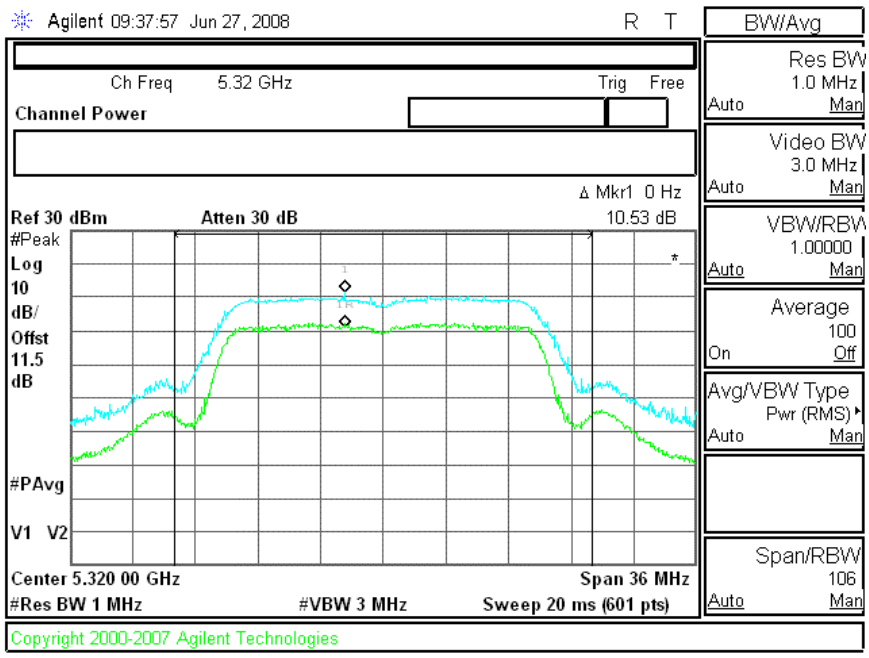
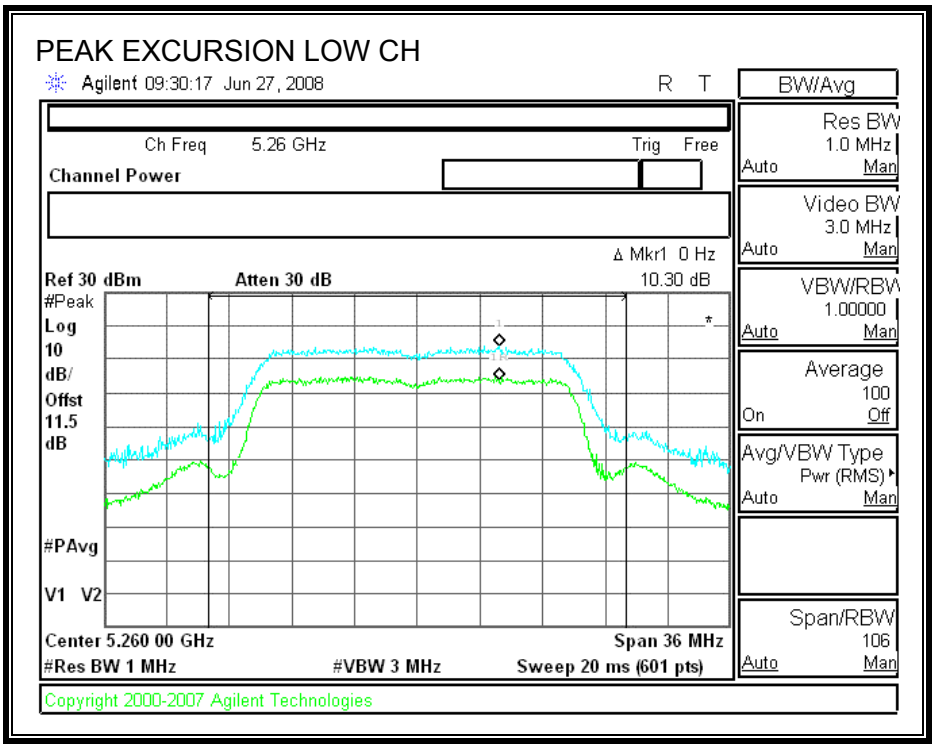
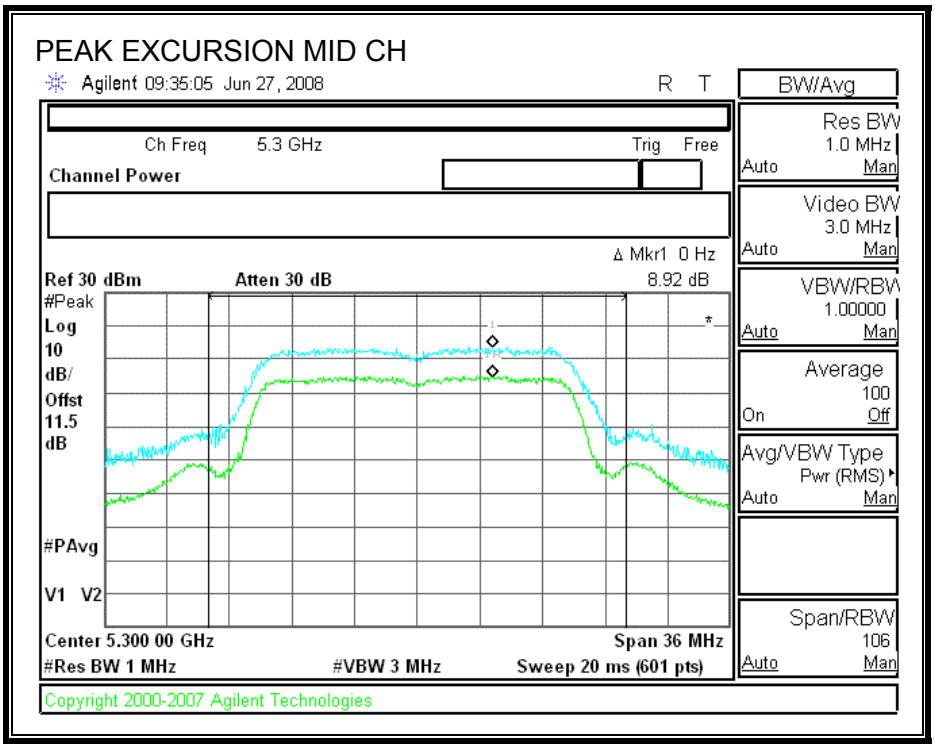
PEAK EXCURSION HIGH CH

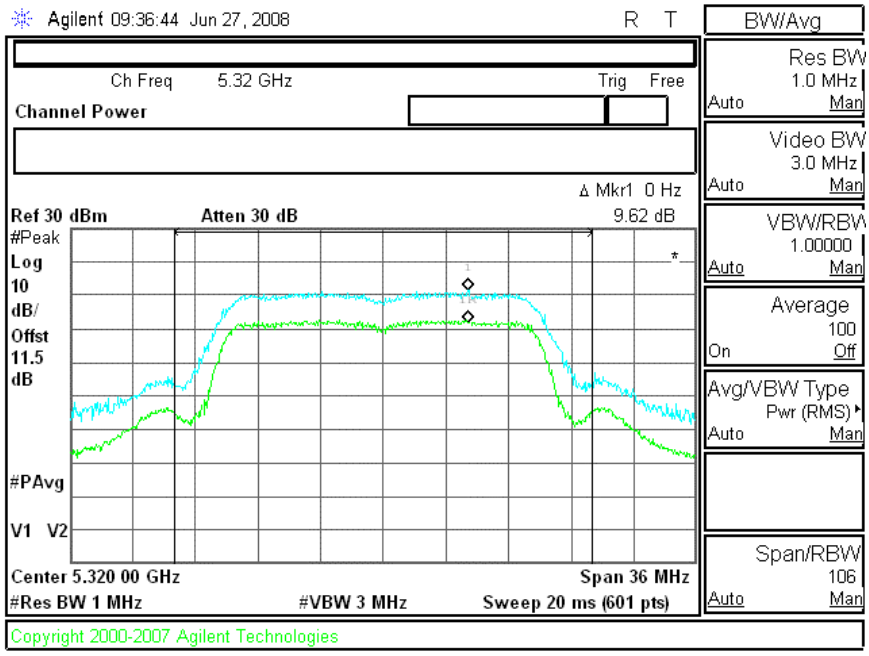


PEAK EXCURSION (CHAIN 1)





PEAK EXCURSION HIGH CH



8.2.5. 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

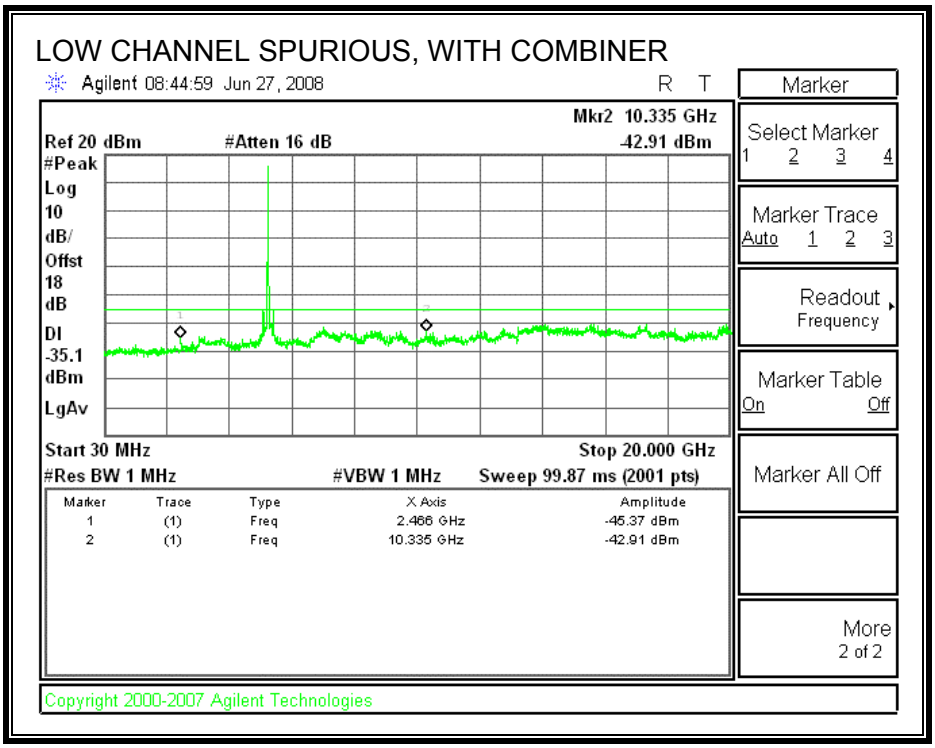
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

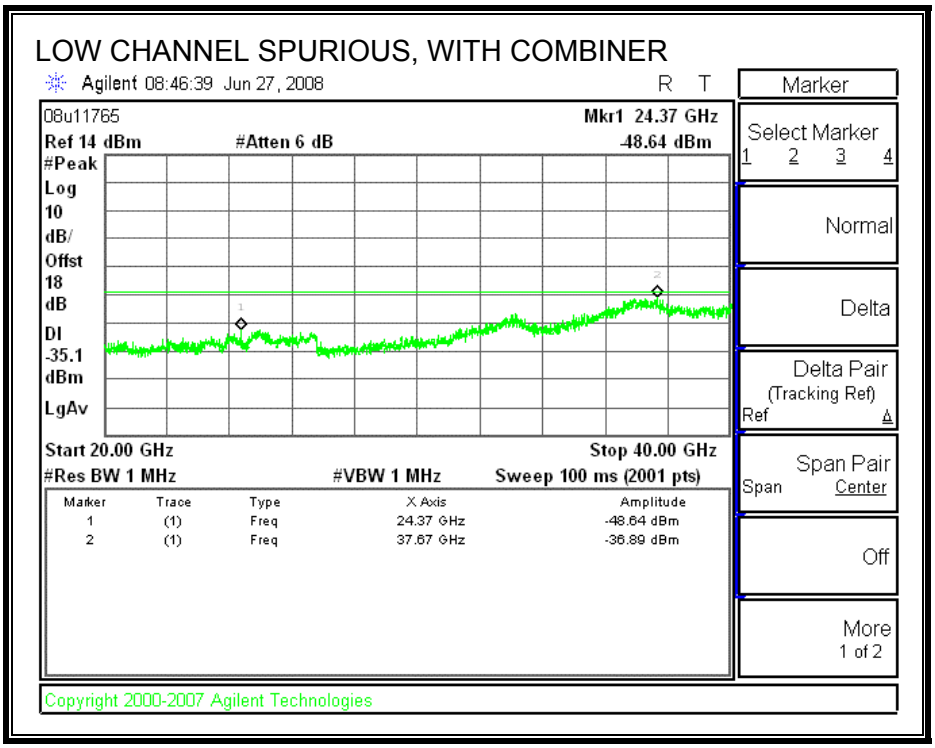
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

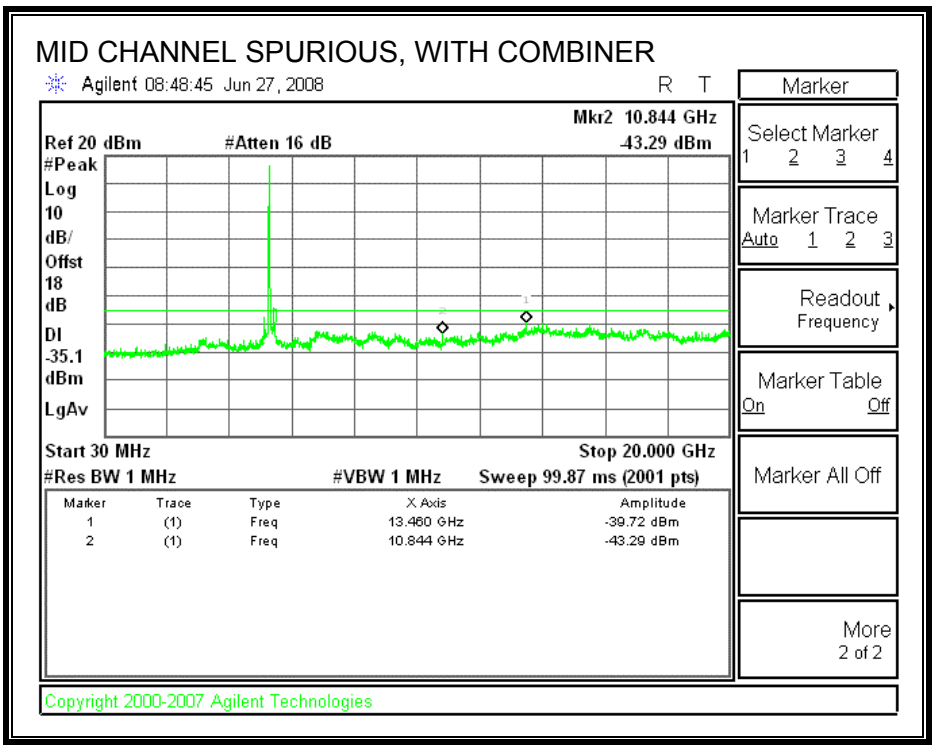
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

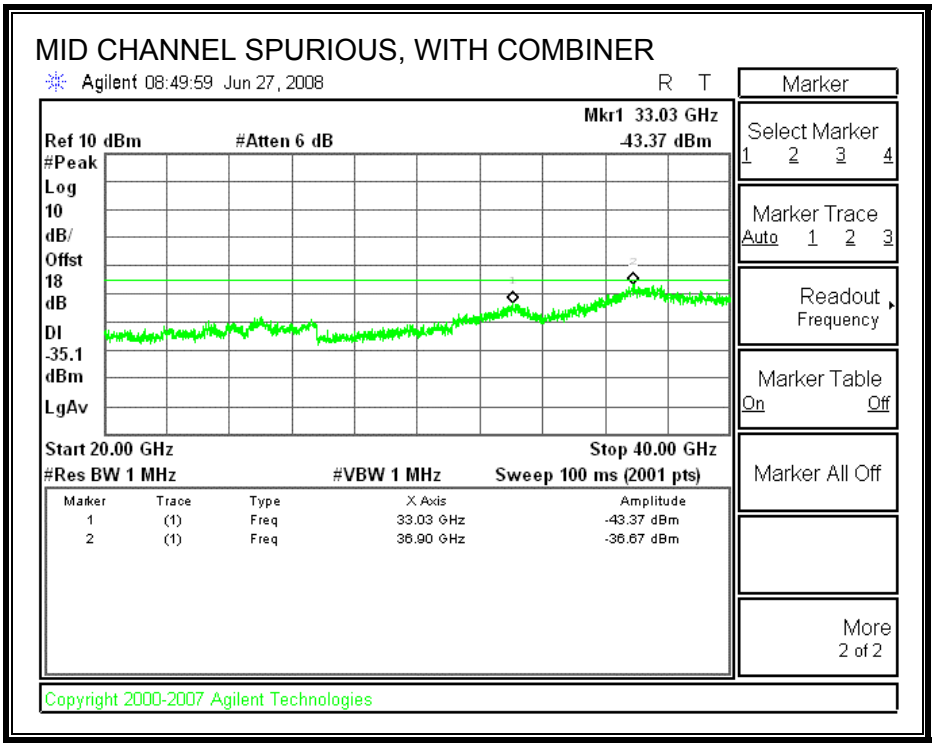
RESULTS

SPURIOUS EMISSIONS WITH COMBINER

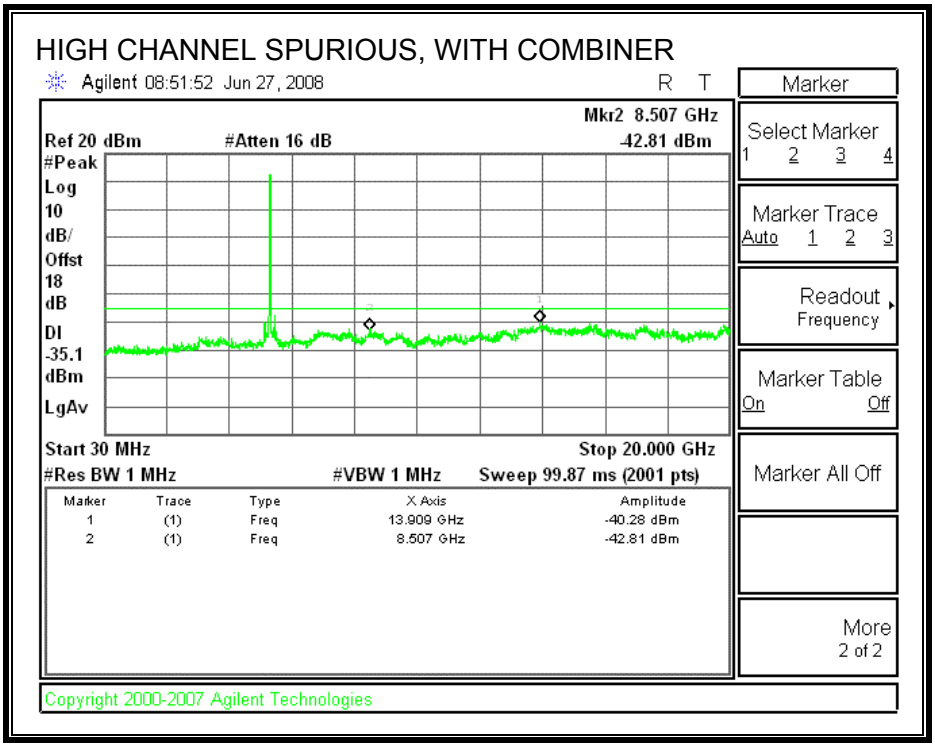




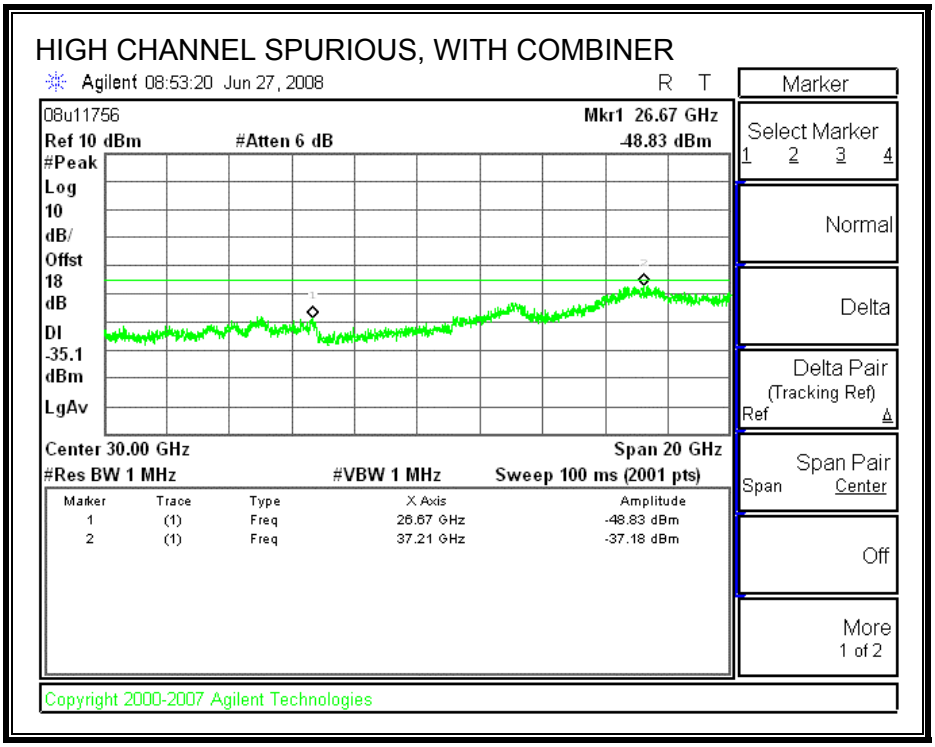




HIGH CHANNEL SPURIOUS, WITH COMBINER



HIGH CHANNEL SPURIOUS, WITH COMBINER



8.3. 802.11n HT40 SISO MODE

8.3.1. 26 dB and 99% BANDWIDTH

LIMITS

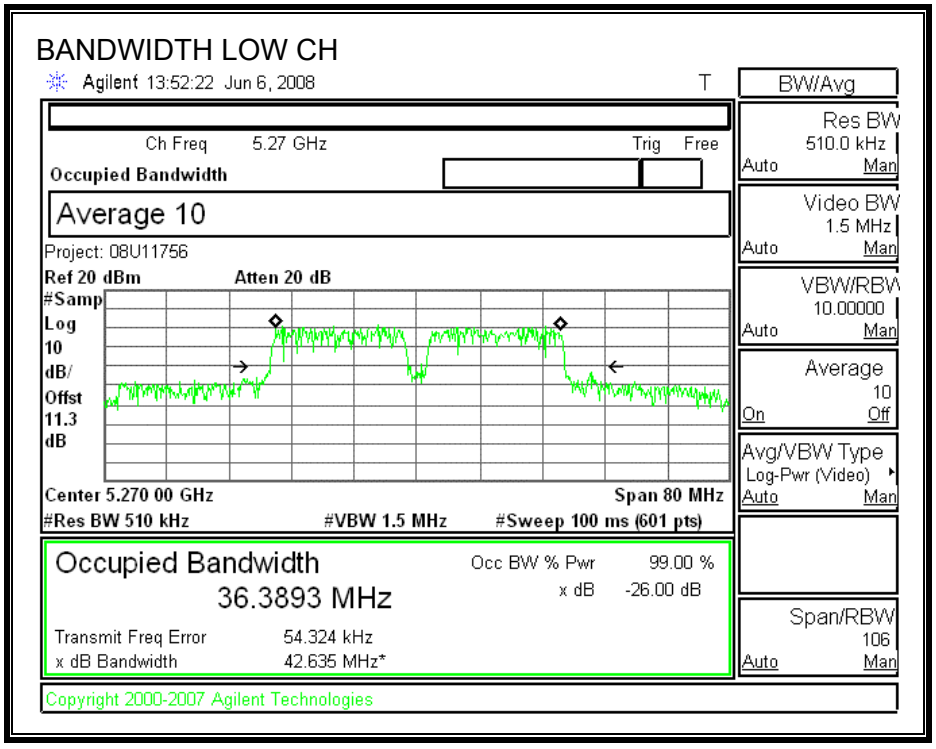
None; for reporting purposes only.

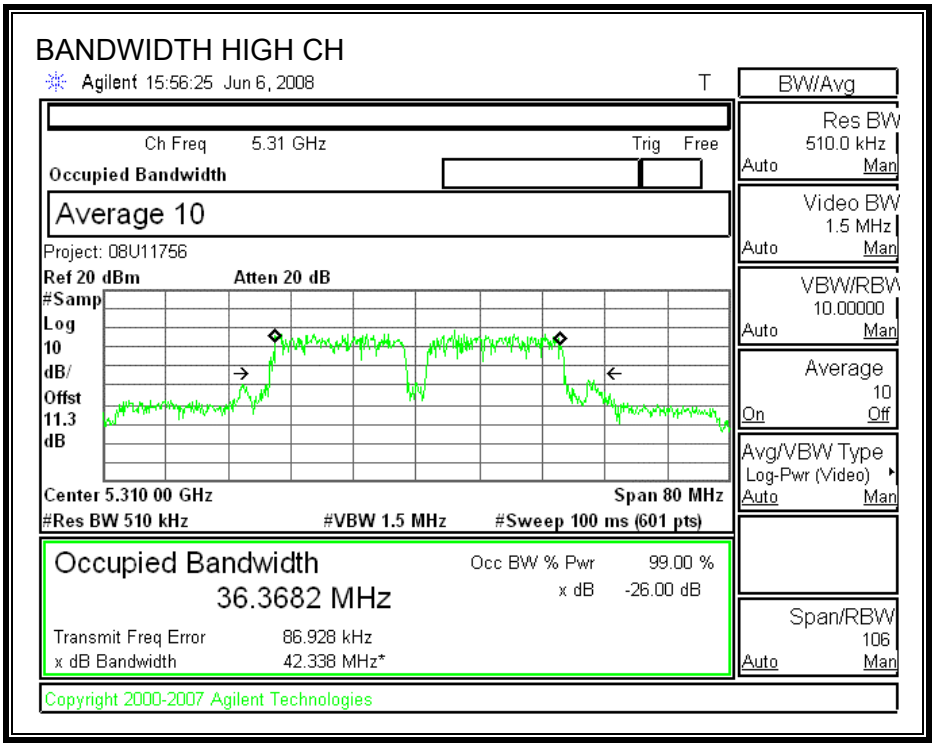
TEST PROCEDURE

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	5270	42.635	36.3893
High	5310	42.338	36.3682





8.3.2. 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.

Max antenna gain is 6.42 dBi (Tyco, PIFA, M97PFTAP2 @ 5.3 GHz band)

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.

RESULTS

Limit

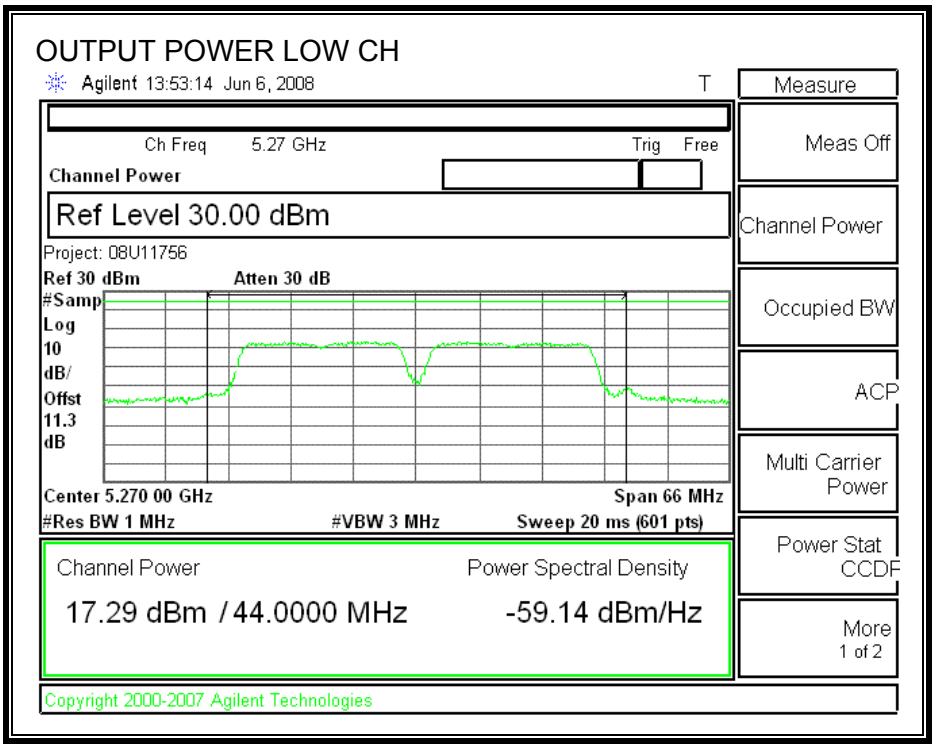
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5270	24	42.635	27.30	6.42	23.58
High	5310	24	42.338	27.27	6.42	23.58

Results

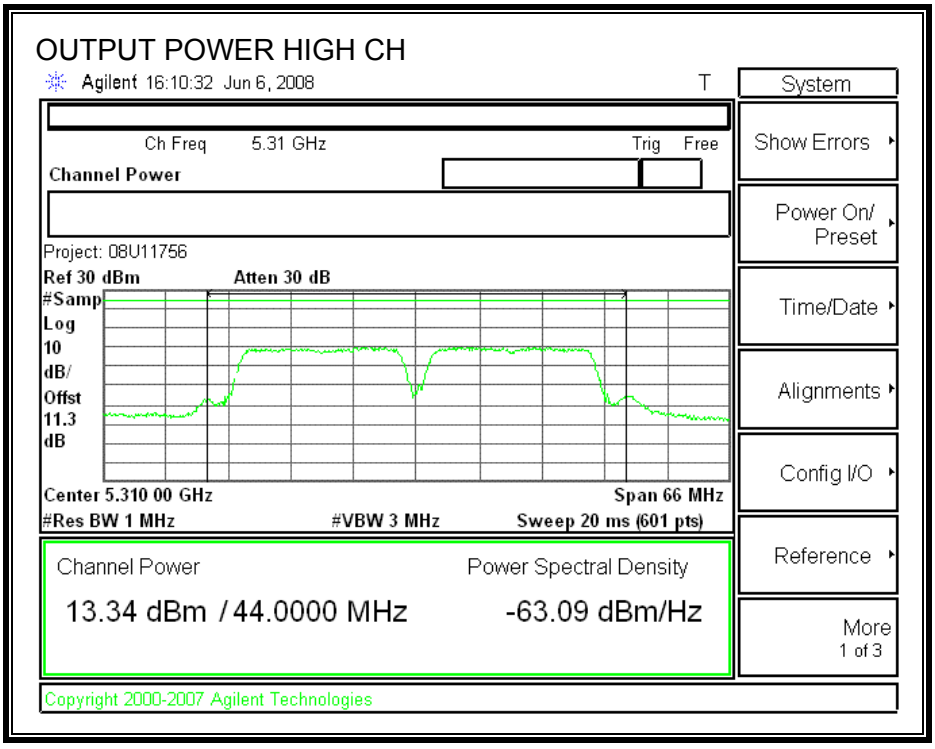
Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5270	17.29	23.58	-6.29
High	5310	13.34	23.58	-10.24

OUTPUT POWER

OUTPUT POWER LOW CH



OUTPUT POWER HIGH CH



8.3.3. 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.

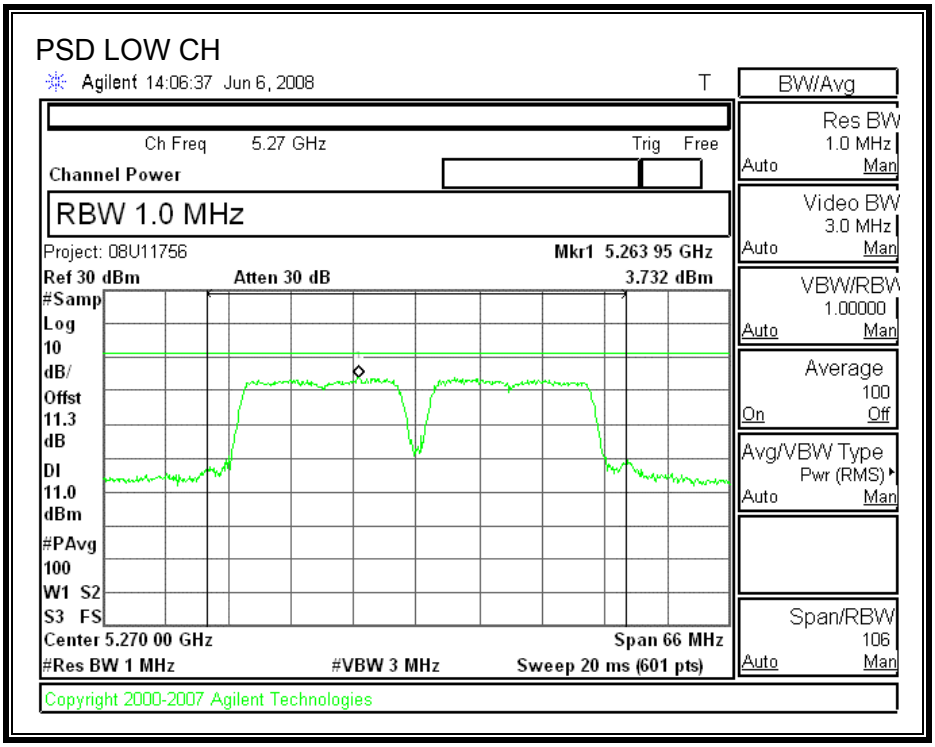
TEST PROCEDURE

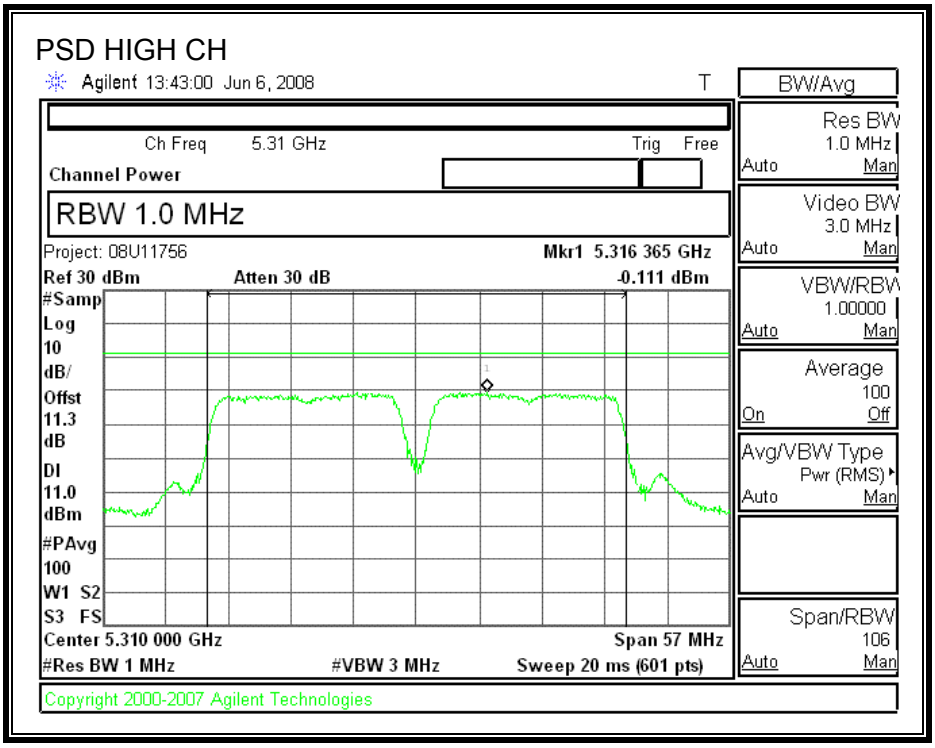
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5270	3.732	10.58	-6.85
High	5310	-0.111	10.58	-10.69

POWER SPECTRAL DENSITY





8.3.4. 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

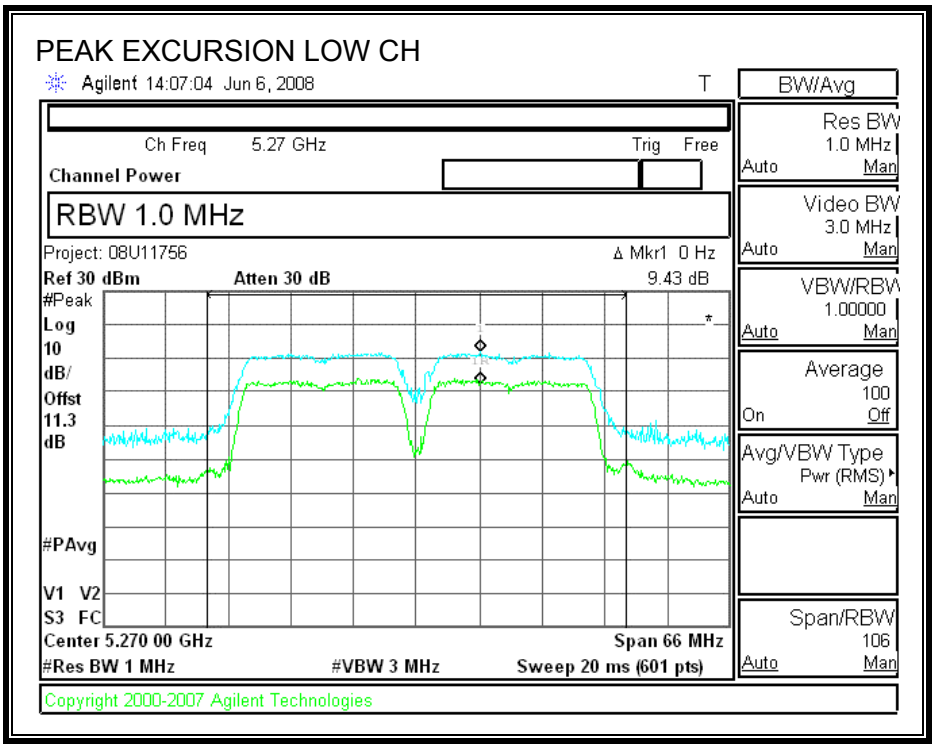
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

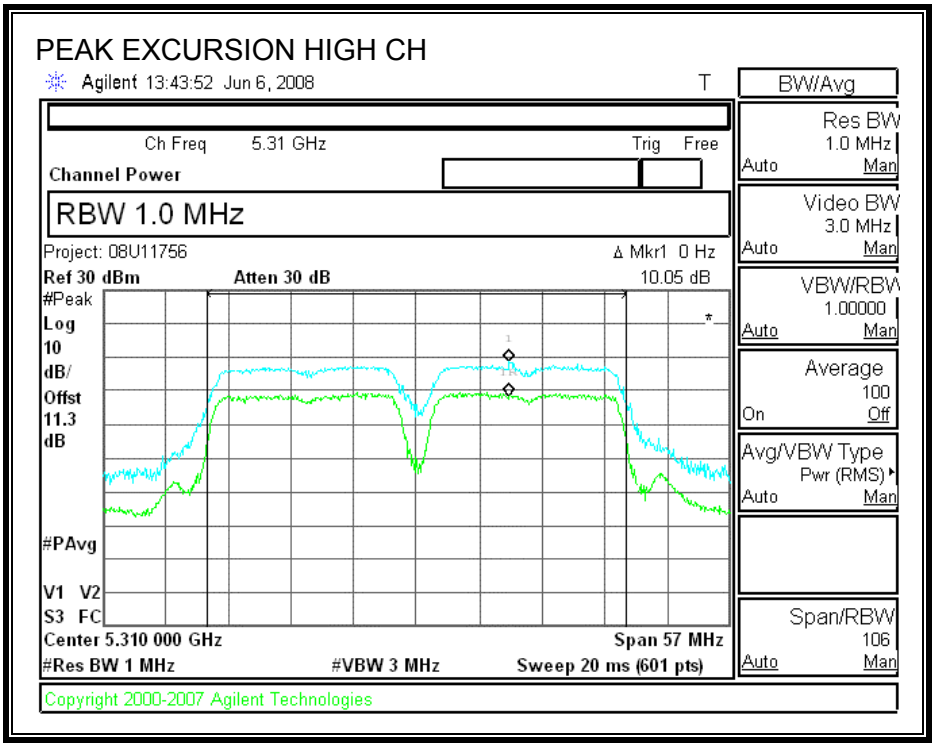
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5270	9.43	13	-3.57
High	5310	10.05	13	-2.95

PEAK EXCURSION





8.3.5. 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

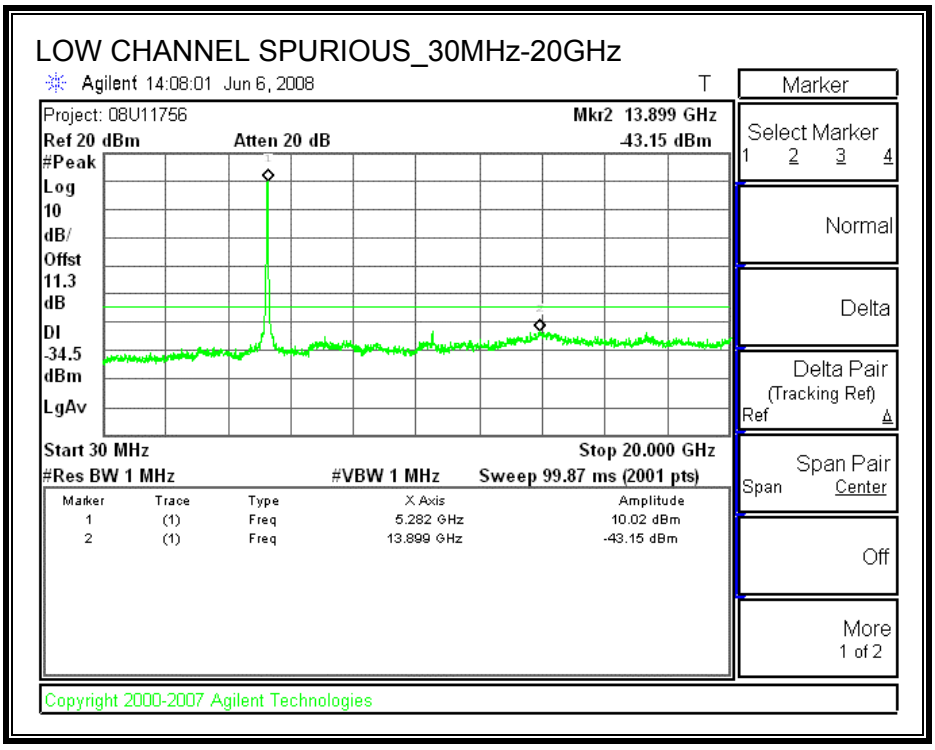
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

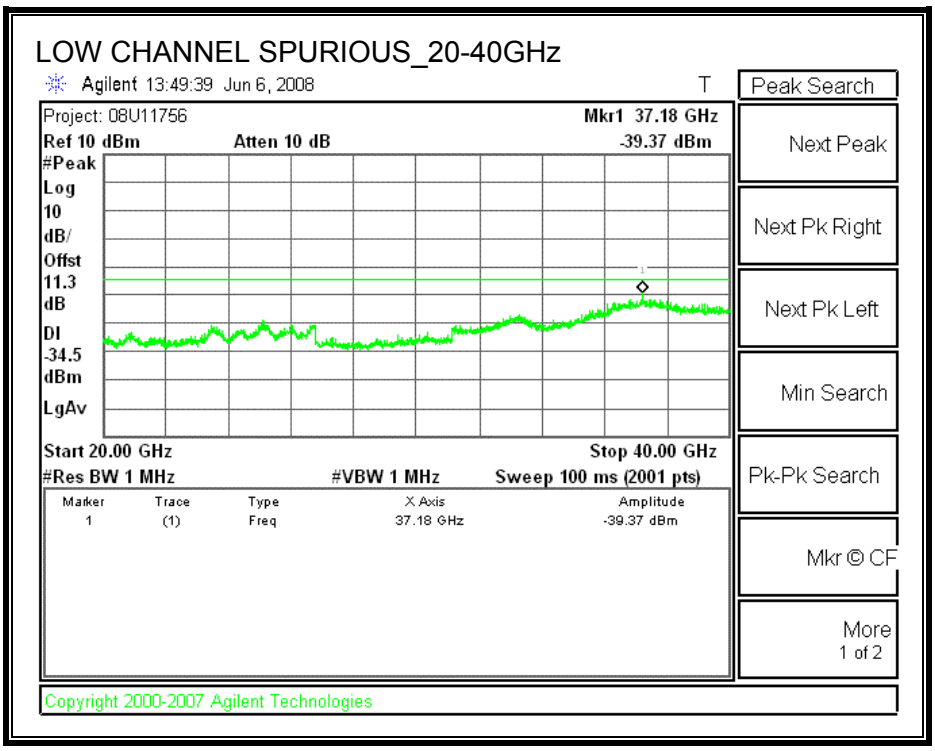
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

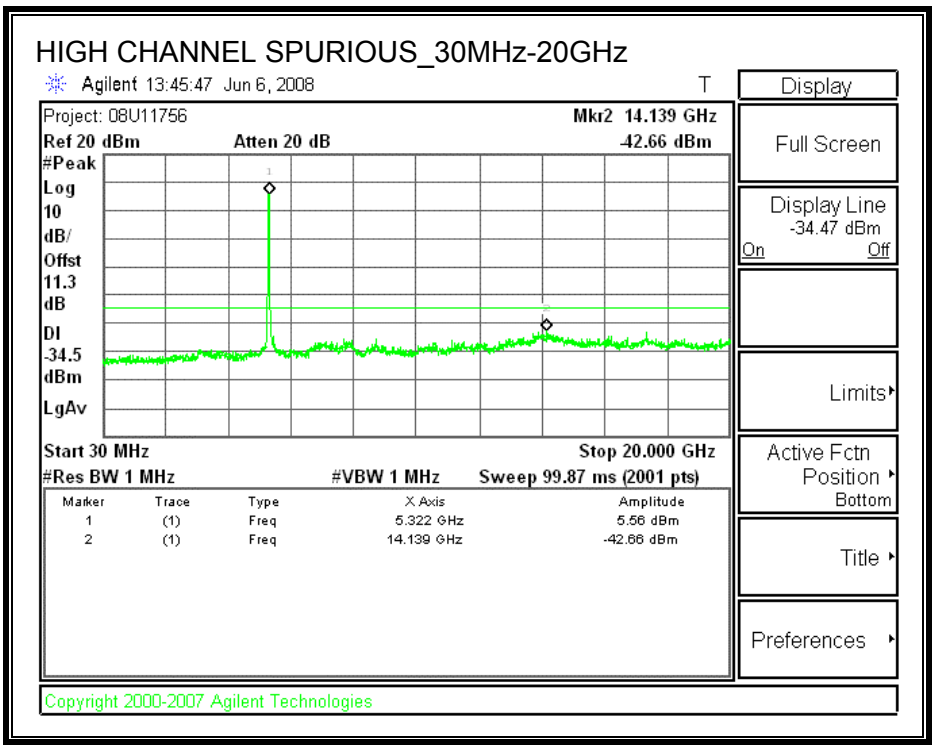
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

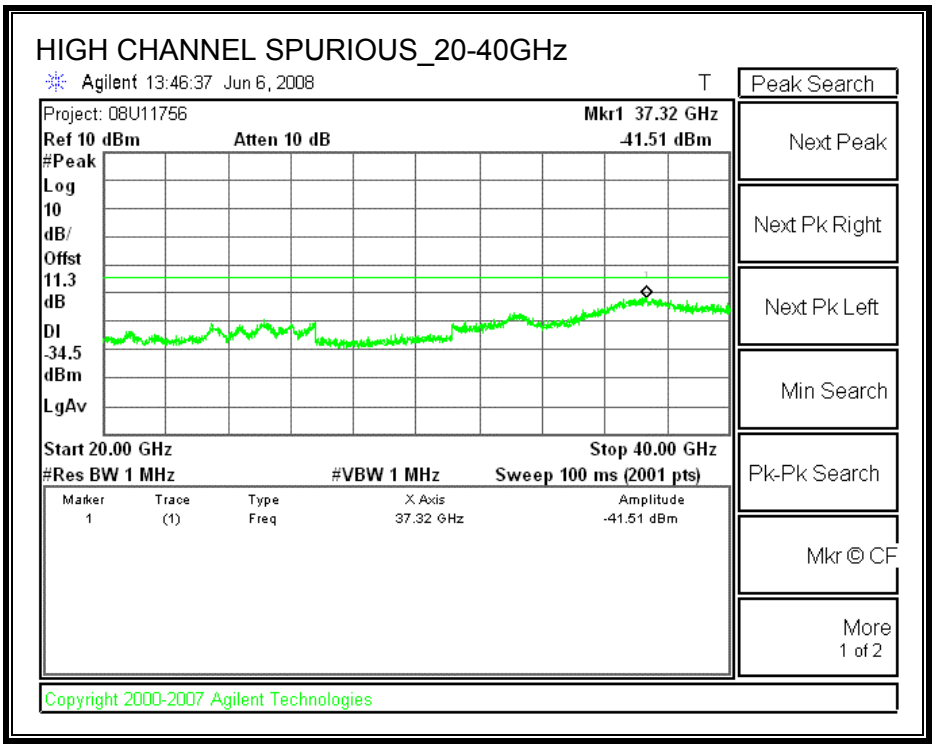
RESULTS

SPURIOUS EMISSIONS









8.4. 802.11n HT40 MODE

8.4.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

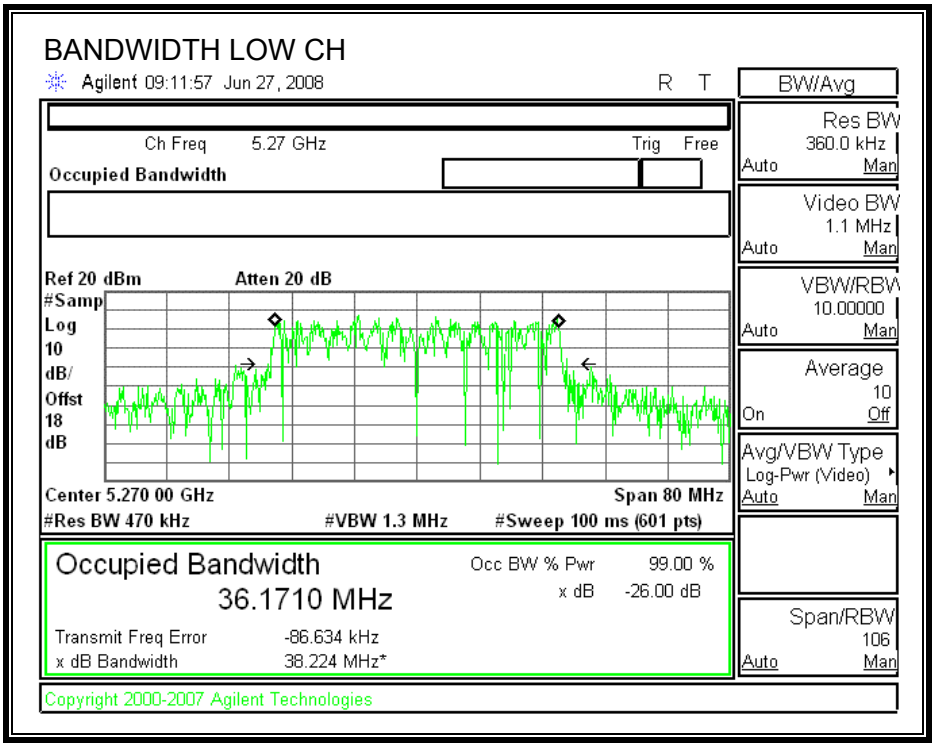
TEST PROCEDURE

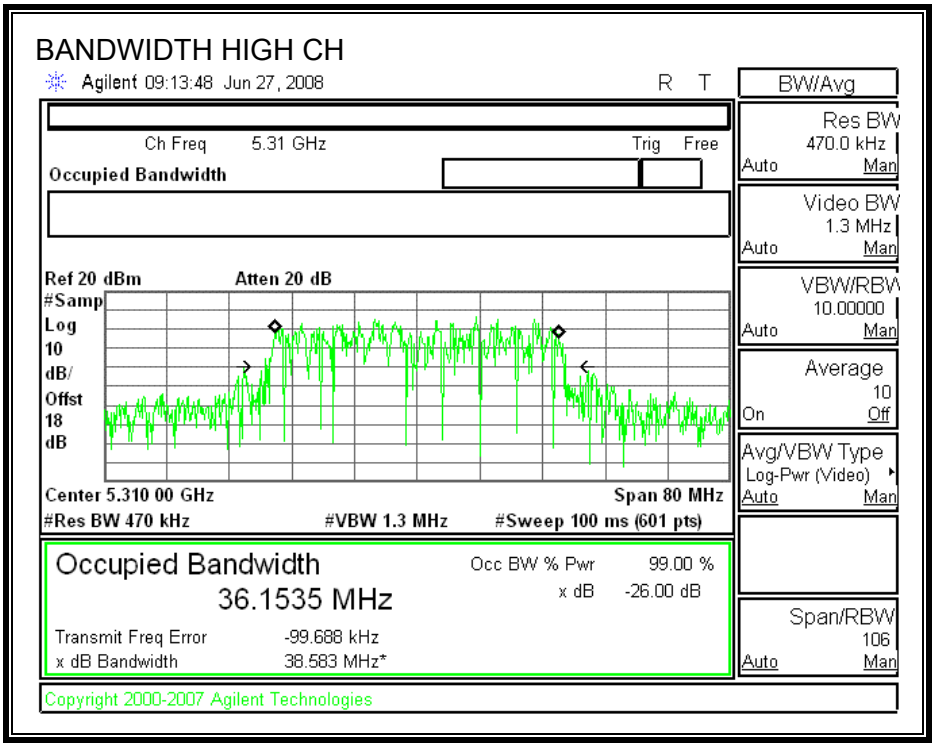
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Middle	5270	38.224	36.171
High	5310	38.583	36.154

26 dB and 99% BANDWIDTH





8.4.2. OUTPUT POWER

LIMITS

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

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

TEST PROCEDURE

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

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

RESULTS

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

Note: Waived this test due to the highest combination antenna gain 7.84 dBi pass the Output power test.

Antenna Combination: Hi PIFA / Low Slot = 7.84dBi
Tyco PIFA M97PFTAP2 (6.42 dBi) plus Tyco Slot M97SLTAP1 (2.28 dBi) = 7.84 dBi

Limit

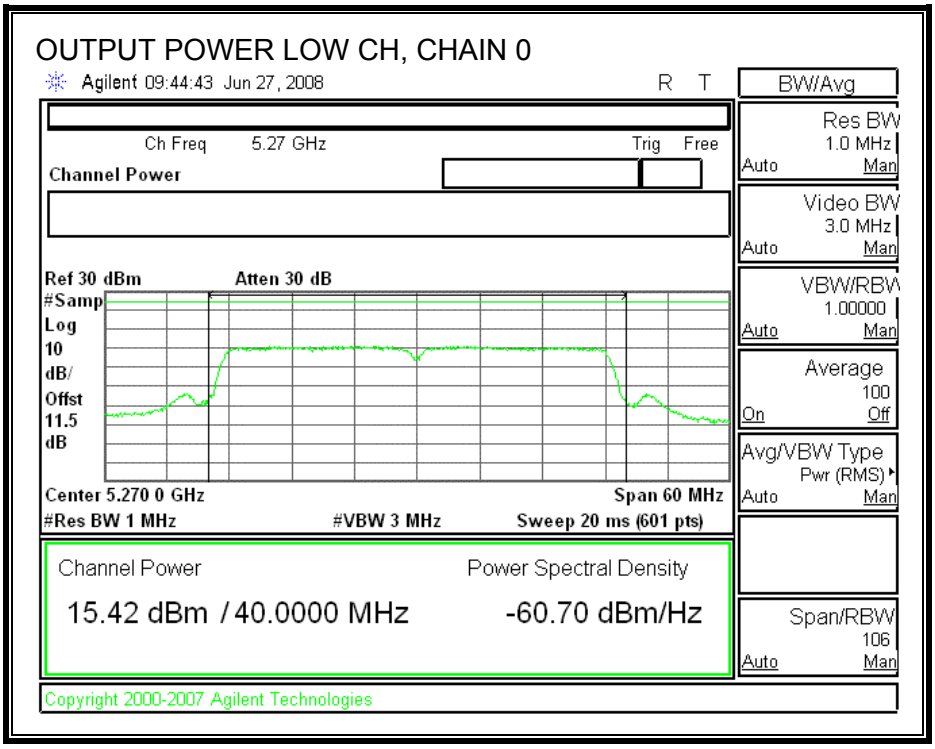
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5270	24	38.224	26.82	7.84	22.16
High	5310	24	38.583	26.86	7.84	22.16

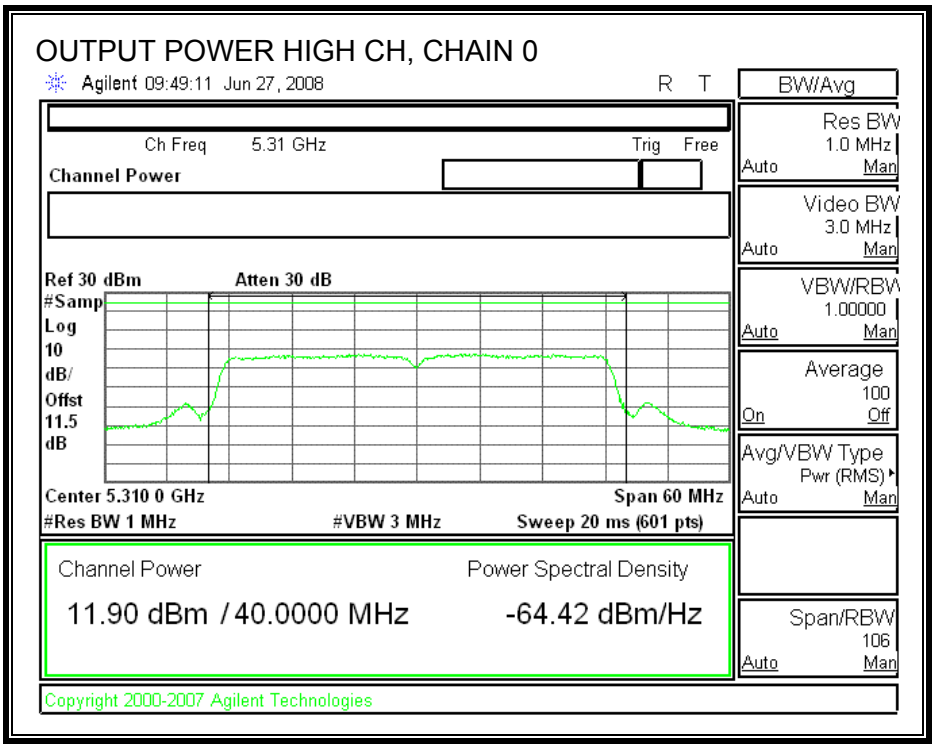
Individual Chain Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5270	15.42	15.76	18.60	22.16	-3.56
High	5310	11.90	12.34	15.14	22.16	-7.03

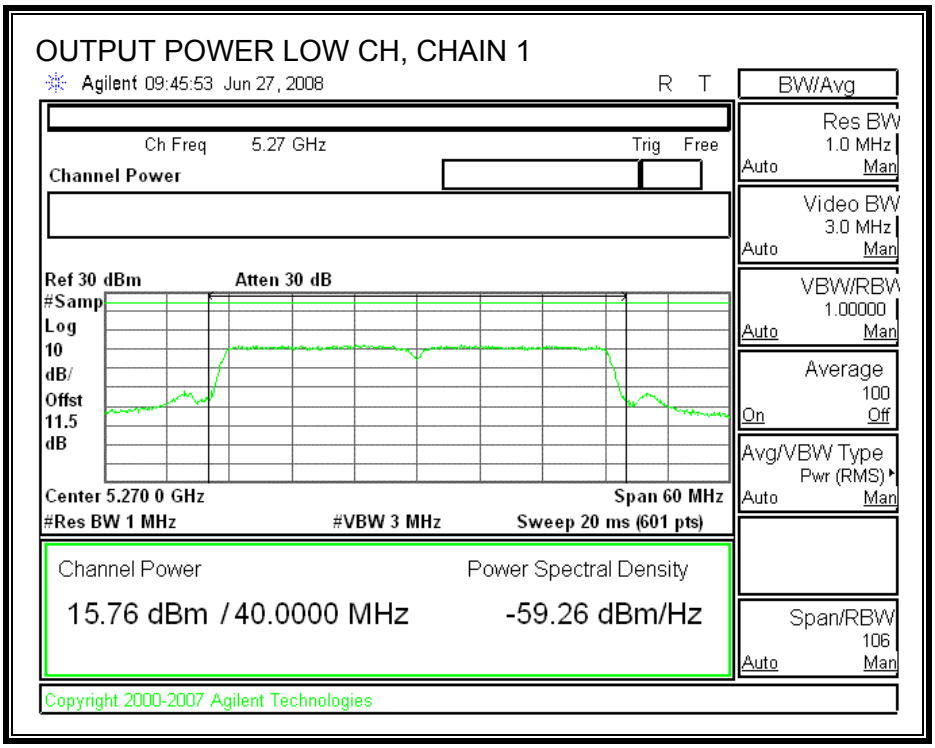
Antenna Combination: Hi PIFA / Low Slot = 7.84dBi

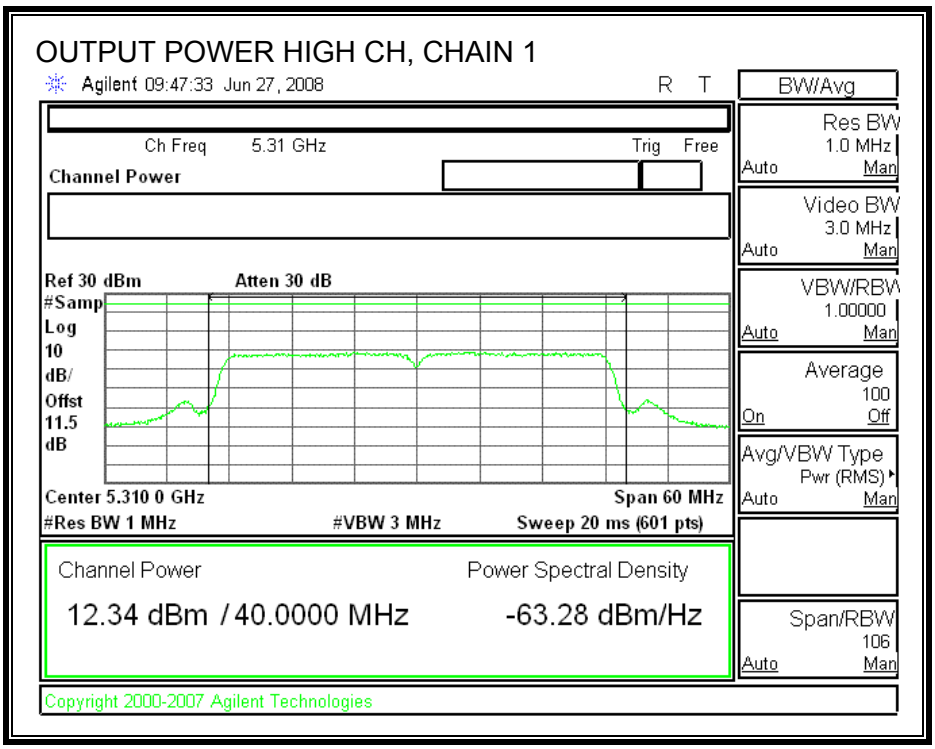
CHAIN 0 OUTPUT POWER





CHAIN 1 OUTPUT POWER





8.4.3. 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.

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

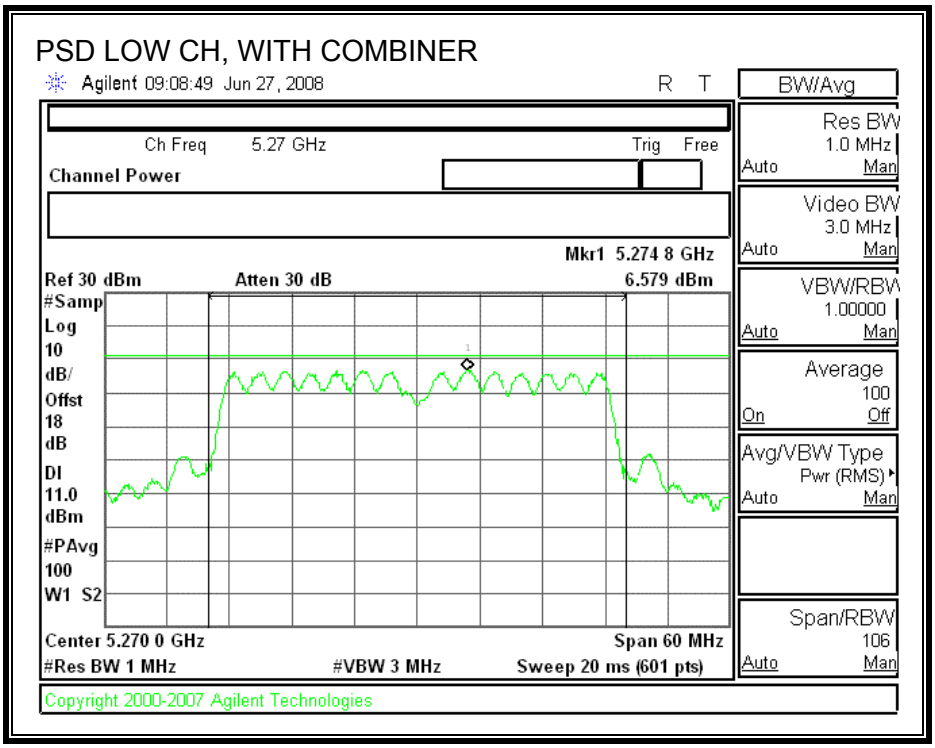
Antenna Combination: Low PIFA / Hi Slot = 6.72dBi
Foxconn PIFA WDAN-HQAT80-03-DF (2.99 dBi) plus X 9 Slot K5SLT (4.32 dBi) = 6.72 dBi

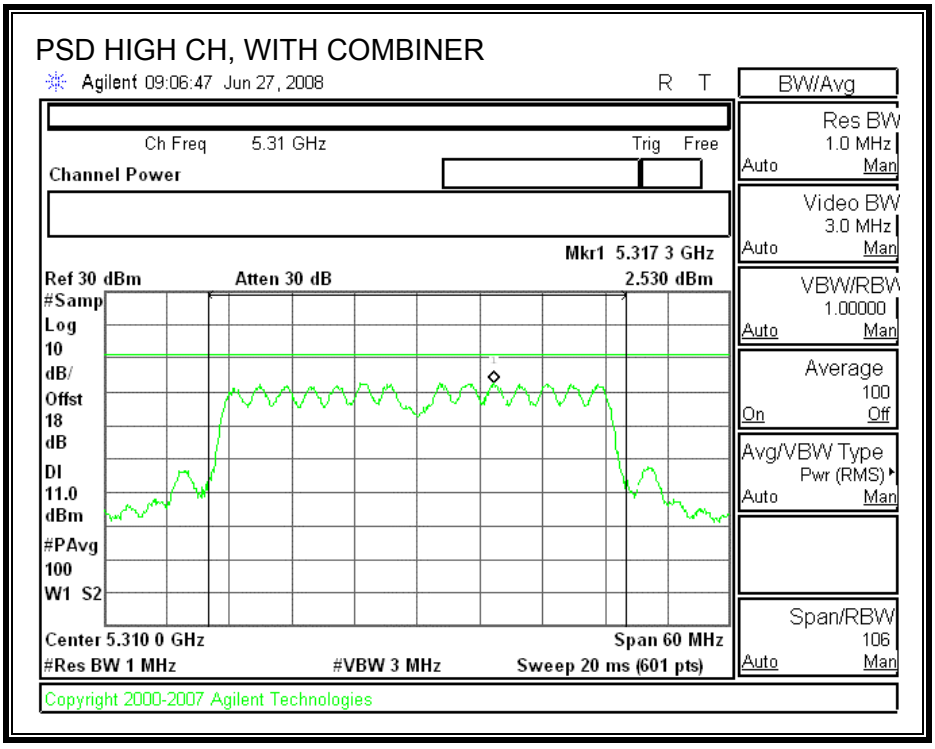
Note: Waived this test due to the highest combination antenna gain 7.84 dBi pass the PPSD test.

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	5270	6.759	9.16	-2.40
High	5310	2.530	9.16	-6.63

POWER SPECTRAL DENSITY WITH COMBINER





8.4.4. 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

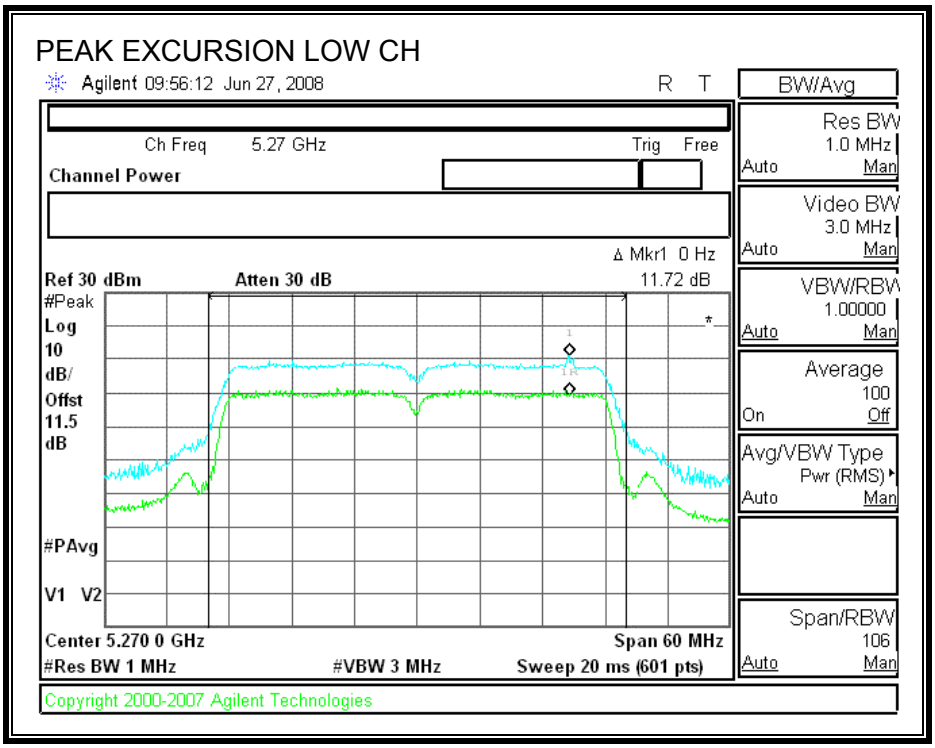
CHAIN 0

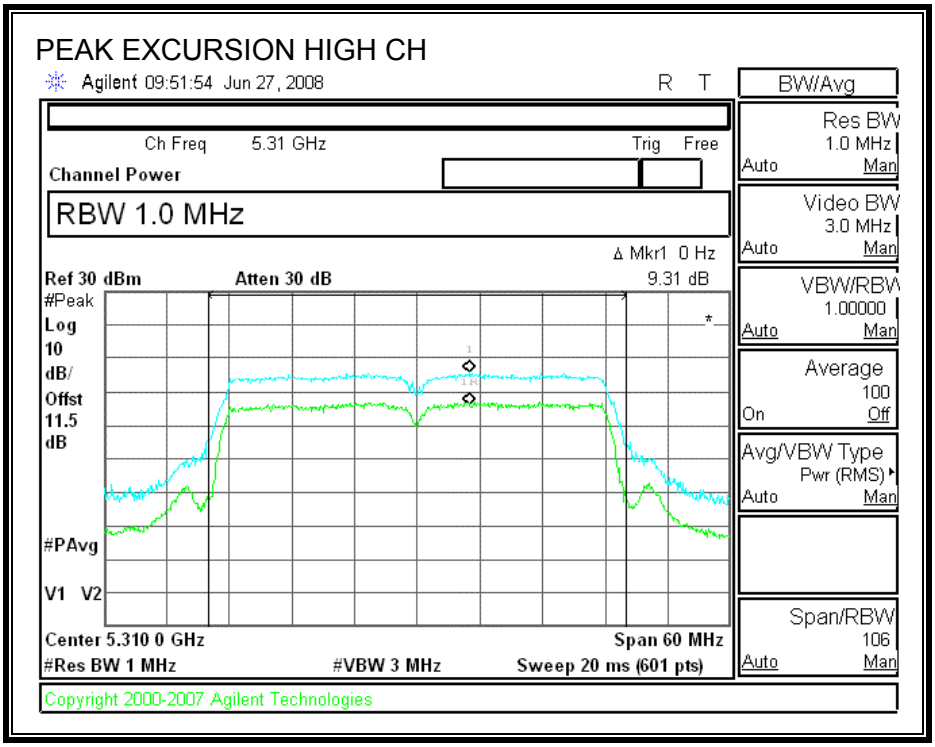
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5270	11.72	13	-1.28
High	5310	9.31	13	-3.69

CHAIN 1

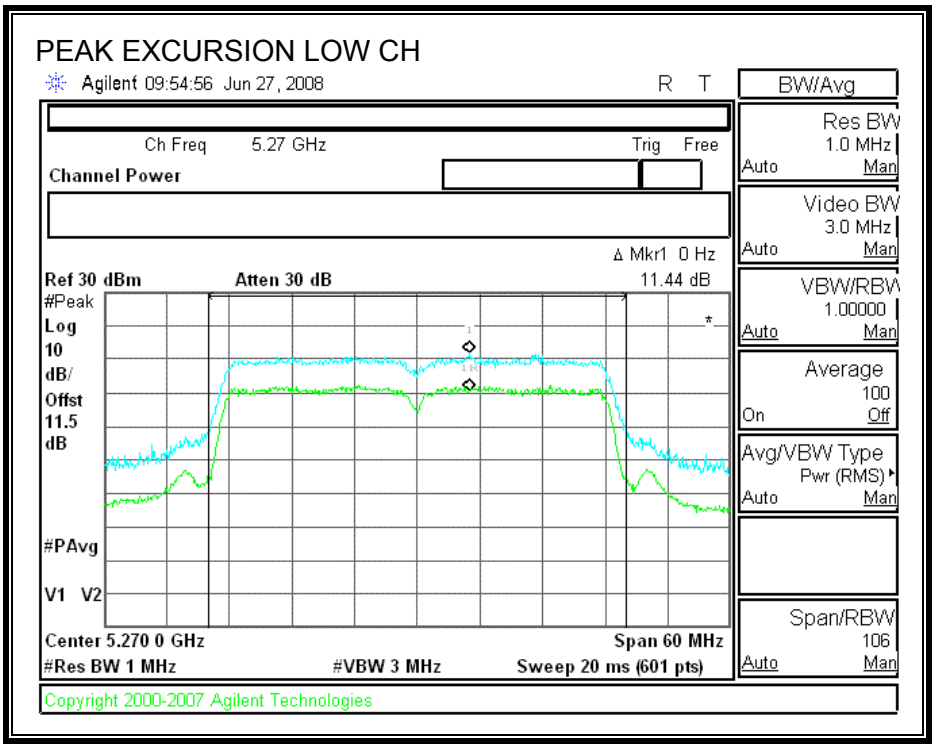
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5270	11.44	13	-1.56
High	5310	12.46	13	-0.54

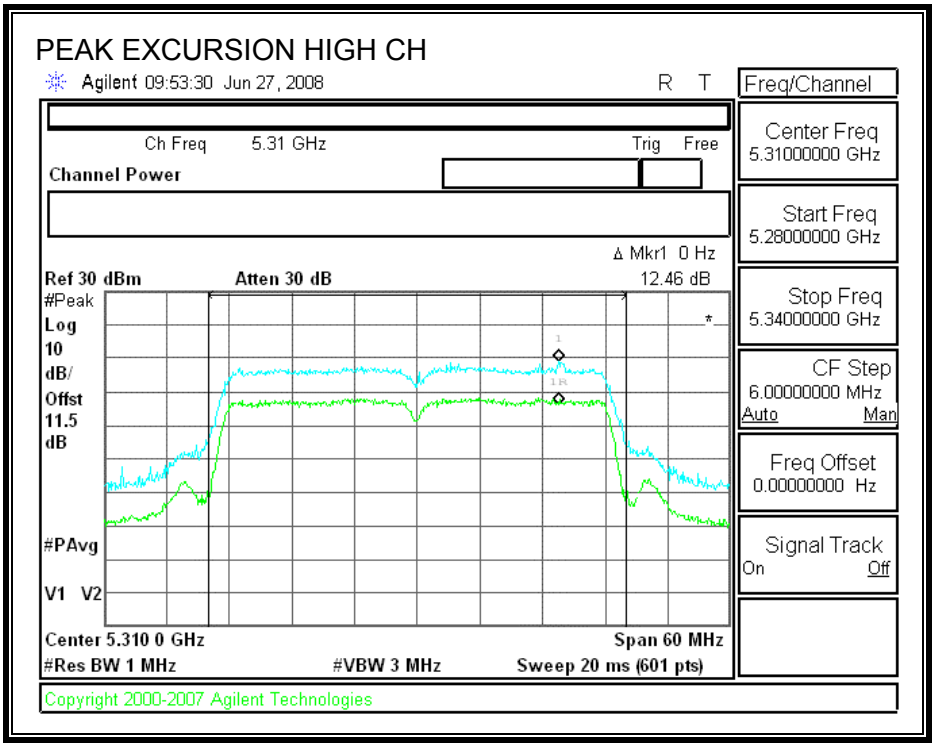
PEAK EXCURSION (CHAIN 0)





PEAK EXCURSION (CHAIN 1)





8.4.5. 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

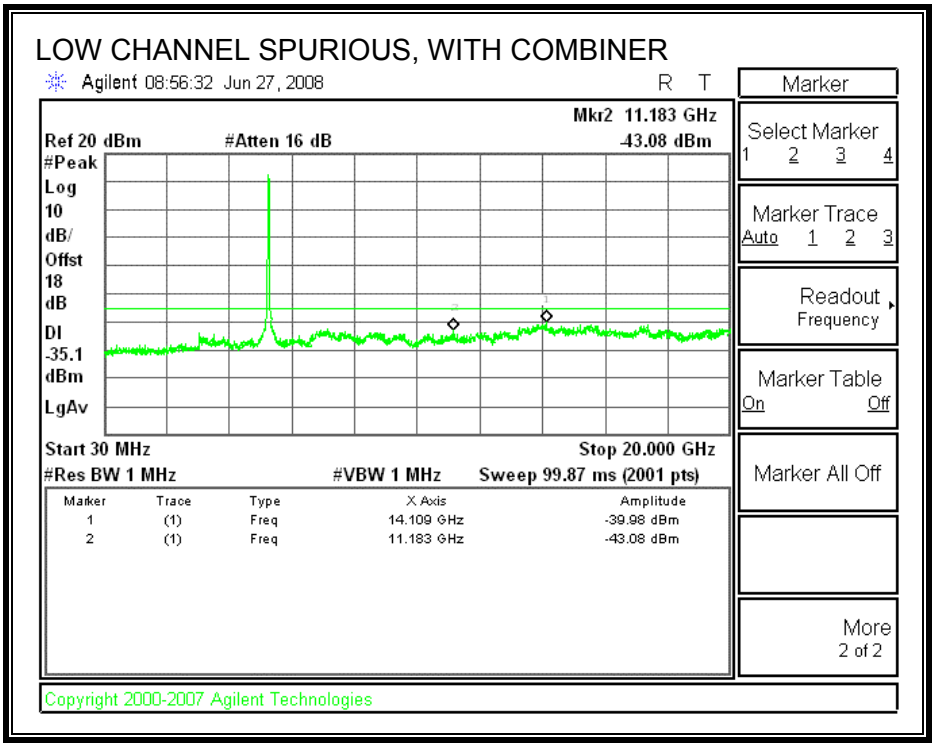
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

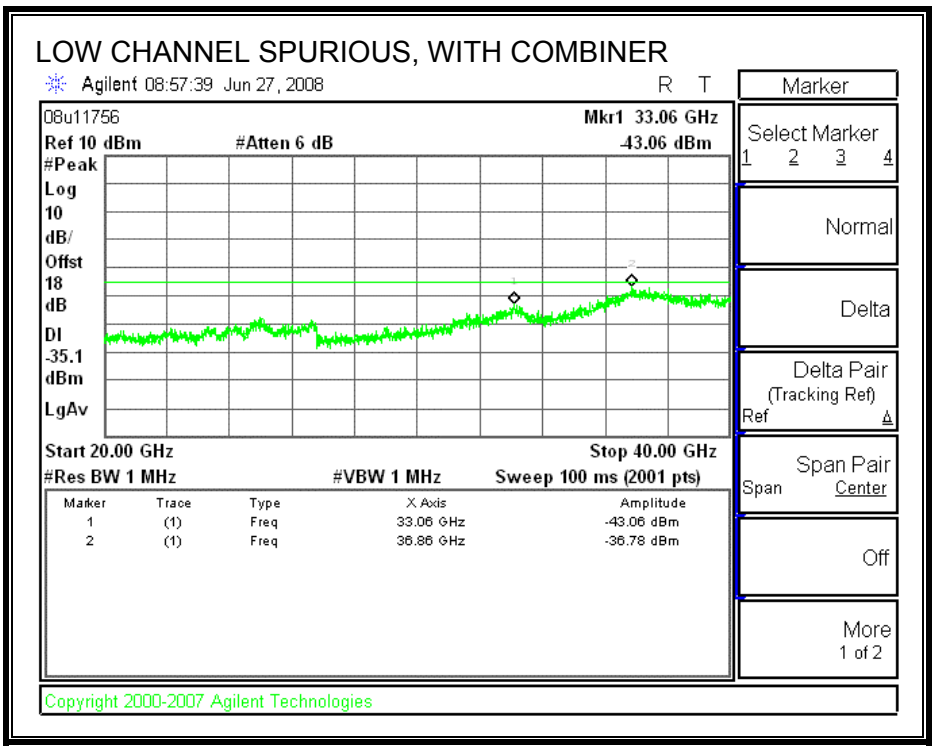
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

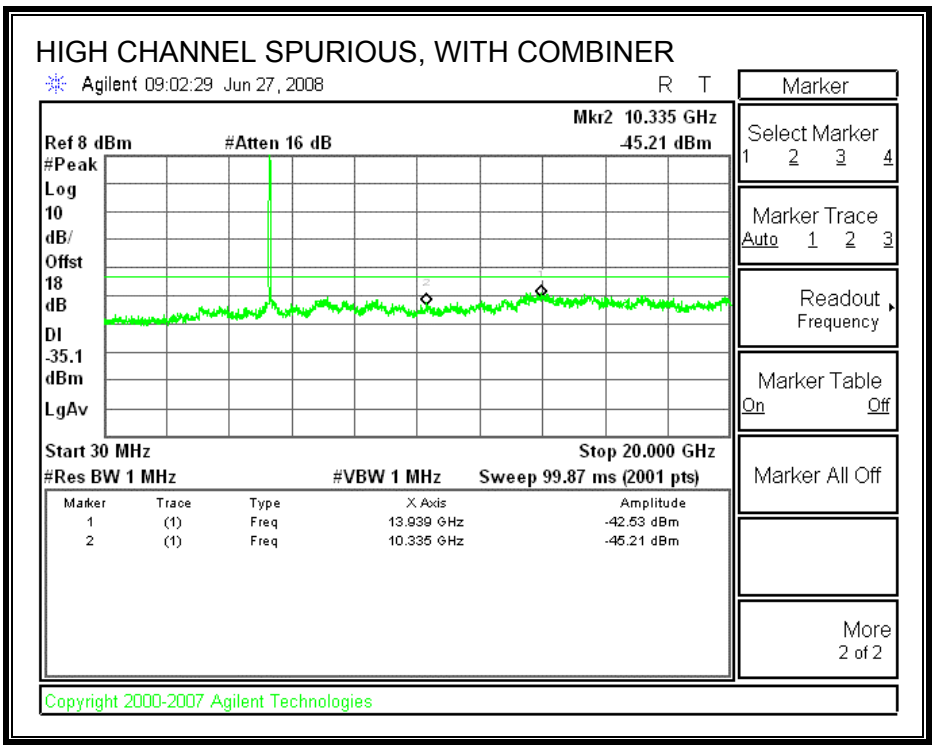
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

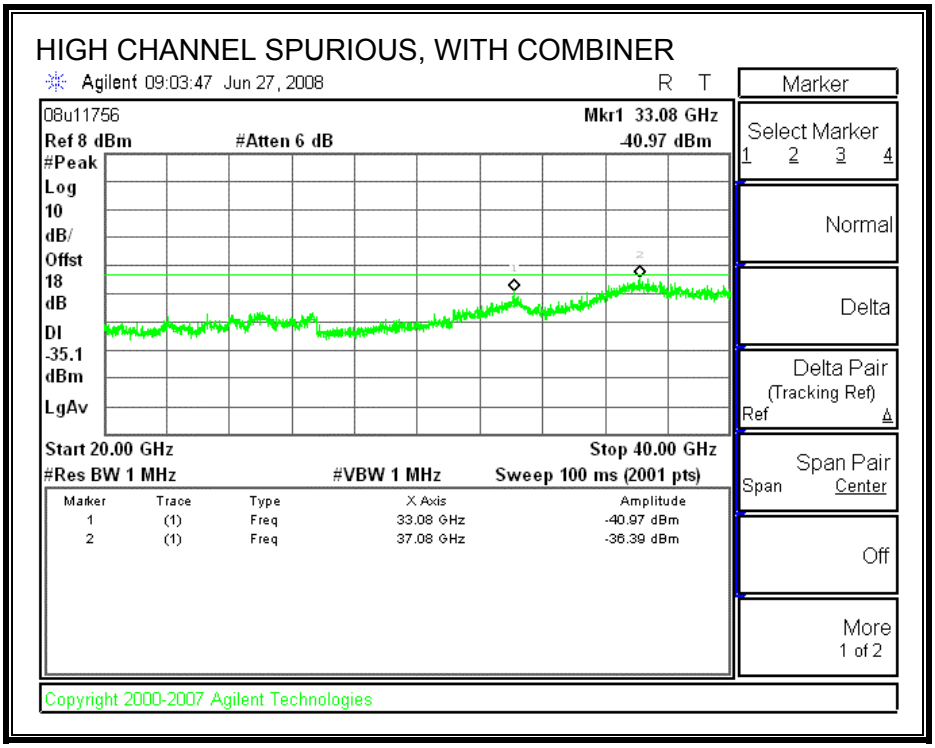
RESULTS

SPURIOUS EMISSIONS WITH COMBINER









9. ANTENNA PORT TEST RESULTS FOR 5.47–5.725 GHz BAND

9.1. 802.11a MODE

9.1.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

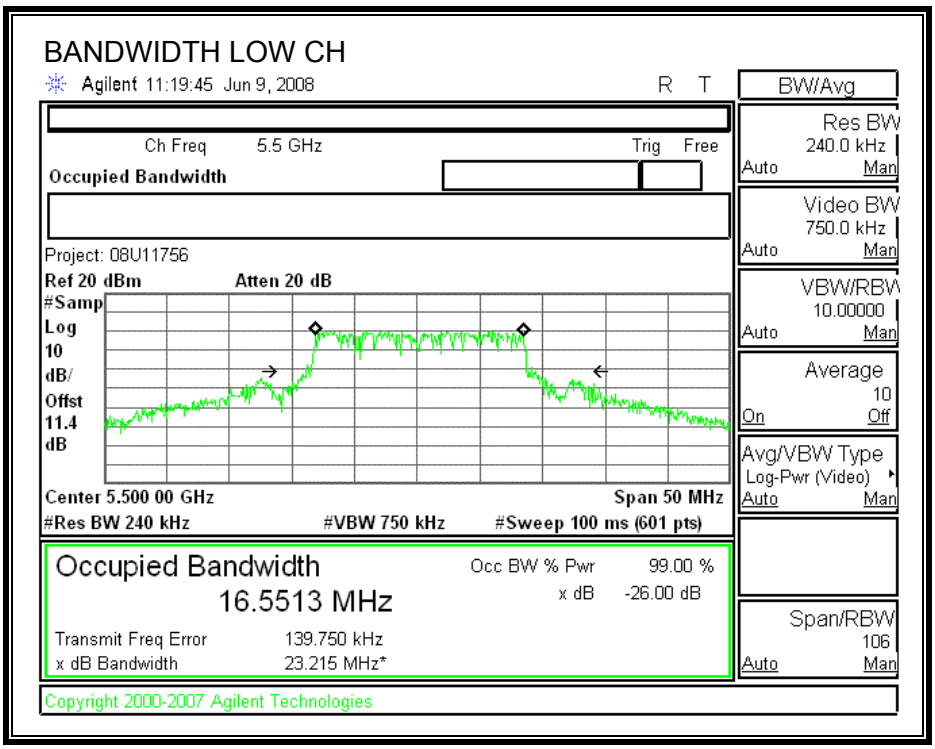
TEST PROCEDURE

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.

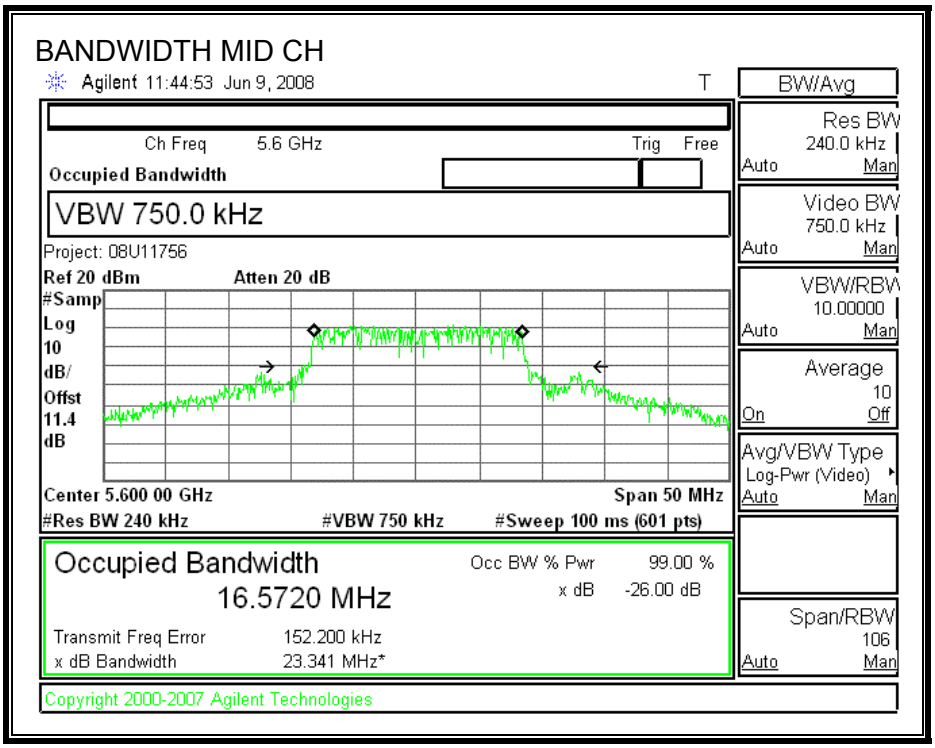
RESULTS

Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
5500	23.215	16.551
5600	23.341	16.572
5700	23.504	16.558

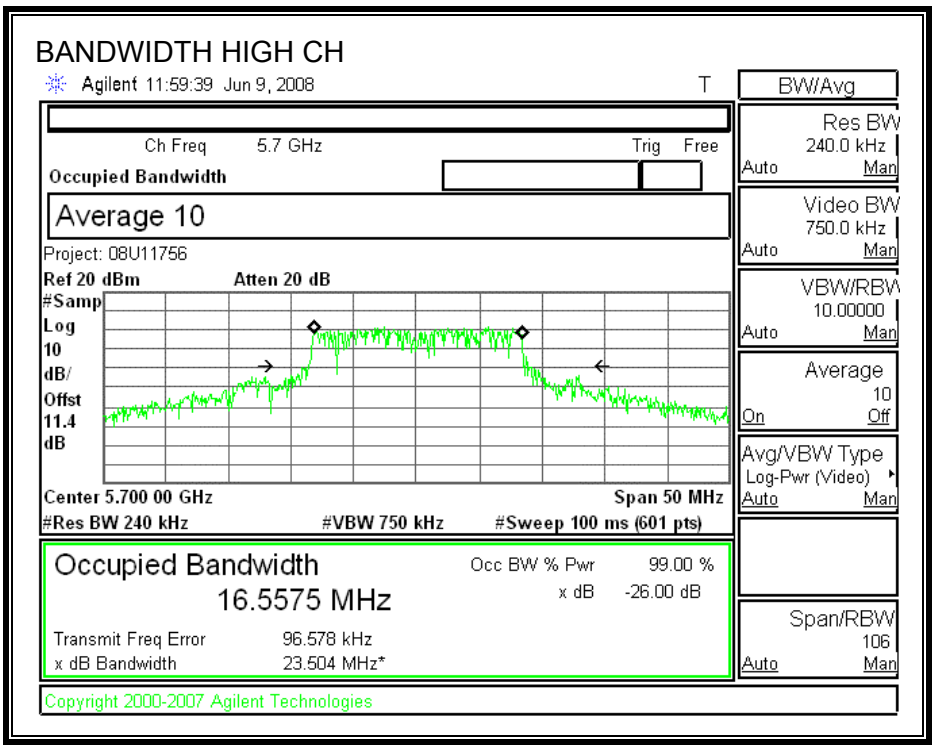
26 dB and 99% BANDWIDTH



BANDWIDTH MID CH



BANDWIDTH HIGH CH



9.1.2. OUTPUT POWER

LIMITS

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

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

The maximum antenna gain is 7.48 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

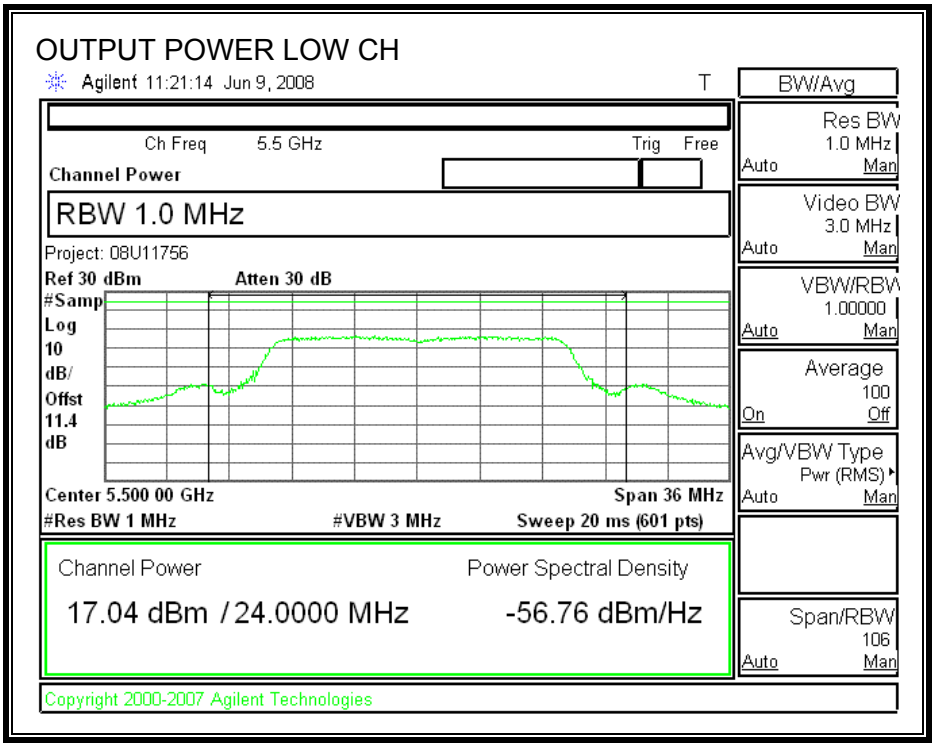
Limit

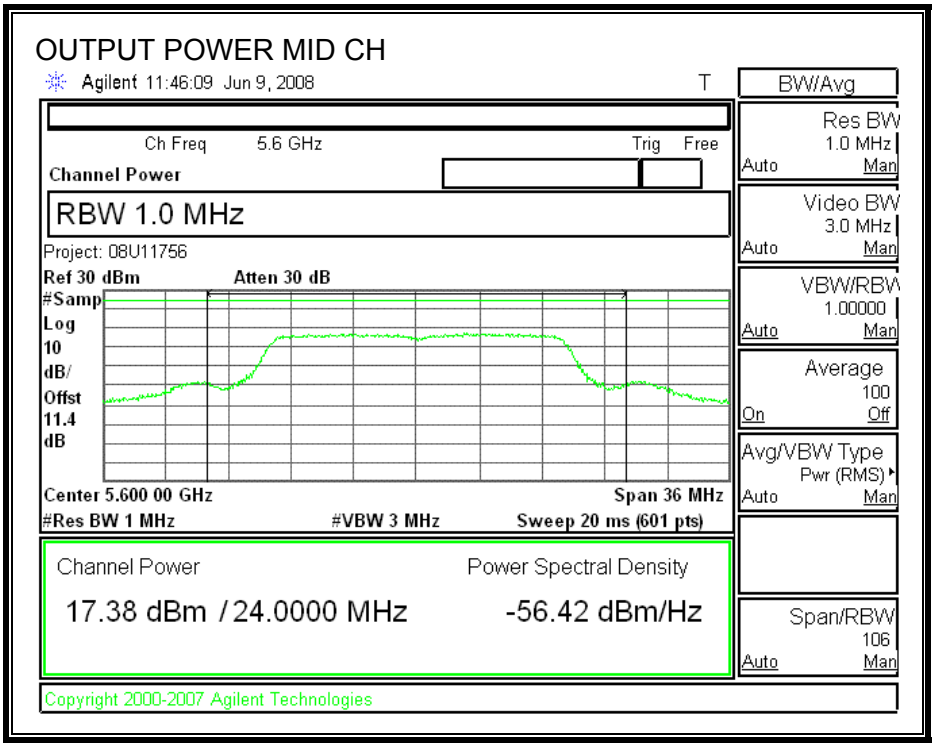
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5500	24	23.215	24.66	7.48	22.52
Mid	5600	24	23.341	24.68	7.48	22.52
High	5700	24	23.504	24.71	7.48	22.52

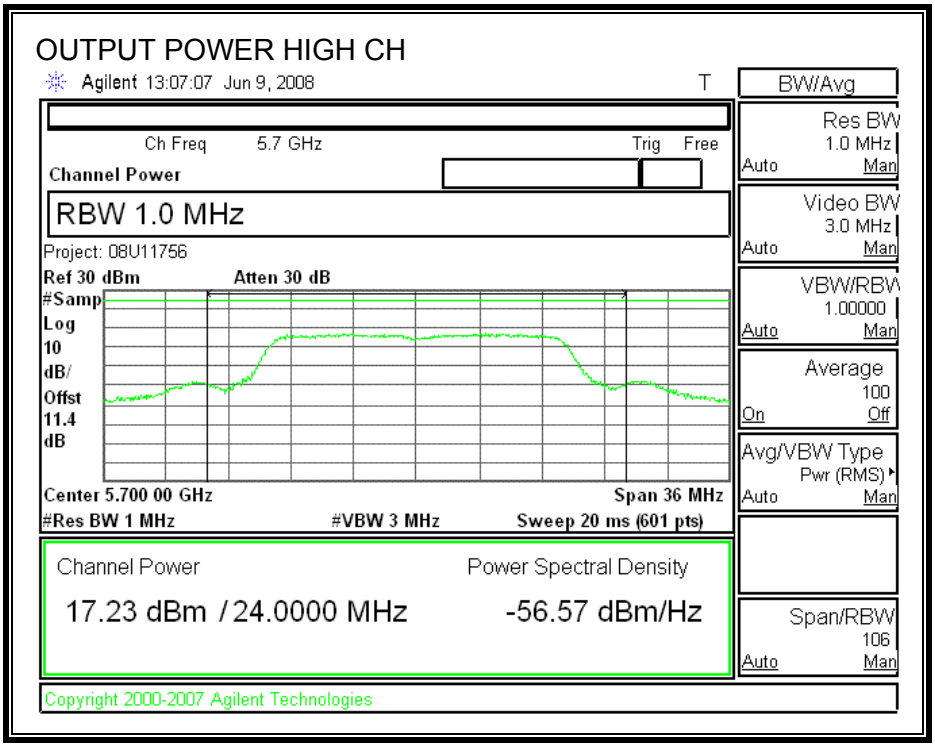
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	17.04	22.52	-5.48
Mid	5600	17.38	22.52	-5.14
High	5700	17.23	22.52	-5.29

OUTPUT POWER







9.1.3. 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 7.48 dBi, therefore the limit is 9.52 dBm.

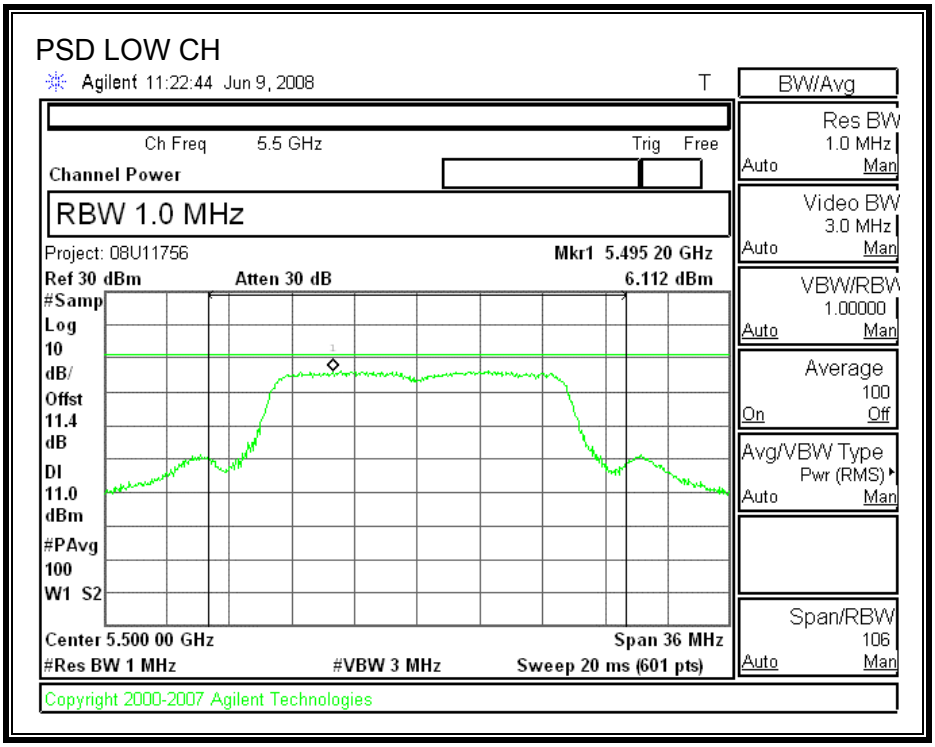
TEST PROCEDURE

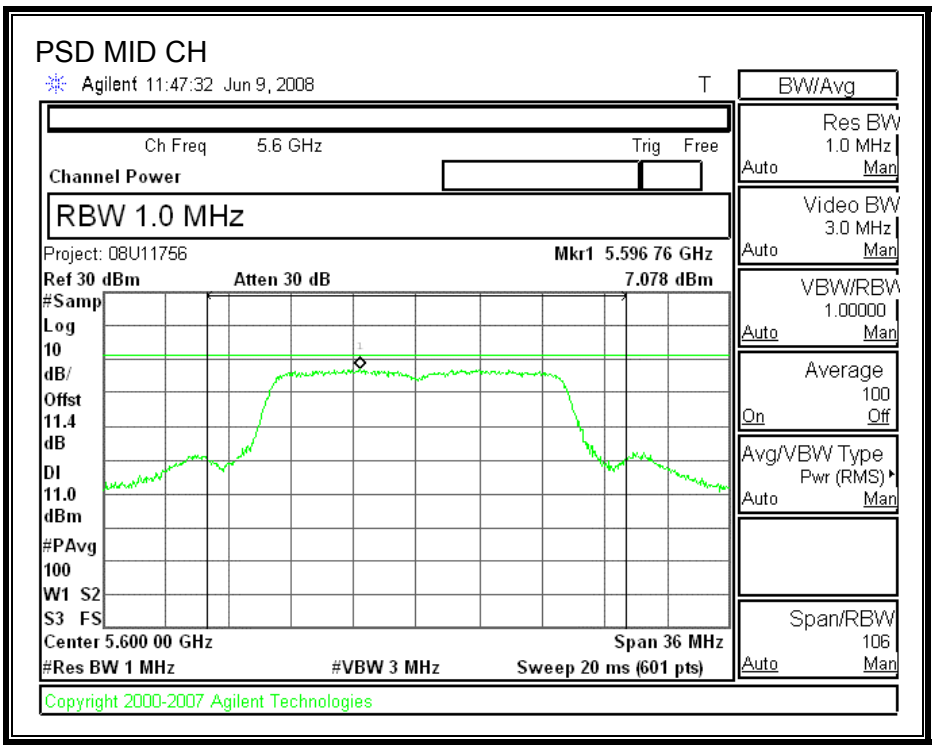
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

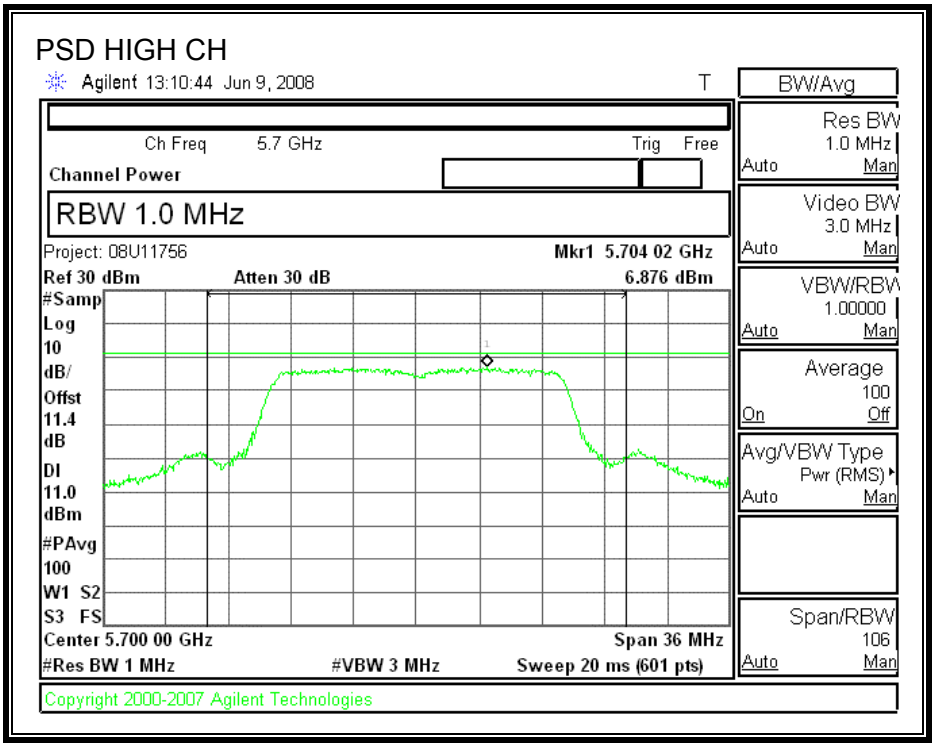
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5500	6.112	9.52	-3.41
Middle	5600	7.078	9.52	-2.44
High	5700	6.876	9.52	-2.64

POWER SPECTRAL DENSITY







9.1.4. 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

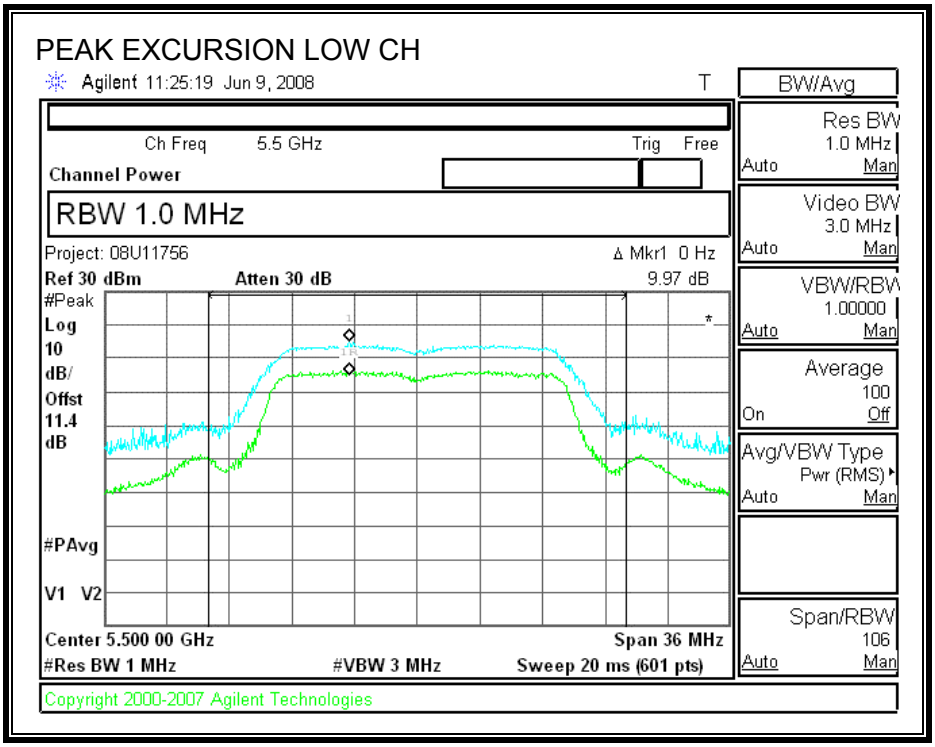
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

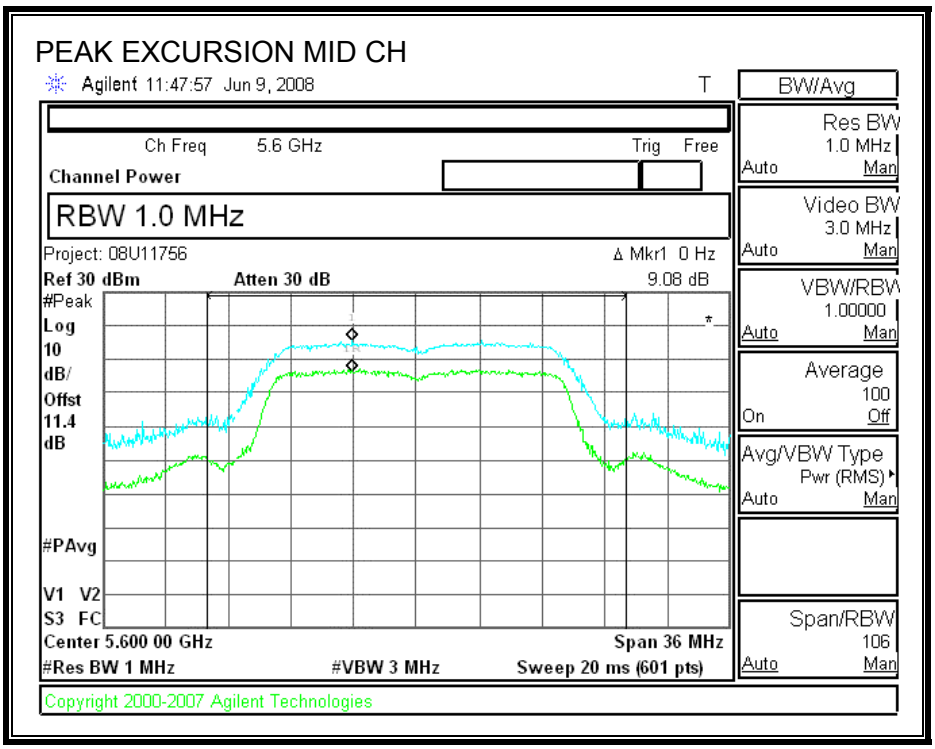
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

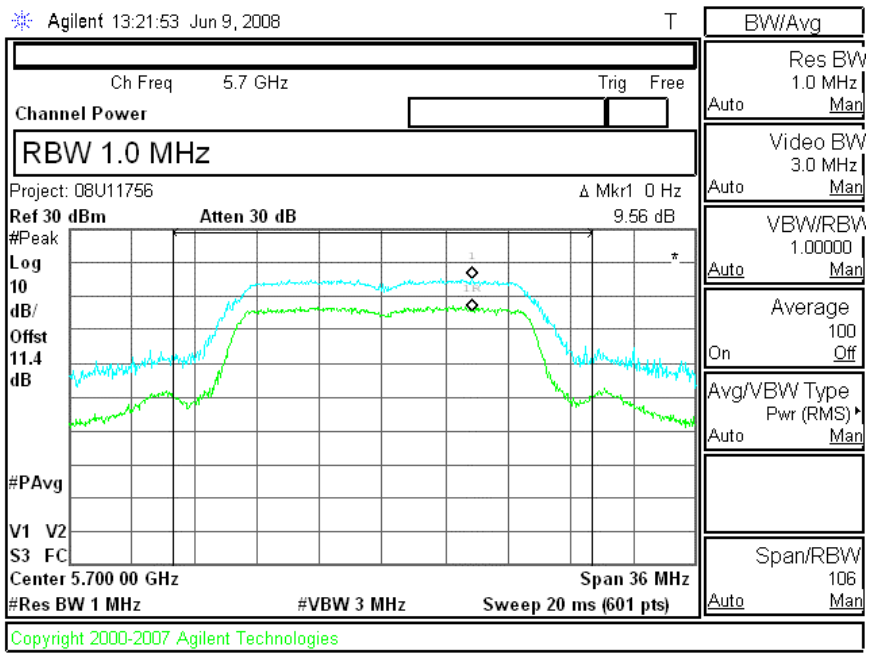
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	9.97	13	-3.03
Middle	5600	9.08	13	-3.92
High	5700	9.56	13	-3.44

PEAK EXCURSION





PEAK EXCURSION HIGH CH



9.1.5. 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.

Limit line = -27 - EUT Antenna Gain

TEST PROCEDURE

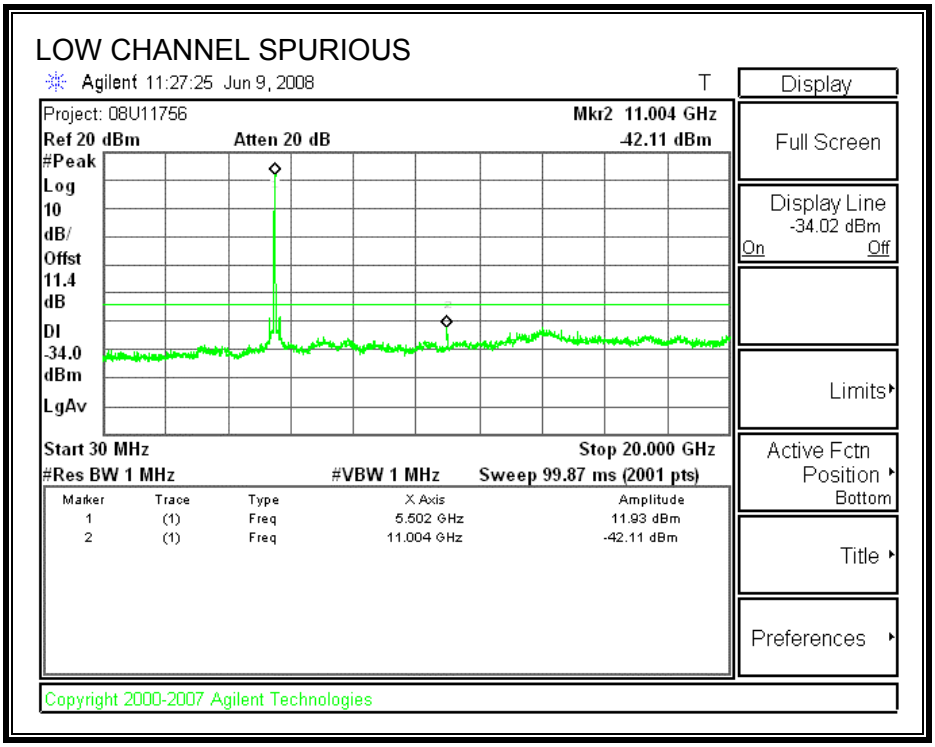
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

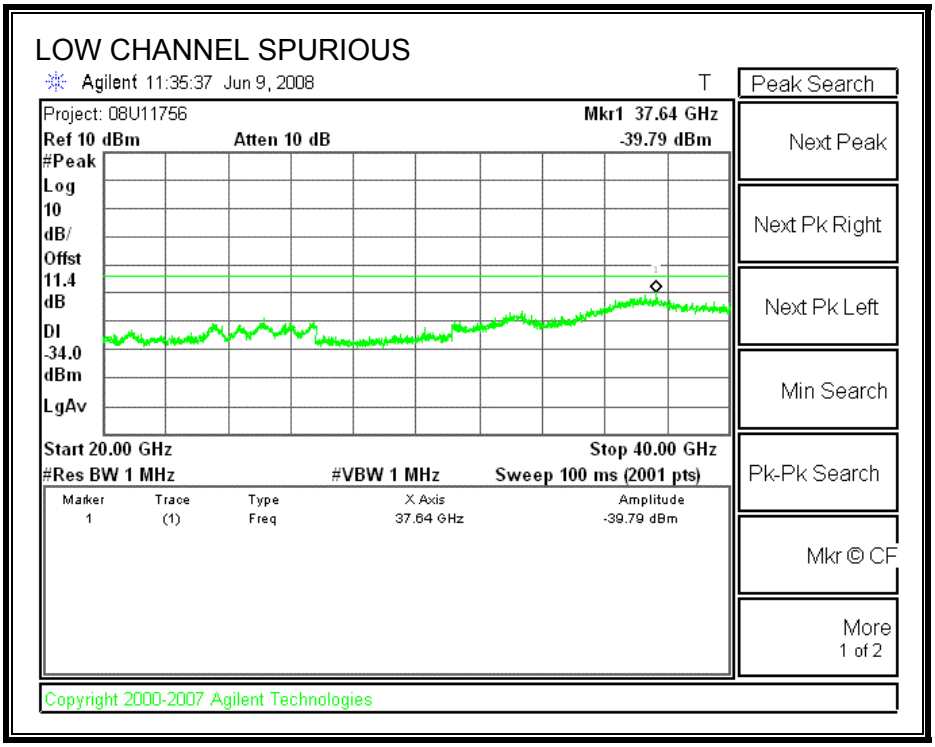
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

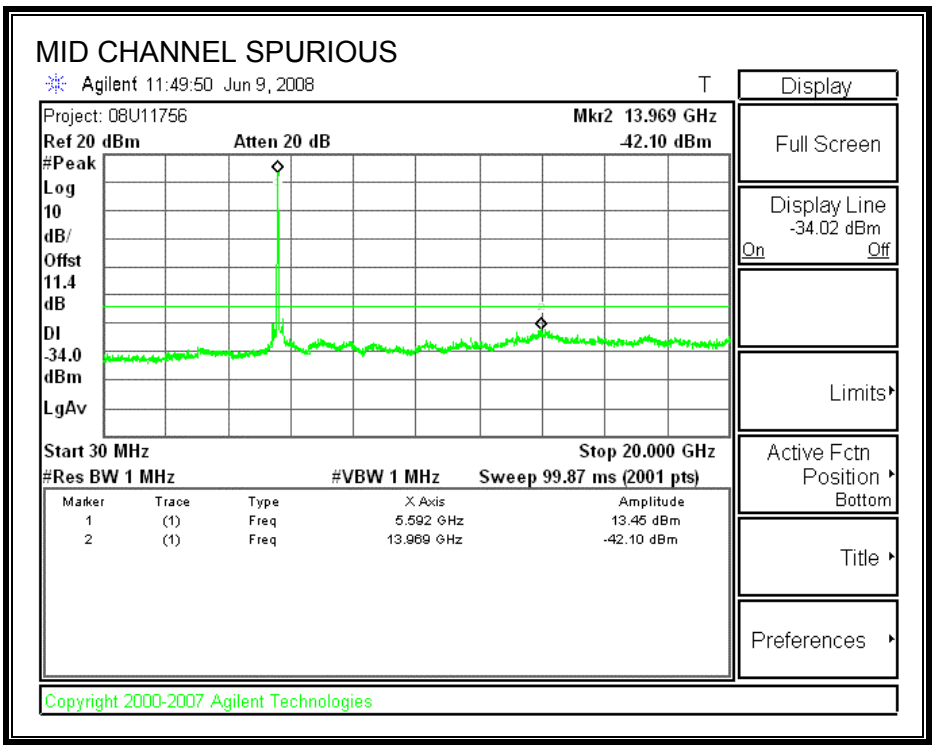
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

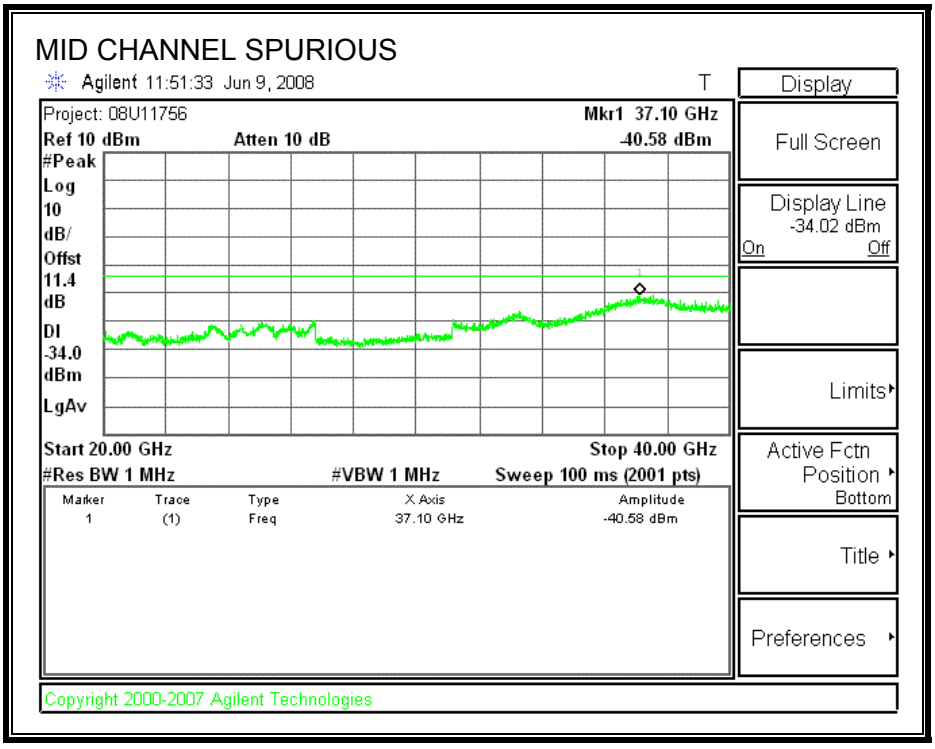
RESULTS

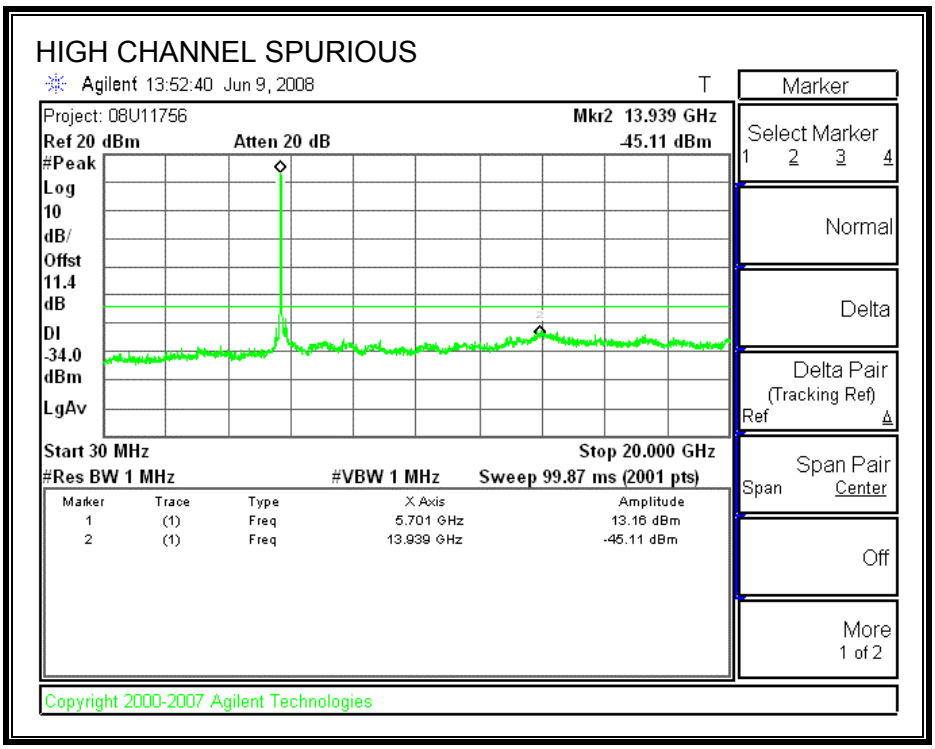
SPURIOUS EMISSIONS

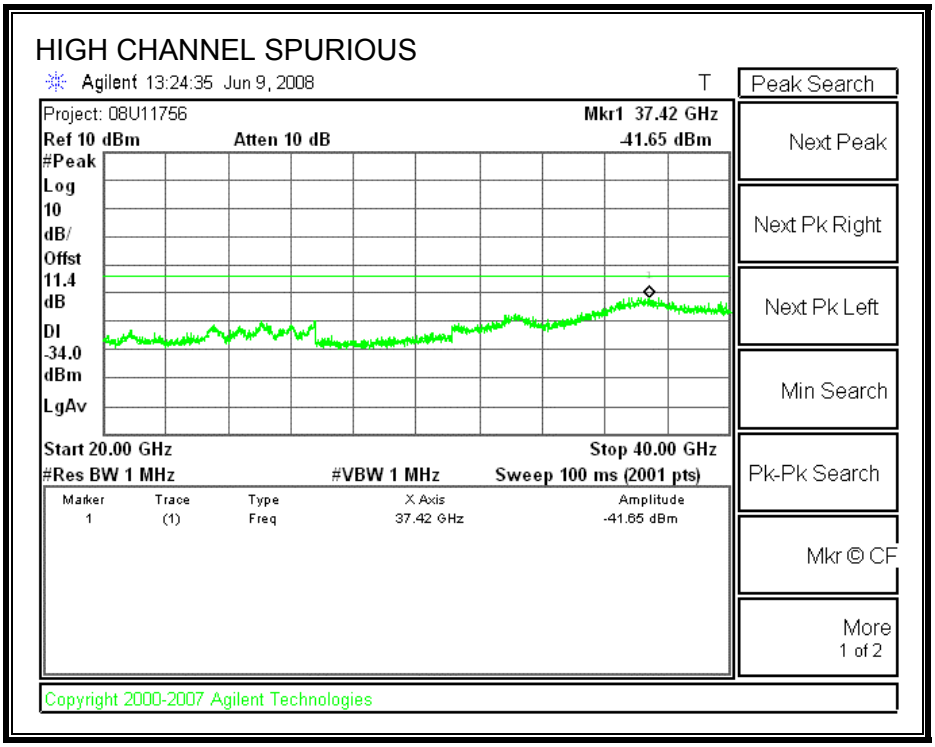












9.2. 802.11n HT20 MODE

9.2.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

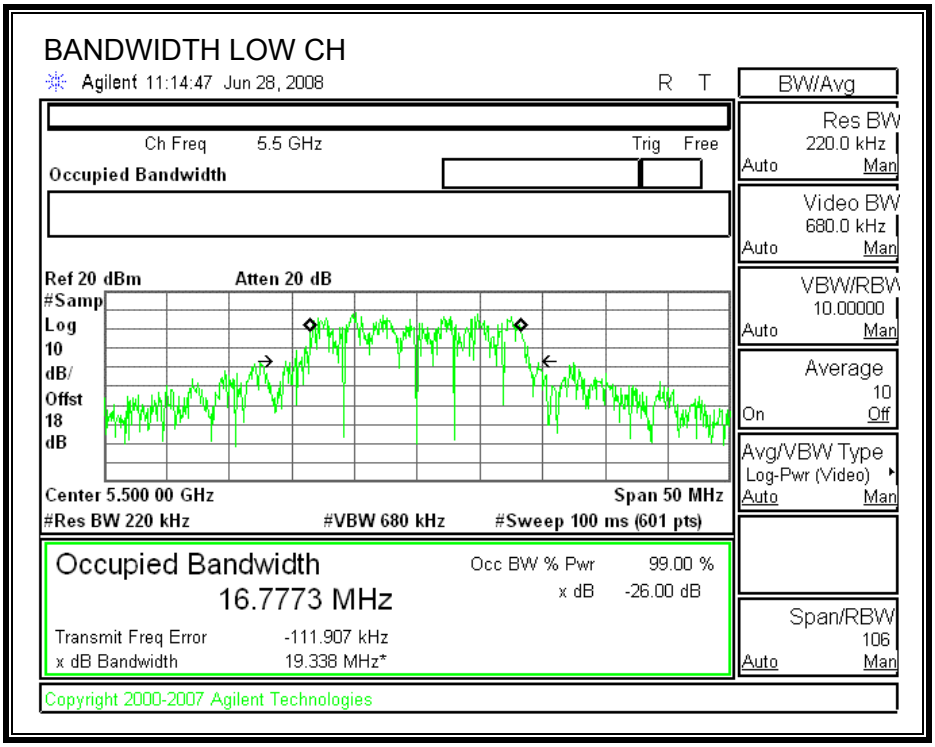
TEST PROCEDURE

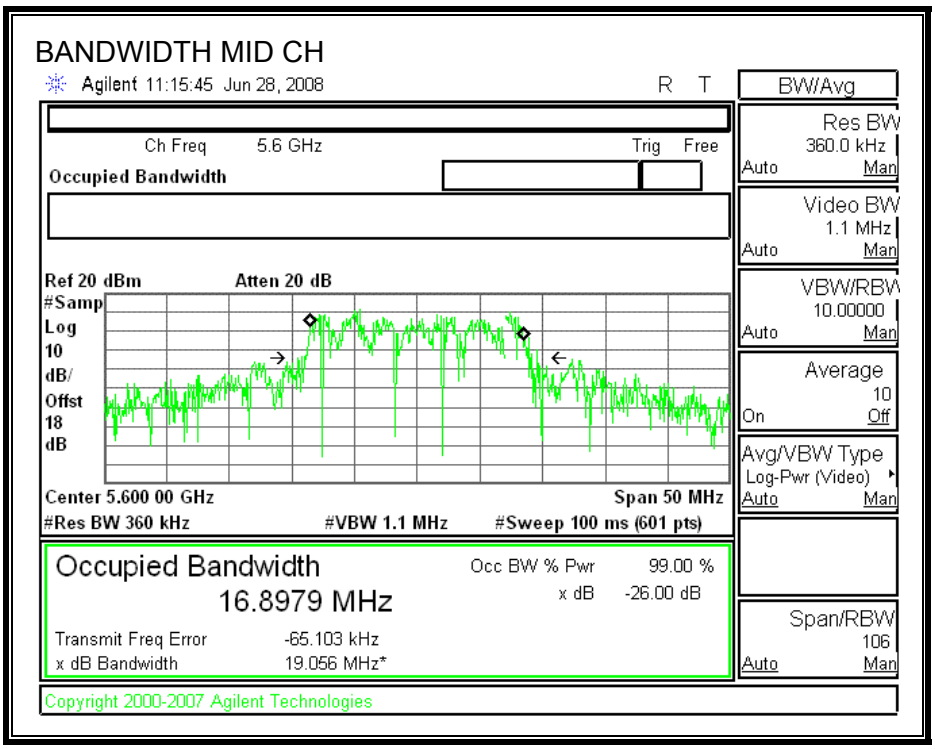
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

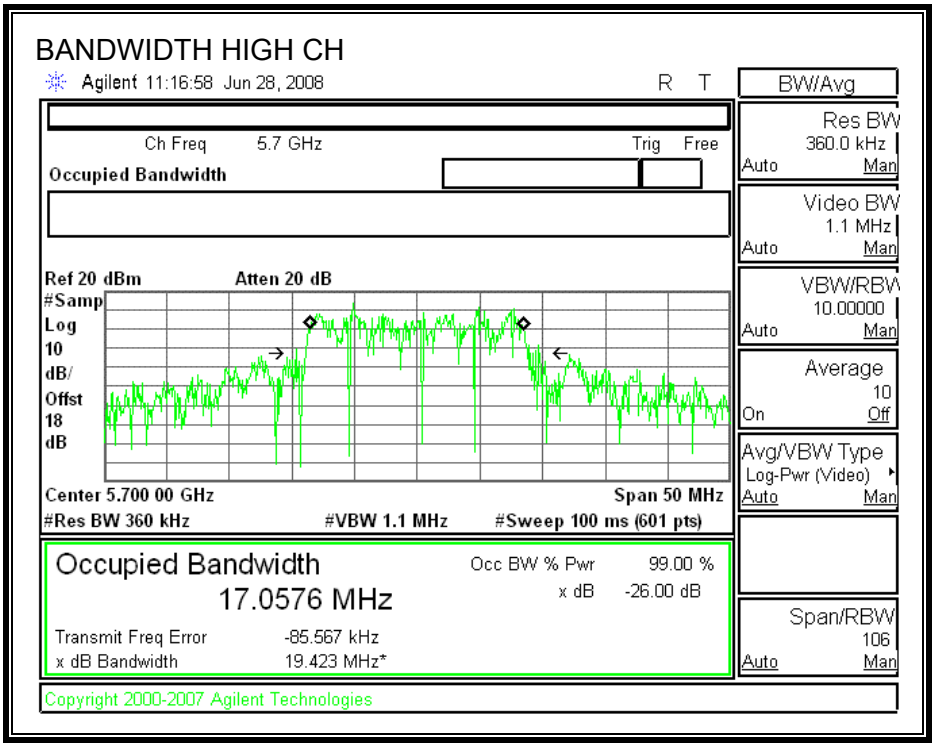
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5500	19.338	16.777
Middle	5600	19.056	16.898
High	5700	19.423	17.058

26 dB and 99% BANDWIDTH







9.2.2. OUTPUT POWER

LIMITS

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

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

TEST PROCEDURE

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

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

RESULTS

Antenna Combination: Low PIFA / Hi Slot = 5.83 dBi

Limit

Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5500	24	19.338	23.86	5.83	23.86
Mid	5600	24	19.056	23.80	5.83	23.80
High	5700	24	19.423	23.88	5.83	23.88

Individual Chain Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	16.70	16.71	19.72	23.86	-4.15
Mid	5600	16.40	16.47	19.45	23.80	-4.35
High	5700	16.55	16.72	19.65	23.88	-4.24

Antenna Combination: Hi PIFA / Low Slot = 8.8 dBi

Limit

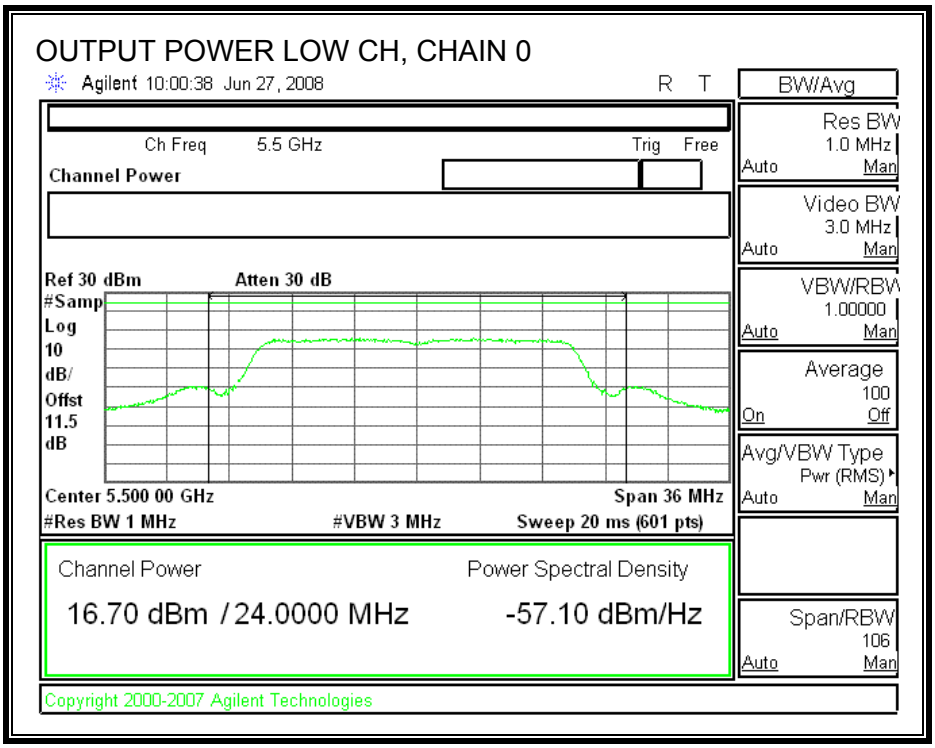
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5500	24	19.338	23.86	8.80	21.06
Mid	5600	24	19.506	23.90	8.80	21.10
High	5700	24	19.423	23.88	8.80	21.08

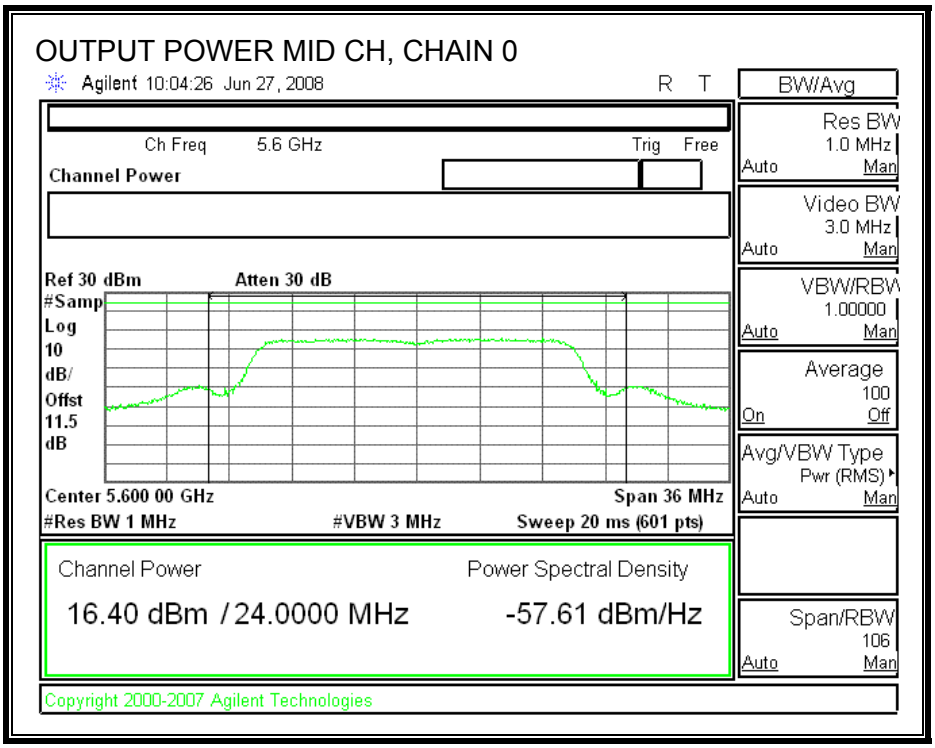
Individual Chain Results

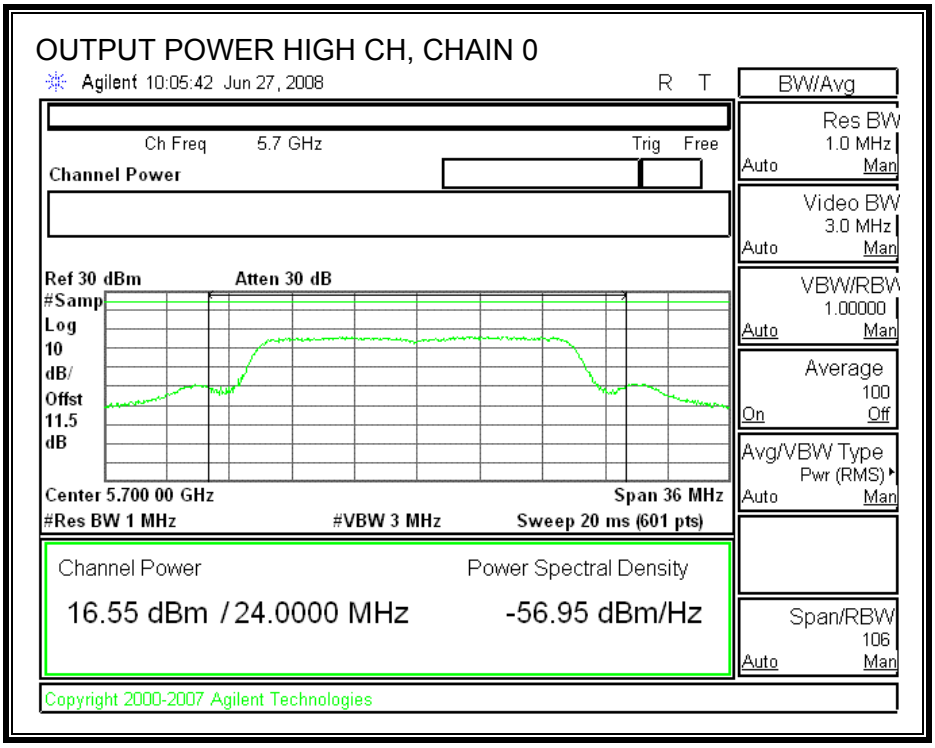
Channel	Frequency (MHz)	Chain 0 Power (dBm)	1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	14.01	14.31	17.17	21.06	-3.89
Mid	5600	13.94	14.02	16.99	21.10	-4.11
High	5700	14.27	14.16	17.23	21.08	-3.86

Antenna Combination: Low PIFA / Hi Slot = 5.829dBi

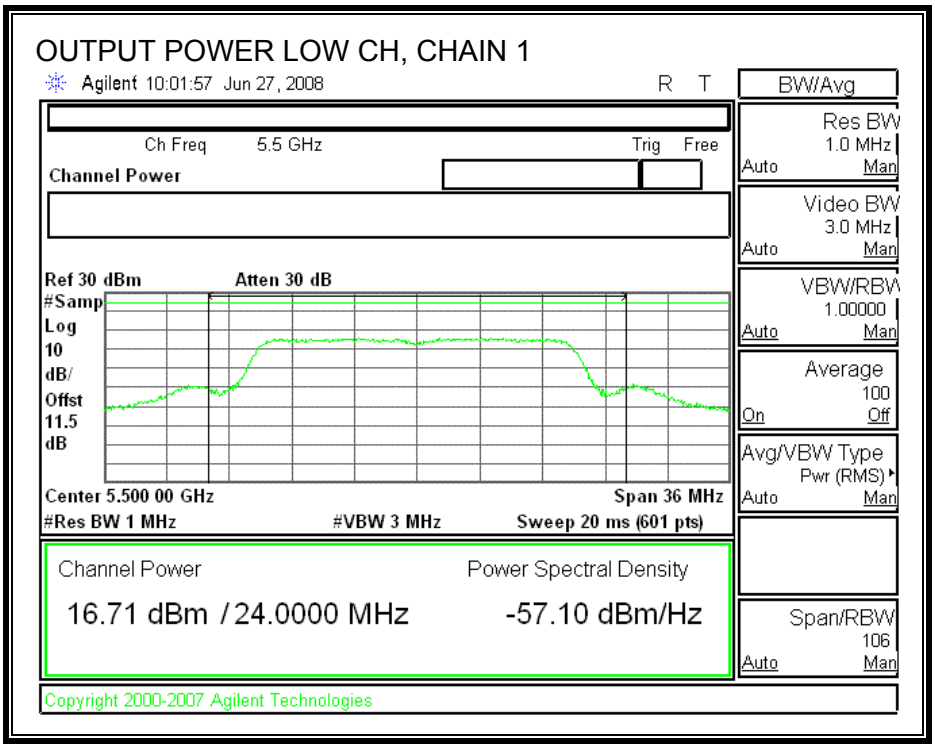
CHAIN 0 OUTPUT POWER

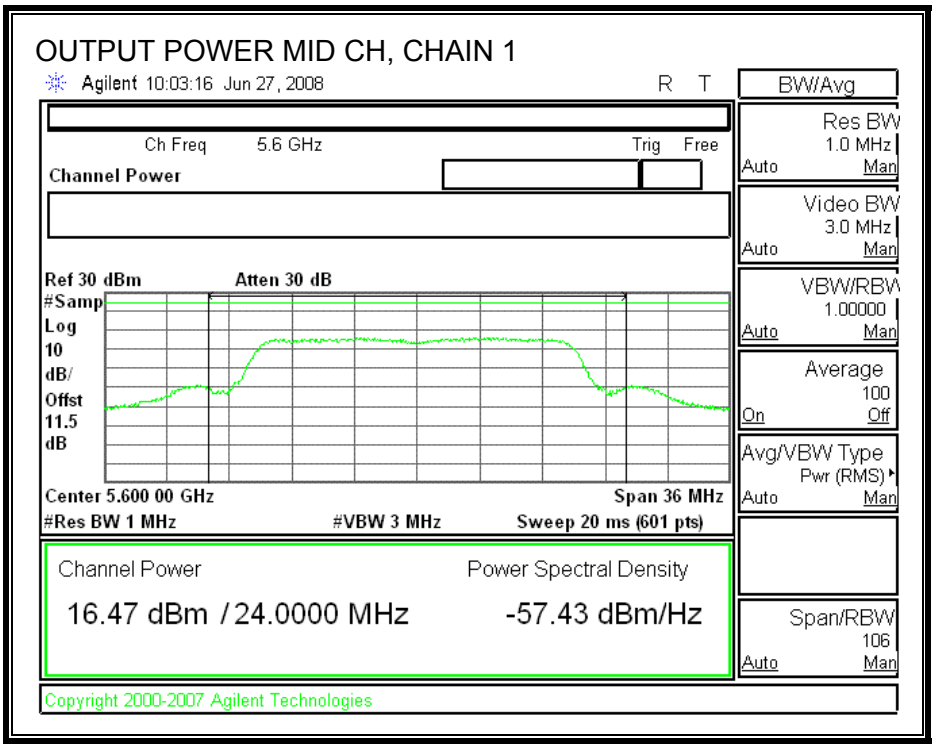


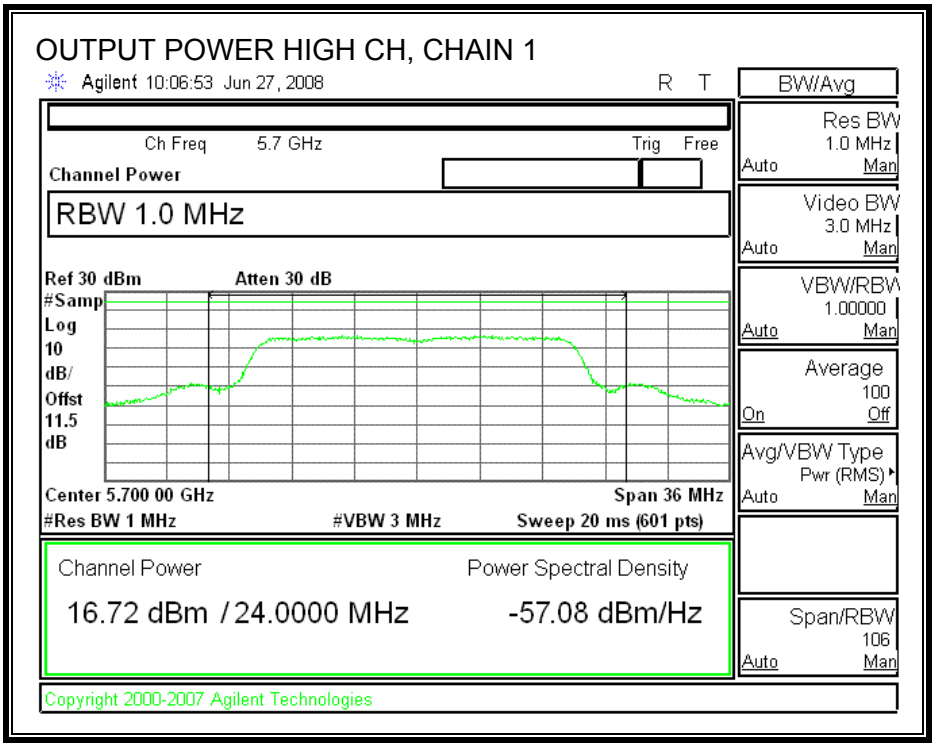




CHAIN 1 OUTPUT POWER

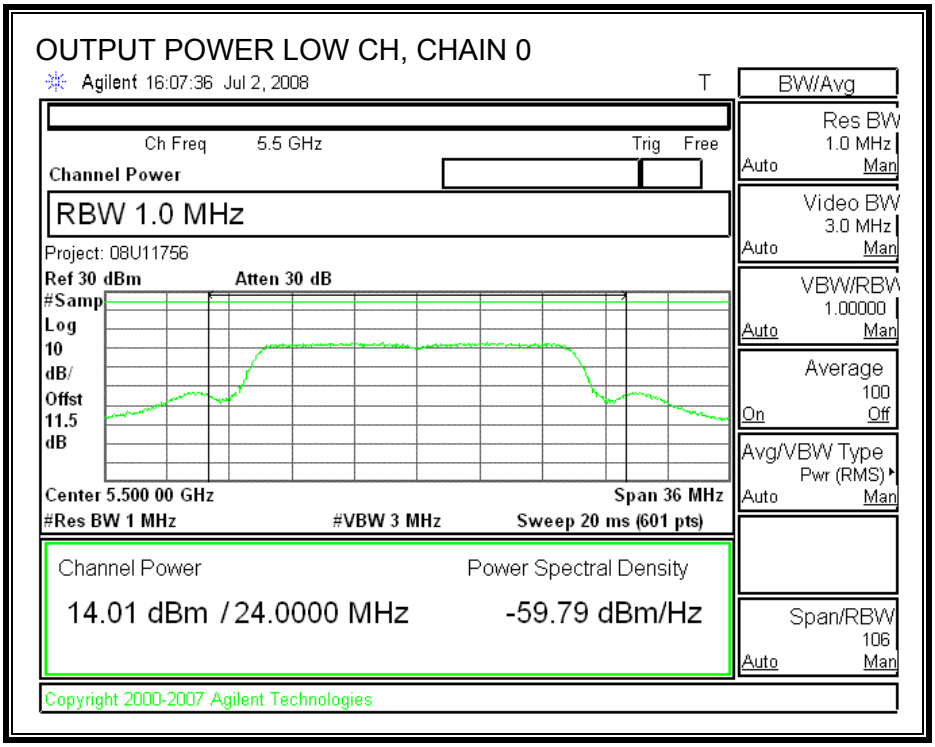


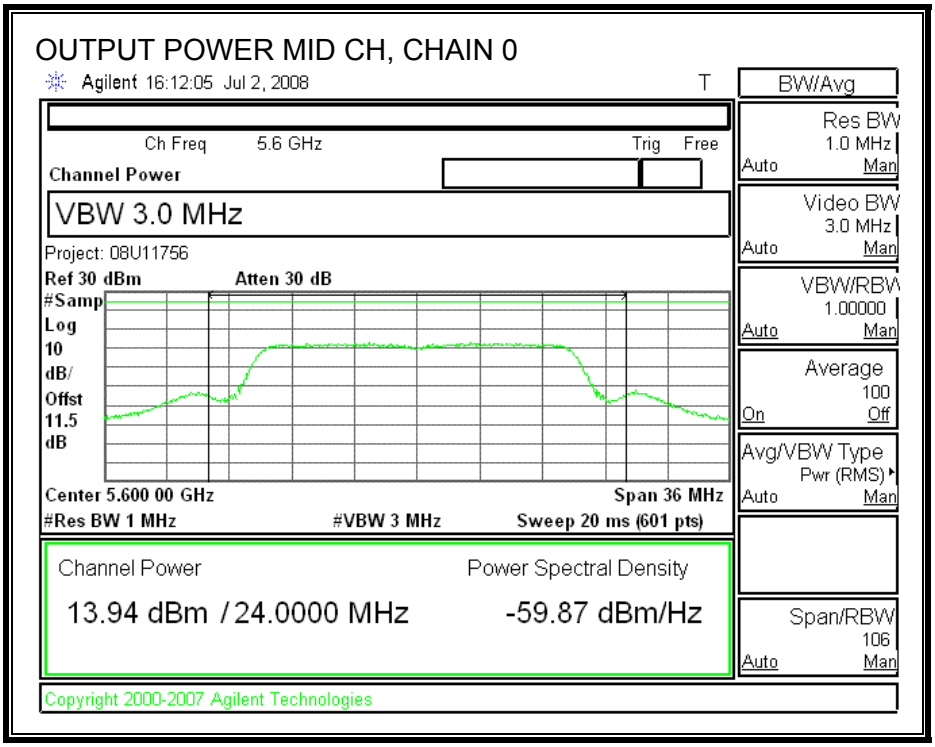


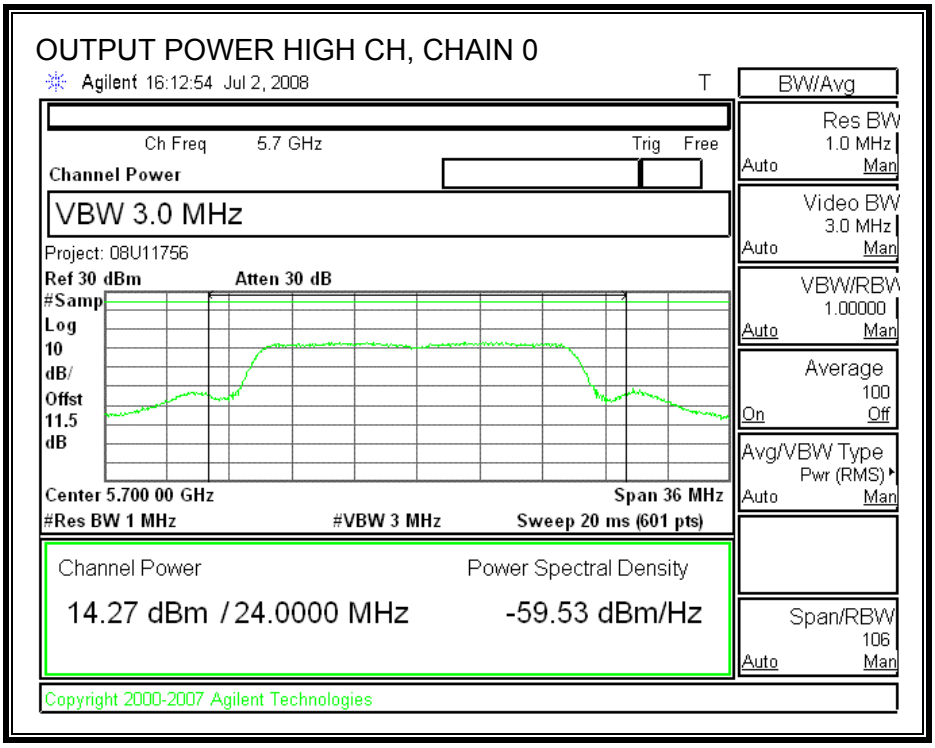


Antenna Combination: Hi PIFA / Low Slot = 8.8 dBi

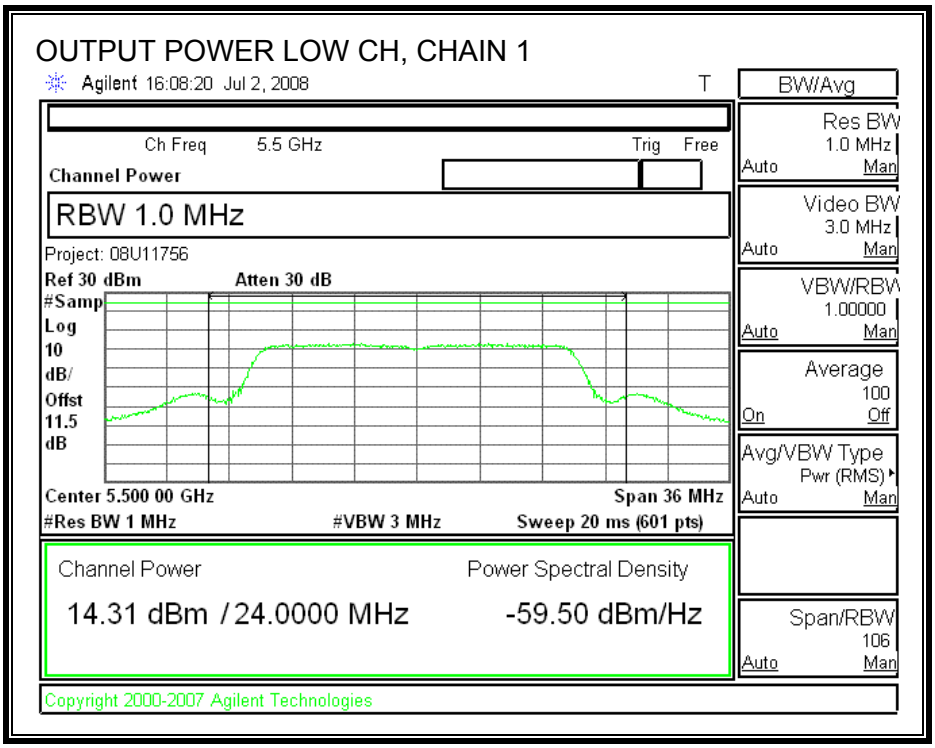
CHAIN 0 OUTPUT POWER

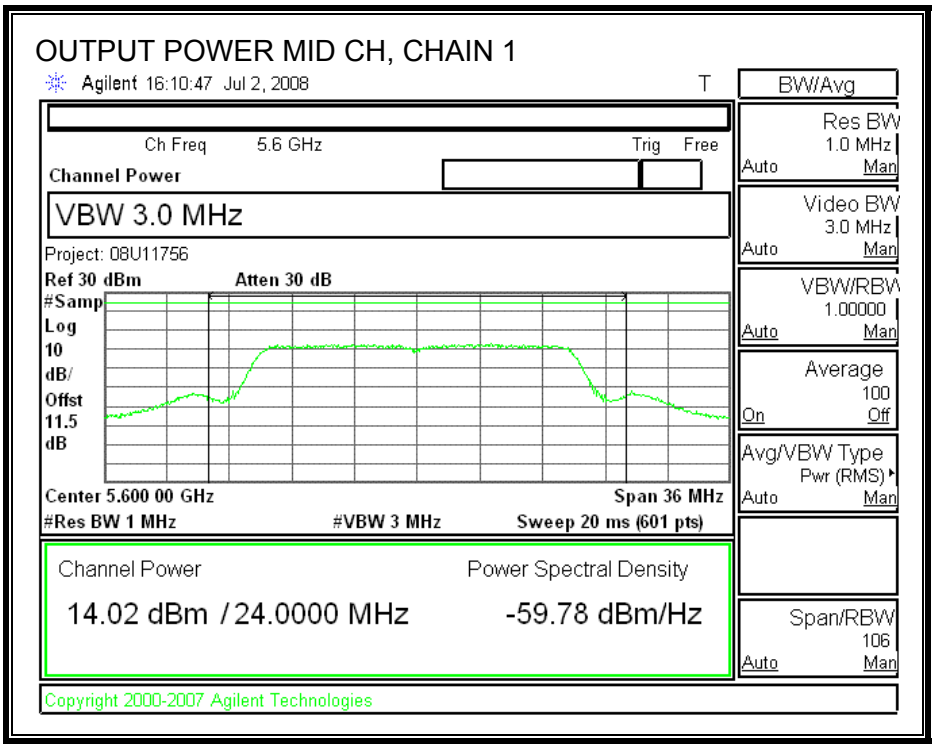


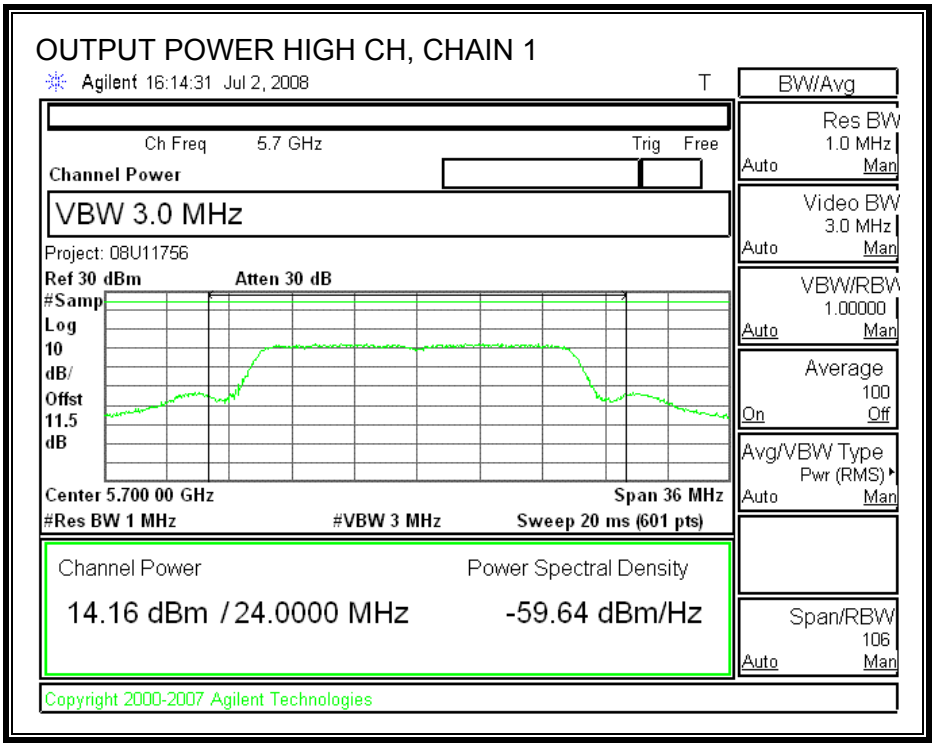




CHAIN 1 OUTPUT POWER







9.2.3. 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 5.83 dBi, therefore the limit is 11 dBm

The maximum antenna gain is 8.80 dBi, therefore the limit is 8.20 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 = 5.83 dBi

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5500	10.264	11.00	-0.74
Middle	5600	10.361	11.00	-0.64
High	5700	10.707	11.00	-0.29

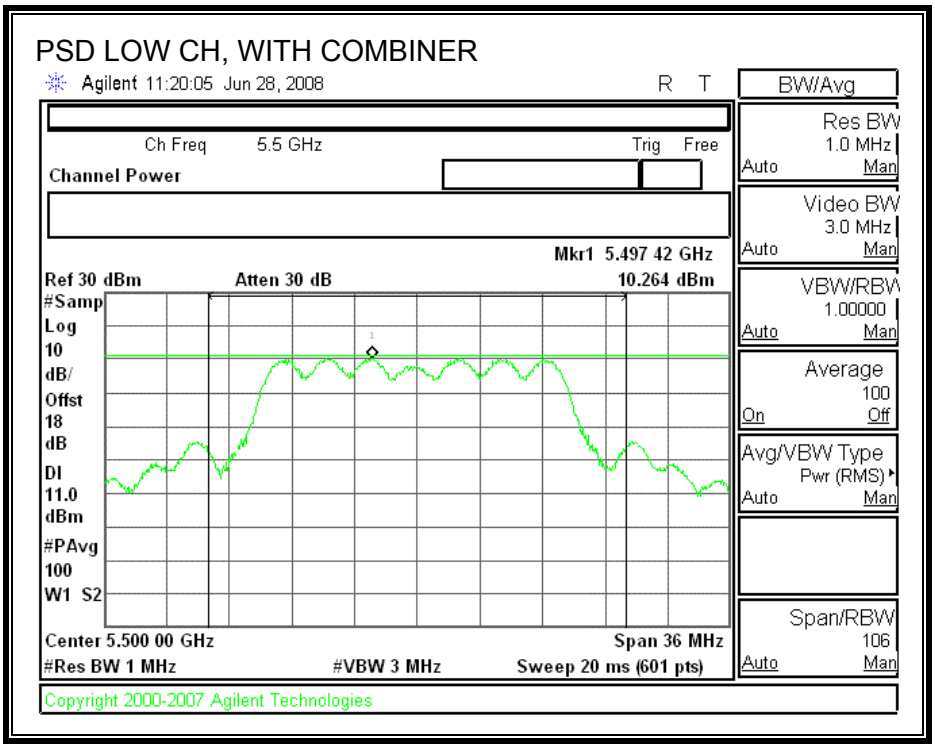
Antenna Combination: Hi PIFA / Low Slot = 8.8 dBi

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5500	7.921	8.20	-0.28
Middle	5600	7.800	8.20	-0.40
High	5700	7.992	8.20	-0.21

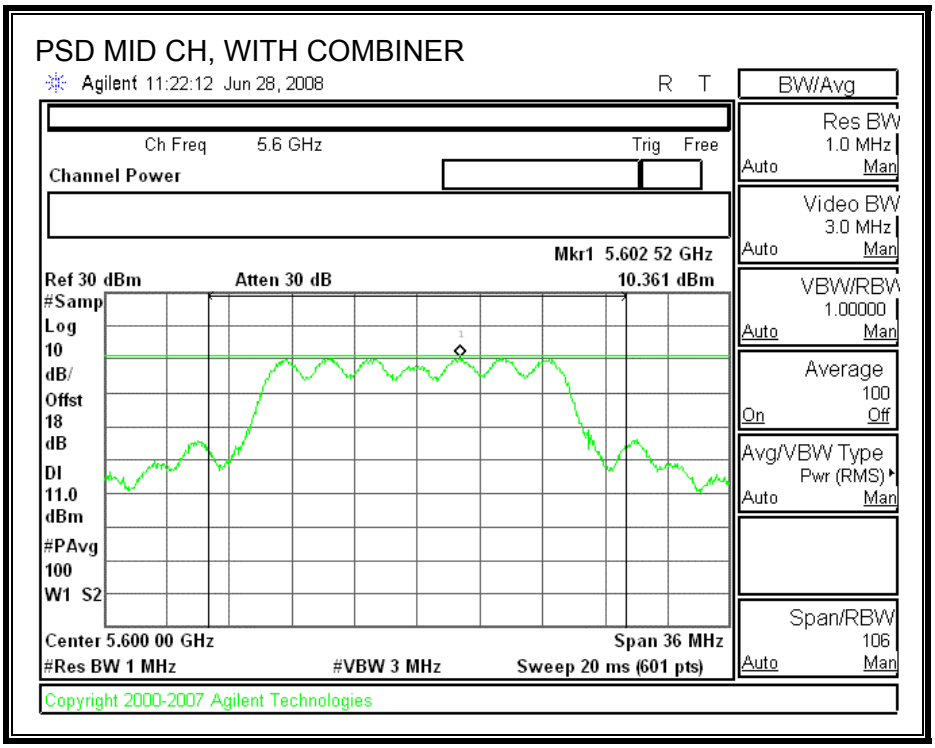
Antenna Combination: Low PIFA / Hi Slot = 5.83 dBi

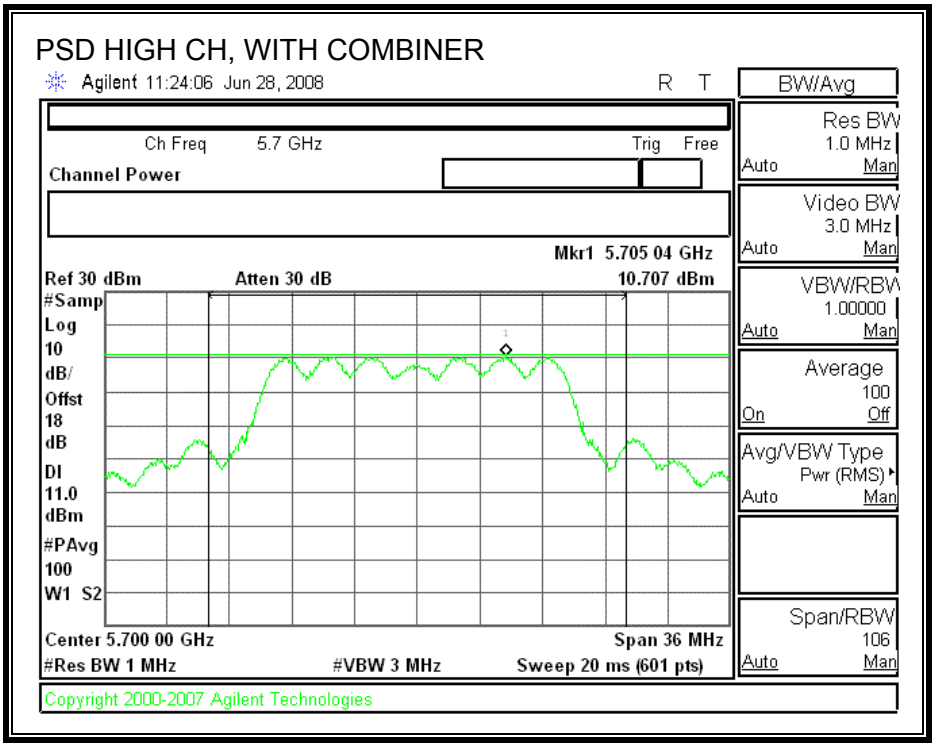
POWER SPECTRAL DENSITY WITH COMBINER

PSD LOW CH, WITH COMBINER



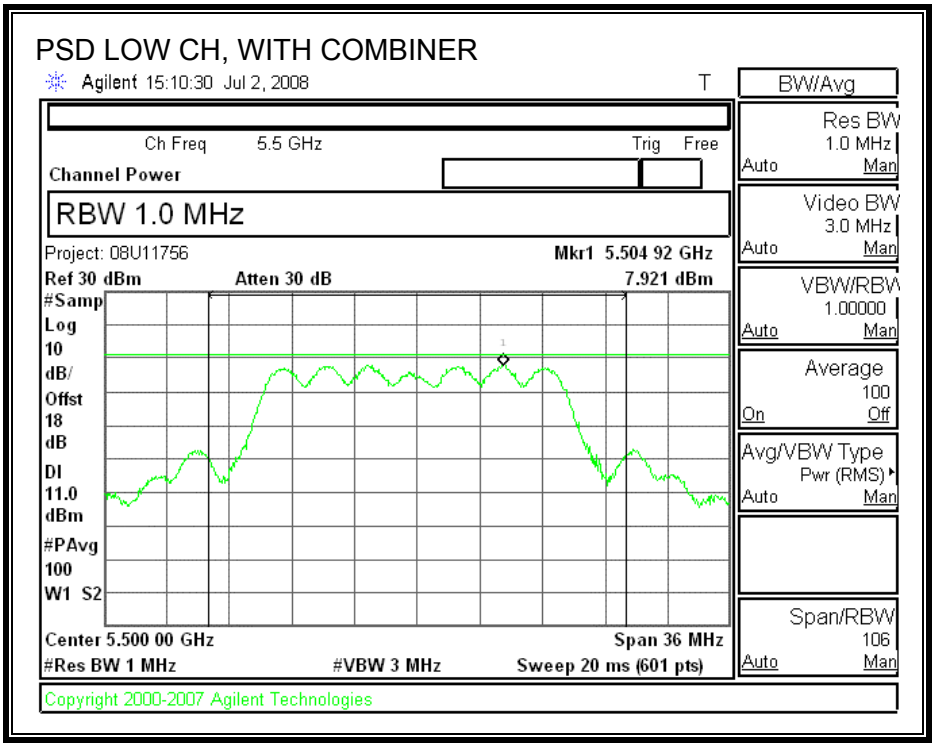
PSD MID CH, WITH COMBINER

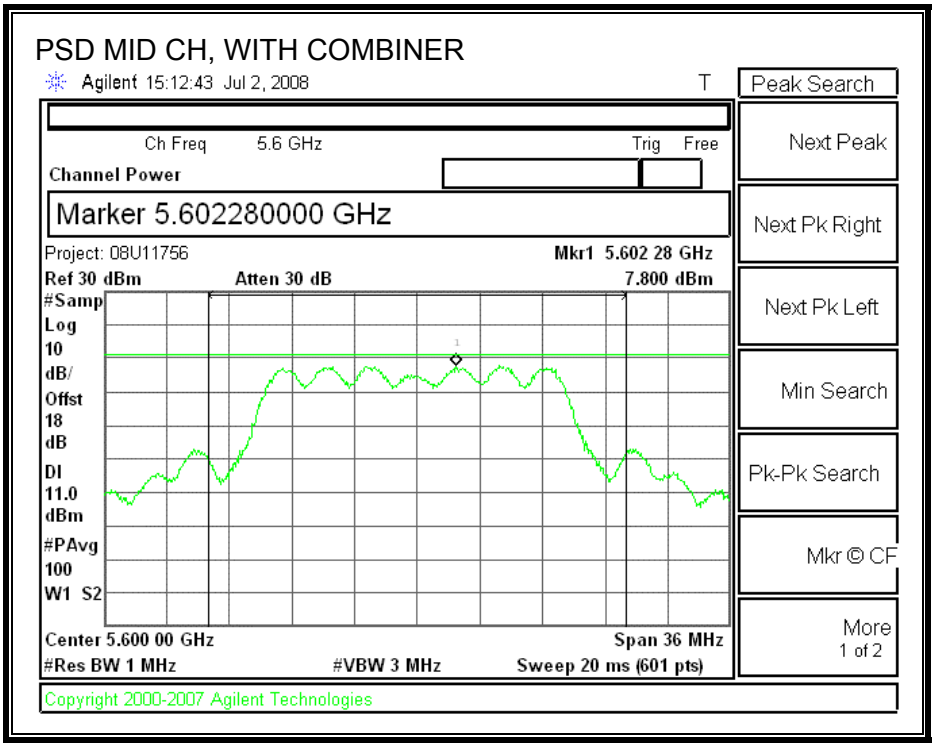




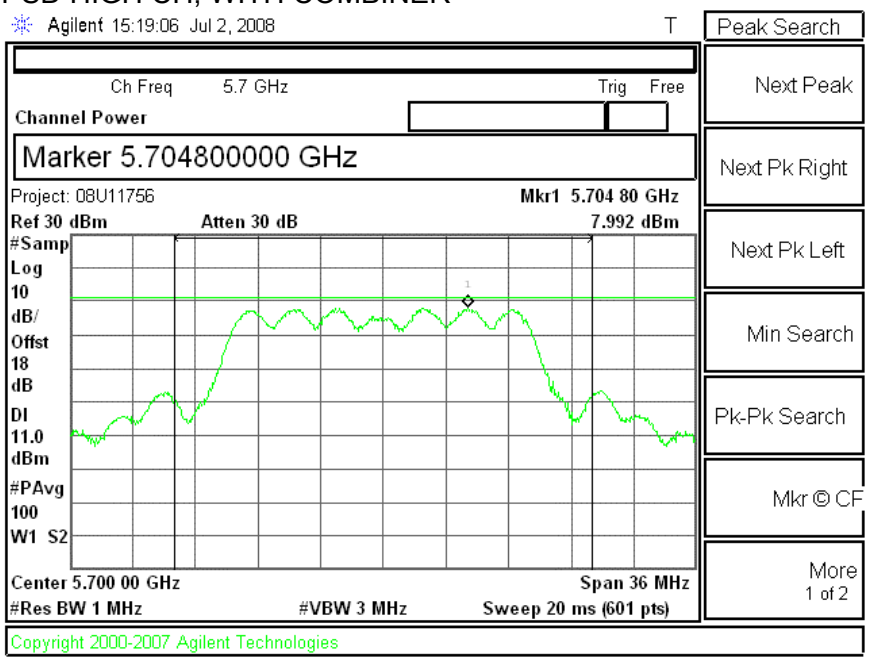
Antenna Combination: Hi PIFA / Low Slot = 8.8 dBi

POWER SPECTRAL DENSITY WITH COMBINER





PSD HIGH CH, WITH COMBINER



9.2.4. 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 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

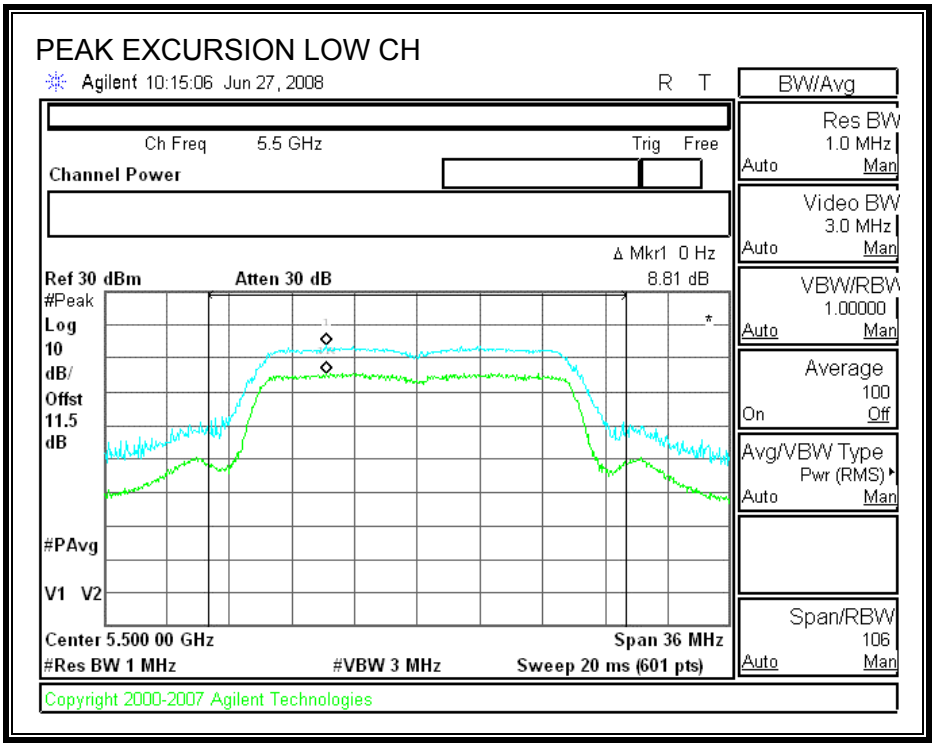
Chain 0

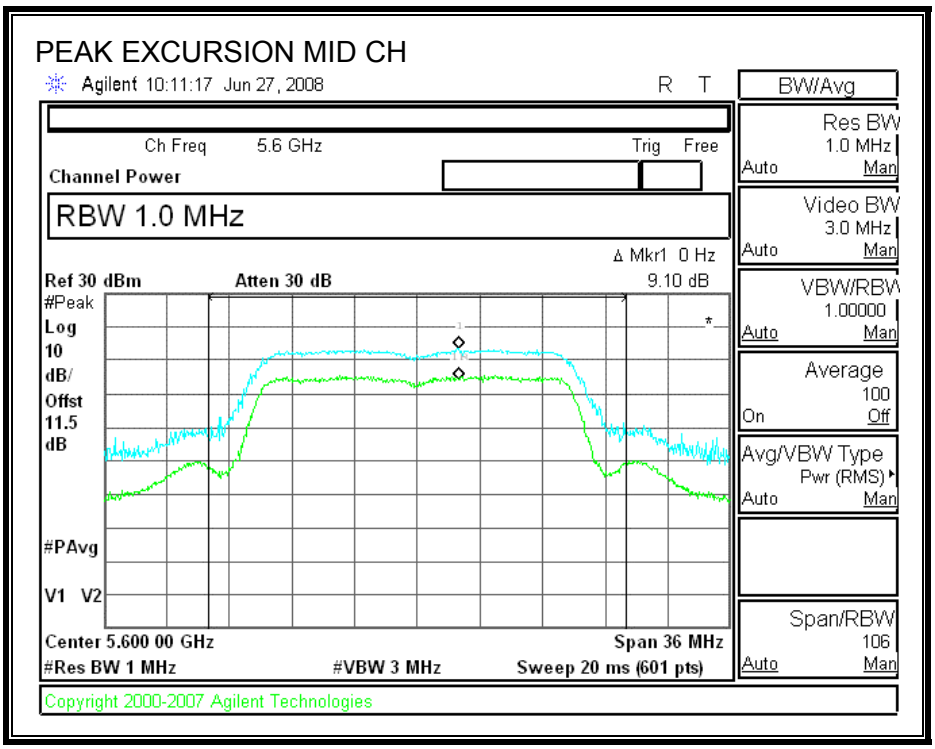
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	8.81	13	-4.19
Middle	5600	9.10	13	-3.90
High	5700	7.98	13	-5.02

Chain 1

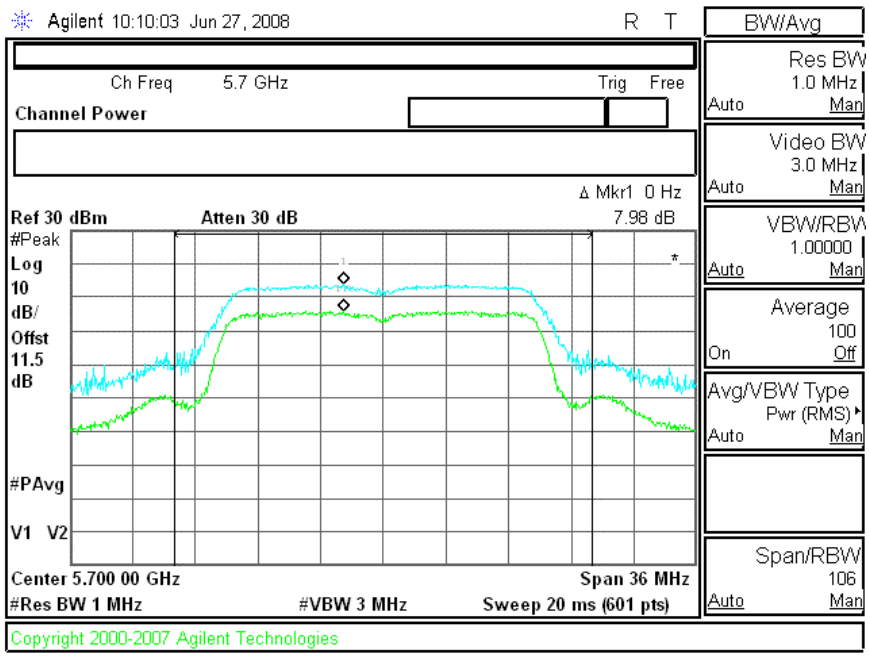
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	9.88	13	-3.12
Middle	5600	9.96	13	-3.04
High	5700	10.18	13	-2.82

PEAK EXCURSION (CHAIN 0)

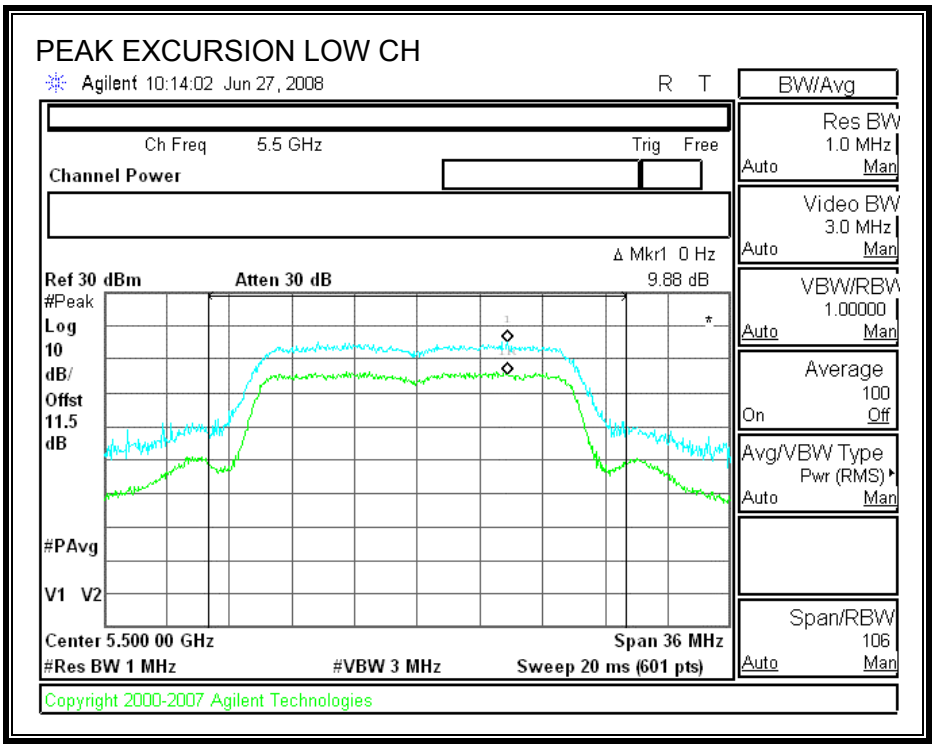


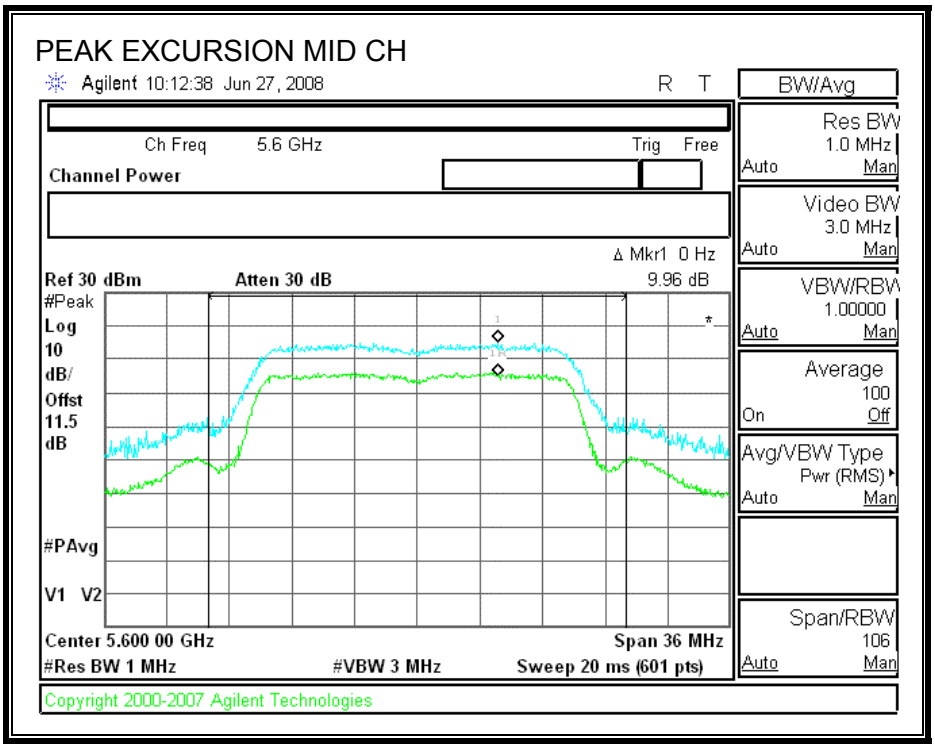


PEAK EXCURSION HIGH CH

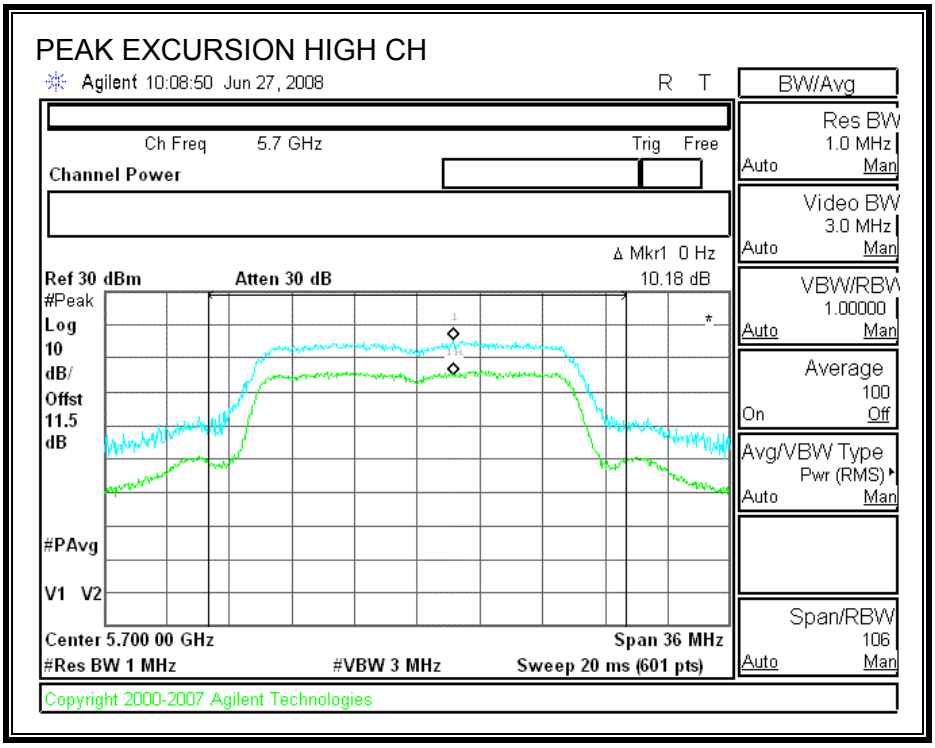


PEAK EXCURSION (CHAIN 1)





PEAK EXCURSION HIGH CH



9.2.5. 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

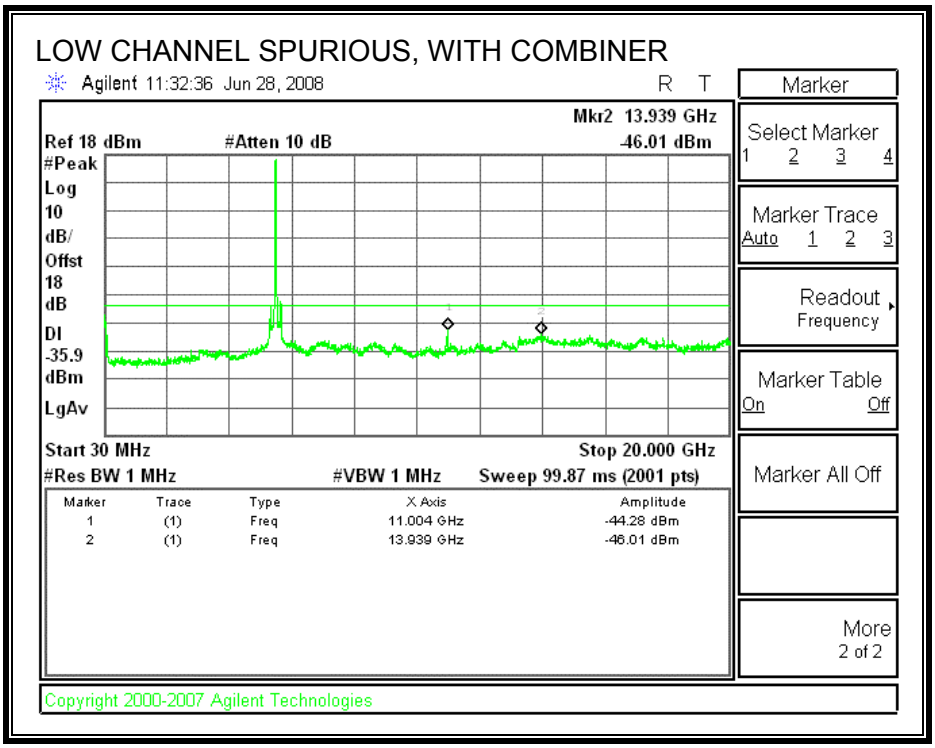
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

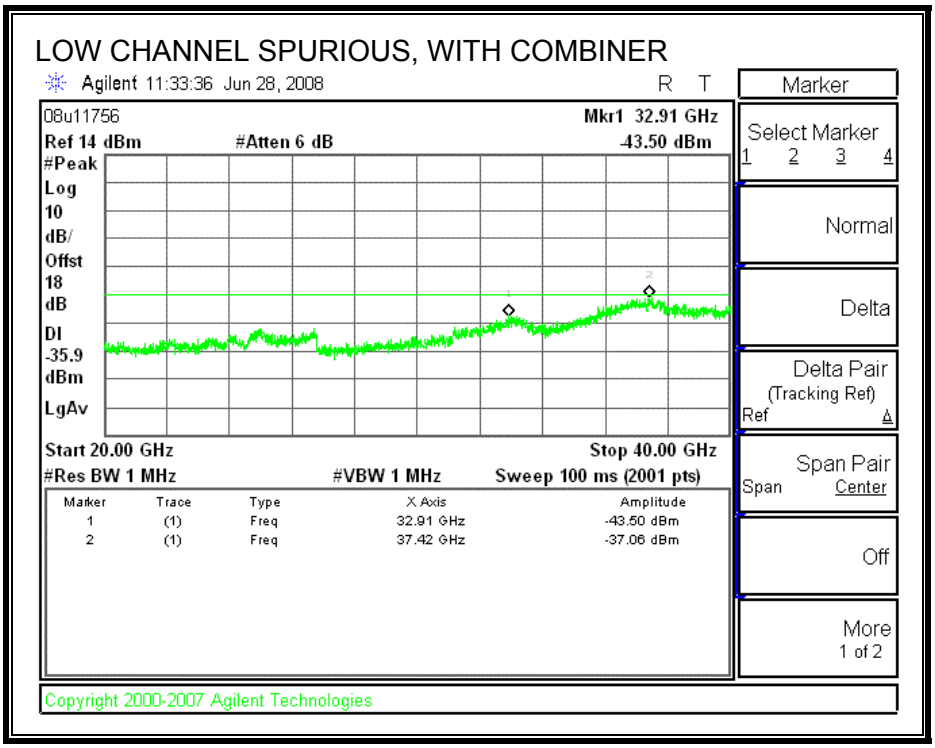
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

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

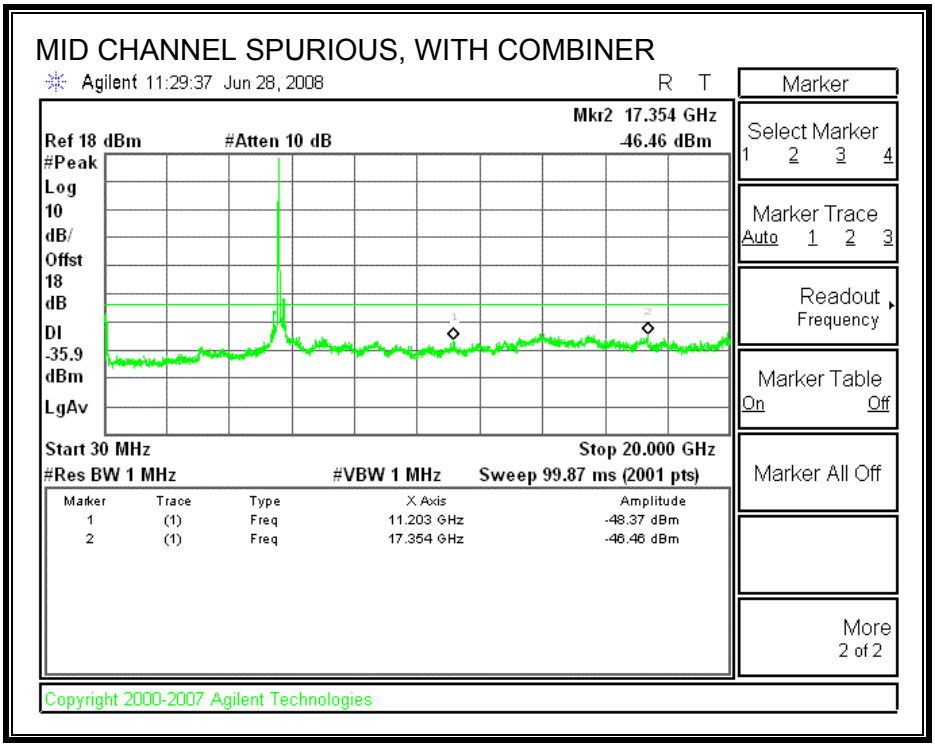
RESULTS

SPURIOUS EMISSIONS WITH COMBINER

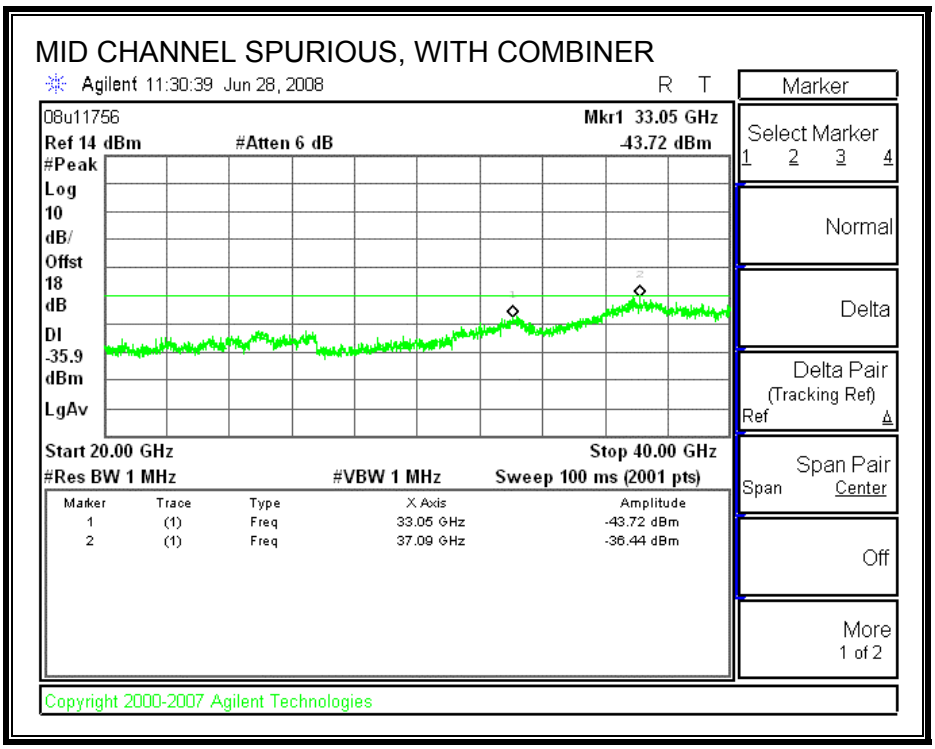




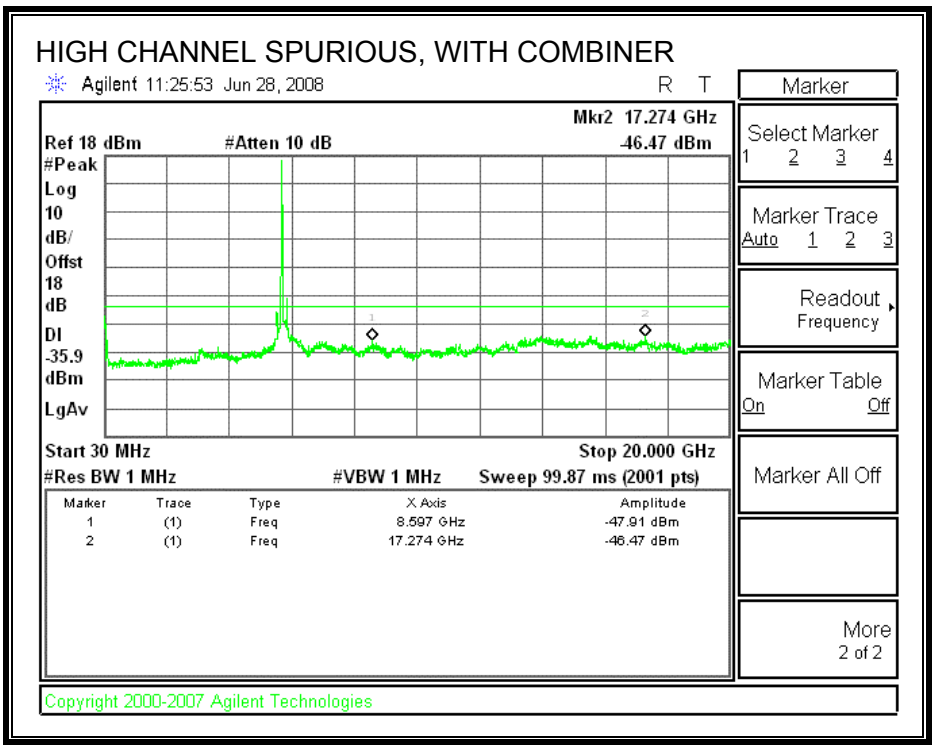
MID CHANNEL SPURIOUS, WITH COMBINER



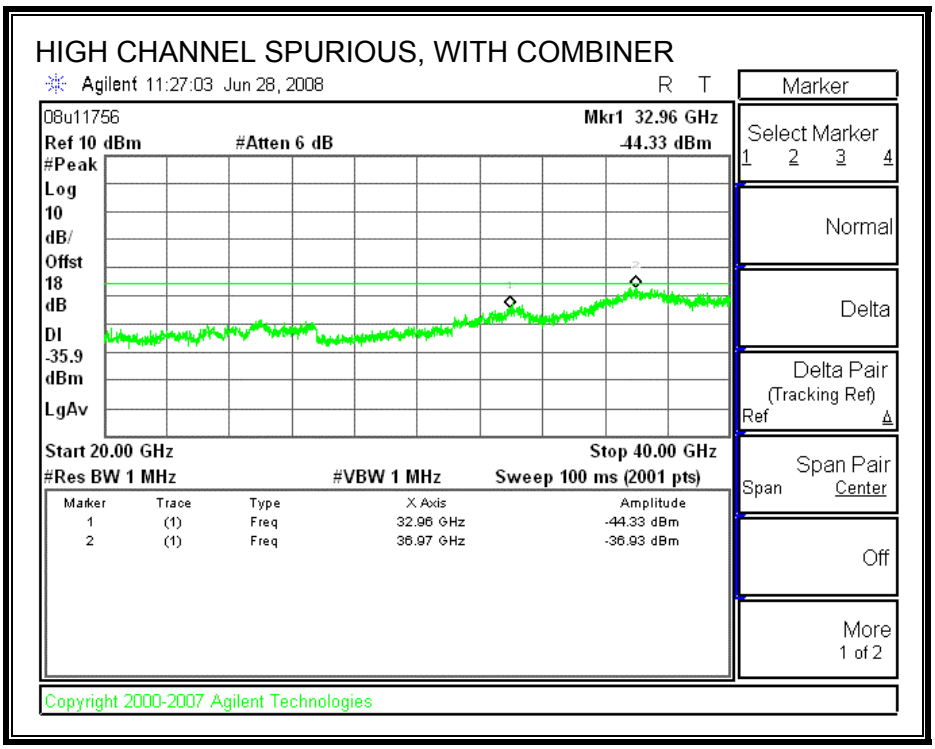
MID CHANNEL SPURIOUS, WITH COMBINER



HIGH CHANNEL SPURIOUS, WITH COMBINER



HIGH CHANNEL SPURIOUS, WITH COMBINER



9.3. 802.11n HT40 SISO MODE

9.3.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

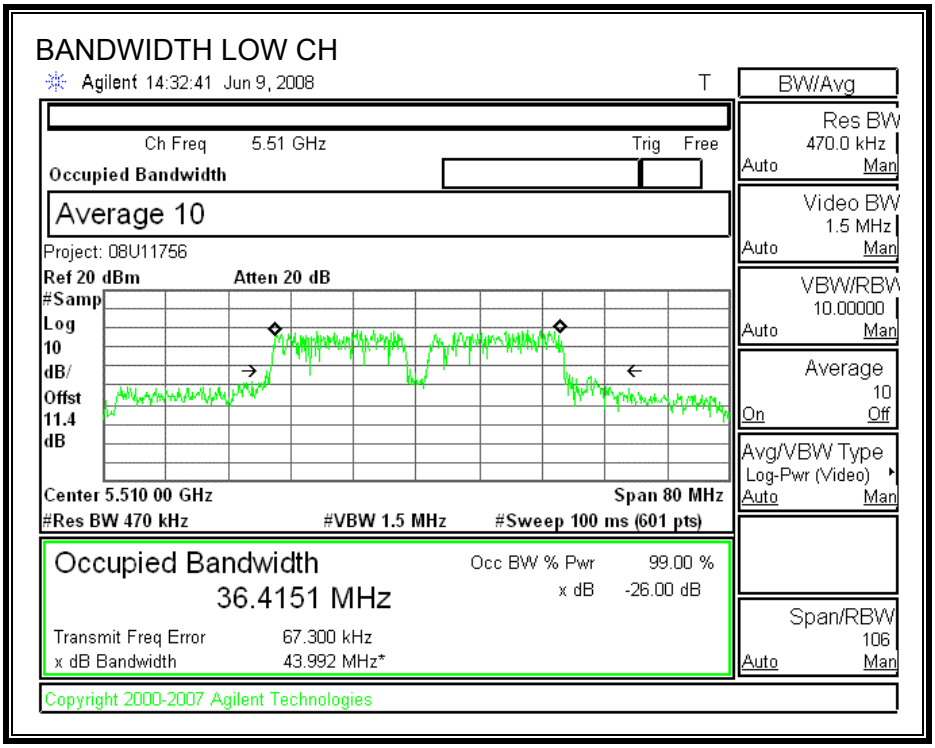
TEST PROCEDURE

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.

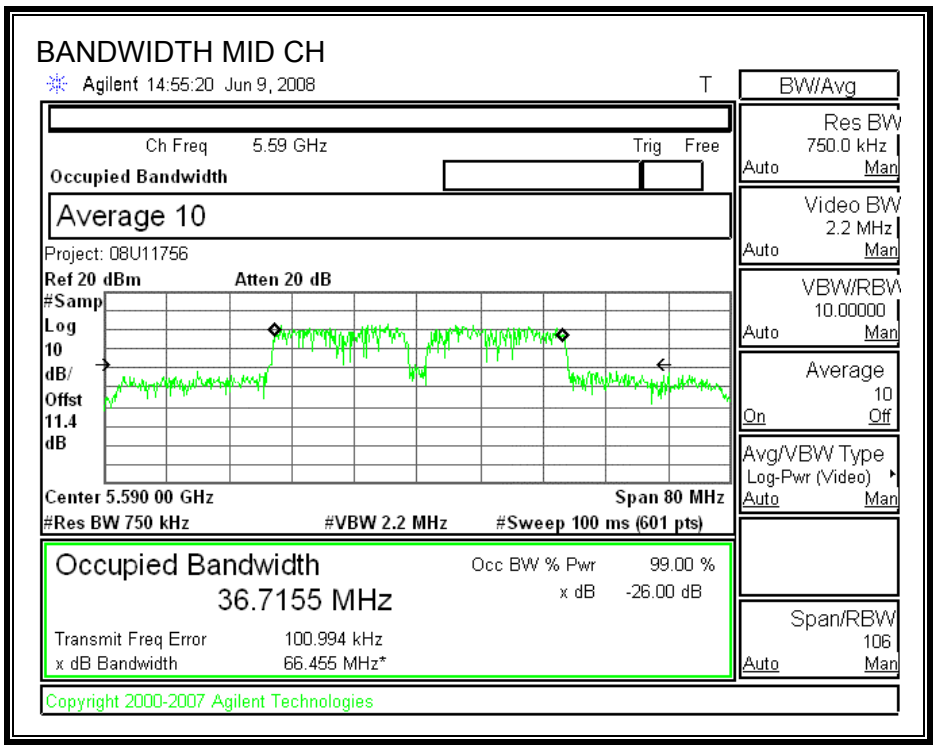
RESULTS

Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
5510	43.992	36.4151
5590	66.455	36.7155
5670	76.603	37.2079

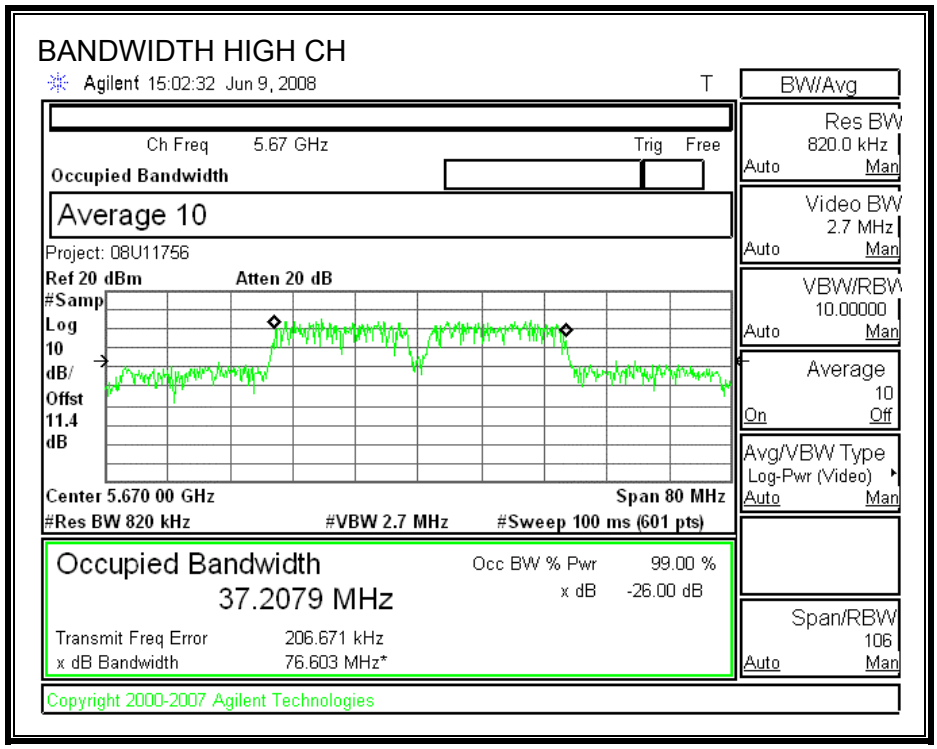
26 dB and 99% BANDWIDTH



BANDWIDTH MID CH



BANDWIDTH HIGH CH



9.3.2. OUTPUT POWER

LIMITS

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

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

The maximum antenna gain is 7.48 dBi

TEST PROCEDURE

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

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

RESULTS

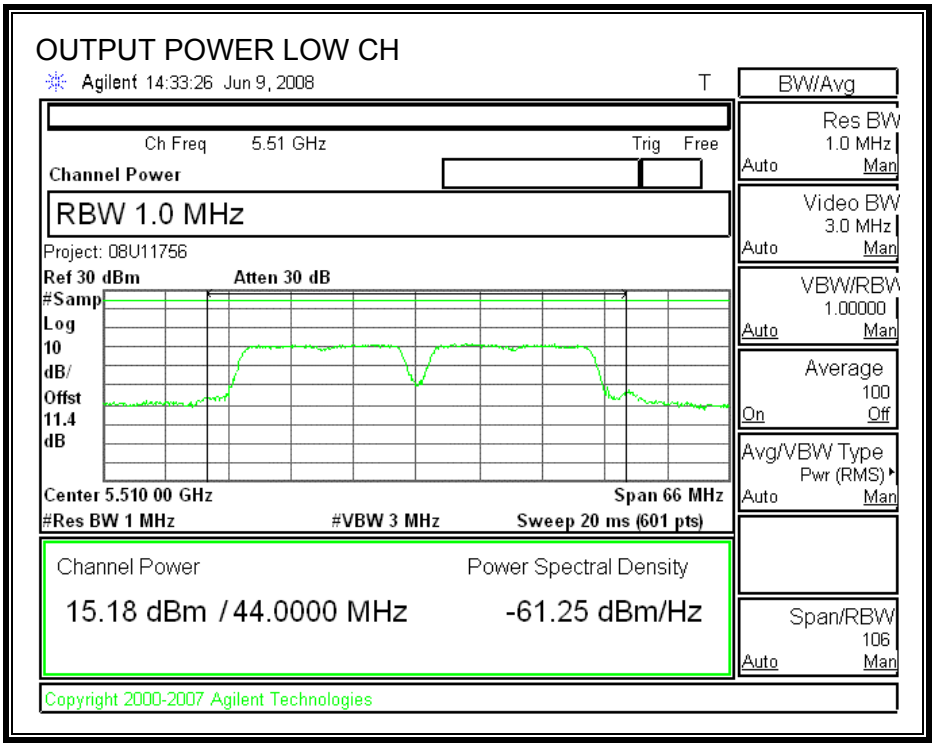
Limit

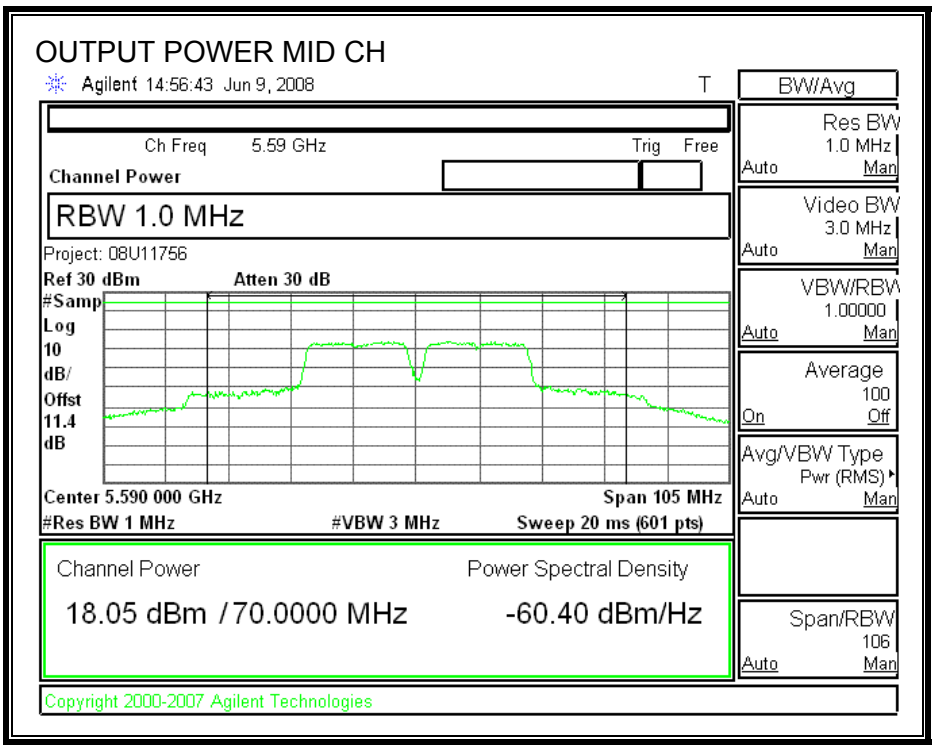
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5510	24	43.992	27.43	7.48	22.52
Mid	5590	24	66.455	29.23	7.48	22.52
High	5670	24	76.603	29.84	7.48	22.52

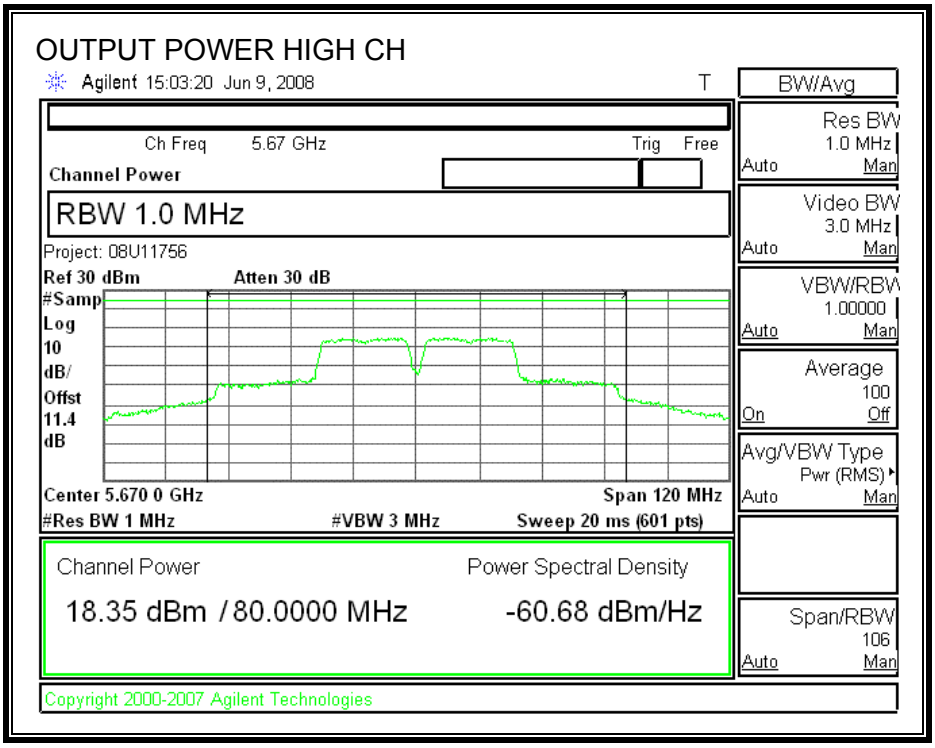
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5510	15.18	22.52	-7.34
Mid	5590	18.05	22.52	-4.47
High	5670	18.35	22.52	-4.17

OUTPUT POWER







9.3.3. 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 7.48 dBi; therefore the limit is .9.52 dBm.

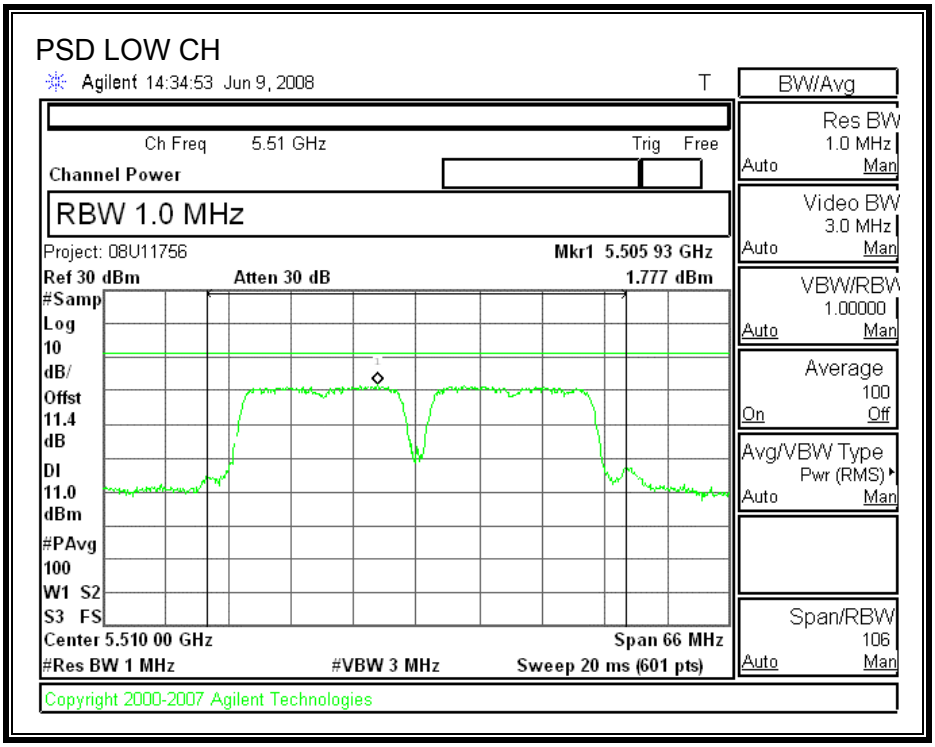
TEST PROCEDURE

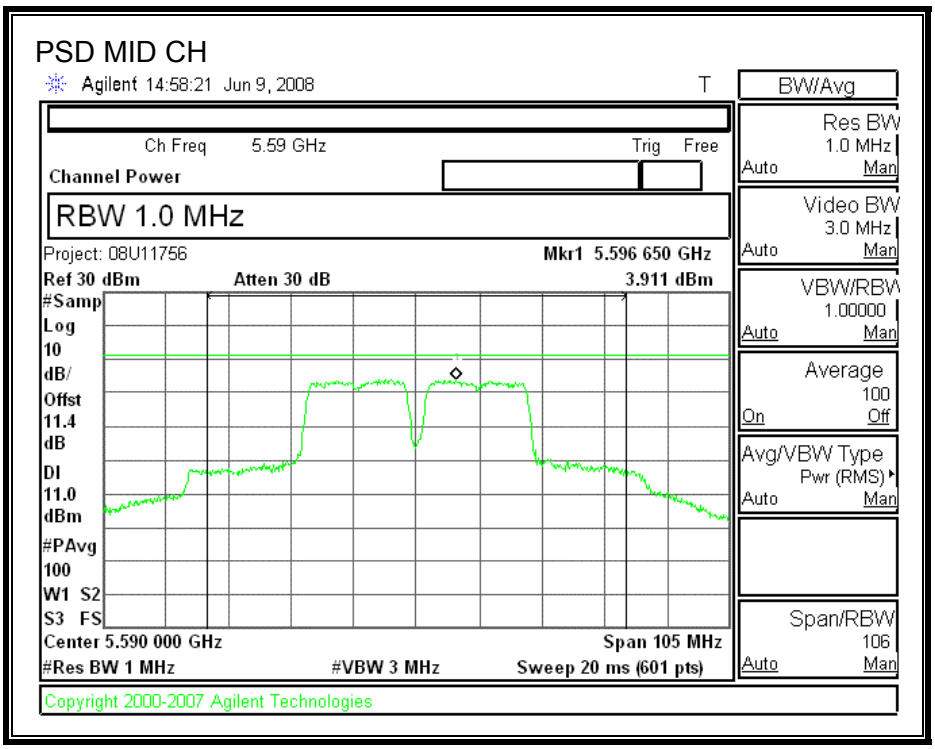
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

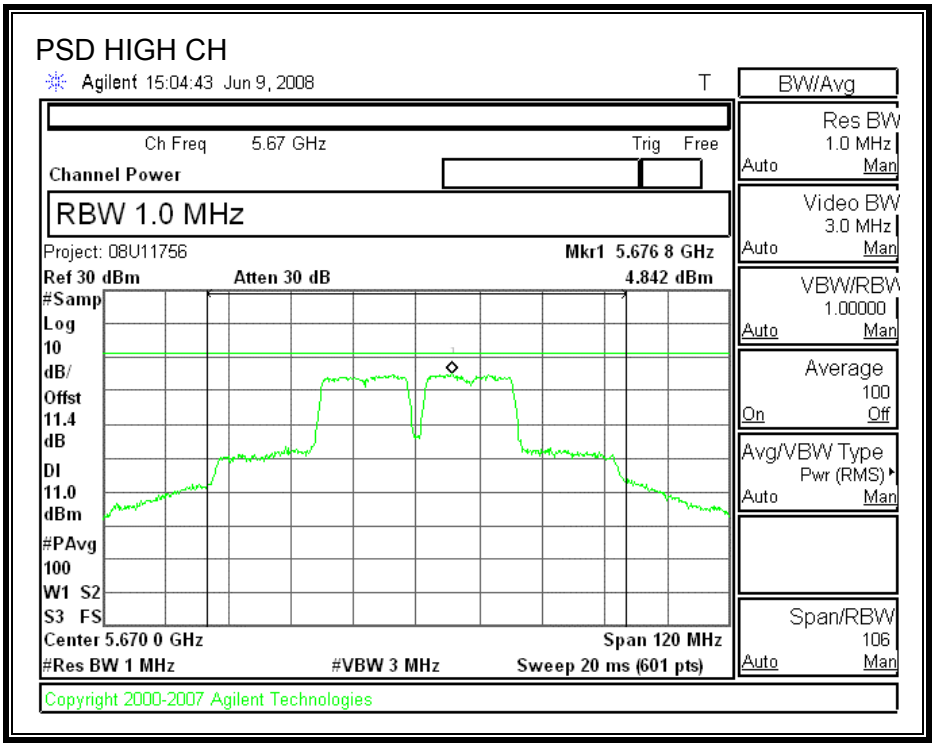
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5510	1.777	9.52	-7.74
Middle	5590	3.911	9.52	-5.61
High	5670	4.842	9.52	-4.68

POWER SPECTRAL DENSITY





PSD HIGH CH



9.3.4. 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

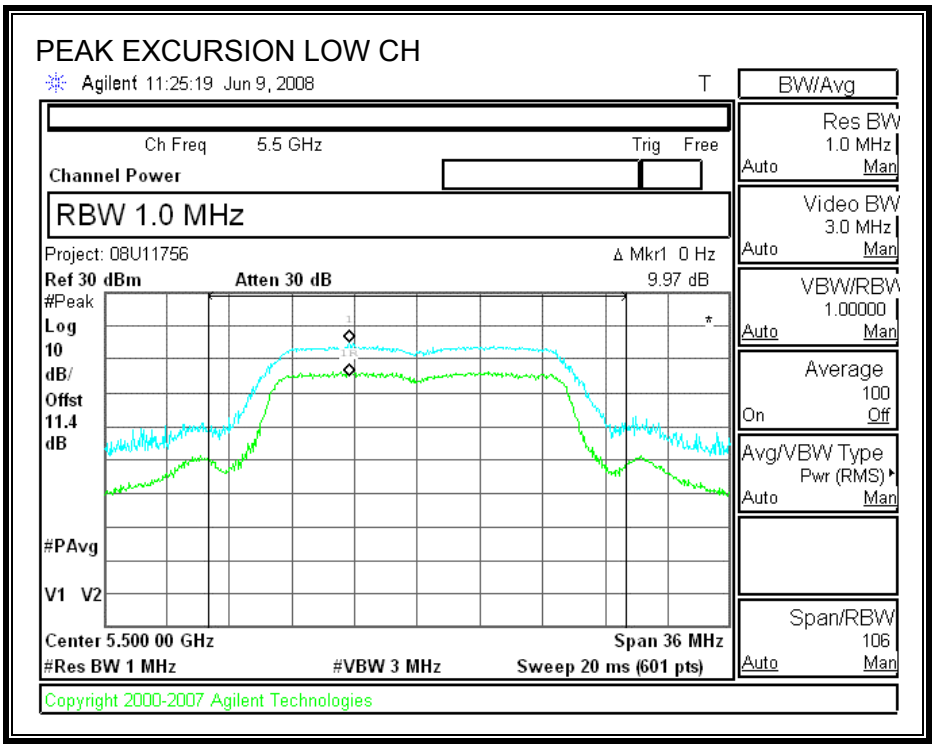
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

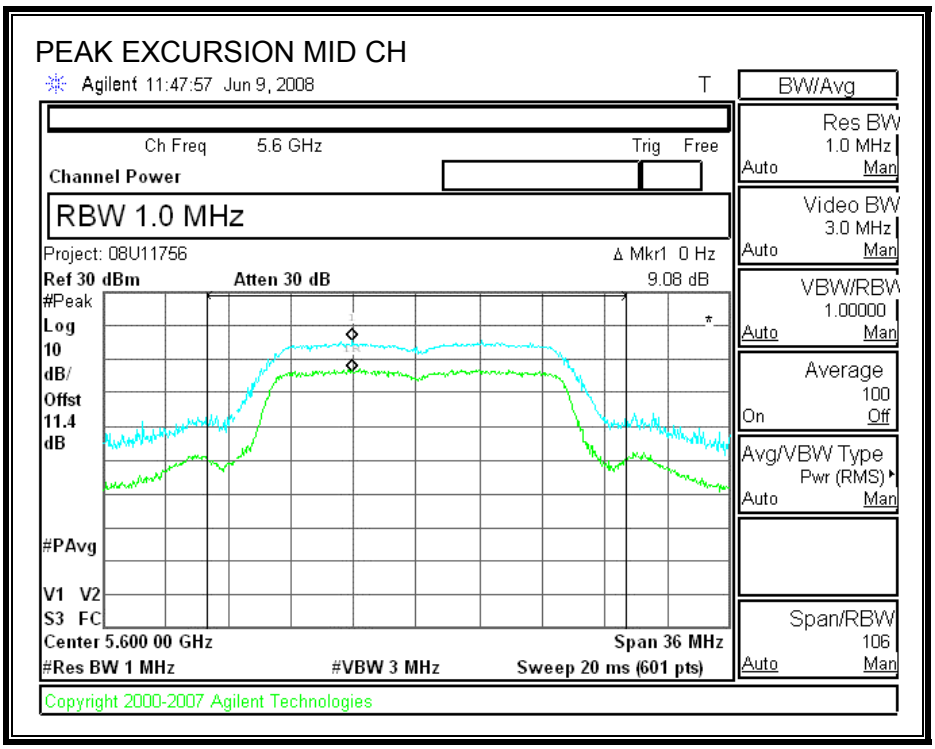
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

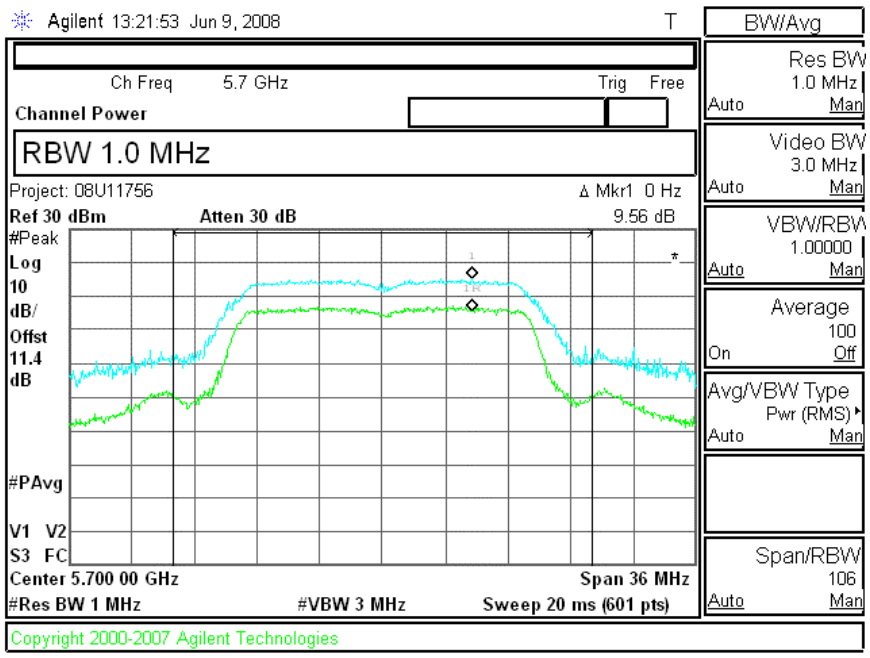
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5510	9.97	13	-3.03
Middle	5590	9.08	13	-3.92
High	5670	9.56	13	-3.44

PEAK EXCURSION





PEAK EXCURSION HIGH CH



9.3.5. 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.

Limit line = -27 - EUT Antenna Gain

TEST PROCEDURE

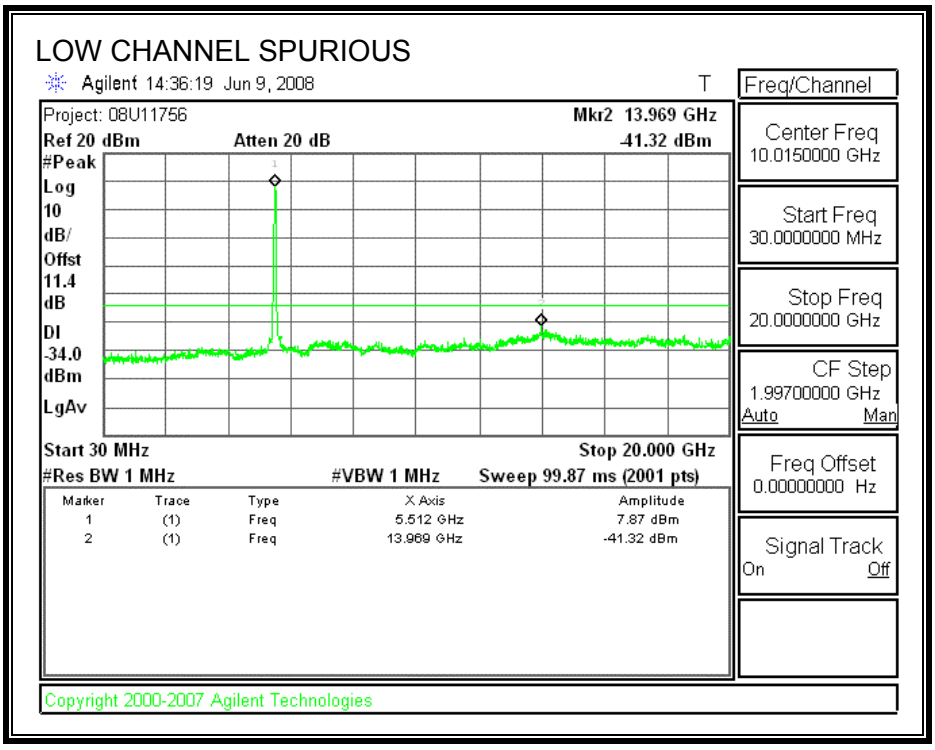
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

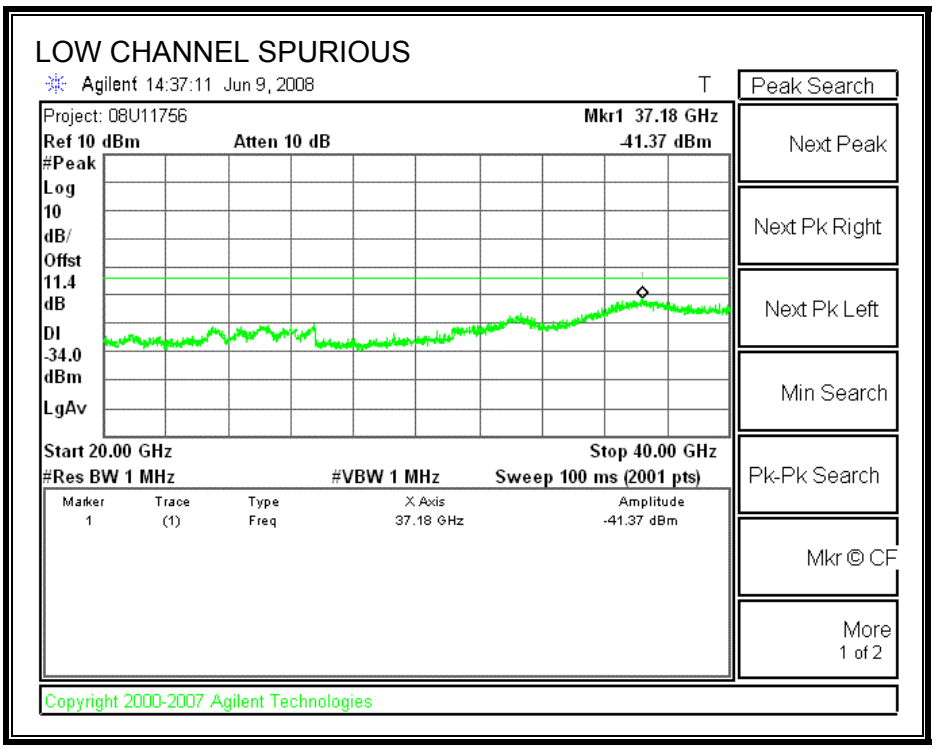
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

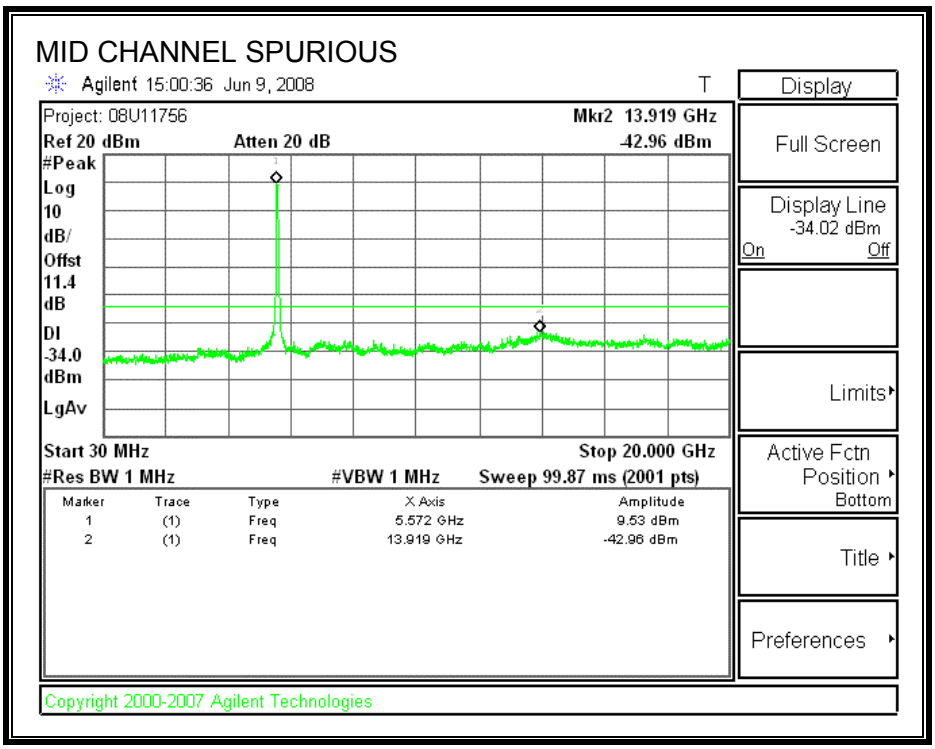
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

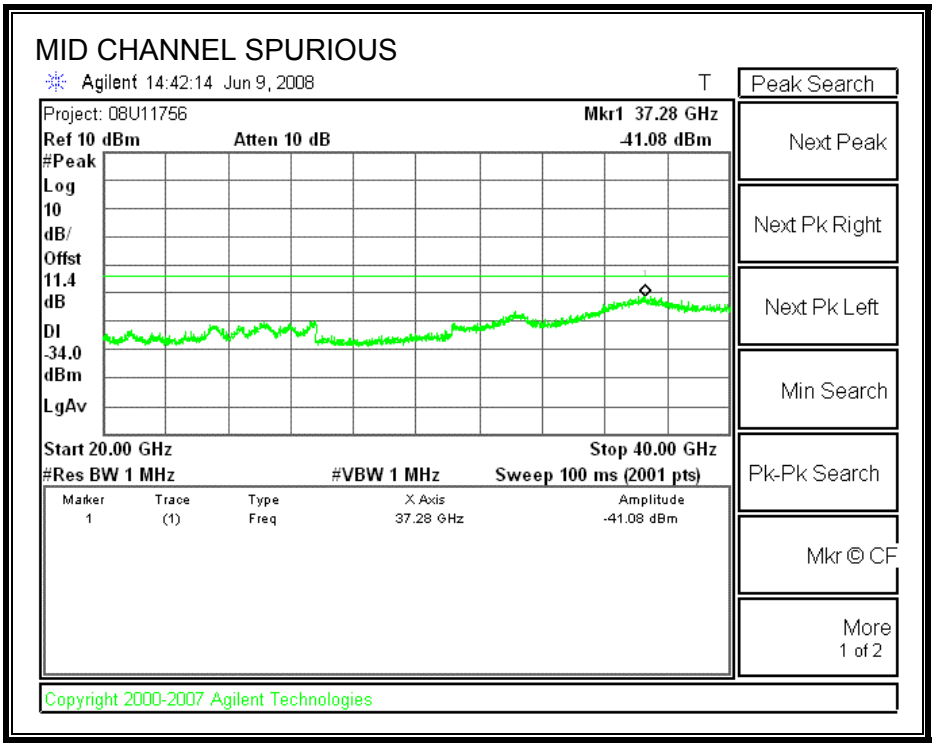
RESULTS

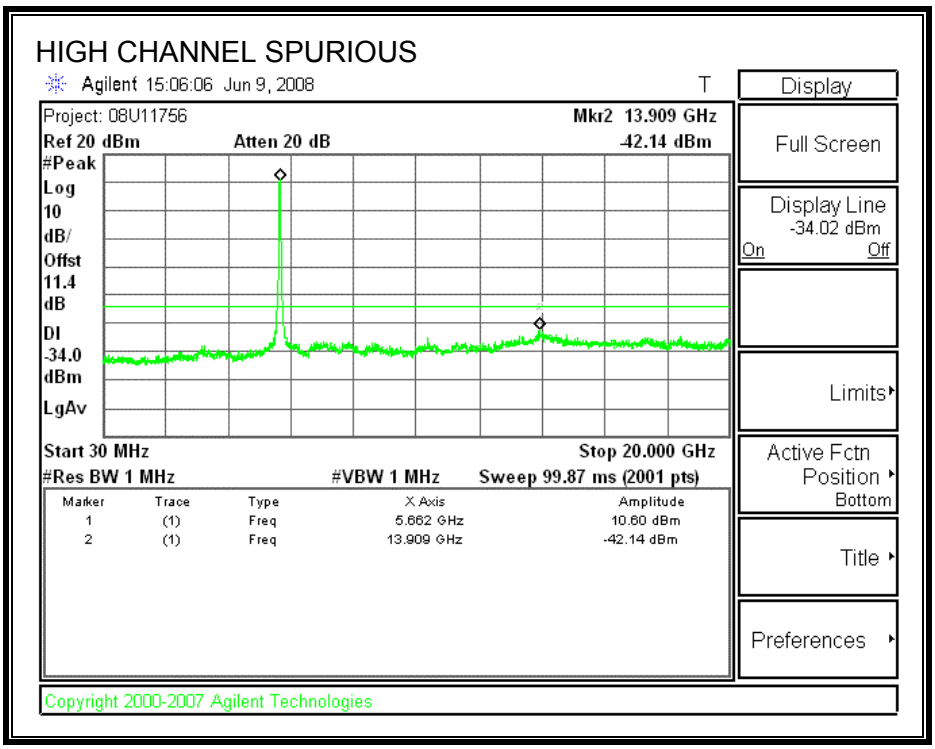
SPURIOUS EMISSIONS

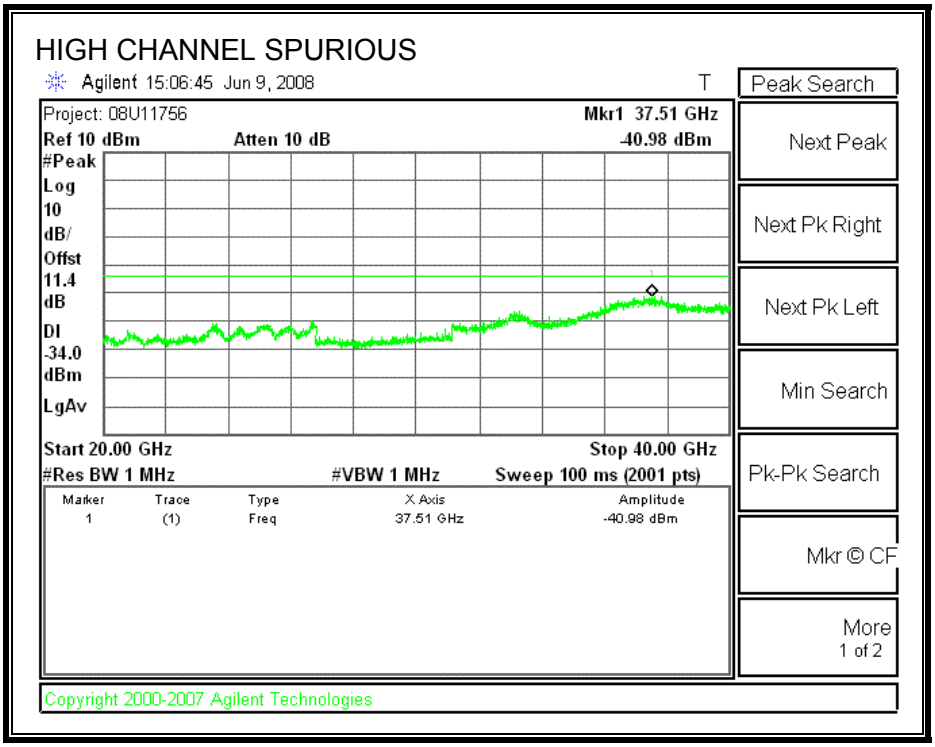












9.4. 802.11n HT40 MODE

9.4.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

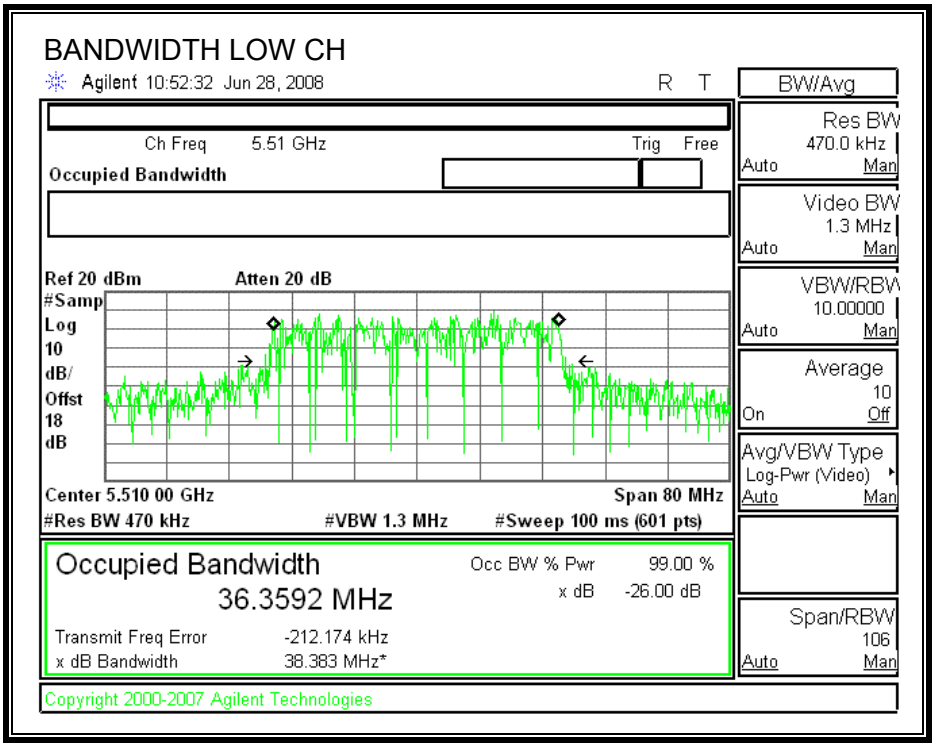
TEST PROCEDURE

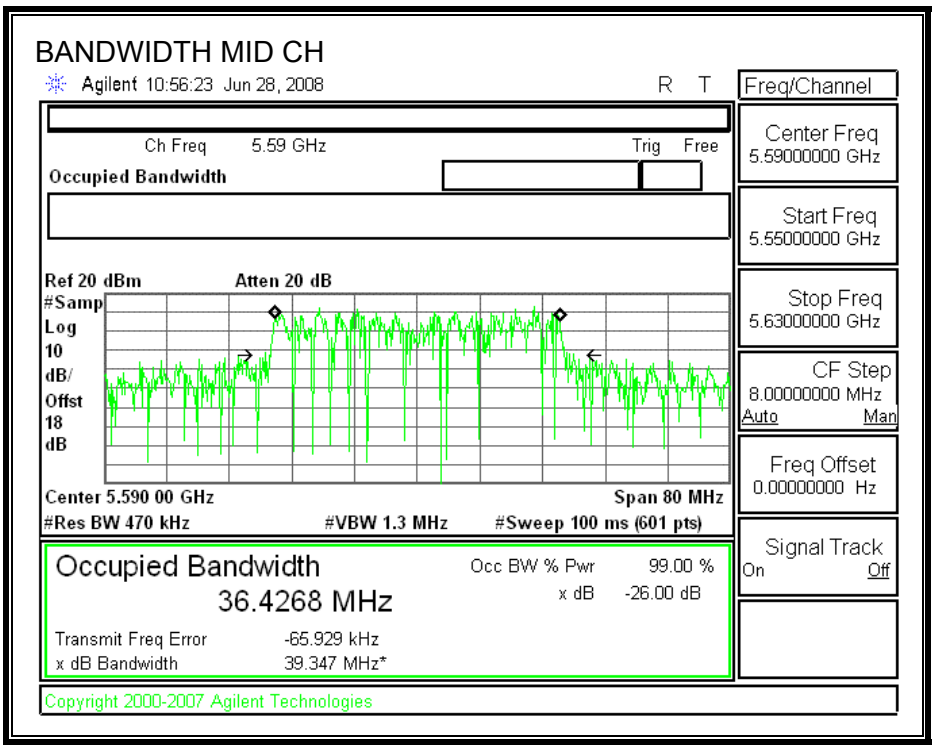
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

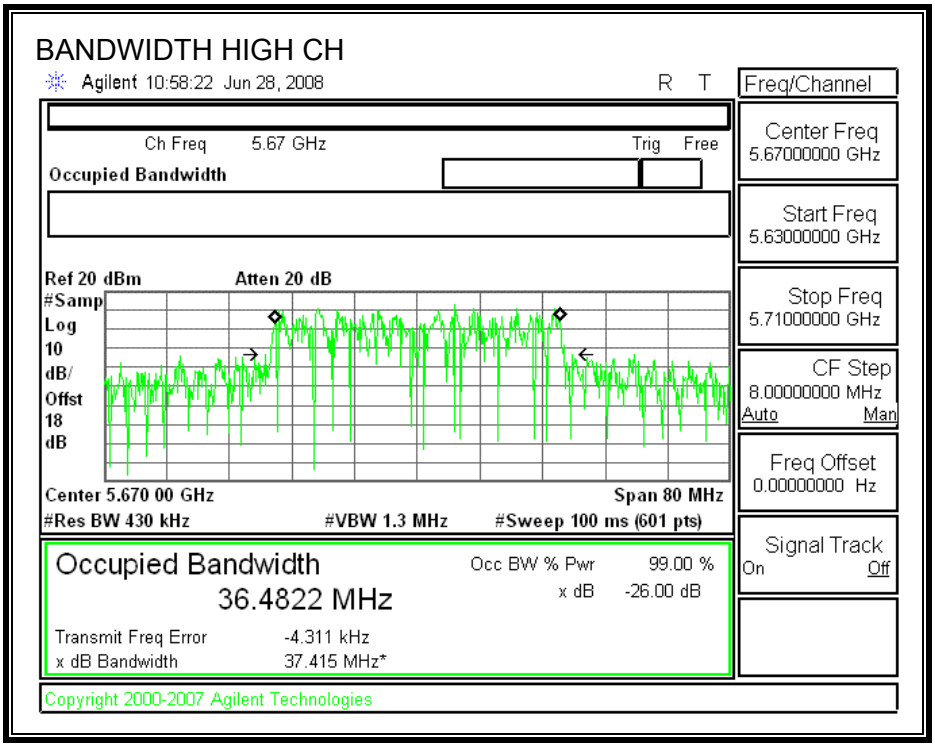
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5510	38.383	36.3592
Middle	5590	39.347	36.4268
High	5670	37.415	36.4822

26 dB and 99% BANDWIDTH







9.4.2. OUTPUT POWER

LIMITS

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

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

TEST PROCEDURE

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

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

RESULTS

Antenna Combination: Low PIFA / Hi Slot = 5.829 dBi

Limit

Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Mid	5590	24	39.347	26.95	5.83	24.00
High	5670	24	37.415	26.73	5.83	24.00

Individual Chain Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Mid	5590	17.44	18.51	21.02	24.00	-2.98
High	5670	17.43	18.53	21.03	24.00	-2.97

Note: The low channel at 15.5dBm meets the spec of highest & lowest antenna gain combinations. Data in the table above only shows the mid & high channels; see table below for low channel.

Antenna Combination: Hi PIFA / Low Slot = 8.80 dBi

Limit

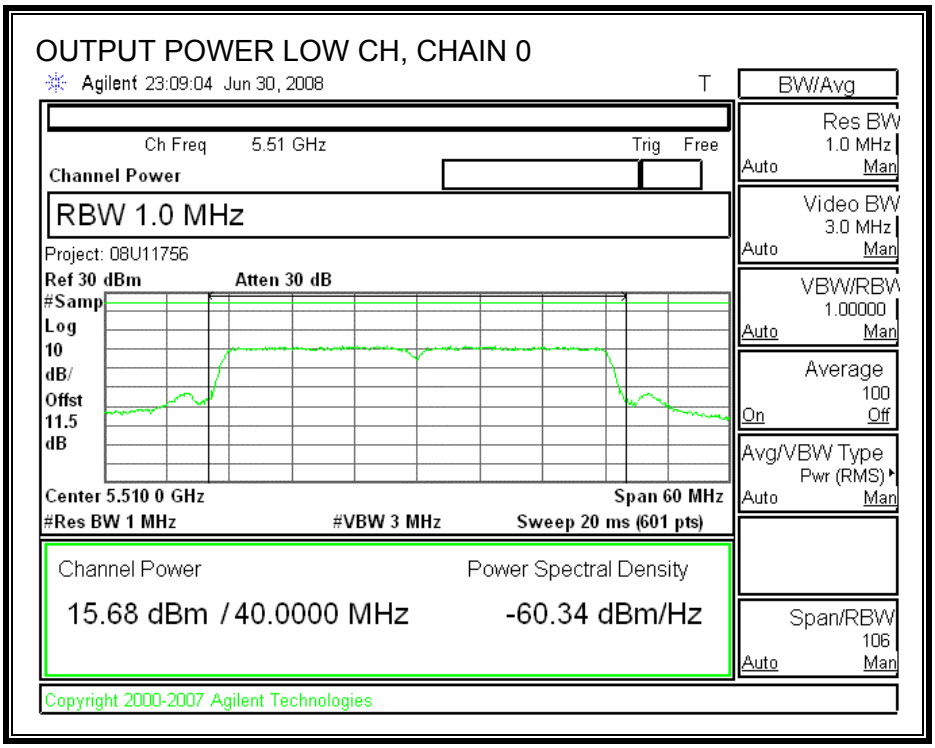
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5510	24	38.383	26.84	8.80	21.20
Mid	5590	24	39.347	26.95	8.80	21.20
High	5670	24	37.415	26.73	8.80	21.20

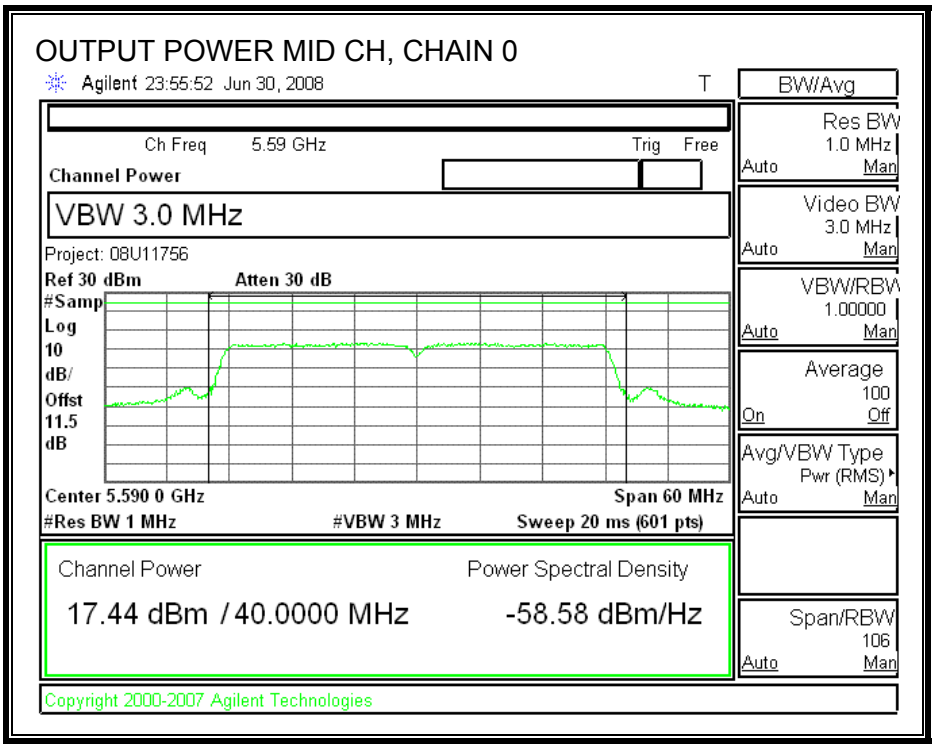
Individual Chain Results

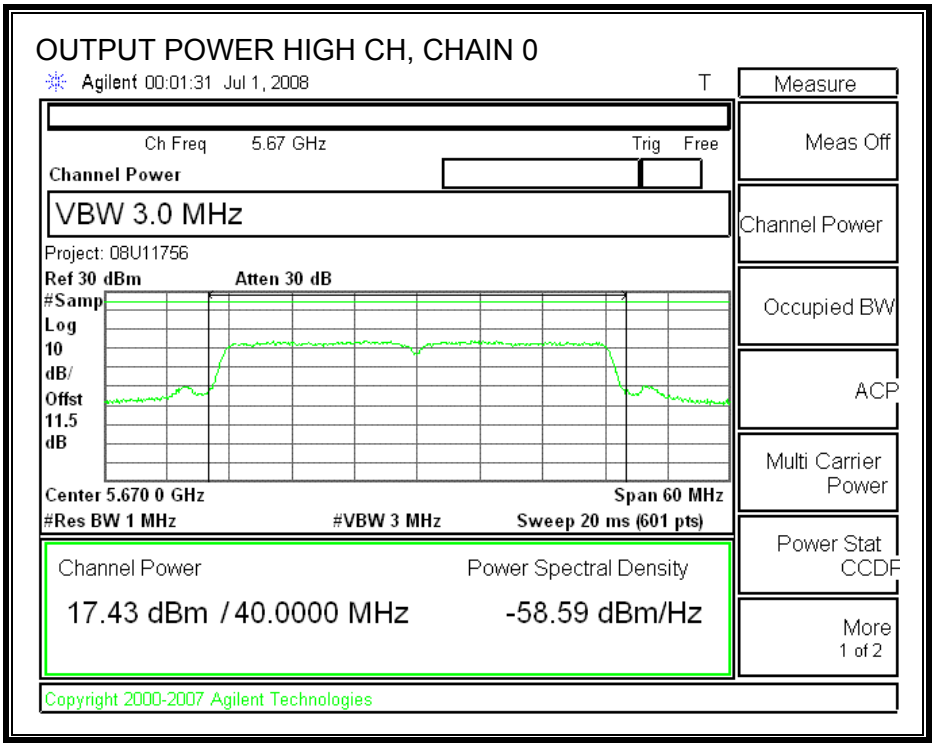
Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5510	15.68	15.87	18.79	21.20	-2.41
Mid	5590	16.65	17.52	20.12	21.20	-1.08
High	5670	16.49	17.54	20.06	21.20	-1.14

Antenna Combination: Low PIFA / Hi Slot = 5.829 dBi

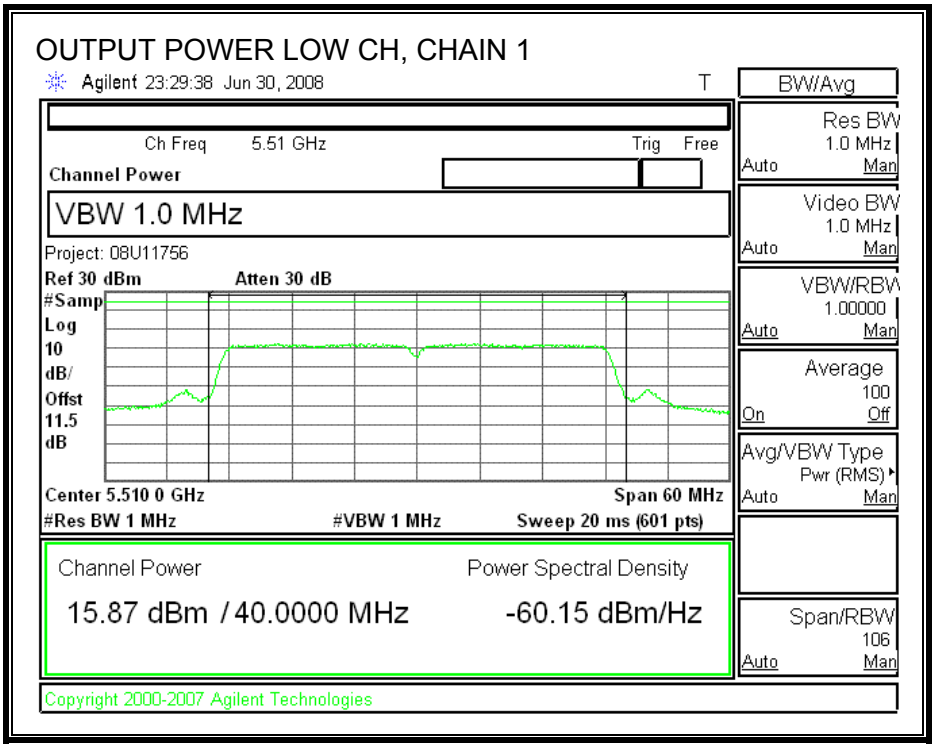
CHAIN 0 OUTPUT POWER



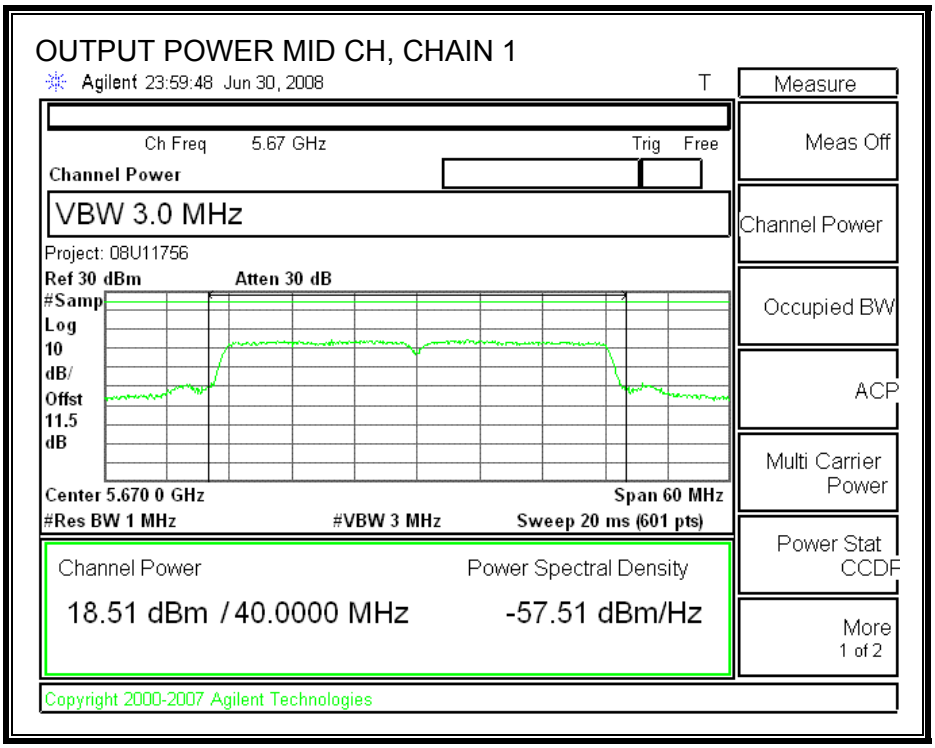




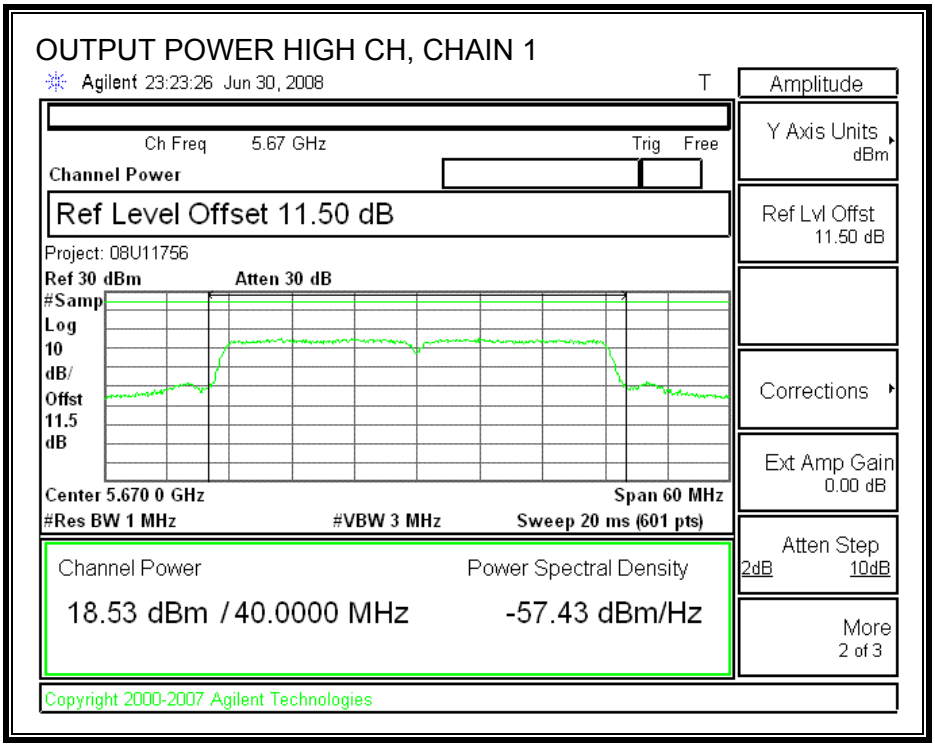
CHAIN 1 OUTPUT POWER



OUTPUT POWER MID CH, CHAIN 1

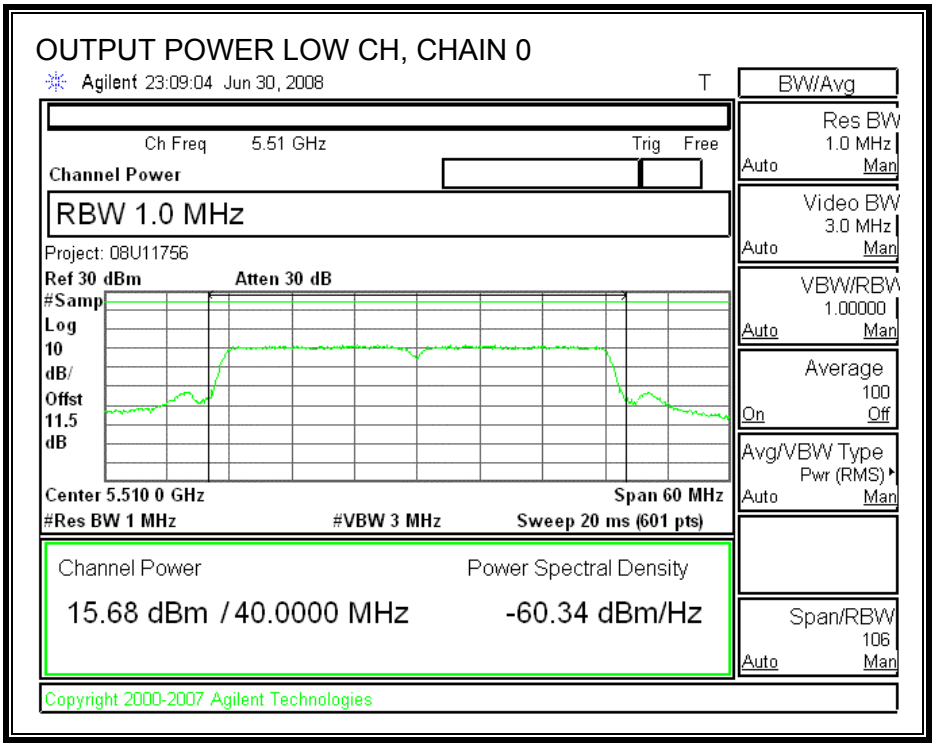


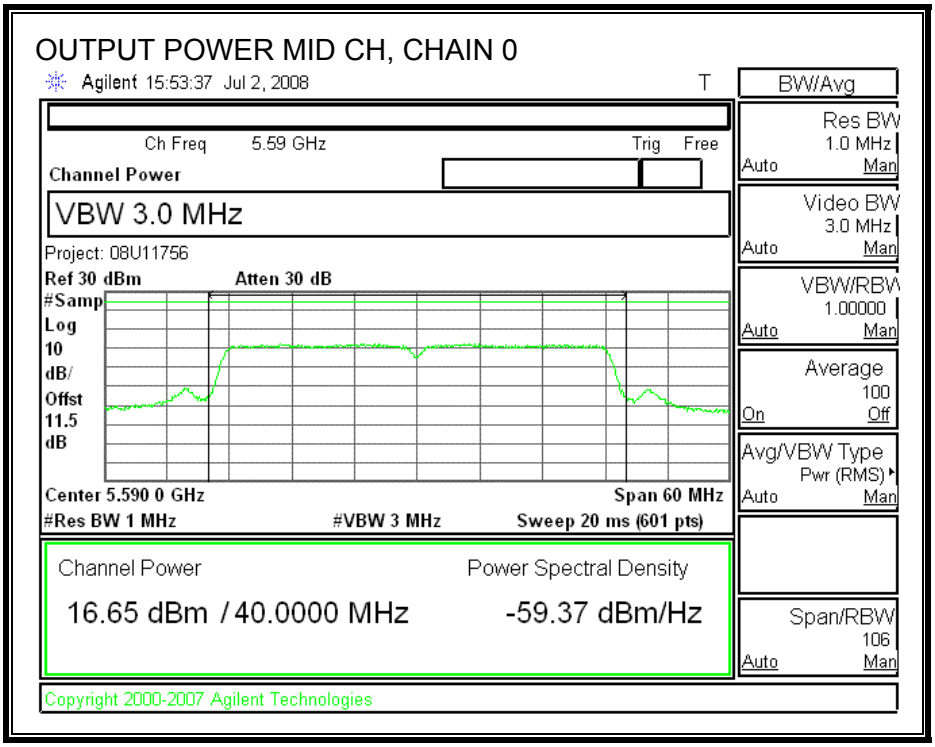
OUTPUT POWER HIGH CH, CHAIN 1

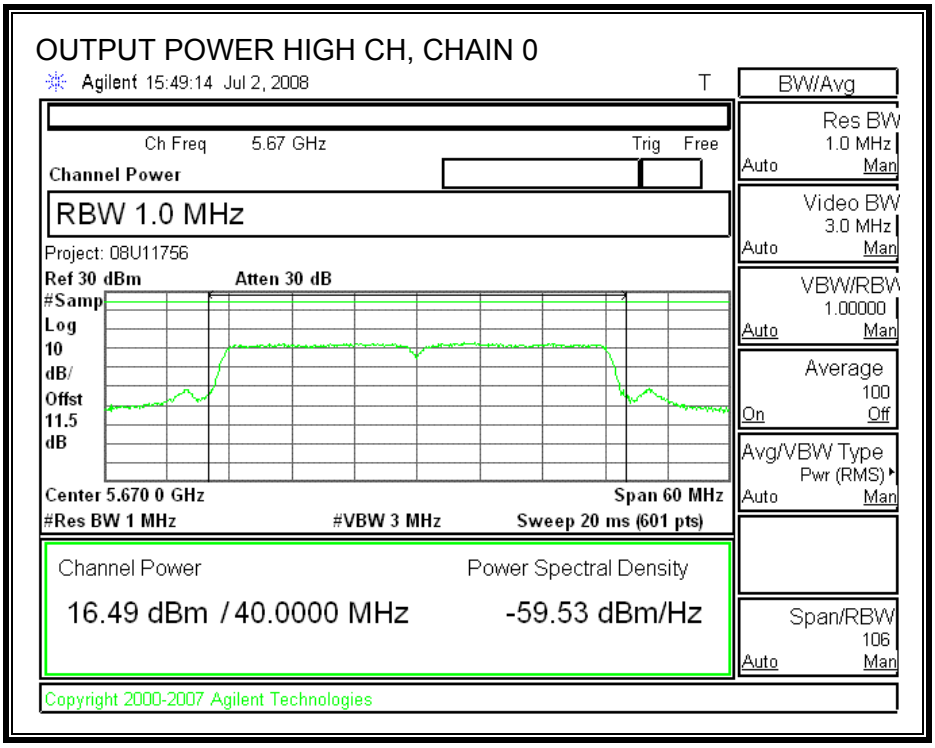


Antenna Combination: Hi PIFA / Low Slot = 8.80 dBi

CHAIN 0 OUTPUT POWER







CHAIN 1 OUTPUT POWER