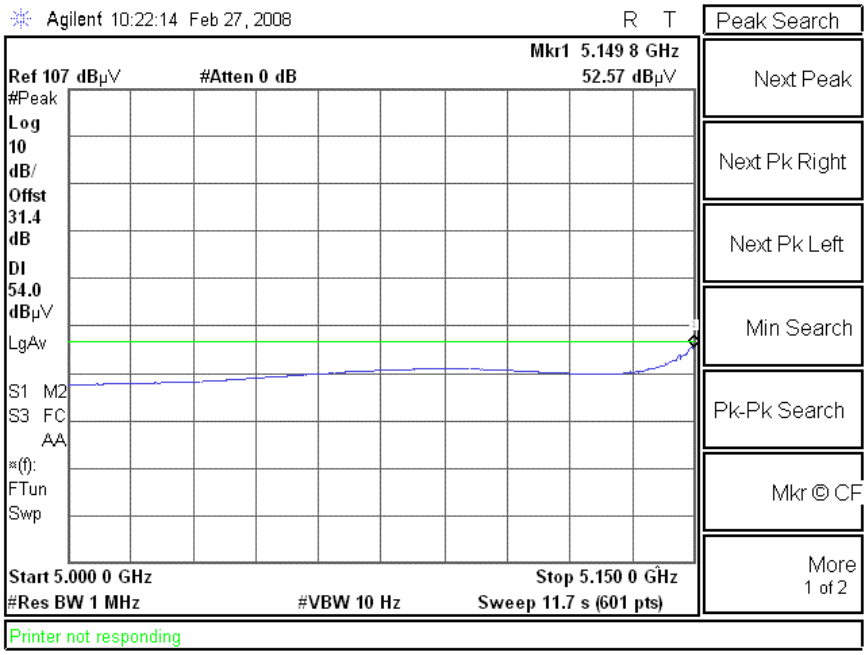
LOW CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 08U11571
Date: 2/27/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: a mode, TX, lower Band
EUT S/N: HB92-031-S-0830
FEM #2

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T39-T88 ARA 18-40GHz & Mixer > 40GHz	FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_7.6GHz	

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

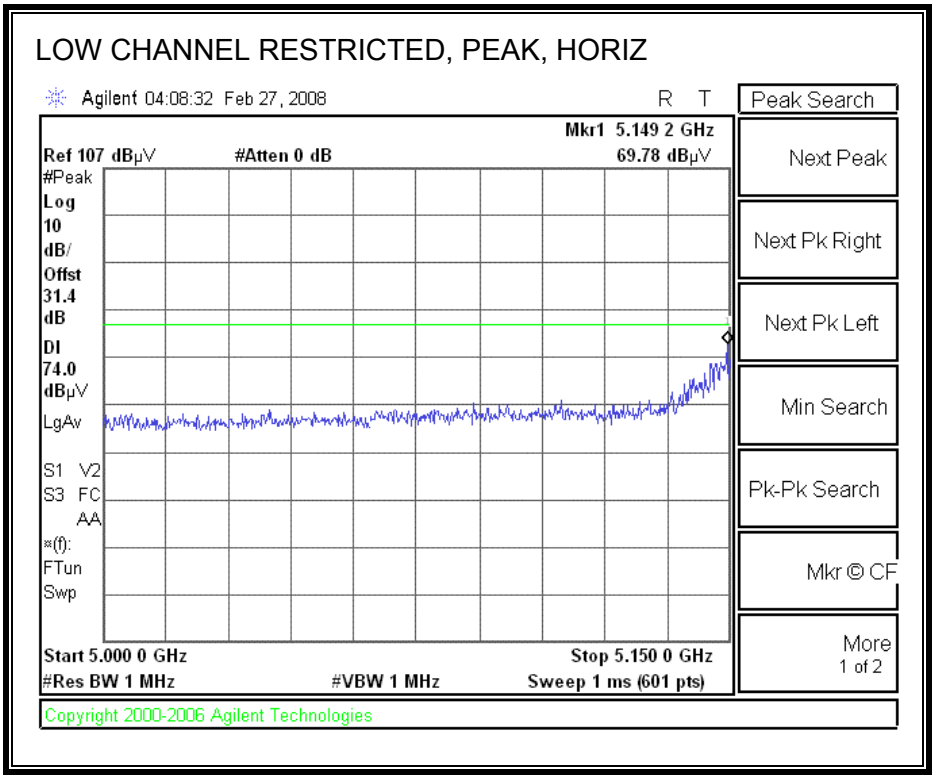
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch (5180MHz)															
10.360	3.0	48.6	34.5	37.0	10.4	-32.6	0.0	0.8	64.2	50.1	74	54	-9.8	-3.9	V
15.540	3.0	48.0	34.0	38.1	12.7	-32.2	0.0	0.7	67.3	53.3	74	54	-6.7	-0.7	V
10.360	3.0	45.2	31.6	37.0	10.4	-32.6	0.0	0.8	60.8	47.2	74	54	-13.2	-6.8	H
15.540	3.0	40.0	30.2	38.1	12.7	-32.2	0.0	0.7	59.3	49.5	74	54	-14.7	-4.5	H
Mid Ch (5220MHz)															
10.440	3.0	46.0	32.0	37.0	10.5	-32.6	0.0	0.8	61.7	47.7	74	54	-12.3	-6.3	V
15.660	3.0	47.3	33.2	37.8	12.7	-32.2	0.0	0.7	66.4	52.3	74	54	-7.6	-1.7	V
10.440	3.0	44.0	31.0	37.0	10.5	-32.6	0.0	0.8	59.7	46.7	74	54	-14.3	-7.3	H
15.660	3.0	43.0	30.5	37.8	12.7	-32.2	0.0	0.7	62.1	49.6	74	54	-11.9	-4.4	H
High Ch (5240MHz)															
10.480	3.0	45.0	32.5	37.0	10.6	-32.6	0.0	0.8	60.8	48.3	74	54	-13.2	-5.7	V
15.720	3.0	47.0	33.0	37.6	12.8	-32.2	0.0	0.7	66.0	52.0	74	54	-8.0	-2.0	V
10.480	3.0	43.8	32.0	37.0	10.6	-32.6	0.0	0.8	59.6	47.8	74	54	-14.4	-6.2	H
15.720	3.0	44.0	31.2	37.6	12.8	-32.2	0.0	0.7	63.0	50.2	74	54	-11.0	-3.8	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

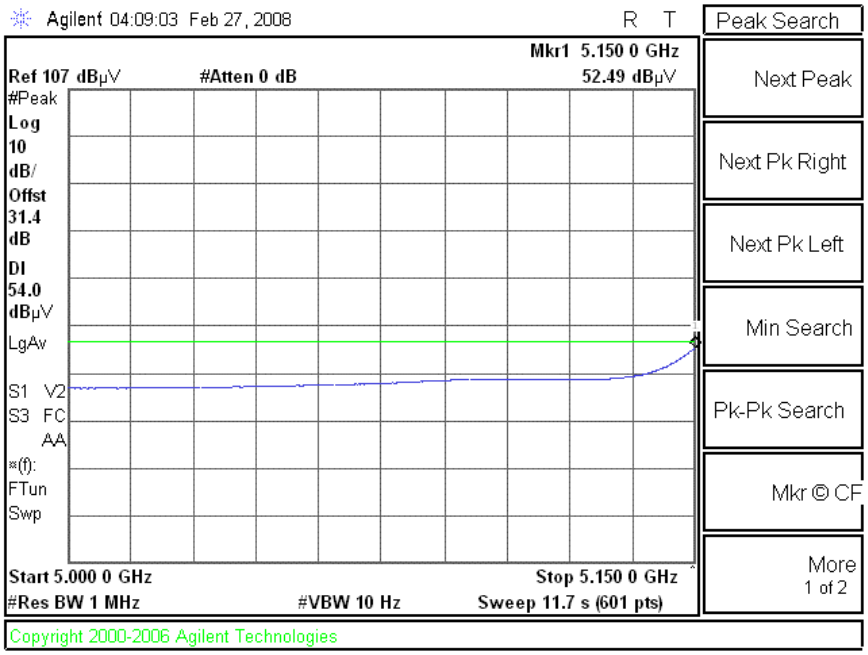
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.2.2. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE LOWER 5.2 GHz BAND

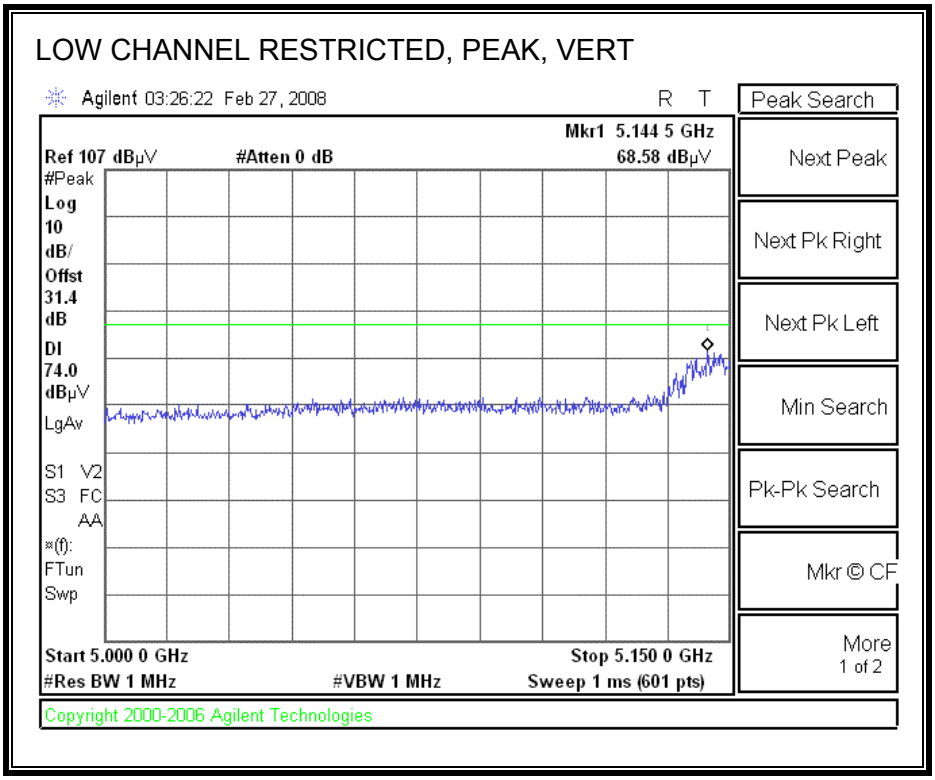
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



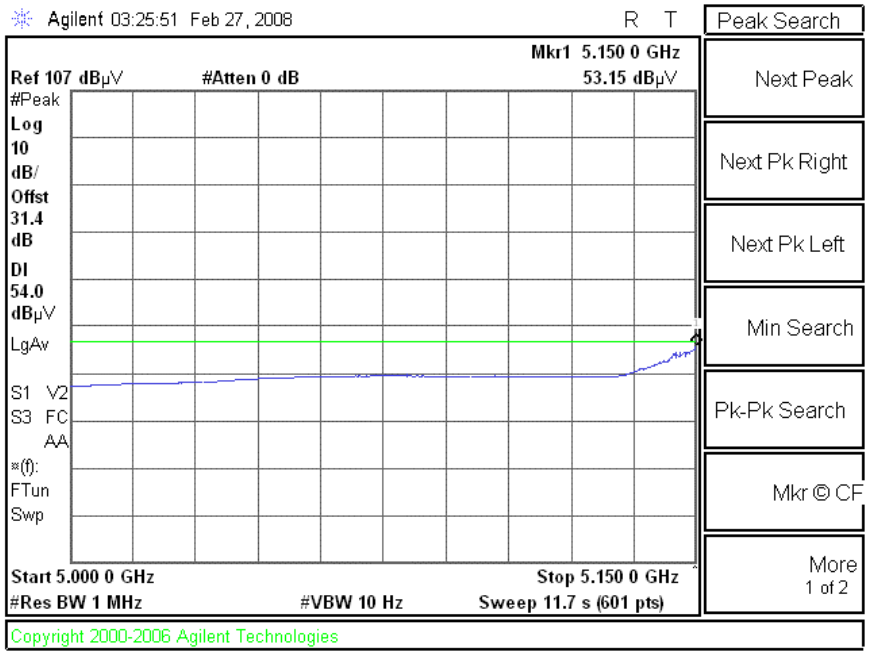
LOW CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



LOW CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 08U11571
Date: 2/27/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: HT20 mode, TX, lower Band
EUT S/N: HB92-031-S-0830
FEM #2

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T39-T88 ARA 18-40GHz & Mixer > 40GHz	FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_7.6GHz	

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

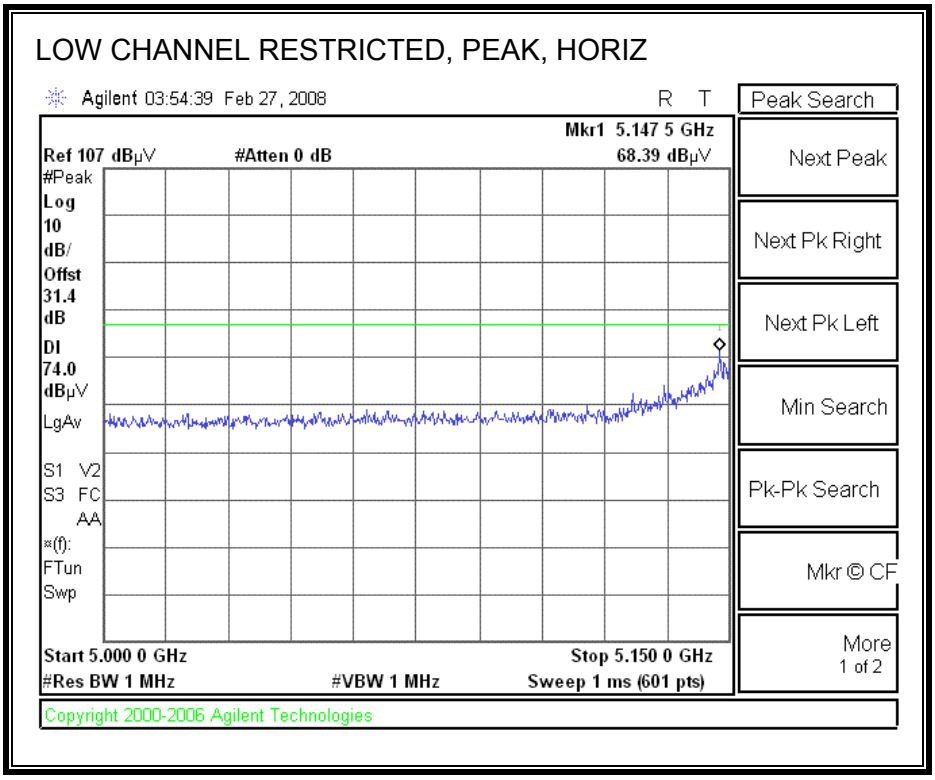
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch (5180MHz)															
10.360	3.0	47.0	34.4	37.0	10.4	-32.6	0.0	0.8	62.6	50.0	74	54	-11.4	-4.0	V
15.540	3.0	48.0	33.4	38.1	12.7	-32.2	0.0	0.7	67.3	52.7	74	54	-6.7	-1.3	V
10.360	3.0	45.0	32.2	37.0	10.4	-32.6	0.0	0.8	60.6	47.8	74	54	-13.4	-6.2	H
15.540	3.0	45.1	31.6	38.1	12.7	-32.2	0.0	0.7	64.4	50.9	74	54	-9.6	-3.1	H
Mid Ch (5220MHz)															
10.440	3.0	47.6	34.7	37.0	10.5	-32.6	0.0	0.8	63.3	50.4	74	54	-10.7	-3.6	V
15.660	3.0	47.3	33.6	37.8	12.7	-32.2	0.0	0.7	66.4	52.7	74	54	-7.6	-1.3	V
10.440	3.0	45.2	32.3	37.0	10.5	-32.6	0.0	0.8	60.9	48.0	74	54	-13.1	-6.0	H
15.660	3.0	43.8	32.0	37.8	12.7	-32.2	0.0	0.7	62.9	51.1	74	54	-11.1	-2.9	H
High Ch (5240MHz)															
10.480	3.0	47.5	34.2	37.0	10.6	-32.6	0.0	0.8	63.3	50.0	74	54	-10.7	-4.0	V
15.720	3.0	46.5	33.0	37.6	12.8	-32.2	0.0	0.7	65.5	52.0	74	54	-8.5	-2.0	V
10.480	3.0	44.6	32.0	37.0	10.6	-32.6	0.0	0.8	60.4	47.8	74	54	-13.6	-6.2	H
15.720	3.0	43.4	31.6	37.6	12.8	-32.2	0.0	0.7	62.4	50.6	74	54	-11.6	-3.4	H

Rev. 4.12.7

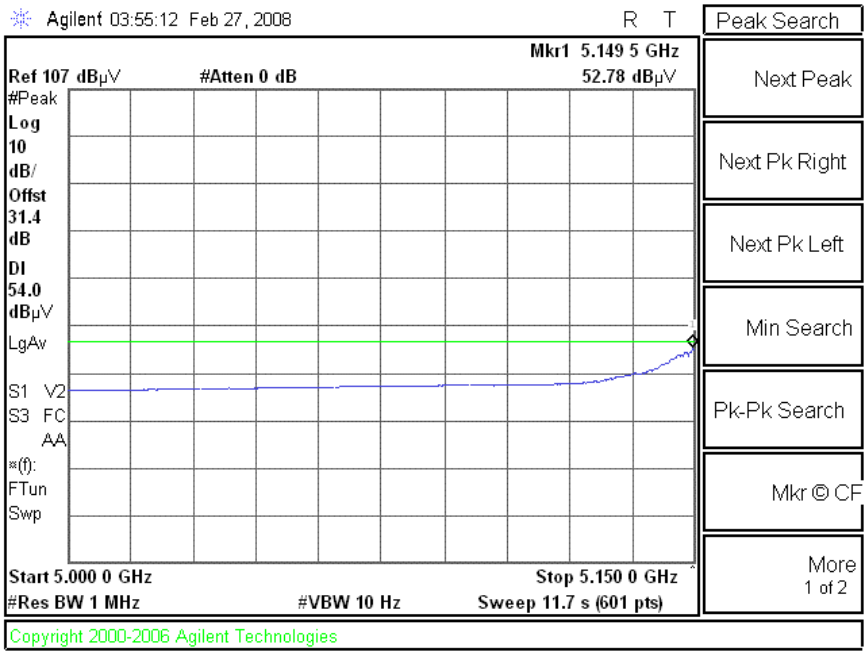
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.2.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE LOWER 5.2 GHz BAND

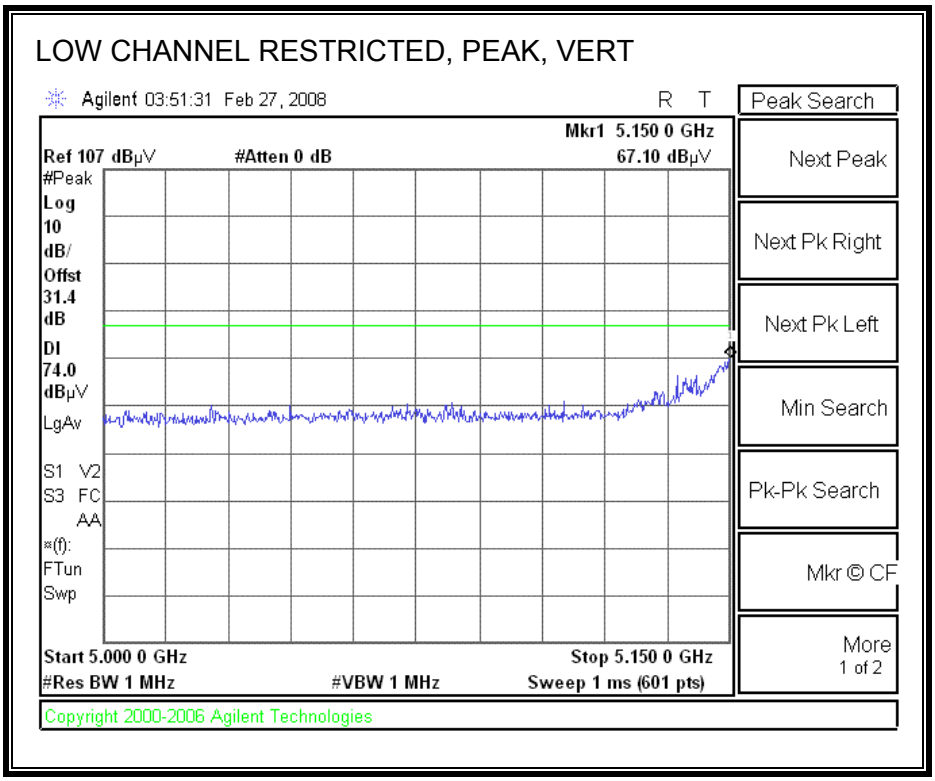
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



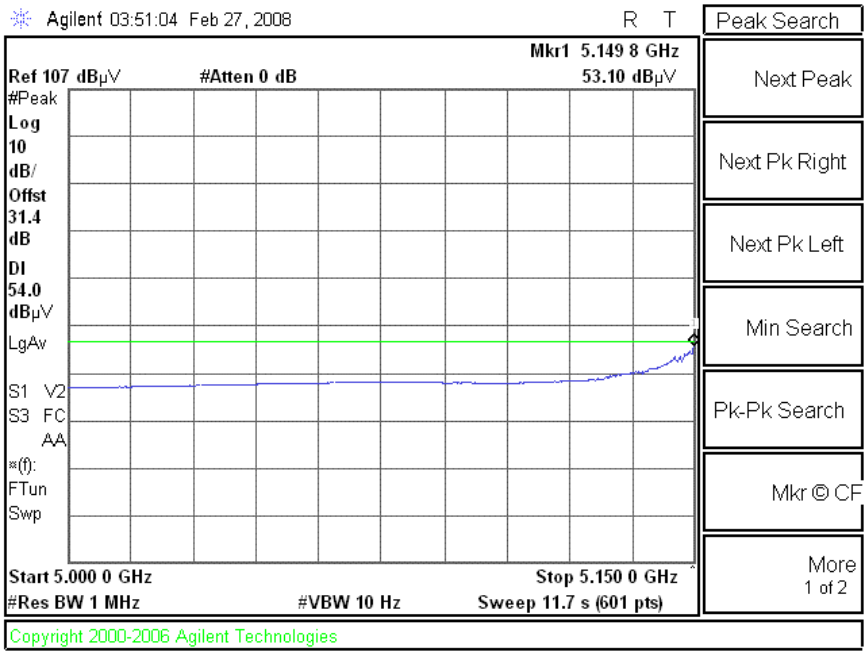
LOW CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



LOW CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 08U11571
Date: 2/27/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop.
Mode: Tx HT40 mode, Lower band.

