



Excellence in Compliance Testing

## Certification Test Report

**FCC ID: IHDT56MR1  
IC: 1090-T56MR1**

**FCC Rule Part: 15.247  
IC Radio Standards Specification: RSS-210**

**ACS Report Number: 11-2007.W06.12.B**

**Manufacturer: Motorola, Inc  
Model: H80XAH6QR2AN**

**Test Begin Date: February 1, 2011  
Test End Date: February 15, 2011**

**Report Issue Date: February 17, 2011**



FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200897-0

This report is not be used to claim certification, approval, or endorsement by NVLAP, NIST or any government agency.

**Project Manager:**

**Thierry Jean-Charles  
EMC Engineer  
Advanced Compliance Solutions, Inc.**

**Reviewed by:**

**Kirby Munroe  
Director, Wireless Certifications  
Advanced Compliance Solutions, Inc.**

This test report shall not be reproduced except in full. This report may be reproduced in part with prior written consent of ACS, Inc. The results contained in this report are representative of the sample(s) submitted for evaluation.

**This report contains 17 pages**

## TABLE OF CONTENTS

<b>GENERAL .....</b>	<b>3</b>
1.1 Purpose .....	3
1.2 Manufacturer Information .....	3
1.3 Product description .....	3
1.4 Test Methodology and Considerations .....	3
<b>2 TEST FACILITIES .....</b>	<b>4</b>
2.1 Location.....	4
2.2 Laboratory Accreditations/Recognitions/Certifications .....	4
2.3 Radiated & Conducted Emissions Test Site Description .....	5
<b>3 APPLICABLE STANDARD REFERENCES.....</b>	<b>6</b>
<b>4 LIST OF TEST EQUIPMENT.....</b>	<b>7</b>
<b>5 SUPPORT EQUIPMENT .....</b>	<b>8</b>
<b>6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM .....</b>	<b>8</b>
<b>SUMMARY OF TESTS.....</b>	<b>9</b>
6.1 Antenna Requirement – FCC: Section 15.203 .....	9
6.2 Power Line Conducted Emissions – FCC: Section 15.207 IC: RSS-Gen 7.2.2.....	9
6.3 Band-Edge Compliance of Radiated Spurious Emissions - FCC Sections 15.205 and 15.247(d) IC RSS-210 A8.5 and 2.5.....	12
6.4 Radiated Spurious Emissions - FCC Section 15.205 IC: RSS-210 2.5 .....	15
<b>7 CONCLUSION.....</b>	<b>16</b>

**GENERAL****1.1 Purpose**

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations and Industry Canada's Radio Standards Specification RSS-210.

**1.2 Manufacturer Information**

Motorola, Inc.  
8000 W. Sunrise Blvd.  
Plantation, FL 33322

**1.3 Product description**

The EUT is a cell phone - iDEN (800/900MHz), GPS, and BT 2.0 EDR.

Mode of Operation	Frequency Range (MHz)	Number of Channels	Channel Separation (kHz)	Data Rates Supported (kbps)
Bluetooth	2402 - 2480	79	1000	1000

Test Sample Serial Number(s): 364VMA2R5Q

Test Sample Condition: The test sample was provided in good physical condition with no noticeable functional defects.

Model Variants:

Variants/Configurations	Description	Test
i420	Carrier Model with silver back cover and flip	Yes
i412	Boost Model with blue back cover and flip	---

The customer declares the two model variants identical in terms of hardware and compliant base on similarities.

**1.4 Test Methodology and Considerations**

The EUT was evaluated for radiated spurious emissions for the Bluetooth Transceiver in the GFSK modulation format only. The radio was prescanned in three orthogonal orientations and the final measurements were performed using the orientation leading to the highest emissions.

Conducted emissions evaluations was also performed for the EUT in hopping mode.

## **2 TEST FACILITIES**

### **2.1 Location**

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions, Inc.  
3998 FAU Blvd, Suite 310  
Boca Raton, Florida 33431  
Phone: (561) 961-5585  
Fax: (561) 961-5587  
[www.acstestlab.com](http://www.acstestlab.com)

FCC Test Firm Registration #: 581606  
Industry Canada Lab Code: 4175C

### **2.2 Laboratory Accreditations/Recognitions/Certifications**

ACS is accredited to ISO/IEC 17025 by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program (NVLAP), Lab Code 200897-0. Unless otherwise specified, all tests methods described within this report are covered under the ISO/IEC 17025 scope of accreditation.

**2.3 Radiated & Conducted Emissions Test Site Description**

**2.3.1 Semi-Anechoic Chamber Test Site**

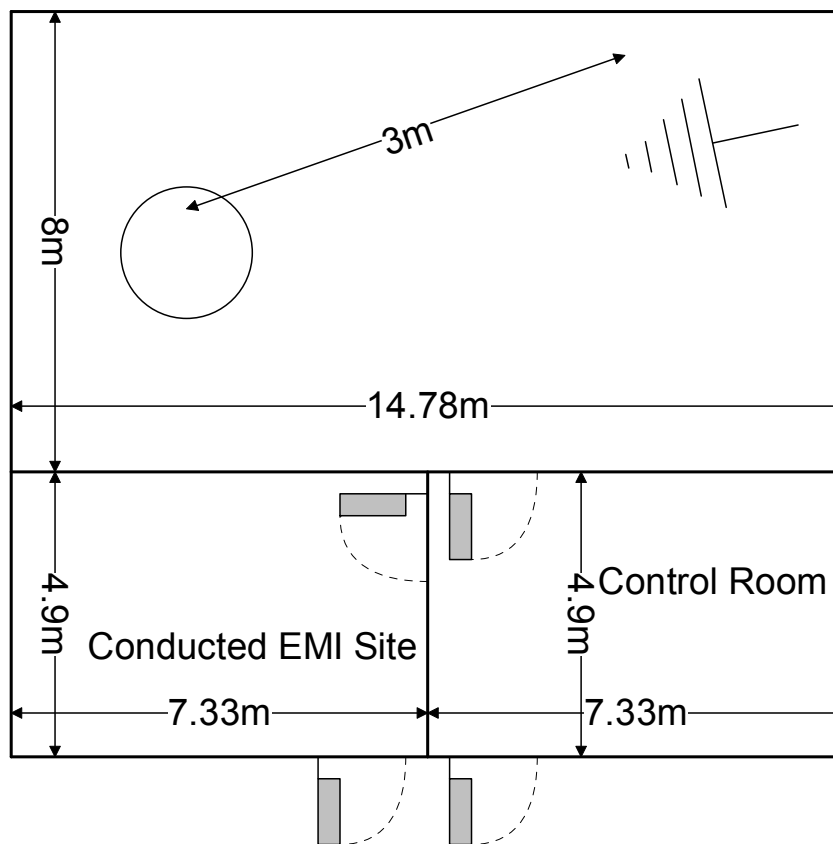
The EMC radiated test facility consists of an RF-shielded enclosure. The interior dimensions of the indoor semi-anechoic chamber are approximately 48 feet (14.6 m) long by 36 feet (10.8 m) wide by 24 feet (7.3 m) high and consist of rigid, 1/8 inch (0.32 cm) steel-clad, wood core modular panels with steel framing. In the shielded enclosure, the faces of the panels are galvanized and the chamber is self-supporting. 8-foot RF absorbing cones are installed on 4 walls and the ceiling. The steel-clad ground plane is covered with vinyl floor.

The turntable is driven by pneumatic motor, which is capable of supporting a 2000 lb. load. The turntable is flushed with the chamber floor which it is connected to, around its circumference, with a continuous metallic loaded spring. An EMCO Model 1050 Multi-device Controller controls the turntable position.

A pneumatic motor is used to control antenna polarizations and height relative to the ground. The height information is displayed on the control unit EMCO Model 1050.

The control room is an RF shielded enclosure attached to the semi-anechoic chamber with two bulkhead panels for connecting RF, and control cables. The dimension of the room is 7.3 m x 4.9 m x 3 m high and the entrance doors of both control and conducted rooms are 3 feet (0.91 m) by 7 feet (2.13 m).

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3.1-1 below:



**Figure 2.3.1-1: Semi-Anechoic Chamber Test Site**

### 2.3.2 Conducted Emissions Test Site Description

The dimensions of the shielded conducted room are 7.3 x 4.9 x 3 m<sup>3</sup>. As per ANSI C63.4 2003 requirements, the data were taken using two LISNs; a Solar Model 8028-50 50 Ω/50 μH and an EMCO Model 3825, which are installed as shown in Photograph 3. For 220 V, 50 Hz, a Polarad LISN (S/N 879341/048) is used in conjunction with a 1 kVA, 50 Hz/220 V EDGAR variable frequency generator, Model 1001B, to filter conducted noise from the generator.

A diagram of the room is shown below in figure 2.3.2-1:

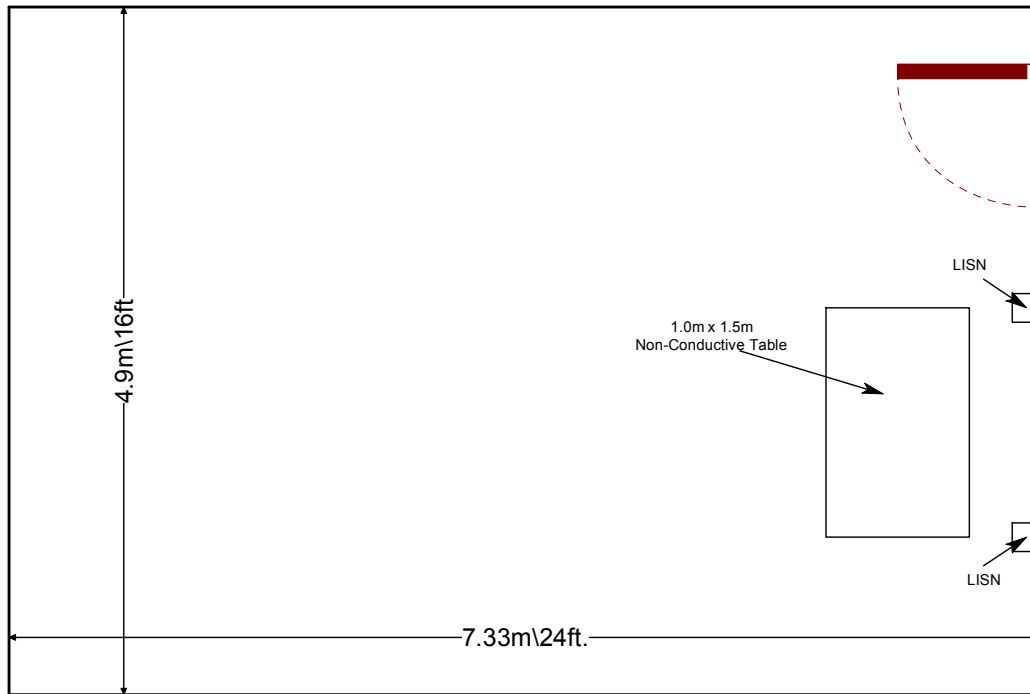


Figure 2.3.2-1: AC Mains Conducted EMI Site

### 3 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ❖ ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- ❖ US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2010
- ❖ US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2010
- ❖ FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems, March 30, 2000
- ❖ Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 8, December 2010.
- ❖ Industry Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, Issue3, December 2010.

#### 4 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

**Table 4-1: Test Equipment**

AssetID	Manufacturer	Model #	Equipment Type	Serial #	Last Calibration Date	Calibration Due Date
2002	EMCO	3108	Antennas	2147	9/10/2009	9/10/2011
2004	EMCO	3146	Antennas	1385	9/10/2009	9/10/2011
2006	EMCO	3115	Antennas	2573	2/21/2009	2/21/2011
2008	COM-Power	AH-826	Antennas	81009	NCR	NCR
2011	Hewlett-Packard	HP 8447D	Amplifiers	2443A03952	1/3/2011	1/3/2012
RE581	Hewlett Packard	8449B	Amplifier	3008A00198	1/20/2011	1/20/2012
2013	Hewlett Packard	HP8566B	Spectrum Analyzers	2407A03233	8/5/2010	8/5/2012
2014	Hewlett Packard	HP 85650A	Quasi Peak Adapter	2430A00559	8/5/2010	8/5/2012
2037	ACS Boca	Chamber EMI Cable Set	Cable Set	2037	1/7/2011	1/7/2012
2044	QMI	N/A	Cables	2044	1/7/2011	1/7/2012
523	Agilent	E7405	Spectrum Analyzers	MY45103293	1/5/2011	1/5/2013
2077	Hewlett Packard	HP 5061-5458	Cables	2077	2/2/2011	2/2/2012
2022	EMCO	LISN3825/2R	LISN	1095	8/10/2009	8/10/2011
2045	ACS Boca	Conducted Cable Set	Cable Set	2045	1/6/2011	1/6/2012
2064	CIR Q-TEL	FHT/22-10K-13/50-3A/3A	Filter	9	1/15/2011	1/15/2012
2070	Mini Circuits	VHF-8400+	Filter	2070	2/3/2011	2/3/2012
2072	Mini Circuits	VHF-3100+	Filter	30737	2/3/2011	2/3/2012

**NCR=No Calibration Required**

\*Note:

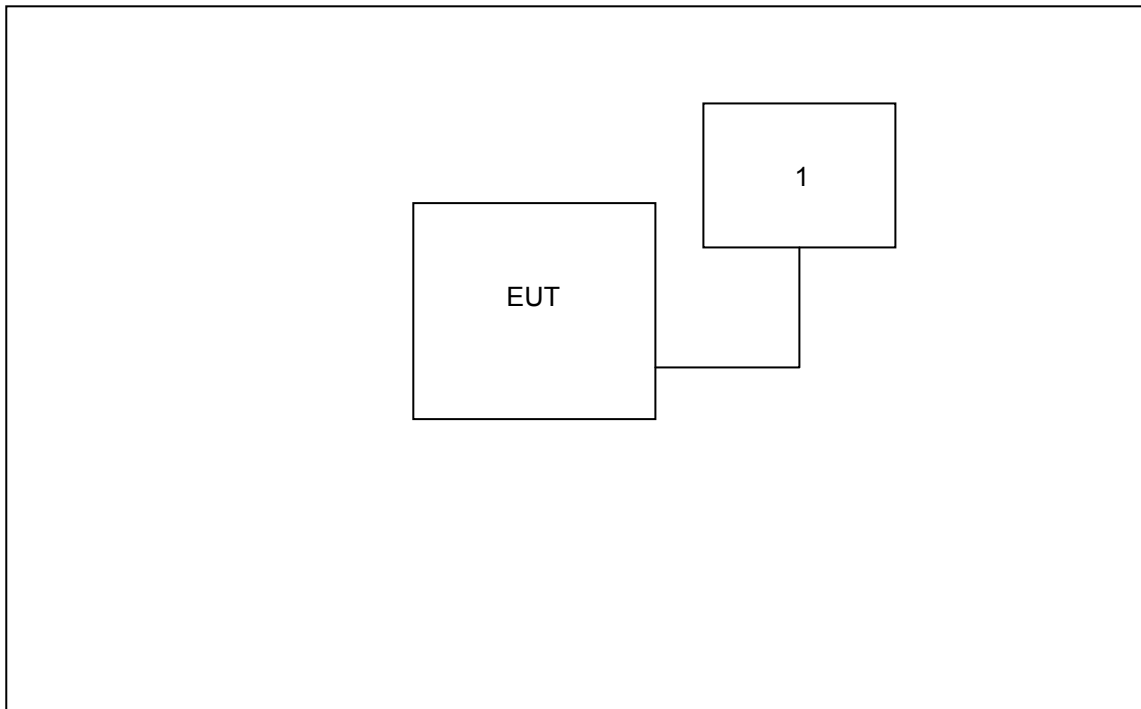
The asset 2008 is a standard gain horn antenna. Hence, recurring calibration beyond initial calibration per the manufacturer is not required only in case of damage, suspected deterioration or use at distance closer than  $2x\lambda^2/\lambda$ , as per ANSI C63.4 requirements.

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number
1	AC adapter	Motorola	FMP5358A	09135-12-0838738-B-B

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM



NOTE:  
The EUT was evaluated standalone for the TX portion of the evaluation. The power supply was connected for the conducted power line emissions evaluation.

## 7 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

### 7.1 Antenna Requirement – FCC: Section 15.203

The EUT uses an integral Inverted-F Antenna (IFA) for the Bluetooth Transceiver.

### 7.2 Power Line Conducted Emissions – FCC: Section 15.207 IC: RSS-Gen 7.2.4

#### 7.2.1 Measurement Procedure

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150 kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9 kHz and the video bandwidth set to 30 kHz. The calculation for the conducted emissions is as follows:

**Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss**  
**Margin = Applicable Limit - Corrected Reading**

The Bluetooth transceiver was in the hopping mode during the evaluation.

## 7.2.2 Measurement Results

Results of the test are shown below in and Table 7.2.2-1.

**Table 7.2.2-1: Power Line Conducted EMI Results**

Frequency (MHz)	Uncorrected Reading (dB $\mu$ V)		Total Correction Factor (dB)	Corrected Level (dB $\mu$ V)		Limit (dB $\mu$ V)		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
<b>Line 1</b>									
0.486	30.889	21.84	0.35	31.24	22.19	56.23	46.23	25.0	24.0
0.507	42.776	37.803	0.33	43.11	38.14	55.88	45.88	12.8	7.7
2.347	38.579	30.094	0.39	38.97	30.49	56.00	46.00	17.0	15.5
2.933	39.5	29.855	0.39	39.89	30.25	56.00	46.00	16.1	15.8
4.659	38.305	30.832	0.48	38.78	31.31	56.00	46.00	17.2	14.7
4.763	36.543	29.734	0.48	37.02	30.21	56.00	46.00	19.0	15.8
4.804	36.954	13.519	0.48	37.43	14.00	56.00	46.00	18.6	32.0
4.962	37.517	30.272	0.48	38.00	30.75	56.00	46.00	18.0	15.3
5.004	37.975	30.637	0.48	38.46	31.12	60.00	50.00	21.5	18.9
5.866	38.694	31.711	0.64	39.34	32.35	60.00	50.00	20.7	17.6
<b>Line 2</b>									
0.159	45.334	34.166	0.56	45.90	34.73	65.53	55.53	19.6	20.8
0.197	40.153	30.449	0.55	40.70	31.00	63.72	53.72	23.0	22.7
0.472	41.895	36.892	0.41	42.31	37.30	56.49	46.49	14.2	9.2
3.582	37.952	31.209	0.54	38.49	31.75	56.00	46.00	17.5	14.3
5.475	36.764	30.568	0.67	37.44	31.24	60.00	50.00	22.6	18.8
5.910	38.308	31.745	0.75	39.06	32.50	60.00	50.00	20.9	17.5
5.99091	38.614	30.279	0.77	39.38	31.05	60.00	50.00	20.6	19.0
6.26069	33.038	27.01	0.65	33.69	27.66	60.00	50.00	26.3	22.3
6.32085	38.437	31.117	0.66	39.10	31.78	60.00	50.00	20.9	18.2
6.45005	38.147	30.453	0.69	38.83	31.14	60.00	50.00	21.2	18.9

### NOTES:

The EUT was charging, the BT TX was constantly hopping and the IDEN TX was turned on at 896 MHz.

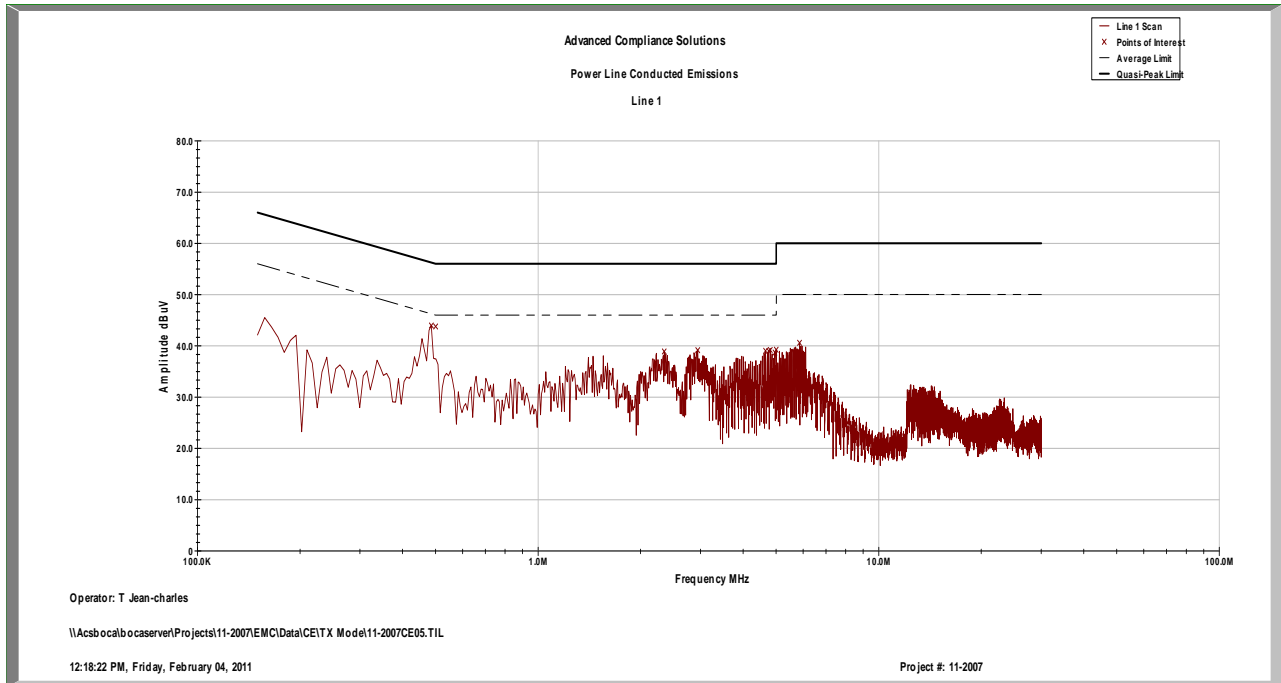


Figure 7.2.2-3: Conducted Emission Line 1

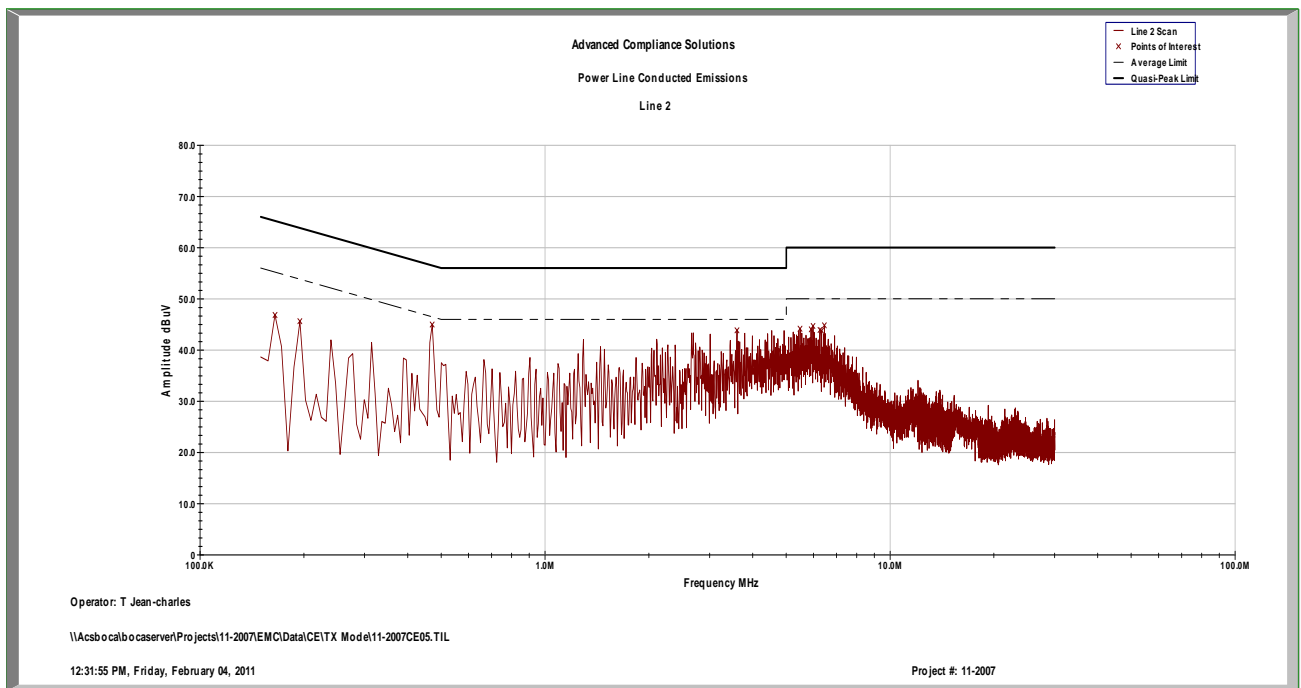


Figure 7.2.2-4: Conducted Emission Line 2

\*Note:

### 7.3 Band-Edge Compliance of Radiated Spurious Emissions - FCC Sections 15.205 and 15.247(d) IC RSS-210 A8.5 and 2.5

#### 7.3.1 Measurement Procedure

The EUT was investigated at the low and high channels of operation to determine band-edge compliance. Because the upper band-edge coincides with a restricted band, band-edge compliance for the upper band-edge was determined using the radiated mark-delta method. The radiated field strength of the fundamental emission was first determined and then the mark-delta method was used to determine the field strength of the band-edge emission

#### 7.3.2 Measurement Results

Band-edge compliance is displayed in Figures 7.3.2-1 – 7.3.2-4 and Table 7.3.2-1.

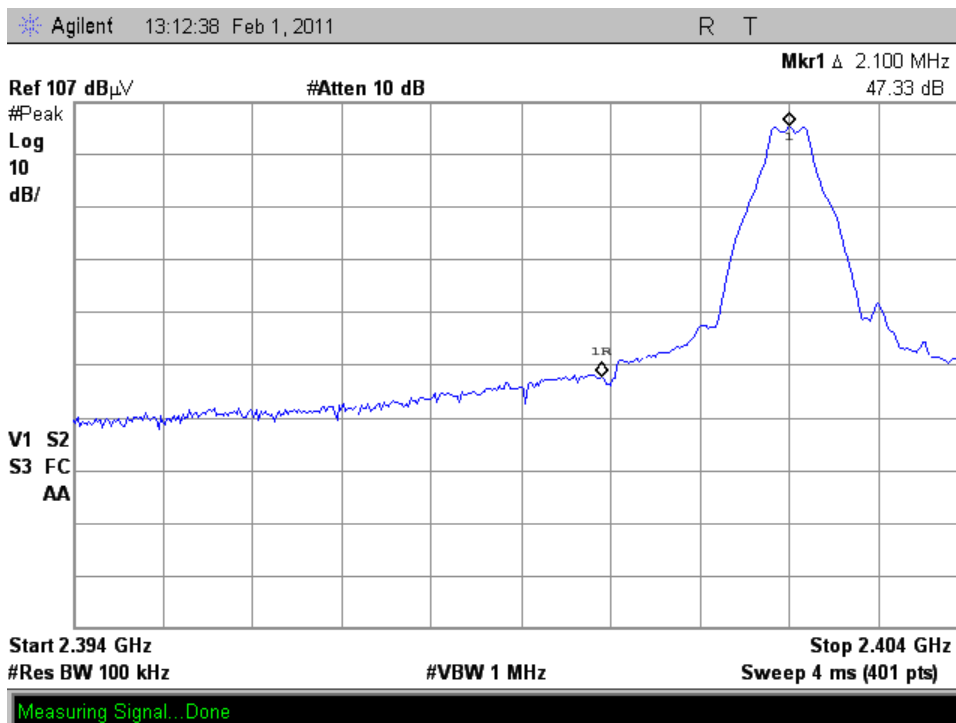


Figure 7.3.2-1: Lower Band-edge - Horizontal

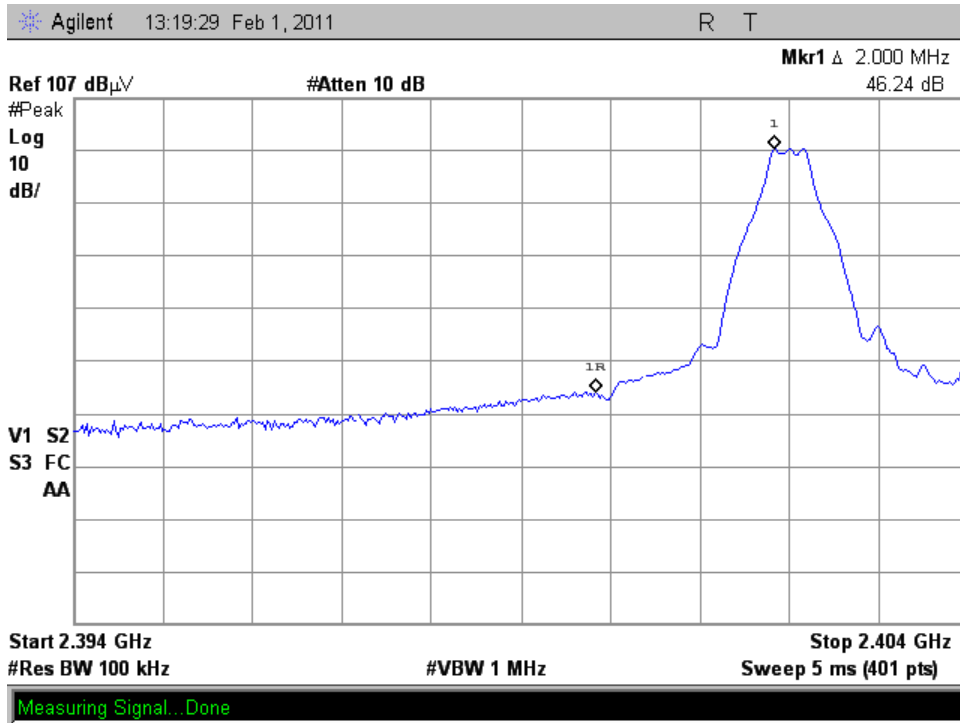


Figure 7.3.2-2: Lower Band-edge - Vertical

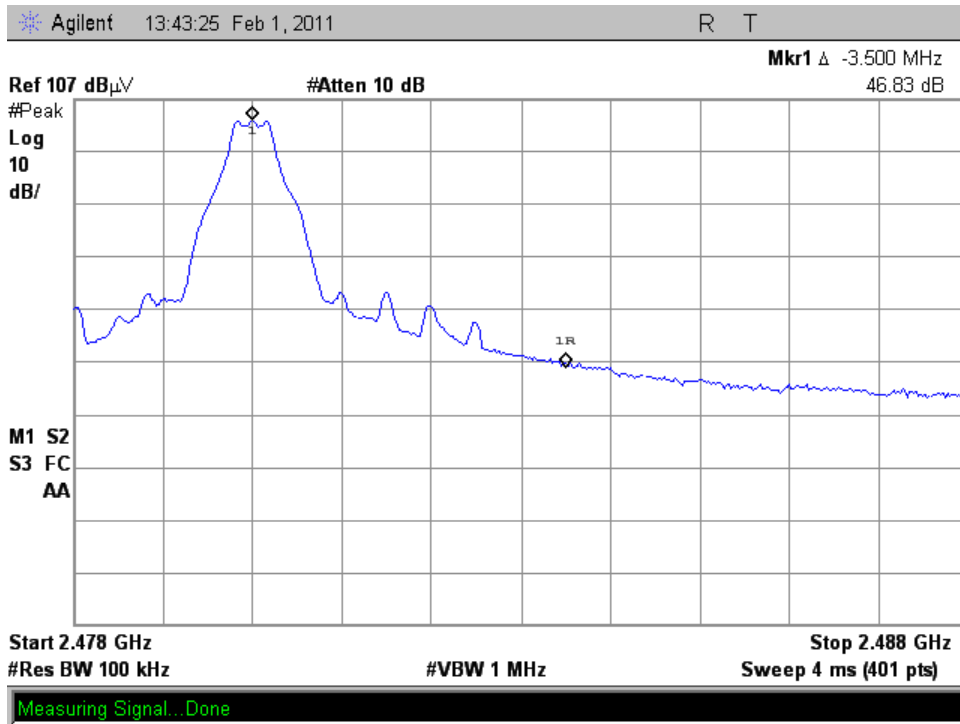


Figure 7.3.2-3: Upper Band-edge - Horizontal

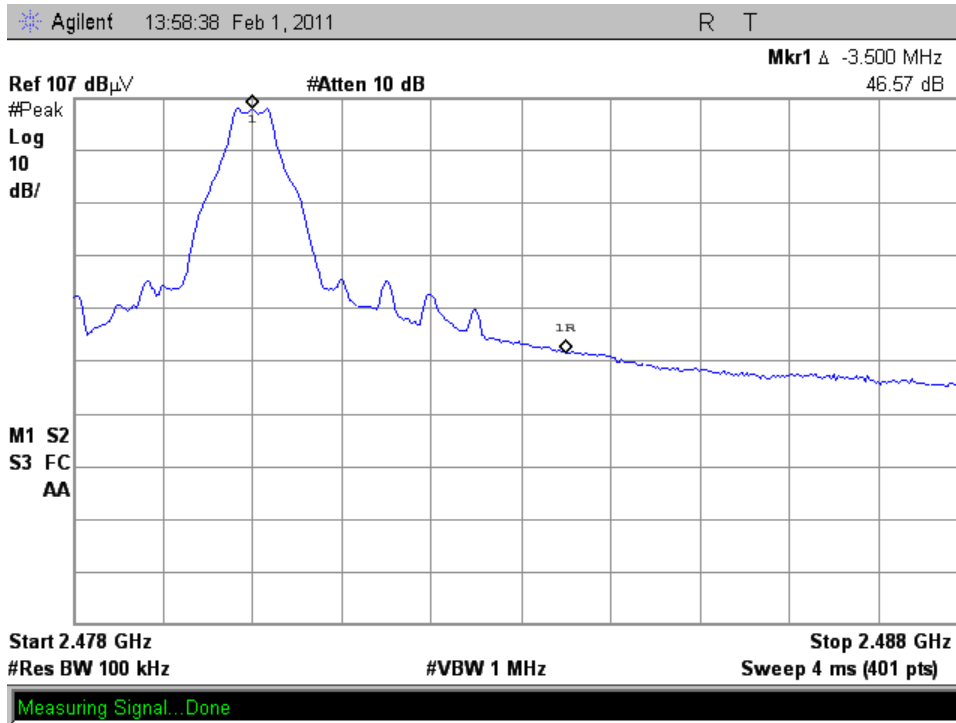


Figure 7.3.2-4: Upper Band-edge – Vertical

Table 7.3.2-1: Upper Band-edge – Marker Delta Table

Frequency (MHz)	Uncorrected Level (dB $\mu$ V)		Antenna Polarity (H/V)	Correction Factors (dB)	Fundamental Level (dB $\mu$ V/m)		Marker-Delta (dB)	Band-Edge Level (dB $\mu$ V/m)		Margin to Limit (dB $\mu$ V/m)	
	pk	Qpk/Avg			pk	Qpk/Avg		pk	Qpk/Avg	74	54
2480	102.90	93.40	H	-0.62	102.28	92.78	46.83	55.45	45.95	18.5	8.0
2480	105.00	94.92	V	-0.62	104.38	94.30	46.57	57.81	47.73	16.2	6.3

## 7.4 Radiated Spurious Emissions - FCC Section 15.205 IC: RSS-210 2.5

### 7.4.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 30MHz to 25 GHz, 10 times the highest fundamental frequency.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000 MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000MHz, peak and average measurements made with RBW and VBW of 1 MHz and 3MHz respectively.

The EUT was caused to generate a continuous carrier signal on the hopping channel.

### 7.4.2 Measurement Results

Radiated spurious emissions found in the band of 30MHz to 25 GHz, are reported in the Table 7.4.2-1 below.

**Table 7.4.2-1: Radiated Spurious Emissions Tabulated Data**

Frequency (MHz)	Level (dBUV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBUV/m)		Limit (dBUV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
<b>Low Channel</b>										
4804	44.52	32.28	H	4.74	49.26	37.02	74.0	54.0	24.7	17.0
4804	46.98	34.52	V	4.74	51.72	39.26	74.0	54.0	22.3	14.7
<b>Middle Channel</b>										
4882	44.20	31.18	H	5.01	49.21	36.19	74.0	54.0	24.8	17.8
4882	46.53	34.09	V	5.01	51.54	39.10	74.0	54.0	22.5	14.9
12205	44.63	32.06	H	12.51	57.14	44.57	83.5	63.5	26.4	18.9
<b>High Channel</b>										
4960	42.78	30.54	H	5.28	48.06	35.82	74.0	54.0	25.9	18.2
4960	45.57	30.79	V	5.28	50.85	36.07	74.0	54.0	23.2	17.9
12400	44.99	31.98	H	12.68	57.67	44.66	83.5	63.5	25.8	18.8

\* Note: All emissions above 12400 MHz were attenuated below the permissible limit and the noise floor of the measurement equipment.

No emissions from the collocated radios could be detected from both BT and iDEN radios being on at the same time.

**7.4.3 Sample Calculation:**

$$R_C = R_U + CF_T$$

Where:

 $CF_T$  = Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only) $R_U$  = Uncorrected Reading $R_C$  = Corrected Level

AF = Antenna Factor

CA = Cable Attenuation

AG = Amplifier Gain

DC = Duty Cycle Correction Factor

**Example Calculation: Peak**Corrected Level:  $44.52 + 4.74 = 49.26\text{dBuV/m}$ Margin:  $74\text{dBuV/m} - 49.26\text{dBuV/m} = 24.7\text{dB}$ **Example Calculation: Average**Corrected Level:  $32.28 + 4.74 - 0 = 37.02\text{dBuV}$ Margin:  $54\text{dBuV} - 37.02\text{dBuV} = 17.0\text{dB}$ **8 CONCLUSION**

In the opinion of ACS, Inc. the H80XAH6QR2AN, manufactured by Motorola, Inc. meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

## END REPORT