Excellence in Compliance Testing

Certification Test Report

FCC ID: QHC-060203A
IC: 4393B-060203A

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

ACS Report Number: 13-0256.W06.1A

Manufacturer: Itron
Model: OW31SASL5BE-1

Test Begin Date: October 16, 2013
Test End Date: October 30, 2013

Report Issue Date: November 26, 2013

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.

Reviewed by:
Kirby Munroe
Director, Wireless Certifications
ACS, Inc.

This report contains 22 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 limited modular approval (LMA) certification.

1.2 Product description

The OW31SASL5BE-1 is a module that is integrated in a variety of electricity meter form factors. The OW31SASL5BE-1 includes (1) 900 MHz FHSS radio and an on-board Sierra Wireless CDMA modem SL5011, FCC ID: N7NSL5011 / IC: 2417C-SL5011. The Sierra Wireless CDMA modem SL5011 is modular approved and not covered under the scope of this report.

The OW31SASL5BE-1 is designed to be integrated into 1S, 2S and 12S electric utility meter forms and be collocated and transmit simultaneously with the on-board Sierra Wireless CDMA modem SL5011, FCC ID: N7NSL5011 / IC: 2417C-SL5011 and separate Itron module ITR24 FCC ID: SK9ITR24 / IC: 864G-ITR24.

Technical Details:

Detail	Description
Frequency Range	910.0 - 921.8 MHz
Number of Channels	50
Modulation Format	FSK
Operating Voltage	120 / 240 VAC (Host)
Antenna Type / Gain	Slot Antenna; 0dBi

Manufacturer Information:
Itron Inc.
4400 Old Canton Road
Suite 300
Jackson, MS 39211

EUT Serial Numbers: D3200057J01

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

1.3 Test Methodology and Considerations

The EUT is designed to be integrated into 1S, 2S, 12S electric utility meter host forms and be collocated and transmit simultaneously with an on-board Sierra Wireless CDMA modem SL5011, FCC ID: N7NSL5011 / IC: 2417C-SL5011 and separate Itron module ITR24 FCC ID: SK9ITR24 / IC: 864G-ITR24 . The EUT was tested for radiated emissions in each host and worst case data presented where applicable. Radiated inter-modulation testing was performed for all combinations of simultaneous transmission and found to be in compliance.

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:

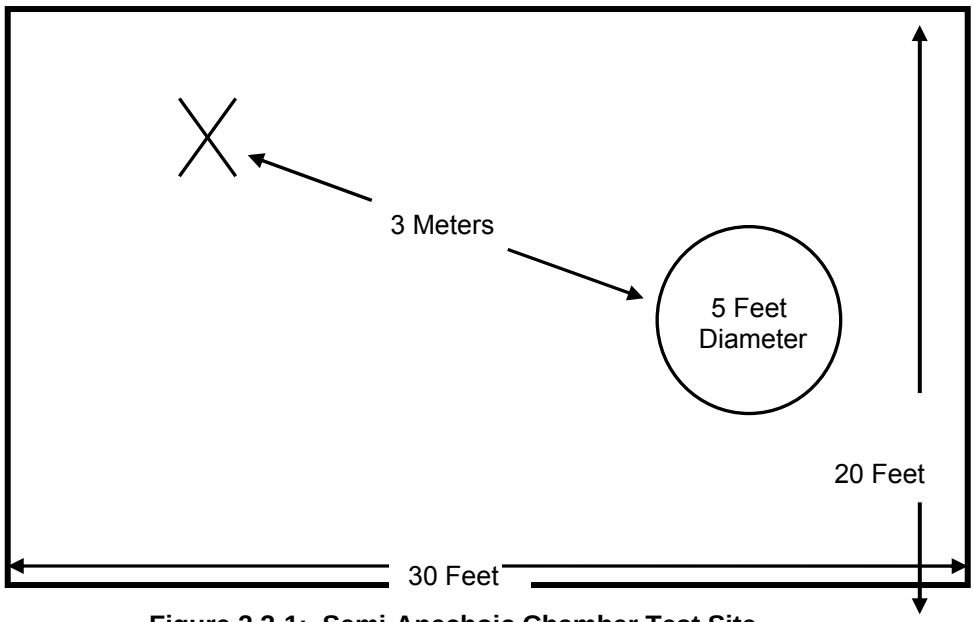

Figure 2.3-1: Semi-Anechoic Chamber Test Site

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:

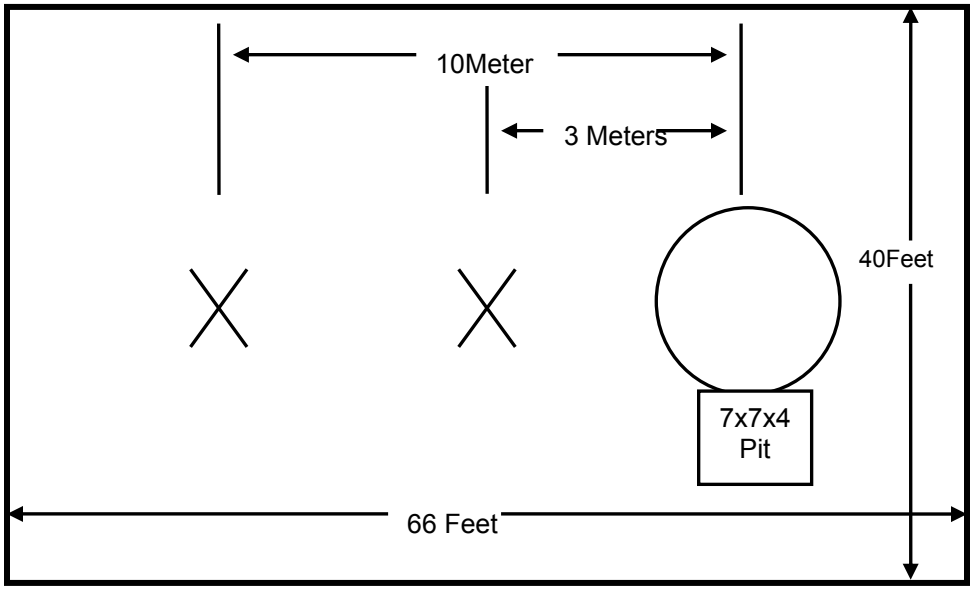

Figure 2.3-2: Open Area Test Site

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 2.4-1:

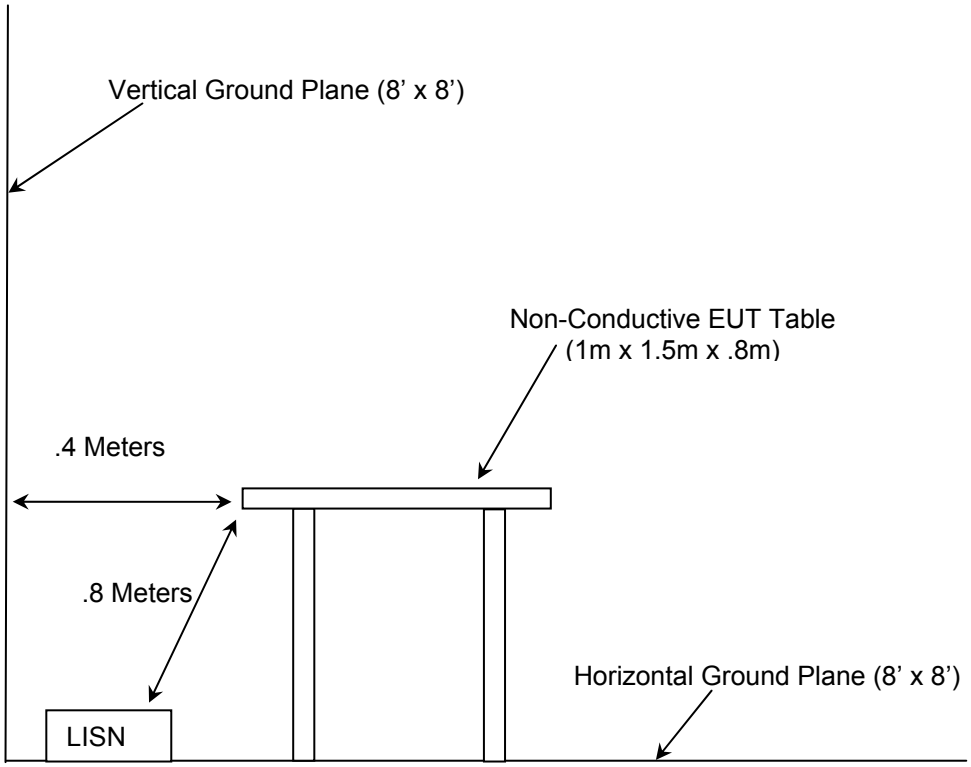

Figure 2.4-1: AC Mains Conducted EMI Site

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
- ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2013
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2013
- FCC Public Notice DA 00-705 – Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems, March 30, 2000
- Industry Canada Radio Standards Specification: RSS-210 – Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 8, December 2010
- Industry Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, Issue 3, December 2010.

4 LIST OF TEST EQUIPMENT

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

Table 4-1: Test Equipment

AssetID	Manufacturer	Model #	Equipment Type	Serial #	Last Calibration Date	Calibration Due Date
1	Rohde & Schwarz	ESMI - Display	Spectrum Analyzers	833771/007	8/2/2012	8/2/2014
2	Rohde & Schwarz	ESMI-Receiver	Spectrum Analyzers	839587/003	8/2/2012	8/2/2014
30	Spectrum Technologies	DRH-0118	Antennas	970102	4/23/2013	4/23/2015
40	EMCO	3104	Antennas	3211	2/14/2013	2/14/2015
73	Agilent	8447D	Amplifiers	2727A05624	7/16/2013	7/16/2014
153	EMCO	3825/2	LISN	9411-2268	7/31/2012	7/31/2014
167	ACS	Chamber EMI Cable Set	Cable Set	167	12/17/2012	12/17/2013
168	Hewlett Packard	11947A	Attenuators	44829	2/1/2013	2/1/2014
267	Agilent	N1911A	Meters	MY45100129	7/30/2013	7/30/2015
268	Agilent	N1921A	Sensors	MY45240184	7/30/2013	7/30/2015
283	Rohde & Schwarz	FSP40	Spectrum Analyzers	1000033	9/18/2013	9/18/2015
292	Florida RF Cables	SMR-290AW-480.0-SMR	Cables	None	3/26/2013	3/26/2014
331	Microwave Circuits	H1G513G1	Filters	31417	6/19/2013	6/19/2014
338	Hewlett Packard	8449B	Amplifiers	3008A01111	7/30/2013	7/30/2015
340	Aeroflex/Weinschel	AS-20	Attenuators	7136	7/30/2013	7/30/2014
412	Electro Metrics	LPA-25	Antennas	1241	7/27/2012	7/27/2014
422	Florida RF	SMS-200AW-72.0-SMR	Cables	805	11/20/2012	11/20/2013
616	Florida RF Cables	SMRE-200W-12.0-SMRE	Cables	N/A	9/26/2013	9/26/2014
RE90	Agilent	E7404A	Analyzers	US40240143	11/28/2012	11/28/2013

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number
1	Form 1S, 2S, 12S Electric Utility Meters	General Electric	1S 2S 12S	1S: N/A (RF Conducted) 1S: 310 290 165 2S: 310 290 187 12S: 310 290 159
2	Isolation Transformer	Hammond Manufacturing	171B	N/A
3	Step-Up Transformer	Federal Pacific	SB16N1.5F	N/A

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

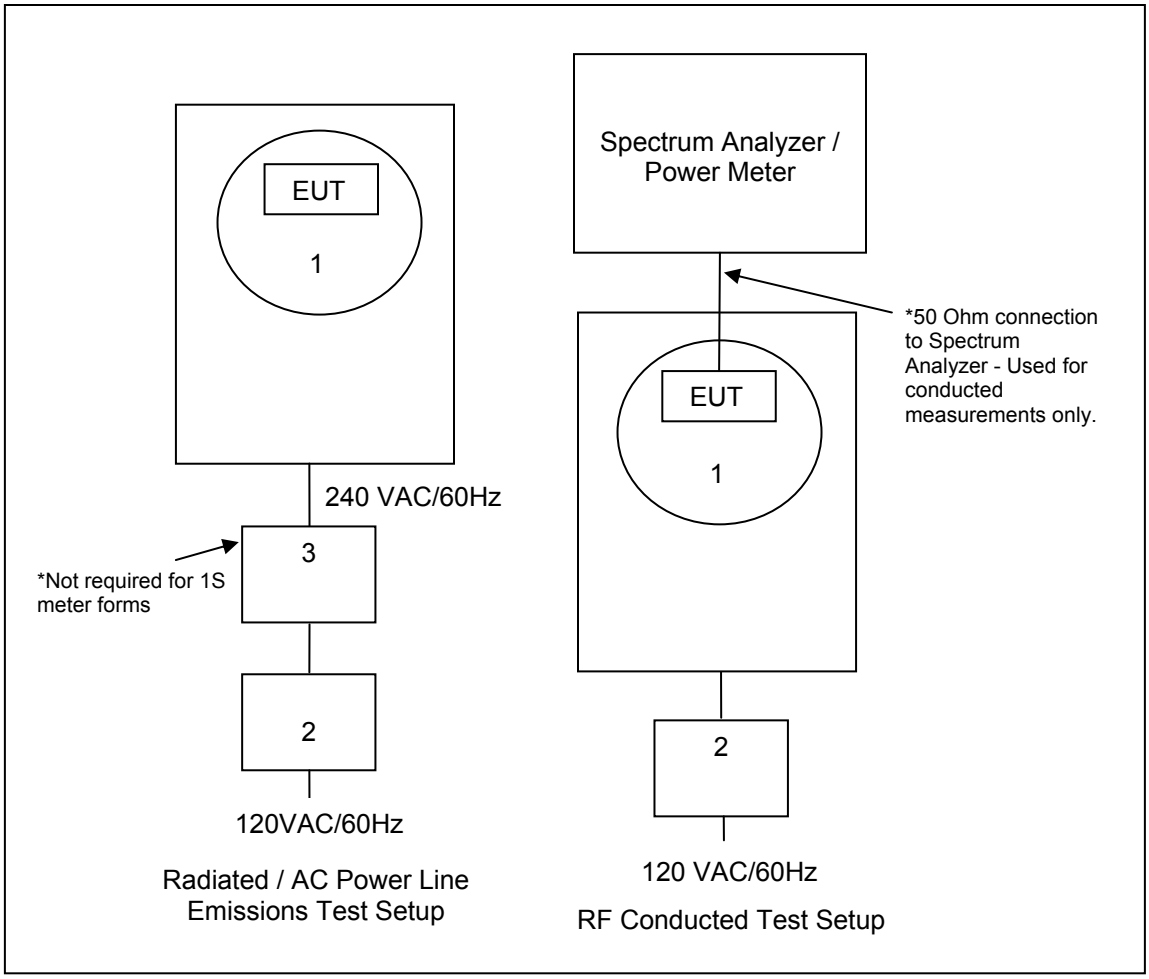

Figure 6-1: Test Setup Block Diagram

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 15.203

The EUT utilizes a 0dBi integral slot antenna terminated at 50ohms into a U.FL RF connector thus satisfying Part 15.203.

7.2 Power Line Conducted Emissions – FCC 15.207; IC RSS-Gen 7.2.4

7.2.1 Measurement Procedure

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 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 Tables 7.2.2-1 - 7.2.2-6.

Table 7.2.2-1: Conducted EMI Results – 1S Meter Line 1 (120Vac/60Hz)

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
1.173	38.47	32.01	9.99	48.46	42.00	56.00	46.00	7.5	4.0
1.052	39.01	31.96	9.99	49.00	41.95	56.00	46.00	7.0	4.1
0.952	38.72	31.29	10.08	48.80	41.37	56.00	46.00	7.2	4.6
0.883	36.96	32.36	9.99	46.95	42.35	56.00	46.00	9.1	3.7
0.487	33.4	28.15	10.01	43.41	38.16	56.22	46.22	12.8	8.1
0.403	36.53	31.45	9.99	46.52	41.44	57.79	47.79	11.3	6.4

Table 7.2.2-2: Conducted EMI Results – 1S Meter Line 2 (120Vac/60Hz)

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
1.174	39.03	32.6	9.99	49.02	42.59	56.00	46.00	7.0	3.4
1.064	39.98	32.2	9.99	49.97	42.19	56.00	46.00	6.0	3.8
0.593	36.77	32.06	9.99	46.76	42.05	56.00	46.00	9.2	4.0
0.486	34.61	29.66	10.01	44.62	39.67	56.24	46.24	11.6	6.6
0.439	35.91	30.25	10.00	45.91	40.25	57.08	47.08	11.2	6.8
0.171	37.22	33.92	10.25	47.47	44.17	64.91	54.91	17.4	10.7

Table 7.2.2-3: Conducted EMI Results – 2S Meter Line 1 (240Vac/60Hz)

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
1.245	39.72	29.43	9.99	49.71	39.42	56.00	46.00	6.3	6.6
1.17	40.98	30.13	9.99	50.97	40.12	56.00	46.00	5.0	5.9
1.114	41.11	30.77	9.99	51.10	40.76	56.00	46.00	4.9	5.2
1.04	41.76	31.03	9.99	51.75	41.02	56.00	46.00	4.3	5.0
0.983	40.76	30.54	10.07	50.83	40.61	56.00	46.00	5.2	5.4
0.197	41.99	38.19	10.23	52.22	48.42	63.74	53.74	11.5	5.3

Table 7.2.2-4: Conducted EMI Results – 2S Meter Line 2 (240Vac/60Hz)

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
1.235	39.27	28.72	9.99	49.26	38.71	56.00	46.00	6.7	7.3
1.143	41.34	30.52	9.99	51.33	40.51	56.00	46.00	4.7	5.5
1.077	41.73	30.59	9.99	51.72	40.58	56.00	46.00	4.3	5.4
1.009	41.02	31.54	9.99	51.01	41.53	56.00	46.00	5.0	4.5
0.942	41.29	30.59	10.08	51.37	40.67	56.00	46.00	4.6	5.3
0.877	40	30.78	9.99	49.99	40.77	56.00	46.00	6.0	5.2

Table 7.2.2-5: Conducted EMI Results – 12S Meter Line 1 (120Vac/60Hz)

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
29.9215	23.03	18.384	11.343	34.373	29.728	60	50	25.627	20.272
0.602181	29.088	24.584	9.993	39.081	34.577	56	46	16.919	11.423
0.484449	13.327	7.441	9.989	23.316	17.43	56.444	46.444	33.128	29.014
0.406813	26.69	20.923	9.989	36.679	30.912	58.662	48.662	21.984	17.751
0.261919	30.857	24.753	10.036	40.892	34.789	62.802	52.802	21.91	18.013
0.199113	32.797	29.952	10.11	42.907	40.062	64.597	54.597	21.69	14.535

Table 7.2.2-6: Conducted EMI Results – 12S Meter Line 2 (120Vac/60Hz)

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.933649	24.166	15.541	10.053	34.219	25.595	56	46	21.781	20.405
0.599993	29.871	25.314	9.991	39.862	35.305	56	46	16.138	10.695
0.545113	27.52	18.86	9.99	37.51	28.85	56	46	18.49	17.15
0.481849	15.328	9.288	9.989	25.317	19.277	56.519	46.519	31.202	27.241
0.261437	30.416	23.932	10.036	40.452	33.968	62.816	52.816	22.364	18.848
0.201575	33.677	31.579	10.107	43.784	41.686	64.526	54.526	20.743	12.84

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

7.3.1 Measurement Procedure (Conducted Method)

The RF output port of the EUT was directly connected to the input of a power meter. 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 below:

Table 7.3.2-1: RF Output Power

Frequency [MHz]	Level [dBm]
910	10.25
917	9.74
921.8	9.27

7.4 Channel Usage Requirements

7.4.1 Carrier Frequency Separation – FCC 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.

Carrier frequency separation was measured for all modes of operation and data presented in section 7.4.1.2 below.

7.4.1.2 Measurement Results

Results are shown below in Figure 7.4.1.2-1.

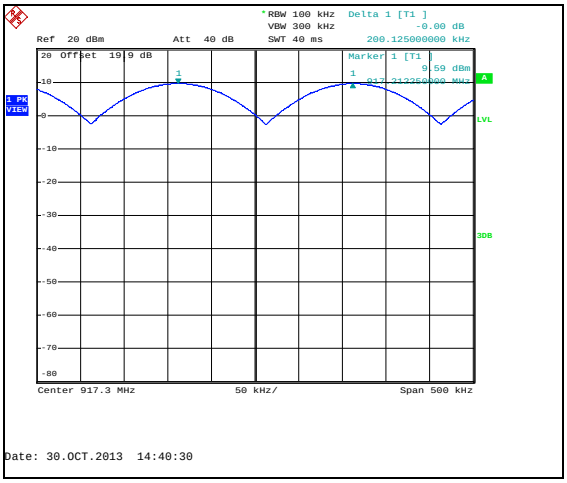

Figure 7.4.1.2-1: Carrier Frequency Separation

7.4.2 Number of Hopping Channels – FCC 15.247(a)(1)(i); IC RSS-210 A8.1(c)

7.4.2.1 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 the frequency band of operation. The RBW was set to ≥ 1% of the span and VBW set to ≥ RBW.

The number of hopping channels was measured for the modes of operation identified in section 1.2 and data presented in section 7.4.2.2 below.

7.4.2.2 Measurement Results

Results are shown below in Figures 7.4.2.2-1 to 7.4.2.2-3.

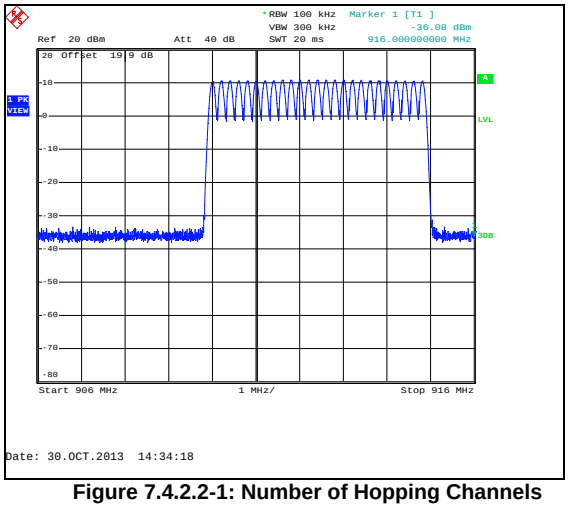

Figure 7.4.2.2-1: Number of Hopping Channels

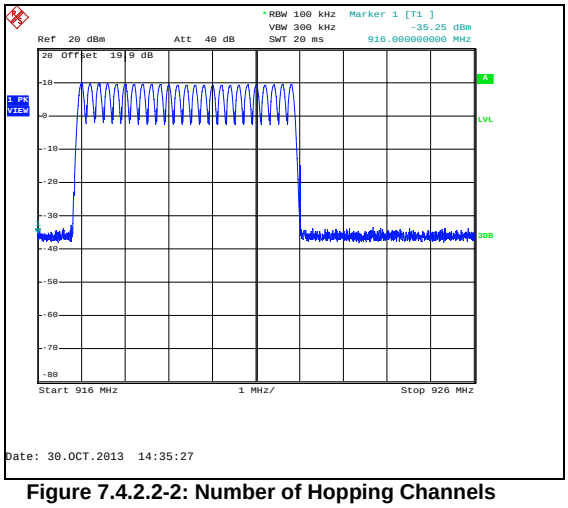

Figure 7.4.2.2-2: Number of Hopping Channels

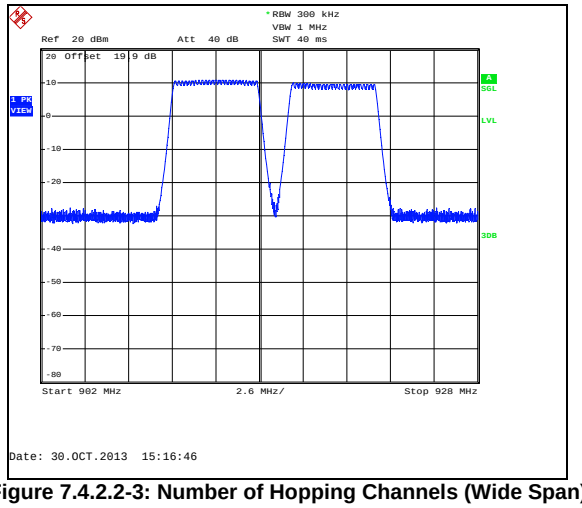

Figure 7.4.2.2-3: Number of Hopping Channels (Wide Span)

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

7.4.3.1 Measurement Procedure

The span was set to 0 Hz, centered on a hopping channel. The RBW was set to 1 MHz and the VBW to 3MHz. Sweep time was set such 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

A single transmission is shown in Table 7.4.3.2-1 and Figure 7.4.3.2-1 below.

Table 7.4.3.2-1: Channel Dwell Time

Single Occurrence (ms)	Number of Occurrences / 20s	Total Dwell Time (ms)
57.21	1	57.21

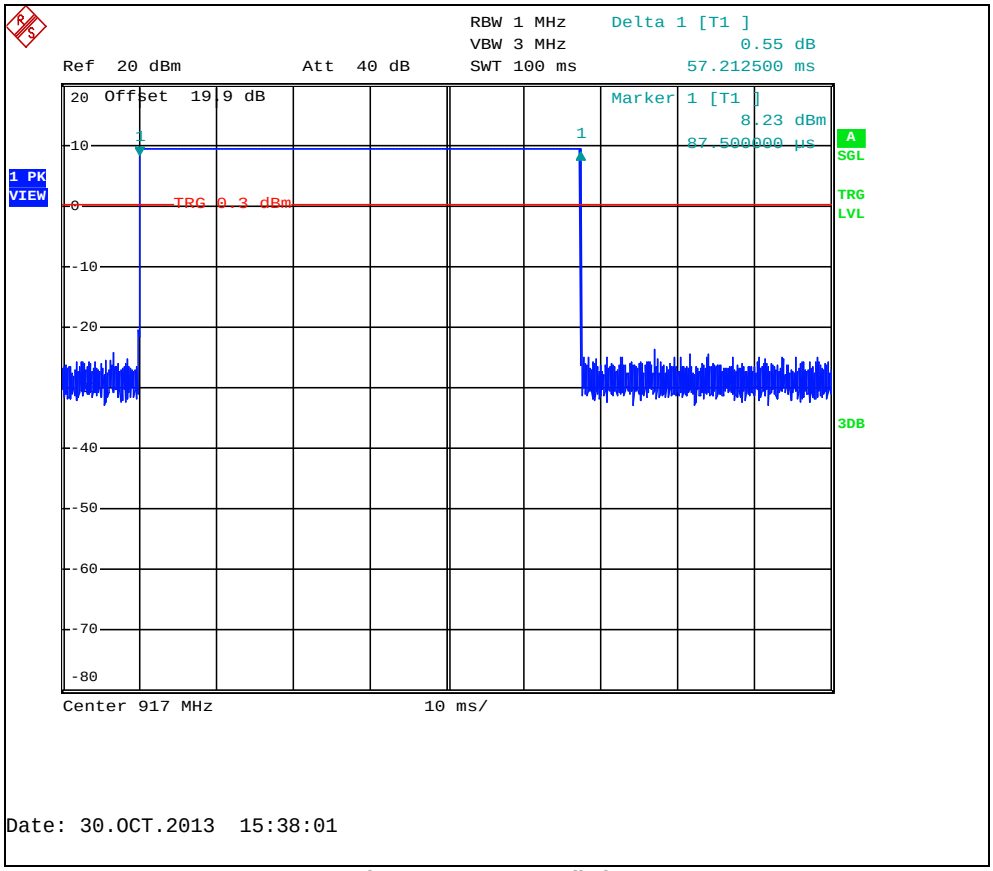

Figure 7.4.3.2-1: Dwell Time

Detailed description of timing provided in theory of operation.

7.4.4 20dB / 99% Bandwidth - FCC 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 span of the spectrum analyzer display was set between two times and five times the occupied bandwidth (OBW) of the emission. The RBW of the spectrum analyzer was set to approximately 1 % to 5 % of the OBW. 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 occupied bandwidth measurement function of the analyzer was used for the 99% bandwidth. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth was set to 3 times the resolution bandwidth. A sampling detector was used.

7.4.4.2 Measurement Results

Results are shown below in Table 7.4.4.2-1 and Figures 7.4.4.2-1 to 7.4.4.2-6.

Table 7.4.4.2-1: 20dB / 99% Bandwidth

Frequency [MHz]	20dB Bandwidth [kHz]	99% Bandwidth [kHz]
910	138.71	138.00
917	138.52	138.30
921.8	138.52	138.15

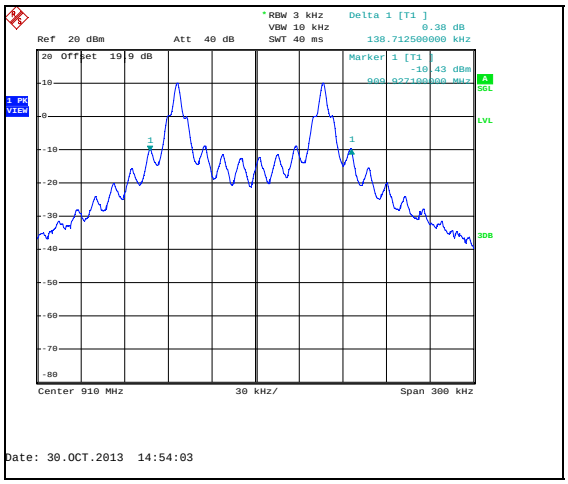

Figure 7.4.4.2-1: 20dB BW Low Channel

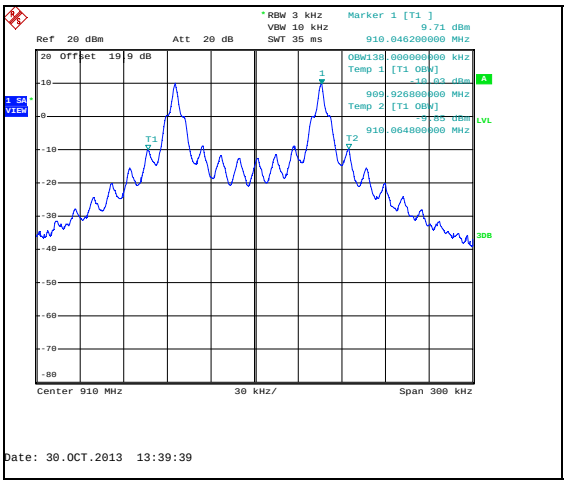

Figure 7.4.4.2-2: 99% OBW Low Channel

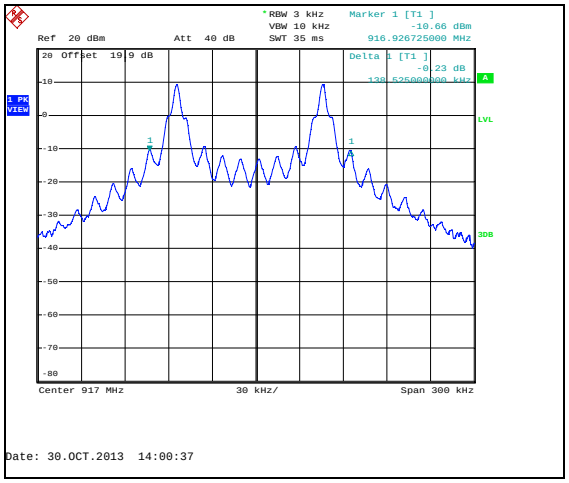

Figure 7.4.4.2-3: 20dB BW Mid Channel

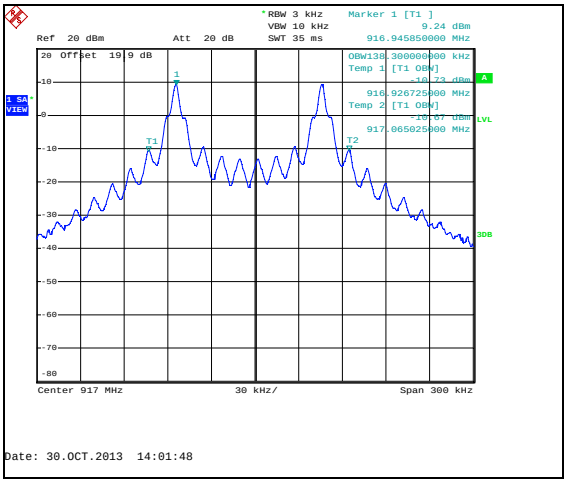

Figure 7.4.4.2-4: 99% OBW Mid Channel

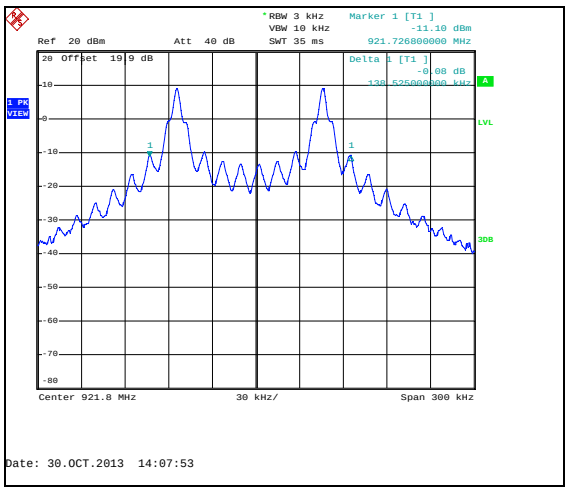

Figure 7.4.4.2-5: 20dB BW High Channel

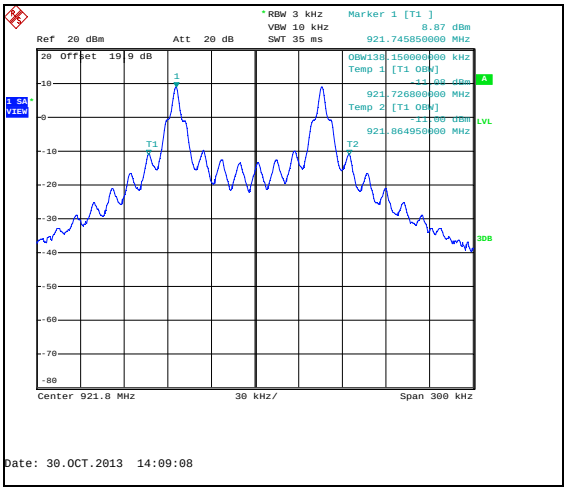

Figure 7.4.4.2-6: 99% OBW High Channel

7.5 Band-Edge Compliance and Spurious Emissions

7.5.1 Band-Edge Compliance of RF Conducted Emissions - FCC 15.247(d); IC RSS-210 A8.5

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 ≥ 1% of the span, and the VBW was set to >> RBW.

7.5.1.2 Measurement Results

Results are shown in the figures 7.5.1.2-1 to 7.5.1.2-4 below.

NON-HOPPING MODE:

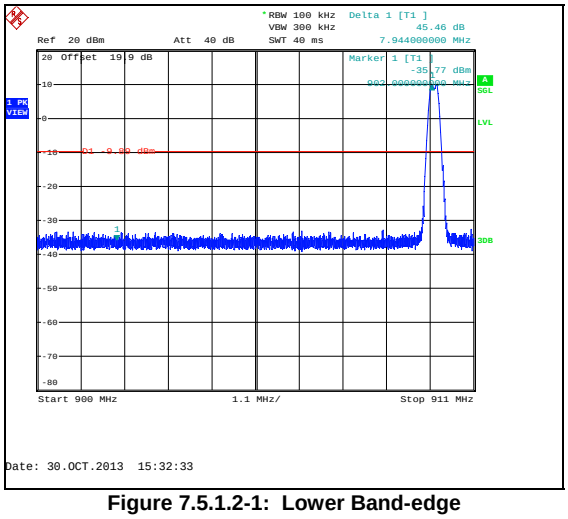

Figure 7.5.1.2-1: Lower Band-edge

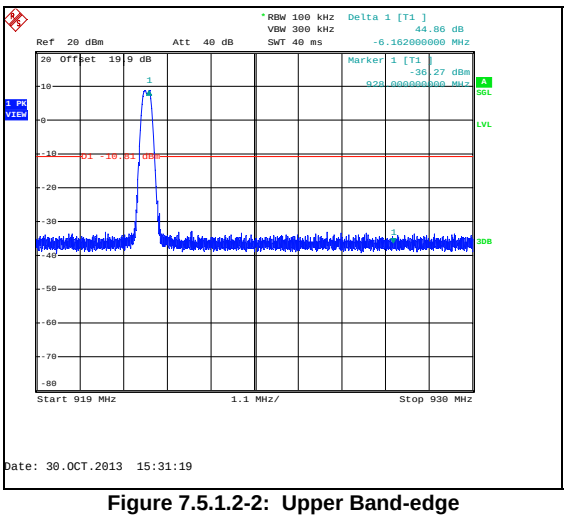

Figure 7.5.1.2-2: Upper Band-edge

HOPPING MODE:

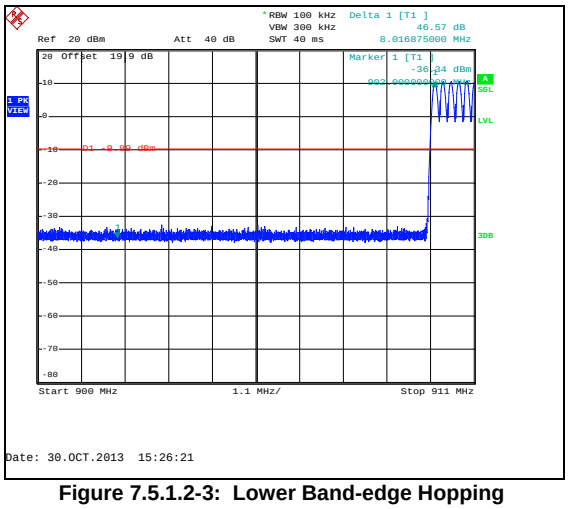

Figure 7.5.1.2-3: Lower Band-edge Hopping

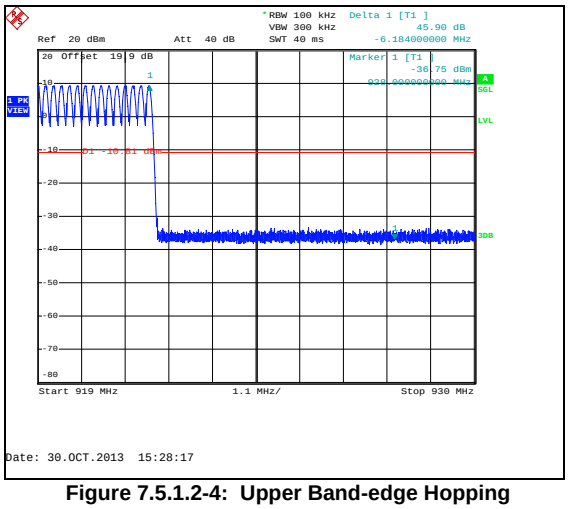

Figure 7.5.1.2-4: Upper Band-edge Hopping

7.5.2 RF Conducted Spurious Emissions - FCC 15.247(d); IC RSS-210 A8.5

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

Results are shown below in Figures 7.5.2.2-1 to 7.5.2.2-6:

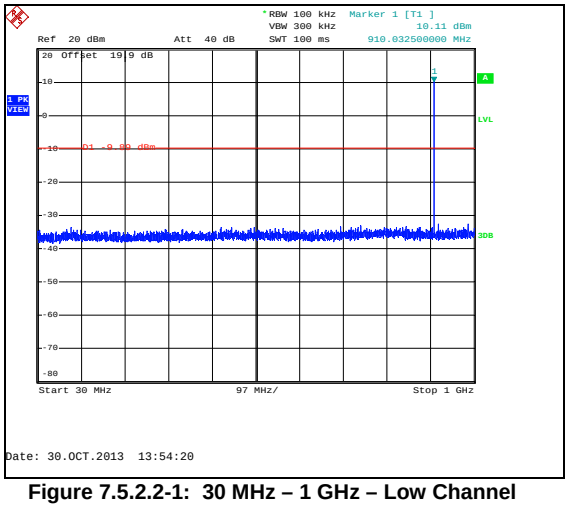

Figure 7.5.2.2-1: 30 MHz – 1 GHz – Low Channel

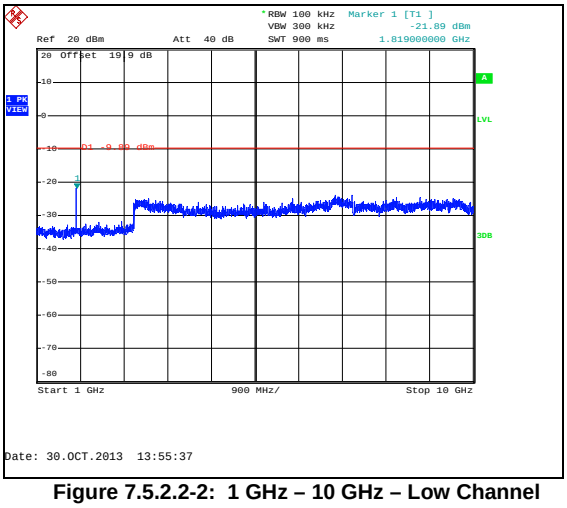

Figure 7.5.2.2-2: 1 GHz – 10 GHz – Low Channel

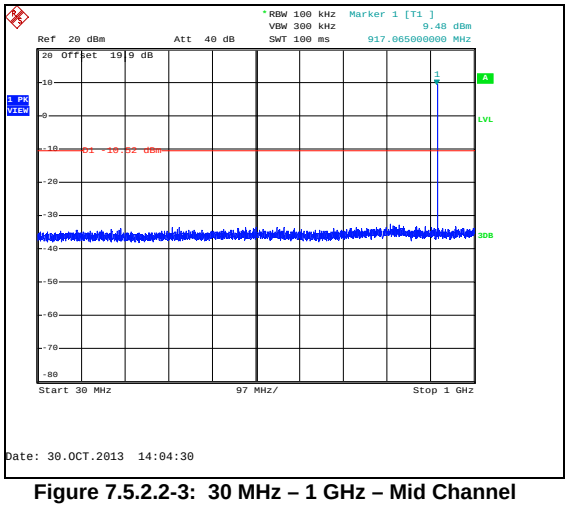

Figure 7.5.2.2-3: 30 MHz – 1 GHz – Mid Channel

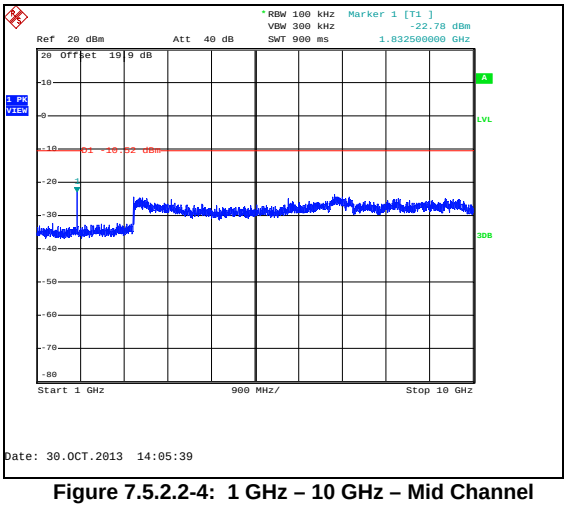

Figure 7.5.2.2-4: 1 GHz – 10 GHz – Mid Channel

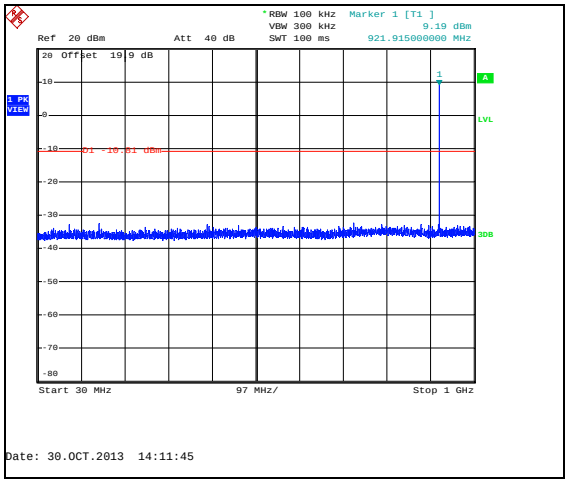

Figure 7.5.2.2-5: 30 MHz – 1 GHz – High Channel

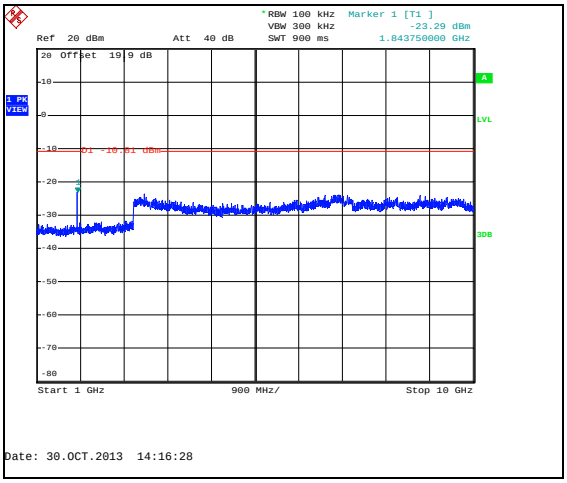

Figure 7.5.2.2-6: 1 GHz – 10 GHz – High Channel

7.5.3 Radiated Spurious Emissions - FCC 15.205, 15.209; IC RSS-210 2.2, RSS-Gen 7.2.2

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 were made with RBW and VBW of 1 MHz and 3MHz respectively.

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

Each emission found to be in a restricted band was compared to the applicable radiated emission limits.

7.5.3.2 Duty Cycle Correction

For average radiated measurements, using a 57.2% duty cycle, the measured level was reduced by a factor 4.852dB. The duty cycle correction factor is determined using the formula: 20log (57.2/100). See Section 7.4.3 for details.

7.5.3.3 Measurement Results

Radiated spurious emissions found in the band of 30MHz to 10GHz are reported in the Table 7.5.3.3-1 below.

Table 7.5.3.3-1: Radiated Spurious Emissions Tabulated Data – 12S 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										
2730	61.08	58.62	H	-4.40	56.68	49.37	74.0	54.0	17.3	4.6
2730	58.92	56.03	V	-4.40	54.52	46.78	74.0	54.0	19.5	7.2
3640	51.26	43.69	H	-1.09	50.17	37.75	74.0	54.0	23.8	16.3
3640	50.67	42.49	V	-1.09	49.58	36.55	74.0	54.0	24.4	17.5
Mid Channel										
2751	59.65	57.25	H	-4.31	55.34	48.09	74.0	54.0	18.7	5.9
2751	57.32	54.33	V	-4.31	53.01	45.17	74.0	54.0	21.0	8.8
3668	50.41	41.53	H	-0.98	49.43	35.70	74.0	54.0	24.6	18.3
3668	49.17	40.74	V	-0.98	48.19	34.91	74.0	54.0	25.8	19.1
High Channel										
2765.4	59.23	56.79	H	-4.26	54.97	47.68	74.0	54.0	19.0	6.3
2765.4	55.11	51.89	V	-4.26	50.85	42.78	74.0	54.0	23.1	11.2
3687.2	50.05	46.16	H	-0.90	49.15	40.41	74.0	54.0	24.8	13.6
3687.2	49.21	39.70	V	-0.90	48.31	33.95	74.0	54.0	25.7	20.0

7.5.3.4 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: Peak

Corrected Level: 61.08 - 4.40 = 56.68dBuV/m
Margin: 74dBuV/m – 56.68dBuV/m = 17.3dB

Example Calculation: Average

Corrected Level: 58.62 - 4.40 - 4.852 = 49.37dBuV
Margin: 54dBuV – 49.37dBuV = 4.6dB

8 CONCLUSION

In the opinion of ACS, Inc. the OW31SASL5BE-1, manufactured by Itron meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT