



Engineering and Testing for EMC and Safety Compliance



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### Certification Application Report FCC Part 15 Subpart B

Test Lab: Rhein Tech Laboratories, Inc. Phone:703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 www.rheintech.com Herndon, VA 20170 Email: <a href="mailto:atcbinfo@rheintech.com">atcbinfo@rheintech.com</a>		Applicant: XM Radio Inc. 1500 Eckington Place NE Washington, DC 20002-2164 Contact: James Blitz	
<b>FCC ID</b>	RS2XDPENT1	<b>Test Report Date</b>	August 14, 2009
<b>EUT</b>	onyX	<b>RTL Work Order Number</b>	2009198
<b>Model #</b>	XDNX1	<b>RTL Quote Number</b>	QRTL09-209
<b>FCC Classification</b>	Part 15 Low Power Transceiver, Rx Verified		
<b>FCC Rule Part(s)</b>	FCC Part 15 Subpart B, Rule Section 15.209		
<b>Industry Canada Standard</b>	RSS-210 Issue 7 June 2007: Low Power License-Exempt Radio Communication Devices (All Frequency Bands)		
<b>Receiver Information</b>	Receiver was found to be compliant		
<b>Frequency Range (MHz)</b>	<b>Output Power (W)</b>	<b>Frequency Tolerance</b>	<b>Emission Designator</b>
88 – 108 (FM Band)	N/A	N/A	N/A

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. Modifications made to the equipment during testing in order to achieve compliance with these standards are listed in the report.

Furthermore, there was no deviation from, additions to, or exclusions from the applicable part of FCC Part 15 and ANSI C63.4.

Signature: 

Date: August 14, 2009

Typed/Printed Name: Desmond A. Fraser

Position: President

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## 1 General Information

### 1.1 Scope

FCC Rules Part 15 Subpart B, rule section 15.209

RSS-210 Issue 7 June 2007: Low Power License-Exempt Radio Communication Devices (All Frequency Bands)

### 1.2 Modifications

N/A

### 1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at Rhein Tech Laboratories (RTL), 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

## 2 Product Information

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Sirius XM Radio onyX FM Transmitter, Model # XDNX1, FCC ID: RS2XDPENT1**. The FM transmitter is located within the satellite broadcast receiver but is only capable of FM transmissions in the Vehicle Mode while docked in the car cradle. The test data contained in this report pertains only to the equipment tested.

### 2.2 Operation Mode

**The Sirius XM Radio onyX FM Transmitter** was set to transmit in the FM band while receiving live satellite broadcast. The EUT was tested while receiving live satellite broadcast.

### 2.3 Test Configuration Descriptions

The **Sirius XM Radio onyX FM Transmitter** was tested in a total of six different configurations for unintentional and intentional emissions compliance to FCC rules and regulations and IC standards. Each test configuration is shown in the test information section.

### 3 Test Information

#### 3.1 Test Justification

The FM transmitter is located within the onyX housing and is only capable of FM transmission. The test data contained in this report pertains only to the emissions due to the FM band transmitter of the EUT.

The test procedure document used for this report was Sirius XM Satellite Radio Document: SOW1; dated June 17, 2009. It should be noted that the onyX uses the following connection methods: Standalone injected FM Cigarette Lighter Adapter (CLA), FM Direct, Cassette, and FM Extender Antenna (FEA). This report contains all but the standalone configuration which can be found in report 2009198 Sirius XM onyX FCC 15.239 IC RSS-210 Test Report R0.0.

#### 3.2 Exercising the EUT

The EUT was tested with the FM modulator enabled while receiving live satellite broadcast. The EUT was tested using 89.1 MHz, 97.7 MHz and 106.3 MHz. There were no deviations from the test standard(s) and/or methods. The EUT was tested using frequencies from the low, mid, and high bands across its frequency tuning range 88.1 MHz-107.9 MHz. The lowest and highest tuning frequencies, namely, 88.1 MHz and 107.9 MHz, were not used during testing due to very strong local ambient that prevented their use. The tuning range of the onyX was verified during testing to be between 88.1 and 107.9 MHz, any other frequencies outside this tuning range was prohibited by the unit's software content.

#### 3.3 Test Result Summary

Table 3.3-1: Test Result Summary with FCC Rules and Regulations

FCC Part Section	Test Description	Test Limit	Pass/Fail
15.239(a)	Bandwidth	< 200 kHz	Pass
15.109(a)	Out-of-Band Emissions	Emissions outside of the specified band must meet the radiated limits detailed in 15.209	Pass
15.107(a)	Conducted Emissions	Emissions must meet conducted emissions limits detailed in 15.107(a)	Pass

#### 3.4 Test System Details

The test sample was received on June 20, 2009. The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system, are shown in the table below.

Table 3.4-1: Equipment under Test (EUT)

Part	Manufacturer	Model	Serial Number	Cable Description	RTL Bar Code
onyX	Sirius XM	XDNX1	DVTA 035	N/A	019067
Home Cradle	Audiovox	136-4060	132-7279C	Unshielded power	N/A
AC Adapter	Phihong	PSM08A-052	R07280A1-D	Unshielded	N/A
XM Home Antenna	Sirius XM	Satellite	N/A	Shielded	N/A
Vehicle Cradle	Audiovox	136-4281/ XPREZCAR_P8 Xpress	13644580P08	Unshielded	019083
Vehicle Cradle	Sirius XM	Gen 2	P22209103	N/A	019064
Power adapter (to cradle)	Sirius XM	CLA	N/A	Unshielded with ferrite	019072
Power adapter (to cradle)	Sirius XM	UFM- SIR(CFEA)	U434923A0027J01	Unshielded with ferrite	019065
XM Car Antenna	Sirius XM	XM	N/A	Shielded	019075
FM Direct Adapter	Sirius XM	FMDA25	N/A	Shielded	019102
FM Direct Adapter	Sirius XM	XM-7700-0022	N/A	Shielded	N/A
FEA Adapter	Sirius XM	FEA Adapter	N/A	Unshielded	N/A
SureConnect	Sirius XM	SureConnect	N/A	Shielded	019084
Cassette Adapter	Sirius XM	Cassette Adapter	N/A	Unshielded	019073
Car Aerial Antenna	Radio Shack	N/A	N/A	Shielded	019074
12V battery	Valucraft	N/A	N/A	N/A	N/A
CLA Power Adapter (socket)	Sirius XM	N/A	N/A	Unshielded	019122

#### 4 Radiated Emissions – FCC 15.209

##### 4.1 Conducted Emissions FCC 15.107(a)

###### 4.1.1 Test Configuration 1: onyX w/ Home Cradle

The EUT was configured as shown in Test Configuration 1. The spurious radiated emissions were measured at a distance of three meters. The EUT was powered by the AC adapter. The audio level was set to the maximum audio level. The EUT was configured to receive live satellite broadcast.

The data was recorded using a RBW of 9 kHz and a VBW of 100 kHz. The data was recorded using a Quasi Peak and Average detector.

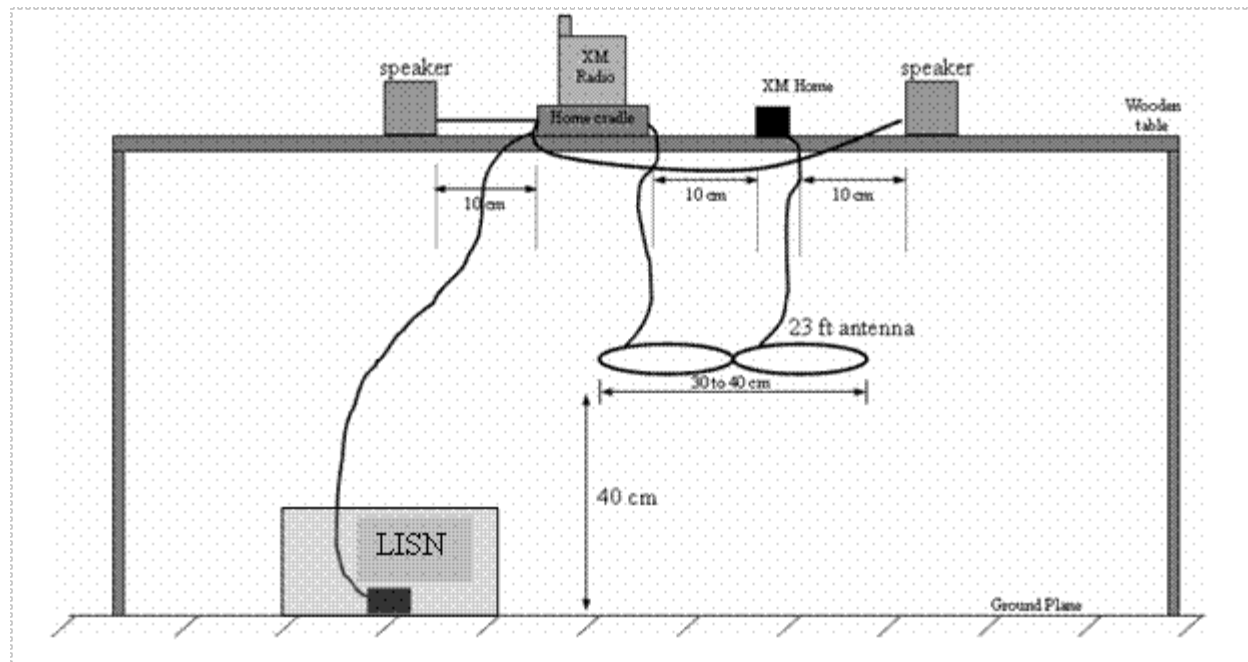


Figure 4.1-1: Test Configuration 1 – Home Cradle Conducted Emissions Setup

4.1.2 Conducted Emissions Test Data

Temperature: 77°F Humidity: 35%

Table 4.1-1: Conducted Emissions 120 Vac Phase

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	CISPR B QP Limit (dBuV)	CISPR B QP Margin (dBuV)	CISPR B AV Limit (dBuV)	CISPR B AV Margin (dBuV)	Pass/Fail
0.268	Qp	46.1	0.2	46.3	61.2	-14.9	51.2	---	Pass
0.265	Av	30.5	0.2	30.7	61.3	-30.6	51.3	-20.6	Pass
0.316	Qp	46.4	0.3	46.7	59.8	-13.1	49.8	---	Pass
0.316	Av	32.2	0.3	32.5	59.8	-27.3	49.8	-17.3	Pass
0.394	Qp	46.4	0.3	46.7	58.0	-11.3	48.0	---	Pass
0.394	Av	30.5	0.3	30.8	58.0	-27.2	48.0	-17.2	Pass
0.483	Qp	47.5	0.3	47.8	56.3	-8.5	46.3	---	Pass
0.483	Av	29.4	0.3	29.7	56.3	-26.6	46.3	-16.6	Pass
0.664	Qp	52.2	0.4	52.6	56.0	-3.4	46.0	---	Pass
0.669	Av	37.9	0.4	38.3	56.0	-17.7	46.0	-7.7	Pass
0.910	Qp	45.5	0.5	46.0	56.0	-10.0	46.0	---	Pass
0.911	Av	24.2	0.5	24.7	56.0	-31.3	46.0	-21.3	Pass
5.070	Pk	43.9	1.6	45.5	60.0	-14.5	50.0	-4.5	Pass
14.160	Pk	33.3	2.7	36.0	60.0	-24.0	50.0	-14.0	Pass

Table 4.1-2: Conducted Emissions 120 Vac Neutral

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	CISPR B QP Limit (dBuV)	CISPR B QP Margin (dBuV)	CISPR B AV Limit (dBuV)	CISPR B AV Margin (dBuV)	Pass/Fail
0.267	Pk	43.6	0.2	43.8	61.2	-17.4	51.2	-7.4	Pass
0.350	Qp	41.2	0.3	41.5	59.0	-17.5	49.0	-7.5	Pass
0.398	Qp	41.0	0.3	41.3	57.9	-16.6	47.9	-6.6	Pass
0.486	Qp	42.6	0.3	42.9	56.2	-13.3	46.2	---	Pass
0.486	Av	17.7	0.3	18.0	56.2	-38.2	46.2	-28.2	Pass
0.618	Qp	42.6	0.4	43.0	56.0	-13.0	46.0	---	Pass
0.618	Av	24.1	0.4	24.5	56.0	-31.5	46.0	-21.5	Pass
0.657	Qp	50.0	0.4	50.4	56.0	-5.6	46.0	---	Pass
0.657	Av	30.6	0.4	31.0	56.0	-25.0	46.0	-15.0	Pass
0.970	Qp	40.0	0.5	40.5	56.0	-15.5	46.0	-5.5	Pass
5.100	Qp	41.7	1.6	43.3	60.0	-16.7	50.0	-6.7	Pass
16.140	Pk	33.0	2.8	35.8	60.0	-24.2	50.0	-14.2	Pass

## 4.2 Unintentional Radiated Emissions 15.109(a)

### 4.2.1 Test Configuration 2: onyX w/ Home Cradle

The EUT was configured as shown in Test Configuration 2. The conducted emissions were measured on the 120 Vac Line and Neutral power leads. The EUT was powered by the AC adapter. The audio level was set to the maximum audio level. The EUT was configured to receive a live satellite broadcast. The test configuration is shown below.

The data was recorded using a RBW of 120 kHz and a VBW of 300 kHz. The data was recorded using a Quasi Peak detector.

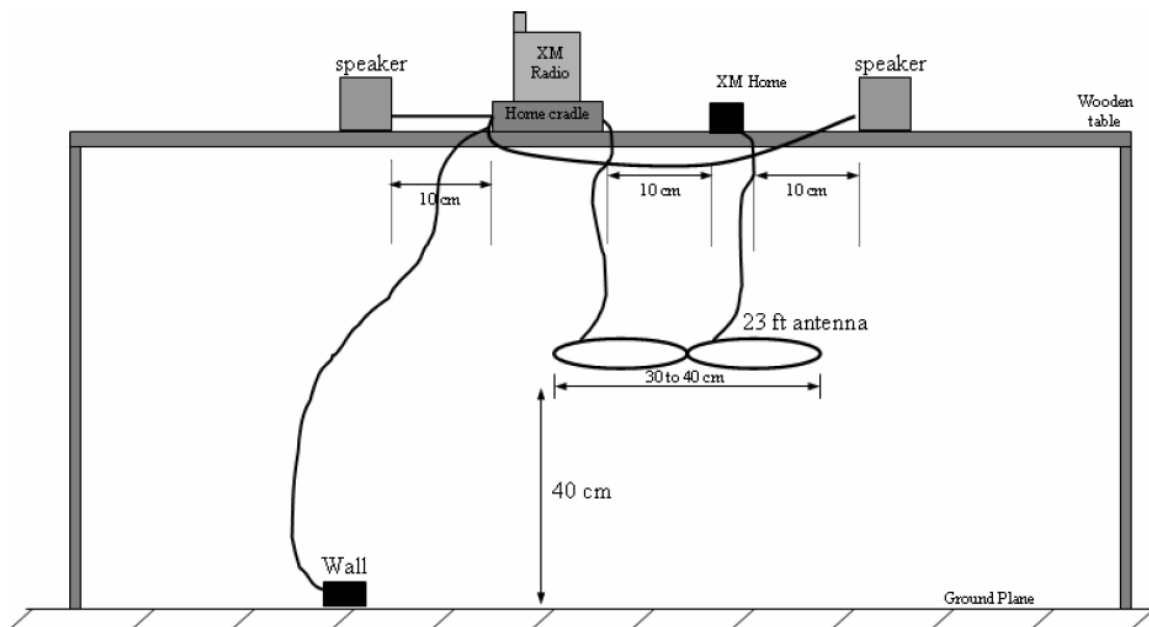


Figure 4.2-1: Test Configuration 2 – onyX w/ Home Cradle



4.2.2 Radiated Measurement Data for onyX w/Home Cradle (15.109(a))

Table 4.2-1: Radiated Measurement Data

Temperature: 69°F Humidity: 51%

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	FCC/ IC Limit (dBuV/m)	FCC/ IC Margin (dB)	Pass/ Fail
55.940	Qp	H	180	3.5	38.8	-24.6	14.2	40.0	-25.8	Pass
55.940	Qp	V	150	1.0	43.5	-24.6	18.9	40.0	-21.1	Pass
70.940	Qp	H	260	3.0	39.8	-26.2	13.6	40.0	-26.4	Pass
70.940	Qp	V	170	1.2	43.6	-26.2	17.4	40.0	-22.6	Pass
91.640	Qp	H	290	2.5	28.6	-22.3	6.3	43.5	-37.2	Pass
91.640	Qp	V	55	1.0	31.9	-22.3	9.6	43.5	-33.9	Pass
169.610	Qp	H	20	2.0	38.6	-19.8	18.8	43.5	-24.7	Pass
169.610	Qp	V	210	1.0	48.5	-19.8	28.7	43.5	-14.8	Pass
194.140	Qp	H	175	2.2	49.5	-20.3	29.2	43.5	-14.3	Pass
194.140	Qp	V	180	1.0	52.7	-20.3	32.4	43.5	-11.1	Pass
218.380	Qp	H	285	2.0	42.2	-20.4	21.8	46.0	-24.2	Pass
218.380	Qp	V	210	1.0	47.1	-20.4	26.7	46.0	-19.3	Pass
242.650	Qp	H	165	2.0	43.5	-19.3	24.2	46.0	-21.8	Pass
242.650	Qp	V	180	1.2	42.8	-19.3	23.5	46.0	-22.5	Pass
315.445	Qp	H	100	1.0	46.0	-15.3	30.7	46.0	-15.3	Pass
315.415	Qp	V	255	1.0	40.7	-15.3	25.4	46.0	-20.6	Pass
339.710	Qp	H	80	1.6	47.1	-14.8	32.3	46.0	-13.7	Pass
339.710	Qp	V	130	2.0	45.3	-14.8	30.5	46.0	-15.5	Pass
388.250	Qp	H	230	2.0	43.9	-13.4	30.5	46.0	-15.5	Pass
388.250	Qp	V	175	1.8	45.2	-13.4	31.8	46.0	-14.2	Pass
703.640	Qp	H	280	1.8	37.7	-7.1	30.6	46.0	-15.4	Pass
703.640	Qp	V	340	1.0	38.6	-7.1	31.5	46.0	-14.5	Pass

### 4.3 Radiated Spurious Emission Measurements - Test Configuration 3: FM Direct Adapter

The EUT was configured as shown in the configuration below. The car aerial antenna was mounted to a 4' by 3' aluminum plate to simulate the antenna being mounted to a vehicle. The FM direct adapter (output to radio) was terminated with a 75Ω termination. The out-of-band radiated emissions were measured at a distance of three meters. The EUT was powered by a fully charged 12 Vdc car battery. The FM Modulator was enabled and the audio level set to the maximum audio level. The EUT was configured to receive a live satellite broadcast. The cables were manipulated to produce the highest emission level. The EUT was tested using the harmonics of the following frequencies: 89.1 MHz, 97.7 MHz and 106.3 MHz. Data was recorded for the ten harmonics of each fundamental frequency. Data was taken for both horizontal and vertical antenna polarizations.

