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Technical Report No. 06-069

"EMI Evaluation of the XM Satellite Radio, Inc. XM2go XM Satellite Radio Receiver to FCC Class B Conducted and Radiated Emission Requirements And Intentional Radiator Requirements"

Date Performed: 9/11/2006 – 9/13/2006

Customer: XM Satellite Radio, Inc.
Attn: Terry Helstrom
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Company Official responsible for product(s) tested:

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Test Performed and Reported By:

Raymond Aina, Test Engineer
FAU EMI R&D Laboratory

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Director, FAU EMI R&D Laboratory

Date of Test Report: 02 October 2006

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2129.01

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1. INTRODUCTION

The XM Satellite Radio, Inc., XM2go Model X2G100 was evaluated for compliance to the FCC Class B requirements and the results apply only to the specific items of equipment, configurations and procedures supplied to the Florida Atlantic University EMI Research Lab by XM Satellite Radio, Inc., as reported in this document.

2. OBJECTIVE

Test Specifications

This evaluation was performed to verify conformance of the XM Satellite Radio, Inc., XM2go XM Satellite Radio receiver to U.S. Federal Communications Commission (FCC) Code of Federal Regulations (CFR), Title 47 - Telecommunication, Part 15 - Radio Frequency Devices,

- Subpart B - Unintentional Radiators, Section 15.107(a) Conducted limits, and Section 15.109(a) Radiated Class B Emission limits.
- Subpart C – Paragraph 15.239 (a) (b) (c) – Operation in the band 88MHz to 108MHz

Mode of Operation

- During FCC Part 15 Subpart C, Paragraph 15.239 (b)(c) radiated emissions tests, the EUT was configured to transmit a continuous FM signal with normal modulation at 88.1MHz, 96.9MHz, and 107.9MHz using the XM Satellite Radio's FM Coupler attached to a standard FM aerial antenna attached to a large ground plane.
- During FCC Part 15 Subpart C, Paragraph 15.239(b)(c), the EUT was also configured to transmit a continuous FM signal with normal modulation at 88.7MHz, 96.9MHz, and 107.1MHz in three representative vehicles, using the XM Satellite Radio's SureConnect adapter, attached to the vehicle's in-glass FM antennas, in accordance with the intentional radiator limits described in 15.239(b).
- During FCC Part 15 Subpart B, Paragraph 15.107(a) conducted emissions tests, the EUT was configured to receive an XM Satellite Radio signal, with the EUT in the XM2go home cradle with the XM Home AC adaptor.
- During FCC Part 15 Subpart B, Paragraph 15.109(a), the EUT was configured to receive an XM Satellite Radio signal, with the EUT in three different modes:
    - In a XM2go car cradle, using only an XM Satellite Radio car antenna.
    - In a XM2go car cradle, using an FM Direct Adaptor and car antenna.
    - In a XM2go home cradle, using only an XM Satellite Radio home antenna.
    - In Portable Mode, under battery power.

3. CONCLUSION

The XM Satellite Radio, Inc., XM2go Model X2G-100, met the FCC Class B conducted and radiated emission requirements, as well as the intentional radiation limits, as described in the following pages.

4. TEST PROCEDURES AND RESULTS

4.1 GENERAL TEST PROCEDURES

The measurement techniques identified in the measurement procedure of ANSI C63.4-2003 *"American National Standard of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"* were followed as close as practical during this evaluation. Complete details and specific procedures used are discussed in the respective test result sections.

4.2 CONDUCTED EMISSIONS – Section 15.107(a)

4.2.1 Test Setup – Conducted Emissions

The XM Satellite Radio, Inc., XM2go Model X2G-100; was powered by a I.T.I Power Supply Model No. SMPS5V2A-XMRT. The 120VAC/ DC 5V switching power supply was then installed in the FAU EMI Research facilities conducted emissions shielded enclosure on a wooden test table 80 centimeters above the ground plane floor and 40 centimeters from the rear wall. The I.T.E Power Supply was then plugged into an EMCO Model No.3825/2R Serial No. 1095, 50 Ω, 50 μH Line Impedance Stabilization Network (LISN).

Conducted power line emissions were measured on both the phase and neutral lines with reference to earth ground, over the specified 150 kHz to 30 MHz range on a Hewlett Packard HP 8566B Spectrum Analyzer operated in the peak detection mode with a bandwidth of 9 kHz obtained through the HP 85650A Quasi Peak Adapter.

4.2.2 Test Data – Conducted Emissions

The EUT was tested for the peak-detected emissions on phase and neutral lines while the XM2go50 unit was receiving a live XM broadcast.

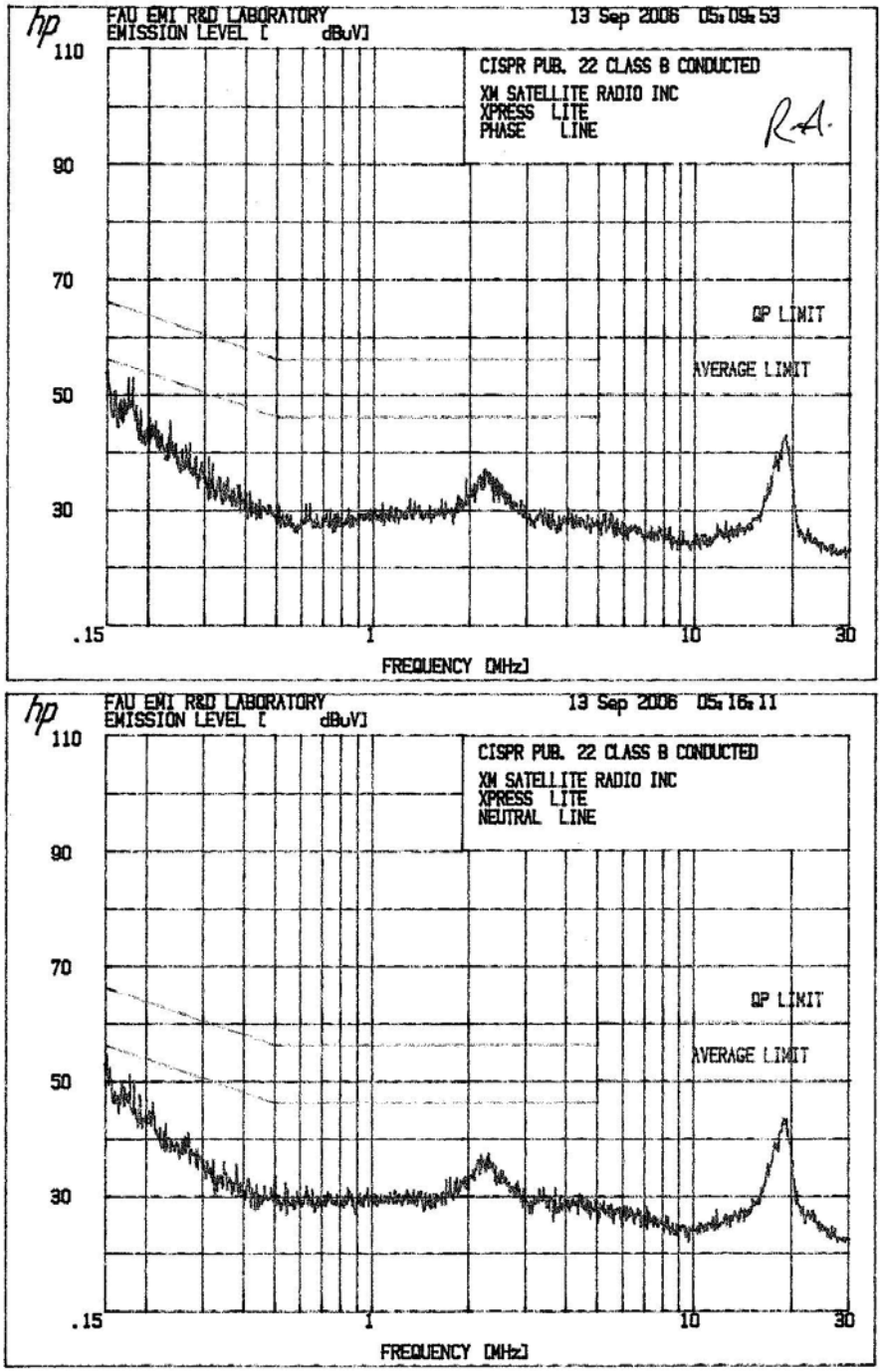


FIGURE 1: Phase and Neutral Conducted Emissions 150 kHz-30 MHz

4.3 RADIATED EMISSIONS – Section 15.109(a)

4.3.1 General Test Setup

The XM Satellite Radio, Inc., XM2go Model X2G-100 was set up on a wooden table 80 centimeters above the ground plane turntable of the FCC listed Semi-Anechoic test site.

An EMCO 3104 Broadband Biconical antenna was installed on an EMCO pneumatically controlled Antenna Mast at a distance of 3 meters from the system. The 30 to 200 MHz frequency range was automatically scanned on the HP 8566B Spectrum Analyzer operated in the peak detector mode with a bandwidth of 120 kHz obtained through the HP 85650A Quasi Peak Adapter. It should be noted that the RES BW and VBW of the spectrum analyzer must be set to 1 MHz for the Quasi Peak Adaptor to provide 120 kHz bandwidth correctly. Hence, in the figures RES BW and VBW are still indicated as 1 MHz. The turntable was incrementally rotated through 360 degrees and at the same time the receiving antenna was scanned in height from 1 to 4 meters in both the horizontal and vertical polarizations. An EMCO 3146 Log Periodic antenna was then installed and the above procedure was repeated for the 200 to 1000 MHz ranges.

The FCC Class B limit lines have been corrected for the appropriate antenna factors, cable loss, and amplifier gain based on the following equation:

E (dBμV/m) = SA reading (dBμV) + Antenna Factor (dB/m) + Cable Loss (dB) - Amp Gain (dB)

The EUT was tested in three configurations under Section 15.109(a)

- Home Cradle with Speaker attached
- Car Cradle using FM Direct Adaptor
- Car Cradle using XM antenna only
- Portable Mode under battery power

4.3.2 Radiated Emissions – Portable Mode

Note : For *portable* mode measurements, data was analyzed in each of 3 axis. Data from the axis with highest emissions only is shown.

4.3.2.1 Live XM Content – Internal Antenna

The EUT is placed on the table with earbuds attached. In addition, a USB cable is attached to the USB port and placed onto the tabletop. The EUT is receiving a live XM broadcast from it's internal antenna.

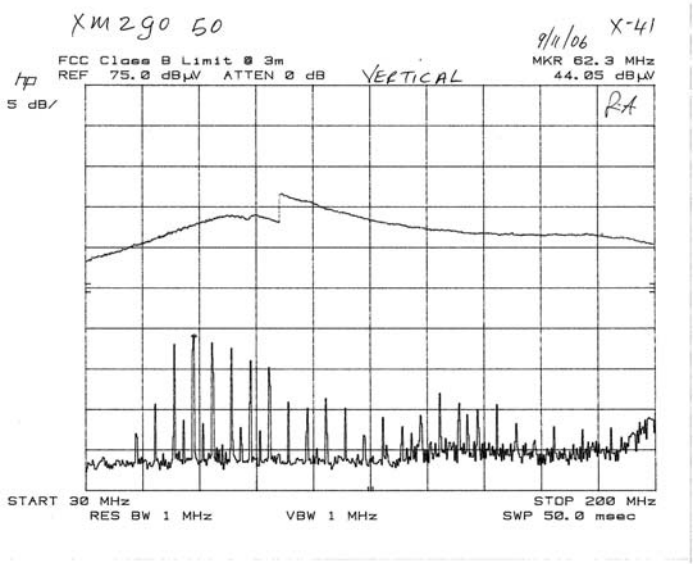


Figure 2
30MHz to 200MHz Vertical

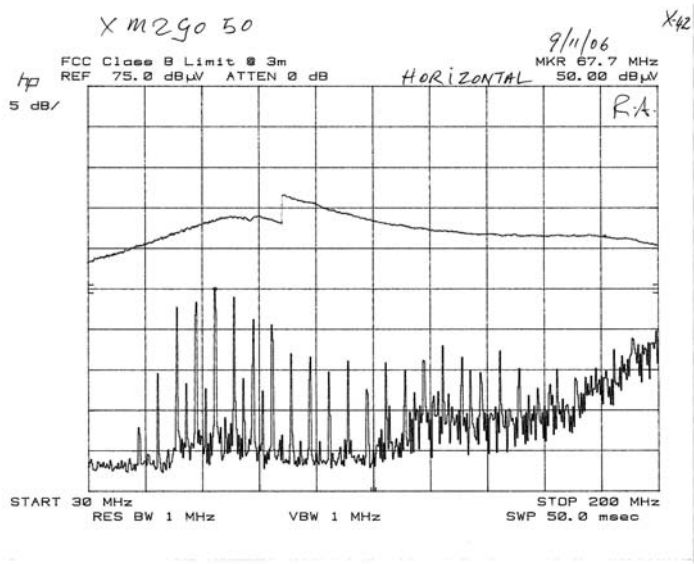


Figure 3
30MHz to 200MHz Horizontal

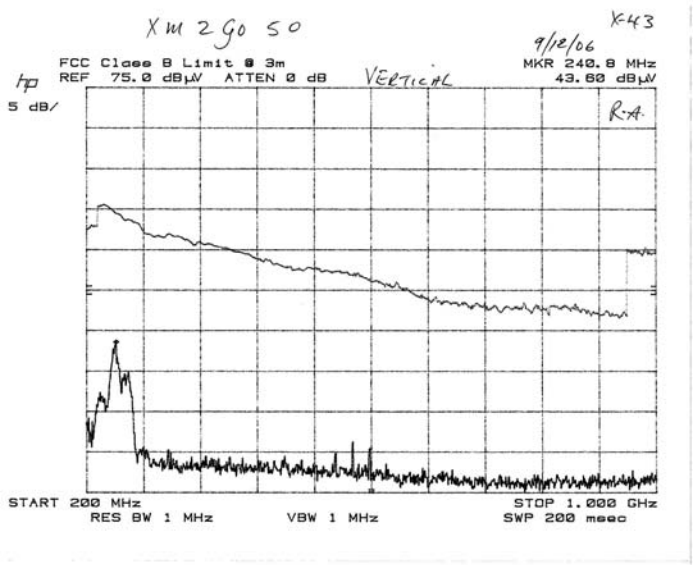


Figure 4
200MHz to 1GHz Vertical

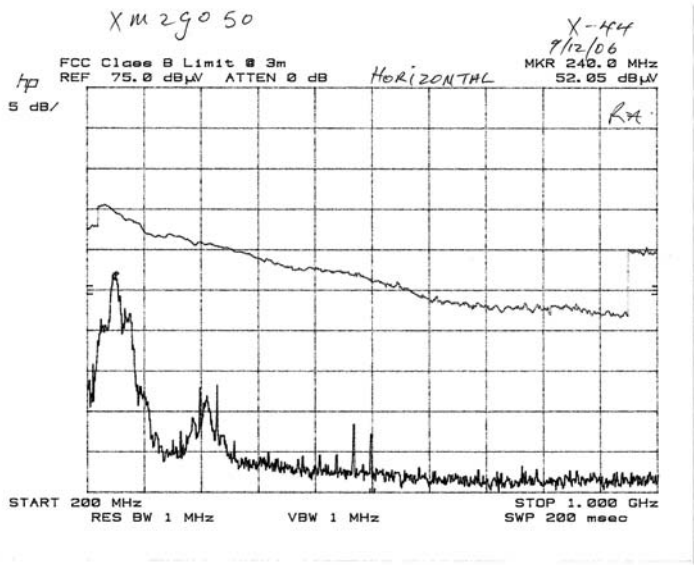


Figure 5
200MHz to 1GHz Horizontal

4.3.2.2 Playing MP3 Content

The EUT is placed on the table with earbuds attached. In addition, a USB cable is attached to the USB port and placed onto the tabletop. The EUT is playing stored MP3 content.

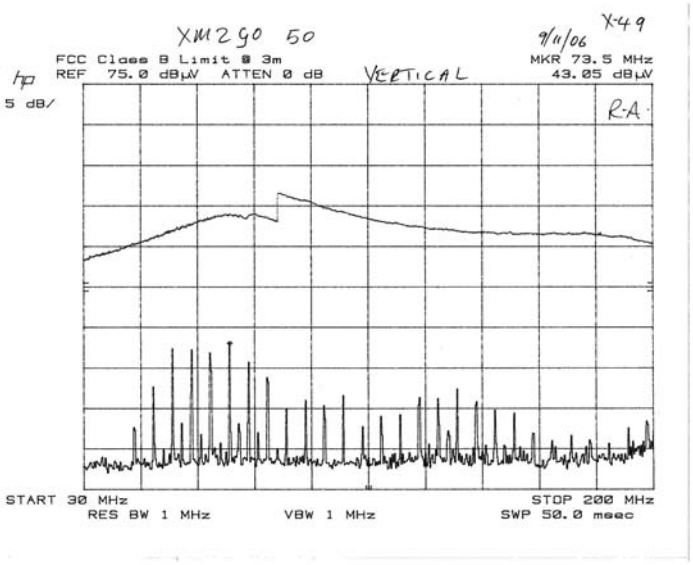


Figure 6
30MHz to 200MHz Vertical

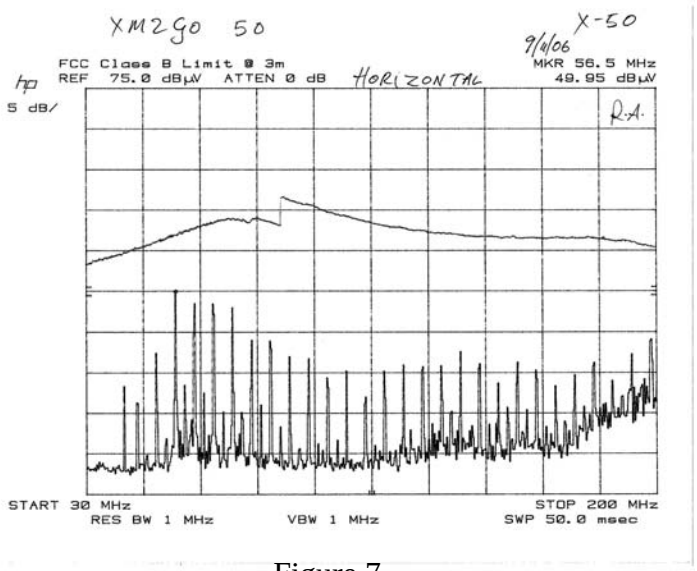


Figure 7
30MHz to 200MHz Horizontal

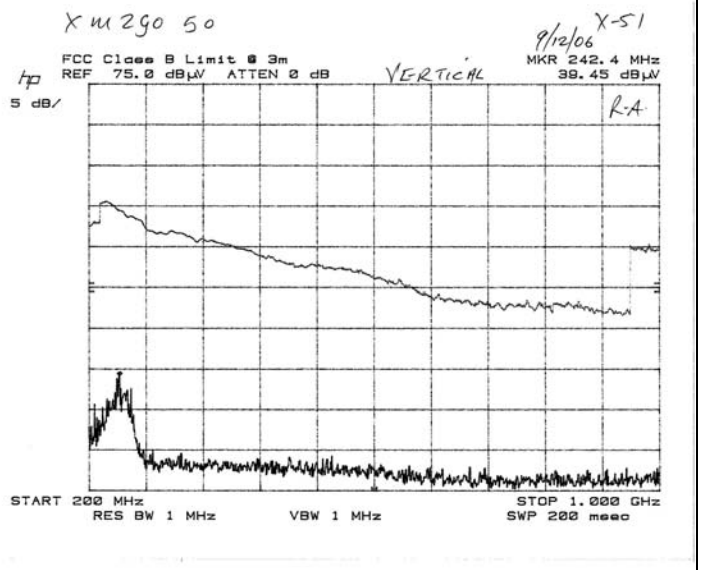


Figure 8
200MHz to 1GHz Vertical

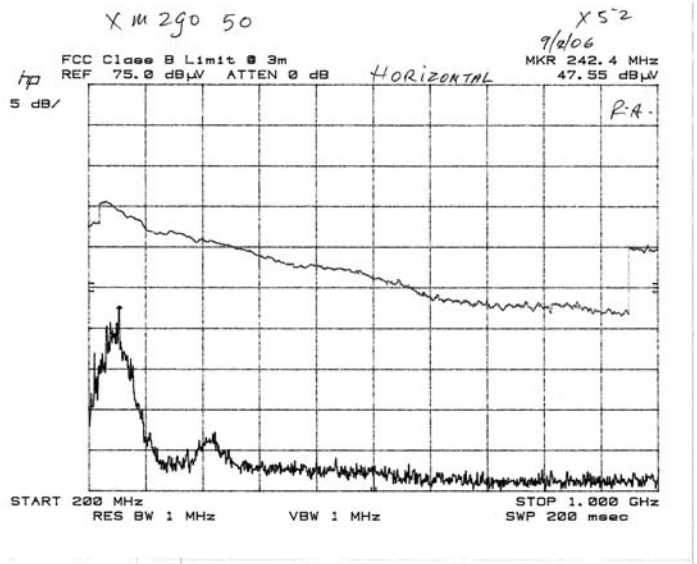


Figure 9
200MHz to 1GHz Horizontal

4.3.2.3 Playing XM Recorded Content

The EUT is placed on the table with earbuds attached. In addition, a USB cable is attached to the USB port and placed onto the tabletop. The EUT is playing XM content that has been previously recorded.

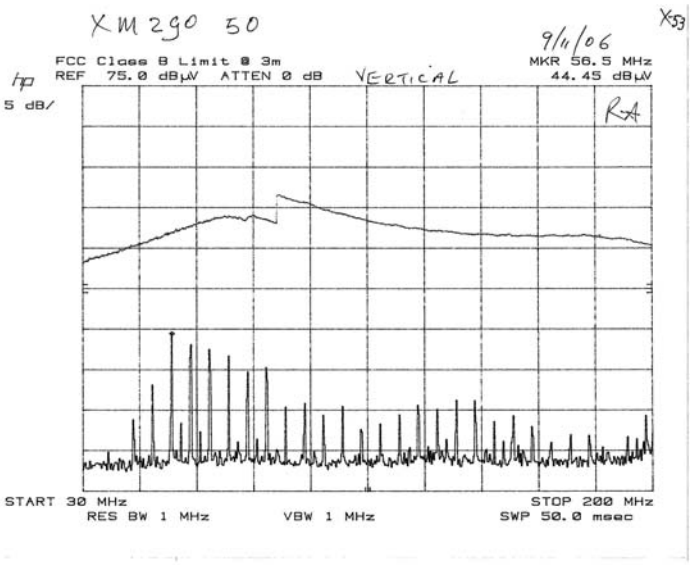


Figure 10
30MHz to 200MHz Vertical

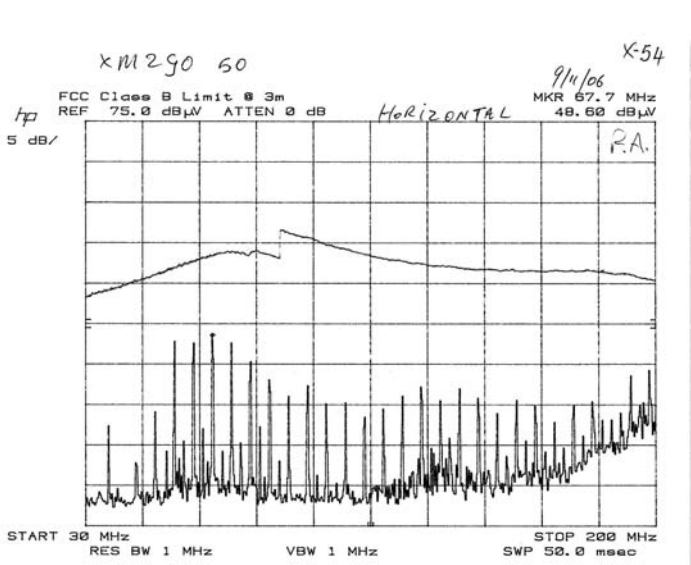


Figure 11
30MHz to 200MHz Horizontal

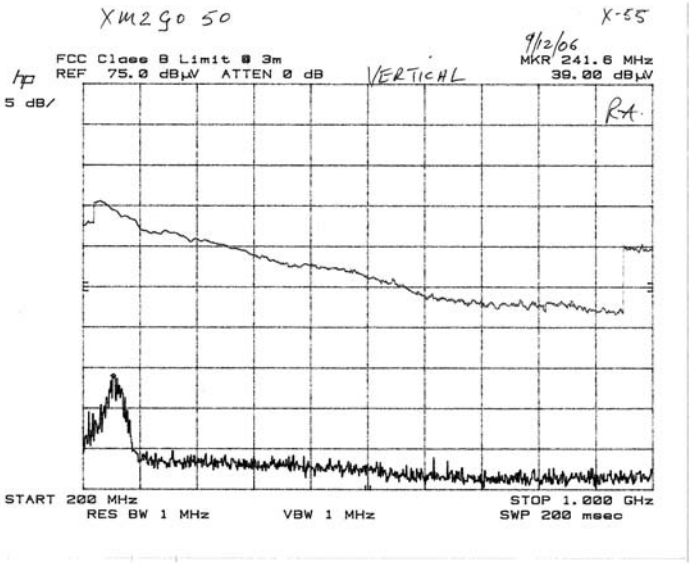


Figure 12
200MHz to 1GHz Vertical

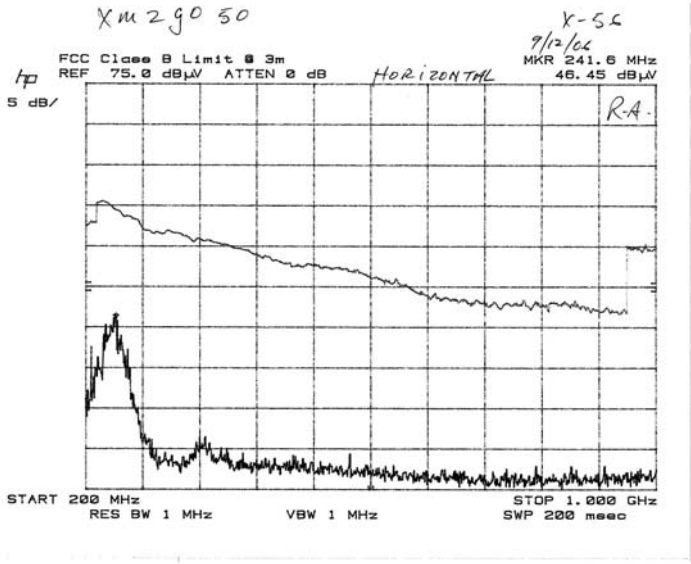


Figure 13
200MHz to 1GHz Horizontal

4.3.2.4 Radiated Emissions – Live XM using Headphone Antenna

The EUT is placed on the table with an XM Headphone accessory attached. In addition, a USB cable is attached to the USB port and placed onto the tabletop. The EUT is receiving a live XM broadcast from the headphone antenna.

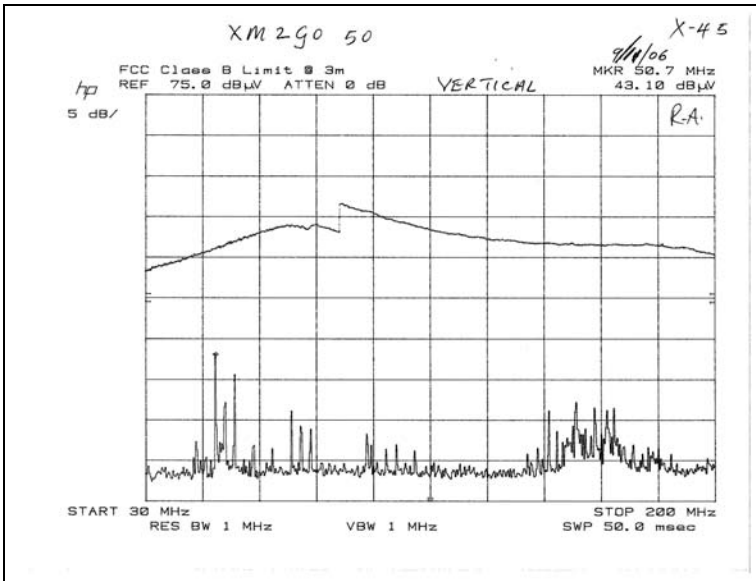


Figure 14
30MHz to 200MHz Vertical

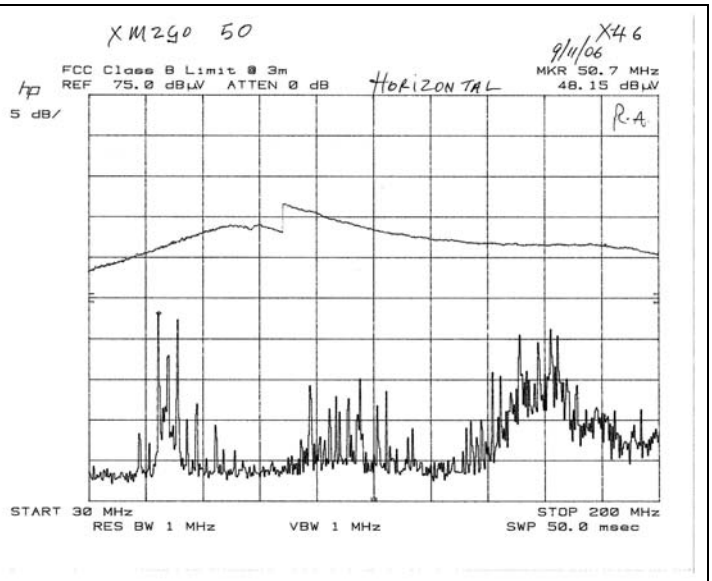


Figure 15
30MHz to 200MHz Horizontal

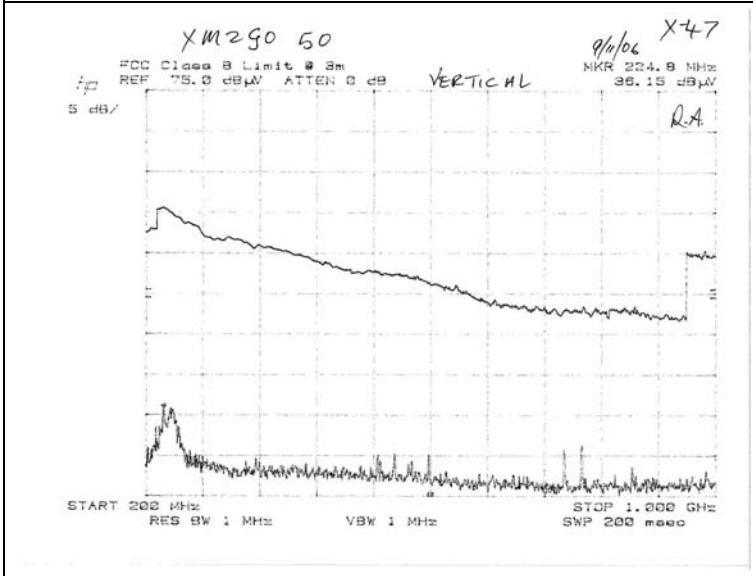


Figure 16
200MHz to 1GHz Vertical

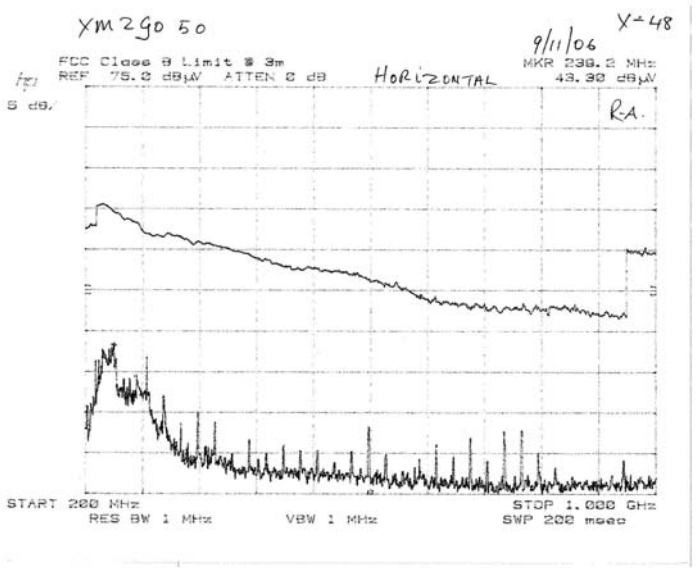


Figure 17
200MHz to 1GHz Horizontal

4.3.3 Radiated Emissions – Home Cradle

4.3.3.1 Test Setup – Home Cradle

In the home cradle setup, the EUT was placed into the XM2go home cradle, with an XM home antenna and XM 5V AC power adaptor. External speakers were connected to the audio output connector on the home cradle with the unit receiving a live XM broadcast signal.

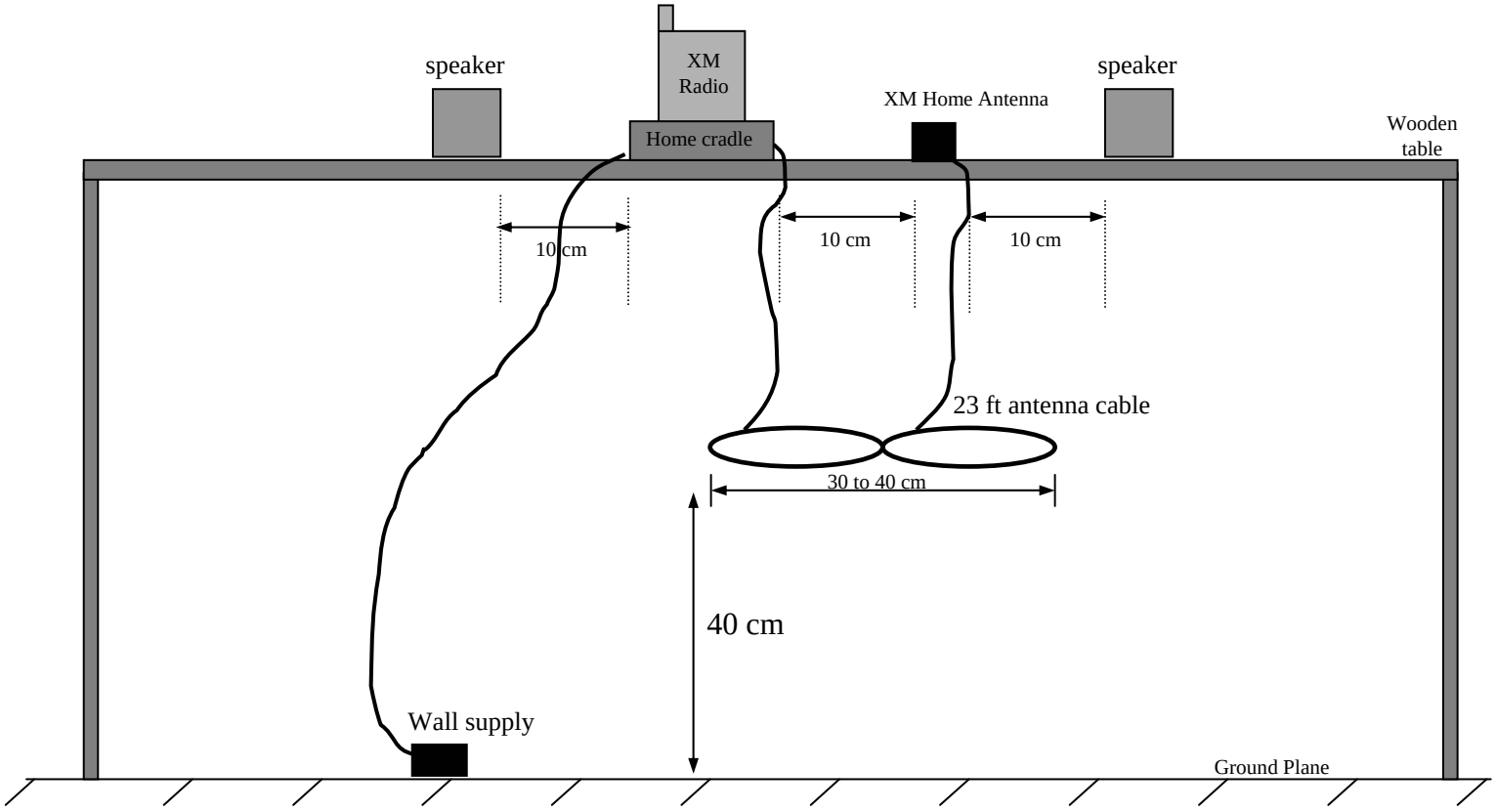


Diagram 1 : Home Cradle Radiated Emissions Setup

4.3.3.2 Home Cradle during USB Transfer

The EUT, while placed into a Home Cradle, was connected to a PC using a USB cable. While transferring a large amount of MP3 content from the PC to the EUT, the radiated emissions were measured.

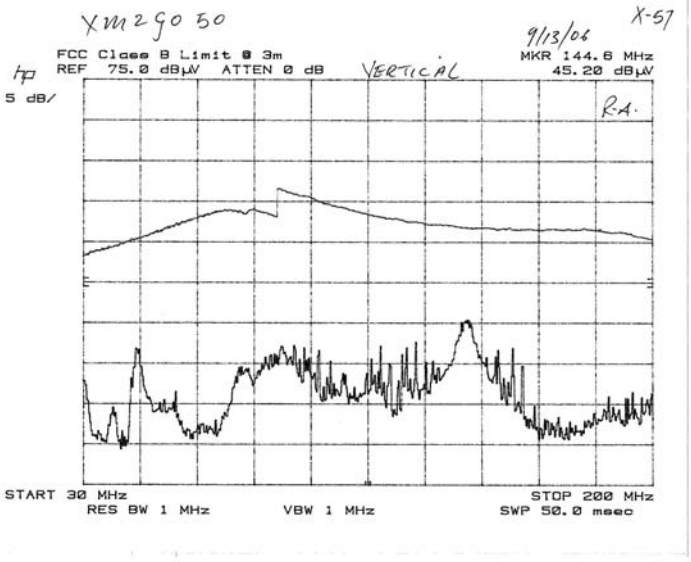


Figure 18
30MHz to 200MHz Vertical

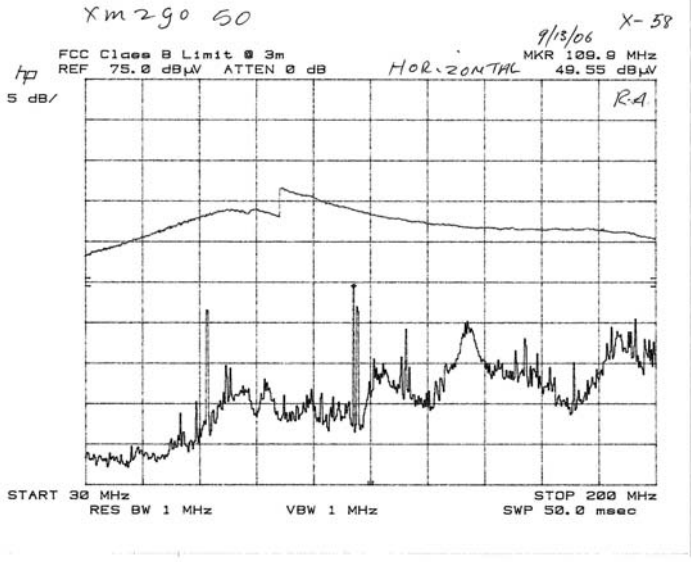


Figure 19
30MHz to 200MHz Horizontal

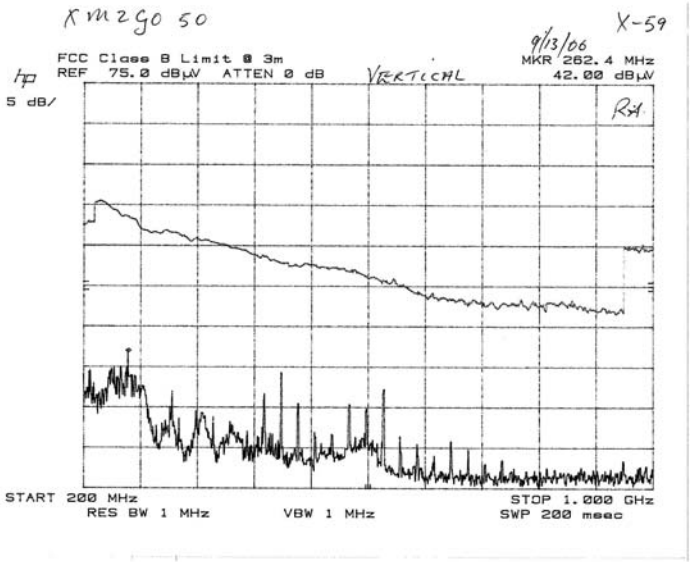


Figure 20
200MHz to 1GHz Vertical

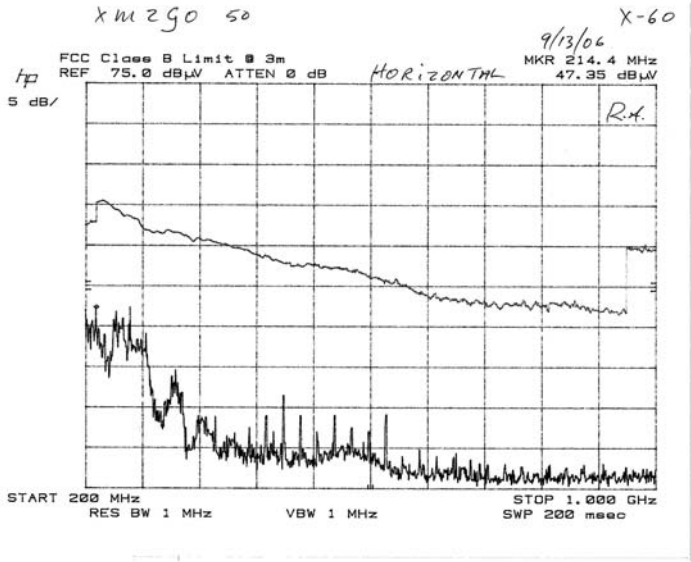


Figure 21
200MHz to 1GHz Horizontal

4.3.3.3 Home Cradle – Live XM content

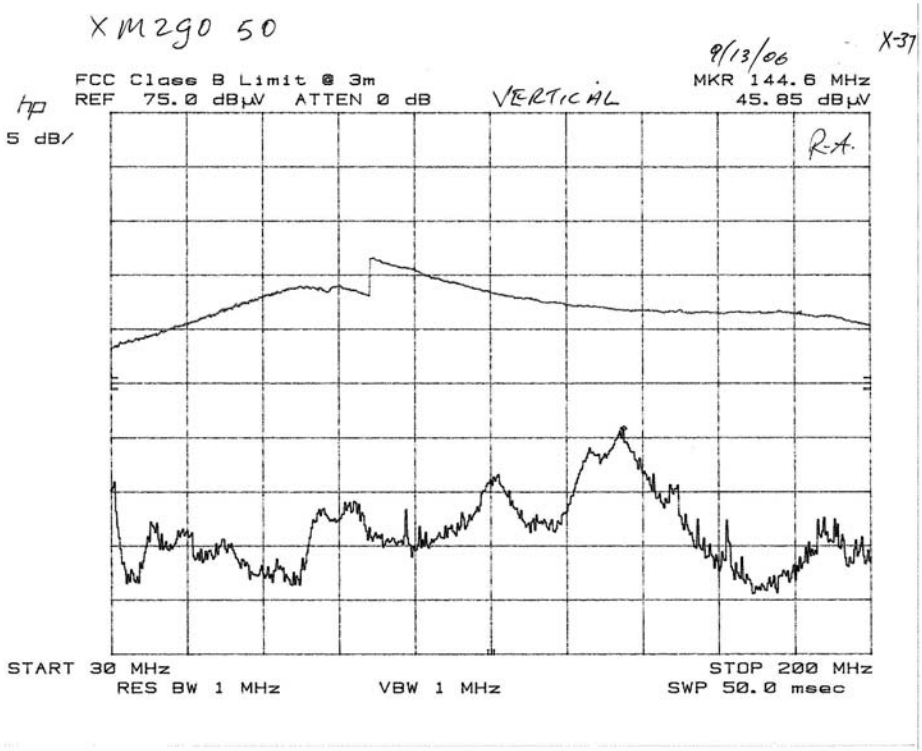


FIGURE 22 : Radiated Emission 30 – 200 MHz Vertical Polarization

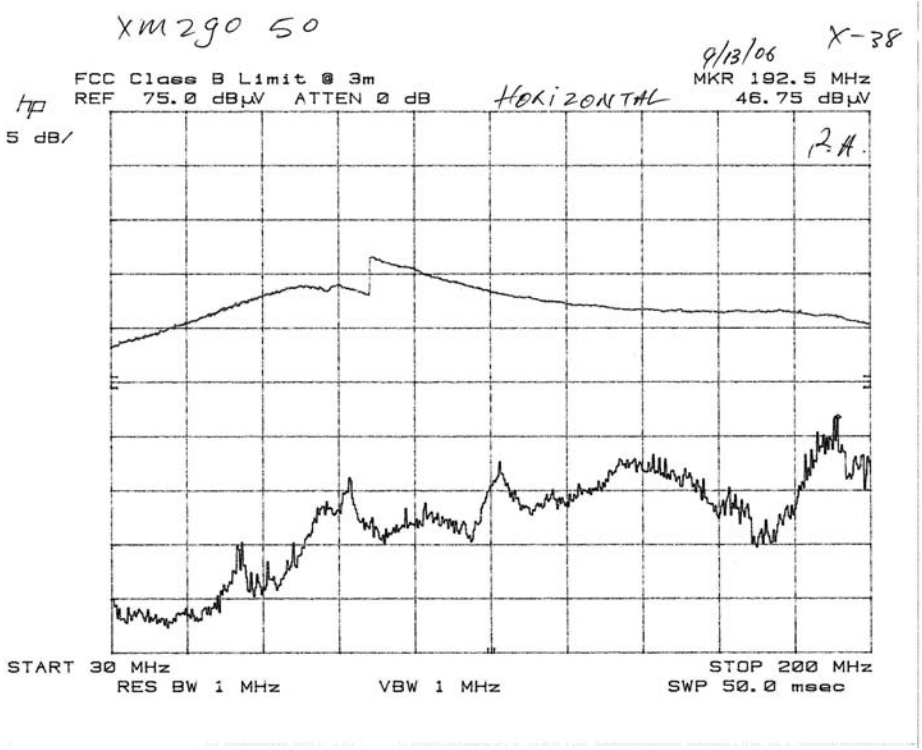


FIGURE 23: Radiated Emission 30 – 200 MHz Horizontal Polarization

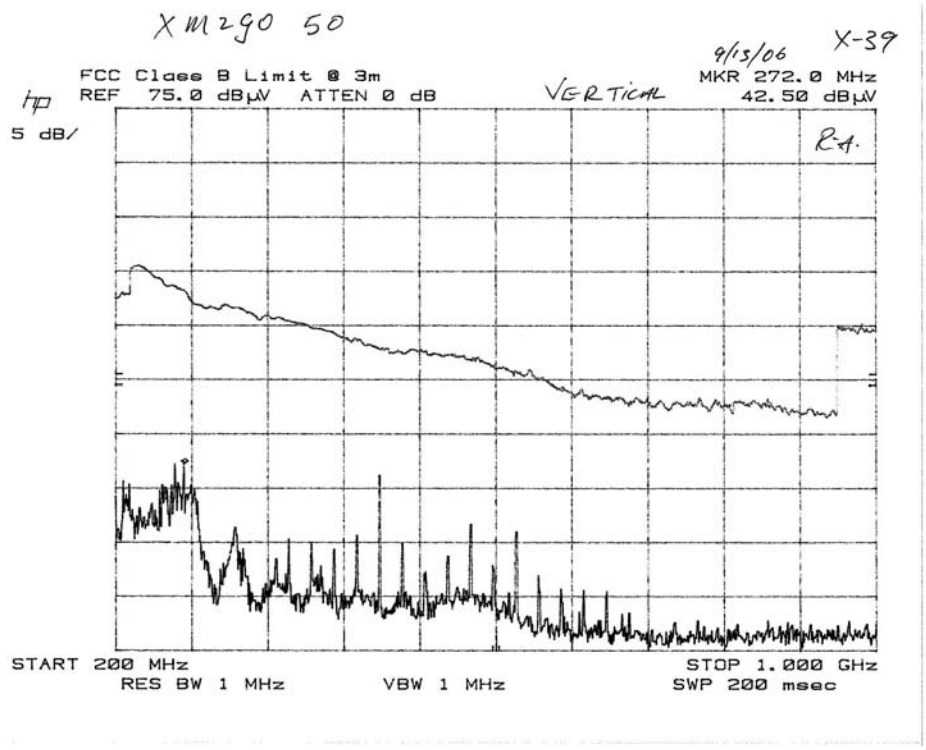


FIGURE 24 : Radiated Emission 200MHz – 1 GHz Vertical Polarization

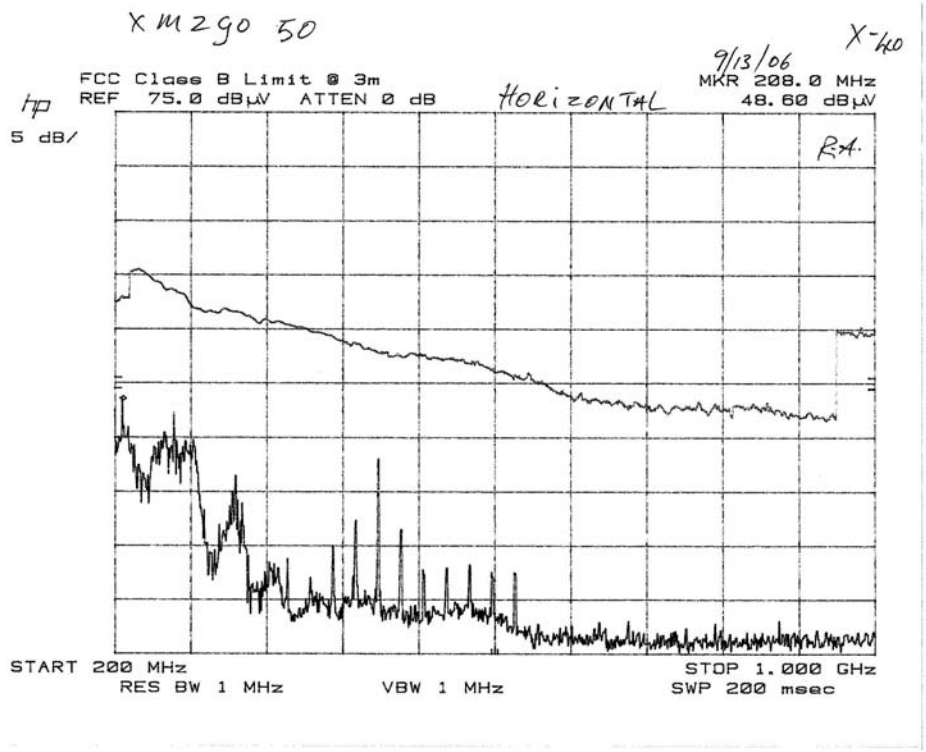


FIGURE 25 : Radiated Emission 200 – 1000 MHz Vertical Polarization

4.3.4 Radiated Emissions - FM Direct Adapter

4.3.4.1 Test Setup – FM Direct Adapter

In the FM Direct Adaptor setup, the EUT was placed in the Xpress car cradle, with an XM FM Direct Adapter, XM car antenna and XM 5V cigarette adaptor power supply. The FM Direct Adapter FM OUT cable was terminated with 75 ohms to simulate an FM radio's FM input jack. The FM Direct Adaptor FM IN cable was attached to an FM aerial antenna on a ground plane to simulate a vehicle's FM antenna. The ground plane is connected to the negative supply of the vehicle battery.

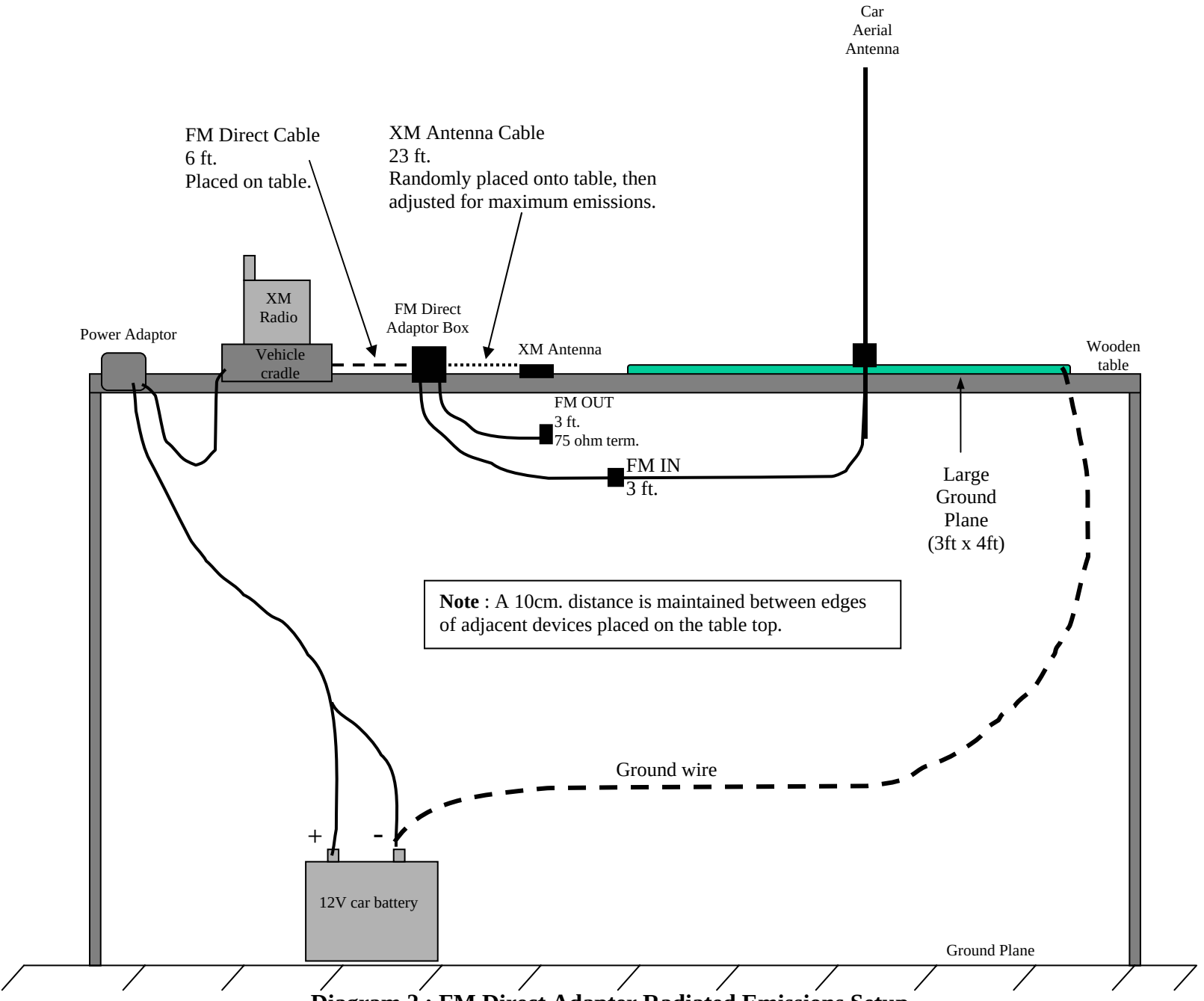


Diagram 2 : FM Direct Adapter Radiated Emissions Setup

4.3.4.2 Test Data – FM Direct Adapter

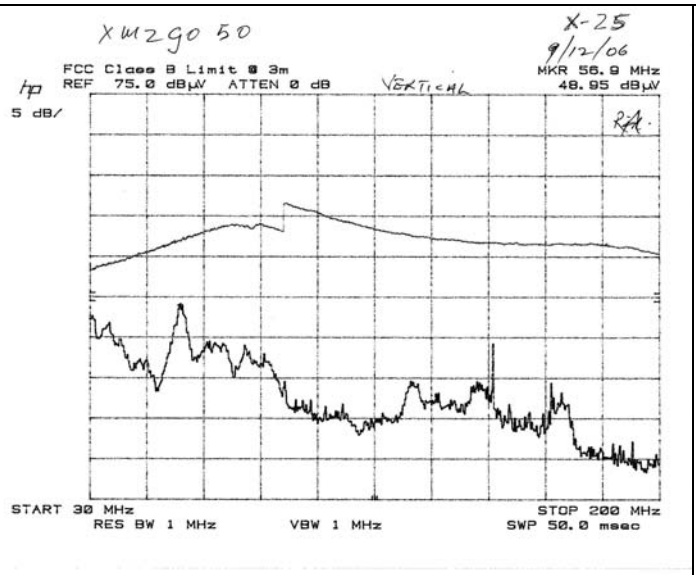


Figure 26 30MHz to 200MHz Vertical (FM programmed to 88.1MHz)

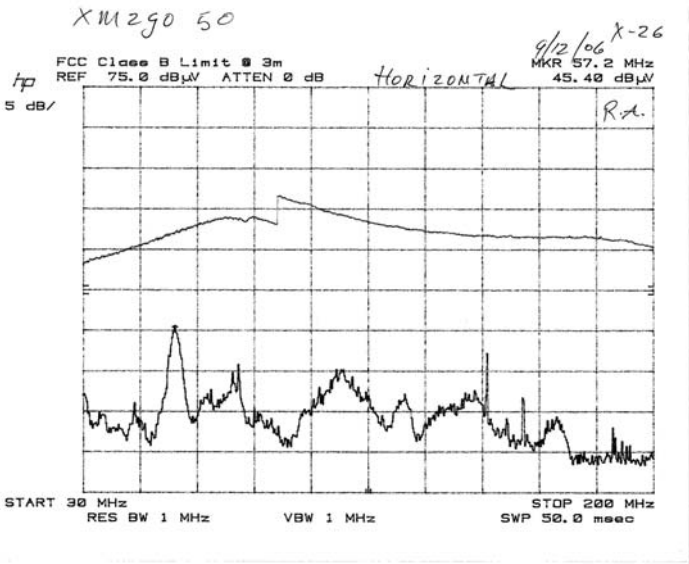


Figure 27 30MHz to 200MHz Horizontal (FM programmed to 88.1MHz

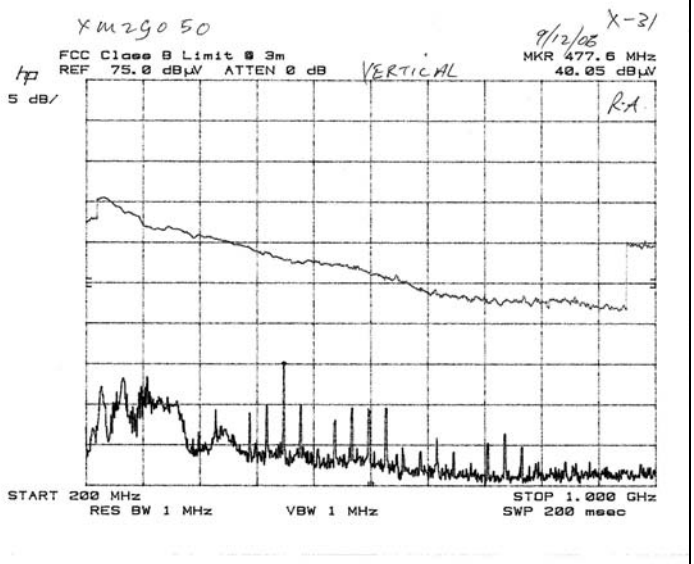


Figure 28 200MHz to 1GHz Vertical (FM programmed to 88.1MHz)

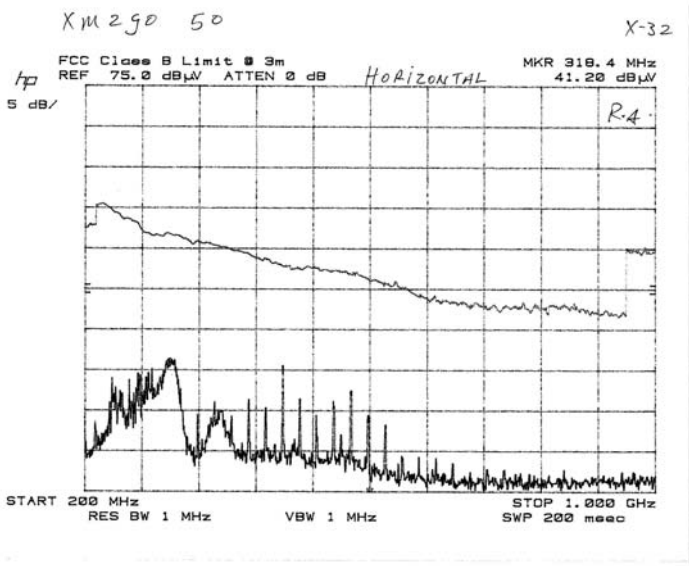


Figure 29 200MHz to 1GHz Horizontal (FM programmed to 88.1MHz)

Table 1 : FM Direct Adapter, FM programmed to 88.1MHz

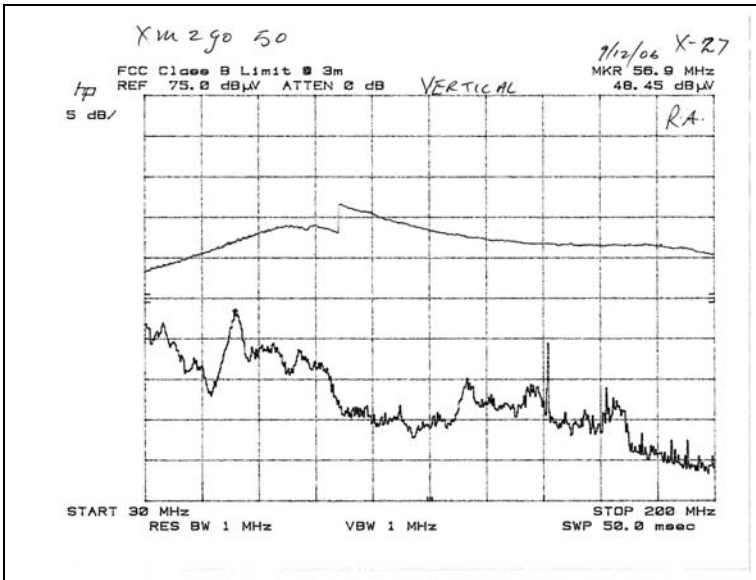


Figure 30 30MHz to 200MHz Vertical (FM programmed to 96.9MHz)

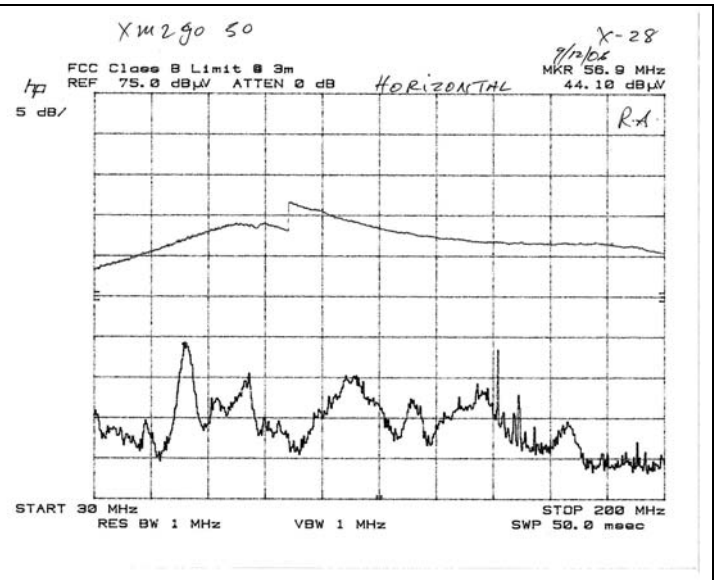


Figure 31 30MHz to 200MHz Horizontal (FM programmed to 96.9MHz)

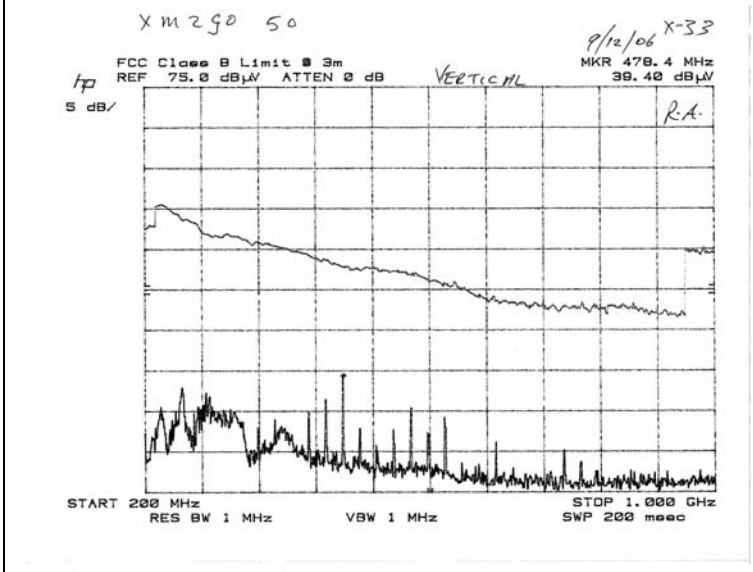


Figure 32 200MHz to 1GHz Vertical (FM programmed to 96.9MHz)

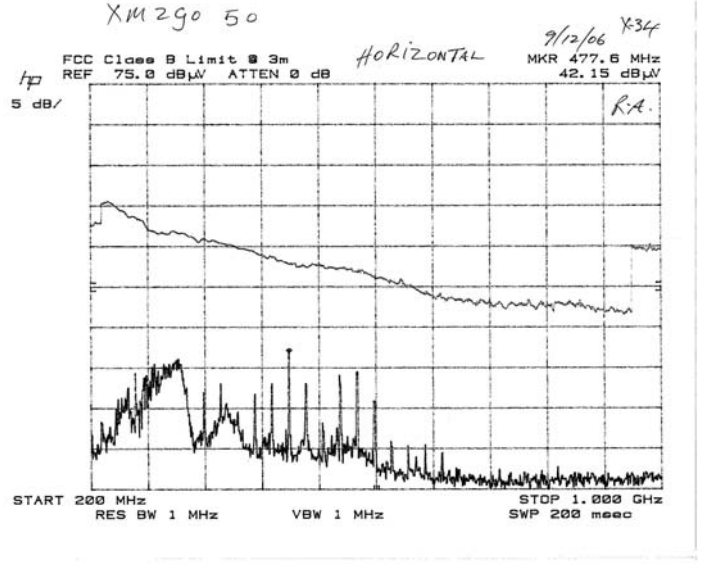


Figure 33 200MHz to 1GHz Horizontal (FM programmed to 96.9MHz)

Table 2 : FM Direct Adapter, FM programmed to 96.9MHz

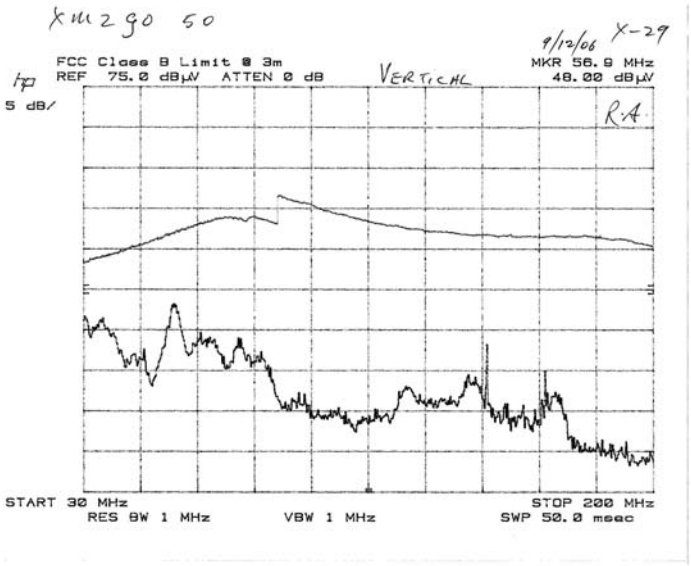


Figure 34 30MHz to 200MHz Vertical (FM programmed to 107.9MHz)

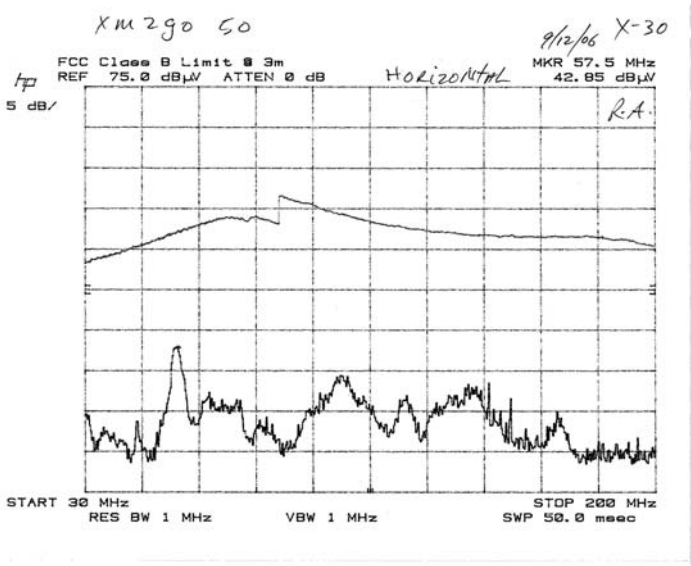


Figure 35 30MHz to 200MHz Horizontal (FM programmed to 107.9MHz)

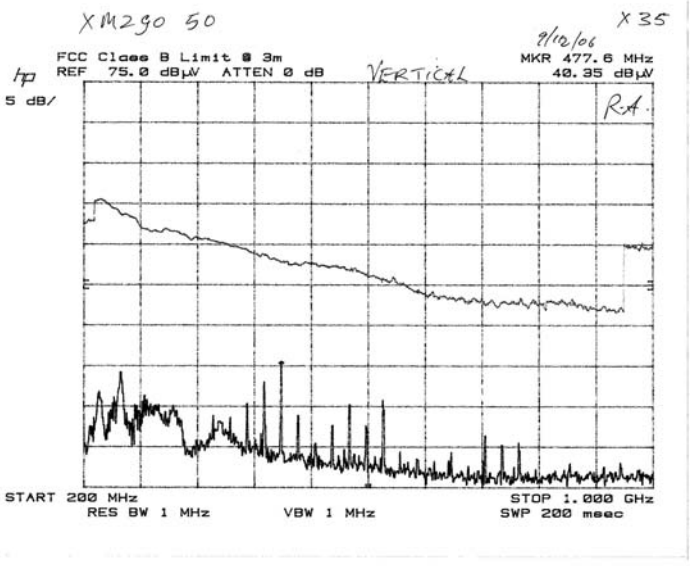


Figure 36 200MHz to 1GHz Vertical (FM programmed to 107.9MHz

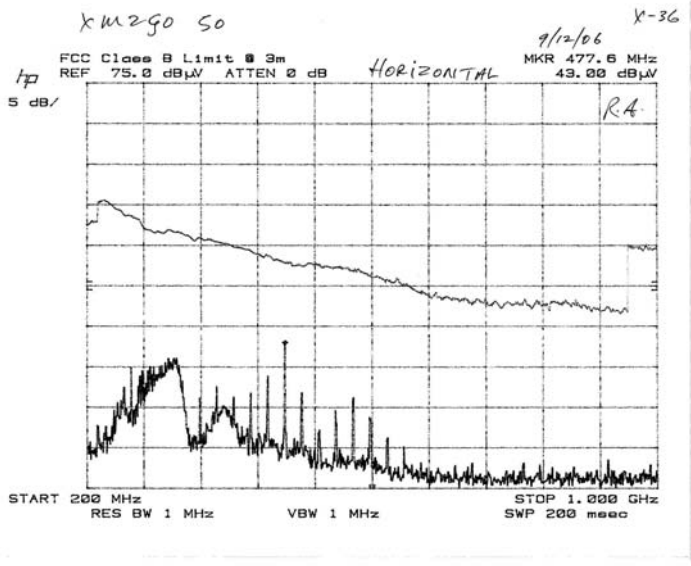


Figure 37 200MHz to 1GHz Horizontal (FM programmed to 107.9MHz)

Table 3 : FM Direct Adapter, FM programmed to 107.9MHz

4.3.5 Radiated Emissions – Car Cradle and XM Antenna only

4.3.5.1 Test Setup – Car Cradle and XM Antenna only

In this test setup, the EUT was placed into a Xpress car cradle with an XM antenna and 5V Cigarette adaptor power supply connected to the radio.

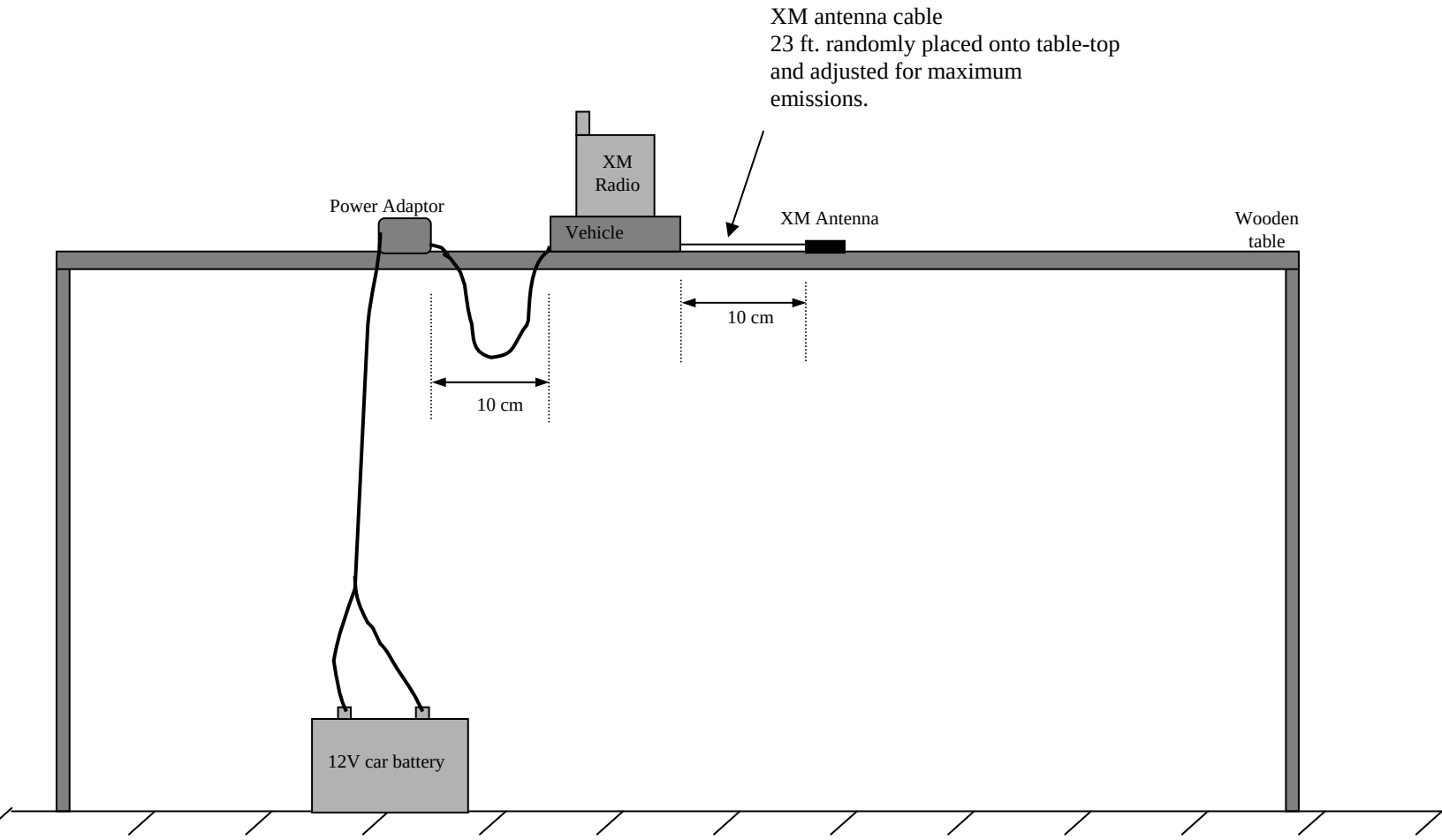


Diagram 3 : XM Antenna Only - Radiated Emissions Setup

4.3.5.2 Test Data – Car Cradle and XM antenna only

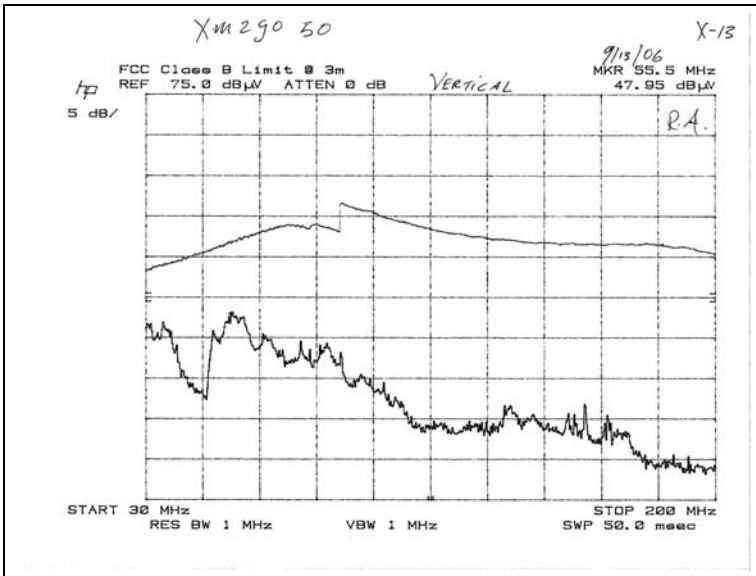


Figure 38 30MHz to 200MHz Vertical (FM programmed to 88.1MHz)

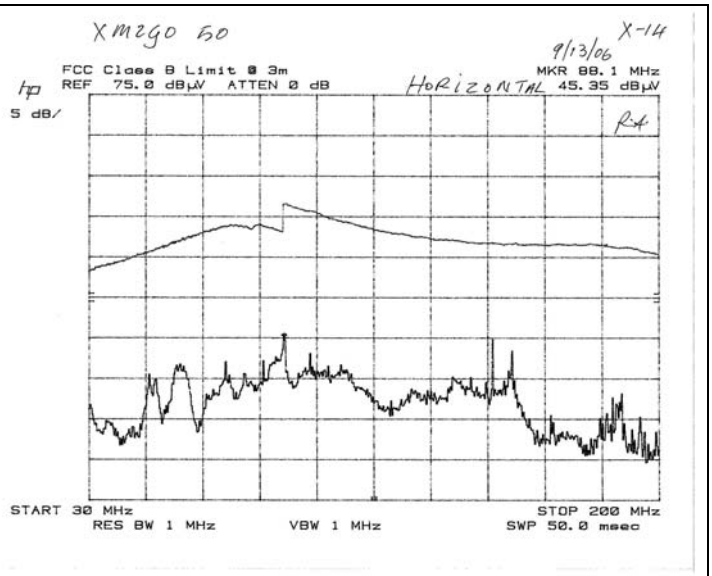


Figure 39 30MHz to 200MHz Horizontal (FM programmed to 88.1MHz)

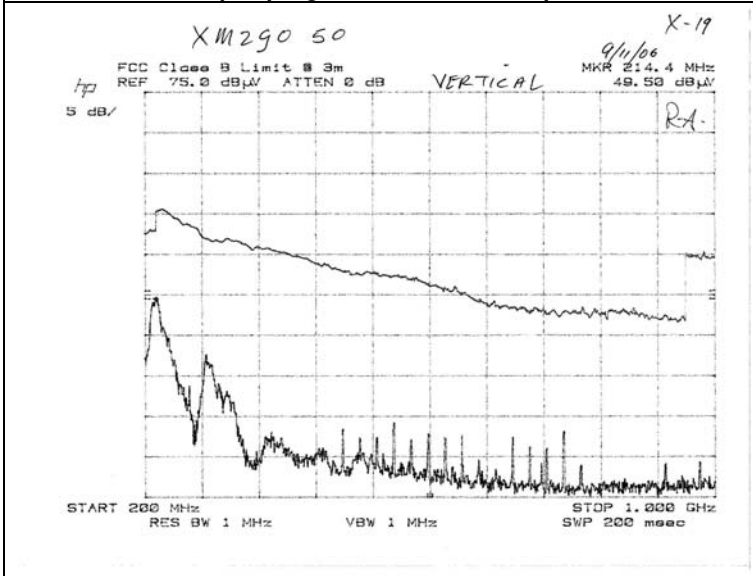


Figure 40 200MHz to 1GHz Vertical (FM programmed to 88.1MHz)

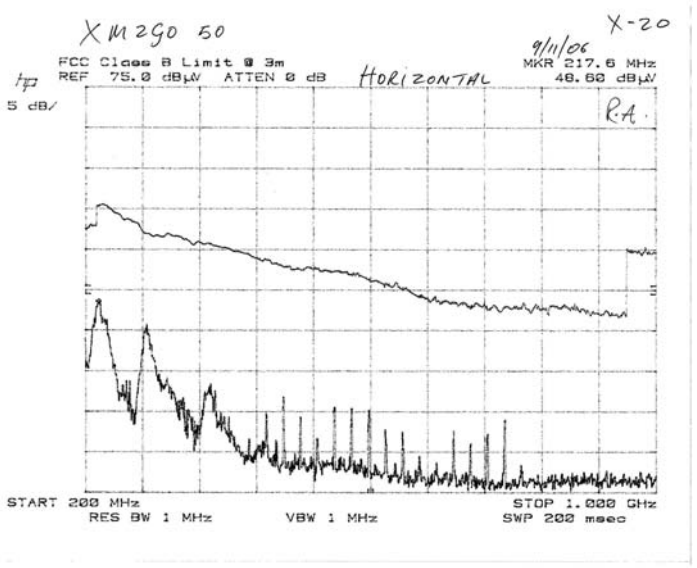


Figure 41 200MHz to 1GHz Horizontal (FM programed to 88.1MHz)

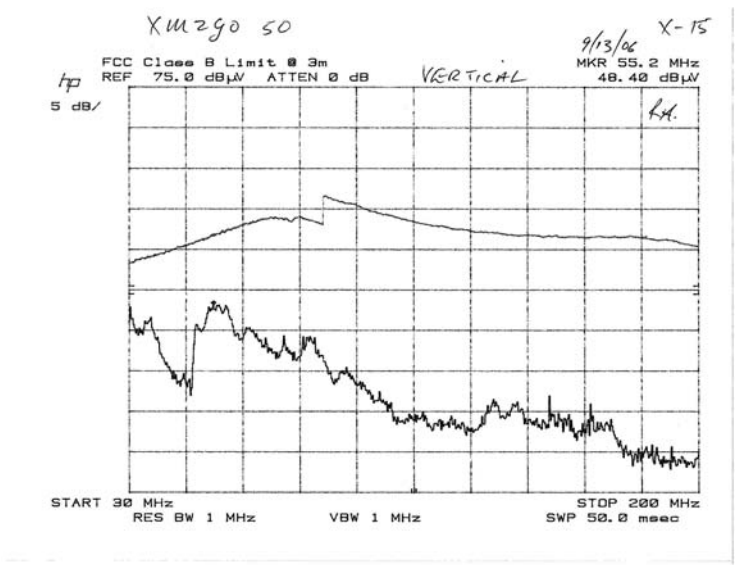


Figure 42 30MHz to 200MHz Vertical (FM programmed to 96.9MHz)

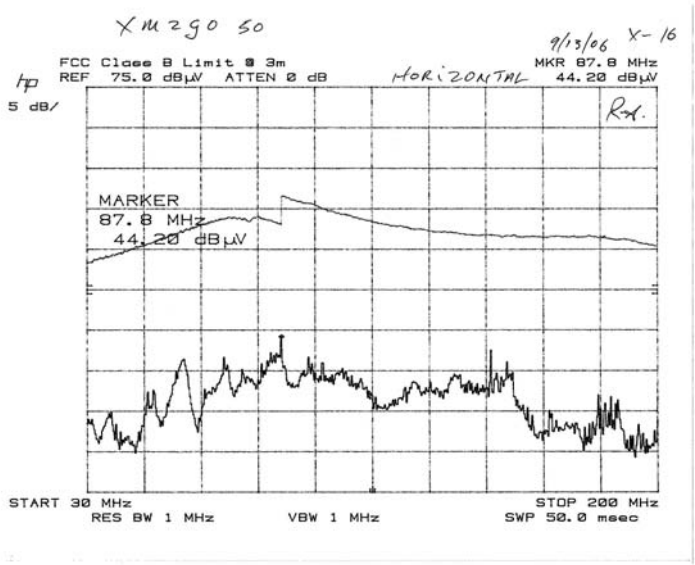


Figure 43 30MHz to 200MHz Horizontal (FM programed to 96.9MHz)

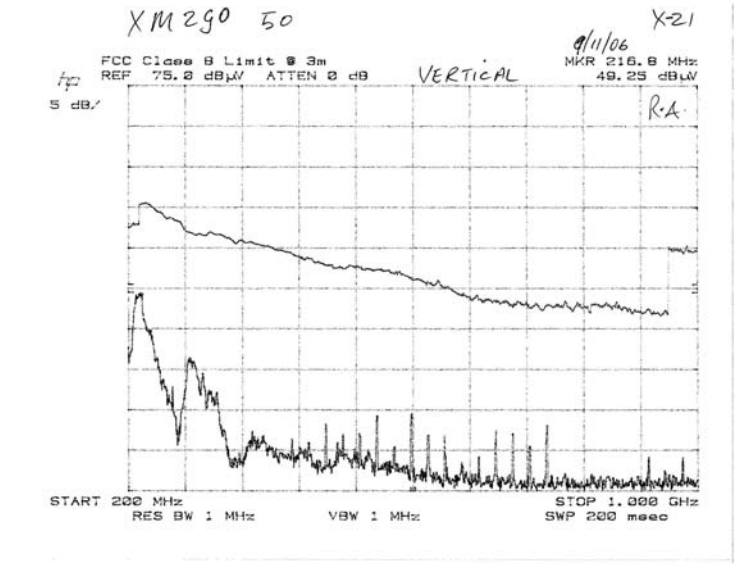


Figure 44 200MHz to 1GHz Vertical (FM programed to 96.9MHz)

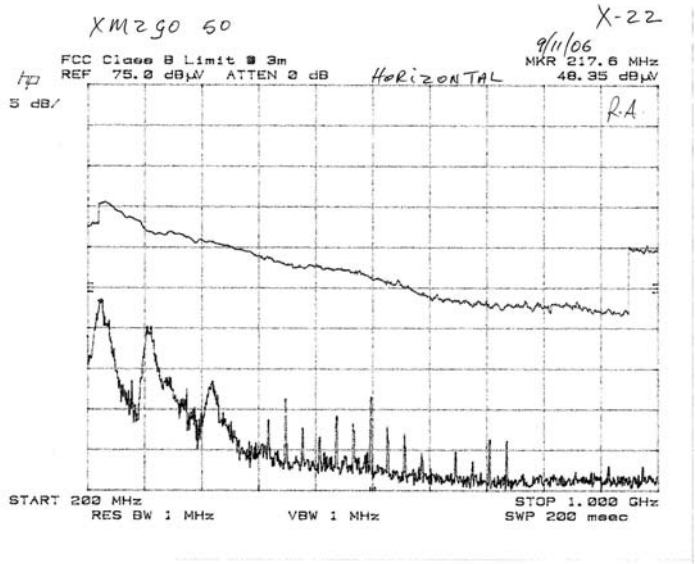


Figure 45 200MHz to 1GHz Horizontal (FM programed to 96.9MHz)

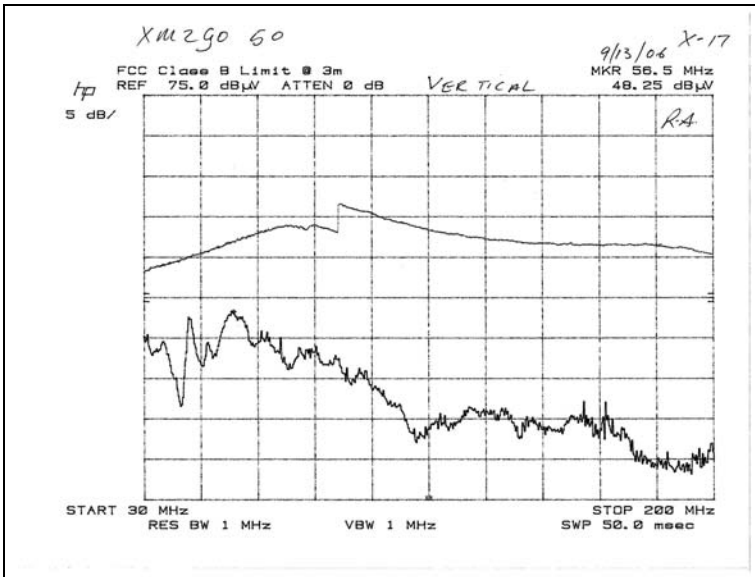


Figure 46 30MHz to 200MHz Vertical (FM programmed to 107.9MHz)

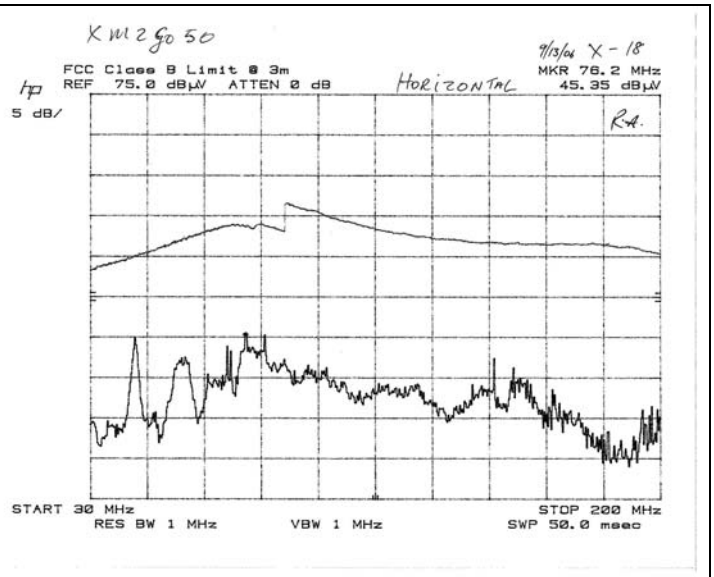


Figure 47 30MHz to 200MHz Horizontal (FM programed to 107.9MHz)

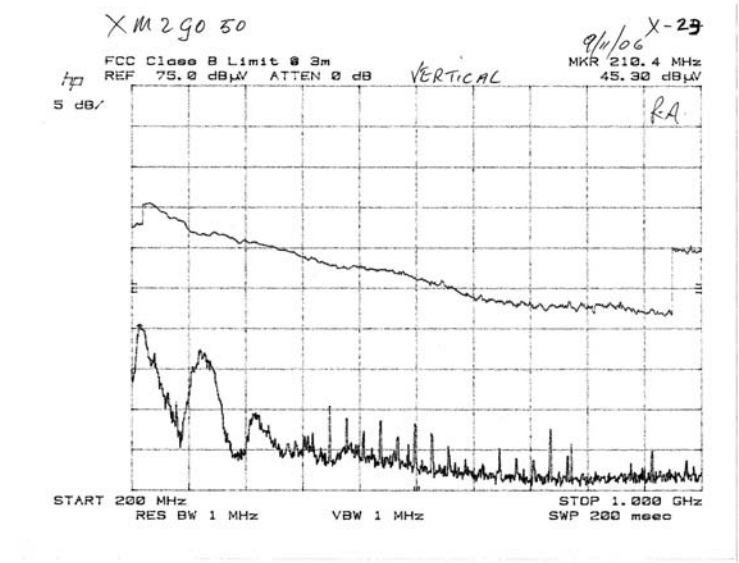


Figure 48 200MHz to 1GHz Vertical (FM programed to 107.9MHz)

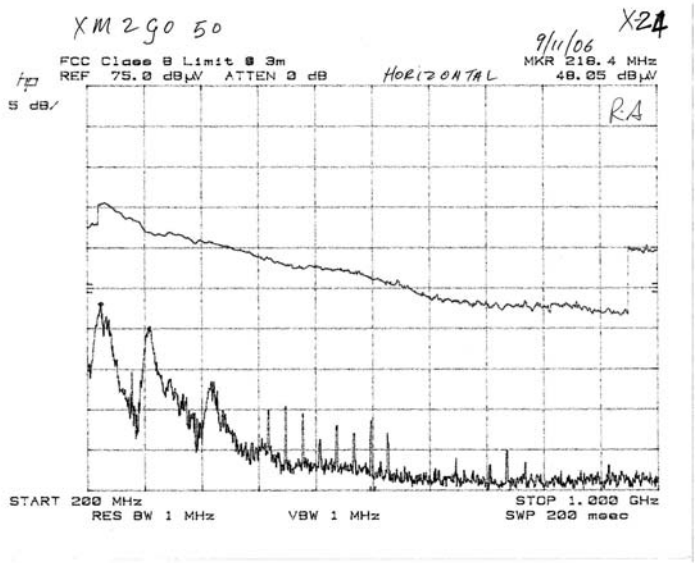


Figure 49 200MHz to 1GHz Horizontal (FM programed to 107.9MHz)

4.4 INTENTIONAL RADIATOR – Section 15.239 Operation in the Band 88MHz to 108MHz

4.4.1 Test Setup – Using FM Aerial antenna

The XM2go Model X2G-100 was set up on a wooden table 80 centimeters above the ground plane turntable of the FCC listed Semi-Anechoic test site.

An EMCO 3104 Broadband Biconical antenna was installed on an EMCO pneumatically controlled Antenna Mast at a distance of 3 meters from the system. The 30 to 200 MHz frequency range was automatically scanned on the HP 8566B Spectrum Analyzer operated in the peak detector mode with a bandwidth of 120 kHz obtained through the HP 85650A Quasi Peak Adapter. It should be noted that the RES BW and VBW of the spectrum analyzer must be set to 1 MHz for the Quasi Peak Adaptor to provide 120 kHz bandwidth correctly. Hence, in the figures RES BW and VBW are still indicated as 1 MHz. The turntable was incrementally rotated through 360 degrees and at the same time the receiving antenna was scanned in height from 1 to 4 meters in both the horizontal and vertical polarizations. An EMCO 3146 Log Periodic antenna was then installed and the above procedure was repeated for the 200 to 1000 MHz ranges.

The FCC Class B limit lines have been corrected for the appropriate antenna factors, cable loss, and amplifier gain based on the following equation:

E (dBμV/m) = SA reading (dBμV) + Antenna Factor (dB/m) + Cable Loss (dB) - Amp Gain (dB)

The test setup description for this test is described in the Test Setup Document.

4.4.2 Test Data – FM Aerial Antenna

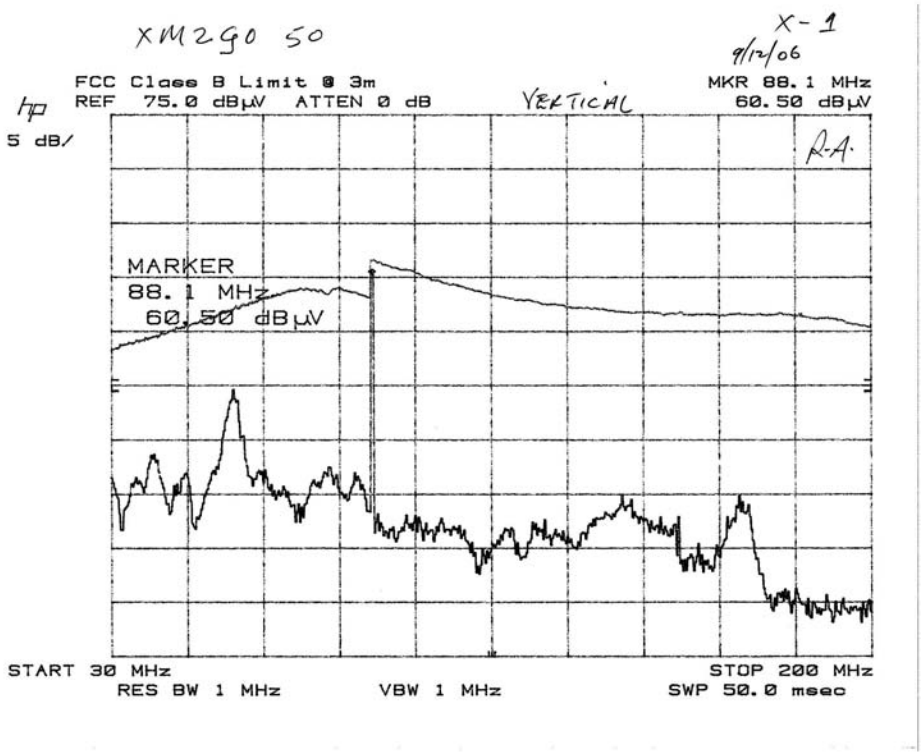


Figure 50 30MHz to 200MHz Vertical
(FM programmed to 88.1MHz)

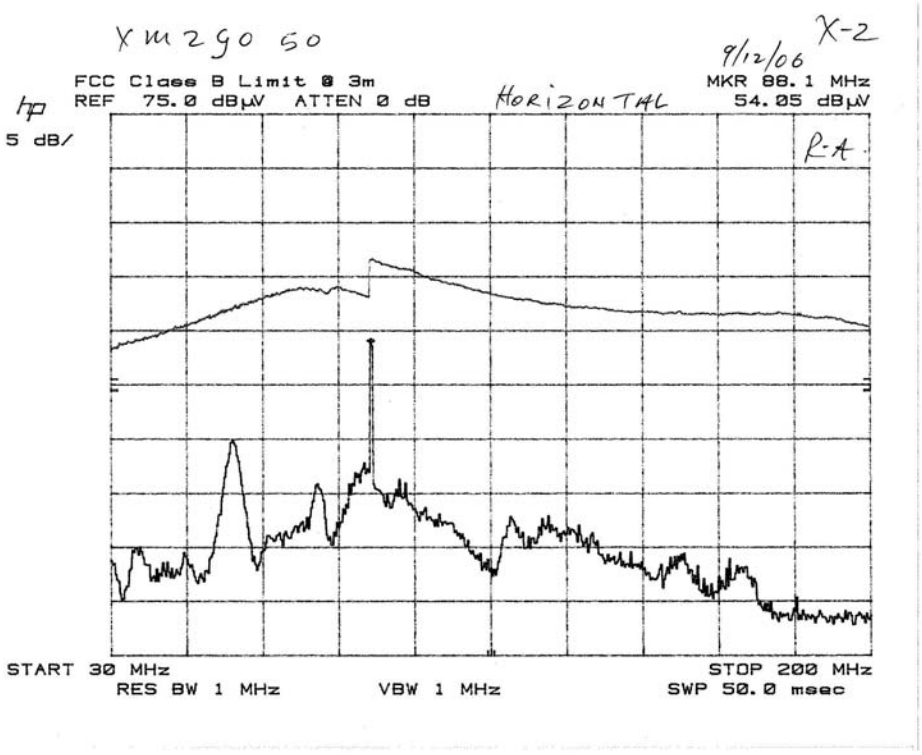


Figure 51 30MHz to 200MHz Horizontal
(FM programmed to 88.1MHz)

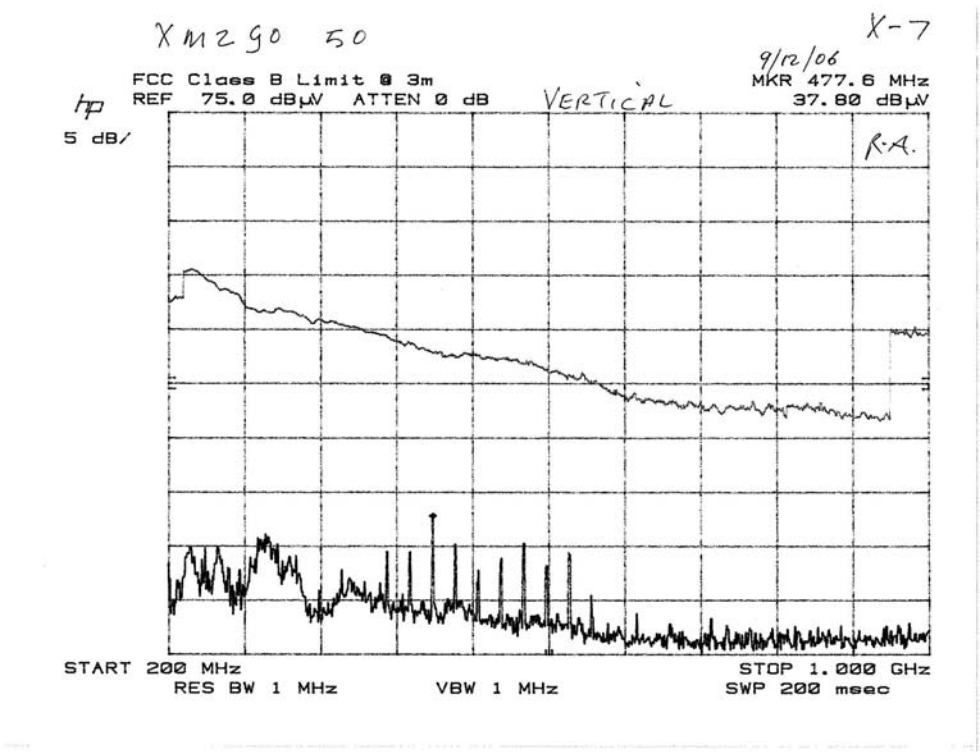


Figure 52 200MHz to 1GHZ Vertical
(FM programmed to 88.1MHz)

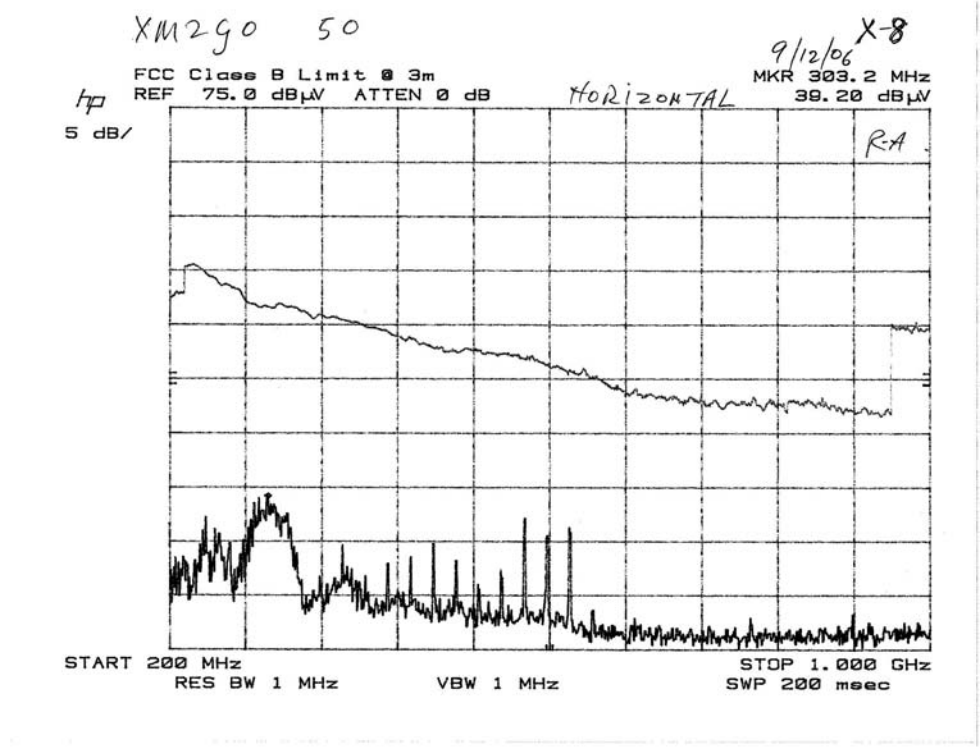


Figure 53 200MHz to 1GHz Horizontal
(FM programmed to 88.1MHz)

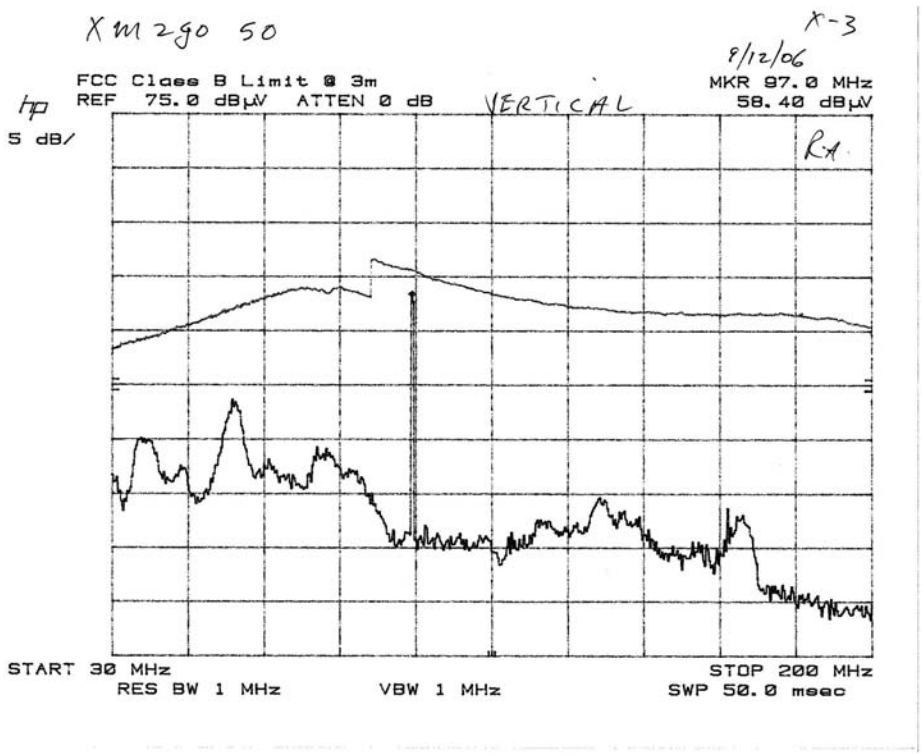


Figure 54 30MHz to 200MHz Vertical
(FM programmed to 96.9MHz)

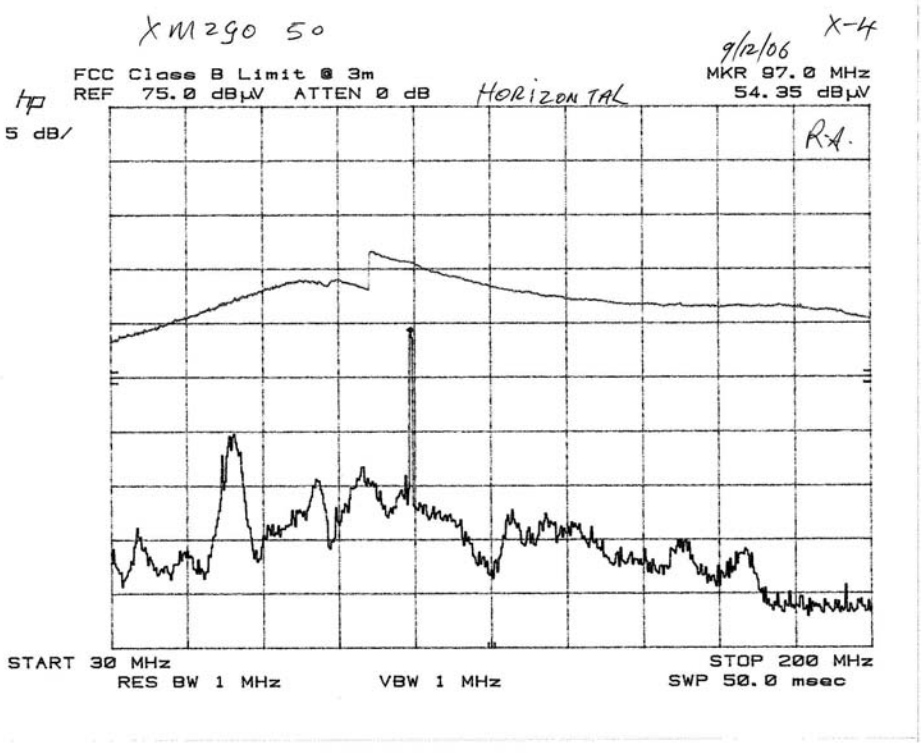


Figure 55 30MHz to 200MHz Horizontal
(FM programmed to 96.9MHz)

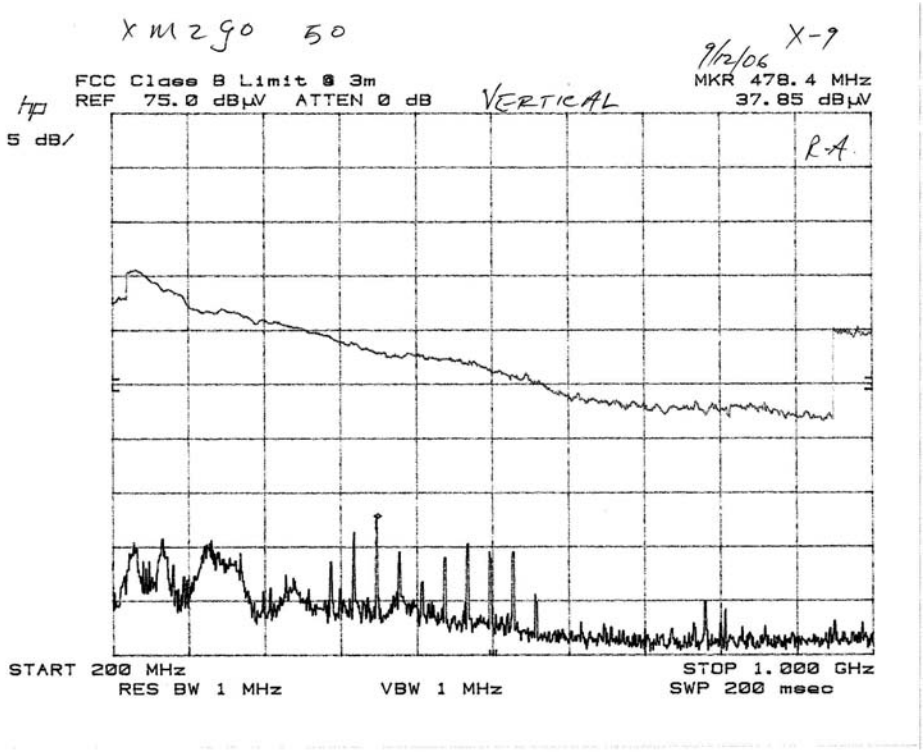


Figure 56 200MHz to 1GHz Vertical
(FM programmed to 96.9MHz)

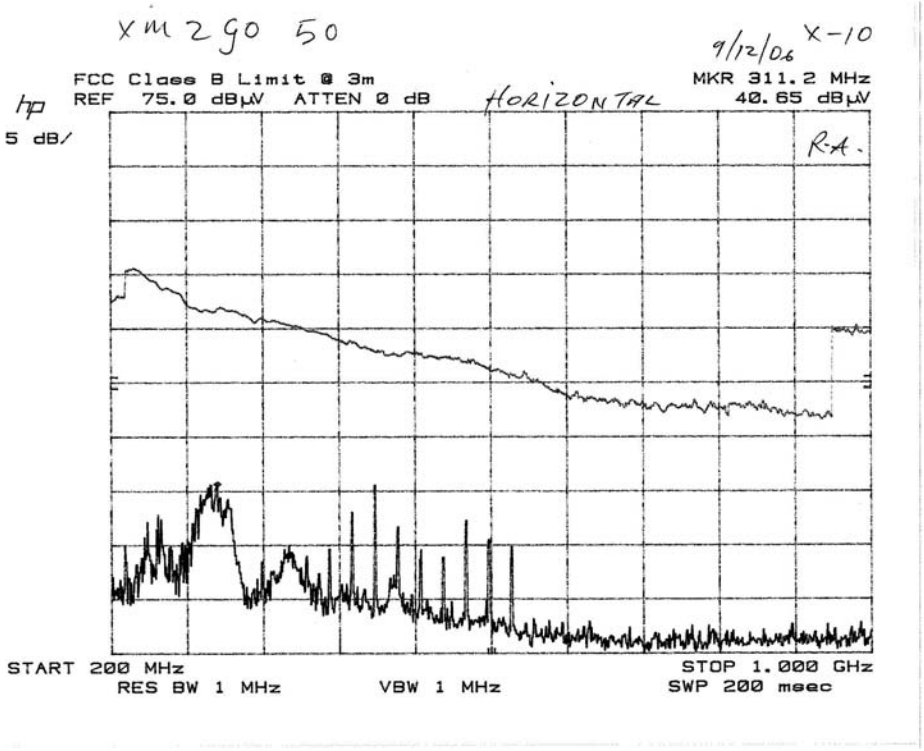


Figure 57 200MHz to 1GHz Horizontal
(FM programmed to 96.9MHz)

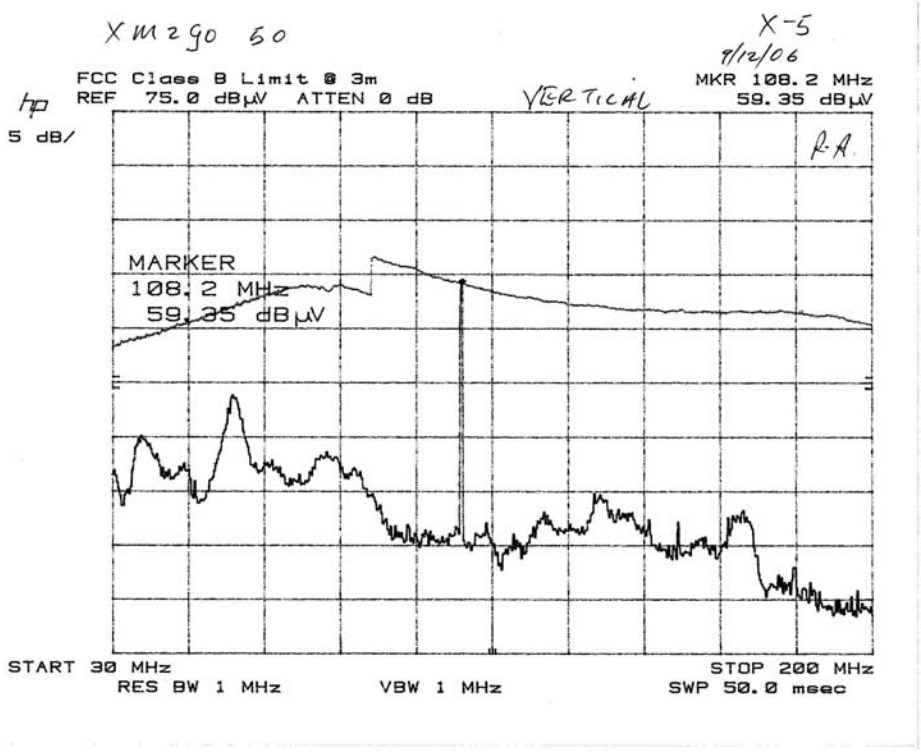


Figure 58 30MHz to 200MHz Vertical
(FM programmed to 107.9MHz)

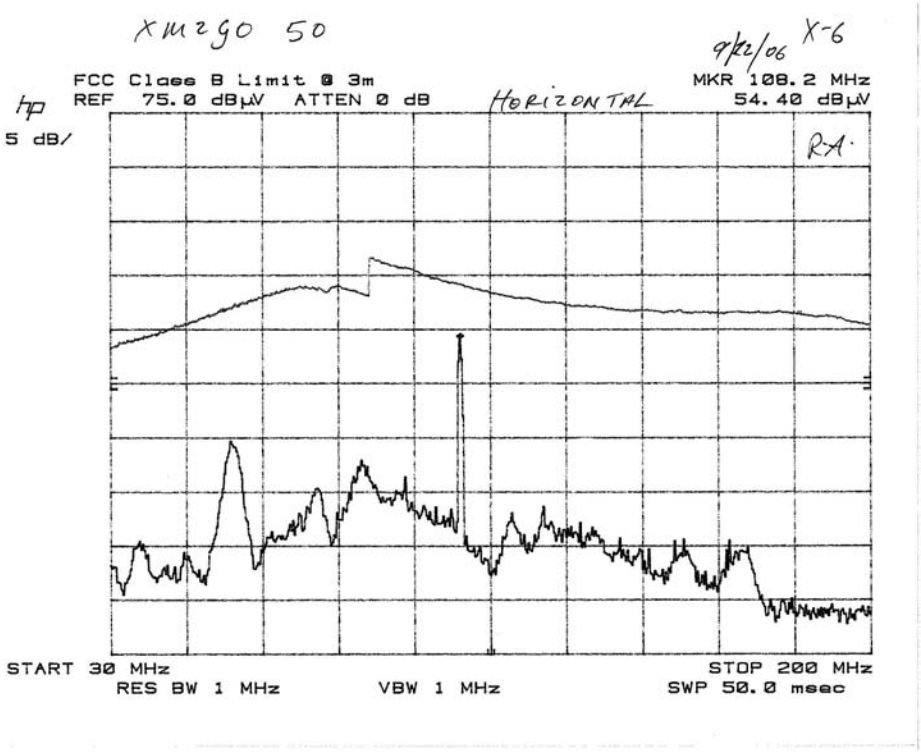


Figure 59 30MHz to 200MHz Horizontal
(FM programmed to 107.9MHz)

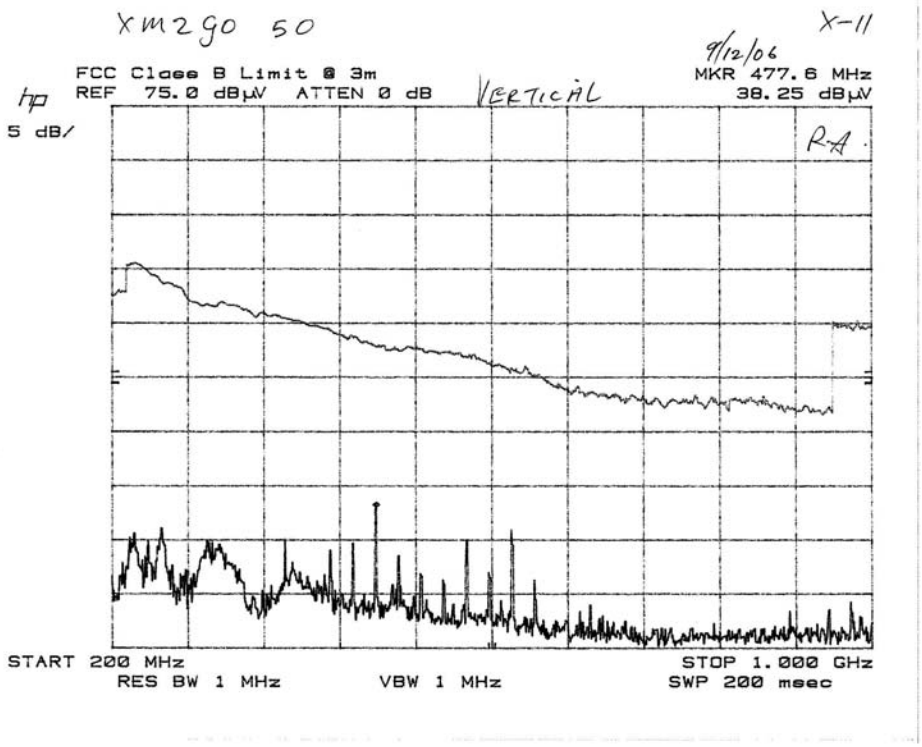


Figure 60 200MHz to 1GHz Vertical
(FM programmed to 107.9MHz)

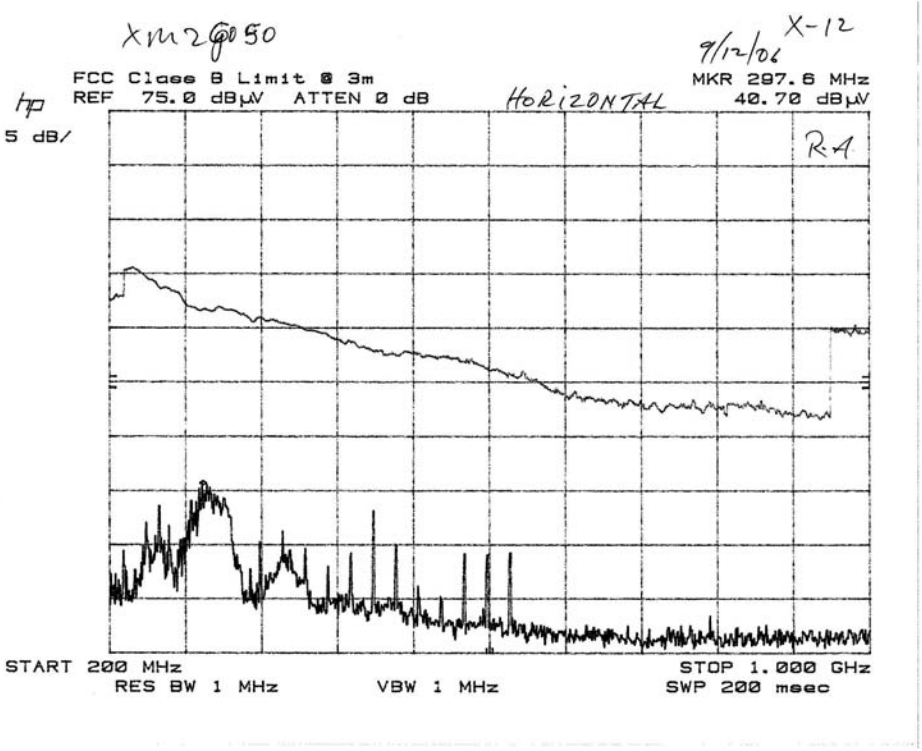


Figure 61 200MHz to 1GHz Horizontal
(FM programmed to 107.9MHz)

4.5 Tabular Data of Peak Voltage Measurements

The following table shows peak voltage measurements for all plots that were taken in the 3 meter chamber. Where noted, the intentional radiator limit is used.

Plot ID	Peak Frequency (MHz)	Peak Voltage (dBµV)	Correction Factor (dB)	Corrected Peak Voltage (dBuV/m)	FCC Limit dBuV/m	Margin to Limit dB
X-1	88.10	60.50	-18.5	42.00	48[1]	6.00
X-2	88.10	54.10	-18.5	40.95	48[1]	7.05
X-3	96.90	58.40	-17.5	40.90	48[1]	7.10
X-4	96.90	54.40	-17.5	36.90	48[1]	11.10
X-5	107.90	59.40	-16.4	43.00	48[1]	5.00
X-6	107.90	54.40	-16.4	38.00	48[1]	10.00
X-7	477.60	37.80	-7.5	30.30	46	15.70
X-8	303.20	39.20	-10.8	28.40	46	17.60
X-9	478.40	37.90	-7.5	30.40	46	15.60
X-10	311.20	40.70	-10.7	30.00	46	16.00
X-11	477.60	38.30	-7.5	30.80	46	15.20
X-12	297.60	40.70	-11	29.70	46	16.30
X-13	55.20	48.00	-17.6	30.40	40	9.60
X-14	88.10	45.40	-18.5	26.90	43.5	16.60
X-15	55.20	48.40	-17.6	30.80	40	9.20
X-16	88.10	44.20	-18.5	25.70	43.5	17.80
X-17	56.50	48.30	-17.7	30.60	40	9.40
X-18	76.20	45.40	-18.9	26.50	40	13.50
X-19	214.40	49.50	-14.3	35.20	43.5	8.30
X-20	217.60	48.60	-14.2	34.40	46	11.60
X-21	216.80	49.30	-14.2	35.10	46	10.90
X-22	217.60	48.40	-14.2	34.20	46	11.80
X-23	210.40	45.30	-14.4	30.90	43.5	12.60
X-24	218.40	48.10	-14.2	33.90	46	12.10
X-25	56.90	49.00	-17.9	31.10	40	8.90
X-26	57.20	45.40	-17.9	27.50	40	12.50
X-27	56.90	48.50	-17.7	30.80	40	9.20
X-28	44.10	44.10	-15	29.10	40	10.90
X-29	56.90	48.00	-17.9	30.1	40	9.90
X-30	57.50	42.90	-17.9	25	40	15.00
X-31	477.60	40.00	-7.5	32.5	46	13.50
X-32	318.40	41.20	-10.6	30.6	46	15.40
X-33	478.40	39.40	-7.5	31.9	46	14.10
X-34	477.60	42.20	-7.5	34.7	46	11.30
X-35	477.60	40.40	-7.5	32.9	46	13.10
X-36	477.60	43.00	-7.5	35.5	46	10.50
X-37	144.60	45.90	-14	31.9	43.5	11.60
X-38	192.50	46.80	-12.2	34.6	43.5	8.90

X-39	272.00	42.50	-12.4	30.1	46	15.90
X-40	208.00	48.60	-14.4	34.2	43.5	9.30
X-41	62.30	44.10	-18.5	25.6	40	14.40
X-42	67.70	50.00	-19	31	40	9.00
X-43	240.80	43.60	-13.8	29.8	46	16.20
X-44	240.00	52.10	-13.8	38.3	46	7.70
X-45	50.70	43.10	-16.7	26.4	40	13.60
X-46	50.70	48.20	-16.7	31.5	40	8.50
X-47	224.80	36.20	-14.1	22.1	46	23.90
X-48	239.20	43.30	-13.9	29.4	46	16.60
X-49	73.50	43.10	-19	24.1	40	15.90
X-50	56.50	50.00	-17.9	32.1	40	7.90
X-51	242.40	39.50	-13.8	25.7	46	20.30
X-52	242.50	47.60	-13.8	33.8	46	12.20
X-53	56.50	44.40	-17.7	26.7	40	13.30
X-54	67.70	48.60	-19.1	29.5	40	10.50
X-55	241.60	39.00	-13.8	25.2	46	20.80
X-56	241.60	46.50	-13.8	32.7	46	13.30
X-57	144.60	45.20	-14	31.2	43.5	12.30
X-58	109.90	50.00	-16.2	33.8	43.5	9.70
X-59	262.40	42.00	-13	29	46	17.00
X-60	214.40	47.40	-14.3	33.1	43.5	10.40

Note 1 : The intentional radiator limit is used for these frequency points.

Table 1 : Voltage Measurements from FAU 3-m chamber

4.6 Radiated Emissions – Section 15.239 – Measured On-Vehicle

Per FCC instructions, the FM fundamental power measurements using the FM Coupler device were measured on three different vehicles which utilize embedded FM antennas in the vehicle's glass.

The test vehicles that were used during the test include:

- Chrysler Pacifica
- Nissan Maxima
- Toyota Camry

4.6.1 Test Setup – In Vehicle Measurements

TEST PROCEDURE

1. The satellite radio receiver and SureConnect accessory were installed in each vehicle per the installation guidelines provided to the user and tuned to one of the three test FM frequencies.
2. The RBW and VBW of the spectrum analyzer were set to 120KHz and 300KHz respectively. A peak detector was utilized.
3. For tests where the receiving antenna is in Vertical polarization, the receive antenna is initially placed at one meter from the ground. For Horizontal polarization, the receive antenna is initially placed at three meters from the ground.
4. While monitoring the power of the fundamental FM emission, the receive antenna base is moved horizontally along one of the vehicles sides, at 3 meters from the vehicle. The position that produces the highest emission is found.
5. At the position found in step (4) above, the antenna is moved vertically from 1 meter to 4 meters. The highest FM emission is found and recorded.
6. The above procedure is repeated for each of the four sides of the vehicle.
7. The above procedure is repeated for each of three FM frequencies (88.7MHz, 96.9MHz, and 107.1MHz). These frequencies are chosen due to FM co-channel interfering signals at the extreme band edges.
8. The cable loss, amplifier gain, and antenna factors are used to determine the absolute field strength from each peak power measurement as shown in the table below.

Test Frequency	Vertical Polarization V-Factor	Horizontal Polarization H-Factor
88.7MHz	-19.2 dB	-18.8 dB
96.9MHz	-20.0 dB	-18.2 dB
107.1MHz	-21.0 dB	-18.7 dB

Table 2 : Calibration Factors for In-Vehicle Measurements

Diagram 4 : In-Vehicle Measurement Method

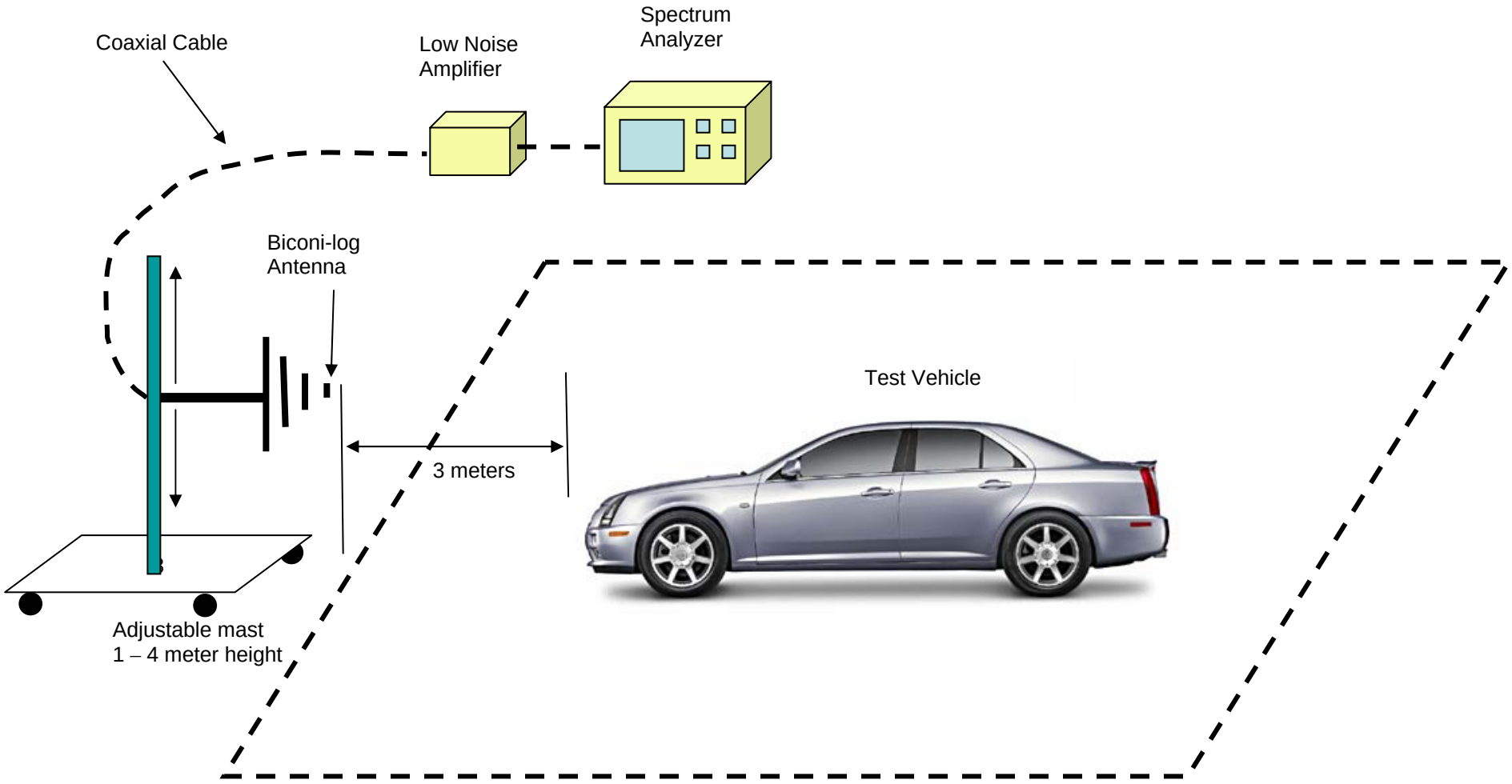
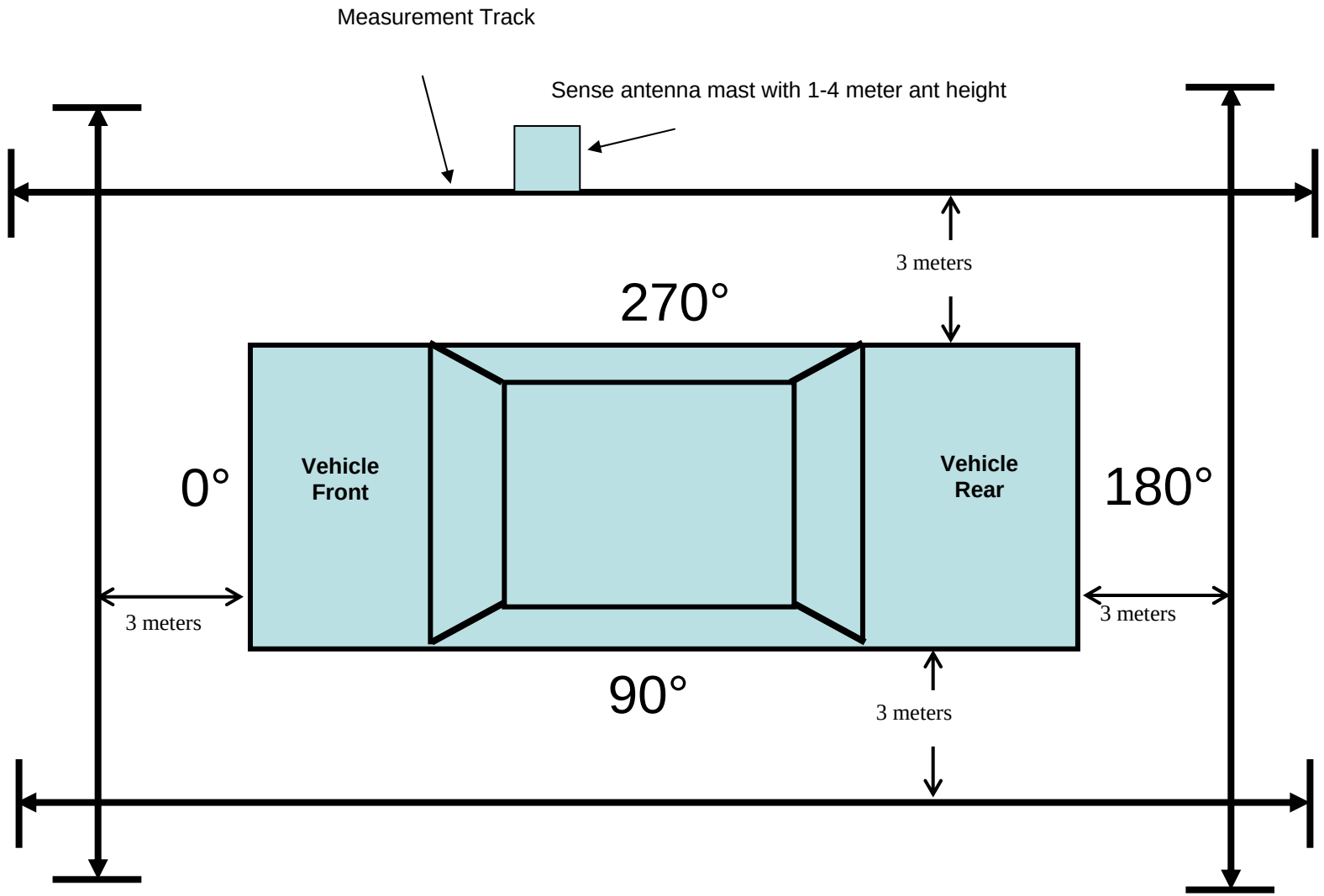


Diagram 5 : In Vehicle Measurement Method



4.6.2 Test Data – In-Vehicle Measurements

Vehicle Description	Freq (MHz)	V factor	FAU OATS reading VERTICAL				Meas. Peak	Corr. Peak	Limit	Margin
		dB	0 deg	90 deg	180 deg	270 deg	dBuV	dBuV/m	dBuV/m	dB
Pacifica	88.7	-19.20	48.7	45.8	50.2	53.0	53.0	33.8	48	14.2
	96.9	-20.00	49.2	46.1	49.3	50.4	50.4	30.4	48	17.6
	107.1	-21.00	48.3	50.8	52.3	56.2	56.2	35.2	48	12.8
Camry	88.7	-19.20	50.99	53.9	59.9	53.4	59.9	40.7	48	7.3
	96.9	-20.00	51.19	54.0	55.8	52.1	55.8	35.8	48	12.2
	107.1	-21.00	58.59	50.5	56.9	53.0	58.6	37.6	48	10.4
Maxima	88.7	-19.20	48.2	47.5	48.1	46.9	48.2	29.0	48	19.0
	96.9	-20.00	52.0	49.3	49.9	47.8	52.0	32.0	48	16.0
	107.1	-21.00	52.4	50.0	51.3	46.9	52.4	31.4	48	16.6

Table 3 : Vertical Polarization results from In-Vehicle Measurements

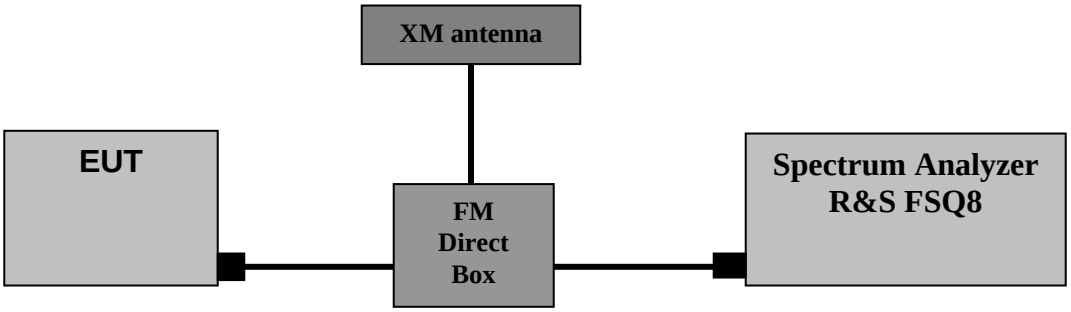
Vehicle Description	Freq (MHz)	H Factor	FAU OATS reading HORIZONTAL				Meas. Peak	Corrected Peak	Limit	Margin
		dB	0 deg	90 deg	180 deg	270 deg	dBuV	dBuV/m	dBuV/m	dB
Pacifica	88.7	-18.8	45.3	48.0	50.0	49.9	50.0	31.2	48	16.8
	96.9	-18.2	48.2	47.1	50.5	49.3	50.5	32.3	48	15.7
	107.1	-18.7	52.7	49.7	53.0	51.6	53.0	34.3	48	13.7
Camry	88.7	-18.8	47.49	50.8	52.9	50.9	52.9	34.1	48	13.9
	96.9	-18.2	50.19	55.2	51.3	55.0	55.2	37.0	48	11.0
	107.1	-18.7	50.99	53.6	51.4	56.7	56.7	38.0	48	10.0
Maxima	88.7	-18.8	45.6	46.7	46.1	49.9	49.9	31.1	48	16.9
	96.9	-18.2	50.6	49.6	49.4	53.0	53.0	34.8	48	13.2
	107.1	-18.7	52.0	53.0	51.0	50.7	53.0	34.3	48	13.7

Table 4 : Horizontal Polarization results from In-Vehicle Measurements

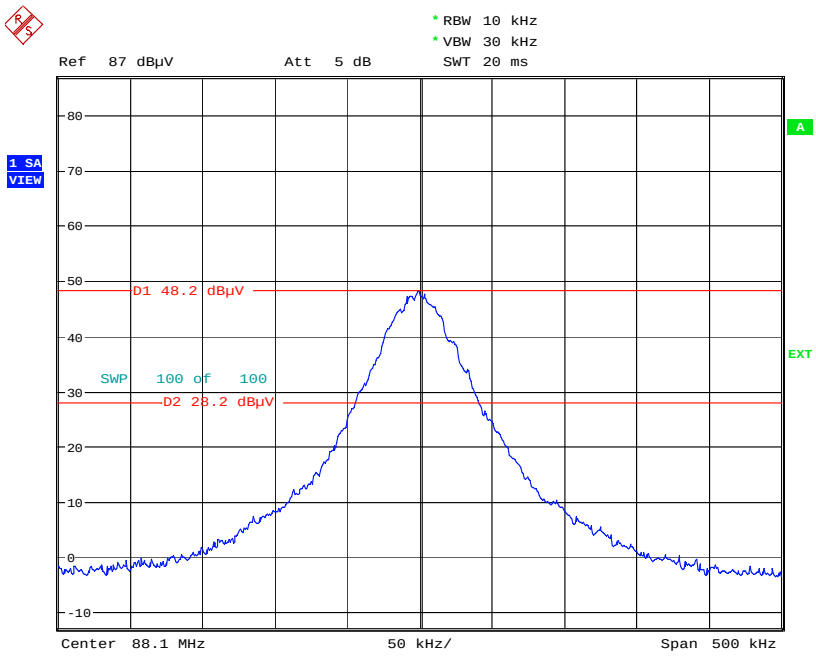
4.7 Occupied Bandwidth – Section 15.239(a)

4.7.1 Test Setup – Occupied Bandwidth

The occupied bandwidth test was performed using an FM direct adaptor to maximize the power into the spectrum analyzer. The unit was programmed to the three FM test frequencies (88.1MHz, 96.9MHz, and 107.9MHz) while receiving live over-the-air signal. The FM audio level was maximized to find the highest occupied bandwidth.

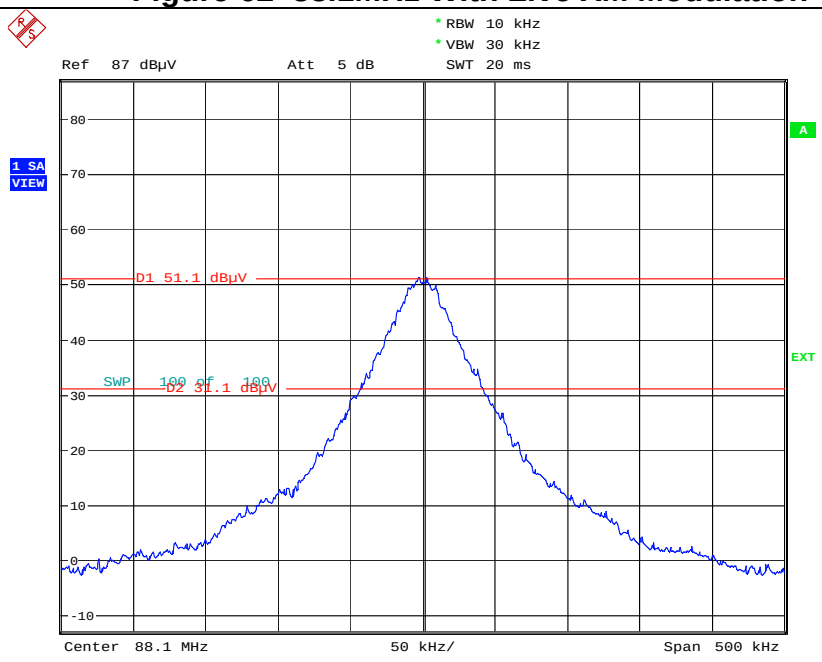


4.7.2 Test Data – Occupied Bandwidth



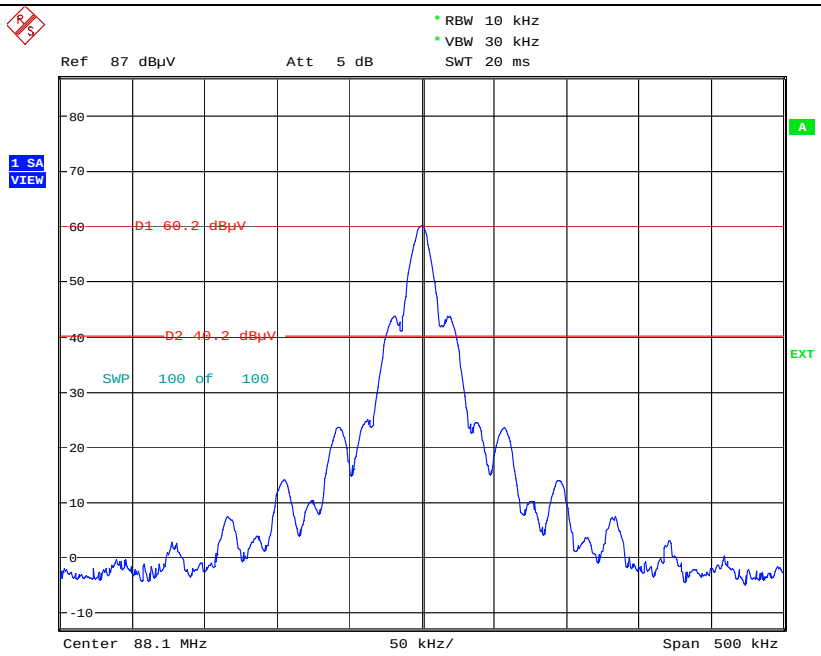
Date: 11.SEP.2006 10:09:48

Figure 62 88.1MHz With Live XM Modulation



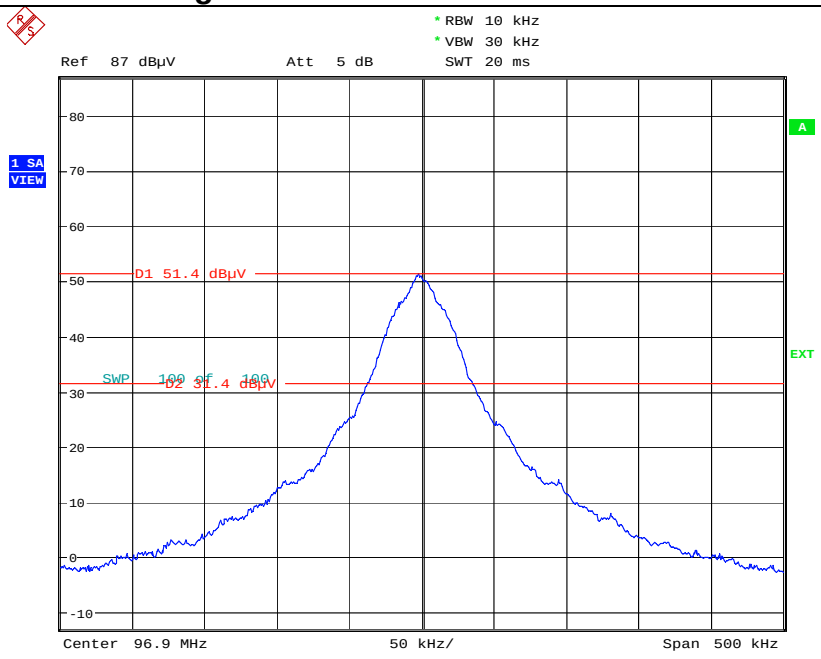
Date: 11.SEP.2006 10:10:24

Figure 63 88.1MHz With MP3 Playback



Date: 11.SEP.2006 10:10:58

Figure 64 88.1MHz With No Modulation



Date: 11.SEP.2006 10:11:59

Figure 65 96.9MHz With Live XM Modulation

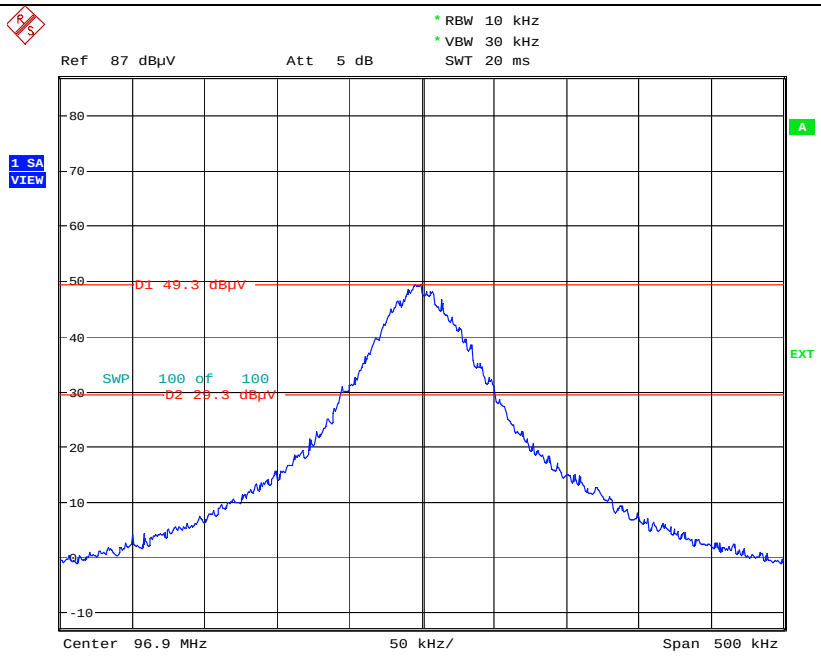


Figure 66 96.9MHz With MP3 Playback

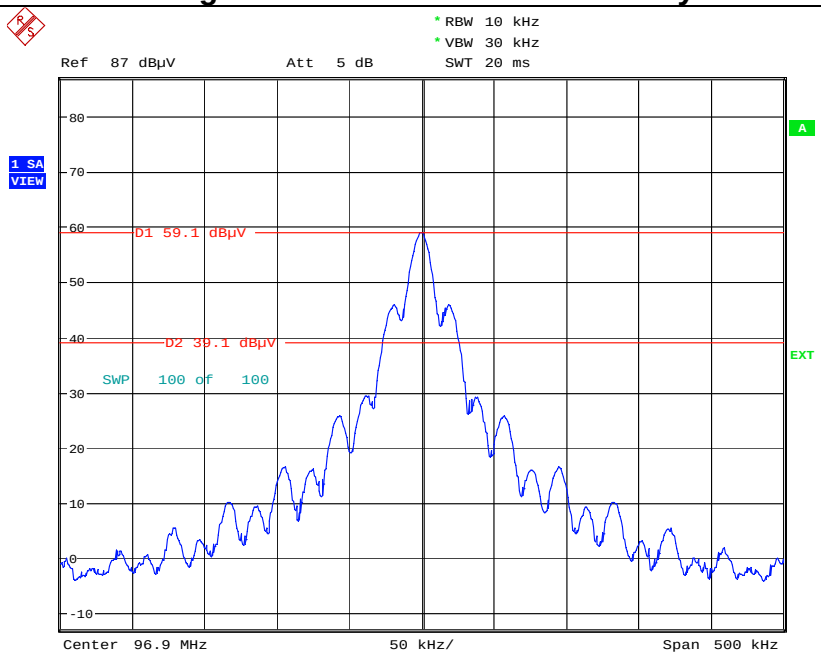


Figure 67 96.9MHz No Modulation

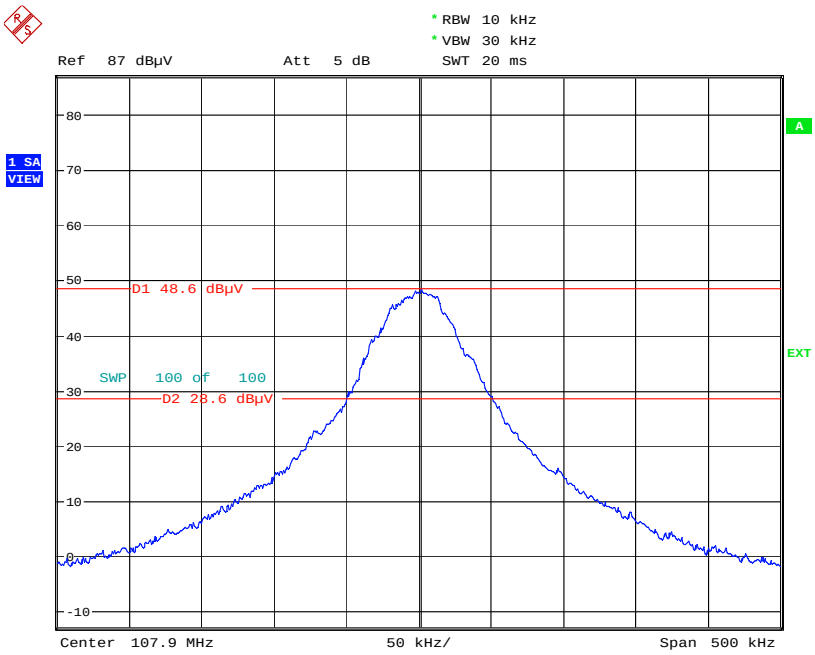


Figure 68 107.9MHz With Live XM Modulation

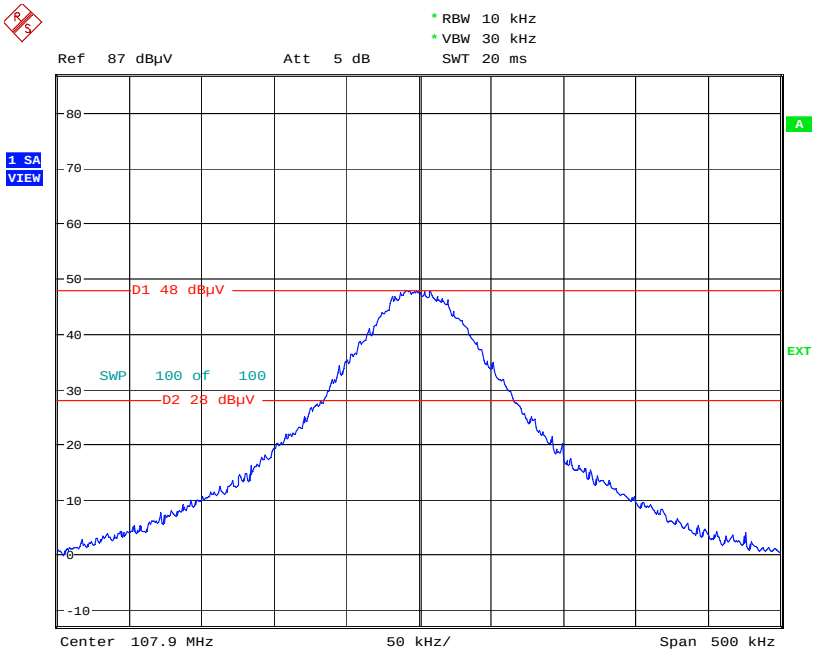


Figure 69 107.9MHz With MP3 Playback

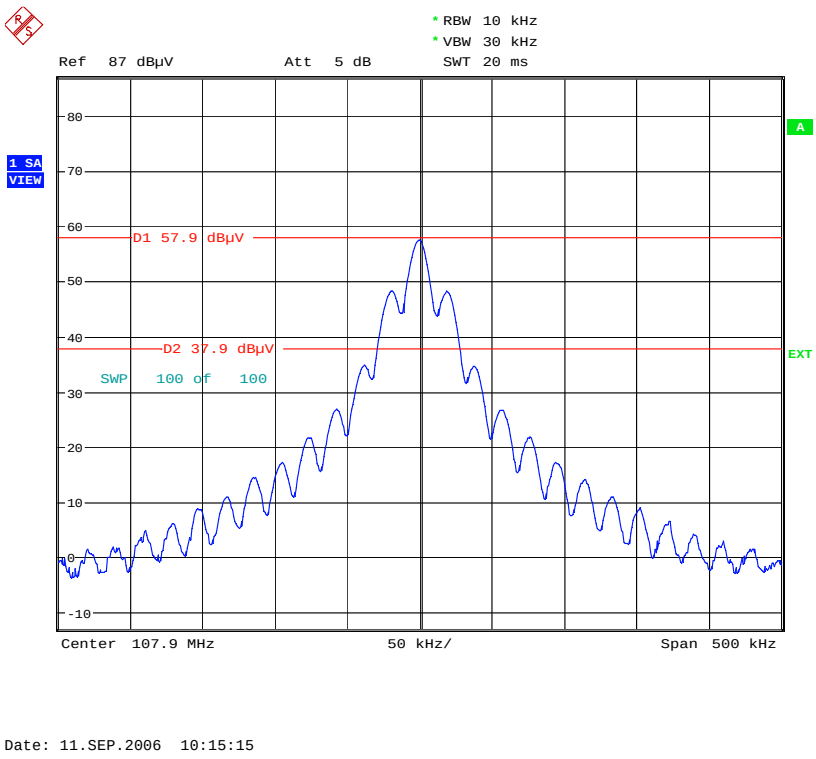


Figure 70 107.9MHz With No Modulation

4.8 FM TUNING RANGE

The FM tuning range of the XM2go device was verified to be restricted to the range of 88.1MHz to 107.9MHz in step sizes of 200KHz.

4.9 TEST EQUIPMENT

FAU EMI LAB – Radiated Emissions

FAU EMI R&D LABORATORY TEST EQUIPMENT						
Equipment Type	**Manufacturer**	**Description**	**Model**	**Serial No.**	**Calibration Date**	**Calibration Interval (Years)**
Spectrum Analyzer	Hewlett Packard	RF Section	8566B	2403A06381	Aug-22-06	2
Spectrum Analyzer	Hewlett Packard	Display	85662A	2407A06381	Aug-22-06	2
Spectrum Analyzer	Hewlett Packard	Quasi Peak Adapter	85650A	2430A00559	Aug-22-06	2
RF Preselector	Hewlett Packard	Preselector	85685A	2510A00151	Feb-8-06	2

FAU EMI LAB – Conducted Emissions

FAU EMI R&D LABORATORY TEST EQUIPMENT						
Equipment Type	**Manufacturer**	**Description**	**Model**	**Serial No.**	**Calibration Date**	**Calibration Interval (Years)**
Spectrum Analyzer	Hewlett Packard	RF Section	8566B	2403A06381	Aug-22-06	2
Spectrum Analyzer	Hewlett Packard	Display	85662A	2407A06381	Aug-22-06	2
Spectrum Analyzer	Hewlett Packard	Quasi Peak Adapter	85650A	2430A00559	Aug-22-06	2
RF Preselector	Hewlett Packard	Preselector	85685A	2510A00151	Feb-8-06	2
LISN	EMCO	Line Impedance Stabilization Network	3825/2R	1095	Mar-10-06	2

IN-VEHICLE TEST SETUP

Equipment Type	Manufacturer	Model	Cal Date	Due Date
Spectrum Analyzer	R&S	FSIQ7	3/28/2006	3/28/2007
Low Noise Amplifier	Sonoma	Inst310	6/9/2006	6/9/2007
Biconilog Antenna	ETS-Lindgren	3142C	6/5/2006	6/5/2007

OCCUPIED BANDWIDTH TEST SETUP

Equipment Type	Manufacturer	Model	Cal Date	Due Date
Spectrum Analyzer	R&S	FSQ8	3/28/2006	3/28/2007

TEST FACILITY

FAU EMI Research and Development Laboratory
Department of Electrical Engineering
Florida Atlantic University
Boca Raton, Florida 33431
(561) 361-4390

A2LA Certificate Number: 2129.01
FCC Registration: 90599
Industry of Canada: IC46405-4076

Description:	The 3-m semi-anechoic chamber and Power Line Conducted Spurious Voltage test setup is constructed and calibrated to meet the FCC requirements of Section 2.948, as well as Industry Canada RSS 212 Issue 1.
Site Filing:	A site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046, and with the Industry Canada, Certification and Engineering Bureau, 3701 Carling Ave., Building 94, P.O. Box 11490, Station "H", Ottawa Ontario, K2H 8S2.
Instrument Tolerance:	All measuring equipment is in accordance with ANSI C63.4 and CISPR 22 requirements.

End Report