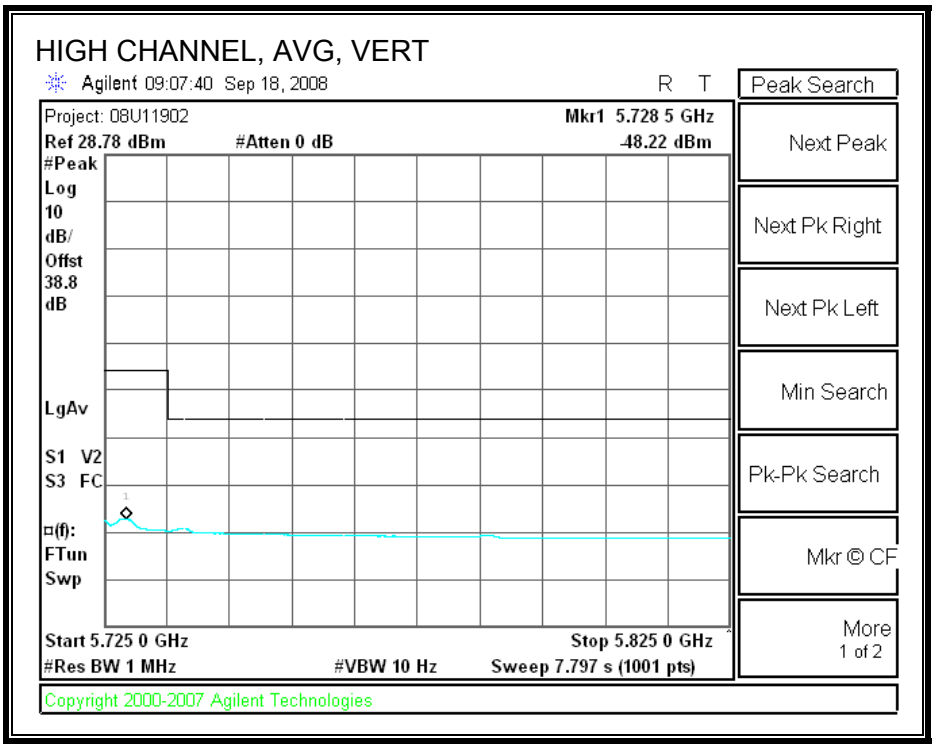


HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Motorola
Project #: 08U11902
Date: 9-18-2008
Test Engineer: Tom Chen
Configuration: EUT with Dish Antenna (33.9dBi Gain)
Mode: Tx 10MHz BW

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T89; ARA 18-26GHz; S/N:1049	FCC 15.205

Hi Frequency Cables

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

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

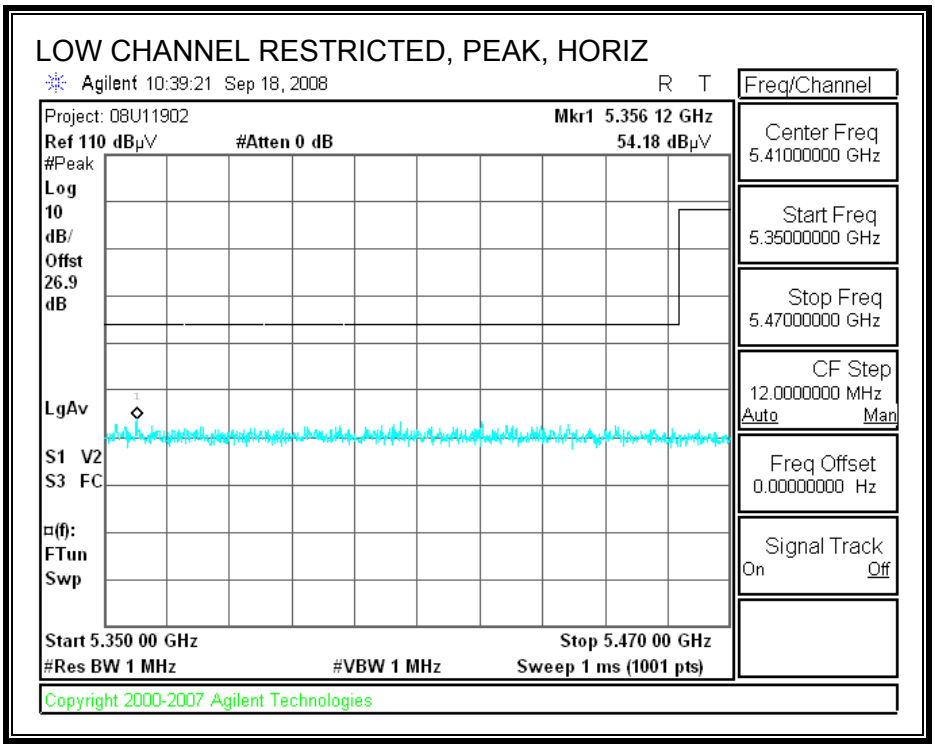
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 5476MHz															
10.952	3.0	41.6	28.7	38.6	0.0	-32.6	0.0	0.0	47.6	34.7	74	54	-26.4	-19.3	V
10.952	3.0	40.8	28.0	38.6	0.0	-32.6	0.0	0.0	46.8	34.0	74	54	-27.2	-20.0	H
Mid Ch, 5590MHz															
11.180	3.0	41.6	28.5	38.7	0.0	-32.6	0.0	0.0	47.7	34.6	74	54	-26.3	-19.4	V
11.180	3.0	40.9	28.3	38.7	0.0	-32.6	0.0	0.0	47.0	34.4	74	54	-27.0	-19.6	H
High Ch, 5718MHz															
11.436	3.0	41.3	28.5	38.8	0.0	-32.5	0.0	0.0	47.5	34.7	74	54	-26.5	-19.3	V
11.436	3.0	40.1	28.0	38.8	0.0	-32.5	0.0	0.0	46.3	34.2	74	54	-27.7	-19.8	H

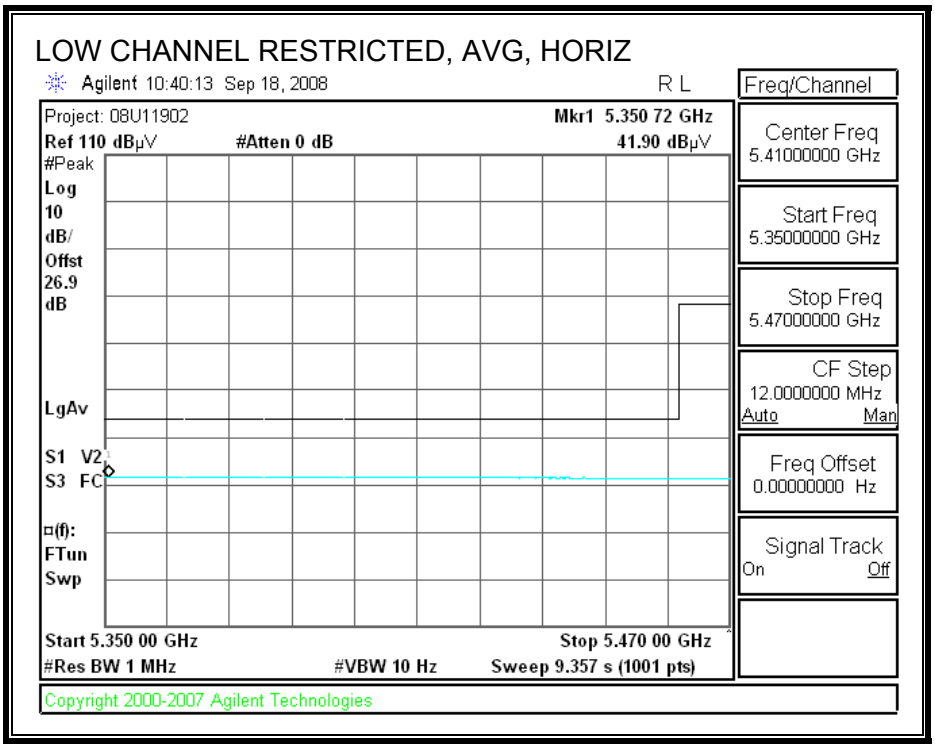
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

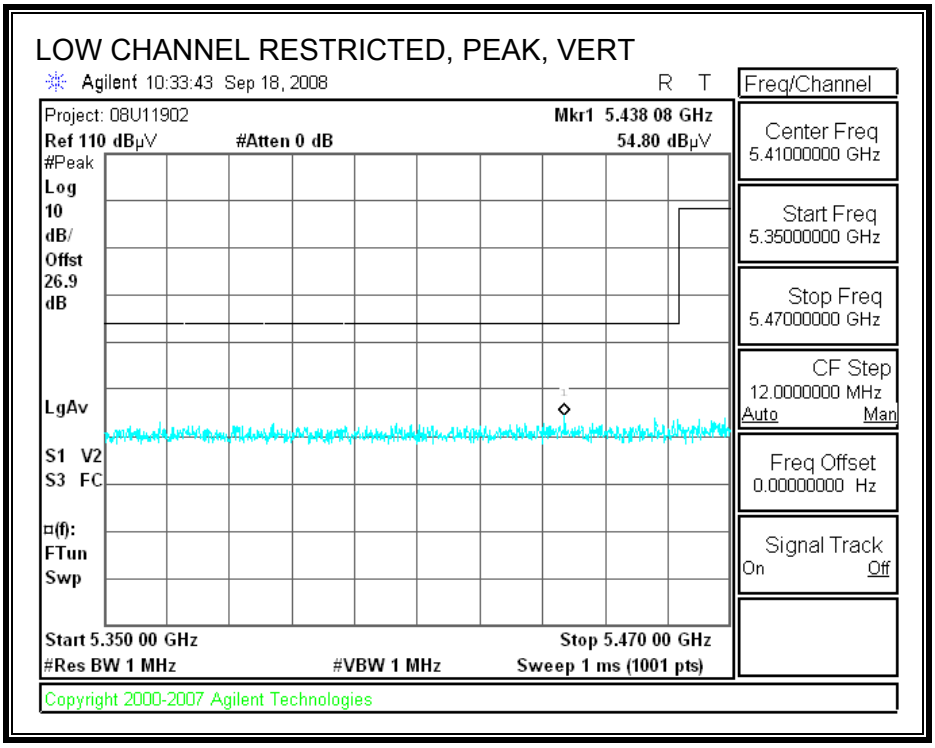
8.2.3. TRANSMITTER ABOVE 1 GHz FOR 15MHZ BANDWIDTH, DISH ANTENNA.

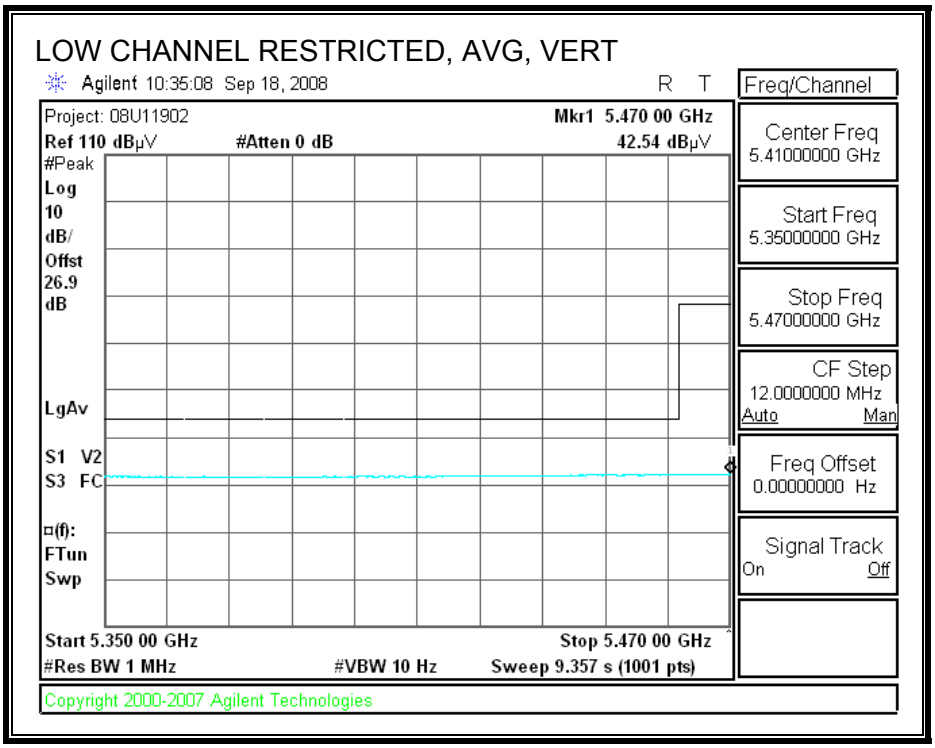
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



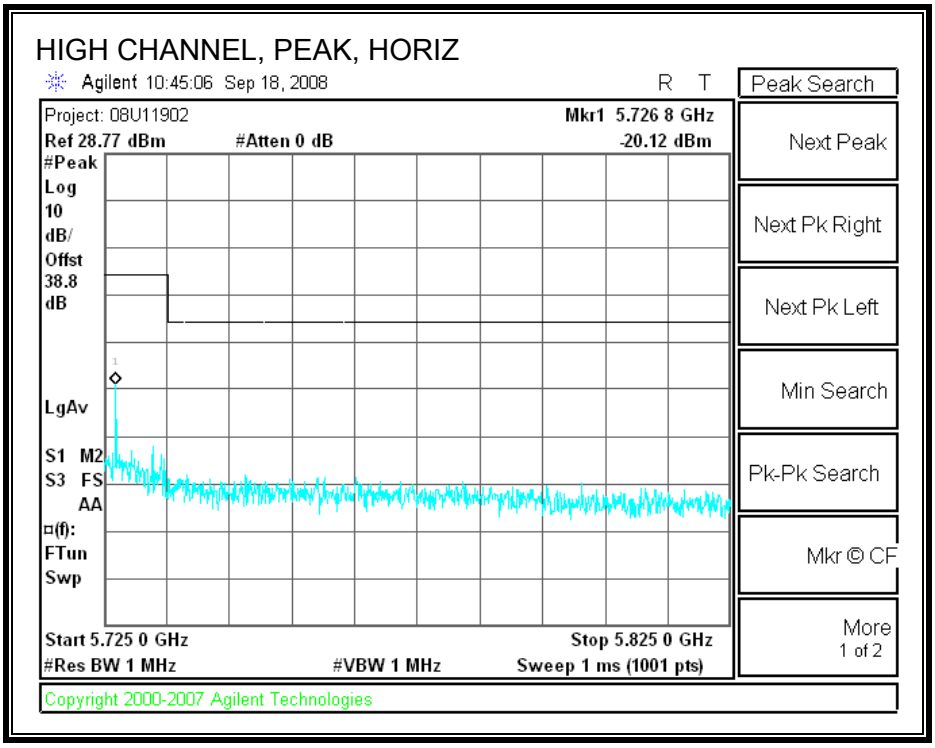


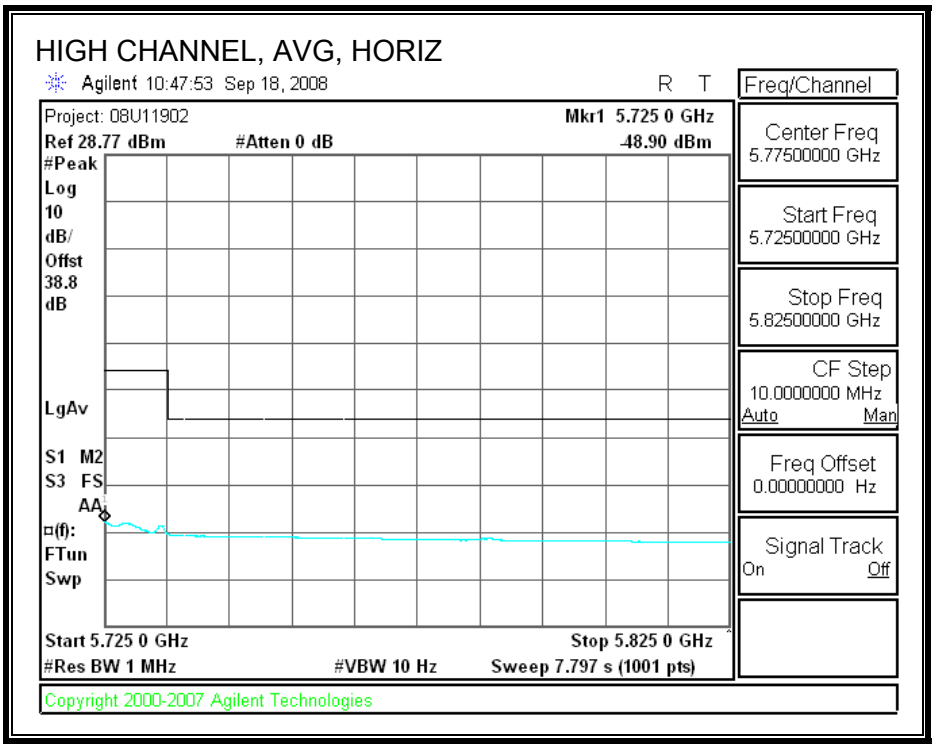
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



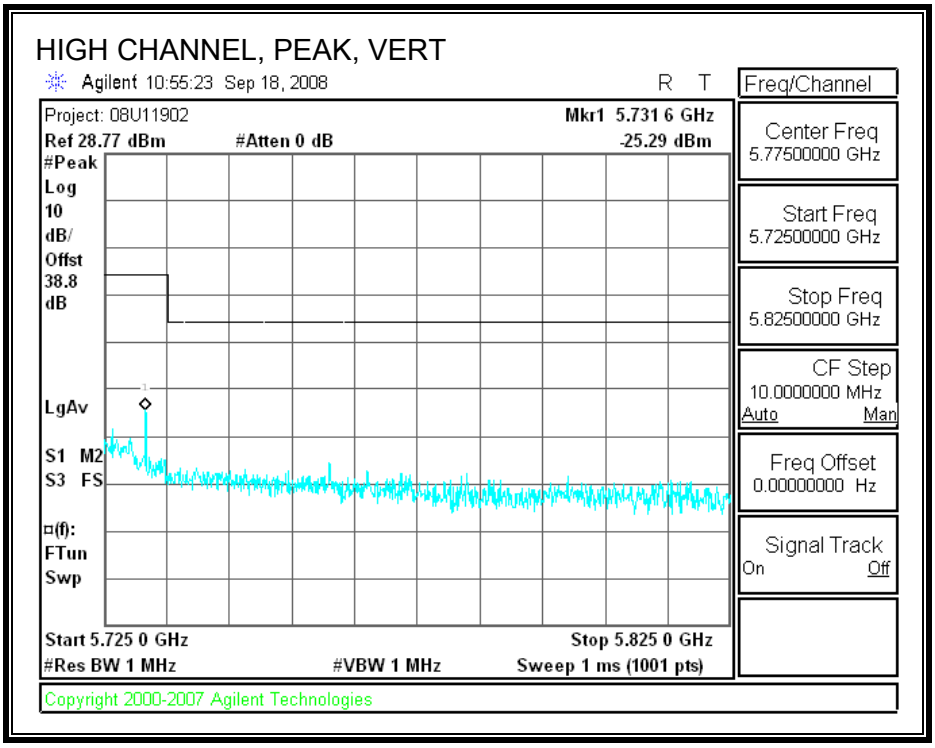


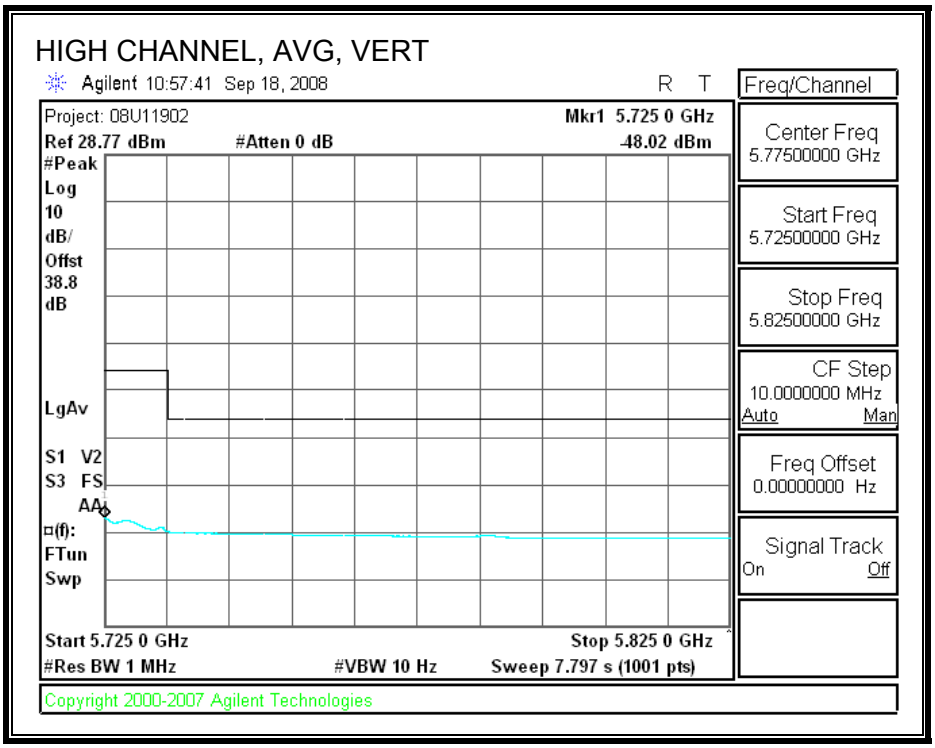
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Motorola
Project #: 08U11902
Date: 9-18-2008
Test Engineer: Tom Chen
Configuration: EUT with Dish Antenna (33.9dBi Gain)
Mode: Tx 15MHz BW

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T89; ARA 18-26GHz; S/N:1049	FCC 15.205

Hi Frequency Cables

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

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

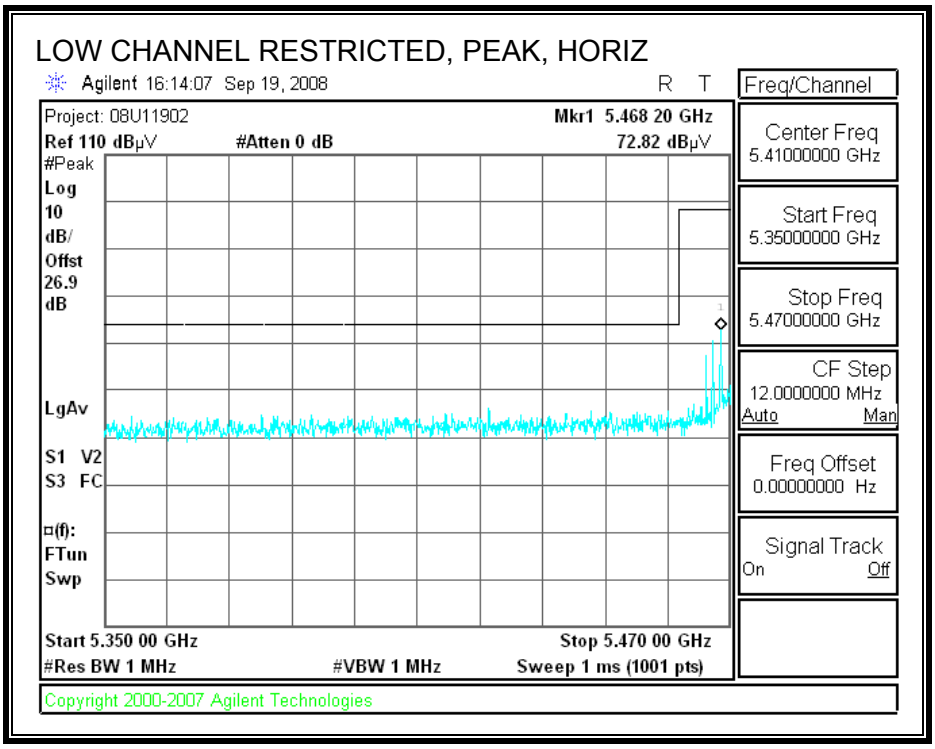
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 5480MHz															
10.960	3.0	40.9	28.7	38.6	0.0	-32.6	0.0	0.0	46.9	34.7	74	54	-27.1	-19.3	V
10.960	3.0	40.5	28.3	38.6	0.0	-32.6	0.0	0.0	46.5	34.3	74	54	-27.5	-19.7	H
Mid Ch, 5600MHz															
11.200	3.0	40.7	28.7	38.7	0.0	-32.6	0.0	0.0	46.8	34.8	74	54	-27.2	-19.2	V
11.200	3.0	40.2	28.0	38.7	0.0	-32.6	0.0	0.0	46.3	34.1	74	54	-27.7	-19.9	H
High Ch, 5714MHz															
11.428	3.0	41.3	28.9	38.7	0.0	-32.5	0.0	0.0	47.5	35.1	74	54	-26.5	-18.9	V
11.428	3.0	40.5	28.6	38.7	0.0	-32.5	0.0	0.0	46.7	34.8	74	54	-27.3	-19.2	H

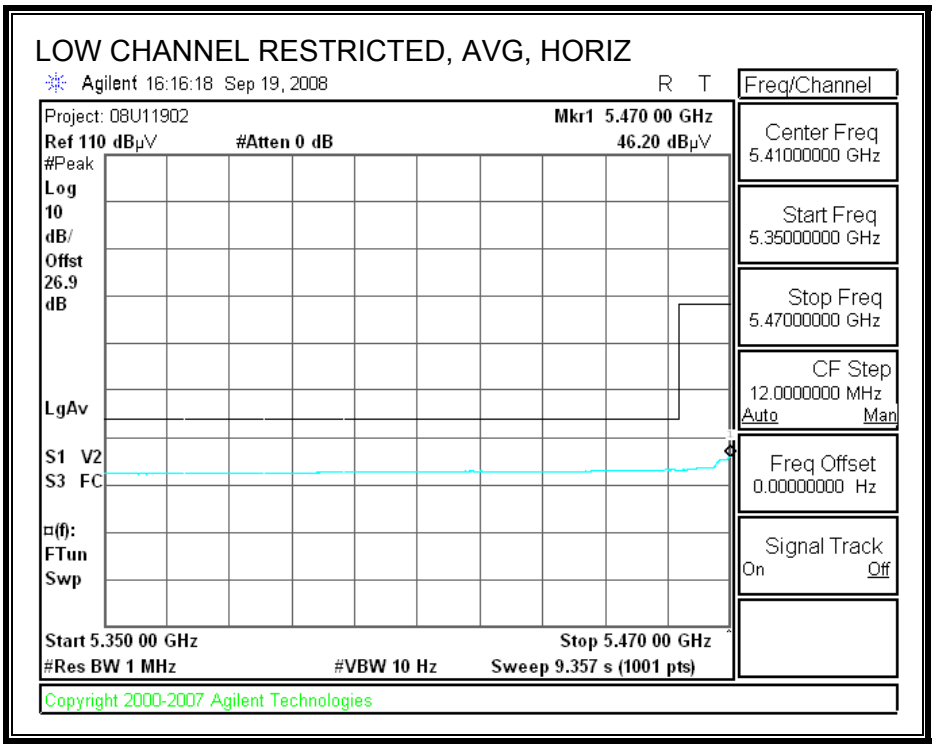
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

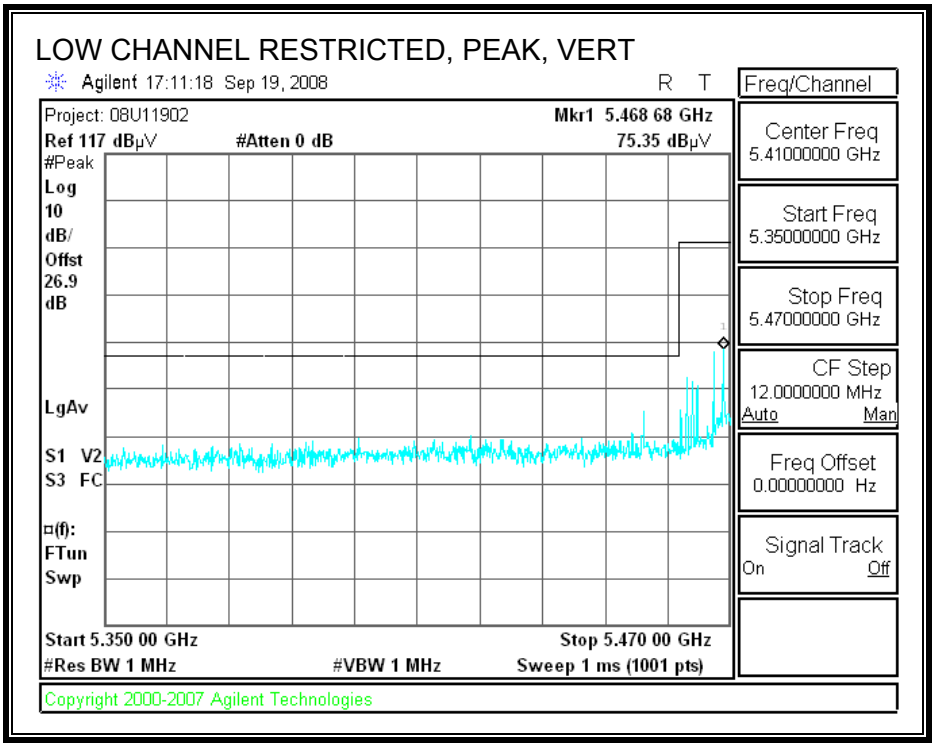
8.2.4. TRANSMITTER ABOVE 1 GHz FOR 5MHz BANDWIDTH, PANEL ANTENNA

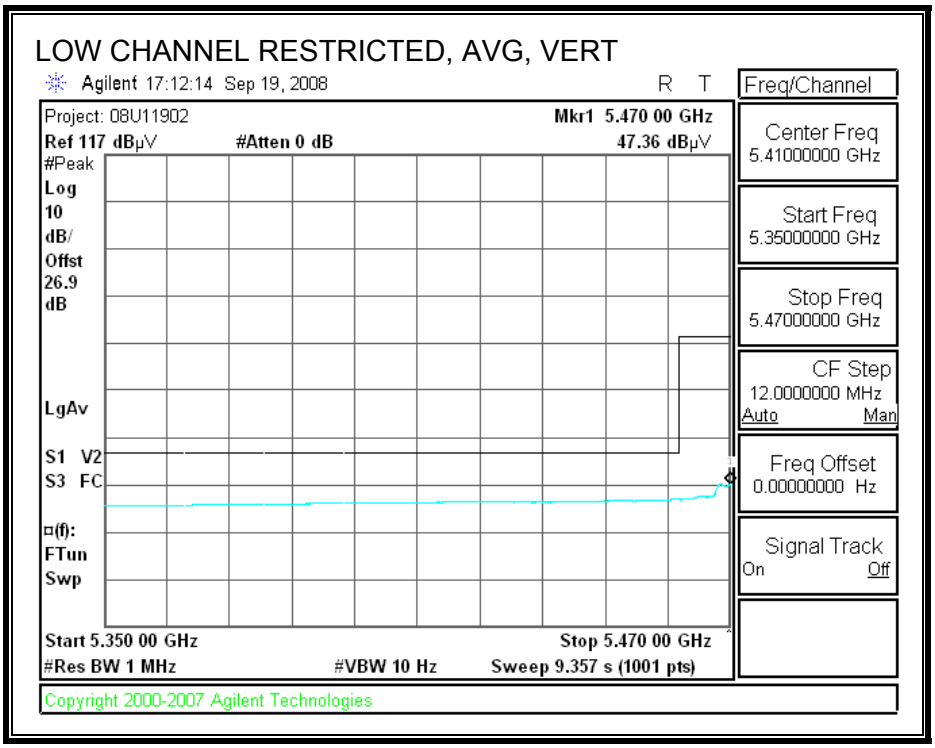
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



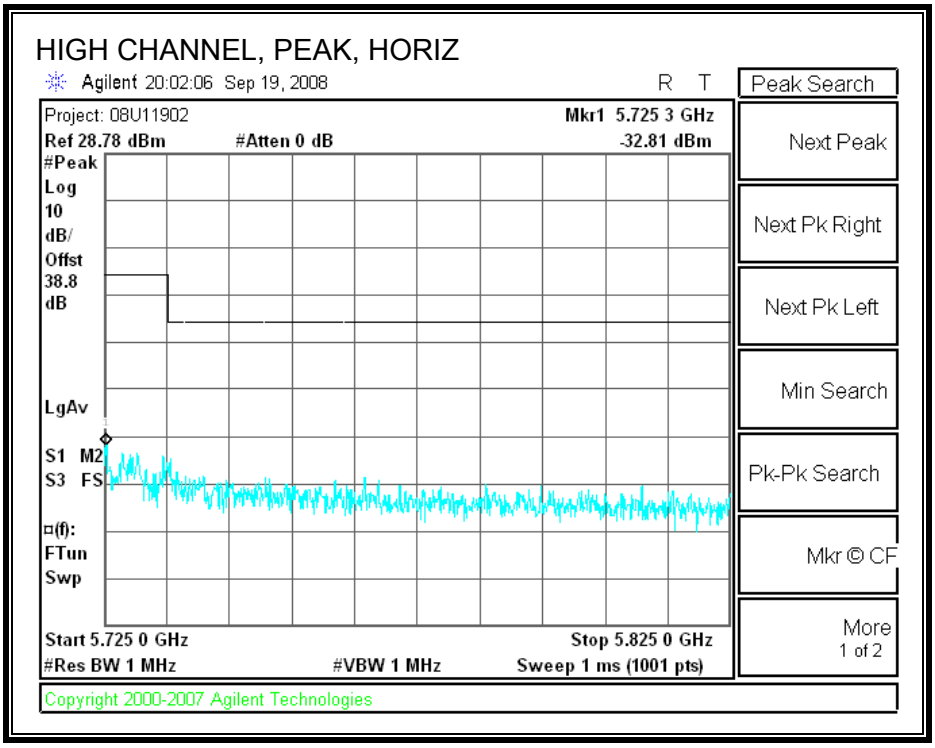


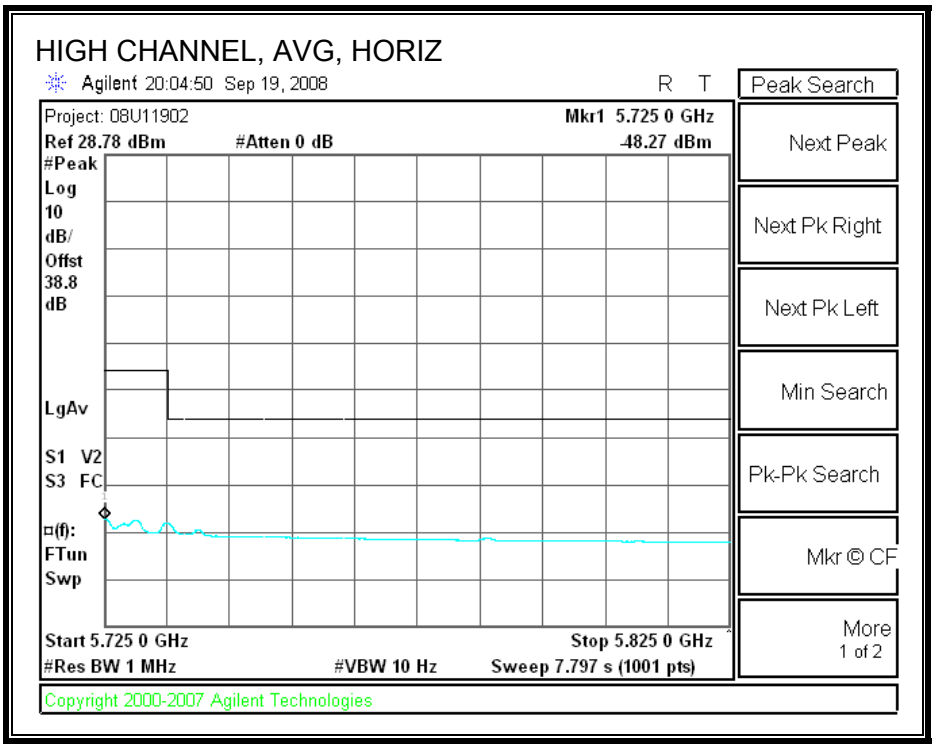
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



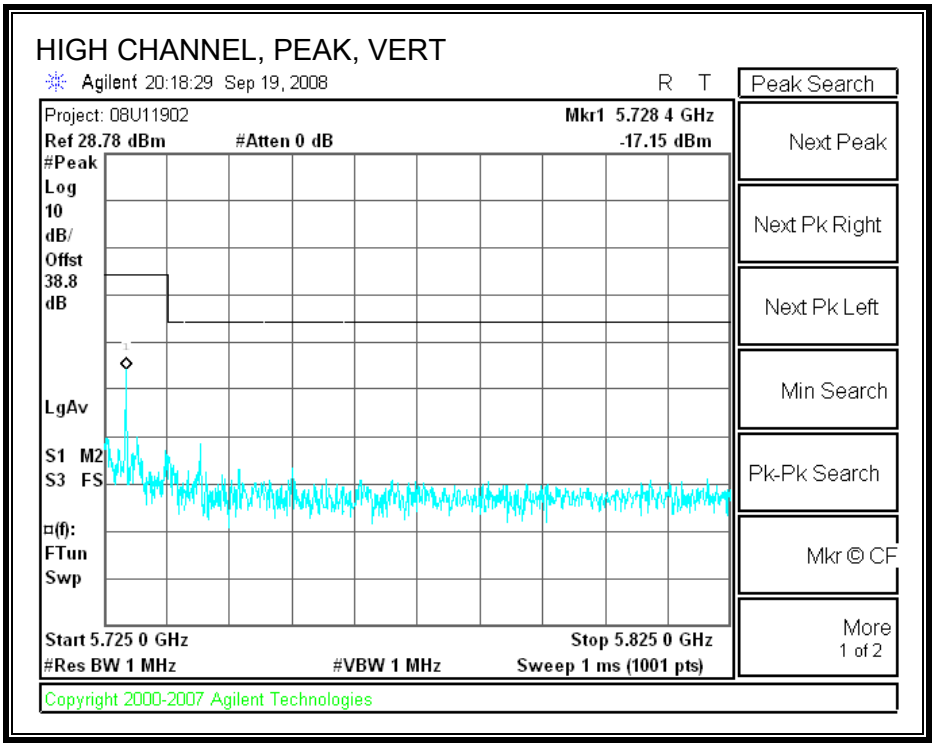


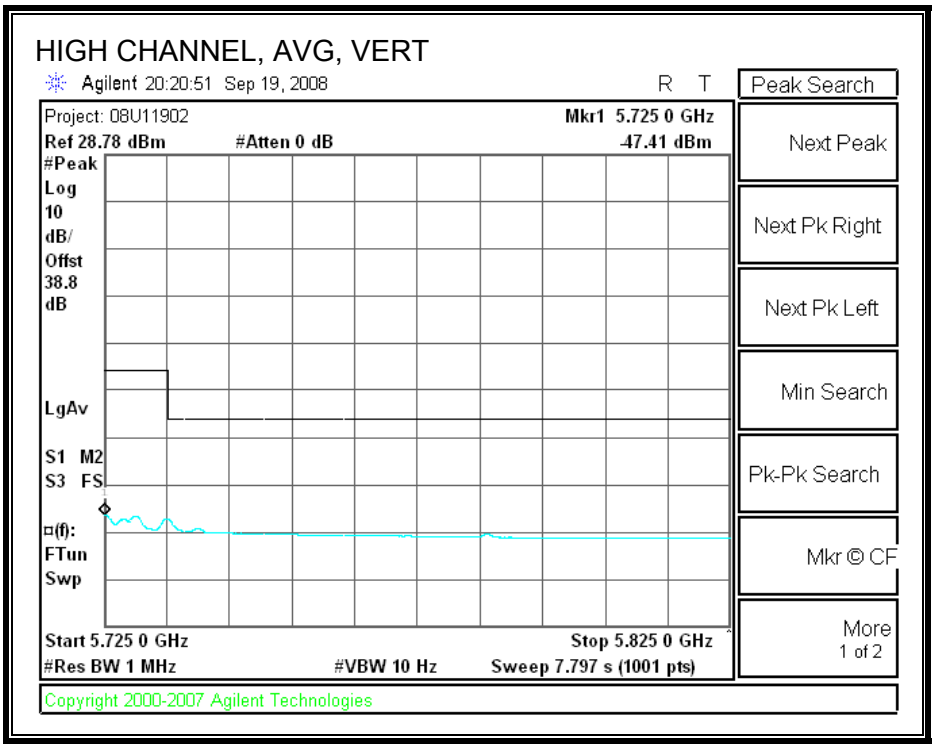
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Motorola
Project #: 08U11902
Date: 9-19-2008
Test Engineer: Tom Chen
Configuration: EUT with Panel Antenna (23dBi Gain)
Mode: Tx, 5MHz BW

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T89; ARA 18-26GHz; S/N:1049	FCC 15.205

Hi Frequency Cables

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

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

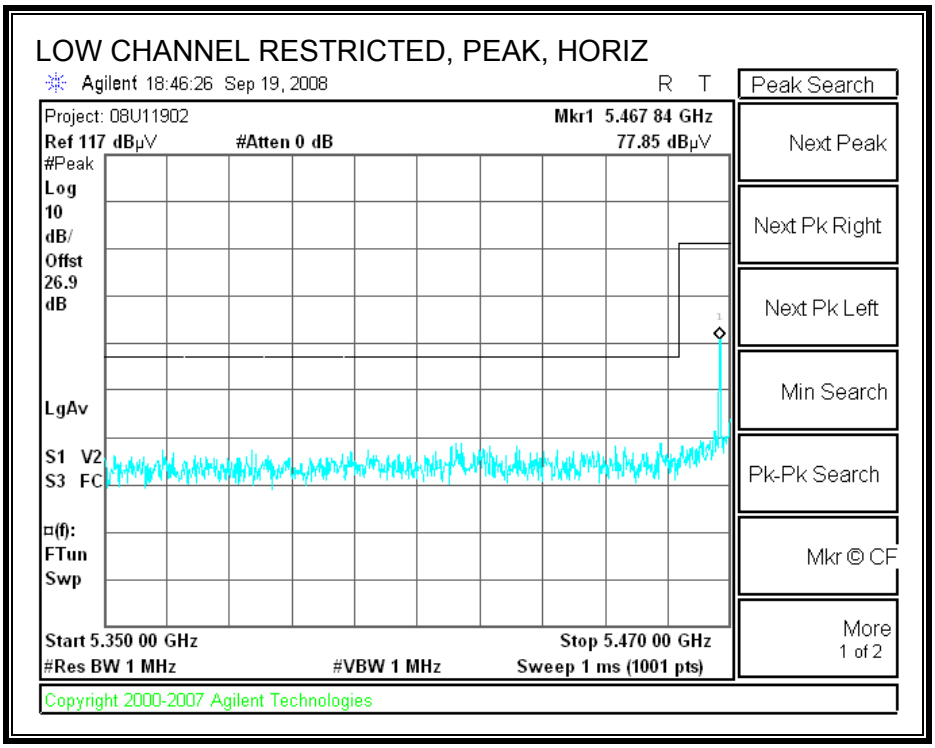
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 5474MHz															
10.948	3.0	41.9	30.0	38.6	0.0	-32.6	0.0	0.0	47.9	36.0	74	54	-26.1	-18.0	V
10.948	3.0	40.9	29.0	38.6	0.0	-32.6	0.0	0.0	46.9	35.0	74	54	-27.1	-19.0	H
Mid Ch, 5600MHz															
11.200	3.0	42.8	30.6	38.7	0.0	-32.6	0.0	0.0	48.9	36.7	74	54	-25.1	-17.3	V
11.200	3.0	41.9	29.8	38.7	0.0	-32.6	0.0	0.0	48.0	35.9	74	54	-26.0	-18.1	H
High Ch, 5720MHz															
11.440	3.0	41.5	29.6	38.8	0.0	-32.5	0.0	0.0	47.7	35.8	74	54	-26.3	-18.2	V
11.440	3.0	40.8	29.5	38.8	0.0	-32.5	0.0	0.0	47.0	35.7	74	54	-27.0	-18.3	H

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

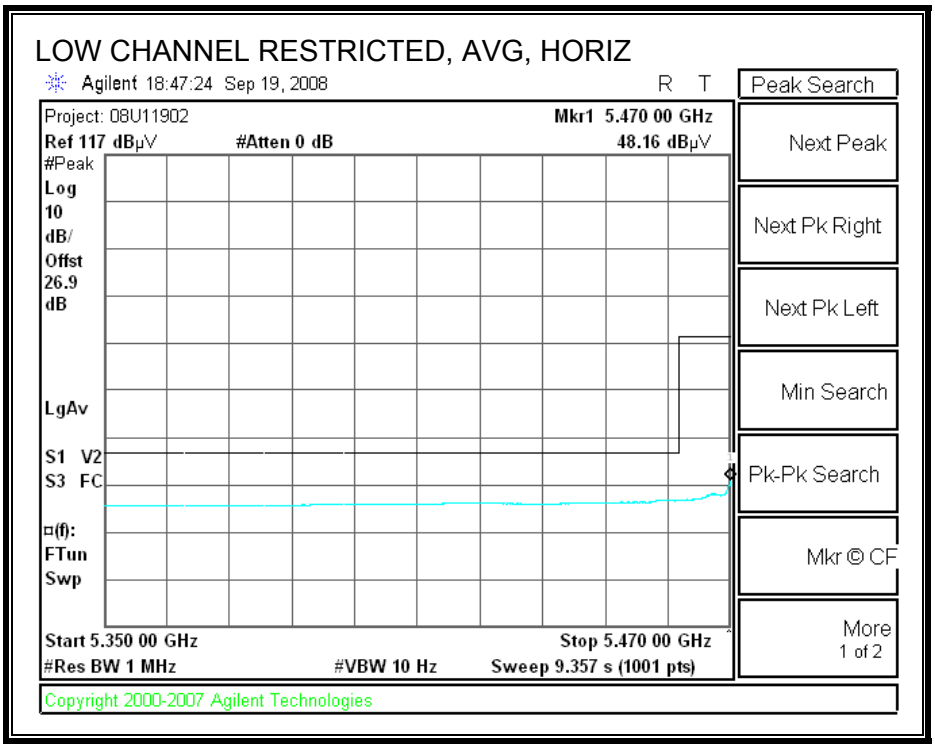
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.2.5. TRANSMITTER ABOVE 1 GHz FOR 10MHz, PANEL ANTENNA

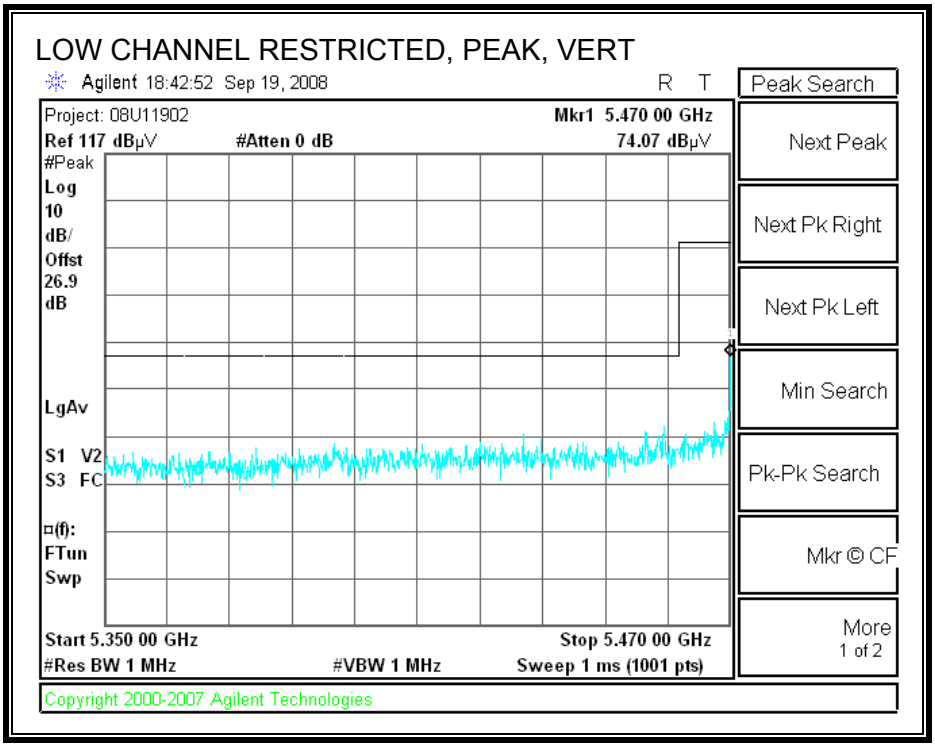
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

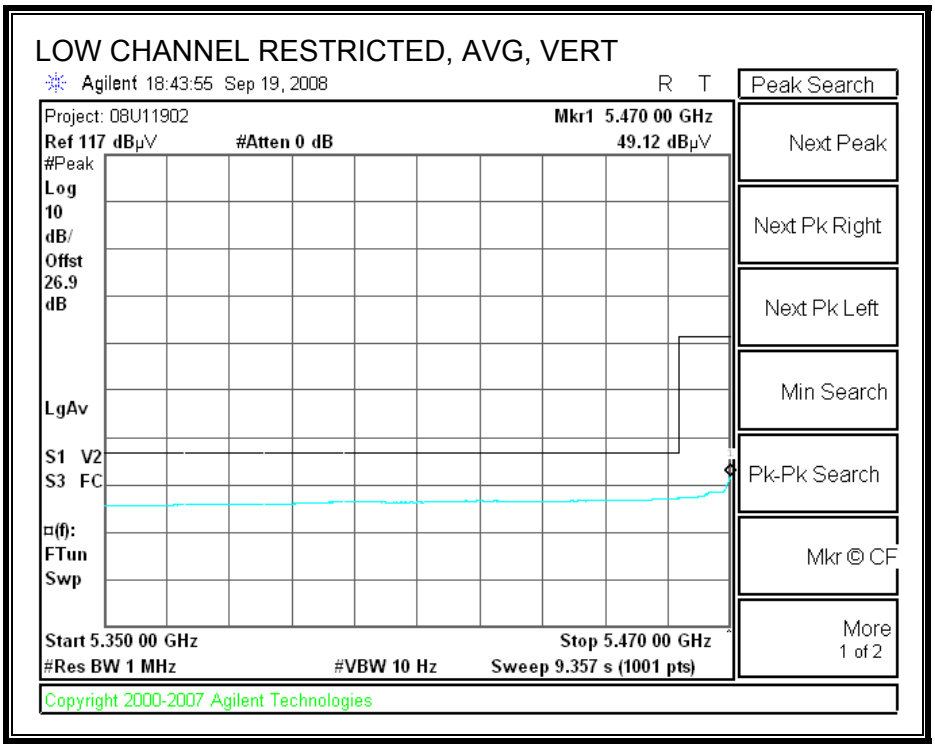


LOW CHANNEL RESTRICTED, AVG, HORIZ

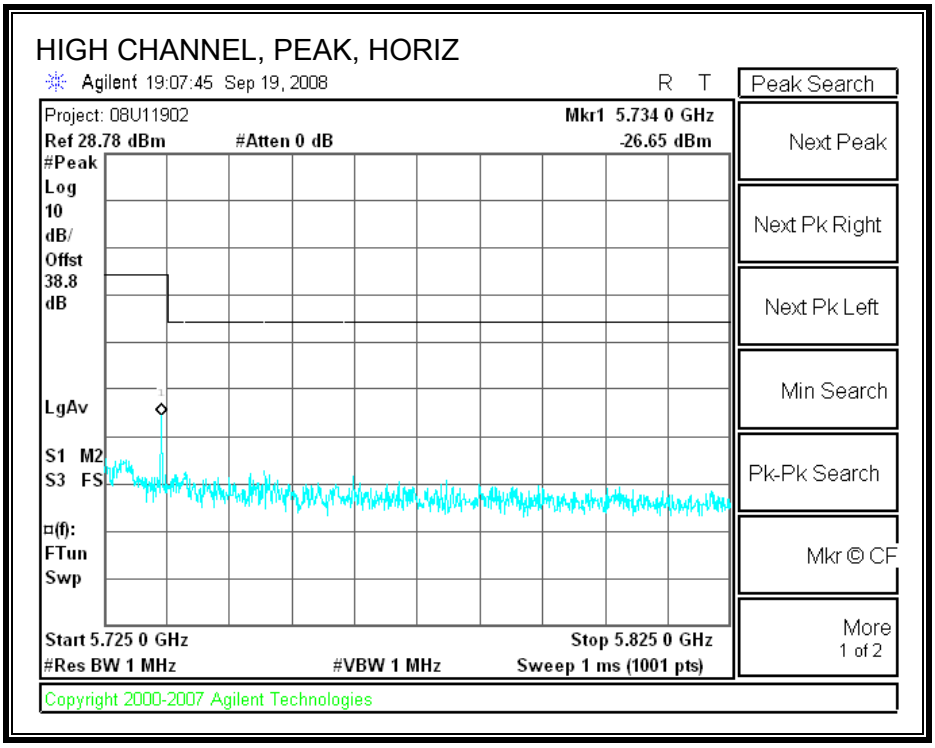


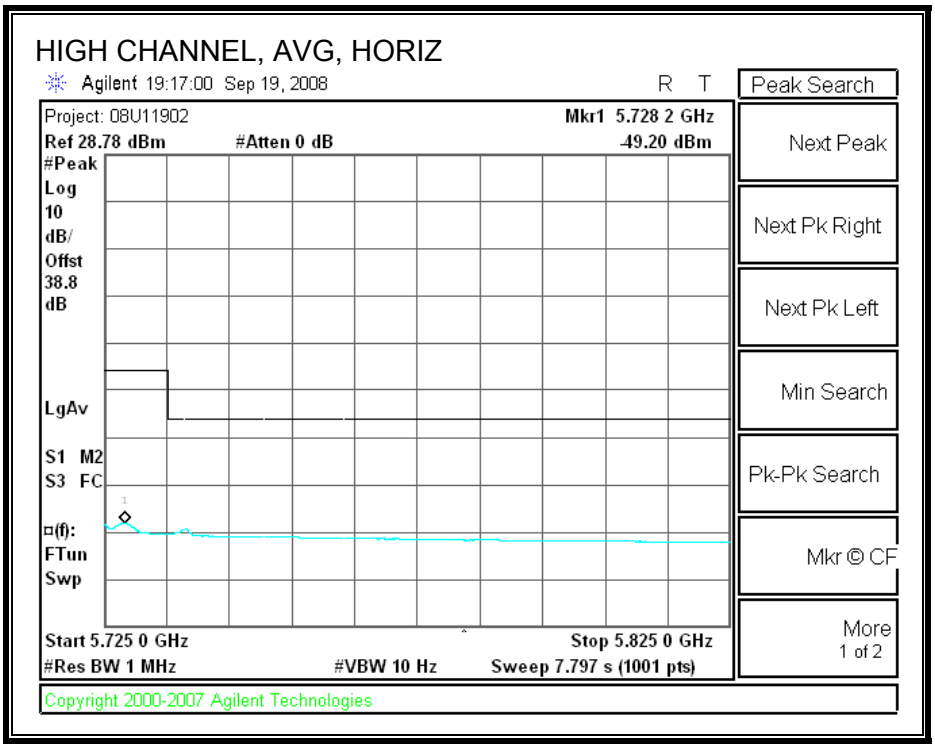
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



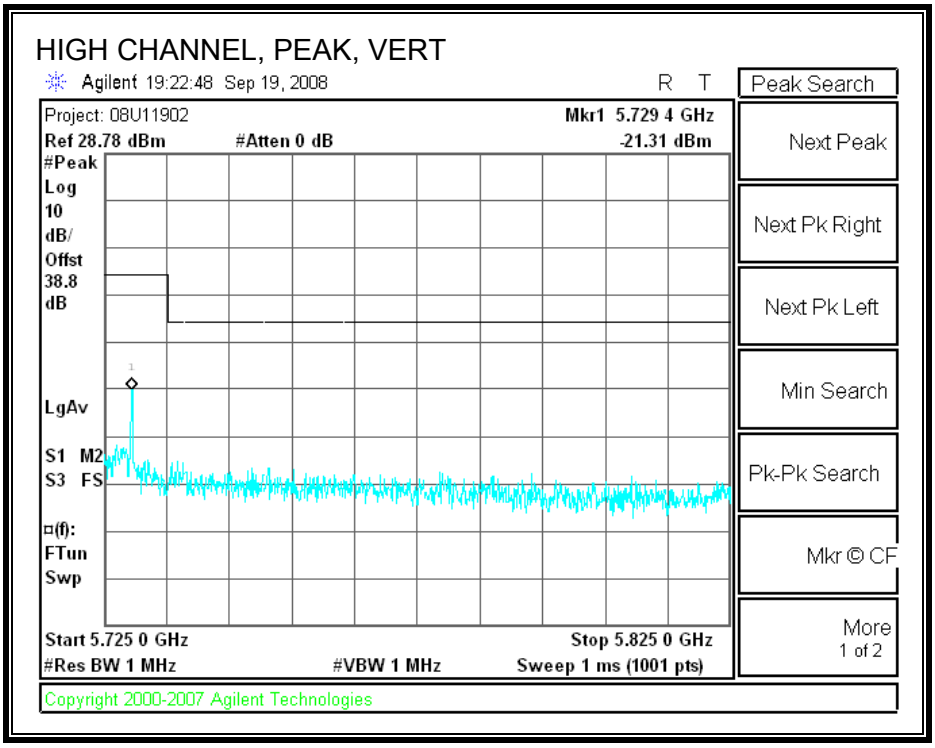


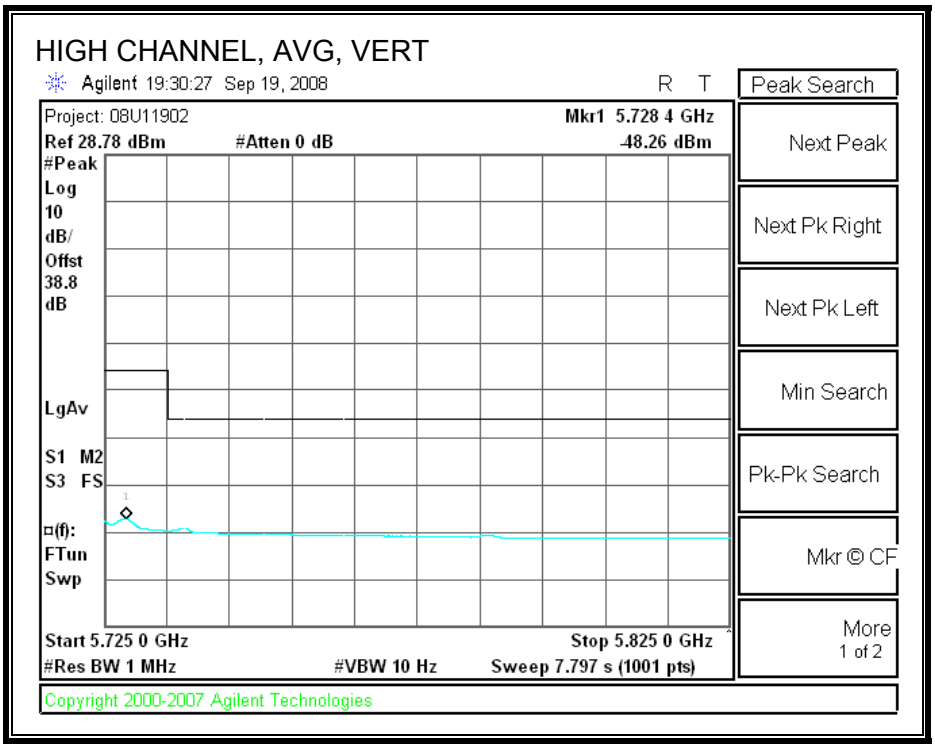
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Motorola
Project #: 08U11902
Date: 9-19-2008
Test Engineer: Tom Chen
Configuration: EUT with Panel Antenna (23dBi Gain)
Mode: Tx 10MHz BW

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T89; ARA 18-26GHz; S/N:1049	FCC 15.205

Hi Frequency Cables

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

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

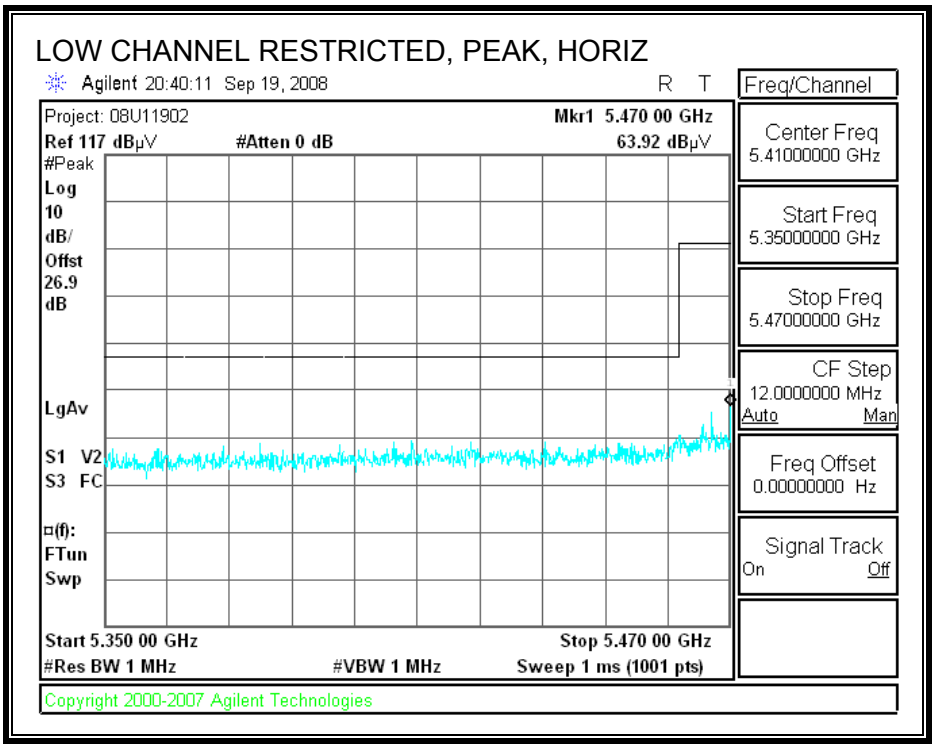
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 5476MHz															
10.952	3.0	41.2	28.5	38.6	0.0	-32.6	0.0	0.0	47.2	34.5	74	54	-26.8	-19.5	V
10.952	3.0	40.5	28.0	38.6	0.0	-32.6	0.0	0.0	46.5	34.0	74	54	-27.5	-20.0	H
Mid Ch, 5590MHz															
11.180	3.0	41.6	28.5	38.7	0.0	-32.6	0.0	0.0	47.7	34.6	74	54	-26.3	-19.4	V
11.180	3.0	40.9	28.3	38.7	0.0	-32.6	0.0	0.0	47.0	34.4	74	54	-27.0	-19.6	H
High Ch, 5718MHz															
11.436	3.0	40.9	28.2	38.8	0.0	-32.5	0.0	0.0	47.1	34.4	74	54	-26.9	-19.6	V
11.436	3.0	40.3	28.0	38.8	0.0	-32.5	0.0	0.0	46.5	34.2	74	54	-27.5	-19.8	H

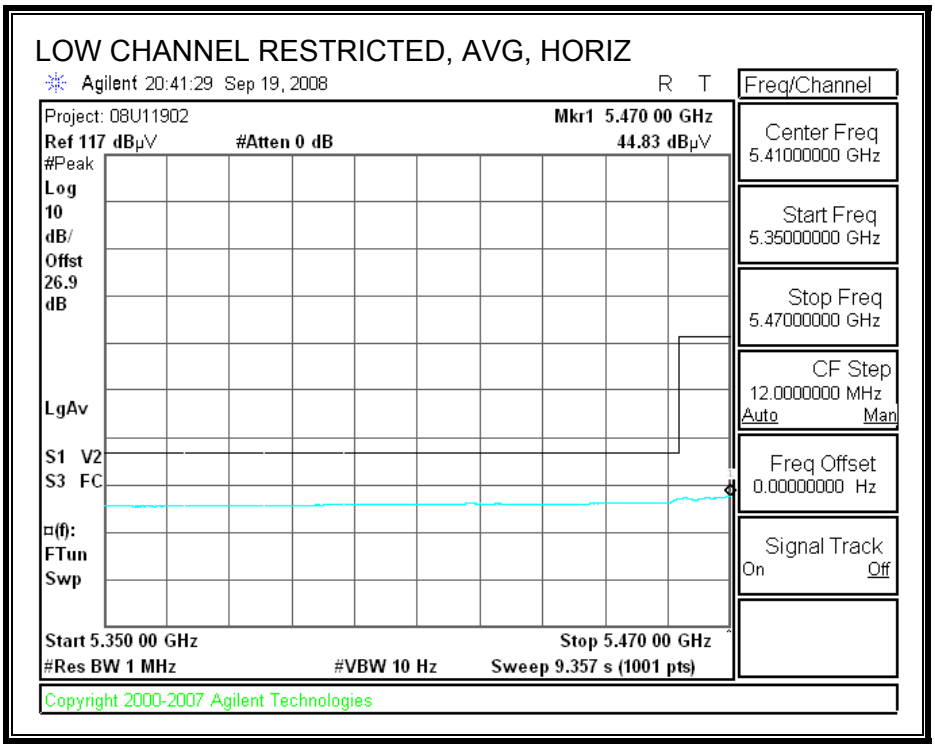
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

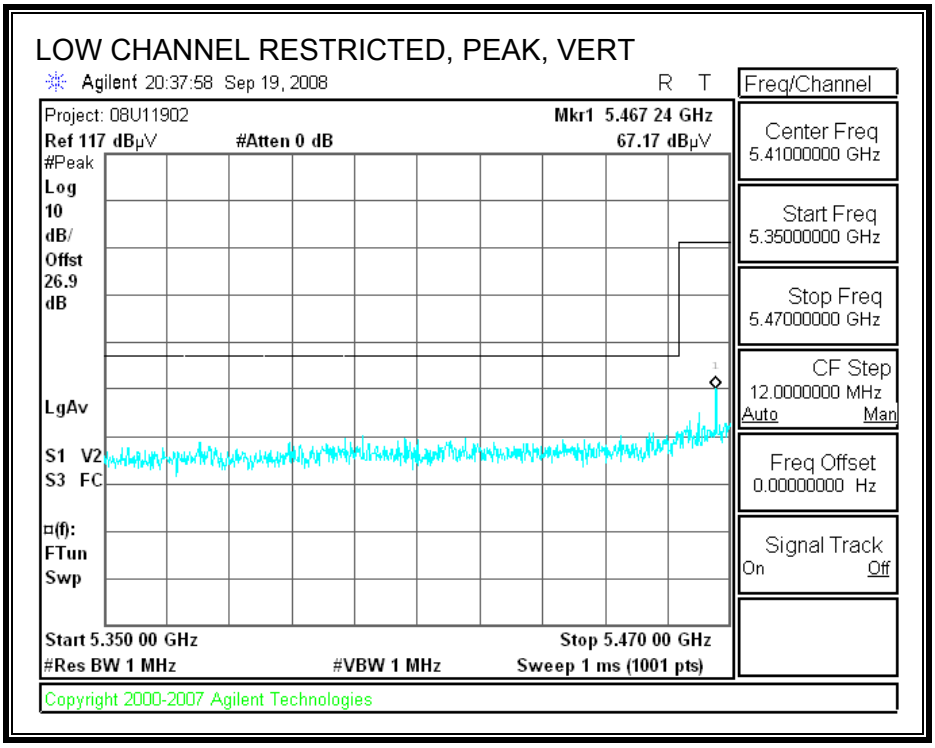
8.2.6. TRANSMITTER ABOVE 1 GHz FOR 15MHZ BANDWIDTH, PANEL ANTENNA.

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

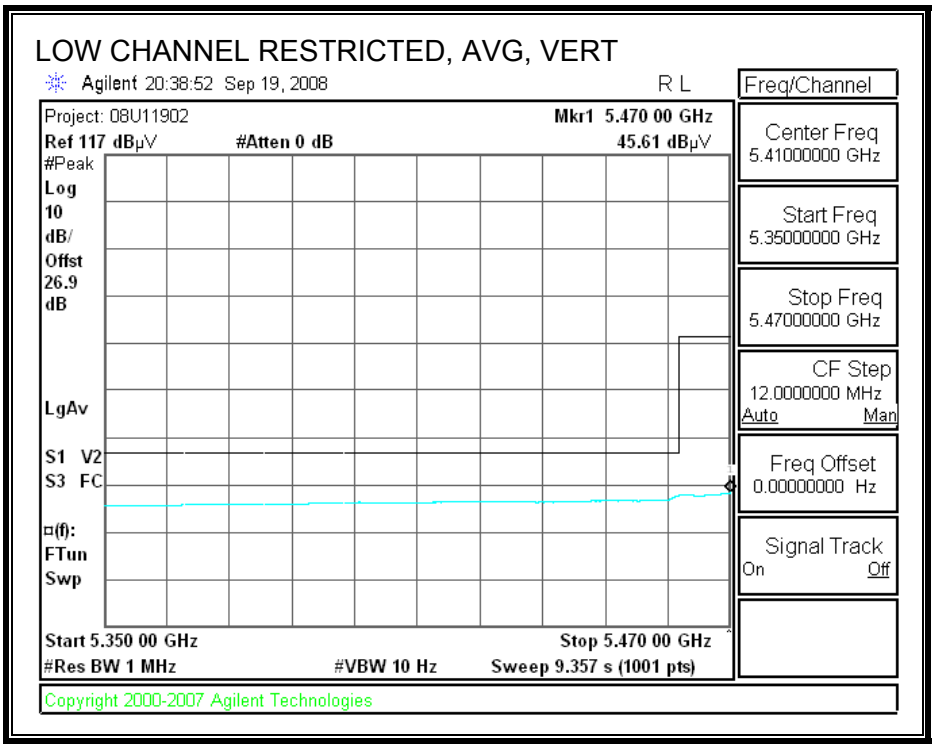




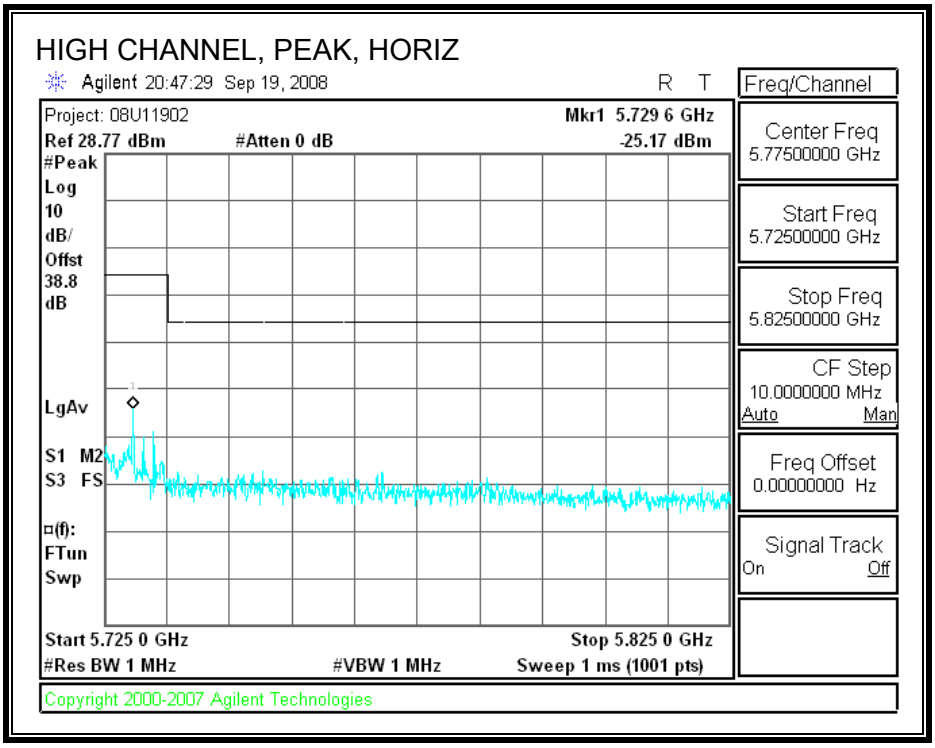
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

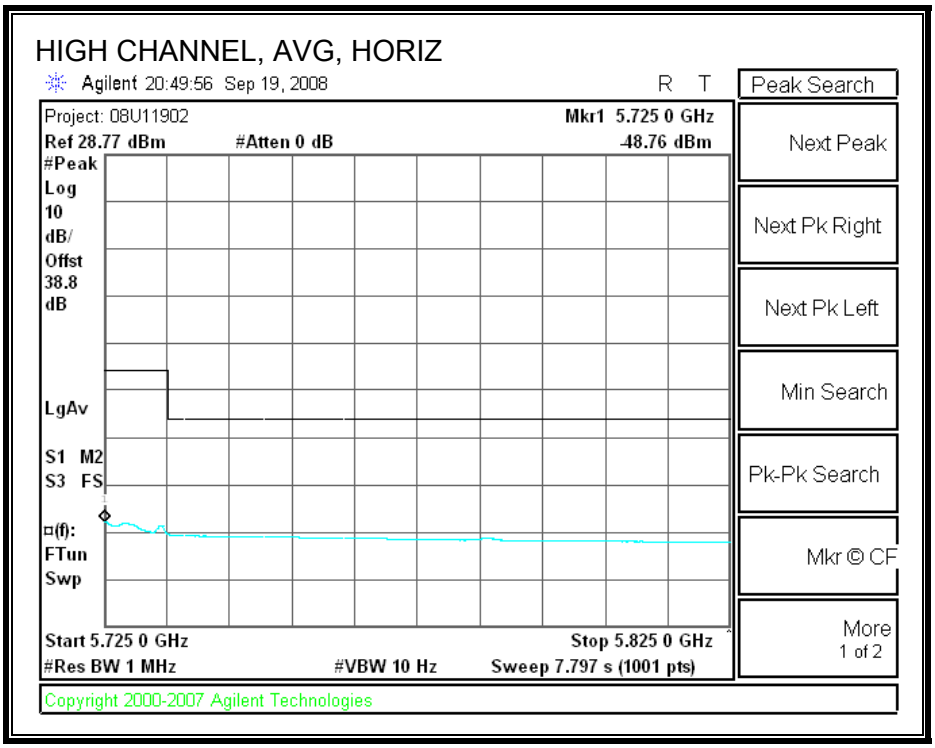


LOW CHANNEL RESTRICTED, AVG, VERT

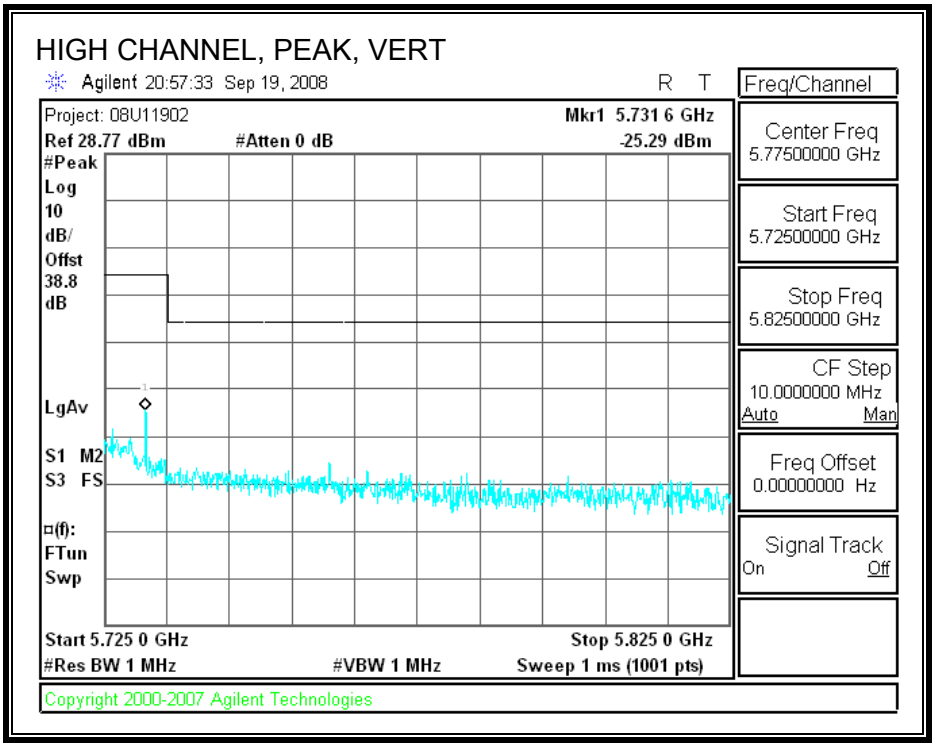


AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

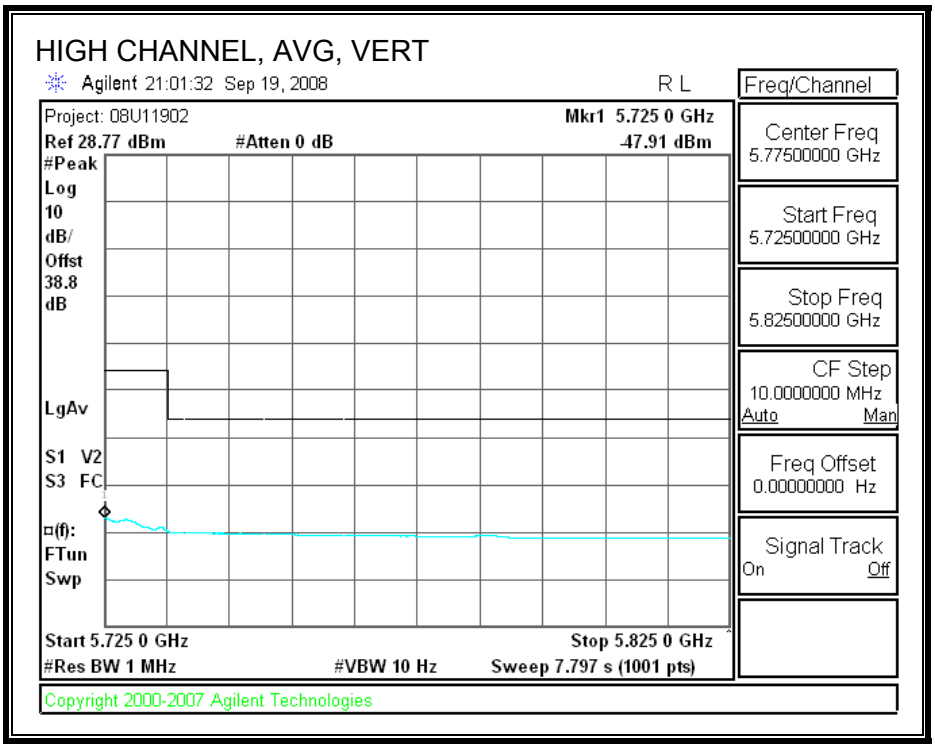




AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Motorola
Project #: 08U11902
Date: 9-19-2008
Test Engineer: Tom Chen
Configuration: EUT with Panel Antenna (23dBi Gain)
Mode: Tx 15MHz BW

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T89; ARA 18-26GHz; S/N:1049	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		C-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 Ch, 5480MHz															
10.960	3.0	40.5	28.4	38.6	0.0	-32.6	0.0	0.0	46.5	34.4	74	54	-27.5	-19.6	V
10.960	3.0	40.1	28.0	38.6	0.0	-32.6	0.0	0.0	46.1	34.0	74	54	-27.9	-20.0	H
Mid Ch, 5600MHz															
11.200	3.0	40.7	28.7	38.7	0.0	-32.6	0.0	0.0	46.8	34.8	74	54	-27.2	-19.2	V
11.200	3.0	40.2	28.0	38.7	0.0	-32.6	0.0	0.0	46.3	34.1	74	54	-27.7	-19.9	H
High Ch, 5714MHz															
11.428	3.0	40.9	28.2	38.7	0.0	-32.5	0.0	0.0	47.1	34.4	74	54	-26.9	-19.6	V
11.428	3.0	40.0	28.0	38.7	0.0	-32.5	0.0	0.0	46.2	34.2	74	54	-27.8	-19.8	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		

8.3. RECEIVER RADIATED SPURIOUS

Note: No receive-only mode, test is not applicable

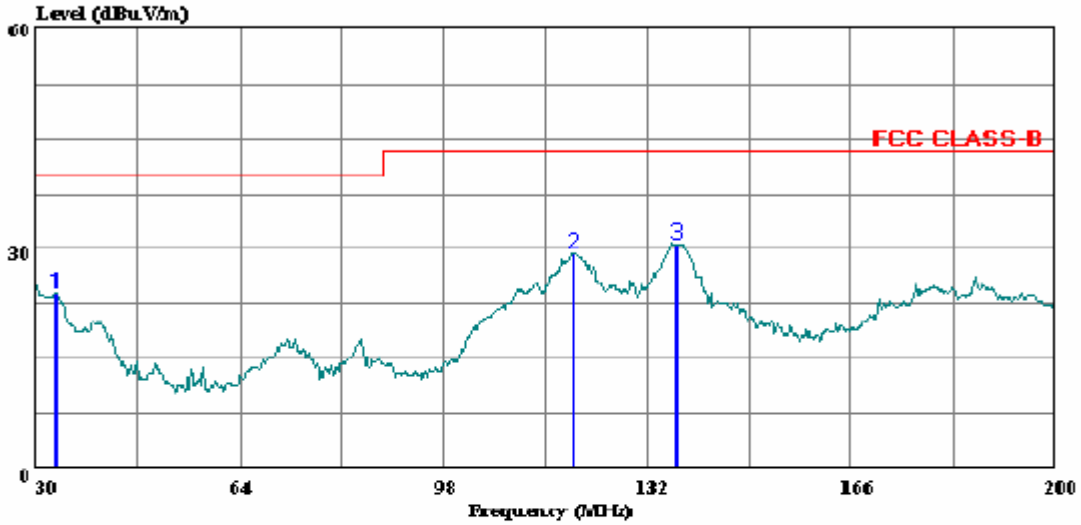
8.4. WORST-CASE BELOW 1 GHz (DISH ANTENNA)

SPURIOUS EMISSIONS 30 TO 230 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT AND DATA

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

Data#: 21 File#: 08U11901_FCC.EMI Date: 09-25-2008 Time: 11:17:16



Trace: 20 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Chin Pang
Project #: : 08U11901
Company: : Motorola
Configuration:: EUT with Dish Antenna
Mode : : TX
Target: : FCC Class B

Page: 1

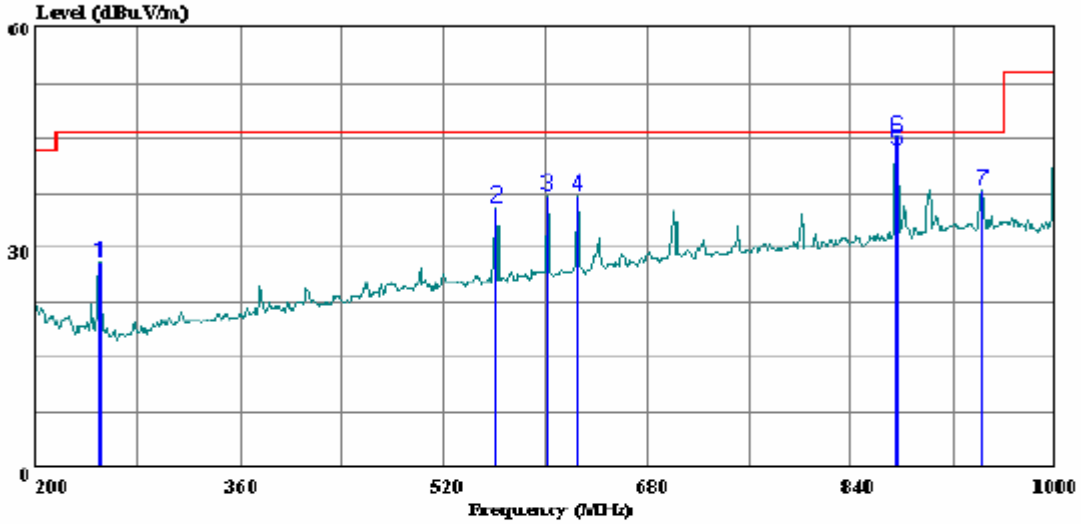
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	33.230	33.23	-9.26	23.98	40.00	-16.02	Peak
2	119.590	42.22	-12.74	29.48	43.50	-14.02	Peak
3	136.930	44.21	-13.48	30.73	43.50	-12.77	Peak

SPURIOUS EMISSIONS 200 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT AND DATA

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

Data#: 25 File#: 08U11901_FCC.EMI Date: 09-25-2008 Time: 11:23:37



Trace: 22 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Chin Pang
Project #: : 08U11901
Company: : Motorola
Configuration:: EUT with Dish Antenna
Mode : : TX
Target: : FCC Class B

Page: 1

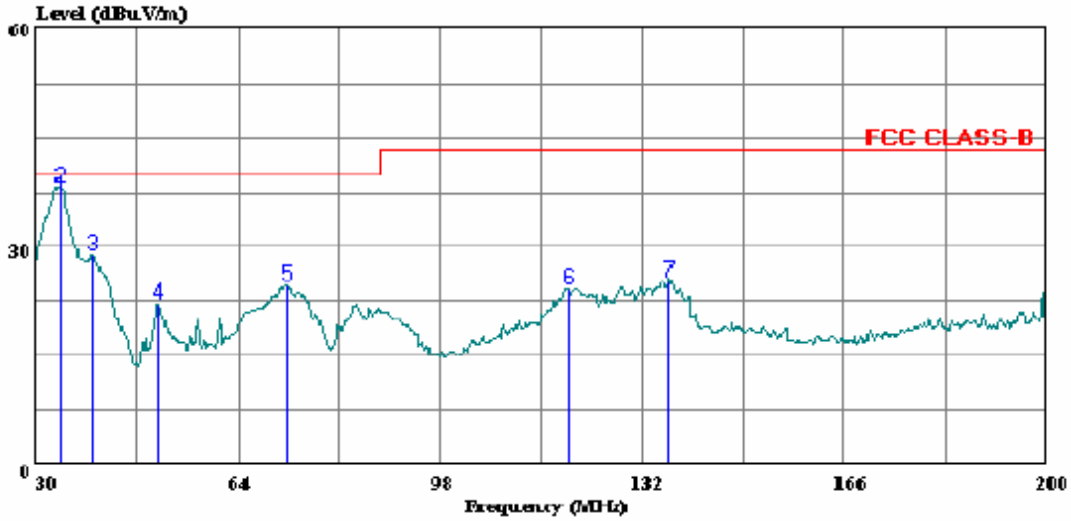
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	249.600	41.26	-13.25	28.01	46.00	-17.99	Peak
2	561.600	39.21	-3.64	35.57	46.00	-10.43	Peak
3	601.600	39.85	-2.82	37.03	46.00	-8.97	Peak
4	625.600	39.40	-2.28	37.12	46.00	-8.88	Peak
5	875.200	40.99	2.31	43.30	46.00	-2.70	QP
6	875.200	42.79	2.34	45.13	46.00	-0.87	Peak
7	943.200	34.67	3.13	37.80	46.00	-8.20	Peak

SPURIOUS EMISSIONS 30 TO 200 MHz (WORST-CASE CONFIGURATION VERTICAL

VERTICAL PLOT

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

Data#: 15 File#: 08U11901_FCC.EMI Date: 09-25-2008 Time: 11:01:39



Trace: 12 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator:: Chin Pang
Project #: : 08U11901
Company: : Motorola
Configuration:: EUT with Dish Antenna
Mode : : TX
Target: : FCC Class B

Page: 1

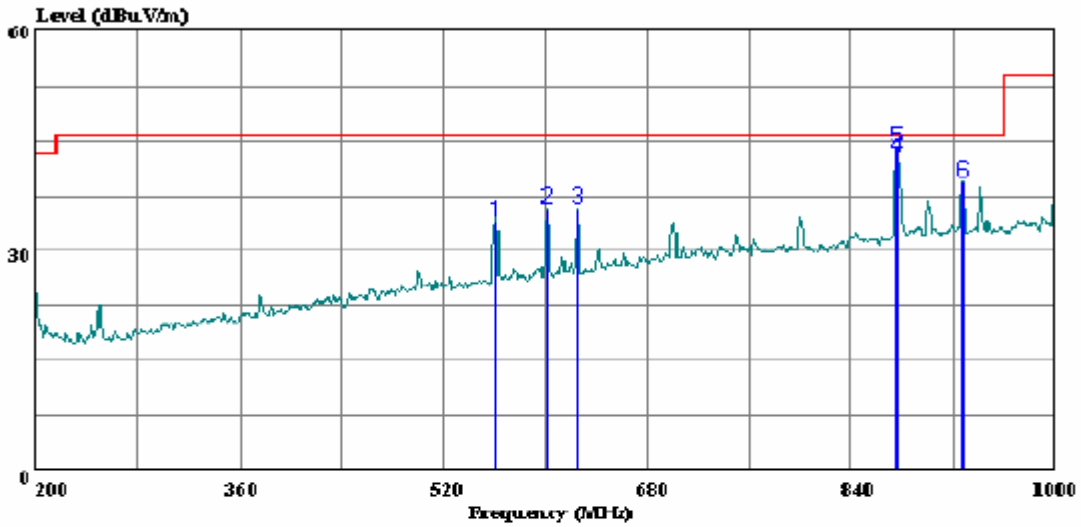
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	34.080	46.40	-9.58	36.82	40.00	-3.18	QP
2	34.080	48.04	-9.89	38.15	40.00	-1.85	Peak
3	39.520	41.76	-13.01	28.75	40.00	-11.25	Peak
4	50.570	41.69	-19.65	22.03	40.00	-17.97	Peak
5	72.160	43.69	-19.08	24.60	40.00	-15.40	Peak
6	119.590	36.78	-12.74	24.04	43.50	-19.46	Peak
7	136.420	38.70	-13.47	25.23	43.50	-18.27	Peak

SPURIOUS EMISSIONS 200 TO 1000 MHz (WORST-CASE CONFIGURATION VERTICAL

VERTICAL DATA

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

Data#: 19 File#: 08U11901_FCC.EMI Date: 09-25-2008 Time: 11:10:35



Trace: 16 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator:: Chin Pang
Project #: : 08U11901
Company: : Motorola
Configuration:: EUT with Dish Antenna
Mode : : TX
Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	560.800	37.76	-3.64	34.12	46.00	-11.88	Peak
2	601.600	38.57	-2.82	35.75	46.00	-10.25	Peak
3	625.600	38.14	-2.28	35.86	46.00	-10.14	Peak
4	875.200	40.51	2.31	42.82	46.00	-3.18	QP
5	875.200	41.69	2.34	44.03	46.00	-1.97	Peak
6	927.200	36.38	3.11	39.49	46.00	-6.51	Peak

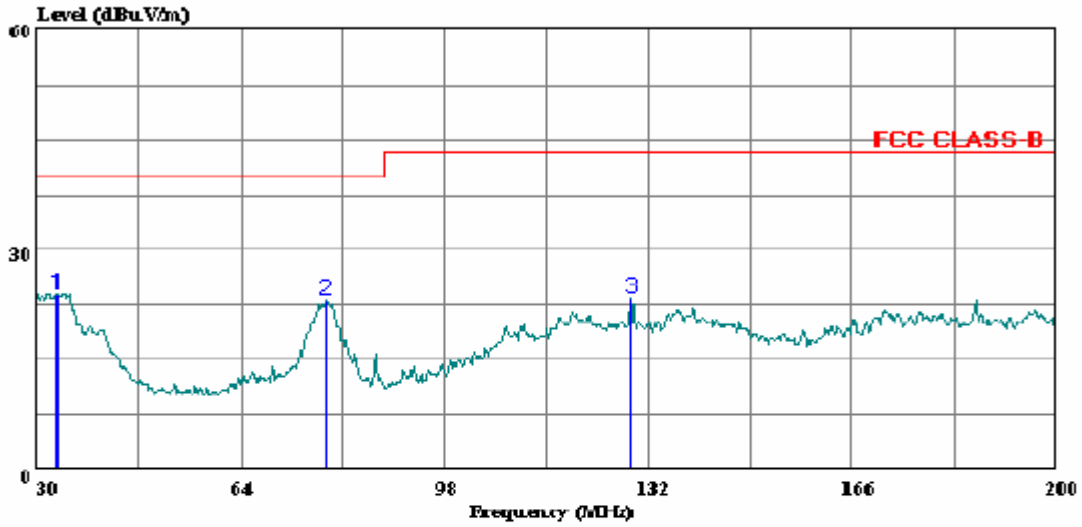
8.5. WORST-CASE BELOW 1 GHz (PANEL ANTENNA)

SPURIOUS EMISSIONS 30 TO 230 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT AND DATA

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

Data#: 31 File#: 08U11901_FCC.EMI Date: 09-25-2008 Time: 13:22:18



Trace: 30 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Chin Pang
Project #: : 08U11901
Company: : Motorola
Configuration:: EUT with Panel Antenna
Mode : : TX
Target: : FCC Class B

Page: 1

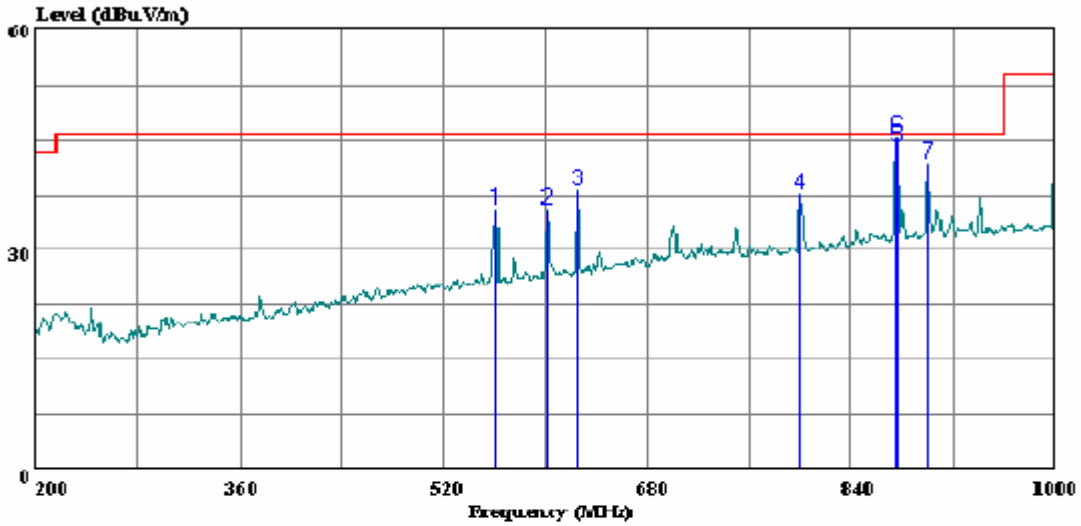
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	33.230	33.23	-9.26	23.98	40.00	-16.02	Peak
2	78.280	42.25	-19.22	23.03	40.00	-16.97	Peak
3	129.280	36.75	-13.36	23.39	43.50	-20.11	Peak

SPURIOUS EMISSIONS 200 TO 100 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT AND DATA

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

Data#: 35 File#: 08U11901_FCC.EMI Date: 09-25-2008 Time: 13:29:32



Trace: 32 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Chin Pang
Project #: : 08U11901
Company: : Motorola
Configuration:: EUT with Panel Antenna
Mode : : TX
Target: : FCC Class B

Page: 1

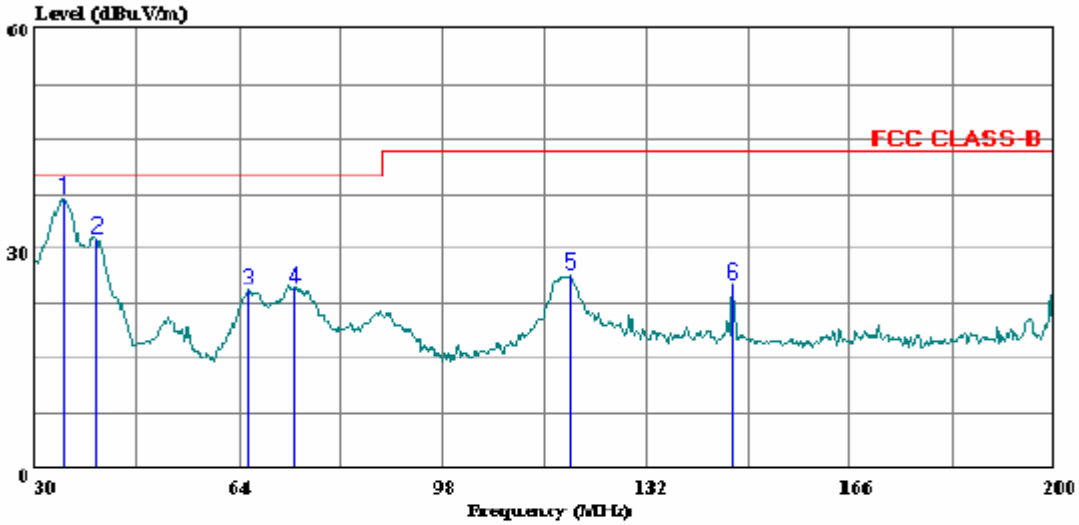
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	561.600	39.24	-3.64	35.60	46.00	-10.40	Peak
2	601.600	38.43	-2.82	35.61	46.00	-10.39	Peak
3	625.600	40.54	-2.28	38.26	46.00	-7.74	Peak
4	799.200	36.71	0.86	37.57	46.00	-8.43	Peak
5	875.200	41.83	2.31	44.14	46.00	-1.86	QP
6	875.200	43.19	2.34	45.53	46.00	-0.47	Peak
7	899.200	38.93	2.90	41.83	46.00	-4.17	Peak

SPURIOUS EMISSIONS 30 TO 200 MHz (WORST-CASE CONFIGURATION VERTICAL

VERTICAL PLOT AND DATA

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

Data#: 27 File#: 08U11901_FCC.EMI Date: 09-25-2008 Time: 12:07:30



Trace: 26 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator:: Chin Pang
Project #: : 08U11901
Company: : Motorola
Configuration:: EUT with Panel Antenna
Mode : : TX
Target: : FCC Class B

Page: 1

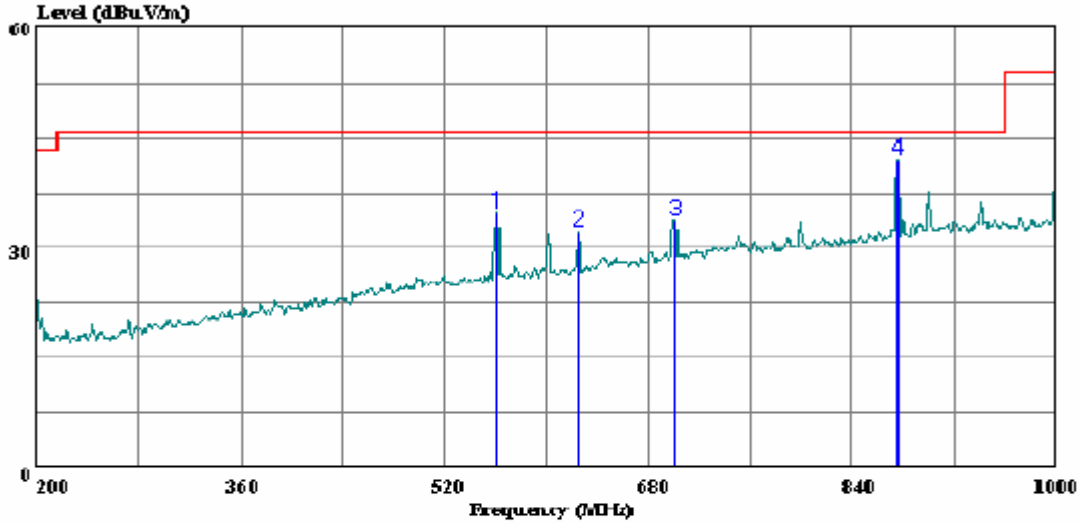
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	34.930	47.36	-10.36	37.00	40.00	-3.00	Peak
2	40.200	45.21	-13.72	31.49	40.00	-8.51	Peak
3	65.530	43.70	-19.35	24.35	40.00	-15.65	Peak
4	73.180	43.74	-19.11	24.63	40.00	-15.37	Peak
5	119.080	39.35	-12.87	26.48	43.50	-17.02	Peak
6	146.280	38.88	-13.69	25.19	43.50	-18.31	Peak

SPURIOUS EMISSIONS 200 TO 1000 MHz (WORST-CASE CONFIGURATION VERTICAL

VERTICAL PLOT AND DATA

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

Data#: 29 File#: 08U11901_FCC.EMI Date: 09-25-2008 Time: 13:15:20



Trace: 28 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator:: Chin Pang
Project #: : 08U11901
Company: : Motorola
Configuration:: EUT with Panel Antenna
Mode : : TX
Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	561.600	38.45	-3.64	34.81	46.00	-11.19	Peak
2	625.600	34.50	-2.28	32.22	46.00	-13.78	Peak
3	700.800	34.28	-0.44	33.84	46.00	-12.16	Peak
4	875.200	39.74	2.34	42.08	46.00	-3.92	Peak

9. 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

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 receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

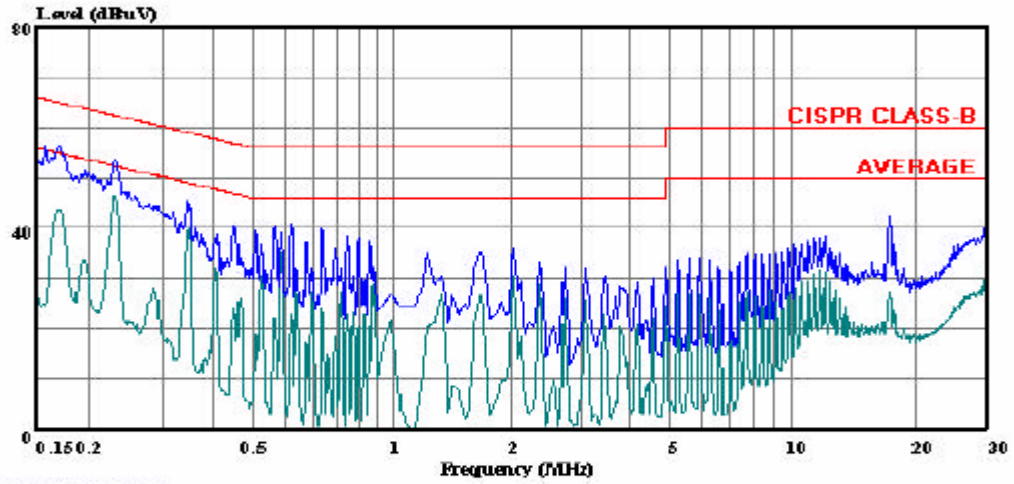
6 WORST EMISSIONS

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
0.17	55.72	--	43.61	0.00	64.86	54.86	-9.14	-11.25	L1
0.23	53.58	--	46.55	0.00	62.38	52.38	-8.80	-5.83	L1
11.74	38.23	--	31.58	0.00	60.00	50.00	-21.77	-18.42	L1
0.17	56.26	--	43.33	0.00	65.01	55.01	-8.75	-11.68	L2
0.23	48.45	--	45.34	0.00	62.38	52.38	-13.93	-7.04	L2
11.56	39.21	--	33.35	0.00	60.00	50.00	-20.79	-16.65	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#: 7 File#: 08u11901.emi Date: 09-22-2008 Time: 16:33:11

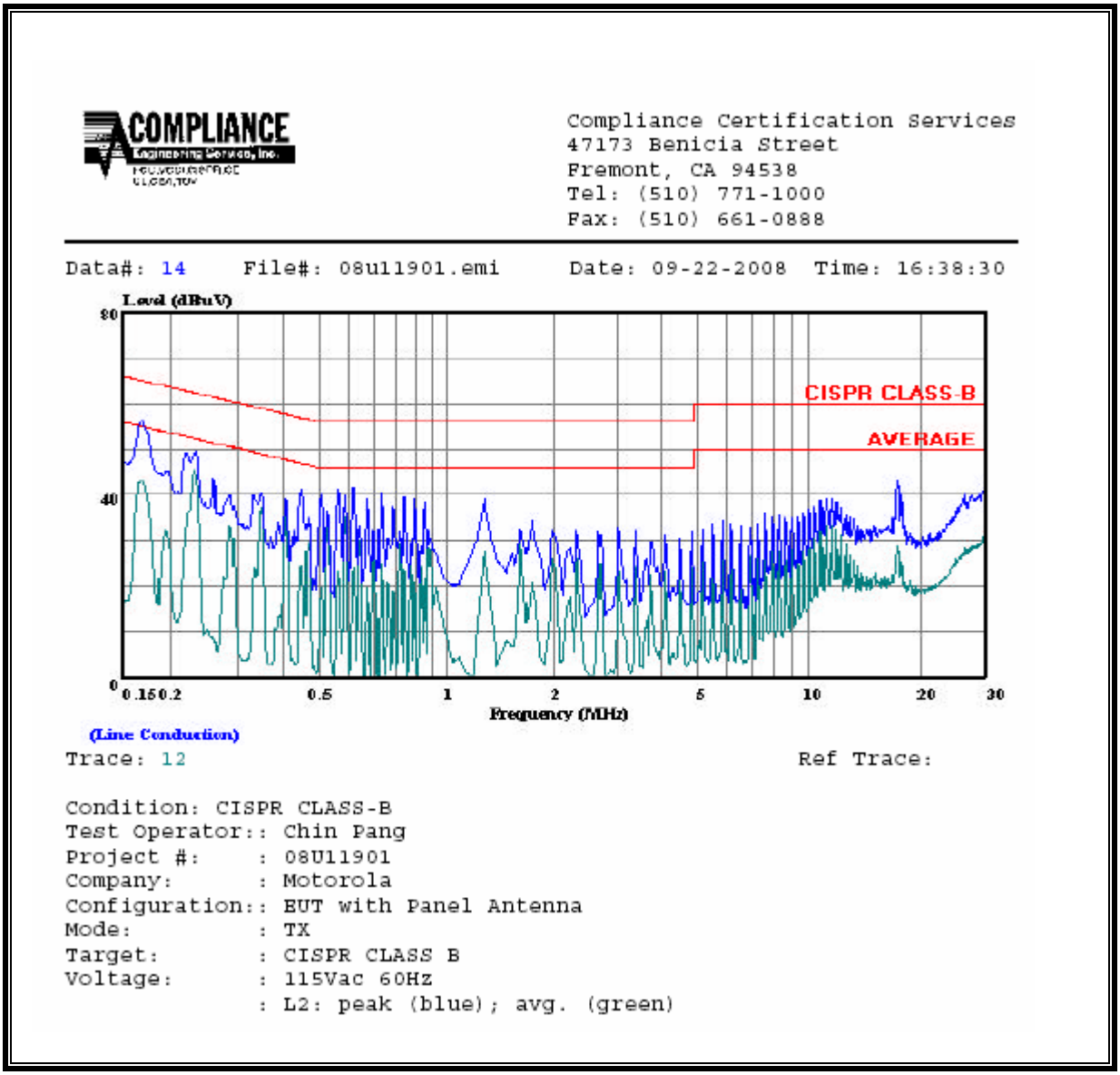


(Line Conduction)

Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Chin Pang
Project #: : 08U11901
Company: : Motorola
Configuration:: EUT with Panel Antenna
Mode: : TX
Target: : CISPR CLASS B
Voltage: : 115Vac 60Hz
: L1: peak (blue); avg. (green)

LINE 2 RESULTS



10. DYNAMIC FREQUENCY SELECTION

10.1. OVERVIEW

10.1.1. 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

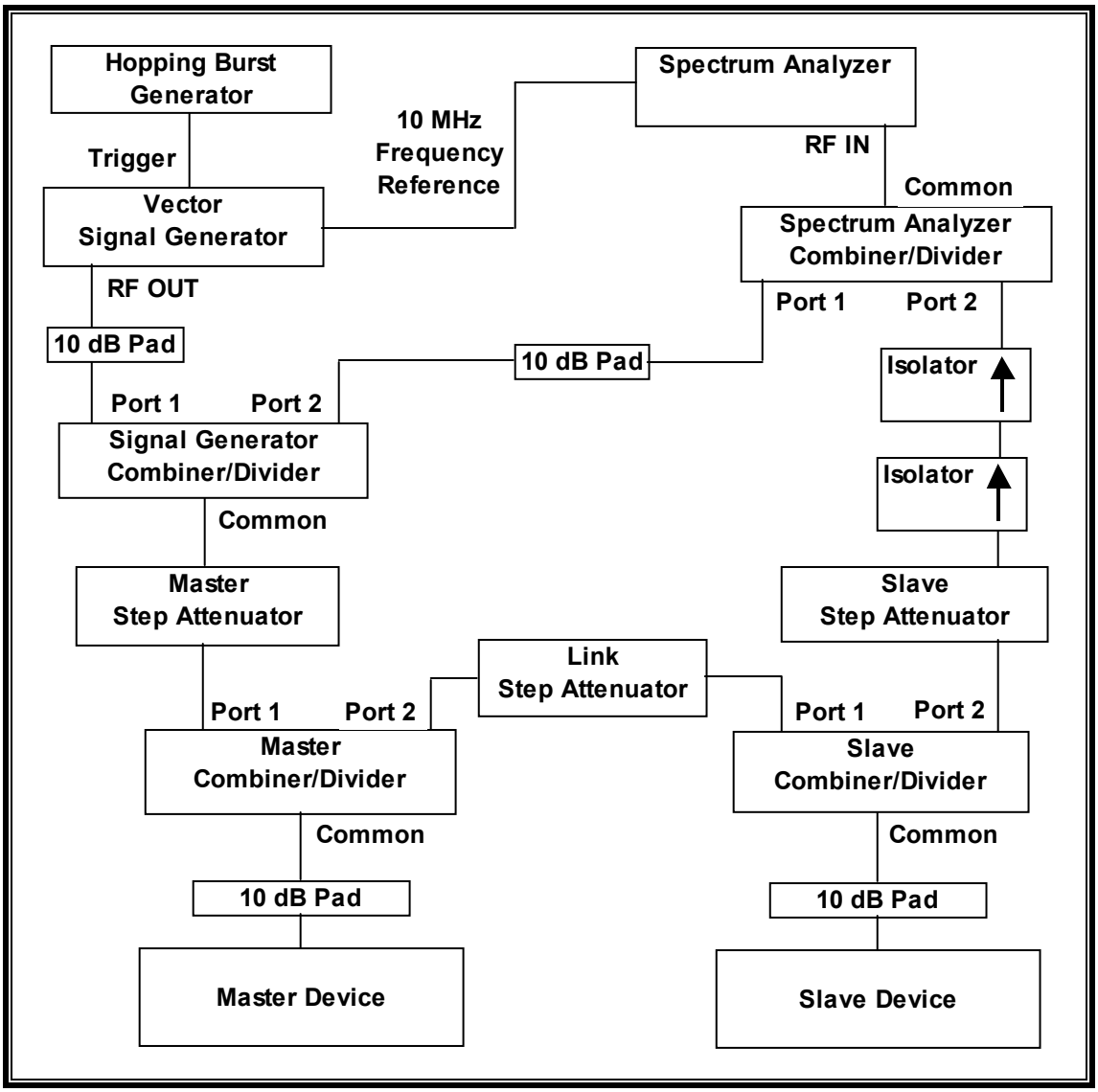
Radar Waveform	Bursts	Pulses per Burst	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

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

10.1.2. 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 in place of the master device and 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 Link Step Attenuator 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 Master Step Attenuator is required to meet the above conditions, perform a new System Calibration for the new Master Step Attenuator setting.

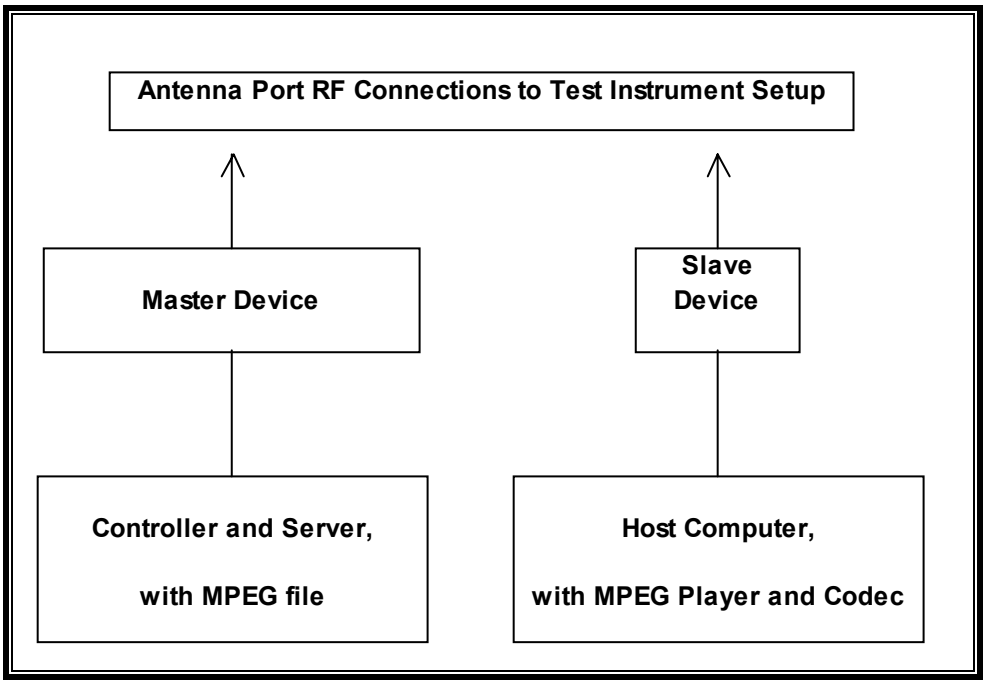
TEST AND MEASUREMENT EQUIPMENT

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 9 kHz ~ 26.5 GHz	**Agilent / HP**	**E4407B**	**US41444322**	**11/9/2008**
Vector Signal Generator 250kHz-20GHz	**Agilent / HP**	**E8267C**	**US43320336**	**11/16/2008**
Arbitrary Waveform Generator	**Agilent / HP**	**33220A**	**MY44026694**	**5/5/2009**

10.1.3. SETUP OF EUT

CONDUCTED 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**
Wireless Ethernet Bridge (Master)	Motorola	PTP54600	000456803C	QWP54100
PIDU (Master)	Motorola	WB2521	732249782	DoC
Wireless Ethernet Bridge (Slave)	Motorola	PTP54600	000456804C5D	QWP54100
PIDU (Slave)	Motorola	WB2521	73629995	DoC
Notebook PC (Master)	Dell	PP18L	36778905757	DoC
AC Adapter (Master)	Dell	PA-1650-06D3	CN-0DF263-71615-66C-2E22	DoC
Notebook PC (Slave)	Dell	PP18L	28071776413	DoC
AC Adapter (Slave)	Dell	PA-1650-06D3	CN-0DF263-71615-72M-2925	DoC

10.1.4. DESCRIPTION OF EUT

The EUT operates over the 5470-5725 MHz range.

The EUT can be configured as a Master Device or a Slave Device without Radar Detection.

The highest power level within these bands is 30 dBm EIRP.

The highest gain antenna assembly utilized with the EUT is an external antenna with coaxial feed cable; the antenna has a gain of 34.9 dBi and the minimum cable loss is specified by the installation instructions. The lowest gain antenna assembly utilized with the EUT is an integral antenna, without any coax feed cable; this antenna assembly has a gain of 23 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 + 23 + 1 = -40 dBm.

The calibrated conducted DFS Detection Threshold level is set to –41 dBm. The tested level is lower than the required level hence it provides margin to the limit.

The EUT uses two transmitter/receiver chains, each connected to a 50-ohm coaxial antenna port. The Vertical antenna ports are connected to the test system to perform conducted tests. The Horizontal antenna ports are connected via 70 dB attenuation.

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 a proprietary, frame-based architecture. Three nominal channel bandwidths, 5, 10, and 15 MHz, are implemented. The channel spacing is 6, 6, and 10 MHz respectively.

The frame timing parameters are set in accordance with a test plan approved by the FCC.

The EUT has an initial power-up cycle time of 61.9 seconds in the 5 MHz BW mode, 63.2 seconds in the 10 MHz BW mode, and 61.8 seconds in the 15 MHz BW mode.

The software installed in the EUT is revision B1377.

MANUFACTURER’S STATEMENT REGARDING UNIFORM CHANNEL SPREADING

This statement is in a separate document.

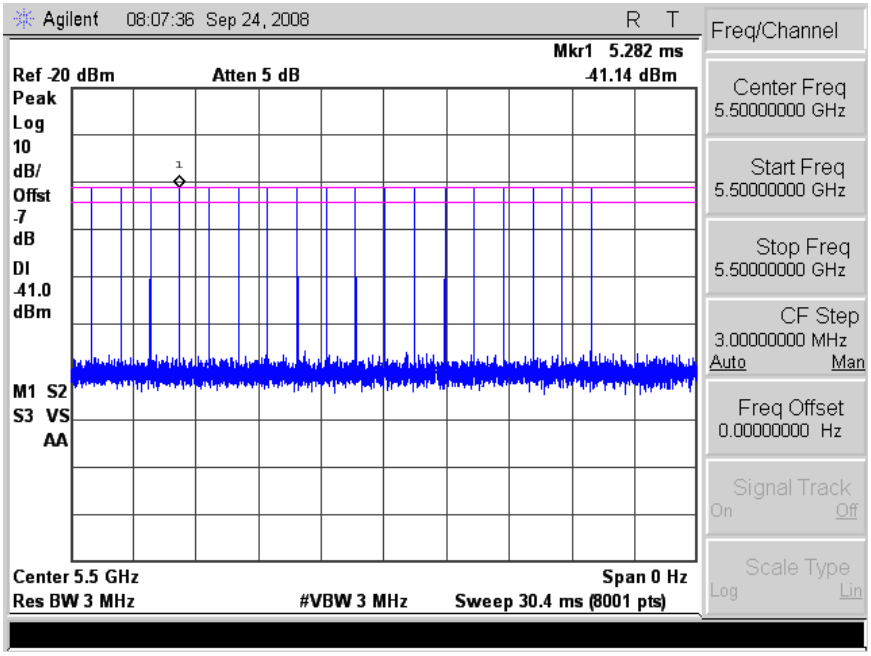
10.1.5. PLOTS OF RADAR WAVEFORMS

TEST CHANNEL

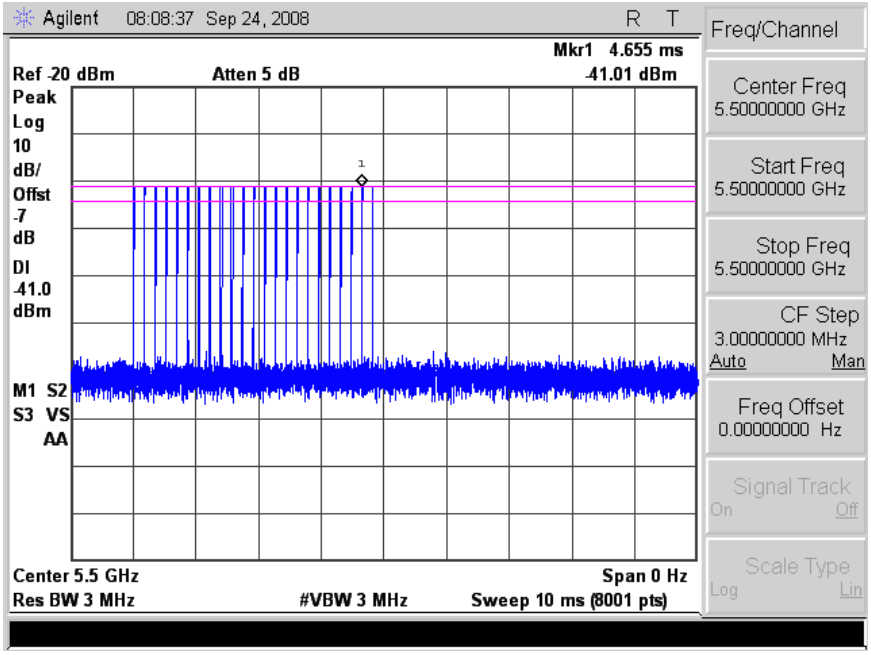
All tests were performed at a channel center frequency of 5500 MHz. Measurements were performed using conducted test methods.

PLOTS OF RADAR WAVEFORMS

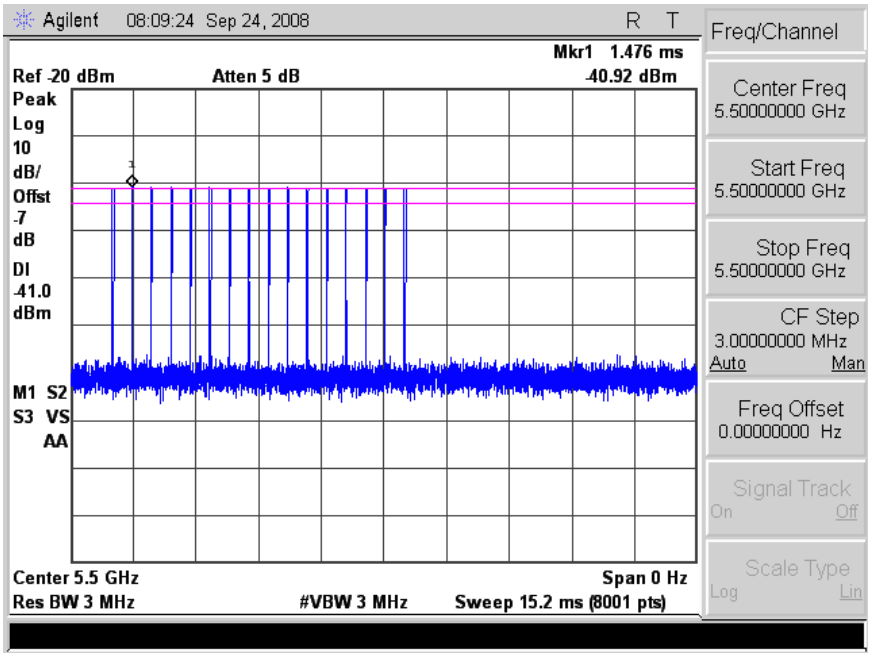
SHORT PULSE RADAR TYPE 1



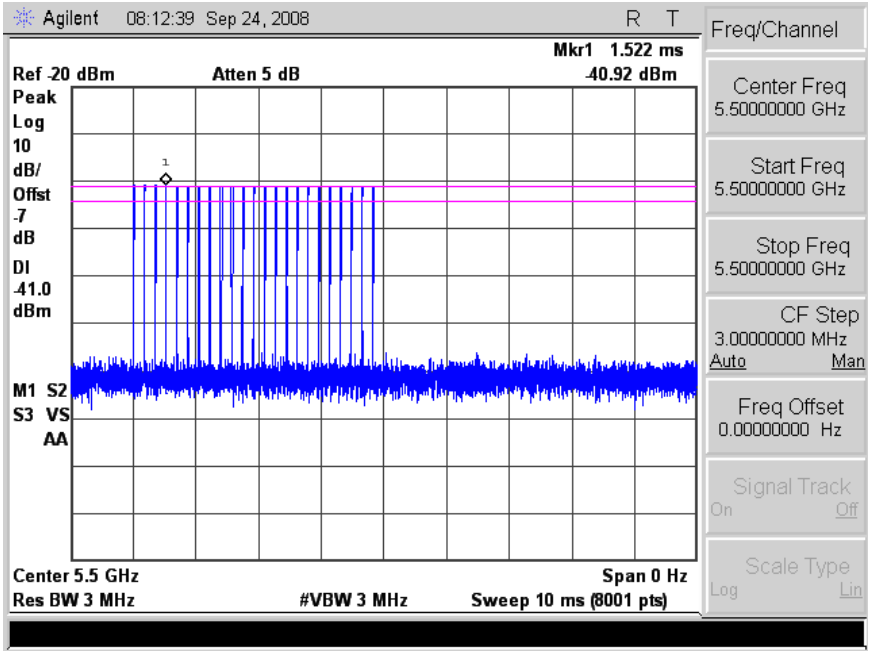
SAMPLE OF RADAR TYPE 2



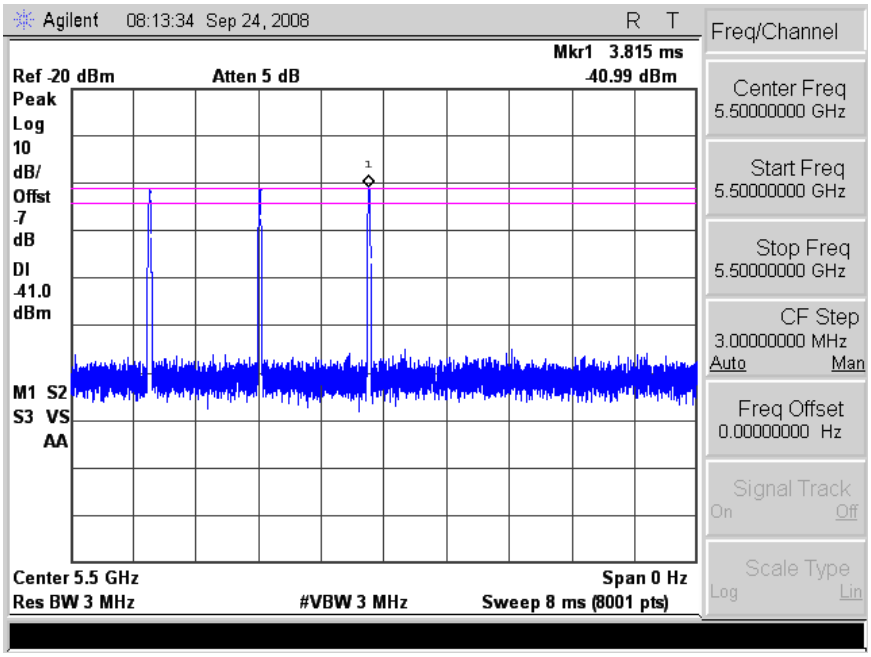
SAMPLE OF RADAR TYPE 3



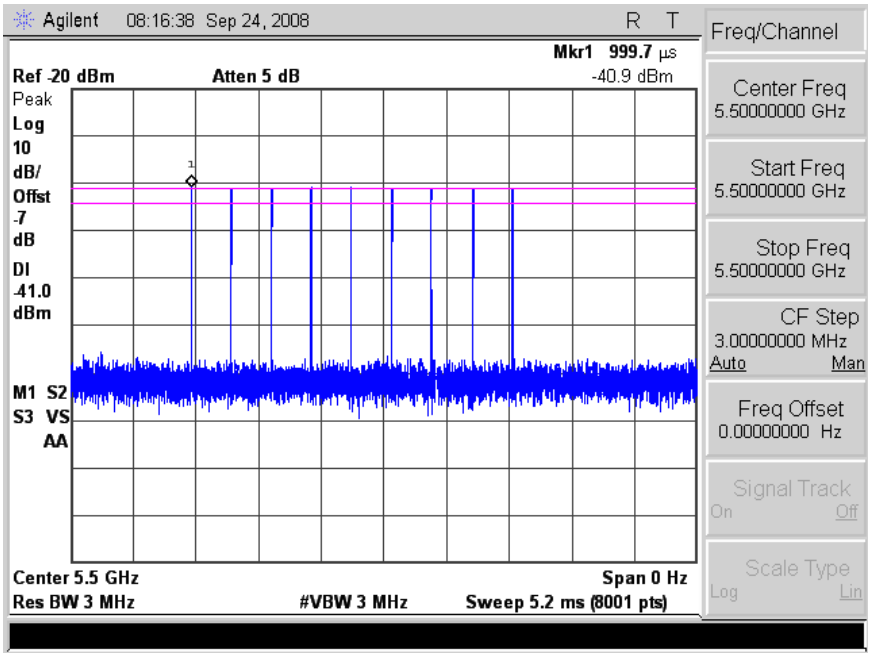
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5



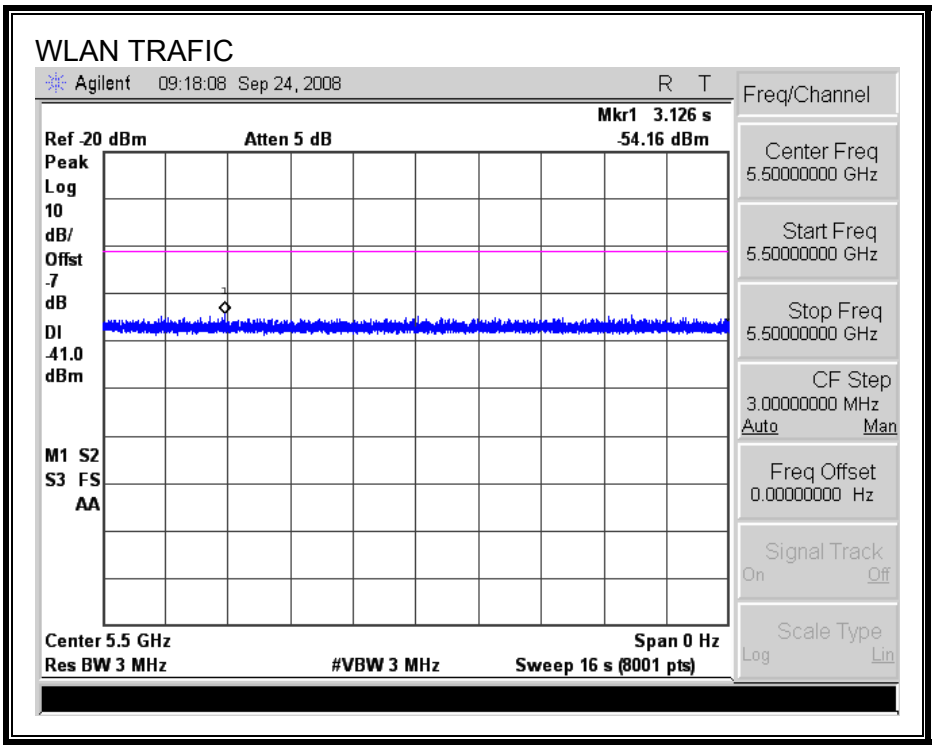
SINGLE BURST OF RADAR TYPE 6



10.2. RESULTS FOR 5 MHz BANDWIDTH MASTER CONFIGURATION

10.2.1. TRAFFIC

PLOT OF TRAFFIC FROM MASTER



10.2.2. CHANNEL AVAILABILITY CHECK TIME

PROCEDURE TO DETERMINE INITIAL POWER-UP CYCLE TIME

A link was established on channel then the EUT was rebooted. The time from the cessation of traffic to the re-initialization of traffic was measured as the time required for the EUT to complete the total power-up cycle. The time to complete the initial power-up period is 60 seconds less than this total power-up time.

PROCEDURE FOR TIMING OF RADAR BURST

With a link established on channel, the EUT was rebooted. A radar signal was triggered within 0 to 6 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

The Non-Occupancy list was cleared. With a link established on channel, the EUT was rebooted. A radar signal was triggered within 54 to 60 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

QUANTITATIVE RESULTS

No Radar Triggered

Timing of Reboot (sec)	Timing of Start of Traffic (sec)	Total Power-up Cycle Time (sec)	Initial Power-up Cycle Time (sec)
24.3	146.2	121.9	61.9

Radar Near Beginning of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
24.0	86.4	62.4	0.5

Radar Near End of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
25.6	146.2	120.6	58.7

QUALITATIVE RESULTS

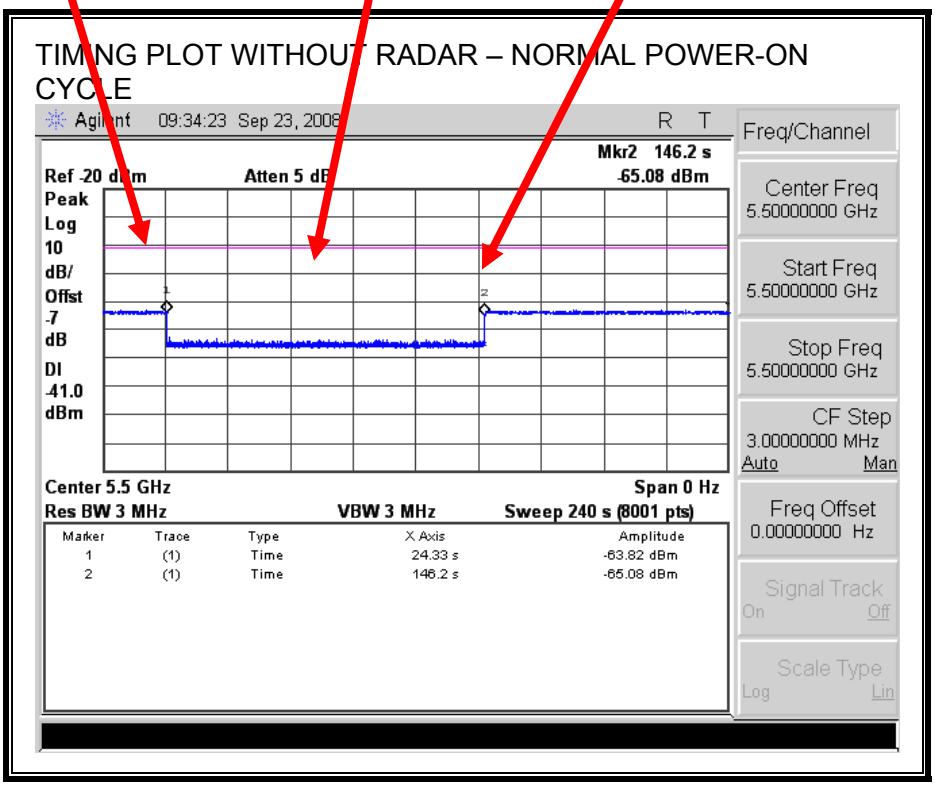
Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within 54 to 60 second window	EUT indicates radar detected	No transmissions on channel

TIMING PLOT WITHOUT RADAR DURING CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

End of CAC
Traffic is Initiated



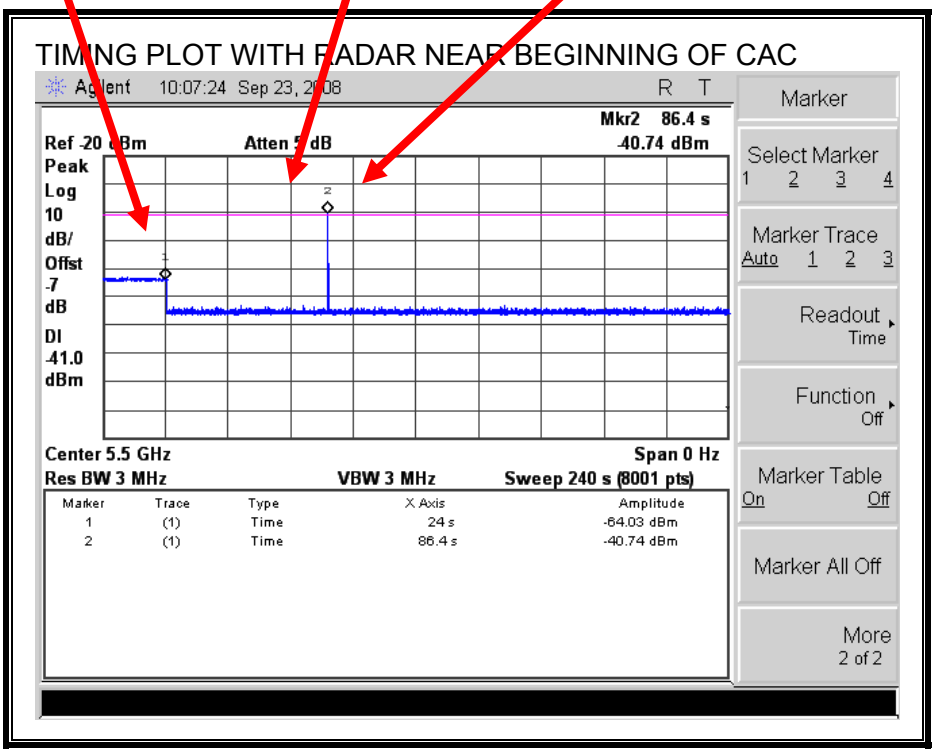
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

TIMING PLOT WITH RADAR NEAR BEGINNING OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



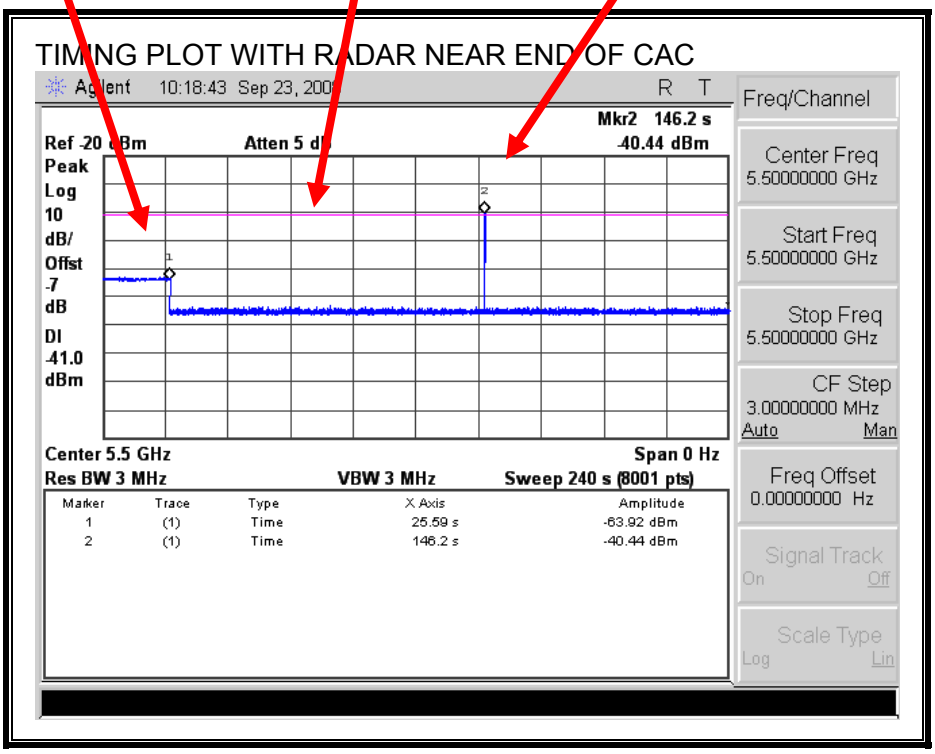
No EUT transmissions were observed after the radar signal.

TIMING PLOT WITH RADAR NEAR END OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

10.2.3. 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).

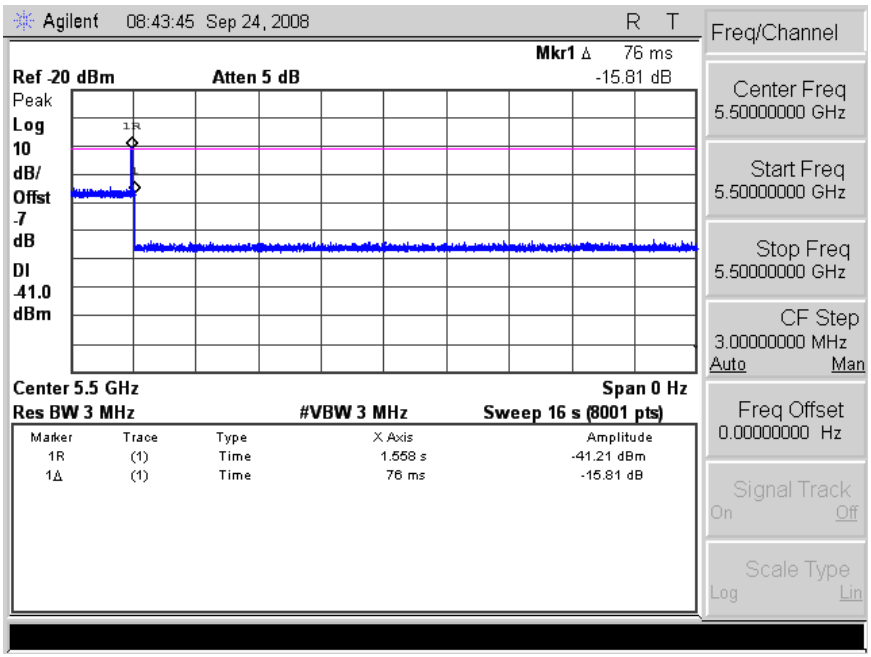
RESULTS

Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.076	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	0.0	60
IC	76.0	260

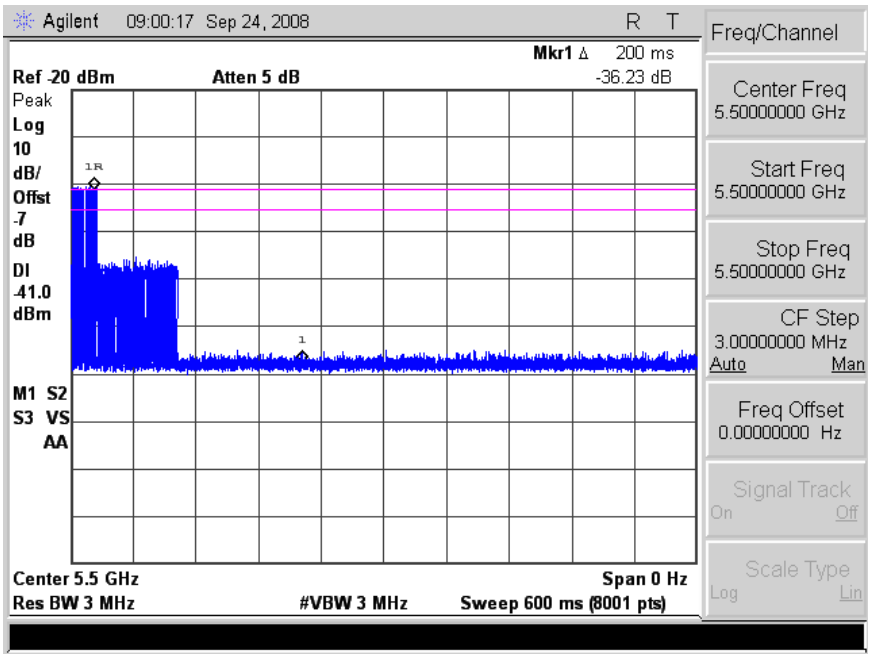
MOVE TIME

MOVE TIME PLOT



CHANNEL CLOSING TIME

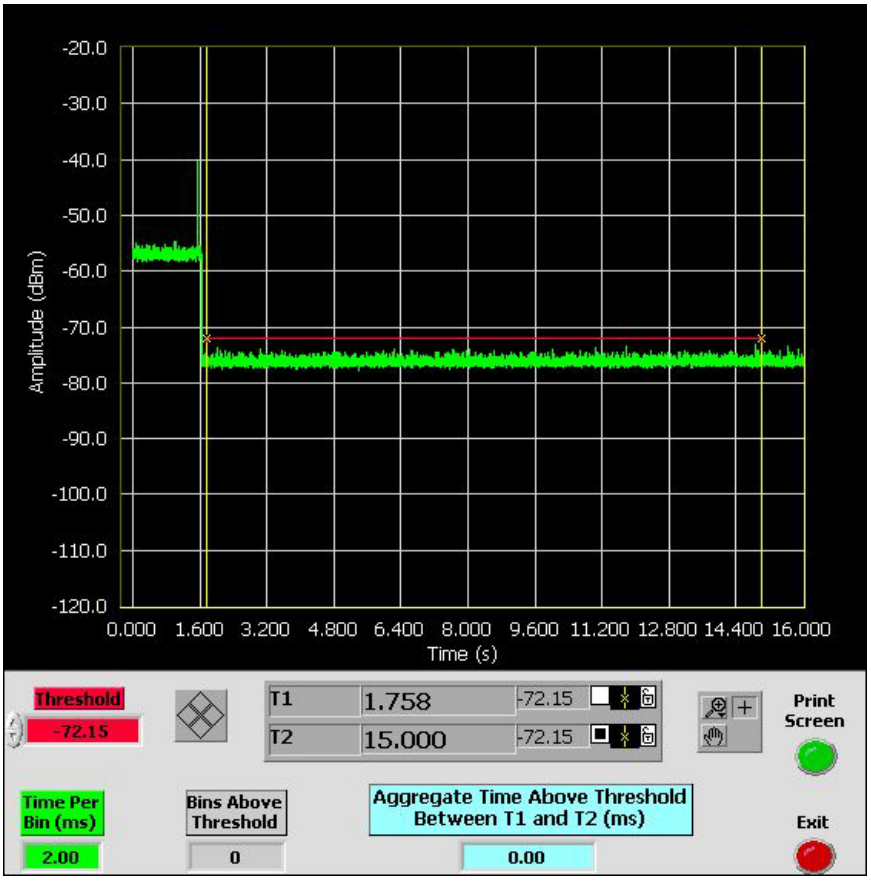
CLOSING TIME PLOT



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

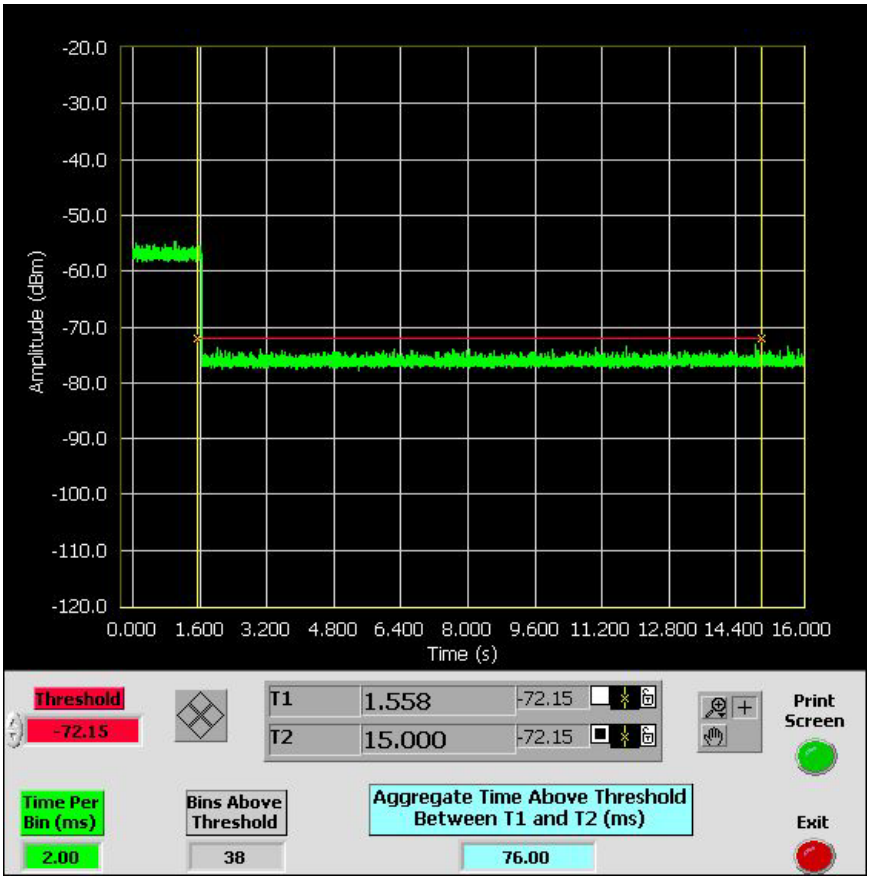
No transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME PLOT



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

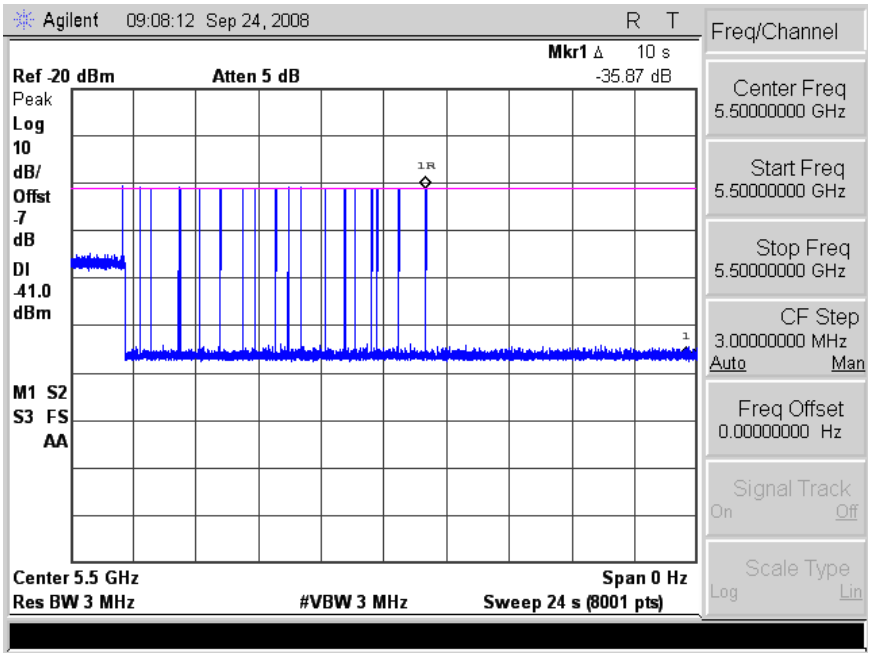
IC AGGREGATE CLOSING TIME PLOT



LONG PULSE CHANNEL MOVE TIME

The traffic ceases prior to 10 seconds after the end of the radar waveform.

MOVE TIME PLOT FOR LONG PULSE RADAR

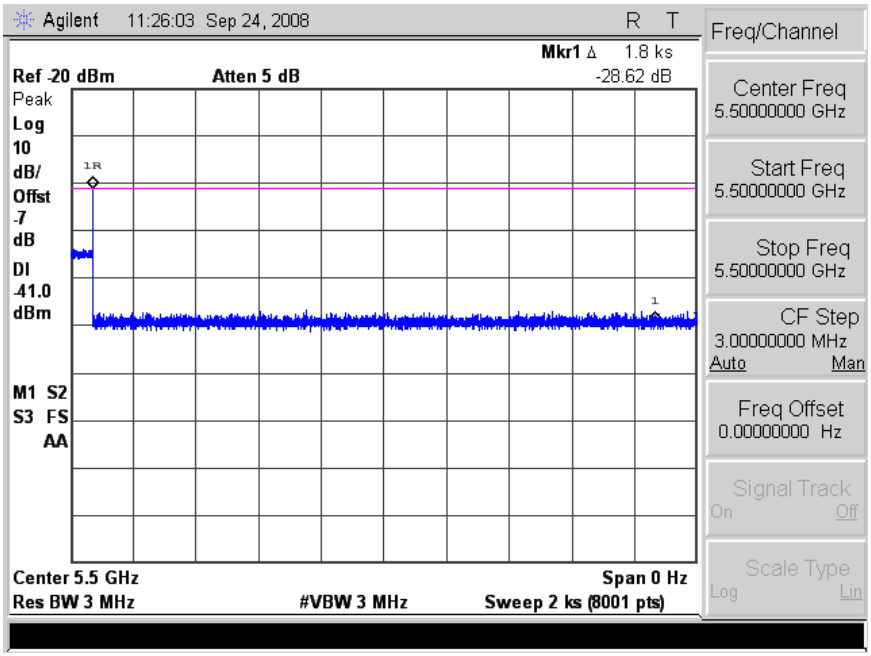


10.2.4. NON-OCCUPANCY PERIOD

RESULTS

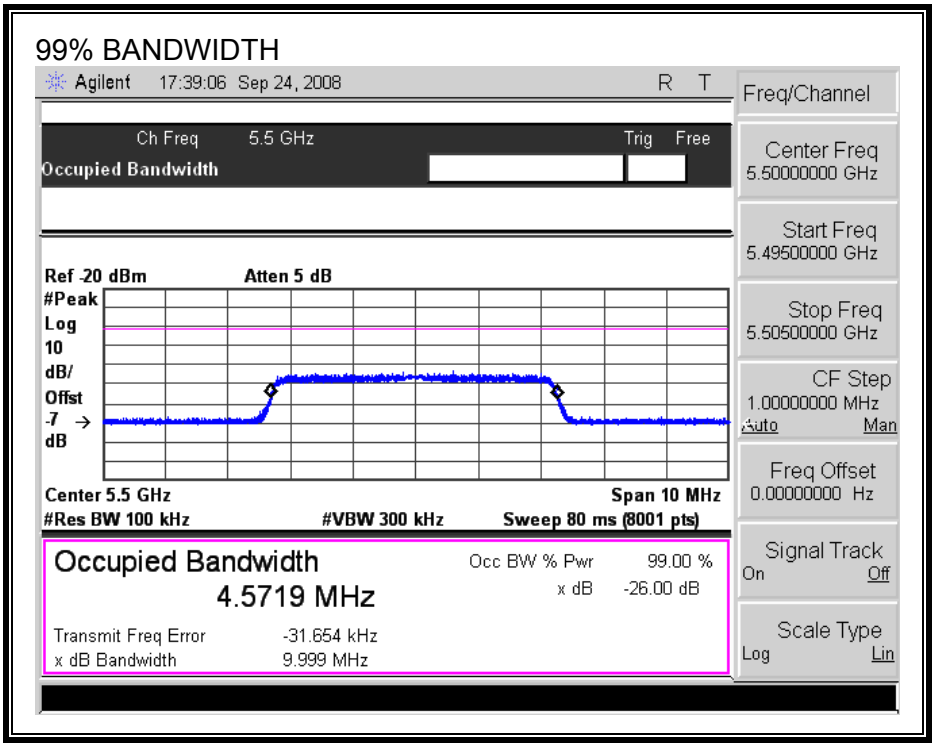
No EUT transmissions were observed on the test channel during the 30-minute observation time.

NON-OCCUPANCY PERIOD PLOT



10.2.5. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5498	5502	4	4.572	87.5	80

DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results
FCC Type 1 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst

Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	Mark
5498	10	10	100	FL
5499	10	10	100	
5500	10	10	100	
5501	10	10	100	
5502	10	10	100	FH

10.2.6. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary

Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail
FCC TYPE 1	30	100.00	60	Pass
FCC TYPE 2	30	90.00	60	Pass
FCC TYPE 3	30	93.33	60	Pass
FCC TYPE 4	30	96.67	60	Pass
Aggregate		95.00	80	Pass
FCC TYPE 5	30	100.00	80	Pass
FCC TYPE 6	30	90.00	70	Pass

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Fixed Radar Type 1
1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst

Trial	Successful Detection (Yes/No)
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	Yes
14	Yes
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
2001	2.5	174.00	23	Yes
2002	4.3	222.00	25	Yes
2003	3	163.00	27	Yes
2004	3.1	223.00	29	Yes
2005	4.6	179.00	28	Yes
2006	1.5	160.00	27	Yes
2007	3.4	180.00	29	Yes
2008	4.4	193.00	26	Yes
2009	3.3	160.00	28	No
2010	4.2	205.00	27	Yes
2011	3.6	225.00	24	Yes
2012	2.9	182.00	28	Yes
2013	1.1	181.00	27	Yes
2014	1.7	187.00	29	Yes
2015	4.7	204.00	28	Yes
2016	3.5	210.00	28	Yes
2017	1.4	198.00	25	Yes
2018	4	163.00	25	Yes
2019	3.3	159.00	23	No
2020	4.2	153.00	27	Yes
2021	4	163.00	27	Yes
2022	3.8	193.00	29	Yes
2023	3.9	208.00	24	No
2024	1	182.00	24	Yes
2025	3.9	160.00	28	Yes
2026	4.8	188.00	24	Yes
2027	1.2	180.00	29	Yes
2028	1.1	167.00	24	Yes
2029	2	155.00	28	Yes
2030	4.7	157.00	27	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
3001	7.4	474.00	16	Yes
3002	6.7	349.00	16	Yes
3003	5.5	416.00	18	Yes
3004	8.7	453.00	17	Yes
3005	8.6	369.00	18	Yes
3006	5.7	257.00	16	Yes
3007	5.4	404.00	17	Yes
3008	8	419.00	17	Yes
3009	5.2	296.00	17	Yes
3010	7.6	353.00	16	Yes
3011	8.7	312.00	17	Yes
3012	9.9	494.00	17	Yes
3013	6	304.00	18	Yes
3014	7.8	283.00	16	Yes
3015	8	303.00	16	Yes
3016	9.1	348.00	17	Yes
3017	6.7	360.00	18	Yes
3018	7.8	375.00	17	Yes
3019	7.8	382.00	16	Yes
3020	7.6	273.00	16	Yes
3021	9.9	365.00	18	Yes
3022	7.7	487.00	18	Yes
3023	8.8	442.00	17	Yes
3024	6	434.00	18	Yes
3025	6.3	296.00	18	Yes
3026	6	369.00	18	No
3027	5.4	490.00	17	Yes
3028	7.4	284.00	18	Yes
3029	9.5	274	18	No
3030	7	404	17	Yes

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
4001	13.8	413.00	14	Yes
4002	14.4	489.00	15	Yes
4003	13	306.00	16	Yes
4004	10.5	497.00	13	Yes
4005	11.3	359.00	13	Yes
4006	13.5	251.00	13	No
4007	11.2	272.00	16	Yes
4008	14.1	451.00	15	Yes
4009	17.1	378.00	14	Yes
4010	17.2	284.00	12	Yes
4011	19.2	332.00	13	Yes
4012	11.2	313.00	12	Yes
4013	18.1	389.00	15	Yes
4014	16.2	473.00	15	Yes
4015	12.5	356.00	15	Yes
4016	18.7	326.00	14	Yes
4017	12.6	297.00	16	Yes
4018	16.4	270.00	13	Yes
4019	13.4	335.00	14	Yes
4020	13	404.00	12	Yes
4021	13.4	429.00	16	Yes
4022	15.6	328.00	14	Yes
4023	17.6	453.00	14	Yes
4024	19.8	319.00	13	Yes
4025	14	344.00	14	Yes
4026	19.5	280.00	14	Yes
4027	10.2	424.00	16	Yes
4028	14.6	277.00	15	Yes
4029	10.2	353.00	14	Yes
4030	14.7	351.00	15	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5

Trial	Successful Detection (Yes/No)
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	Yes
14	Yes
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

Note: The Type 5 randomized parameters are shown in a separate document.

TYPE 6 DETECTION PROBABILITY

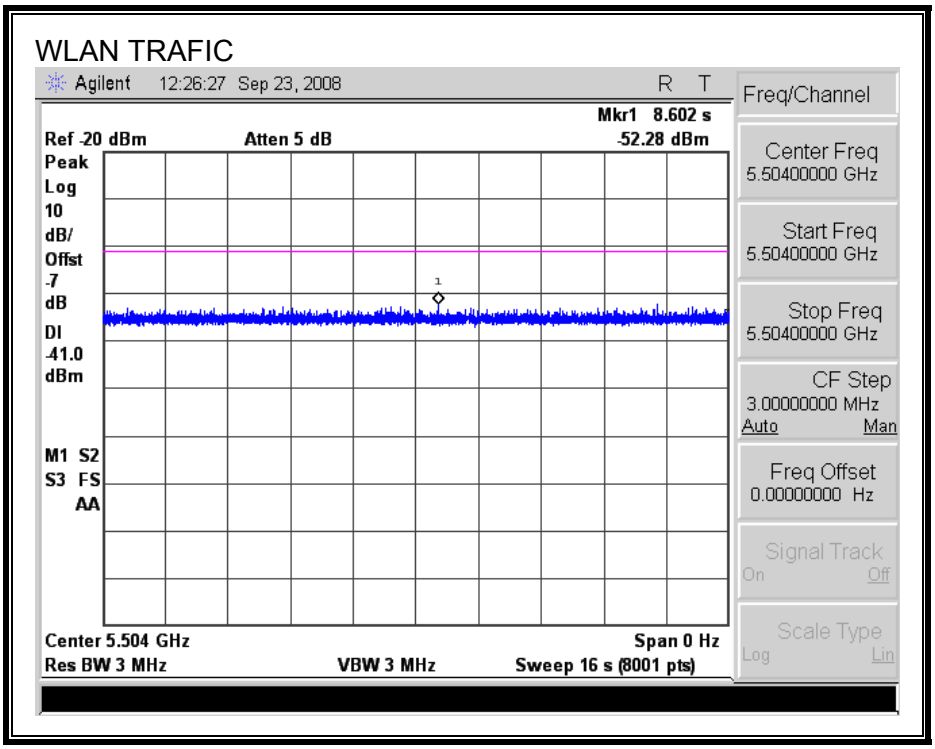
Data Sheet for FCC Hopping Radar Type 6
1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop
NTIA August 2005 Hopping Sequence

Trial	Starting Index Within Sequence (Base 1)	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (Yes/No)
1	259	5498	4	Yes
2	734	5499	1	Yes
3	1684	5500	1	Yes
4	2159	5501	2	Yes
5	3109	5502	1	No
6	3584	5498	1	Yes
7	4059	5499	2	Yes
8	5009	5500	1	Yes
9	5484	5501	2	No
10	5959	5502	2	Yes
11	6434	5498	2	Yes
12	6909	5499	3	Yes
13	7384	5500	1	Yes
14	7859	5501	1	Yes
15	9284	5502	1	Yes
16	9759	5498	1	Yes
17	10234	5499	3	Yes
18	11184	5500	1	Yes
19	11659	5501	1	Yes
20	12134	5502	2	Yes
21	12609	5498	1	Yes
22	13559	5499	3	Yes
23	14509	5500	1	Yes
24	14984	5501	1	Yes
25	15459	5502	2	Yes
26	15934	5498	2	Yes
27	16409	5499	1	Yes
28	17359	5500	2	Yes
29	17834	5501	1	Yes
30	18309	5502	1	No

10.3. RESULTS FOR 10 MHz BANDWIDTH MASTER CONFIGURATION

10.3.1. TRAFFIC

PLOT OF TRAFFIC FROM MASTER



10.3.2. CHANNEL AVAILABILITY CHECK TIME

PROCEDURE TO DETERMINE INITIAL POWER-UP CYCLE TIME

A link was established on channel then the EUT was rebooted. The time from the cessation of traffic to the re-initialization of traffic was measured as the time required for the EUT to complete the total power-up cycle. The time to complete the initial power-up period is 60 seconds less than this total power-up time.

PROCEDURE FOR TIMING OF RADAR BURST

With a link established on channel, the EUT was rebooted. A radar signal was triggered within 0 to 6 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

The Non-Occupancy list was cleared. With a link established on channel, the EUT was rebooted. A radar signal was triggered within 54 to 60 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

QUANTITATIVE RESULTS

No Radar Triggered

Timing of Reboot (sec)	Timing of Start of Traffic (sec)	Total Power-up Cycle Time (sec)	Initial Power-up Cycle Time (sec)
24.03	147.2	123.2	63.2

Radar Near Beginning of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
24.6	88.4	63.8	0.6

Radar Near End of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
23.7	145.3	121.6	58.4

QUALITATIVE RESULTS

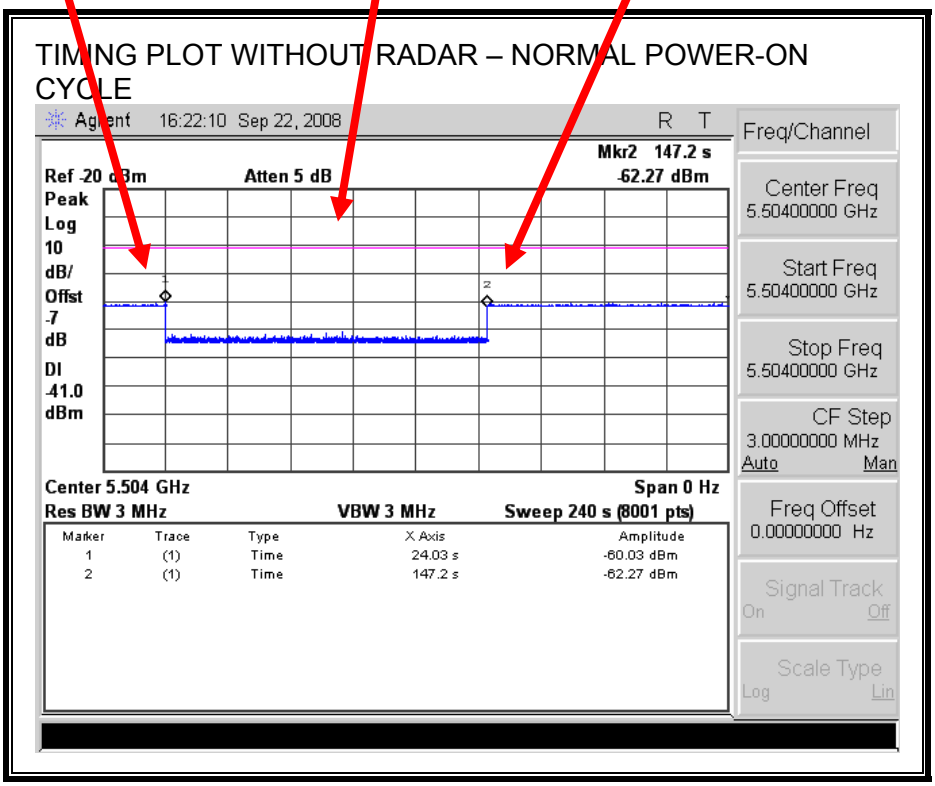
Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within 54 to 60 second window	EUT indicates radar detected	No transmissions on channel

TIMING PLOT WITHOUT RADAR DURING CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

End of CAC
Traffic is Initiated



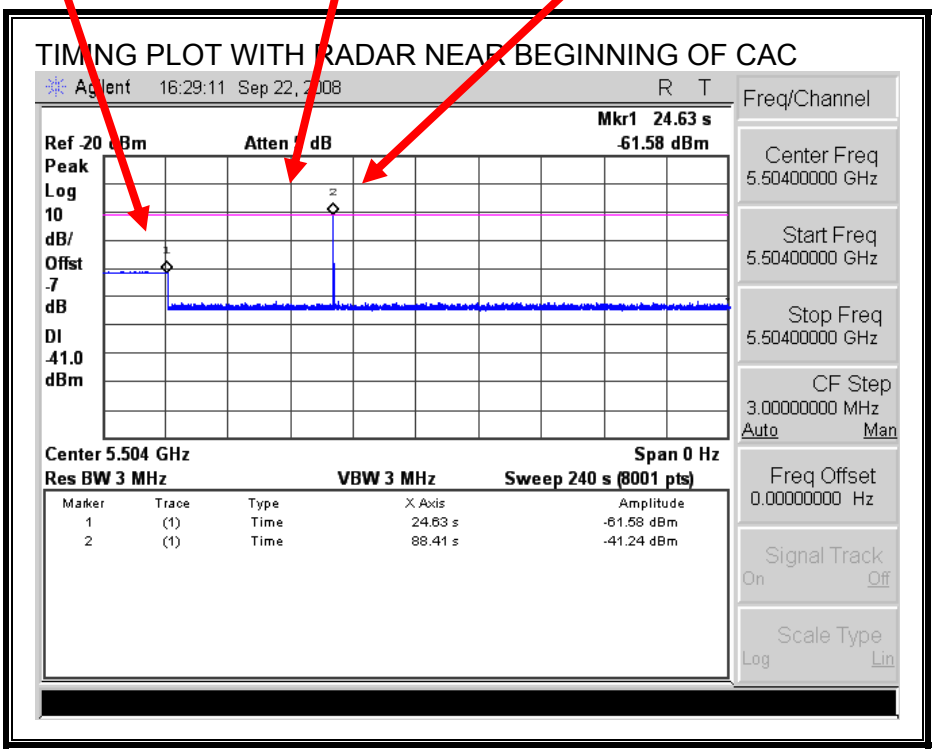
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

TIMING PLOT WITH RADAR NEAR BEGINNING OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



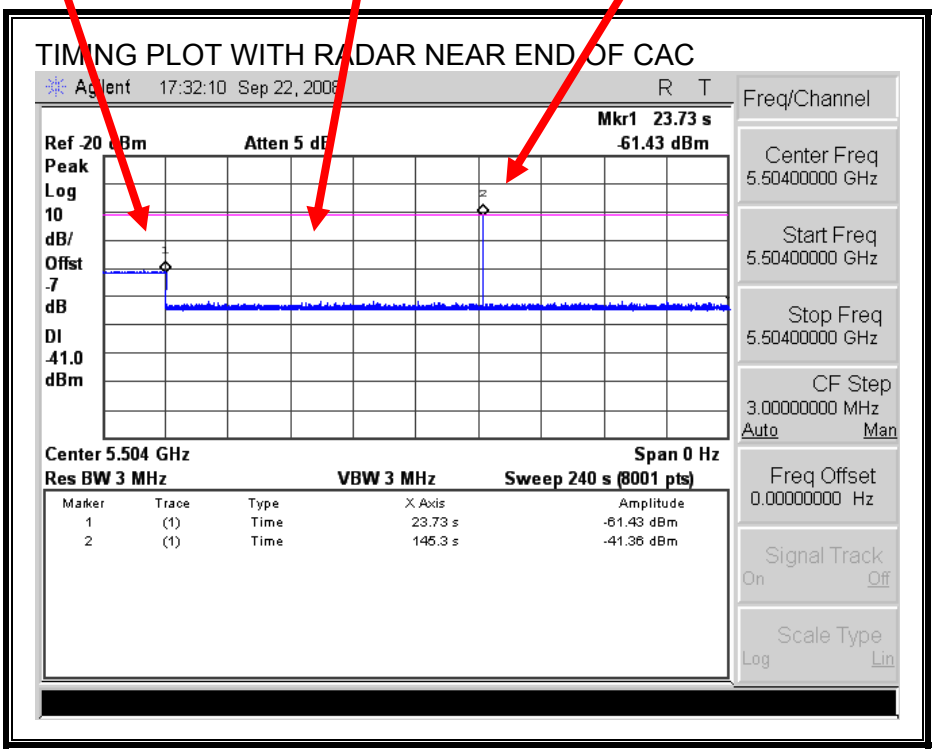
No EUT transmissions were observed after the radar signal.

TIMING PLOT WITH RADAR NEAR END OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

10.3.3. 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).

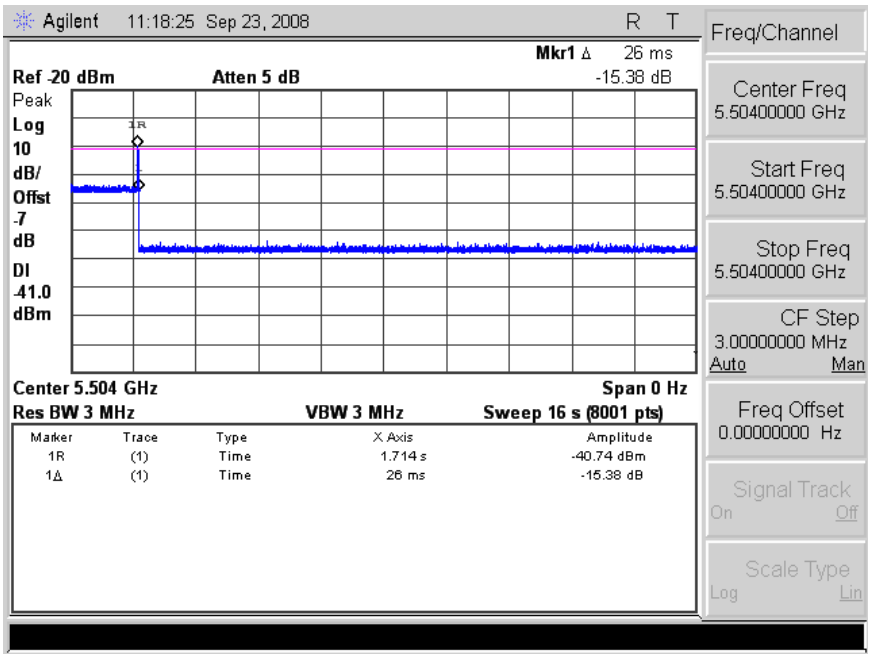
RESULTS

Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.026	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	0.0	60
IC	30.0	260

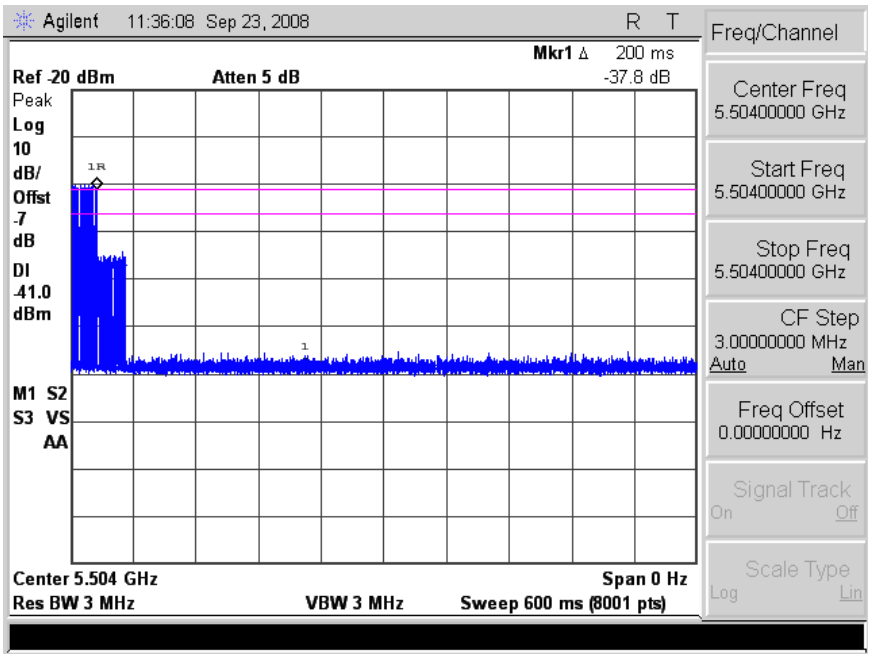
MOVE TIME

MOVE TIME PLOT



CHANNEL CLOSING TIME

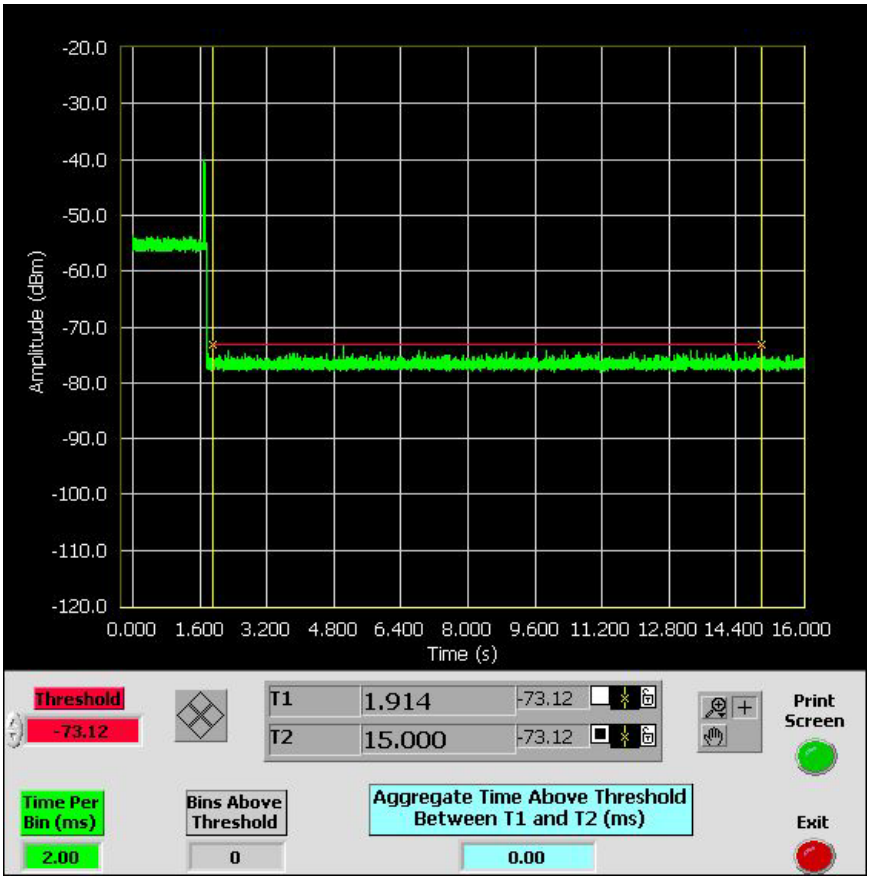
CLOSING TIME PLOT



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

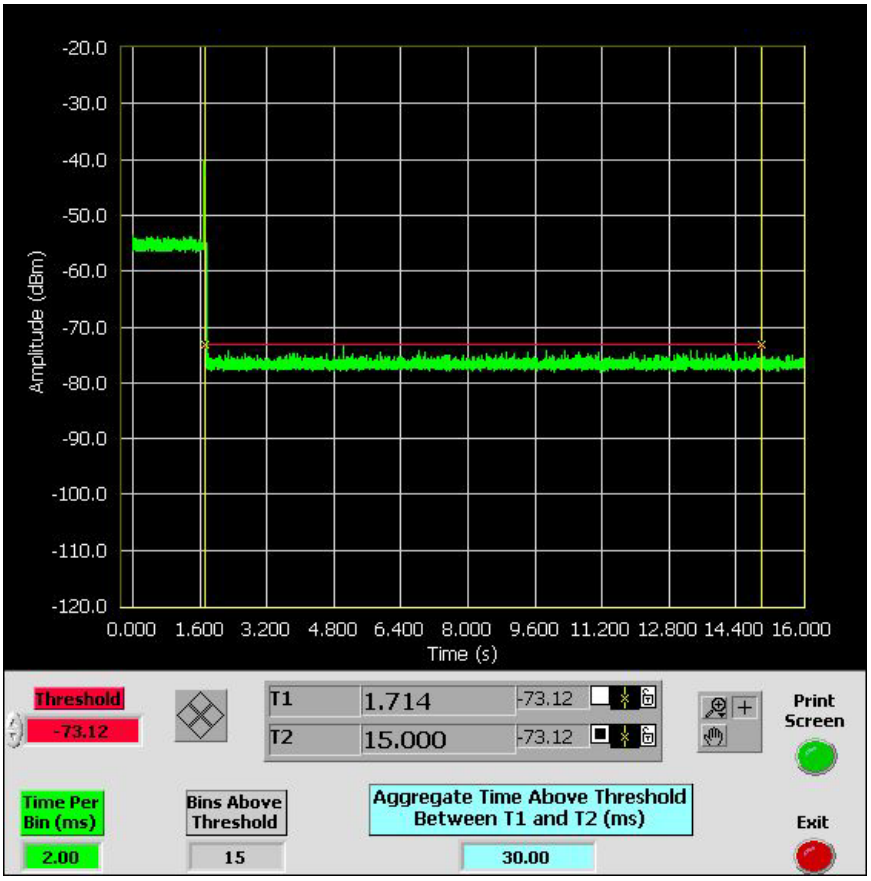
No transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME PLOT



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

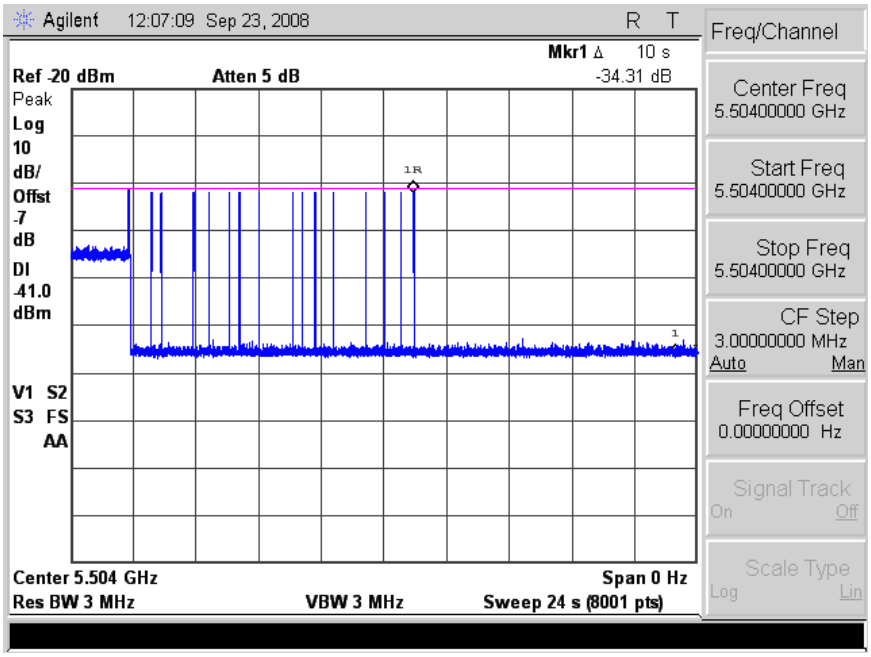
IC AGGREGATE CLOSING TIME PLOT



LONG PULSE CHANNEL MOVE TIME

The traffic ceases prior to 10 seconds after the end of the radar waveform.

MOVE TIME PLOT FOR LONG PULSE RADAR

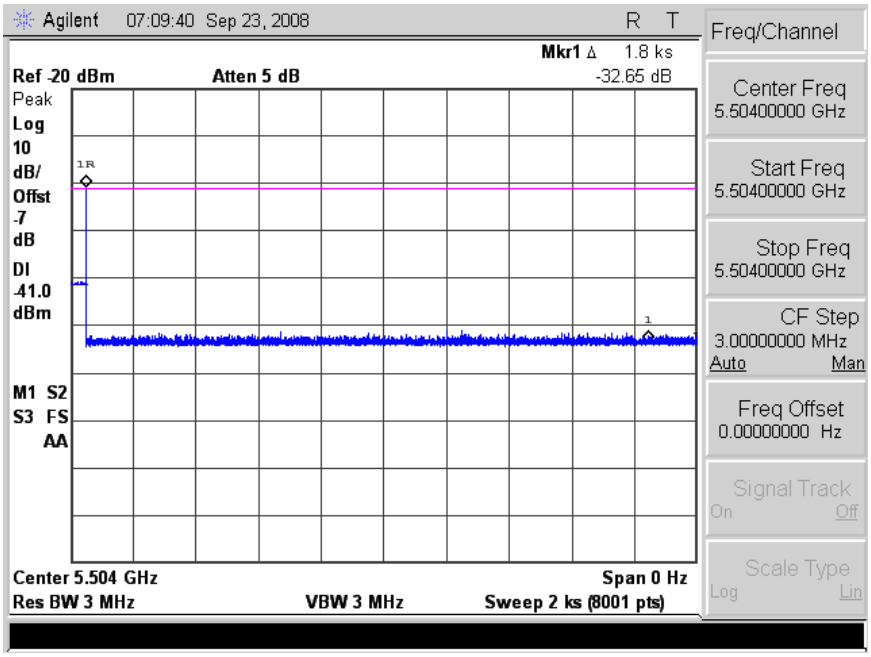


10.3.4. NON-OCCUPANCY PERIOD

RESULTS

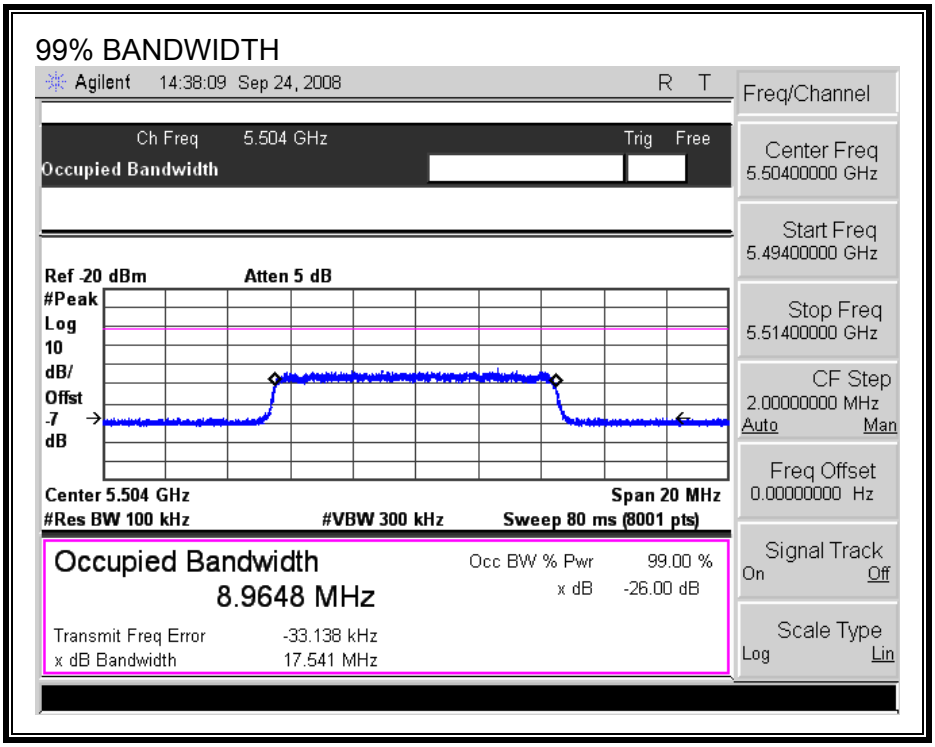
No EUT transmissions were observed on the test channel during the 30-minute observation time.

NON-OCCUPANCY PERIOD PLOT



10.3.5. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5500	5508	8	8.965	89.2	80

DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results

FCC Type 1 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst

Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	Mark
5500	10	10	100	FL
5501	10	10	100	
5502	10	10	100	
5503	10	10	100	
5504	10	10	100	
5505	10	10	100	
5506	10	10	100	
5507	10	10	100	
5508	10	10	100	FH

10.3.6. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary

Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail
FCC TYPE 1	30	100.00	60	Pass
FCC TYPE 2	30	100.00	60	Pass
FCC TYPE 3	30	100.00	60	Pass
FCC TYPE 4	30	100.00	60	Pass
Aggregate		100.00	80	Pass
FCC TYPE 5	30	100.00	80	Pass
FCC TYPE 6	36	100.00	70	Pass

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Fixed Radar Type 1
1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst

Trial	Successful Detection (Yes/No)
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	Yes
14	Yes
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
2001	2.5	174.00	23	Yes
2002	4.3	222.00	25	Yes
2003	3	163.00	27	Yes
2004	3.1	223.00	29	Yes
2005	4.6	179.00	28	Yes
2006	1.5	160.00	27	Yes
2007	3.4	180.00	29	Yes
2008	4.4	193.00	26	Yes
2009	3.3	160.00	28	Yes
2010	4.2	205.00	27	Yes
2011	3.6	225.00	24	Yes
2012	2.9	182.00	28	Yes
2013	1.1	181.00	27	Yes
2014	1.7	187.00	29	Yes
2015	4.7	204.00	28	Yes
2016	3.5	210.00	28	Yes
2017	1.4	198.00	25	Yes
2018	4	163.00	25	Yes
2019	3.3	159.00	23	Yes
2020	4.2	153.00	27	Yes
2021	4	163.00	27	Yes
2022	3.8	193.00	29	Yes
2023	3.9	208.00	24	Yes
2024	1	182.00	24	Yes
2025	3.9	160.00	28	Yes
2026	4.8	188.00	24	Yes
2027	1.2	180.00	29	Yes
2028	1.1	167.00	24	Yes
2029	2	155.00	28	Yes
2030	4.7	157.00	27	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
3001	7.4	474.00	16	Yes
3002	6.7	349.00	16	Yes
3003	5.5	416.00	18	Yes
3004	8.7	453.00	17	Yes
3005	8.6	369.00	18	Yes
3006	5.7	257.00	16	Yes
3007	5.4	404.00	17	Yes
3008	8	419.00	17	Yes
3009	5.2	296.00	17	Yes
3010	7.6	353.00	16	Yes
3011	8.7	312.00	17	Yes
3012	9.9	494.00	17	Yes
3013	6	304.00	18	Yes
3014	7.8	283.00	16	Yes
3015	8	303.00	16	Yes
3016	9.1	348.00	17	Yes
3017	6.7	360.00	18	Yes
3018	7.8	375.00	17	Yes
3019	7.8	382.00	16	Yes
3020	7.6	273.00	16	Yes
3021	9.9	365.00	18	Yes
3022	7.7	487.00	18	Yes
3023	8.8	442.00	17	Yes
3024	6	434.00	18	Yes
3025	6.3	296.00	18	Yes
3026	6	369.00	18	Yes
3027	5.4	490.00	17	Yes
3028	7.4	284.00	18	Yes
3029	9.5	274	18	Yes
3030	7	404	17	Yes

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
4001	13.8	413.00	14	Yes
4002	14.4	489.00	15	Yes
4003	13	306.00	16	Yes
4004	10.5	497.00	13	Yes
4005	11.3	359.00	13	Yes
4006	13.5	251.00	13	Yes
4007	11.2	272.00	16	Yes
4008	14.1	451.00	15	Yes
4009	17.1	378.00	14	Yes
4010	17.2	284.00	12	Yes
4011	19.2	332.00	13	Yes
4012	11.2	313.00	12	Yes
4013	18.1	389.00	15	Yes
4014	16.2	473.00	15	Yes
4015	12.5	356.00	15	Yes
4016	18.7	326.00	14	Yes
4017	12.6	297.00	16	Yes
4018	16.4	270.00	13	Yes
4019	13.4	335.00	14	Yes
4020	13	404.00	12	Yes
4021	13.4	429.00	16	Yes
4022	15.6	328.00	14	Yes
4023	17.6	453.00	14	Yes
4024	19.8	319.00	13	Yes
4025	14	344.00	14	Yes
4026	19.5	280.00	14	Yes
4027	10.2	424.00	16	Yes
4028	14.6	277.00	15	Yes
4029	10.2	353.00	14	Yes
4030	14.7	351.00	15	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5

Trial	Successful Detection (Yes/No)
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	Yes
14	Yes
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

Note: The Type 5 randomized parameters are shown in a separate document.

TYPE 6 DETECTION PROBABILITY

Data Sheet for FCC Hopping Radar Type 6
1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop
NTIA August 2005 Hopping Sequence

Trial	Starting Index Within Sequence (Base 1)	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (Yes/No)
1	110	5500	1	Yes
2	585	5501	1	Yes
3	1060	5502	1	Yes
4	2010	5503	2	Yes
5	2485	5504	3	Yes
6	2960	5505	4	Yes
7	3435	5506	1	Yes
8	3910	5507	1	Yes
9	4385	5508	1	Yes
10	4860	5500	4	Yes
11	5335	5501	2	Yes
12	5810	5502	2	Yes
13	6285	5503	2	Yes
14	6760	5504	3	Yes
15	7235	5505	3	Yes
16	8185	5506	3	Yes
17	8660	5507	1	Yes
18	9135	5508	2	Yes
19	9610	5500	2	Yes
20	10085	5501	3	Yes
21	10560	5502	4	Yes
22	11985	5503	5	Yes
23	12460	5504	4	Yes
24	12935	5505	4	Yes
25	13410	5506	2	Yes
26	13885	5507	1	Yes
27	14360	5508	2	Yes
28	14835	5500	1	Yes
29	15310	5501	3	Yes
30	15785	5502	2	Yes
31	16260	5503	2	Yes
32	17210	5504	1	Yes
33	17685	5505	2	Yes
34	18160	5506	4	Yes
35	18635	5507	2	Yes
36	19110	5508	3	Yes

10.3.7. OVERLAPPING CHANNELS

PROCEDURE

The EUT was set to block all channels except 5498 MHz and 5504 MHz, which are overlapping. The active channel was 5504 MHz and the radar test frequency was 5501 MHz. The radar test frequency was chosen to be within the detection bandwidth of both unblocked (overlapping) channels.

A link was established on the active channel with the video file streaming.

A radar burst was triggered and a stopwatch timer was started.

The EUT was confirmed to vacate the active channel then a second radar burst was triggered approximately 45 seconds after the first and again the EUT was confirmed to vacate that active channel.

RESULTS

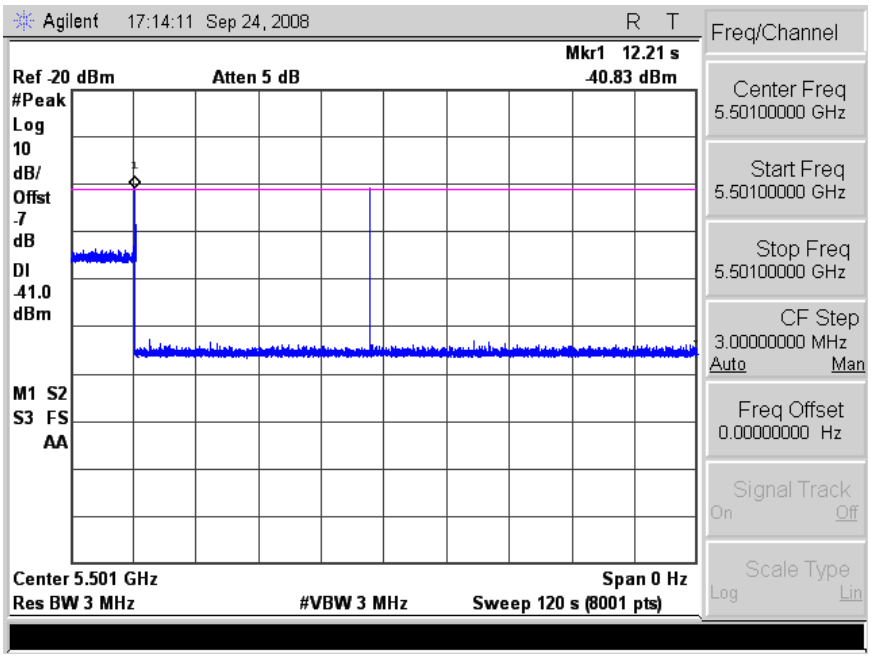
The EUT display indicated that 5504 MHz was blocked after the first radar burst was transmitted. The EUT switched to the remaining channel and a second burst was transmitted 45 seconds later, at which time the EUT displayed that channel was blocked.

No beacons or traffic were observed on the spectrum analyzer after the first radar burst was transmitted.

TEST RESULTS

No EUT transmissions were observed on the test channels during the observation time.

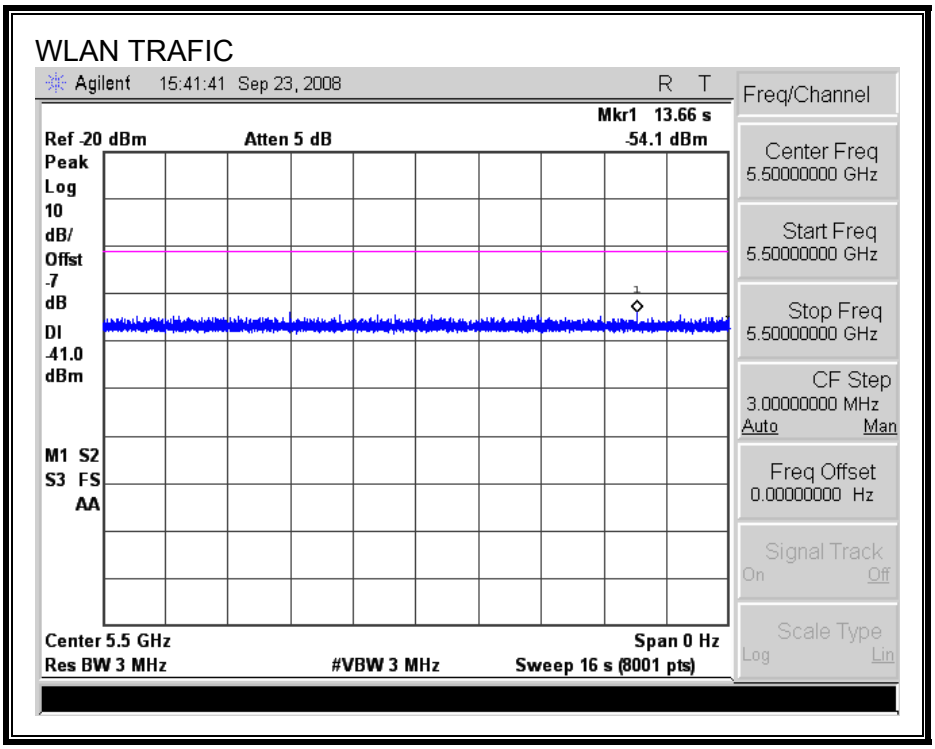
OVERLAPPING CHANNEL PLOT



10.4. RESULTS FOR 15 MHz BANDWIDTH MASTER CONFIGURATION

10.4.1. TRAFFIC

PLOT OF TRAFFIC FROM MASTER



10.4.2. CHANNEL AVAILABILITY CHECK TIME

PROCEDURE TO DETERMINE INITIAL POWER-UP CYCLE TIME

A link was established on channel then the EUT was rebooted. The time from the cessation of traffic to the re-initialization of traffic was measured as the time required for the EUT to complete the total power-up cycle. The time to complete the initial power-up period is 60 seconds less than this total power-up time.

PROCEDURE FOR TIMING OF RADAR BURST

With a link established on channel, the EUT was rebooted. A radar signal was triggered within 0 to 6 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

The Non-Occupancy list was cleared. With a link established on channel, the EUT was rebooted. A radar signal was triggered within 54 to 60 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

QUANTITATIVE RESULTS

No Radar Triggered

Timing of Reboot (sec)	Timing of Start of Traffic (sec)	Total Power-up Cycle Time (sec)	Initial Power-up Cycle Time (sec)
24.7	146.5	121.8	61.8

Radar Near Beginning of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
24.5	86.8	62.37	0.53

Radar Near End of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
24.6	145.1	120.5	58.7

QUALITATIVE RESULTS

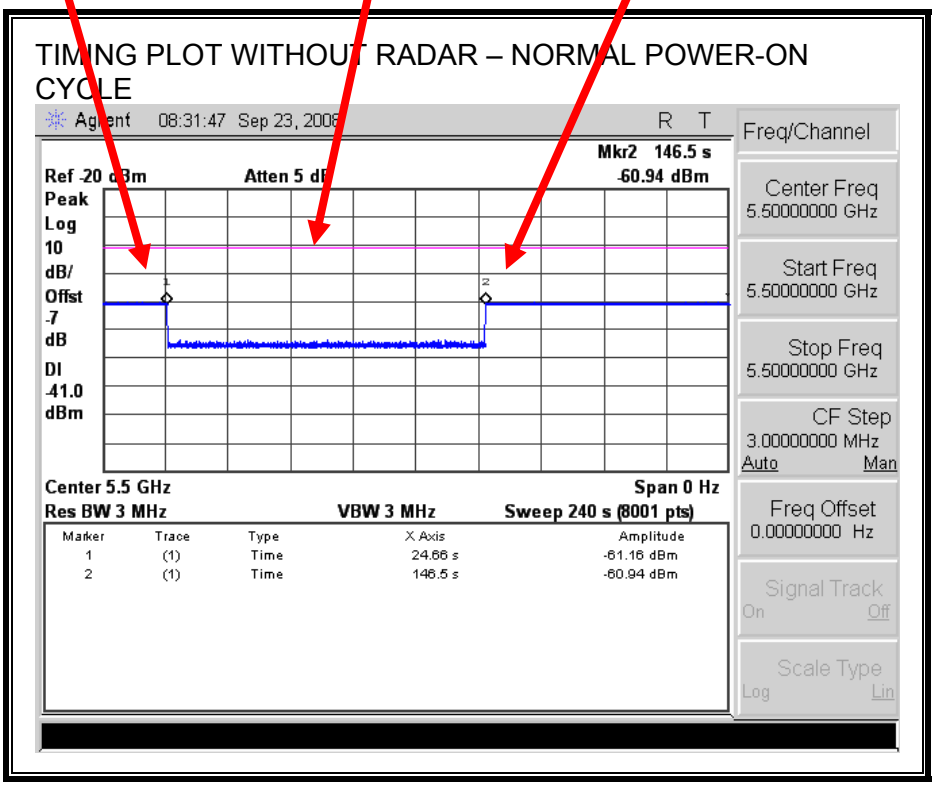
Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within 54 to 60 second window	EUT indicates radar detected	No transmissions on channel

TIMING PLOT WITHOUT RADAR DURING CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

End of CAC
Traffic is Initiated



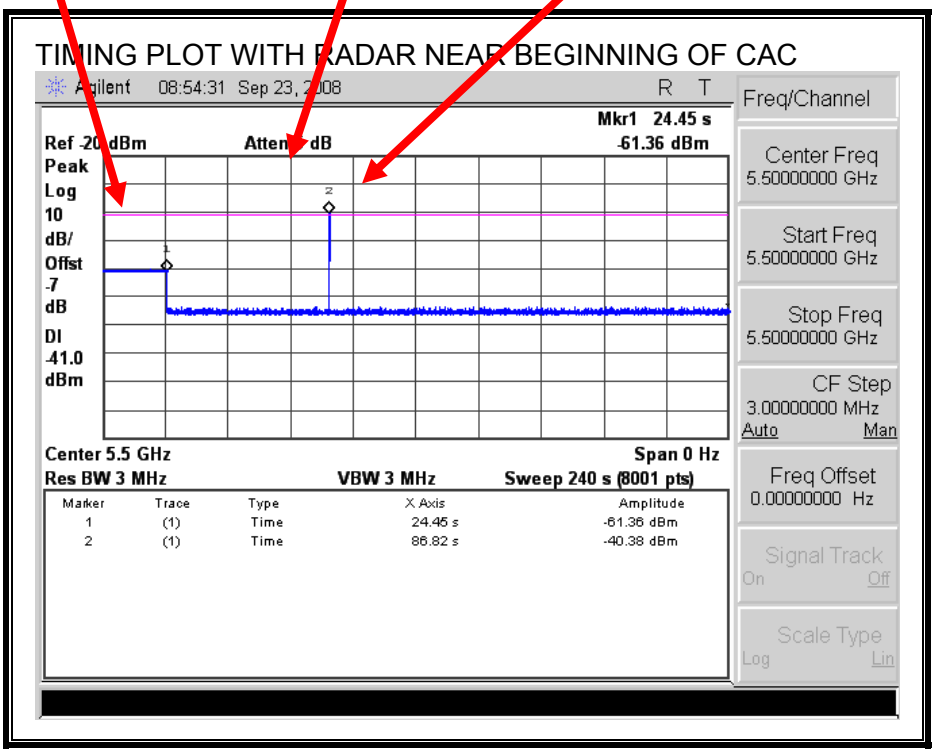
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

TIMING PLOT WITH RADAR NEAR BEGINNING OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



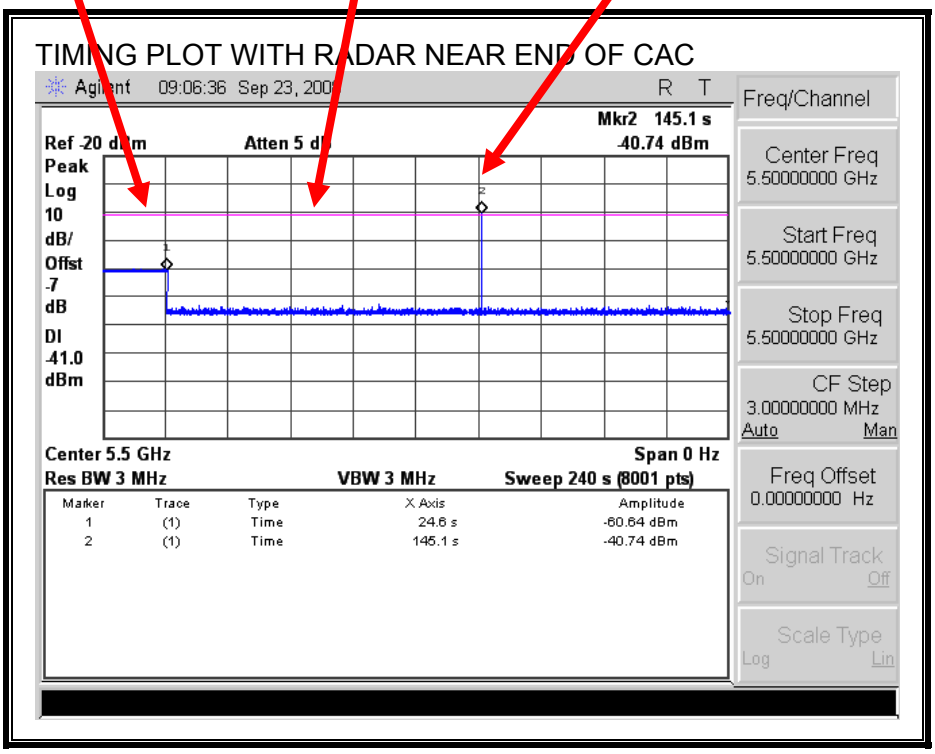
No EUT transmissions were observed after the radar signal.

TIMING PLOT WITH RADAR NEAR END OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

10.4.3. 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).

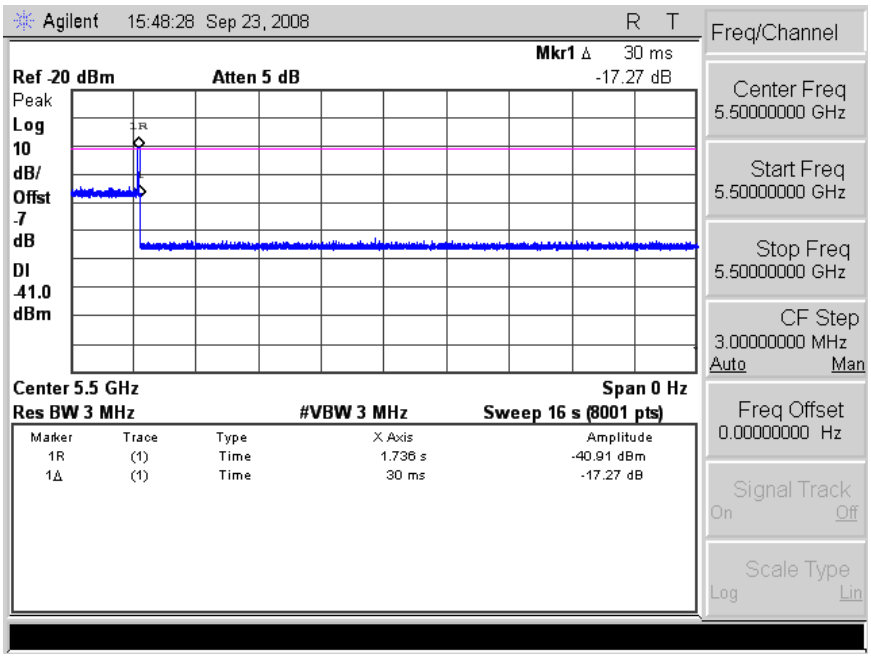
RESULTS

Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.030	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	0.0	60
IC	30.0	260

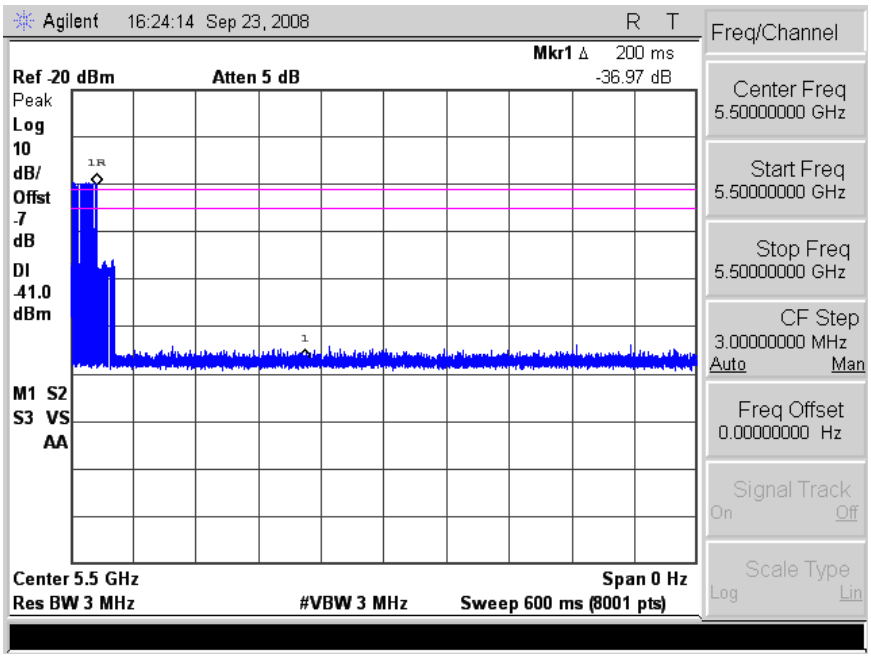
MOVE TIME

MOVE TIME PLOT



CHANNEL CLOSING TIME

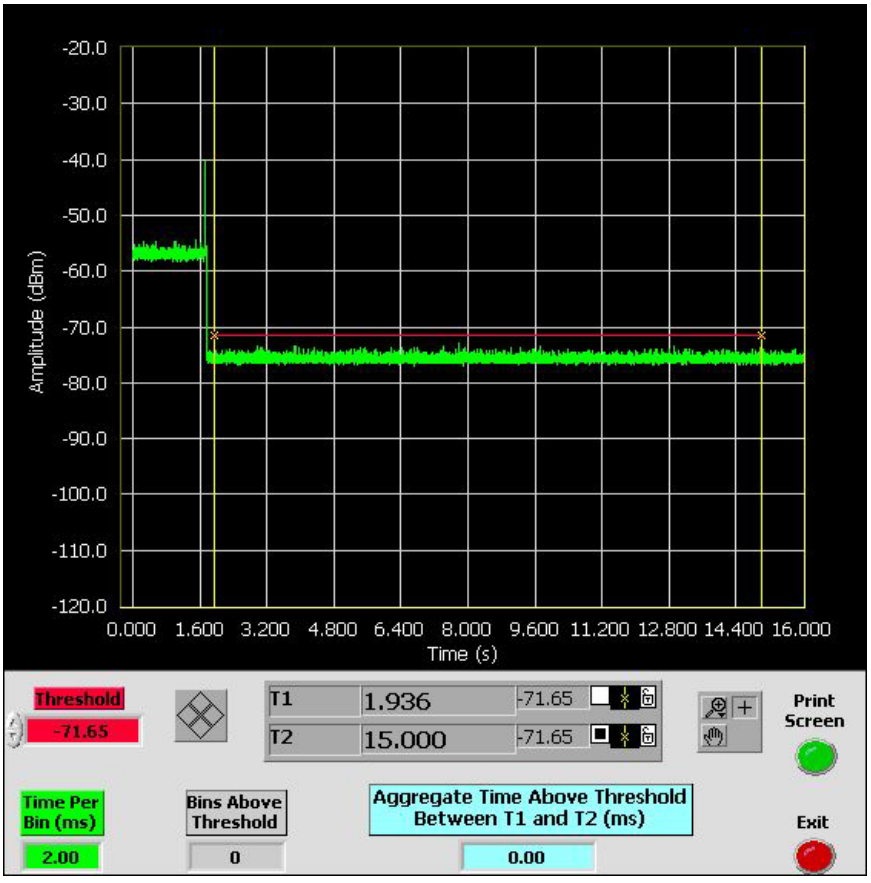
CLOSING TIME PLOT



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

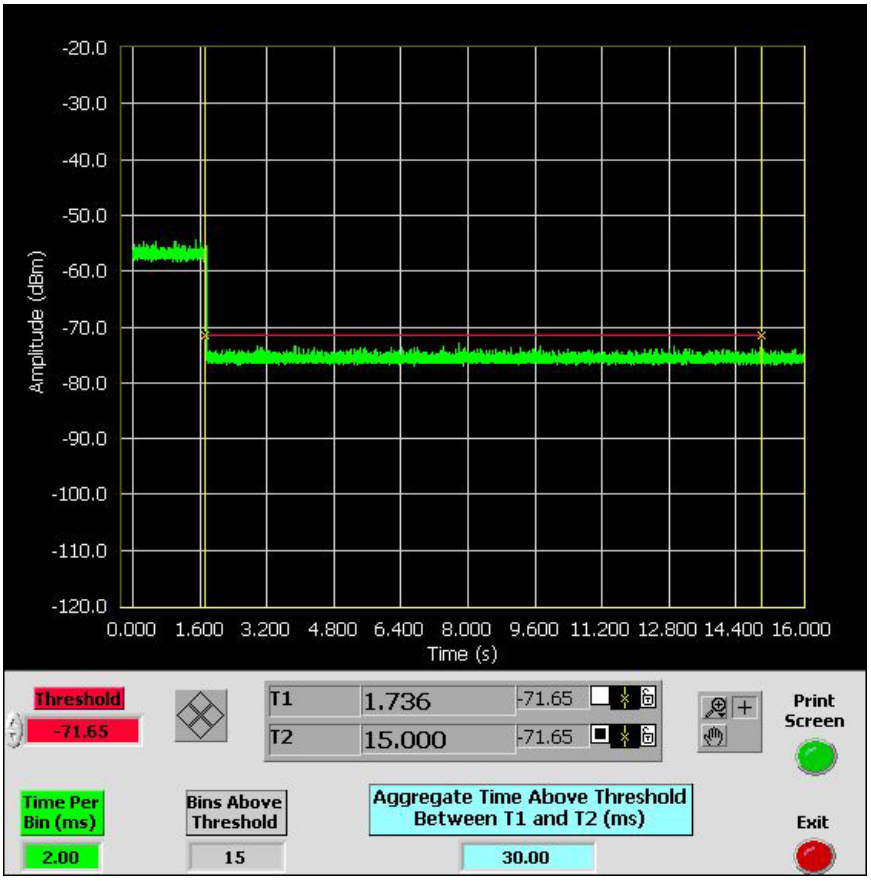
No transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME PLOT



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

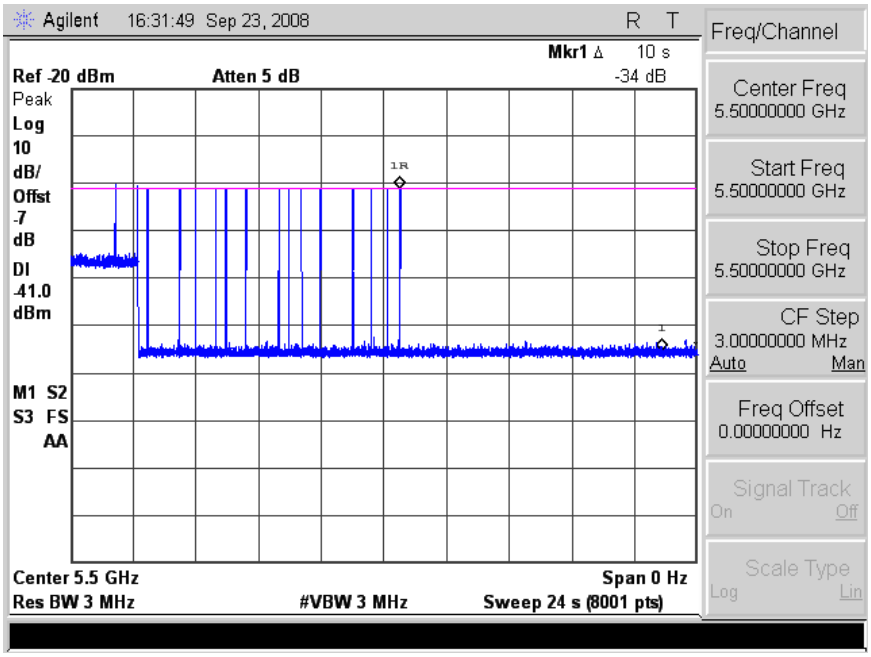
IC AGGREGATE CLOSING TIME PLOT



LONG PULSE CHANNEL MOVE TIME

The traffic ceases prior to 10 seconds after the end of the radar waveform.

MOVE TIME PLOT FOR LONG PULSE RADAR

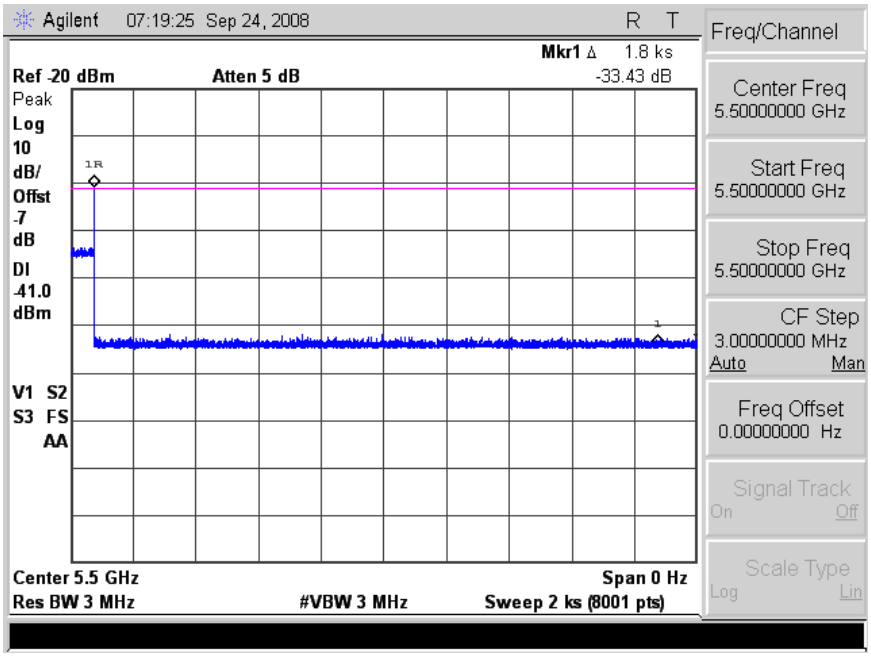


10.4.4. NON-OCCUPANCY PERIOD

RESULTS

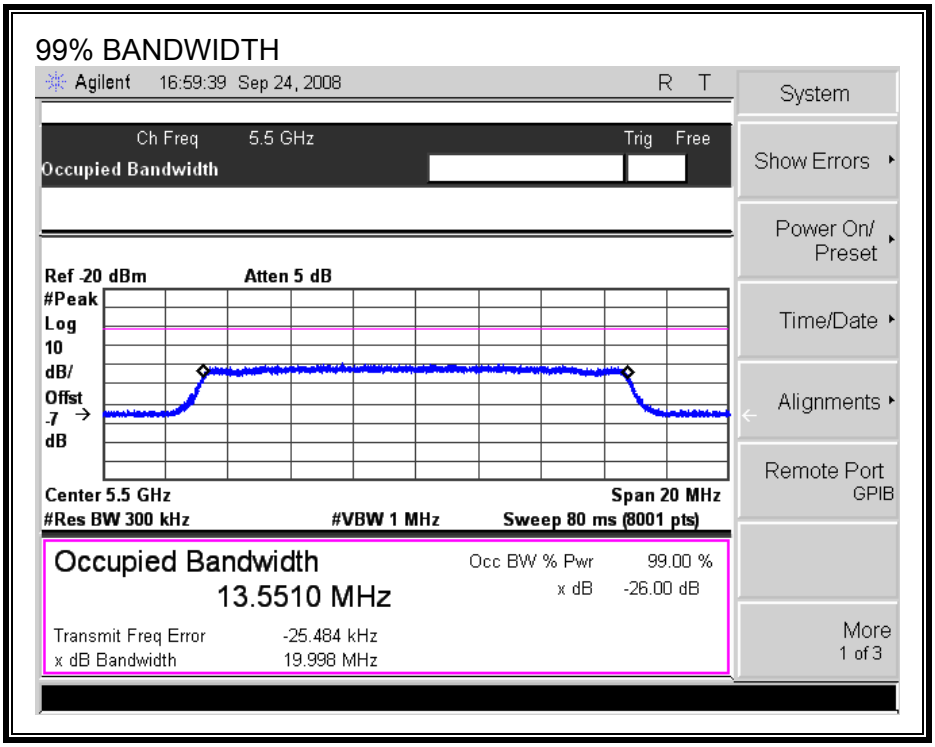
No EUT transmissions were observed on the test channel during the 30-minute observation time.

NON-OCCUPANCY PERIOD PLOT



10.4.5. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5494	5506	12	13.551	88.6	80

DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results
FCC Type 1 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst

Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	Mark
5494	10	10	100	FL
5495	10	10	100	
5496	10	10	100	
5497	10	10	100	
5498	10	10	100	
5499	10	10	100	
5500	10	10	100	
5501	10	10	100	
5502	10	10	100	
5503	10	10	100	
5504	10	10	100	
5505	10	10	100	
5506	10	10	100	FH

10.4.6. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary

Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail
FCC TYPE 1	30	100.00	60	Pass
FCC TYPE 2	30	100.00	60	Pass
FCC TYPE 3	30	100.00	60	Pass
FCC TYPE 4	30	100.00	60	Pass
Aggregate		100.00	80	Pass
FCC TYPE 5	30	100.00	80	Pass
FCC TYPE 6	39	100.00	70	Pass

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Fixed Radar Type 1
1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst

Trial	Successful Detection (Yes/No)
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	Yes
14	Yes
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
2001	2.5	174.00	23	Yes
2002	4.3	222.00	25	Yes
2003	3	163.00	27	Yes
2004	3.1	223.00	29	Yes
2005	4.6	179.00	28	Yes
2006	1.5	160.00	27	Yes
2007	3.4	180.00	29	Yes
2008	4.4	193.00	26	Yes
2009	3.3	160.00	28	Yes
2010	4.2	205.00	27	Yes
2011	3.6	225.00	24	Yes
2012	2.9	182.00	28	Yes
2013	1.1	181.00	27	Yes
2014	1.7	187.00	29	Yes
2015	4.7	204.00	28	Yes
2016	3.5	210.00	28	Yes
2017	1.4	198.00	25	Yes
2018	4	163.00	25	Yes
2019	3.3	159.00	23	Yes
2020	4.2	153.00	27	Yes
2021	4	163.00	27	Yes
2022	3.8	193.00	29	Yes
2023	3.9	208.00	24	Yes
2024	1	182.00	24	Yes
2025	3.9	160.00	28	Yes
2026	4.8	188.00	24	Yes
2027	1.2	180.00	29	Yes
2028	1.1	167.00	24	Yes
2029	2	155.00	28	Yes
2030	4.7	157.00	27	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
3001	7.4	474.00	16	Yes
3002	6.7	349.00	16	Yes
3003	5.5	416.00	18	Yes
3004	8.7	453.00	17	Yes
3005	8.6	369.00	18	Yes
3006	5.7	257.00	16	Yes
3007	5.4	404.00	17	Yes
3008	8	419.00	17	Yes
3009	5.2	296.00	17	Yes
3010	7.6	353.00	16	Yes
3011	8.7	312.00	17	Yes
3012	9.9	494.00	17	Yes
3013	6	304.00	18	Yes
3014	7.8	283.00	16	Yes
3015	8	303.00	16	Yes
3016	9.1	348.00	17	Yes
3017	6.7	360.00	18	Yes
3018	7.8	375.00	17	Yes
3019	7.8	382.00	16	Yes
3020	7.6	273.00	16	Yes
3021	9.9	365.00	18	Yes
3022	7.7	487.00	18	Yes
3023	8.8	442.00	17	Yes
3024	6	434.00	18	Yes
3025	6.3	296.00	18	Yes
3026	6	369.00	18	Yes
3027	5.4	490.00	17	Yes
3028	7.4	284.00	18	Yes
3029	9.5	274	18	Yes
3030	7	404	17	Yes

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
4001	13.8	413.00	14	Yes
4002	14.4	489.00	15	Yes
4003	13	306.00	16	Yes
4004	10.5	497.00	13	Yes
4005	11.3	359.00	13	Yes
4006	13.5	251.00	13	Yes
4007	11.2	272.00	16	Yes
4008	14.1	451.00	15	Yes
4009	17.1	378.00	14	Yes
4010	17.2	284.00	12	Yes
4011	19.2	332.00	13	Yes
4012	11.2	313.00	12	Yes
4013	18.1	389.00	15	Yes
4014	16.2	473.00	15	Yes
4015	12.5	356.00	15	Yes
4016	18.7	326.00	14	Yes
4017	12.6	297.00	16	Yes
4018	16.4	270.00	13	Yes
4019	13.4	335.00	14	Yes
4020	13	404.00	12	Yes
4021	13.4	429.00	16	Yes
4022	15.6	328.00	14	Yes
4023	17.6	453.00	14	Yes
4024	19.8	319.00	13	Yes
4025	14	344.00	14	Yes
4026	19.5	280.00	14	Yes
4027	10.2	424.00	16	Yes
4028	14.6	277.00	15	Yes
4029	10.2	353.00	14	Yes
4030	14.7	351.00	15	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5

Trial	Successful Detection (Yes/No)
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	Yes
14	Yes
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

Note: The Type 5 randomized parameters are shown in a separate document.

TYPE 6 DETECTION PROBABILITY

Data Sheet for FCC Hopping Radar Type 6
1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop
NTIA August 2005 Hopping Sequence

Trial	Starting Index Within Sequence (Base 1)	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (Yes/No)
1	257	5494	5	Yes
2	732	5495	3	Yes
3	1207	5496	2	Yes
4	1682	5497	1	Yes
5	2157	5498	1	Yes
6	2632	5499	4	Yes
7	3107	5500	4	Yes
8	3582	5501	4	Yes
9	4057	5502	4	Yes
10	5007	5503	3	Yes
11	5482	5504	4	Yes
12	5957	5505	2	Yes
13	6432	5506	2	Yes
14	6907	5494	4	Yes
15	7382	5495	1	Yes
16	7857	5496	1	Yes
17	8332	5497	1	Yes
18	9282	5498	1	Yes
19	9757	5499	1	Yes
20	10232	5500	1	Yes
21	10707	5501	4	Yes
22	11182	5502	2	Yes
23	11657	5503	2	Yes
24	12132	5504	2	Yes
25	12607	5505	2	Yes
26	13082	5506	4	Yes
27	13557	5494	2	Yes
28	14032	5495	4	Yes
29	14507	5496	3	Yes
30	14982	5497	2	Yes
31	15457	5498	3	Yes
32	15932	5499	5	Yes
33	16407	5500	4	Yes
34	16882	5501	3	Yes
35	17357	5502	4	Yes
36	17832	5503	2	Yes
37	18307	5504	2	Yes
38	18782	5505	2	Yes
39	19257	5506	2	Yes

10.4.7. OVERLAPPING CHANNELS

PROCEDURE

The EUT was set to block all channels except 5494MHz, 5500 MHz and 5506 MHz, which are overlapping. The active channel was 5500 MHz and the radar test frequency was 5500 MHz.

A link was established on the active channel with the video file streaming.

A radar burst was triggered and a stopwatch timer was started.

The EUT was confirmed to vacate the active channel then a second radar burst was triggered approximately 45 seconds after the first again the EUT was confirmed to vacate that active channel

A third radar burst was triggered approximately 45 seconds after the second and again the EUT was confirmed to vacate that third channel.

RESULTS

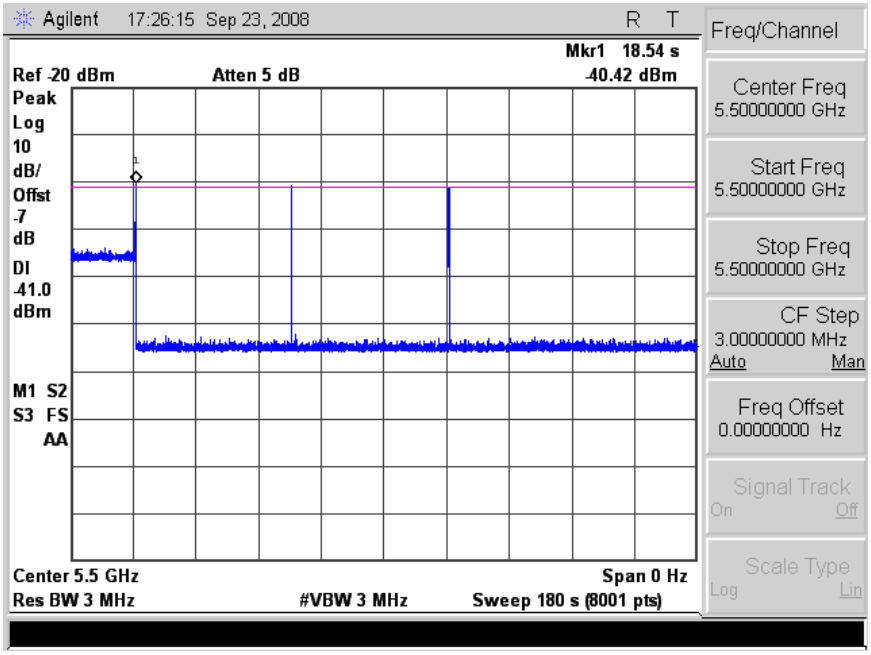
The EUT display indicated that 5550 MHz was blocked after the first radar burst was transmitted. The EUT switched to one of the remaining two channels and a second burst was transmitted 45 seconds later, at which time the EUT displayed that channel was blocked and the EUT moved to the remaining channel. When the third radar burst was transmitted 45 seconds later the EUT display that all three channels were blocked.

No beacons or traffic was observed on the spectrum analyzer after the first radar burst was transmitted.

TEST RESULTS

No EUT transmissions were observed on the test channels during the observation time.

OVERLAPPING CHANNEL PLOT



10.5. RESULTS FOR 5 MHz BANDWIDTH SLAVE CONFIGURATION

10.5.1. RADAR DETECTION BY THE SLAVE DEVICE

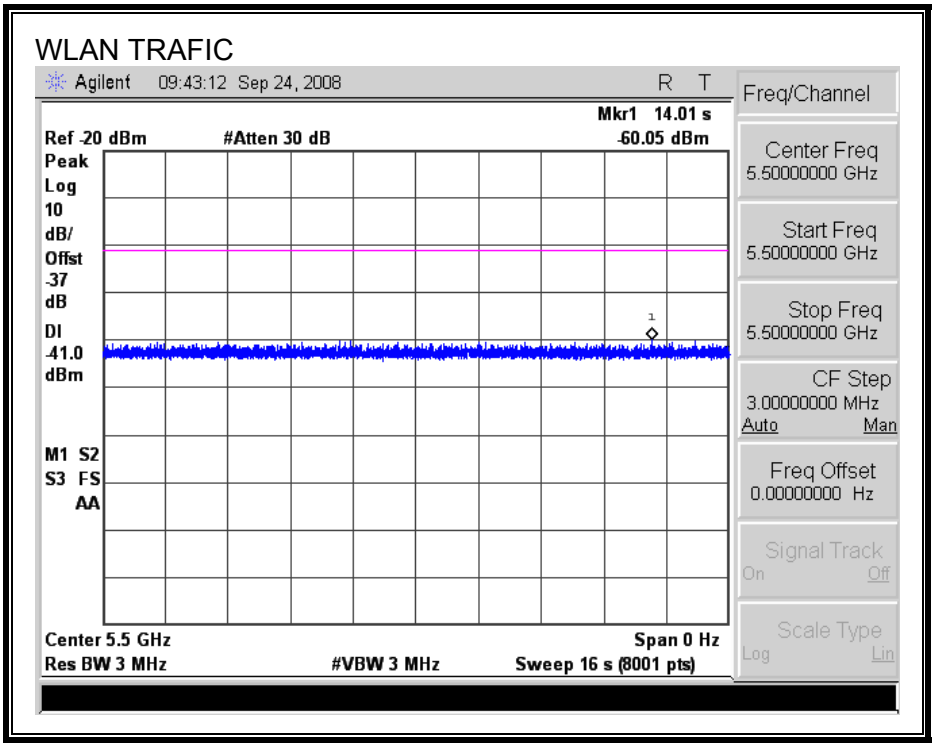
The Slave is identical to the Master, therefore the above results for the Master device are also applicable to demonstrate the In-Service Monitoring and the Channel Shutdown performance characteristics of the Slave device, for the situation when the Slave detects a radar.

10.5.2. RADAR DETECTION BY THE MASTER DEVICE

The Slave is tested separately for compliance with the Channel Shutdown requirements, for the situation when the Slave device vacates the channel in response to detection of a radar by the Master.

10.5.3. TRAFFIC

PLOT OF TRAFFIC FROM SLAVE



10.5.4. 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).

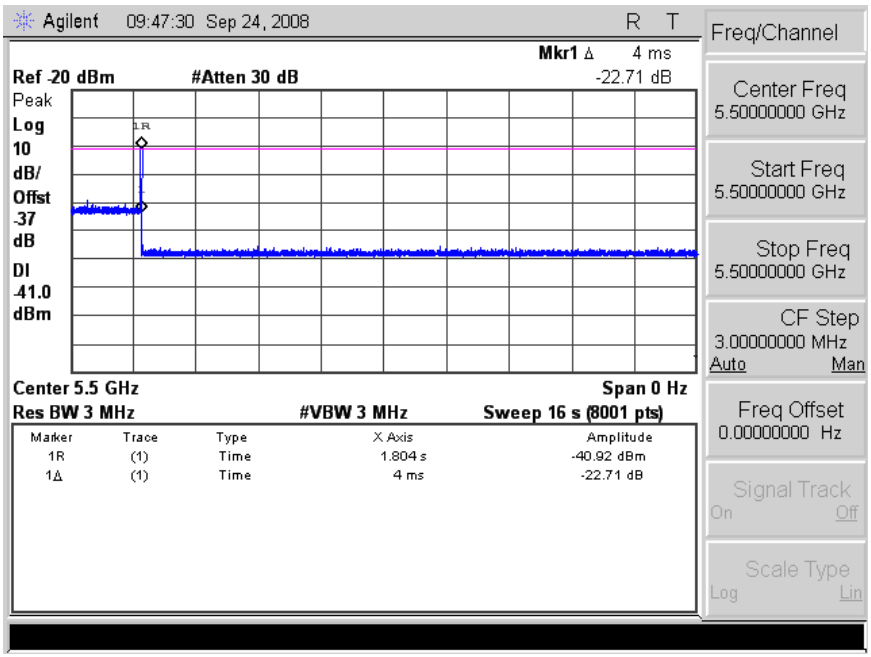
RESULTS

Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.004	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	0.0	60
IC	4.0	260

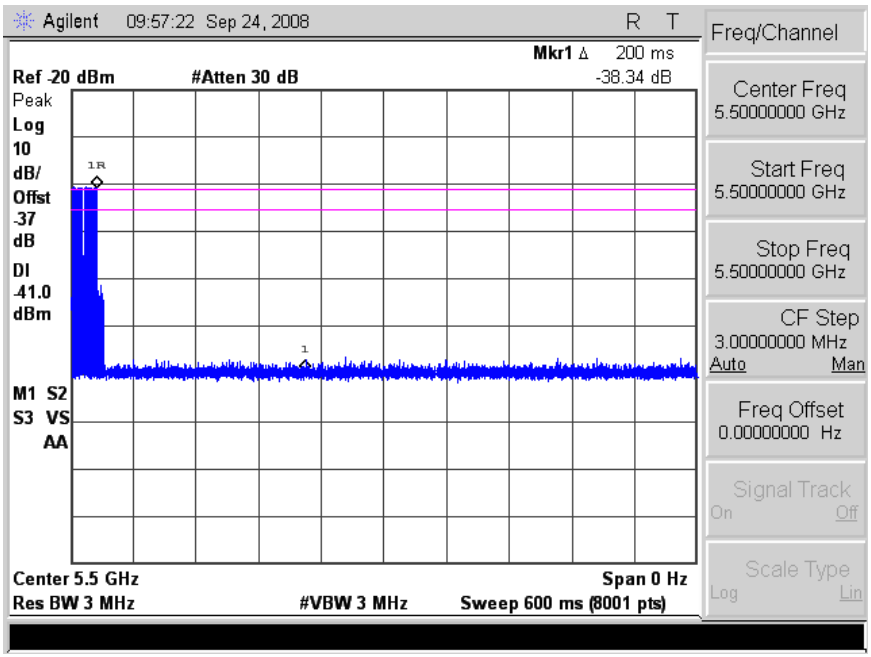
MOVE TIME

MOVE TIME PLOT



CHANNEL CLOSING TIME

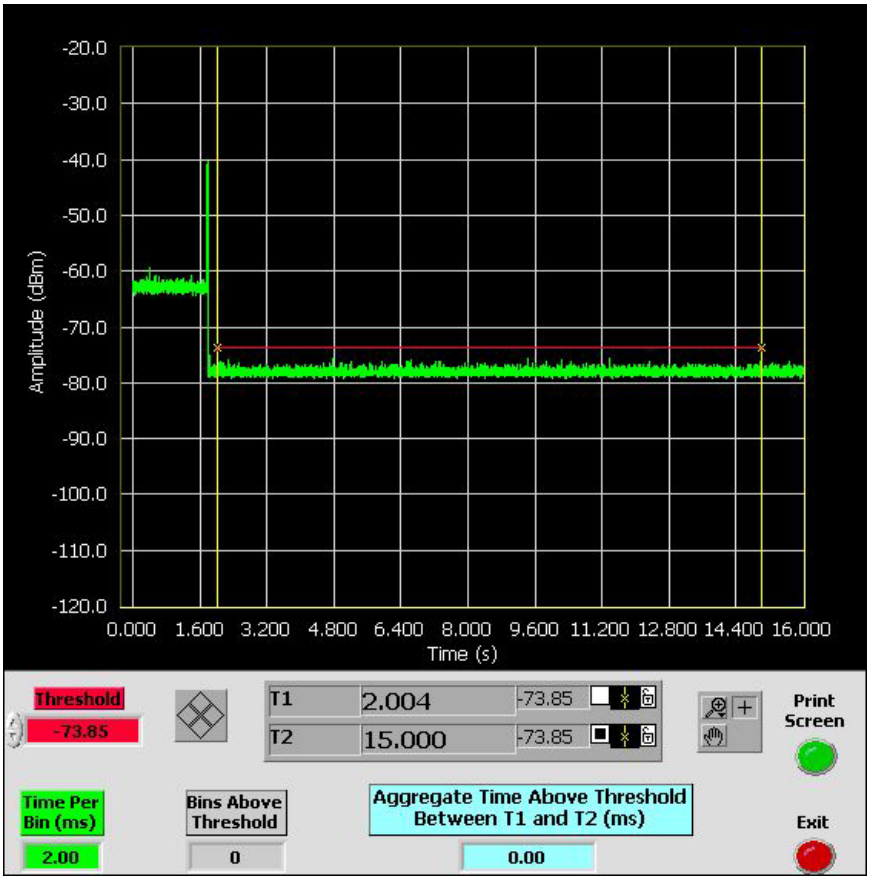
CLOSING TIME PLOT



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

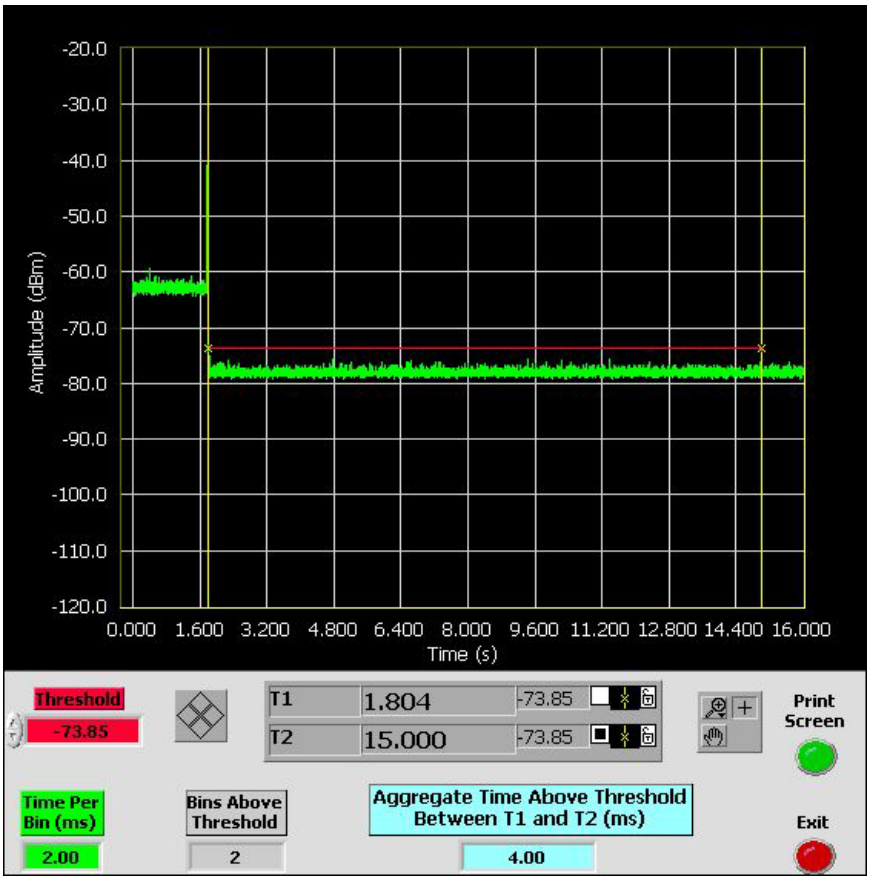
Only intermittent transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME PLOT



No transmissions are observed during the IC aggregate monitoring period.

IC AGGREGATE CLOSING TIME PLOT



10.5.5. SLAVE NON-OCCUPANCY

TEST PROCEDURE

The spectrum analyzer is monitoring the emissions from the Slave.

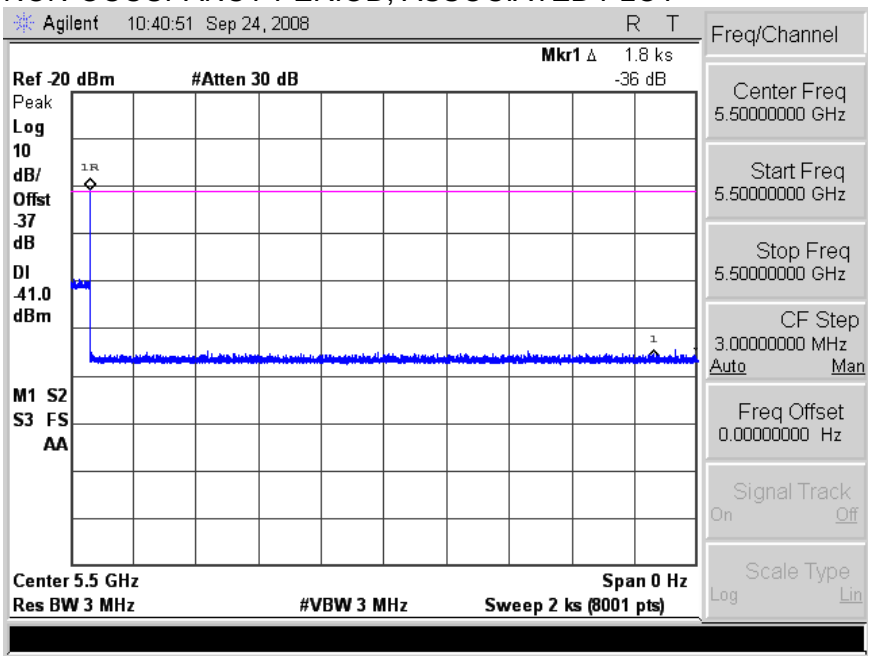
The AP and Slave are linked in a 5 MHz bandwidth mode, with streaming video. The spectrum analyzer trace is started, then the radar is triggered, and the channel is monitored for > 30 minutes.

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



10.6. RESULTS FOR 10 MHz BANDWIDTH SLAVE CONFIGURATION

10.6.1. RADAR DETECTION BY THE SLAVE DEVICE

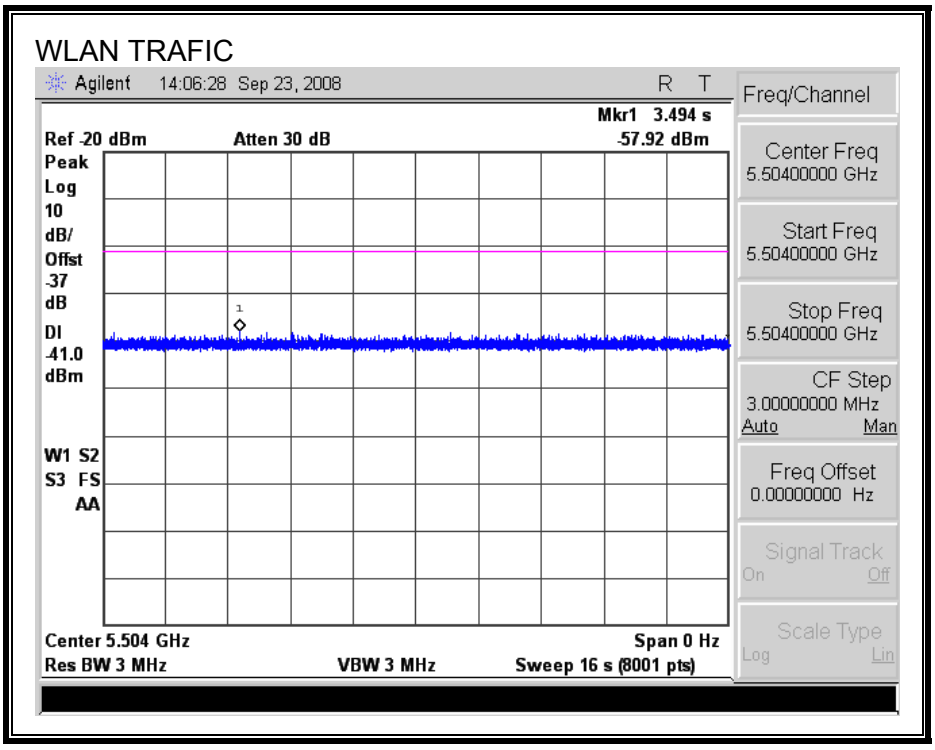
The Slave is identical to the Master, therefore the above results for the Master device are also applicable to demonstrate the In-Service Monitoring and the Channel Shutdown performance characteristics of the Slave device, for the situation when the Slave detects a radar.

10.6.2. RADAR DETECTION BY THE MASTER DEVICE

The Slave is tested separately for compliance with the Channel Shutdown requirements, for the situation when the Slave device vacates the channel in response to detection of a radar by the Master.

10.6.3. TRAFFIC

PLOT OF TRAFFIC FROM SLAVE



10.6.4. 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).

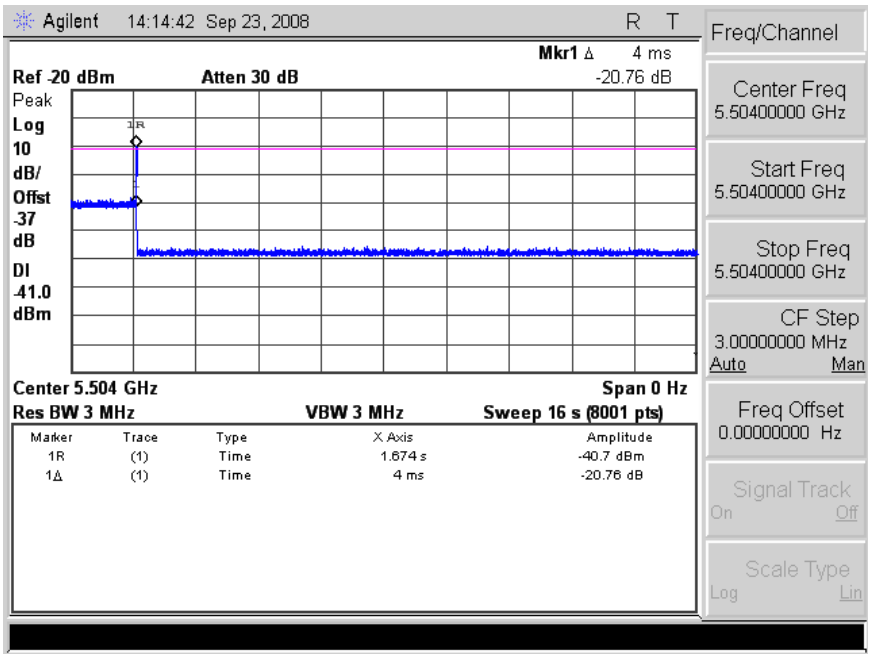
RESULTS

Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.004	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	0.0	60
IC	4.0	260

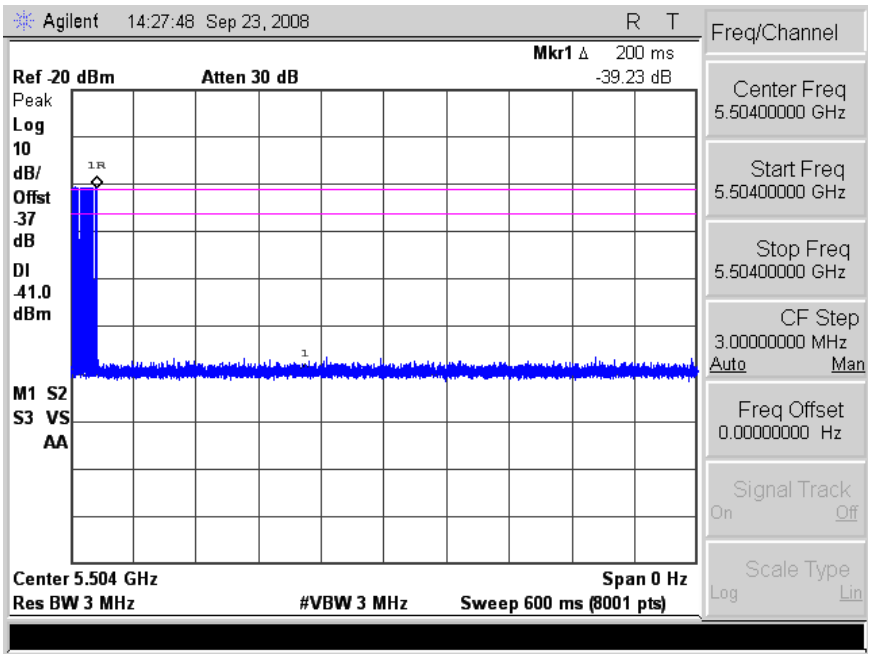
MOVE TIME

MOVE TIME PLOT



CHANNEL CLOSING TIME

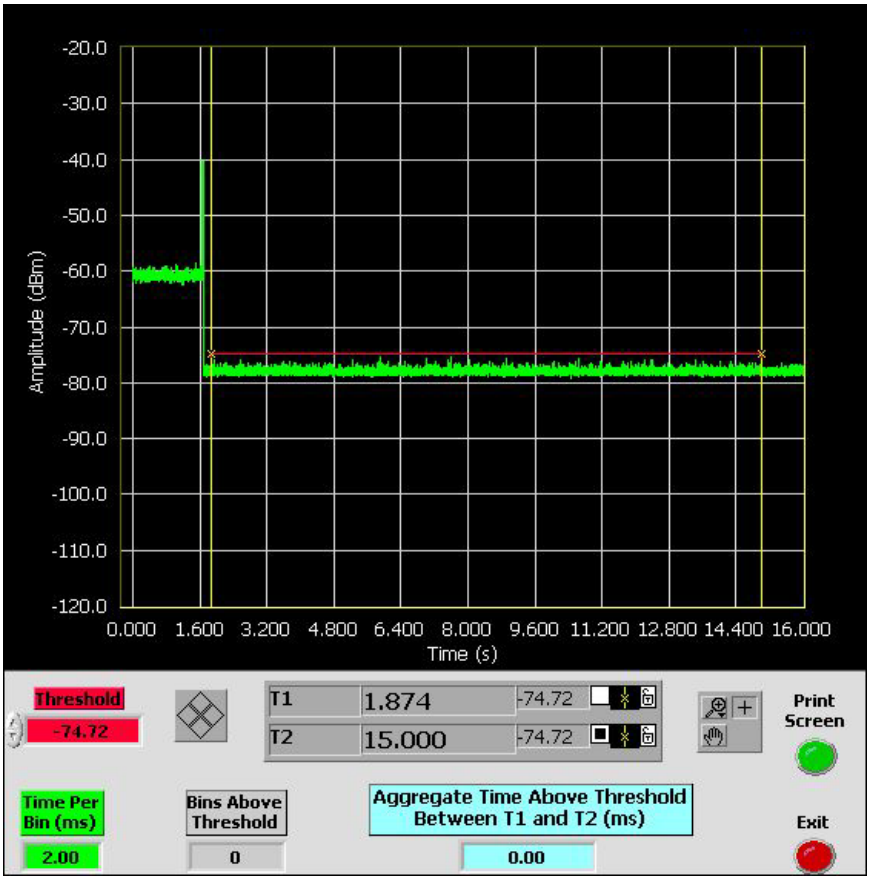
CLOSING TIME PLOT



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

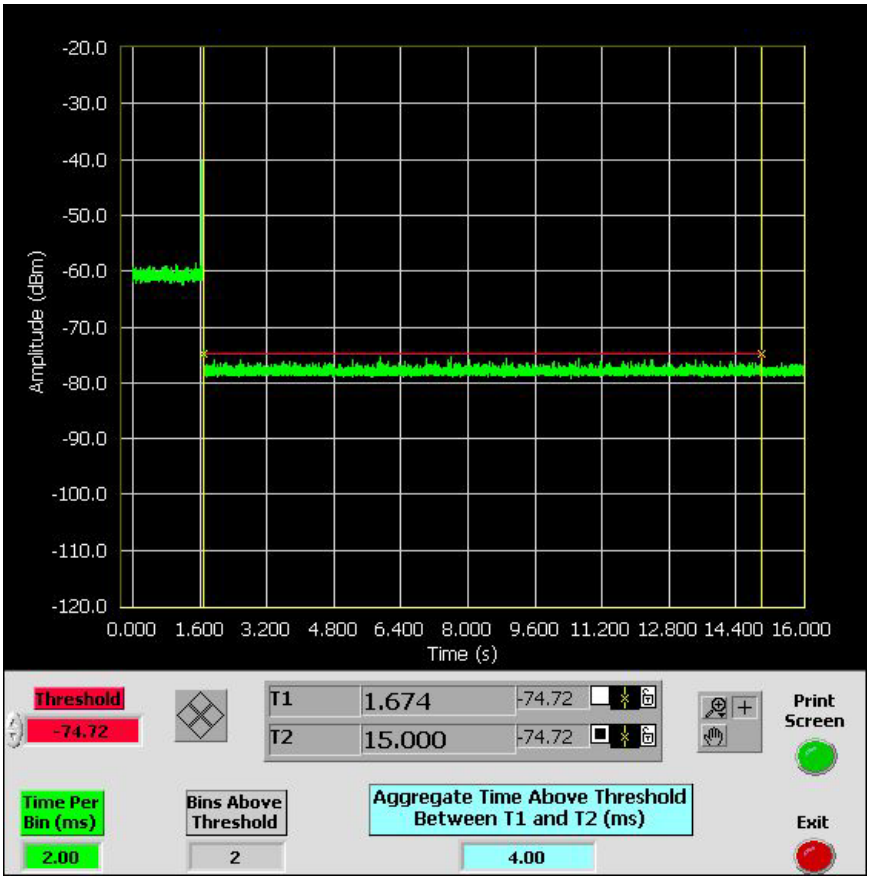
No transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME PLOT



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

IC AGGREGATE CLOSING TIME PLOT



10.6.5. SLAVE NON-OCCUPANCY

TEST PROCEDURE

The spectrum analyzer is monitoring the emissions from the Slave.

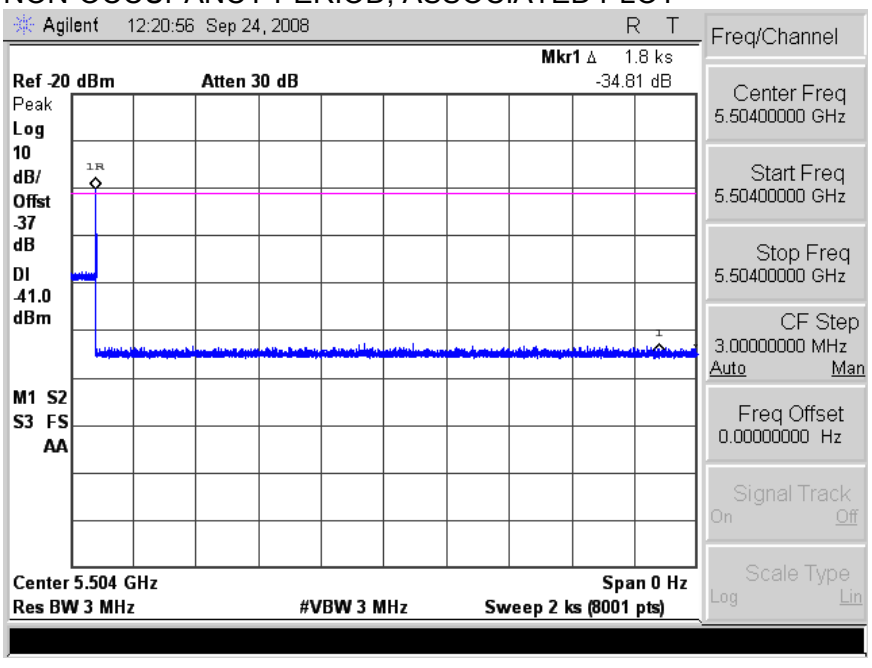
The AP and Slave are linked in a 10 MHz bandwidth mode, with streaming video. The spectrum analyzer trace is started, then the radar is triggered, and the channel is monitored for > 30 minutes.

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



10.7. RESULTS FOR 15 MHz BANDWIDTH SLAVE CONFIGURATION

10.7.1. RADAR DETECTION BY THE SLAVE DEVICE

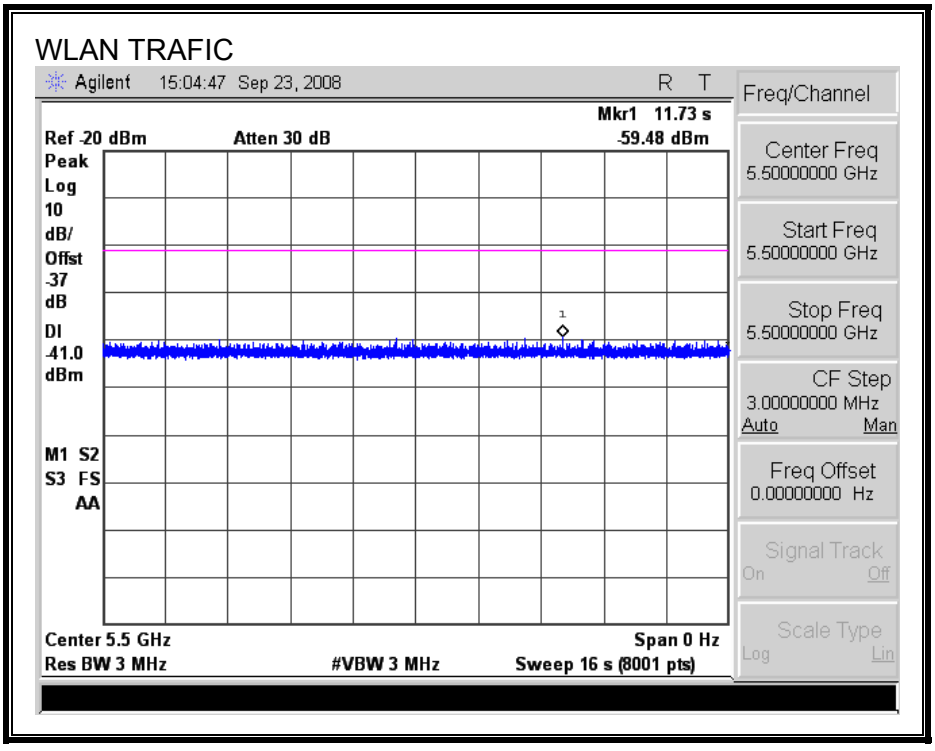
The Slave is identical to the Master, therefore the above results for the Master device are also applicable to demonstrate the In-Service Monitoring and the Channel Shutdown performance characteristics of the Slave device, for the situation when the Slave detects a radar.

10.7.2. RADAR DETECTION BY THE MASTER DEVICE

The Slave is tested separately for compliance with the Channel Shutdown requirements, for the situation when the Slave device vacates the channel in response to detection of a radar by the Master.

10.7.3. TRAFFIC

PLOT OF TRAFFIC FROM SLAVE



10.7.4. 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).

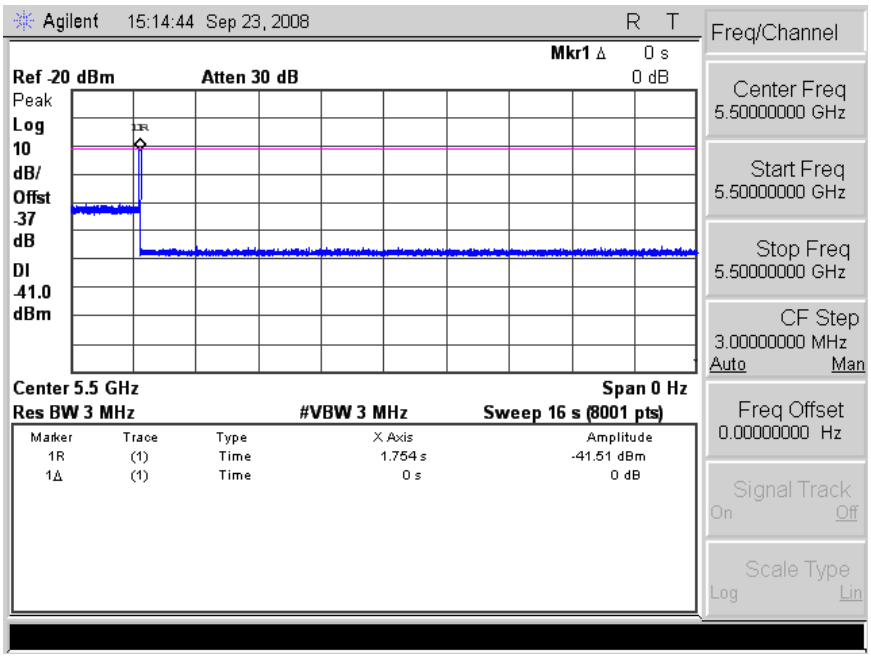
RESULTS

Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.0	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	0.0	60
IC	0.0	260

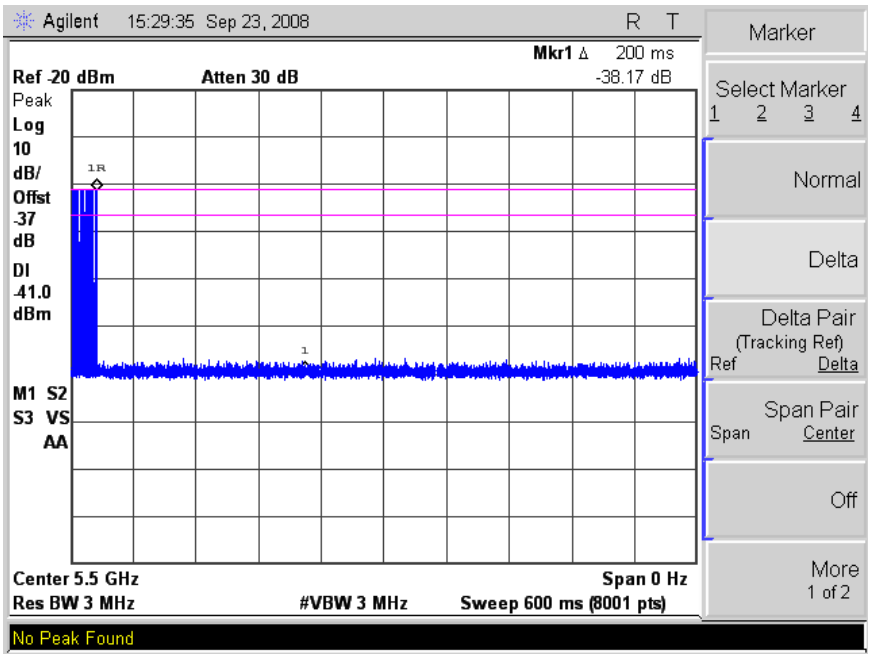
MOVE TIME

MOVE TIME PLOT



CHANNEL CLOSING TIME

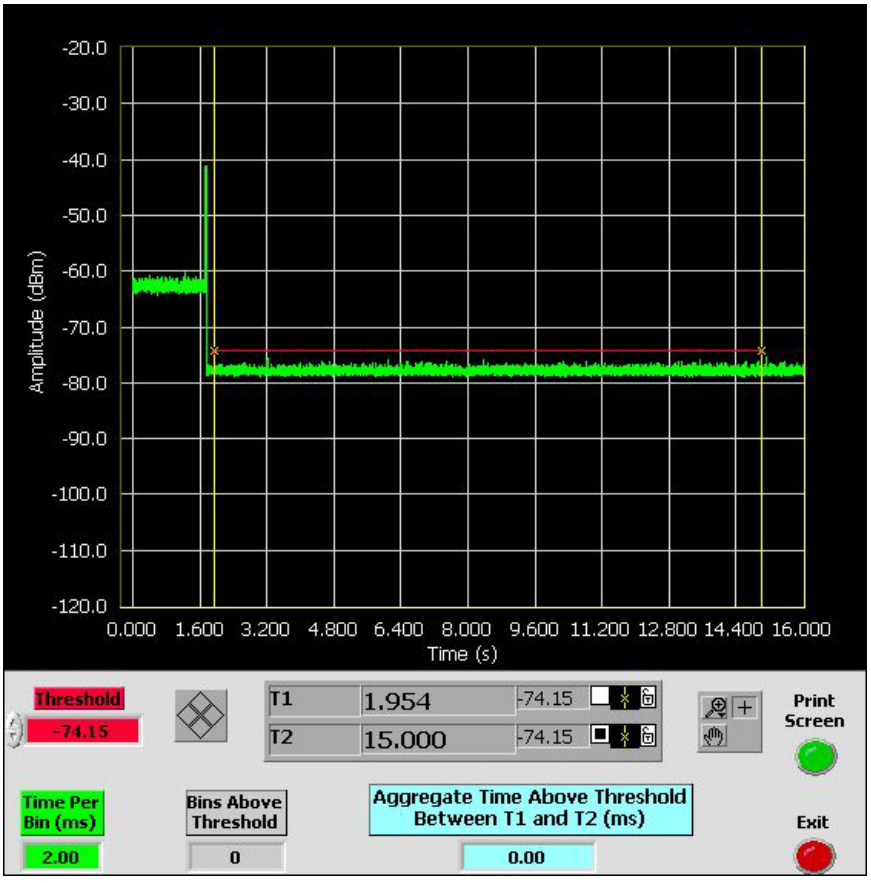
CLOSING TIME PLOT



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

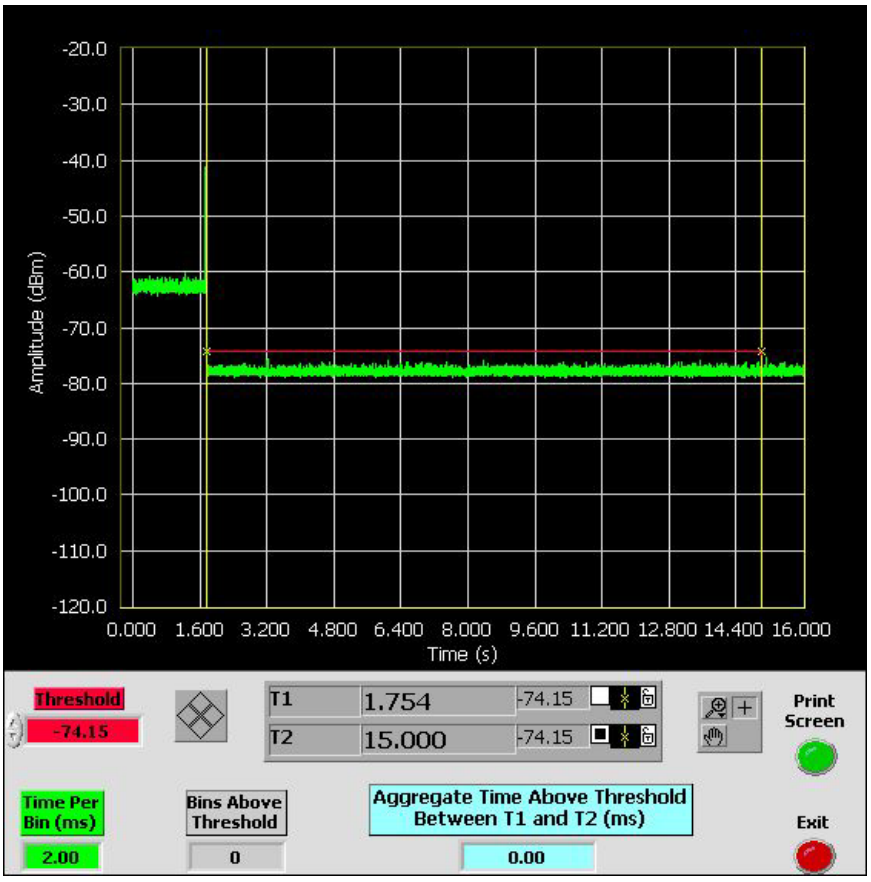
No transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME PLOT



No transmissions are observed during the IC aggregate monitoring period.

IC AGGREGATE CLOSING TIME PLOT



10.7.5. SLAVE NON-OCCUPANCY

TEST PROCEDURE

The spectrum analyzer is monitoring the emissions from the Slave.

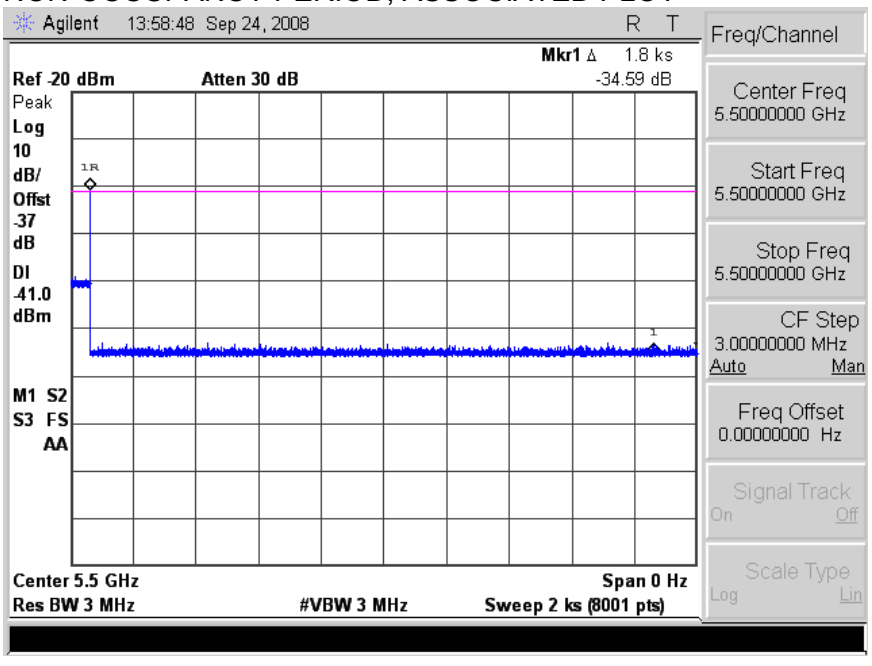
The AP and Slave are linked in a 15 MHz bandwidth mode, with streaming video. The spectrum analyzer trace is started, then the radar is triggered, and the channel is monitored for > 30 minutes.

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



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)
5 MHz	5 GHz	20.0	-0.95	23.00	0.03	0.32
10 MHz BW	5 GHz	20.0	3.10	23.00	0.08	0.81
15 MHz BW	5 GHz	20.0	3.99	23.00	0.10	0.99
5 MHz	5 GHz	20.0	-9.00	33.90	0.06	0.61
10 MHz BW	5 GHz	20.0	-7.51	33.90	0.09	0.87
15 MHz BW	5 GHz	20.0	-6.15	33.90	0.12	1.18