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T39-T88 ARA 18-40GHz & Mixer > 40GHz	FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_7.6GHz	

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

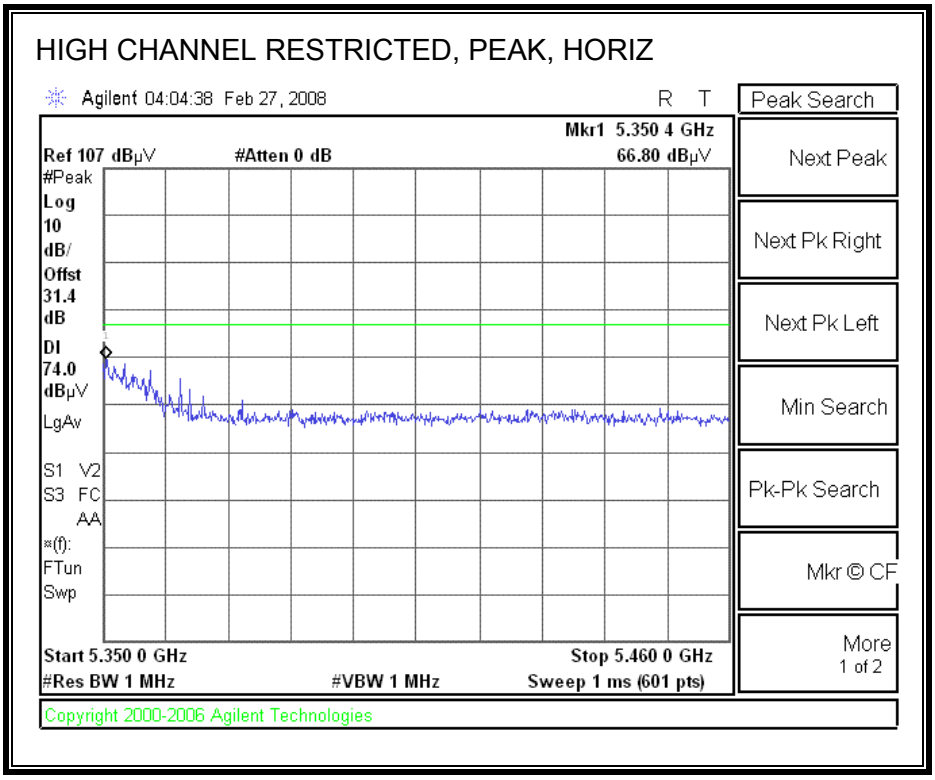
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low channel (5190MHz)															
10.380	3.0	45.0	32.0	37.0	10.5	-32.6	0.0	0.8	60.6	47.6	74	54	-13.4	-6.4	V
15.570	3.0	46.0	33.8	38.0	12.7	-32.2	0.0	0.7	65.2	53.0	74	54	-8.8	-1.0	V
10.380	3.0	43.8	30.8	37.0	10.5	-32.6	0.0	0.8	59.4	46.4	74	54	-14.6	-7.6	H
15.570	3.0	44.2	31.5	38.0	12.7	-32.2	0.0	0.7	63.4	50.7	74	54	-10.6	-3.3	H
High band (5230MHz)															
10.460	3.0	43.2	31.0	37.0	10.5	-32.6	0.0	0.8	58.9	46.7	74	54	-15.1	-7.3	V
15.690	3.0	46.4	33.2	37.7	12.7	-32.2	0.0	0.7	65.4	52.2	74	54	-8.6	-1.8	V
15.720	3.0	41.5	30.0	37.6	12.8	-32.2	0.0	0.7	60.5	49.0	74	54	-13.5	-5.0	H
15.720	3.0	44.3	31.5	37.6	12.8	-32.2	0.0	0.7	63.3	50.5	74	54	-10.7	-3.5	H

Rev. 4.12.7

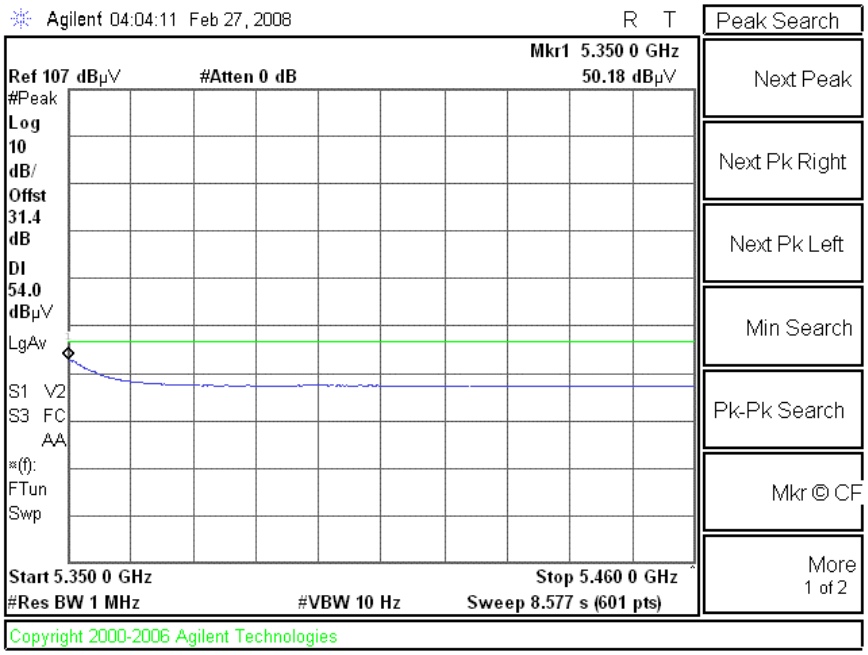
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.2.4. TRANSMITTER ABOVE 1 GHz FOR 802.11a MODE IN THE UPPER 5.2 GHz BAND

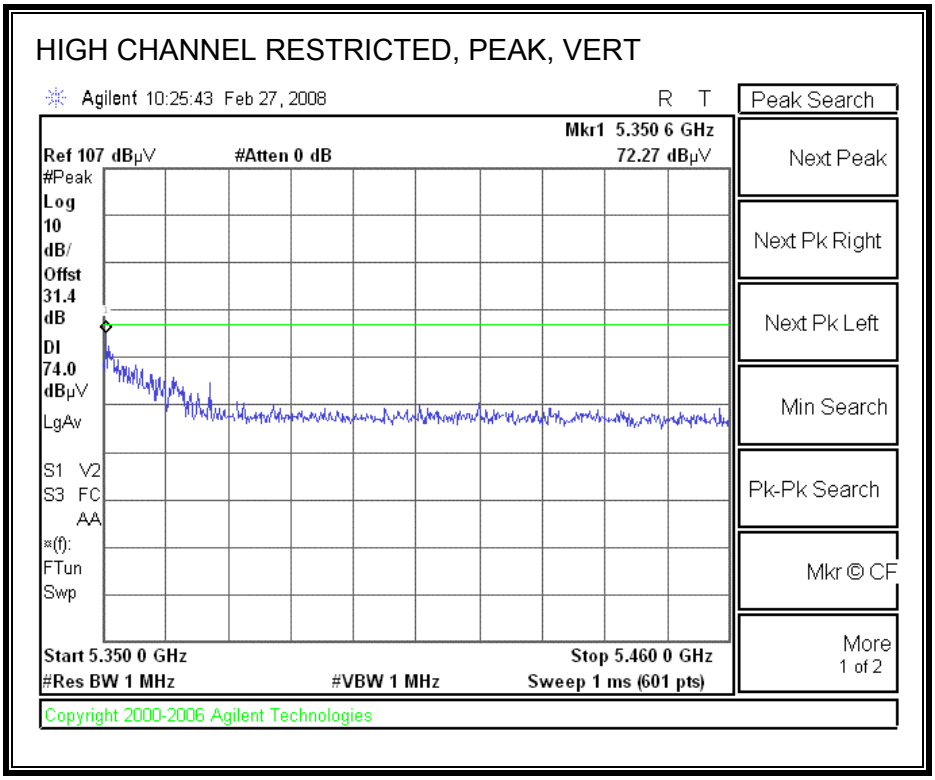
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



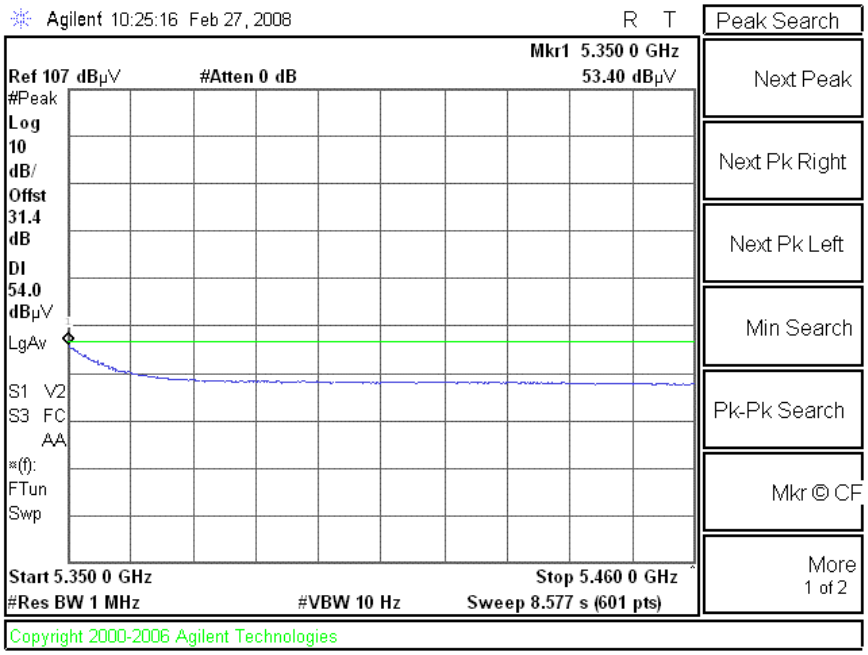
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 08U11571
Date: 2/27/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: a mode, TX, Upper Band
EUT S/N: HB92-031-S-0830
FEM #2

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T39-T88 ARA 18-40GHz & Mixer > 40GHz	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_7.6GHz	

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

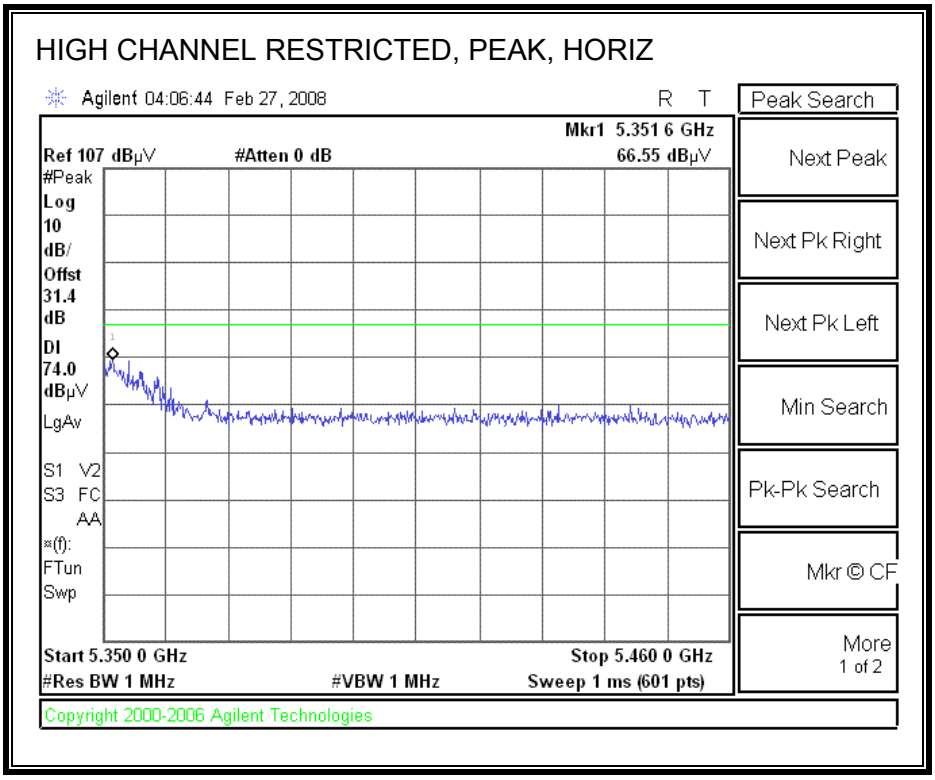
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch (5260MHz)															
15.780	3.0	45.0	34.0	37.5	12.8	-32.2	0.0	0.7	63.8	52.8	74	54	-10.2	-1.2	V
15.780	3.0	43.7	32.0	37.5	12.8	-32.2	0.0	0.7	62.5	50.8	74	54	-11.5	-3.2	H
Mid Ch (5300MHz)															
10.600	3.0	45.0	32.4	37.1	10.7	-32.6	0.0	0.8	60.9	48.3	74	54	-13.1	-5.7	V
15.900	3.0	43.5	31.6	37.2	12.8	-32.1	0.0	0.7	62.1	50.2	74	54	-11.9	-3.8	V
10.600	3.0	42.8	30.6	37.1	10.7	-32.6	0.0	0.8	58.7	46.5	74	54	-15.3	-7.5	H
15.900	3.0	41.6	29.8	37.2	12.8	-32.1	0.0	0.7	60.2	48.4	74	54	-13.8	-5.6	H
High Ch (5320MHz)															
10.640	3.0	44.6	32.2	37.1	10.7	-32.6	0.0	0.8	60.6	48.2	74	54	-13.4	-5.8	V
15.960	3.0	43.6	31.0	37.1	12.8	-32.1	0.0	0.7	62.1	49.5	74	54	-11.9	-4.5	V
10.640	3.0	43.0	31.5	37.1	10.7	-32.6	0.0	0.8	59.0	47.5	74	54	-15.0	-6.5	H
15.960	3.0	41.2	29.5	37.1	12.8	-32.1	0.0	0.7	59.7	48.0	74	54	-14.3	-6.0	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

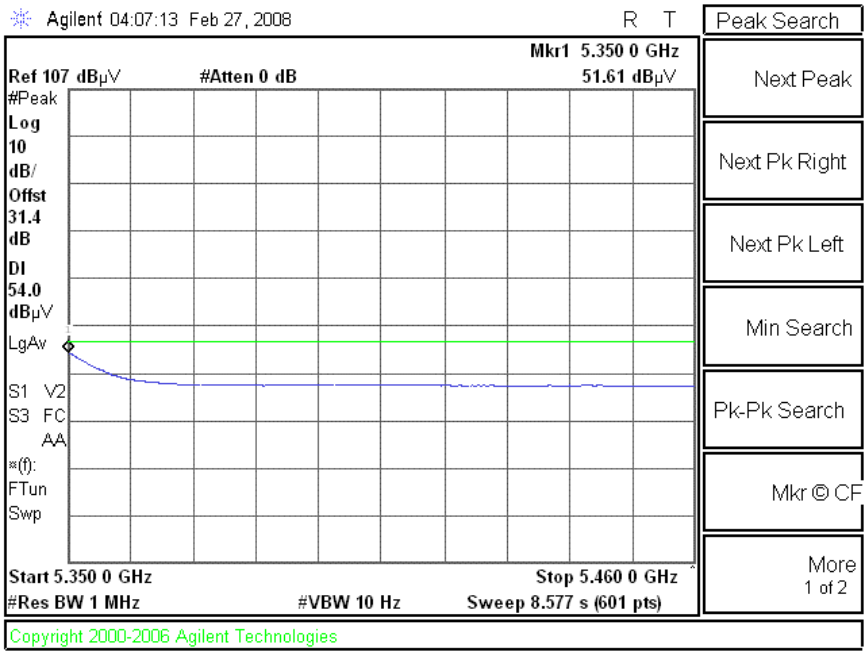
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.2.5. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE UPPER 5.2 GHz BAND

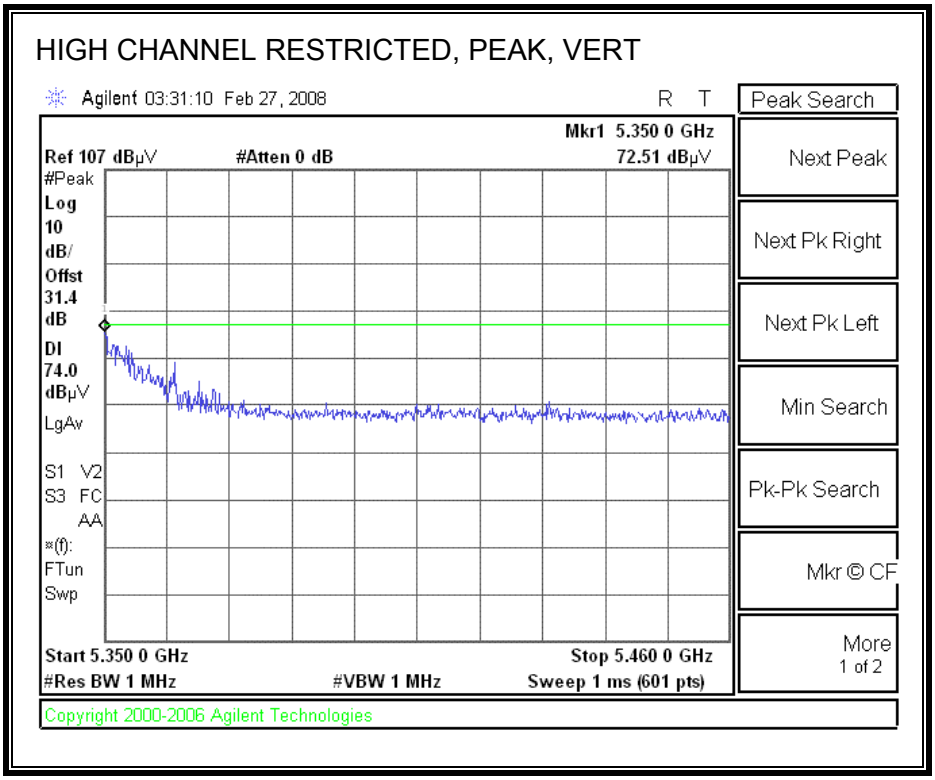
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



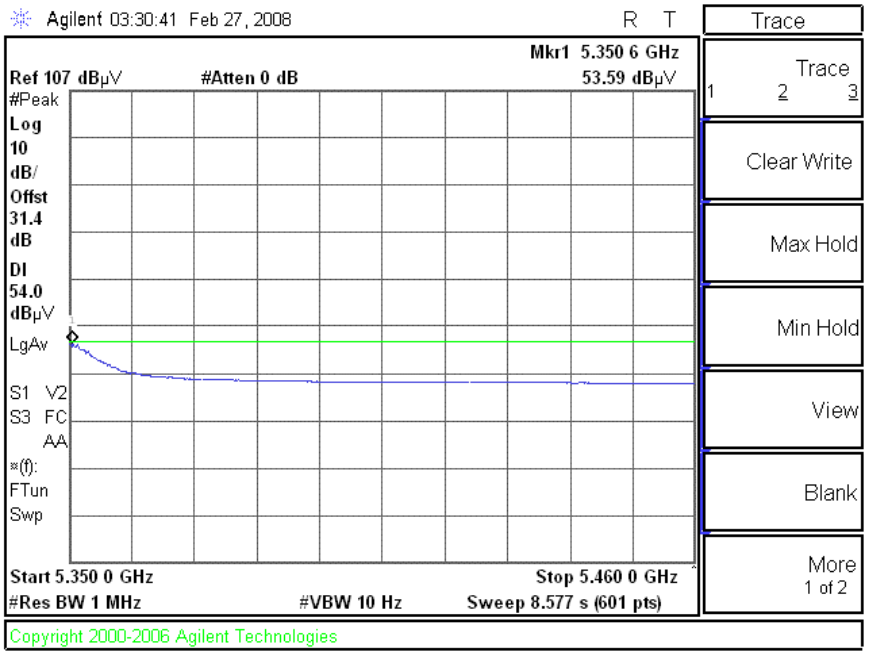
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 08U11571
Date: 2/27/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: HT20 mode, TX, Upper Band
EUT S/N: HB92-031-S-0830
FEM #2

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T39-T88 ARA 18-40GHz & Mixer > 40GHz	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_7.6GHz	

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

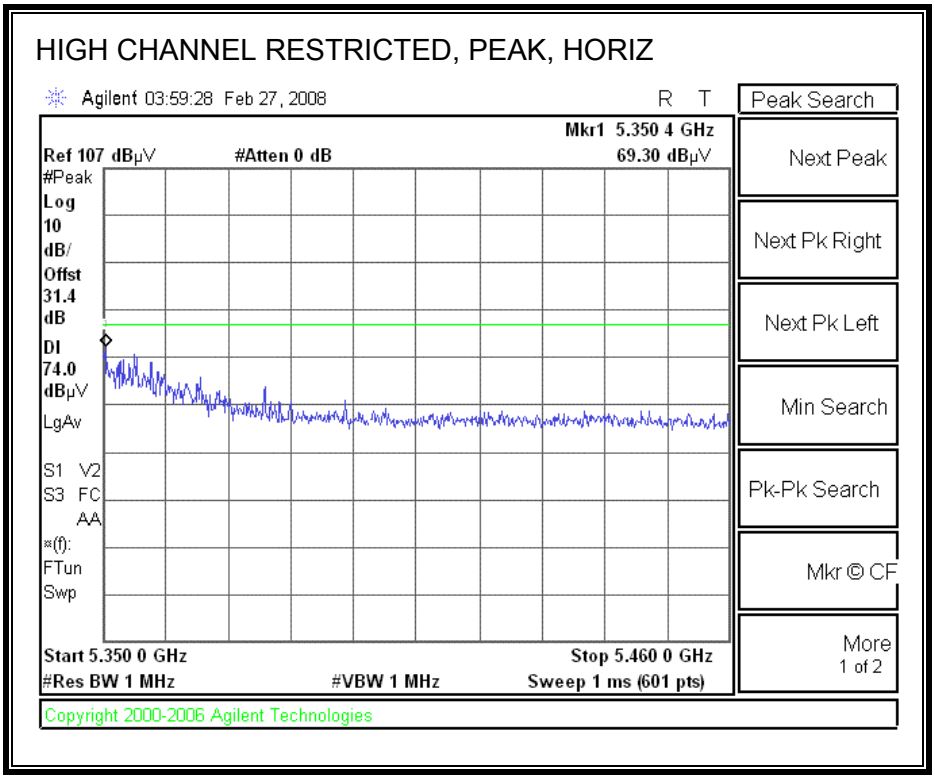
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch (5260MHz)															
15.780	3.0	45.3	32.0	37.5	12.8	-32.2	0.0	0.7	64.1	50.8	74	54	-9.9	-3.2	V
15.780	3.0	43.3	30.8	37.5	12.8	-32.2	0.0	0.7	62.1	49.6	74	54	-11.9	-4.4	H
Mid Ch (5300MHz)															
10.600	3.0	45.6	33.0	37.1	10.7	-32.6	0.0	0.8	61.5	48.9	74	54	-12.5	-5.1	V
15.900	3.0	43.0	30.0	37.2	12.8	-32.1	0.0	0.7	61.6	48.6	74	54	-12.4	-5.4	V
10.600	3.0	43.6	31.5	37.1	10.7	-32.6	0.0	0.8	59.5	47.4	74	54	-14.5	-6.6	H
15.900	3.0	42.2	29.7	37.2	12.8	-32.1	0.0	0.7	60.8	48.3	74	54	-13.2	-5.7	H
High Ch (5320MHz)															
10.640	3.0	46.1	33.0	37.1	10.7	-32.6	0.0	0.8	62.1	49.0	74	54	-11.9	-5.0	V
15.960	3.0	43.0	30.0	37.1	12.8	-32.1	0.0	0.7	61.5	48.5	74	54	-12.5	-5.5	V
10.640	3.0	43.4	30.6	37.1	10.7	-32.6	0.0	0.8	59.4	46.6	74	54	-14.6	-7.4	H
15.960	3.0	41.5	29.2	37.1	12.8	-32.1	0.0	0.7	60.0	47.7	74	54	-14.0	-6.3	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

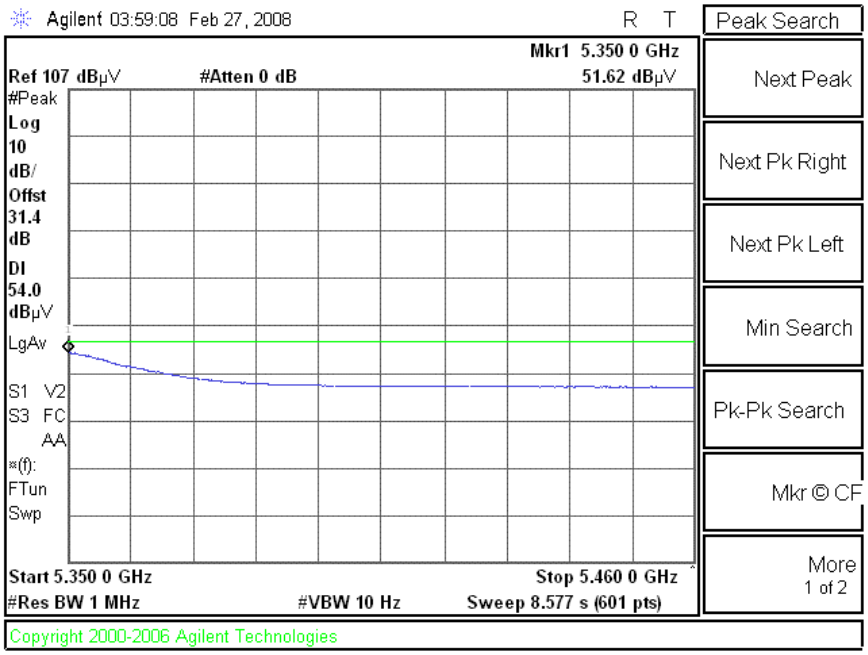
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.2.6. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE UPPER 5.2 GHz BAND

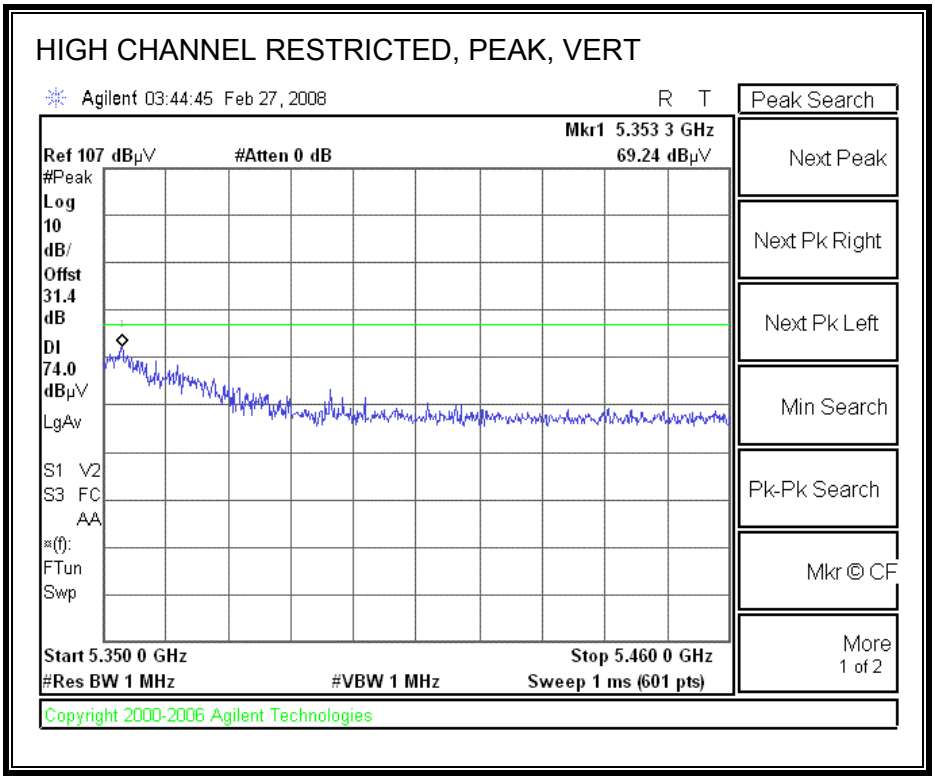
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



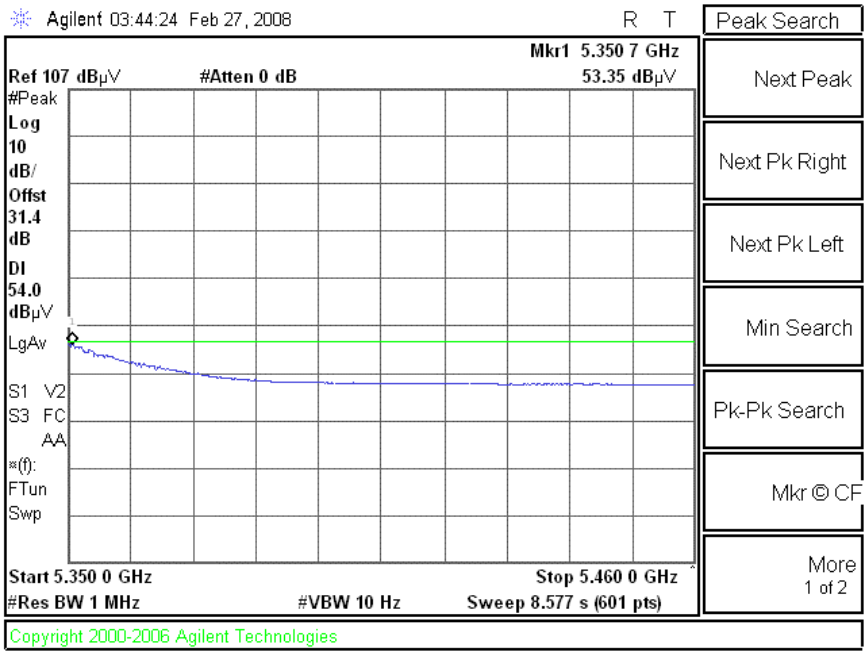
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 08U11571
Date: 2/27/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: HT40, TX, Upper band.

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T39-T88 ARA 18-40GHz & Mixer > 40GHz	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_7.6GHz	

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

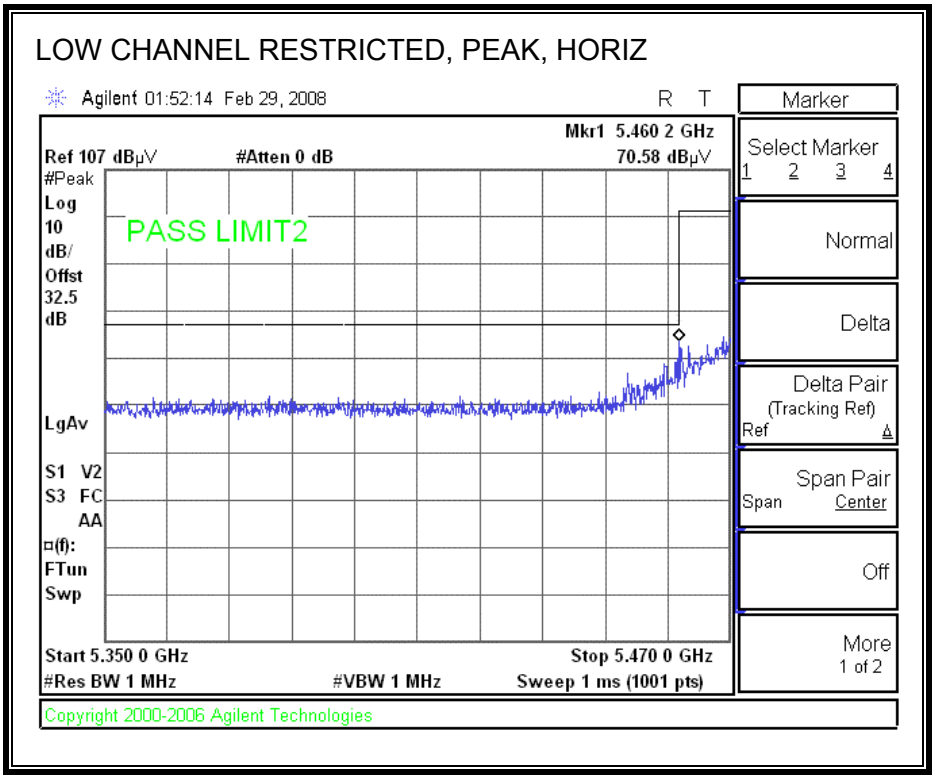
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low channel (5270MHz)															
15.810	3.0	41.5	30.5	37.4	12.8	-32.2	0.0	0.7	60.3	49.3	74	54	-13.7	-4.7	V
15.810	3.0	40.5	29.4	37.4	12.8	-32.2	0.0	0.7	59.3	48.2	74	54	-14.7	-5.8	H
High Channel (5310MHz)															
10.620	3.0	41.6	30.3	37.1	10.7	-32.6	0.0	0.8	57.6	46.3	74	54	-16.4	-7.7	V
15.930	3.0	43.3	31.0	37.2	12.8	-32.1	0.0	0.7	61.9	49.6	74	54	-12.1	-4.4	V
10.620	3.0	39.5	29.3	37.1	10.7	-32.6	0.0	0.8	55.5	45.3	74	54	-18.5	-8.7	H
15.930	3.0	40.8	29.8	37.2	12.8	-32.1	0.0	0.7	59.4	48.4	74	54	-14.6	-5.6	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

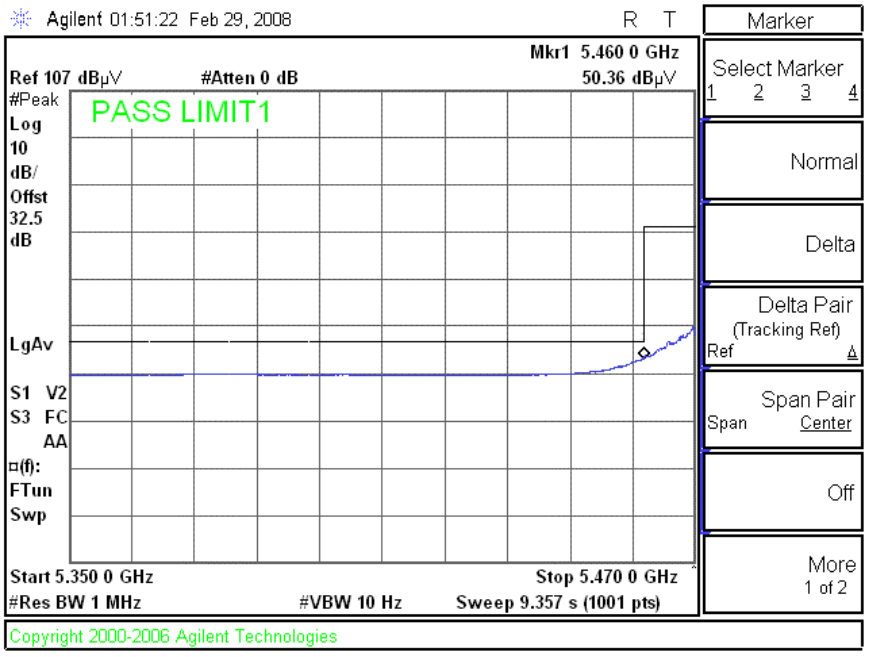
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.2.7. TRANSMITTER ABOVE 1 GHz FOR 802.11a MODE IN THE 5.6 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

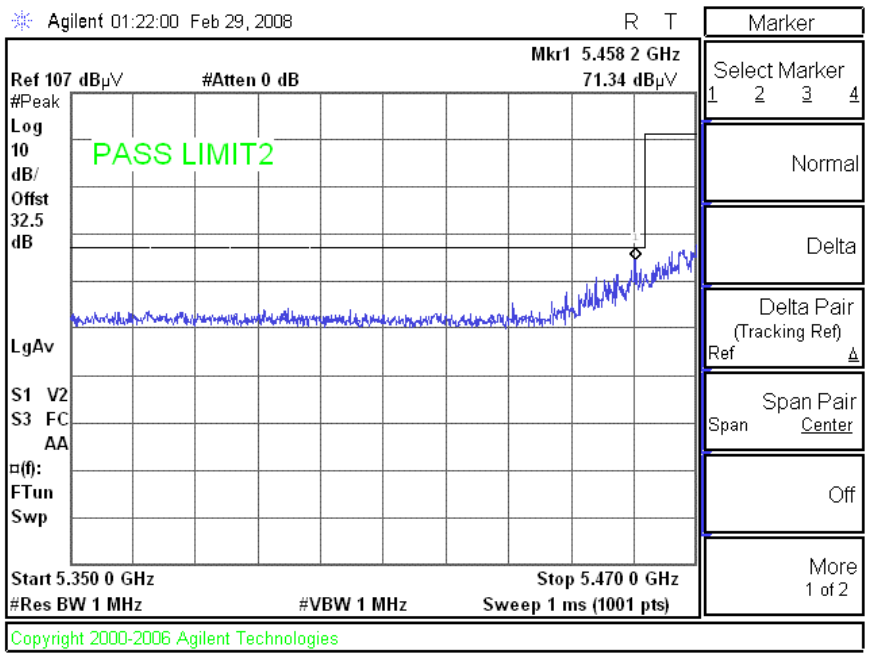


LOW CHANNEL RESTRICTED, AVG, HORIZ

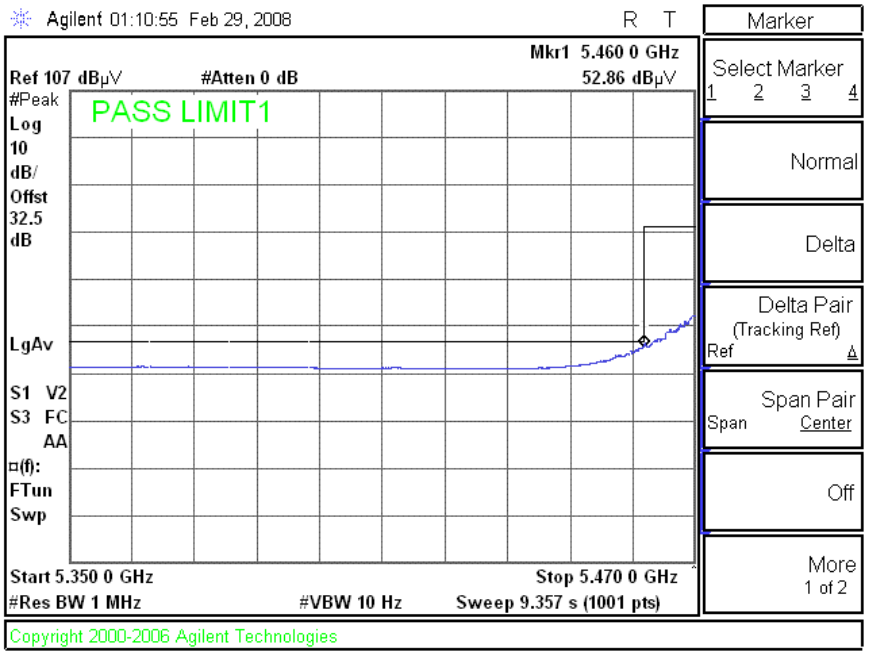


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

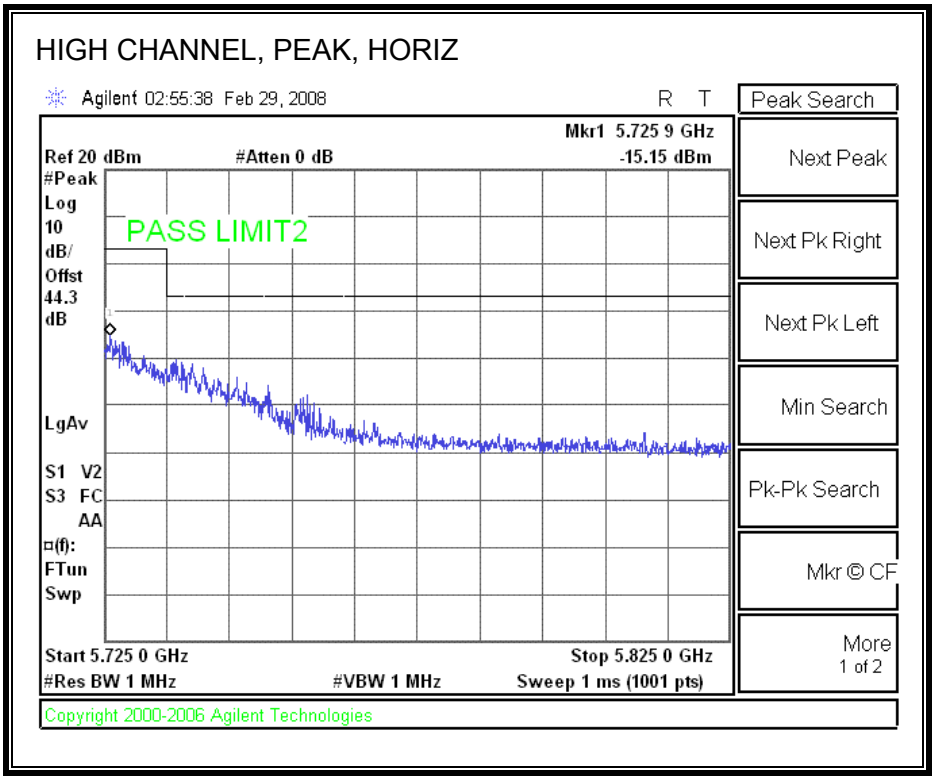
LOW CHANNEL RESTRICTED, PEAK, VERT



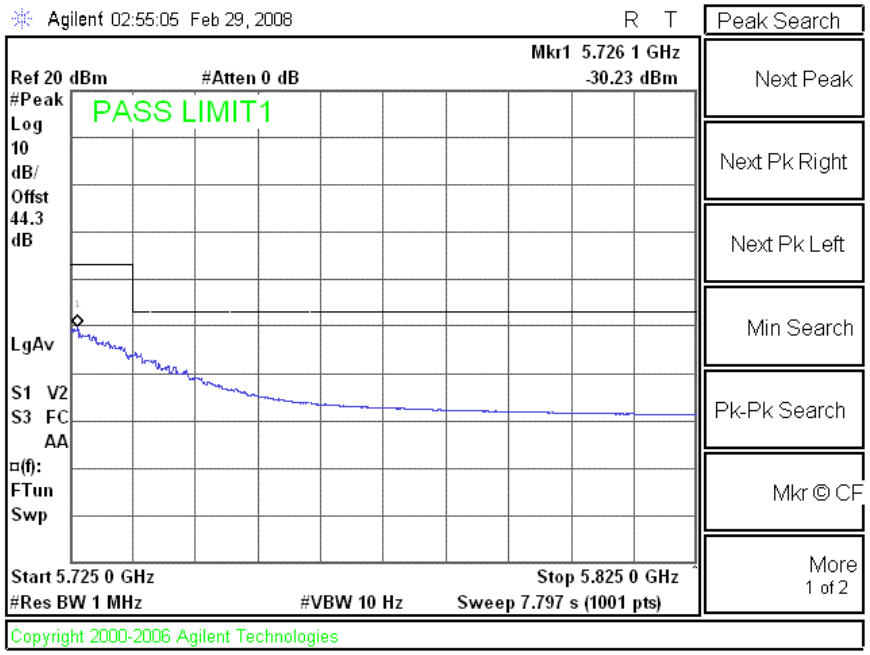
LOW CHANNEL RESTRICTED, AVG, VERT



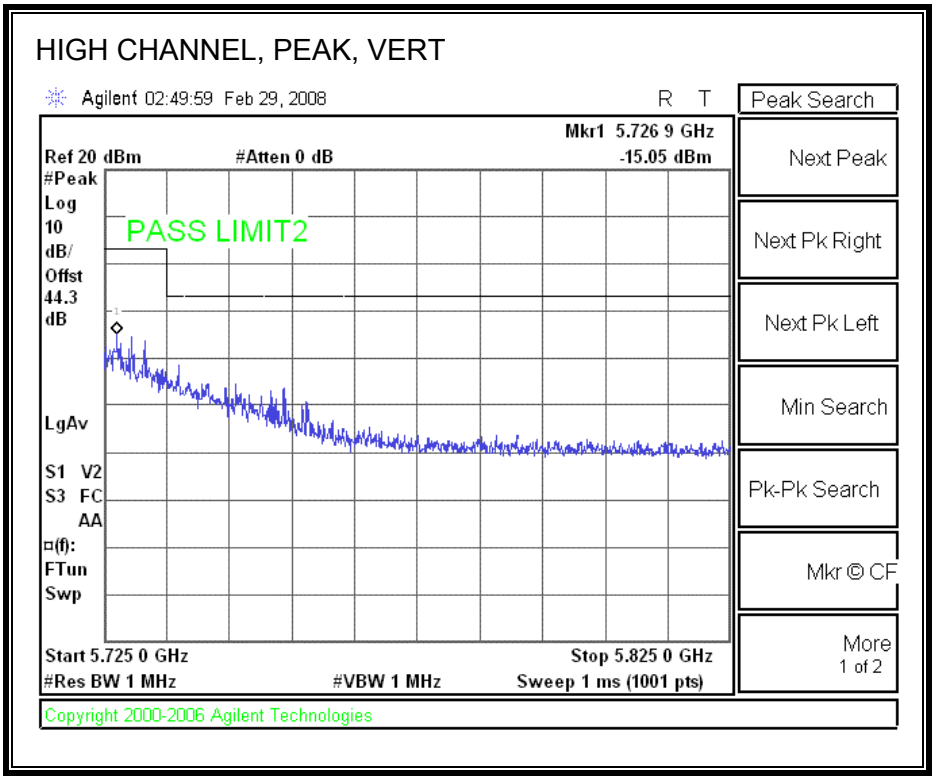
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



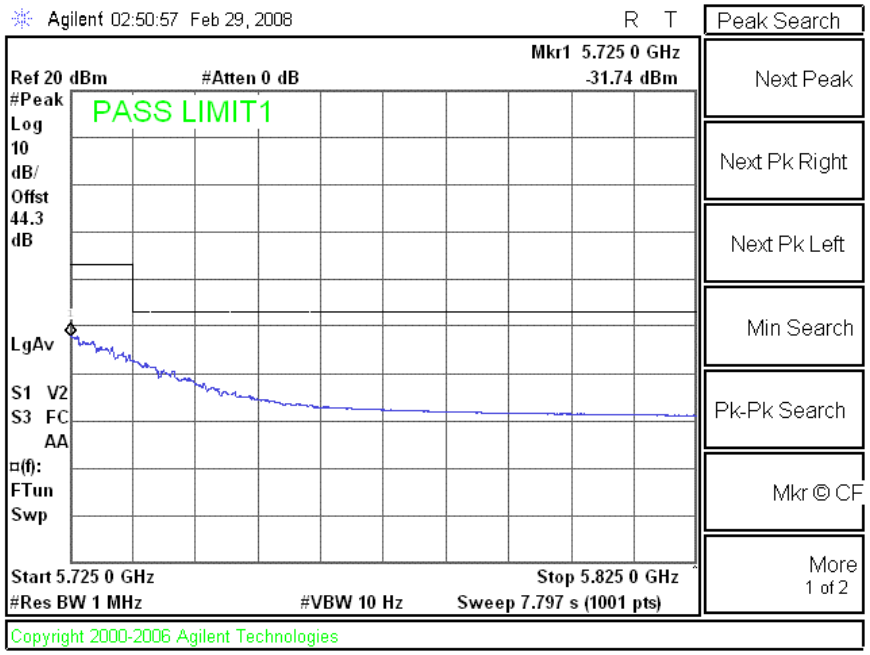
HIGH CHANNEL, AVG, HORIZ



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros Communications
Project #: 08U11571
Date: 2/282008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: Tx, a mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T39-T88 ARA 18-40GHz & Mixer > 40GHz	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_7.6GHz	

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

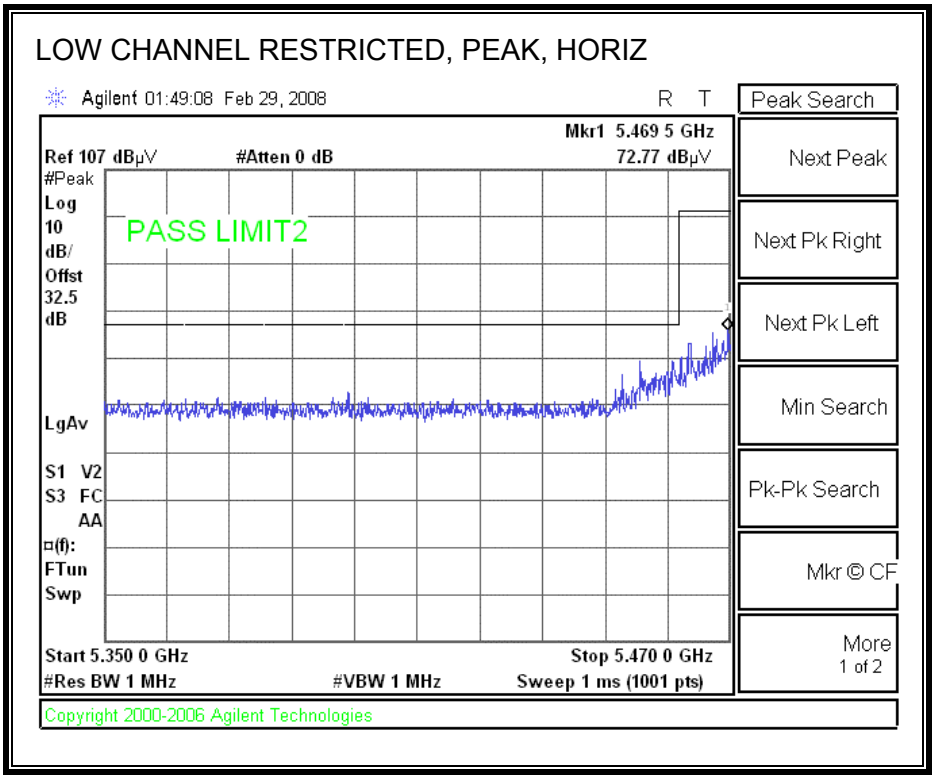
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low channel (5500MHz)															
11.000	1.0	48.4	45.5	37.2	11.1	-32.6	-9.5	0.7	55.4	52.5	74	54	-18.6	-1.5	V
11.000	1.0	44.5	39.5	37.2	11.1	-32.6	-9.5	0.7	51.5	46.5	74	54	-22.5	-7.5	H
Mid Channel (5600MHz)															
11.200	1.0	47.0	42.0	37.3	11.3	-32.6	-9.5	0.7	54.3	49.3	74	54	-19.7	-4.7	V
11.200	1.0	43.0	35.0	37.3	11.3	-32.6	-9.5	0.7	50.3	42.3	74	54	-23.7	-11.7	H
High Channel (5700MHz)															
11.400	1.0	56.0	43.0	37.4	11.5	-32.5	-9.5	0.7	63.6	50.6	74	54	-10.4	-3.4	V
11.400	1.0	53.0	41.0	37.4	11.5	-32.5	-9.5	0.7	60.6	48.6	74	54	-13.4	-5.4	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

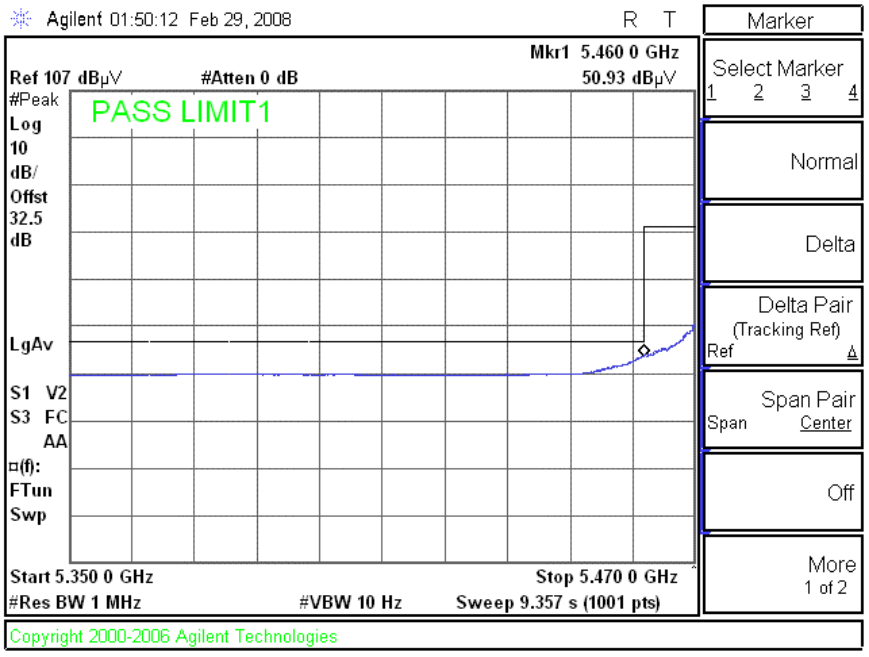
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.2.8. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.6 GHz BAND

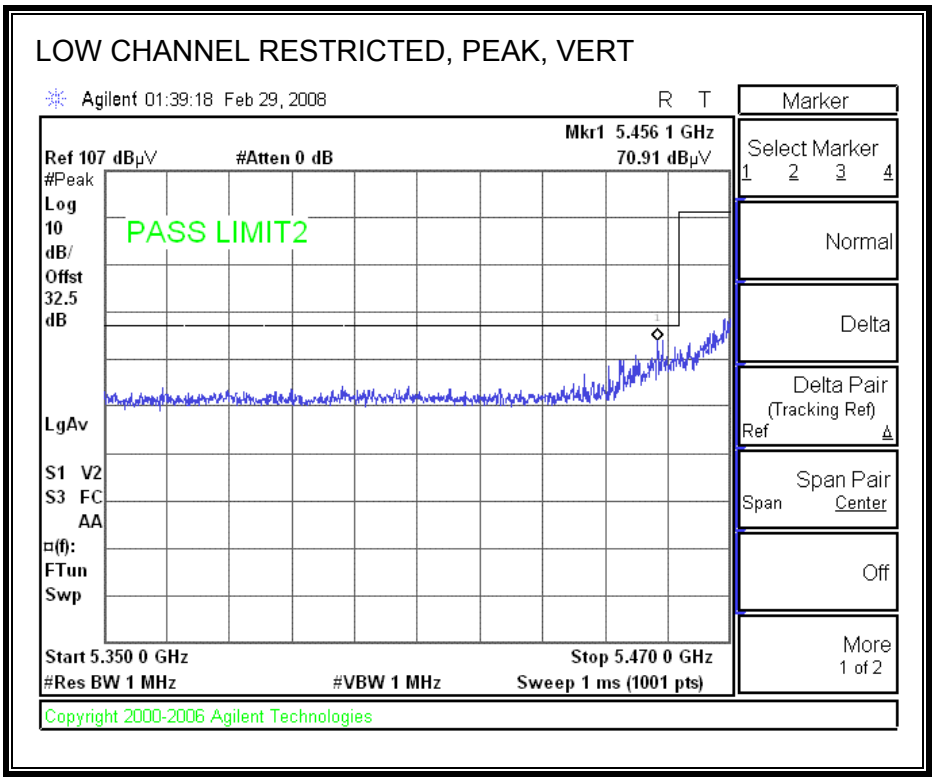
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



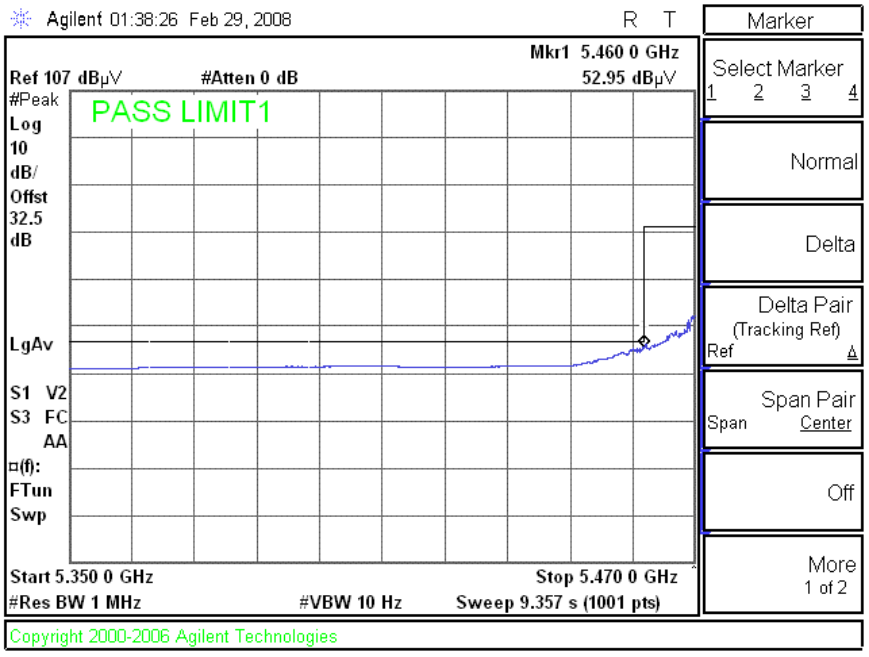
LOW CHANNEL RESTRICTED, AVG, HORIZ



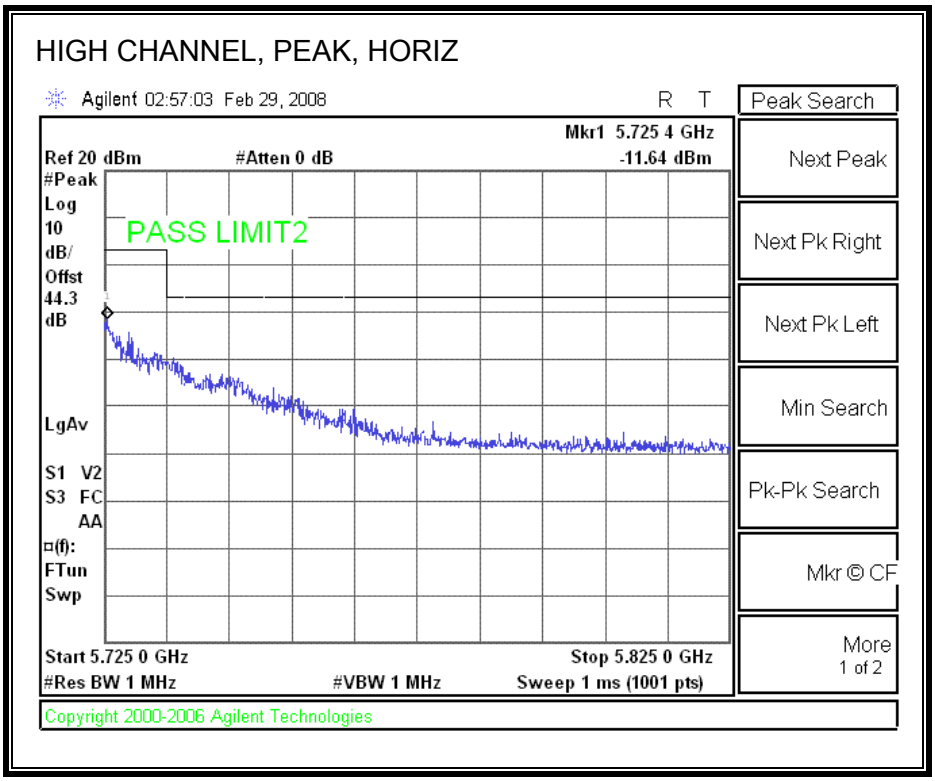
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



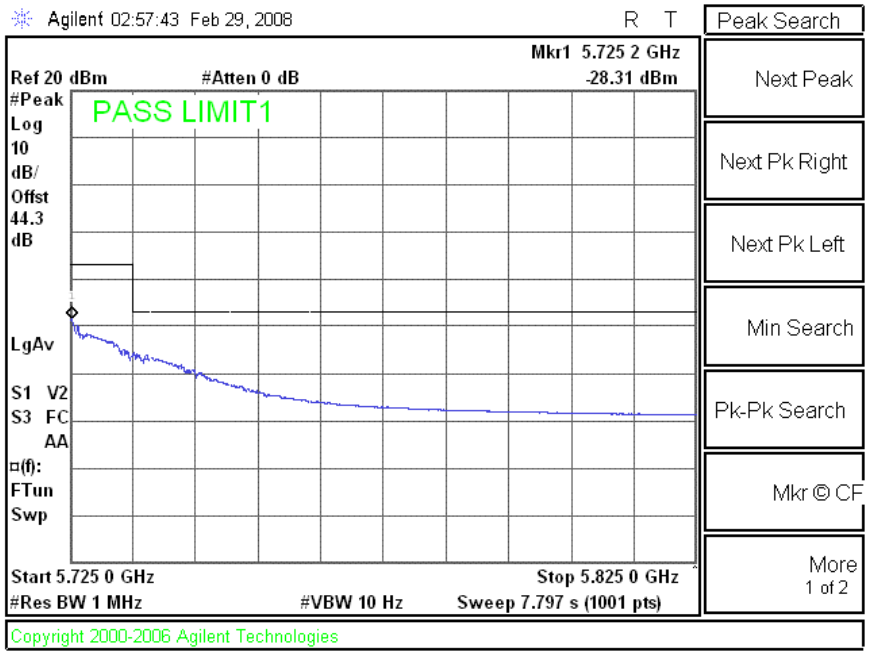
LOW CHANNEL RESTRICTED, AVG, VERT



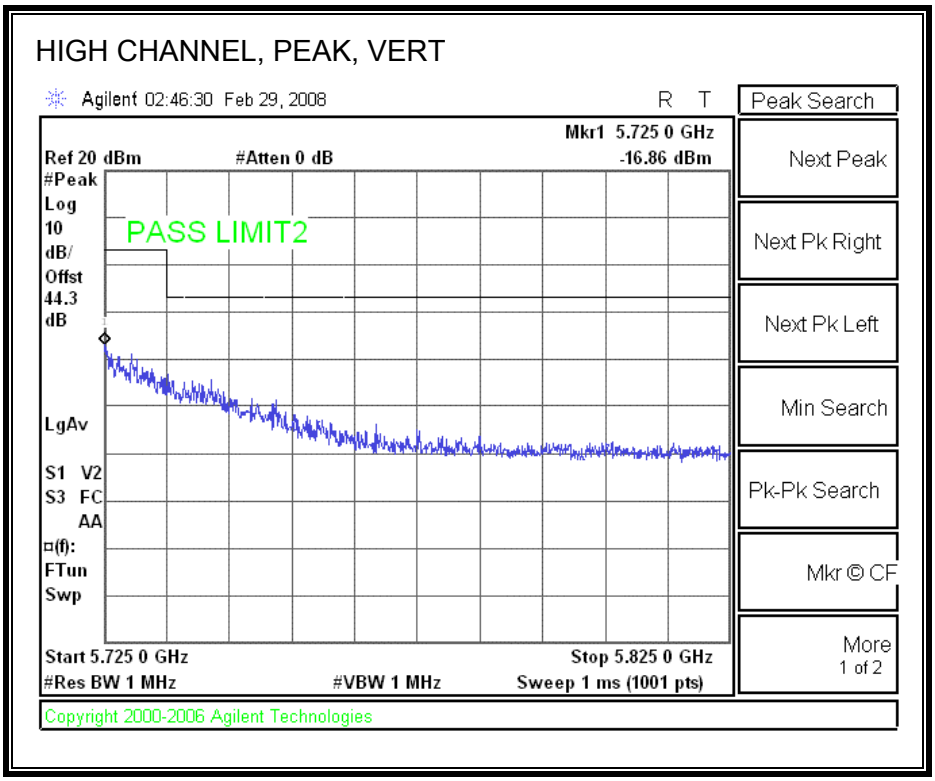
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



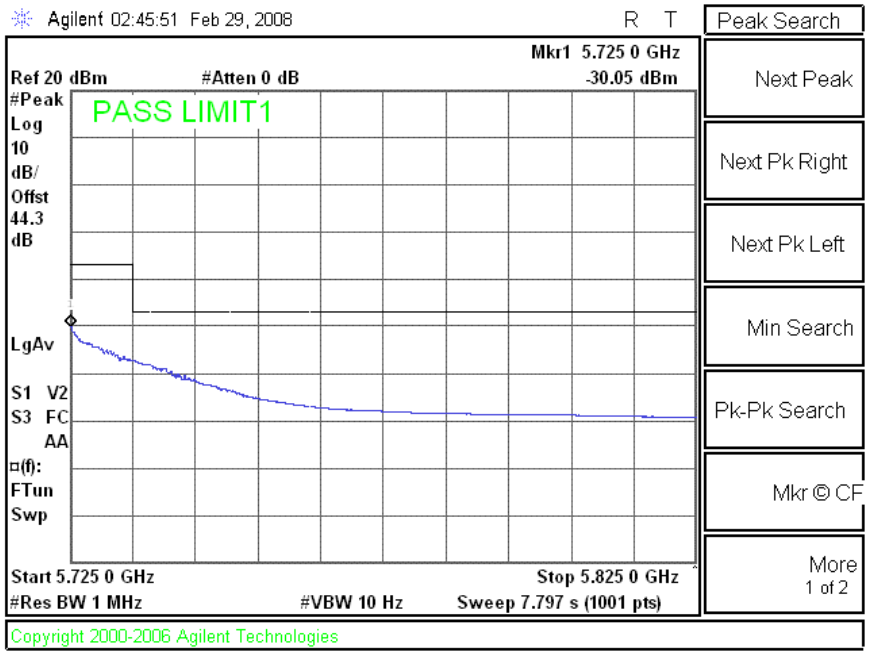
HIGH CHANNEL, AVG, HORIZ



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 08U11571
Date: 2/282008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: HT20 , TX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T39-T88 ARA 18-40GHz & Mixer > 40GHz	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_7.6GHz	

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

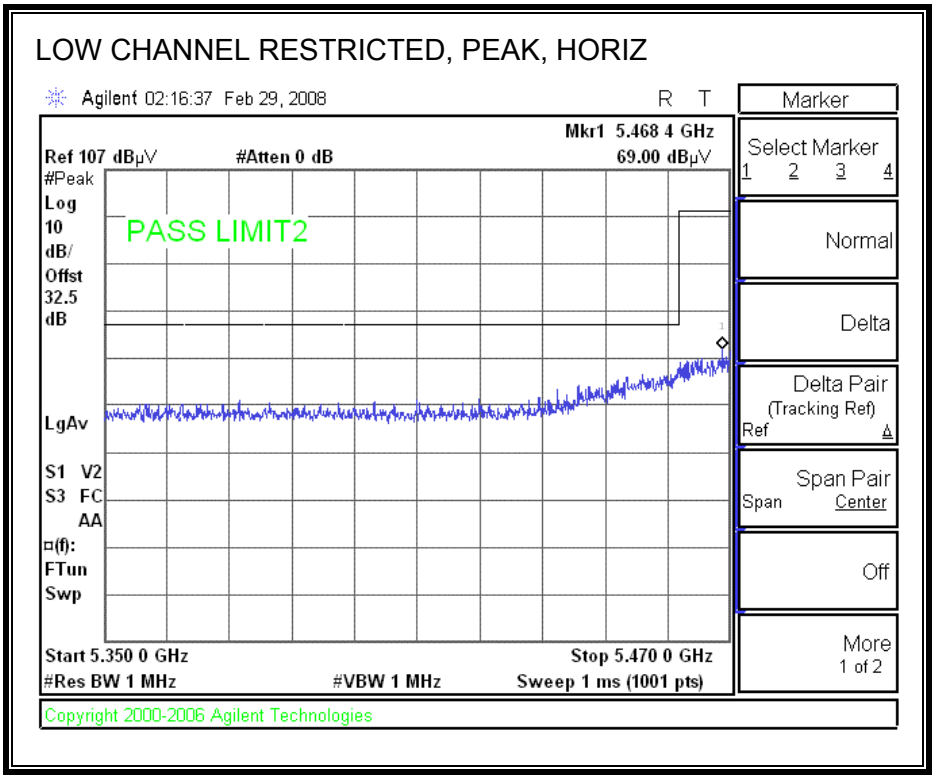
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low channel (5500MHz)															
11.000	1.0	49.0	46.0	37.2	11.1	-32.6	-9.5	0.7	56.0	53.0	74	54	-18.0	-1.0	V
11.000	1.0	45.0	39.6	37.2	11.1	-32.6	-9.5	0.7	52.0	46.6	74	54	-22.0	-7.4	H
Mid Channel (5600MHz)															
11.200	1.0	47.5	43.6	37.3	11.3	-32.6	-9.5	0.7	54.8	50.9	74	54	-19.2	-3.1	V
11.200	1.0	43.0	35.0	37.3	11.3	-32.6	-9.5	0.7	50.3	42.3	74	54	-23.7	-11.7	H
High Channel (5700MHz)															
11.400	1.0	50.0	40.0	37.4	11.5	-32.5	-9.5	0.7	57.6	47.6	74	54	-16.4	-6.4	V
11.400	1.0	45.6	37.5	37.4	11.5	-32.5	-9.5	0.7	53.2	45.1	74	54	-20.8	-8.9	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

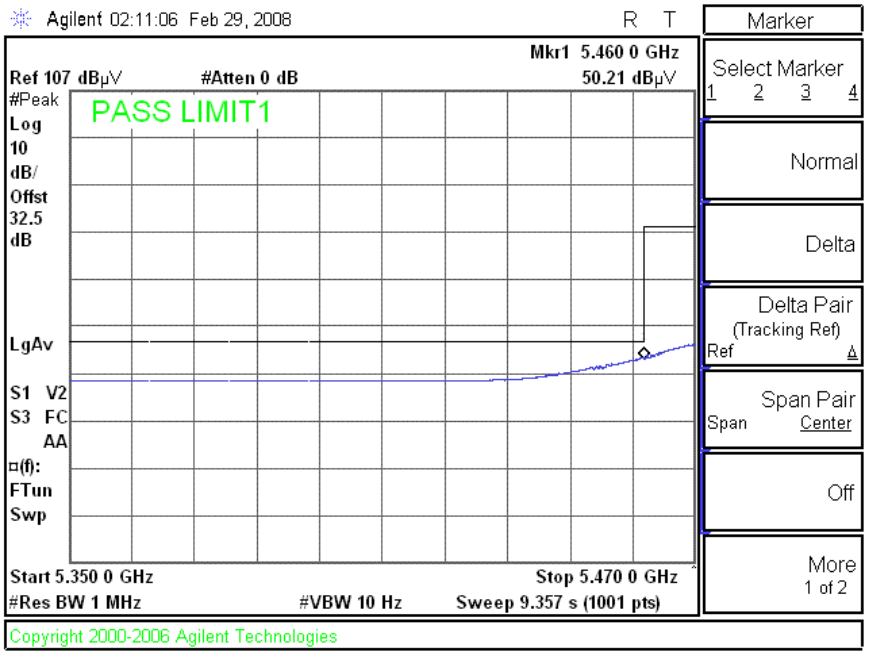
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.2.9. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.6 GHz BAND

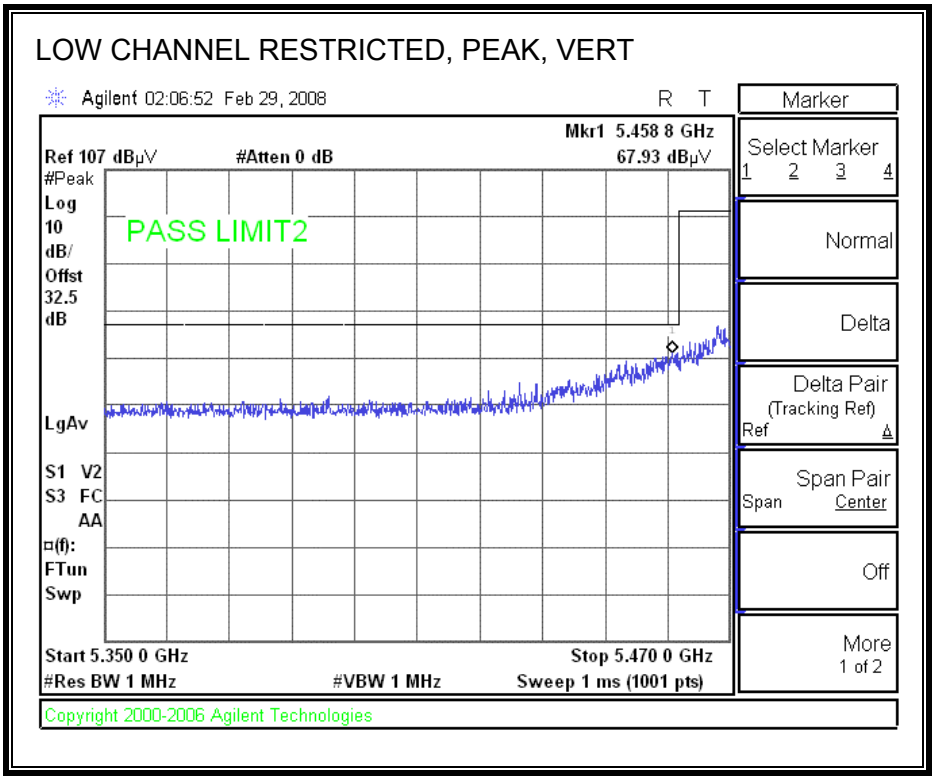
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



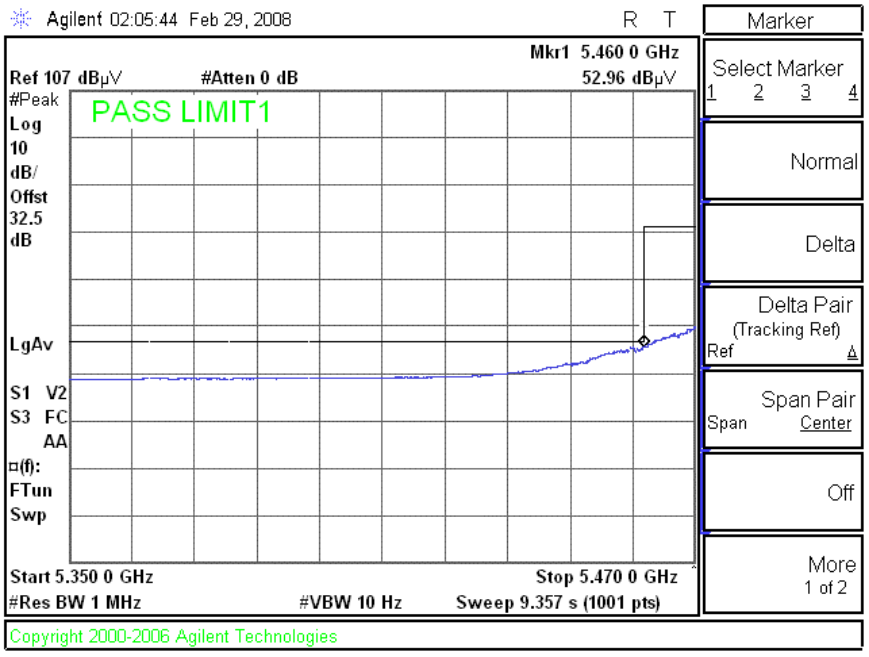
LOW CHANNEL RESTRICTED, AVG, HORIZ



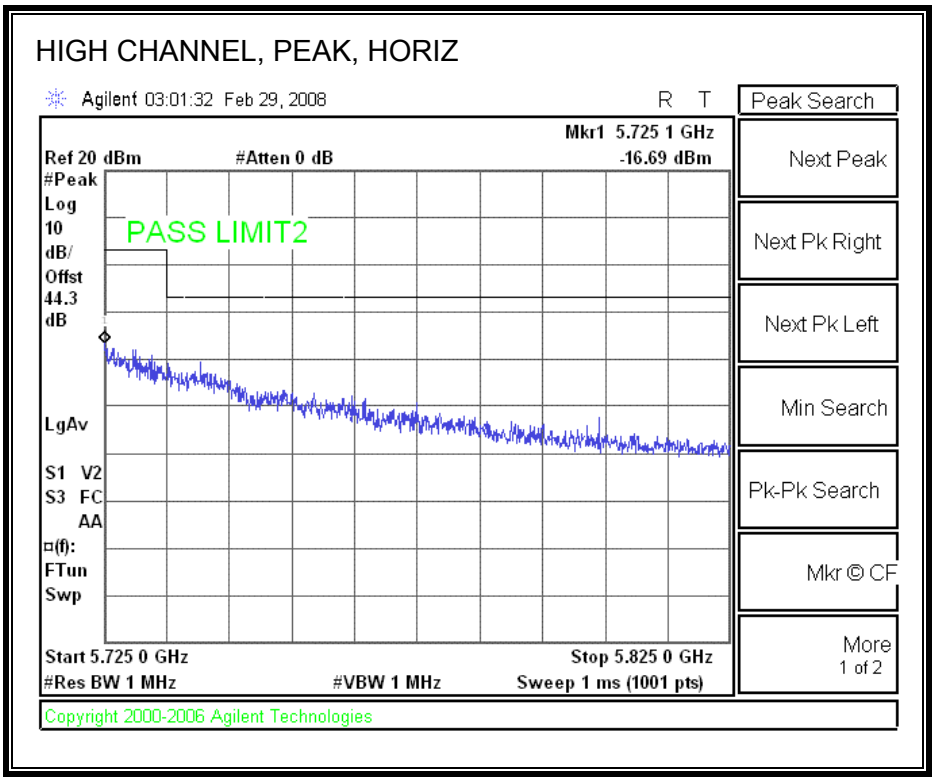
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



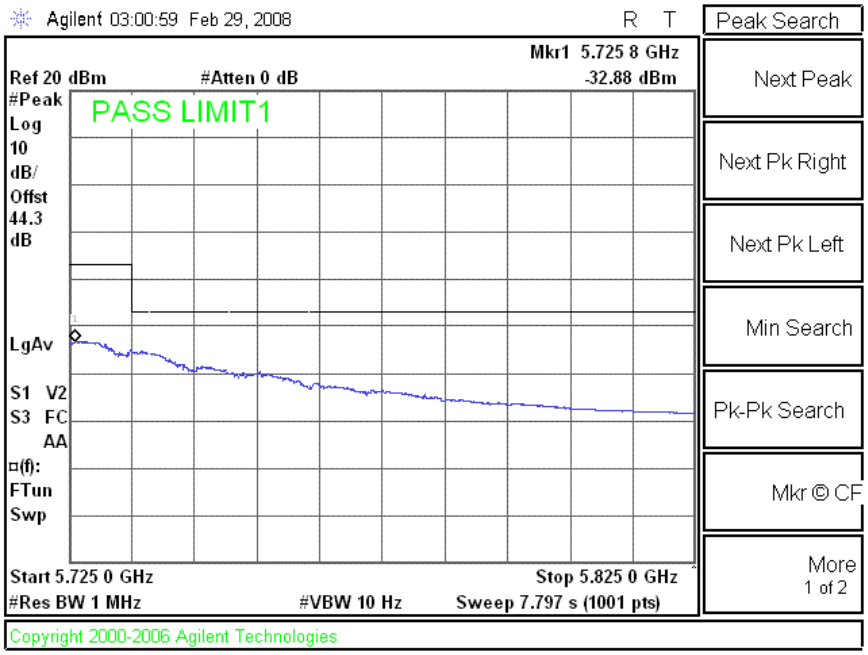
LOW CHANNEL RESTRICTED, AVG, VERT



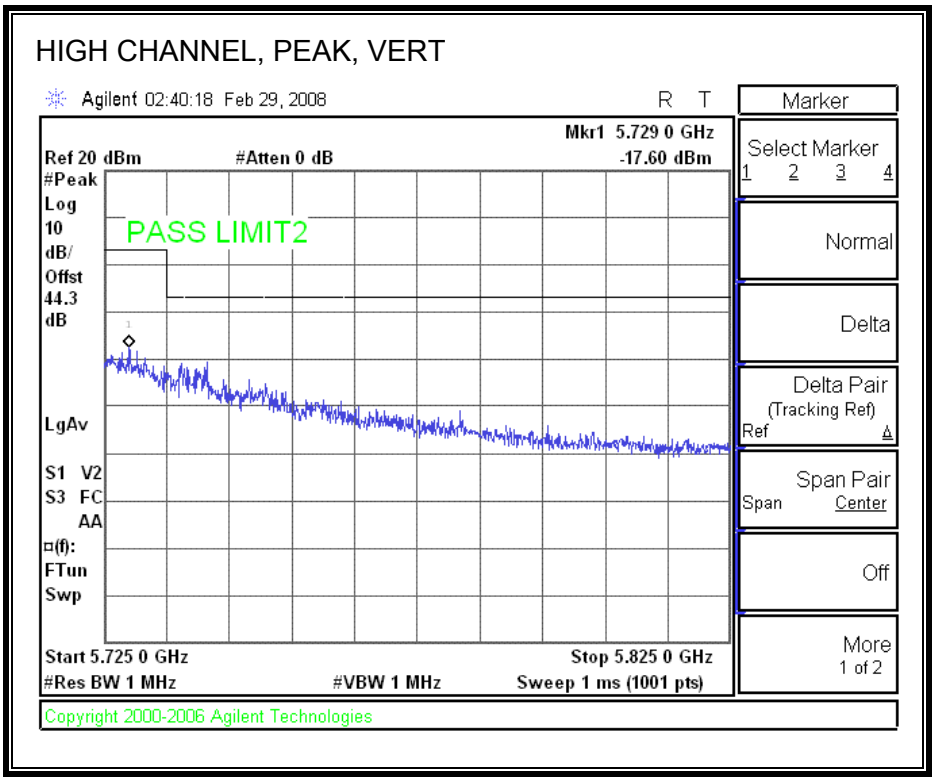
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



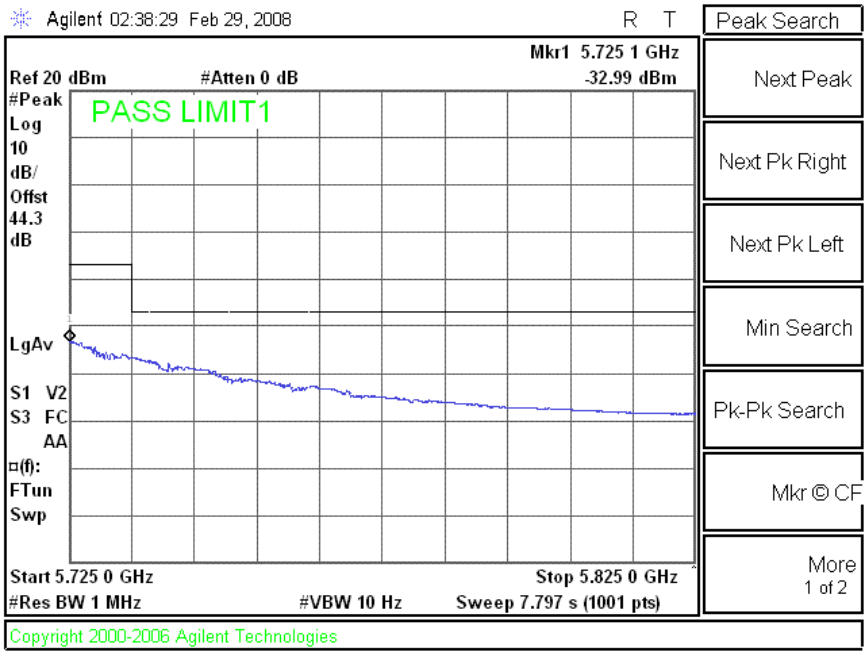
HIGH CHANNEL, AVG, HORIZ



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros
Project #: 08U11571
Date: 2/28/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: Tx HT40 mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T39-T88 ARA 18-40GHz & Mixer > 40GHz	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber		R_001

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low channel (5510MHz)															
11.020	1.0	48.0	44.7	37.3	11.1	-32.6	-9.5	0.0	54.3	51.0	74	54	-19.7	-3.0	V
11.020	1.0	43.0	37.0	37.3	11.1	-32.6	-9.5	0.0	49.3	43.3	74	54	-24.7	-10.7	H
Mid Channel (5590MHz)															
11.180	1.0	46.5	42.0	37.3	11.3	-32.6	-9.5	0.0	53.0	48.5	74	54	-21.0	-5.5	V
11.180	1.0	42.8	36.6	37.3	11.3	-32.6	-9.5	0.0	49.3	43.1	74	54	-24.7	-10.9	H
High Channel (5670MHz)															
11.340	1.0	47.0	40.0	37.4	11.5	-32.6	-9.5	0.0	53.8	46.8	74	54	-20.2	-7.2	V
11.340	1.0	42.5	35.0	37.4	11.5	-32.6	-9.5	0.0	49.3	41.8	74	54	-24.7	-12.2	H

Rev. 4.12.7
Note: No other emissions were detected above the 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		

8.3. RECEIVER ABOVE 1 GHz

8.3.1. RECEIVER ABOVE 1 GHz FOR 20 MHz BANDWIDTH IN THE 2.4 GHz BAND

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros Communications
Project #: 08U11571
Date: 2/29/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: 2.4GHz RX (Worst Case)

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber		

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Mid Ch															
1.062	3.0	54.0	34.2	25.9	3.1	-38.2	0.0	0.0	44.8	25.0	74	54	-29.2	-29.0	V
2.492	3.0	58.5	36.0	29.5	4.9	-36.3	0.0	0.0	56.7	34.2	74	54	-17.3	-19.8	V
1.062	3.0	53.4	33.5	25.9	3.1	-38.2	0.0	0.0	44.2	24.3	74	54	-29.8	-29.7	H
2.500	3.0	57.8	34.1	29.5	4.9	-36.3	0.0	0.0	56.0	32.3	74	54	-18.0	-21.7	H

Rev. 4.12.7
Note: No other emissions were detected above the 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		

8.3.2. RECEIVER ABOVE 1 GHz FOR 40 MHz BANDWIDTH IN THE 5.2 GHz BAND

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Atheros Communications
Project #: 08U11571
Date: 2/29/2008
Test Engineer: Chin Pang
Configuration: EUT/Antenna/Laptop
Mode: 5GHz RX (Worst Case)

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber		

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Mid Ch															
1.200	3.0	58.0	34.5	26.2	3.3	-38.0	0.0	0.0	49.5	26.0	74	54	-24.5	-28.0	V
2.492	3.0	5.0	36.0	29.5	4.9	-36.3	0.0	0.0	3.2	34.2	74	54	-70.8	-19.8	V
1.196	3.0	52.8	32.6	26.2	3.3	-38.0	0.0	0.0	44.3	24.1	74	54	-29.7	-29.9	H
2.492	3.0	56.7	34.0	29.5	4.9	-36.3	0.0	0.0	54.9	32.2	74	54	-19.1	-21.8	H

Rev. 4.12.7
Note: No other emissions were detected above the 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		

8.4. WORST-CASE BELOW 1 GHz

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

HORIZONTAL DATA

```
Condition: FCC CLASS-B HORIZONTAL
Test Operator: Chin Pang
Project #     : 08U11571
Company       : Atheros Communications
Config        : EUT/laptop/antenna
Mode          : 5GHz Band, Tx (Worst Case)
Target        : FCC Class B
```

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	129.910	54.83	-16.57	38.27	43.50	-5.23	Peak
2	299.660	53.67	-15.92	37.75	46.00	-8.25	Peak
3	422.850	49.00	-12.85	36.15	46.00	-9.85	Peak
4	454.860	51.17	-12.28	38.89	46.00	-7.11	Peak
5	551.860	45.00	-10.68	34.32	46.00	-11.68	Peak
6	697.360	42.00	-8.57	33.43	46.00	-12.57	Peak

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

VERTICAL DATA

```
Condition: FCC CLASS-B VERTICAL
Test Operator: Chin Pang
Project #     : 08U11571
Company       : Atheros Communications
Config        : EUT/laptop/antenna
Mode          : 5GHz Band, Tx (Worst Case)
Target        : FCC Class B
```

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	129.910	49.83	-16.57	33.27	43.50	-10.23	Peak
2	181.320	51.00	-18.52	32.49	43.50	-11.02	Peak
3	258.920	50.33	-17.48	32.86	46.00	-13.14	Peak
4	357.860	53.17	-14.43	38.73	46.00	-7.27	Peak
5	486.870	46.50	-11.59	34.91	46.00	-11.09	Peak
6	799.210	43.83	-7.05	36.78	46.00	-9.22	Peak

9. DYNAMIC FREQUENCY SELECTION

9.1. OVERVIEW

9.1.1. LIMITS

INDUSTRY CANADA

IC RSS-210 is closely harmonized with FCC Part 15 DFS rules. The deviations are as follows:

RSS-210 Issue 7 A9.4 (b) (ii) **Channel Availability Check Time:** …

Additional requirements for the band 5600-5650 MHz: Until further notice, devices subject to this Section shall not be capable of transmitting in the band 5600-5650 MHz, so that Environment Canada weather radars operating in this band are protected.

RSS-210 Issue 7 A9.4 (b) (iv) **Channel closing time:** the maximum channel closing time is 260 ms.

FCC

§15.407 (h) and FCC 06-96 APPENDIX "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVCIES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION".

Table 1: Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode		
	Master	Client (without radar detection)	Client (with radar detection)
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
Uniform Spreading	Yes	Not required	Not required

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client **(without DFS)**	Client **(with DFS)**
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes

Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.	

Table 4: DFS Response requirement values

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds
Channel Closing Transmission Time	200 milliseconds + approx. 60 milliseconds over remaining 10 second period
The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows: For the Short pulse radar Test Signals this instant is the end of the *Burst*. For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated. For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission. The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.	

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (Microseconds)	PRI (Microseconds)	Pulses	Minimum Percentage of Successful Detection	Minimum Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Table 6 – Long Pulse Radar Test Signal

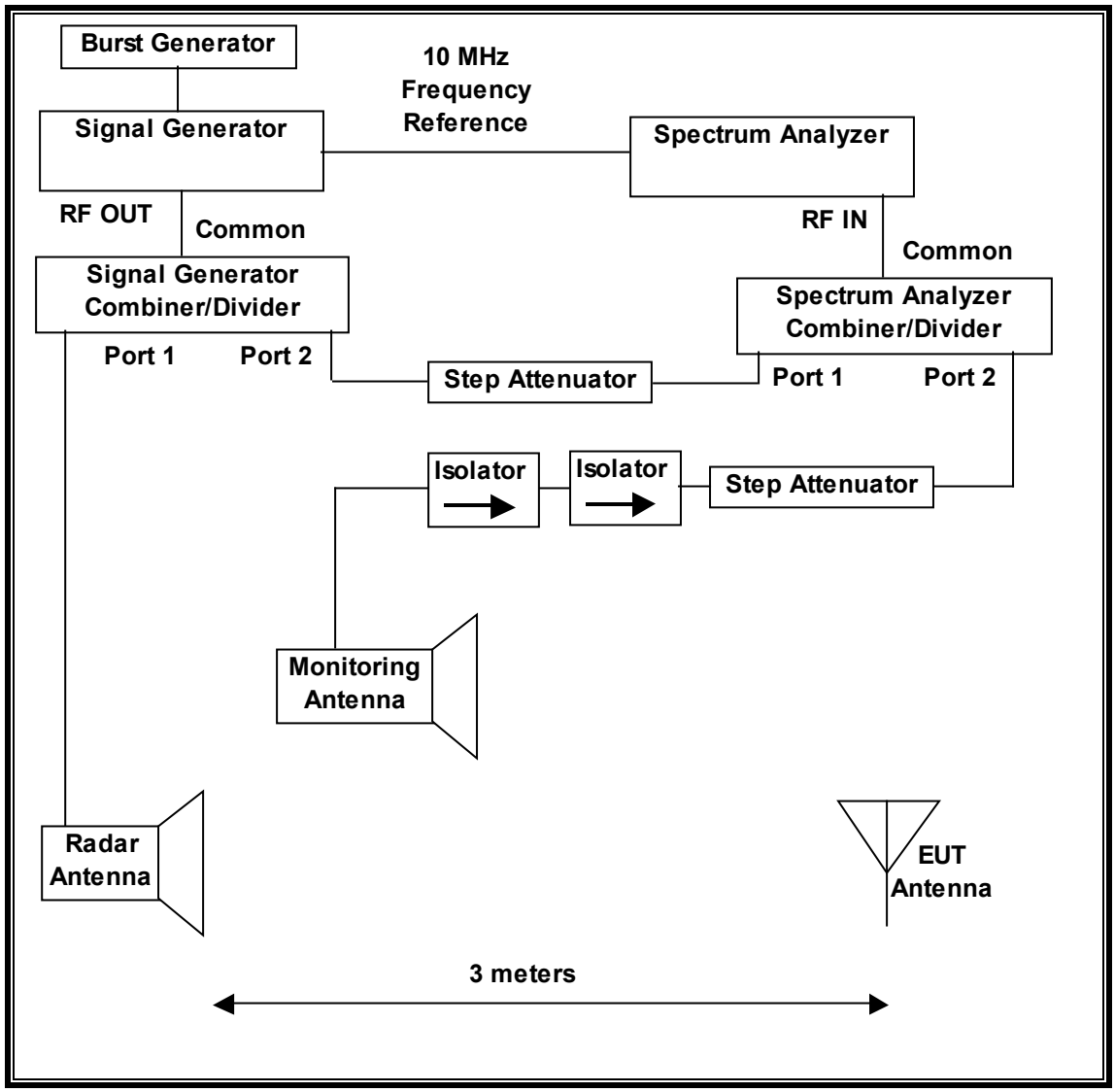
Radar Waveform	Bursts	Pulses per Burst	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

Table 7 – Frequency Hopping Radar Test Signal

Radar Waveform	Pulse Width (µsec)	PRI (µsec)	Burst Length (ms)	Pulses per Hop	Hopping Rate (kHz)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	300	9	.333	70%	30

9.1.2. TEST AND MEASUREMENT SYSTEM

CONDUCTED METHOD SYSTEM BLOCK DIAGRAM



SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Freqeuncy Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from F_L to F_H for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer set to display 8001 bins on the horizontal axis. The time-domain resolution is 2 msec / bin with a 16 second sweep time, meeting the 10 second short pulse reporting criteria. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

Should multiple RF ports be utilized for the Master and/or Slave devices (for example, for diversity or MIMO implementations), additional combiner/dividers are inserted between the Master Combiner/Divider and the pad connected to the Master Device (and/or between the Slave Combiner/Divider and the pad connected to the Slave Device). Additional pads are utilized such that there is one pad at each RF port on each EUT.

SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. Measure the amplitude and calculate the difference from –64 dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

Set the signal generator to produce a radar waveform, trigger a burst manually and measure the level on the spectrum analyzer. Readjust the amplitude of the signal generator as required so that the peak level of the waveform is at a displayed level equal to the required or desired interference detection threshold. Separate signal generator amplitude settings are determined as required for each radar type.

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

Establish a link between the Master and Slave, adjusting the distance between the units as needed to provide a suitable received level at the Master and Slave devices. Stream the video test file to generate WLAN traffic. Confirm that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold. For Master Device testing confirm that the displayed traffic does not include Slave Device traffic. For Slave Device testing confirm that the displayed traffic does not include Master Device traffic.

If a different setting of the Step Attenuators are required to meet the above conditions, perform a new System Calibration for the new Step Attenuator settings.

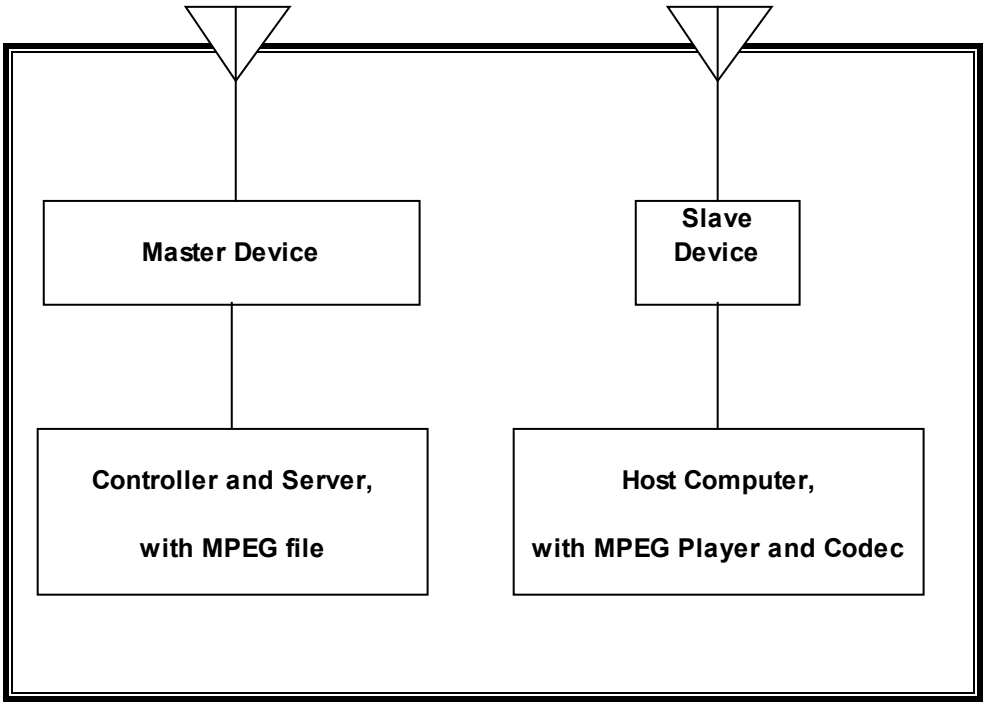
TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the DFS tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	MY43360112	3/3/2009
Vector Signal Generator, 20GHz	Agilent / HP	E8267C	US43320336	11/16/2009
High Speed Digital I/O Card	National Instruments	PCI-6534	HA1612845	1/16/2008
Signal Generator, 20GHz	Agilent / HP	83732B	US34490599	7/5/2008
Arbitrary Waveform Generator	Agilent / HP	33220A	MY44026694	5/2/2008

9.1.3. SETUP OF EUT

RADIATED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

The following test and measurement equipment was utilized for the DFS tests documented in this report:

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Compaq	PPP012L	565BC0ALL0J1BE	DoC
Laptop	Compaq	Presario 3000	CNU327025L	DoC
AC Adapter	IBM	92P1016	11S92P1016Z1ZAC66AJ0V9	DoC
Laptop	IBM	T42P	ZZ-27259	DoC

9.1.4. DESCRIPTION OF EUT

The EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges.

The EUT is a Slave Device without Radar Detection.

The highest power level within these bands is 29.24 dBm EIRP in the 5250-5350 MHz band and 28.92 dBm EIRP in the 5470-5725 MHz band.

The highest gain antenna assembly utilized with the EUT has a gain of 5.56 dBi in the 5250-5350 MHz band and 5.34 dBi in the 5470-5725 MHz band. The lowest gain antenna assembly utilized with the EUT has a gain of 3.74 dBi in the 5250-5350 MHz band and 5.03 dBi in the 5470-5725 MHz band.

The only antenna assembly utilized with the EUT has a gain of 5.56 dBi.

Two identical antennas are utilized to meet the diversity and MIMO operational requirements.

The EUT uses two transmitter/receiver chains and one receive only chain, each connected to a 50-ohm coaxial antenna port. All antenna ports are connected to the test system via a power divider to perform conducted tests.

The Slave device associated with the EUT during these tests does not have radar detection capability.

WLAN traffic is generated by streaming the video file TestFile.mp2 “6 ½ Magic Hours” from the Master to the Slave in full motion video mode using the media player with the V2.61 Codec package.

TPC is required since the maximum EIRP is greater than 500 mW (27 dBm).

The EUT utilizes the 802.11a/n architecture. Two nominal channel bandwidths are implemented: 20 MHz and 40 MHz.

DESCRIPTION OF TPC FUNCTION

The power is adjustable over a range of approximately 12 dB, therefore the EUT is capable of the required 6 dB TPC reduction.

OVERVIEW OF MASTER DEVICE WITH RESPECT TO §15.407 (h) REQUIREMENTS

The Master Device is a Cisco Access Point, FCC ID: LDK102061. The minimum antenna gain for the Master Device is 3.5 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is –64 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is –64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides margin to the limit.

9.2. RESULTS FOR 20 MHz BANDWIDTH

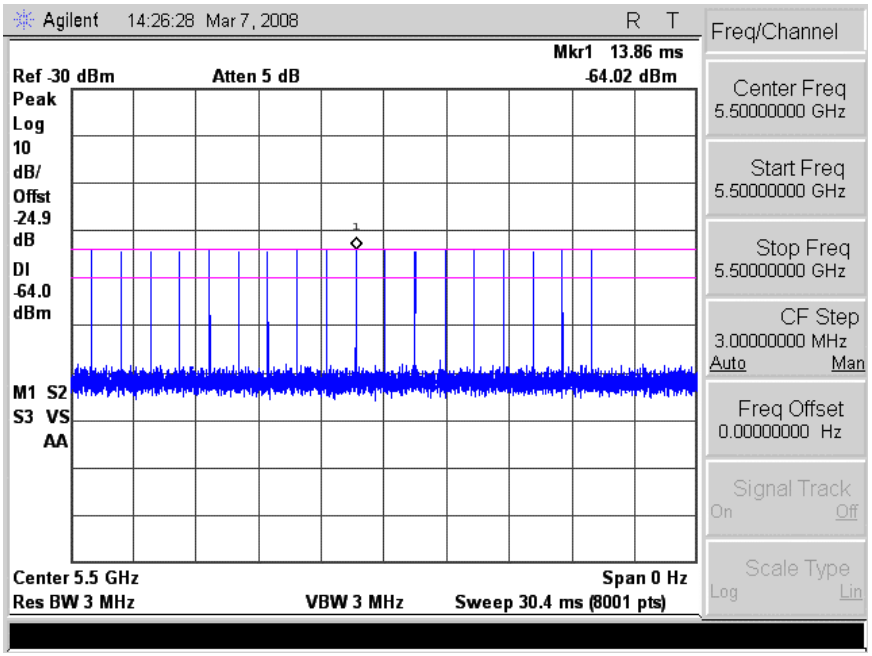
9.2.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5500 MHz. Measurements were performed using conducted test methods.

9.2.2. PLOTS OF RADAR WAVEFORM AND WLAN TRAFFIC

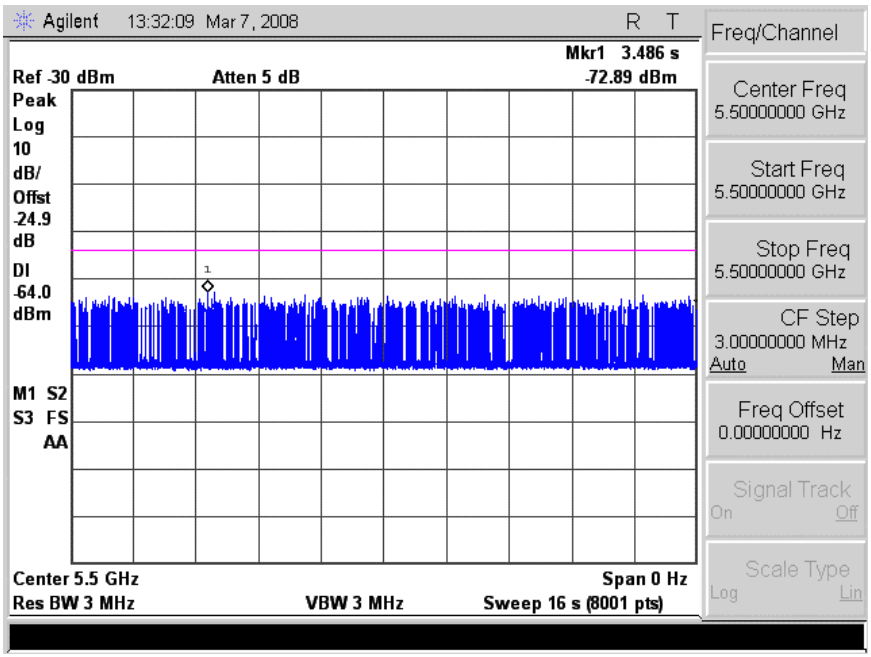
PLOTS OF RADAR WAVEFORM

SHORT PULSE RADAR TYPE 1



PLOT OF WLAN TRAFFIC

WLAN TRAFFIC



9.2.3. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =

(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

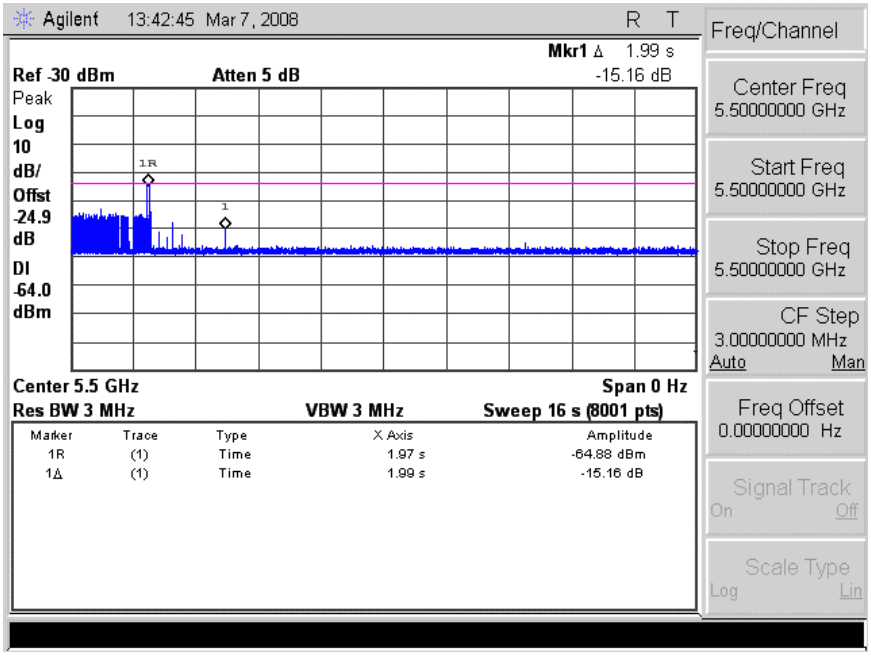
RESULTS

Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	2.0	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	10.0	60
IC	26.0	260

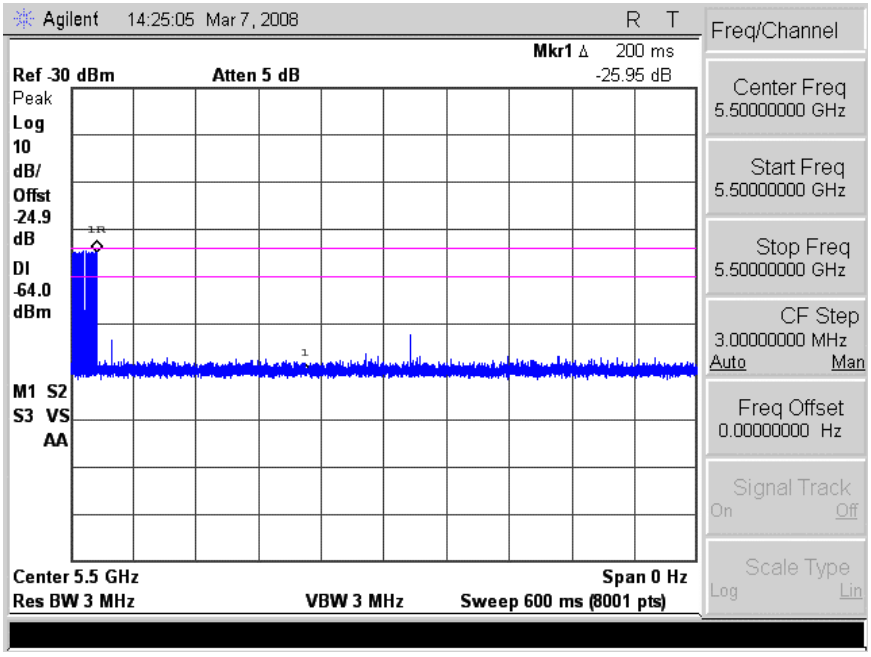
MOVE TIME

MOVE TIME PLOT



CHANNEL CLOSING TIME

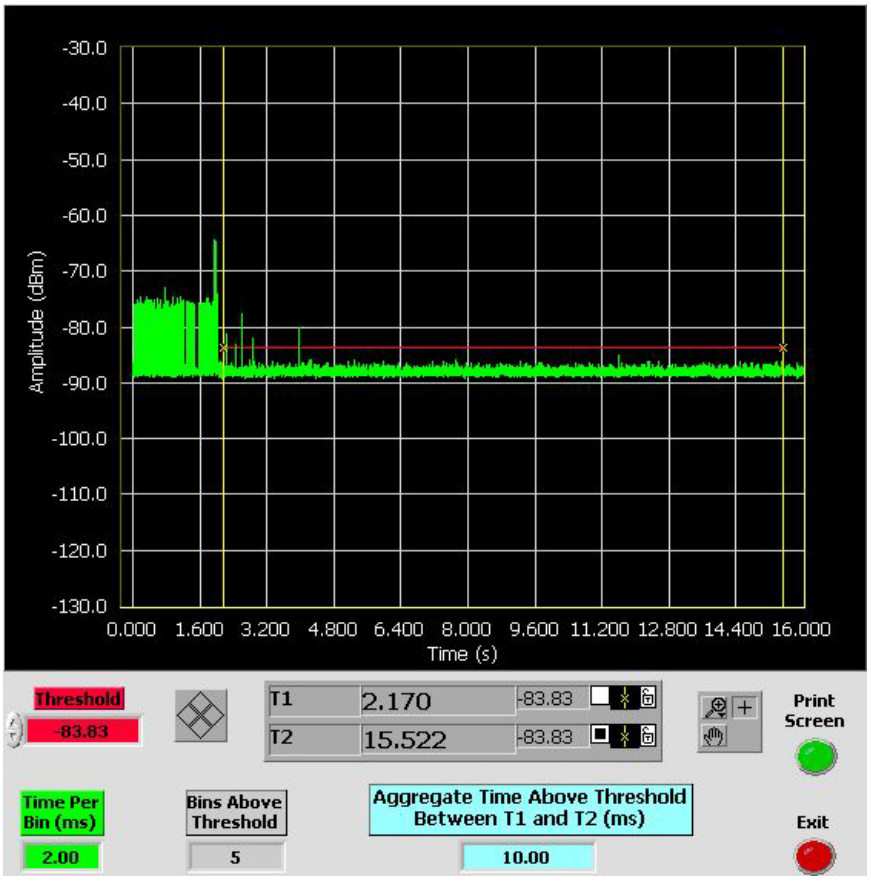
CLOSING TIME PLOT



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

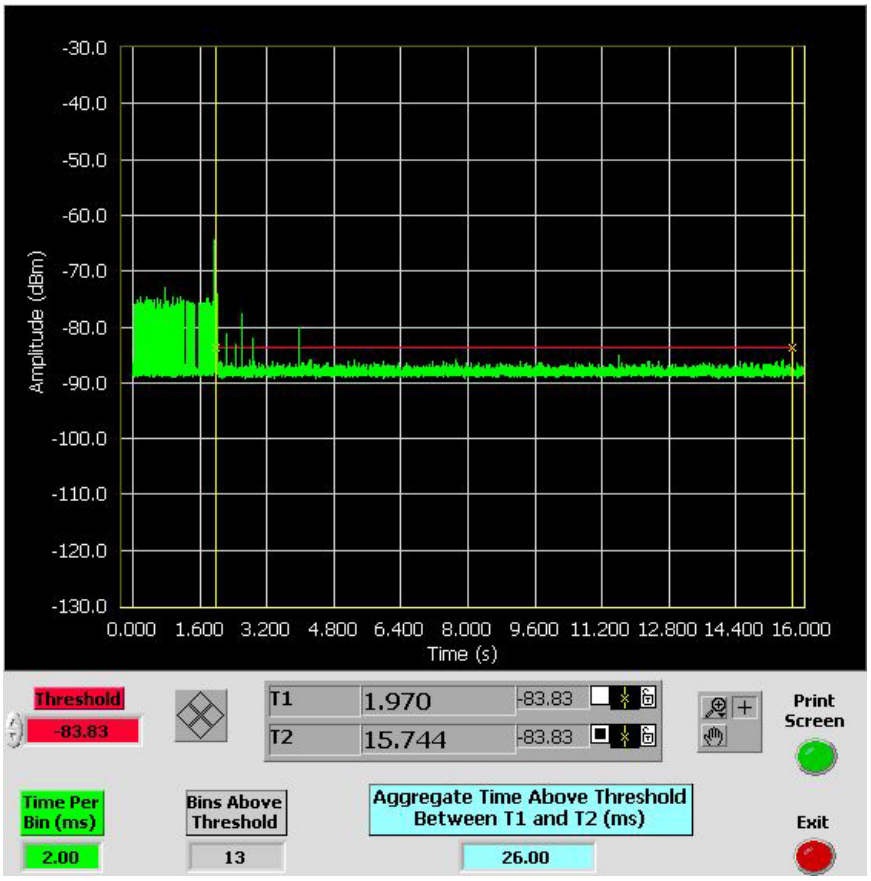
Only intermittent transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME PLOT



Only intermittent transmissions are observed during the IC aggregate monitoring period.

IC AGGREGATE CLOSING TIME PLOT



9.2.4. SLAVE NON-OCCUPANCY

TEST PROCEDURE

The spectrum analyzer is monitoring the emissions from the Slave.

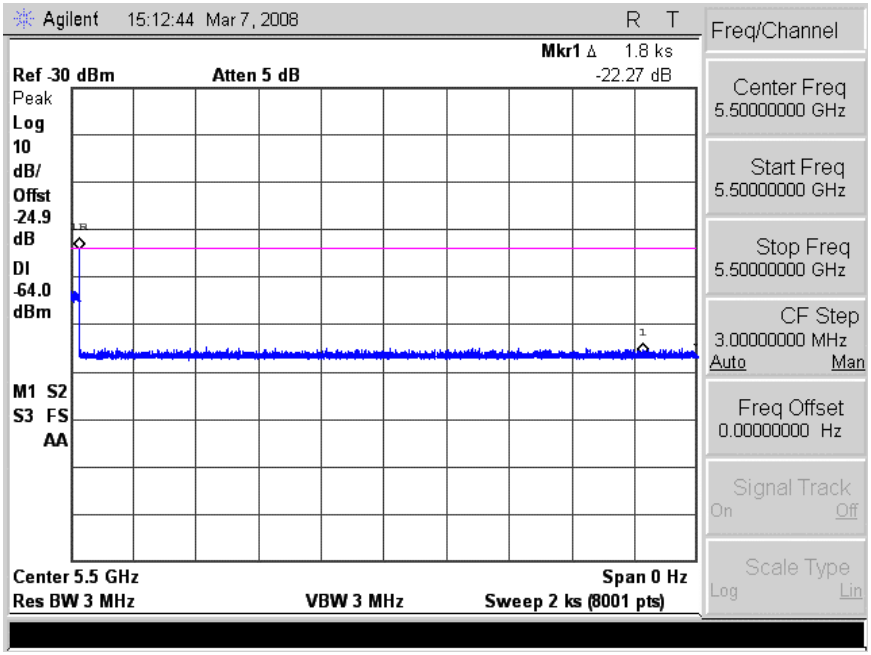
The AP and Slave are linked in a 20 MHz bandwidth mode, with streaming video. The spectrum analyzer trace is started, then the radar is triggered, and the channel is monitored for > 30 minutes.

Then the AP is powered down. The spectrum analyzer trace is started, then the Slave is rebooted, and the channel is monitored for > 30 minutes.

ASSOCIATED TEST RESULTS

No EUT transmissions were observed on the test channel during the 30-minute observation time.

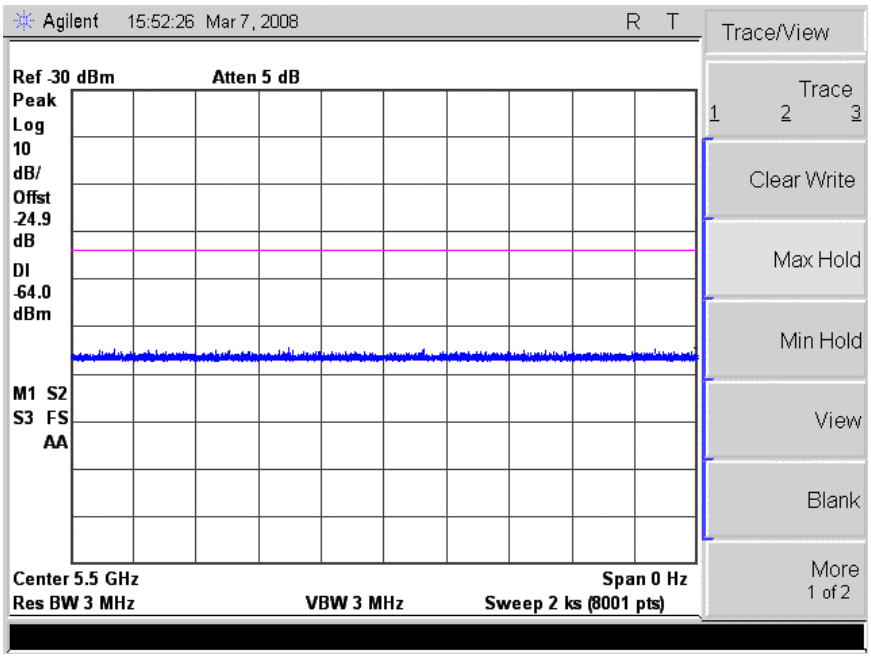
NON-OCCUPANCY PERIOD, ASSOCIATED PLOT



NON-ASSOCIATED TEST RESULTS

No EUT transmissions were observed on the test channel during the 30-minute observation time.

NON-OCCUPANCY PERIOD, NON-ASSOCIATED PLOT



9.3. RESULTS FOR 40 MHz BANDWIDTH

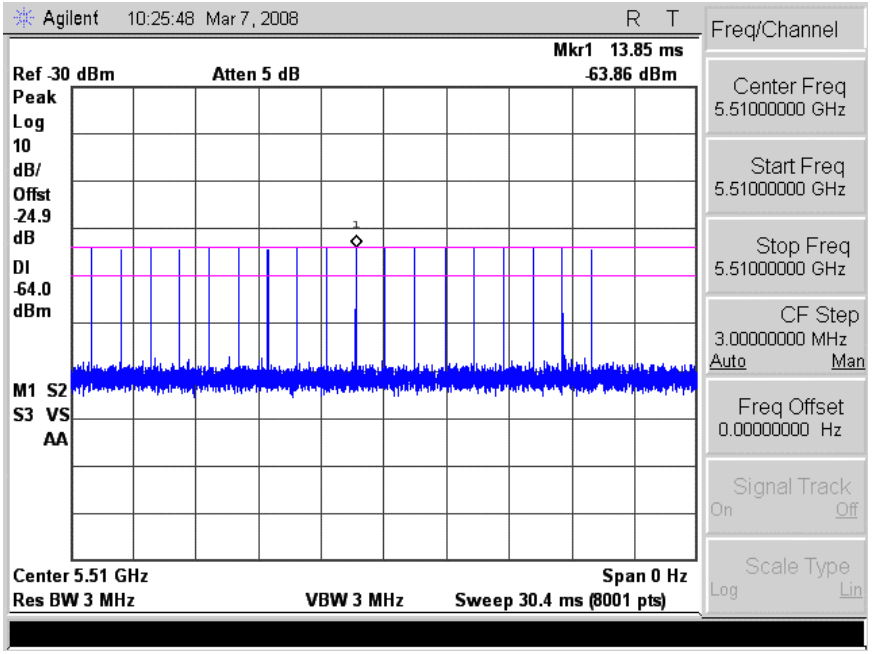
9.3.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5510 MHz. Measurements were performed using conducted test methods.

9.3.2. PLOTS OF RADAR WAVEFORM AND WLAN TRAFFIC

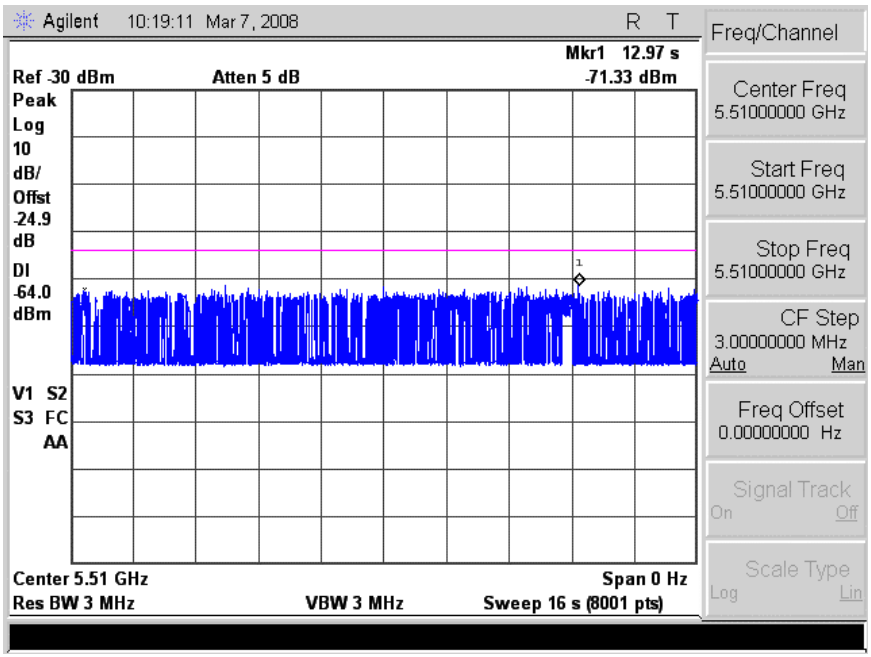
PLOTS OF RADAR WAVEFORM

SHORT PULSE RADAR TYPE 1



PLOT OF WLAN TRAFFIC

WLAN TRAFFIC



9.3.3. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =

(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

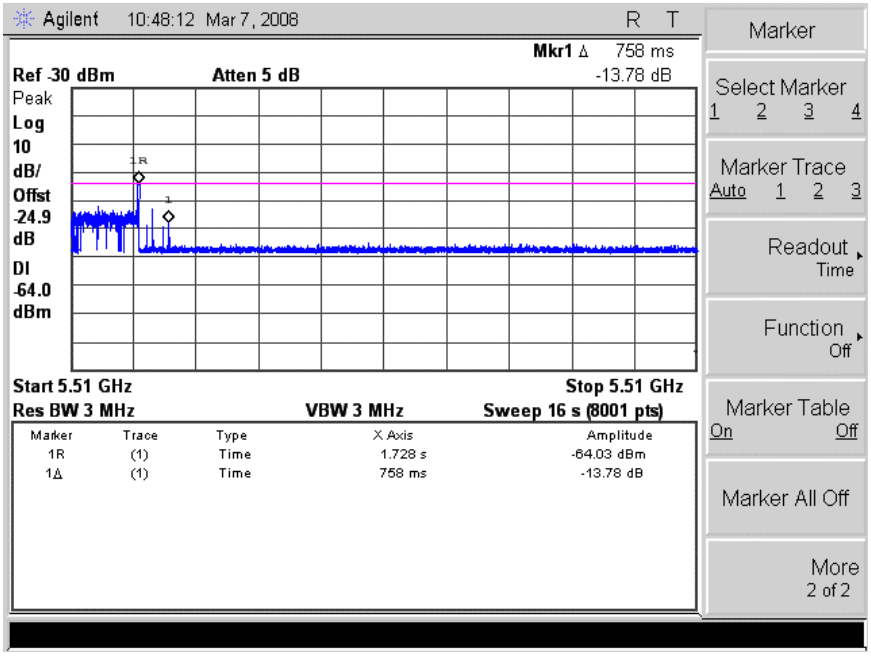
RESULTS

Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.8	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	10.0	60
IC	16.0	260

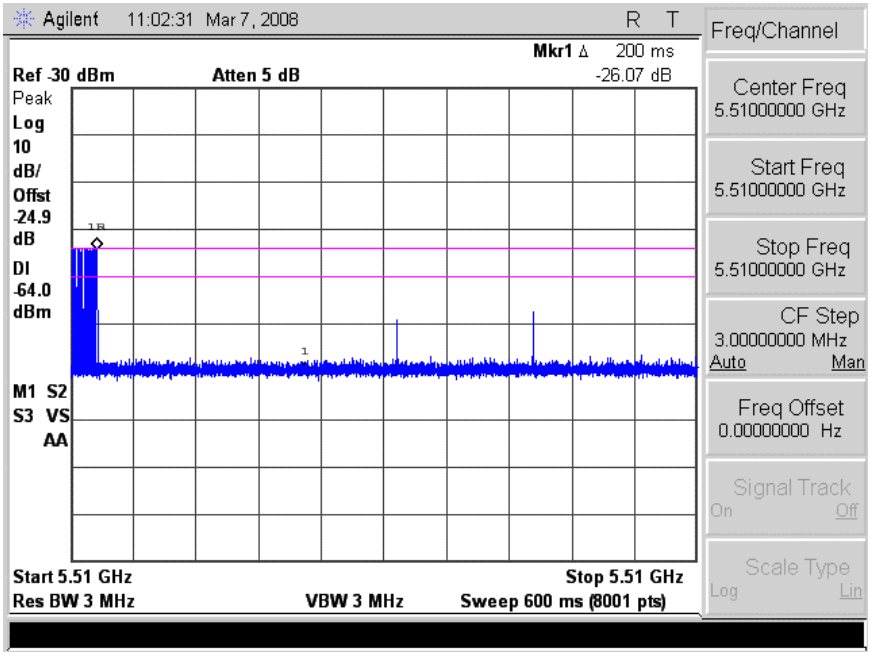
MOVE TIME

MOVE TIME PLOT



CHANNEL CLOSING TIME

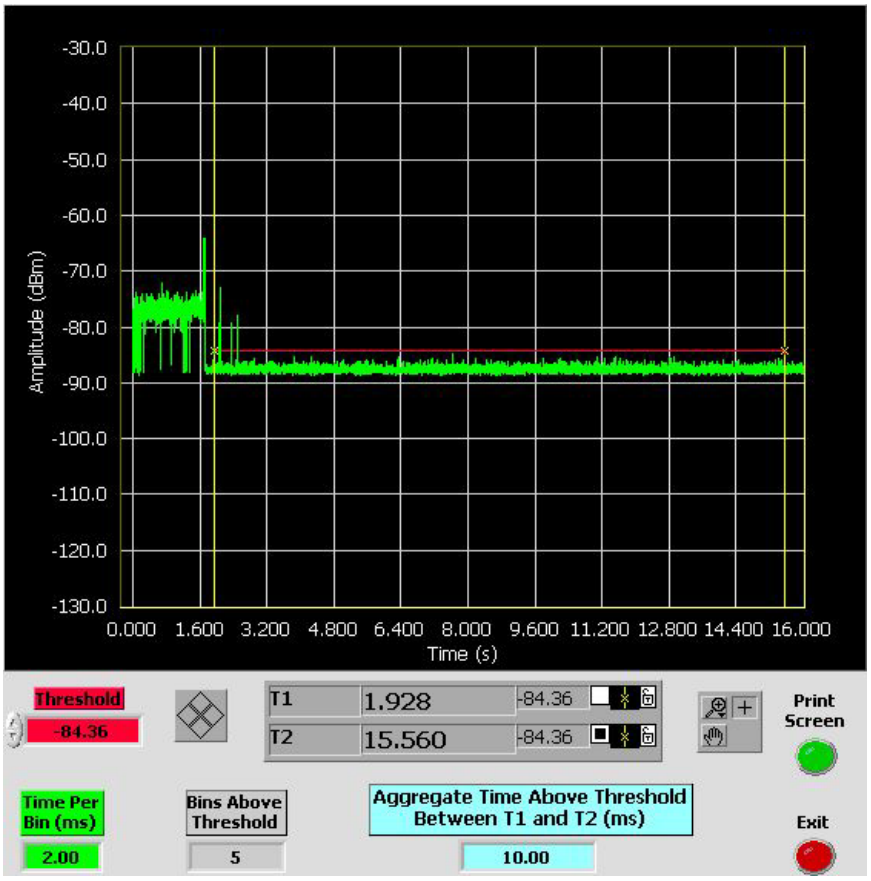
CLOSING TIME PLOT



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

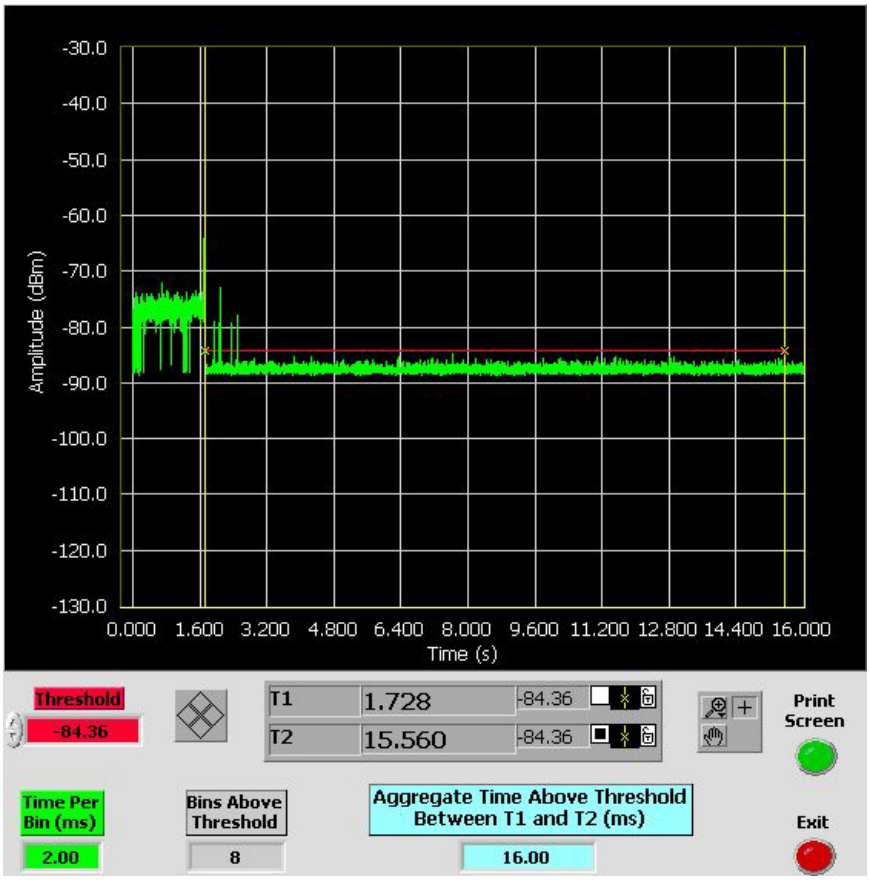
Only intermittent transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME PLOT



Only intermittent transmissions are observed during the IC aggregate monitoring period.

IC AGGREGATE CLOSING TIME PLOT



9.3.4. SLAVE NON-OCCUPANCY

TEST PROCEDURE

The spectrum analyzer is monitoring the emissions from the Slave.

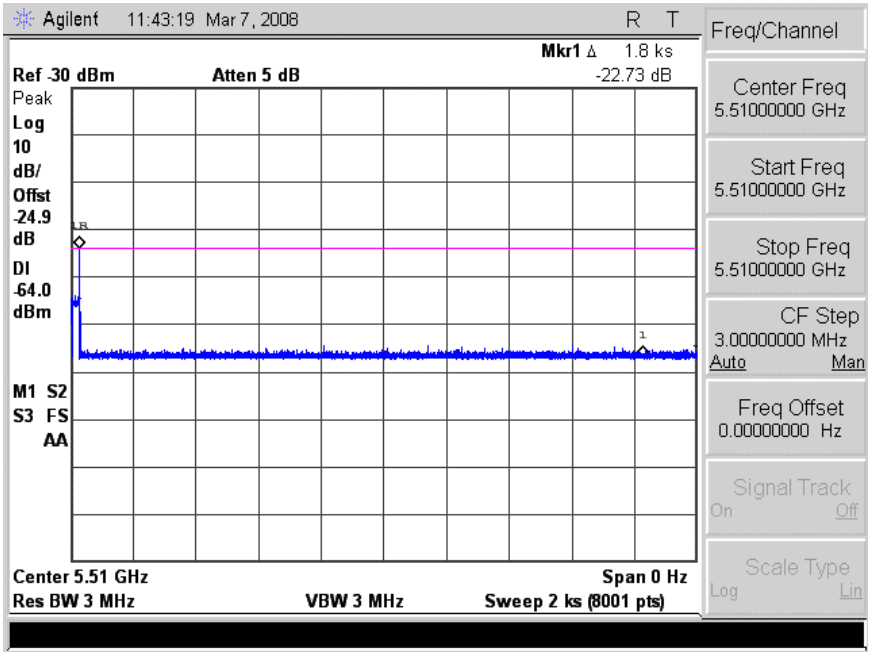
The AP and Slave are linked in a 40 MHz bandwidth mode, with streaming video. The spectrum analyzer trace is started, then the radar is triggered, and the channel is monitored for > 30 minutes.

Then the AP is powered down. The spectrum analyzer trace is started, then the Slave is rebooted, and the channel is monitored for > 30 minutes.

ASSOCIATED TEST RESULTS

No EUT transmissions were observed on the test channel during the 30-minute observation time.

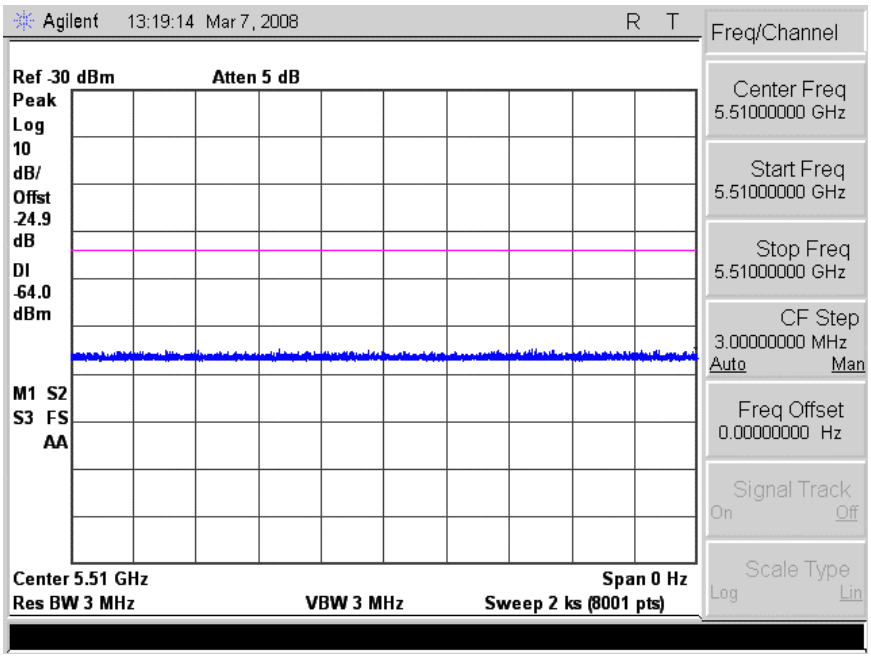
NON-OCCUPANCY PERIOD, ASSOCIATED PLOT



NON-ASSOCIATED TEST RESULTS

No EUT transmissions were observed on the test channel during the 30-minute observation time.

NON-OCCUPANCY PERIOD, NON-ASSOCIATED PLOT



10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

ANSI C63.4

RESULTS

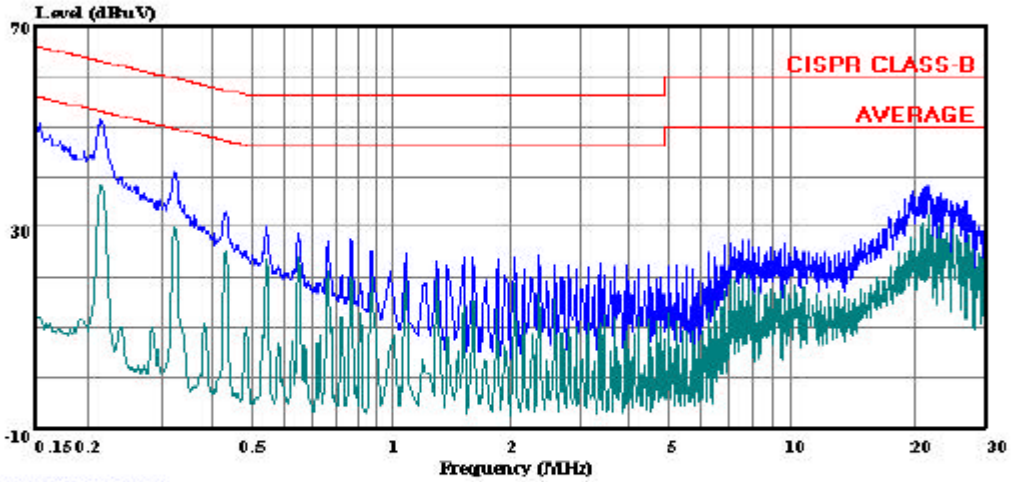
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.22	51.17	--	38.33	0.00	63.01	53.01	-11.84	-14.68	L1
0.32	40.84	--	29.74	0.00	59.63	49.63	-18.79	-19.89	L1
21.71	38.27	--	32.32	0.00	60.00	50.00	-21.73	-17.68	L1
0.22	52.03	--	38.67	0.00	63.01	53.01	-10.98	-14.34	L2
0.32	40.62	--	29.60	0.00	59.63	49.63	-19.01	-20.03	L2
21.26	34.70	--	27.01	0.00	60.00	50.00	-25.30	-22.99	L2
6 Worst Data									

LINE 1 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 70 File#: 08U11571 LC.EMI Date: 02-29-2008 Time: 18:21:49



(Line Conduction)

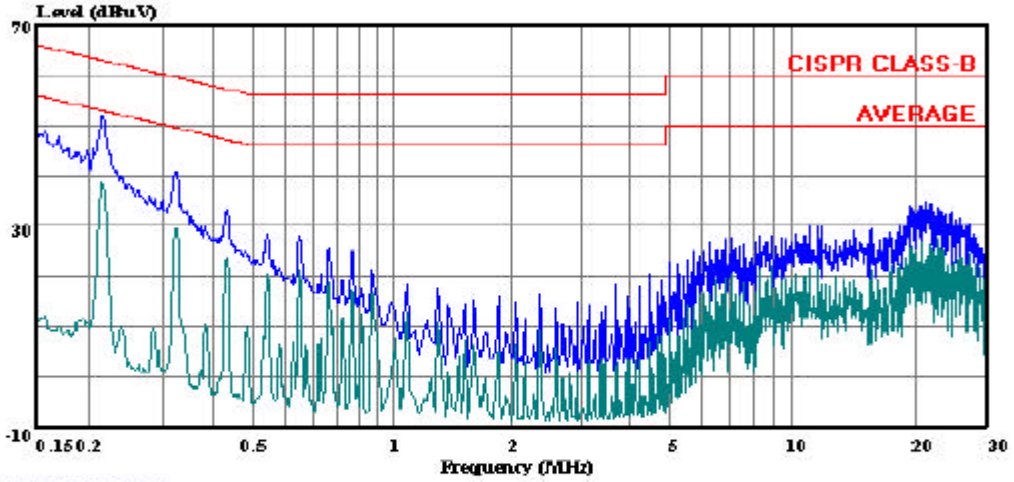
Trace: 68 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Mengistu Mekuria
Project #: : 08U11571
Company: : Atheros Communications
Configuration:: EUT With Support Laptop
Mode: : Tx (Worst Case)
Target: : FCC Class B
Voltage: : 115 VAC / 60Hz
: Line 1: Peak (Blue); Average (Green)

LINE 2 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 63 File#: 08U11571 LC.EMI Date: 02-29-2008 Time: 18:12:53



(Line Conduction)

Trace: 61 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Mengistu Mekuria
Project #: : 08U11571
Company: : Atheros Communications
Configuration:: EUT With Support Laptop
Mode: : Tx (Worst Case)
Target: : FCC Class B
Voltage: : 115 VAC / 60Hz
: Line 2: Peak (Blue); Average (Green)

11. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§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.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.
2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

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, rearranging the terms to express the distance as a function of the remaining variables, changing to units of Power to mW and Distance to cm, and substituting the logarithmic form of power and gain yields:

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

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm^2

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

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

The power density in units of mW/cm^2 is converted to units of W/m^2 by multiplying by a factor of 10.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

RESULTS

Mode	Band	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)	IC Power Density (W/m^2)
WLAN	5 GHz	20.0	23.68	5.56	0.17	1.67