



Engineering and Testing for EMC and Safety Compliance



Accredited under A2LA Testing Certificate # 2653.01

**Certificate of Compliance Report  
FCC Part 15.239 / IC RSS-210 Certification**

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>	RS2XDPRCL1	<b>Test Report Date</b>	August 13, 2009
<b>EUT</b>	Xpress RCi	<b>RTL Work Order Number</b>	2009219
<b>Model #</b>	XDRC2	<b>RTL Quote Number</b>	QRTL08-332
<b>FCC Classification</b>	Part 15 Low Power Transceiver, Rx Verified		
<b>FCC Rule Part(s)</b>	FCC Part 15 Subpart C (15.239)		
<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 MHz (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, Industry Canada RSS-210, and ANSI C63.4.

Signature: 

Date: August 13, 2009

Typed/Printed Name: Desmond A. Fraser

Position: President

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## 1 General Information

### 1.1 Scope

FCC Rules Part 15 Subpart C (15.239); Operation within the band 88 – 108 MHz.

### 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 and Industry Canada 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 Xpress RCi FM Transmitter, Model # XDRC2, FCC ID: RS2XDPRCL1**. 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 Xpress RCi FM Transmitter** was set to transmit in the FM band while receiving live satellite broadcast.

### 2.3 Test Configuration Descriptions

The **Sirius XM Radio Xpress RCi FM Transmitter** was tested in a total of two 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 EUT tested was the **Sirius XM Radio Xpress RCi with FM Transmitter, Model # XDRC2, FCC ID: RS2XDPRCL1**. The FM transmitter is located within the Xpress RCi 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 results relate only to the item that was tested. The test procedure document used for this report was Sirius XM Satellite Radio Documents: Xpress RCi; dated June 18, 2009.

#### 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 Xpress RCi was verified during testing. There were no deviations from the test standard(s) and/or methods.

#### 3.3 Test Result Summary

FCC Part Section	IC Section	Test Description	Test Limit	Pass/Fail
15.239(a)	RSS-210 (A2.8)	Bandwidth	< 200 kHz	Pass
15.239(b)	RSS-210 (A2.8)	In-band Emissions	<250 uV/m within permitted 200 kHz band	Pass
15.239(c) 15.209	RSS-210 (2.7)	Out-of-Band Emissions	Emissions outside of the specified band must meet the radiated limits detailed in 15.209 (RSS-210 table 3 limits)	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
Xpress RCi	Sirius XM	XDRC2	FCC unit 1: HW P2SWV12	N/A	019076
Vehicle Cradle (Gen2)	Audiovox	XDPIV1	CJ 1769	N/A	019078
Power adapter for Gen2 cradle (to cradle)	Sirius XM	SXDPIP1, iFMCLA	HW: PV	N/A	019081
Vehicle XM Antenna	Sirius XM	Satellite Radio	N/A	N/A	019075

#### 4 Radiated Emissions – FCC 15.209, 15.239 / IC RSS-210

##### 4.1 Radiated Emission Measurements Standalone Injected FM CLA - Test Configuration 1

The EUT was configured as shown below. The intentional 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 either receive live satellite broadcast or to playback saved broadcast. The cables were manipulated to produce the highest emission level. The EUT was tested using the following in-band 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.

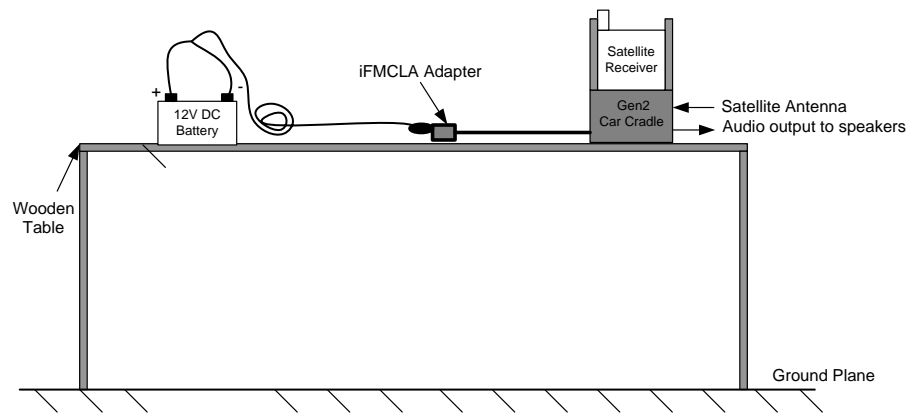


Figure 4.1-1: Test Configuration 1: Xpress RCi Receiver with Gen 2 Car Cradle and iFMCLA Adapter

#### 4.1.1 In-Band Radiated Emissions Test Data (15.239)

Table 4.1-1: In-Band Radiated Emissions: Live XM Radio

Temperature: 80°F Humidity: 67%											
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	245	4.0	60.4	-22.9	37.5	48.0	-10.5	60.0	-22.5
89.100	Qp	V	250	1.0	61.8	-22.9	38.9	48.0	-9.1	60.0	-21.1
97.700	Qp	H	235	3.5	59.0	-20.8	38.2	48.0	-9.8	60.0	-21.8
97.700	Qp	V	220	1.2	61.8	-20.8	41.0	48.0	-7.0	60.0	-19.0
106.300	Qp	H	150	3.0	57.8	-19.6	38.2	48.0	-9.8	60.0	-21.8
106.300	Qp	V	245	1.0	61.5	-19.6	41.9	48.0	-6.1	60.0	-18.1

Table 4.1-2: In-Band Radiated Emissions: Playback Mode

Temperature: 76°F Humidity: 65%											
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	V	20	1.0	59.4	-26.0	33.4	48.0	-14.6	60.0	-26.6
89.100	Qp	V	200	3.5	64.2	-26.0	38.2	48.0	-9.8	60.0	-21.8
97.700	Qp	H	250	3.0	64.7	-23.2	41.5	48.0	-6.5	60.0	-18.5
97.700	Qp	V	285	1.0	59.8	-23.2	36.6	48.0	-11.4	60.0	-23.4
106.300	Qp	H	80	2.8	62.8	-21.8	41.0	48.0	-7.0	60.0	-19.0
106.300	Qp	V	200	1.0	58.8	-21.8	37.0	48.0	-11.0	60.0	-23.0
212.600	Qp	H	150	2.0	43.3	-21.8	21.5	43.5	-22.0	43.5	-22.0

#### 4.1.2 Out-of-Band Radiated Emissions Test Data

Table 4.1-3: Out-of-Band Radiated Emissions Test Data

Temperature: 76°F Humidity: 65%											
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)
212.600	Qp	H	150	2.0	43.3	-21.8	21.5	43.5	-22.0	43.5	-22.0

**Note:**

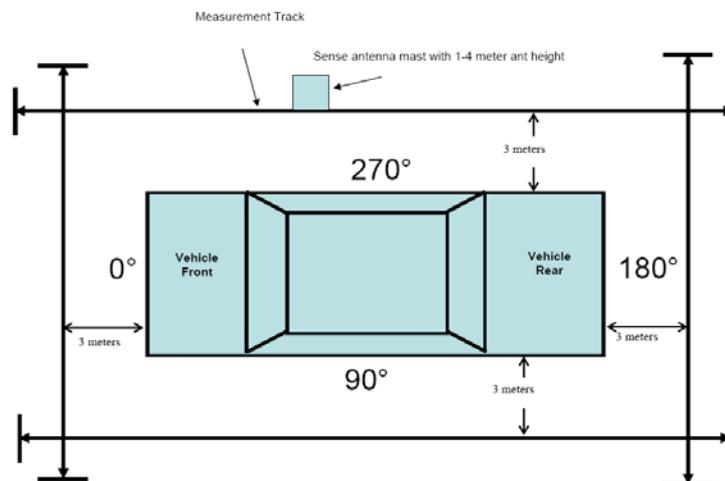
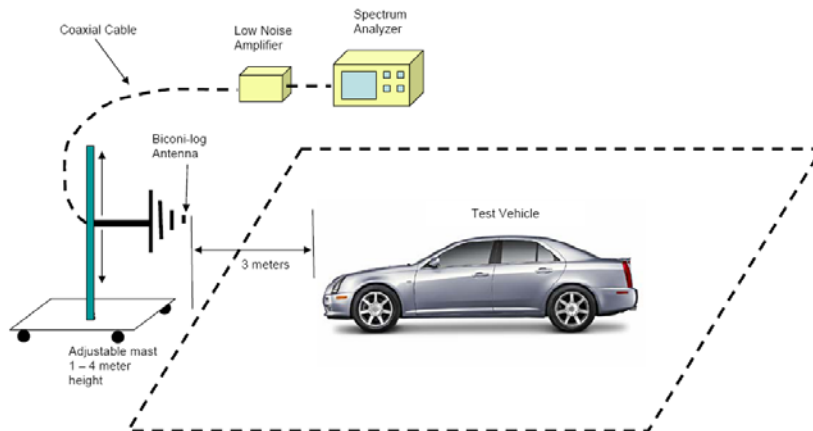
No harmonics found above the noise floor. Investigated 89.1, 97.7, and 106.3 MHz to the 10th harmonic using both "live XM radio" mode and "playback" mode. The data table above represents the investigation of the harmonics of 97.7 and 106.3 MHz. These emissions represent noise floor measurements.

#### 4.2 In-Band Radiated Emission Measurements – In-Situ Test Configuration 2

The Xpress RCi was installed into the Gen2 car cradle placed on the center (middle) of the vehicle's dashboard. The Gen2 car cradle was powered by the FM injected CLA power adapter cable which was plugged into the vehicle's CLA port. The satellite antenna port of the Gen2 car cradle was also fed with the satellite signal via the XM satellite antenna cable for the following three vehicles: (1) Nissan Sentra, (2) Subaru Outback, and (3) Range Rover SUV. The XM satellite antenna was placed in the rear center of the vehicles roof, with its cable routed all the way to the vehicle's dash board along the vehicle's door lining spaces. The EUT was configured to receive live satellite broadcast signals and the audio levels were set to maximum. The antenna mast was moved along the side of the vehicle under test to maximize the emission levels. During the maximization process, a three meter distance was maintained between the antenna mast and vehicle. At the emission peaks, the antenna height was also varied between 1 & 4 meters to maximize the emissions. The frequencies used were 89.1 MHz, 97.7 MHz & 106.3 MHz.

Testing was performed using both horizontal and vertical antenna polarities, with the highest level recorded. 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.

Each vehicle was tested on all four sides. The test configuration is shown below.



4.2.1 Radiated Measurement Data for Nissan Sentra (15.239(b) / 15.209)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Vehicle 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	4.0	66.8	-22.9	43.9	48.0	-4.1	60.0	-16.1
89.100	Qp	H	270	2.5	67.0	-22.9	44.1	48.0	-3.9	60.0	-15.9
89.100	Qp	H	0	1.5	54.9	-22.9	32.0	48.0	-16.0	60.0	-28.0
89.100	Qp	H	180	3.5	60.4	-22.9	37.5	48.0	-10.5	60.0	-22.5
89.100	Qp	V	90	2.0	61.9	-22.9	39.0	48.0	-9.0	60.0	-21.0
89.100	Qp	V	270	1.5	62.3	-22.9	39.4	48.0	-8.6	60.0	-20.6
89.100	Qp	V	0	3.0	65.6	-22.9	42.7	48.0	-5.3	60.0	-17.3
89.100	Qp	V	180	2.0	66.4	-22.9	43.5	48.0	-4.5	60.0	-16.5
97.700	Qp	H	90	4.0	62.9	-20.8	42.1	48.0	-5.9	60.0	-17.9
97.700	Qp	H	270	2.0	62.2	-20.8	41.4	48.0	-6.6	60.0	-18.6
97.700	Qp	H	0	2.5	60.9	-20.8	40.1	48.0	-7.9	60.0	-19.9
97.700	Qp	H	180	3.0	59.9	-20.8	39.1	48.0	-8.9	60.0	-20.9
97.700	Qp	V	90	3.0	61.9	-20.8	41.1	48.0	-6.9	60.0	-18.9
97.700	Qp	V	270	1.5	62.2	-20.8	41.4	48.0	-6.6	60.0	-18.6
97.700	Qp	V	0	1.5	64.3	-20.8	43.5	48.0	-4.5	60.0	-16.5
97.700	Qp	V	180	1.5	63.7	-20.8	42.9	48.0	-5.1	60.0	-17.1
106.300	Qp	H	90	4.0	60.2	-19.6	40.6	48.0	-7.4	60.0	-19.4
106.300	Qp	H	270	4.0	59.8	-19.6	40.2	48.0	-7.8	60.0	-19.8
106.300	Qp	H	0	3.0	66.1	-19.6	46.5	48.0	-1.5	60.0	-13.5
106.300	Qp	H	180	3.5	59.0	-19.6	39.4	48.0	-8.6	60.0	-20.6
106.300	Qp	V	90	2.5	62.9	-19.6	43.3	48.0	-4.7	60.0	-16.7
106.300	Qp	V	270	3.0	59.1	-19.6	39.5	48.0	-8.5	60.0	-20.5
106.300	Qp	V	0	2.0	59.4	-19.6	39.8	48.0	-8.2	60.0	-20.2
106.300	Qp	V	180	2.0	64.0	-19.6	44.4	48.0	-3.6	60.0	-15.6

**NOTE:** No out-of-band emissions were found.



4.2.2 Radiated Measurement Data for Subaru Outback (15.239(b) / 15.209)

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	0	3.0	57.0	-22.9	34.1	48.0	-13.9	60.0	-25.9
89.110	Qp	V	0	1.0	60.7	-22.9	37.8	48.0	-10.2	60.0	-22.2
89.100	Qp	H	90	4.0	60.1	-22.9	37.2	48.0	-10.8	60.0	-22.8
89.100	Qp	V	90	3.0	55.6	-22.9	32.7	48.0	-15.3	60.0	-27.3
89.100	Qp	H	180	3.0	54.3	-22.9	31.4	48.0	-16.6	60.0	-28.6
89.110	Qp	V	180	3.0	58.8	-22.9	35.9	48.0	-12.1	60.0	-24.1
89.100	Qp	H	270	3.0	61.9	-22.9	39.0	48.0	-9.0	60.0	-21.0
89.100	Qp	V	270	2.0	59.3	-22.9	36.4	48.0	-11.6	60.0	-23.6
97.700	Qp	H	0	4.0	44.9	-20.8	24.1	48.0	-23.9	60.0	-35.9
97.700	Qp	V	0	3.0	55.1	-20.8	34.3	48.0	-13.7	60.0	-25.7
97.700	Qp	H	90	4.0	53.7	-20.8	32.9	48.0	-15.1	60.0	-27.1
97.700	Qp	V	90	3.5	50.0	-20.8	29.2	48.0	-18.8	60.0	-30.8
97.700	Qp	H	180	2.5	48.3	-20.8	27.5	48.0	-20.5	60.0	-32.5
97.700	Qp	V	180	3.0	55.6	-20.8	34.8	48.0	-13.2	60.0	-25.2
97.700	Qp	H	270	4.0	52.5	-20.8	31.7	48.0	-16.3	60.0	-28.3
97.700	Qp	V	270	1.5	52.1	-20.8	31.3	48.0	-16.7	60.0	-28.7
106.300	Qp	H	0	3.5	51.8	-19.6	32.2	48.0	-15.8	60.0	-27.8
106.300	Qp	V	0	1.0	51.6	-19.6	32.0	48.0	-16.0	60.0	-28.0
106.300	Qp	H	90	2.5	48.0	-19.6	28.4	48.0	-19.6	60.0	-31.6
106.300	Qp	V	90	3.0	47.5	-19.6	27.9	48.0	-20.1	60.0	-32.1
106.300	Qp	H	180	3.0	46.4	-19.6	26.8	48.0	-21.2	60.0	-33.2
106.300	Qp	V	180	2.5	51.8	-19.6	32.2	48.0	-15.8	60.0	-27.8
106.300	Qp	H	270	3.8	49.2	-19.6	29.6	48.0	-18.4	60.0	-30.4
106.300	Qp	V	270	1.5	47.9	-19.6	28.3	48.0	-19.7	60.0	-31.7

**NOTE:** No out-of-band emissions were found.

4.2.3 Radiated Measurement Data for Range Rover SUV (15.239(b) / 15.209)

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	2.0	51.9	-22.9	29.0	48.0	-19.0	60.0	-31.0
89.100	Qp	H	0	2.5	48.2	-22.9	25.3	48.0	-22.7	60.0	-34.7
89.100	Qp	H	180	3.0	56.0	-22.9	33.1	48.0	-14.9	60.0	-26.9
89.100	Qp	H	270	4.0	52.9	-22.9	30.0	48.0	-18.0	60.0	-30.0
89.100	Qp	V	90	1.0	48.0	-22.9	25.1	48.0	-22.9	60.0	-34.9
89.100	Qp	V	0	2.0	50.8	-22.9	27.9	48.0	-20.1	60.0	-32.1
89.100	Qp	V	180	1.5	52.9	-22.9	30.0	48.0	-18.0	60.0	-30.0
89.100	Qp	V	270	1.4	55.7	-22.9	32.8	48.0	-15.2	60.0	-27.2
97.700	Qp	H	90	4.0	49.2	-20.8	28.4	48.0	-19.6	60.0	-31.6
97.700	Qp	H	180	3.2	56.3	-20.8	35.5	48.0	-12.5	60.0	-24.5
97.700	Qp	H	270	3.5	55.7	-20.8	34.9	48.0	-13.1	60.0	-25.1
97.700	Qp	V	90	2.5	51.8	-20.8	31.0	48.0	-17.0	60.0	-29.0
97.700	Qp	V	0	1.5	48.8	-20.8	28.0	48.0	-20.0	60.0	-32.0
97.700	Qp	V	0	4.0	48.8	-20.8	28.0	48.0	-20.0	60.0	-32.0
97.700	Qp	V	180	2.0	53.4	-20.8	32.6	48.0	-15.4	60.0	-27.4
97.700	Qp	V	270	1.5	50.5	-20.8	29.7	48.0	-18.3	60.0	-30.3
106.300	Qp	H	90	4.0	50.3	-19.6	30.7	48.0	-17.3	60.0	-29.3
106.300	Qp	H	180	2.8	55.1	-19.6	35.5	48.0	-12.5	60.0	-24.5
106.300	Qp	H	270	3.8	48.2	-19.6	28.6	48.0	-19.4	60.0	-31.4
106.300	Qp	V	90	1.0	49.0	-19.6	29.4	48.0	-18.6	60.0	-30.6
106.300	Qp	V	0	1.8	49.5	-19.6	29.9	48.0	-18.1	60.0	-30.1
106.300	Qp	V	0	3.5	50.0	-19.6	30.4	48.0	-17.6	60.0	-29.6
106.300	Qp	V	180	1.2	53.0	-19.6	33.4	48.0	-14.6	60.0	-26.6
106.300	Qp	V	270	1.0	47.6	-19.6	28.0	48.0	-20.0	60.0	-32.0

**NOTE:** No out-of-band emissions were found.

## 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 Xpress RCi with FM Transmitter, Model # XDRC2, FCC ID: RS2XDPRCL1 / IC: 5697A-XDPRCL1**, is in compliance with the requirements specified within FCC Section 15.239 and Annex A2 of RSS-210 of Industry Canada standard.