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Technical Report No. 07-012

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

Date Performed: 1/25/2007 – 1/30/2007

Customer: XM Satellite Radio, Inc.
3161 S.W. 10th street
Deerfield Beach, FL 33442

Company Representative and Point of Contact for product(s) tested:

David Bulk, Sr. Member Technical Staff
Ground Systems Engineering
XM Satellite Radio, Inc.
(202) 409-4105

Test Performed By:

Thierry Jean-Charles, Test Engineer
FAU EMI R&D Laboratory

Approved by:

Vichate Ungvichian, Ph.D., P.E.
Director, FAU EMI R&D Laboratory

Date of Test Report: 12 February 2007

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1. INTRODUCTION

The XM Satellite Radio, **Xpress EZ** receiver 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. **Xpress EZ** 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 88 MHz to 108 MHz

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 88.1 MHz, 96.9 MHz and 107.9 MHz 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 88.7 MHz, 96.9 MHz and 107.1 MHz in three representative vehicles, using the XM Satellite Radio's FM Coupler 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 **Xpress EZ** home cradle with the XM Home AC adapter.
- 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 an **Xpress EZ** car cradle, using only an XM Satellite Radio car antenna and an XM Cassette Adapter.
    - In an **Xpress EZ** car cradle, using an FM Direct Adapter and car antenna.
    - In an **Xpress EZ** home cradle, using only an XM Satellite Radio home antenna.

3. CONCLUSION

The XM Satellite Radio, Inc. **Xpress EZ** receiver met the FCC Class B conducted and radiated emission requirements, as well as the intentional radiation limits, as described in the following pages. Note that throughout the measurements it was verified that the unit could not be programmed outside of the frequency band 88 MHz to 108 MHz.

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 Xpress EZ receiver was evaluated for an I.T.E. (Model No.: SMPS5V2A-XM) wall adapter power supply. The unit and the 120VAC/ DC 5V switching power supply were 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). Photographs 1 and 2 in the document '**Xpress EZ** _Report_of_Measurements_test_set_up_photos.doc' depict the conducted emissions test setup.

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, in conjunction with HP 85685A Preselector, with a bandwidth of 9 kHz obtained through the HP 85650A Quasi Peak Adapter.

4.2.2 Test Data –Conducted Emissions for I.T.E. Power Supply

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

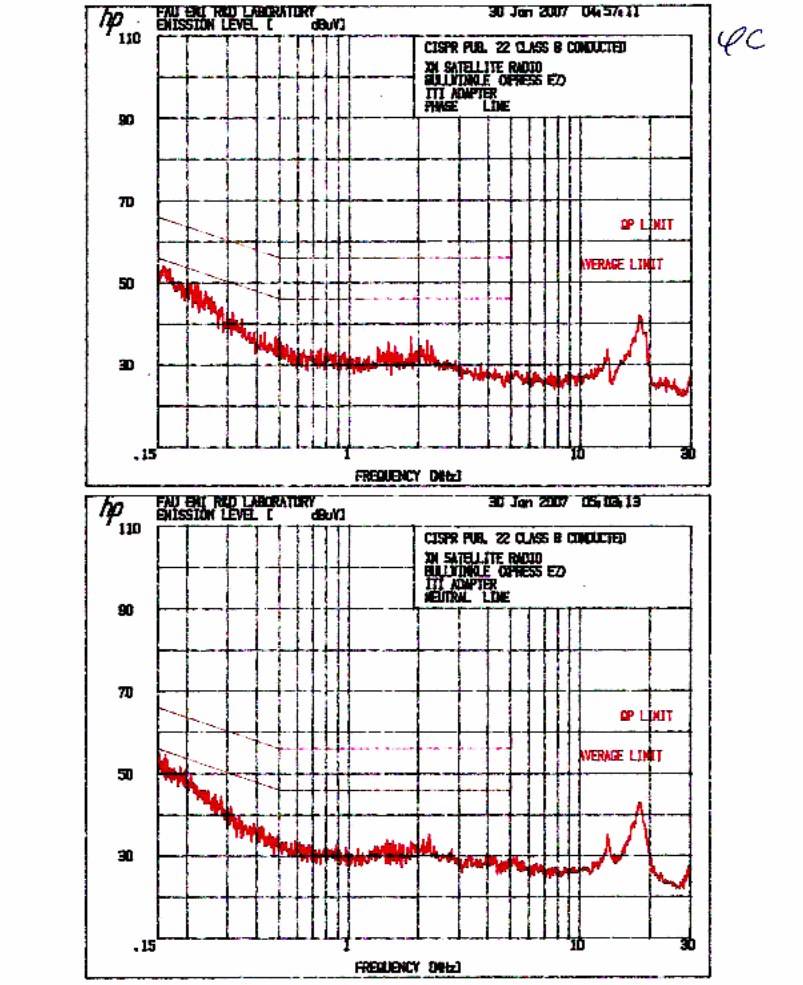


FIGURE 1: Phase and Neutral Conducted Emissions 150 kHz-30 MHz

From the above Figure, the emissions that exceeded or were within 5 dB of the limit are reported in Table 1.

Line Tested	Frequency (kHz)	Peak Value (dBµV)	Average Value (dBµV)	QP Value (dBµV)	Avg. Limit (dBµV)	Margin to Avg. Limit (dB)
Phase	158	53			55.86	2.86
Neutral	158	54.8	29.82		55.86	26.04
Phase						
Neutral						

Table 1: Conducted Emission Peak Measurement

4.3 RADIATED EMISSIONS – Section 15.109(a)

4.3.1 General Test Setup

The XM Satellite Radio, Inc **Xpress EZ** receiver 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 Adapter 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 **Xpress EZ** unit was tested in three configurations under Section 15.109(a)

- Home Cradle with Speaker attached
- Car Cradle using FM Direct Adapter
- Car Cradle using only an XM antenna and an XM Cassette Adapter

4.3.2 Radiated Emissions - Home Cradle

4.3.2.1 Test Setup – Home Cradle

In the home cradle setup, the EUT was placed in the **Xpress EZ** home cradle, with an XM home antenna and I.T.E 5V AC power adapter. External speakers were connected to the audio output connector on the home cradle with the unit receiving a live XM broadcast signal. Diagram 1 below, and Photograph 3 in the document '**Xpress EZ** _Report_of_Measurements_test_set_up_photos.doc' depict the radiated emissions home cradle test setup.

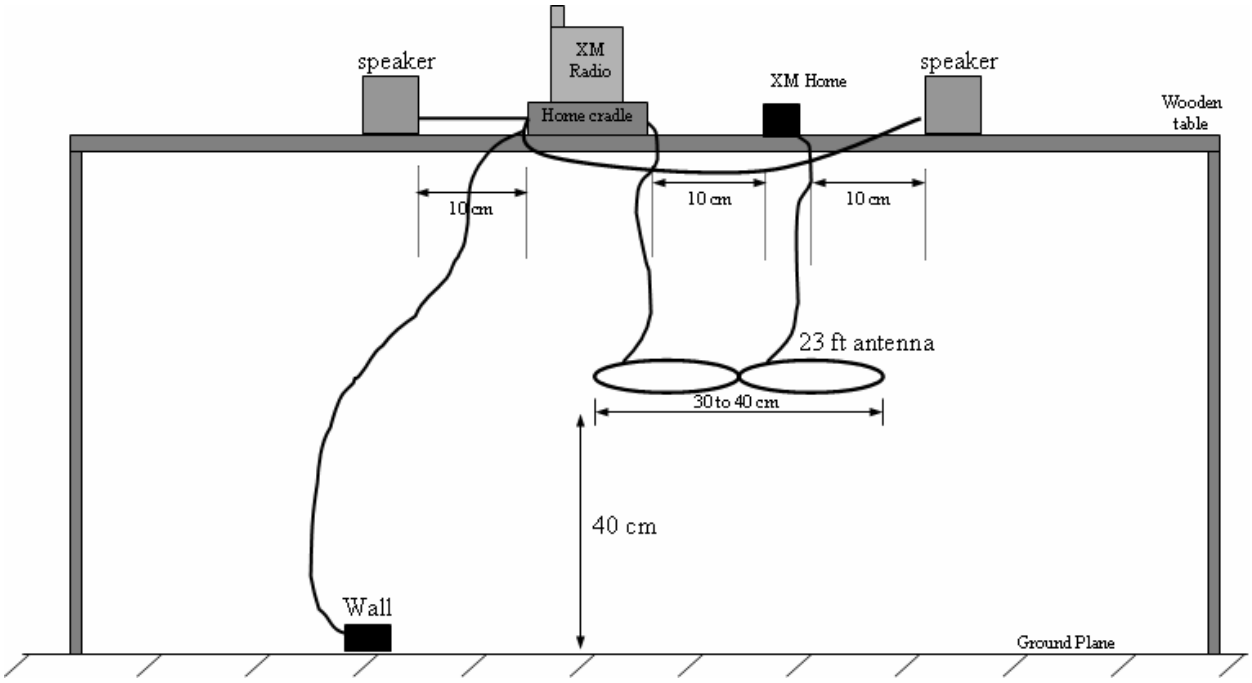


Diagram 1: Home Cradle Radiated Emissions Setup

4.3.2.2 Test Data – Home Cradle

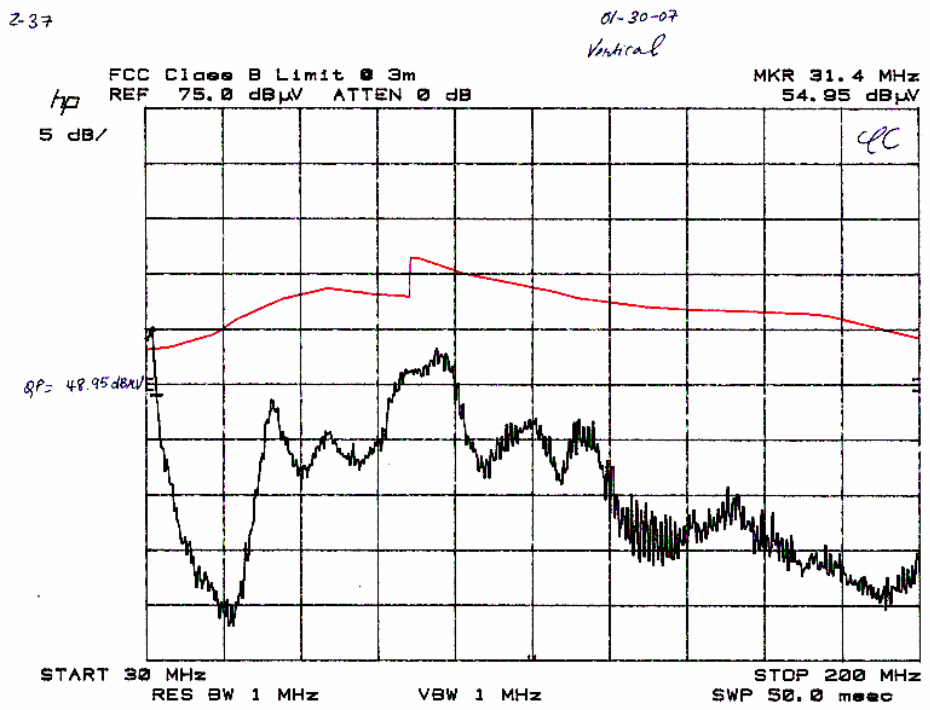


Figure 2: Radiated Emission 30 – 200 MHz Vertical Polarization

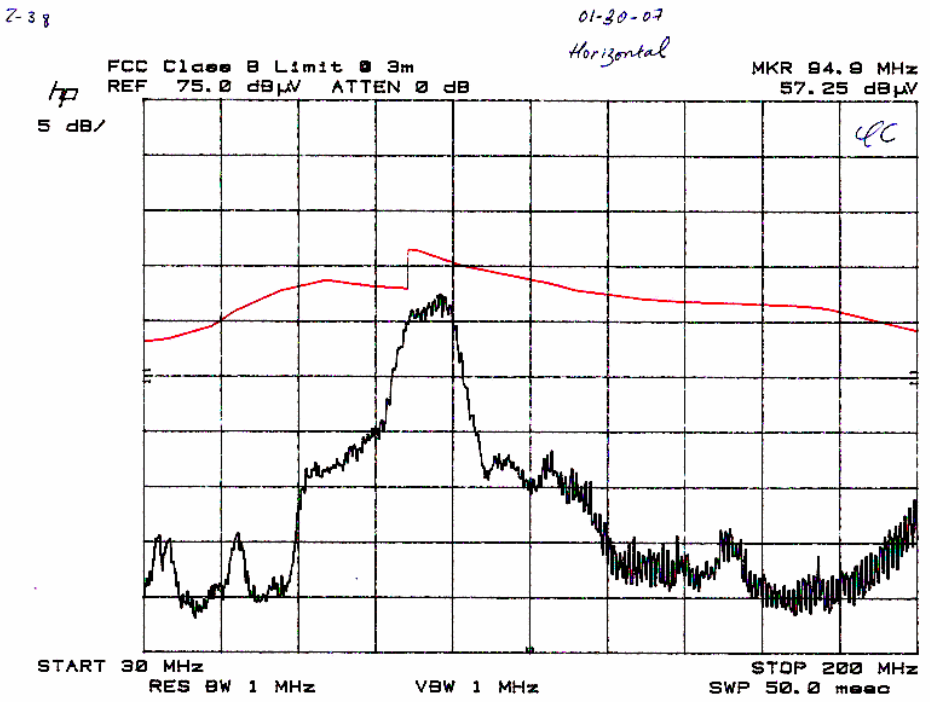


Figure 3: Radiated Emission 30 – 200 MHz Horizontal Polarization

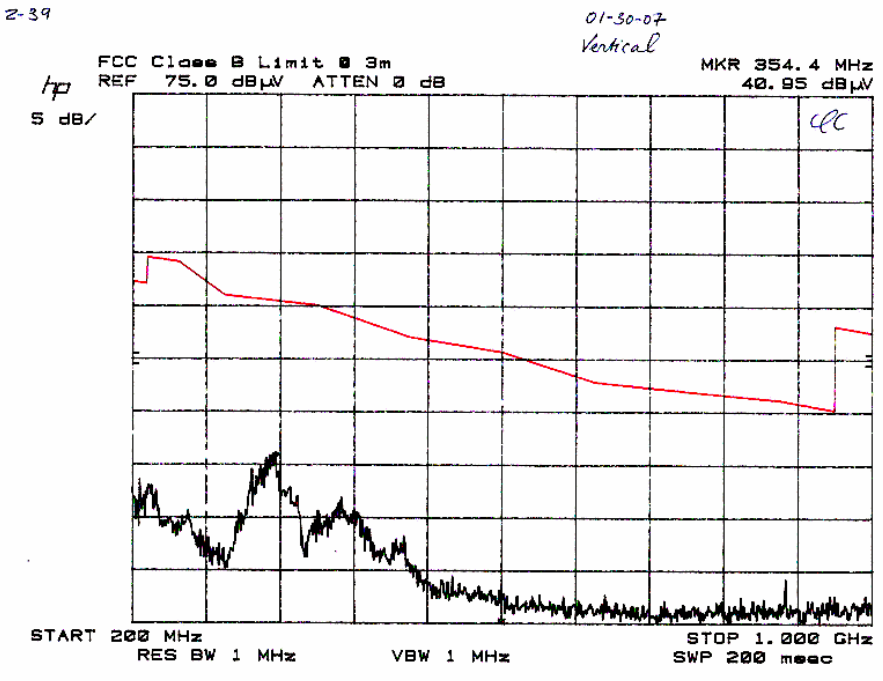


Figure 4: Radiated Emission 200MHz – 1 GHz Vertical Polarization

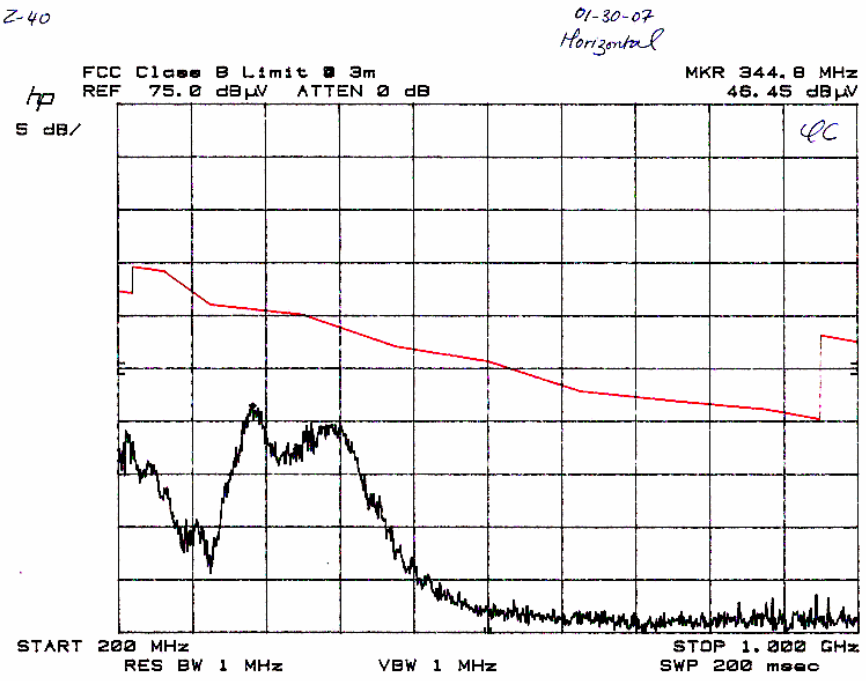


Figure 5: Radiated Emission 200 – 1000 MHz Vertical Polarization

4.3.3 Radiated Emissions - FM Direct Adapter

4.3.3.1 Test Setup – FM Direct Adapter

In the FM Direct Adapter setup, the EUT was placed in the **Xpress EZ** car cradle, with an XM FM Direct Adapter, XM car antenna, XM 5V cigarette adapter (CLA) power supply and an audio out cable. The FM Direct Adapter FM OUT cable was terminated with 75 ohms to simulate an FM radio's FM input jack. The FM Direct Adapter 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 below, and Photograph 4 in the document '**Xpress EZ** _Report_of_Measurements_test_set_up_photos.doc' depict the radiated emissions FM Direct test setup.

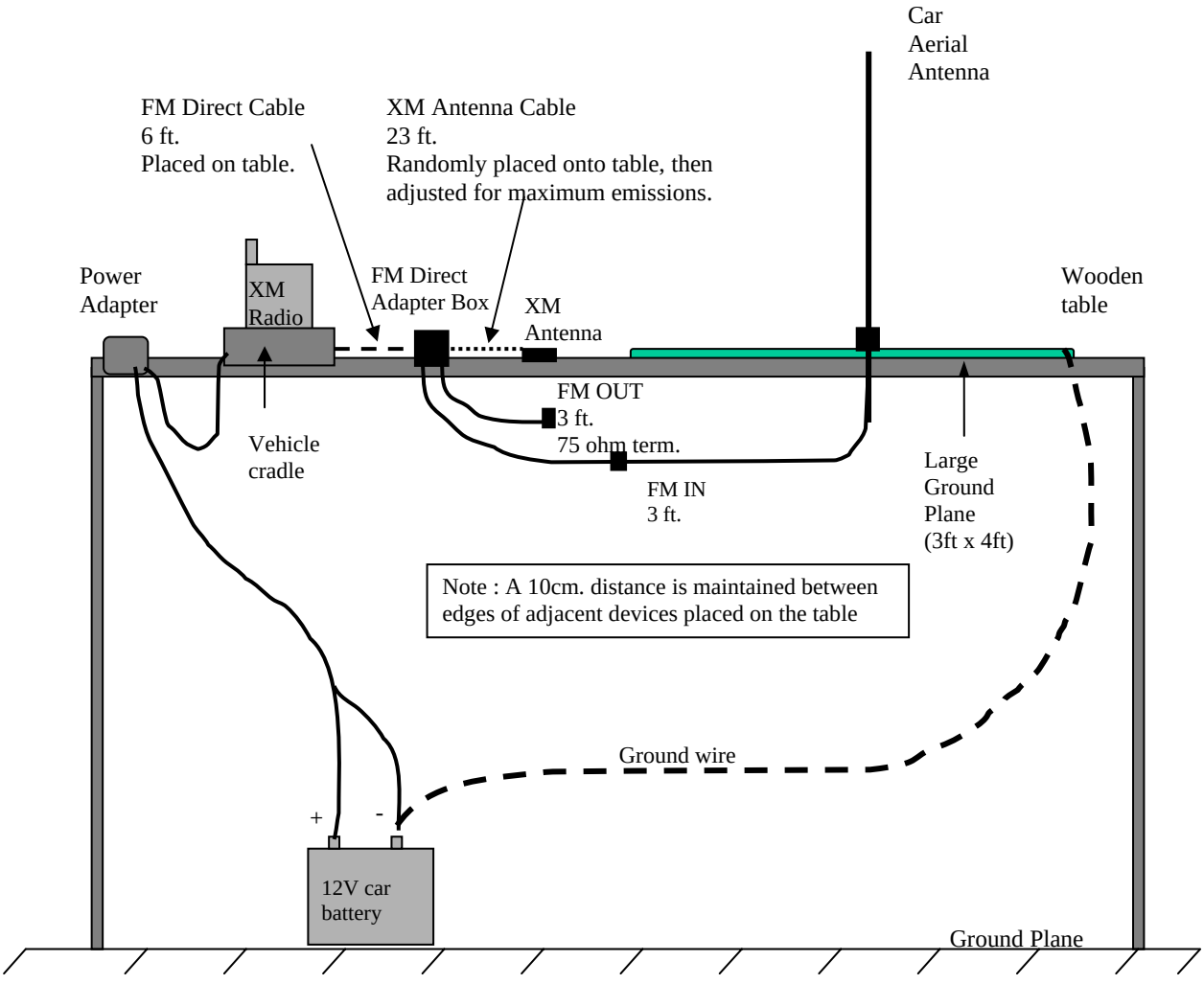


Diagram 2 : FM Direct Adapter Radiated Emissions Setup

4.3.3.2 Test Data – FM Direct Adapter

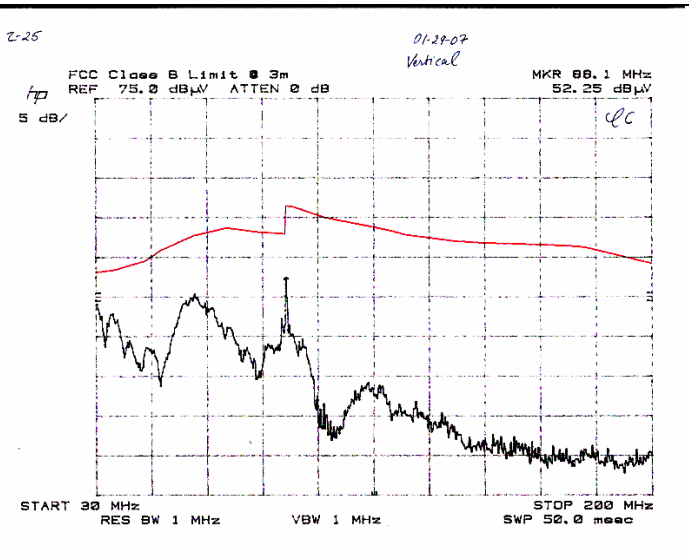


Figure 6 30MHz to 200MHz Vertical (FM programmed to 88.1MHz)

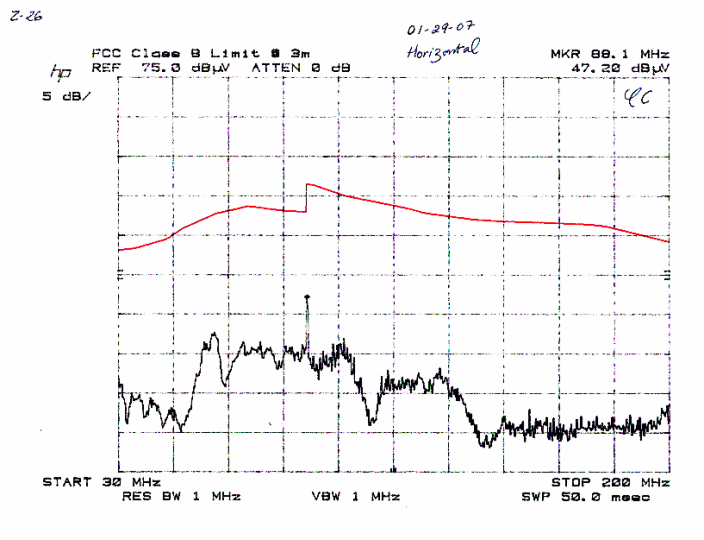


Figure 7 30MHz to 200MHz Horizontal (FM programmed to 88.1MHz

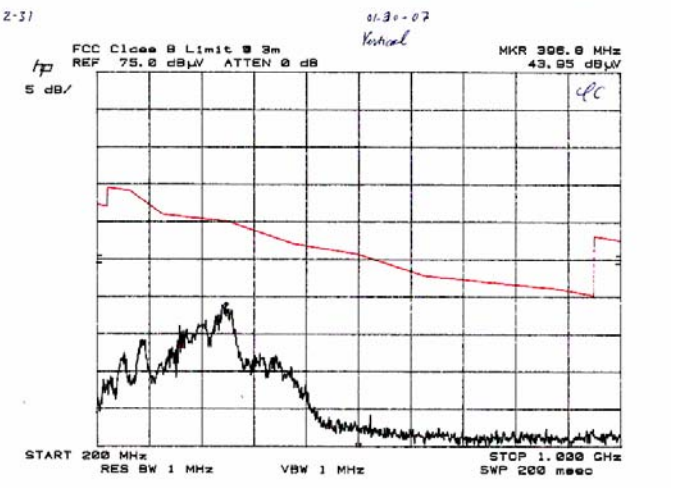


Figure 8 200MHz to 1GHz Vertical (FM programmed to 88.1MHz)

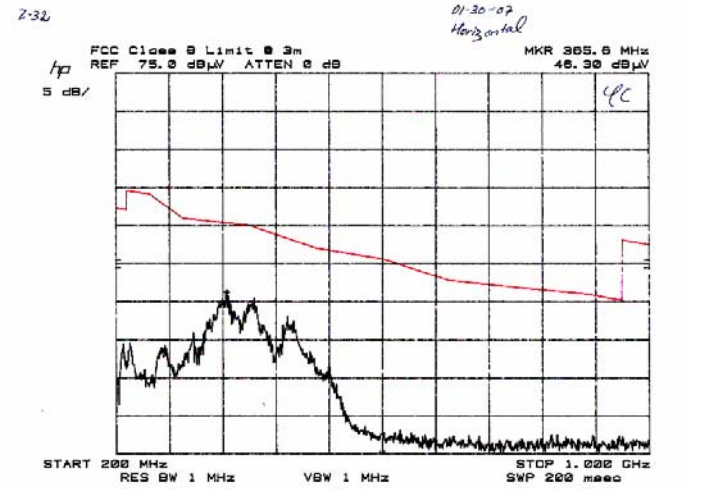


Figure 9 200MHz to 1GHz Horizontal (FM programmed to 88.1MHz)

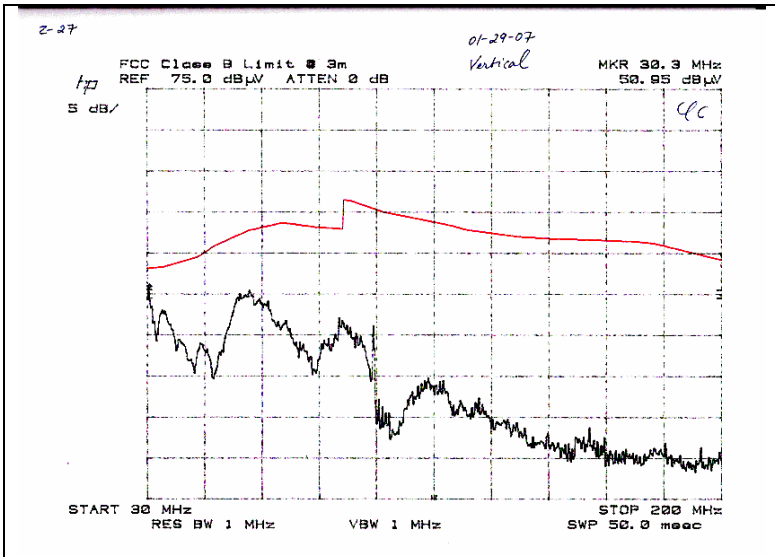


Figure 10 30MHz to 200MHz Vertical (FM programmed to 96.9MHz)

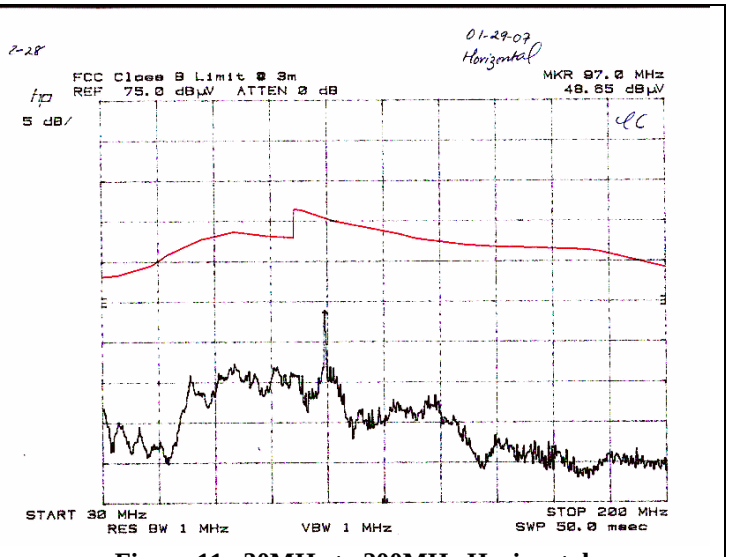


Figure 11 30MHz to 200MHz Horizontal (FM programmed to 96.9MHz)

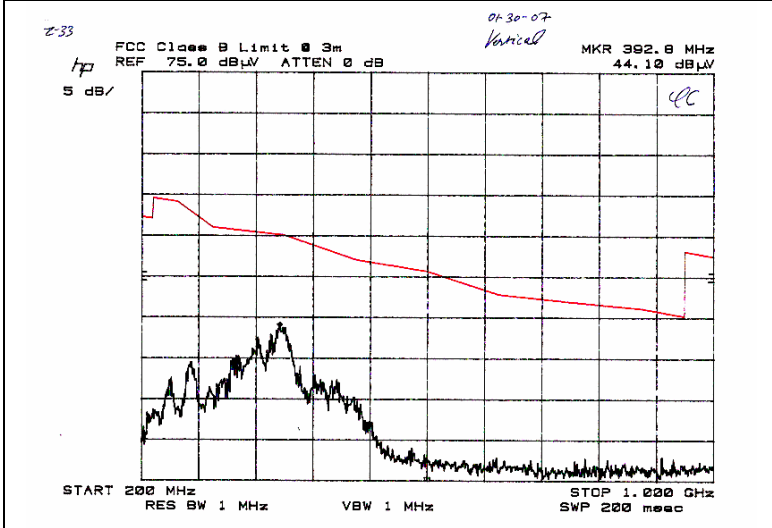


Figure 12 200MHz to 1GHz Vertical (FM programmed to 96.9MHz

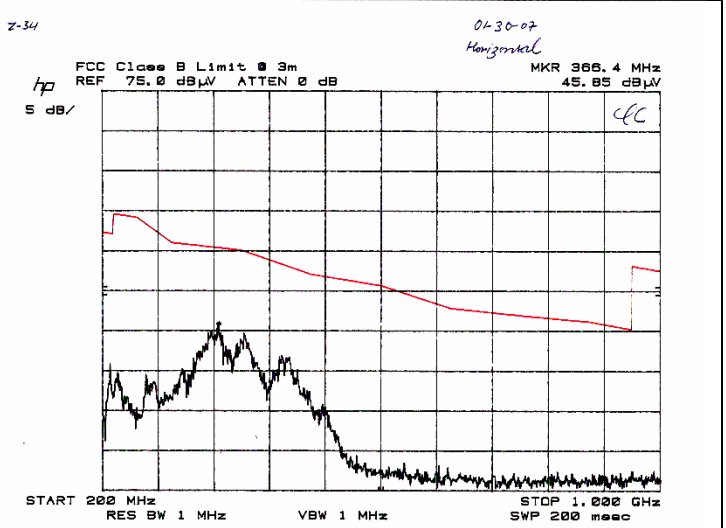


Figure 13 200MHz to 1GHz Horizontal (FM programmed to 96.9MHz)

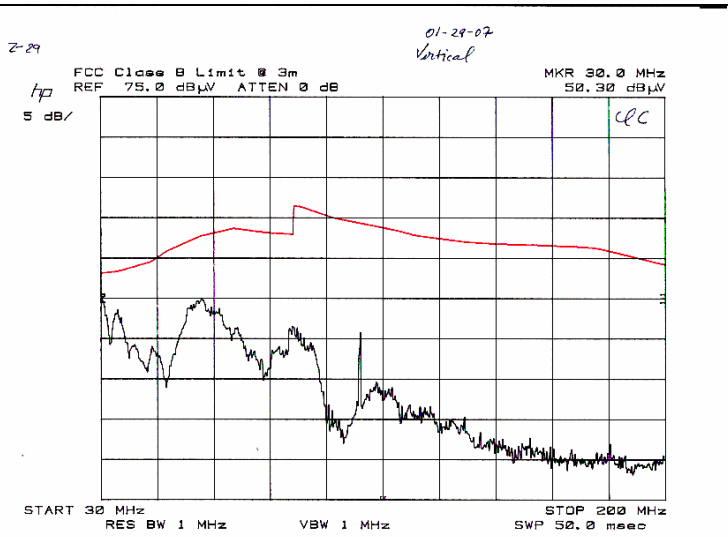


Figure 14 30MHz to 200MHz Vertical (FM programmed to 107.9MHz)

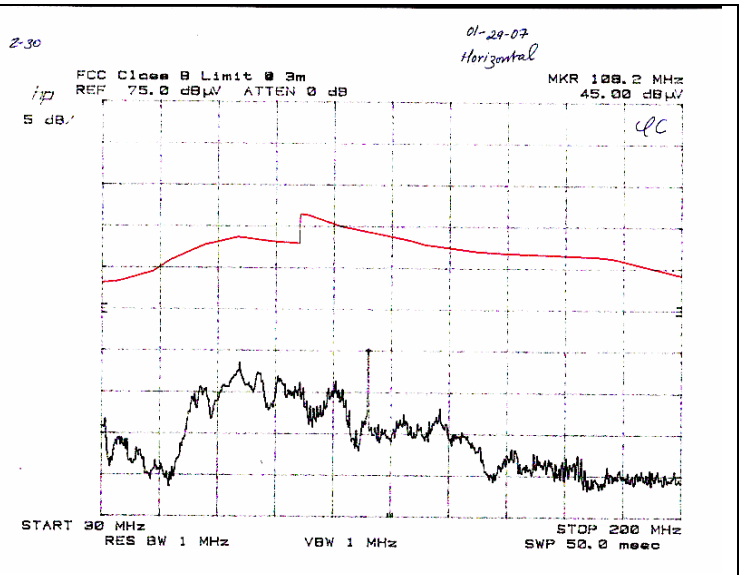


Figure 15 30MHz to 200MHz Horizontal (FM programmed to 107.9MHz)

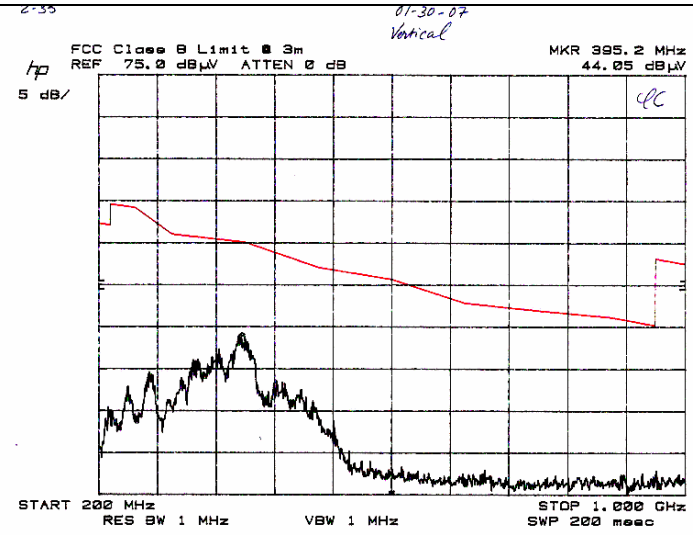


Figure 16 200MHz to 1GHz Vertical (FM programmed to 107.9MHz

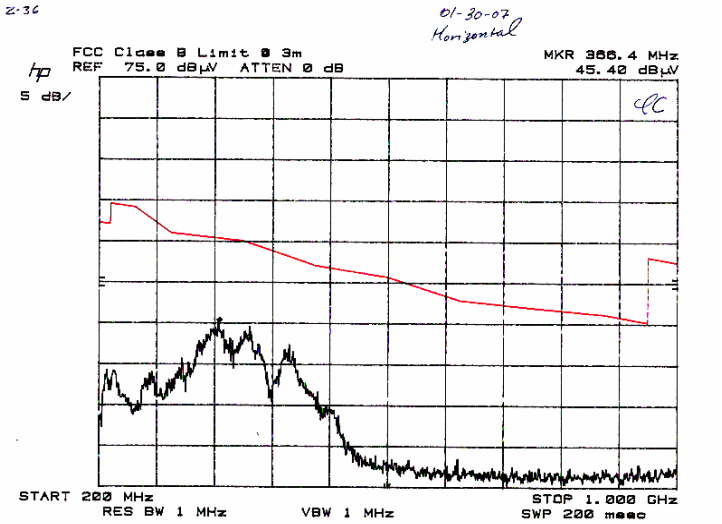


Figure 17 200MHz to 1GHz Horizontal (FM programmed to 107.9MHz)

4.3.4 Radiated Emissions – Car Cradle and XM Antenna only

4.3.4.1 Test Setup – Car Cradle and XM Antenna only

In this test setup, the EUT was placed into an **Xpress EZ** car cradle with an XM antenna, an XM Cassette Adapter and 5V Cigarette adapter (CLA) power supply connected to the radio under test. Diagram 3 below, and Photograph 5 in the document '**Xpress EZ**_Report_of_Measurements_test_set_up_photos.doc' depict the radiated emissions car cradle with XM antenna only test setup.

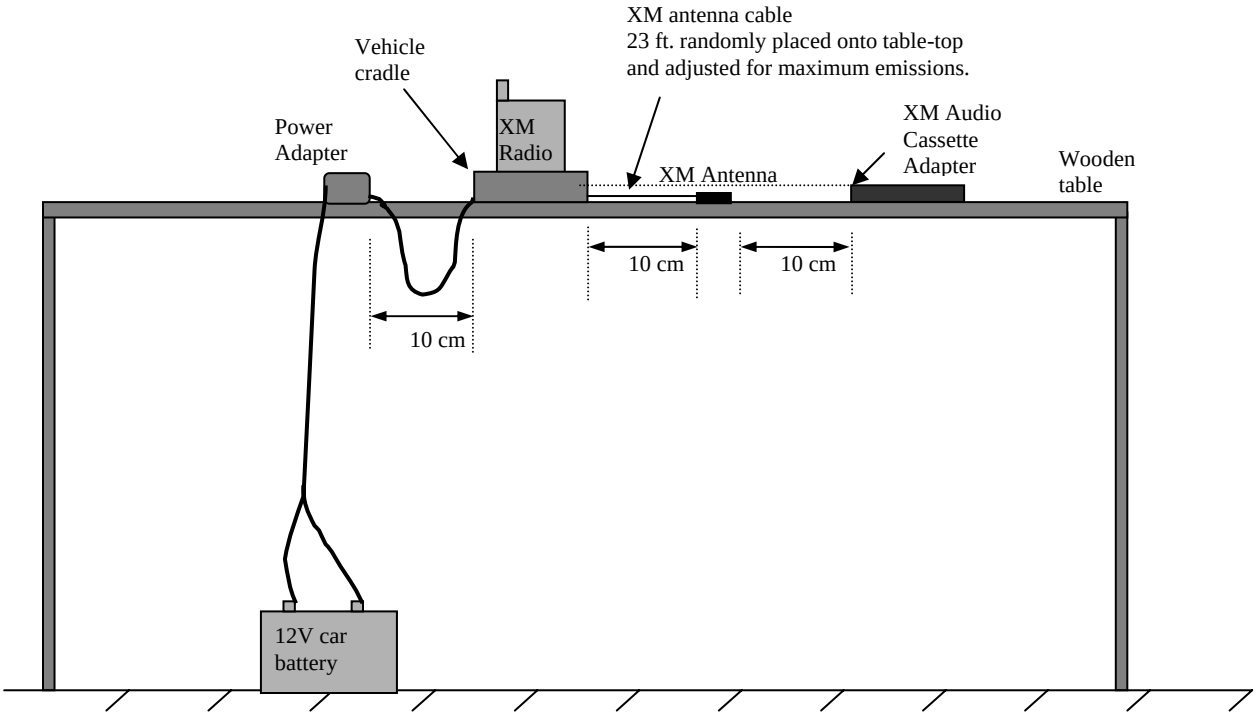


Diagram 3: XM Antenna Only - Radiated Emissions Setup

4.3.4.2 Test Data – Car Cradle, Cassette Adapter and XM Antenna only

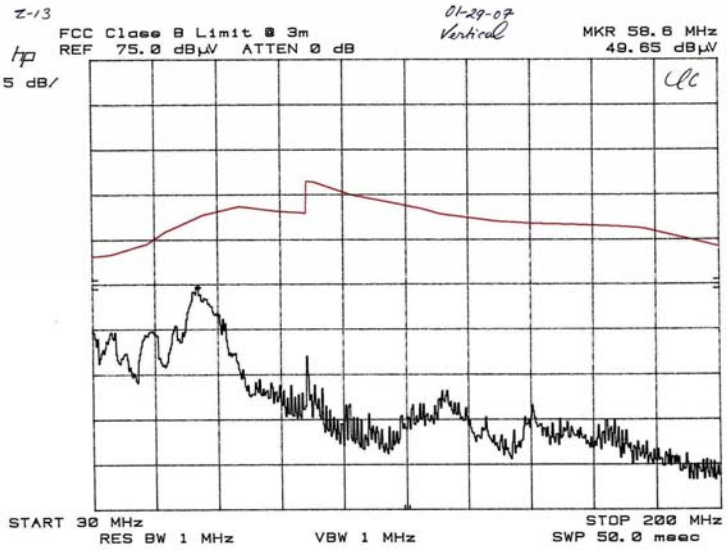


Figure 18 30MHz to 200MHz Vertical
(FM programmed to 88.1MHz)

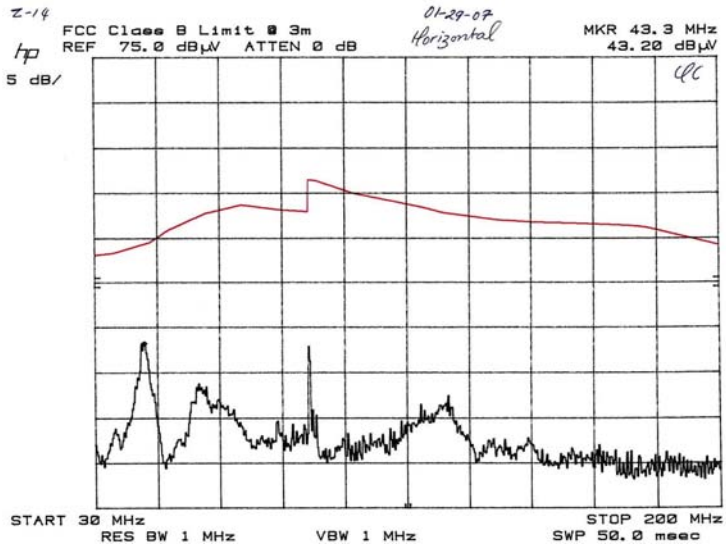


Figure 19 30MHz to 200MHz Horizontal
(FM programmed to 88.1MHz)

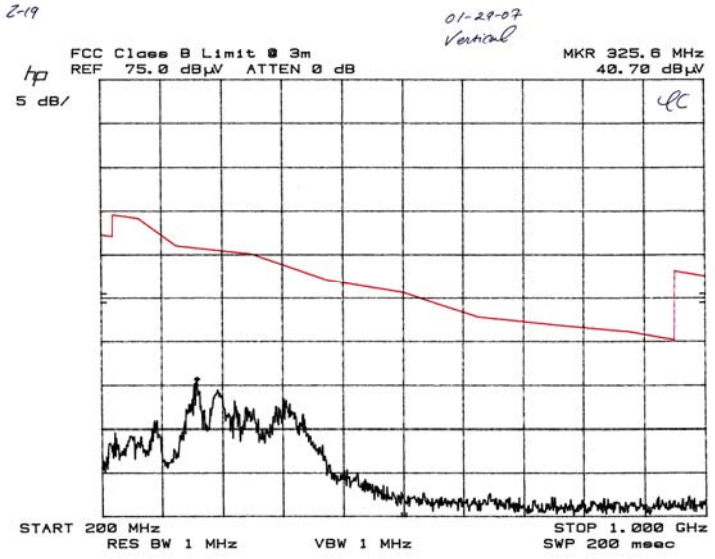


Figure 20 200MHz to 1GHz Vertical
(FM programmed to 88.1MHz)

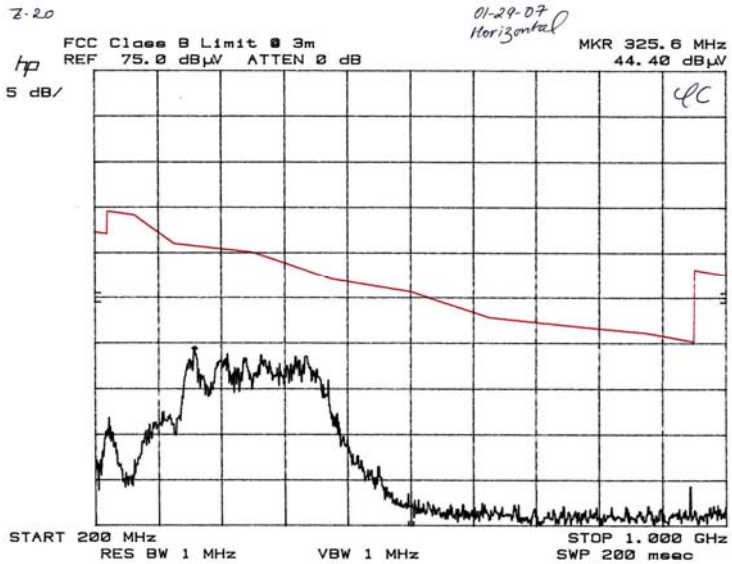


Figure 21 200MHz to 1GHz Horizontal
(FM programmed to 88.1MHz)

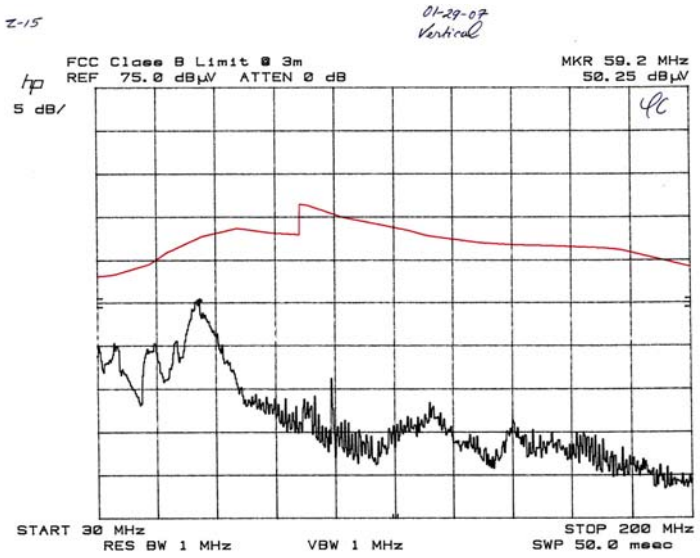


Figure 22 30MHz to 200MHz Vertical
(FM programmed to 96.9MHz)

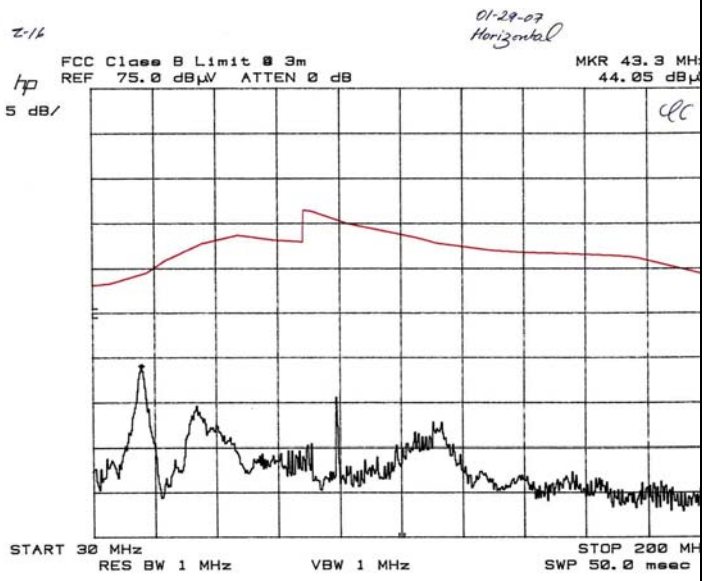


Figure 23 30MHz to 200MHz Horizontal
(FM programmed to 96.9MHz)

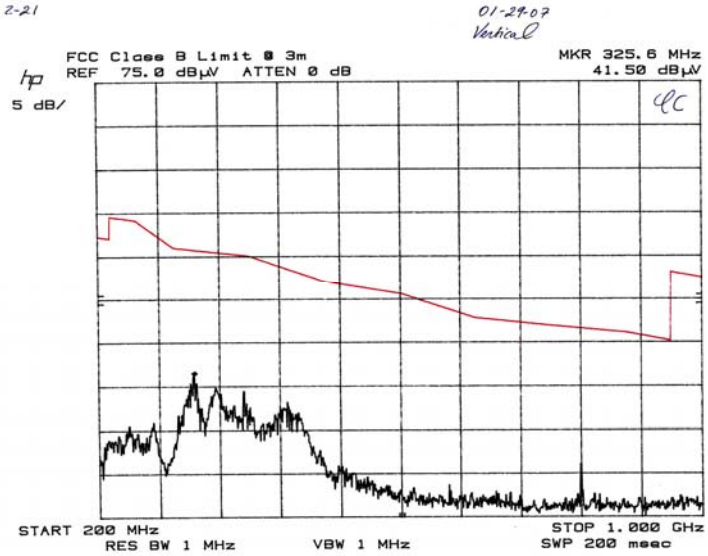


Figure 24 200MHz to 1GHz Vertical
(FM programmed to 96.9MHz)

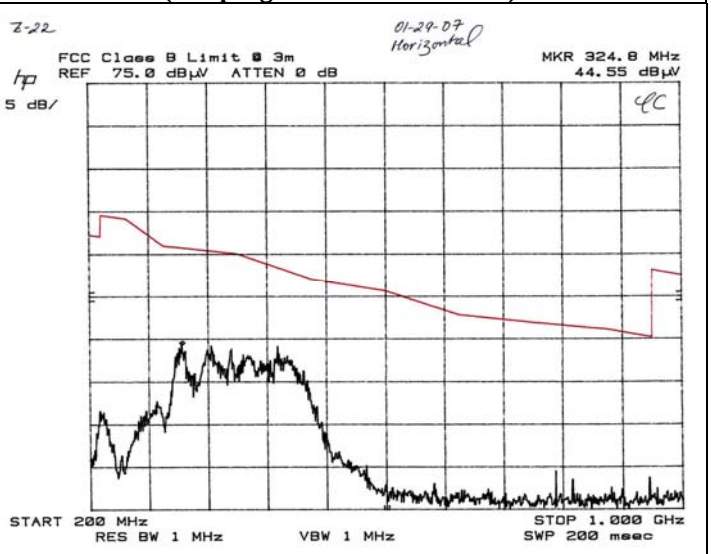


Figure 25 200MHz to 1GHz Horizontal
(FM programmed to 96.9MHz)

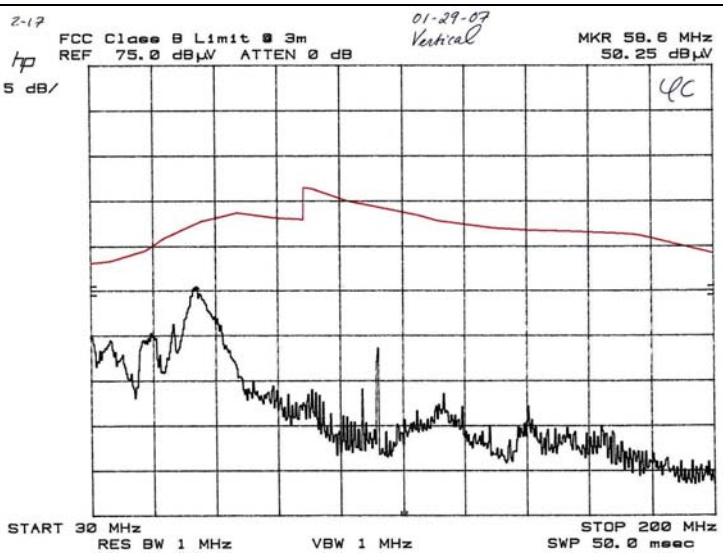


Figure 26 30MHz to 200MHz Vertical
(FM programmed to 107.9MHz)

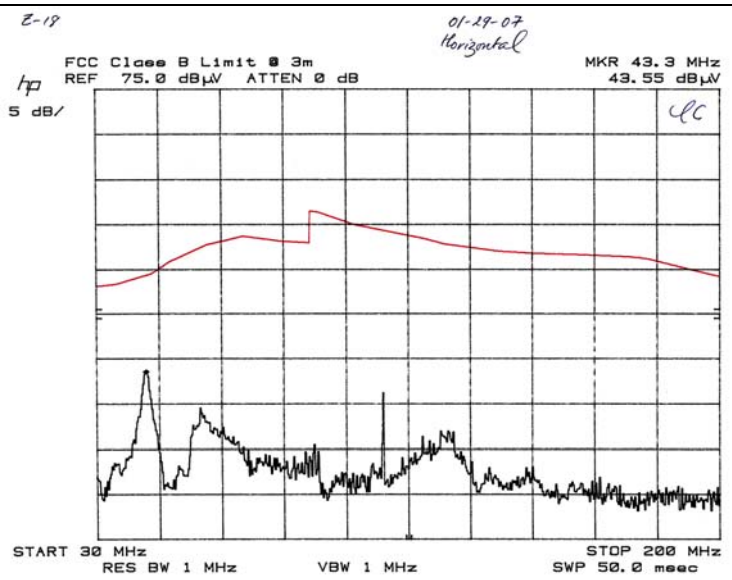


Figure 27 30MHz to 200MHz Horizontal
(FM programmed to 107.9MHz)

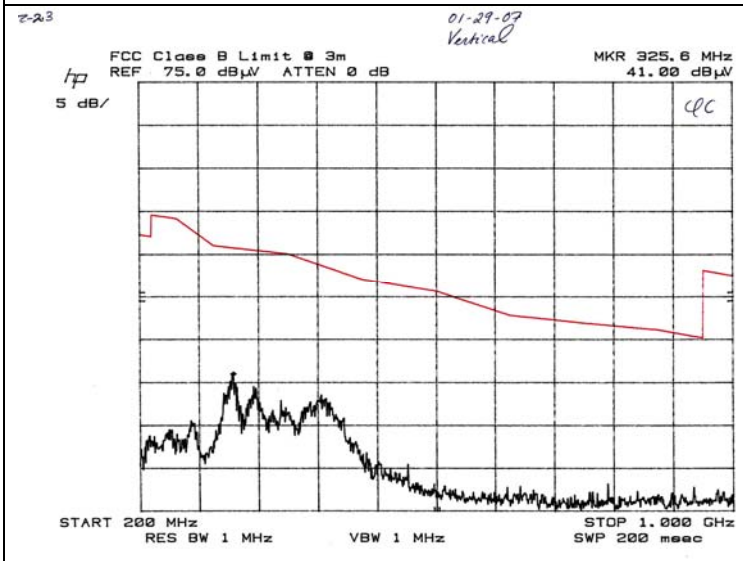


Figure 28 200MHz to 1GHz Vertical
(FM programmed to 107.9MHz)

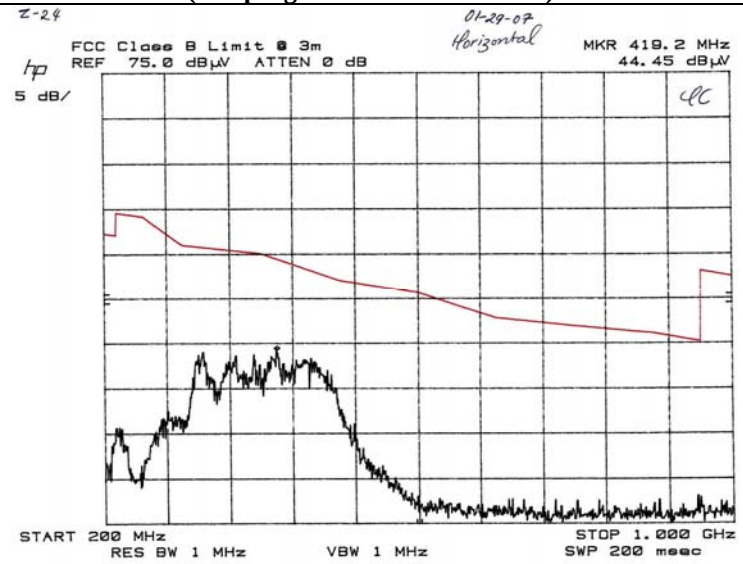


Figure 29 200MHz to 1GHz Horizontal
(FM programmed to 107.9MHz)

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

4.4.1 Test Setup – Using FM Aerial antenna

The XM Satellite Radio, Inc **Xpress EZ** receiver 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 Adapter 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)

In this test setup, the EUT was placed into an **Xpress EZ** car cradle with an XM FM Coupler attached to the RF jack of the car cradle. An XM car antenna is attached to the FM Coupler's RF jack. A 5V cigarette lighter adapter (CLA) power supply is connected to the radio, and powered by a car battery which is placed on the floor.

It should be noted that the limit line indicated in Figures 30-41 is for FCC Class B unintentional radiators. However, the allowable field strength for Intentional radiation as per Section 15.239 is 250 µV/m or 47.96 dBµV/m, which is 4.45 dB higher than the unintentional FCC Class B (43.5 dBµV/m) limit in this frequency range. As an example, the measured value at 96.9 MHz on Figure 35 was 1.33 dB (44.83 dBµV/m) above the FCC Class B unintentional limit, but it was 3.13 dB below the intentional Class B limit of 47.96 dBµV/m.

Diagram 4 below and photograph 6, representing the setup as described above, are in the separate document entitled, '**Xpress EZ** _Report_of_Measurements _test_set_up_photos.doc'.

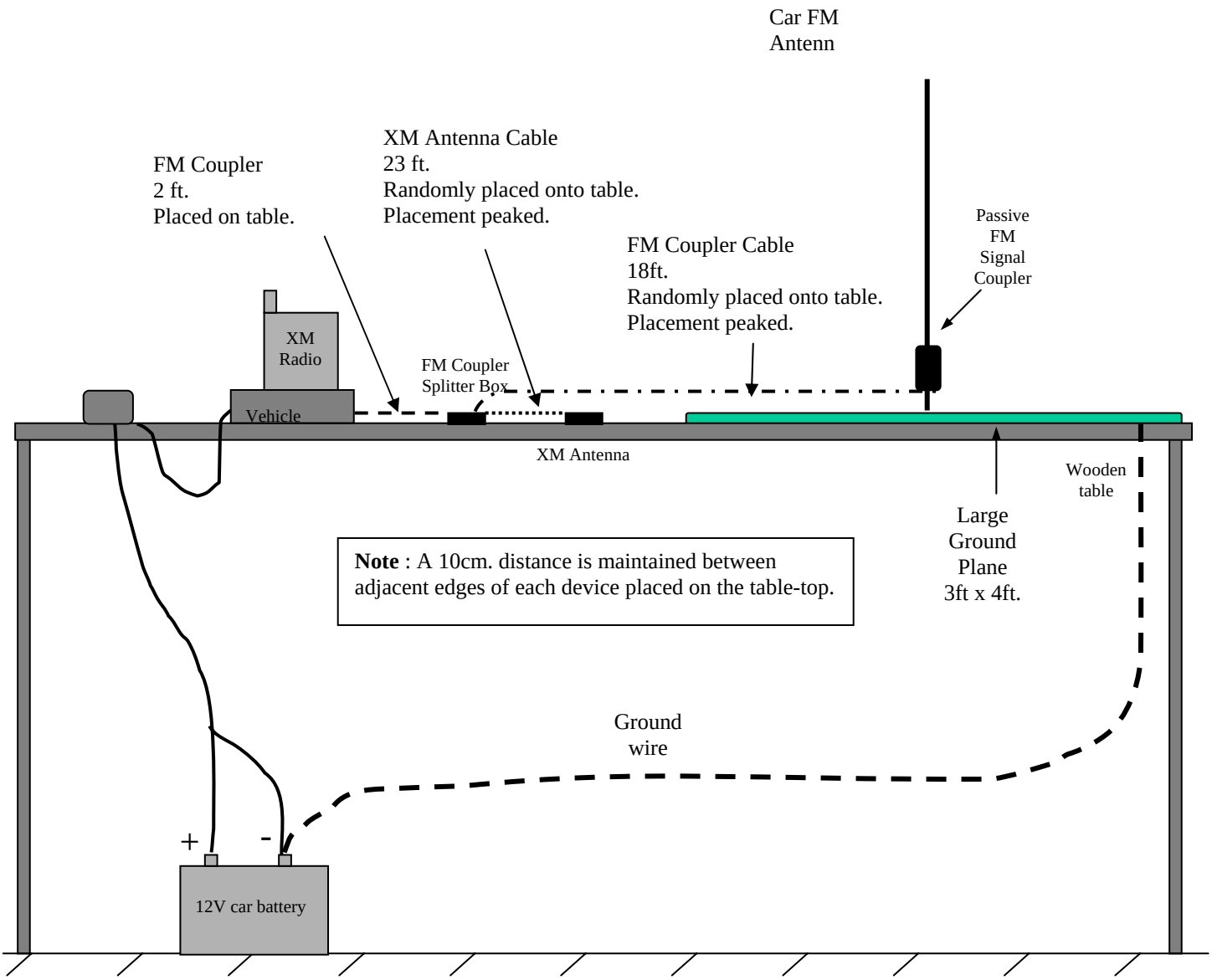


Diagram 4: Intentional Radiator – FM Aerial Setup

4.4.2 Test Data – FM Aerial Antenna; Audio Cable Out

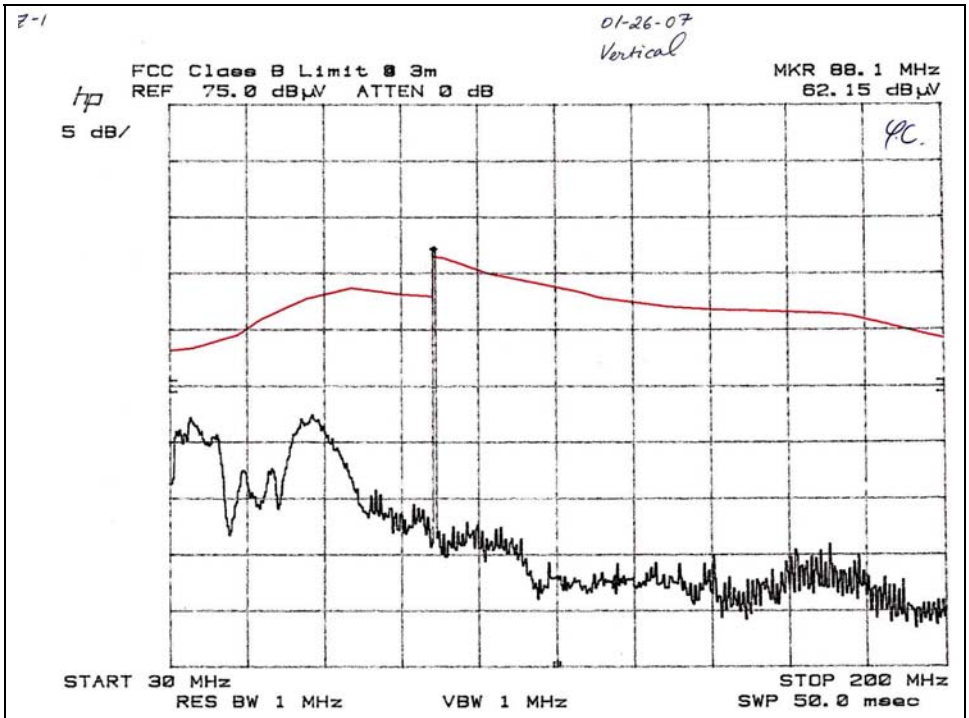


Figure 30 30MHz to 200MHz Vertical
(FM programmed to 88.1MHz)

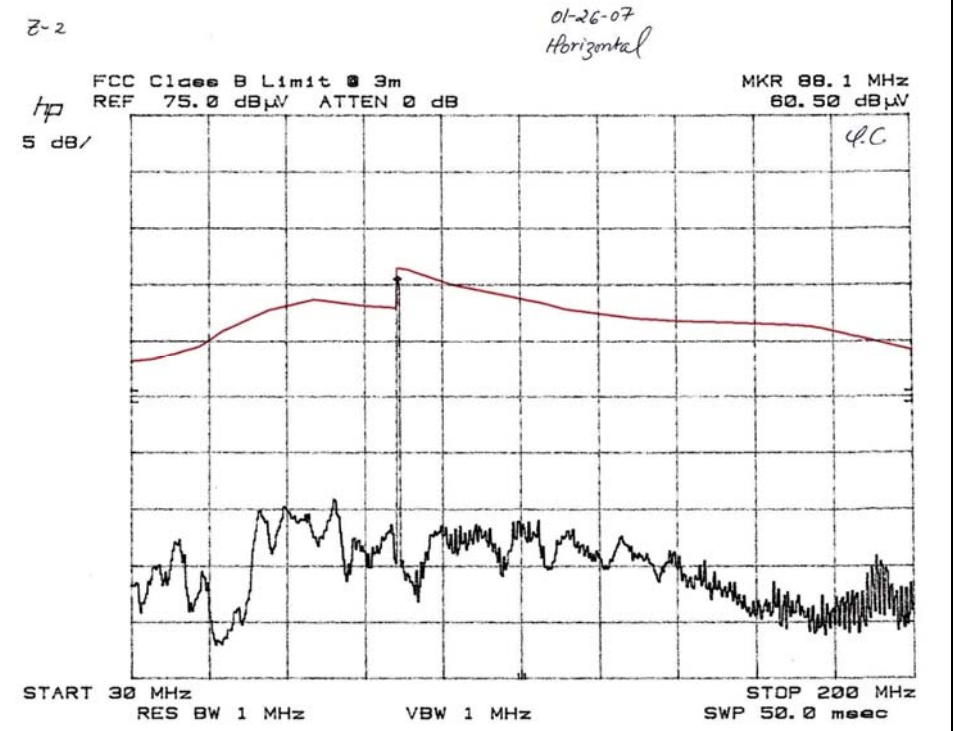


Figure 31 30MHz to 200MHz Horizontal
(FM programmed to 88.1MHz)

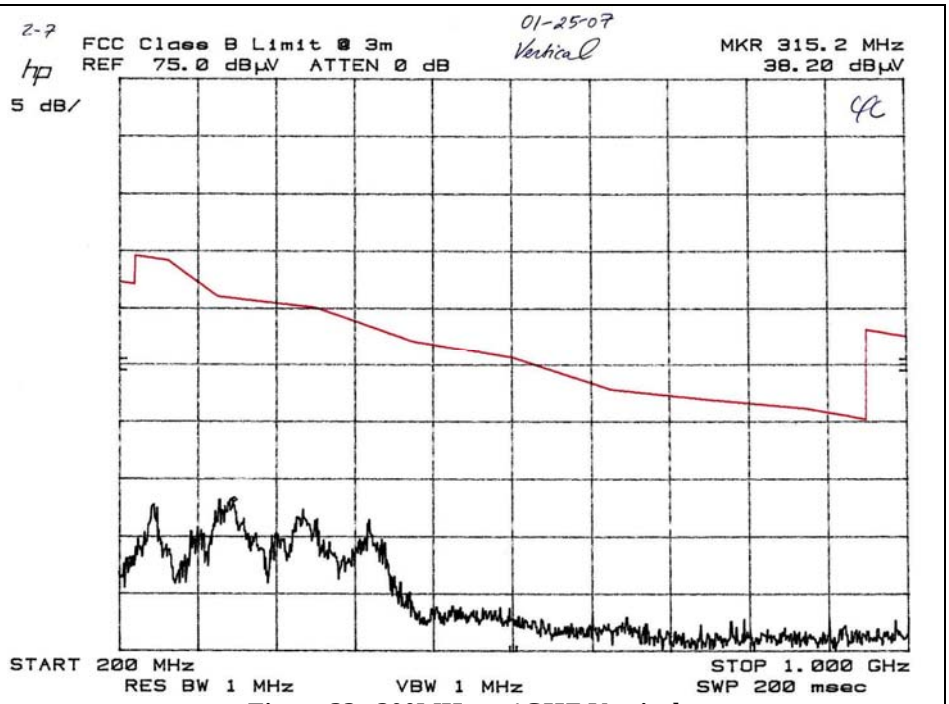


Figure 32 200MHz to 1GHZ Vertical
(FM programmed to 88.1MHz)

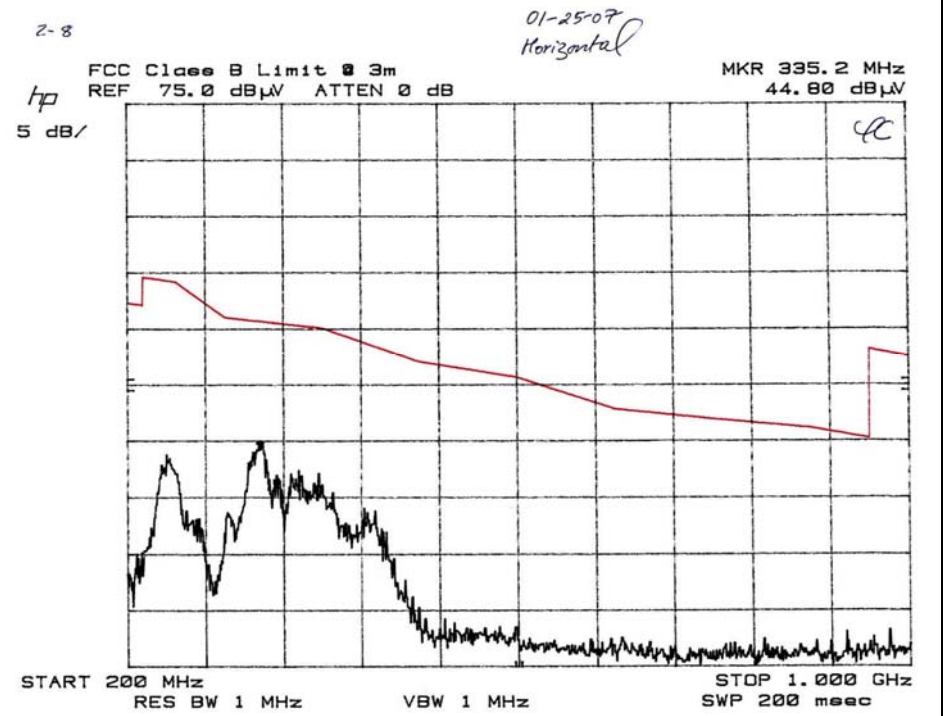


Figure 33 200MHz to 1GHz Horizontal
(FM programmed to 88.1MHz)

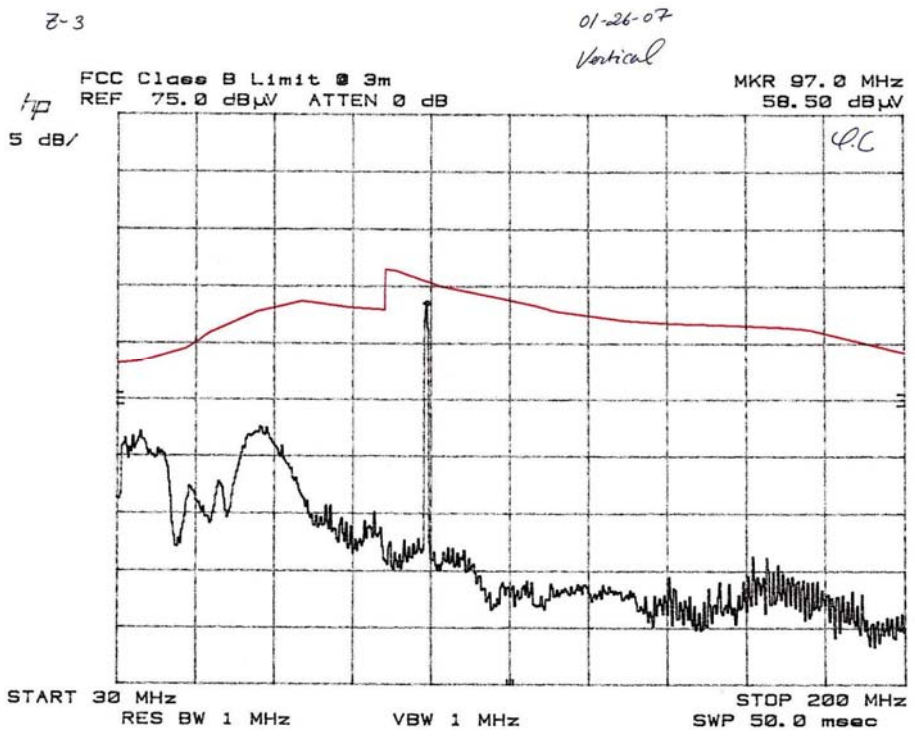


Figure 34 30MHz to 200MHz Vertical
(FM programmed to 96.9MHz)

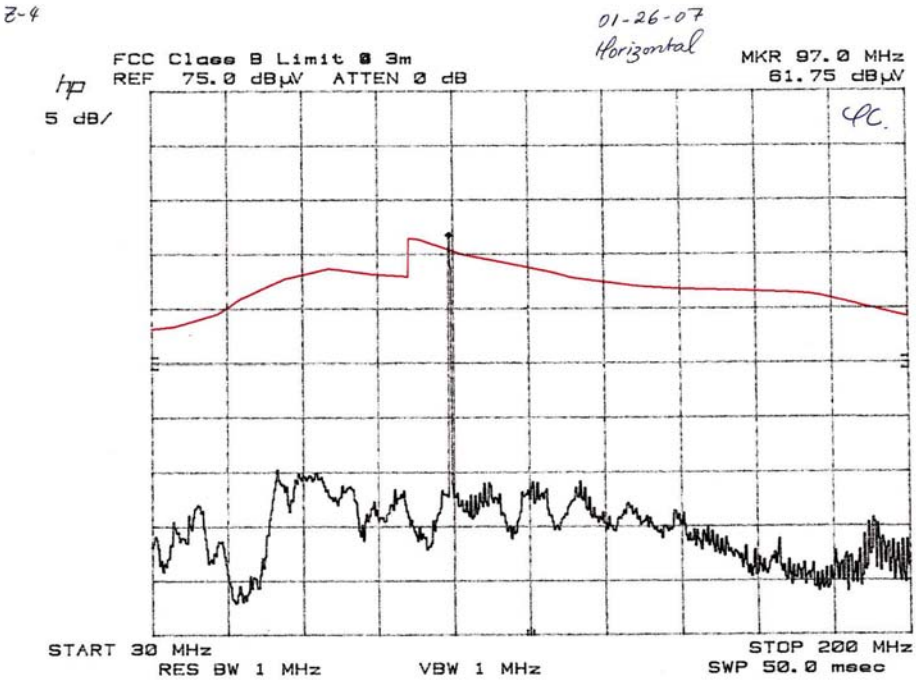


Figure 35 30MHz to 200MHz Horizontal
(FM programmed to 96.9MHz)

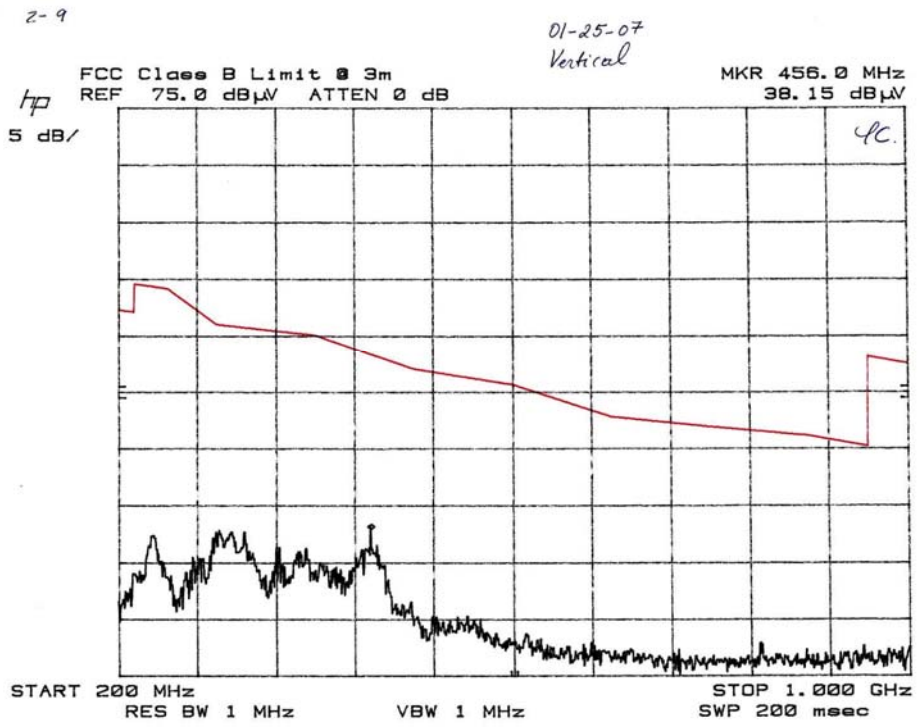


Figure 36 200MHz to 1GHZ Vertical
(FM programmed to 96.9MHz)

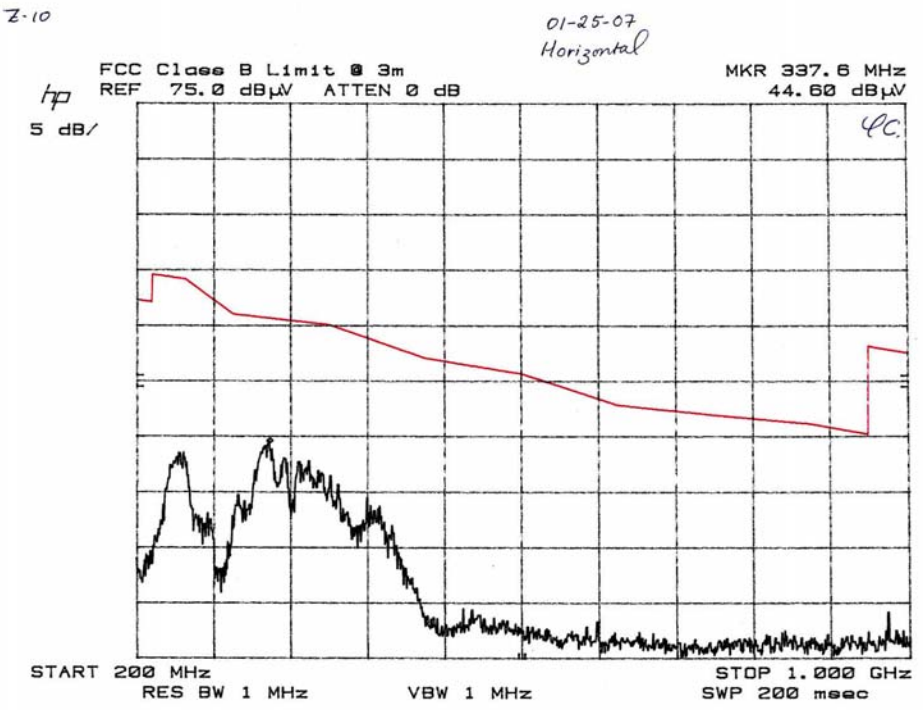


Figure 37 200MHz to 1GHz Horizontal
(FM programmed to 96.9MHz)

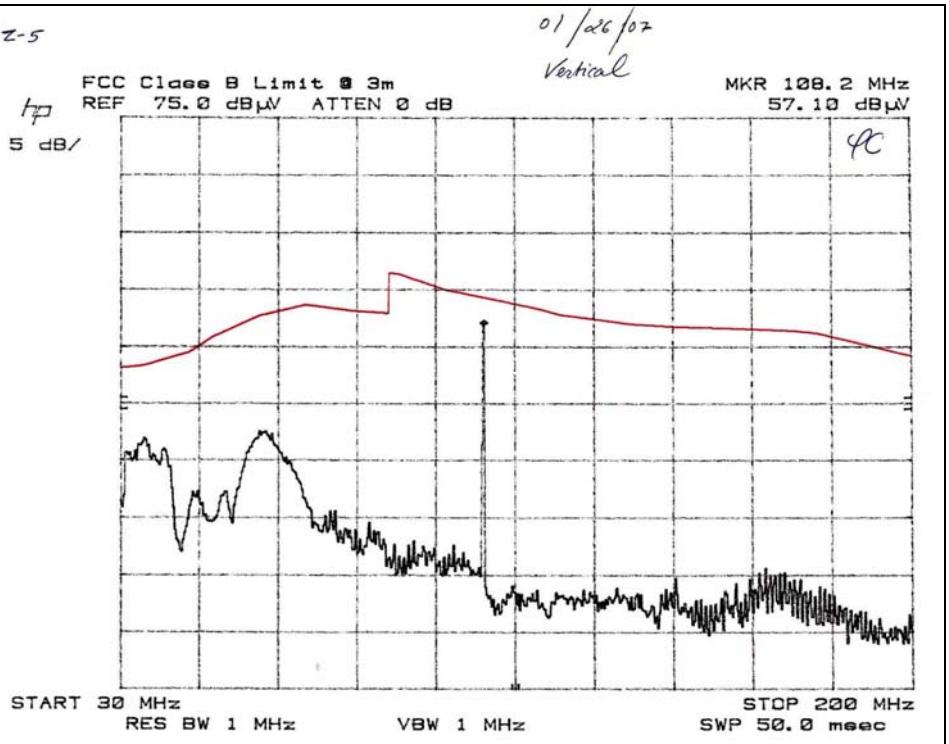


Figure 38 30MHz to 200MHz Vertical
(FM programmed to 107.9MHz)

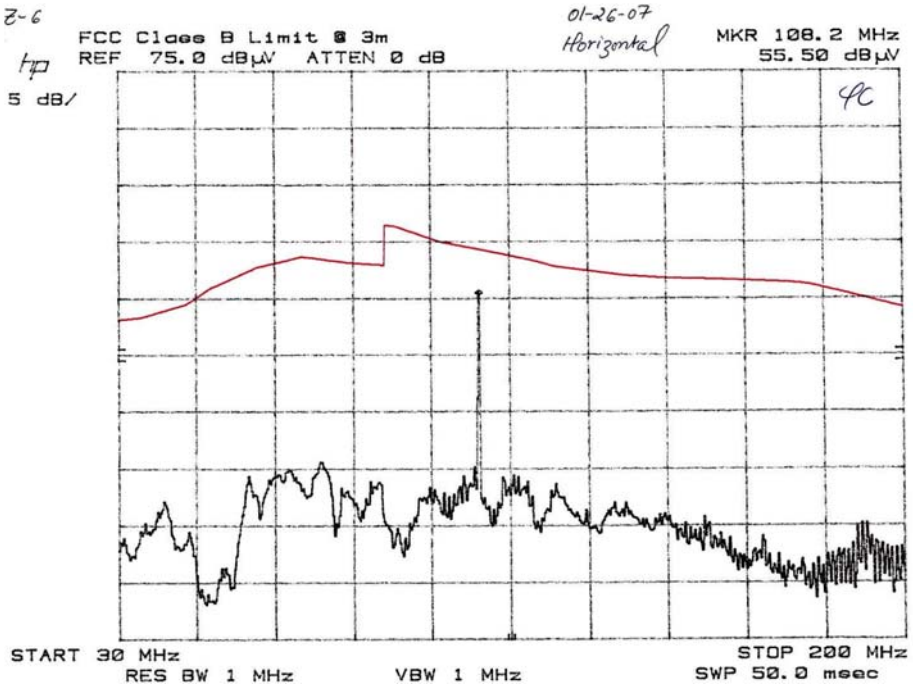


Figure 39 30MHz to 200MHz Horizontal
(FM programmed to 107.9MHz)

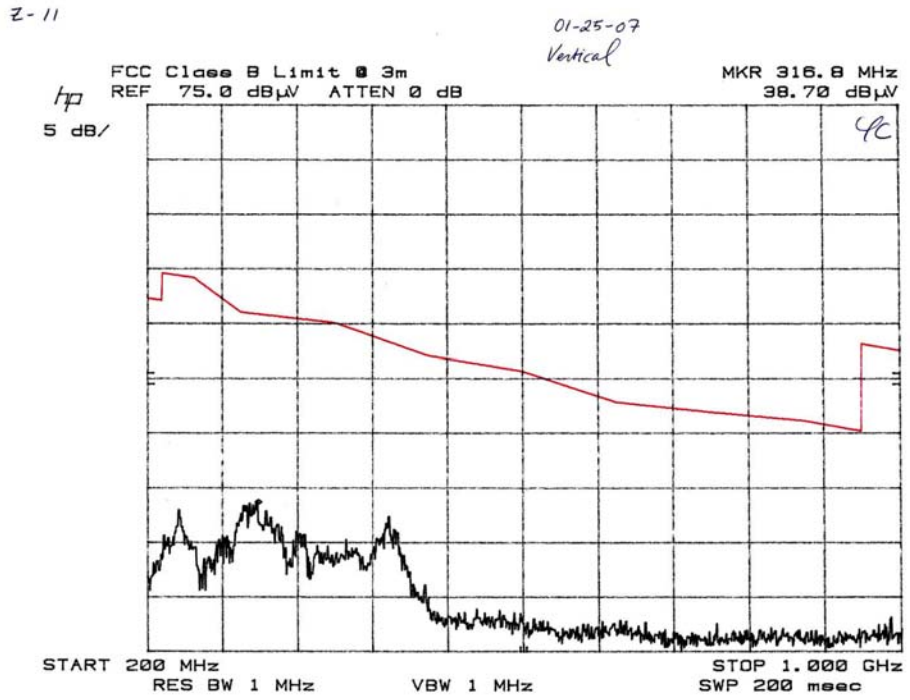


Figure 40 200MHz to 1GHz Vertical
(FM programmed to 107.9MHz)

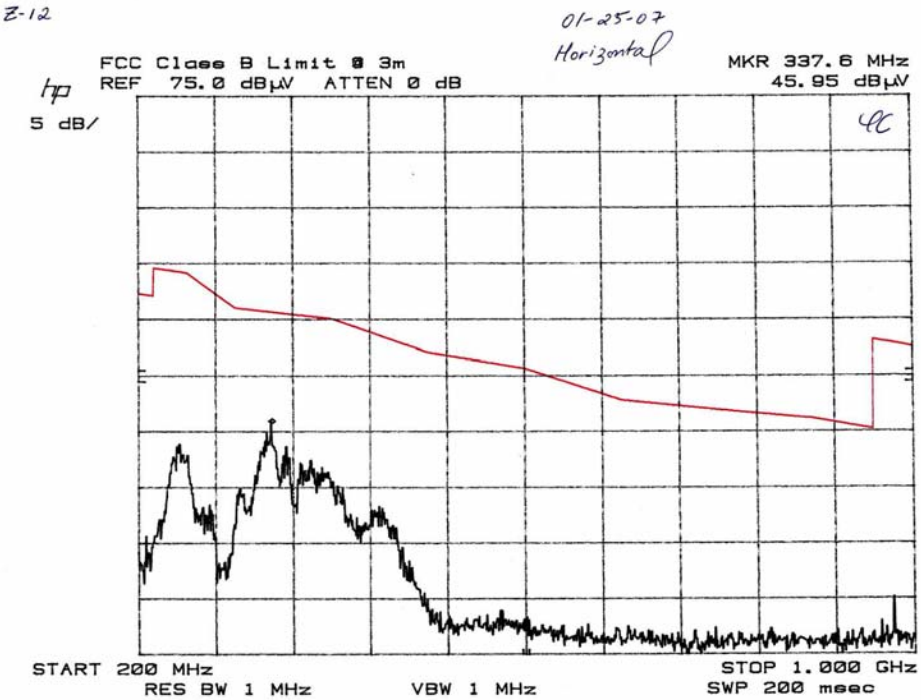


Figure 41 200MHz to 1GHz Horizontal
(FM programmed to 107.9MHz)

4.5 Tabular Data of Voltage Measurements

The following table shows voltage measurements for any emission that was within 5dB of the limit for all plots that were taken in the 3 meter chamber. Where noted, the QP measurement or intentional radiator limit is used.

		Peak Frequency	Peak Voltage	Correction Factor	Corrected Peak Voltage	FCC Limit	Margin to Limit
Figure	**Plot ID**	**(MHz)**	**(dBµV)**	**(dB)**	**(dBµV/m)**	**dBµV/m**	**dB**
2	Z-37	31.4	48.95[2]	13.2	35.75	40	4.25
3	Z-38	94.9	57.25	17.21	40.04	43.5	3.46
6	Z-25	30.0	49	13.15	35.85	40	4.15
10	Z-27	30.3	50.95	13.2	37.75	40	2.25
14	Z-29	30.0	50.3	13.15	37.15	40	2.85
30	Z-1	88.1	62.15	17.95	44.2	48[1]	3.8
31	Z-2	88.1	60.5	17.95	42.55	48[1]	5.45
35	Z-4	96.9	61.75	16.92	44.83	48[1]	3.17

Note 1 : The intentional radiator limit is used for these frequency points.
Note 2 : A quasi-peak detector measurement is used for these data points, and the Q.P. value is shown in the table.

Table 2: 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:

- Lexus SUV
- Toyota Camry
- Cadillac Escalade

4.6.1 Test Setup – In Vehicle Measurements

TEST PROCEDURE

1. The satellite radio receiver and FM Coupler 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 120 kHz and 300 kHz, 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 (88.7 MHz, 96.9 MHz and 107.1 MHz).
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 (MHz)	Vertical Polarization V-Factor	Horizontal Polarization H-Factor
88.7	-18.3 dB/m	-17.8 dB/m
96.9	-19.3 dB/m	-17.2 dB/m
107.1	-19.5 dB/m	-17.4 dB/m

Table 3: Calibration Factors for In-Vehicle Measurements

Diagram 5: In-Vehicle Measurement Method

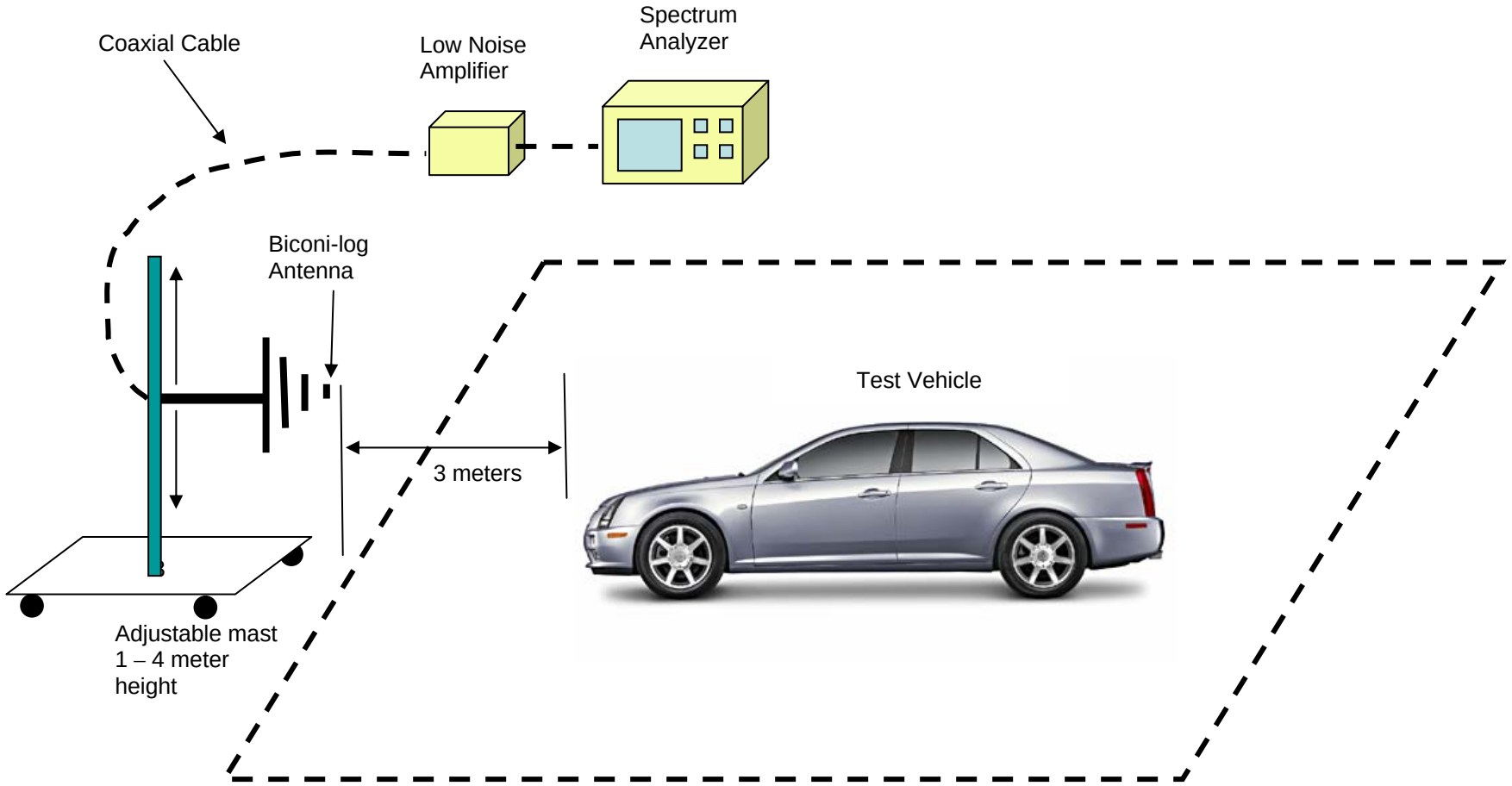
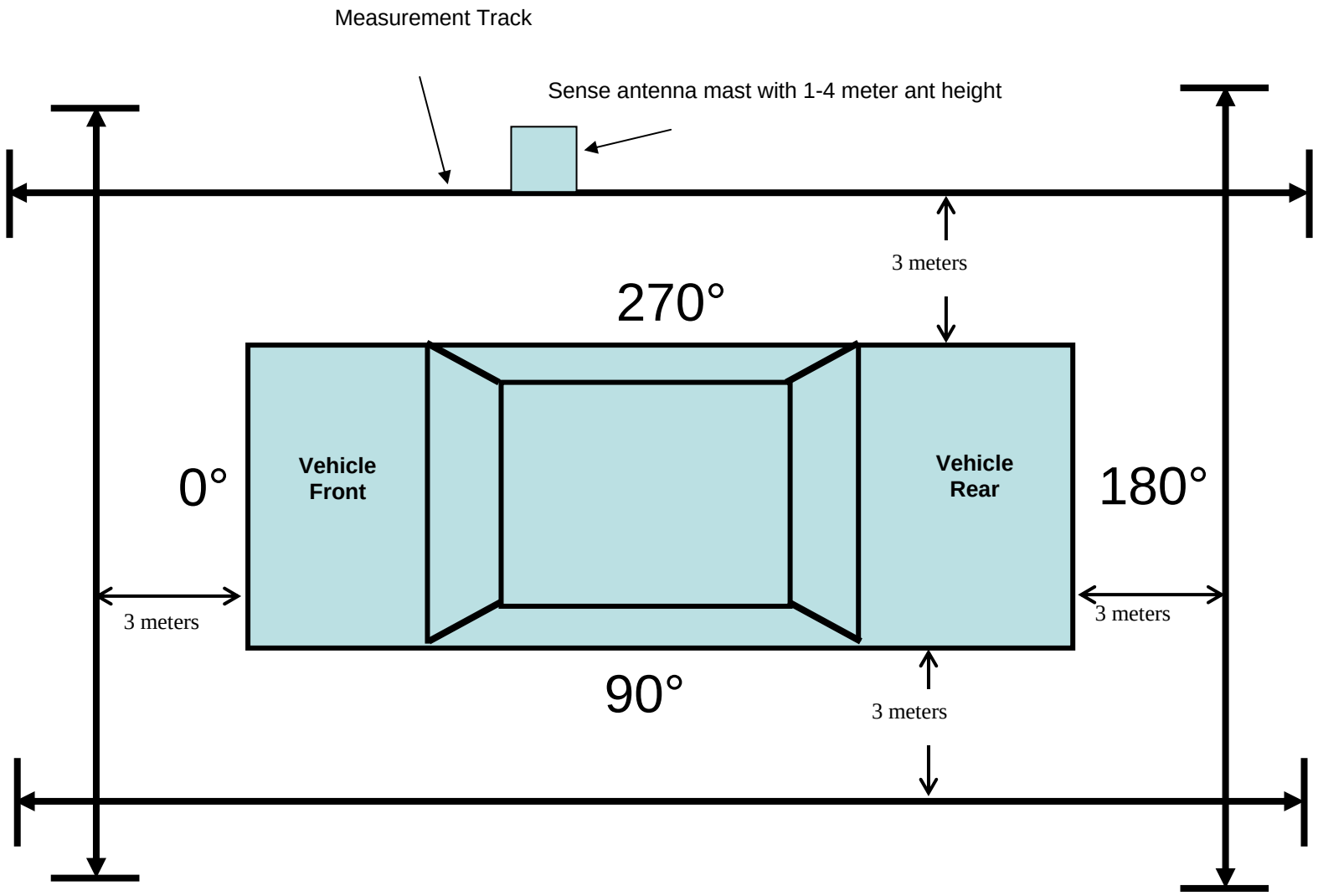


Diagram 6: In Vehicle Measurement Method



4.6.2 Test Data – In-Vehicle Measurements

Product Description	Freq (MHz)	V-factor (dB)	FAU OATS reading VERTICAL				Meas. Peak	Corr. Peak	Limit	Margin
			0 deg	90 deg	180 deg	270 deg	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
Lexus SUV	88.7	-18.30	37.5	47.7	51.0	50.6	51.0	32.7	48	15.4
	96.9	-19.30	46.8	49.0	51.2	52.8	52.8	33.5	48	14.5
	107.1	-19.50	54.6	51.1	56.0	53.2	56.0	36.5	48	11.6
Toyota Camry	88.7	-18.30	49.3	46.8	54.2	47.2	54.2	35.9	48	12.1
	96.9	-19.30	56.15	53.3	64.5	55.8	64.5	45.2	48	2.8
	107.1	-19.50	52.2	53.5	58.8	52.3	58.8	39.3	48	8.7
Cadillac Escalade	88.7	-18.30	50.7	51.2	56.8	58.9	58.9	40.6	48	7.4
	96.9	-19.30	53.6	57.1	61.1	64.6	64.6	45.3	48	2.7
	107.1	-19.50	49.5	54.6	58.7	63.0	63.0	43.5	48	4.5

Table 4: Vertical Polarization results from In-Vehicle Measurements

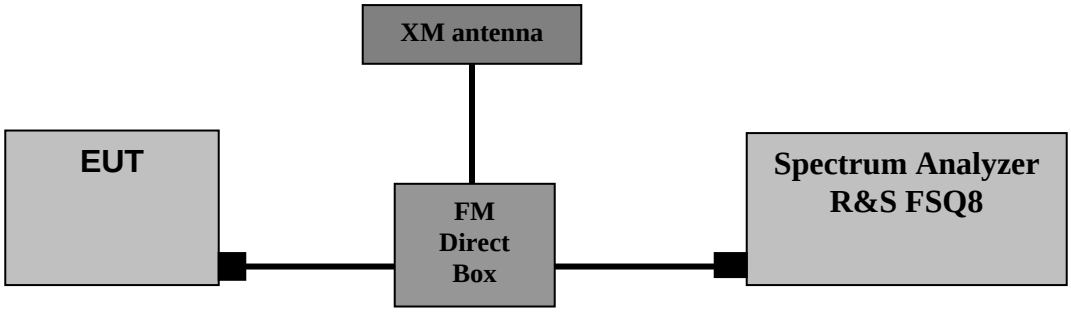
Product Description	Freq (MHz)	H-Factor (dB)	FAU OATS reading HORIZONTAL				Meas. Peak	Corr. Peak	Limit	Margin
			0 deg	90 deg	180 deg	270 deg	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
Lexus SUV	88.7	-17.8	36.8	42.6	35.9	37.3	42.6	24.8	48	23.2
	96.9	-17.2	41.4	42.5	46.5	44.7	46.5	29.3	48	18.8
	107.1	-17.4	46.1	45.9	49.2	51.1	51.1	33.7	48	14.3
Toyota Camry	88.7	-17.8	45.2	49.2	43.6	51.6	51.6	33.8	48	14.3
	96.9	-17.2	52.5	58.3	53.6	60.4	60.4	43.2	48	4.8
	107.1	-17.4	50.4	55.8	51.3	54.4	55.8	38.4	48	9.7
Cadillac Escalade	88.7	-17.8	49.6	48.1	48.0	52.6	52.6	34.8	48	13.2
	96.9	-17.2	51.6	53.1	52.3	52.4	53.1	35.9	48	12.1
	107.1	-17.4	49.2	49.1	50.2	48.6	50.2	32.8	48	15.3

Table 5: 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 adapter to maximize the power into the spectrum analyzer. The unit was programmed to the minimum and maximum FM frequencies as well as one mid-range frequency (88.1 MHz, 96.9 MHz and 107.9 MHz) while receiving live over-the-air signal. *It was verified that the unit could not be programmed outside of this frequency range.* The FM audio level was maximized to find the highest occupied bandwidth. Photograph 16, representing the setup as described above, is in the separate document entitled, '**Xpress EZ**_Report_of_Measurements_test_set_up_photos.doc'.



4.7.2 Test Data – Occupied Bandwidth

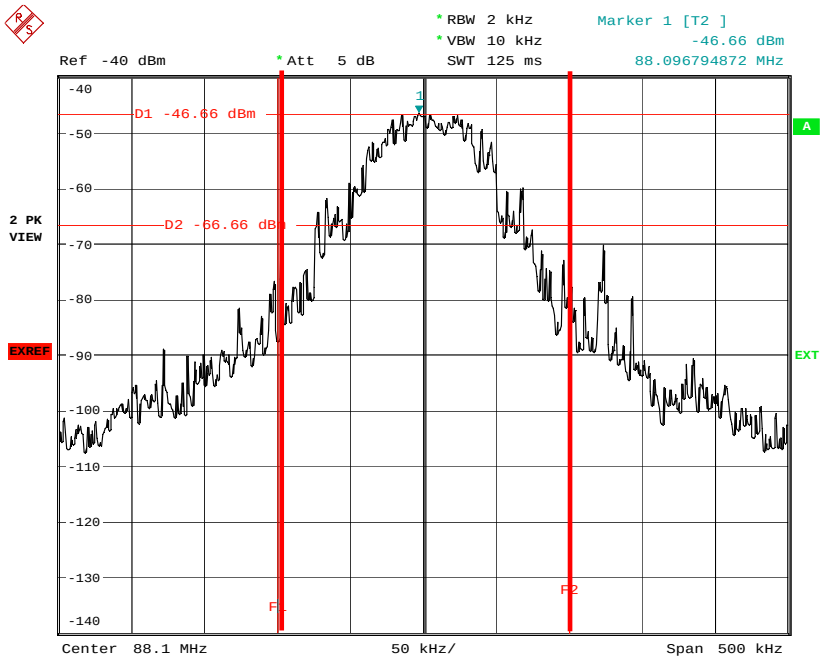


Figure 42 88.1MHz With Modulation

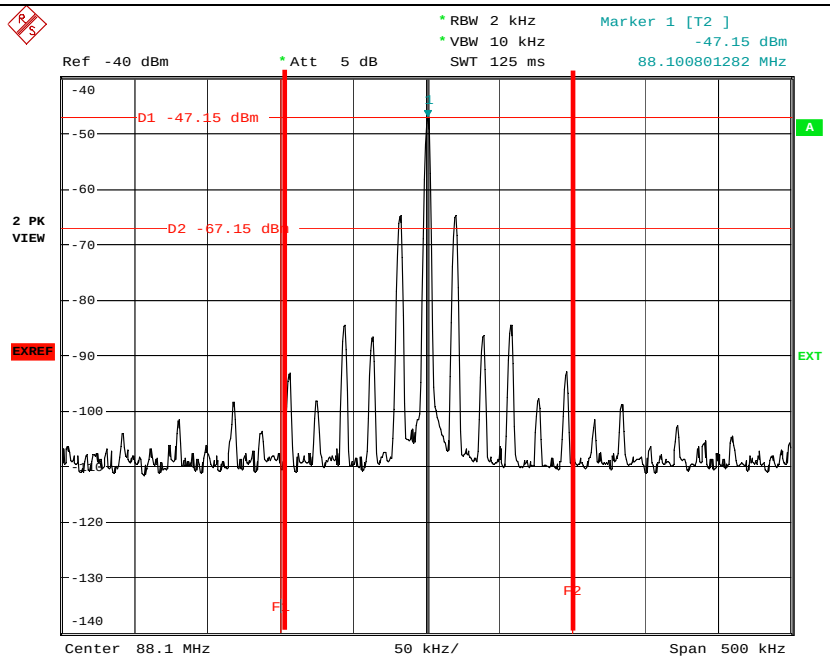


Figure 43 88.1MHz No Modulation

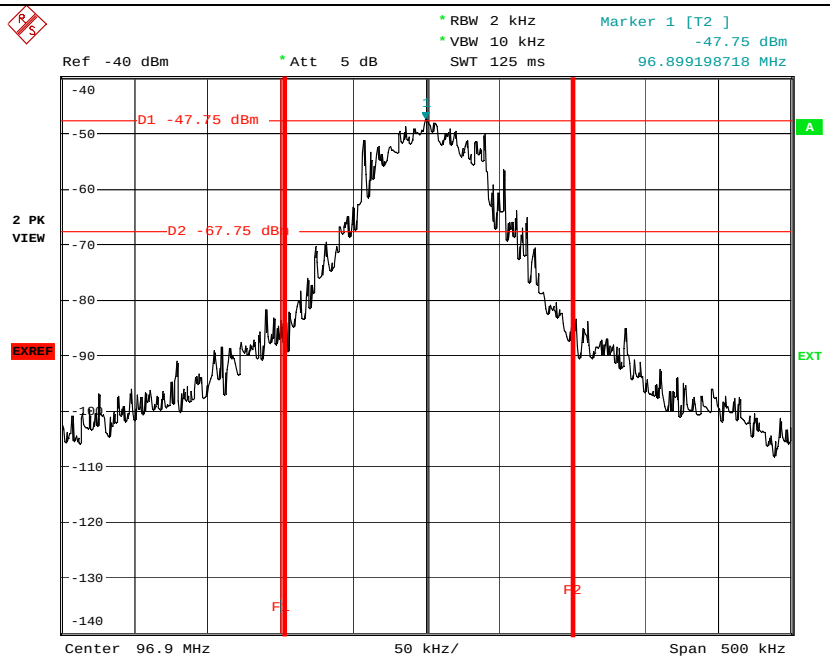


Figure 44 96.9MHz With Modulation

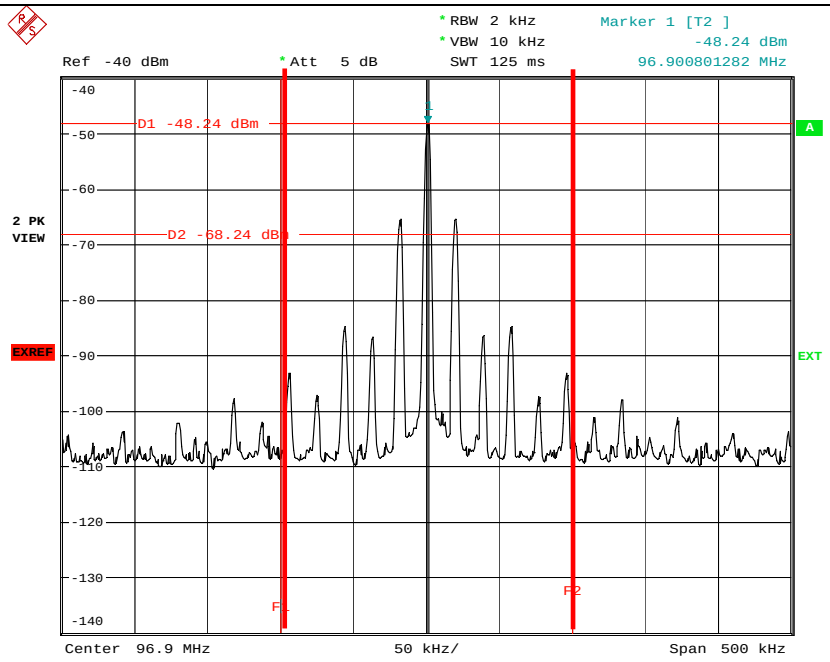
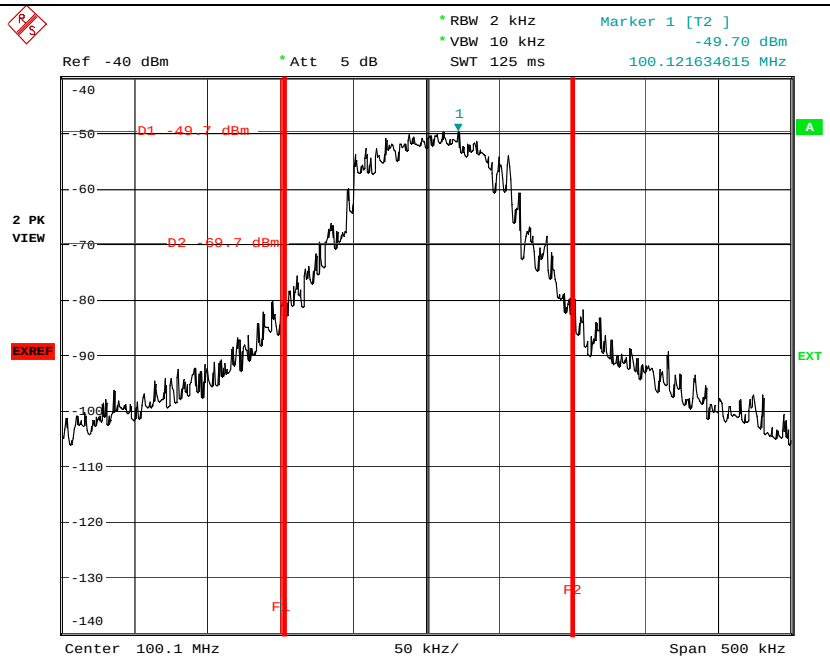
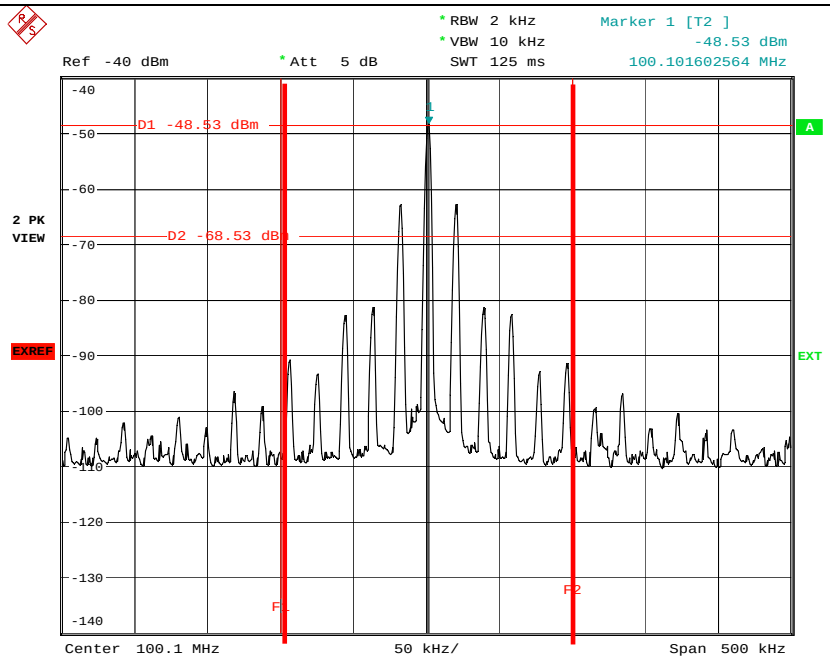


Figure 45 96.9MHz No Modulation



Date: 14.FEB.2007 09:58:17

Figure 46 100.1 MHz With Modulation



Date: 14.FEB.2007 10:00:34

Figure 47 100.1MHz No Modulation

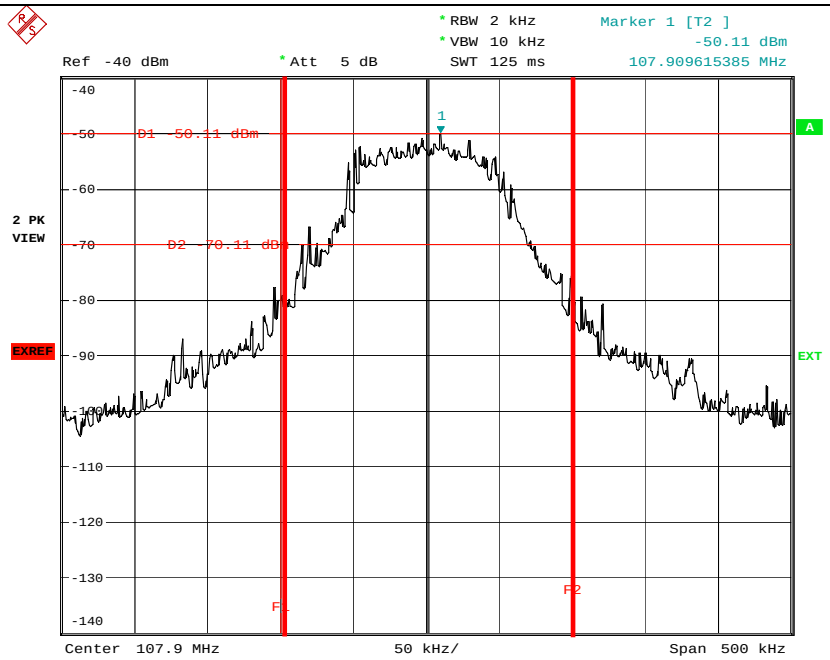


Figure 48 107.9MHz With Modulation

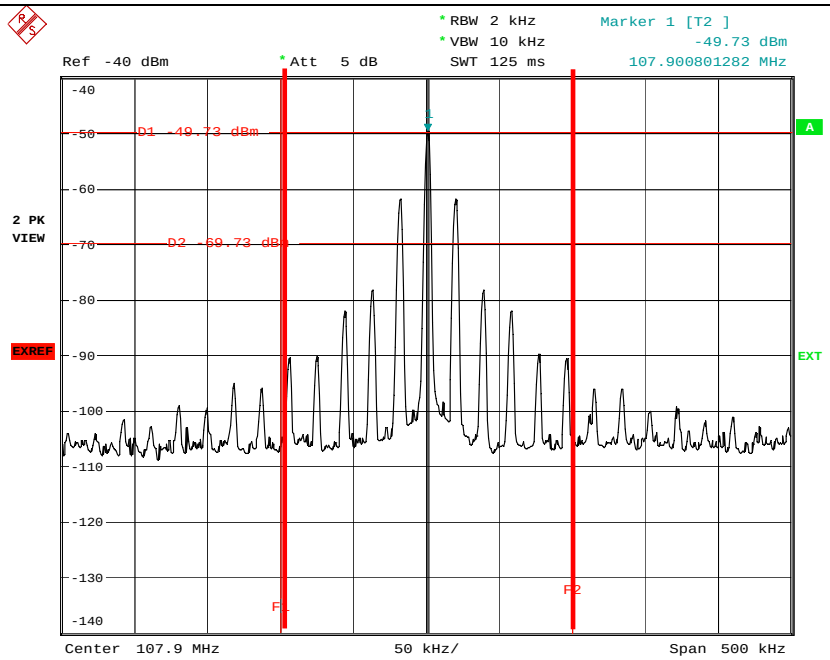


Figure 49 107.9MHz No Modulation

4.8 TEST EQUIPMENT

FAU EMI LAB

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	LISN	3825/2R	1095	March-10-06	2

IN-VEHICLE TEST SETUP

Equipment Type	**Manufacturer**	**Model**	**Cal Date**	**Due Date**
Spectrum Analyzer	Rhode & Schwarz	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	Rhode & Schwarz	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