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Certification Test Report

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IC: 5294A-NG0R1S1

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

ACS Report Number 08-0300-15C

Manufacturer: Cellnet Technology Inc.
Model(s): Utilinet Modular SCADA/DA

Test Begin Date: August 13, 2008
Test End Date: November 5, 2008

Report Issue Date: November 5, 2008

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 26 pages

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Additional Exhibits Included In Filing

Internal Photographs
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RF Exposure
Manual
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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.

1.2 Product Description

1.2.1 General

The UtiliNet SCADA Single Board Radio (UtiliNet SBR) is for use by OEM vendors wanting to incorporate the UtiliNet SBR capability within their SCADA/DA and metering products.

The UtiliNet SBR is a self-contained 100 mW Integrated WanGate Radio (IWR) which includes voltage regulation, micro-processor, radio transmitter and receiver.

Manufacturer Information:
Cellnet Technology Inc.
30000 Mill Creek Ave., Suite 100
Alpharetta, GA 30022

Test Sample Serial Number(s):
External Antenna: E035L430800000021
Internal Antenna: E031L430800000021

Test Sample Condition:
Test samples were provided in good working condition with no visible defects.

Detailed photographs of the EUT are filed separately with this filing.

1.2.2 Intended Use

The UtiliNet SCADA Single Board Radio (UtiliNet SBR) is for use by OEM vendors wanting to incorporate the UtiliNet SBR capability within their SCADA/DA and metering products.

1.3 Test Methodology and Considerations

The UtiliNet, Modular SCADA/DA utilizes two different board variations. One has a connector for an external antenna, the other has an integral PCB antenna. In both cases the RF portion of the device is identical. Reference the internal photos exhibit.

The EUT was tested in multiple orientations for radiated emissions and worst case data presented in this report.

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 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 4175
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:

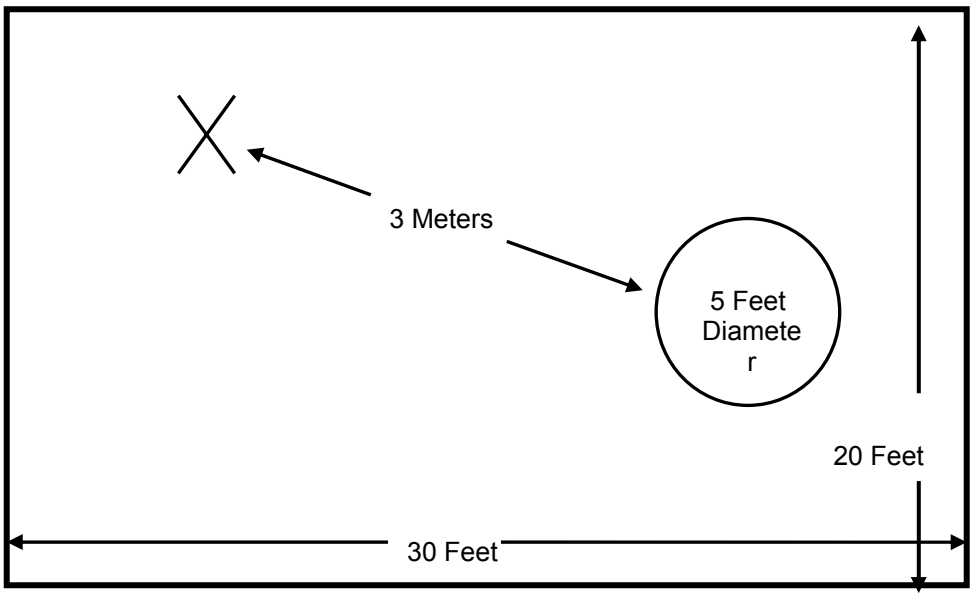

Figure 2.3-1: Semi-Anechoic Chamber Test Site

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:

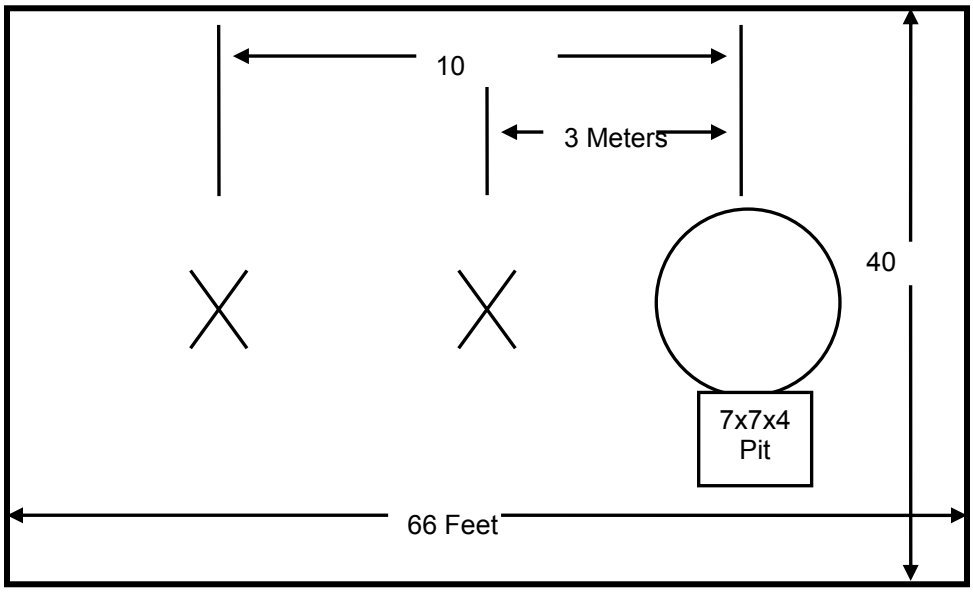

Figure 2.3-2: Open Area Test Site

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:

