



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

CERTIFICATION TEST REPORT

**FOR
802.11ag/Draft 802.11n WLAN PCI-E Mini Card**

**MODEL NUMBER: BCM94322USA
FCC ID: QDS-BRCM1038
IC: 4324A-BRCM1038**

**REPORT NUMBER: 08U11756-2B
ISSUE DATE: JULY 11, 2008**

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NVLAP LAB CODE 200065-0

Revision History

| <u>Rev.</u> | <u>Issue Date</u> | <u>Revisions</u> | <u>Revised By</u> |
|-------------|-------------------|---|-------------------|
| -- | July 9, 2008 | Initial Issue | Sunny Shih |
| A | July 9, 2008 | Removed standard description "NCC LOW POWER 0002 (LP0002)" from cover page and page 8. | A. Zaffar |
| B | July 11, 2008 | Clarified antenna combinations used for test purposes, clarified DFS test results, added TPC description. | Sunny Shih |

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, USA

EUT DESCRIPTION: 802.11ag / Draft 802n WLAN PCI-E MINI CARD

MODEL: BCM94322USA

SERIAL NUMBER: 973 (P405)

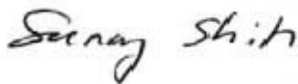
DATE TESTED: JUNE 06 - JULY 7, 2008

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

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:



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EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:



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EMC ENGINEER
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC MO&O 06-96, RSS-GEN Issue 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. MEASUREMENT UNCERTAINTY

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

| PARAMETER | UNCERTAINTY |
|-------------------------------|-------------|
| Power Line Conducted Emission | +/- 2.3 dB |
| Radiated Emission | +/- 3.4 dB |

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11ag/Draft 802.11n Wireless LAN transceiver card and manufactured by Broadcom. Model number is BCM94322USA.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

5150 to 5250 MHz Authorized Band

| Frequency Range (MHz) | Mode | Peak Power Chain 0 (dBm) | Peak Power Chain 1 (dBm) | Total Peak Power (dBm) | Output Power (mW) |
|-----------------------|--------------------|--|--------------------------|------------------------|-------------------|
| 5180 - 5240 | 802.11a Legacy | | | 14.23 | 26.49 |
| 5180 - 5240 | 802.11n 20MHz SISO | Covered by the worst case 802.11a Legacy testing | | | |
| 5180 - 5240 | 802.11a CDD Mode | Covered by the worst case 802.11n 20 MHz CDD | | | |
| 5180 - 5240 | 802.11n 20MHz CDD | 9.43 | 9.69 | 12.57 | 18.08 |
| 5190 - 5230 | 802.11n 40MHz SISO | | | 16.57 | 45.39 |
| 5190 - 5230 | 802.11n 40MHz CDD | 12.25 | 12.26 | 15.27 | 33.61 |

5250 - 5350 MHz Authorized Band

| Frequency Range (MHz) | Mode | Peak Power Chain 0 (dBm) | Peak Power Chain 1 (dBm) | Total Peak Power (dBm) | Output Power (mW) |
|--|--------------------|--|--------------------------|------------------------|-------------------|
| 5260 - 5320 | 802.11a Legacy | | | 17.86 | 61.09 |
| 5260 - 5320 | 802.11n 20MHz SISO | Covered by the worst case 802.11a Legacy testing | | | |
| 5260 - 5320 | 802.11a CDD Mode | Covered by the worst case 802.11n 20 MHz CDD | | | |
| 5270 - 5310 | 802.11n 40MHz SISO | | | 17.29 | 53.58 |
| Power with Antenna Array Gain up to 6.72 dBi | | | | | |
| 5260 - 5320 | 802.11n 20MHz CDD | 16.29 | 16.10 | 19.21 | 83.30 |
| 5270 - 5310 | 802.11n 40MHz CDD | 15.42 | 15.76 | 18.60 | 72.50 |
| Power with Antenna Array Gain up to 7.84 dBi | | | | | |
| 5260 - 5320 | 802.11n 20MHz CDD | 15.27 | 15.22 | 18.26 | 66.92 |

5470 - 5725 MHz Authorized Band

| Frequency Range (MHz) | Mode | Peak Power Chain 0 (dBm) | Peak Power Chain 1 (dBm) | Total Peak Power (dBm) | Output Power (mW) |
|--|--------------------|--|--------------------------|------------------------|-------------------|
| 5500 - 5700 | 802.11a Legacy | | | 17.38 | 54.70 |
| 5500 - 5700 | 802.11n 20MHz SISO | Covered by the worst case 802.11a Legacy testing | | | |
| 5500 - 5700 | 802.11a CDD Mode | Covered by the worst case 802.11n 20 MHz CDD | | | |
| 5510 - 5670 | 802.11n 40MHz SISO | | | 18.35 | 68.39 |
| Power with Antenna Array Gain up to 5.83 dBi | | | | | |
| 5500 - 5700 | 802.11n 20MHz CDD | 16.70 | 16.71 | 19.72 | 93.65 |
| 5510 - 5670 | 802.11n 40MHz CDD | 17.43 | 18.53 | 21.03 | 126.62 |
| Power with Antenna Array Gain up to 8.80 dBi | | | | | |
| 5500 - 5700 | 802.11n 20MHz CDD | 14.27 | 14.16 | 17.23 | 52.79 |
| 5510 - 5670 | 802.11n 40MHz CDD | 16.65 | 17.52 | 20.12 | 102.73 |

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes with two different types of antenna, with the maximum gain as table below

| Antenna Manufacturer | Antenna Type | Model | Peak gain (dBi) @ 5150MHz | Peak gain (dBi) @ 5350MHz | Peak gain (dBi) @ 5470MHz | Peak gain (dBi) @ 5700MHz |
|----------------------|--------------|-------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Tyco | PIFA | M97PIFA | 5.35 | 6.42 | 7.48 | 7.45 |
| Foxconn | PIFA | WDAN-HQAT80-03-DF | 2.99 | 2.99 | 2.01 | 2.19 |
| Tyco | Slot antenna | M97SLTAP1 | 0.63 | 2.28 | 2.99 | 2.47 |
| Tyco | Slot antenna | K5SLT | 4.11 | 4.32 | 3.50 | 3.36 |

Antennas combinations for all 2x2 (CCD) modes test

(Low Slot ant gain + Hi PIFA ant gain & Hi Slot ant gain + Low PIFA ant gain)

| Frequency Band | Antennas combination | SLOT Antenna Gain | PIFA Antenna gain | 10^(Ant Main /10) | 10^(Ant Aux/10) | 10^(ant main/10)+ 10^(ant aux/10) | 10*log[10^(ant main/10)+ 10^(ant aux/10)] (dBm) |
|----------------|----------------------|-------------------|-------------------|-------------------|-----------------|-----------------------------------|---|
| 5.2 GHz | SLOT Low / PIFA Hi | 0.63 | 5.35 | 1.156 | 3.428 | 4.584 | 6.61 |
| | SLOT Hi / PIFA Low | 4.11 | 2.99 | 2.576 | 1.991 | 4.567 | 6.60 |
| 5.3 GHz | SLOT Low / PIFA Hi | 2.28 | 6.42 | 1.690 | 4.385 | 6.076 | 7.84 |
| | SLOT Hi / PIFA Low | 4.32 | 2.99 | 2.704 | 1.991 | 4.695 | 6.72 |
| 5.5 GHz | SLOT Low / PIFA Hi | 2.99 | 7.48 | 1.991 | 5.598 | 7.588 | 8.80 |
| | SLOT Hi / PIFA Low | 3.50 | 2.01 | 2.239 | 1.589 | 3.827 | 5.83 |

The highest gains of each type of antennas for all legacy/SISO modes test

| Band | SLOT Ant Gain | PIFA Ant Gain |
|---------|---------------|---------------|
| 5.2 GHz | 4.11 | 5.35 |
| 5.3 GHz | 4.32 | 6.42 |
| 5.5 GHz | 3.50 | 7.48 |

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was BCMWL5, rev. 4.170.83.0.

The test utility software used during testing was wl_tool, rev. 4.170. RC83.0.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case data rate for each mode is determined to be as follows, based on preliminary tests of the chipset utilized in this radio.

All final tests in the 802.11a mode were made at 6 Mb/s.

All final tests in the 802.11n HT20 mode were made at MCS0.

All final tests in the 802.11n HT40 mode were made at MCS0 & MCS15

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

Radiated emissions tests were performed with the following antenna configurations:

All legacy/SISO modes were measured with the highest gain for each type of antenna (PIFA and Slot).

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT & PERIPHERALS

| PERIPHERAL SUPPORT EQUIPMENT LIST | | | | |
|-----------------------------------|--------------|---------------|---------------|--------|
| Description | Manufacturer | Model | Serial Number | FCC ID |
| Monitor | LG | Microline 186 | 512MXAY0A752 | DoC |
| Keyboard | Microsoft | KC-0405 | 7.6198E+12 | DoC |
| Mouse | Dell | 0YH958 | HC6450C2BP9 | DoC |
| Desktop | Dell | DCNE | FR17YD1 | DoC |

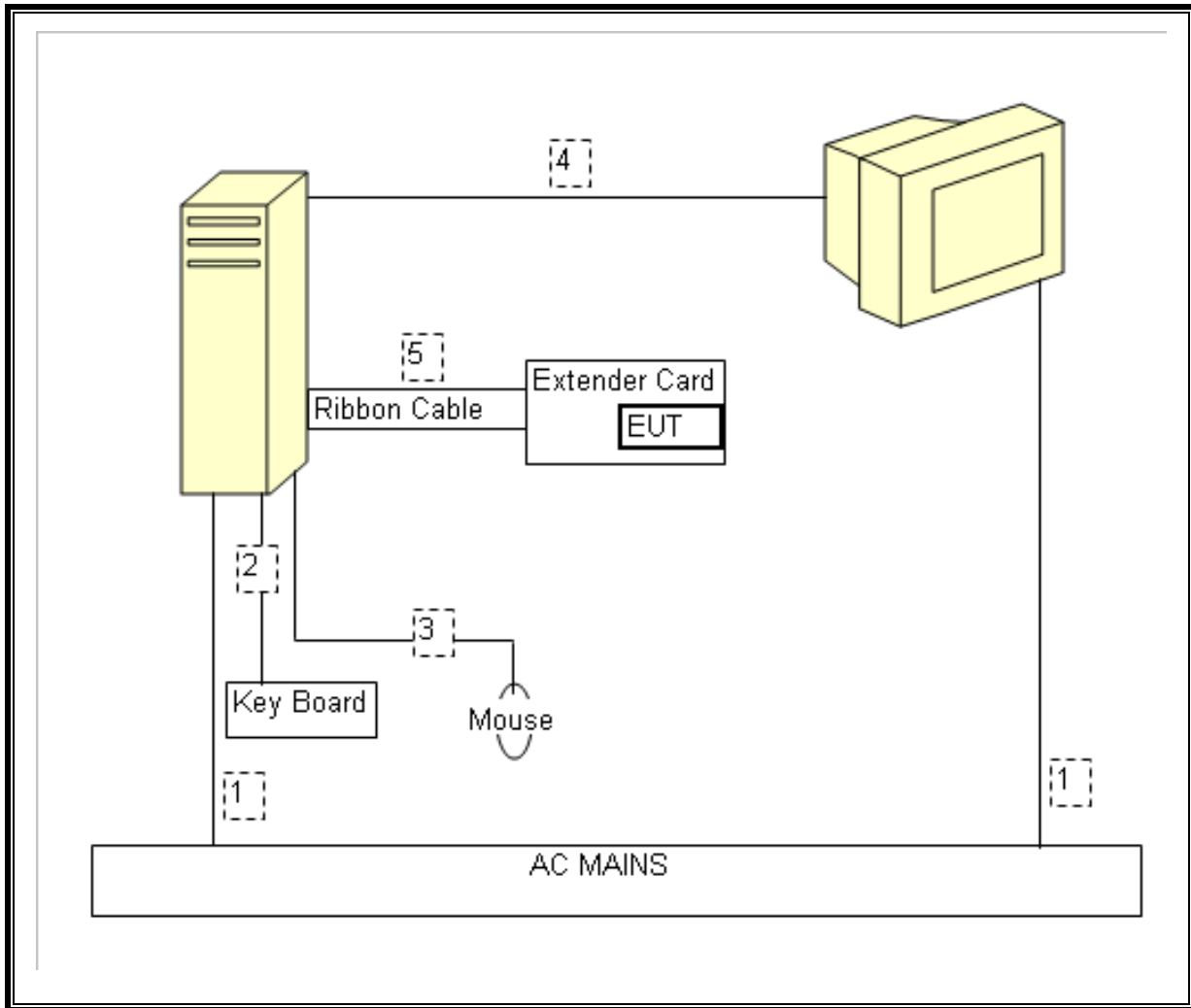
I/O CABLES

| I/O CABLE LIST | | | | | | |
|----------------|---------------|----------------------|----------------|-------------|--------------|---------|
| Cable No. | Port | # of Identical Ports | Connector Type | Cable Type | Cable Length | Remarks |
| 1 | AC | 2 | US 115V | Un-shielded | 2m | N/A |
| 2 | USB Key Board | 1 | USB | Shielded | 1m | N/A |
| 3 | USB Mouse | 1 | USB | Shielded | 1m | N/A |
| 4 | Video | 1 | DB15 | Shielded | 1m | N/A |
| 5 | Ribbon Cable | 1 | Ribbon Cable | Un-shielded | 0.4m | N/A |

TEST SETUP

The EUT is installed in a host desktop computer via a ribbon cable & an express card to Mini PCI-E adapter boards 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 Date | Cal Due |
| EMI Receiver, 2.9 GHz | Agilent / HP | 8542E | C00957 | 2/6/2008 | 6/12/2009 |
| RF Filter Section, 2.9 GHz | Agilent / HP | 85420E | C00958 | 2/6/2008 | 6/12/2009 |
| Preamplifier, 1300 MHz | Agilent / HP | 8447D | C00885 | 5/9/2007 | 5/9/2009 |
| LISN, 30 MHz | FCC | LISN-50/250-25-2 | N02625 | 10/25/2007 | 10/25/2008 |
| LISN, 10 kHz ~ 30 MHz | Solar | 8012-50-R-24-BNC | N02481 | 10/25/2007 | 10/25/2008 |
| EMI Test Receiver, 30 MHz | R & S | ESHS 20 | N02396 | 10/16/2007 | 1/27/2009 |
| Spectrum Analyzer, 44 GHz | Agilent / HP | E4446A | C01012 | 5/2/2006 | 8/7/2008 |
| Antenna, Horn, 18 GHz | ETS | 3117 | C01006 | 4/15/2008 | 4/15/09 |
| Preamplifier, 26.5 GHz | Agilent / HP | 8449B | C01052 | 8/3/2007 | 8/3/08 |
| Antenna, Bilog, 2 GHz | Sunol Sciences | JB1 | C01011 | 10/13/2007 | 10/13/08 |
| Peak Power Meter | Agilent / HP | E4416A | C00963 | 02/14/07 | 12/02/08 |
| Peak / Average Power Sensor | Agilent | E9327A | C00964 | 02/14/07 | 12/02/08 |
| Antenna, Horn 26 ~ 40 GHz | ARA | MWH-2640/B | C01009 | 4/13/2008 | 4/13/2009 |
| 7.6 GHz High Pass Filter | Micro Tronics | HPM13350 | N/A | N/A | N/A |
| 5.75 - 5.8 Reject Filter | Micro Tronics | BRC13192 | N/A | N/A | N/A |

7. ANTENNA PORT TEST RESULTS FOR 5.15–5.25 GHZ BAND

7.1. 802.11a MODE

7.1.1. 26 dB and 99% BANDWIDTH

LIMITS

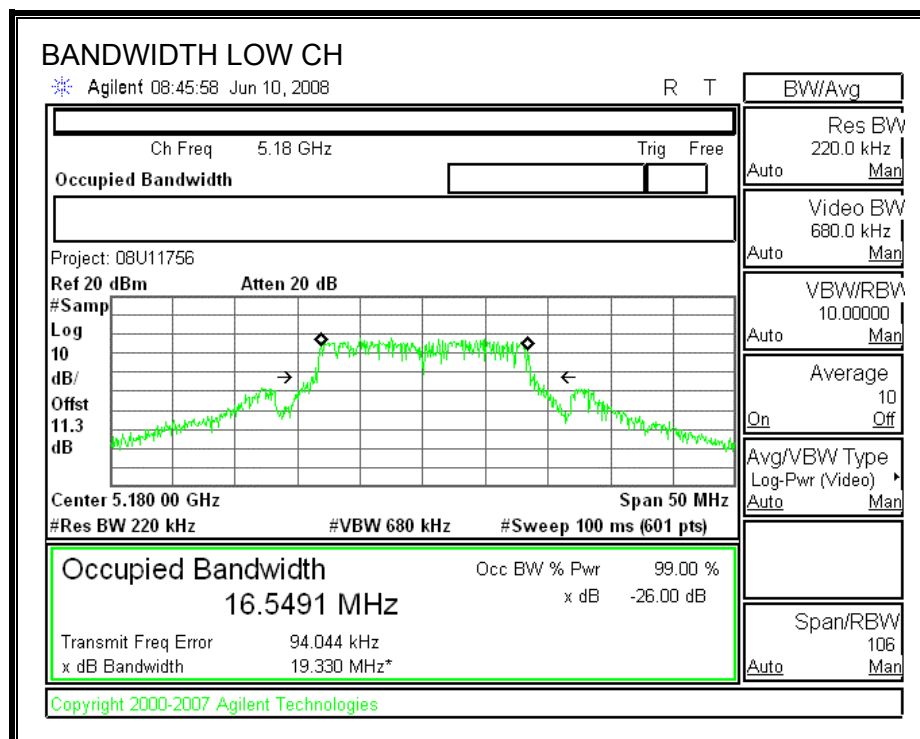
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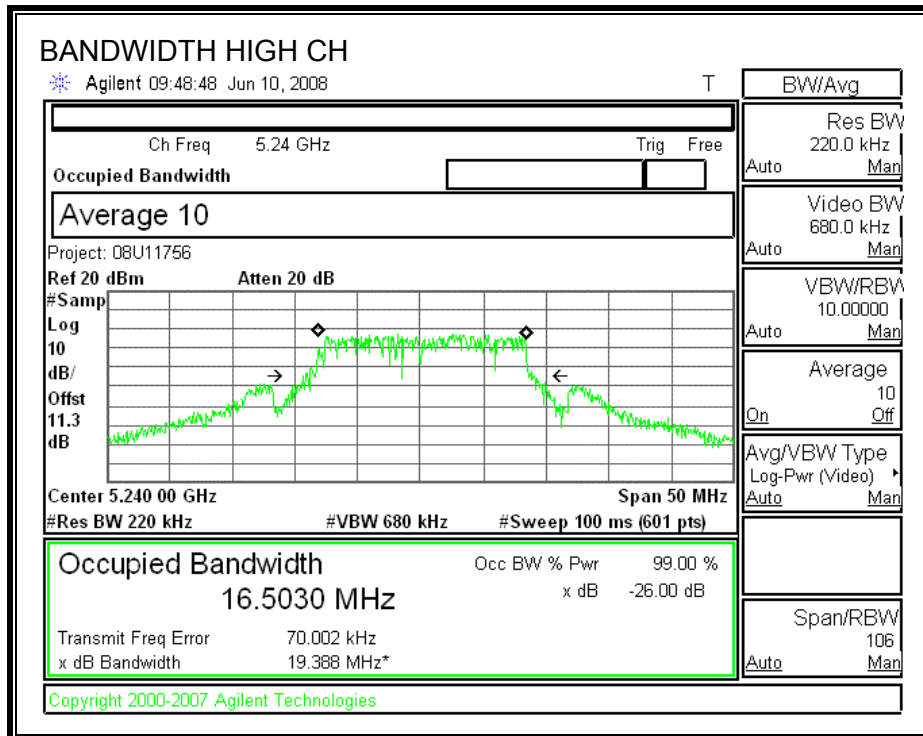
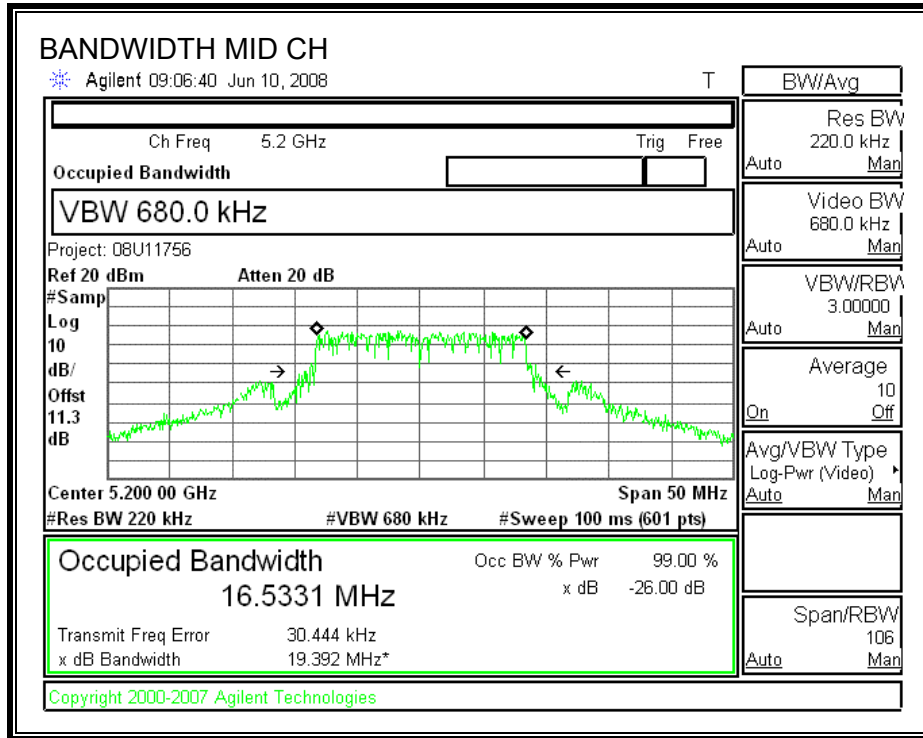
TEST PROCEDURE

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 | 19.330 | 16.5491 |
| Middle | 5200 | 19.392 | 16.5331 |
| High | 5240 | 19.388 | 16.5030 |





7.1.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1) & IC RSS-210 A9.2 (1)

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

The maximum antenna gain is 5.35 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

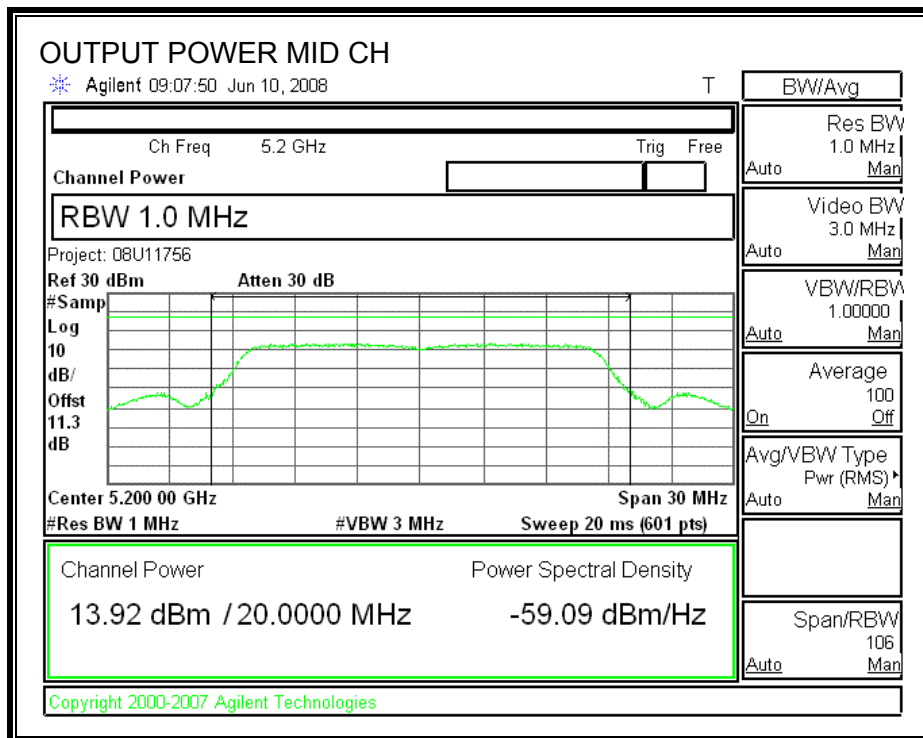
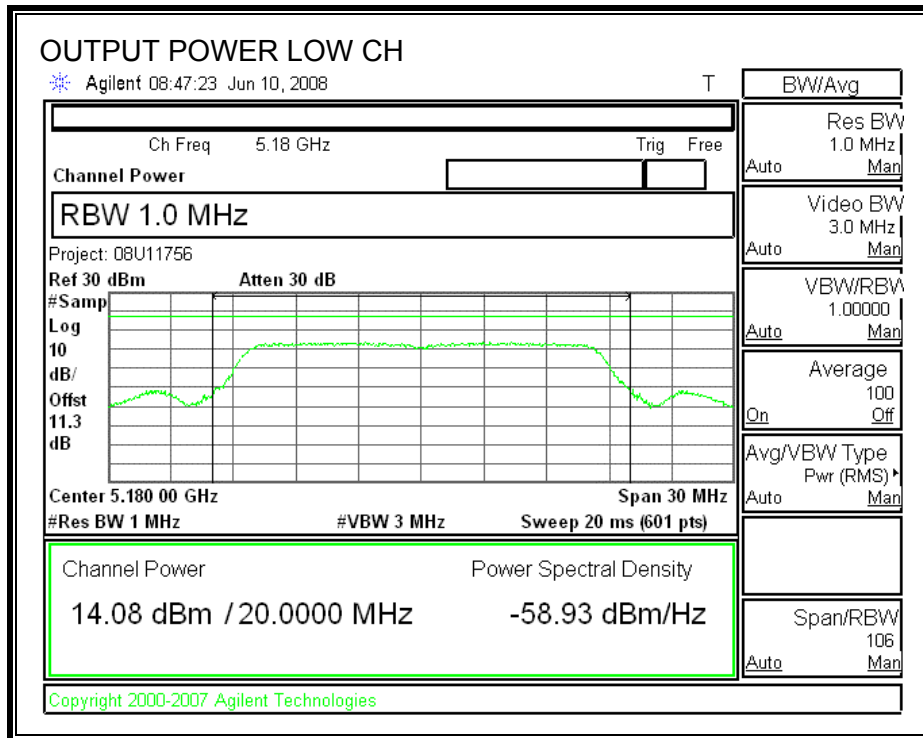
Limit

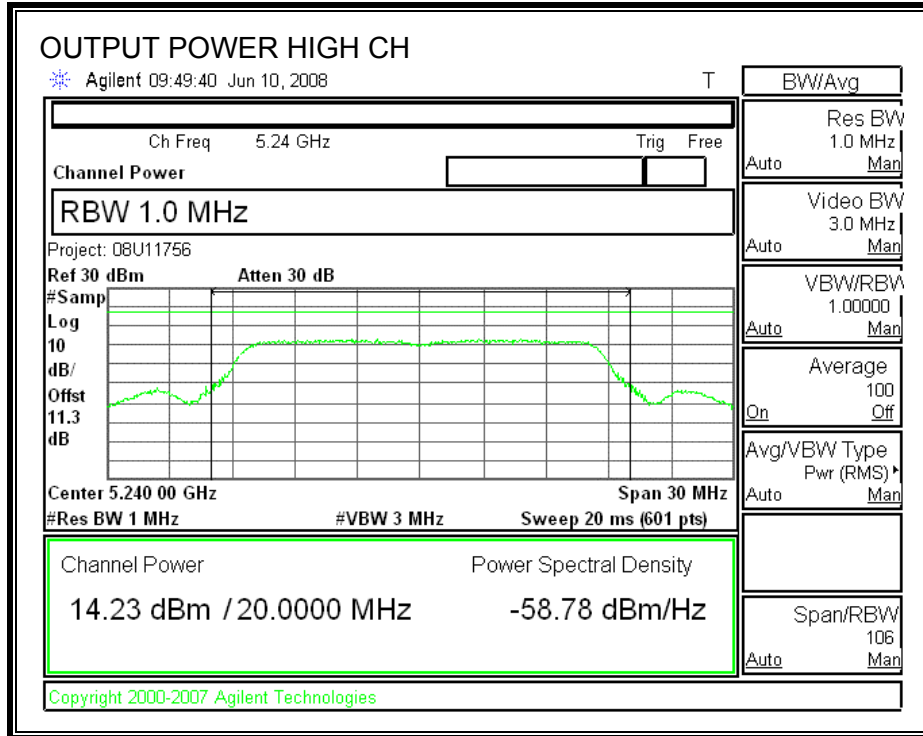
| Channel | Frequency (MHz) | Fixed Limit (dBm) | B (MHz) | 4 + 10 Log B Limit (dBm) | Antenna Gain (dBi) | Limit (dBm) |
|---------|--------------------|-------------------------|------------|--------------------------------|--------------------------|----------------|
| Low | 5180 | 17 | 19.330 | 16.86 | 5.35 | 16.86 |
| Mid | 5200 | 17 | 19.392 | 16.88 | 5.35 | 16.88 |
| High | 5240 | 17 | 19.388 | 16.88 | 5.35 | 16.88 |

Results

| Channel | Frequency (MHz) | Power (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|----------------|----------------|----------------|
| Low | 5180 | 14.08 | 16.86 | -2.78 |
| Mid | 5200 | 13.92 | 16.88 | -2.96 |
| High | 5240 | 14.23 | 16.88 | -2.65 |

OUTPUT POWER





7.1.3. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1) & IC RSS-210 A9.2 (1)

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

The maximum antenna gain is 5.35 dBi, therefore the limit is 4 dBm.

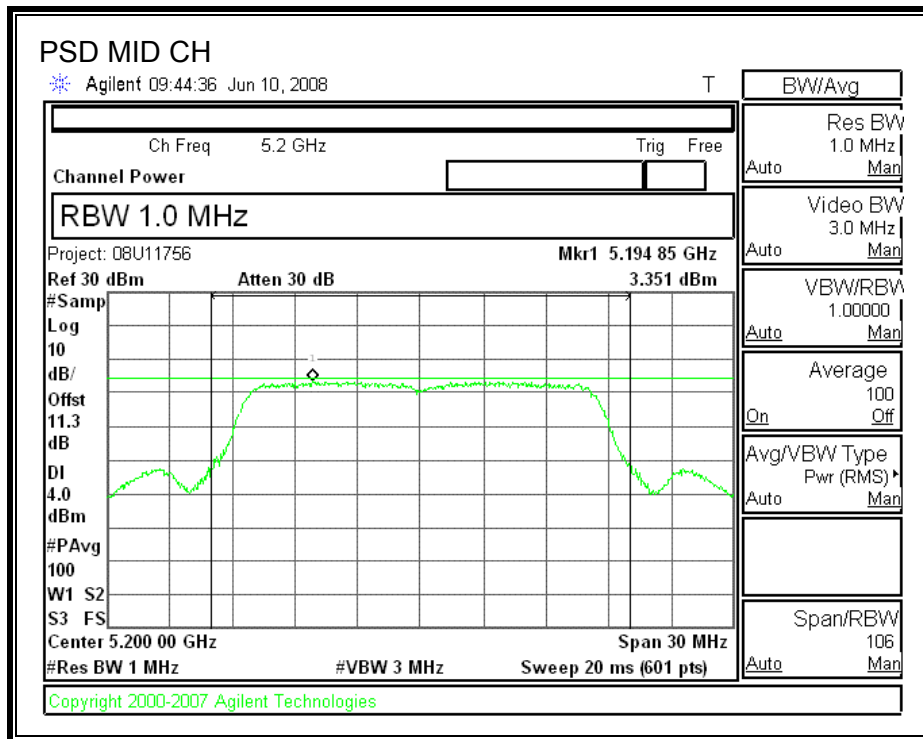
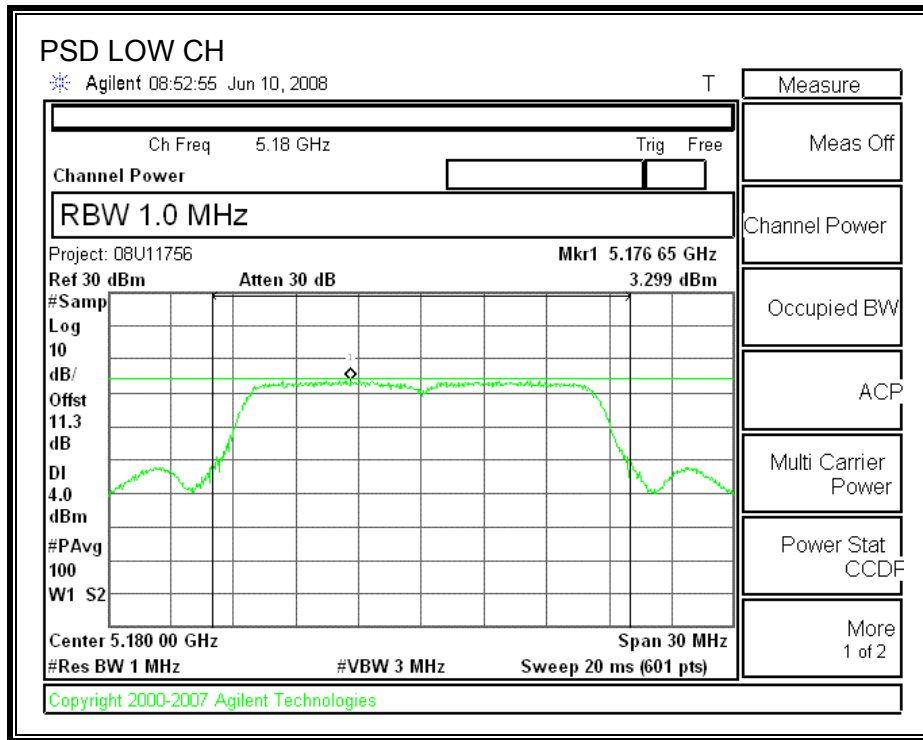
TEST PROCEDURE

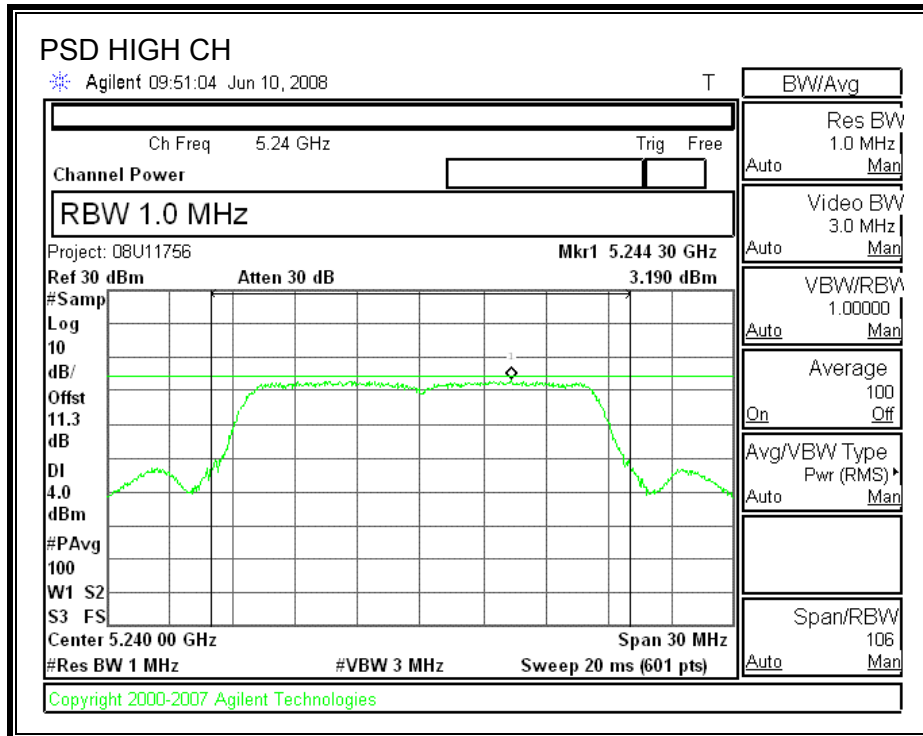
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Margin (dB) |
|---------|-----------------|------------|-------------|-------------|
| Low | 5180 | 3.299 | 4.00 | -0.70 |
| Middle | 5200 | 3.351 | 4.00 | -0.65 |
| High | 5240 | 3.190 | 4.00 | -0.81 |

POWER SPECTRAL DENSITY





7.1.4. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

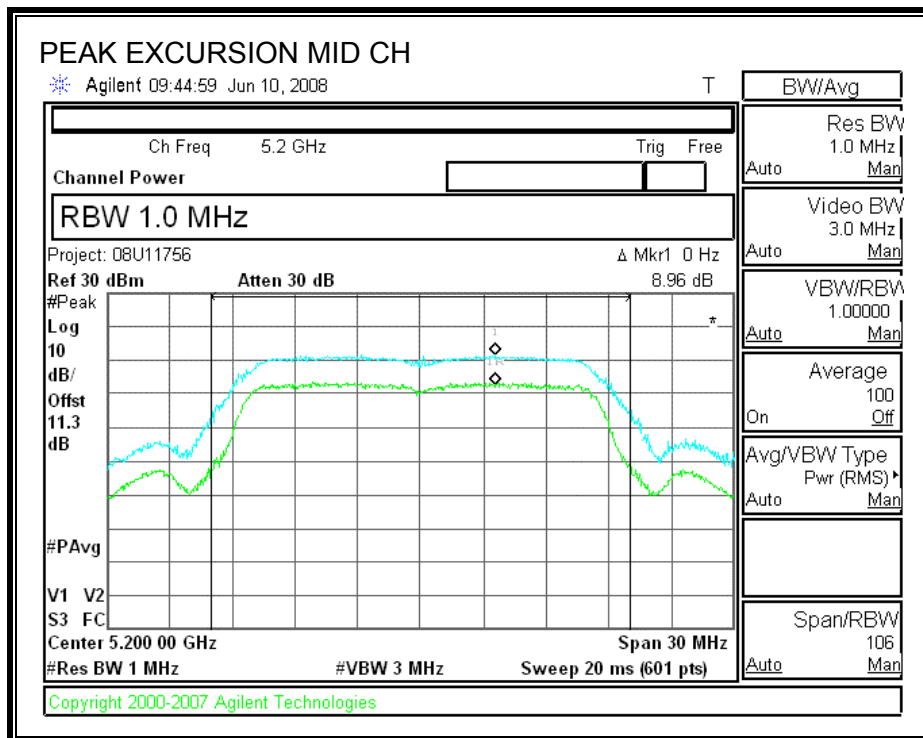
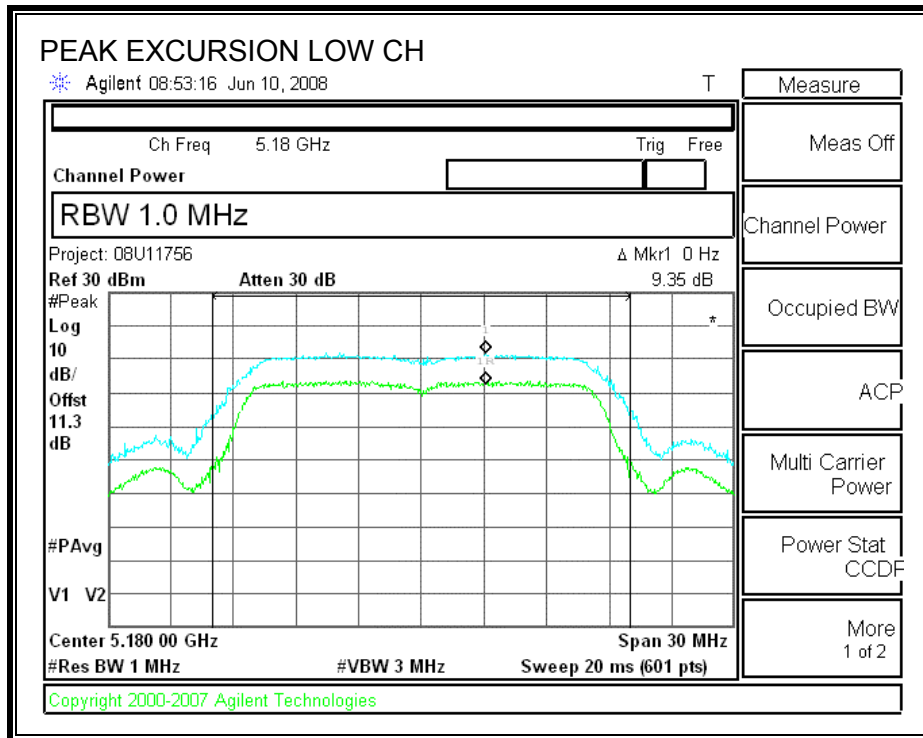
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

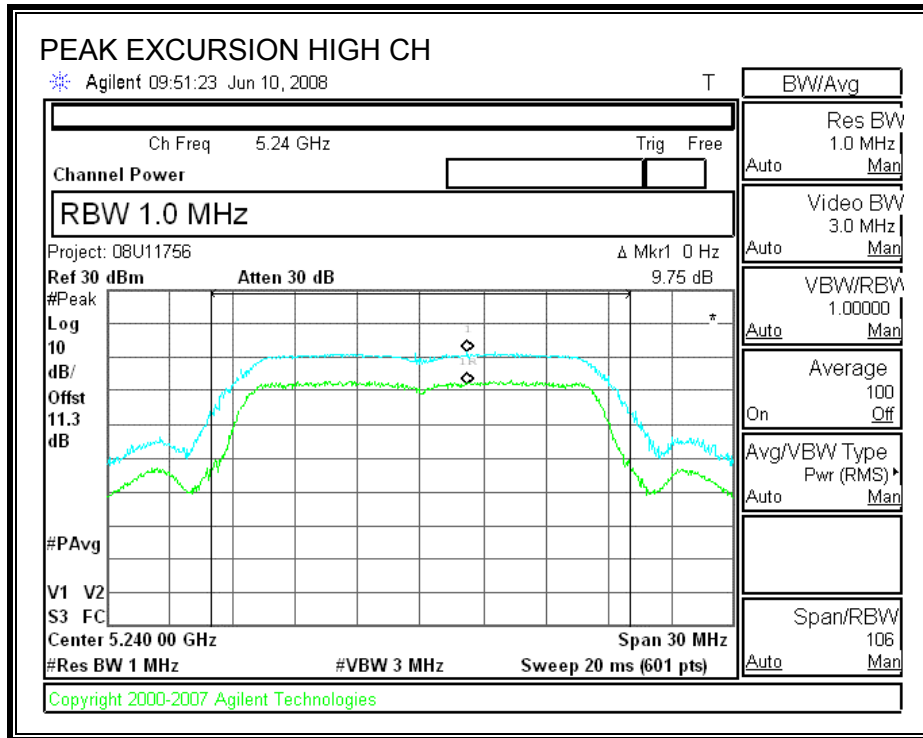
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

| Channel | Frequency (MHz) | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---------|-----------------|---------------------|------------|-------------|
| Low | 5180 | 9.35 | 13 | -3.65 |
| Middle | 5200 | 8.96 | 13 | -4.04 |
| High | 5240 | 9.75 | 13 | -3.25 |

PEAK EXCURSION





7.1.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1) & IC RSS-210 A9.3 (1)

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

Limit line = -27 - EUT Antenna Gain

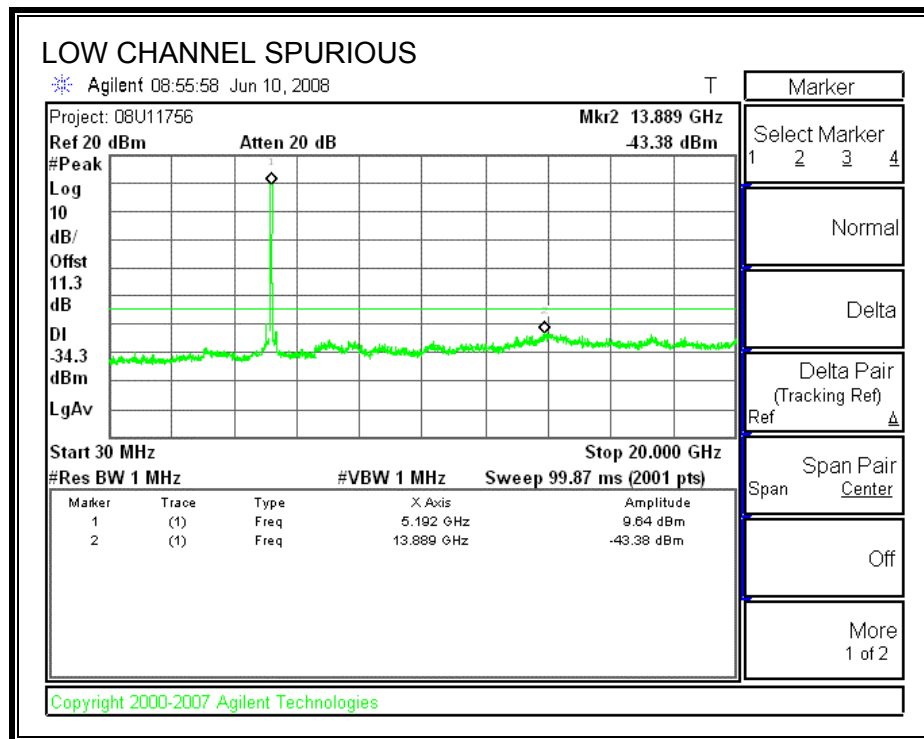
TEST PROCEDURE

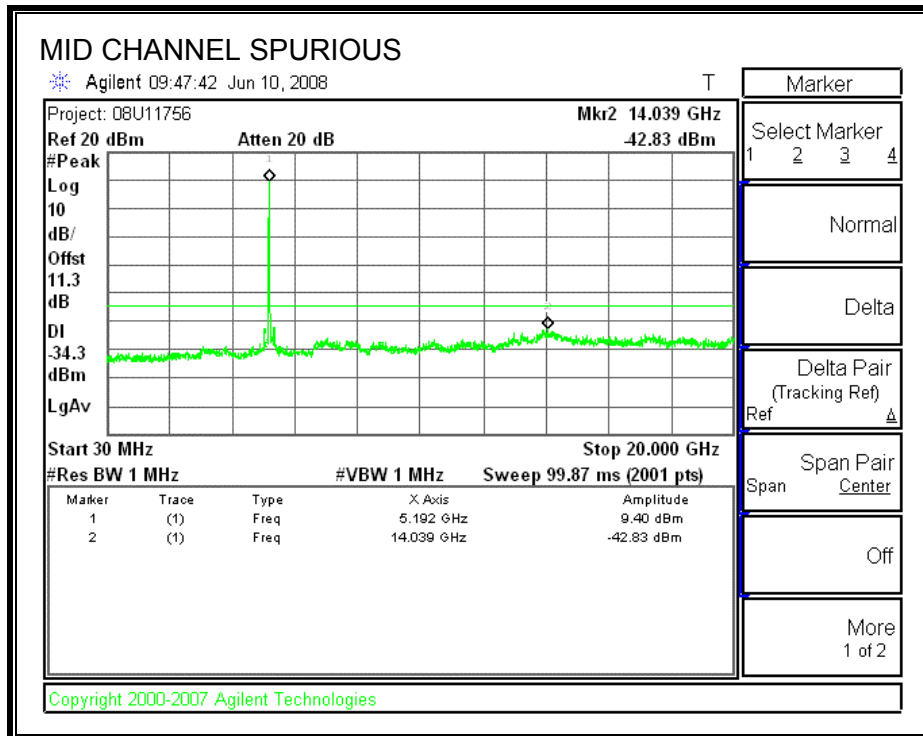
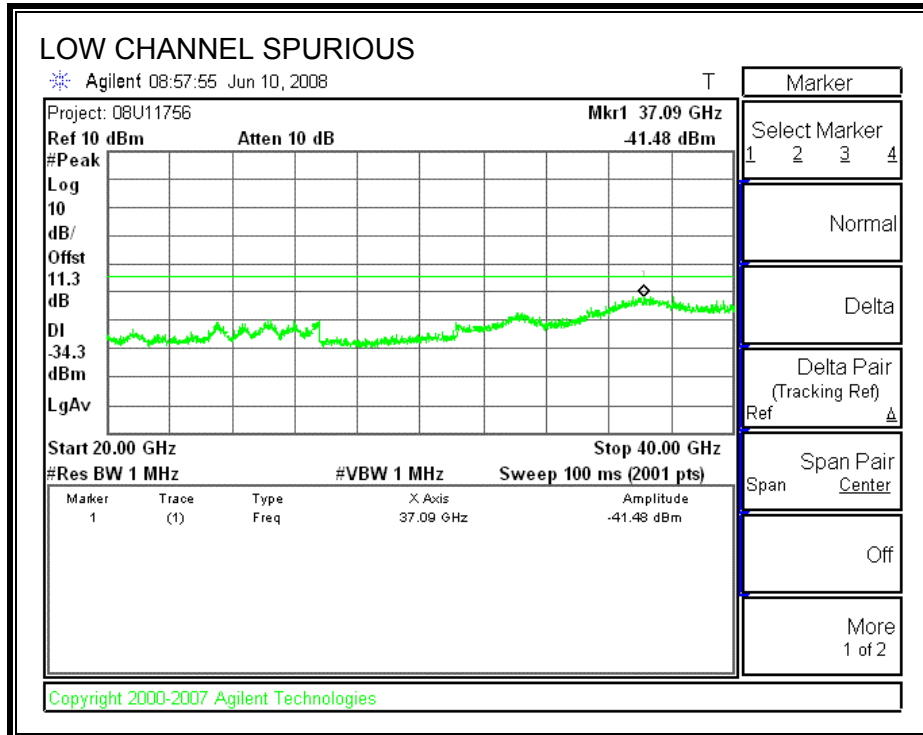
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

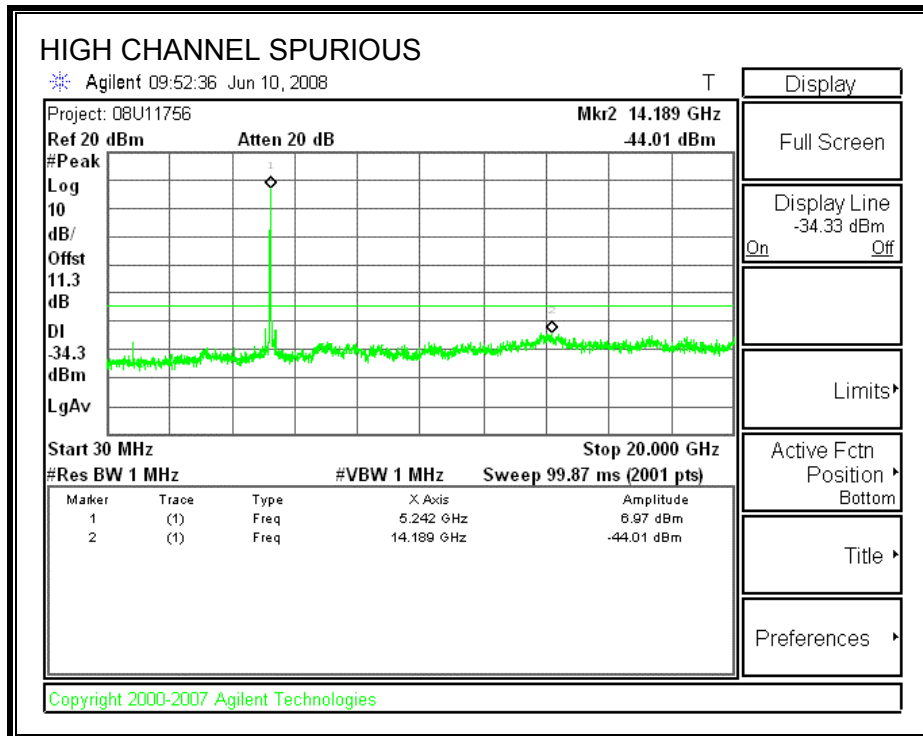
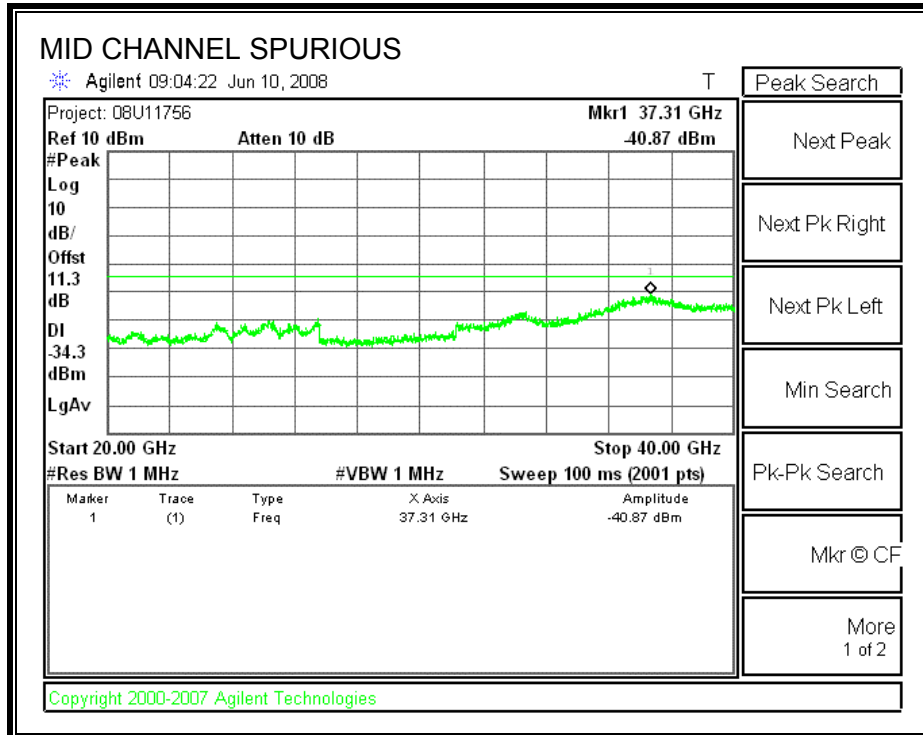
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

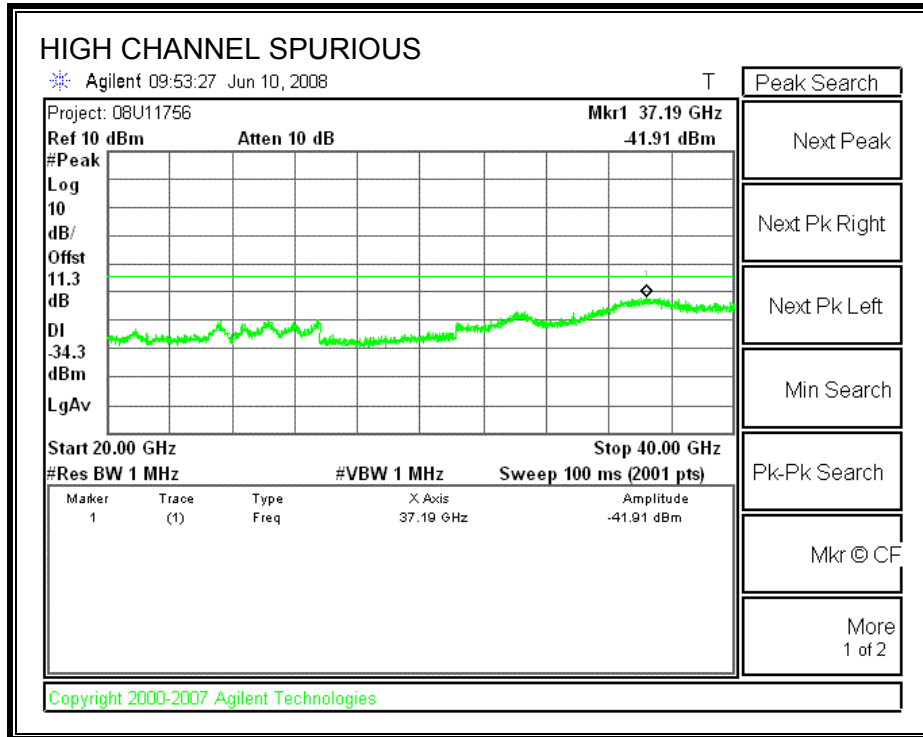
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS









7.2. 802.11n HT20 MODE

7.2.1. 26 dB and 99% BANDWIDTH

LIMITS

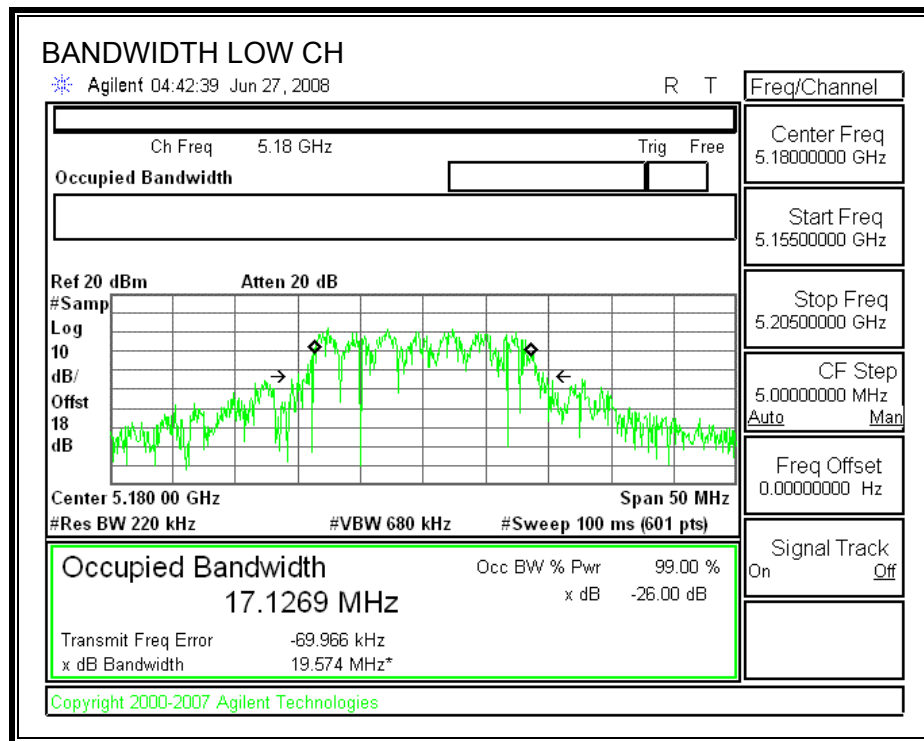
None; for reporting purposes only.

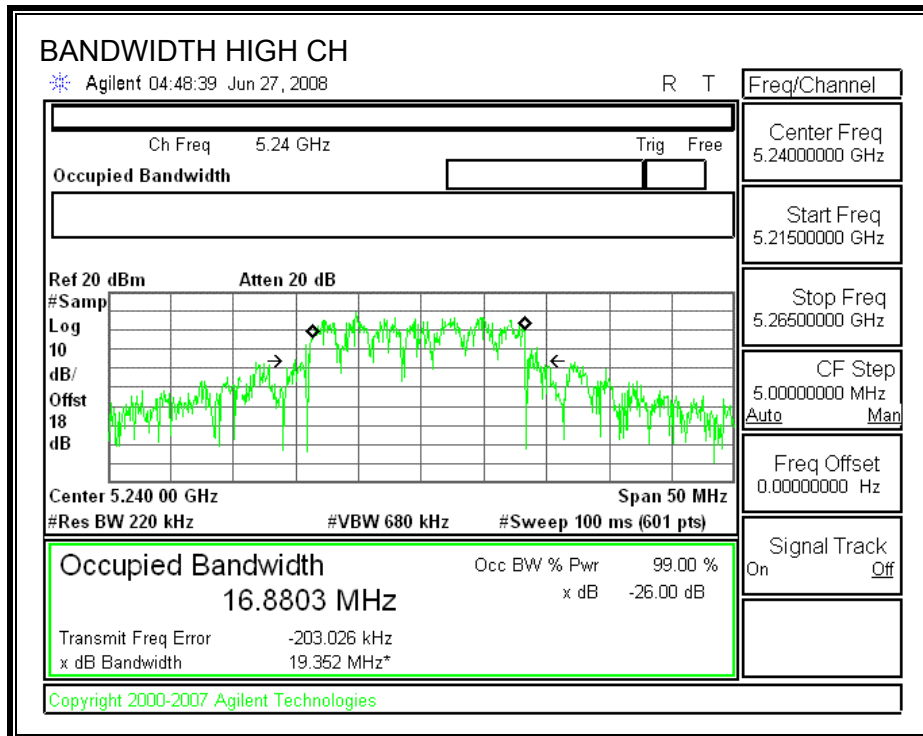
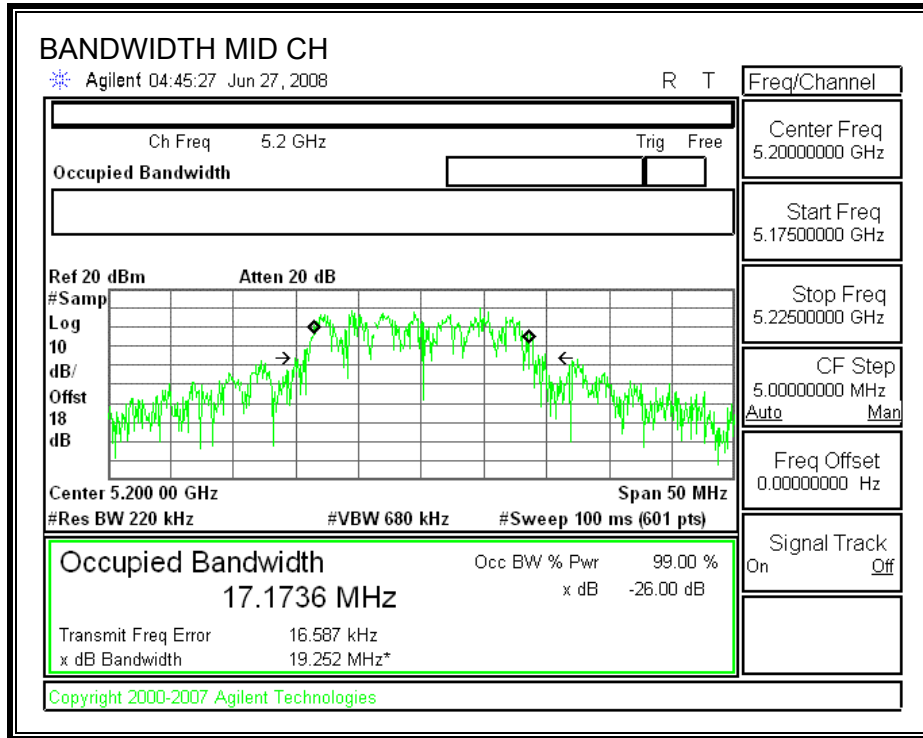
TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer. 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 | 19.574 | 17.1269 |
| Middle | 5200 | 19.252 | 17.1736 |
| High | 5240 | 19.352 | 16.8803 |





7.2.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1); IC RSS-210 A9.2 (1)

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

- Composite Antenna Gains:
 - X9 PIFA (5.35 dBi) plus X9 Slot (0.63 dBi) = 6.61 dBi
 - Foxconn PIFA (2.99 dBi) plus X 9 Slot (4.11 dBi) = 6.60 dBi

The maximum antenna gain is 6.61 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

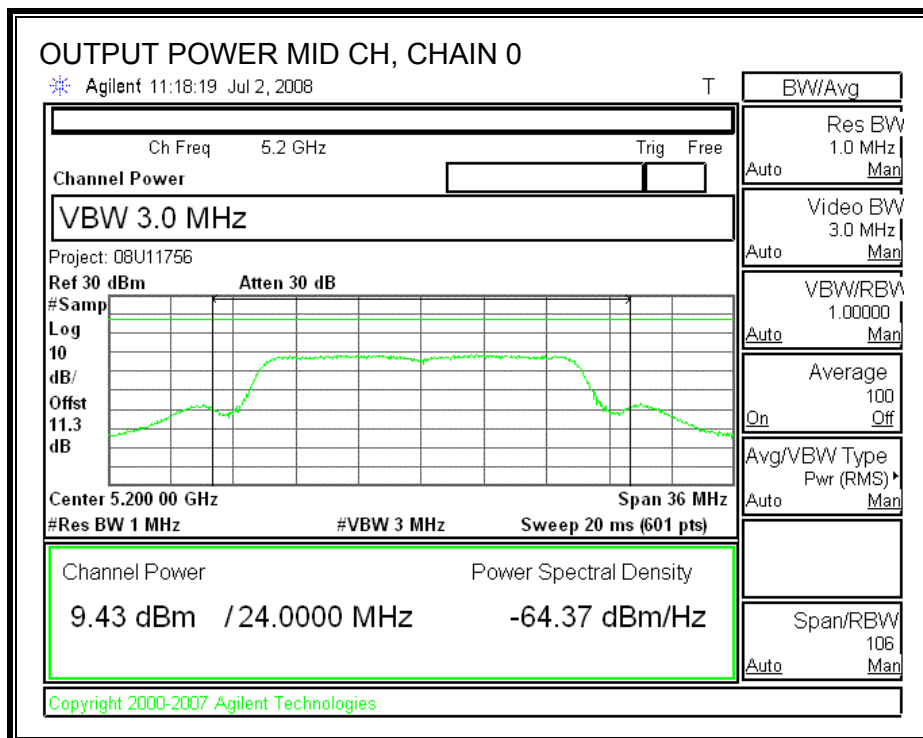
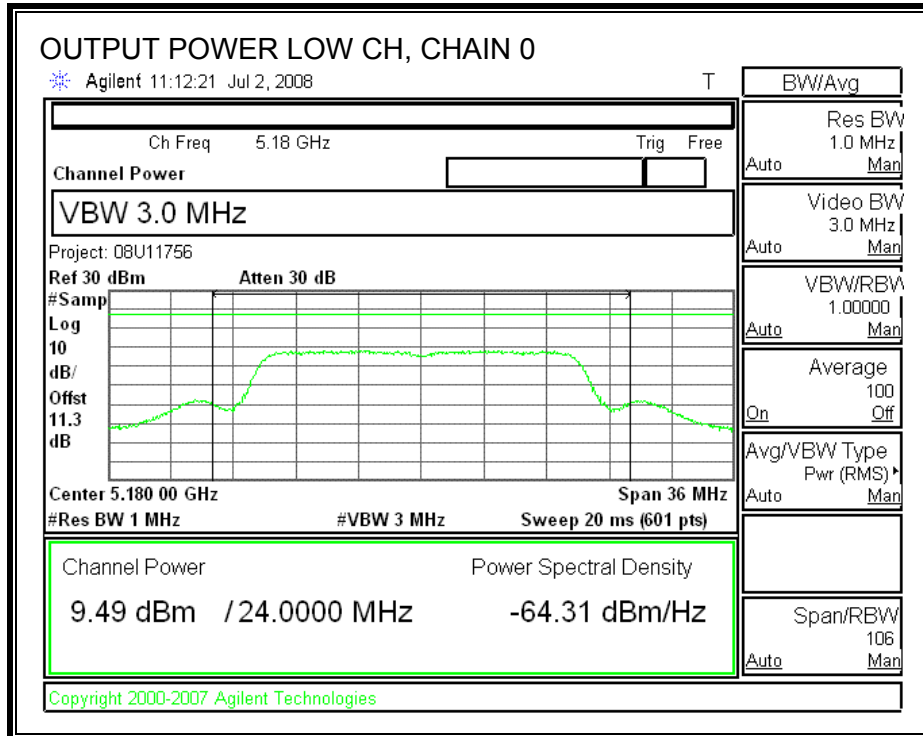
Limit

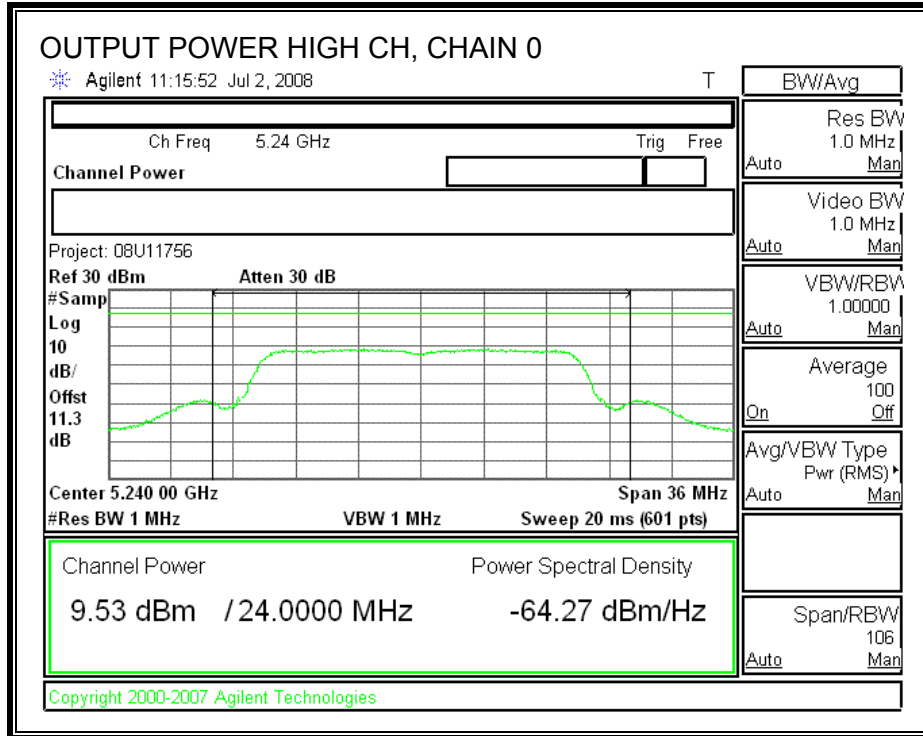
| Channel | Frequency (MHz) | Fixed Limit (dBm) | B (MHz) | 4 + 10 Log B Limit (dBm) | Antenna Gain (dBi) | Limit (dBm) |
|---------|--------------------|-------------------------|------------|--------------------------------|--------------------------|----------------|
| Low | 5180 | 17 | 19.574 | 16.92 | 6.61 | 16.30 |
| Mid | 5200 | 17 | 19.252 | 16.84 | 6.61 | 16.23 |
| High | 5240 | 17 | 19.352 | 16.87 | 6.61 | 16.26 |

Individual Chain Results

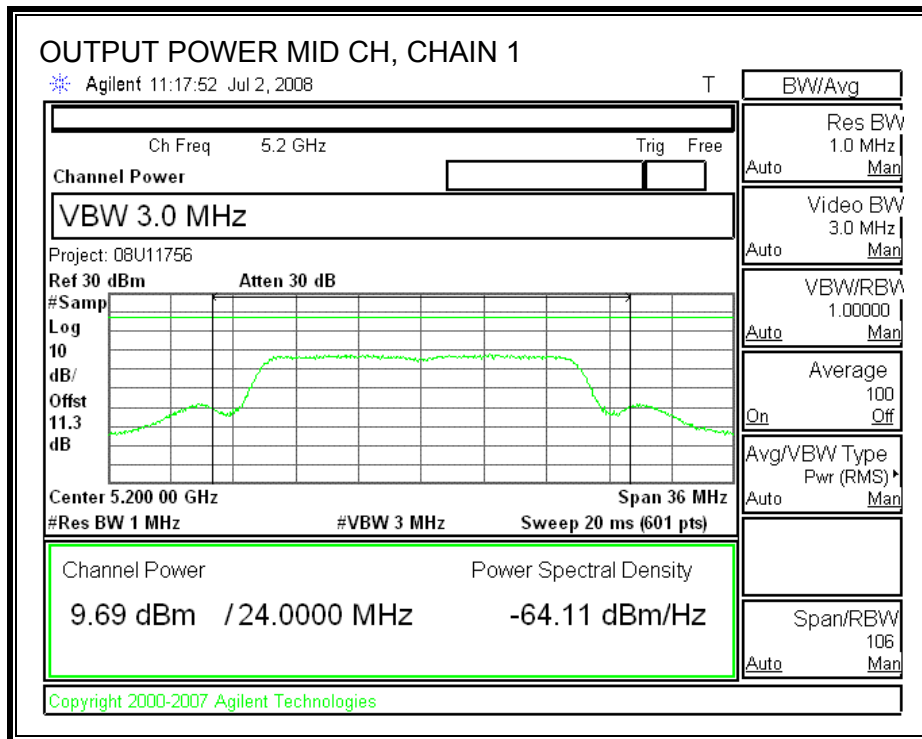
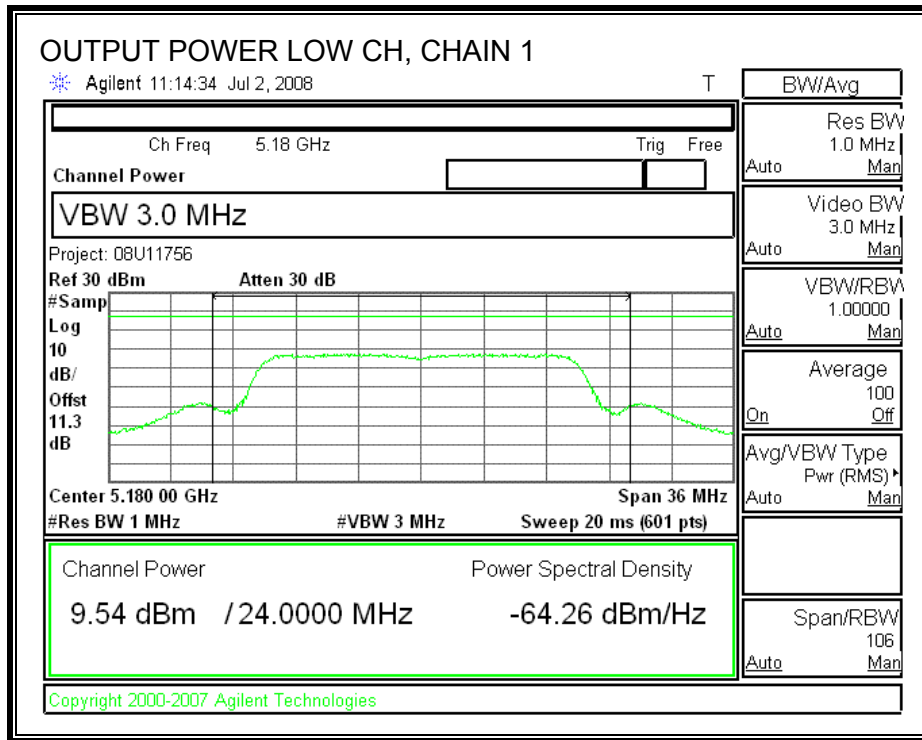
| Channel | Frequency (MHz) | Chain 0 Power (dBm) | Chain 1 Power (dBm) | Total Power (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|---------------------------|---------------------------|-------------------------|----------------|----------------|
| Low | 5180 | 9.49 | 9.54 | 12.53 | 16.30 | -3.78 |
| Mid | 5200 | 9.43 | 9.69 | 12.57 | 16.23 | -3.66 |
| High | 5240 | 9.53 | 9.57 | 12.56 | 16.26 | -3.69 |

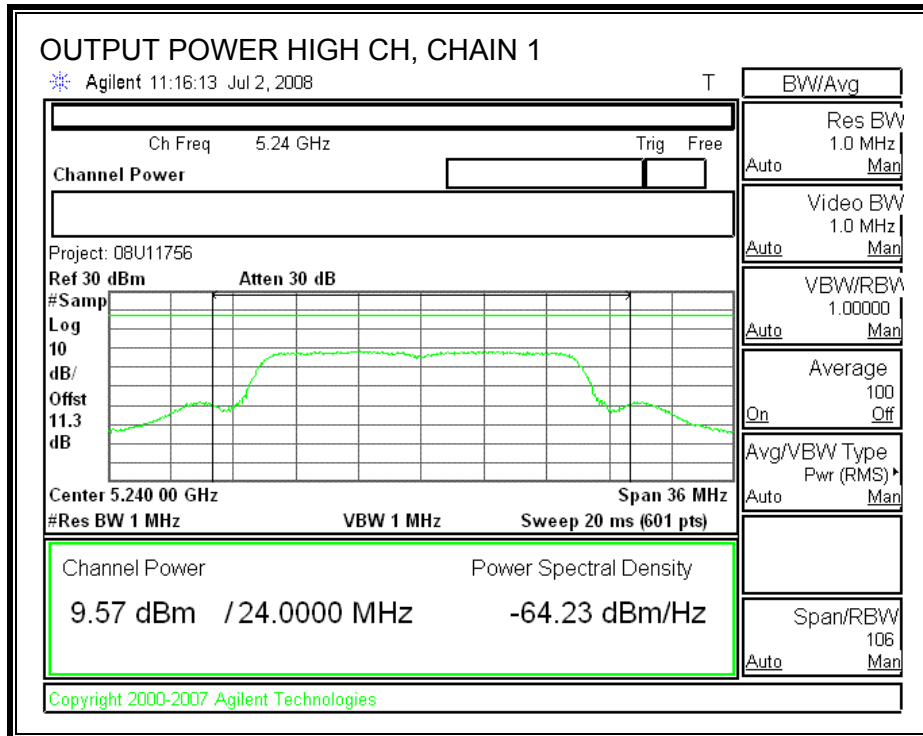
CHAIN 0 OUTPUT POWER





CHAIN 1 OUTPUT POWER





7.2.3. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1); IC RSS-210 A9.2 (1)

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

- Composite Antenna Gains:
 - X9 PIFA (5.35 dBi) plus X9 Slot (0.63 dBi) = 6.61 dBi
 - Foxcom PIFA (2.99 dBi) plus X 9 Slot (4.11 dBi) = 6.60 dBi

The maximum antenna gain is 6.61 dBi, therefore the limit is 3.39 dBm.

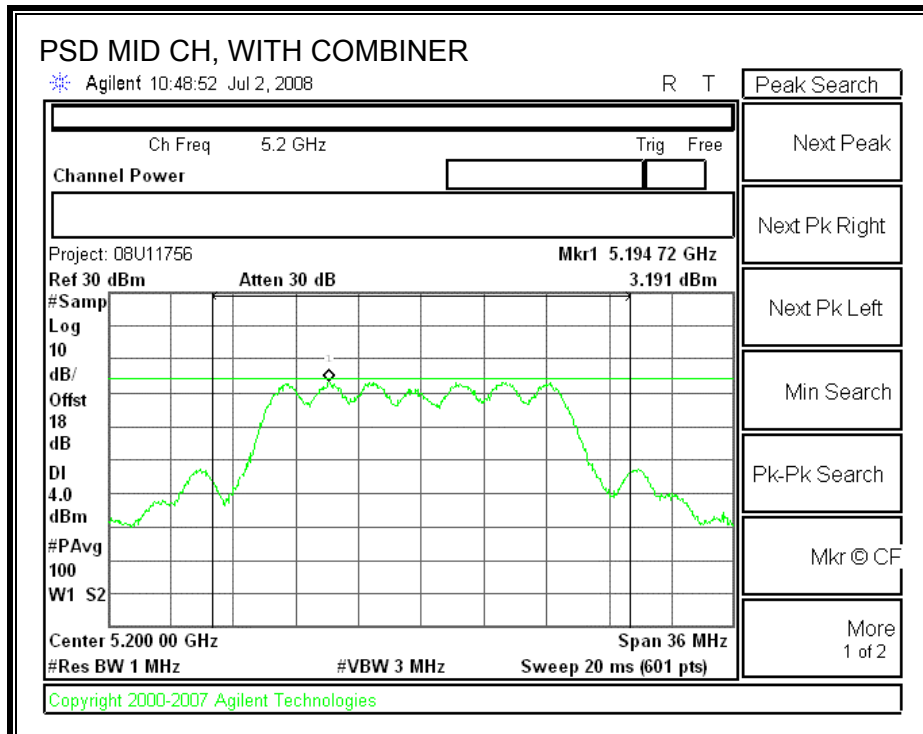
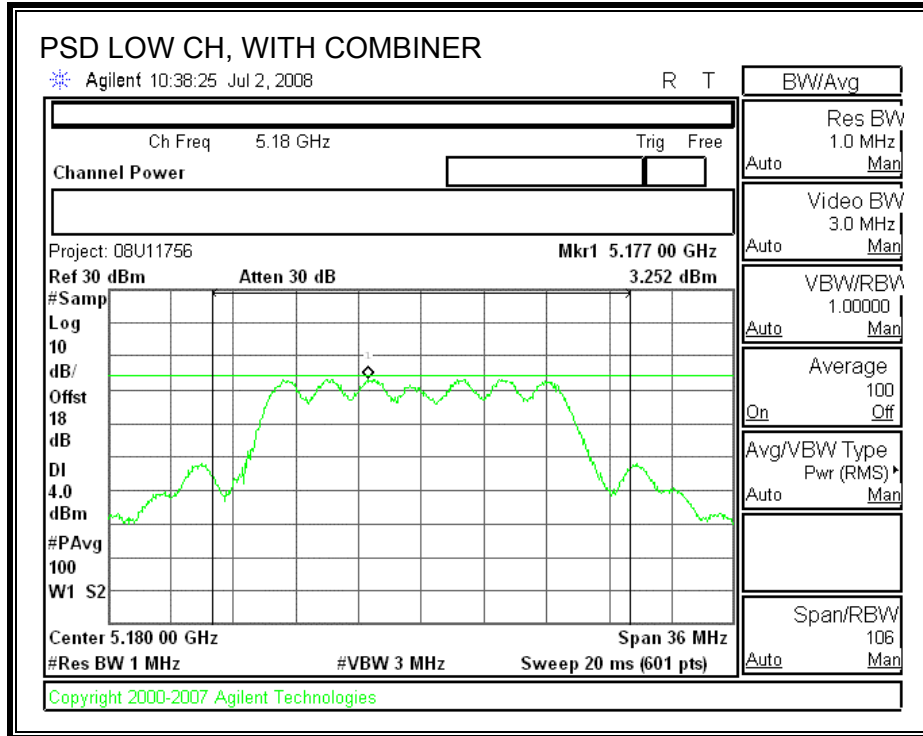
TEST PROCEDURE

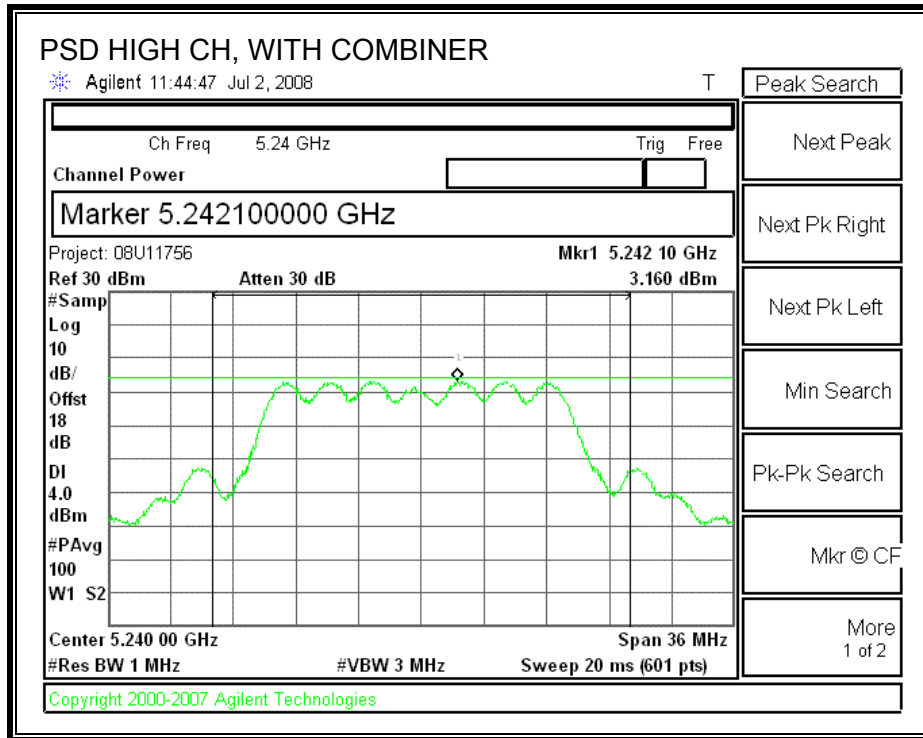
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

| Channel | Frequency (MHz) | PPSD With Combiner (dBm) | Limit (dBm) | Margin (dB) |
|---------|-----------------|--------------------------|-------------|-------------|
| Low | 5180 | 3.252 | 3.39 | -0.14 |
| Middle | 5200 | 3.191 | 3.39 | -0.20 |
| High | 5240 | 3.160 | 3.39 | -0.23 |

POWER SPECTRAL DENSITY WITH COMBINER





7.2.4. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer.

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

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

RESULTS

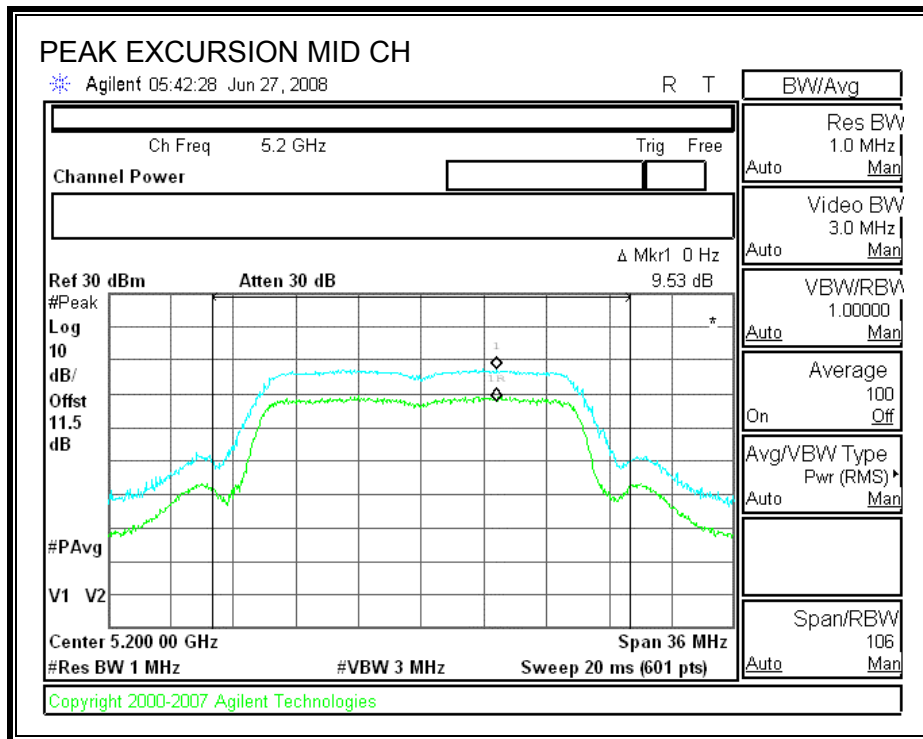
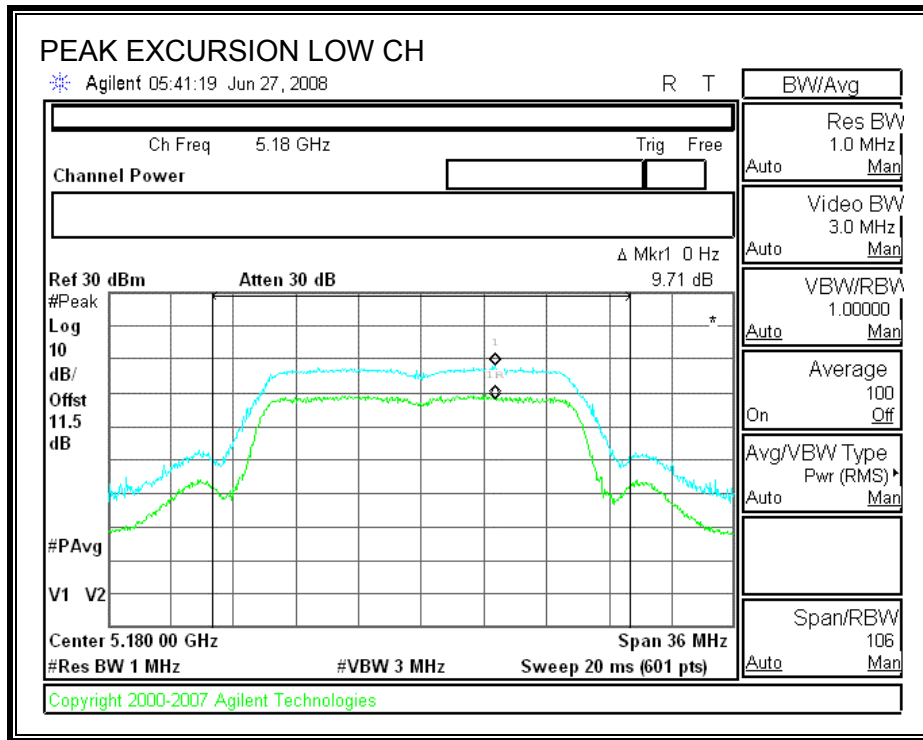
Chain 0

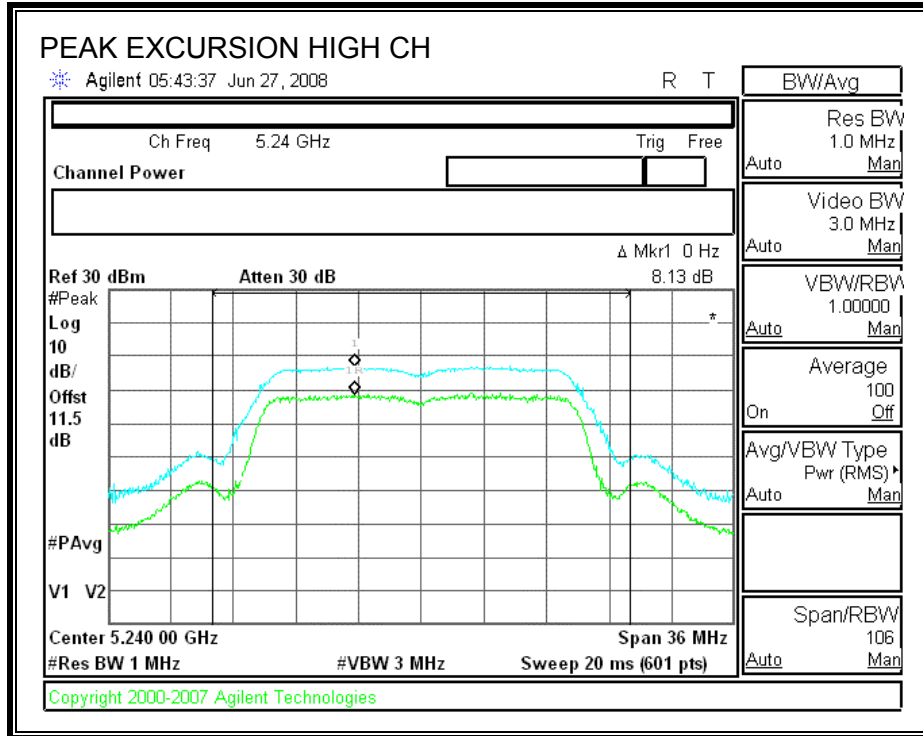
| Channel | Frequency (MHz) | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---------|-----------------|---------------------|------------|-------------|
| Low | 5180 | 9.71 | 13 | -3.29 |
| Middle | 5200 | 9.53 | 13 | -3.47 |
| High | 5240 | 8.13 | 13 | -4.87 |

Chain 1

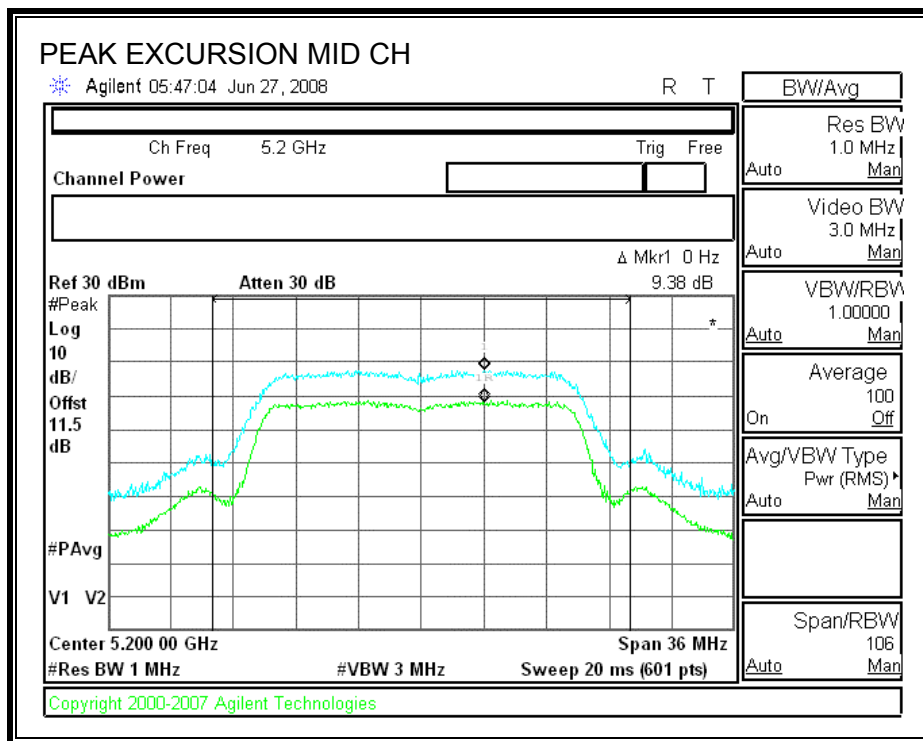
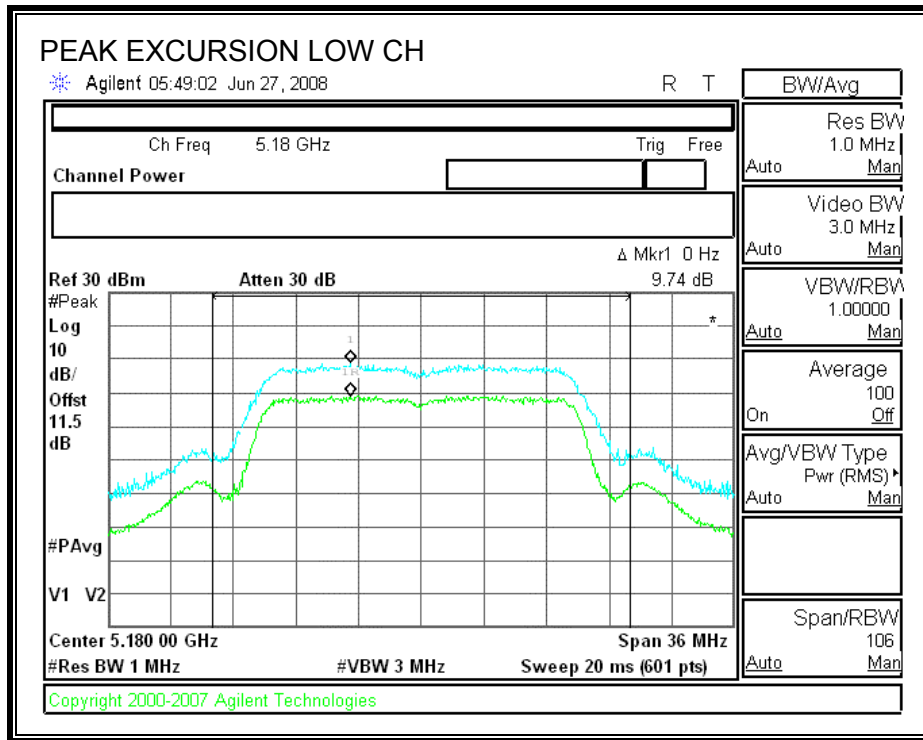
| Channel | Frequency (MHz) | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---------|-----------------|---------------------|------------|-------------|
| Low | 5180 | 9.74 | 13 | -3.26 |
| Middle | 5200 | 9.38 | 13 | -3.62 |
| High | 5240 | 9.98 | 13 | -3.02 |

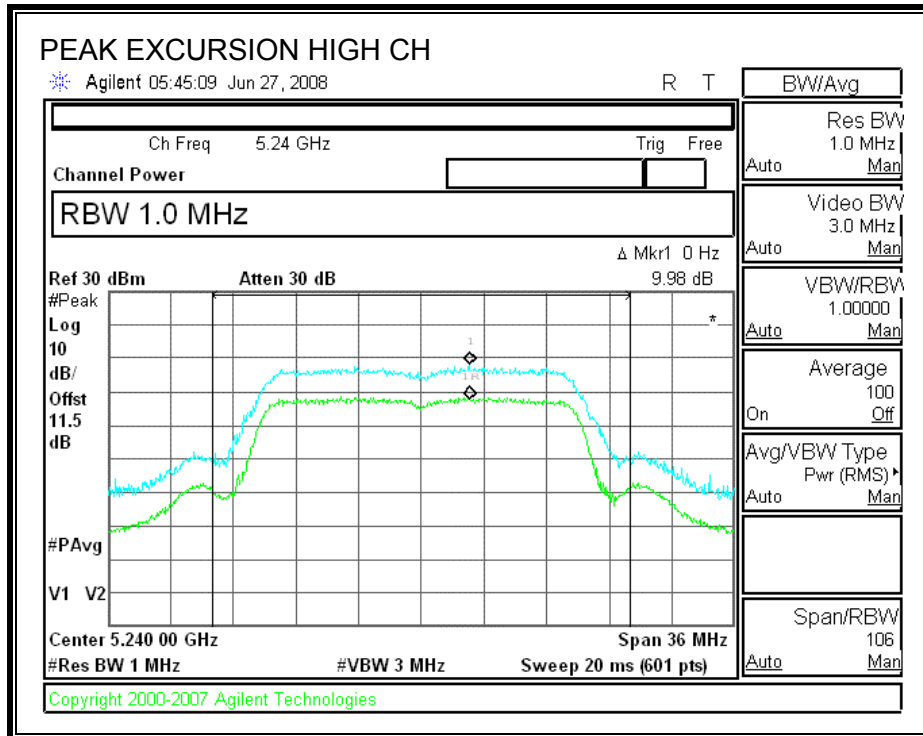
PEAK EXCURSION (CHAIN 0)





PEAK EXCURSION (CHAIN 1)





7.2.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1); IC RSS-210 A9.3 (1)

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

Limit line = -27 - EUT Antenna Gain

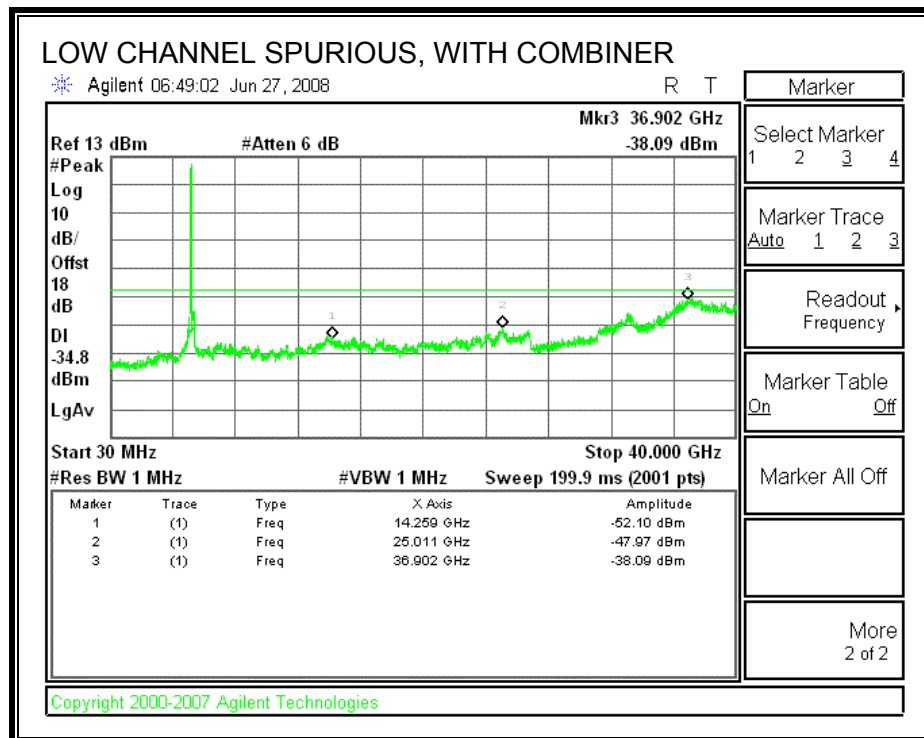
TEST PROCEDURE

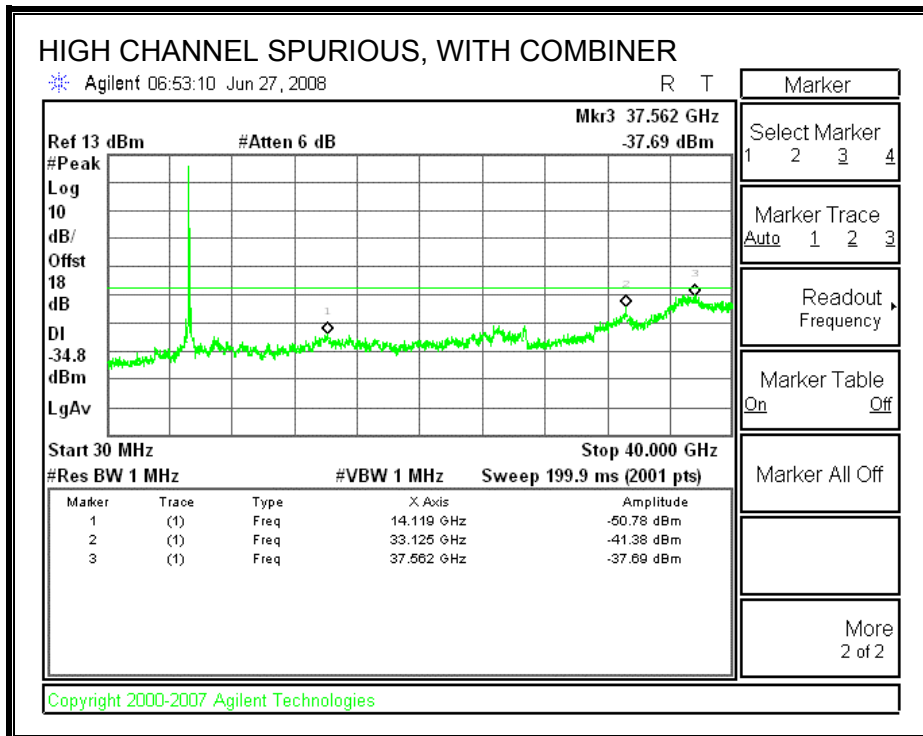
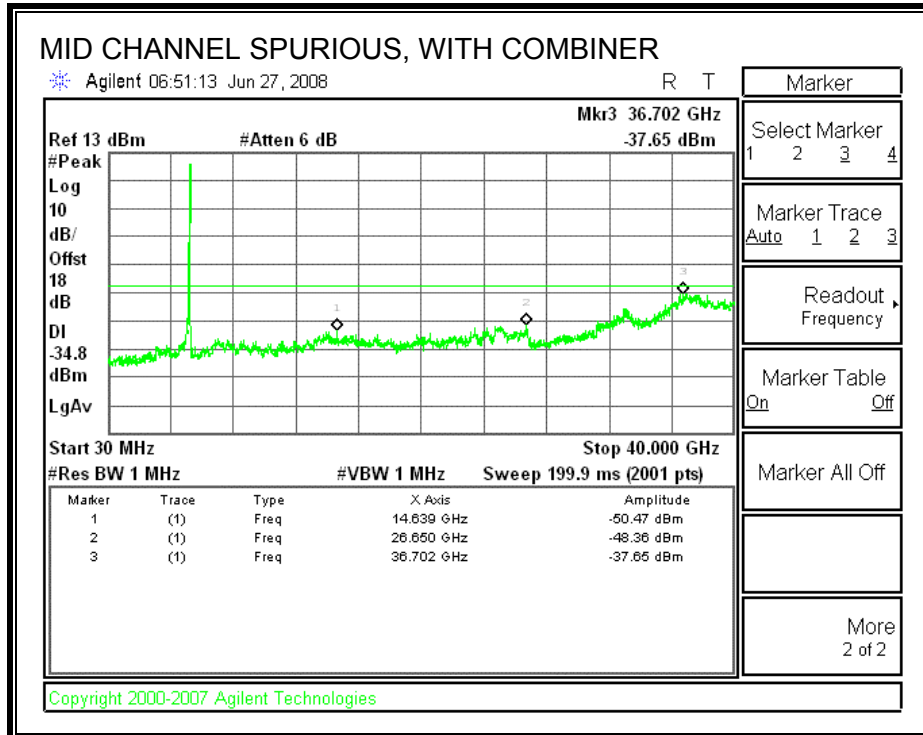
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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 the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

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

RESULTS





7.3. 802.11n HT40 SISO MODE

7.3.1. 26 dB and 99% BANDWIDTH

LIMITS

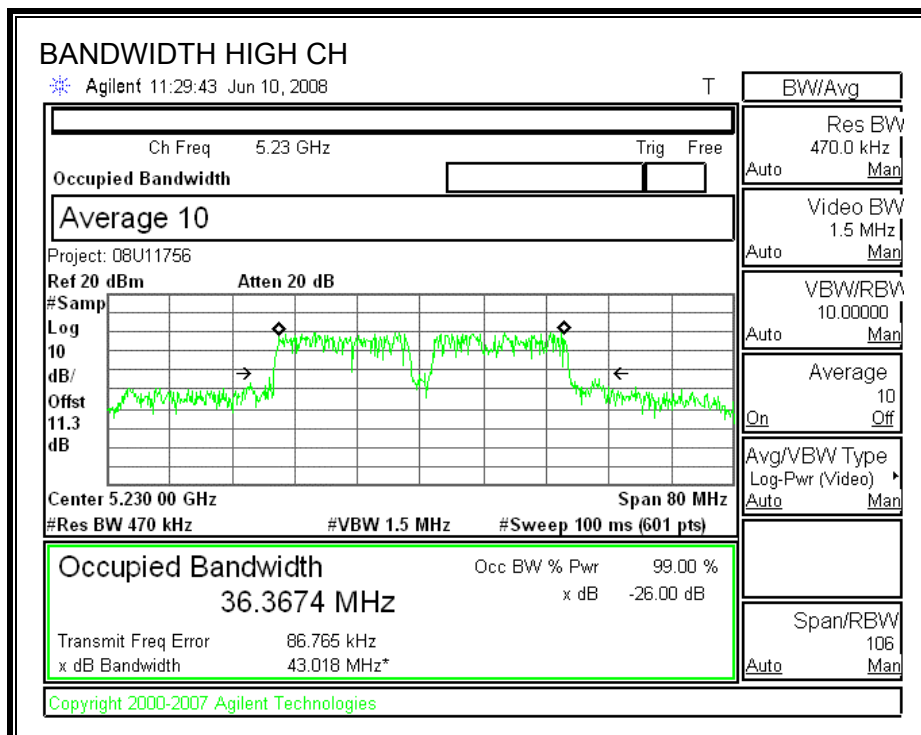
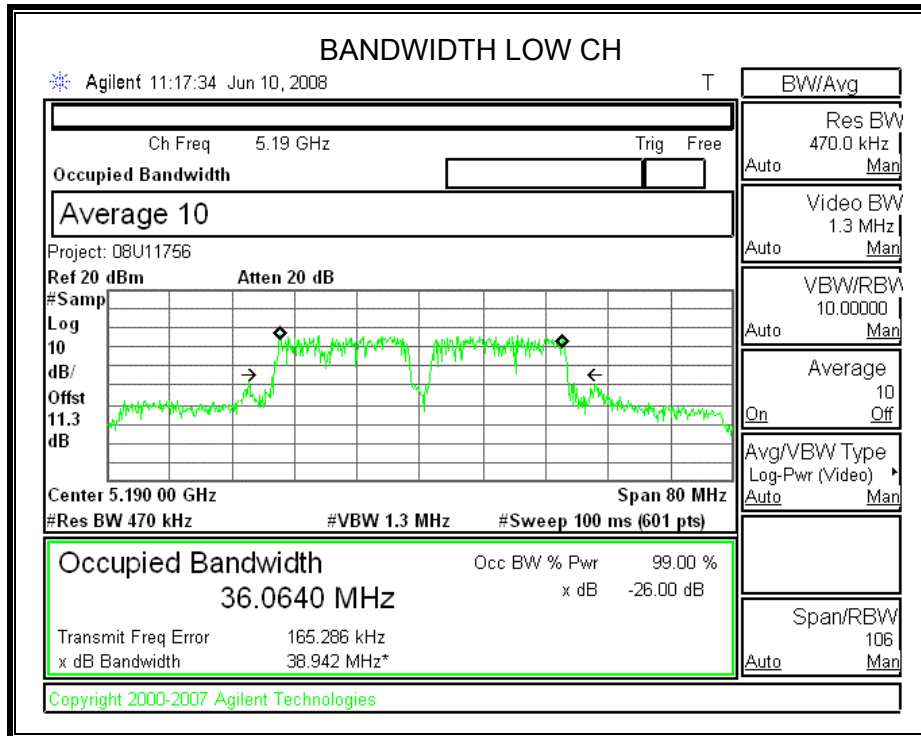
None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) | 99% Bandwidth (MHz) |
|---------|--------------------|--------------------------|------------------------|
| Low | 5190 | 38.942 | 36.064 |
| High | 5230 | 43.018 | 36.367 |



7.3.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1) & IC RSS-210 A9.2 (1)

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

The maximum antenna gain is 5.35 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

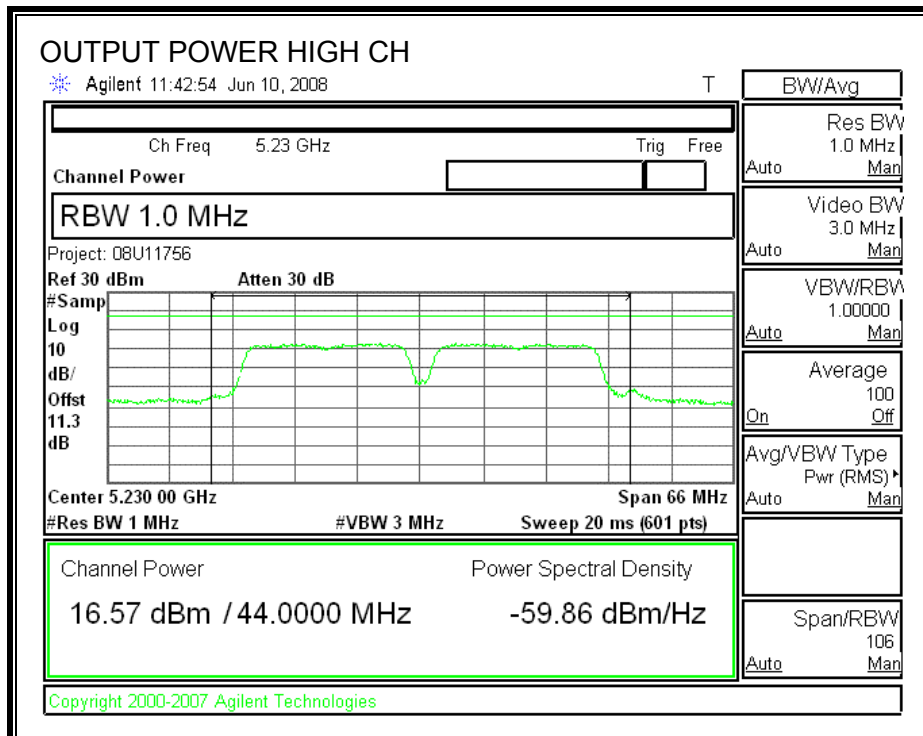
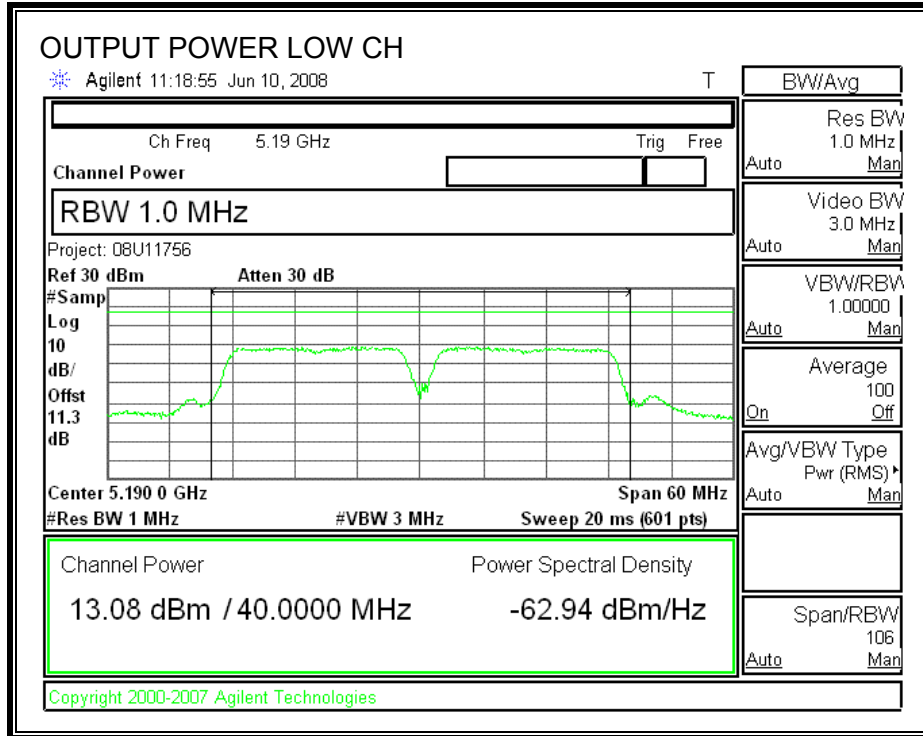
Limit

| Channel | Frequency (MHz) | Fixed Limit (dBm) | B (MHz) | 4 + 10 Log B Limit (dBm) | Antenna Gain (dBi) | Limit (dBm) |
|---------|--------------------|-------------------------|------------|--------------------------------|--------------------------|----------------|
| Low | 5190 | 17 | 38.942 | 19.90 | 5.35 | 17.00 |
| High | 5230 | 17 | 43.018 | 20.34 | 5.35 | 17.00 |

Results

| Channel | Frequency (MHz) | Power (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|----------------|----------------|----------------|
| Low | 5190 | 13.08 | 17.00 | -3.92 |
| High | 5230 | 16.57 | 17.00 | -0.43 |

OUTPUT POWER



7.3.3. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1) & IC RSS-210 A9.2 (1)

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

The maximum antenna gain is 5.35 dBi, therefore the limit is 4 dBm.

