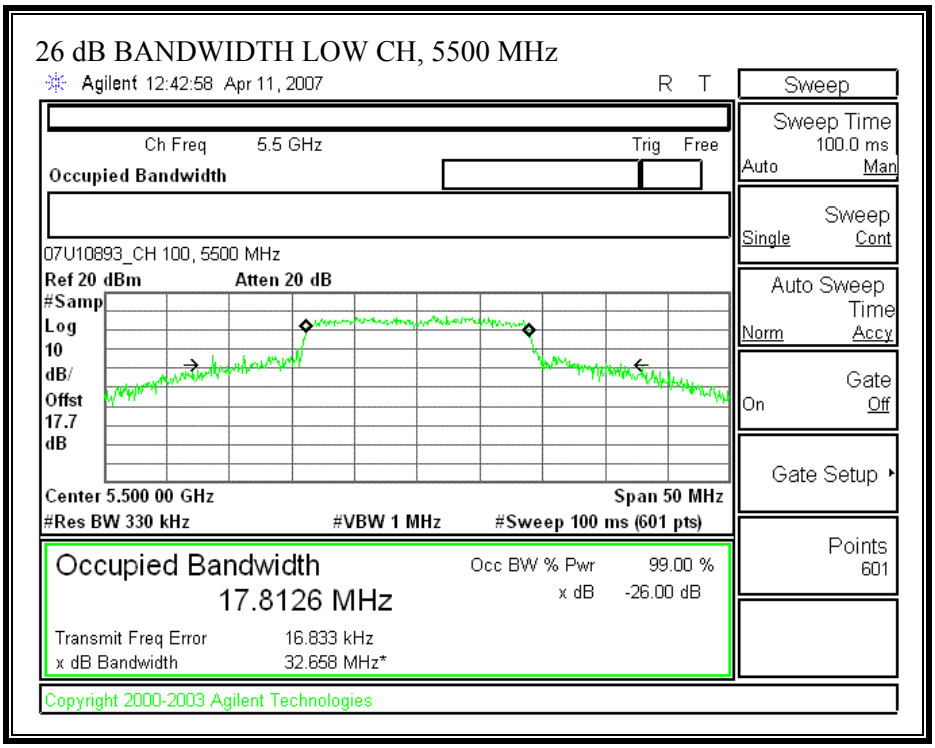
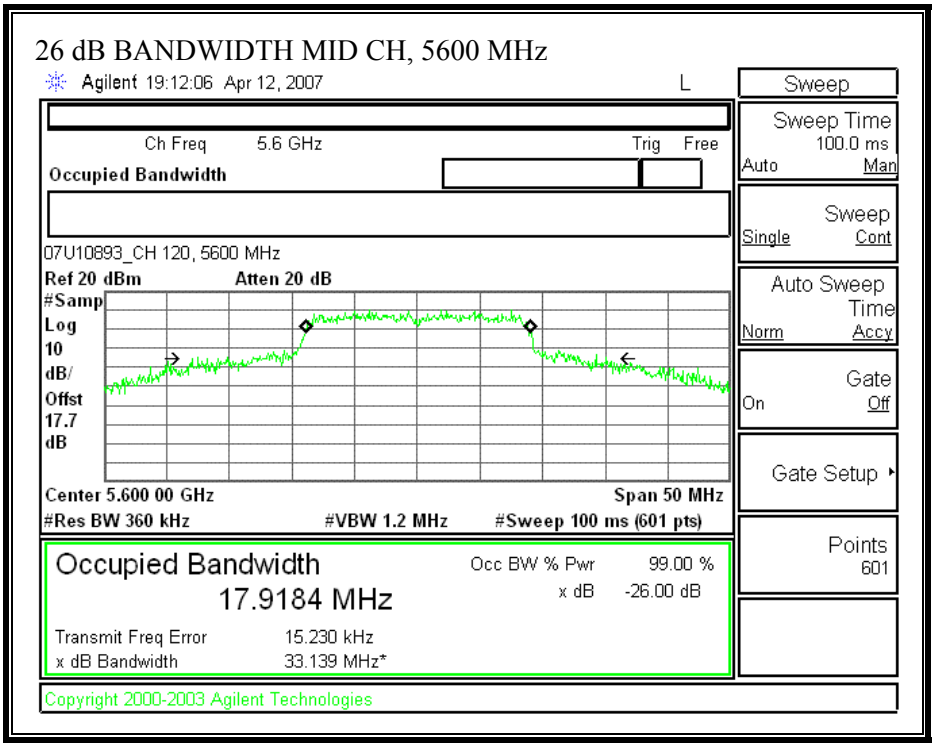
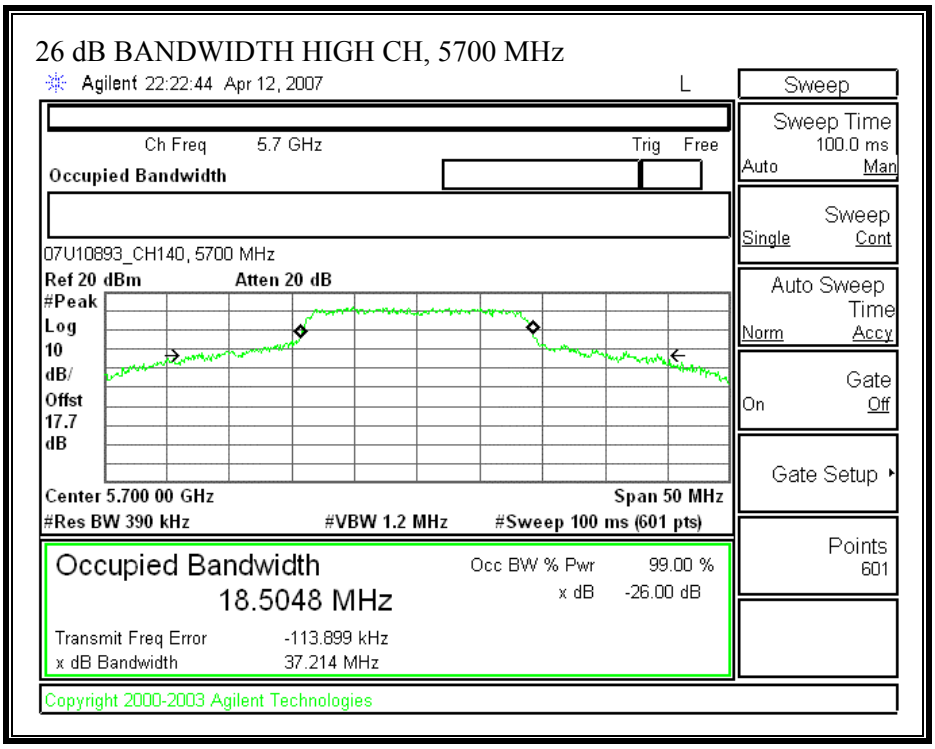
26 dB EMISSION BANDWIDTH (802.11 - 20 MHz TX BANDWIDTH- CHAIN 1)

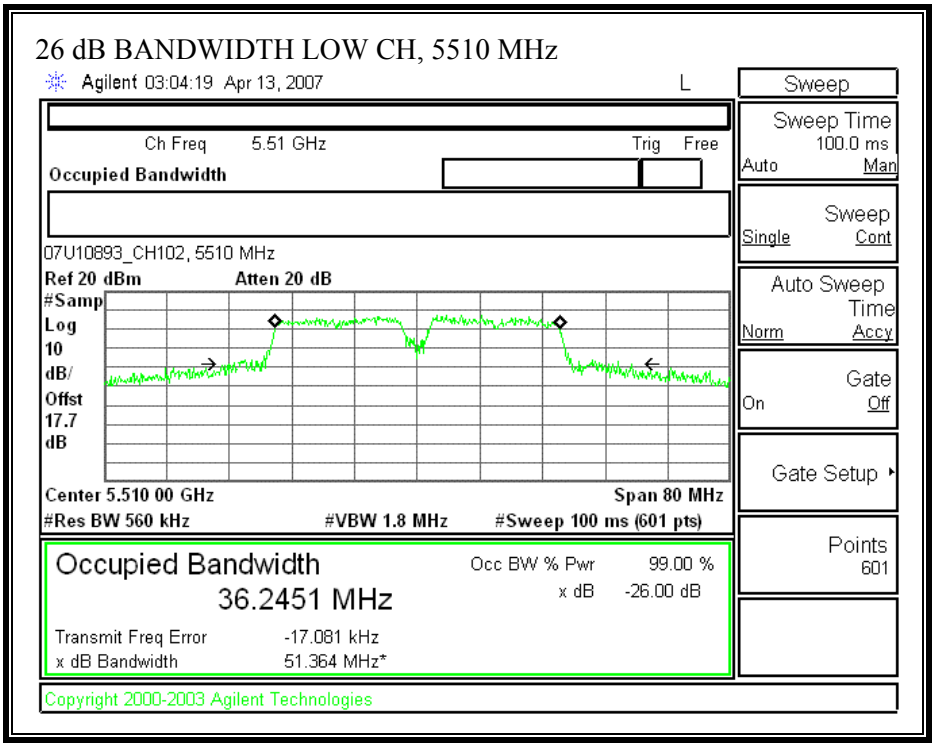


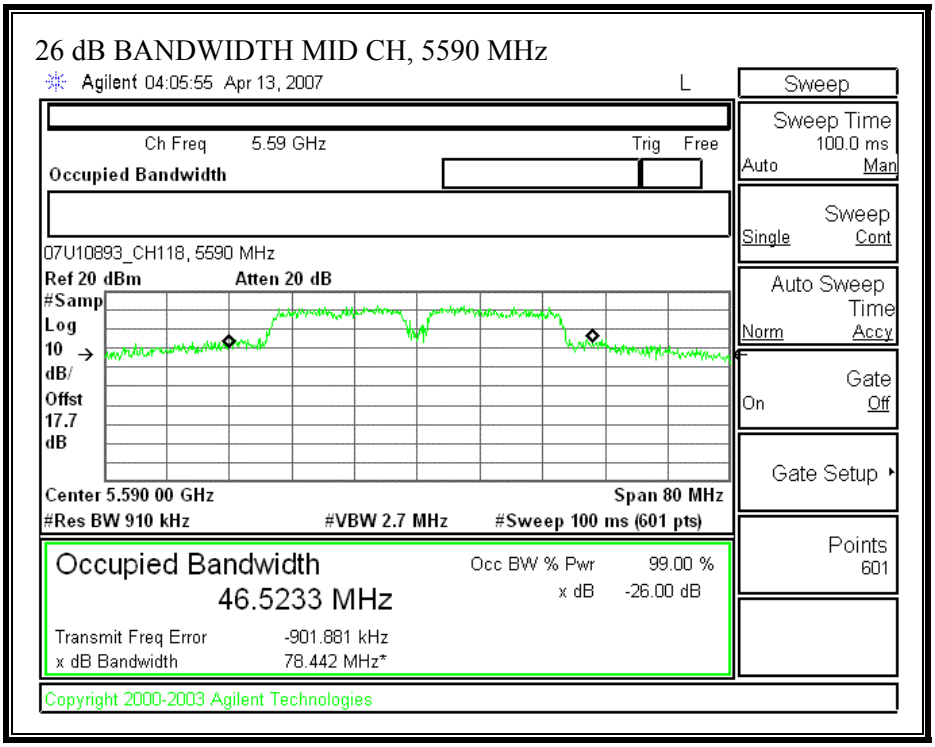


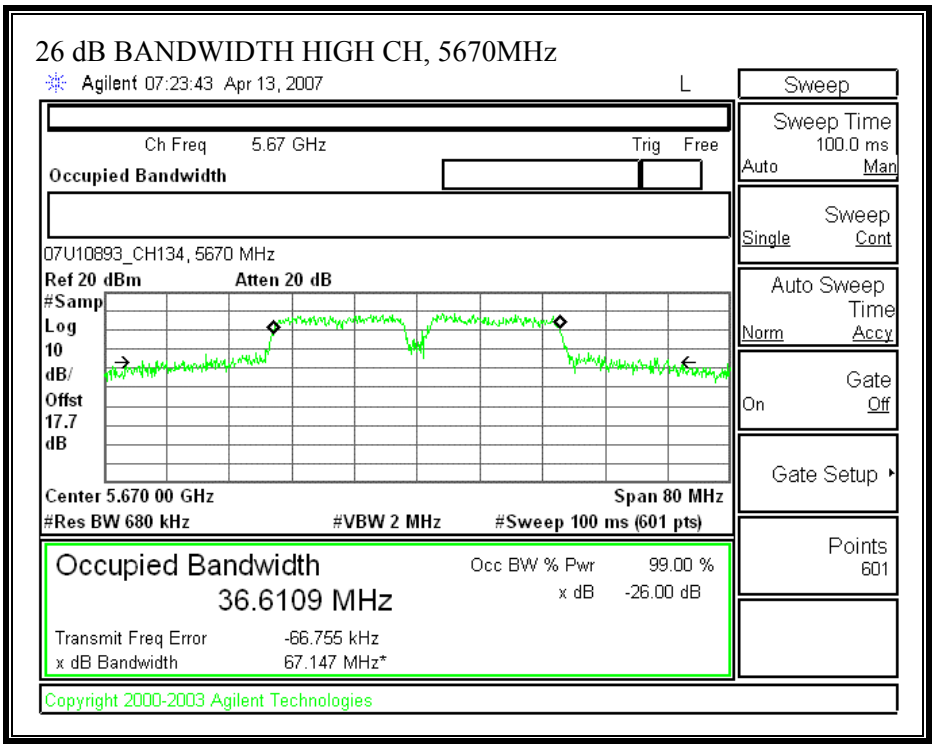


802.11n 40 MHz CDD MCS 32

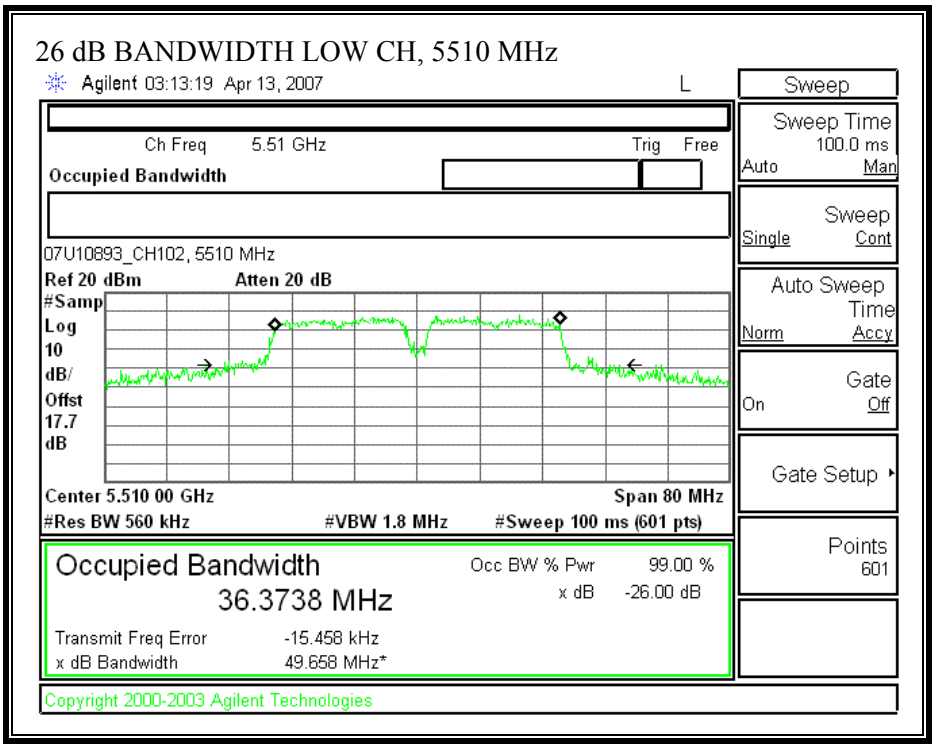
26 dB EMISSION BANDWIDTH (802.11 - 40 MHz TX BANDWIDTH- CHAIN 0)

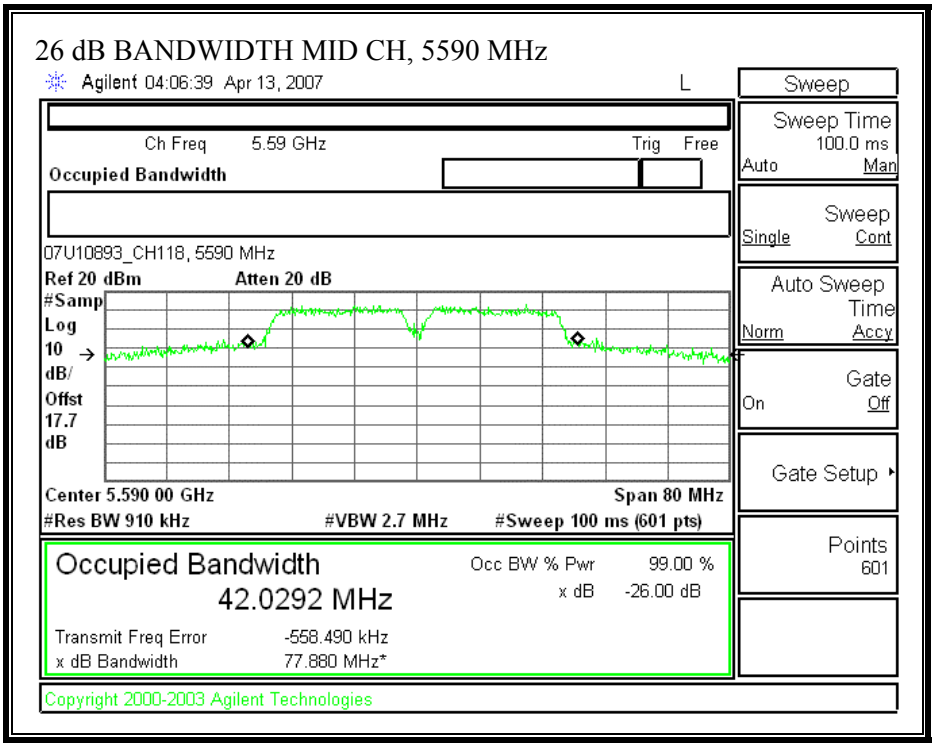


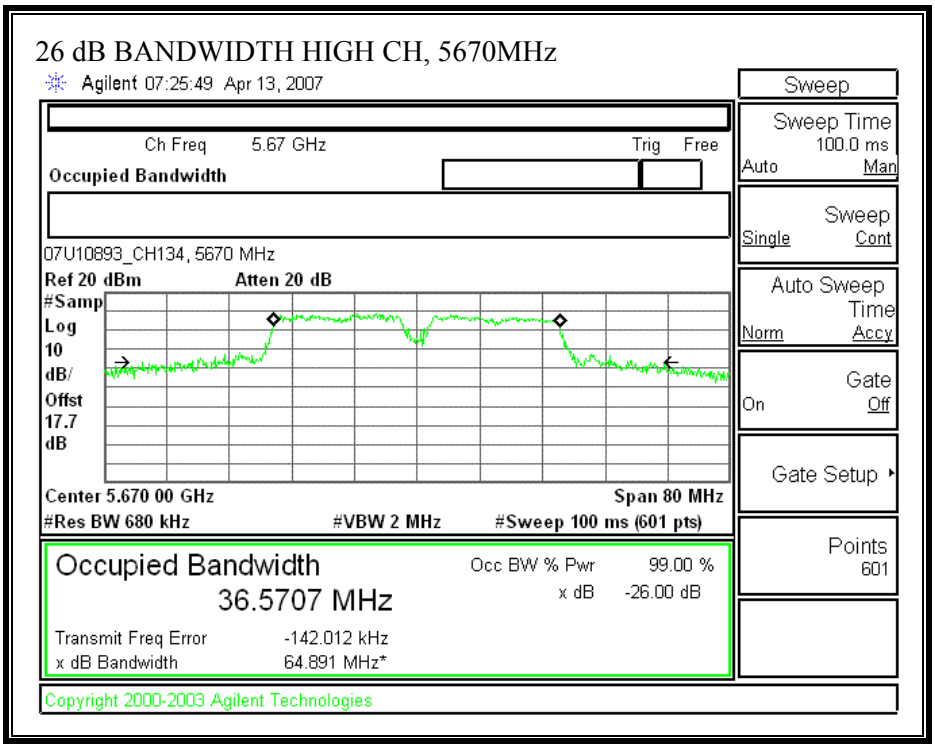




26 dB EMISSION BANDWIDTH (802.11 - 40 MHz TX BANDWIDTH- CHAIN 1)







7.4.2. PEAK POWER

LIMIT

§15.407 (a) (2) For the 5.47–5.725 GHz band, the peak transmit 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.

The cable assembly insertion loss of 11.4 dB (including 10 dB pad and 1.4dB cable) was entered as an offset in the power meter to allow for direct reading of power.

LIMITS AND RESULTS

No non-compliance noted:

Total peak power calculation formula: 10 log (10^ (Pchain0 / 10) + 10^ (Pchain1 / 10))

Note: Pchain 0 and Pchain1 are in dBm

For combiner: Following formula to calculate the array gain:

Array gain = 10*log (10^ (main gain/10) + 10^ (aux gain/10))

5.470 – 5.725GHz band: 8.75dBi

802.11a CDD MODE is covered by worst case 802.11n 20 MHz CDD MCS 0 MODE

802.11n 20 MHz CDD MCS 0 MODE

8.75dBi Antenna

Channel	Frequency (MHz)	Fixed Limit (dBm)	B Chain 0 (MHz)	B Chain 1 (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5500	24	29.169	32.658	25.649	8.75	21.25
Mid	5600	24	35.640	33.139	26.203	8.75	21.25
High	5700	24	40.440	37.214	26.707	8.75	21.25

Results

Channel	Frequency (MHz)	Power Chain 0 (dBm)	Power Chain 1 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	14.63	14.65	17.65	21.25	-3.60
Mid	5600	14.08	14.13	17.12	21.25	-4.13
High	5700	14.32	14.04	17.19	21.25	-4.06

6dBi Antenna

Channel	Frequency (MHz)	Fixed Limit (dBm)	B Chain 0 (MHz)	B Chain 1 (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5500	24	29.169	32.658	25.649	6.00	24.00
Mid	5600	24	35.640	33.139	26.203	6.00	24.00
High	5700	24	40.440	37.214	26.707	6.00	24.00

Results

Channel	Frequency (MHz)	Power Chain 0 (dBm)	Power Chain 1 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	17.21	17.24	20.24	24.00	-3.76
Mid	5600	16.81	16.70	19.77	24.00	-4.23
High	5700	16.58	16.69	19.65	24.00	-4.35

802.11n 40 MHz CDD MCS 32 MODE

8.75dBi antenna

Channel	Frequency (MHz)	Fixed Limit (dBm)	B Chain 0 (MHz)	B Chain 1 (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5510	24	44.836	39.829	27.002	8.75	21.25
Mid	5590	24	76.184	74.998	29.750	8.75	21.25
High	5670	24	65.430	61.061	28.858	8.75	21.25

Results

Channel	Frequency (MHz)	Power Chain 0 (dBm)	Power Chain 1 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5510	15.79	15.68	18.75	21.25	-2.50
Mid	5590	16.64	16.70	19.68	21.25	-1.57
High	5670	16.67	16.81	19.75	21.25	-1.50

6dBi antenna

Note: The low channel utilizes the same power level for all antennas, low channel power data in table below is from 8.75 dBi data.

Channel	Frequency (MHz)	Fixed Limit (dBm)	B Chain 0 (MHz)	B Chain 1 (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Mid	5590	24	44.836	39.829	27.002	6.00	24.00
Mid	5590	24	76.184	74.998	29.750	6.00	24.00
High	5670	24	65.430	61.061	28.858	6.00	24.00

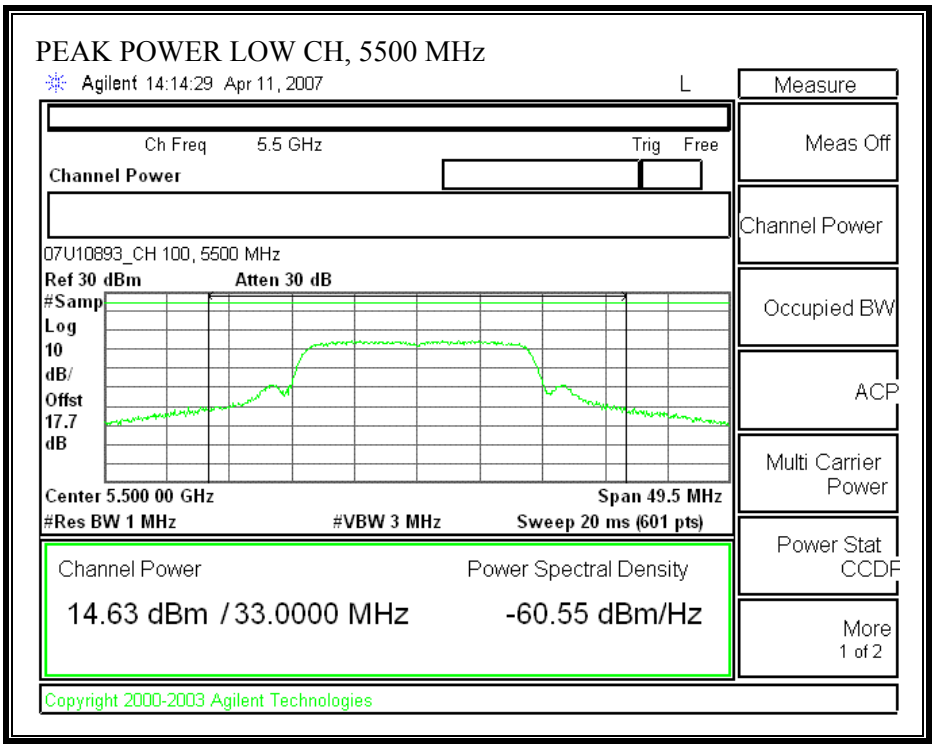
Results

Channel	Frequency (MHz)	Power Chain 0 (dBm)	Power Chain 1 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Mid	5590	15.79	15.68	18.75	24.00	-5.25
Mid	5590	19.38	19.39	22.40	24.00	-1.60
High	5670	19.31	19.34	22.34	24.00	-1.66

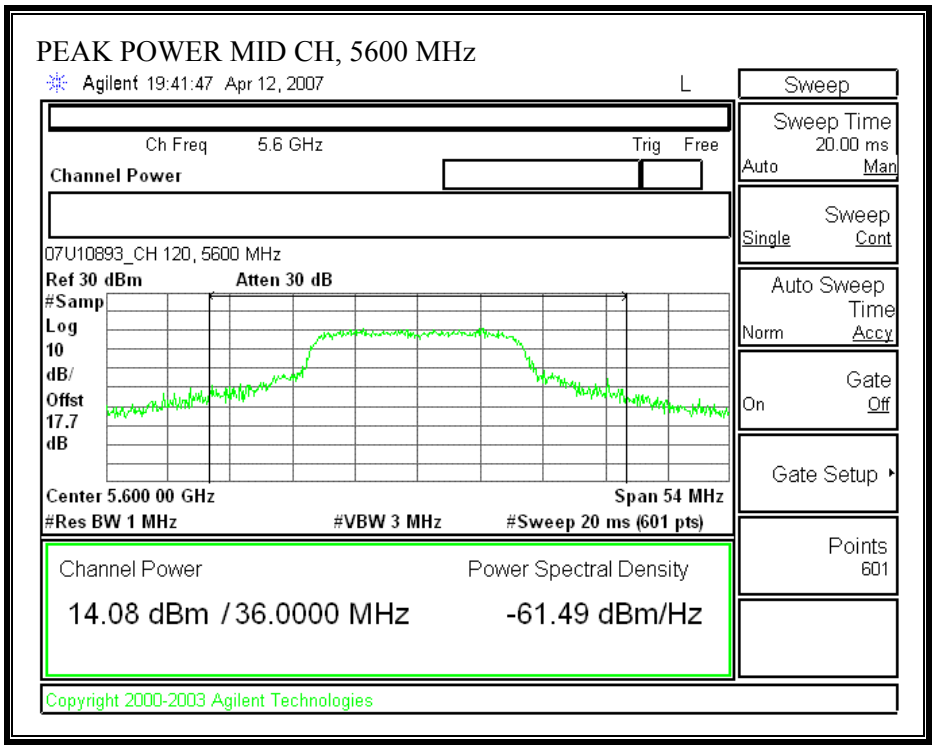
802.11n 20 MHz CDD MCS 0 MODE

8.75dBi Antenna

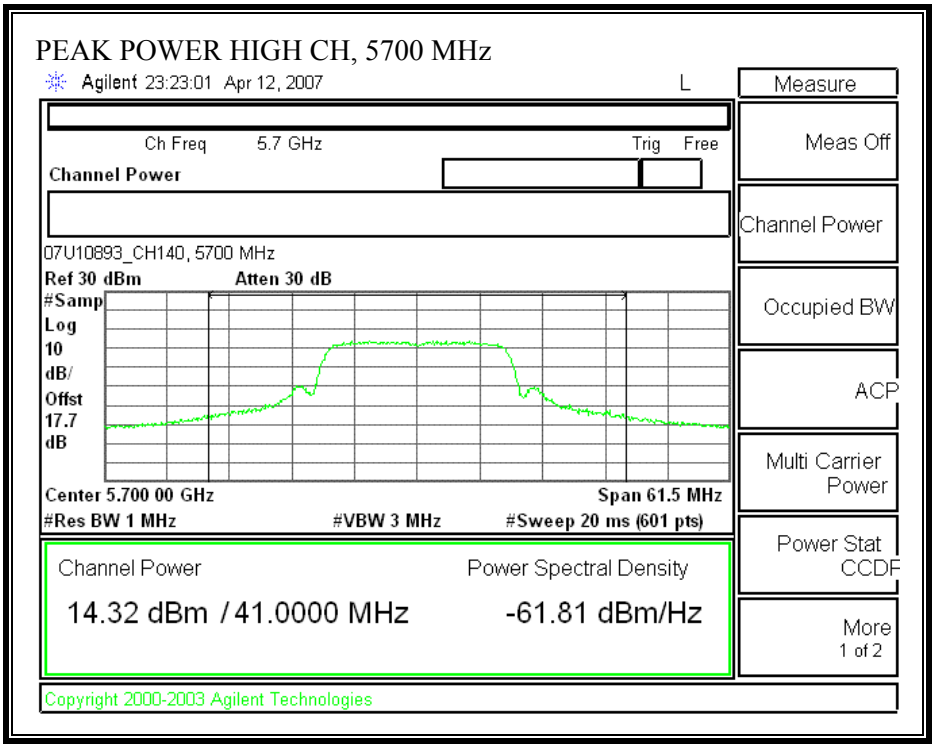
PEAK POW7ER (802.11 – 20MHz TX BANDWIDTH – CHAIN 0)



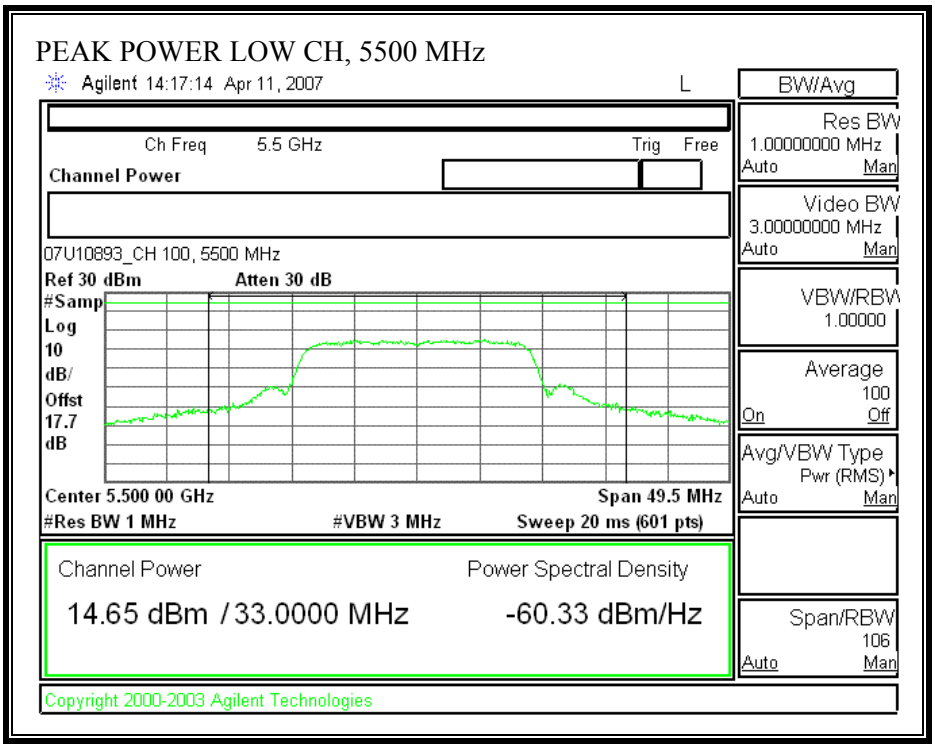
PEAK POWER MID CH, 5600 MHz

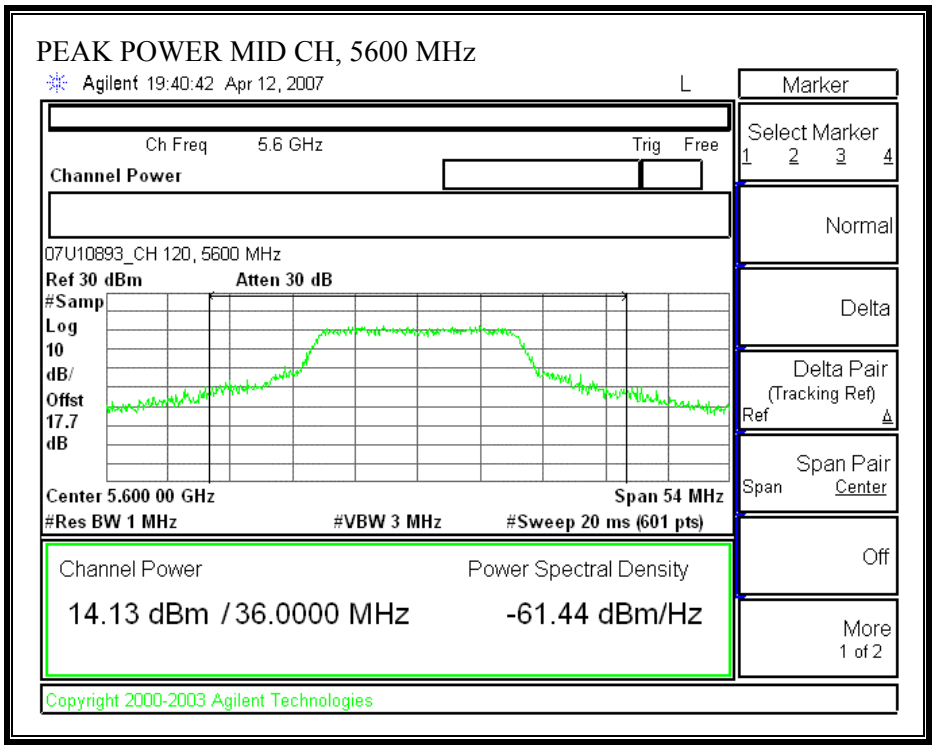


PEAK POWER HIGH CH, 5700 MHz

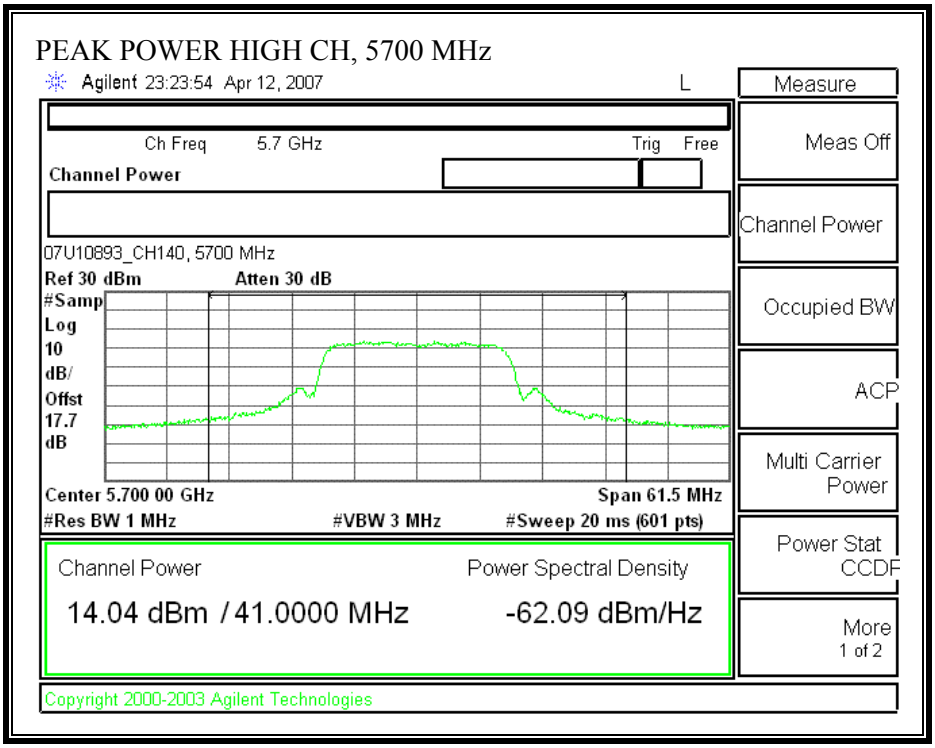


PEAK POWER (802.11 – 20MHz TX BANDWIDTH – CHAIN 1)



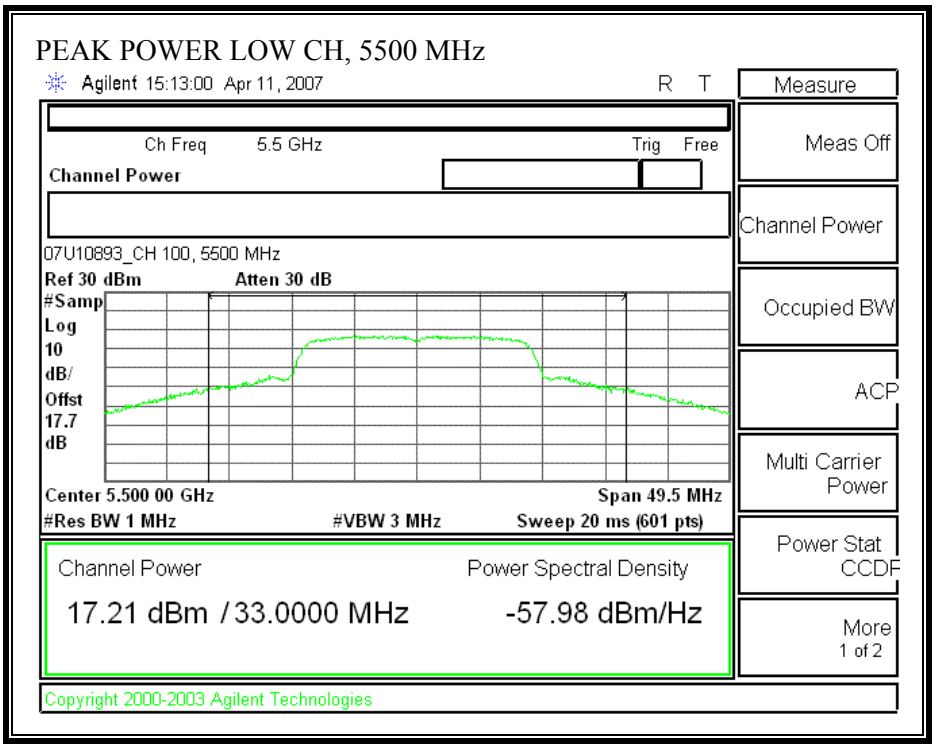


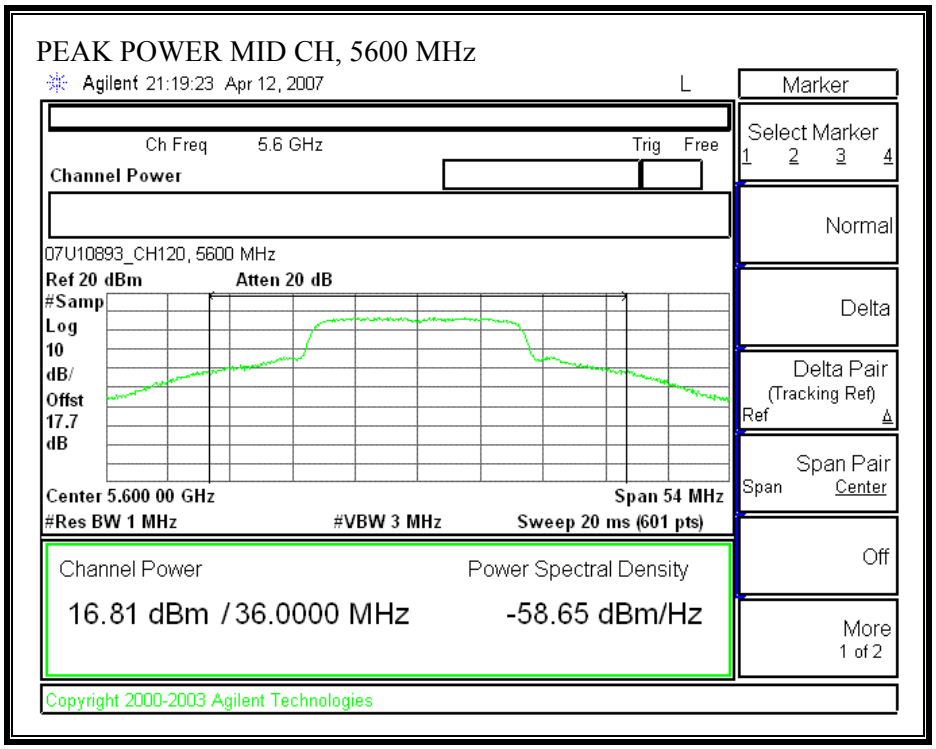
PEAK POWER HIGH CH, 5700 MHz



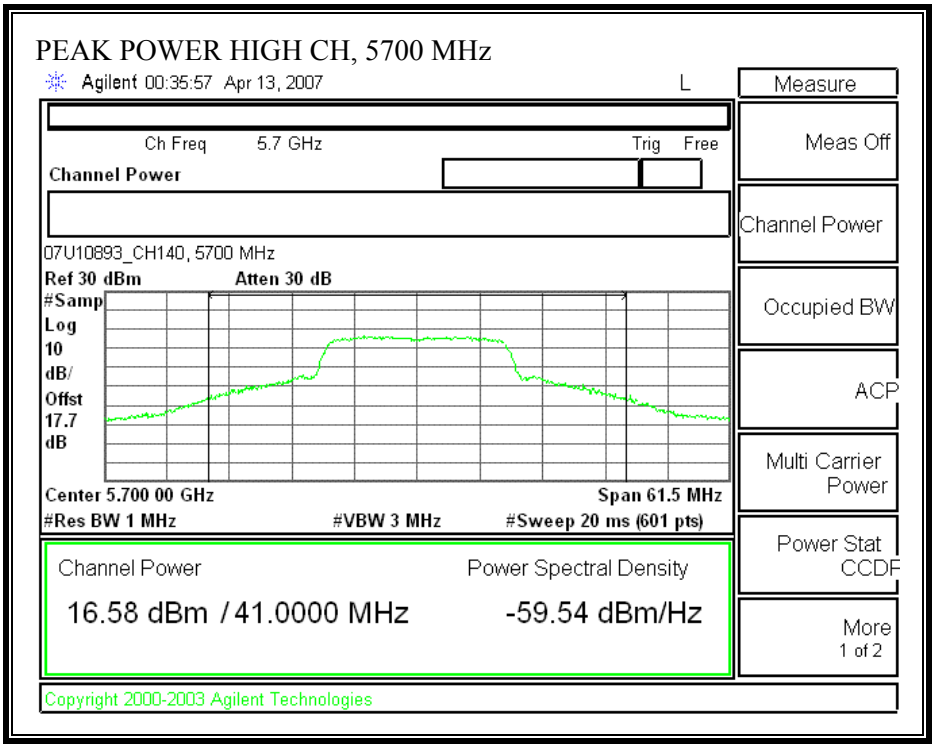
6dBi Antenna

PEAK POWER (802.11 – 20MHz TX BANDWIDTH – CHAIN 0)

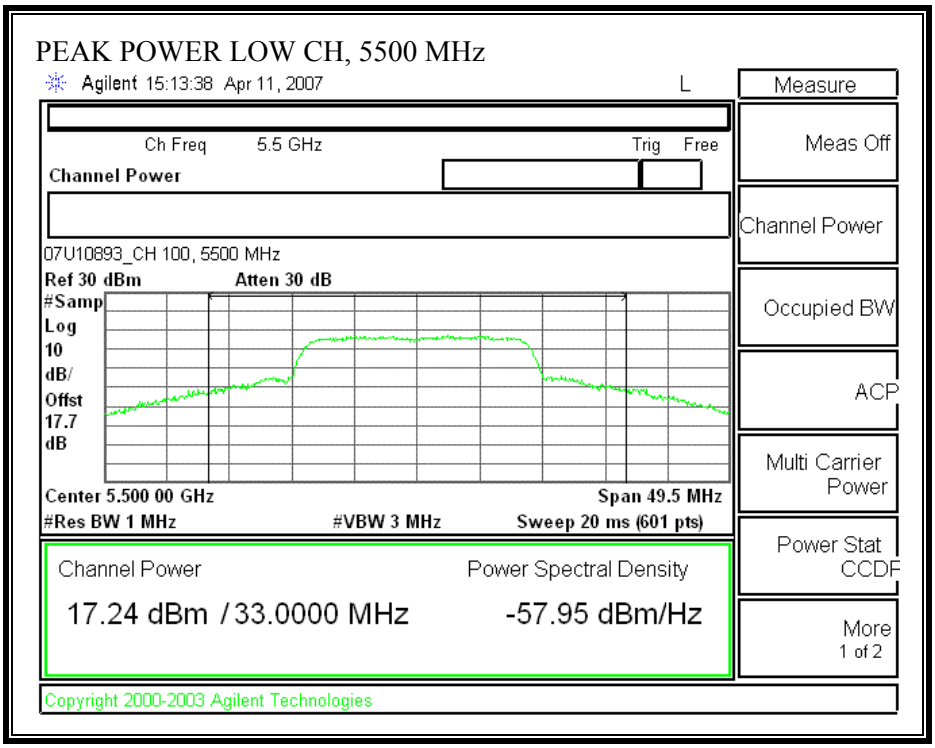




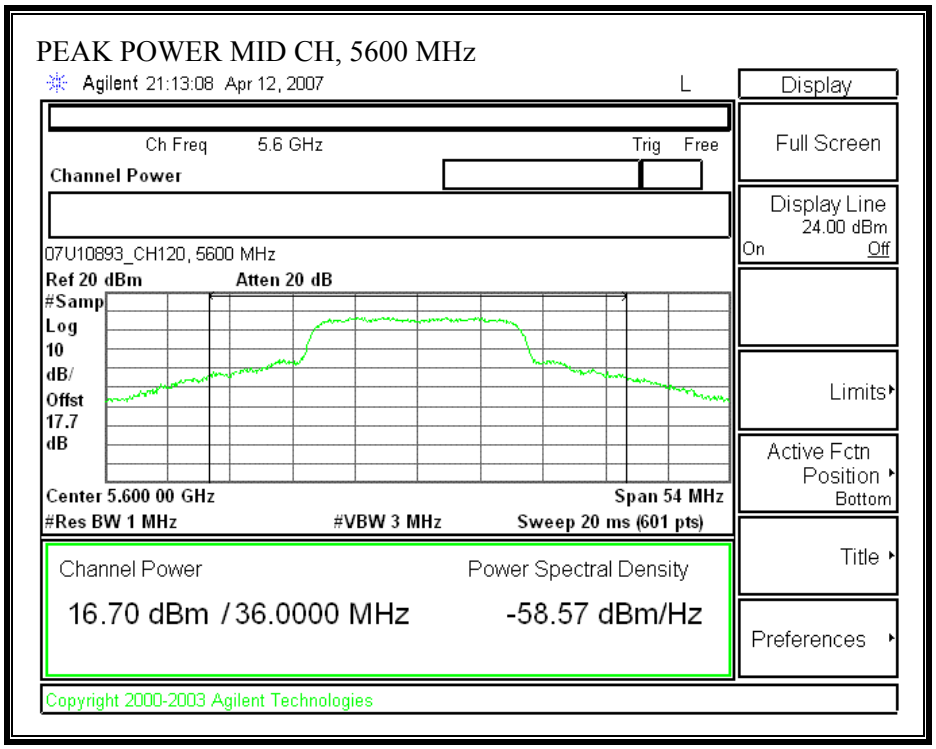
PEAK POWER HIGH CH, 5700 MHz



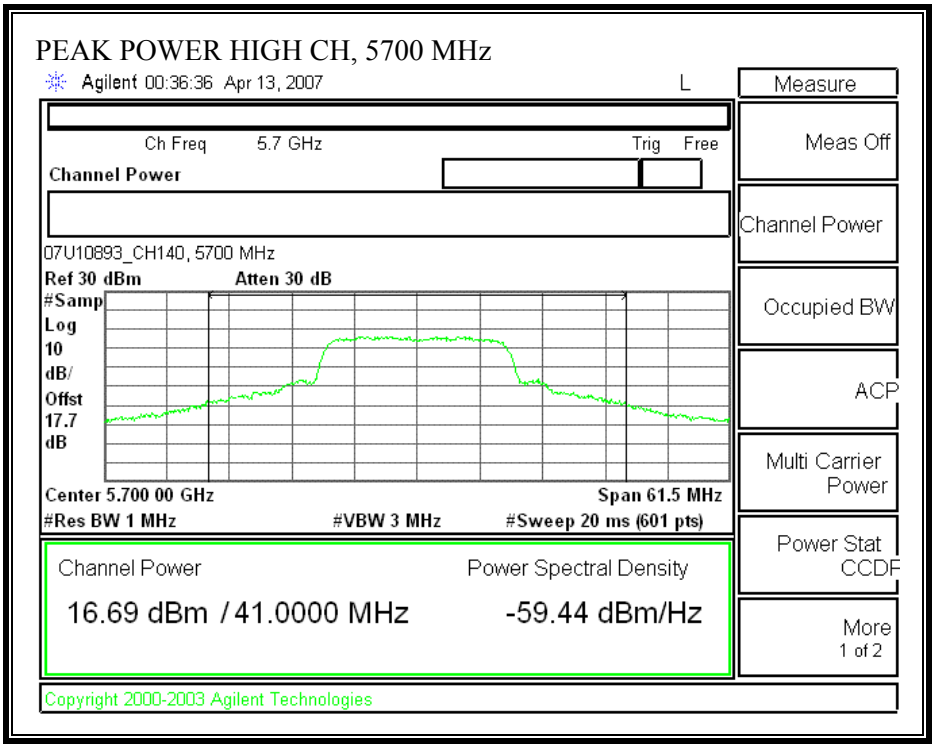
PEAK POWER (802.11 – 20MHz TX BANDWIDTH – CHAIN 1)



PEAK POWER MID CH, 5600 MHz



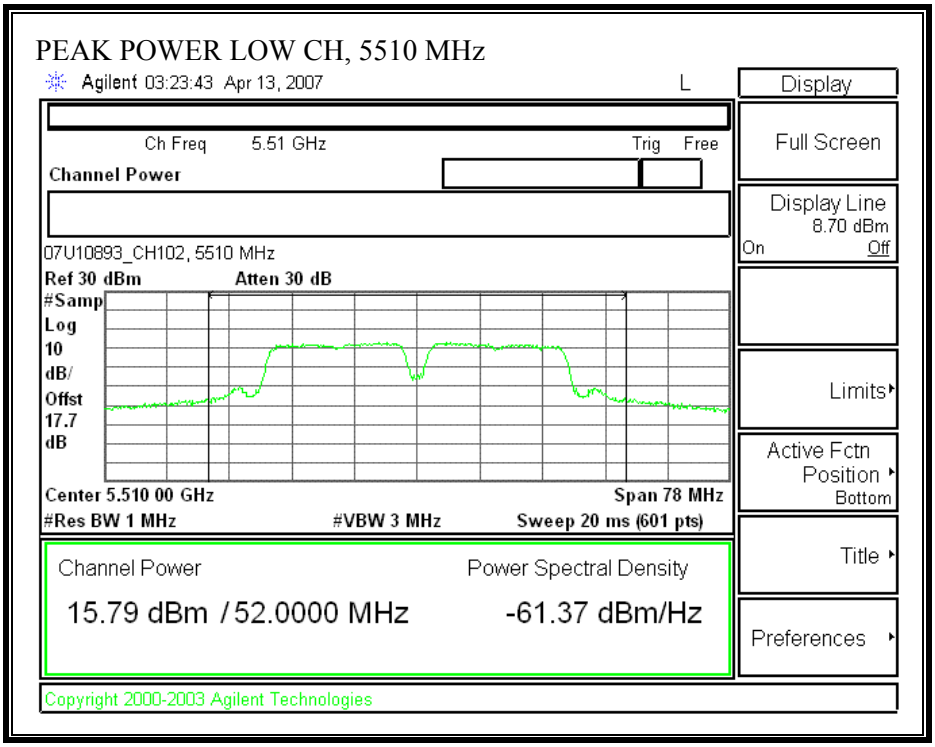
PEAK POWER HIGH CH, 5700 MHz



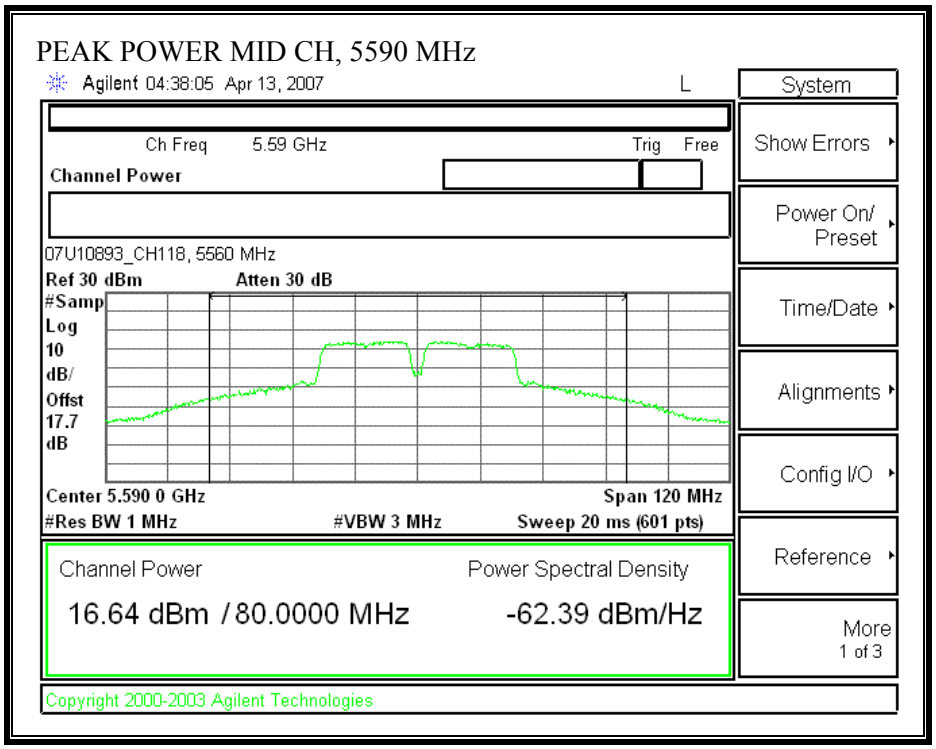
802.11n 40 MHz CDD MCS 32 MODE

8.75dBi antenna

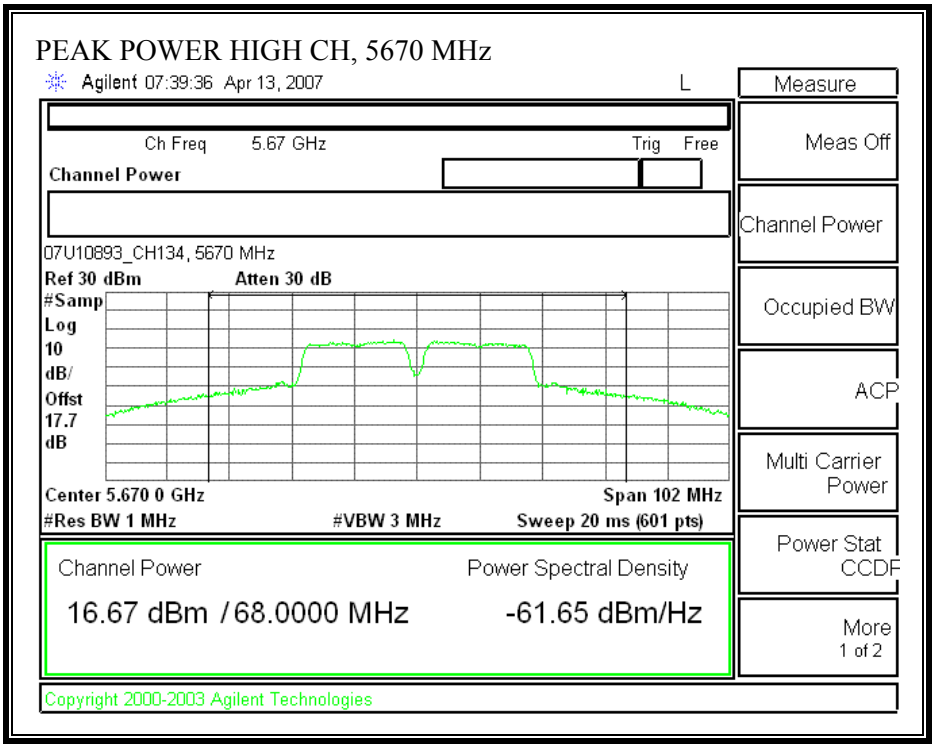
PEAK POWER (802.11 – 40MHz TX BANDWIDTH – CHAIN 0)



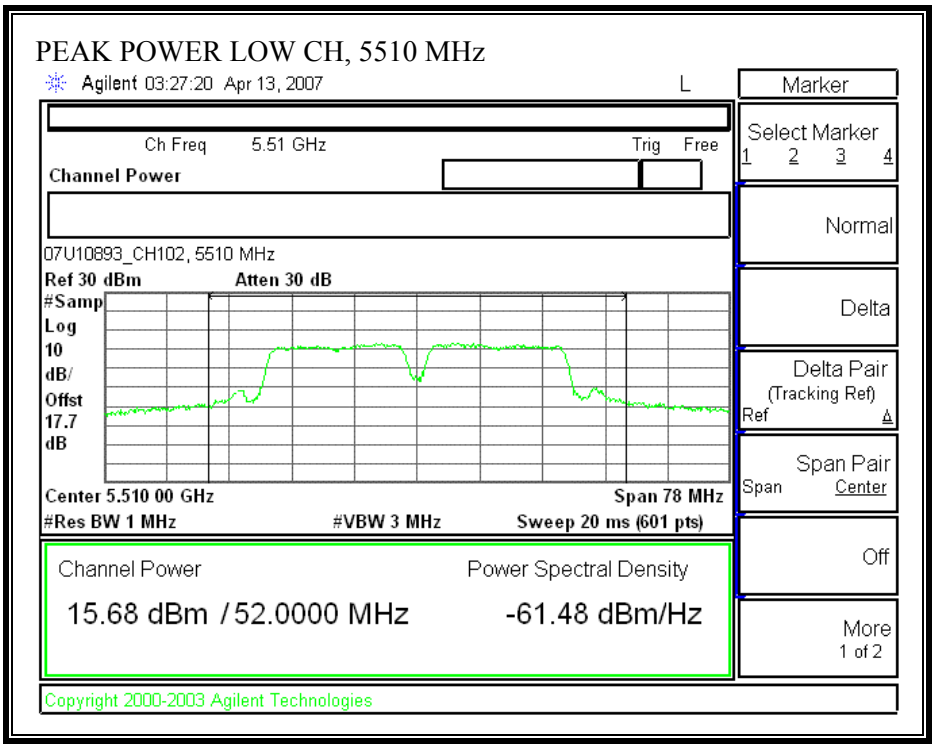
PEAK POWER MID CH, 5590 MHz

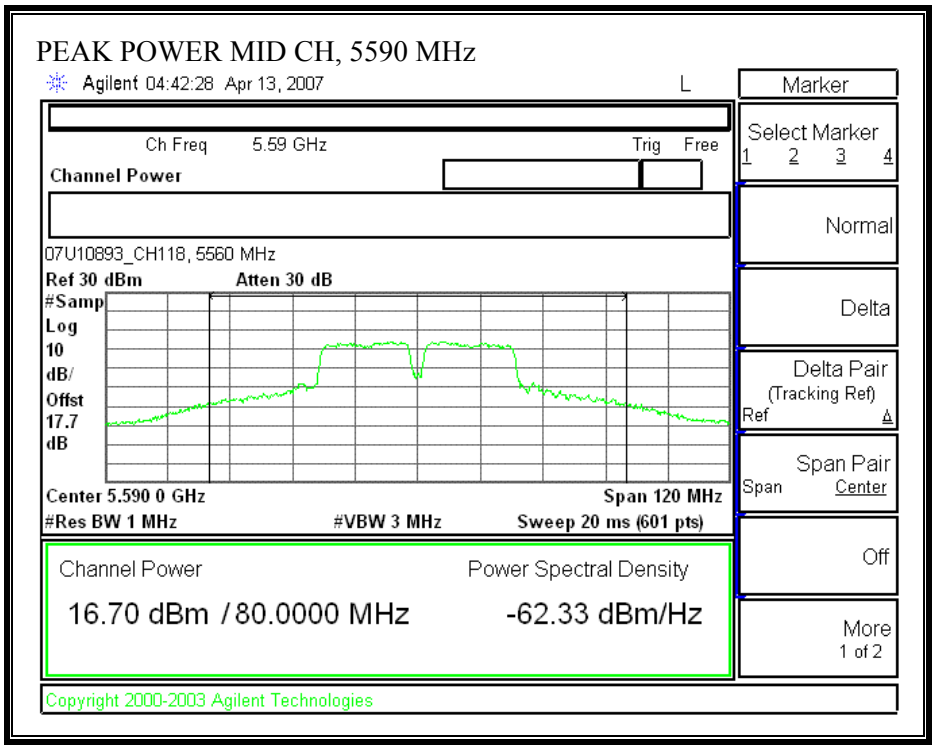


PEAK POWER HIGH CH, 5670 MHz

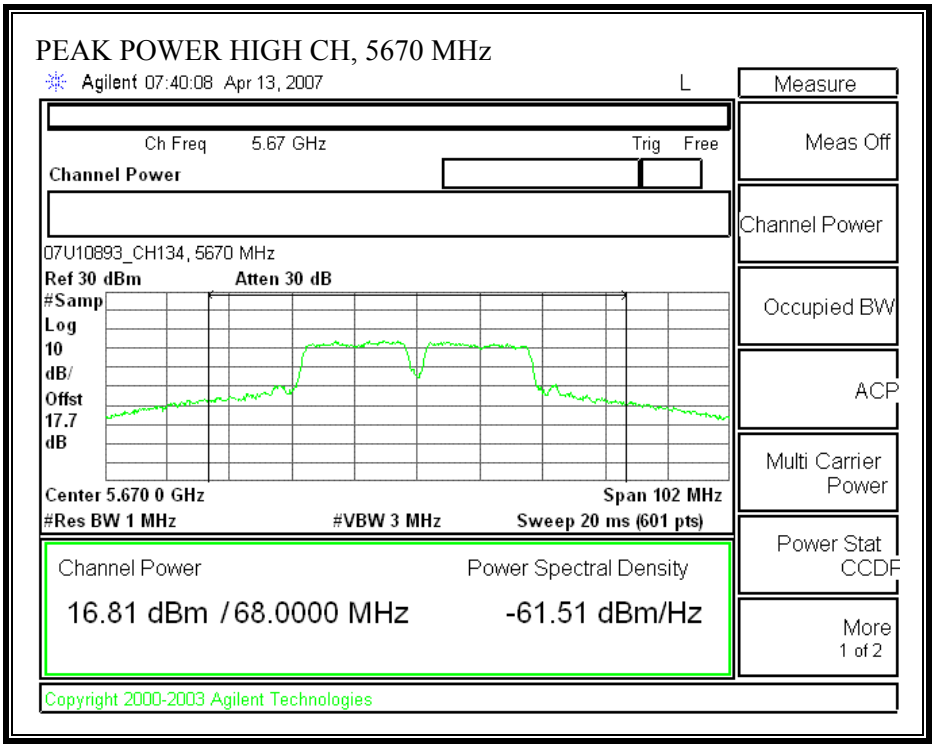


PEAK POWER (802.11 – 40MHz TX BANDWIDTH – CHAIN 1)



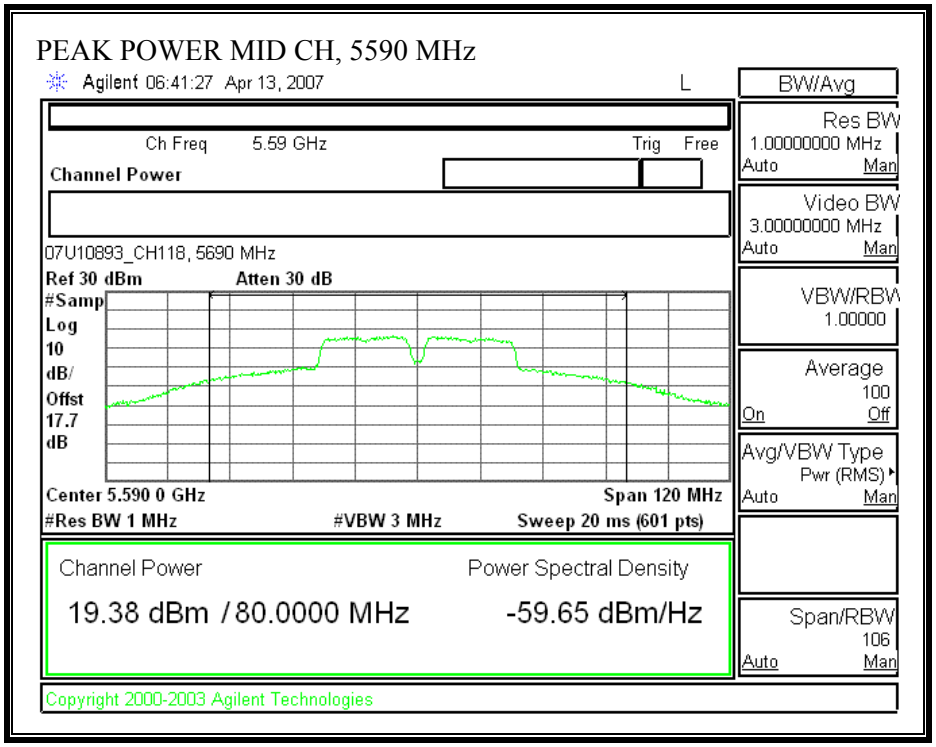


PEAK POWER HIGH CH, 5670 MHz

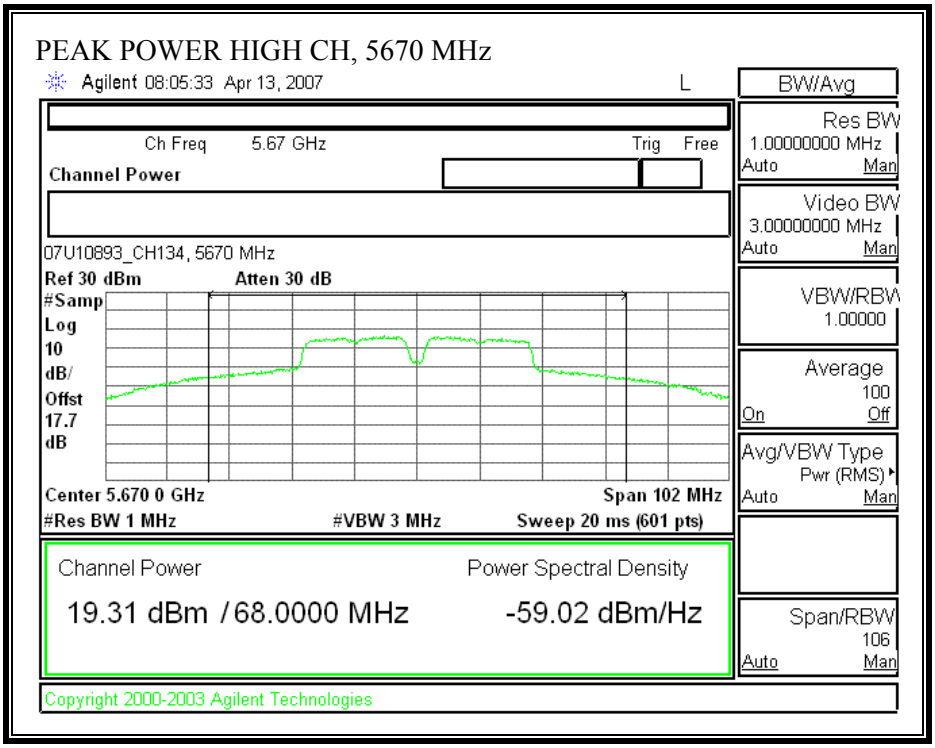


6dBi Antenna

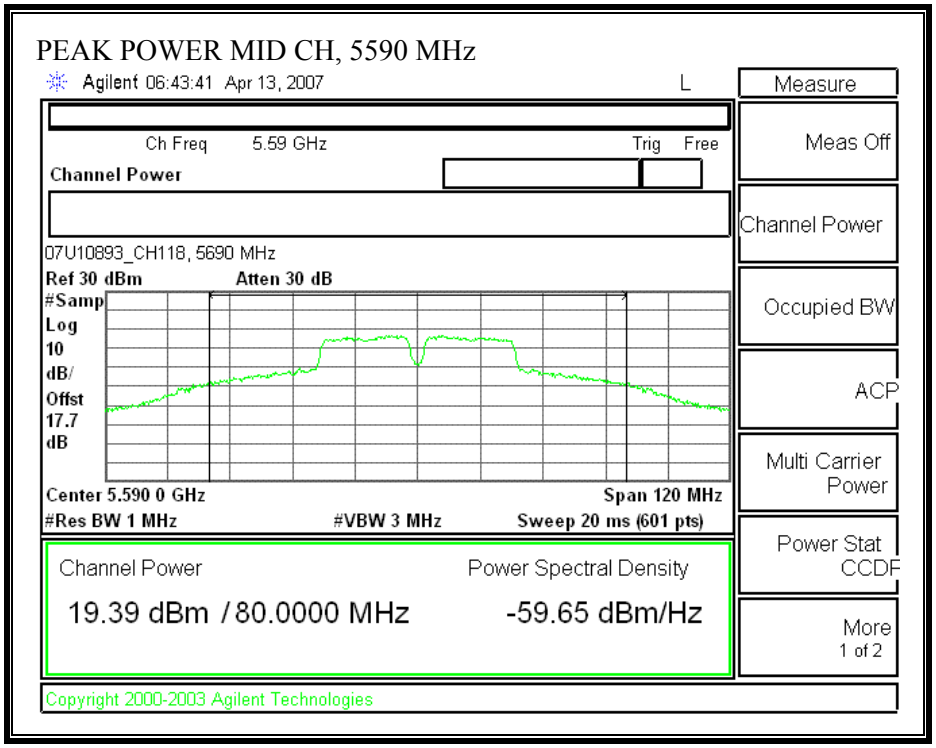
PEAK POWER (802.11 – 40MHz TX BANDWIDTH – CHAIN 0)



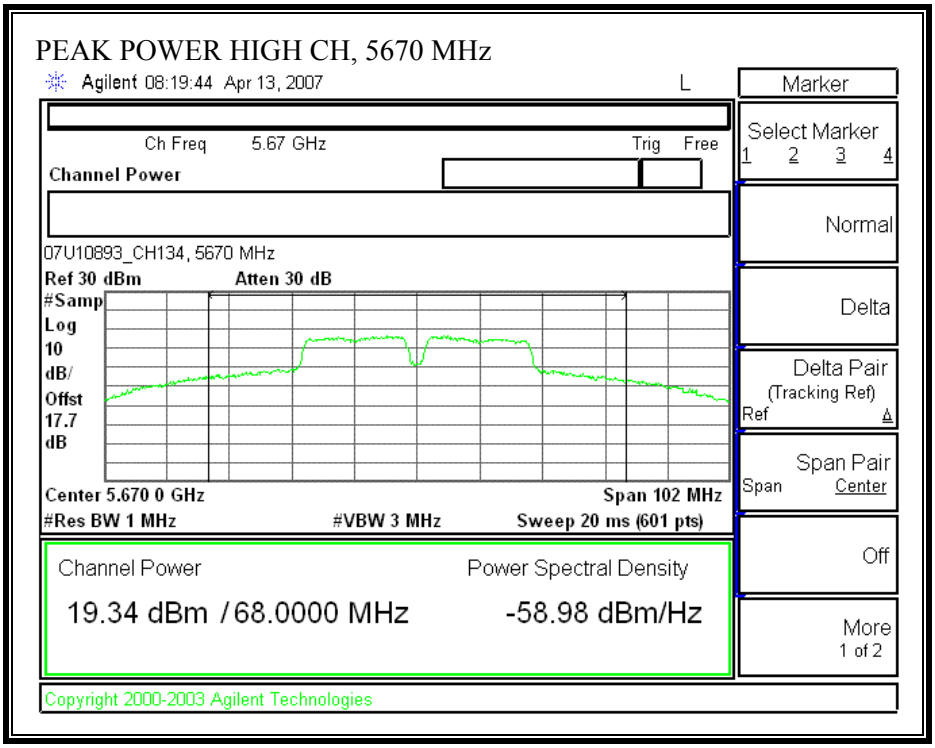
PEAK POWER HIGH CH, 5670 MHz



PEAK POWER (802.11 – 40MHz TX BANDWIDTH – CHAIN 1)



PEAK POWER HIGH CH, 5670 MHz



7.4.3. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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

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

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

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E ^ 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Rearranging terms to calculate the power density at a specific distance yields

$S = 0.0795 * 10 ^ ((P + G) / 10) / (d^2)$

LIMITS

From §1.1310 Table 1 (B), S = 1.0 mW/cm^2 in the 5.6 GHz band.

RESULTS

No non-compliance noted

802.11a CDD MODE is covered by worst case 802.11n 20 MHz CDD MODE

802.11n 20 MHz CDD MODE

8.75dBi Antenna

Mode	MPE Distance (cm)	Total Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
802.11n 20 MHz CDD	20.0	17.65	8.75	0.09

6dBi Antenna

Mode	MPE Distance (cm)	Total Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
802.11n 20 MHz CDD	20.0	20.24	6.00	0.08

802.11n 40 MHz CDD MODE

8.75dBi Antenna

Mode	MPE Distance (cm)	Total Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
802.11n 40 MHz CDD	20.0	19.75	8.75	0.14

6dBi Antenna

Mode	MPE Distance (cm)	Total Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
802.11n 40 MHz CDD	20.0	22.40	6.00	0.14

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

7.4.4. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.407 (a) (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 > 6dBi, therefore there is a reduction due to antenna gain.

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.

For combiner: Following formula to calculate the array gain:

Array gain = 10*log (10^ (main gain/10) + 10^ (aux gain/10))

5.470 – 5.725GHz band: 8.75dBi, limit = 8.25 dBm

802.11a CDD is covered by worst case 802.11n 20 MHz CDD MCS 0 MODE

802.11n 20 MHz CDD MCS 0 MODE

8.75dBi Antenna

Channel	Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Margin (dB)
Low	5500	4.30	4.71	7.52	8.25	-0.73
Middle	5600	4.16	4.07	7.13	8.25	-1.12
High	5700	3.26	3.39	6.34	8.25	-1.91

6dBi Antenna

Channel	Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Margin (dB)
Low	5500	6.69	6.98	9.85	11.00	-1.15
Middle	5600	6.88	6.69	9.80	11.00	-1.20
High	5700	6.43	6.53	9.49	11.00	-1.51

802.11n 40 MHz CDD MCS 32 MODE

8.75dBi Antenna

Channel	Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Margin (dB)
Low	5510	2.99	2.99	6.00	8.25	-2.25
Middle	5590	3.87	3.91	6.90	8.25	-1.35
High	5670	4.07	3.67	6.89	8.25	-1.36

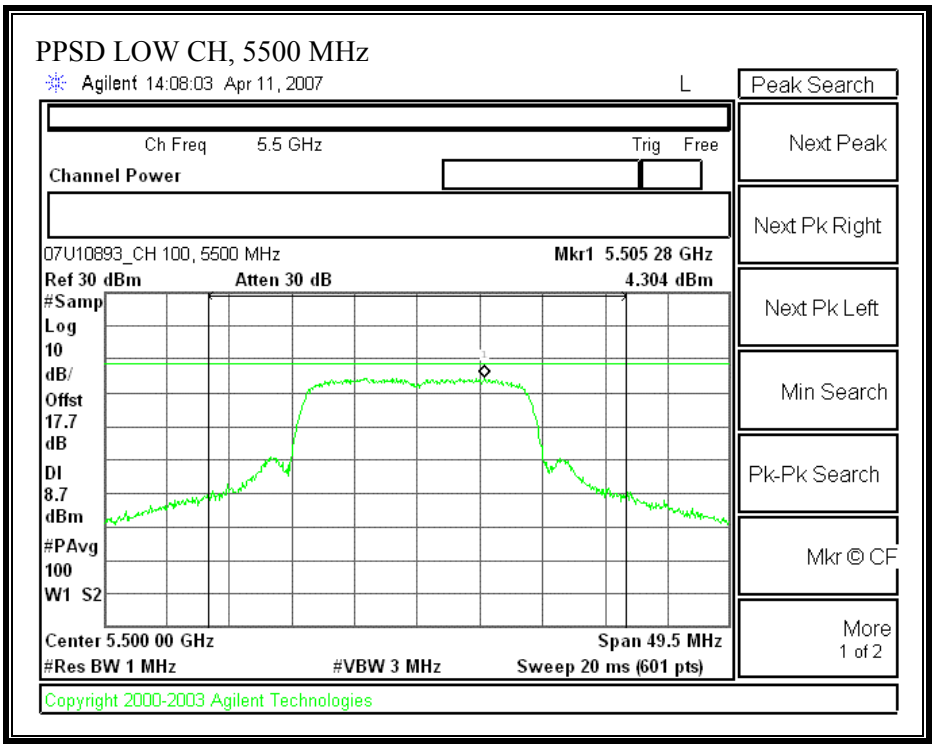
6dBi Antenna

Channel	Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Margin (dB)
Middle	5590	6.28	6.48	9.39	11.00	-1.61
High	5670	6.22	6.15	9.19	11.00	-1.81

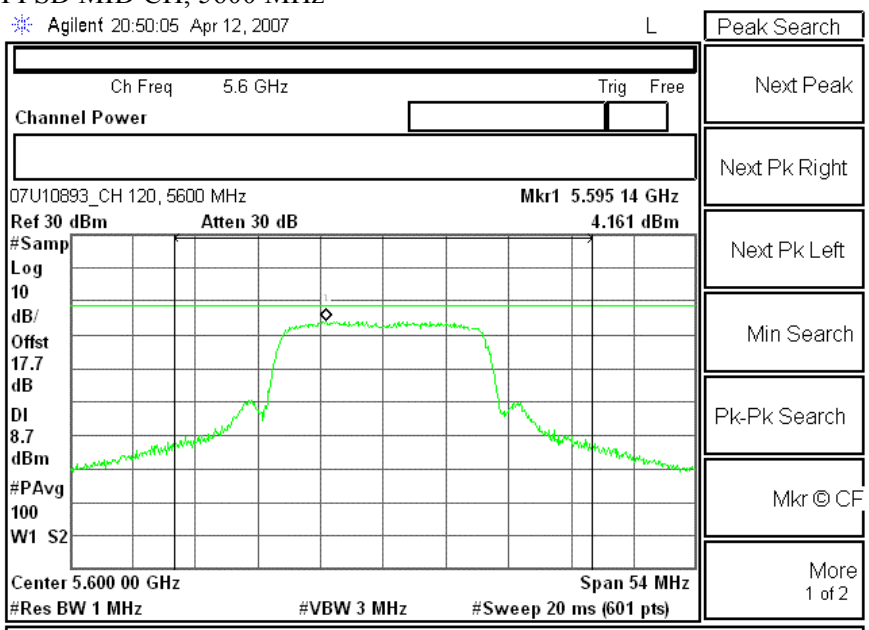
802.11n 20 MHz CDD MCS 0 MODE

8.75dBi Antenna

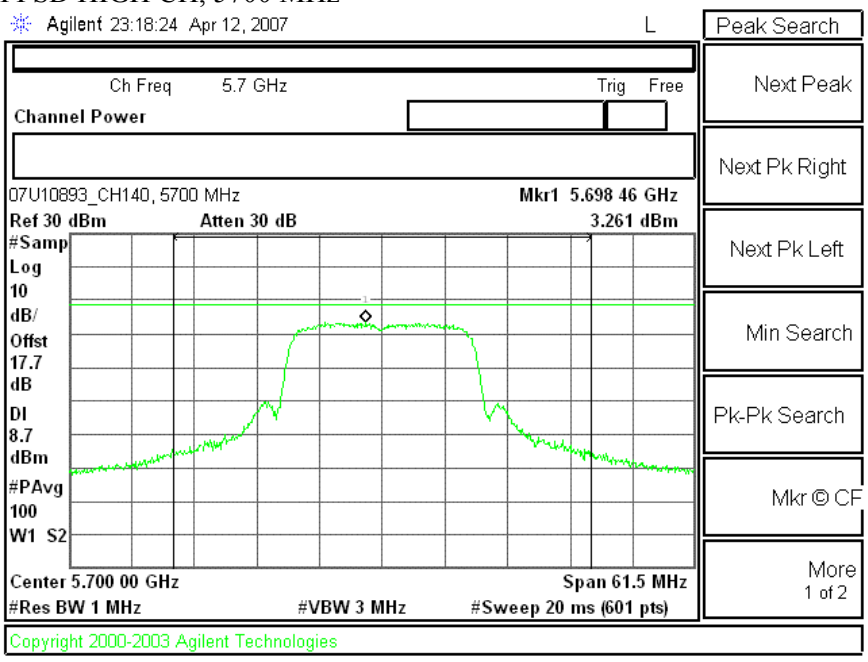
PEAK POWER SPECTRAL DENSITY (802.11 - 20 MHz TX BANDWIDTH – CHAIN 0)



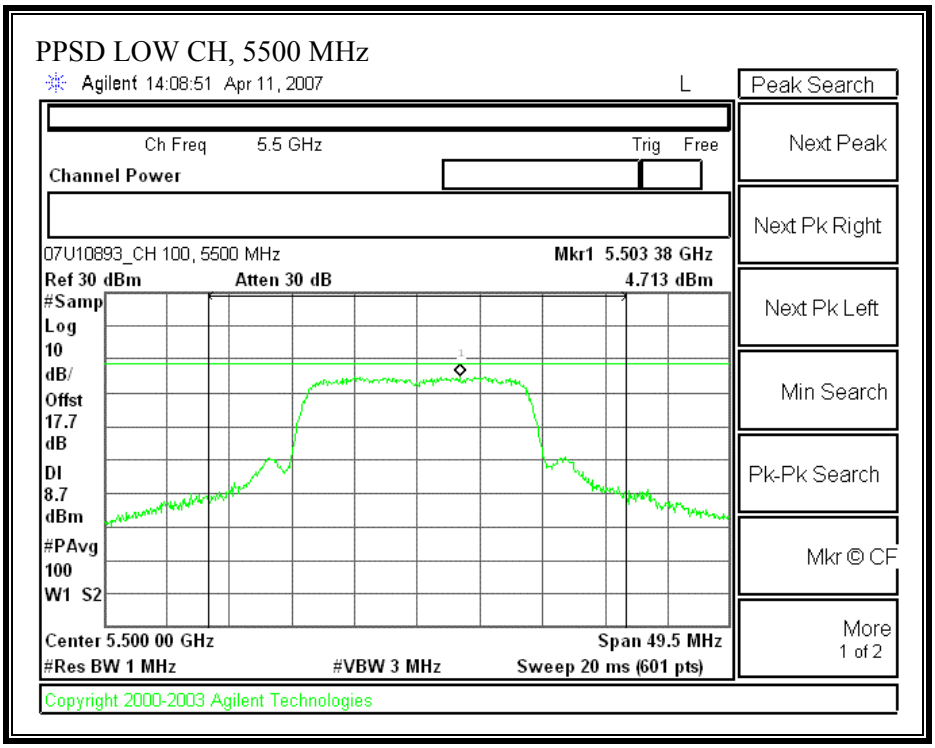
PPSD MID CH, 5600 MHz



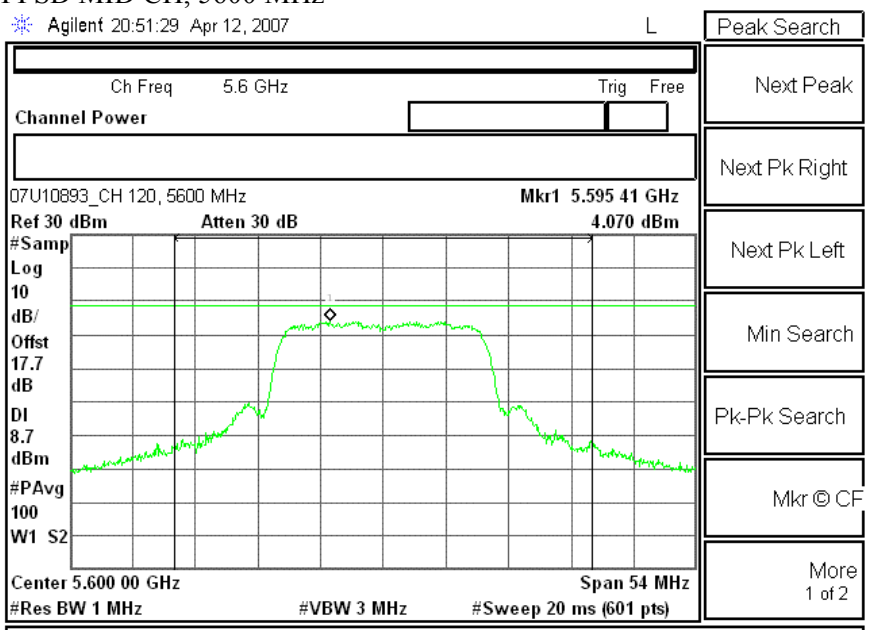
PPSD HIGH CH, 5700 MHz



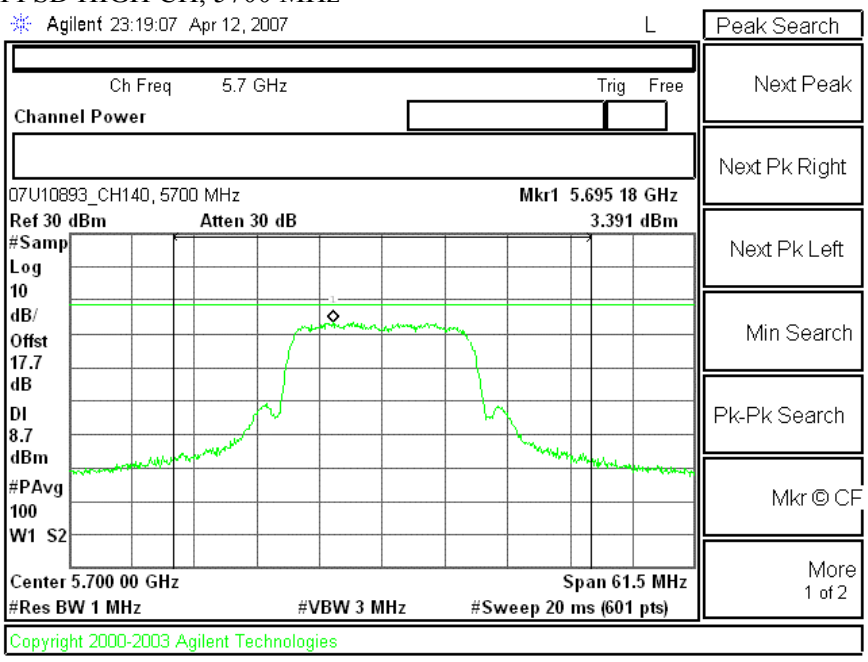
PEAK POWER SPECTRAL DENSITY (802.11 - 20 MHz TX BANDWIDTH – CHAIN 1)



PPSD MID CH, 5600 MHz

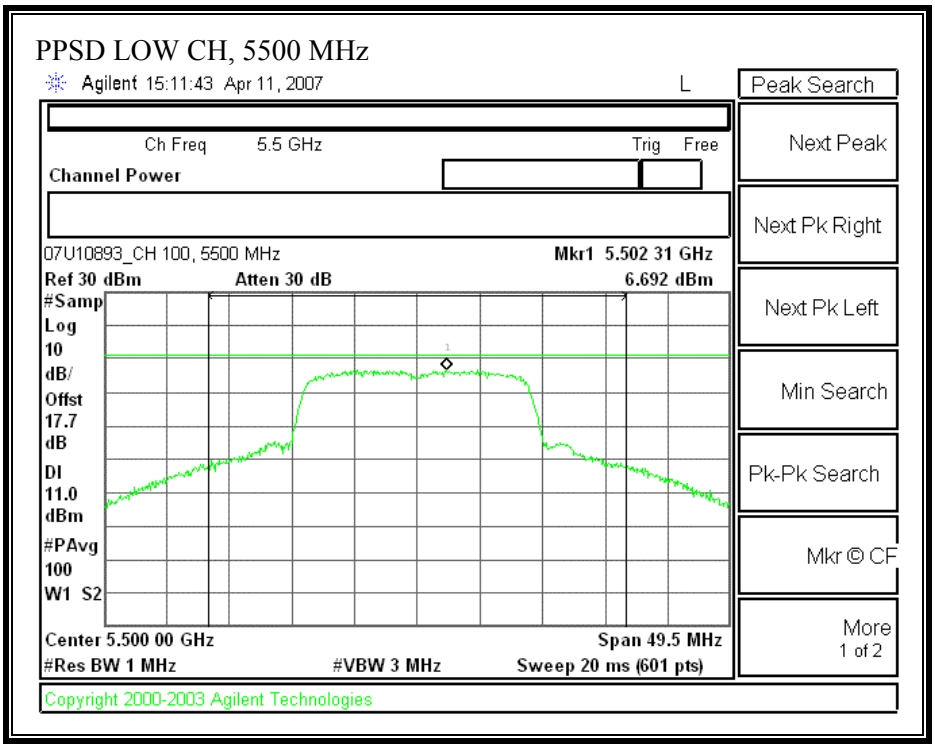


PPSD HIGH CH, 5700 MHz

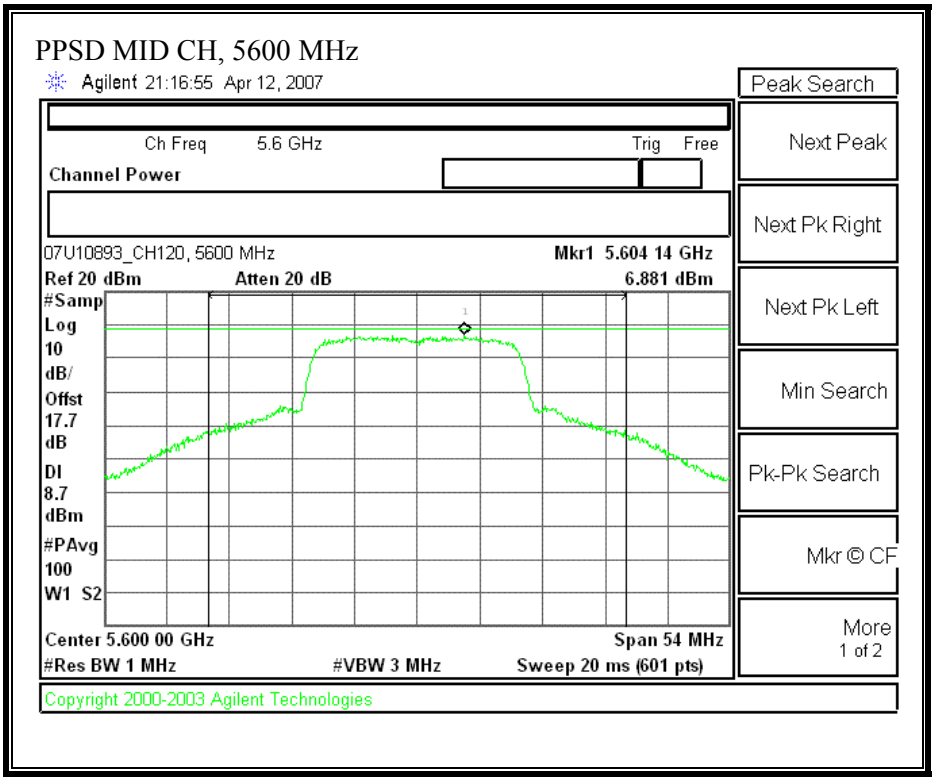


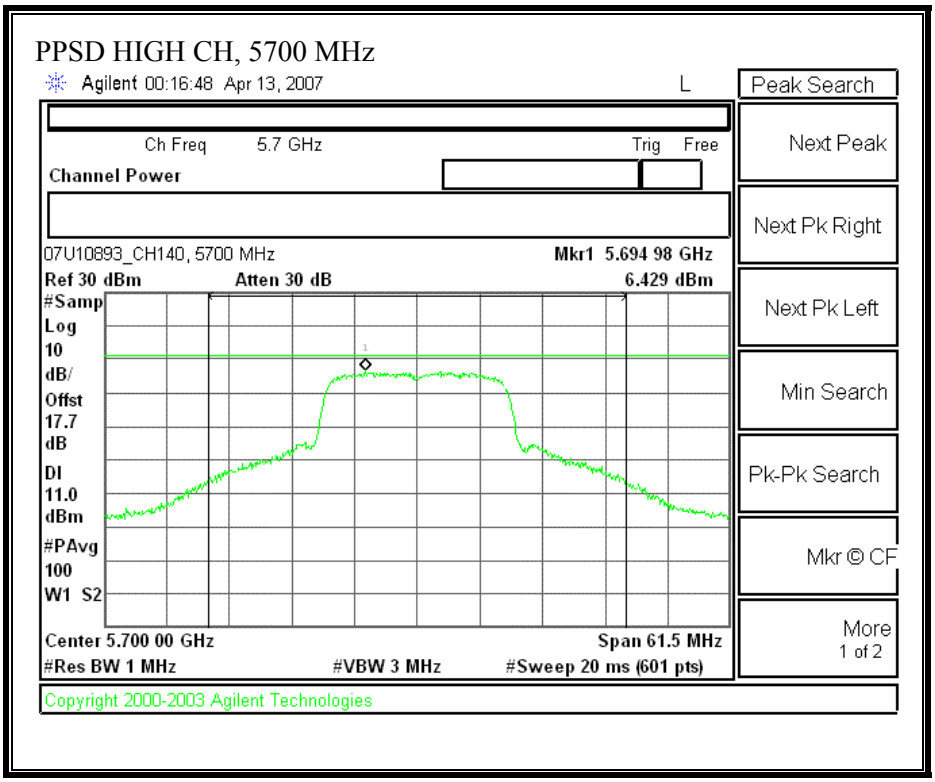
6dBi Antenna

PEAK POWER SPECTRAL DENSITY (802.11 - 20 MHz TX BANDWIDTH – CHAIN 0)

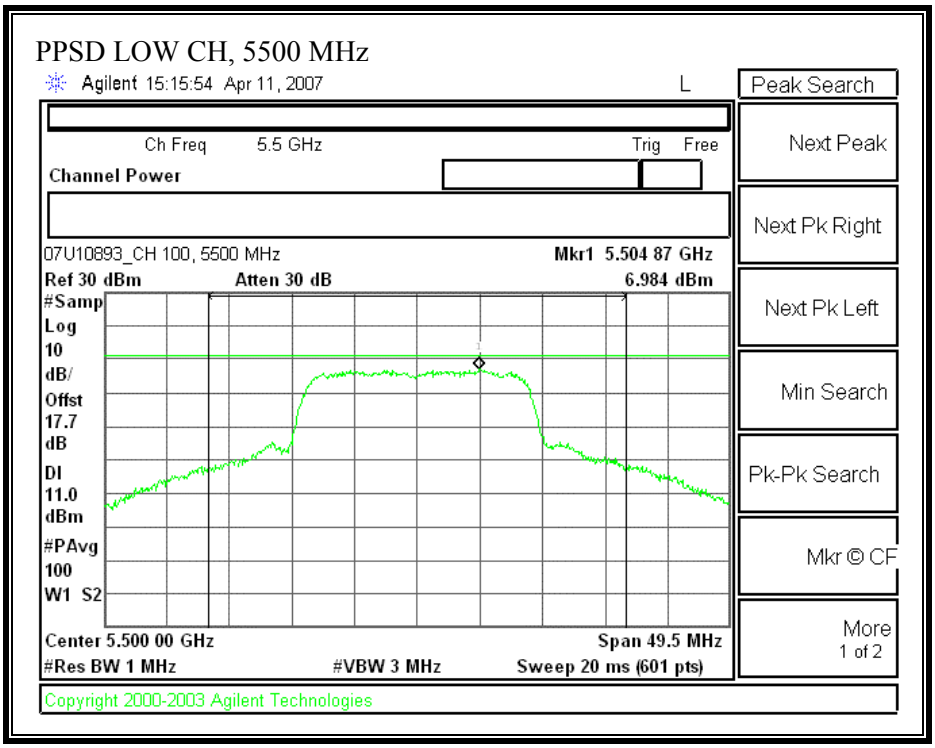


PPSD MID CH, 5600 MHz

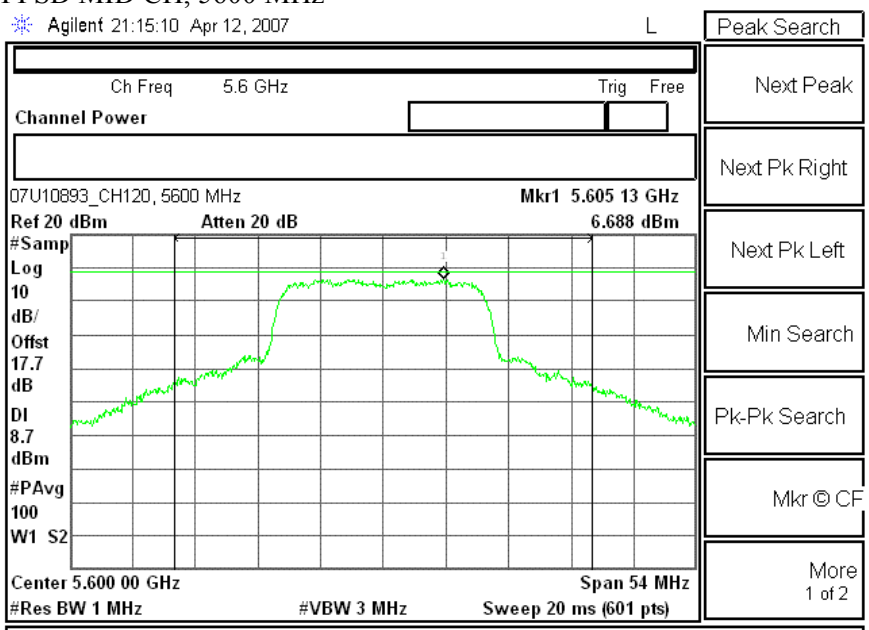




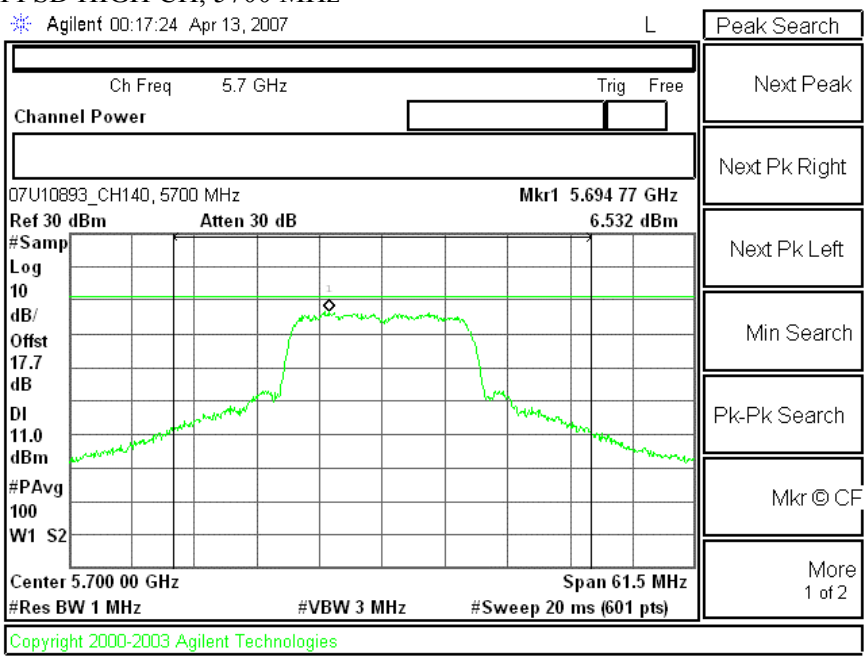
PEAK POWER SPECTRAL DENSITY (802.11 - 20 MHz TX BANDWIDTH – CHAIN 1)