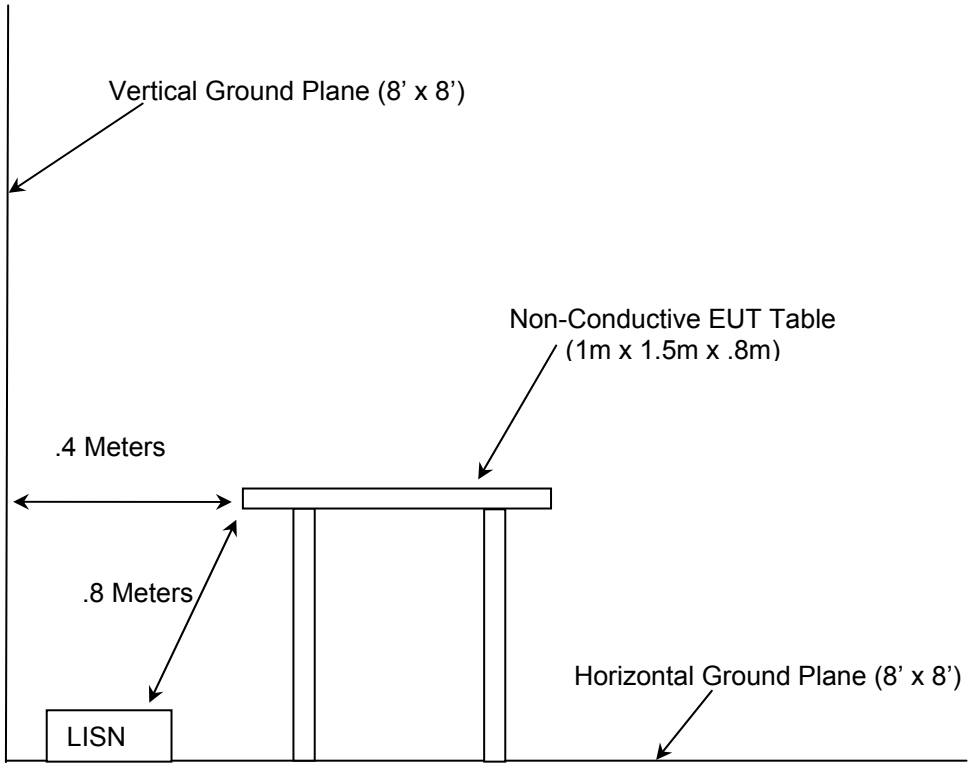

Figure 2.4-1: AC Mains Conducted EMI Site

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, 2008
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2008
- FCC OET Bulletin 65 Appendix C - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, 2001
- 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 and Schwarz	Spectrum Analyzer	ESMI Display	833771/007	09/19/09
2	Rohde and Schwarz	Spectrum Analyzer	ESMI Receiver	839587/003	09/19/09
331	Microwave Circuits	Filter	H1G513G1	31417	07/28/09 (See Note1)
22	Agilent	Amplifier	8449B	3008A00526	10/22/09
30	Spectrum Technologies	Antenna	DRH-0118	970102	05/07/09
291	Florida RF Cables	Cables	SMRE-200W-12.0-SMRE	NA	11/21/09 (See Note1)
292	Florida RF Cables	Cables	SMR-290AW-480.0-SMR	NA	11/21/09 (See Note1)
422	Florida RF Cables	Cables	SMS-200AW-72.0-SMR	NA	02/25/09 (See Note1)
283	Rohde and Schwarz	Spectrum Analyzer	FSP40	1000033	09/19/09
73	Agilent	Amplifier	8447D	2727A05624	12/19/08
354	ETS Lindgren	Antenna	3142C	00078838	06/11/09
167	ACS	Cable	EMI Cable Set	167	01/04/09
431	Solar Electronics	LISN	9408-50-R-25-N	084701	06/19/09
168	Hewlett Packard	Attenuator	11947A	44829	02/18/09 (See Note2)

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(s)
1	EUT	Cellnet	Utilinet, Modular SCADA/DA	E035L430800000021 E031L430800000021
2	DC Power Supply	Hewlett Packard	E3620A	KR41200296
3	AC Adaptor	Nintendo	AGS-002	NA

6.0 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

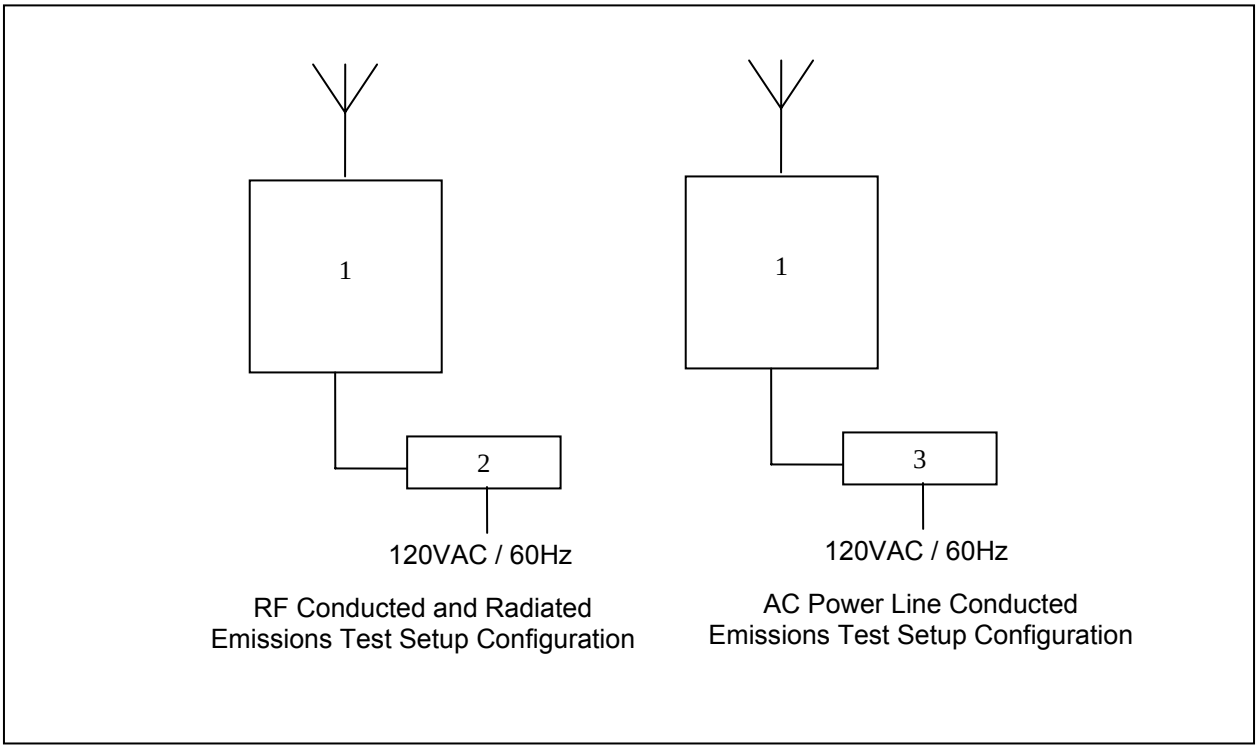

Figure 6-1: EUT Test Setup

RF conducted and radiated emissions measurements were performed using the DC power supply. AC power line conducted emissions was performed using an off-the-shelf AC adaptor as indicated in the test setup diagram above.

See Test Setup photographs for additional detail.

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 integral antenna is an etched PCB F Antenna thus satisfying 15.203. The external antenna is connected via an MCX Female coaxial RF connector. This unique connector satisfies 15.203.

External Antenna: MMG (Manufacturer's Marketing Group) 5dBi Whip Antenna P/N 16-1000-0

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

7.2.1 Test Methodology

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

Both integral and external antenna module variants were evaluated and worst case data presented in section 7.2.2.

7.2.2 Test Results

Results of the test are shown below in and Table 7.2-1.

Table 7.2-1: Conducted EMI Results

Frequency (MHz)	Uncorrected Reading (dBuV)		Total Correction Factor (dB)	Corrected Level (dBuV)		Limit (dBuV)		Margin (dB)		Line
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	
Line 1										
0.22	15.7	7.6	9.80	25.50	17.40	62.82	52.82	37.3	35.4	FLO
0.29	17.4	15	9.82	27.22	24.82	60.52	50.52	33.3	25.7	FLO
0.65	2.1	-1.3	9.90	12.00	8.60	56.00	46.00	44.0	37.4	FLO
0.71	19.2	15.1	9.90	29.10	25.00	56.00	46.00	26.9	21.0	FLO
1.14	16.5	15.2	9.90	26.40	25.10	56.00	46.00	29.6	20.9	FLO
1.43	24.1	12.9	9.90	34.00	22.80	56.00	46.00	22.0	23.2	FLO
Line 2										
0.17	27.1	19.2	9.81	36.91	29.01	64.96	54.96	28.1	26.0	FLO
0.31	10.3	6.1	9.80	20.10	15.90	59.97	49.97	39.9	34.1	FLO
0.71	19.9	15.6	9.90	29.80	25.50	56.00	46.00	26.2	20.5	FLO
0.78	1.2	-1.9	9.90	11.10	8.00	56.00	46.00	44.9	38.0	FLO
1.29	18.2	17.3	9.90	28.10	27.20	56.00	46.00	27.9	18.8	FLO
1.57	16.6	14.7	9.90	26.50	24.60	56.00	46.00	29.5	21.4	FLO

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

7.3.1 Test Methodology

Radiated emissions tests were performed over the frequency range of 30MHz to 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.

Both integral and external antenna module variants were evaluated and worst case data presented in section 7.3.2.

7.3.2 Test Results

Results of the test are given in Table 7.3-1 below:

Table 7.3-1: Radiated Emissions Tabulated Data

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	---------	16.92	H	-9.20	---------	7.72	--------	40.0	---------	32.28
49.4	---------	33.55	V	-17.98	---------	15.57	--------	40.0	---------	24.43
81.73	---------	23.19	V	-19.68	---------	3.51	--------	40.0	---------	36.49
97.9	---------	28.14	V	-16.77	---------	11.37	--------	43.5	---------	32.13
160.41	---------	18.06	V	-15.60	---------	2.46	--------	43.5	---------	41.04
193.82	---------	18.26	V	-14.65	---------	3.61	--------	43.5	---------	39.89
349.02	---------	19.10	V	-8.98	---------	10.12	--------	46.0	---------	35.88
486.97	---------	20.67	V	-5.60	---------	15.07	--------	46.0	---------	30.93
701.45	---------	21.16	H	-1.96	---------	19.20	--------	46.0	---------	26.80
838.33	---------	20.34	V	-0.33	---------	20.01	--------	46.0	---------	25.99

* Note: All emissions above 838.33 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 Test Methodology (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 Test Results

Results are shown below in table 7.4-1 and the worst case was plotted and shown in figure 7.4-1 to 7.4-3 below:

Table 7.4-1: RF Output Power

Frequency [MHz]	Level [dBm]
902.1	21.16
915	21.23
927.9	20.56

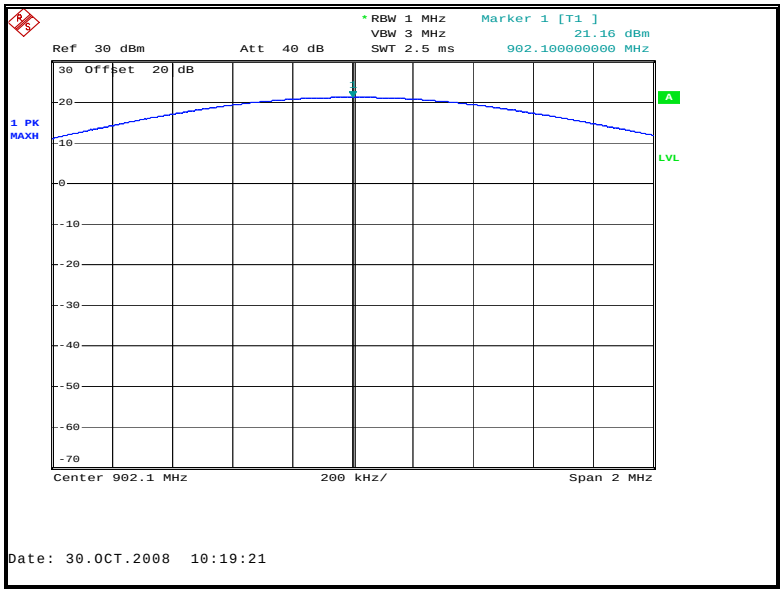

Figure 7.4-1: Output power – Low Channel

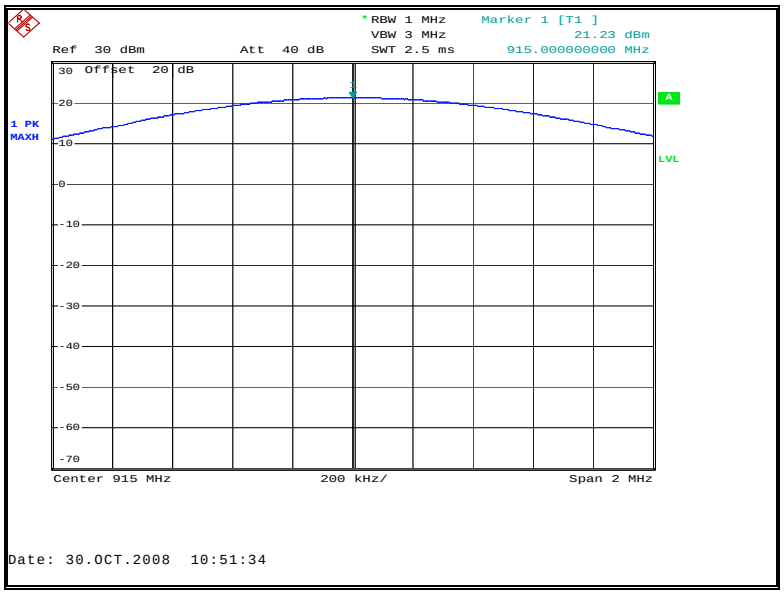

Figure 7.4-2: Output power – Mid Channel

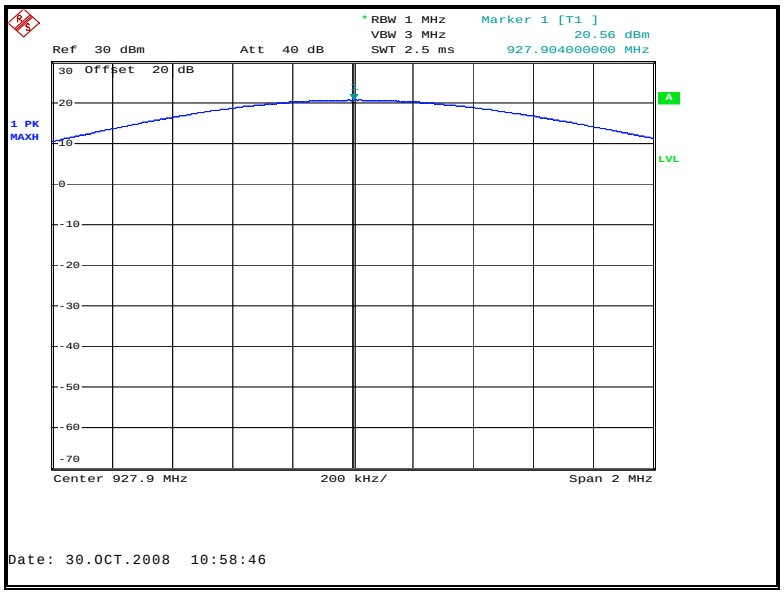

Figure 7.4-3: Output power – High Channel

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 Test Methodology

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.

7.5.1.2 Test Results

The maximum 20dB bandwidth of the hopping channel was measured to be 27.36kHz (See figure 7.5.4-1 to 7.5.4-3 below). The adjacent channel separation was measured to be 100kHz. Results are shown in figure 7.5.1-1 below:

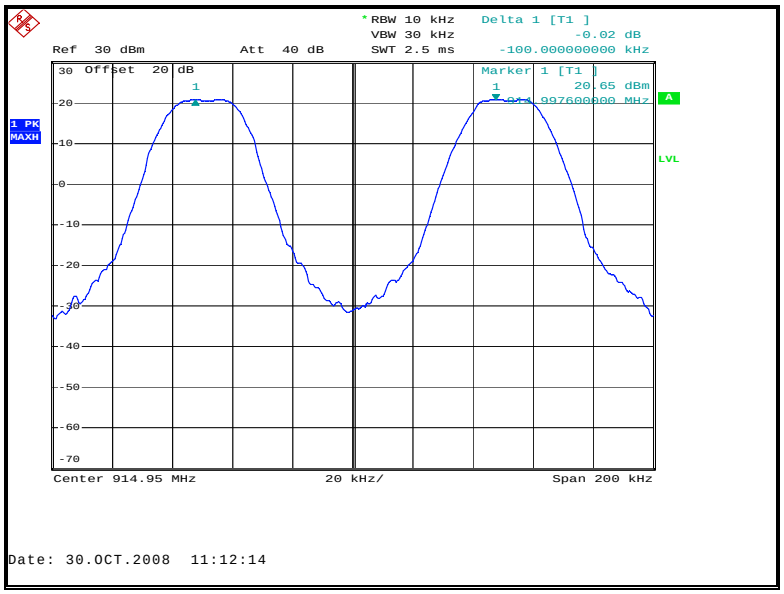

Figure 7.5.1-1: Carrier Frequency Separation

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 240 hopping channels which is > 50 as required. Results are shown in Figure 7.5.2-1 to 7.5.2-5 below:

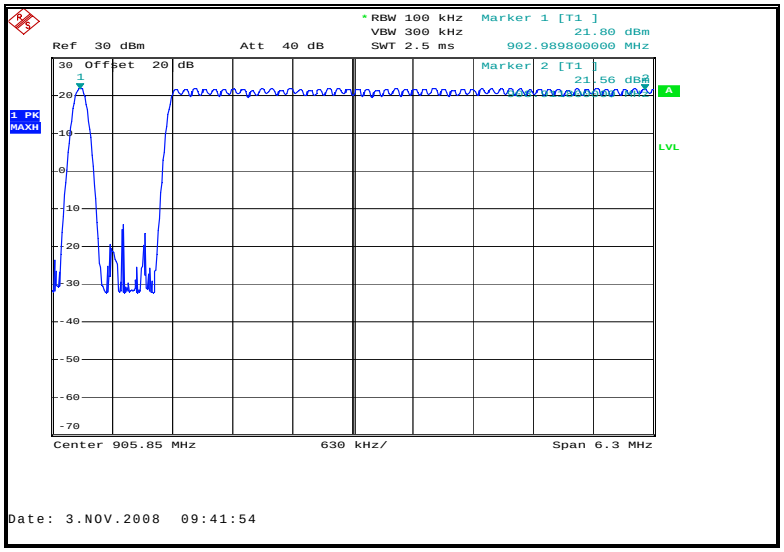

Figure 7.5.2-1: Number of Hopping Channels

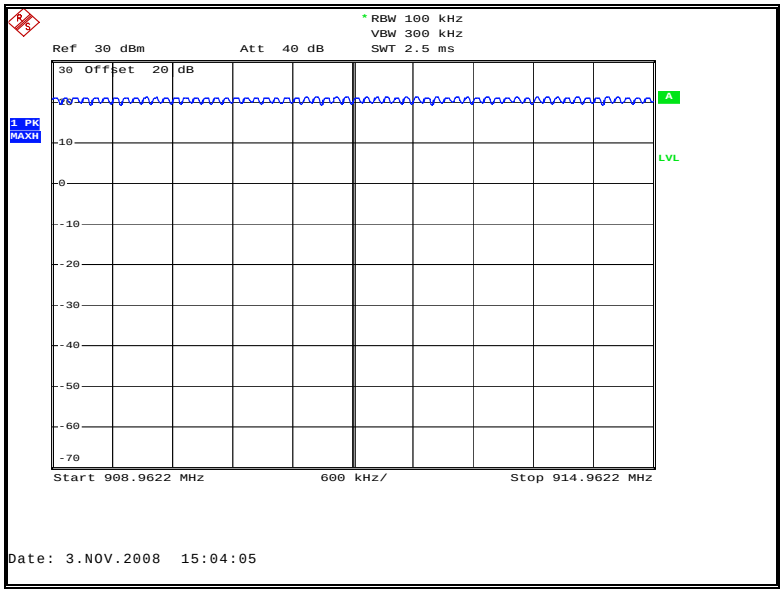

Figure 7.5.2-2: Number of Hopping Channels

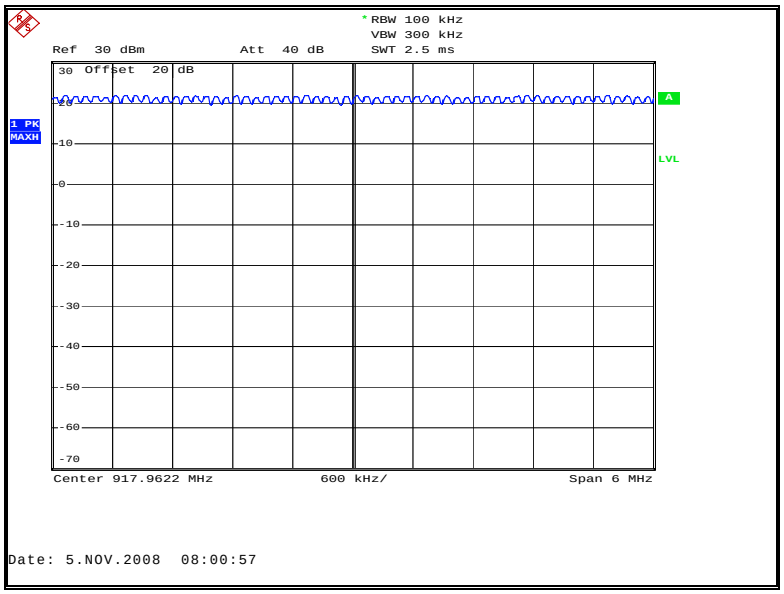

Figure 7.5.2-3: Number of Hopping Channels

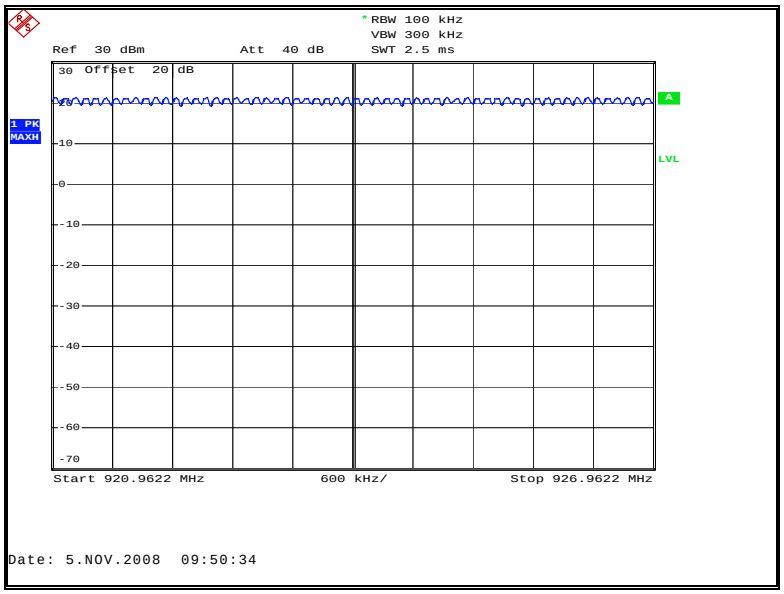

Figure 7.5.2-4: Number of Hopping Channels

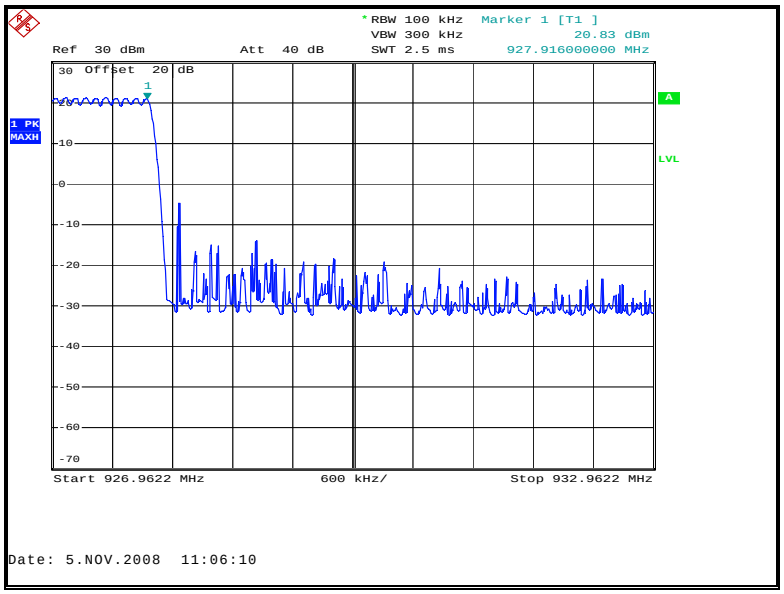

Figure 7.5.2-5: Number of Hopping Channels

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

The duration of the RF transmission is 364 ms. There is a minimum 35 second rest period in which the device hops to another channel according to the pseudorandom frequency table before transmitting another 364ms burst. Therefore the average time of occupancy on any channel in a 20 second period is 364ms.

A detailed description of the RF timing and a timing diagram are included in the theory of operation.

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

7.5.4.1 Test Methodology

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.

7.5.4.2 Test Results

The maximum 20dB bandwidth was found to be approximately 27.36kHz and maximum 99% bandwidth 23.88kHz. Results are shown below in Table 7.5.4-1 and Figures 7.5.4-1 through 7.5.4-6.

Table 7.5.4-1: 20dB / 99% Bandwidth

Frequency [MHz]	20dB Bandwidth [kHz]	99% Bandwidth [kHz]
902.1	27.36	23.88
915	26.88	23.64
927.9	27.36	23.88

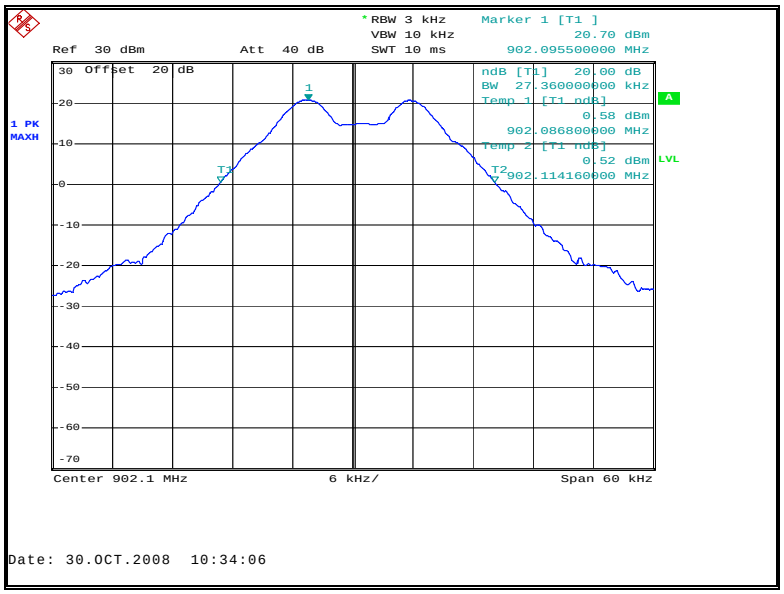

Figure 7.5.4-1: 20dB Bandwidth Low Channel

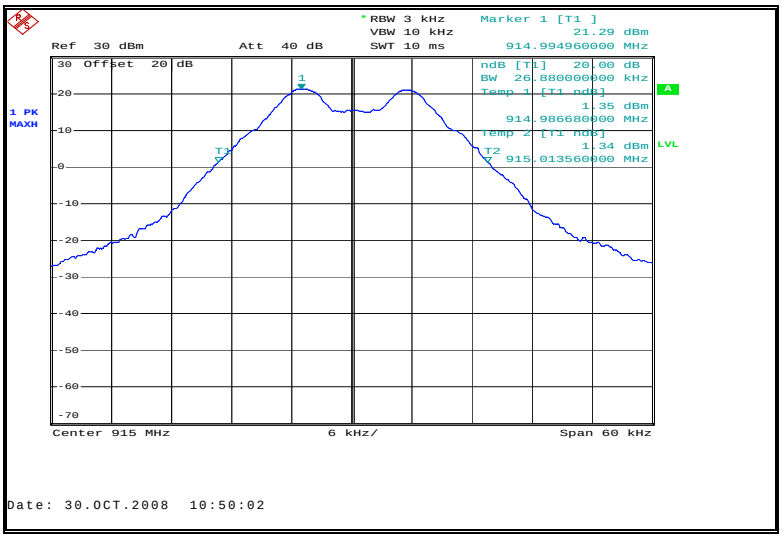

Figure 7.5.4-2: 20dB Bandwidth Mid Channel

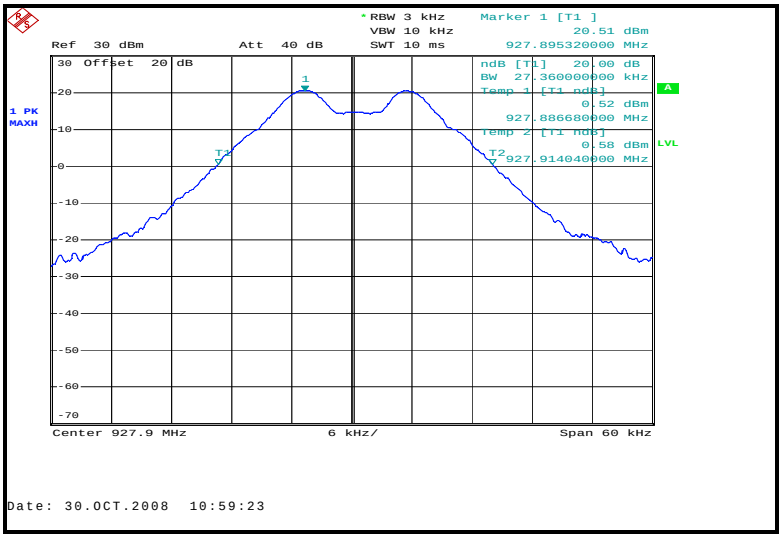

Figure 7.5.4-3: 20dB Bandwidth High Channel

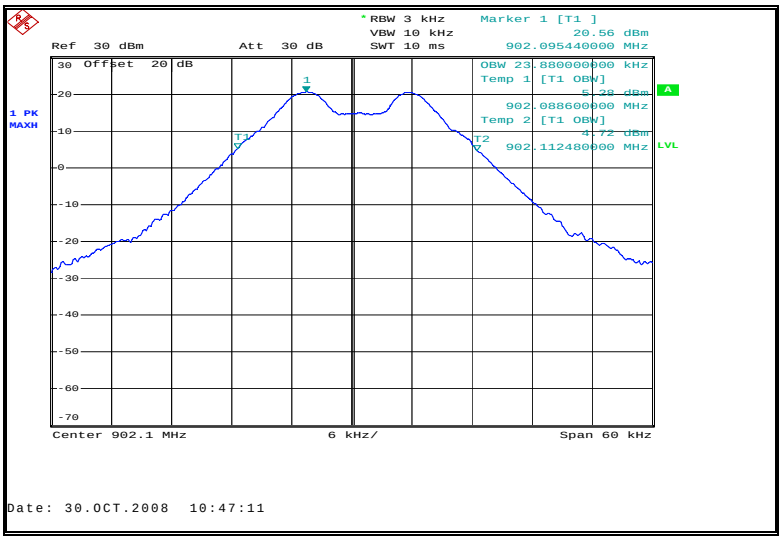

Figure 7.5.4-4: 99% Bandwidth Low Channel

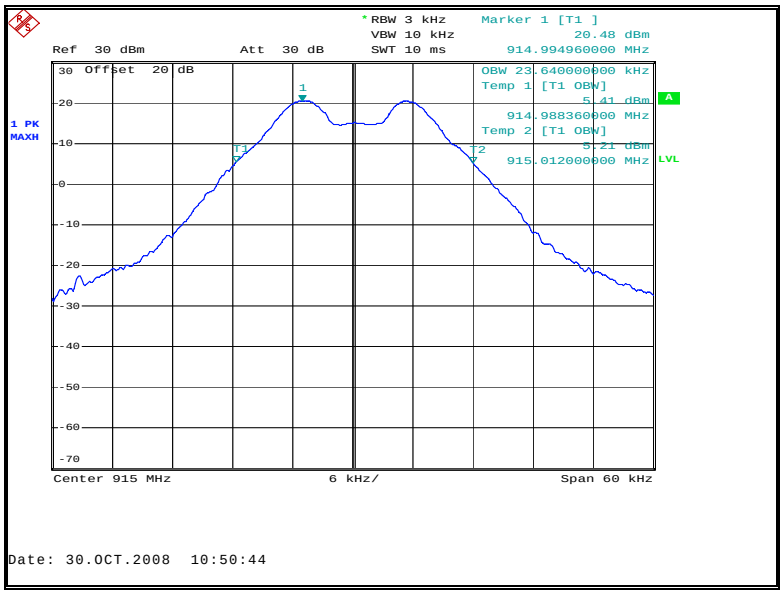

Figure 7.5.4-5: 99% Bandwidth Mid Channel

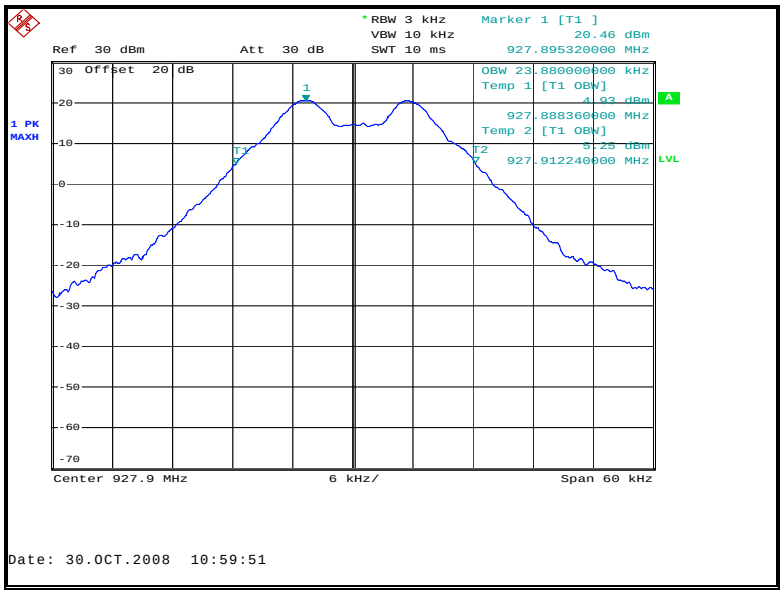

Figure 7.5.4-6: 99% Bandwidth High Channel

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

7.6.1 Band-Edge Compliance of RF Conducted Emissions

7.6.1.1 Test Methodology

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

7.6.1.2 Test 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 Figures 7.6.1-1 and 7.6.2-4

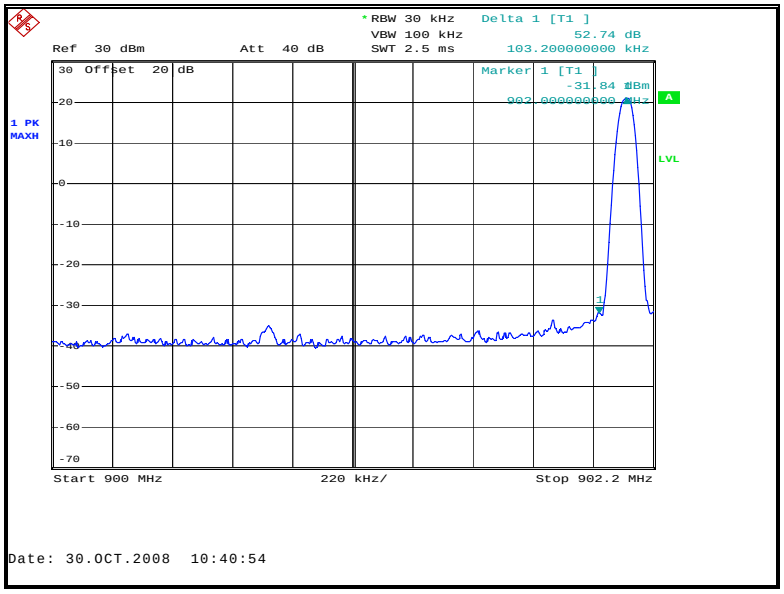

Figure 7.6.1-1: Lower Band-edge

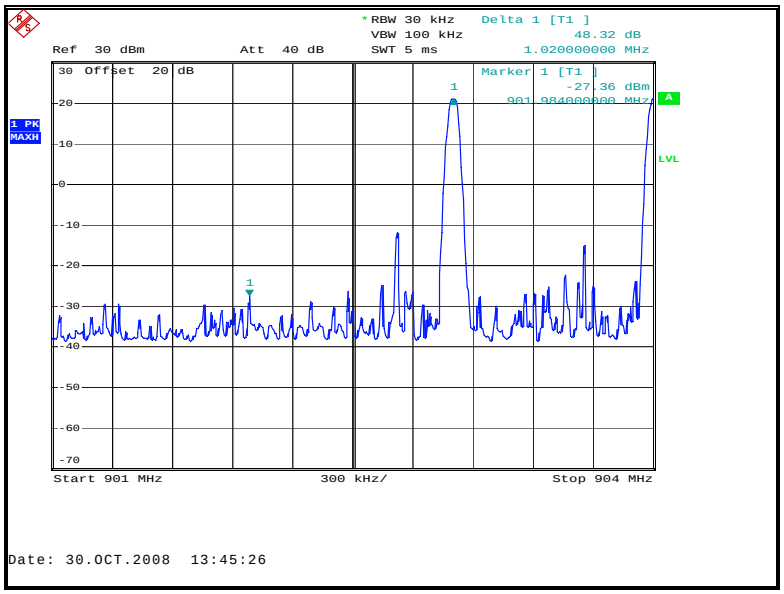

Figure 7.6.1-2: Lower Band-edge - Hopping Mode

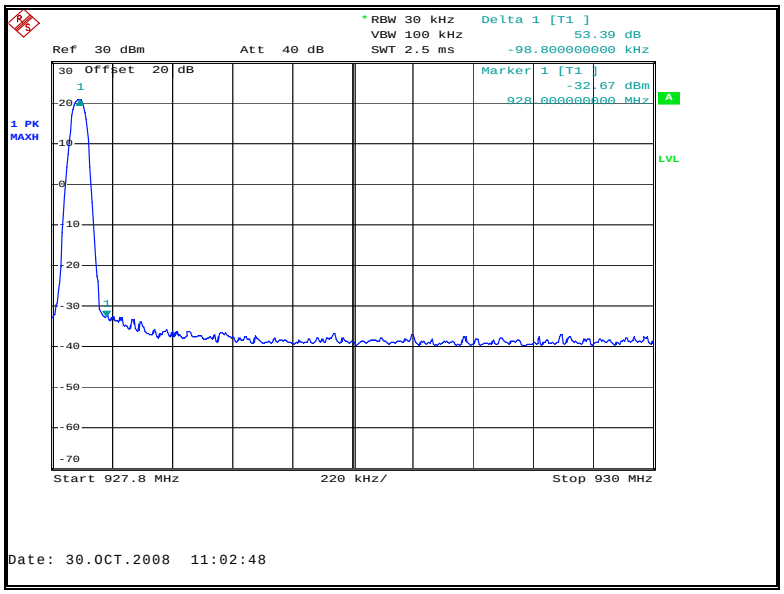

Figure 7.6.1-3: Upper Band-edge

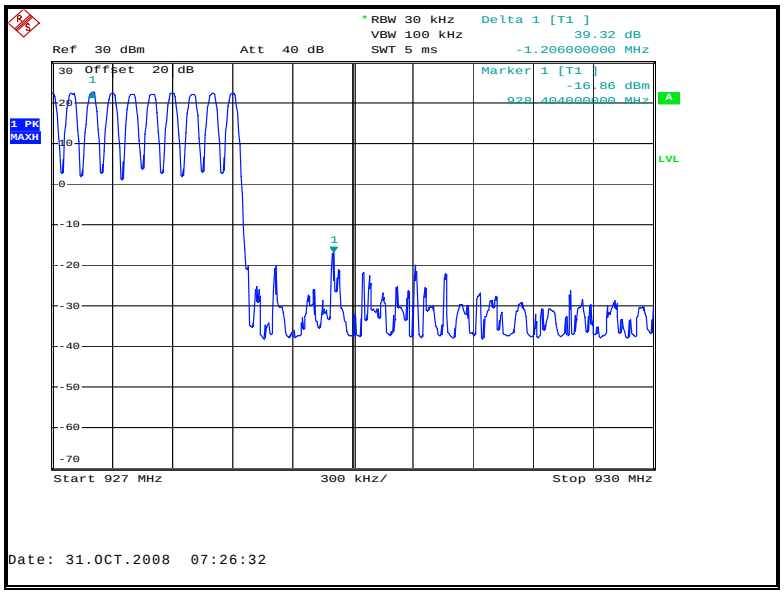

Figure 7.6.1-4: Upper Band-edge - Hopping Mode

7.6.2 RF Conducted Spurious Emissions

7.6.2.1 Test Methodology

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.

7.6.2.2 Test 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 in Figure 7.6.2-1 through 7.6.2-6.

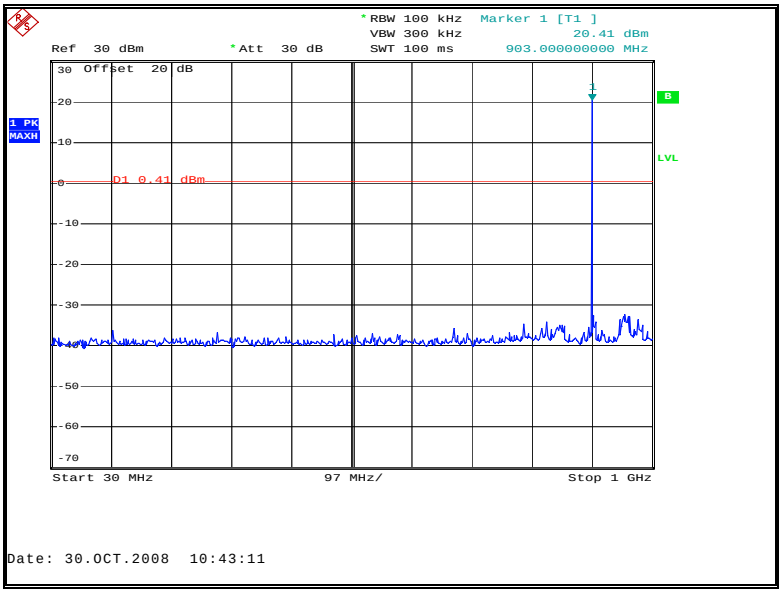

Figure 7.6.2.2-1: 30 MHz – 1 GHz – Low Channel

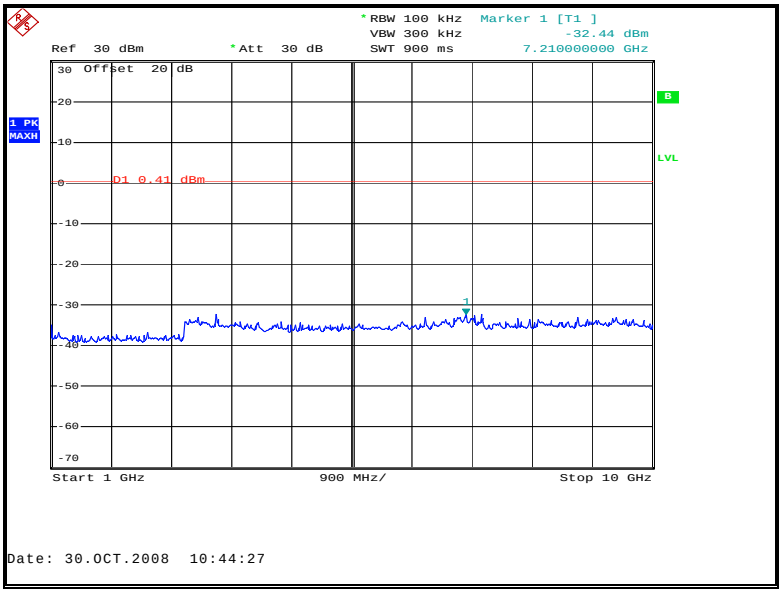

Figure 7.6.2.2-2: 1 GHz – 10 GHz – Low Channel

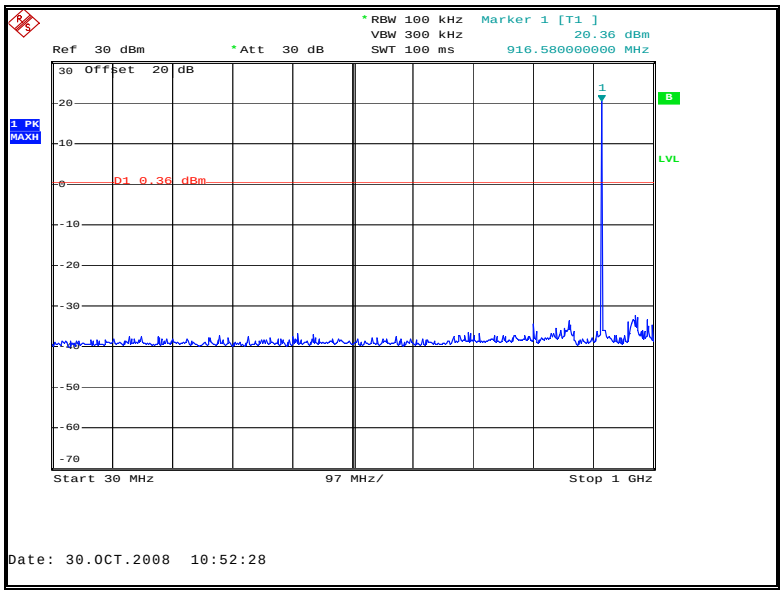

Figure 7.6.2.2-3: 30 MHz – 1 GHz –Mid Channel

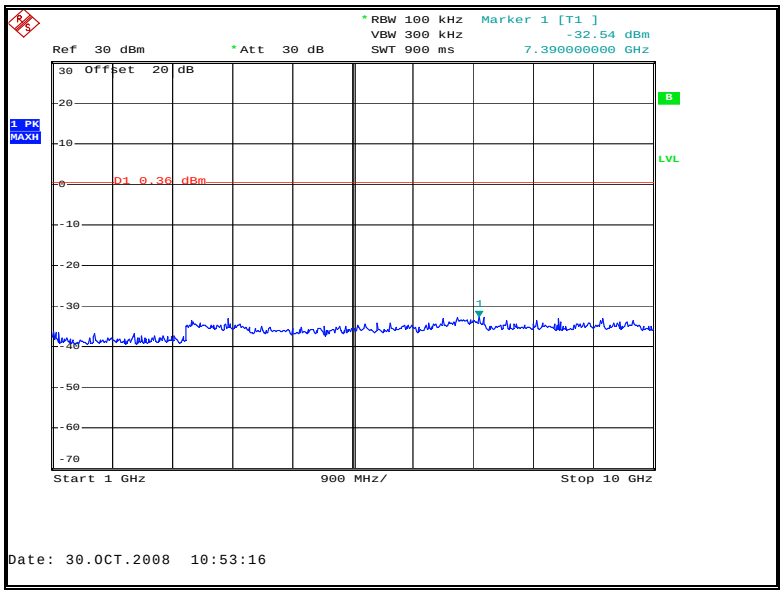

Figure 7.6.2.2-4: 1 GHz – 10 GHz – Mid Channel

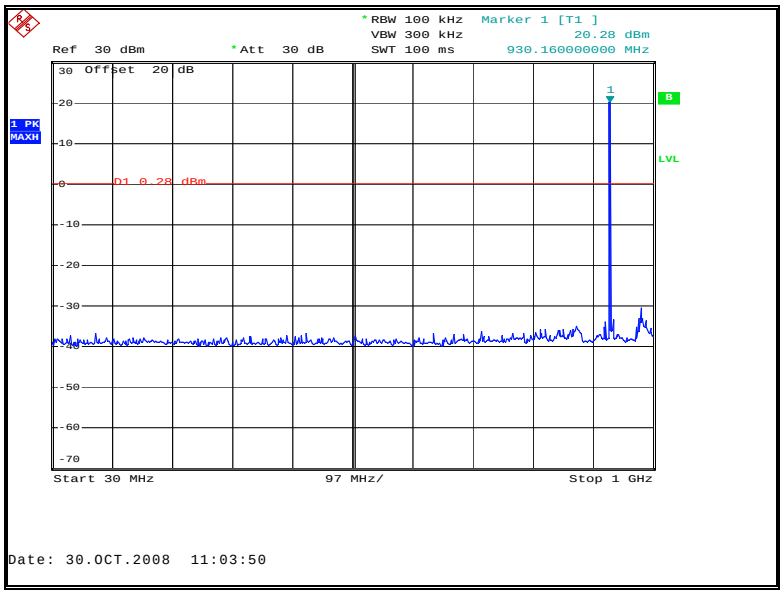

Figure 7.6.2.2-5: 30 MHz – 1 GHz – High Channel

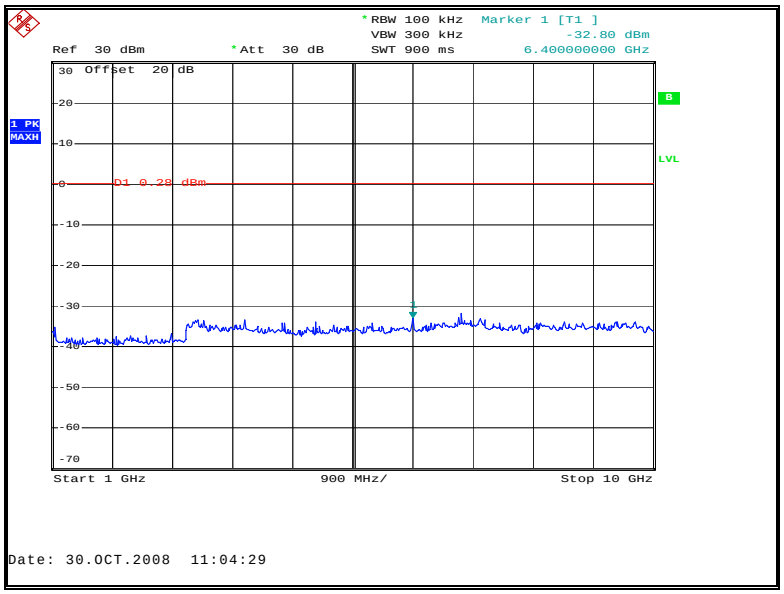

Figure 7.6.2.2-6: 1 GHz – 10 GHz –High Channel

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

7.6.3.1 Test Methodology

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. Average measurements were made with RBW of 1MHz and a VBW of 10Hz. The average emissions were further corrected by applying the duty cycle correction of the EUT to the average measurements for comparison to the average limit.

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

Both integral and external antenna module variants were evaluated in multiple orientations and worst case data presented in section 7.6.3.2.

7.6.3.2 Test Results

Radiated spurious emissions found in the band of 30MHz to 10GHz are reported in Table 7.6.3-1 through 7.6.3-3. The magnitude of all emissions not reported were below the noise floor of the measurement system.

Table 7.6.3-1: Radiated Spurious Emissions – Low Channel

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
External Antenna										
2706.3	43.80	34.68	H	0.55	44.35	35.23	74.0	54.0	29.65	18.77
2706.3	48.07	43.72	V	0.35	48.42	44.07	74.0	54.0	25.58	9.93
3608.4	43.57	32.54	V	3.68	47.25	36.22	74.0	54.0	26.75	17.78
Internal Antenna										
2706.3	44.23	35.41	H	0.55	44.78	35.96	74.0	54.0	29.22	18.04
2706.3	43.47	32.62	V	0.35	43.82	32.97	74.0	54.0	30.18	21.03
3608.4	43.65	33.63	H	3.66	47.31	37.29	74.0	54.0	26.69	16.71
3608.4	43.09	32.11	V	3.68	46.77	35.79	74.0	54.0	27.23	18.21

Table 7.6.3-2: Radiated Spurious Emissions – Mid Channel

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
External Antenna										
2745	43.85	35.56	H	0.69	44.54	36.25	74.0	54.0	29.46	17.75
2745	45.15	39.73	V	0.49	45.64	40.22	74.0	54.0	28.36	13.78
3660	43.57	32.92	H	3.84	47.41	36.76	74.0	54.0	26.59	17.24
3660	43.70	31.70	V	3.87	47.57	35.57	74.0	54.0	26.43	18.43
Internal Antenna										
2745	43.50	34.24	H	0.69	44.19	34.93	74.0	54.0	29.81	19.07
2745	43.39	32.83	V	0.49	43.88	33.32	74.0	54.0	30.12	20.68
3660	44.03	34.98	H	3.84	47.87	38.82	74.0	54.0	26.13	15.18
3660	43.37	32.29	V	3.87	47.24	36.16	74.0	54.0	26.76	17.84

Table 7.6.3-3: Radiated Spurious Emissions – High Channel

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
External Antenna										
2783.7	43.19	33.49	H	0.83	44.02	34.32	74.0	54.0	29.98	19.68
2783.7	46.06	40.01	V	0.63	46.69	40.64	74.0	54.0	27.31	13.36
3711.6	43.60	31.78	H	4.02	47.62	35.80	74.0	54.0	26.38	18.20
3711.6	43.60	31.96	V	4.07	47.67	36.03	74.0	54.0	26.33	17.97
7423.2	43.90	33.68	V	12.22	56.12	45.90	74.0	54.0	17.88	8.10
Internal Antenna										
2783.7	43.70	33.15	H	0.83	44.53	33.98	74.0	54.0	29.47	20.02
2783.7	43.19	32.52	V	0.63	43.82	33.15	74.0	54.0	30.18	20.85
3711.6	44.13	34.88	H	4.02	48.15	38.90	74.0	54.0	25.85	15.10
3711.6	43.88	32.06	V	4.07	47.95	36.13	74.0	54.0	26.05	17.87
7423.2	44.54	35.92	H	12.13	56.67	48.05	74.0	54.0	17.33	5.95
7423.2	44.46	35.56	V	12.22	56.68	47.78	74.0	54.0	17.32	6.22

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

7.6.3.4 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: 43.80+ 0.55= 44.35dBuV/m
Margin: 74dBuV/m – 44.35dBuV/m = 29.65dB

Example Calculation: Average
Corrected Level: 34.68+ 0.55-0= 35.23dBuV
Margin: 54dBuV – 35.23dBuV = 18.77dB

8.0 CONCLUSION
In the opinion of ACS, Inc. the Utilinet, Modular SCADA/DA, manufactured by Cellnet Technology Inc. meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT