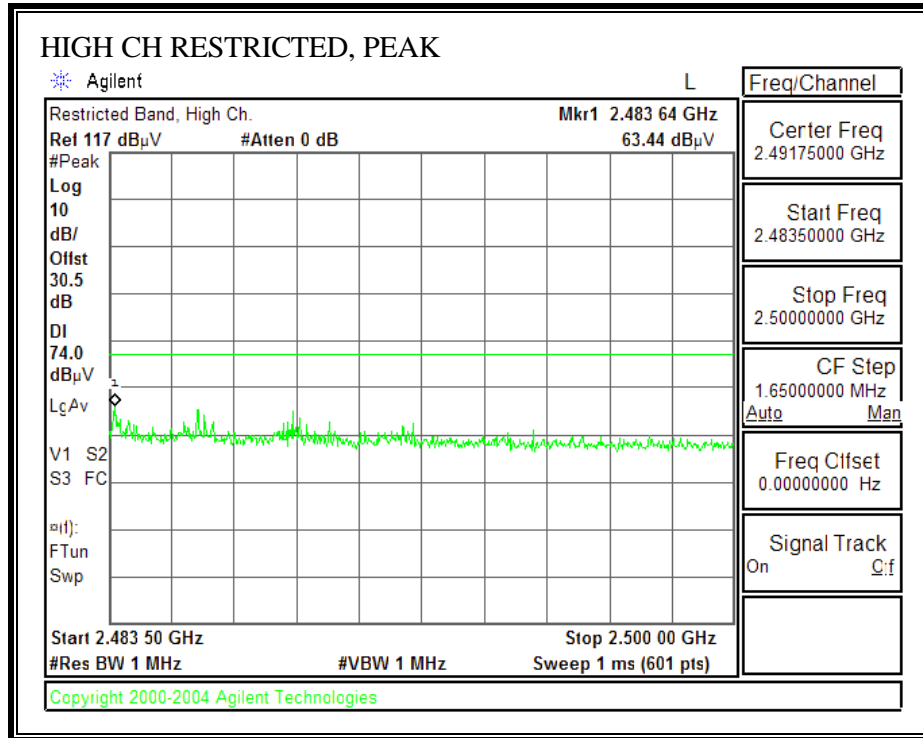
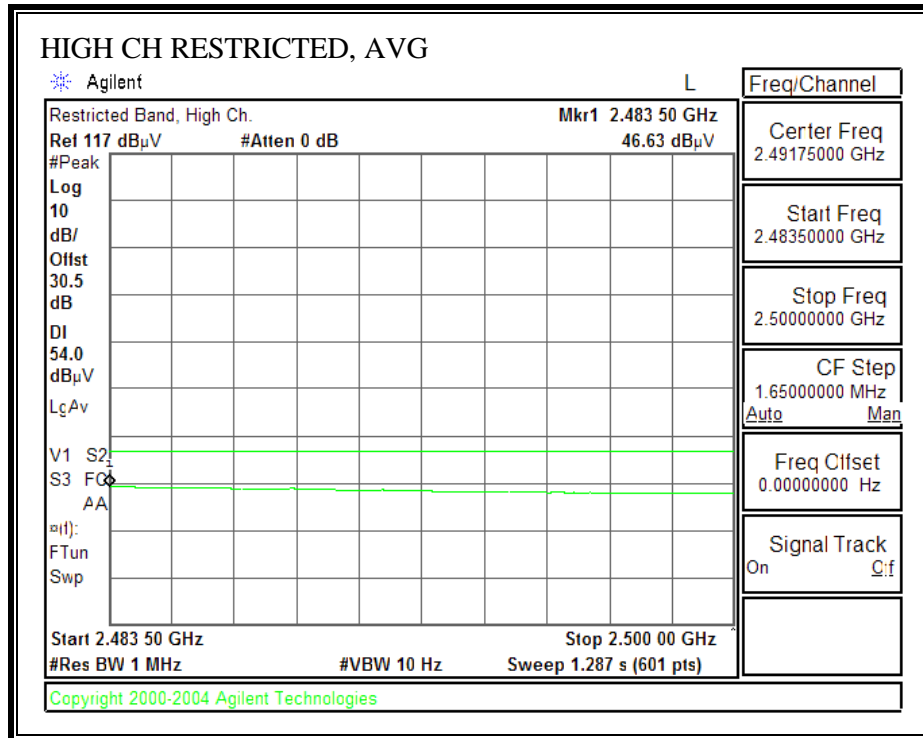
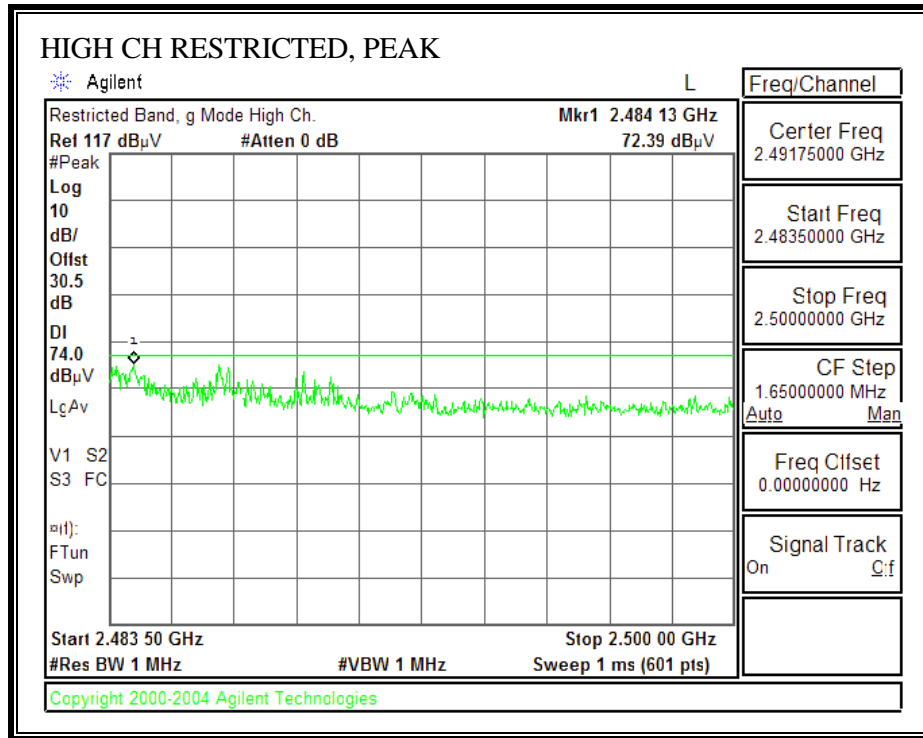


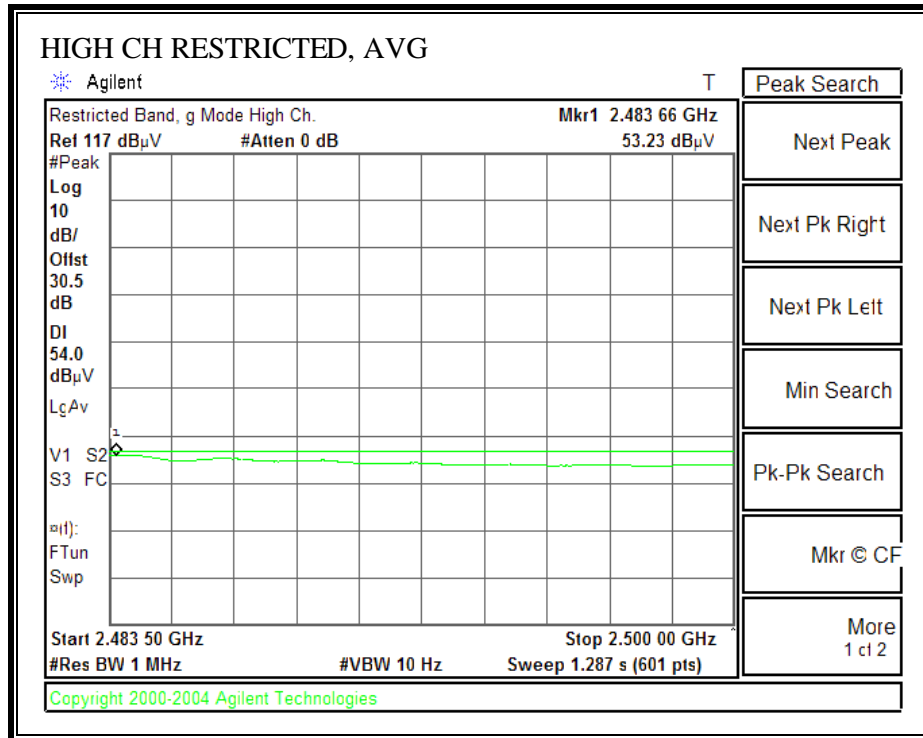
RESTRICTED BANDEDGE (HIGHCHANNEL, 2457 MHz, HORIZONTAL)



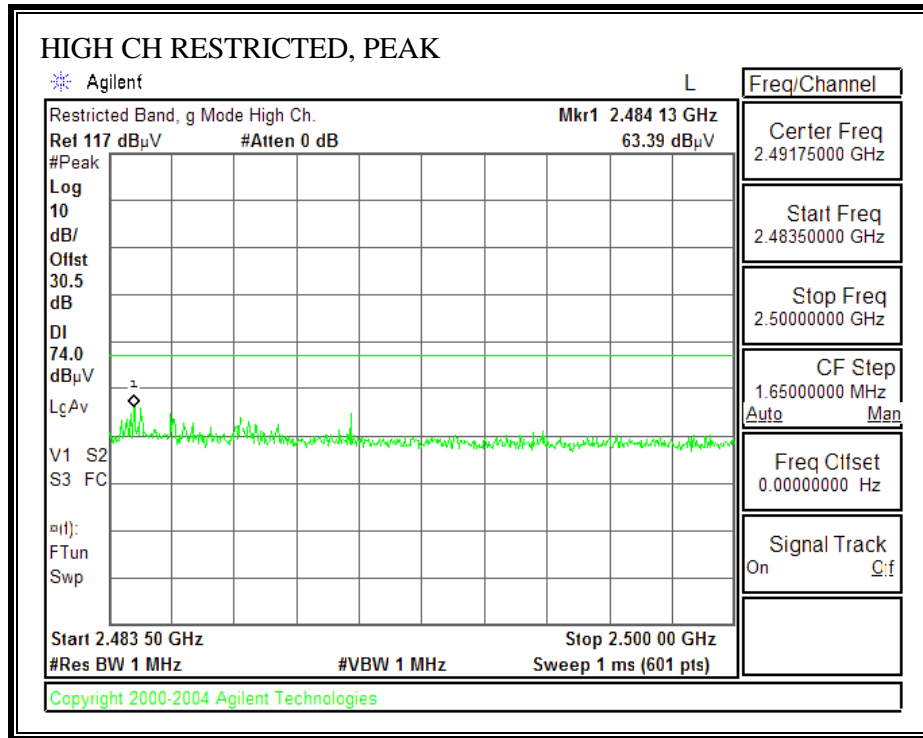


RESTRICTED BANDEGE (HIGH CHANNEL, 2457 MHz, VERTICAL)

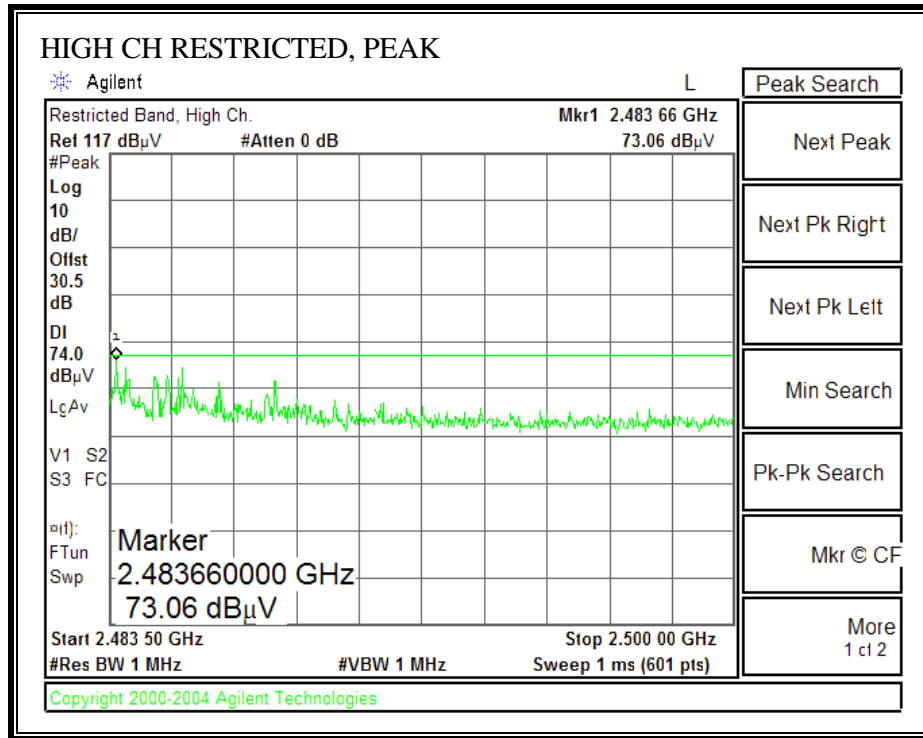


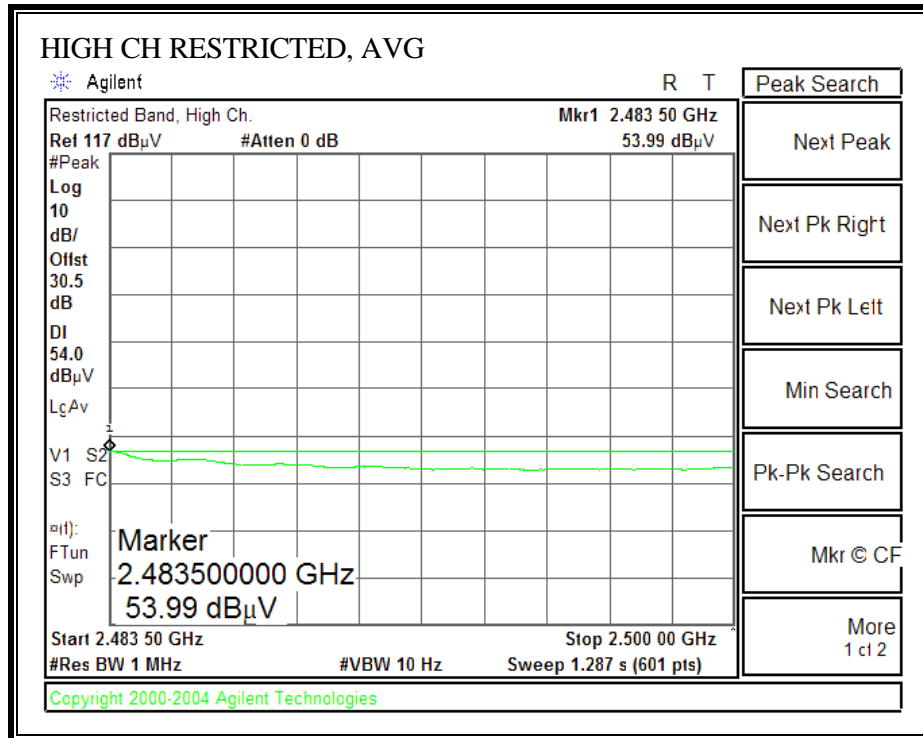


RESTRICTED BANDEDGE (HIGH CHANNEL, 2462 MHz, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, 2462 MHz, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS – 20 MHz TX BANDWIDTH

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

Company: Broadcom
Project #: 06U10233
Date: 05/12/06
Test Engineer: Vien Tran
Configuration: EUT (BCM94321MC, S/N 316) & Apple PCB Antenna
Mode: MIMO 20MHz Tx BW 2.4 GHz Band
Average Power Meter: Low = 16 dBm, Mid = 16 dBm, High = 16 dBm

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

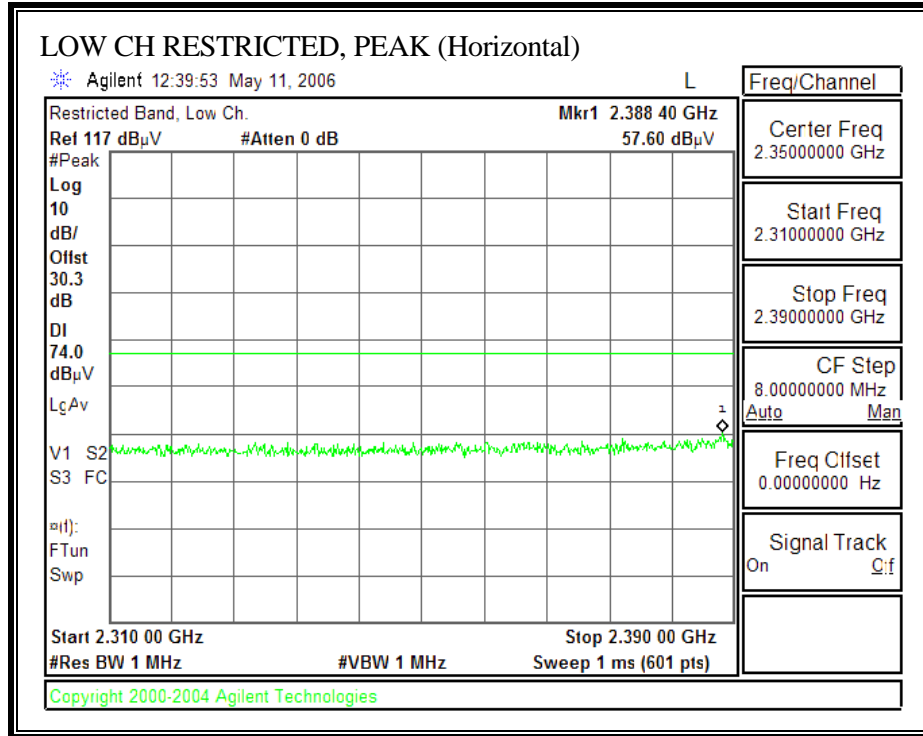
2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz
	Vien 187215002	Vien 197209005	HPF_4.0GHz		

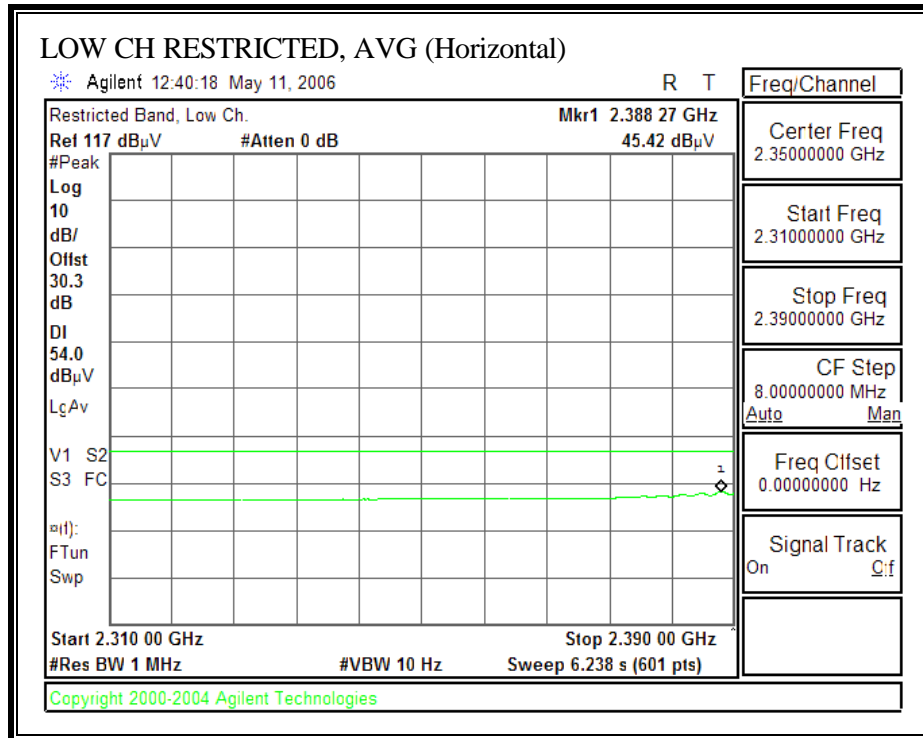
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Channel, 2412 MHz															
4.824	3.0	53.4	44.5	33.3	2.9	-36.5	0.0	0.6	53.8	44.9	74	54	-20.2	-9.1	V
12.060	3.0	43.7	33.6	37.7	4.8	-35.4	0.0	0.9	51.7	41.6	74	54	-32.5	-32.4	Y
4.824	3.0	55.5	51.2	33.3	2.9	-36.5	0.0	0.6	55.9	51.6	74	54	-38.1	-32.4	H
12.060	3.0	44.5	34.2	37.7	4.8	-35.4	0.0	0.9	52.5	42.2	74	54	-31.5	-11.8	H
Mid Channel, 2437 MHz															
4.874	3.0	51.5	43.5	33.4	3.0	-36.5	0.0	0.6	52.0	44.0	74	54	-32.0	-10.0	V
7.311	3.0	43.0	32.7	35.0	4.2	-36.2	0.0	0.6	46.6	36.3	74	54	-37.4	-17.7	V
12.185	3.0	42.4	32.8	37.6	4.9	-35.4	0.0	0.9	50.4	41.8	74	54	-33.6	-12.3	V
4.874	3.0	54.6	51.9	33.4	3.0	-36.5	0.0	0.6	55.1	52.4	74	54	-38.9	-1.6	H
7.311	3.0	47.0	36.4	35.0	4.2	-36.2	0.0	0.6	50.6	40.0	74	54	-33.4	-14.0	H
12.185	3.0	43.0	32.8	37.6	4.9	-35.4	0.0	0.9	51.0	40.8	74	54	-33.0	-13.3	H
High Channel, 2462 MHz															
4.924	3.0	50.1	42.8	33.4	3.1	-36.5	0.0	0.6	50.7	43.4	74	54	-33.3	-10.6	V
7.386	3.0	51.0	40.6	35.0	4.2	-36.2	0.0	0.6	54.6	44.2	74	54	-39.4	-9.8	V
12.310	3.0	43.2	33.0	37.6	4.9	-35.4	0.0	0.9	51.2	41.0	74	54	-32.8	-13.0	V
4.924	3.0	55.5	52.3	33.4	3.1	-36.5	0.0	0.6	56.1	52.9	74	54	-37.9	-3.1	H
7.386	3.0	44.9	34.0	35.0	4.2	-36.2	0.0	0.6	48.5	37.6	74	54	-33.9	-16.4	H
12.310	3.0	44.0	33.0	37.6	4.9	-35.4	0.0	0.9	52.0	41.0	74	54	-32.0	-13.0	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		

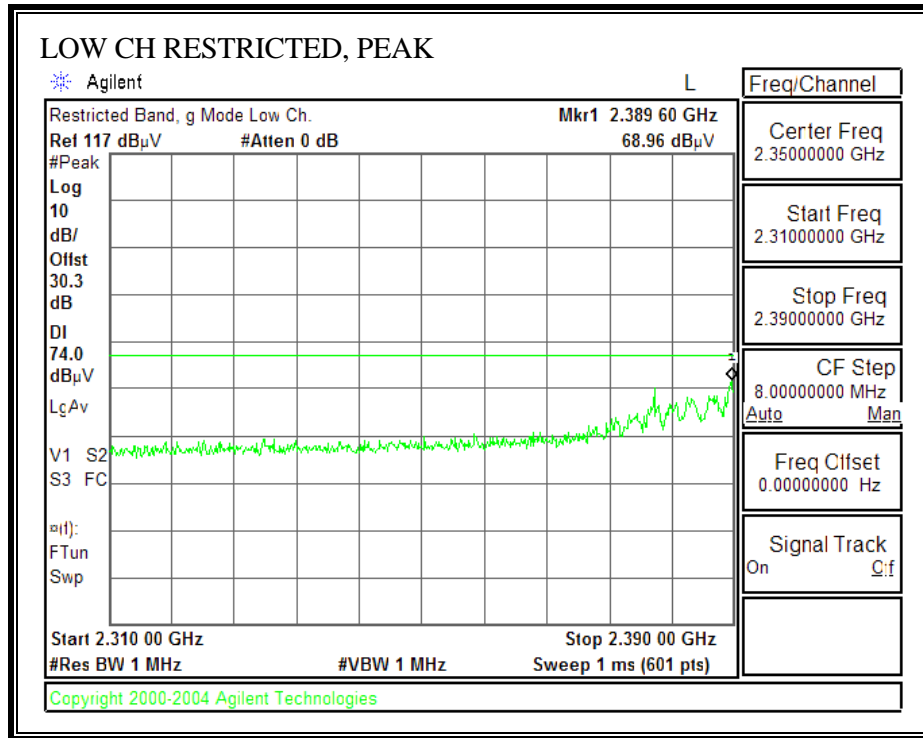
40 MHz TX BANDWIDTH

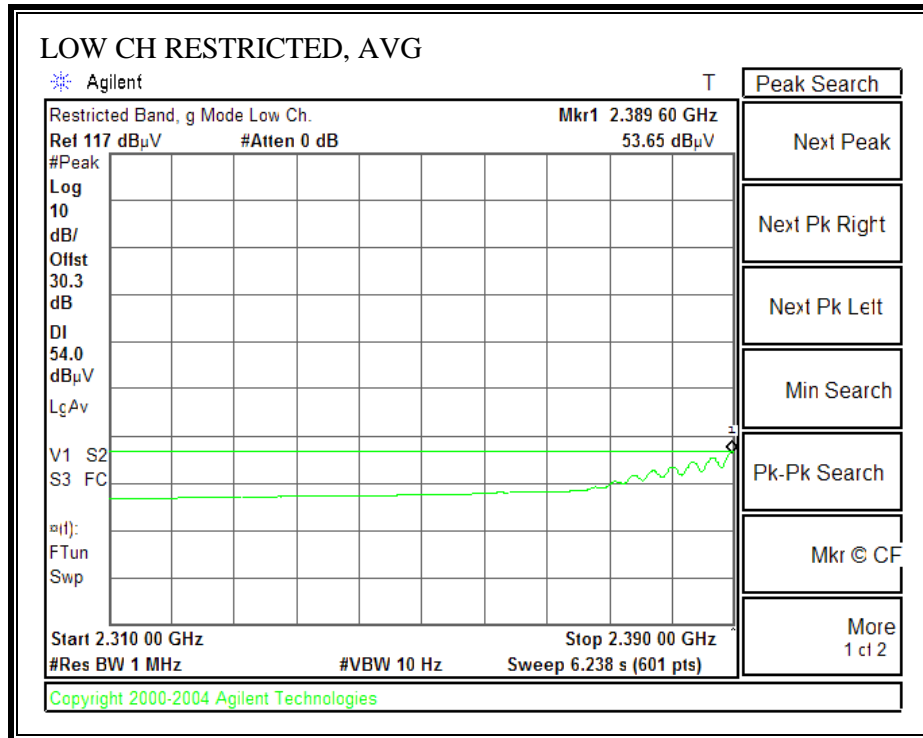
RESTRICTED BANDEDGE (LOW CHANNEL, 2422 MHz, HORIZONTAL)



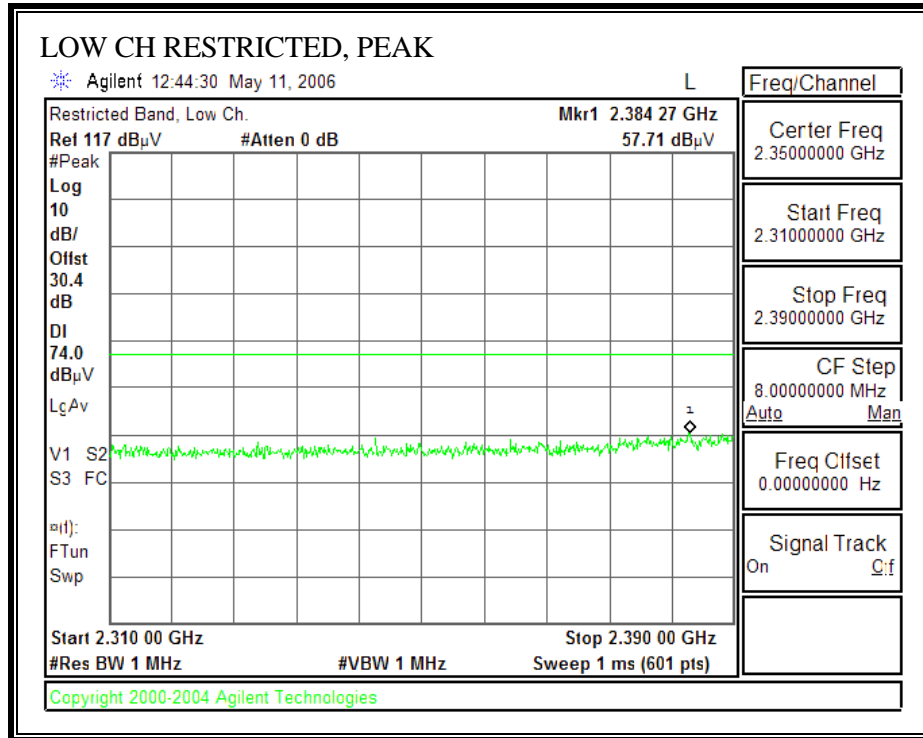


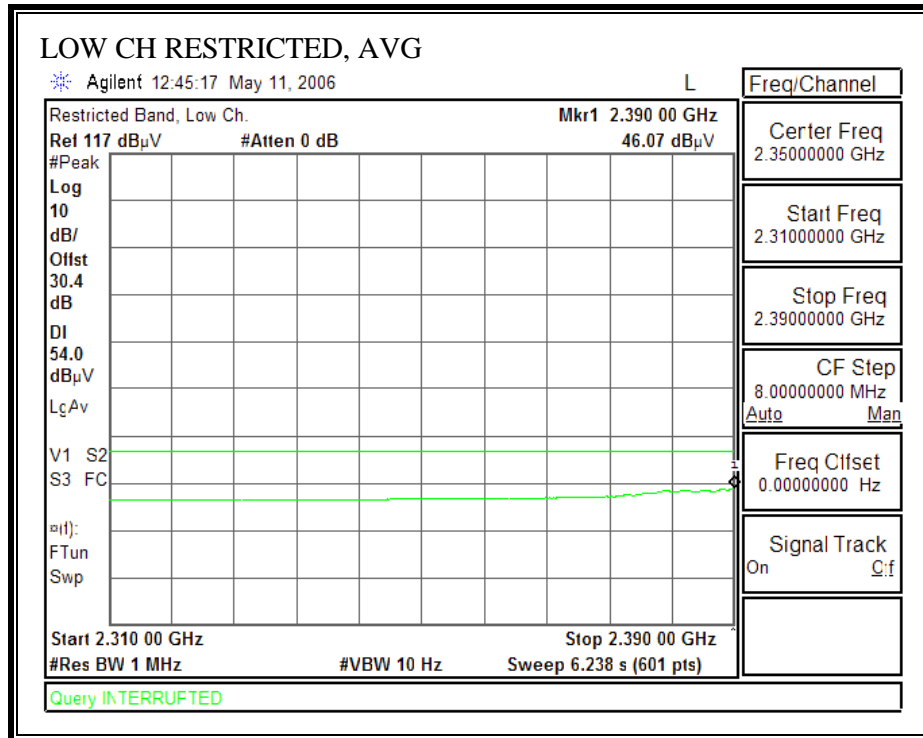
RESTRICTED BANDEGE (LOW CHANNEL, 2422 MHz, VERTICAL)



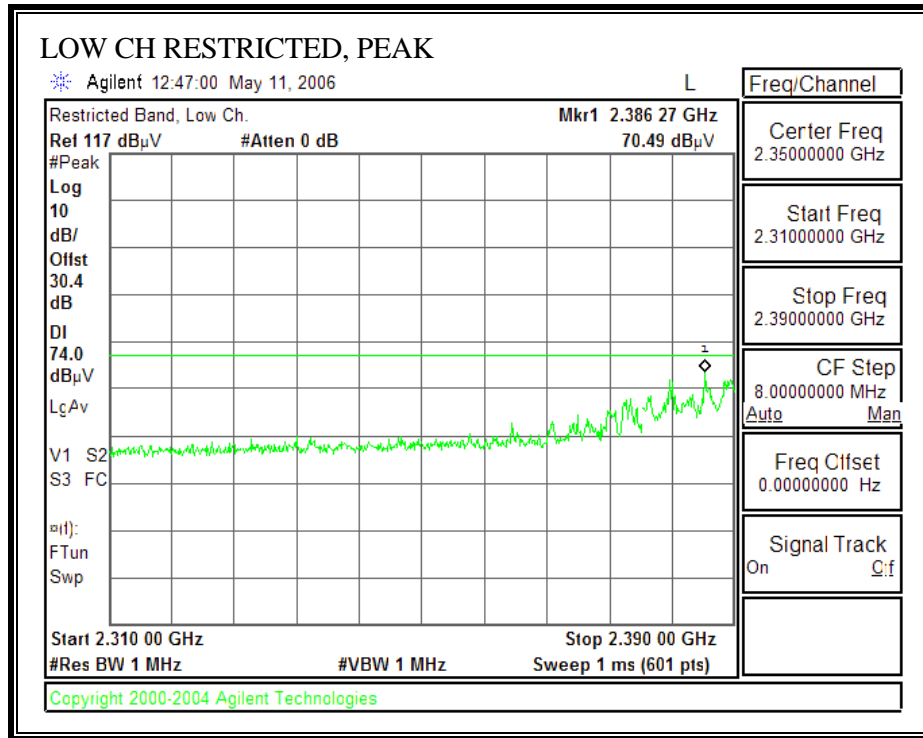


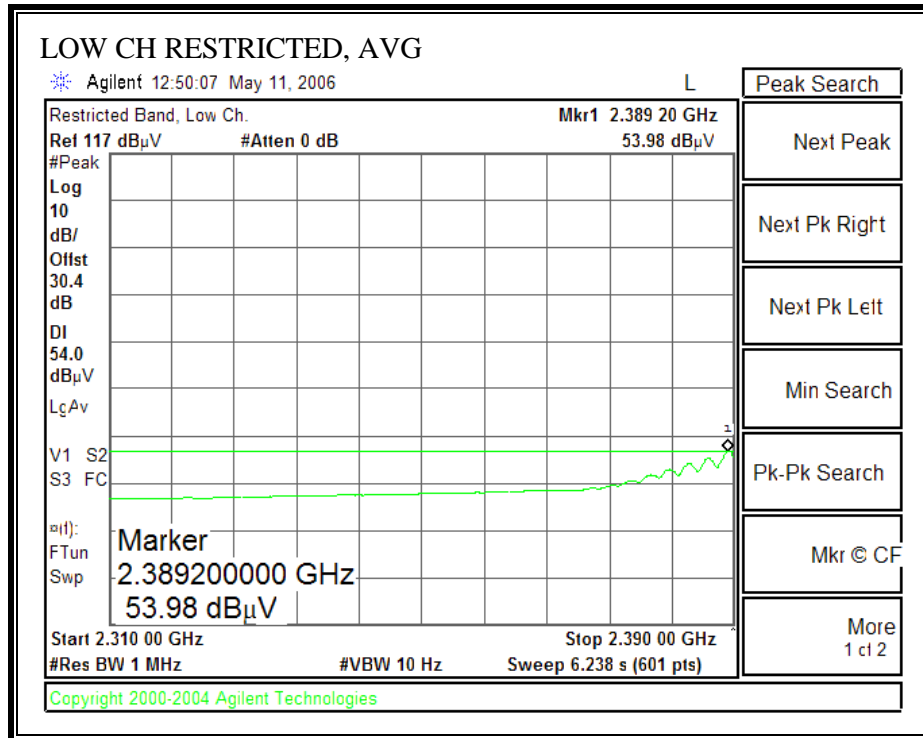
RESTRICTED BANDEDGE (LOW CHANNEL, 2427 MHz, HORIZONTAL)



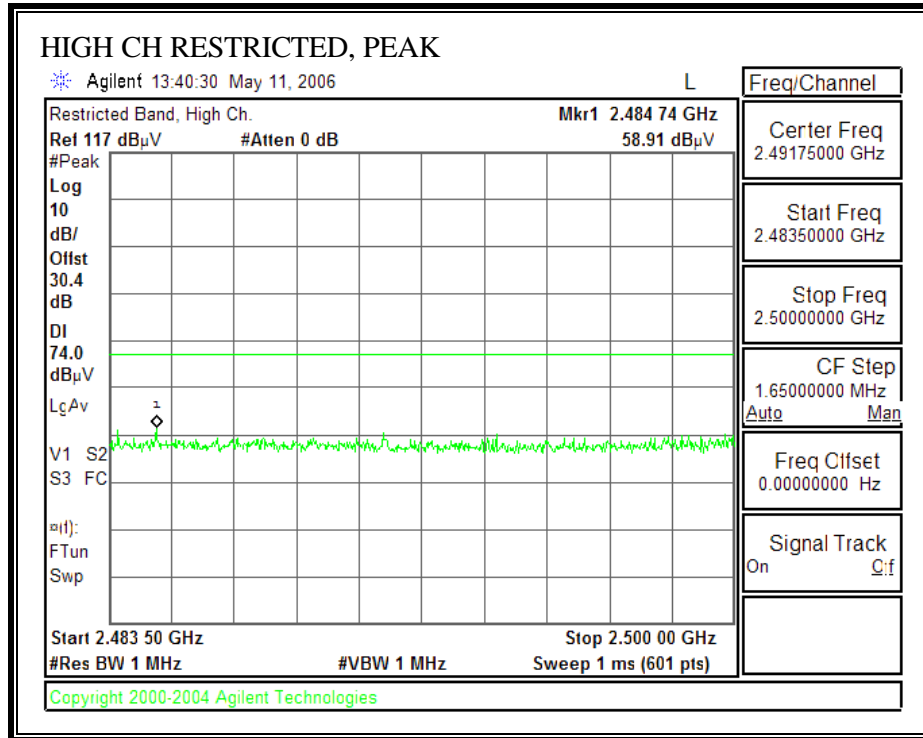


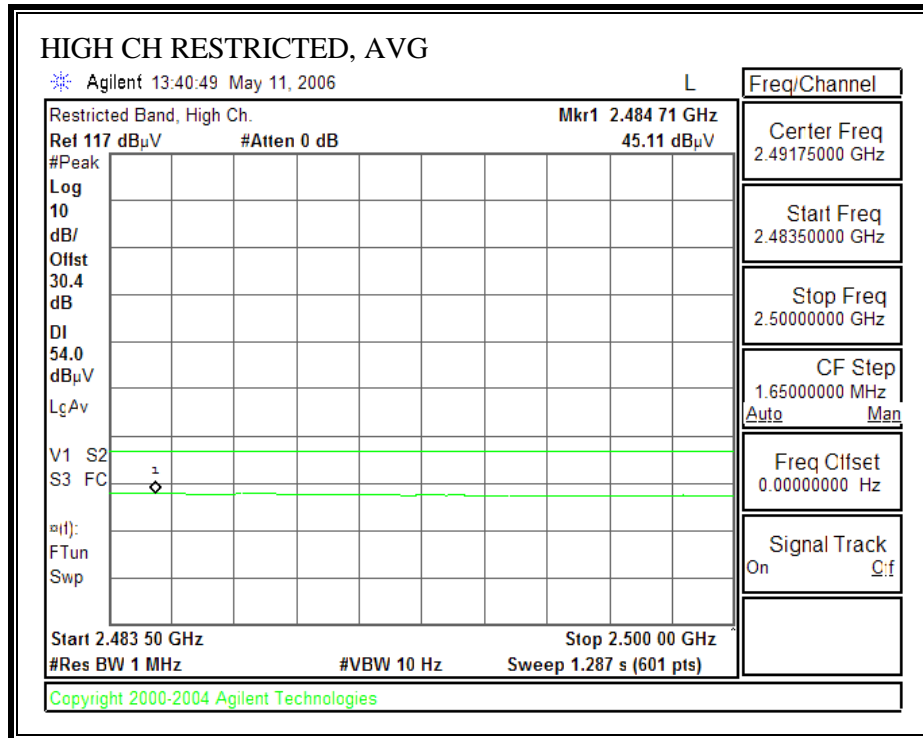
RESTRICTED BANDEGE (LOW CHANNEL, 2427 MHz, VERTICAL)



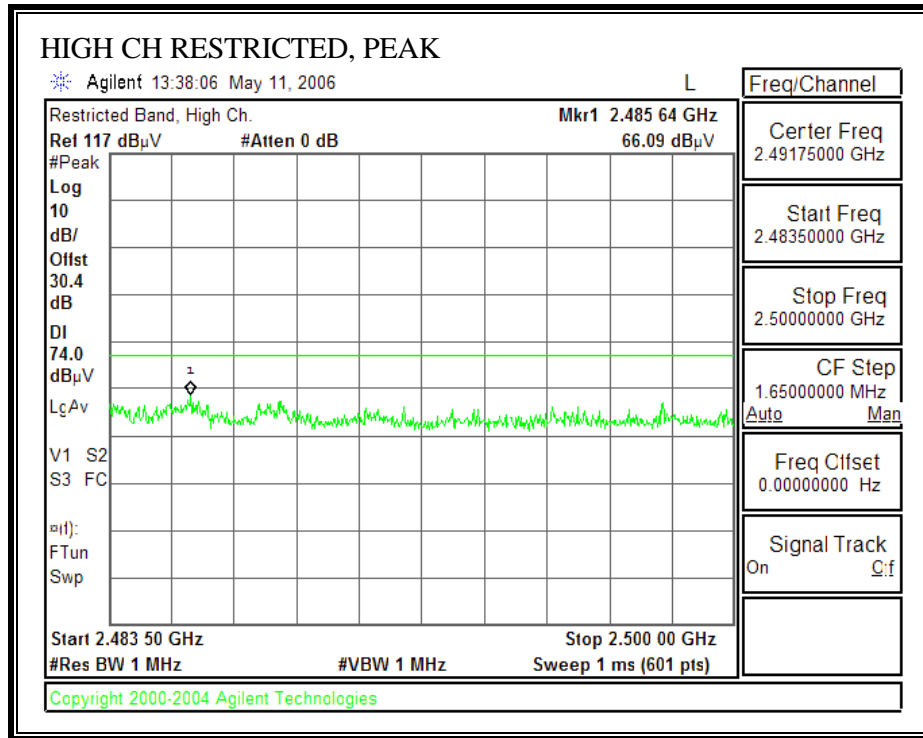


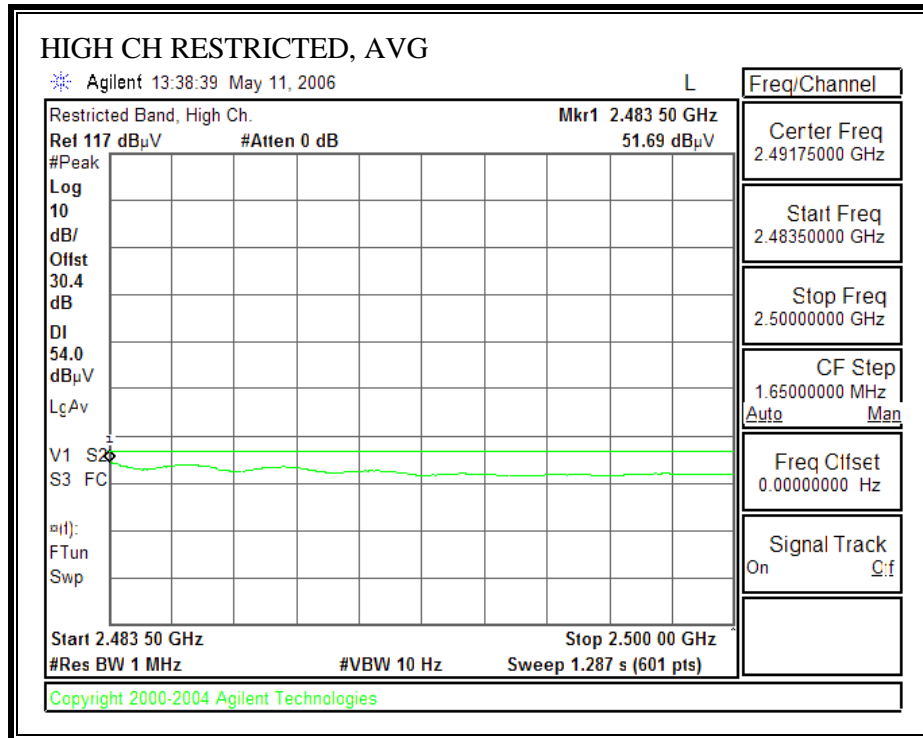
RESTRICTED BANDEDGE (HIGHCHANNEL, 2442 MHz, HORIZONTAL)



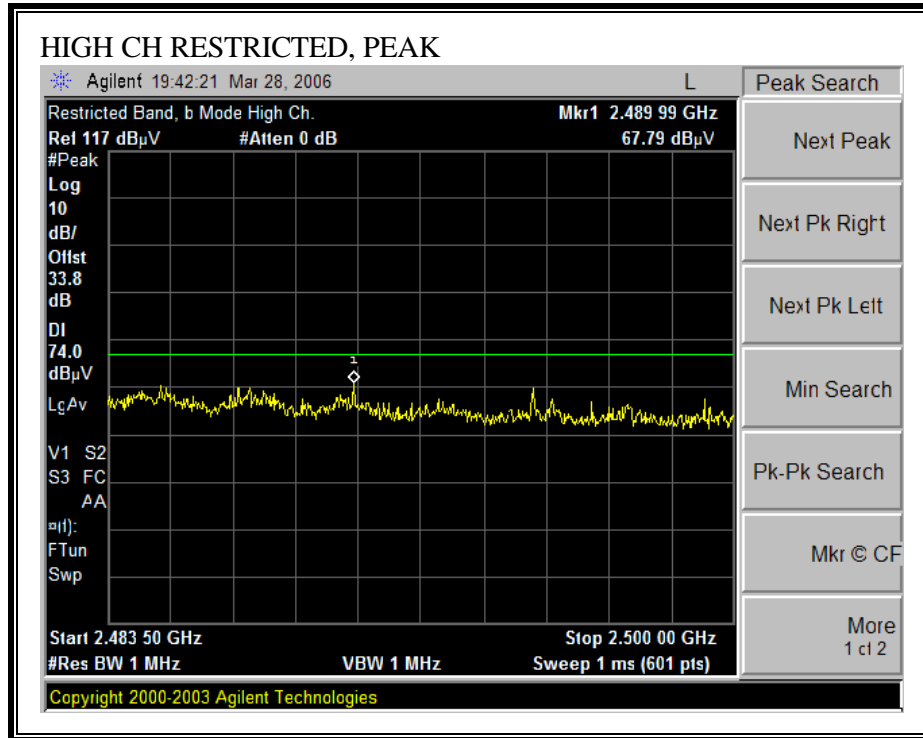


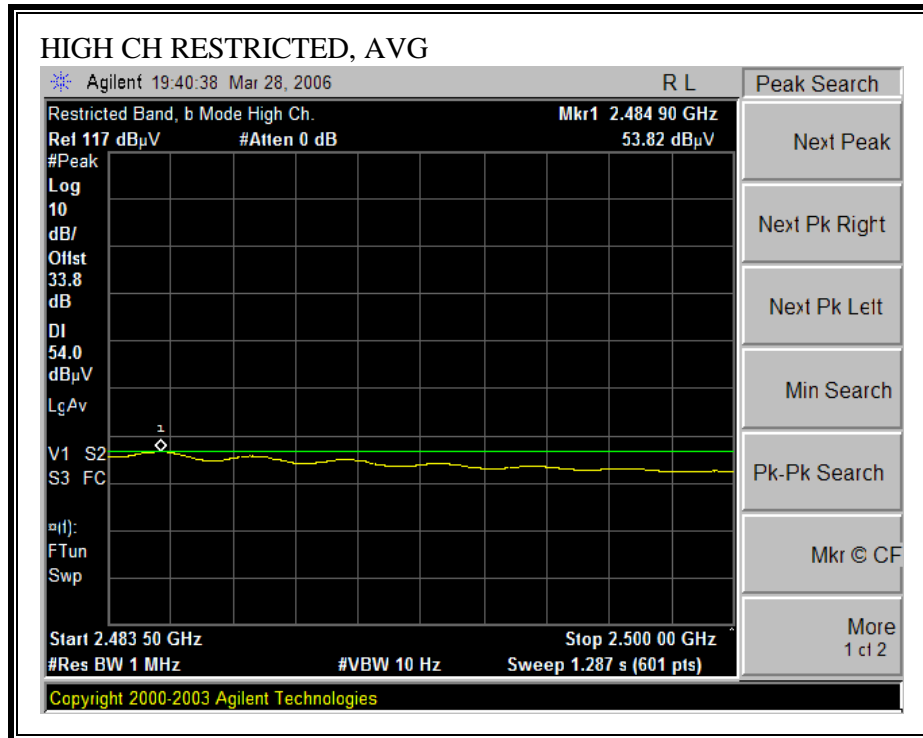
RESTRICTED BANDEDGE (HIGH CHANNEL, 2442 MHz, VERTICAL)



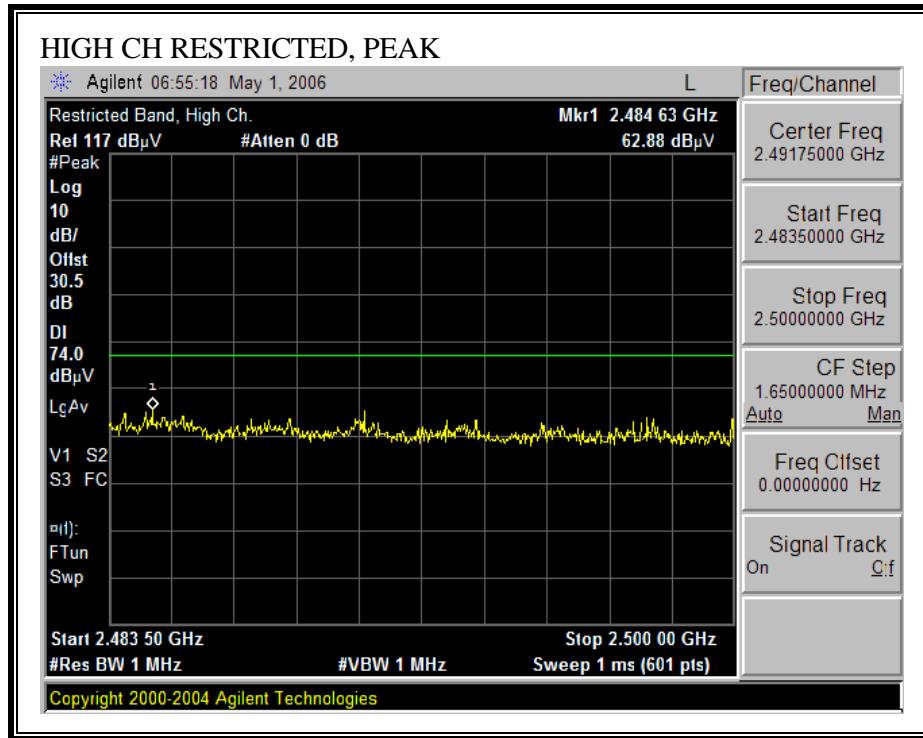


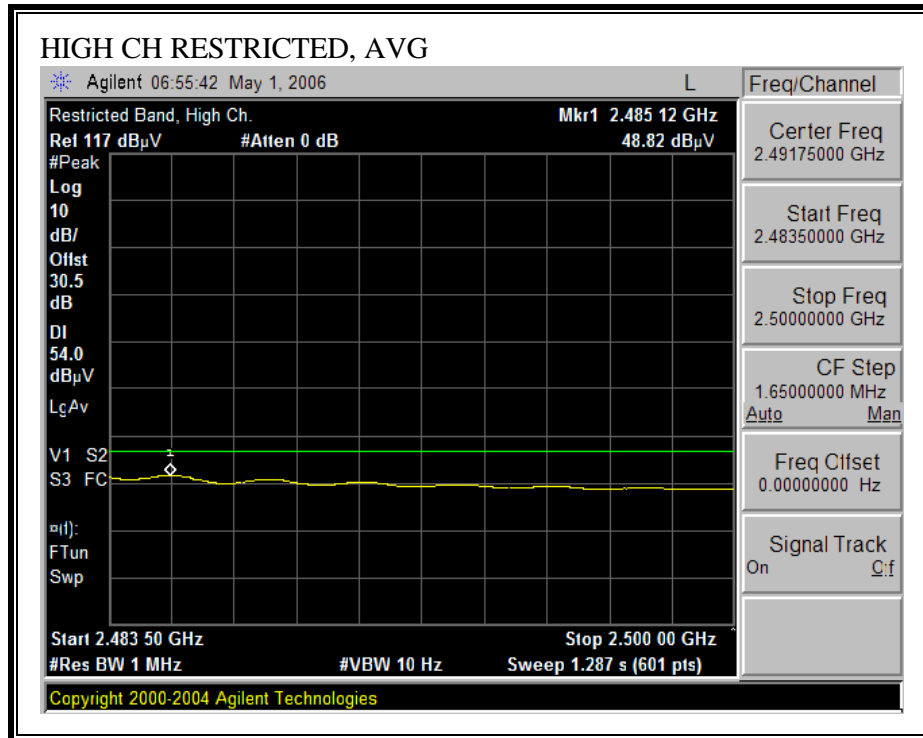
RESTRICTED BANDEDGE (HIGHCHANNEL, 2447 MHz, HORIZONTAL)



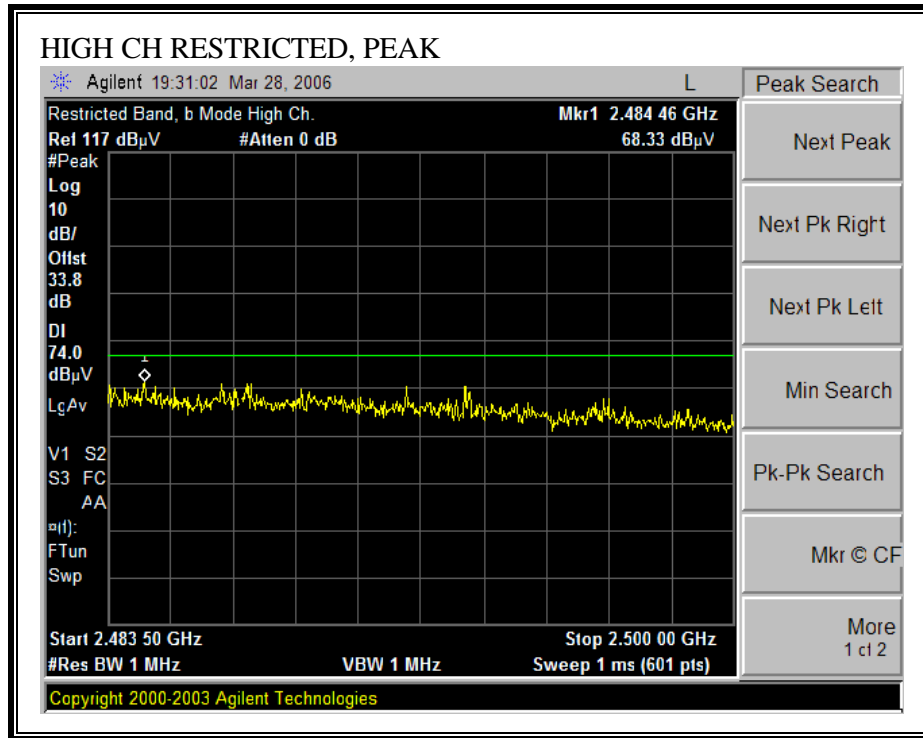


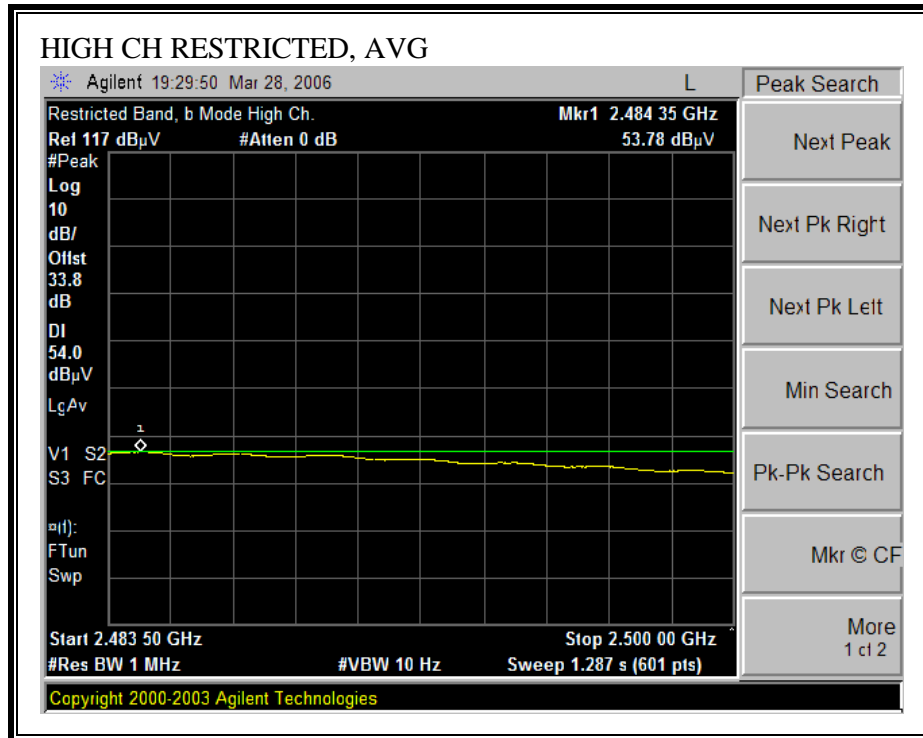
RESTRICTED BANDEDGE (HIGH CHANNEL, 2447 MHz, VERTICAL)



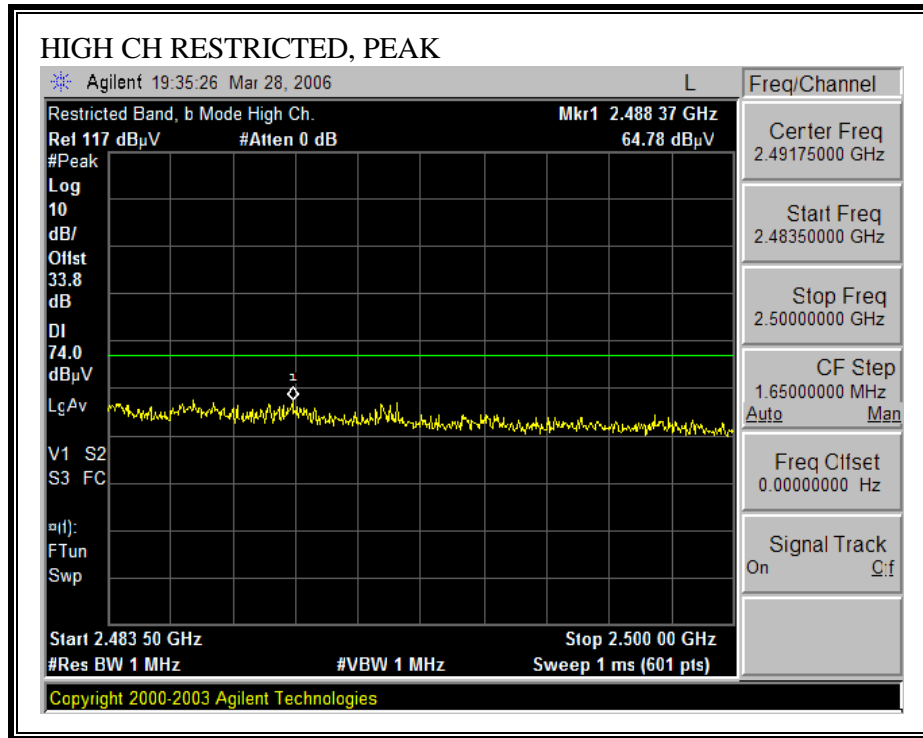


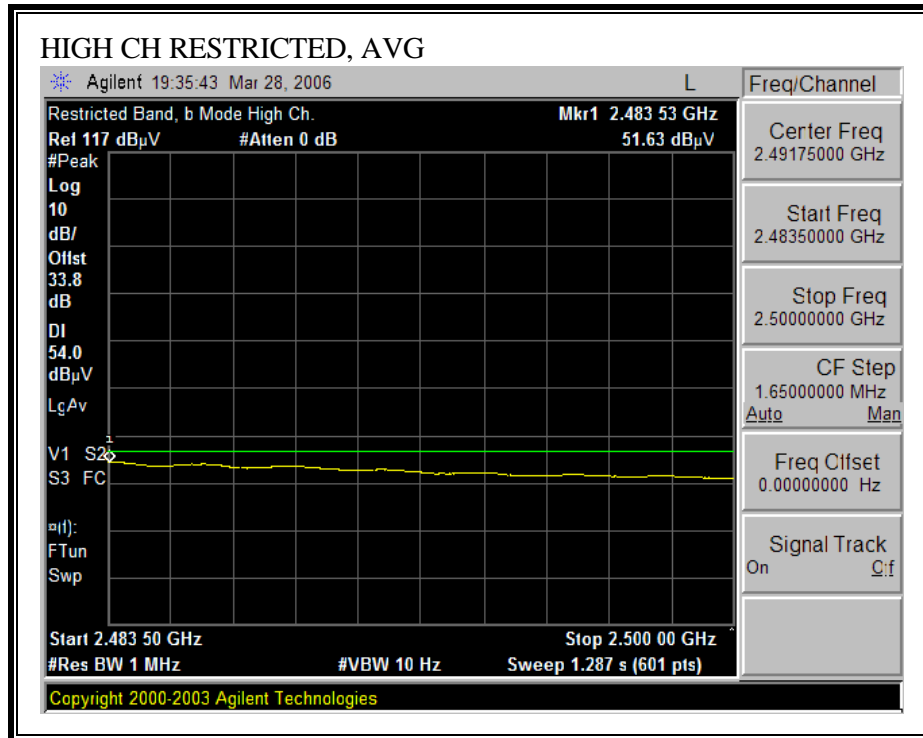
RESTRICTED BANDEDGE (HIGH CHANNEL, 2452 MHz, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, 2452 MHz, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS – 40 MHz TX BANDWIDTH

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

Company: Broadcom
Project #: 06U10233
Date: 05/15/06
Test Engineer: Vien Tran
Configuration: EUT (BCM94321MC, S/N 316) & Apple PCB Antenna
Mode: MIMO 40MHz Tx BW 2.4 GHz Band
Average Power Meter: Low = 14 dBm, Mid = 14 dBm, High = 14dBm