PPSD MID CH, 5600 MHz



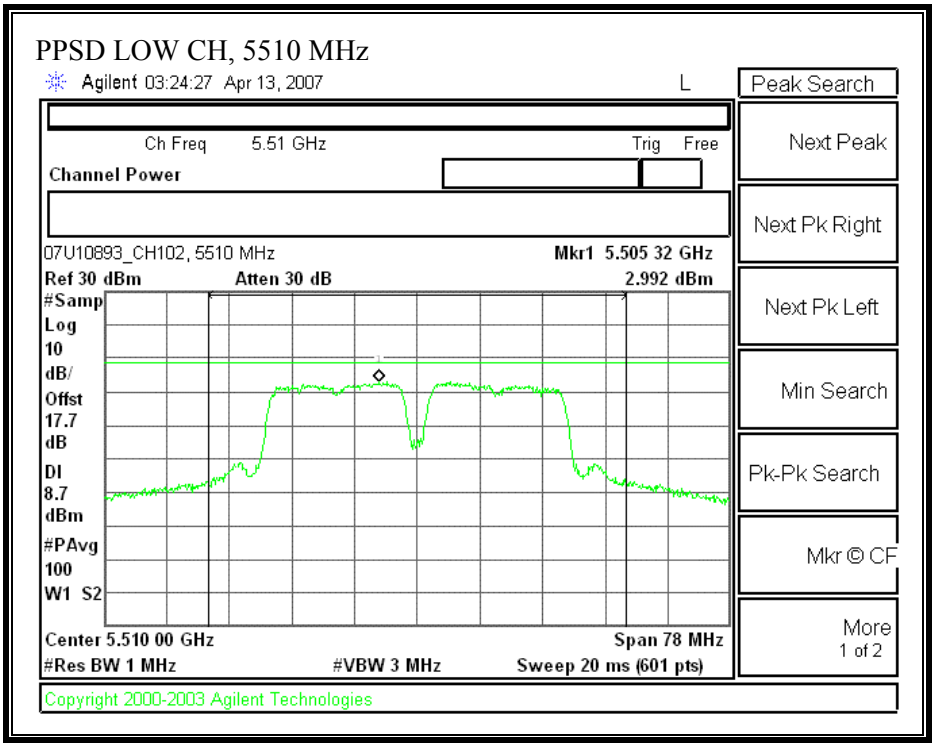
PPSD HIGH CH, 5700 MHz



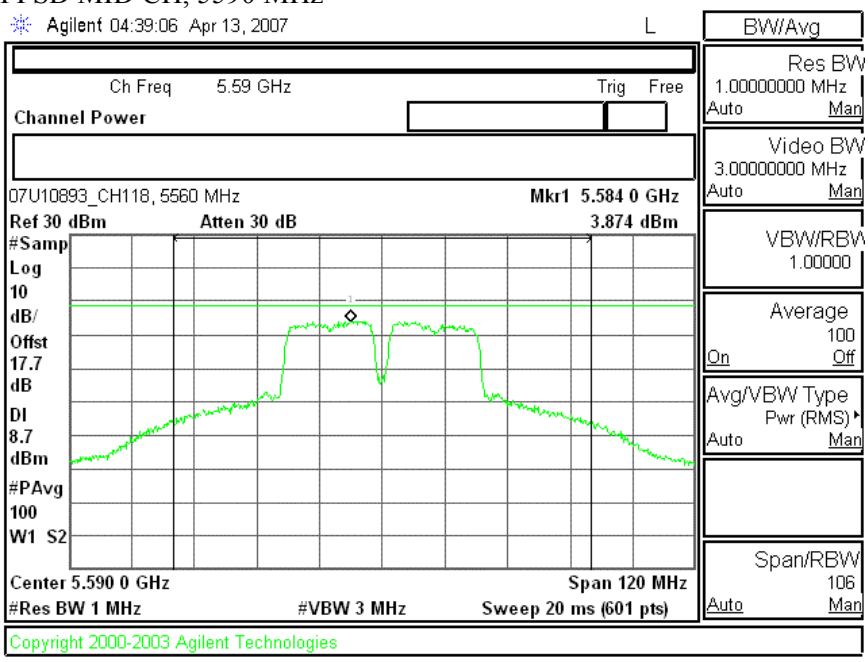
802.11n 40 MHz CDD MCS 32 MODE

8.75dBi Antenna

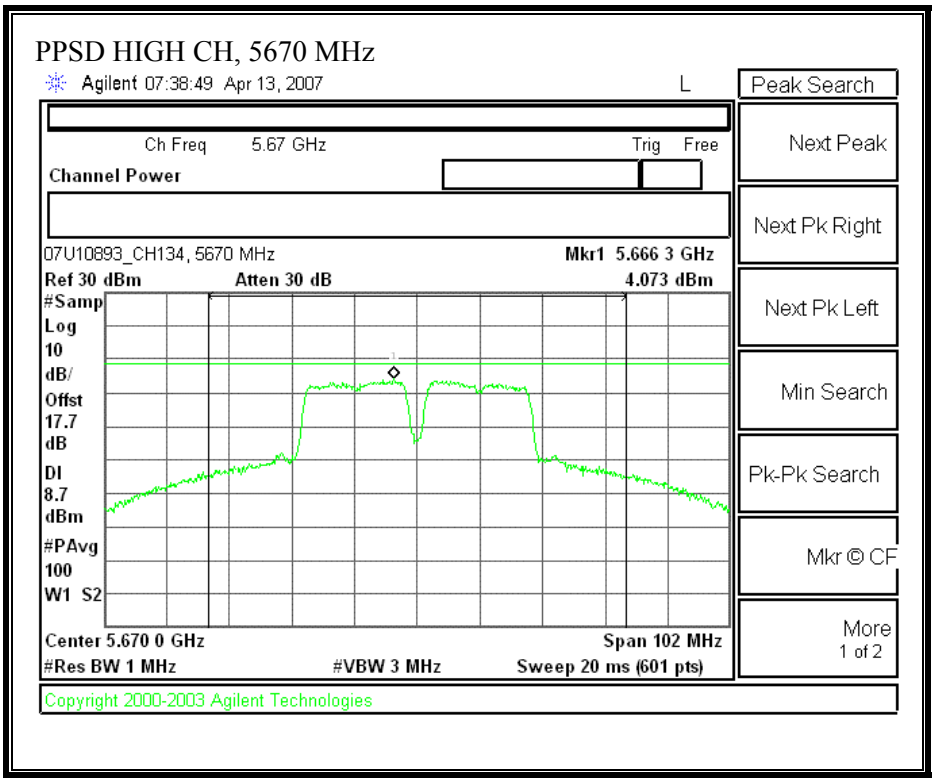
PEAK POWER SPECTRAL DENSITY (802.11 - 40 MHz TX BANDWIDTH – CHAIN 0)



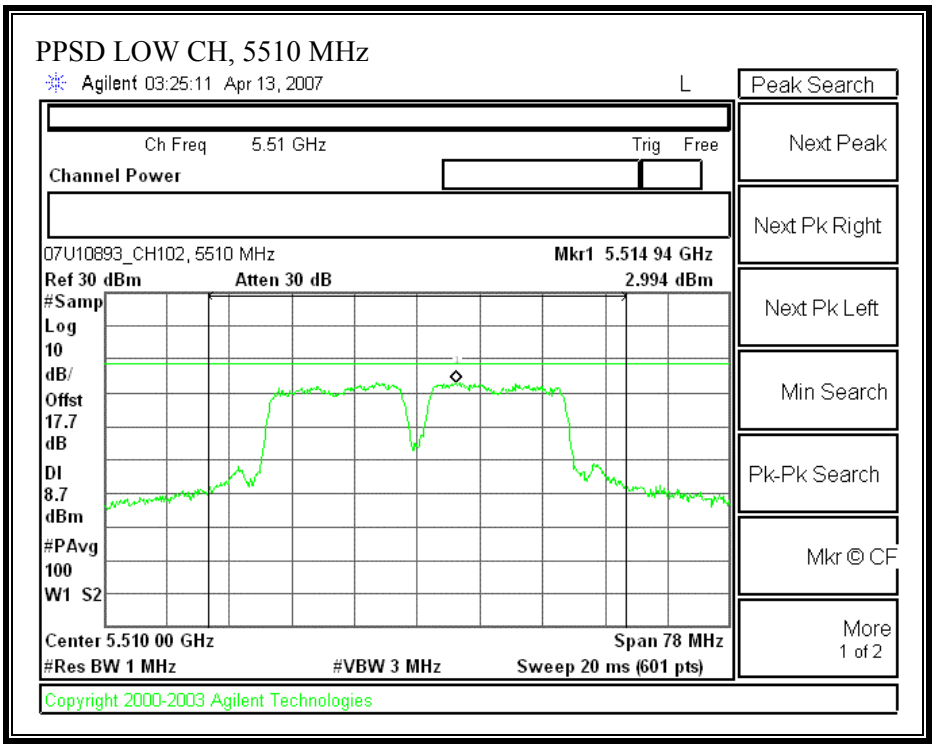
PPSD MID CH, 5590 MHz



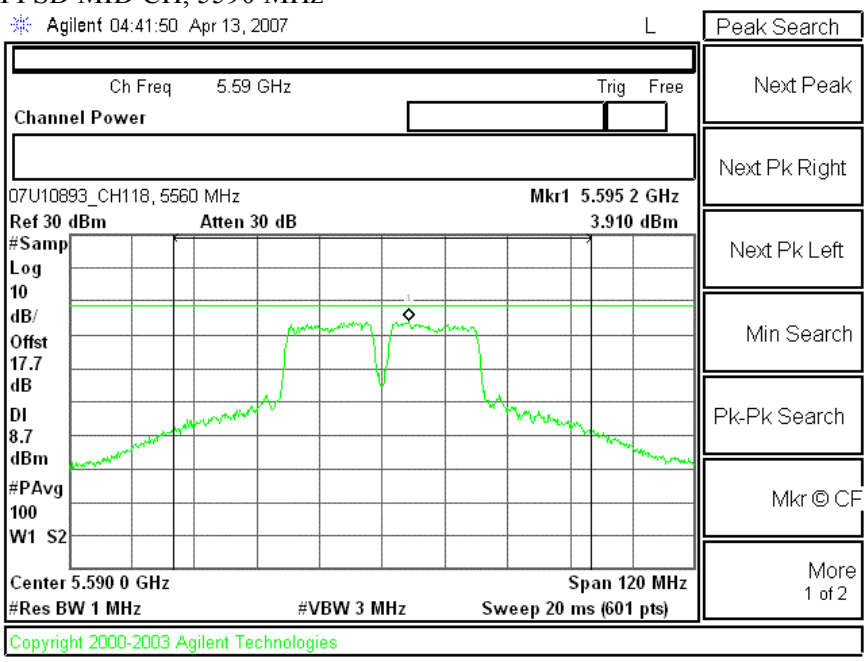
PPSD HIGH CH, 5670 MHz



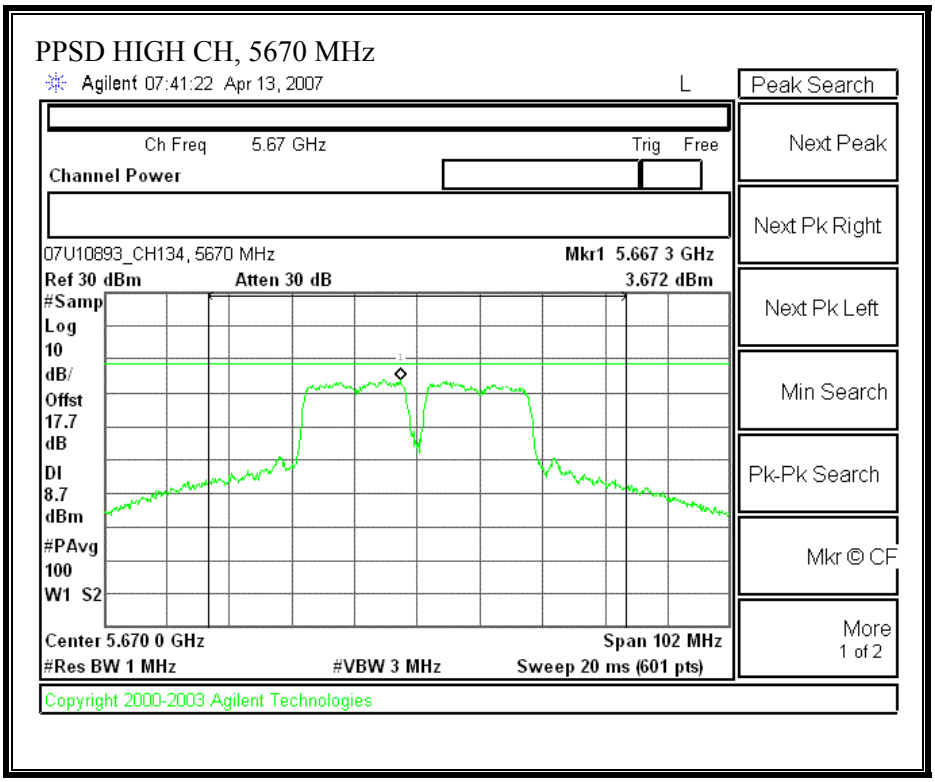
PEAK POWER SPECTRAL DENSITY (802.11 - 40 MHz TX BANDWIDTH – CHAIN 1)



PPSD MID CH, 5590 MHz

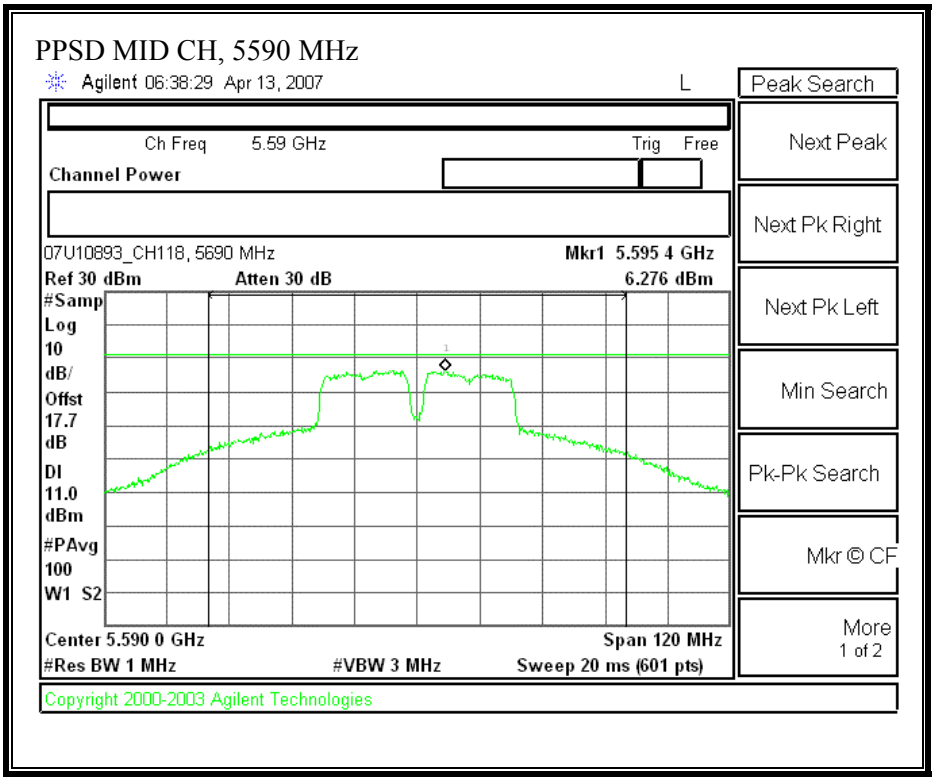


PPSD HIGH CH, 5670 MHz

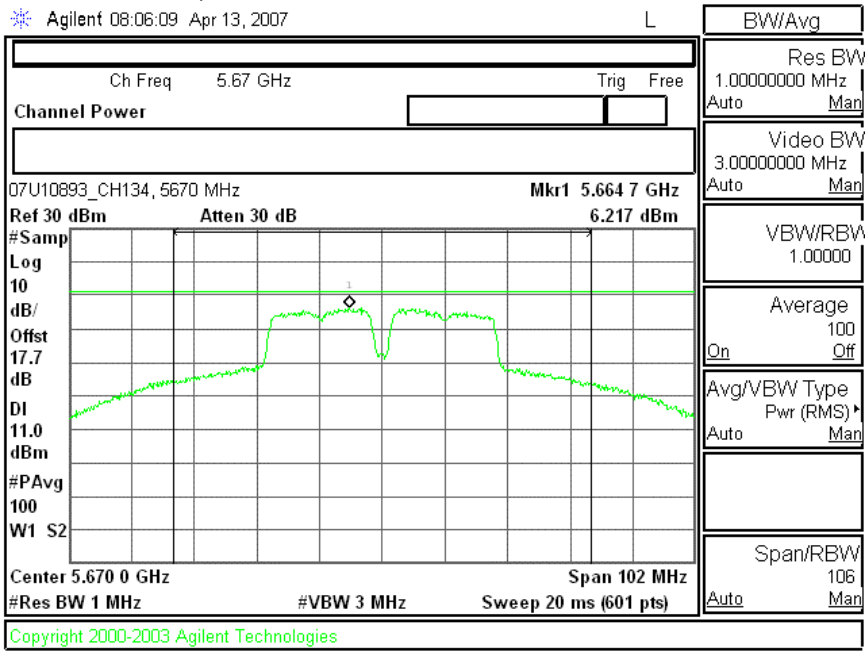


6dBi Antenna

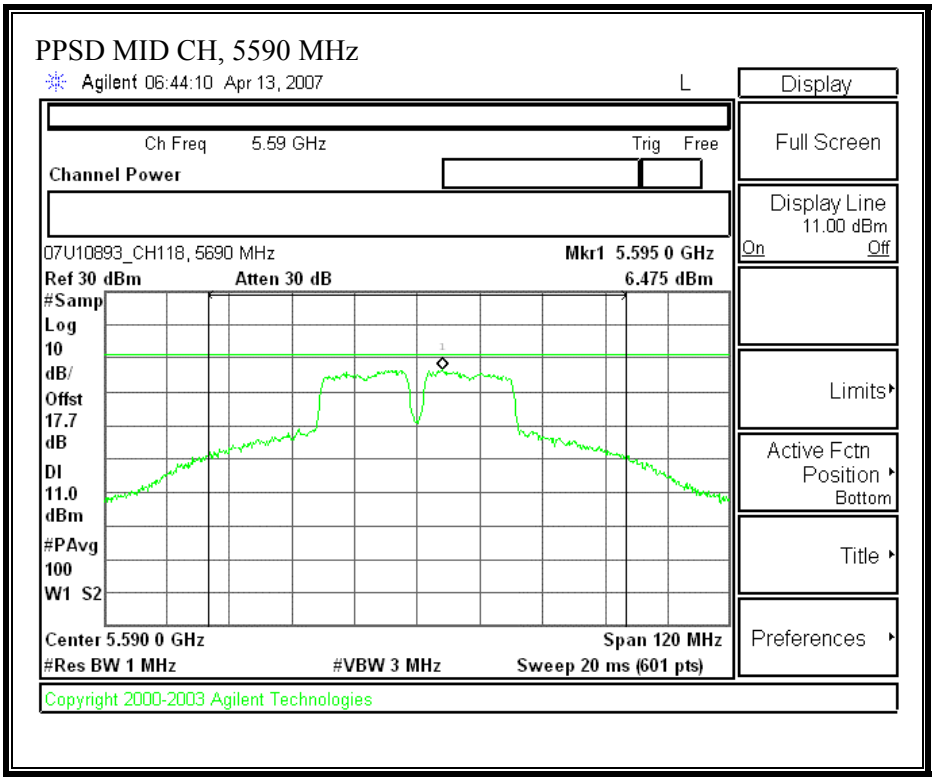
PEAK POWER SPECTRAL DENSITY (802.11 - 40 MHz TX BANDWIDTH – CHAIN 0)



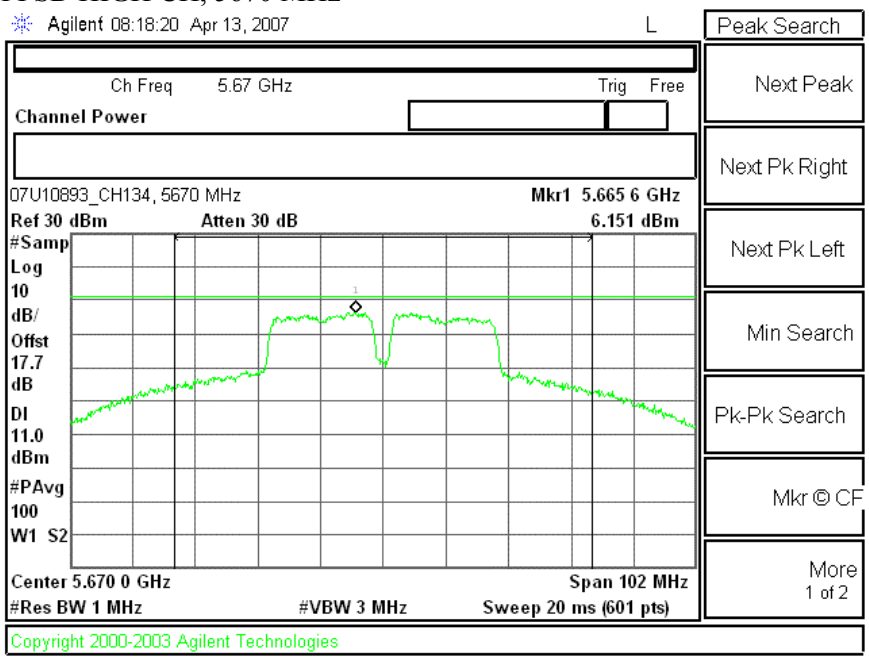
PPSD HIGH CH, 5670 MHz



PEAK POWER SPECTRAL DENSITY (802.11 - 40 MHz TX BANDWIDTH – CHAIN 1)



PPSD HIGH CH, 5670 MHz



7.4.5. PEAK EXCURSION

LIMIT

§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

No non-compliance noted:

802.11a CDD is covered by worst case 802.11n 20 MHz CDD MCS 0 MODE

802.11n 20 MHz CDD MCS 0

20 MHz TX BANDWIDTH - CHAIN 0

Channel	Frequency (MHz)	Peak Excursion Chain 0 (dB)	Limit (dB)	Margin (dB)
Low	5180	8.21	13	-4.79
Middle	5260	8.79	13	-4.21
High	5320	9.51	13	-3.49

20 MHz TX BANDWIDTH - CHAIN 1

Channel	Frequency (MHz)	Peak Excursion Chain 1 (dB)	Limit (dB)	Margin (dB)
Low	5180	9.59	13	-3.41
Middle	5260	8.99	13	-4.01
High	5320	9.22	13	-3.78

802.11n 40 MHz CDD MCS 32

40 MHz TX BANDWIDTH - CHAIN 0

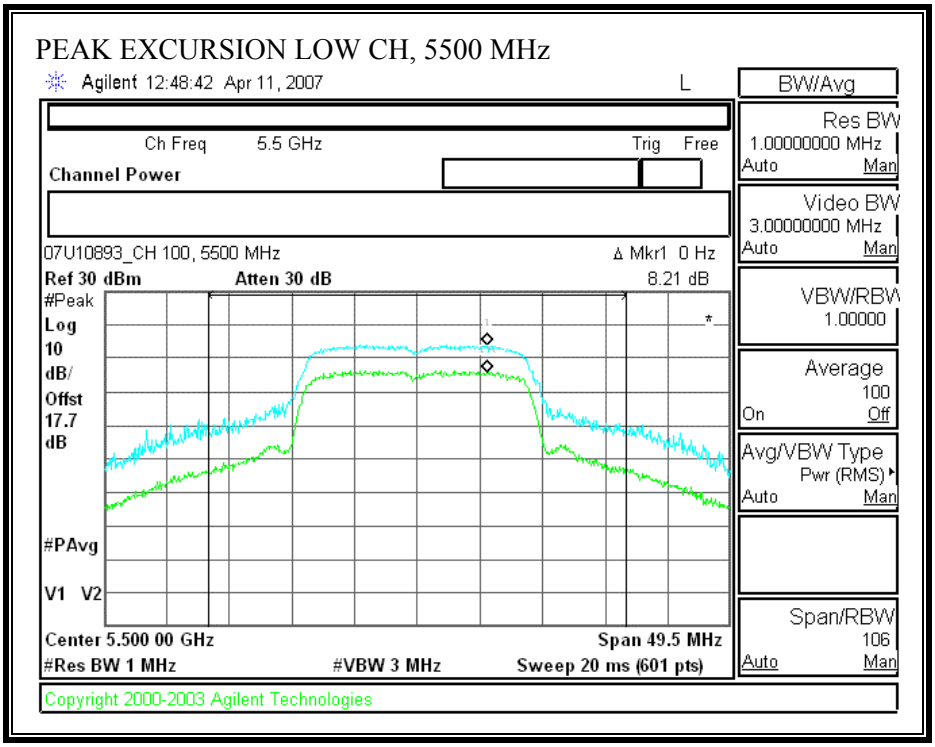
Channel	Frequency (MHz)	Peak Excursion Chain 0 (dB)	Limit (dB)	Margin (dB)
Low	5510	9.99	13	-3.01
Middle	5590	9.51	13	-3.49
High	5670	9.86	13	-3.14

40 MHz TX BANDWIDTH - CHAIN 1

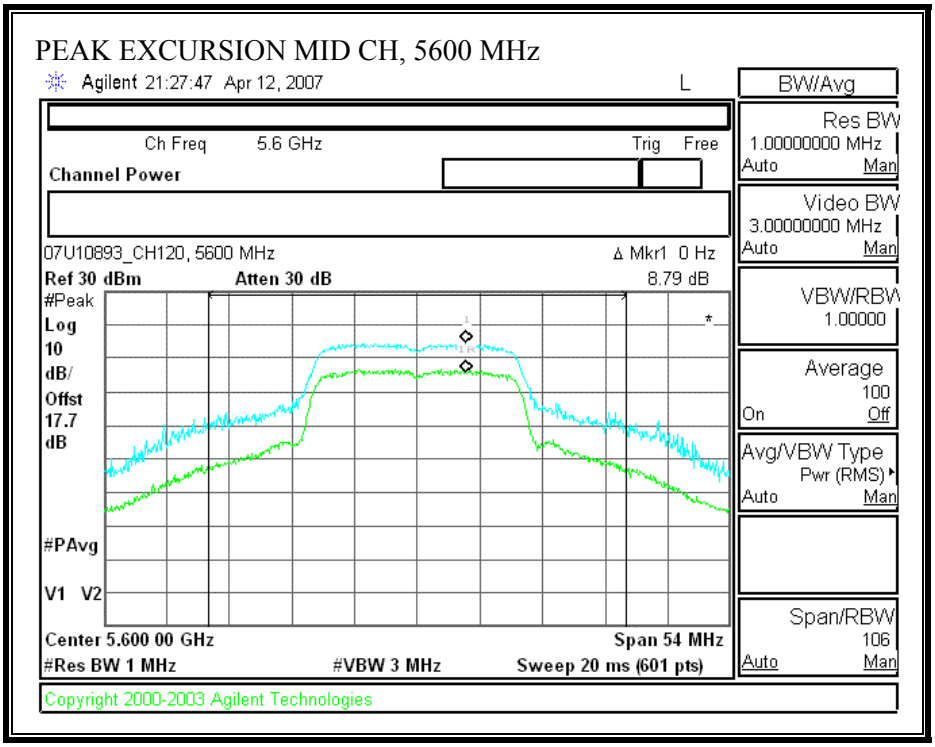
Channel	Frequency (MHz)	Peak Excursion Chain 1 (dB)	Limit (dB)	Margin (dB)
Low	5510	9.11	13	-3.89
Middle	5590	9.77	13	-3.23
High	5670	9.41	13	-3.59

802.11n 20 MHz CDD MCS 0

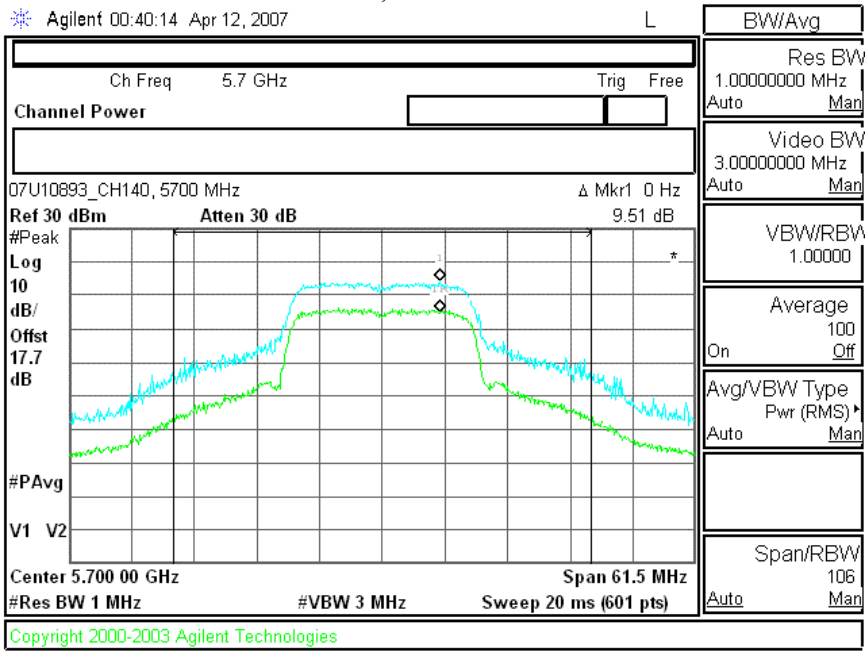
PEAK EXCURSION (802.11 - 20 MHz TX BANDWIDTH – CHAIN 0)



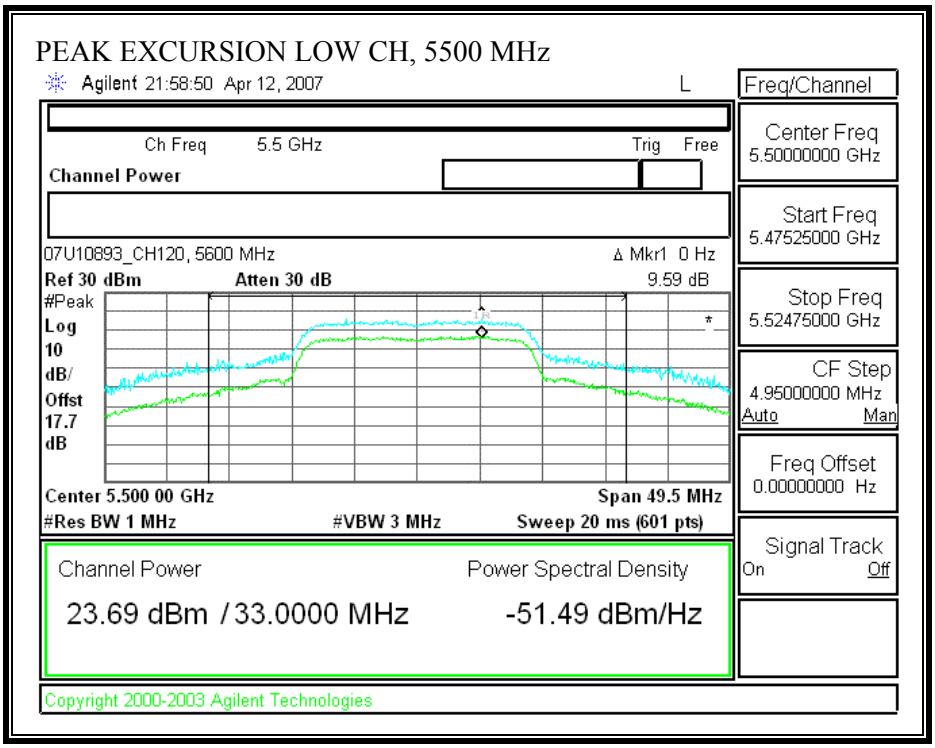
PEAK EXCURSION MID CH, 5600 MHz



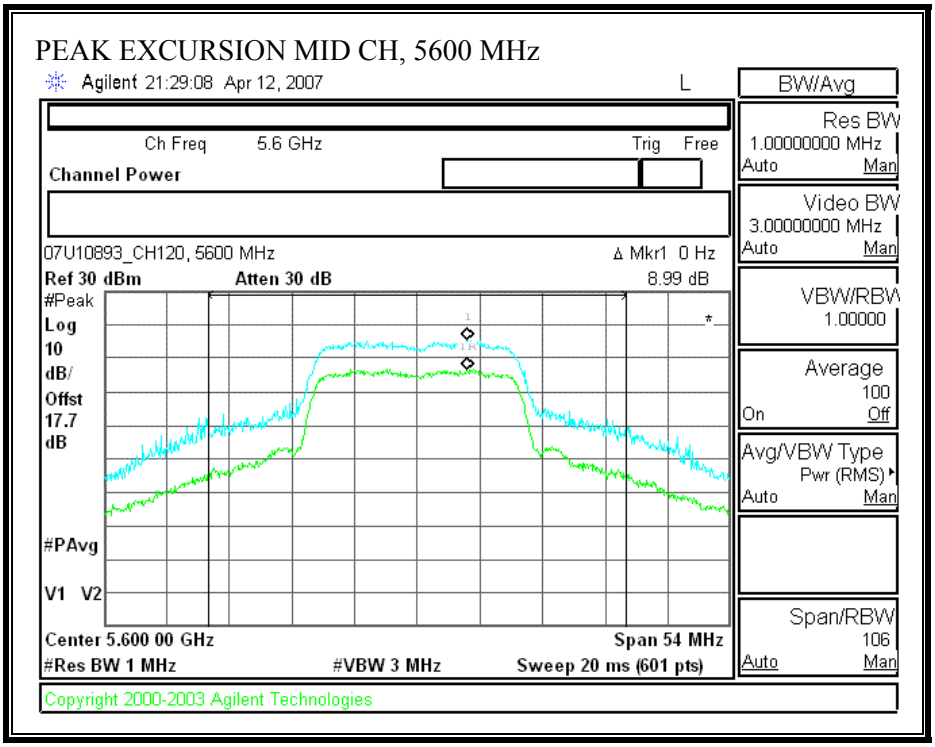
PEAK EXCURSION HIGH CH, 5700 MHz



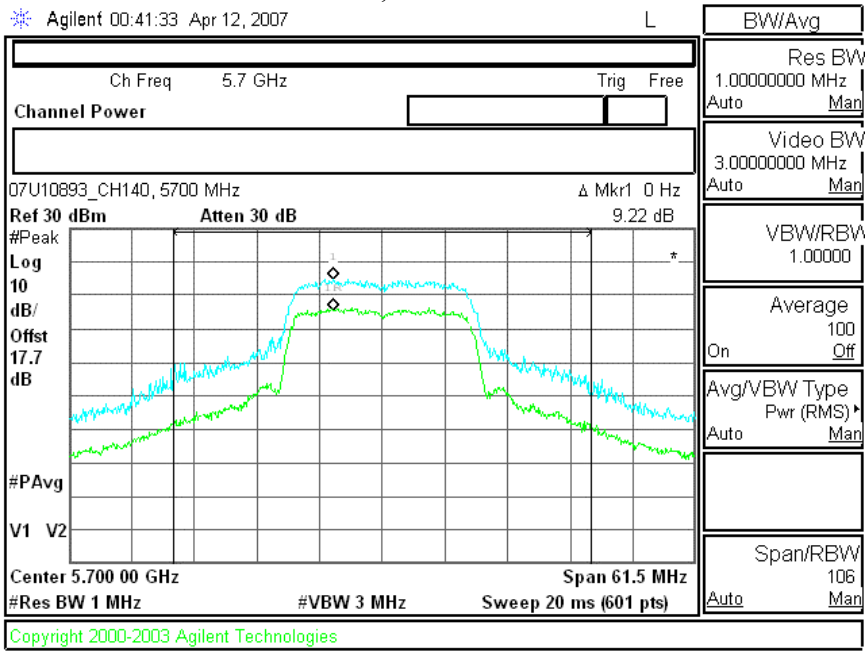
PEAK EXCURSION (802.11 - 20 MHz TX BANDWIDTH – CHAIN 1)



PEAK EXCURSION MID CH, 5600 MHz

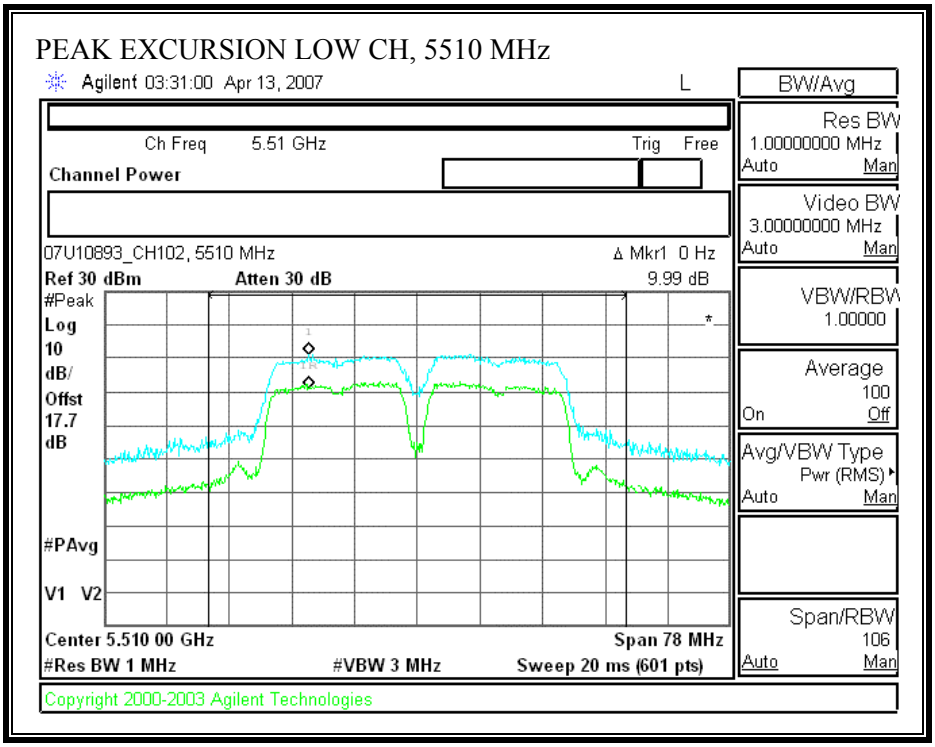


PEAK EXCURSION HIGH CH, 5700 MHz

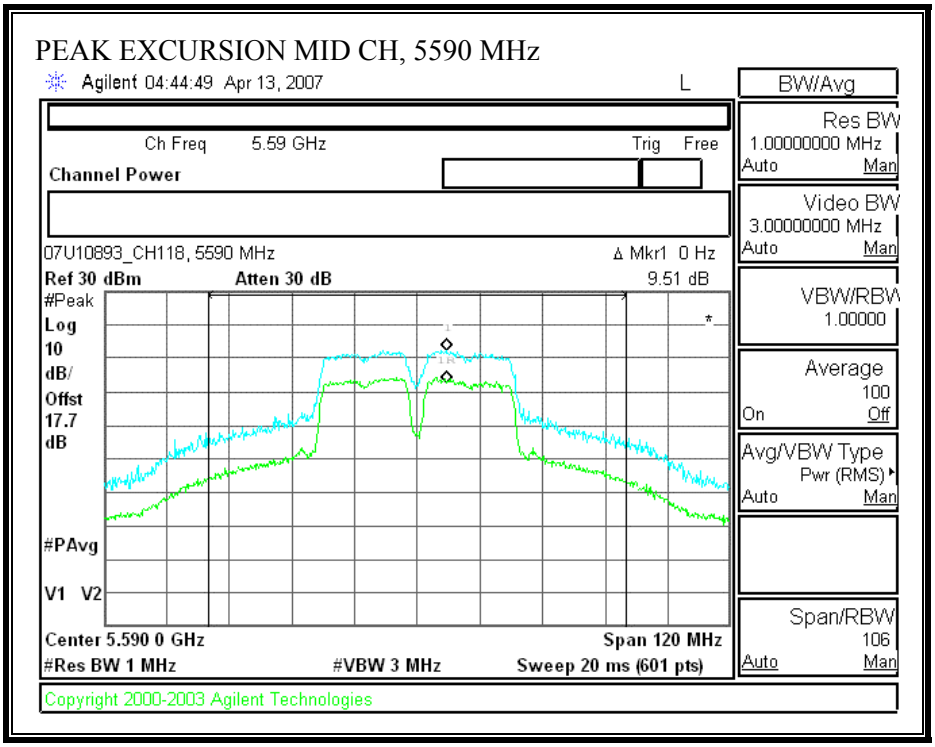


802.11n 40 MHz CDD MCS 32

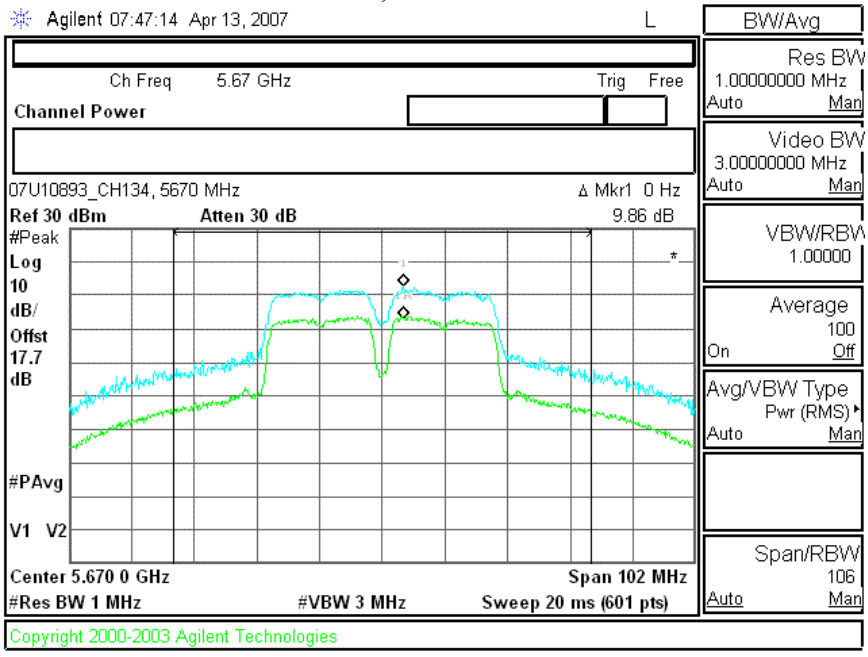
PEAK EXCURSION (802.11 - 40 MHz TX BANDWIDTH – CHAIN 0)



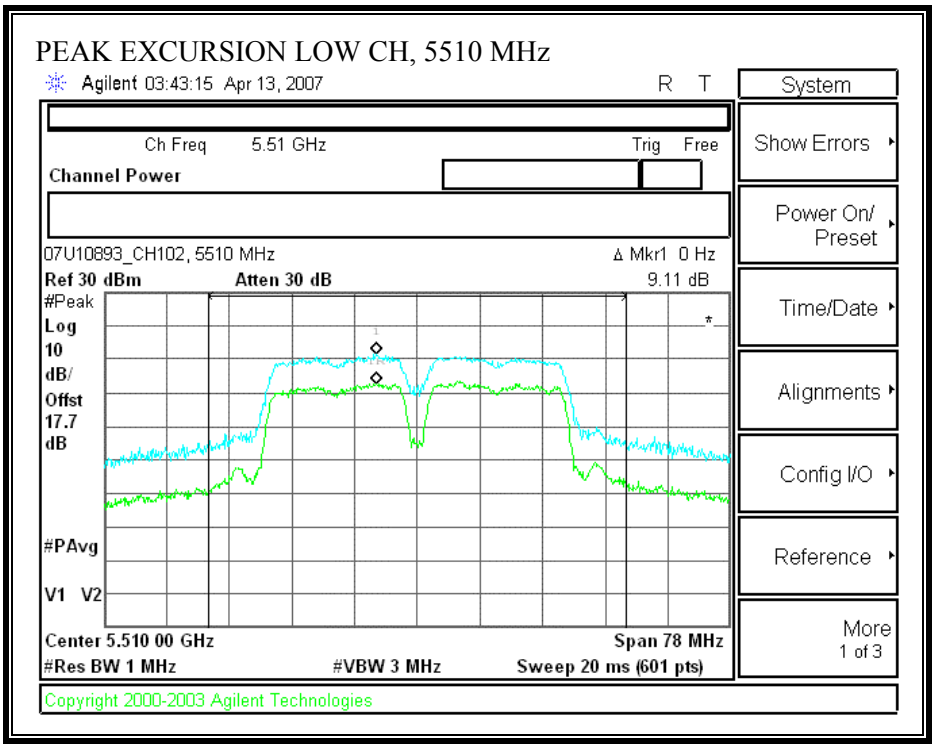
PEAK EXCURSION MID CH, 5590 MHz



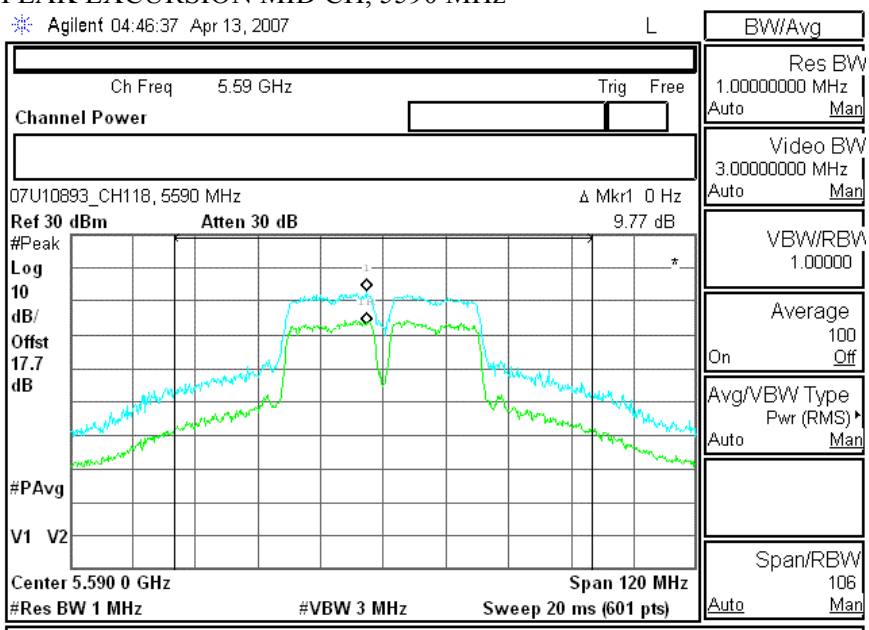
PEAK EXCURSION HIGH CH, 5670 MHz



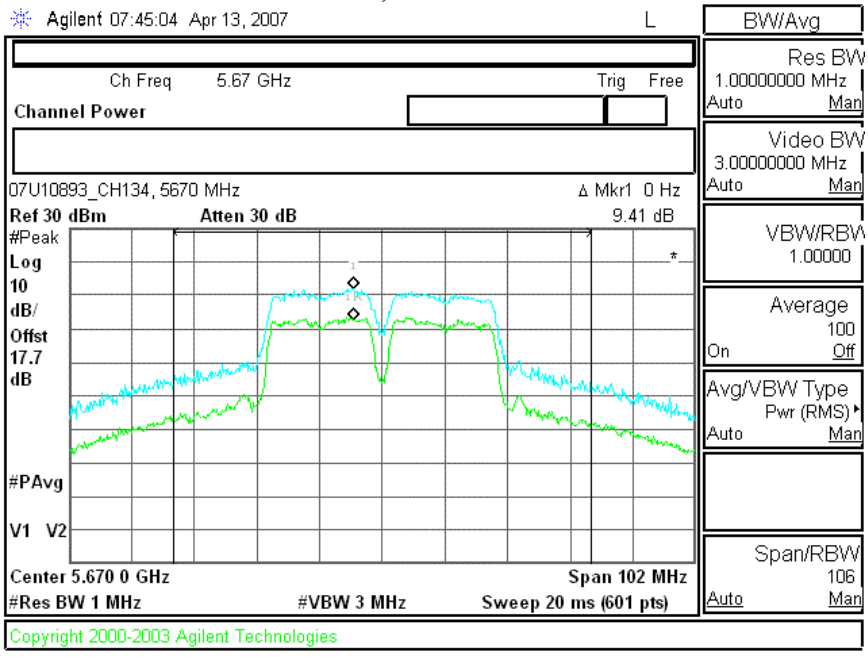
PEAK EXCURSION (802.11 - 40 MHz TX BANDWIDTH – CHAIN 1)



PEAK EXCURSION MID CH, 5590 MHz



PEAK EXCURSION HIGH CH, 5670 MHz



7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.407 (b) (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.

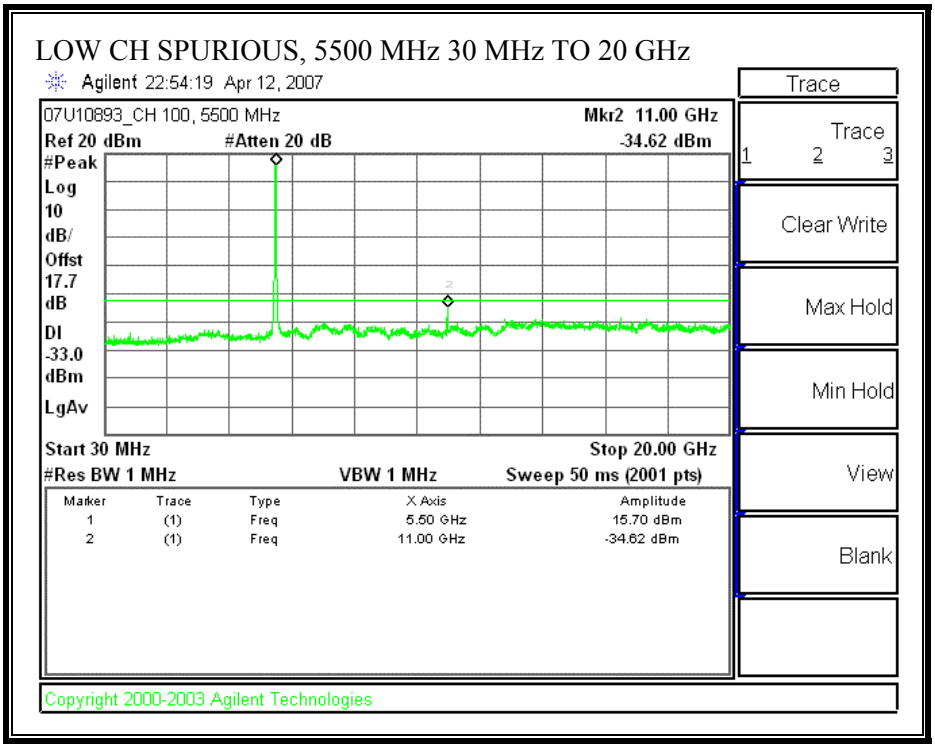
RESULTS

No non-compliance noted:

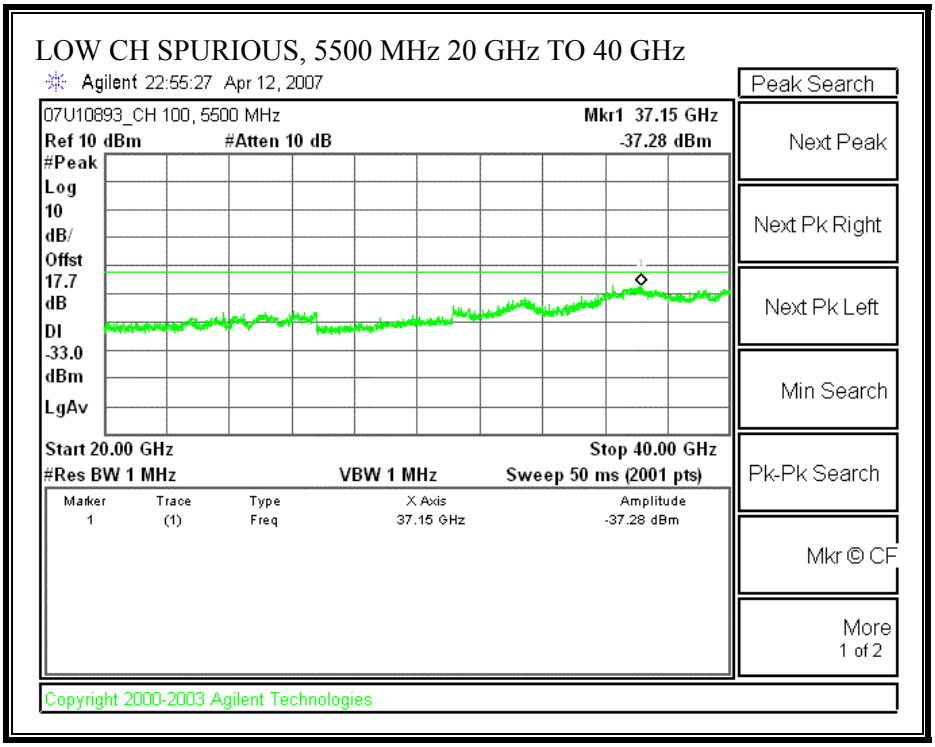
802.11a CDD is covered by worst case 802.11n 20 MHz CDD MCS 0

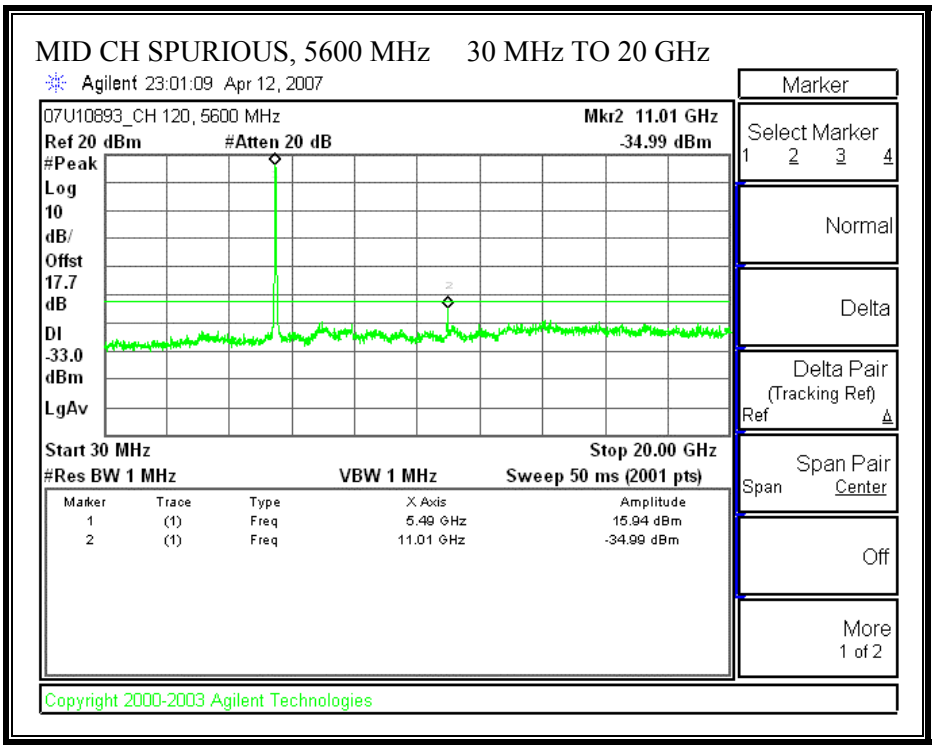
802.11n 20 MHz CDD MCS 0

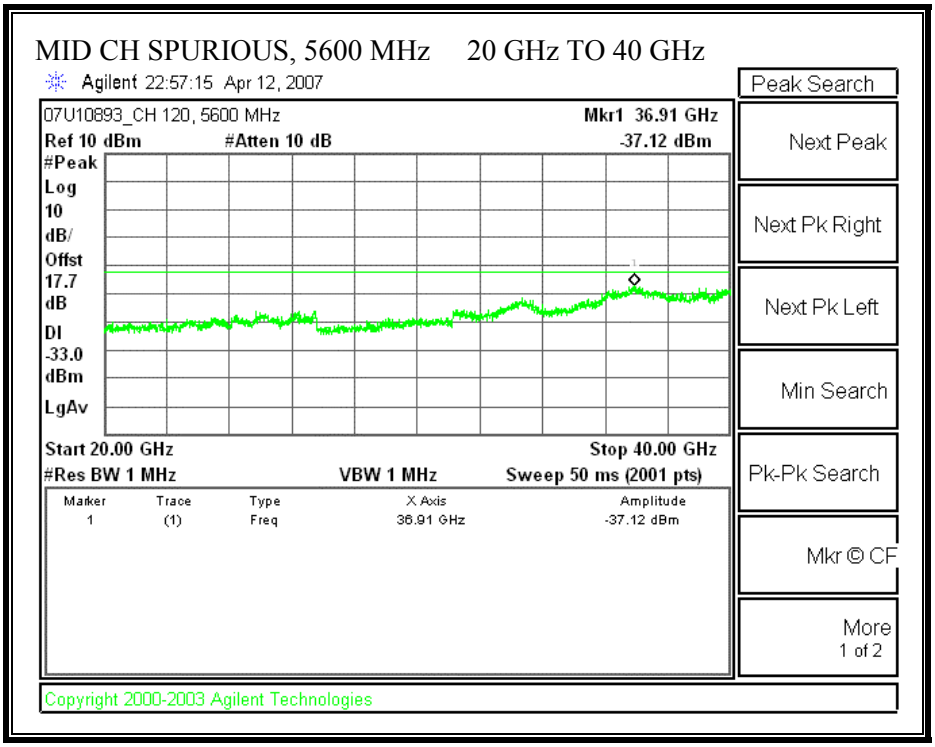
SPURIOUS EMISSIONS - 802.11a -20 MHz TX BANDWIDTH – CHAIN 0

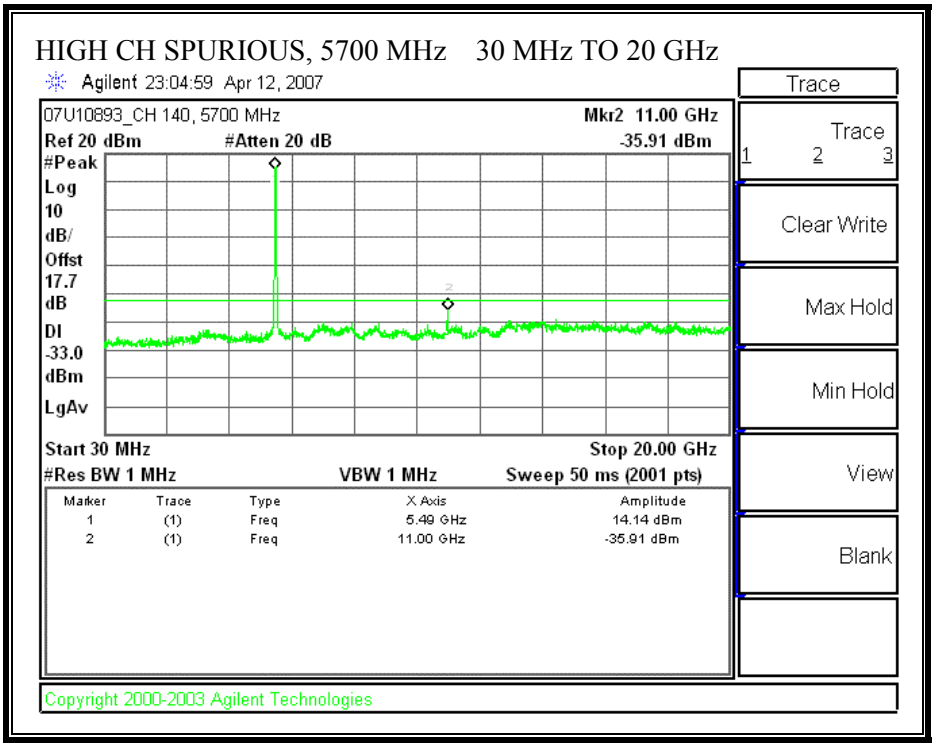


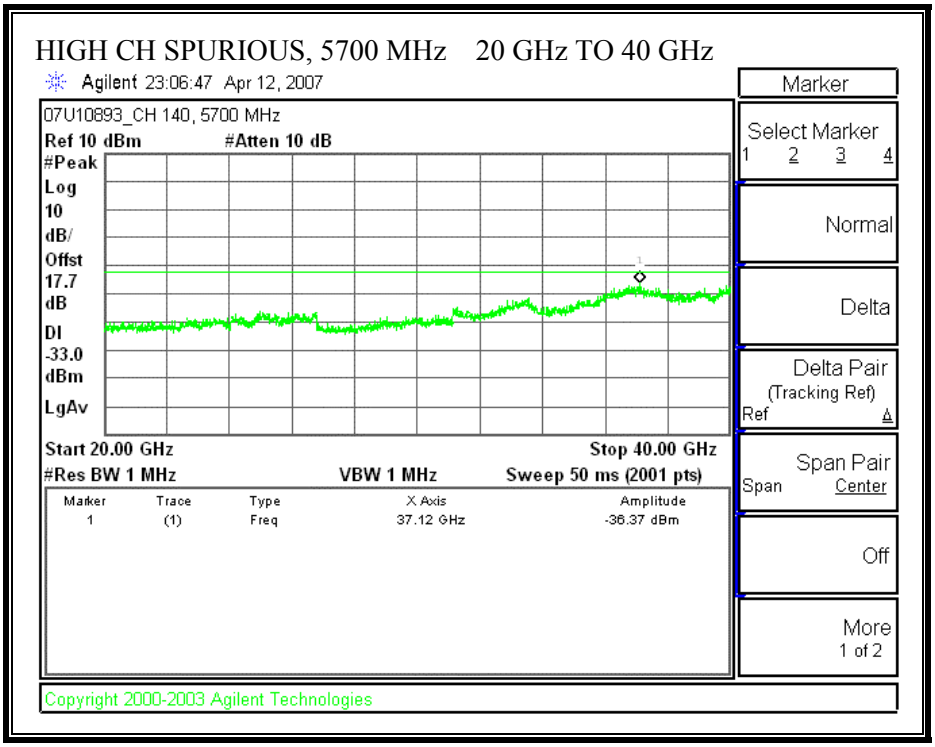
LOW CH SPURIOUS, 5500 MHz 20 GHz TO 40 GHz



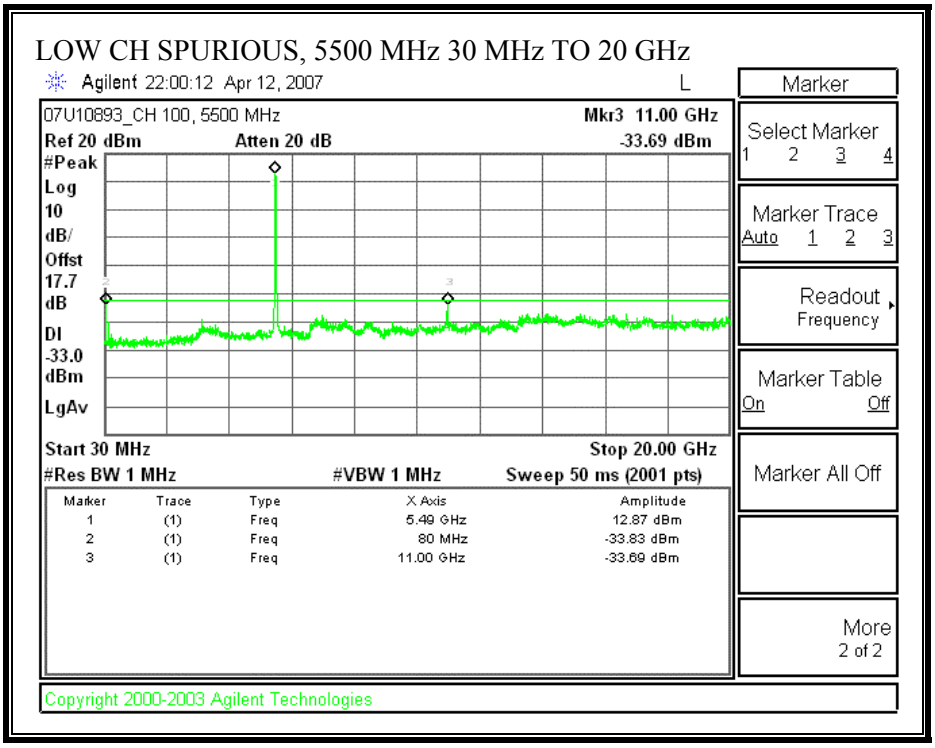




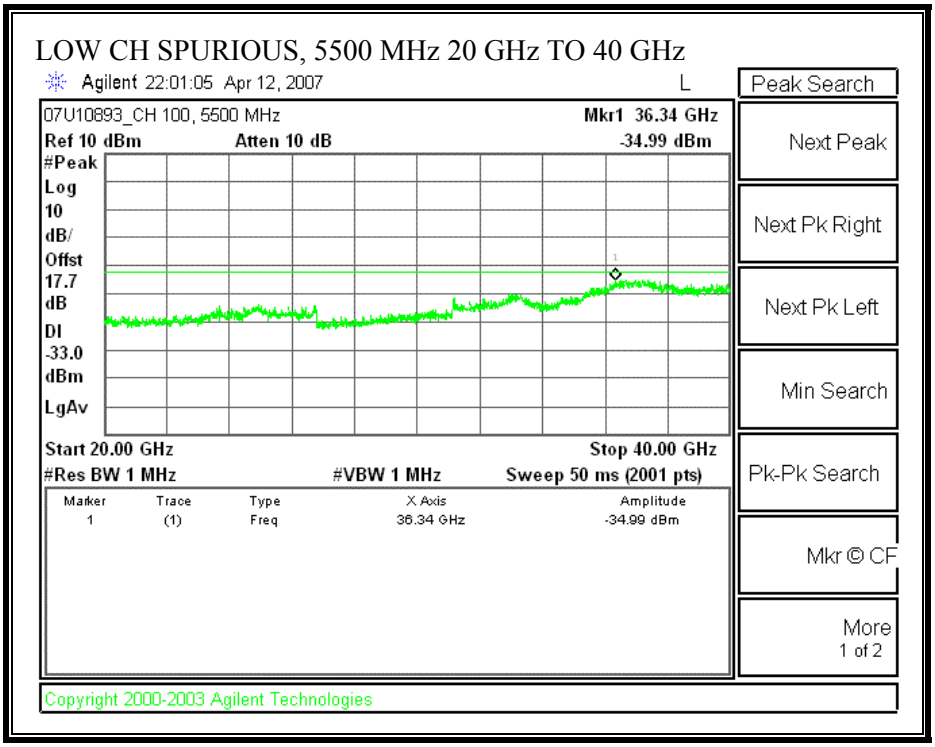


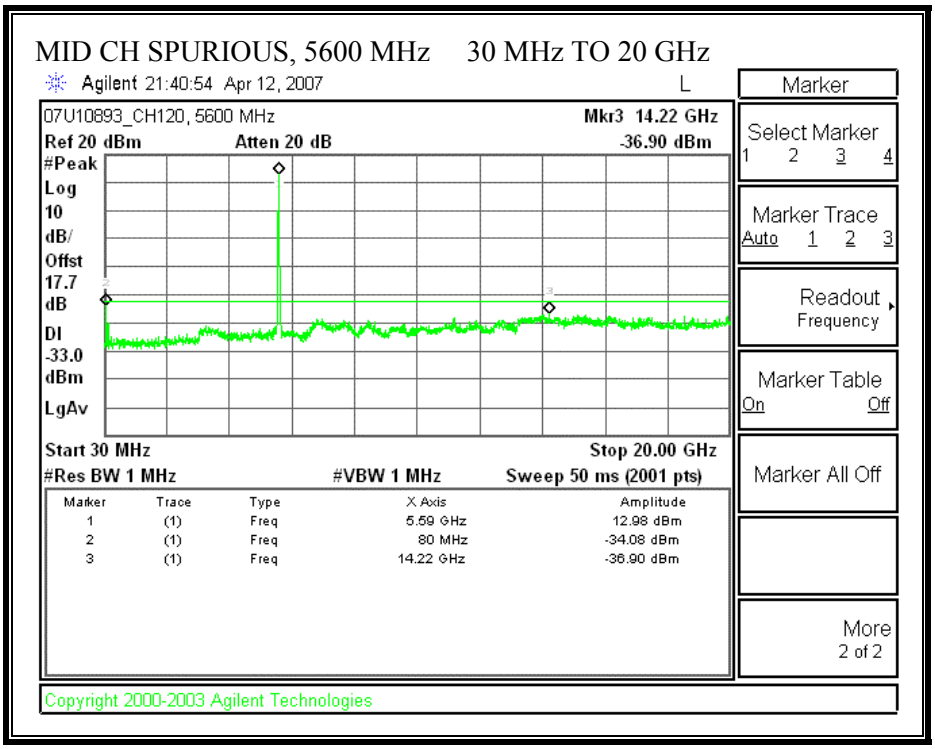


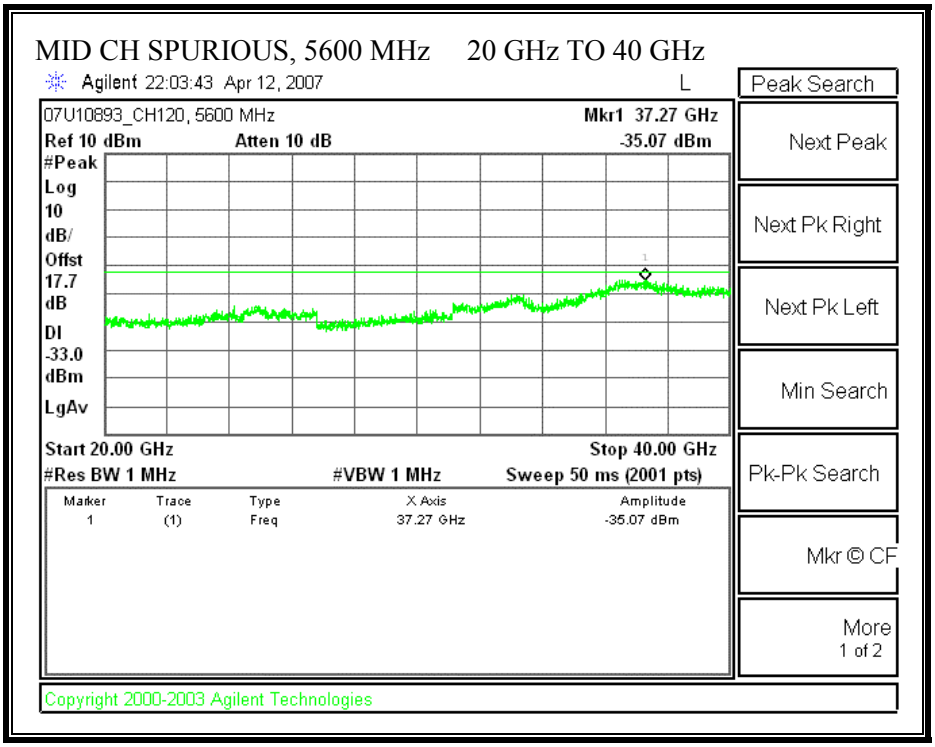
SPURIOUS EMISSIONS - 802.11a -20 MHz TX BANDWIDTH – CHAIN 1

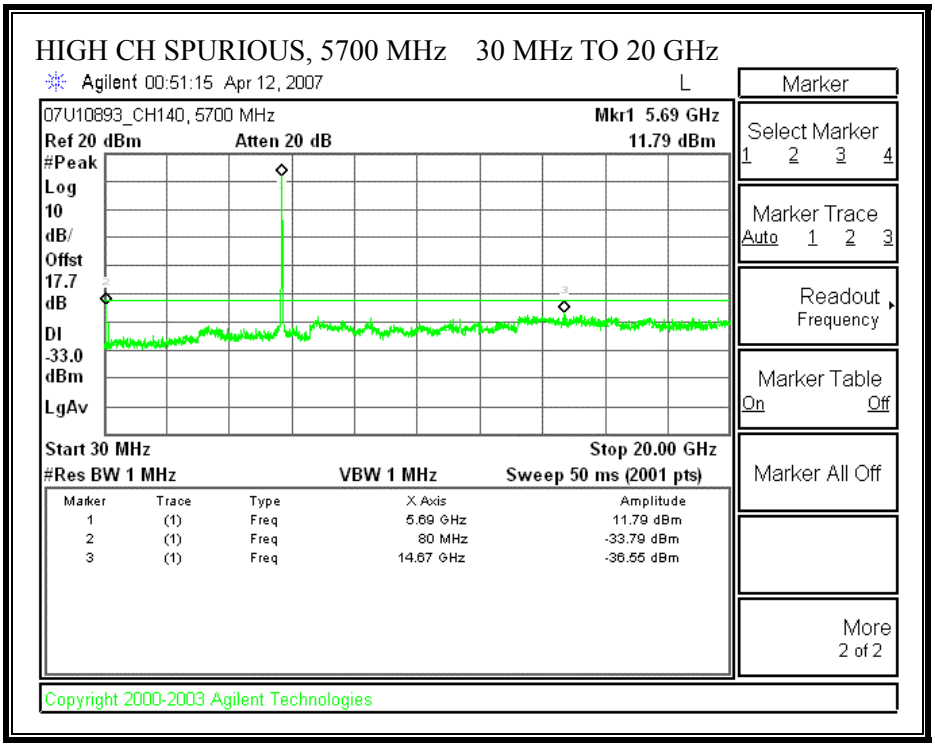


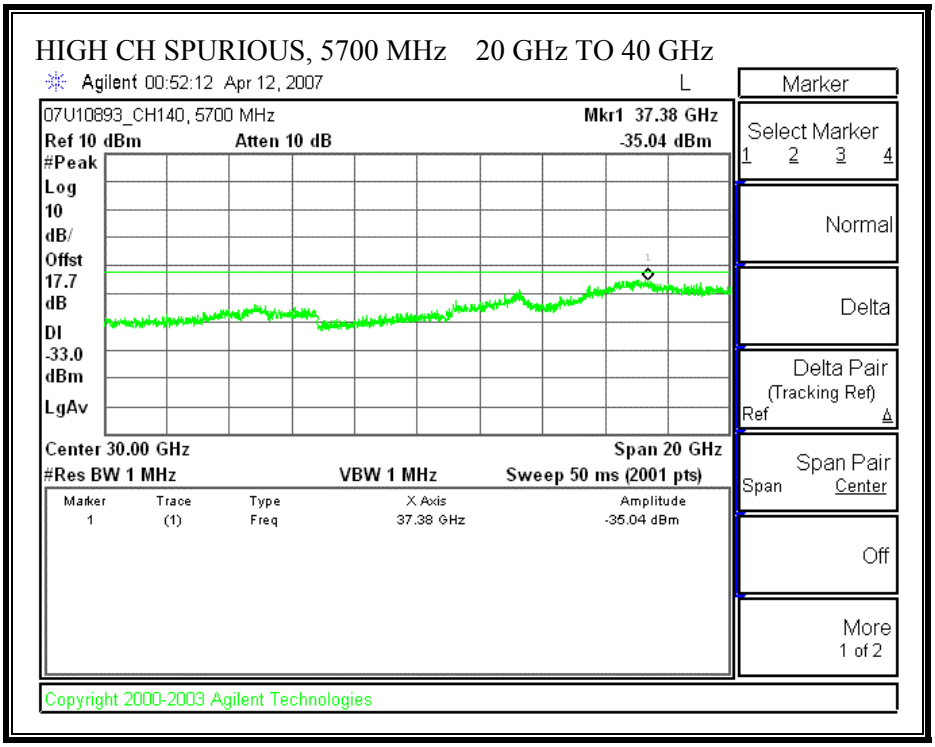
LOW CH SPURIOUS, 5500 MHz 20 GHz TO 40 GHz





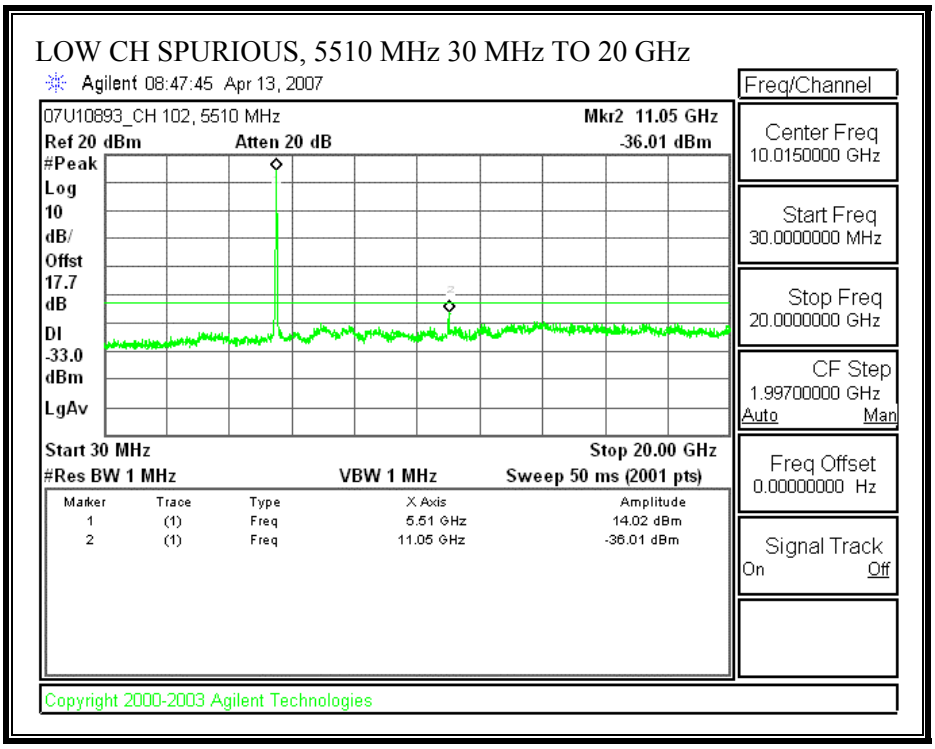


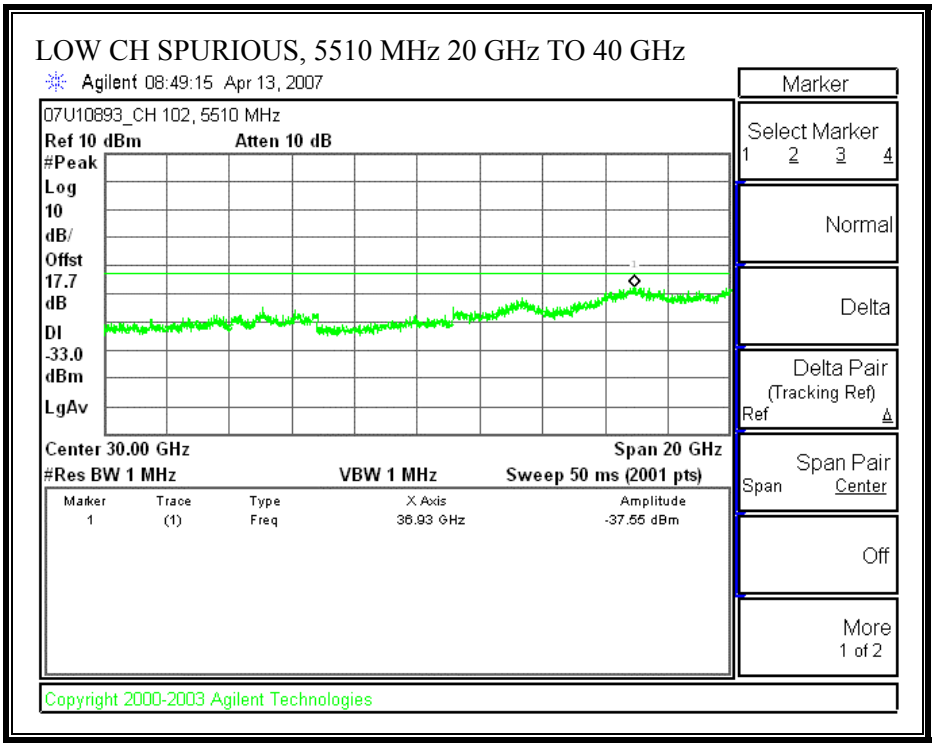


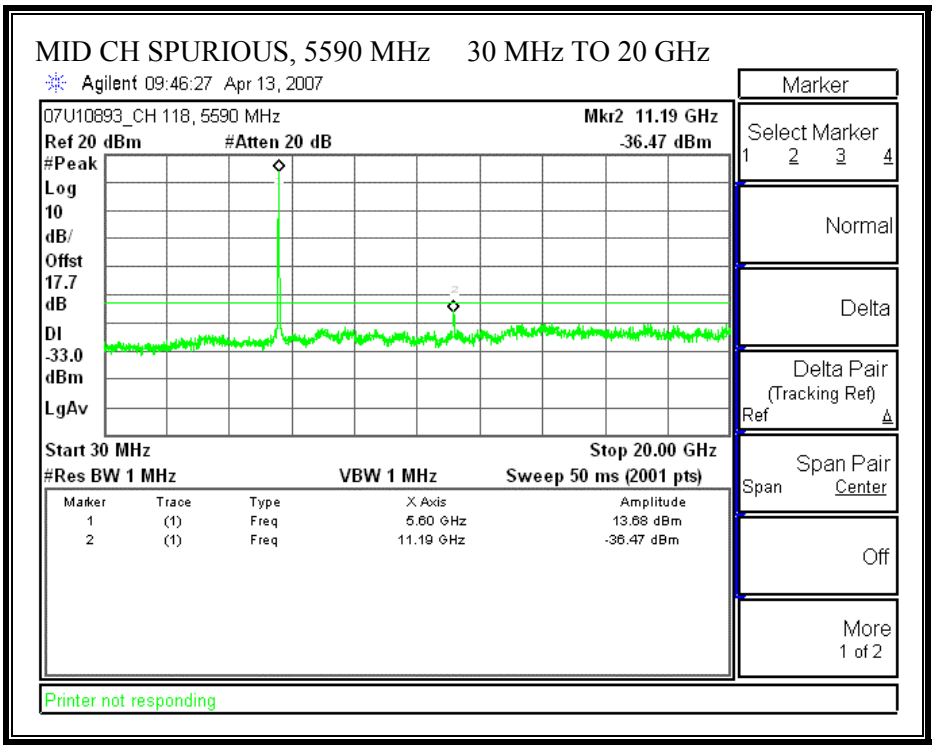


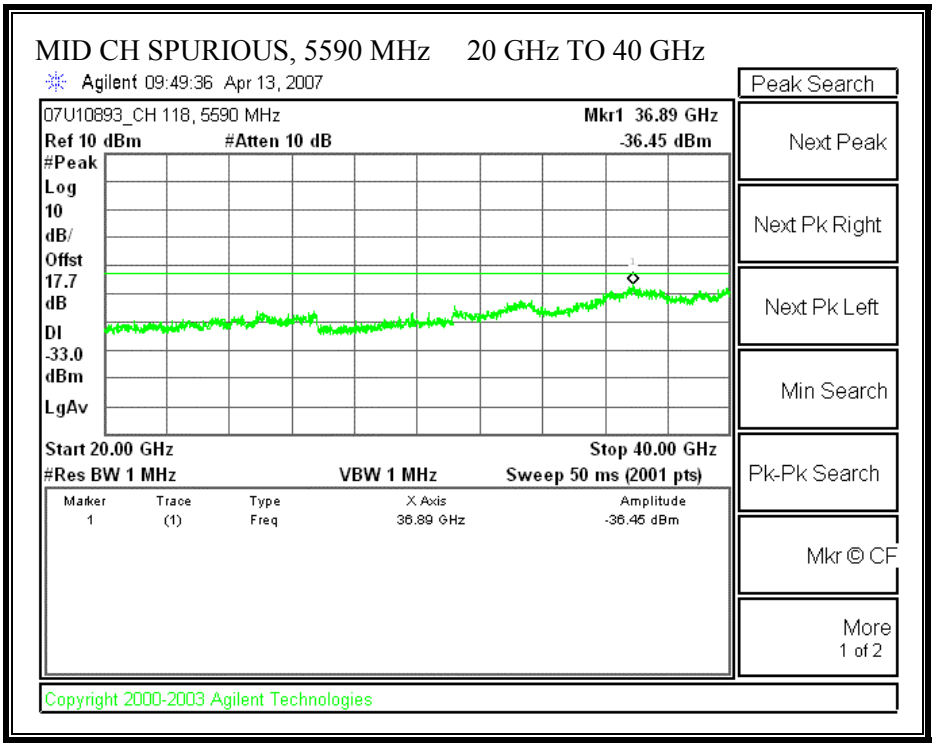
802.11n 40 MHz CDD MCS 32

SPURIOUS EMISSIONS - 802.11a -40 MHz TX BANDWIDTH – CHAIN 0

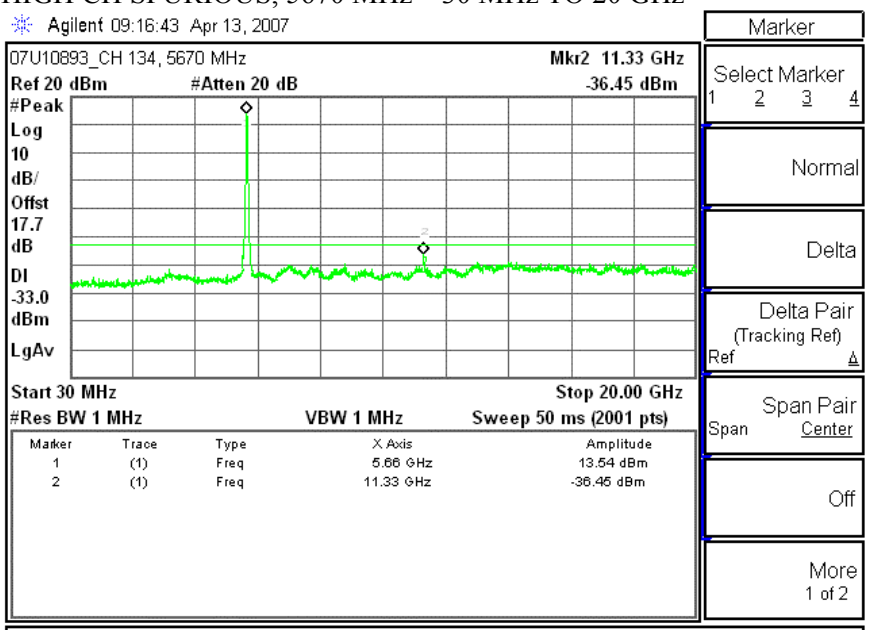


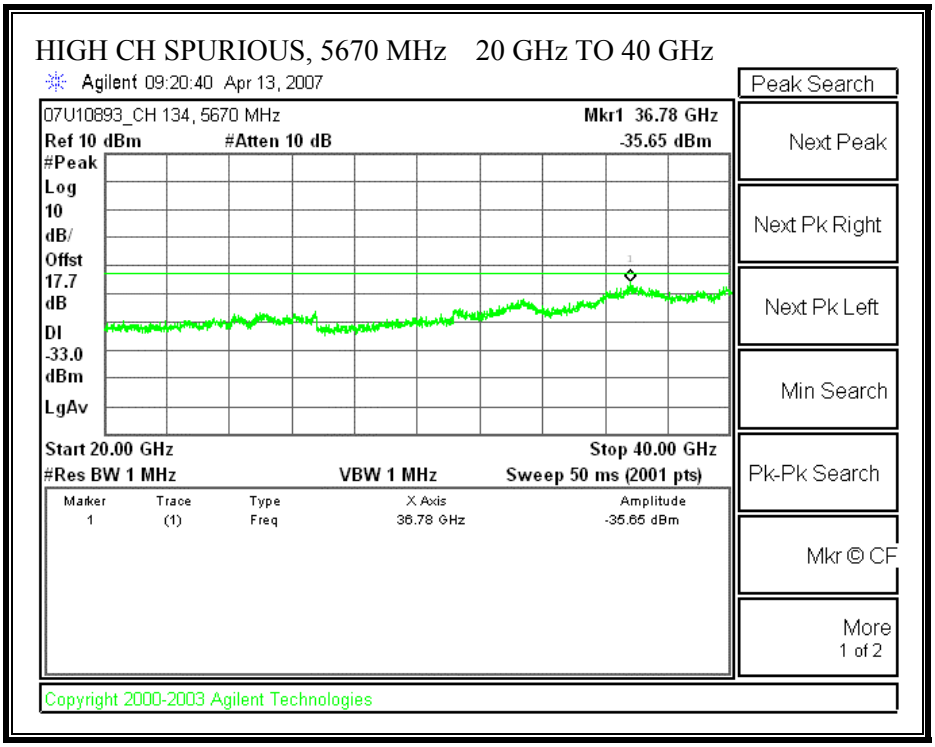




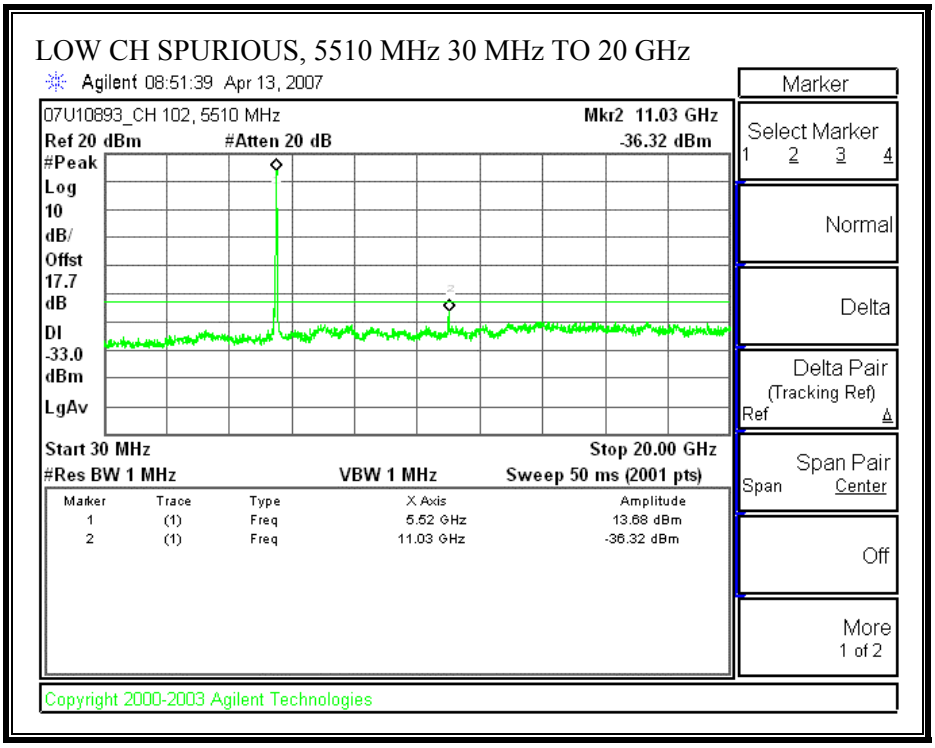


HIGH CH SPURIOUS, 5670 MHz 30 MHz TO 20 GHz

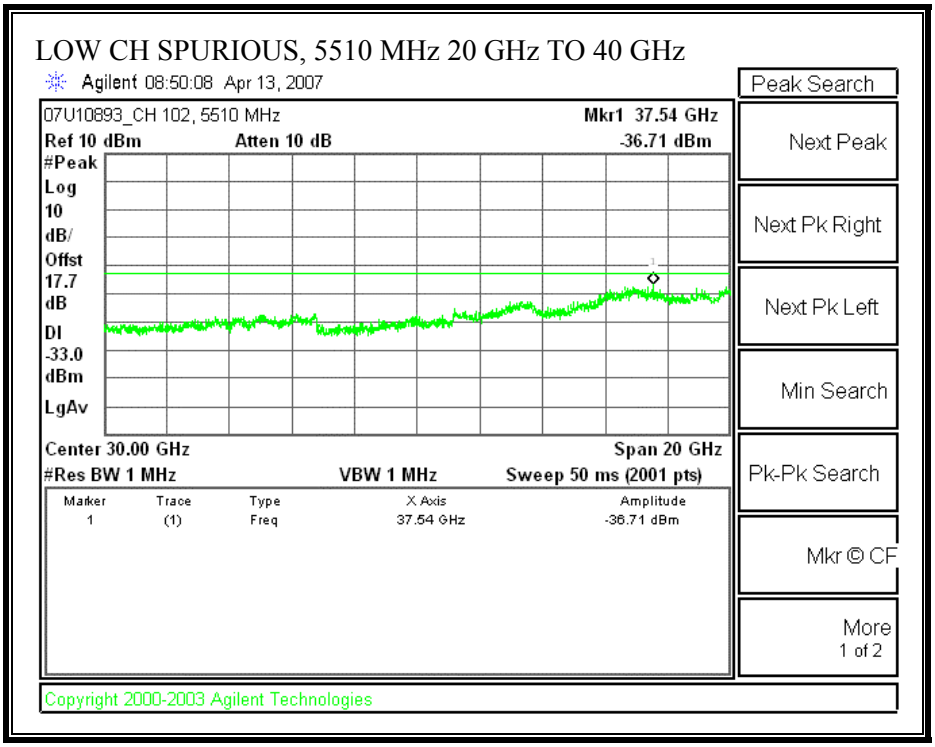


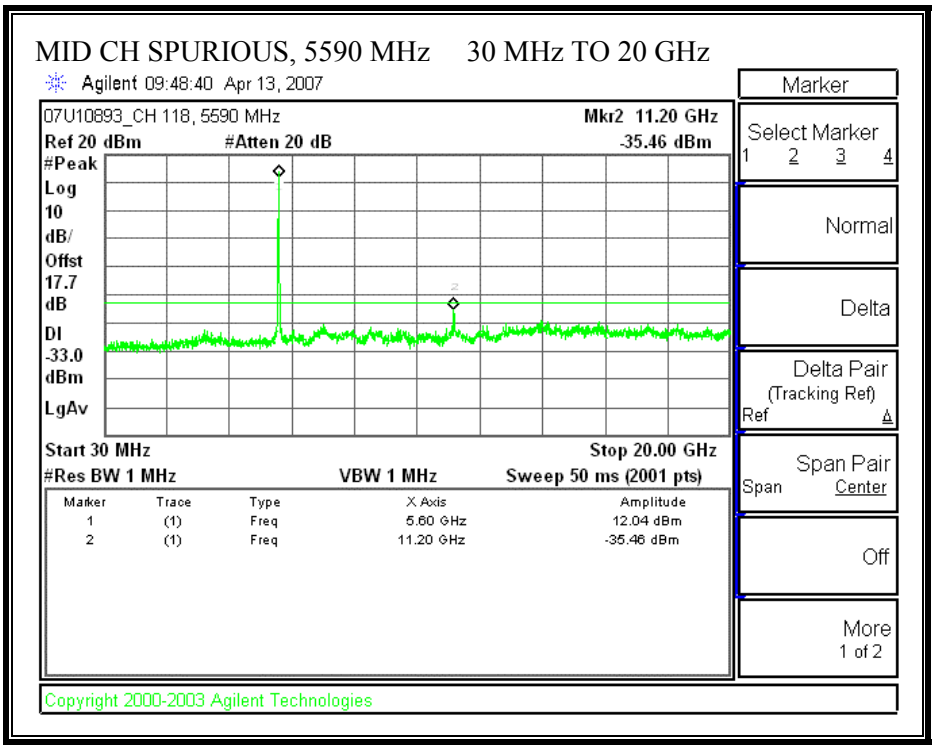


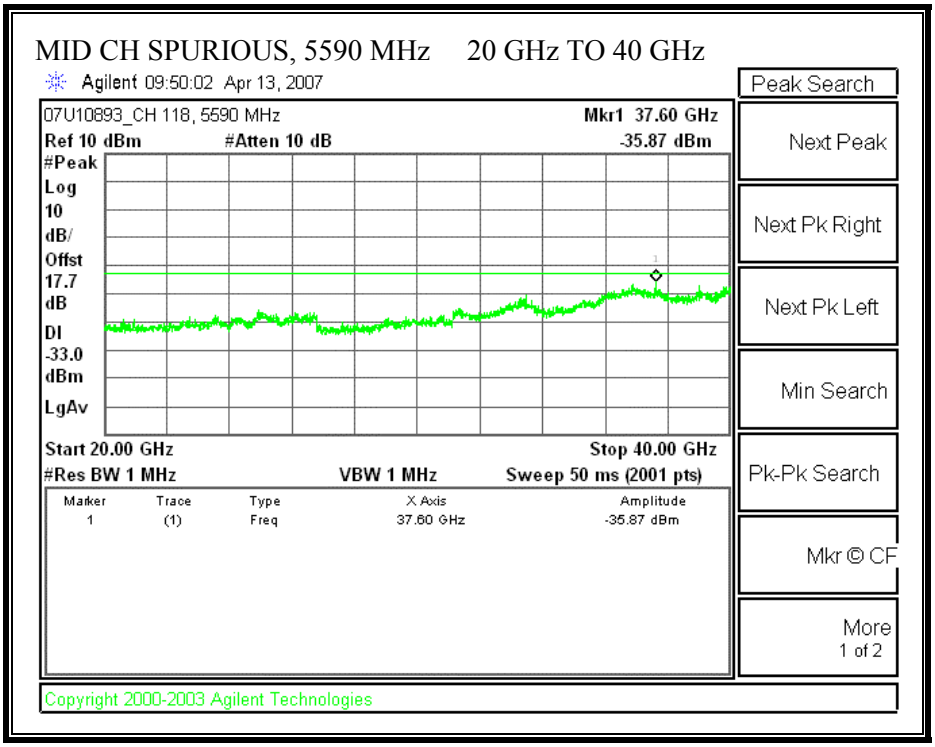
SPURIOUS EMISSIONS - 802.11a -40 MHz TX BANDWIDTH – CHAIN 1

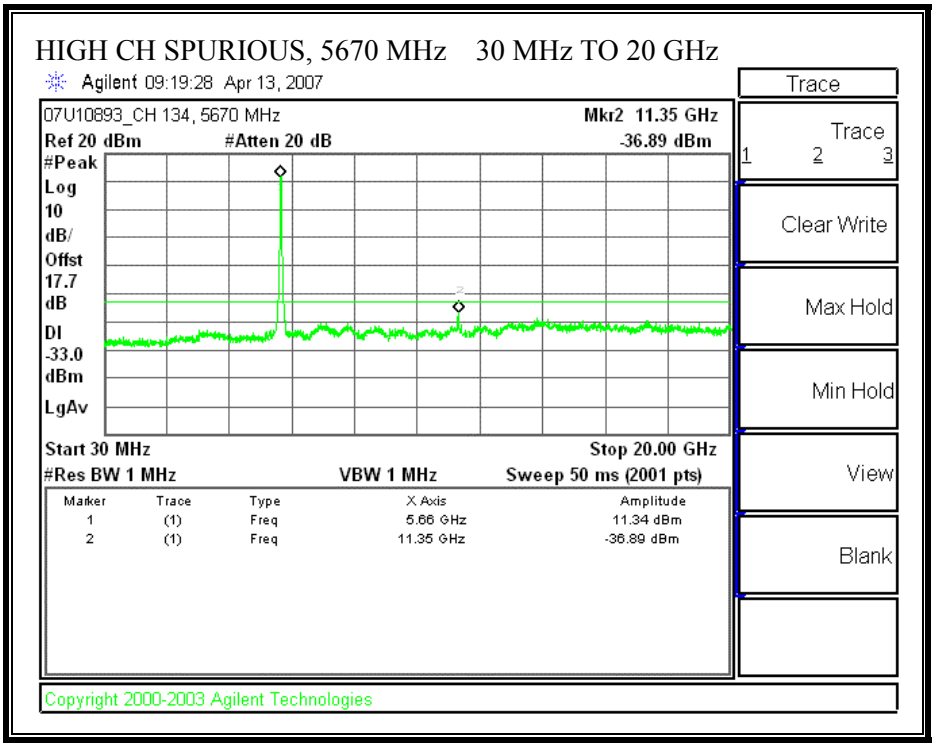


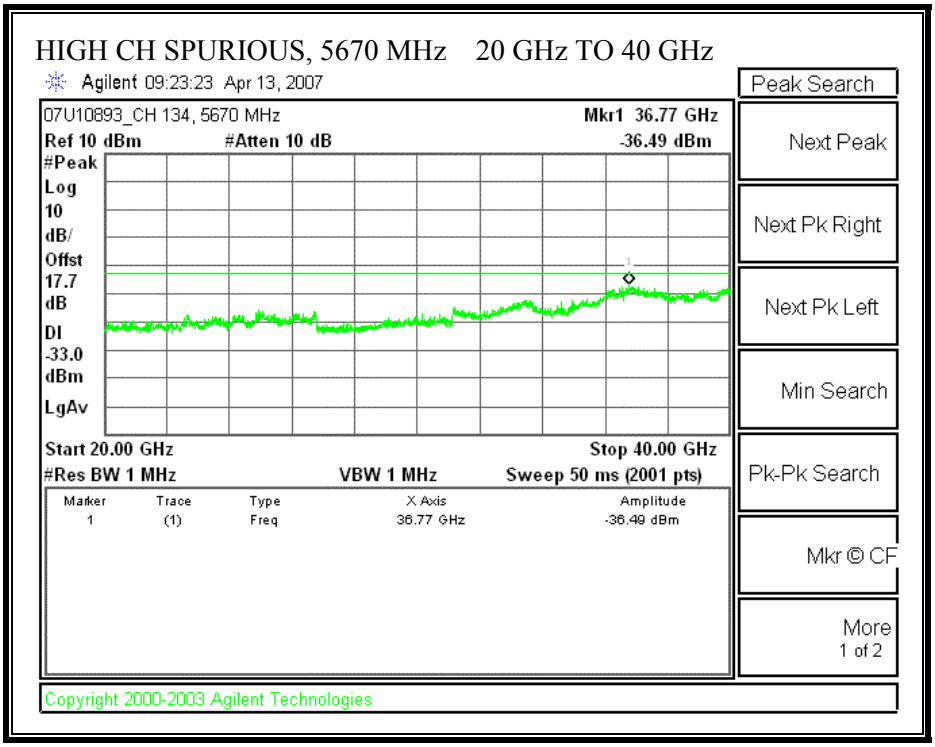
LOW CH SPURIOUS, 5510 MHz 20 GHz TO 40 GHz











7.5. RADIATED EMISSIONS

7.5.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2] Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST PROCEDURE

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

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

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

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

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

5150 TO 5350 MHz BAND

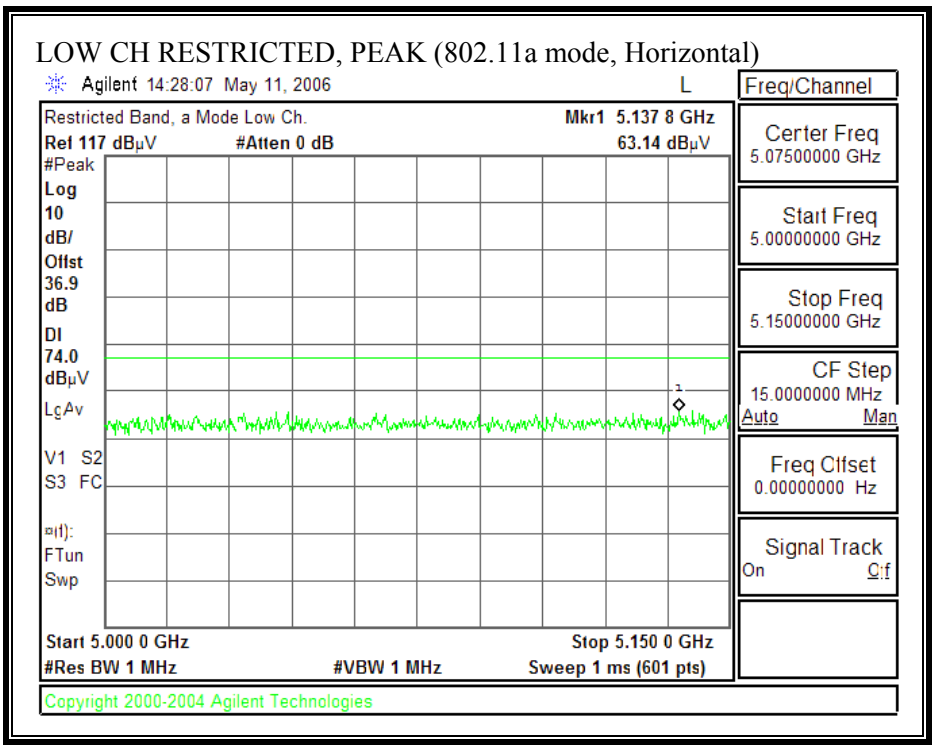
LEGACY MODE

7.5.2. TRANSMITTER ABOVE 1 GHz FOR 5150 TO 5350 MHz BAND

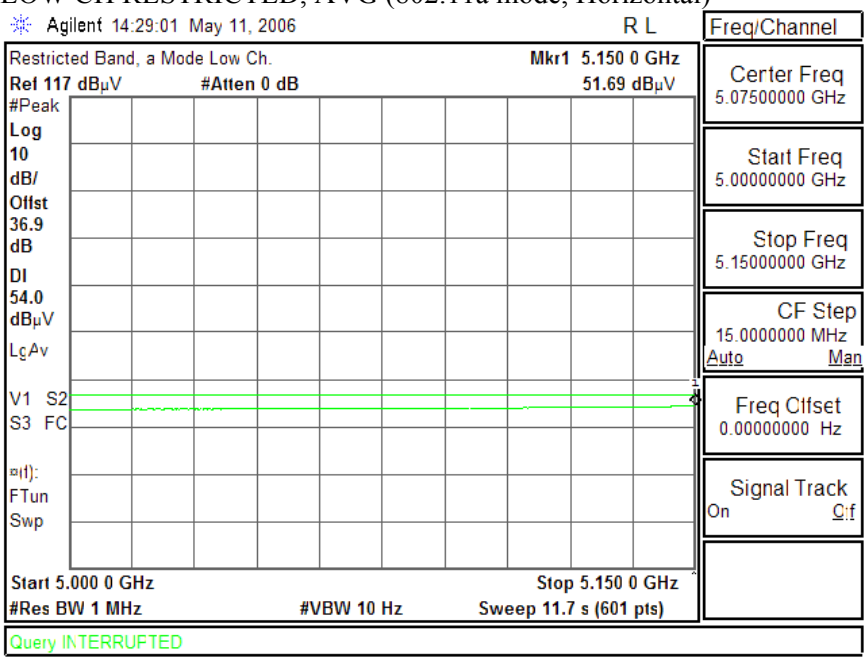
802.11a MODE

RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, 5180 MHz - HORIZONTAL)

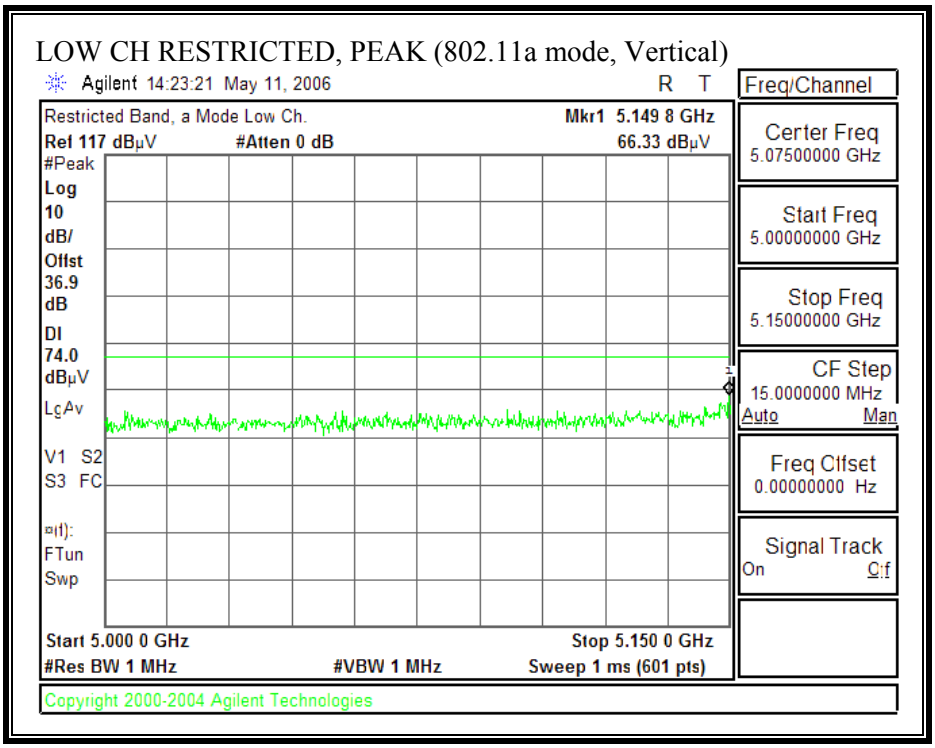
LOW CH RESTRICTED, PEAK (802.11a mode, Horizontal)



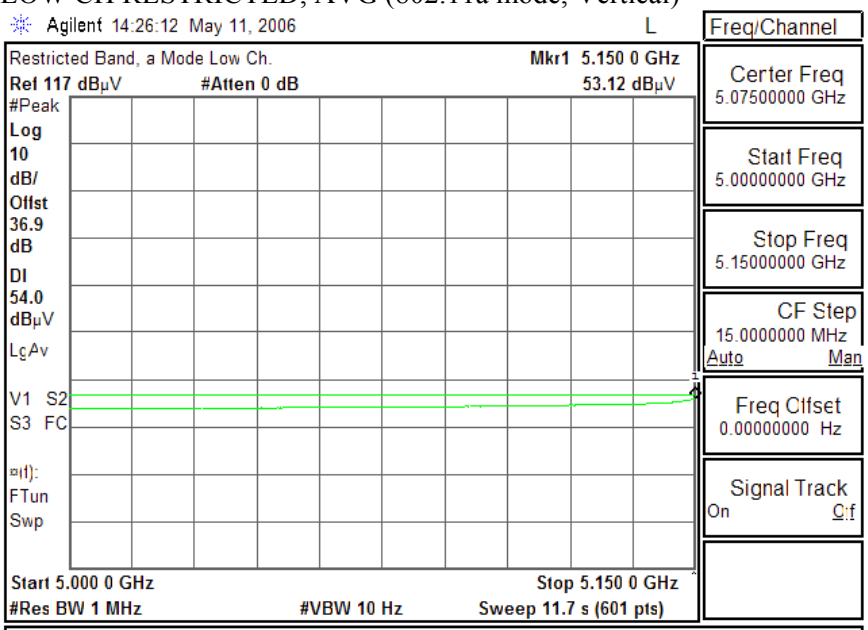
LOW CH RESTRICTED, AVG (802.11a mode, Horizontal)



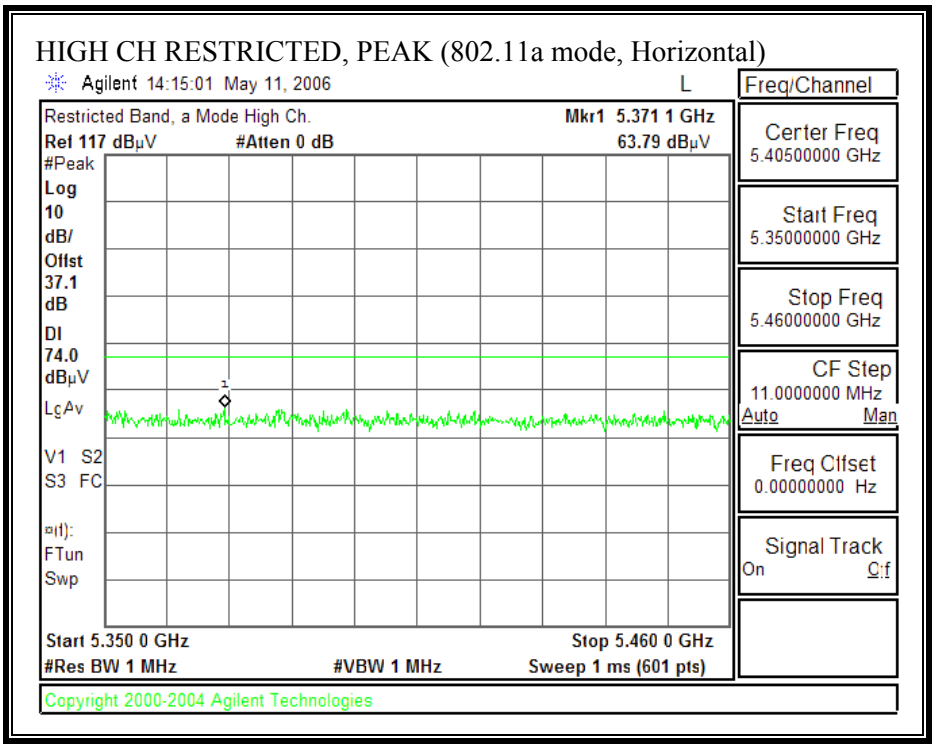
RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, 5180 MHz - VERTICAL)



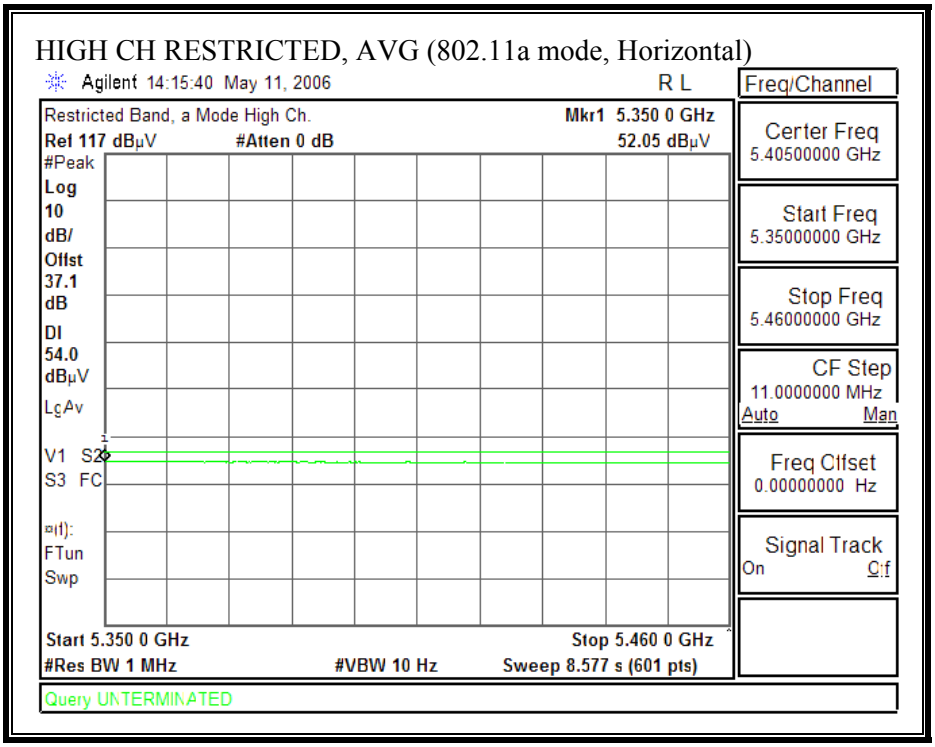
LOW CH RESTRICTED, AVG (802.11a mode, Vertical)



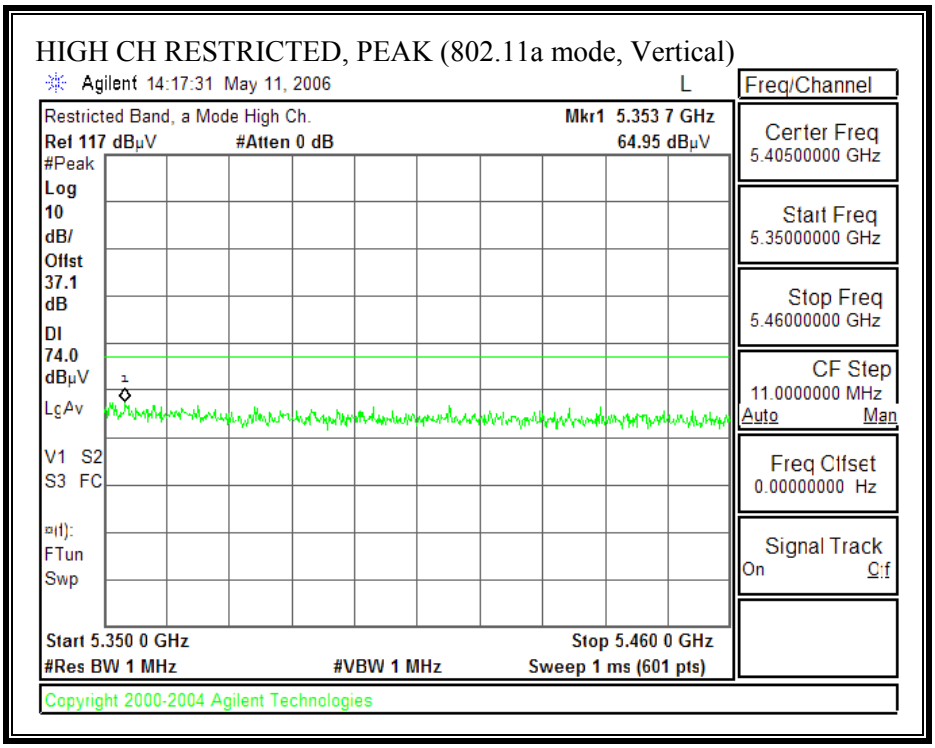
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, 5300 MHz - HORIZONTAL)



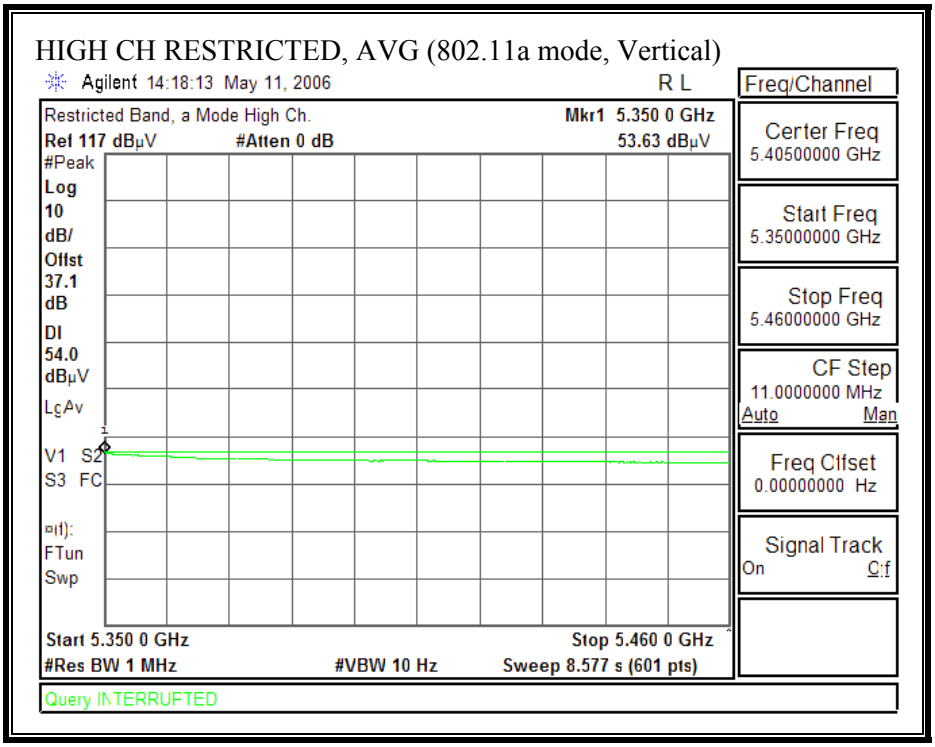
HIGH CH RESTRICTED, AVG (802.11a mode, Horizontal)



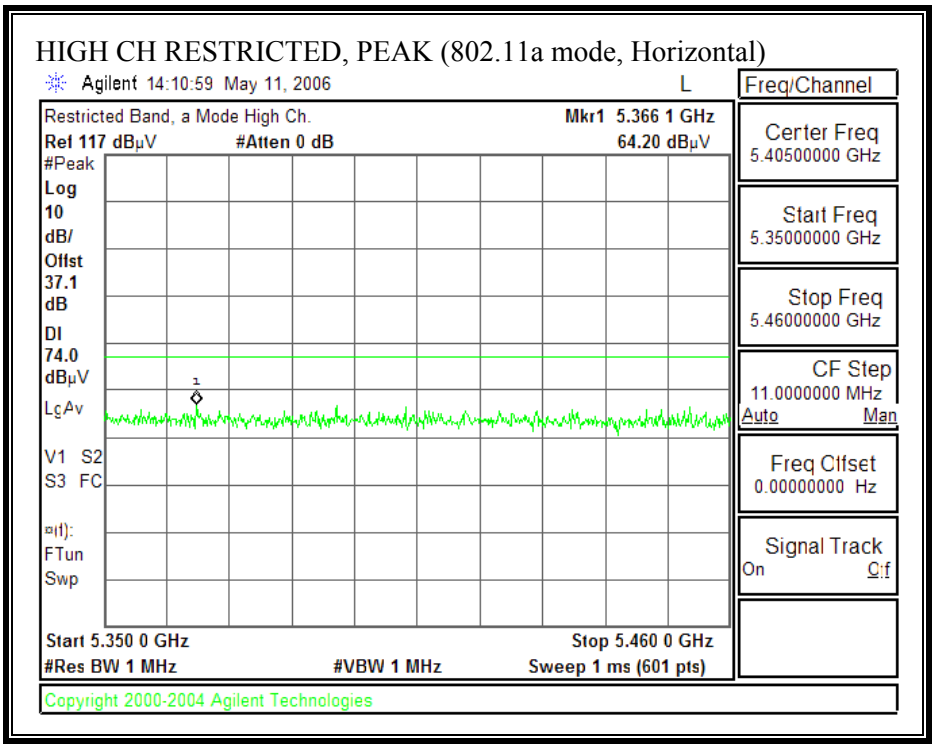
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, 5300 MHz - VERTICAL)



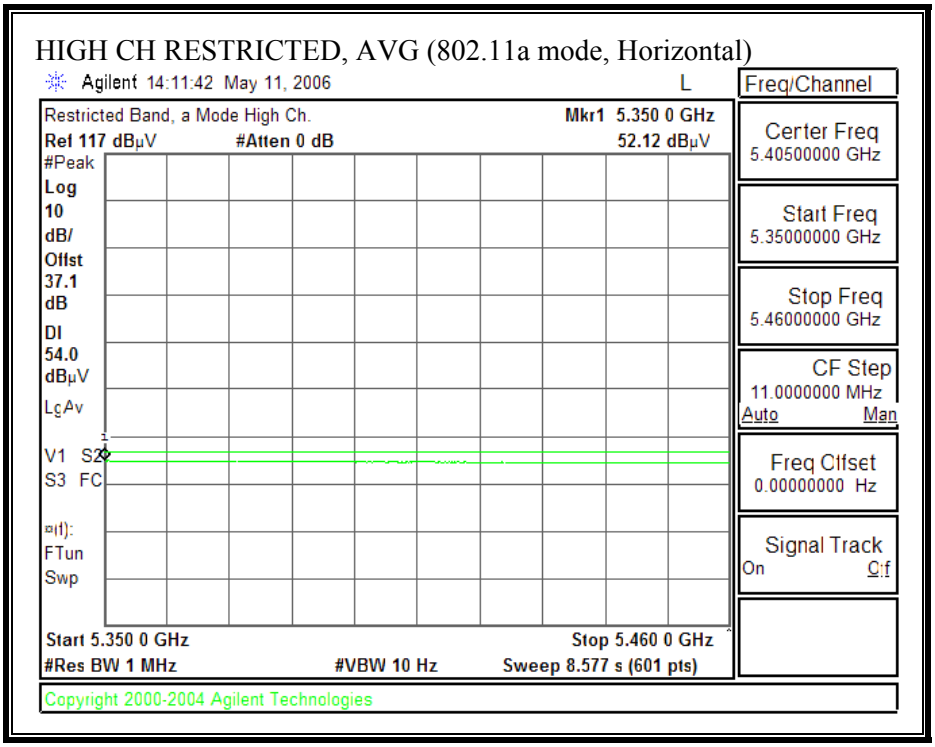
HIGH CH RESTRICTED, AVG (802.11a mode, Vertical)



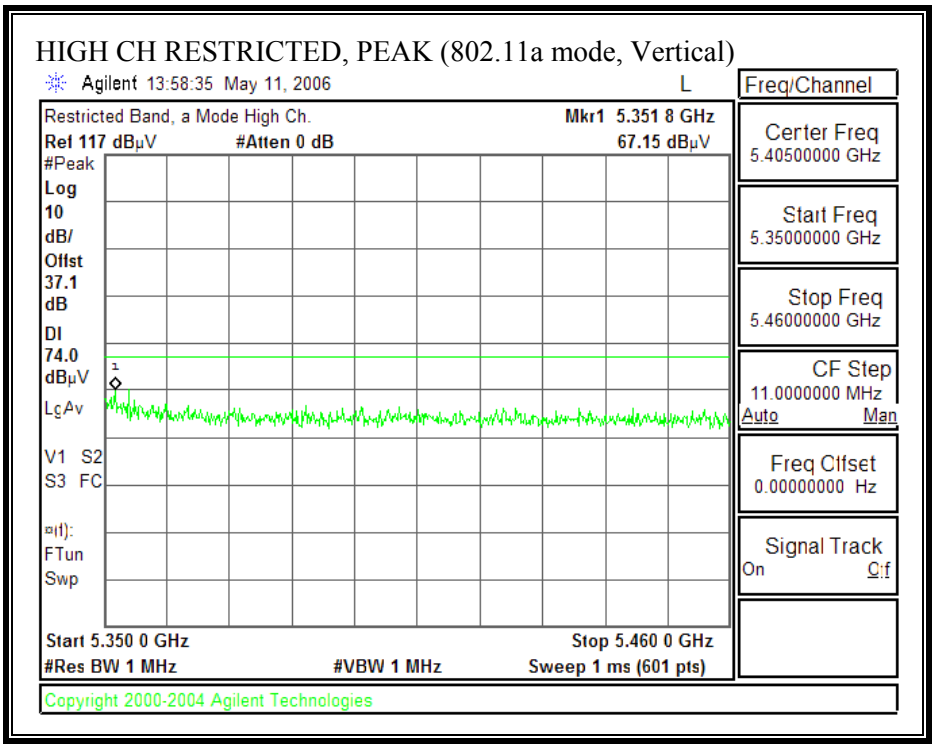
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, 5320 MHz - HORIZONTAL)



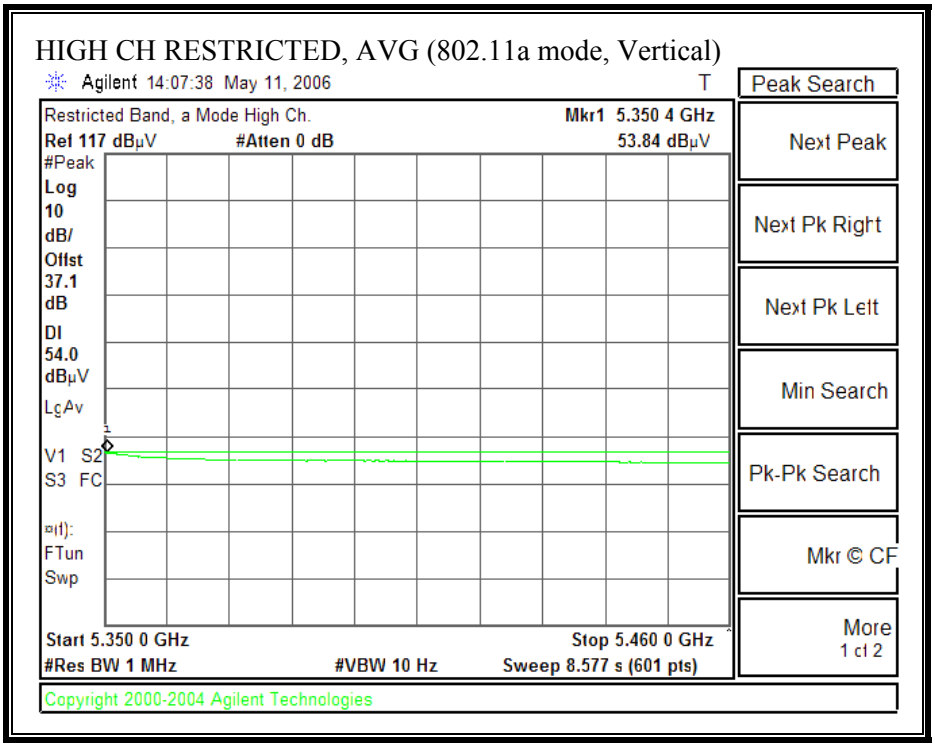
HIGH CH RESTRICTED, AVG (802.11a mode, Horizontal)



RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, 5320 MHz - VERTICAL)



HIGH CH RESTRICTED, AVG (802.11a mode, Vertical)



802.11a MODE

HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Company: Broadcom
Project #: 06U10233
Date: 05/10/06
Test Engineer: Vien Tran
Configuration: EUT & Low Gain Antenna_BCM94321MC, S/N 316
Mode: Tx Legacy 11a Mode_5.2 GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Vien 187215002	Vien 197209005	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

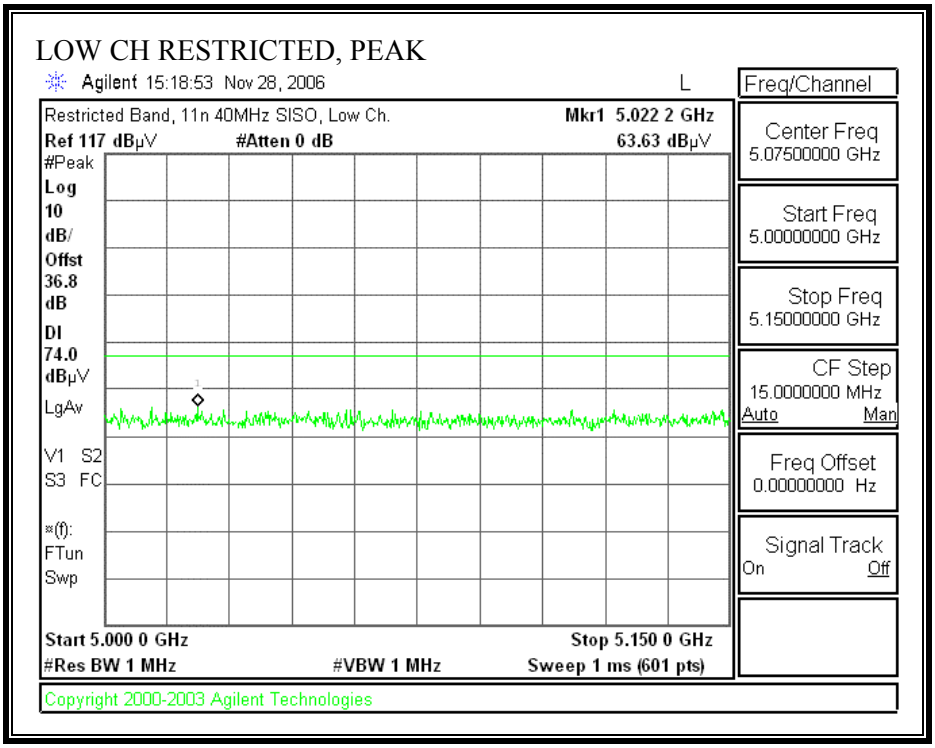
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CH, 5180 MHz															
10.360	3.0	59.1	43.4	37.0	4.7	-36.8	0.0	0.8	64.8	49.1	74	54	-9.2	-4.9	V
15.540	3.0	45.4	34.5	38.1	5.8	-34.8	0.0	0.7	55.1	44.2	74	54	-18.9	-9.8	V
10.360	3.0	55.5	44.2	37.0	4.7	-36.8	0.0	0.8	61.2	49.9	74	54	-12.8	-4.1	H
15.540	3.0	44.8	34.2	38.1	5.8	-34.8	0.0	0.7	54.5	43.9	74	54	-19.5	-10.1	H
MID CH, 5260 MHz															
10.520	3.0	52.3	38.9	37.1	4.7	-36.7	0.0	0.8	58.2	44.8	74	54	-15.8	-9.2	V
15.780	3.0	45.6	34.3	37.5	5.8	-34.6	0.0	0.7	55.0	43.7	74	54	-19.0	-10.3	V
10.520	3.0	53.2	41.2	37.1	4.7	-36.7	0.0	0.8	59.1	47.1	74	54	-14.9	-6.9	H
15.780	3.0	43.7	34.3	37.5	5.8	-34.6	0.0	0.7	53.1	43.7	74	54	-20.9	-10.3	H
HI CH, 5320 MHz															
10.640	3.0	55.5	42.8	37.1	4.8	-36.6	0.0	0.8	61.5	48.8	74	54	-12.5	-5.2	V
15.960	3.0	44.6	33.9	37.1	5.9	-34.5	0.0	0.7	53.8	43.1	74	54	-20.2	-10.9	V
10.640	3.0	56.9	44.8	37.1	4.8	-36.6	0.0	0.8	62.9	50.8	74	54	-11.1	-3.2	H
15.960	3.0	44.2	33.9	37.1	5.9	-34.5	0.0	0.7	53.4	43.1	74	54	-20.6	-10.9	H
No other emissions were detected above system noise floor.															

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

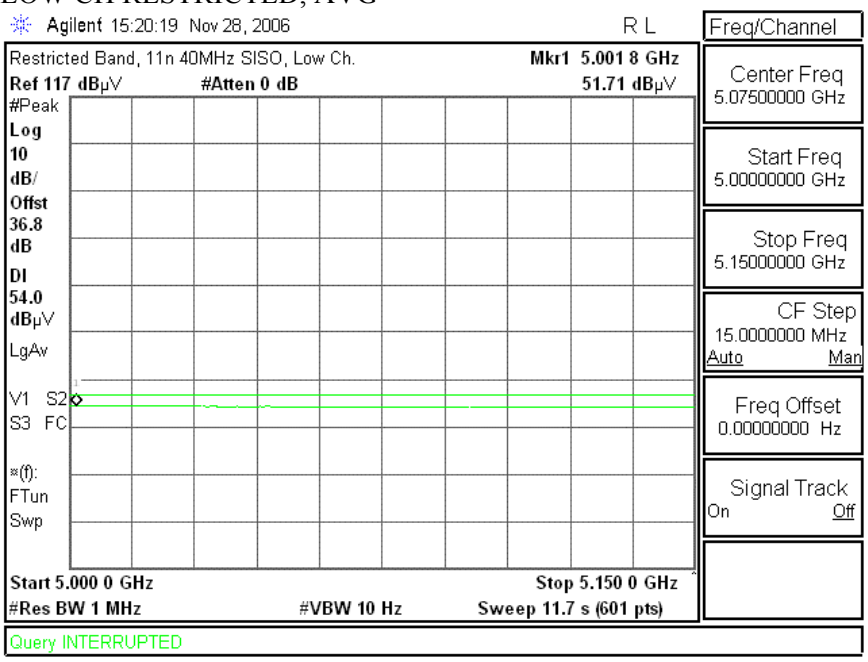
802.11n 40 MHz SISO MODE

RESTRICTED BANDEDGE (802.11n 40 MHz SIS0 MODE)

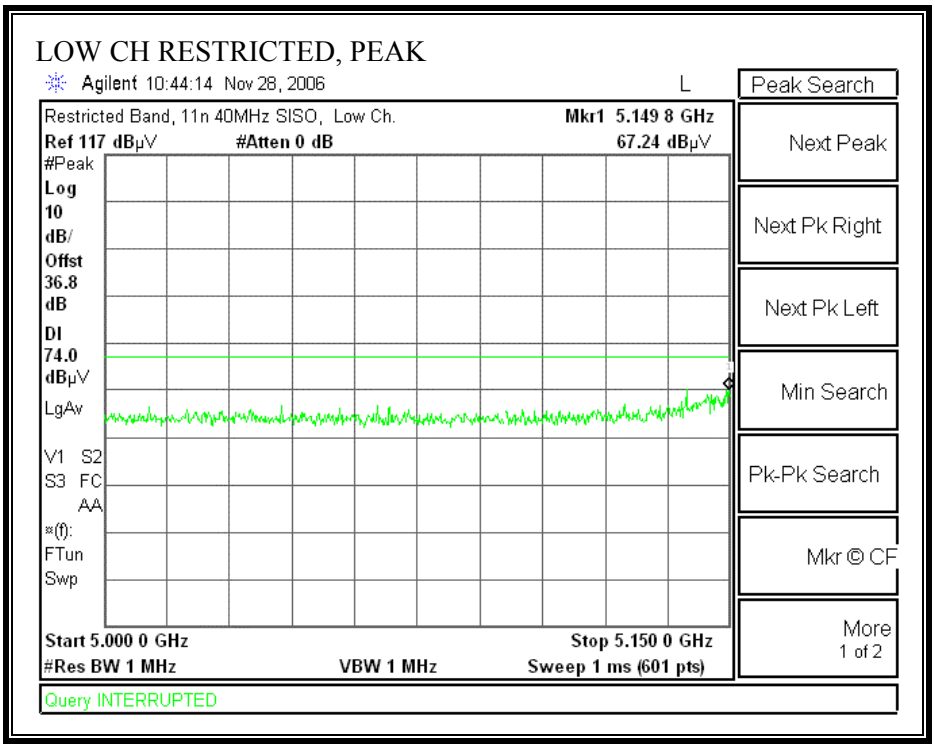
LOW CHANNEL, 5190 MHz - HORIZONTAL)



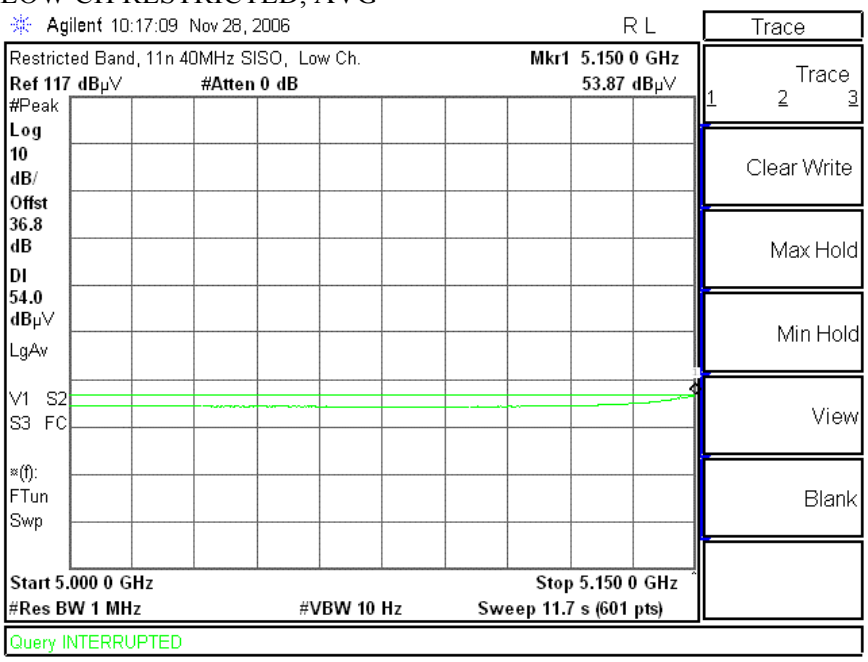
LOW CH RESTRICTED, AVG



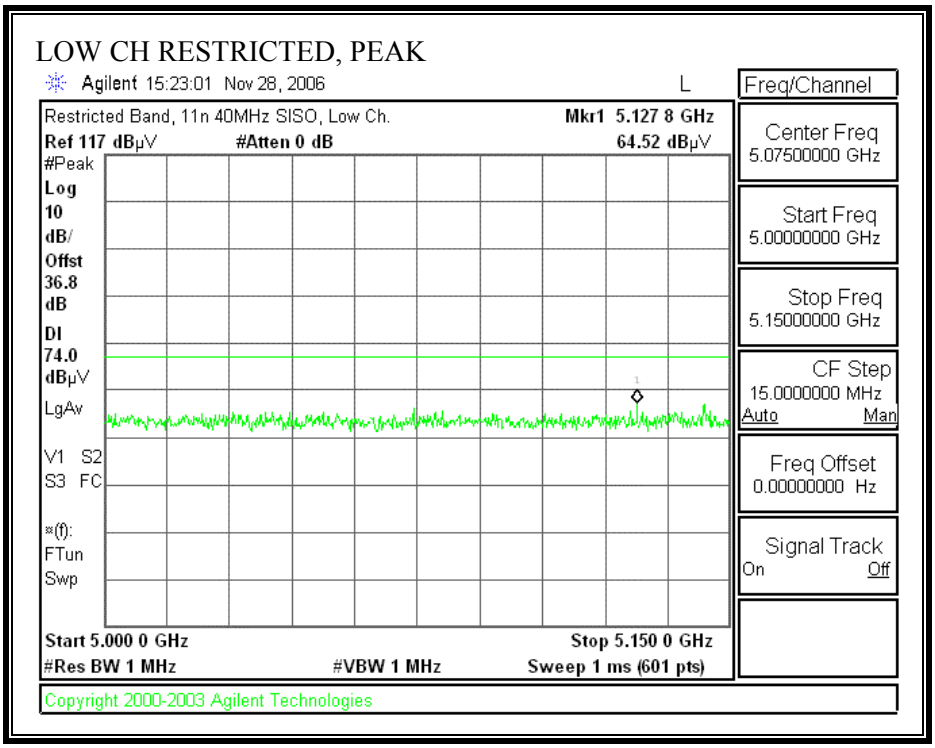
LOW CHANNEL, 5190 MHz - VERTICAL)



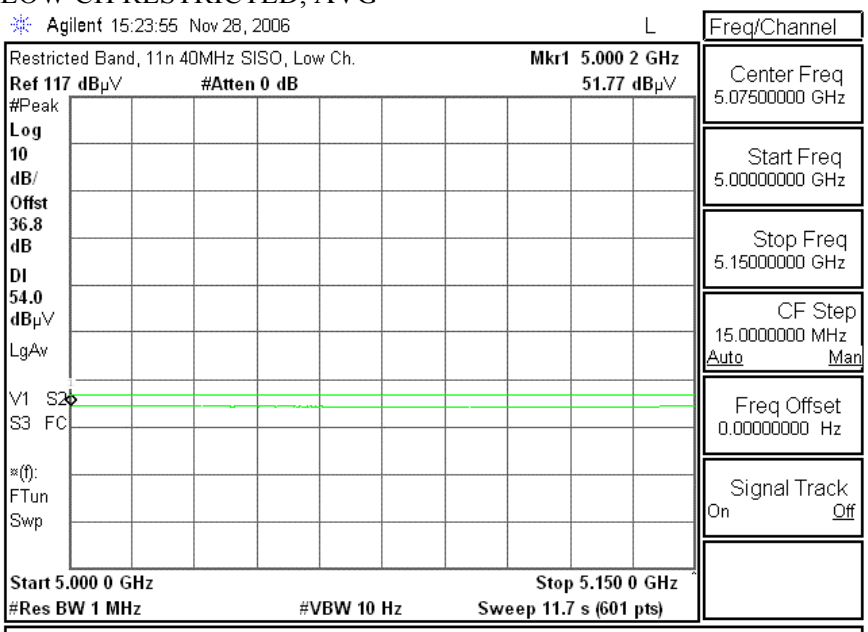
LOW CH RESTRICTED, AVG



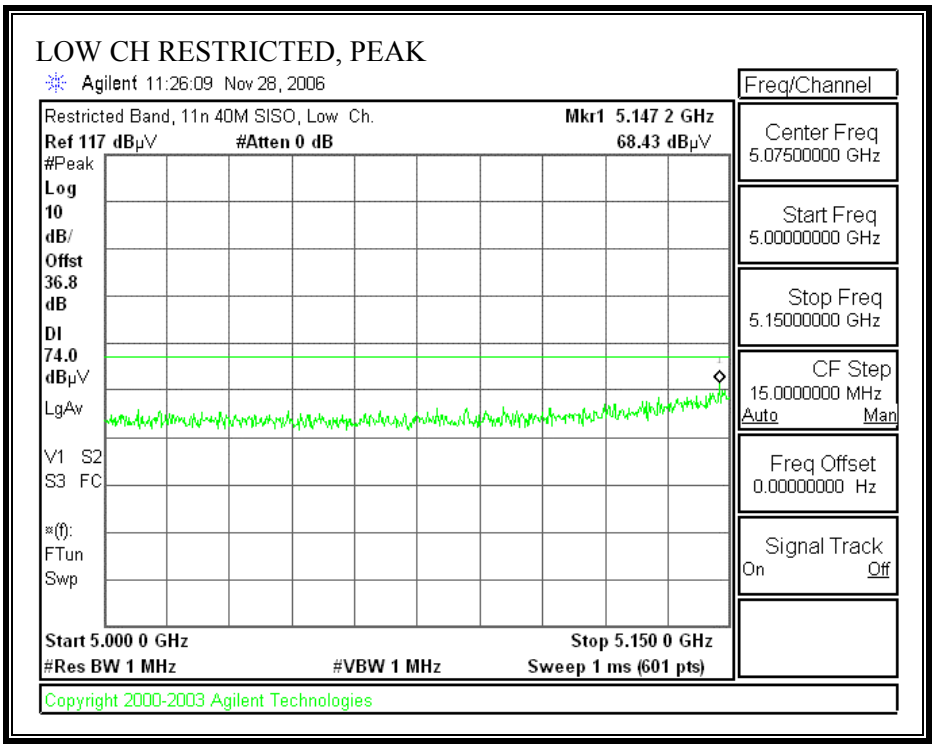
LOW CHANNEL, 5230 MHz - HORIZONTAL)



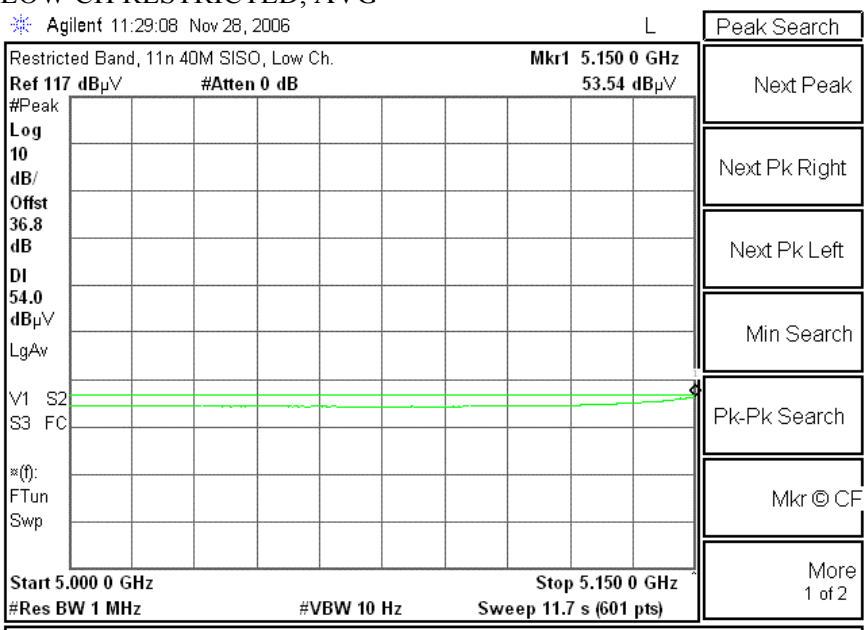
LOW CH RESTRICTED, AVG



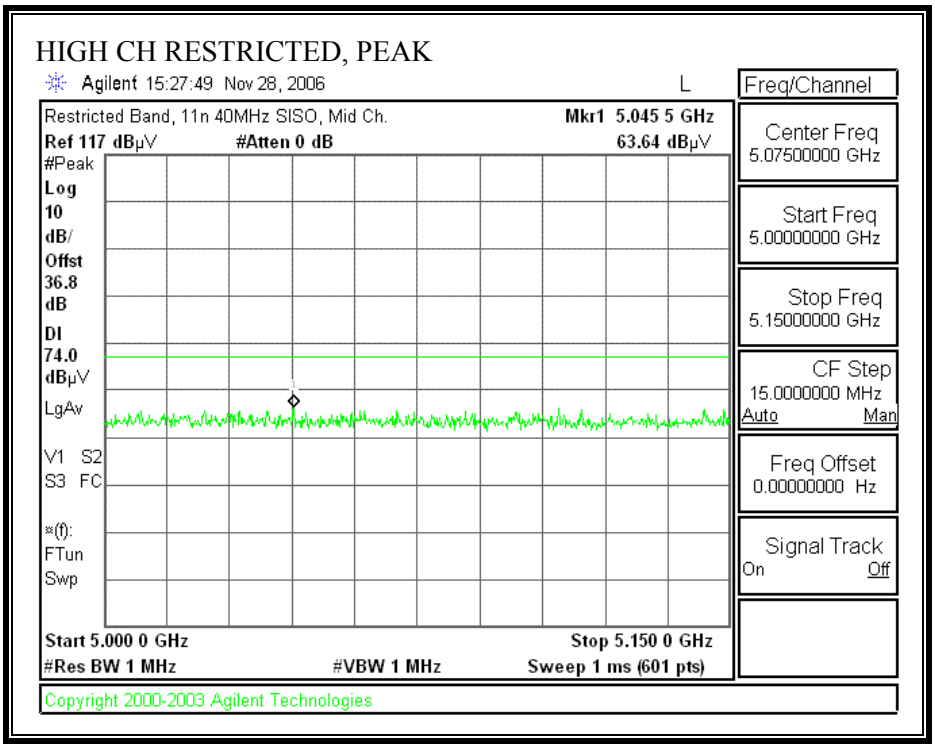
LOW CHANNEL, 5230 MHz - VERTICAL)



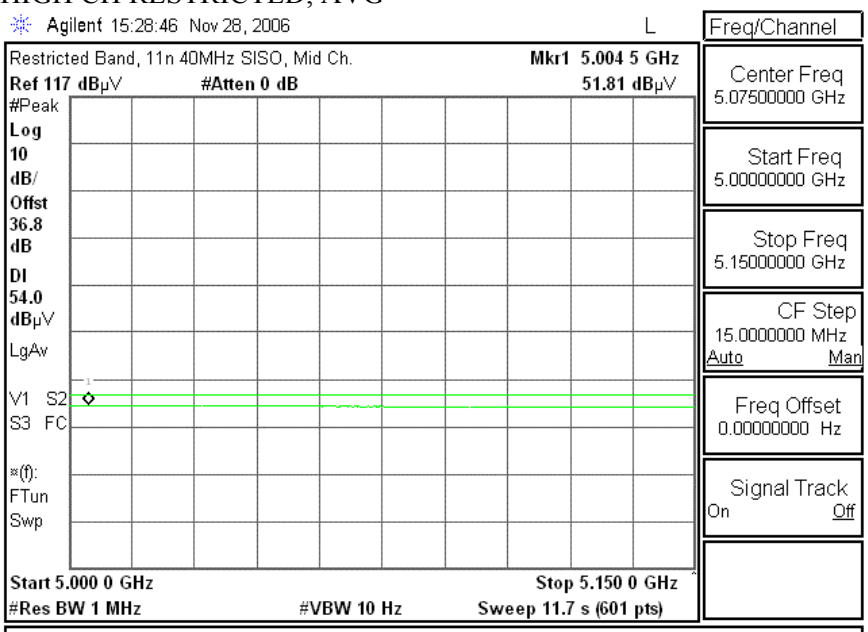
LOW CH RESTRICTED, AVG



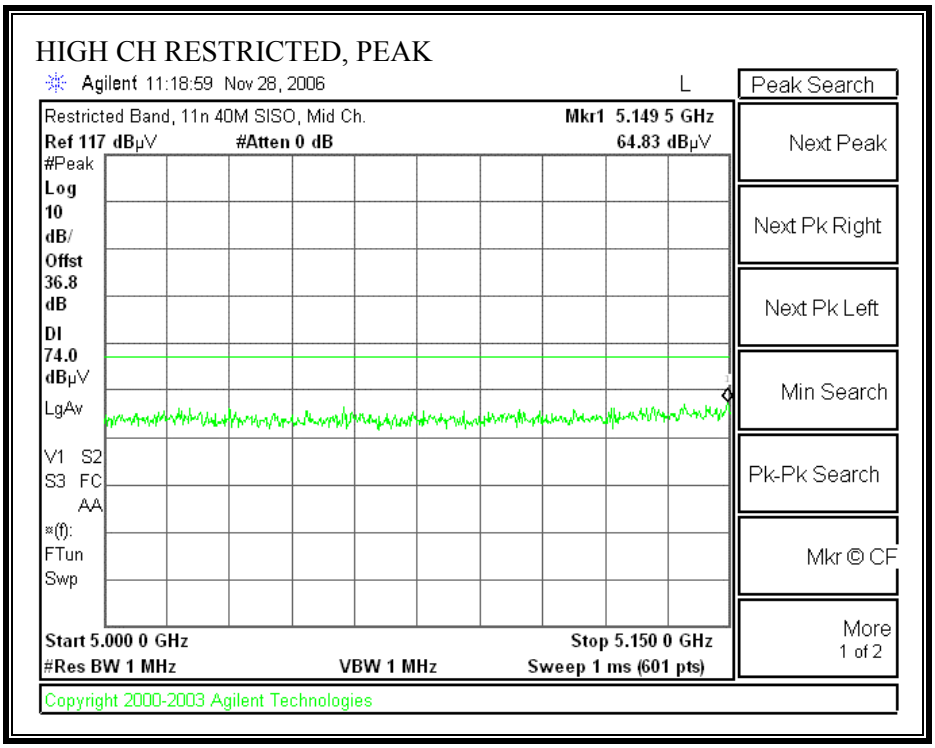
HIGH CHANNEL, 5270 MHz - HORIZONTAL)



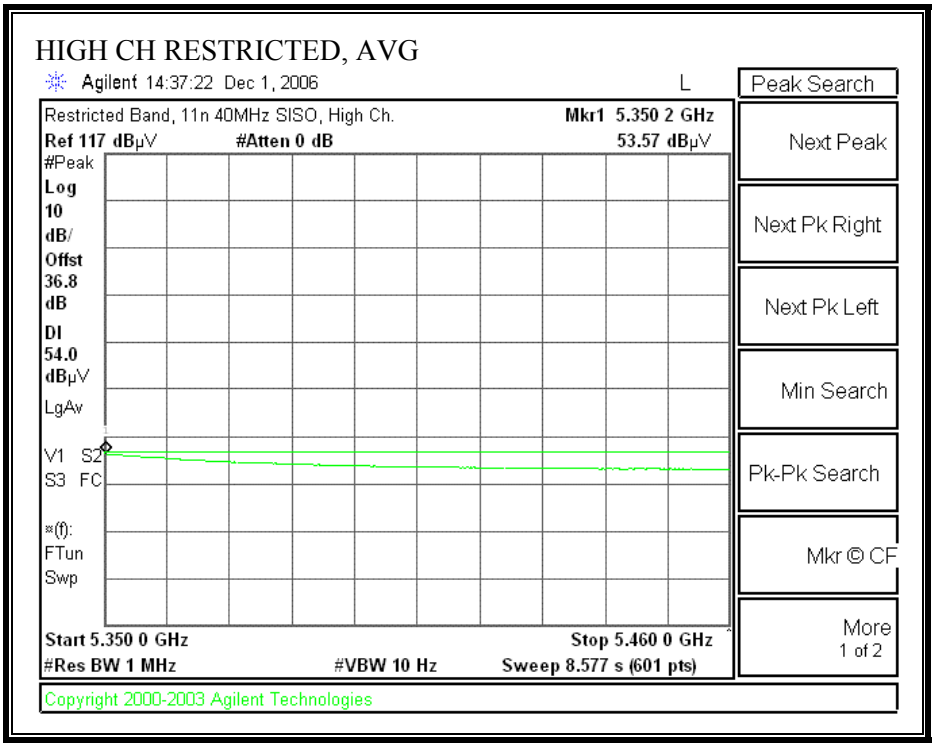
HIGH CH RESTRICTED, AVG



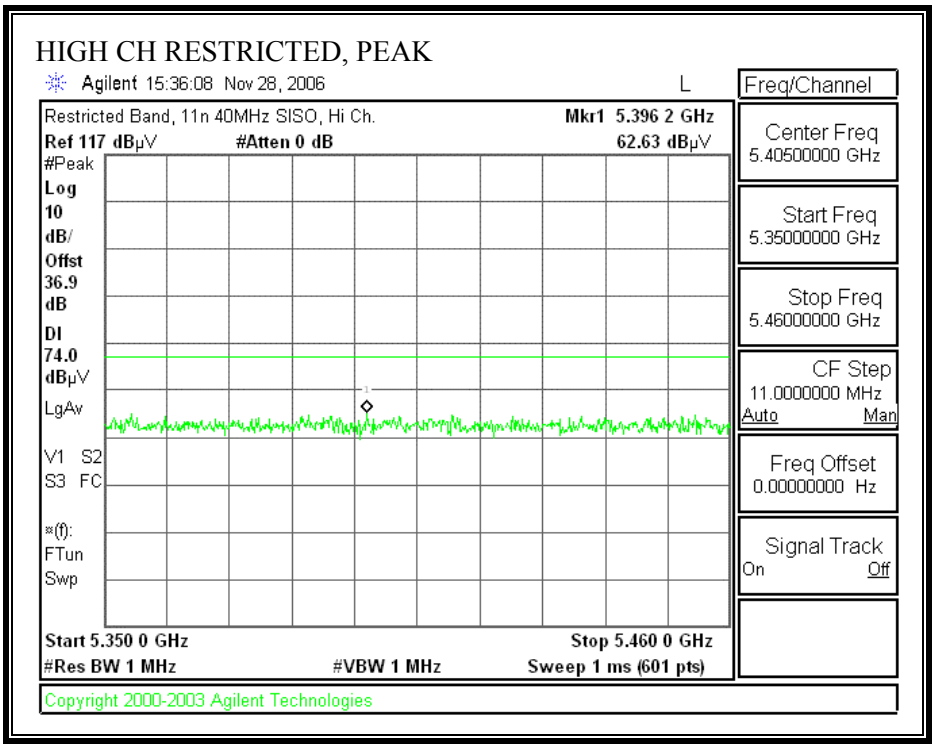
HIGH CHANNEL, 5270 MHz - VERTICAL)



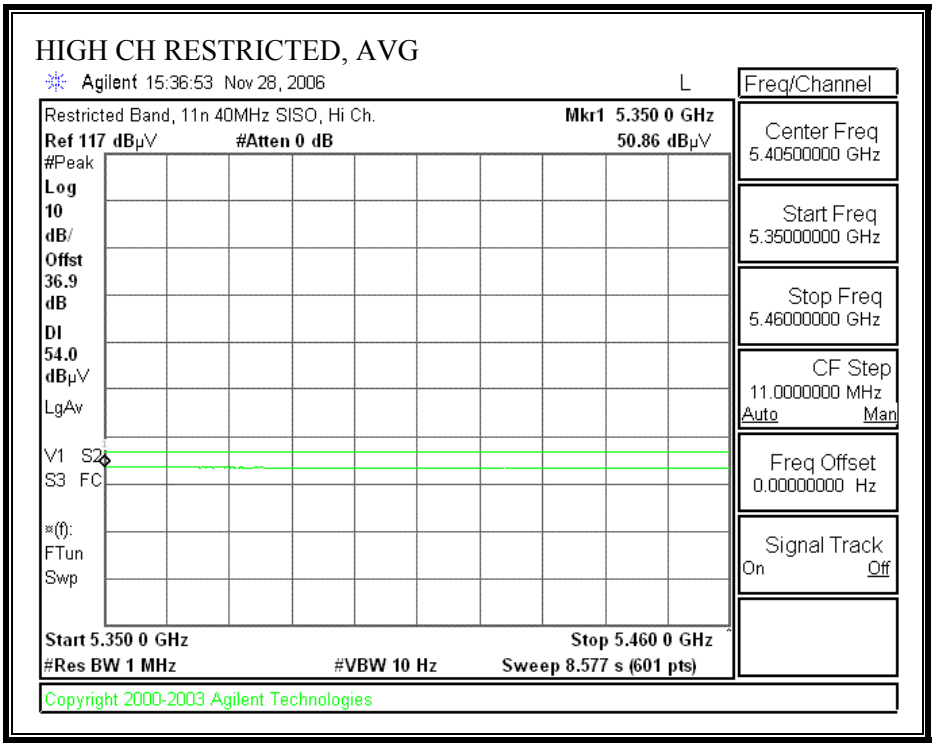
HIGH CH RESTRICTED, AVG



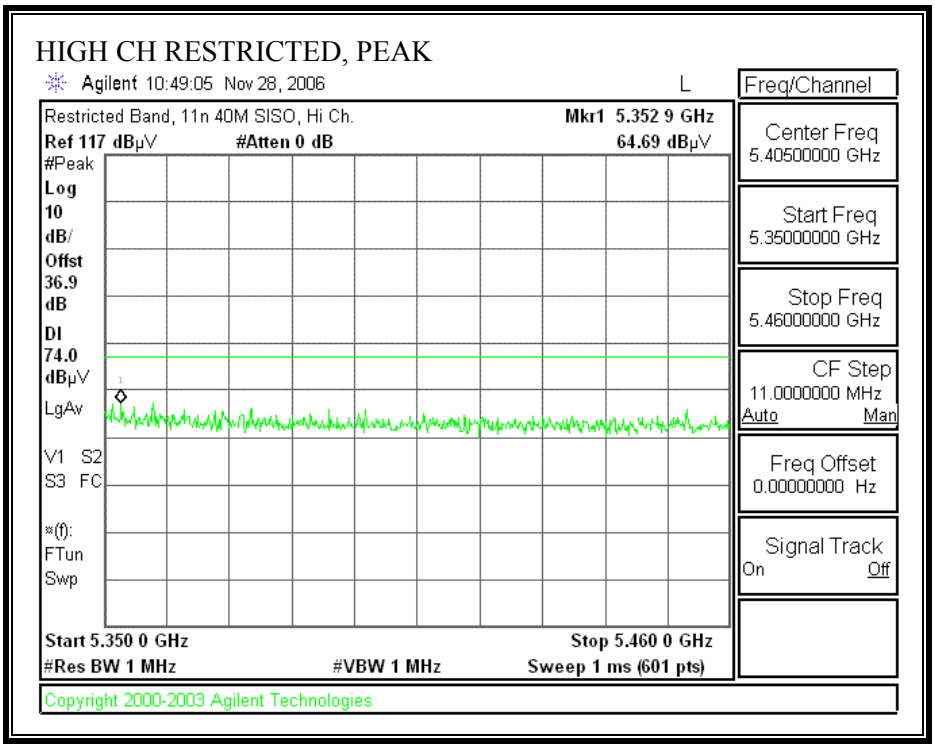
HIGH CHANNEL, 5310 MHz - HORIZONTAL)



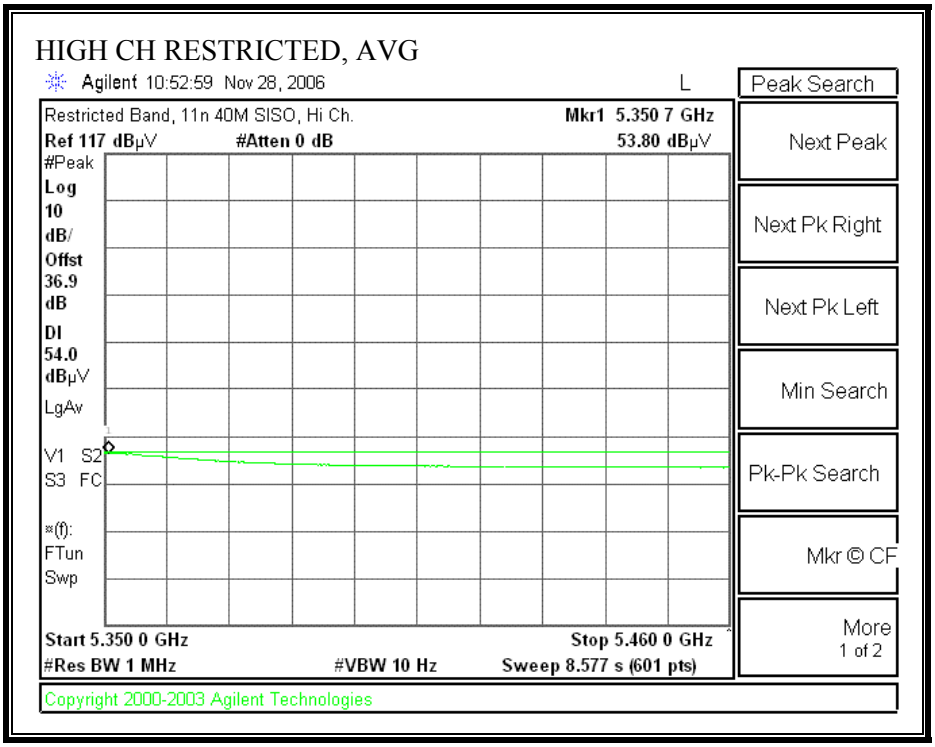
HIGH CH RESTRICTED, AVG



HIGH CHANNEL, 5310 MHz - VERTICAL)



HIGH CH RESTRICTED, AVG



802.11n 40 MHz SISO MODE

HARMONICS AND SPURIOUS EMISSIONS (802.11n 40 MHz SISO MODE)

High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Company: Broadcom
Project #: 06U10708
Date: 11/28/06
Test Engineer: Vien Tran
Configuration: EUT & Antenna
Mode: Tx_5.2GHz Band_ 11n 40 MHz SISO

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
Vien 177079005		Vien 197209005	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
CH 38, 5190 MHz															
15.570	3.0	46.5	35.6	39.0	5.8	-34.8	0.0	0.7	57.2	46.3	74	54	-16.8	-7.7	H
15.570	3.0	44.3	34.3	39.0	5.8	-34.8	0.0	0.7	55.0	45.0	74	54	-19.0	-9.0	V
CH 54, 5270 MHz															
15.810	3.0	47.5	36.4	39.2	5.9	-34.6	0.0	0.7	58.6	47.5	74	54	-15.4	-6.5	H
15.810	3.0	45.8	34.7	39.2	5.9	-34.6	0.0	0.7	56.9	45.8	74	54	-17.1	-8.2	V
CH 62, 5310 MHz															
10.620	3.0	59.7	47.2	37.5	4.8	-36.6	0.0	0.8	66.2	53.7	74	54	-7.8	-0.3	H
15.930	3.0	47.4	36.8	39.2	5.9	-34.5	0.0	0.7	58.7	48.1	74	54	-15.3	-5.9	H
10.620	3.0	58.3	44.4	37.5	4.8	-36.6	0.0	0.8	64.8	50.9	74	54	-9.2	-3.1	V
15.930	3.0	46.7	35.8	39.2	5.9	-34.5	0.0	0.7	58.0	47.1	74	54	-16.0	-6.9	V
			No other emissions were detected above system noise floor												

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

MIMO MODE

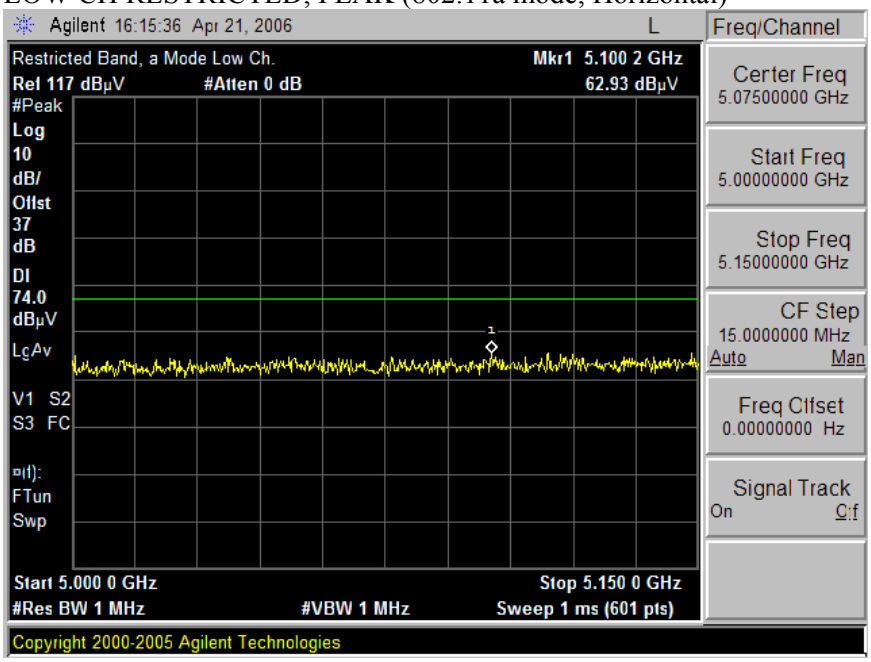
7.5.3. TRANSMITTER ABOVE 1 GHZ FOR 5150 TO 5350 MHz BAND

802.11a CDD is covered by worst case 802.11n 20 MHz CDD MCS 0

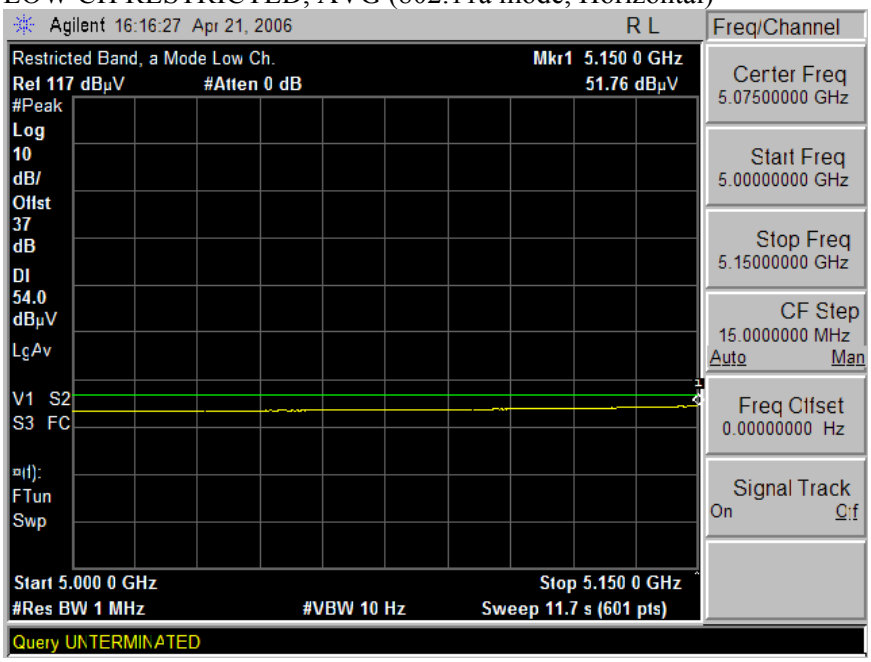
802.11n 20 MHz CDD MCS 0

RESTRICTED BANDEDGE (LOW CHANNEL, 5180 MHz - HORIZONTAL)

LOW CH RESTRICTED, PEAK (802.11a mode, Horizontal)

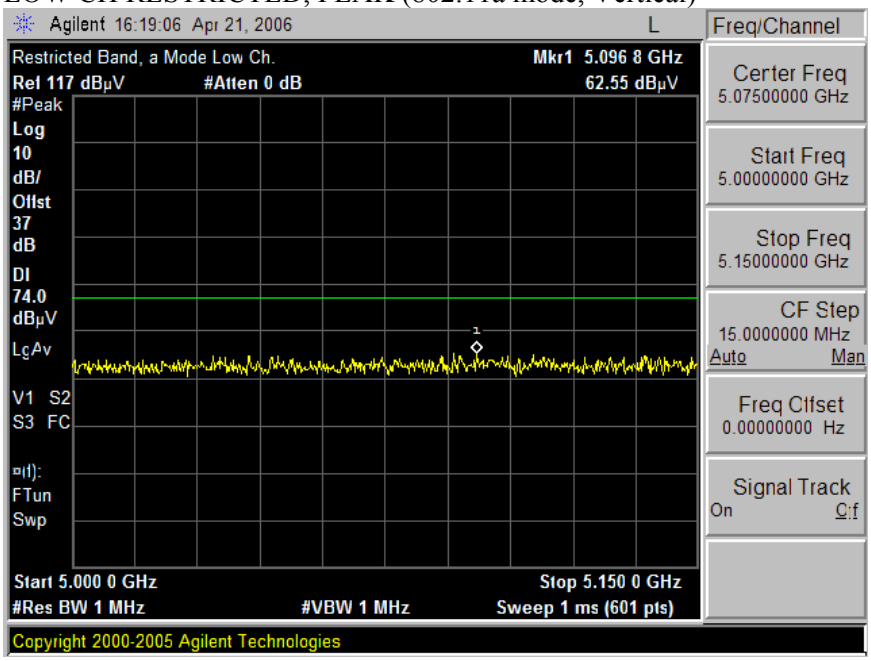


LOW CH RESTRICTED, AVG (802.11a mode, Horizontal)

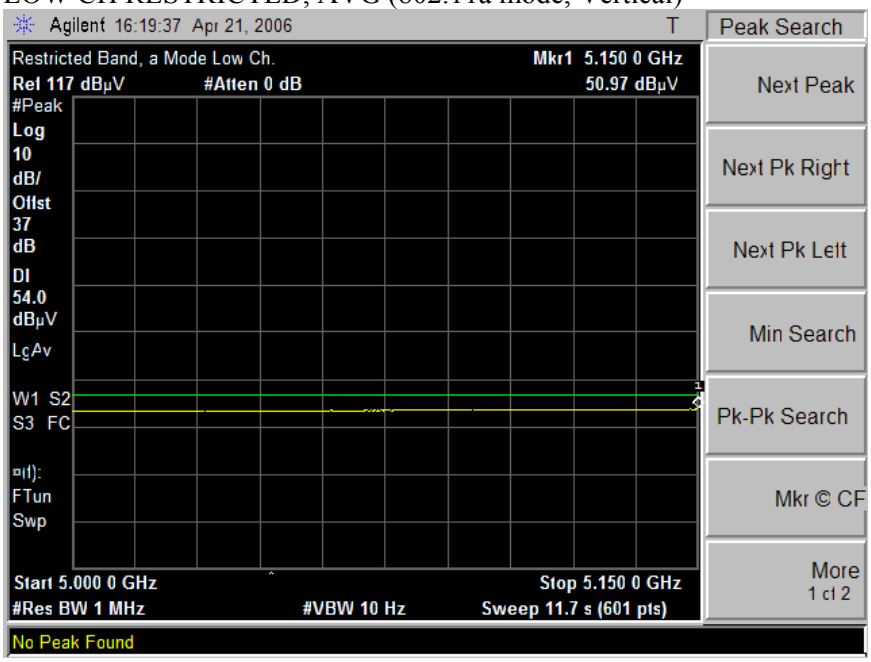


RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, 5180 MHz - VERTICAL)

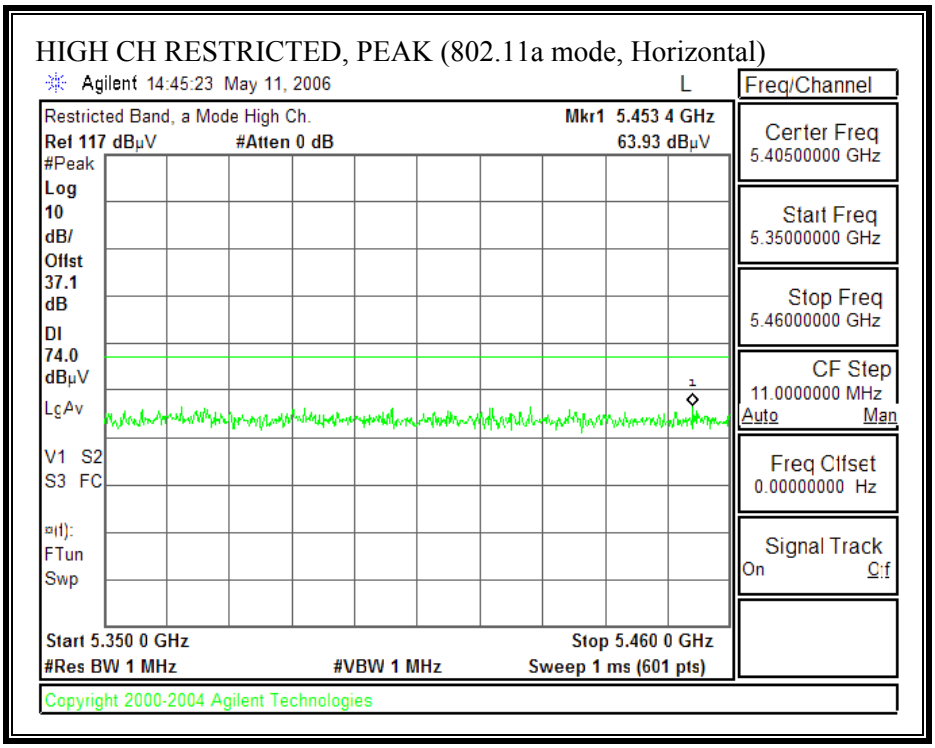
LOW CH RESTRICTED, PEAK (802.11a mode, Vertical)



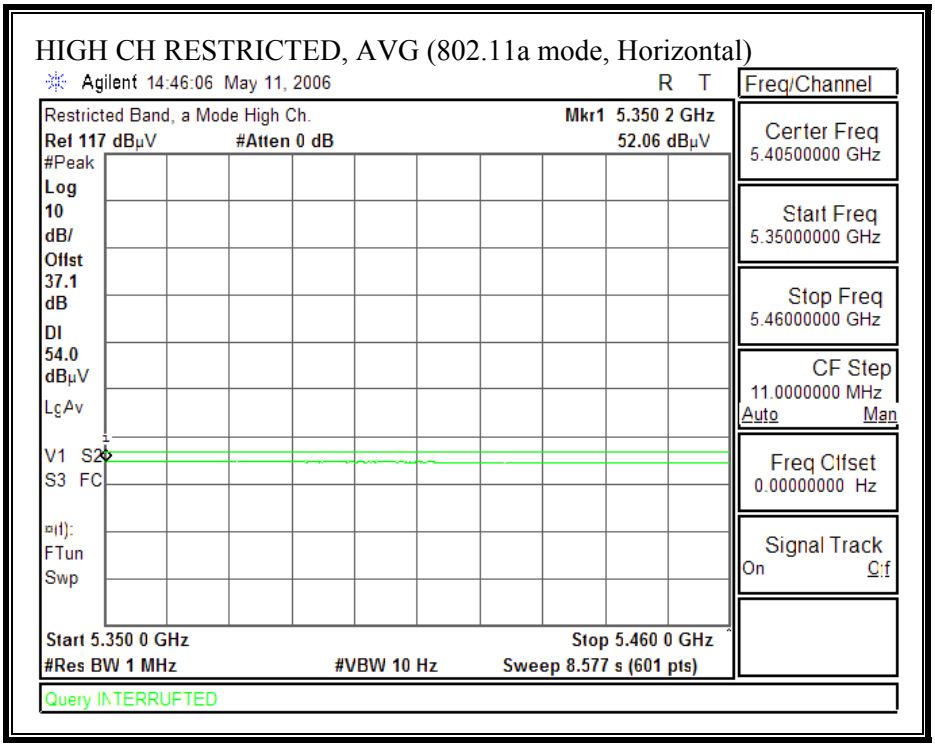
LOW CH RESTRICTED, AVG (802.11a mode, Vertical)



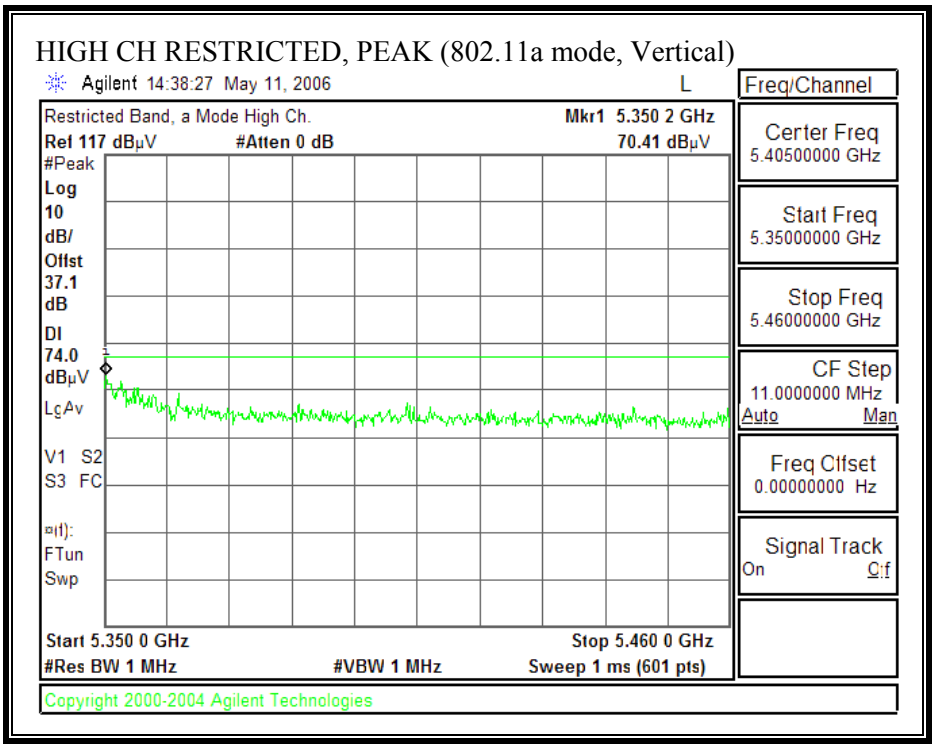
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, 5320 MHz - HORIZONTAL)



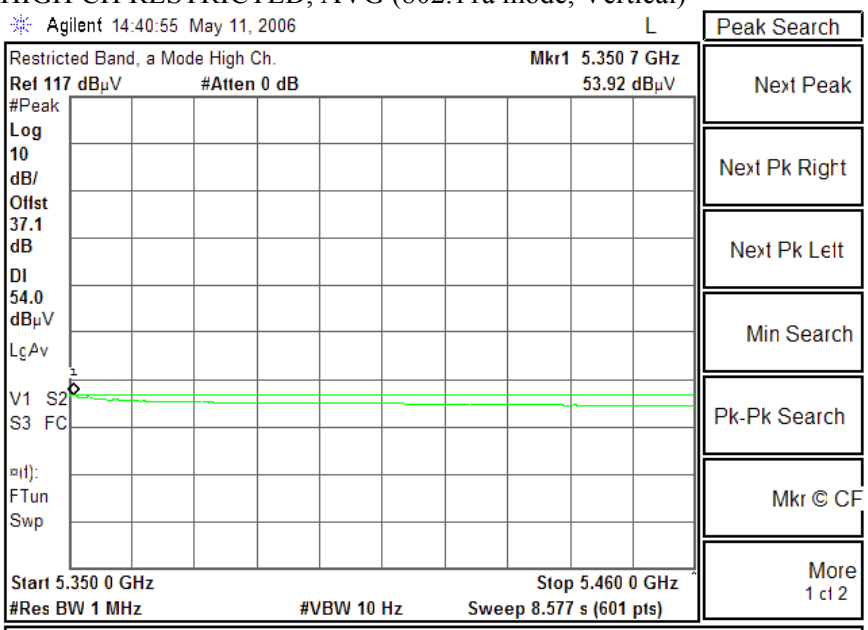
HIGH CH RESTRICTED, AVG (802.11a mode, Horizontal)



RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, 5320 MHz - VERTICAL)



HIGH CH RESTRICTED, AVG (802.11a mode, Vertical)



HARMONICS AND SPURIOUS EMISSIONS)20 MHz TX BANDWIDTH)

High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Company: Broadcom
Project #: 06U10233
Date: 05/10/06
Test Engineer: Vien Tran
Configuration: EUT (BCM94321MC, S/N 316)
Mode: MIMO 20MHz Tx BW 11a Mode_5.2 GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Vien 187215002	Vien 197209005	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

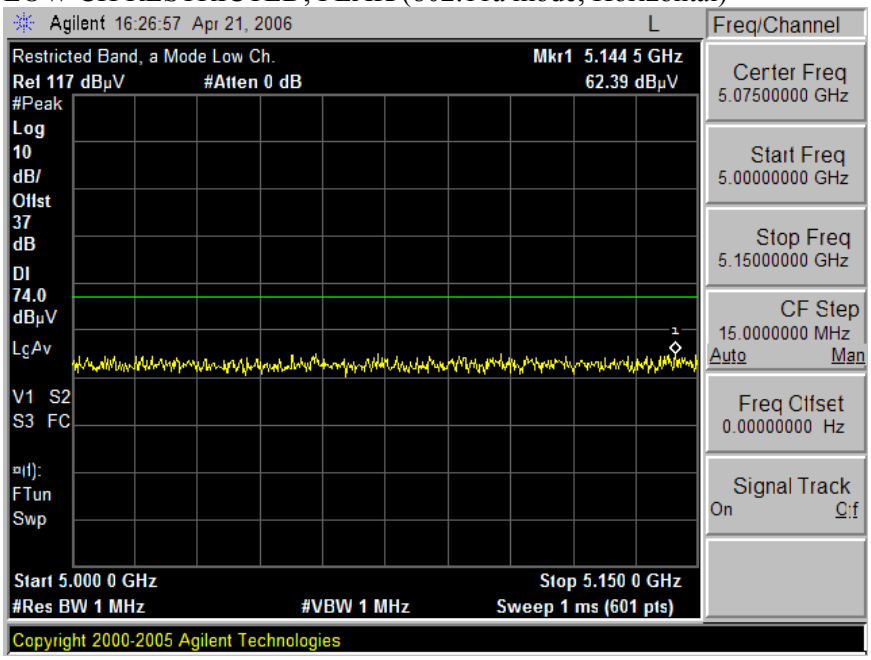
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CH, 5180 MHz															
10.360	3.0	59.1	43.1	37.0	4.7	-36.8	0.0	0.8	64.8	48.8	74	54	-9.2	-5.2	V
15.540	3.0	43.7	34.4	38.1	5.8	-34.8	0.0	0.7	53.4	44.1	74	54	-20.6	-9.9	V
10.360	3.0	55.5	40.3	37.0	4.7	-36.8	0.0	0.8	61.2	46.0	74	54	-12.8	-8.0	H
15.540	3.0	43.8	33.9	38.1	5.8	-34.8	0.0	0.7	53.5	43.6	74	54	-20.5	-10.4	H
MID CH, 5260 MHz															
10.520	3.0	55.6	41.2	37.1	4.7	-36.7	0.0	0.8	61.5	47.1	74	54	-12.5	-6.9	V
15.780	3.0	43.6	34.3	37.5	5.8	-34.6	0.0	0.7	53.0	43.7	74	54	-21.0	-10.3	V
10.520	3.0	53.8	39.8	37.1	4.7	-36.7	0.0	0.8	59.7	45.7	74	54	-14.3	-8.3	H
15.780	3.0	43.3	33.9	37.5	5.8	-34.6	0.0	0.7	52.7	43.3	74	54	-21.3	-10.7	H
HI CH, 5320 MHz															
10.640	3.0	55.1	40.9	37.1	4.8	-36.6	0.0	0.8	61.1	46.9	74	54	-12.9	-7.1	V
15.960	3.0	43.2	33.7	37.1	5.9	-34.5	0.0	0.7	52.4	42.9	74	54	-21.6	-11.1	V
10.640	3.0	53.8	40.5	37.1	4.8	-36.6	0.0	0.8	59.8	46.5	74	54	-14.2	-7.5	H
15.960	3.0	43.5	34.2	37.1	5.9	-34.5	0.0	0.7	52.7	43.4	74	54	-21.3	-10.6	H
No other emissions were detected above system noise floor.															

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

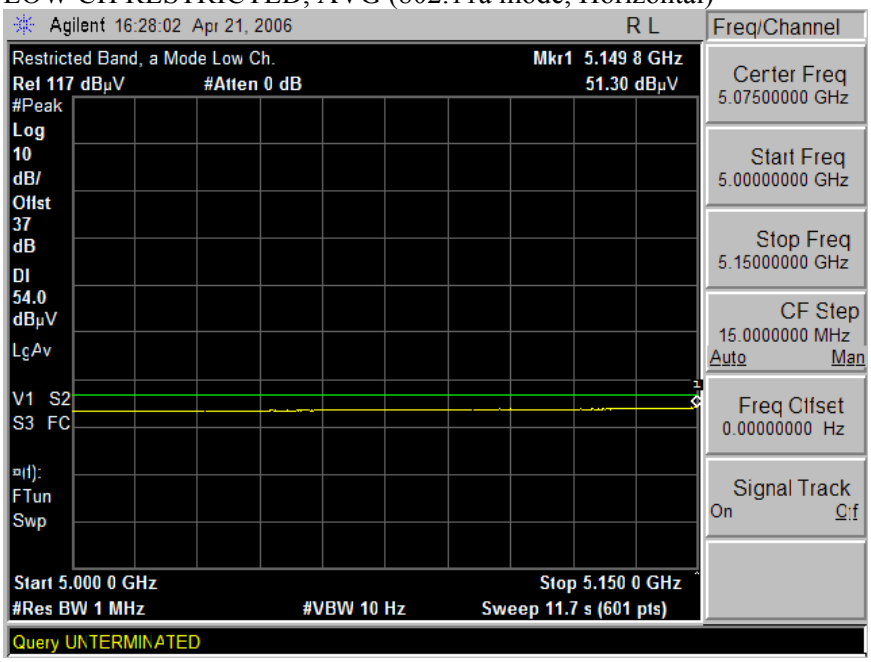
802.11n 40 MHz CDD MCS 32

RESTRICTED BANDEDGE (LOW CHANNEL, 5190 MHz - HORIZONTAL)

LOW CH RESTRICTED, PEAK (802.11a mode, Horizontal)

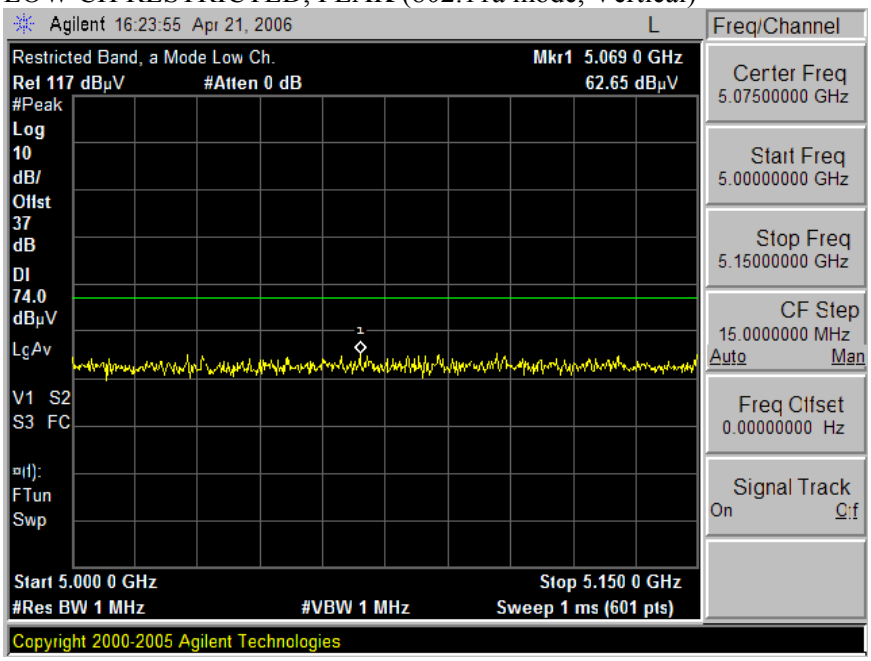


LOW CH RESTRICTED, AVG (802.11a mode, Horizontal)

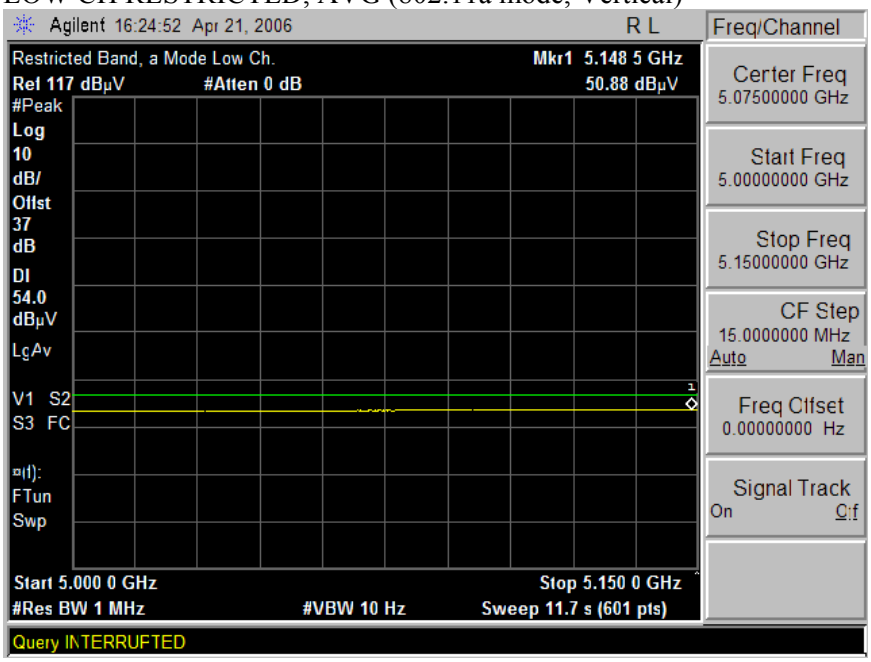


RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, 5190 MHz - VERTICAL)

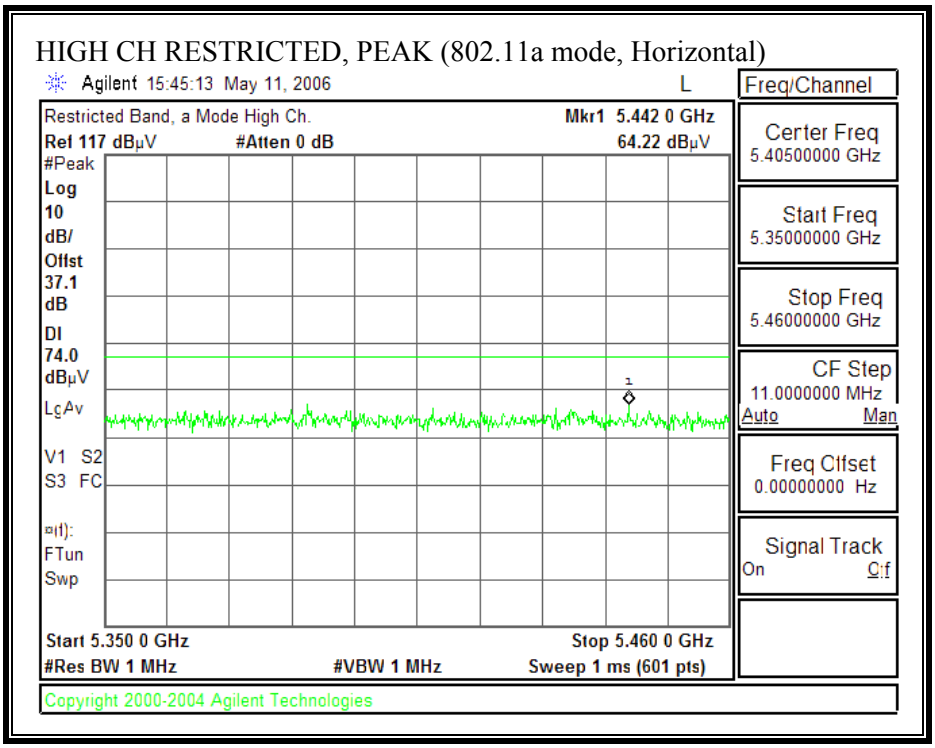
LOW CH RESTRICTED, PEAK (802.11a mode, Vertical)



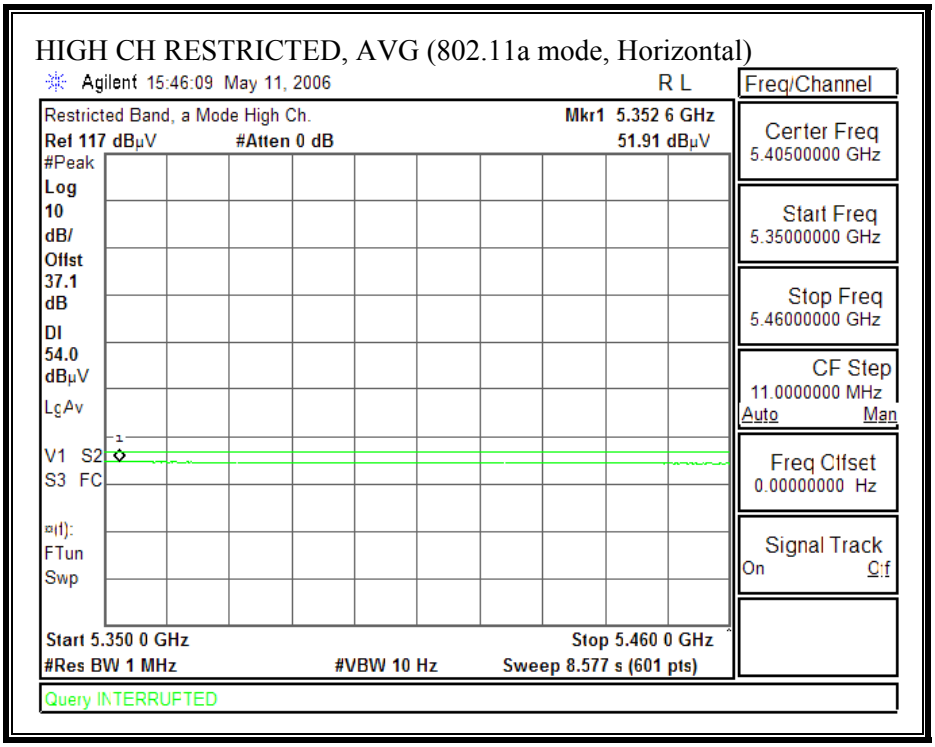
LOW CH RESTRICTED, AVG (802.11a mode, Vertical)



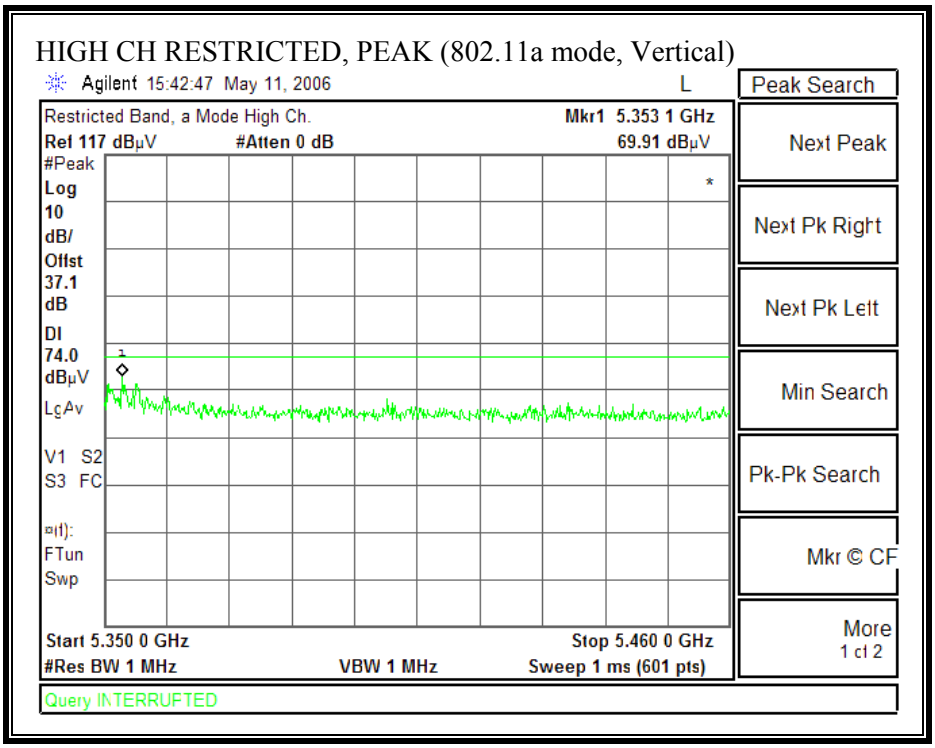
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, 5310 MHz - HORIZONTAL)



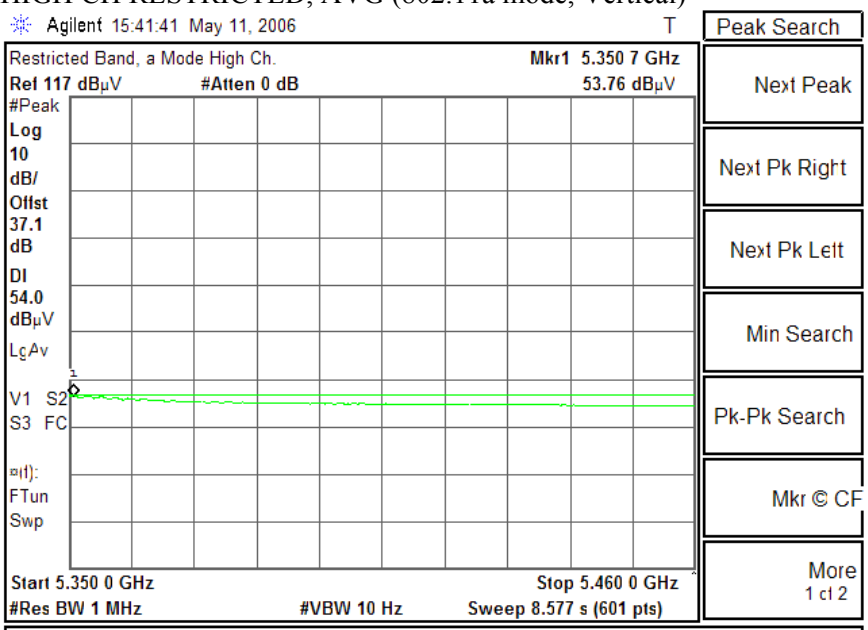
HIGH CH RESTRICTED, AVG (802.11a mode, Horizontal)



RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, 5310 MHz - VERTICAL)



HIGH CH RESTRICTED, AVG (802.11a mode, Vertical)



802.11n 40 MHz CDD MCS 32

HARMONICS AND SPURIOUS EMISSIONS (40 MHz BANDWIDTH)

High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Company: Broadcom
Project #: 06U10233
Date: 05/12/06
Test Engineer: Vien Tran
Configuration: EUT (BCM94321MC, S/N 316)
Mode: MIMO 40MHz Tx BW 11a Mode_5.2 GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Vien 187215002	Vien 197209005	HPF_7.6GHz	

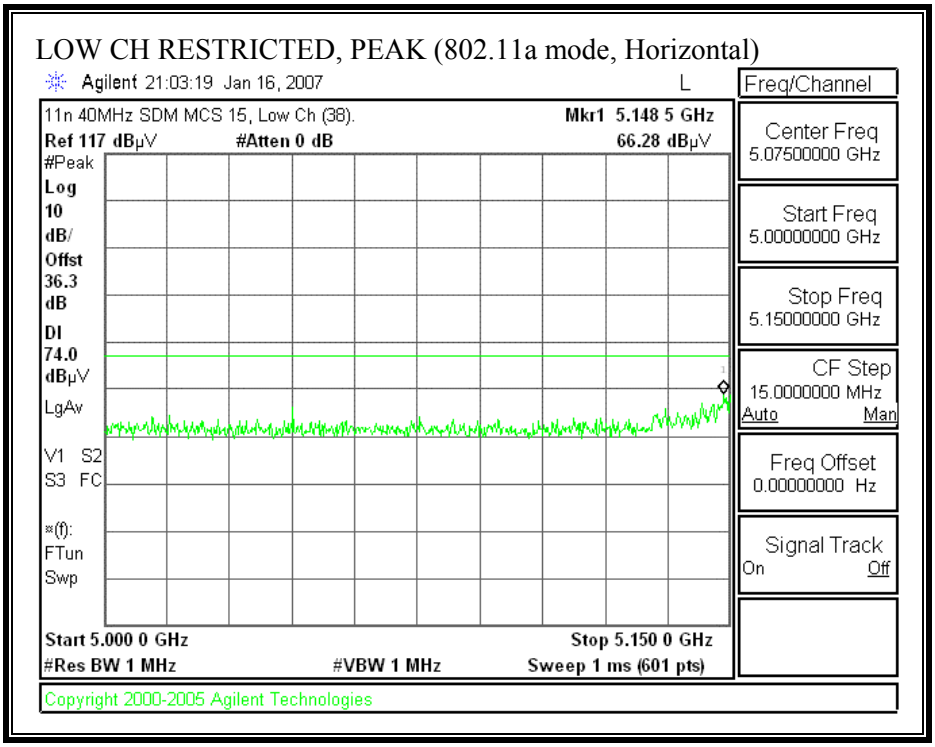
Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Ch 38, 5190 MHz															
10.380	3.0	56.3	43.9	37.9	4.7	-36.8	0.0	0.8	62.9	50.5	74	54	-11.1	-3.5	V
15.570	3.0	44.9	34.3	39.5	5.8	-34.8	0.0	0.7	56.1	45.5	74	54	-17.9	-8.5	V, Noise Floor
10.380	3.0	54.9	43.1	37.9	4.7	-36.8	0.0	0.8	61.5	49.7	74	54	-12.5	-4.3	H
15.570	3.0	46.7	34.0	39.5	5.8	-34.8	0.0	0.7	57.9	45.2	74	54	-16.1	-8.8	H, Noise Floor
Ch 54, 5270 MHz															
10.540	3.0	56.9	45.3	37.9	4.7	-36.7	0.0	0.8	63.7	52.1	74	54	-10.3	-1.9	V
15.810	3.0	45.5	34.3	39.1	5.8	-34.6	0.0	0.7	56.5	45.3	74	54	-17.5	-8.7	V, Noise Floor
10.540	3.0	55.5	44.9	37.9	4.7	-36.7	0.0	0.8	62.3	51.7	74	54	-11.7	-2.3	H
15.810	3.0	45.0	34.2	39.1	5.8	-34.6	0.0	0.7	56.0	45.2	74	54	-18.0	-8.8	H, Noise Floor
Ch 62, 5310 MHz															
10.620	3.0	55.3	43.5	38.0	4.8	-36.6	0.0	0.8	62.2	50.4	74	54	-11.8	-3.6	V
15.930	3.0	44.4	34.1	38.9	5.9	-34.5	0.0	0.7	55.4	45.1	74	54	-18.6	-8.9	V, Noise Floor
10.620	3.0	55.0	43.0	38.0	4.8	-36.6	0.0	0.8	61.9	49.9	74	54	-12.1	-4.1	H
15.930	3.0	43.0	33.4	38.9	5.9	-34.5	0.0	0.7	54.0	44.4	74	54	-20.0	-9.6	H, Noise Floor
1/3 & 2/3 of Fundamental															
1.600	3.0	52.2	38.3	25.9	2.2	-38.6	0.0	0.0	41.7	27.8	74	54	-32.3	-26.2	V
3.530	3.0	44.8	34.2	31.6	2.6	-37.0	0.0	0.0	42.0	31.4	74	54	-32.0	-22.6	V
1.600	3.0	49.0	38.0	25.9	2.2	-38.6	0.0	0.0	38.5	27.5	74	54	-35.5	-26.5	H
3.530	3.0	43.5	34.0	31.6	2.6	-37.0	0.0	0.0	40.7	31.2	74	54	-33.3	-22.8	H
Note: No other emissions were detected above the noise floor															

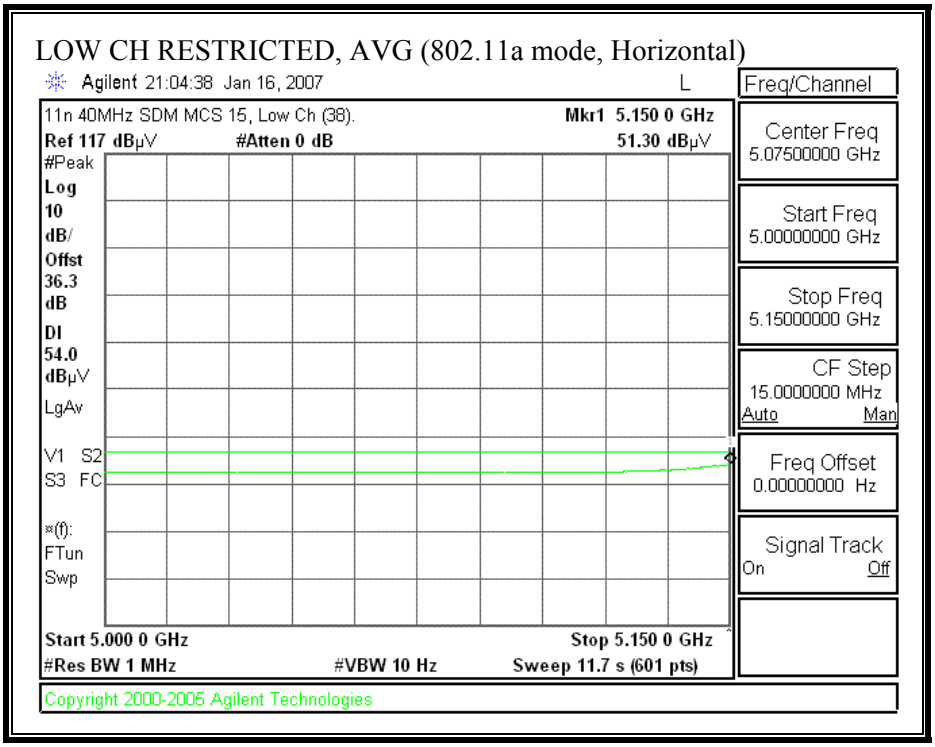
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

802.11n 40 MHz SDM MCS 15

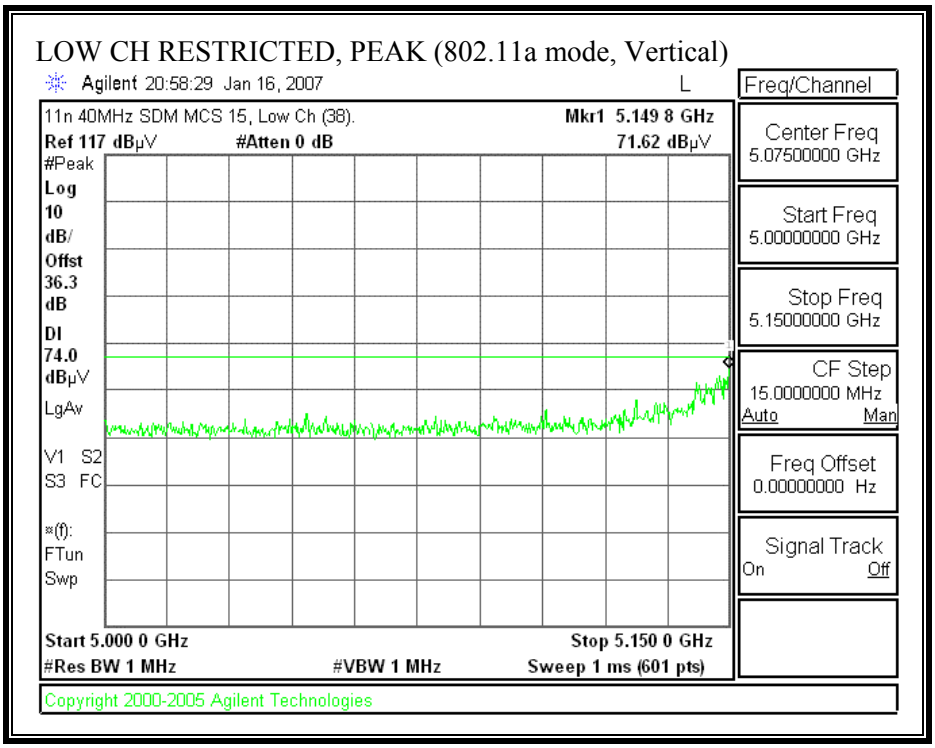
RESTRICTED BANDEDGE (LOW CHANNEL, 5190 MHz - HORIZONTAL)



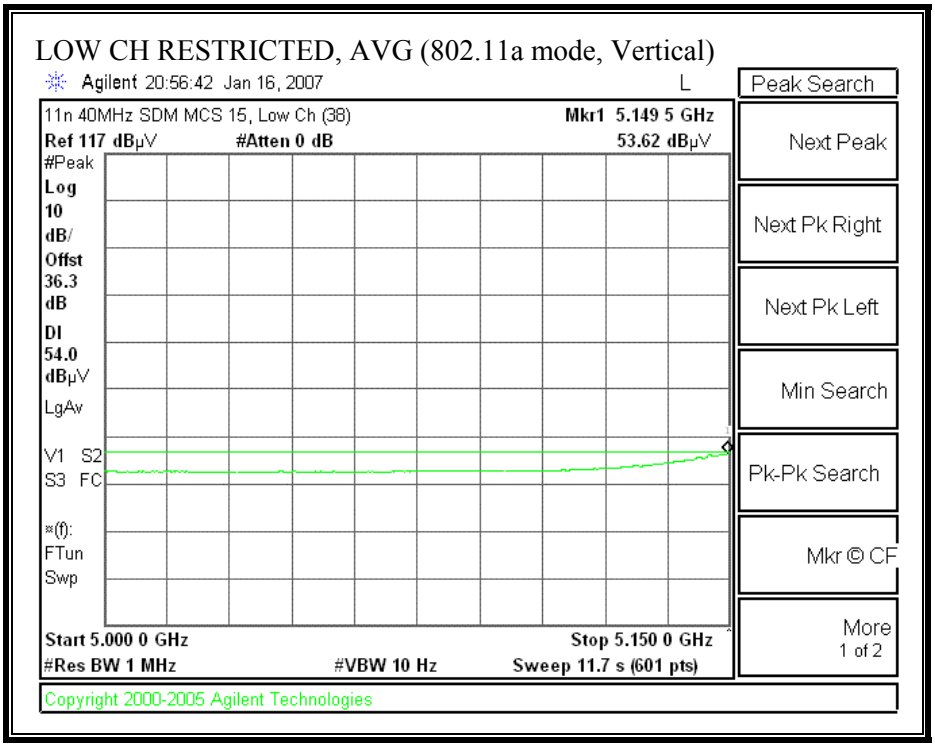
LOW CH RESTRICTED, AVG (802.11a mode, Horizontal)



RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, 5190 MHz - VERTICAL)



LOW CH RESTRICTED, AVG (802.11a mode, Vertical)



802.11n 40 MHz SDM MCS 15

HARMONICS AND SPURIOUS EMISSIONS (802.11a – 40 MHz TX BANDWIDTH

High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Company: Broadcom
Project #: 06U10708
Date: 01/16/07
Test Engineer: Vien Tran
Configuration: EUT
Mode: Tx_5.2GHz Band_ 11n 40 MHz SDM MCS 15

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T145 Agilent 3008A005(			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
Vien 177079005		Vien 197209005	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
CH 38, 5190 MHz															
10.380	3.0	52.6	41.8	37.4	4.8	-34.6	0.0	0.8	60.9	50.1	74	54	-13.1	-3.9	H
15.570	3.0	45.9	33.8	38.0	5.8	-32.3	0.0	0.7	58.2	46.1	74	54	-15.8	-7.9	H
10.520	3.0	50.7	37.4	37.4	4.8	-34.4	0.0	0.8	59.2	45.9	74	54	-14.8	-8.1	V
15.780	3.0	43.7	32.2	37.9	5.9	-32.2	0.0	0.7	55.9	44.4	74	54	-18.1	-9.6	V
			No other emissions were detected above system noise floor												

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

5470 TO 57250 MHz BAND

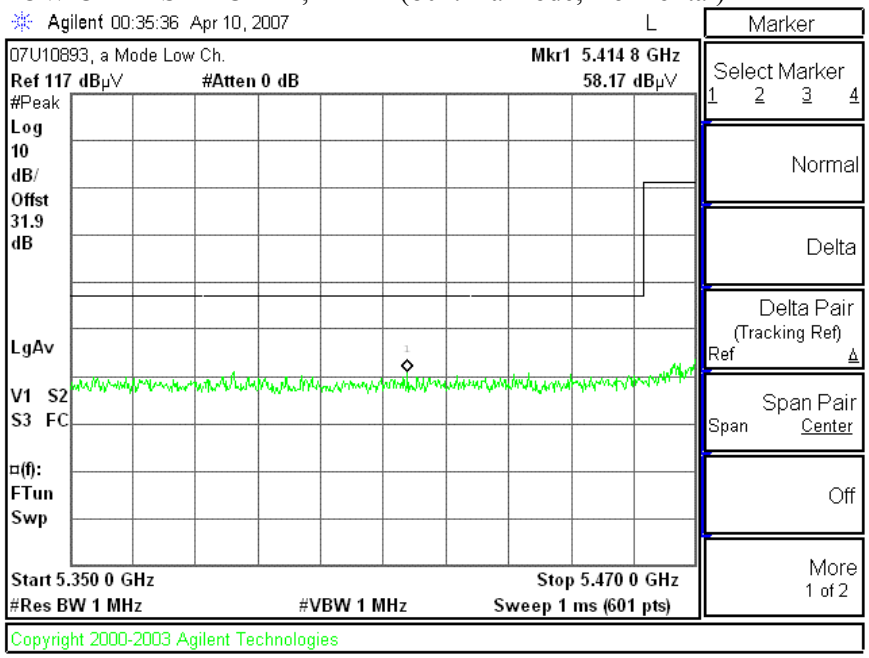
LEGACY MODE

7.5.4. TRANSMITTER ABOVE 1 GHz FOR 5470 TO 5725 MHz BAND

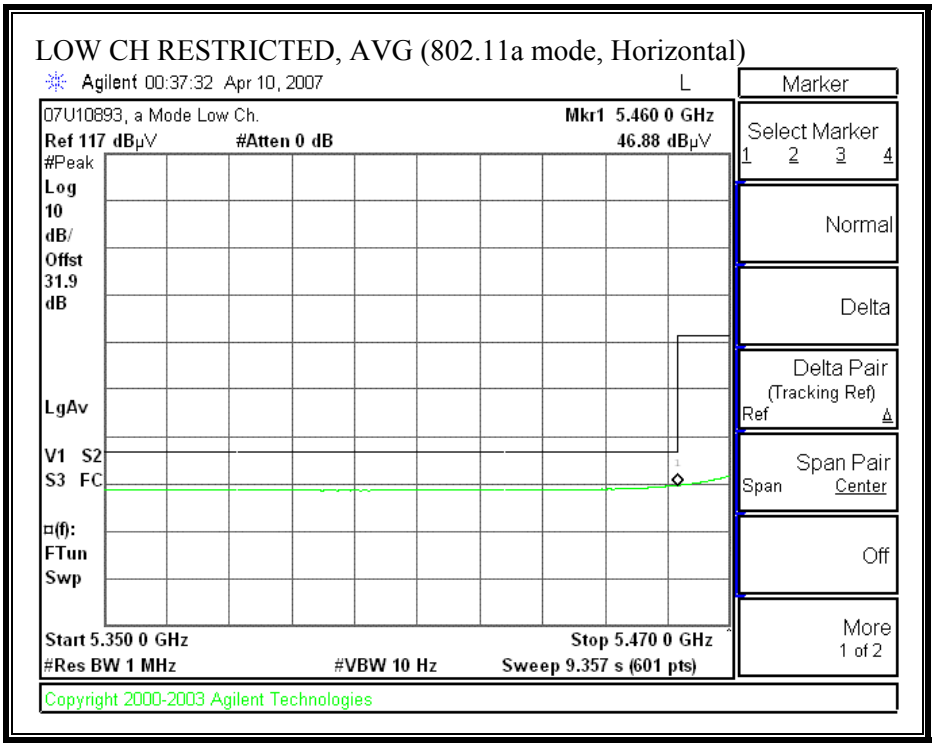
802.11a MODE

RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, 5500 MHz - HORIZONTAL)

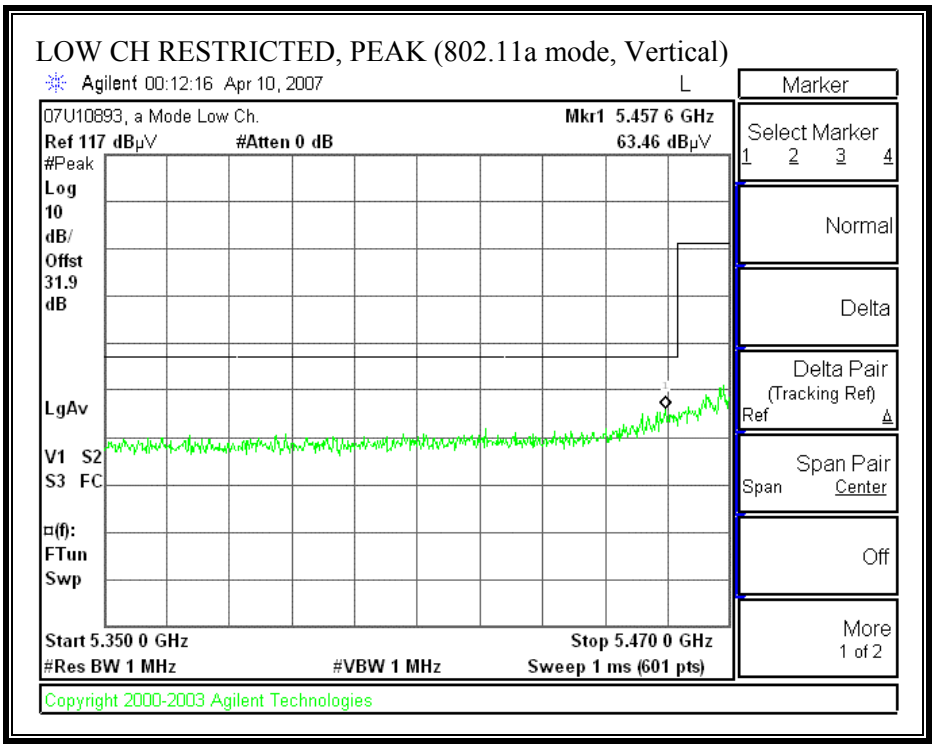
LOW CH RESTRICTED, PEAK (802.11a mode, Horizontal)



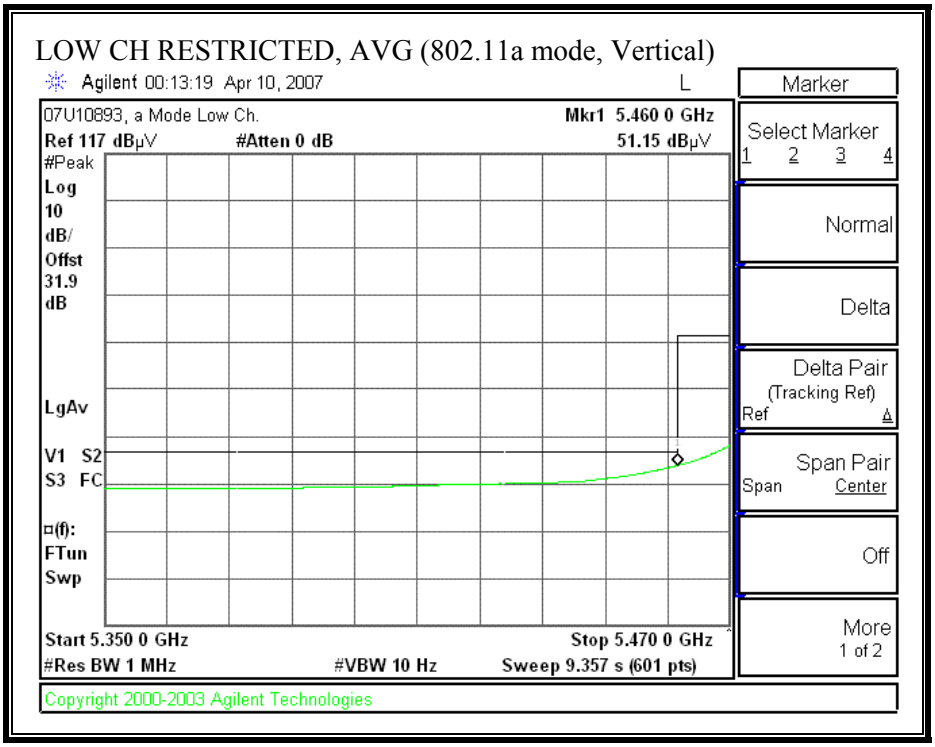
LOW CH RESTRICTED, AVG (802.11a mode, Horizontal)



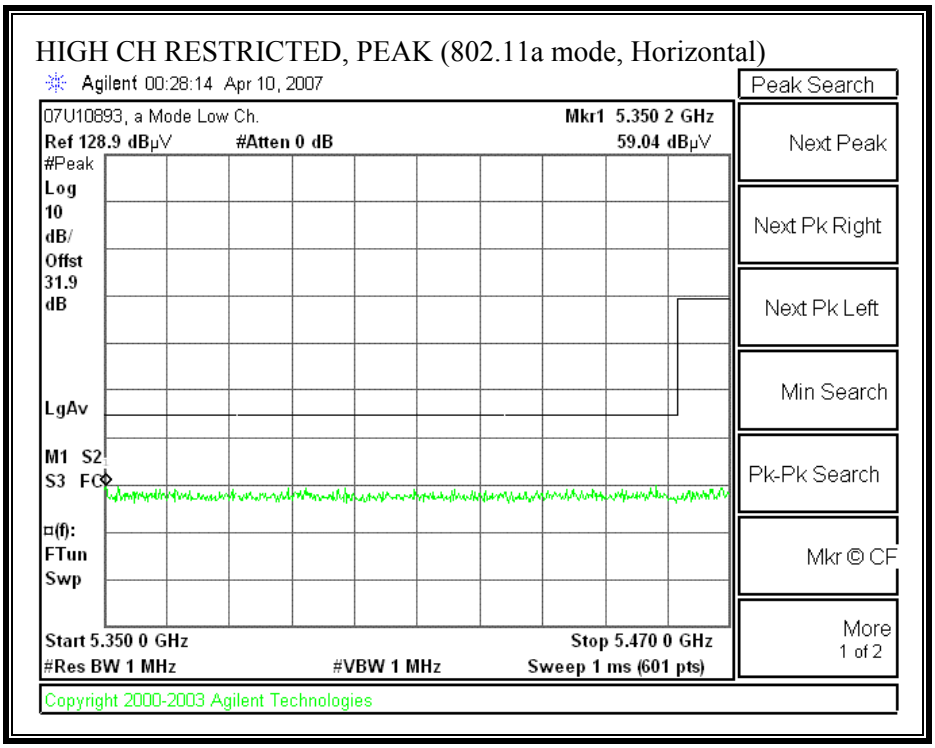
RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, 5500 MHz - VERTICAL)



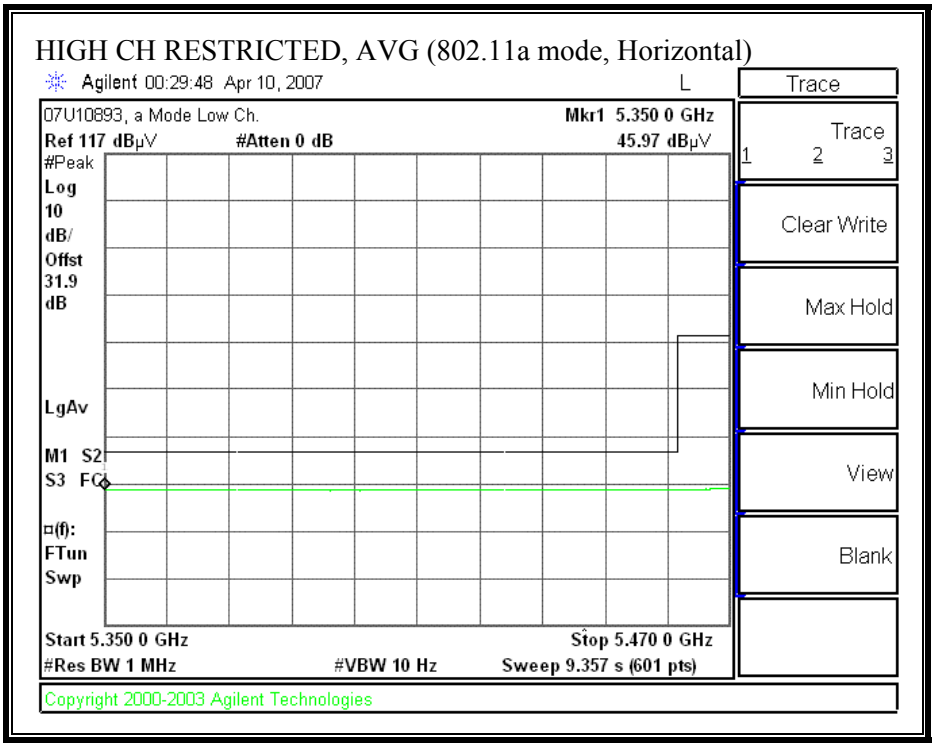
LOW CH RESTRICTED, AVG (802.11a mode, Vertical)



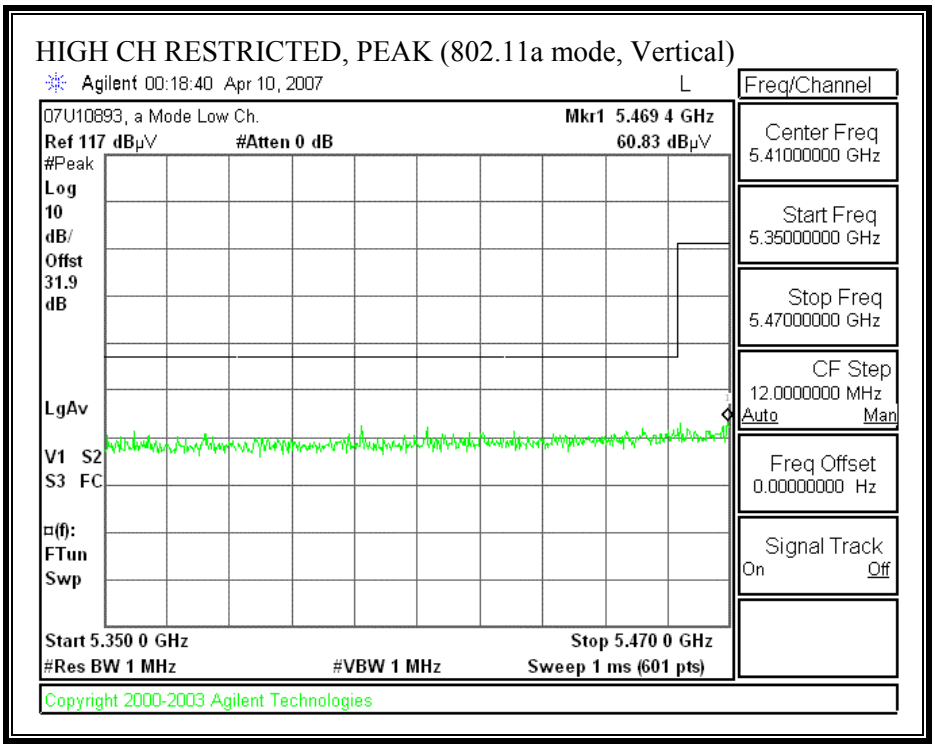
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, 5520 MHz - HORIZONTAL)



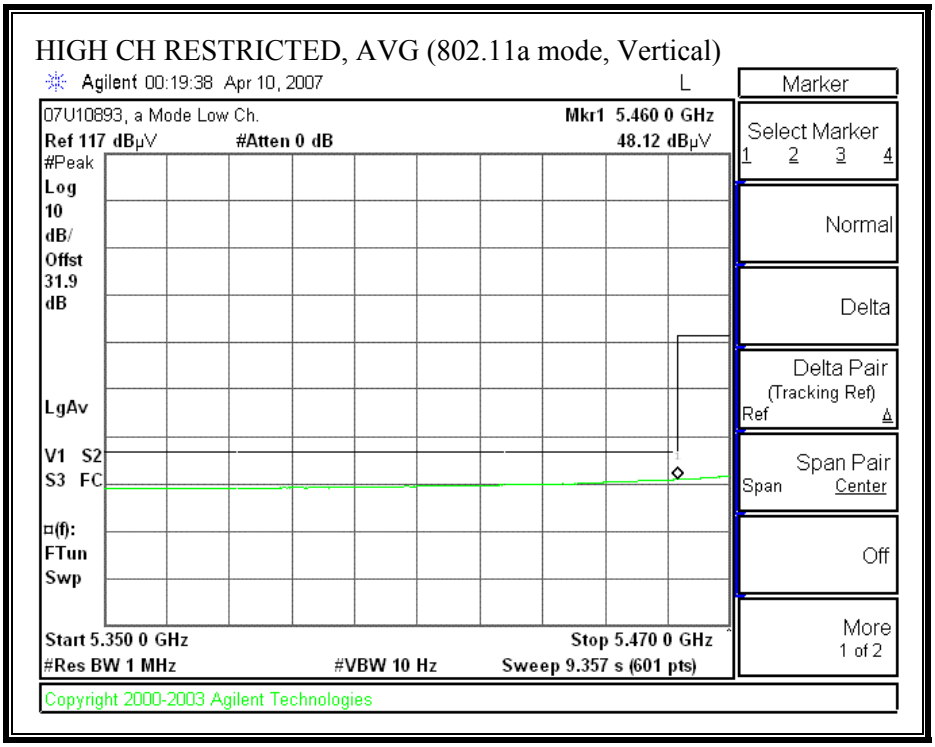
HIGH CH RESTRICTED, AVG (802.11a mode, Horizontal)



RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, 5520 MHz - VERTICAL)

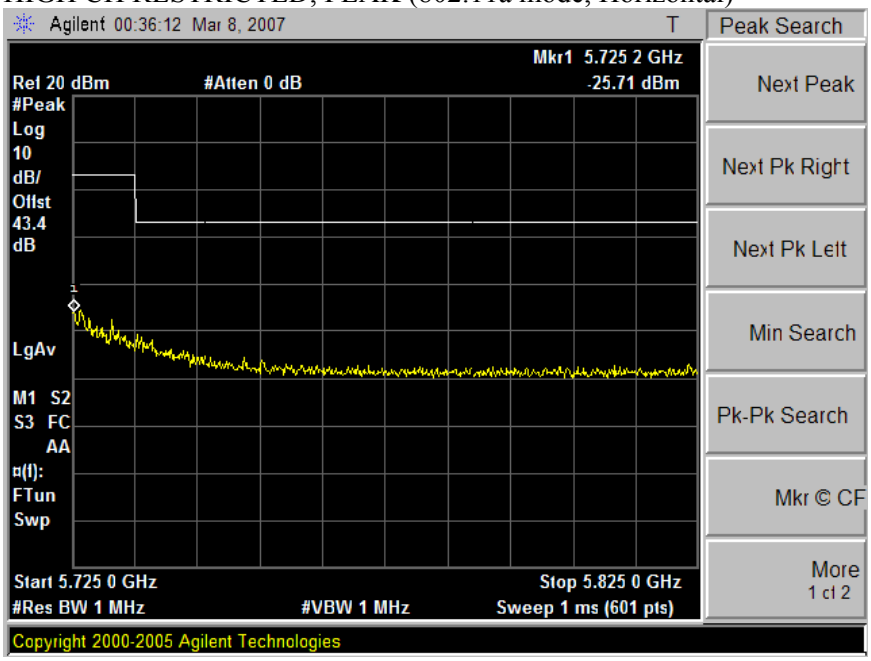


HIGH CH RESTRICTED, AVG (802.11a mode, Vertical)

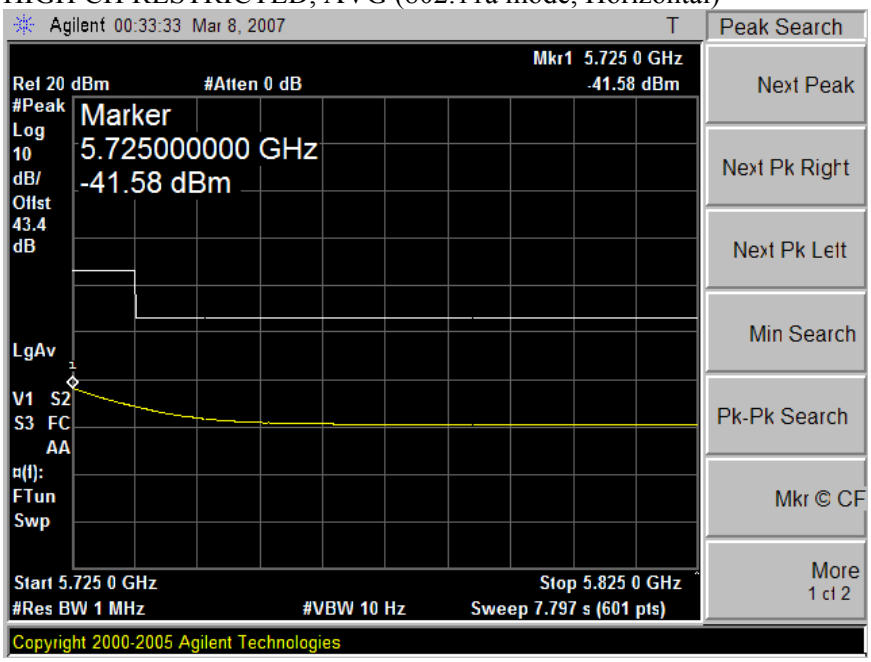


RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, 5700 MHz - HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11a mode, Horizontal)

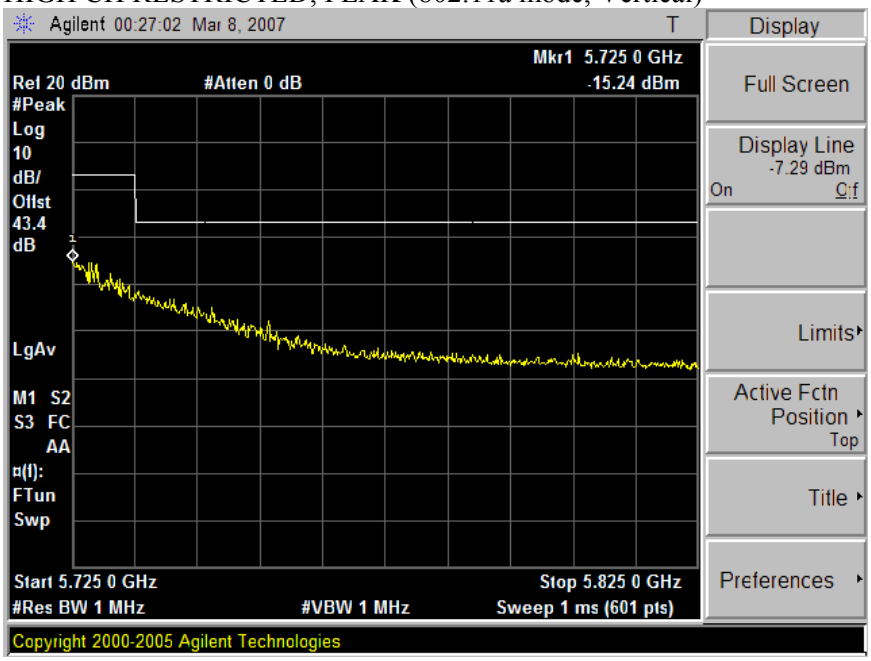


HIGH CH RESTRICTED, AVG (802.11a mode, Horizontal)

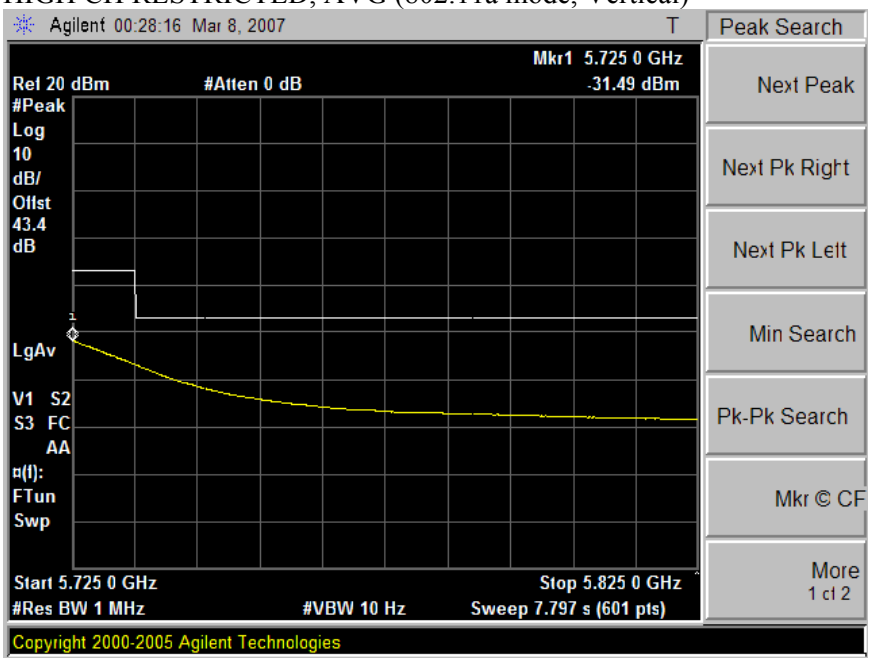


RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, 5700 MHz - VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11a mode, Vertical)



HIGH CH RESTRICTED, AVG (802.11a mode, Vertical)



802.11a MODE

HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

High Frequency Measurement
Compliance Certification Services, Fremont, A-5m Chamber

Company: Broadcom Corporation
Project #: 07U10893
Date: 04/09/2007
Test Engineer: Vien Tran
Configuration: EUT (With 5.35dBi Main Antenna, 5.2dBi Aux dBi)
Mode: Transmit, 5.5GHz_11a Legacy

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		Gordon 203134001	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

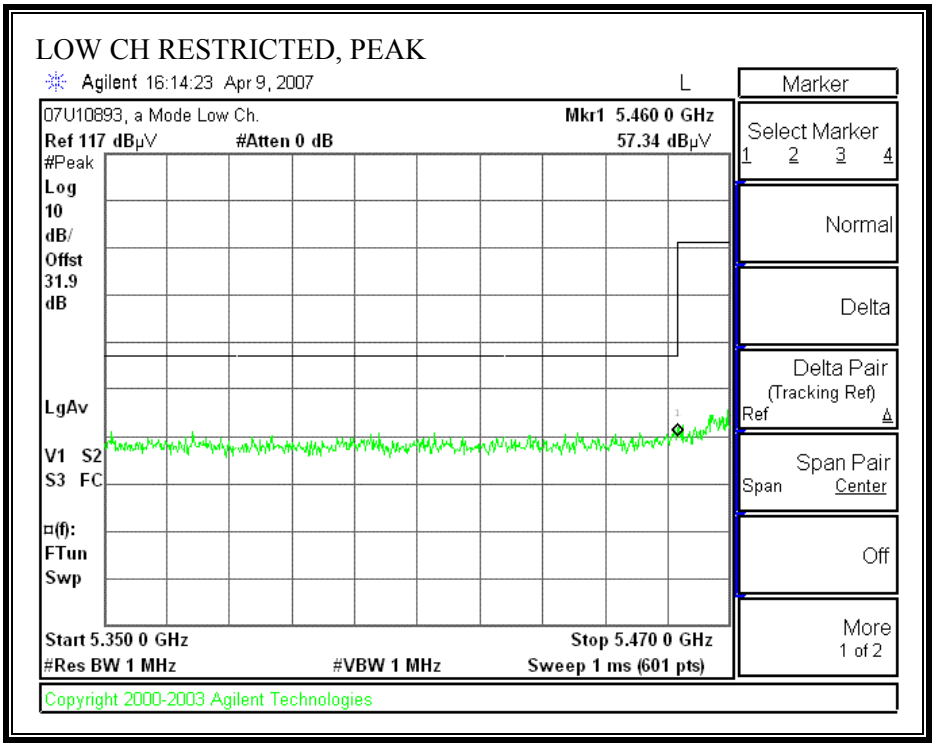
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
CH 100, 5500 MHz															
11.000	3.0	56.0	40.8	37.3	11.1	-36.3	0.0	0.7	68.9	53.7	74	54	-5.1	-0.3	H
11.000	3.0	51.6	39.9	37.3	11.1	-36.3	0.0	0.7	64.5	52.8	74	54	-9.5	-1.2	V
CH 120, 5600 MHz															
11.200	3.0	52.6	40.6	37.3	11.3	-36.1	0.0	0.7	65.9	53.9	74	54	-8.1	-0.1	H
11.200	3.0	51.8	40.0	37.3	11.3	-36.1	0.0	0.7	65.1	53.3	74	54	-8.9	-0.7	V
CH140, 5700 MHz															
11.400	3.0	52.2	40.1	37.4	11.5	-35.9	0.0	0.7	65.9	53.8	74	54	-8.1	-0.2	H
11.400	3.0	51.5	39.4	37.4	11.5	-35.9	0.0	0.7	65.2	53.1	74	54	-8.8	-0.9	V

No other emissions were detected above system noise floor

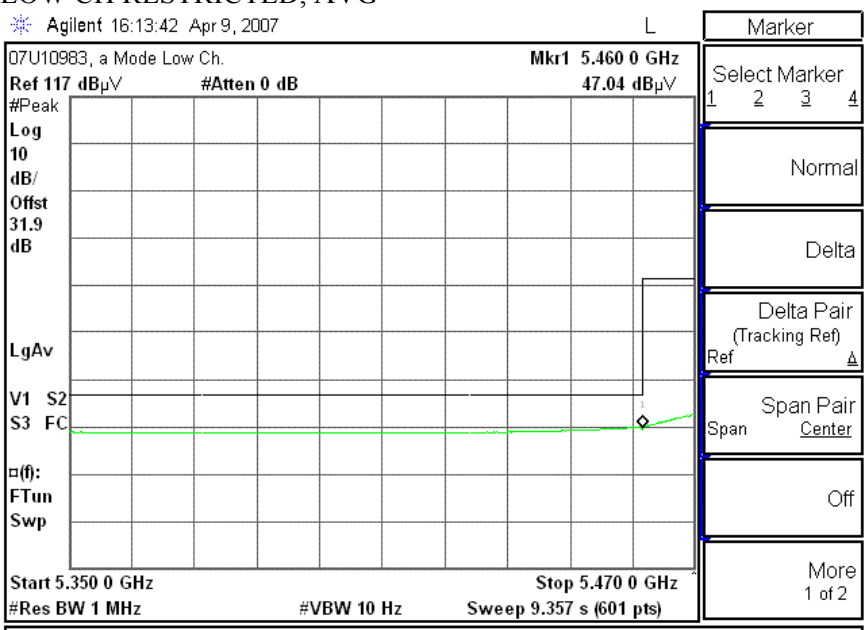
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

802.11n 40 MHz SISO MCS 32 MODE

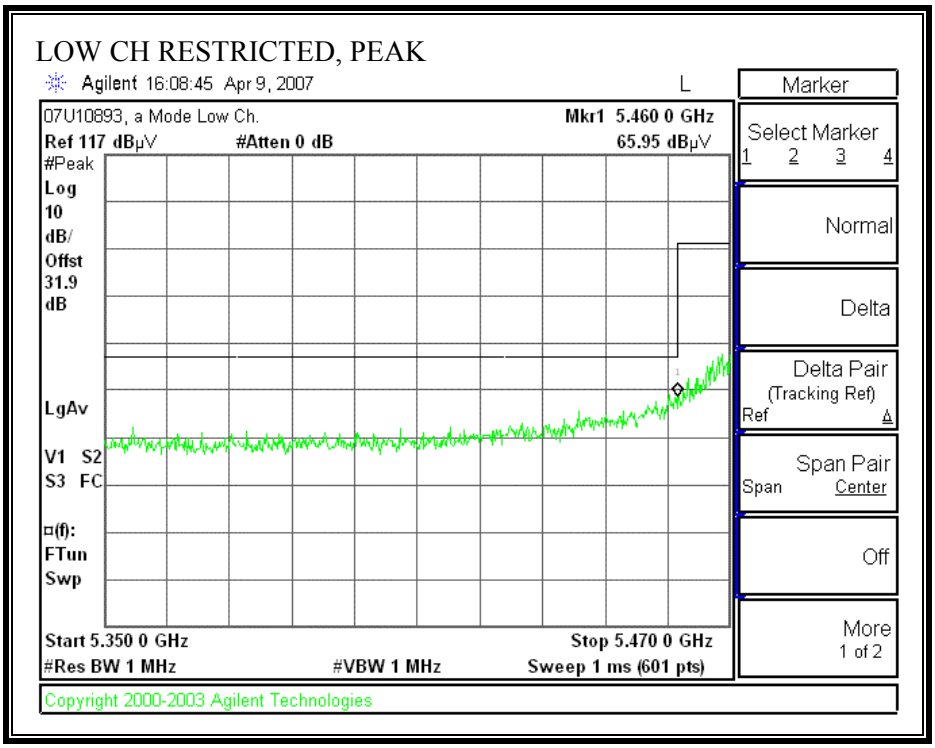
RESTRICTED BANDEDGE, LOW CHANNEL, 5510 MHz - HORIZONTAL



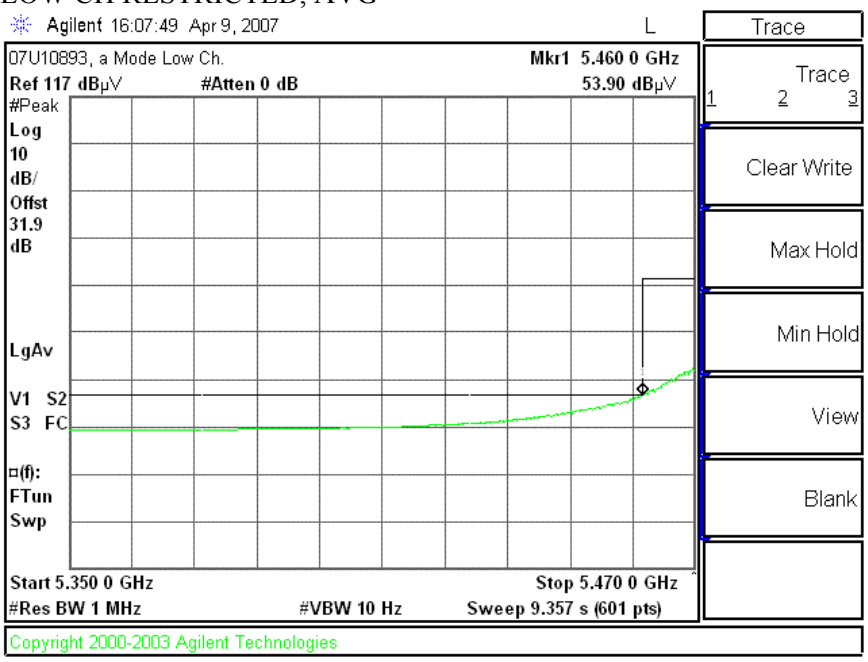
LOW CH RESTRICTED, AVG



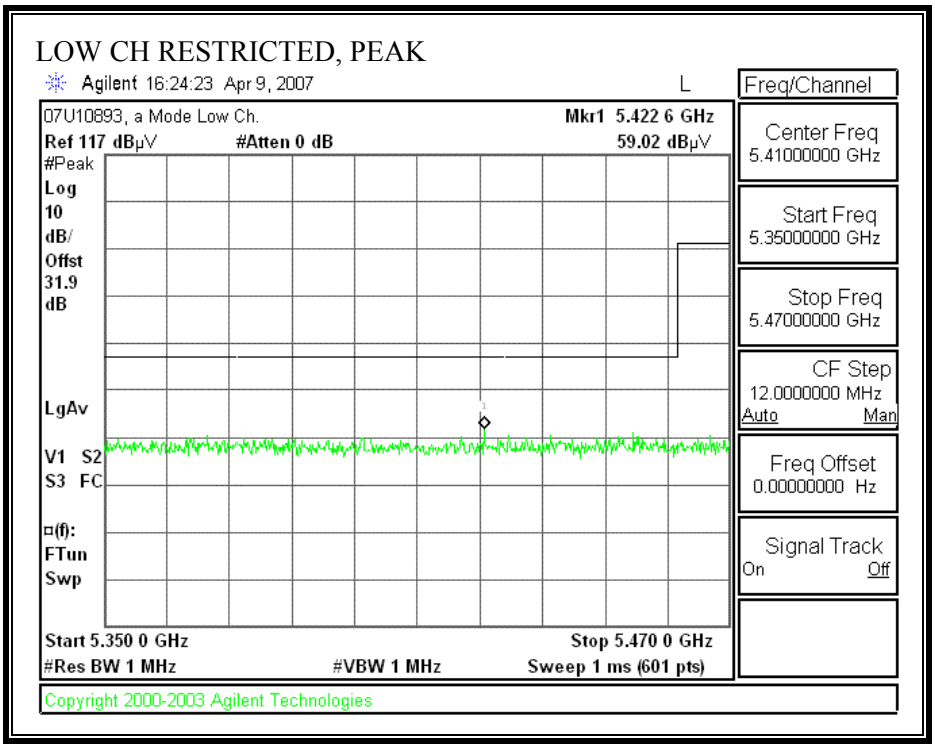
RESTRICTED BANDEDGE, LOW CHANNEL, 5510 MHz - VERTICAL



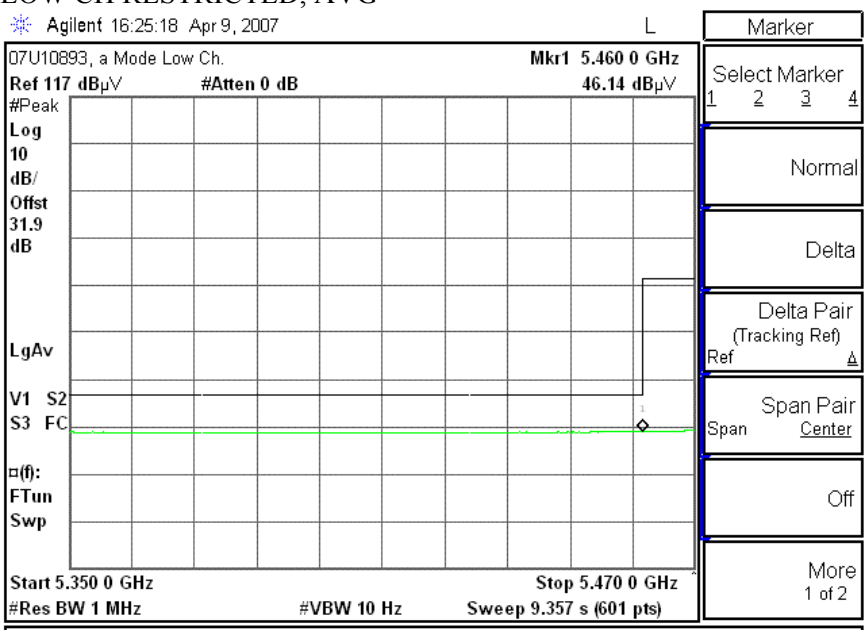
LOW CH RESTRICTED, AVG



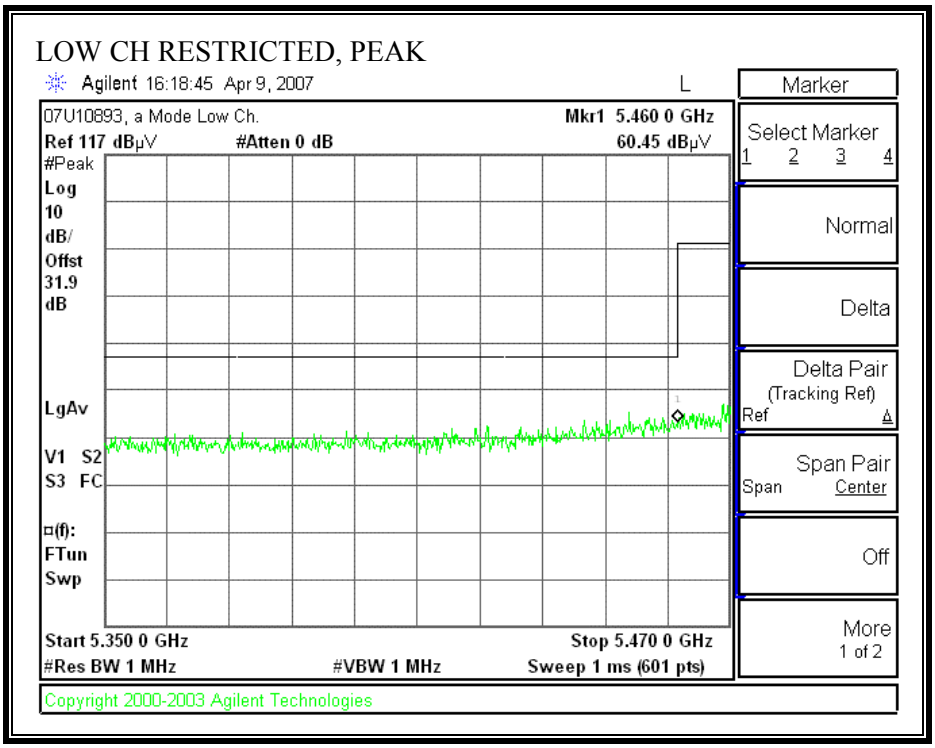
RESTRICTED BANDEDGE, LOW CHANNEL, 5550 MHz - HORIZONTAL



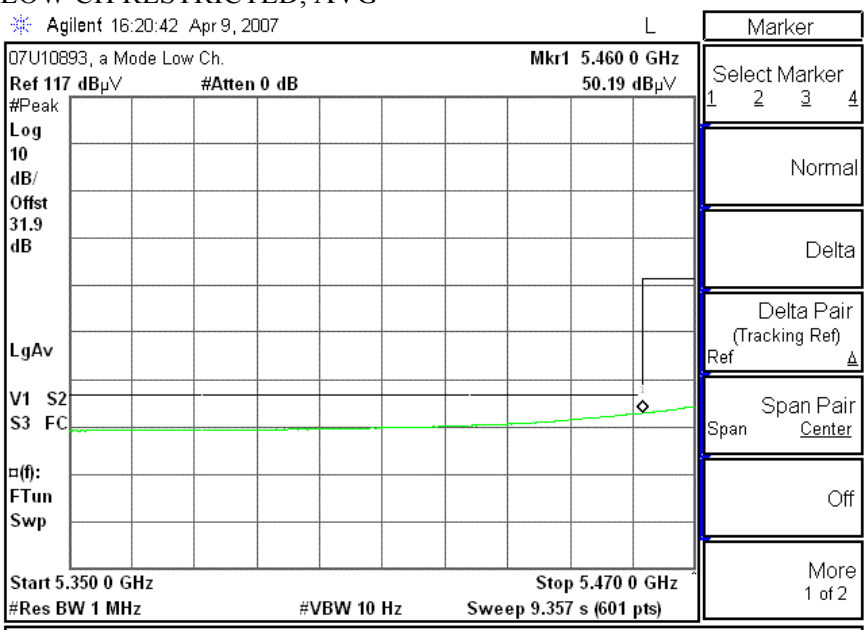
LOW CH RESTRICTED, AVG



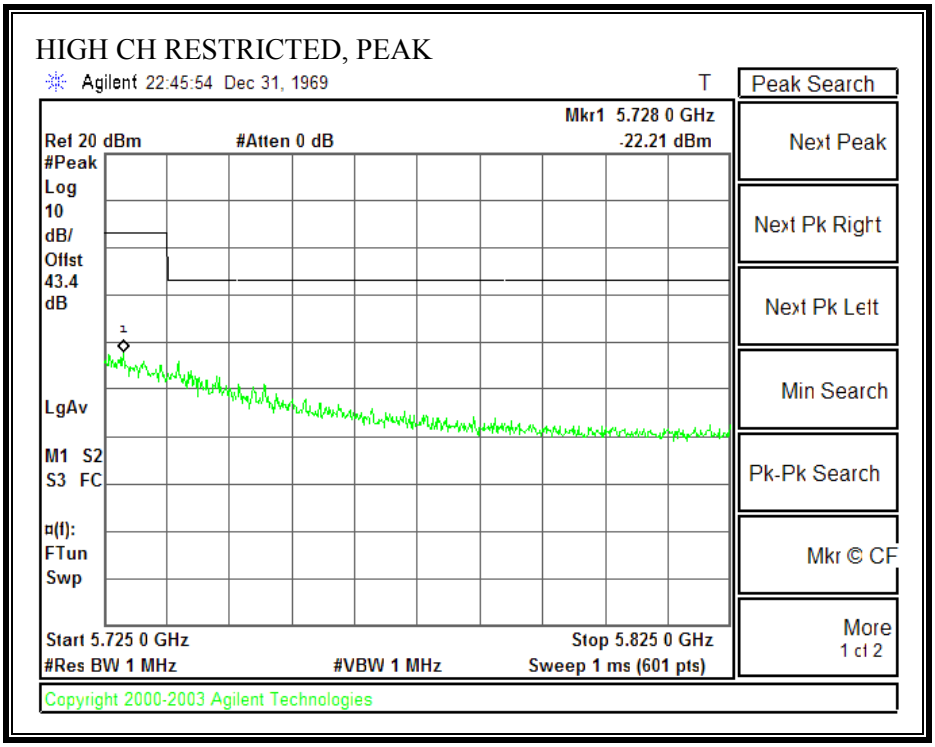
RESTRICTED BANDEDGE, LOW CHANNEL, 5550 MHz - VERTICAL



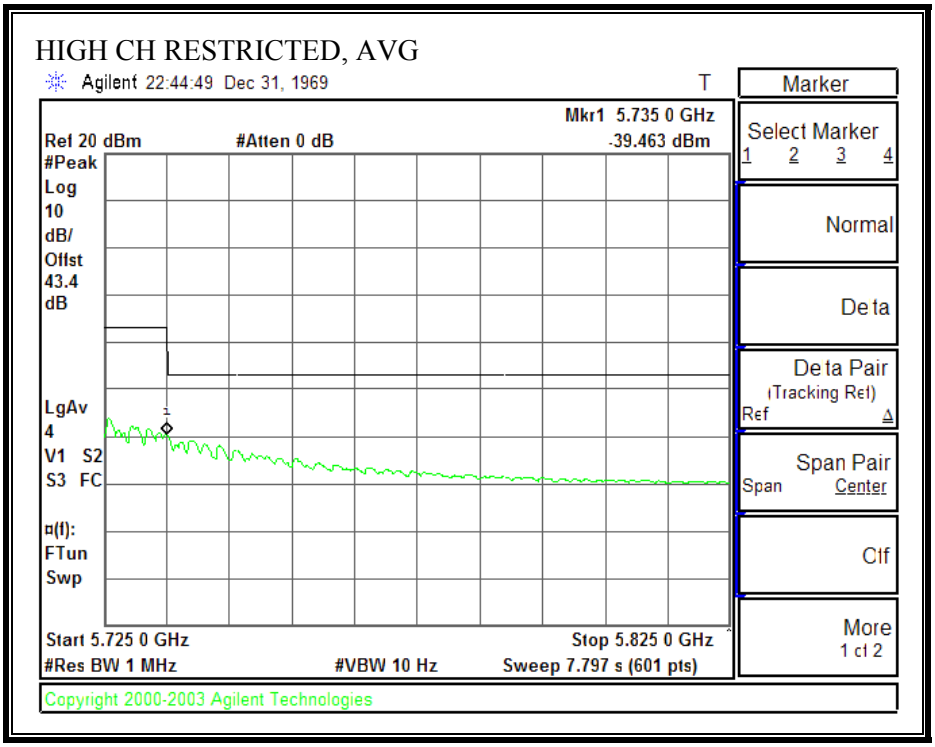
LOW CH RESTRICTED, AVG



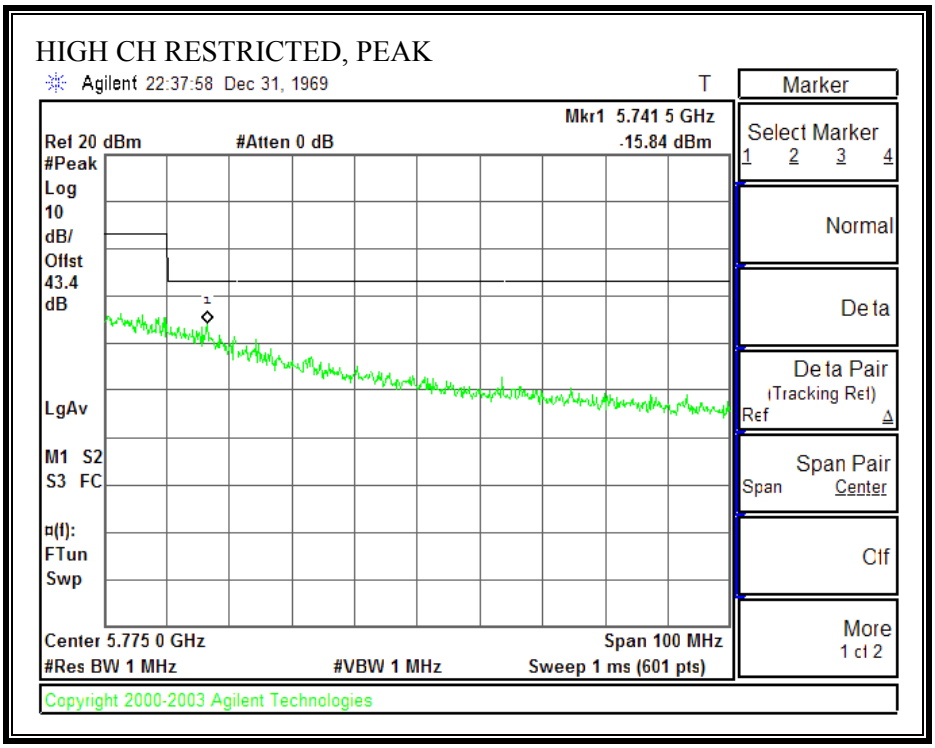
RESTRICTED BANDEDGE, HIGH CHANNEL, 5670 MHz - HORIZONTAL



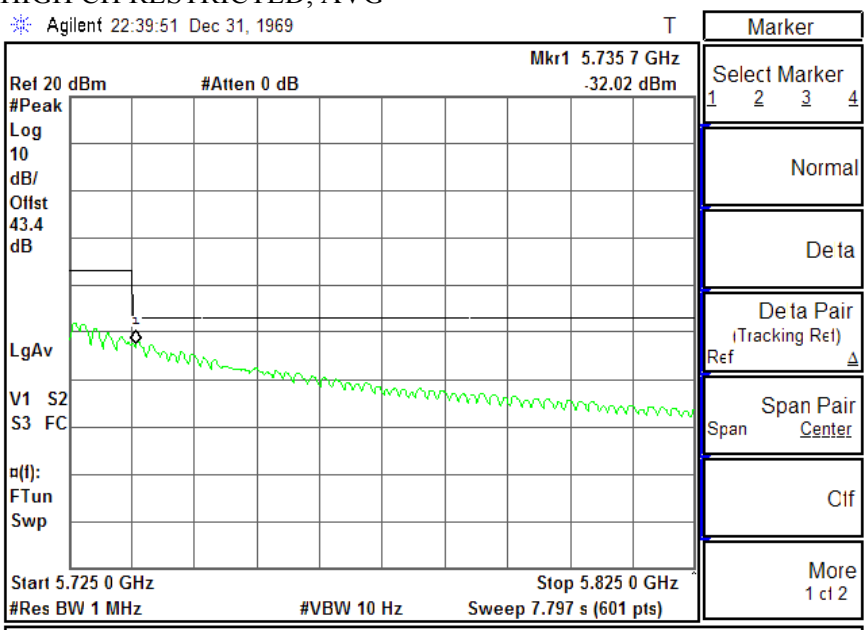
HIGH CH RESTRICTED, AVG



RESTRICTED BANDEDGE, HIGH CHANNEL, 5670 MHz - VERTICAL



HIGH CH RESTRICTED, AVG



802.11n 40 MHz SISO MODE

HARMONICS AND SPURIOUS EMISSIONS (802.11n 40 MHz SISO MODE)

High Frequency Measurement
Compliance Certification Services, Fremont, A-5m Chamber

Company: Broadcom Corporation
Project #: 07U10893
Date: 4/9/2007
Test Engineer: Vien Tran
Configuration: EUT (With 5.35dBi Main Antenna, 5.2dBi Aux dBi)
Mode: Transmit, 5.5GHz_11n 40 MHz SISO MCS 32

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		Gordon 203134001	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
CH 102, 5510 MHz															
11.020	3.0	52.5	40.8	37.3	11.1	-36.3	0.0	0.7	65.4	53.7	74	54	-8.6	-0.3	H
11.020	3.0	51.5	39.5	37.3	11.1	-36.3	0.0	0.7	64.4	52.4	74	54	-9.6	-1.6	V
CH 118, 5590 MHz															
11.180	3.0	50.5	40.5	37.3	11.3	-36.1	0.0	0.7	63.7	53.7	74	54	-10.3	-0.3	H
11.180	3.0	49.8	39.1	37.3	11.3	-36.1	0.0	0.7	63.0	52.3	74	54	-11.0	-1.7	V
CH134, 5670 MHz															
11.340	3.0	50.5	39.7	37.4	11.5	-36.0	0.0	0.7	64.1	53.3	74	54	-9.9	-0.7	H
11.340	3.0	49.3	38.9	37.4	11.5	-36.0	0.0	0.7	62.9	52.5	74	54	-11.1	-1.5	V

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

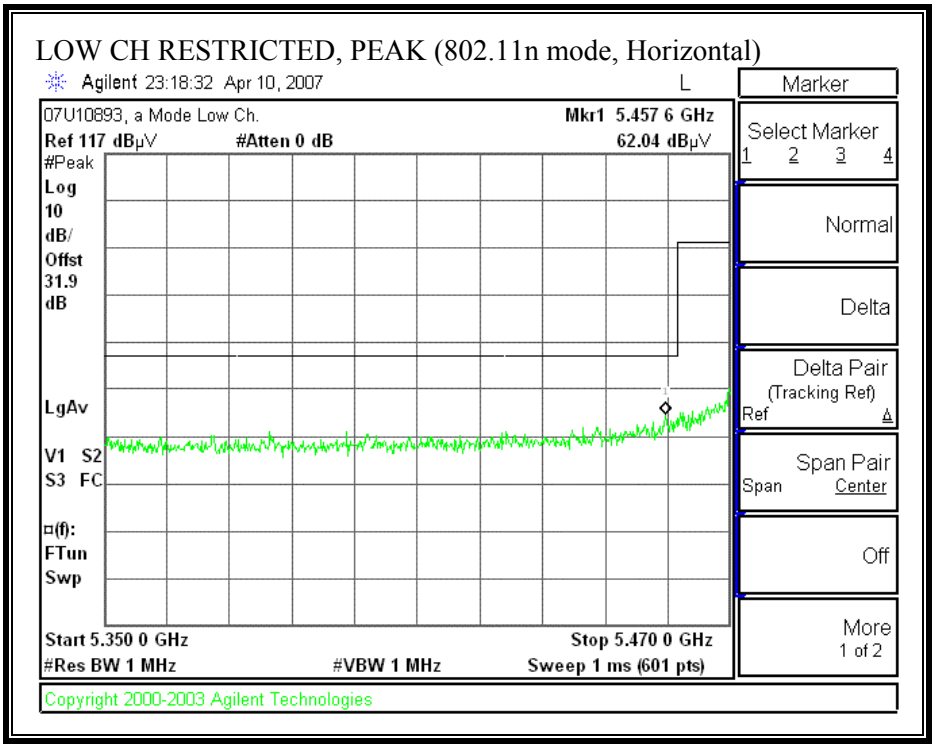
MIMO MODE

7.5.5. TRANSMITTER ABOVE 1 GHz FOR 5470 TO 5725 MHz BAND

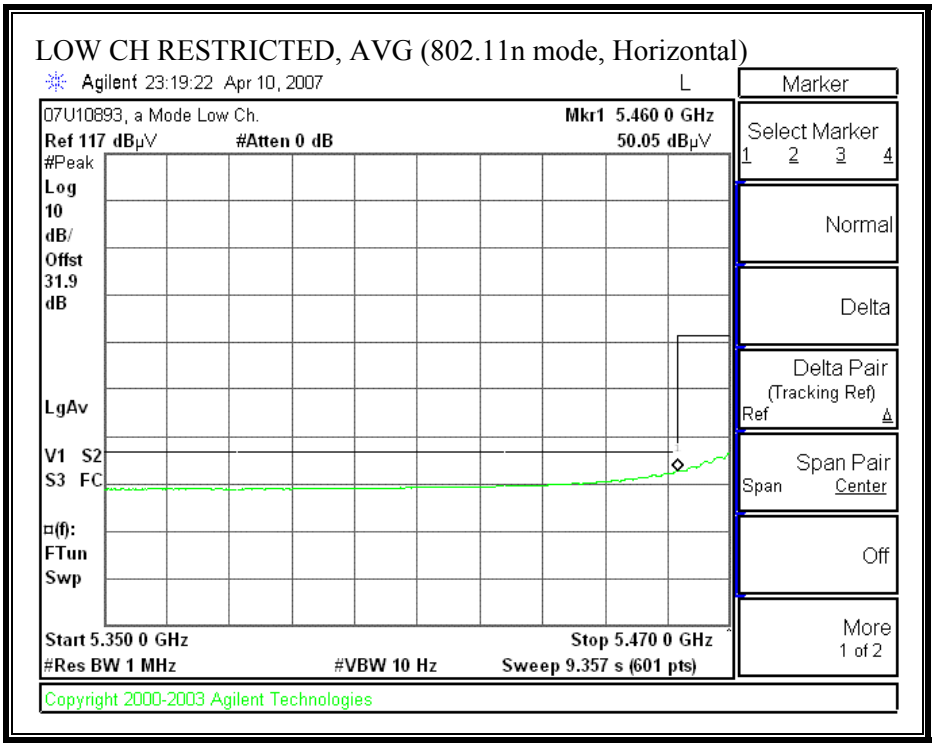
802.11a CDD is covered by worst case 802.11n 20 MHz CDD MCS 0

802.11n 20 MHz CDD MCS 0

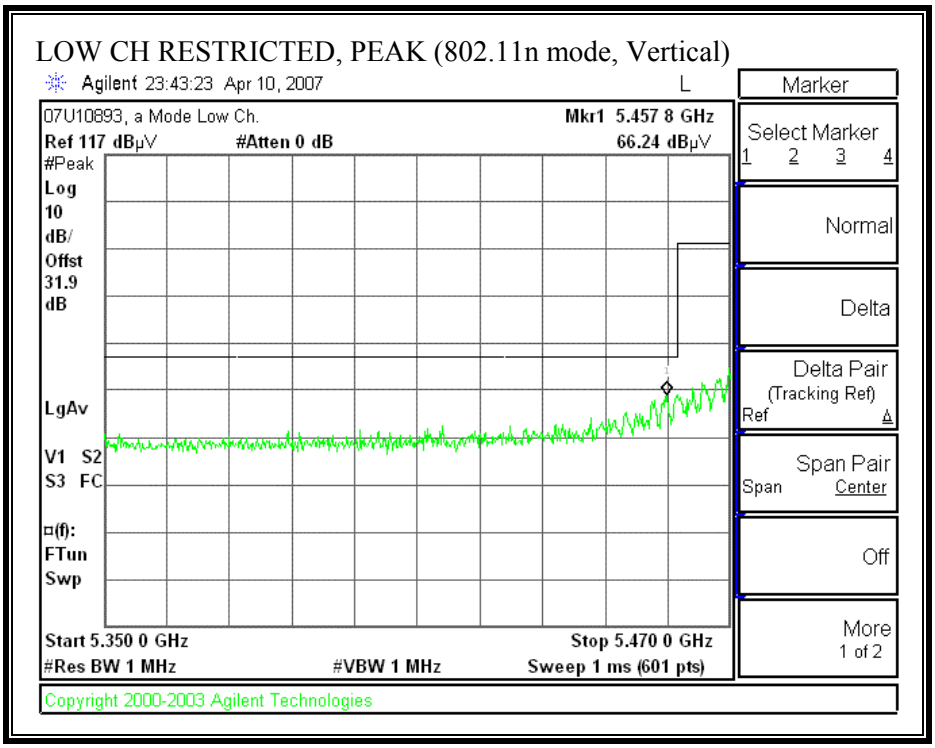
RESTRICTED BANDEDGE (LOW CHANNEL, 5500 MHz - HORIZONTAL)



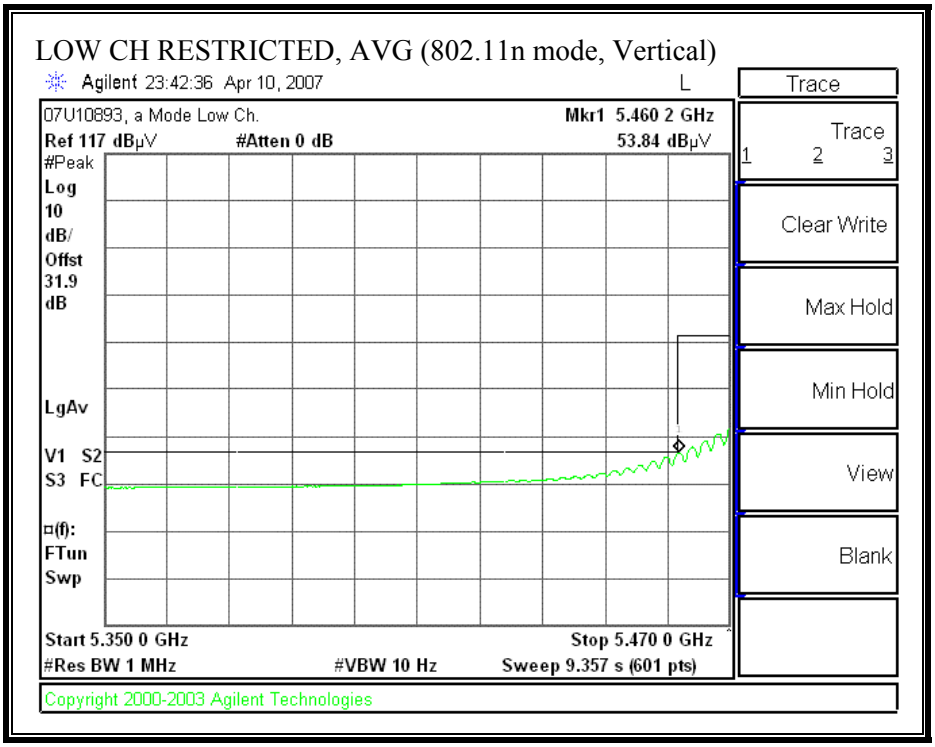
LOW CH RESTRICTED, AVG (802.11n mode, Horizontal)



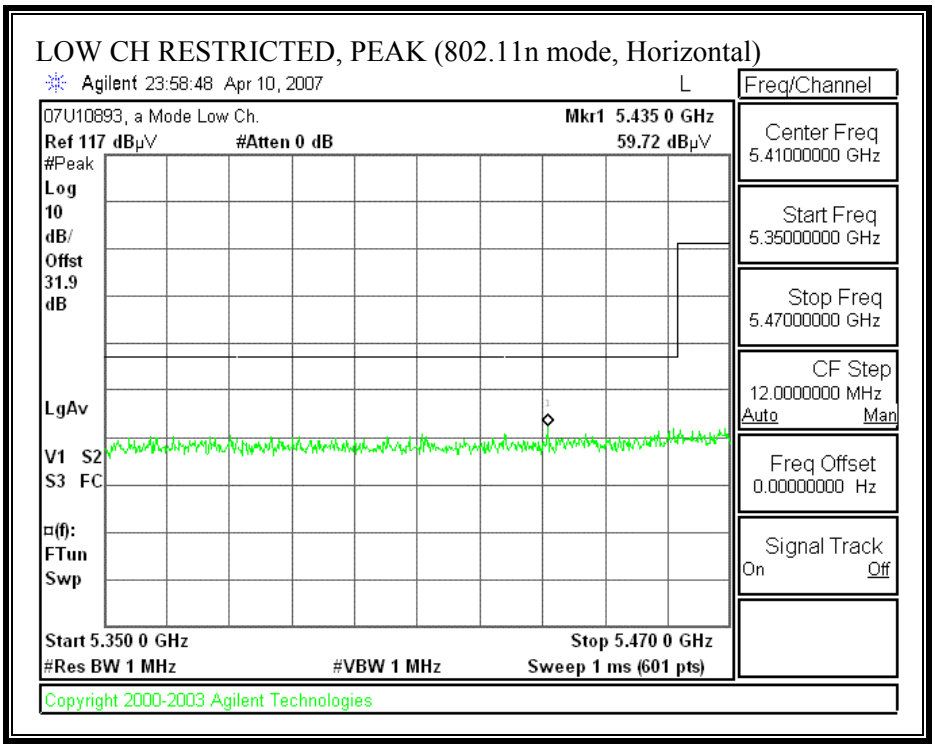
RESTRICTED BANDEDGE (802.11n MODE, LOW CHANNEL, 5500 MHz - VERTICAL)



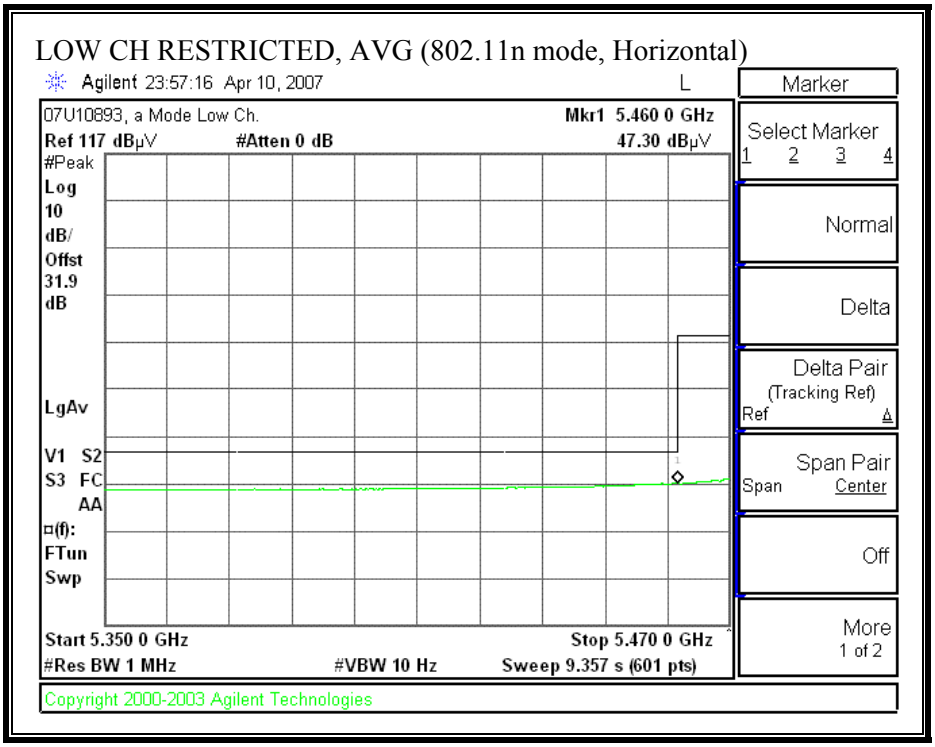
LOW CH RESTRICTED, AVG (802.11n mode, Vertical)



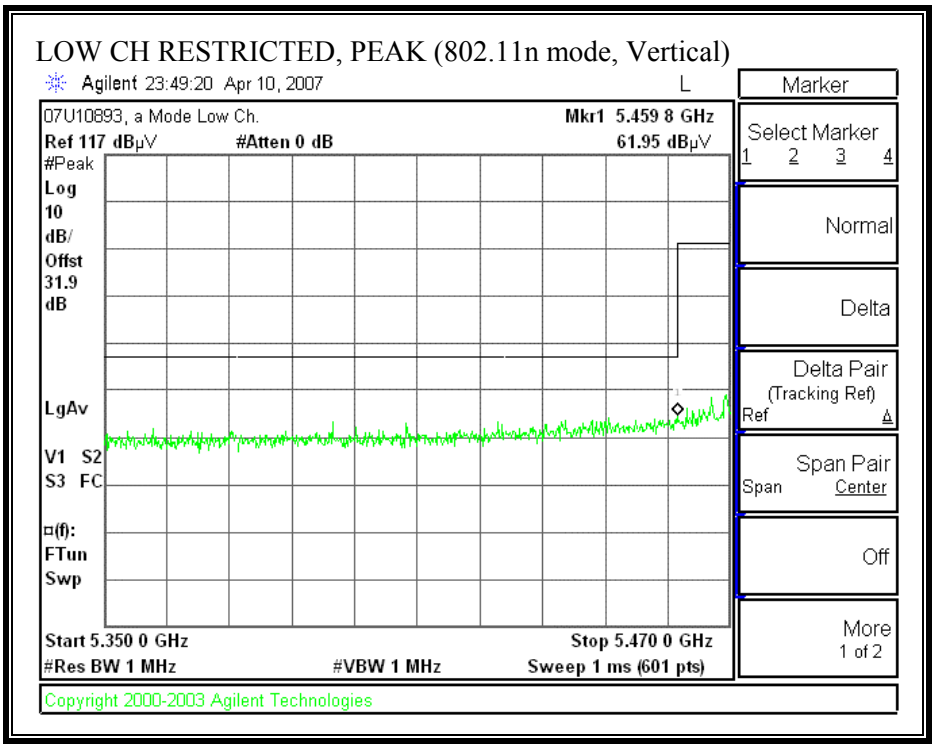
RESTRICTED BANDEDGE (LOW CHANNEL, 5520 MHz - HORIZONTAL)



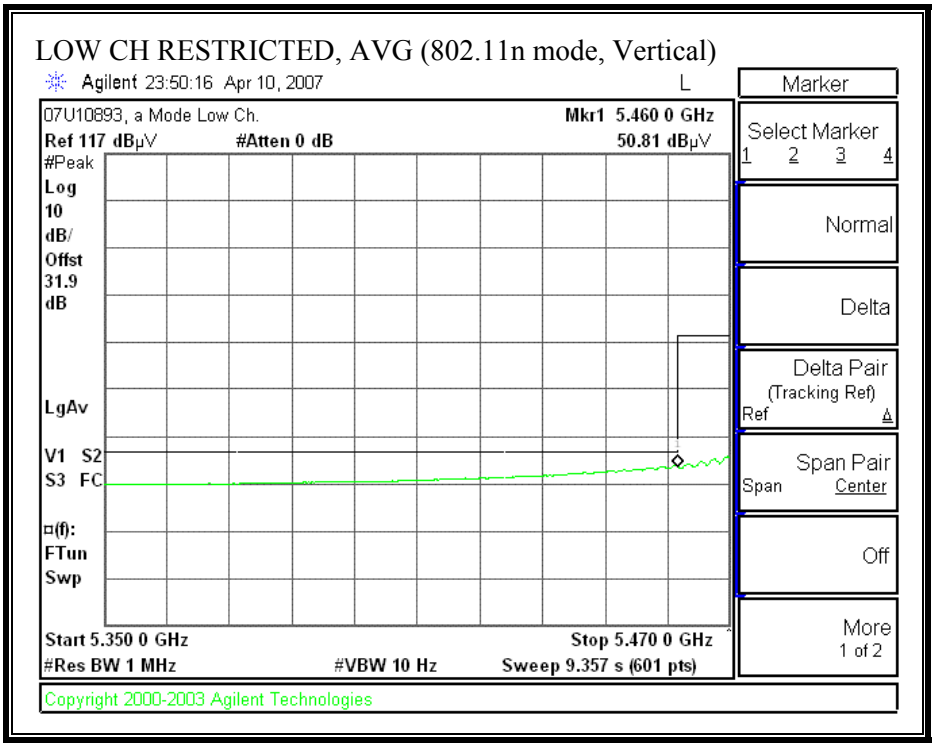
LOW CH RESTRICTED, AVG (802.11n mode, Horizontal)



RESTRICTED BANDEDGE (802.11n MODE, LOW CHANNEL, 5520 MHz - VERTICAL)

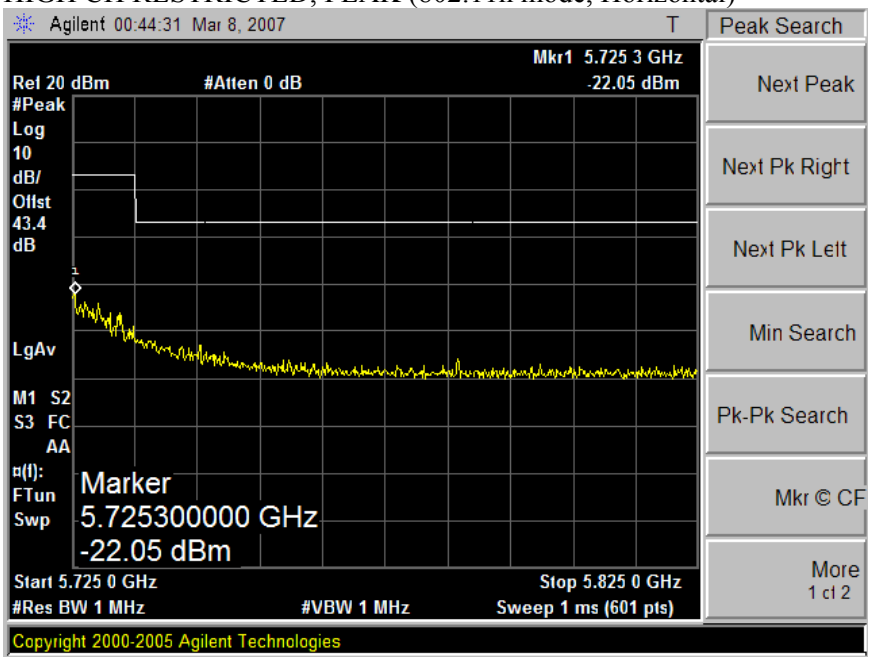


LOW CH RESTRICTED, AVG (802.11n mode, Vertical)

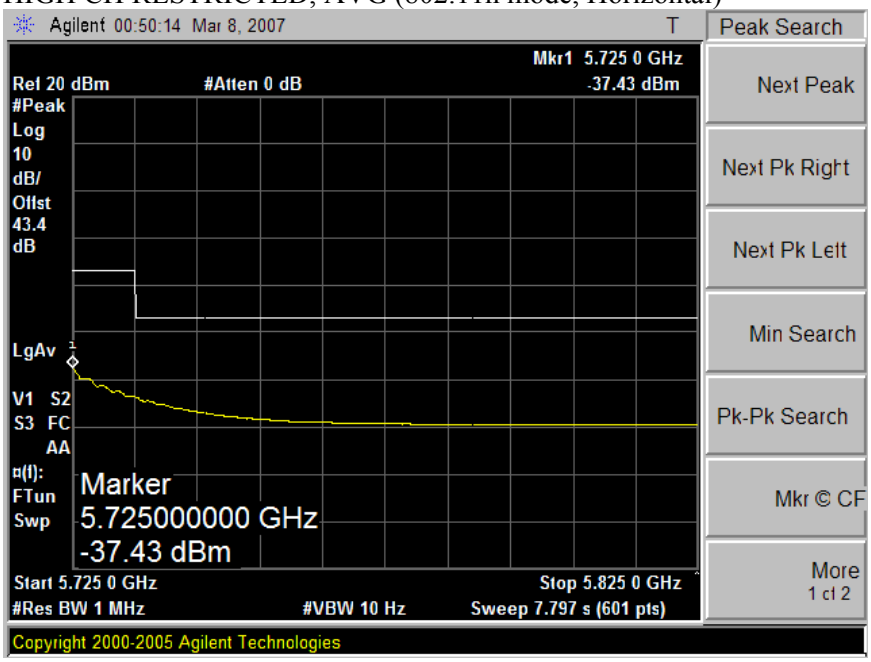


RESTRICTED BANDEDGE (802.11n MODE, HIGH CHANNEL, 5700 MHz - HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11n mode, Horizontal)

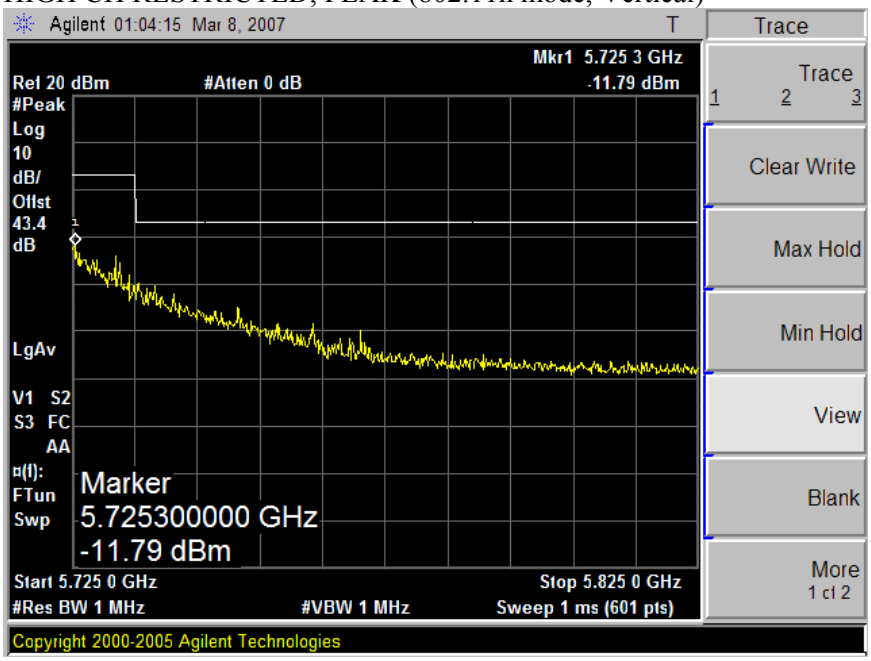


HIGH CH RESTRICTED, AVG (802.11n mode, Horizontal)

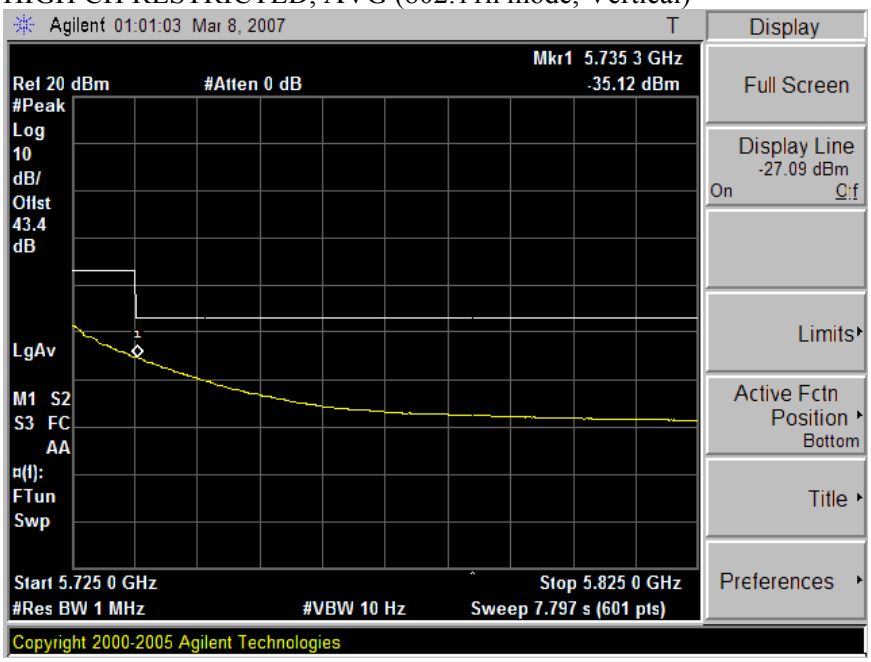


RESTRICTED BANDEDGE (802.11n MODE, HIGH CHANNEL, 5700 MHz - VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11n mode, Vertical)



HIGH CH RESTRICTED, AVG (802.11n mode, Vertical)



HARMONICS AND SPURIOUS EMISSIONS (802.11n – 20 MHz TX BANDWIDTH)

High Frequency Measurement
Compliance Certification Services, Fremont, A-5m Chamber

Company: Broadcom Corporation
Project #: 07U10893
Date: 04/09/2007
Test Engineer: Vien Tran
Configuration: EUT
Mode: Transmit, 5.6GHz_11n 20 MHz CDD MCS 0

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		Gordon 203134001	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
CH 100, 5500 MHz															
11.000	3.0	53.8	40.7	37.3	11.1	-36.3	0.0	0.7	66.7	53.6	74	54	-7.3	-0.4	H
11.000	3.0	51.6	39.3	37.3	11.1	-36.3	0.0	0.7	64.5	52.2	74	54	-9.5	-1.8	V
CH 120, 5600 MHz															
11.200	3.0	53.2	40.4	37.3	11.3	-36.1	0.0	0.7	66.5	53.6	74	54	-7.5	-0.4	H
11.200	3.0	51.1	38.9	37.3	11.3	-36.1	0.0	0.7	64.4	52.2	74	54	-9.6	-1.8	V
CH140, 5700 MHz															
11.400	3.0	52.8	40.2	37.4	11.5	-35.9	0.0	0.7	66.5	53.9	74	54	-7.5	-0.1	H
11.400	3.0	51.0	39.0	37.4	11.5	-35.9	0.0	0.7	64.7	52.7	74	54	-9.3	-1.3	V

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