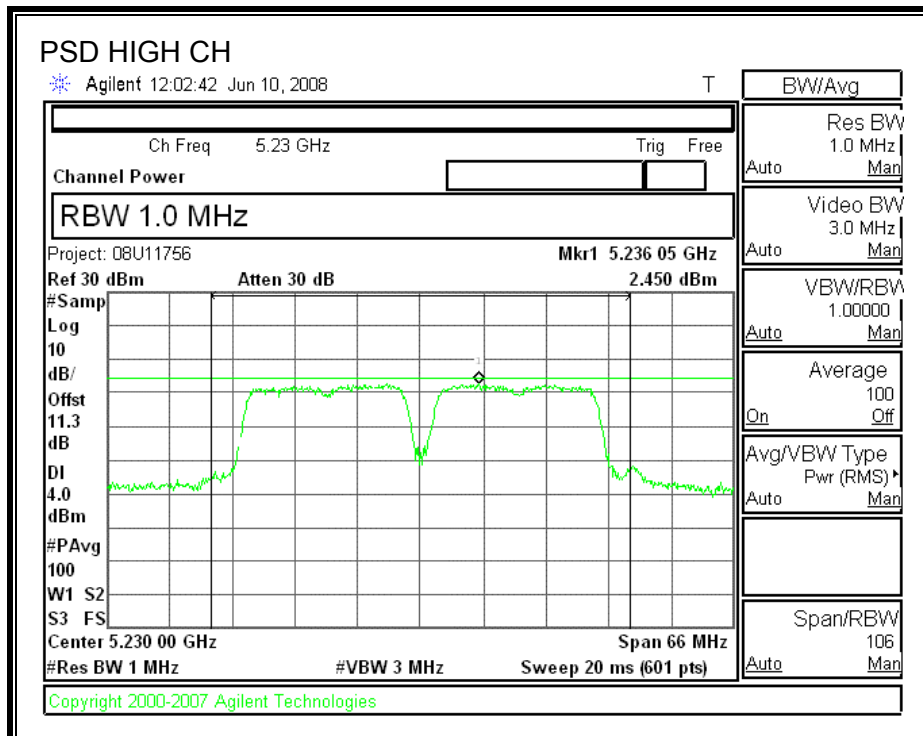
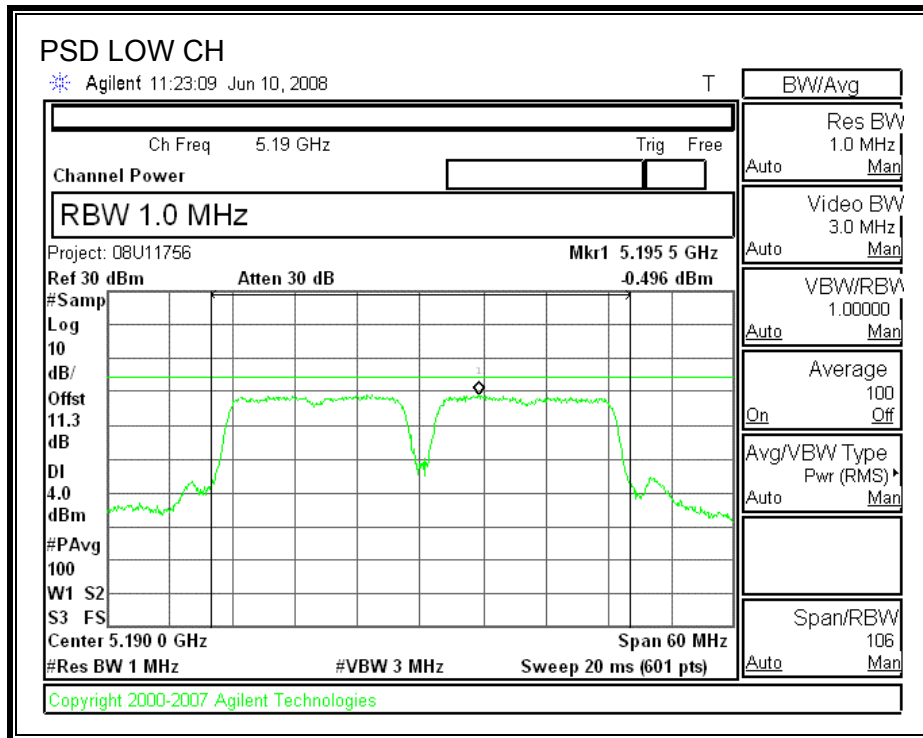
TEST PROCEDURE

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 | -0.496 | 4.00 | -4.50 |
| High | 5230 | 2.450 | 4.00 | -1.55 |

POWER SPECTRAL DENSITY



7.3.4. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

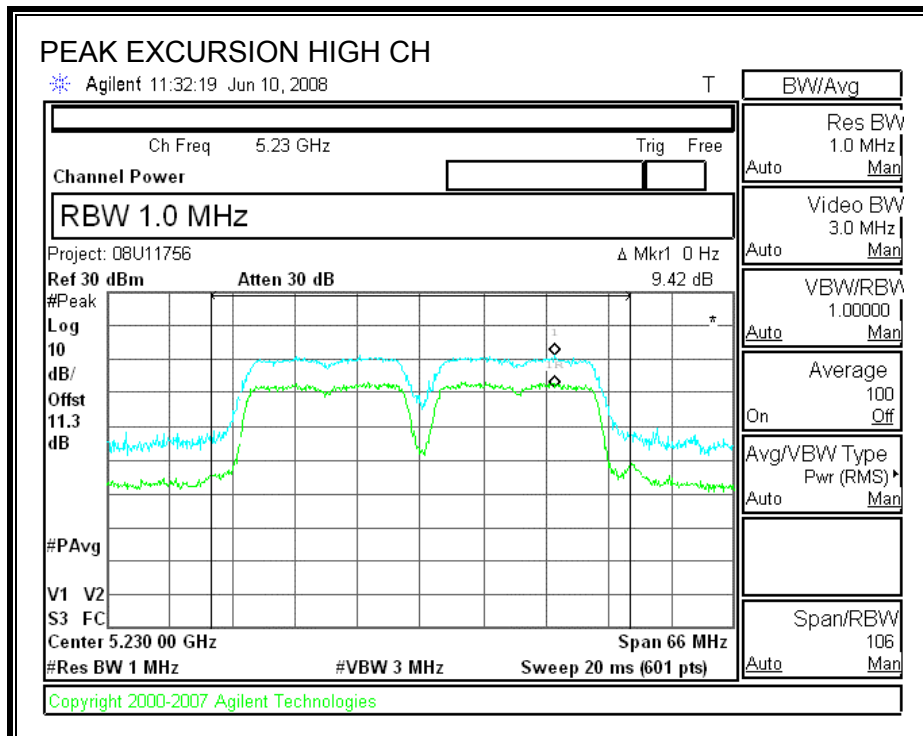
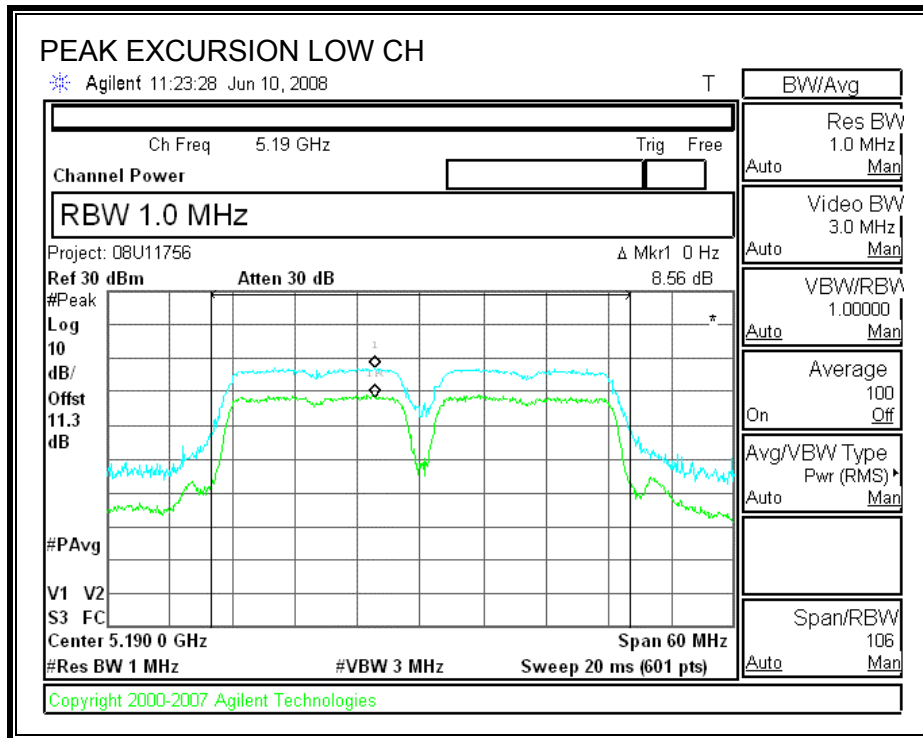
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

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 | 8.56 | 13 | -4.44 |
| High | 5230 | 9.42 | 13 | -3.58 |

PEAK EXCURSION



7.3.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1) & IC RSS-210 A9.3 (1)

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

Limit line = -27 - EUT Antenna Gain

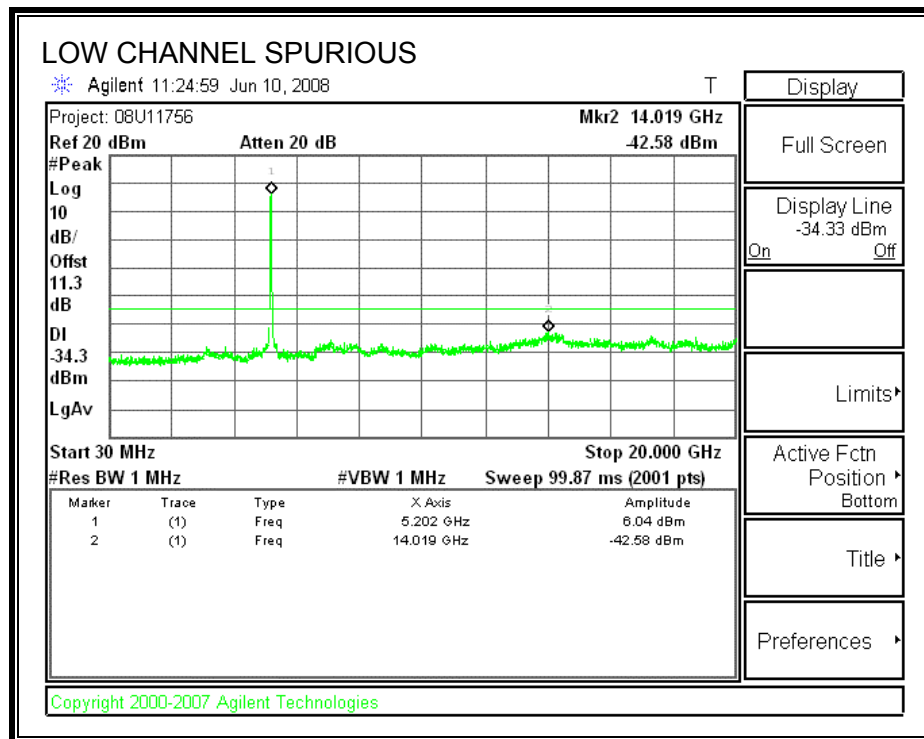
TEST PROCEDURE

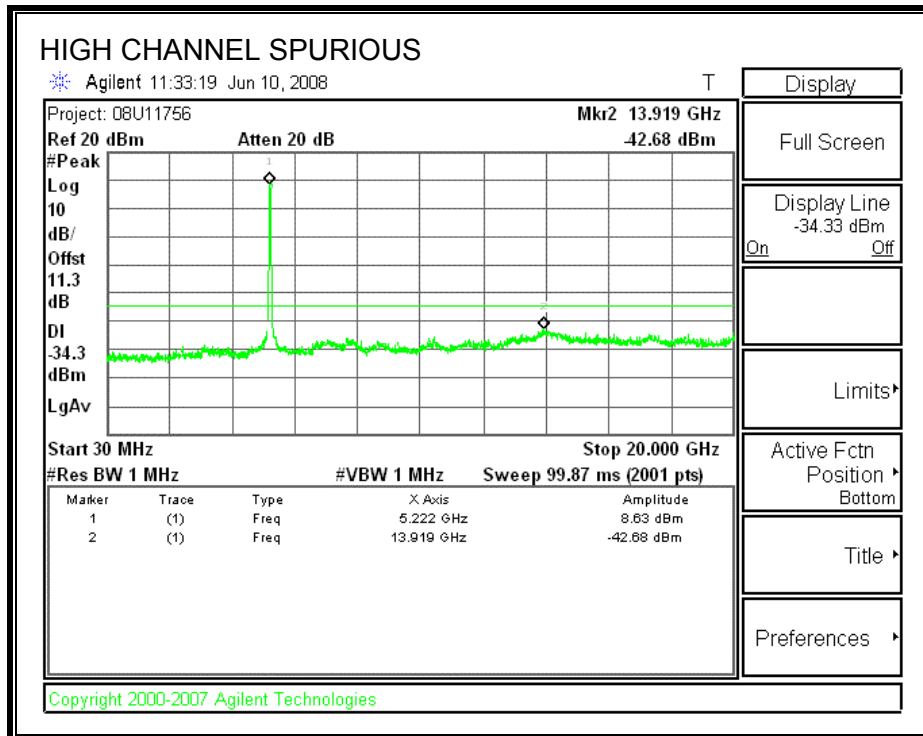
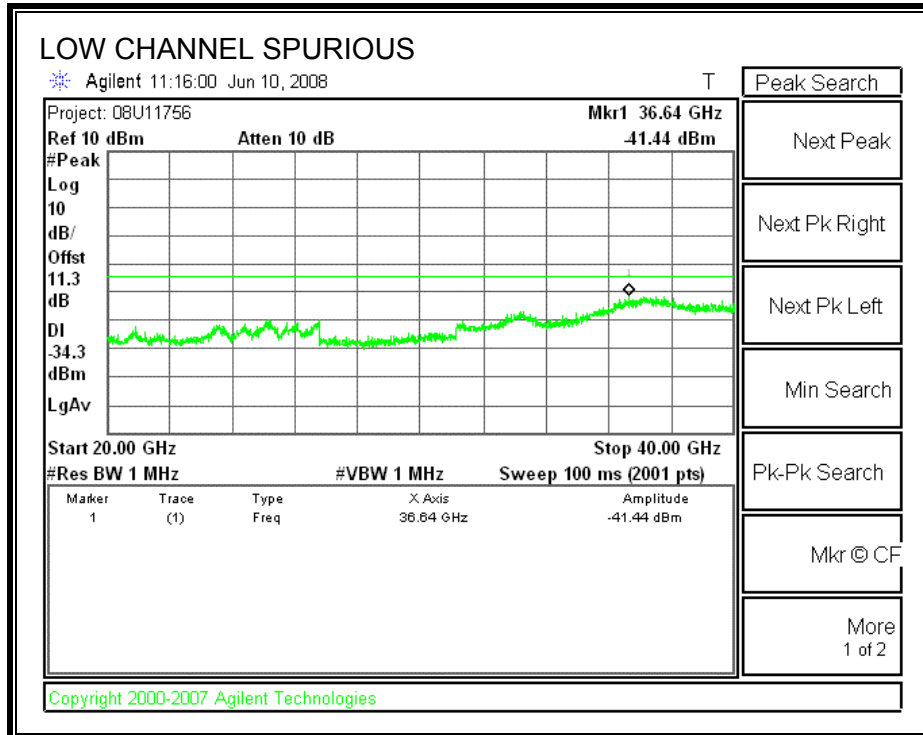
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

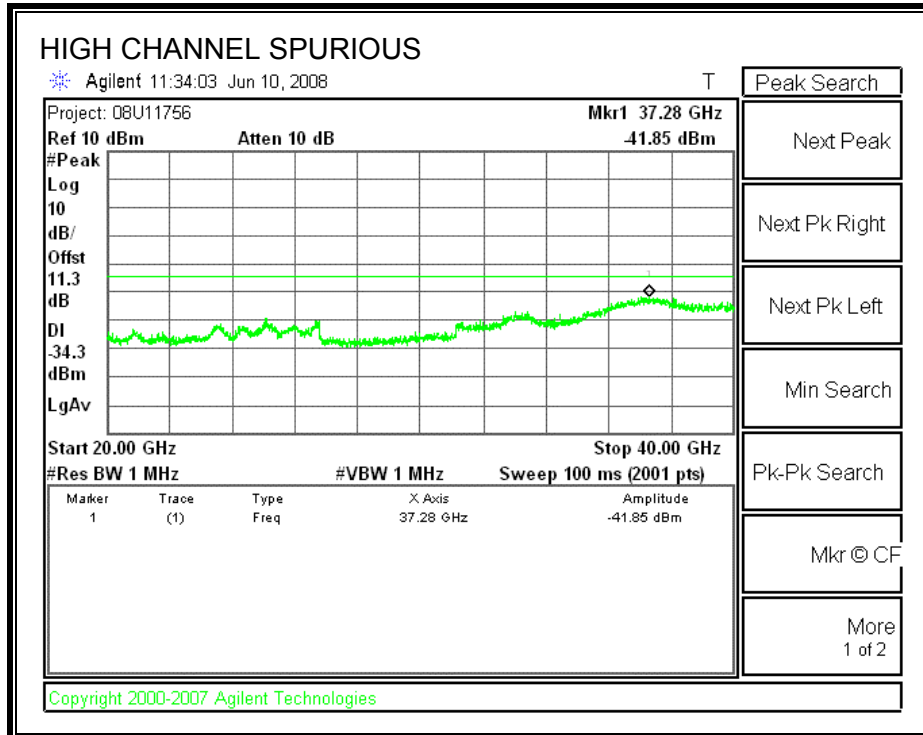
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

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

RESULTS







7.4. 802.11n HT40 MODE

7.4.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

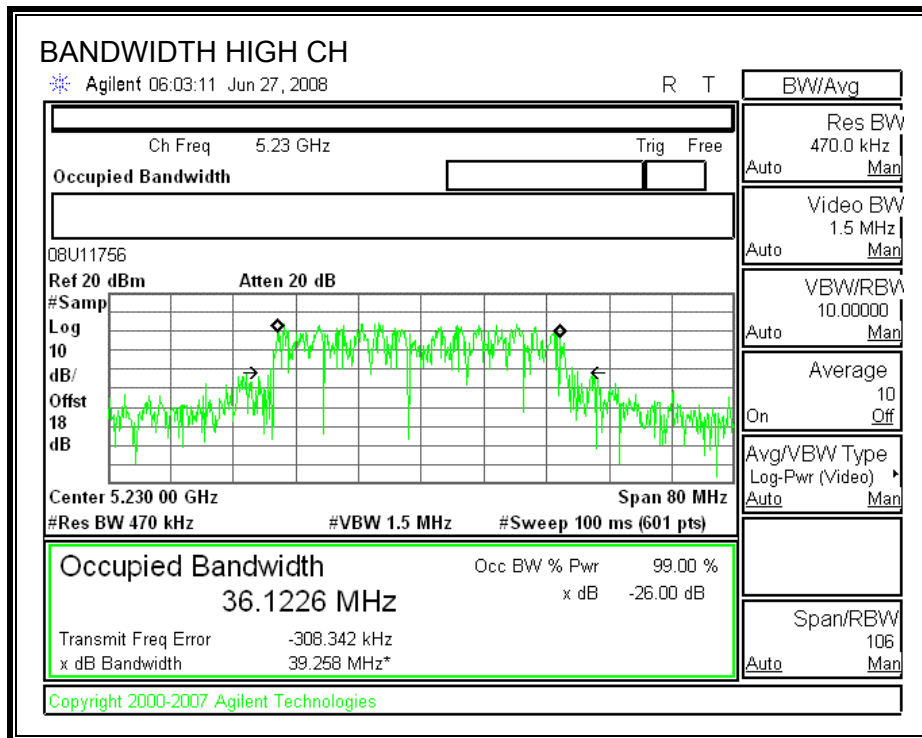
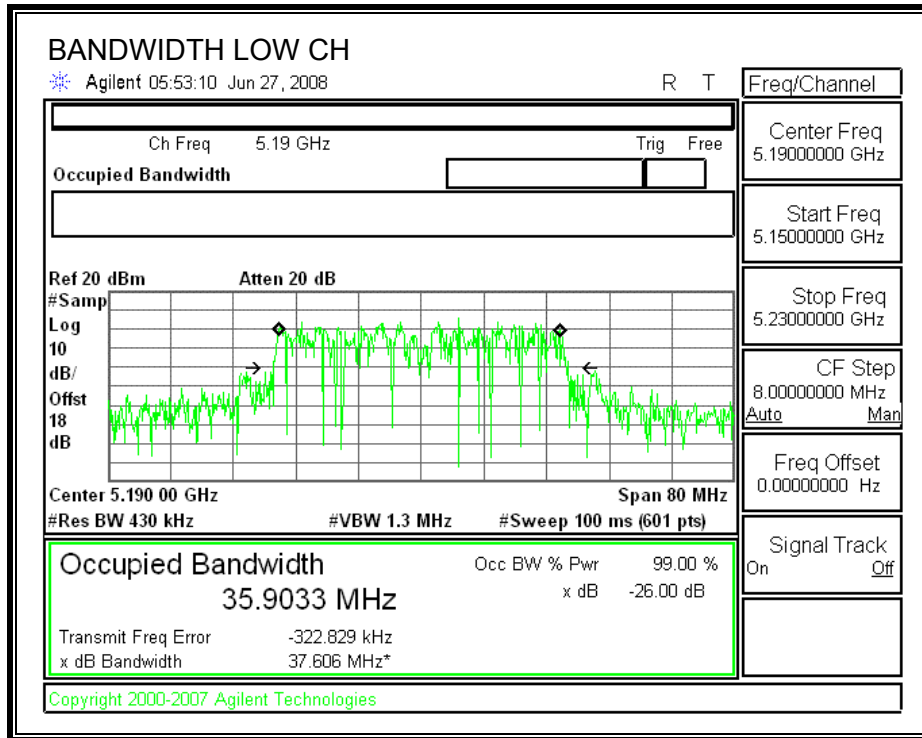
TEST PROCEDURE

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

RESULTS

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) | 99% Bandwidth (MHz) |
|---------|--------------------|--------------------------|------------------------|
| Low | 5190 | 37.606 | 35.9033 |
| High | 5230 | 39.258 | 36.1226 |

26 dB and 99% BANDWIDTH



7.4.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1); IC RSS-210 A9.2 (1)

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

- Composite Antenna Gains:
 - X9 PIFA (5.35 dBi) plus X9 Slot (0.63 dBi) = 6.61 dBi
 - Foxconn PIFA (2.99 dBi) plus X 9 Slot (4.11 dBi) = 6.60 dBi

The maximum antenna gain is 6.61 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

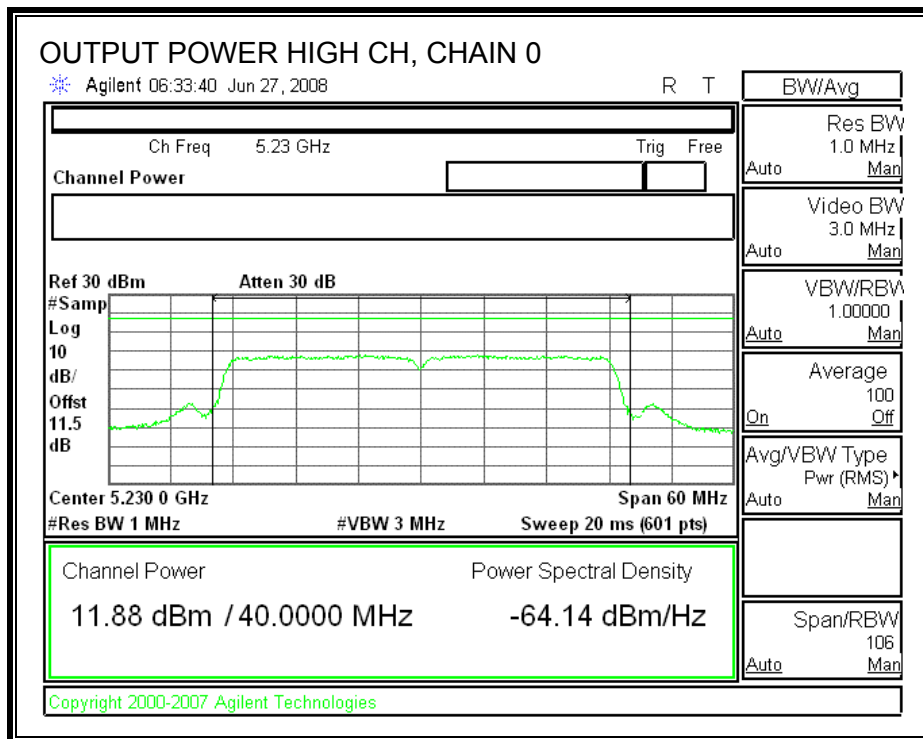
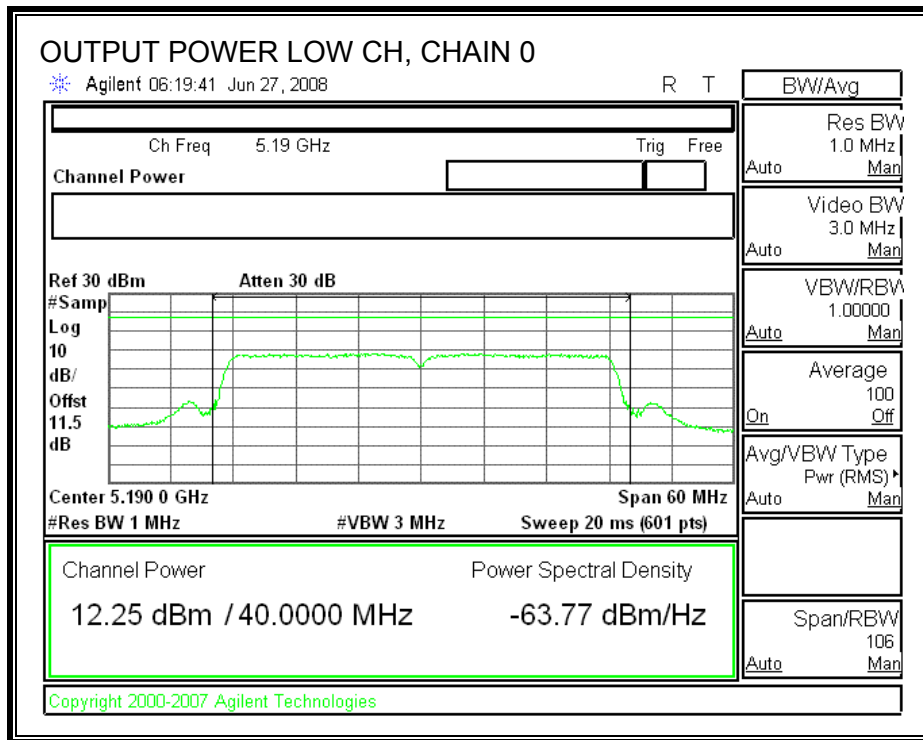
Limit

| Channel | Frequency (MHz) | Fixed Limit (dBm) | B (MHz) | 4 + 10 Log B Limit (dBm) | Antenna Gain (dBi) | Limit (dBm) |
|---------|--------------------|-------------------------|------------|--------------------------------|--------------------------|----------------|
| Low | 5190 | 17 | 37.606 | 19.75 | 6.61 | 16.39 |
| High | 5230 | 17 | 39.258 | 19.94 | 6.61 | 16.39 |

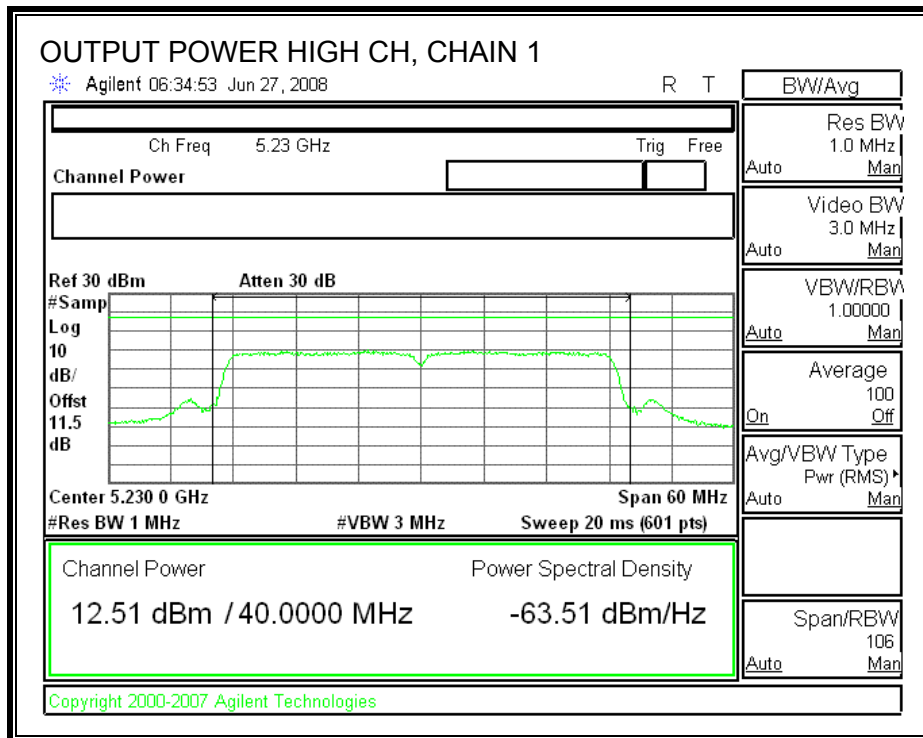
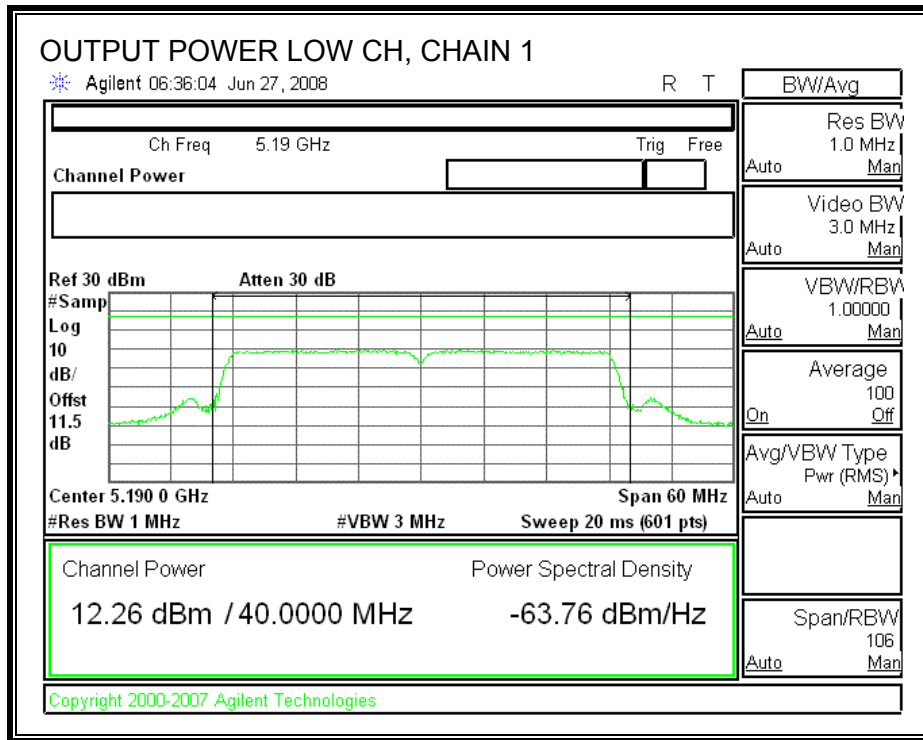
Individual Chain Results

| Channel | Frequency (MHz) | Chain 0 Power (dBm) | Chain 1 Power (dBm) | Total Power (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|---------------------------|---------------------------|-------------------------|----------------|----------------|
| Low | 5190 | 12.25 | 12.26 | 15.27 | 16.39 | -1.12 |
| High | 5230 | 11.88 | 12.51 | 15.22 | 16.39 | -1.17 |

CHAIN 0 OUTPUT POWER



CHAIN 1 OUTPUT POWER



7.4.3. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

- Composite Antenna Gains:
 - X9 PIFA (5.35 dBi) plus X9 Slot (0.63 dBi) = 6.61 dBi
 - Foxcom PIFA (2.99 dBi) plus X 9 Slot (4.11 dBi) = 6.60 dBi

The maximum antenna gain is 6.61 dBi, therefore the limit is 3.39 dBm.

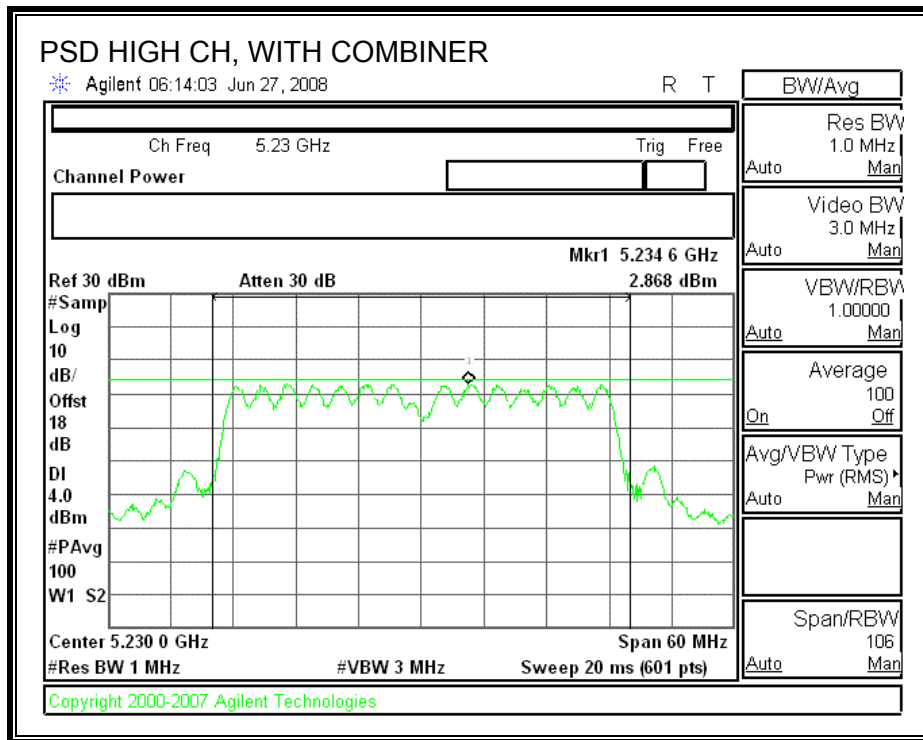
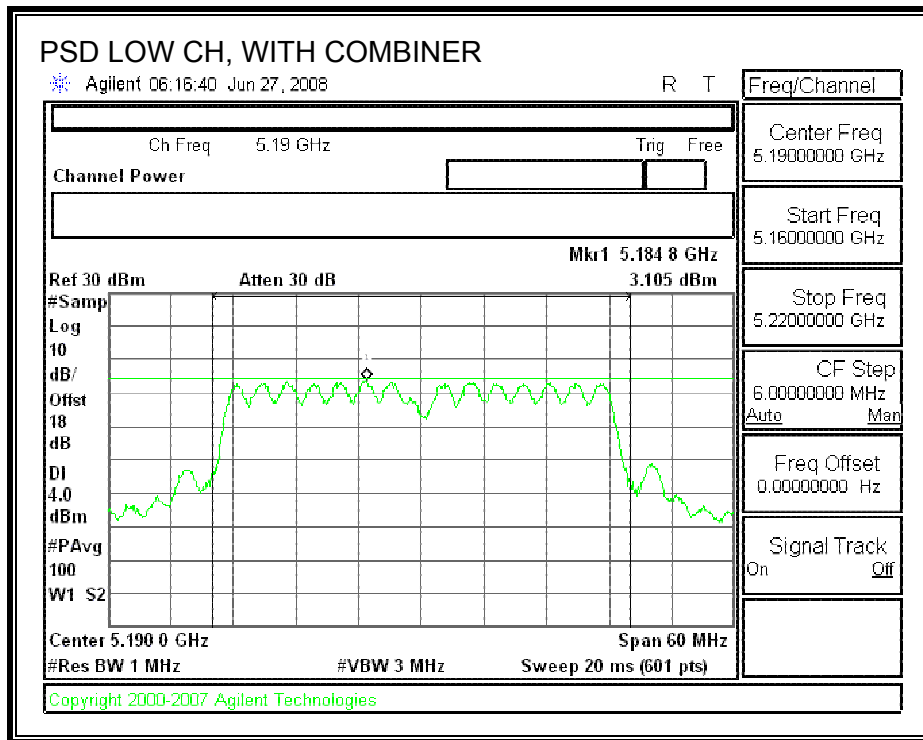
TEST PROCEDURE

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

RESULTS

| Channel | Frequency (MHz) | PPSD With Combiner (dBm) | Limit (dBm) | Margin (dB) |
|---------|-----------------|--------------------------|-------------|-------------|
| Low | 5190 | 3.105 | 3.39 | -0.28 |
| High | 5230 | 2.868 | 3.39 | -0.52 |

POWER SPECTRAL DENSITY WITH COMBINER



7.4.4. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

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

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

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

RESULTS

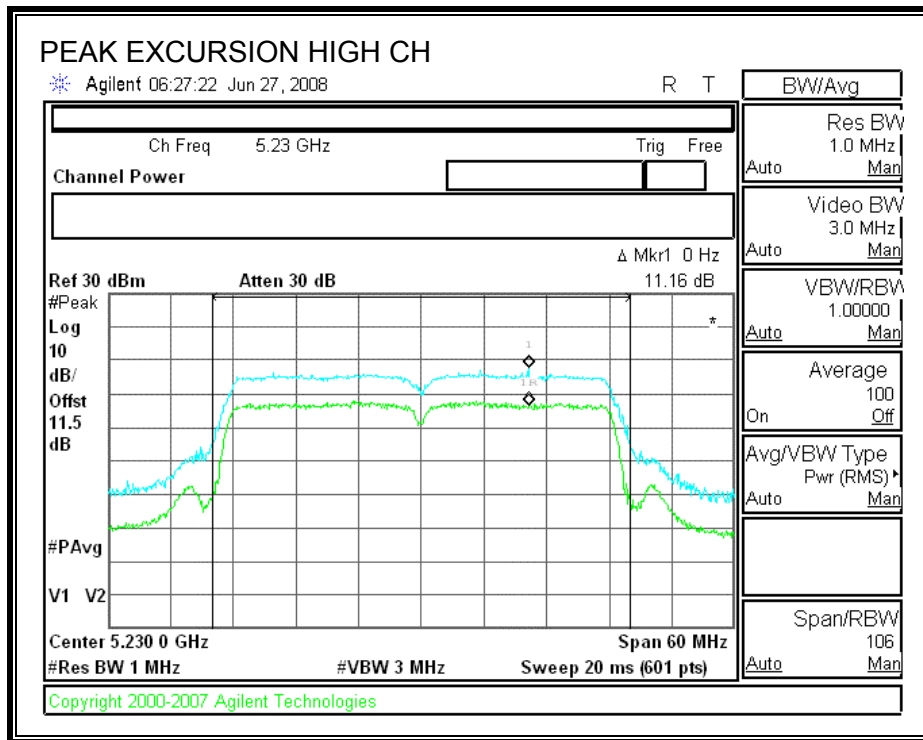
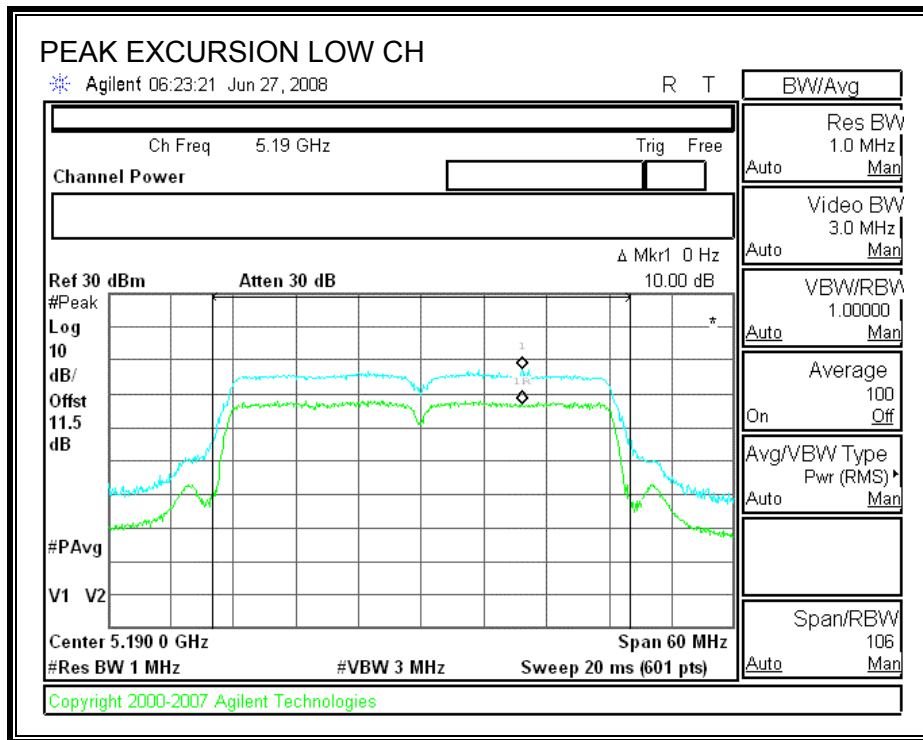
CHAIN 0

| Channel | Frequency (MHz) | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---------|-----------------|---------------------|------------|-------------|
| Low | 5190 | 10.00 | 13 | -3.00 |
| High | 5230 | 11.60 | 13 | -1.40 |

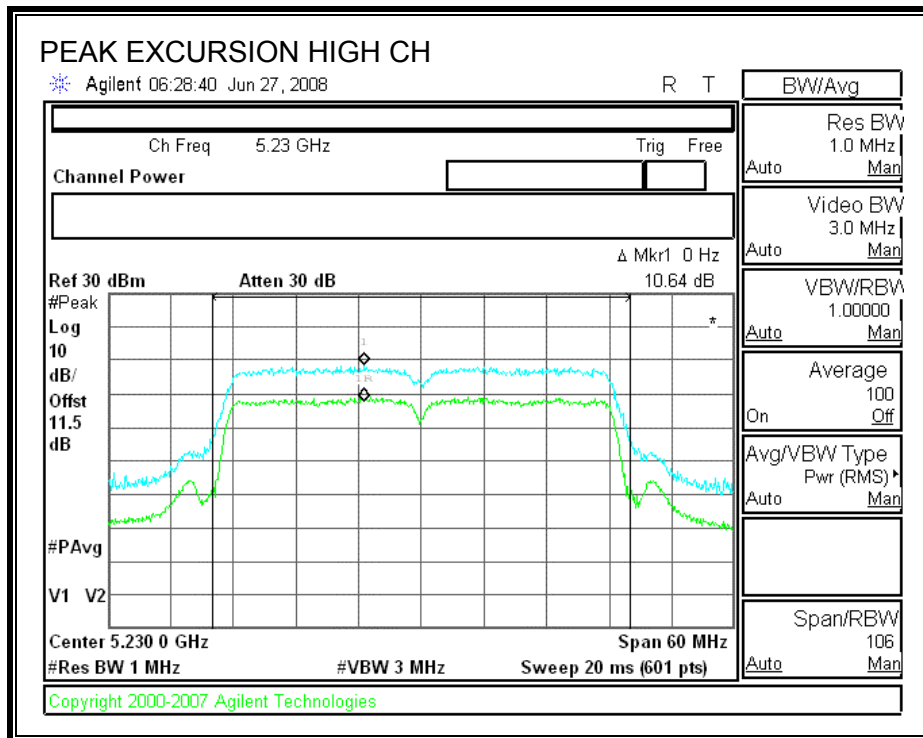
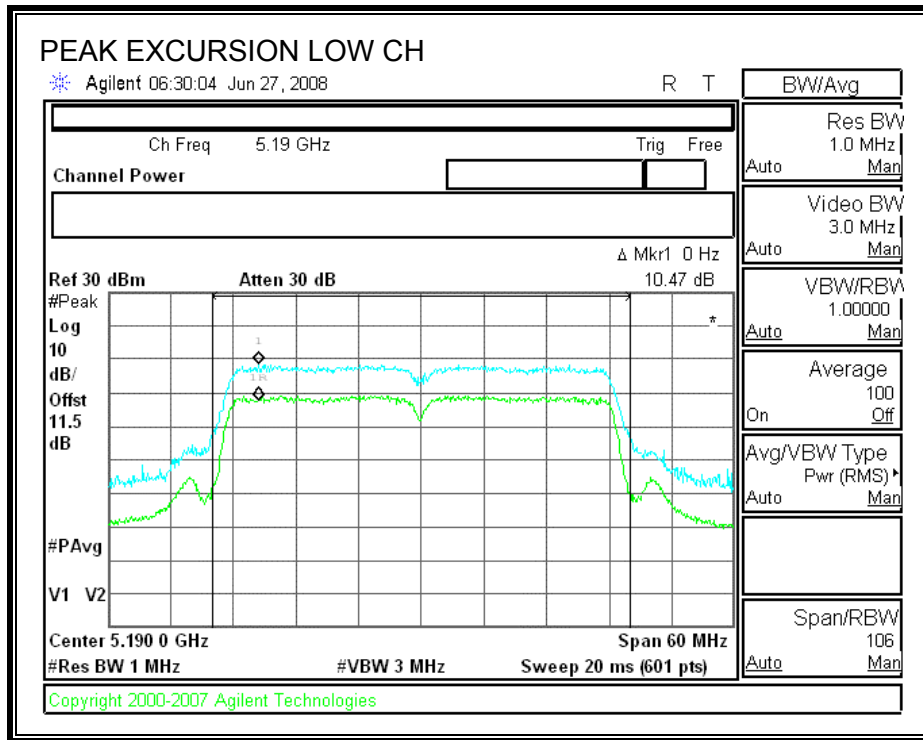
CHAIN 1

| Channel | Frequency (MHz) | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---------|-----------------|---------------------|------------|-------------|
| Low | 5190 | 10.47 | 13 | -2.53 |
| High | 5230 | 10.64 | 13 | -2.36 |

PEAK EXCURSION (CHAIN 0)



PEAK EXCURSION (CHAIN 1)



7.4.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1); IC RSS-210 A9.3 (1)

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

Limit line = -27 - EUT Antenna Gain

TEST PROCEDURE

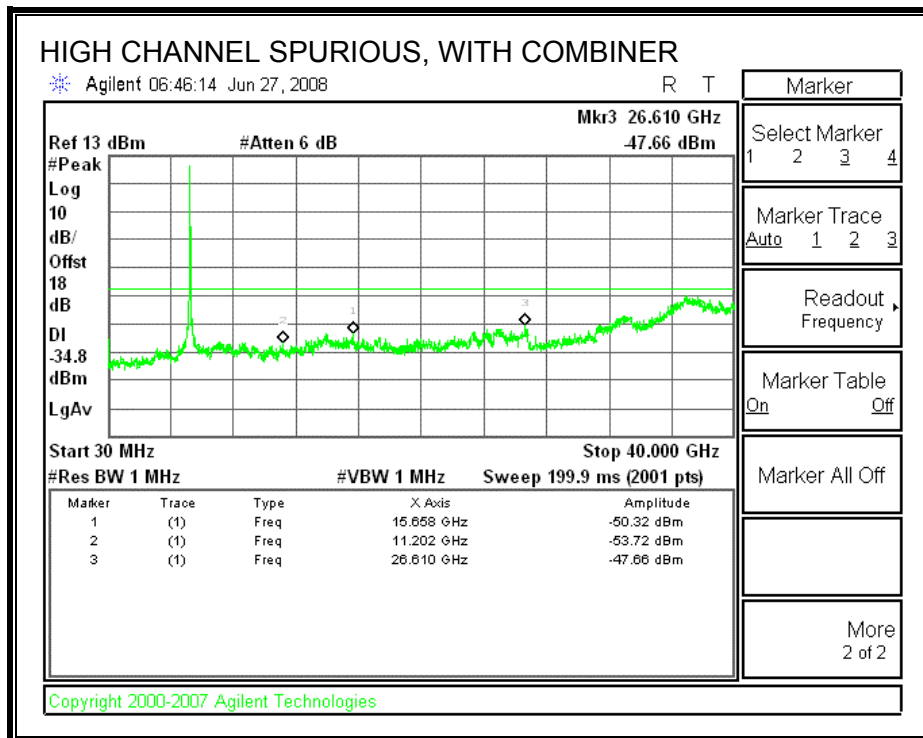
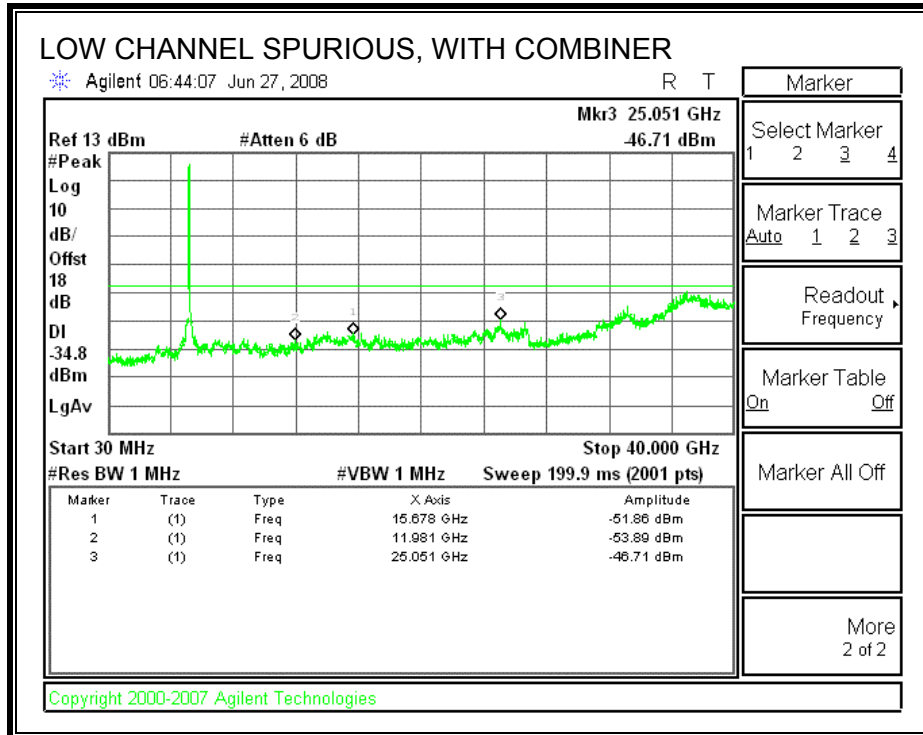
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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 the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

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

RESULTS

SPURIOUS EMISSIONS WITH COMBINER



8. ANTENNA PORT TEST RESULTS FOR 5.25–5.35 GHZ BAND

8.1. 802.11a MODE

8.1.1. 26 dB and 99% BANDWIDTH

LIMITS

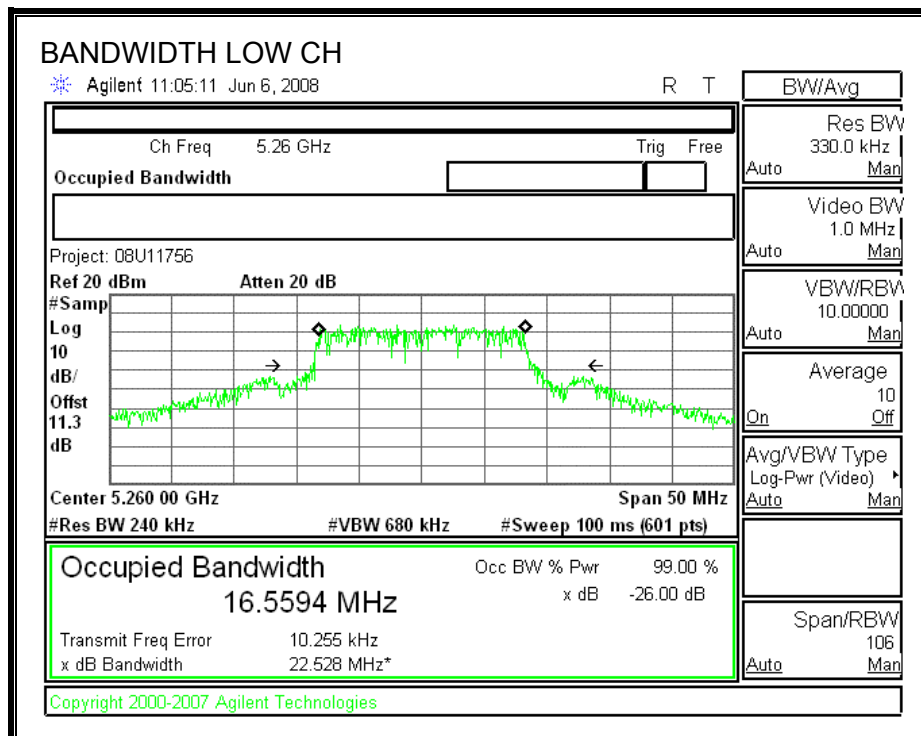
None; for reporting purposes only.

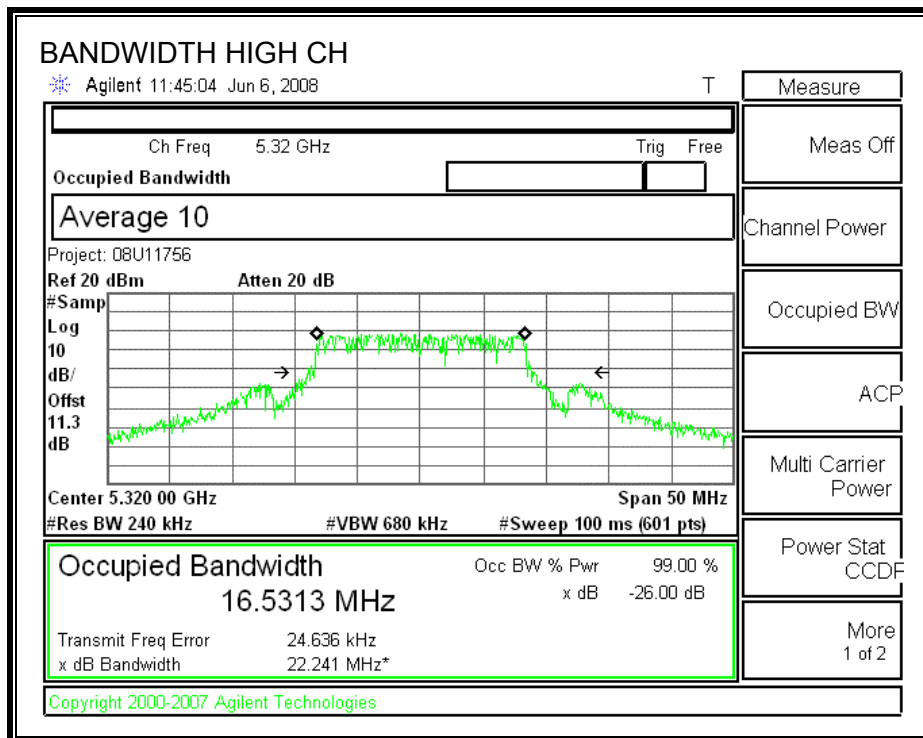
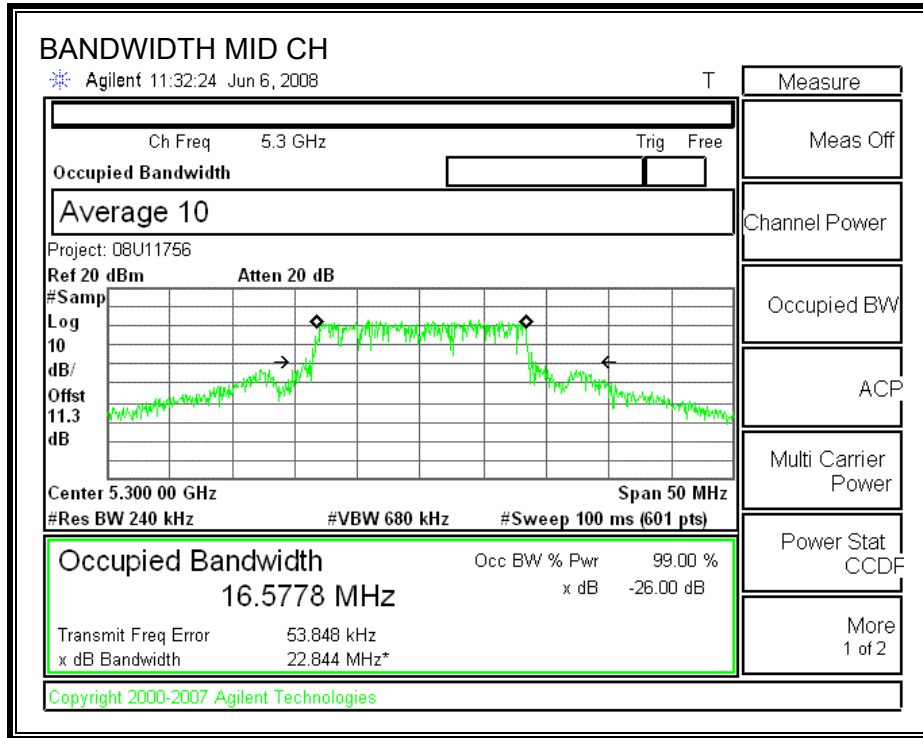
TEST PROCEDURE

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 | 5260 | 22.528 | 16.5594 |
| Middle | 5300 | 22.844 | 16.5778 |
| High | 5320 | 22.241 | 16.5313 |





8.1.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2); IC RSS-210 A9.2 (2)

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

The maximum antenna gain is 6.42 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

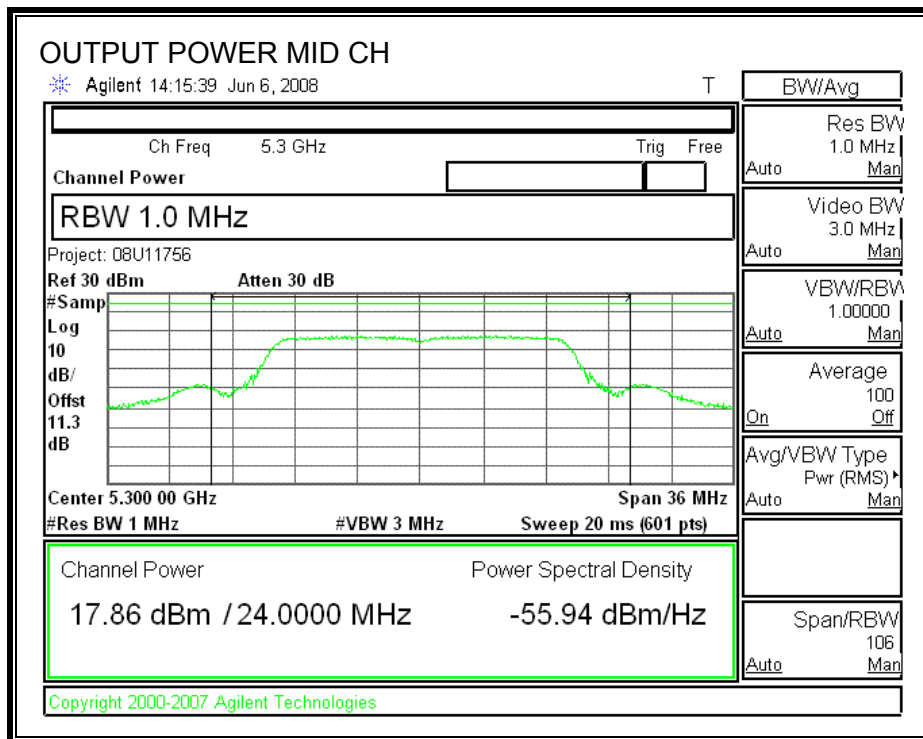
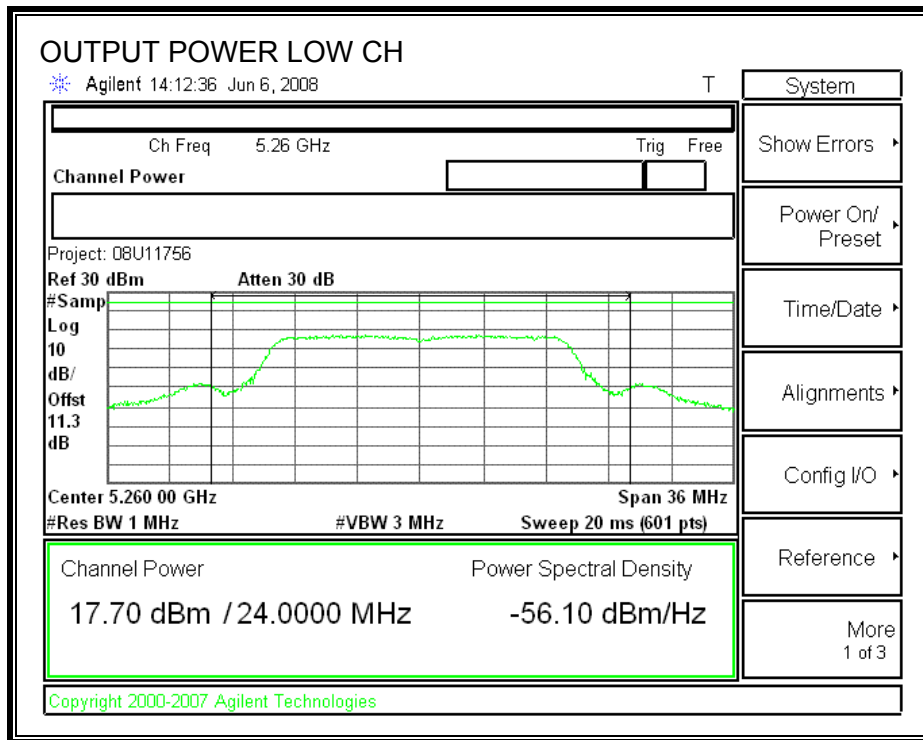
Limit

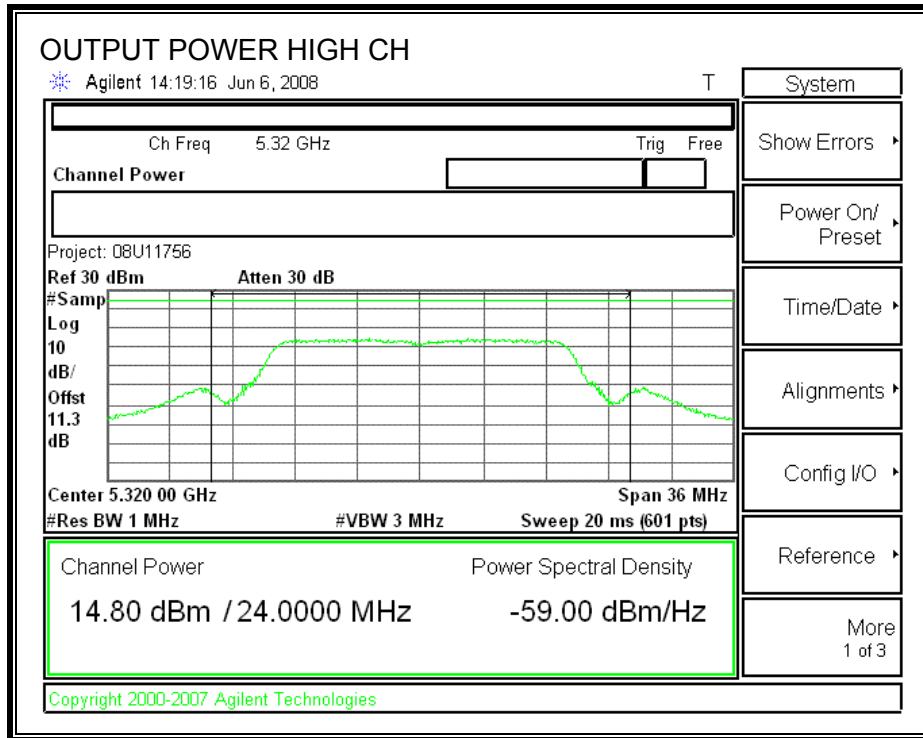
| Channel | Frequency (MHz) | Fixed Limit (dBm) | B (MHz) | 11 + 10 Log B Limit (dBm) | Antenna Gain (dBi) | Limit (dBm) |
|---------|--------------------|-------------------------|------------|---------------------------------|--------------------------|----------------|
| Low | 5260 | 24 | 22.528 | 24.53 | 6.42 | 23.58 |
| Mid | 5300 | 24 | 22.844 | 24.59 | 6.42 | 23.58 |
| High | 5320 | 24 | 22.241 | 24.47 | 6.42 | 23.58 |

Results

| Channel | Frequency (MHz) | Power (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|----------------|----------------|----------------|
| Low | 5260 | 17.70 | 23.58 | -5.88 |
| Mid | 5300 | 17.86 | 23.58 | -5.72 |
| High | 5320 | 14.80 | 23.58 | -8.78 |

OUTPUT POWER





8.1.3. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2); IC RSS-210 A9.2 (2)

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

The maximum antenna gain is 6.42 dBi, therefore the limit is 10.58 dBm.

