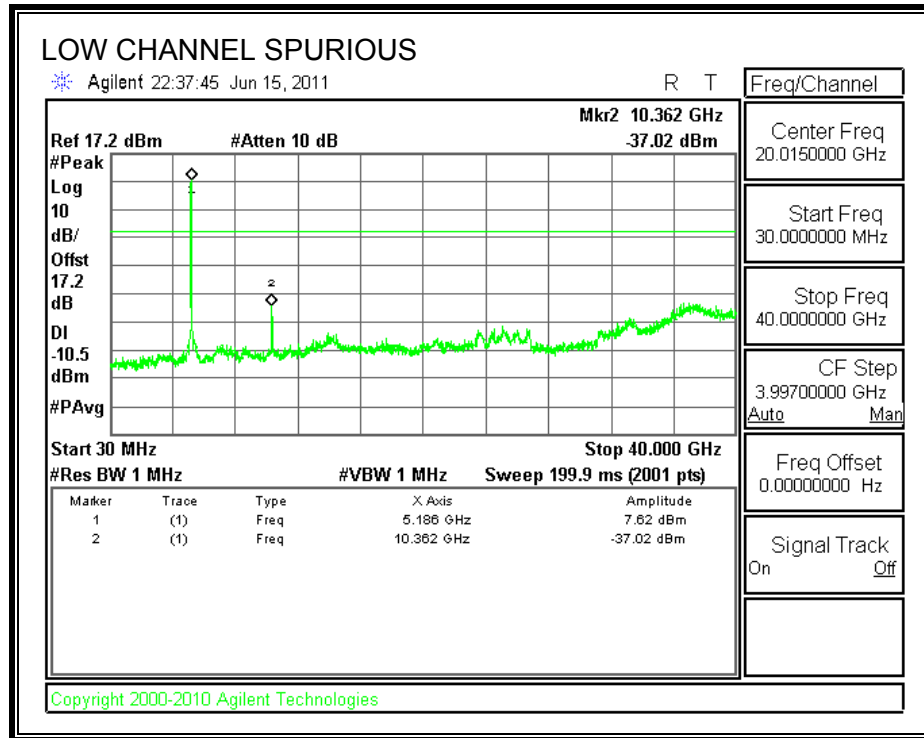
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

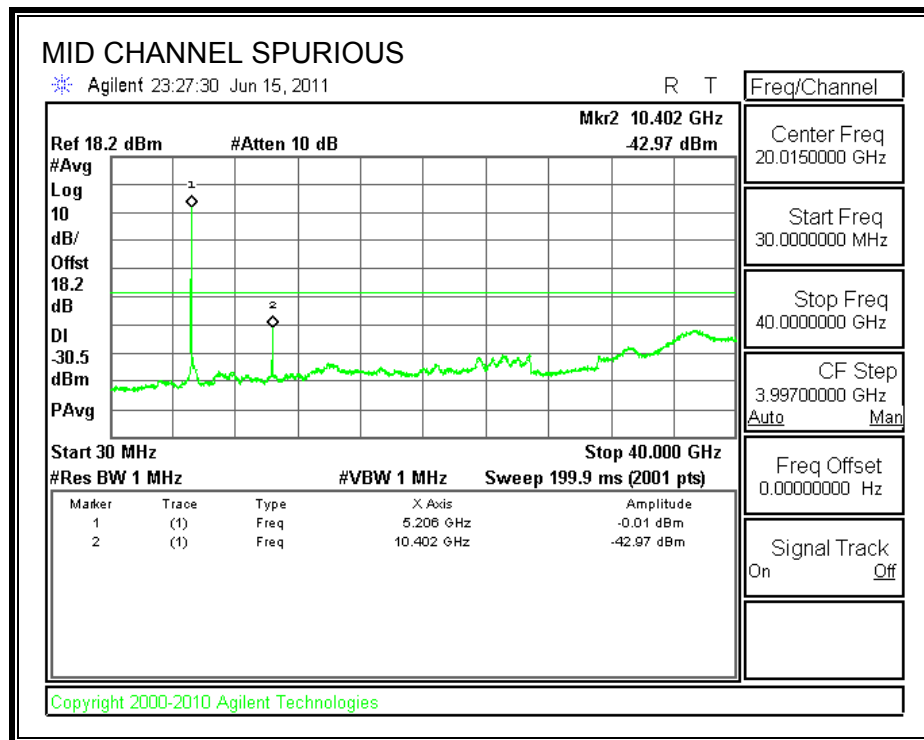
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

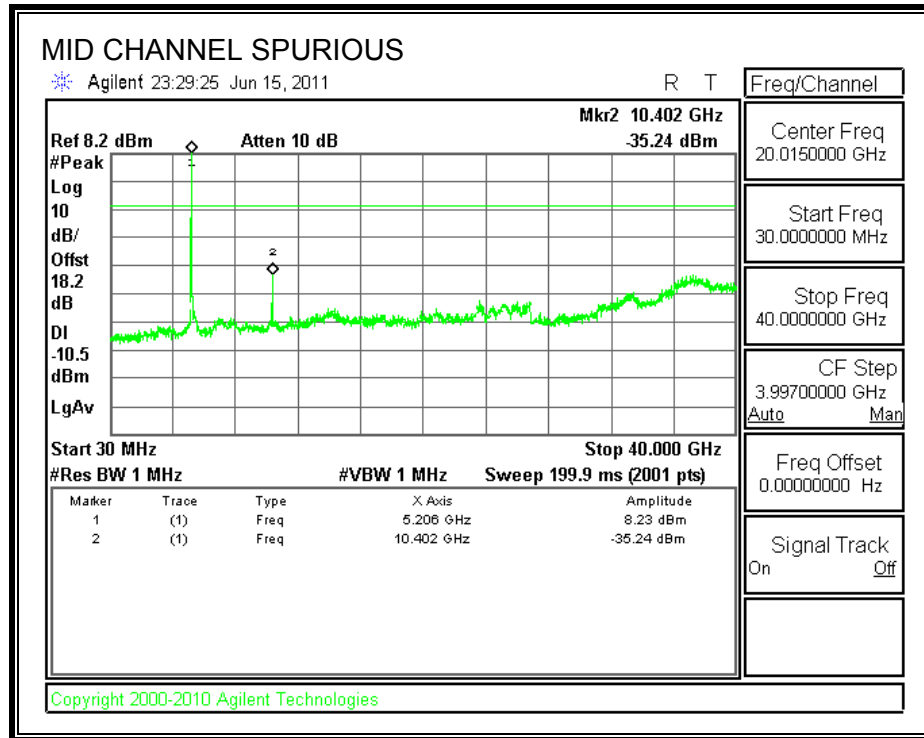
RESULTS

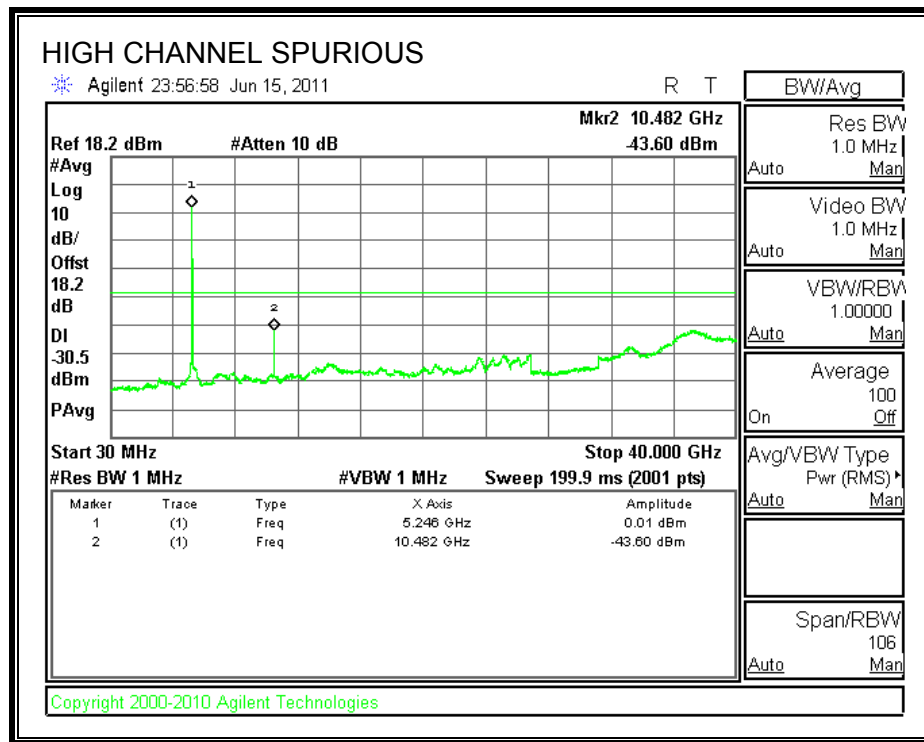
SPURIOUS EMISSIONS

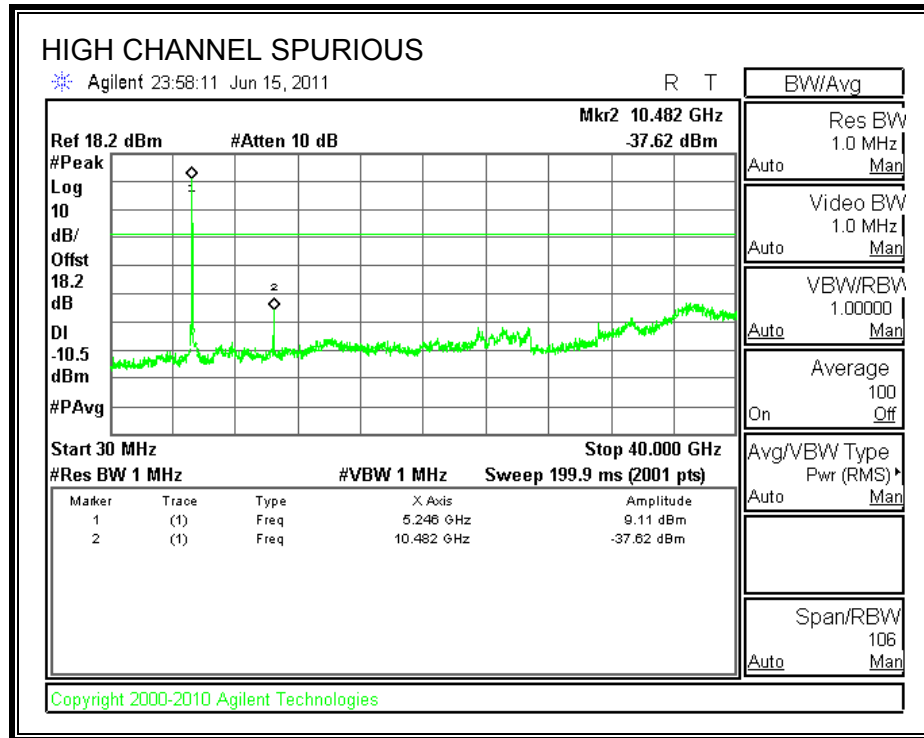












7.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

7.2.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

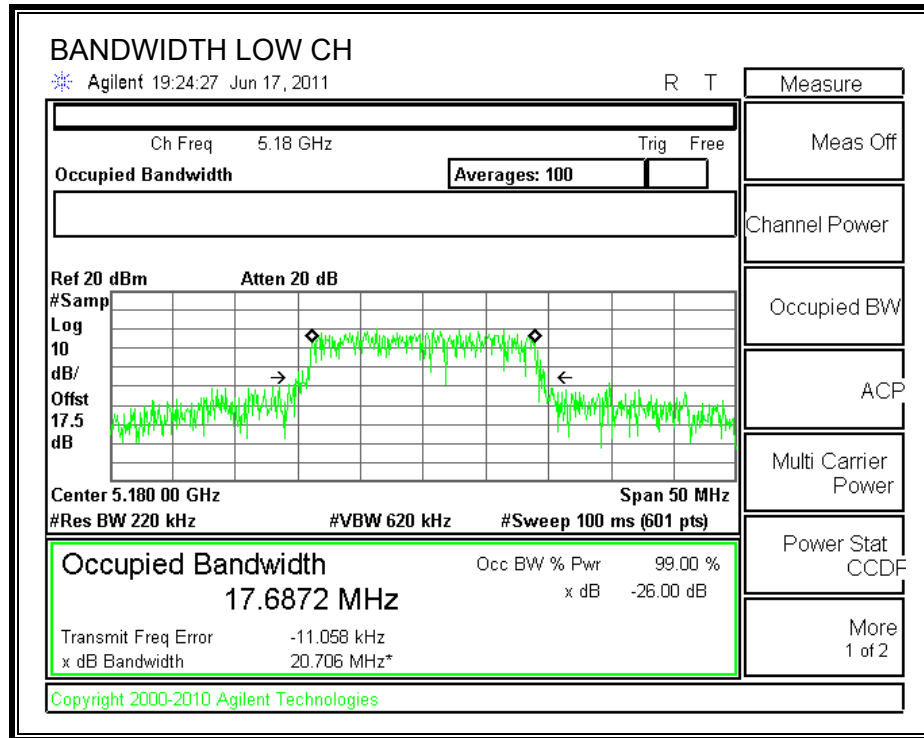
TEST PROCEDURE

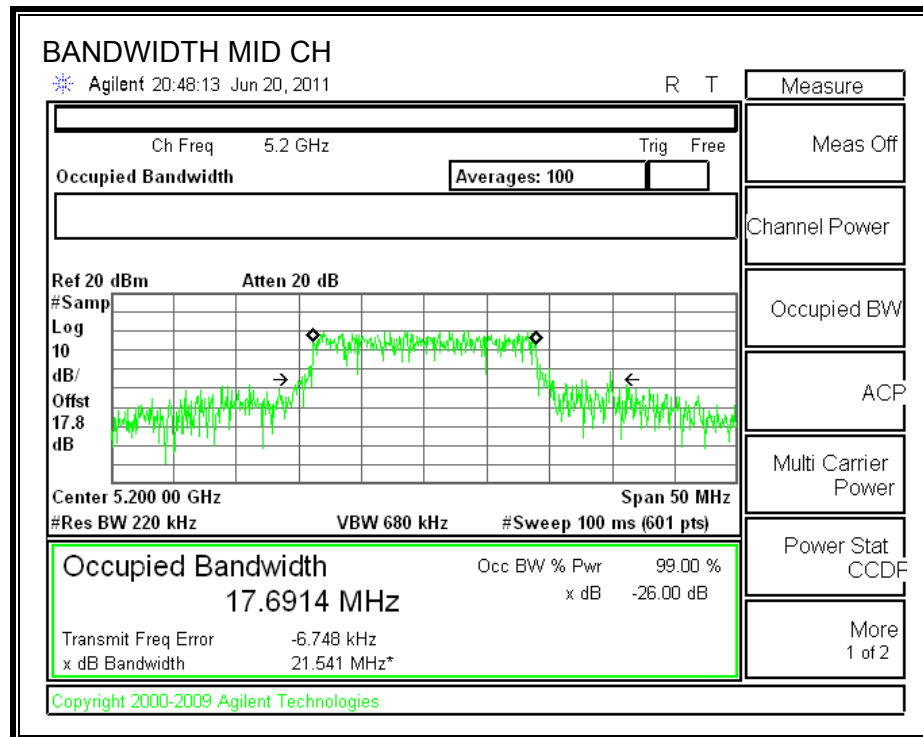
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

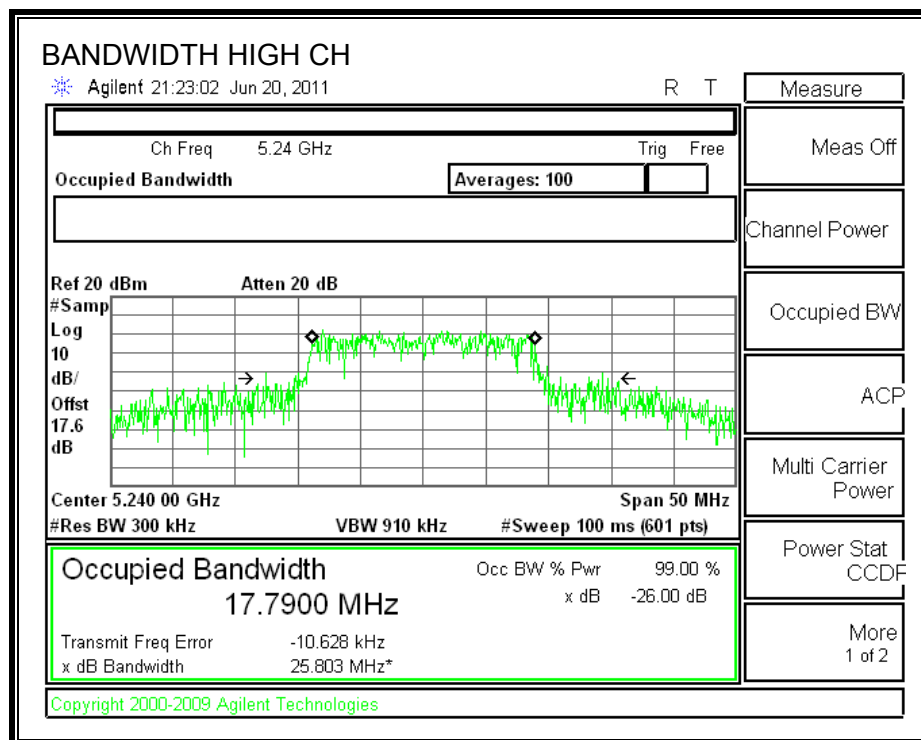
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	20.706	17.6872
Middle	5200	21.541	17.6914
High	5240	25.803	17.79

26 dB and 99% BANDWIDTH







7.2.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

TEST PROCEDURE

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

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

RESULTS

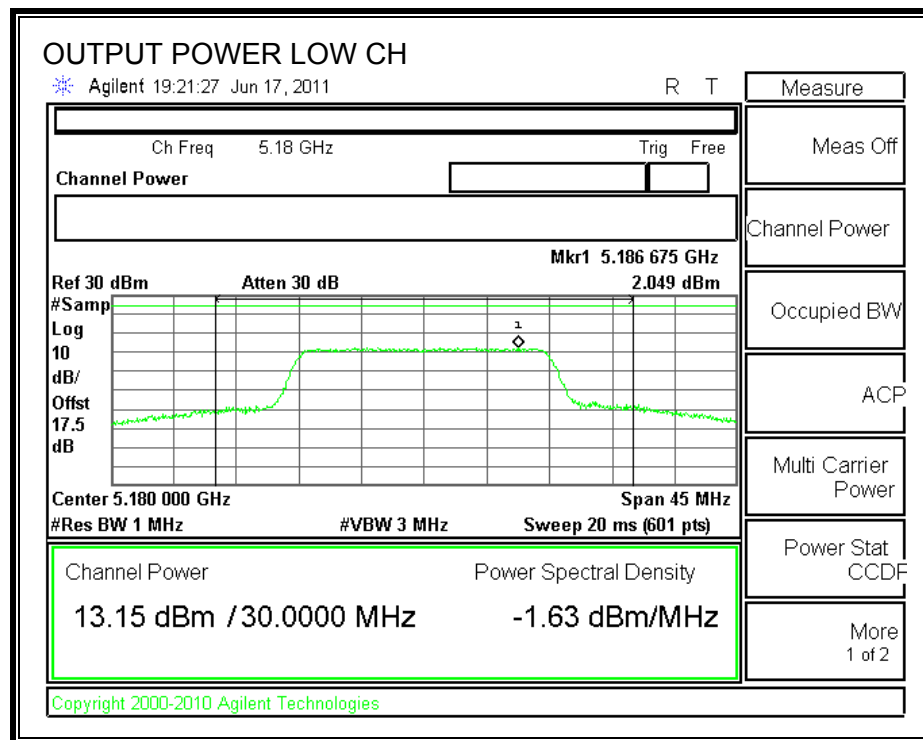
Limit

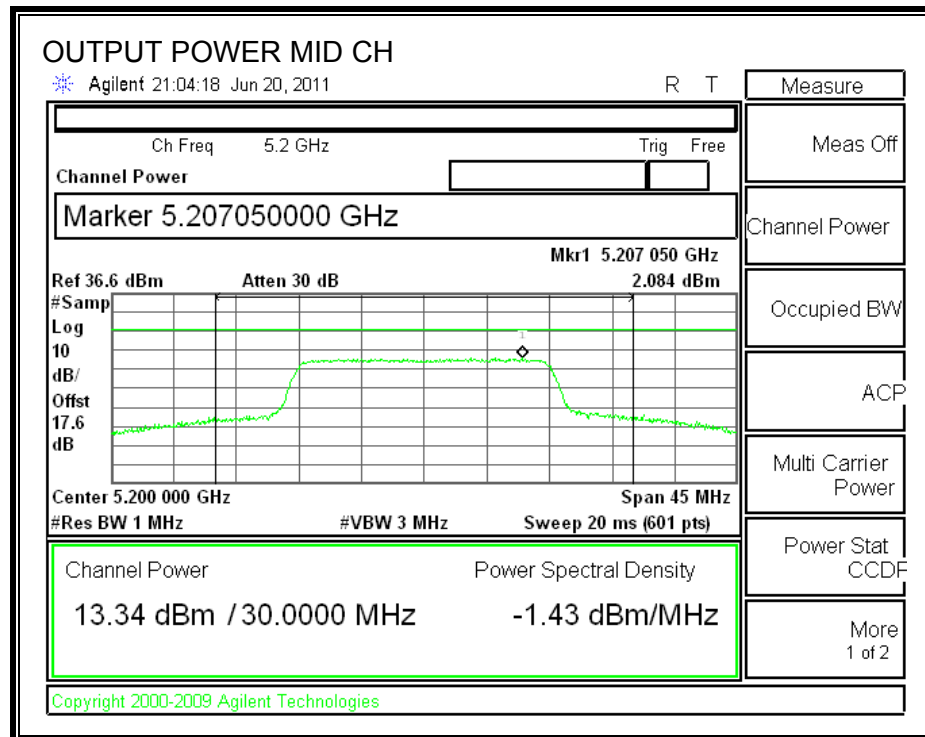
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	20.706	17.16	3.75	17.00
Mid	5200	17	21.541	17.33	3.75	17.00
High	5240	17	25.803	18.12	3.75	17.00

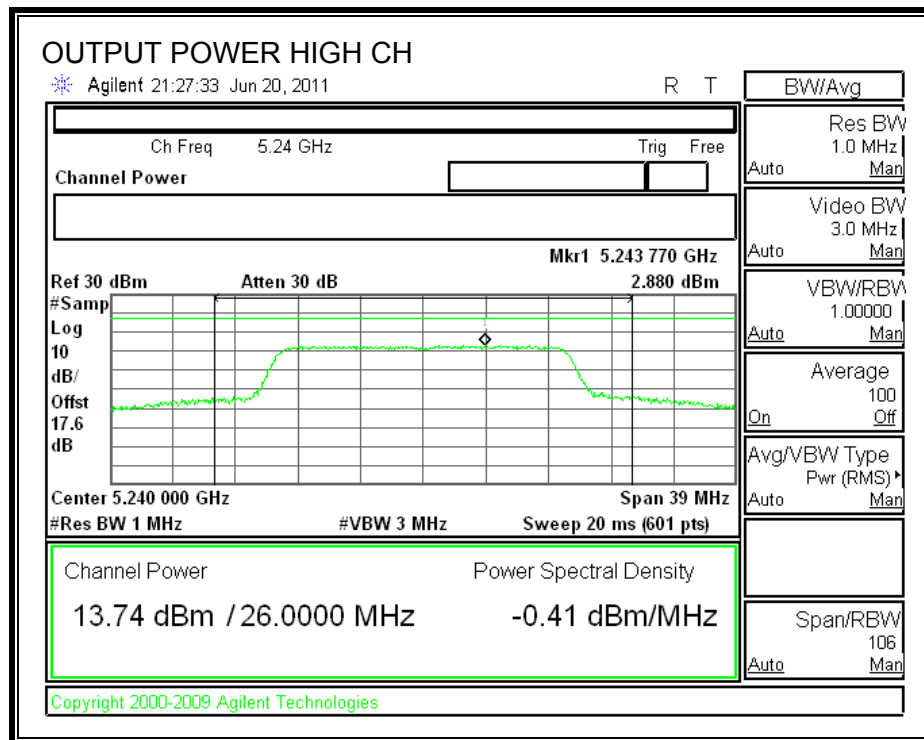
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	13.15	17.00	-3.85
Mid	5200	13.34	17.00	-3.66
High	5240	13.74	17.00	-3.26

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 17.6 dB (including 10 dB pad and 7.6 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	13.05
Middle	5200	13.29
High	5240	13.25

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.

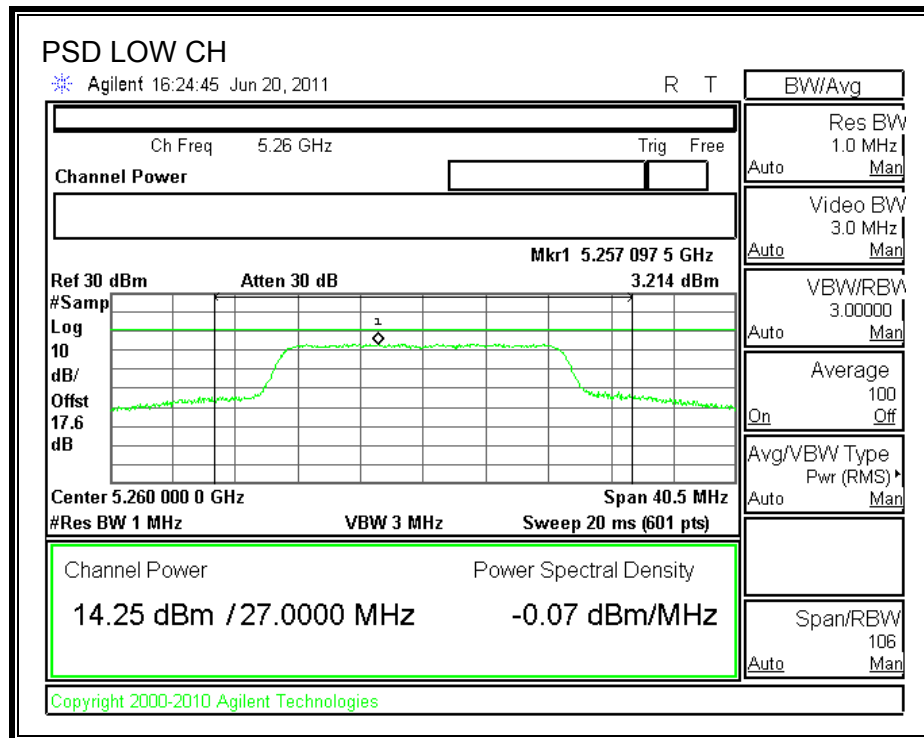
TEST PROCEDURE

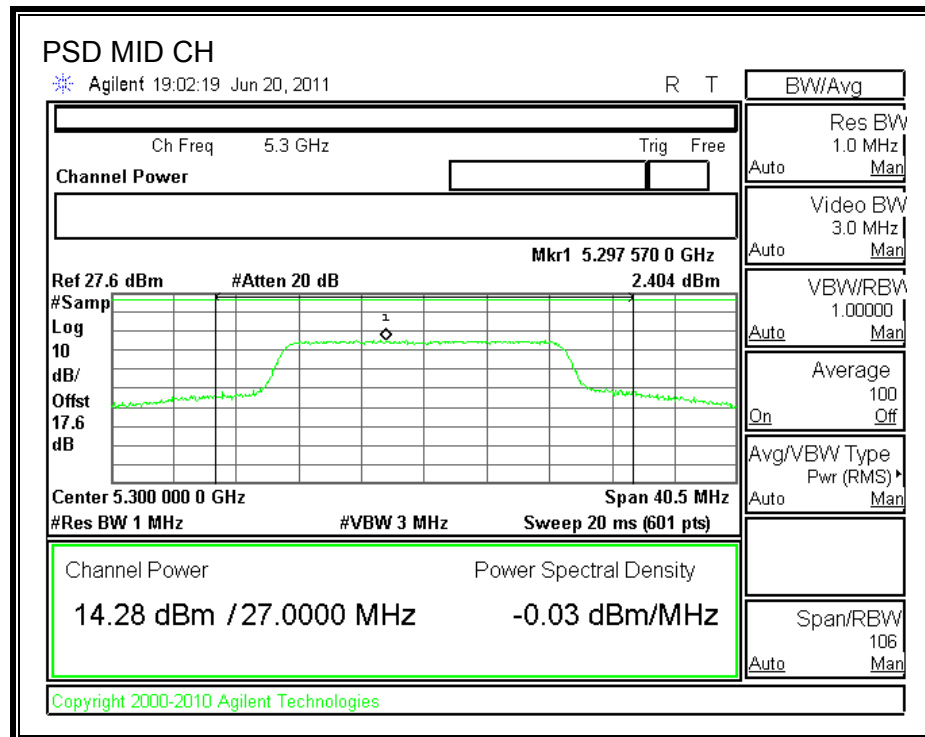
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

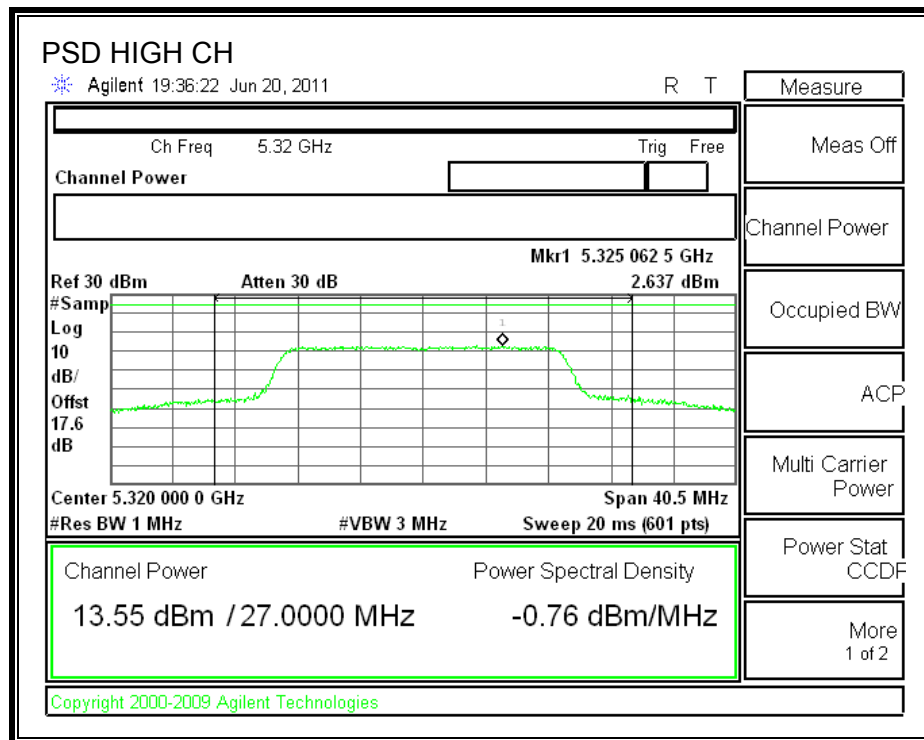
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.214	4	-0.79
Middle	5200	2.404	4	-1.60
High	5240	2.637	4	-1.36

POWER SPECTRAL DENSITY







7.2.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

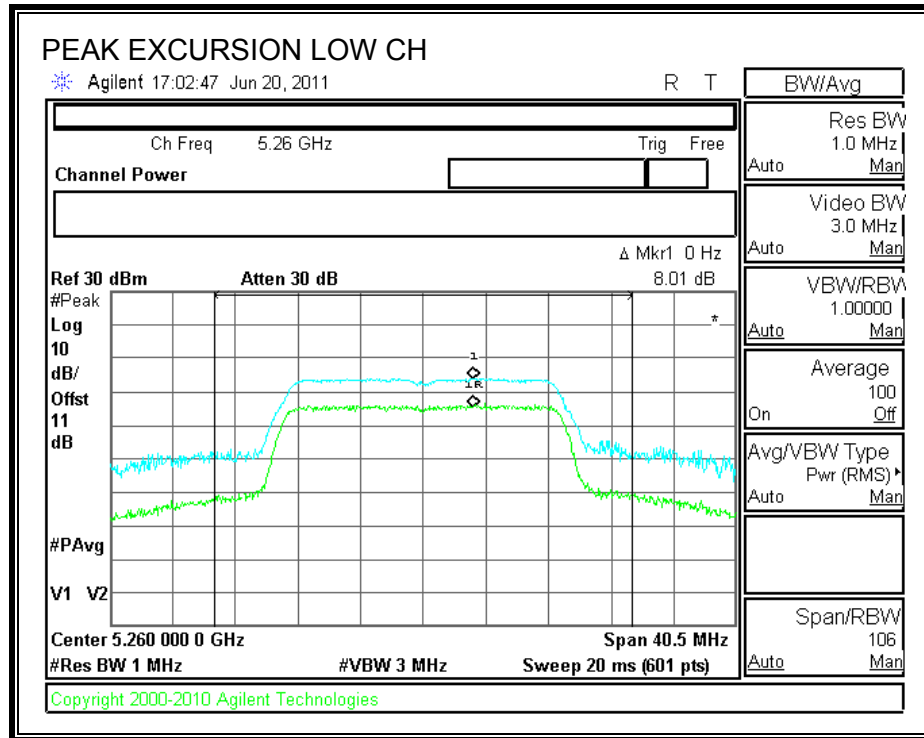
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

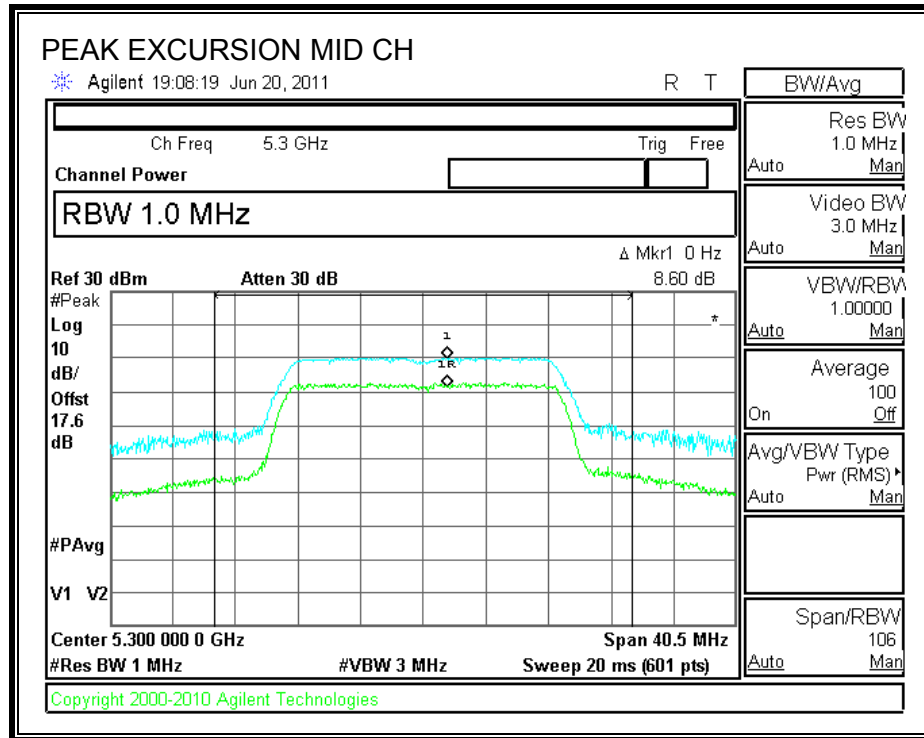
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

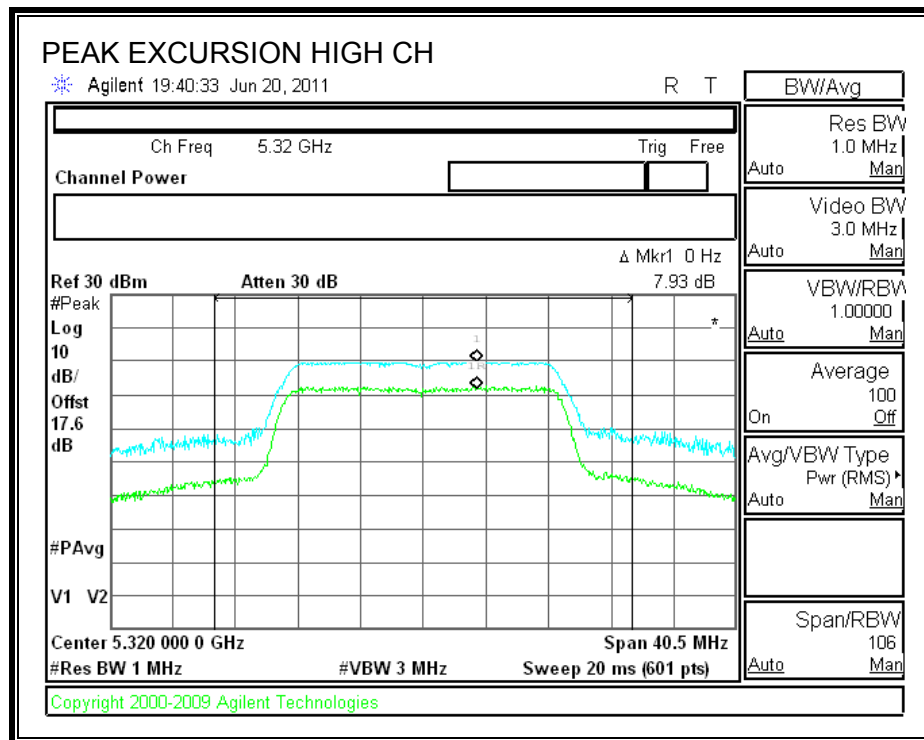
RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	8.01	13	-4.99
Middle	5200	8.60	13	-4.40
High	5240	7.93	13	-5.07

PEAK EXCURSION







7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

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

TEST PROCEDURE

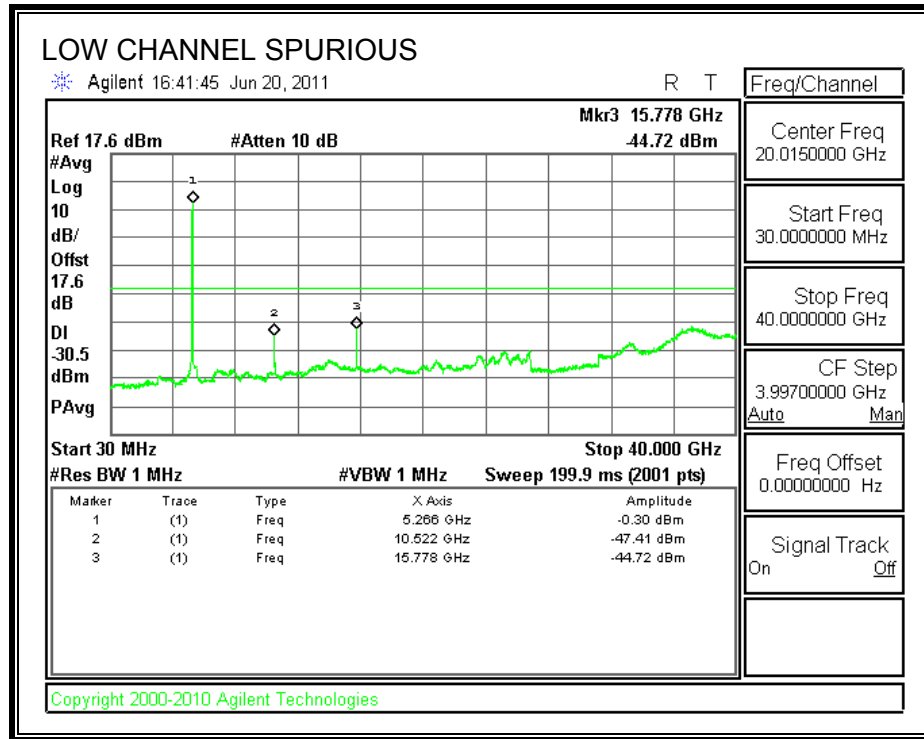
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

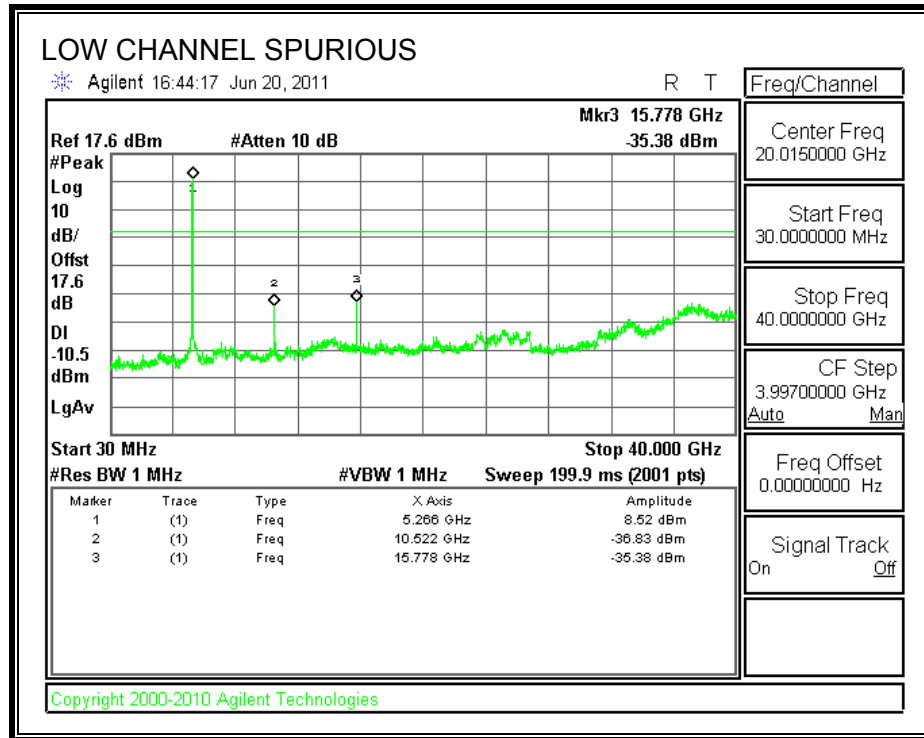
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

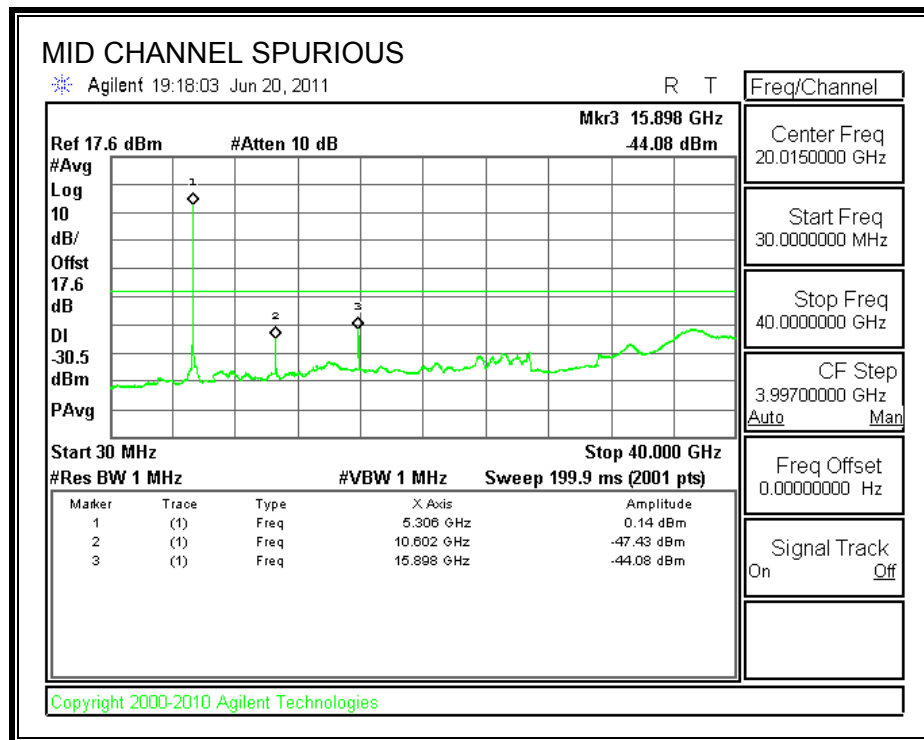
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

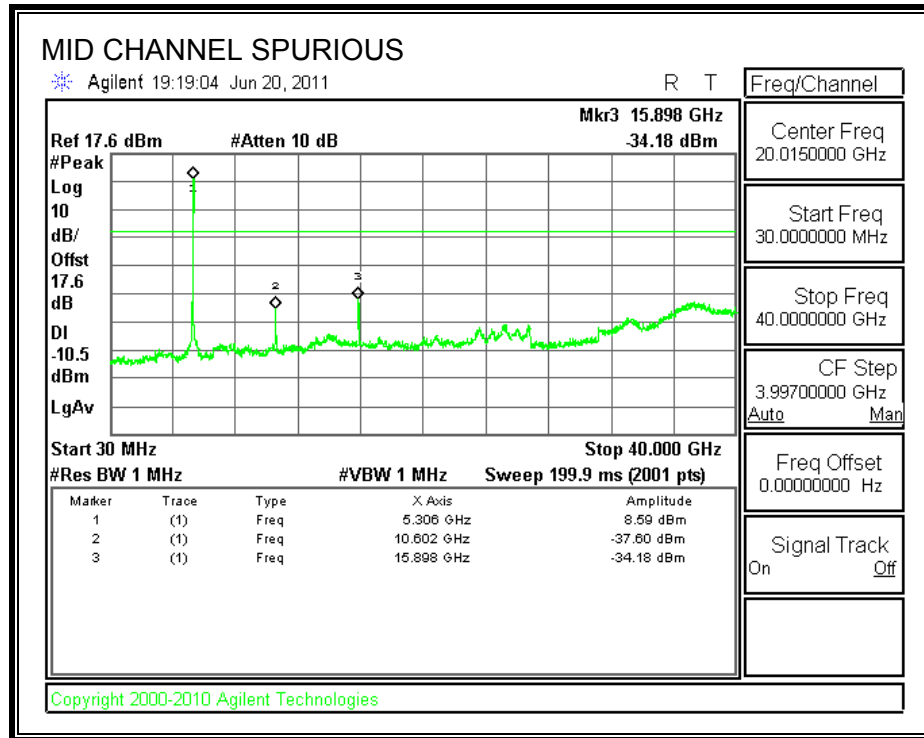
RESULTS

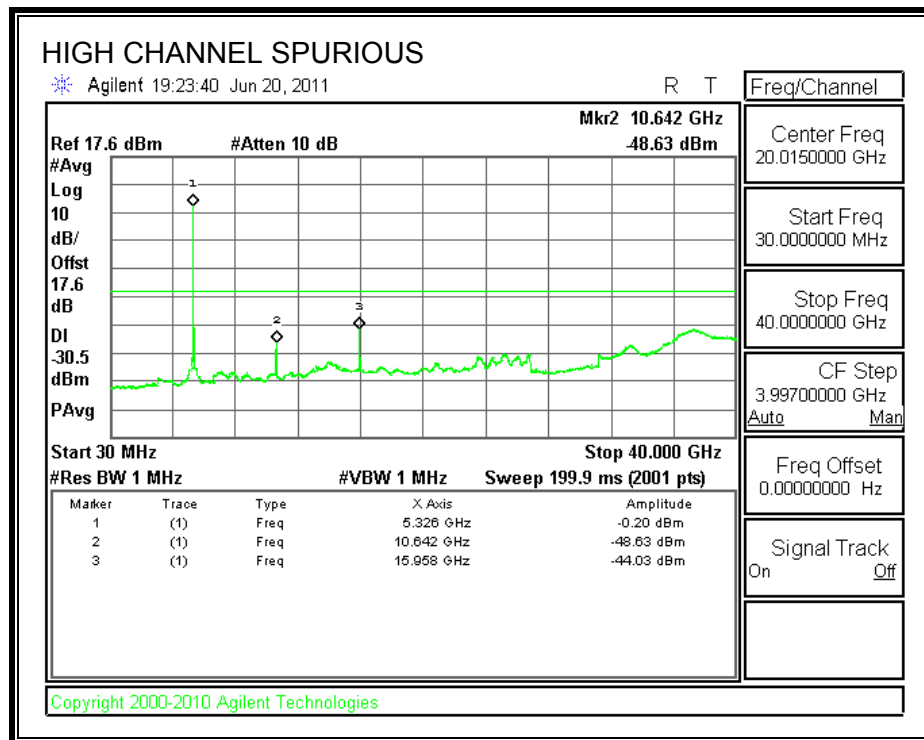
SPURIOUS EMISSIONS

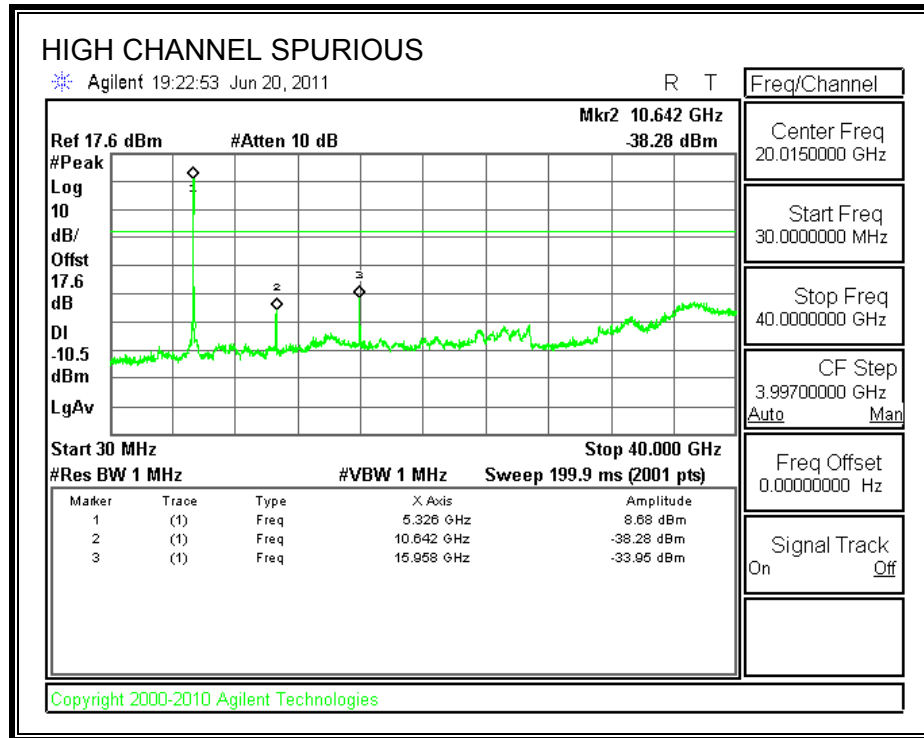












7.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

7.3.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

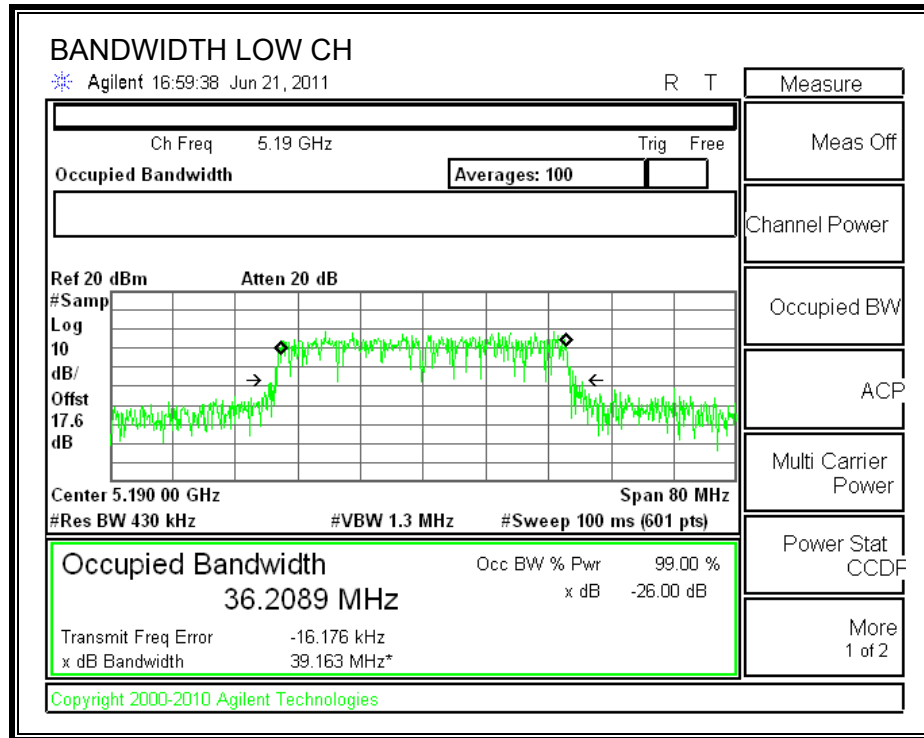
TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5190	39.163	36.0289
High	5230	39.988	36.2282

26 dB and 99% BANDWIDTH





7.3.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

TEST PROCEDURE

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

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

RESULTS

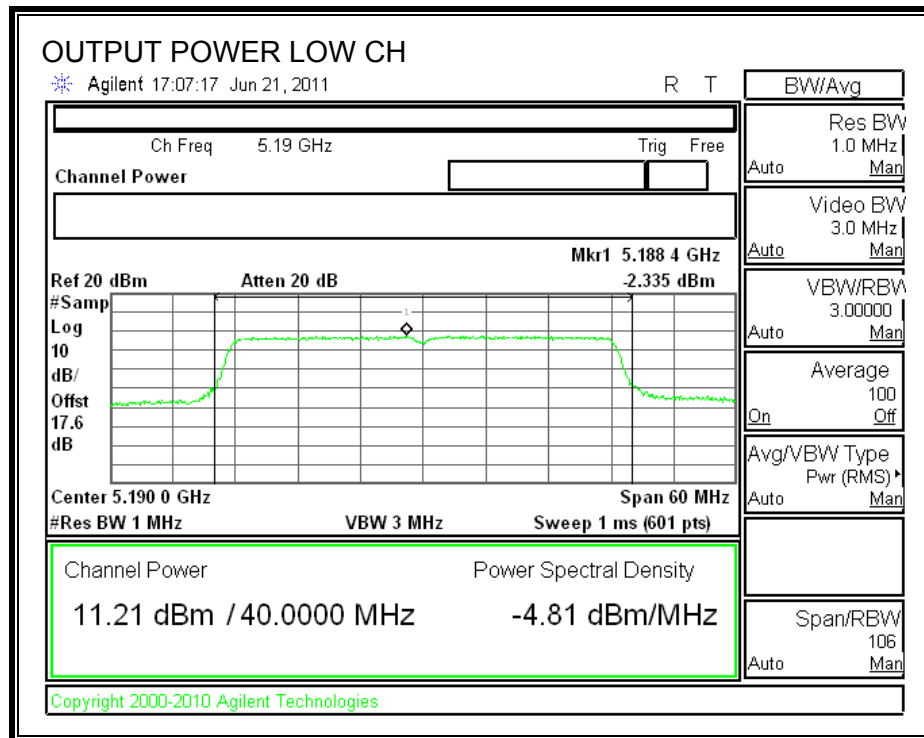
Limit

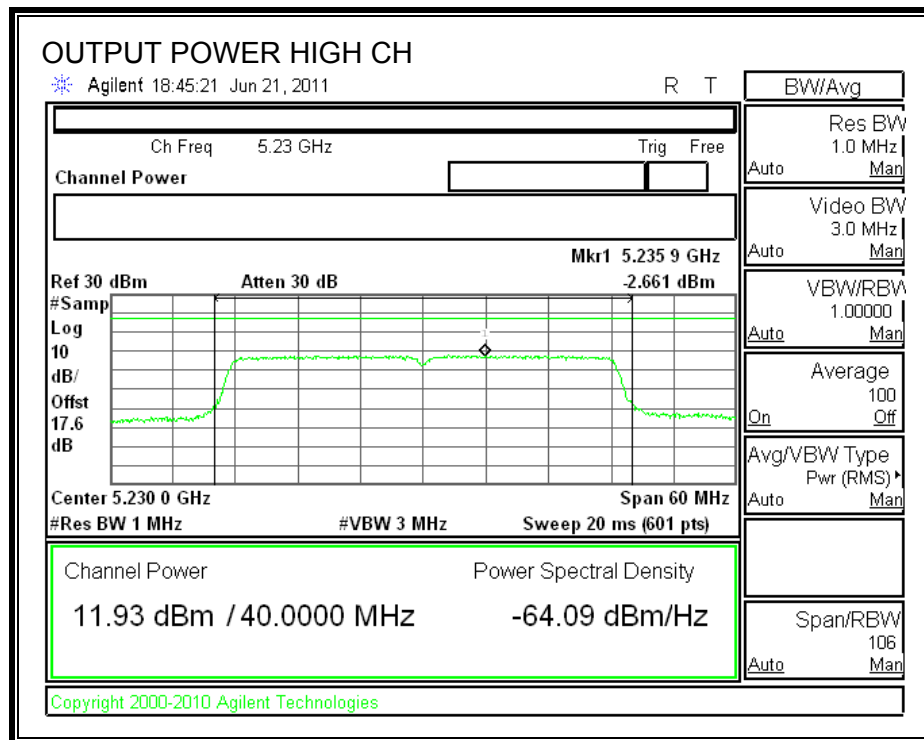
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5190	17	39.163	19.93	3.75	17.00
High	5230	17	39.988	20.02	3.75	17.00

Individual Chain Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5190	11.21	17.00	-5.79
High	5230	11.93	17.00	-5.07

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 17.7 dB (including 10 dB pad and 7.7 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	11.18
High	5230	11.08

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.

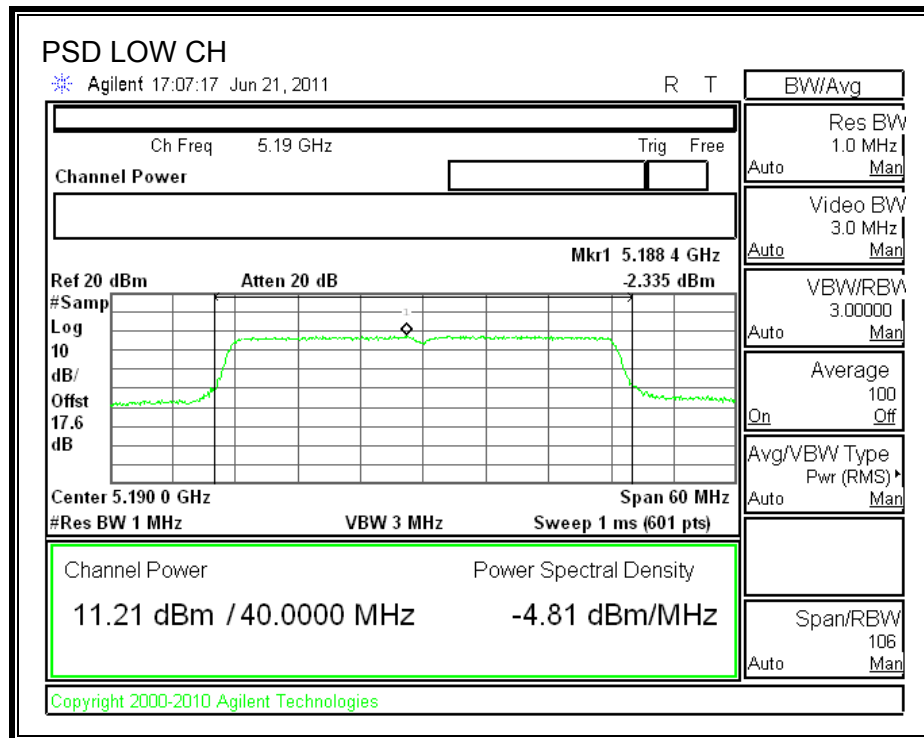
TEST PROCEDURE

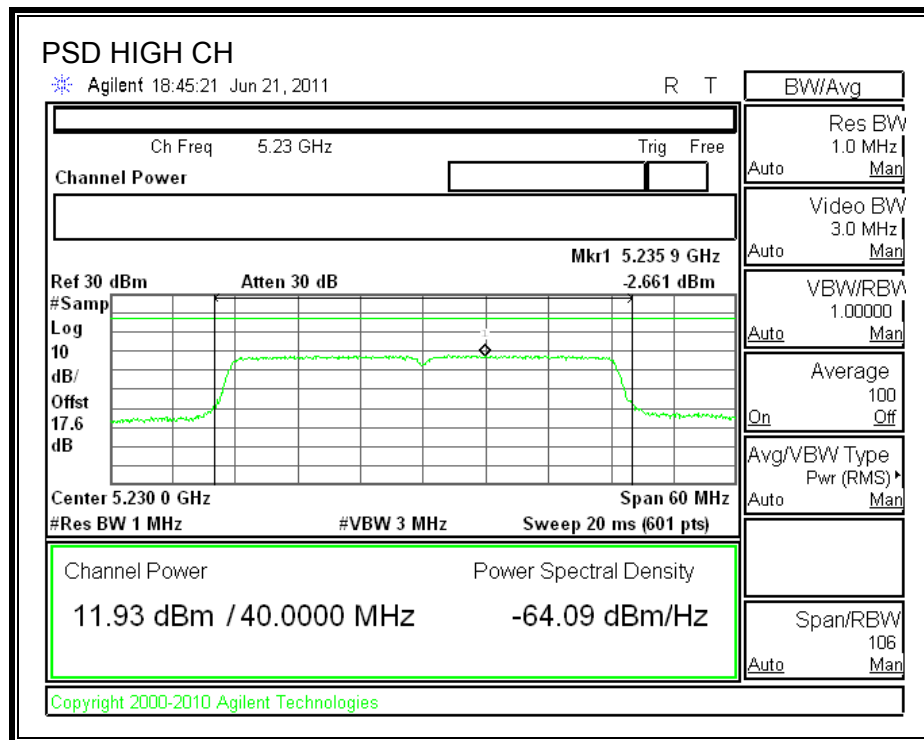
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5190	-2.335	4	-6.34
High	5230	-2.661	4	-6.66

POWER SPECTRAL DENSITY





7.3.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

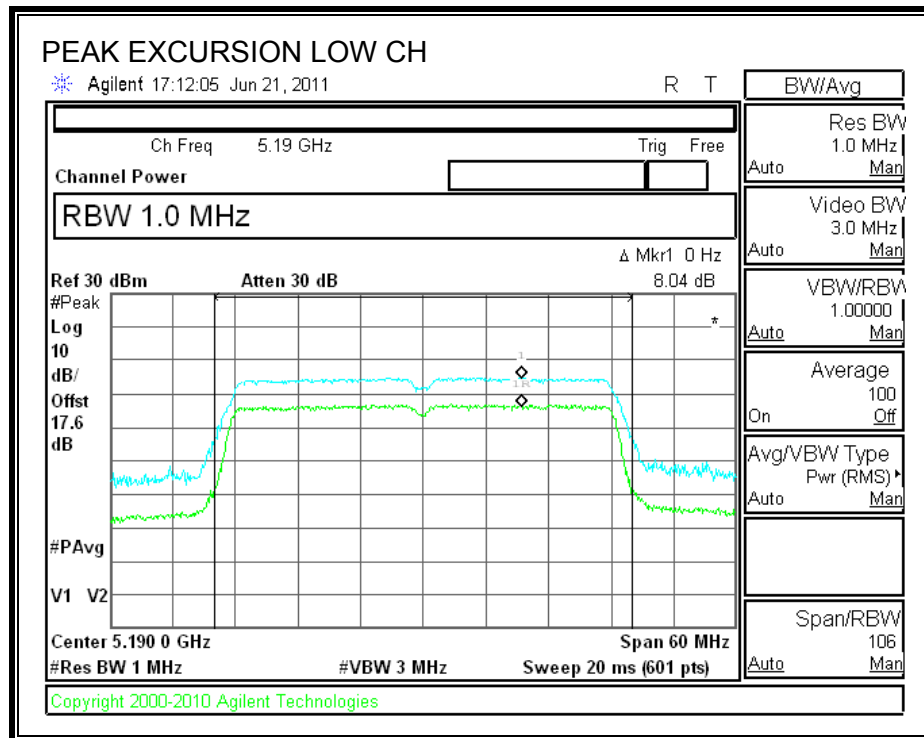
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

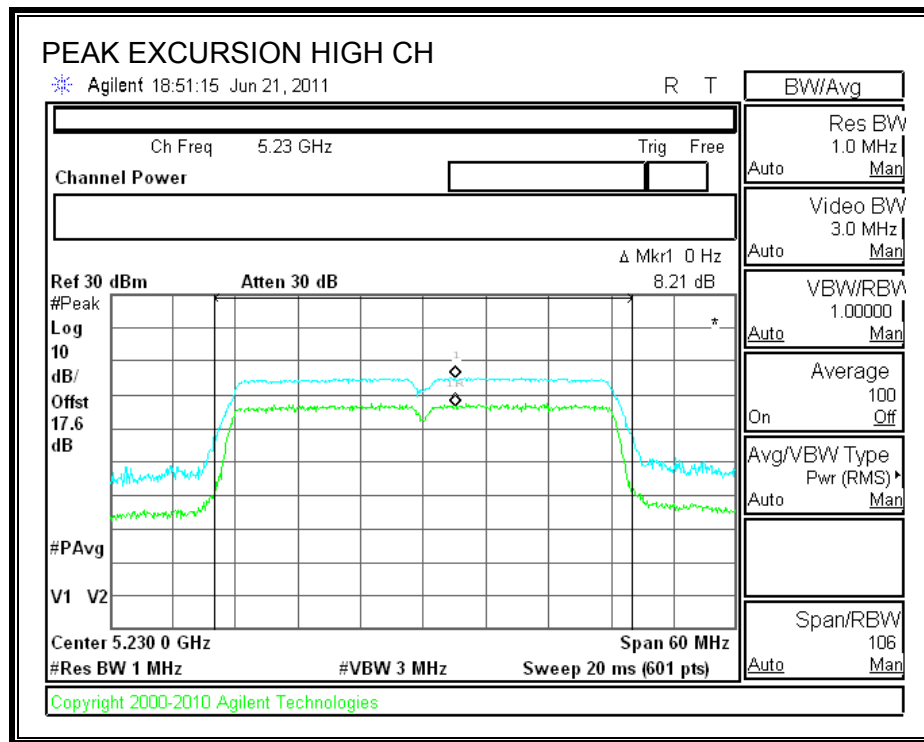
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5190	8.04	13	-4.96
High	5230	8.21	13	-4.79

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

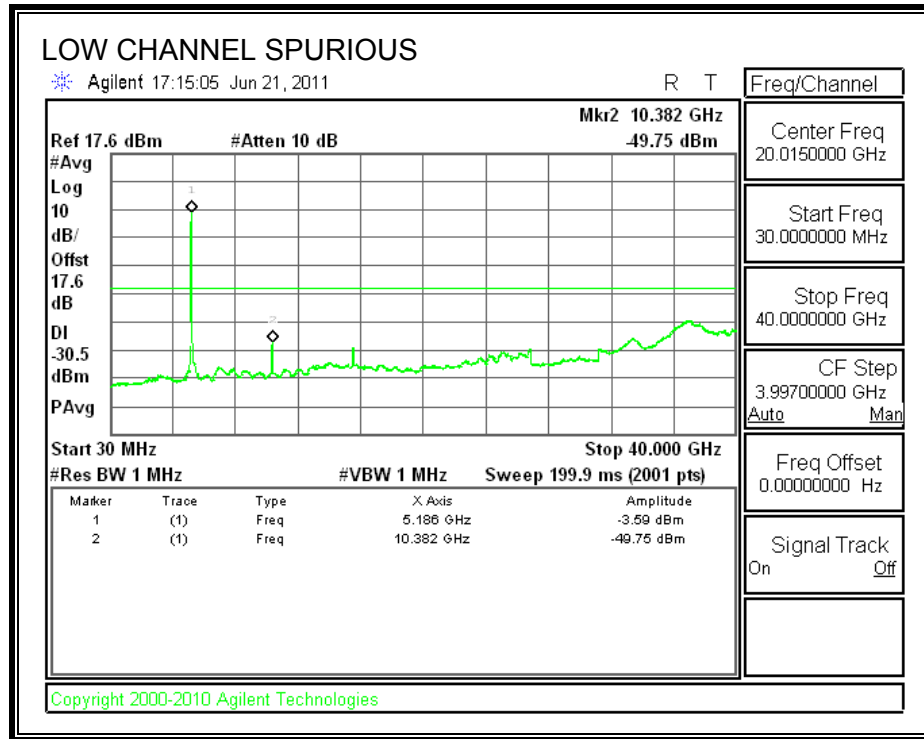
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

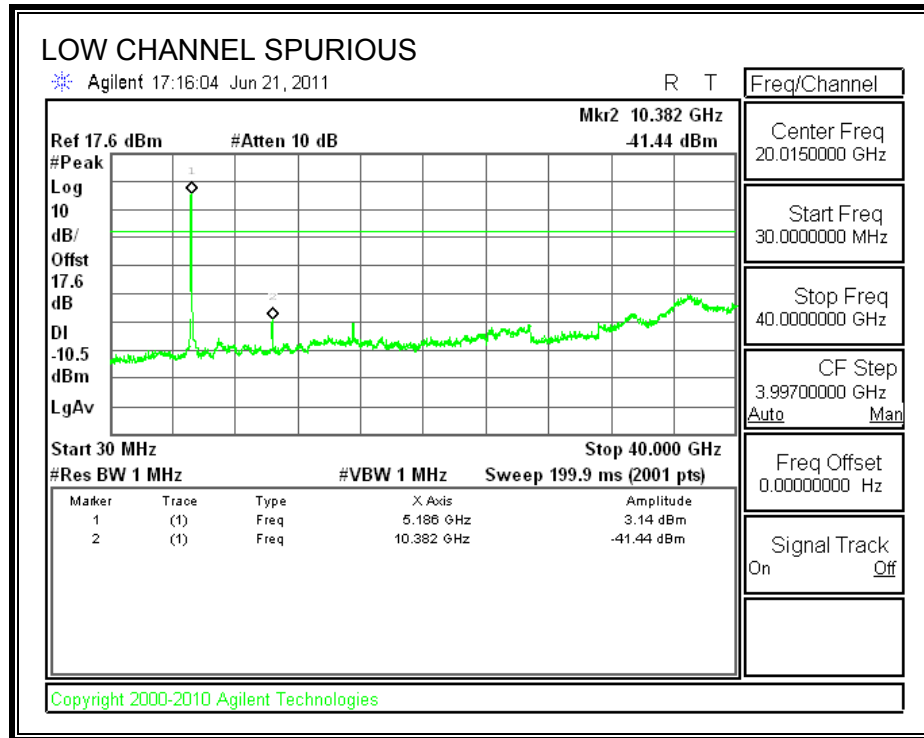
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

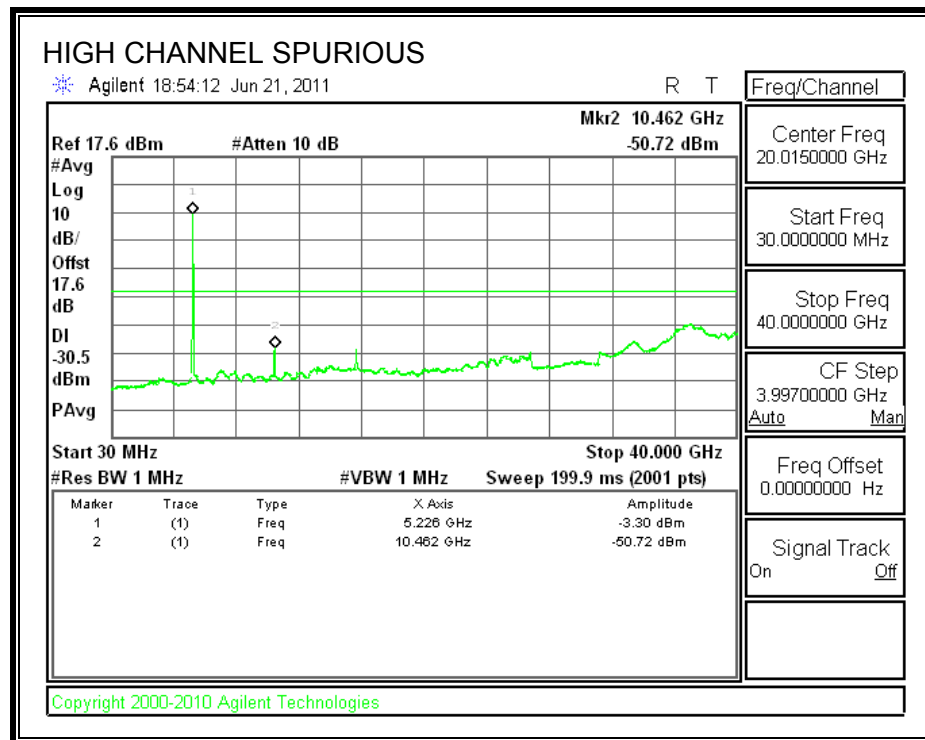
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

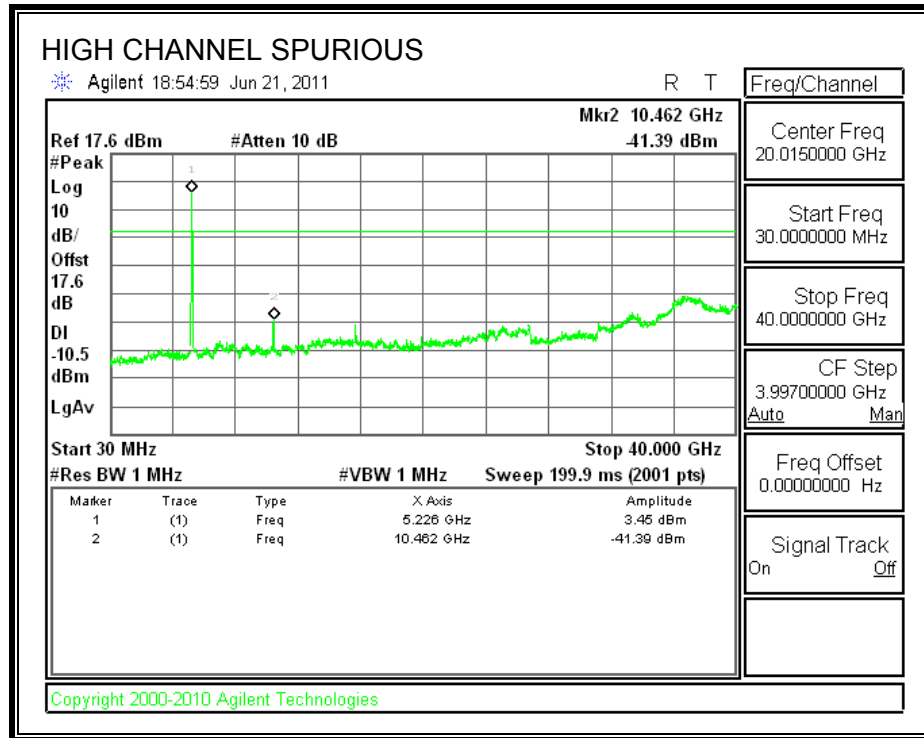
RESULTS

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.

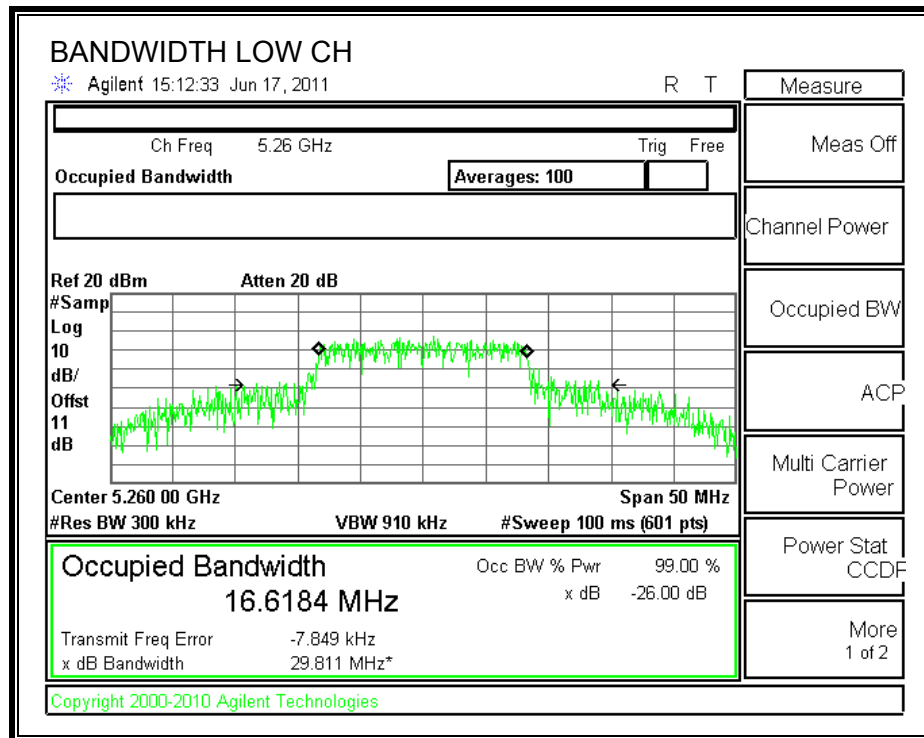
TEST PROCEDURE

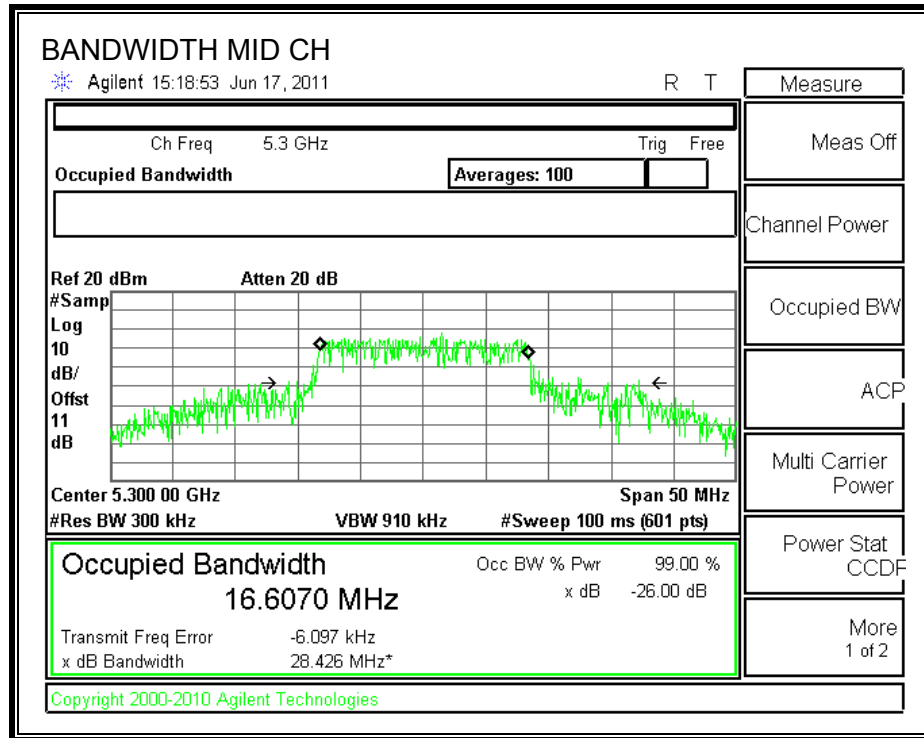
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

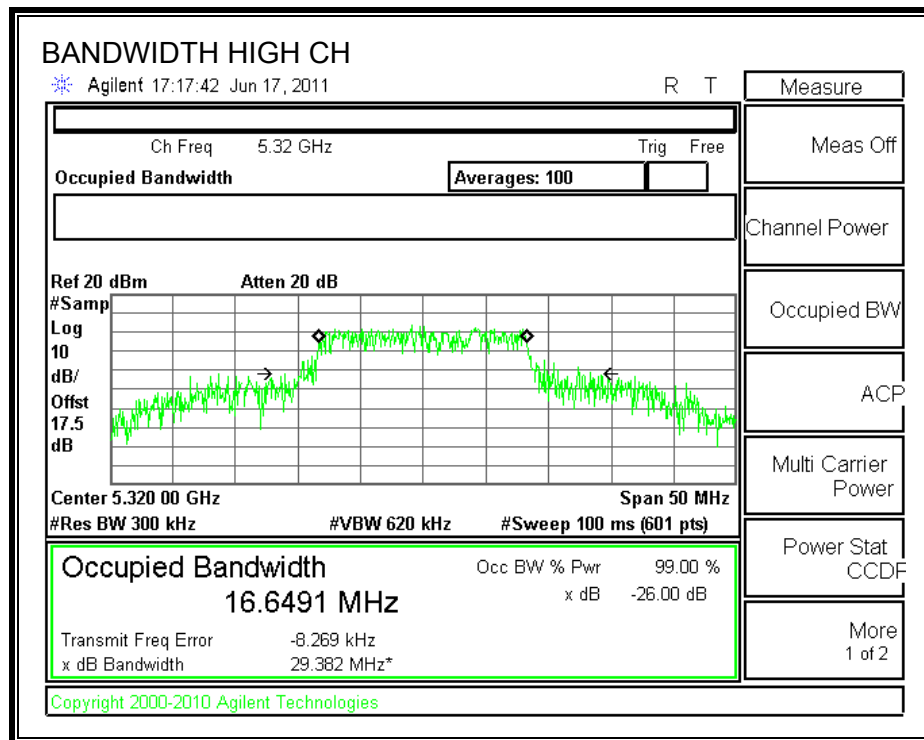
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5260	29.811	16.6184
Middle	5300	28.426	16.607
High	5320	29.382	16.6491

26 dB and 99% BANDWIDTH







7.4.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

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

TEST PROCEDURE

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

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

RESULTS

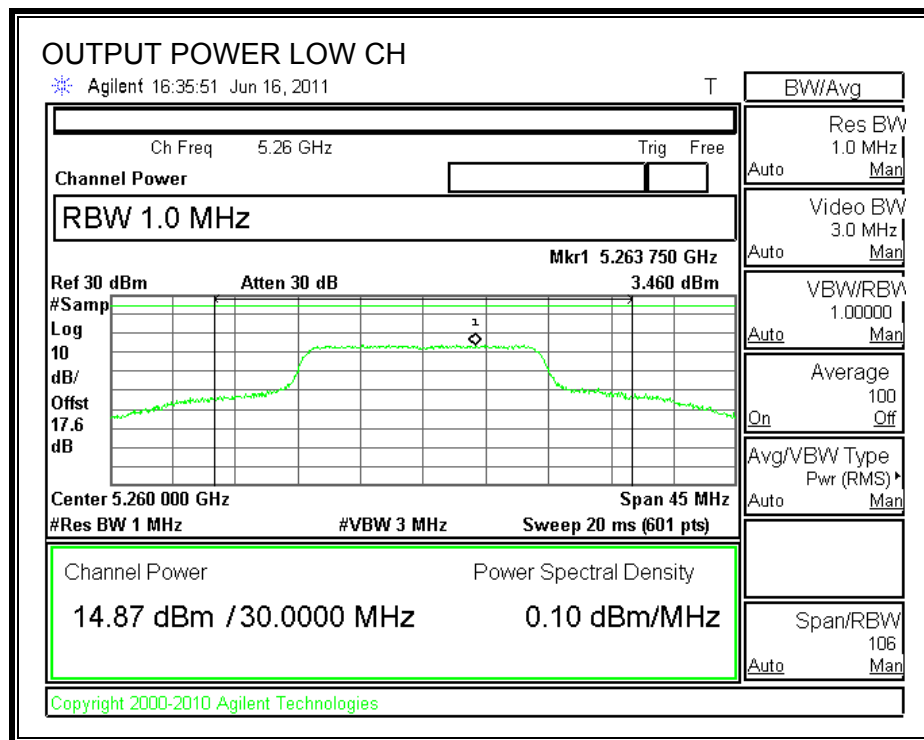
Limit

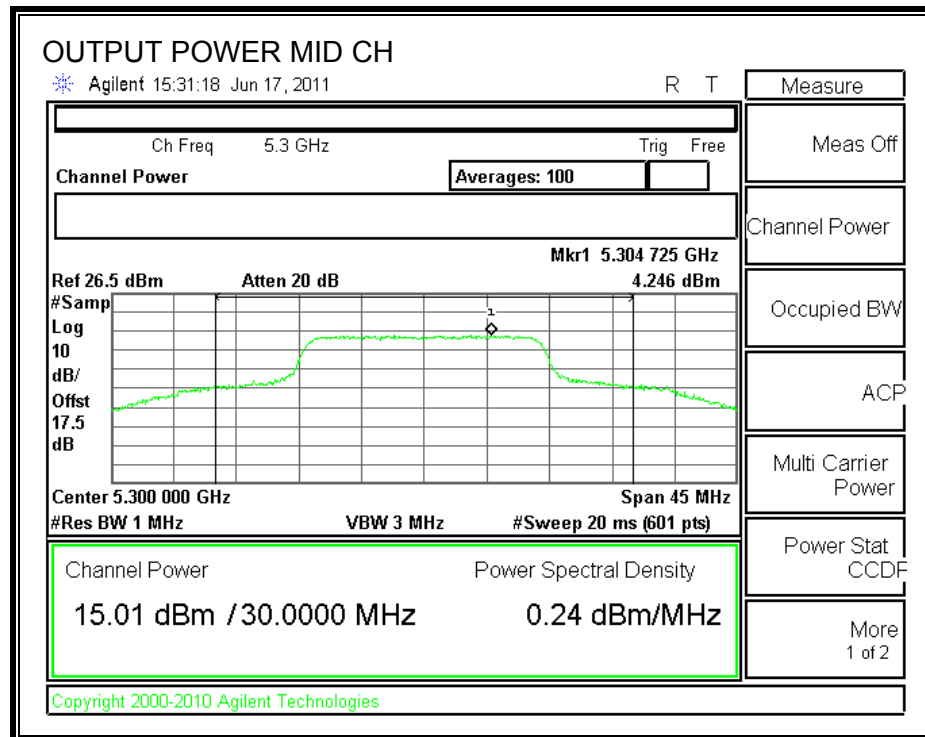
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5260	24	29.811	25.74	3.75	24.00
Mid	5300	24	28.426	25.54	3.75	24.00
High	5320	24	29.382	25.68	3.75	24.00

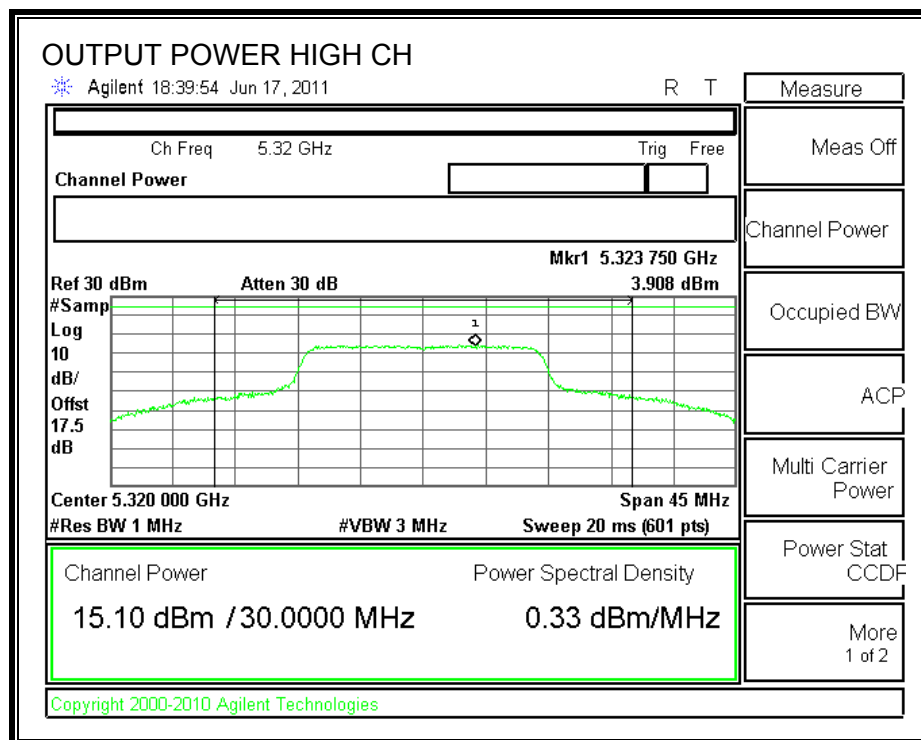
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5260	14.87	24.00	-9.13
Mid	5300	15.01	24.00	-8.99
High	5320	15.10	24.00	-8.90

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 17.2 dB (including 10 dB pad and 7.2 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	14.73
Middle	5300	14.53
High	5320	14.59

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.

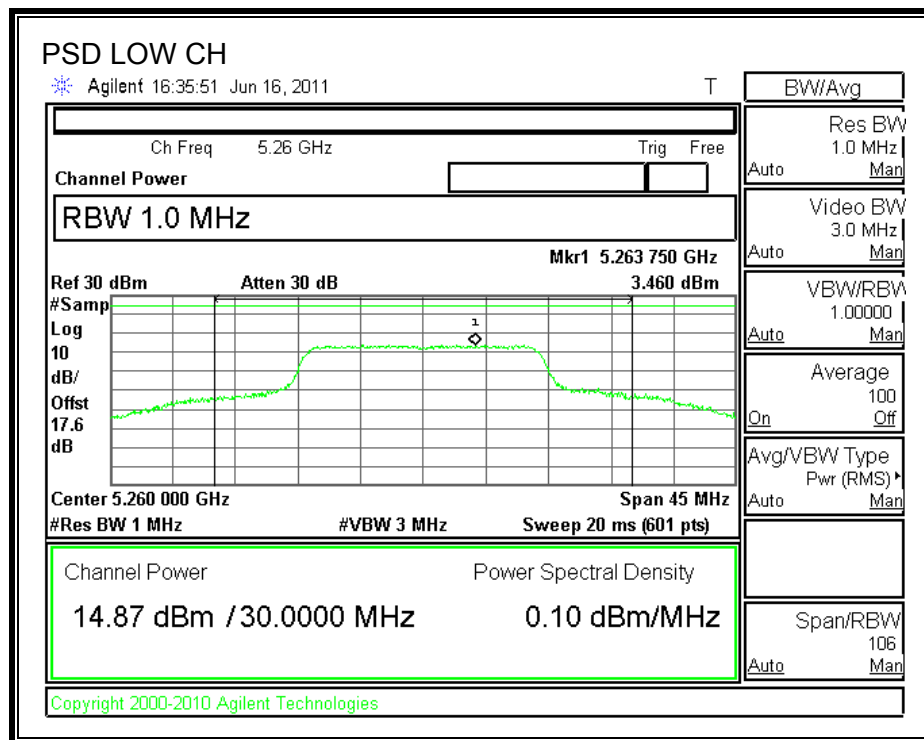
TEST PROCEDURE

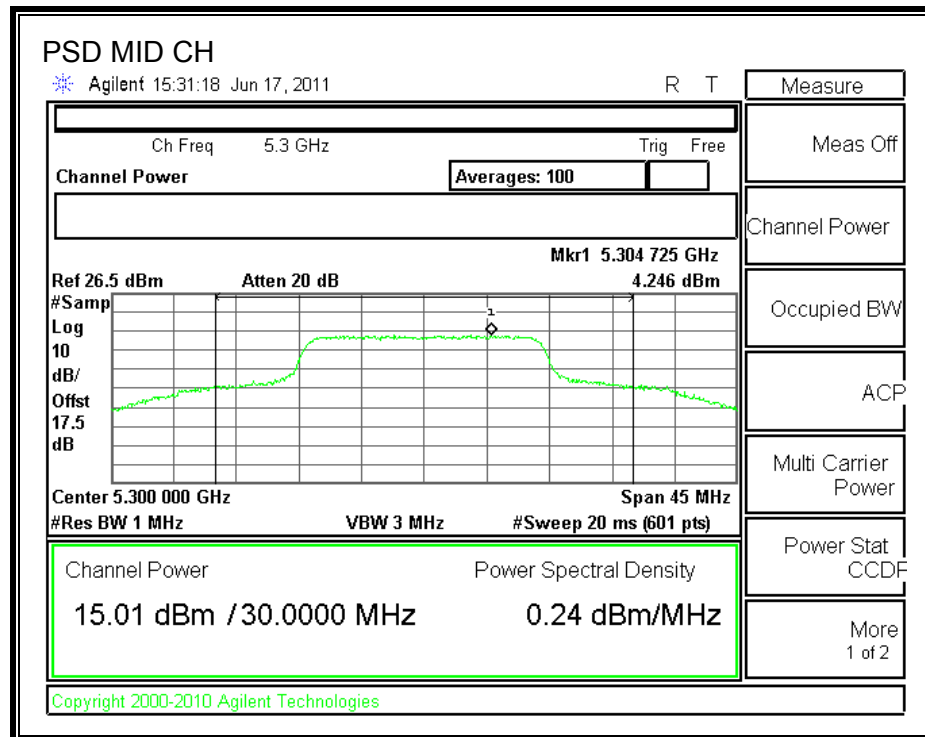
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

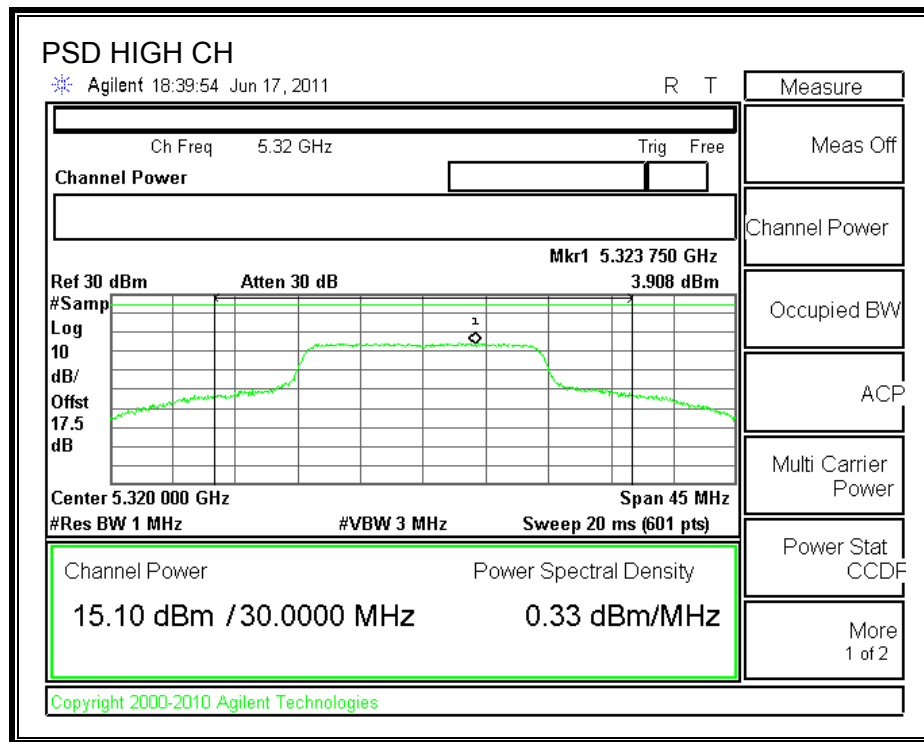
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5260	3.460	11	-7.540
Middle	5300	4.246	11	-6.754
High	5320	3.908	11	-7.092

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

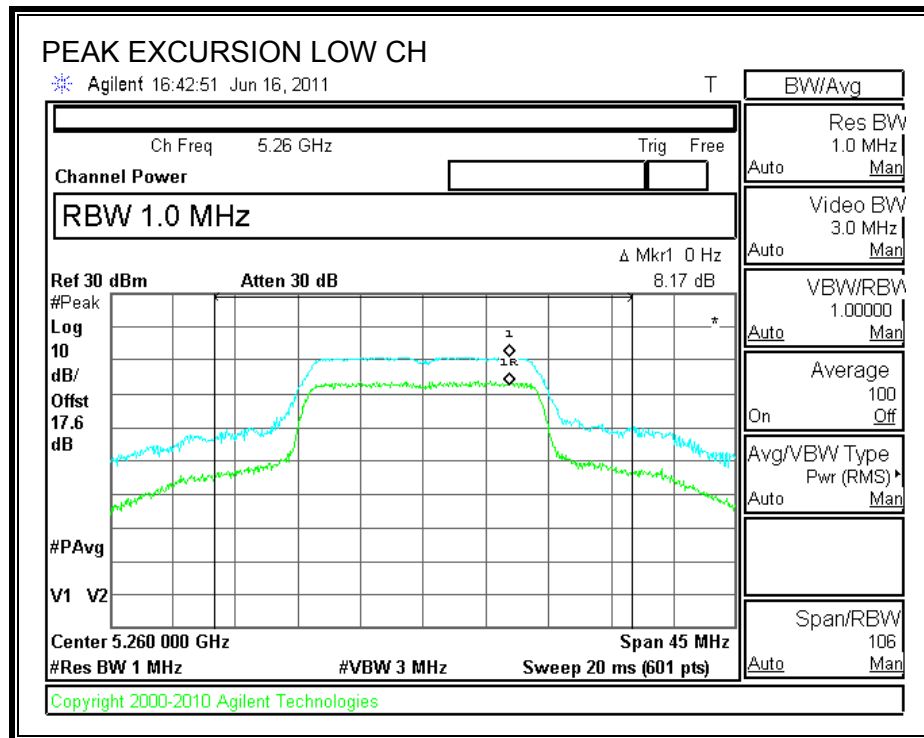
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

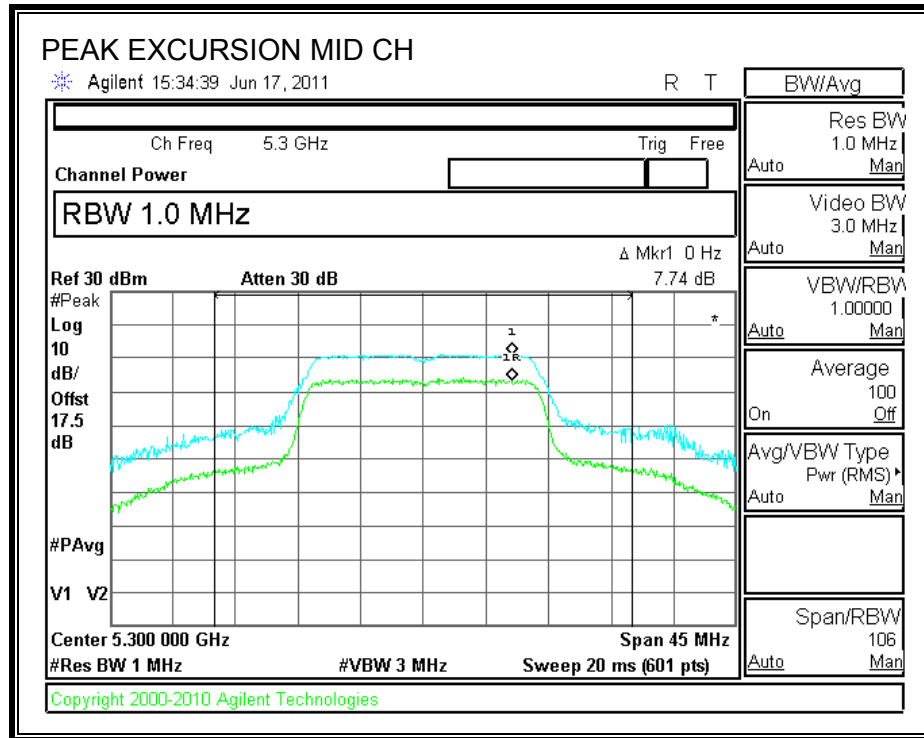
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

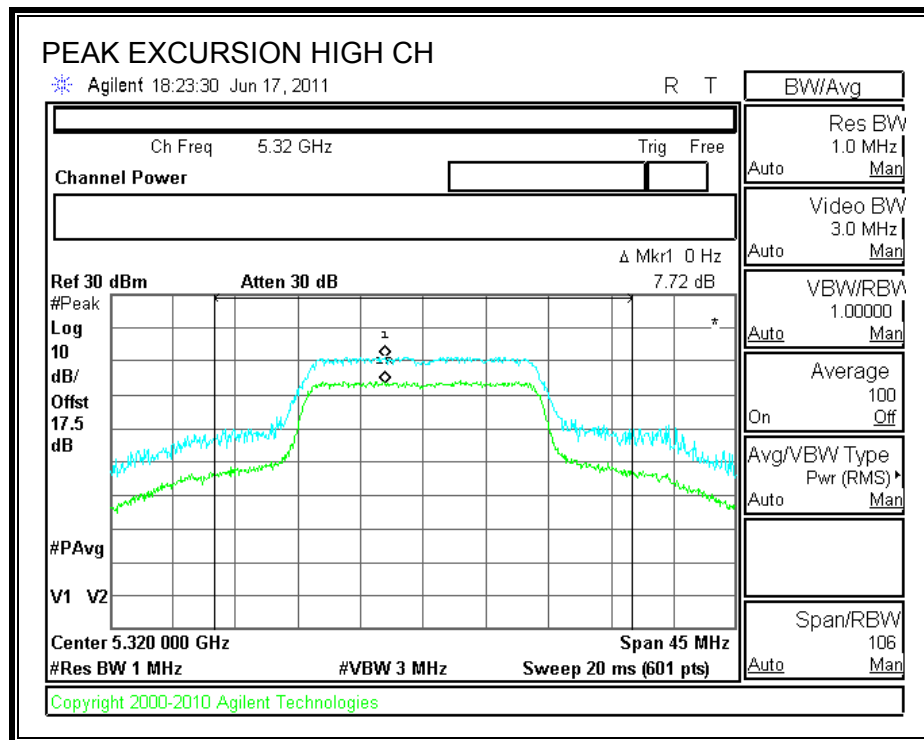
RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	8.17	13	-4.83
Middle	5300	7.74	13	-5.26
High	5320	7.72	13	-5.28

PEAK EXCURSION







7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (2)

IC RSS-210 A9.3 (2)

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

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

TEST PROCEDURE

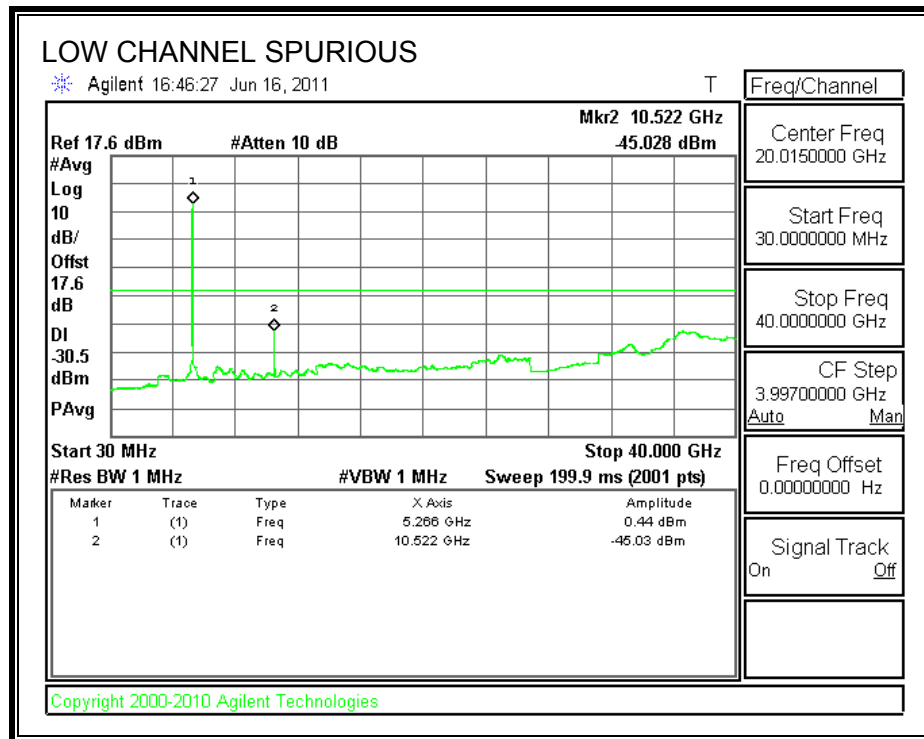
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

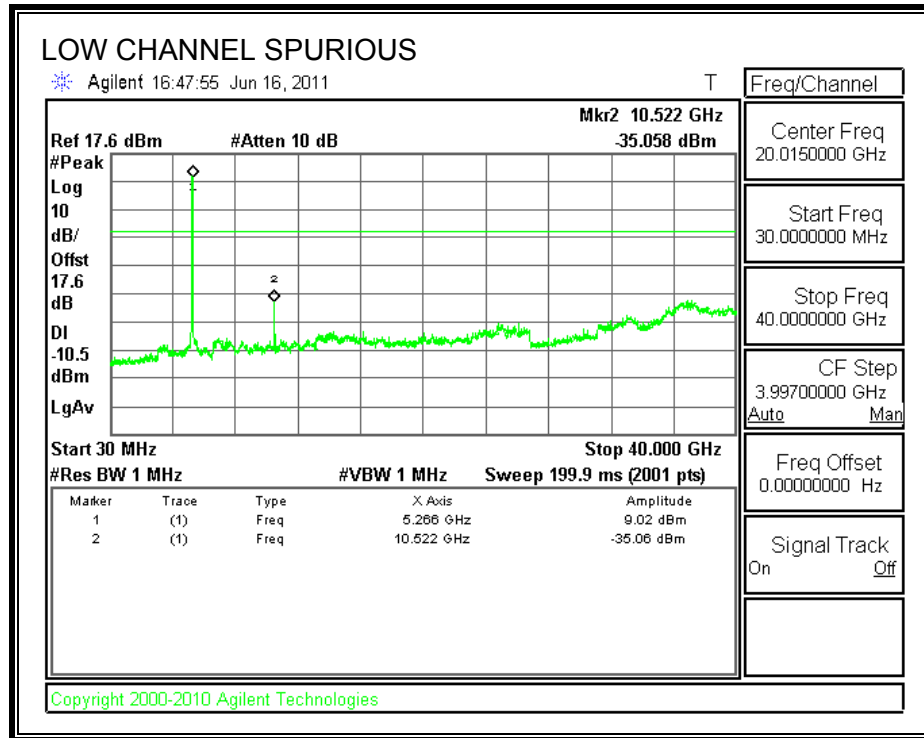
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

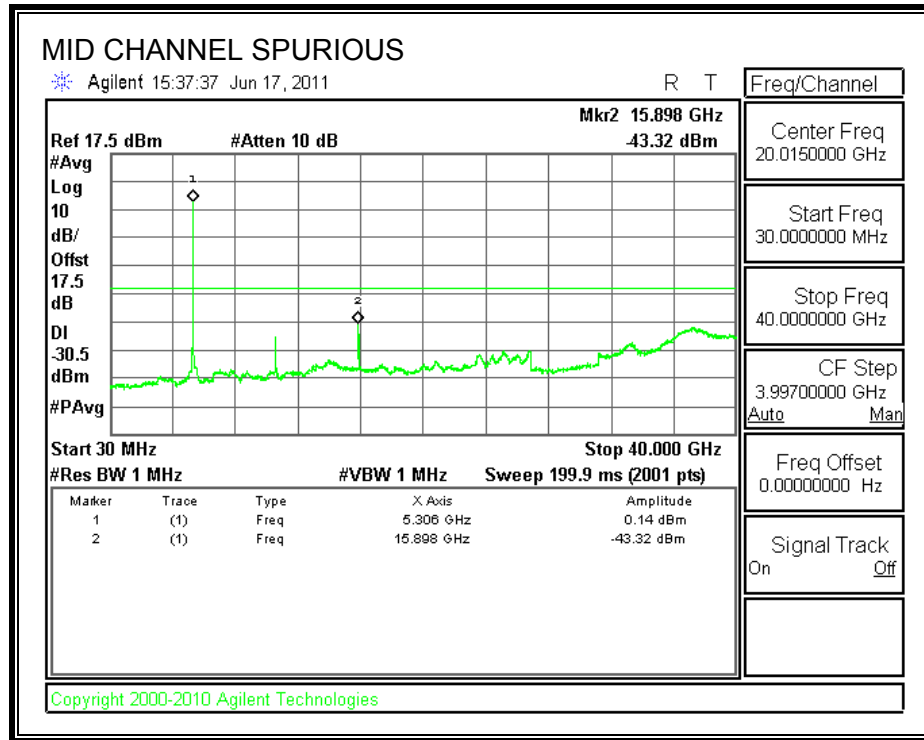
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

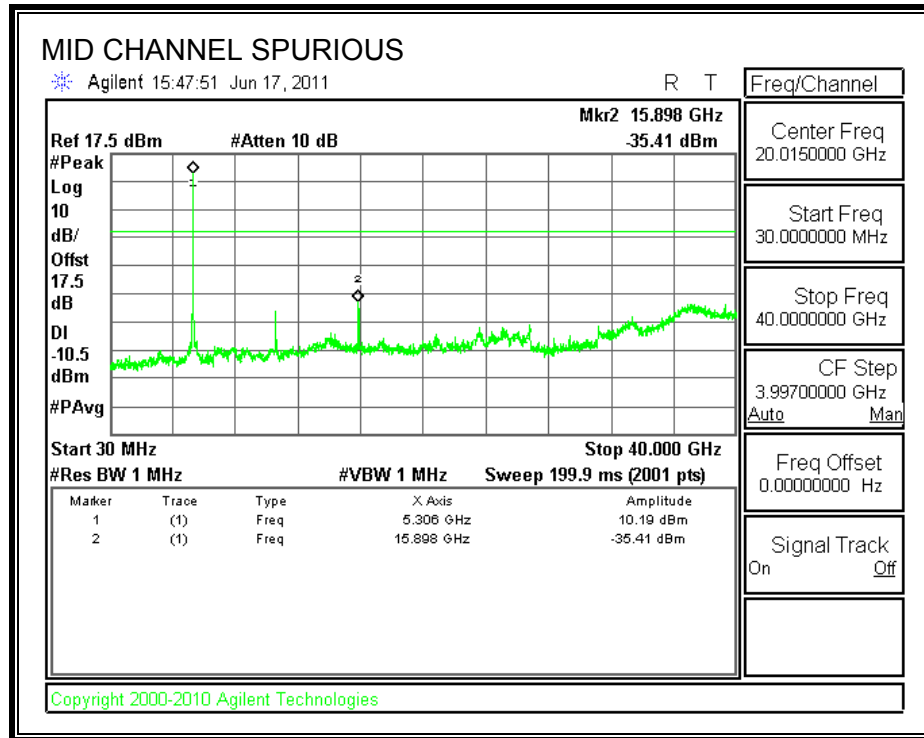
RESULTS

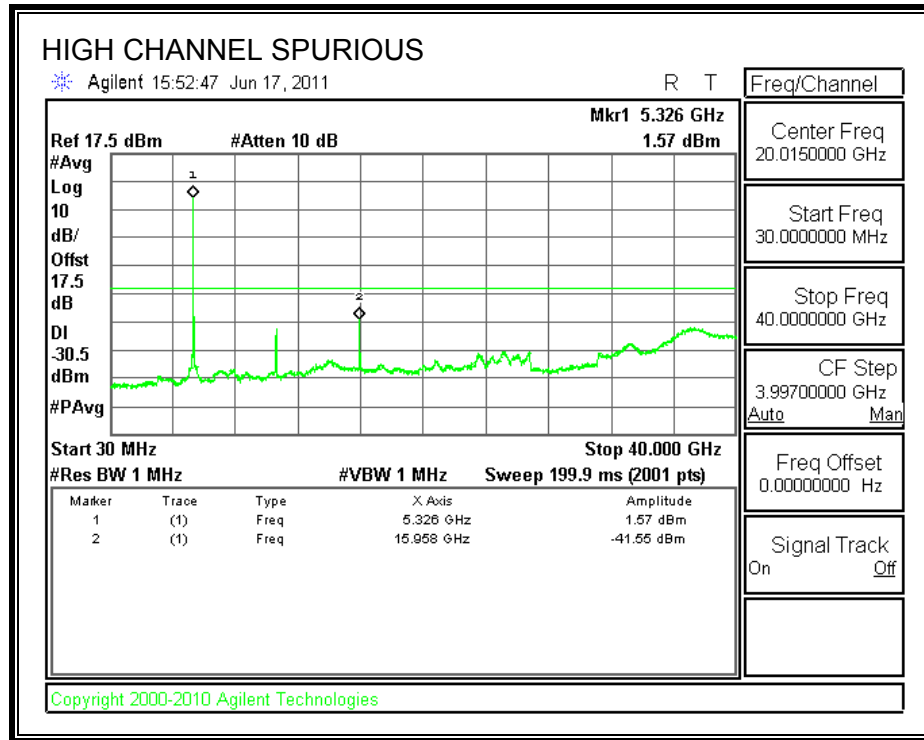
SPURIOUS EMISSIONS

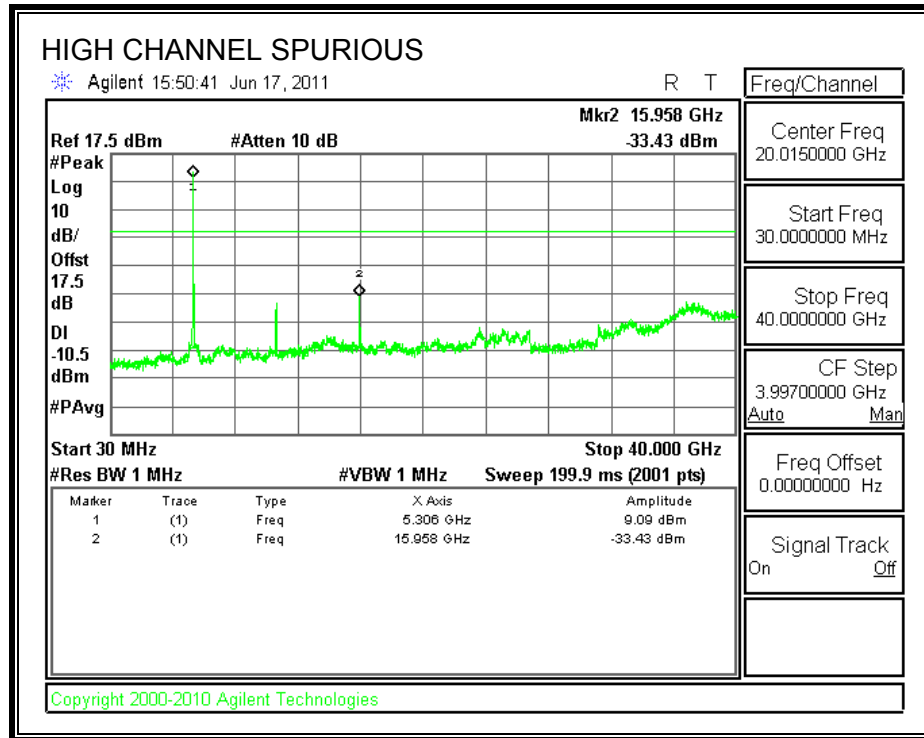












7.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

7.5.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

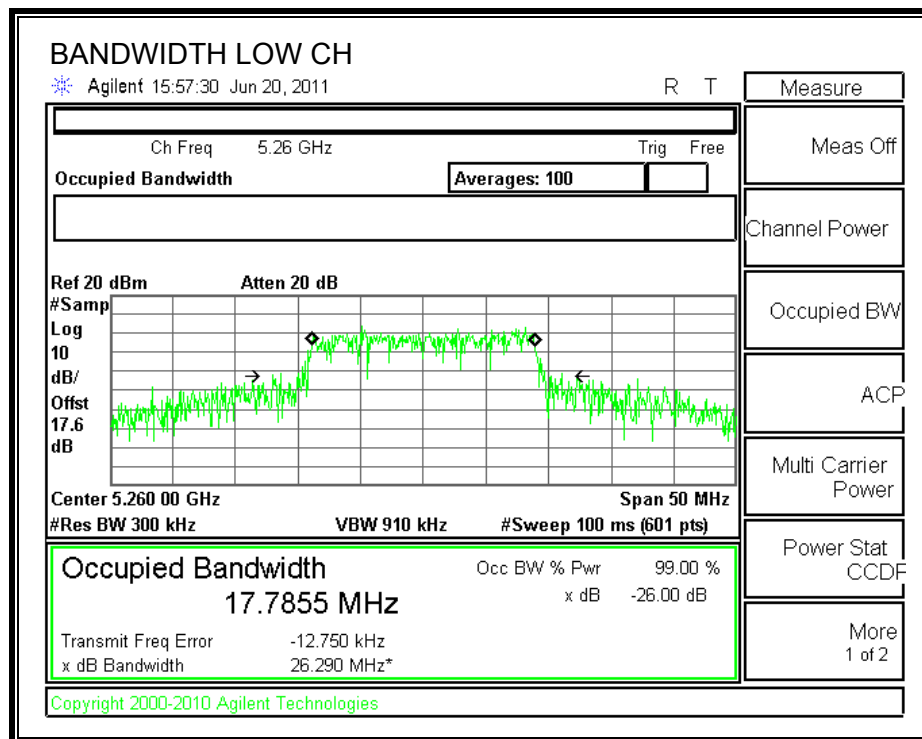
TEST PROCEDURE

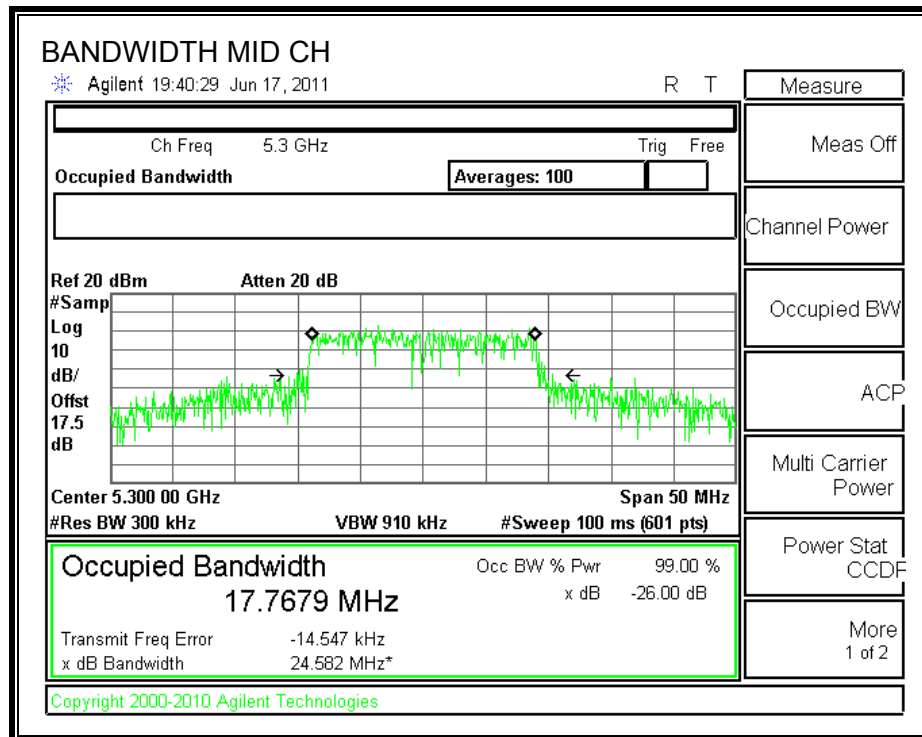
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

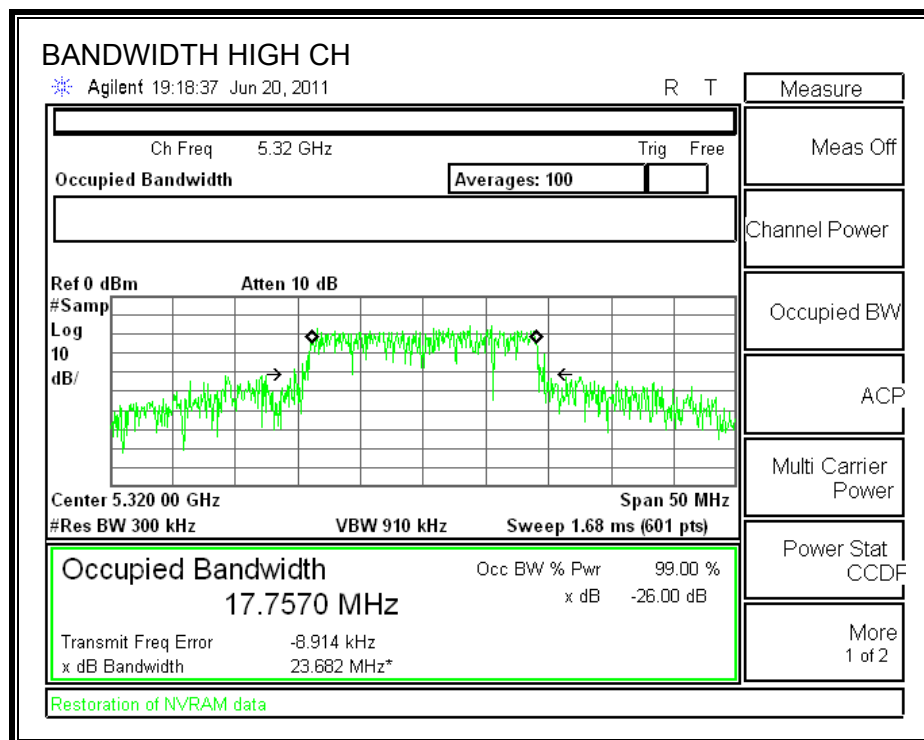
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5260	26.29	17.7855
Middle	5300	24.582	17.7679
High	5320	23.682	17.757

26 dB and 99% BANDWIDTH







7.5.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

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

TEST PROCEDURE

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

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

RESULTS

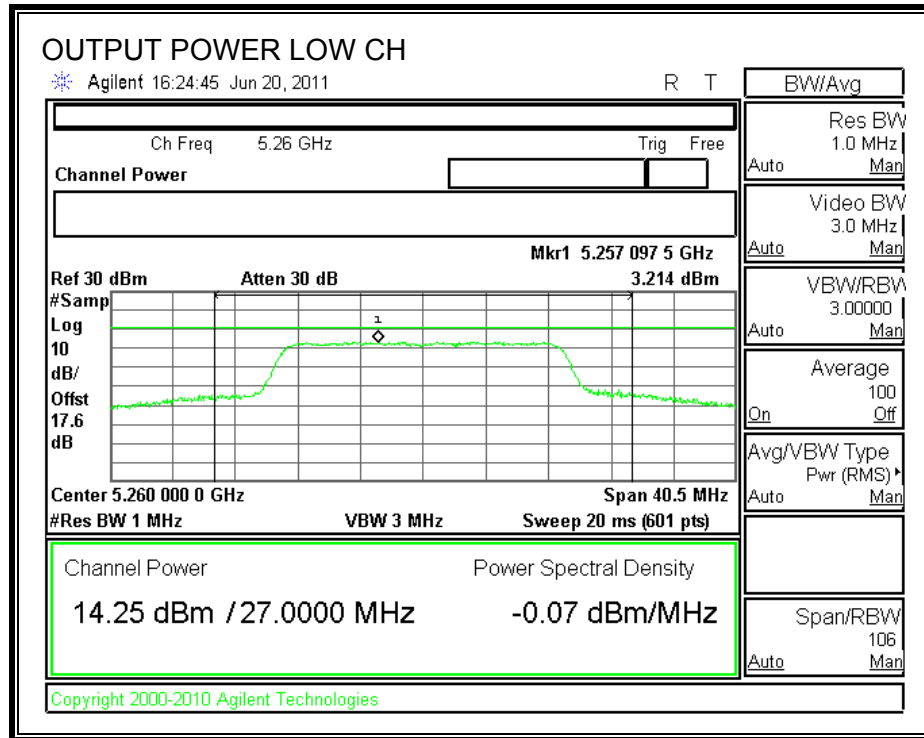
Limit

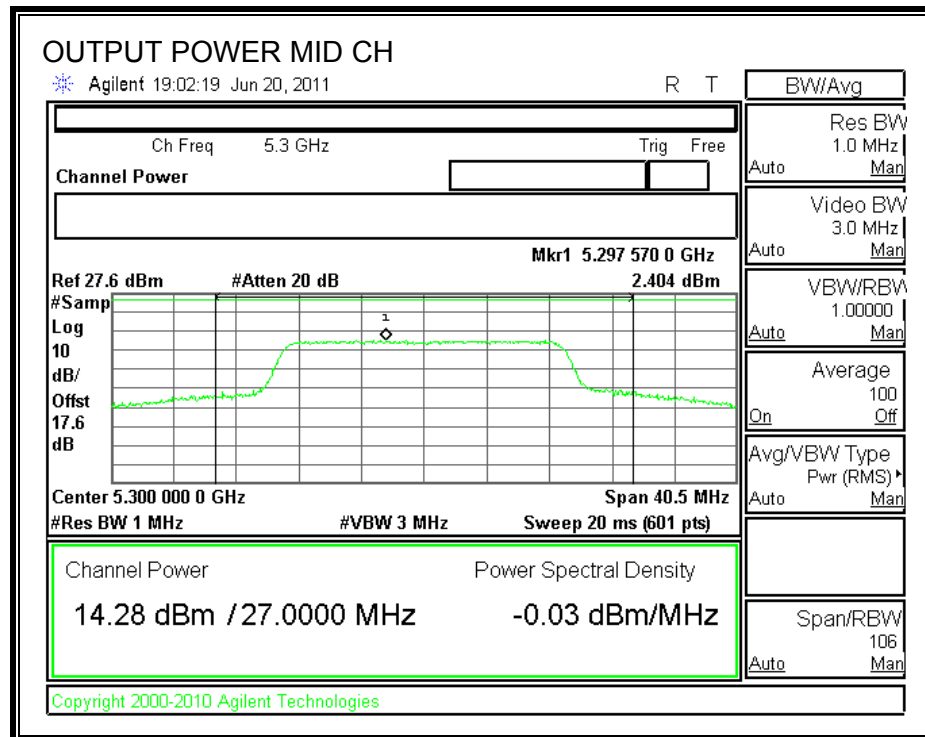
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5260	24	26.29	25.20	3.75	24.00
Mid	5300	24	24.582	24.91	3.75	24.00
High	5320	24	23.682	24.74	3.75	24.00

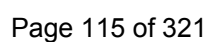
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5260	14.25	24.00	-9.75
Mid	5300	14.28	24.00	-9.72
High	5320	13.55	24.00	-10.45

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 17.2 dB (including 10 dB pad and 7.2 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	13.47
Middle	5300	13.46
High	5320	13.35

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.

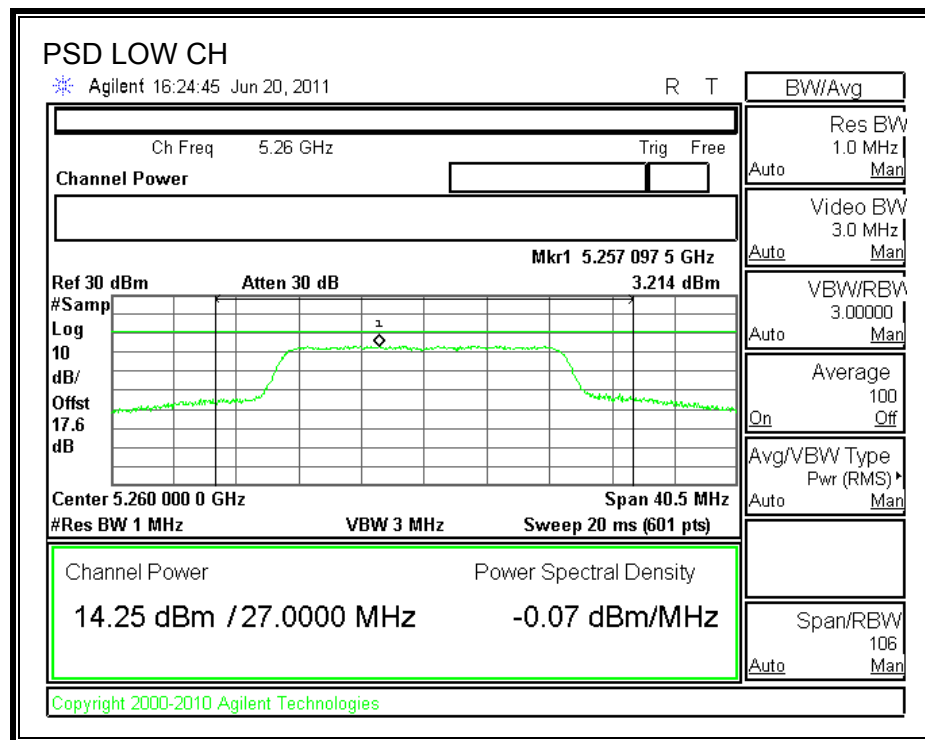
TEST PROCEDURE

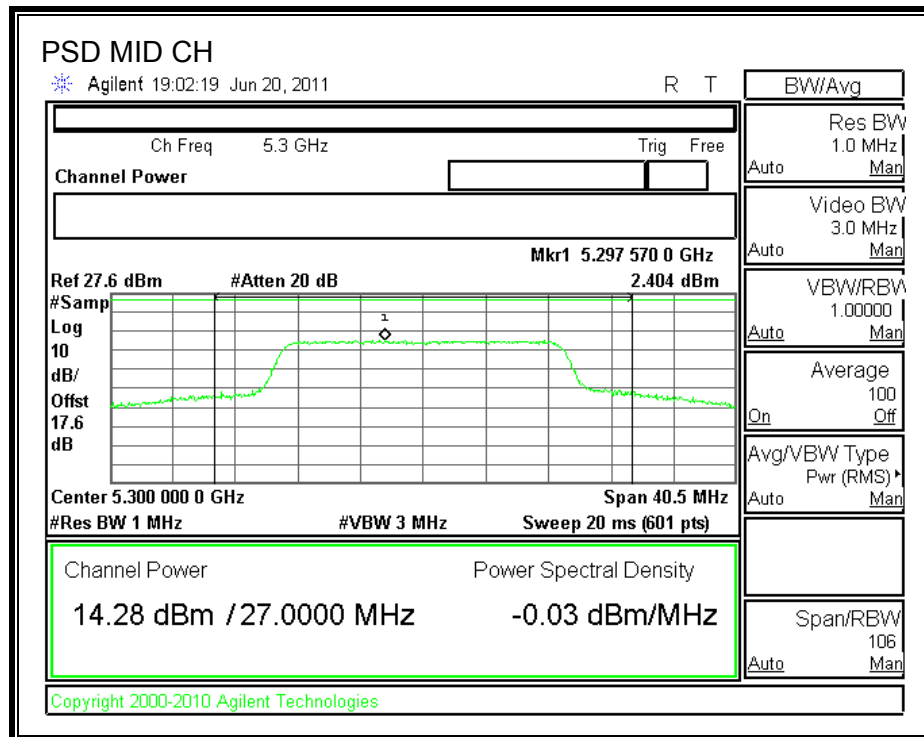
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

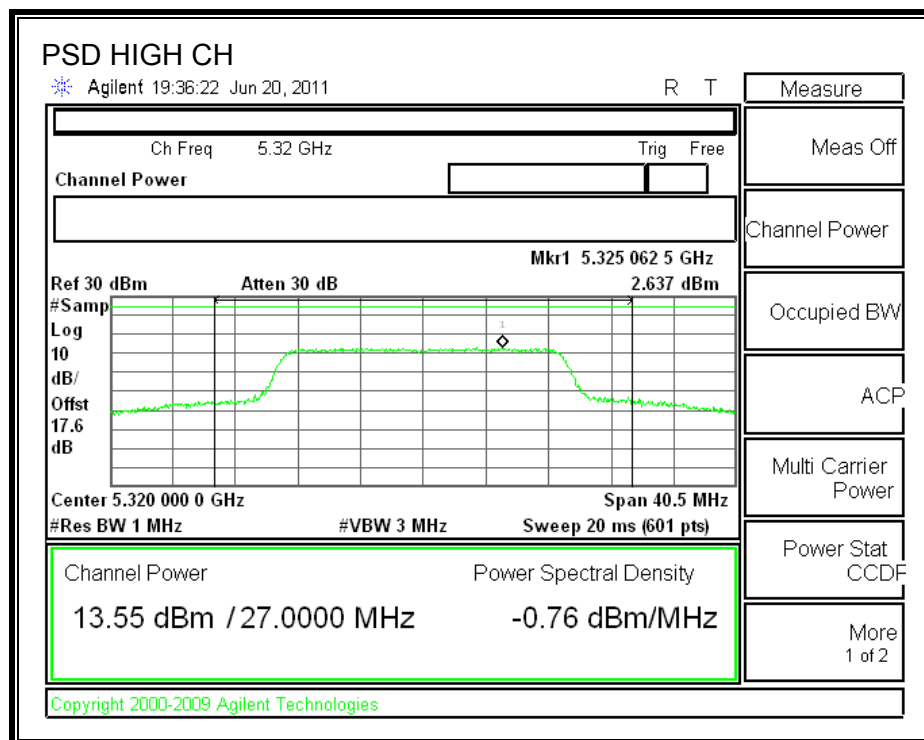
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5260	3.214	11	-7.786
Middle	5300	2.404	11	-8.596
High	5320	2.637	11	-8.363

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

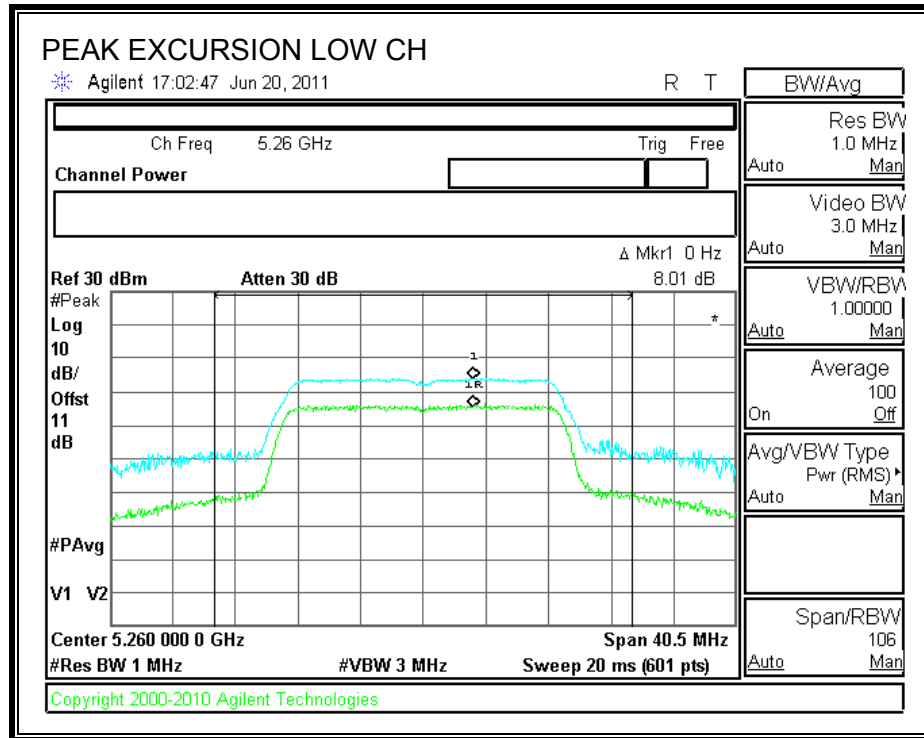
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

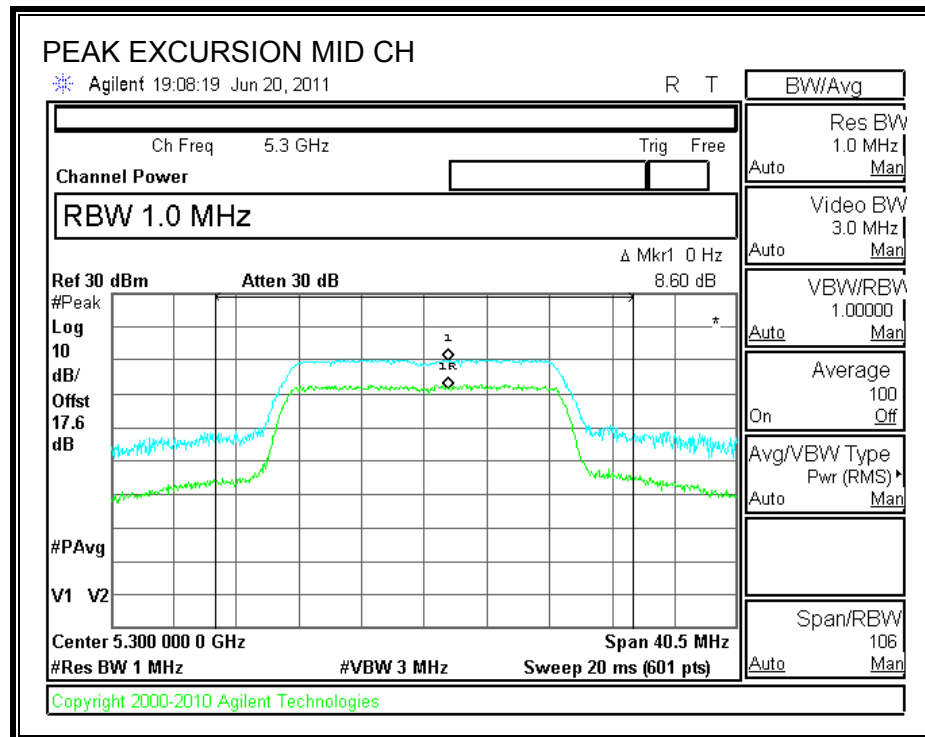
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

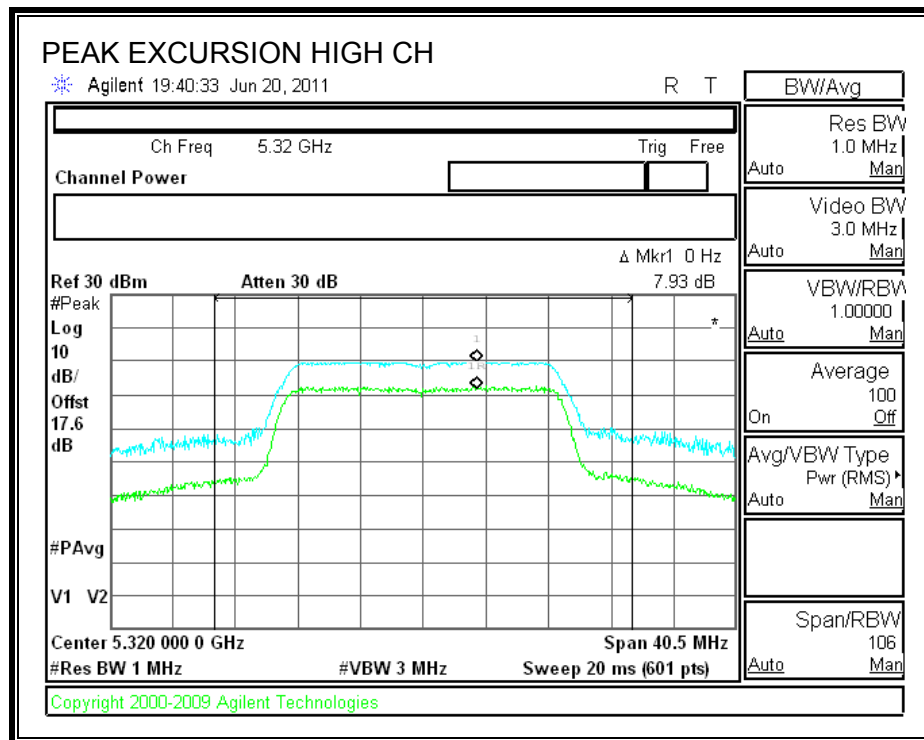
RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	8.01	13	-4.99
Middle	5300	8.60	13	-4.40
High	5320	7.93	13	-5.07

PEAK EXCURSION







7.5.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (2)

IC RSS-210 A9.3 (2)

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

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

TEST PROCEDURE

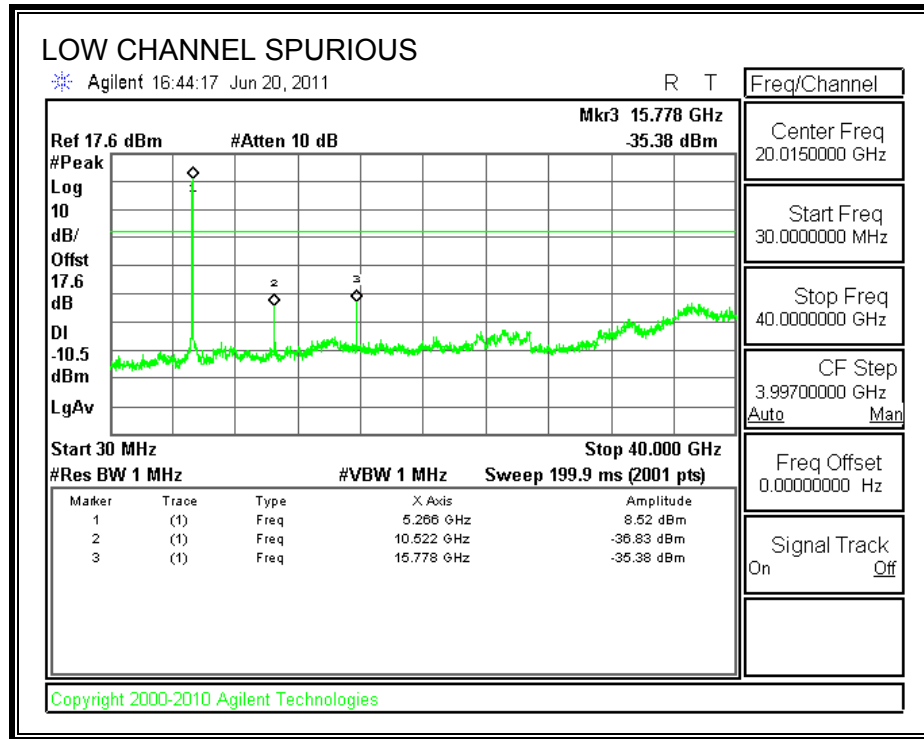
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

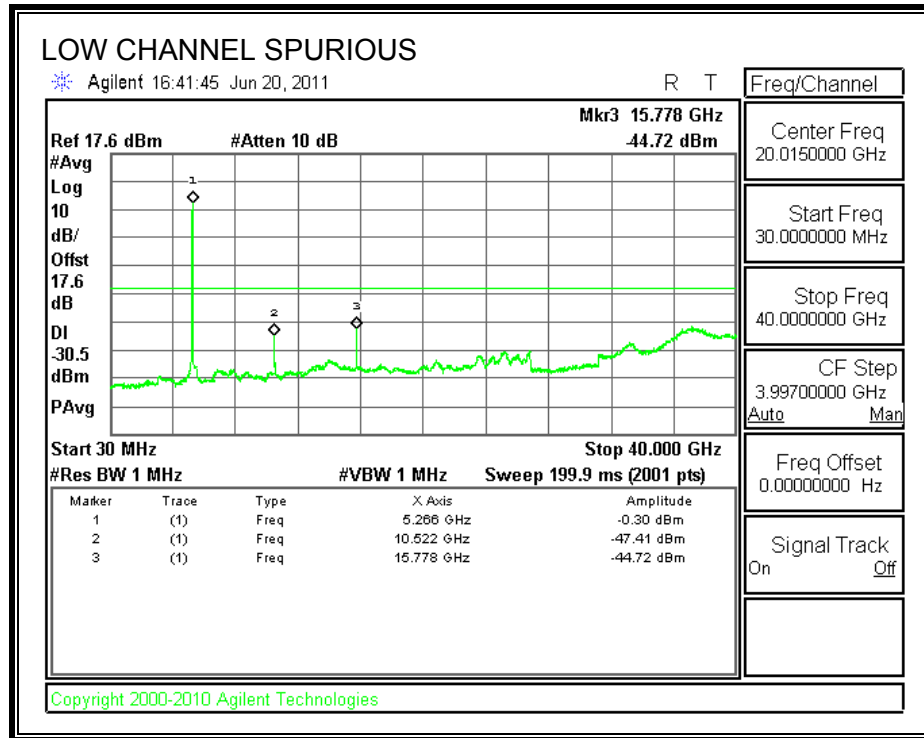
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

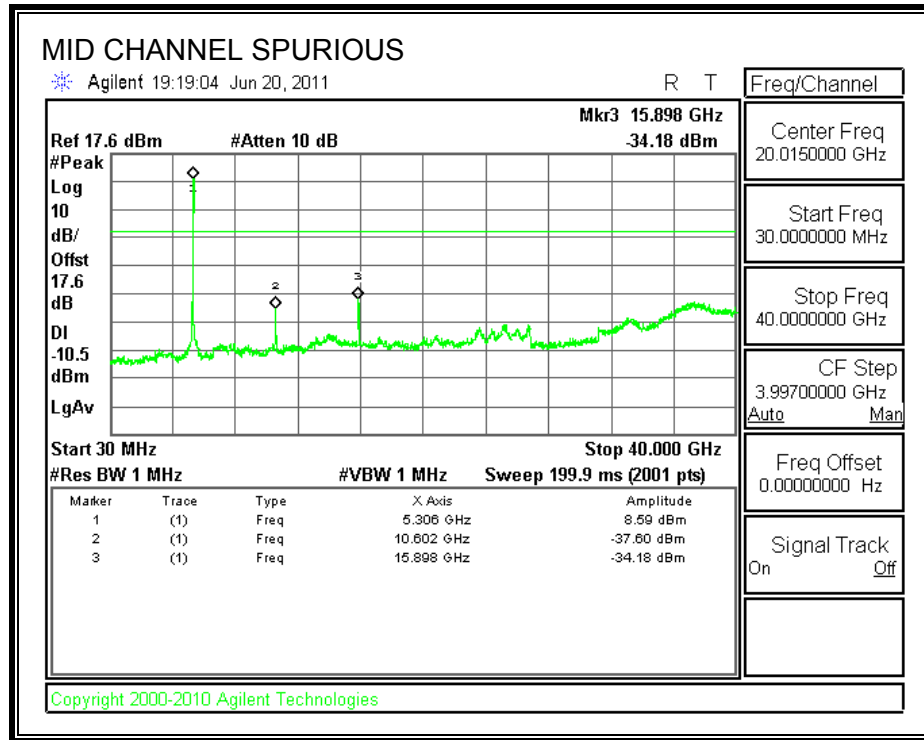
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

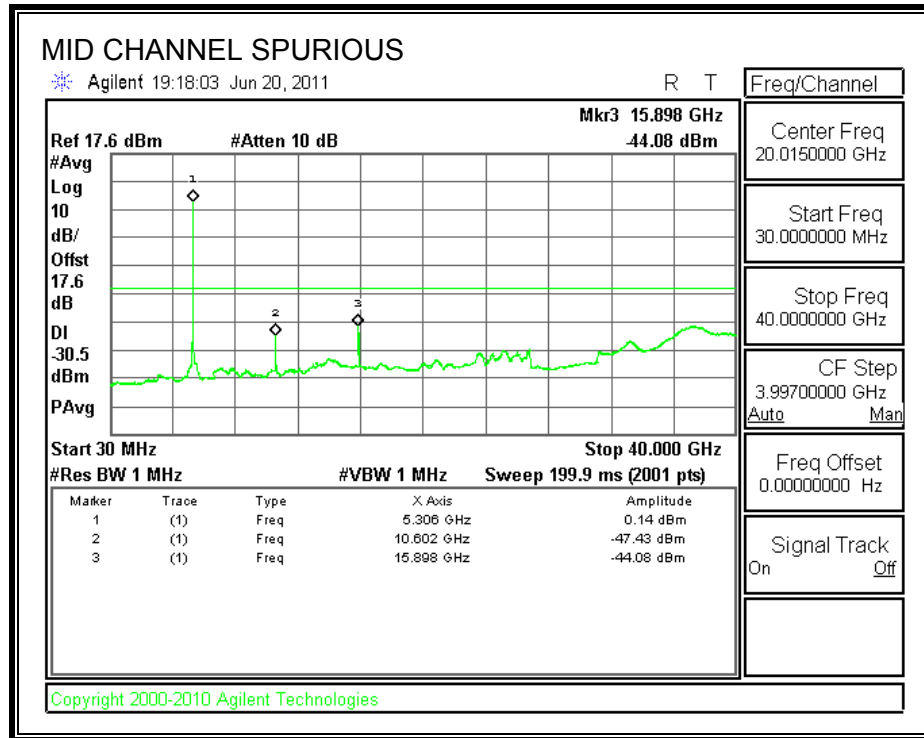
RESULTS

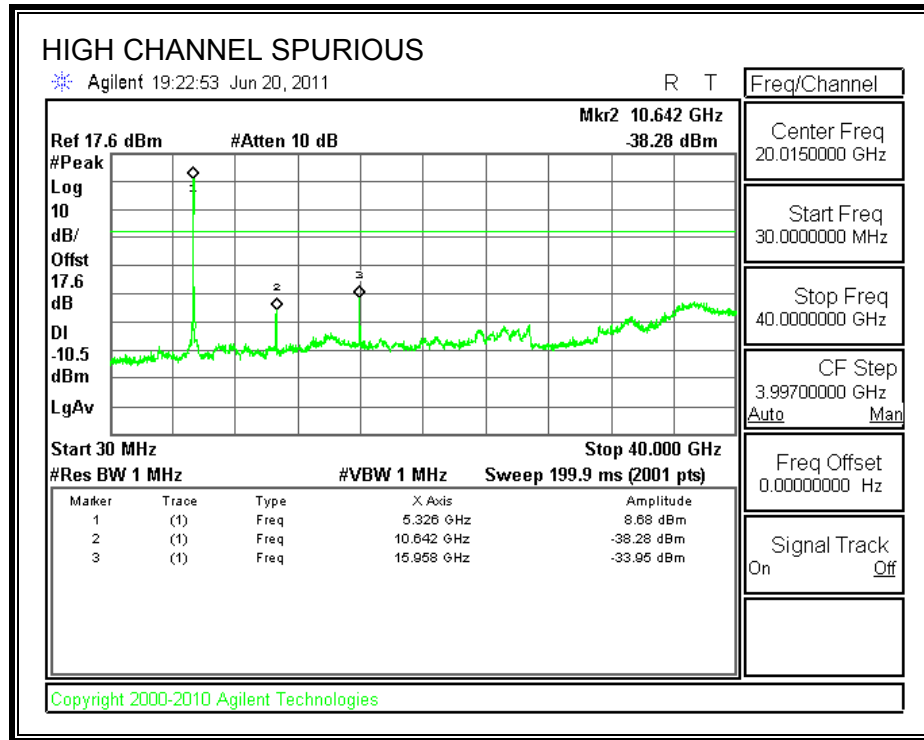
SPURIOUS EMISSIONS

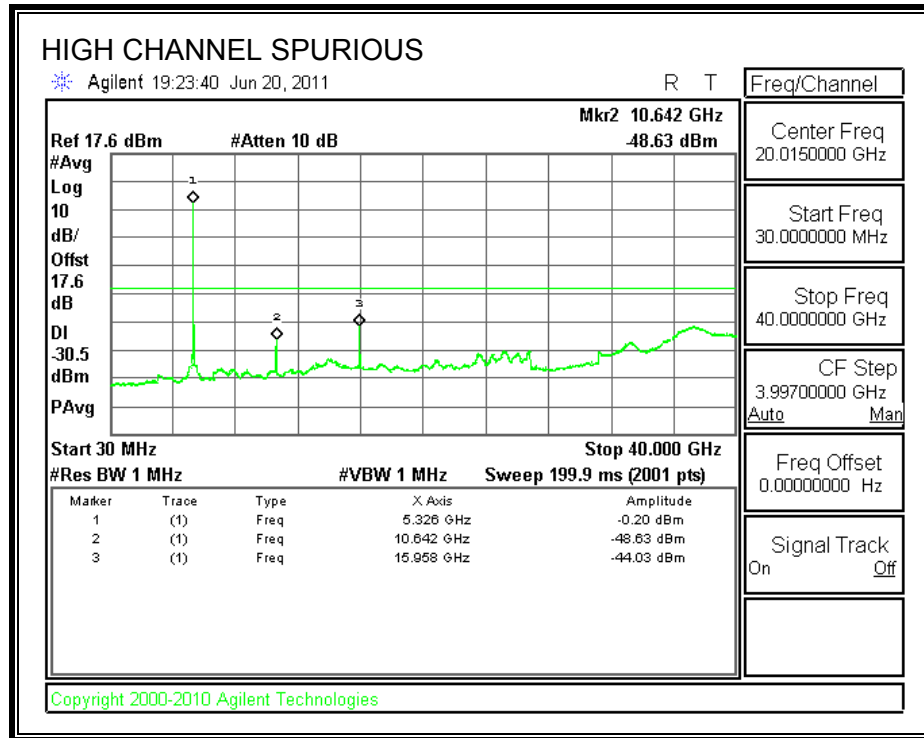












7.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND

7.6.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

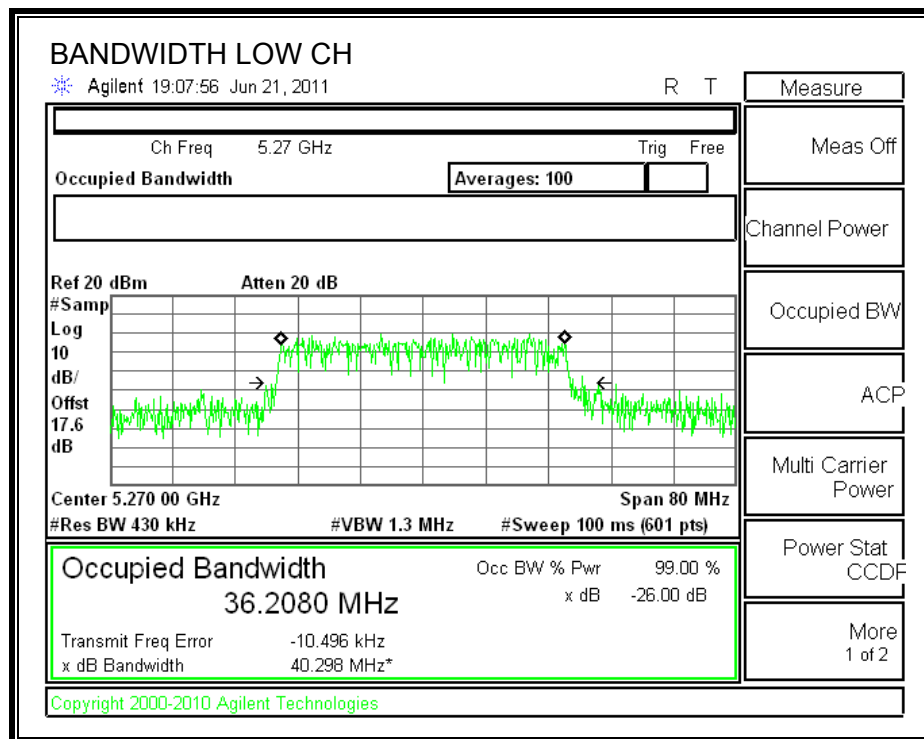
TEST PROCEDURE

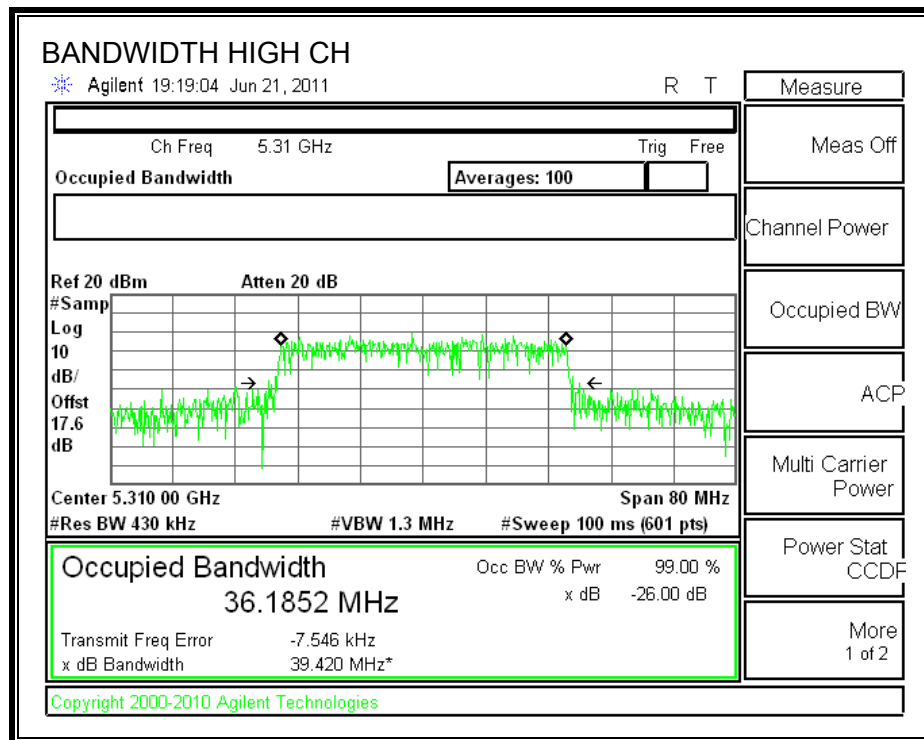
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5270	40.298	36.208
High	5310	39.42	36.1852

26 dB and 99% BANDWIDTH





7.6.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

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

TEST PROCEDURE

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

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

RESULTS

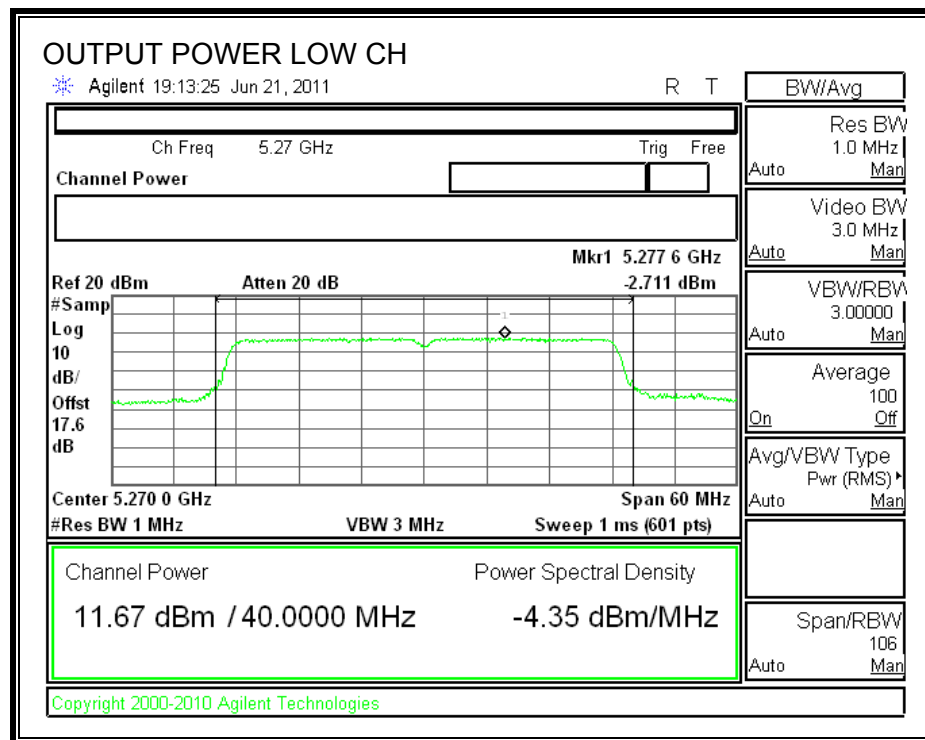
Limit

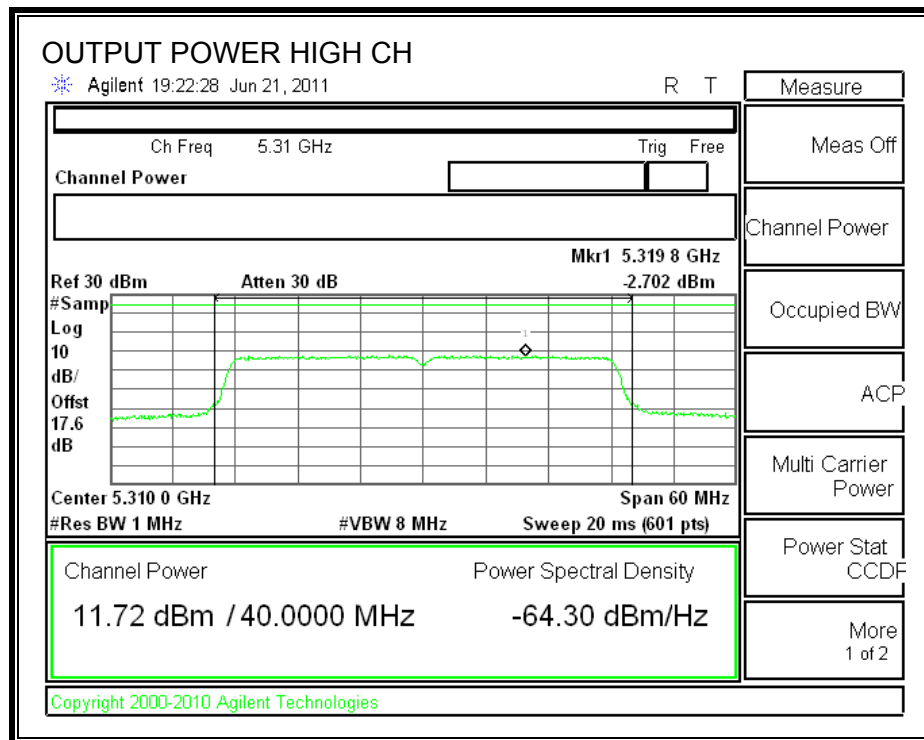
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5270	24	40.298	27.05	3.75	24.00
High	5310	24	39.42	26.96	3.75	24.00

Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5270	11.67	24.00	-12.33
High	5310	11.72	24.00	-12.28

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 17.2 dB (including 10 dB pad and 7.2 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	11.28
High	5310	11.13

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.

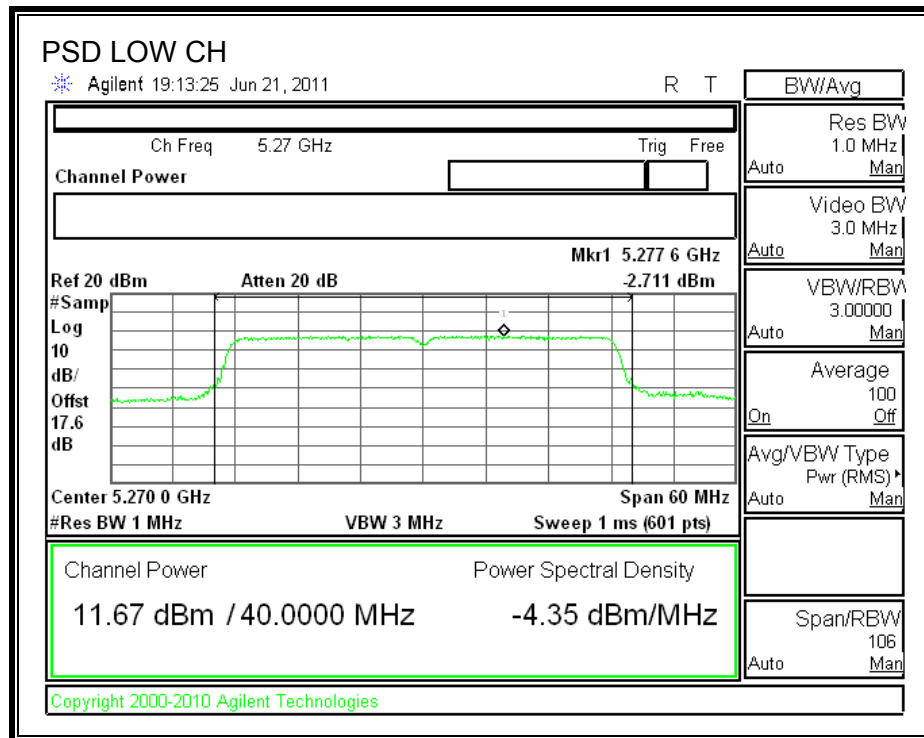
TEST PROCEDURE

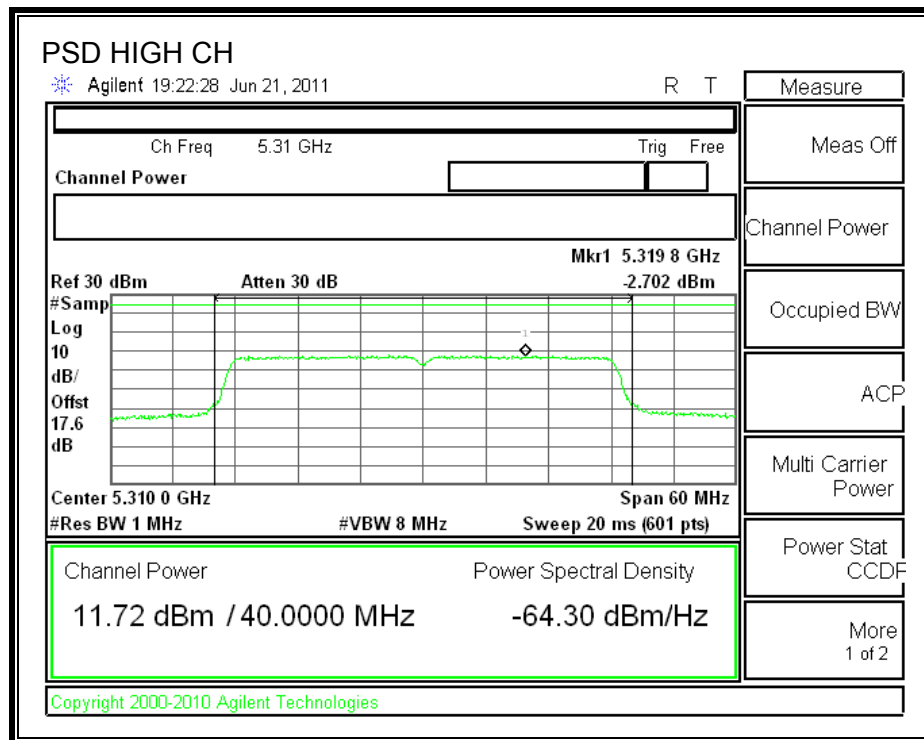
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5270	-2.711	11	-13.711
High	5310	-2.702	11	-13.702

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

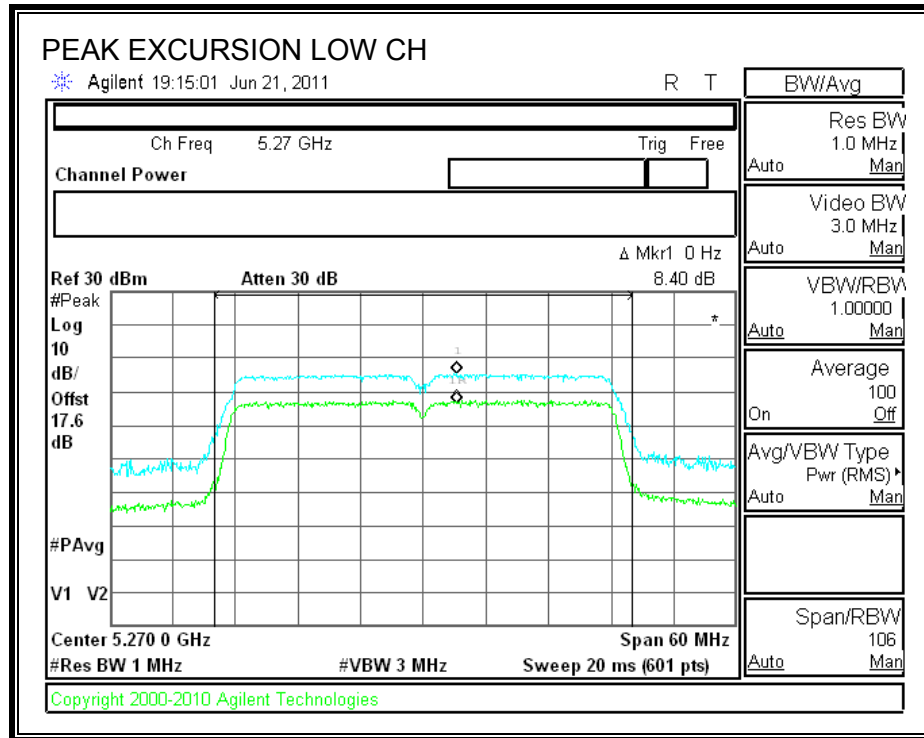
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

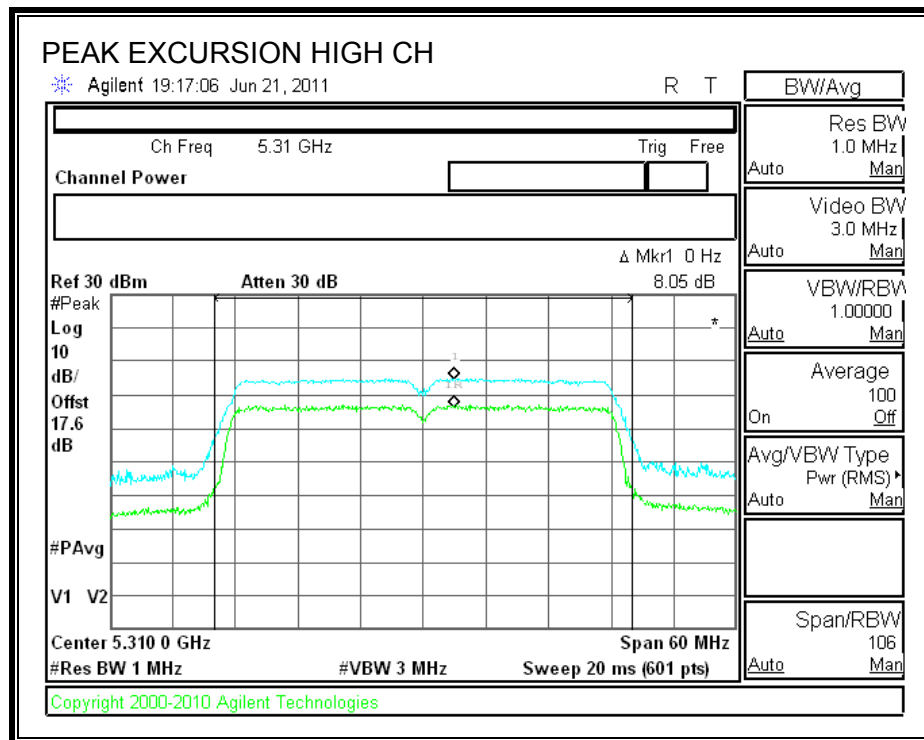
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5270	8.40	13	-4.60
High	5310	8.05	13	-4.95

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

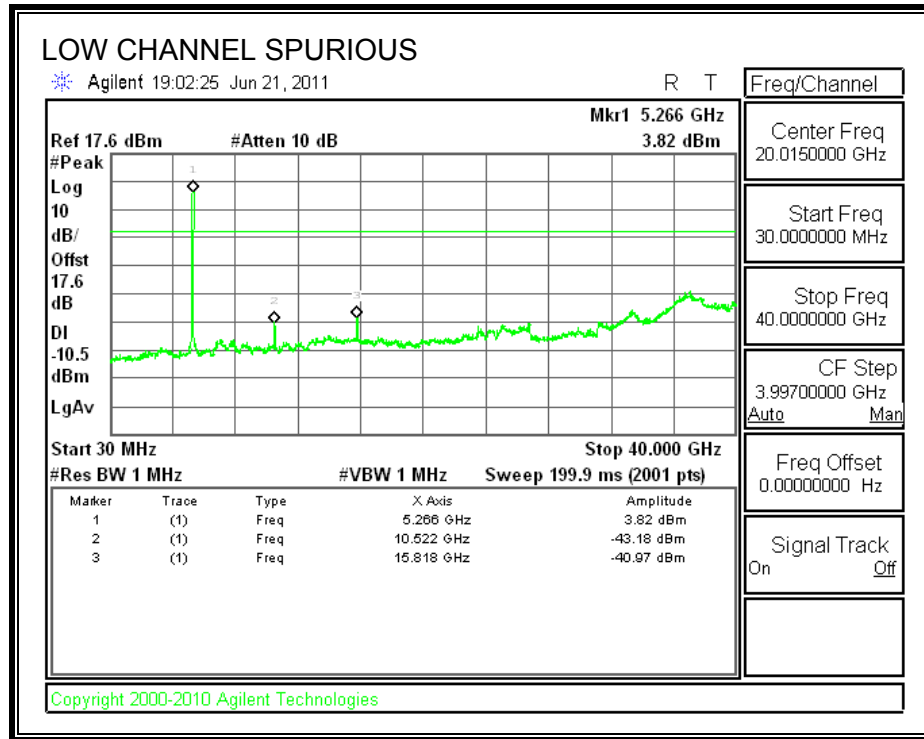
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

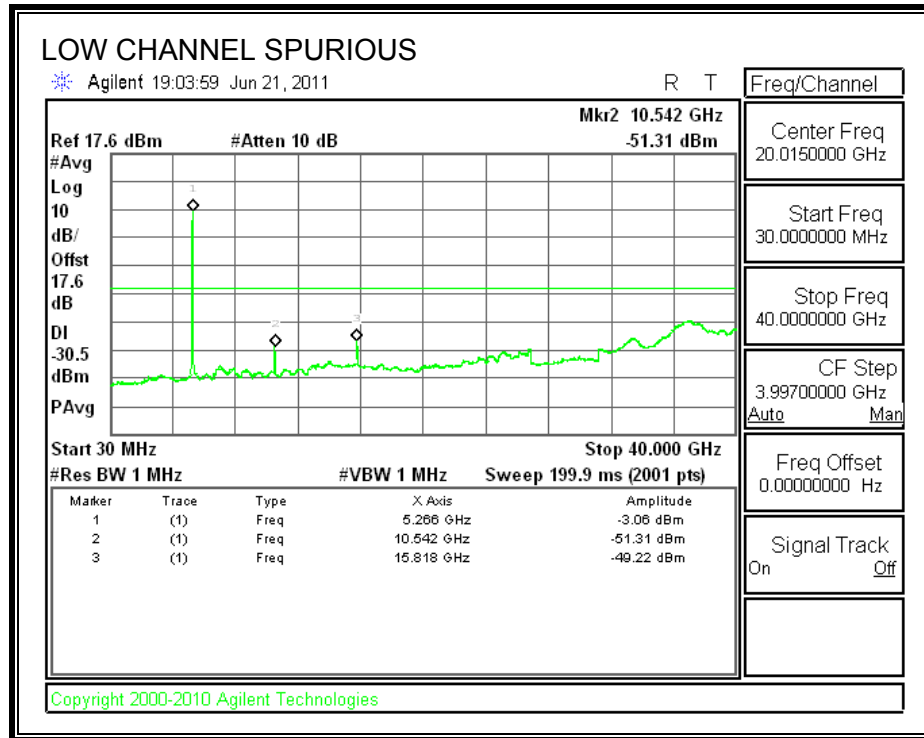
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

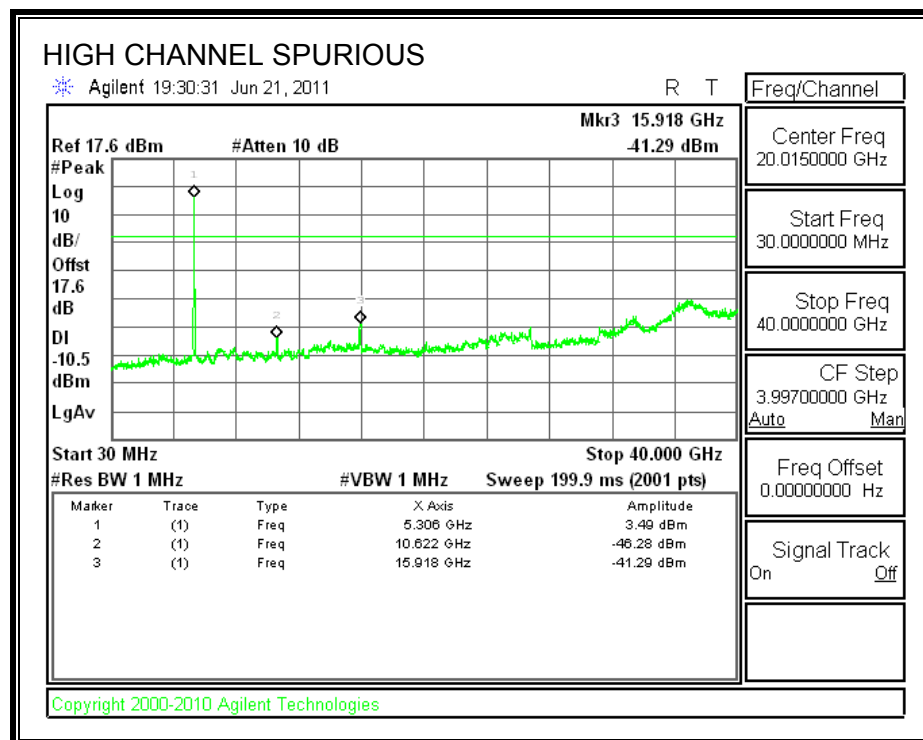
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

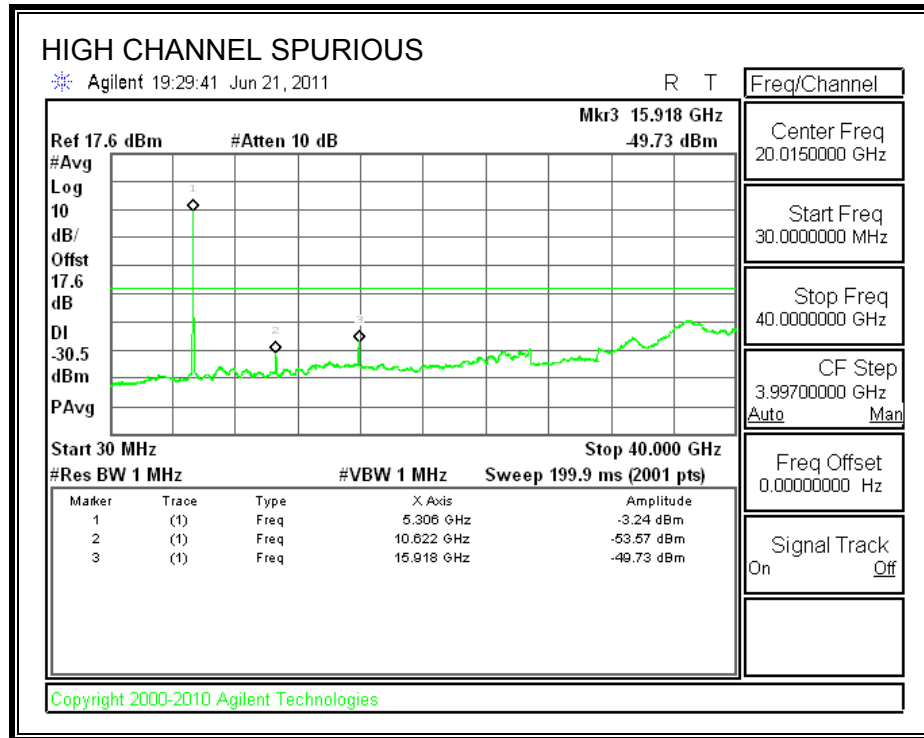
RESULTS

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.

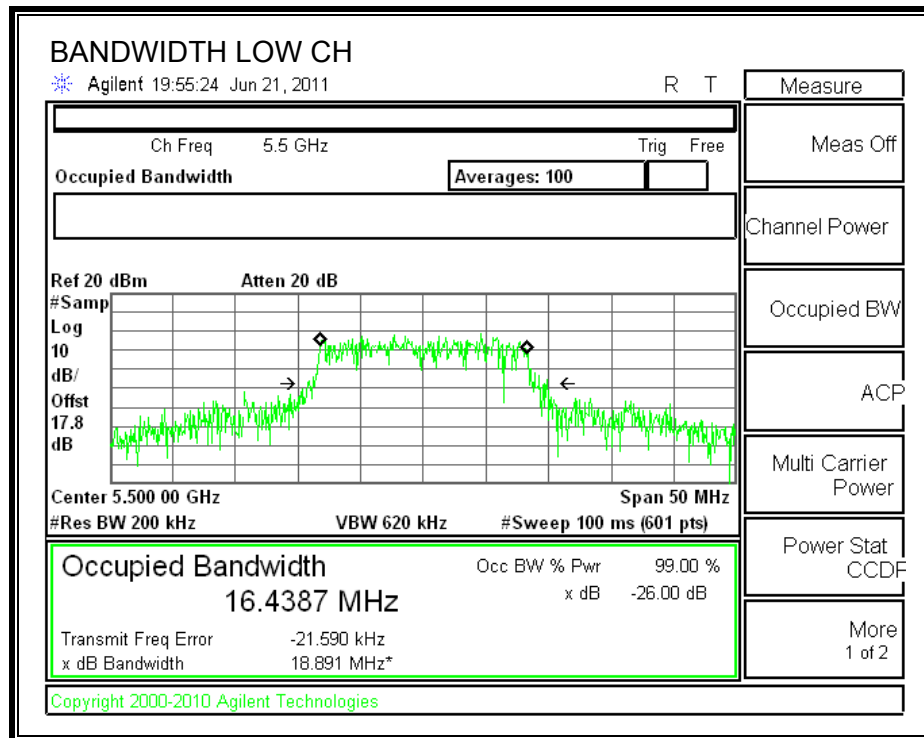
TEST PROCEDURE

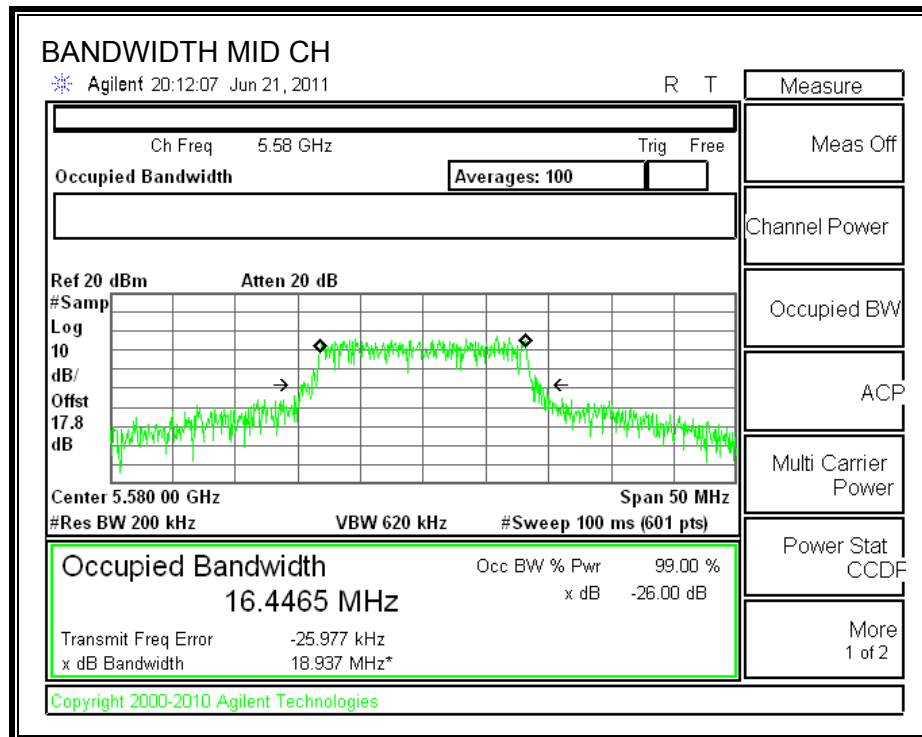
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

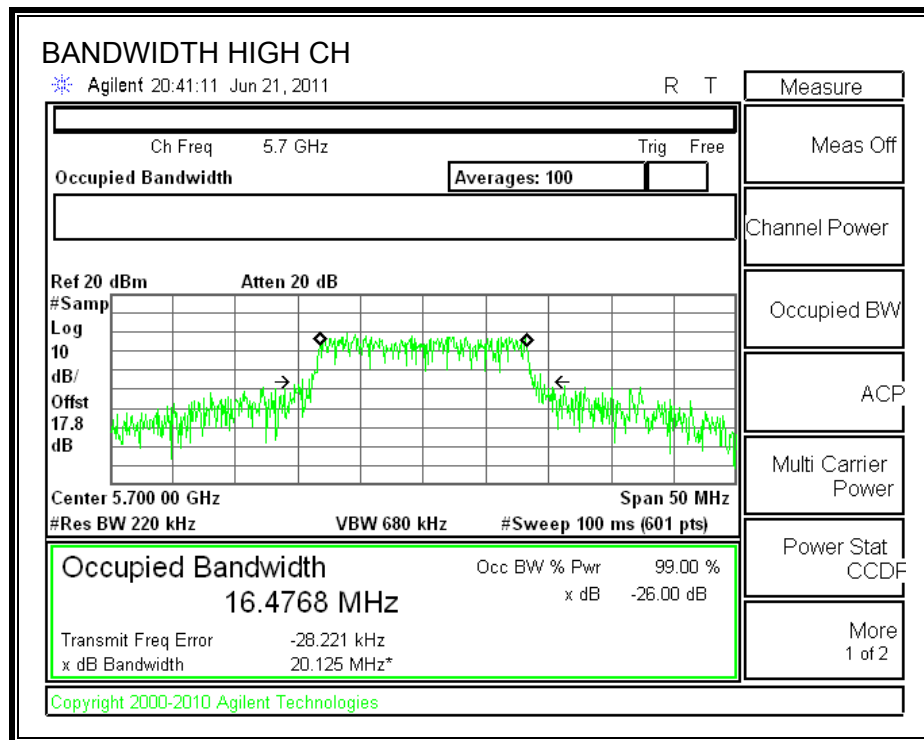
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5500	18.891	16.4387
Middle	5580	18.937	16.4465
High	5700	20.125	16.4768

26 dB and 99% BANDWIDTH







7.7.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

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

TEST PROCEDURE

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

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

RESULTS

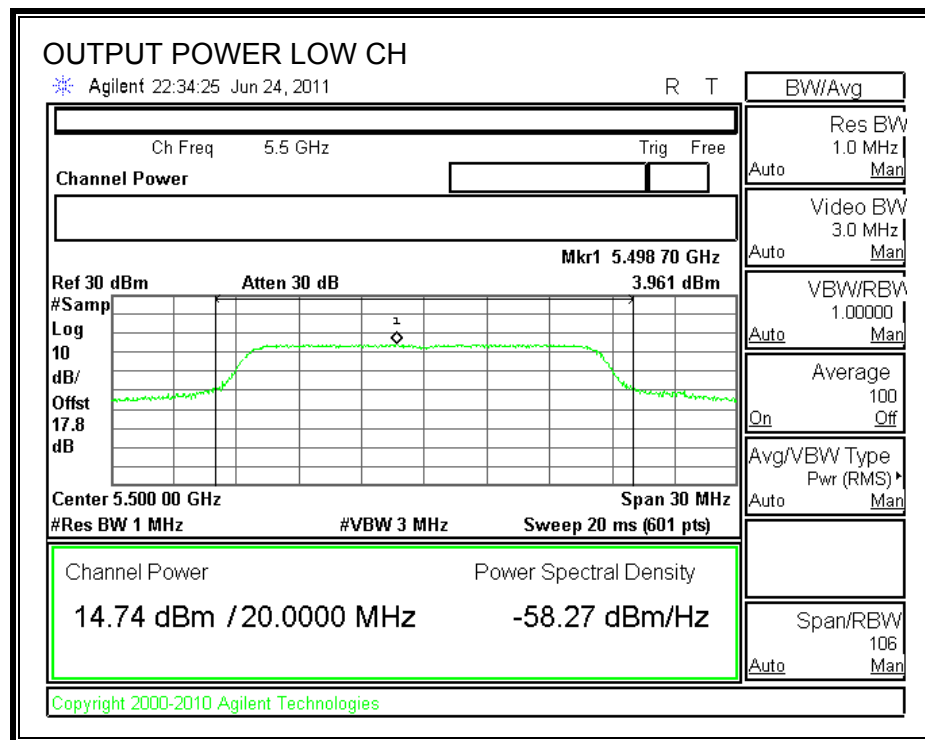
Limit

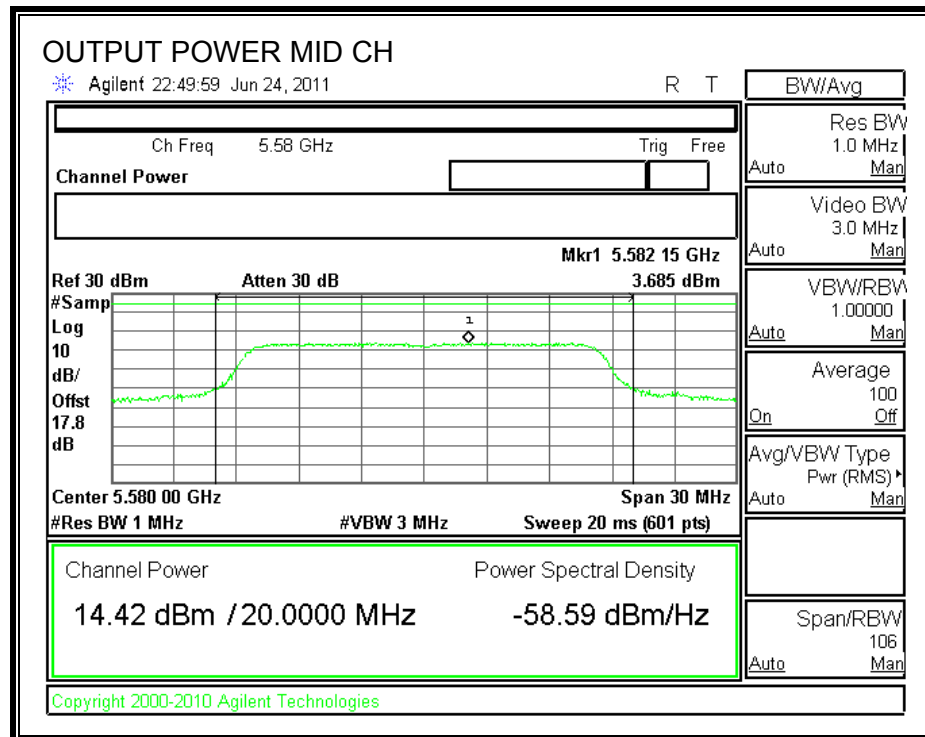
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5500	24	18.891	23.76	3.75	23.76
Mid	5580	24	18.937	23.77	3.75	23.77
High	5700	24	20.125	24.04	3.75	24.00

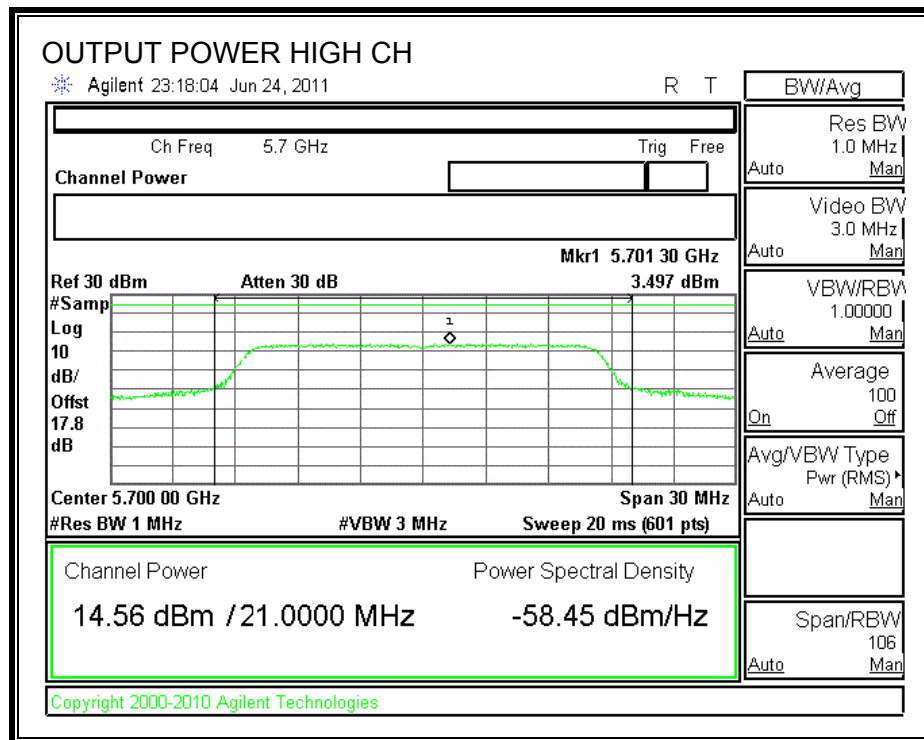
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	14.74	23.76	-9.02
Mid	5580	14.42	23.77	-9.35
High	5700	14.56	24.00	-9.44

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 17.7 dB (including 10 dB pad and 7.7 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	14.53
Middle	5580	14.35
High	5700	14.29

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.

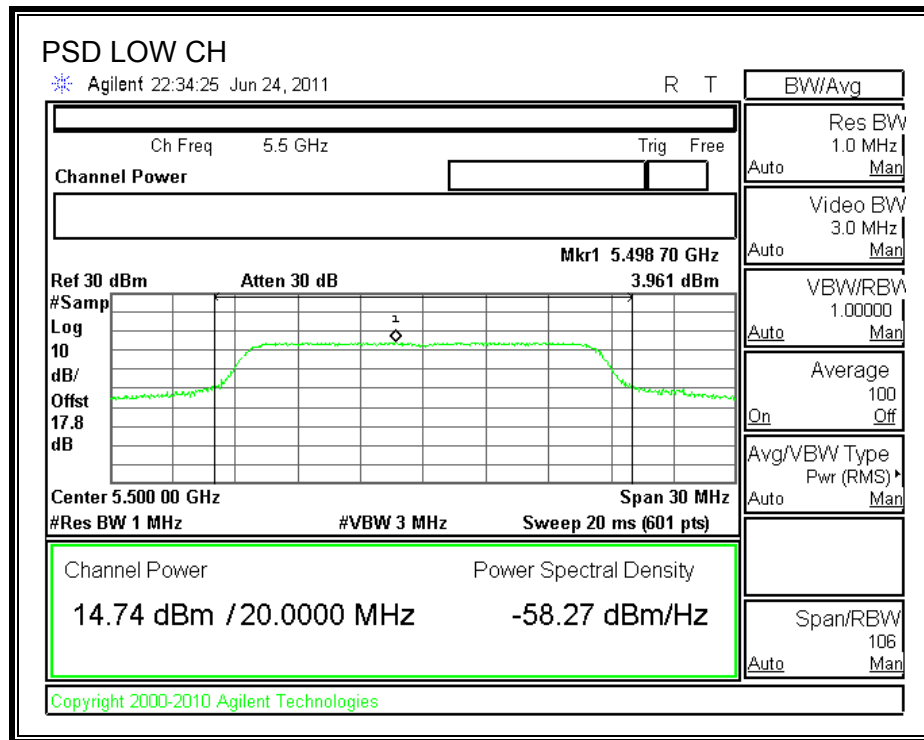
TEST PROCEDURE

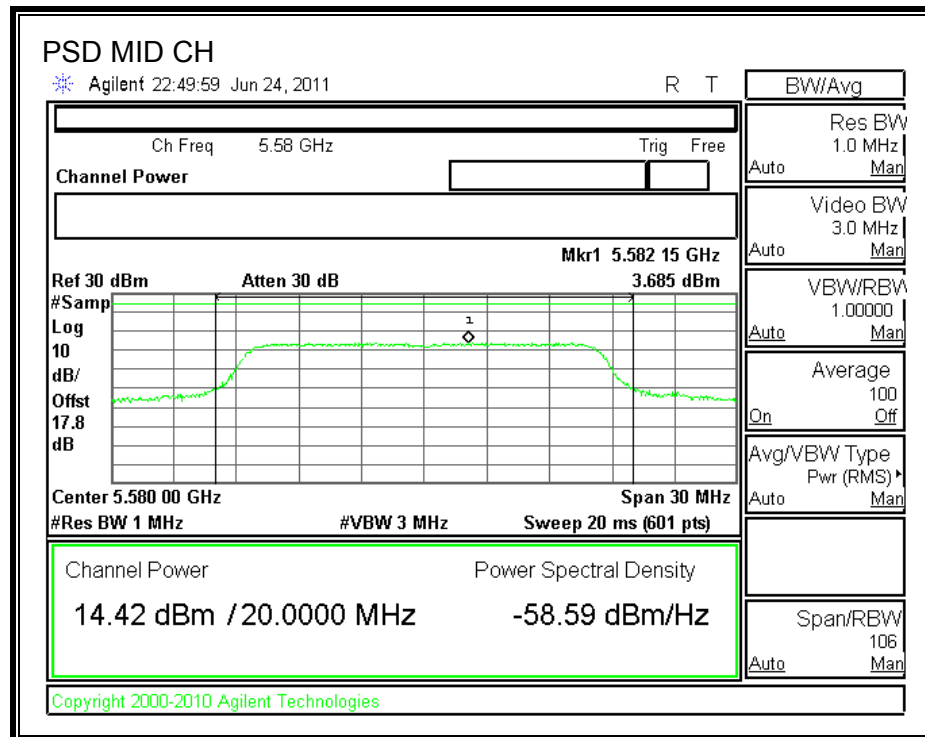
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

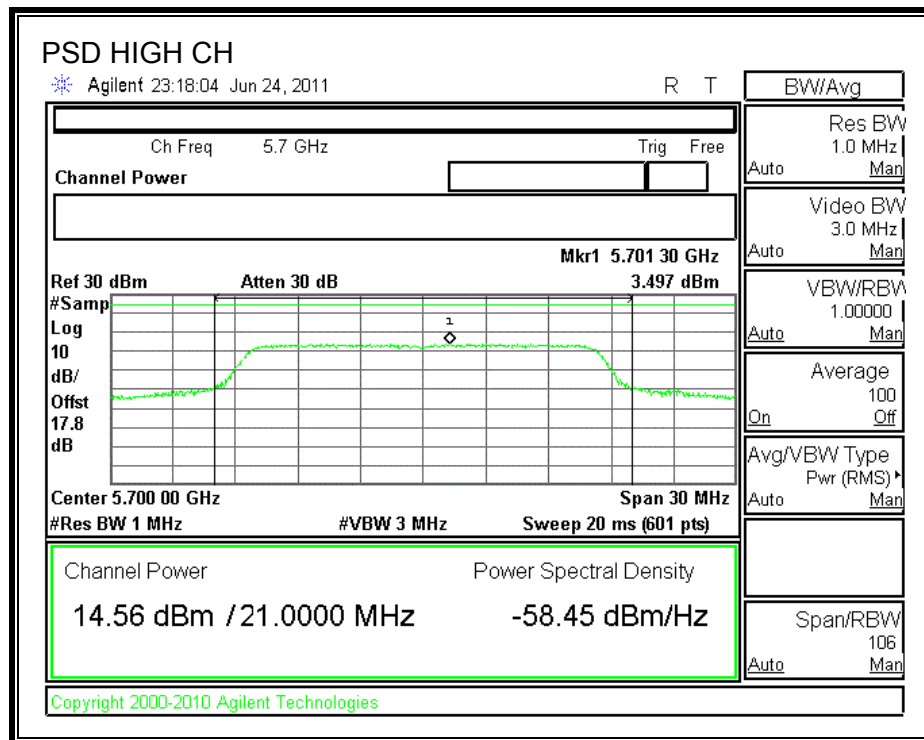
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5500	3.961	11	-7.039
Middle	5580	3.685	11	-7.315
High	5700	3.497	11	-7.503

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

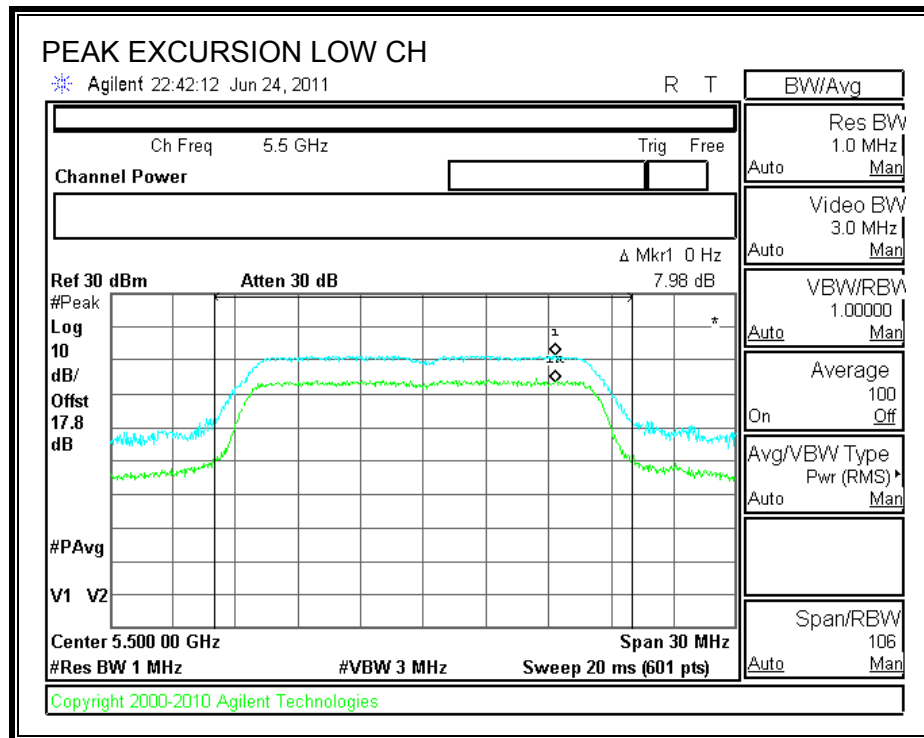
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

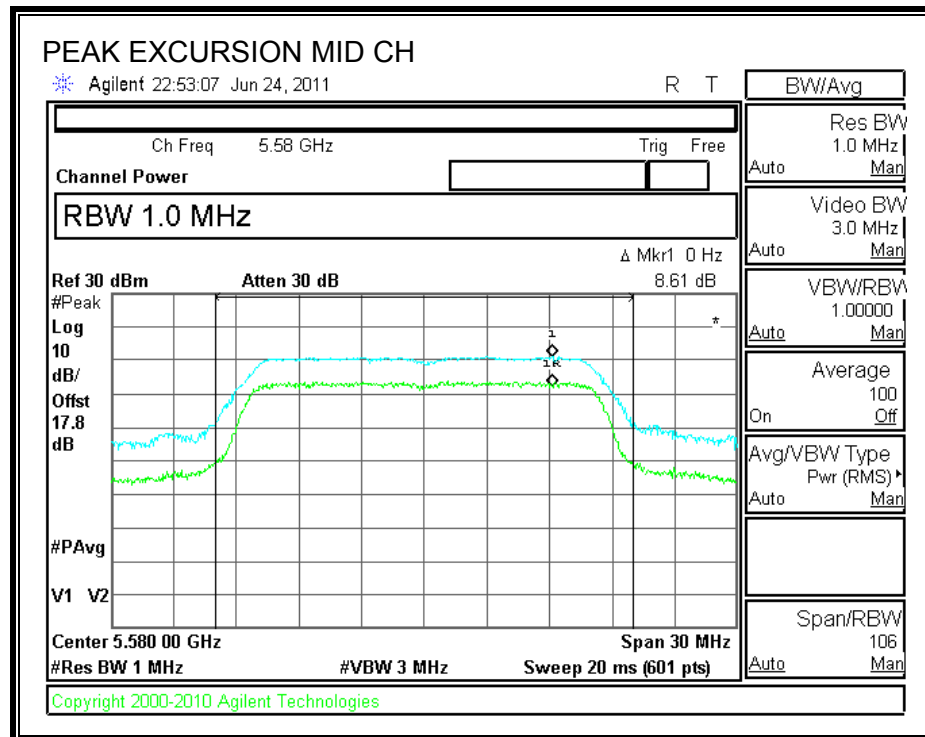
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

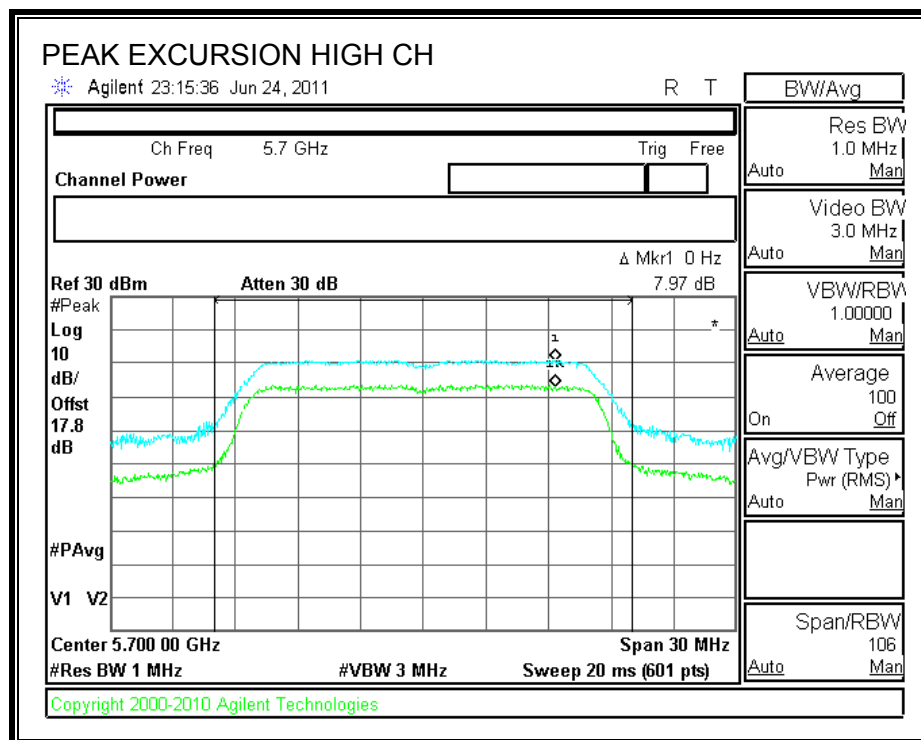
RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	7.98	13	-5.02
Middle	5580	8.61	13	-4.39
High	5700	7.97	13	-5.03

PEAK EXCURSION







7.7.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

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

TEST PROCEDURE

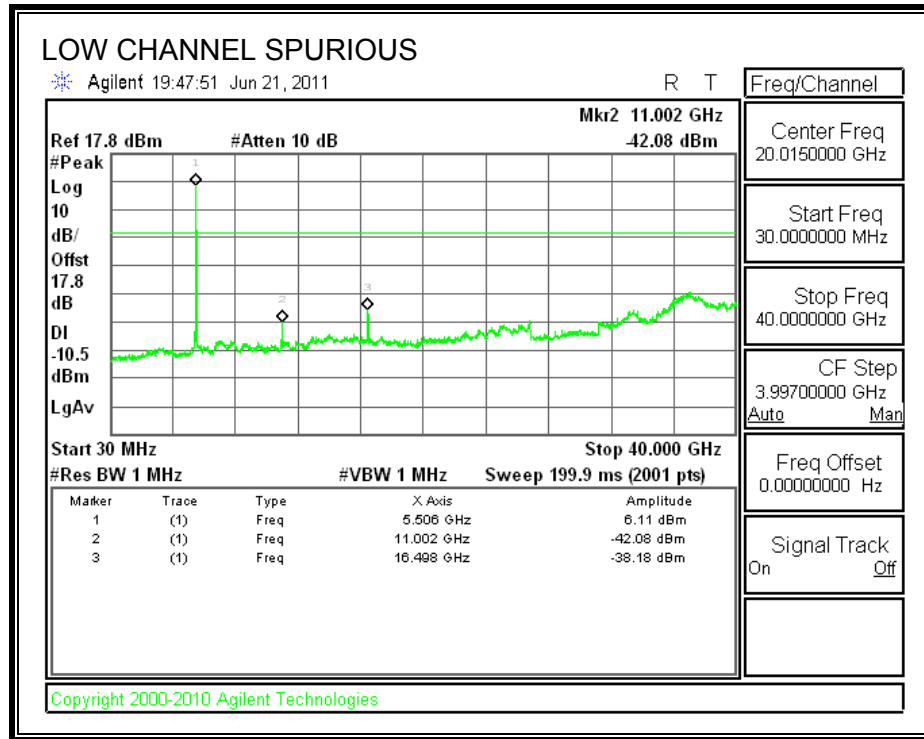
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

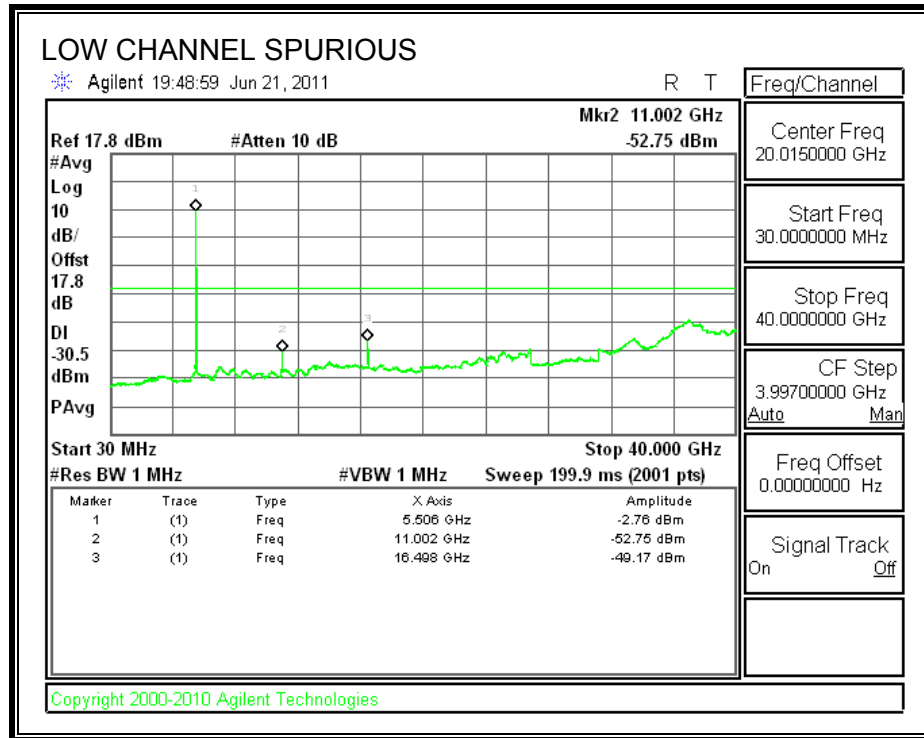
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

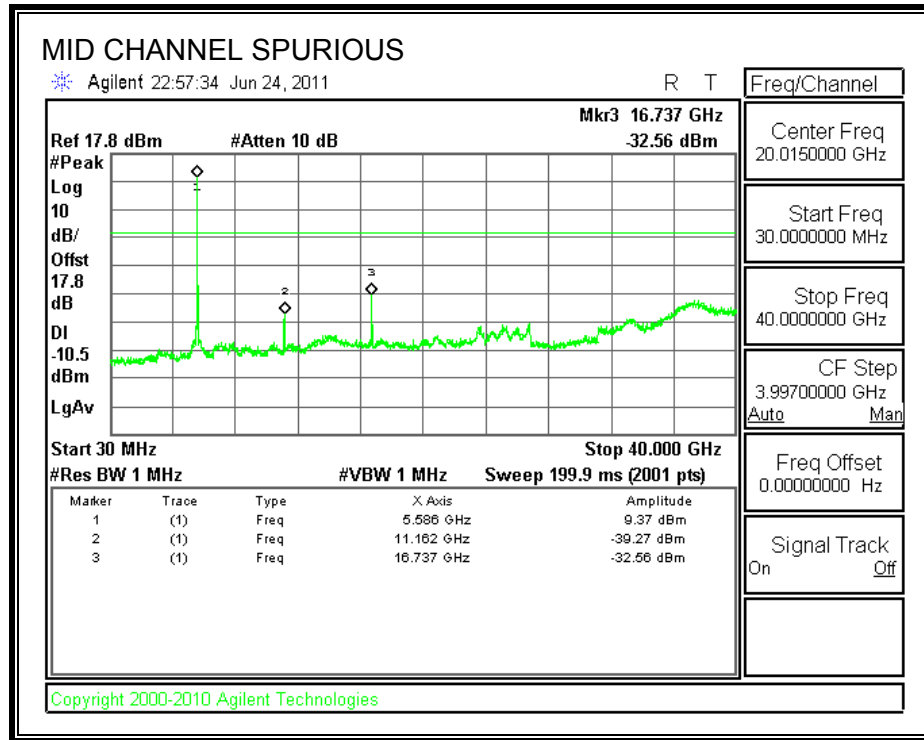
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

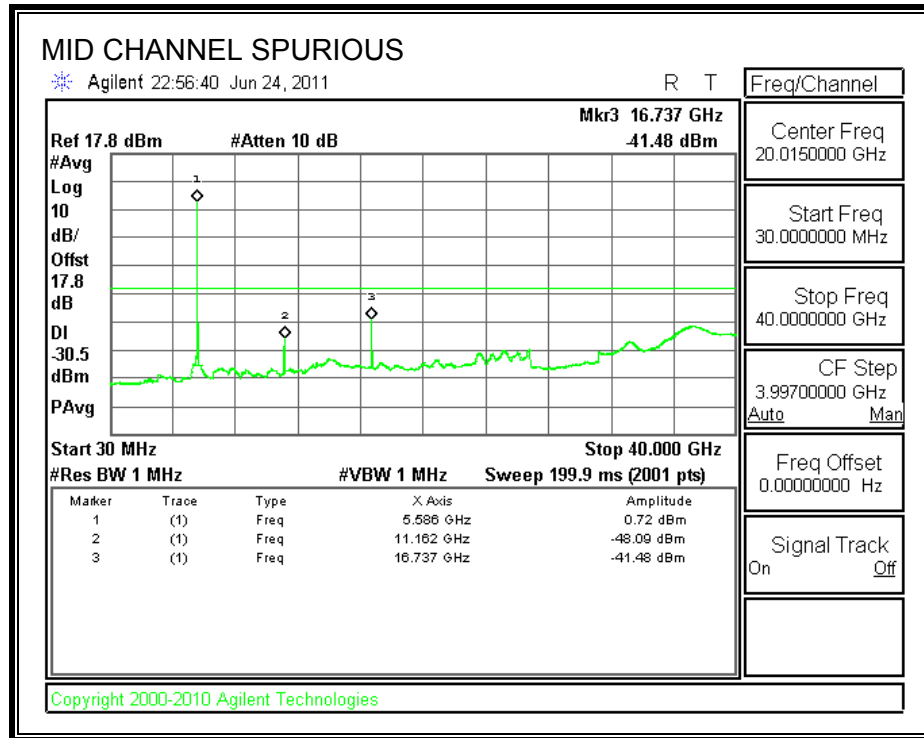
RESULTS

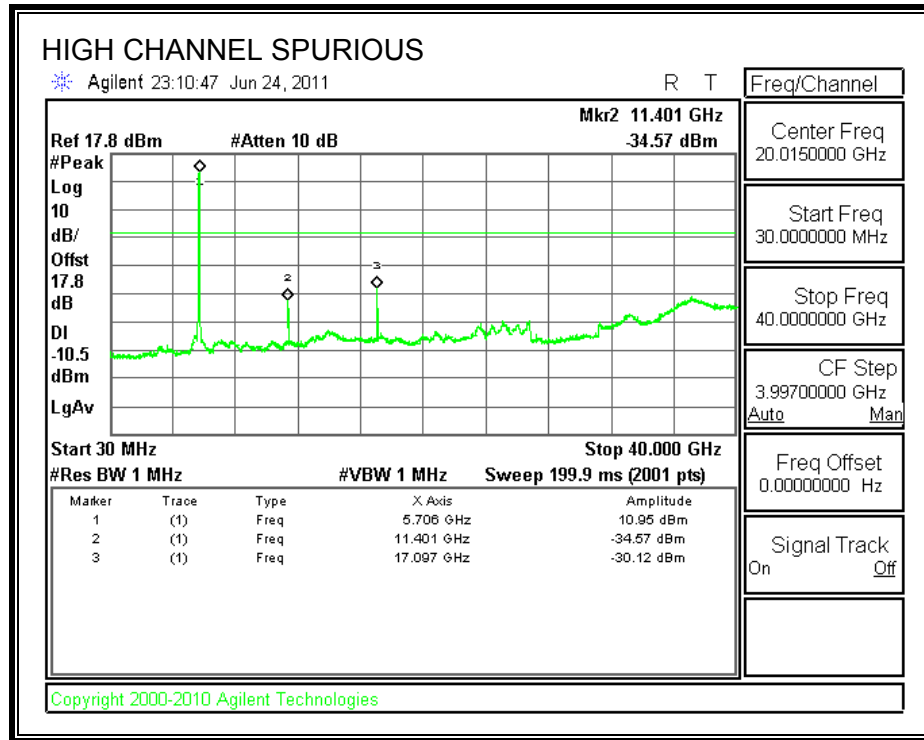
SPURIOUS EMISSIONS

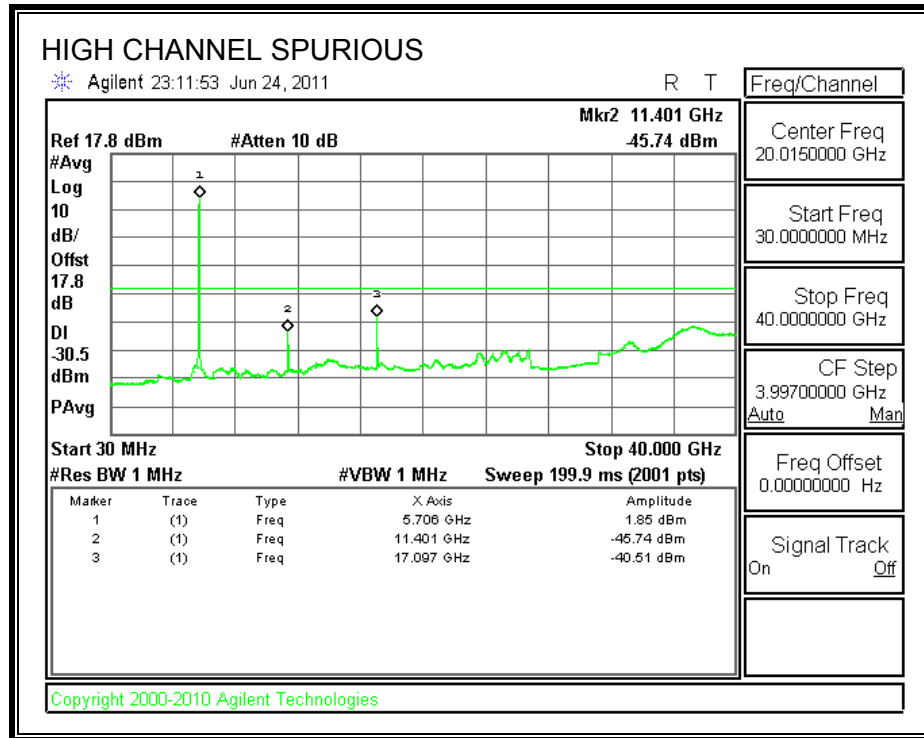












7.8. 802.11n HT20 MODE IN THE 5.6 GHz BAND

7.8.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

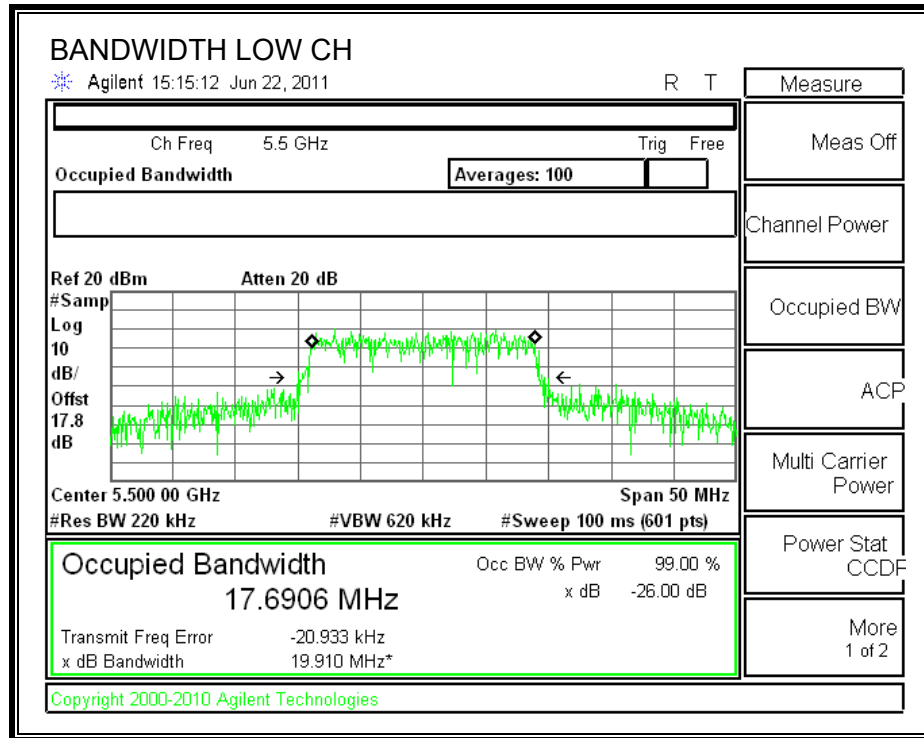
TEST PROCEDURE

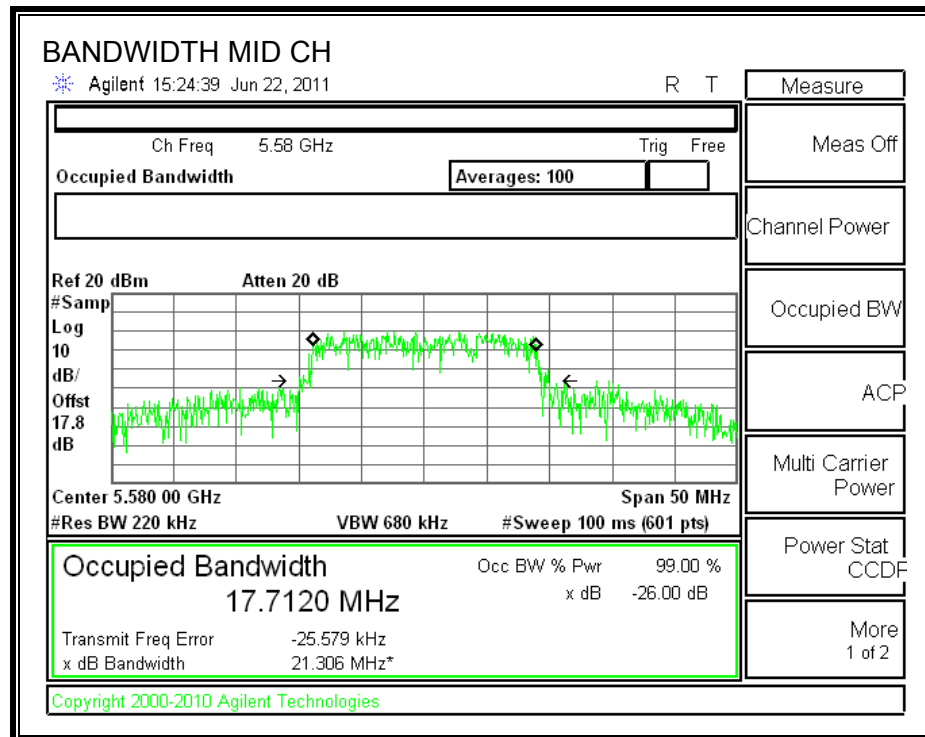
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

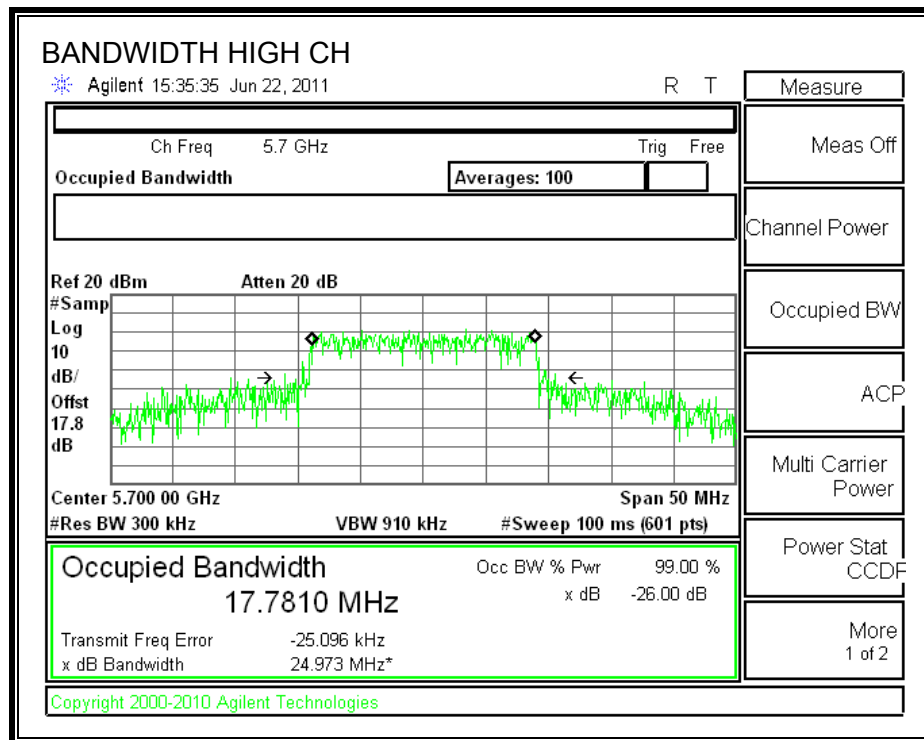
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5500	19.91	17.6906
Middle	5580	21.306	17.712
High	5700	24.973	17.781

26 dB and 99% BANDWIDTH







7.8.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

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

TEST PROCEDURE

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

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

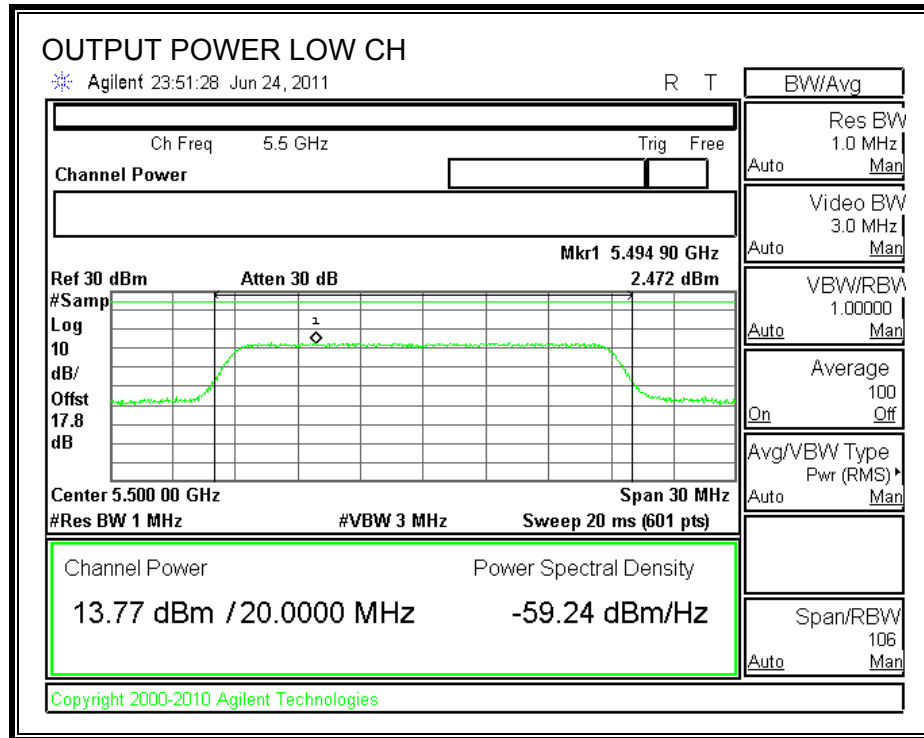
RESULTS

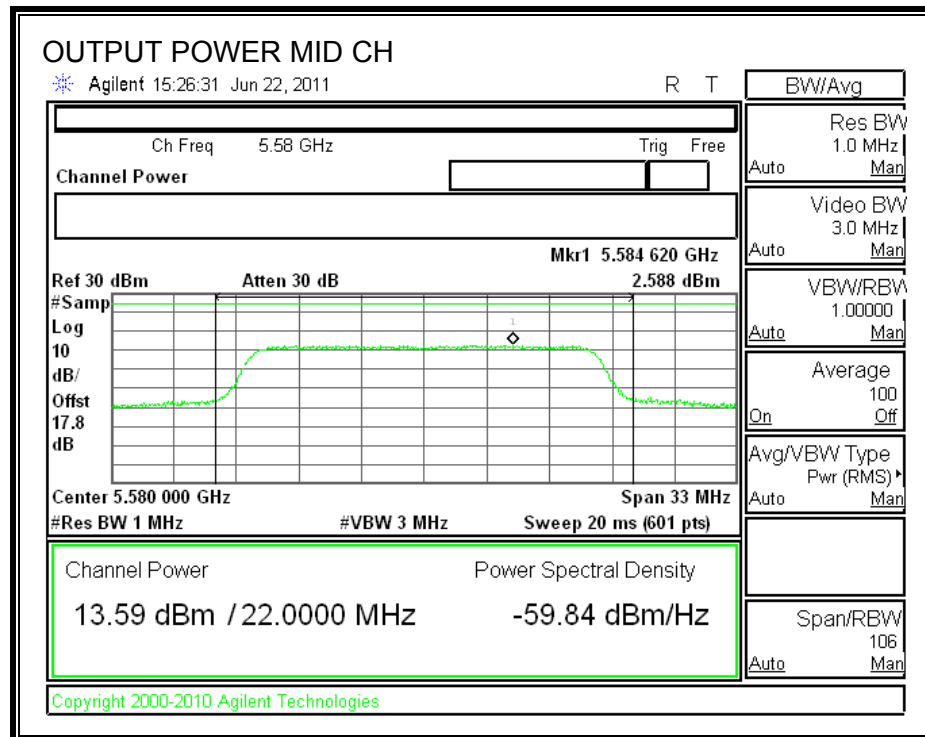
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5500	24	19.91	23.99	3.75	23.99
Mid	5580	24	21.306	24.29	3.75	24.00
High	5700	24	24.973	24.97	3.75	24.00

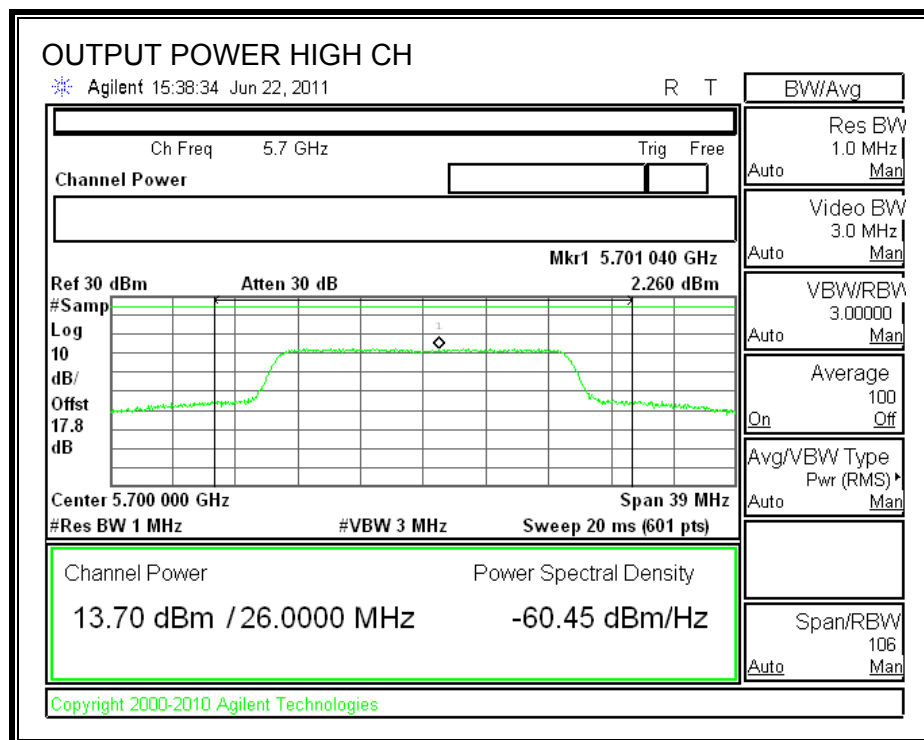
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	13.77	23.99	-10.22
Mid	5580	13.59	24.00	-10.41
High	5700	13.70	24.00	-10.30

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 17.7 dB (including 10 dB pad and 7.7 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	13.25
Middle	5580	13.43
High	5700	13.58

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.

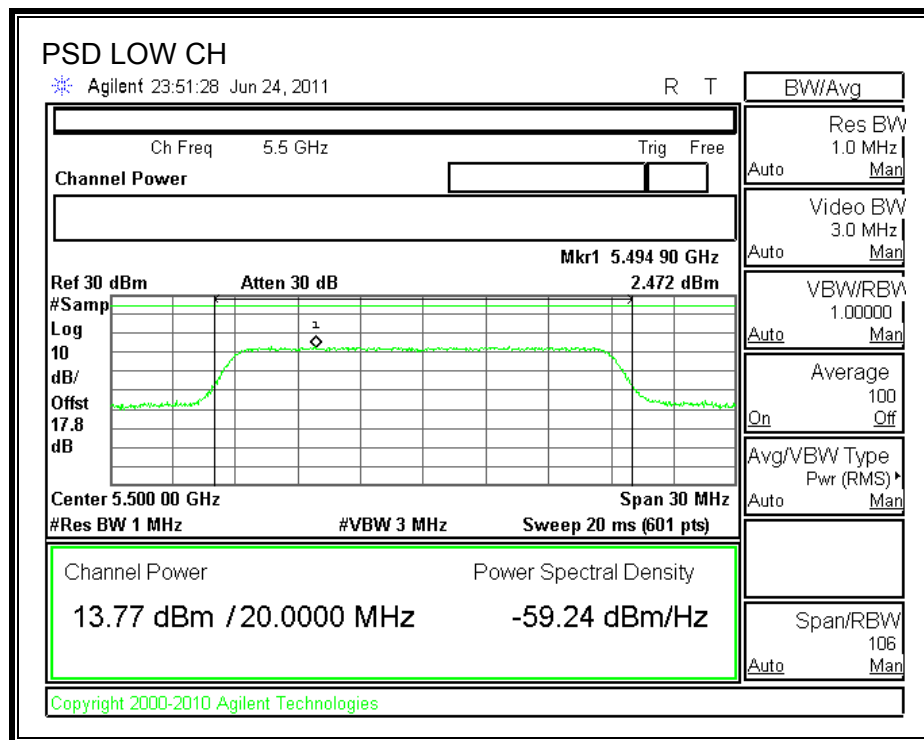
TEST PROCEDURE

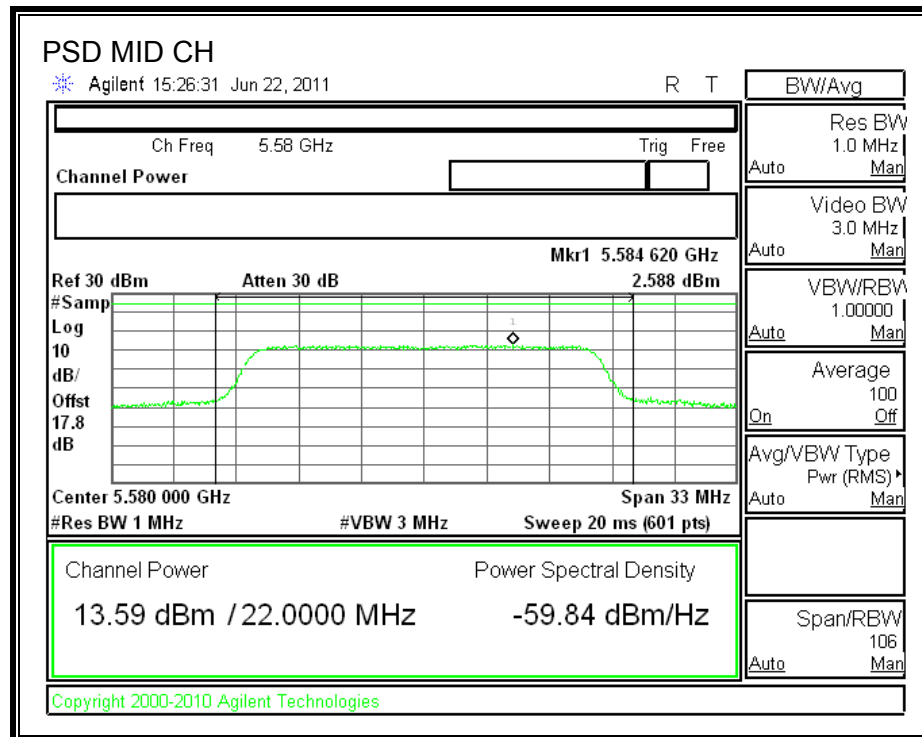
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

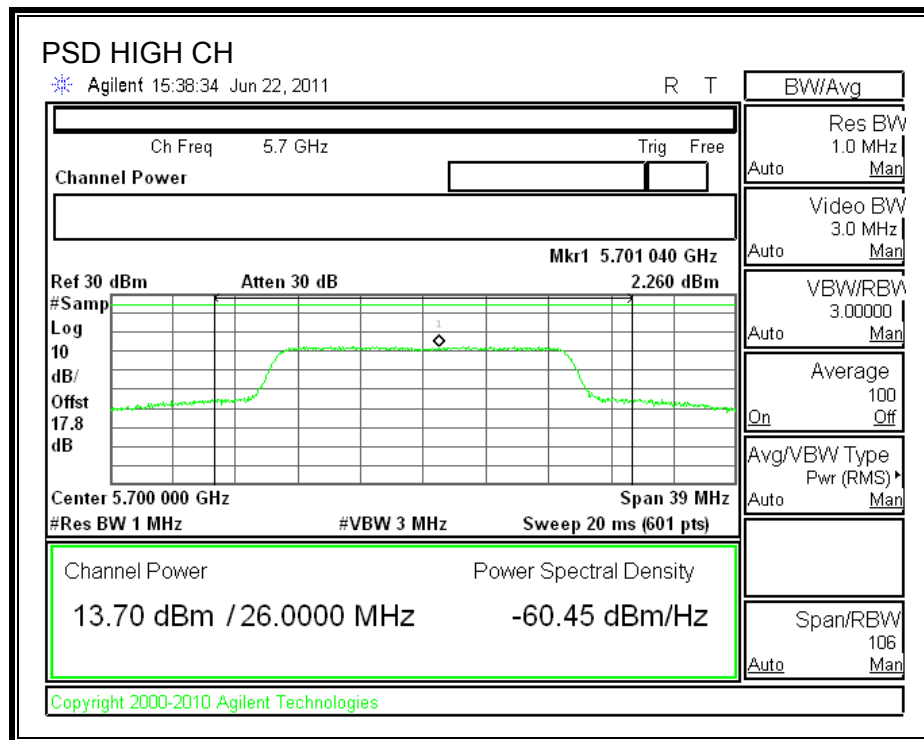
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5500	2.472	11	-8.528
Middle	5580	2.558	11	-8.442
High	5700	2.260	11	-8.740

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

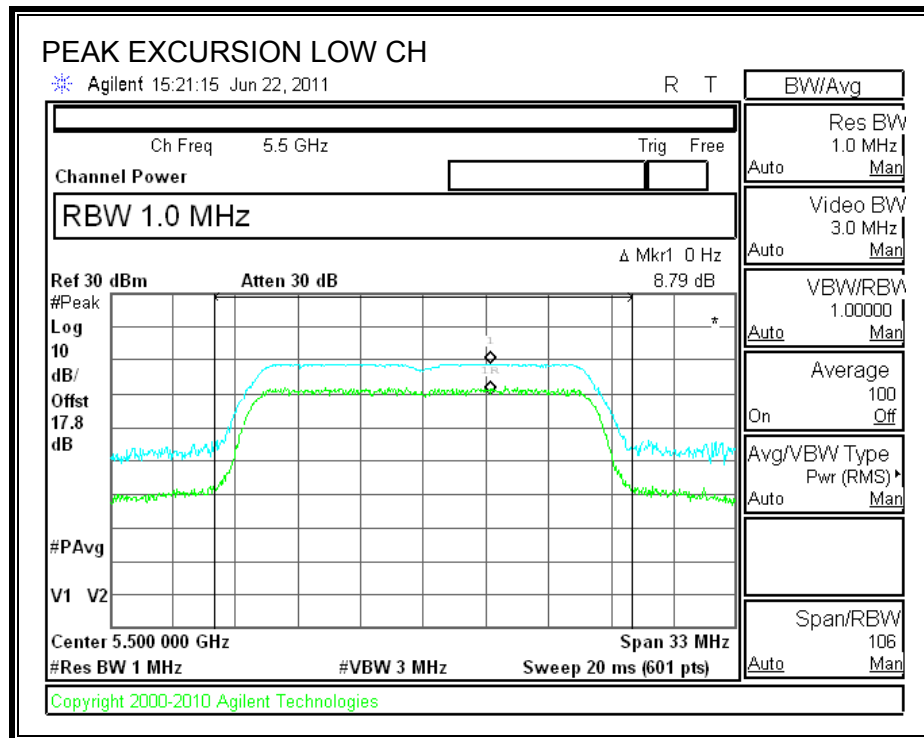
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

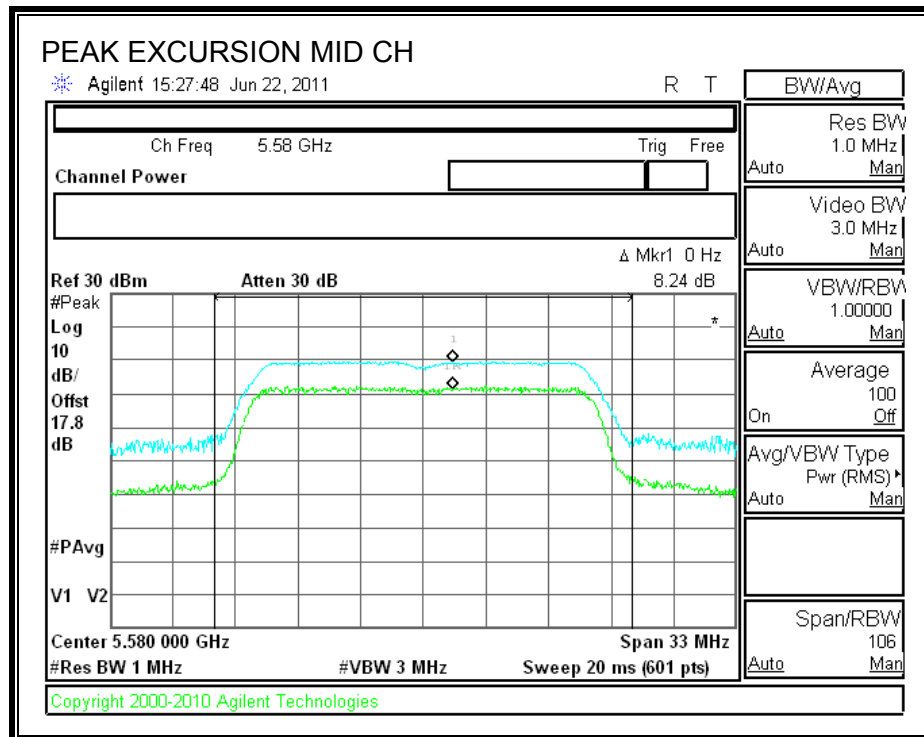
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

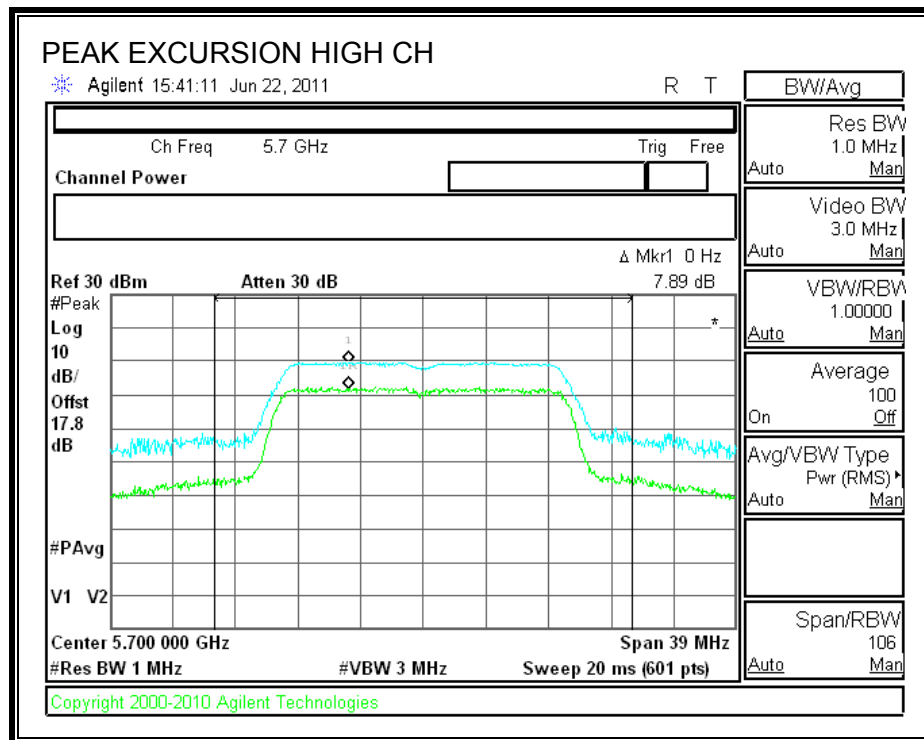
RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	8.79	13	-4.21
Middle	5580	8.24	13	-4.76
High	5700	7.89	13	-5.11

PEAK EXCURSION







7.8.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

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

TEST PROCEDURE

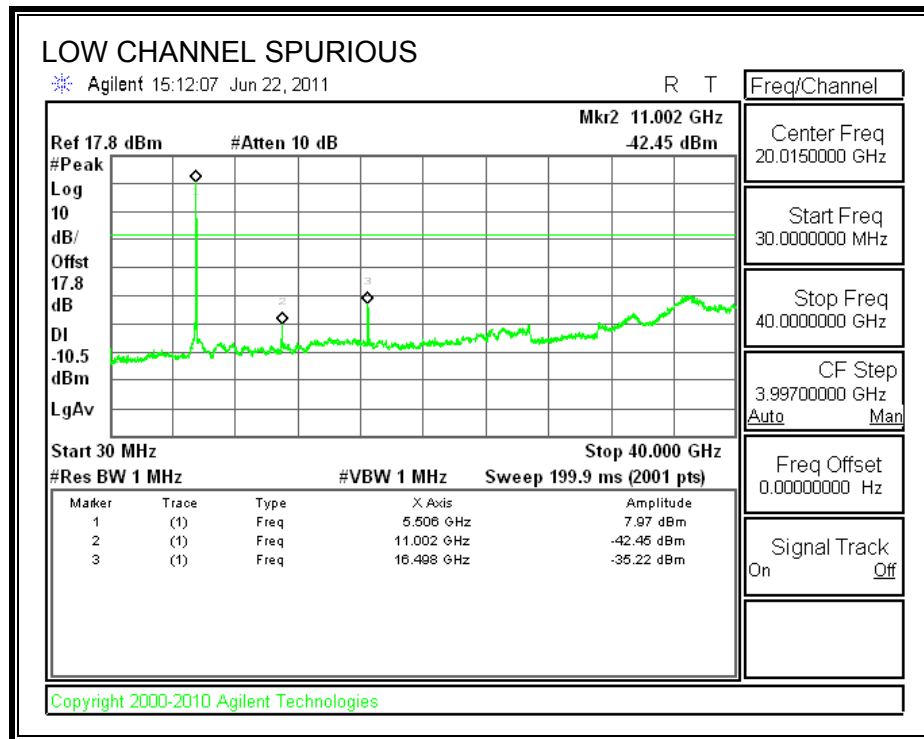
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

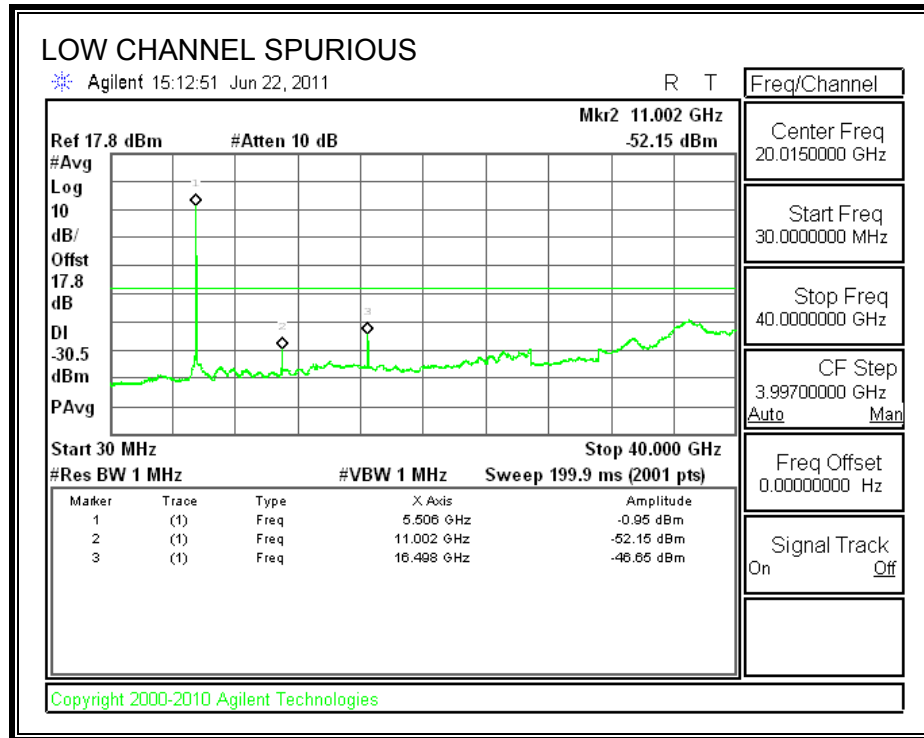
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

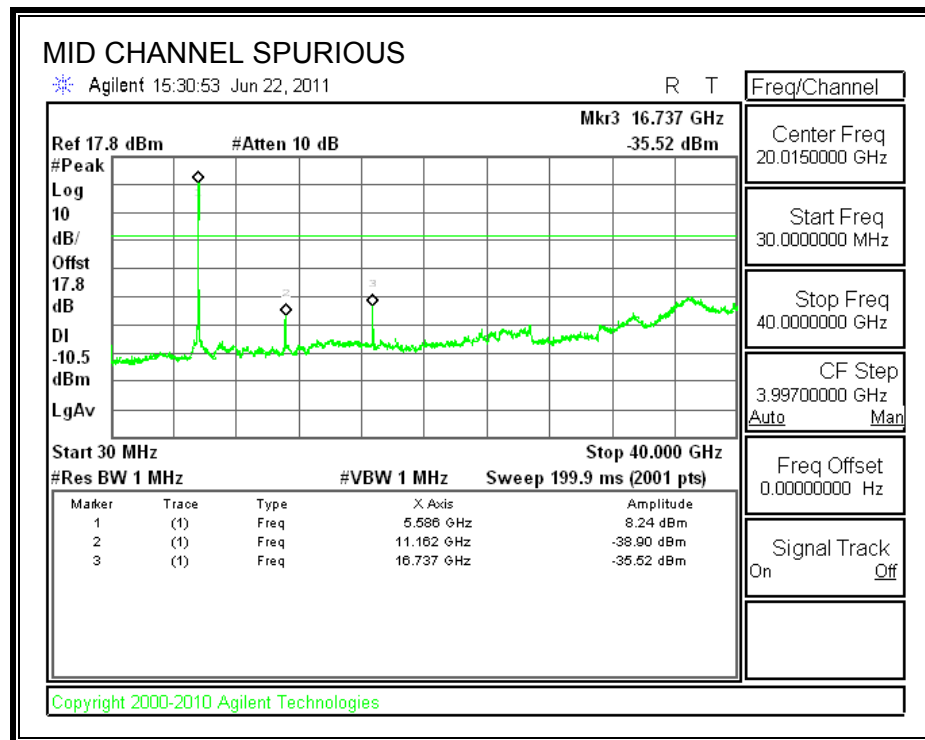
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

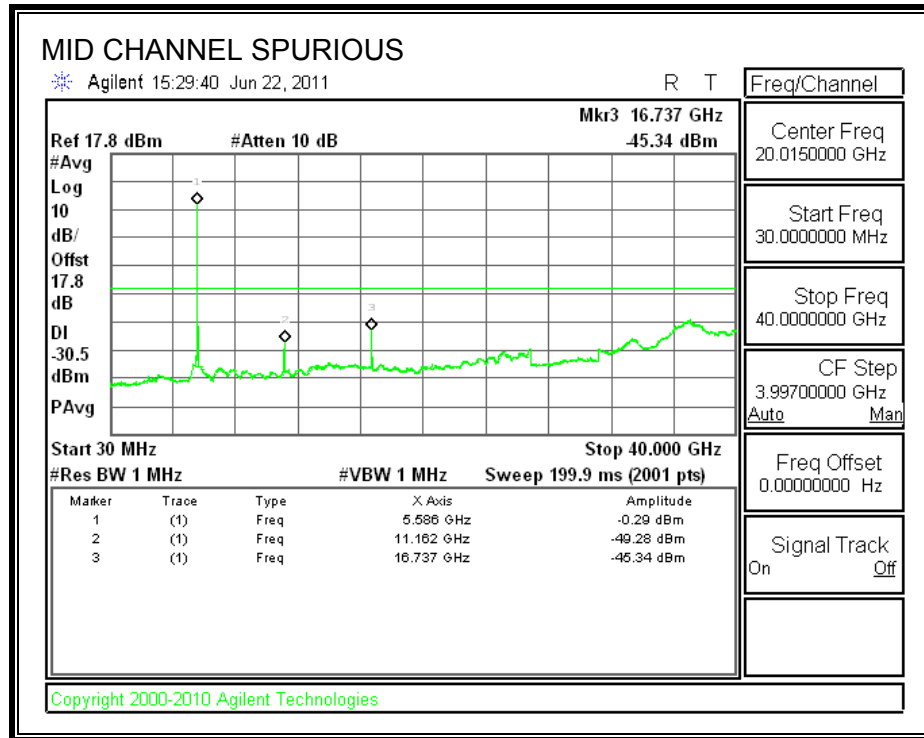
RESULTS

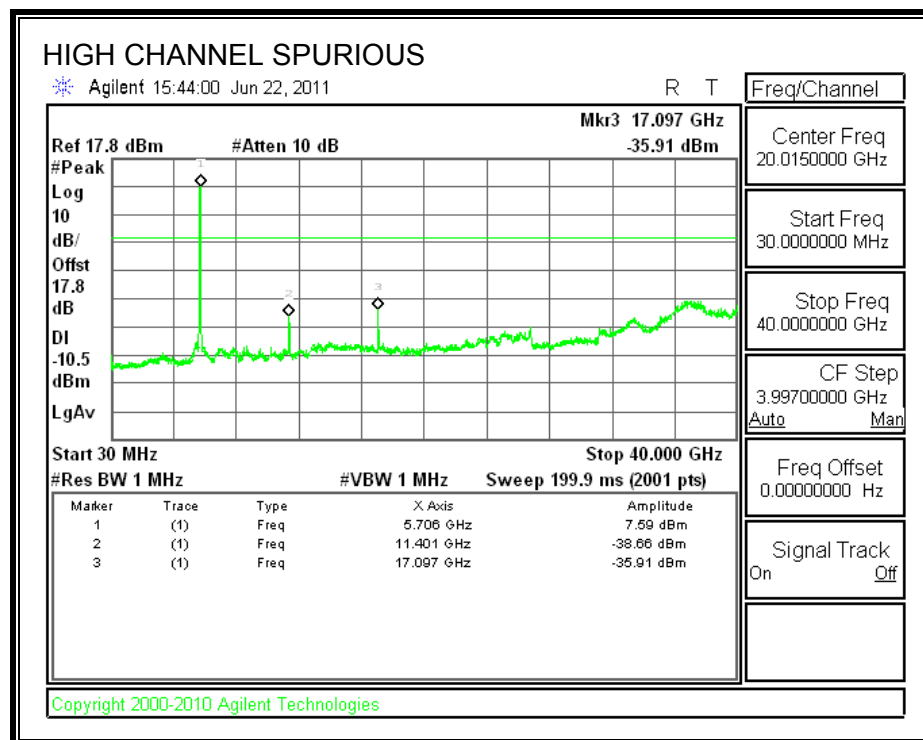
SPURIOUS EMISSIONS

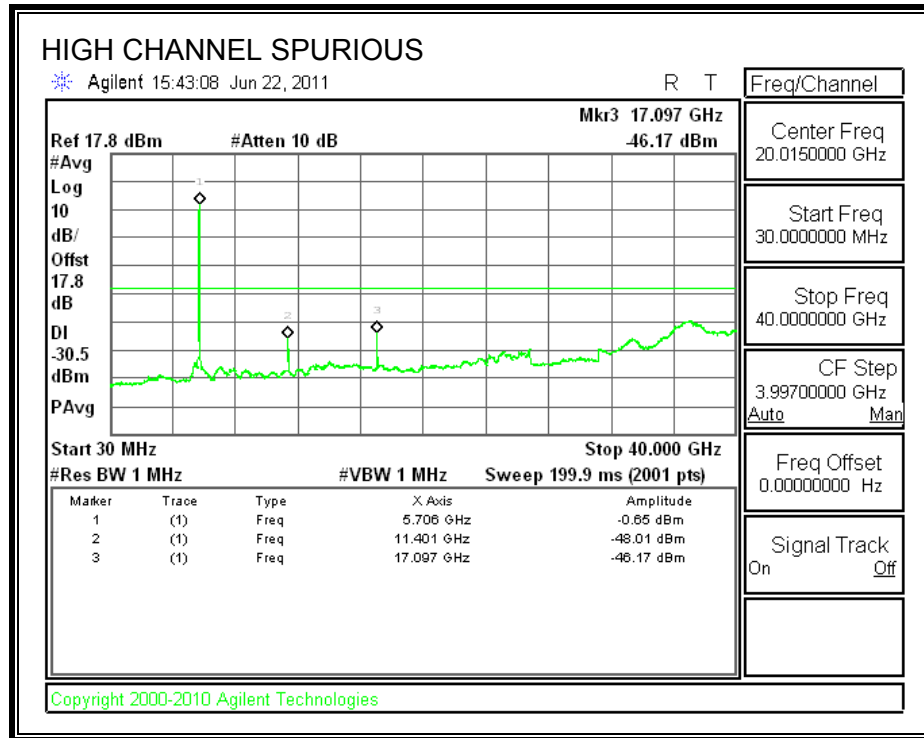












7.9. 802.11n HT40 MODE IN THE 5.6 GHz BAND

7.9.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

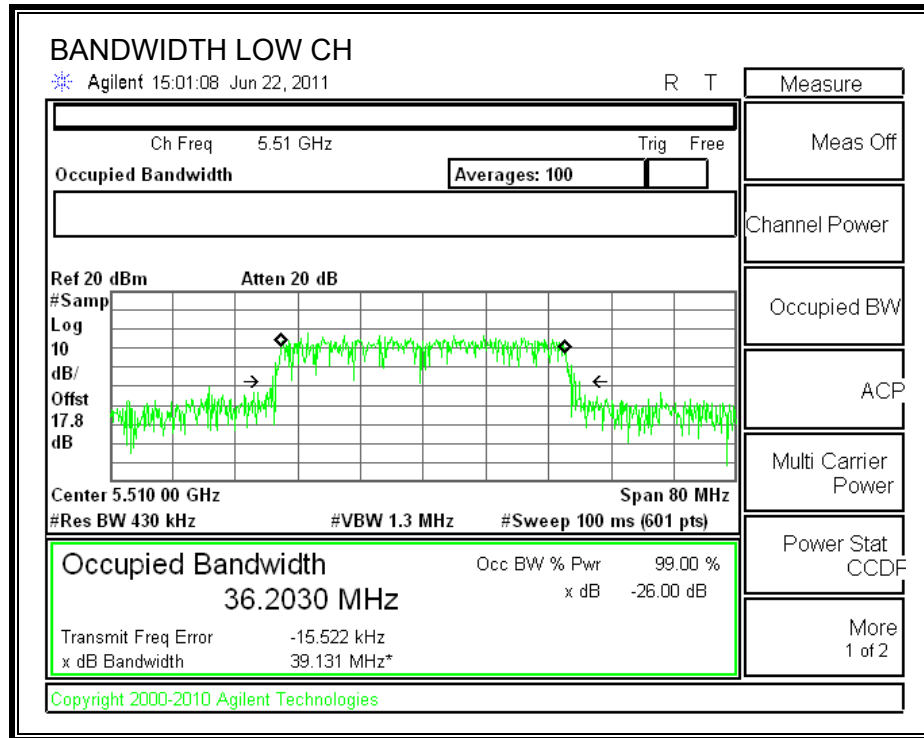
TEST PROCEDURE

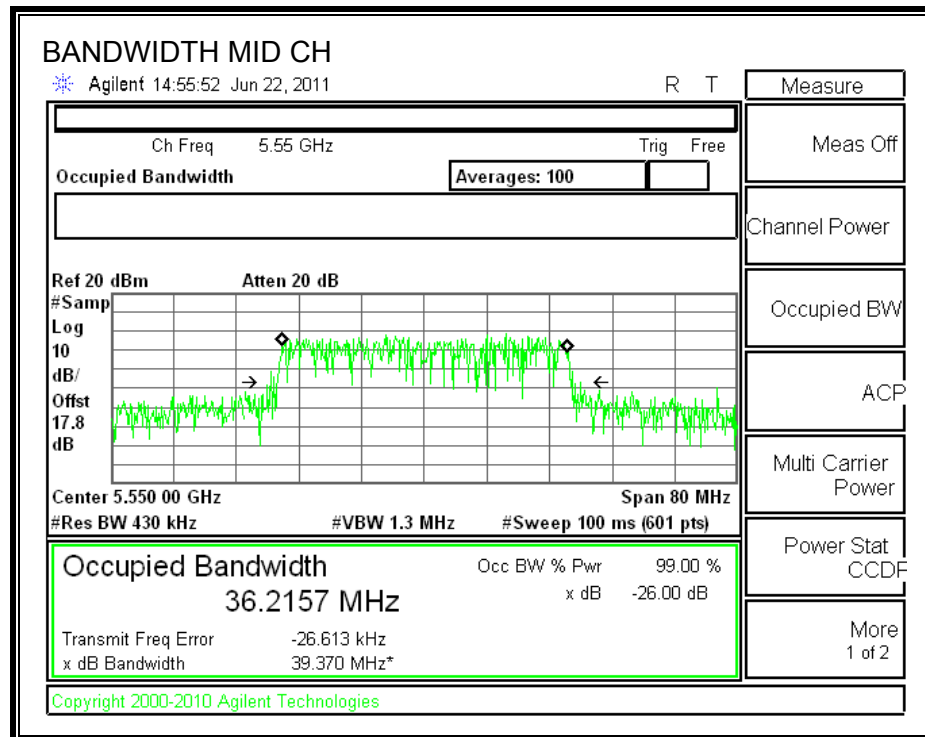
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

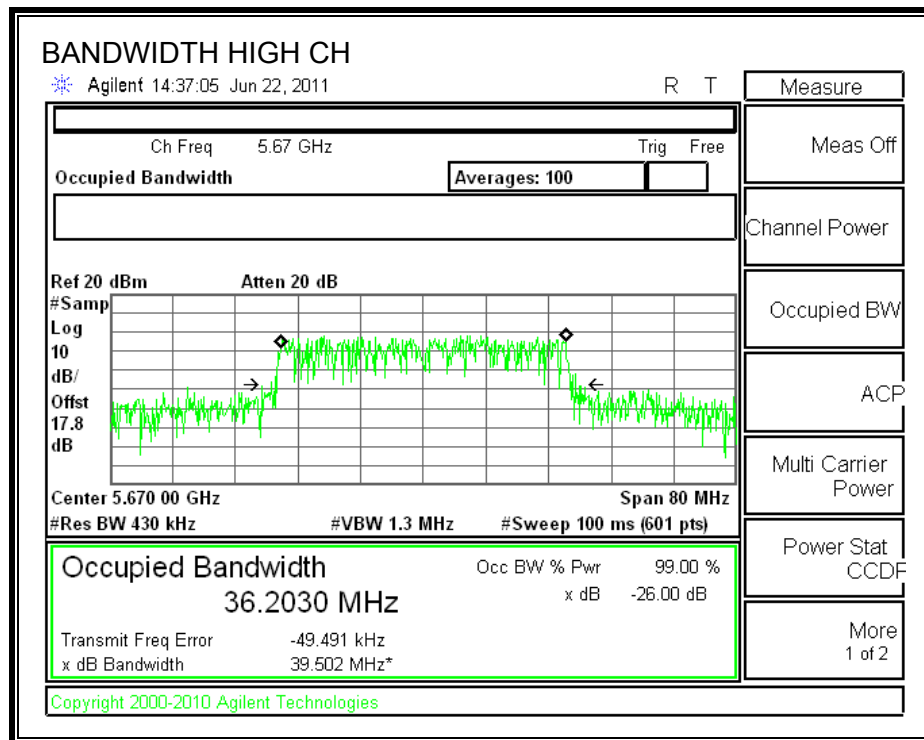
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5510	39.131	36.203
Middle	5550	39.37	36.2157
High	5670	39.502	36.203

26 dB and 99% BANDWIDTH







7.9.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

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

TEST PROCEDURE

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

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

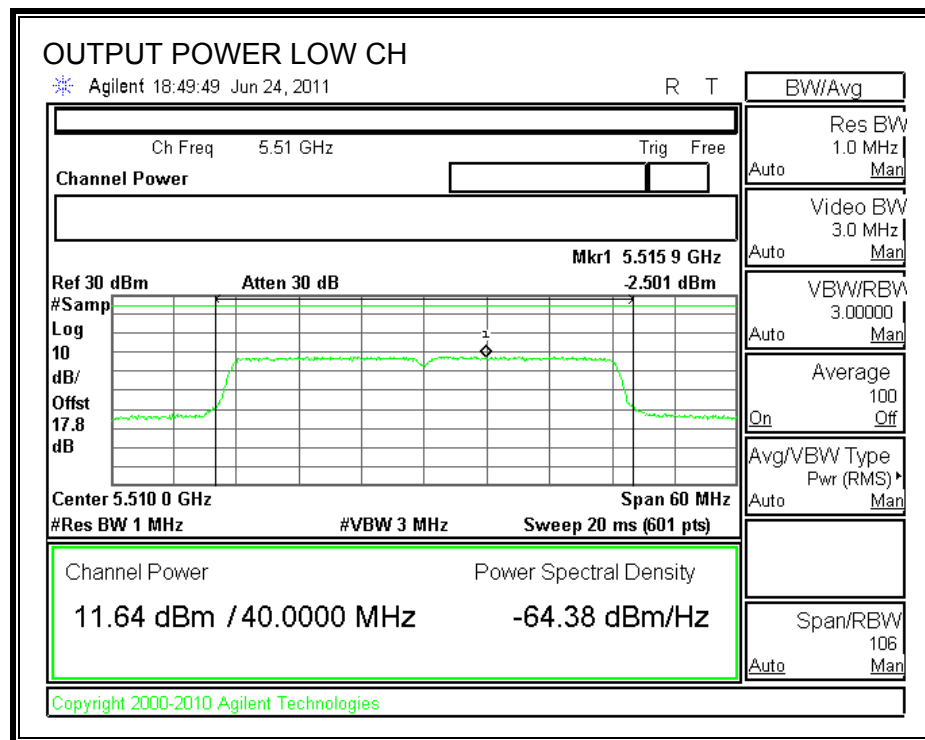
RESULTS

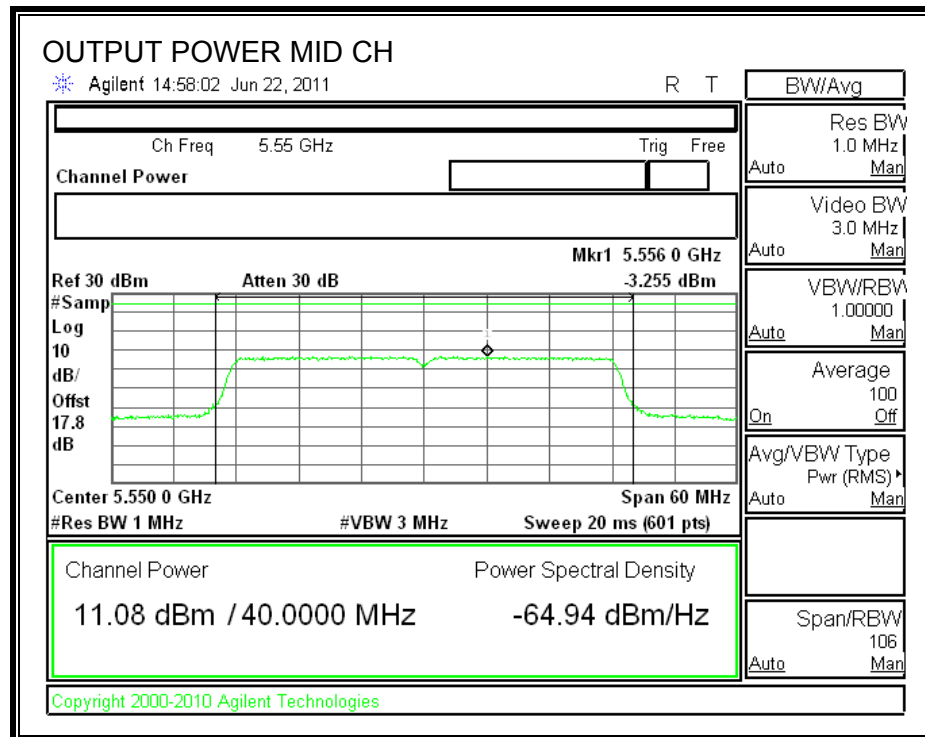
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5510	24	39.131	26.93	3.75	24.00
Mid	5550	24	39.37	26.95	3.75	24.00
High	5670	24	39.502	26.97	3.75	24.00

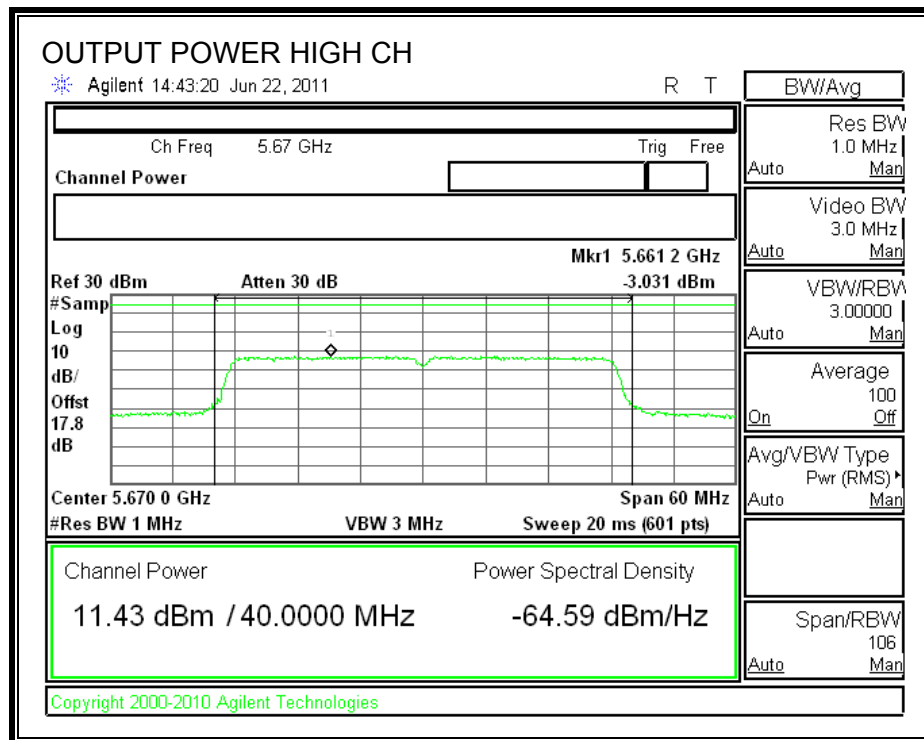
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5510	11.64	24.00	-12.36
Mid	5550	11.08	24.00	-12.92
High	5670	11.43	24.00	-12.57

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 17.7 dB (including 10 dB pad and 7.7 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	11.46
Middle	5550	11.01
High	5670	11.27

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.

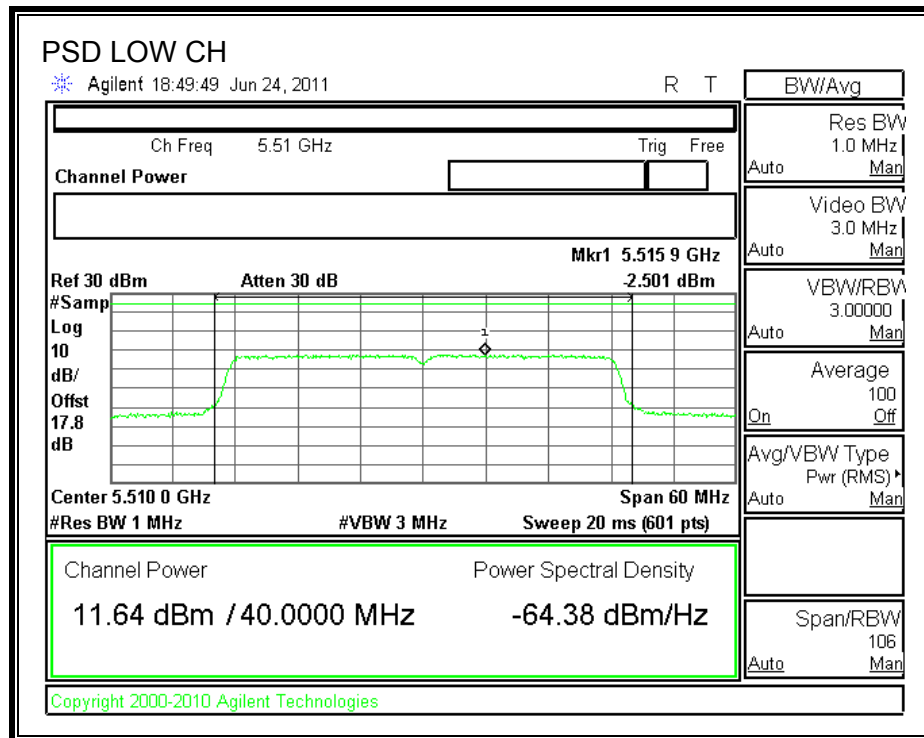
TEST PROCEDURE

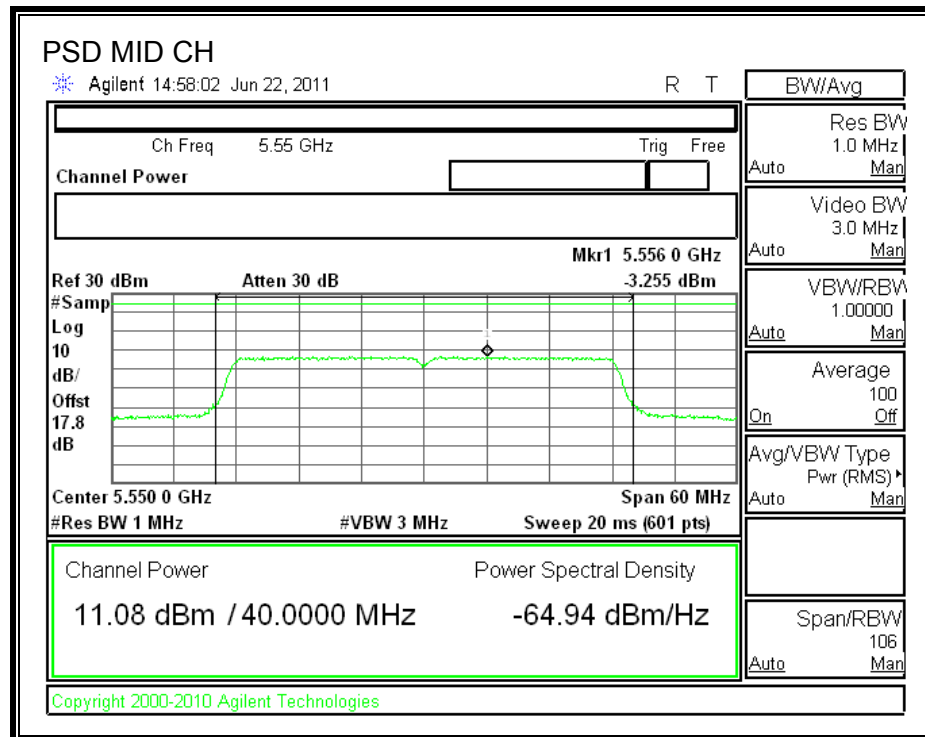
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

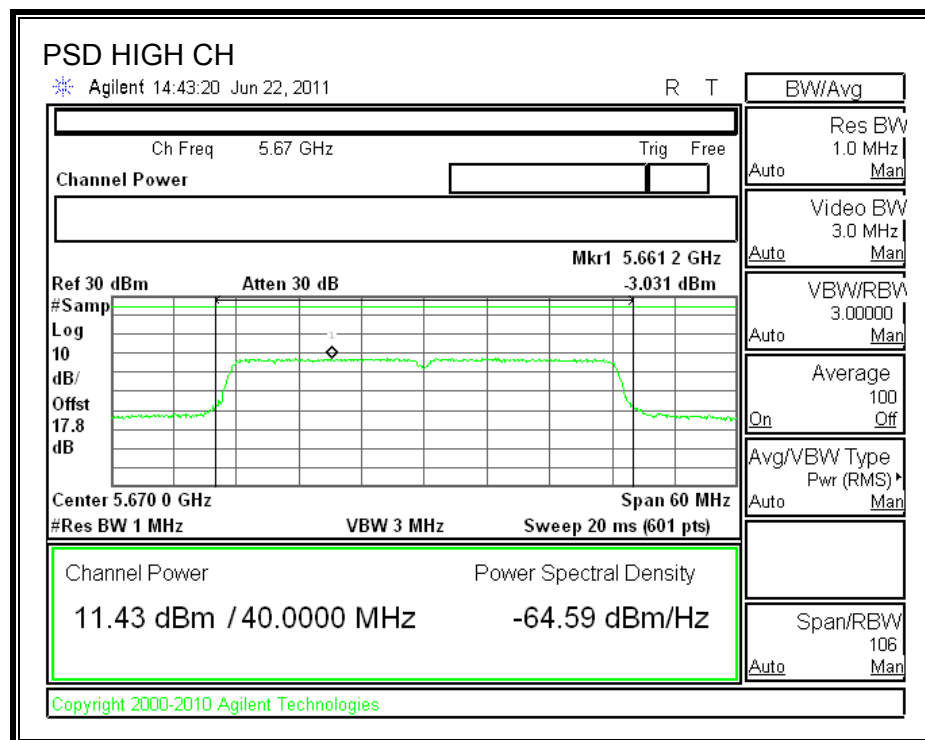
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5510	-2.501	11	-13.501
Middle	5550	-3.255	11	-14.255
High	5670	-3.031	11	-14.031

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

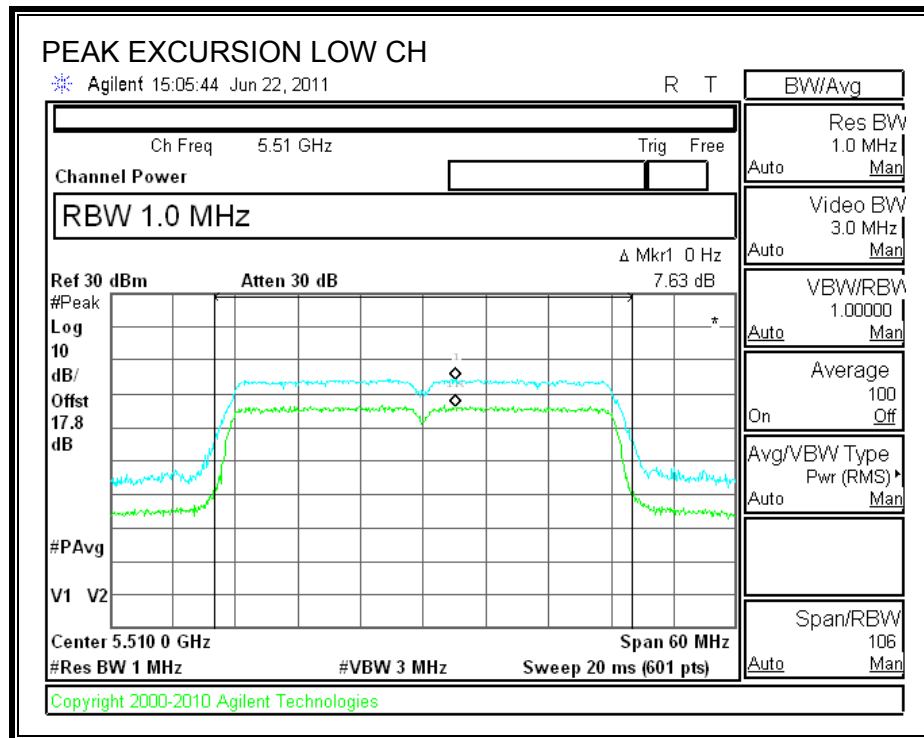
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

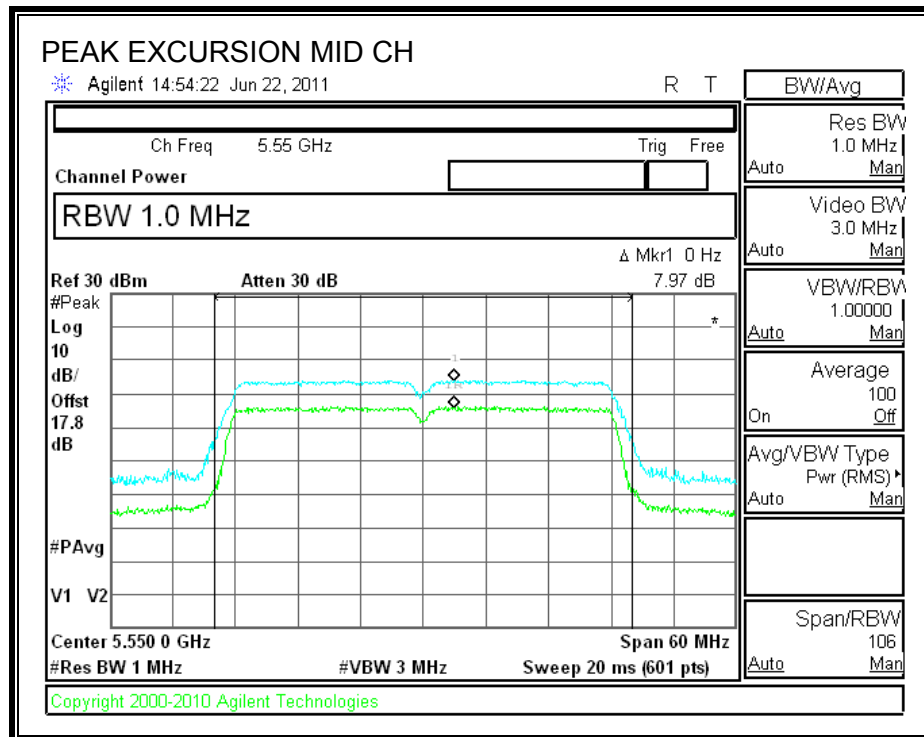
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

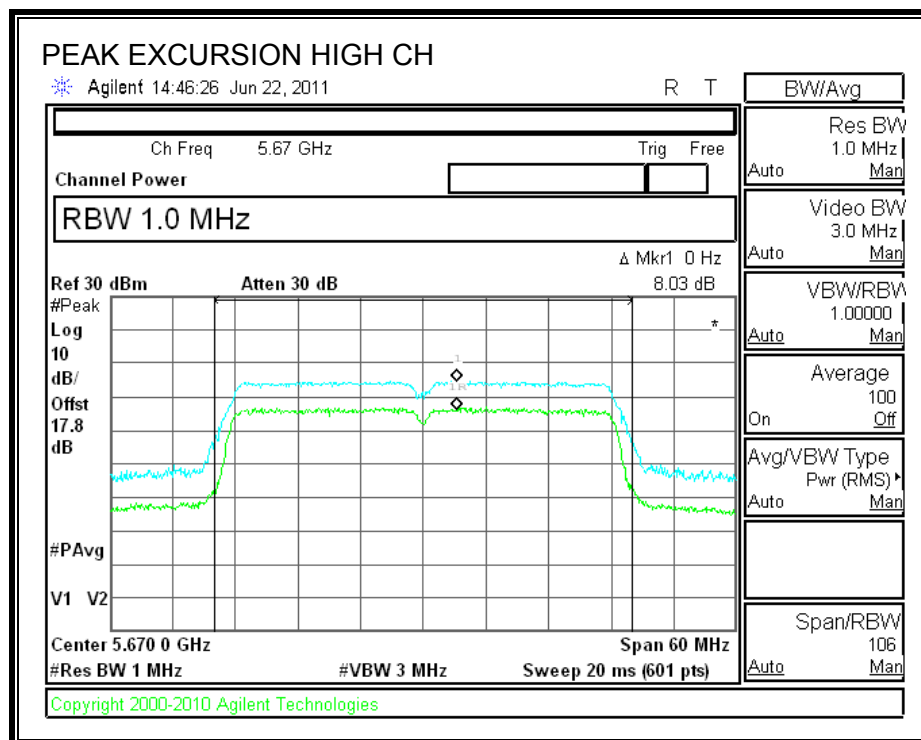
RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5510	7.63	13	-5.37
Middle	5550	7.97	13	-5.03
High	5670	8.03	13	-4.97

PEAK EXCURSION







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

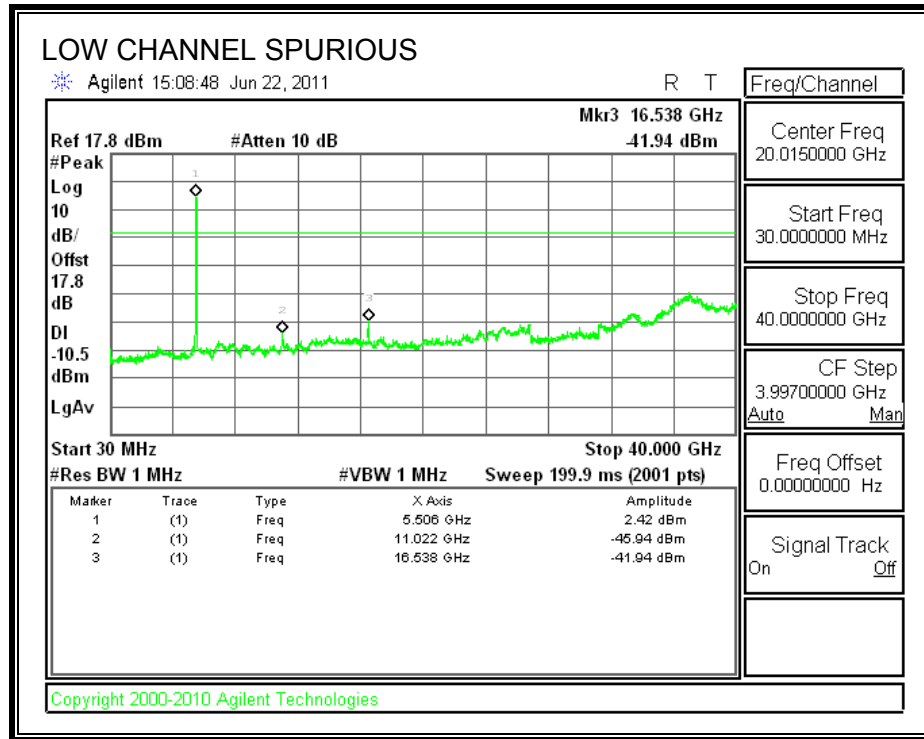
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

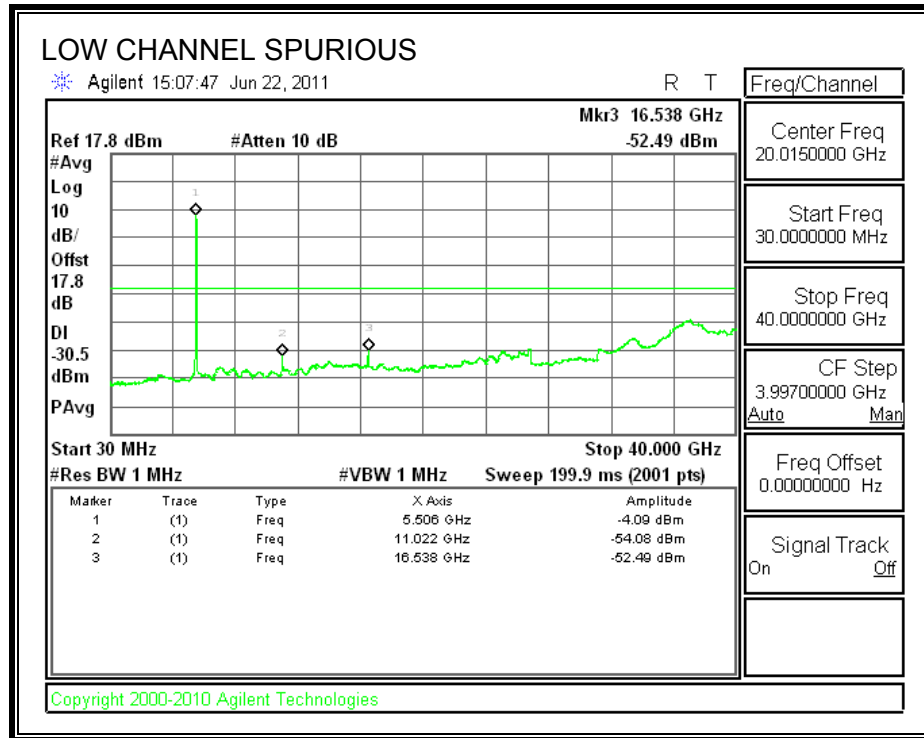
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

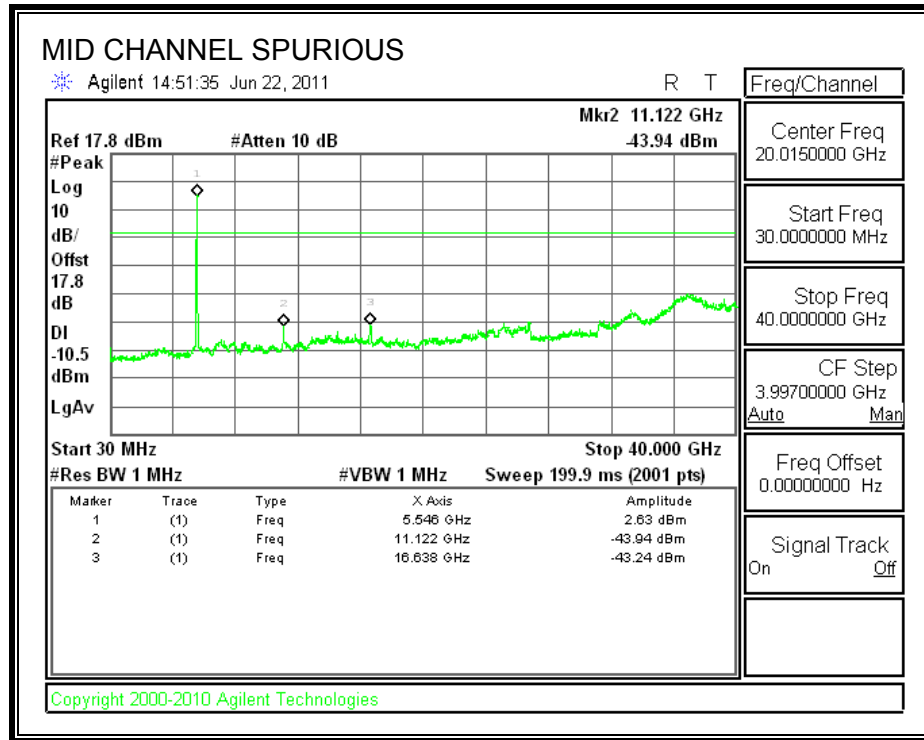
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

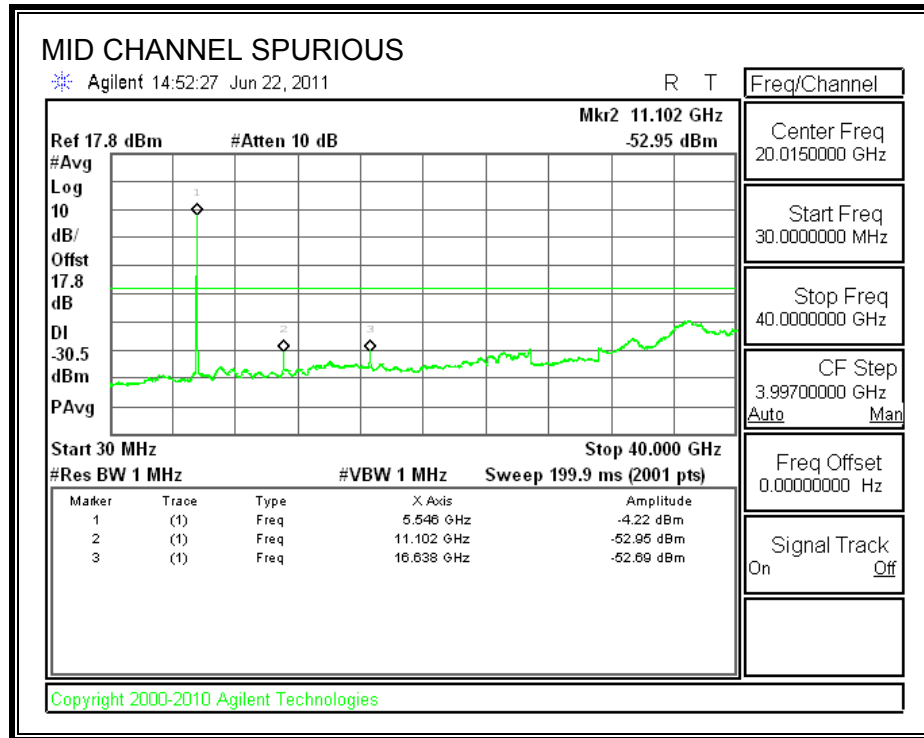
RESULTS

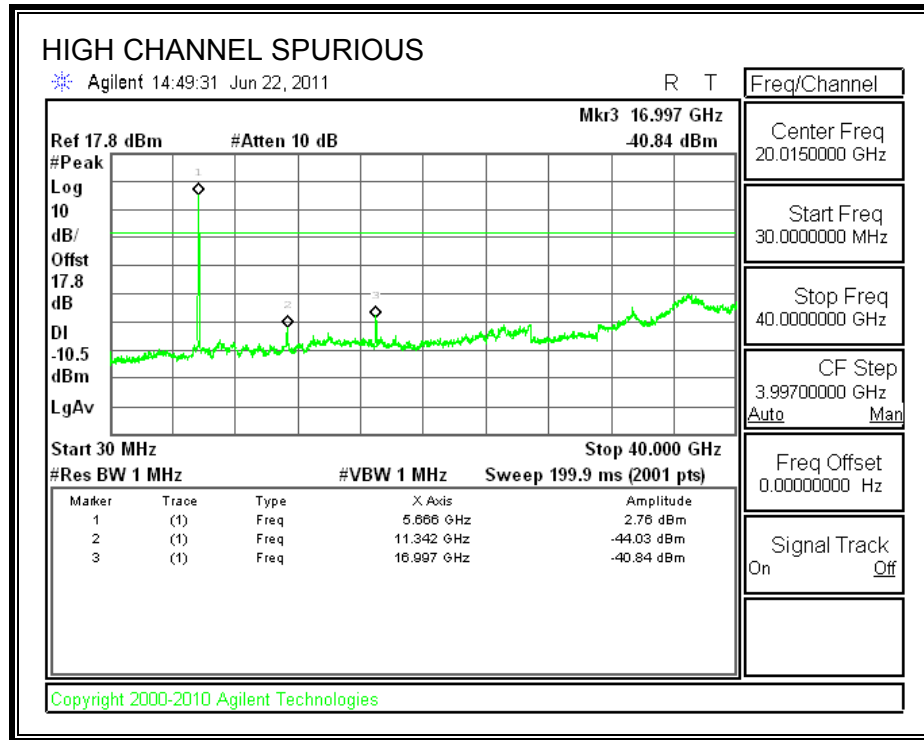
SPURIOUS EMISSIONS

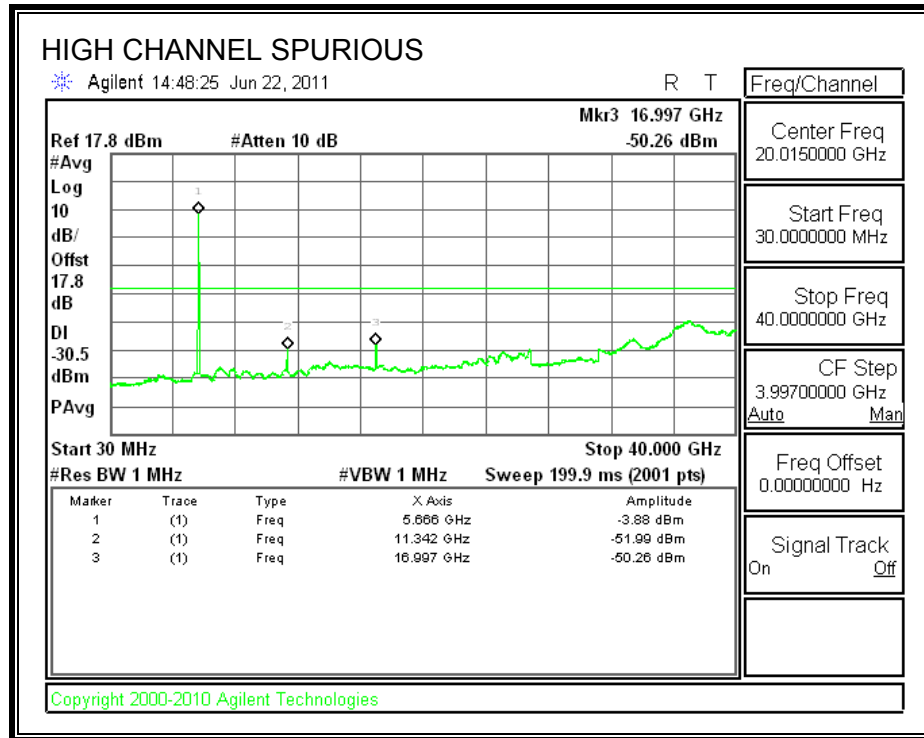












8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

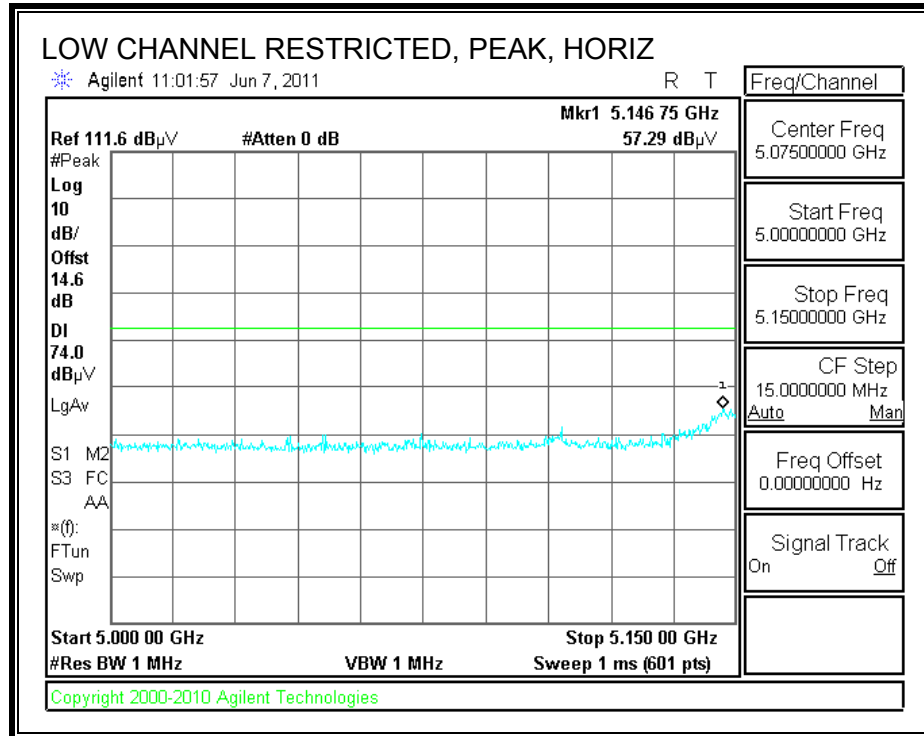
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

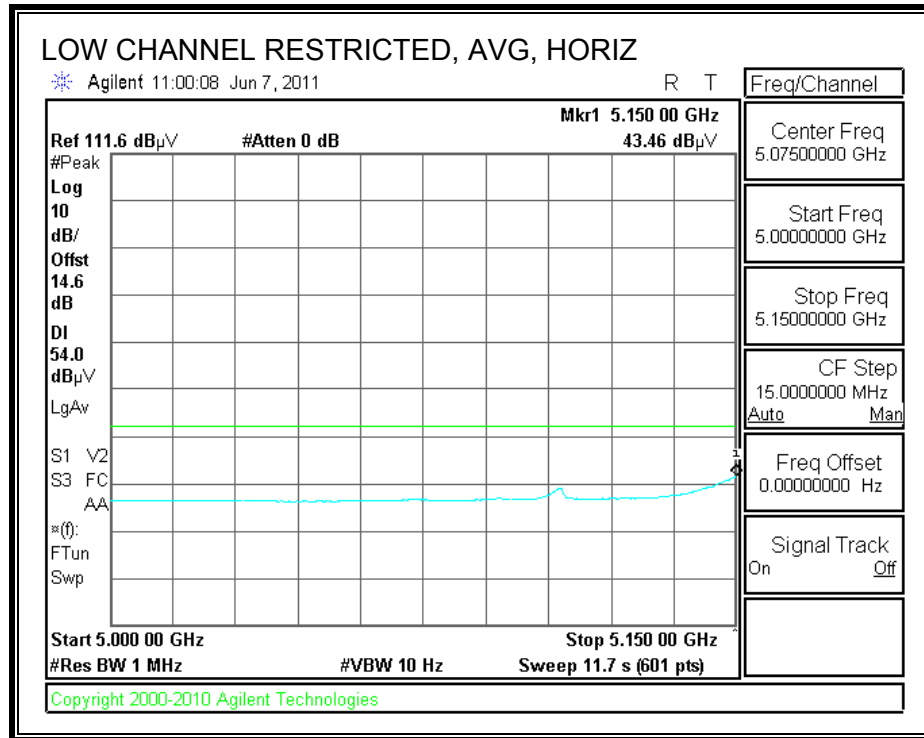
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

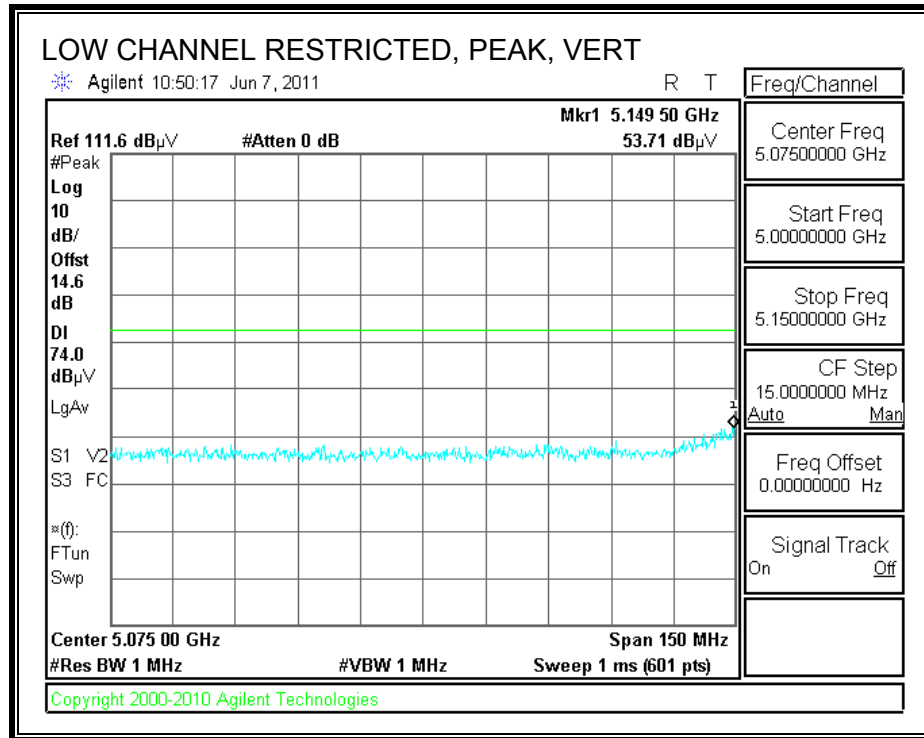
8.2.1. TX ABOVE 1 GHz FOR 802.11a MODE IN THE LOWER 5.2 GHz BAND

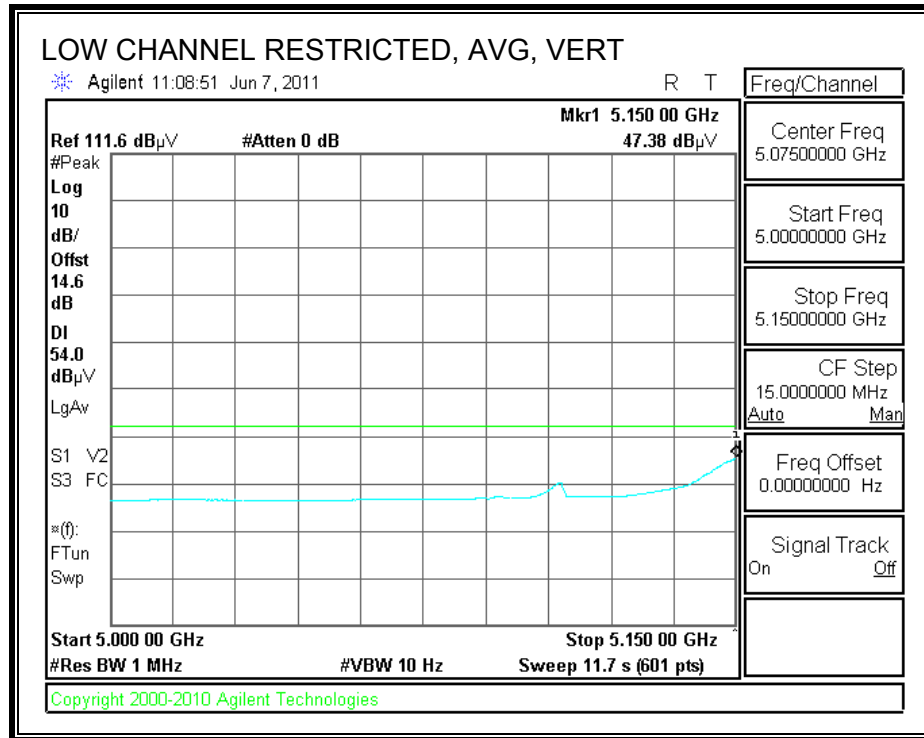
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



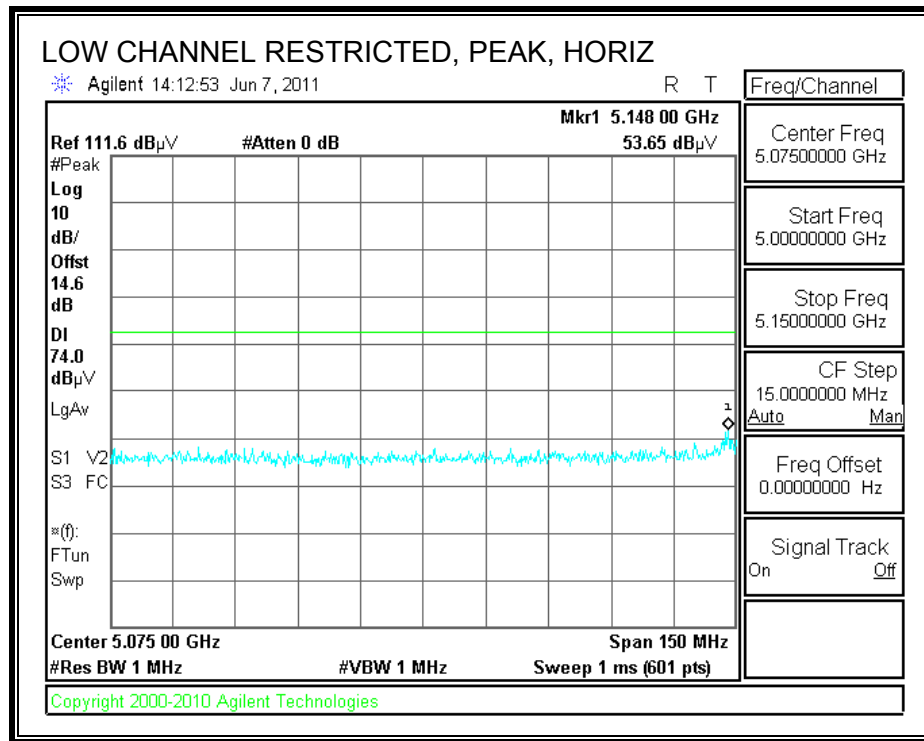


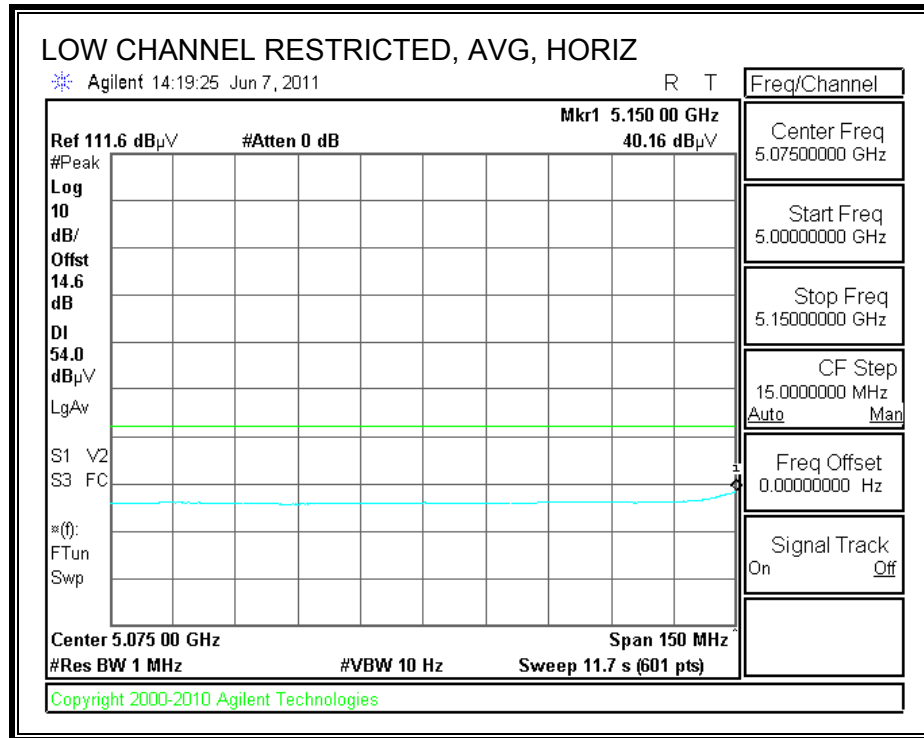
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber																	
Project #:		11U13822															
Date:		6/4/11															
Test Engineer:		Thanh Nguyen															
Configuration:		EUT , SHEEVA Plug USB, support Laptop															
Mode:		Transmit 802.11 a mode															
Test Equipment:																	
Horn 1-18GHz				Pre-amplifier 1-26GHz				Pre-amplifier 26-40GHz				Horn > 18GHz				Limit	
T59; S/N: 3245 @3m				T145 Agilent 3008A0056				T88 Miteq 26-40GHz				T125; ARA 18-26GHz; S/N:1007				FCC 15.205	
Hi Frequency Cables																	
3' cable 22807700				12' cable 22807600				20' cable 22807500				HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz	
3' cable 22807700				12' cable 22807600				20' cable 22807500						R_002			
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)		
Low Ch 5180MHz																	
15.400	3.0	33.5	21.3	39.3	11.3	-32.3	0.0	0.0	51.7	39.5	74	54	-22.3	-14.5	Noise floor		
15.400	3.0	34.4	21.3	39.3	11.3	-32.3	0.0	0.0	52.6	39.5	74	54	-21.4	-14.5	Noise floor		
Mid Ch 5200MHz																	
15.600	3.0	34.7	22.6	38.7	11.4	-32.3	0.0	0.0	52.5	40.4	74	54	-21.5	-13.6	Noise floor		
15.600	3.0	33.8	21.3	38.7	11.4	-32.3	0.0	0.0	51.6	39.1	74	54	-22.4	-14.9	Noise floor		
High Ch 5240MHz																	
15.720	3.0	34.4	22.4	38.4	11.4	-32.3	0.0	0.0	52.0	39.9	74	54	-22.0	-14.1	Noise floor		
15.720	3.0	33.9	21.4	38.4	11.4	-32.3	0.0	0.0	51.5	39.0	74	54	-22.5	-15.0	Noise floor		
No other emissions were detected above the system noise floor.																	
Rev. 07.22.09																	
f	Measurement Frequency			Amp	Preamp Gain			Avg Lim	Average Field Strength Limit								
Dist	Distance to Antenna			D Corr	Distance Correct to 3 meters			Pk Lim	Peak Field Strength Limit								
Read	Analyzer Reading			Avg	Average Field Strength @ 3 m			Avg Mar	Margin vs. Average Limit								
AF	Antenna Factor			Peak	Calculated Peak Field Strength			Pk Mar	Margin vs. Peak Limit								
CL	Cable Loss			HPF	High Pass Filter												

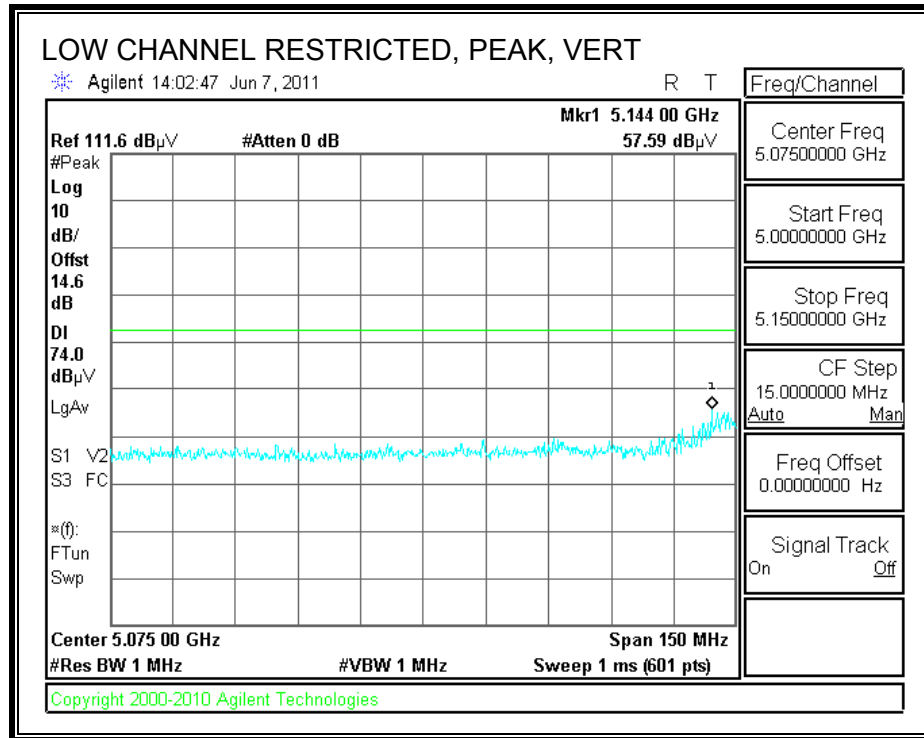
8.2.2. TX ABOVE 1 GHz FOR HT20 MODE IN THE LOWER 5.2 GHz BAND

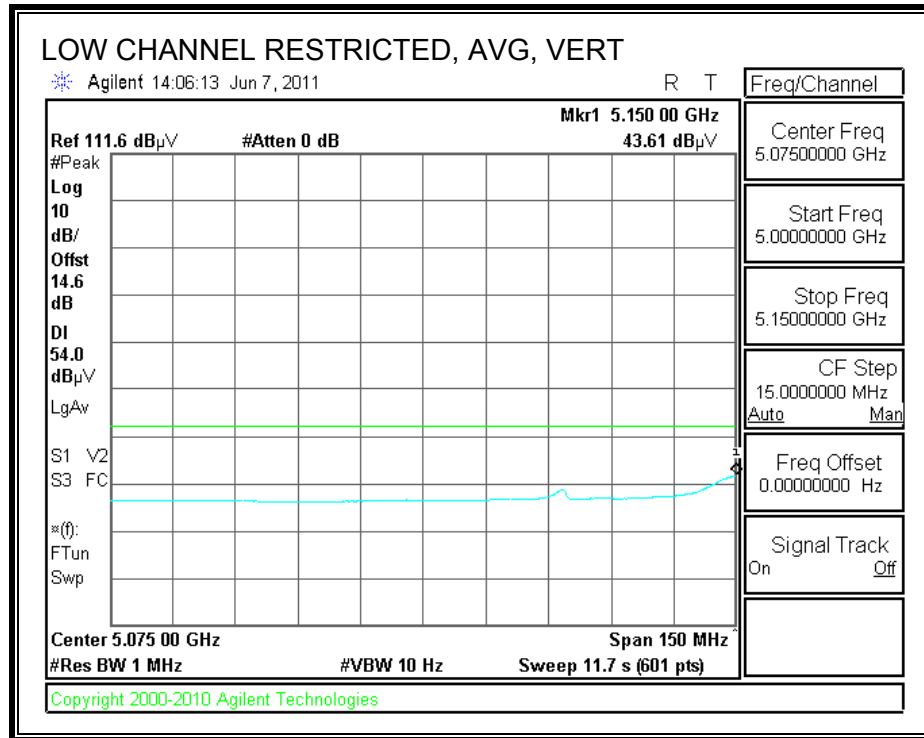
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



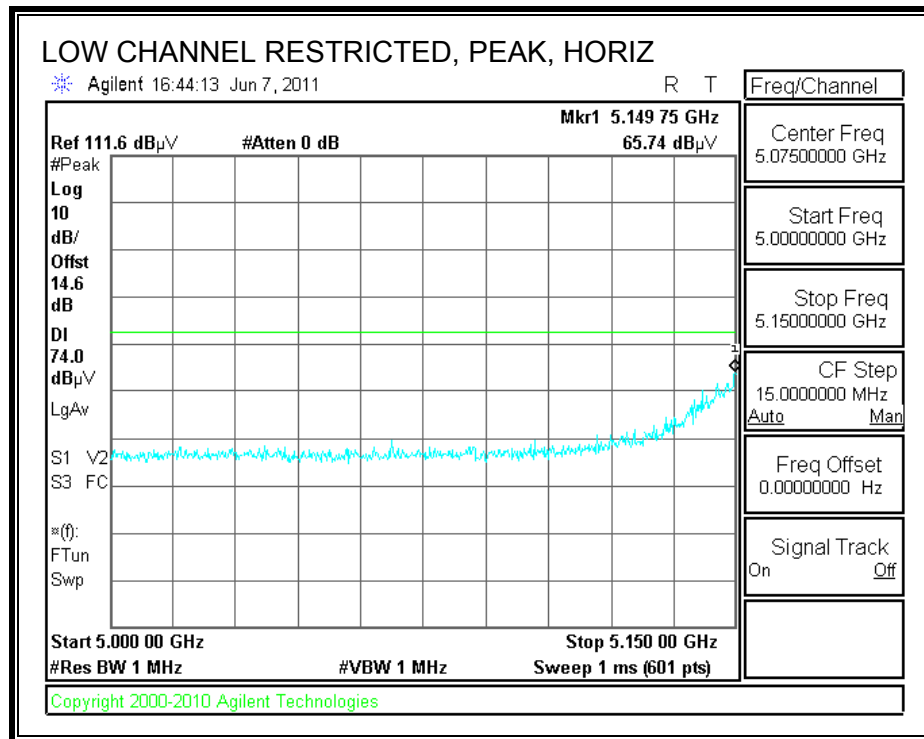


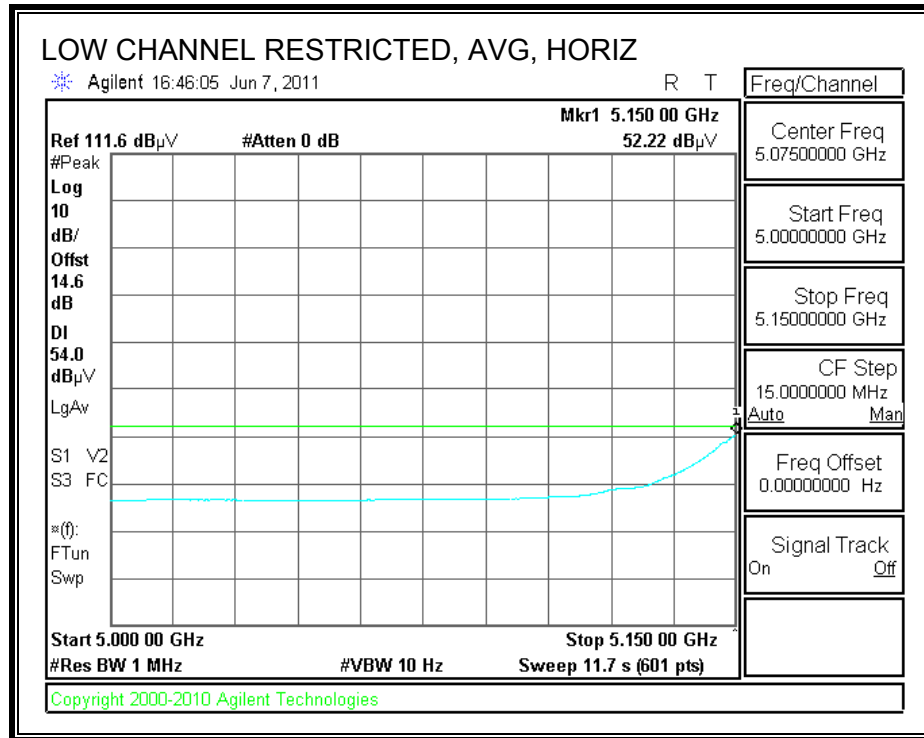
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement															
Compliance Certification Services, Fremont 5m Chamber															
Project #:		11U13822													
Date:		6/22/11													
Test Engineer:		Thanh Nguyen													
Configuration:		EUT , SHEEVA Plug USB, support Laptop													
Mode:		Transmit 802.11 HT20 mode													
Test Equipment:															
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz				Limit					
T60; S/N: 2238 @3m		T34 HP 8449B		T88 Miteq 26-40GHz		T125; ARA 18-26GHz; S/N:1007				FCC 15.205					
Hi Frequency Cables															
3' cable 22807700		12' cable 22807600		20' cable 22807500		HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz					
3' cable 22807700		12' cable 22807600		20' cable 22807500		HPF_7.6GHz									
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch 5180MHz															
15.400	3.0	40.7	26.8	38.9	11.3	-32.2	0.0	0.7	59.4	45.5	74	54	-14.6	-8.5	Noise floor
15.400	3.0	39.7	26.7	38.9	11.3	-32.2	0.0	0.7	58.4	45.4	74	54	-15.6	-8.6	Noise floor
Mid Ch 5200MHz															
15.600	3.0	39.2	26.9	38.3	11.4	-32.2	0.0	0.7	57.5	45.1	74	54	-16.5	-8.9	Noise floor
15.600	3.0	38.7	26.8	38.3	11.4	-32.2	0.0	0.7	56.9	45.0	74	54	-17.1	-9.0	Noise floor
High Ch 5240MHz															
15.720	3.0	40.6	26.6	38.0	11.4	-32.2	0.0	0.7	58.5	44.5	74	54	-15.5	-9.5	Noise floor
15.720	3.0	38.7	26.6	38.0	11.4	-32.2	0.0	0.7	56.7	44.6	74	54	-17.3	-9.4	Noise floor
No other emissions were detected above the system noise floor.															
Rev. 07.22.09															
f	Measurement Frequency			Amp	Preamp Gain			Avg Lim	Average Field Strength Limit						
Dist	Distance to Antenna			D Corr	Distance Correct to 3 meters			Pk Lim	Peak Field Strength Limit						
Read	Analyzer Reading			Avg	Average Field Strength @ 3 m			Avg Mar	Margin vs. Average Limit						
AF	Antenna Factor			Peak	Calculated Peak Field Strength			Pk Mar	Margin vs. Peak Limit						
CL	Cable Loss			HPF	High Pass Filter										

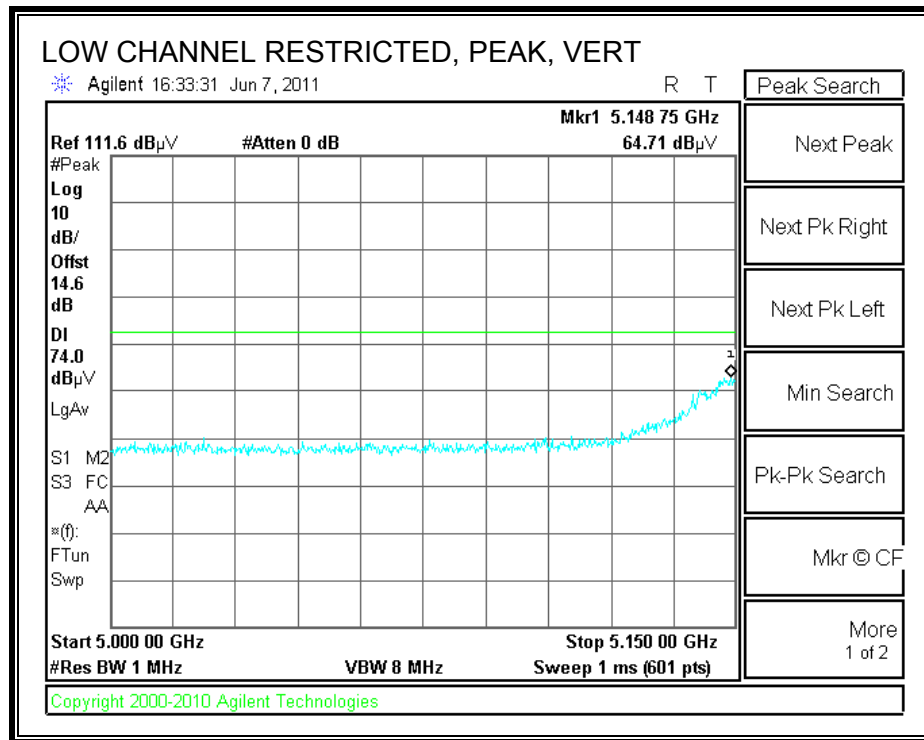
8.2.3. TX ABOVE 1 GHz FOR HT40 MODE IN THE LOWER 5.2 GHz BAND

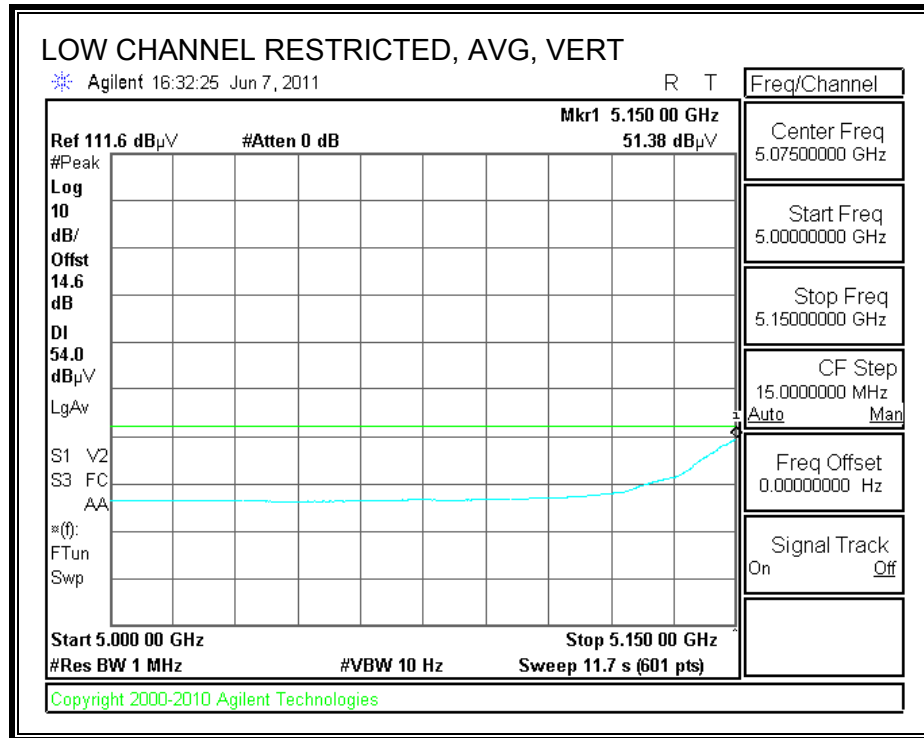
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



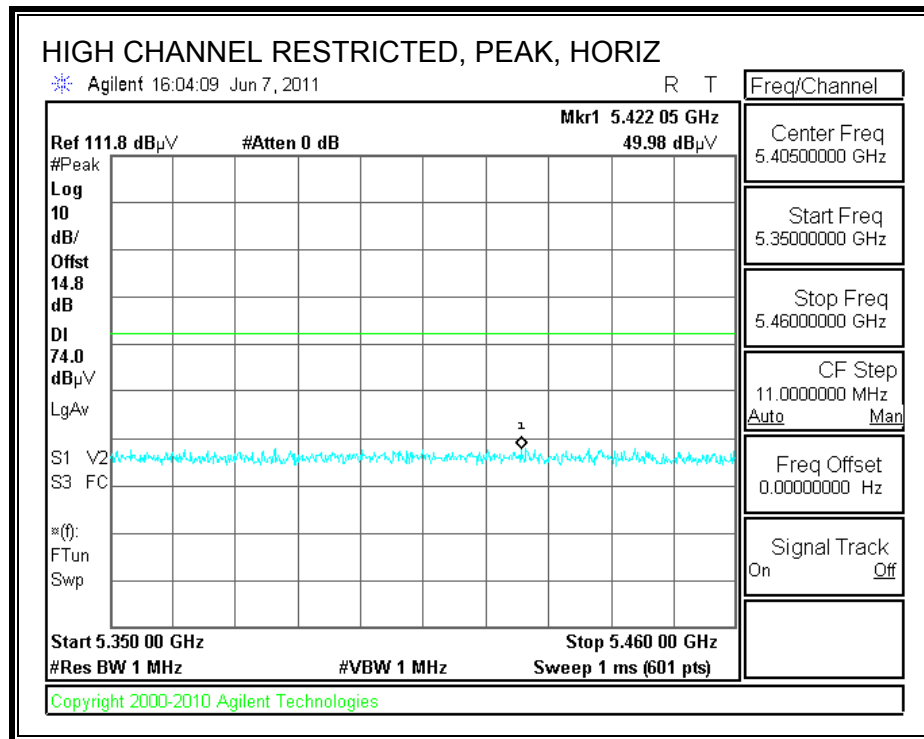


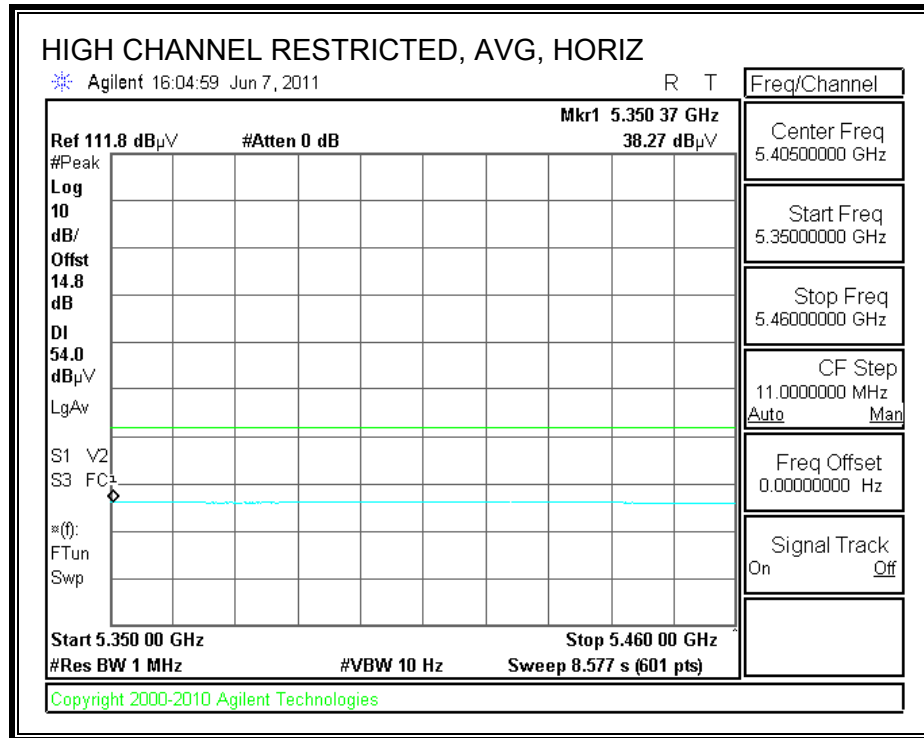
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement															
Compliance Certification Services, Fremont 5m Chamber															
Project #:		11U13822													
Date:		6/22/11													
Test Engineer:		Thanh Nguyen													
Configuration:		EUT , SHEEVA Plug USB, support Laptop													
Mode:		Transmit 802.11 HT40 mode													
Test Equipment:															
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz				Limit					
T60; S/N: 2238 @3m		T34 HP 8449B		T88 Miteq 26-40GHz		T125; ARA 18-26GHz; S/N:1007				FCC 15.205					
Hi Frequency Cables															
3' cable 22807700		12' cable 22807600		20' cable 22807500		HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz					
3' cable 22807700		12' cable 22807600		20' cable 22807500		HPF_7.6GHz									
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch 5190MHz															
15.570	3.0	39.0	26.7	38.4	11.4	-32.2	0.0	0.7	57.3	45.0	74	54	-16.7	-9.0	Noise floor
15.400	3.0	39.2	26.4	38.9	11.3	-32.2	0.0	0.7	57.9	45.0	74	54	-16.1	-9.0	Noise floor
Mid Ch 5210MHz															
15.630	3.0	38.8	26.7	38.2	11.4	-32.2	0.0	0.7	57.0	44.9	74	54	-17.0	-9.1	Noise floor
15.600	3.0	39.2	26.5	38.3	11.4	-32.2	0.0	0.7	57.4	44.7	74	54	-16.6	-9.3	Noise floor
High Ch 5230MHz															
15.690	3.0	39.8	26.8	38.1	11.4	-32.2	0.0	0.7	57.8	44.9	74	54	-16.2	-9.1	Noise floor
15.690	3.0	39.4	26.5	38.1	11.4	-32.2	0.0	0.7	57.4	44.6	74	54	-16.6	-9.4	Noise floor
No other emissions were detected above the system noise floor.															
Rev. 07.22.09															
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit		
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit		
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit		
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit		
CL	Cable Loss					HPF	High Pass Filter								

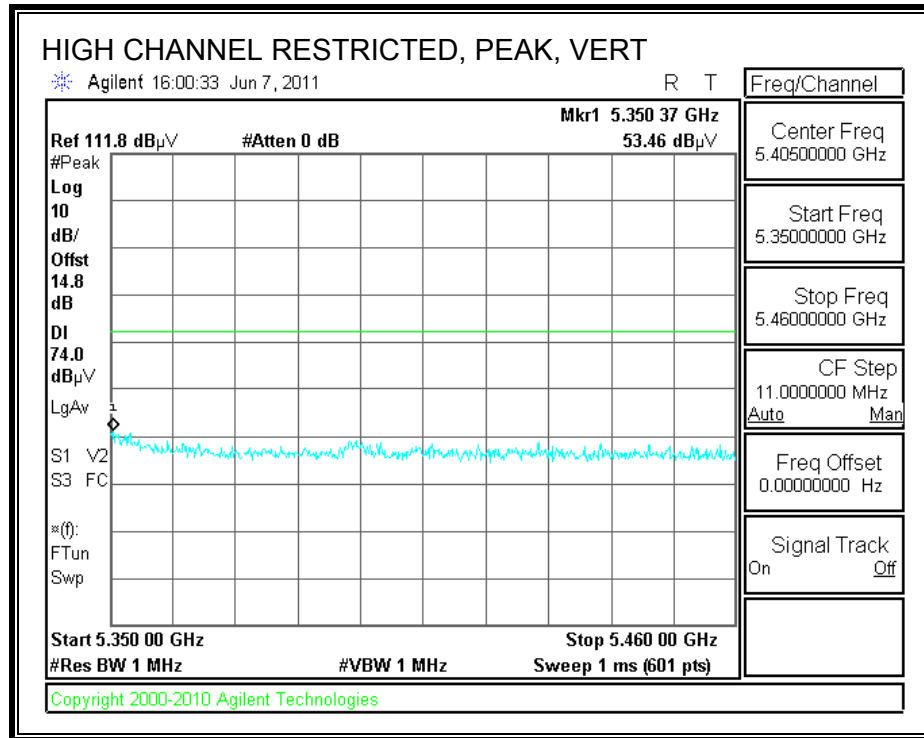
8.2.4. TX ABOVE 1 GHz FOR 802.11a MODE IN THE UPPER 5.2 GHz BAND

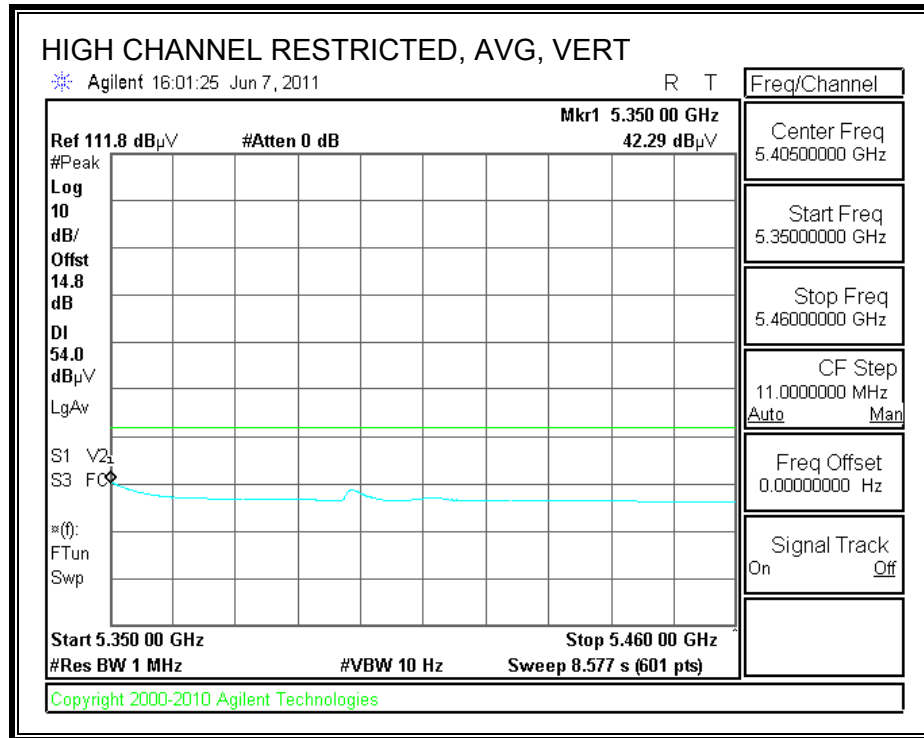
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



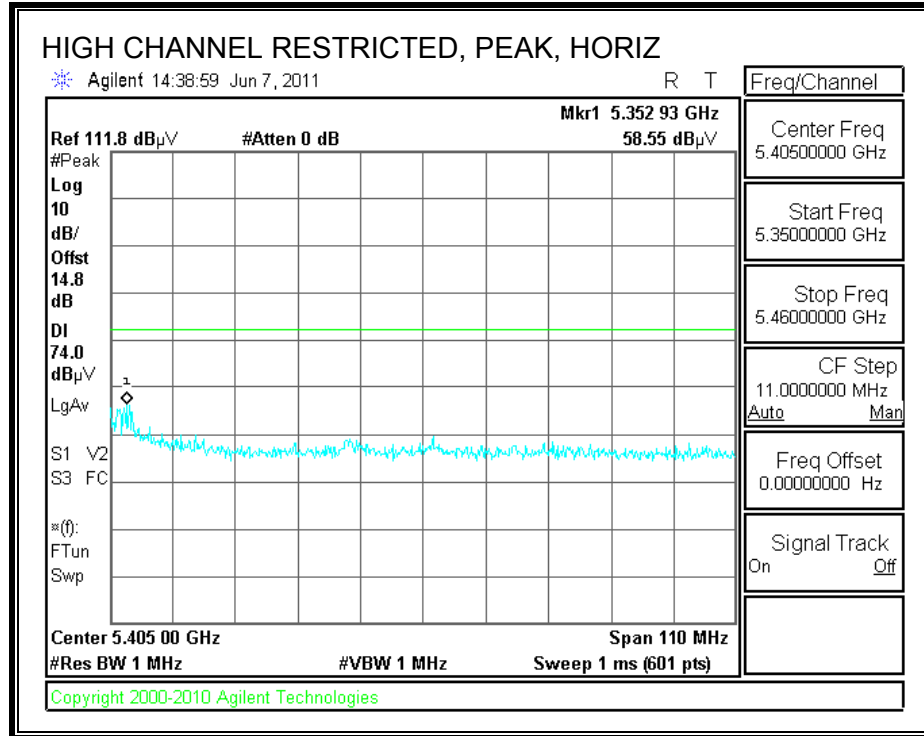


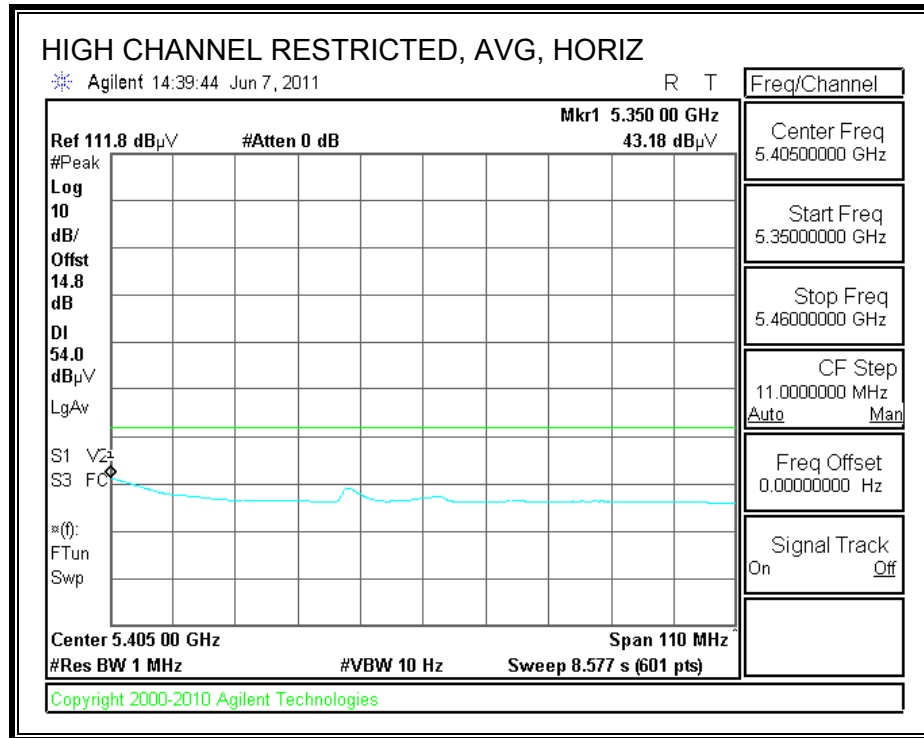
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement															
Compliance Certification Services, Fremont 5m Chamber															
Project #:		11U13822													
Date:		6/22/11													
Test Engineer:		Thanh Nguyen													
Configuration:		EUT , SHEEVA Plug USB, support Laptop													
Mode:		Transmit 802.11 a mode, 5.3Ghz band													
Test Equipment:															
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz				Limit					
T59; S/N: 3245 @3m		T145 Agilent 3008A0056		T88 Miteq 26-40GHz		T125; ARA 18-26GHz; S/N:1007				FCC 15.205					
Hi Frequency Cables															
3' cable 22807700		12' cable 22807600		20' cable 22807500		HPF		Reject Filter		<u>Peak Measurements</u> RBW=VBW=1MHz <u>Average Measurements</u> RBW=1MHz ; VBW=10Hz					
3' cable 22807700		12' cable 22807600		20' cable 22807500		HPF_7.6GHz									
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch 5260MHz															
15.780	3.0	34.4	28.0	38.2	11.5	-32.2	0.0	0.7	52.6	46.2	74	54	-21.4	-7.8	V
15.780	3.0	40.0	27.1	38.2	11.5	-32.2	0.0	0.7	58.2	45.2	74	54	-15.8	-8.8	H
Mid Ch 5300MHz															
10.600	3.0	55.9	40.0	37.5	9.0	-34.3	0.0	0.8	69.0	53.1	74	54	-5.0	-0.9	V
15.600	3.0	40.1	27.0	38.7	11.4	-32.3	0.0	0.7	58.7	45.5	74	54	-15.3	-8.5	Noise floor/V
10.600	3.0	48.4	33.0	37.5	9.0	-34.3	0.0	0.8	61.4	46.1	74	54	-12.6	-7.9	H
15.600	3.0	40.1	27.0	38.7	11.4	-32.3	0.0	0.7	58.6	45.5	74	54	-15.4	-8.5	Noise floor/H
High Ch 5320MHz															
10.640	3.0	52.8	37.5	37.6	9.1	-34.2	0.0	0.8	65.9	50.6	74	54	-8.1	-3.4	V
15.960	3.0	34.4	21.4	37.7	11.5	-32.2	0.0	0.7	52.2	39.2	74	54	-21.8	-14.8	Noise floor
10.640	3.0	50.4	34.8	37.6	9.1	-34.2	0.0	0.8	63.5	48.0	74	54	-10.5	-6.0	H
15.960	3.0	33.6	21.4	37.7	11.5	-32.2	0.0	0.7	51.4	39.2	74	54	-22.6	-14.8	Noise floor
No other emissions were detected above the system noise floor.															
Rev. 07.22.09															
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit		
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit		
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit		
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit		
CL	Cable Loss					HPF	High Pass Filter								

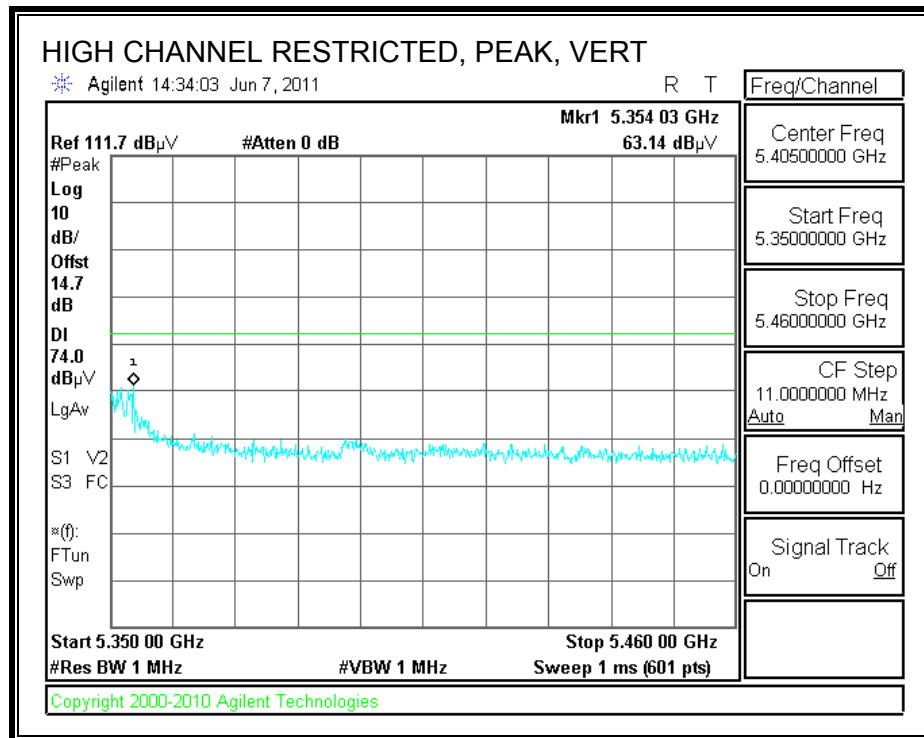
8.2.5. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE UPPER 5.2 GHz BAND

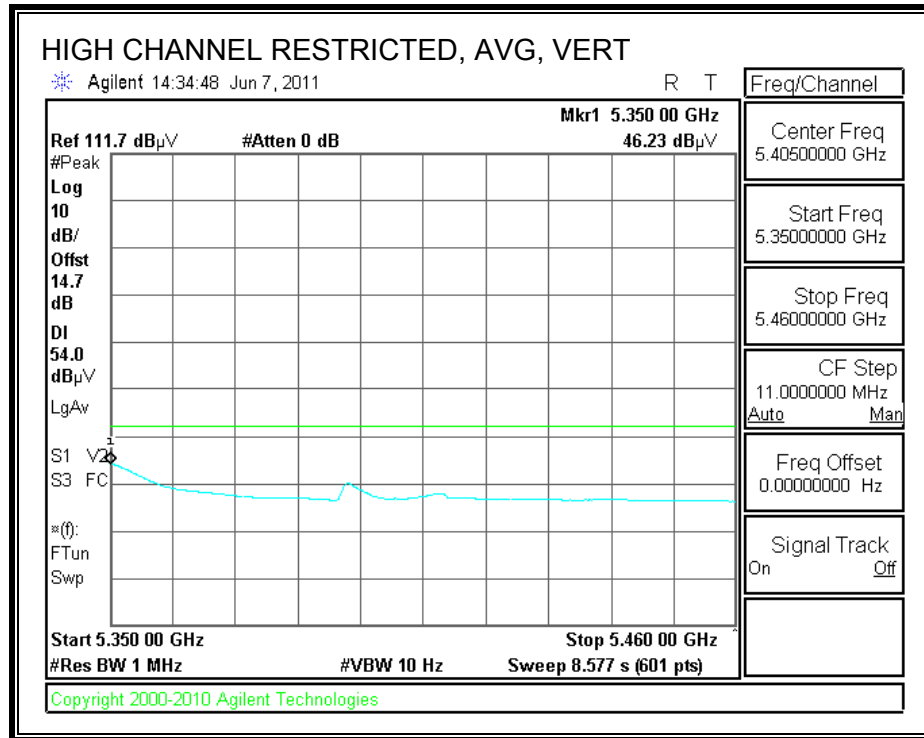
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



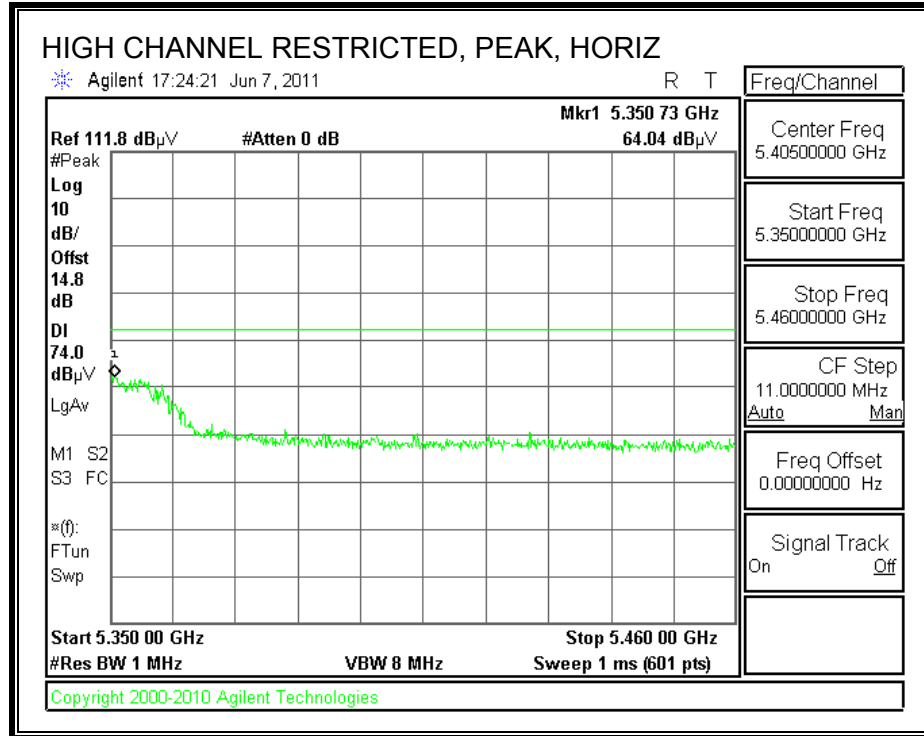


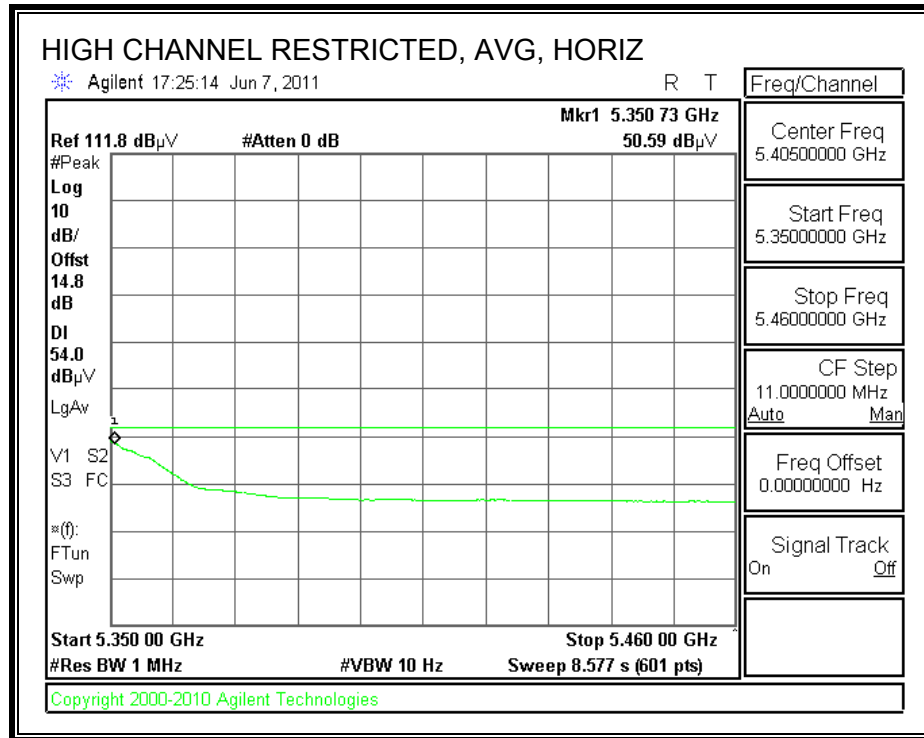
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber																
Project #:		11U13822														
Date:		6/22/11														
Test Engineer:		Thanh Nguyen														
Configuration:		EUT, SHEEVA Plug USB, support Laptop														
Mode:		Transmit 802.11 HT20, 5.3GHz band														
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T59; S/N: 3245 @3m			T145 Agilent 3008A0056			T88 Miteq 26-40GHz			T125; ARA 18-26GHz; S/N:1007			FCC 15.205				
Hi Frequency Cables																
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz			
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF_7.6GHz							
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
Low Ch 5260MHz																
15.780	3.0	40.0	27.1	38.2	11.5	-32.2	0.0	0.7	58.1	45.3	74	54	-15.9	-8.7	V/ Noise floor	
15.780	3.0	38.1	27.0	38.2	11.5	-32.2	0.0	0.7	56.2	45.2	74	54	-17.8	-8.8	H/Noise floor	
Mid Ch 5300MHz																
10.600	3.0	56.2	39.2	37.5	9.0	-34.3	0.0	0.8	69.3	52.3	74	54	-4.7	-1.7	V	
15.600	3.0	40.1	27.0	38.7	11.4	-32.3	0.0	0.7	58.7	45.5	74	54	-15.3	-8.5	Noise floor/V	
10.600	3.0	50.3	33.9	37.5	9.0	-34.3	0.0	0.8	63.3	46.9	74	54	-10.7	-7.1	H	
15.600	3.0	40.1	27.0	38.7	11.4	-32.3	0.0	0.7	58.6	45.5	74	54	-15.4	-8.5	Noise floor/H	
High Ch 5320MHz																
10.640	3.0	54.4	37.1	37.6	9.1	-34.2	0.0	0.8	67.5	50.3	74	54	-6.5	-3.7	V	
15.960	3.0	34.4	21.4	37.7	11.5	-32.2	0.0	0.7	52.2	39.2	74	54	-21.8	-14.8	Noise floor	
10.640	3.0	48.9	31.6	37.6	9.1	-34.2	0.0	0.8	62.0	44.7	74	54	-12.0	-9.3	H	
15.960	3.0	33.6	21.4	37.7	11.5	-32.2	0.0	0.7	51.4	39.2	74	54	-22.6	-14.8	Noise floor	
No other emissions were detected above the system noise floor.																
Rev. 07.22.09																
f	Measurement Frequency		Amp	Preamp Gain		Avg Lim		Average Field Strength Limit								
Dist	Distance to Antenna		D Corr	Distance Correct to 3 meters		Pk Lim		Peak Field Strength Limit								
Read	Analyzer Reading		Avg	Average Field Strength @ 3 m		Avg Mar		Margin vs. Average Limit								
AF	Antenna Factor		Peak	Calculated Peak Field Strength		Pk Mar		Margin vs. Peak Limit								
CL	Cable Loss		HPF	High Pass Filter												

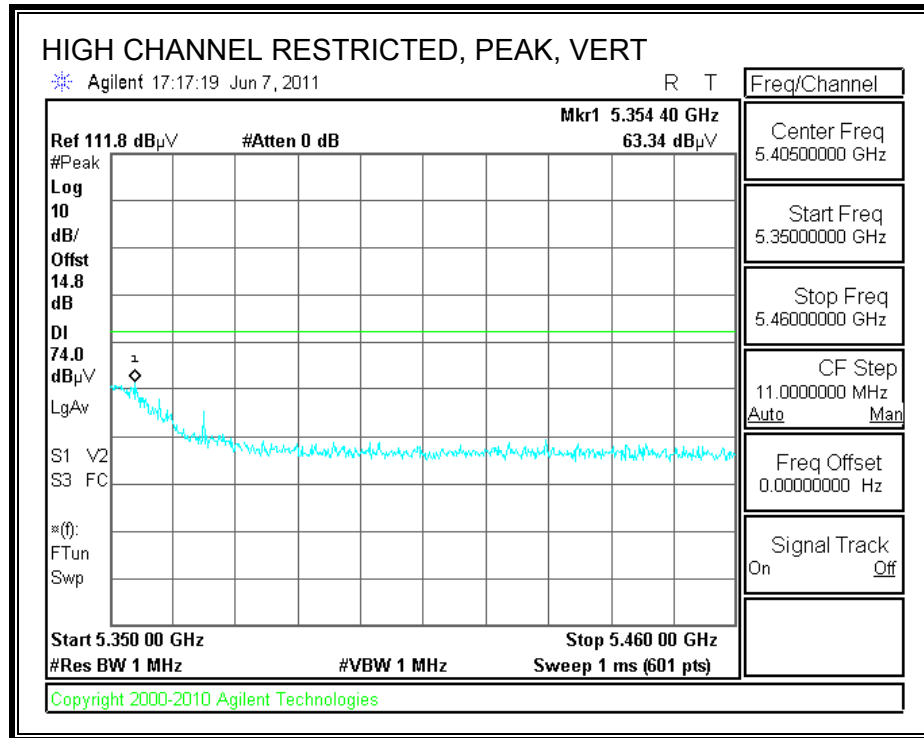
8.2.6. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE UPPER 5.2 GHz BAND

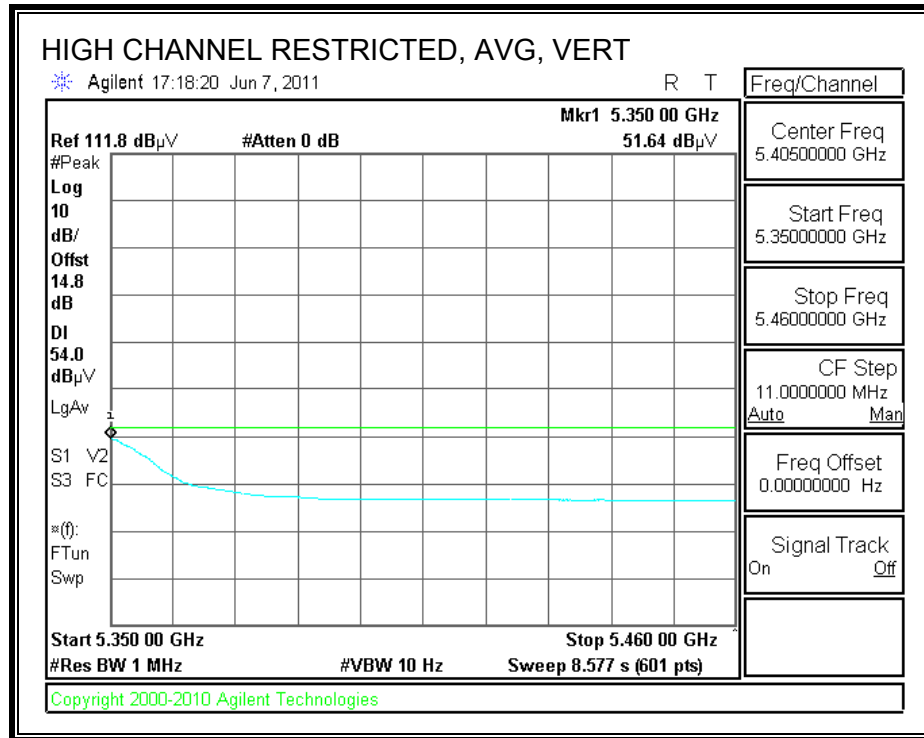
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Project #: 11U13822
Date: 6/22/11
Test Engineer: Thanh Nguyen
Configuration: EUT, SHEEVA Plug USB, support Laptop
Mode: Transmit 802.11 HT40, 5.3Ghz band

Test Equipment:

Horn 1-18GHz

T59; S/N: 3245 @3m

Pre-amplifier 1-26GHz

T145 Agilent 3008A0056

Pre-amplifier 26-40GHz

T88 Miteq 26-40GHz

Horn > 18GHz

T125; ARA 18-26GHz; S/N:1007

Limit

FCC 15.205

Hi Frequency Cables

3' cable 22807700

3' cable 22807700

12' cable 22807600

12' cable 22807600

20' cable 22807500

20' cable 22807500

HPF

HPF_7.6GHz

Reject Filter

Peak Measurements
RBW=VBW=1MHz

Average Measurements
RBW=1MHz ; VBW=10Hz

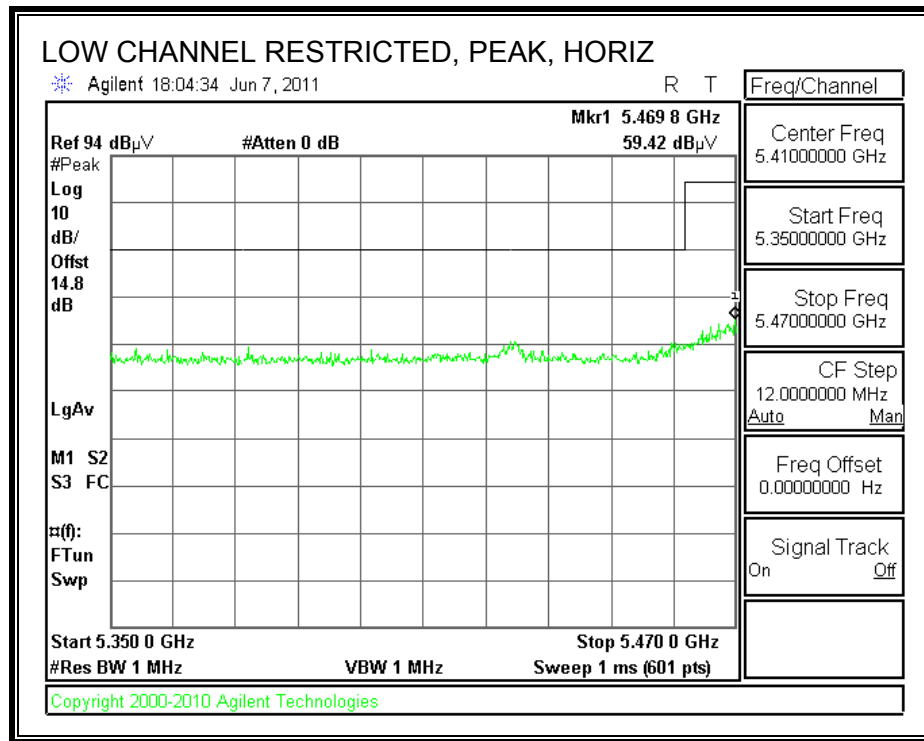
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch 5270MHz															
15.810	3.0	39.3	27.0	38.2	11.5	-32.2	0.0	0.7	57.4	45.1	74	54	-16.6	-8.9	V/ Noise floor
15.810	3.0	38.9	27.0	38.2	11.5	-32.2	0.0	0.7	57.0	45.1	74	54	-17.0	-8.9	H/Noise floor
High Ch 5310MHz															
10.620	3.0	44.0	33.5	37.5	9.0	-34.3	0.0	0.8	57.1	46.6	74	54	-16.9	-7.4	V
15.930	3.0	39.2	26.9	37.8	11.5	-32.2	0.0	0.7	57.0	44.7	74	54	-17.0	-9.3	Noise floor
10.620	3.0	40.9	29.1	37.5	9.0	-34.3	0.0	0.8	53.9	42.2	74	54	-20.1	-11.8	H
15.930	3.0	39.2	26.9	37.8	11.5	-32.2	0.0	0.7	57.1	44.8	74	54	-16.9	-9.2	Noise floor
No other emissions were detected above the system noise floor.															

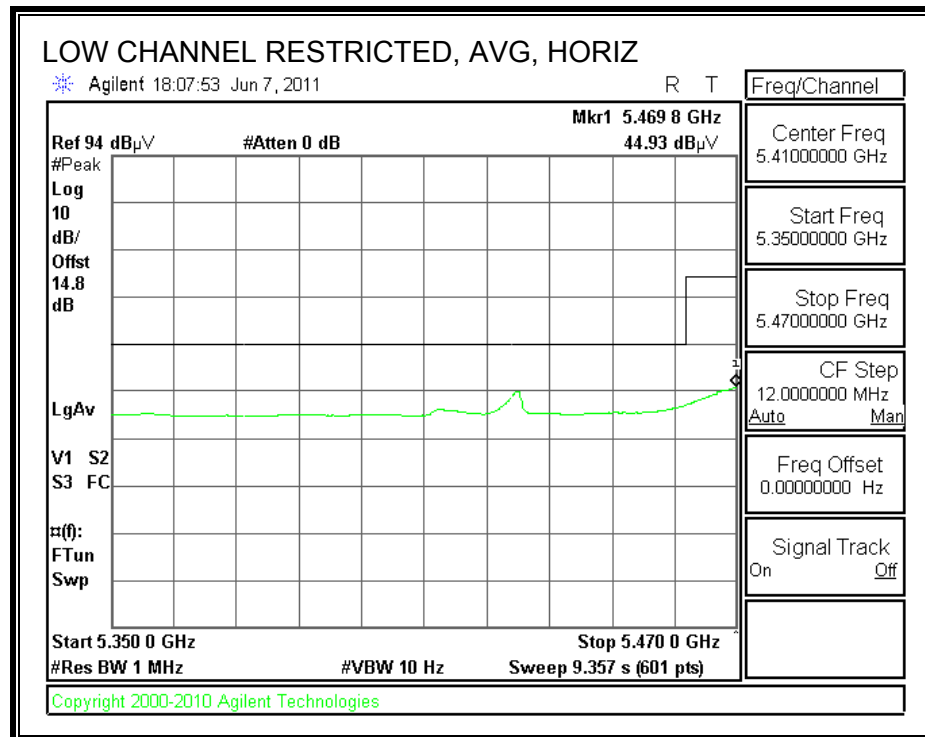
Rev. 07.22.09

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

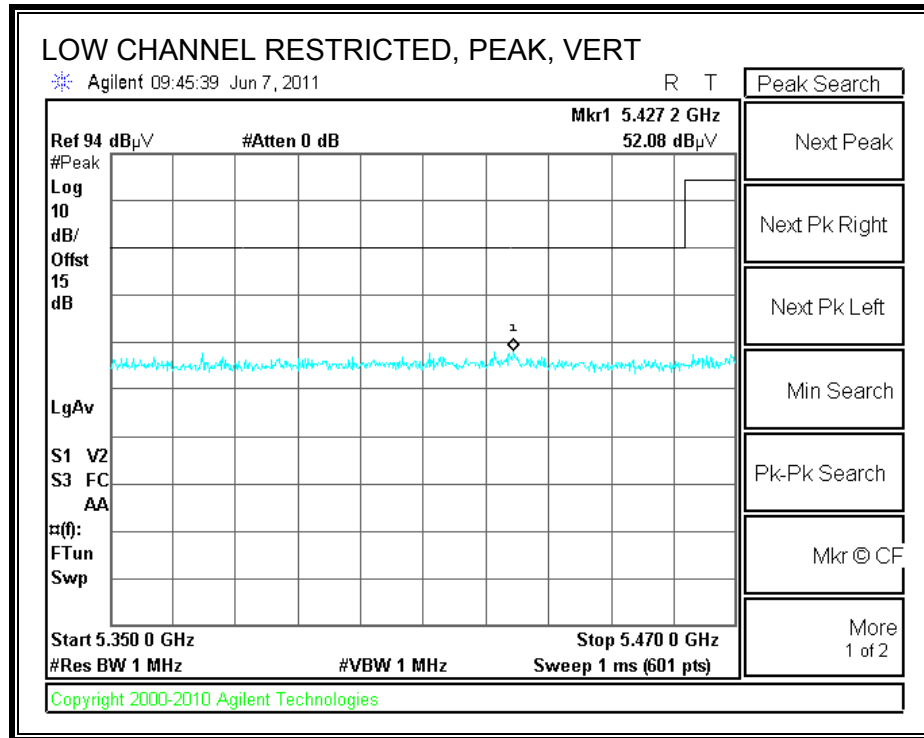
8.2.7. TX ABOVE 1 GHz FOR 802.11a MODE IN THE 5.6 GHz BAND

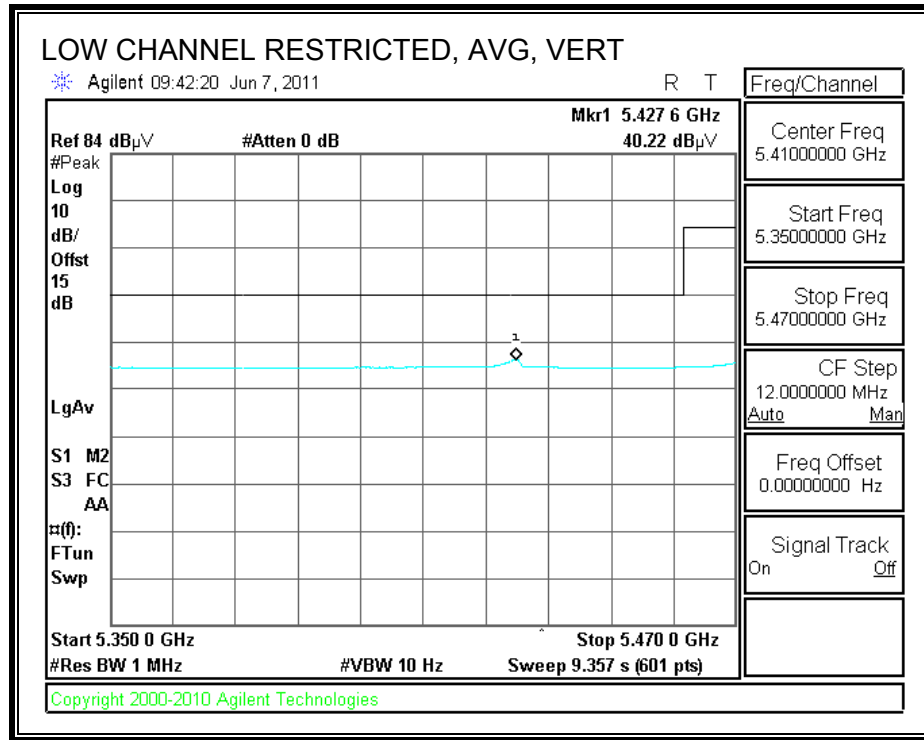
RESTRICTED BANEDGE (LOW CHANNEL, HORIZONTAL)



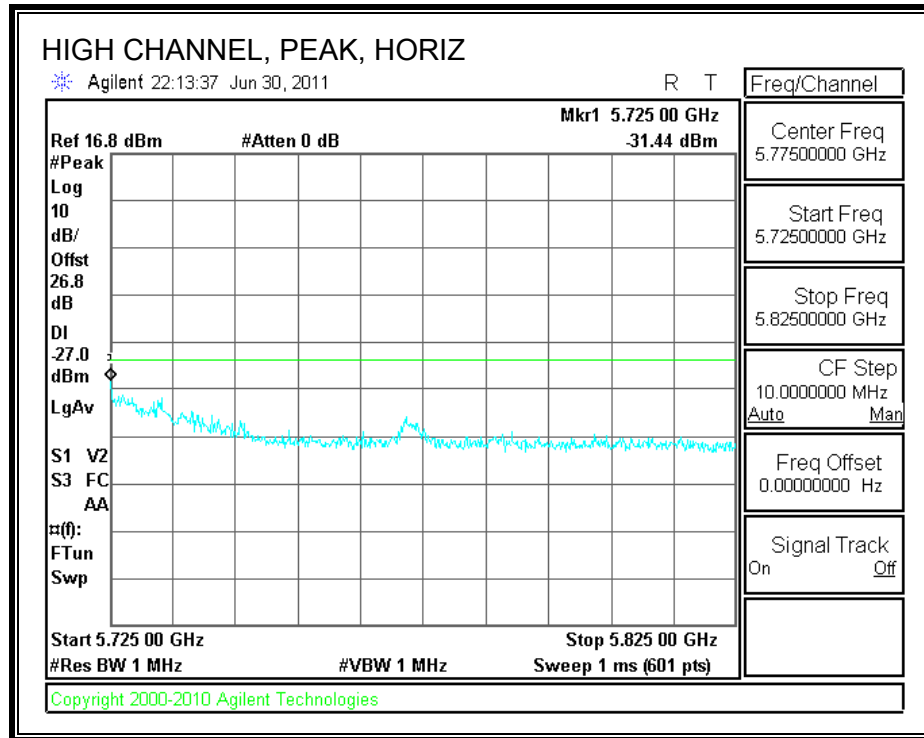


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

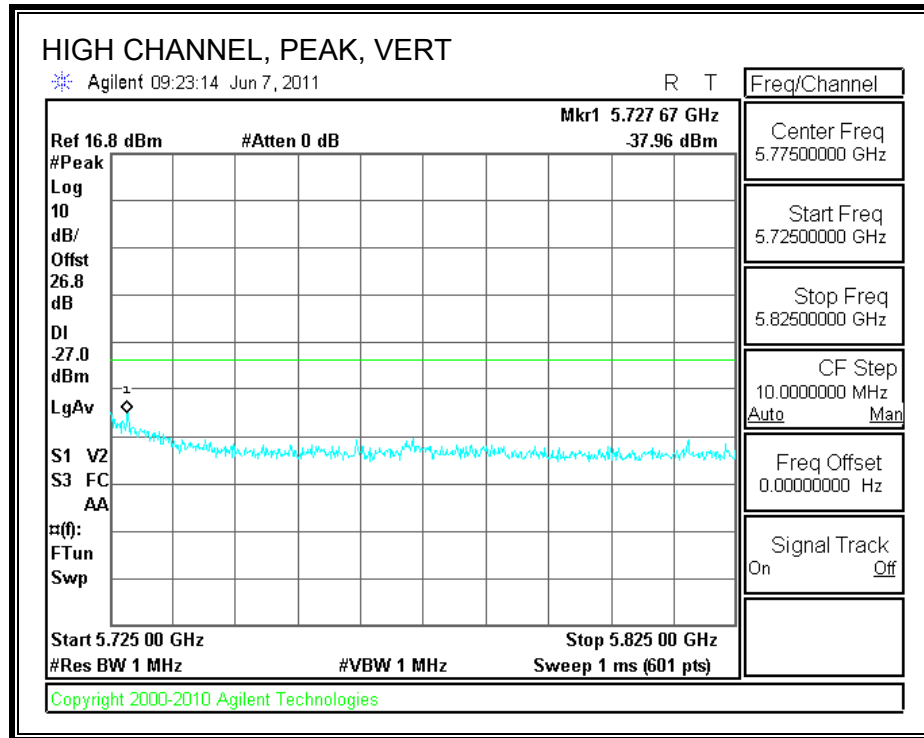




AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)

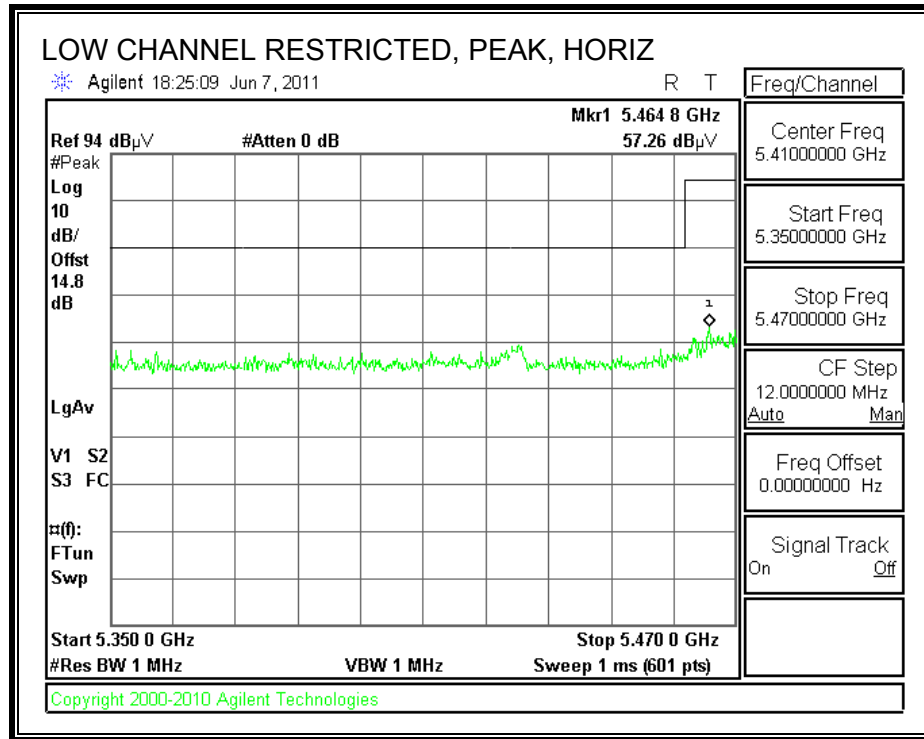


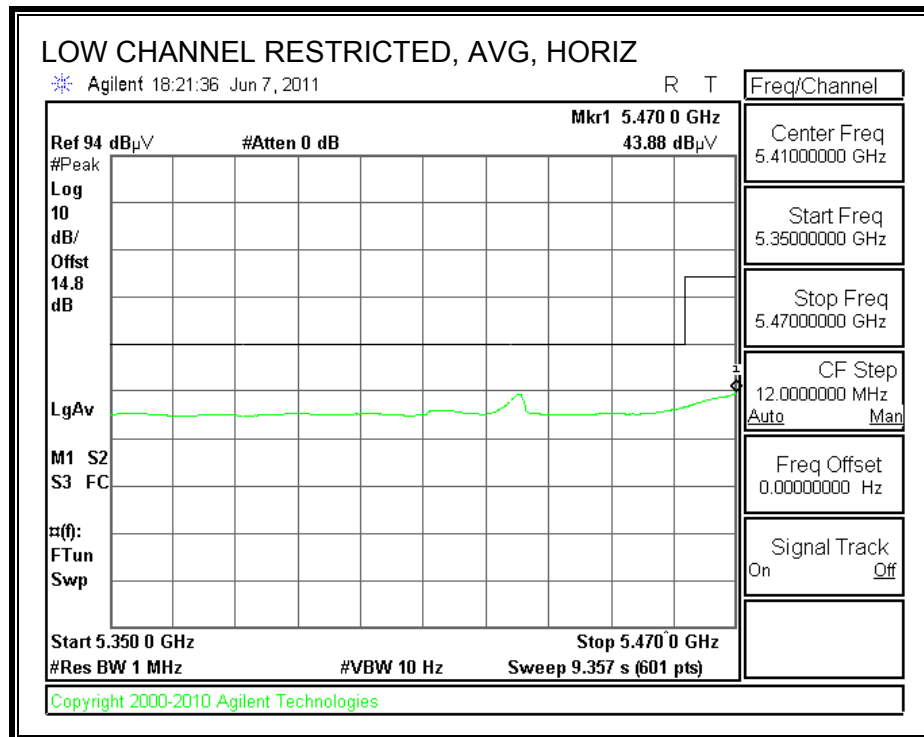
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber																
Project #:		11U13822														
Date:		6/23/11														
Test Engineer:		Thanh Nguyen														
Configuration:		EUT , SHEEVA Plug USB, support Laptop														
Mode:		Transmit 802.11 a mode														
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T60; S/N: 2238 @3m			T34 HP 8449B			T88 Miteq 26-40GHz			T125; ARA 18-26GHz; S/N:1007			FCC 15.205				
Hi Frequency Cables																
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz	
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF_7.6GHz							
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
Card # 00 50 43 21 2C CF																
Low Ch 5500MHz																
11.000	3.0	47.7	36.0	37.6	9.2	-32.6	0.0	0.7	62.7	50.9	74	54	-11.3	-3.1	V	
11.000	3.0	46.7	34.8	37.6	9.2	-32.6	0.0	0.7	61.7	49.8	74	54	-12.3	-4.2	H	
Mid Ch 5580MHz																
11.160	3.0	48.2	36.1	37.7	9.3	-32.6	0.0	0.7	63.4	51.3	74	54	-10.6	-2.7	V	
11.160	3.0	46.9	34.0	37.7	9.3	-32.6	0.0	0.7	62.1	49.2	74	54	-11.9	-4.8	H	
High Ch 5700MHz																
11.400	3.0	46.2	34.5	38.0	9.4	-32.5	0.0	0.7	61.7	50.1	74	54	-12.3	-3.9	V	
11.400	3.0	46.5	33.1	38.0	9.4	-32.5	0.0	0.7	62.1	48.7	74	54	-11.9	-5.3	H	
No other emissions were detected above the system noise floor.																
Rev. 07.22.09																
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit			
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit			
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit			
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit			
CL	Cable Loss					HPF	High Pass Filter									

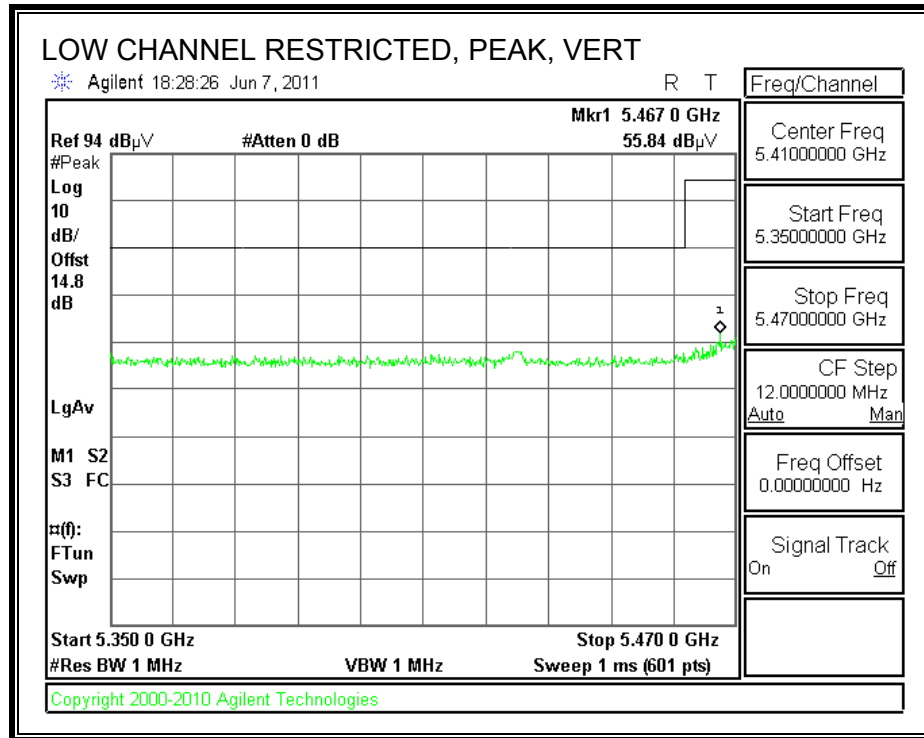
8.2.8. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.6 GHz BAND

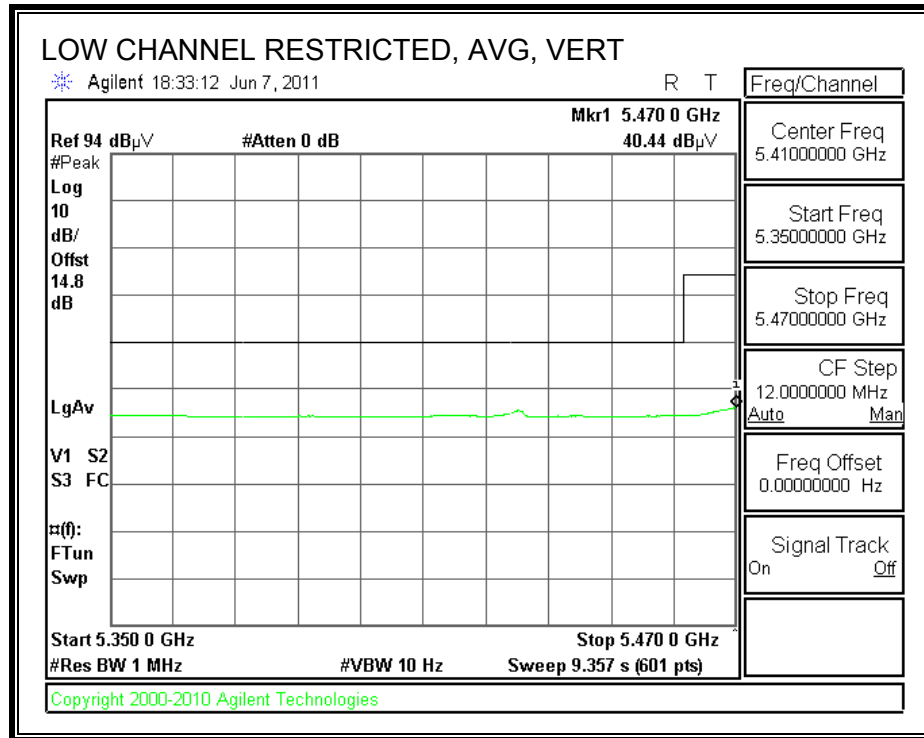
RESTRICTED BANEDGE (LOW CHANNEL, HORIZONTAL)



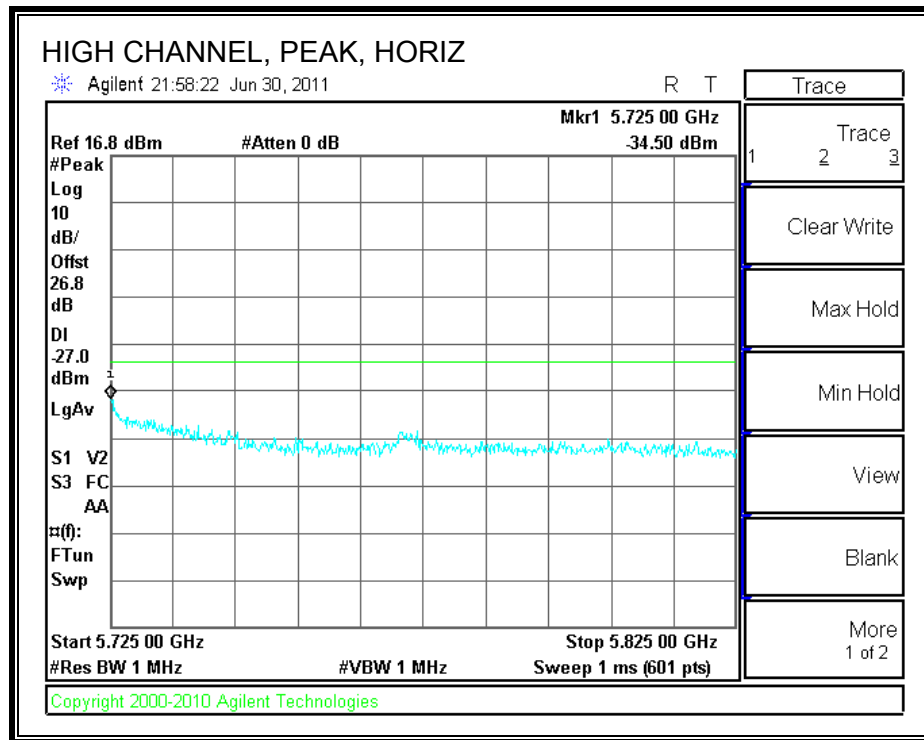


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

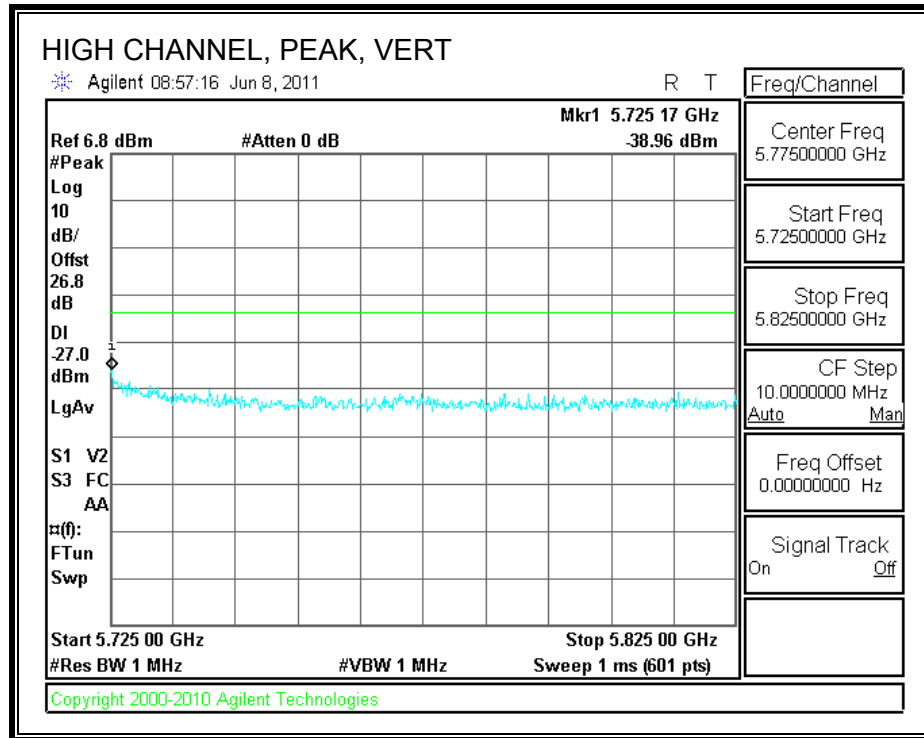




AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)

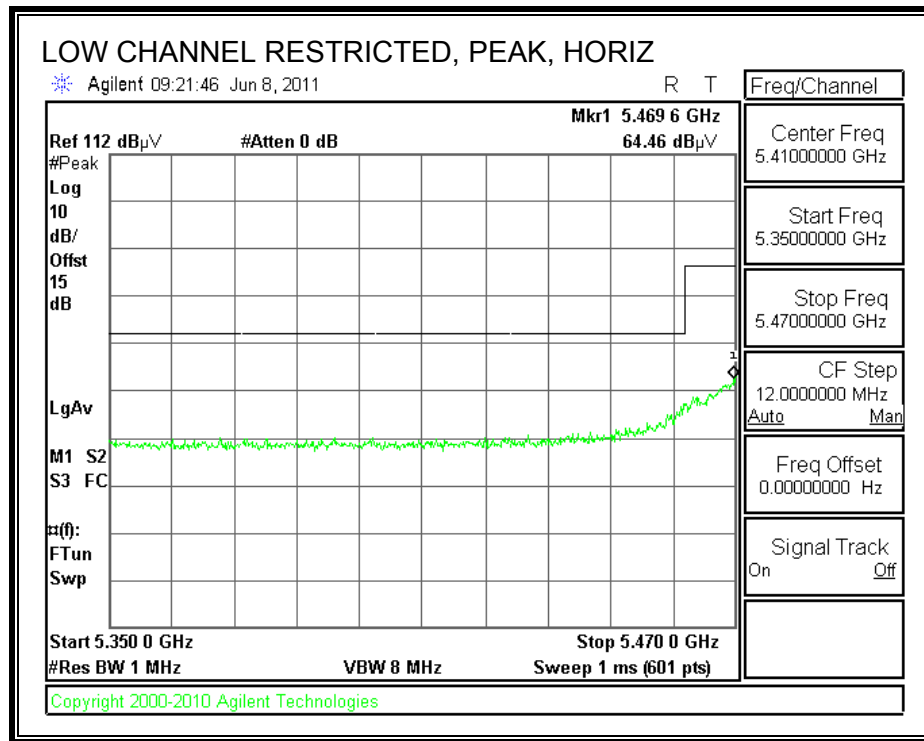


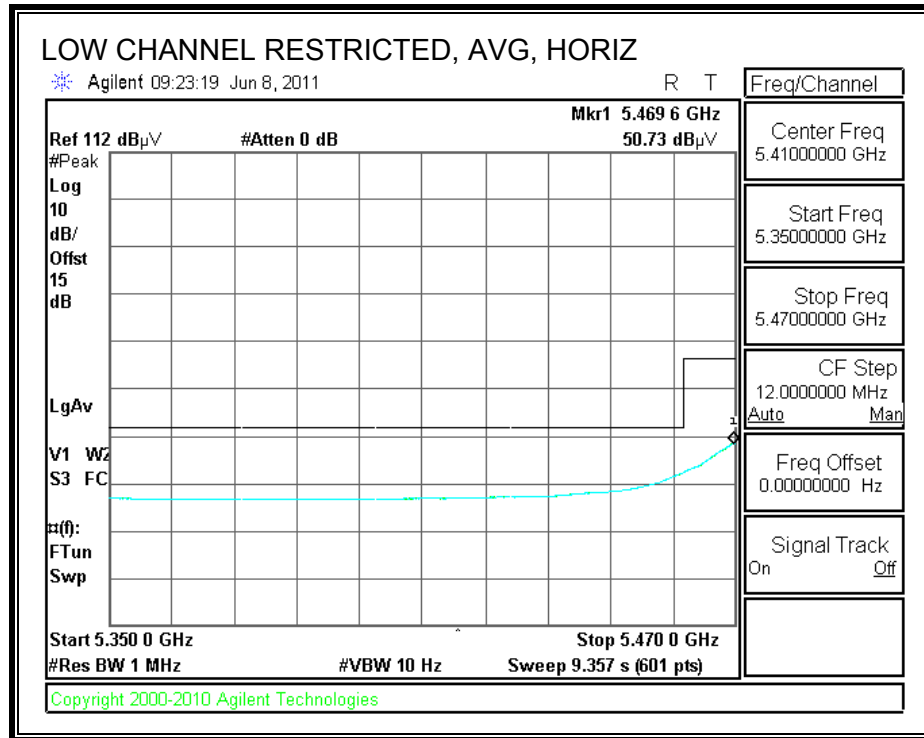
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber																
Project #:		11U13822														
Date:		6/23/11														
Test Engineer:		Thanh Nguyen														
Configuration:		EUT with extended cable, remote SHEEVA Plug USB, support Laptop														
Mode:		Transmit 802.11n HT 20 mode														
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T60; S/N: 2238 @3m			T34 HP 8449B			T88 Miteq 26-40GHz			T125; ARA 18-26GHz; S/N:1007			FCC 15.205				
Hi Frequency Cables																
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz	
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF_7.6GHz							
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
Card # 00 50 43 21 2C CF																
Low Ch 5500MHz																
11.000	3.0	47.7	34.0	37.6	9.2	-32.6	0.0	0.7	62.6	48.9	74	54	-11.4	-5.1	V	
11.000	3.0	45.3	31.8	37.6	9.2	-32.6	0.0	0.7	60.3	46.8	74	54	-13.7	-7.2	H	
Mid Ch 5580MHz																
11.160	3.0	46.9	34.8	37.7	9.3	-32.6	0.0	0.7	62.1	50.0	74	54	-11.9	-4.0	V	
11.160	3.0	47.8	34.0	37.7	9.3	-32.6	0.0	0.7	63.0	49.2	74	54	-11.0	-4.8	H	
High Ch 5700MHz																
11.400	3.0	46.3	33.8	38.0	9.4	-32.5	0.0	0.7	61.8	49.3	74	54	-12.2	-4.7	V	
11.400	3.0	45.9	32.1	38.0	9.4	-32.5	0.0	0.7	61.5	47.6	74	54	-12.5	-6.4	H	
No other emissions were detected above the system noise floor.																
Rev. 07.22.09																
f	Measurement Frequency		Amp	Preamp Gain		Avg Lim	Average Field Strength Limit									
Dist	Distance to Antenna		D Corr	Distance Correct to 3 meters		Pk Lim	Peak Field Strength Limit									
Read	Analyzer Reading		Avg	Average Field Strength @ 3 m		Avg Mar	Margin vs. Average Limit									
AF	Antenna Factor		Peak	Calculated Peak Field Strength		Pk Mar	Margin vs. Peak Limit									
CL	Cable Loss		HPF	High Pass Filter												

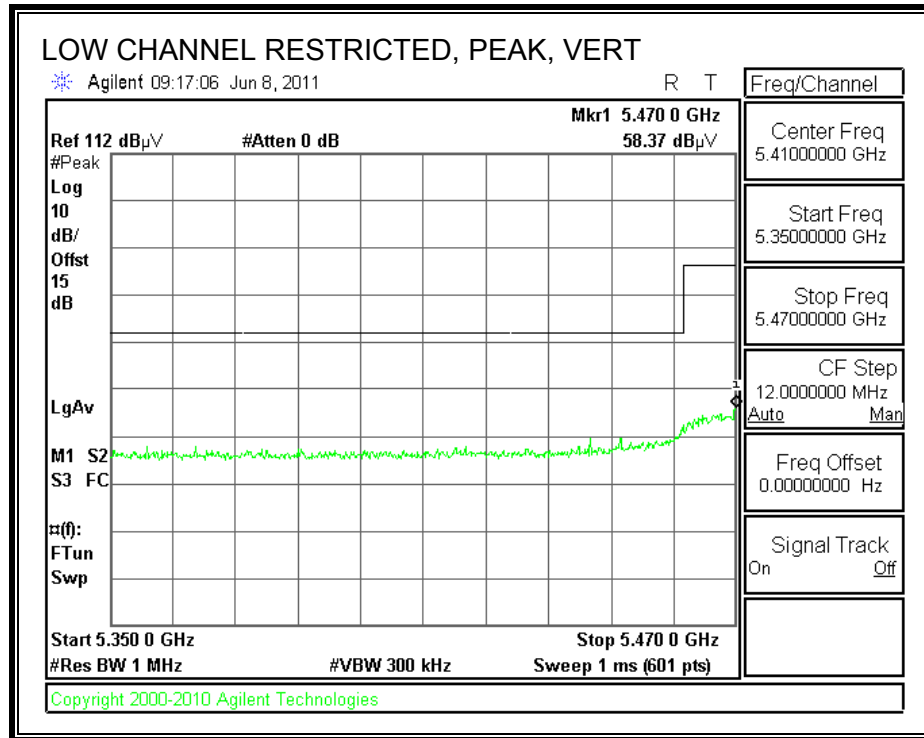
8.2.9. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.6 GHz BAND

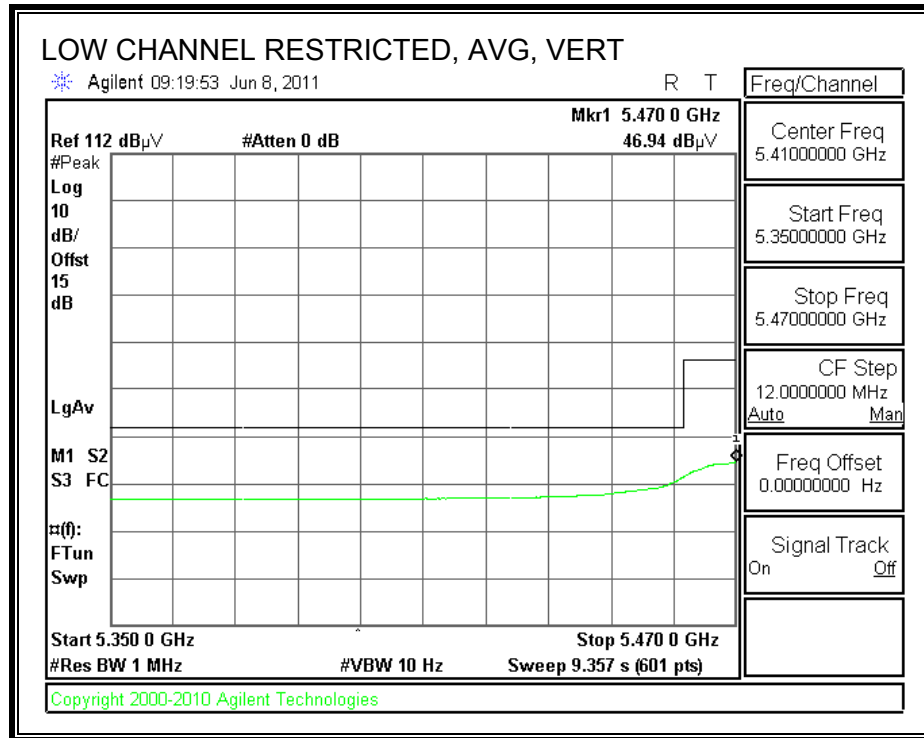
RESTRICTED BANEDGE (LOW CHANNEL, HORIZONTAL)



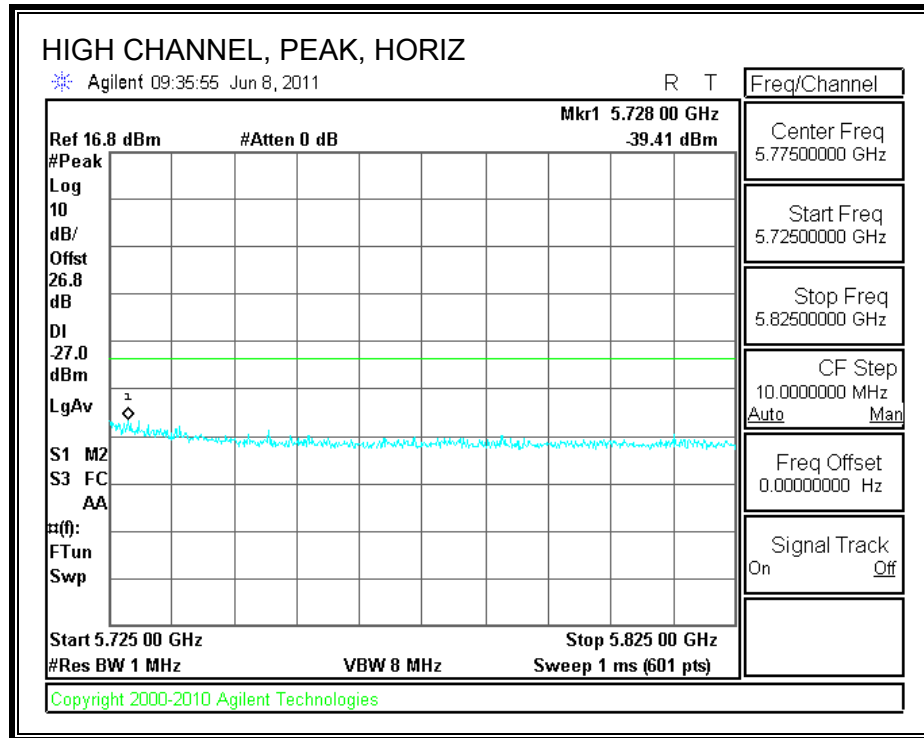


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

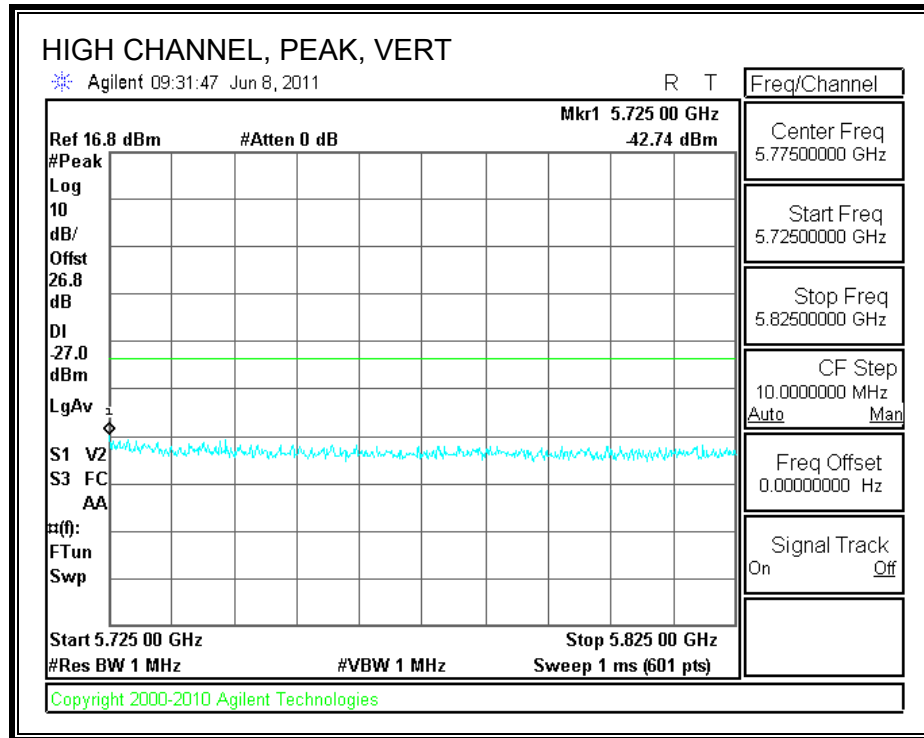




AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber																	
Project #:		11U13822															
Date:		6/23/11															
Test Engineer:		Thanh Nguyen															
Configuration:		EUT , SHEEVA Plug USB, support Laptop															
Mode:		Transmit 802.11n 40 mode															
Test Equipment:																	
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit					
T60; S/N: 2238 @3m			T34 HP 8449B			T88 Miteq 26-40GHz			T125; ARA 18-26GHz; S/N:1007			FCC 15.205					
Hi Frequency Cables																	
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz		
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF_7.6GHz								
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)		
Tx 5.5GHz band																	
Low Ch 5510MHz																	
11.020	3.0	41.6	29.5	37.6	9.2	-32.6	0.0	0.7	56.6	44.5	74	54	-17.4	-9.5	V		
11.020	3.0	41.4	29.5	37.6	9.2	-32.6	0.0	0.7	56.4	44.4	74	54	-17.6	-9.6	H		
Mid Ch 5550MHz																	
11.100	3.0	44.3	32.3	37.7	9.3	-32.6	0.0	0.7	59.4	47.4	74	54	-14.6	-6.6	V		
11.100	3.0	41.4	30.0	37.7	9.3	-32.6	0.0	0.7	56.5	45.1	74	54	-17.5	-8.9	H		
High Ch 5670MHz																	
11.340	3.0	43.4	32.1	37.9	9.4	-32.6	0.0	0.7	58.9	47.6	74	54	-15.1	-6.4	V		
11.340	3.0	41.3	31.3	37.9	9.4	-32.6	0.0	0.7	56.7	46.7	74	54	-17.3	-7.3	H		
No other emissions were detected above the system noise floor.																	
Rev. 07.22.09																	
f	Measurement Frequency		Amp	Preamp Gain		Avg Lim	Average Field Strength Limit		Pk Lim	Peak Field Strength Limit		Avg Mar	Margin vs. Average Limit		Pk Mar	Margin vs. Peak Limit	
Dist	Distance to Antenna		D Corr	Distance Correct to 3 meters		Avg	Average Field Strength @ 3 m		Peak	Calculated Peak Field Strength		HPF	High Pass Filter				
Read	Analyzer Reading																
AF	Antenna Factor																
CL	Cable Loss																

8.3. RECEIVER ABOVE 1 GHz

8.3.1. RECEIVER ABOVE 1 GHz FOR 20 MHz BANDWIDTH

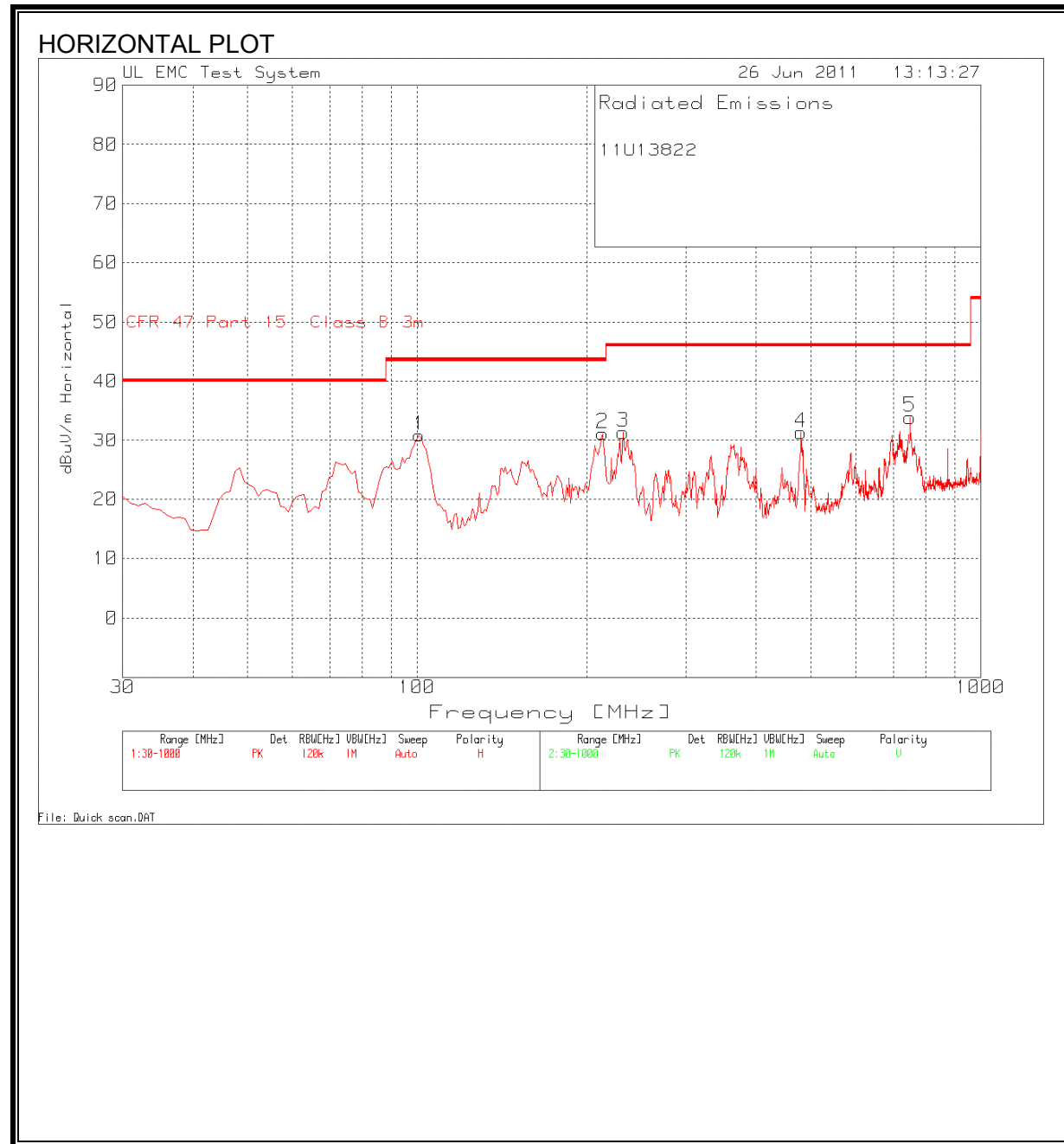
High Frequency Measurement															
Compliance Certification Services, Fremont 5m Chamber															
Project #:		11U13822													
Date:		6/8/2011													
Test Engineer:		Thanh Nguyen													
Configuration:		EUT , remote Laptop, USB stimulator.													
Mode:		Receive 20MHz													
Test Equipment:															
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz		Limit							
T60; S/N: 2238 @3m		T34 HP 8449B						RX RSS 210							
Hi Frequency Cables															
3' cable 22807700		12' cable 22807600		20' cable 22807500		HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz					
3' cable 22807700		12' cable 22807600		20' cable 22807500											
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.105	3.0	58.4	48.4	24.8	2.5	-38.1	0.0	0.0	47.6	37.6	74	54	-26.4	-16.4	V
1.195	3.0	55.8	32.6	25.1	2.6	-38.0	0.0	0.0	45.6	22.3	74	54	-28.4	-31.7	V
1.935	3.0	54.5	33.7	27.6	3.4	-37.0	0.0	0.0	48.5	27.7	74	54	-25.5	-26.3	V
2.135	3.0	56.0	35.7	27.9	3.6	-36.7	0.0	0.0	50.8	30.5	74	54	-23.2	-23.5	V
2.395	3.0	52.7	33.5	28.0	3.8	-36.3	0.0	0.0	48.2	29.1	74	54	-25.8	-24.9	V
2.780	3.0	51.6	40.4	29.1	4.2	-36.1	0.0	0.0	48.8	37.5	74	54	-25.2	-16.5	V
1.185	3.0	57.5	47.4	25.1	2.6	-38.0	0.0	0.0	47.1	37.0	74	54	-26.9	-17.0	H
1.940	3.0	49.9	30.3	27.6	3.4	-37.0	0.0	0.0	43.9	24.3	74	54	-30.1	-29.7	H
2.390	3.0	52.9	32.5	28.0	3.8	-36.3	0.0	0.0	48.4	28.0	74	54	-25.6	-26.0	H
2.790	3.0	51.0	36.5	29.1	4.2	-36.0	0.0	0.0	48.2	33.7	74	54	-25.8	-20.3	H
No other emissions were detected above the system noise floor															
Rev. 07.22.09															
f	Measurement Frequency			Amp	Preamp Gain			Avg Lim	Average Field Strength Limit						
Dist	Distance to Antenna			D Corr	Distance Correct to 3 meters			Pk Lim	Peak Field Strength Limit						
Read	Analyzer Reading			Avg	Average Field Strength @ 3 m			Avg Mar	Margin vs. Average Limit						
AF	Antenna Factor			Peak	Calculated Peak Field Strength			Pk Mar	Margin vs. Peak Limit						
CL	Cable Loss			HPF	High Pass Filter										

8.3.2. RECEIVER ABOVE 1 GHz FOR 40 MHz BANDWIDTH

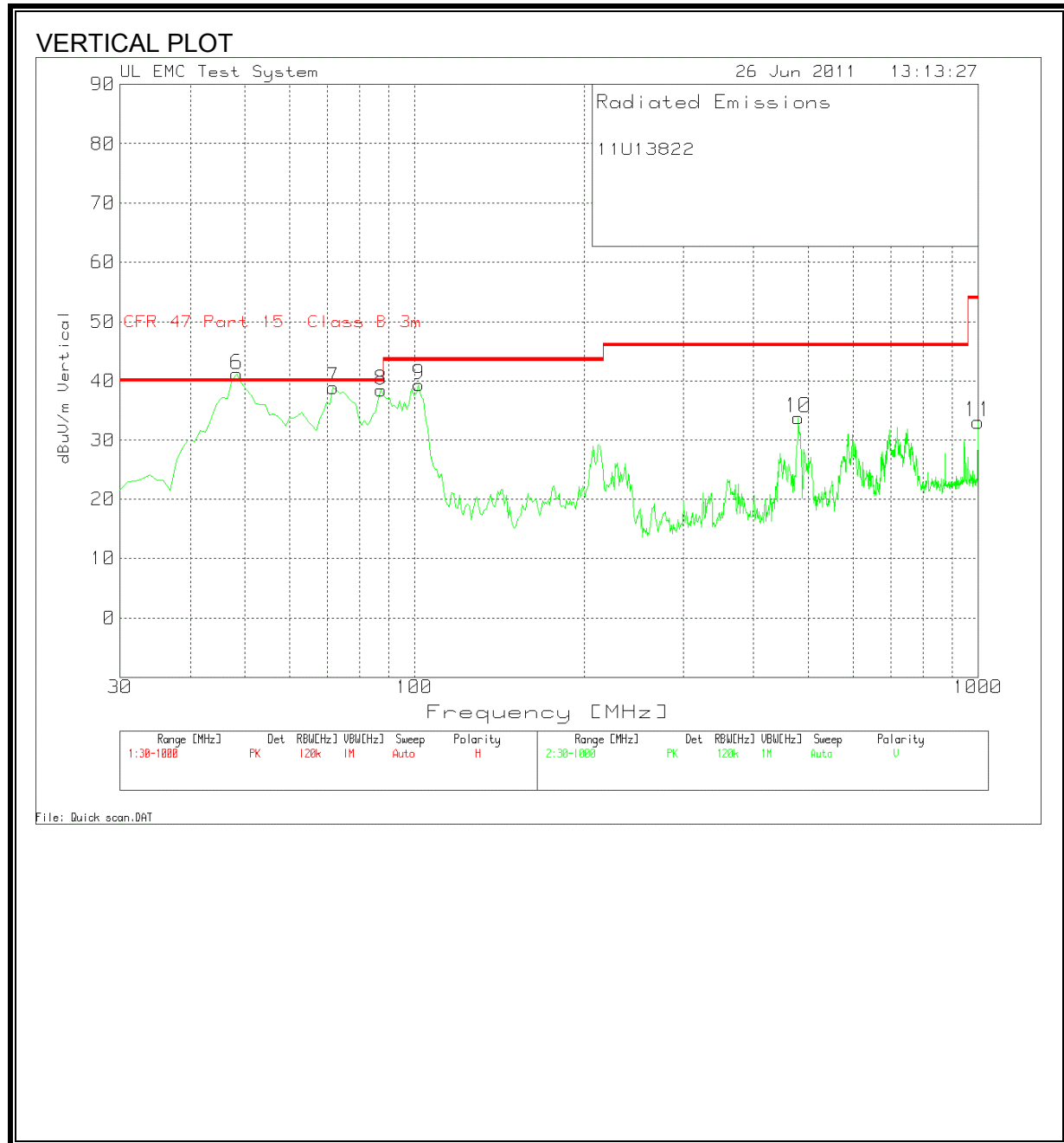
High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber																	
Project #:		11U13822															
Date:		6/8/2011															
Test Engineer:		Thanh Nguyen															
Configuration:		EUT , remote Laptop, USB stimulator.															
Mode:		Receive 40Mhz															
Test Equipment:																	
Horn 1-18GHz				Pre-amplifier 1-26GHz				Pre-amplifier 26-40GHz				Horn > 18GHz				Limit	
T60; S/N: 2238 @3m				T34 HP 8449B												RX RSS 210	
Hi Frequency Cables																	
3' cable 22807700				12' cable 22807600				20' cable 22807500				HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz	
3' cable 22807700				12' cable 22807600				20' cable 22807500									
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)		
1.000	3.0	56.0	47.1	24.5	2.4	-38.3	0.0	0.0	44.6	35.7	74	54	-29.4	-18.3	V		
1.100	3.0	59.7	34.5	24.8	2.5	-38.1	0.0	0.0	48.9	23.7	74	54	-25.1	-30.3	V		
1.463	3.0	48.2	31.0	26.0	2.9	-37.6	0.0	0.0	39.5	22.3	74	54	-34.5	-31.7	V		
1.850	3.0	54.1	32.2	27.3	3.3	-37.1	0.0	0.0	47.6	25.7	74	54	-26.4	-28.3	V		
2.200	3.0	48.7	31.6	27.9	3.6	-36.6	0.0	0.0	43.7	26.5	74	54	-30.3	-27.5	V		
3.000	3.0	46.6	41.9	29.7	4.3	-35.9	0.0	0.0	44.7	40.0	74	54	-29.3	-14.0	V		
3.792	3.0	41.1	28.4	31.6	5.0	-35.2	0.0	0.0	42.5	29.7	74	54	-31.5	-24.3	V		
1.185	3.0	50.1	33.5	25.1	2.6	-38.0	0.0	0.0	39.8	23.1	74	54	-34.2	-30.9	H		
2.135	3.0	50.7	32.4	27.9	3.6	-36.7	0.0	0.0	45.4	27.1	74	54	-28.6	-26.9	H		
2.390	3.0	48.1	30.4	28.0	3.8	-36.3	0.0	0.0	43.6	25.9	74	54	-30.4	-28.1	H		
2.785	3.0	48.5	34.6	29.1	4.2	-36.1	0.0	0.0	45.7	31.7	74	54	-28.3	-22.3	H		
No other emissions were detected above the system noise floor																	
Rev. 07.22.09																	
f	Measurement Frequency			Amp	Preamp Gain			Avg Lim	Average Field Strength Limit								
Dist	Distance to Antenna			D Corr	Distance Correct to 3 meters			Pk Lim	Peak Field Strength Limit								
Read	Analyzer Reading			Avg	Average Field Strength @ 3 m			Avg Mar	Margin vs. Average Limit								
AF	Antenna Factor			Peak	Calculated Peak Field Strength			Pk Mar	Margin vs. Peak Limit								
CL	Cable Loss			HPF	High Pass Filter												

8.4. WORST-CASE BELOW 1 GHz

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



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



EMISSIONS DATA

Range 1 30 - 1000MHz										
Test	Meter	Detector	5m A	5m A T64	5m A T122	dBuV/m	CFR 47	Margin	Height [cm]	Polarity
Frequency	Reading		Cable loss	Factor	Factor		Part 15			
							Class B 3m			
100.81	47.83	PK	1.1	-28.2	10.1	30.83	43.5	-12.67	100	Horz
213.33	45.77	PK	1.6	-28.1	11.9	31.17	43.5	-12.33	100	Horz
231.76	46	PK	1.6	-28.1	11.9	31.4	46	-14.6	100	Horz
480.08	40.24	PK	2.4	-27.7	16.4	31.34	46	-14.66	100	Horz
749.74	37.64	PK	3.1	-27.1	20.3	33.94	46	-12.06	100	Horz
Range 2 30 - 1000MHz										
Test	Meter	Detector	5m A	5m A T64	5m A T122	dBuV/m	CFR 47	Margin	Height [cm]	Polarity
Frequency	Reading		Cable loss	Factor	Factor		Part 15			
							Class B 3m			
48.43	59.55	PK	0.8	-28.3	9.1	41.15	40	1.15	109	Vert
48.43	54.36	QP	0.8	-28.3	9.1	35.96	40	-4.04	109	Vert
71.71	58.34	PK	0.9	-28.2	7.9	38.94	40	-1.06	109	Vert
71.71	58.34	QP	0.9	-28.2	7.9	35.27	40	-4.73	109	Vert
87.23	58.18	PK	1	-28.2	7.5	38.48	40	-1.52	109	Vert
87.23	52.93	QP	1	-28.2	7.5	33.23	40	-6.77	109	Vert
101.78	56.2	PK	1.1	-28.2	10.3	39.4	43.5	-4.1	109	Vert
480.08	42.71	PK	2.4	-27.7	16.4	33.81	46	-12.19	109	Vert
1000	34.84	PK	3.5	-27.7	22.5	33.14	54	-20.86	109	Vert

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

^{*} Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

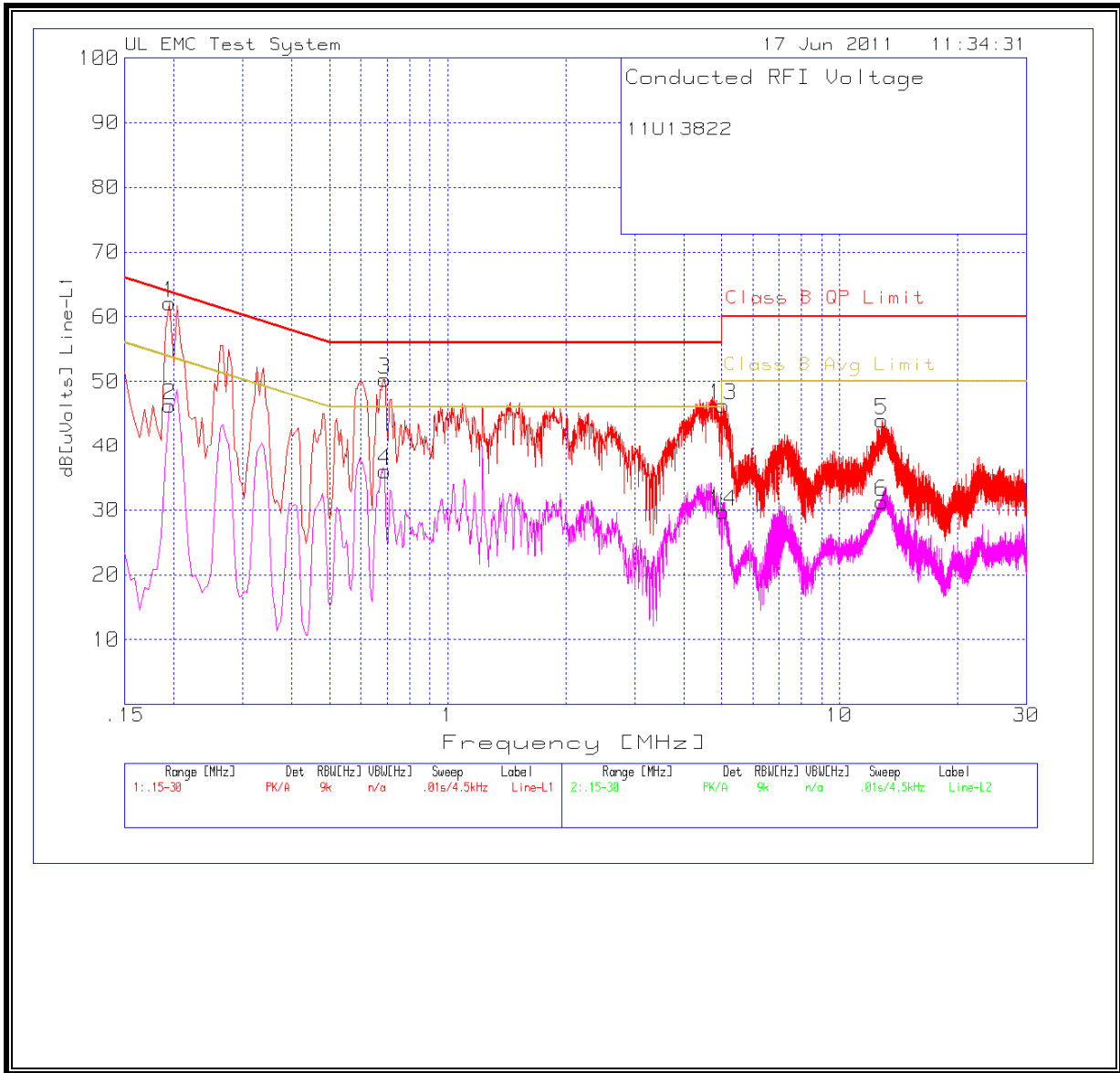
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

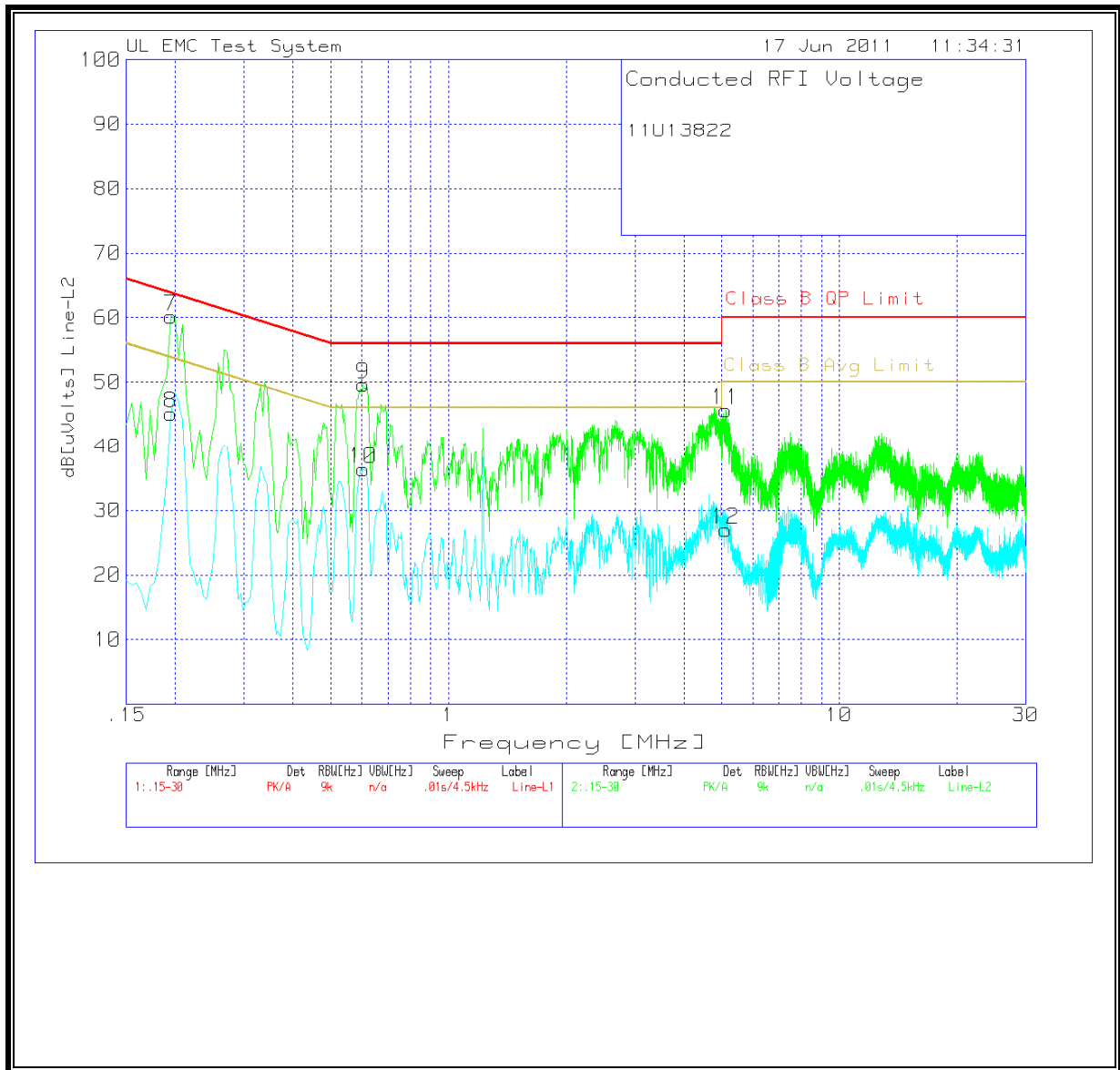
6 WORST EMISSIONS

Line-L1 .15 - 30MHz							
Test							
Frequency	Meter	Detector	dB[uVolts]	Class B	Margin	Class B	Margin
	Reading			QP Limit		Avg Limit	
0.195							
0.195	62.06	PK	62.06	63.8	-1.74		
0.69	46.25	Av	46.25	63.8	-17.55	53.8	-7.55
0.69	50.33	PK	50.33	56	-5.67		
12.84	36.04	Av	36.04	56	-19.96	46	-9.96
12.84	43.97	PK	43.97	60	-16.03	50	-6.03
5.055	31.26	Av	31.26	60	-28.74	50	-18.74
5.055	46.25	PK	46.25	60	-13.75	50	-3.75
	29.73	Av	29.73	60	-30.27	50	-20.27
Line-L2 .15 - 30MHz							
Test							
Frequency	Meter	Detector	dB[uVolts]	Class B	Margin	Class B	Margin
	Reading			QP Limit		Avg Limit	
0.195							
0.195	60.19	PK	60.19	63.8	-3.61		
0.6045	45.15	Av	45.15	63.8	-18.65	53.8	-8.65
0.6045	49.65	PK	49.65	56	-6.35		
5.127	36.4	Av	36.4	56	-19.6	46	-9.6
5.127	45.64	PK	45.64	60	-14.36	50	-4.36
	26.97	Av	26.97	60	-33.03	50	-23.03

LINE 1 RESULTS



LINE 2 RESULTS



10. DYNAMIC FREQUENCY SELECTION

10.1. OVERVIEW

10.1.1. LIMITS

INDUSTRY CANADA

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

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

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

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

FCC

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

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

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

Table 2: Applicability of DFS requirements during normal operation

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

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

Maximum Transmit Power	Value (see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
<p>Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna</p> <p>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.</p>	

Table 4: DFS Response requirement values

Parameter	Value
<i>Non-occupancy period</i>	30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds
<i>Channel Closing Transmission Time</i>	200 milliseconds + approx. 60 milliseconds over remaining 10 second period
<p>The instant that the <i>Channel Move Time</i> and the <i>Channel Closing Transmission Time</i> begins is as follows:</p> <p>For the Short pulse radar Test Signals this instant is the end of the <i>Burst</i>.</p> <p>For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated.</p> <p>For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.</p> <p>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.</p>	

Table 5 – Short Pulse Radar Test Waveforms

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

Table 6 – Long Pulse Radar Test Signal

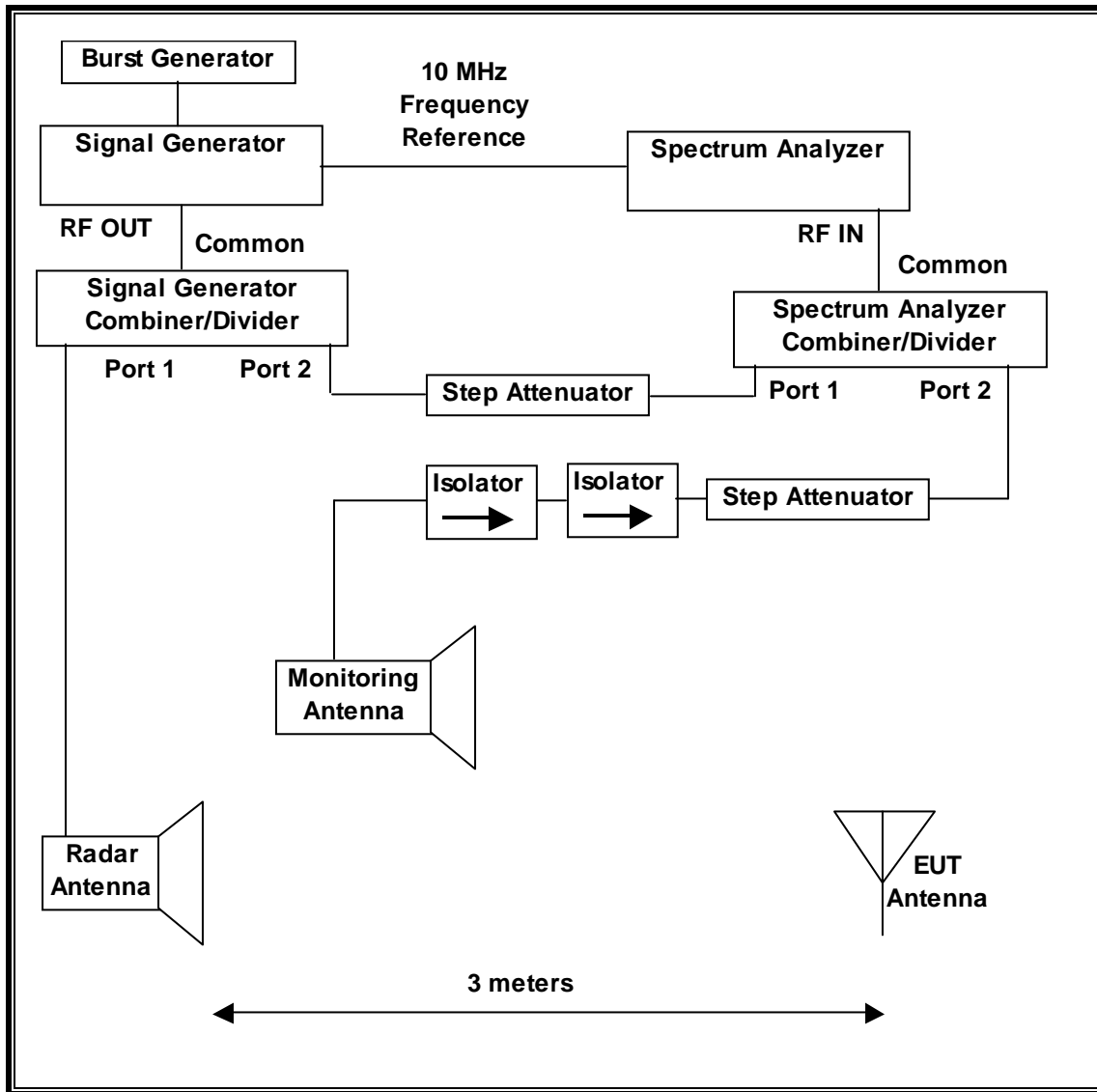
Radar Waveform	Bursts	Pulses per Burst	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

Table 7 – Frequency Hopping Radar Test Signal

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

10.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



SYSTEM OVERVIEW

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

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

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

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

SYSTEM CALIBRATION

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

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

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

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

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

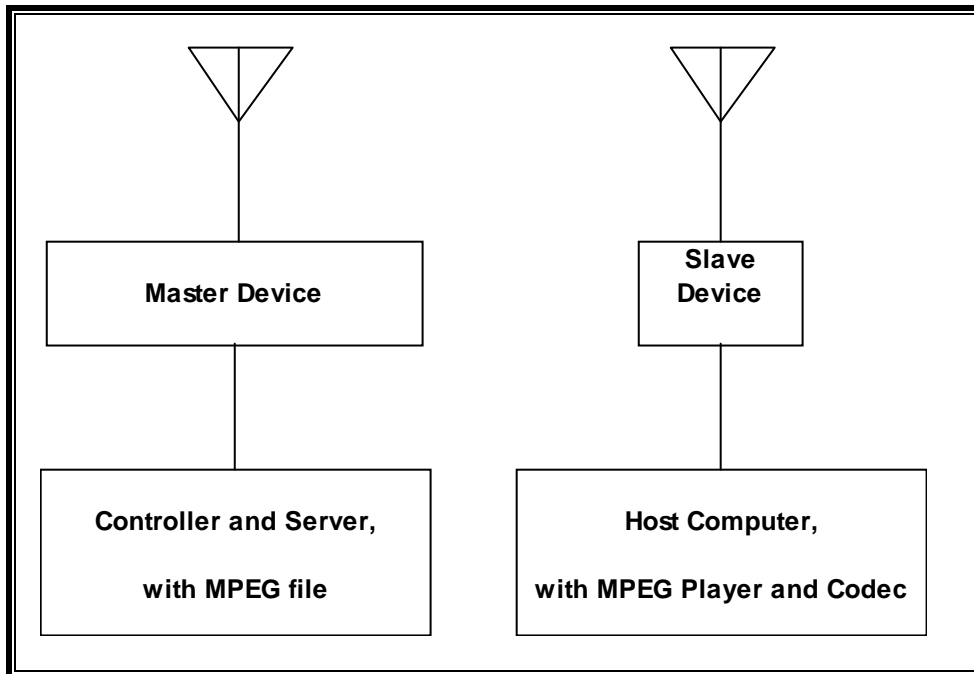
TEST AND MEASUREMENT EQUIPMENT

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

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

10.1.3. SETUP OF EUT

RADIATED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

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

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Wireless Access Point (Master Radio)	Cisco	AIR-AP1252AG-A-K9	FTX120690N2	LDK102061
AC Adapter (AP)	Delta Electronics	EADP-45BB B	DTH112490BD	DoC
Notebook PC (Host)	Dell	PP18L	10657517725	DoC
AC Adapter (Host PC)	Dell	LA65SN0-00	CN-ODF263-71615-6AU-1019	DoC
Notebook PC (Client)	Dell	PP12L	10745307397	DoC
AC Adapter (Client PC)	Dell	ADP-65JB B	0F8834-48661-5C5-4ECV	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 18.85 dBm EIRP in the 5250-5350 MHz band and 18.49 dBm EIRP in the 5470-5725 MHz band.

The only antenna assembly utilized with the EUT has a gain of 3.75 dBi.

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

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is $-64 + 1 = -63$ 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.

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

WLAN traffic is generated by streaming the video file TestFile.mp2 "6 ½ Magic Hours" from the Master to the Slave in full motion video mode using VLC media player.

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

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

The software installed in the access point is 14.62.12.PS.

MANUFACTURER'S STATEMENT REGARDING UNIFORM CHANNEL SPREADING

This is not applicable to slave devices.

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 $> 23\text{dBm}$ (EIRP). Therefore the required interference threshold level is -64 dBm . After correction for procedural adjustments, the required radiated threshold at the antenna port is $-64 + 1 = -63\text{ dBm}$.

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.

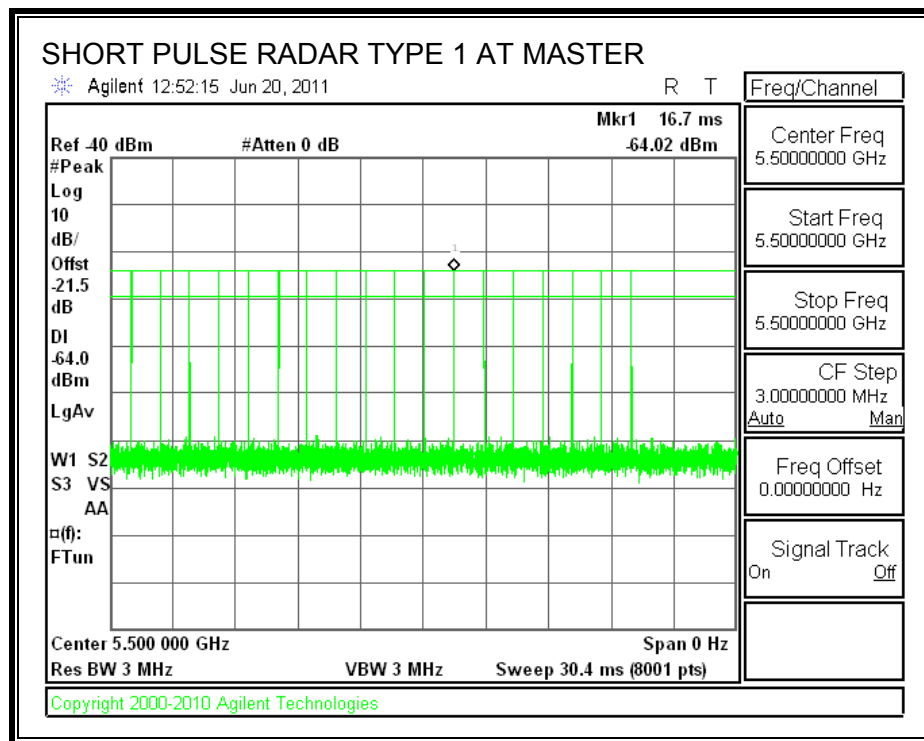
10.2. RESULTS FOR 20 MHz BANDWIDTH

10.2.1. TEST CHANNEL

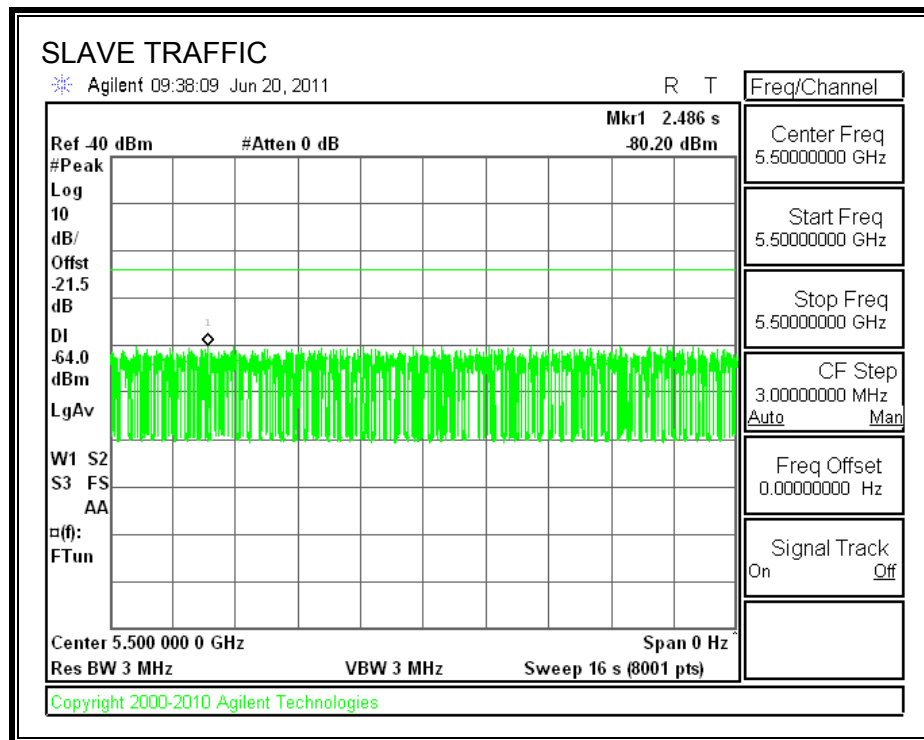
All tests were performed at a channel center frequency of 5500 MHz.

10.2.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



TRAFFIC



10.2.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

10.2.4. MOVE AND CLOSING TIME

REPORTING NOTES

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

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

The aggregate channel closing transmission time is calculated as follows:

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

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

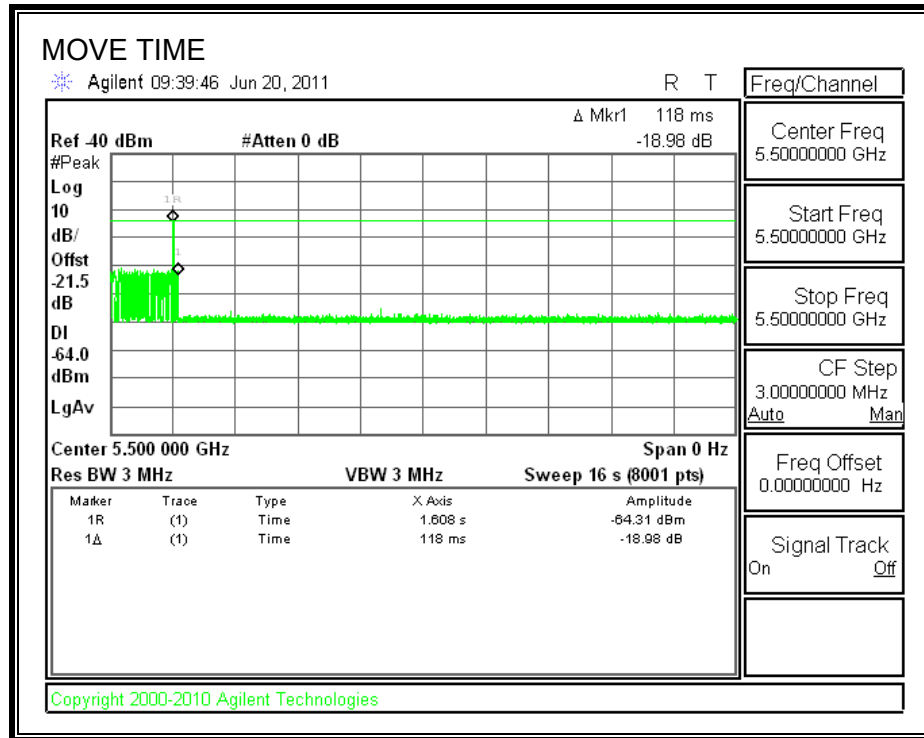
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

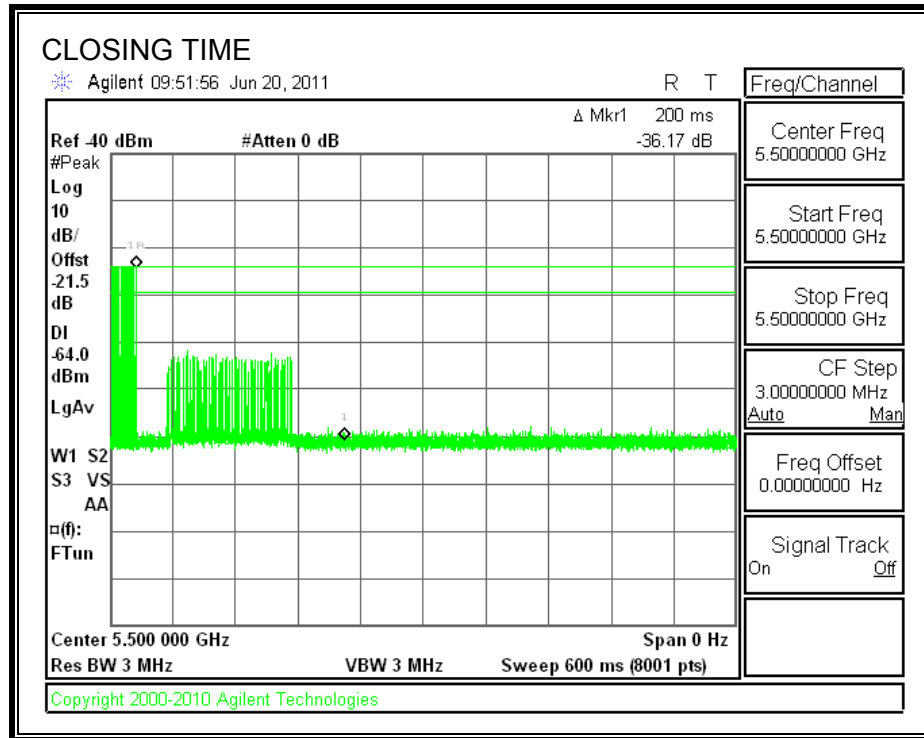
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.118	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	0.0	60
IC	102.0	260

MOVE TIME

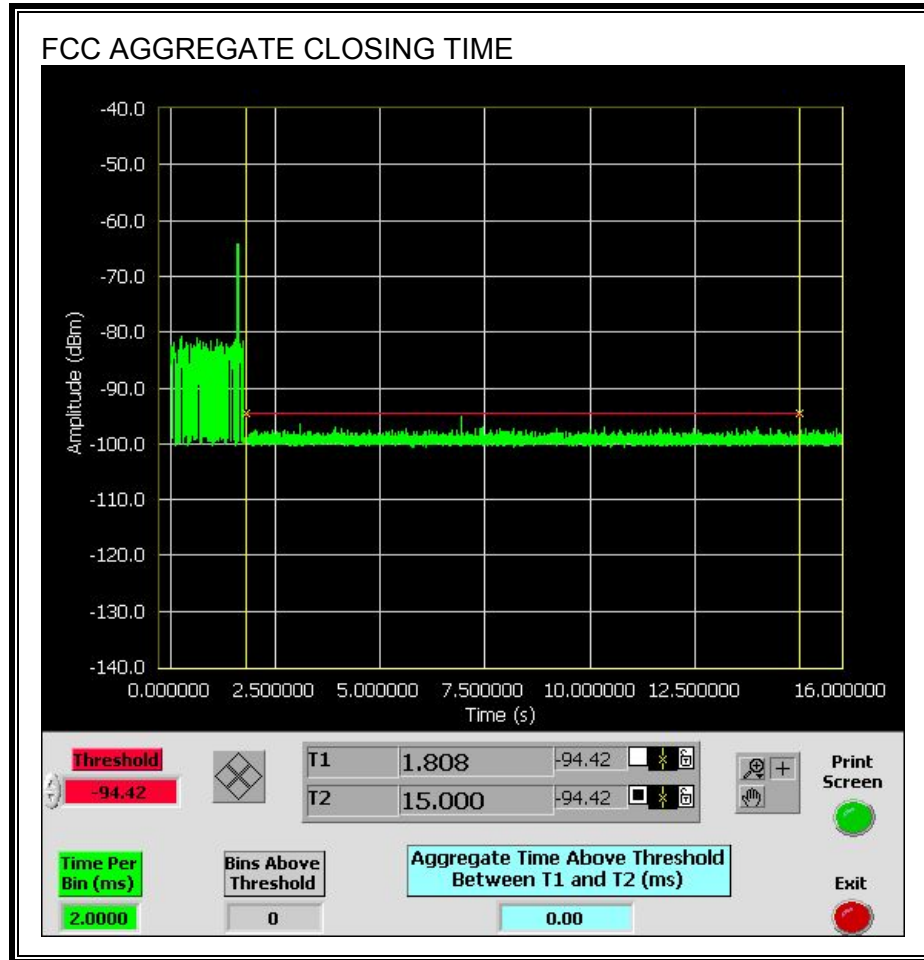


CHANNEL CLOSING TIME

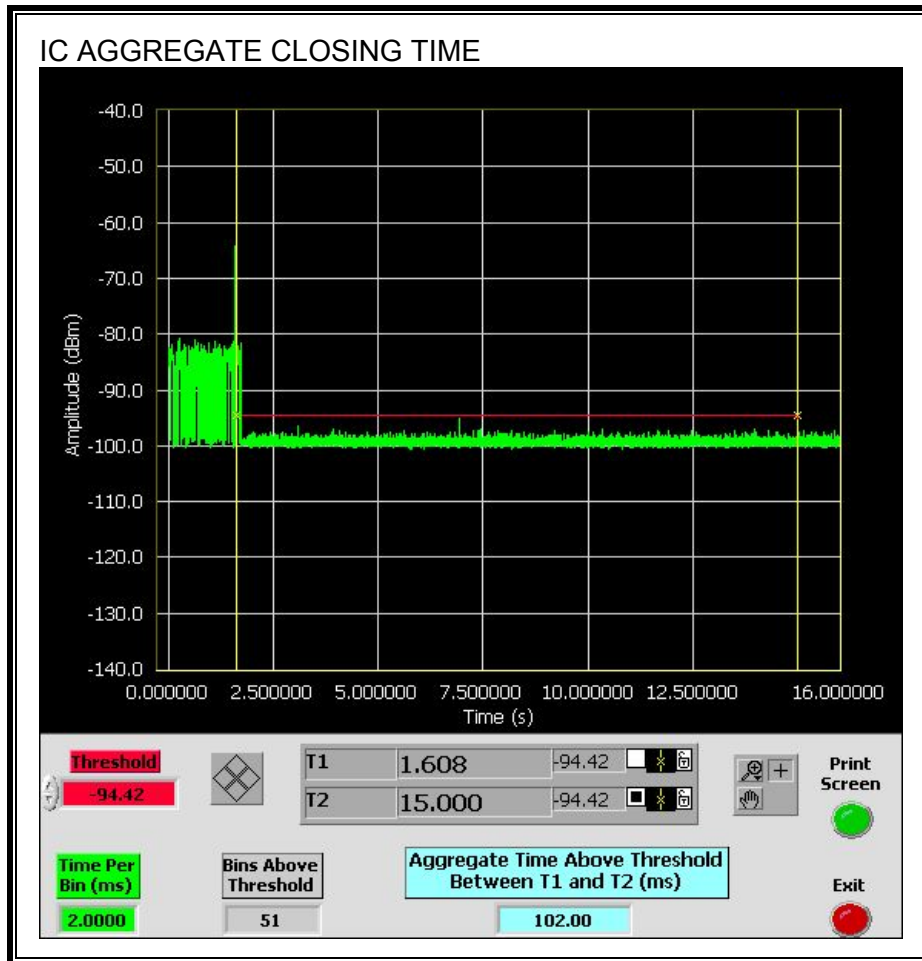


AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



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



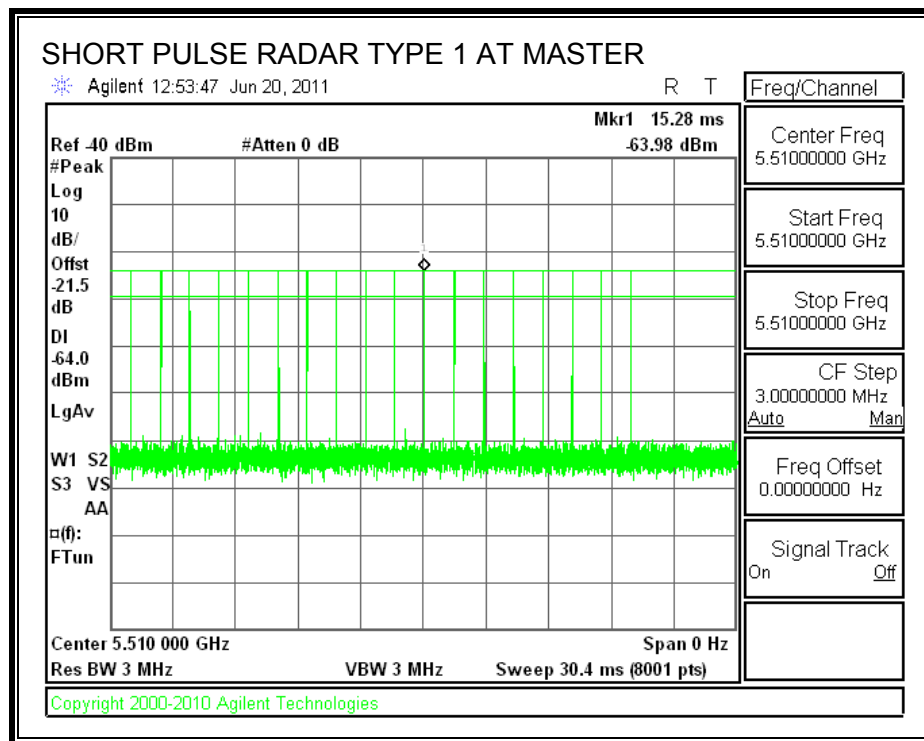
10.3. RESULTS FOR 40 MHz BANDWIDTH

10.3.1. TEST CHANNEL

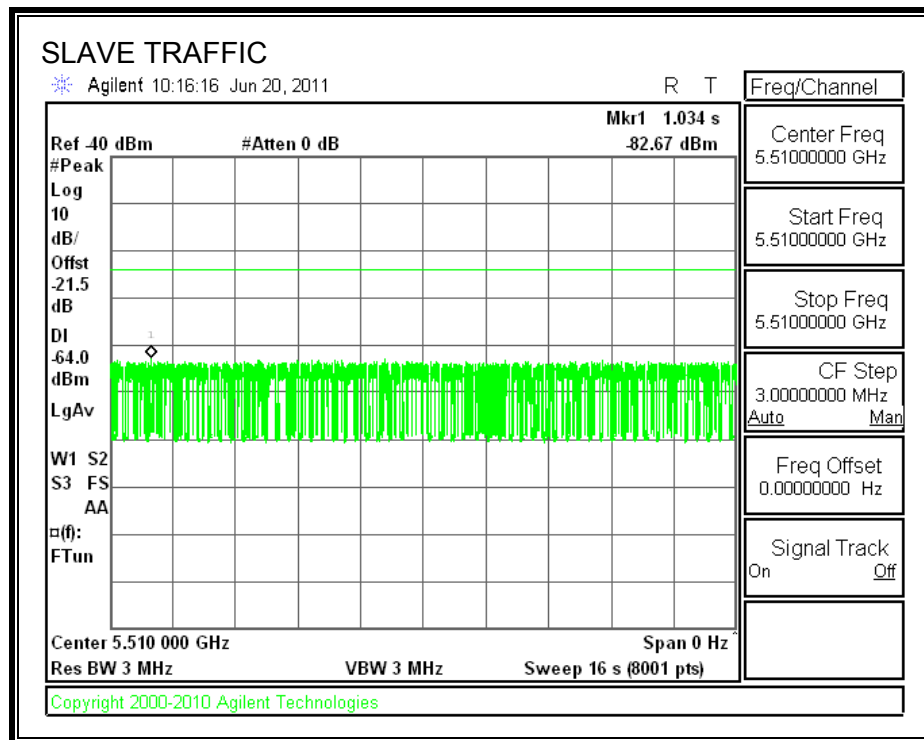
All tests were performed at a channel center frequency of 5510 MHz.

10.3.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



TRAFFIC



10.3.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

10.3.4. MOVE AND CLOSING TIME

REPORTING NOTES

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

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

The aggregate channel closing transmission time is calculated as follows:

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

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

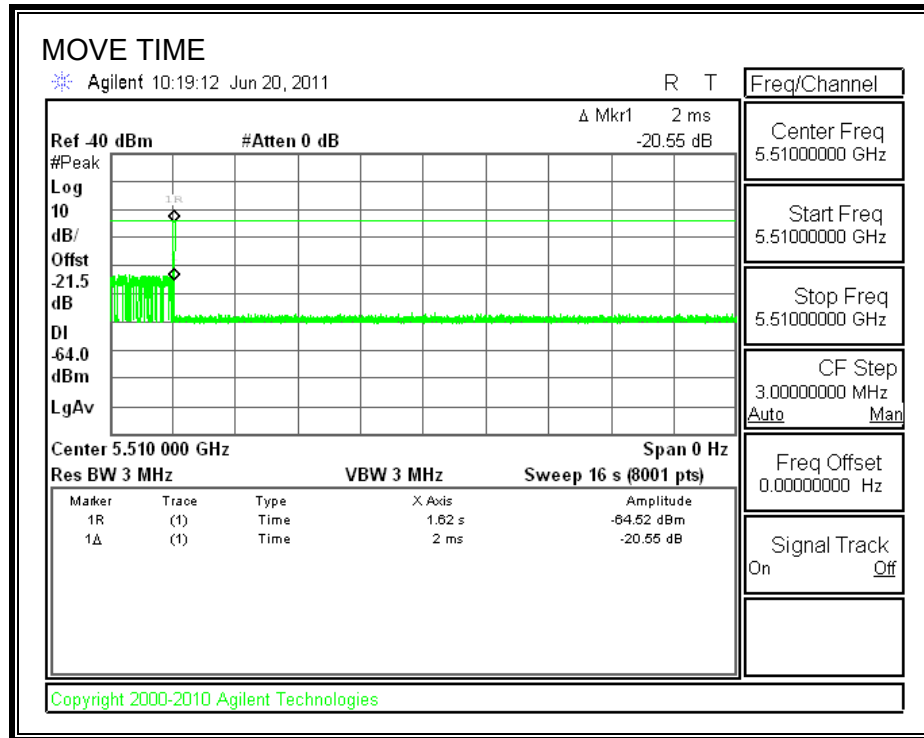
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

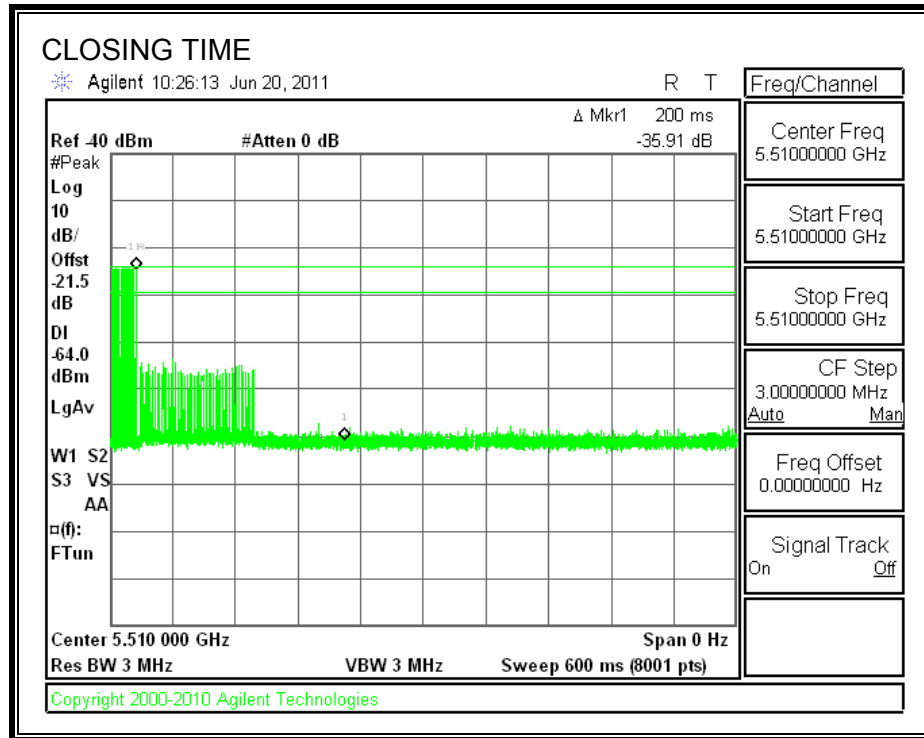
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.002	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	0.0	60
IC	2.0	260

MOVE TIME

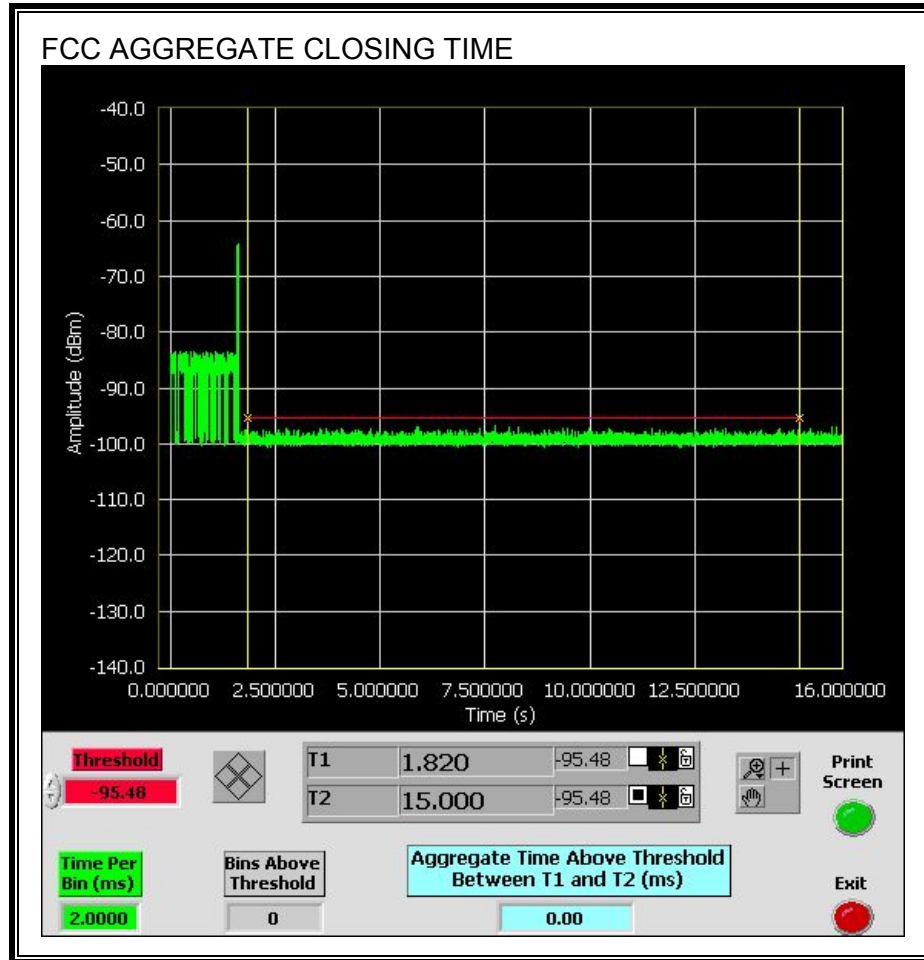


CHANNEL CLOSING TIME

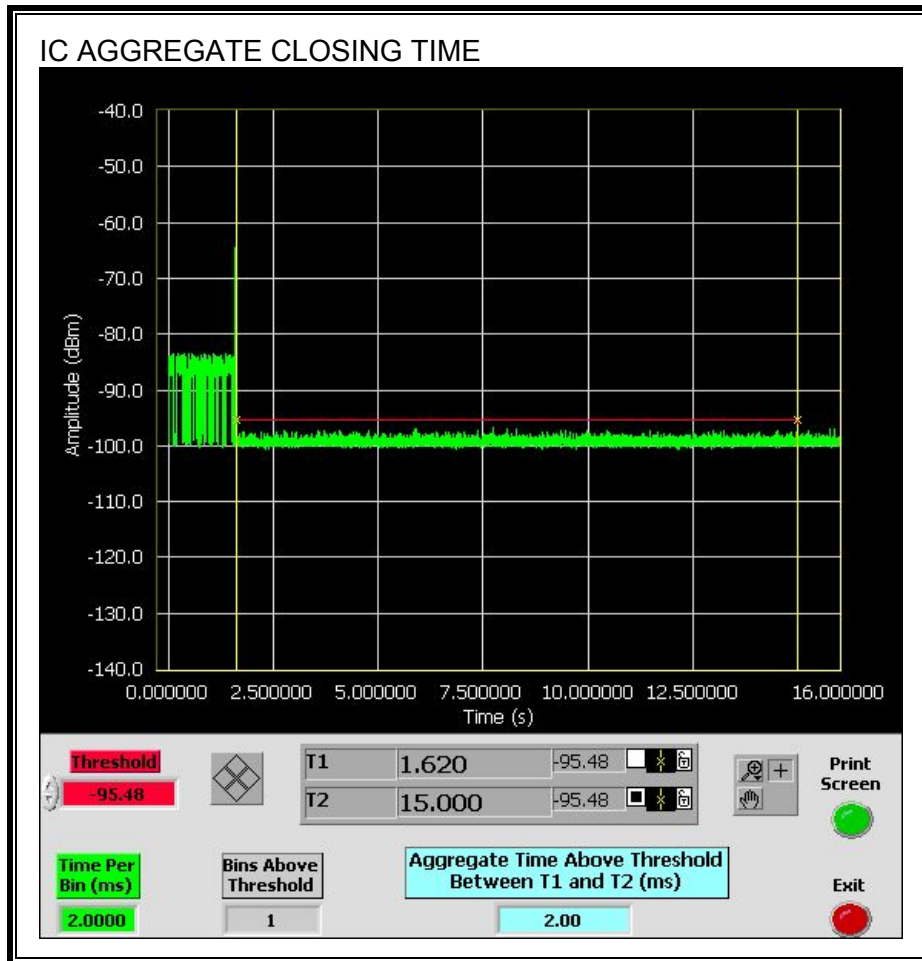


AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



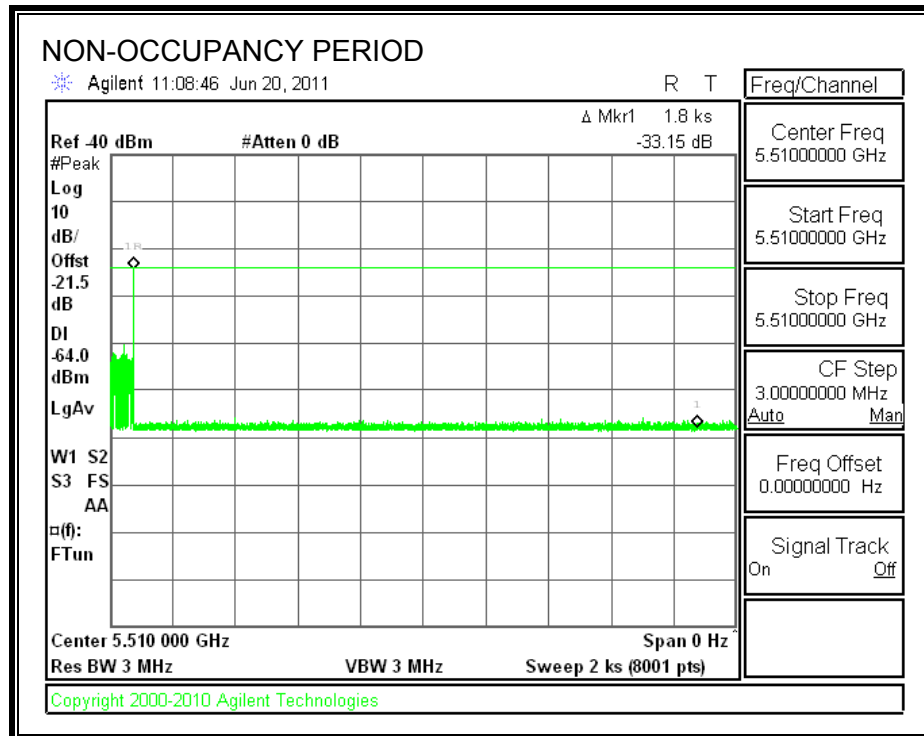
Only intermittent transmissions are observed during the IC aggregate monitoring period.



10.3.5. NON-OCCUPANCY PERIOD

RESULTS

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



11. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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

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

f = frequency in MHz

* = Plane-wave equivalent power density

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

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

IC RULES

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

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

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

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

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

EQUATIONS

Power density is given by:

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

where

S = Power density in W/m²

EIRP = Equivalent Isotropic Radiated Power in W

D = Separation distance in m

Power density in units of W/m² is converted to units of mW/cm² by dividing by 10.

Distance is given by:

$$D = \text{SQRT} (\text{EIRP} / (4 * \text{Pi} * S))$$

where

D = Separation distance in m

EIRP = Equivalent Isotropic Radiated Power in W

S = Power density in W/m²

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

$$\text{Total EIRP} = (P1 * G1) + (P2 * G2) + \dots + (Pn * Gn)$$

where

Px = Power of transmitter x

Gx = Numeric gain of antenna x

For multiple colocated transmitters operating simultaneously in frequency bands where different limits apply, a fraction of the exposure limit is established for each band, such that the sum of the fractions is less than or equal to one.

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

For mobile radio equipment operating in the cellular phone band, the lowest power density limit is calculated using the lowest frequency, as 824 MHz / 1500 = 0.55 mW/cm² (FCC) and 824 MHz / 150 = 5.5 W/m² (IC).

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm²

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m²

RESULTS

Single Chain and non-colocated transmitters								
Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	IC Power Density (W/m^2)	FCC Power Density (mW/cm^2)
5 GHz	WLAN	0.20	15.10	3.75	18.85	0.08	0.15	0.015