

7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.247 (c) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Conducted power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 dB.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

RESULTS

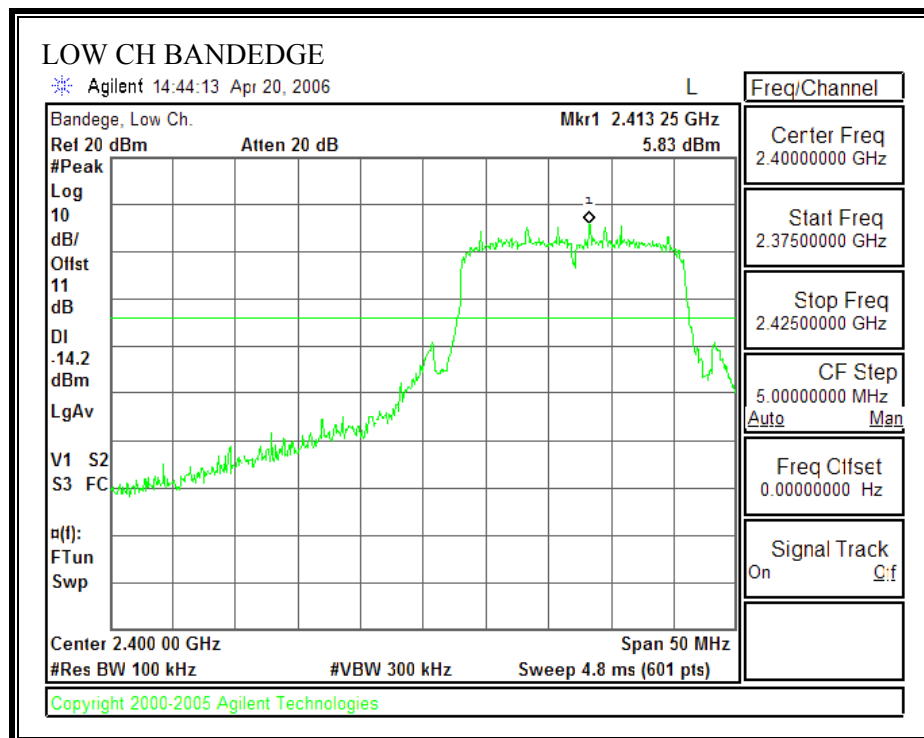
No non-compliance noted:

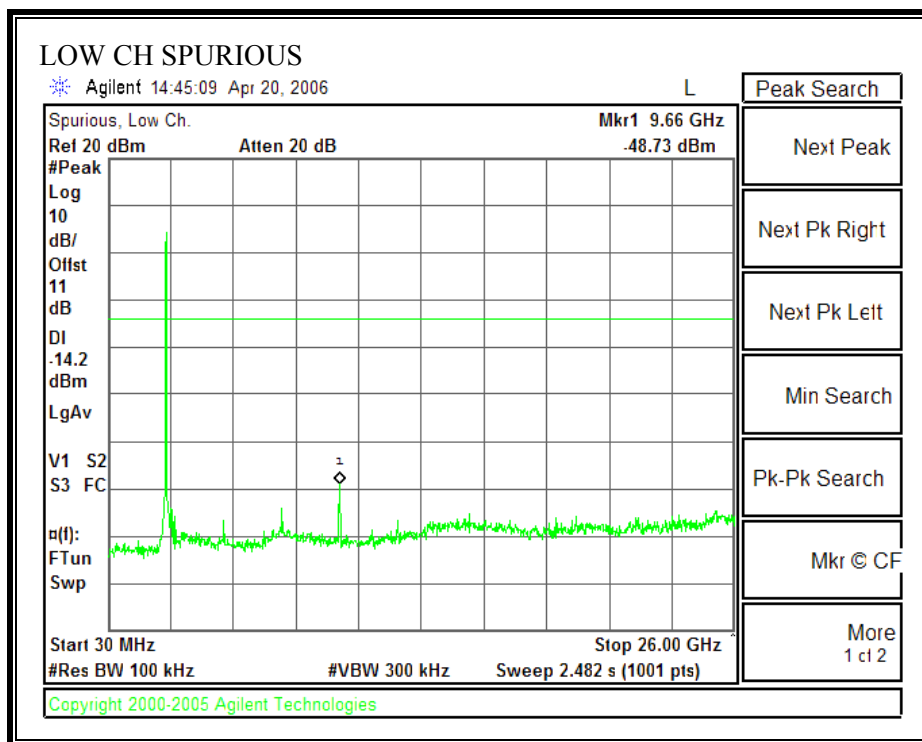
802.11g Mode Legacy CDD is covered by the worst-case 802.11n Mode 20 MHz CDD MCS0.

802.11n Mode 20 MHz CDD MCS 0:

SPURIOUS EMISSIONS, LOW CHANNEL (802.11 - 20 MHz TX BANDWIDTH – CHAIN 0)

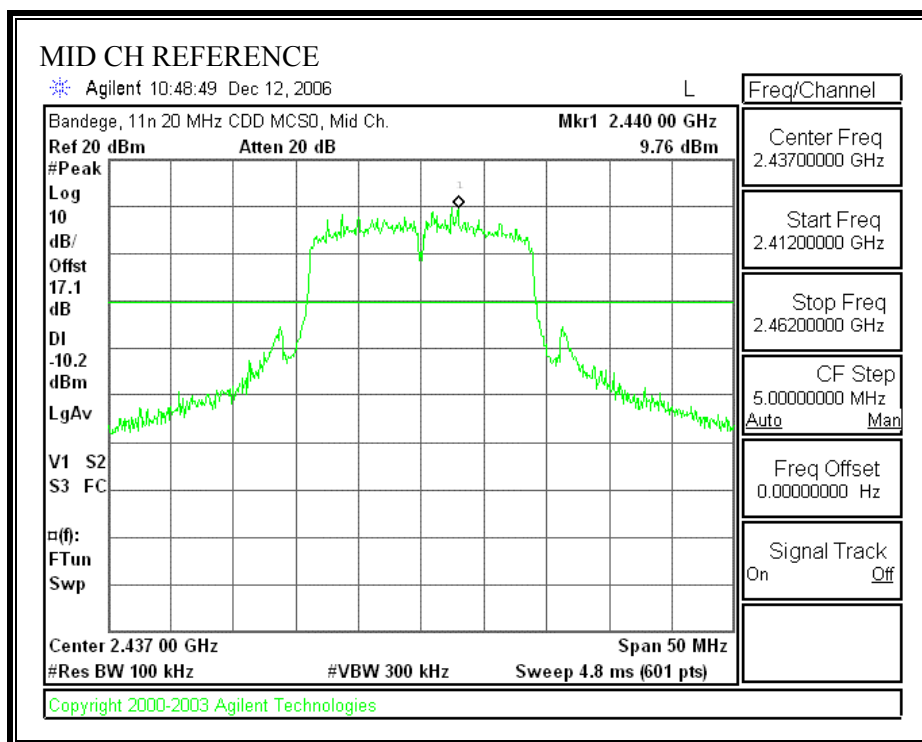
LOW CH BANDEDGE, 2412 MHz

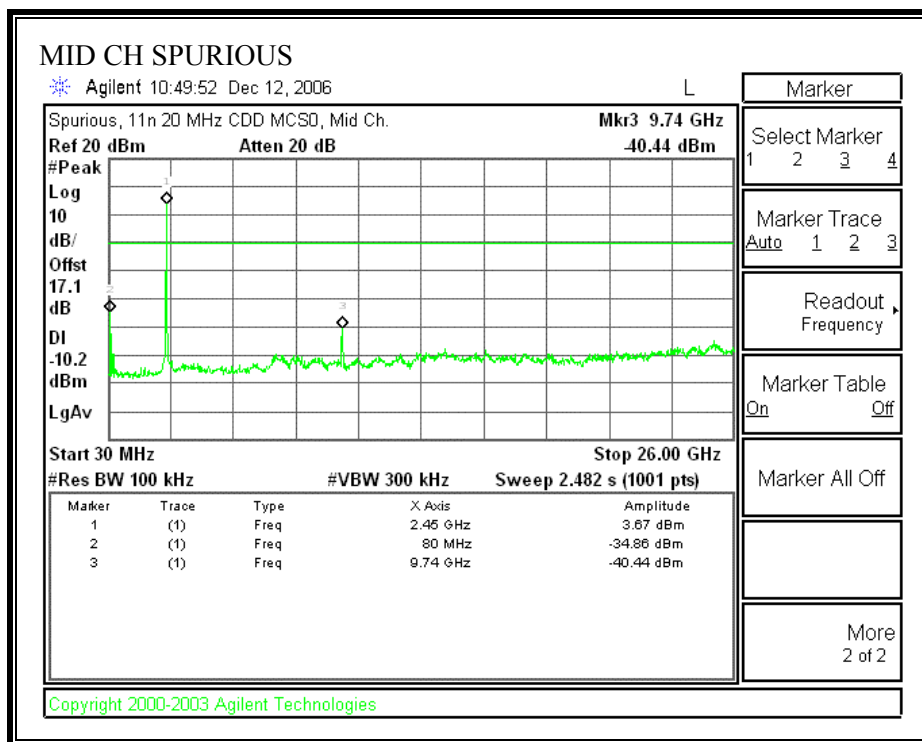




SPURIOUS EMISSIONS, MIDDLE CHANNEL (802.11 - 20 MHz TX BANDWIDTH – CHAIN 0)

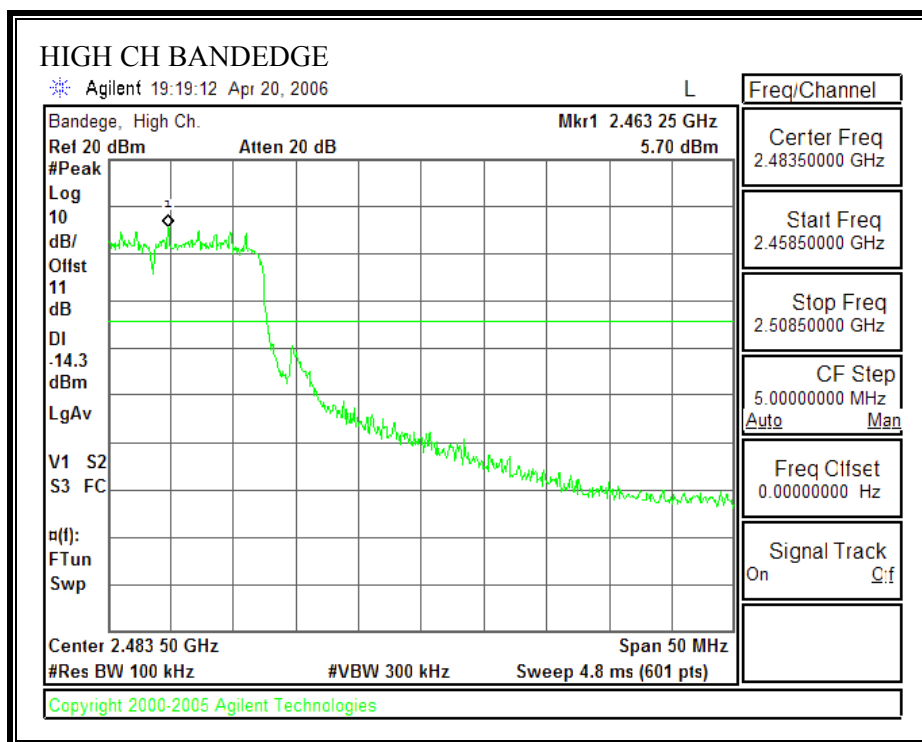
MID CH BANDEGE, 2437 MHz

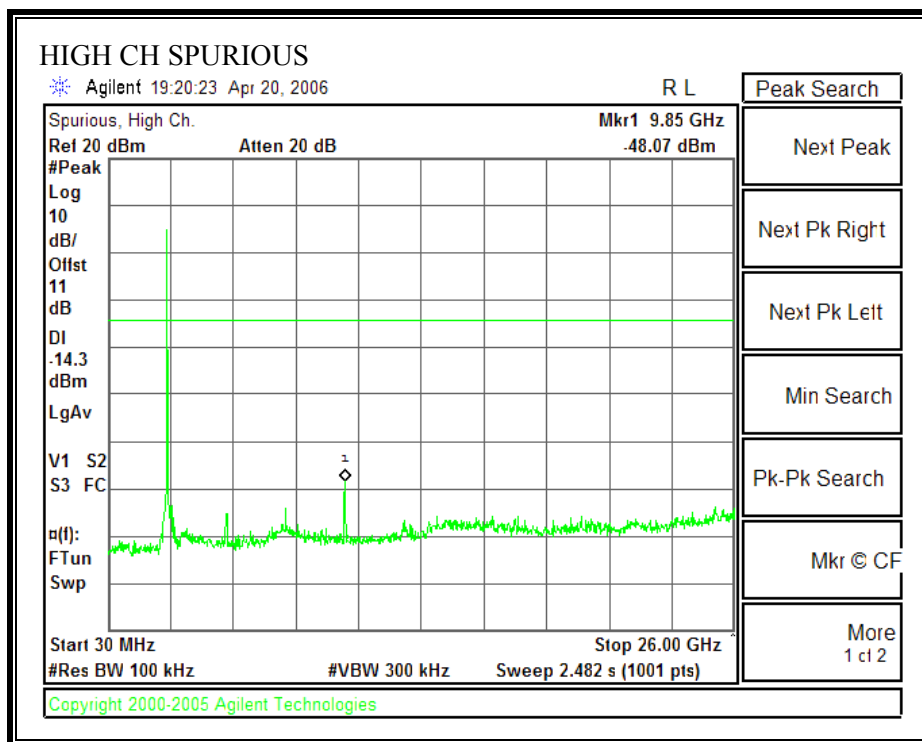




SPURIOUS EMISSIONS, HIGH CHANNEL (802.11 - 20 MHz TX BANDWIDTH – CHAIN 0)

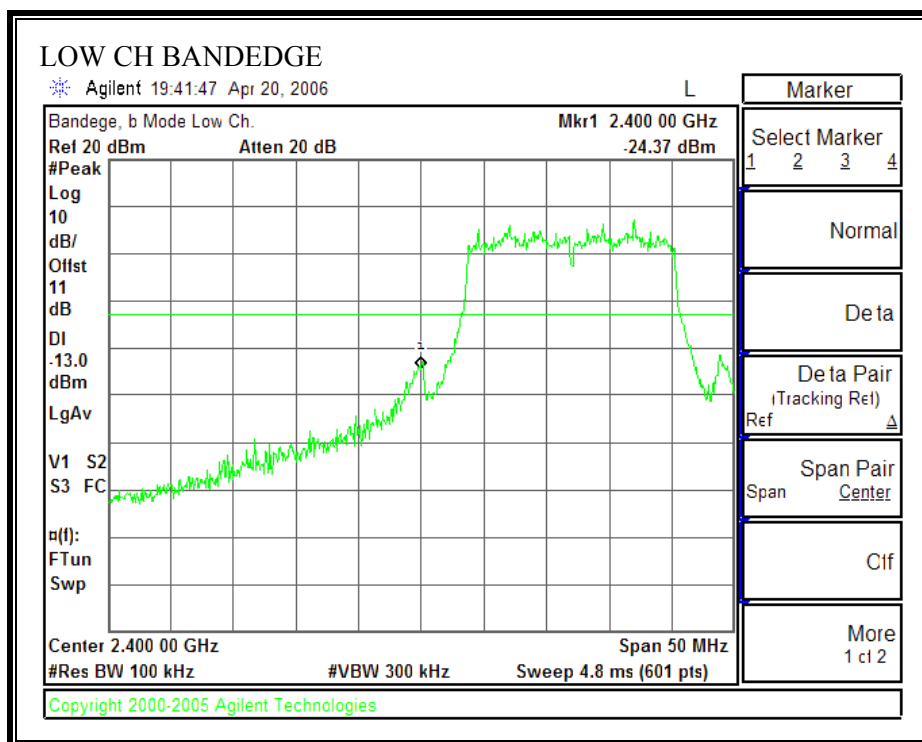
HI CH BANDEDGE, 2462 MHz

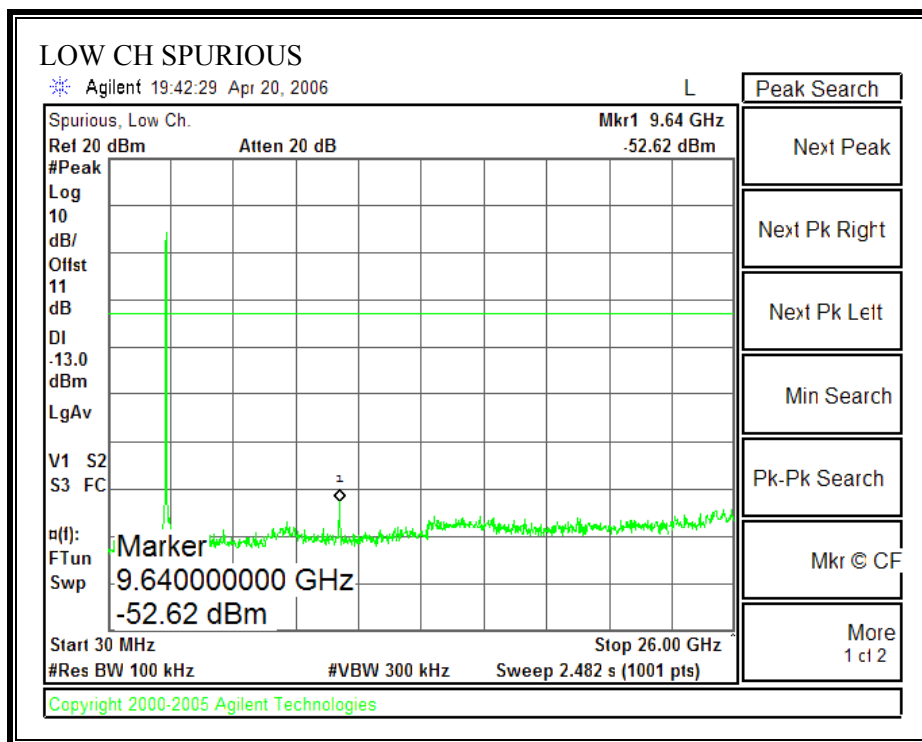




SPURIOUS EMISSIONS, LOW CHANNEL (802.11 - 20 MHz TX BANDWIDTH – CHAIN 1)

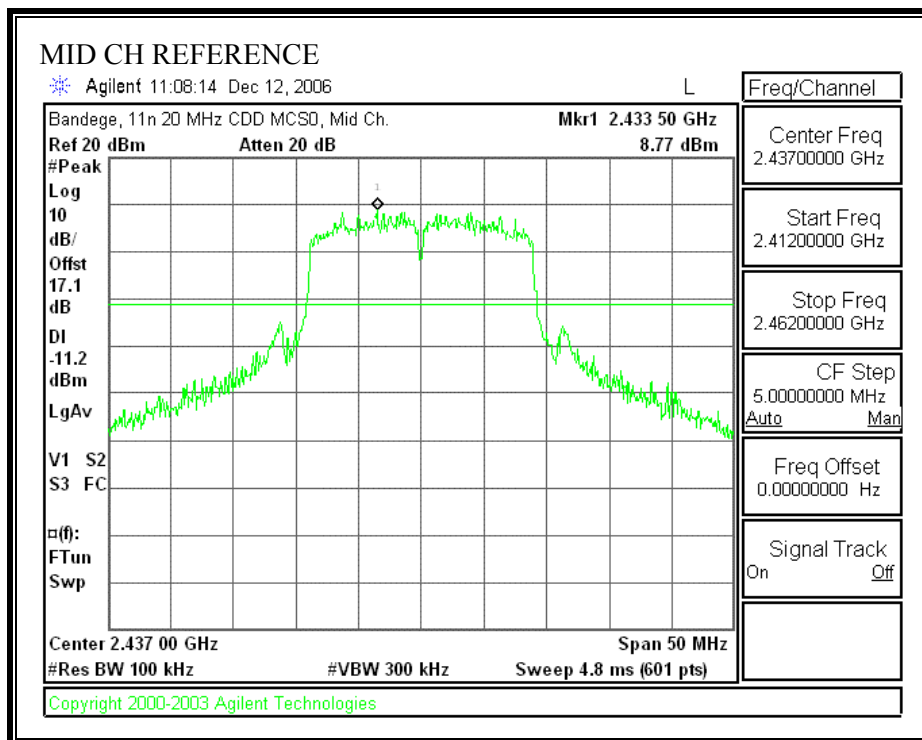
LOW CH BANDEDGE, 2412 MHz

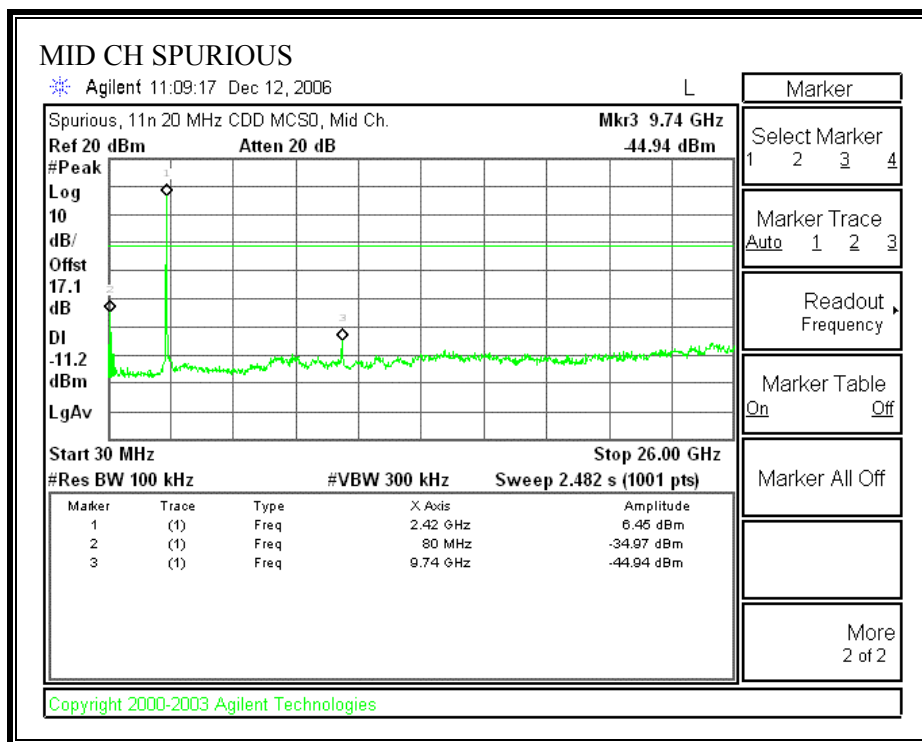




SPURIOUS EMISSIONS, MIDDLE CHANNEL (802.11 - 20 MHz TX BANDWIDTH – CHAIN 1)

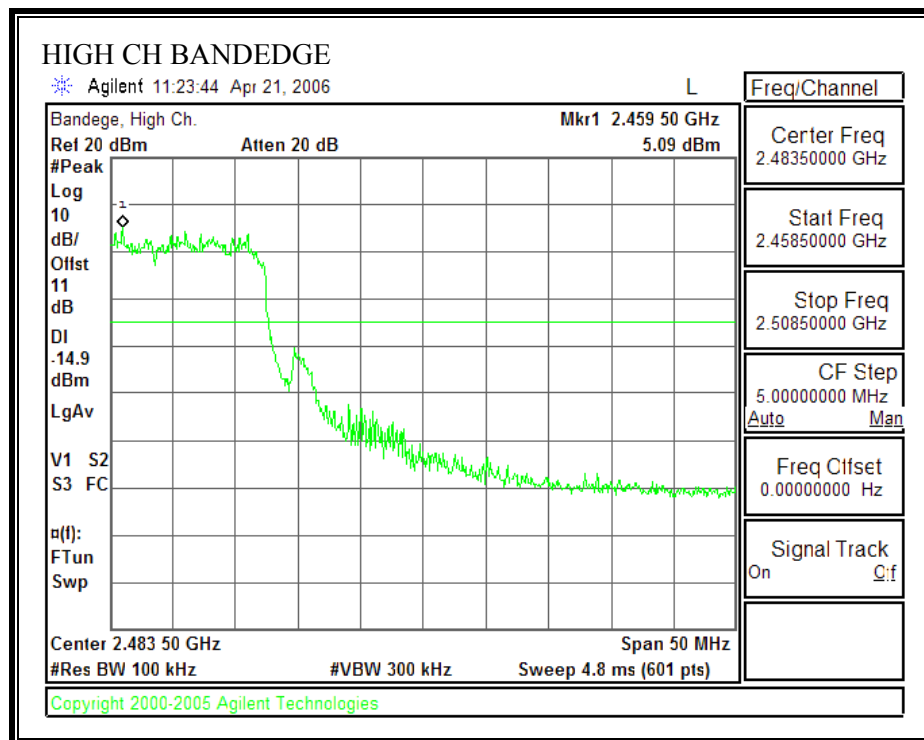
MID CH BANDEGE, 2437 MHz

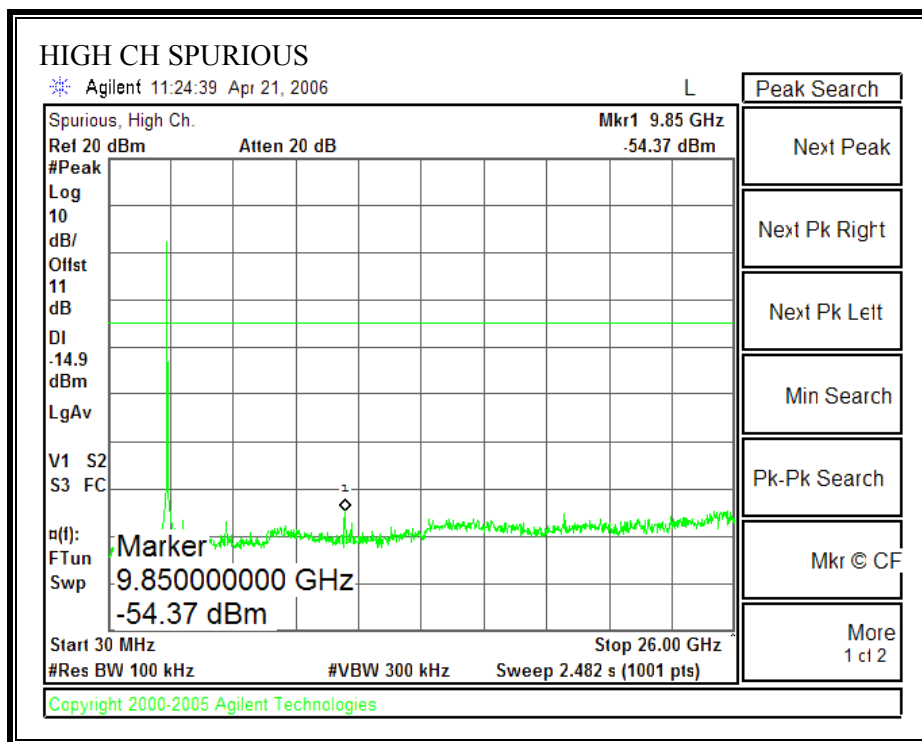




SPURIOUS EMISSIONS, HIGH CHANNEL (802.11 - 20 MHz TX BANDWIDTH – CHAIN 1)

HIGH CH BANDEDGE, 2462 MHz

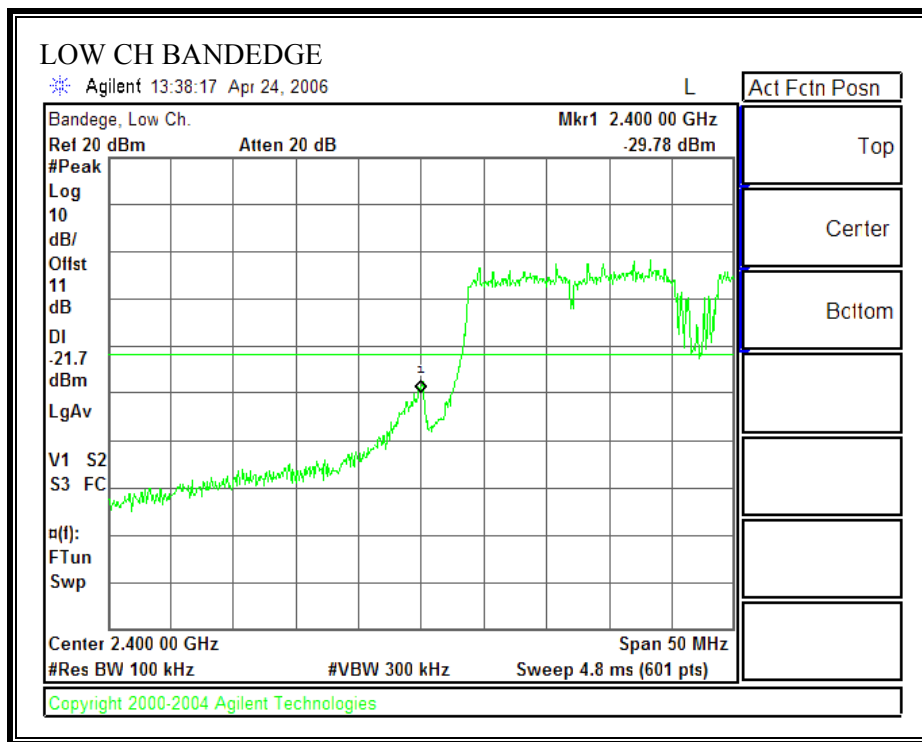


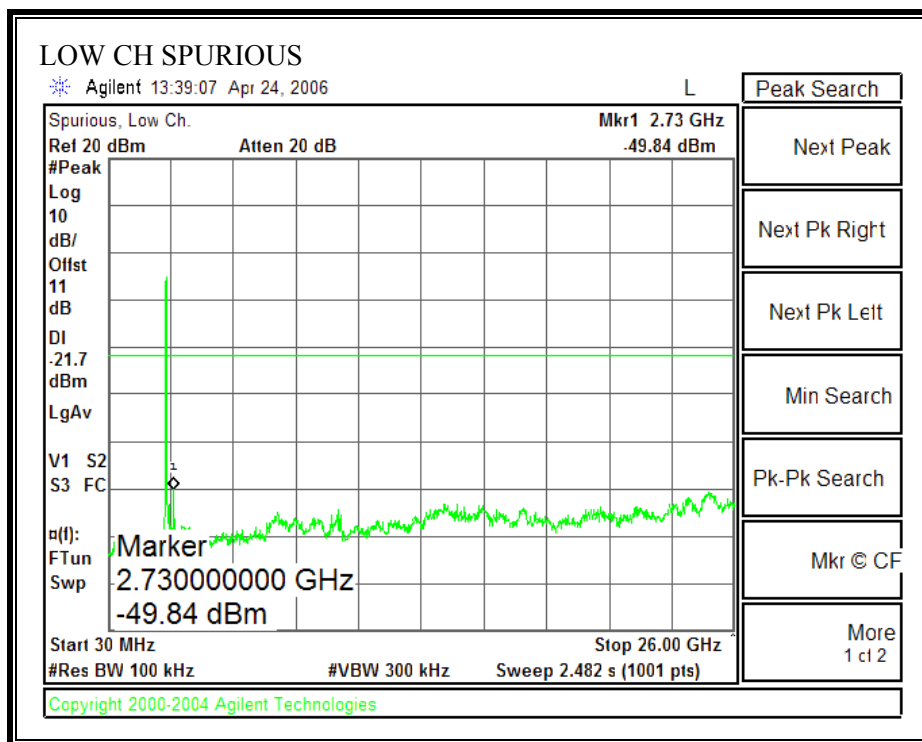


802.11n Mode 40 MHz CDD MCS 32

SPURIOUS EMISSIONS, LOW CHANNEL (802.11 - 40 MHz TX BANDWIDTH – CHAIN 0)

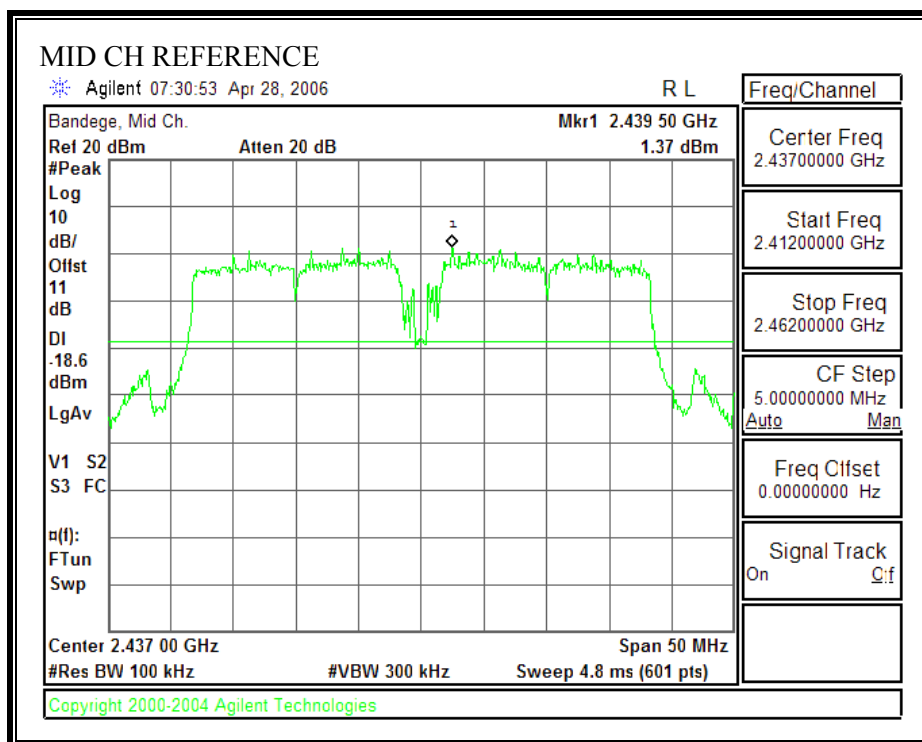
LOW CH BANDEDGE, 2422 MHz

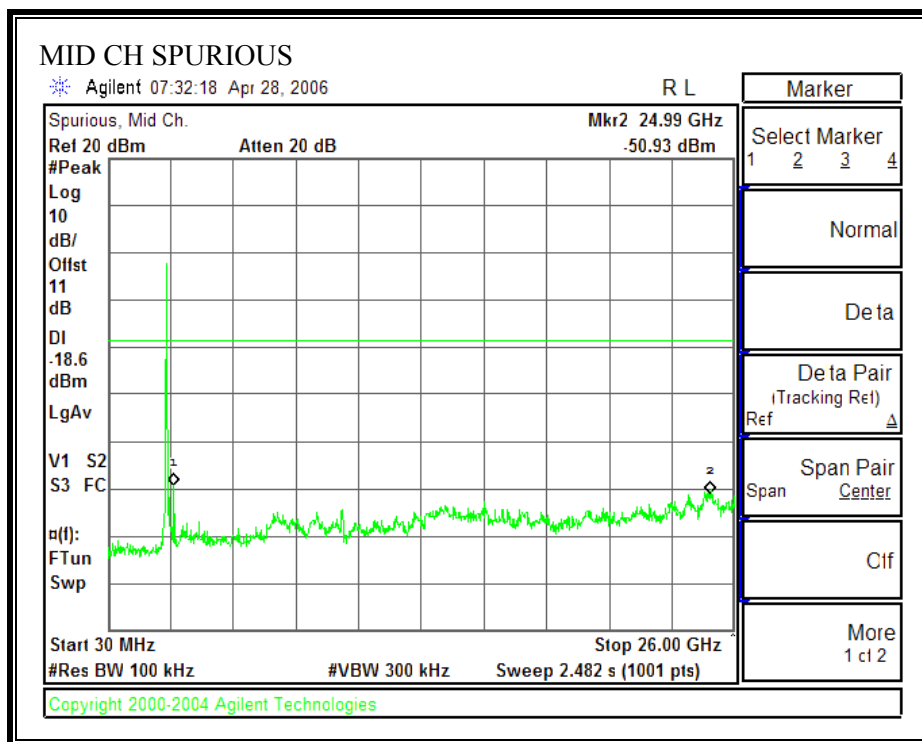




PURIOUS EMISSIONS, MIDDLE CHANNEL (802.11 - 20 MHz TX BANDWIDTH – CHAIN 0)

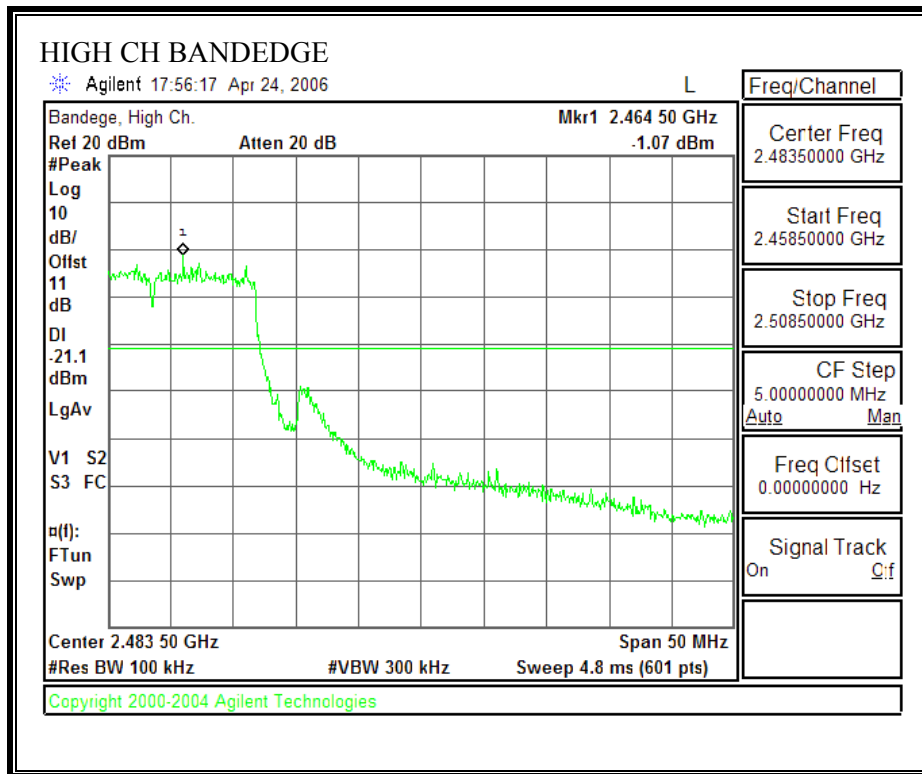
MID CH BANDEGE, 2437 MHz

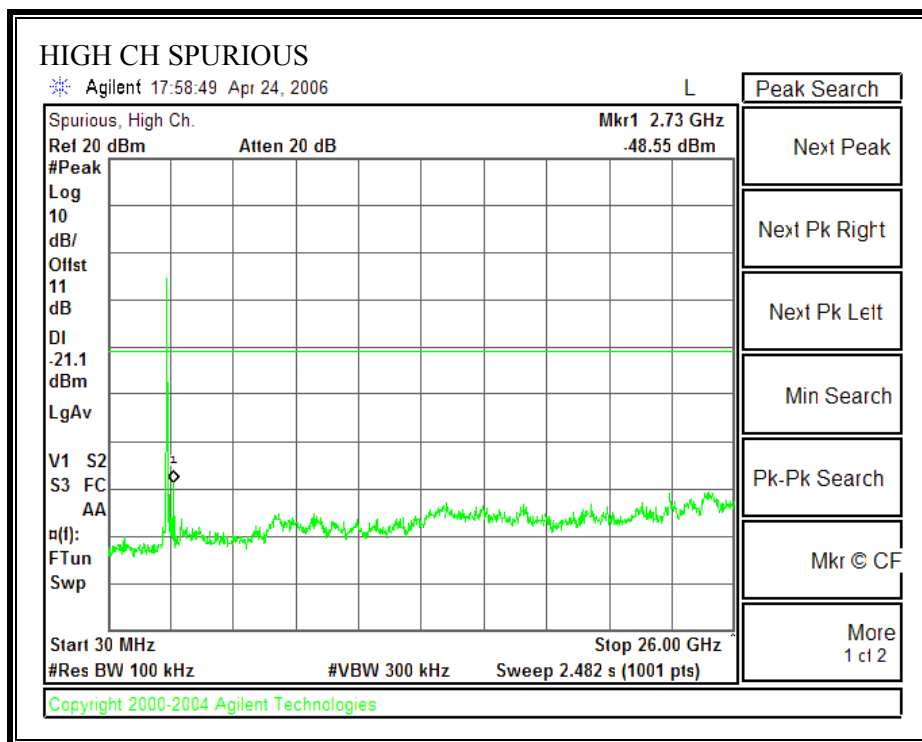




SPURIOUS EMISSIONS, HIGH CHANNEL (802.11 - 40 MHz TX BANDWIDTH – CHAIN 0)

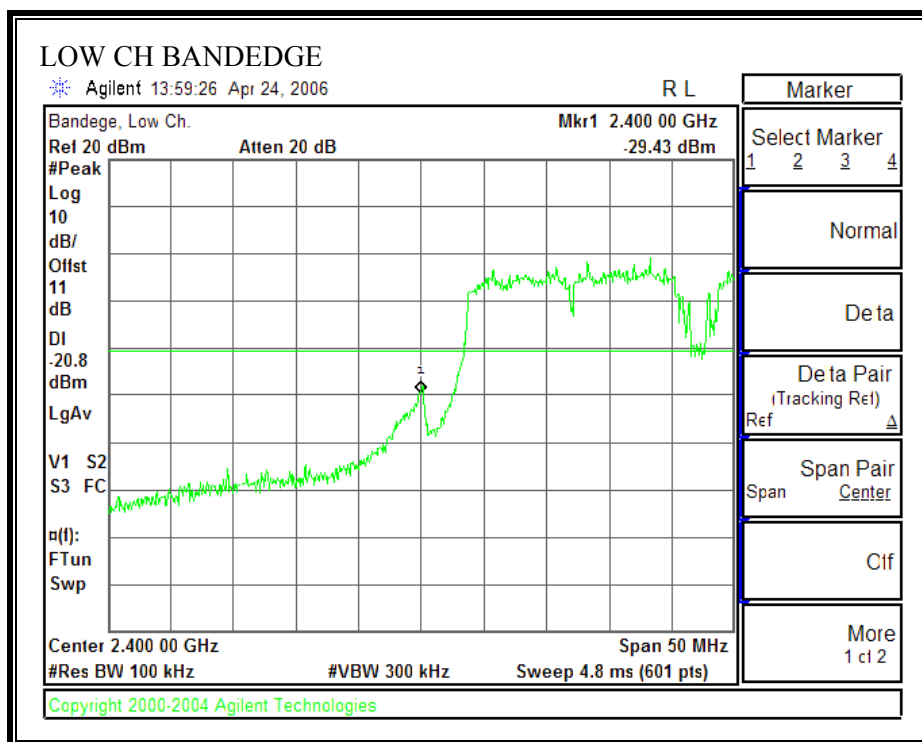
HIGH CH BANDEDGE, 2452 MHz

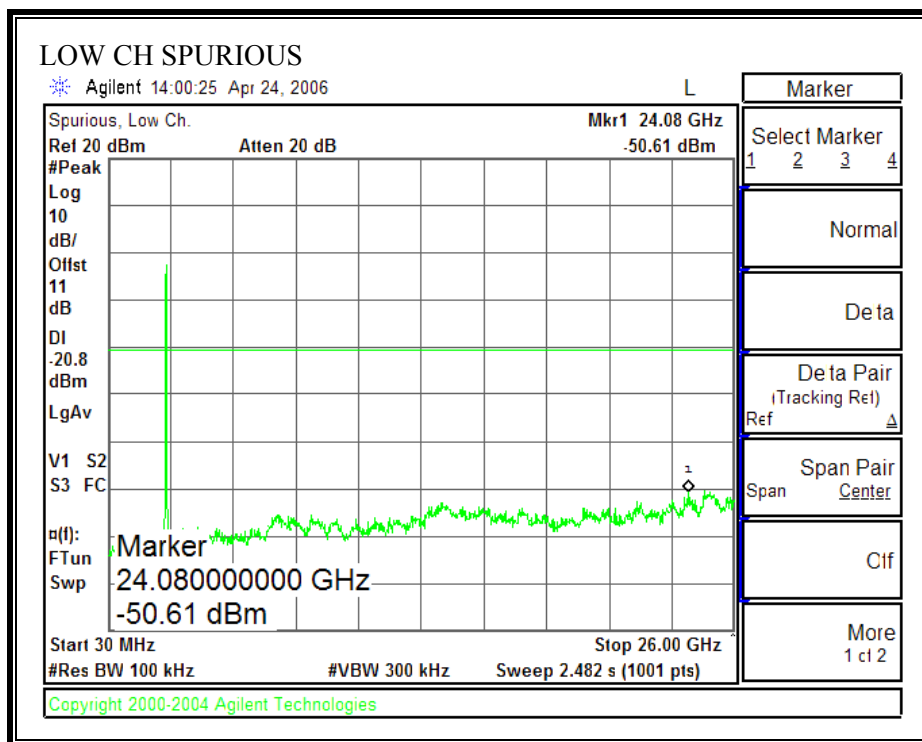




SPURIOUS EMISSIONS, LOW CHANNEL (802.11 - 40 MHz TX BANDWIDTH – CHAIN 1)

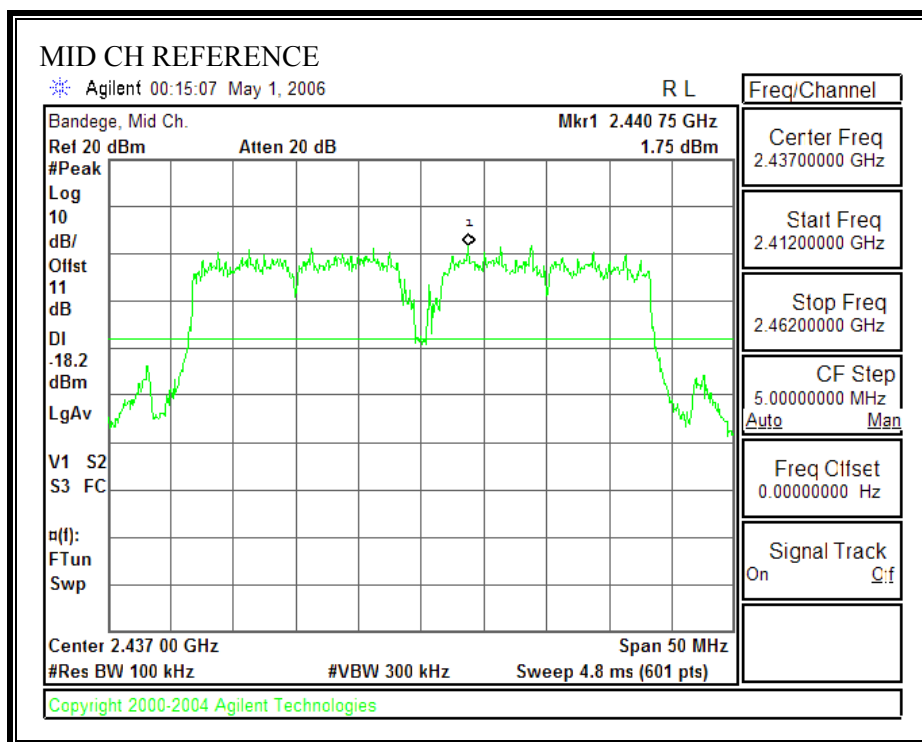
LOW CH BANDEDGE, 2422 MHz

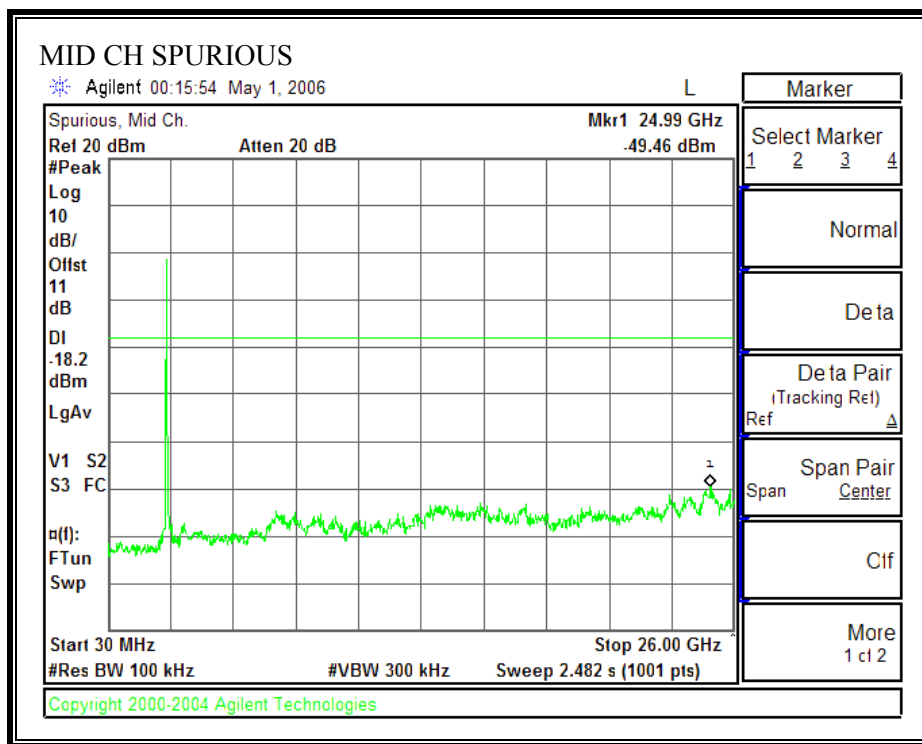




SPURIOUS EMISSIONS, MIDDLE CHANNEL (802.11 - 40 MHz TX BANDWIDTH – CHAIN 1)

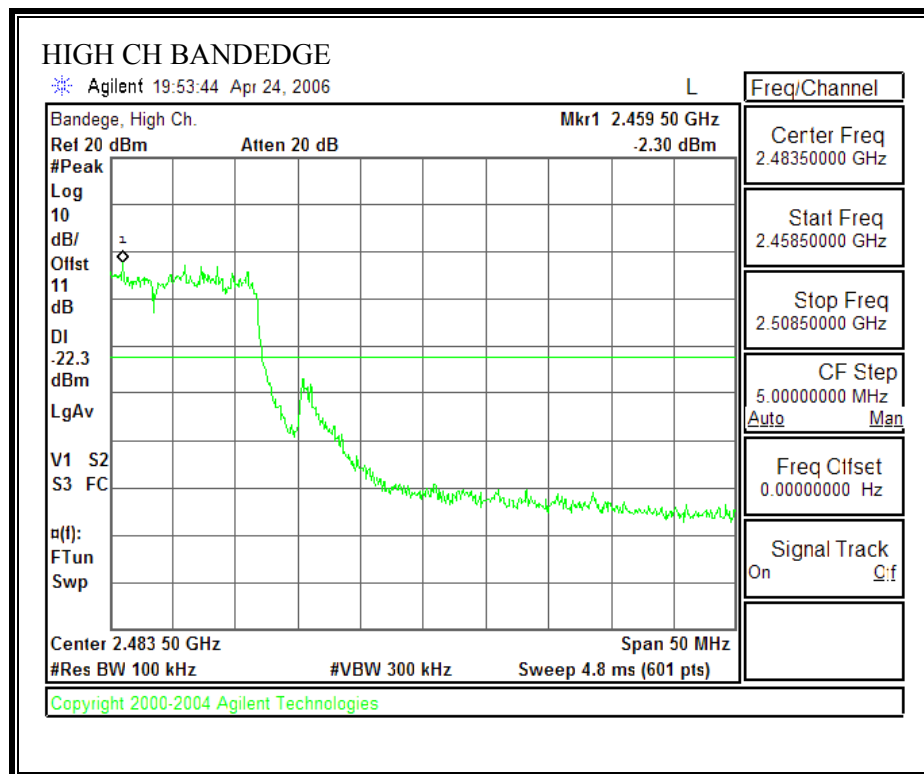
MID CH BANDEGE, 2437 MHz

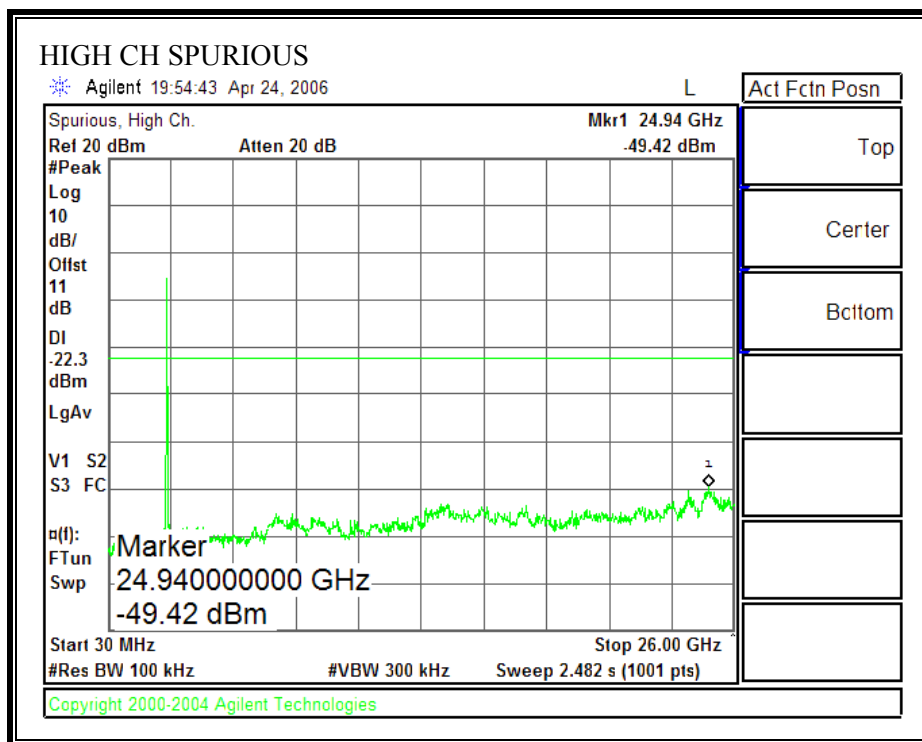




SPURIOUS EMISSIONS, HIGH CHANNEL (802.11 - 40 MHz TX BANDWIDTH – CHAIN 1)

HIGH CH BANDEDGE, 2452 MHz

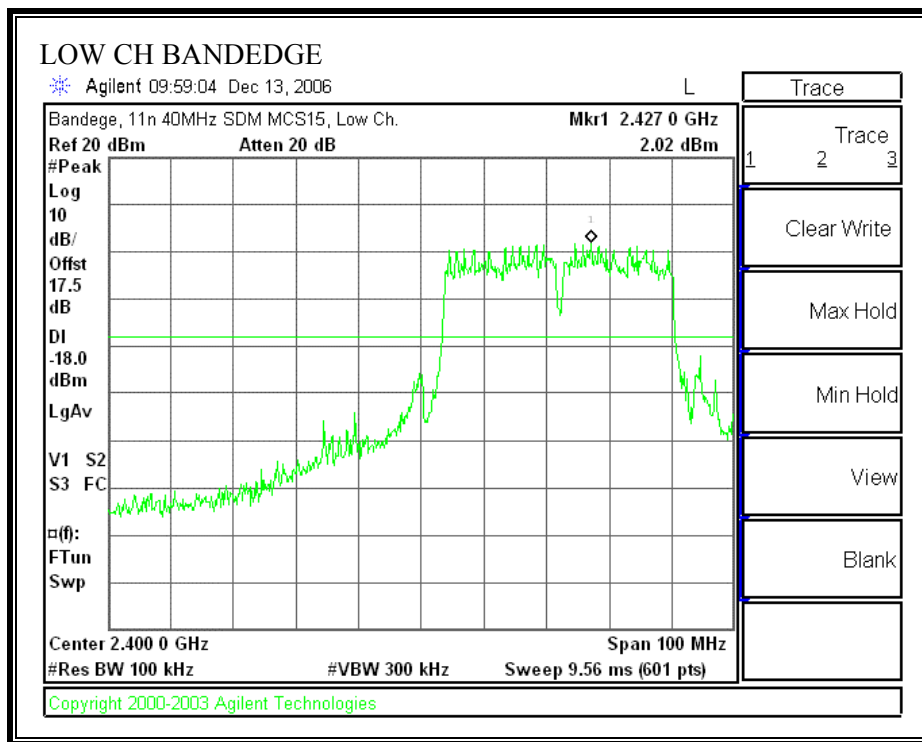


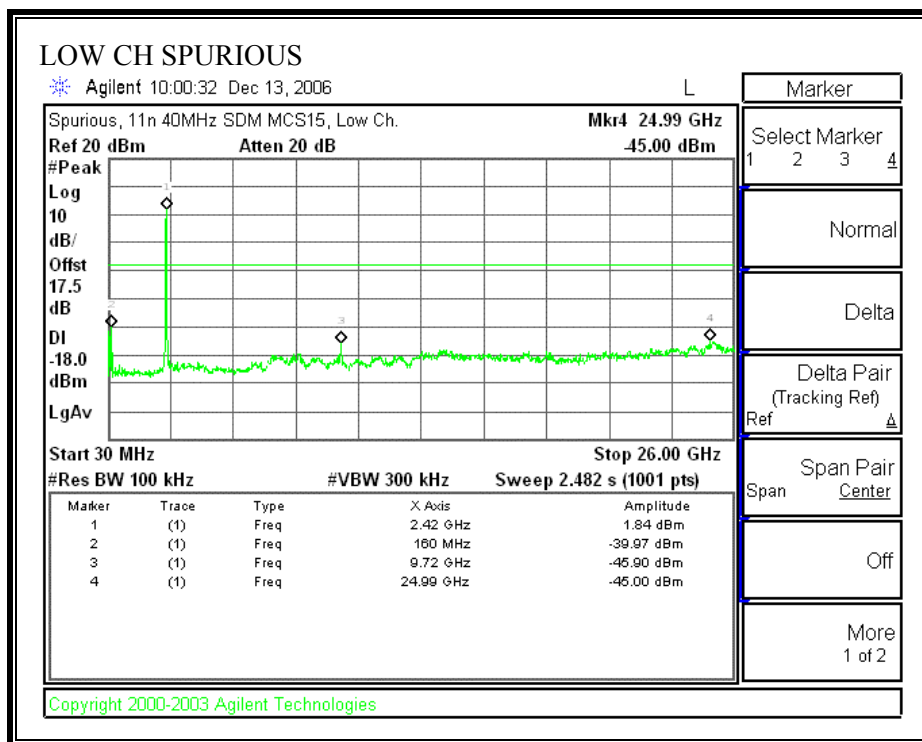


802.11n Mode 40 MHz CDD MCS 15:

SPURIOUS EMISSIONS, LOW CHANNEL (802.11 - 40 MHz TX BANDWIDTH – CHAIN 0)

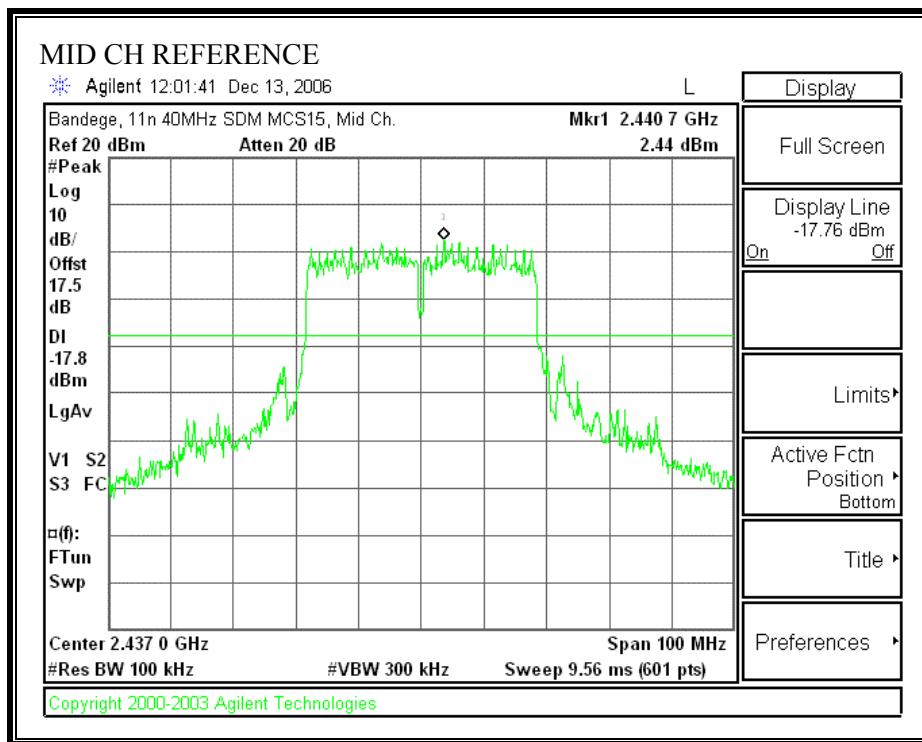
LOW CH BANDEDGE, 2422 MHz

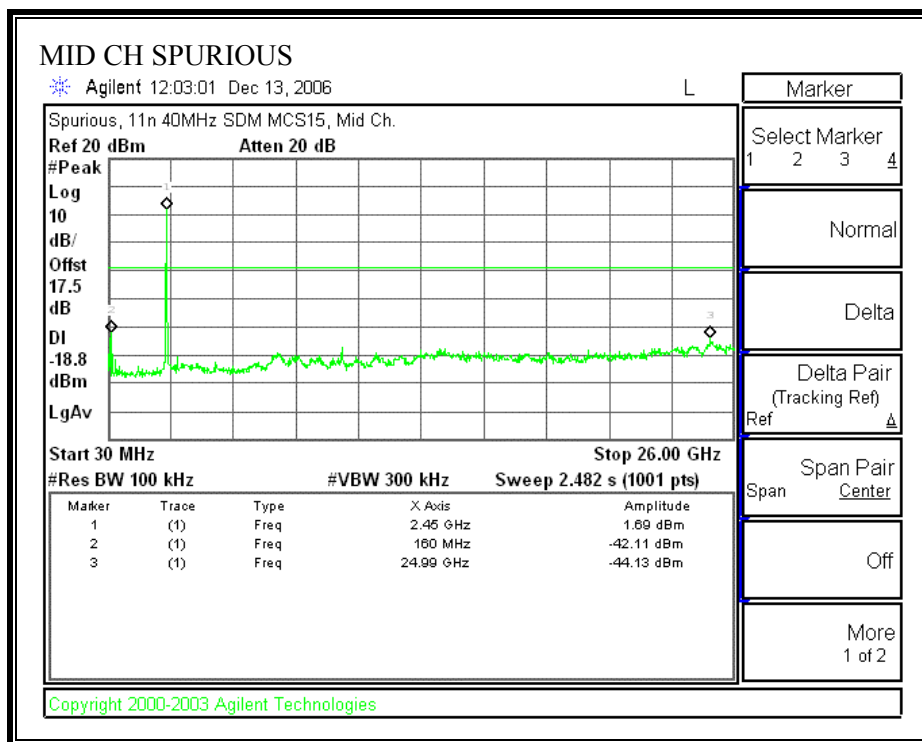




PURIOUS EMISSIONS, MIDDLE CHANNEL (802.11 - 20 MHz TX BANDWIDTH – CHAIN 0)

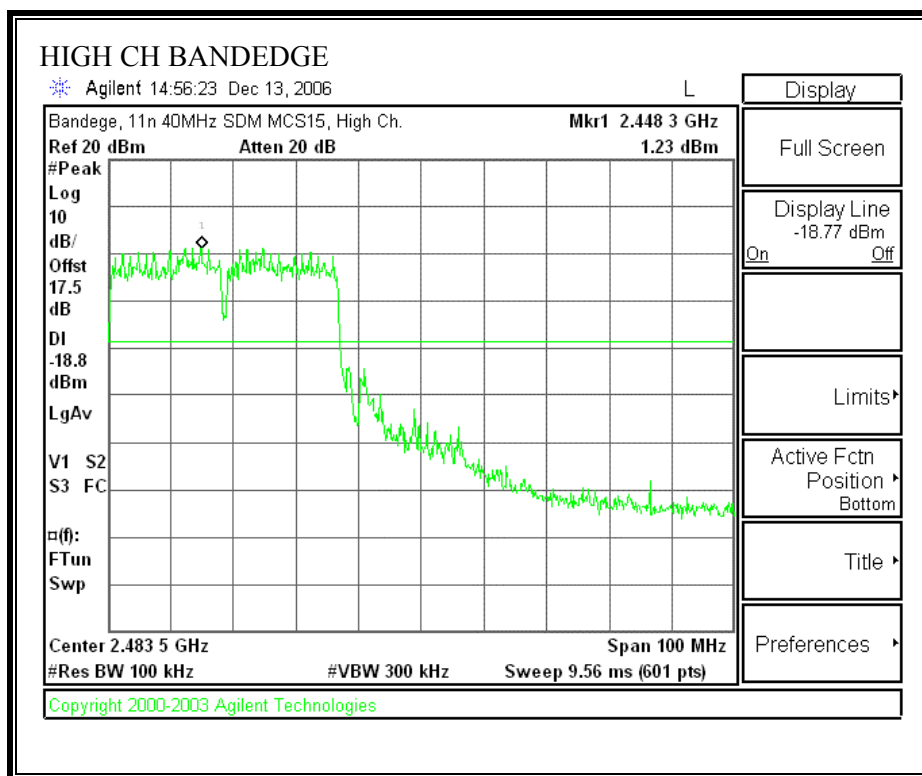
MID CH BANDEGE, 2437 MHz

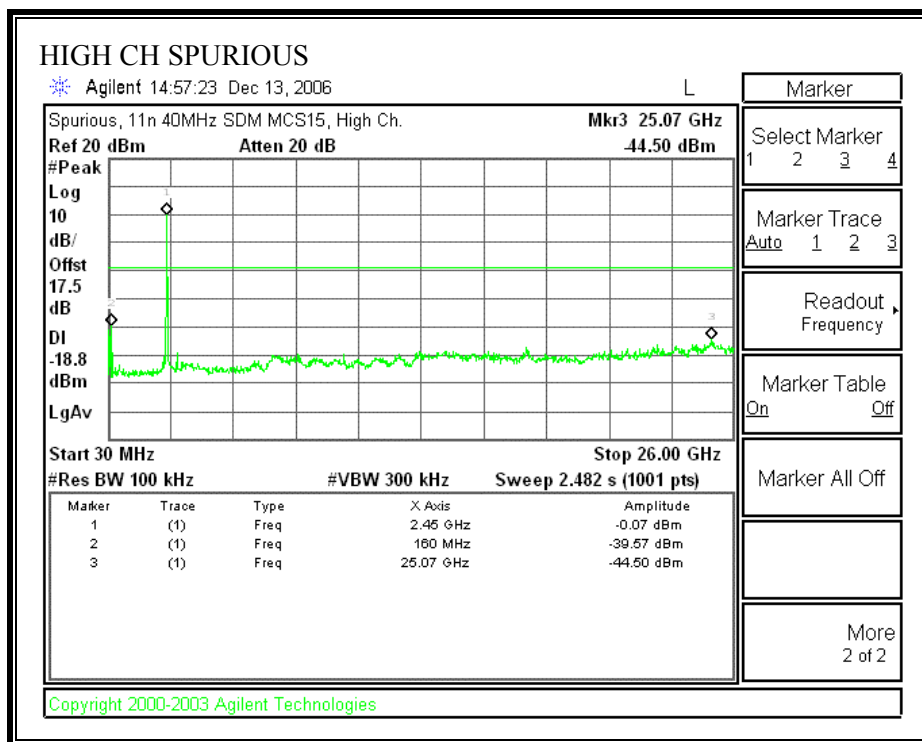




SPURIOUS EMISSIONS, HIGH CHANNEL (802.11 - 40 MHz TX BANDWIDTH – CHAIN 0)

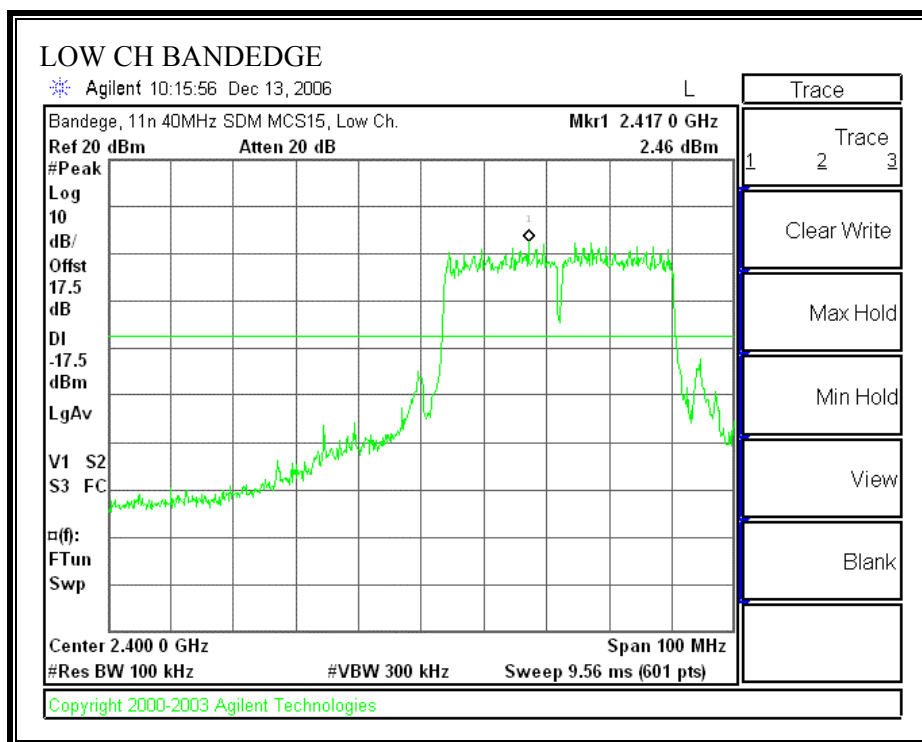
HIGH CH BANDEDGE, 2452 MHz

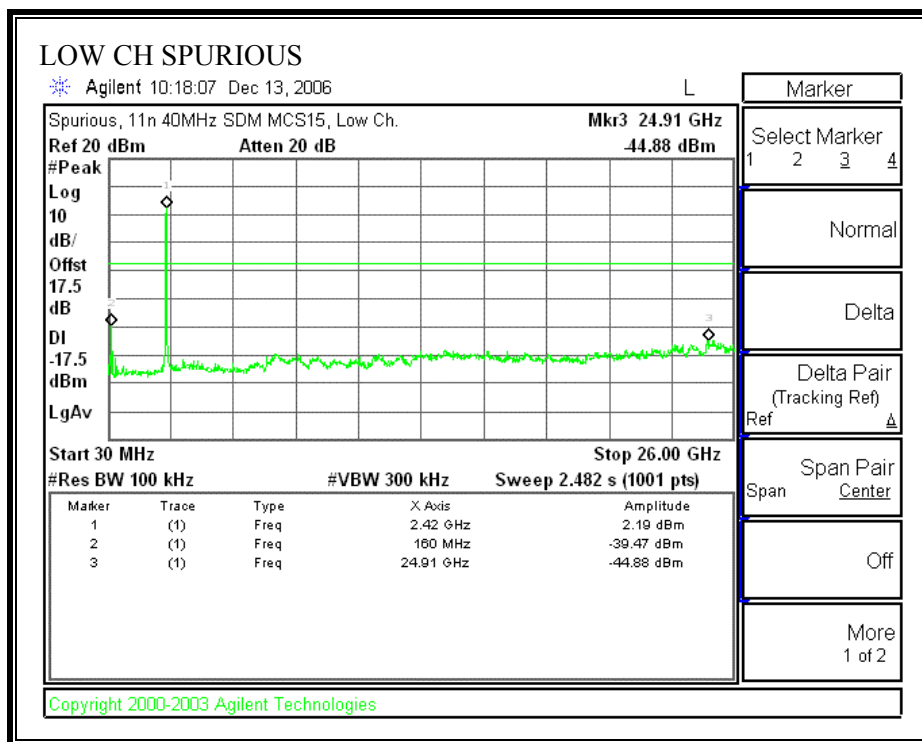




SPURIOUS EMISSIONS, LOW CHANNEL (802.11 - 40 MHz TX BANDWIDTH – CHAIN 1)

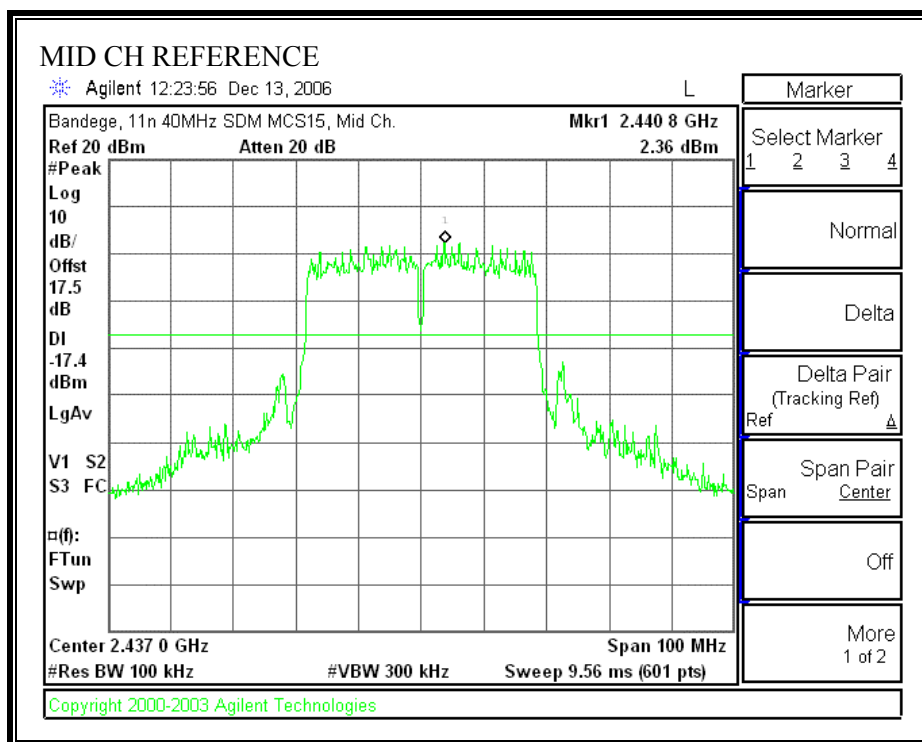
LOW CH BANDEDGE, 2422 MHz

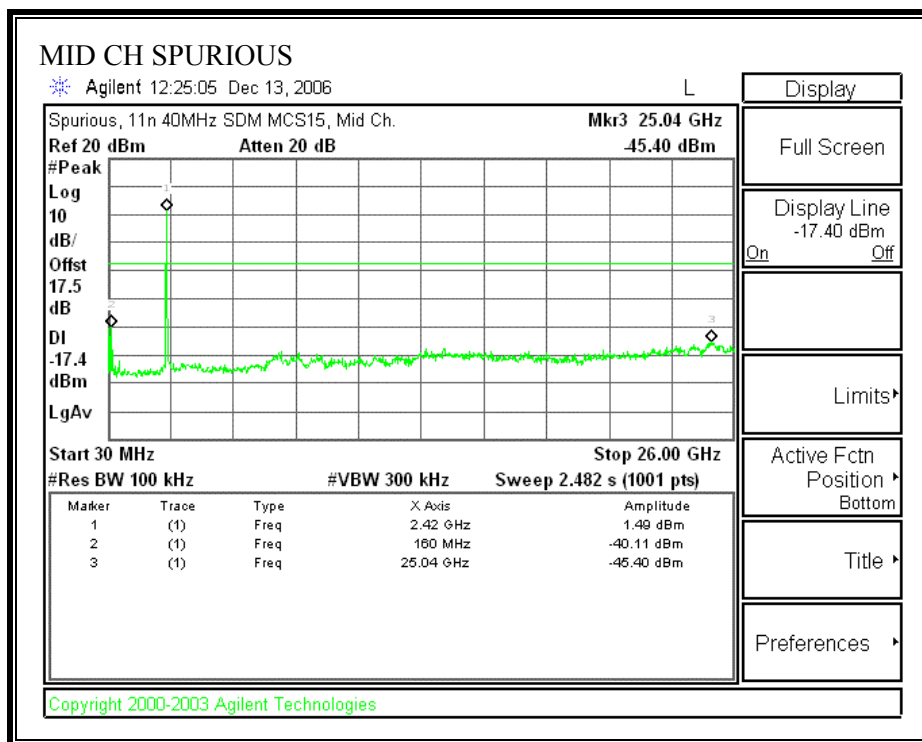


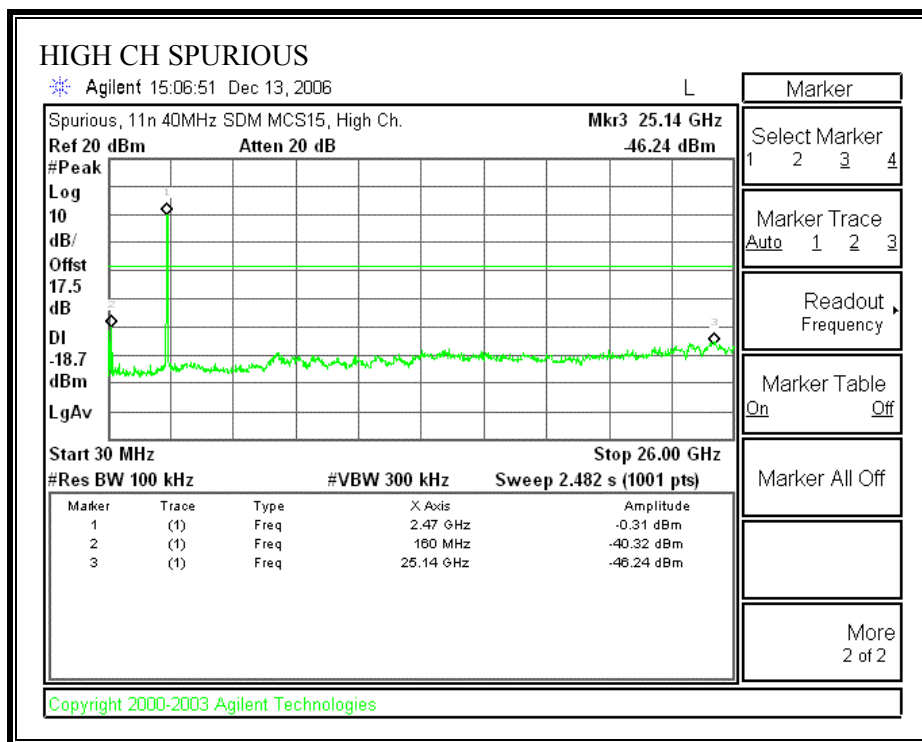


SPURIOUS EMISSIONS, MIDDLE CHANNEL (802.11 - 40 MHz TX BANDWIDTH – CHAIN 1)

MID CH BANDEGE, 2437 MHz







7.4. CHANNEL TESTS FOR THE 5725 TO 5850 MHz BAND

7.4.1. 6 dB BANDWIDTH

LIMIT

§15.247 (a) (2) For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

No non-compliance noted:

6 dB BANDWIDTH

802.11a Mode CDD is covered by the worst case 802.11n Mode 20 MHz CDD MCS0

802.11n Mode 20 MHz CDD MCS0

20 MHz Tx BANDWIDTH - CHAIN 0

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	5745	16170	500	15670
Middle	5785	16420	500	15920
High	5825	16500	500	16000

20 MHz Tx BANDWIDTH - CHAIN 1

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	5745	16250	500	15750
Middle	5785	16420	500	15920
High	5825	16330	500	15830

802.11n Mode 40 MHz CDD MCS32

40 MHz Tz BANDWIDTH - CHAIN 0

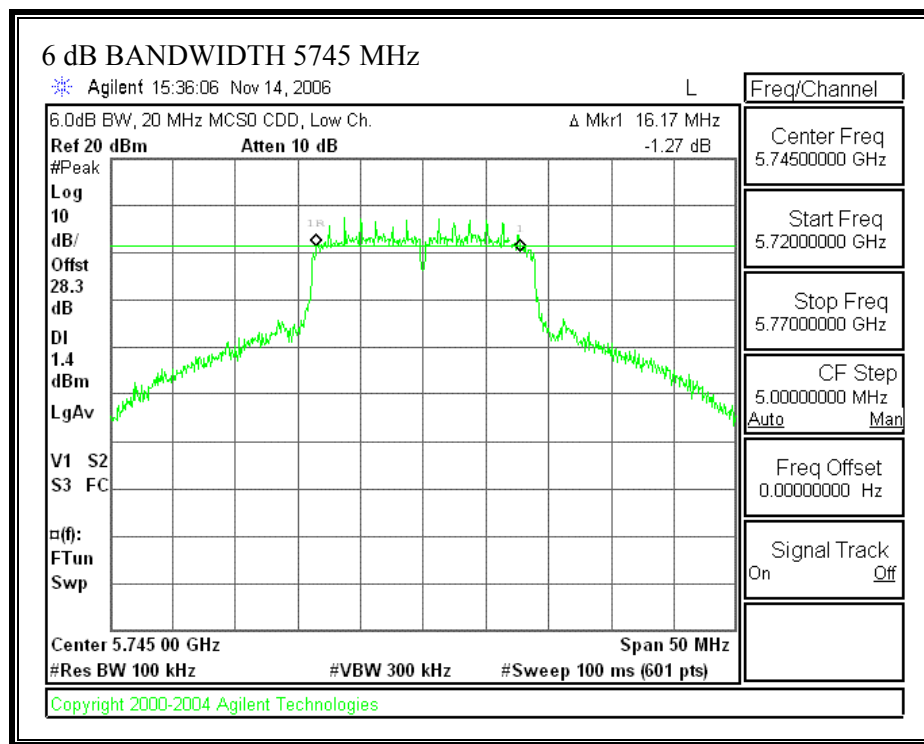
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
High	5755	35420.00	500	34920
High	5795	35420.00	500	34920

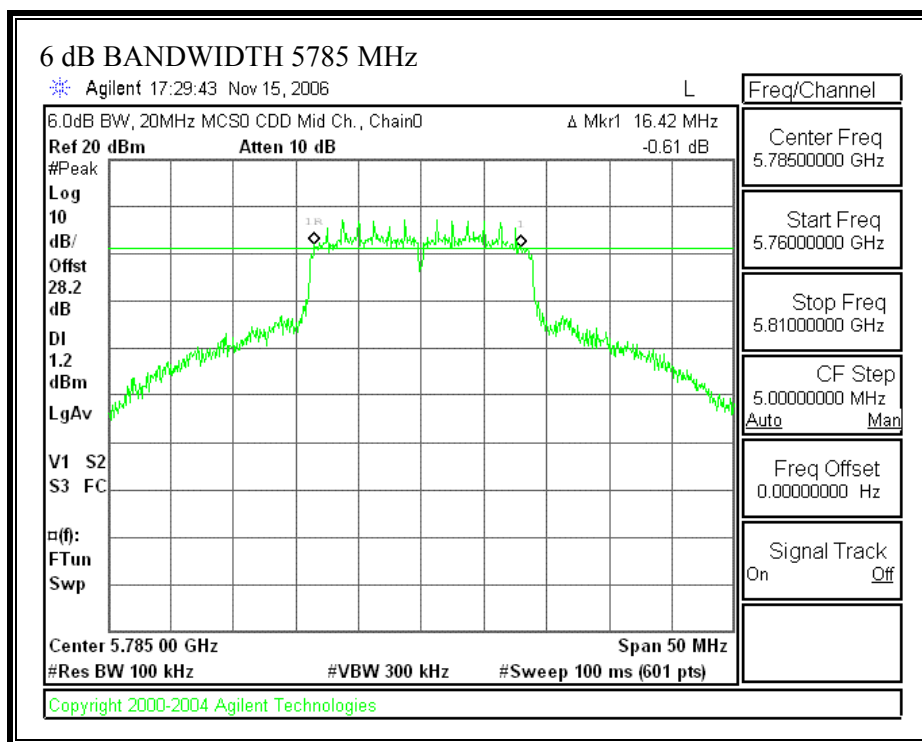
40 MHz Tx BANDWIDTH - CHAIN 1

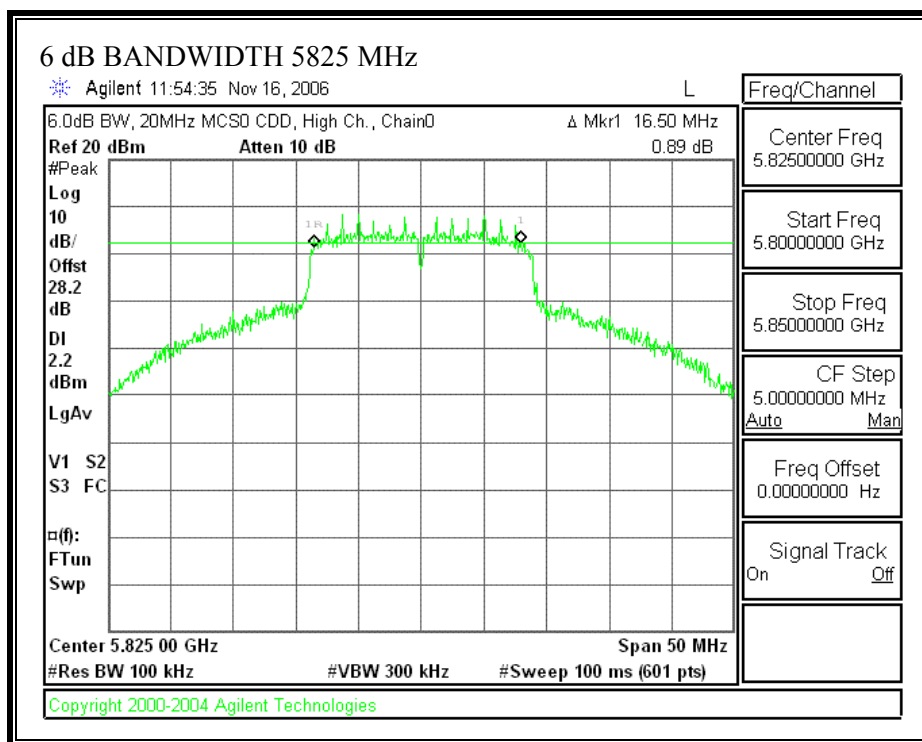
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
High	5755	35750	500	35250
High	5795	35580	500	35080

802.11n Mode 20 MHz CDD MCS0

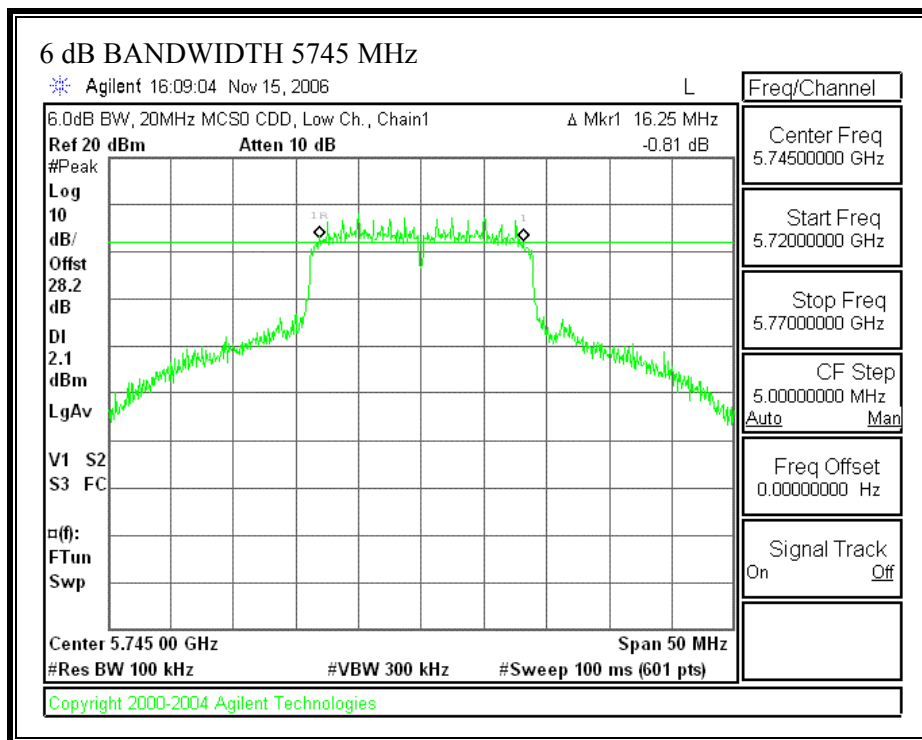
6 dB BANDWIDTH (802.11n - 20 MHz TX BANDWIDTH – CHAIN 0)

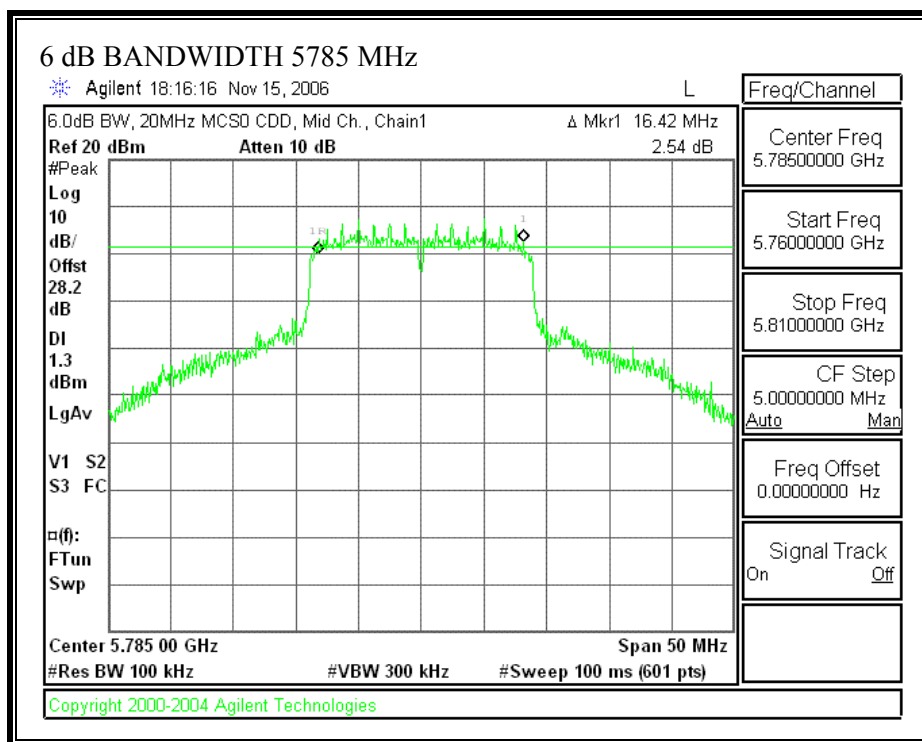


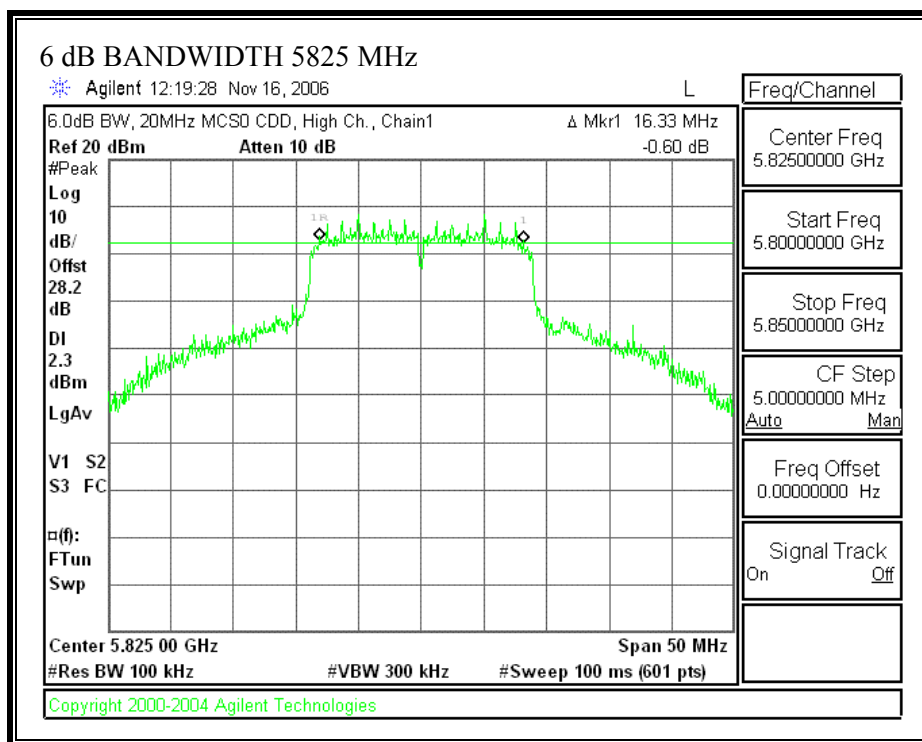




6 dB BANDWIDTH (802.11 - 20 MHz TX BANDWIDTH – CHAIN 1)

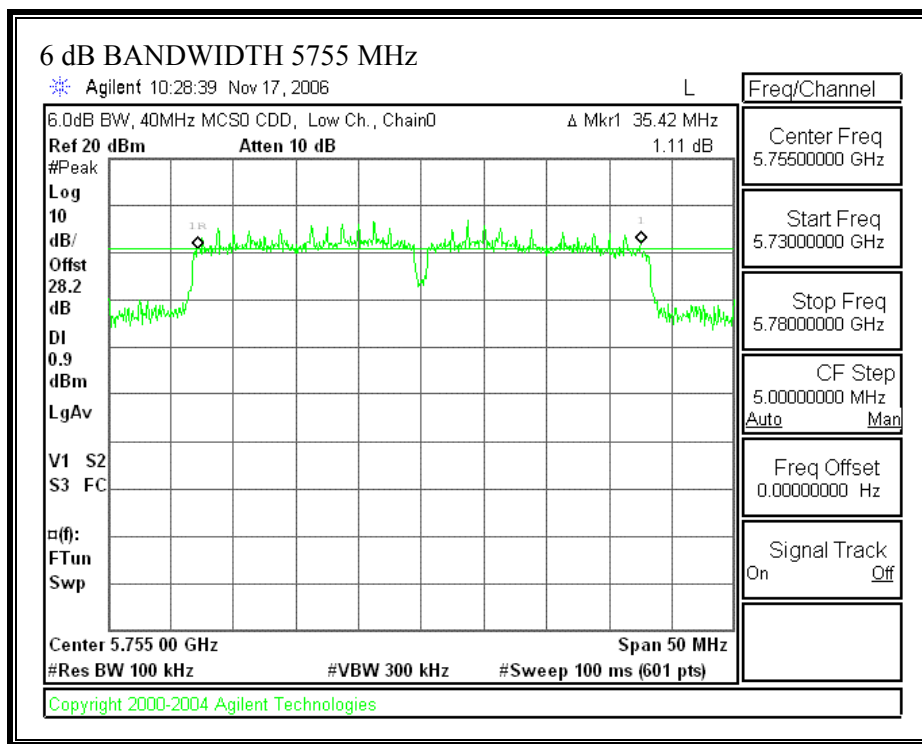


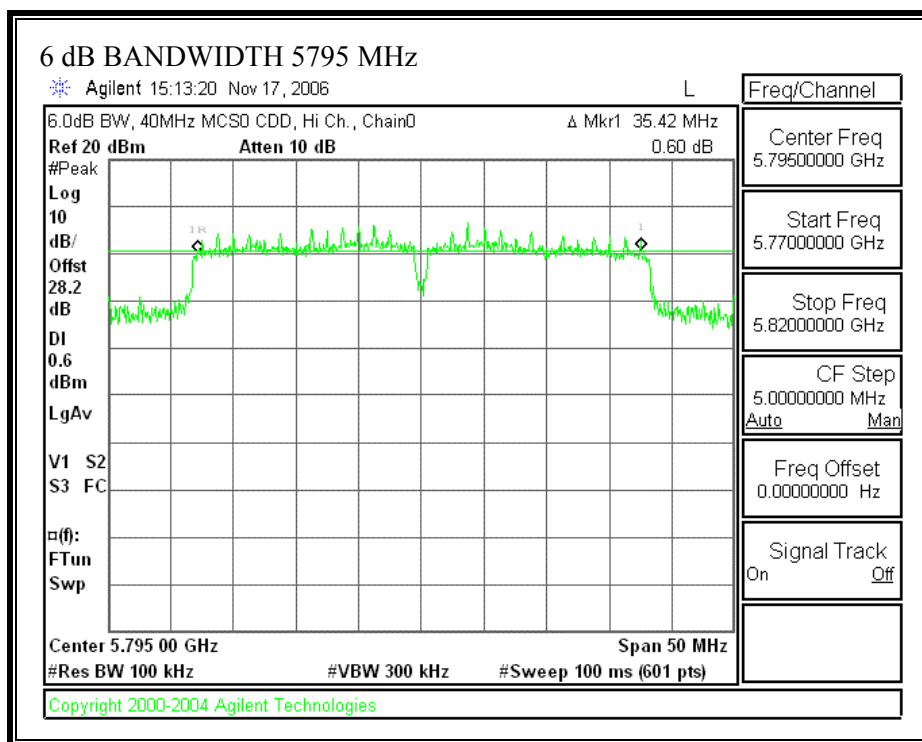




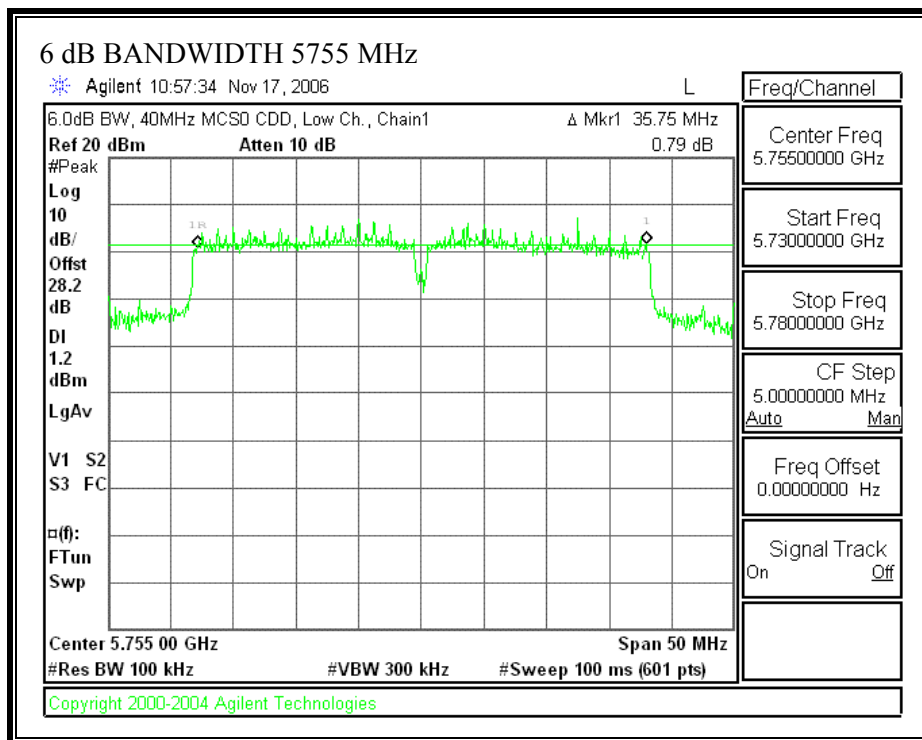
802.11n Mode 40 MHz CDD MCS32

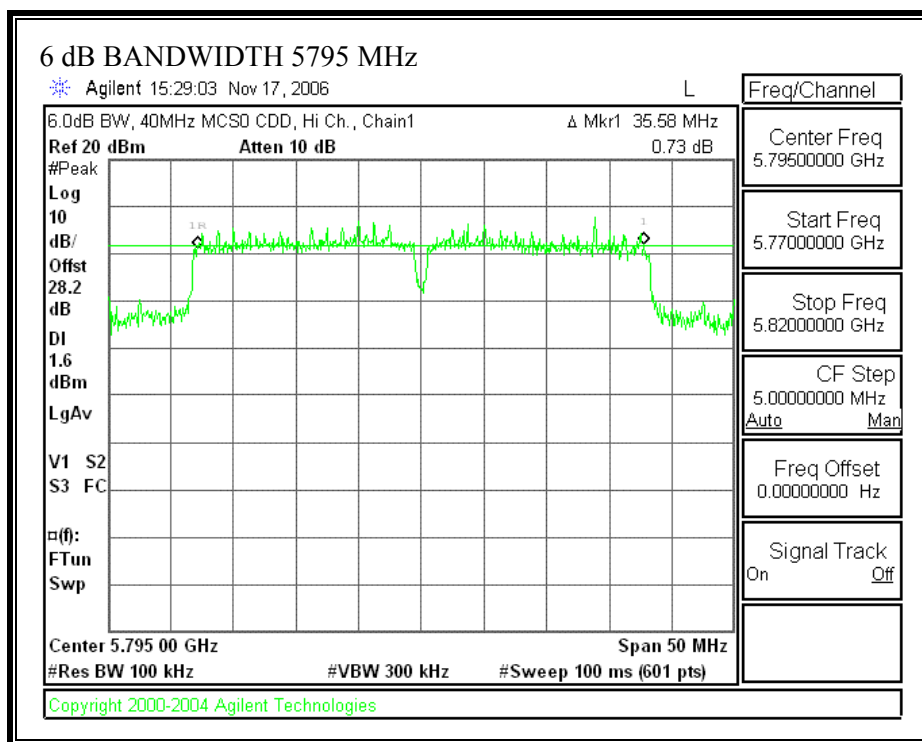
6 dB BANDWIDTH (802.11 - 40 MHz TX BANDWIDTH – CHAIN 0)





6 dB BANDWIDTH (802.11 - 40 MHz TX BANDWIDTH – CHAIN 1)





7.4.2. 99% BANDWIDTH

LIMIT

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 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

No non-compliance noted:

99% BANDWIDTH

802.11a Mode CDD is covered by the worst case **802.11n Mode 20 MHz CDD MCS0**

802.11n Mode 20 MHz CDD MCS0

20MHz Tx Bandwidth

Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)	99% Bandwidth Chain 1 (MHz)
Low	5745	17.8049	17.7141
Middle	5785	18.7346	17.7768
High	5825	24.4415	19.5107

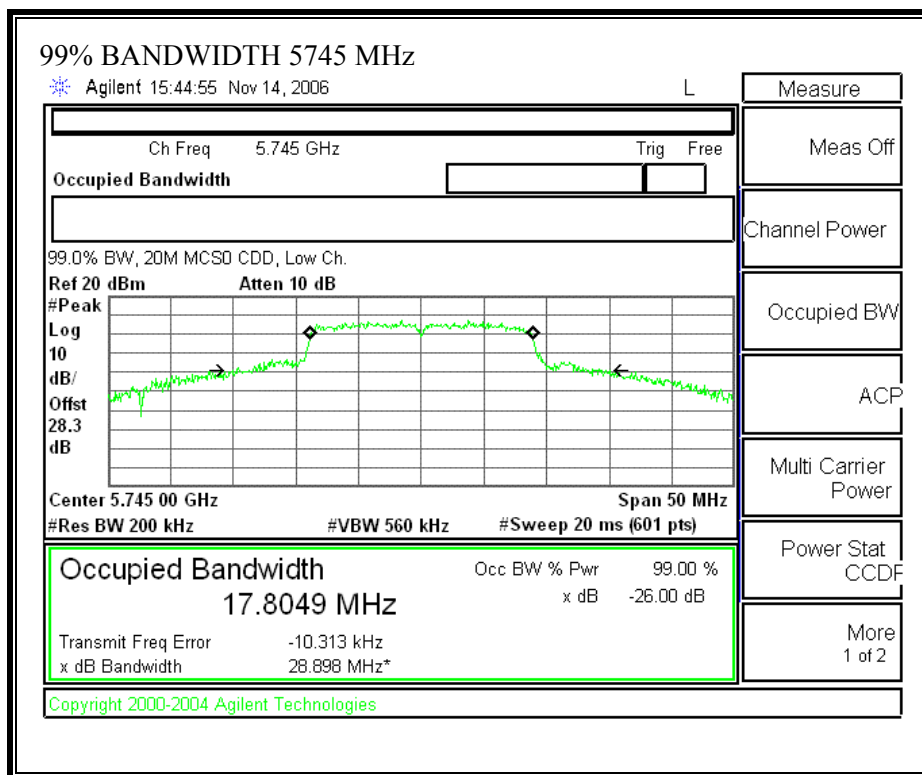
802.11n Mode 40 MHz CDD MCS32

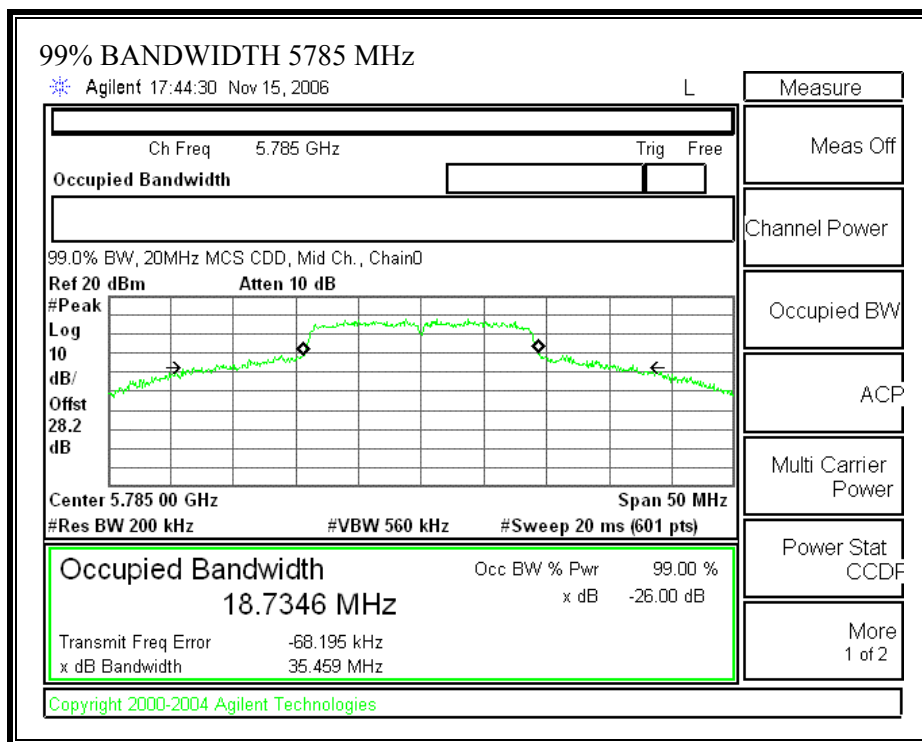
40MHz Tx Bandwidth

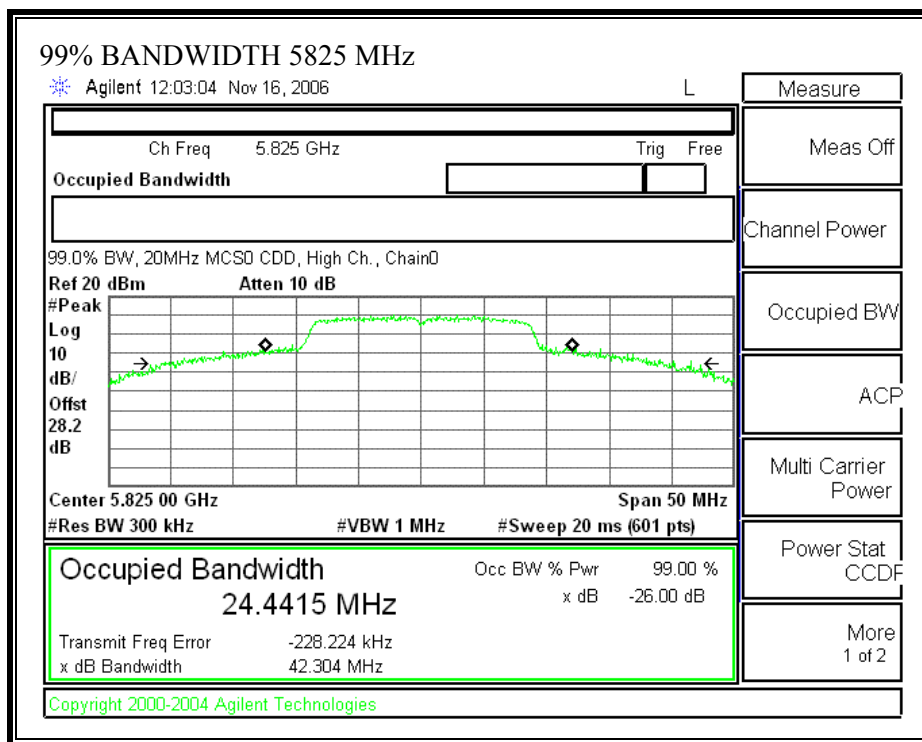
Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)	99% Bandwidth Chain 1 (MHz)
Low	5755	37.3590	36.7146
High	5795	38.4872	36.7906

802.11n Mode 20 MHz CDD MCS0

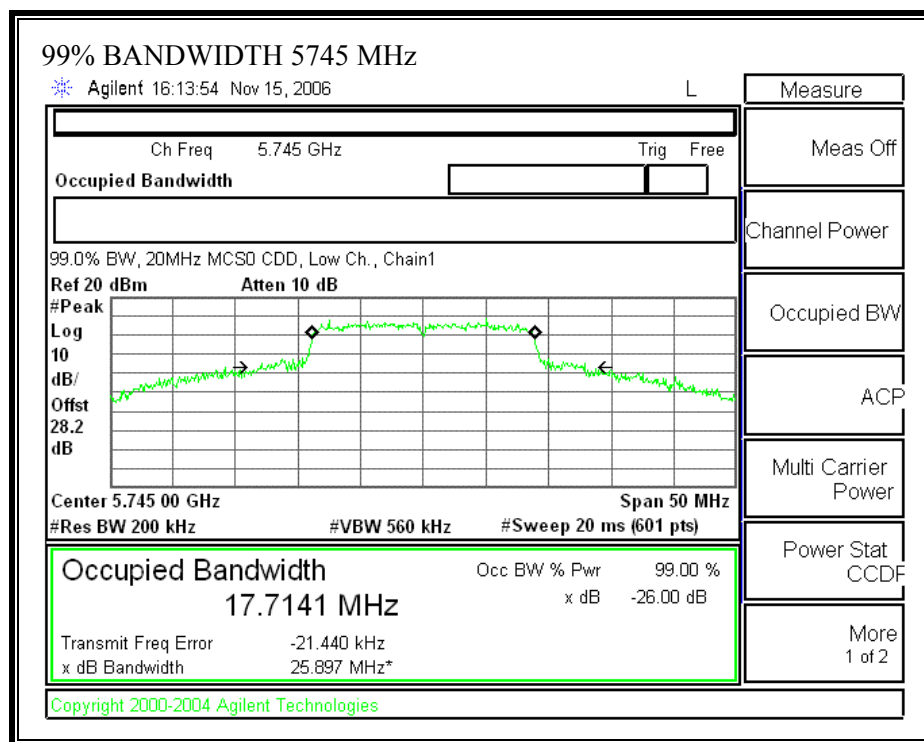
99% BANDWIDTH (802.11 - 20 MHz Tx BANDWIDTH – CHAIN 0)

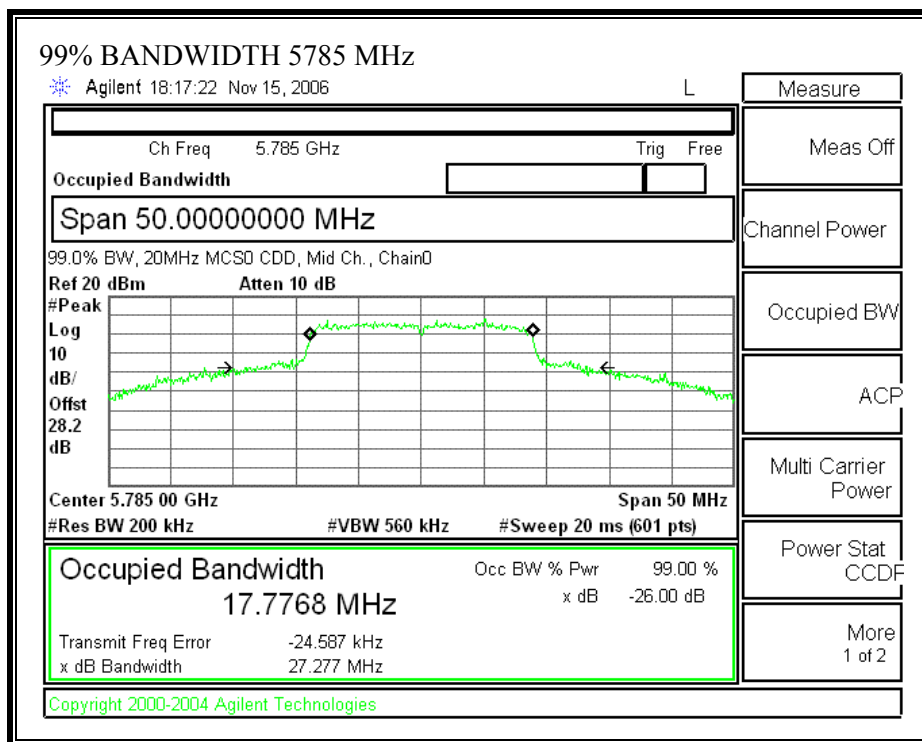


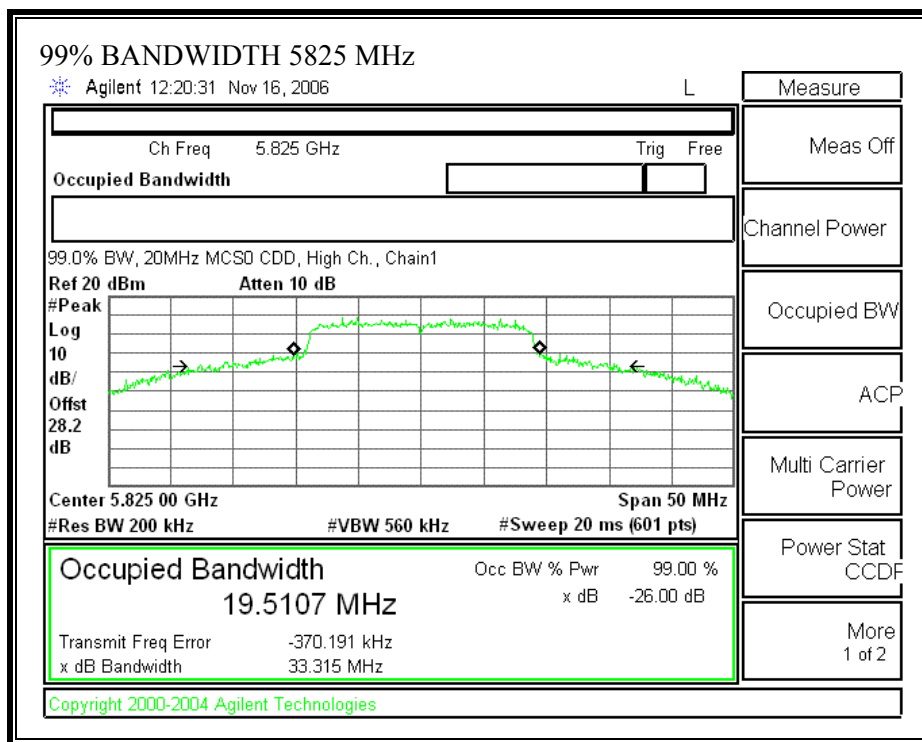




99% BANDWIDTH (802.11 - 20 MHz Tx BANDWIDTH – CHAIN 1)

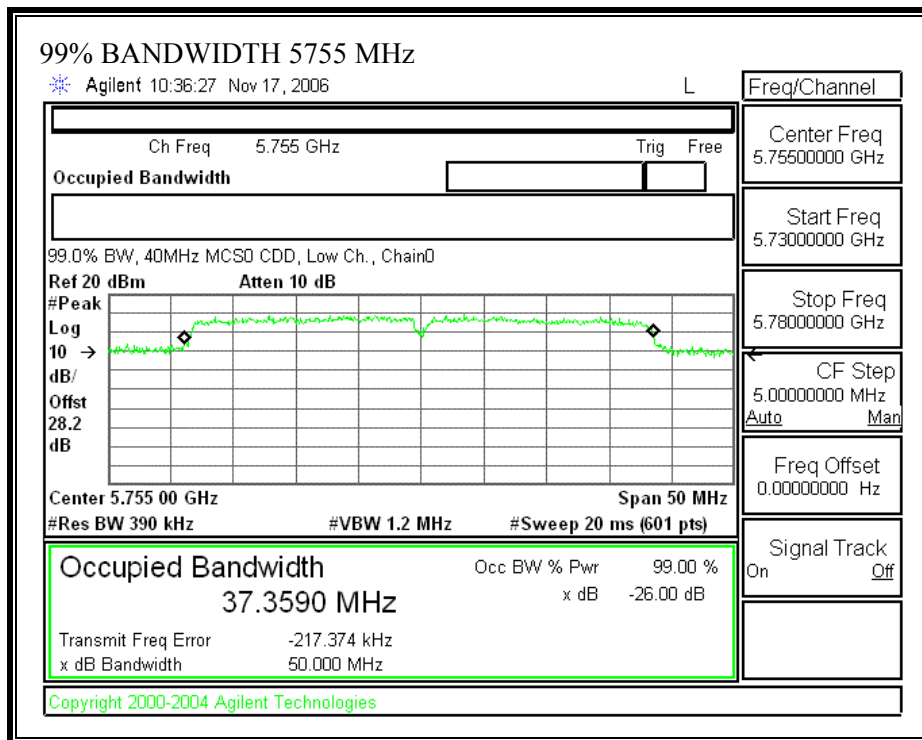


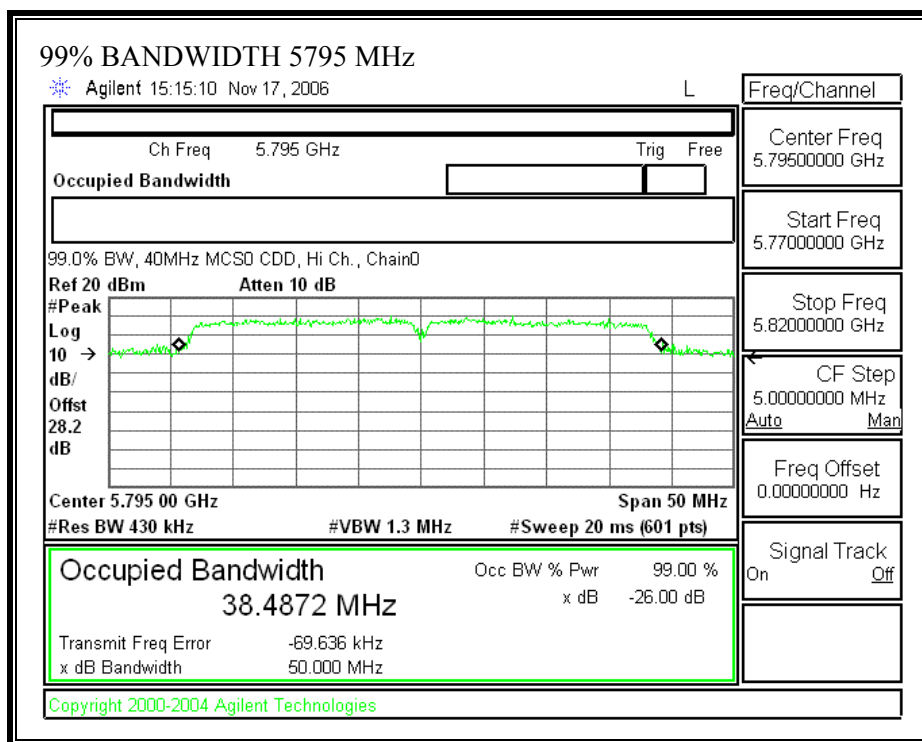




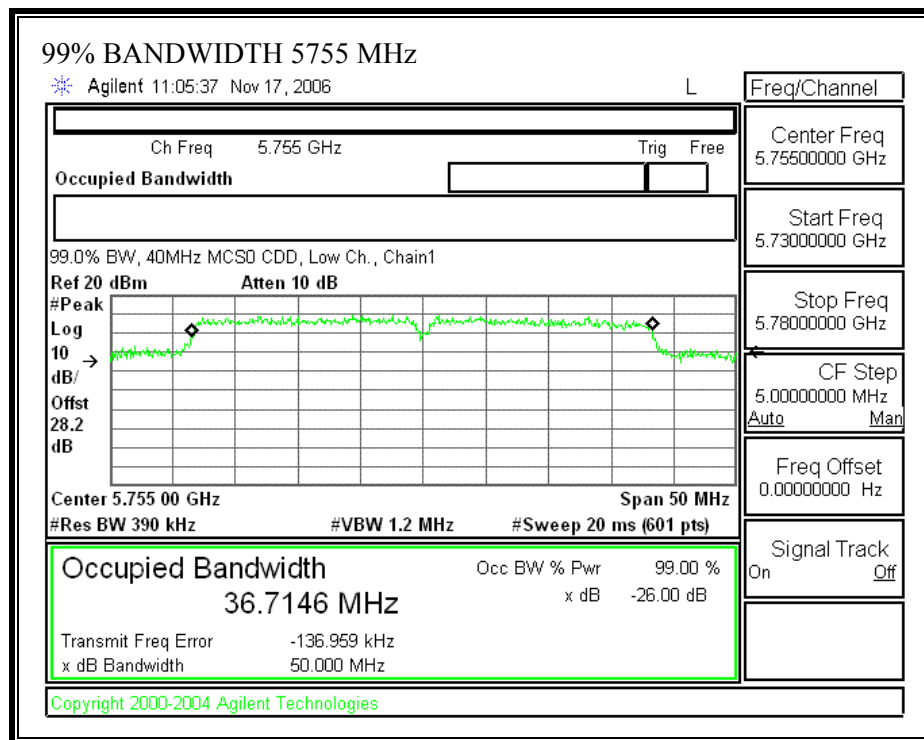
802.11n Mode 40 MHz CDD MCS32

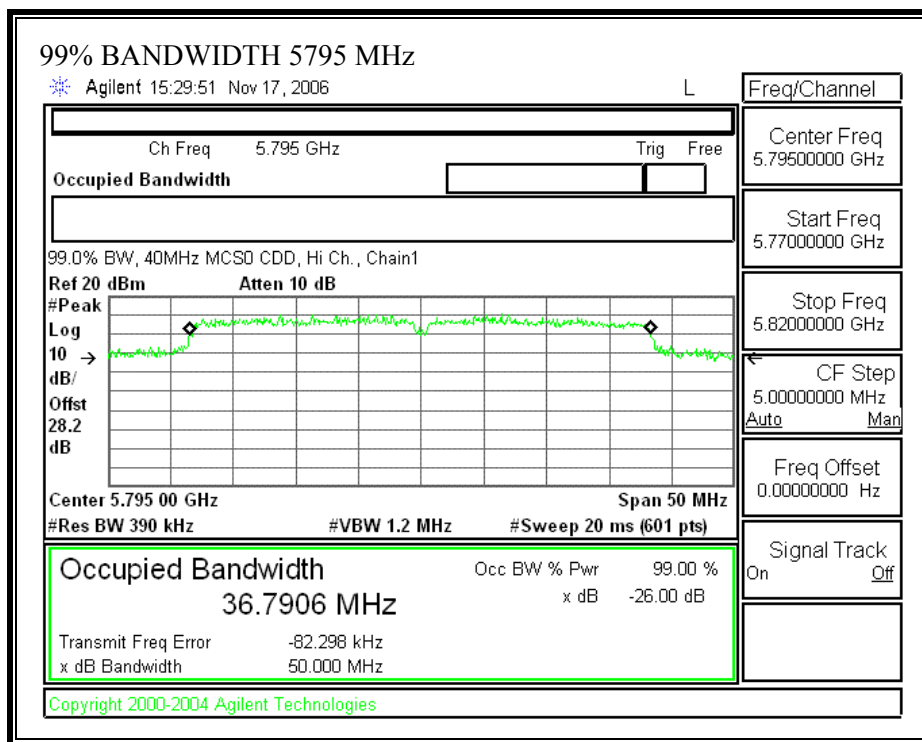
99% BANDWIDTH (802.11 - 40 MHz TX BANDWIDTH – CHAIN 0)





99% BANDWIDTH (802.11 - 40 MHz TX BANDWIDTH – CHAIN 1)





7.4.3. PEAK OUTPUT POWER

PEAK POWER LIMIT

§15.247 (b) The maximum peak output power of the intentional radiator shall not exceed the following:

§15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt.

§15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

§15.247 (b) (4) (i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.

Following formula to calculate the array gain:

$$\text{Array gain} = 10 \cdot \log (10^{\text{(main gain/10)}} + 10^{\text{(aux gain/10)}})$$

2.4GHz band: 6.142 dBi

5.8GHz band: 8.555 dBi

RESULTS.

The maximum antenna gain is 8.555dBi @ 5.8 GHz for other than fixed, point-to-point operations, therefore the limit is 27.48dBm for 5.8 GHz band.