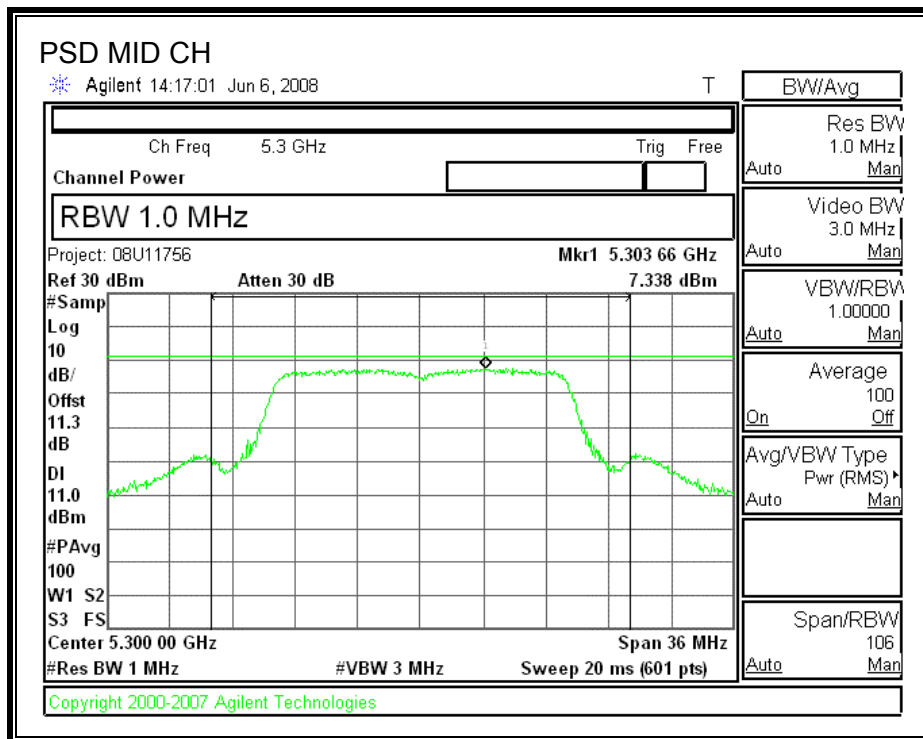
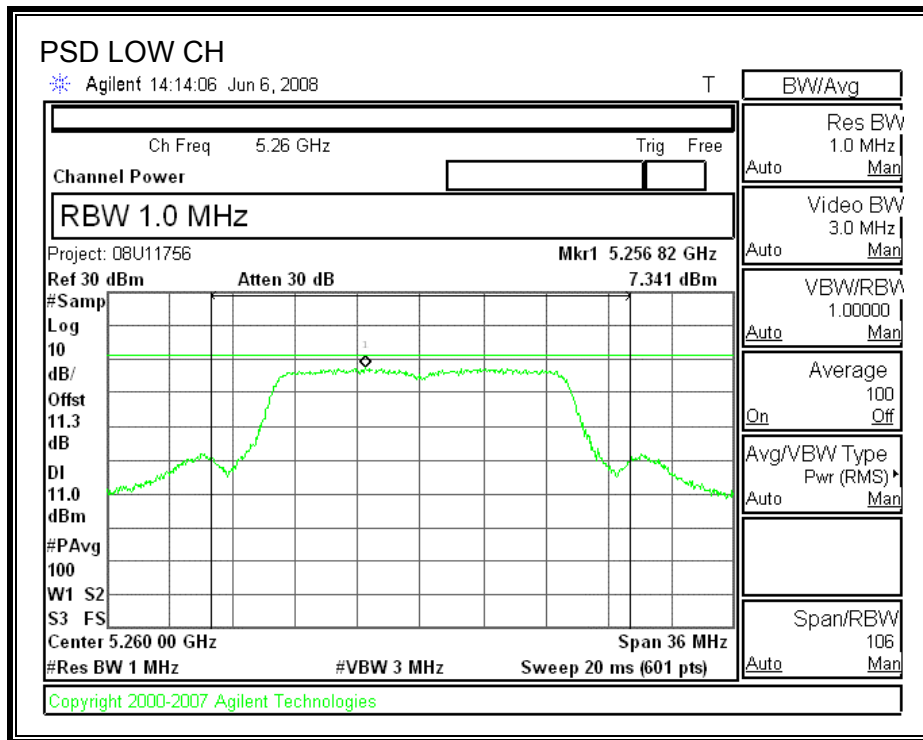
TEST PROCEDURE

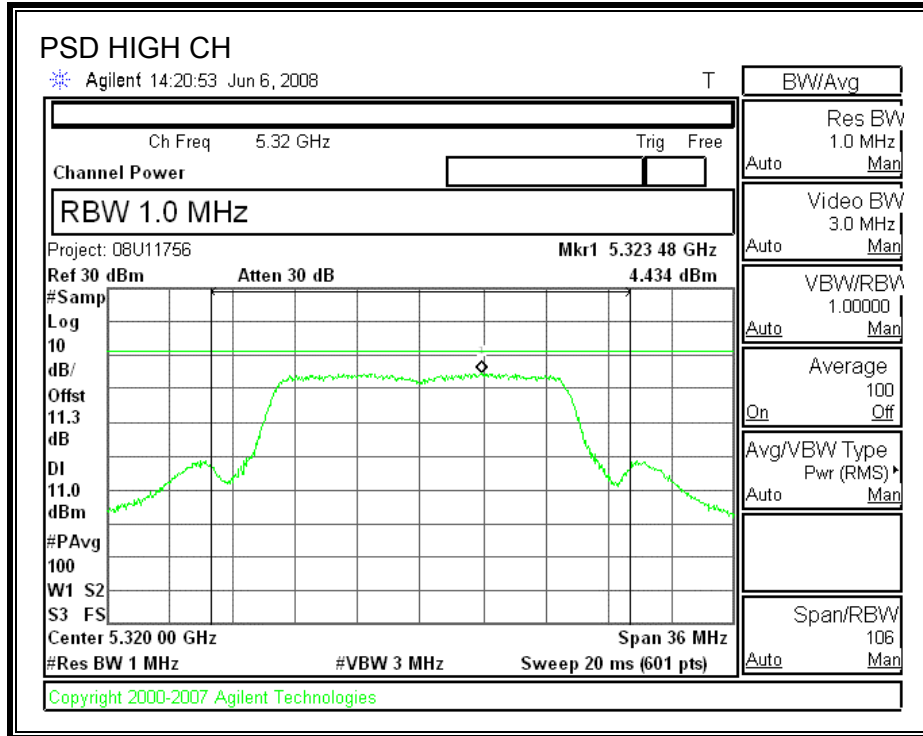
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Margin (dB) |
|---------|-----------------|------------|-------------|-------------|
| Low | 5260 | 7.341 | 10.58 | -3.24 |
| Middle | 5300 | 7.338 | 10.58 | -3.24 |
| High | 5320 | 4.434 | 10.58 | -6.15 |

POWER SPECTRAL DENSITY





8.1.4. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

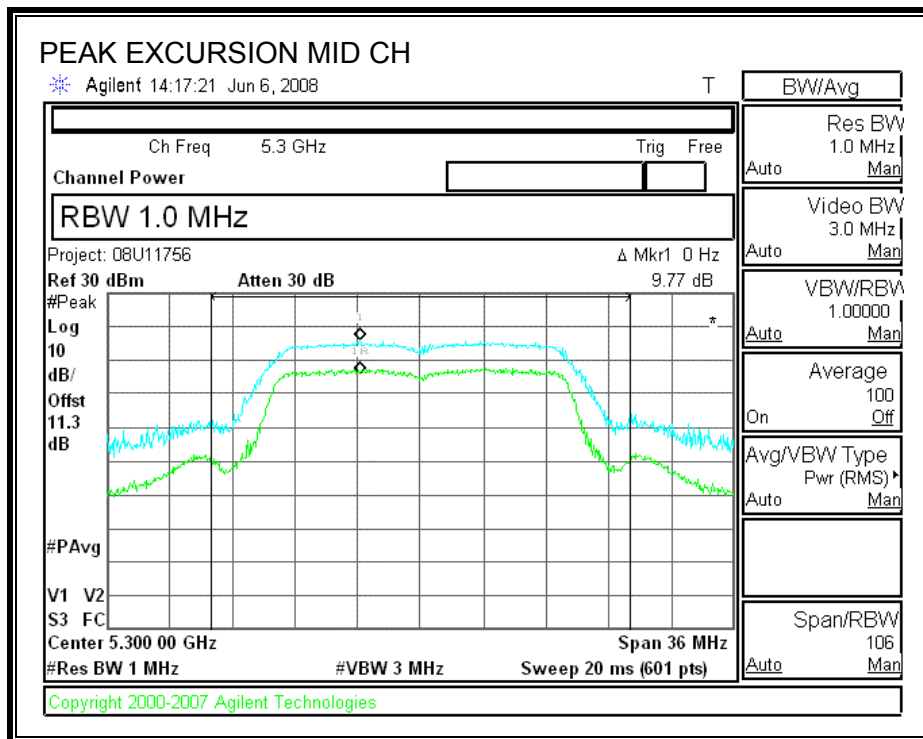
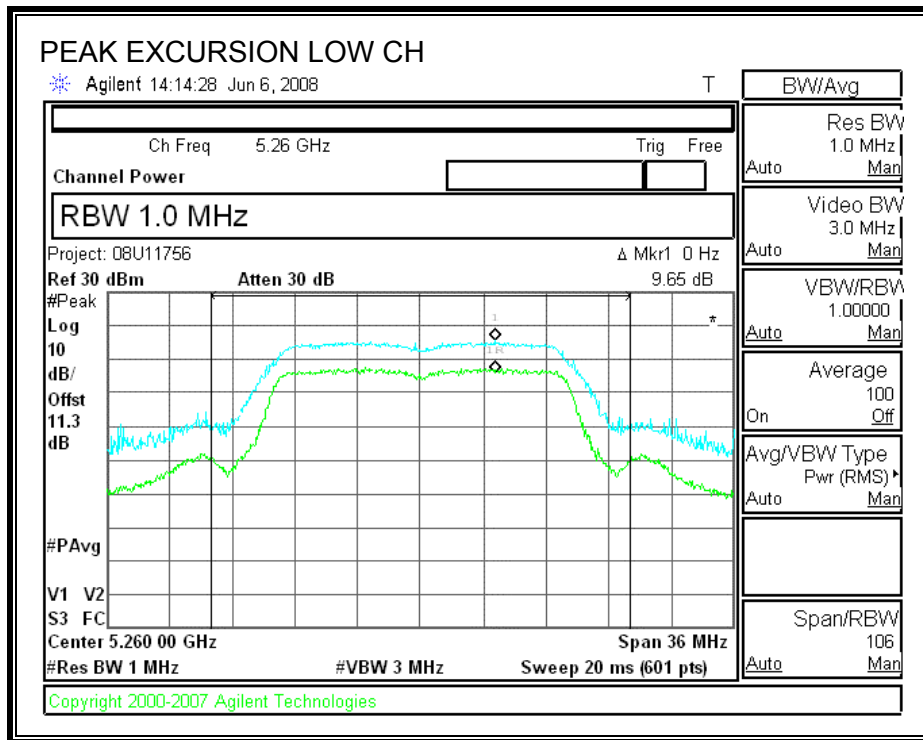
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

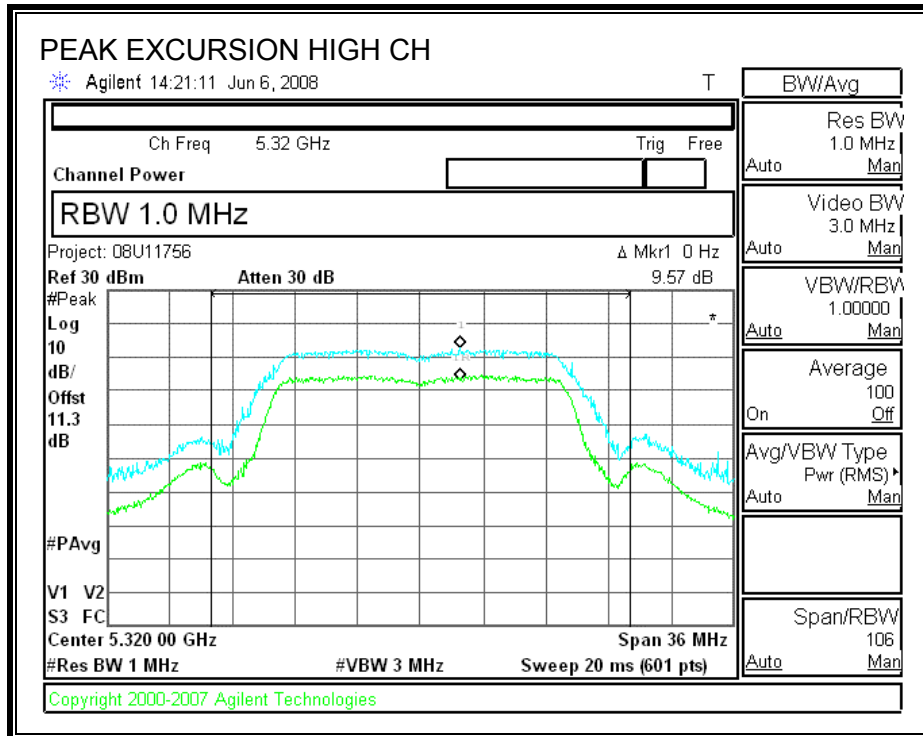
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

| Channel | Frequency (MHz) | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---------|-----------------|---------------------|------------|-------------|
| Low | 5260 | 9.65 | 13 | -3.35 |
| Middle | 5300 | 9.77 | 13 | -3.23 |
| High | 5320 | 9.57 | 13 | -3.43 |

PEAK EXCURSION





8.1.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (2); IC RSS-210 A9.3 (2)

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

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

Limit line = -27 - EUT Antenna Gain

TEST PROCEDURE

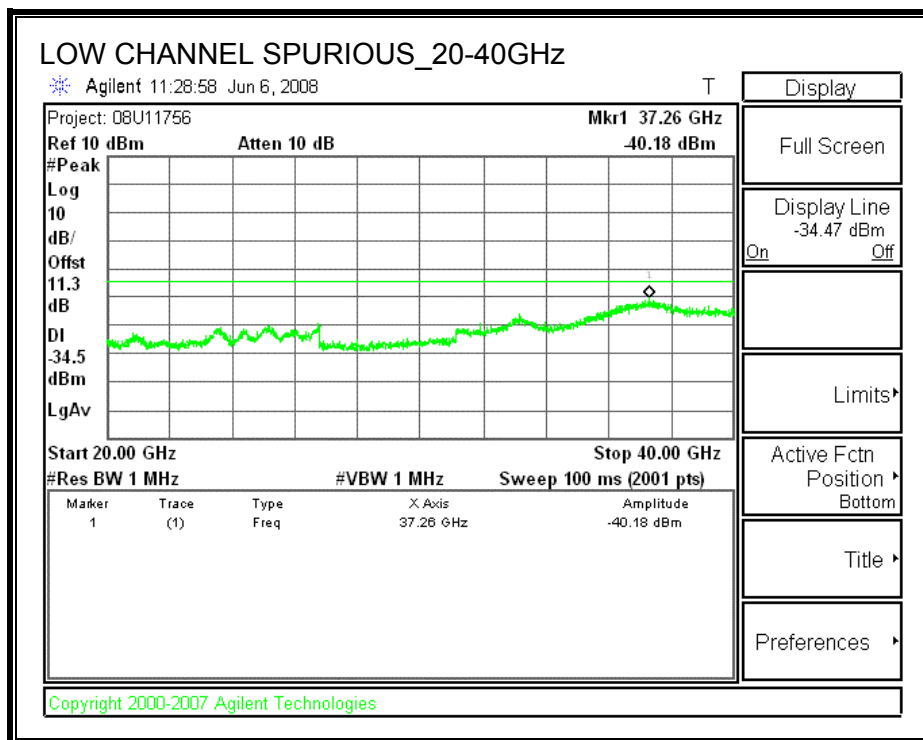
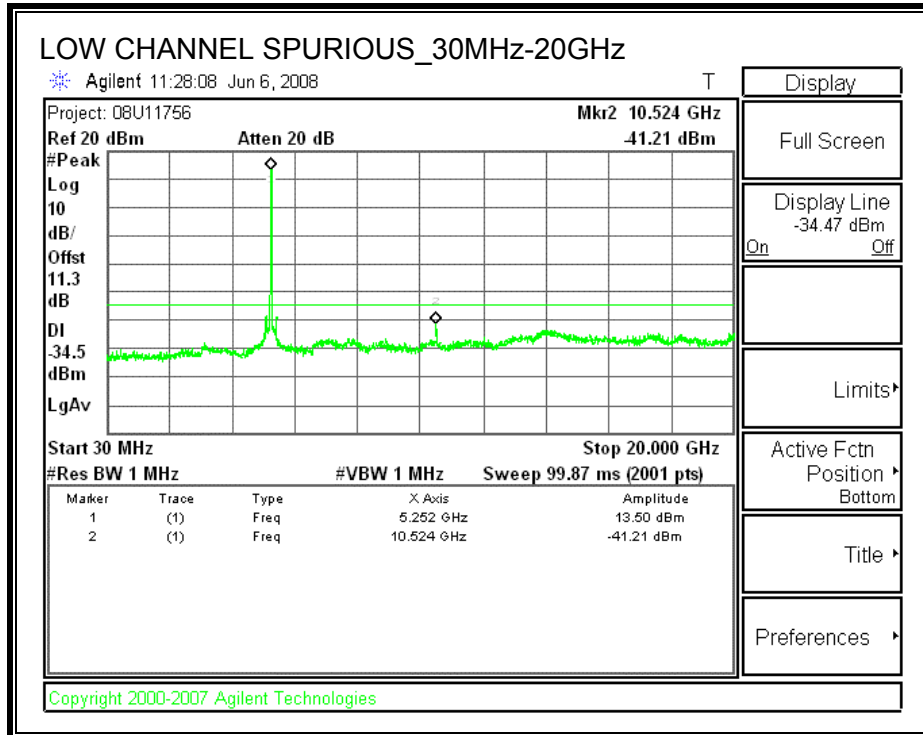
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

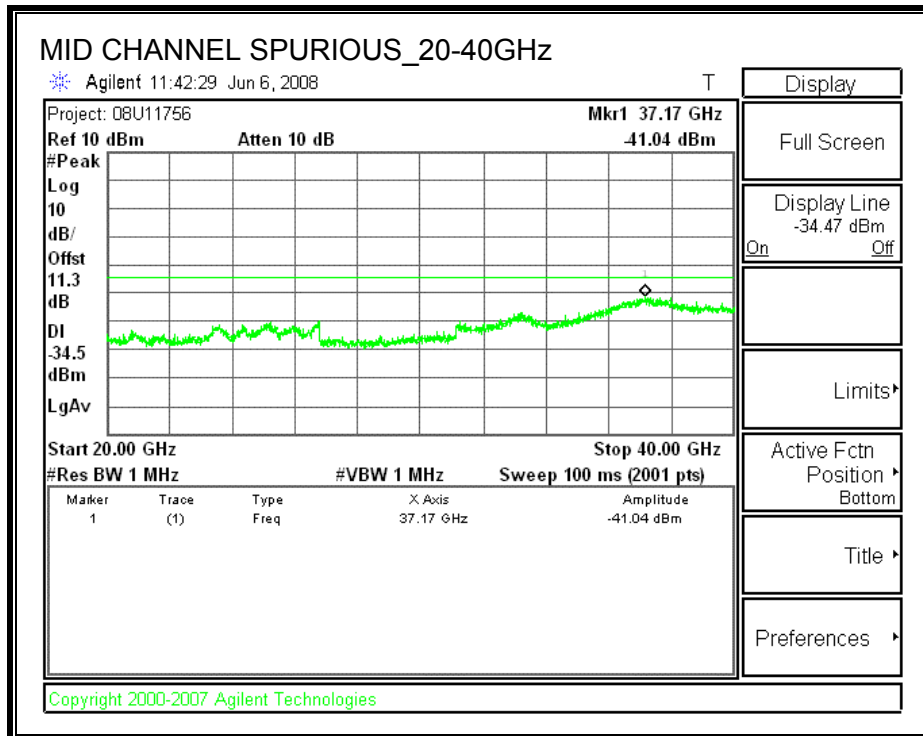
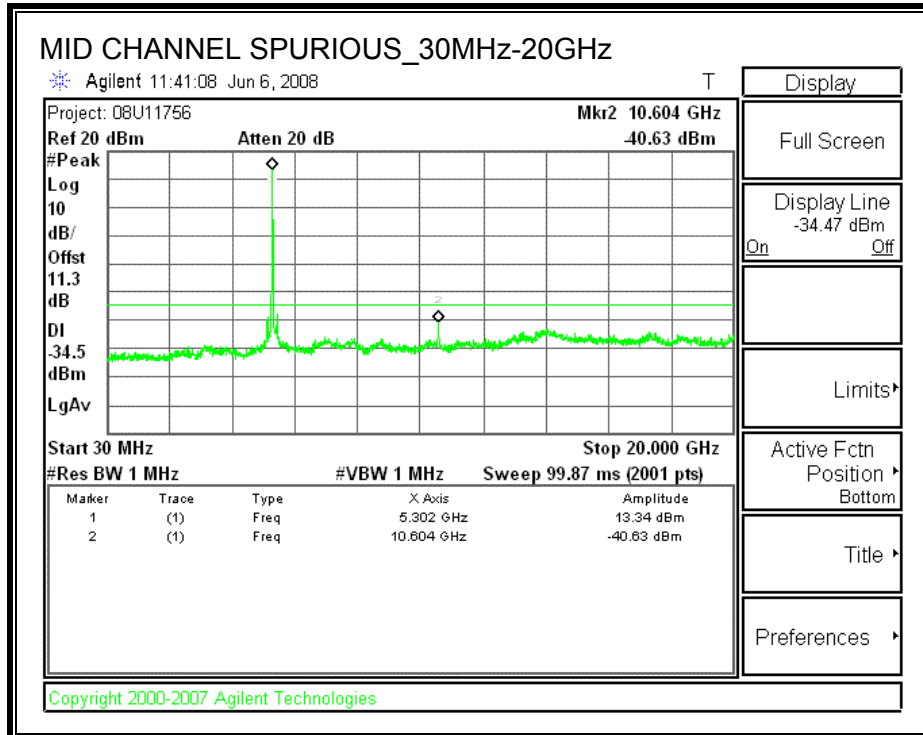
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

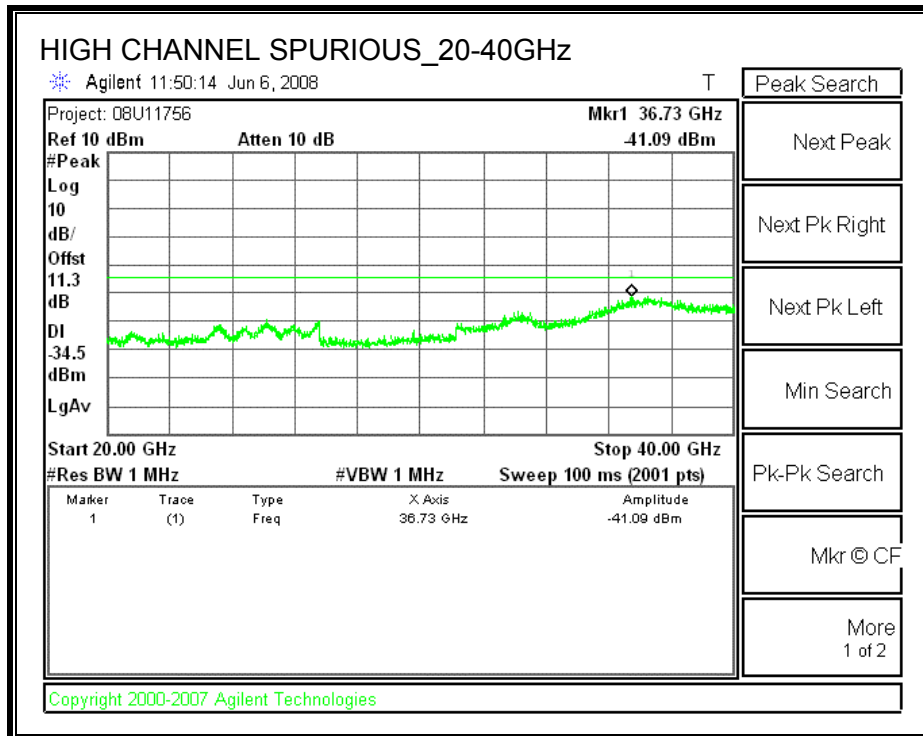
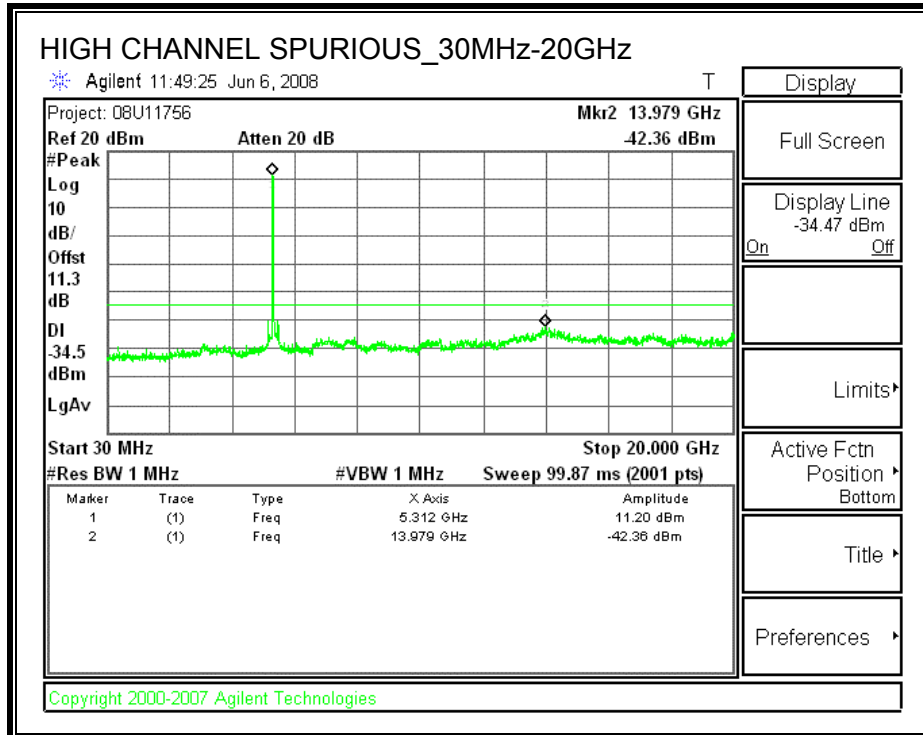
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

SPURIOUS EMISSIONS







8.2. 802.11n HT20 MODE

8.2.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

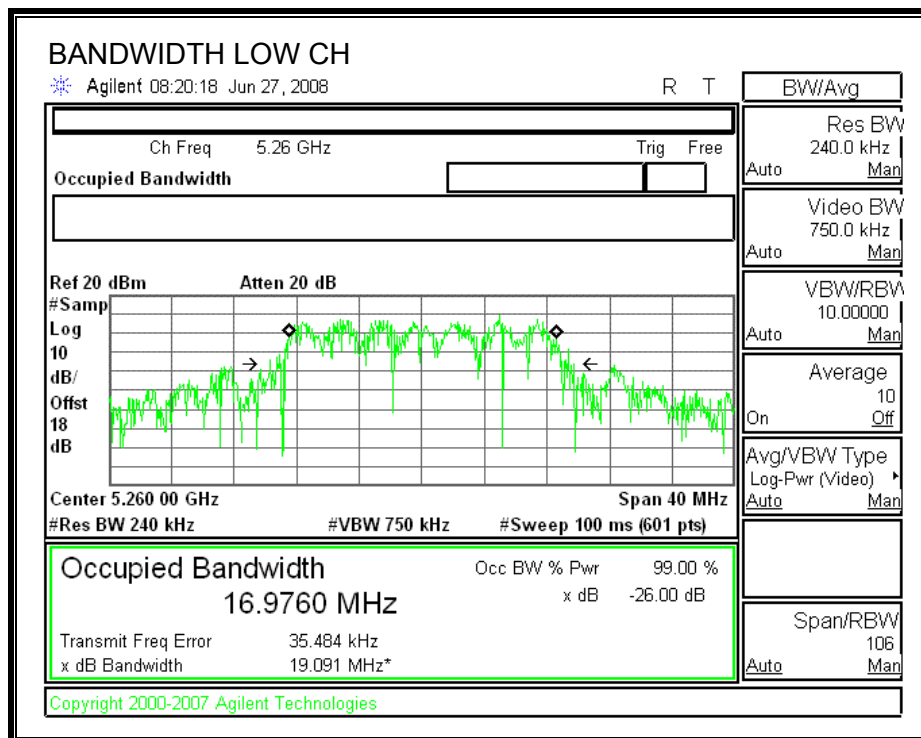
TEST PROCEDURE

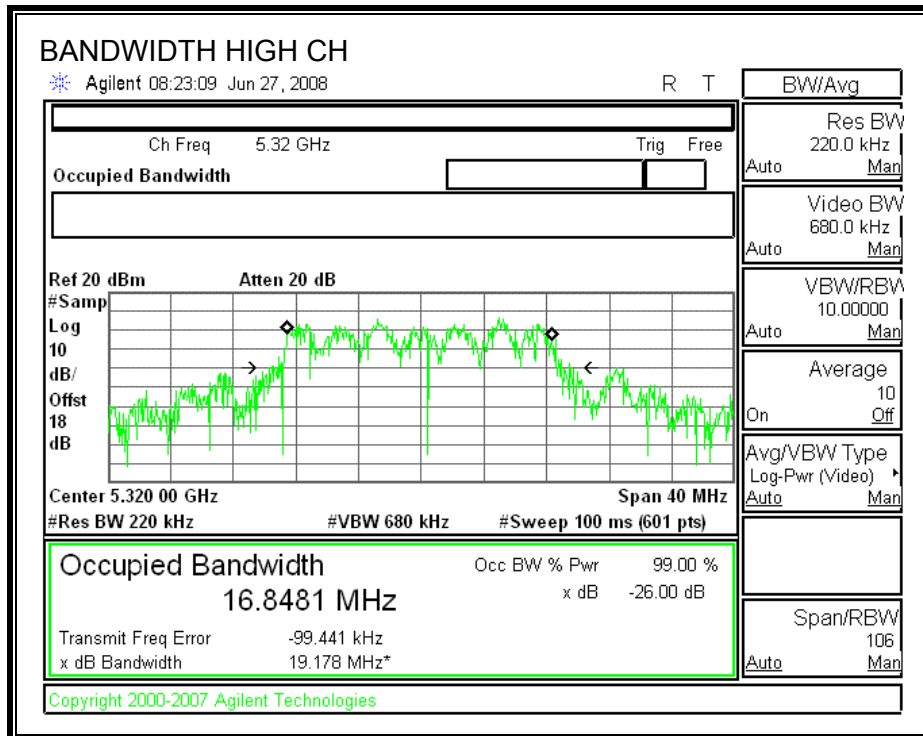
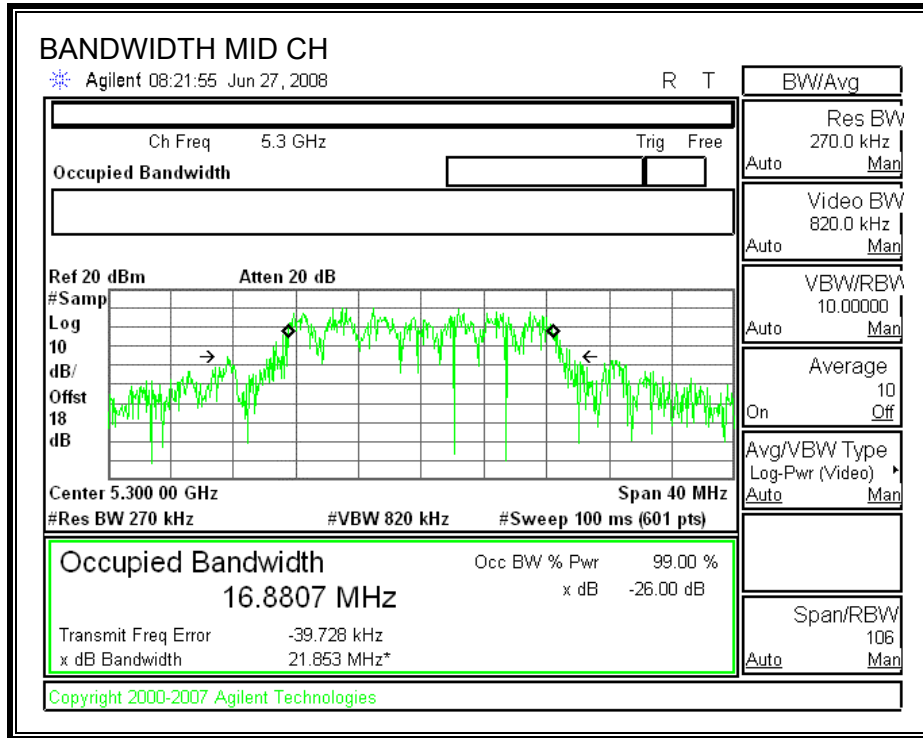
The transmitter outputs are connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|-----------------------|---------------------|
| Low | 5260 | 19.091 | 16.976 |
| Middle | 5300 | 21.853 | 16.8807 |
| High | 5320 | 19.178 | 16.8481 |

26 dB and 99% BANDWIDTH





8.2.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2); IC RSS-210 A9.2 (2)

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

TEST PROCEDURE

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

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

RESULTS

Antenna Combination:

Foxconn PIFA WDAN-HQAT80-03-DF (2.99 dBi) plus X 9 Slot K5SLT (4.32 dBi) = 6.72 dBi

Limit

| Channel | Frequency (MHz) | Fixed Limit (dBm) | B (MHz) | 11 + 10 Log B Limit (dBm) | Antenna Gain (dBi) | Limit (dBm) |
|---------|--------------------|-------------------------|------------|---------------------------------|--------------------------|----------------|
| Low | 5260 | 24 | 19.091 | 23.81 | 6.72 | 23.09 |
| Mid | 5300 | 24 | 21.853 | 24.40 | 6.72 | 23.28 |
| High | 5320 | 24 | 19.178 | 23.83 | 6.72 | 23.11 |

Individual Chain Results

| Channel | Frequency (MHz) | Chain 0 Power (dBm) | Chain 1 Power (dBm) | Total Power (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|---------------------------|---------------------------|-------------------------|----------------|----------------|
| Low | 5260 | 16.29 | 16.10 | 19.21 | 23.09 | -3.89 |
| Mid | 5300 | 16.22 | 16.03 | 19.14 | 23.28 | -4.15 |

Note: The high channel at 13dBm meets the spec of highest & lowest antenna gain combinations. Data in the table above only shows the low & mid channels; see table below for high channel.

Antenna Combination:

Tyco PIFA M97PFTAP2 (6.42 dBi) plus Tyco Slot M97SLTAP1 (2.28 dBi) = 7.84 dBi

Limit

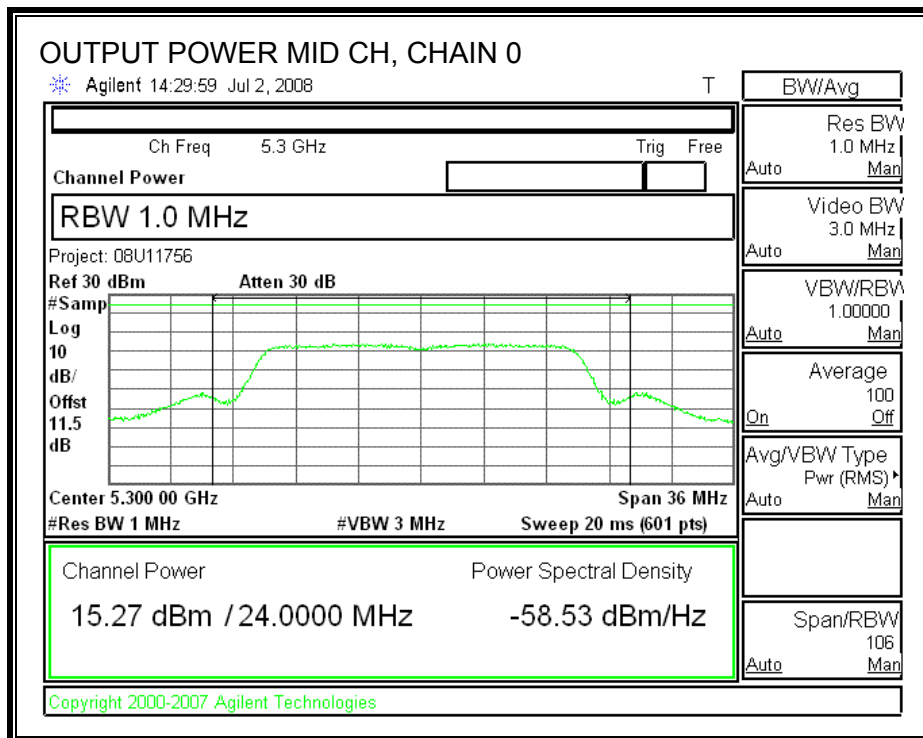
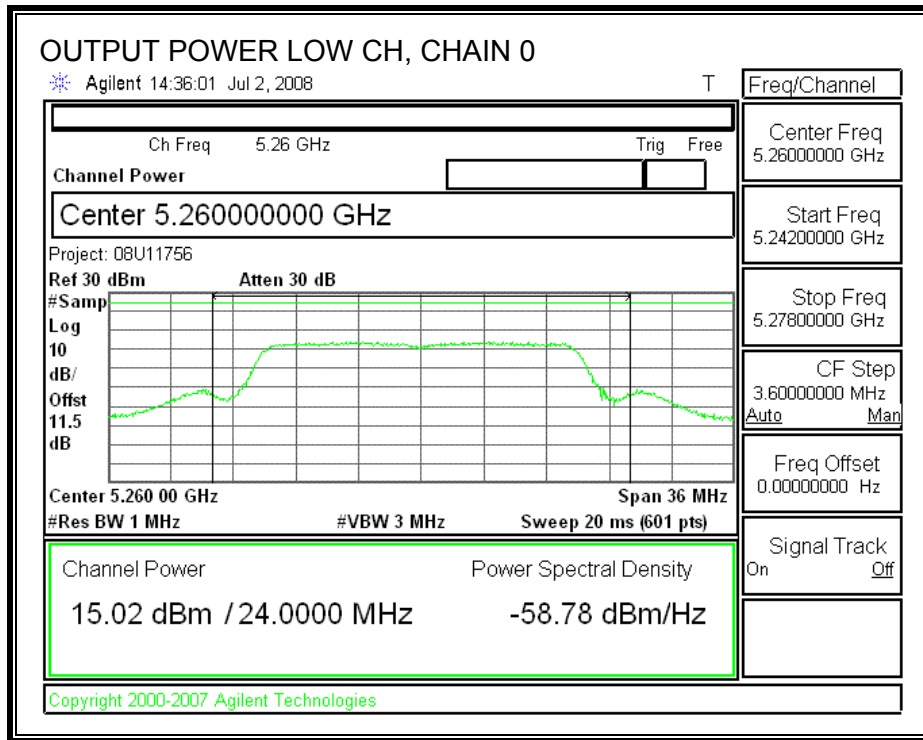
| Channel | Frequency (MHz) | Fixed Limit (dBm) | B (MHz) | 11 + 10 Log B Limit (dBm) | Antenna Gain (dBi) | Limit (dBm) |
|---------|--------------------|-------------------------|------------|---------------------------------|--------------------------|----------------|
| Low | 5260 | 24 | 19.091 | 23.81 | 7.84 | 21.97 |
| Mid | 5300 | 24 | 21.853 | 24.40 | 7.84 | 22.16 |
| High | 5320 | 24 | 19.178 | 23.83 | 7.84 | 21.99 |

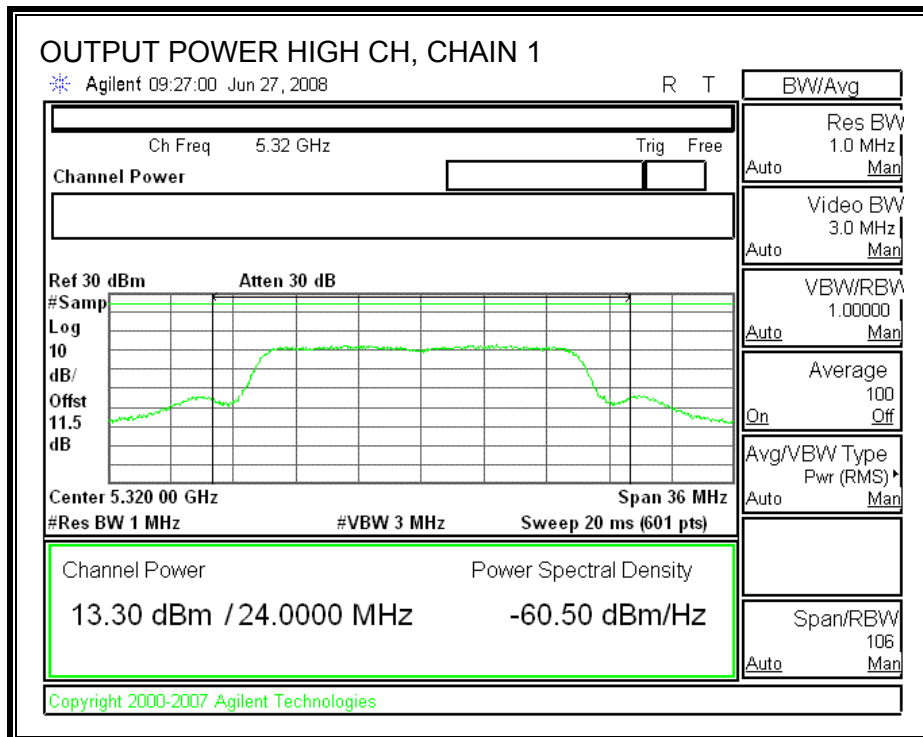
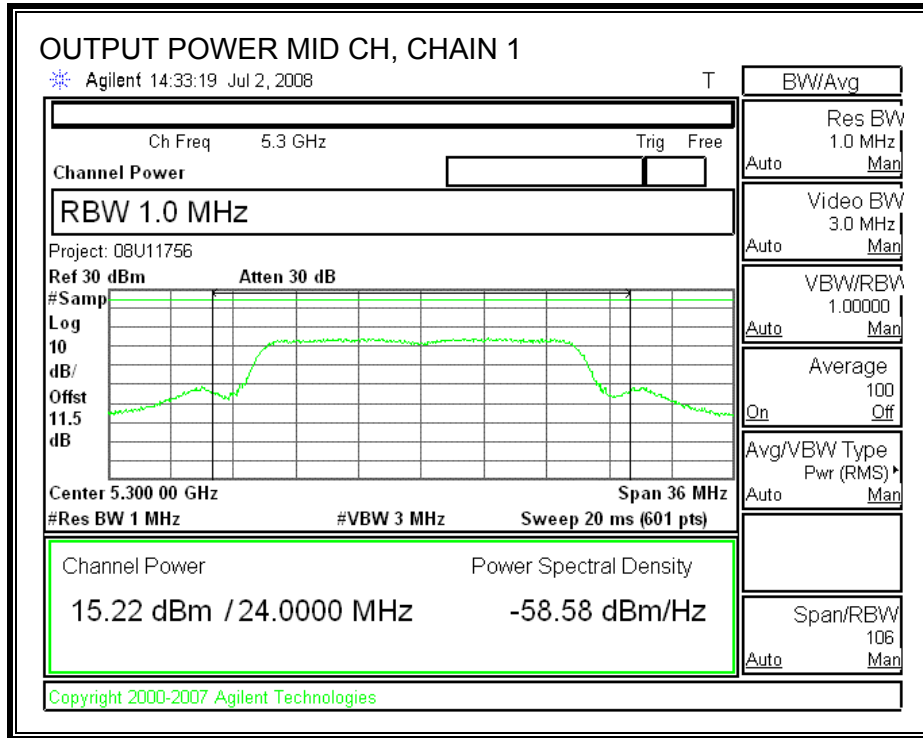
Individual Chain Results

| Channel | Frequency (MHz) | Chain 0 Power (dBm) | Chain 1 Power (dBm) | Total Power (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|---------------------------|---------------------------|-------------------------|----------------|----------------|
| Low | 5260 | 15.02 | 15.07 | 18.06 | 21.97 | -3.92 |
| Mid | 5300 | 15.27 | 15.22 | 18.26 | 22.16 | -3.91 |
| High | 5320 | 13.38 | 13.30 | 16.35 | 21.99 | -5.64 |

Antenna Combination: Hi PIFA / Low Slot = 7.84 dBi

CHAIN 0 OUTPUT POWER





8.2.3. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2); IC RSS-210 A9.2 (2)

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

The maximum antenna gain is 6.72 dBi, therefore the limit is 10.28 dBm.

The maximum antenna gain is 7.84 dBi, therefore the limit is 9.16 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

Antenna Combination: Low PIFA / Hi Slot = 6.72dBi

Foxconn PIFA WDAN-HQAT80-03-DF (2.99 dBi) plus X 9 Slot K5SLT (4.32 dBi) = 6.72 dBi

| Channel | Frequency (MHz) | PPSD With Combiner (dBm) | Limit (dBm) | Margin (dB) |
|---------|-----------------|--------------------------|-------------|-------------|
| Low | 5260 | 10.240 | 10.28 | -0.04 |
| Middle | 5300 | 10.148 | 10.28 | -0.13 |

Note: The high channel at 13dBm meets the spec of highest & lowest antenna gain combinations. Data in the table above only shows the low & mid channels; see table below for high channel.

RESULTS

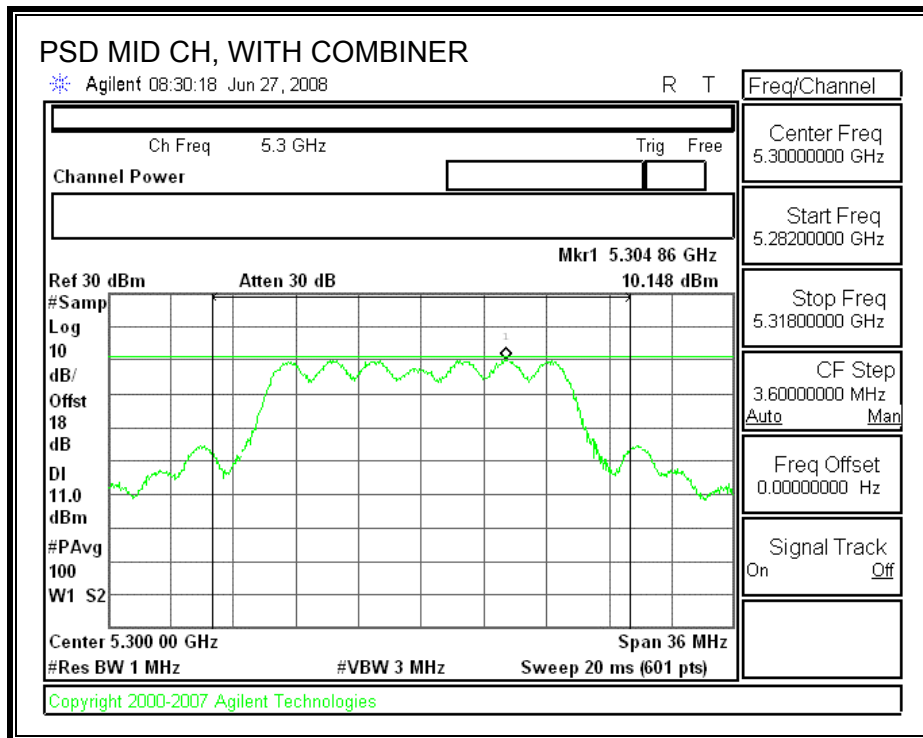
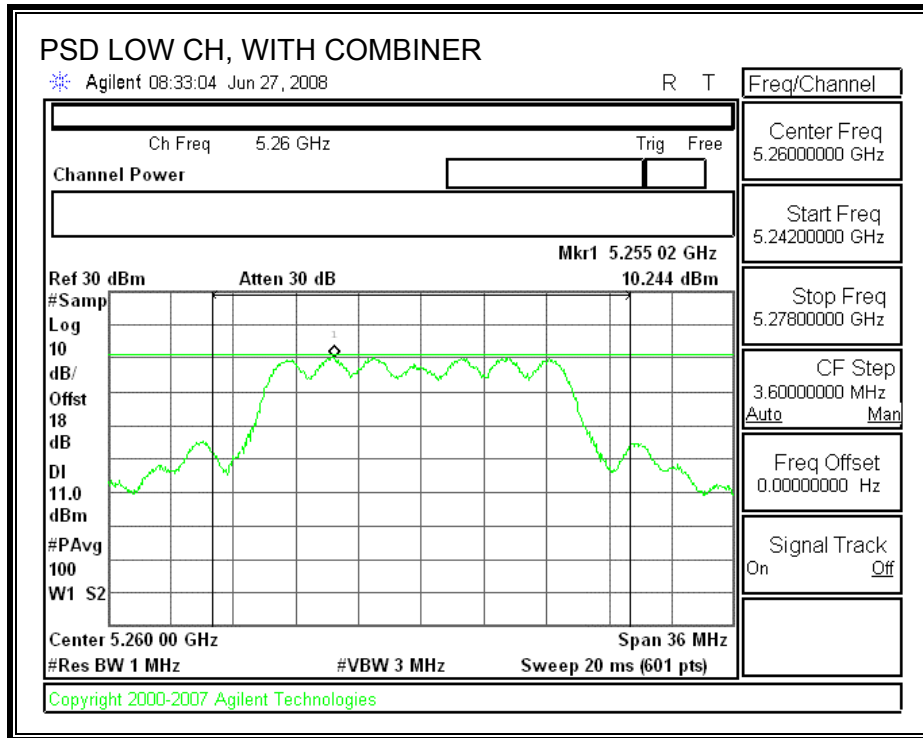
Antenna Combination: Hi PIFA / Low Slot = 7.84dBi

Tyco PIFA M97PFTAP2 (6.42 dBi) plus Tyco Slot M97SLTAP1 (2.28 dBi) = 7.84 dBi

| Channel | Frequency (MHz) | PPSD With Combiner (dBm) | Limit (dBm) | Margin (dB) |
|---------|-----------------|--------------------------|-------------|-------------|
| Low | 5260 | 8.970 | 9.16 | -0.19 |
| Middle | 5300 | 8.900 | 9.16 | -0.26 |
| High | 5320 | 6.950 | 9.16 | -2.21 |

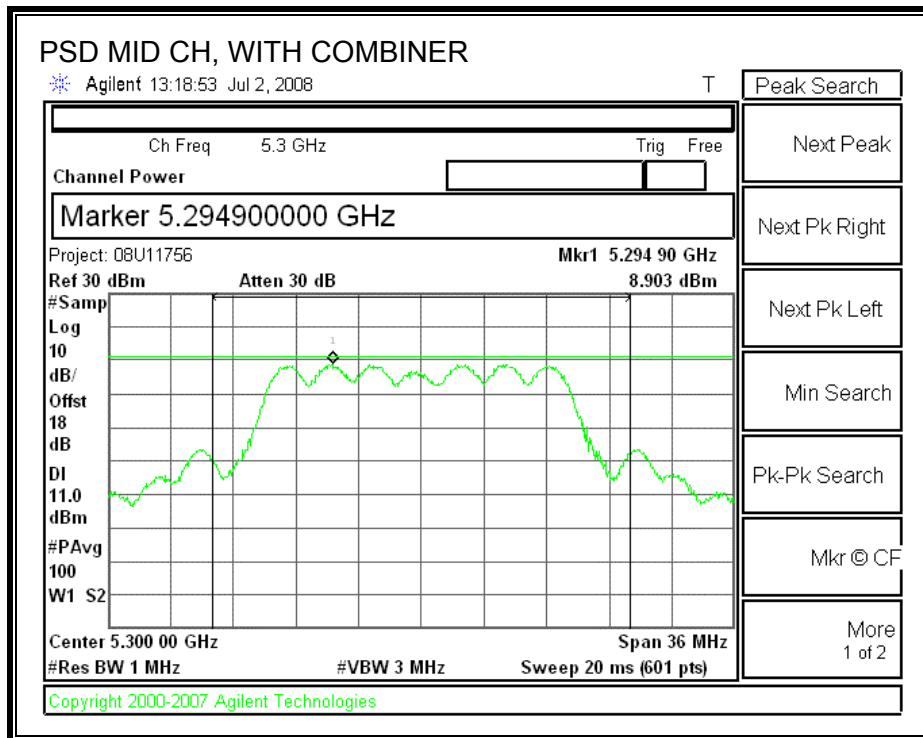
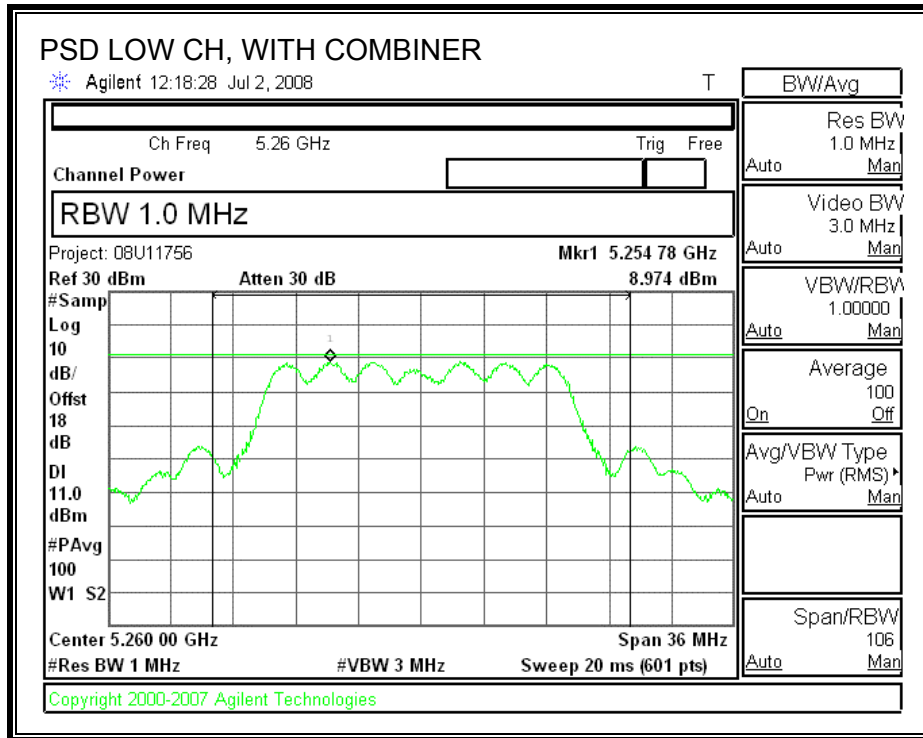
Antenna Combination: Low PIFA / Hi Slot = 6.72dBi

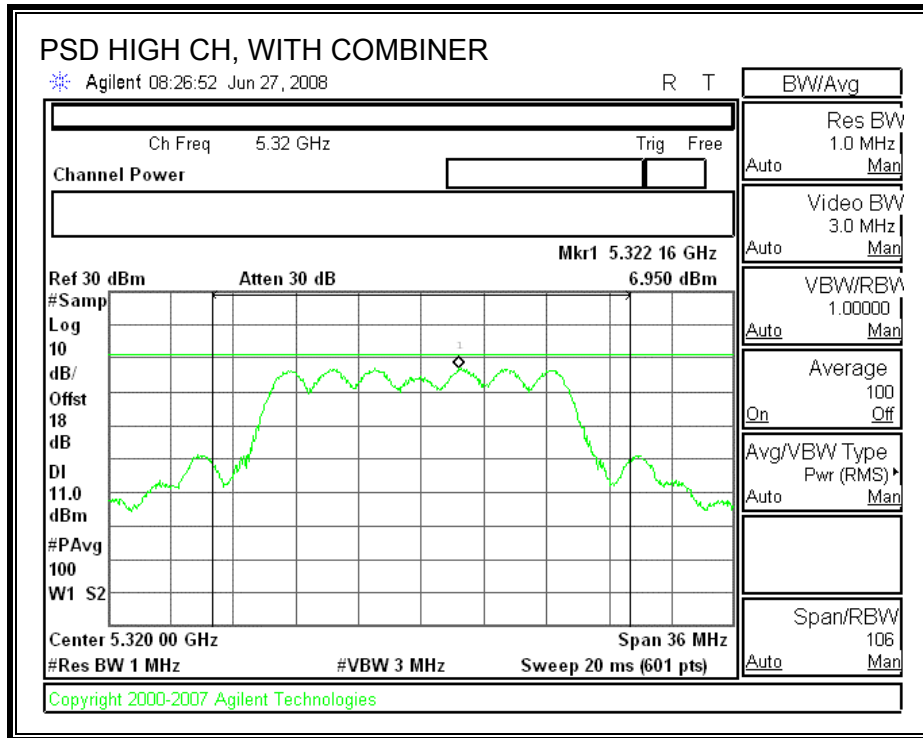
POWER SPECTRAL DENSITY WITH COMBINER



Antenna Combination: Hi PIFA / Low Slot = 7.84 dBi

POWER SPECTRAL DENSITY WITH COMBINER





8.2.4. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

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

TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer.

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

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

RESULTS

Chain 0

| Channel | Frequency (MHz) | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---------|-----------------|---------------------|------------|-------------|
| Low | 5260 | 8.95 | 13 | -4.05 |
| Middle | 5300 | 9.11 | 13 | -3.89 |
| High | 5320 | 10.53 | 13 | -2.47 |

Chain 1

| Channel | Frequency (MHz) | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---------|-----------------|---------------------|------------|-------------|
| Low | 5260 | 10.30 | 13 | -2.70 |
| Middle | 5300 | 8.92 | 13 | -4.08 |
| High | 5320 | 9.62 | 13 | -3.38 |

PEAK EXCURSION (CHAIN 0)

