Excellence in Compliance Testing

Certification Test Report

FCC ID: SK9M2LG1
IC: 864G-M2LG1

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

ACS Report Number: 10-0260.W06.12.A

Manufacturer: Itron Electricity Metering, Inc.
Model: M2 Gateway

Test Begin Date: August 24, 2010
Test End Date: August 25, 2010

Report Issue Date: December 13, 2010

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.

Reviewed by: _____

Kirby Munroe
Director, Wireless Certifications
ACS, Inc.

This report contains 24 pages

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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 for Certification of a single limited modular approval.

1.2 Product description

The M2 Gateway module is a utility meter register board designed to be integrated into a variety of electric meter form factors. The M2 Gateway contains (1) 900 MHz LAN frequency hopping spread spectrum radio and (1) 2.4 GHz direct sequence spread spectrum Zigbee radio.

Manufacturer Information:
Itron Electricity Metering, Inc.
2111 N. Molter Rd.
Liberty Lake, WA 99019

The M2 Gateway technical details:

Modulation	Frequency Range (MHz)	Number of Channels	Channel Separation (kHz)	Data Rates Supported (kbps)
FSK	902.25 - 927.75	52	500	19.2
FSK	902.25 - 927.75	52	500	152.3

Test Sample Serial Number(s):
300490583, 300490681, 300490703

Test Sample Condition: The test samples were provided in good working order with no visible defects.

1.3 Test Methodology and Considerations

This M2 Gateway is a composite device by definition. The 900 MHz LAN radio and the 2.4 GHz Zigbee radio operate under CFR 47 Part 15.247 and IC RSS-210. This report addresses the 900 MHz LAN radio only. A separate report will be issued to address the 2.4 GHz Zigbee radio.

The M2 Gateway was integrated into a 2S meter form for AC power line conducted emissions and radiated emissions. The 2S meter form is representative of a typical host device.

Both the 900 MHz LAN radio and the 2.4 GHz Zigbee radio can transmit simultaneously therefore radiated inter-modulation products were evaluated and found to be in compliance.

For the purpose of RF conducted measurements, the M2 Gateway module was modified with a temporary 50 ohm antenna port.

All modes of operation, including all available data rates, were evaluated. The data presented in this report represents the worst case where applicable.

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: 894540
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:

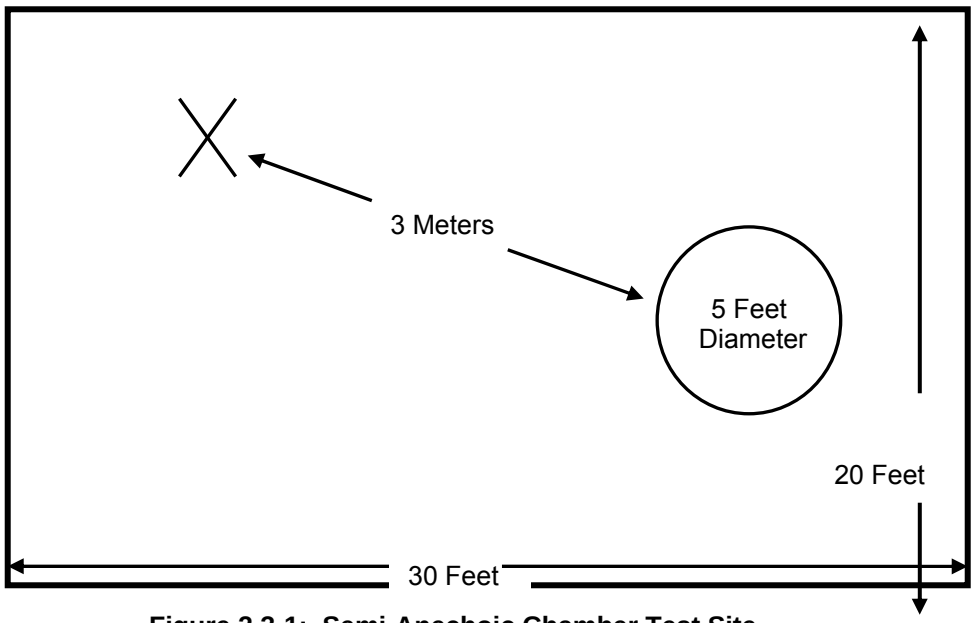

Figure 2.3-1: Semi-Anechoic Chamber Test Site

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:

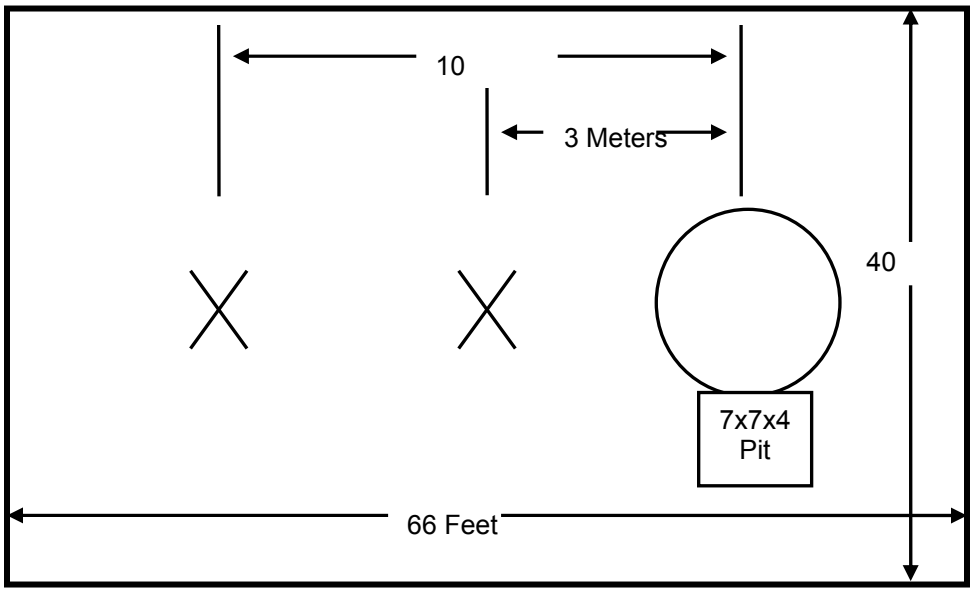

Figure 2.3-2: Open Area Test Site

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 group 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:

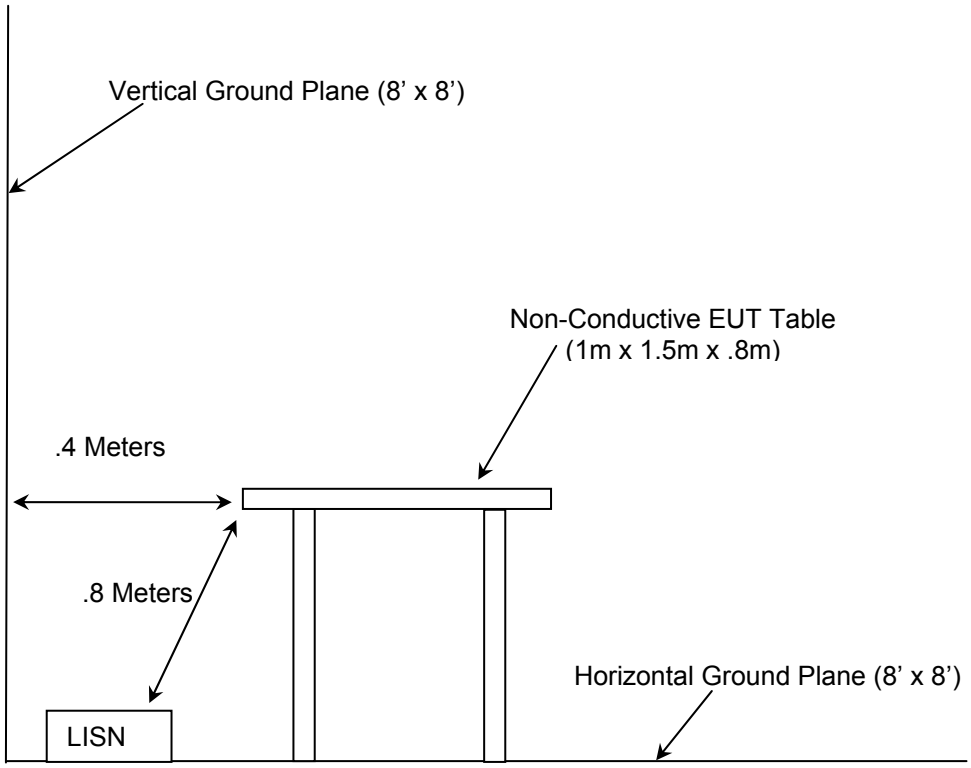

Figure 2.4-1: AC Mains Conducted EMI Site

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, 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 Dec 2010
- Industry Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, Issue3, 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

Equipment Calibration Information					
ACS#	**Mfg.**	**Eq. type**	**Model**	**S/N**	**Cal. Due**
1	Rohde & Schwarz	Spectrum Analyzers	ESMI - Display	833771/007	09-23-2012
2	Rohde & Schwarz	Spectrum Analyzers	ESMI - Receiver	839587/003	09-23-2012
3	Rohde & Schwarz	Spectrum Analyzers	ESMI - Display	839379/011	02-02-2011
4	Rohde & Schwarz	Spectrum Analyzers	ESMI - Receiver	833827/003	02-02-2011
25	Chase	Antennas	CBL6111	1043	09-13-2012
30	Spectrum Technologies	Antennas	DRH-0118	970102	05-08-2011
73	Agilent	Amplifier	8447D	2727A05624	05-26-2011
153	EMCO	LISN	Feb-25	9411-2268	01-11-2011
167	ACS	Cable Set	Chamber EMI Cable Set	167	01-25-2011 (See Note1)
168	Hewlett Packard	Attenuators	11947A	44829	02-04-2011 (See Note2)
193	ACS	Cable Set	OATS cable Set	193	01-05-2011 (See Note1)
283	Rohde & Schwarz	Spectrum Analyzers	FSP40	1000033	08-31-2011
291	Florida RF Cables	Cables	SMRE-200W-12.0-SMRE	None	12-07-2011 (See Note1)
292	Florida RF Cables	Cables	SMR-290AW-480.0-SMR	None	12-07-2011 (See Note1)
324	ACS	Cables	Belden	8214	07-09-2011 (See Note1)
331	Microwave Circuits	Filters	H1G513G1	31417	07-16-2011 (See Note1)
338	Hewlett Packard	Amplifier	8449B	3008A01111	10-29-2011
340	Aeroflex/Weinschel	Attenuators	AS-20	7136	10-05-2011 (See Note2)
422	Florida RF	Cables	SMS-200AW-72.0-SMR	805	01-26-2011 (See Note1)

Note1: Items characterized on an annual cycle. The date shown indicates the next characterization due date.
Note2: Items verified on an annual cycle. The date shown indicates the next verification due date.
Note3: Antennas calibrated on a two year cycle.

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number
1	Electric Meter	Landis & Gyr.	Focus AXR-SD (2S)	107 458 159
2	Transformer	Sagamo Weston	Type T-6A	325827 002

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

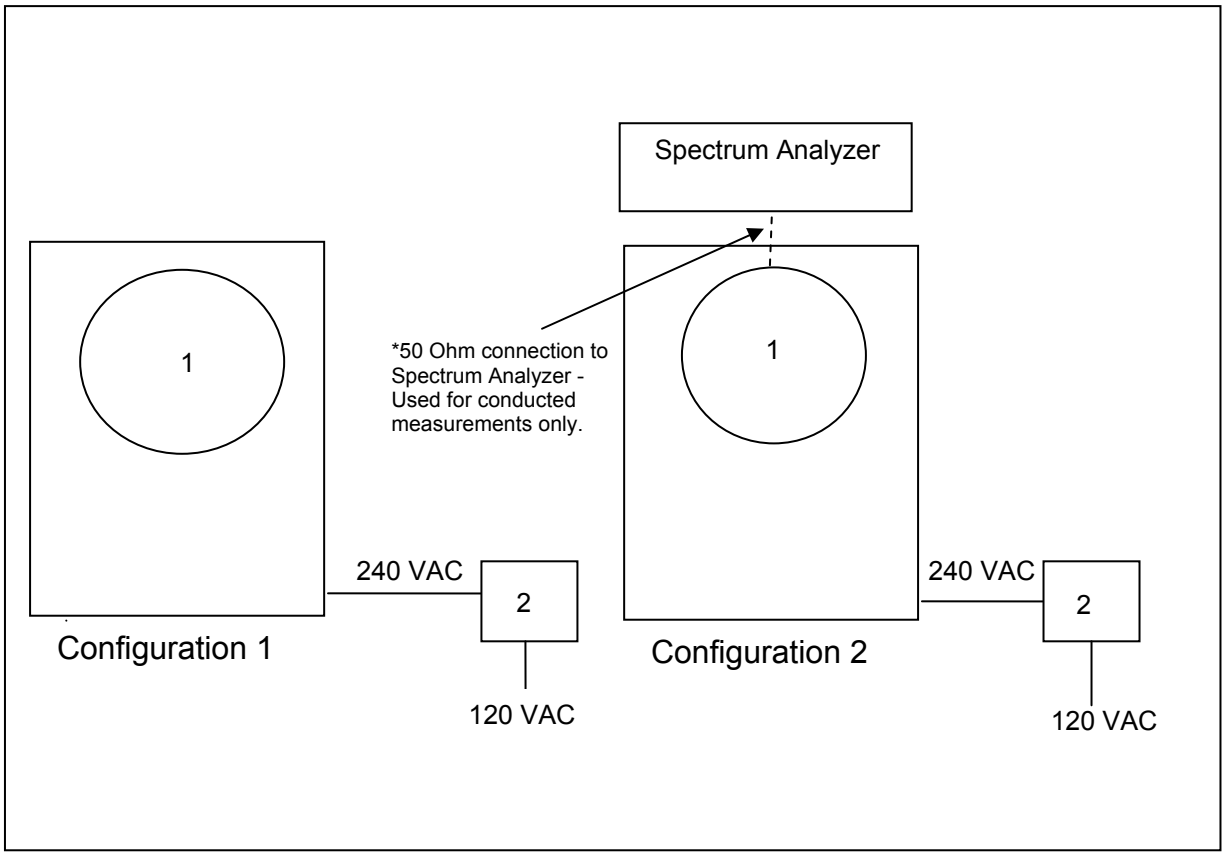

Figure 6-1: EUT Test Setup

Note1: The M2 Gateway was integrated into the 2S meter forms for showing compliance for radiated emissions and AC power line conducted emissions.

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 antenna is a quarter wave embedded slot antenna in the PWB ground plane with a measured gain of 2.2dBi.

7.2 Power Line Conducted Emissions – FCC: Section 15.207 IC: RSS-Gen 7.2.2

7.2.1 Measurement Procedure

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

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

7.2.2 Measurement Results

Results of the test are shown below in and Tables 7.2.2-1 to 7.2.2-2.

Table 7.2.2-1: Line 1 Conducted EMI Results – 2S Meter

Frequency (MHz)	Level (dBuV)	Transducer (dB)	Limit (dBuV)	Margin (dB)	Line	PE	Detector
0.186	56.5	10	64	7.7	L1	GND	QP
0.27	50.4	10	61	10.7	L1	GND	QP
0.456	35.8	10	57	21	L1	GND	QP
0.492	33.9	10	56	22.2	L1	GND	QP
0.534	33.1	10	56	22.9	L1	GND	QP
0.738	21.2	10.1	56	34.8	L1	GND	QP
2.784	28	10	56	28	L1	GND	QP
2.886	28.6	9.9	56	27.4	L1	GND	QP
2.922	28.4	9.9	56	27.6	L1	GND	QP
3.612	20.4	9.9	56	35.6	L1	GND	QP
0.186	46.3	10	54	8	L1	GND	AVG
0.27	38.2	10	51	13	L1	GND	AVG
0.456	24	10	47	22.8	L1	GND	AVG
0.486	23.7	10	46	22.5	L1	GND	AVG
0.57	16.7	10	46	29.3	L1	GND	AVG
0.786	15.2	10.1	46	30.8	L1	GND	AVG
2.832	18.8	10	46	27.2	L1	GND	AVG
2.874	18.9	10	46	27.1	L1	GND	AVG
2.934	18.3	9.9	46	27.7	L1	GND	AVG
3.672	13.1	9.9	46	32.9	L1	GND	AVG

Table 7.2.2-2: Line 2 Conducted EMI Results - 2S Meter

Frequency (MHz)	Level (dBuV)	Transducer (dB)	Limit (dBuV)	Margin (dB)	Line	PE	Detector
0.186	56.9	10	64	7.3	L2	GND	QP
0.276	50.4	10	61	10.5	L2	GND	QP
0.498	37.1	10	56	18.9	L2	GND	QP
0.552	39.5	10	56	16.5	L2	GND	QP
0.798	40.6	10.1	56	15.4	L2	GND	QP
1.578	34.7	10	56	21.3	L2	GND	QP
2.706	38.7	10	56	17.3	L2	GND	QP
2.802	40	10	56	16	L2	GND	QP
2.838	40.1	10	56	15.9	L2	GND	QP
3.042	33.8	9.9	56	22.2	L2	GND	QP
0.186	46.6	10	54	7.7	L2	GND	AVG
0.27	39.6	10	51	11.5	L2	GND	AVG
0.492	31.6	10	46	14.5	L2	GND	AVG
0.534	32.3	10	46	13.8	L2	GND	AVG
0.768	34.5	10.1	46	11.5	L2	GND	AVG
1.512	29.2	10	46	16.8	L2	GND	AVG
2.682	30.7	10	46	15.3	L2	GND	AVG
2.784	31.6	10	46	14.4	L2	GND	AVG
2.862	31.8	10	46	14.2	L2	GND	AVG
3.042	26.1	9.9	46	19.9	L2	GND	AVG

7.3 Radiated Emissions – FCC: Section 15.109 (Unintentional Radiation) IC: RSS-210 2.6

7.3.1 Measurement Procedure

Radiated emissions tests were performed over the frequency range of 30MHz to 12.5GHz. Measurements of the radiated field strength were made at a distance of 3m from the boundary of the equipment under test (EUT) and the receiving antenna. The antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. Radiated measurements above 30MHz and below 1GHz were made with the Spectrum Analyzer's resolution bandwidth set to 120 KHz using a Quasi-peak detector. Above 1GHz, peak and average measurements are taken with the RBW and VBW were set to 1MHz and 3MHz respectively.

7.3.2 Measurement Results

Results of the test are given in Table 7.3.2-1 below:

Table 7.3.2-1: Radiated Emissions Tabulated Data – 2S Meter

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
30	---------	17.81	H	-6.70	---------	11.11	--------	40.0	---------	28.9
207.961	---------	30.22	V	-15.28	---------	14.94	--------	43.5	---------	28.6
349.072	---------	39.29	H	-9.14	---------	30.15	--------	46.0	---------	15.8
350.02	---------	39.26	H	-9.10	---------	30.16	--------	46.0	---------	15.8
703.611	---------	20.68	V	-1.23	---------	19.45	--------	46.0	---------	26.5
827.56	---------	19.89	H	0.85	---------	20.74	--------	46.0	---------	25.3

* Note: All emissions above 827.56 MHz were attenuated below the permissible limit.

7.4 Peak Output Power - FCC Section 15.247(b)(2) IC: RSS-210 A8.4(1)

7.4.1 Measurement Procedure (Conducted Method)

The 20dB bandwidth of the EUT was within the resolution bandwidth of spectrum analyzer, therefore the power measurement was made using the spectrum analyzer method. The RF output port of the EUT was directly connected to the input of the spectrum analyzer. The resolution and video bandwidth were set to > 20 dB bandwidth of the emission measured. The device employs >50 channels therefore the power is limited to 1 Watt.

7.4.2 Measurement Results

Results are shown in Table 7.4.2-1 and Figures 7.4.2-1 to 7.4.2-6 below.

Table 7.4.2-1: RF Output Power

Frequency [MHz]	Data Rate (kbps)	Level [dBm]
902.25	152.3	23.61
914.75	152.3	23.20
927.75	152.3	21.19
902.25	19.2	21.00
914.75	19.2	20.57
927.75	19.2	19.04

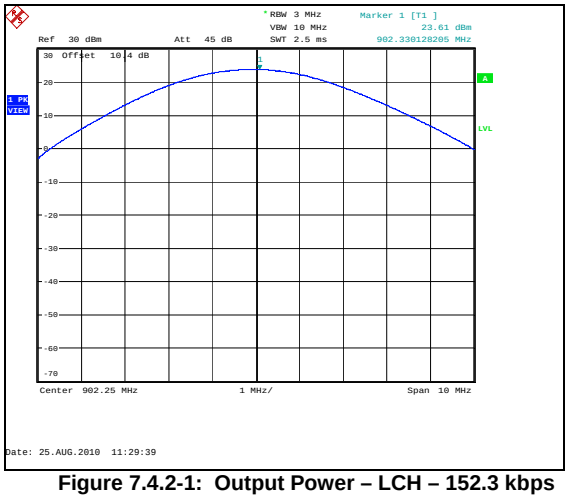

Figure 7.4.2-1: Output Power – LCH – 152.3 kbps

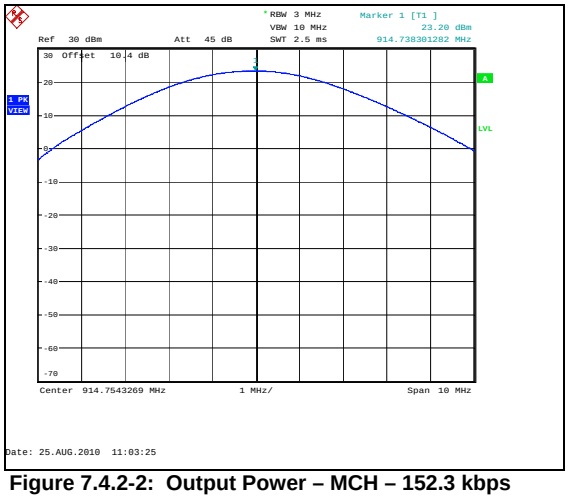

Figure 7.4.2-2: Output Power – MCH – 152.3 kbps

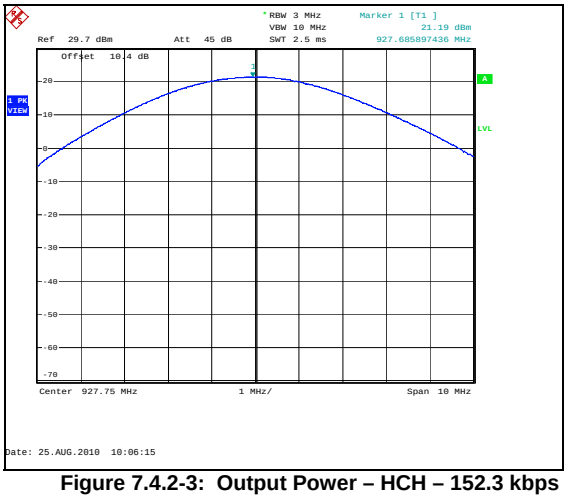

Figure 7.4.2-3: Output Power – HCH – 152.3 kbps

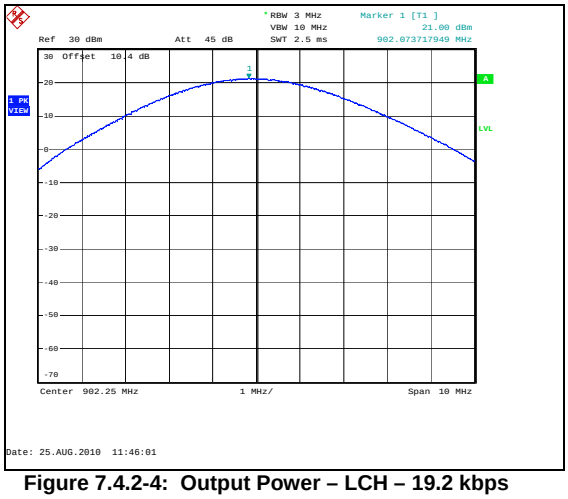

Figure 7.4.2-4: Output Power – LCH – 19.2 kbps

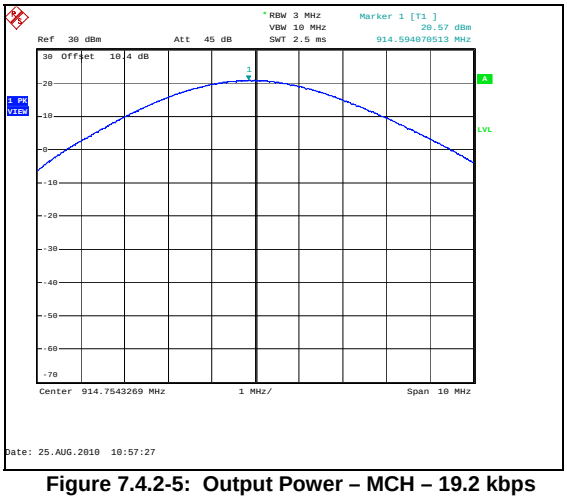

Figure 7.4.2-5: Output Power – MCH – 19.2 kbps

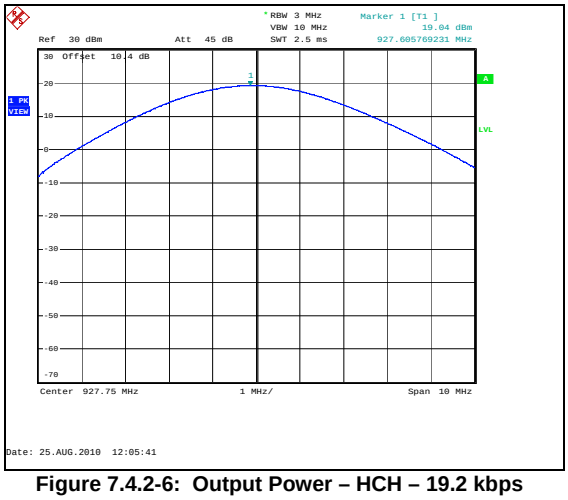

Figure 7.4.2-6: Output Power – HCH – 19.2 kbps

7.5 Channel Usage Requirements

7.5.1 Carrier Frequency Separation – FCC: Section 15.247(a)(1) IC: RSS-210 A8.1(b)

7.5.1.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer. The span of the spectrum analyzer was set wide enough to capture two adjacent peaks and the RBW and VBW were set to ≥ 1% of the span.

Carrier frequency separation was measured for all available data rates.

7.5.1.2 Measurement Results

The adjacent channel separation was measured to be 500 kHz. Results are shown below in Figures 7.5.1.2-1 to 7.5.1.2-2.

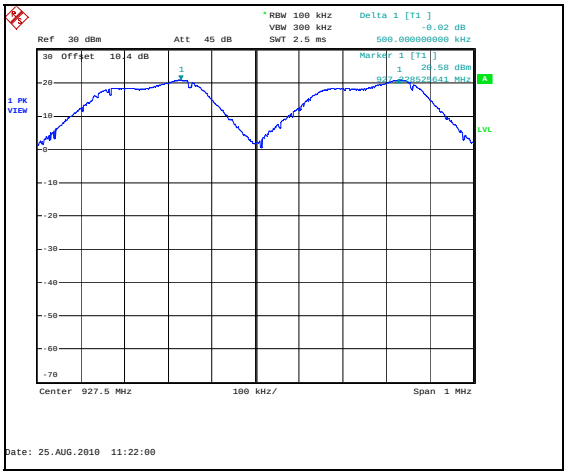

Figure 7.5.1.2-1: Channel Separation – 152.3 kbps

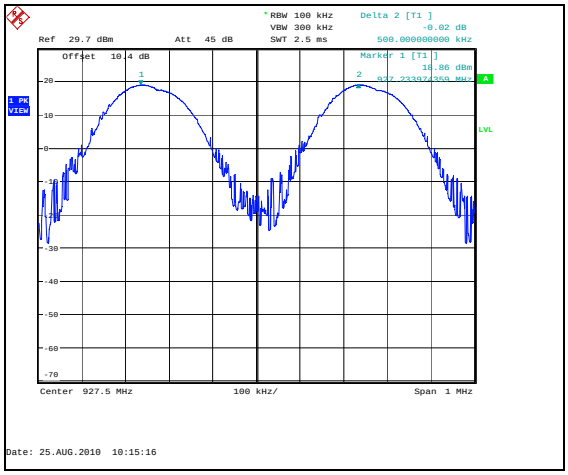

Figure 7.5.1.2-2: Channel Separation - 19.2 kbps

7.5.2 Number of Hopping Channels – FCC: Section 15.247(a)(1)(i) IC: RSS-210 A8.1(c)

The 20dB bandwidth of the device is less than 250 kHz. The device employs > 50 hopping channels as required. Results are shown below in Figures 7.5.2-1 to 7.5.2-2.

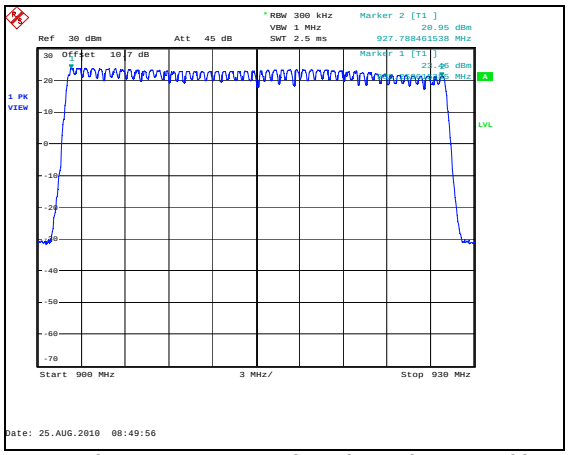

Figure 7.5.2-1: Hopping Channels – 152.3 kbps

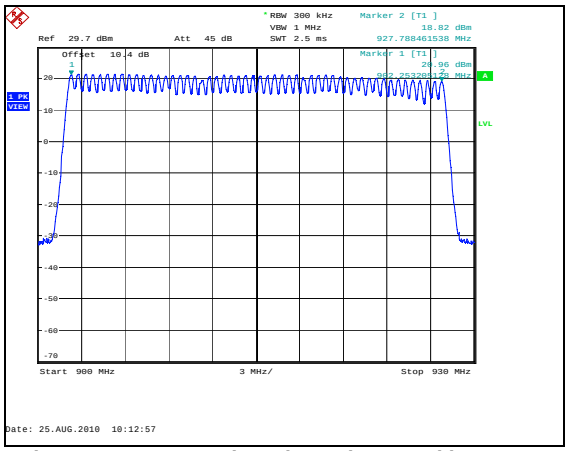

Figure 7.5.2-2: Hopping Channels – 19.2 kbps

7.5.3 Channel Dwell Time – FCC: Section 15.247(a)(1)(i) IC: RSS-210 A8.1(c)

7.5.3.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer. The hopping channel is centered on the analyzer and the span set to 0 Hz. The RBW was set to 1 MHz and the VBW to 3 MHz. Sweep time was adjusted to capture the burst duration of the emission. The marker –delta function of the analyzer was employed to measure the burst duration.

7.5.3.2 Measurement Results

The duration of the RF transmission was measured as 125.3 ms for the 19.2kbps data rate. The duration of the RF transmission was measured as 87.2 ms for the 152.3 kbps data rate. The maximum time of occupancy on any channel in a 20 second period is 125.3ms. A single transmission for each modulation is shown in figures 7.5.3.2-1 to 7.5.3.2-2 below.

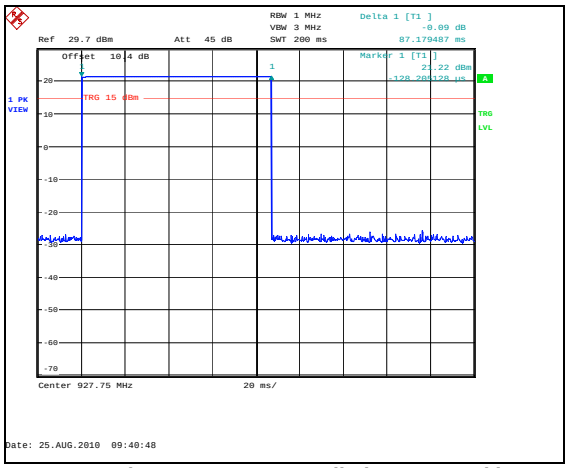

Figure 7.5.3.2-1: Dwell Time – 152.3 kbps

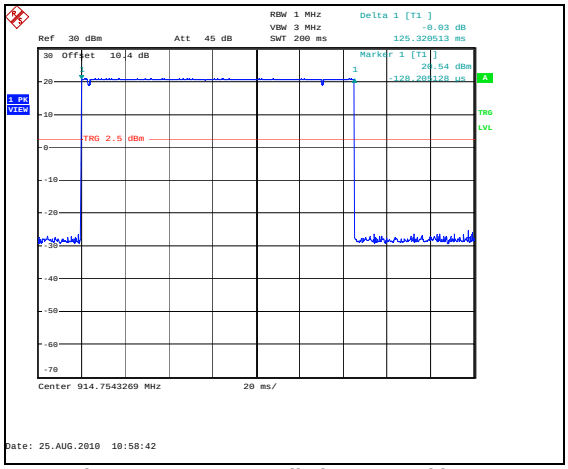

Figure 7.5.3.2-2: Dwell Time – 19.2 kbps

7.5.4 20dB / 99% Bandwidth - FCC: Section 15.247(a)(1)(i) IC: RSS-210 A8.1(c)

7.5.4.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer. The spectrum analyzer span was set to 2 to 3 times the estimated bandwidth of the emission. The RBW was to ≥ 1% of the estimated emission bandwidth. The trace was set to max hold with a peak detector active. The Delta function of the analyzer was utilized to determine the 20 dB bandwidth of the emission.

The 99% occupied bandwidth was measured with the spectrum analyzer span set to fully display the emission and approximately 20dB below the peak level. The RBW was to 1% to 3% of the approximate emission width. The trace was set to max hold with a peak detector active. The occupied bandwidth measurement function of the analyzer was used for the 99% bandwidth.

7.5.4.2 Measurement Results

Results are shown below in Table 7.5.4.2-1 and Figures 7.5.4.2-1 through 7.5.4.2-12.

Table 7.5.4.2-1: 20dB / 99% Bandwidth

Frequency [MHz]	20dB Bandwidth [kHz]	99% Bandwidth [kHz]	Data Rate (kbps)
902.25	339.7	325.3	152.3
914.75	331.7	325.3	152.3
927.75	328.5	326.9	152.3
902.25	64.9	64.7	19.2
914.75	63.5	64.6	19.2
927.75	63.9	65.5	19.2

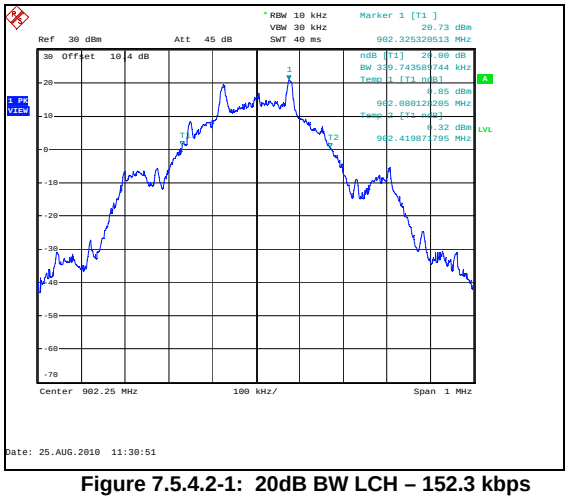

Figure 7.5.4.2-1: 20dB BW LCH – 152.3 kbps

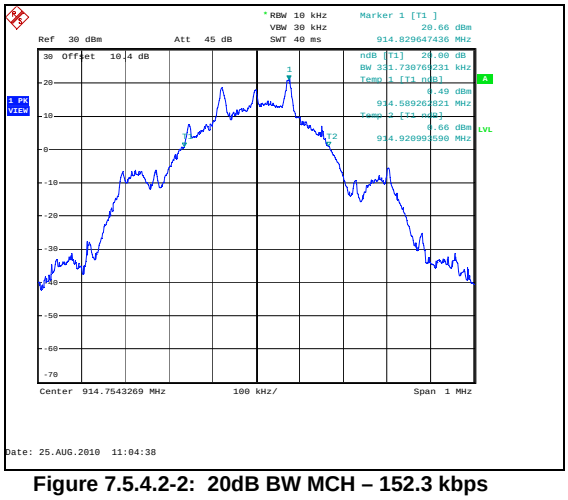

Figure 7.5.4.2-2: 20dB BW MCH – 152.3 kbps

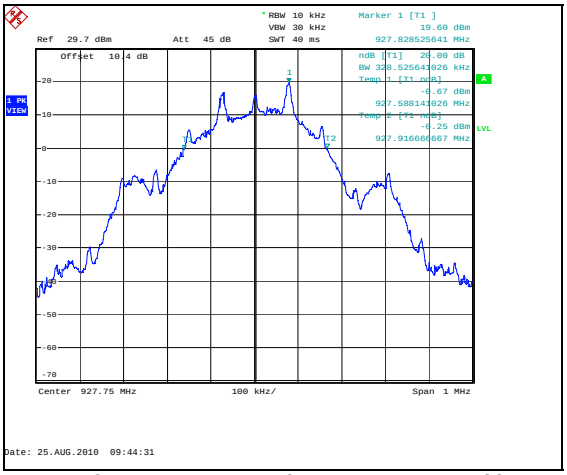

Figure 7.5.4.2-3: 20dB BW HCH – 152.3 kbps

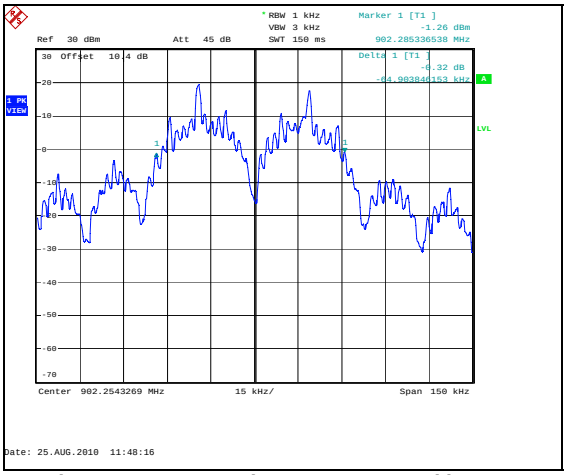

Figure 7.5.4.2-4: 20dB BW LCH – 19.2 kbps

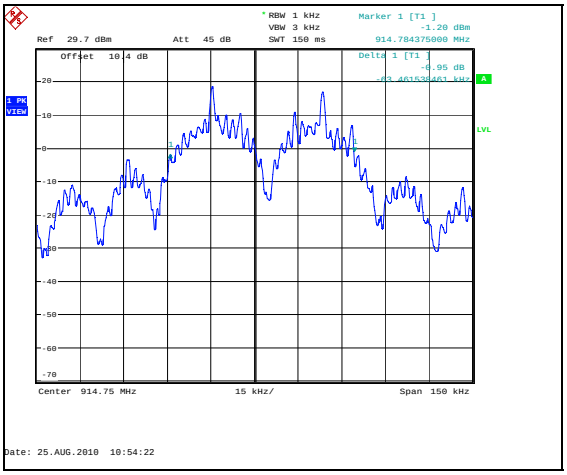

Figure 7.5.4.2-5: 20dB BW MCH – 19.2 kbps

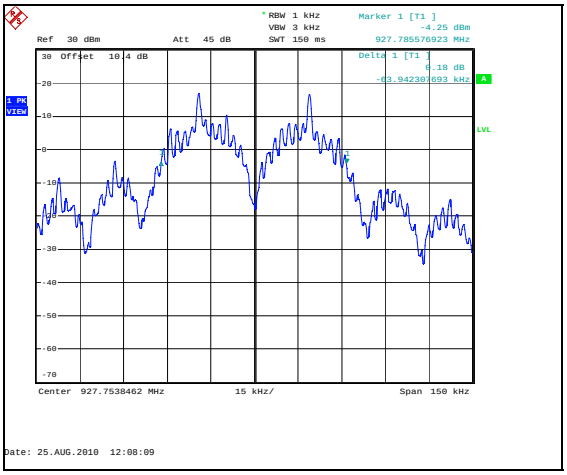

Figure 7.5.4.2-6: 20dB BW HCH – 19.2 kbps

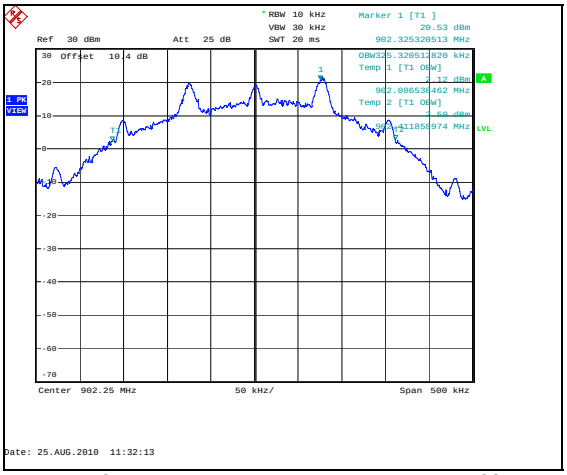

Figure 7.5.4.2-7: 99% BW LCH – 152.3 kbps

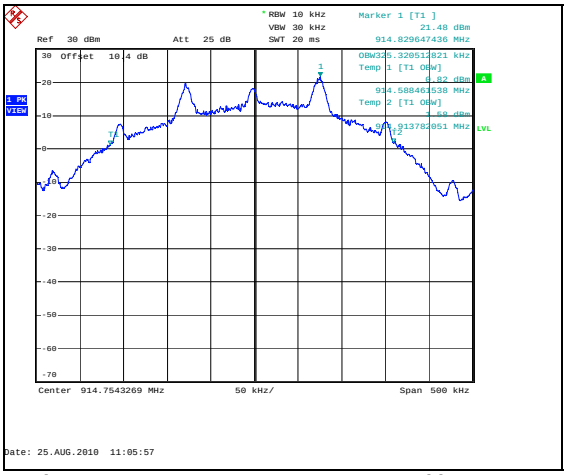

Figure 7.5.4.2-8: 99% BW MCH – 152.3 kbps

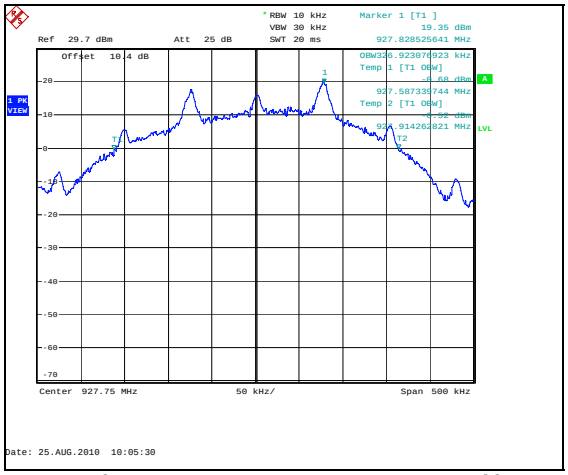

Figure 7.5.4.2-9: 99% BW HCH – 152.3 kbps

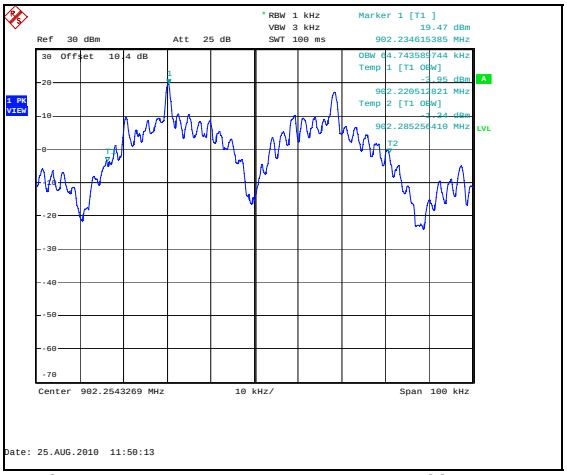

Figure 7.5.4.2-10: 99% BW LCH – 19.2 kbps

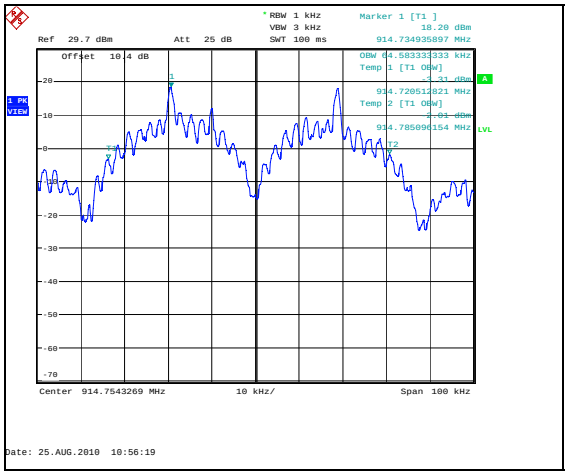

Figure 7.5.4.2-11: 99% BW MCH – 19.2 kbps

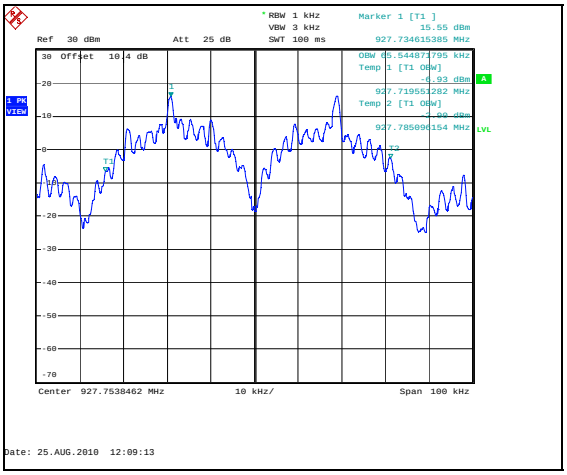

Figure 7.5.4.2-12: 99% BW HCH – 19.2 kbps

7.6 Band-Edge Compliance and Spurious Emissions-FCC 15.247(d) IC: RSS-210 A8.5

7.6.1 Band-Edge Compliance of RF Conducted Emissions

7.6.1.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer. The EUT was investigated at the lowest and highest channel available to determine band-edge compliance. For each measurement the spectrum analyzer's RBW was set to ≥ 1% of the span, and the VBW was set to ≥ 3 times RBW.

Band-edge was evaluated for all available data rates.

7.6.1.2 Measurement Results

Results are shown in the figures 7.6.1.2-1 to 7.6.1.2-8 below.

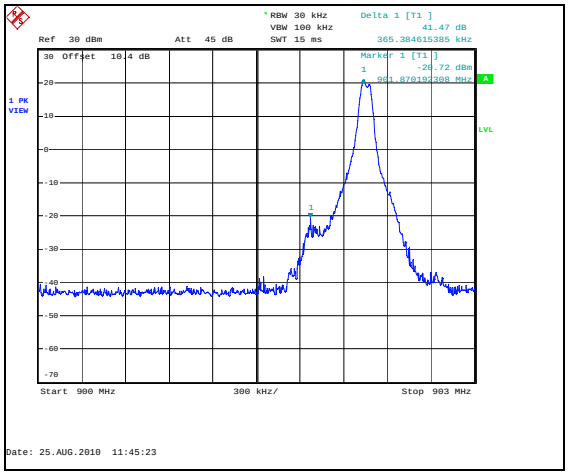

Figure 7.6.1.2-1: Lower Band-edge – 19.2 kbps

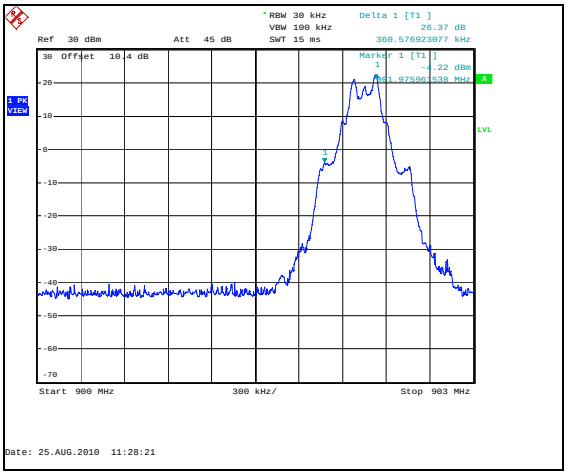

Figure 7.6.1.2-2: Lower Band-edge – 152.3 kbps

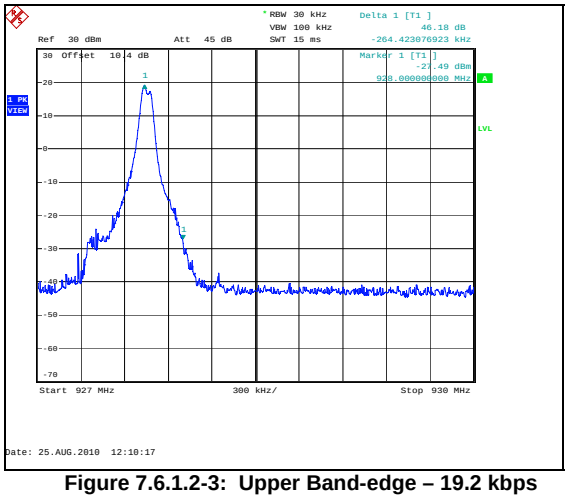

Figure 7.6.1.2-3: Upper Band-edge – 19.2 kbps

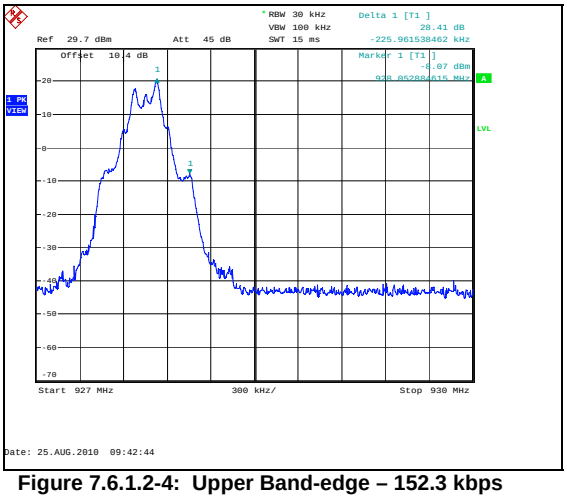

Figure 7.6.1.2-4: Upper Band-edge – 152.3 kbps

HOPPING MODE:

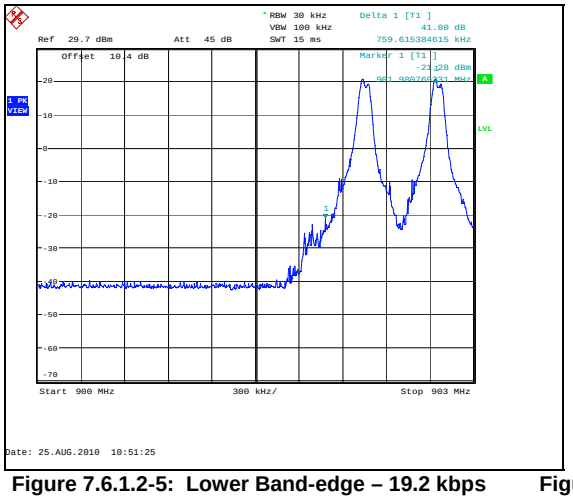

Figure 7.6.1.2-5: Lower Band-edge – 19.2 kbps

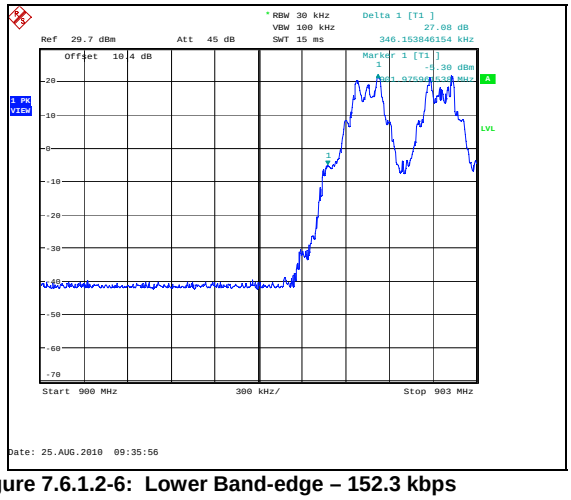

Figure 7.6.1.2-6: Lower Band-edge – 152.3 kbps

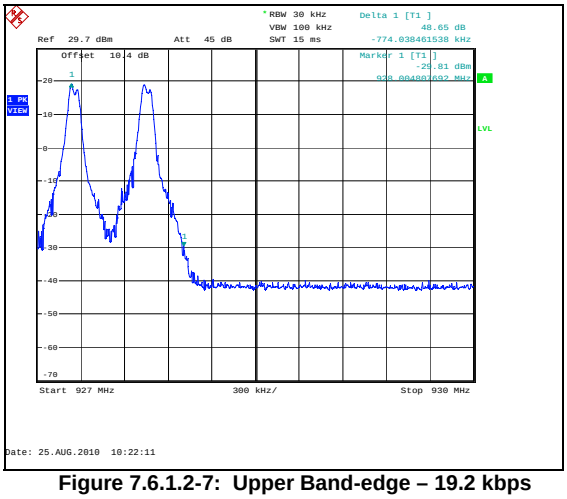

Figure 7.6.1.2-7: Upper Band-edge – 19.2 kbps

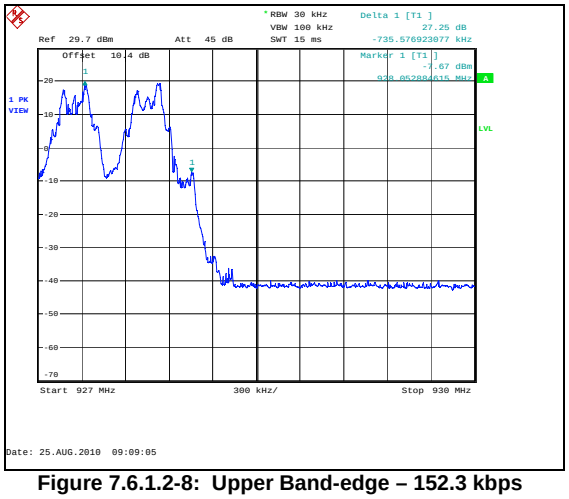

Figure 7.6.1.2-8: Upper Band-edge – 152.3 kbps

7.6.2 RF Conducted Spurious Emissions

7.6.2.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer. The EUT was investigated for conducted spurious emissions from 30MHz to 10GHz, 10 times the highest fundamental frequency. Measurements were made at the low, center and high channels of the EUT. For each measurement, the spectrum analyzer's RBW was set to 100kHz. A peak detector function was used with the trace set to max hold.

RF conducted spurious emissions were evaluated for all available data rates.

7.6.2.2 Measurement Results

Results are shown below in Figures 7.6.2.2-1 to 7.6.2.2-12:

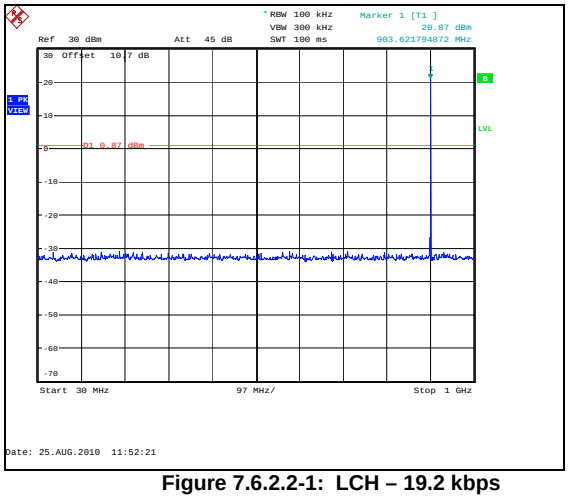

Figure 7.6.2.2-1: LCH – 19.2 kbps

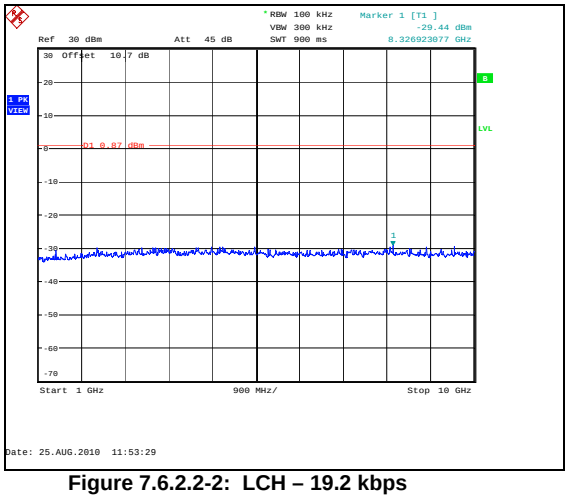

Figure 7.6.2.2-2: LCH – 19.2 kbps

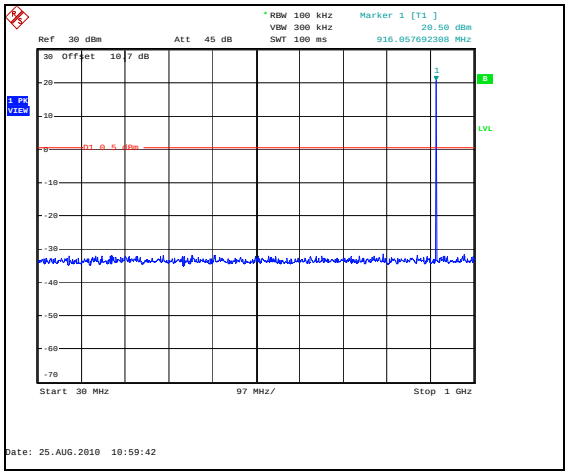

Figure 7.6.2.2-3: MCH – 19.2 kbps

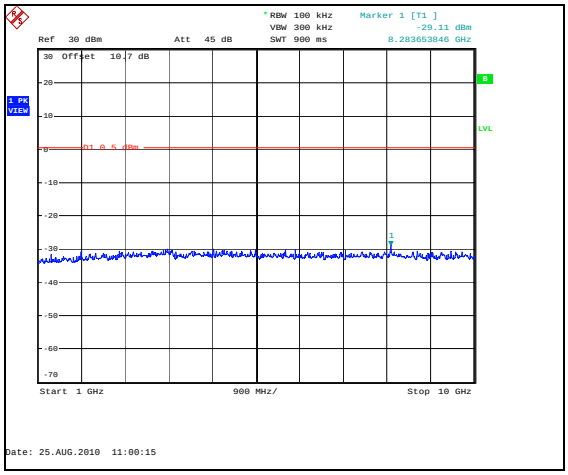

Figure 7.6.2.2-4: MCH – 19.2 kbps

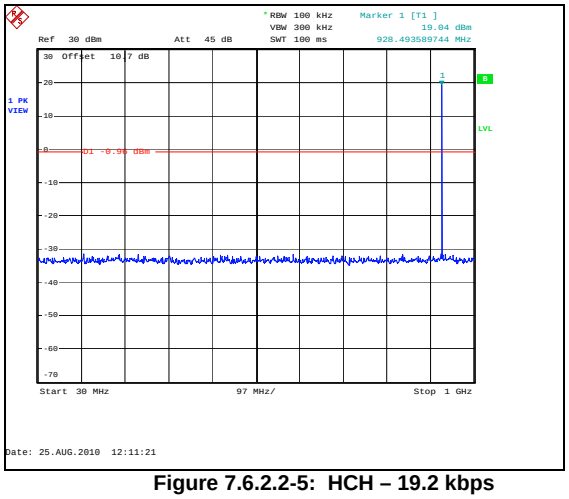

Figure 7.6.2.2-5: HCH – 19.2 kbps

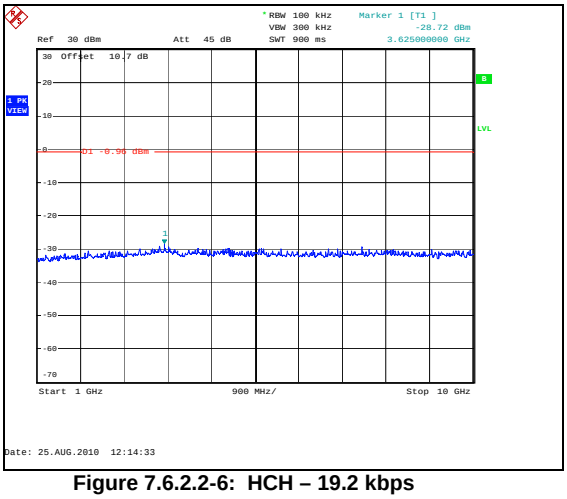

Figure 7.6.2.2-6: HCH – 19.2 kbps

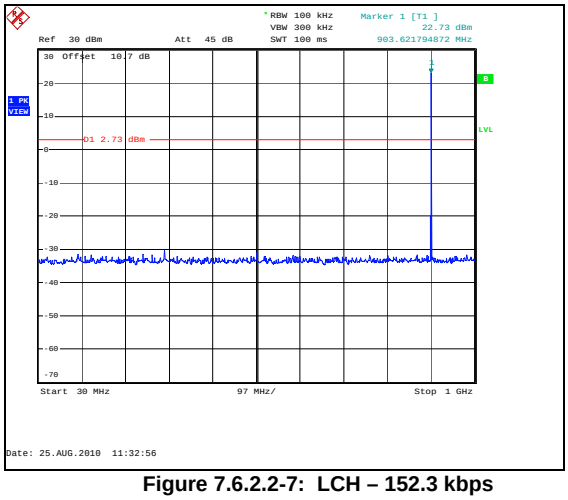

Figure 7.6.2.2-7: LCH – 152.3 kbps

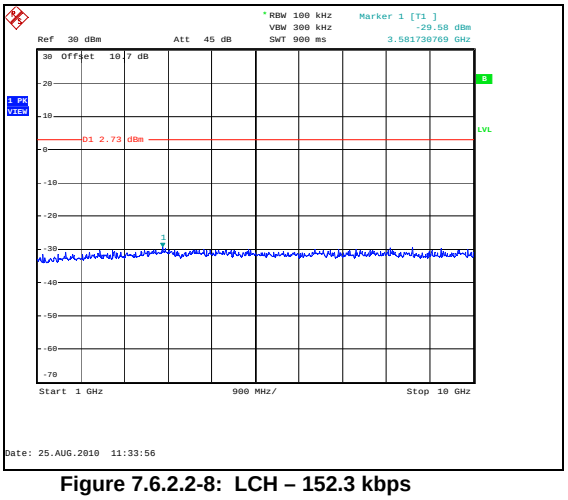

Figure 7.6.2.2-8: LCH – 152.3 kbps

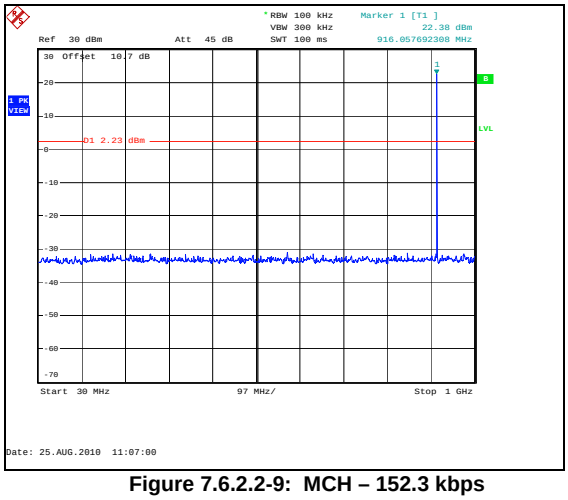

Figure 7.6.2.2-9: MCH – 152.3 kbps

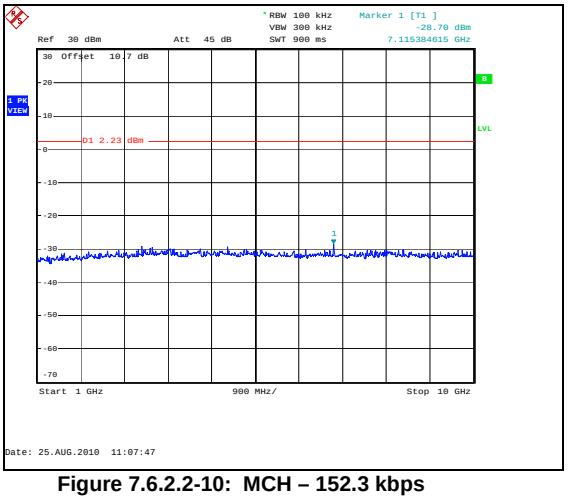

Figure 7.6.2.2-10: MCH – 152.3 kbps

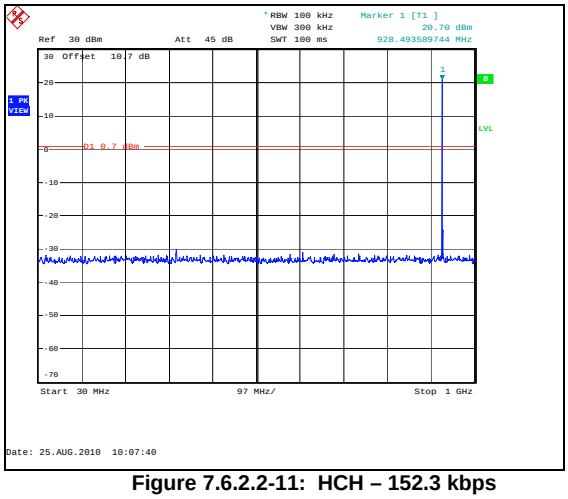

Figure 7.6.2.2-11: HCH – 152.3 kbps

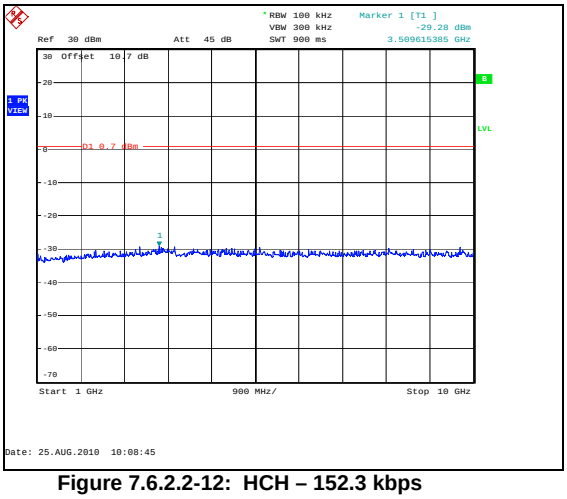

Figure 7.6.2.2-12: HCH – 152.3 kbps

7.6.3 Radiated Spurious Emissions - FCC Section 15.205 IC: RSS-210 2.6

7.6.3.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 30MHz to 10GHz, 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, peak 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.

Radiated spurious emissions were evaluated for all available data rates with worst case data provided. Worst case data rate was 19.2 kbps.

7.6.3.2 Measurement Results

Radiated spurious emissions found in the band of 30MHz to 10GHz are reported in the Table 7.6.3.2-1 below.

Table 7.6.3.2-1: Radiated Spurious Emissions – 2S Meter

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
Low Channel										
2706.75	45.71	34.12	H	-3.20	42.51	30.92	74.0	54.0	31.5	23.1
Middle Channel										
2744.25	48.85	39.99	H	-3.08	45.77	36.91	74.0	54.0	28.2	17.1
High Channel										
2783.25	50.78	43.13	H	-2.97	47.81	40.16	74.0	54.0	26.2	13.8
2783.25	49.02	40.06	V	-2.97	46.05	37.09	74.0	54.0	27.9	16.9

7.6.3.3 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: 45.71 - 3.20 = 42.51dBuV/m
Margin: 74dBuV/m – 42.51dBuV/m = 31.5dB

Example Calculation: Average
Corrected Level: 34.12 - 3.20 – 0 = 30.92dBuV
Margin: 54dBuV – 30.92dBuV = 23.1dB

8 CONCLUSION

In the opinion of ACS, Inc. the M2 Gateway, manufactured by Itron Electricity Metering, Inc. meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT