Certification Test Report

FCC ID: SK9AMI-4
IC: 864G-AMI4

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

ACS Report Number: 09-0368-15C-DSS

Manufacturer: Itron Electricity Metering, Inc.
Model: AMI4

Test Begin Date: November 6, 2009
Test End Date: November 19, 2009

Report Issue Date: November 30, 2009

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612-0

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

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This report contains 31 pages

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Test Setup Photographs

1.0 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 a permissive change. The purpose of the permissive change is the addition of OOK modulation for the 900 MHz LAN radio. No hardware changes were made to the existing radio.

The purpose of adding the Standard Consumption Message (OOK) to the existing OpenWay CENTRON and OpenWay CENTRON Polyphase meter is to allow this product to sustain dual protocols. This meter can be used for existing AMR customers who are interested in moving to an OpenWay Infrastructure in the future without replacement of the meter. The meter will support both SCM transmission (OOK) and OpenWay Infrastructure (FSK).

1.2 Product Description

1.2.1 General

The AMI4 module is a utility meter register board designed to be integrated into a variety of electric meter form factors. The AMI4 contains (1) 900 MHz LAN frequency hopping spread spectrum radio and (1) 2.4GHz direct sequence spread spectrum Zigbee radio.

Manufacturer Information:
Itron Electricity Metering, Inc.
313 North Highway 11
West Union, SC 29696

Test Sample Serial Number(s):
4110214829 – (909.6 MHz Radiated Testing)
4110232887 – (915.8 MHz Radiated Testing)
4110280854 – (921.8 MHz Radiated Testing)
4110213954 – (Frequency Hopping Tests & Conducted Testing)

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

1.2.2 Intended Use

The AMI4 module is intended to be used in electric utility meters to provide automated meter reading capabilities.

1.3 Test Methodology and Considerations

This AMI4 is considered 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. Only the 900MHZ LAN radio is affected by the additional modulation.

A 2S meter form was utilized to power the AMI4 modules for RF conducted measurements. The AMI4 was integrated into the 1S, 2S, 3S, 4S, 12S Mono and 9S, 12S, 16S, 36S Poly meter forms for showing compliance for radiated emissions. The AMI4 was integrated into the 9S meter form for AC power line conducted emissions.

For the purpose of RF conducted measurements, the AMI4 module was modified with a temporary 50 ohm antenna port.

2.0 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

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. In addition, ACS is compliant to ISO/IEC 17025 as certified by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program. The following certification numbers have been issued in recognition of these accreditations and certifications:

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

NVLAP Lab Code: 200612-0

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:

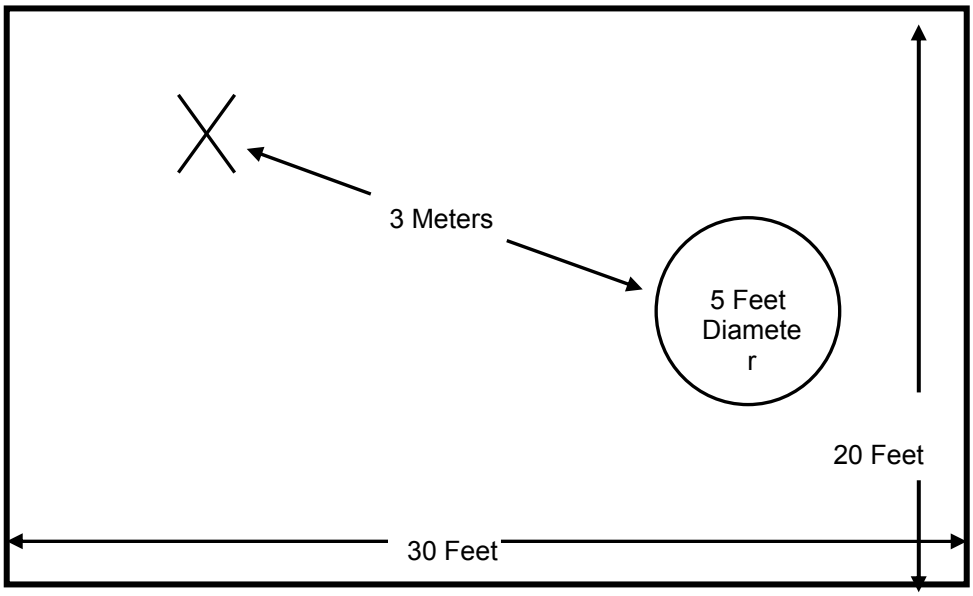

Figure 2.3-1: Semi-Anechoic Chamber Test Site

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:

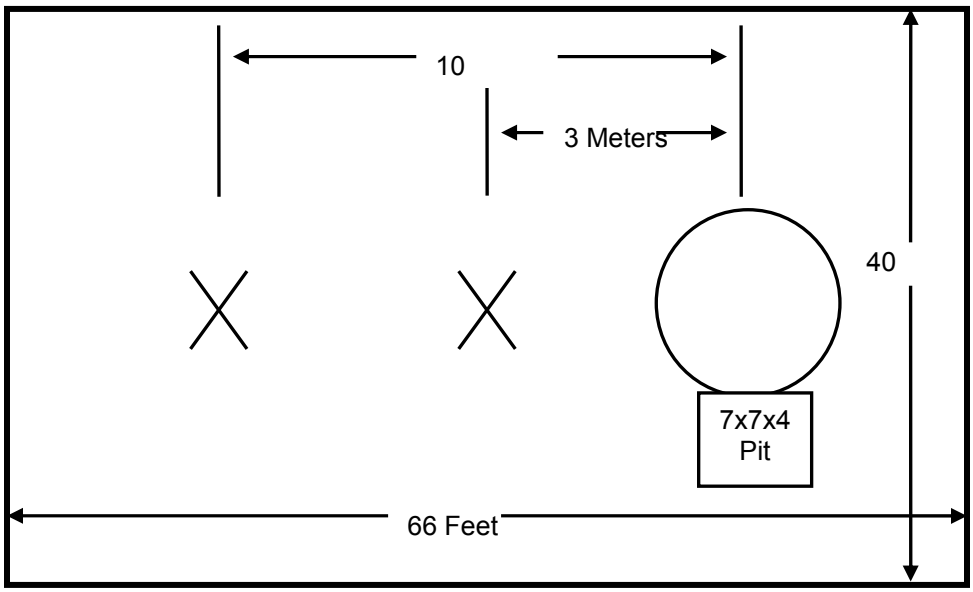

Figure 2.3-2: Open Area Test Site

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:

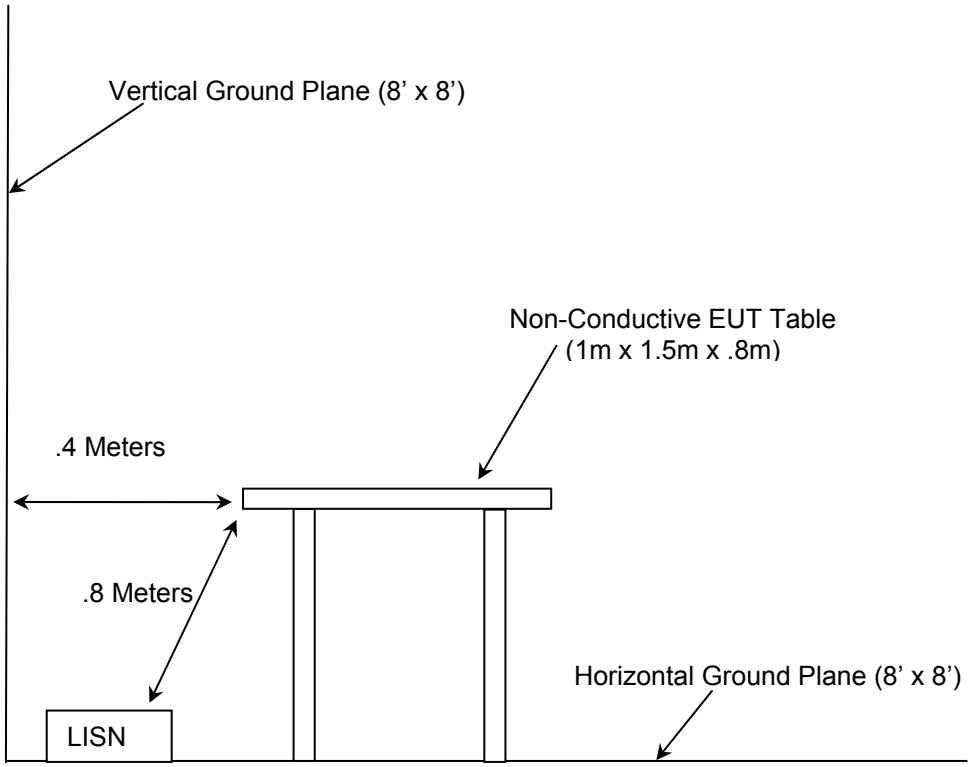

Figure 2.4-1: AC Mains Conducted EMI Site

3.0 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, 2009
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2009
- 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 7 June 2007
- Industry Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, Issue2, June 2007.

4.0 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	09-21-2010
2	Rohde & Schwarz	Spectrum Analyzers	ESMI-Receiver	839587/003	09-21-2010
22	Agilent	Amplifiers	8449B	3008A00526	09-21-2010
25	Chase	Antennas	CBL6111	1043	09-02-2010
30	Spectrum Technologies	Antennas	DRH-0118	970102	05-08-2010
152	EMCO	LISN	Feb-25	9111-1905	03-25-2010
167	ACS	Cable Set	Chamber EMI Cable Set	167	02-06-2010 (See Note1)
168	Hewlett Packard	Attenuators	11947A	44829	02-10-2010 (See Note2)
283	Rohde & Schwarz	Spectrum Analyzers	FSP40	1000033	09-21-2010
291	Florida RF Cables	Cables	SMRE-200W-12.0-SMRE	None	11-24-2009 (See Note1)
292	Florida RF Cables	Cables	SMR-290AW-480.0-SMR	None	11-24-2009 (See Note1)
321	Hewlett Packard	Amplifiers	HPC 8447D	1937A02809	10-06-2010
324	ACS	Cables	Belden	8214	07-15-2010
337	Microwave Circuits	Filters	H1G513G1	31417	07-17-2010 (See Note1)
339	Aeroflex/Weinschel	Attenuators	AS-18	7142	07-02-2010 (See Note2)
422	Florida RF	Cables	SMS-200AW-72.0-SMR	805	02-05-2010 (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.

5.0 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number
1	Electricity meter	Itron Electricity Metering	C2SOD (1S Mono)	60 721 093
2	Electricity meter	Itron Electricity Metering	C2SOD (2S Mono)	61 628 686
3	Electricity meter	Itron Electricity Metering	C2SOD (3S Mono)	61 716 198
4	Electricity meter	Itron Electricity Metering	C2SOD (4S Mono)	61 757 362
5	Electricity meter	Itron Electricity Metering	C2SOD(12S Mono)	61 628 887
6	Electricity meter	Itron Electricity Metering	C2SOD (9S Poly)	61 846 821
7	Electricity meter	Itron Electricity Metering	C2SOD (12S Poly)	61 652 978
8	Electricity meter	Itron Electricity Metering	C2SOD (16S Poly)	61 653 099
9	Electricity meter	Itron Electricity Metering	C2SOD (36S Poly)	61 653 101
10	Transformer	Sagamo Weston	Type T-6A	325827 002

6.0 EQUIPMENT UNDER TEST SETUP AND BLOCK DIAGRAM

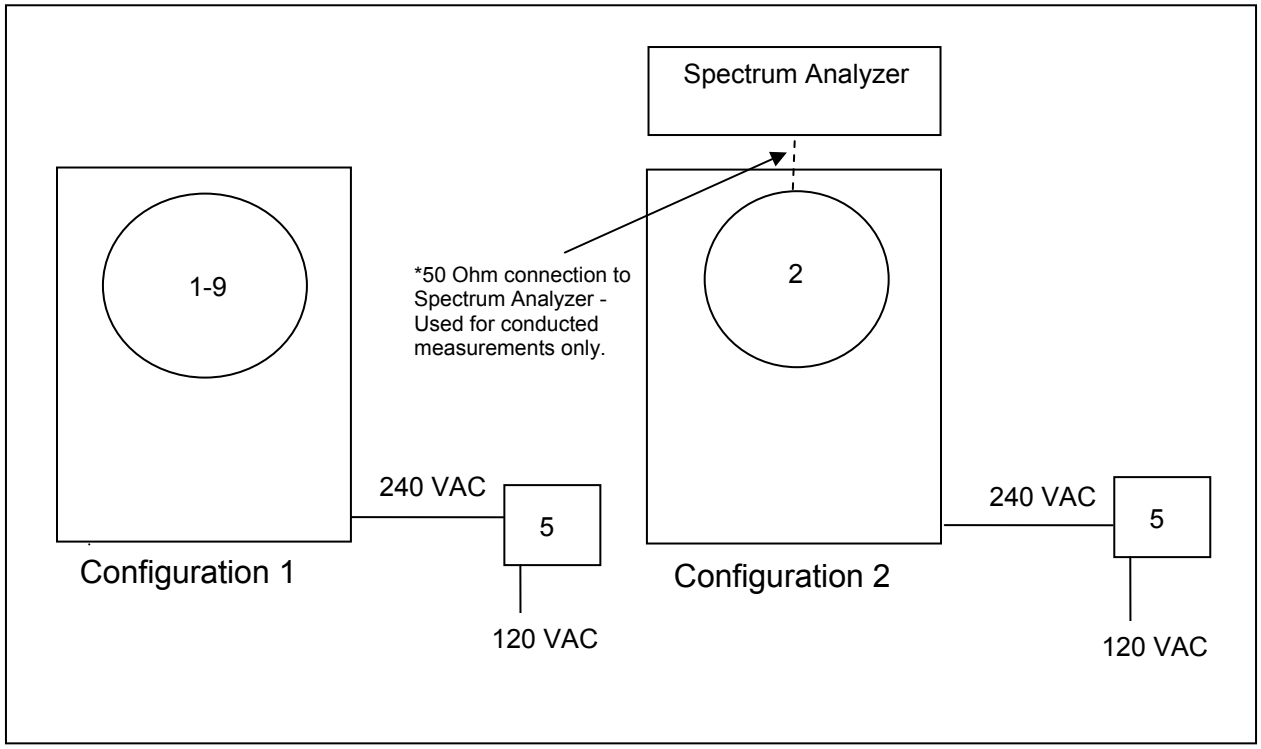

Figure 6-1: EUT Test Setup

Note1: The 2S meter form was utilized to power the AMI4 modules for RF conducted measurements. The AMI4 was integrated into the 1S, 2S, 3S, 4S, 12S Mono and 9S, 12S, 16S, 36S Poly meter forms for showing compliance for radiated emissions. The AMI4 was integrated into the 9S meter form for AC power line conducted emissions.

Note2: 1S, 3S, 12S Mono and 9S, 12S, 16S, 36S Poly meter forms connects directly to 120V AC and did not use a transformer.

7.0 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 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

Table 7.2.2-1: Line 1 Conducted EMI Results

Frequency (MHz)	Detector	Level (dBuV)	Correction Factor (dB)	Limit (dBuV)	Margin (dB)
0.264000	QP	41.60	10.0	61	19.7
0.270000	QP	41.50	10.0	61	19.6
0.402000	QP	38.60	10.1	58	19.2
0.522000	QP	39.30	10.0	56	16.8
0.600000	QP	25.50	10.0	56	30.5
0.786000	QP	34.80	10.1	56	21.2
0.930000	QP	31.80	10.0	56	24.2
1.356000	QP	28.30	10.0	56	27.7
2.268000	QP	26.50	10.0	56	29.5
2.520000	QP	27.00	10.0	56	29.0
0.270000	AV	34.60	10.0	51	16.5
0.330000	AV	23.50	10.0	50	25.9
0.396000	AV	31.20	10.1	48	16.7
0.528000	AV	32.10	10.0	46	13.9
0.672000	AV	19.50	10.0	46	26.5
0.798000	AV	27.60	10.1	46	18.4
0.882000	AV	23.90	10.0	46	22.1
1.296000	AV	24.60	10.0	46	21.4
2.250000	AV	19.10	10.0	46	26.9
2.490000	AV	20.90	10.0	46	25.1

Table 7.2.2-2: Line 2 Conducted EMI Results

Frequency (MHz)	Detector	Level (dBuV)	Correction Factor (dB)	Limit (dBuV)	Margin (dB)
0.270000	QP	44.90	10.0	61	16.2
0.402000	QP	44.00	10.1	58	13.8
0.522000	QP	42.80	10.0	56	13.2
0.654000	QP	41.60	10.0	56	14.4
0.786000	QP	43.40	10.1	56	12.6
0.918000	QP	38.50	10.0	56	17.5
1.152000	QP	37.70	10.0	56	18.3
1.290000	QP	38.60	10.0	56	17.4
1.818000	QP	36.00	10.0	56	20.0
2.394000	QP	35.80	10.0	56	20.2
0.264000	AV	41.00	10.0	51	10.3
0.402000	AV	38.10	10.1	48	9.7
0.540000	AV	37.00	10.0	46	9.0
0.654000	AV	33.80	10.0	46	12.2
0.786000	AV	36.90	10.1	46	9.1
0.930000	AV	32.40	10.0	46	13.7
1.146000	AV	31.70	10.0	46	14.3
1.314000	AV	32.60	10.0	46	13.4
1.812000	AV	30.90	10.0	46	15.1
2.394000	AV	29.30	10.0	46	16.7

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

7.3.1 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.

7.3.2 Measurement Results

Results are shown below in table 7.3.2-1 and the worst case was plotted and shown in figure 7.3.2-1 to 7.3.2-3 below:

Table 7.3.2-1: RF Output Power

Frequency [MHz]	Level [dBm]
909.6	22.53
915.8	24.10
921.8	23.86

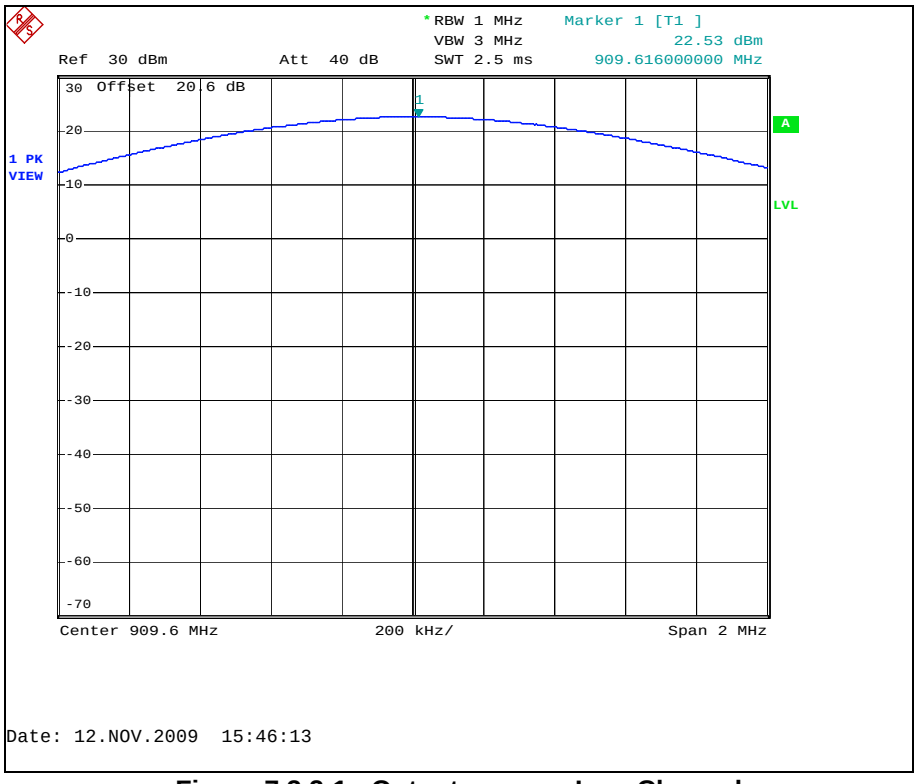

Figure 7.3.2-1: Output power – Low Channel

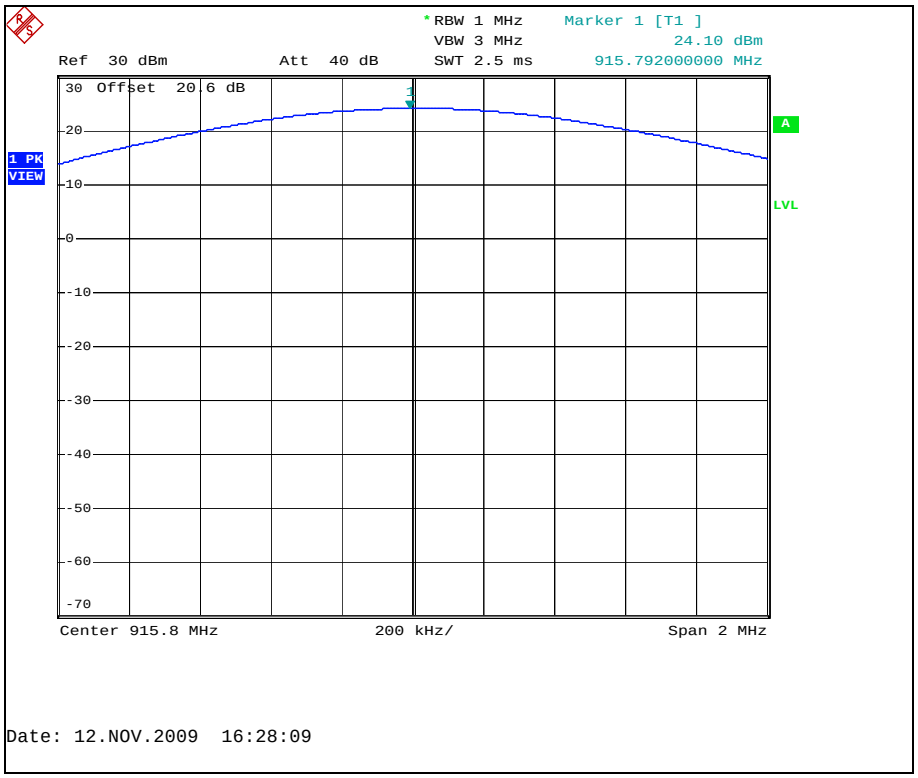

Figure 7.3.2-2: Output power – Mid Channel

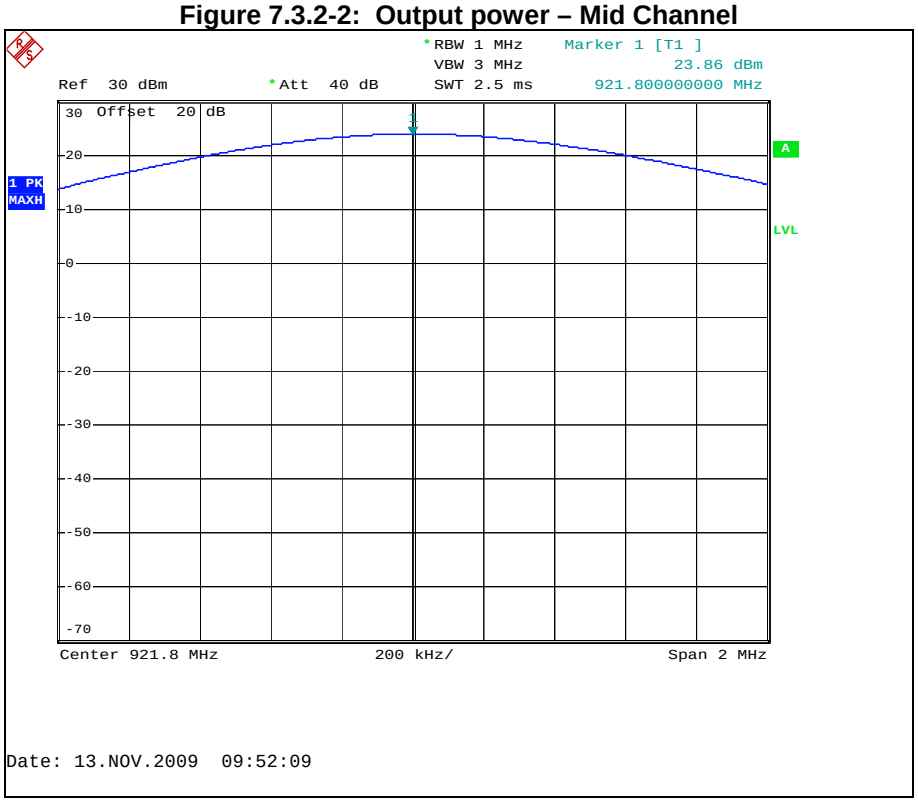

Figure 7.3.2-3: Output power – High Channel

7.4 Channel Usage Requirements

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

7.4.1.1 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.

7.4.1.2 Measurement Results

The adjacent channel separation was measured to be 200kHz. Results are shown below:

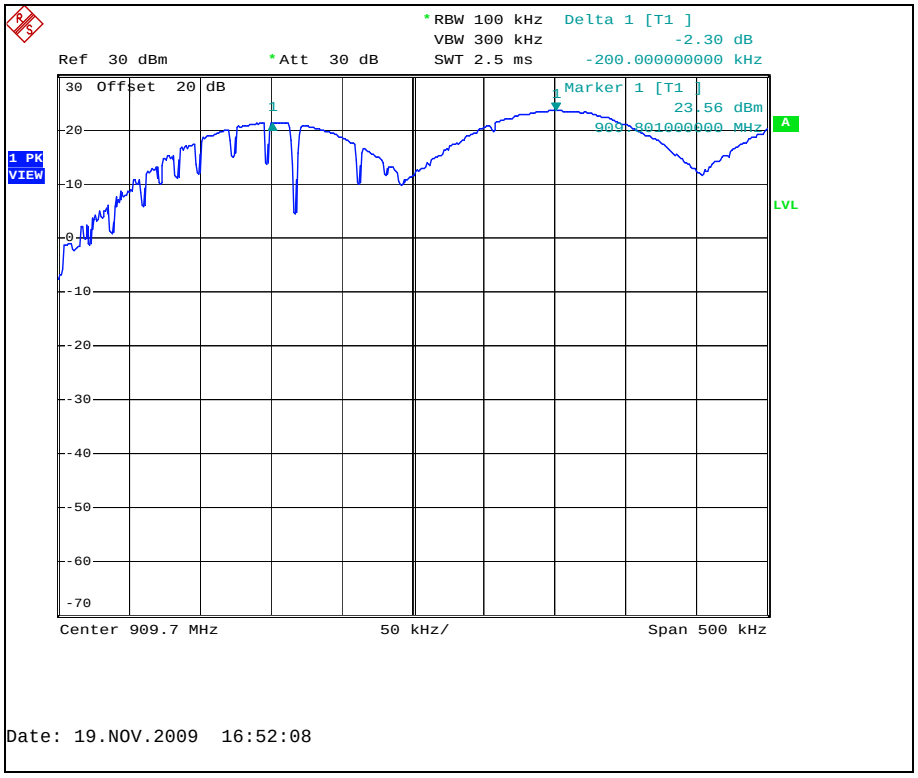

Figure 7.4.1.2-1: Carrier Frequency Separation

7.4.2 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 50 kHz. The device employs 50 hopping channels as required. Results are shown below:

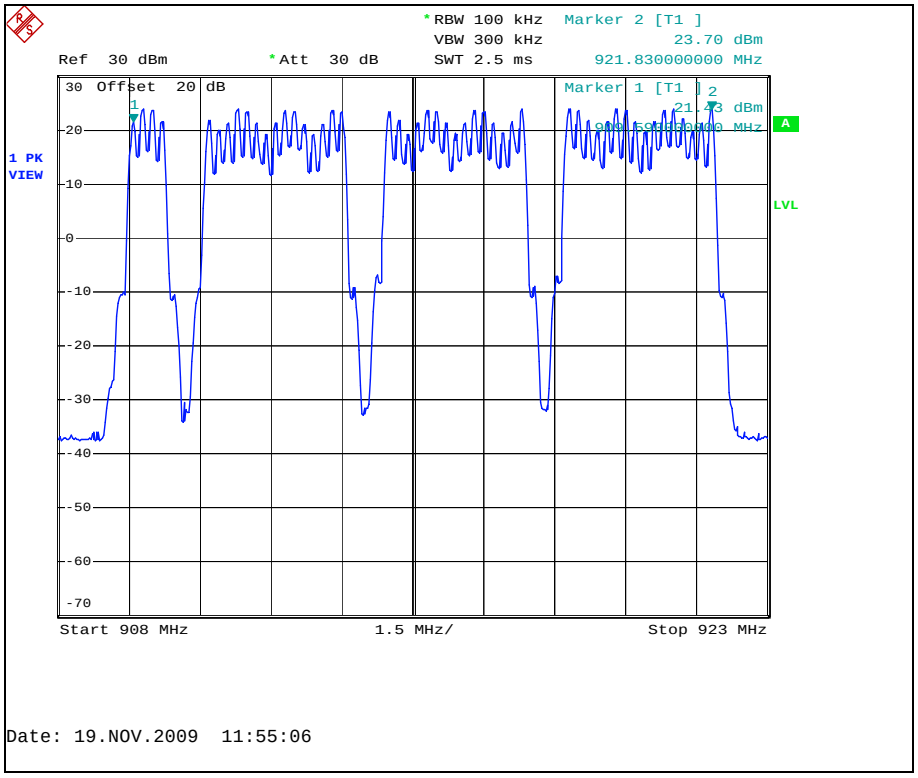

Figure 7.4.2-1: Number of Hopping Channels

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

7.4.3.1 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 set to 20 ms to capture the burst duration of the emission. The marker –delta function of the analyzer was employed to measure the burst duration.

7.4.3.2 Measurement Results

The duration of the RF transmission was measured as 5.84 ms. There is a minimum 7.8 second rest period in which the device hops to another channel according to the pseudorandom frequency table before transmitting another burst. Therefore the average time of occupancy on any channel in a 20 second period is 5.84ms. Dwell time: (12 bytes * 8 bits) / 16378 bits/sec = 5.86 ms (Manchester Encoding). A single transmission is shown in the figure below:

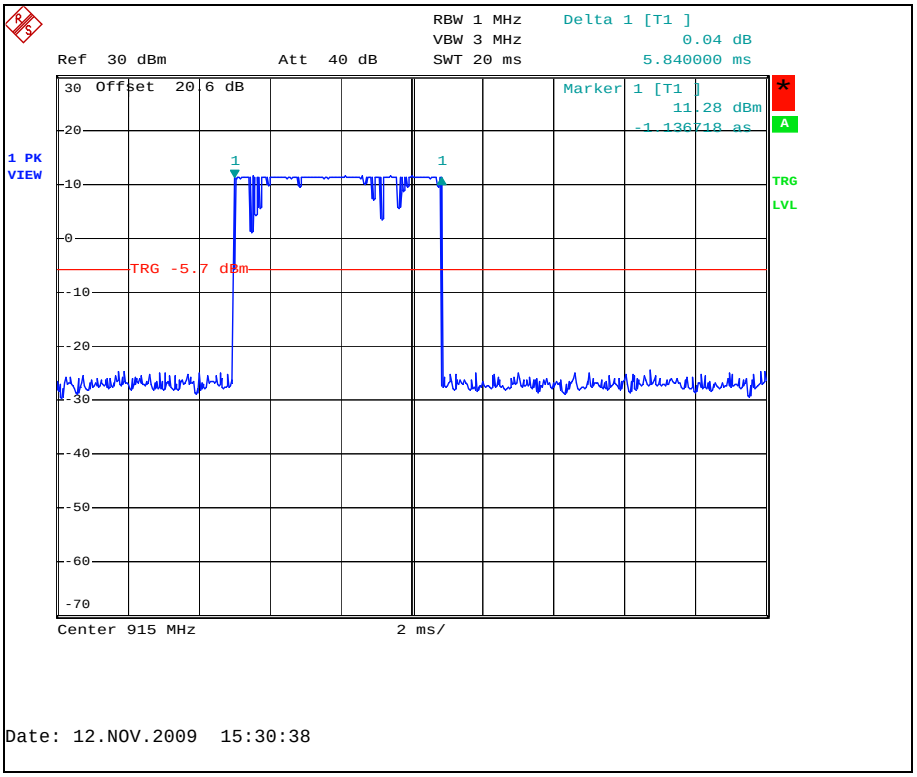

Figure 7.4.3.2-1: Channel Dwell Time

7.4.4 20dB / 99% Bandwidth - FCC: Section 15.247(a)(1)(i) IC: RSS-210 A8.1(c)

7.4.4.1 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 and the occupied bandwidth measurement function of the analyzer used for the 99% bandwidth.

7.4.4.2 Measurement Results

The maximum 20dB bandwidth was found to be approximately 49.8kHz and maximum 99% bandwidth 48.36kHz. Results are shown below in Table 7.4.4.2-1 and Figures 7.4.4.2-1 through 7.4.4.2-6.

Table 7.4.4.2-1: 20dB / 99% Bandwidth

Frequency [MHz]	20dB Bandwidth [kHz]	99% Bandwidth [kHz]
909.6	49.80	48.36
915.8	49.40	48.00
921.8	49.80	48.00

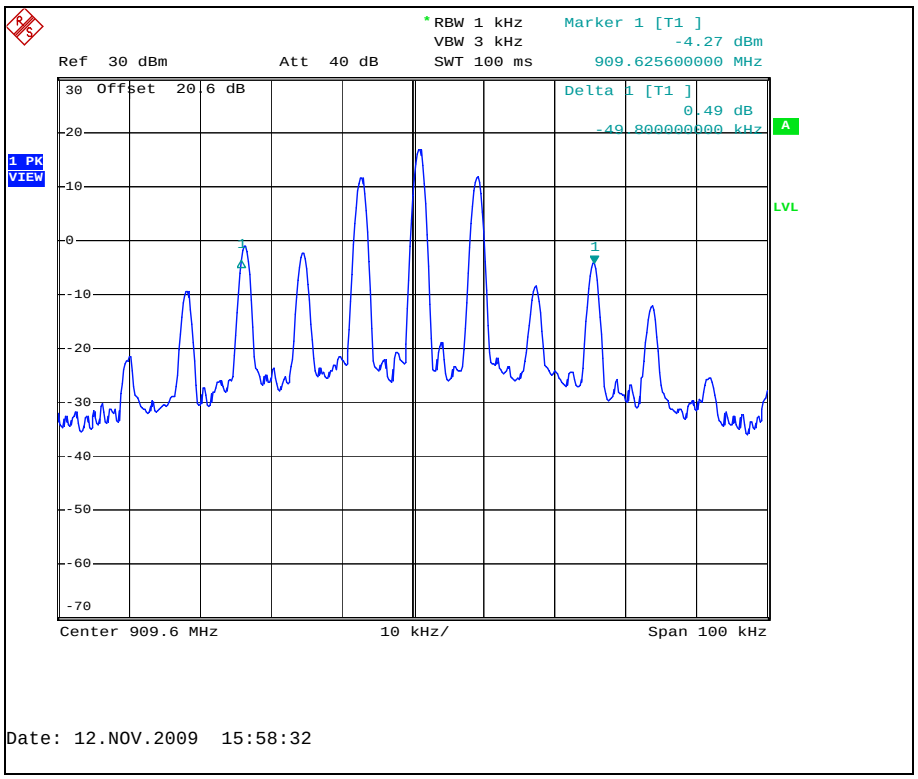

Figure 7.4.4.2-1: 20dB Bandwidth Low Channel

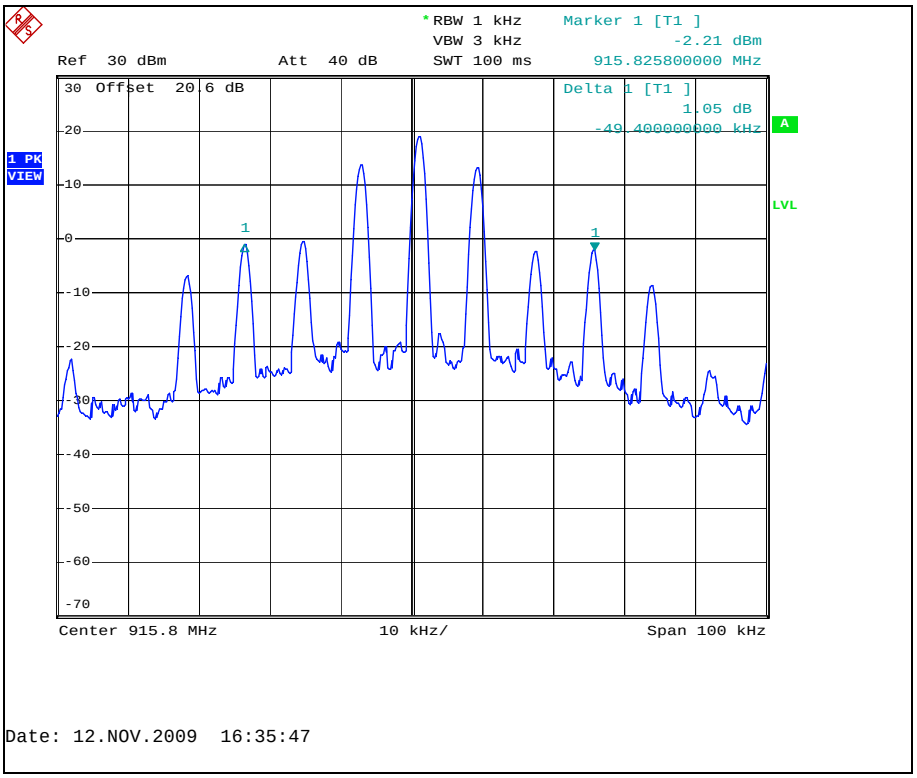

Figure 7.4.4.2-2: 20dB Bandwidth Mid Channel

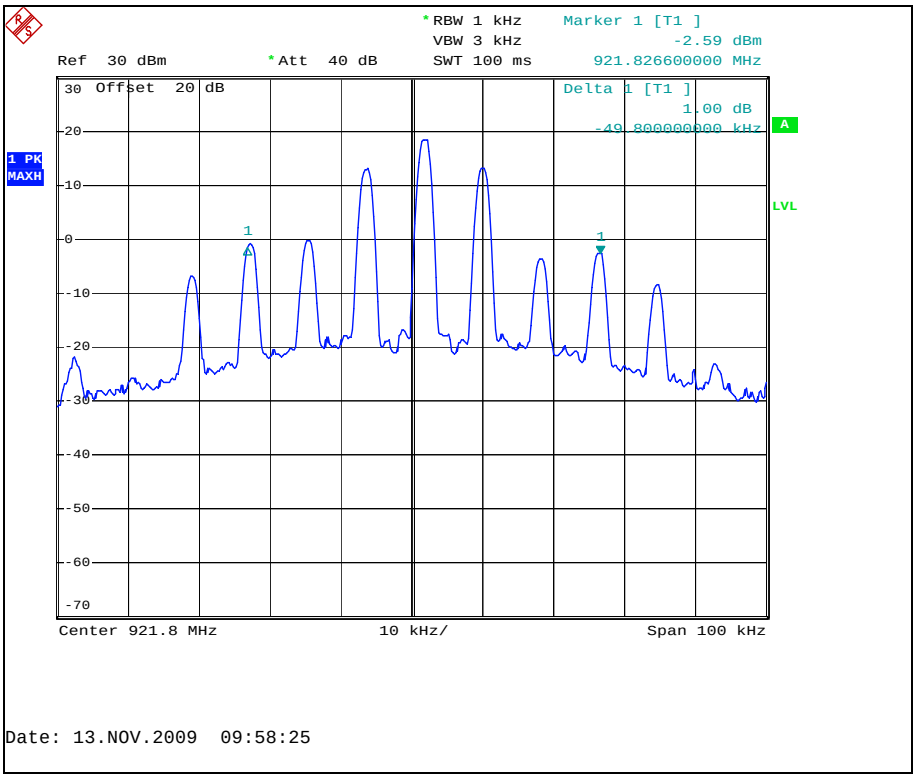

Figure 7.4.4.2-3: 20dB Bandwidth High Channel

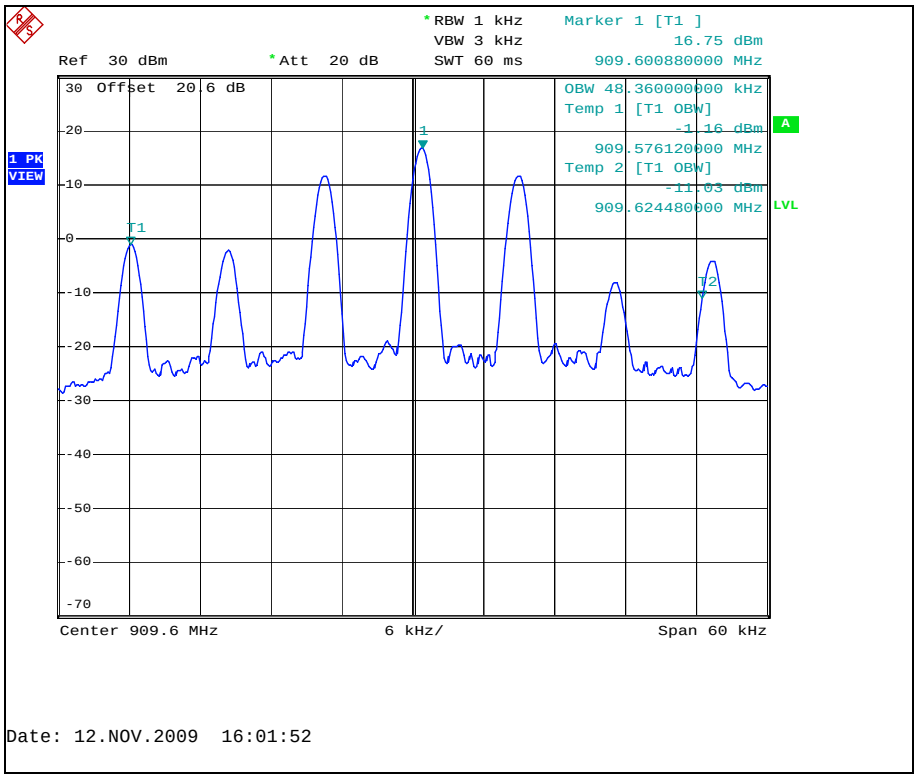

Figure 7.4.4.2-4: 99% Bandwidth Low Channel

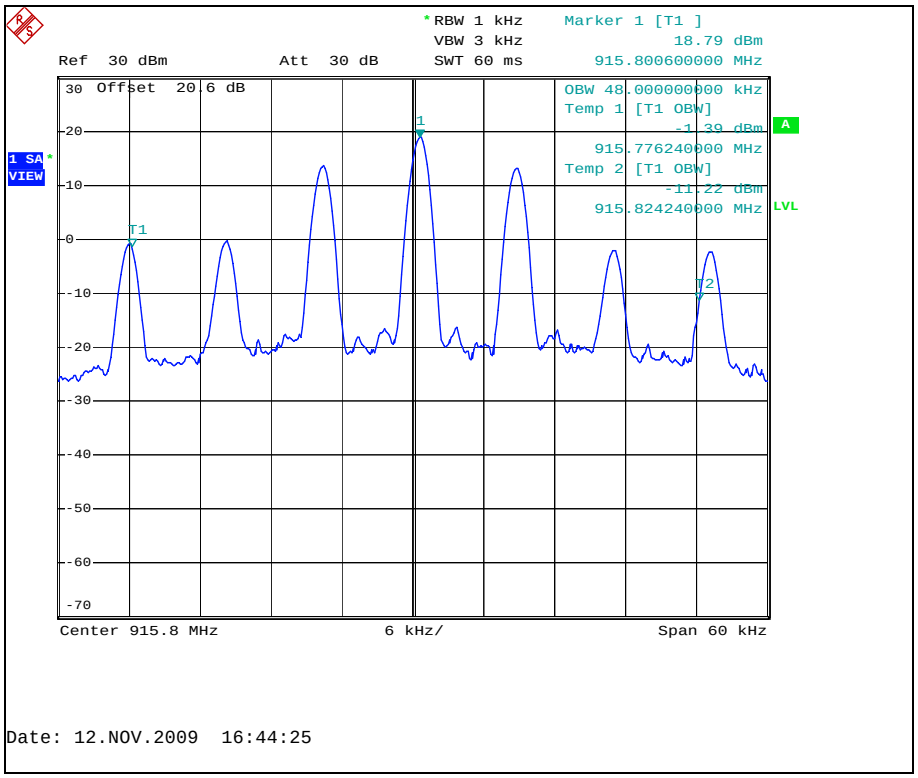

Figure 7.4.4.2-5: 99% Bandwidth Mid Channel

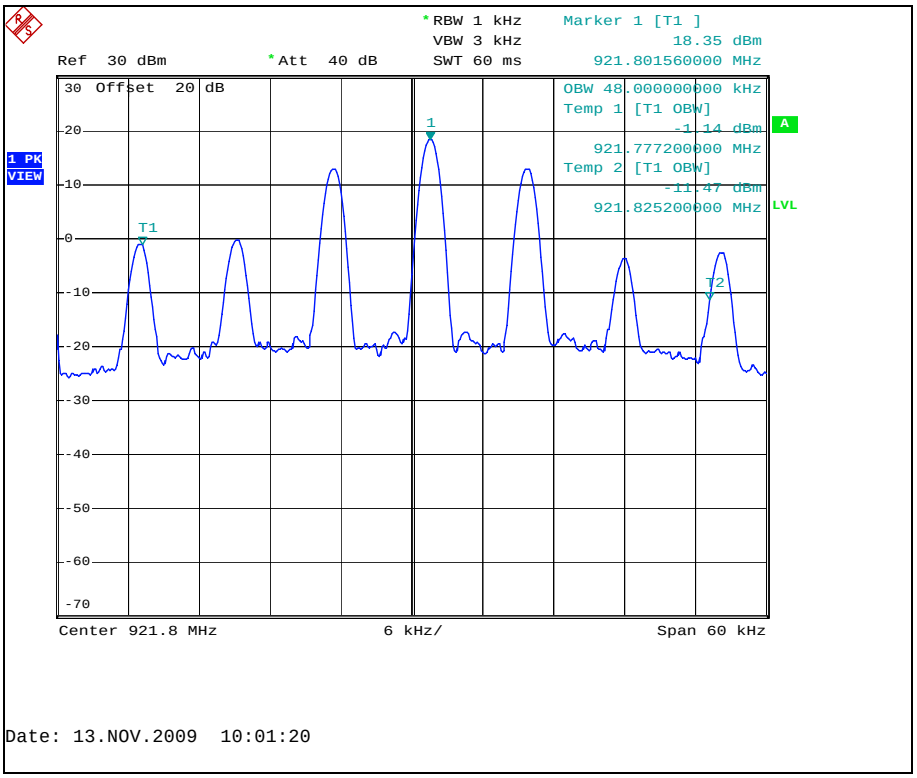

Figure 7.4.4.2-6: 99% Bandwidth High Channel

7.5 Band-Edge Compliance and Spurious Emissions - FCC Section 15.247(d) IC: RSS-210 2.6, A8.5

7.5.1 Band-Edge Compliance of RF Conducted Emissions

7.5.1.1 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 100 kHz, which is ≥ 1% of the span, and the VBW was set to 300kHz.

7.5.1.2 Measurement Results

In a 100 kHz bandwidth at the lower and upper band-edge, the radio frequency power that was produced by the EUT is at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power. Band-edge compliance is displayed in the figures below:

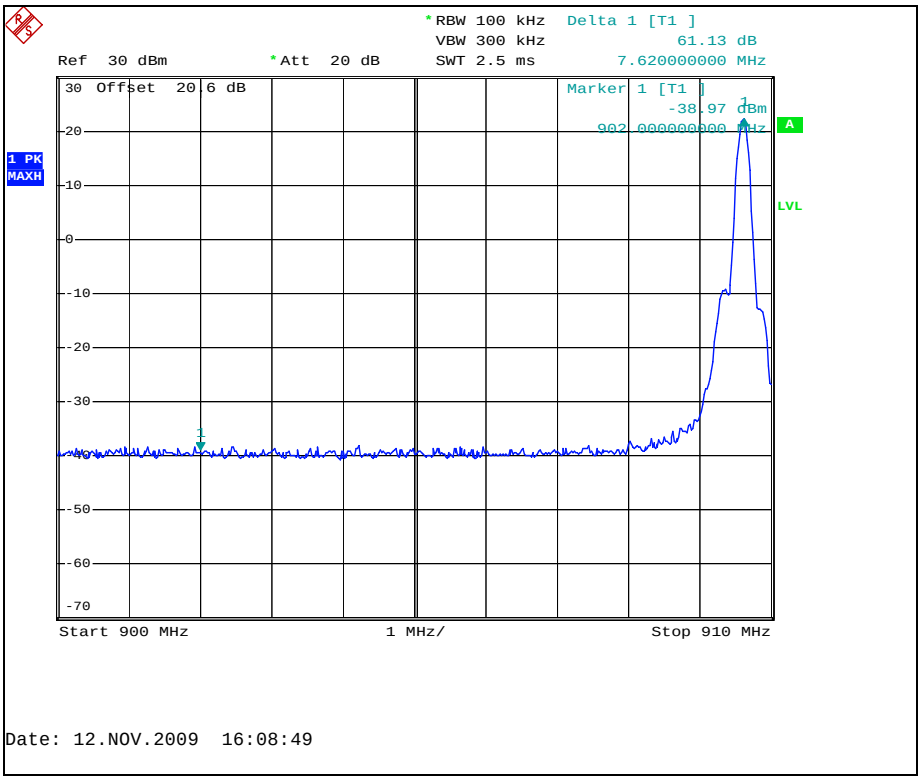

Figure 7.5.1.2-1: Lower Band-edge

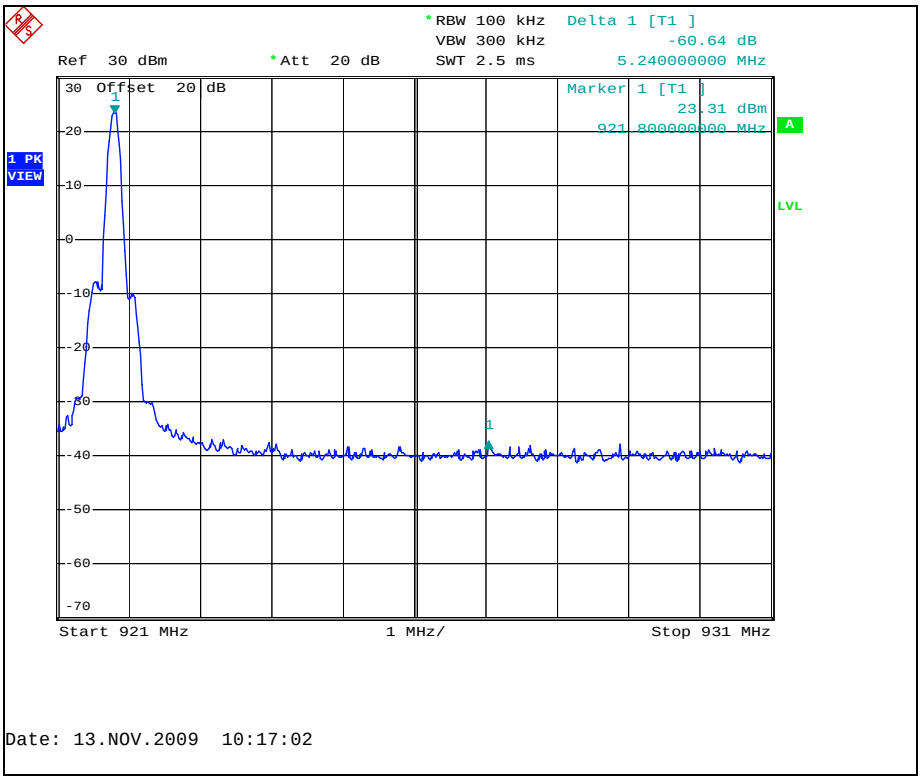

Figure 7.5.1.2-2: Upper Band-edge

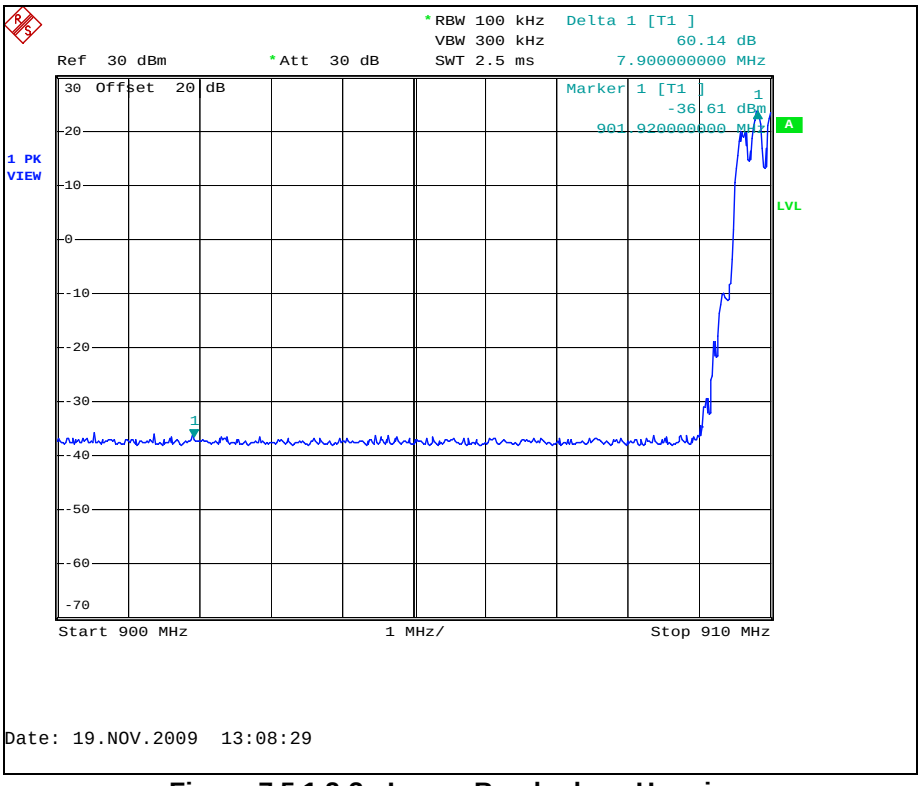

Figure 7.5.1.2-3: Lower Band-edge - Hopping

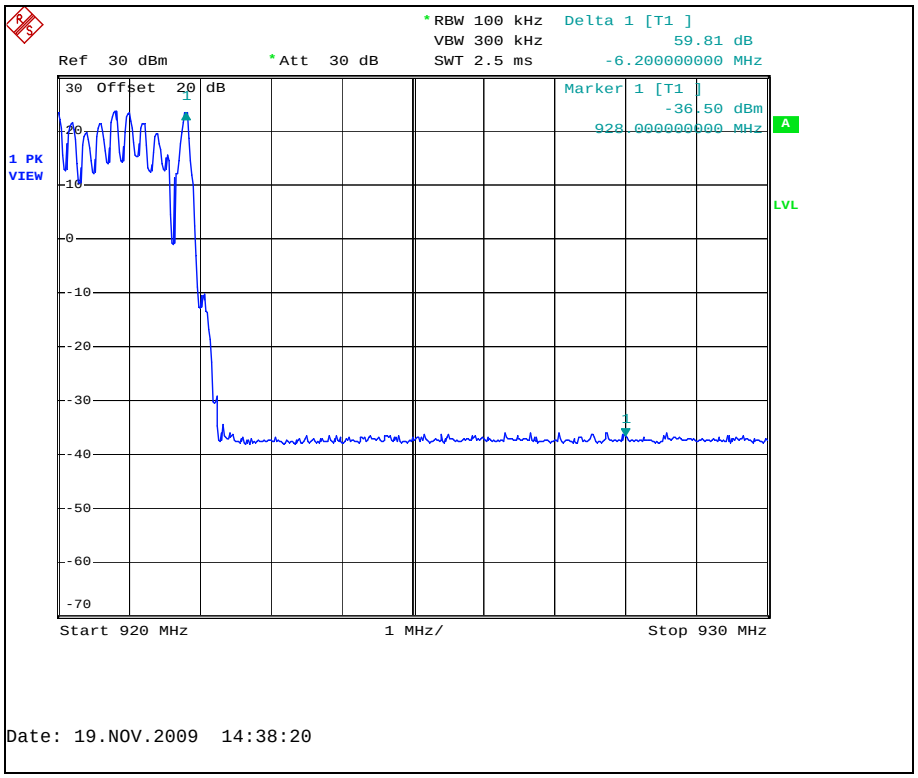

Figure 7.5.1.2-4: Upper Band-edge - Hopping

7.5.2 RF Conducted Spurious Emissions

7.5.2.1 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.

7.5.2.2 Measurement Results

All emission found were greater than 20dB down from the fundamental carrier. The RF conducted spurious emissions were measured in the band of 30MHz to 10GHz. Results are shown below:

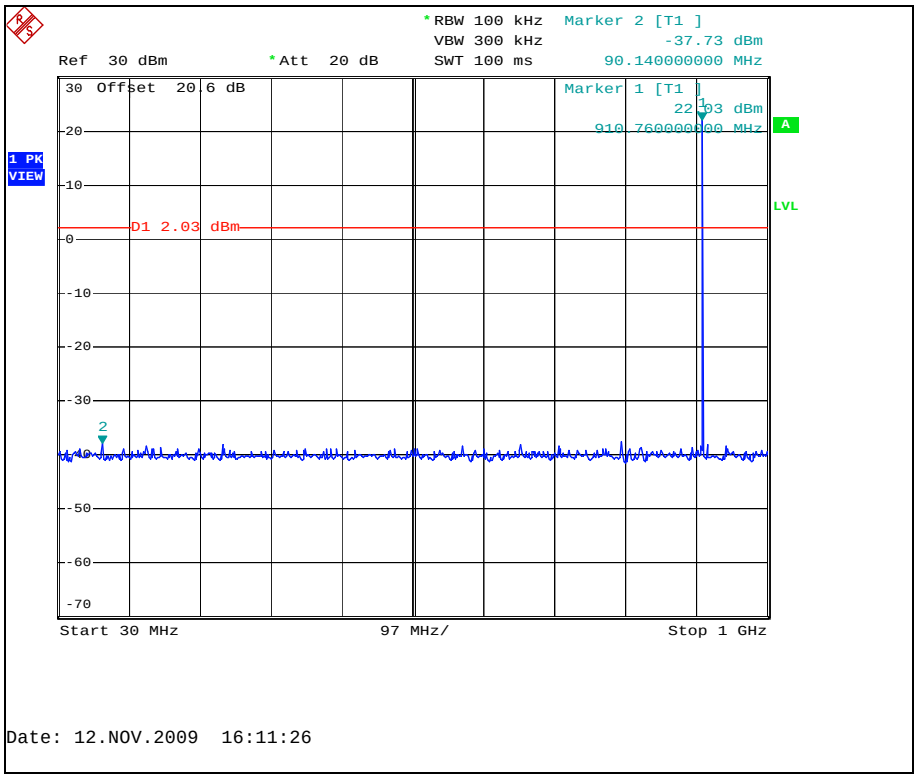

Figure 7.5.2.2-1: 30 MHz – 1 GHz – Low Channel

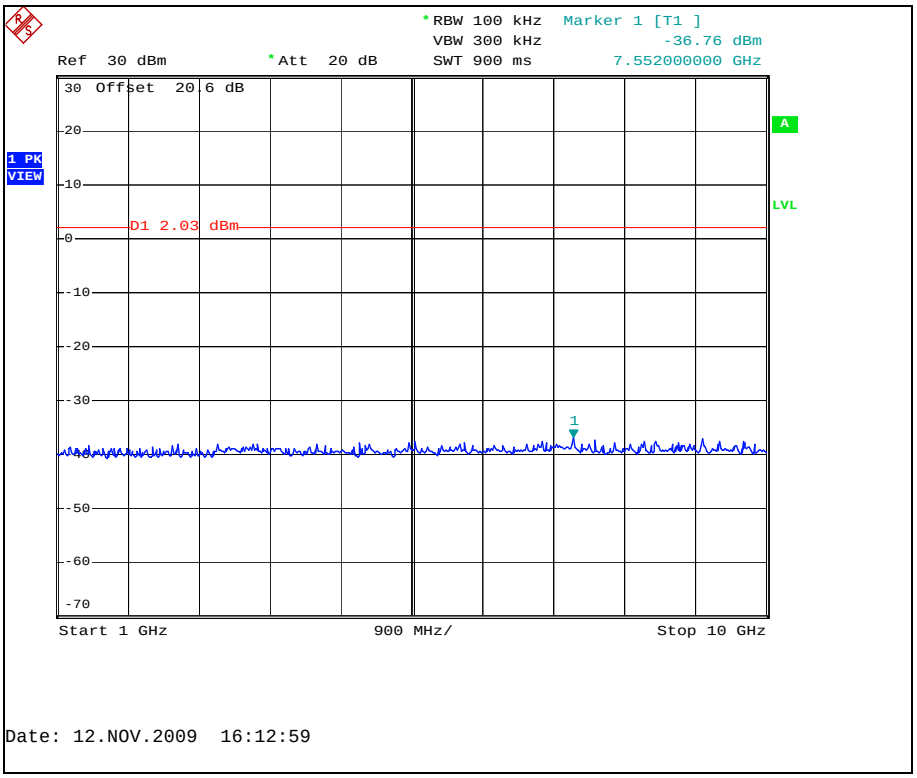

Figure 7.5.2.2-2: 1 GHz – 10 GHz – Low Channel

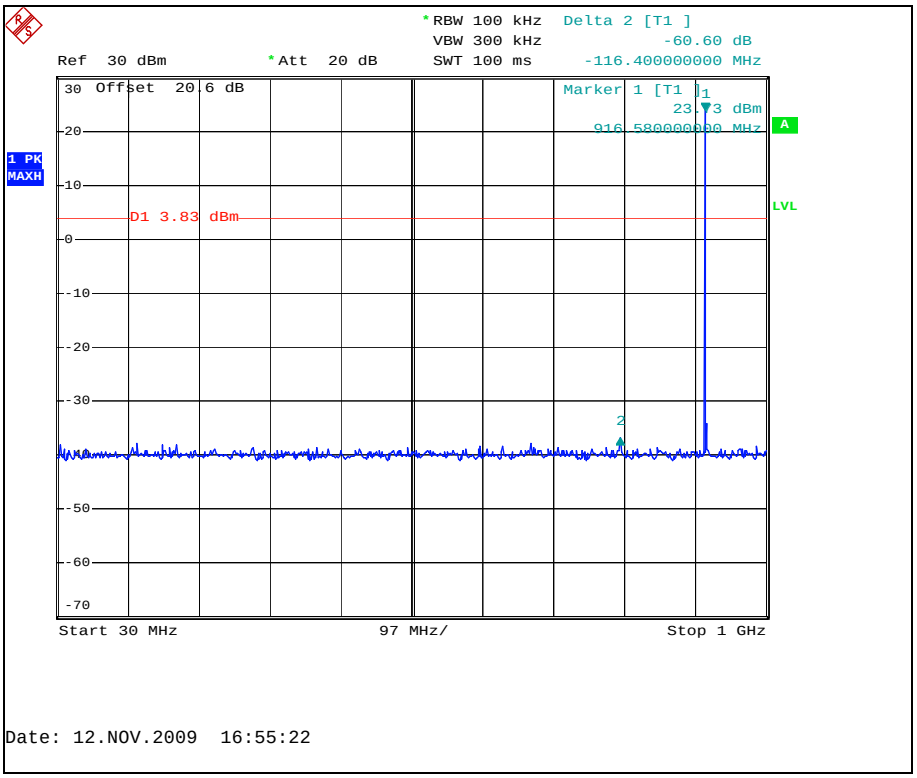

Figure 7.5.2.2-3: 30 MHz – 1 GHz –Mid Channel

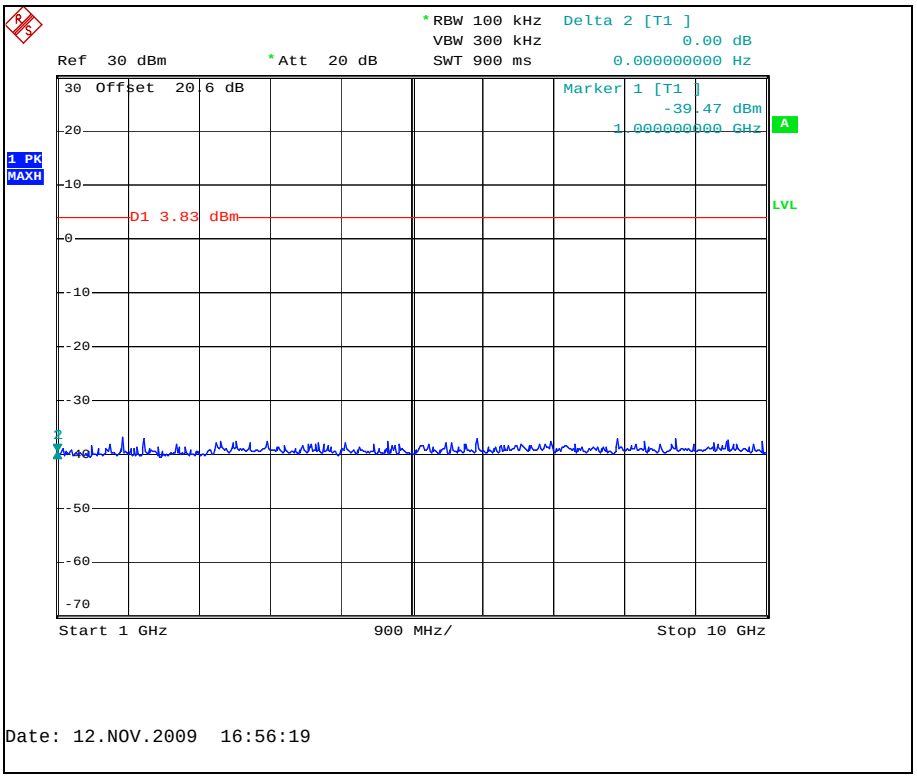

Figure 7.5.2.2-4: 1 GHz – 10 GHz – Mid Channel

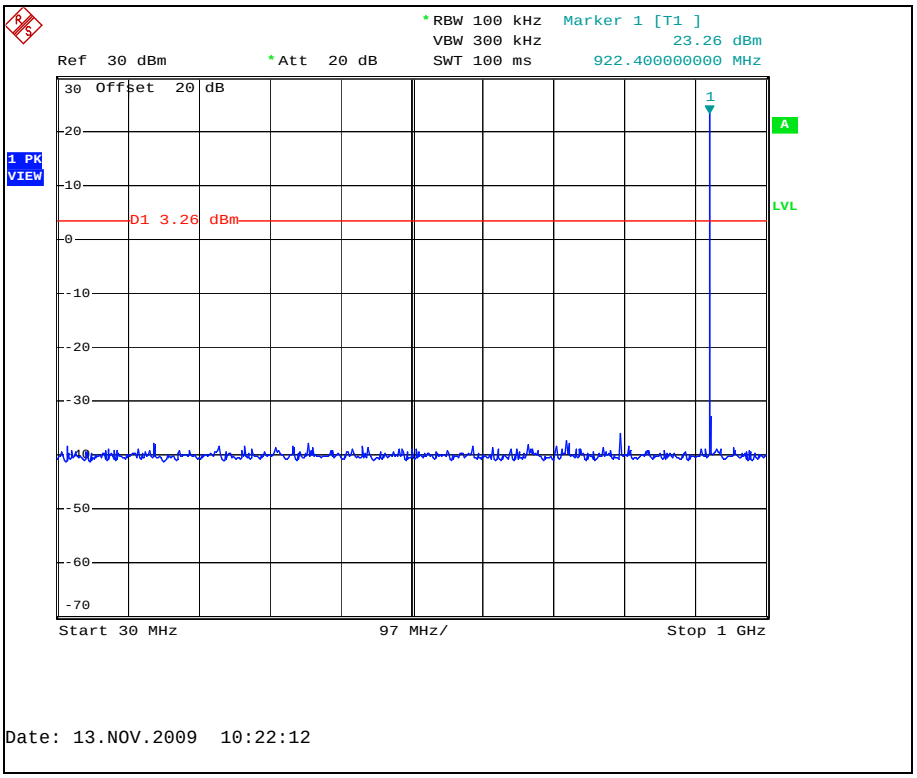

Figure 7.5.2.2-5: 30 MHz – 1 GHz – High Channel

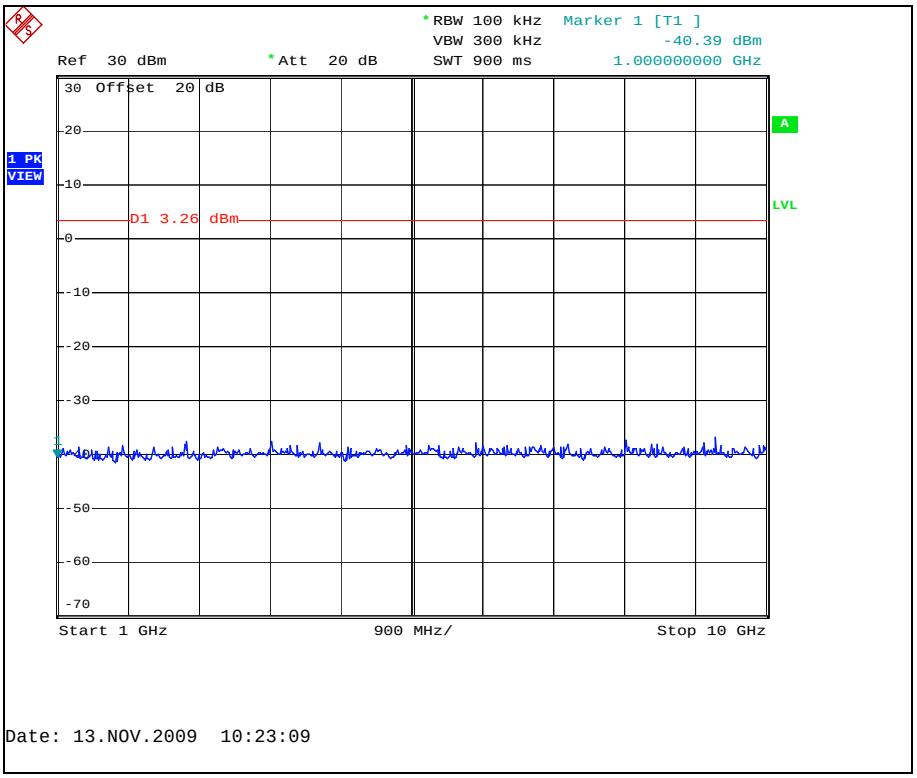

Figure 7.5.2.2-6: 1 GHz – 10 GHz –High Channel

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

7.5.3.1 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 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.

The magnitudes of all emissions not reported were below the noise floor of the measurement system.

7.5.3.2 Measurement Results

Radiated spurious emissions found in the band of 30MHz to 10GHz are reported in the tables below.

Table 7.5.3.2-1: Radiated Spurious Emissions Tabulated Data - 1S Mono (120VAC)

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										
2728.8	42.69	29.37	H	2.65	45.34	32.02	74.0	54.0	28.66	21.98
2728.8	41.67	29.24	V	2.65	44.32	31.89	74.0	54.0	29.68	22.11
Middle Channel										
2747.4	42.64	30.16	H	2.67	45.31	32.83	74.0	54.0	28.69	21.17
2747.4	44.59	30.67	V	2.67	47.26	33.34	74.0	54.0	26.74	20.66
High Channel										
2765.4	45.71	34.40	H	2.70	48.41	37.10	74.0	54.0	25.59	16.90
2765.4	42.92	31.05	V	2.70	45.62	33.75	74.0	54.0	28.38	20.25

* Note: All emissions above 2765.4 MHz were attenuated below the permissible limit.

Table 7.5.3.2-2: Radiated Spurious Emissions Tabulated Data – 2S Mono (240VAC)

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										
2728.8	42.23	29.44	H	2.65	44.88	32.09	74.0	54.0	29.12	21.91
Middle Channel										
	No emissions detected above the noise floor of the measurement system.									
High Channel										
2765.4	44.64	34.22	H	2.70	47.34	36.92	74.0	54.0	26.66	17.08
2765.4	42.51	31.15	V	2.70	45.21	33.85	74.0	54.0	28.79	20.15
4609	50.40	42.14	H	8.23	58.63	50.37	74.0	54.0	15.37	3.63
4609	44.64	34.14	V	8.23	52.87	42.37	74.0	54.0	21.13	11.63

* Note: All emissions above 4609 MHz were attenuated below the permissible limit.

Table 7.5.3.2-3: Radiated Spurious Emissions Tabulated Data – 3S Mono (120VAC)

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										
2728.8	43.50	31.07	H	2.65	46.15	33.72	74.0	54.0	27.85	20.28
Middle Channel										
2747.4	42.61	30.03	H	2.67	45.28	32.70	74.0	54.0	28.72	21.30
High Channel										
2765.4	45.12	35.39	H	2.70	47.82	38.09	74.0	54.0	26.18	15.91
2765.4	42.71	31.38	V	2.70	45.41	34.08	74.0	54.0	28.59	19.92

* Note: All emissions above 2765.4 MHz were attenuated below the permissible limit.

Table 7.5.3.2-4: Radiated Spurious Emissions Tabulated Data – 4S Mono (220VAC)

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										
2728.8	43.77	30.49	H	2.65	46.42	33.14	74.0	54.0	27.58	20.86
Middle Channel										
2747.4	42.61	30.18	H	2.67	45.28	32.85	74.0	54.0	28.72	21.15
High Channel										
2765.4	44.05	33.41	H	2.70	46.75	36.11	74.0	54.0	27.25	17.89

* Note: All emissions above 2765.4 MHz were attenuated below the permissible limit.

Table 7.5.3.2-5: Radiated Spurious Emissions Tabulated Data – 12S Mono (120VAC)

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										
2728.8	47.99	32.34	H	2.65	50.64	34.99	74.0	54.0	23.36	19.01
2728.8	45.70	31.12	V	2.65	48.35	33.77	74.0	54.0	25.65	20.23
3638.4	45.24	31.65	H	5.66	50.90	37.31	74.0	54.0	23.10	16.69
Middle Channel										
2747.4	45.22	31.86	H	2.22	47.44	34.08	74.0	54.0	26.56	19.92
2747.4	44.61	30.64	V	2.22	46.83	32.86	74.0	54.0	27.17	21.14
3663.2	43.50	31.06	H	5.32	48.82	36.38	74.0	54.0	25.18	17.62
High Channel										
2765.4	43.47	30.84	H	2.27	45.74	33.11	74.0	54.0	28.26	20.89

* Note: All emissions above 2765.4 MHz were attenuated below the permissible limit.

Table 7.5.3.2-6: Radiated Spurious Emissions Tabulated Data – 9S Poly (120VAC)

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										
	No emissions detected above the noise floor of the measurement system.									
Middle Channel										
2747.4	42.64	31.15	H	2.67	45.31	33.82	74.0	54.0	28.69	20.18
High Channel										
2765.4	43.42	31.06	H	2.70	46.12	33.76	74.0	54.0	27.88	20.24

* Note: All emissions above 2765.4 MHz were attenuated below the permissible limit.

Table 7.5.3.2-7: Radiated Spurious Emissions Tabulated Data – 12S Poly (120VAC)

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										
2728.8	43.42	29.32	H	2.65	46.07	31.97	74.0	54.0	27.93	22.03
Middle Channel										
2747.4	41.71	31.45	H	2.67	44.38	34.12	74.0	54.0	29.62	19.88
High Channel										
2765.4	41.97	30.66	H	2.70	44.67	33.36	74.0	54.0	29.33	20.64

* Note: All emissions above 2765.4 MHz were attenuated below the permissible limit.

Table 7.5.3.2-8: Radiated Spurious Emissions Tabulated Data – 16S Poly (120VAC)

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										
	No emissions detected above the noise floor of the measurement system.									
Middle Channel										
2747.4	42.79	32.68	H	2.67	45.46	35.35	74.0	54.0	28.54	18.65
2747.4	41.62	30.61	V	2.67	44.29	33.28	74.0	54.0	29.71	20.72
High Channel										
2765.4	43.65	31.84	H	2.70	46.35	34.54	74.0	54.0	27.65	19.46
2765.4	43.27	30.71	V	2.70	45.97	33.41	74.0	54.0	28.03	20.59

* Note: All emissions above 2765.4 MHz were attenuated below the permissible limit.

Table 7.5.3.2-9: Radiated Spurious Emissions Tabulated Data – 36S Poly (120VAC)

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										
2728.8	42.66	31.04	H	2.65	45.31	33.69	74.0	54.0	28.69	20.31
Middle Channel										
2747.4	42.89	31.12	H	2.67	45.56	33.79	74.0	54.0	28.44	20.21
2747.4	42.15	30.18	V	2.67	44.82	32.85	74.0	54.0	29.18	21.15
High Channel										
	No emissions detected above the noise floor of the measurement system.									

* Note: All emissions above 2747.4 MHz were attenuated below the permissible limit.

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: 42.15+ 2.67 = 44.82dBuV/m
Margin: 74dBuV/m – 44.82dBuV/m = 29.18dB

Example Calculation: Average
Corrected Level: 30.18+ 2.67 - 0= 32.85dBuV
Margin: 54dBuV – 32.85dBuV = 21.15dB

8.0 CONCLUSION
In the opinion of ACS, Inc. the AMI4, 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