Excellence in Compliance Testing

Certification Test Report

FCC ID: X6P-HR110845
IC: 8832A-HR110845

FCC Rule Part: 15.231
IC Radio Standards Specification: RSS-210

ACS Report Number: 11-0408.W06.11.A

Manufacturer: HomeRun Holdings
Models: QTL184, QTL74

Test Begin Date: November 21, 2011
Test End Date: November 28, 2011

Report Issue Date: December 2, 2011

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612-0

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Prepared by: _____

Kirby Munroe
Director, Wireless Certifications
ACS, Inc.

This report contains 21 pages

TABLE OF CONTENTS

1 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 Product description

The Qmotion remote transmitter is a handheld, remote control designed to operate an electronic window shade(s). There are two model versions of the Qmotion remote; the QTL184 and the QTL74. The two models are electrically identical. The only difference is the QTL184 has 3 rows of 18 buttons, while the QTL74 has 2 rows of 12 buttons.

Shades are programmed at the factory to recognize the remote control. By pressing one of the many buttons a compatible window shade can be made to go completely up or down, or to other user defined positions in between. Each remote control has five shade control buttons and a number of channel selection buttons. Although a single frequency is used, different channels or "groups" can be assigned to shades in a particular location. Operation is from a single 3V coin cell and is user replaceable.

Frequency Range: 433.92 MHz
Operating channels: 1
Modulation: ASK (OOK)
Operating Voltage: 3VDC battery

Manufacturer Information:
HomeRun Holdings Corp.
6370 Mt. Pleasant St. NW
North Canton OH 44720
USA

Test Sample Serial Number(s): FCC#1

Test Sample Condition: The test sample was provided in working order with no visible defects.

1.3 Test Methodology and Considerations

The two model versions are electrically identical, therefore only model QTL184 was evaluated. The EUT, QTL184, was tested in three orientations which represents normal intended operation. Radiated emissions were performed with the EUT configured as such. The EUT is a battery powered device; therefore AC power line conducted emissions were not performed.

2 TEST FACILITIES

2.1 Location

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

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

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 200612-0. Unless otherwise specified, all tests methods described within this report are covered under the ISO/IEC 17025 scope of accreditation.

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment.

FCC Registration Number: 511277
Industry Canada Lab Code: IC 4175A-1
VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

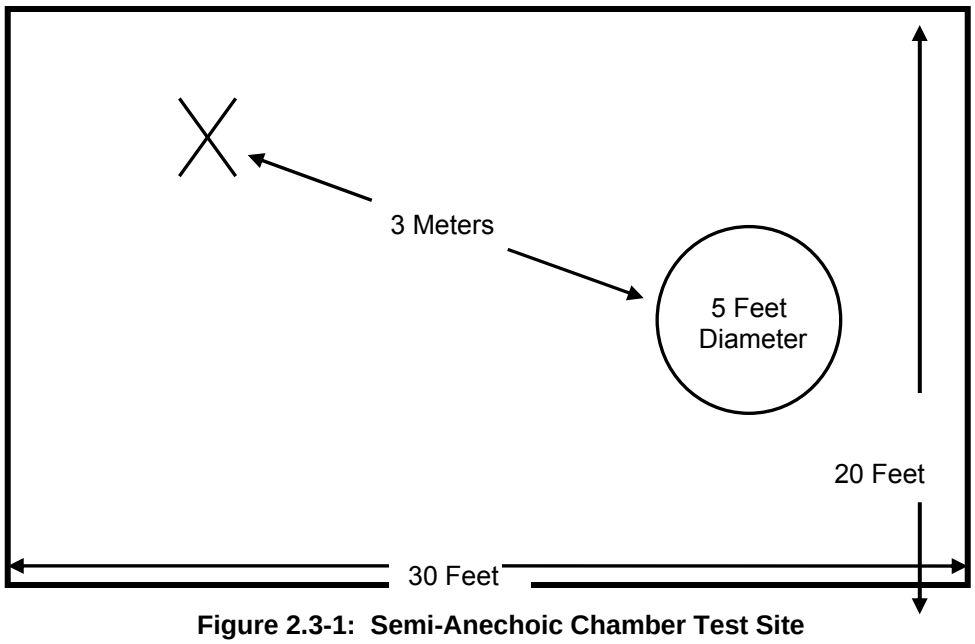

Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

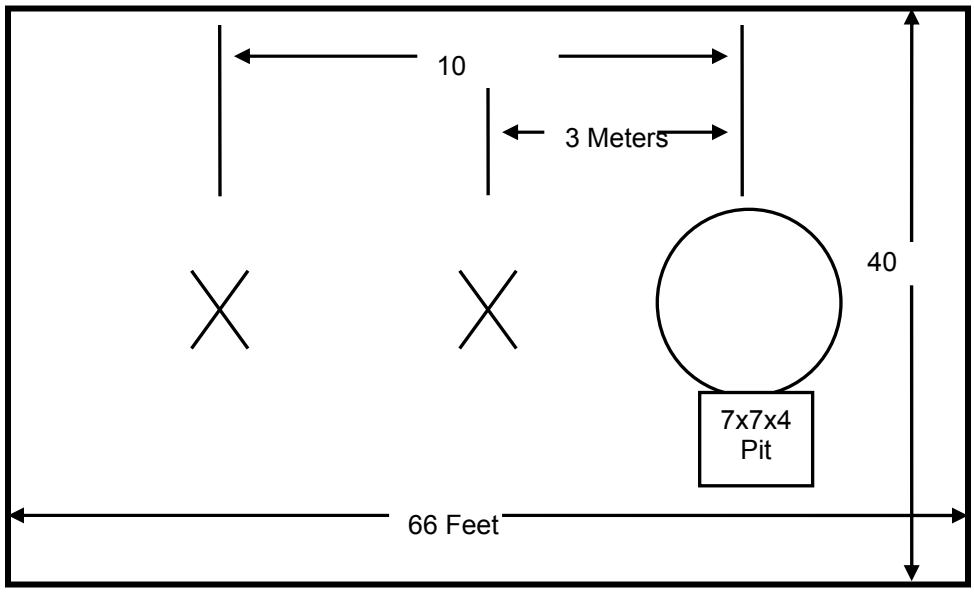

Figure 2.3-2: Open Area Test Site

2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is located in the main EMC lab. It consists of an 8' x 8' solid aluminum horizontal ground reference plane (GRP) bonded every 3" to an 8' X 8' vertical ground plane.

The site is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 4.1.3-1:

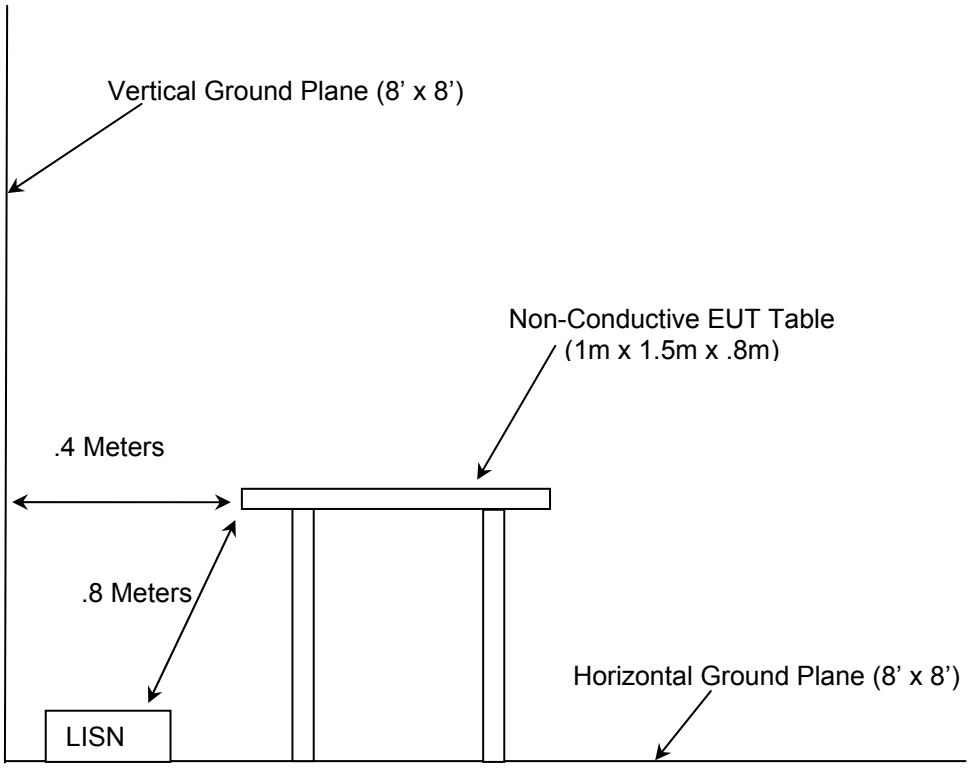

Figure 2.4-1: AC Mains Conducted EMI Site

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, 2011
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2011
- Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 8, Dec 2010
- Industry Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, Issue 3, Dec 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
1	Rohde & Schwarz	ESMI - Display	Spectrum Analyzers	833771/007	9/23/2010	9/23/2012
2	Rohde & Schwarz	ESMI-Receiver	Spectrum Analyzers	839587/003	9/23/2010	9/23/2012
3	Rohde & Schwarz	ESMI - Display	Spectrum Analyzers	839379/011	5/26/2011	5/26/2013
4	Rohde & Schwarz	ESMI - Receiver	Spectrum Analyzers	833827/003	5/26/2011	5/26/2013
30	Spectrum Technologies	DRH-0118	Antennas	970102	4/27/2011	4/27/2013
40	EMCO	3104	Antennas	3211	2/11/2011	2/11/2013
73	Agilent	8447D	Amplifiers	2727A05624	9/30/2011	9/30/2012
152	EMCO	3825/2	LISN	9111-1905	11/2/2010	11/2/2012
167	ACS	Chamber EMI Cable Set	Cable Set	167	1/26/2011	1/26/2012
283	Rohde & Schwarz	FSP40	Spectrum Analyzers	1000033	8/26/2011	8/26/2012
291	Florida RF Cables	SMRE-200W-12.0-SMRE	Cables	None	12/7/2010	12/7/2011
292	Florida RF Cables	SMR-290AW-480.0-SMR	Cables	None	4/11/2011	4/11/2012
331	Microwave Circuits	H1G513G1	Filters	31417	7/11/2011	7/11/2012
338	Hewlett Packard	8449B	Amplifiers	3008A01111	3/24/2011	3/24/2012
412	Electro Metrics	LPA-25	Antennas	1241	7/28/2010	7/28/2012
422	Florida RF	SMS-200AW-72.0-SMR	Cables	805	12/29/2010	12/29/2011

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number
The EUT was tested and operates stand alone therefore no support equipment was utilized.				

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

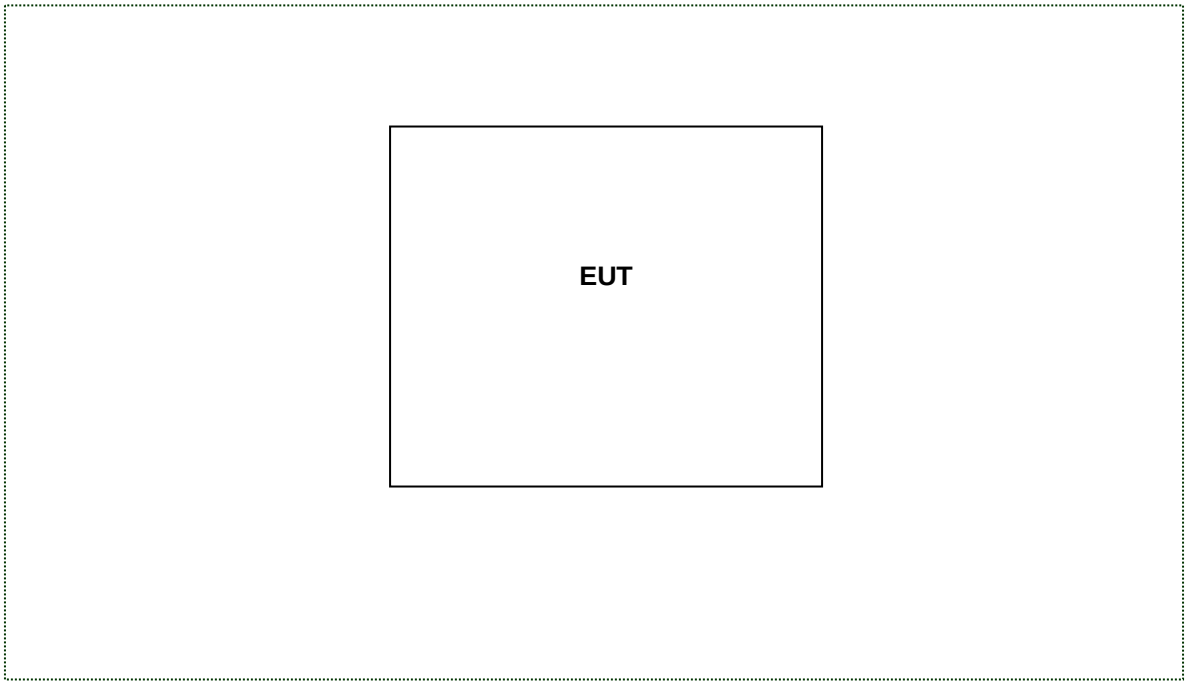

Figure 6-1: EUT Test Setup

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: CFR 47 Part 15.203

The QTL74 utilizes a Splatch planar antenna which uses a grounded-line technique from a tiny surface mount element, thus satisfying Part 15.203. The antenna gain is -9.7dBi into 50Ω.

7.2 Power Line Conducted Emissions – FCC: CFR 47 Part 15.207/ IC: RSS-GEN 7.2.4

Power Line Conducted Emissions testing was not performed because the EUT is battery powered.

7.3 Periodic Operation – FCC: CFR 47 15.231(a) / IC: RSS-210 A1.1.1

7.3.1 Test Methodology

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

A transmitter activated automatically shall cease transmission within 5 seconds after activation.

The transmitter was activated manually and was evaluated using a spectrum analyzer at zero span with a 5 second sweep time.

7.3.2 Test Results

The results are shown in Figure 7.3.2-1.

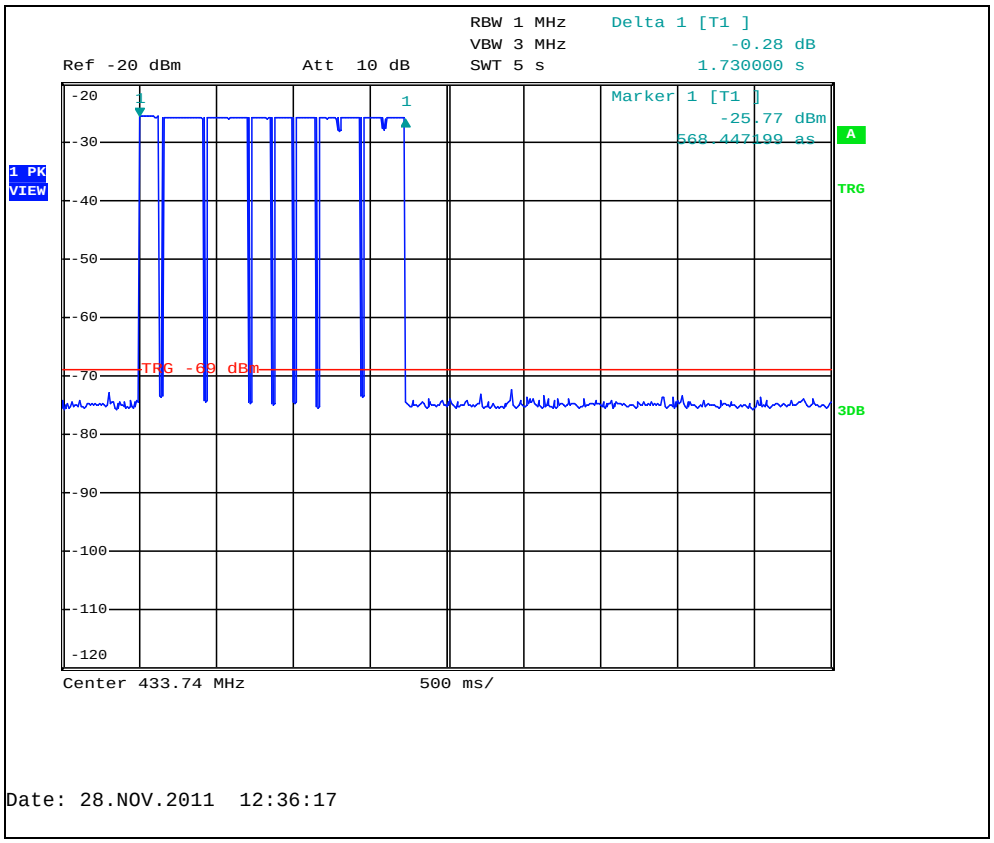

Figure 7.3.2-1: TX Hold Time – Manually Activated

7.4 Occupied Bandwidth – FCC: CFR 47 15.231(c)(1) / IC: RSS-210 A1.1.3

7.4.1 Test Methodology

For devices operating above 70MHz and below 900 MHz, the bandwidth of the emission shall be no wider than 0.25% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier for FCC compliance. The 99% occupied bandwidth is also provided.

7.4.2 Test Results

The 20dB and 99% bandwidths were measured as 5.94kHz and 8.88kHz respectively. 0.25% of the 433.92MHz center frequency is equivalent to 1.085MHz. Therefore the 20dB and 99% bandwidths of the emission is less than 0.25% of the center frequency. The results are shown in Figure 7.4.2-1 and 7.4.2-2.

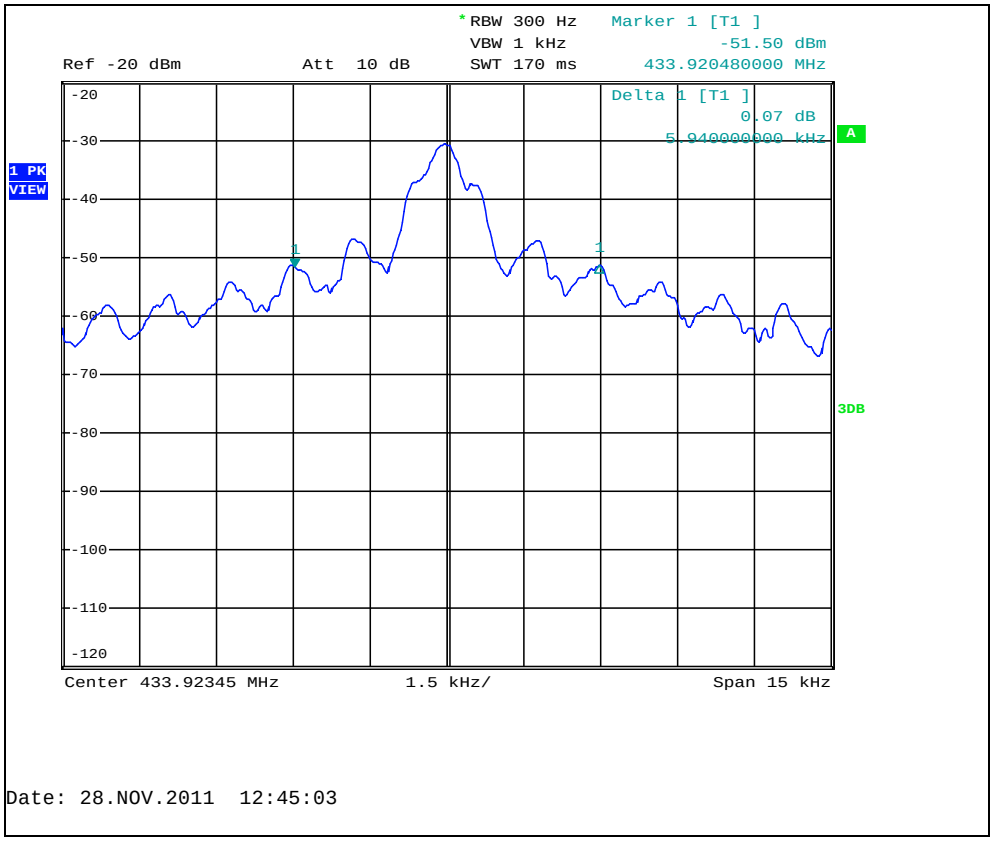

Figure 7.4.2-1: Occupied Bandwidth – 20dB

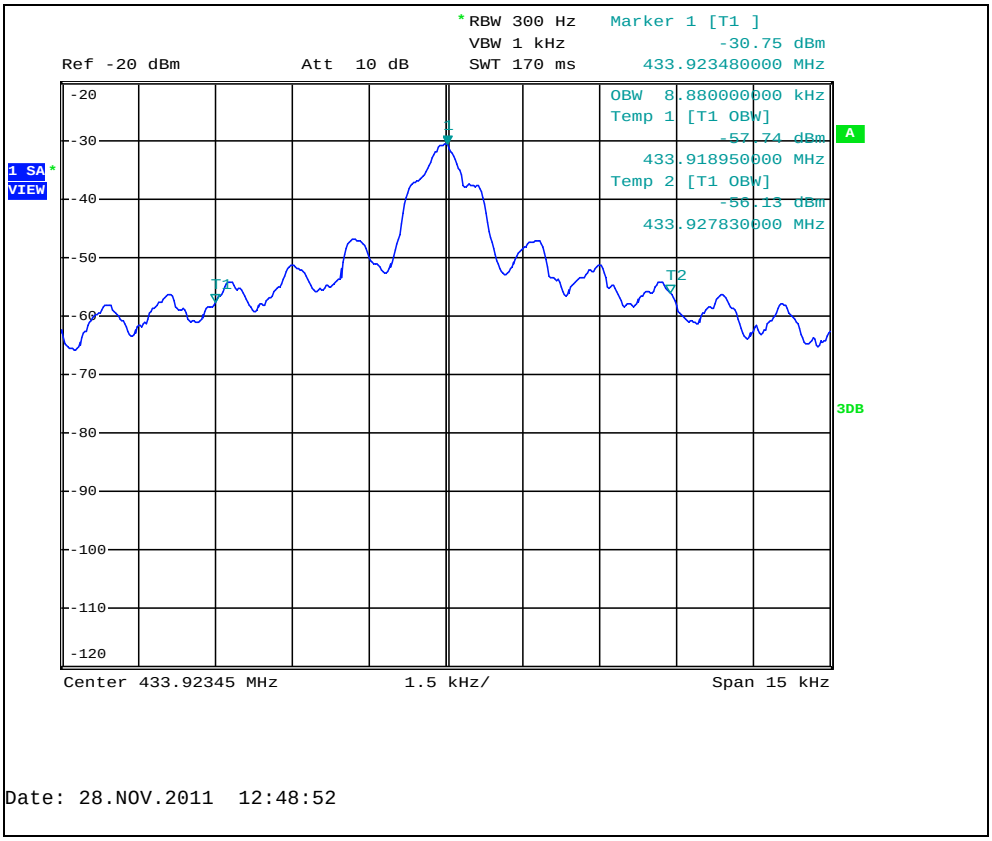

Figure 7.4.2-2: Occupied Bandwidth – 99%

7.5 Radiated Emissions – FCC: CFR 47 15.231(b) / IC: RSS-210 A1.1.2

7.5.1 Test Methodology

Radiated emissions tests were made over the frequency range of 30MHz to 5GHz, 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 1000MHz, 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, average and peak measurements were made with RBW of 1 MHz and a VBW of 3 MHz.

Further, compliance with the provisions of 15.205 was demonstrated using the measurement instrumentation specified in that section where applicable.

The EUT utilized pulsed modulation therefore peak measurements where corrected by the duty cycle for comparison to the average limits.

7.5.2 Duty Cycle Correction

For average radiated measurements, the measured level was reduced by a factor -6.74dB to account for the duty cycle of the EUT. The worst case duty cycle was determined to be 46%. The duty cycle correction factor is determined using the formula: 20log (0.460) = -6.74dB. Determination of the duty cycle correction is included in the plots and justification below.

Period (T) = 100us
Number Pulses (N1) = 44
Pulse Width (T1) = 840us
Number Pulse (N2) = 6
Pulse Width (T2) = 1.76ms
(N1*T1 + N2*T2)/T = ((44*0.840) + (6*1.76))/100 = 0.4752
20*Log(0.4752) = -6.46dB Average Correction Factor

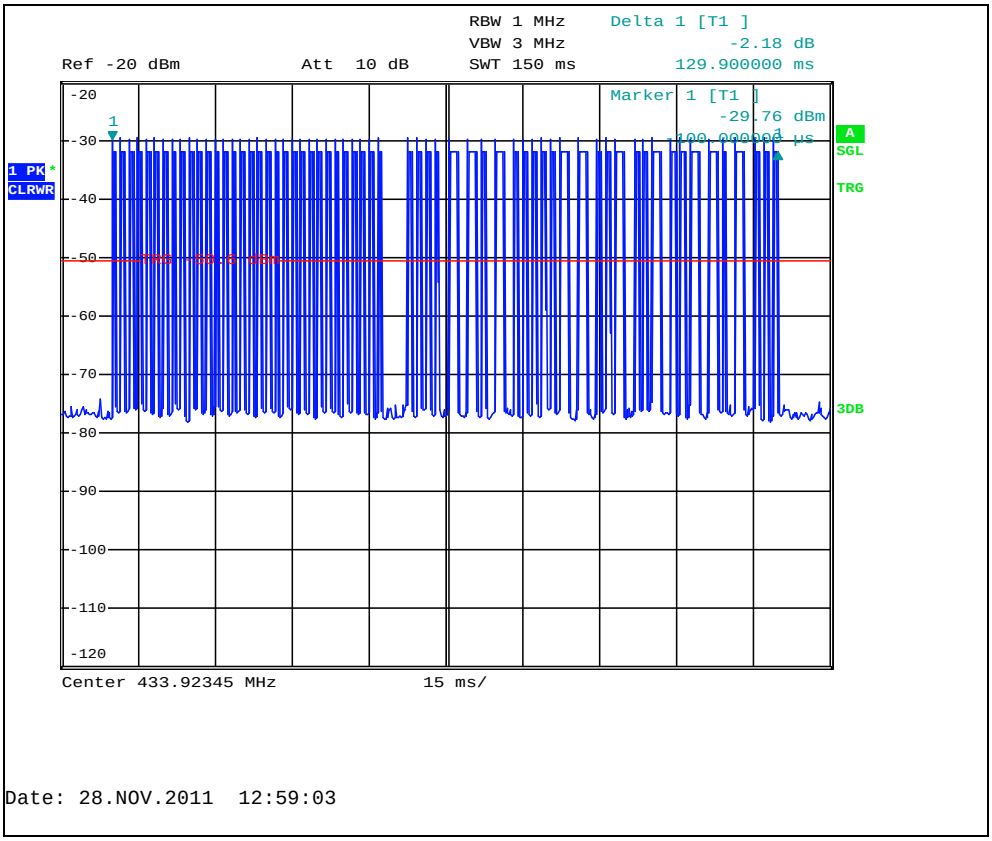

Figure 7.5.2-1: Pulse Train Period

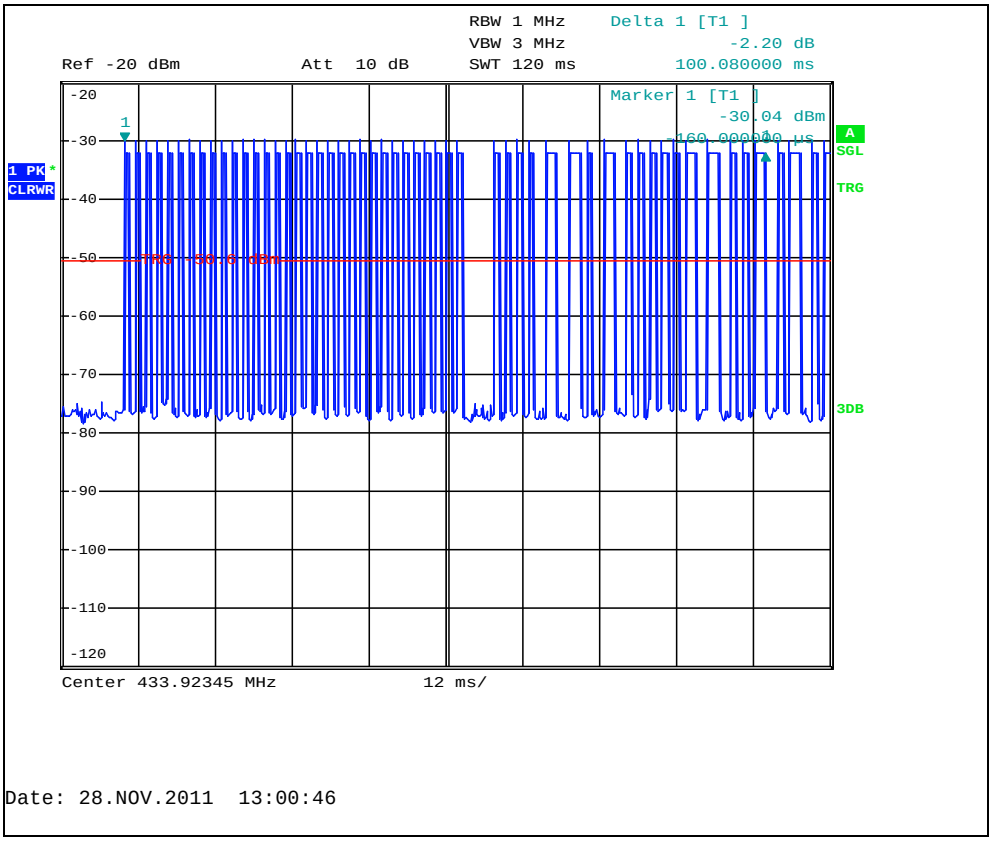

Figure 7.5.2-2: Duty Cycle - 100ms Period

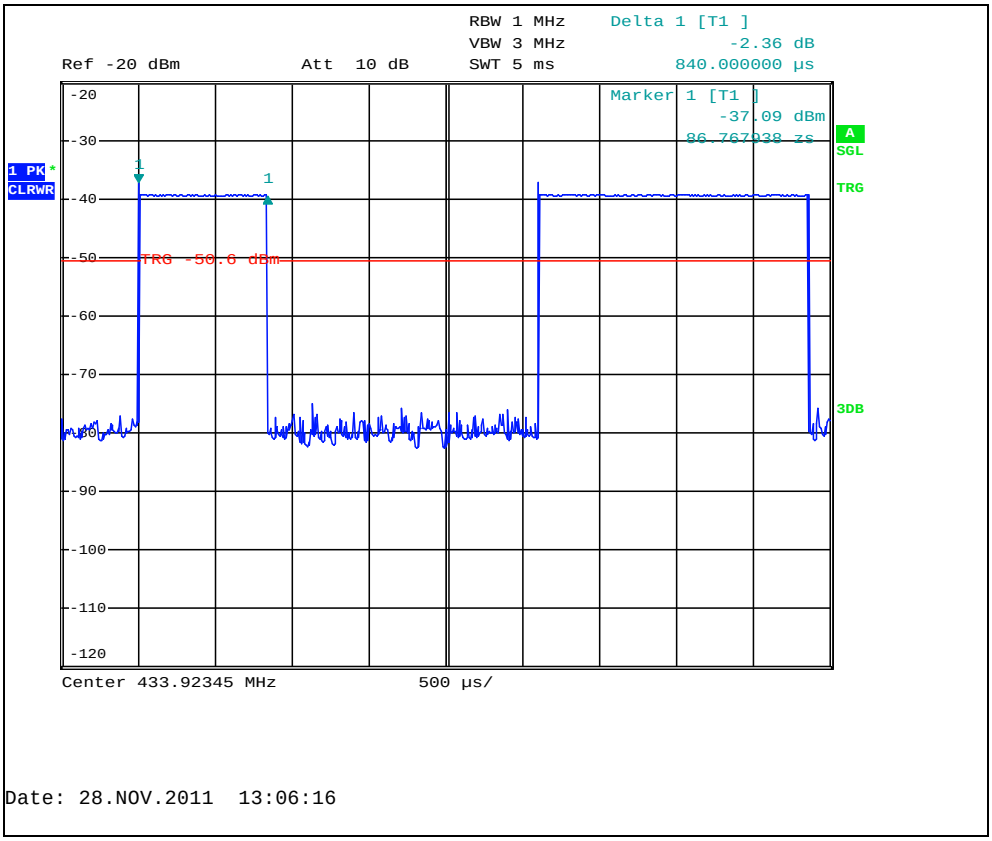

Figure 7.5.2-3: Duty Cycle – Pulse Width

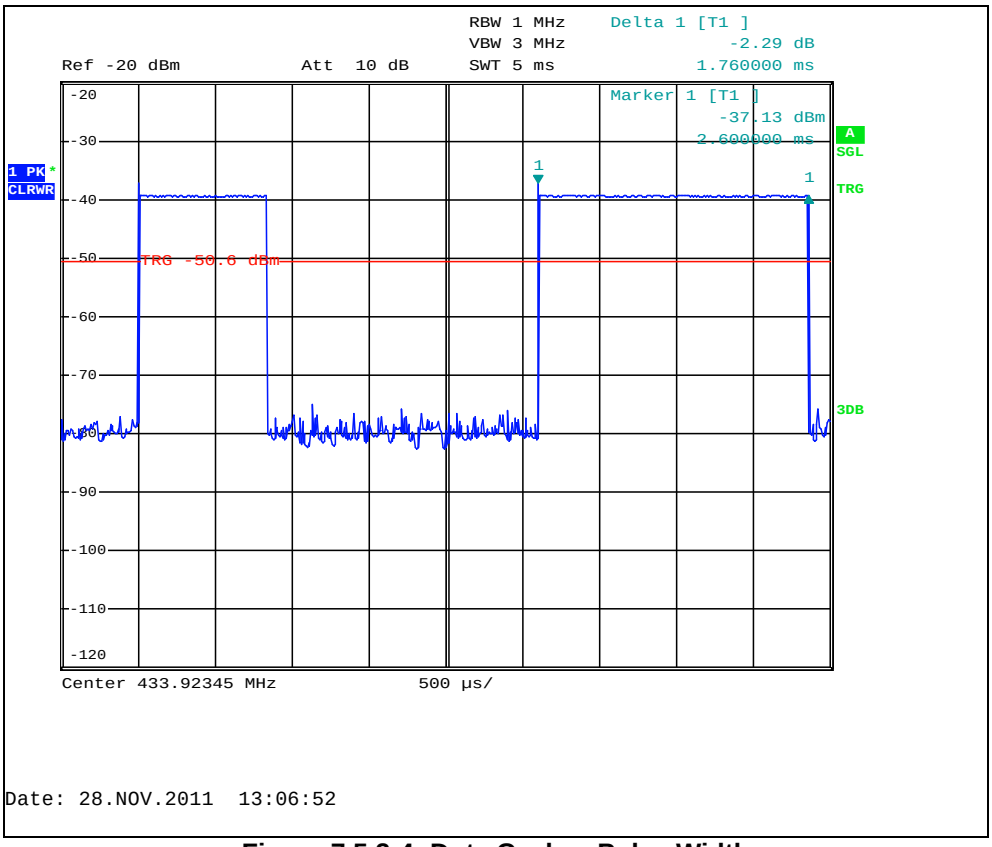

Figure 7.5.2-4: Duty Cycle – Pulse Width

7.5.3 Test Results

Radiated spurious emissions are reported in Tables 7.5.3-1 through 7.5.3-3. Emissions not reported were below the noise floor of the measurement system.

Table 7.5.3-1: Radiated Emissions – X Position

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Fundamental Emission										
433.92	88.91	88.91	H	-7.42	81.49	75.03	100.8	80.8	19.3	5.8
433.92	72.27	72.27	V	-7.42	64.85	58.39	100.8	80.8	36.0	22.4
Spurious Emissions										
867.84	46.05	46.05	H	0.94	46.99	40.53	80.8	60.8	33.8	20.3
867.84	38.46	38.46	V	0.94	39.40	32.94	80.8	60.8	41.4	27.9
1301.76	56.11	56.11	H	-11.13	44.98	38.52	74.0	54.0	29.0	15.5
1301.76	53.44	53.44	V	-11.13	42.31	35.85	74.0	54.0	31.7	18.2
1735.68	68.55	68.55	H	-8.19	60.36	53.90	80.8	60.8	20.4	6.9
1735.68	70.02	70.02	V	-8.19	61.83	55.37	80.8	60.8	19.0	5.5
2169.6	62.10	62.10	H	-5.79	56.31	49.85	80.8	60.8	24.5	11.0
2169.6	66.17	66.17	V	-5.79	60.38	53.92	80.8	60.8	20.4	6.9
2603.52	51.03	51.03	H	-4.26	46.77	40.31	80.8	60.8	34.0	20.5
2603.52	52.27	52.27	V	-4.26	48.01	41.55	80.8	60.8	32.8	19.3
3471.36	56.59	56.59	H	-1.07	55.52	49.06	80.8	60.8	25.3	11.8
3471.36	54.13	54.13	V	-1.07	53.06	46.60	80.8	60.8	27.7	14.2
3905.28	54.18	54.18	H	0.69	54.87	48.41	74.0	54.0	19.1	5.6
3905.28	54.18	54.18	V	0.69	54.87	48.41	74.0	54.0	19.1	5.6
4339.2	50.09	50.09	H	1.27	51.36	44.90	74.0	54.0	22.6	9.1
4339.2	49.74	49.74	V	1.27	51.01	44.55	74.0	54.0	23.0	9.5

Table 7.5.3-2: Radiated Emissions – Y Position

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Fundamental Emission										
433.92	85.15	85.15	H	-7.42	77.73	71.27	100.8	80.8	23.1	9.6
433.92	82.35	82.35	V	-7.42	74.93	68.47	100.8	80.8	25.9	12.4
Spurious Emissions										
867.84	44.68	44.68	H	0.94	45.62	39.16	80.8	60.8	35.2	21.7
867.84	42.14	42.14	V	0.94	43.08	36.62	80.8	60.8	37.7	24.2
1301.76	54.87	54.87	H	-11.13	43.74	37.28	74.0	54.0	30.3	16.7
1301.76	53.64	53.64	V	-11.13	42.51	36.05	74.0	54.0	31.5	18.0
1735.68	66.85	66.85	H	-8.19	58.66	52.20	80.8	60.8	22.1	8.6
1735.68	63.42	63.42	V	-8.19	55.23	48.77	80.8	60.8	25.6	12.1
2169.6	56.33	56.33	H	-5.79	50.54	44.08	80.8	60.8	30.3	16.7
2169.6	65.22	65.22	V	-5.79	59.43	52.97	80.8	60.8	21.4	7.9
2603.52	53.26	53.26	V	-4.26	49.00	42.54	80.8	60.8	31.8	18.3
3471.36	52.84	52.84	H	-1.07	51.77	45.31	80.8	60.8	29.0	15.5
3471.36	58.24	58.24	V	-1.07	57.17	50.71	80.8	60.8	23.6	10.1
3905.28	57.01	57.01	H	0.69	57.70	51.24	74.0	54.0	16.3	2.8
3905.28	54.13	54.13	V	0.69	54.82	48.36	74.0	54.0	19.2	5.6
4339.2	49.38	49.38	H	1.27	50.65	44.19	74.0	54.0	23.3	9.8
4339.2	49.40	49.40	V	1.27	50.67	44.21	74.0	54.0	23.3	9.8

Table 7.5.3-3: Radiated Emissions – Z Position

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Fundamental Emission										
433.92	76.20	76.20	H	-7.42	68.78	62.32	100.8	80.8	32.0	18.5
433.92	88.08	88.08	V	-7.42	80.66	74.20	100.8	80.8	20.1	6.6
Spurious Emissions										
867.84	40.85	40.85	H	0.94	41.79	35.33	80.8	60.8	39.0	25.5
867.84	43.14	43.13	V	0.94	44.08	37.61	80.8	60.8	36.7	23.2
1301.76	50.02	50.02	H	-11.13	38.89	32.43	74.0	54.0	35.1	21.6
1301.76	55.29	55.29	V	-11.13	44.16	37.70	74.0	54.0	29.8	16.3
1735.68	58.34	58.34	H	-8.19	50.15	43.69	80.8	60.8	30.7	17.1
1735.68	69.41	69.41	V	-8.19	61.22	54.76	80.8	60.8	19.6	6.1
2169.6	60.17	60.17	H	-5.79	54.38	47.92	80.8	60.8	26.4	12.9
2169.6	60.37	60.37	V	-5.79	54.58	48.12	80.8	60.8	26.2	12.7
2603.52	53.14	53.14	H	-4.26	48.88	42.42	80.8	60.8	31.9	18.4
2603.52	50.16	50.16	V	-4.26	45.90	39.44	80.8	60.8	34.9	21.4
3037.44	52.65	52.65	H	-3.05	49.60	43.14	80.8	60.8	31.2	17.7
3471.36	59.68	59.68	H	-1.07	58.61	52.15	80.8	60.8	22.2	8.7
3471.36	51.01	51.01	V	-1.07	49.94	43.48	80.8	60.8	30.9	17.3
3905.28	56.31	56.31	H	0.69	57.00	50.54	74.0	54.0	17.0	3.5
3905.28	56.11	56.11	V	0.69	56.80	50.34	74.0	54.0	17.2	3.7
4339.2	51.56	51.56	H	1.27	52.83	46.37	74.0	54.0	21.2	7.6
4339.2	50.16	50.16	V	1.27	51.43	44.97	74.0	54.0	22.6	9.0

7.5.4 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: Fundamental Frequency (X Orientation)

PEAK:
Corrected Level: 46.05 + 0.94 = 46.99dBuV
Margin: 80.8dBuV – 46.99dBuV = 33.8dB

AVERAGE:
Corrected Level: 46.05 + 0.94 - 6.46 = 40.53dBuV
Margin: 60.8dBuV – 40.53dBuV = 20.3dB

8 CONCLUSION

In the opinion of ACS, Inc. the QTL184 and QTL74 manufactured by HomeRun Holdings met the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT