

TEST REPORT
for the
Apple Bluetooth Mouse

Model # A1197

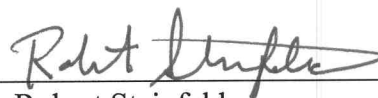
Apple Computer, Inc.

May 5, 2006

Engineering contact:

Mike Kriege
Apple Computers, Inc.
1 Infinite Loop M/S 26A
Cupertino, California 95014
(408) 974-0560 Voice, (408) 862-5061 Fax
E-Mail: kriege@apple.com

EMC NVLAP Technical Manager:

 Date: 5/5/06
Robert Steinfeld

EMC Test Engineer:

 Date: 5/5/06
Mike Kriege

This document may not be reproduced without written permission from Apple Computer, 1 Infinite Loop, Cupertino, CA 95014.

TABLE OF CONTENTS

1	Test Report Summary	3
2	EUT Description	4
3	Test Methodology	5
4	Facilities and Accreditation	5
5	Calibration and Uncertainty	6
6	Setup of Equipment Under Test	8
7	Applicable Limits and Test Results	12
7.1	99% and 20 dB Bandwidth	12
7.2	Hopping Frequency Separation	15
7.3	Number of Hopping Channels	17
7.4	Average Time of Occupancy	18
7.5	Maximum Peak Output Power	20
7.6	Average Power	21
7.7	Peak Power Spectral Density	22
7.8	Conducted Spurious Emissions	25
7.9	Radiated Emissions	29

1 Test Report Summary

Specification	Test or Requirement	Result	Comment
N/A – For reporting purposes only	99% Bandwidth and 20 dB Bandwidth	N/A	Section 7.1
CFR 15.247(a)(1)	Hopping Frequency Separation	Pass	Section 7.2
CFR 15.247(a)(1)(iii)	Number of Hopping Channels	Pass	Section 7.3
CFR 15.247(b)(1)(iii)	Average Time of Occupancy	Pass	Section 7.4
CFR 15.247(b)(1) CFR 15.247(b)(4)	Peak Output Power	Pass	Section 7.5
N/A – For reporting purposes only	Average Power	N/A	Section 7.6
CFR 15.247(d) CFR 15.247(f)	Peak Power Spectral Density	Pass	Section 7.7
CFR 15.247(c)	Conducted Spurious Emissions	N/A	Section 7.8
CFR 15.205(a) CFR 15.209(a)	Radiated Emissions	Pass	Section 7.9
CFR 15.207(a)	AC Power Line Conducted Emissions	N/A	N/A

2 EUT Description

The Apple Bluetooth Mouse, model number A1197, operates in the 2.4 GHz unlicensed Industrial, Scientific and Medical band and uses Frequency Hopping Spread Spectrum. This device uses the CSR BC417143B BlueCore4 External which is a single chip radio and baseband IC for Bluetooth 2.4 GHz system. Technical Information on the Apple Bluetooth Mouse is provided in the table below.

Apple Bluetooth Mouse Information	
Product	Transceiver
Trade Name	Apple Bluetooth Mouse
Model Number	A1197
Power Supply	3.0V DC Power Supply
Frequency Range	2402-2480 MHz
Transmit Power	1 mWatt
Modulation Technique	FHSS
Emission Designator	894KF1D

Apple Bluetooth Mouse Antenna Information

Antenna Model Number	Maximum Gain (dBi)
m6_antenna	-1.21

3 Test Methodology

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 Part 2 and Part 15.

4 Facilities and Accreditation

4.1 Facilities and Equipment

The ac power line and RF conducted emissions measurements were performed at the Apple Computer, Inc. facility located at 20650 Valley Green Drive, Cupertino, California 95014. The radiated emissions measurements were performed at the Apple Computer, Inc. Evelyn 1, 10 meter semi-anechoic chamber located at 123 East Evelyn Ave., Mountain View, California 94041. Both of these facilities are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

All Receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

4.2 Laboratory Accreditation

The test facilities at Apple Computer, Inc. used to perform radiated and conducted emissions measurements are accredited by National Voluntary Laboratory Accreditation Program to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22. Apple Computer, Inc. NVLAP Lab Code is 200071-0 and is effective through September 30, 2006. No part of this report may be used to claim or endorsement by NVLAP or any agency of the US Government.

The Apple Computer, Inc. Evelyn 1 10 meter Semi-anechoic chamber is currently listed with the FCC. The FCC Registration Number is 90450 and is effective through Jan 5, 2007.

5 Calibration and Uncertainty

5.1 Measurement Instrument Calibration

The measurement instruments utilized to perform the tests documented in this report have been calibrated in accordance with the manufacturer's recommendations and are traceable to national standards.

5.2 Measurement Uncertainty

The Apple measurement uncertainty policy, available upon request under Apple File Number EMC20, ensures uncertainty has been calculated using the proper procedure. Apple will use this measurement uncertainty knowledge in determining the pass / fail criteria from the test data. The measurement uncertainty has been determined to be the following:

Conducted Emissions = +/- 2.3 dB

Radiated Emissions = +/- 4.1 dB

5.3 Test Equipment

The following test equipment was used.

Description	Manufacturer	Model No.	Identification No.	Last Cal	Next Cal
Spectrum Analyzer	R&S	ESIB 26	100105	Sept 2005	Sept 2006
Spectrum Analyzer	Agilent	E4446A	AOU238719	Aug 2005	Aug 2006
Antenna	Sunol	JB1	A122302-1	Sept 2005	Sept 2006
Antenna	Sunol	JB1	A122302-2	Sept 2005	Sept 2006
Amplifier	Sanoma	310	253927	April 2005	April 2006
Amplifier	Sanoma	310	253928	April 2005	April 2006
Amplifier	HP	8449	3008A00713	May 2005	May 2006
Horn Antenna	EMCO	3117	34197	March 2004	March 2009
Horn Antenna	EMCO	3160-09	011269-0041264	Sept 2001	Sept 2006
Power Meter	Boonton	4532	165201	April 2006	April 2007
Power Meter Sensor	Boonton	57318	3890	April 2006	April 2007

6 Setup of Equipment Under Test**EUT Support Equipment**

Peripheral Support Equipment				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop Computer	Apple	A1054	PT342059	DoC

EUT I/O Cables

None

EUT Operating Conditions

All of the equipment and cables were placed in the worst-case configuration to maximize the emissions during the tests. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

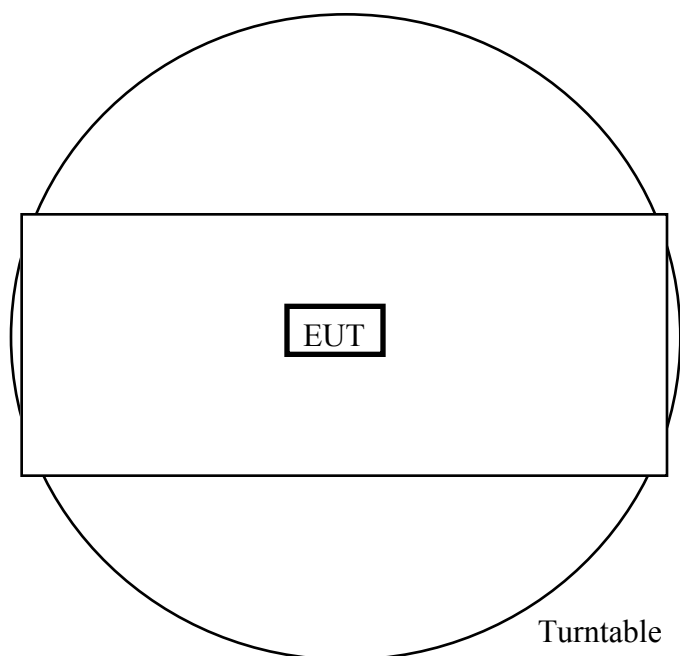
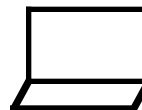
The EUT was activated by using special test software which put the EUT into a continuous transmit mode. Each of the low, mid and high channels was activate at full power and the EUT continuously transmitted at the active channel.

Test Setup Block Diagrams

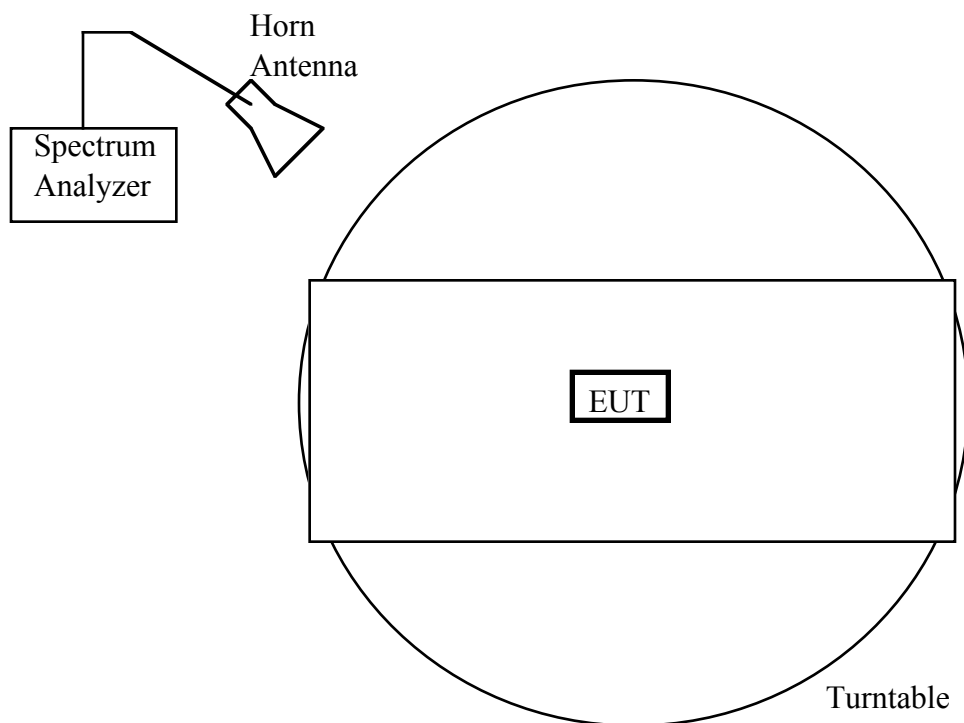
For RF Radiated Emissions, the EUT was placed on a nonmetallic table, 80 cm above the metallic ground-plane. The host system was used to put the EUT into continuous transmit mode.

RF Radiated Emissions Test Setup below 1 GHz

Host



RF Radiated Emissions Test Setup above 1 GHz



Host



7.1 20 dB Bandwidth and 99% Bandwidth**Applicable Limits and Test Results****Limit**

None; for reporting purposes only

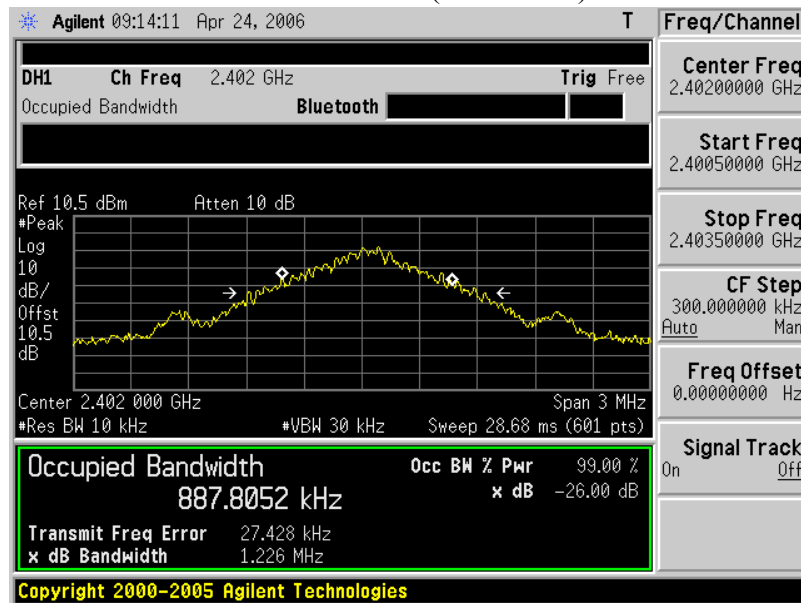
Test Procedure

The transmitter is connected to a spectrum analyzer and set to continuously transmit. The resolution Bandwidth is set to 10 kHz and the Video Bandwidth is set to 30 kHz.

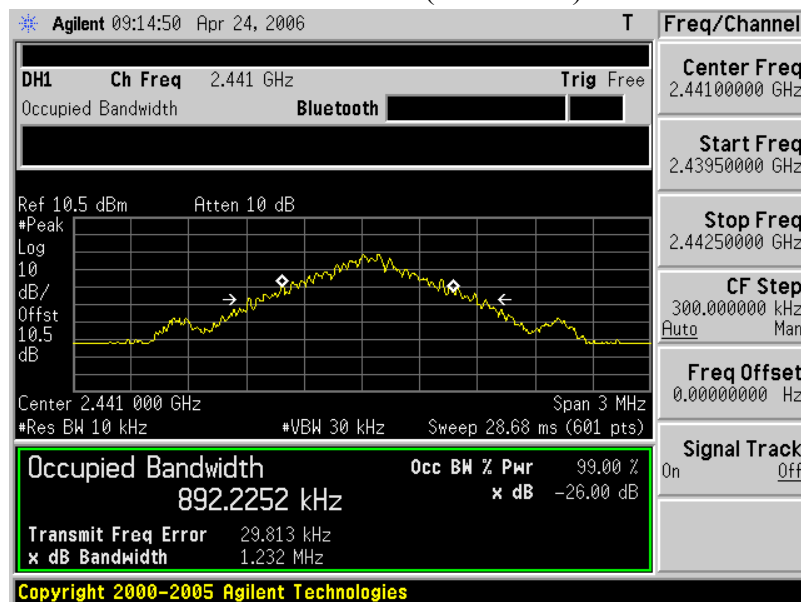
Results

Channel	Frequency - (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	921 kHz	887.8 kHz
Mid	2441	921 kHz	892.2 kHz
High	2480	921 kHz	893.56 kHz

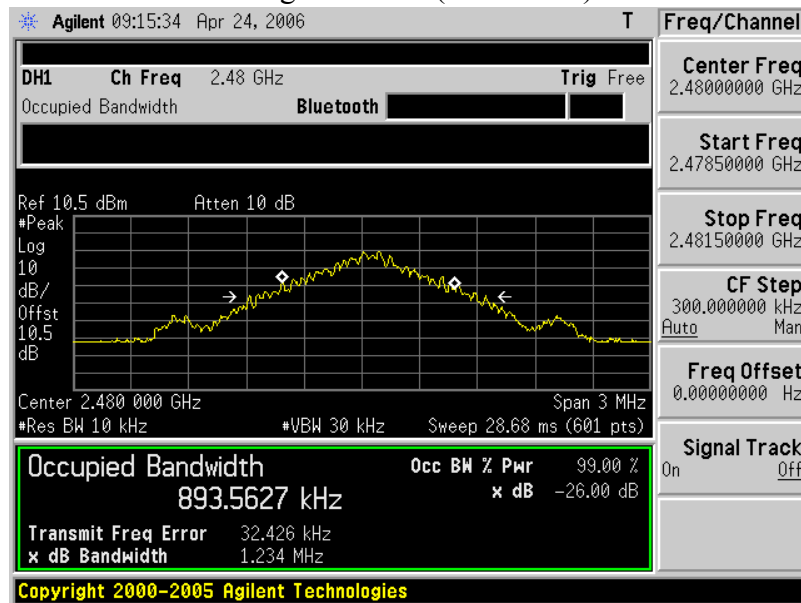
99% Bandwidth – Low Channel (2402 MHz)



99% Bandwidth – Mid Channel (2441 MHz)

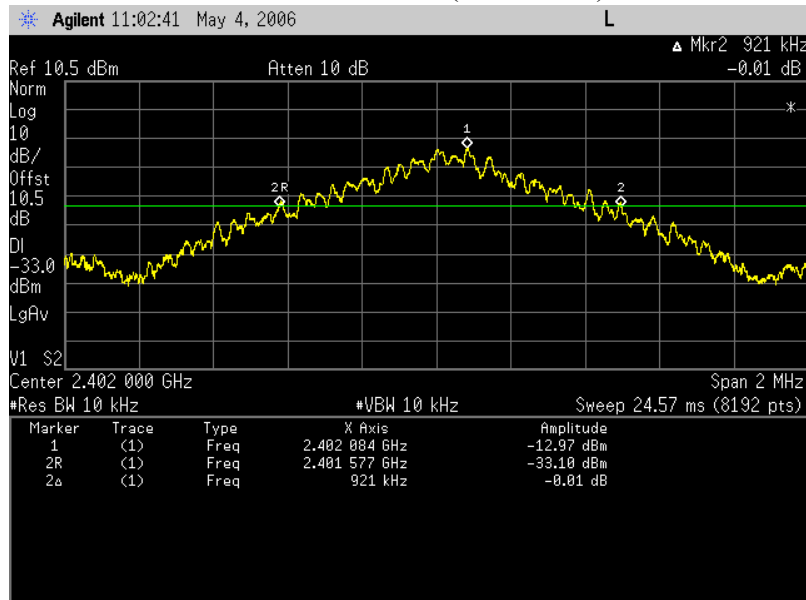


99% Bandwidth – High Channel (2480 MHz)

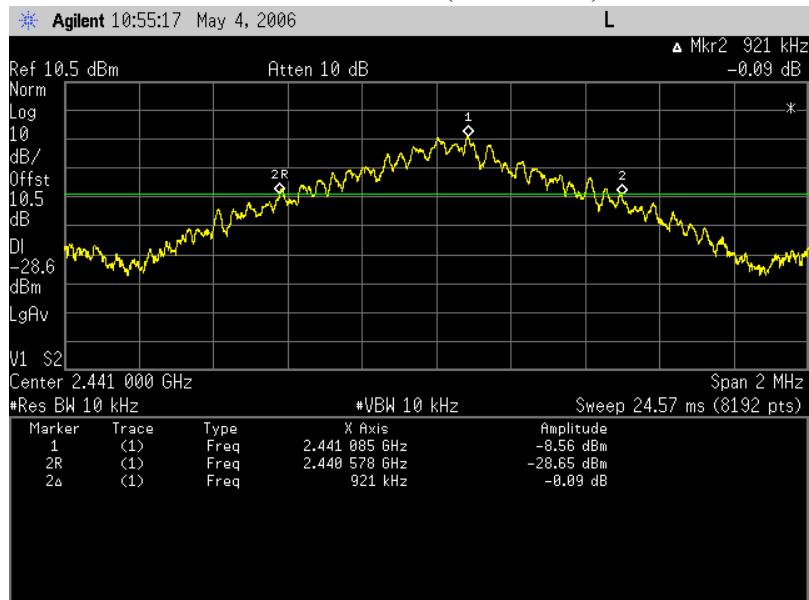


Date of Test: April 24, 2006

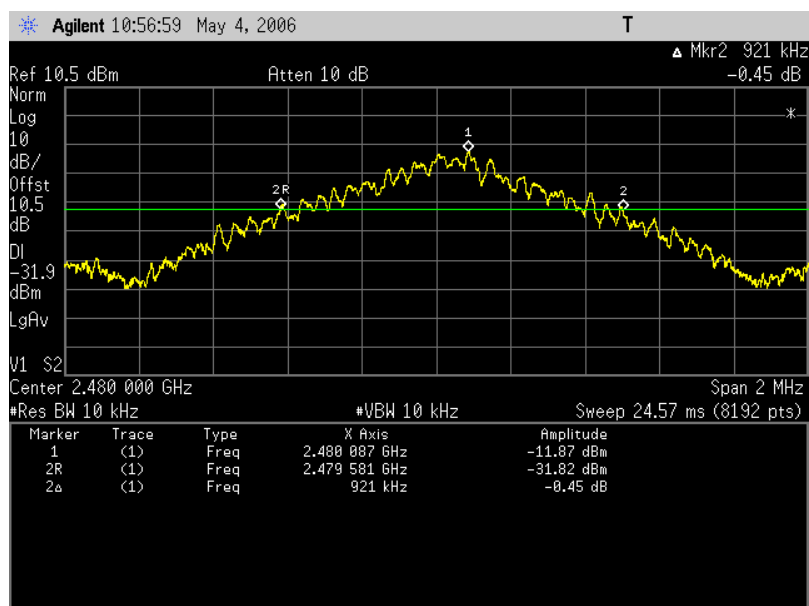
20 dB Bandwidth – Low Channel (2402 MHz)



20 dB Bandwidth – Mid Channel (2441 MHz)



20 dB Bandwidth – High Channel (2480 MHz)



7.2 Hopping Frequency Separation

Limit

Frequency Hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB Bandwidth of the hopping channel, whichever is greater, CFR 15.247(a)(1).

Test Procedure

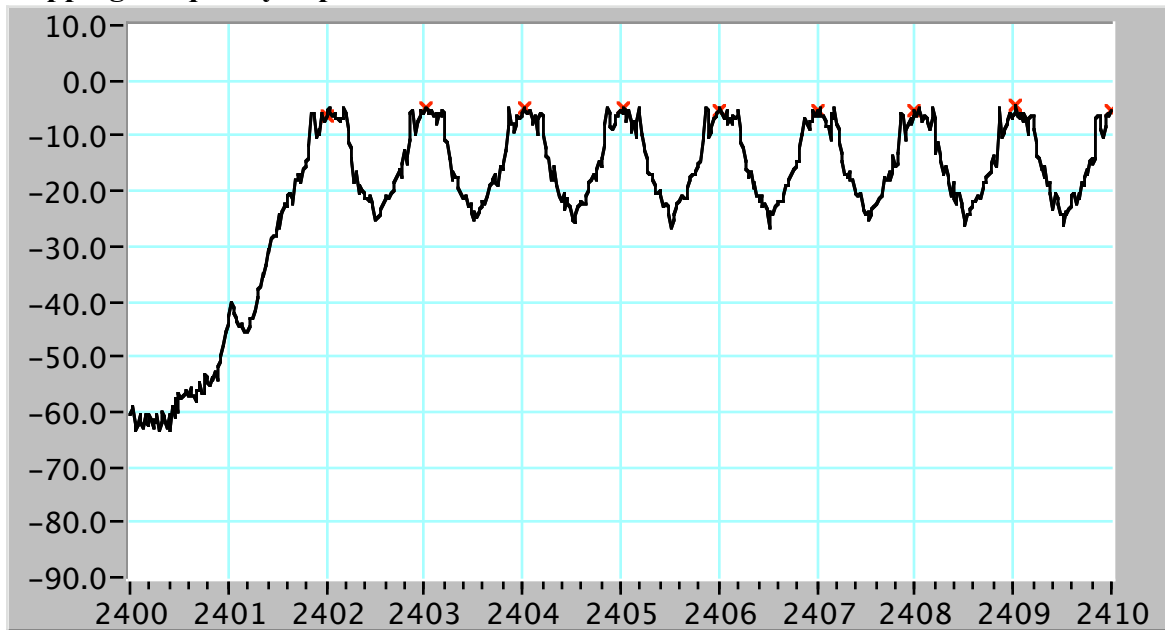
The Apple Bluetooth module was placed in continuous transmit mode while hopping over all 79 channels. The transmitter output is connected to a spectrum analyzer RF input. The bandwidth of the spectrum analyzer is set to 30 kHz.

Test Results

No non-compliance was found. Channel separation was equal to 1 MHz.

Hopping Frequency Separation Instrument Settings:

Reference Level	Attenuation	Resolution BW	Video Bandwidth	Span	Sweep Time
10 dBm	10 dB	30 kHz	30 kHz	10 MHz	200 Seconds

Hopping Frequency Separation – Lower Channels**Date of Test: April 24, 2006**

Frequency (MHz)	Amplitude (dBm)	Channel Separation from Previous Channel (MHz)
2402.0	-6.5	N/A
2403.0	-5.2	1.0
2404.0	-5.1	1.0
2405.0	-5.0	1.0
2406.0	-5.6	1.0
2407.0	-5.3	1.0
2408.0	-5.3	1.0
2409.0	-4.6	1.0
2410.0	-5.7	1.0

7.3 Number of Hopping Channels**Limit**

15.247(a)(1)(iii) Frequency Hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Test Procedure

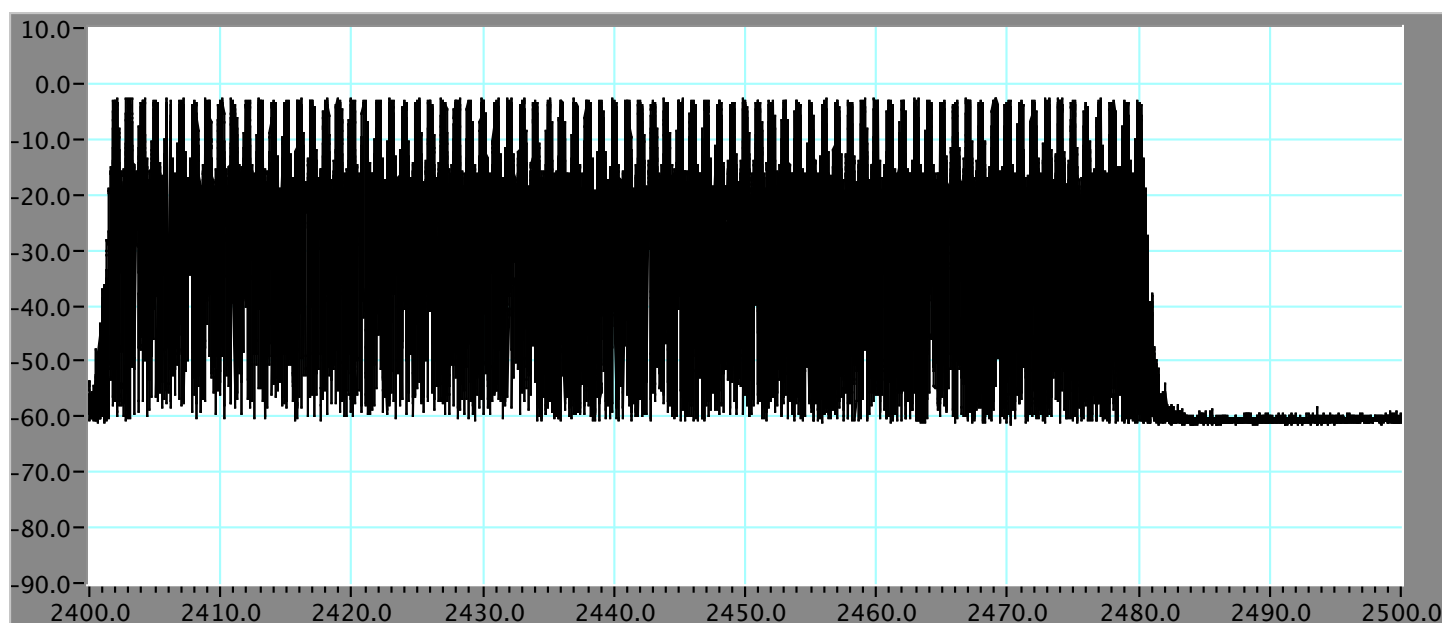
The Apple Bluetooth module was placed in continuous transmit mode while hopping over all 79 channels. The transmitter output is connected to a spectrum analyzer RF input with sufficient resolution (8192 points) to reveal all channels.

Test Results

79 Hopping Channels were observed. No non-compliance was found.

Number of Hopping Channels - Instrument Settings:

Reference Level	Attenuation	Resolution BW	Video Bandwidth	Span	Sweep Time
10 dBm	10 dB	100 kHz	100 kHz	100 MHz	2000 Seconds



Date of Test: April 24, 2006

7.4 Average Time of Occupancy**Limit**

15.247(a)(1)(iii) Frequency Hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Test Procedure

The Apple Bluetooth module was placed in continuous transmit mode while hopping over all 79 channels. The transmitter output is connected to a spectrum analyzer RF input. The width of a single channel is measured in a fast scan of 1 mS sweep time. The number of pulses in a 3.16 second period are counted and multiplied by 10.

The average occupancy time in the specified 31.6 second period (79 channels x 0.4 S = 31.6) is equal to

10 x (number of pulses in 3.16 s) x pulse width.

Test Results

No non-compliance was found.

Average Time of Occupancy - Instrument Settings:

Reference Level	Attenuation	Resolution BW	Video Bandwidth	Span	Sweep Time
20 dBm	50 dB	1 MHz	1 MHz	0 Hz	0.001 Seconds or 3.16 Seconds

Pulse Width (DH1) = 418 uS

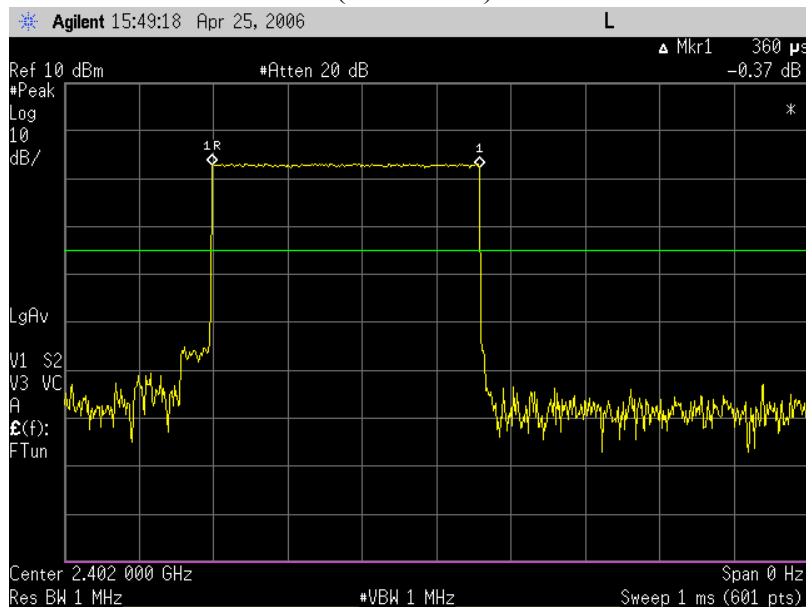
Number of Pulses in 3.16 Seconds = 24

Number of Pulses in 31.6 Seconds = 240

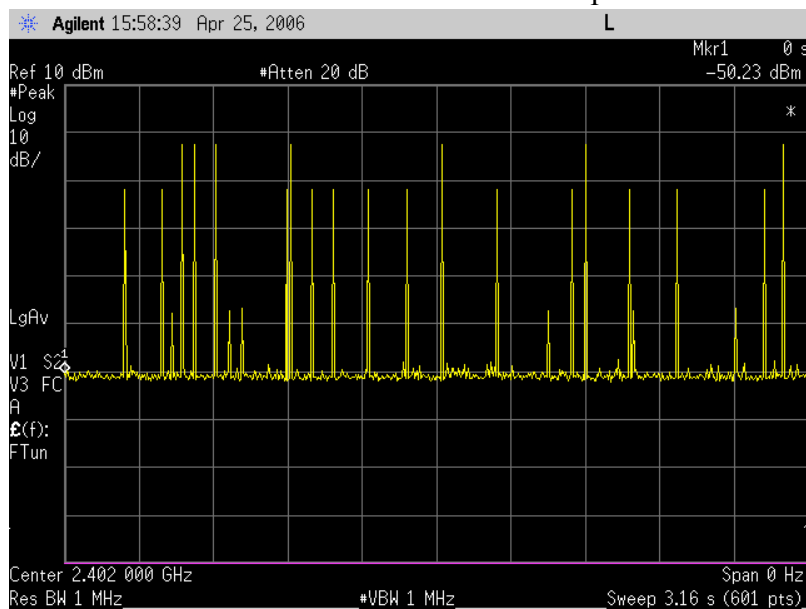
Average Time of occupancy = 240 x 360 uS = 86.4 mS

Average Time of Occupancy (Seconds)	Limit (Seconds)	Margin (Seconds)
0.0864	0.4	0.313

Pulse Width – Channel 1 (2402 MHz) Horizontal scale set to 1 mSecond, Pulse Width = 360 uS



Number of Pulses on Channel 1 (2402 MHz) with a 0 Hz Span. Horizontal Scale set to 3.16 Seconds. The Number of Pulses observed in a 3.16 Second period = 24



Date of Test: April 25, 2006

7.5 Maximum Peak Output Power

Limit

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

15.247 (b) (1) For frequency hopping systems operating in the 2400 – 2483.5 MHz band employing at least 75 hopping channels: 1 watt.

15.247 (b) (4) Except as shown in paragraph (b)(3)(i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum gain for the Apple Bluetooth Mouse is –1.21 dBi therefore the limit is 30 dBm.

Test Setup

The transmitter is connected to a peak power meter and set to continuously transmit..

Maximum Peak Output Power Test Results

No non-compliance were found.

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-1.31	30	-28.69
Mid	2441	1.04	30	-28.96
High	2480	0.67	30	-29.33

Date of Test: April 18, 2006

7.6 Average Power

Average Power Limit

None; for reporting purposes only

Test Procedure

The transmitter is connected to an average power meter and set to transmit continuously.

Average Power Test Results

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-2.57
Mid	2441	0.41
High	2480	-0.03

Date of Test: April 18, 2006

7.7 Peak Power Spectral Density

Limit

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

15.247 (f) The digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

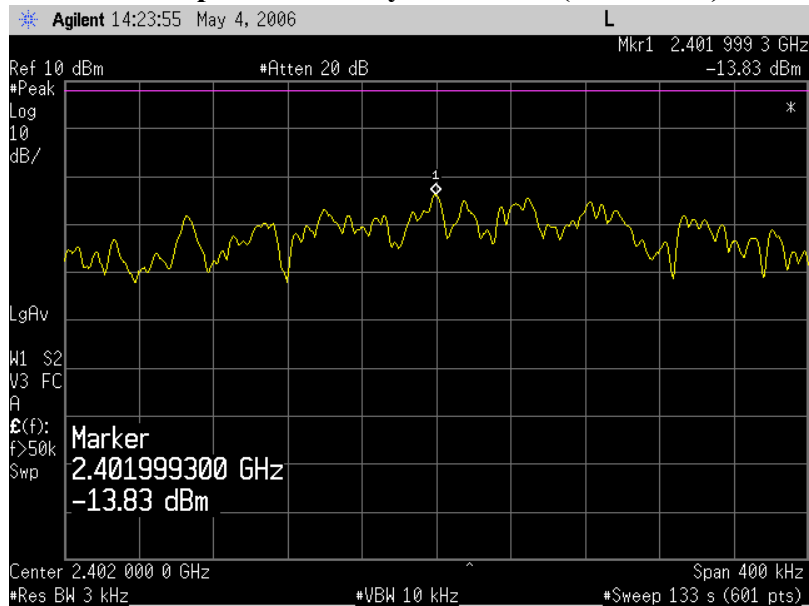
Test Procedure

The transmitter is connected to a spectrum analyzer. The maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = 3 kHz and VBW = 10 kHz, sweep time = span / 3 kHz. A span of 400 kHz was used for the final measurement and the sweep time was 133 Seconds.

Peak Power Spectral Density Test Results

No non-compliance was found.

Channel	Frequency (MHz)	Peak Power Spectral Density (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-13.83	8	-21.33
Mid	2441	-14.0	8	-22
High	2480	-17.25	8	-22.19

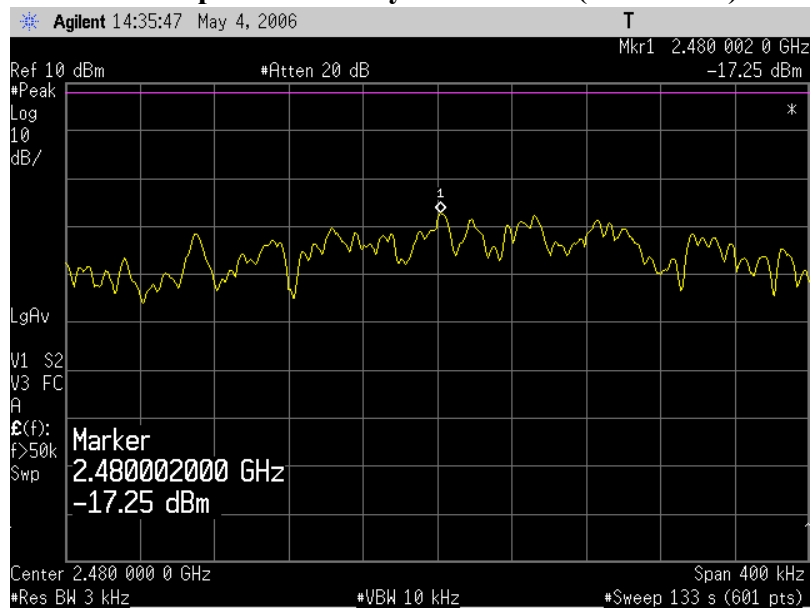
Peak Power Spectral Density Channel 1 (2402 MHz)

Date of Test: May 4, 2006

Peak Power Spectral Density Channel 40 (2441 MHz)

Date of Test: May 4, 2006

Peak Power Spectral Density Channel 79 (2480 MHz)



Date of Test: May 4, 2006

7.8 Conducted Spurious Emissions

Limit

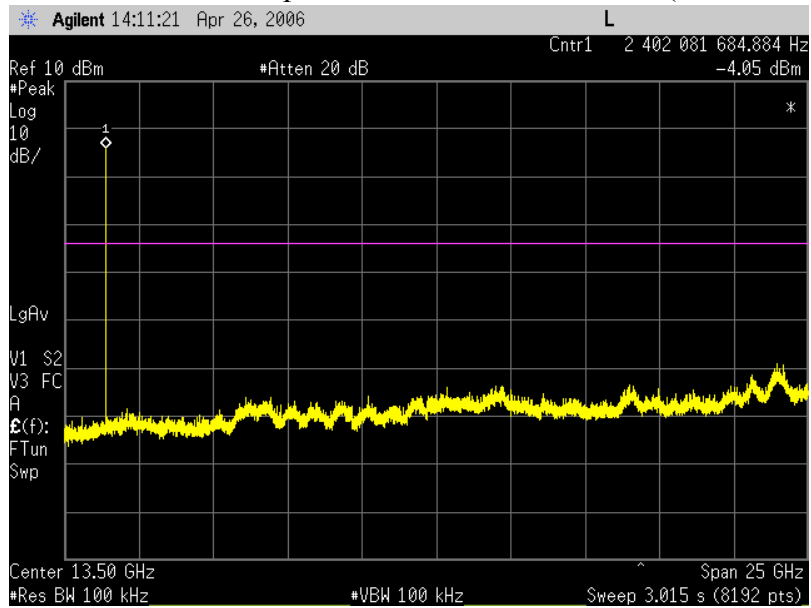
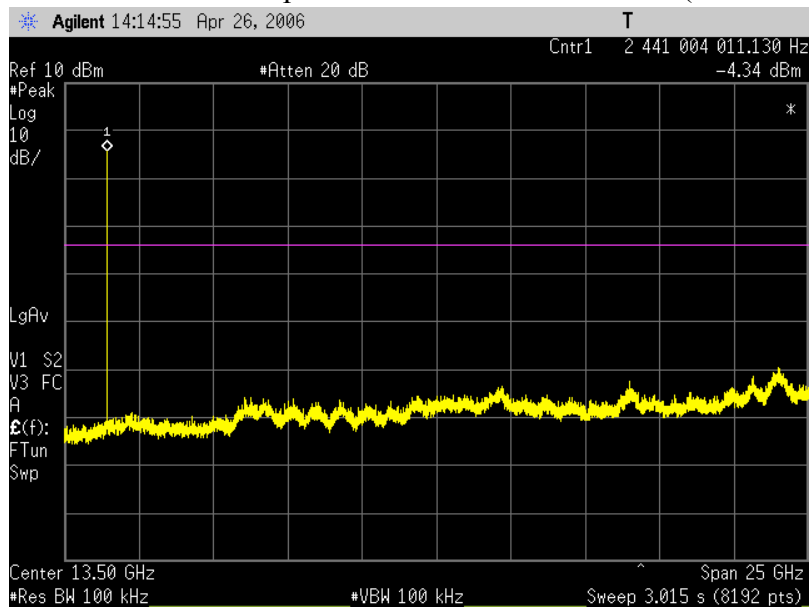
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired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

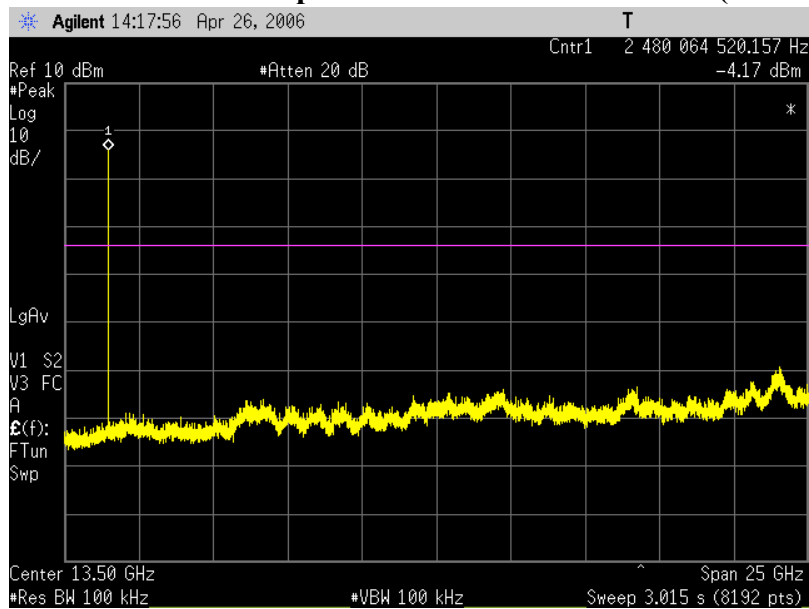
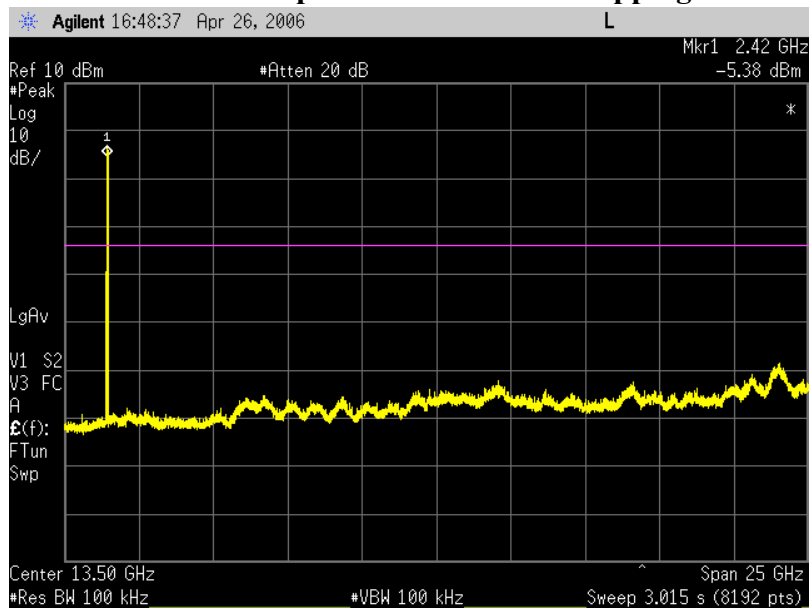
Test Procedure

The transmitter is set to continuously transmit using iperf as described in Section 6 and the transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The spectrum from 30 MHz to 25 GHz is investigated when transmitting on the low, mid and high channels.

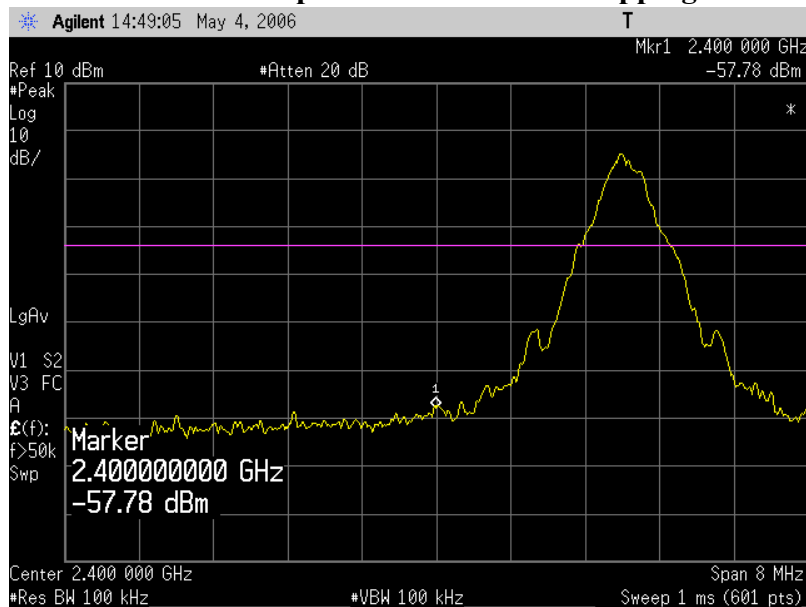
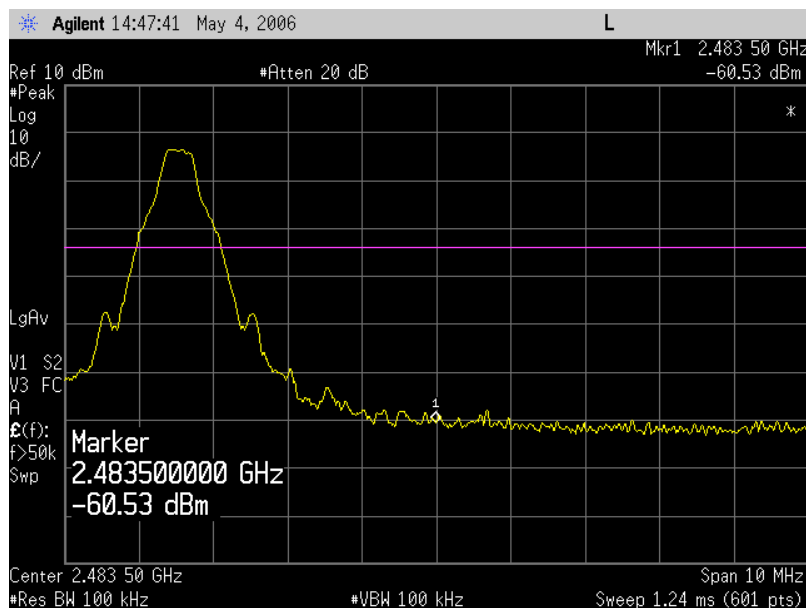
Test Results

No non-compliance was found.

-20 dBc Conducted Spurious Emissions Channel 1 (2402 MHz)**-20 dBc Conducted Spurious Emissions Channel 40 (2441 MHz)**

-20 dBc Conducted Spurious Emissions Channel 79 (2480 MHz)**-20 dBc Conducted Spurious Emissions - Hopping Enabled**

Date of Test: April 26, 2006

-20 dBc Conducted Spurious Emissions – Hopping Enabled, Lower Bandedge**-20 dBc Conducted Spurious Emissions – Hopping Enabled, Upper Bandedge**

Date of Test: May 4, 2006

7.9 Radiated Emissions

7.9.1 Transmitter Radiated Spurious Emissions

Limits

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

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

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

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

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

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

Test Procedure

Radiated Emission measurements were performed at the Apple Computer Evelyn 1, semi-anechoic chamber located at 123 East Evelyn Avenue, Mountain View, California. The EUT was placed on a nonmetallic table, 80 cm above the metallic ground-plane. The EUT and peripherals were powered from a filtered main supply.

The frequency spectrum from 30 MHz to 25 GHz was scanned and the emission levels maximized at each frequency. The antenna was varied in height and the system was rotated 360 degrees while scanning for maximum emission amplitudes. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

For Peak Detection measurements below 1 GHz, the RBW is set to 100 kHz and the VBW is set to 100 kHz. For Quasi-Peak detection measurements, 120 kHz bandwidths were used. Peak detection was used unless otherwise noted as Quasi-Peak. For peak measurements above 1 GHz, the RBW is set to 1 MHz and the VBW is set to 1 MHz. For Average measurements the RBW is set to 1 MHz and the VBW is set to 10 Hz. Radiated Emission measurements below 1 GHz were performed at an EUT to antenna distance of 3 meters and measurements above 1 GHz were performed at an EUT to antenna distance of 1 meter.

Radiated emissions measurements were performed with the transmitter set to continuously transmit using the low, mid and highest channel using maximum transmit power.

- low (channel 1) - 2.402 GHz
- mid (channel 40) - 2.441 GHz
- high (channel 80) - 2.480 GHz

Test Results

No non-compliance was found.

7.9.2 Transmitter Radiated Spurious Emissions above 1 GHz

Restricted Bands

The adjacent restricted bands at the lower and upper edges of the 2.4 GHz ISM band were scanned for the maximum radiated emissions with the transmitter set to continuously transmit at the corresponding lowest and highest channels. Peak and Average detection plots are provided for restricted band measurements.

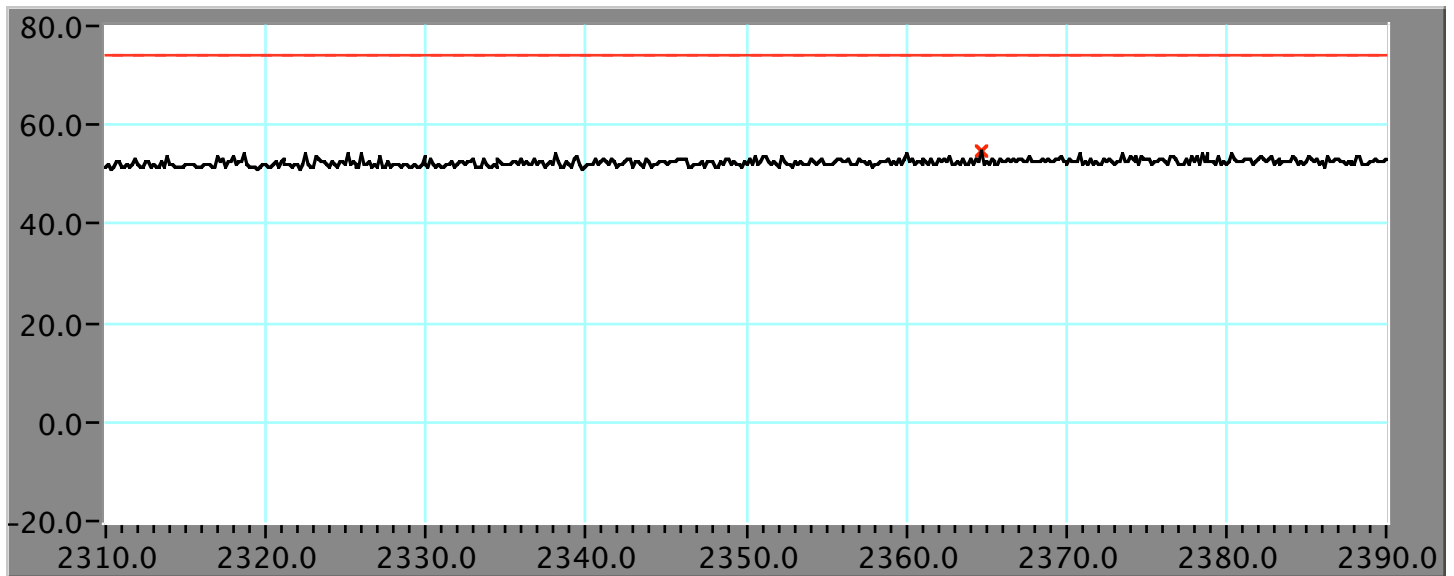
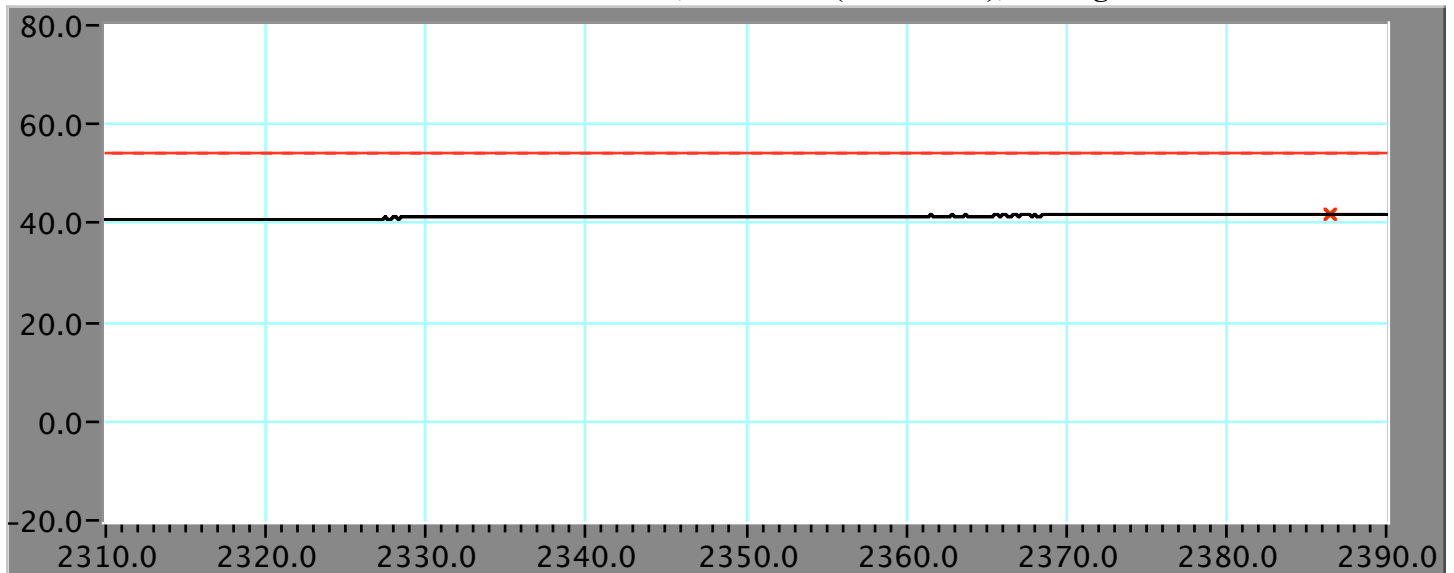
Restricted Bands Instrument Settings

Peak Measurement Instrument Settings

Frequency Range	Reference Level	Attenuation	Resolution BW	Video BW	Sweep Rate
2310-2390 MHz	80 dBuV/m	10 dB	1 MHz	1 MHz	5 mS
2483-2500 MHz	80 dBuV/m	10 dB	1 MHz	1 MHz	5 mS

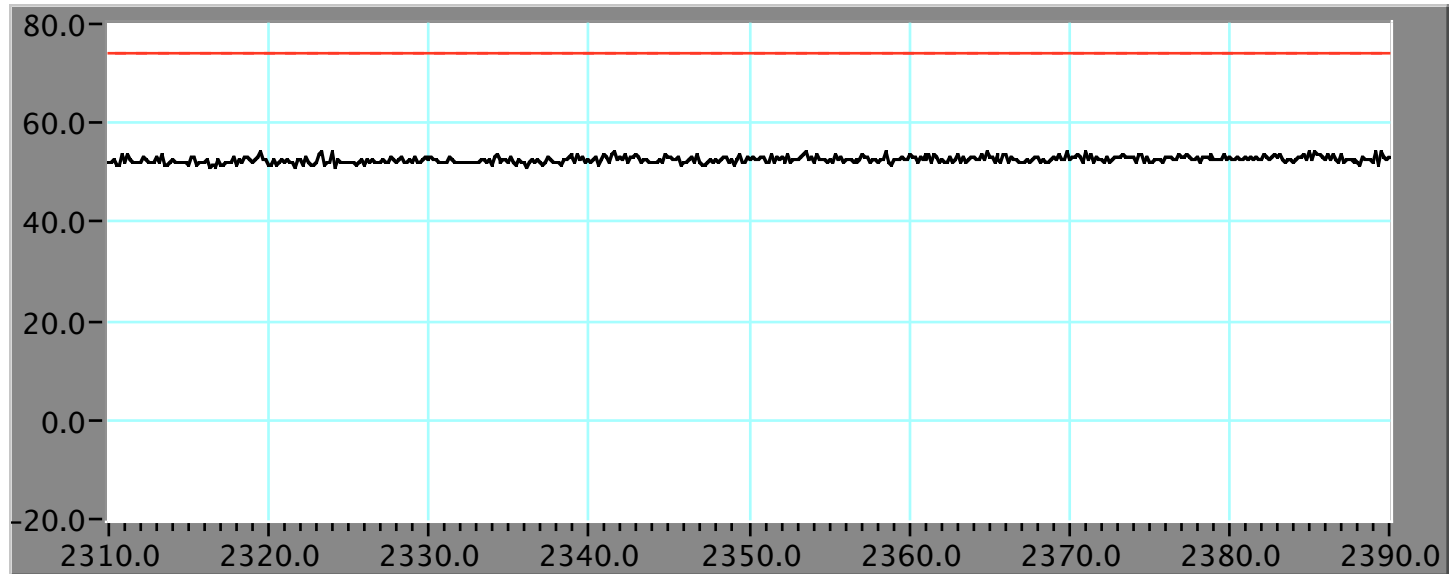
Average Measurement Instrument Settings

Frequency Range	Reference Level	Attenuation	Resolution BW	Video BW	Sweep Rate
2310-2390 MHz	80 dBuV/m	10 dB	1 MHz	10 Hz	22.5 Seconds
2483-2500 MHz	80 dBuV/m	10 dB	1 MHz	10 Hz	6.4 Seconds

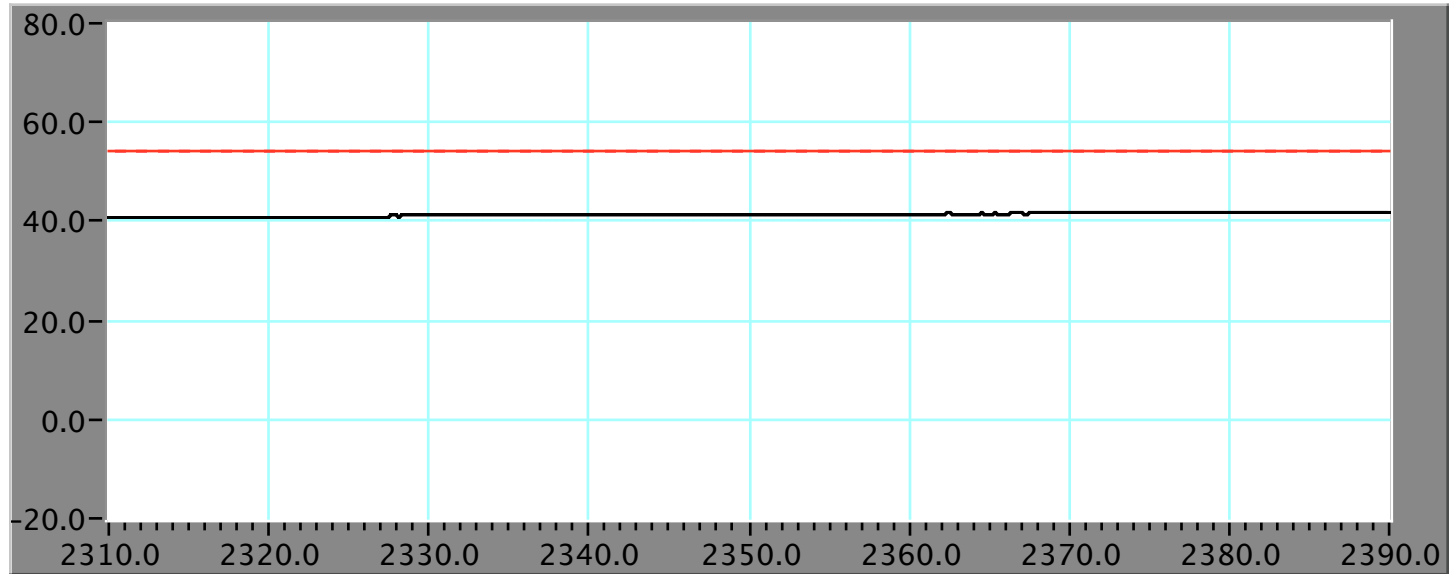
2310 MHz - 2390 MHz Restricted Band - Vertical, channel 1 (2.402 GHz), Peak Detection**2310 MHz - 2390 MHz Restricted Band - Vertical, channel 1 (2.402 GHz), Average Detection**

Date of Test: April 25, 2006

2310 MHz - 2390 MHz Restricted Band - Horizontal, channel 1 (2.402 GHz), Peak Detection

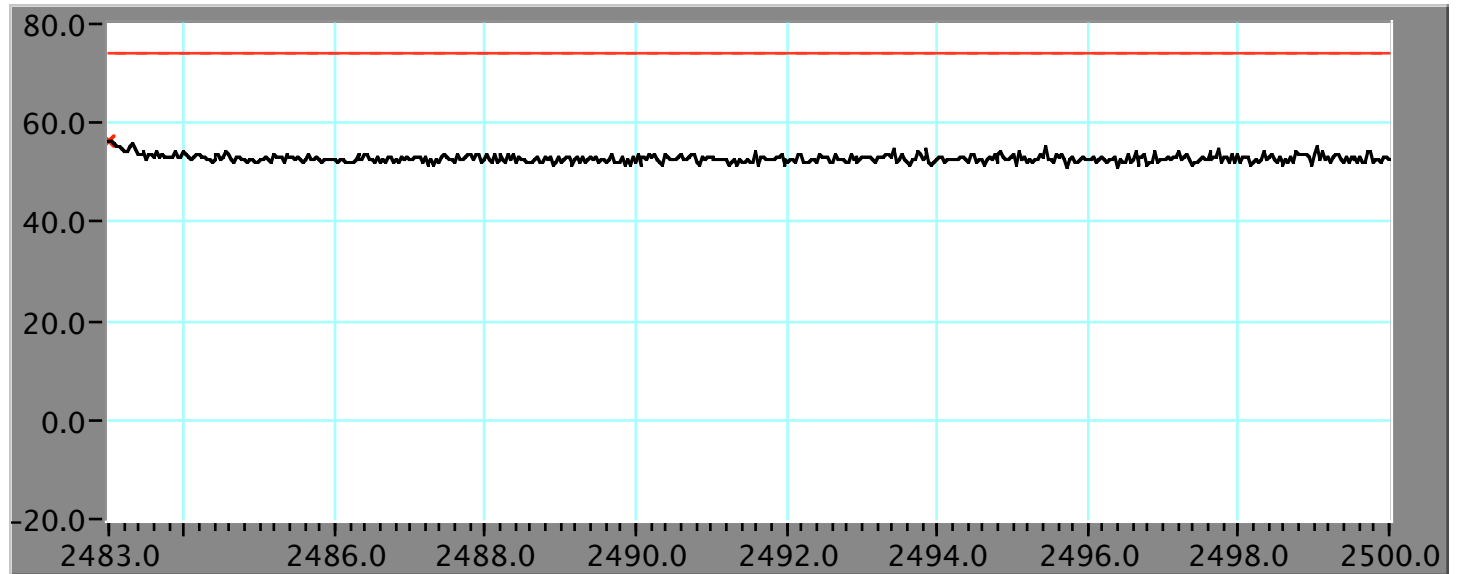


2310 MHz - 2390 MHz Restricted Band - Horizontal, channel 1 (2.402 GHz), Average Detection

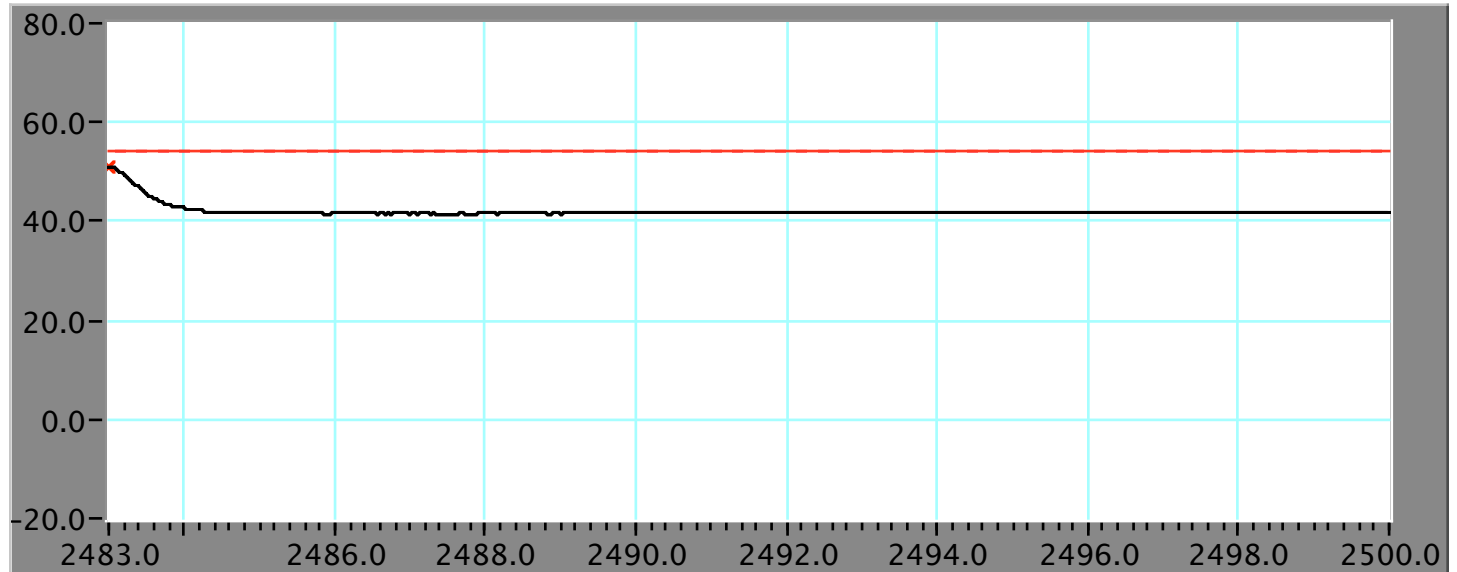


Date of Test: April 25, 2006

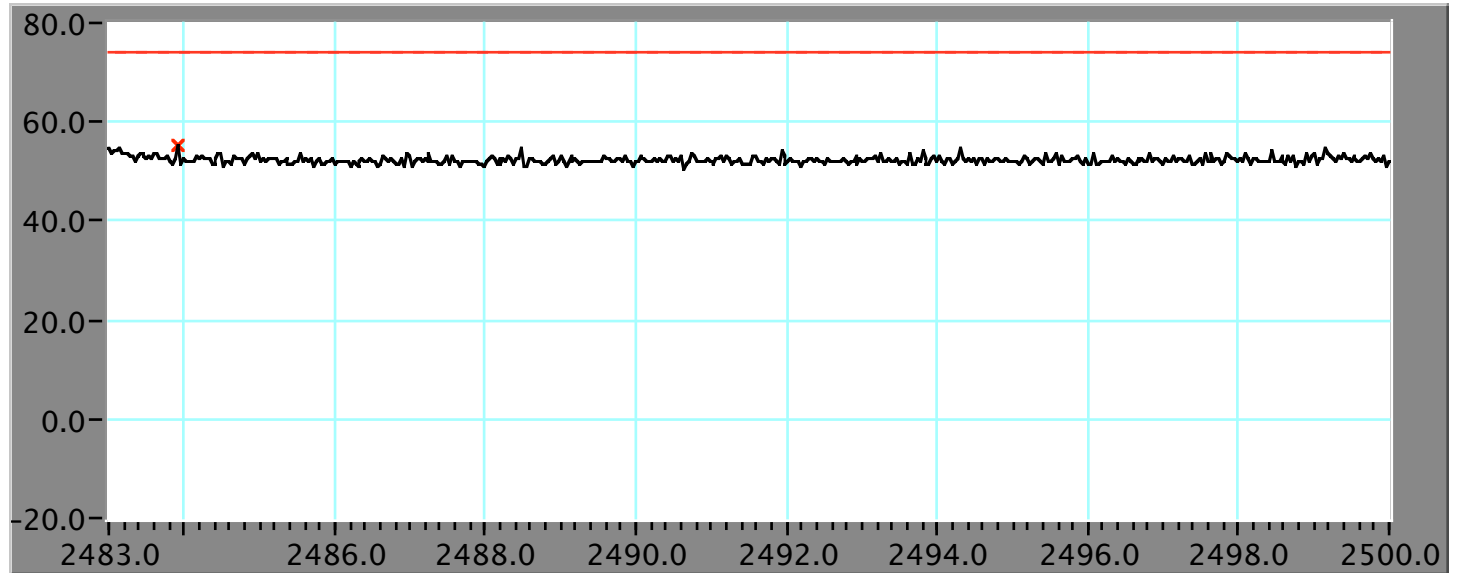
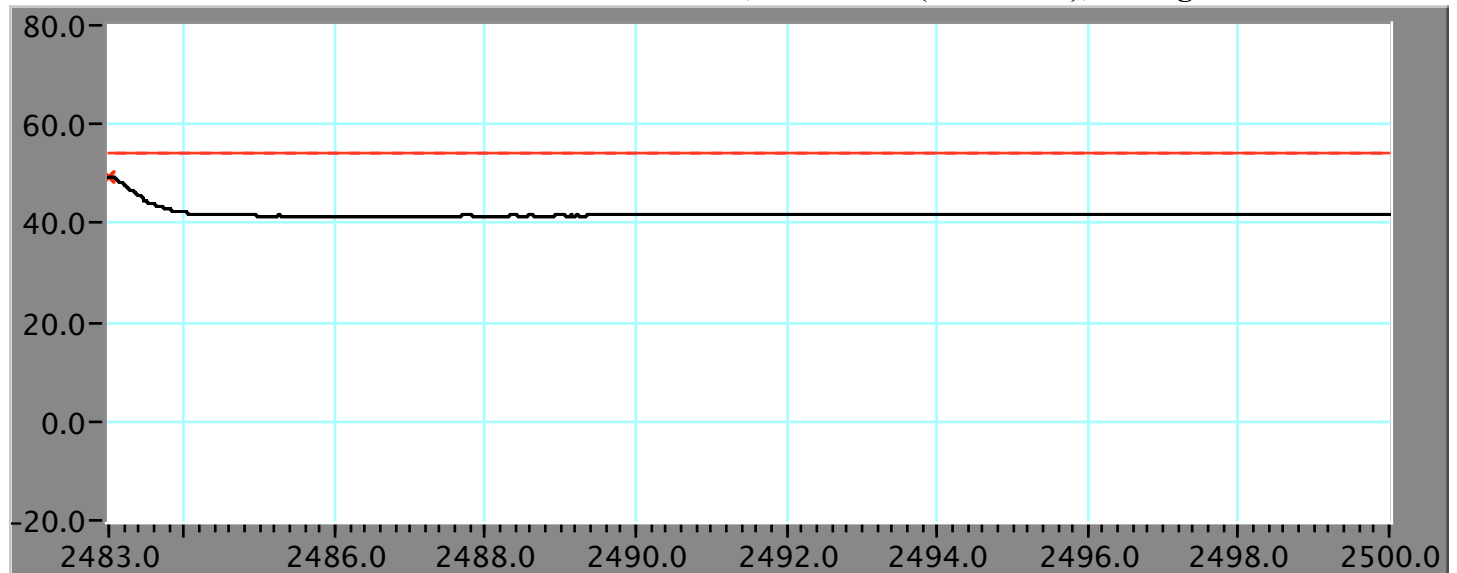
2483.5 MHz - 2500 MHz Restricted Band - Vertical, channel 79 (2.480 GHz), Peak Detection



2483.5 MHz - 2500 MHz Restricted Band - Vertical, channel 79 (2.480 GHz), Average Detection



Date of Test: April 25, 2006

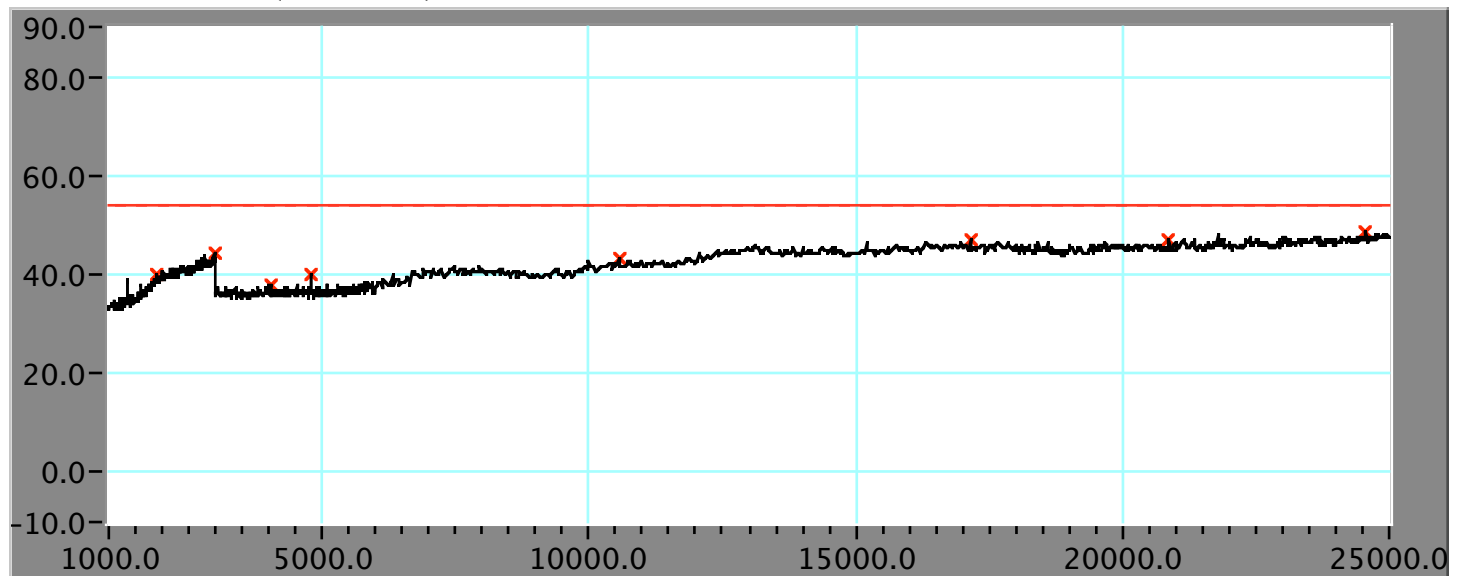
2483.5 MHz - 2500 MHz Restricted Band - Horizontal, channel 79 (2.480 GHz), Peak Detection**2483.5 MHz - 2500 MHz Restricted Band - Horizontal, channel 79 (2.480 GHz), Average Detection**

Date of Test: April 25, 2006

7.9.3 Spurious Radiated Emissions above 1 GHz

Radiated Emissions scans from 1 to 25 GHz for the low, mid and high channels were performed to demonstrate compliance with all of the restricted bands in CFR 47 Section 205(a). The data from the Radiated Emissions scans are presented in the following pages. In all cases, Peak detection was used and are shown with the Average detection limits.

Vertical, channel 1 (2.402 GHz)

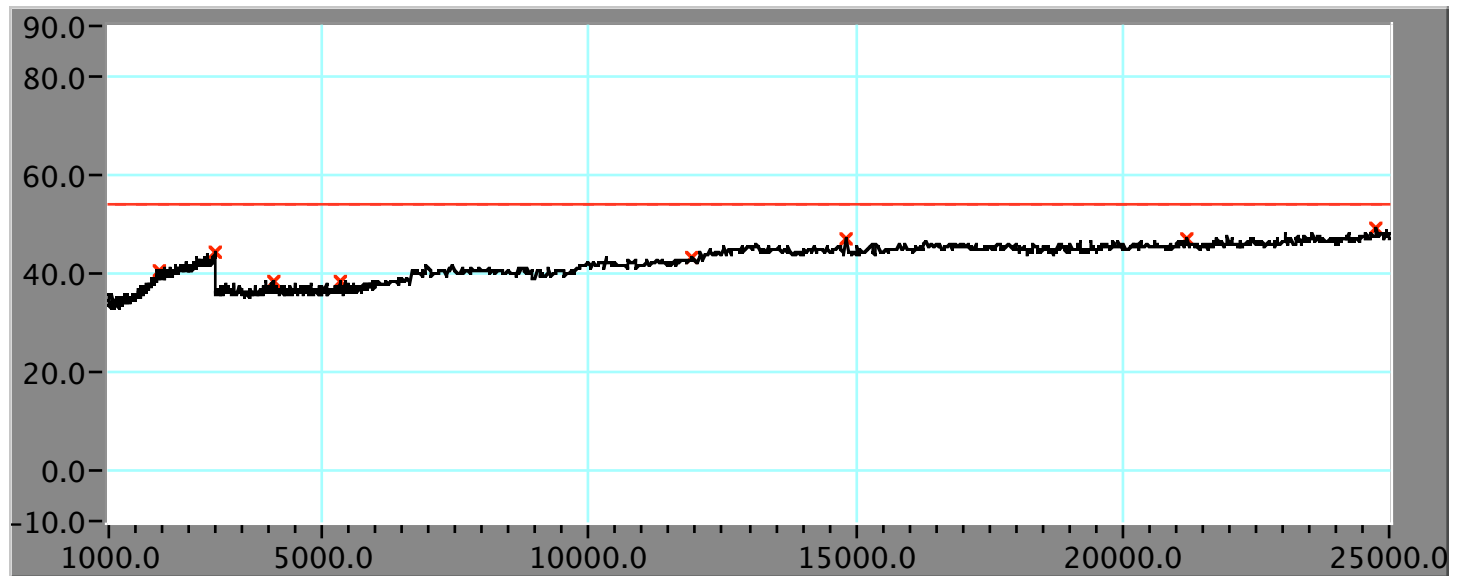


Frequency MHz	Level dBuV	Limit dBuV	Delta dB	Raw Data dBuV	Antenna dB	Cable dB	Amp dB	All Factor dB
1915.00	40.0	54.0	-14.0	50.74	31.45	1.17	43.39	10.76
2975.00	44.1	54.0	-9.9	52.74	33.48	1.52	43.66	8.66
4057.50	37.9	54.0	-16.1	44.88	34.53	1.87	43.37	6.96
4807.50	39.8	54.0	-14.2	46.83	34.80	1.90	43.77	7.07
10560.00	43.1	54.0	-10.9	47.20	37.91	2.77	44.81	4.13
17160.00	47.1	54.0	-6.9	47.43	41.10	2.87	44.27	0.30
20870.00	47.2	54.0	-6.8	48.63	40.30	2.81	44.50	1.39
24562.50	48.4	54.0	-5.6	49.32	40.40	2.81	44.17	0.96

All levels are with a peak detector unless otherwise indicated.

Date of Test: April 28, 2006

Horizontal, channel 1 (2.402 GHz)

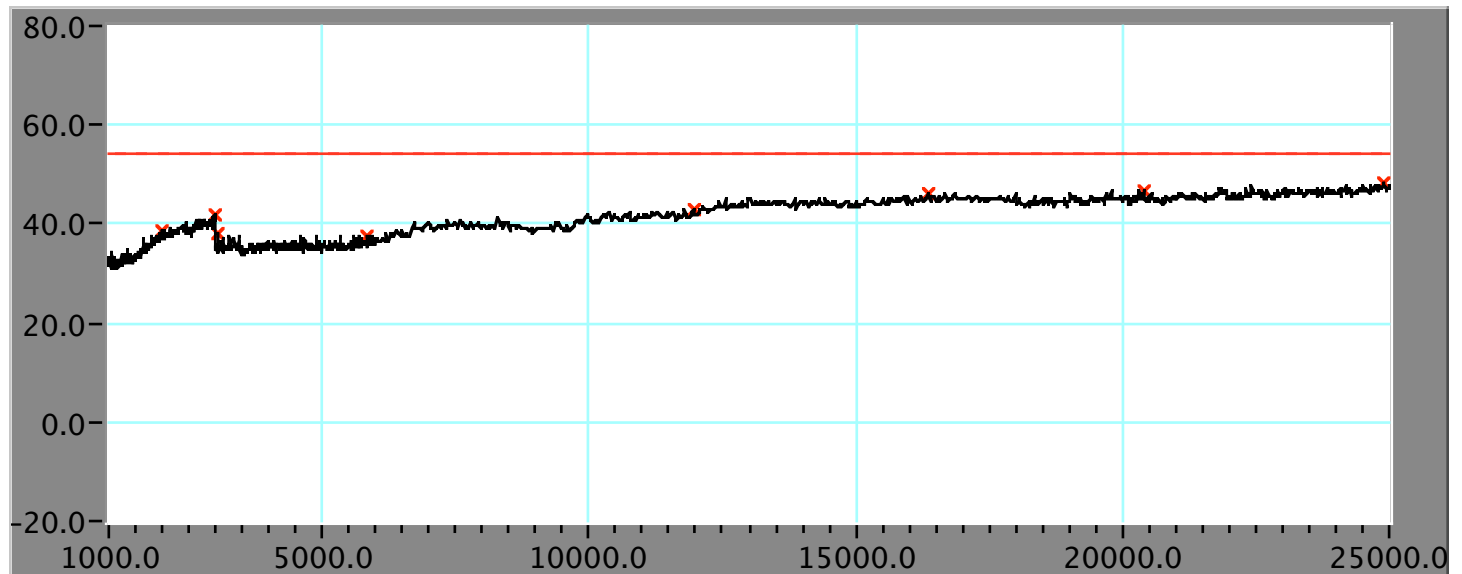


Frequency MHz	Level dBuV	Limit dBuV	Delta dB	Raw Data dBuV	Antenna dB	Cable dB	Amp dB	All Factor dB
1970.00	40.7	54.0	-13.3	51.01	31.87	1.19	43.35	10.29
2990.00	44.3	54.0	-9.7	52.93	33.49	1.53	43.66	8.64
4072.50	38.4	54.0	-15.6	45.39	34.54	1.87	43.38	6.96
5325.00	38.5	54.0	-15.5	45.26	35.06	1.96	43.83	6.81
11940.00	43.2	54.0	-10.8	46.63	38.90	2.84	45.13	3.39
14820.00	46.8	54.0	-7.2	48.59	39.66	2.92	44.38	1.79
21220.00	46.7	54.0	-7.3	48.06	40.30	2.81	44.43	1.32
24772.50	48.9	54.0	-5.1	49.90	40.40	2.81	44.16	0.95

All levels are with a peak detector unless otherwise indicated.

Date of Test: April 28, 2006

Vertical Channel 40 (2.441 GHz)

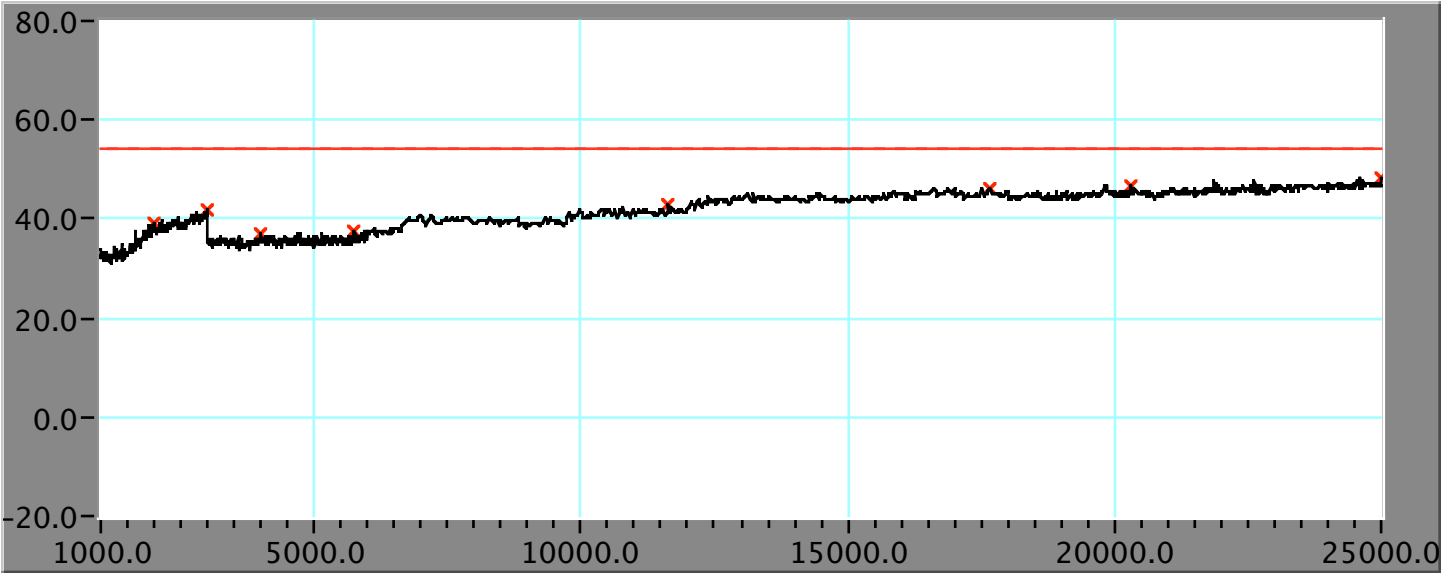


Frequency MHz	Level dBuV	Limit dBuV	Delta dB	Raw Data dBuV	Antenna dB	Cable dB	Amp dB	All Factor dB
1995.00	38.5	54.0	-15.5	48.56	32.06	1.20	43.33	10.07
2990.00	42.0	54.0	-12.0	50.64	33.49	1.53	43.66	8.64
3060.00	37.8	54.0	-16.2	46.45	33.54	1.55	43.70	8.61
5857.50	37.6	54.0	-16.4	43.78	35.84	2.05	44.07	6.18
11970.00	43.0	54.0	-11.0	46.38	38.95	2.84	45.15	3.36
16350.00	46.3	54.0	-7.7	47.19	40.62	3.25	44.76	0.89
20415.00	46.6	54.0	-7.4	48.01	40.30	2.81	44.47	1.36
24895.00	48.0	54.0	-6.0	48.98	40.40	2.81	44.16	0.95

All levels are with a peak detector unless otherwise indicated.

Date of Test: April 28, 2006

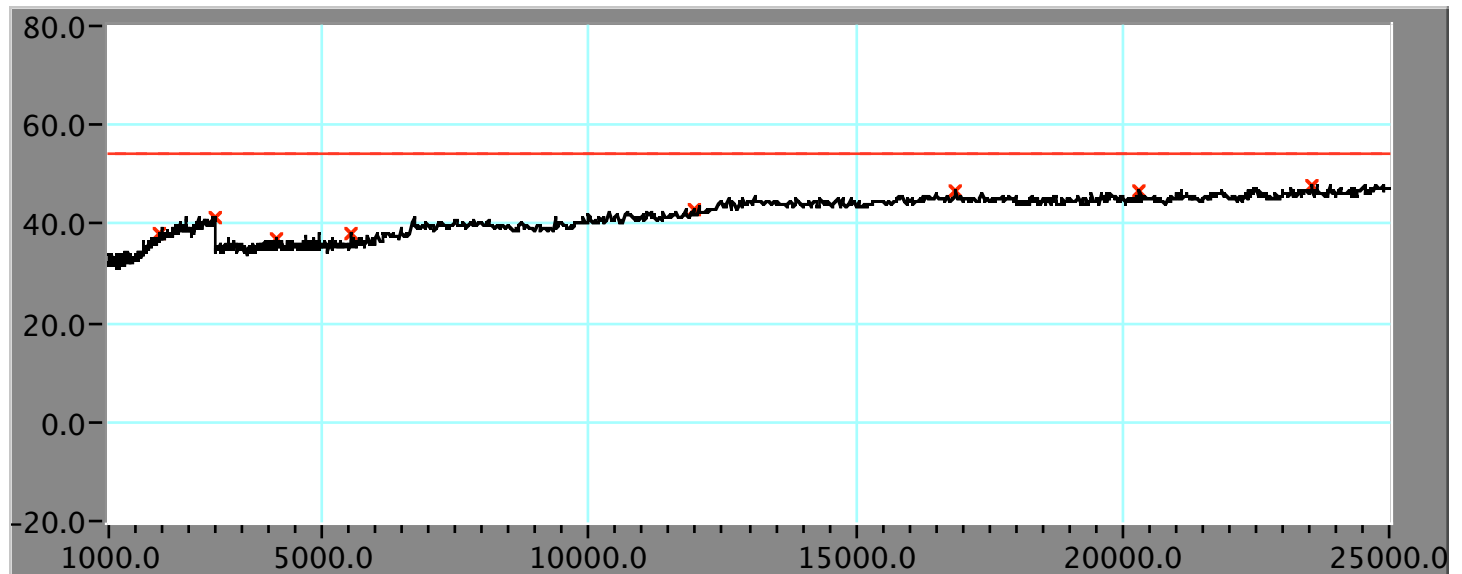
Horizontal Channel 40 (2.441GHz)



Frequency	Level	Limit	Delta	Raw Data	Antenna	Cable	Amp	All Factor
MHz	dBuV	dBuV	dB	dBuV	dB	dB	dB	dB
1990.00	38.9	54.0	-15.1	49.04	32.02	1.20	43.34	10.12
2980.00	41.9	54.0	-12.1	50.58	33.48	1.52	43.66	8.65
3990.00	36.8	54.0	-17.2	43.77	34.49	1.87	43.34	6.99
5760.00	37.4	54.0	-16.6	43.67	35.67	2.03	44.01	6.31
11640.00	42.8	54.0	-11.2	46.46	38.42	2.82	44.93	3.69
17670.00	46.4	54.0	-7.6	46.92	40.97	2.83	44.33	0.53
20310.00	46.7	54.0	-7.3	48.03	40.30	2.81	44.44	1.33
25000.00	48.2	54.0	-5.8	49.20	40.40	2.81	44.16	0.95

All levels are with a peak detector unless otherwise indicated.
Date of Test: April 28, 2006

Vertical Channel 79 (2.480 GHz)

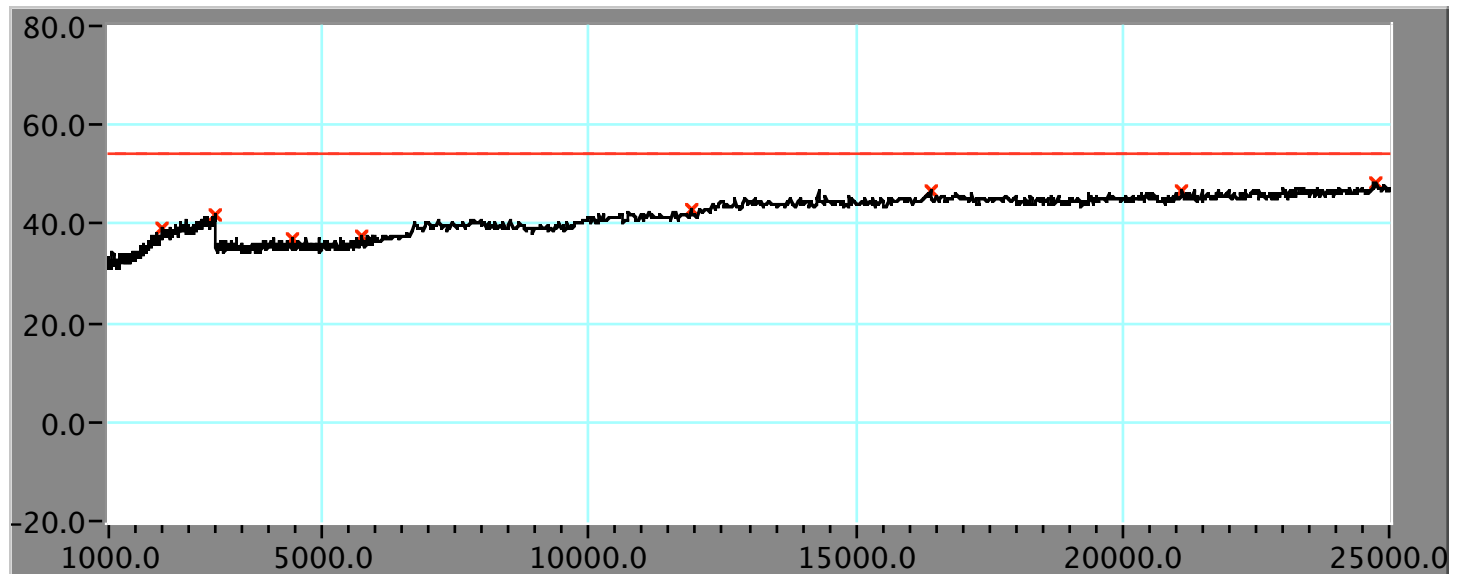


Frequency MHz	Level dBuV	Limit dBuV	Delta dB	Raw Data dBuV	Antenna dB	Cable dB	Amp dB	All Factor dB
1955.00	38.1	54.0	-15.9	48.56	31.76	1.19	43.36	10.42
2975.00	41.4	54.0	-12.6	50.03	33.48	1.52	43.66	8.66
4140.00	36.9	54.0	-17.1	43.88	34.58	1.88	43.43	6.97
5550.00	38.1	54.0	-15.9	44.66	35.29	2.00	43.86	6.58
11970.00	42.9	54.0	-11.1	46.26	38.95	2.84	45.15	3.36
16890.00	46.4	54.0	-7.6	46.66	41.11	2.94	44.27	0.22
20327.50	46.7	54.0	-7.3	48.07	40.30	2.81	44.44	1.33
23547.50	47.8	54.0	-6.2	48.31	40.40	2.81	43.72	0.51

All levels are with a peak detector unless otherwise indicated.

Date of Test: April 28, 2006

Horizontal Channel 79 (2.480 GHz)



Frequency MHz	Level dBuV	Limit dBuV	Delta dB	Raw Data dBuV	Antenna dB	Cable dB	Amp dB	All Factor dB
1990.00	38.9	54.0	-15.1	49.00	32.02	1.20	43.34	10.12
2985.00	41.7	54.0	-12.3	50.33	33.49	1.53	43.66	8.65
4455.00	37.1	54.0	-16.9	44.11	34.77	1.89	43.64	6.98
5752.50	37.7	54.0	-16.3	44.01	35.65	2.03	44.00	6.32
11910.00	42.7	54.0	-11.3	46.10	38.86	2.83	45.11	3.42
16410.00	46.6	54.0	-7.4	47.41	40.69	3.22	44.72	0.81
21132.50	46.9	54.0	-7.1	48.27	40.30	2.81	44.45	1.34
24772.50	48.2	54.0	-5.8	49.18	40.40	2.81	44.16	0.95

All levels are with a peak detector unless otherwise indicated.

Date of Test: April 28, 2006

7.9.3 Radiated Emissions less than 1 GHz Instrument Settings:

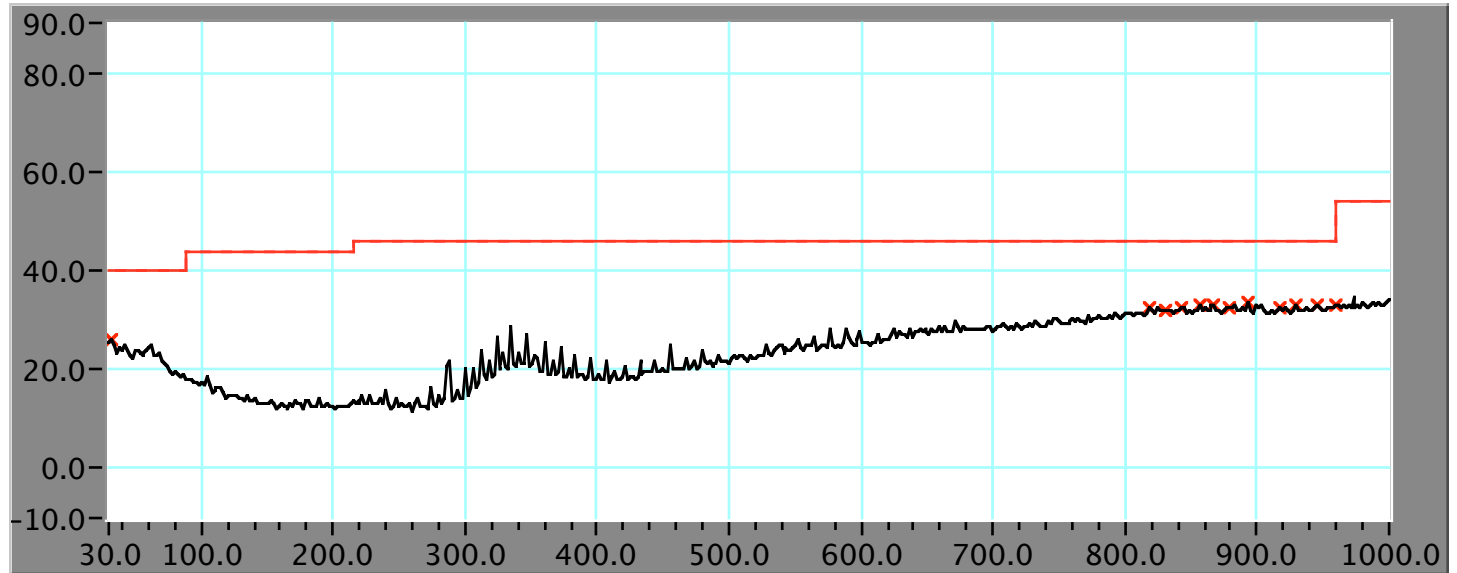
Instrument Settings				
Frequency Range	Reference Level	Attenuation	Resolution BW	Video BW
30 MHz - 1 GHz	90 dBuV	10	100 kHz	100 kHz

Radiated emissions measurements from 30 MHz - 1 GHz were performed with the transmitter set to low, mid and high channels. In each of these cases, the results were similar. Only the data from the scans with channel 1 transmitting is presented.

7.9.4 Radiated Emissions less than 1 GHz

All radiated emissions measurements below 1 GHz were collected using peak detection.

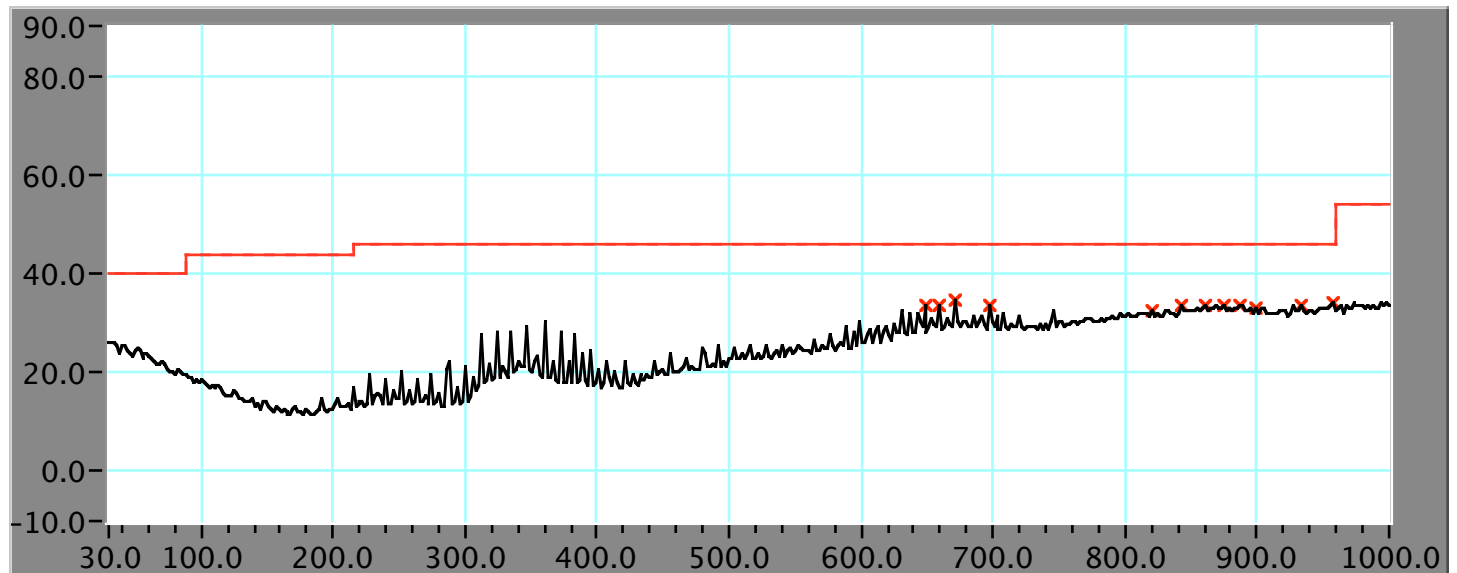
Radiated Emissions Data less than 1 GHz. Transmitter set to channel 1 (2402 MHz) Vertical



Frequency MHz	Level dBuV/m	Limit dBuV/m	Raw Data dBuV	Antenna dB	Cable dB	Amp dB	All Factors dB
31.94	25.9	40.0	29.66	23.39	1.11	28.28	3.78
819.22	32.4	46.0	31.64	23.50	7.16	29.95	-0.71
830.88	32.1	46.0	31.40	23.50	7.22	29.98	-0.74
842.55	32.5	46.0	31.55	23.60	7.32	29.96	-0.96
856.15	33.0	46.0	31.59	23.90	7.43	29.96	-1.37
867.82	32.9	46.0	31.32	24.06	7.47	29.95	-1.58
879.48	32.3	46.0	32.58	22.00	7.56	29.89	0.33
893.09	33.6	46.0	33.41	22.36	7.65	29.85	-0.17
916.41	32.2	46.0	31.75	22.43	7.82	29.76	-0.49
930.02	32.7	46.0	31.84	22.70	7.91	29.70	-0.91
945.57	33.2	46.0	32.03	22.80	8.00	29.63	-1.17
959.18	33.2	46.0	31.72	22.90	8.14	29.57	-1.46

Date of Test: April 25, 2006

Radiated Emissions Data less than 1 GHz. Transmitter set to channel 1 (2402 MHz) Horizontal



Frequency MHz	Level dBuV/m	Limit dBuV/m	Raw Data dBuV	Antenna dB	Cable dB	Amp dB	All Factors dB
648.16	33.8	46.0	36.84	20.06	6.01	29.14	3.07
659.82	33.6	46.0	36.49	20.30	6.06	29.22	2.86
671.48	34.9	46.0	37.45	20.56	6.14	29.26	2.56
696.75	33.3	46.0	35.09	21.36	6.28	29.39	1.75
821.16	32.7	46.0	31.56	23.92	7.20	29.95	-1.17
842.55	33.5	46.0	32.04	24.05	7.32	29.96	-1.41
860.04	33.6	46.0	31.73	24.40	7.43	29.97	-1.86
875.59	33.3	46.0	33.26	22.40	7.56	29.91	-0.05
887.25	33.4	46.0	33.15	22.50	7.65	29.86	-0.29
898.92	33.0	46.0	32.46	22.60	7.73	29.83	-0.50
933.91	33.5	46.0	32.15	23.08	7.94	29.68	-1.34
957.23	33.8	46.0	31.90	23.40	8.12	29.58	-1.94

Date of Test: April 25, 2006