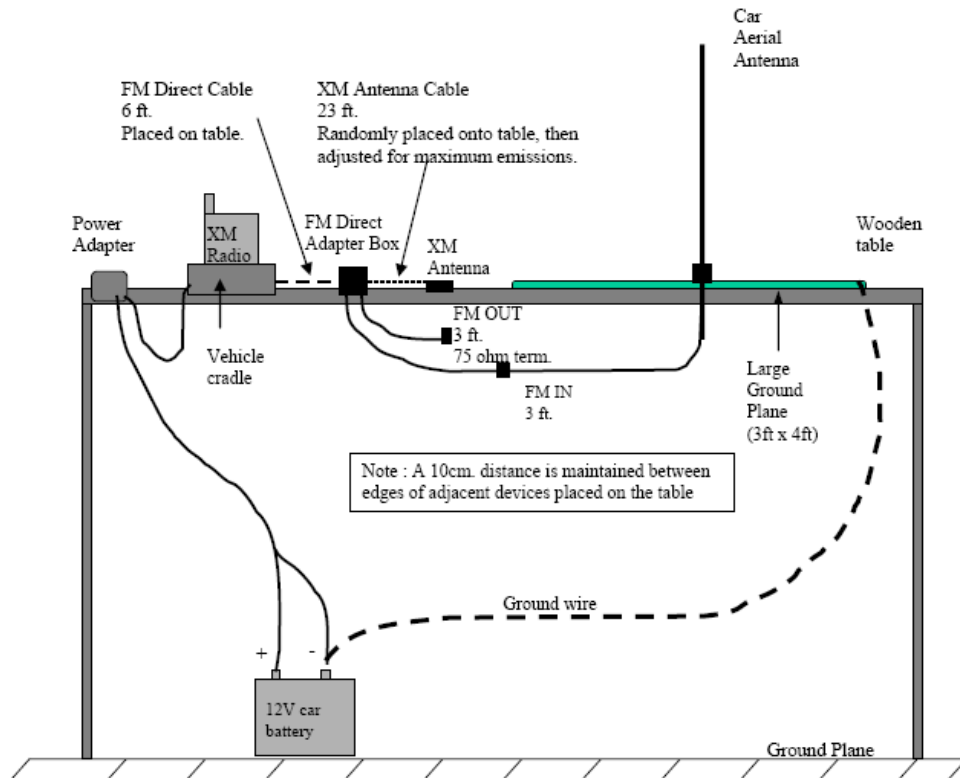


Figure 4.3-1: Test Configuration 3: onyX with FM Direct Adapter Radiated Emissions Setup

4.3.1 15.109(a) Radiated Emission Measurements – In-Band and Out-of-Band

Table 4.3-1: FM Direct Adapter with Gen 2 Cradle

Temperature: 88°F Humidity: 45%										
Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	FCC/IC Limit (dBuV/m)	FCC/IC Margin (dB)	Pass/Fail
89.100	Qp	H	180	3.0	51.8	-22.9	28.9	43.5	-14.6	Pass
89.100	Qp	V	230	1.5	51.7	-22.9	28.8	43.5	-14.7	Pass
97.700	Qp	H	75	3.5	42.2	-20.8	21.4	43.5	-22.1	Pass
97.700	Qp	V	90	1.2	45.2	-20.8	24.4	43.5	-19.1	Pass
106.300	Qp	H	45	2.5	39.5	-19.6	19.9	43.5	-23.6	Pass
106.300	Qp	V	185	2.0	40.1	-19.6	20.5	43.5	-23.0	Pass
178.200	Qp	H	75	3.0	42.5	-20.5	22.0	43.5	-21.5	Pass
179.000	Qp	V	260	1.5	45.5	-20.6	24.9	43.5	-18.6	Pass
195.400	Qp	H	180	3.0	39.5	-20.1	19.4	43.5	-24.1	Pass
212.600	Qp	V	90	1.0	40.2	-20.4	19.8	43.5	-23.7	Pass
268.500	Qp	H	150	2.0	45.6	-16.8	28.8	46.0	-17.2	Pass
293.100	Qp	V	25	1.0	43.5	-16.5	27.0	46.0	-19.0	Pass
318.900	Qp	H	175	3.0	37.1	-15.3	21.8	46.0	-24.2	Pass
358.000	Qp	V	270	1.0	37.9	-14.0	23.9	46.0	-22.1	Pass
390.800	Qp	H	200	2.0	38.2	-13.3	24.9	46.0	-21.1	Pass
425.200	Qp	V	250	1.0	38.7	-12.0	26.7	46.0	-19.3	Pass
447.500	Qp	H	280	1.8	39.7	-11.8	27.9	46.0	-18.1	Pass
488.500	Qp	V	80	1.0	39.0	-10.5	28.5	46.0	-17.5	Pass
531.500	Qp	H	170	1.5	45.8	-9.7	36.1	46.0	-9.9	Pass
537.000	Qp	V	170	1.0	36.8	-9.6	27.2	46.0	-18.8	Pass
586.200	Qp	H	45	1.5	37.7	-8.9	28.8	46.0	-17.2	Pass
626.500	Qp	V	45	1.0	42.4	-8.3	34.1	46.0	-11.9	Pass
637.800	Qp	V	80	1.0	39.7	-8.4	31.3	46.0	-14.7	Pass
683.900	Qp	H	190	1.0	35.9	-7.3	28.6	46.0	-17.4	Pass
716.000	Qp	V	345	1.0	36.4	-6.7	29.7	46.0	-16.3	Pass
744.100	Qp	V	260	1.0	37.5	-6.2	31.3	46.0	-14.7	Pass
781.600	Qp	H	120	1.0	37.1	-5.9	31.2	46.0	-14.8	Pass
805.500	Qp	V	100	1.5	37.4	-5.2	32.2	46.0	-13.8	Pass
850.400	Qp	H	180	1.0	36.8	-4.7	32.1	46.0	-13.9	Pass
879.300	Qp	H	230	1.0	38.5	-4.5	34.0	46.0	-12.0	Pass
895.000	Qp	V	180	1.0	35.8	-4.2	31.6	46.0	-14.4	Pass
956.700	Qp	V	140	1.0	36.5	-3.3	33.2	46.0	-12.8	Pass
977.000	Qp	V	85	2.0	37.1	-2.9	34.2	54.0	-19.8	Pass
984.500	Qp	H	125	1.0	37.4	-2.7	34.7	54.0	-19.3	Pass
1063.000	Av	H	5	1.0	25.5	-2.1	23.4	54.0	-30.6	Pass
1063.000	Pk	H	5	1.0	37.2	-2.1	35.1	74.0	-38.9	Pass

Table 4.3-2: FM Direct Adapter with Xpress Cradle

Temperature: 80°F Humidity: 70%										
Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	FCC/IC Limit (dBuV/m)	FCC/IC Margin (dB)	Pass/Fail
89.100	Qp	H	260	3.5	52.0	-22.9	29.1	43.5	-14.4	Pass
89.100	Qp	V	190	1.0	51.2	-22.9	28.3	43.5	-15.2	Pass
97.700	Qp	H	95	3.0	41.7	-20.8	20.9	43.5	-22.6	Pass
97.700	Qp	V	100	1.0	43.9	-20.8	23.1	43.5	-20.4	Pass
106.300	Qp	H	20	2.5	39.8	-19.6	20.2	43.5	-23.3	Pass
106.300	Qp	V	165	1.5	42.3	-19.6	22.7	43.5	-20.8	Pass
178.200	Qp	H	100	3.5	43.3	-20.5	22.8	43.5	-20.7	Pass
178.200	Qp	V	55	1.0	44.7	-20.5	24.2	43.5	-19.3	Pass
195.400	Qp	V	220	1.0	37.6	-20.1	17.5	43.5	-26.0	Pass
212.600	Qp	H	355	3.5	38.7	-20.4	18.3	43.5	-25.2	Pass
212.600	Qp	V	250	1.0	41.4	-20.4	21.0	43.5	-22.5	Pass

#### 4.4 Radiated Spurious Emission Measurements - Test Configuration 4: Cassette Adapter

The EUT was configured as shown in Test Configuration 4. The out-of-band radiated emissions were measured at a distance of three meters. The EUT was powered by a fully charged 12 VDC car battery. The FM Modulator was disabled and the audio level was set to the maximum audio level. The EUT was configured to receive a live satellite broadcast. The cables were manipulated to produce the highest emission level. Data was taken for both horizontal and vertical antenna polarizations. The test configuration is shown below.

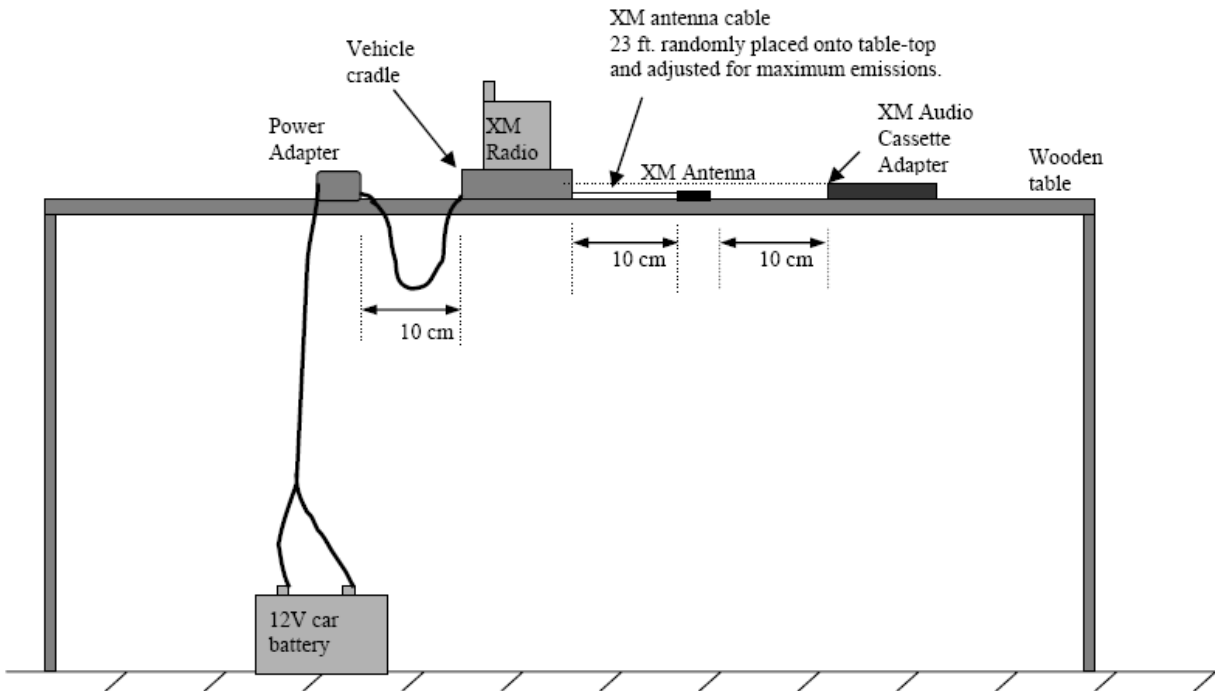


Figure 4.4-1: Test Configuration 4: onyX with Cassette Adapter Out-of-Band Radiated Emissions

4.4.1 15.109(a) Radiated Emission Measurements Out-of-Band (FM Modulator Off)

Temperature: 78°F Humidity: 66%

Table 4.4-1: Cassette Adapter with Gen 2 Cradle

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	FCC/IC Limit (dBuV/m)	FCC/IC Margin (dB)	Pass/Fail
179.000	Qp	H	180	1.5	42.1	-20.6	21.5	43.5	-22.0	Pass
195.400	Qp	V	260	1.0	47.1	-20.1	27.0	43.5	-16.5	Pass
212.600	Qp	V	75	1.0	46.8	-20.4	26.4	43.5	-17.1	Pass
268.500	Qp	H	90	1.5	45.0	-16.8	28.2	46.0	-17.8	Pass
293.100	Qp	V	90	2.0	40.5	-16.5	24.0	46.0	-22.0	Pass
307.900	Qp	H	130	1.0	47.1	-15.5	31.6	46.0	-14.4	Pass
318.900	Qp	H	150	1.5	45.1	-15.3	29.8	46.0	-16.2	Pass
358.000	Qp	H	25	1.0	42.3	-14.0	28.3	46.0	-17.7	Pass
390.810	Qp	H	120	2.0	39.0	-13.3	25.7	46.0	-20.3	Pass
425.200	Qp	H	190	1.8	37.7	-12.0	25.7	46.0	-20.3	Pass
447.500	Qp	V	80	1.0	36.7	-11.8	24.9	46.0	-21.1	Pass
488.510	Qp	H	90	1.0	36.8	-10.5	26.3	46.0	-19.7	Pass
531.500	Qp	H	5	2.0	40.8	-9.7	31.1	46.0	-14.9	Pass
537.000	Qp	H	220	1.0	36.3	-9.6	26.7	46.0	-19.3	Pass
586.210	Qp	H	210	1.5	41.0	-8.9	32.1	46.0	-13.9	Pass
626.500	Qp	H	220	1.0	35.7	-8.3	27.4	46.0	-18.6	Pass
637.800	Qp	V	55	1.0	37.2	-8.4	28.8	46.0	-17.2	Pass
683.910	Qp	H	180	1.0	35.3	-7.3	28.0	46.0	-18.0	Pass
716.000	Qp	V	90	1.2	37.4	-6.7	30.7	46.0	-15.3	Pass
744.100	Qp	V	260	1.0	36.1	-6.2	29.9	46.0	-16.1	Pass
781.600	Qp	V	145	1.0	37.6	-5.9	31.7	46.0	-14.3	Pass
805.500	Qp	V	140	1.0	36.6	-5.2	31.4	46.0	-14.6	Pass
850.400	Qp	V	190	1.0	36.7	-4.7	32.0	46.0	-14.0	Pass
879.310	Qp	V	100	1.0	37.0	-4.5	32.5	46.0	-13.5	Pass
895.000	Qp	H	180	1.0	34.3	-4.2	30.1	46.0	-15.9	Pass
956.700	Qp	H	250	1.0	35.5	-3.3	32.2	46.0	-13.8	Pass
977.010	Qp	H	0	1.0	36.5	-2.9	33.6	54.0	-20.4	Pass
984.500	Qp	V	270	1.2	35.3	-2.7	32.6	54.0	-21.4	Pass
1063.000	Pk	V	290	1.0	35.9	-2.1	33.8	74.0	-40.2	Pass
1063.000	Av	V	290	1.0	25.1	-2.1	23.0	54.0	-31.0	Pass
1074.710	Pk	V	110	1.0	36.9	-1.9	35.0	74.0	-39.0	Pass
1074.710	Av	V	110	1.0	24.8	-1.9	22.9	54.0	-31.1	Pass

Table 4.4-2: Cassette Adapter with Xpress Cradle

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	FCC/IC Limit (dBuV/m)	FCC/IC Margin (dB)	Pass/Fail
179.000	Qp	H	10	2.5	40.5	-20.6	19.9	43.5	-23.6	Pass
195.400	Qp	V	250	1.0	37.7	-20.1	17.6	43.5	-25.9	Pass
212.600	Qp	H	190	2.5	39.5	-20.4	19.1	43.5	-24.4	Pass
268.500	Qp	V	45	1.0	39.2	-16.8	22.4	46.0	-23.6	Pass
293.100	Qp	V	170	1.0	35.9	-16.5	19.4	46.0	-26.6	Pass
318.900	Qp	H	320	1.8	36.2	-15.3	20.9	46.0	-25.1	Pass
358.000	Qp	H	325	1.0	36.9	-14.0	22.9	46.0	-23.1	Pass
390.800	Qp	H	90	2.0	37.6	-13.3	24.3	46.0	-21.7	Pass
425.200	Qp	H	200	1.0	36.8	-12.0	24.8	46.0	-21.2	Pass
447.500	Qp	H	250	1.5	37.5	-11.8	25.7	46.0	-20.3	Pass
488.500	Qp	V	325	1.5	39.9	-10.5	29.4	46.0	-16.6	Pass
531.500	Qp	H	270	1.0	40.4	-9.7	30.7	46.0	-15.3	Pass
537.000	Qp	V	340	1.5	37.3	-9.6	27.7	46.0	-18.3	Pass
586.200	Qp	V	350	1.0	40.1	-8.9	31.2	46.0	-14.8	Pass
626.500	Qp	V	160	1.0	35.8	-8.3	27.5	46.0	-18.5	Pass
637.800	Qp	V	65	1.2	39.0	-8.4	30.6	46.0	-15.4	Pass
683.900	Qp	V	170	1.0	36.5	-7.3	29.2	46.0	-16.8	Pass
716.000	Qp	V	190	1.0	36.2	-6.7	29.5	46.0	-16.5	Pass
744.100	Qp	V	120	1.5	36.8	-6.2	30.6	46.0	-15.4	Pass
781.600	Qp	V	290	1.0	35.5	-5.9	29.6	46.0	-16.4	Pass
805.500	Qp	V	320	1.2	36.9	-5.2	31.7	46.0	-14.3	Pass
850.400	Qp	H	260	1.5	37.0	-4.7	32.3	46.0	-13.7	Pass
879.300	Qp	H	345	1.2	36.8	-4.5	32.3	46.0	-13.7	Pass
895.000	Qp	H	320	2.0	36.8	-4.2	32.6	46.0	-13.4	Pass
956.700	Qp	H	80	1.0	36.4	-3.3	33.1	46.0	-12.9	Pass
977.000	Qp	V	260	1.0	42.2	-2.9	39.3	54.0	-14.7	Pass
984.500	Qp	V	0	1.0	36.8	-2.7	34.1	54.0	-19.9	Pass
1063.000	Av	V	230	1.2	24.7	-2.1	21.9	54.0	-32.1	Pass
1063.000	Pk	V	230	1.2	35.3	-2.1	33.2	74.0	-40.8	Pass

#### 4.5 Radiated Spurious Emission Measurements - Test Configuration 6: FEA

The EUT was configured as shown in the configuration below. The out-of-band radiated emissions were measured at a distance of three meters. The EUT was powered by a fully charged 12 Vdc car battery. The FM Modulator was enabled and the audio level was set to the maximum audio level. The EUT was configured to receive a live satellite broadcast. The cables were manipulated to produce the highest emission level. The EUT was tested using the harmonics of the following frequencies: 89.1 MHz, 97.7 MHz and 106.3 MHz. Data was taken for both horizontal and vertical antenna polarizations with the worst case levels recorded.

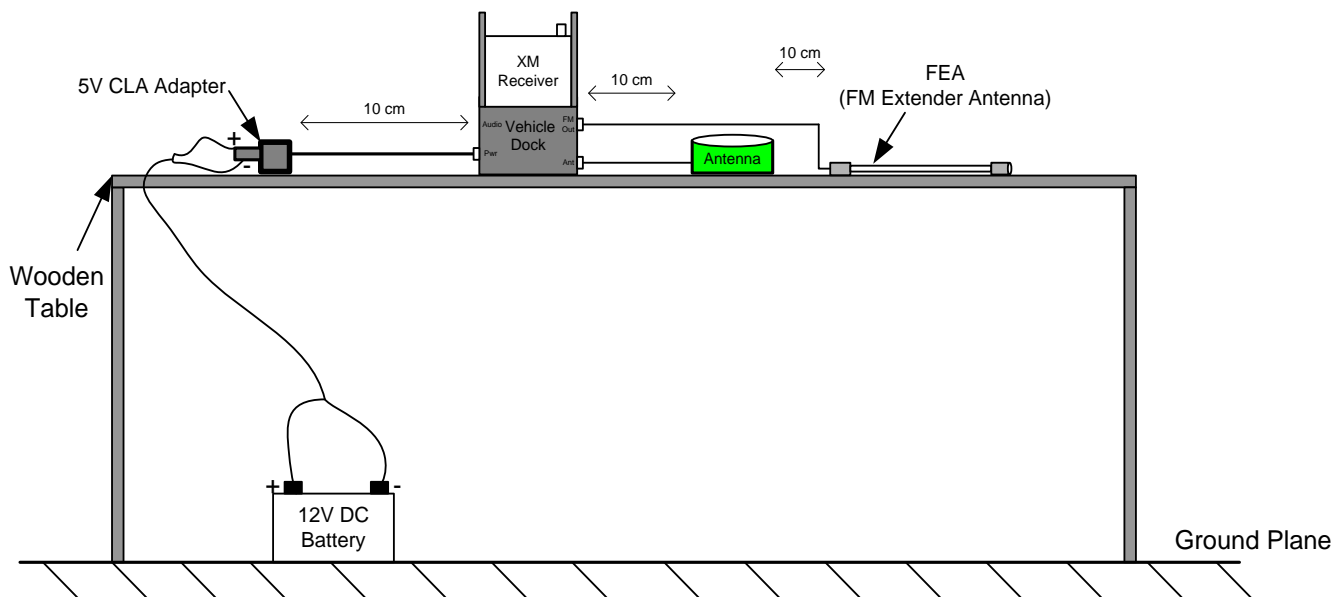


Figure 4.5-1: Test Configuration 6 - Car Cradle with FEA (FM Extender Antenna) Radiated Emissions



4.5.1 15.209(a) Radiated Emission Measurements

Temperature: 87°F Humidity: 55%

Table 4.5-1: FEA Adapter Gen 2 Cradle - In-Band

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	FCC Limit (dBuV/m)	FCC Margin (dB)	IC Limit (dBuV/m)	IC Margin (dB)
89.100	Qp	H	90	3.2	63.1	-22.9	40.2	48.0	-7.8	60.0	-19.8
89.100	Qp	V	30	3.2	57.0	-22.9	34.1	48.0	-13.9	60.0	-25.9
97.700	Qp	H	160	3.5	62.3	-20.8	41.5	48.0	-6.5	60.0	-18.5
97.700	Qp	V	225	3.0	59.6	-20.8	38.8	48.0	-9.2	60.0	-21.2
106.300	Qp	H	95	2.5	62.4	-19.6	42.8	48.0	-5.2	60.0	-17.2
106.300	Qp	V	30	3.8	56.9	-19.6	37.3	48.0	-10.7	60.0	-22.7

Based on the operational mode of this test setup, 15.239 emission limits apply to the above data table.

Table 4.5-2: FEA Adapter Gen 2 Cradle - Out-of-Band

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	FCC/ IC Limit (dBuV/m)	FCC/IC Margin (dB)	Pass/ Fail
178.200	Qp	V	0	1.0	41.2	-20.5	20.7	43.5	-22.8	Pass
195.400	Qp	H	80	1.8	46.0	-20.1	25.9	43.5	-17.6	Pass
211.500	Qp	H	60	1.5	49.9	-20.3	29.6	43.5	-13.9	Pass
267.300	Qp	H	0	4.0	33.7	-16.9	16.8	46.0	-29.2	Pass
293.100	Qp	V	0	1.0	33.3	-16.5	16.8	46.0	-29.2	Pass
318.900	Qp	H	0	1.0	34.5	-15.3	19.2	46.0	-26.8	Pass
356.400	Qp	H	0	4.0	36.6	-14.2	22.4	46.0	-23.6	Pass
390.800	Qp	V	0	1.0	33.1	-13.3	19.8	46.0	-26.2	Pass
425.200	Qp	V	0	1.0	34.1	-12.0	22.1	46.0	-23.9	Pass
445.500	Qp	H	0	1.0	36.0	-11.9	24.1	46.0	-21.9	Pass
488.500	Qp	V	0	1.0	33.2	-10.5	22.7	46.0	-23.3	Pass
531.500	Qp	V	0	1.0	35.7	-9.7	26.0	46.0	-20.0	Pass
534.600	Qp	H	0	1.0	39.9	-9.6	30.3	46.0	-15.7	Pass
586.200	Qp	V	0	1.0	43.8	-8.9	34.9	46.0	-11.1	Pass
623.700	Qp	H	0	1.0	33.2	-8.4	24.8	46.0	-21.2	Pass
637.800	Qp	H	0	1.0	34.1	-8.4	25.7	46.0	-20.3	Pass
683.900	Qp	V	0	1.0	34.0	-7.3	26.7	46.0	-19.3	Pass
712.800	Qp	H	0	1.0	33.3	-6.8	26.5	46.0	-19.5	Pass
744.100	Qp	H	0	1.0	33.0	-6.2	26.8	46.0	-19.2	Pass
781.600	Qp	V	0	1.0	32.2	-5.9	26.3	46.0	-19.7	Pass
801.900	Qp	H	0	1.0	37.8	-5.3	32.5	46.0	-13.5	Pass
850.400	Qp	V	0	1.0	40.0	-4.7	35.3	46.0	-10.7	Pass
879.300	Qp	V	0	1.0	28.2	-4.5	23.7	46.0	-22.3	Pass
891.000	Qp	V	0	1.0	39.2	-4.4	34.8	46.0	-11.2	Pass
956.700	Qp	V	0	1.0	32.6	-3.3	29.3	46.0	-16.7	Pass
977.000	Qp	V	0	1.0	32.9	-2.9	30.0	54.0	-24.0	Pass
1063.000	Pk	H	0	1.0	34.0	-2.1	31.9	74.0	-42.1	Pass
1063.000	Av	H	0	1.0	22.6	-2.1	20.5	54.0	-33.5	Pass

Table 4.5-3: FEA Adapter Xpress Cradle - In-Band

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	FCC Limit (dBuV/m)	FCC Margin (dB)	IC Limit (dBuV/m)	IC Margin (dB)	Pass/Fail
89.100	Qp	H	95	3.0	63.3	-22.9	40.4	48.0	-7.6	60.0	-19.6	Pass
89.100	Qp	V	120	3.5	51.4	-22.9	28.5	48.0	-19.5	60.0	-31.5	Pass
97.700	Qp	H	90	1.8	64.7	-20.8	43.9	48.0	-4.1	60.0	-16.1	Pass
97.700	Qp	V	290	3.5	51.2	-20.8	30.4	48.0	-17.6	60.0	-29.6	Pass
106.300	Qp	H	90	2.5	63.2	-19.6	43.6	48.0	-4.4	60.0	-16.4	Pass
106.300	Qp	V	30	4.0	57.5	-19.6	37.9	48.0	-10.1	60.0	-22.1	Pass

Based on the operational mode of this test setup, 15.239 emission limits apply to the above data table.  
 There were no out-of-band emissions found for all frequencies.

#### 4.6 Radiated Spurious Emission Measurements - Test Configuration 7: SureConnect Adapter

The EUT was configured as shown below. The whip antenna was mounted on a 4' by 3' aluminum plate to simulate the whip antenna mounted on a vehicle, while its port was terminated with a 75 Ohm load. The SureConnect adapter was connected to the whip antenna. The out-of-band radiated emissions were measured at a distance of three meters. The EUT was powered by a fully charged 12 Vdc car battery. The FM Modulator was enabled and the audio level was set to the maximum audio level. The EUT was configured to receive a live satellite broadcast. The cables were manipulated to produce the highest emission level. The EUT was tested using the harmonics of the following frequencies: 89.1 MHz, 97.7 MHz and 106.3 MHz. Data was taken for both horizontal and vertical antenna polarizations with the worst case levels recorded.

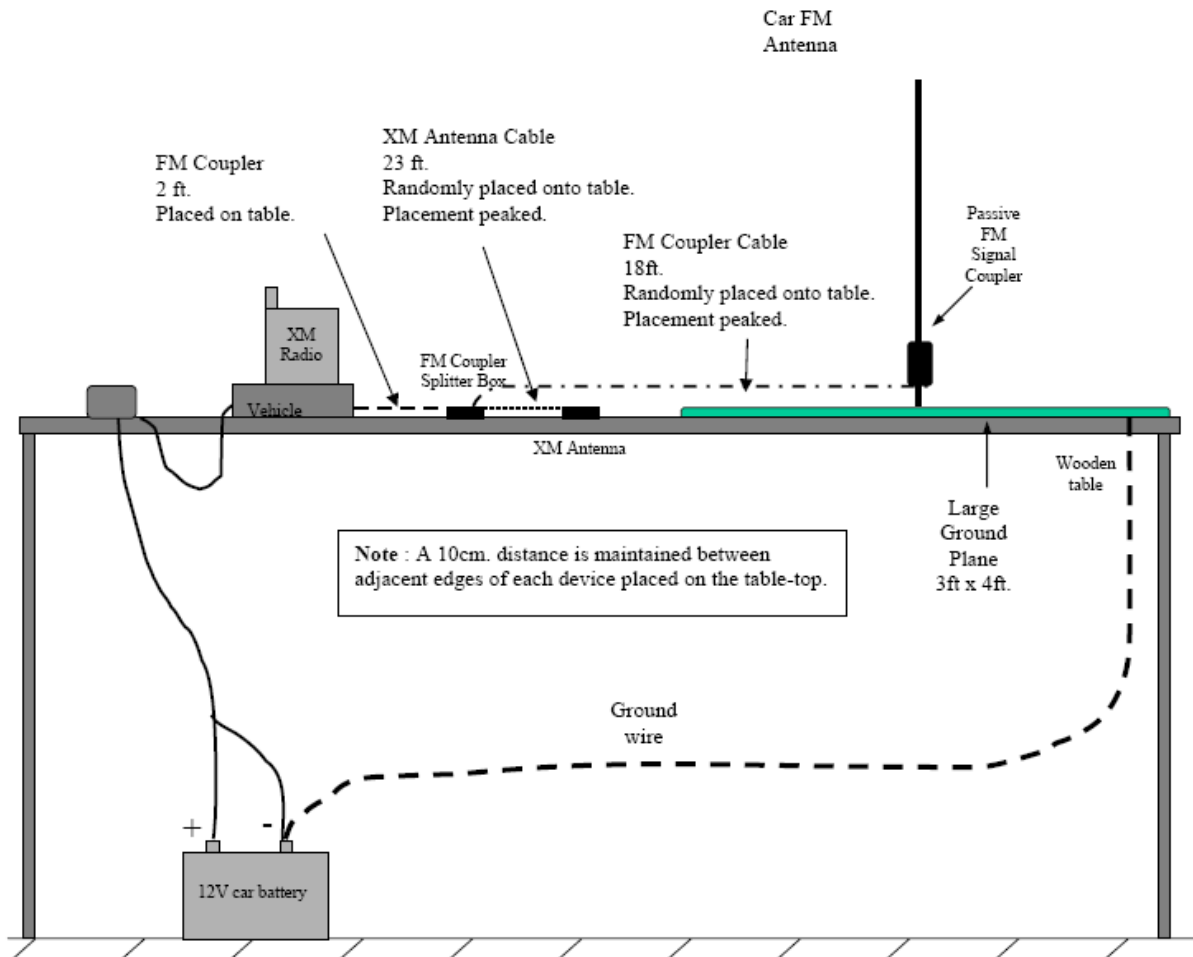


Figure 4.6-1: Test Configuration 7 - Car Cradle with SureConnect Adapter Out-of-Band Radiated Emissions

4.6.1 15.209(a) Radiated Emission Measurements – SureConnect Adapter

Temperature: 87°F Humidity: 55%

Table 4.6-1: SureConnect Adapter - In-Band

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	FCC Limit (dBuV/m)	FCC Margin (dB)	IC Limit (dBuV/m)	IC Margin (dB)	Pass/Fail
89.500	Qp	H	185	4.0	64.1	-22.8	41.3	48.0	-6.7	60.0	-18.7	Pass
89.500	Qp	V	280	1.0	68.7	-22.8	45.9	48.0	-2.1	60.0	-14.1	Pass
97.700	Qp	H	90	3.0	65.0	-20.8	44.2	48.0	-3.8	60.0	-15.8	Pass
97.700	Qp	V	275	1.0	64.6	-20.8	43.8	48.0	-4.2	60.0	-16.2	Pass
106.300	Qp	H	90	3.0	62.0	-19.6	42.4	48.0	-5.6	60.0	-17.6	Pass
106.300	Qp	V	270	1.0	64.0	-19.6	44.4	48.0	-3.6	60.0	-15.6	Pass

Based on the operational mode of this test setup, 15.239 emission limits apply to the above data table.

Table 4.6-2: SureConnect Adapter - Out-of-Band

Harmonics were investigated and none were found above the noise floor. Investigation performed up to the 10<sup>th</sup> harmonic of 89.5 MHz, 97.7 MHz, and 106.3 MHz

Table 4.6-3: Emissions Equipment List

Part Type	Manufacturer	Model	Serial Number	Barcode	Calibration Due Date
<b>Conducted Emissions</b>					
Spectrum Analyzer (100 Hz - .15 GHz)	Hewlett Packard	8567A	2602A00160	900968	9/8/2009
Spectrum Analyzer Display Section	Hewlett Packard	85662A	2542A11239	900970	9/8/2009
Quasi-Peak Adapter	Hewlett Packard	85650A	2521A00743	900339	9/11/2009
Filter	Solar	8130	947306	900729	8/19/2009
16A LISN	AFJ International	LS16/110VAC	16010020081	901083	10/23/2009
Emissions testing software	Quantum Change	Tile!	4.0.A.8	N/A	N/A
<b>Radiated Emissions (OATS1)</b>					
Amplifier (20 MHz – 2 GHz)	Rhein Tech Laboratories, Inc.	PR-1040	900905	900905	6/2/2010
Bi-Log Antenna (20 MHz – 2 GHz)	Schaffner Chase	CBL6112B	2099	900791	12/12/2010
EMI Receiver RF Section, (9 KHz - 6.5 GHz)	Hewlett Packard	85462A	3325A00159	900913	4/15/2010
RF Filter Section, (100 KHz - 6.5 GHz)	Hewlett Packard	85460A	3330A00107	900914	4/15/2010
Emissions testing software	Rhein Tech Laboratories, Inc.	Automated Emission Tester	Rev. 14.0.2	N/A	N/A

**4.7 200 kHz Bandwidth Measurement FCC 15.239(a) – Test Configuration 5: FM Direct Adapter (BW)**

The FM transmitter audio level was set to maximum. The EUT was setup as shown in Test Configuration 5 below. The 200 kHz bandwidth measurements were made at 88.1 MHz, 96.9 MHz and 107.9 MHz. The bandwidth at 20 dB down from the highest in-band spectral density was measured with the spectrum analyzer connected to the audio output port on the XDNX1. The 20 dB bandwidth was measured with the EUT receiving a live satellite broadcast as well iTunes MP3 files played from the iPod Touch device. The 20 dB bandwidth measurements were made with modulation. All measurements were made with the spectrum analyzer in max hold. The test results are shown in Table 4.7-1. The plots of the bandwidth measurements are shown in plots 4.7-1 through 4.7-6 below.

Table 4.7-1: 200 kHz Bandwidth Measurements

Frequency (MHz)	Mode	200 kHz Bandwidth Test Results	
		(kHz)	Pass / Fail
88.1	With Modulation	151.900	Pass
96.9	With Modulation	175.600	Pass
107.9	With Modulation	161.300	Pass
88.1	No Modulation	43.800	Pass
96.9	No Modulation	43.800	Pass
107.9	No Modulation	43.100	Pass

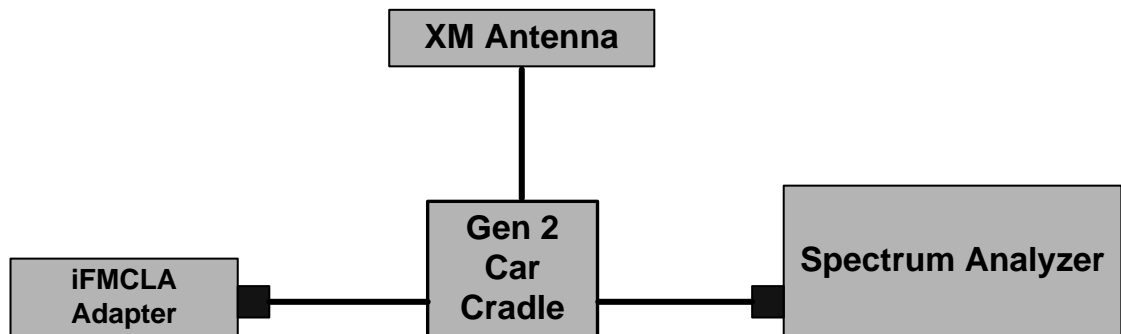
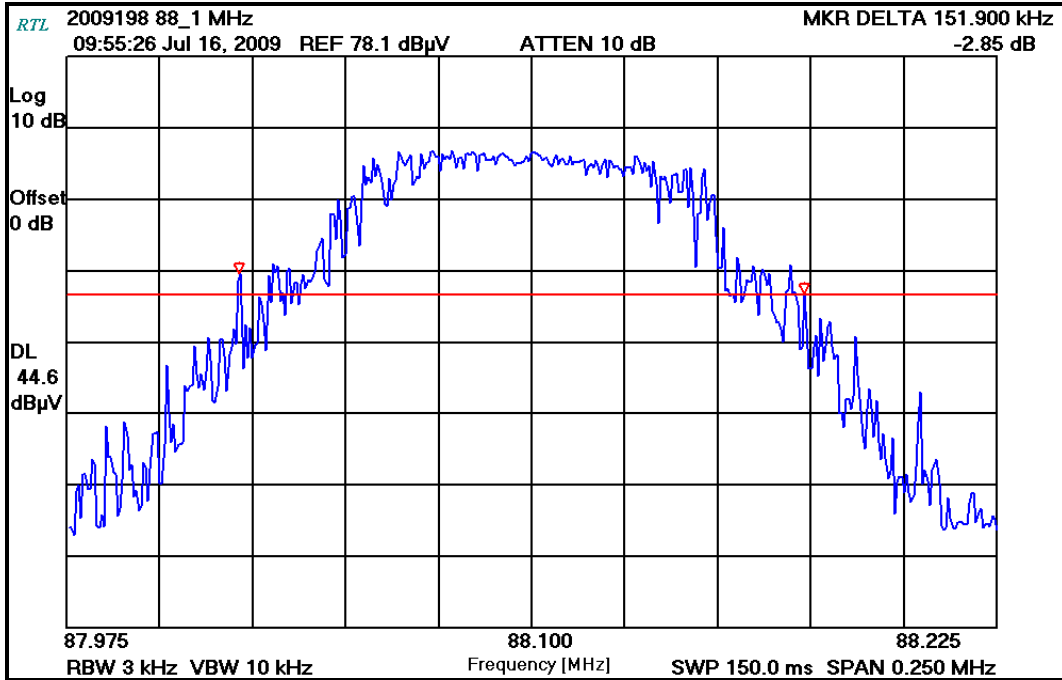
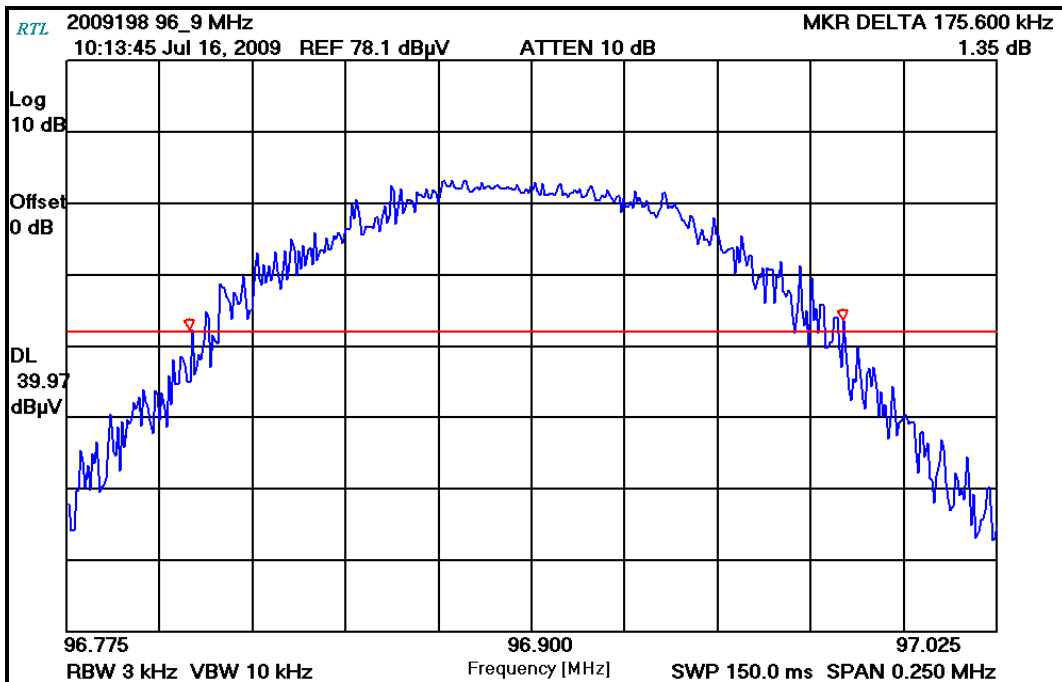


Figure 4.7-1: Test Configuration 5: Occupied Bandwidth Test Setup

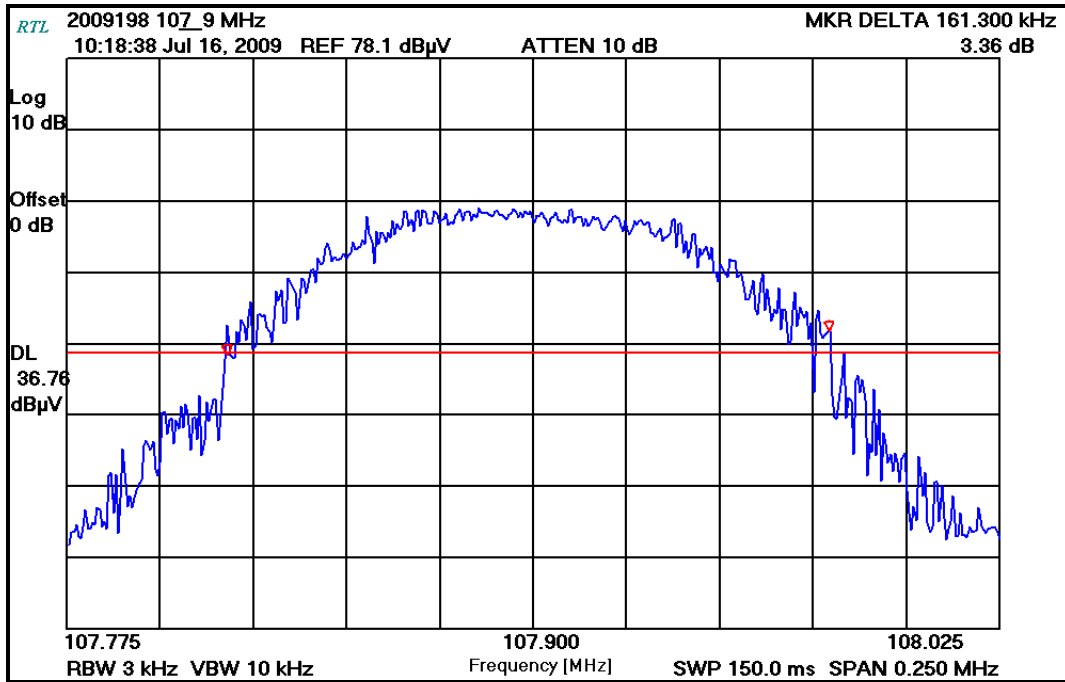
The plots of the 20 dB bandwidths are shown below. The plots were taken using the peak detector with the spectrum analyzer in max hold.



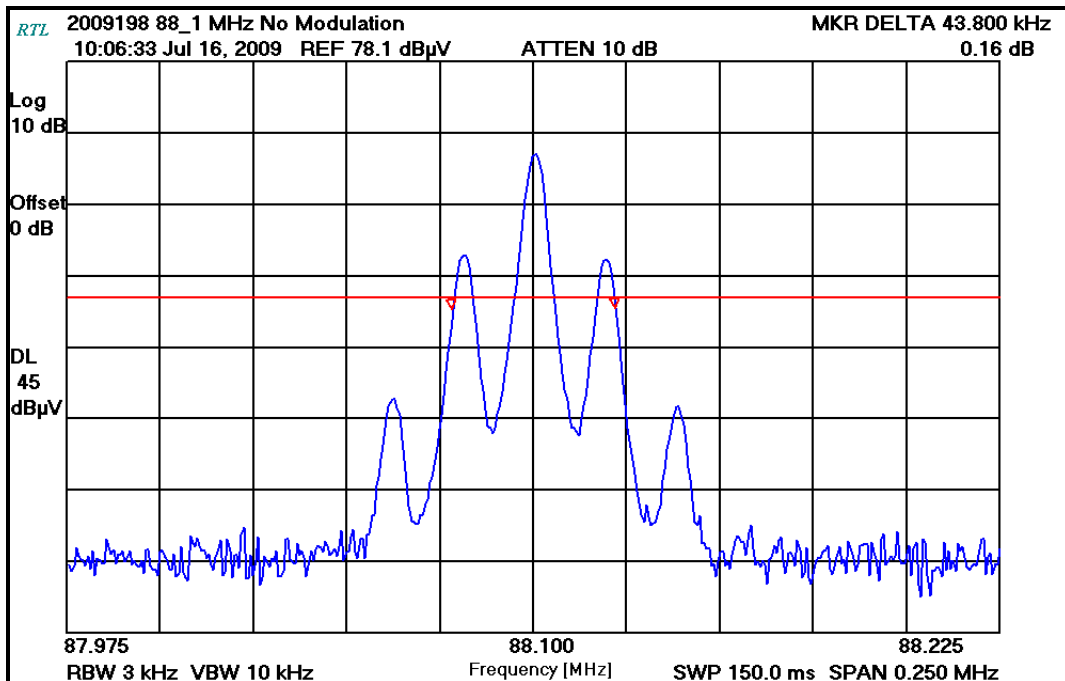
Plot 4.7-1: Bandwidth Plot at 88.1 MHz with Modulation



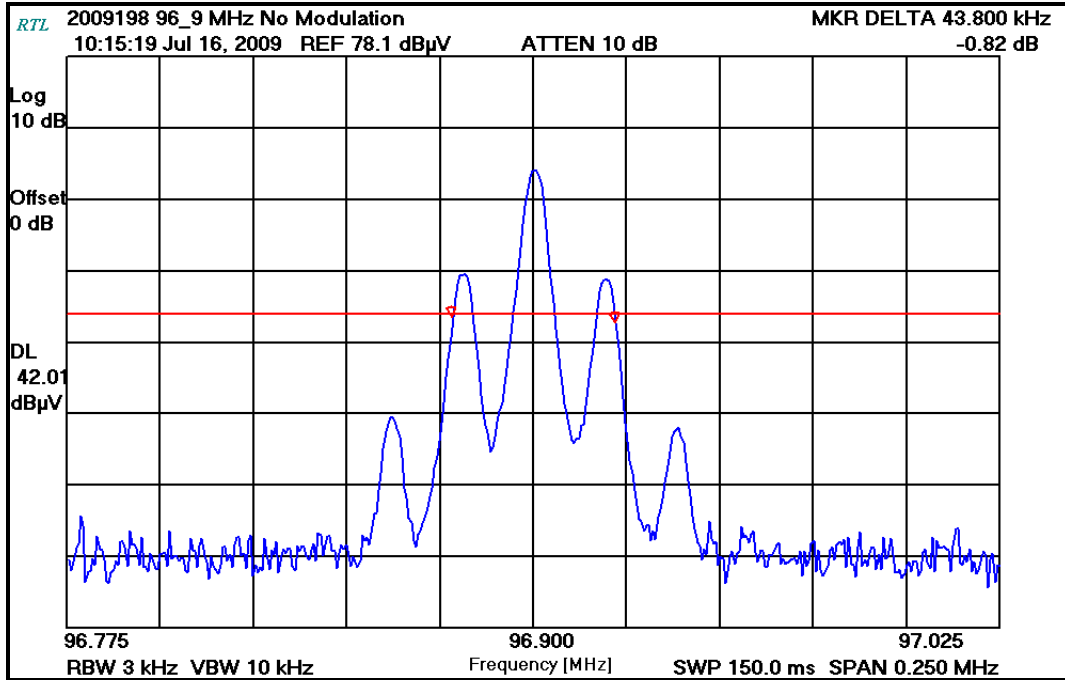
Plot 4.7-2: Bandwidth Plot at 96.9 MHz with Modulation



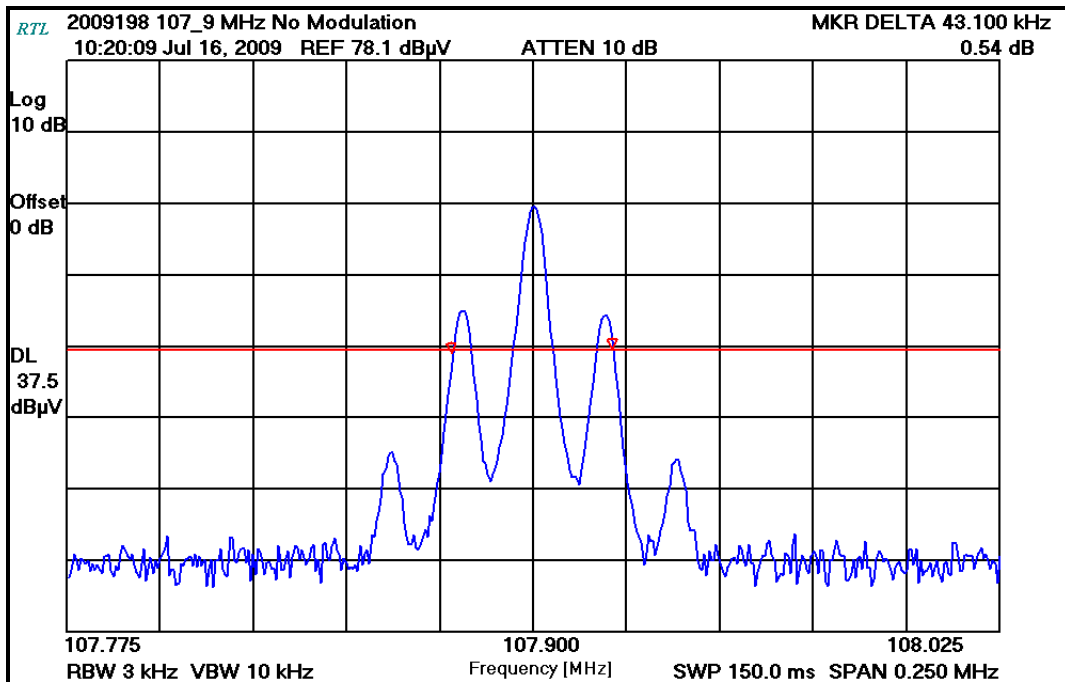
Plot 4.7-3: Bandwidth Plot at 107.9 MHz with Modulation



Plot 4.7-4: Bandwidth Plot at 88.1 MHz without Modulation



Plot 4.7-5: Bandwidth Plot at 96.9 MHz without Modulation



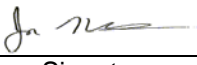
Plot 4.7-6: Bandwidth Plot at 107.9 MHz without Modulation



Table 4.7-2: Bandwidth Equipment List

Part Type	Manufacturer	Model	Serial Number	Barcode	Calibration Due Date
EMI Receiver RF Section, (9 KHz - 6.5 GHz)	Hewlett Packard	85462A	3325A00159	900913	4/15/2010
RF Filter Section, (100 KHz to 6.5 GHz)	Hewlett Packard	85460A	3330A00107	900914	4/15/2010

**Test Personnel:**

Jon Wilson EMC Engineer	 Signature	July 16, 2009 Date Of Tests
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## 5 Sample Calculations

### 5.1 Radiated Emissions Measurement Sample Calculation

$$\text{Limit} = 150 \mu\text{V/m} = 20 * \log (150\mu\text{V}/1\mu\text{V}) = 43.5 \text{ dB}\mu\text{V/m}$$

$$\text{Field Strength Level}_{(\text{dB}\mu\text{V/m})} = \text{Analyzer Level}_{(\text{dB}\mu\text{V})} + \text{Site Correction Factor}_{(\text{dB})}$$

Where:

$$\text{Site Correction Factor}_{(\text{dB})} = \text{Antenna Correction Factor}_{(\text{dB})} + \text{Cable Loss}_{(\text{dB})} - \text{Preamp Gain}_{(\text{dB})}$$

$$\text{Margin}_{(\text{dB})} = \text{Field Strength Level} - \text{Limit}$$

## 6 Conclusion

The data in this test report demonstrates that the **Sirius XM Radio onyX FM Transmitter, Model # XDNX1, FCC ID: RS2XDPENT1**, is in compliance with the requirements specified within FCC Part 15 Subpart B and IC RSS-210.