Total peak power calculation formula: $10 \log (10^{(P_{chain0} / 10)} + 10^{(P_{chain1} / 10)})$

Note: Pchain 0 and Pchain1 are in dBm

No non-compliance noted:

802.11a Mode CDD is covered by the worst case 802.11n Mode 20 MHz CDD MCS0

802.11n Mode 20 MHz CDD MCS0

CHAIN 0 & CHAIN 1

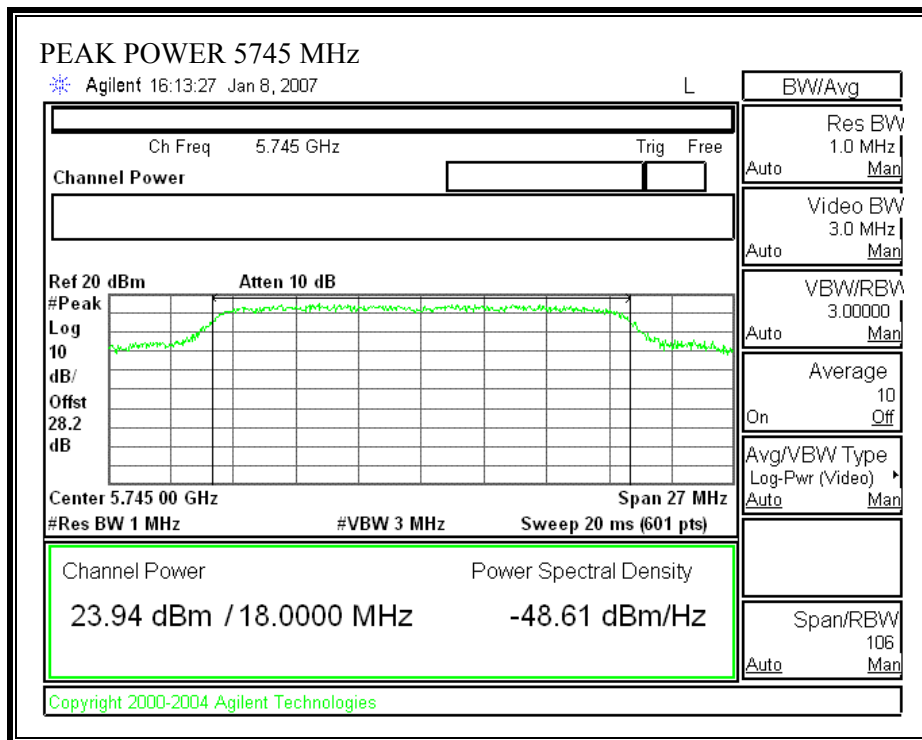
Channel	Frequency (MHz)	Peak Power Chain 0 (dBm)	Peak Power Chain 1 (dBm)	Peak Power Total (dBm)	Limit (dBm)	Margin (dB)
Low	5745	23.94	23.82	26.89	27.45	-0.56
Middle	5785	24.38	24.36	27.38	27.45	-0.07
High	5825	24.39	24.29	27.35	27.45	-0.10

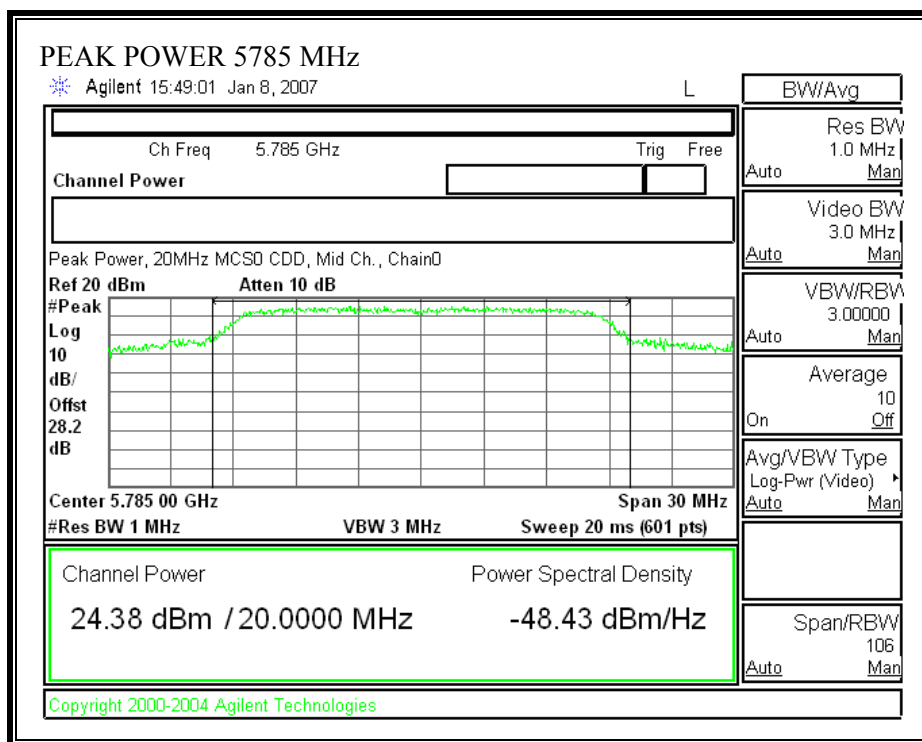
802.11n Mode 40 MHz CDD MCS32

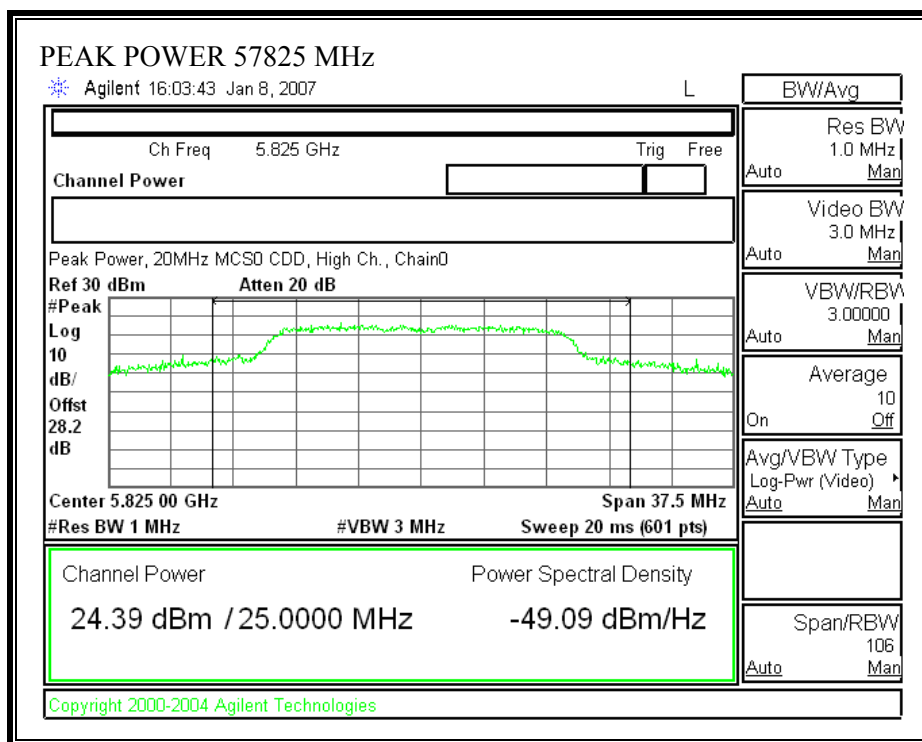
Channel	Frequency (MHz)	Peak Power Chain 0 (dBm)	Peak Power Chain 1 (dBm)	Peak Power Total (dBm)	Limit (dBm)	Margin (dB)
CHAIN 0 & CHAIN 1						
Low	5755	24.18	24.19	27.20	27.45	-0.25
High	5795	24.33	24.36	27.36	27.45	-0.09

802.11n Mode 20 MHz CDD MCS0

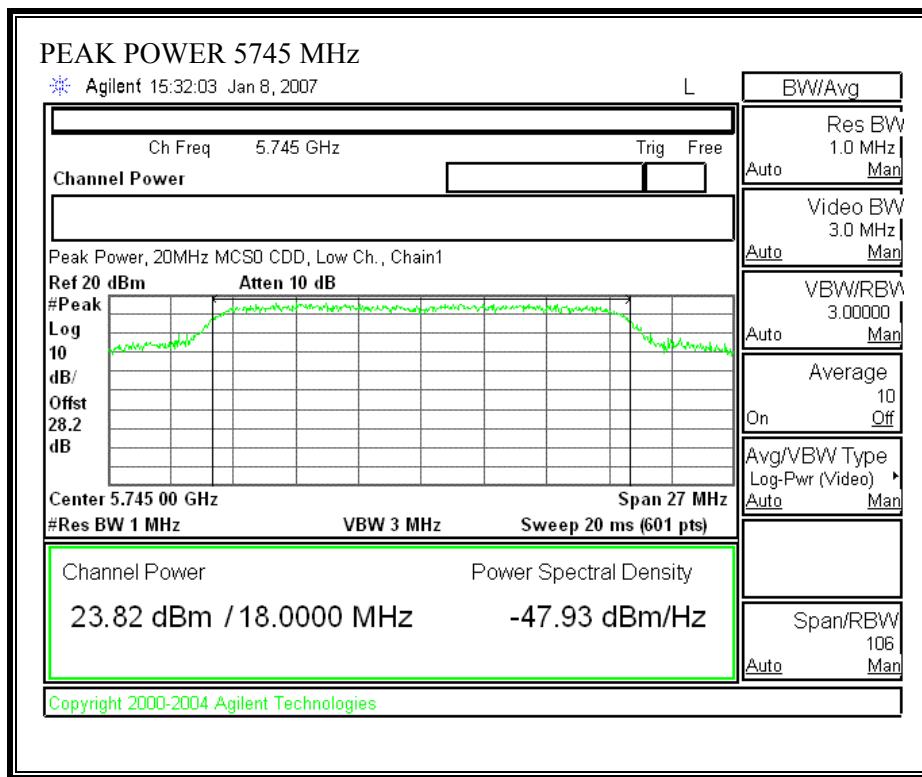
OUTPUT POWER (802.11 - 20 MHz TX BANDWIDTH – CHAIN 0)

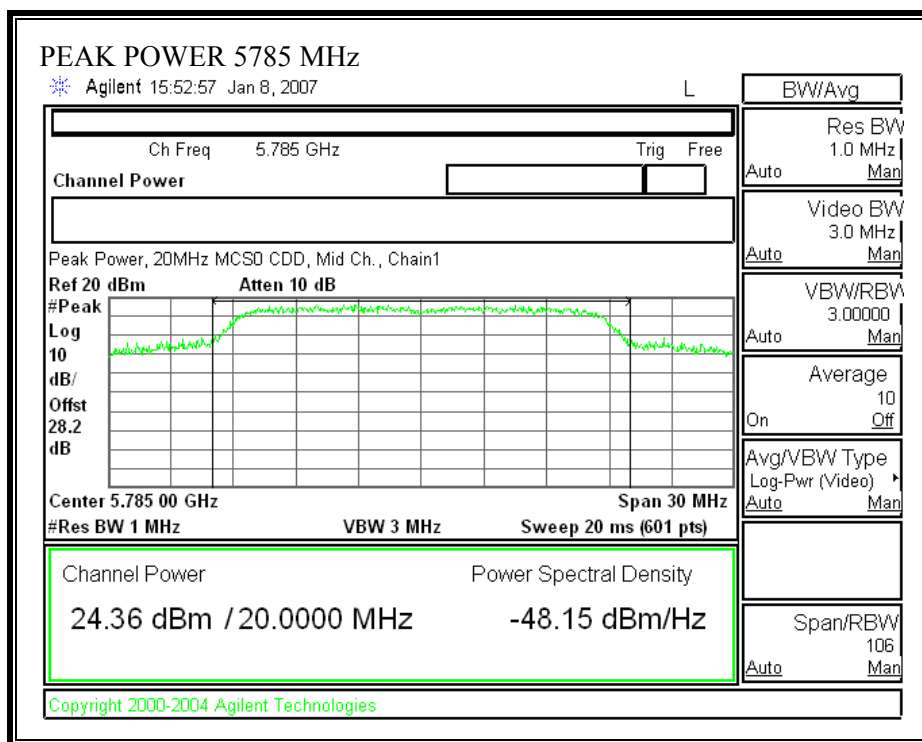


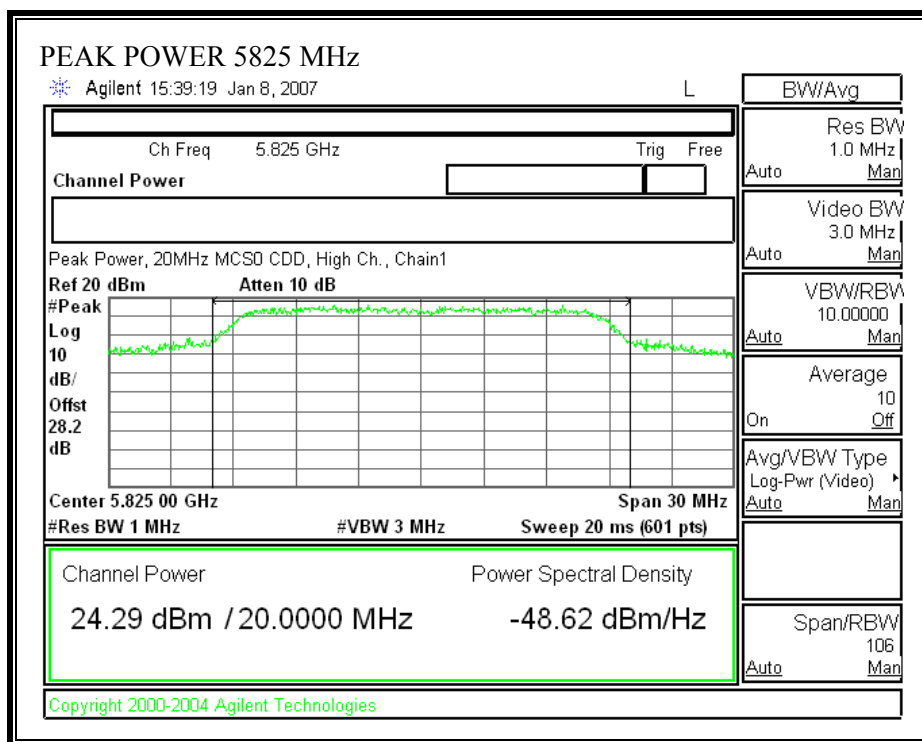




OUTPUT POWER (802.11 - 20 MHz TX BANDWIDTH – CHAIN 1)

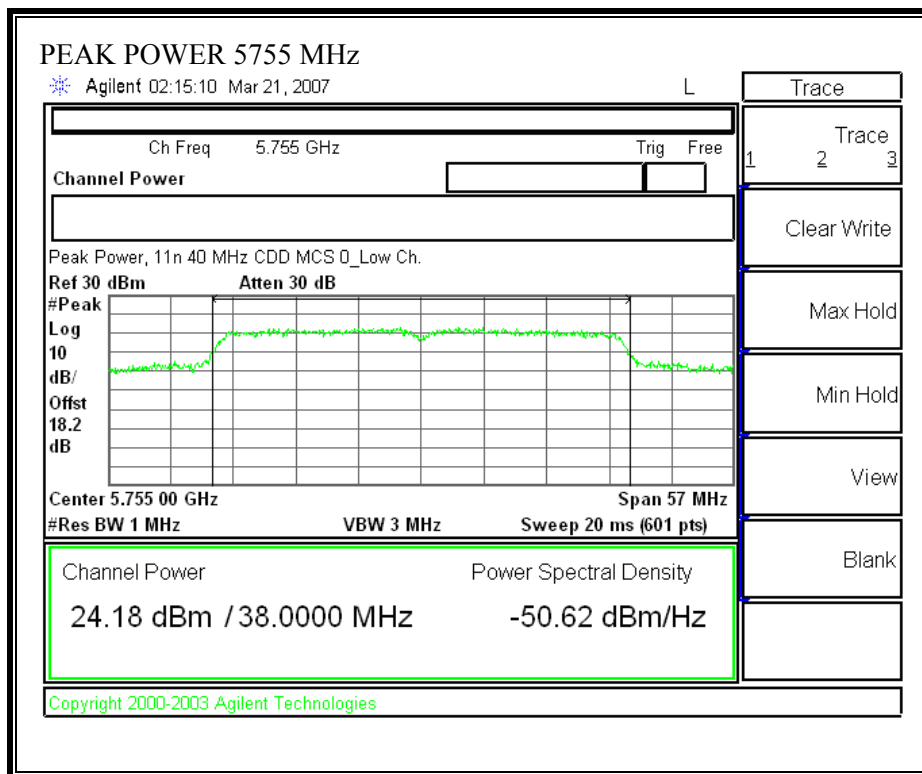


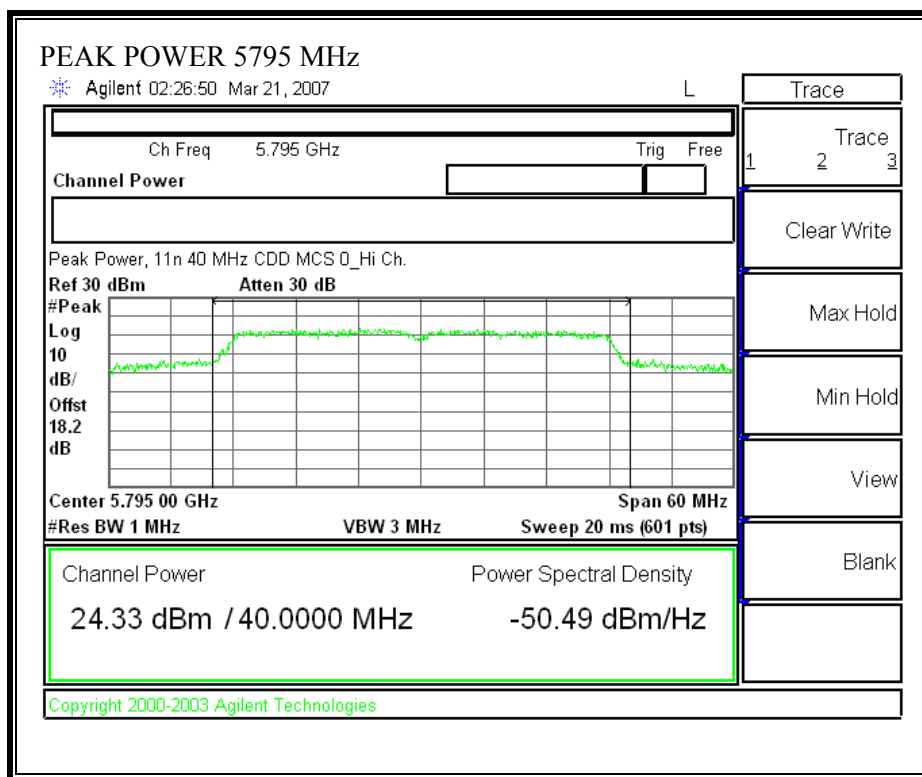




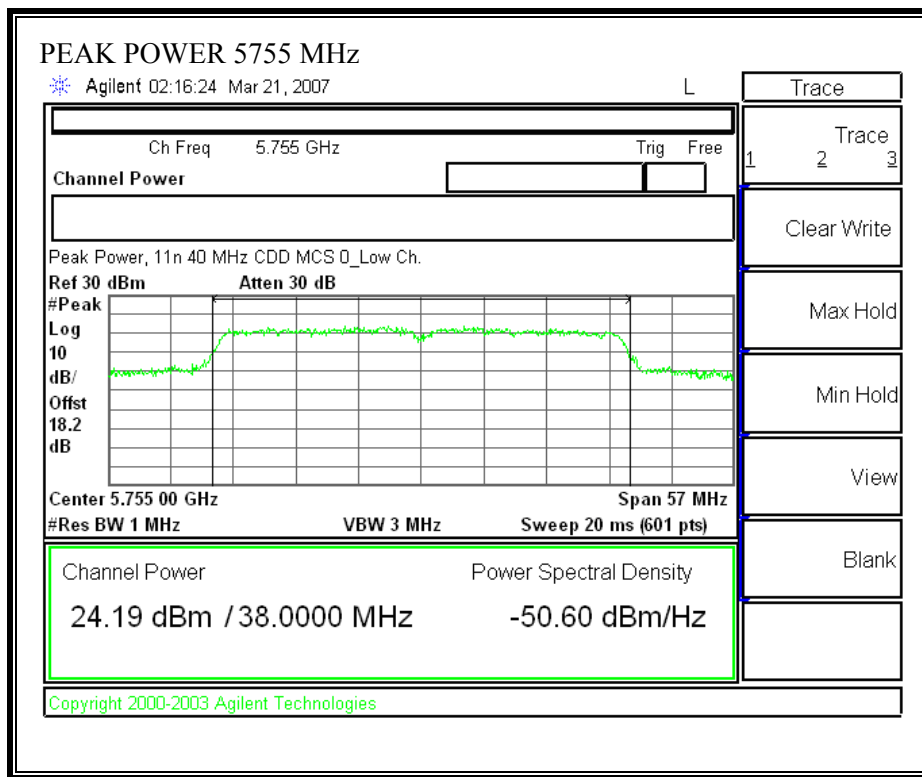
802.11n Mode 40 MHz CDD MCS32

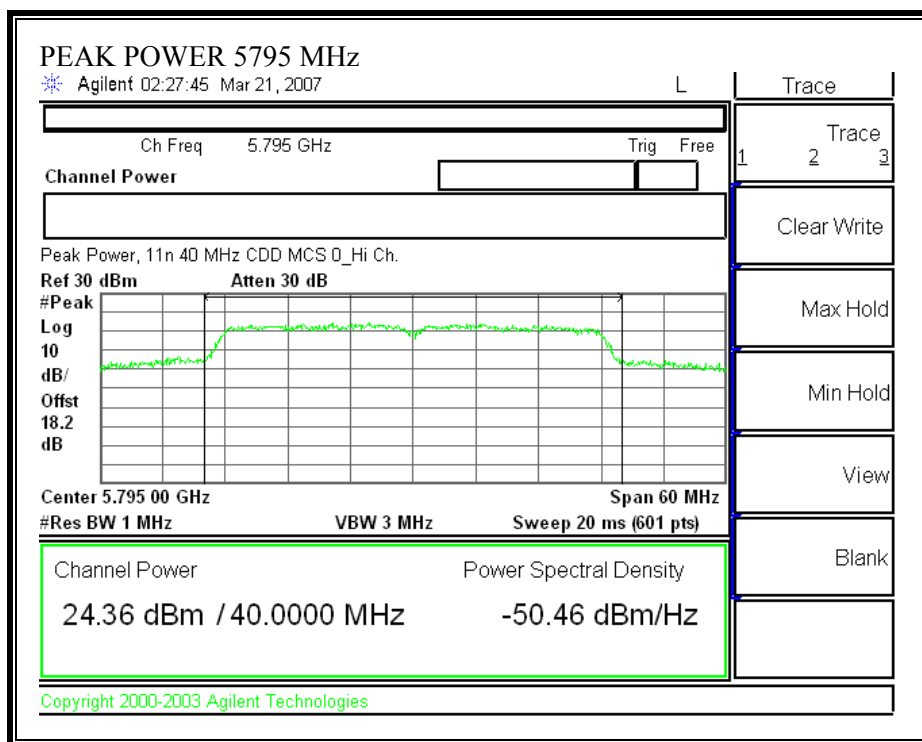
OUTPUT POWER (802.11 - 40 MHz TX BANDWIDTH – CHAIN 0)





OUTPUT POWER (802.11 - 40 MHz TX BANDWIDTH – CHAIN 1)





7.4.4. 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:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

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/cm²

Substituting the logarithmic form of power and gain using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)} \text{ and}$$

$$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)}$$

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/cm²

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), $S = 1.0 \text{ mW/cm}^2$ in the 5.8 GHz band.

RESULTS

No non-compliance noted

802.11a Mode CDD is covered by the worst case 802.11n Mode 20 MHz CDD

Mode	MPE Distance (cm)	Total Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm ²)
20MHz CDD	20.0	27.38	8.56	0.78
40MHz CDD	20.0	27.36	8.56	0.78

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.

7.4.5. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.247 (d) For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using $RBW = 3 \text{ kHz}$ and $VBW > 3 \text{ kHz}$, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

RESULTS

No non-compliance noted:

802.11a Mode CDD is covered by the worst case **802.11n Mode 20 MHz CDD MCS0**

802.11n Mode20 MHz CDD MCS0

CHAIN 0 & CHAIN 1

Channel	Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-5.76	-6.75	-3.22	8	-11.22
Middle	5785	-7.76	-7.30	-4.51	8	-12.51
High	5825	-6.51	-7.58	-4.00	8	-12.00

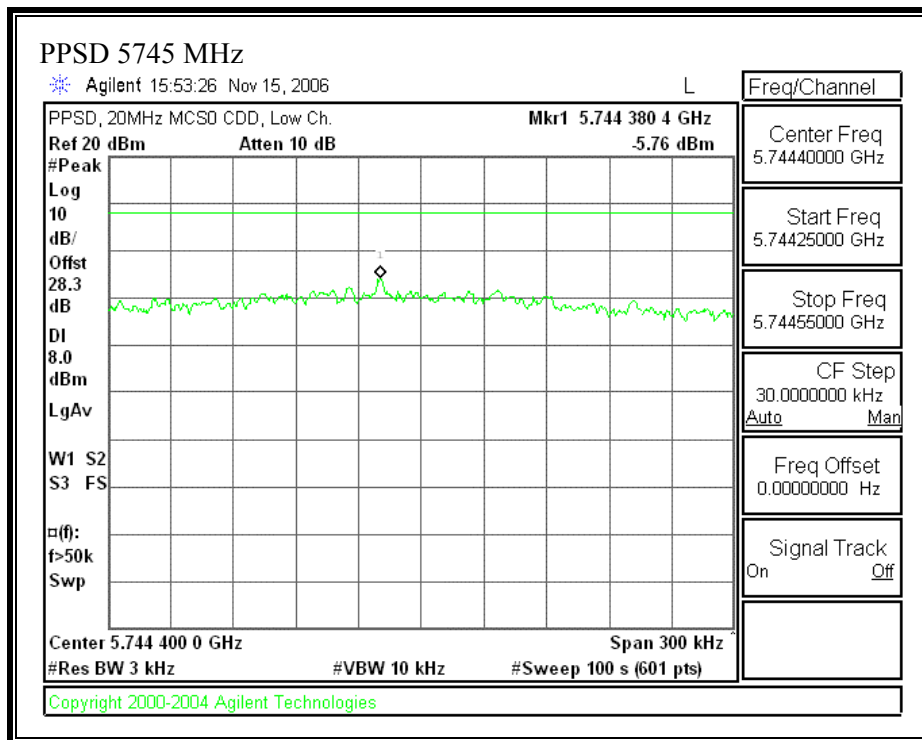
802.11n 40 MHz CDD MCS32

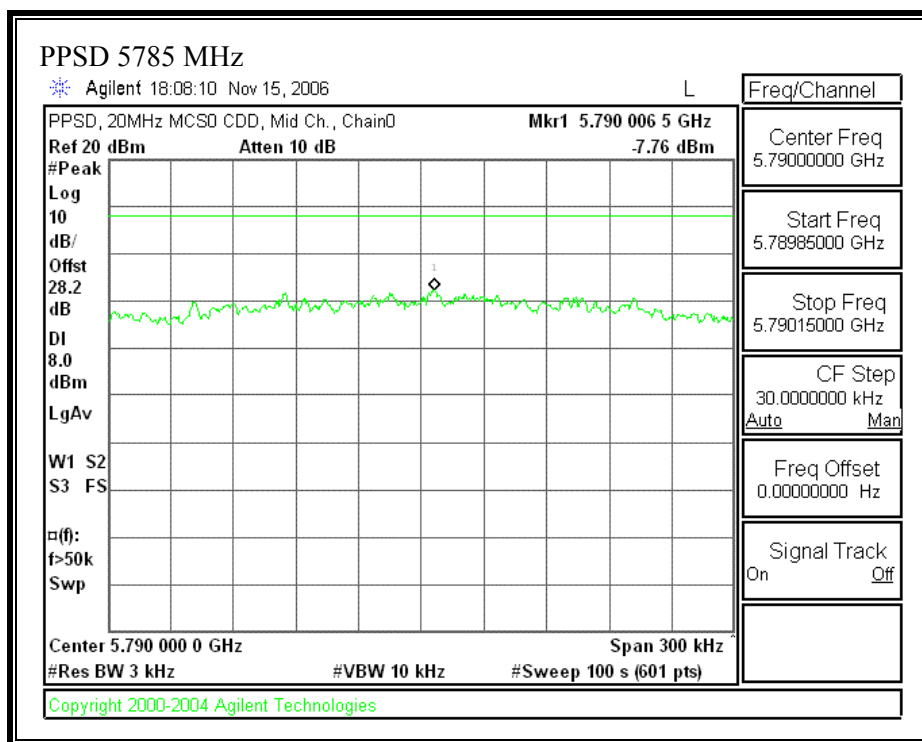
CHAIN 0 & CHAIN 1

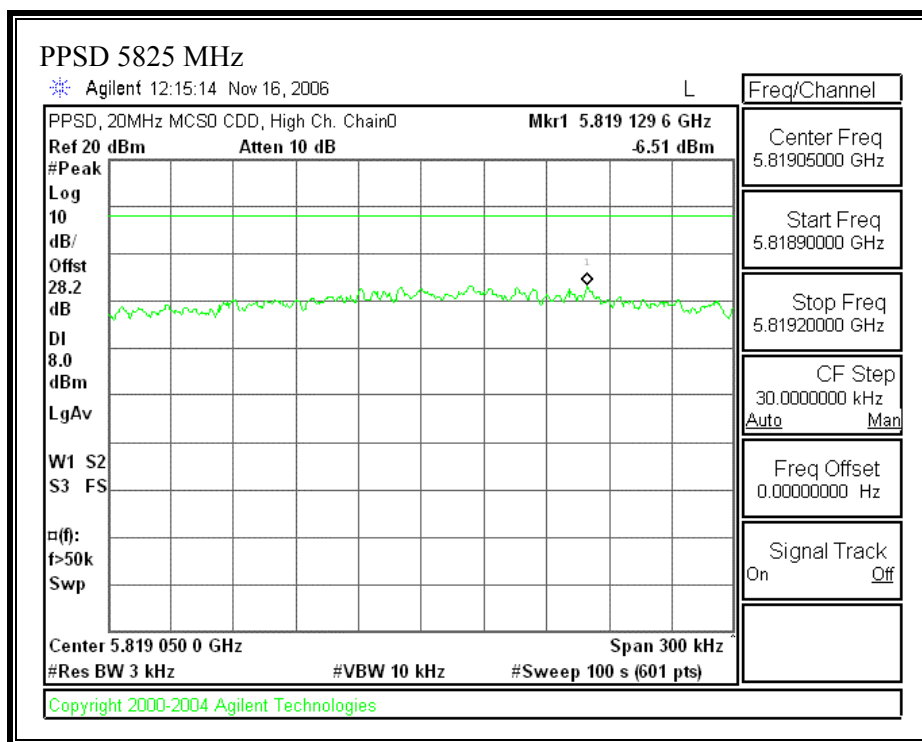
Channel	Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Margin (dB)
Low	5755	-8.99	-7.64	-5.25	8	-13.25
High	5795	-9.87	-8.66	-6.21	8	-14.21

802.11n Mode 20 MHz CDD MCS0

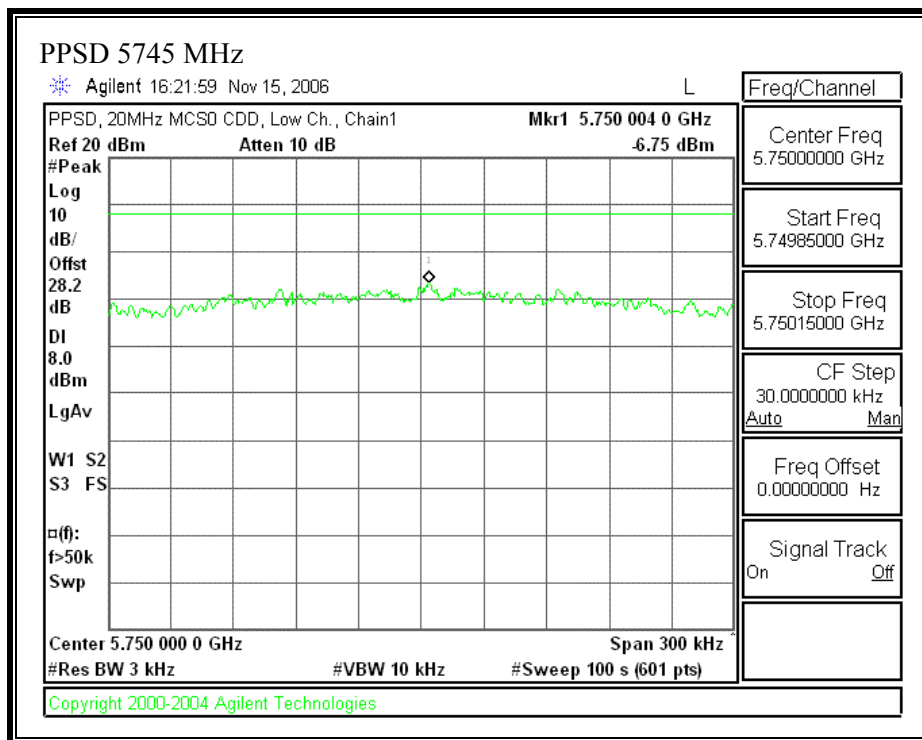
PEAK POWER SPECTRAL DENSITY (802.11 - 20 MHz TX BANDWIDTH – CHAIN 0)

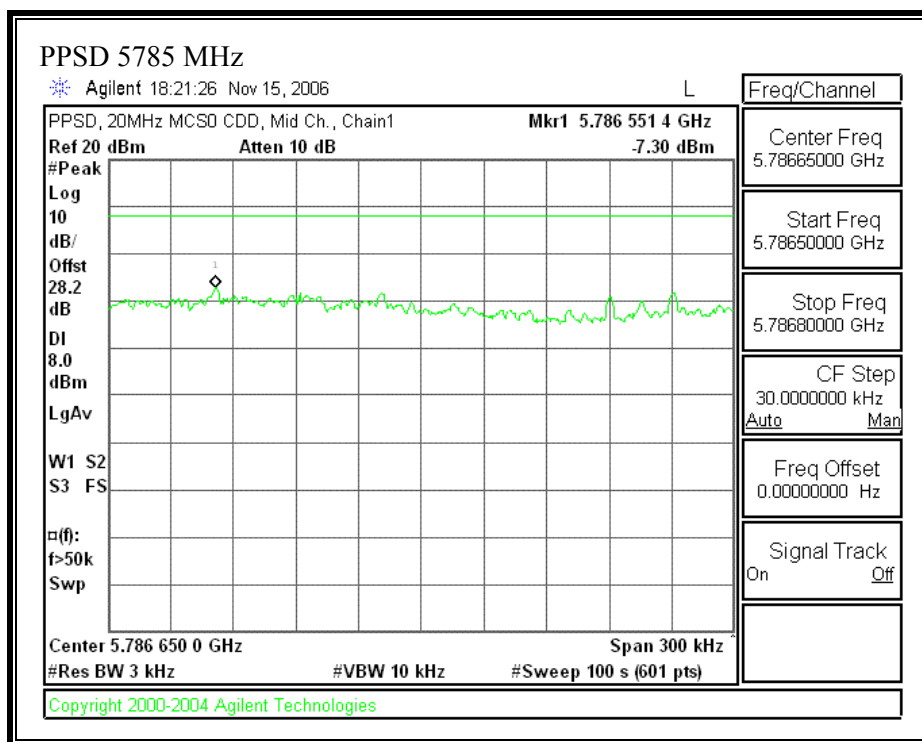


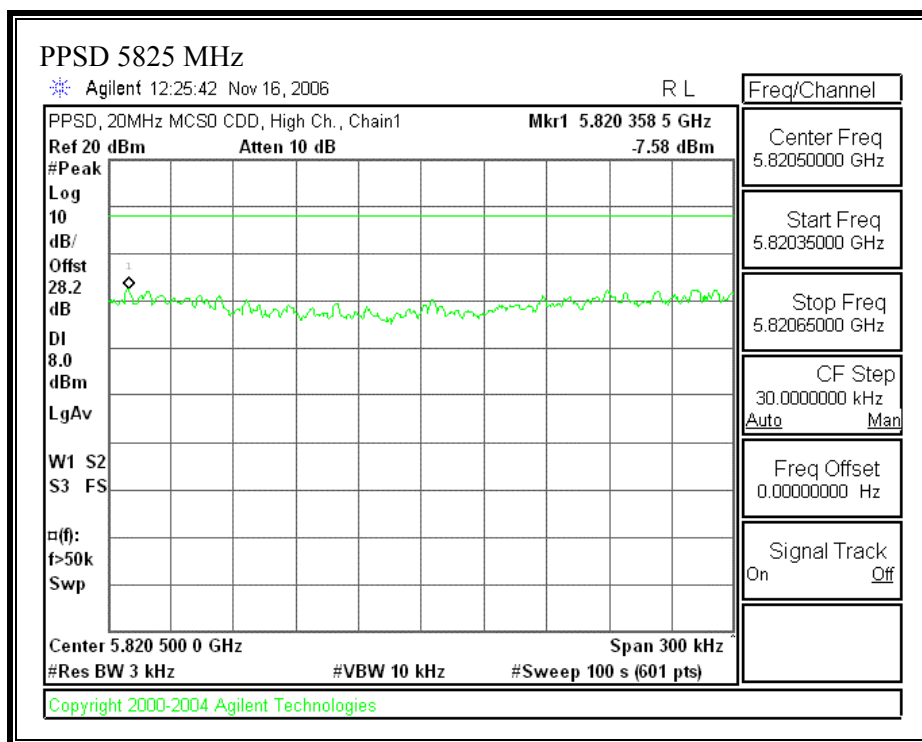




PEAK POWER SPECTRAL DENSITY (802.11 - 20 MHz TX BANDWIDTH – CHAIN 1)

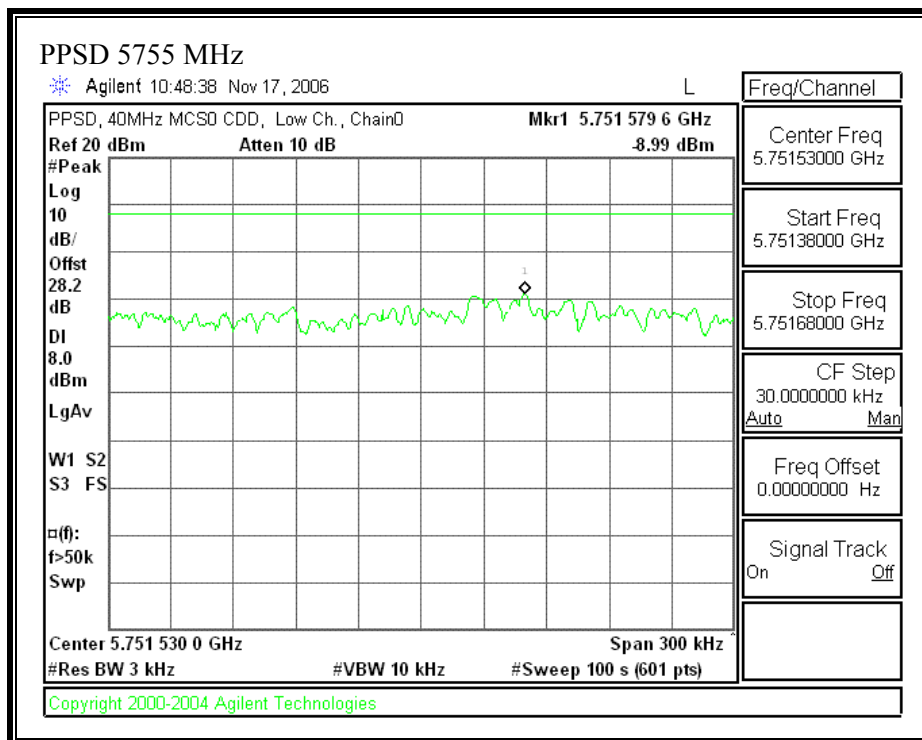


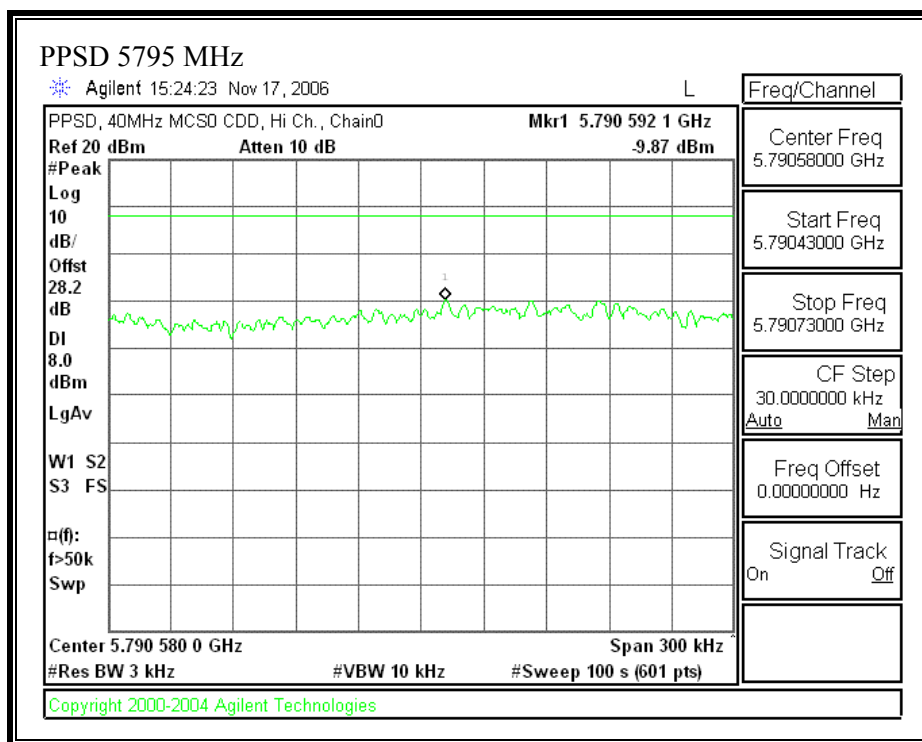




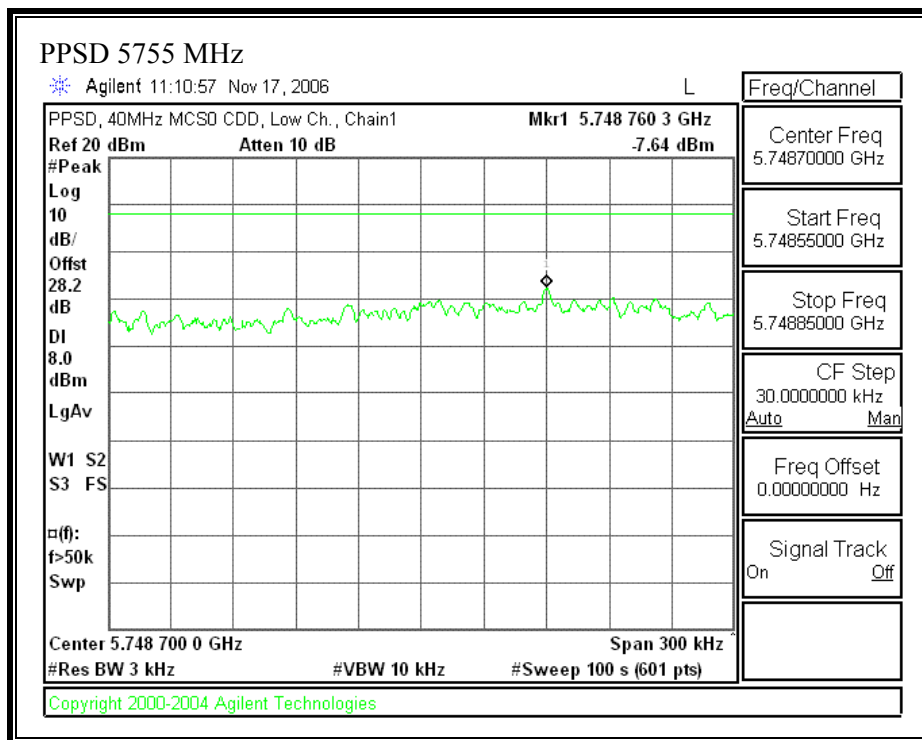
802.11n Mode40 MHz CDD MCS32

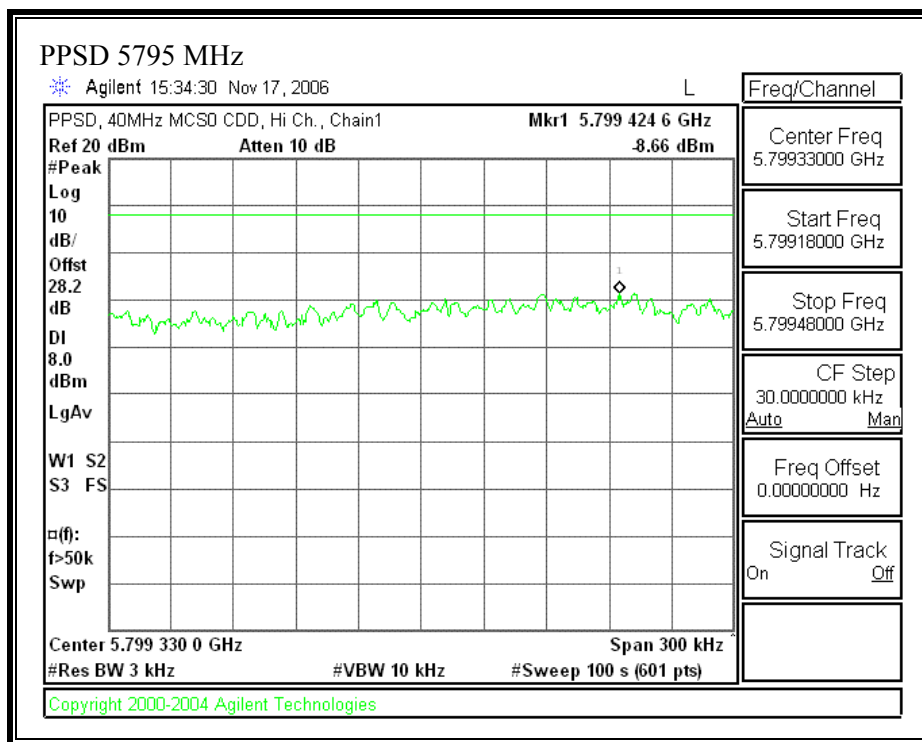
PEAK POWER SPECTRAL DENSITY (802.11 - 40 MHz TX BANDWIDTH – CHAIN 0)





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





7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.247 (c) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Conducted power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 dB.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

RESULTS

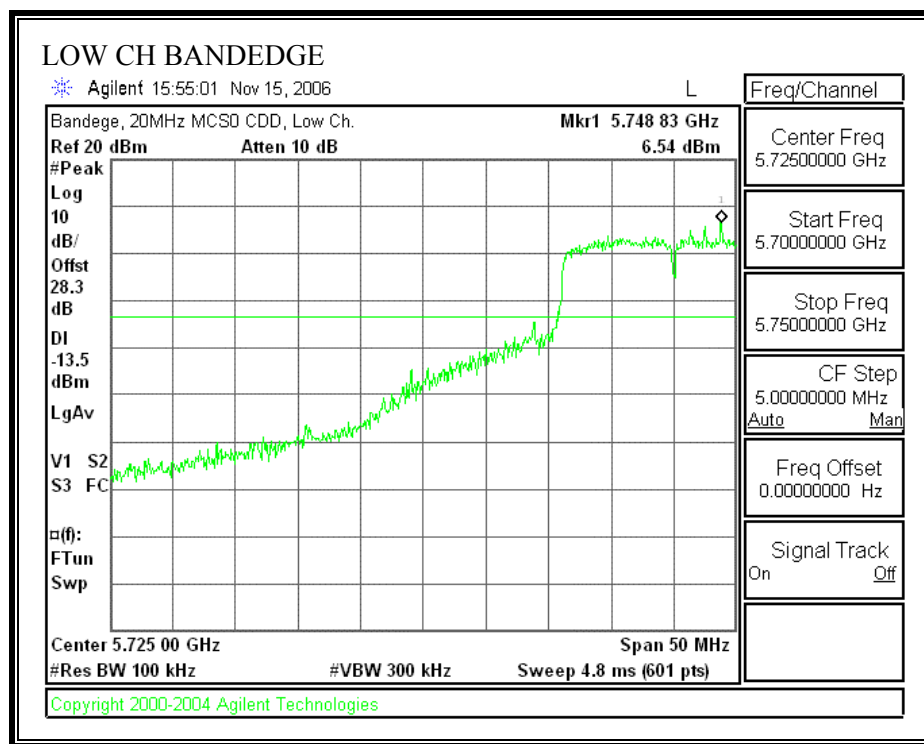
No non-compliance noted:

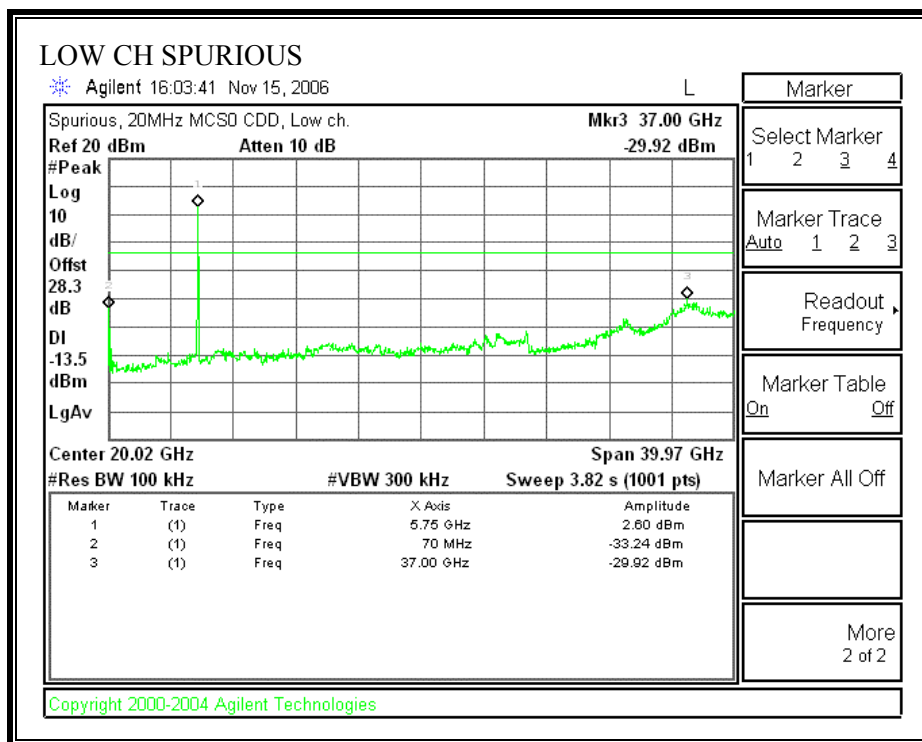
802.11a Mode CDD is covered by the worst case **802.11n Mode 20 MHz CDD MCS0**

802.11n Mode 20 MHz CDD MCS0

SPURIOUS EMISSIONS, LOW CHANNEL (802.11 - 20 MHz TX BANDWIDTH – CHAIN 0)

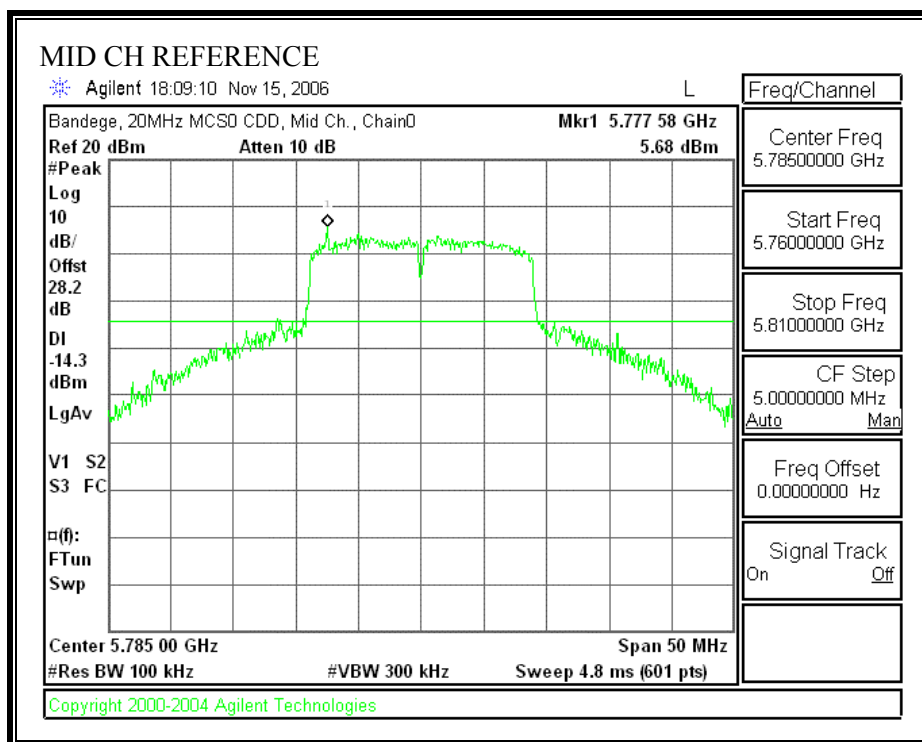
LOW CH BANEDGE, 5745 MHz

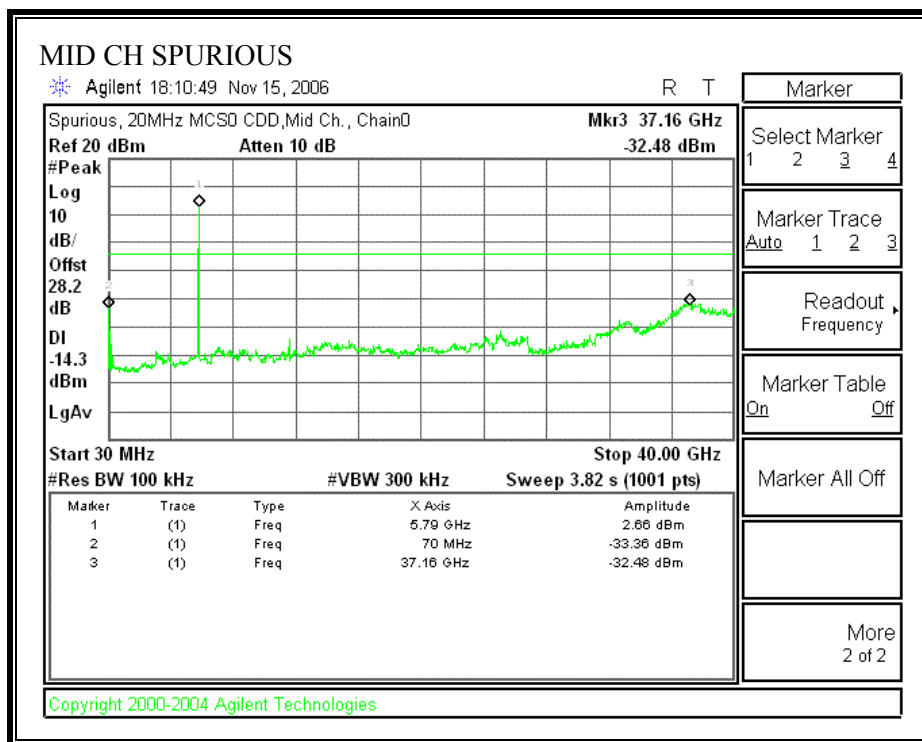




SPURIOUS EMISSIONS, MIDDLE CHANNEL (802.11 - 20 MHz TX BANDWIDTH – CHAIN 0)

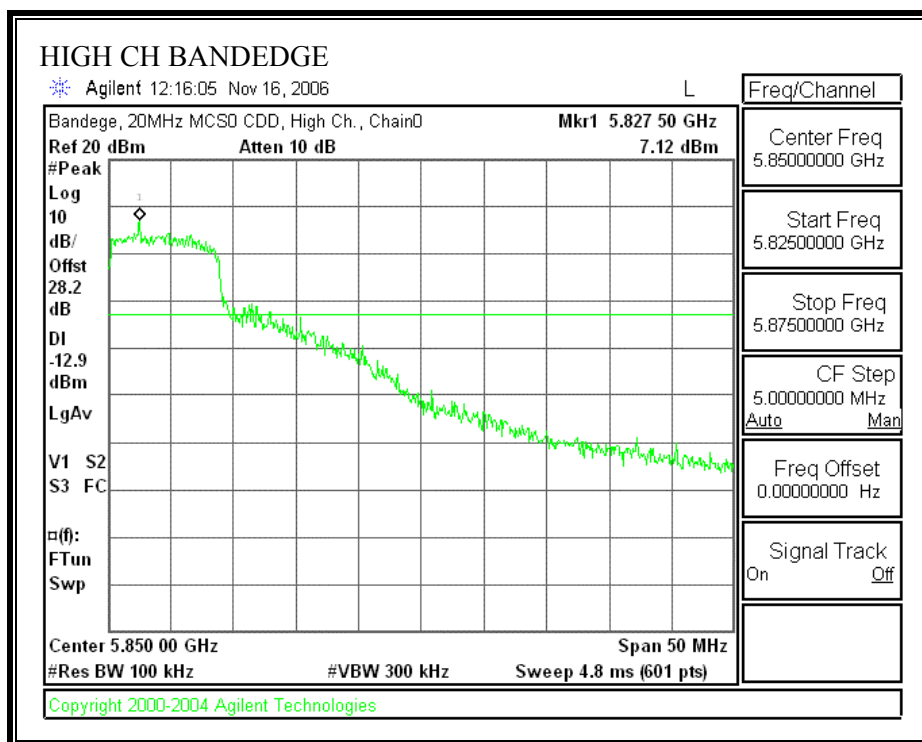
MID CH BANDEGE, 5785 MHz

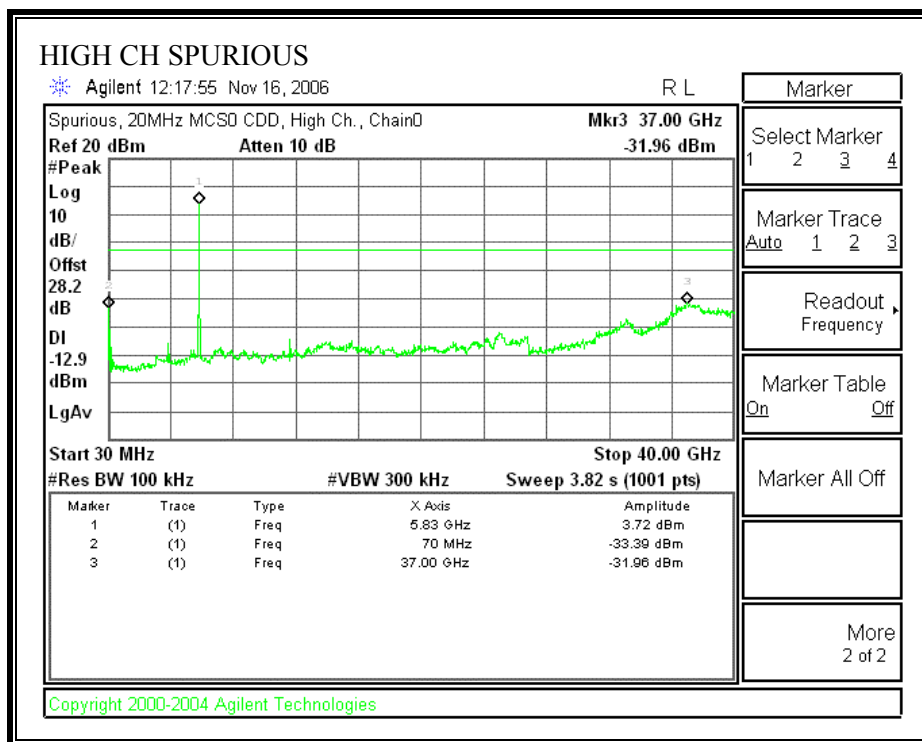




SPURIOUS EMISSIONS, HIGH CHANNEL (802.11 - 20 MHz TX BANDWIDTH – CHAIN 0)

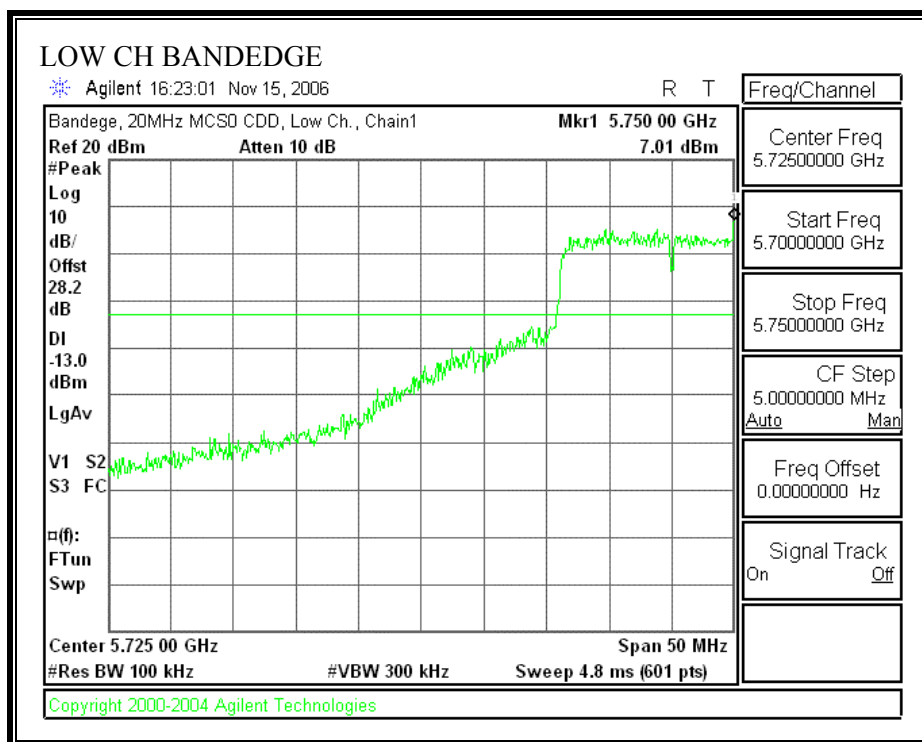
HI CH BANDEDGE, 5825 MHz

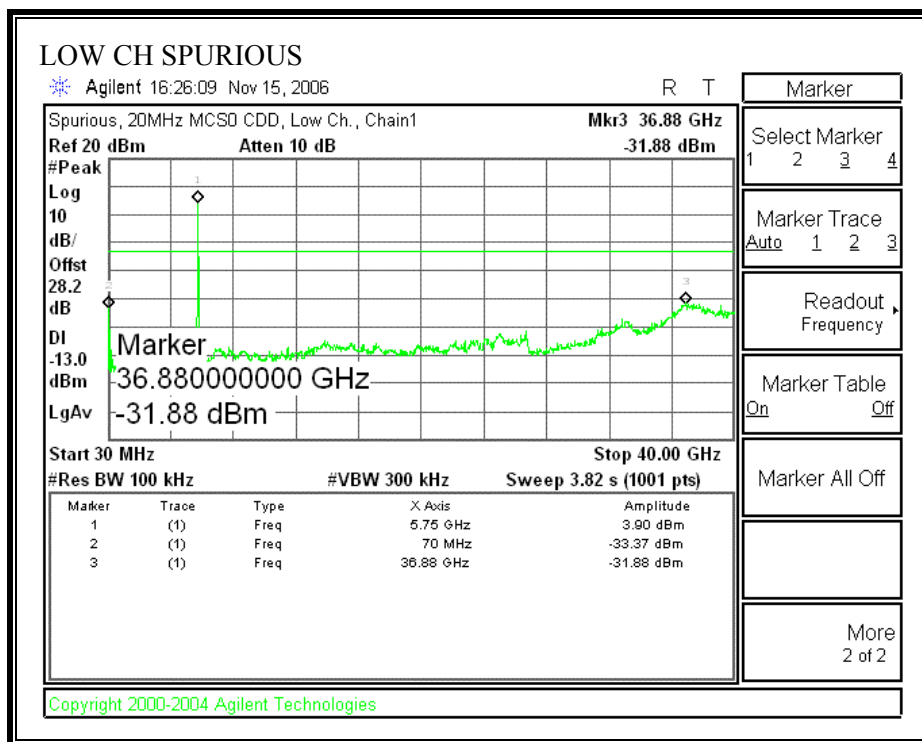




SPURIOUS EMISSIONS, LOW CHANNEL (802.11 - 20 MHz TX BANDWIDTH – CHAIN 1)

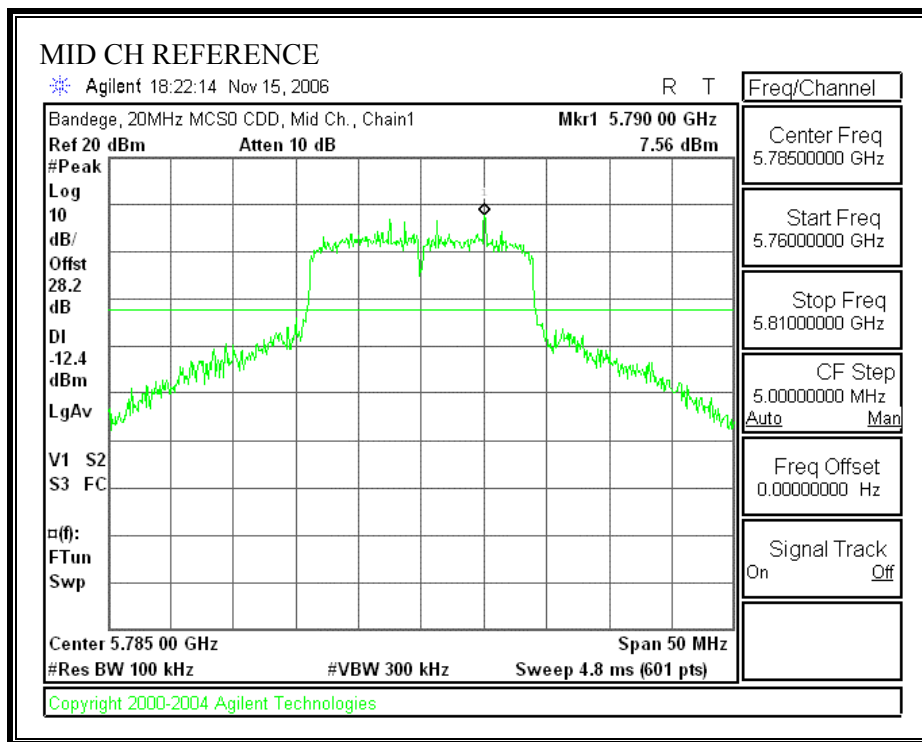
LOW CH BANDEDGE, 5745 MHz

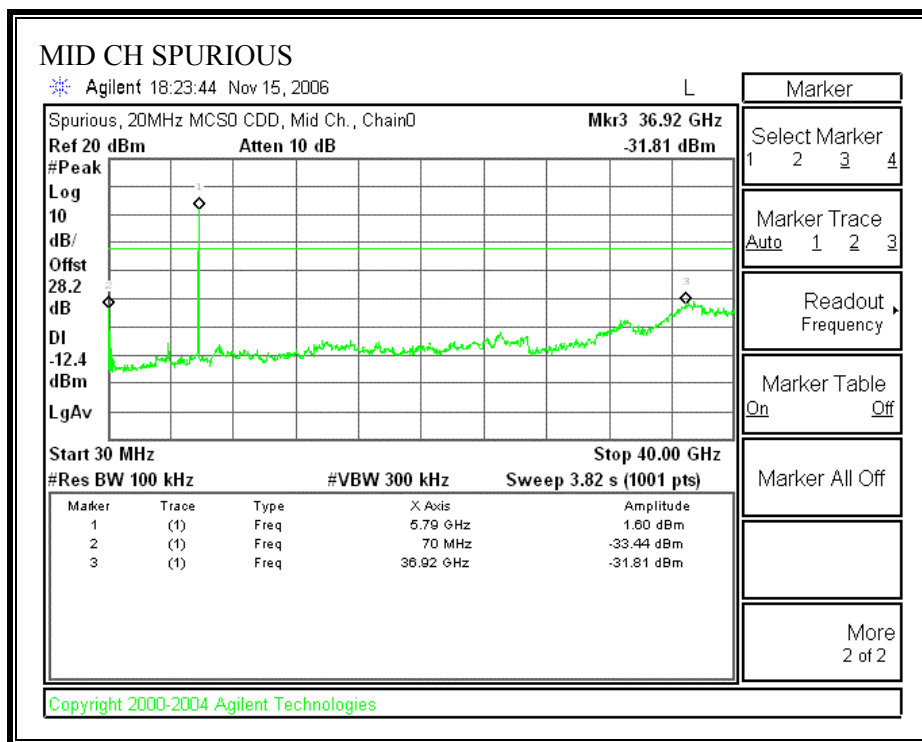




SPURIOUS EMISSIONS, MIDDLE CHANNEL (802.11 - 20 MHz TX BANDWIDTH – CHAIN 1)

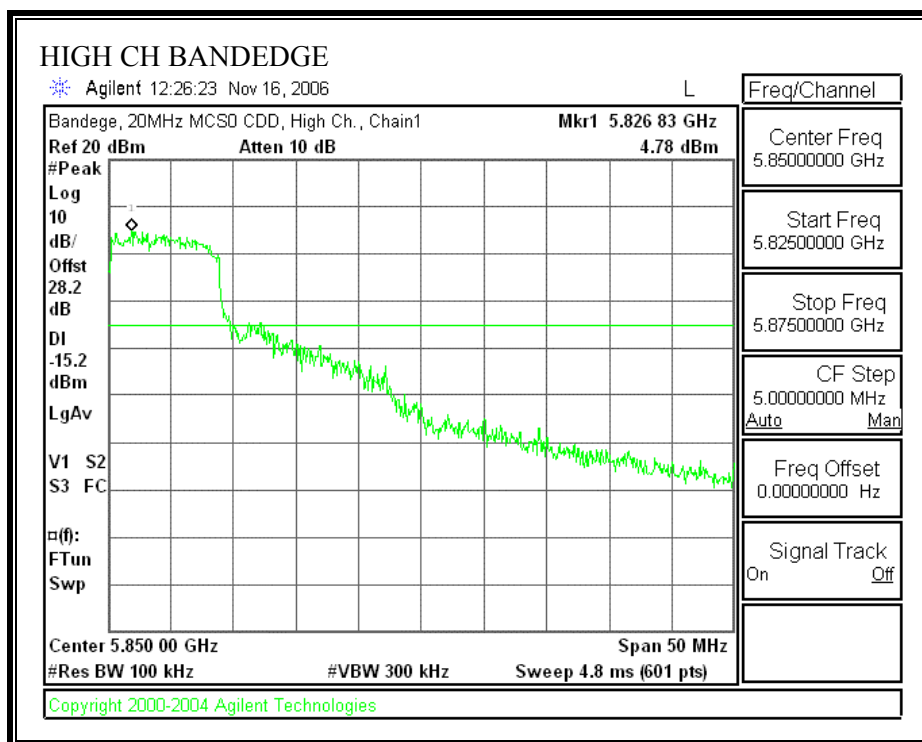
MID CH BANDEGE, 5785 MHz

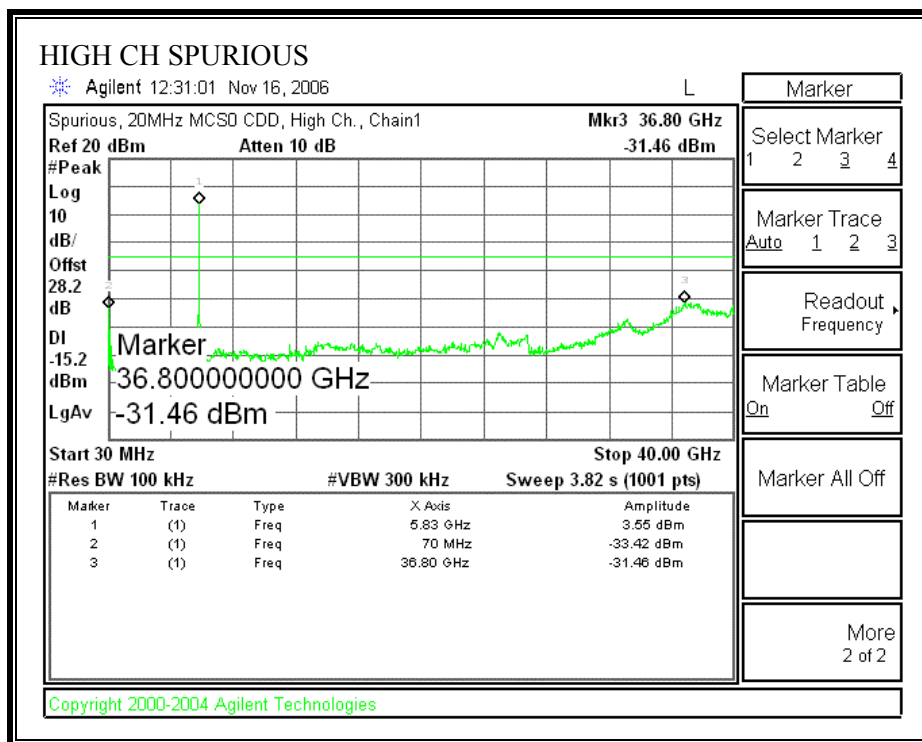




SPURIOUS EMISSIONS, HIGH CHANNEL (802.11 20 - MHz TX BANDWIDTH – CHAIN 1)

HI CH BANDEDGE, 5825 MHz

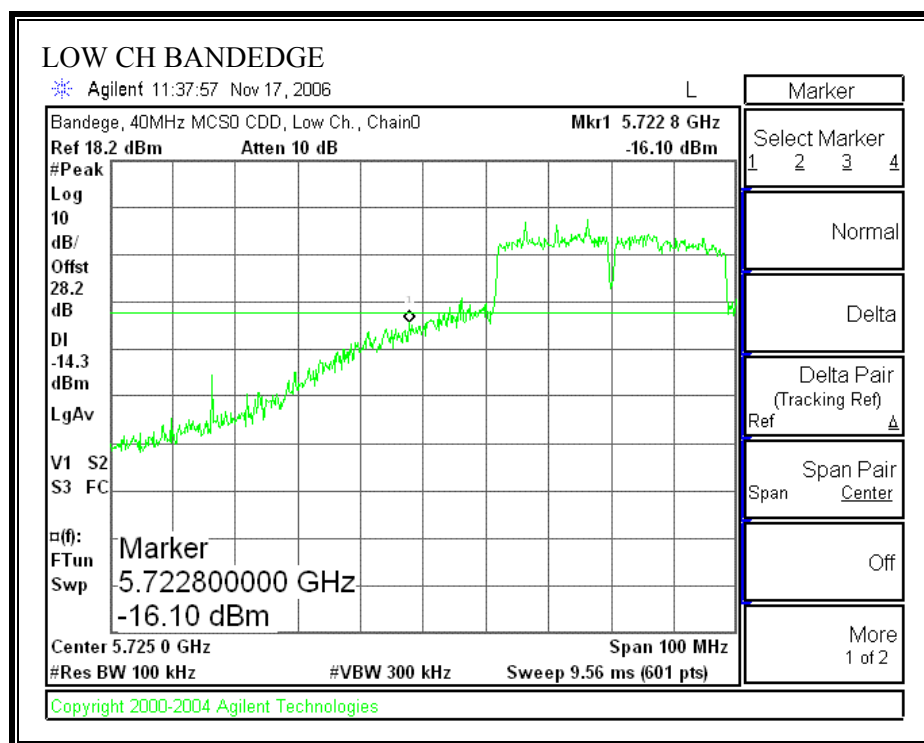


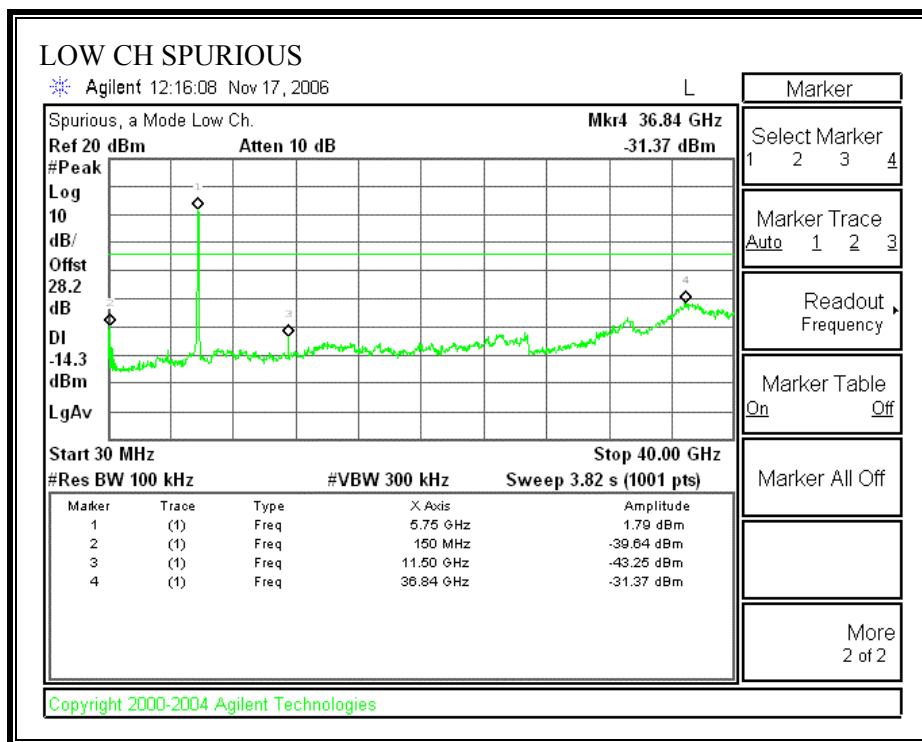


802.11n Mode40 MHz CDD MCS32

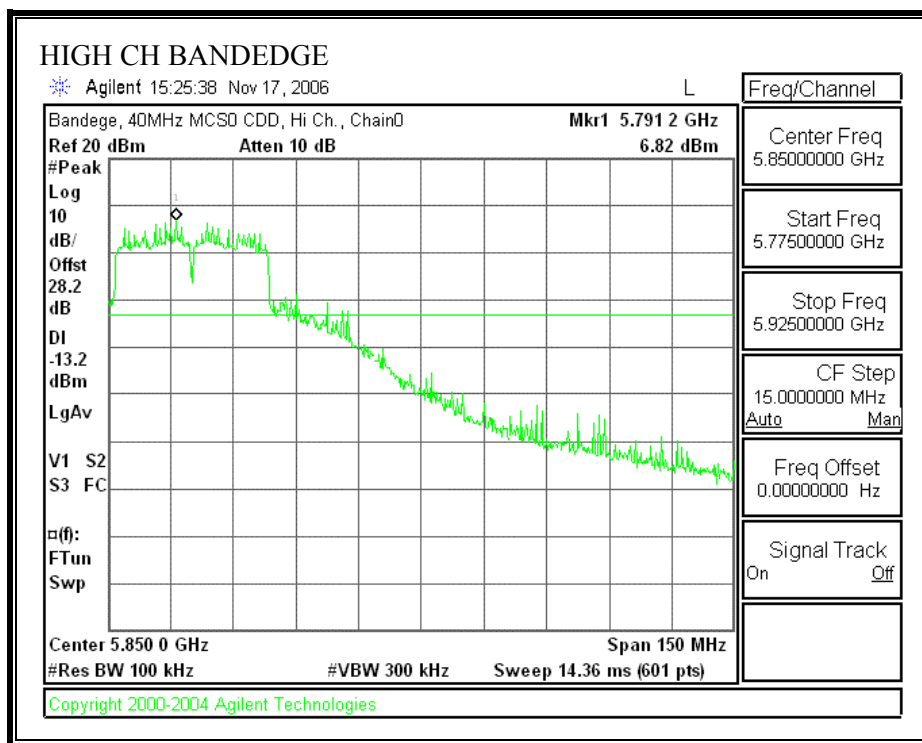
SPURIOUS EMISSIONS, HIGH CHANNEL (802.11 - 40 MHz TX BANDWIDTH – CHAIN 0)

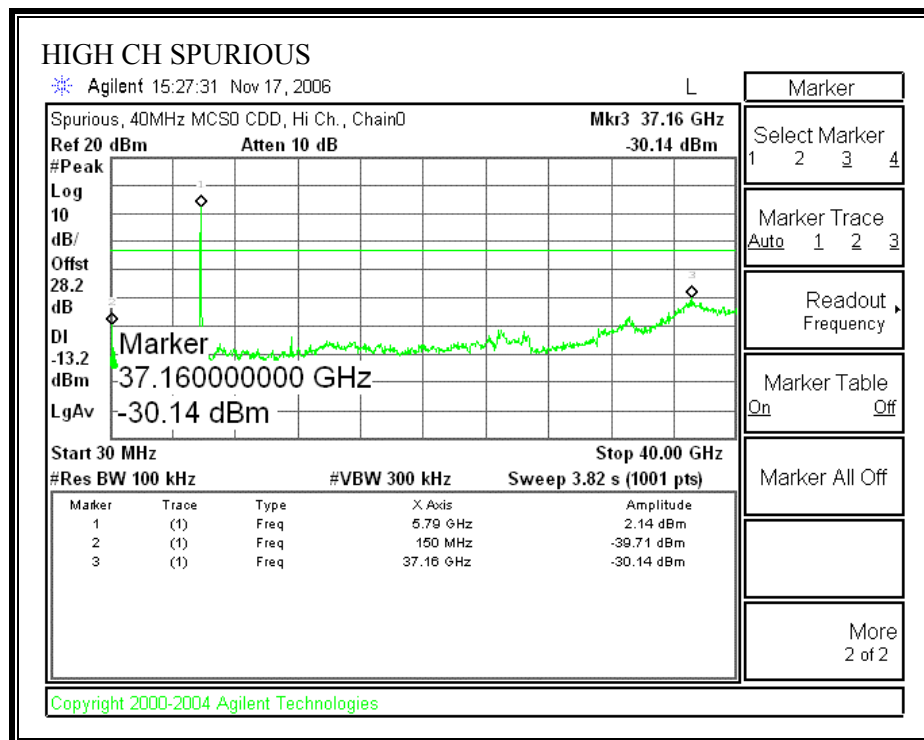
LOW CH BANDEDGE, 5755 MHz





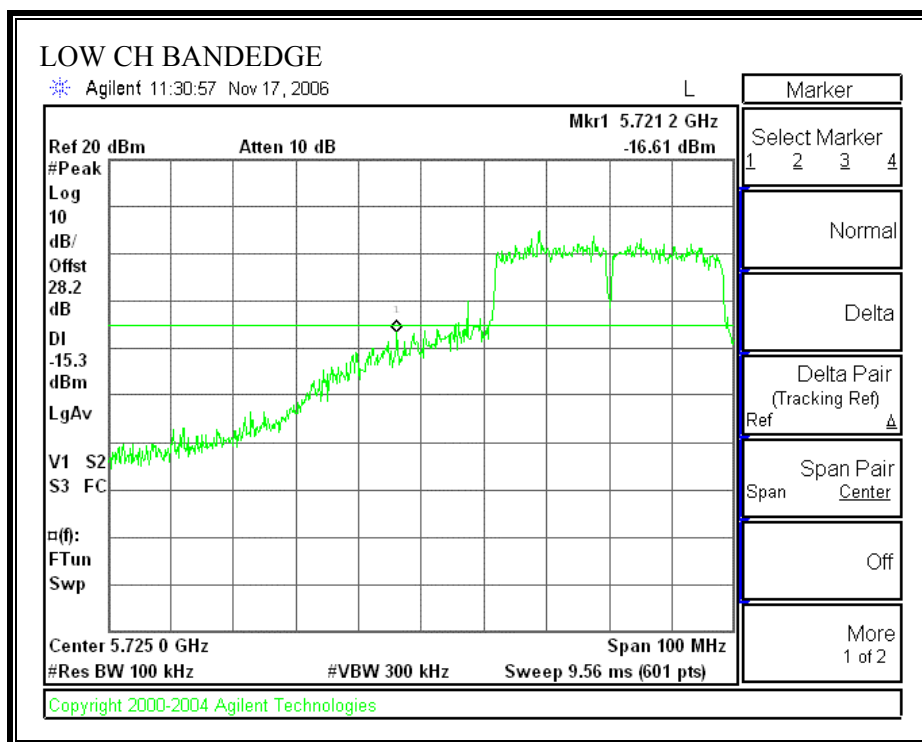
HIGH CH BANDEDGE, 5795 MHz

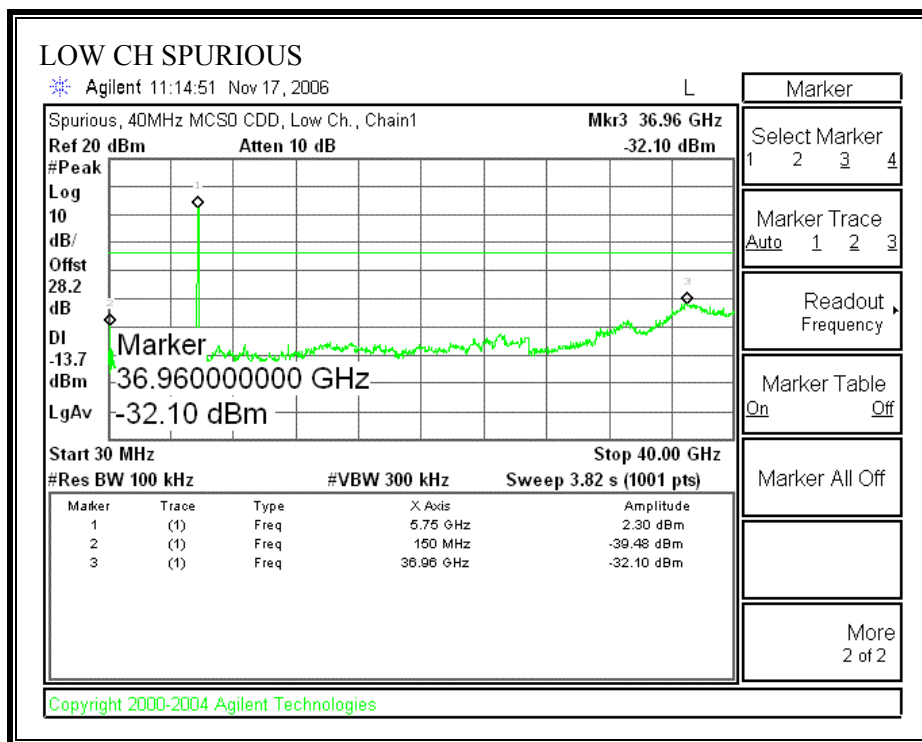




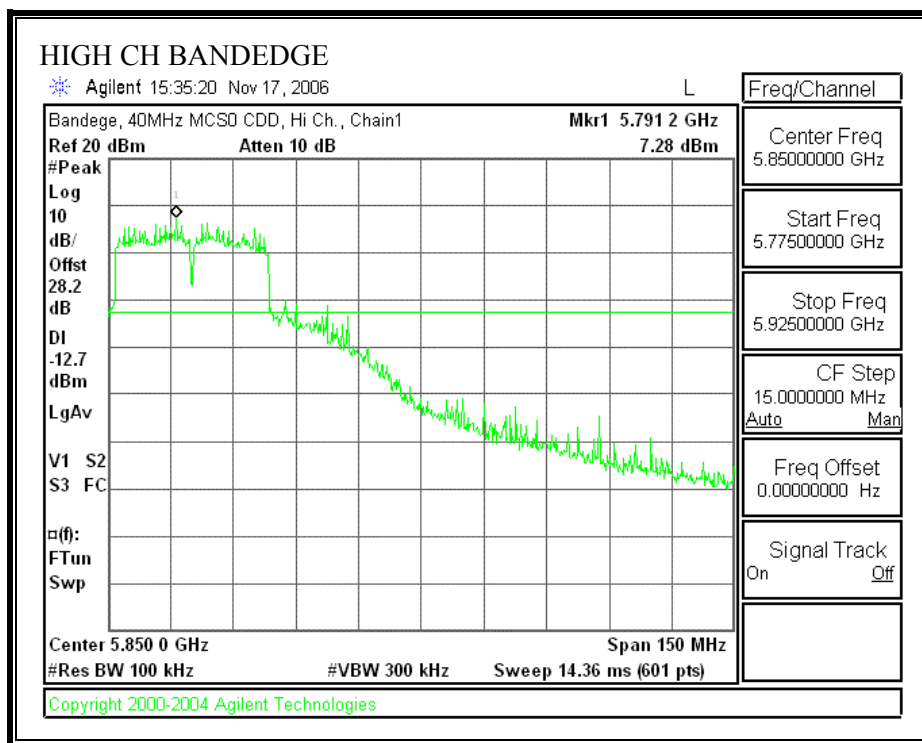
SPURIOUS EMISSIONS, HIGH CHANNEL (802.11 - 40 MHz TX BANDWIDTH – CHAIN 1)

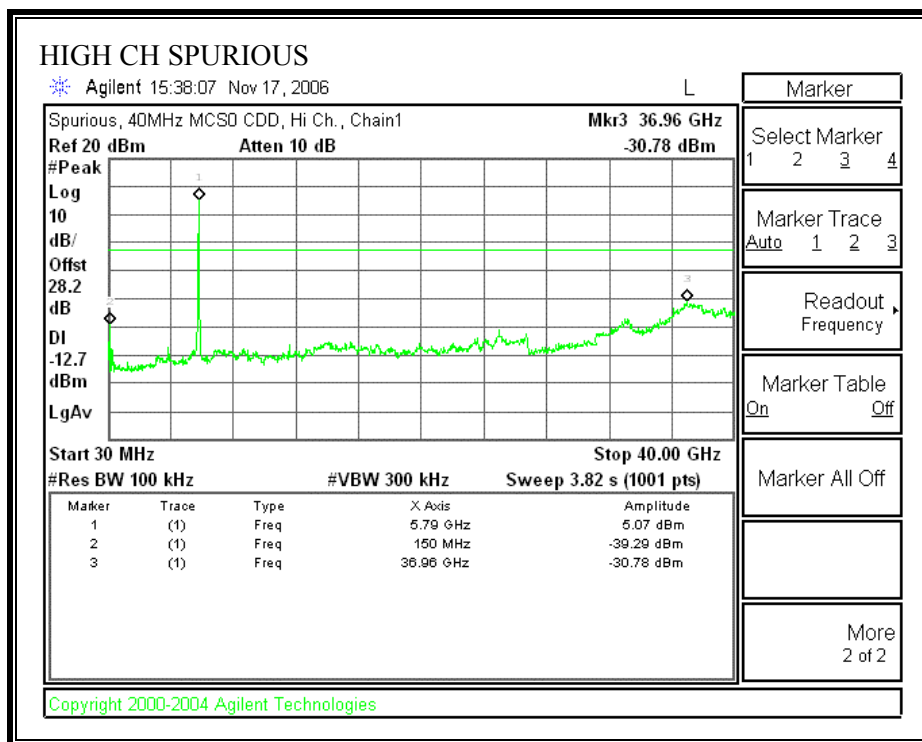
LOW CH BANDEDGE, 5755 MHz





HI CH BANEDGE, 5795 MHz





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.

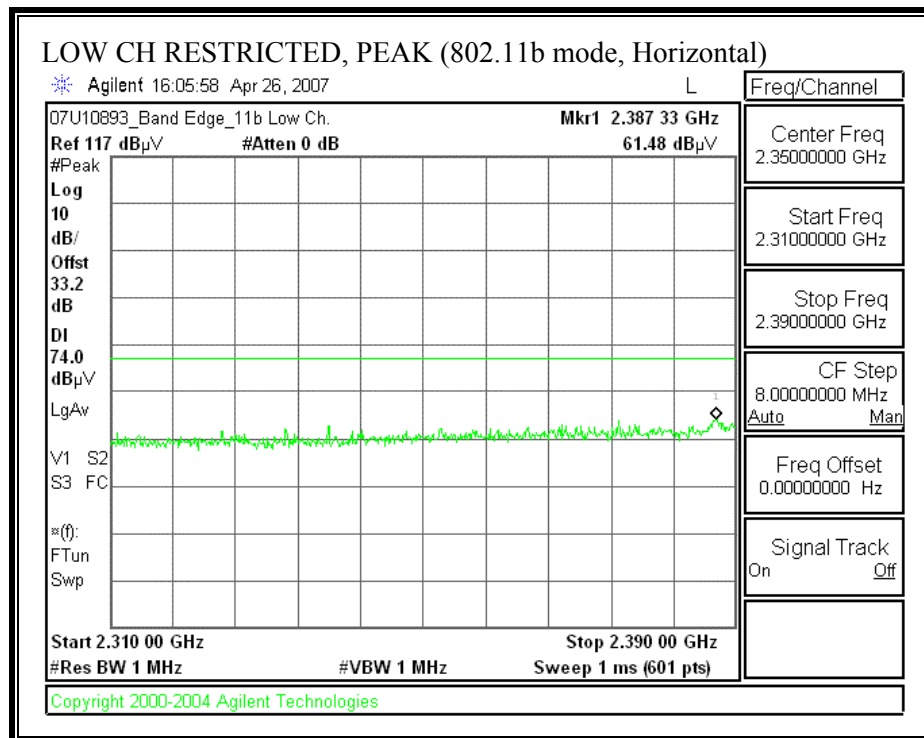
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

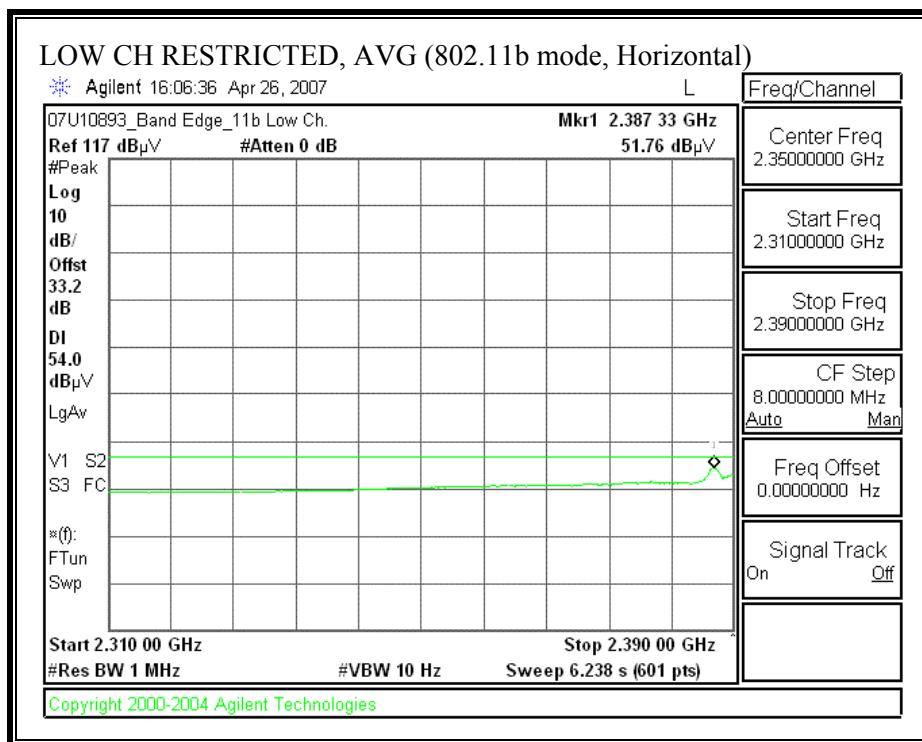
LEGACY MODE

7.5.2. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND

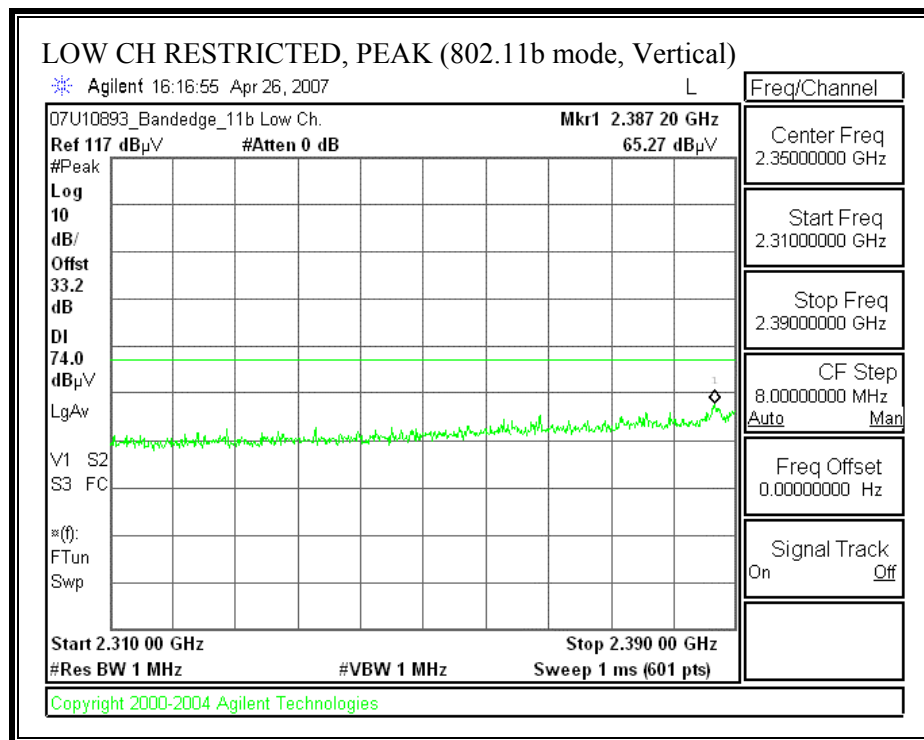
11b Legacy Mode

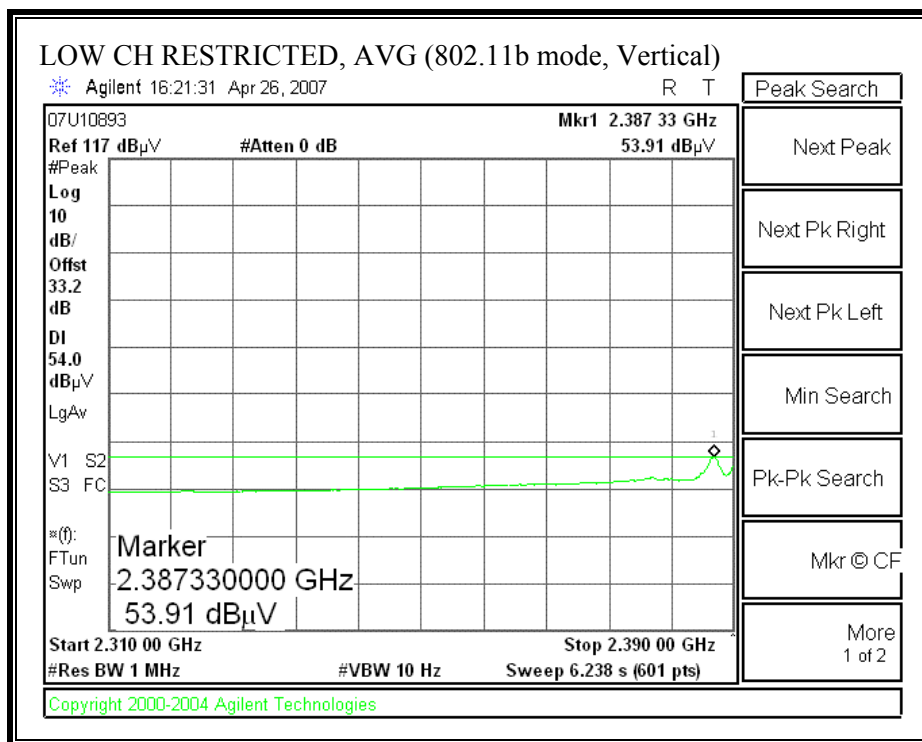
RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, 2412 MHz, HORIZONTAL)



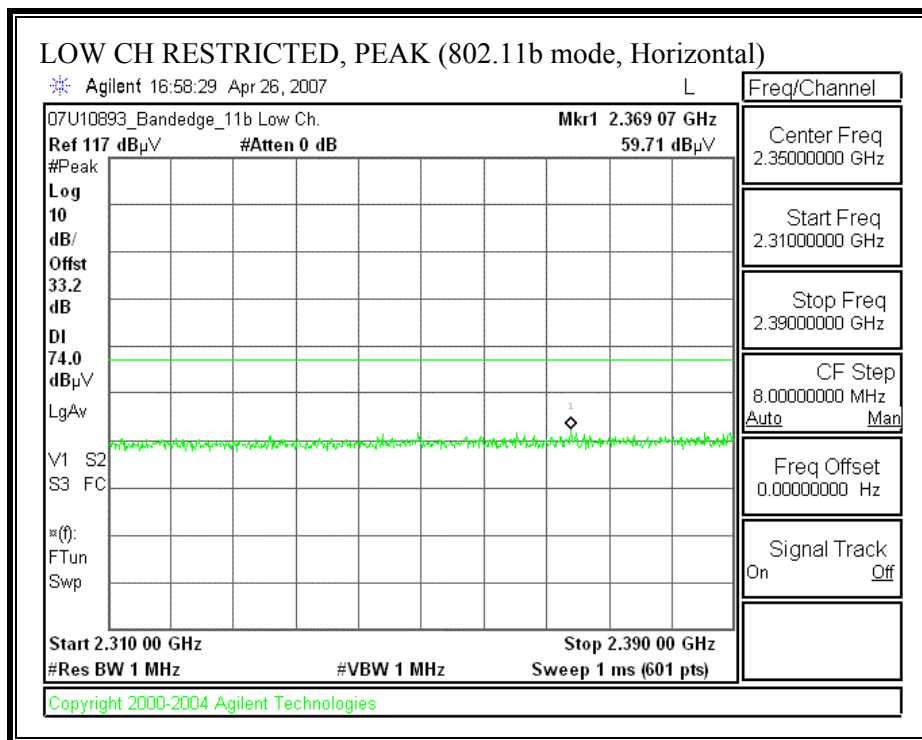


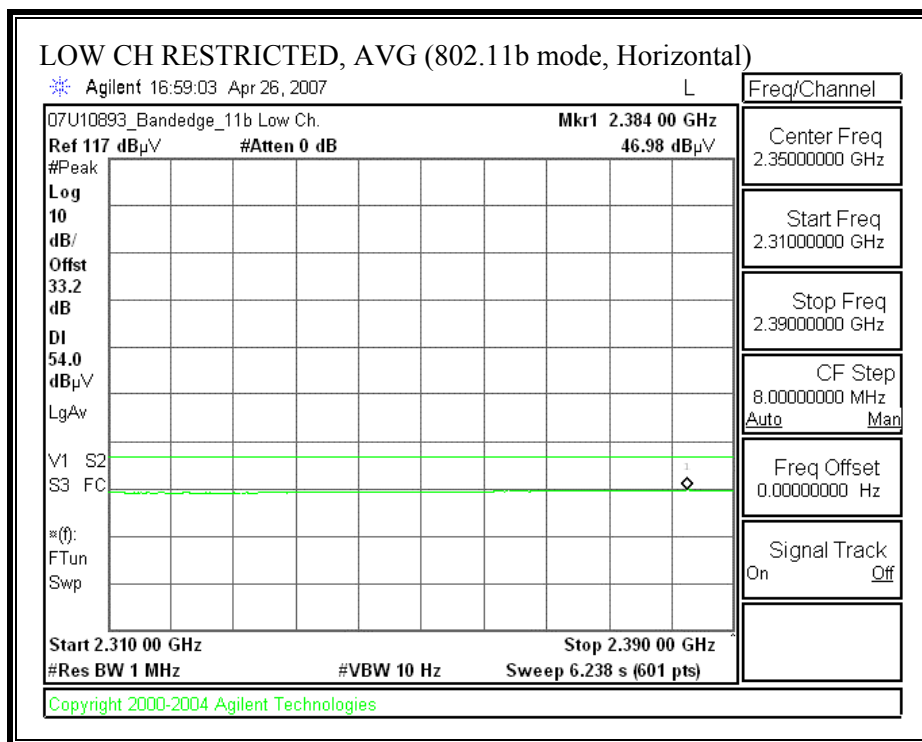
RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, 2412 MHz, VERTICAL)



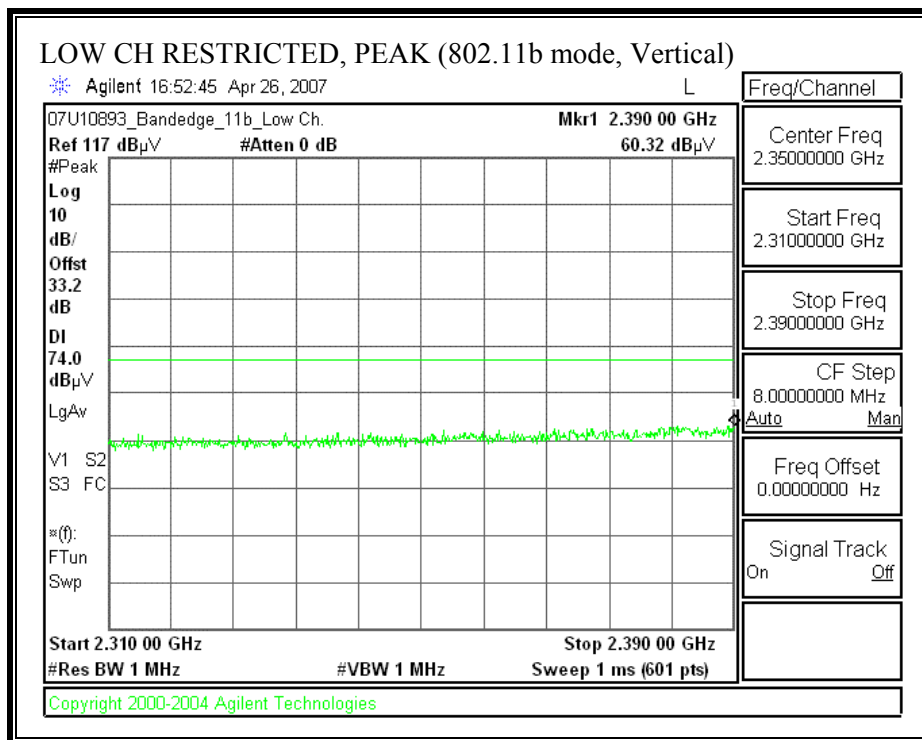


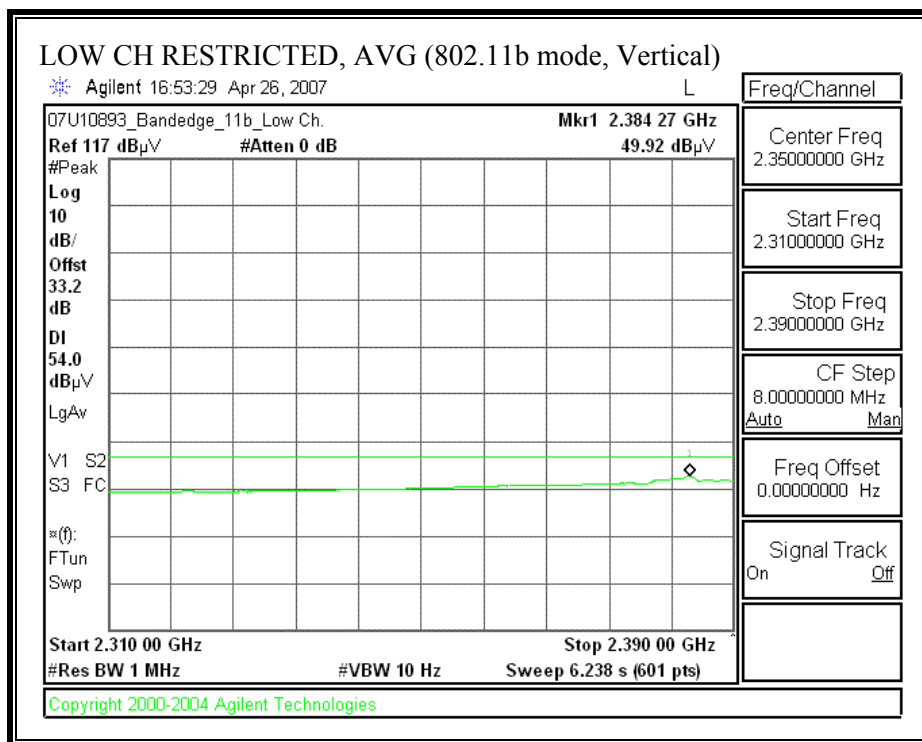
RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, 2417 MHz, HORIZONTAL)



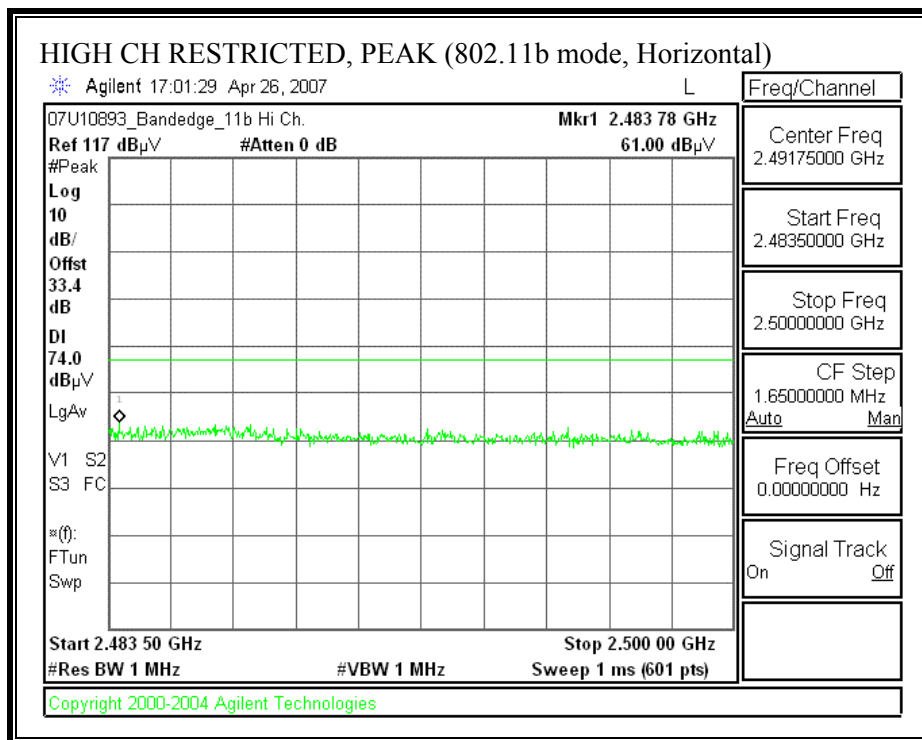


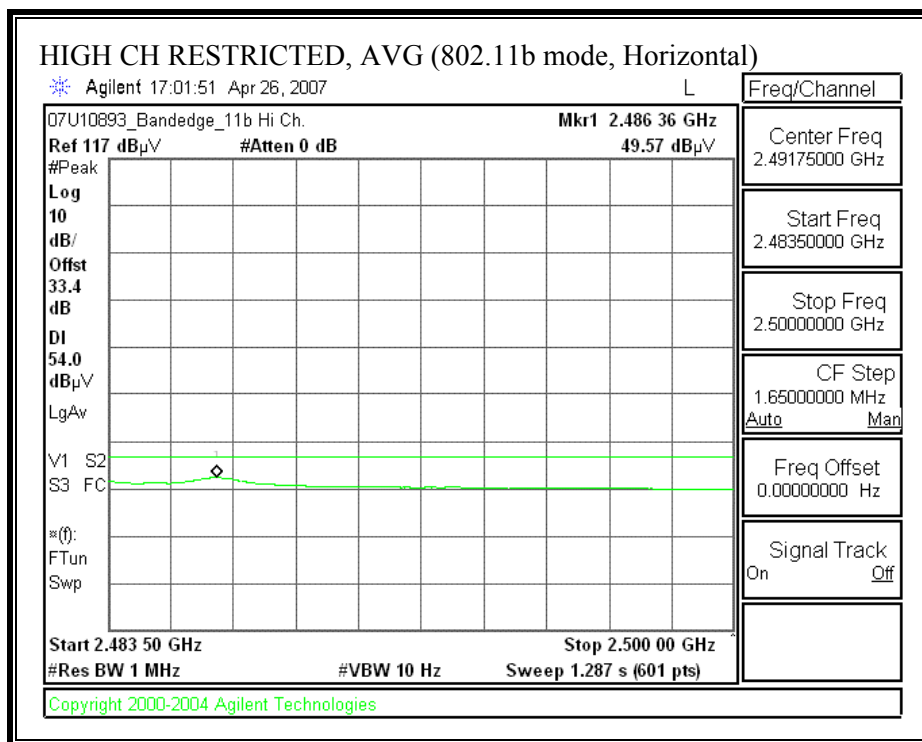
RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, 2417 MHz, VERTICAL)



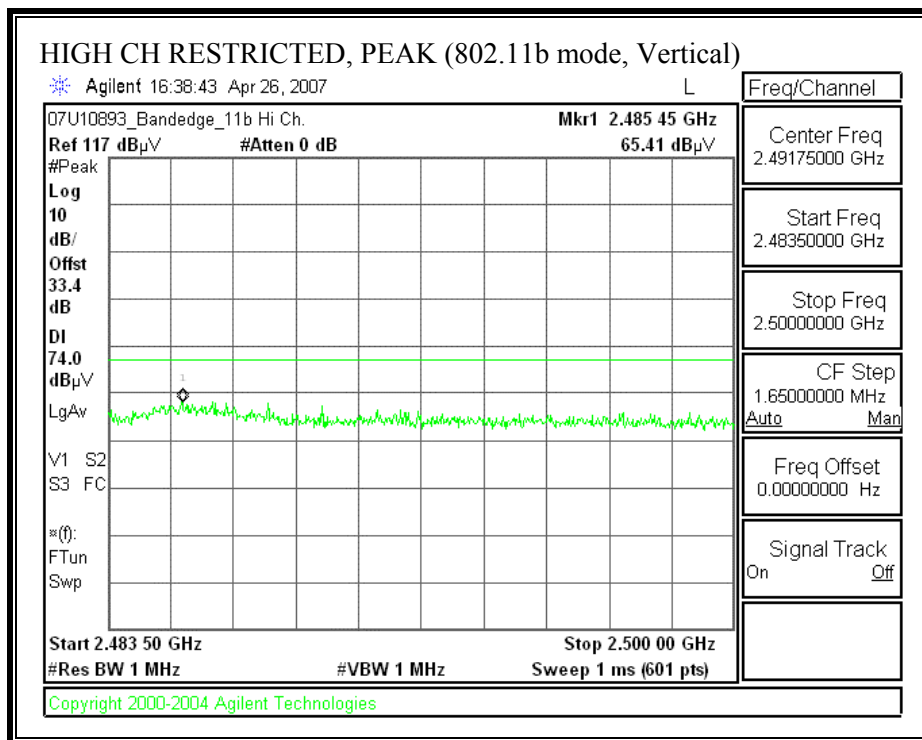


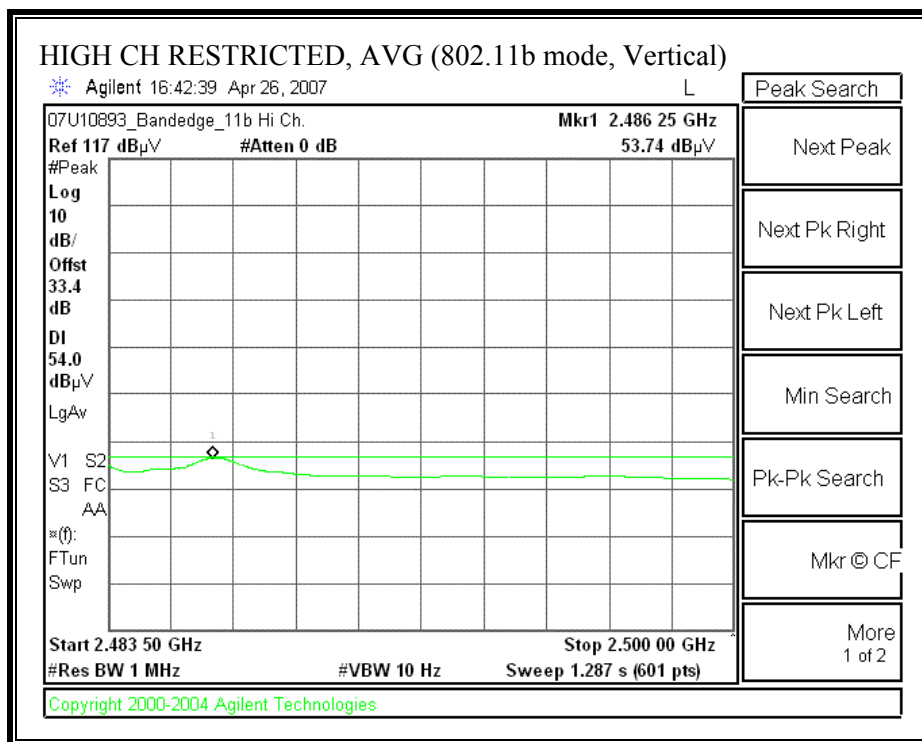
RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, 2462 MHz, HORIZONTAL)





RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, 2462 MHz, VERTICAL)



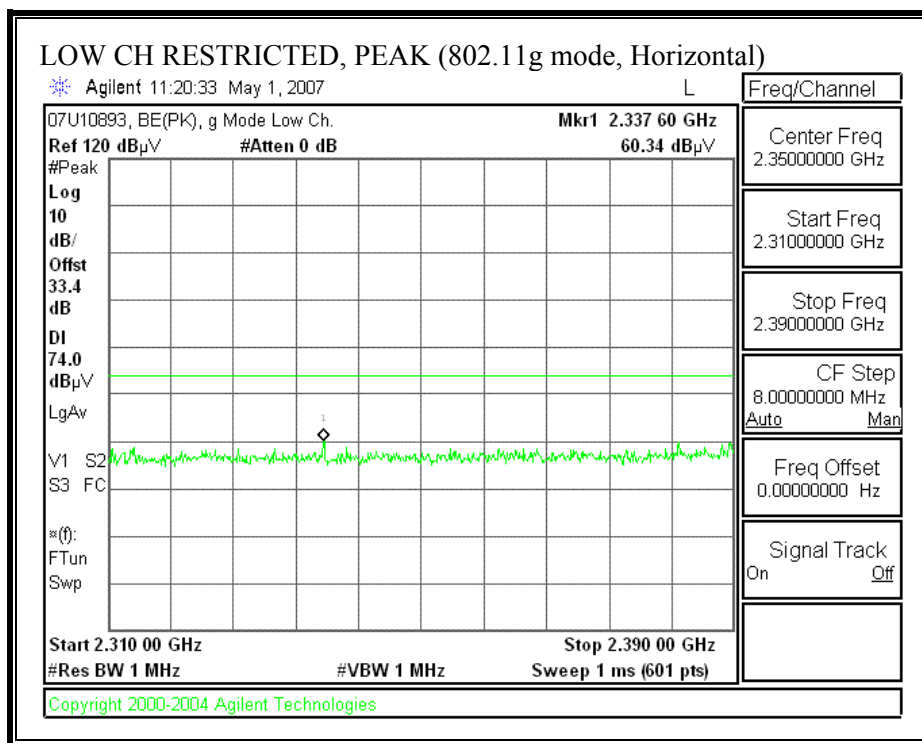


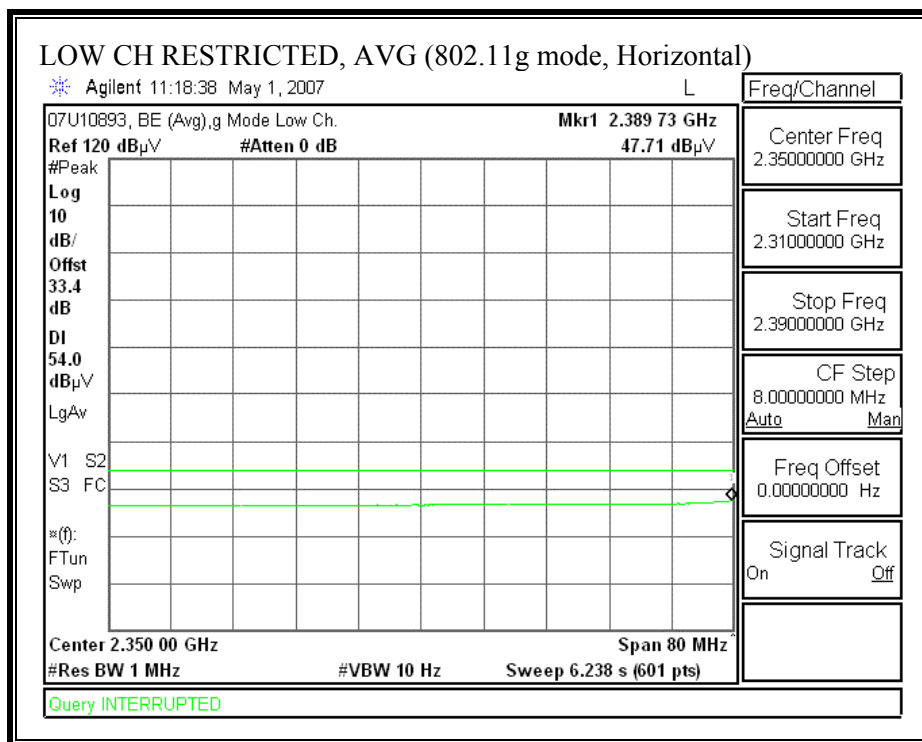
HARMONICS AND SPURIOUS EMISSIONS (b MODE)

High Frequency Measurement															
Compliance Certification Services, Fremont, A-5m Chamber															
Company: Broadcom Corporation															
Project #: 07U10893															
Date: 04/26/2007															
Test Engineer: Vien Tran															
Configuration: EUT with 3.36dBi antenna															
Mode: Transmit_2.4GHz_11b Legacy Mode															
Test Equipment:															
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz		Limit							
T73; S/N: 6717 @3m		T144 Miteq 3008A00931						FCC 15.205							
Hi Frequency Cables															
2 foot cable		3 foot cable		12 foot cable		HPF		Reject Filter		<u>Peak Measurements</u> RBW=VBW=1MHz <u>Average Measurements</u> RBW=1MHz; VBW=10Hz					
				Gordon 203134001		HPF_4.0GHz									
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt 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 Channel = CH 1 (2412 MHz)															
4.824	3.0	49.1	46.5	33.3	6.9	-36.5	0.0	0.6	53.4	50.8	74	54	-20.6	-3.2	V
12.060	3.0	41.5	30.5	37.7	12.2	-35.4	0.0	0.9	56.8	45.8	74	54	-17.2	-8.2	V
4.824	3.0	48.7	45.6	33.3	6.9	-36.5	0.0	0.6	53.0	49.9	74	54	-21.0	-4.1	H
12.060	3.0	41.0	29.8	37.7	12.2	-35.4	0.0	0.9	56.3	45.1	74	54	-17.7	-8.9	H
Mid Channel = CH 6 (2437 MHz)															
4.874	3.0	50.5	48.1	33.4	6.9	-36.5	0.0	0.6	54.9	52.5	74	54	-19.1	-1.5	V
7.311	3.0	46.5	38.2	35.0	8.4	-36.2	0.0	0.6	54.3	46.0	74	54	-19.7	-8.0	V
4.874	3.0	49.4	46.1	33.4	6.9	-36.5	0.0	0.6	53.8	50.5	74	54	-20.2	-3.5	H
7.311	3.0	43.5	33.7	35.0	8.4	-36.2	0.0	0.6	51.3	41.5	74	54	-22.7	-12.5	H
High Channel = CH 11 (2462 MHz)															
4.924	3.0	52.5	49.3	33.4	7.0	-36.5	0.0	0.6	57.0	53.8	74	54	-17.0	-0.2	V
7.386	3.0	43.9	35.3	35.0	8.4	-36.2	0.0	0.6	51.8	43.2	74	54	-22.2	-10.8	V
4.924	3.0	50.5	47.5	33.4	7.0	-36.5	0.0	0.6	55.0	52.1	74	54	-19.0	-1.9	H
7.386	3.0	42.0	30.5	35.0	8.4	-36.2	0.0	0.6	49.9	38.4	74	54	-24.1	-15.6	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											

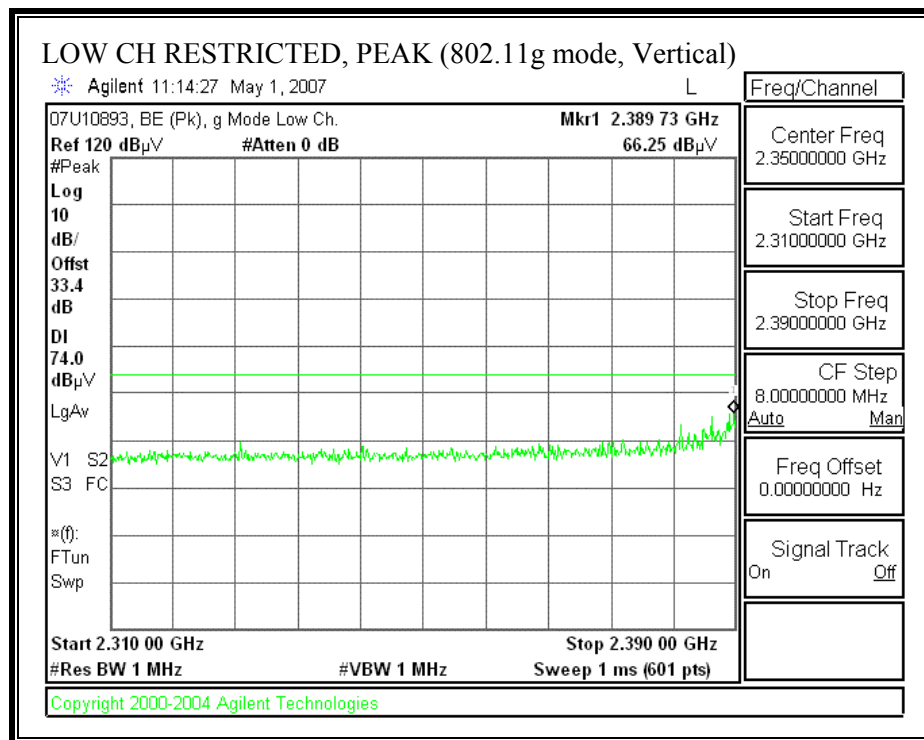
11g Legacy Mode

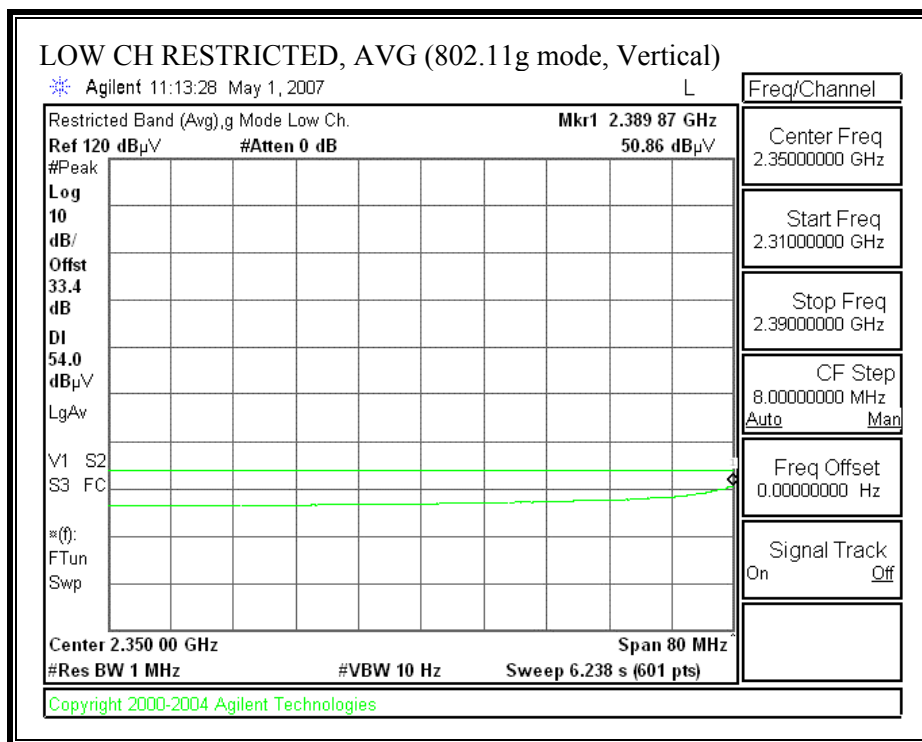
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, 2412 MHz, HORIZONTAL)



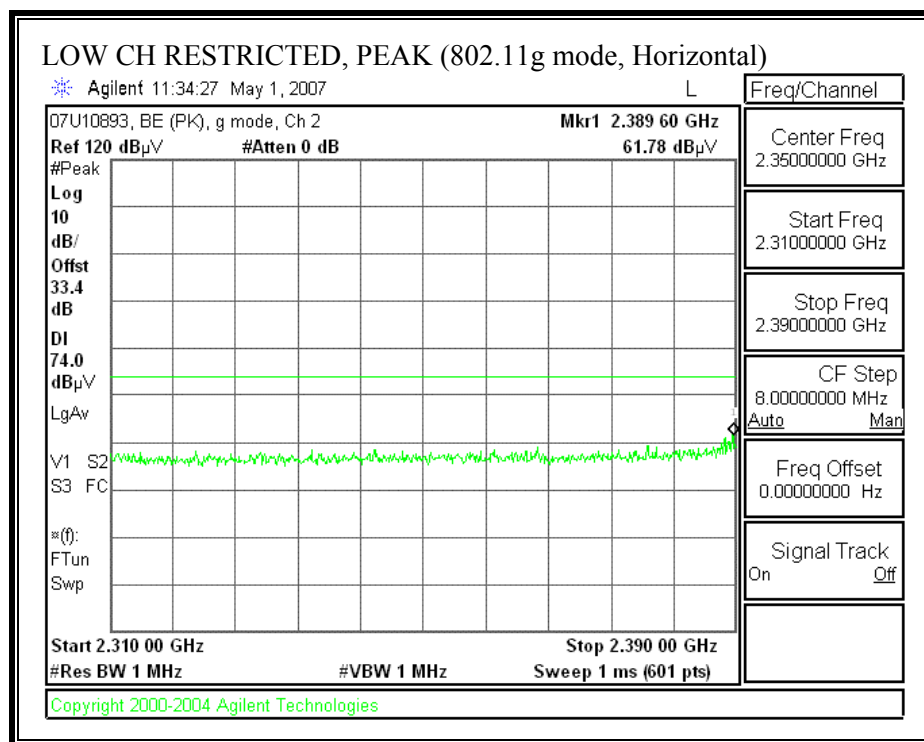


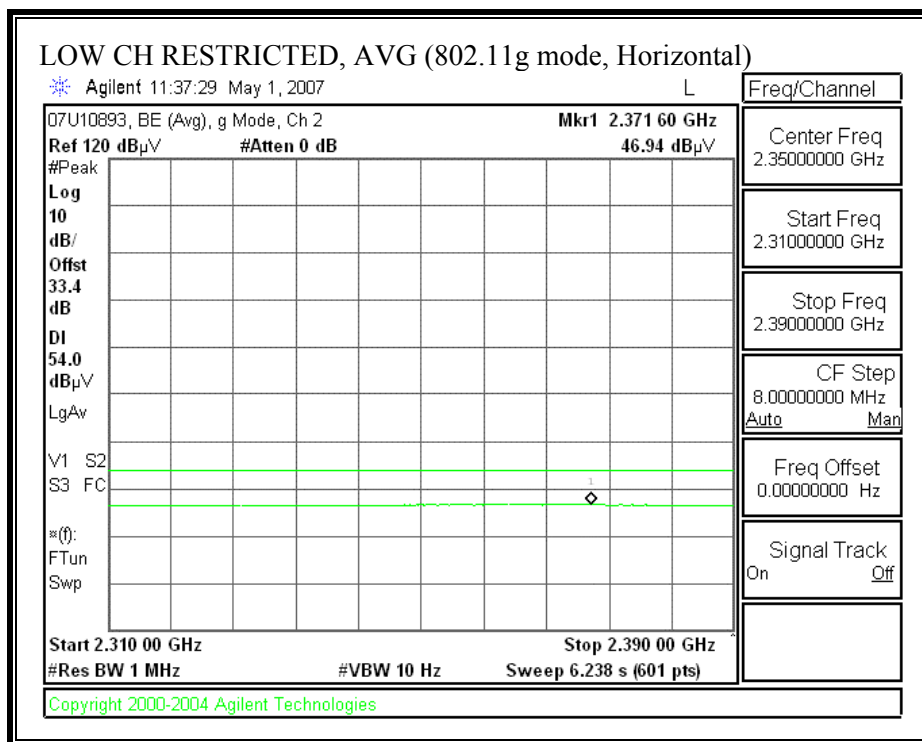
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, 2412 MHz, VERTICAL)



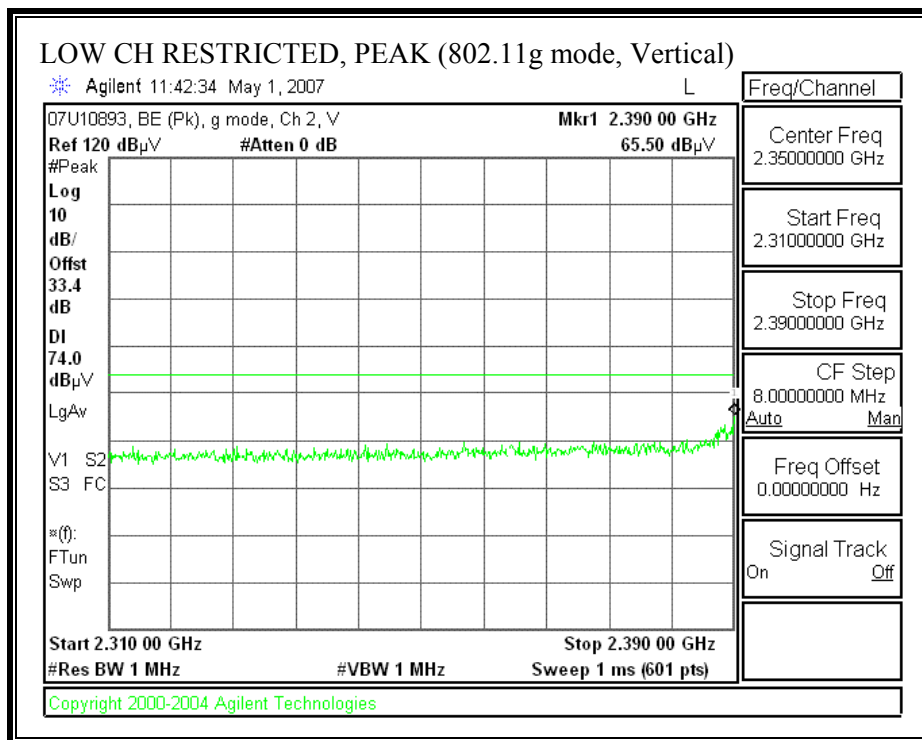


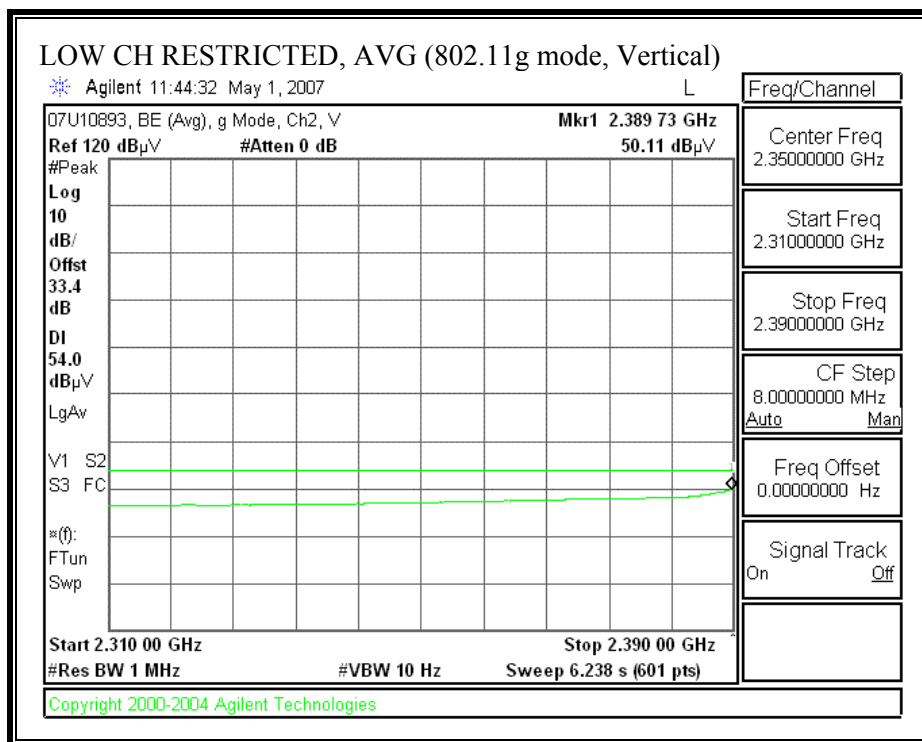
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, 2417 MHz, HORIZONTAL)



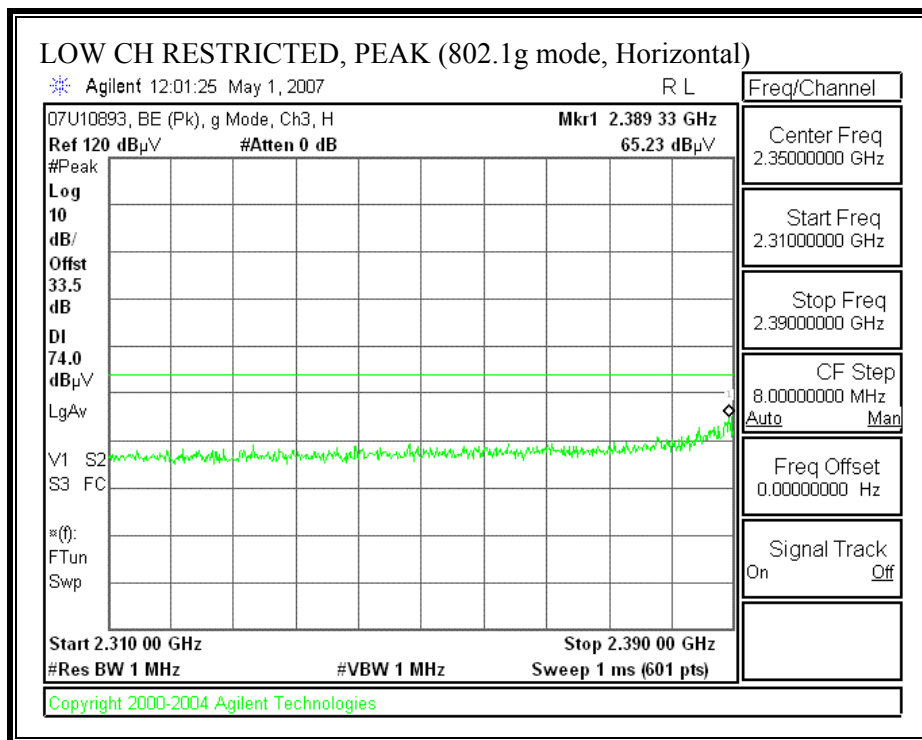


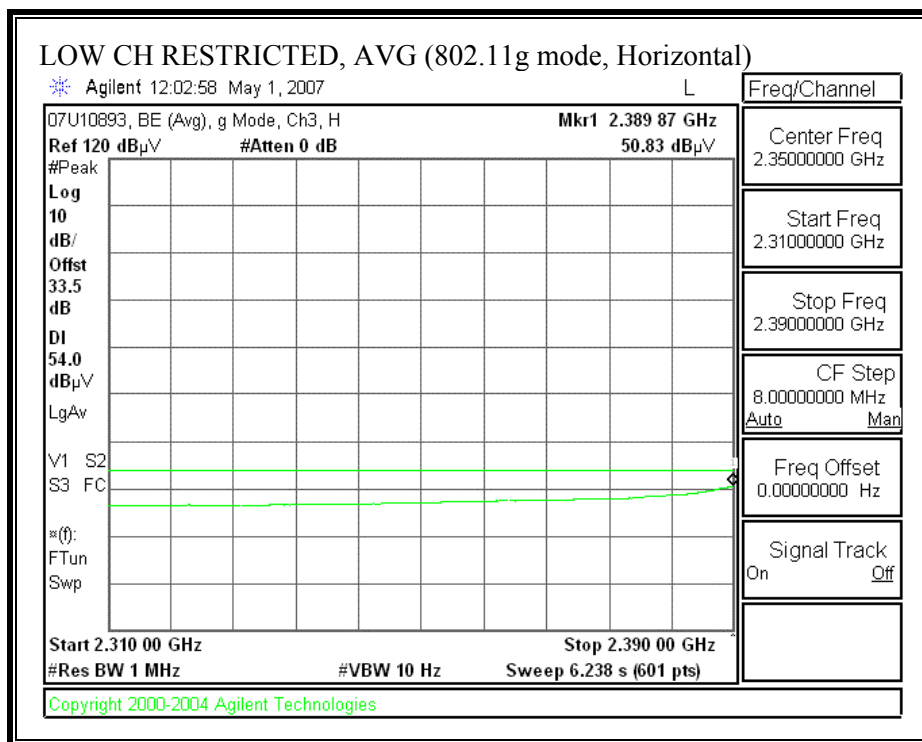
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, 2417 MHz, VERTICAL)



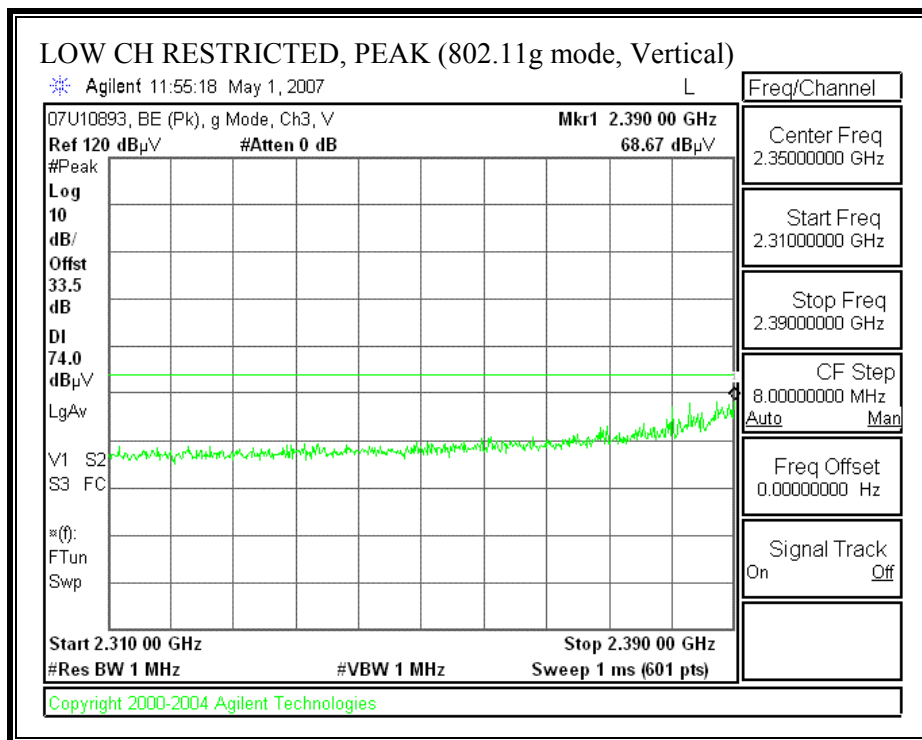


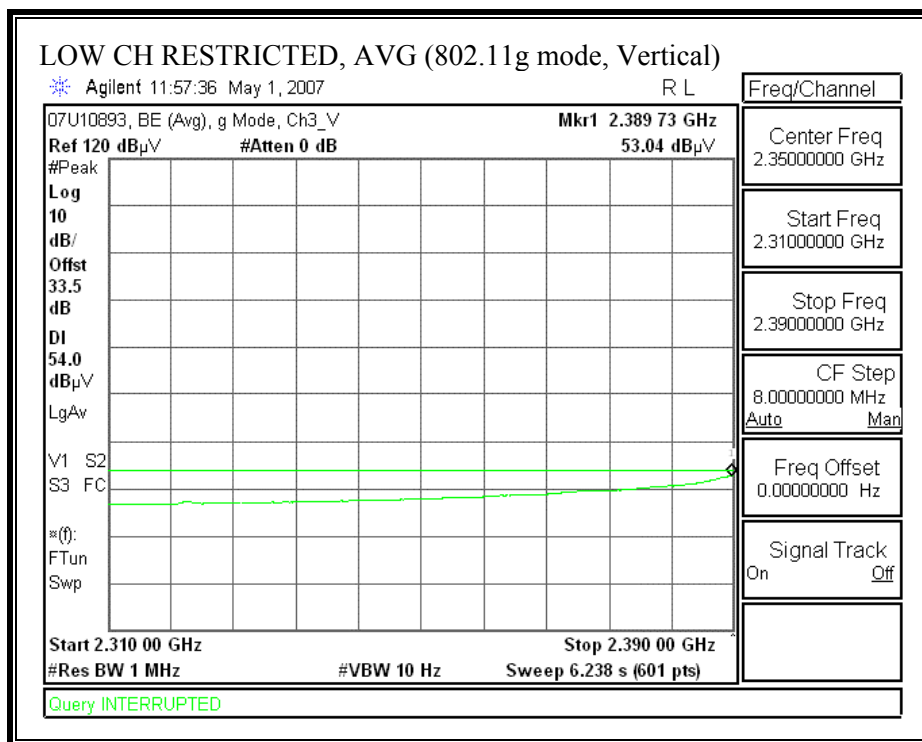
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, 2422 MHz, HORIZONTAL)



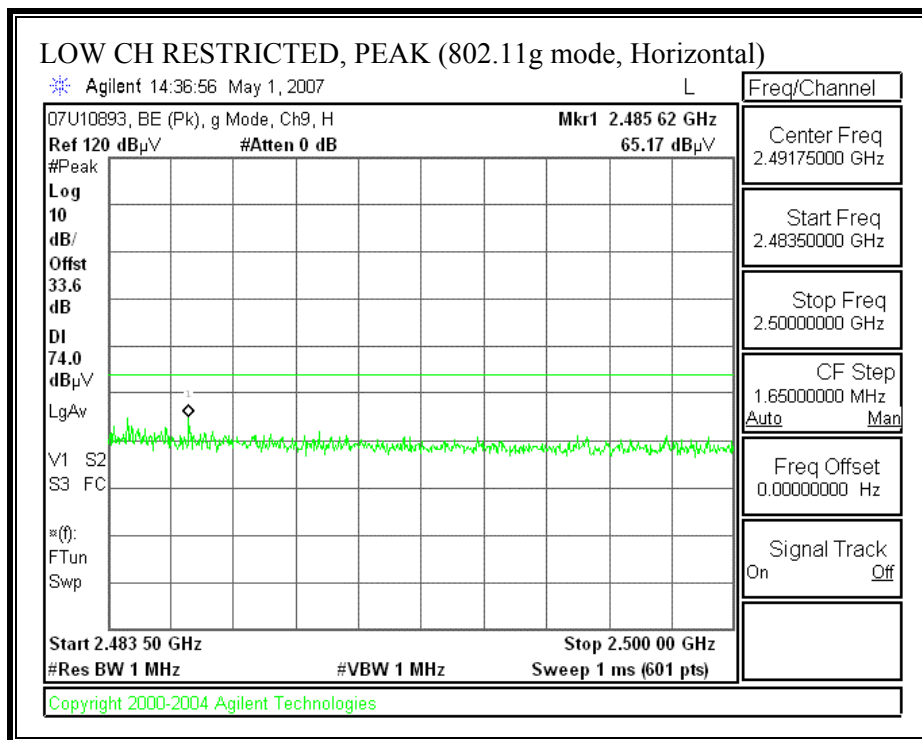


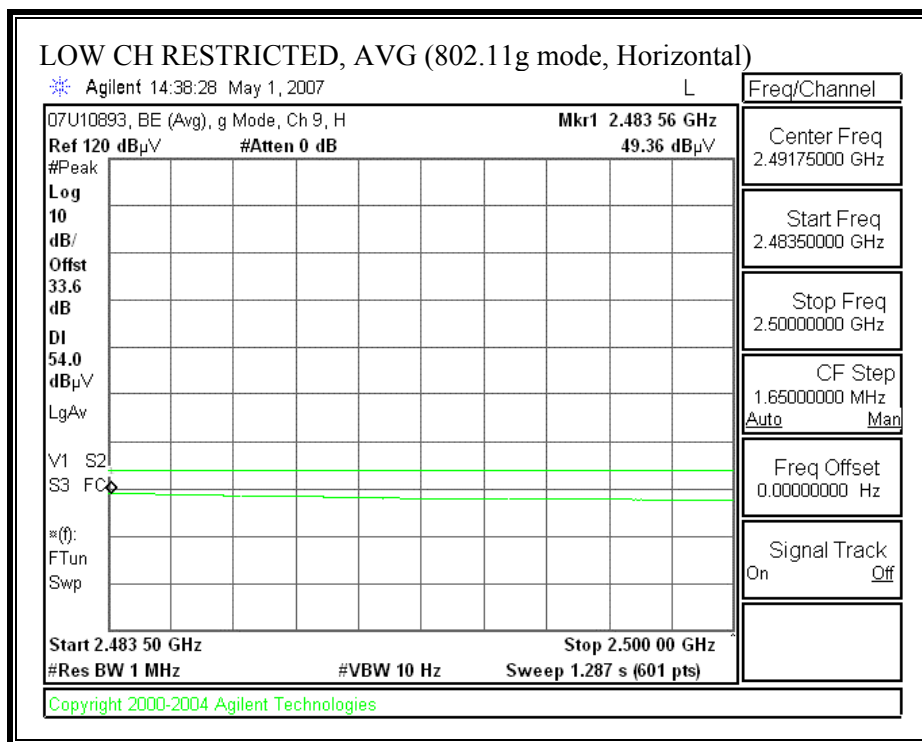
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, 2422 MHz, VERTICAL)



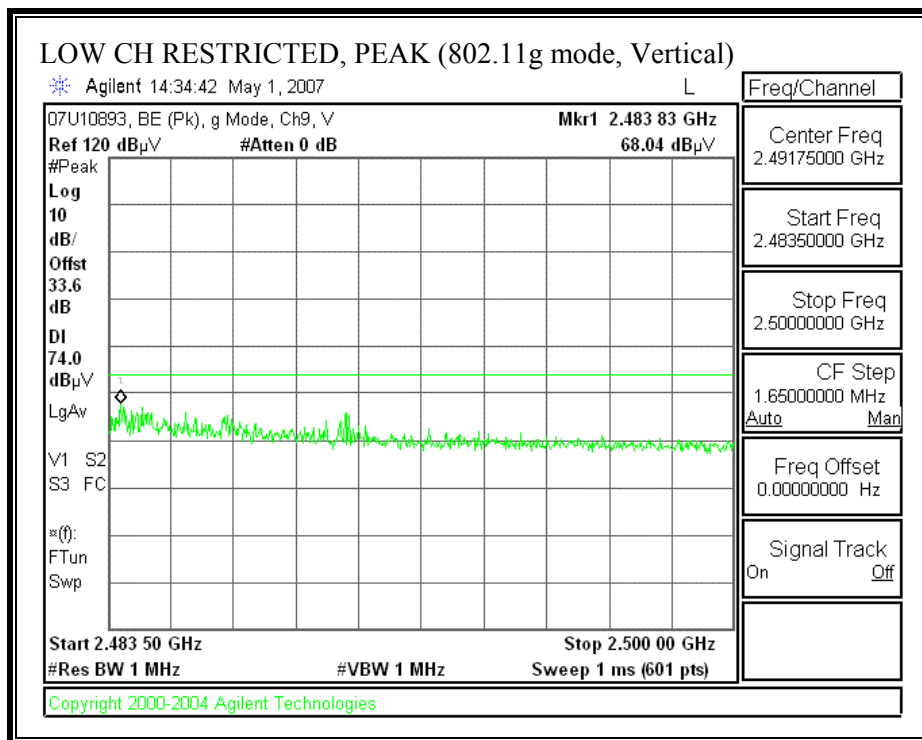


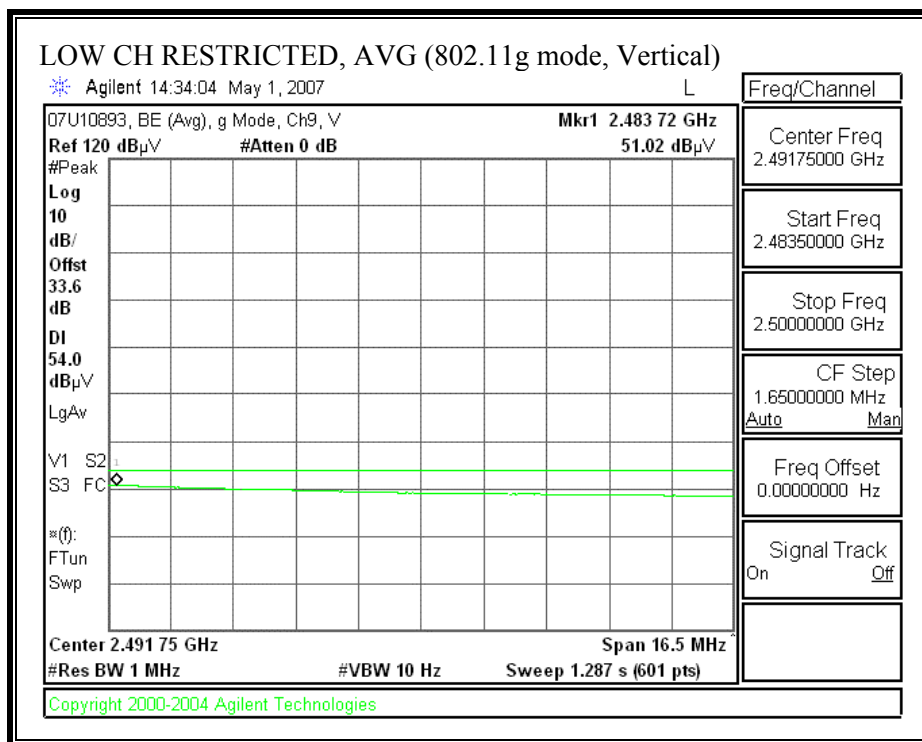
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, 2452 MHz, HORIZONTAL)



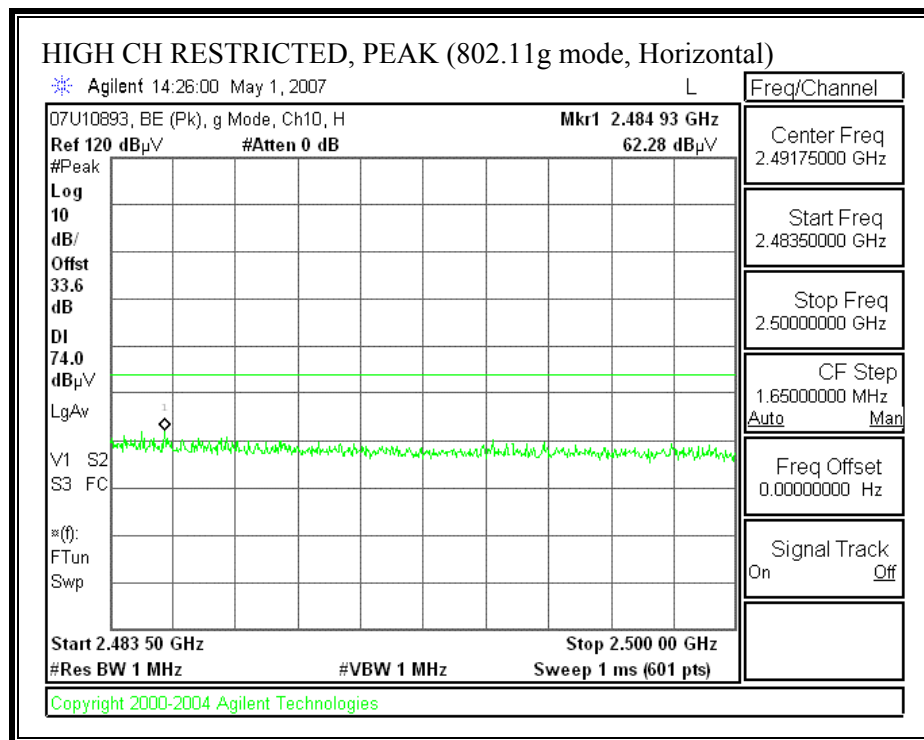


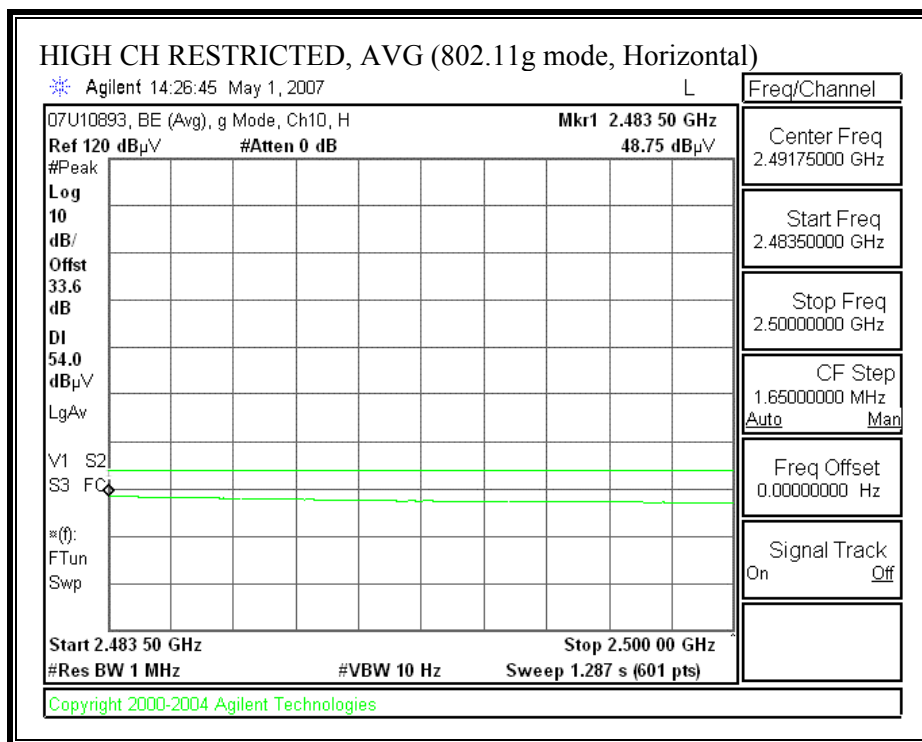
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, 2452 MHz, VERTICAL)



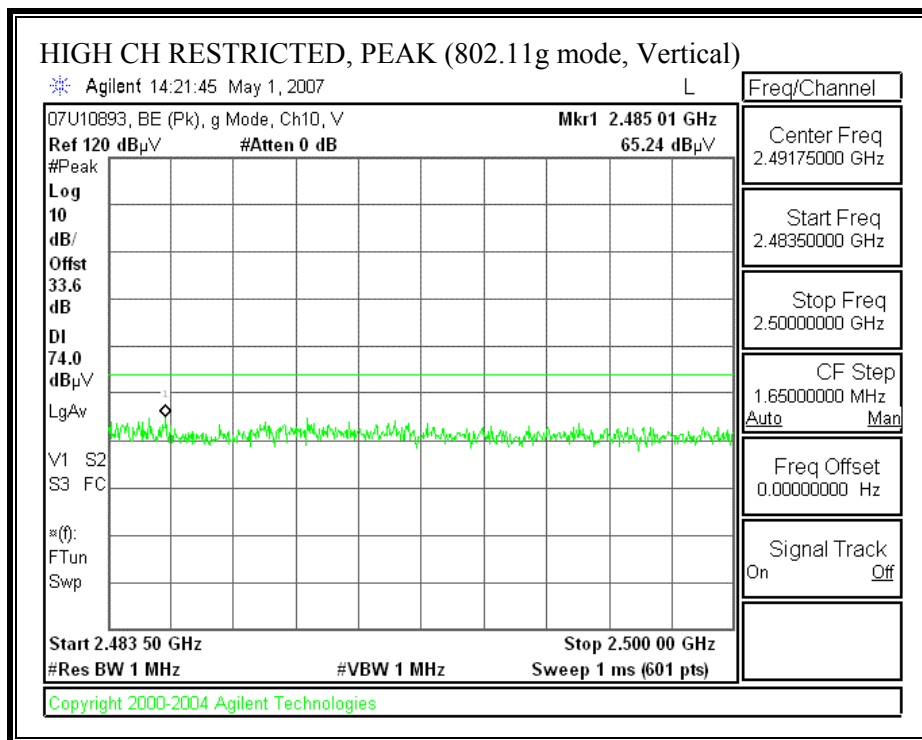


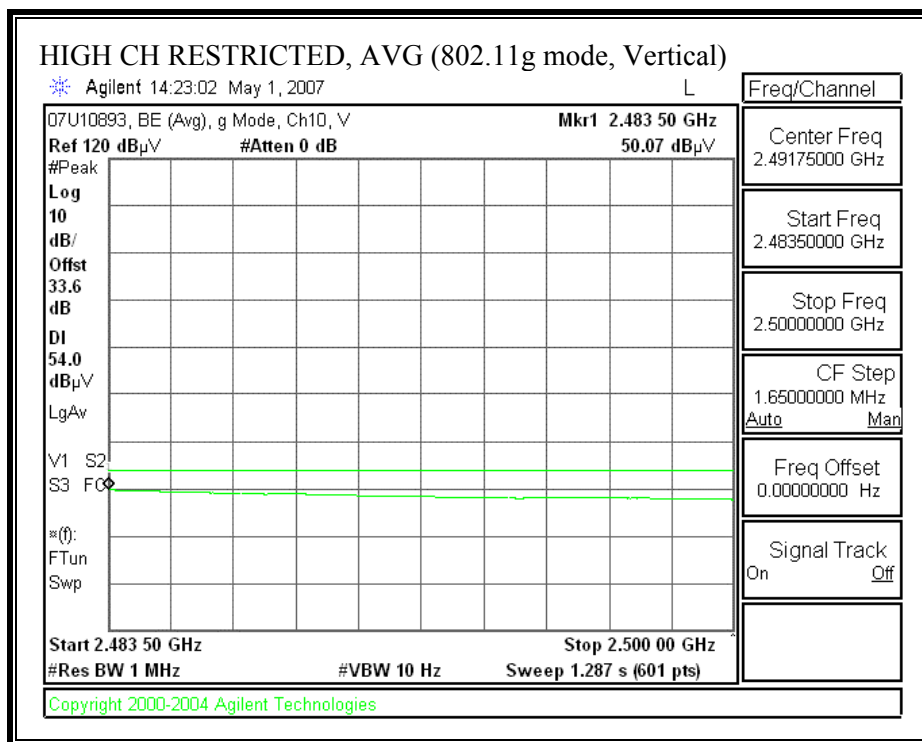
RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, 2457 MHz, HORIZONTAL)



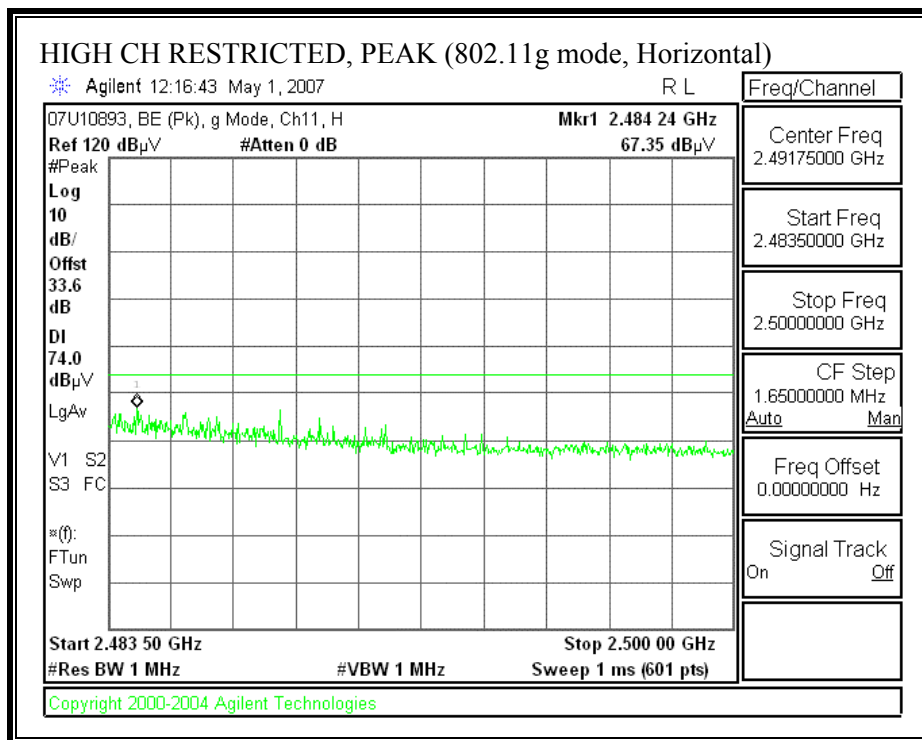


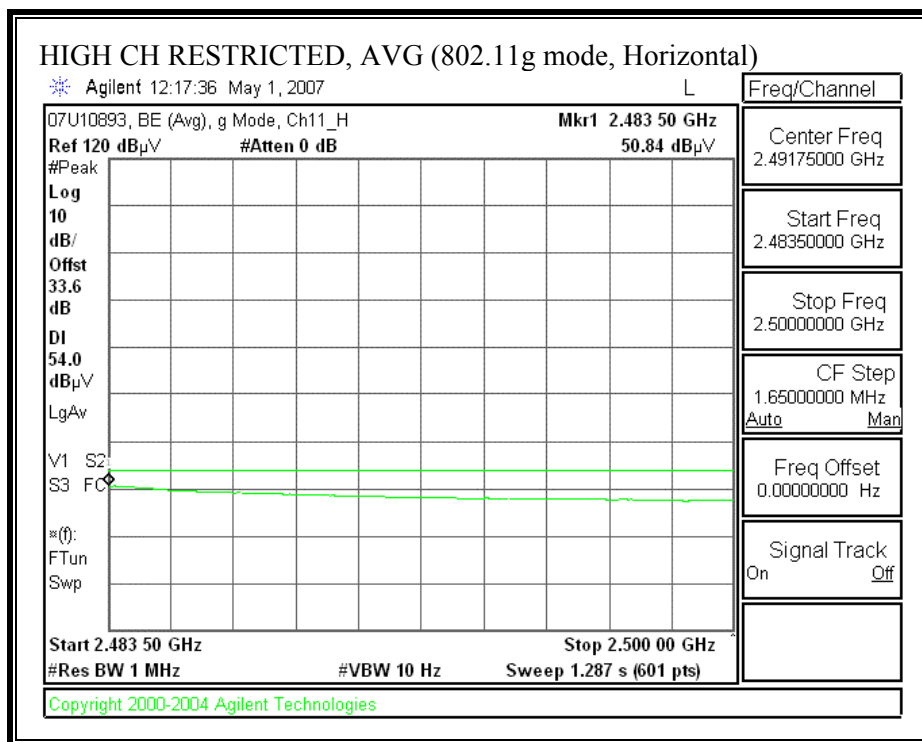
RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, 2457 MHz, VERTICAL)



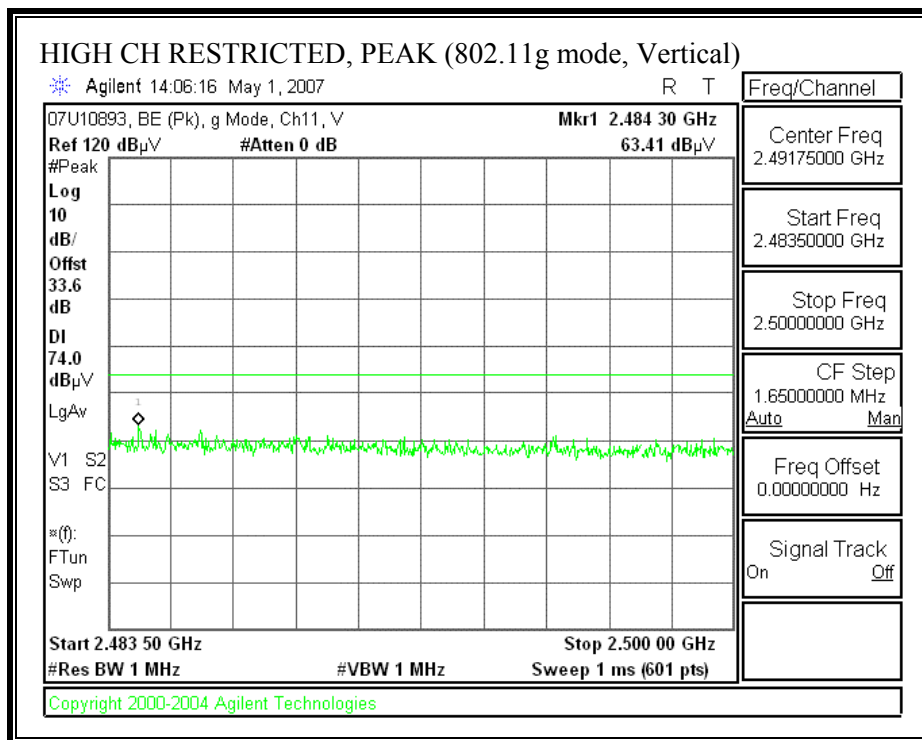


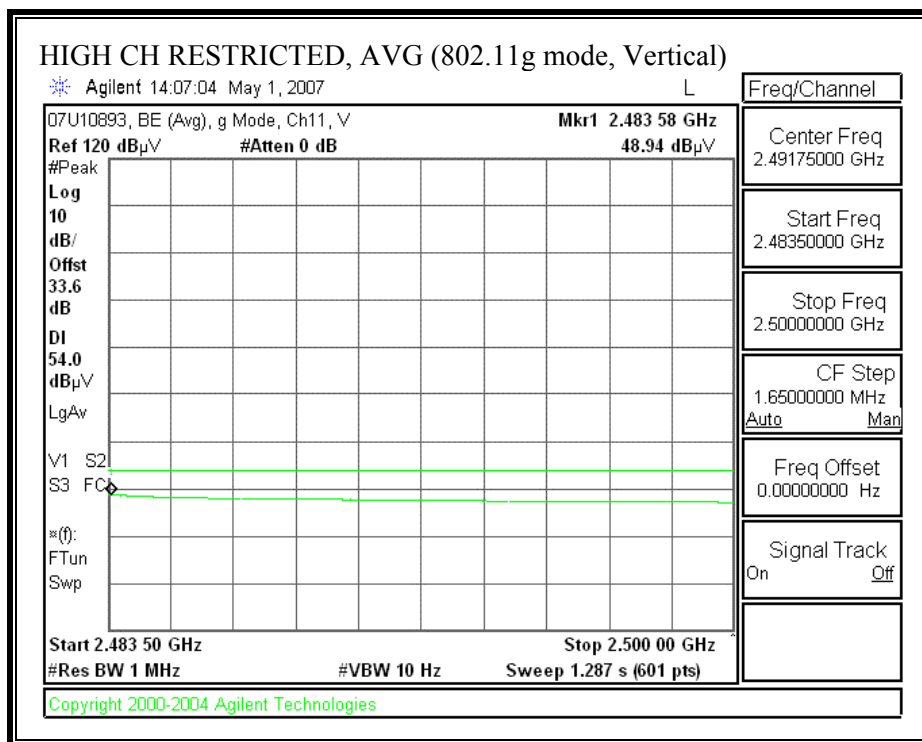
RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, 2462 MHz, HORIZONTAL)





RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, 2462 MHz, VERTICAL)





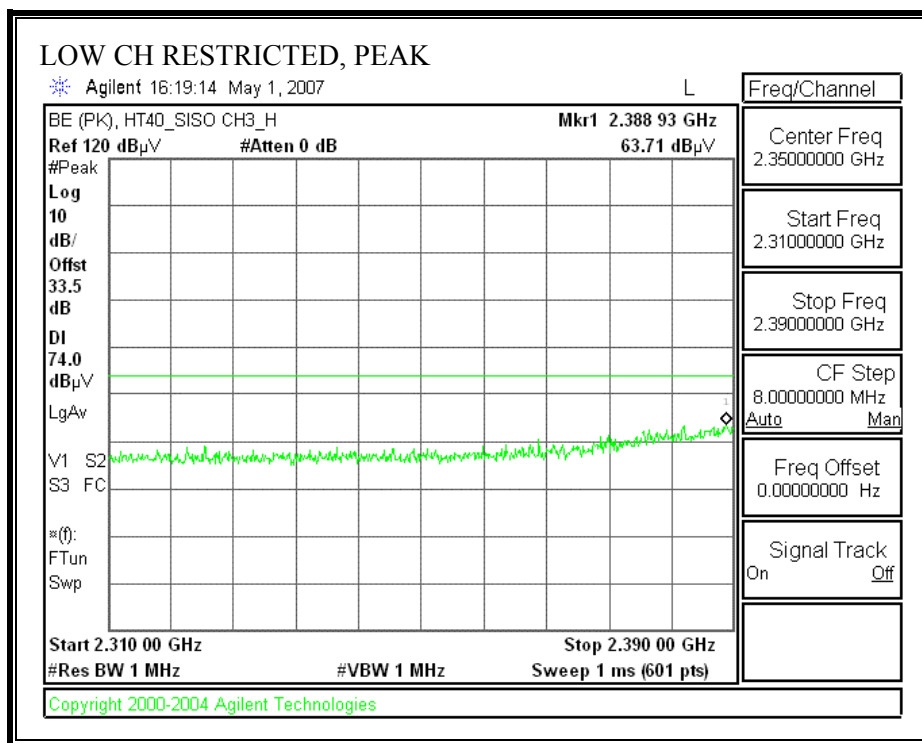
HARMONICS AND SPURIOUS EMISSIONS (g MODE)

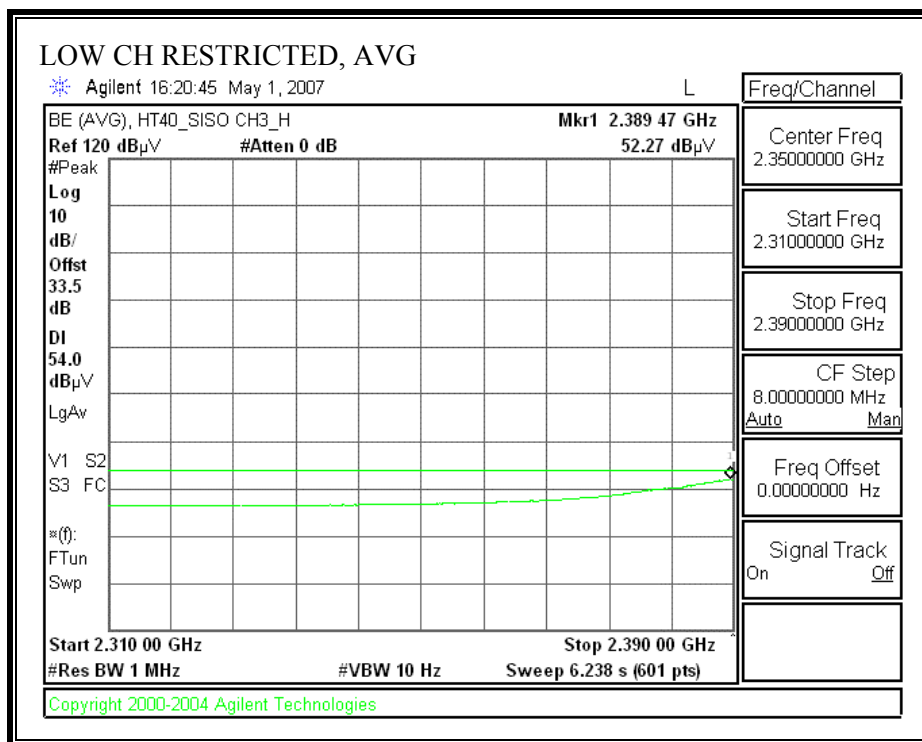
High Frequency Measurement																
Compliance Certification Services, Fremont 5 meter Chamber A																
Company: BroadCom Corporation																
Project #: 07U10893-2																
Date: 5-2-2007																
Test Engineer: Thanh Nguyen																
Configuration: EUT, Extender card, Laptop																
Mode: Transmit 11g Legacy mode																
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T60; S/N: 2238 @3m			T145 Agilent 3008A0050									FCC 15.209				
Hi Frequency Cables																
2 foot cable			3 foot cable			12 foot cable			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz; VBW=10Hz	
						Gordon 203134001			HPF_4.0GHz							
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fldr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
Channel 1, 2412MHz																
4.824	3.0	45.64	41.55	33.0	6.9	-34.8	0.0	0.6	51.3	47.2	74	54	-22.7	-6.8	V	
7.236	3.0	49.66	34.56	35.4	8.4	-34.7	0.0	0.6	59.4	44.3	74	54	-14.6	-9.7	V	
9.648	3.0	53.79	37.27	37.1	9.7	-35.0	0.0	0.8	66.4	49.9	74	54	-7.6	-4.1	V	
12.060	3.0	42.56	28.66	37.4	12.2	-32.4	0.0	0.9	60.7	46.8	74	54	-13.3	-7.2	Noise floor	
4.824	3.0	46.49	38.89	33.0	6.9	-34.8	0.0	0.6	52.2	44.6	74	54	-21.8	-9.4	H	
7.236	3.0	49.01	34.25	35.4	8.4	-34.7	0.0	0.6	58.8	44.0	74	54	-15.2	-10.0	H	
9.648	3.0	53.97	37.17	37.1	9.7	-35.0	0.0	0.8	66.6	49.8	74	54	-7.4	-4.2	H	
12.060	3.0	42.12	28.45	37.4	12.2	-32.4	0.0	0.9	60.2	46.6	74	54	-13.8	-7.4	Noise floor	
Channel 6, 2437MHz																
4.874	3.0	46.31	39.83	33.1	6.9	-34.9	0.0	0.6	52.1	45.6	74	54	-21.9	-8.4	H	
7.311	3.0	46.51	24.67	35.5	8.4	-34.7	0.0	0.6	56.4	34.6	74	54	-17.6	-19.4	H	
9.748	3.0	53.70	37.76	37.2	9.8	-35.0	0.0	0.8	66.5	50.6	74	54	-7.5	-3.4	H	
12.185	3.0	43.82	29.33	37.4	12.2	-32.4	0.0	0.9	61.9	47.4	74	54	-12.1	-6.6	Noise floor	
4.874	3.0	48.85	36.45	33.1	6.9	-34.9	0.0	0.6	54.6	42.2	74	54	-19.4	-11.8	V	
7.311	3.0	49.58	36.67	35.5	8.4	-34.7	0.0	0.6	59.5	46.6	74	54	-14.5	-7.4	V	
9.748	3.0	54.97	39.33	37.2	9.8	-35.0	0.0	0.8	67.8	52.1	74	54	-6.2	-1.9	V	
12.185	3.0	42.74	28.78	37.4	12.2	-32.4	0.0	0.9	60.8	46.9	74	54	-13.2	-7.1	Noise floor	
Channel 11, 2462MHz																
4.924	3.0	52.54	37.73	33.1	7.0	-34.9	0.0	0.6	58.4	43.6	74	54	-15.6	-10.4	V	
7.386	3.0	47.93	33.62	35.6	8.4	-34.6	0.0	0.6	57.9	43.6	74	54	-16.1	-10.4	V	
9.848	3.0	56.08	38.43	37.3	9.9	-35.1	0.0	0.8	69.0	51.4	74	54	-5.0	-2.6	V	
12.310	3.0	42.15	28.86	37.4	12.2	-32.4	0.0	0.9	60.3	47.0	74	54	-13.7	-7.0	Noise floor	
4.924	3.0	53.50	39.82	33.1	7.0	-34.9	0.0	0.6	59.3	45.7	74	54	-14.7	-8.3	H	
7.386	3.0	47.89	34.05	35.6	8.4	-34.6	0.0	0.6	57.9	44.1	74	54	-16.1	-9.9	H	
9.848	3.0	52.67	37.12	37.3	9.9	-35.1	0.0	0.8	65.6	50.1	74	54	-8.4	-3.9	H	
12.310	3.0	43.25	28.66	37.4	12.2	-32.4	0.0	0.9	61.4	46.8	74	54	-12.6	-7.2	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 Mode 20 MHz SISO is covered by the worst case 802.11g mode Legacy testing.

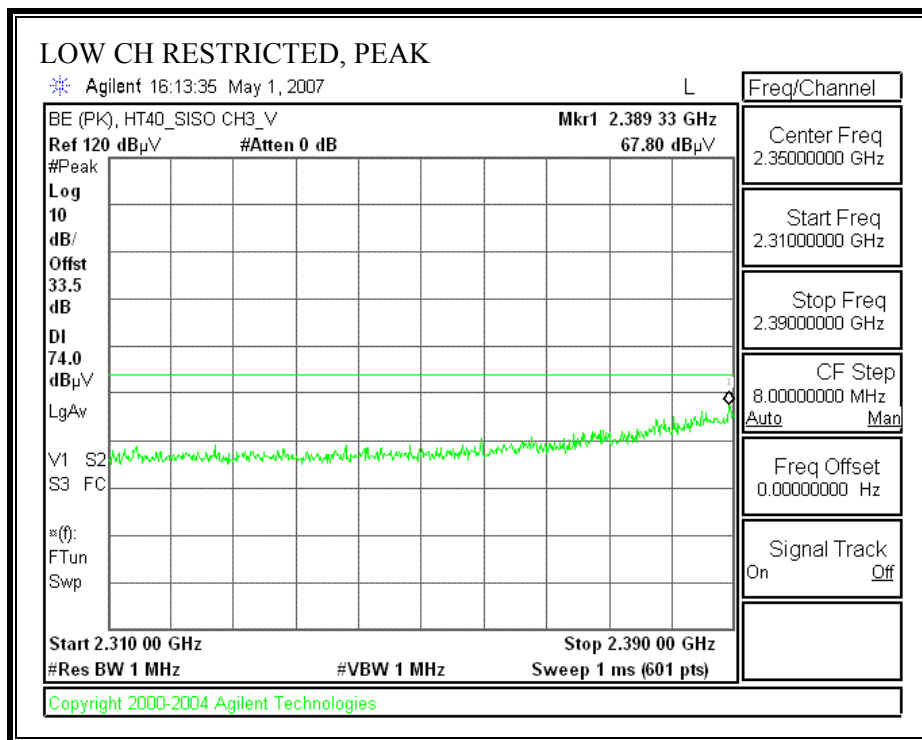
802.11n Mode 40 MHz SISO

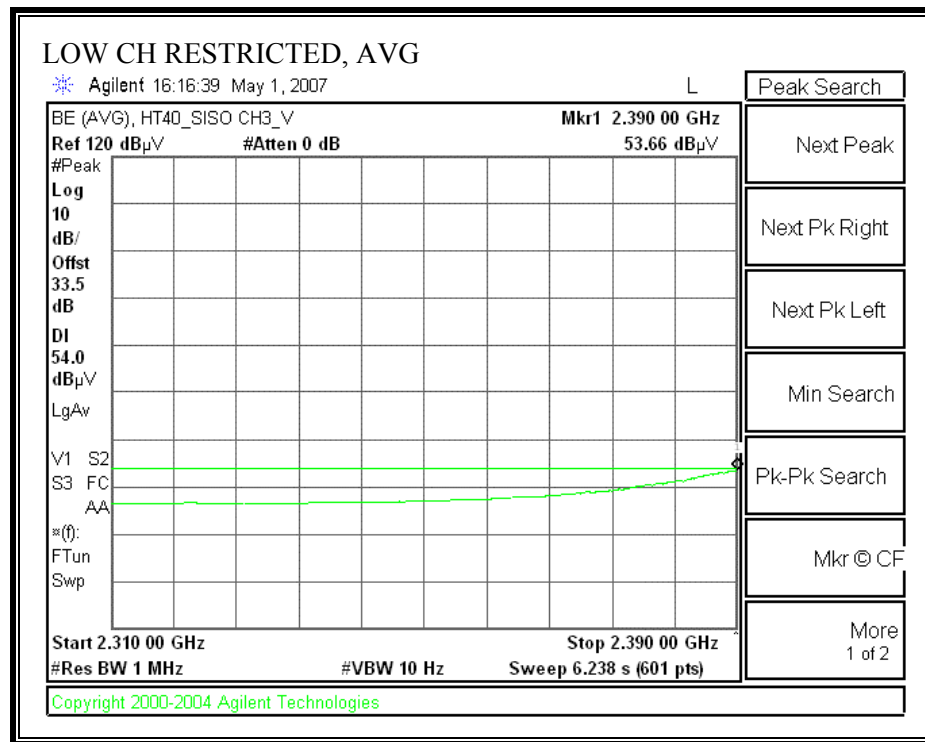
LOW CHANNEL, 2422 MHz, HORIZONTAL



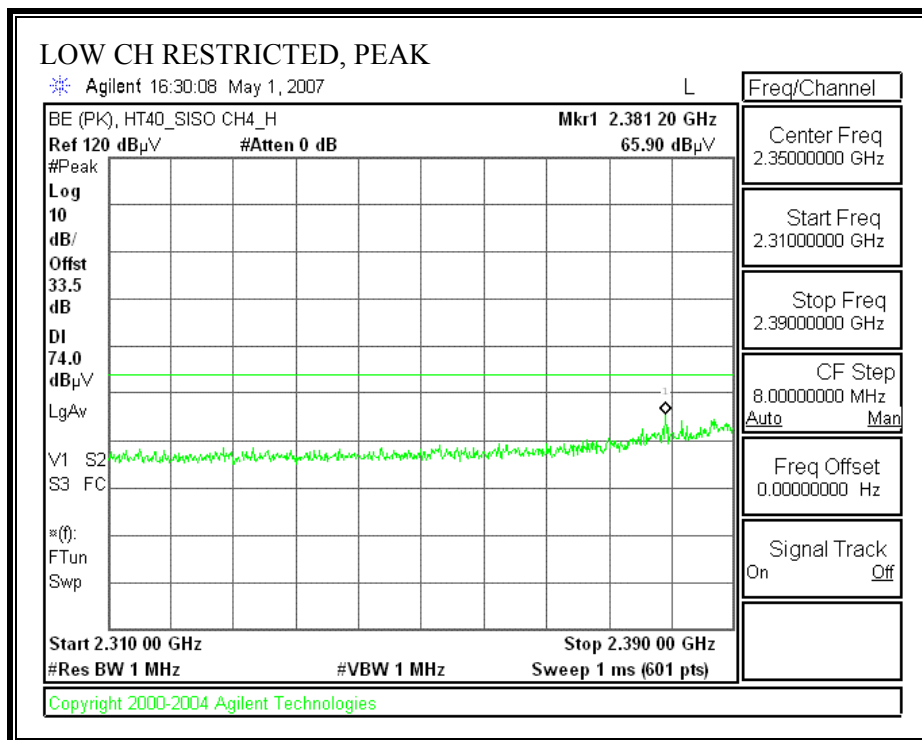


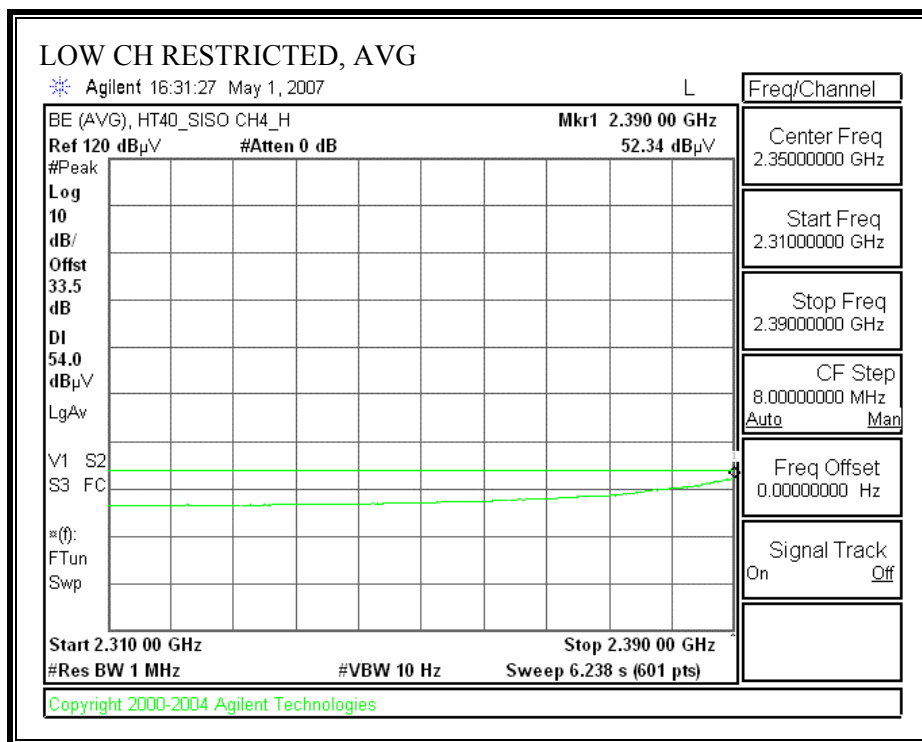
RESTRICTED BANDEDGE (LOW CHANNEL, 2422 MHz, VERTICAL)



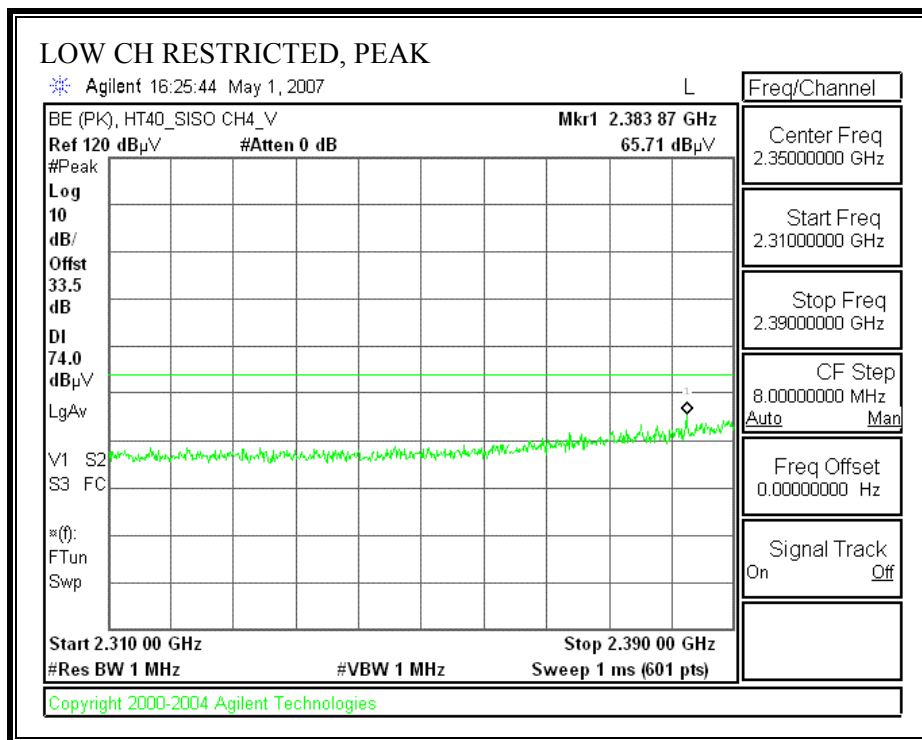


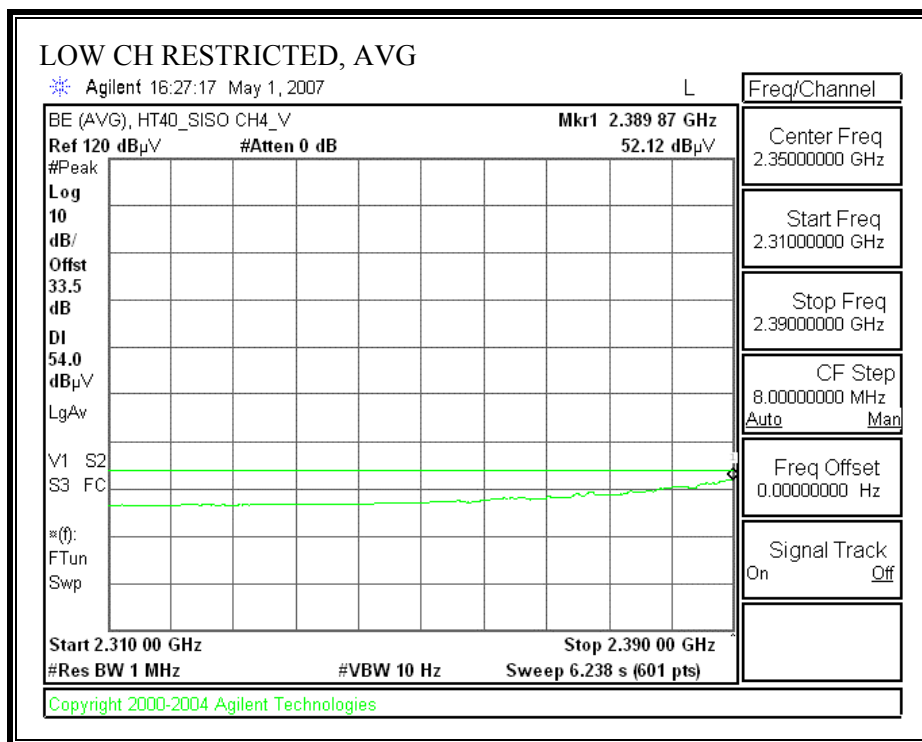
RESTRICTED BANDEDGE (LOW CHANNEL, 2427 MHz, HORIZONTAL)



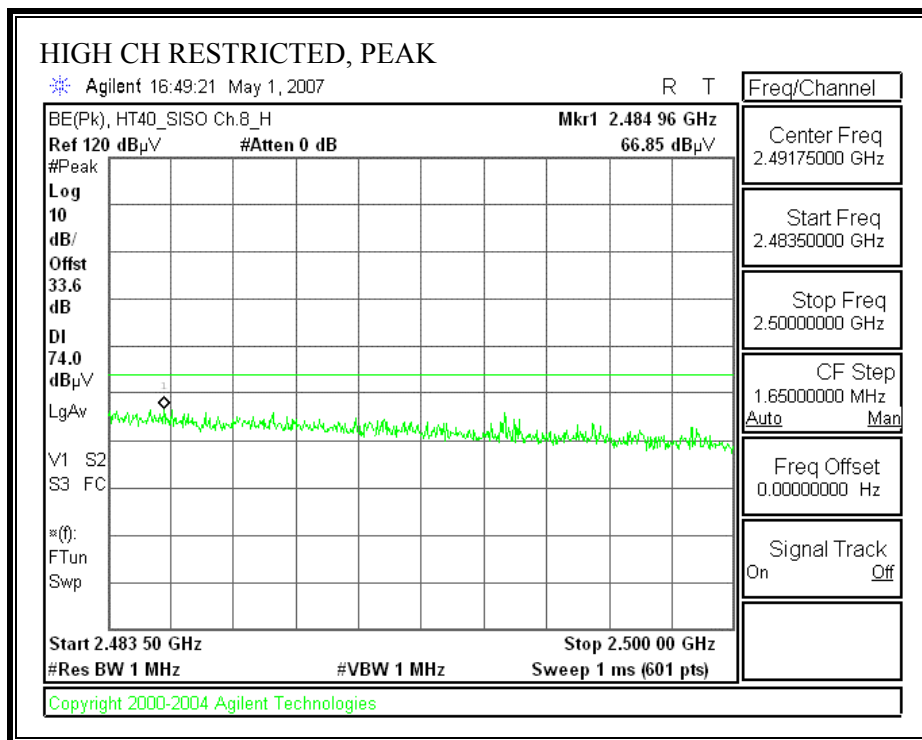


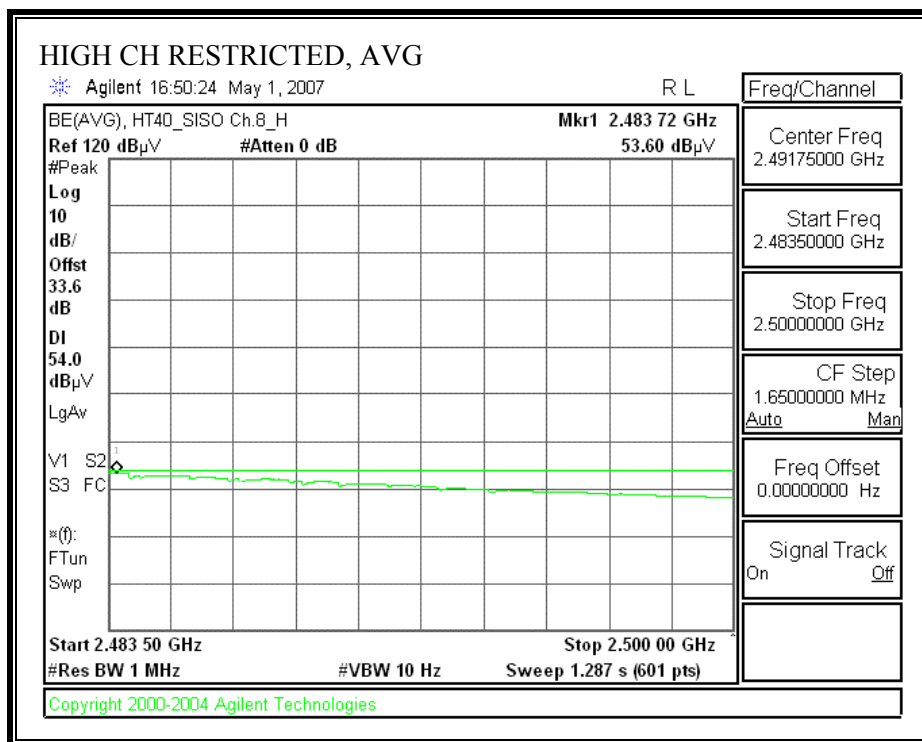
RESTRICTED BANEDGE (LOW CHANNEL, 2427 MHz, VERTICAL)



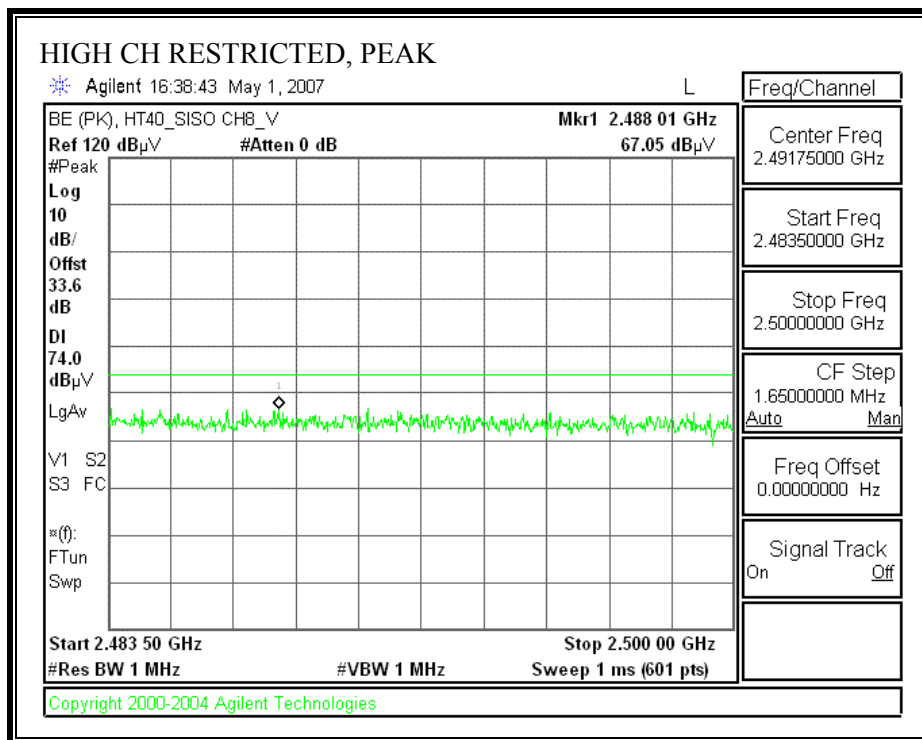


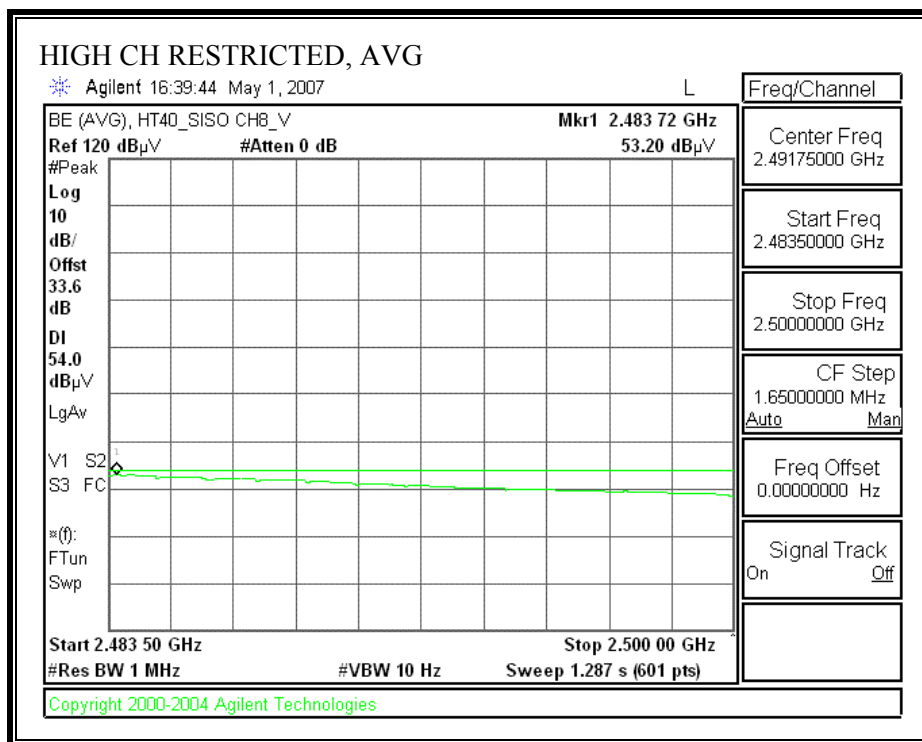
RESTRICTED BANDEDGE (HIGHCHANNEL, 2447MHz, HORIZONTAL)



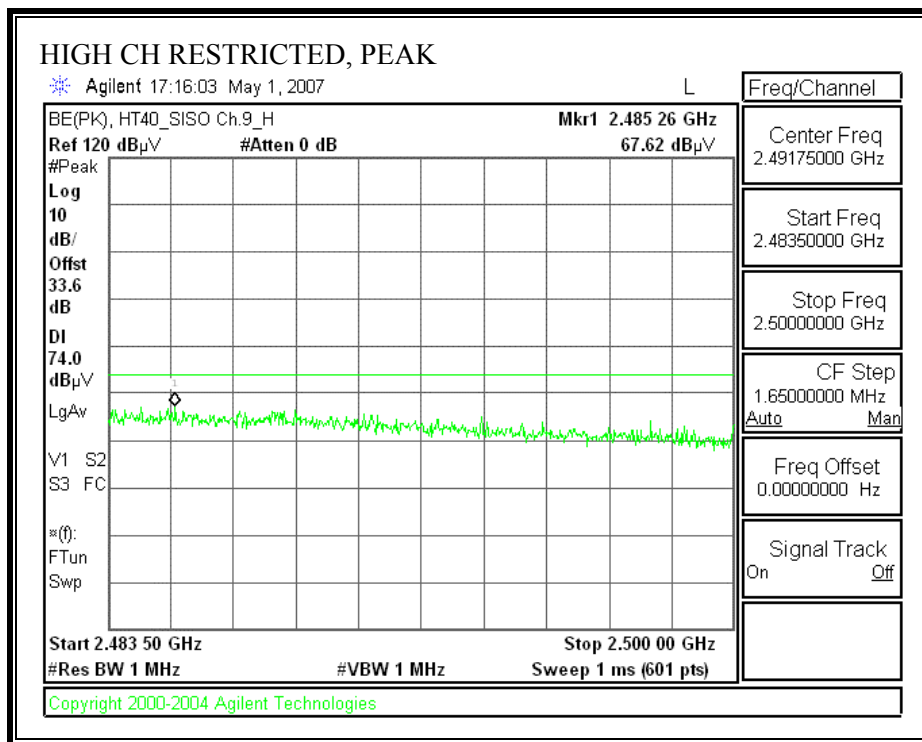


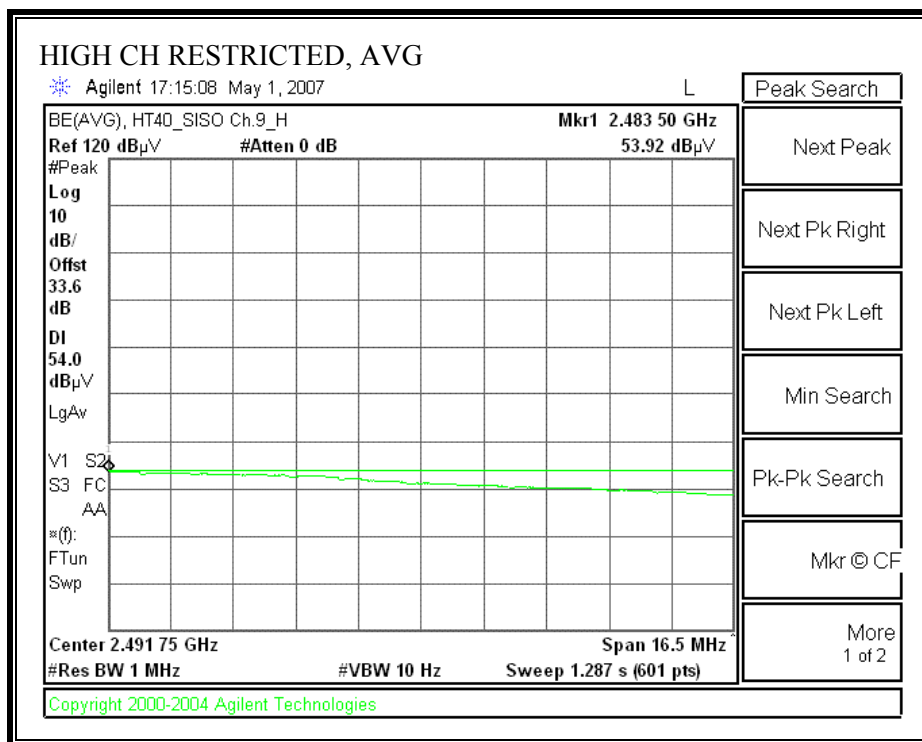
RESTRICTED BANDEDGE (HIGH CHANNEL, 2447 MHz, VERTICAL)



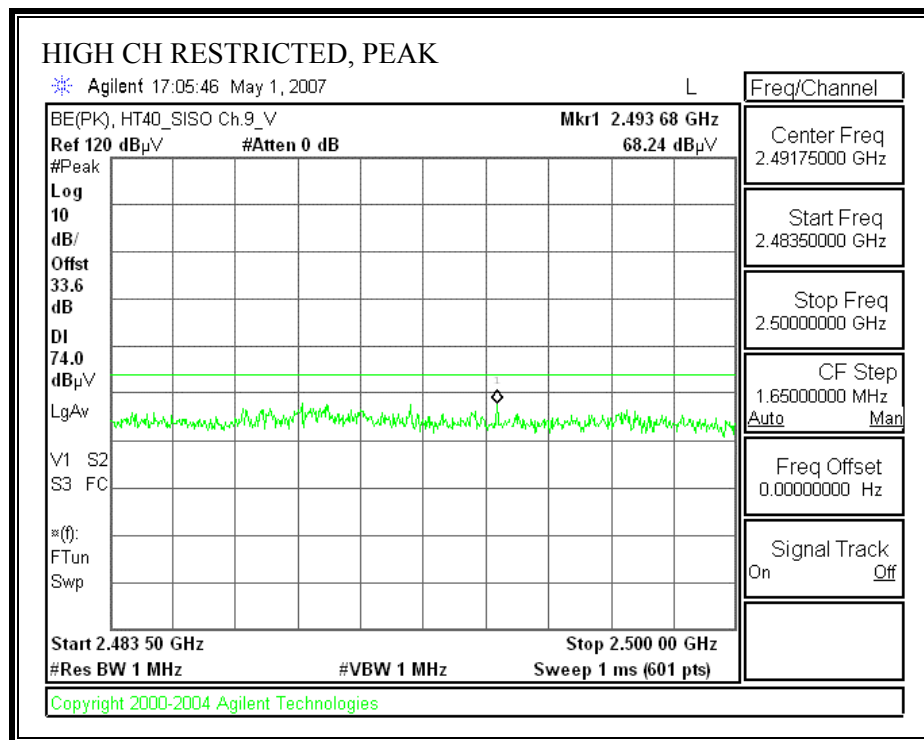


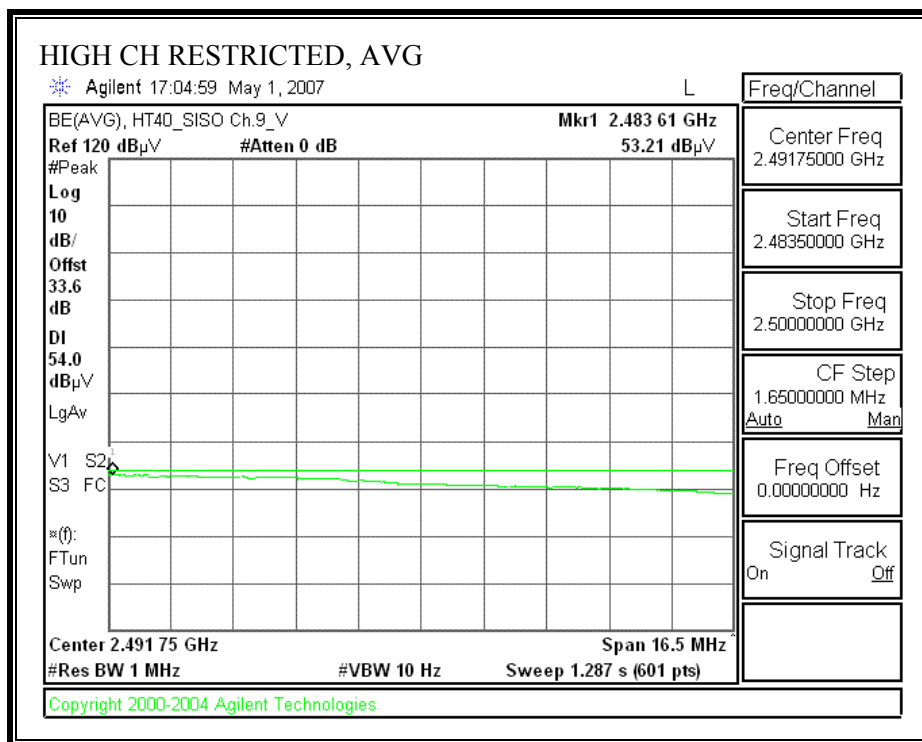
RESTRICTED BANDEDGE (HIGH CHANNEL, 2452 MHz, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, 2452 MHz, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS (11n 40 MHz SISO)

High Frequency Measurement															
Compliance Certification Services, Fremont 5 meter Chamber A															
Company: BroadCom Corporation															
Project #: 07U10893-2															
Date: 5-3-2007															
Test Engineer: Thanh Nguyen															
Configuration: EUT, Extender card, Laptop															
Mode: Transmit 11n HT40 SISO															
Test Equipment:															
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 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		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz					
				Gordon 203134001		HPF_4.0GHz									
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)
Channel 3, 2422MHz															
4.844	3.0	42.30	33.84	33.0	6.9	-34.8	0.0	0.6	48.0	39.5	74	54	-26.0	-14.5	V
7.266	3.0	44.58	30.50	35.4	8.4	-34.7	0.0	0.6	54.4	40.3	74	54	-19.6	-13.7	V
9.688	3.0	47.34	34.03	37.2	9.7	-35.0	0.0	0.8	60.1	46.7	74	54	-13.9	-7.3	V
12.110	3.0	37.03	24.54	37.4	12.2	-32.4	0.0	0.9	55.1	42.6	74	54	-18.9	-11.4	Noise floor
4.844	3.0	45.25	40.55	33.0	6.9	-34.8	0.0	0.6	50.9	46.2	74	54	-23.1	-7.8	H
7.266	3.0	42.63	29.17	35.4	8.4	-34.7	0.0	0.6	52.4	39.0	74	54	-21.6	-15.0	H
9.688	3.0	45.40	31.08	37.2	9.7	-35.0	0.0	0.8	58.1	43.8	74	54	-15.9	-10.2	H
12.110	3.0	37.37	23.59	37.4	12.2	-32.4	0.0	0.9	55.5	41.7	74	54	-18.5	-12.3	Noise floor
Channel 6, 2437MHz															
4.874	3.0	45.64	40.38	33.1	6.9	-34.9	0.0	0.6	51.4	46.1	74	54	-22.6	-7.9	H
7.311	3.0	42.75	29.12	35.5	8.4	-34.7	0.0	0.6	52.6	39.0	74	54	-21.4	-15.0	H
9.748	3.0	42.51	28.95	37.2	9.8	-35.0	0.0	0.8	55.3	41.8	74	54	-18.7	-12.2	H
12.185	3.0	37.79	25.44	37.4	12.2	-32.4	0.0	0.9	55.9	43.5	74	54	-18.1	-10.5	Noise floor
4.874	3.0	43.28	30.62	33.1	6.9	-34.9	0.0	0.6	49.0	36.4	74	54	-25.0	-17.6	V
7.311	3.0	42.55	28.61	35.5	8.4	-34.7	0.0	0.6	52.4	38.5	74	54	-21.6	-15.5	V
9.748	3.0	47.38	32.54	37.2	9.8	-35.0	0.0	0.8	60.2	45.3	74	54	-13.8	-8.7	V
12.185	3.0	38.08	25.67	37.4	12.2	-32.4	0.0	0.9	56.2	43.8	74	54	-17.8	-10.2	Noise floor
Channel 9, 2452MHz															
4.904	3.0	43.89	33.14	33.1	7.0	-34.9	0.0	0.6	49.7	38.9	74	54	-24.3	-15.1	V
7.356	3.0	42.30	28.33	35.5	8.4	-34.6	0.0	0.6	52.3	38.3	74	54	-21.7	-15.7	V
9.808	3.0	44.40	31.25	37.3	9.9	-35.0	0.0	0.8	57.3	44.1	74	54	-16.7	-9.9	V
12.260	3.0	37.02	23.56	37.4	12.2	-32.4	0.0	0.9	55.1	41.7	74	54	-18.9	-12.3	Noise floor
4.904	3.0	46.16	37.67	33.1	7.0	-34.9	0.0	0.6	52.0	43.5	74	54	-22.0	-10.5	H
7.356	3.0	39.52	25.44	35.5	8.4	-34.6	0.0	0.6	49.5	35.4	74	54	-24.5	-18.6	H
9.808	3.0	45.81	32.55	37.3	9.9	-35.0	0.0	0.8	58.7	45.4	74	54	-15.3	-8.6	H
12.260	3.0	37.33	24.23	37.4	12.2	-32.4	0.0	0.9	55.4	42.3	74	54	-18.6	-11.7	Noise floor
f Measurement Frequency															
Dist Distance to Antenna															
Read Analyzer Reading															
AF Antenna Factor															
CL Cable Loss															
Amp Preamp Gain															
D Corr Distance Correct to 3 meters															
Avg Average Field Strength @ 3 m															
Peak Calculated Peak Field Strength															
HPF High Pass Filter															
Avg Lim Average Field Strength Limit															
Pk Lim Peak Field Strength Limit															
Avg Mar Margin vs. Average Limit															
Pk Mar Margin vs. Peak Limit															

7.5.3. TRANSMITTER ABOVE 1 GHz FOR 5725 TO 5850 MHz BAND

802.11a Legacy Mode

HARMONICS AND SPURIOUS EMISSIONS (802.11a LEGACY MODE)

High Frequency Measurement																
Compliance Certification Services, Fremont, A-5m Chamber																
Company: Broadcom Corporation																
Project #: 07U10893																
Date: 04/05/2007																
Test Engineer: Vien Tran																
Configuration: EUT																
Mode: Transmit_5.8GHz_11a Legacy Mode																
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 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			Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz	
						Gordon 203134001			HPF_7.6GHz							
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fldr 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 Channel = CH149 (5745 MHz)																
11.490	3.0	49.3	37.5	37.4	11.6	-35.9	0.0	0.7	63.1	51.3	74	54	-10.9	-2.7	H	
11.490	3.0	47.6	34.2	37.4	11.6	-35.9	0.0	0.7	61.4	48.0	74	54	-12.6	-6.0	V	
Mid Channel = CH157 (5785 MHz)																
11.570	3.0	48.5	36.2	37.4	11.7	-35.8	0.0	0.7	62.5	50.2	74	54	-11.5	-3.8	H	
11.570	3.0	46.3	34.0	37.4	11.7	-35.8	0.0	0.7	60.3	48.0	74	54	-13.7	-6.0	V	
High Channel = CH165 (5825 MHz)																
11.650	3.0	49.2	36.9	37.4	11.8	-35.7	0.0	0.7	63.4	51.1	74	54	-10.6	-2.9	H	
11.650	3.0	45.7	33.1	37.4	11.8	-35.7	0.0	0.7	59.9	47.3	74	54	-14.1	-6.7	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																

802.11n Mode 20 MHz SISO is covered by the worst case 802.11a Mode Legacy testing.

802.11n MODE 40 MHz SISO

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: 04/05/2007																
Test Engineer: Vien Tran																
Configuration: EUT																
Mode: Transmit_5.8GHz_11n 40 MHz SISO MCS 0																
Test Equipment:																
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 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		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz						
				Gordon 203134001		HPF_7.6GHz										
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Ftr 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 Channel = CH151 (5755 MHz)																
11.510	3.0	50.1	38.3	37.4	11.6	-35.8	0.0	0.7	64.0	52.2	74	54	-10.0	-1.8	H	
11.510	3.0	47.4	35.1	37.4	11.6	-35.8	0.0	0.7	61.3	49.0	74	54	-12.7	-5.0	V	
High Channel = CH159 (5795 MHz)																
11.590	3.0	51.8	39.6	37.4	11.7	-35.8	0.0	0.7	65.8	53.6	74	54	-8.2	-0.4	H	
11.590	3.0	48.4	35.7	37.4	11.7	-35.8	0.0	0.7	62.4	49.7	74	54	-11.6	-4.3	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									

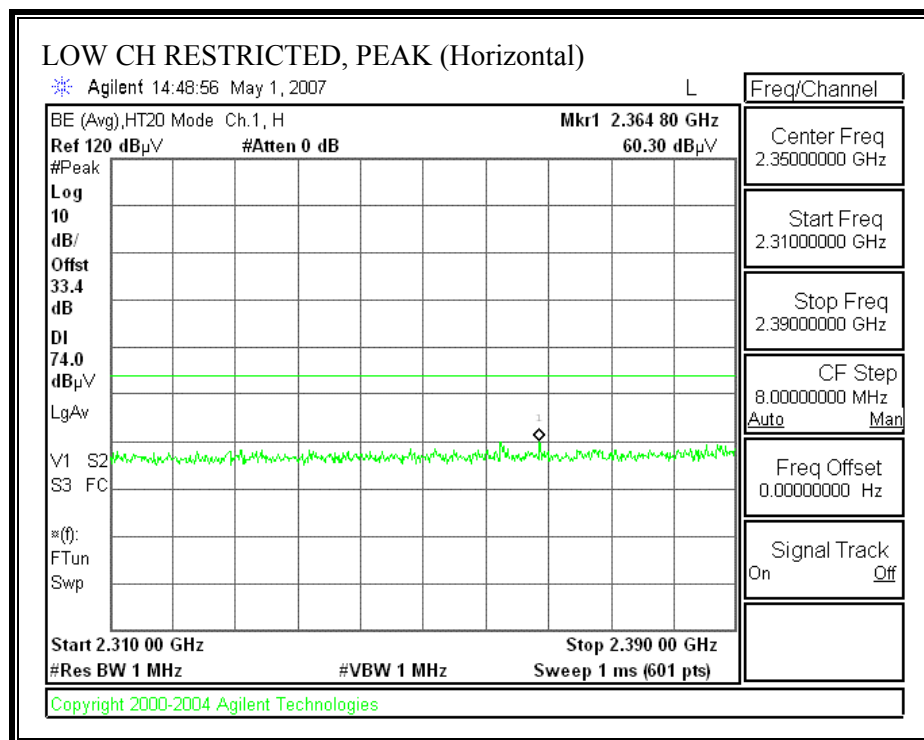
MIMO MODE

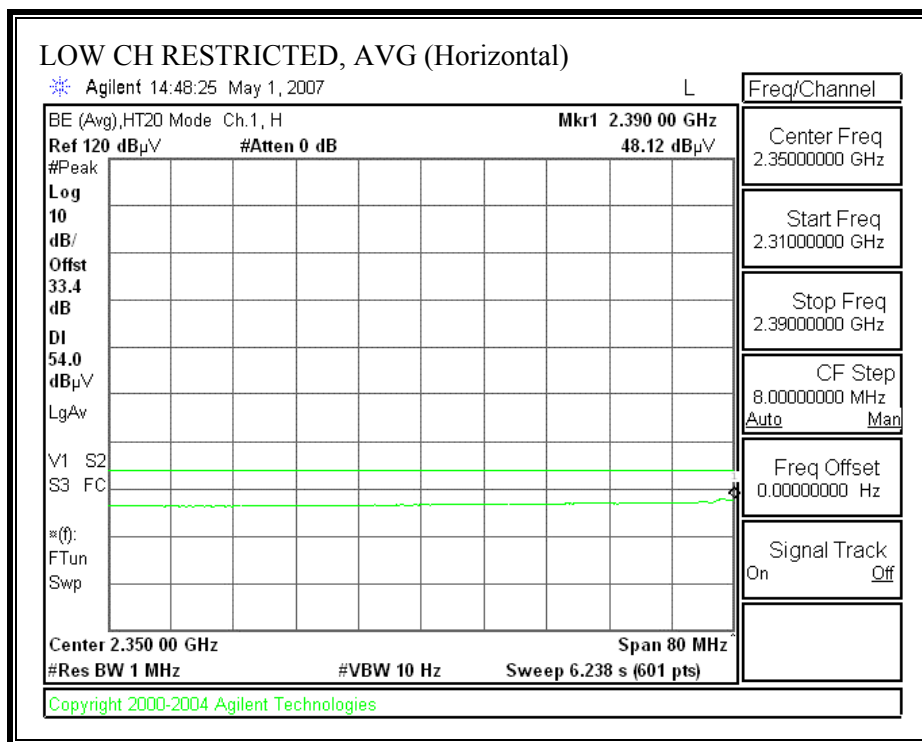
7.5.4. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND

802.11g Mode CDD is covered by the worst-case 802.11n Mode 20 MHz CDD MCS0.

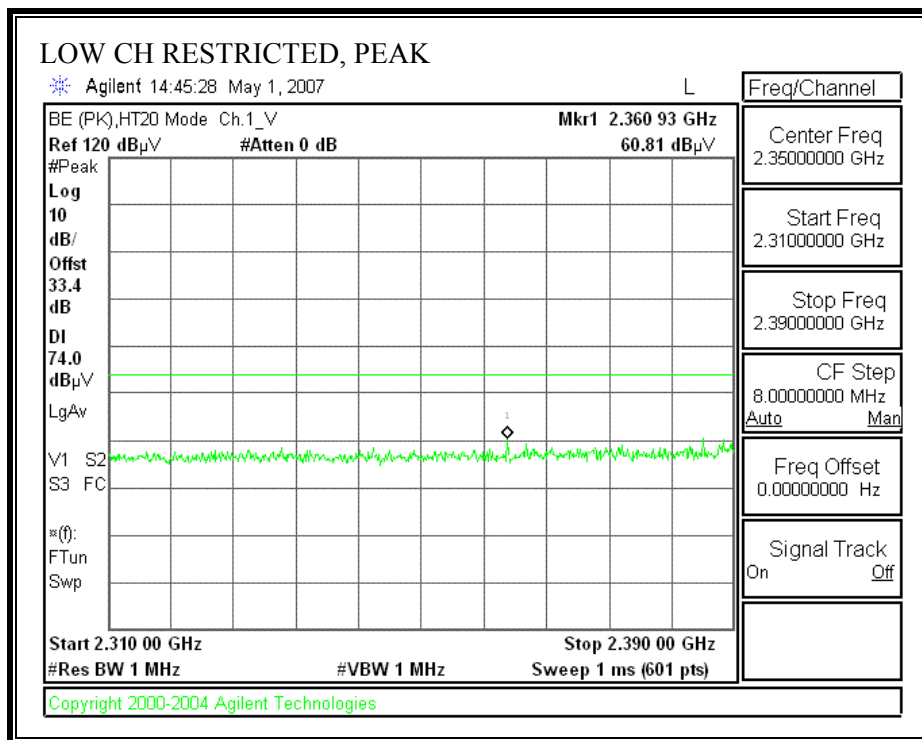
802.11n Mode 20 MHz CDD MCS 0:

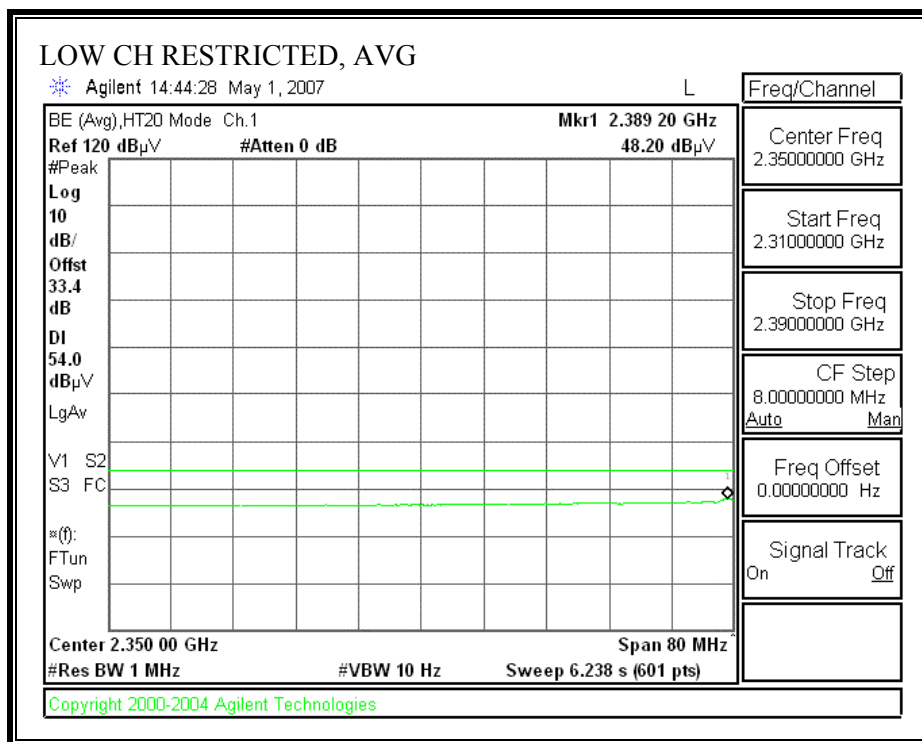
RESTRICTED BANDEDGE (LOW CHANNEL, 2412 MHz, HORIZONTAL)



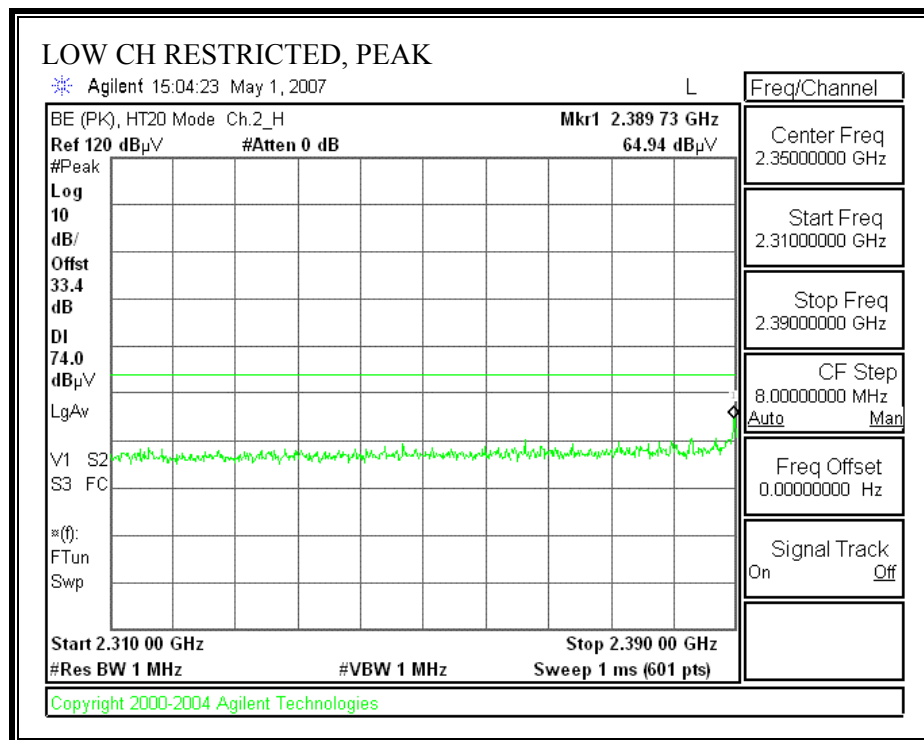


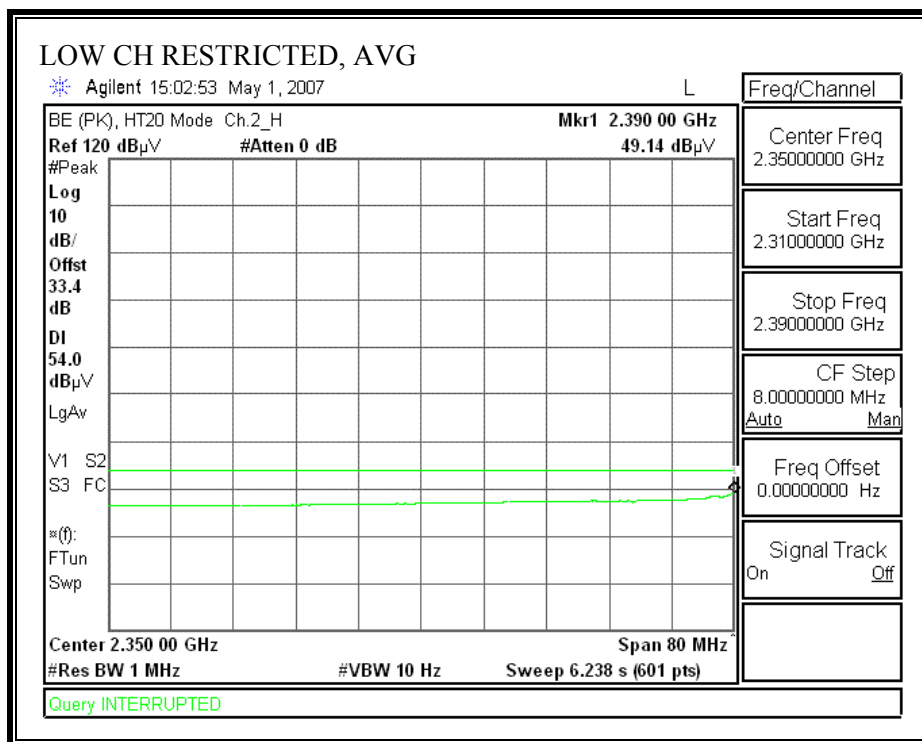
RESTRICTED BANDEDGE (LOW CHANNEL, 2412 MHz, VERTICAL)



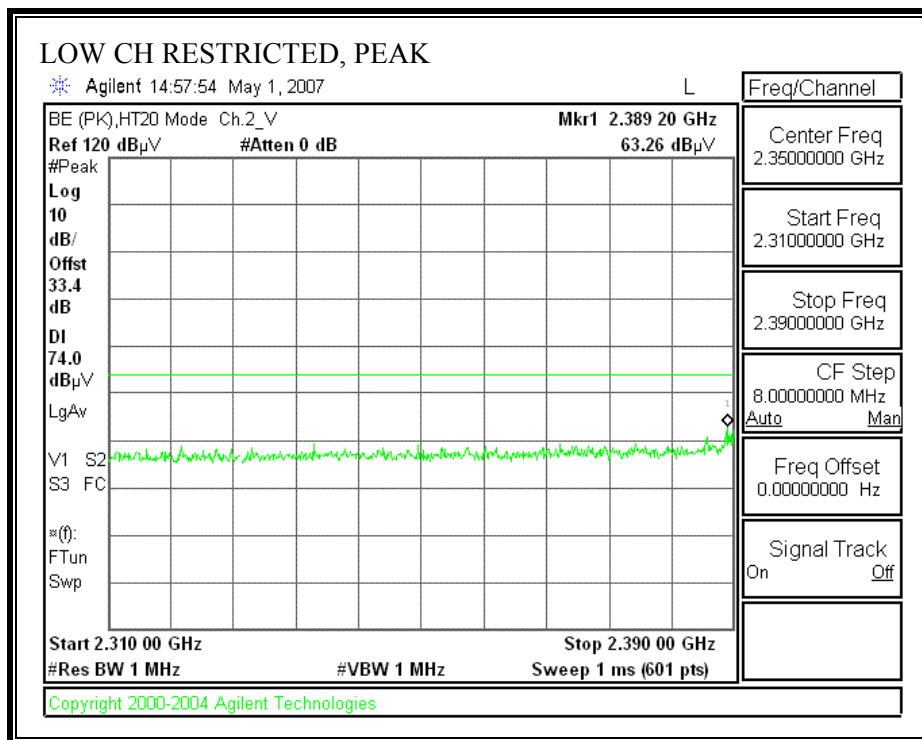


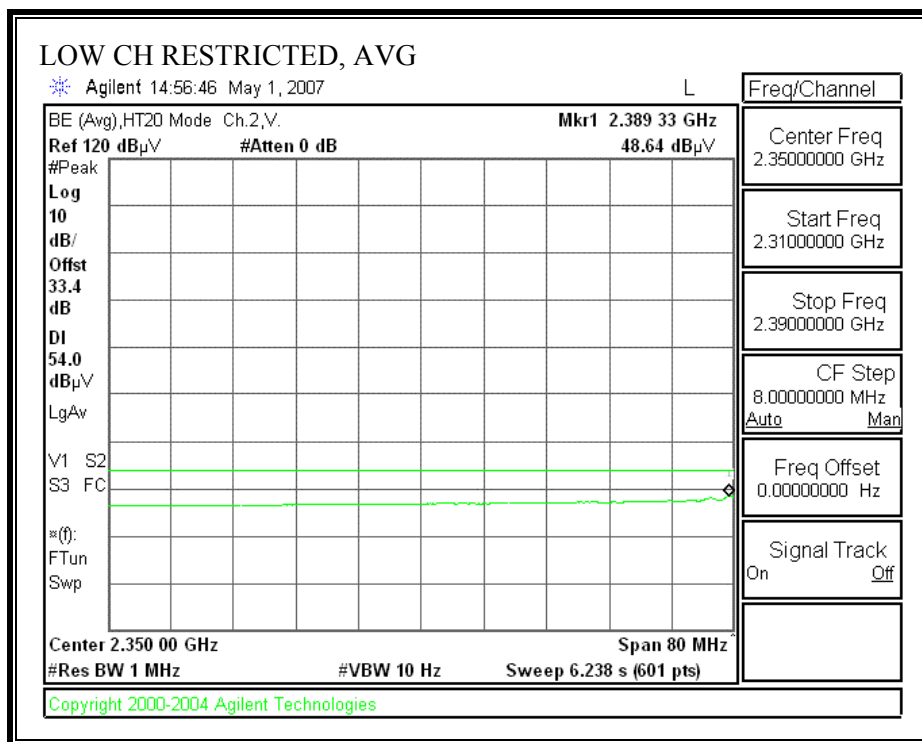
RESTRICTED BANDEDGE (LOW CHANNEL, 2417 MHz, HORIZONTAL)



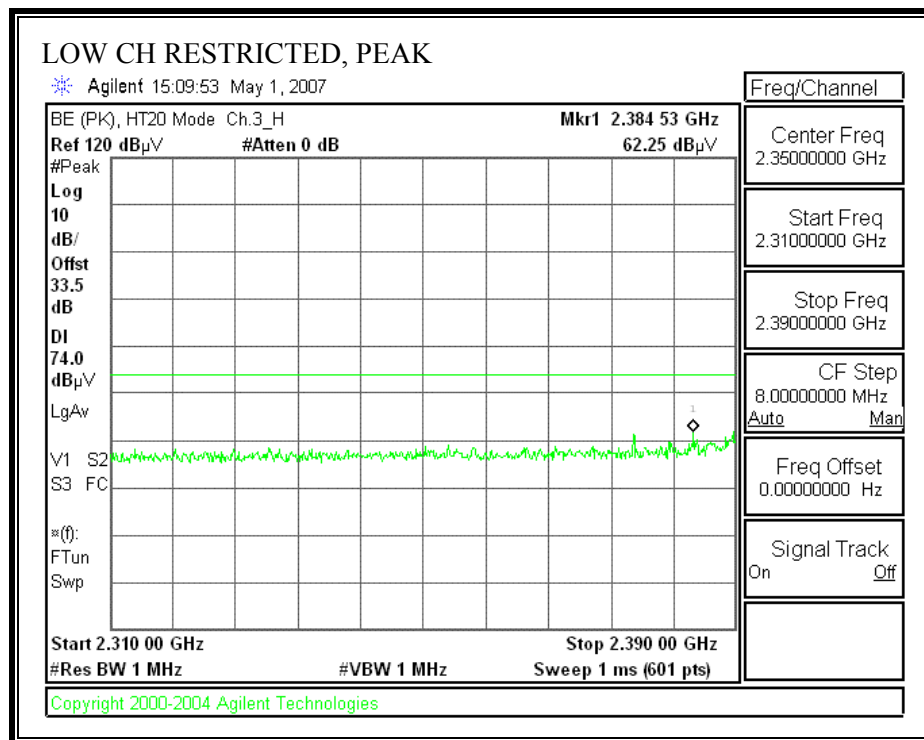


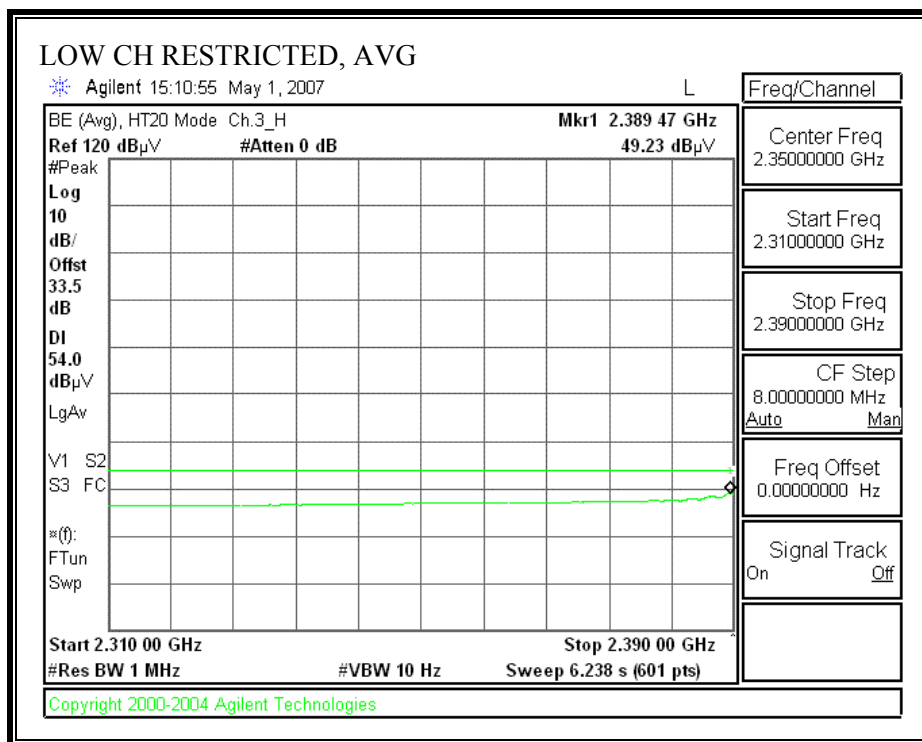
RESTRICTED BANDEDGE (LOW CHANNEL, 2417 MHz, VERTICAL)



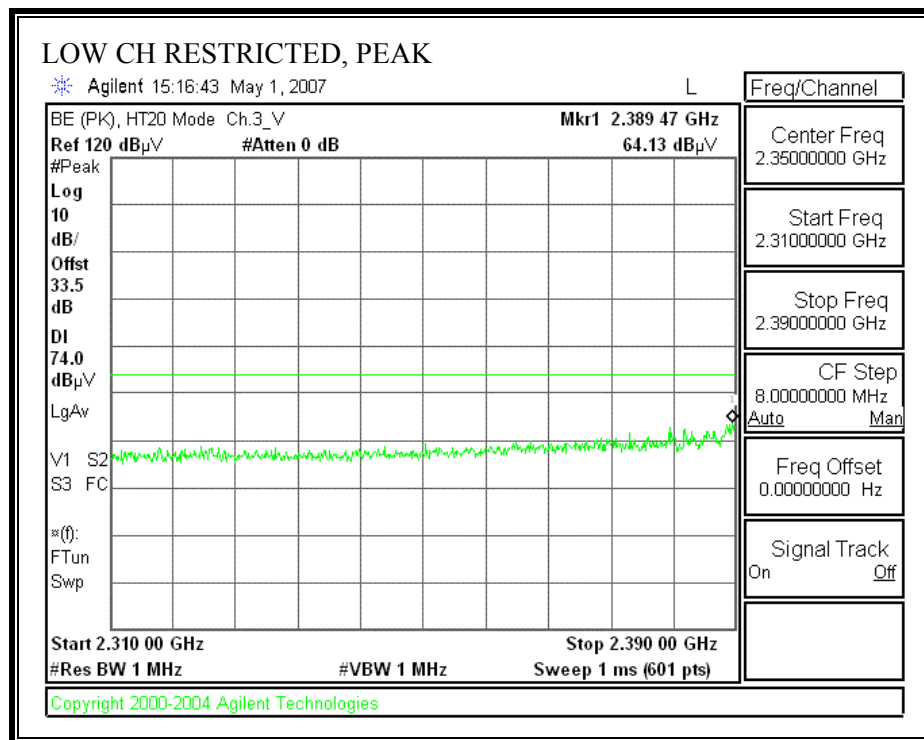


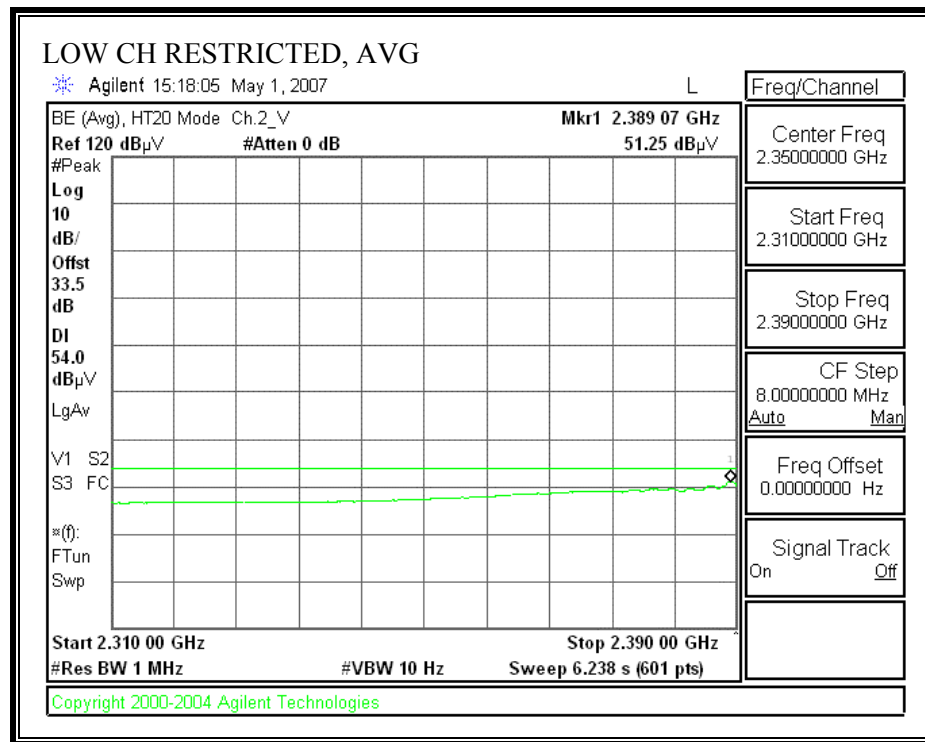
RESTRICTED BANDEDGE (LOW CHANNEL, 2422 MHz, HORIZONTAL)



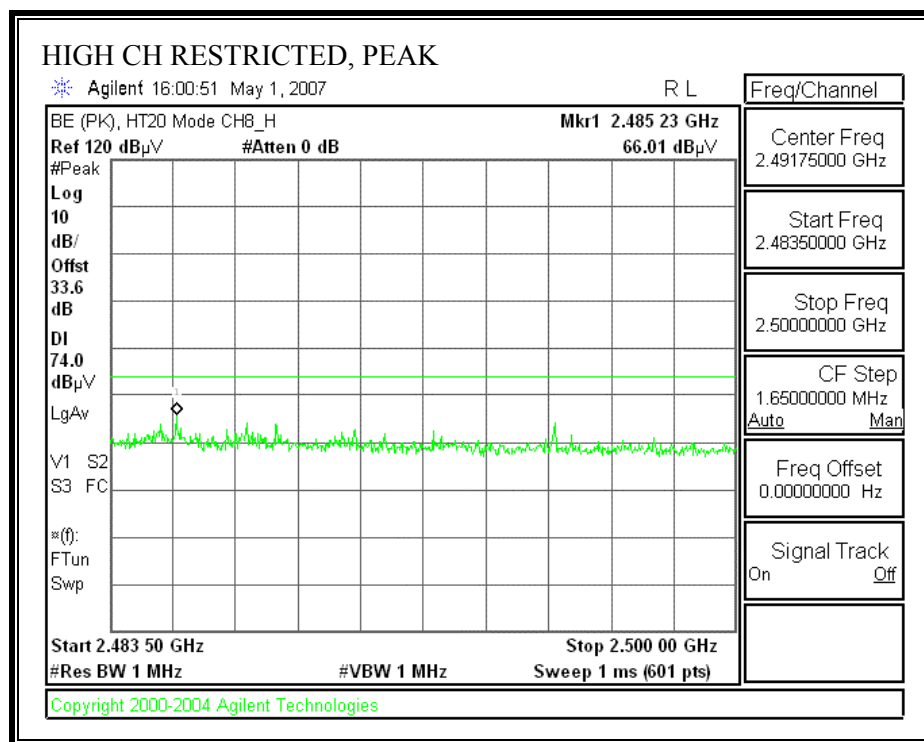


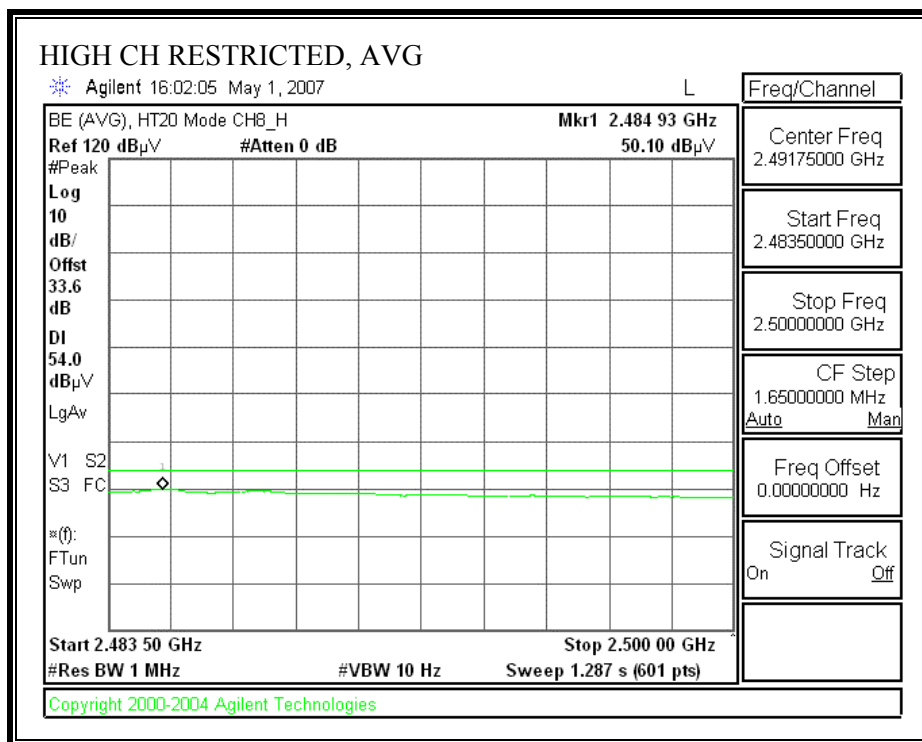
RESTRICTED BANDEDGE (LOW CHANNEL, 2422 MHz, VERTICAL)



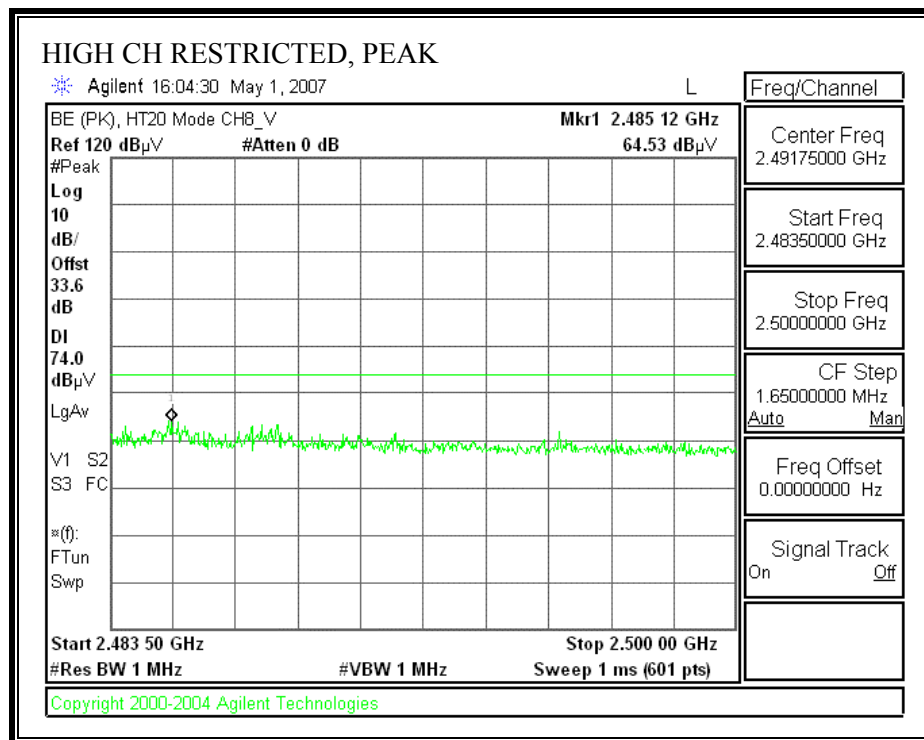


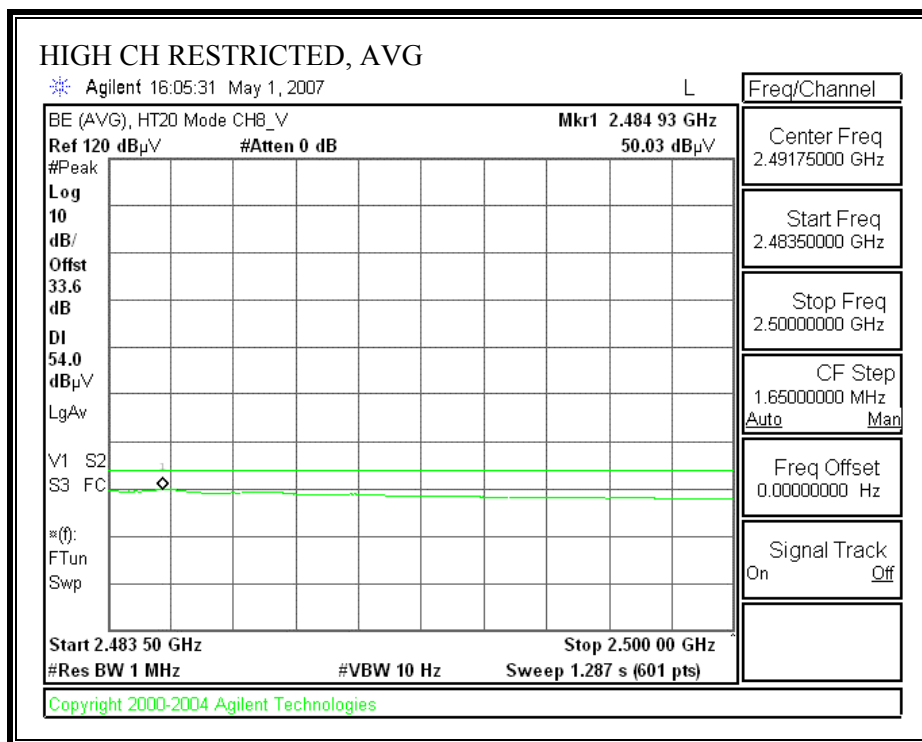
RESTRICTED BANDEDGE (HIGHCHANNEL, 2447 MHz, HORIZONTAL)



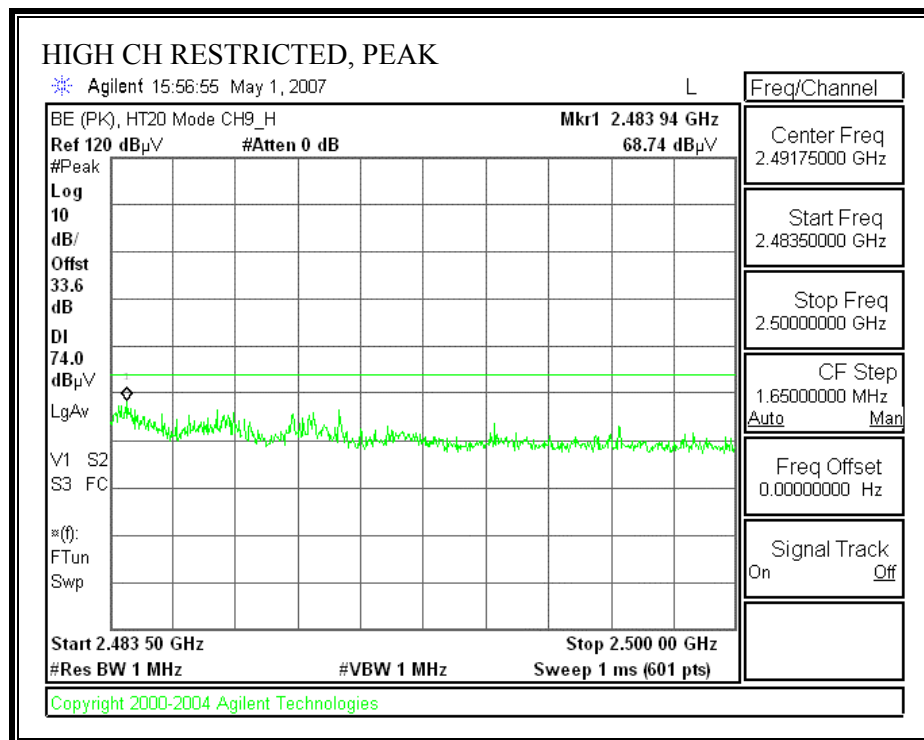


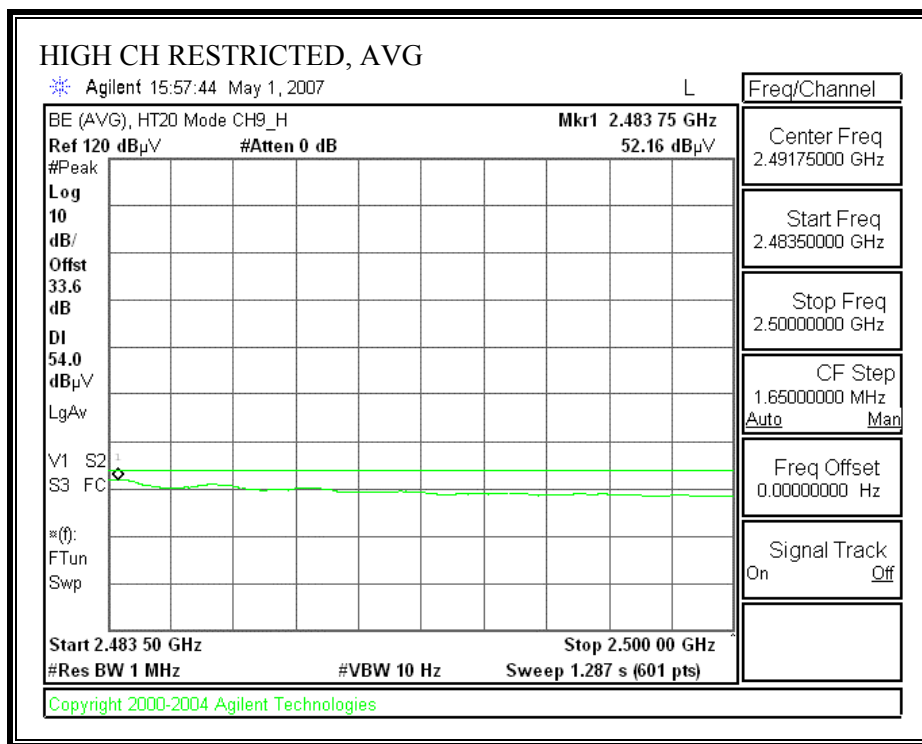
RESTRICTED BANDEDGE (HIGH CHANNEL, 2447 MHz, VERTICAL)



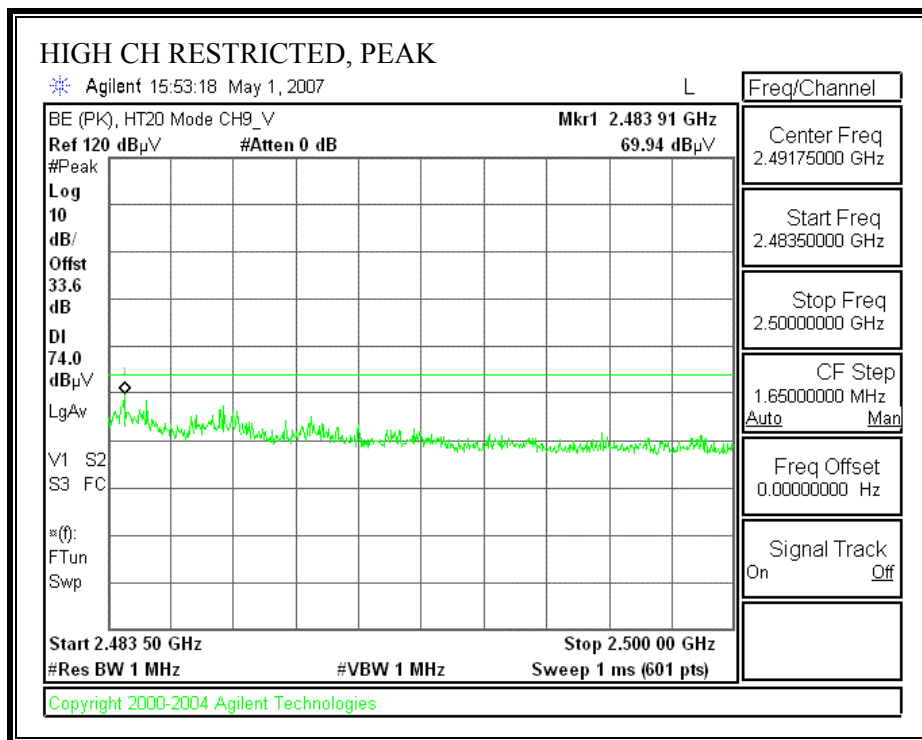


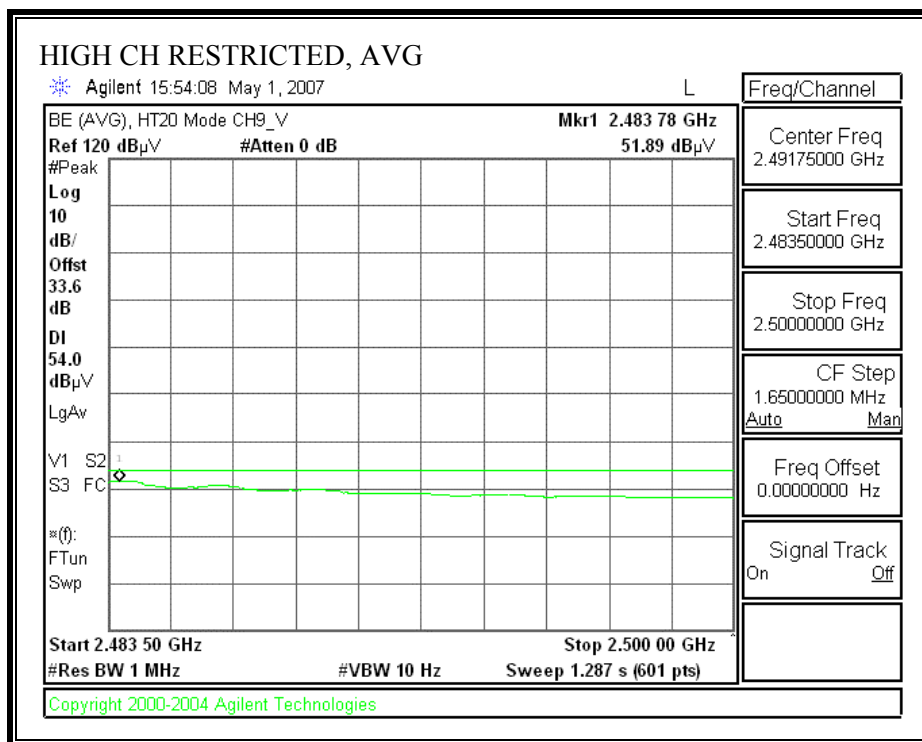
RESTRICTED BANDEDGE (HIGHCHANNEL, 2452 MHz, HORIZONTAL)



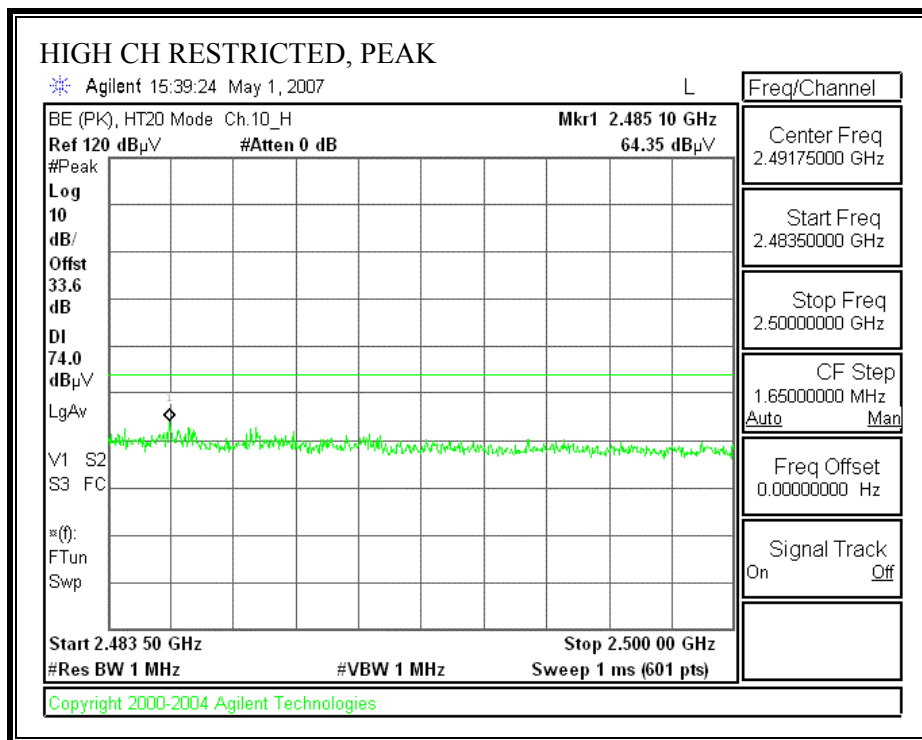


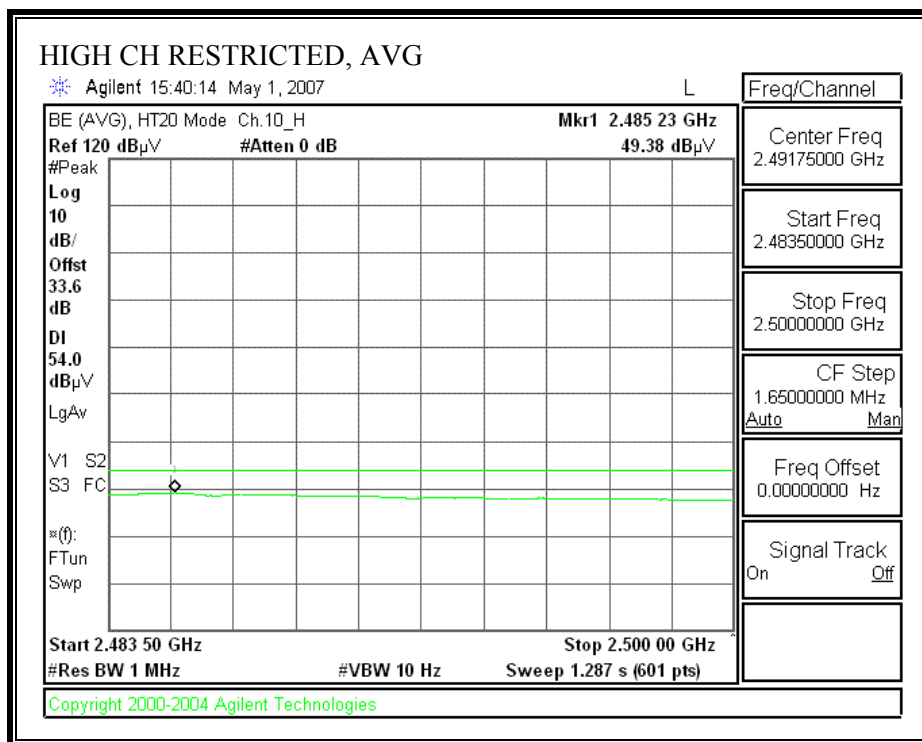
RESTRICTED BANDEDGE (HIGH CHANNEL, 2452 MHz, VERTICAL)



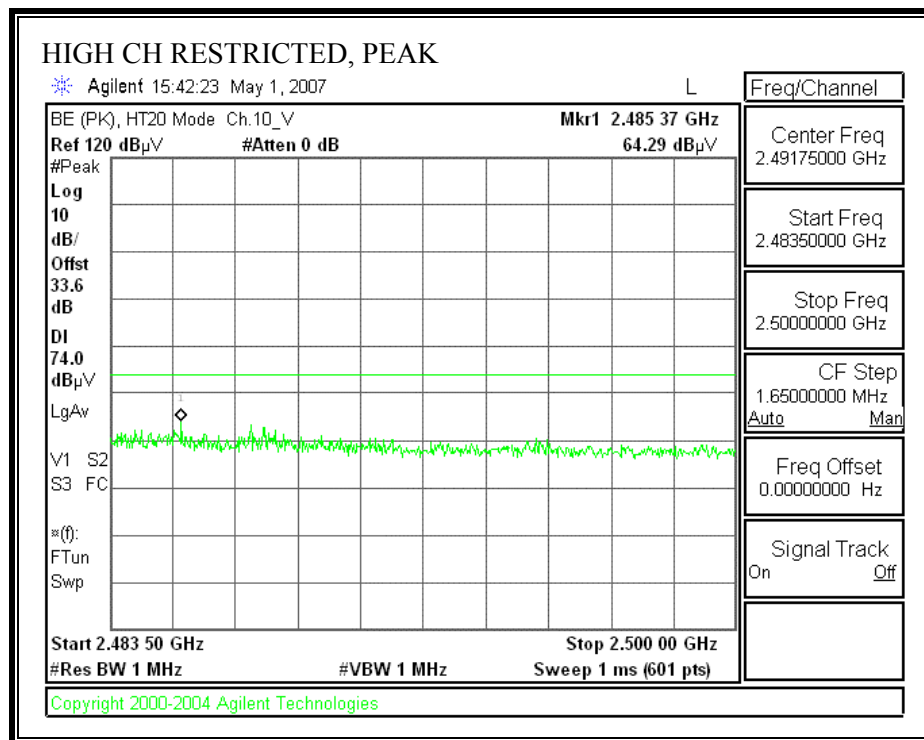


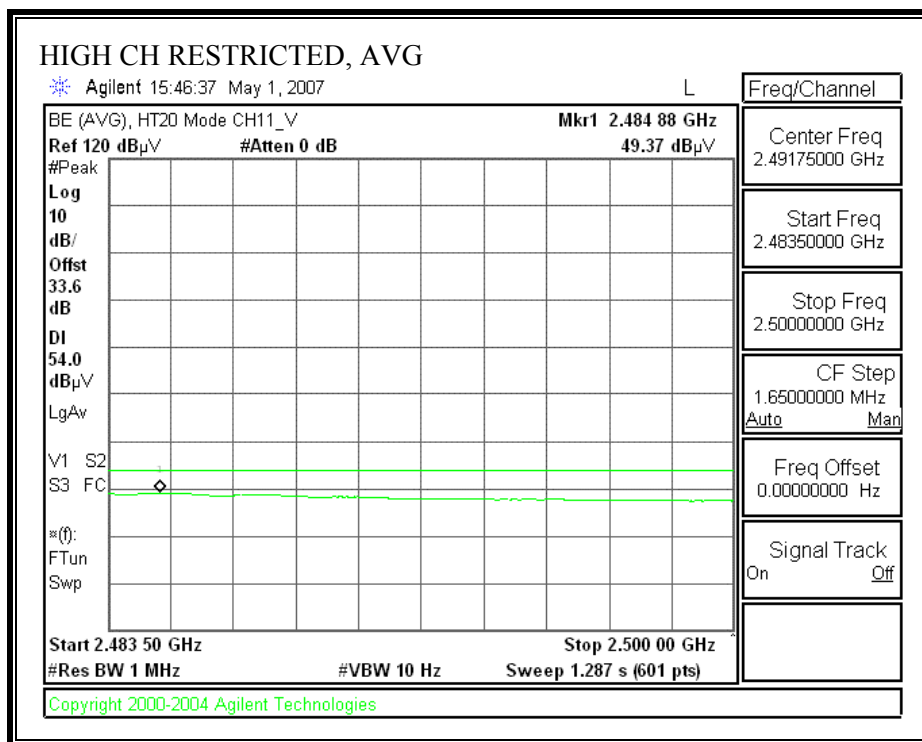
RESTRICTED BANDEDGE (HIGHCHANNEL, 2457 MHz, HORIZONTAL)



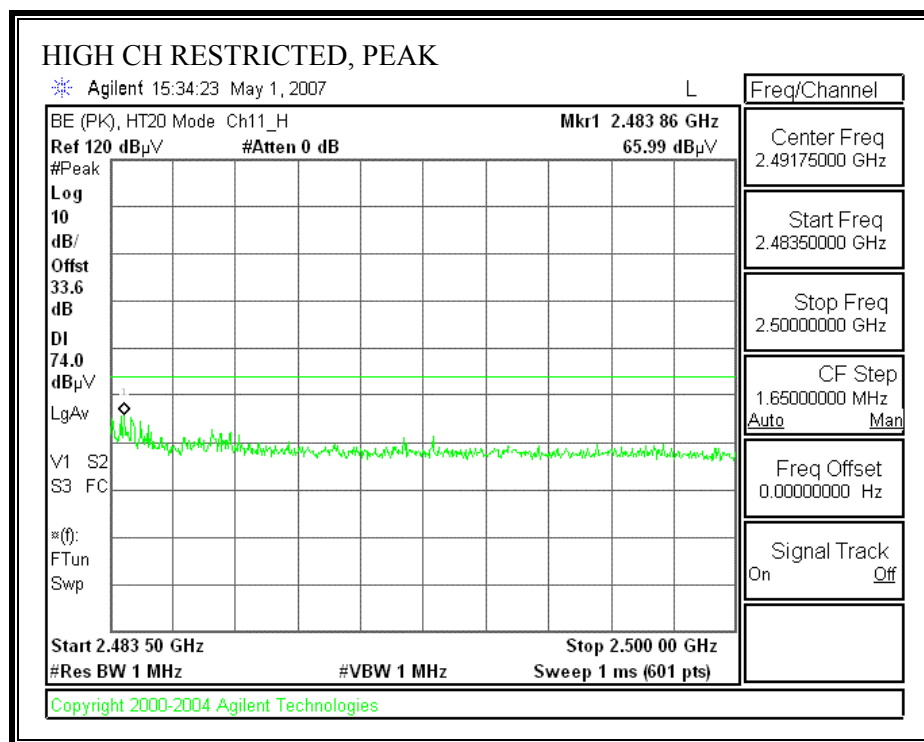


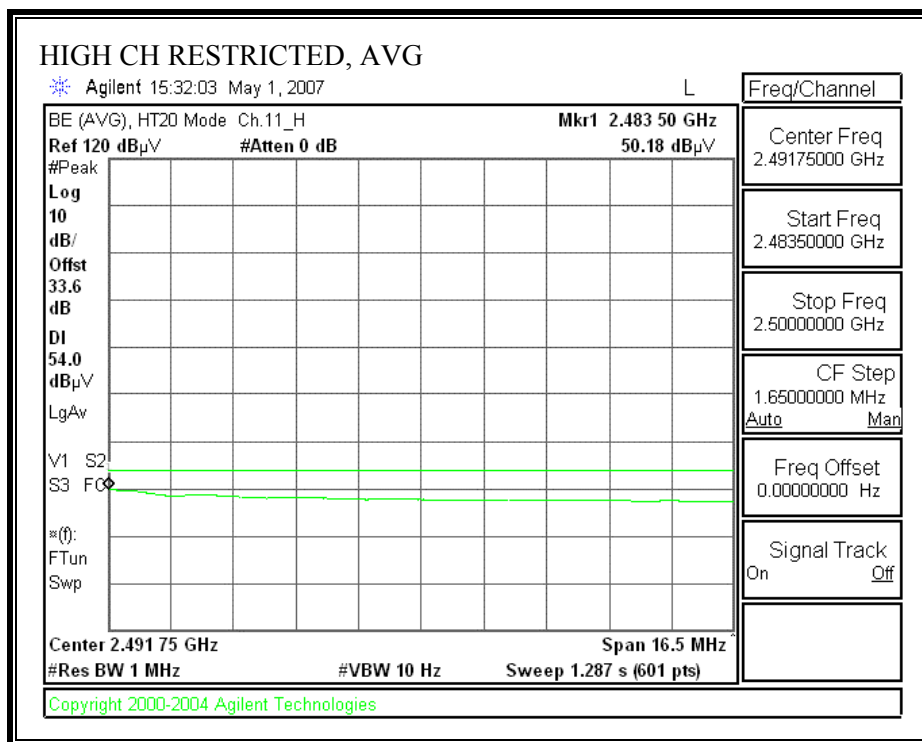
RESTRICTED BANDEDGE (HIGH CHANNEL, 2457 MHz, VERTICAL)



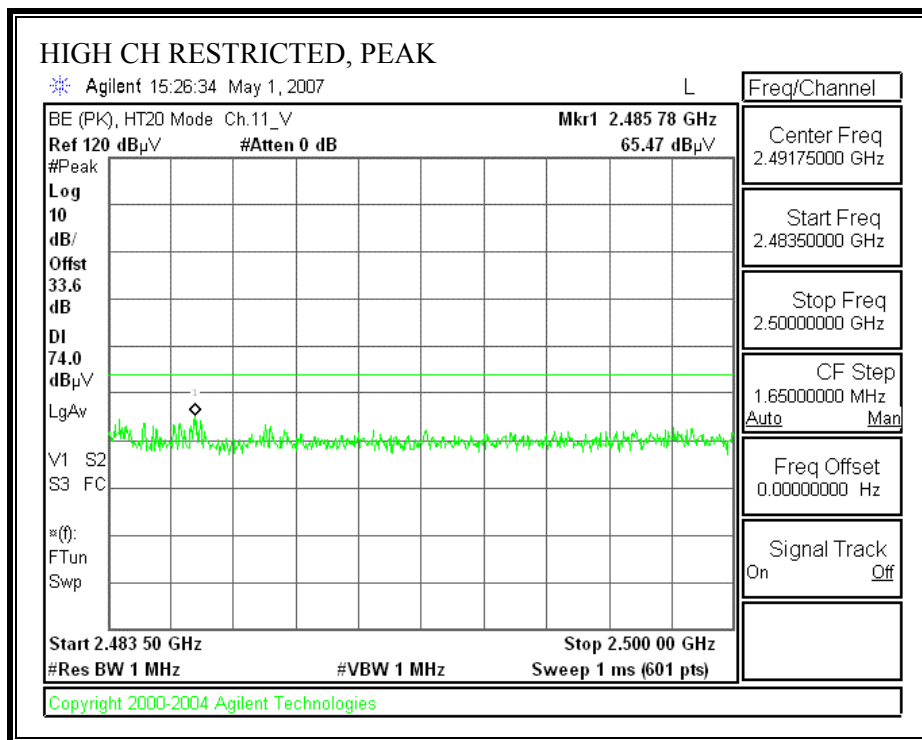


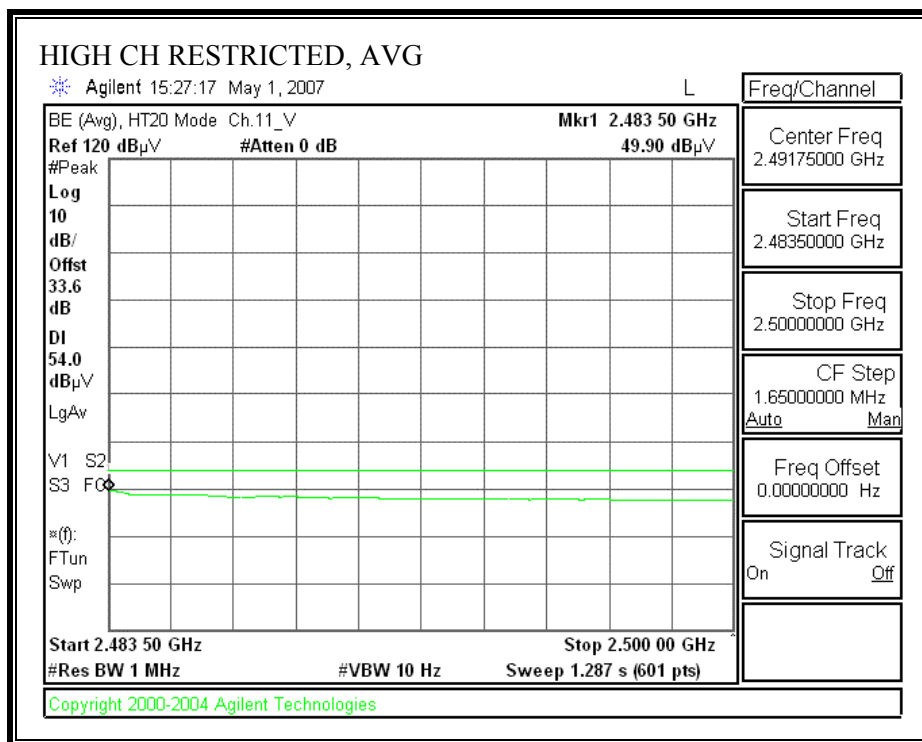
RESTRICTED BANDEDGE (HIGH CHANNEL, 2462 MHz, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, 2462 MHz, VERTICAL)





802.11g Mode Legacy CDD is covered by the worst-case 802.11n Mode 20 MHz CDD MCS0.

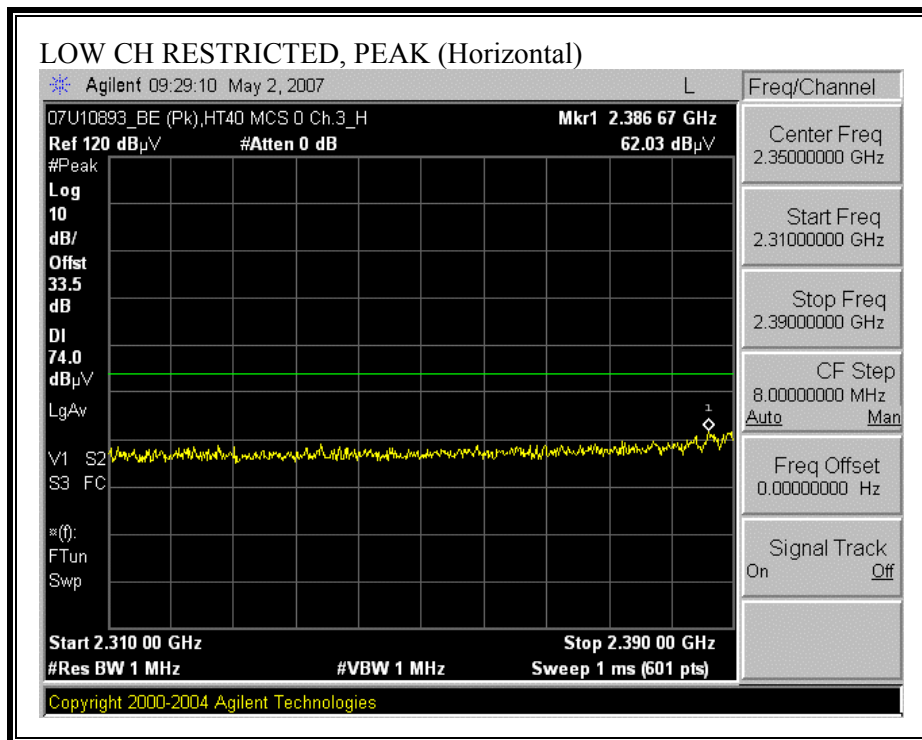
802.11n Mode 20 MHz CDD MCS 0:

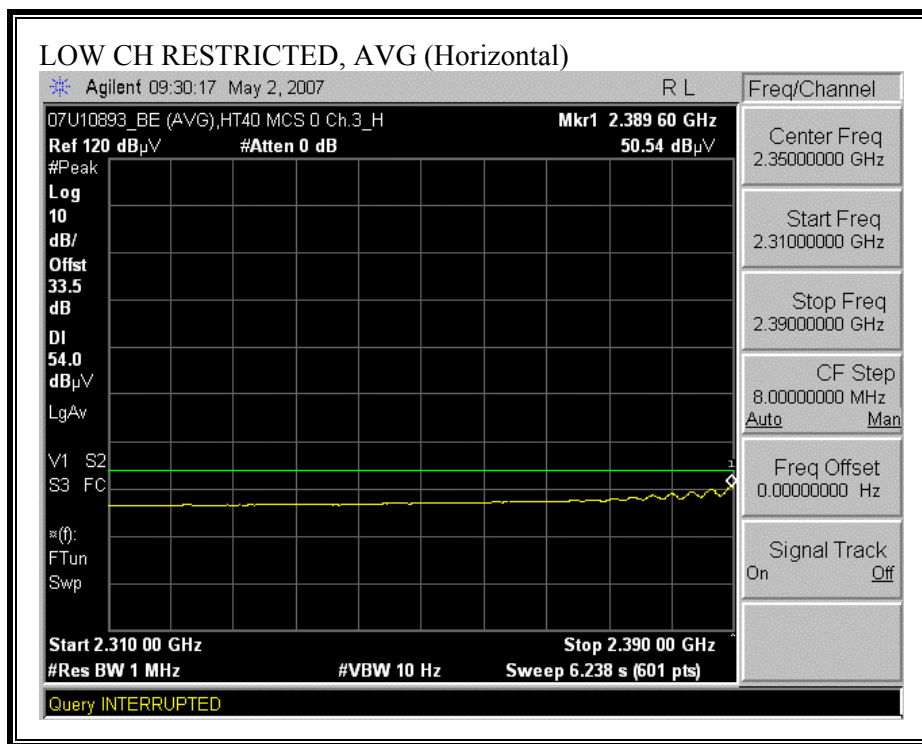
HARMONICS AND SPURIOUS EMISSIONS – 20 MHz TX BANDWIDTH

High Frequency Measurement Compliance Certification Services, Fremont 5 meter Chamber A																
Company: BroadCom Corporation Project #: 07U10893-2 Date: 5-2-2007 Test Engineer: Anoop Singh/ Thanh Nguyen Configuration: EUT, Extender card, Laptop Mode: Transmit 11n HT20_																
Test Equipment:																
Horn 1-18GHz T60; S/N: 2238 @3m			Pre-amplifier 1-26GHz T145 Agilent 3008A0050			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit FCC 15.209				
Hi Frequency Cables																
2 foot cable			3 foot cable			12 foot cable Gordon 203134001			HPF HPF_4.0GHz		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz; VBW=10Hz			
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
Channel 1, 2412MHz																
4.824	3.0	48.29	43.81	33.0	6.9	-34.8	0.0	0.6	54.0	49.5	74	54	-20.0	-4.5	V	
7.236	3.0	53.15	39.70	35.4	8.4	-34.7	0.0	0.6	62.9	49.4	74	54	-11.1	-4.6	V	
9.648	3.0	55.95	39.03	37.1	9.7	-35.0	0.0	0.8	68.6	51.7	74	54	-5.4	-2.3	V	
12.060	3.0	42.85	28.67	37.4	12.2	-32.4	0.0	0.9	61.0	46.8	74	54	-13.0	-7.2	Noise floor	
4.824	3.0	45.91	40.93	33.0	6.9	-34.8	0.0	0.6	51.6	46.6	74	54	-22.4	-7.4	H	
7.236	3.0	50.23	36.77	35.4	8.4	-34.7	0.0	0.6	60.0	46.5	74	54	-14.0	-7.5	H	
9.648	3.0	51.97	37.04	37.1	9.7	-35.0	0.0	0.8	64.6	49.7	74	54	-9.4	-4.3	H	
12.060	3.0	42.45	28.33	37.4	12.2	-32.4	0.0	0.9	60.6	46.4	74	54	-13.4	-7.6	Noise floor	
Channel 6, 2437MHz																
4.874	3.0	48.68	41.67	33.1	6.9	-34.9	0.0	0.6	54.4	47.4	74	54	-19.6	-6.6	H	
7.311	3.0	48.44	25.97	35.5	8.4	-34.7	0.0	0.6	58.3	35.9	74	54	-15.7	-18.1	H	
9.748	3.0	51.72	35.96	37.2	9.8	-35.0	0.0	0.8	64.5	48.8	74	54	-9.5	-5.2	H	
12.185	3.0	42.78	28.45	37.4	12.2	-32.4	0.0	0.9	60.9	46.6	74	54	-13.1	-7.4	Noise floor	
4.874	3.0	49.60	36.67	33.1	6.9	-34.9	0.0	0.6	55.3	42.4	74	54	-18.7	-11.6	V	
7.311	3.0	50.73	36.93	35.5	8.4	-34.7	0.0	0.6	60.6	46.8	74	54	-13.4	-7.2	V	
9.748	3.0	50.93	35.37	37.2	9.8	-35.0	0.0	0.8	63.7	48.2	74	54	-10.3	-5.8	V	
12.185	3.0	43.16	29.76	37.4	12.2	-32.4	0.0	0.9	61.3	47.9	74	54	-12.7	-6.1	Noise floor	
Channel 11, 2462MHz																
4.924	3.0	53.82	39.43	33.1	7.0	-34.9	0.0	0.6	59.7	45.3	74	54	-14.3	-8.7	V	
7.386	3.0	50.30	34.73	35.6	8.4	-34.6	0.0	0.6	60.3	44.7	74	54	-13.7	-9.3	V	
9.848	3.0	53.90	36.90	37.3	9.9	-35.1	0.0	0.8	66.9	49.9	74	54	-7.1	-4.1	V	
12.310	3.0	43.06	29.59	37.4	12.2	-32.4	0.0	0.9	61.2	47.7	74	54	-12.8	-6.3	Noise floor	
4.924	3.0	52.40	41.30	33.1	7.0	-34.9	0.0	0.6	58.2	47.1	74	54	-15.8	-6.9	H	
7.386	3.0	47.82	33.91	35.6	8.4	-34.6	0.0	0.6	57.8	43.9	74	54	-16.2	-10.1	H	
9.848	3.0	53.60	37.23	37.3	9.9	-35.1	0.0	0.8	66.6	50.2	74	54	-7.4	-3.8	H	
12.310	3.0	42.80	29.53	37.4	12.2	-32.4	0.0	0.9	60.9	47.6	74	54	-13.1	-6.4	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									

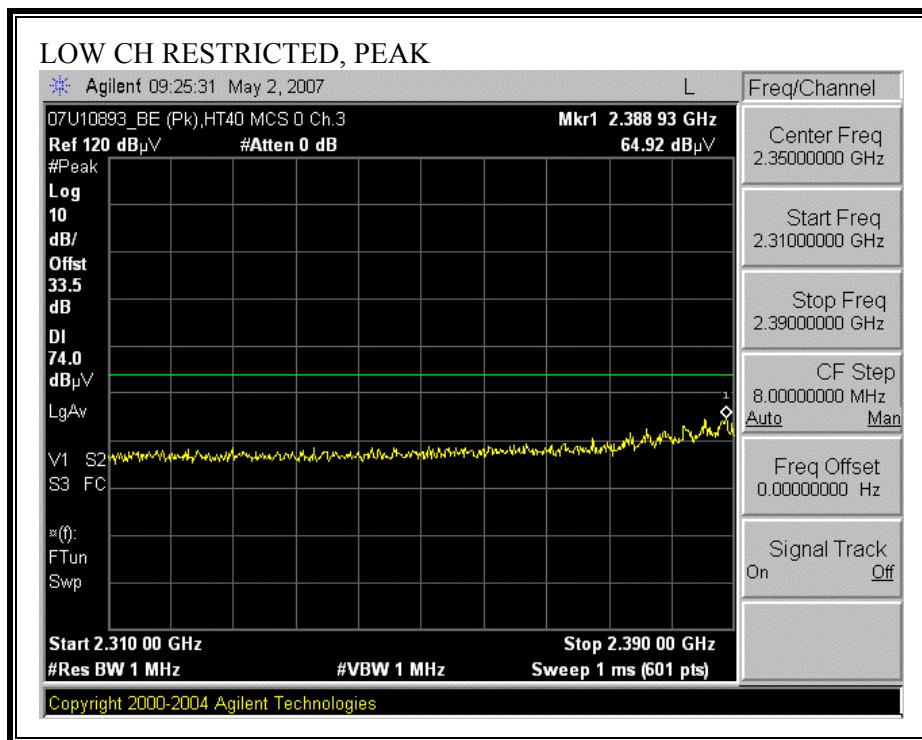
802.11n Mode 40 MHz CDD MCS 32:

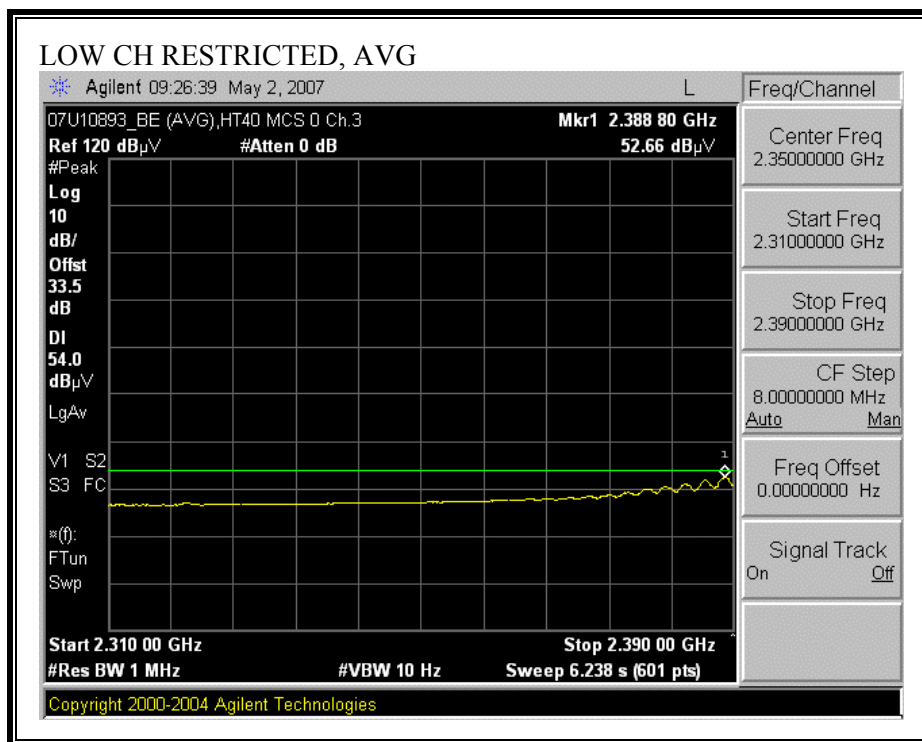
RESTRICTED BANDEDGE (LOW CHANNEL, 2422 MHz, HORIZONTAL)



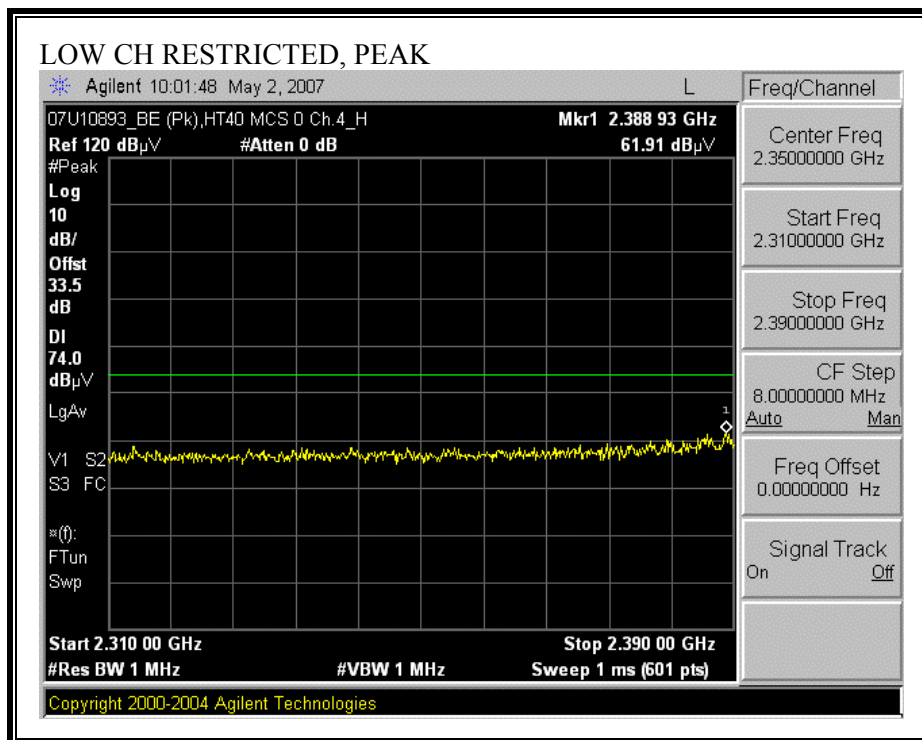


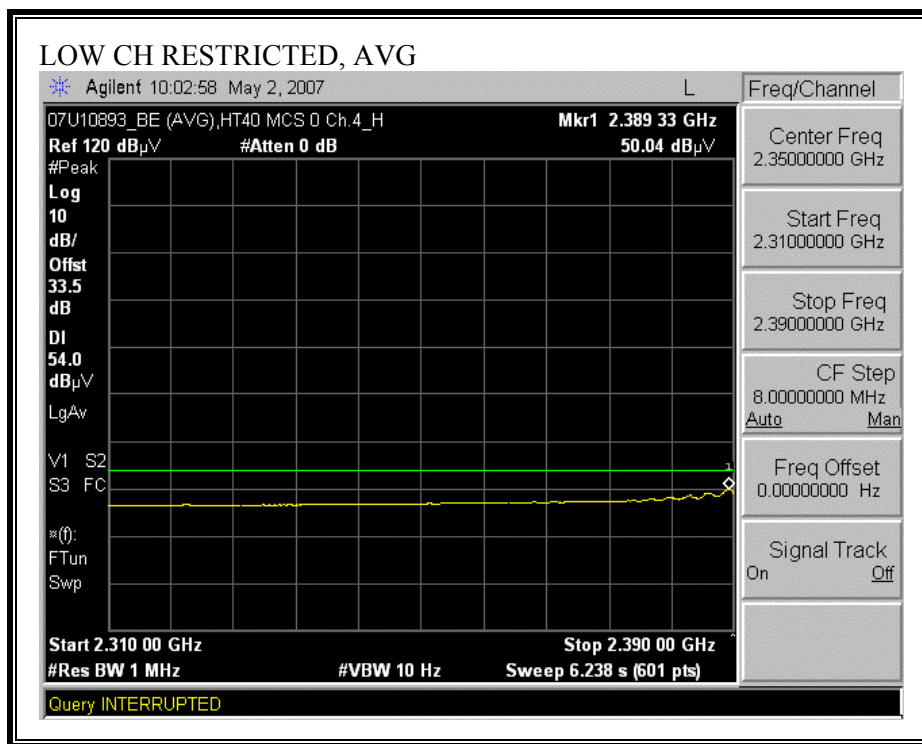
RESTRICTED BANDEDGE (LOW CHANNEL, 2422 MHz, VERTICAL)



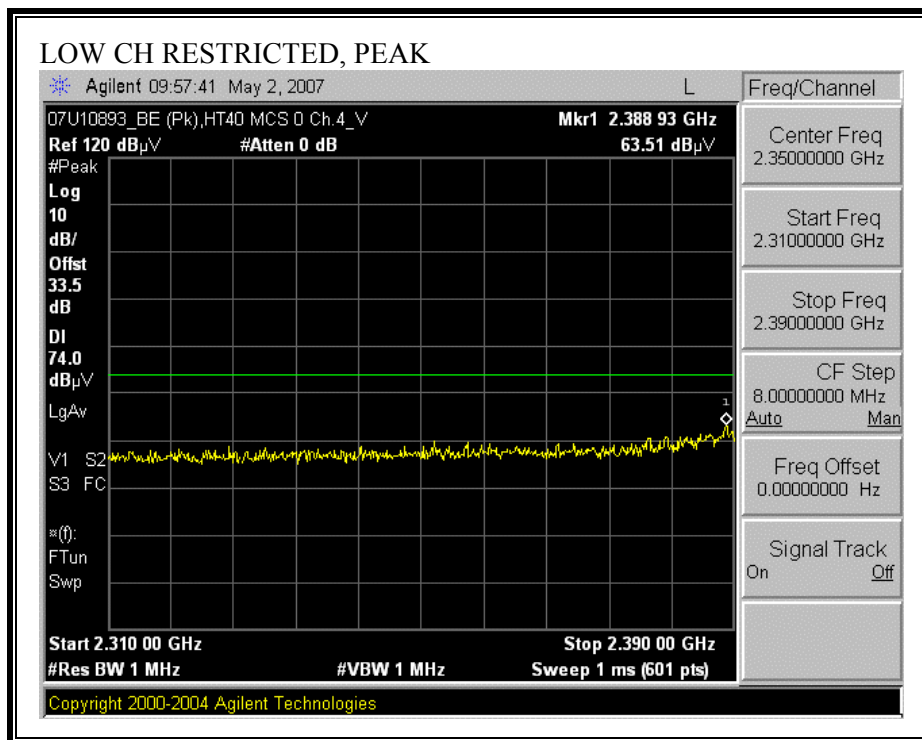


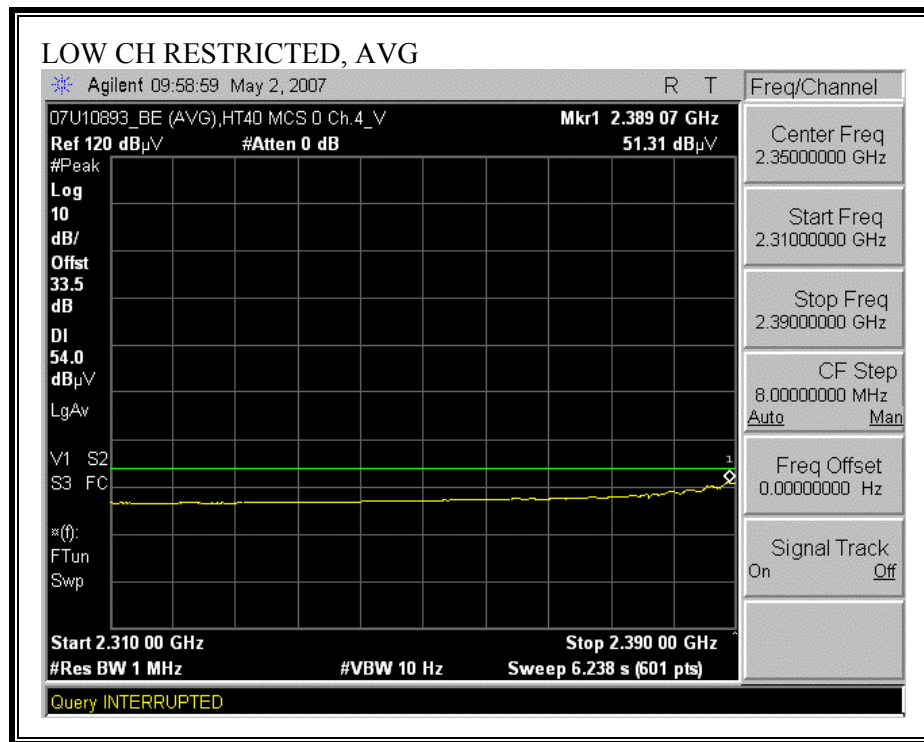
RESTRICTED BANDEDGE (LOW CHANNEL, 2427 MHz, HORIZONTAL)



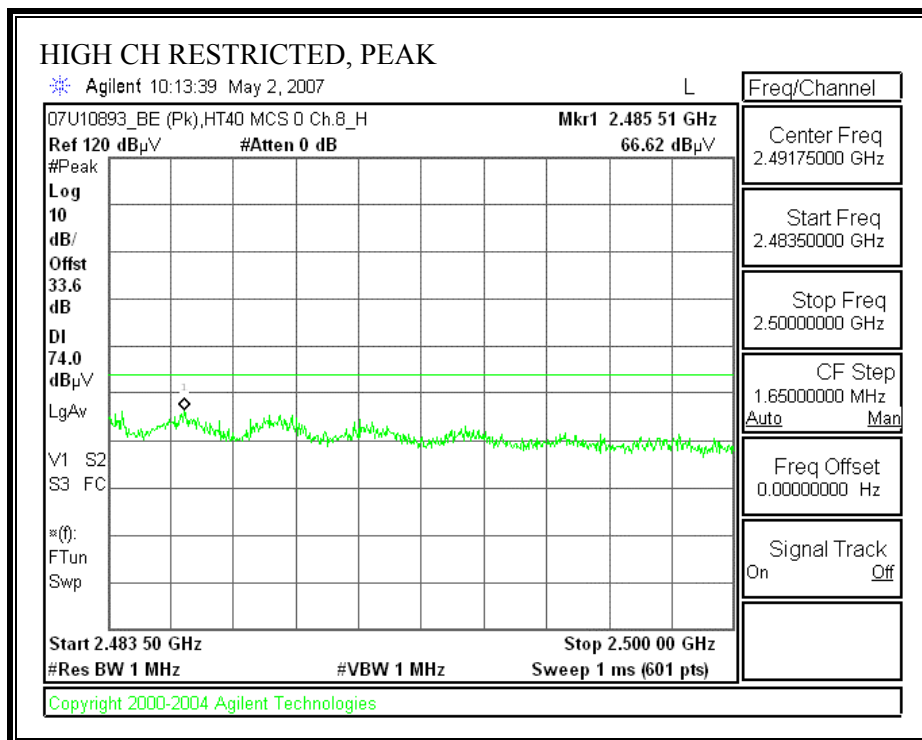


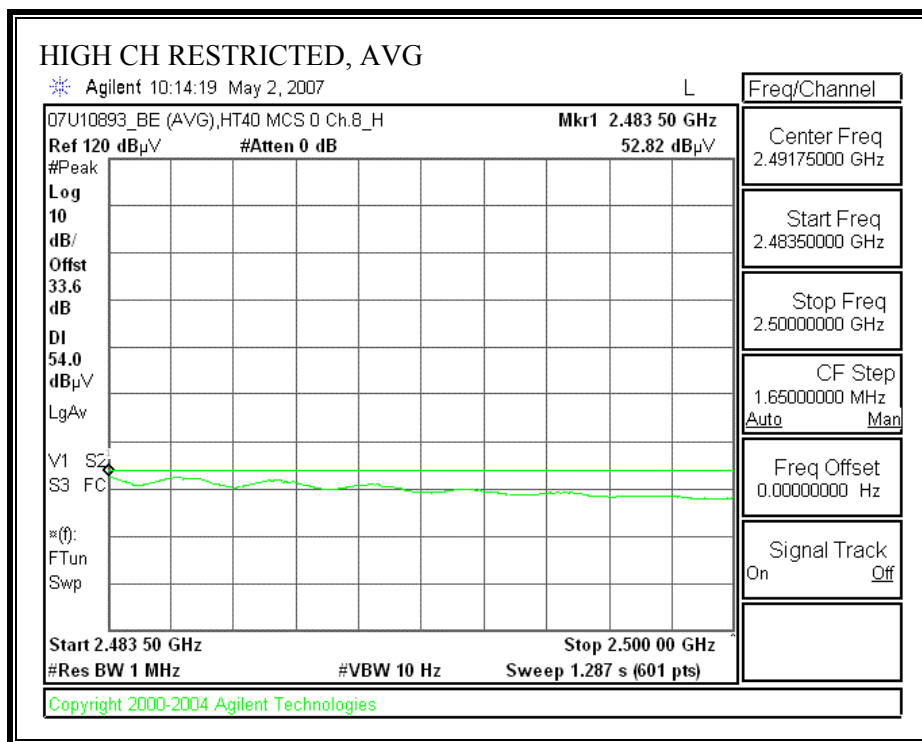
RESTRICTED BANDEDGE (LOW CHANNEL, 2427 MHz, VERTICAL)



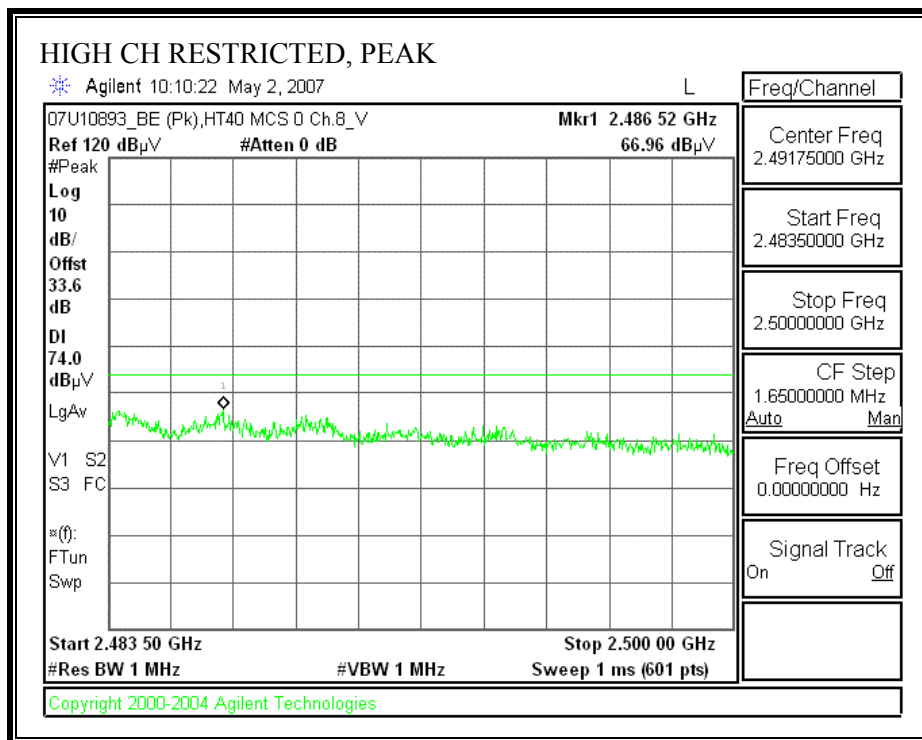


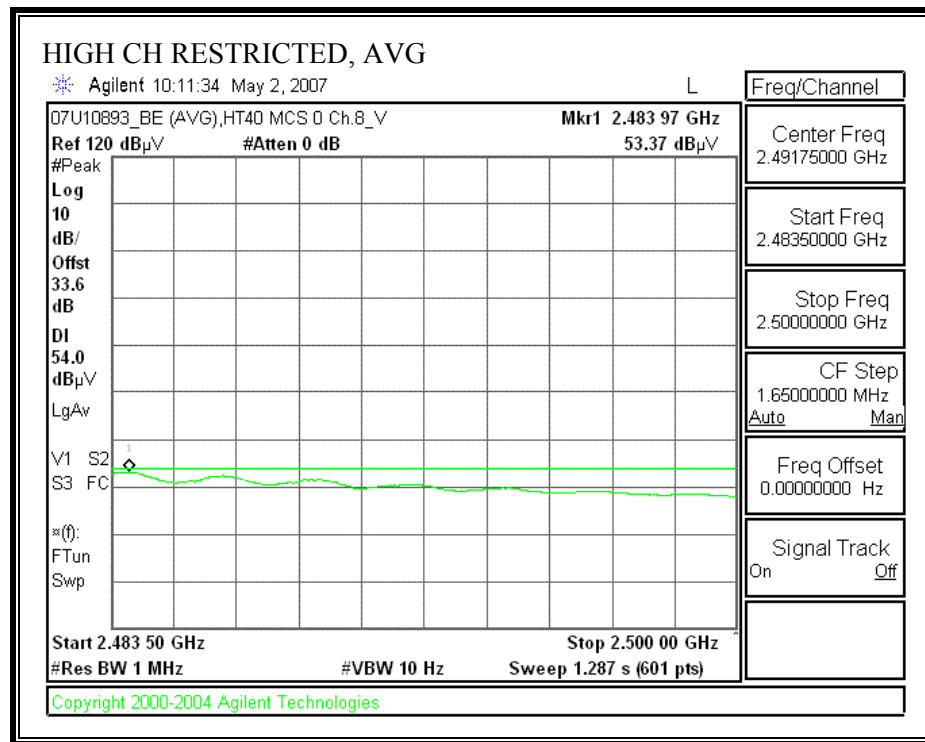
RESTRICTED BANDEDGE (HIGHCHANNEL, 2447 MHz, HORIZONTAL)



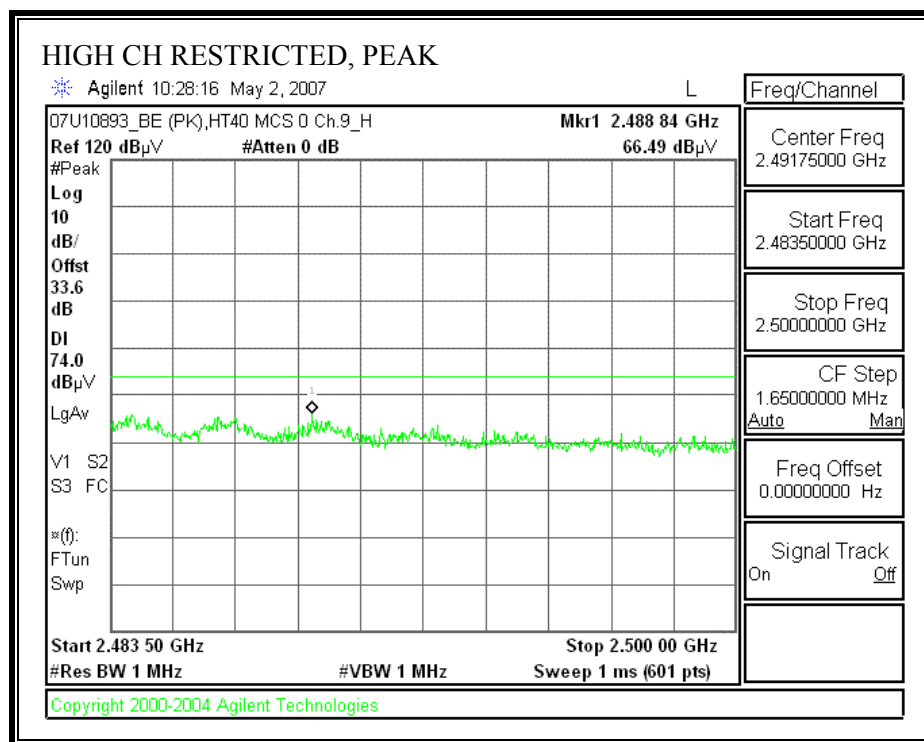


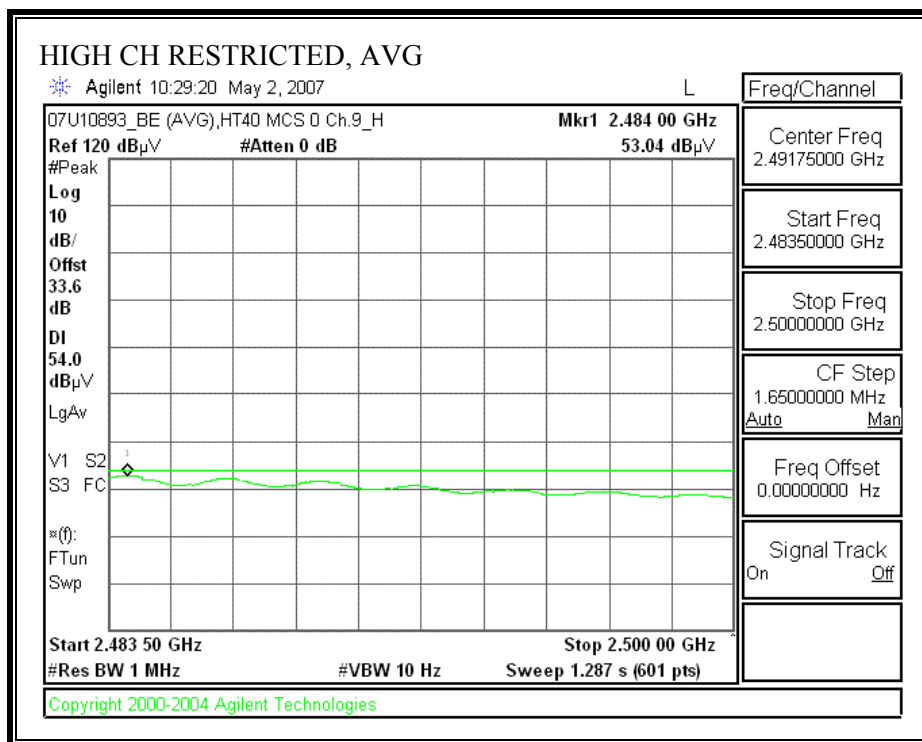
RESTRICTED BANDEDGE (HIGH CHANNEL, 2447 MHz, VERTICAL)



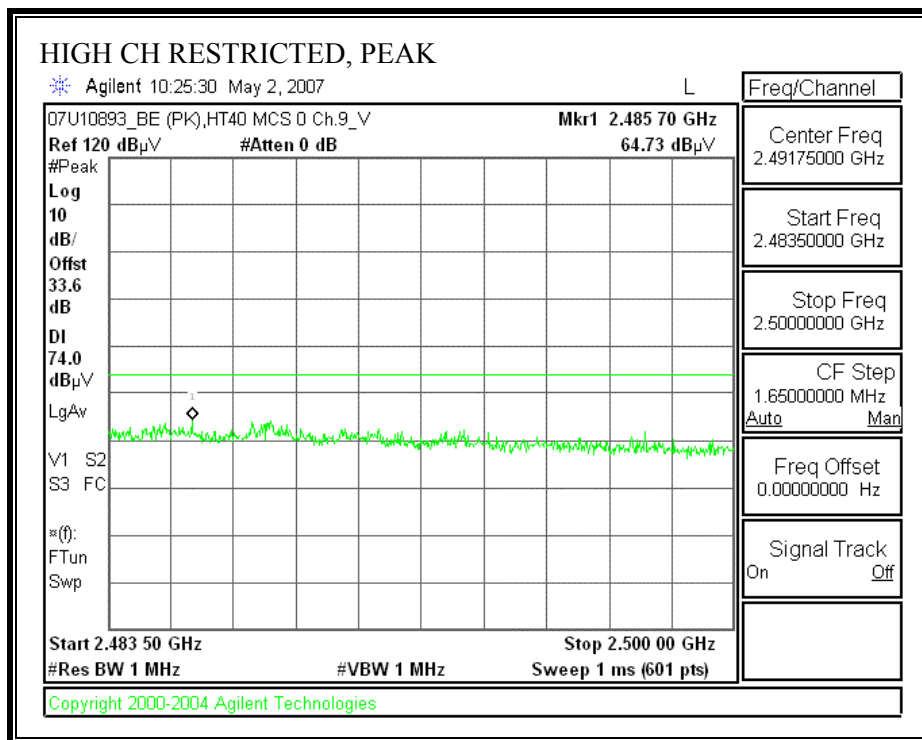


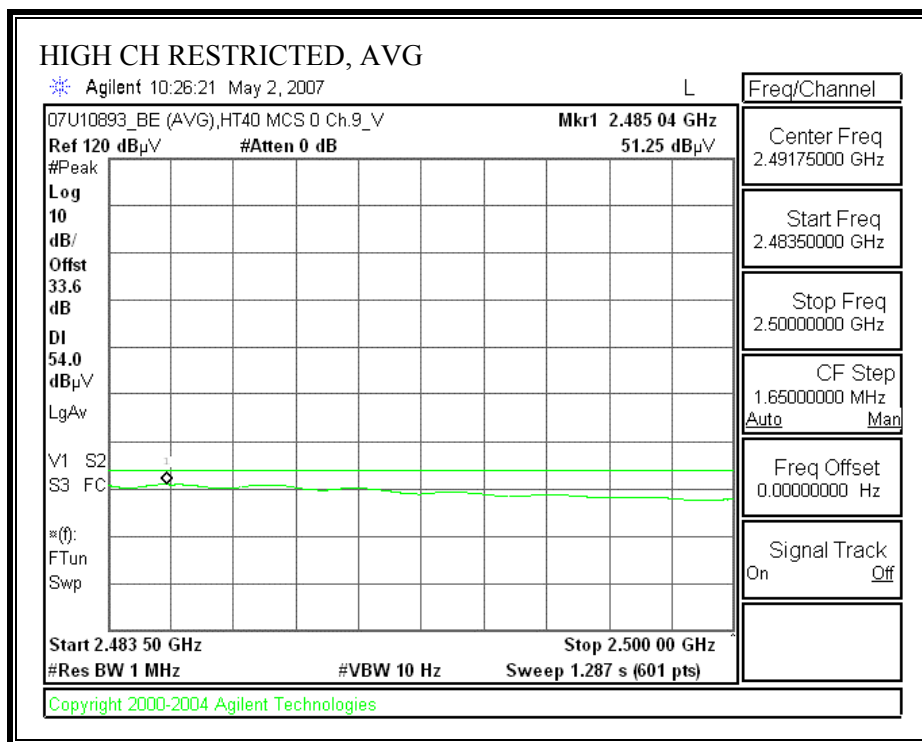
RESTRICTED BANDEDGE (HIGH CHANNEL, 2452 MHz, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, 2452 MHz, VERTICAL)



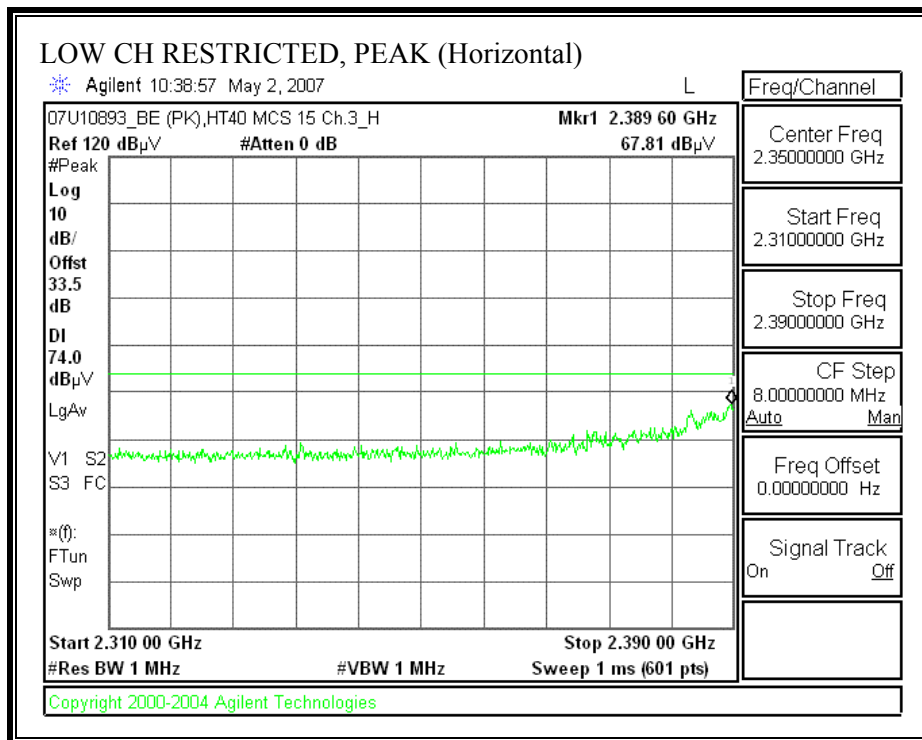


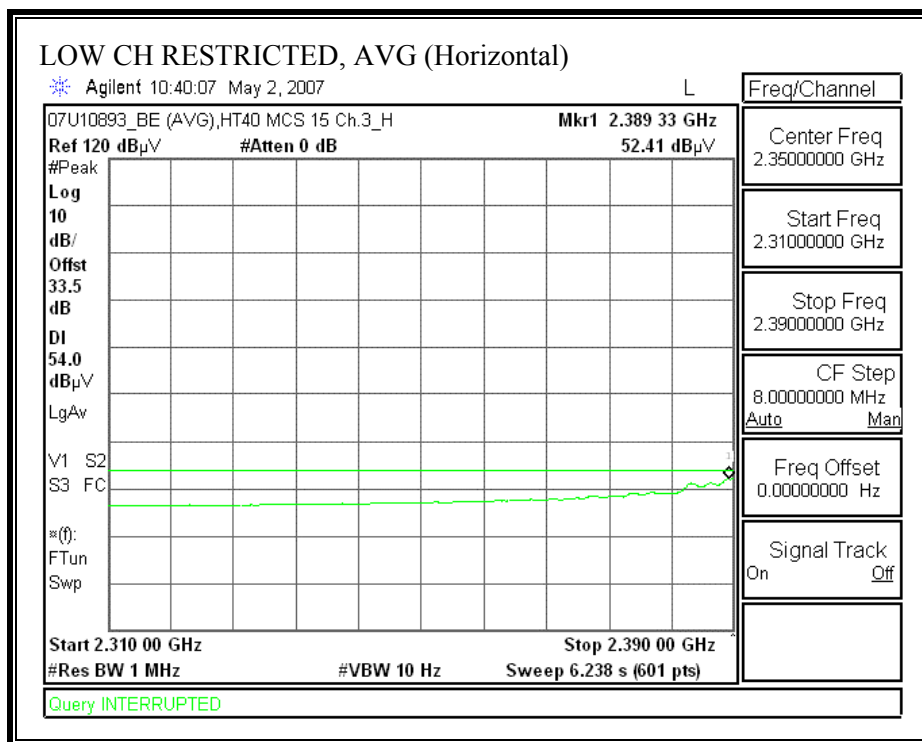
HARMONICS AND SPURIOUS EMISSIONS – 40 MHz TX BANDWIDTH

High Frequency Measurement																
Compliance Certification Services, Fremont 5 meter Chamber A																
Company: BroadCom Corporation																
Project #: 07U10893-2																
Date: 5-2-2007																
Test Engineer: Anoop Singh																
Configuration: EUT, Extender card, Laptop																
Mode: Transmit 11n HT40 MIMO MCS 0																
Test Equipment:																
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz		Limit								
T60; S/N: 2238 @3m		T145 Agilent 3008A0050						FCC 15.209								
Hi Frequency Cables																
2 foot cable		3 foot cable		12 foot cable		HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz; VBW=10Hz						
				Gordon 203134001		HPF_4.0GHz										
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
Channel 3, 2422MHz																
4.844	3.0	41.63	43.81	33.0	6.9	-34.8	0.0	0.6	47.3	49.5	74	54	-26.7	-4.5	V	
7.266	3.0	40.02	28.69	35.4	8.4	-34.7	0.0	0.6	49.8	38.5	74	54	-24.2	-15.5	V	
9.688	3.0	39.50	24.36	37.2	9.7	-35.0	0.0	0.8	52.2	37.1	74	54	-21.8	-16.9	Noise floor	
4.844	3.0	43.72	40.93	33.0	6.9	-34.8	0.0	0.6	49.4	46.6	74	54	-24.6	-7.4	H	
7.266	3.0	40.03	28.69	35.4	8.4	-34.7	0.0	0.6	49.8	38.5	74	54	-24.2	-15.5	H	
9.688	3.0	40.05	24.39	37.2	9.7	-35.0	0.0	0.8	52.8	37.1	74	54	-21.2	-16.9	Noise floor	
Channel 6, 2437MHz																
4.874	3.0	42.44	41.67	33.1	6.9	-34.9	0.0	0.6	48.2	47.4	74	54	-25.8	-6.6	H	
7.311	3.0	39.58	25.97	35.5	8.4	-34.7	0.0	0.6	49.5	35.9	74	54	-24.5	-18.1	H	
9.748	3.0	40.01	28.16	37.2	9.8	-35.0	0.0	0.8	52.8	41.0	74	54	-21.2	-13.0	Noise floor	
4.874	3.0	42.97	47.85	33.1	6.9	-34.9	0.0	0.6	48.7	53.6	74	54	-25.3	-0.4	V	
7.311	3.0	39.11	28.16	35.5	8.4	-34.7	0.0	0.6	49.0	38.0	74	54	-25.0	-16.0	V	
9.748	3.0	39.39	24.39	37.2	9.8	-35.0	0.0	0.8	52.2	37.2	74	54	-21.8	-16.8	Noise floor	
Channel 9, 2452MHz																
4.904	3.0	42.50	32.15	33.1	7.0	-34.9	0.0	0.6	48.3	37.9	74	54	-25.7	-16.1	V	
7.356	3.0	40.46	25.54	35.5	8.4	-34.6	0.0	0.6	50.4	35.5	74	54	-23.6	-18.5	Noise floor	
4.904	3.0	43.68	41.59	33.1	7.0	-34.9	0.0	0.6	49.5	47.4	74	54	-24.5	-6.6	H	
7.356	3.0	40.41	25.95	35.5	8.4	-34.6	0.0	0.6	50.4	35.9	74	54	-23.6	-18.1	Noise floor	
f Measurement Frequency																
Dist Distance to Antenna																
Read Analyzer Reading																
AF Antenna Factor																
CL Cable Loss																
Amp Preamp Gain																
D Corr Distance Correct to 3 meters																
Avg Average Field Strength @ 3 m																
Peak Calculated Peak Field Strength																
HPF High Pass Filter																
Avg Lim Average Field Strength Limit																
Pk Lim Peak Field Strength Limit																
Avg Mar Margin vs. Average Limit																
Pk Mar Margin vs. Peak Limit																

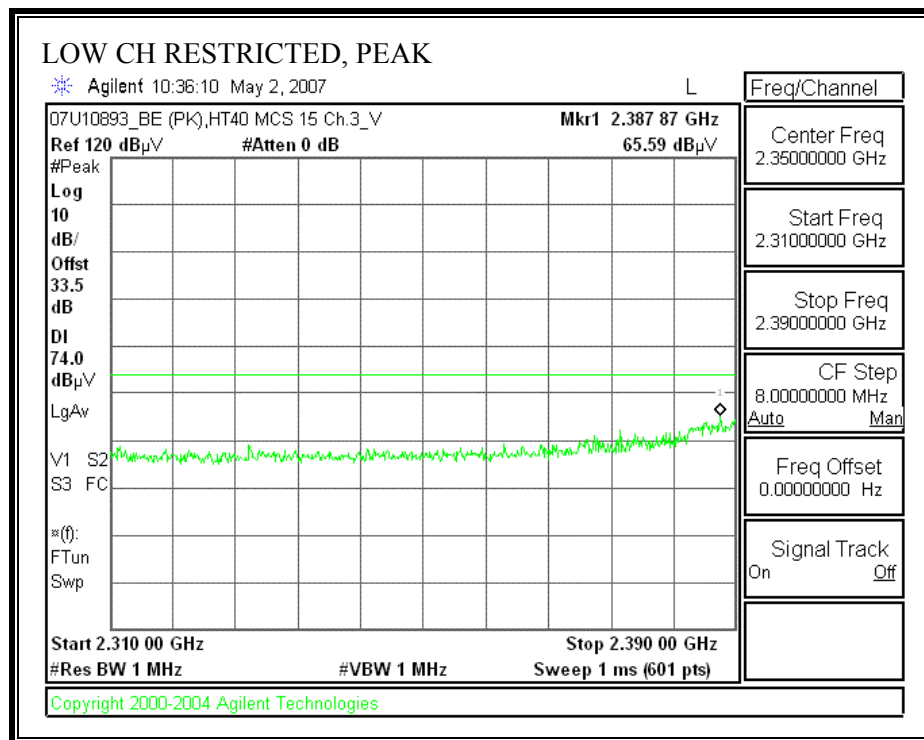
802.11n Mode 40 MHz SDM MCS 15:

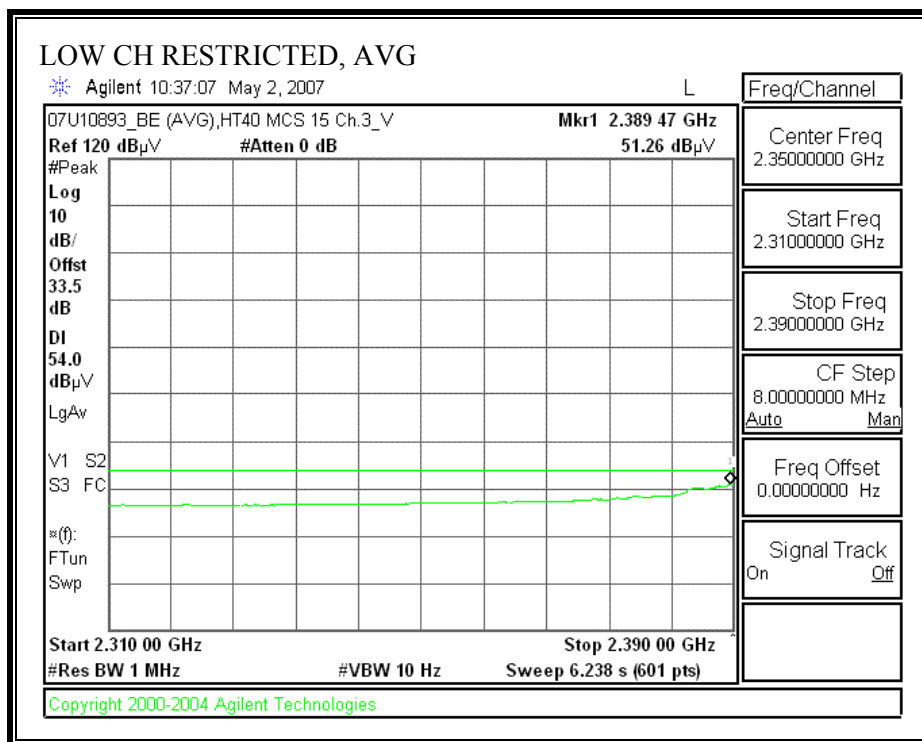
RESTRICTED BANDEDGE (LOW CHANNEL, 2422 MHz, HORIZONTAL)



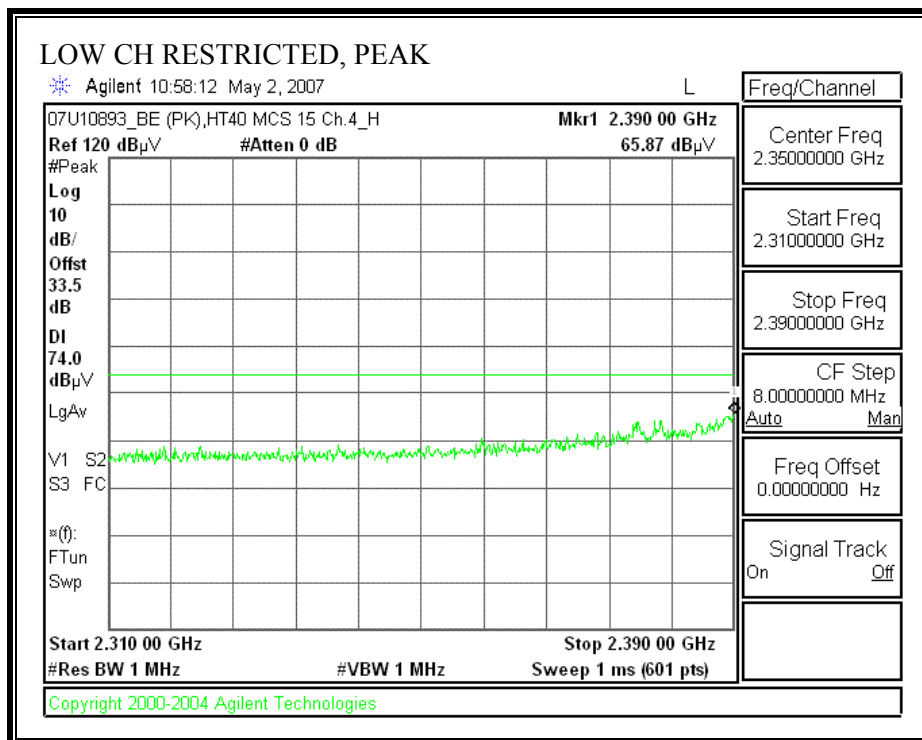


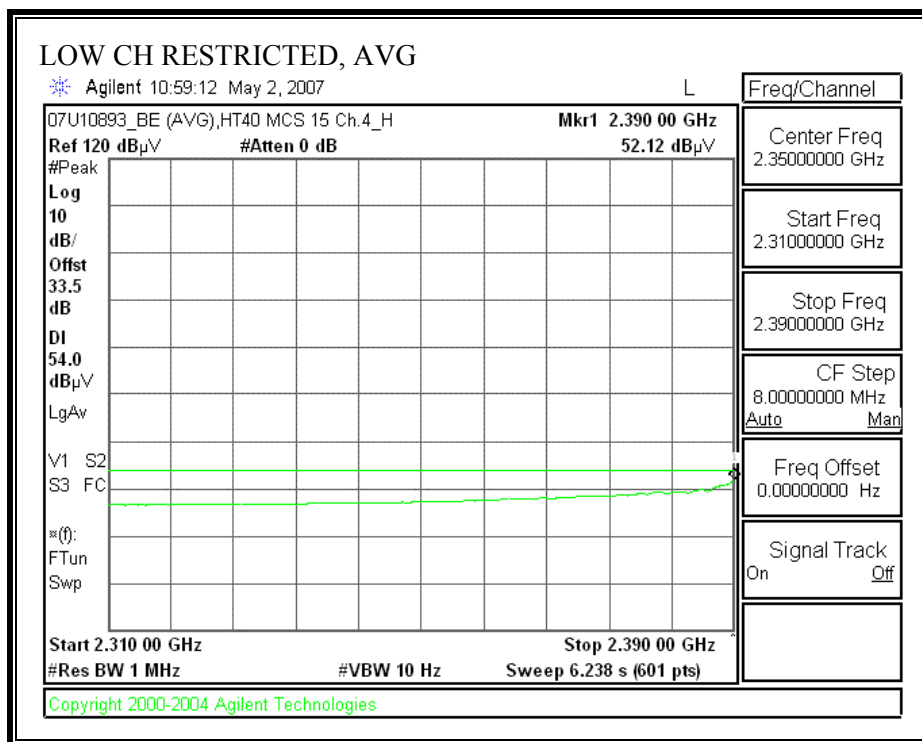
RESTRICTED BANDEDGE (LOW CHANNEL, 2422 MHz, VERTICAL)



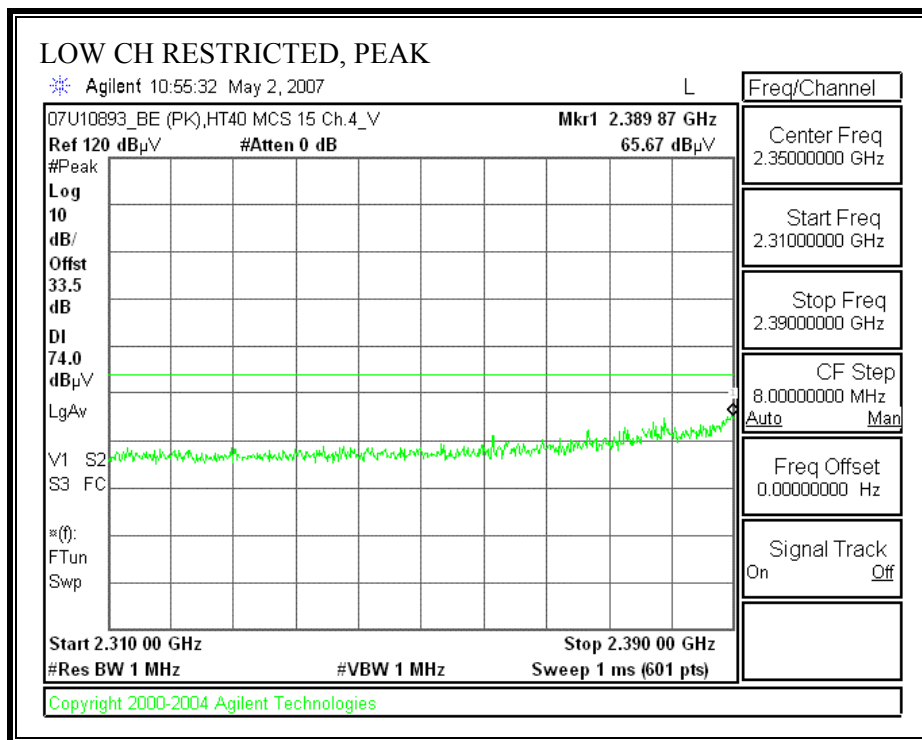


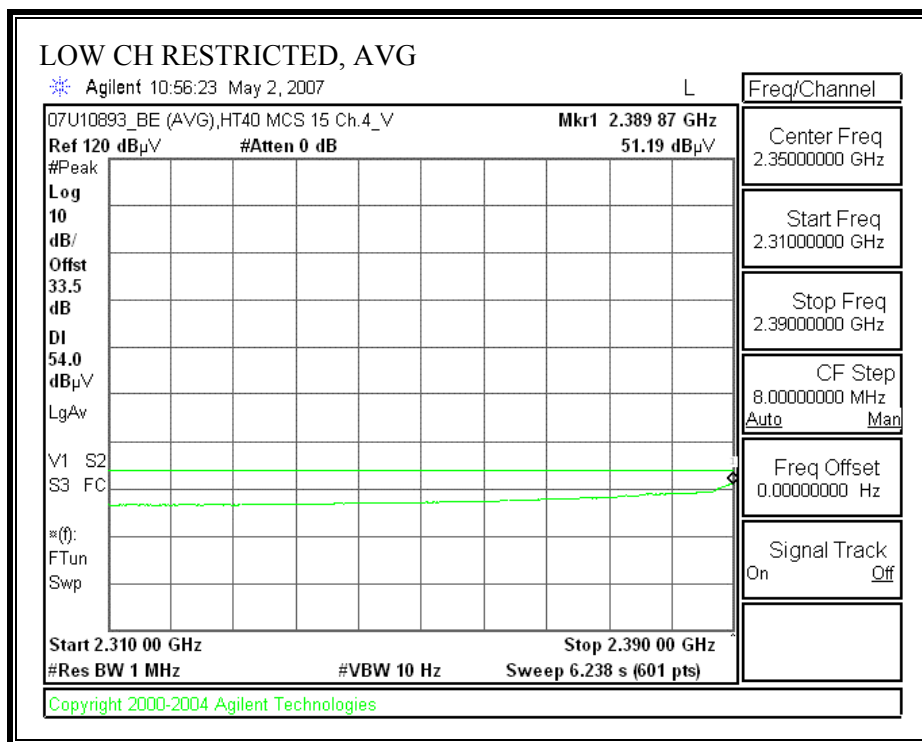
RESTRICTED BANDEDGE (LOW CHANNEL, 2427 MHz, HORIZONTAL)



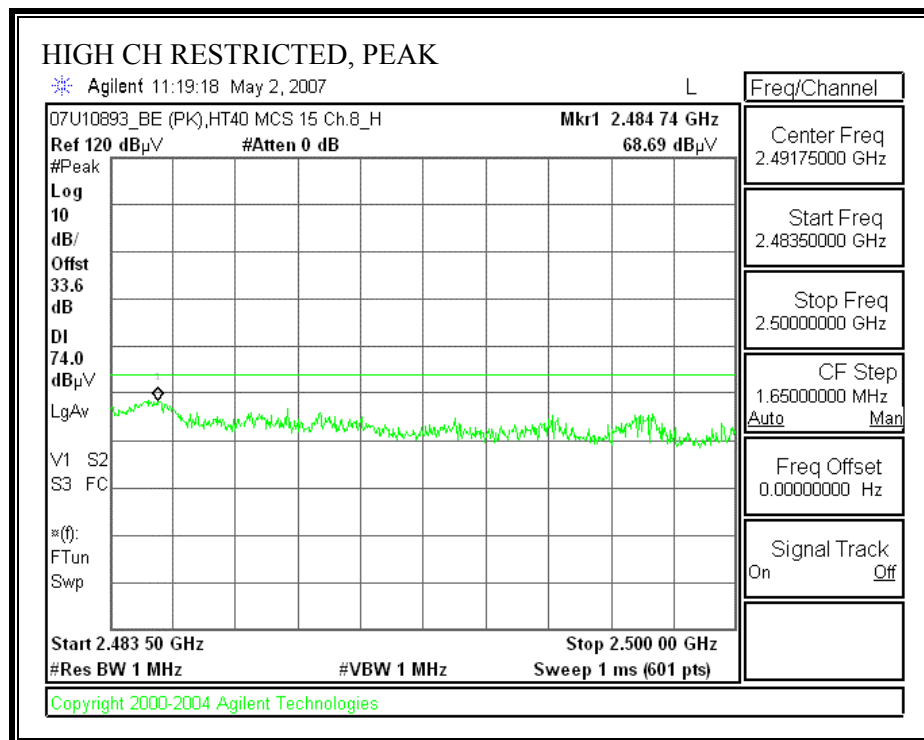


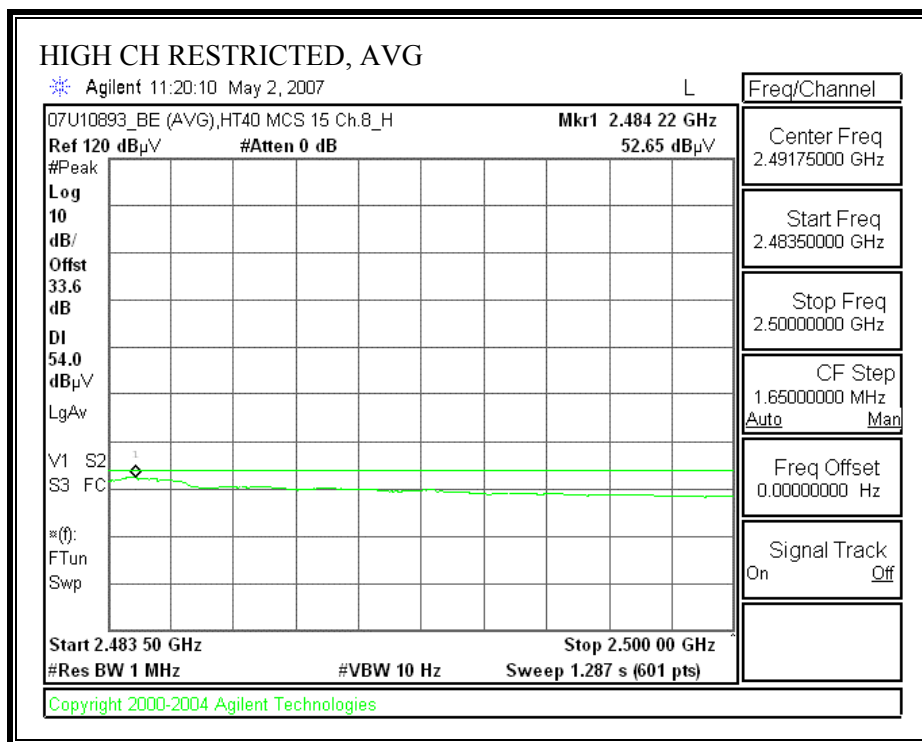
RESTRICTED BANDEDGE (LOW CHANNEL, 2427 MHz, VERTICAL)



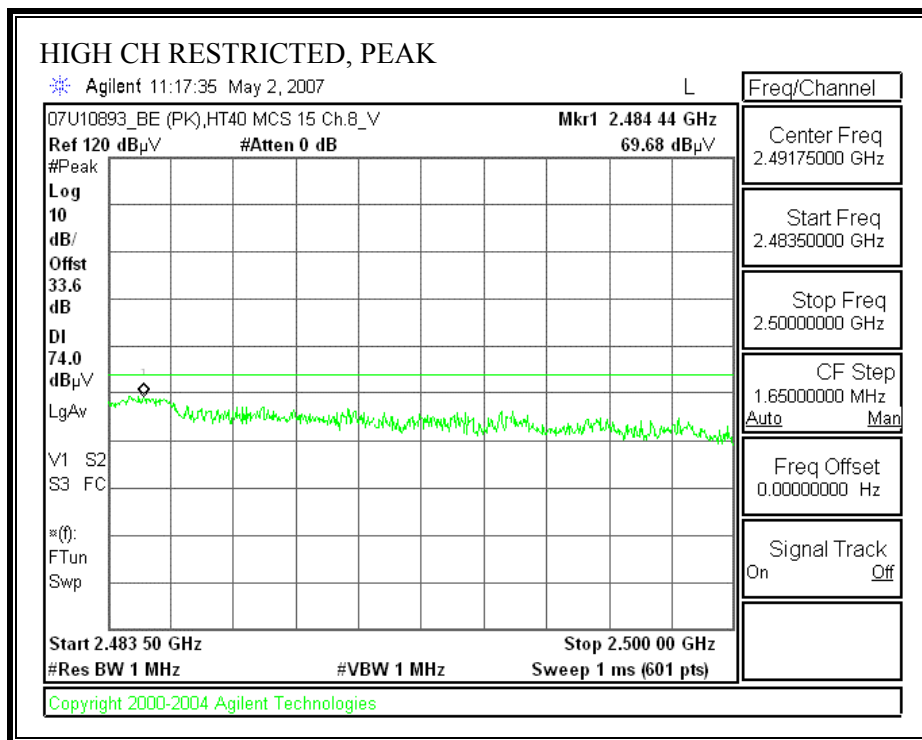


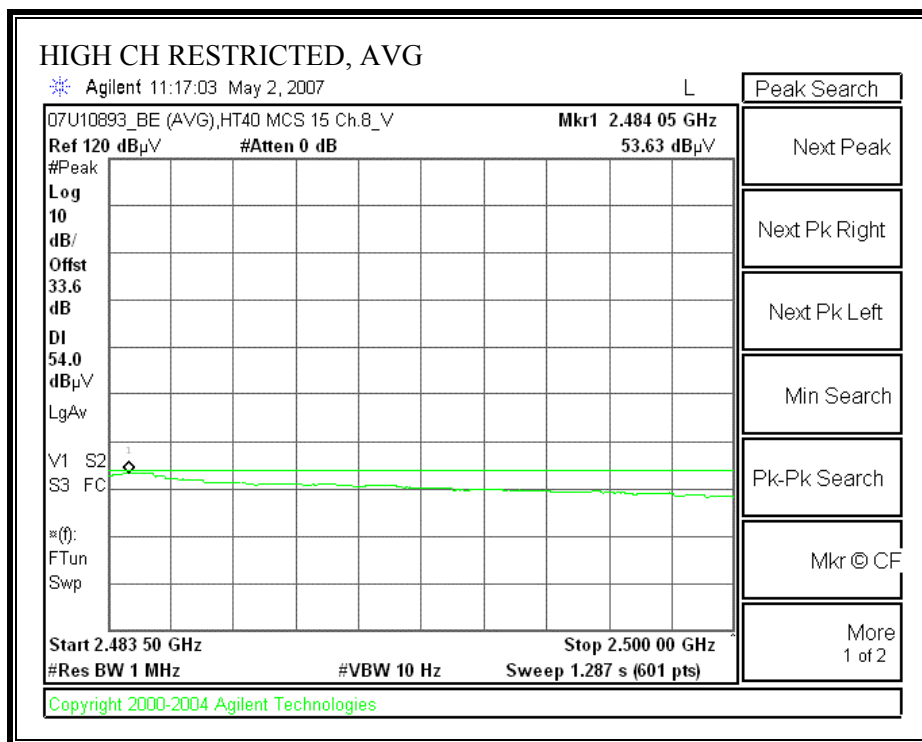
RESTRICTED BANDEDGE (HIGHCHANNEL, 2447 MHz, HORIZONTAL)



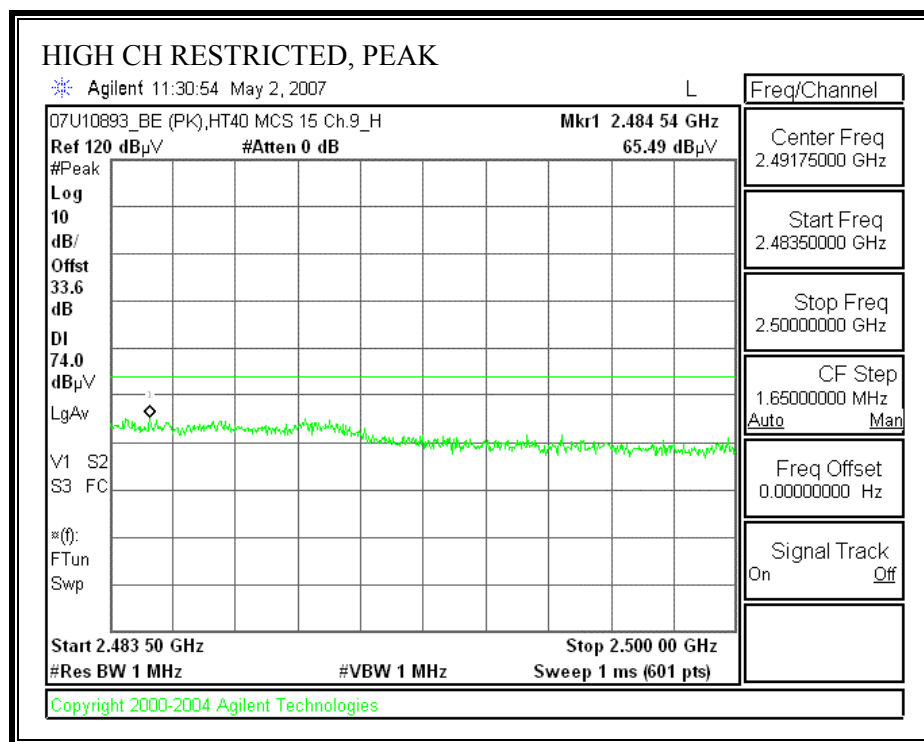


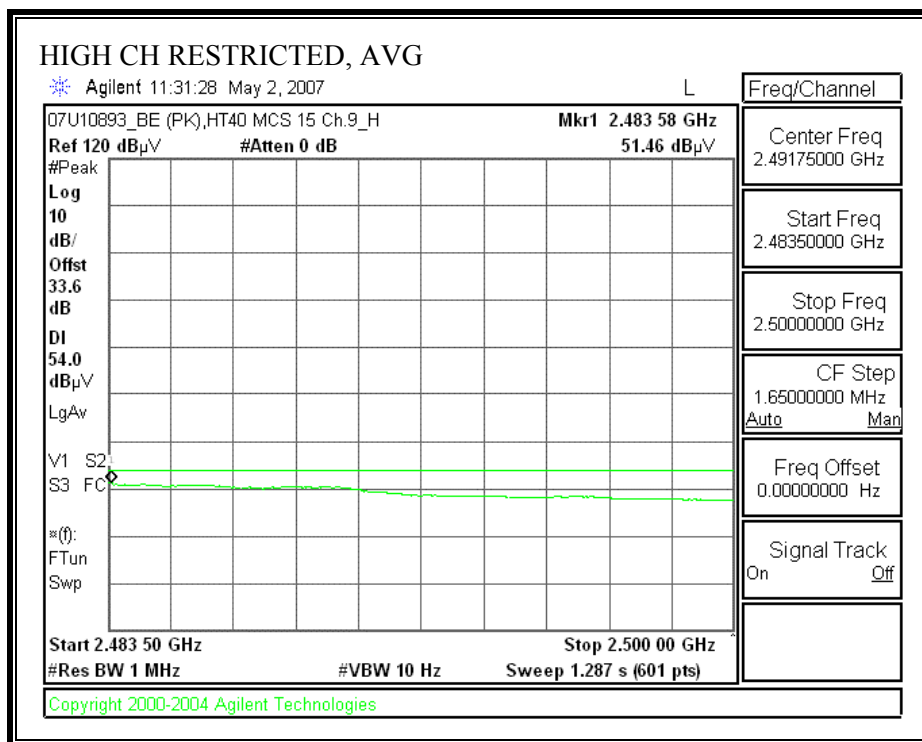
RESTRICTED BANDEDGE (HIGH CHANNEL, 2447 MHz, VERTICAL)



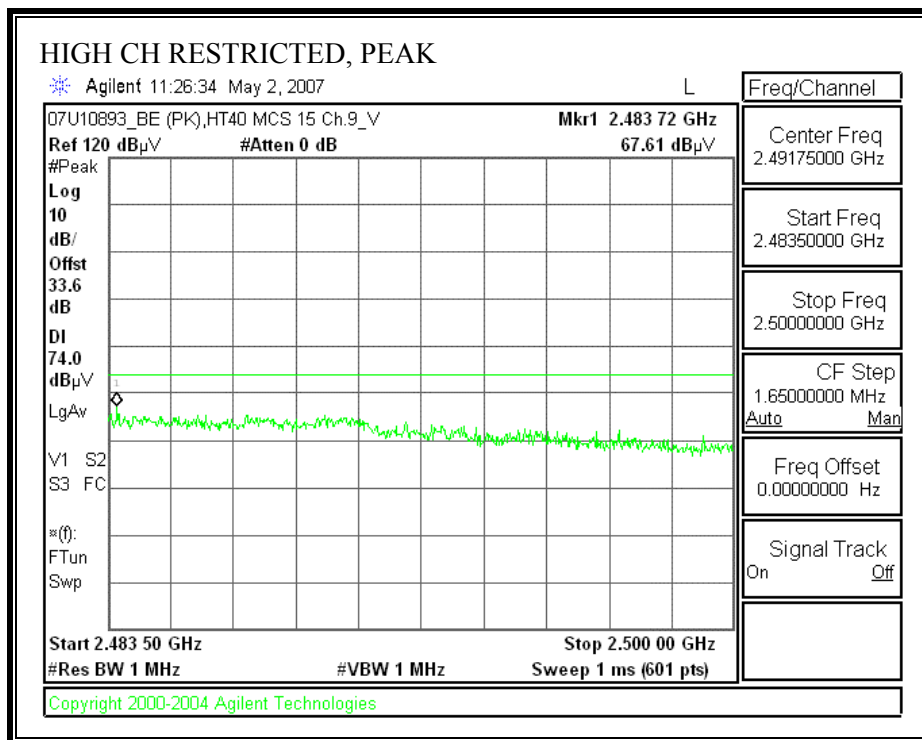


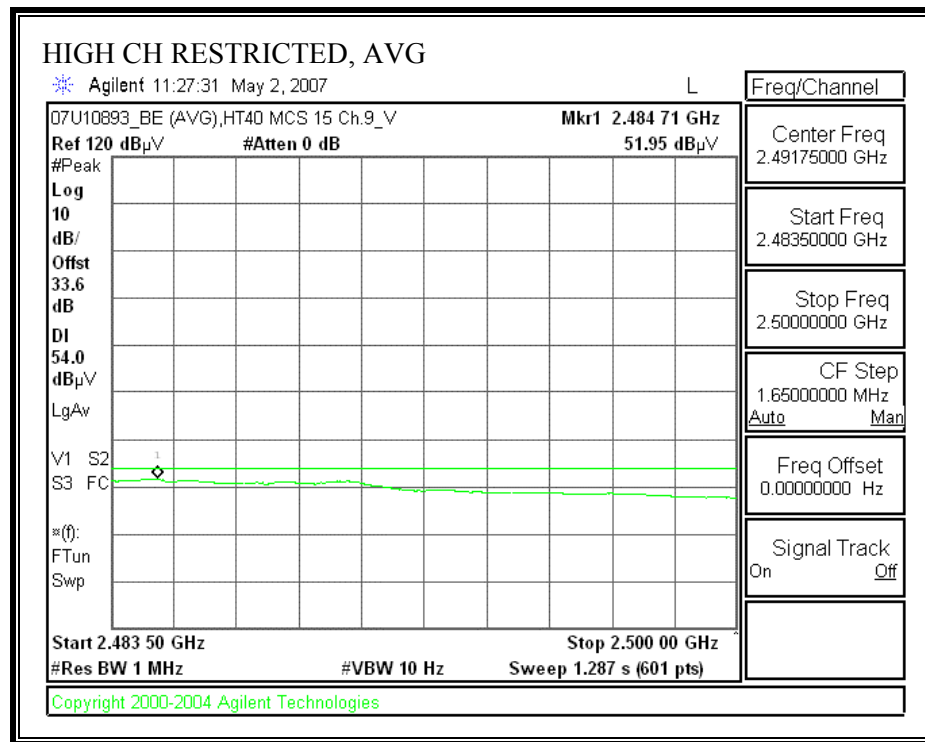
RESTRICTED BANDEDGE (HIGH CHANNEL, 2452 MHz, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, 2452 MHz, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS – 40 MHz TX BANDWIDTH

High Frequency Measurement															
Compliance Certification Services, Fremont 5 meter Chamber A															
Company: BroadCom Corporation															
Project #: 07U10893-2															
Date: 5-2-2007															
Test Engineer: Thanh Nguyen															
Configuration: EUT, Extender card, Laptop															
Mode: Transmit 11n 40MHz SDM MCS15 w/ 3.36dBi antenna.															
Test Equipment:															
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 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		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz, VBW=10Hz					
				Gordon 203134001		HPF_4.0GHz									
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Ftr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Channel 3, 2422MHz															
4.844	3.0	45.46	43.81	33.0	6.9	-34.8	0.0	0.6	51.2	49.5	74	54	-22.8	-4.5	V
7.266	3.0	40.44	28.69	35.4	8.4	-34.7	0.0	0.6	50.2	38.5	74	54	-23.8	-15.5	V
9.688	3.0	42.92	24.36	37.2	9.7	-35.0	0.0	0.8	55.6	37.1	74	54	-18.4	-16.9	Noise floor
4.844	3.0	44.45	40.93	33.0	6.9	-34.8	0.0	0.6	50.1	46.6	74	54	-23.9	-7.4	H
7.266	3.0	40.48	28.69	35.4	8.4	-34.7	0.0	0.6	50.3	38.5	74	54	-23.7	-15.5	H
9.688	3.0	41.76	24.39	37.2	9.7	-35.0	0.0	0.8	54.5	37.1	74	54	-19.5	-16.9	Noise floor
Channel 6, 2437MHz															
4.874	3.0	45.31	41.67	33.1	6.9	-34.9	0.0	0.6	51.1	47.4	74	54	-22.9	-6.6	H
7.311	3.0	39.46	25.97	35.5	8.4	-34.7	0.0	0.6	49.3	35.9	74	54	-24.7	-18.1	H
9.748	3.0	41.25	28.16	37.2	9.8	-35.0	0.0	0.8	54.1	41.0	74	54	-19.9	-13.0	Noise floor
4.874	3.0	46.08	47.85	33.1	6.9	-34.9	0.0	0.6	51.8	53.6	74	54	-22.2	-0.4	V
7.311	3.0	31.73	28.16	35.5	8.4	-34.7	0.0	0.6	41.6	38.0	74	54	-32.4	-16.0	V
9.748	3.0	29.38	24.39	37.2	9.8	-35.0	0.0	0.8	42.2	37.2	74	54	-31.8	-16.8	Noise floor
Channel 9, 2452MHz															
4.904	3.0	41.77	32.15	33.1	7.0	-34.9	0.0	0.6	47.6	37.9	74	54	-26.4	-16.1	V
7.356	3.0	38.90	25.54	35.5	8.4	-34.6	0.0	0.6	48.9	35.5	74	54	-25.1	-18.5	Noise floor
4.904	3.0	45.89	41.59	33.1	7.0	-34.9	0.0	0.6	51.7	47.4	74	54	-22.3	-6.6	H
7.356	3.0	39.70	25.95	35.5	8.4	-34.6	0.0	0.6	49.7	35.9	74	54	-24.3	-18.1	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										

7.5.5. TRANSMITTER ABOVE 1 GHz FOR 5725 TO 5850 MHz BAND

11n 20 MHz CDD MCS 0

HARMONICS AND SPURIOUS EMISSIONS – 20 MHz TX BANDWIDTH

High Frequency Measurement																
Compliance Certification Services, Fremont, A-5m Chamber																
Company: Broadcom Corporation																
Project #: 07U10893																
Date: 04/06/2007																
Test Engineer: Vien Tran																
Configuration: EUT																
Mode: Transmit_5.8GHz_11n 20 MHz CDD MCS 0																
Test Equipment:																
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 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		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz						
				Gordon 203134001		HPF_7.6GHz										
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fldr 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 Channel = CH149 (5745 MHz)																
11.490	3.0	52.10	39.50	37.4	11.6	-35.9	0.0	0.7	65.95	53.35	74	54	-8.1	-0.7	H	
11.490	3.0	46.90	34.80	37.4	11.6	-35.9	0.0	0.7	60.75	48.65	74	54	-13.3	-5.4	V	
Mid Channel = CH157 (5785 MHz)																
11.570	3.0	53.00	39.90	37.4	11.7	-35.8	0.0	0.7	67.01	53.91	74	54	-7.0	-0.1	H	
11.570	3.0	48.70	36.60	37.4	11.7	-35.8	0.0	0.7	62.71	50.61	74	54	-11.3	-3.4	V	
High Channel = CH165 (5825 MHz)																
11.650	3.0	51.80	39.40	37.4	11.8	-35.7	0.0	0.7	65.96	53.56	74	54	-8.0	-0.4	H	
11.650	3.0	47.30	35.50	37.4	11.8	-35.7	0.0	0.7	61.46	49.66	74	54	-12.5	-4.3	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												

11n 40 MHz CDD MCS 32

HARMONICS AND SPURIOUS EMISSIONS – 40 MHz TX BANDWIDTH

High Frequency Measurement																
Compliance Certification Services, Fremont, A-5m Chamber																
Company: Broadcom Corporation																
Project #: 07U10893																
Date: 04/05/2007																
Test Engineer: Vien Tran																
Configuration: EUT																
Mode: Transmit_5.8GHz_11n 40 MHz CDD MCS 0																
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 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	Ftr 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 Channel = CH151 (5755 MHz)																
11.510	3.0	52.6	39.9	37.4	11.6	-35.8	0.0	0.7	66.5	53.8	74	54	-7.5	-0.2	H	
11.510	3.0	47.5	35.5	37.4	11.6	-35.8	0.0	0.7	61.4	49.4	74	54	-12.6	-4.6	V	
High Channel = CH159 (5795 MHz)																
11.590	3.0	52.6	39.7	37.4	11.7	-35.8	0.0	0.7	66.6	53.7	74	54	-7.4	-0.3	H	
11.590	3.0	47.2	35.0	37.4	11.7	-35.8	0.0	0.7	61.2	49.0	74	54	-12.8	-5.0	V	
f Measurement Frequency Dist Distance to Antenna Read Analyzer Reading AF Antenna Factor CL Cable Loss Amp Preamp Gain D Corr Distance Correct to 3 meters Avg Average Field Strength @ 3 m Peak Calculated Peak Field Strength HPF High Pass Filter Avg Lim Average Field Strength Limit Pk Lim Peak Field Strength Limit Avg Mar Margin vs. Average Limit Pk Mar Margin vs. Peak Limit																

7.5.6. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

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

2.4 GHz BAND

HORIZONTAL DATA



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 7 File#: 06u10708.emi Date: 12-08-2006 Time: 15:10:24
Audix ATC

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Vien Tran
Company: : Broadcom
Project #: : 06U10708
Configuration:: EUT and Laptop
Mode of Oper.: Tx Worst Case 2.4 GHz Band
Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	301.600	21.27	15.70	36.97	46.00	-9.03	Peak
2	367.560	18.41	17.33	35.74	46.00	-10.26	Peak
3	402.480	22.77	18.11	40.88	46.00	-5.12	Peak
4	434.490	19.74	18.84	38.58	46.00	-7.42	Peak
5	589.690	17.55	21.39	38.94	46.00	-7.06	Peak
6	897.180	16.94	25.85	42.79	46.00	-3.21	Peak

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

VERTICAL DATA



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 9 File#: 06u10708.emi Date: 12-08-2006 Time: 15:19:58
Audix ATC

Condition: FCC CLASS-B VERTICAL
Test Operator:: Vien Tran
Company: : Broadcom
Project #: : 06U10708
Configuration:: EUT / Laptop
Mode of Oper.: Tx Worst Case 2.4 GHz Band
Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	286.080	17.36	15.16	32.52	46.00	-13.48	Peak
2	402.480	18.21	18.11	36.32	46.00	-9.68	Peak
3	434.490	16.77	18.84	35.61	46.00	-10.39	Peak
4	482.990	18.87	19.89	38.76	46.00	-7.24	Peak
5	565.440	18.61	21.05	39.66	46.00	-6.34	Peak
6	898.150	12.71	25.86	38.57	46.00	-7.43	Peak

5 GHz BAND

HORIZONTAL DATA



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Data#: 13 File#: 06u10708.emi Date: 12-08-2006 Time: 15:47:39
Audix ATC

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Vien Tran
Company: : Broadcom
Project #: : 06U10708
Configuration:: EUT / Laptop
Mode of Oper.: Tx Worst Case 5.2 GHz Band
Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	201.690	23.54	14.32	37.86	43.50	-5.64	Peak
2	337.490	20.55	16.56	37.11	46.00	-8.89	Peak
3	434.490	18.23	18.84	37.07	46.00	-8.93	Peak
4	516.940	16.85	20.48	37.32	46.00	-8.68	Peak
5	633.340	17.26	22.05	39.31	46.00	-6.69	Peak
6	897.180	17.10	25.85	42.95	46.00	-3.05	Peak

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

VERTICAL DATA



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Data#: 11 File#: 06u10708.emi Date: 12-08-2006 Time: 15:30:42
Audix ATC

Condition: FCC CLASS-B VERTICAL
Test Operator:: Vien Tran
Company: : Broadcom
Project #: : 06U10708
Configuration:: EUT / Laptop
Mode of Oper.: Tx Worst Case 5.2 GHz Band
Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	279.290	18.64	14.93	33.57	46.00	-12.43	Peak
2	402.480	18.35	18.11	36.46	46.00	-9.54	Peak
3	482.990	20.39	19.89	40.28	46.00	-5.72	Peak
4	516.940	18.58	20.48	39.05	46.00	-6.95	Peak
5	565.440	17.65	21.05	38.70	46.00	-7.30	Peak
6	997.090	14.38	26.91	41.29	54.00	-12.71	Peak

7.6. POWERLINE CONDUCTED EMISSIONS

LIMIT

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

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

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

TEST PROCEDURE

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

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

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

RESULTS

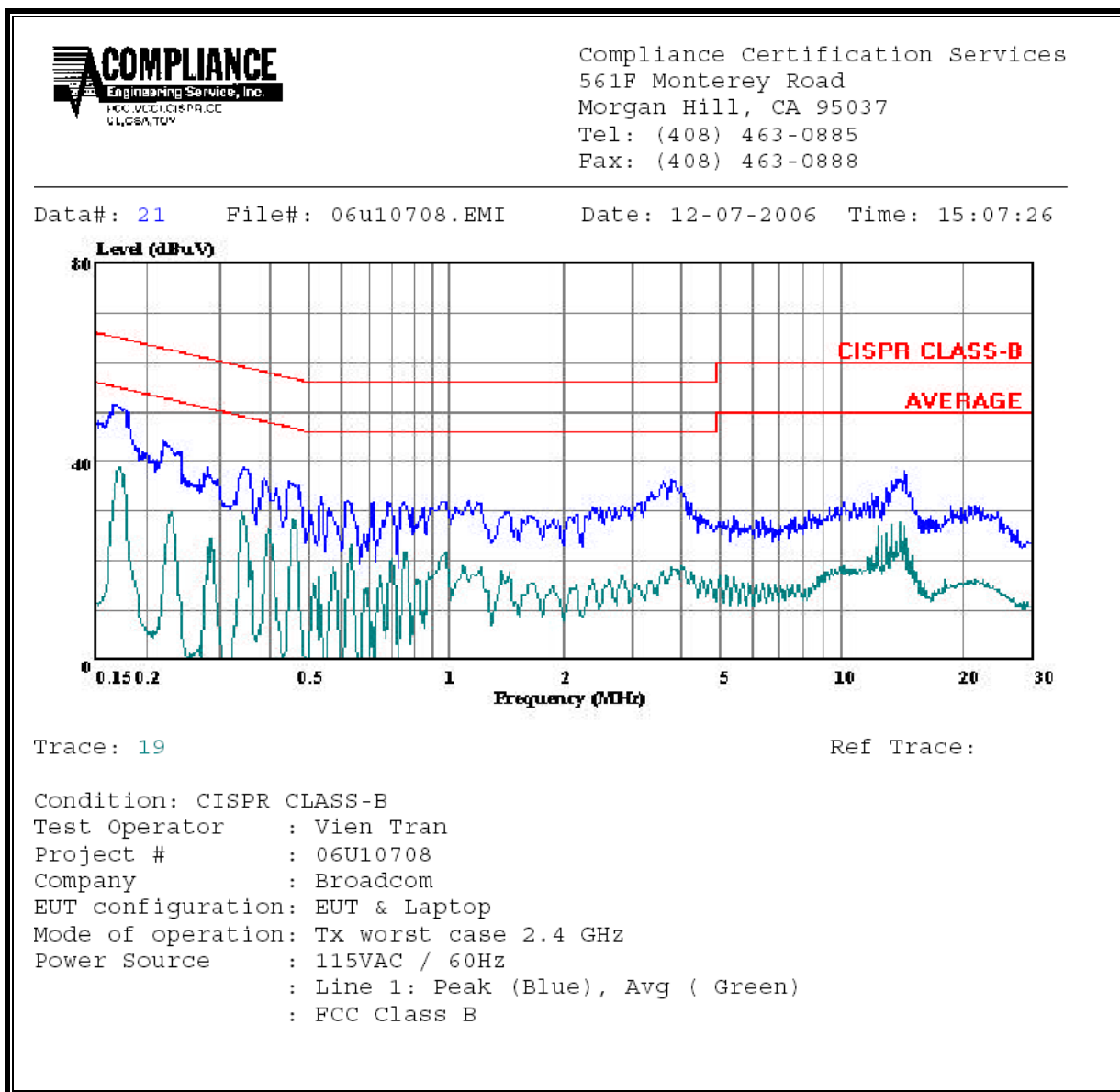
No non-compliance noted:

2.4 GHz BAND

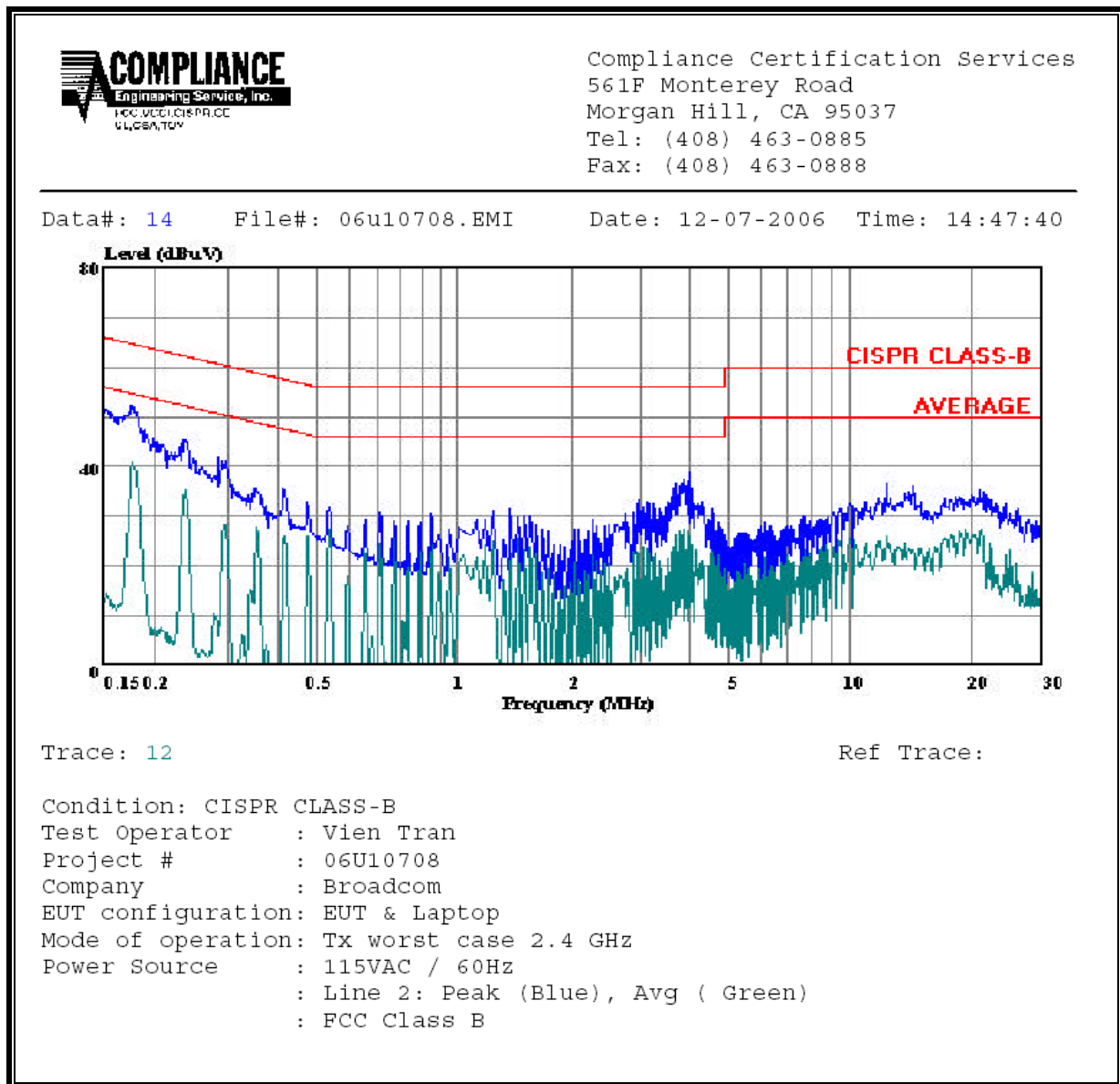
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.17	51.37	--	38.56	0.00	65.16	55.16	-13.79	-16.60	L1
0.24	43.92	--	29.86	0.00	62.17	52.17	-18.25	-22.31	L1
3.95	36.12	--	24.00	0.00	56.00	46.00	-19.88	-22.00	L1
0.18	52.27	--	40.72	0.00	64.49	54.49	-12.22	-13.77	L2
0.24	43.92	--	35.37	0.00	62.17	52.17	-18.25	-16.80	L2
4.10	36.12	--	26.99	0.00	56.00	46.00	-19.88	-19.01	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS

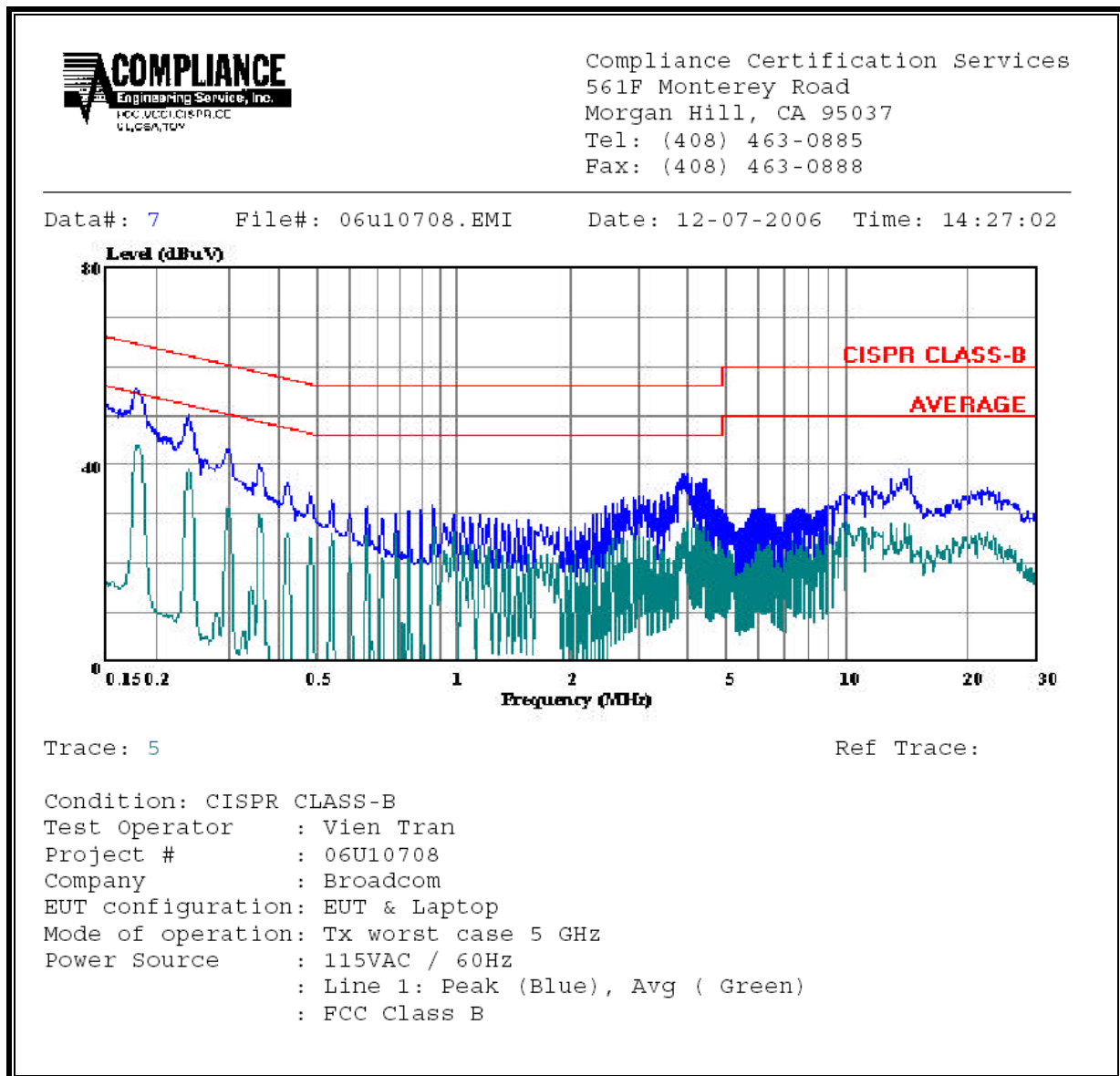


5 GHz BAND

6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.18	55.32	--	44.00	0.00	64.49	54.49	-9.17	-10.49	L1
0.24	50.36	--	38.98	0.00	62.10	52.10	-11.74	-13.12	L1
4.05	37.97	--	28.50	0.00	56.00	46.00	-18.03	-17.50	L1
0.18	51.51	--	39.12	0.00	64.49	54.49	-12.98	-15.37	L2
0.24	42.85	--	20.62	0.00	62.10	52.10	-19.25	-31.48	L2
4.05	35.63	--	18.90	0.00	56.00	46.00	-20.37	-27.10	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS

