

Retlif Testing Laboratories

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FCC Test Results

On

XM Radio Receiver
Containing an
88 to 108 MHz Low Power Transmitter
FCC ID Number: RS2R101B

Customer Name: XM Radio

Customer P.O.: 115178-0-IECH

Date of Results: August 14, 2006

Test Results No.: R-11574-1

Test Start Date: August 3, 2006

Test Finish Date: August 9, 2006

Test Technician: R. Aina

Test Engineer: D. Lerner

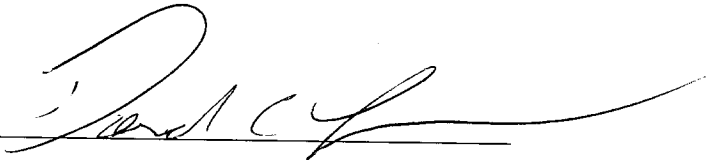
Supervisor: R. J. Reitz

Results Prepared By: W. Balgobin

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Donald C. Lerner
EMC Test Engineer



Richard J. Reitz
Corporate Laboratory Manager

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Non-Endorsement

This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement or certification of the product or material tested. This test report may not be used by the client to claim product endorsement by NVLAP, NIST or any agency of the U.S. Government.



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Test Results No. R-11574-1

Test Program Summary

Test Results Number:	R-11574-1
Customer:	XM Radio
P.O. Number:	115178-0-IECH
Test Sample:	XM Radio Receiver containing an 88 to 108 MHz Low Power Transmitter
Brandname:	Sportscaster
Model Number:	R101
Serial Number:	1FL0619000874
FCC ID Number:	RS2R101B

Test Specification:

- FCC Rules and Regulations, Part 15, Subpart C, Paragraph 15.239 (a) (b) (c).
- FCC Rules and Regulations, Part 15, Subpart B, Paragraph 15.107 (a) and 15.109 (a).
- FCC Rules and Regulations, Part 15, Subpart A, Paragraph 15.31 (d).
- ANSI C63.4-2003 (American National Standard for Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz).

Modes of Operation:

- During FCC Part 15 Subpart C, Paragraph 15.239 (b)(c) radiated emissions tests; the EUT was configured to transmit a continuous Frequency Modulated (FM) frequency with normal modulation at 88.1, 96.9 and 107.9 MHz onto a representative FM aerial antenna.
- During FCC Part 15 Subpart C, Paragraph 15.239 (b)(c) radiated emissions tests; the EUT was configured to transmit a continuous Frequency Modulated (FM) frequency with normal modulation at 88.1, 96.9 and 107.9 MHz into an XM antenna.
- During FCC Part 15 Subpart C, Paragraph 15.239 (a) bandwidth tests, the EUT was configured to transmit a continuous Frequency Modulated (FM) frequency with normal modulation at 88.1, 96.9 and 107.9 MHz and without modulation.
- During FCC Part 15 Subpart B, Paragraph 15.107(a) conducted emissions tests and 15.109(a) radiated emissions tests; the EUT was configured to receive an XM satellite radio signal then send the audio out to support stereo speakers and through an FM Direct module to an FM Aerial antenna.

Notes:

All Radiated and Conducted Emissions test data contained within this test report was acquired by Florida Atlantic University. Retlif was contracted only to complete the test report and files associated with the filing for certification. Inquiries regarding test data should be directed to Florida Atlantic University.



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Test Methods:

The following table depicts the test methods that were performed on the XM Radio Receiver and the corresponding test results:

FCC Paragraph	Test Method	Test Results
15.239(a)	Occupied Bandwidth	Complied
15.239(b)	Radiated Emissions Fundamental Field Strength	Complied
15.239(c)	Radiated Emissions, Spurious	Complied
15.109(a)	Radiated Emissions	Complied
15.107(a)	Conducted Emissions	Complied



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Revision History

Revision	Date	Pages Affected
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Bandwidth Test Method

- The satellite radio receivers were placed on a bench.
- The satellite radio receivers were directly connected to a spectrum analyzer using the antenna port and an XM FM Direct accessory.
- The satellite radio receivers were set to three of the operating frequencies utilizing normal modulation and no modulation.
- The adjustment for FM audio level was set to maximum to measure the peak modulation bandwidth of the unit.
- The RBW and VBW of the spectrum analyzer was set to 10 kHz and 30 kHz respectively with a convenient span to include the 200 kHz bandwidth of emission.
- Display lines were used to measure the bandwidth from the peak of the emission to -20 dB below the peak.
- The above procedure was repeated until all of the selected fundamental frequencies were completed.



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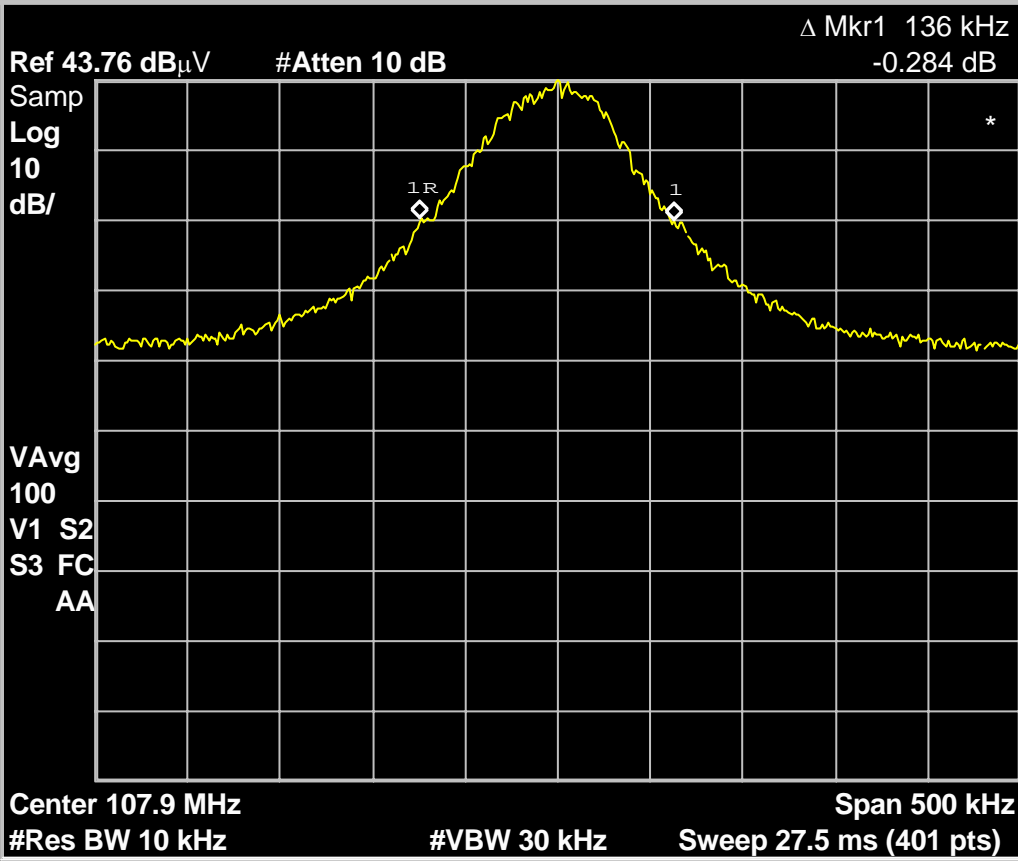
Test Results No. R-11574-1

15.239(a), Occupied Bandwidth
Test Data



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Marker

Select Marker 1 2 3 4

Normal

Delta

Band Pair Start Stop

Span Pair Span Center

Off

More 1 of 2

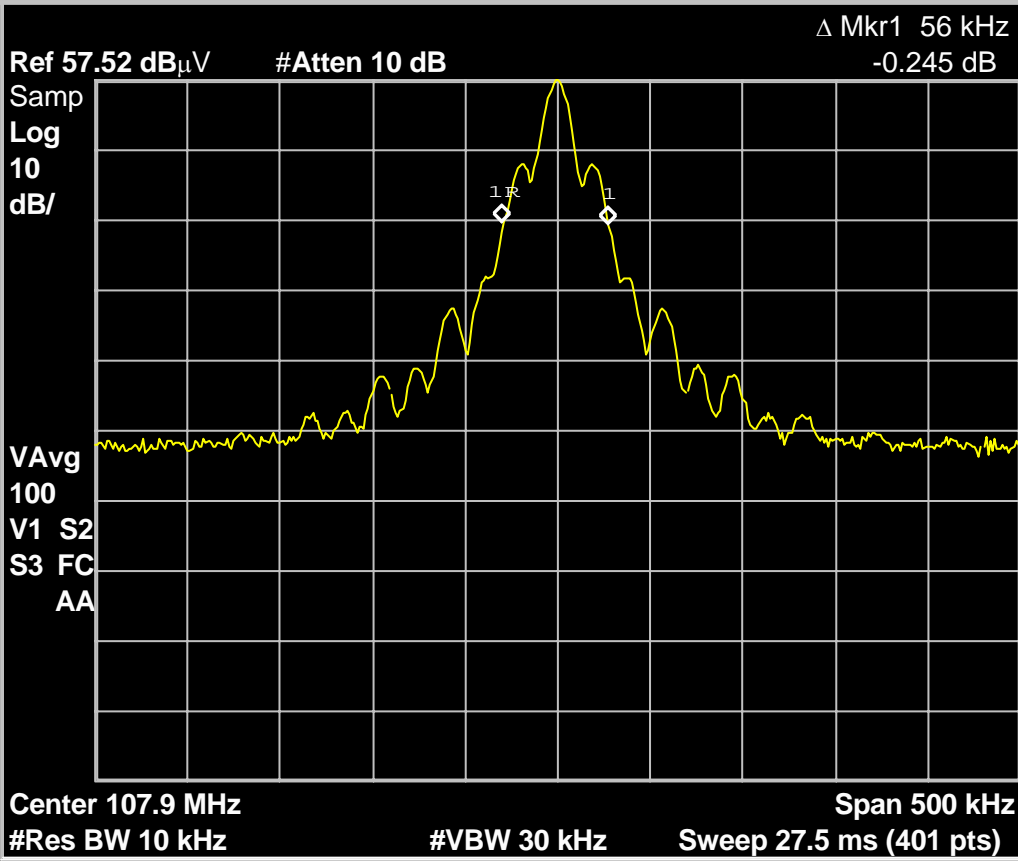
FCC Part 15, Subpart C, Section 15.239(a) Bandwidth
 EUT Transmitting at 107.9 MHz, Modulation applied
 The bandwidth of the emission was confined within a band 200 kHz wide centered on the operating frequency

Customer	XM Radio	
Test Sample	XM Radio Receiver	
Brand Name	Sportscaster	
Date: 8-4-2006	Tech: D. Lerner	Sheet 1 of 6



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Marker

Select Marker
1 2 3 4

Normal

Delta

Band Pair
Start Stop

Span Pair
Span Center

Off

More
1 of 2

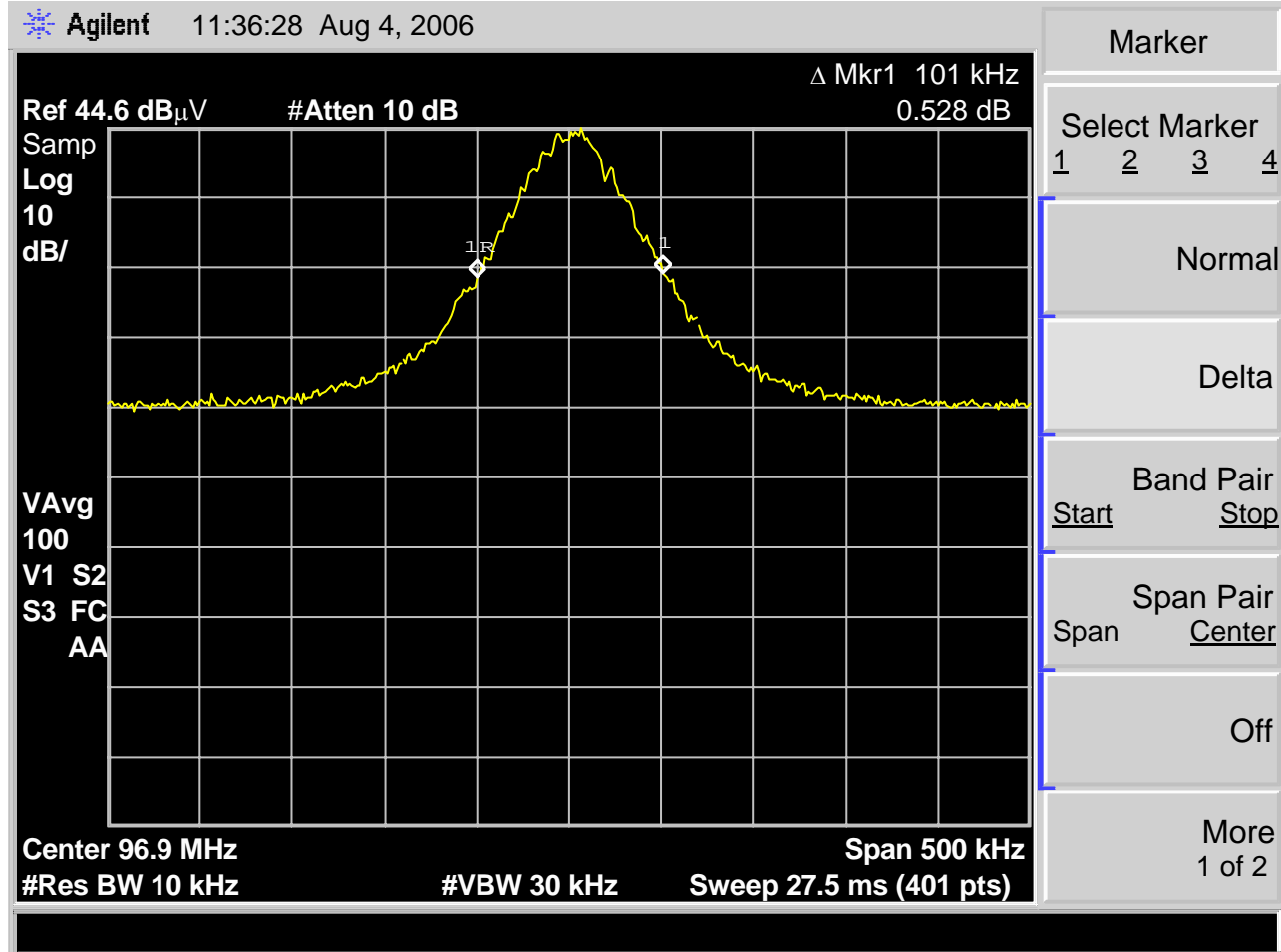
FCC Part 15, Subpart C, Section 15.239(a) Bandwidth
 EUT Transmitting at 107.9 MHz, Modulation applied
 The bandwidth of the emission was confined within a band 200 kHz wide centered on the operating frequency

Customer	XM Radio		
Test Sample	XM Radio Receiver		
Brand Name	Sportscaster		
Date: 8-4-2006	Tech: D. Lerner	Sheet 2 of 6	



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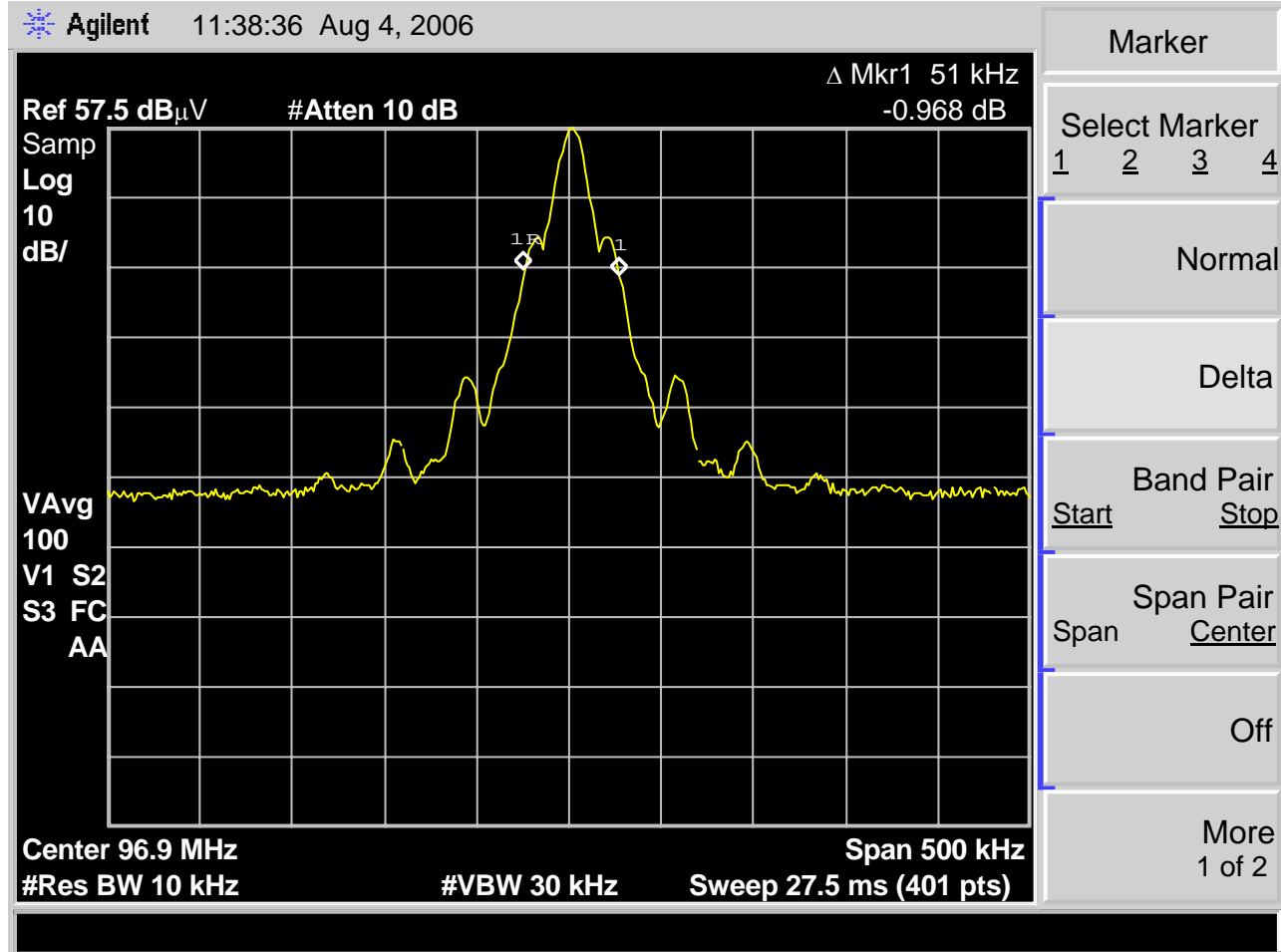
FCC Part 15, Subpart C, Section 15.239(a) Bandwidth
EUT Transmitting at 96.9 MHz, Modulation applied
The bandwidth of the emission was confined within a band 200 kHz wide centered on the operating frequency

Customer	XM Radio		
Test Sample	XM Radio Receiver		
Brand Name	Sportscaster		
Date: 8-4-2006	Tech: D. Lerner	Sheet 3 of 6	



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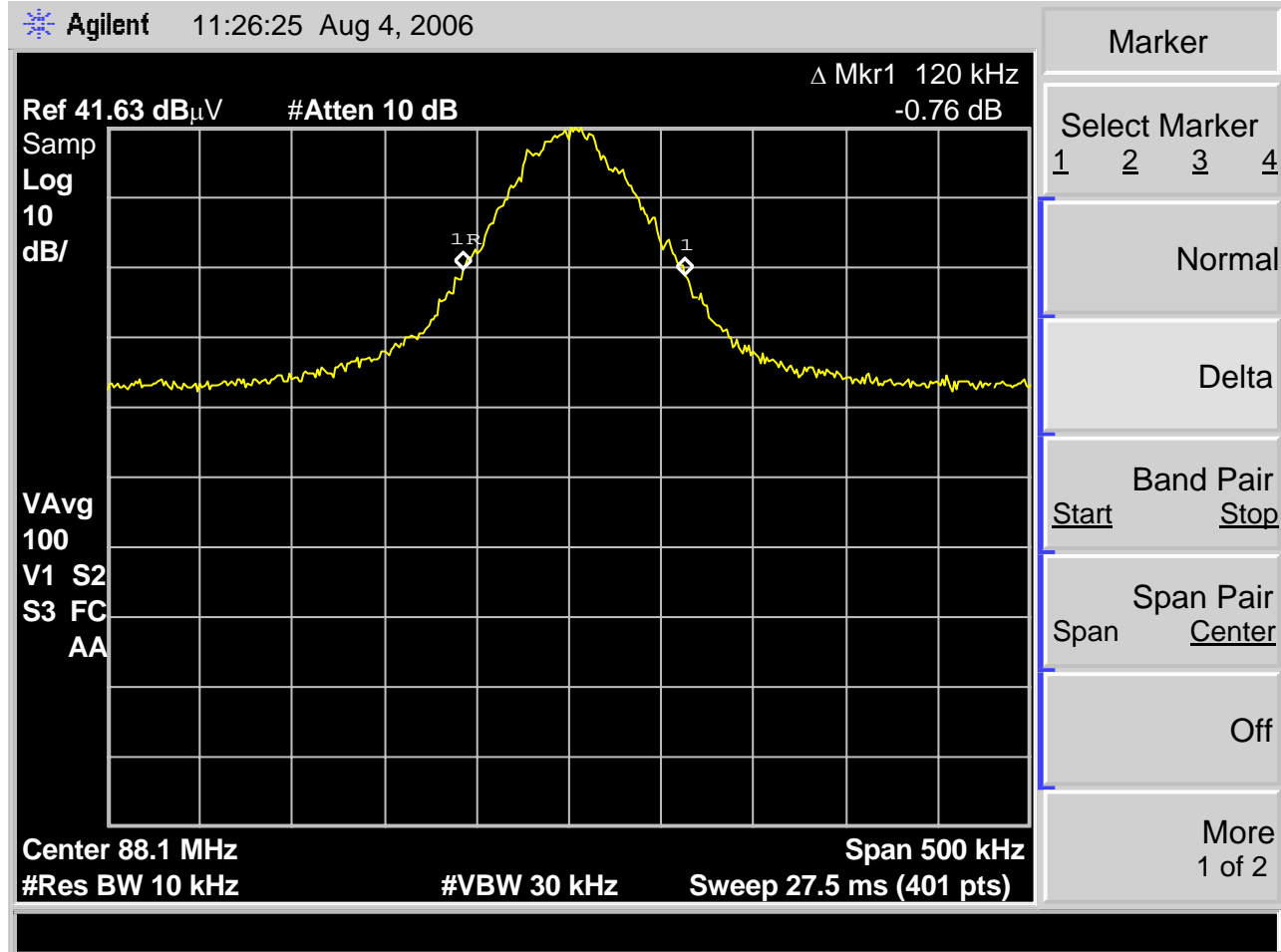
FCC Part 15, Subpart C, Section 15.239(a) Bandwidth
 EUT Transmitting at 96.9 MHz, No Modulation applied
 The bandwidth of the emission was confined within a band 200 kHz wide centered on the operating frequency

Customer	XM Radio		
Test Sample	XM Radio Receiver		
Brand Name	Sportscaster		
Date: 8-4-2006	Tech: D. Lerner	Sheet 4 of 6	



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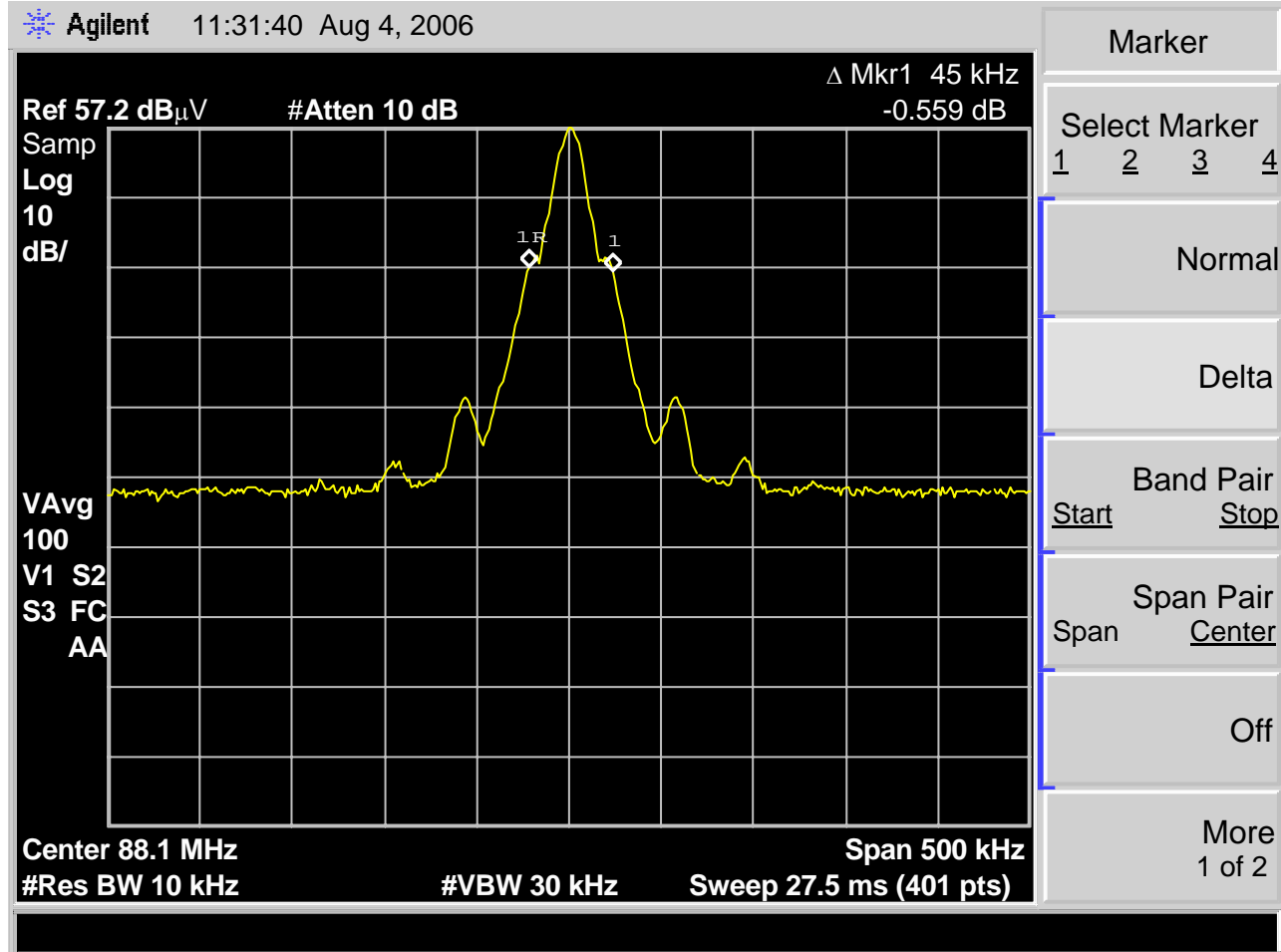
FCC Part 15, Subpart C, Section 15.239(a) Bandwidth
 EUT Transmitting at 88.1 MHz, Modulation applied
 The bandwidth of the emission was confined within a band 200 kHz wide centered on the operating frequency

Customer	XM Radio
Test Sample	XM Radio Receiver
Brand Name	Sportscaster
Date: 8-4-2006	Tech: D. Lerner Sheet 5 of 6



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FCC Part 15, Subpart C, Section 15.239(a) Bandwidth
 EUT Transmitting at 88.1 MHz, No Modulation applied
 The bandwidth of the emission was confined within a band 200 kHz wide centered on the operating frequency

Customer	XM Radio	
Test Sample	XM Radio Receiver	
Brand Name	Sportscaster	
Date: 8-4-2006	Tech: D. Lerner	Sheet 6 of 6



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EQUIPMENT LIST

FCC Part 15, Subpart C, Occupied Bandwidth, Paragraph 15.239(a)

Type	Manufacturer	Model No.	Cal Date	Due Date
Spectrum Analyzer	Hewlett Packard	E4405B	7/25/2006	7/25/2007



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FCC Part 15, Subpart C, Paragraph 15.239, Radiated Emissions Test Method:

1. Each satellite radio receiver was tested at Florida Atlantic University (FAU) three-meter indoor test site. Test firm FCC registration number is 447616.
2. All radiated emissions test data was obtained by test personnel at FAU.
3. Testing consisted of determining the maximum emissions by placing the test sample three meters away from the measuring antenna. With the spectrum analyzer in max hold, the antenna placed in a vertical polarity was raised and lowered from 1 meter to 4 meters until the maximum emission was determined.
4. After the antenna was raised and lowered the turntable was rotated 360°. The spectrum analyzer set to max hold until the maximum emission was determined. The data was recorded utilizing both data points and graphical plots for each configuration.
5. Steps 3 and 4 were repeated with the antenna in horizontal polarity.
6. The RBW and VBW of the spectrum analyzer were set to 120 kHz and 300 kHz respectively. A peak detector was utilized
7. The fundamental frequency and harmonics up to the 10th were measured
8. The above procedure was repeated at three frequencies representing the lower, middle, and upper end of the provided FM range. The frequencies selected were 88.1 MHz, 96.9 MHz, and 107.9 MHz.
9. Graphical Plots indicate the maximum emission. The FCC Part 15, Subpart B, Class B, test limit line was adjusted utilizing the correction factors for each operating frequency and mode of testing. There were four (4) plots; one plot displayed the emissions from 30 MHz and 200 MHz, one plot displayed 200 MHz -1000 MHz, one set in vertical polarity and one set in horizontal polarity.

Test Results

No emissions which exceeded the specified limits were observed and the EUT was found to comply with the requirements specified for this method.

See the following forty (40) data sheets for a full presentation of the results obtained.



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15.239(b), Radiated Emissions, Fundamental Field Strength
Test Data



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Test Results No. R-11574-1

The following table describes the graphical test data

Plot ID#	Test Description
	Car-Cradle - Using FM Coupler & FM arial antenna
D-1	88.1MHz Low-Band Vertical
D-2	88.1MHz Low-Band Horizontal
D-3	96.9MHz Low-Band Vertical
D-4	96.9MHz Low-Band Horizontal
D-5	107.9MHz Low-Band Vertical
D-6	107.9MHz Low-Band Horizontal
D-7	88.1MHz High-Band Vertical
D-8	88.1MHz High-Band Horizontal
D-9	96.9MHz High-Band Vertical
D-10	96.9MHz High-Band Horizontal
D-11	107.9MHz High-Band Vertical
D-12	107.9MHz High-Band Horizontal
	Car-Cradle - Using XM antenna ONLY
D-13	88.1MHz Low-Band Vertical
D-14	88.1MHz Low-Band Horizontal
D-15	96.9MHz Low-Band Vertical
D-16	96.9MHz Low-Band Horizontal
D-17	107.9MHz Low-Band Vertical
D-18	107.9MHz Low-Band Horizontal
D-19	88.1MHz High-Band Vertical
D-20	88.1MHz High-Band Horizontal
D-21	96.9MHz High-Band Vertical
D-22	96.9MHz High-Band Horizontal
D-23	107.9MHz High-Band Vertical
D-24	107.9MHz High-Band Horizontal
	Home Cradle
D-25	Low-Band Vertical
D-26	Low-Band Horizontal
D-27	High-Band Vertical
D-28	High-Band Horizontal



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Test Results No. R-11574-1

The following table describes the graphical test data (con't)

Plot ID#	Test Description
	FM Direct Adaptor & FM Arial antenna
D-29	88.1MHz Low-Band Vertical
D-30	88.1MHz Low-Band Horizontal
D-31	96.9MHz Low-Band Vertical
D-32	96.9MHz Low-Band Horizontal
D-33	107.9MHz Low-Band Vertical
D-34	107.9MHz Low-Band Horizontal
D-35	88.1MHz High-Band Vertical
D-36	88.1MHz High-Band Horizontal
D-37	96.9MHz High-Band Vertical
D-38	96.9MHz High-Band Horizontal
D-39	107.9MHz High-Band Vertical
D-40	107.9MHz High-Band Horizontal
	Conducted Emissions
	Line & Phase
	Occupied Bandwidth
	88.1MHz (with modulation)
	88.1MHz (no modulation)
	96.9MHz (with modulation)
	96.9MHz (no modulation)
	107.9MHz (with modulation)
	107.9MHz (no modulation)



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Test Results No. R-11574-1

15.239(b), Radiated Emissions, Fundamental Field Strength
Car-Cradle utilizing FM aerial antenna Test Data

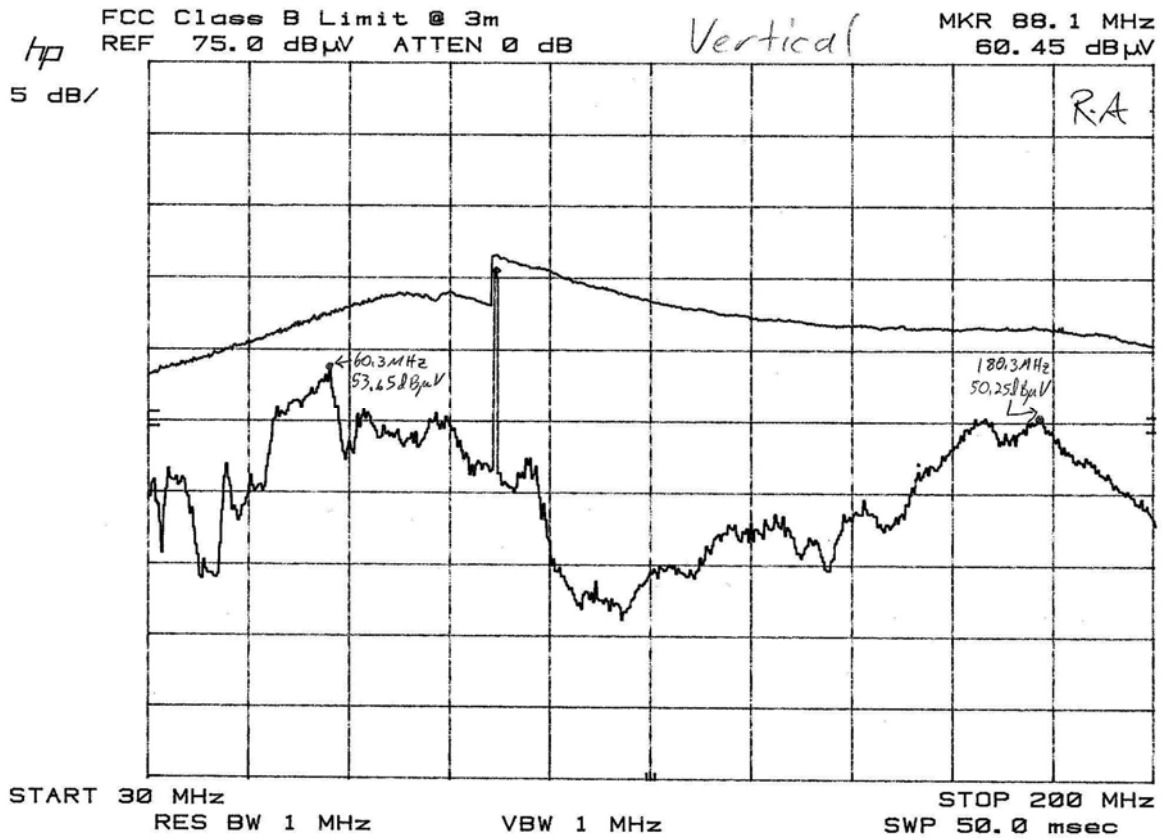


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Test Results No. R-11574-1

D-1

8/10/06

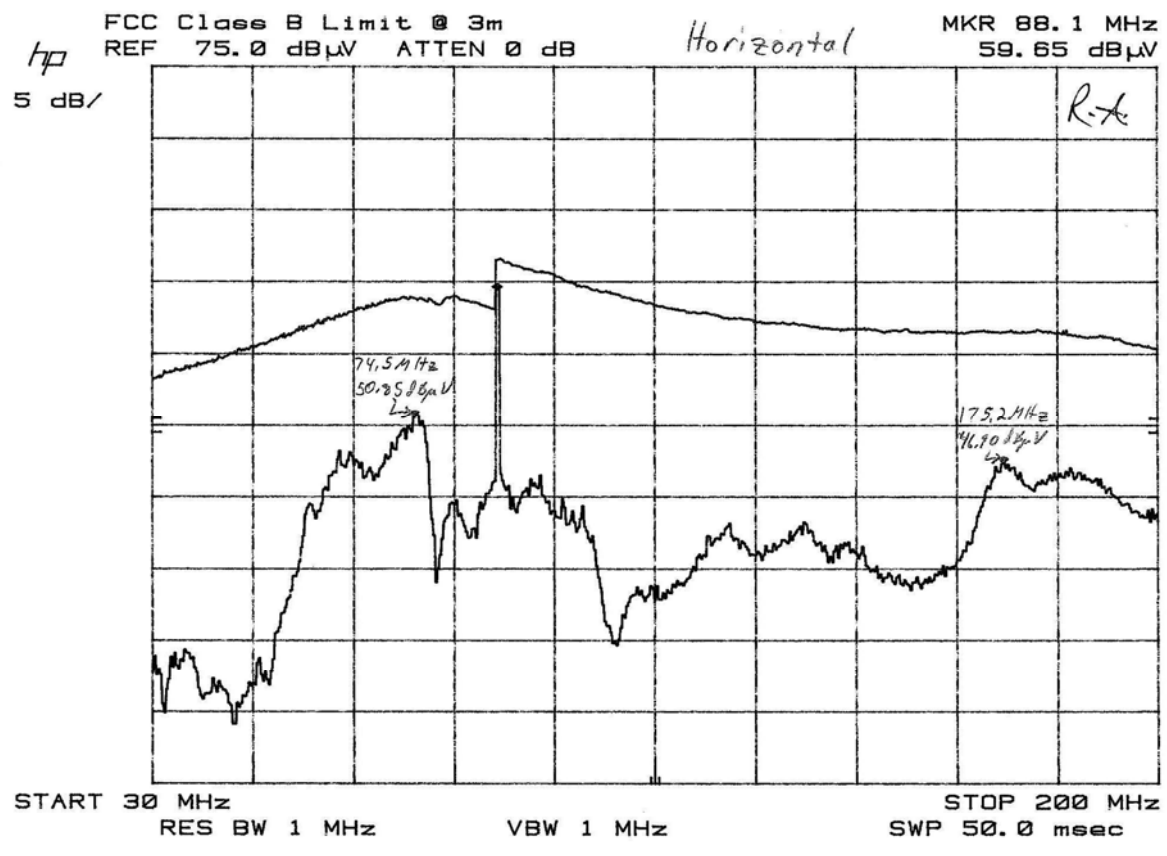


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Test Results No. R-11574-1

D-2

8/10/06

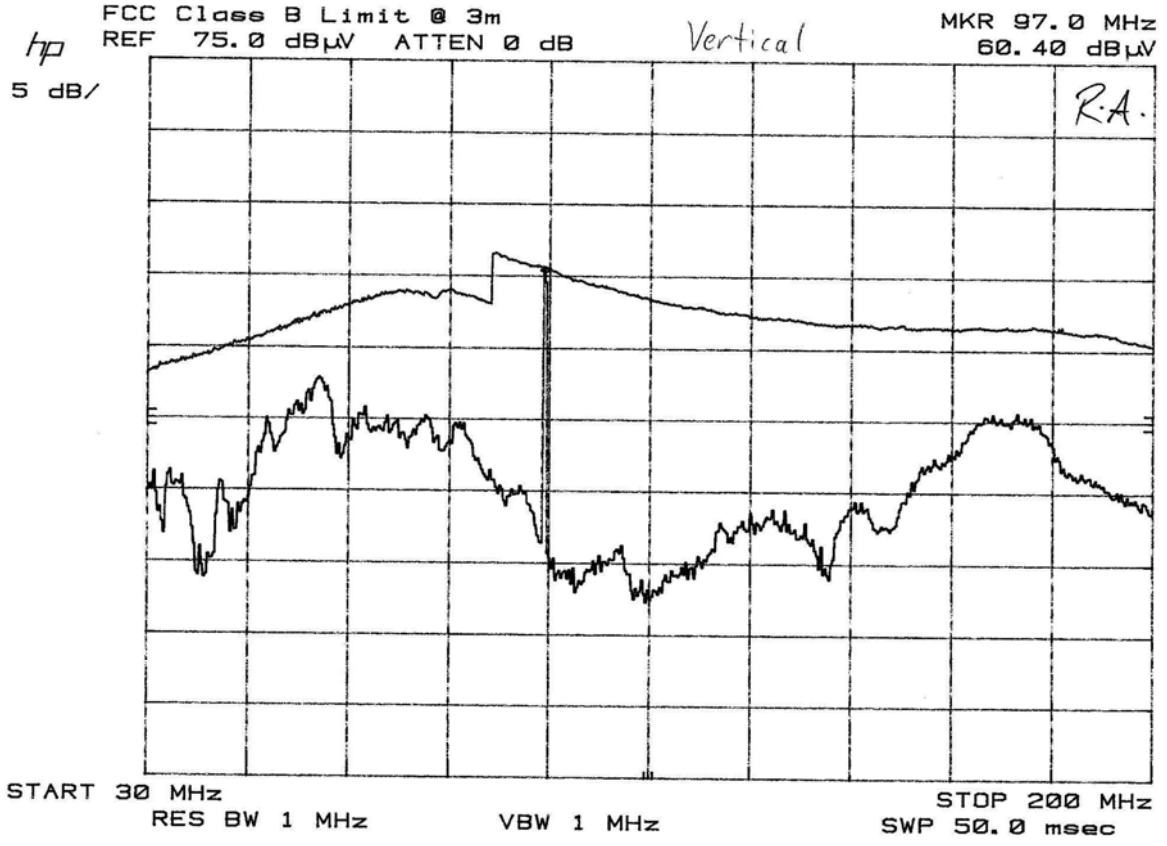


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Test Results No. R-11574-1

D-3

8/10/06

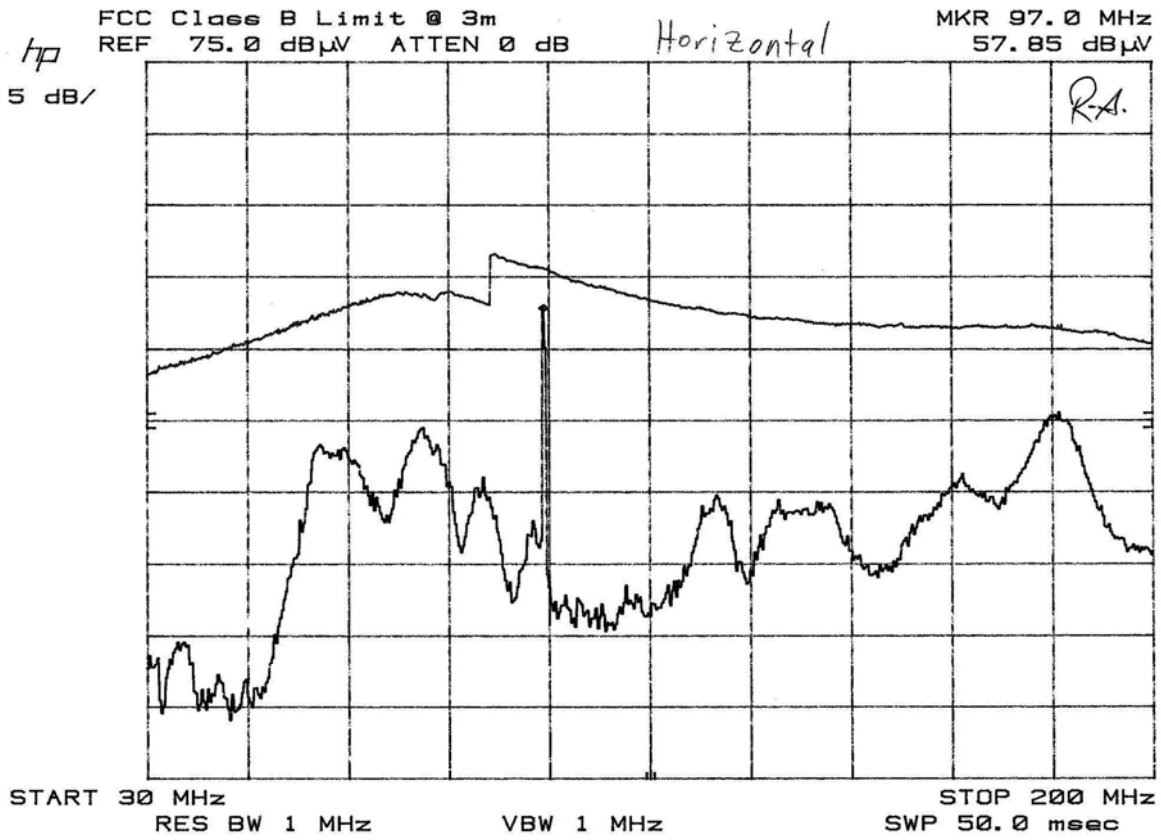


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Test Results No. R-11574-1

D-4

3/10/06

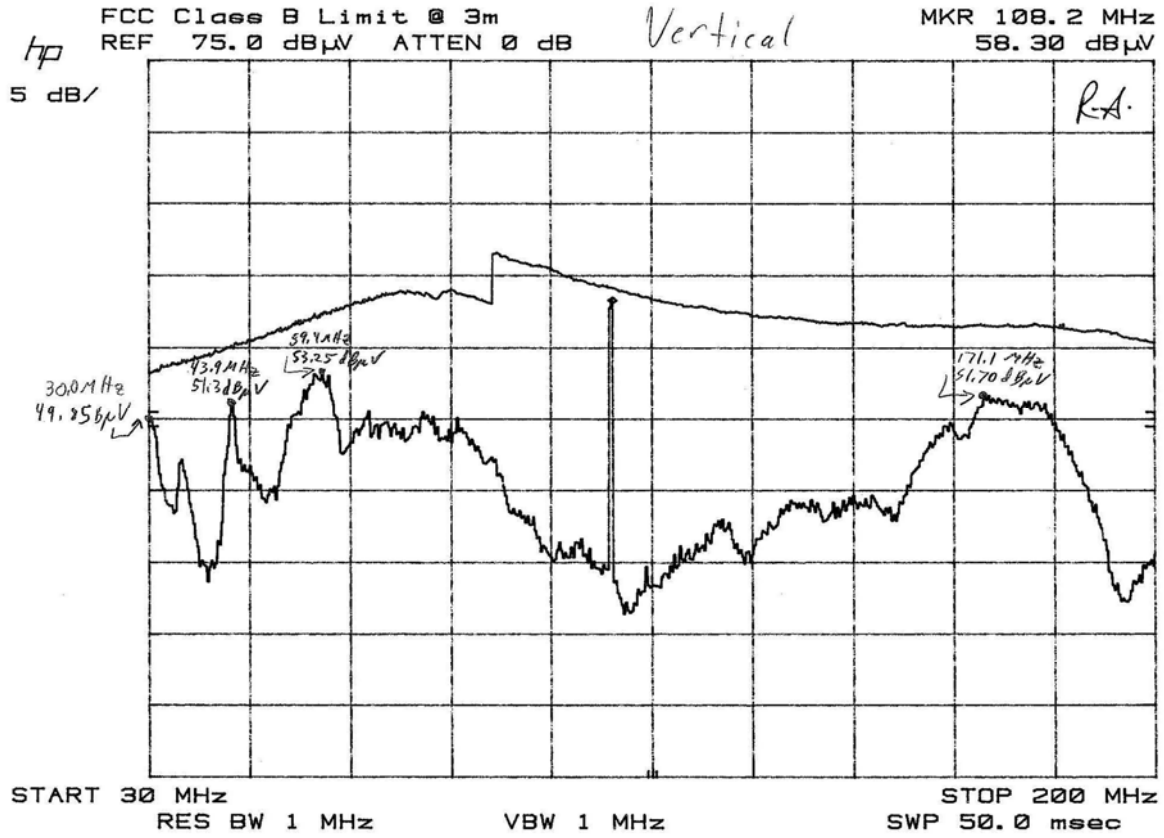


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Test Results No. R-11574-1

D-5

8/10/06

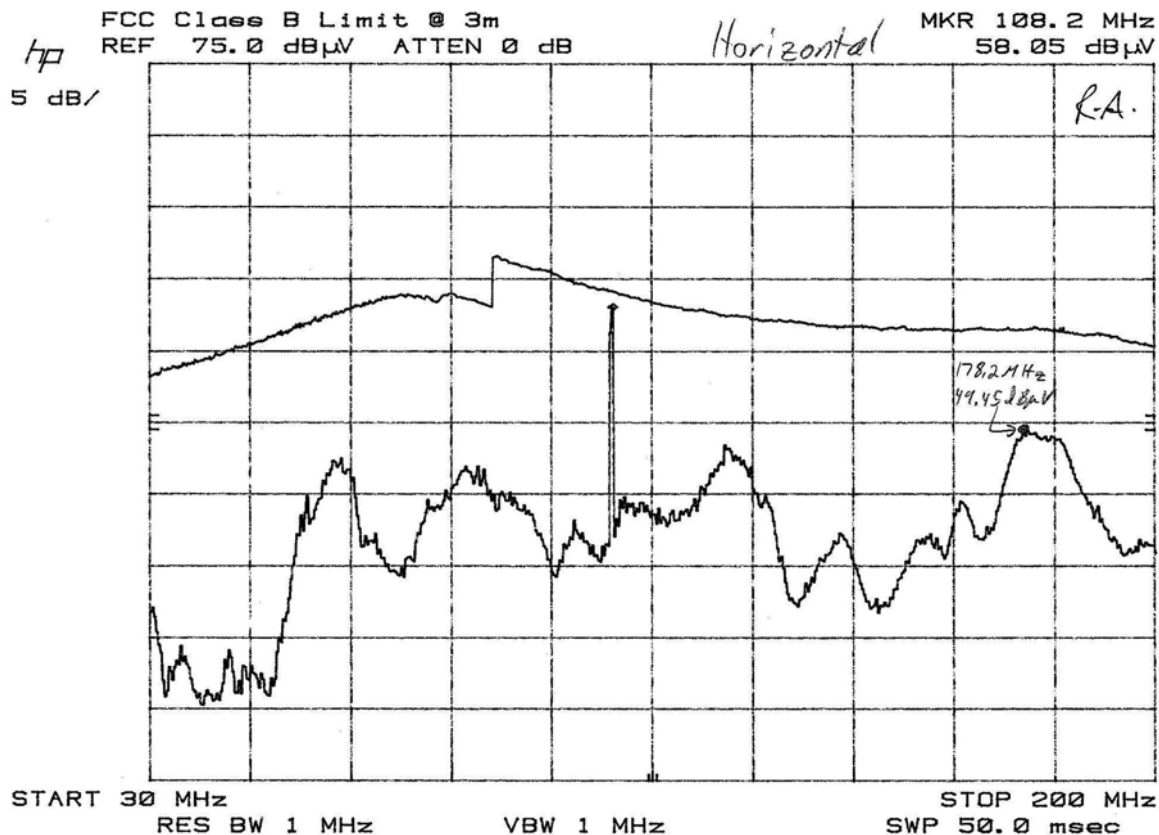


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Test Results No. R-11574-1

D-6

8/10/06

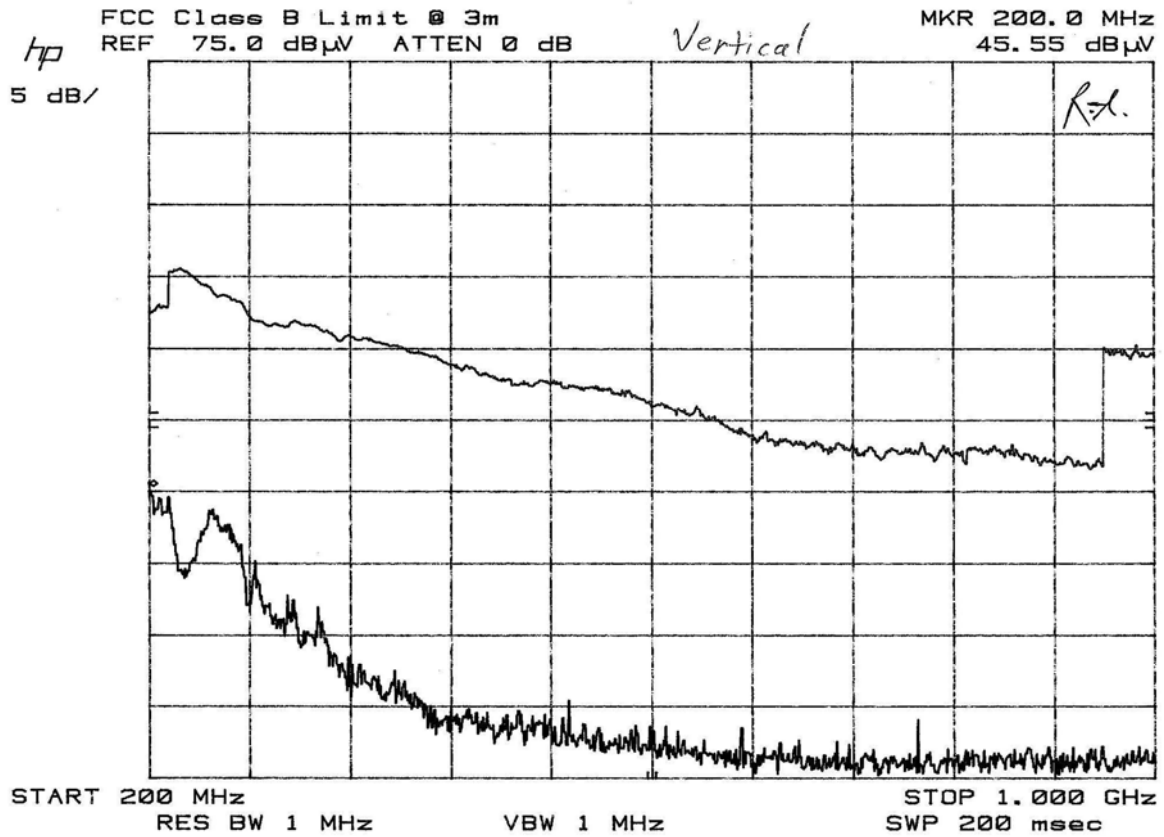


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Test Results No. R-11574-1

D-7

8/10/06

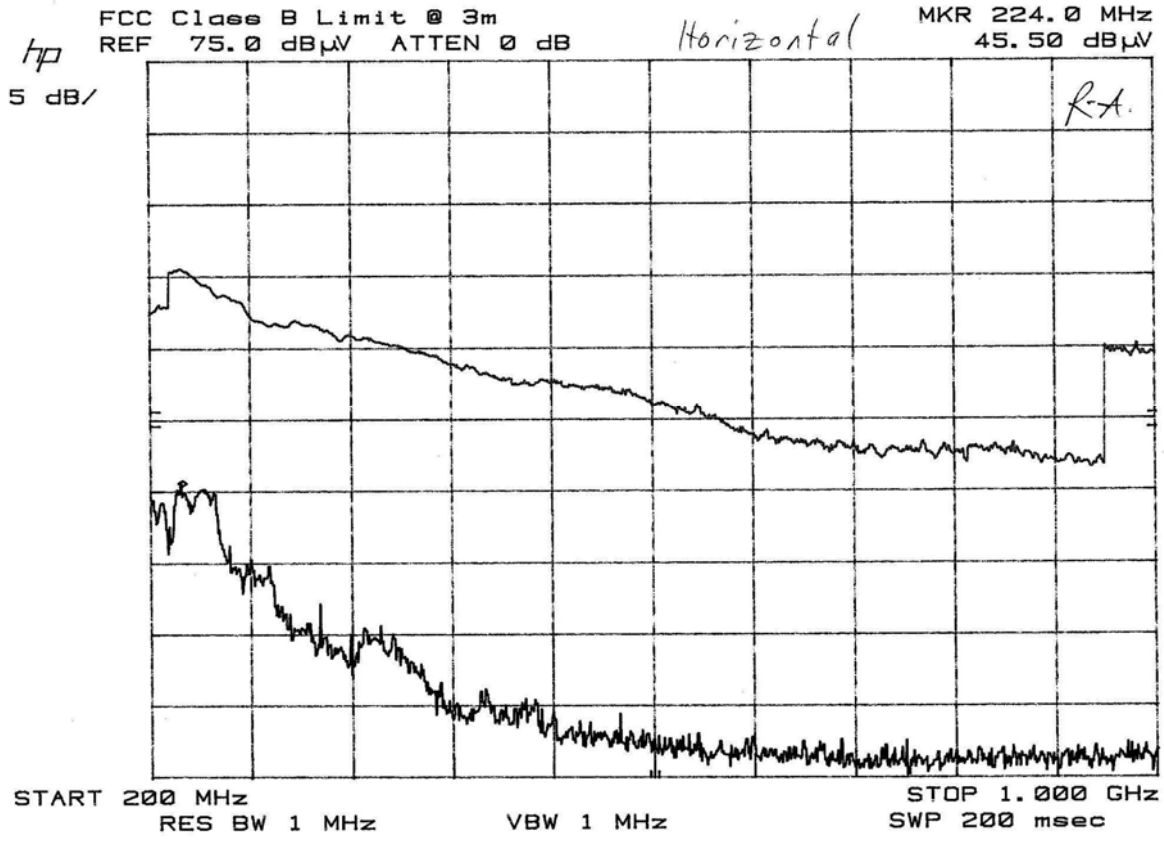


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Test Results No. R-11574-1

D-8

8/16/06

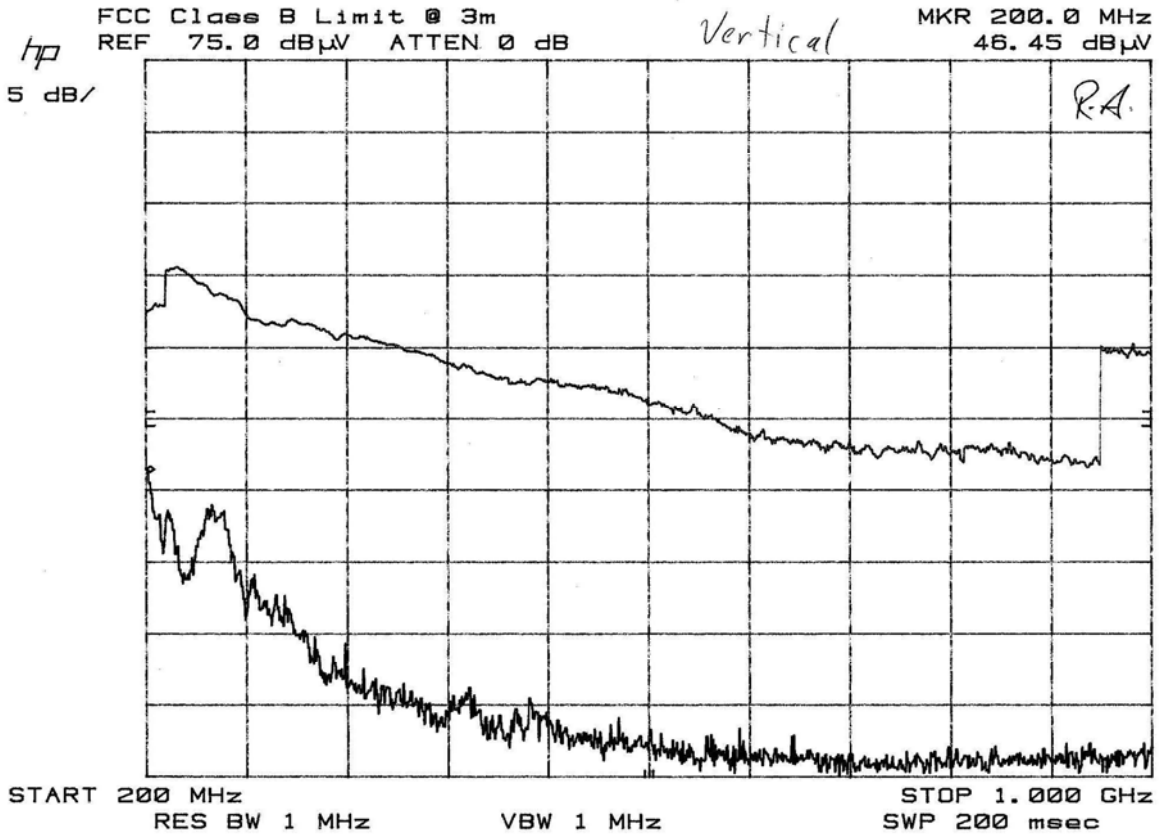


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Test Results No. R-11574-1

D-9

8/10/06

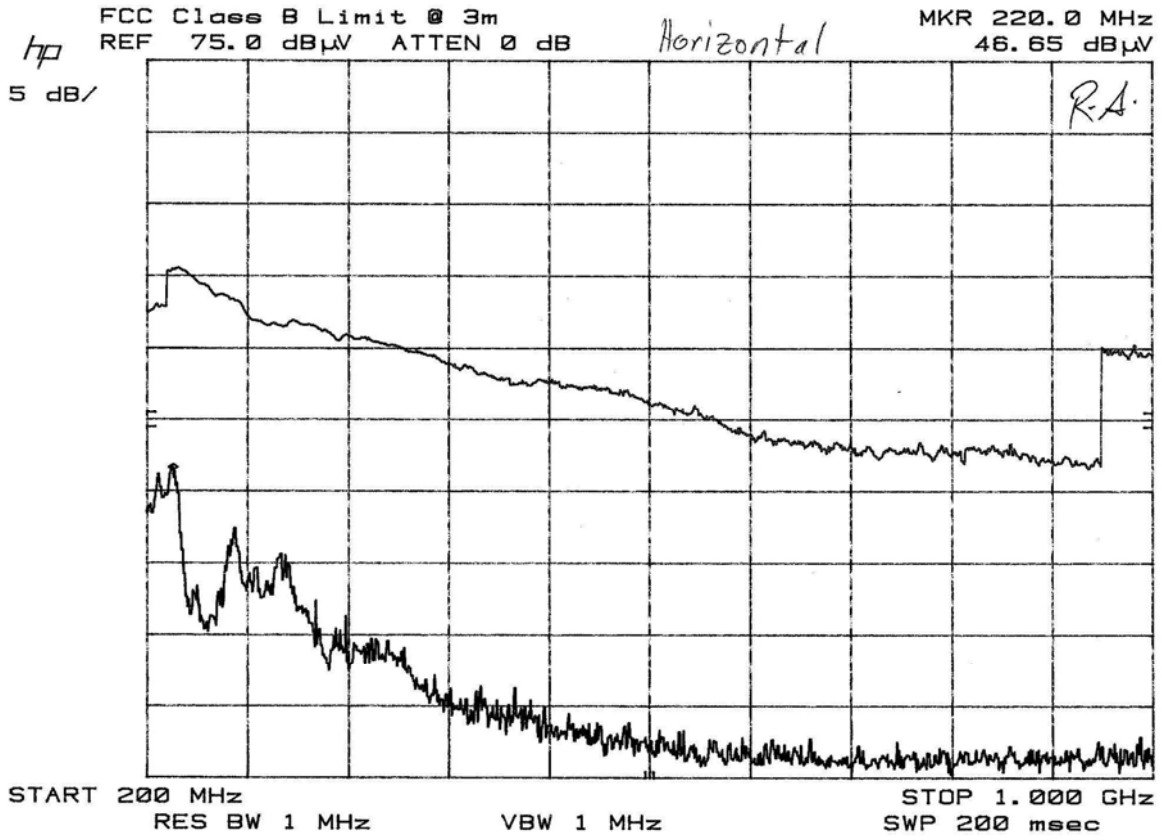


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Test Results No. R-11574-1

D-10

8/10/06

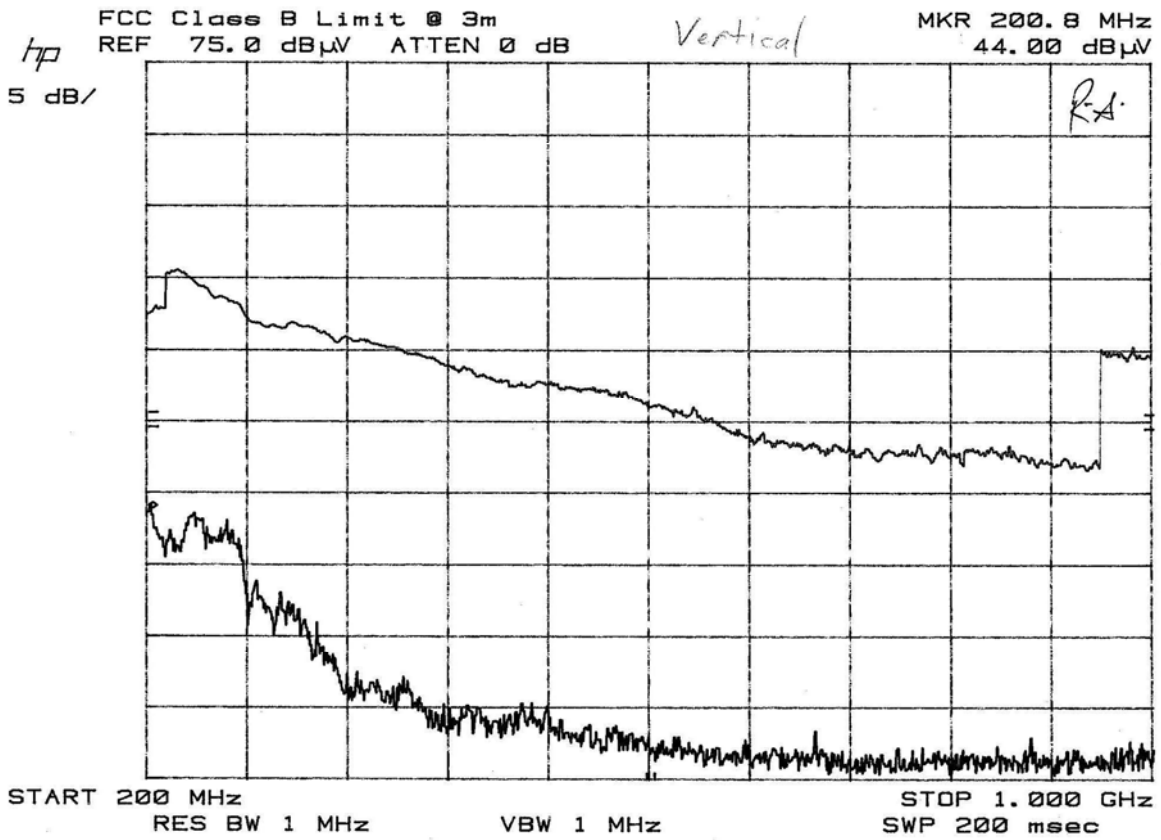


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Test Results No. R-11574-1

D-11

8/10/06

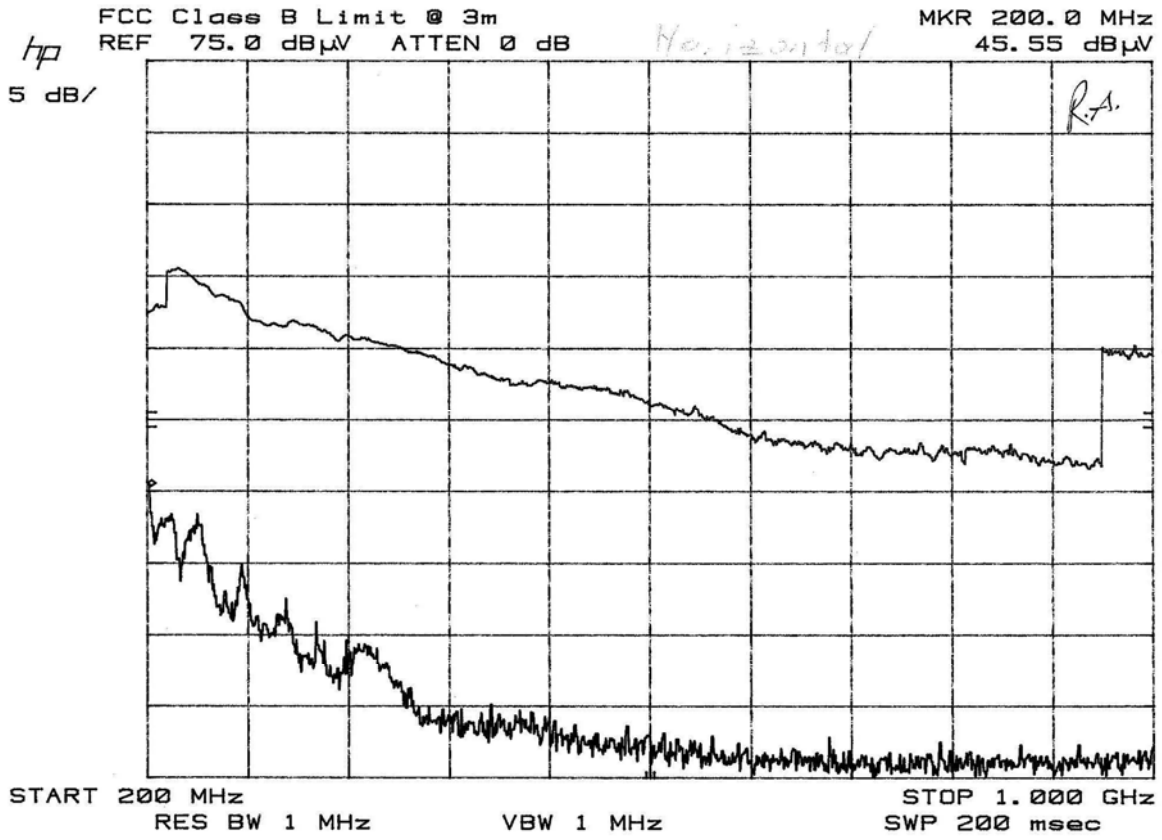


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D-12

8/10/06



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15.239(b), Radiated Emissions, Fundamental Field Strength
Car-Cradle utilizing XM antenna only Test Data

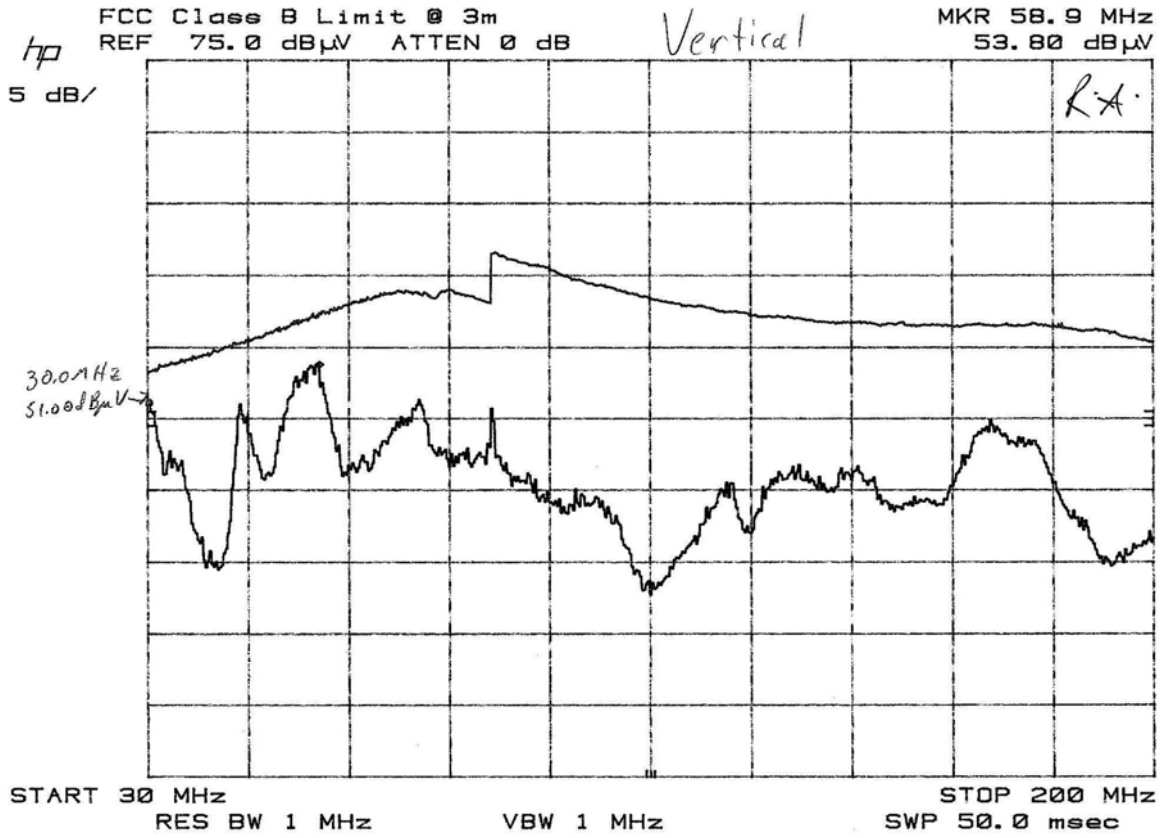


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Test Results No. R-11574-1

D-13

8/10/06

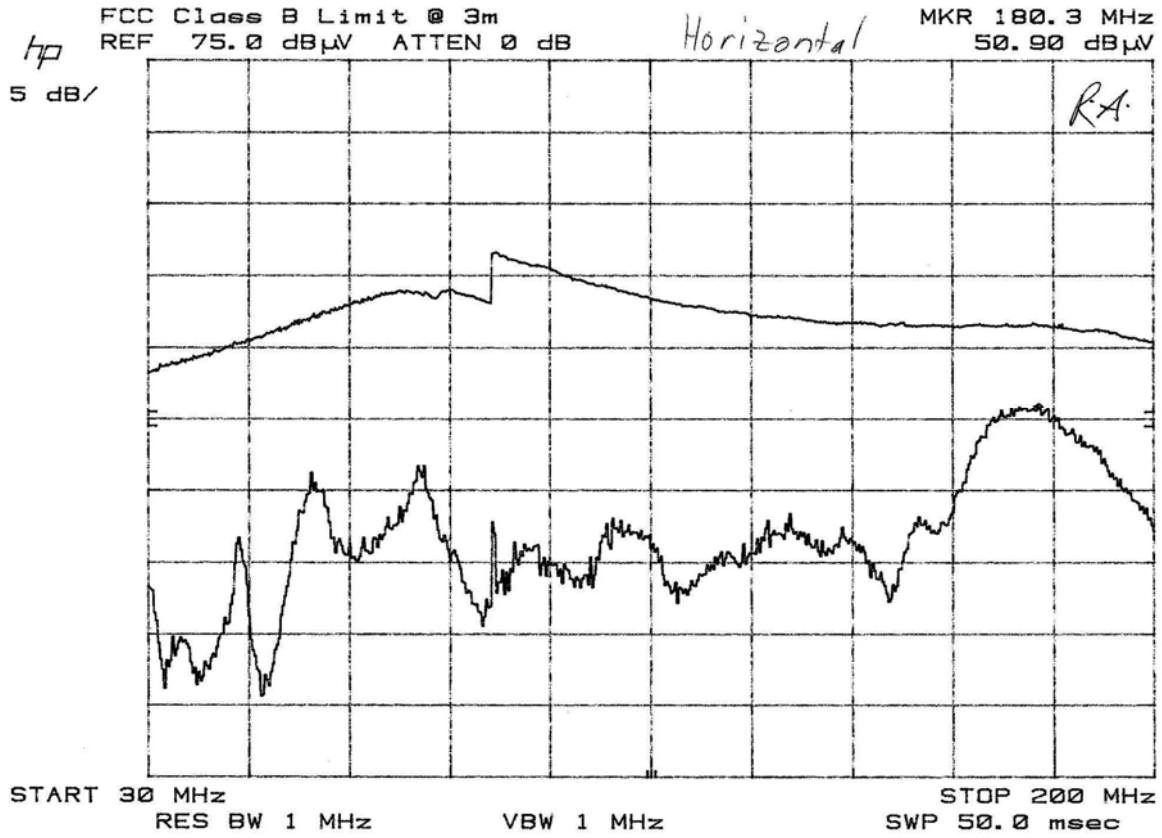


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Test Results No. R-11574-1

D-14

8/10/06

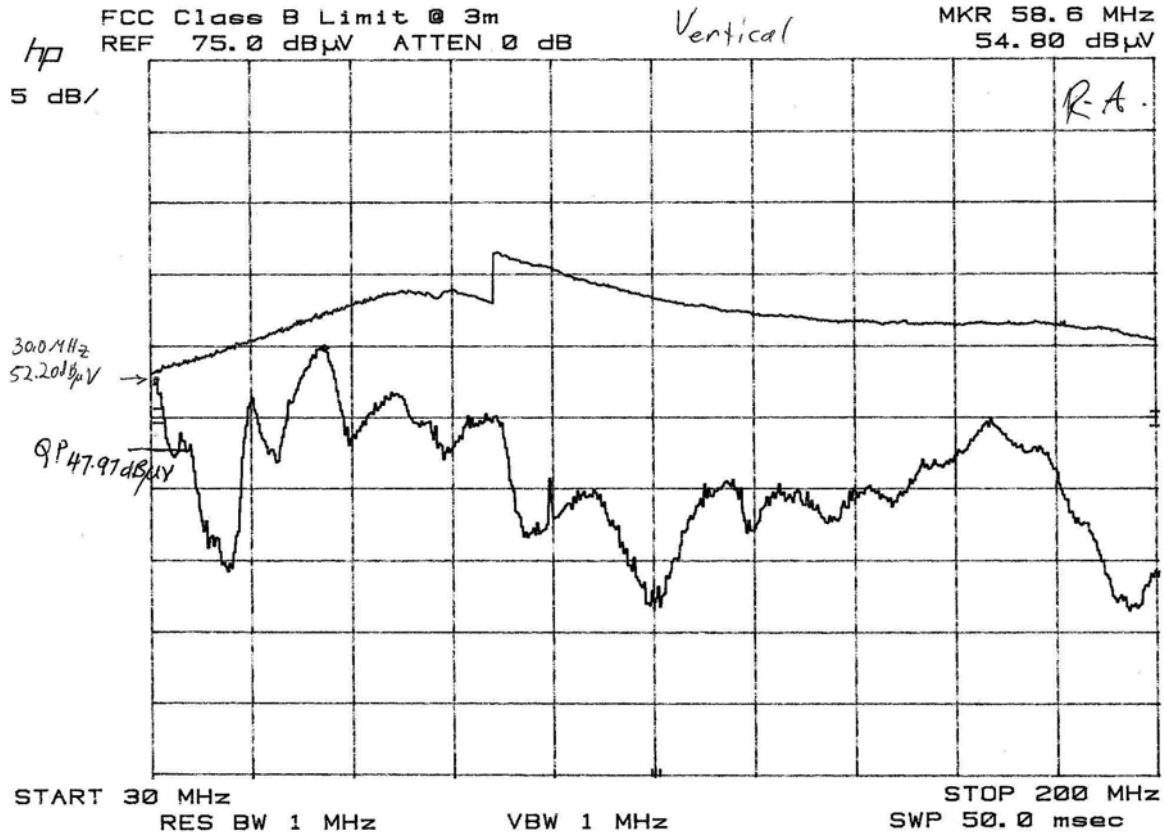


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Test Results No. R-11574-1

D-15

9/10/06

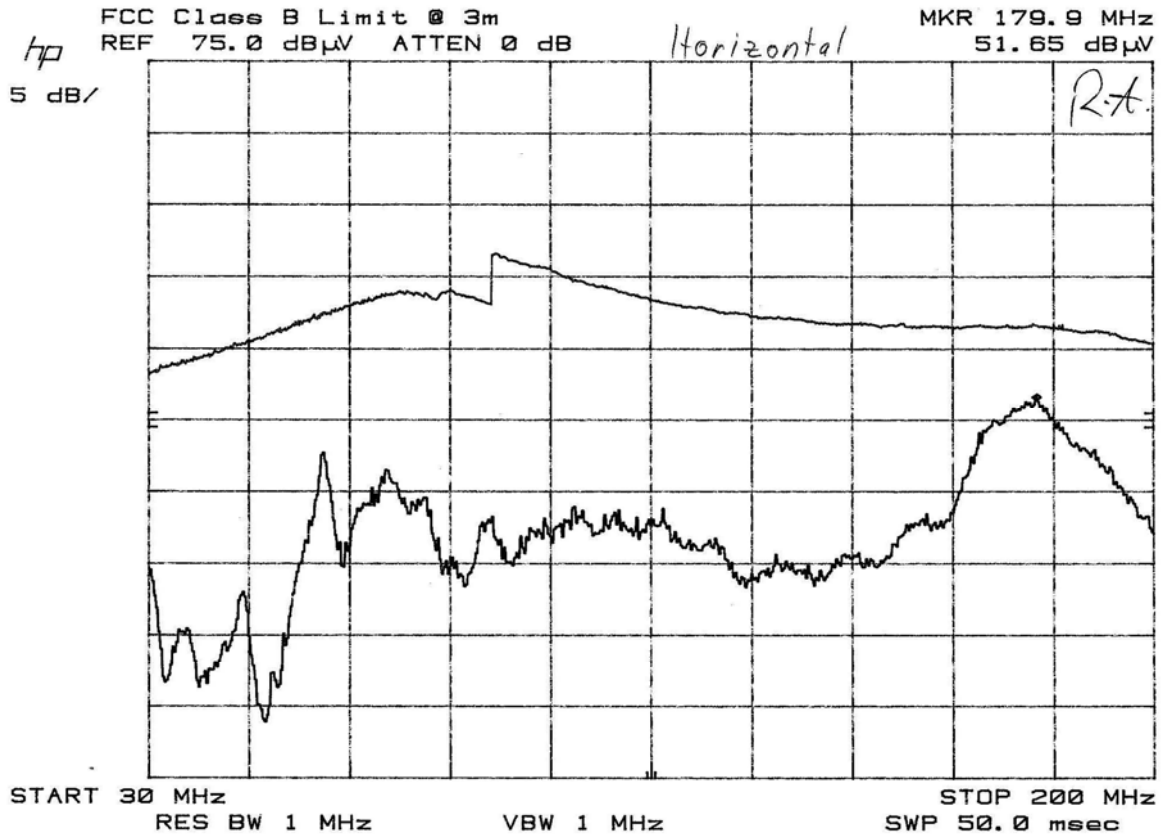


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Test Results No. R-11574-1

D-16

8/10/06

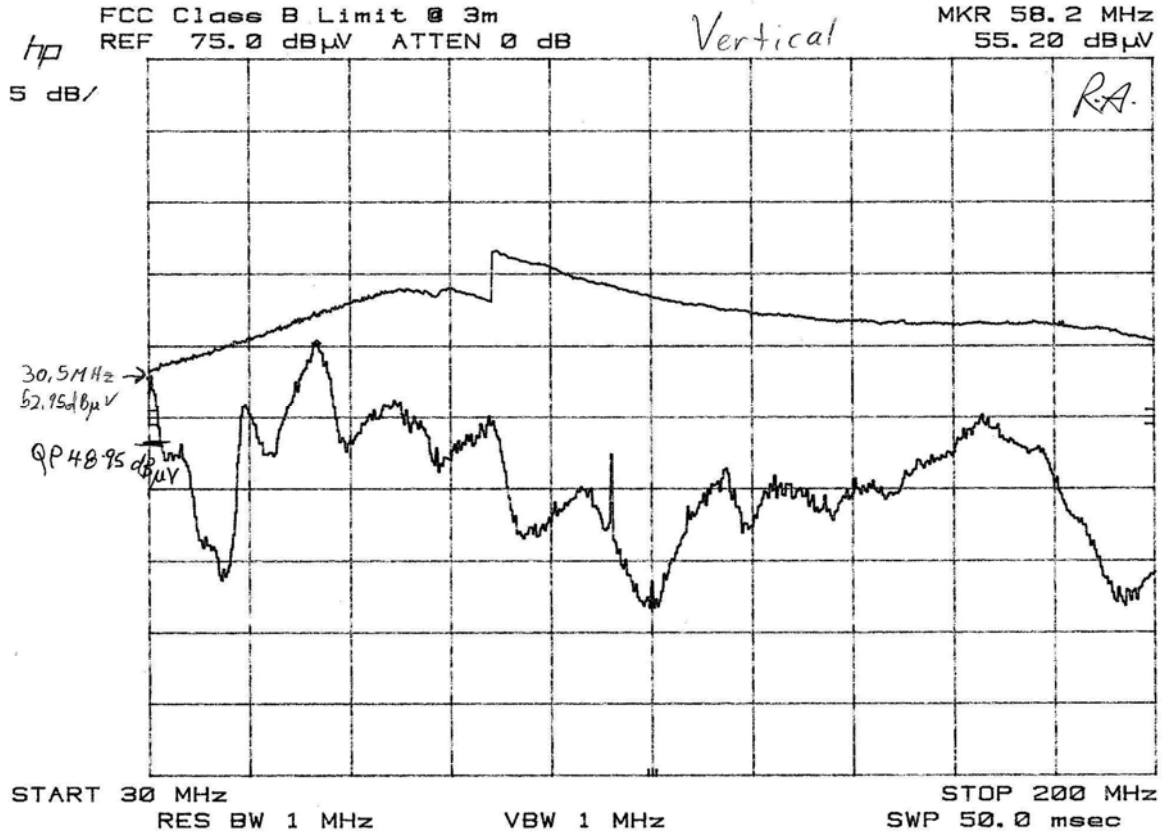


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Test Results No. R-11574-1

D-17

8/10/06

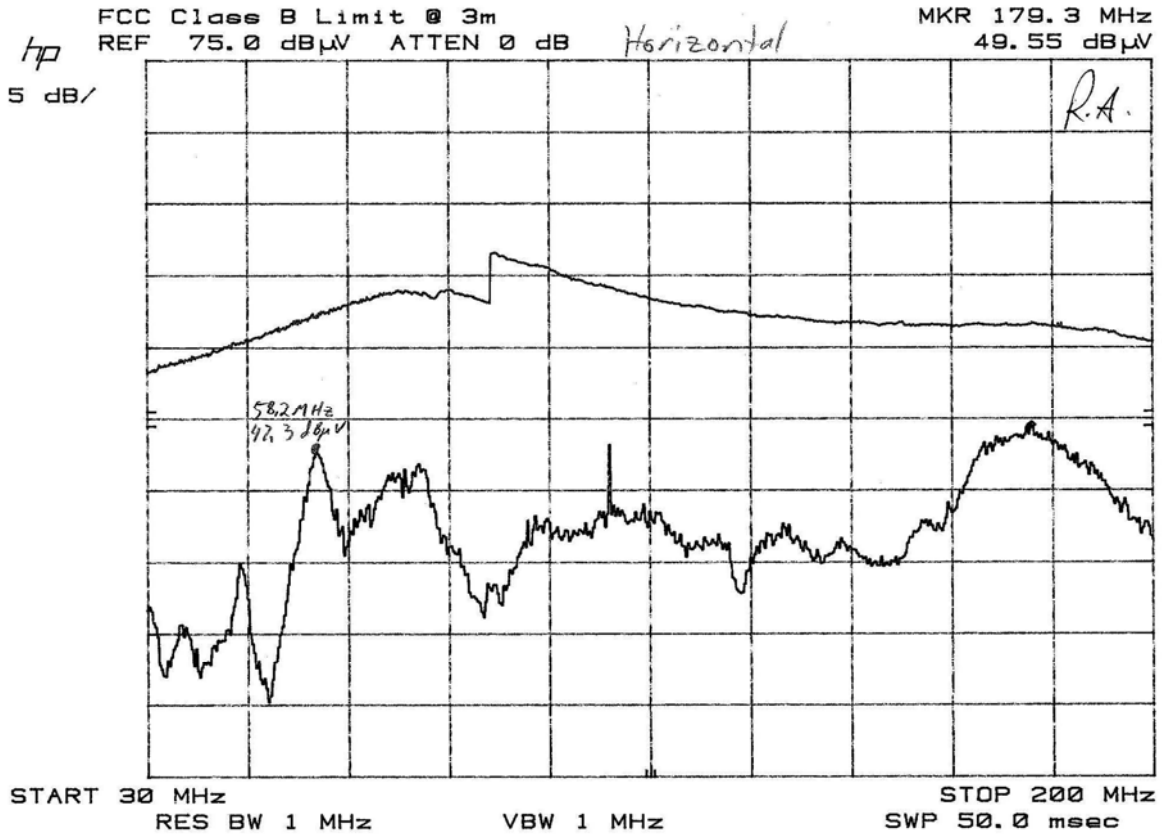


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Test Results No. R-11574-1

D-18

8/10/06

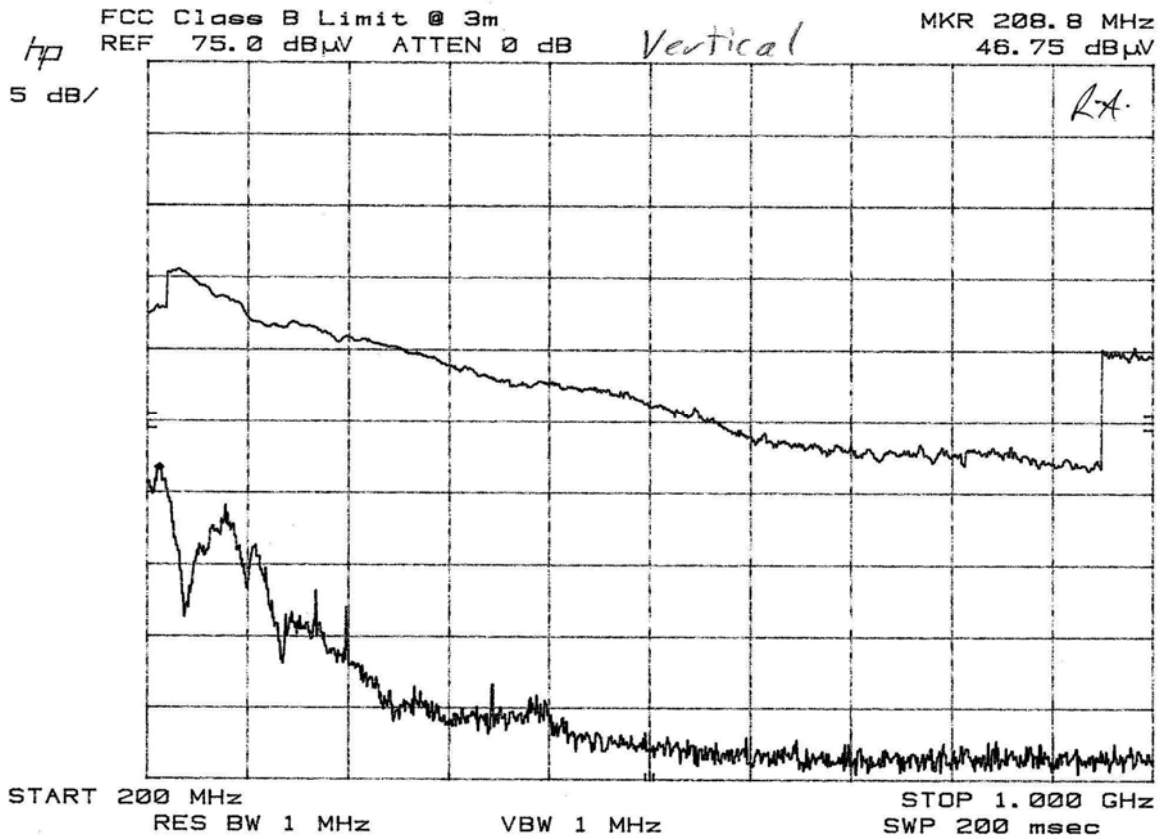


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Test Results No. R-11574-1

D-19

8/10/06

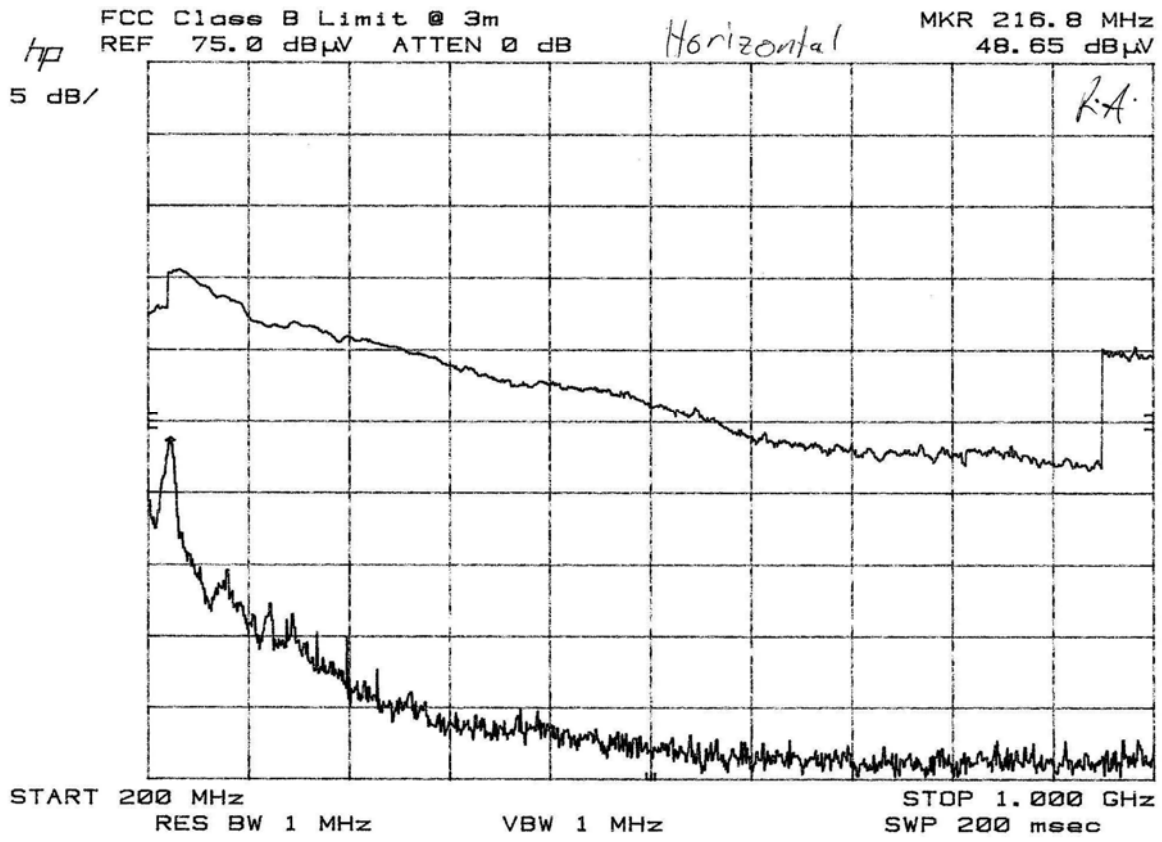


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Test Results No. R-11574-1

D-20

8/10/06

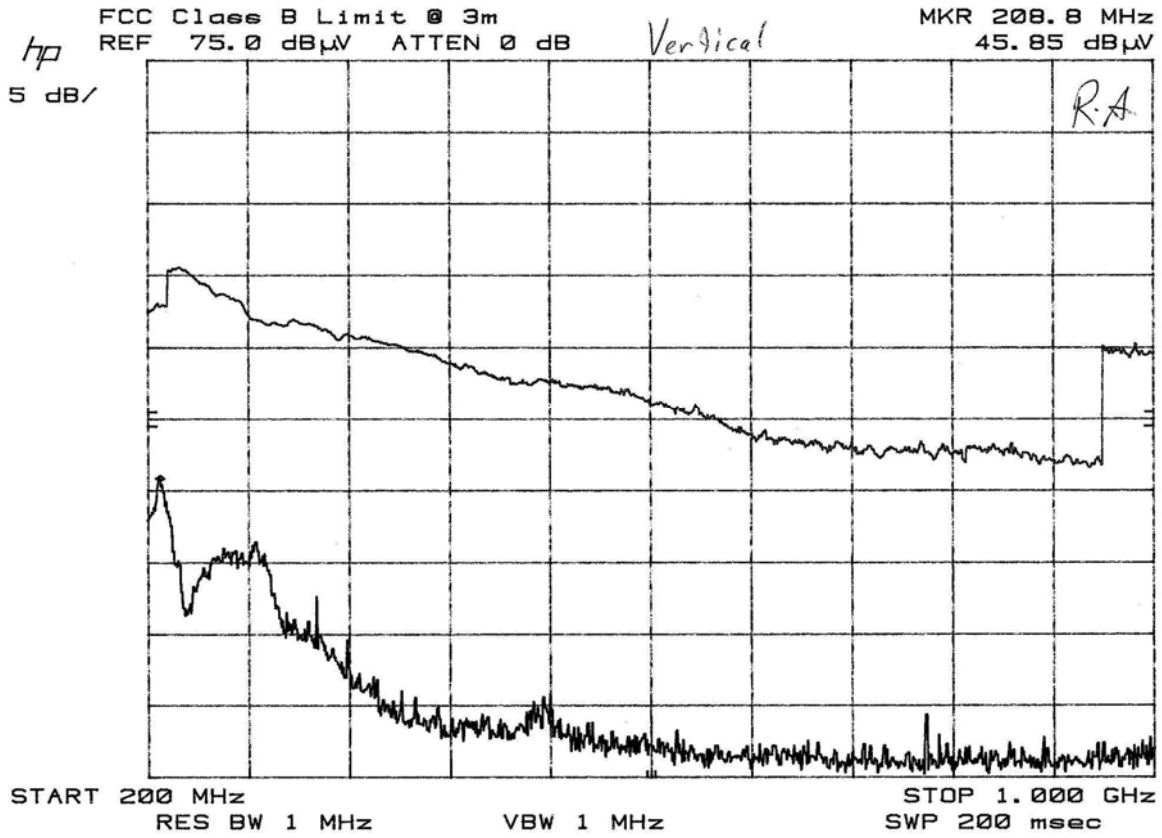


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Test Results No. R-11574-1

D-21

8/10/9

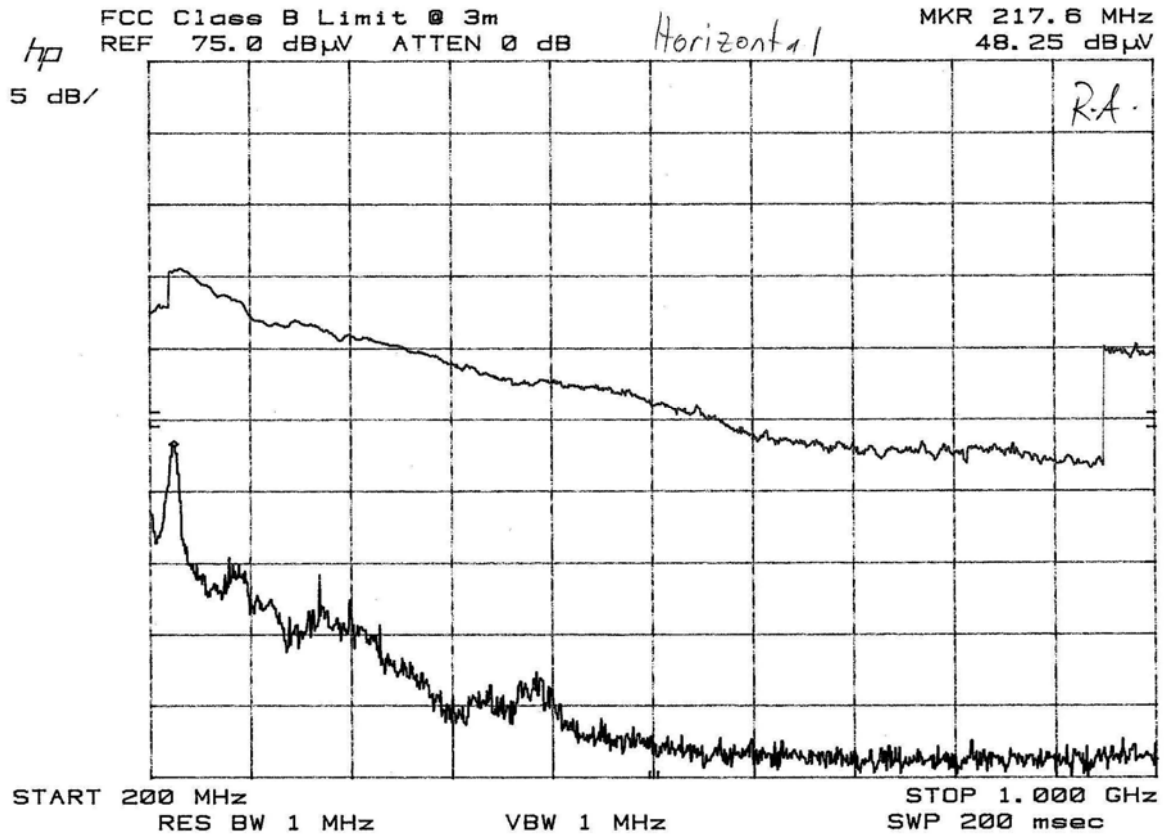


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Test Results No. R-11574-1

D-22

8/10/06

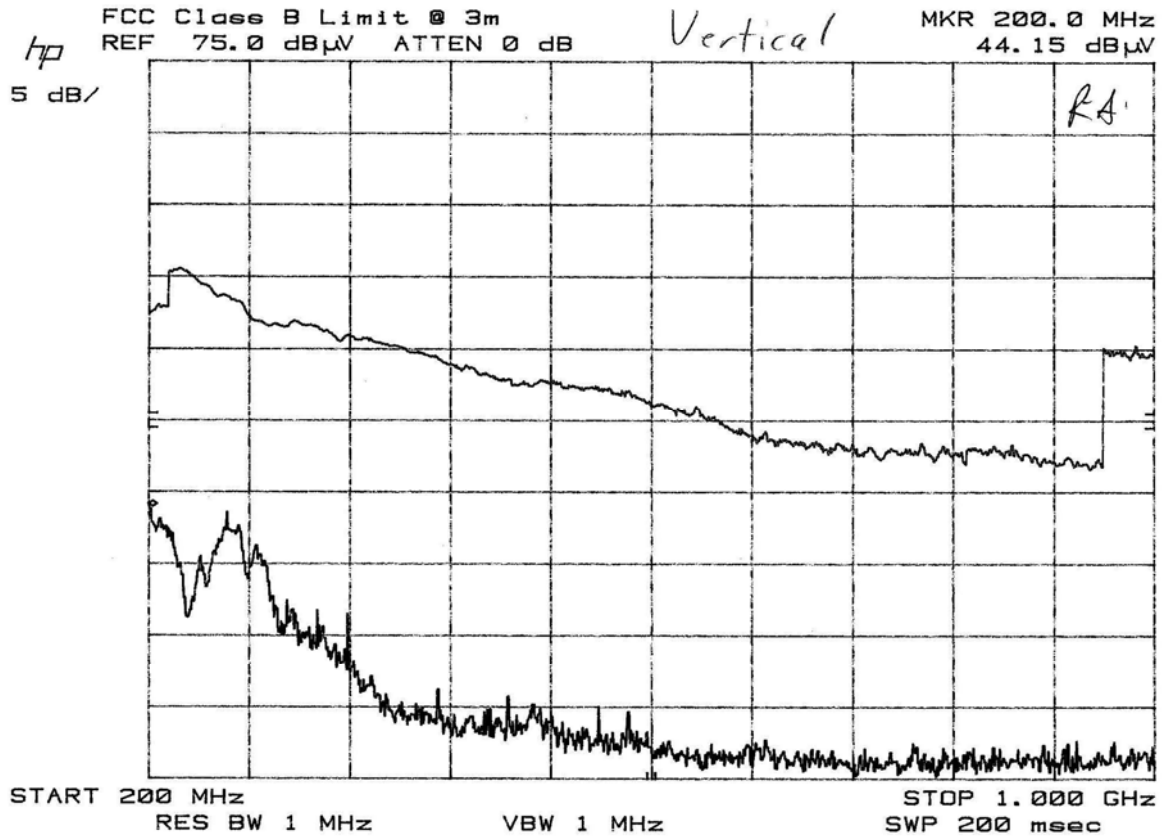


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Test Results No. R-11574-1

D-23

8/10/06

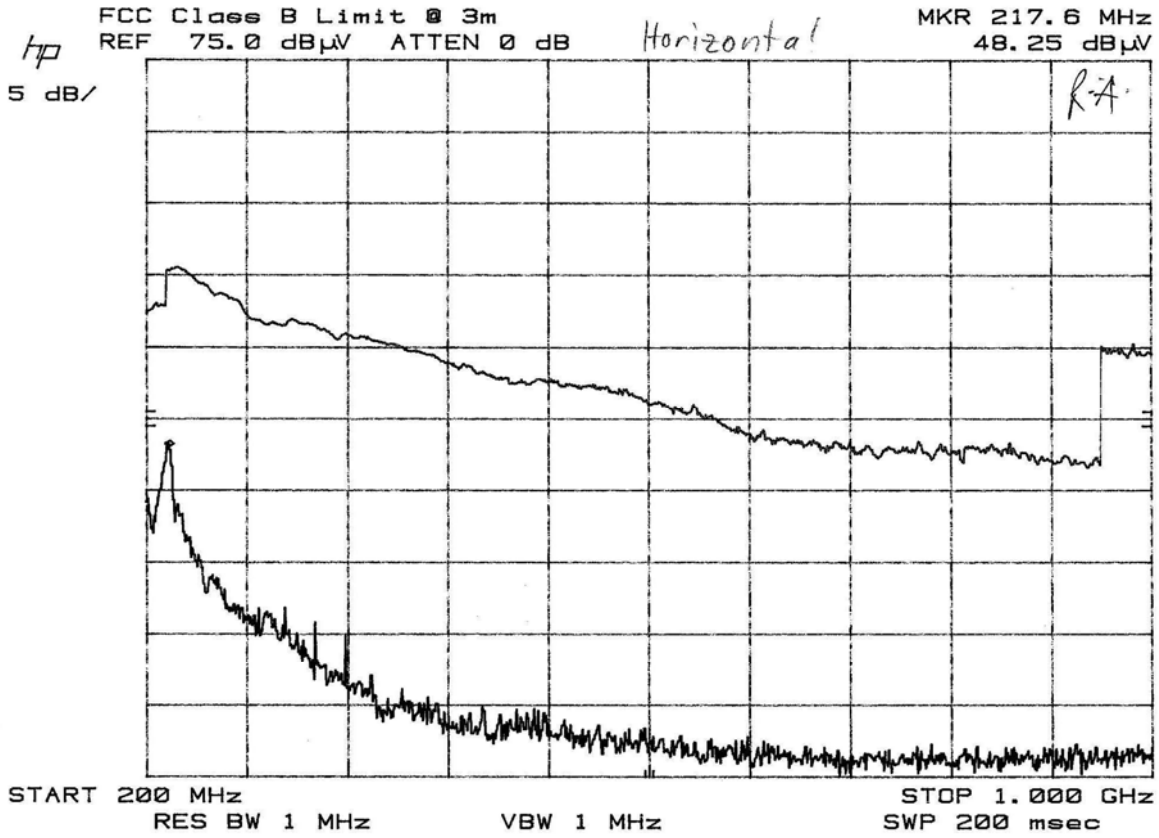


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D-24

8/10/06



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Test Results No. R-11574-1