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 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz
	Vien 187215002	Vien 197209005	HPF_4.0GHz		Average Measurements RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch 3, 2422 MHz															
4.844	3.0	49.1	42.0	33.3	3.0	-36.5	0.0	0.6	49.5	42.4	74	54	-24.5	-11.6	V
7.266	3.0	47.2	35.5	35.0	4.2	-36.2	0.0	0.6	50.7	39.0	74	54	-23.3	-15.0	V
9.688	3.0	46.8	33.2	36.7	4.7	-37.0	0.0	0.8	52.1	38.5	74	54	-21.9	-15.0	V
4.844	3.0	53.1	50.9	33.3	3.0	-36.5	0.0	0.6	53.5	51.3	74	54	-20.0	-2.9	H
7.266	3.0	43.0	32.1	35.0	4.2	-36.2	0.0	0.6	46.5	35.6	74	54	-22.0	-18.4	H
9.688	3.0	43.8	33.3	36.7	4.7	-37.0	0.0	0.8	49.1	38.6	74	54	-24.9	-15.4	H
Mid Ch , 2437 MHz															
4.874	3.0	49.3	42.2	33.4	3.0	-36.5	0.0	0.6	49.7	42.6	74	54	-24.3	-11.4	V
7.311	3.0	47.4	35.7	35.0	4.2	-36.2	0.0	0.6	50.9	39.2	74	54	-23.1	-14.8	V
9.748	3.0	47.0	33.4	36.8	4.7	-37.0	0.0	0.8	52.2	38.6	74	54	-21.8	-15.4	V
4.874	3.0	54.0	51.6	33.4	3.0	-36.5	0.0	0.6	54.5	52.1	74	54	-19.0	-1.9	H
7.311	3.0	43.5	32.5	35.0	4.2	-36.2	0.0	0.6	47.1	36.1	74	54	-26.9	-17.9	H
9.748	3.0	44.0	33.6	36.8	4.7	-37.0	0.0	0.8	49.3	38.9	74	54	-24.7	-15.1	H
High Ch 9, 2452 MHz															
4.904	3.0	49.8	42.7	33.4	3.0	-36.5	0.0	0.6	50.4	43.3	74	54	-23.6	-10.7	V
7.356	3.0	47.9	36.2	35.0	4.2	-36.2	0.0	0.6	51.5	39.8	74	54	-22.0	-14.2	V
9.808	3.0	47.5	33.9	36.8	4.7	-37.0	0.0	0.8	52.8	39.2	74	54	-21.2	-14.8	V
4.904	3.0	55.0	52.2	33.4	3.0	-36.5	0.0	0.6	55.6	52.8	74	54	-18.4	-1.2	H
7.356	3.0	45.1	32.8	35.0	4.2	-36.2	0.0	0.6	48.7	36.4	74	54	-21.3	-17.6	H
9.808	3.0	43.8	32.9	36.8	4.7	-37.0	0.0	0.8	49.1	38.2	74	54	-24.9	-15.8	H

Note: No other emissions were detected above the noise floor

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

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

HARMONICS AND SPURIOUS EMISSIONS – 20 MHz TX BANDWIDTH

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

Company: Broadcom
Project #: 06U10233
Date: 05/10/06
Test Engineer: Vien Tran
Configuration: EUT (BCM94321MC, S/N 316) & Apple PCB Antenna
Mode: MIMO 20MHz Tx Bandwidth, 11a Mode, 5.8 GHz Band
Average Power Meter: Low = 15dBm, Mid = 15dBm, High = 15dBm

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931	T88 Miteq 26-40GHz	T89; ARA 18-26GHz; S/N:1049	FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz
	Vien 187215002	Vien 197209005	HPF_7.6GHz		Average Measurements RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CH, 5745 MHz															
11.490	3.0	47.9	38.6	37.5	4.8	-35.9	0.0	0.7	55.0	45.7	74	54	-19.0	-8.3	V
17.235	3.0	44.0	33.2	41.7	6.1	-33.8	0.0	0.6	58.8	48.0	74	54	-15.2	-6.0	V
11.490	3.0	49.4	39.8	37.5	4.8	-35.9	0.0	0.7	56.5	46.9	74	54	-17.5	-7.1	H
17.235	3.0	44.1	33.9	41.7	6.1	-33.8	0.0	0.6	58.9	48.7	74	54	-15.1	-5.3	H
MID CH, 5785 MHz															
11.570	3.0	46.6	38.3	37.5	4.8	-35.8	0.0	0.7	53.8	45.5	74	54	-20.2	-8.5	H
17.355	3.0	43.6	32.8	42.2	6.1	-33.8	0.0	0.6	58.8	48.0	74	54	-15.2	-6.0	V
11.570	3.0	48.5	39.2	37.5	4.8	-35.8	0.0	0.7	55.7	46.4	74	54	-18.3	-7.6	V
17.355	3.0	43.5	33.1	42.2	6.1	-33.8	0.0	0.6	58.7	48.3	74	54	-15.3	-5.7	H
HI CH, 5825 MHz															
11.650	3.0	46.8	37.1	37.5	4.8	-35.7	0.0	0.7	54.1	44.4	74	54	-19.9	-9.6	V
17.475	3.0	43.5	32.2	42.7	6.2	-33.8	0.0	0.6	59.1	47.8	74	54	-14.9	-6.2	V
11.650	3.0	49.7	38.6	37.5	4.8	-35.7	0.0	0.7	57.0	45.9	74	54	-17.0	-8.1	H
17.475	3.0	43.2	31.6	42.7	6.2	-33.8	0.0	0.6	58.8	47.2	74	54	-15.2	-6.8	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		

HARMONICS AND SPURIOUS EMISSIONS – 40 MHz TX BANDWIDTH

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

Company: Broadcom
Project #: 06U10233
Date: 05/12/06
Test Engineer: Vien Tran
Configuration: EUT (BCM94321MC, S/N 316) & Apple PCB Antenna
Mode: MIMO 40MHz Tx BW 11a Mode_5.8 GHz Band
Average Power Meter: Low = 15 dBm, Mid = 15 dBm, High = 15 dBm

Test Equipment:

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

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz
	Vien 187215002	Vien 197209005	HPF_7.6GHz		Average Measurements RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Ch 151, 5755 MHz															
11.510	3.0	46.3	35.5	38.3	4.8	-35.8	0.0	0.7	54.3	43.5	74	54	-19.7	-10.5	V
17.265	3.0	44.6	34.3	42.5	6.1	-33.8	0.0	0.6	60.1	49.8	74	54	-13.9	-4.2	V, Noise Floor
11.510	3.0	50.5	40.6	38.3	4.8	-35.8	0.0	0.7	58.5	48.6	74	54	-15.5	-5.4	H
17.265	3.0	44.3	34.3	42.5	6.1	-33.8	0.0	0.6	59.8	49.8	74	54	-14.2	-4.2	H, Noise Floor
Ch 159, 5795 MHz															
11.590	3.0	44.5	35.2	38.3	4.8	-35.8	0.0	0.7	52.6	43.3	74	54	-21.4	-10.7	V
17.385	3.0	43.7	33.5	43.2	6.1	-33.8	0.0	0.6	59.9	49.7	74	54	-14.1	-4.3	V, Noise Floor
11.590	3.0	51.2	41.0	38.3	4.8	-35.8	0.0	0.7	59.3	49.1	74	54	-14.7	-4.9	H
17.385	3.0	44.0	32.8	43.2	6.1	-33.8	0.0	0.6	60.2	49.0	74	54	-13.8	-5.0	H, Noise Floor
Note: No other emissions were detected above the noise floor															


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

7.13.13. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

2.4 GHz BAND

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

HORIZONTAL



COMPLIANCE
Engineering Services, Inc.
FCC, CE, EMC, PIREC
UL, CSA, TUV

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

Data#: 6 File#: 30-1000.EMI Date: 04-22-2006 Time: 10:32:49
Audix ATC


Condition: FCC CLASS-B HORIZONTAL
 Test Operator : Vien Tran
 Project # : 06U10233
 Company : Broadcom
 EUT : 2x2 Dual Band MIMO Device
 Model No : BCM94321MCAG Rev. 3
 S/N : 107
 Configuration : EUT and Laptop
 Mode of operation: Tx 2.4 GHz Band MIMO_Worst Case

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.000	9.20	20.45	29.65	40.00	-10.35	Peak
2	208.480	22.72	13.30	36.02	43.50	-7.48	Peak
3	290.930	26.73	15.33	42.06	46.00	-3.94	Peak
4	406.360	22.28	18.20	40.47	46.00	-5.53	Peak
5	434.490	20.13	18.84	38.97	46.00	-7.03	Peak
6	574.170	16.09	21.18	37.27	46.00	-8.73	Peak

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

VERTICAL



COMPLIANCE
Engineering Services, Inc.
FCC, CE, EMC, EMI, ESD, LPS, SAR, TUV

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

Data#: 3 File#: 30-1000.EMI Date: 04-22-2006 Time: 10:22:22
Audix ATC

Condition: FCC CLASS-B VERTICAL

Test Operator : Vien Tran
Project # : 06U10233
Company : Broadcom
EUT : 2x2 Dual Band MIMO Device
Model No : BCM94321MCAG Rev. 3
S/N : 107
Configuration : EUT and Laptop
Mode of operation: Tx 2.4 GHz Band MIMO_Worst Case


Page: 1

	Freq	Read Level	Factor	Level	Limit	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	51.340	26.16	9.05	35.21	40.00	-4.79	Peak
2	126.030	20.49	15.25	35.74	43.50	-7.76	Peak
3	293.840	22.97	15.42	38.39	46.00	-7.61	Peak
4	343.310	18.64	16.68	35.33	46.00	-10.67	Peak
5	406.360	22.22	18.20	40.41	46.00	-5.59	Peak
6	574.170	17.16	21.18	38.33	46.00	-7.67	Peak

5 GHz BAND

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

HORIZONTAL



COMPLIANCE
CERTIFICATION SERVICES, INC.
FCC/CE/IC/ETSI/TELEC/UKCA/CCC

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

Data#: 16 File#: 30-1000.EMI Date: 04-22-2006 Time: 11:48:19
Audix ATC

Condition: FCC CLASS-B HORIZONTAL


Test Operator : Vien Tran
Project # : 06U10233
Company : Broadcom
EUT : 2x2 Dual Band MIMO Device
Model No : BCM94321MCAG Rev. 3
S/N : 107
Configuration : EUT and Laptop
Mode of operation: Tx 5 GHz Band MIMO_Worst Case

Page: 1

	Read	Limit	Over				
Freq	Level	Line	Limit	Remark			
MHz	dBuV	dB	dBuV/m	dB			
1	30.000	10.02	20.45	30.47	40.00	-9.53	Peak
2	124.090	21.68	15.23	36.91	43.50	-6.59	Peak
3	290.930	23.93	15.33	39.26	46.00	-6.74	Peak
4	361.740	21.45	17.20	38.65	46.00	-7.35	Peak
5	643.040	21.88	22.23	44.11	46.00	-1.89	Peak
6	681.840	19.55	22.86	42.41	46.00	-3.59	Peak

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

VERTICAL



COMPLIANCE
Engineering Services, Inc.
REGULATORY ELECTRONICS
CALIFORNIA

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

Data#: 18 File#: 30-1000.EMI Date: 04-22-2006 Time: 11:52:24
Audix ATC

Condition: FCC CLASS-B VERTICAL
 Test Operator : Vien Tran
 Project # : 06U10233
 Company : Broadcom
 EUT : 2x2 Dual Band MIMO Device
 Model No : BCM94321MCAG Rev. 3
 S/N : 107
 Configuration : EUT and Laptop
 Mode of operation: Tx 5 GHz Band MIMO_Worst Case

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	62.980	24.18	8.90	33.08	40.00	-6.92	Peak
2	126.030	20.38	15.25	35.63	43.50	-7.87	Peak
3	406.360	20.65	18.20	38.85	46.00	-7.15	Peak
4	573.200	20.48	21.16	41.64	46.00	-4.36	Peak
5	642.070	19.87	22.21	42.08	46.00	-3.92	Peak
6	707.060	17.27	23.20	40.47	46.00	-5.53	Peak

PHYCOMP PCB ANTENNA**LEGACY MODE****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.

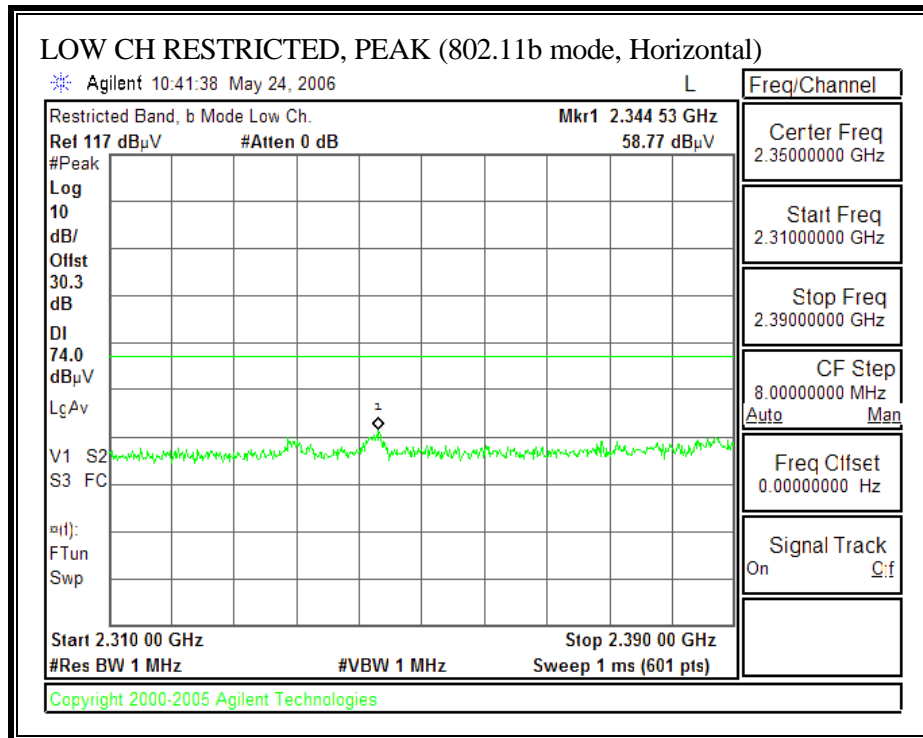
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

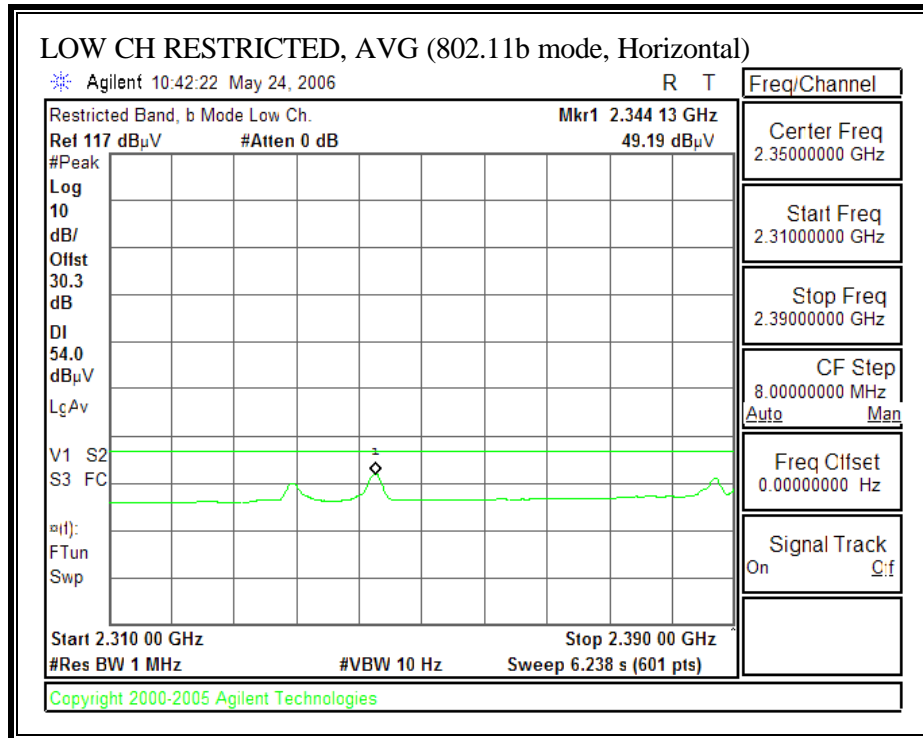
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

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.

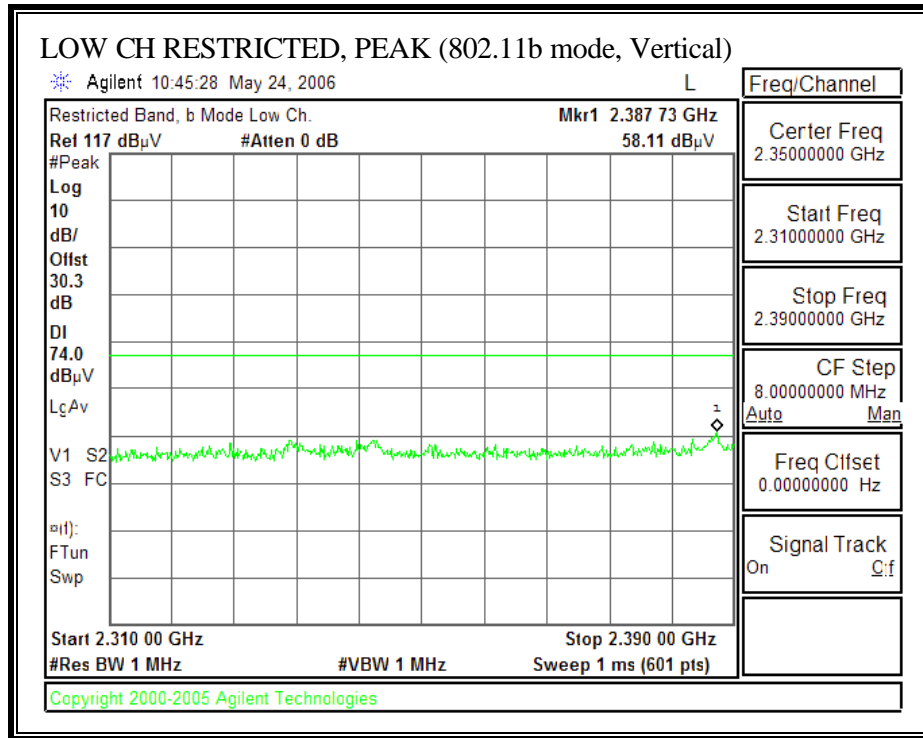
7.13.14. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND

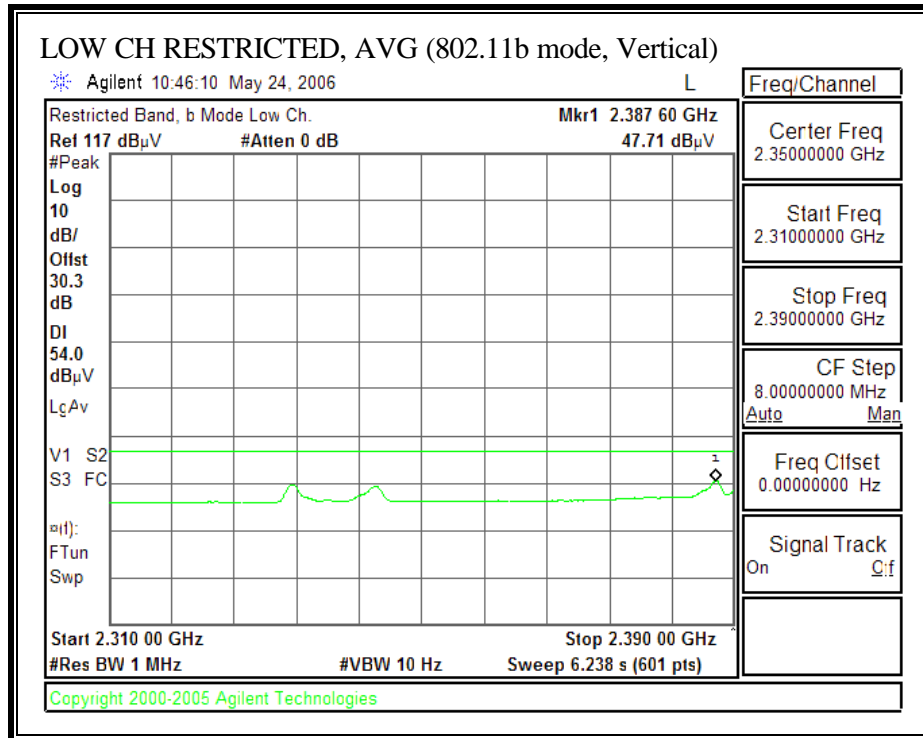
RESTRICTED BANDEGE (b MODE, LOW CHANNEL, 2412 MHz, HORIZONTAL)



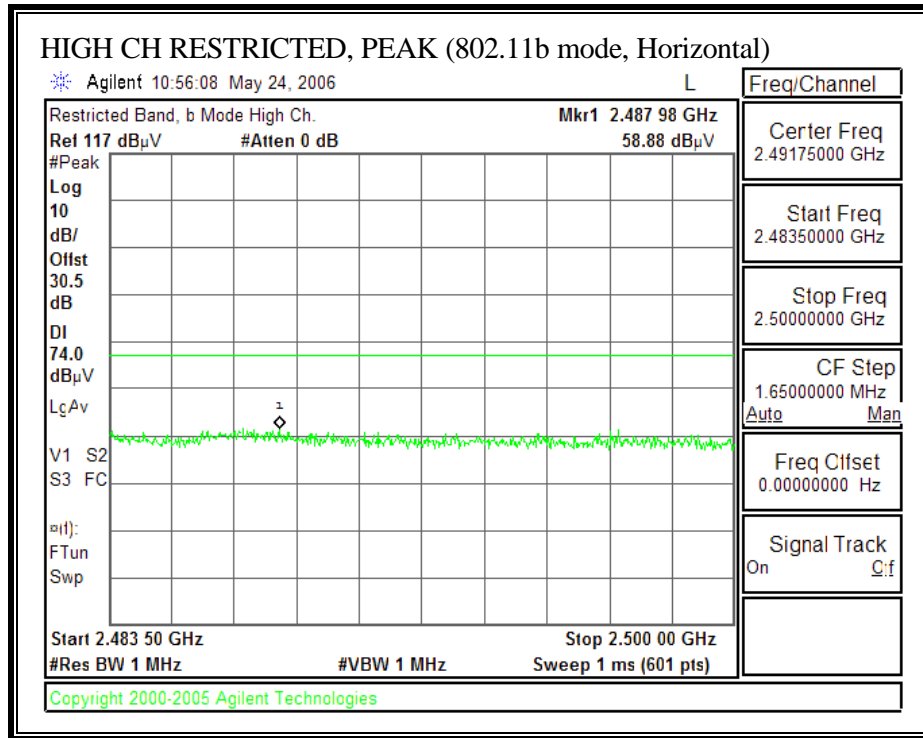


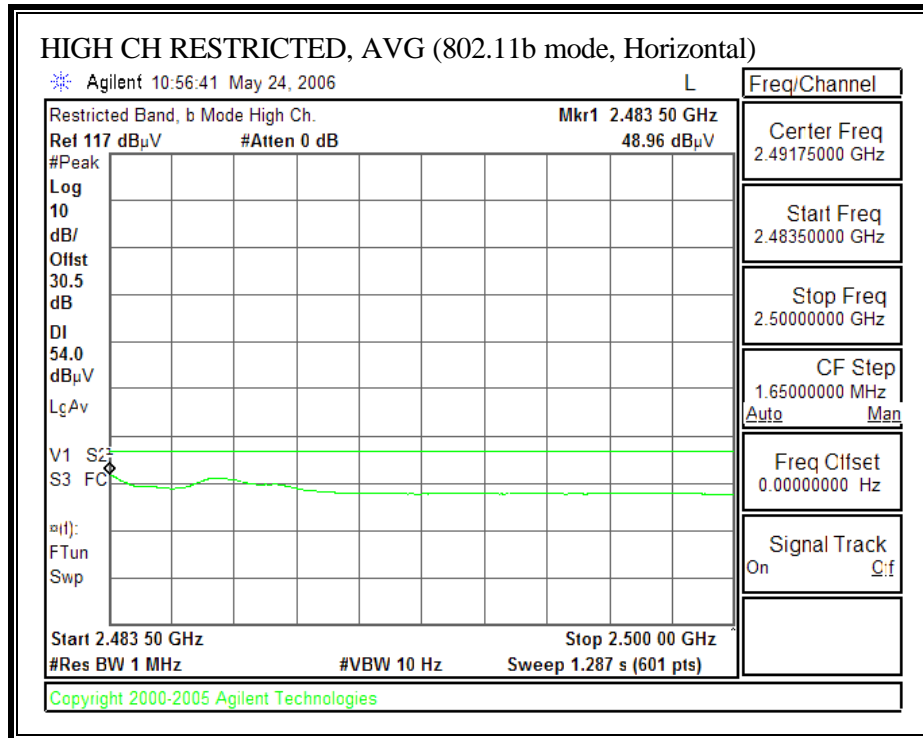
RESTRICTED BANDEGE (b MODE, LOW CHANNEL, 2412 MHz, VERTICAL)



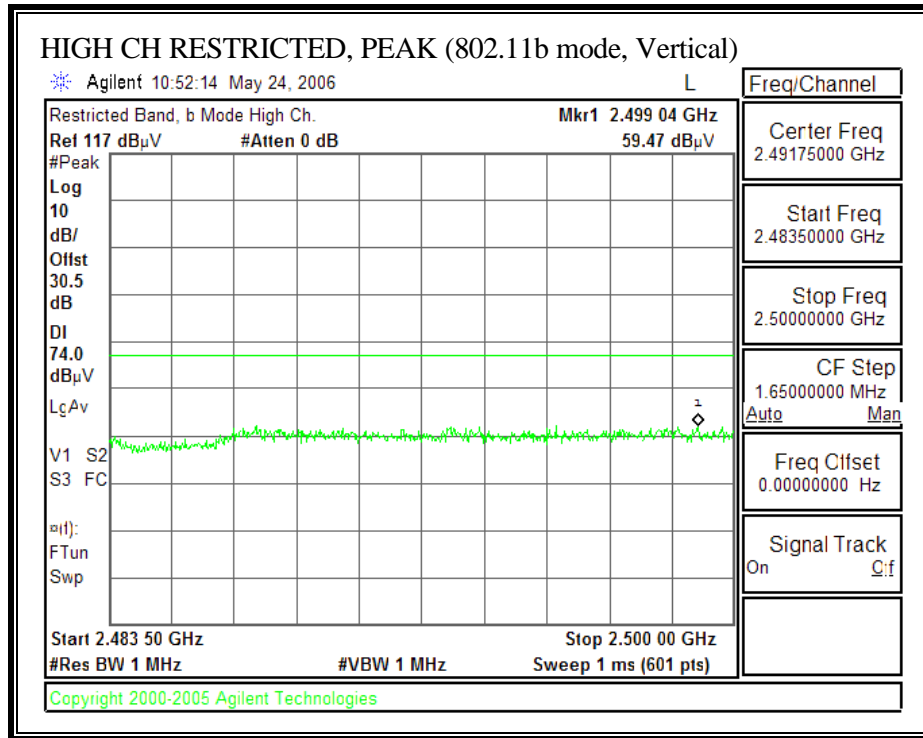


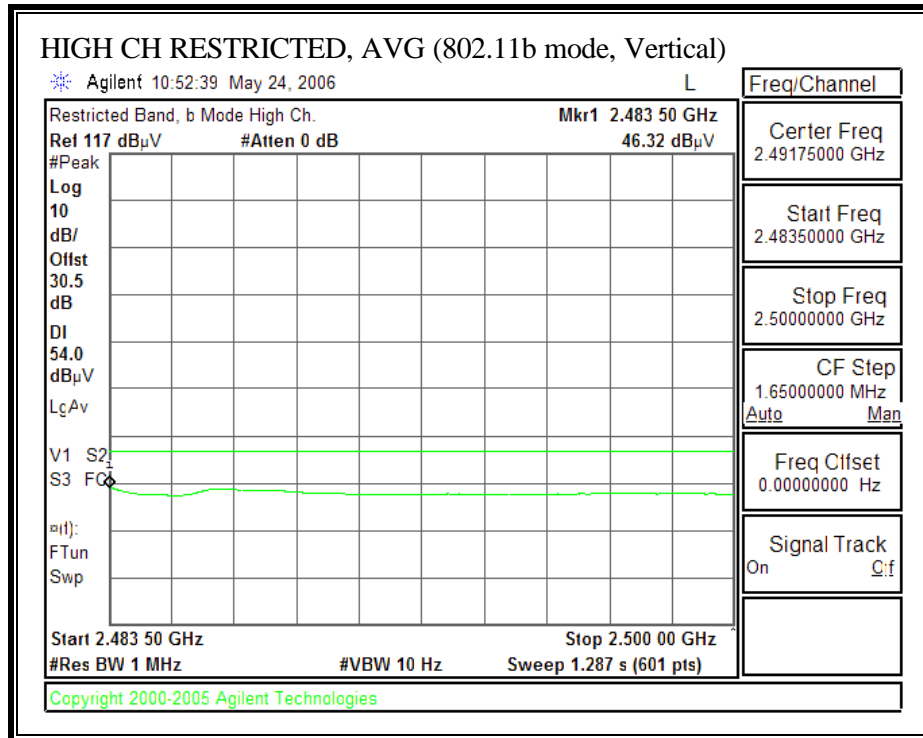
RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, 2462 MHz, HORIZONTAL)



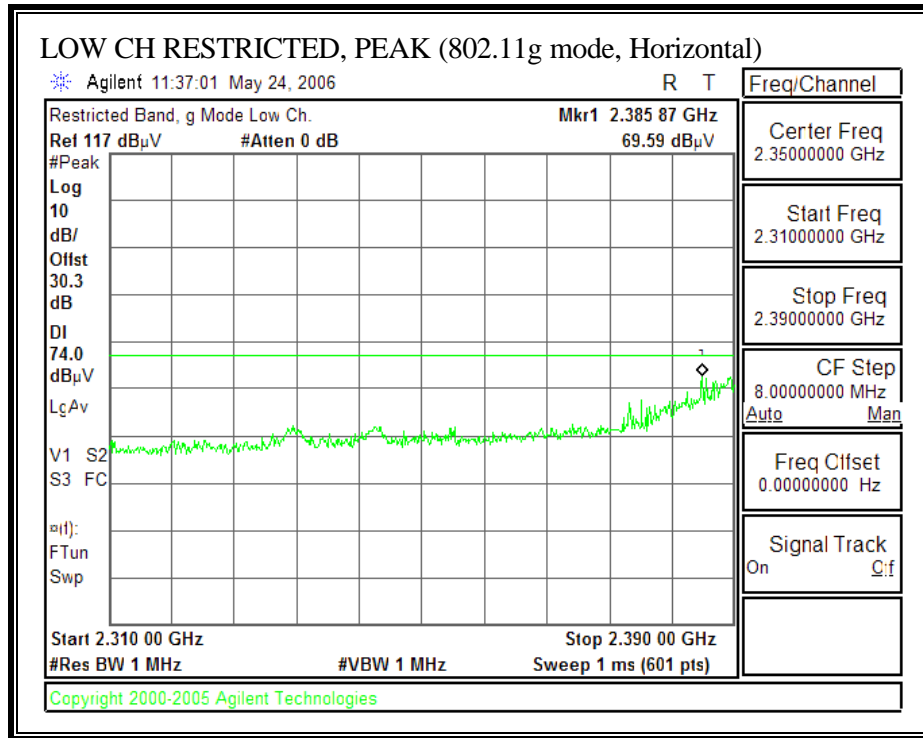


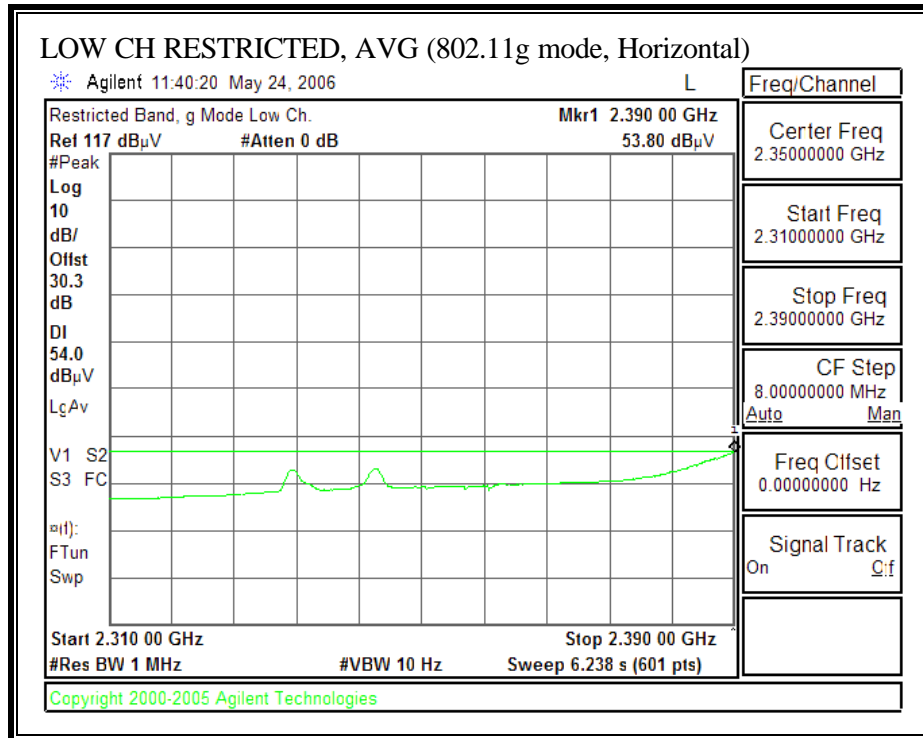
RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, 2462 MHz, VERTICAL)



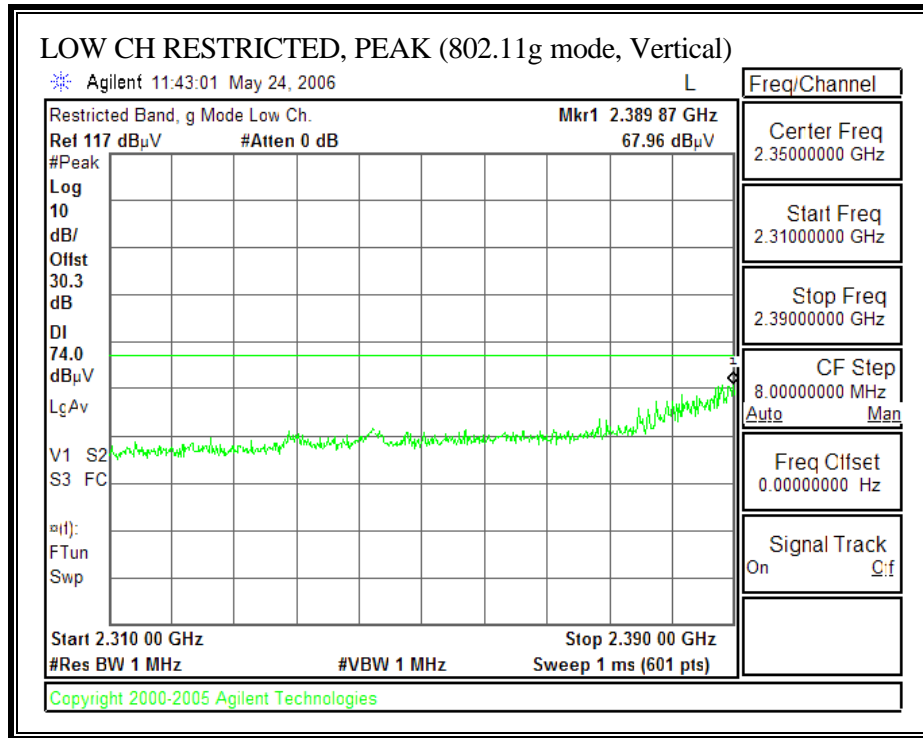


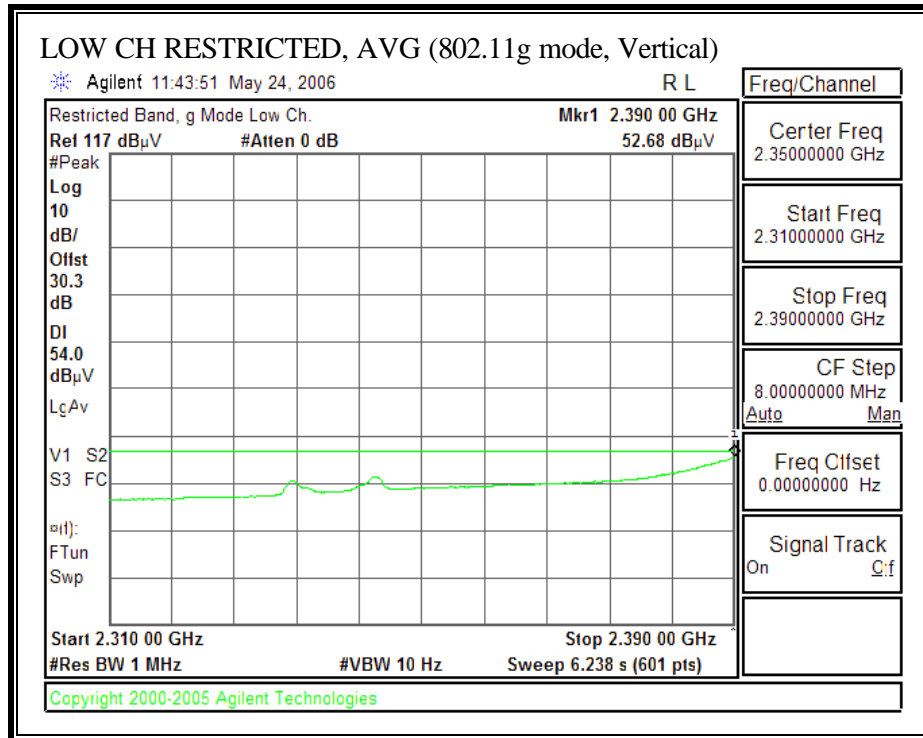
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, 2412 MHz, HORIZONTAL)



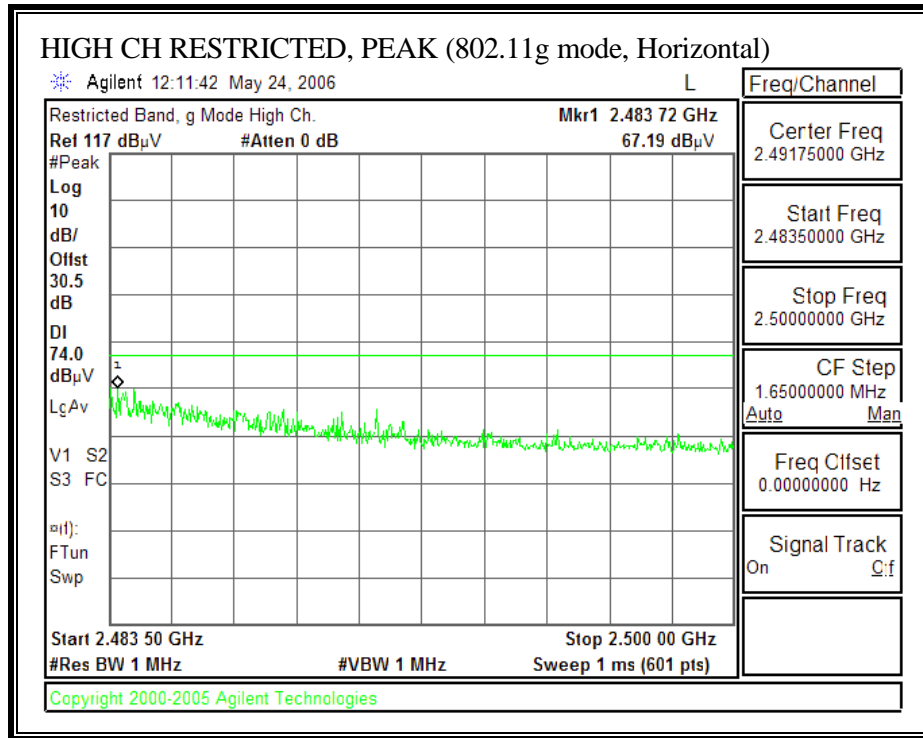


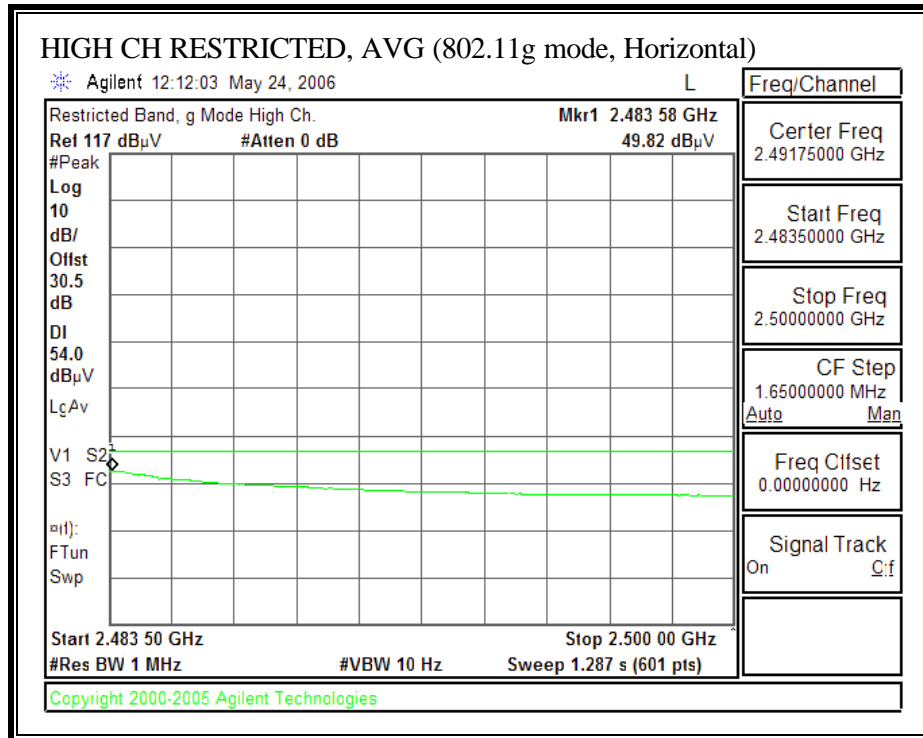
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, 2412 MHz, VERTICAL)



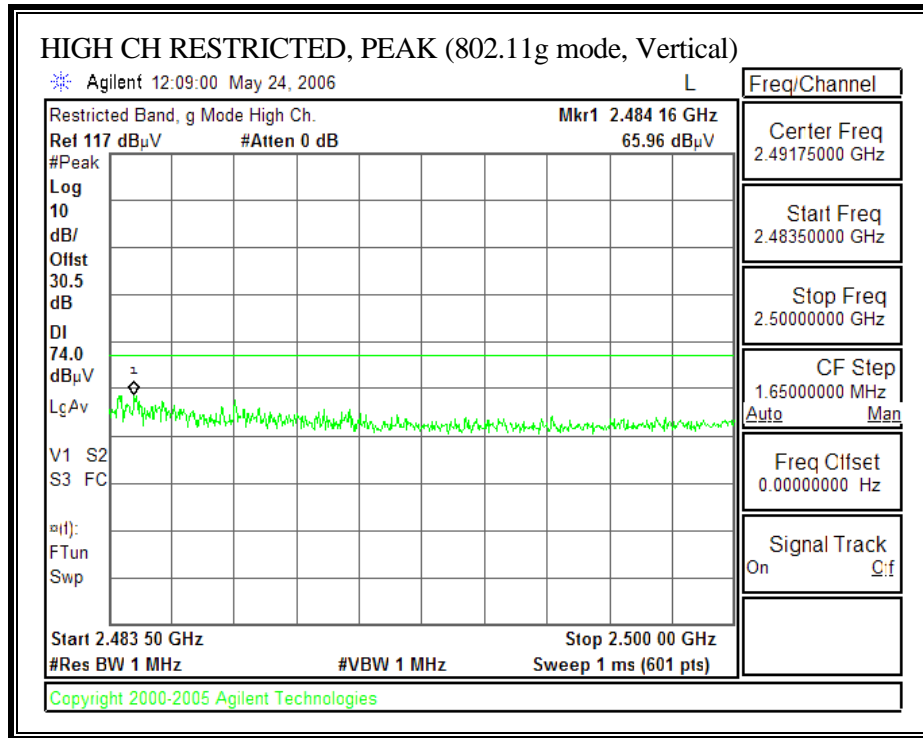


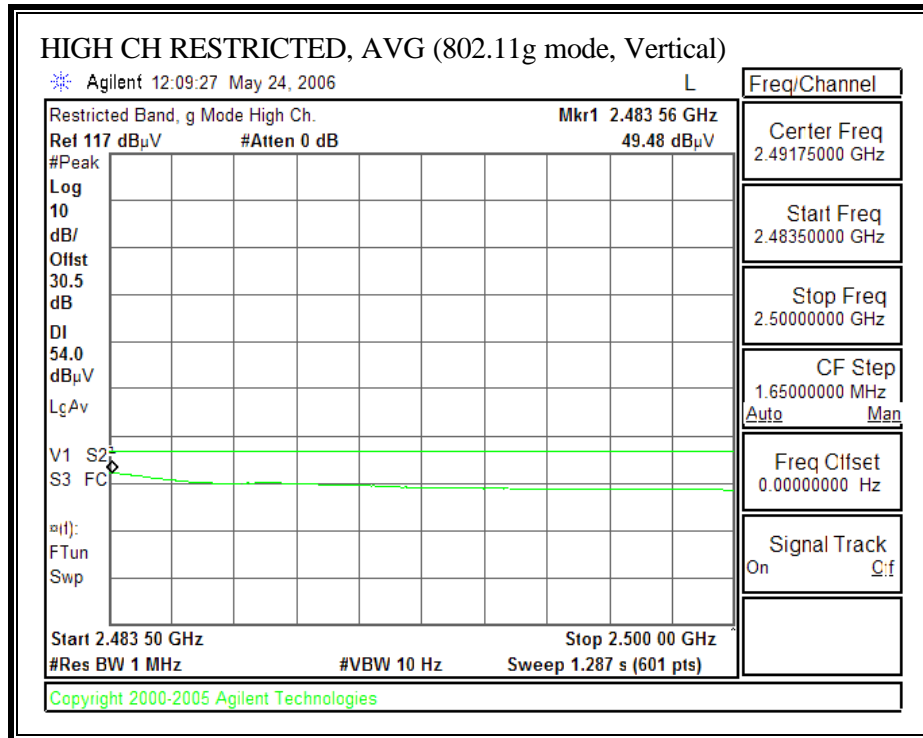
RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, 2462 MHz, HORIZONTAL)





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





HARMONICS AND SPURIOUS EMISSIONS (b MODE)

Please refer to Hitachi antenna section.

HARMONICS AND SPURIOUS EMISSIONS (g MODE)

Please refer to Hitachi antenna section.

7.13.15. TRANSMITTER ABOVE 1 GHz FOR 5.725 to 5850 MHz BAND

HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

Please refer to Hitachi antenna section.

7.13.16. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

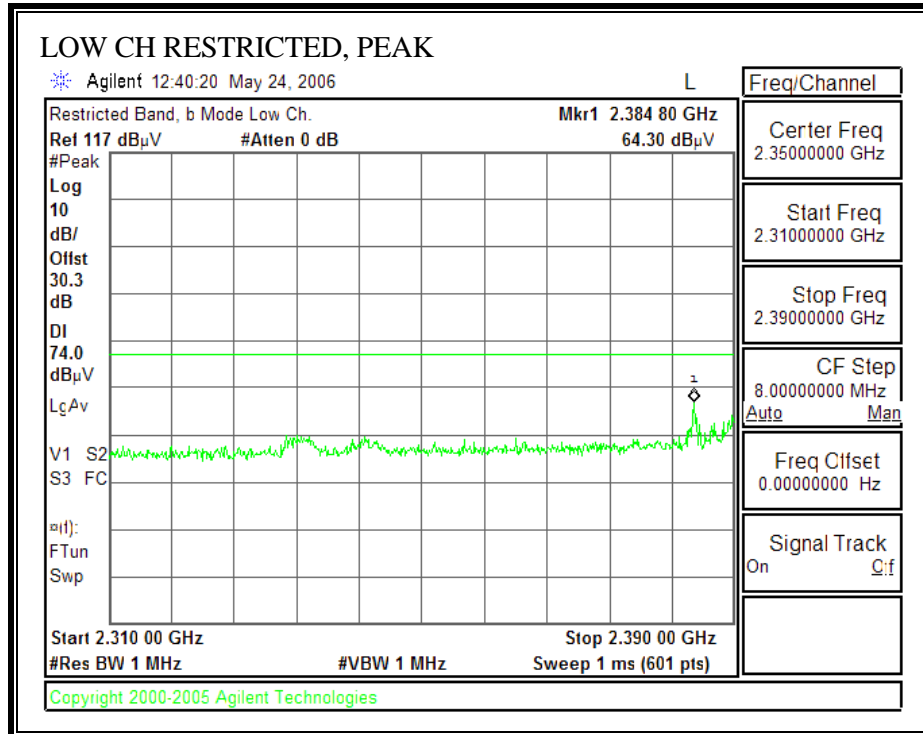
Please refer to Hitachi antenna section.

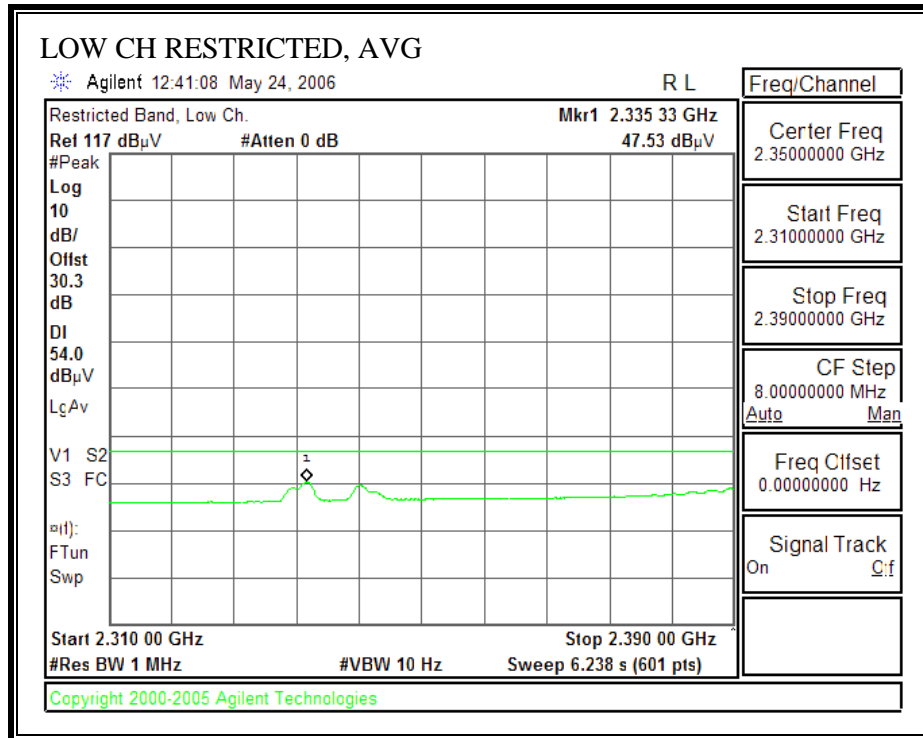
MIMO MODE

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

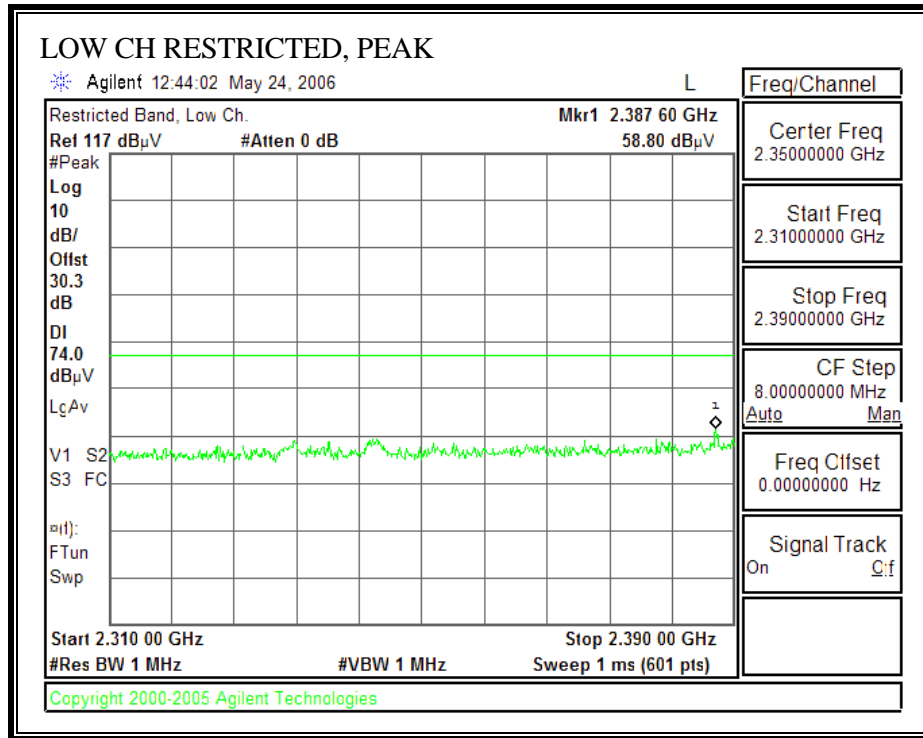
20 MHz TX BANDWIDTH

RESTRICTED BANDEDGE (LOW CHANNEL, 2417 MHz, HORIZONTAL)

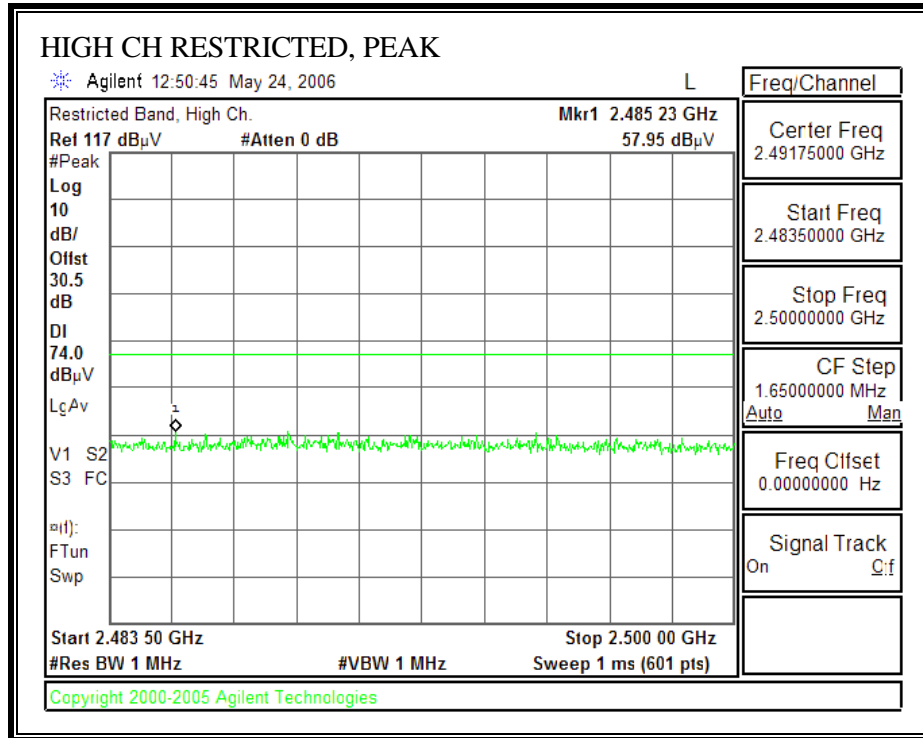


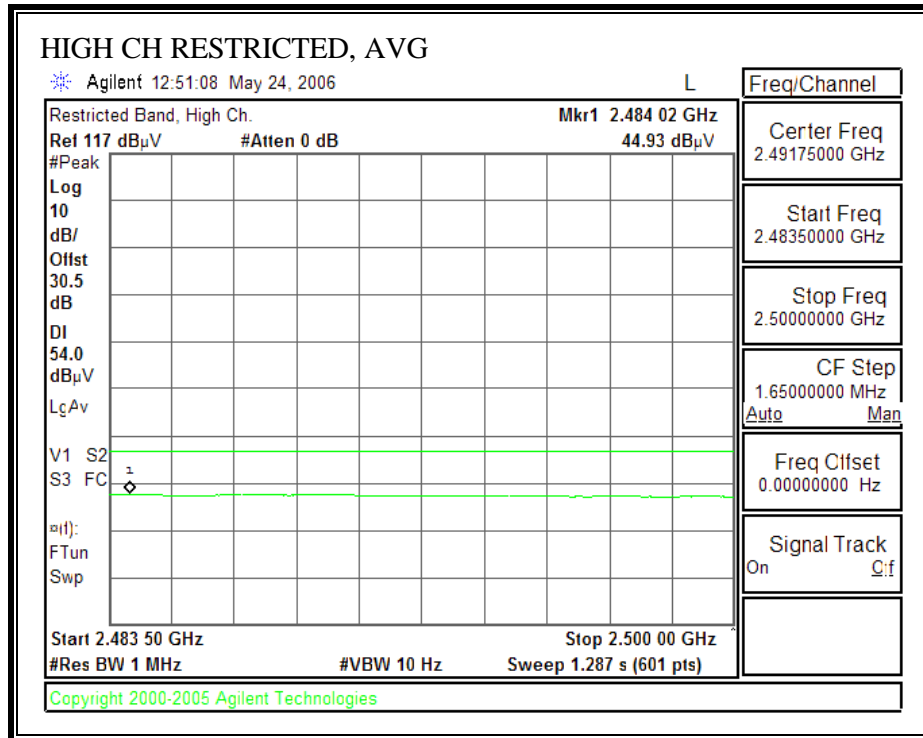


RESTRICTED BANDEDGE (LOW CHANNEL, 2417 MHz, VERTICAL)

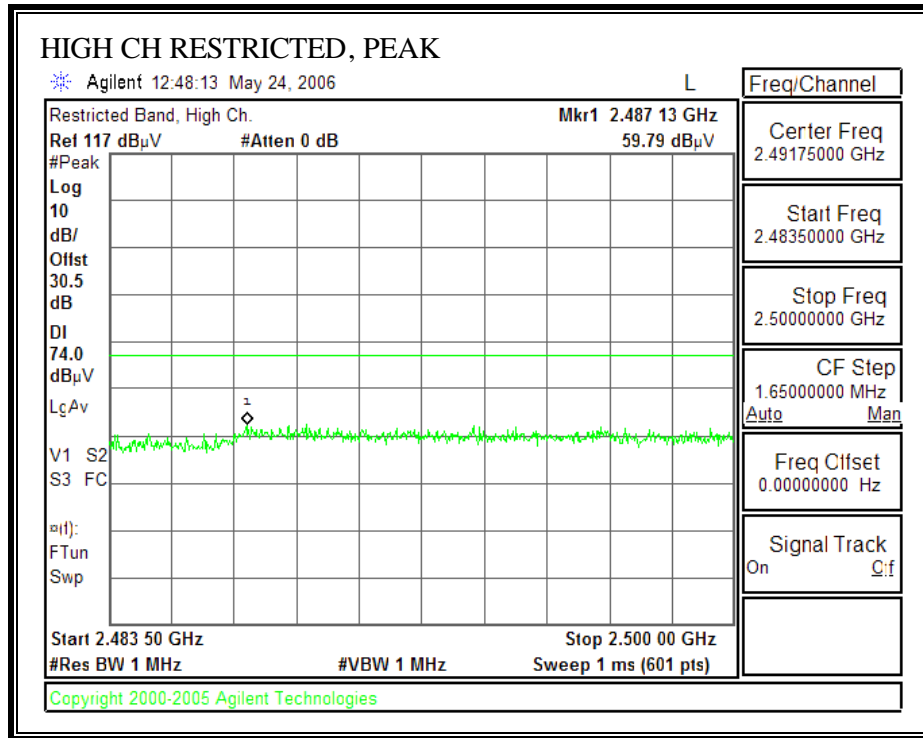


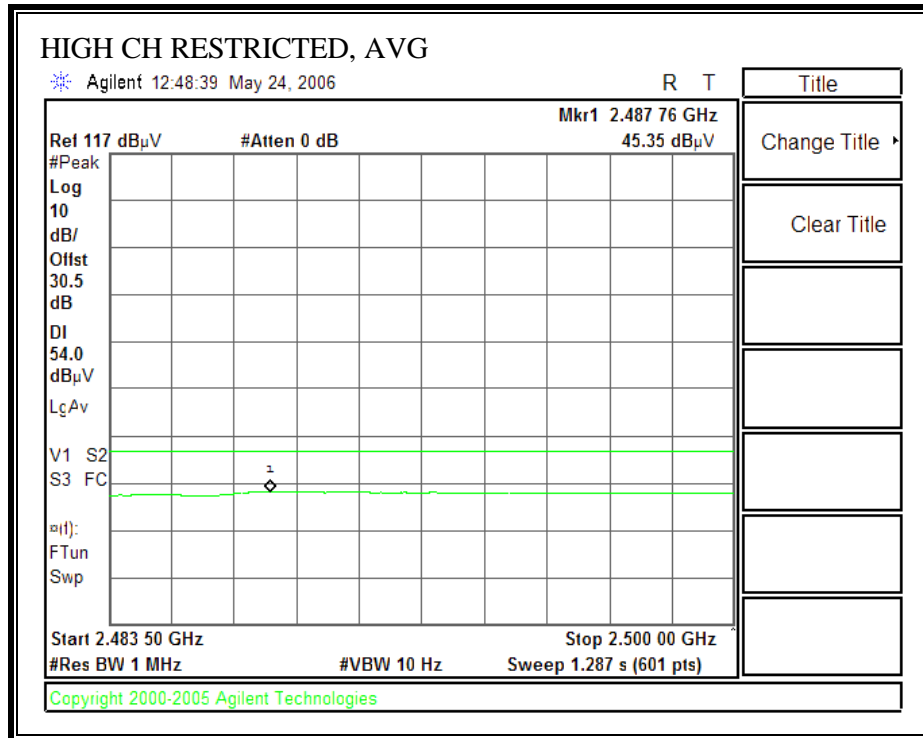
RESTRICTED BANDEDGE (HIGHCHANNEL, 2457 MHz, HORIZONTAL)



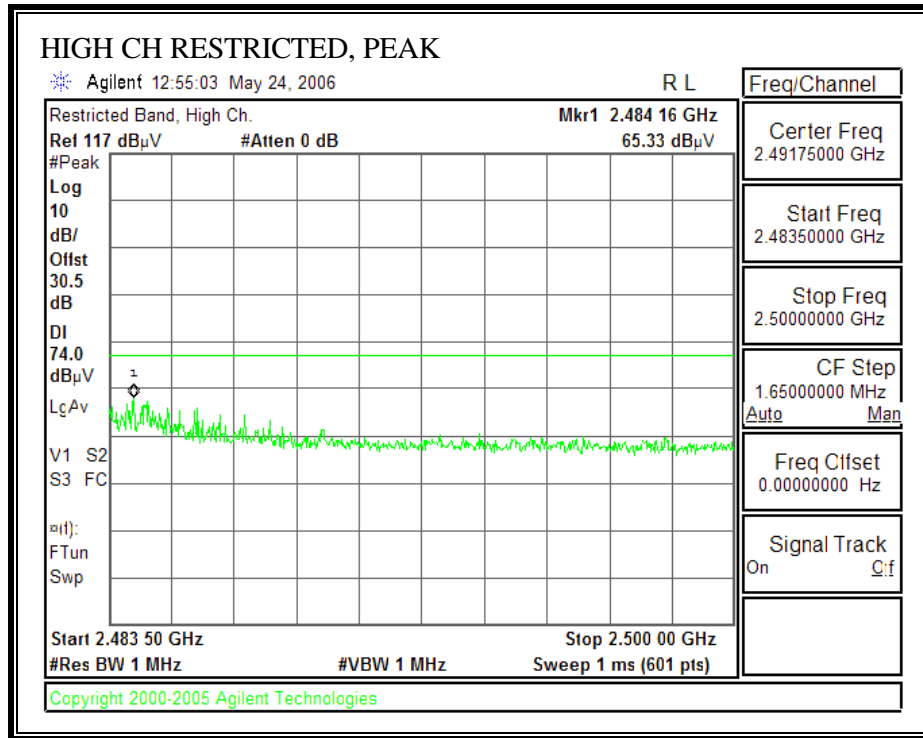


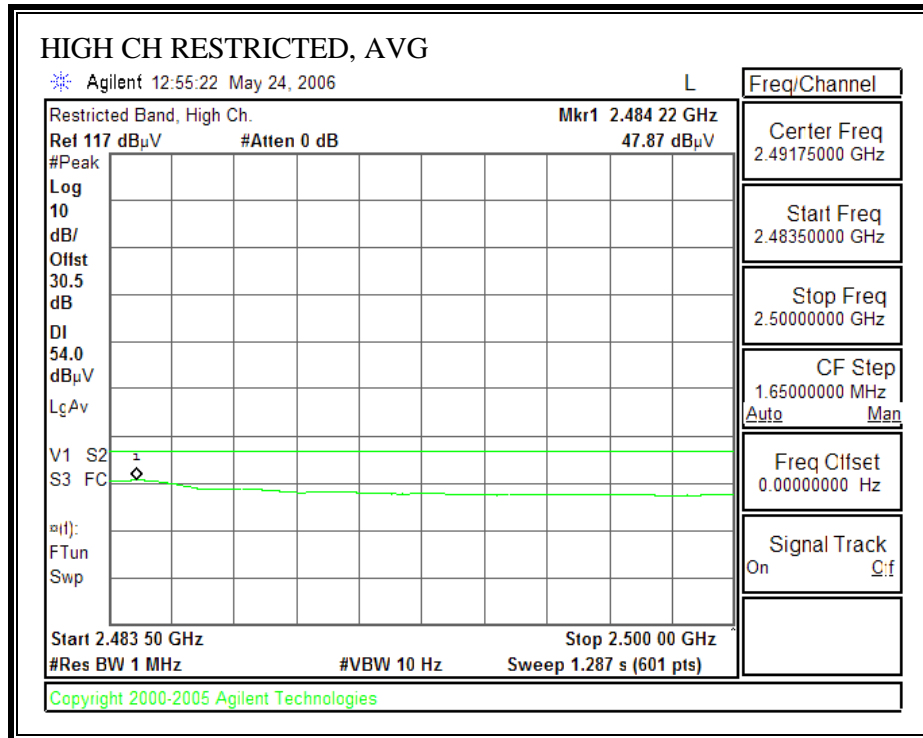
RESTRICTED BANDEGE (HIGH CHANNEL, 2457 MHz, VERTICAL)



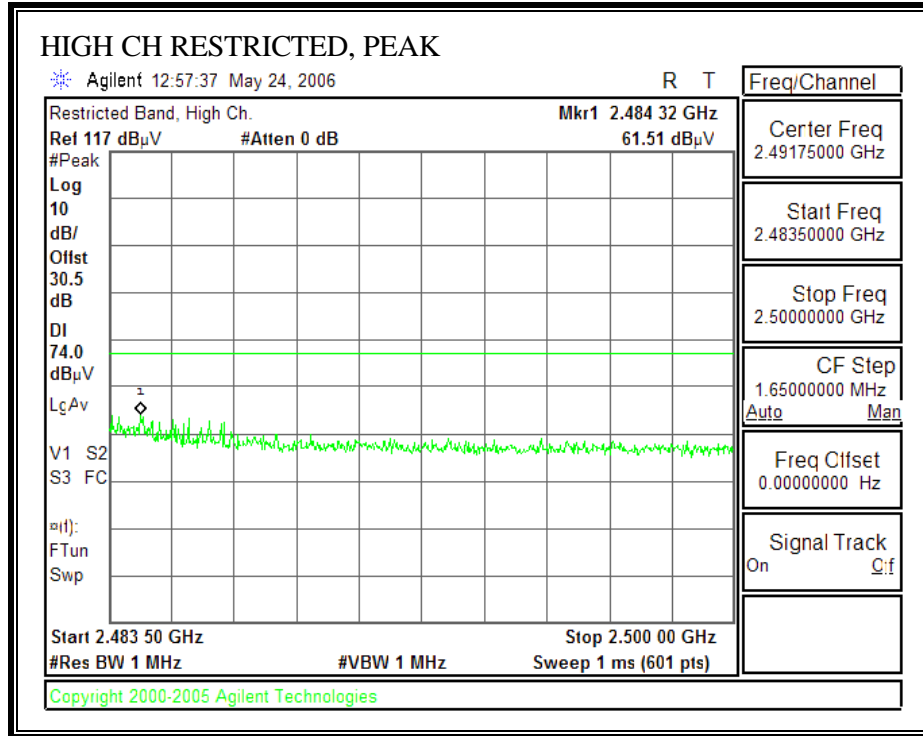


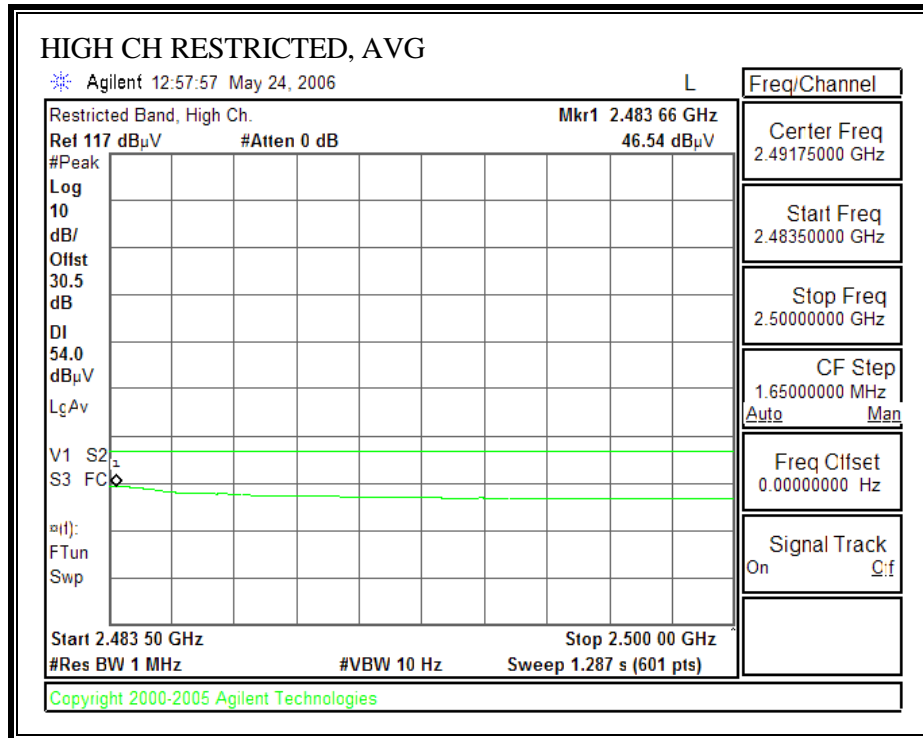
RESTRICTED BANDEDGE (HIGH CHANNEL, 2462 MHz, HORIZONTAL)





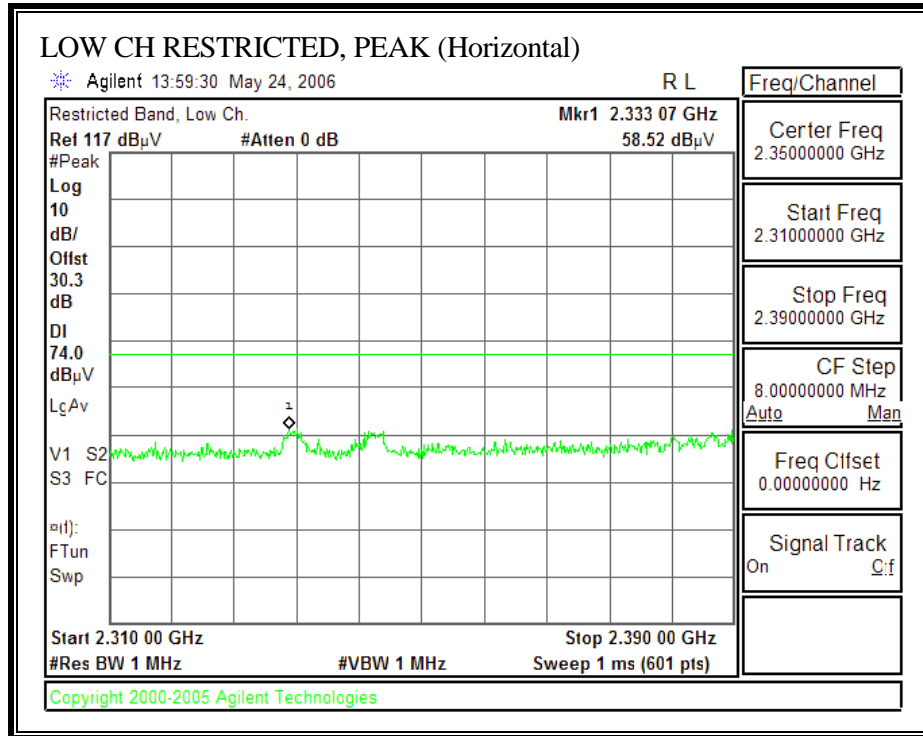
RESTRICTED BANDEDGE (HIGH CHANNEL, 2462 MHz, VERTICAL)

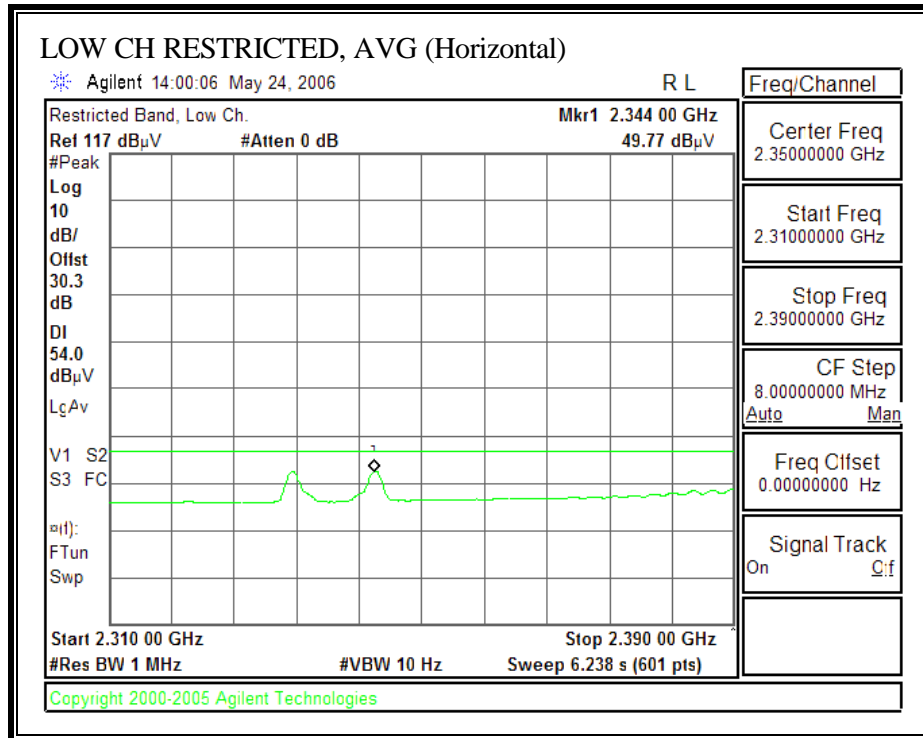




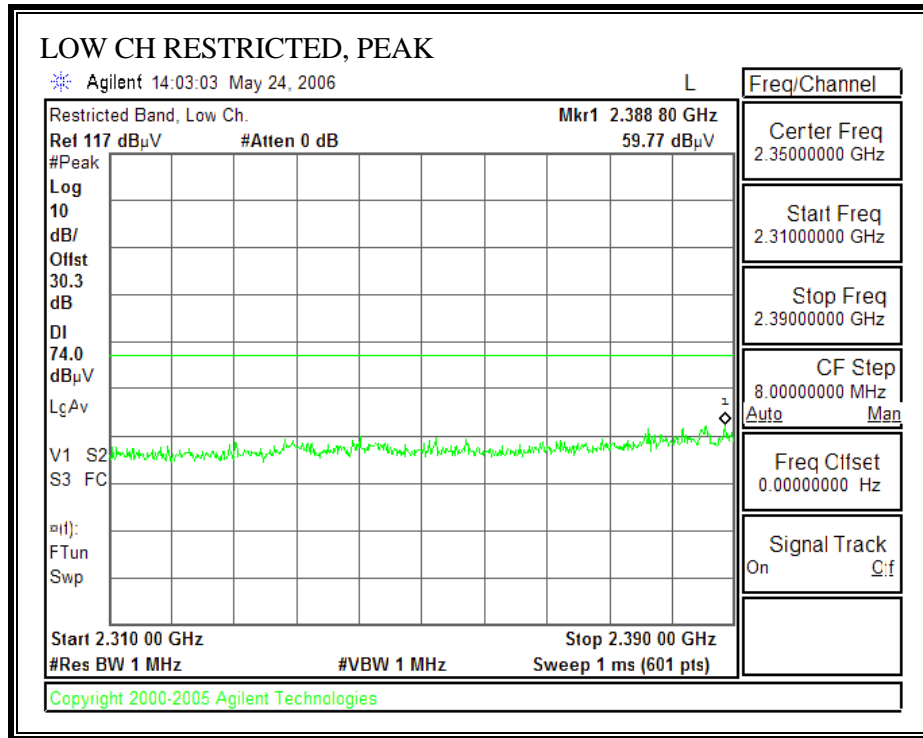
40 MHz TX BANDWIDTH

RESTRICTED BANDEGE (LOW CHANNEL, 2422 MHz, HORIZONTAL)

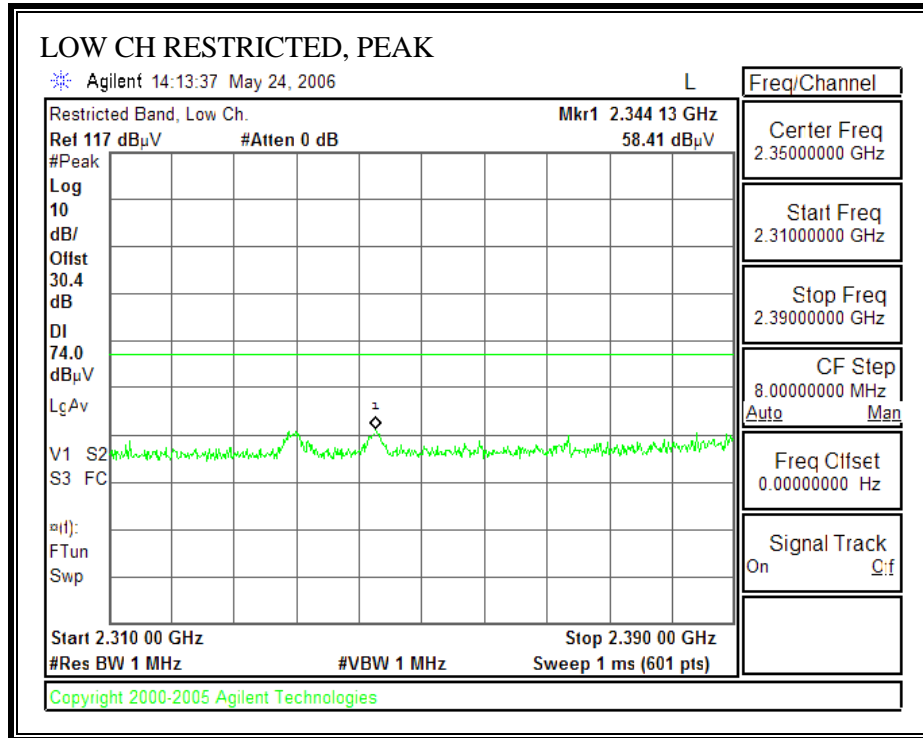


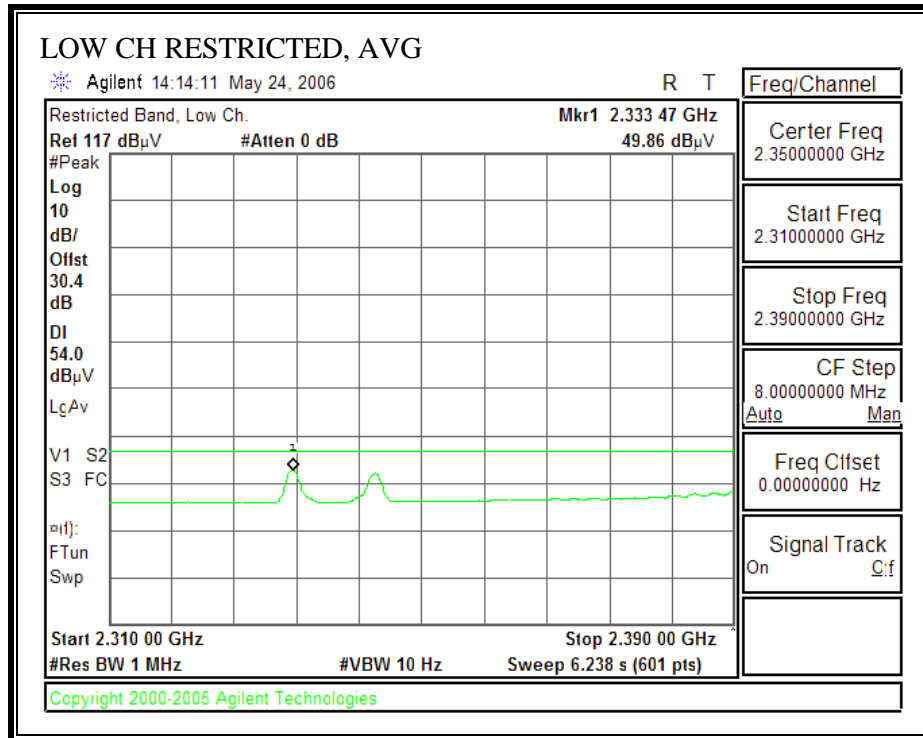


RESTRICTED BANDEGE (LOW CHANNEL, 2422 MHz, VERTICAL)

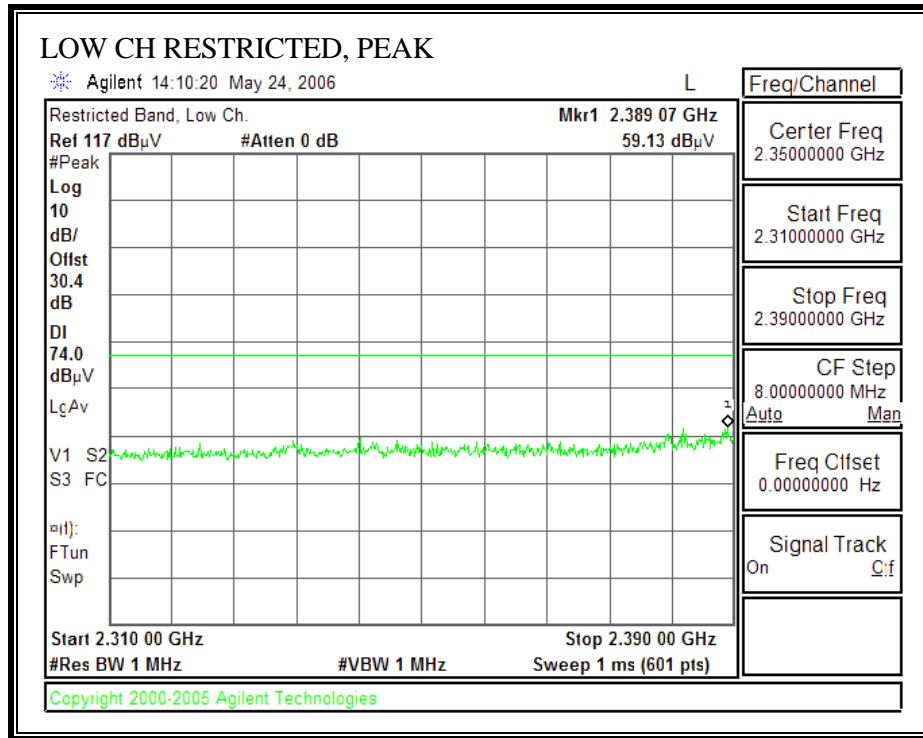


RESTRICTED BANDEDGE (LOW CHANNEL, 2427 MHz, HORIZONTAL)

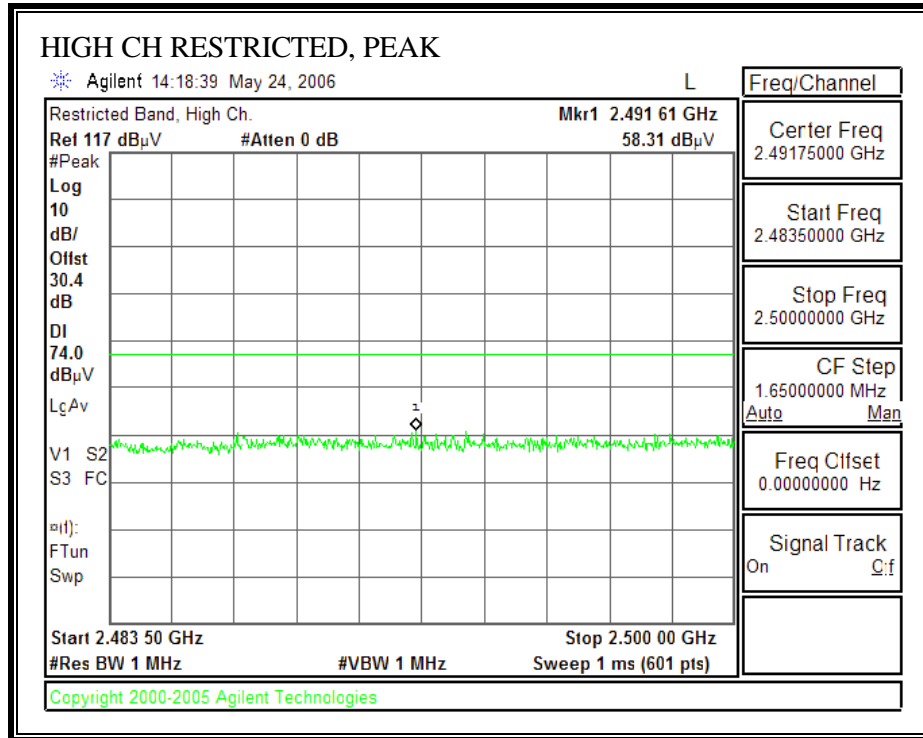


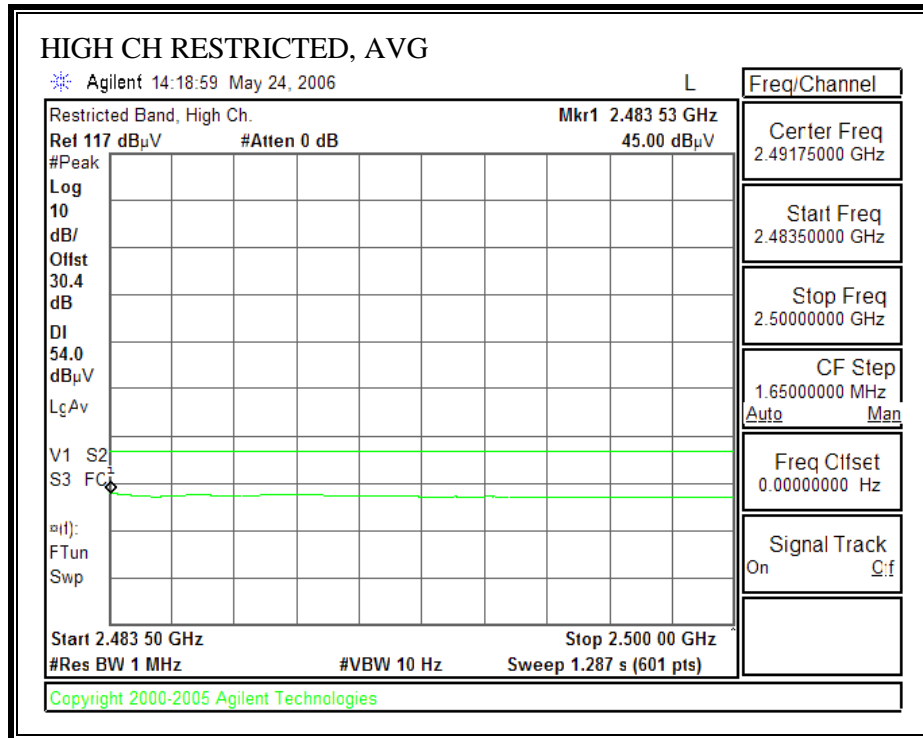


RESTRICTED BANDEGE (LOW CHANNEL, 2427 MHz, VERTICAL)

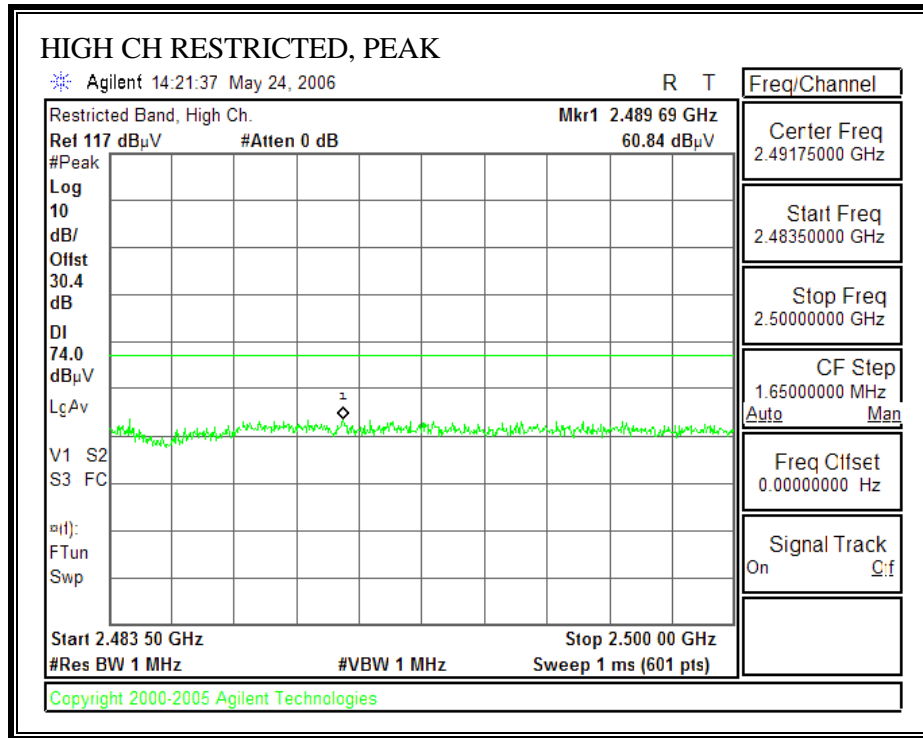


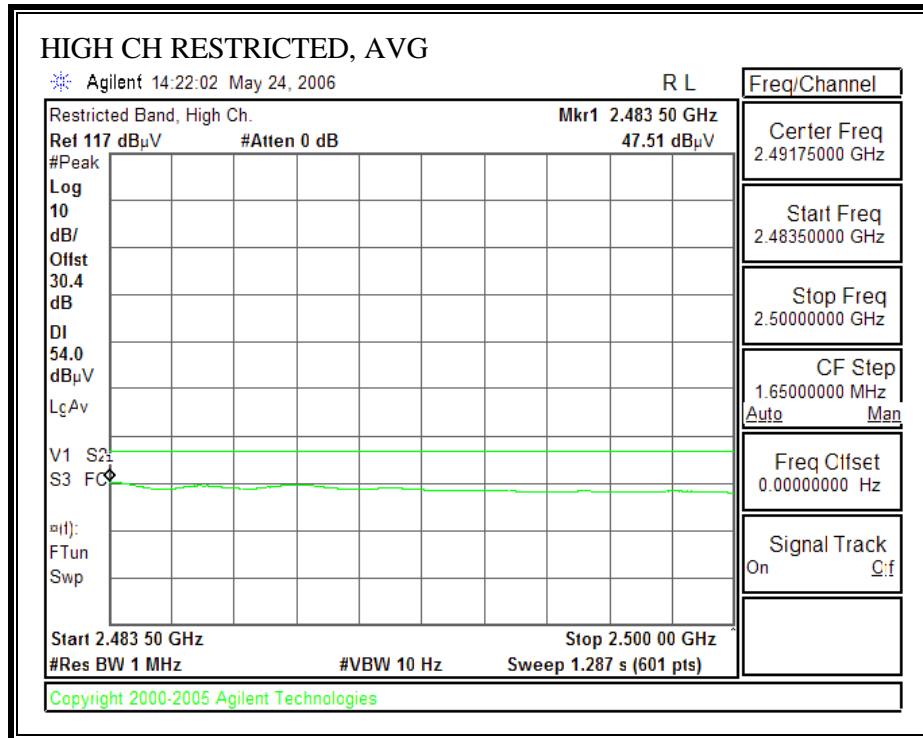
RESTRICTED BANDEDGE (HIGHCHANNEL, 2442 MHz, HORIZONTAL)





RESTRICTED BANDEGE (HIGH CHANNEL, 2442 MHz, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS – 20 MHz TX BANDWIDTH

Please refer to Hitachi antenna section.

HARMONICS AND SPURIOUS EMISSIONS – 40 MHz TX BANDWIDTH

Please refer to Hitachi antenna section.

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

HARMONICS AND SPURIOUS EMISSIONS – 20 MHz TX BANDWIDTH

Please refer to Hitachi antenna section.

HARMONICS AND SPURIOUS EMISSIONS – 40 MHz TX BANDWIDTH

Please refer to Hitachi antenna section.

7.13.19. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

Please refer to Hitachi antenna section.

7.14. 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:

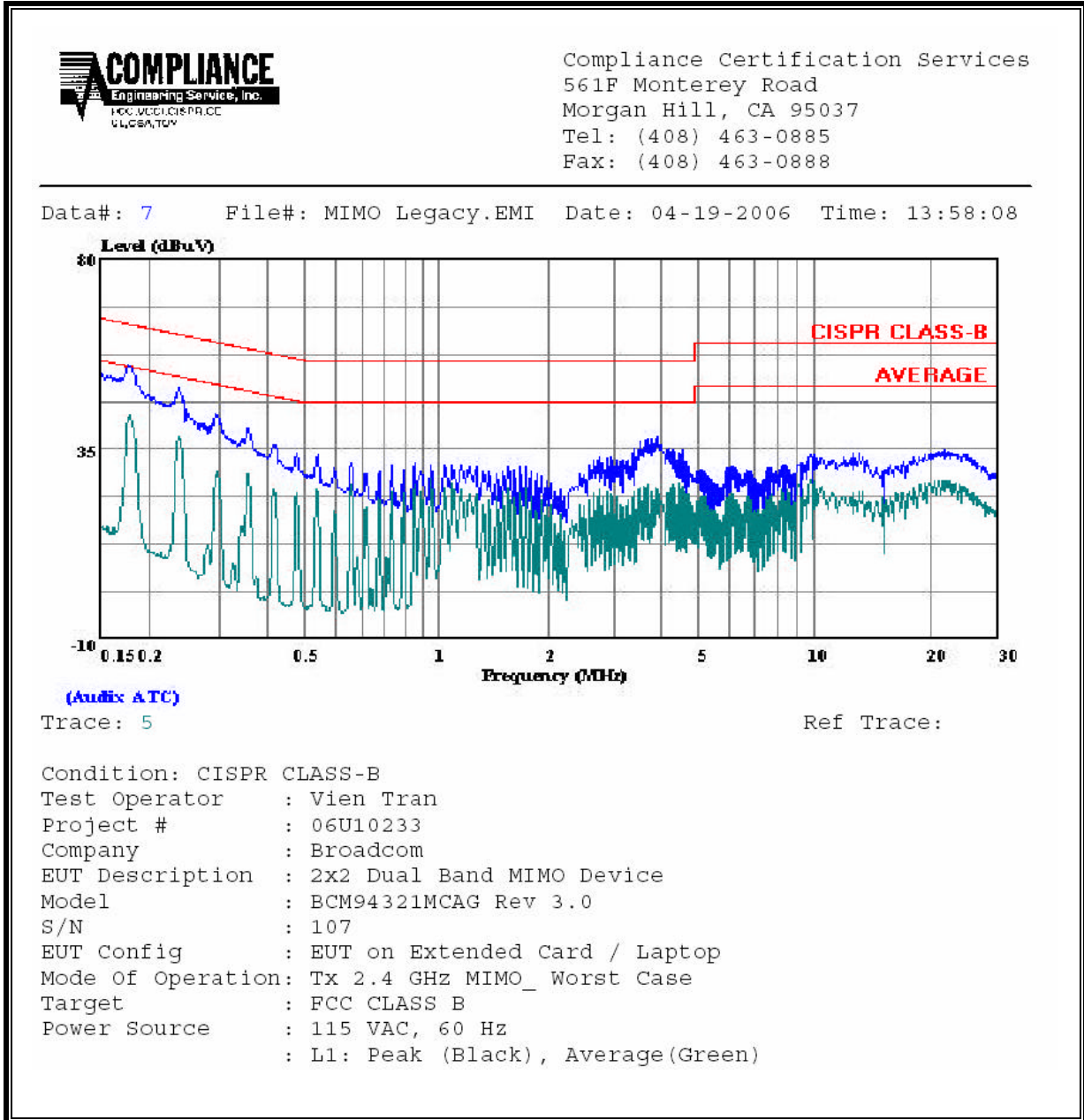
2.4 GHz BAND

6 WORST EMISSIONS

2.4 GHz MIMO _ Worst Case

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	54.86	--	42.85	0.00	64.58	54.58	-9.72	-11.73	L1	
0.24	49.48	--	37.45	0.00	62.20	52.20	-12.72	-14.75	L1	
3.88	37.78	--	26.62	0.00	56.00	46.00	-18.22	-19.38	L1	
0.18	52.20	--	39.55	0.00	64.58	54.58	-12.38	-15.03	L2	
0.24	45.88	--	33.58	0.00	62.20	52.20	-16.32	-18.62	L2	
3.88	37.80	--	26.00	0.00	56.00	46.00	-18.20	-20.00	L2	
6 Worst Data										

LINE 1 RESULTS



5 GHz BAND

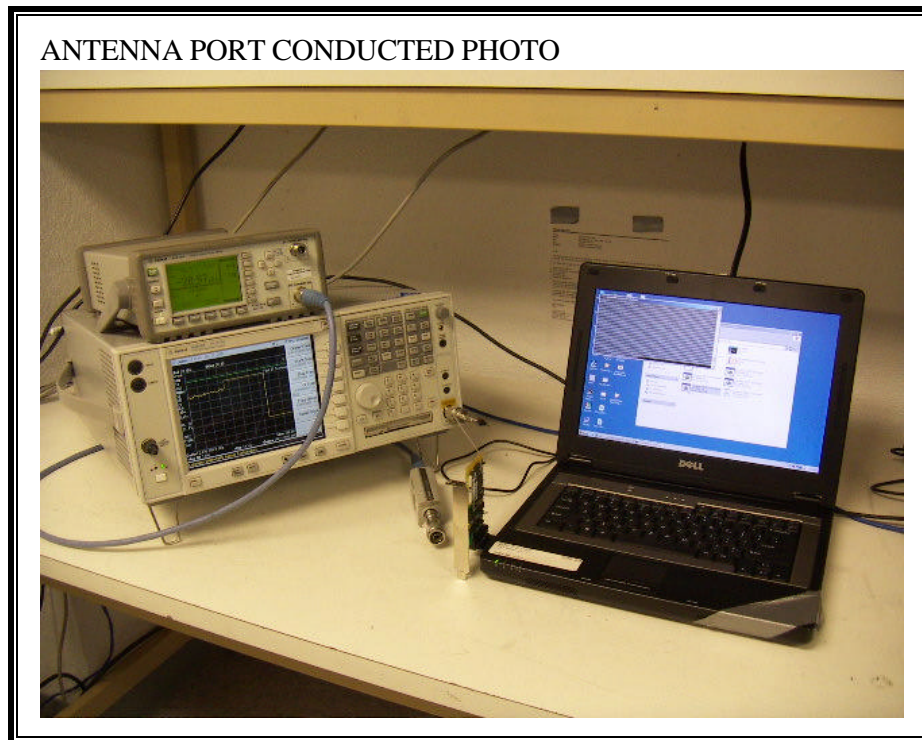
6 WORST EMISSIONS

5 GHz BAND _ MIMO _ WORST CASE

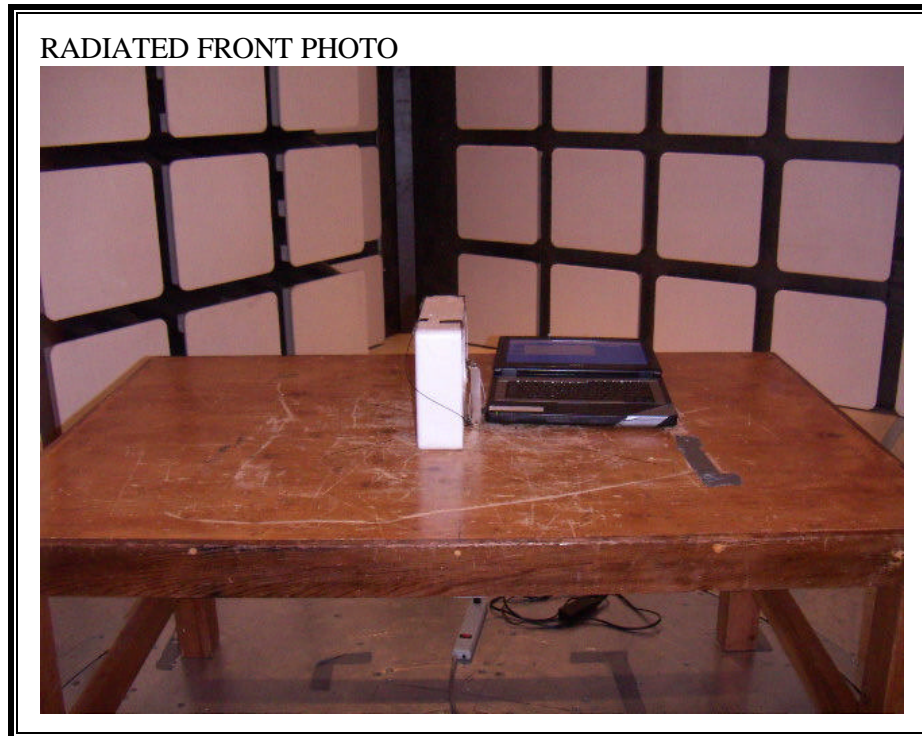
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Class (dB)	Limit QP	FCC B AV	Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)				QP (dB)	AV (dB)	
0.18	52.88	--	39.62	0.00	64.67	54.67	-11.79	-15.05	L1
0.23	47.40	--	34.36	0.00	62.31	52.31	-14.91	-17.95	L1
3.74	35.94	--	24.00	0.00	56.00	46.00	-20.06	-22.00	L1
0.18	50.76	--	38.68	0.00	64.67	54.67	-13.91	-15.99	L2
0.23	43.24	--	29.90	0.00	62.31	52.31	-19.07	-22.41	L2
3.74	35.80	--	21.00	0.00	56.00	46.00	-20.20	-25.00	L2
6 Worst Data									

8. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



RADIATED RF MEASUREMENT SETUP



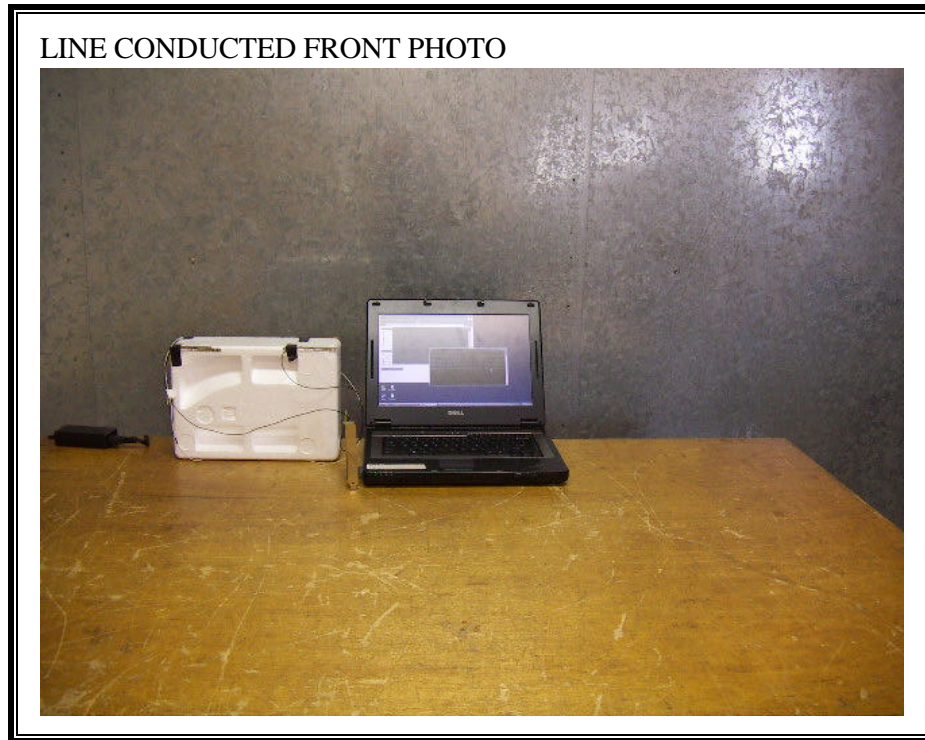
RADIATED BACK PHOTO



RADIATED SIDE PHOTO



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP



LINE CONDUCTED BACK PHOTO



END OF REPORT