NVLAP Lab Code 200087-0

Application Submittal Report
For
FCC And Industry Canada Grant Of Certification

FOR

Model: 1184 CO Detector
902-928 MHz Transmitter

FCC ID: CCKPC0104
IC: 5251A-PC0104

FOR

Digital Monitoring Products, Inc.
2500 North Partnership Boulevard
Springfield, MO 65802-6310

Test Report Number: 110914C

Authorized Signatory: Scot D Rogers
Scot D. Rogers

NVLAP Lab Code 200087-0

ROGERS LABS, INC.

4405 West 259th Terrace
Louisburg, KS 66053
Phone / Fax (913) 837-3214

Engineering Test Report For Grant Of Certification Application Submittal

CFR47, Part 15C - Intentional Radiators Paragraph 15.249,
Industry Canada, RSS-210
Low Power Transmitter

For

Digital Monitoring Products, Inc

2500 North Partnership Boulevard
Springfield, MO 65802-6310
Phone: (913) 397-8200
Mr. Terry Shelton
Director of Product Quality Assurance

Model: 1184 CO Detector

Frequency 903-927MHz
FCC ID#: CCKPC0104
IC: 5251A-PC0104

Test Date: September 14, 2011

Certifying Engineer: Scot D Rogers

Scot D. Rogers
Rogers Labs, Inc.
4405 West 259th Terrace
Louisburg, KS 66053
Telephone: (913) 837-3214

Table of Contents

Forward

The following information is submitted for consideration in obtaining Grant of Certification for a license exempt low power intentional radiator operating under CFR47 Paragraph 15.249 and Industry Canada Spectrum Management and Telecommunications Radio Standard Specification RSS-210, Issue 8.

Name of Applicant: Digital Monitoring Products, Inc
2500 North Partnership Boulevard
Springfield, MO 65802-6310
Model: 1184 CO Detector
FCC I.D.: CCKPC0104 IC: 5251A-PC0104, Frequency Range: 903-927 MHz
Operating Power: Average emission of 91.4 dBµV/m (3 meter radiated measurement), 99% Occupied Bandwidth 76.1 kHz, Receiver worst-case emission 34.1 dBµV/m

Applicable Standards & Procedures

In accordance with the Federal Communications Code of Federal Regulations, dated October 1, 2010, Part 2, Subpart J, Paragraphs 2.907, 2.911, 2.913, 2.925, 2.926, 2.1031 through 2.1057, and applicable parts of paragraph 15, Part 15C Paragraph 15.249, and Industry Canada Spectrum Management and Telecommunications Radio Standard Specification RSS-210, Issue 8 the following information is submitted. Test procedures used are the established Methods of Measurement of Radio-Noise Emissions as described in the ANSI C63.4-2009, RSS-210, and appropriate FCC documents DA00-1407 and DA00-705 and/or TIA/EIA 603-1.

Opinion / Interpretation of Results

Test Performed	Minimum Margin (dB)	Results
Antenna requirement per CFR 47 15.203	N/A	Complies
Restricted Bands Emissions as per CFR 47 15.205 and RSS-210 2.2	-12.8	Complies
AC Line Conducted Emissions as per CFR 47 15.207 and RSS-210 2.5	N/A	Complies
Radiated Emissions as per CFR 47 15.209 and RSS-210 2.5	-14.2	Complies
Radiated Emissions per CFR 47 15C and RSS-210 A2.9	-5.9	Complies
Receivers emissions per CFR 47 15.111 and RSS-210 and RSS-GEN	-17.5	Complies

Application for Certification

(1) Manufacturer: Digital Monitoring Products, Inc
2500 North Partnership Boulevard
Springfield, MO 65802-6310

(2) Identification: Model: 1184 CO Detector
FCC I.D.: CCKPC0104 IC: 5251A-PC0104

(3) Instruction Book: Refer to Exhibit for Instruction Manual.

(4) Description of Circuit Functions: Refer to Operational Description Exhibit

(5) Block Diagram with Frequencies: Refer to Block Diagram Exhibit

(6) Report of Measurements: Report of measurements follows in this Report.

(7) Photographs: Construction, Component Placement, etc.: Refer to Exhibit for photographs of equipment.

(8) Peripheral equipment or accessories for the equipment. No optional equipment is available for the EUT. The available configuration options were investigated for this and other reports in compliance with required standards with worst-case data presented.

(9) Transition Provisions of 15.37 are not being requested.

(10) Equipment is not a scanning receiver and this section is not applicable.

(11) The equipment does not operate in the 59 – 64 GHz frequency band and this section is not applicable.

(12) The equipment is not software defined and this section is not applicable.

Statement of Modifications and Deviations

No modifications to the EUT were required for the equipment to demonstrate compliance with CFR47 Part 15C, or RSS-210 Emission Requirements. There were no deviations or modification to the specifications.

Equipment Tested

Equipment	Model, PN	Serial Number
(EUT)	1184 CO Detector	W3CO ENG1

Test results in this report relate only to the items tested.

Equipment Function and Testing Procedures

The EUT is a 902-928 MHz low power radio transmitter used to wirelessly interface remote sensor condition offering state/alarm conditions for use in an alarm panel installation. The equipment performs monitoring of installation conditions for use in fire/premises alarm system. The 1184 CO Detector is a transceiver offering wireless interface to the central control panel of the alarm system installation. The EUT wirelessly communicates with other compliant alarm equipment. The unit is marketed for use to incorporate a wireless link in an alarm system solution. Test software was installed in the test sample forcing continuous transmission. This function offered test personnel ability to test EUT for emissions and harmonics. Operation in this mode increases the typical duty cycle to 100 percent. Typical operation of equipment is below 0.01 percent duty cycle. The modified software allowed the transmitter to be set to transmit on specific channels as required for testing. The unit operates from replaceable internal battery power only offers no provision for connection to utility power systems. As requested by the manufacturer and required by regulations, the equipment was tested for emissions compliance using the available configurations with the worst-case data presented. Test results in this report relate only to the products described in this report.

Equipment and Cable Configurations

AC Line Conducted Emission Test Procedure

The EUT operates solely from direct current replaceable battery power and offers no provision for connection to utility AC power systems. Therefore, no AC line conducted emissions test was required of performed.

Radiated Emission Test Procedure

Testing for the radiated emissions was performed as defined in sections 8.3 and 13.4 of ANSI C63.4-2009. The EUT was arranged in the test configurations as shown above during testing. The test configuration was placed on a rotating 1 x 1.5-meter wooden platform 0.8 meters above the ground plane at a distance of 3 meters from the FSM antenna. EMI energy was maximized by equipment placement, raising and lowering the FSM antenna, changing the antenna polarization, and by rotating the turntable. Each emission was maximized before final data was taken using a spectrum analyzer. Refer to photographs in exhibits for EUT placement used during testing.

Environmental Conditions

Ambient Temperature	21.6° C
Relative Humidity	36%
Atmospheric Pressure	1027.0 mb

Units of Measurements

Conducted EMI	Data is in dBµV; dB referenced to one microvolt.
Radiated EMI	Data is in dBµV/m; dB/m referenced to one microvolt per meter.

Test Site Locations

Conducted EMI	The AC power line conducted emissions testing performed in a shielded screen room located at Rogers Labs, Inc., 4405 W. 259th Terrace, Louisburg, KS.
Radiated EMI	The radiated emissions tests were performed at the 3 meters, Open Area Test Site (OATS) located at Rogers Labs, Inc., 4405 W. 259th Terrace, Louisburg, KS.
Site Registration	Refer to Annex for FCC Site Registration Letter, # 90910, and Industry Canada Site Registration Letter, IC3041A-1.

List of Test Equipment

A Rohde & Schwarz ESU40 and/or Hewlett Packard 8591EM Spectrum Analyzer was used as the measuring device for the emissions testing of frequencies below 1 GHz. A Rohde & Schwarz ESU40 and/or Hewlett Packard 8562A Spectrum Analyzer was used as the measuring device for testing the emissions at frequencies above 1 GHz. The analyzer settings used are described in the following table. Refer to the appendix for a complete list of test equipment.

Analyzer Settings		
AC Line Conducted Emissions:		
RBW	AVG. BW	Detector Function
9 kHz	30 kHz	Peak/Quasi Peak
Radiated Emissions 26-1000 MHz		
RBW	AVG. BW	Detector Function
100 kHz	100 kHz	Peak
120 kHz	300 kHz	Peak/Quasi Peak
Radiated Emissions Above 1000 MHz		
RBW	Video BW	Detector Function
1 MHz	1 MHz	Peak / Average

Equipment	Manufacturer	Model	Calibration Date	Due
LISN	Comp. Design	FCC-LISN-2-MOD.CD	10/10	10/11
Antenna	ARA	BCD-235-B	10/10	10/11
Antenna	Sunol	JB6	10/10	10/11
Antenna	EMCO	3147	10/10	10/11
Antenna	EMCO	3143	5/11	5/12
Analyzer	HP	8591EM	5/11	5/12
Analyzer	HP	8562A	5/11	5/12
Analyzer	Rohde & Schwarz	ESU40	5/11	5/12

General Emissions (Unintentional Radiators)

AC Line Conducted EMI Procedure

The EUT operates solely from direct current replaceable battery power and offers no provision for connection to utility AC power systems. Therefore, no AC line conducted emissions test was required of performed.

Radiated EMI

The EUT was arranged in the test configuration emulating worst-case equipment configurations and operated through all various modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Radiated emissions measurements were performed to identify the frequencies, which produced the highest emissions. Plots were made of the worst-case radiated emission frequency spectrum from 30 MHz to 12,000 MHz for the preliminary testing. Refer to figures one through five showing plots of the worst-case radiated emissions spectrum taken in the screen room. Each radiated emission was then re-maximized at the OATS location before final radiated emissions measurements were performed. Final data was taken with the EUT located at the OATS at a distance of 3 meters between the EUT and the receiving antenna. The frequency spectrum from 32 kHz to 12,000 MHz was searched for radiated emissions. Measured emission levels were maximized by EUT placement on the table, rotating the turntable through 360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna position between horizontal and vertical polarization. Antennas used were Biconical, Broadband Biconilog, Log Periodic, and Double Ridge or Pyramidal Horns, notch filters and appropriate amplifiers were utilized.

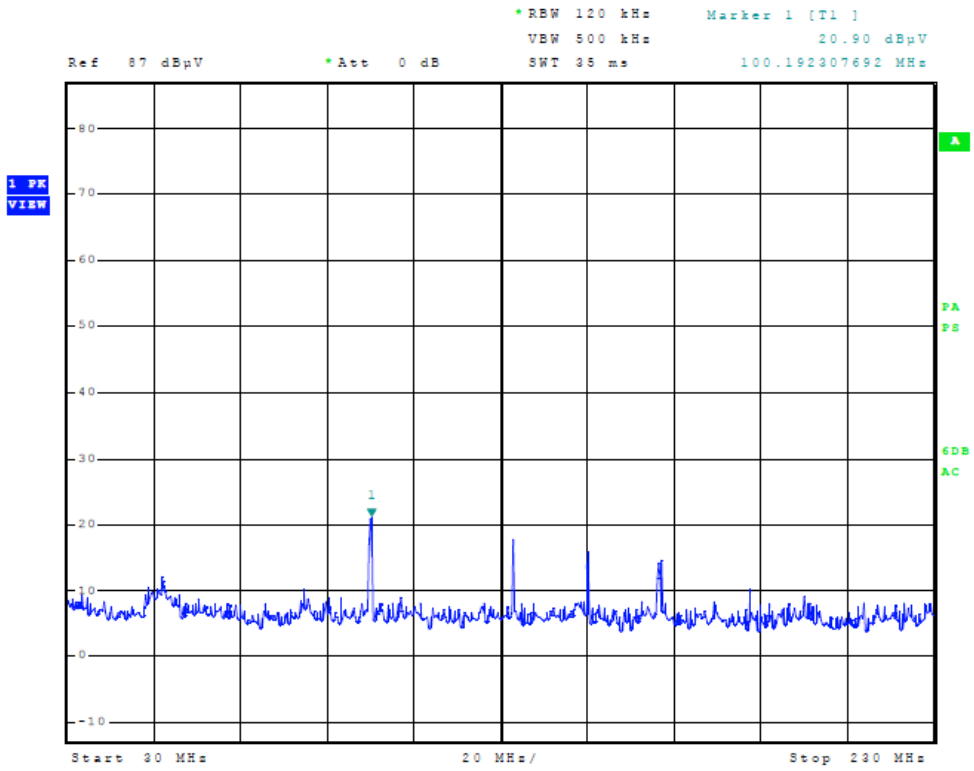

Figure One Plot of General Radiated Emissions

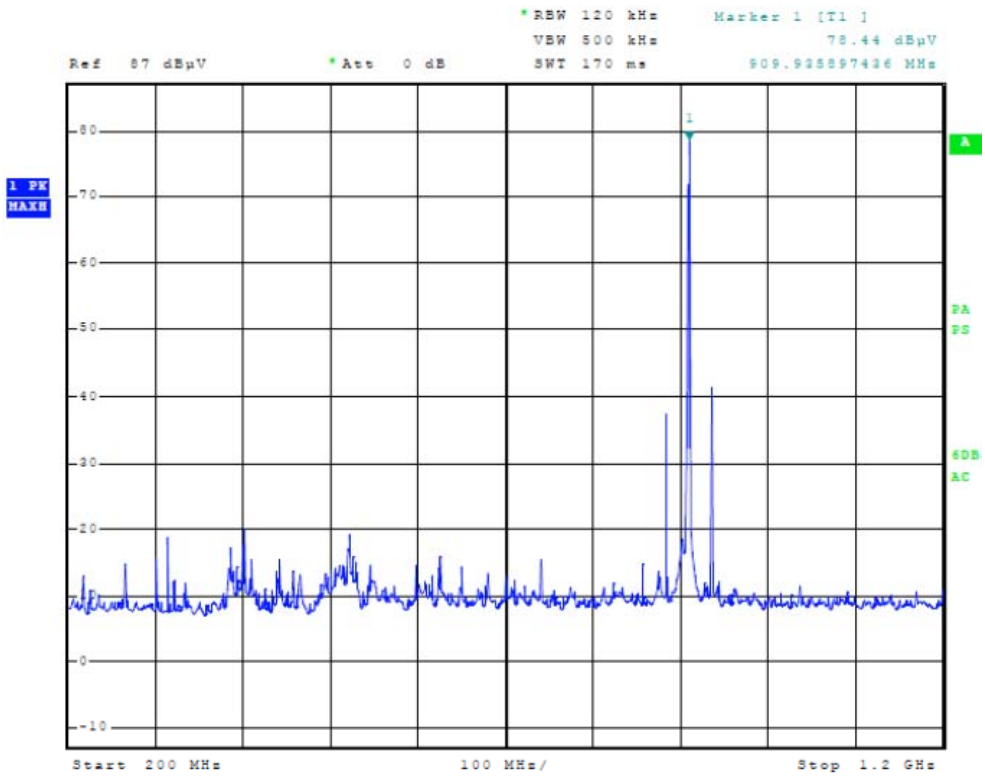

Figure Two Plot of General Radiated Emissions

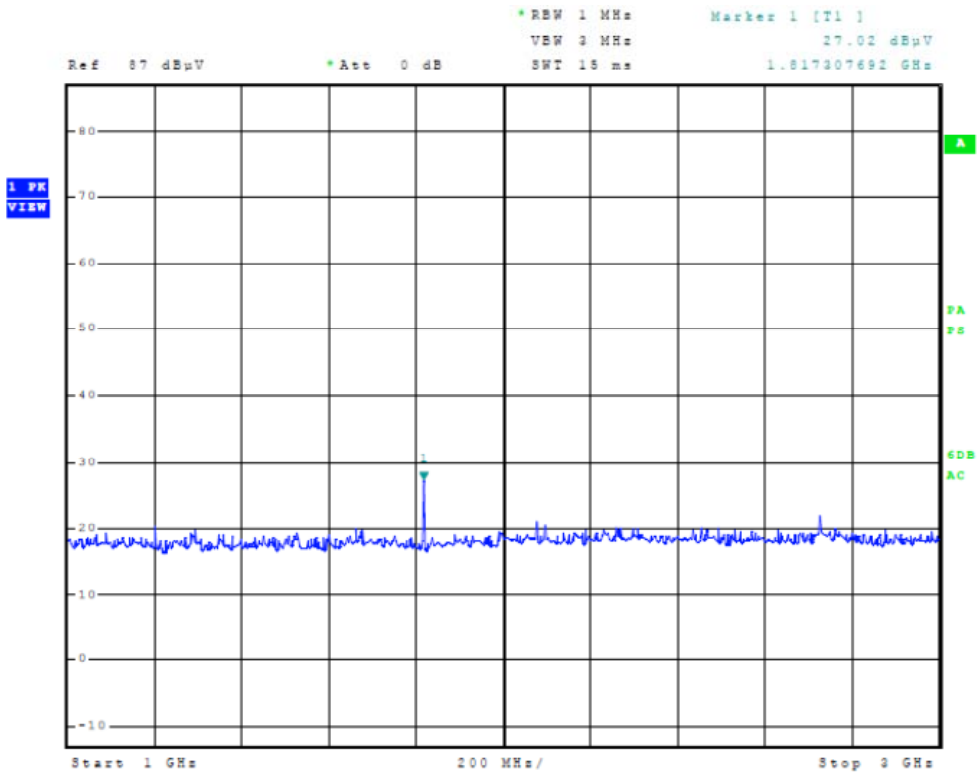

Figure Three Plot of General Radiated Emissions

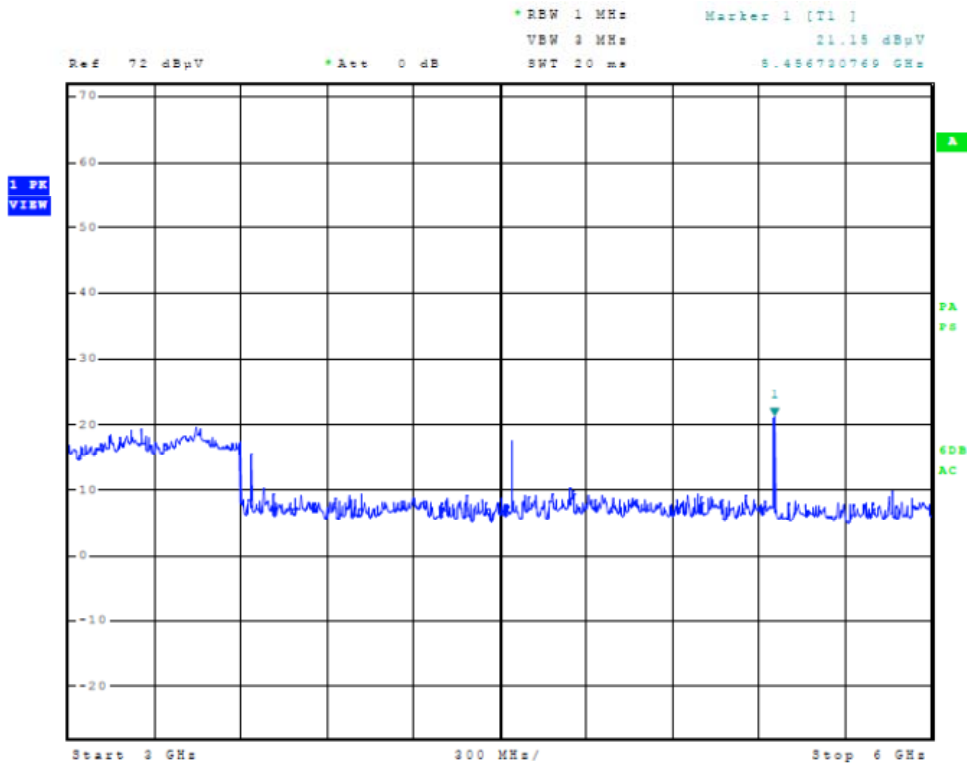

Figure Four Plot of General Radiated Emissions

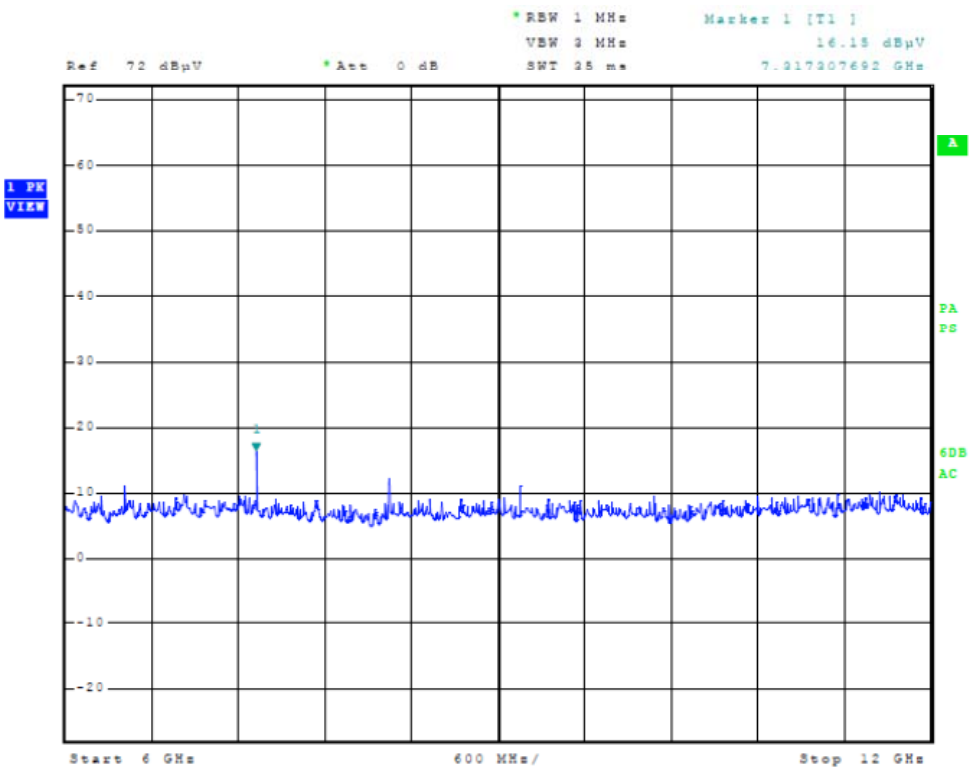

Figure Five Plot of General Radiated Emissions

General Radiated Emissions Data from EUT (Chip antenna)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Quasi-Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Quasi-Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)
100.0	34.5	25.8	N/A	31.1	24.1	N/A	43.5
132.9	25.7	18.5	N/A	22.5	15.7	N/A	43.5
150.0	25.6	20.3	N/A	21.6	13.1	N/A	43.5
166.3	23.3	14.1	N/A	21.0	12.1	N/A	43.5
824.2	30.2	25.1	N/A	32.3	27.3	N/A	46.0
882.7	31.9	26.2	N/A	37.2	31.4	N/A	46.0

Other emissions present had amplitudes at least 20 dB below the limit.
Peak and Quasi-Peak amplitude emissions are recorded above for frequency range of 26-1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

General Radiated Emissions Data from EUT (Wire Loop antenna)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Quasi-Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Quasi-Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)
100.0	35.3	26.7	N/A	31.4	25.3	N/A	43.5
132.9	24.6	18.1	N/A	28.9	18.3	N/A	43.5
150.0	27.3	20.8	N/A	23.5	14.3	N/A	43.5
166.3	30.2	16.0	N/A	22.8	13.7	N/A	43.5
824.2	31.6	27.0	N/A	33.2	30.6	N/A	46.0
882.7	31.5	25.7	N/A	39.1	31.8	N/A	46.0

Other emissions present had amplitudes at least 20 dB below the limit.
Peak and Quasi-Peak amplitude emissions are recorded above for frequency range of 26-1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Summary of Results for Radiated Emissions

The EUT demonstrated compliance with requirements of CFR47, and Industry Canada requirements. The EUT demonstrated a minimum margin of -14.2 dB below requirements. Other emissions were present with amplitudes at least 20 dB below the limit.

Intentional Radiators Emissions

As per CFR47 Part 15, Subpart C, paragraphs 15.203, 15.205, 15.209, 15.249 and RSS-210 the following information is submitted.

Antenna Requirements

The unit is produced with a permanently attached transmitter antenna and has no provision for user service, replacement, or antenna modification. Two versions were offered and tested, chip antenna or wire loop. The requirements for unique antenna are fulfilled and there are no deviations or exceptions to the specification.

Restricted Bands of Operation

Spurious emissions falling in the restricted frequency bands of operation were measured at a distance of three meters at the OATS. The EUT utilizes frequency, determining circuitry, which generates harmonics falling in the restricted bands. Emissions were checked at the OATS, using appropriate antennas or pyramidal horns, amplification stages, and a spectrum analyzer. No other significant emission was observed which fell into the restricted bands of operation.

Sample Calculation:

RFS (dBµV/m @ 3m)= FSM (dBµV) + Antenna Factor (dB/m) - Amplifier Gain (dB)

Radiated Emissions Data in Restricted Bands (Chip Antenna)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Quasi-Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Quasi-Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)
132.9	25.7	18.5	N/A	22.5	15.7	N/A	43.5
150.0	25.6	20.3	N/A	21.6	13.1	N/A	43.5
166.3	23.3	14.1	N/A	21.0	12.1	N/A	43.5
2710.0	34.0	N/A	22.8	34.1	N/A	21.4	54.0
2746.3	38.3	N/A	28.7	32.4	N/A	21.0	54.0
2780.1	35.4	N/A	25.6	34.2	N/A	22.9	54.0
3613.3	33.0	N/A	20.7	35.5	N/A	25.6	54.0
3661.8	34.0	N/A	22.0	36.7	N/A	25.3	54.0
3706.8	33.5	N/A	21.9	42.8	N/A	34.9	54.0
4516.7	35.5	N/A	23.8	39.7	N/A	29.9	54.0
4577.2	38.3	N/A	26.9	41.3	N/A	31.3	54.0
4633.5	36.9	N/A	26.7	45.3	N/A	37.0	54.0
5420.0	42.6	N/A	33.7	45.6	N/A	37.7	54.0

Other emissions present had amplitudes at least 20 dB below the limit.
Peak and Quasi-Peak amplitude emissions are recorded above for frequency range of 26-1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Radiated Emissions Data in Restricted Bands (Wire Loop Antenna)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Quasi-Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Quasi-Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)
132.9	24.6	18.1	N/A	28.9	18.3	N/A	43.5
150.0	27.3	20.8	N/A	23.5	14.3	N/A	43.5
166.3	30.2	16.0	N/A	22.8	13.7	N/A	43.5
2710.0	32.9	N/A	21.4	33.5	N/A	20.6	54.0
2746.3	36.2	N/A	26.2	33.1	N/A	20.3	54.0
2780.1	44.6	N/A	35.8	41.3	N/A	28.9	54.0
3613.3	33.1	N/A	21.5	33.0	N/A	20.8	54.0
3661.8	37.6	N/A	27.5	36.0	N/A	24.8	54.0
3706.8	44.5	N/A	31.5	44.1	N/A	30.8	54.0
4516.7	36.7	N/A	25.2	37.1	N/A	25.6	54.0
4577.2	41.0	N/A	31.1	45.0	N/A	36.8	54.0
4633.5	48.2	N/A	36.7	49.2	N/A	41.2	54.0
5420.0	43.6	N/A	35.5	45.0	N/A	31.4	54.0

Other emissions present had amplitudes at least 20 dB below the limit.
Peak and Quasi-Peak amplitude emissions are recorded above for frequency range of 26-1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Summary of Results for Radiated Emissions in Restricted Bands

The EUT demonstrated compliance with requirements of CFR47 15C, and Industry Canada RSS-210 requirements. The EUT demonstrated a minimum margin of -12.8 dB below requirements. Peak and Quasi-peak amplitudes of frequencies below 1000 MHz were measured and average and peak amplitudes of frequencies above 1000 MHz were measured for demonstration of compliance with the regulations. No other significant emissions where found in the restricted frequency bands. Other emissions were present with amplitudes at least 20 dB below the FCC Limits.

Operation in the Band 902 – 928 MHz

The power output was measured on an Open Area Test Site at a 3 meters distance. The EUT and test configurations were placed on a wooden turntable 0.8 meters above the ground plane at a distance of 3 meters from the FSM antenna. The peak and quasi-peak amplitude of the frequencies below 1000 MHz were measured using a spectrum analyzer. The peak and average amplitude of emissions above 1000 MHz including were measured using a spectrum analyzer. The test sample was rotated through 360 degrees and receive antenna raised and lowered between 1 and 4 meters to maximize emission measurement. Data was then recorded from the analyzer. Emissions radiated outside of the specified bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in 15.209 (and/or RSS-210), whichever is the lesser attenuation. Antennas used were Biconical, Broadband Biconilog, Log Periodic, and Double Ridge or Pyramidal Horns, notch filters and appropriate amplifiers. Emissions were measured in dBµV/m @ 3 meters. Refer to figures six through eleven showing the frequency and amplitude of emission displayed on the spectrum analyzer.

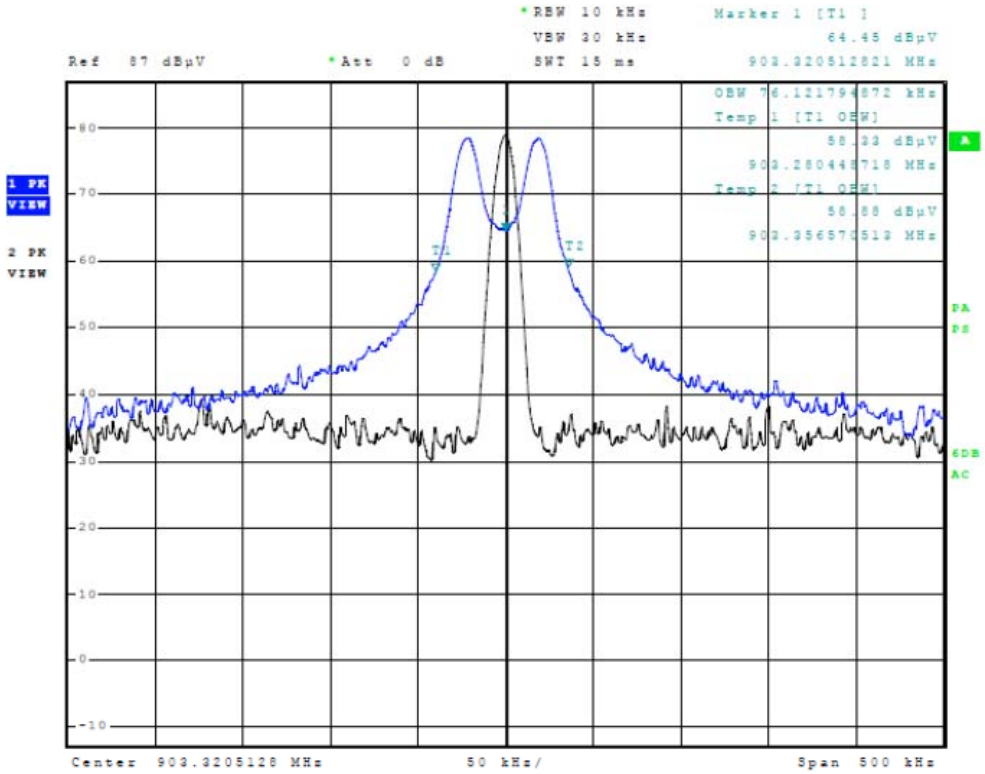

Figure Six Plot of Occupied Bandwidth (Low channel)

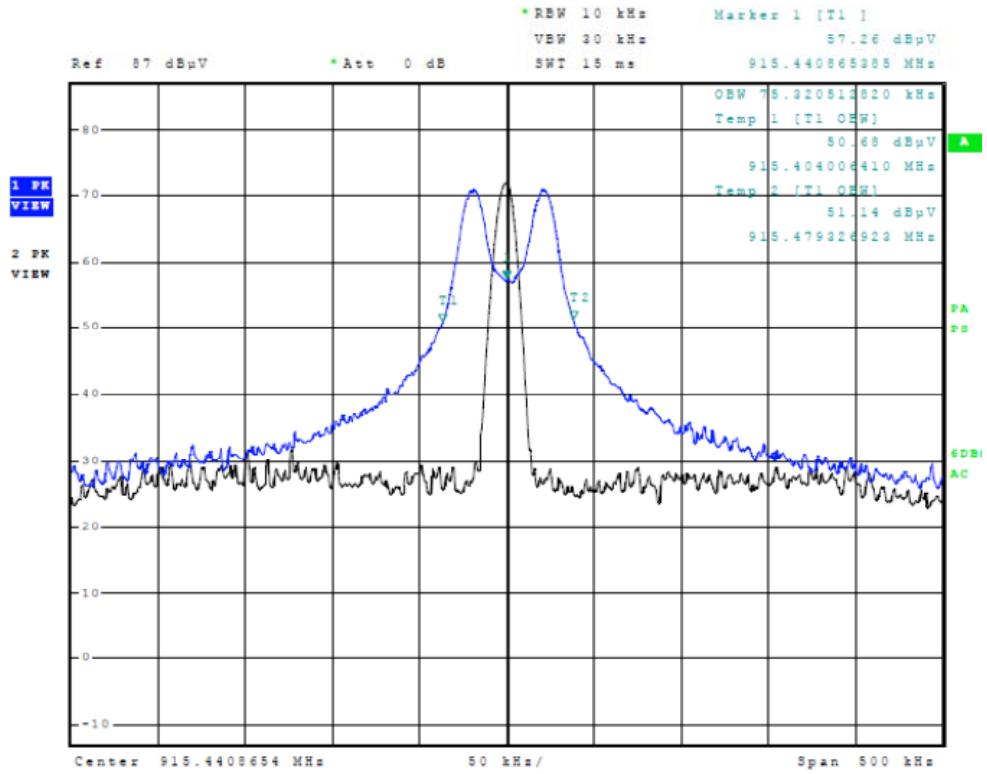

Figure Seven Plot of Occupied Bandwidth (Middle channel)

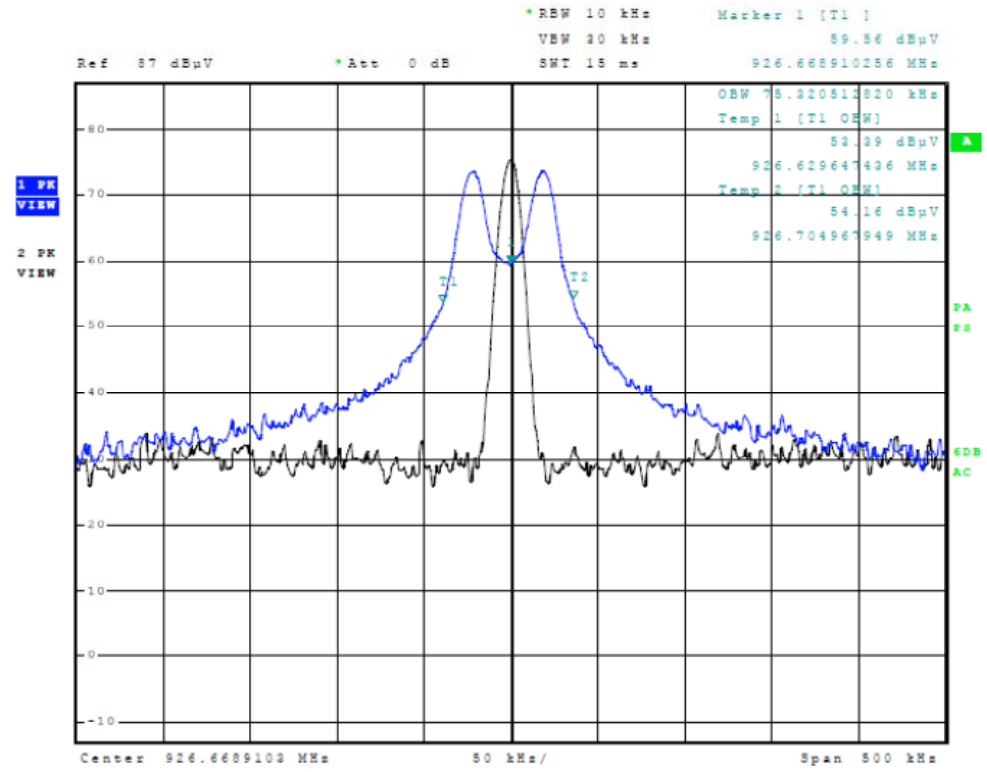

Figure Eight Plot of Occupied Bandwidth (High channel)

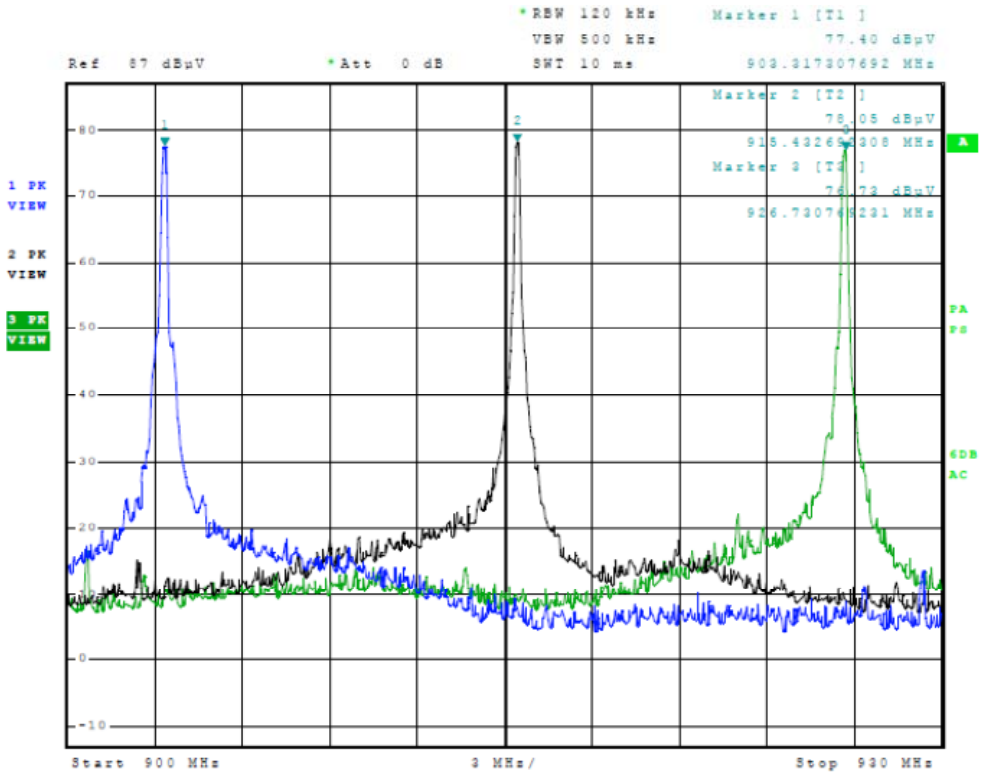

Figure Nine Plot of Transmitter Operation across frequency band

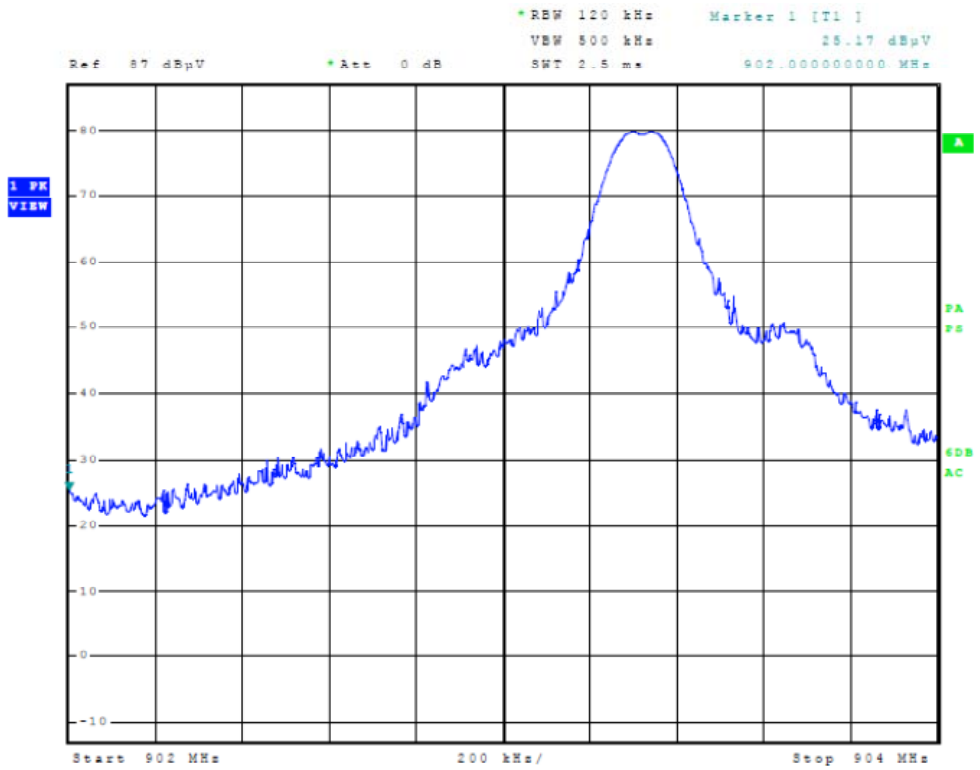

Figure Ten Plot of Low Frequency Band Edge

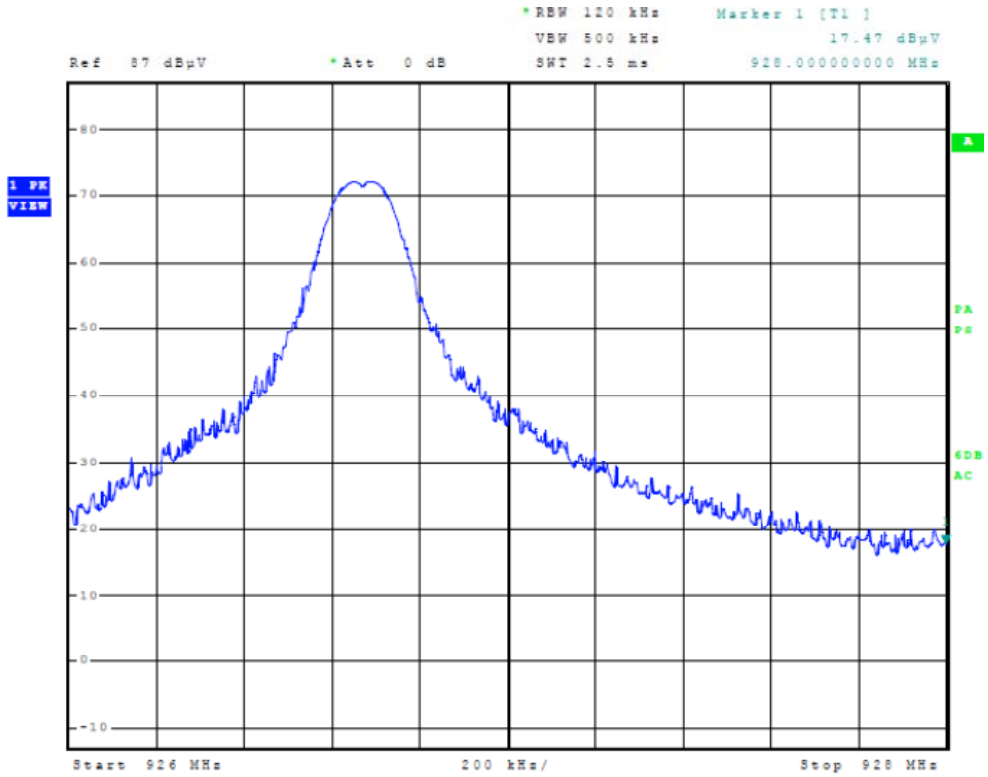

Figure Eleven High Frequency Band Edge

Transmitter Emissions Data

Transmitter Power and Occupied Bandwidth Data

Frequency MHz	Transmitter Output Power (dBµV/m at 3m)	Occupied Bandwidth kHz
Chip Antenna		
903.3	90.9	76.1
915.4	91.4	75.3
926.7	91.4	75.3
Wire Loop Antenna		
903.3	87.6	76.1
915.4	88.7	75.3
926.7	86.6	75.3

Transmitter Radiated Emissions (Chip Antenna)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal QP/Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical QP/Average (dBµV/m)	Limit @ 3m (dBµV/m)
903.3	91.8	90.9	89.8	88.9	94.0
1806.7	36.6	29.1	45.6	40.8	54.0
2710.0	34.0	22.8	34.1	21.4	54.0
3613.3	33.0	20.7	35.5	25.6	54.0
4516.7	35.5	23.8	39.7	29.9	54.0
5420.0	42.6	33.7	45.6	37.7	54.0
6323.3	41.7	30.6	45.7	37.8	54.0
915.4	91.9	91.4	89.2	88.3	94.0
1830.9	30.3	19.0	34.1	25.5	54.0
2746.3	38.3	28.7	32.4	21.0	54.0
3661.8	34.0	22.0	36.7	25.3	54.0
4577.2	38.3	26.9	41.3	31.3	54.0
5492.6	41.6	31.2	43.4	35.5	54.0
6408.1	39.2	31.6	46.1	37.4	54.0
926.7	91.7	91.4	90.2	89.8	94.0
1853.4	42.3	39.6	37.6	31.3	54.0
2780.1	35.4	25.6	34.2	22.9	54.0
3706.8	33.5	21.9	42.8	34.9	54.0
4633.5	36.9	26.7	45.3	37.0	54.0
5560.2	40.4	30.0	45.9	38.0	54.0
6486.9	42.1	31.8	45.1	36.5	54.0

Other emissions present had amplitudes at least 20 dB below the limit.
Quasi-Peak amplitude emissions are recorded above for frequency range of 26-1000 MHz.
Average amplitude emissions are recorded above for frequency range above 1000 MHz.
Note: Levels measured @ 3-meter OATS site.

Transmitter Radiated Emissions (Wire Loop Antenna)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal QP/Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical QP/Average (dBµV/m)	Limit @ 3m (dBµV/m)
903.3	87.7	87.6	82.9	82.8	94.0
1806.7	38.7	31.9	39.6	35.6	54.0
2710.0	32.9	21.4	33.5	20.6	54.0
3613.3	33.1	21.5	33.0	20.8	54.0
4516.7	36.7	25.2	37.1	25.6	54.0
5420.0	43.6	35.5	45.0	31.4	54.0
6323.3	39.1	26.2	39.6	27.3	54.0
915.4	88.8	88.7	82.4	80.3	94.0
1830.9	36.7	29.4	41.3	35.3	54.0
2746.3	36.2	26.2	33.1	20.3	54.0
3661.8	37.6	27.5	36.0	24.8	54.0
4577.2	41.0	31.1	45.0	36.8	54.0
5492.6	45.3	37.2	51.0	43.4	54.0
6408.1	44.9	36.0	44.7	36.3	54.0
926.7	86.7	86.6	83.1	83.0	94.0
1853.4	41.5	35.7	40.1	34.2	54.0
2780.1	44.6	35.8	41.3	28.9	54.0
3706.8	44.5	31.5	44.1	30.8	54.0
4633.5	48.2	36.7	49.2	41.2	54.0
5560.2	51.3	45.4	53.0	48.1	54.0
6486.9	48.9	38.8	48.8	38.9	54.0

Other emissions present had amplitudes at least 20 dB below the limit.
Quasi-Peak amplitude emissions are recorded above for frequency range of 26-1000 MHz. Average amplitude emissions are recorded above for frequency range above 1000 MHz.
Note: Levels measured @ 3-meter OATS site.

Summary of Results for Transmitter Radiated Emissions

The EUT demonstrated compliance with the requirements and specifications of CFR47 Part 15C and RSS-210 Intentional Radiators. The EUT demonstrated highest peak emission level of the fundamental of 91.9 dBµV/m, and average emission of 91.4 dBµV/m as measured at 3 meters. The EUT demonstrated a minimum margin of -5.9 dB below limits for the harmonic emissions. There were no other measurable emissions greater than 20 dB below requirements than those recorded in this report. There are no deviations or exceptions to the requirements.

Receiver Spurious Emissions

Receivers which provide terminals for the connection of an external receiving antenna may be tested to demonstrate compliance with the antenna terminals shielded and terminated with a termination equal to the impedance specified for the antenna, provided these receivers also comply with the following: With the receiver antenna terminal connected to a resistive termination equal to the impedance specified or employed for the antenna, the power at the antenna terminal at any frequency within the range of measurements specified shall not exceed 2.0 nanowatts (-57 dBm). The EUT incorporates an integral antenna system in production equipment. The EUT offers no provision for antenna port conduction measurements. The frequency spectrum was investigated and plots produced of the radiated emissions of the receiver with the worst case data presented. Refer to figures twelve through sixteen showing the spectrum analyzer display of worst-case receiver radiated emissions. Worst-case receiver radiated emissions were tested at 3 meter OATS. Data presented below demonstrates compliance with regulations.

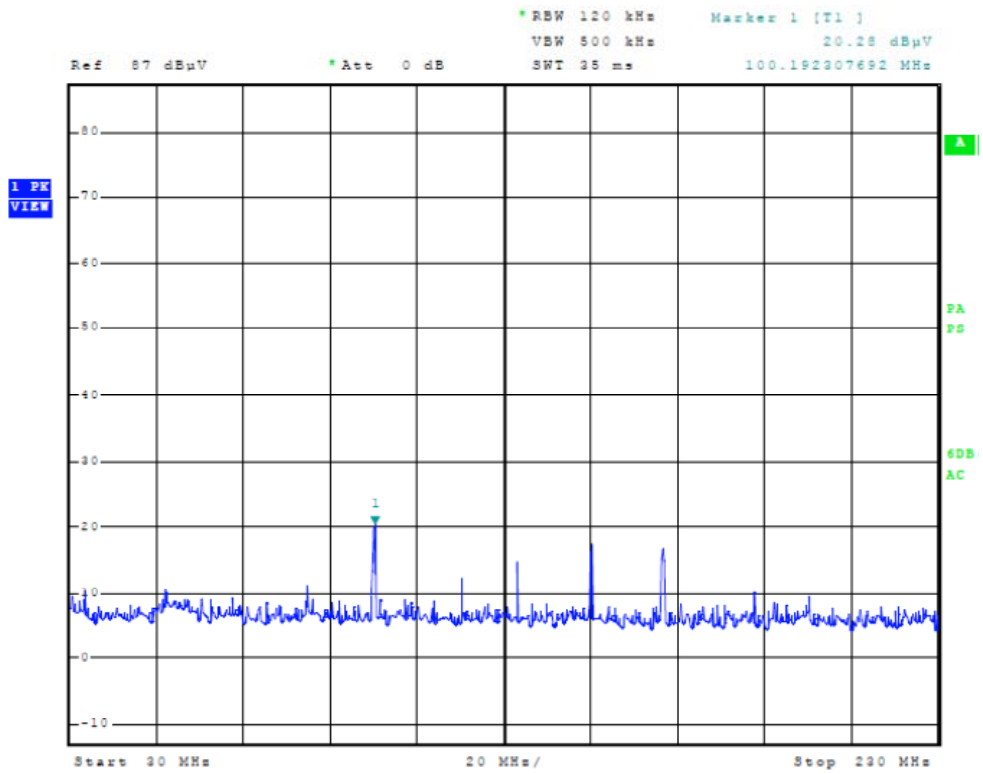

Figure Twelve Plot of Receiver Radiated Emissions

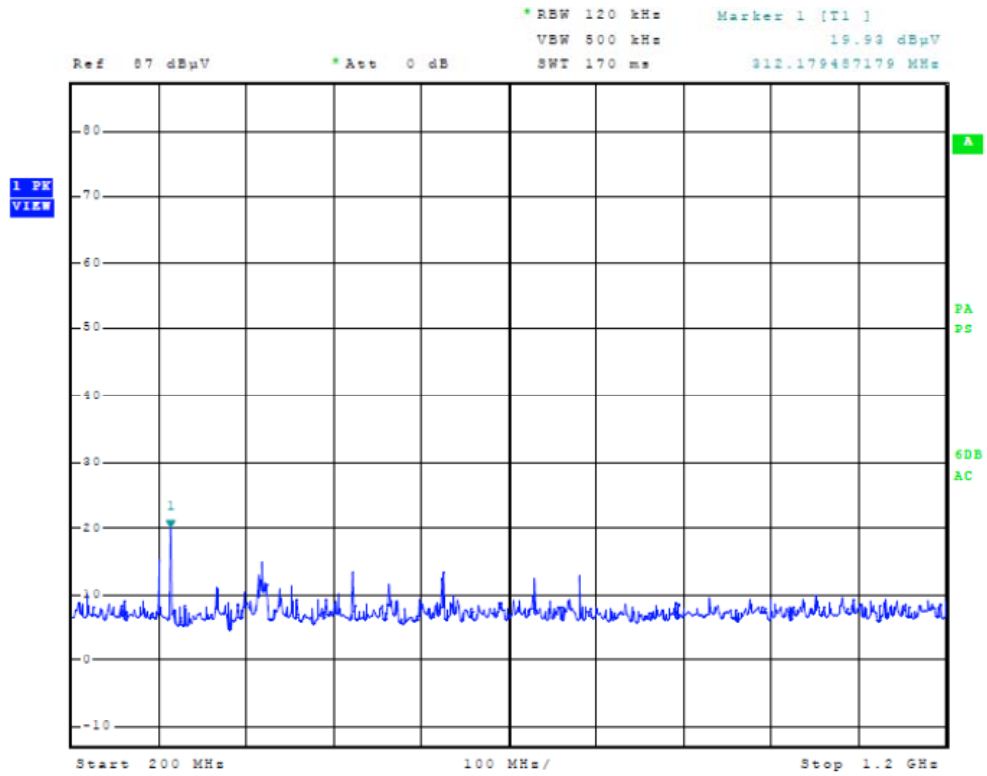

Figure Thirteen Plot of Receiver Radiated Emissions

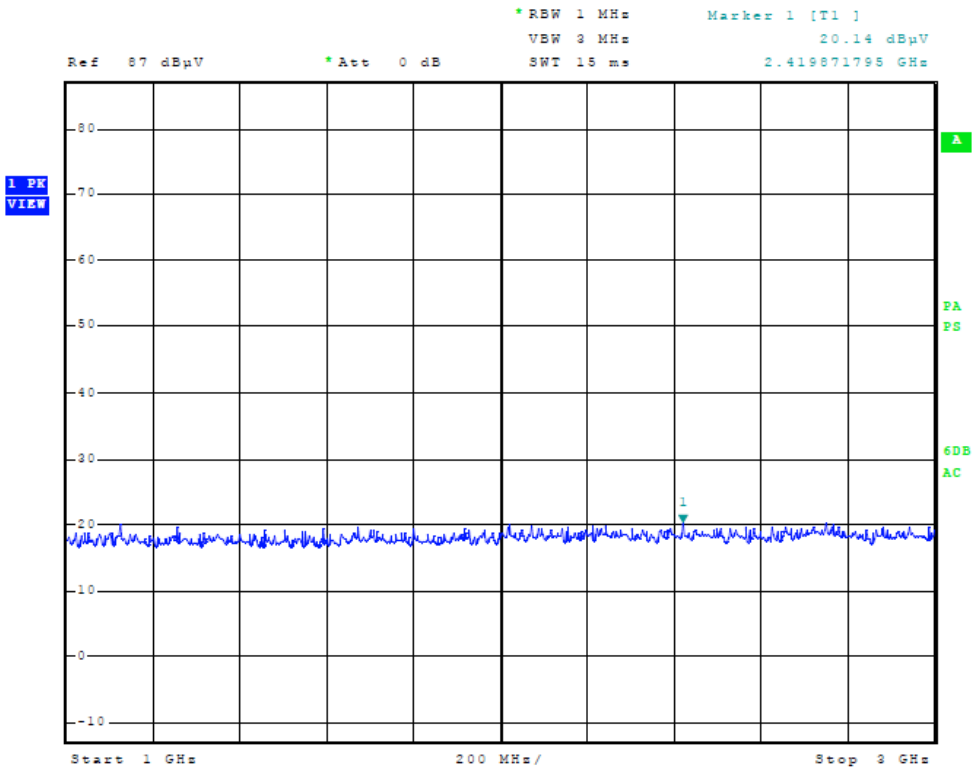

Figure Fourteen Plot of Receiver Radiated Emissions

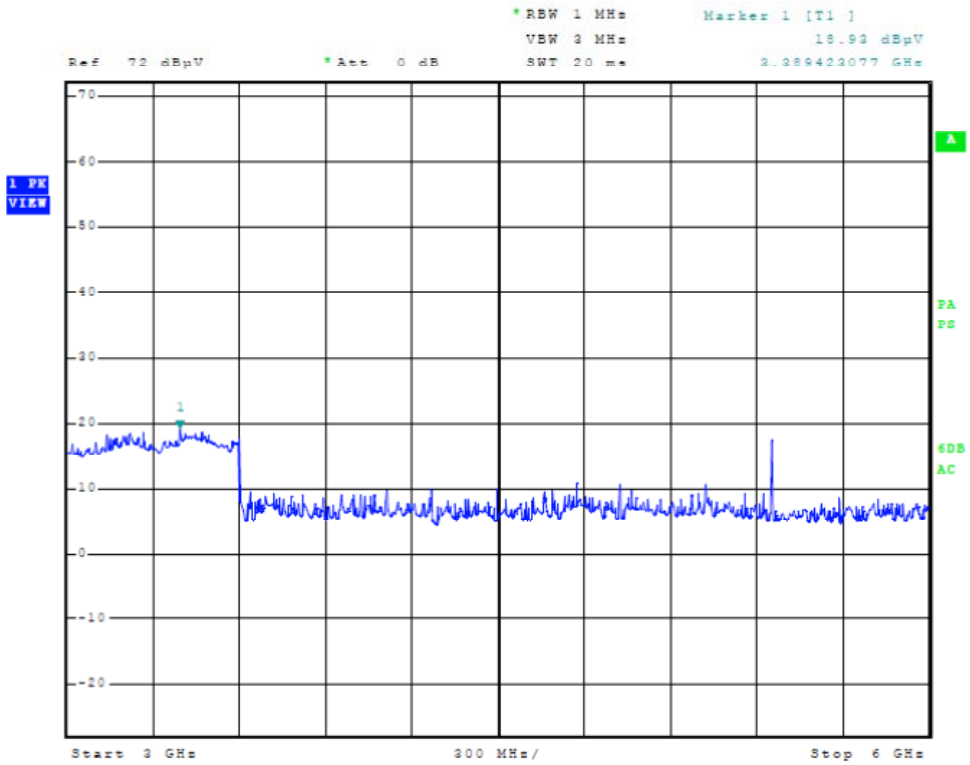

Figure Fifteen Plot of Receiver Radiated Emissions

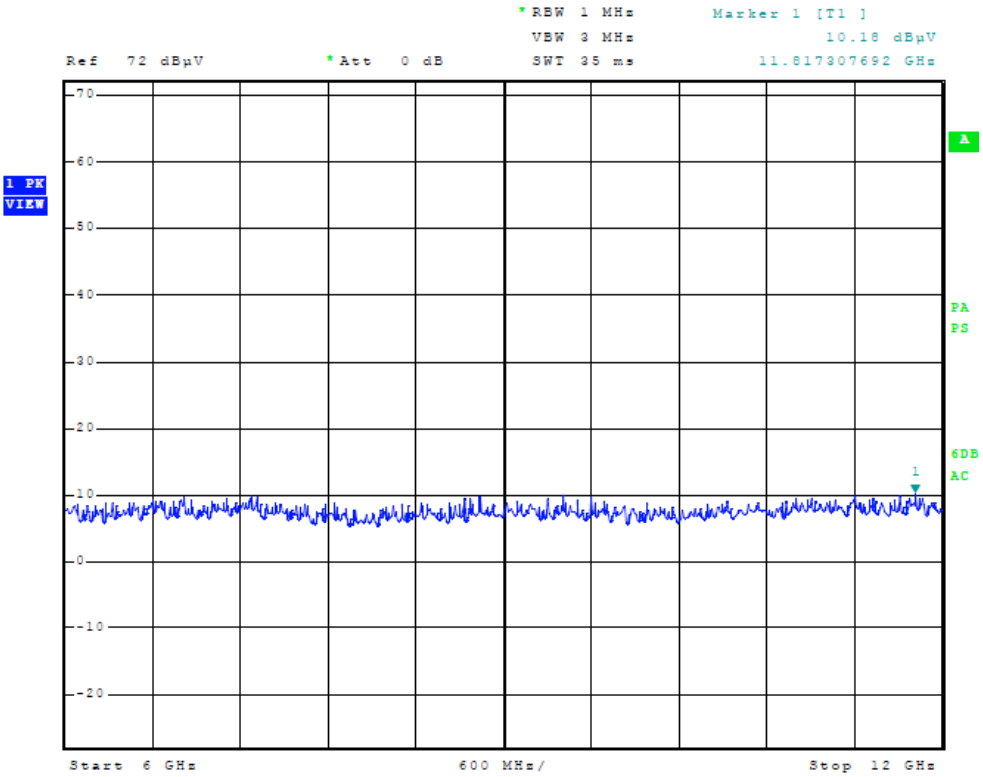

Figure Sixteen Plot of Receiver Radiated Emissions

Receiver Radiated Emissions Data

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Quasi-Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Quasi-Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)
100.0	32.9	25.9	N/A	32.8	26.0	N/A	43.5
132.9	25.3	18.5	N/A	33.2	16.4	N/A	43.5
150.0	25.7	21.1	N/A	33.0	17.3	N/A	43.5
166.3	23.0	14.3	N/A	32.3	13.9	N/A	43.5
937.6	24.9	19.6	N/A	30.2	28.0	N/A	46.0
5451.3	38.6	N/A	33.7	38.6	N/A	34.1	54.0

Other emissions present had amplitudes at least 20 dB below the limit.
Peak and Quasi-Peak amplitude emissions are recorded above for frequency range of 26-1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Summary of Results for Receiver Emissions

The EUT demonstrated compliance with the radiated emissions requirements of CFR 47 Part 15B and RSS-GEN with a minimum -17.5 dB margin below requirements. Other emissions were present with amplitudes at least 20 dB below the CFR 47 and RSS-GEN limits.

Annex

- Annex A Measurement Uncertainty Calculations
- Annex B Rogers Labs Test Equipment List
- Annex C Rogers Qualifications
- Annex D FCC Test Site Registration Letter
- Annex E Industry Canada Test Site Registration Letter

Annex A Measurement Uncertainty Calculations

Radiated Emissions Measurement Uncertainty Calculation

Measurement of vertically polarized radiated field strength over the frequency range 30 MHz to 1 GHz on an open area test site at 3m and 10m includes following uncertainty:

Contribution	Probability Distribution	Uncertainty (dB)
Antenna factor calibration	normal (k = 2)	±0.58
Cable loss calibration	normal (k = 2)	±0.2
Receiver specification	rectangular	±1.0
Antenna directivity	rectangular	±0.1
Antenna factor variation with height	rectangular	±2.0
Antenna factor frequency interpolation	rectangular	±0.1
Measurement distance variation	rectangular	±0.2
Site Imperfections	rectangular	±1.5

Combined standard uncertainty $u_c(y)$ is

$$U_c(y) = \pm \sqrt{\left[\frac{1.0}{2}\right]^2 + \left[\frac{0.2}{2}\right]^2 + \left[\frac{1.0^2 + 0.1^2 + 2.0^2 + 0.1^2 + 0.2^2 + 1.5^2}{3}\right]}$$

$U_c(y) = \pm 1.6$ dB

It is probable that $u_c(y) / s(q_k) > 3$, where $s(q_k)$ is estimated standard deviation from a sample of n readings unless the repeatability of the EUT is particularly poor, and a coverage factor of k = 2 will ensure that the level of confidence will be approximately 95%, therefore:

$$s(q_k) = \sqrt{\frac{1}{(n-1)} \sum_{k-1}^{n} (q_k - \bar{q})^2}$$

$U = 2\ U_c(y) = 2 \times \pm 1.6$ dB $= \pm 3.2$ dB

Notes:

1.1 Uncertainties for the antenna and cable were estimated, based on a normal probability distribution with k = 2.

1.2 The receiver uncertainty was obtained from the manufacturer's specification for which a rectangular distribution was assumed.

1.3 The antenna factor uncertainty does not take account of antenna directivity.

1.4 The antenna factor varies with height and since the height was not always the same in use as when the antenna was calibrated an additional uncertainty is added.

1.5 The uncertainty in the measurement distance is relatively small but has some effect on the received signal strength. The increase in measurement distance as the antenna height is increased is an inevitable consequence of the test method and is therefore not considered a contribution to uncertainty.

1.6 Site imperfections are difficult to quantify but may include the following contributions:
-Unwanted reflections from adjacent objects.
-Ground plane imperfections: reflection coefficient, flatness, and edge effects.
-Losses or reflections from "transparent" cabins for the EUT or site coverings.
-Earth currents in antenna cable (mainly effect Biconical antennas).

The specified limits for the difference between measured site attenuation and the theoretical value (± 4 dB) were not included in total since the measurement of site attenuation includes uncertainty contributions already allowed for in this budget, such as antenna factor.

Conducted Measurements Uncertainty Calculation

Measurement of conducted emissions over the frequency range 9 kHz to 30 MHz includes following uncertainty:

Contribution	Probability Distribution	Uncertainty (dB)
Receiver specification	rectangular	±1.5
LISN coupling specification	rectangular	±1.5
Cable and input attenuator calibration	normal (k=2)	±0.5

Combined standard uncertainty $u_c(y)$ is

$$U_c(y) = \pm \sqrt{\left[\frac{0.5}{2}\right]^2 + \frac{1.5^2 + 1.5^2}{3}}$$

$U_c(y) = \pm 1.2$ dB

As with radiated field strength uncertainty, it is probable that $u_c(y) / s(q_k) > 3$ and a coverage factor of k = 2 will suffice, therefore:

$U = 2\ U_c(y) = 2 \times \pm 1.2$ dB $= \pm 2.4$ dB

Annex B Rogers Labs Test Equipment List

List of Test Equipment	Calibration Date
Spectrum Analyzer: Rohde & Schwarz ESU40	5/11
Spectrum Analyzer: HP 8562A, HP Adapters: 11518, 11519, and 11520 Mixers: 11517A, 11970A, 11970K, 11970U, 11970V, 11970W	5/11
Spectrum Analyzer: HP 8591EM	5/11
Antenna: EMCO Biconilog Model: 3143	5/11
Antenna: Sunol Biconilog Model: JB6	10/10
Antenna: EMCO Log Periodic Model: 3147	10/10
Antenna: Antenna Research Biconical Model: BCD 235	10/10
LISN: Compliance Design Model: FCC-LISN-2.Mod.cd, 50 µHy/50 ohm/0.1 µf	10/10
R.F. Preamp CPPA-102	10/10
Attenuator: HP Model: HP11509A	10/10
Attenuator: Mini Circuits Model: CAT-3	10/10
Attenuator: Mini Circuits Model: CAT-3	10/10
Cable: Belden RG-58 (L1)	10/10
Cable: Belden RG-58 (L2)	10/10
Cable: Belden 8268 (L3)	10/10
Cable: Time Microwave: 4M-750HF290-750	10/10
Cable: Time Microwave: 10M-750HF290-750	10/10
Frequency Counter: Leader LDC825	2/11
Oscilloscope Scope: Tektronix 2230	2/11
Wattmeter: Bird 43 with Load Bird 8085	2/11
Power Supplies: Sorensen SRL 20-25, SRL 40-25, DCR 150, DCR 140	2/11
R.F. Generators: HP 606A, HP 8614A, HP 8640B	2/11
R.F. Power Amp 65W Model: 470-A-1010	2/11
R.F. Power Amp 50W M185- 10-501	2/11
R.F. Power Amp A.R. Model: 10W 1010M7	2/11
R.F. Power Amp EIN Model: A301	2/11
LISN: Compliance Eng. Model 240/20	2/11
LISN: Fischer Custom Communications Model: FCC-LISN-50-16-2-08	2/11
Antenna: EMCO Dipole Set 3121C	2/11
Antenna: C.D. B-101	2/11
Antenna: Solar 9229-1 & 9230-1	2/11
Antenna: EMCO 6509	2/11
Audio Oscillator: H.P. 201CD	2/11
Peavey Power Amp Model: IPS 801	2/11
ELGAR Model: 1751	2/11
ELGAR Model: TG 704A-3D	2/11
ESD Test Set 2010i	2/11
Fast Transient Burst Generator Model: EFT/B-101	2/11
Field Intensity Meter: EFM-018	2/11
KEYTEK Ecat Surge Generator	2/11
Shielded Room 5 M x 3 M x 3.0 M	

Annex C Rogers Qualifications

Scot D. Rogers, Engineer

Rogers Labs, Inc.

Mr. Rogers has approximately 17 years experience in the field of electronics. Work experience includes six years working in the automated controls industry and remaining years working with the design, development and testing of radio communications and electronic equipment.

Positions Held:

Systems Engineer: A/C Controls Mfg. Co., Inc. 6 Years

Electrical Engineer: Rogers Consulting Labs, Inc. 5 Years

Electrical Engineer: Rogers Labs, Inc. Current

Educational Background:

1) Bachelor of Science Degree in Electrical Engineering from Kansas State University

2) Bachelor of Science Degree in Business Administration Kansas State University

3) Several Specialized Training courses and seminars pertaining to Microprocessors and Software programming.

NVLAP Lab Code 200087-0

Annex D FCC Test Site Registration Letter

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

May 18, 2010

Registration Number: 90910

Rogers Labs, Inc.
4405 West 259th Terrace,
Louisburg, KS 66053

Attention: Scot Rogers,

Re: Measurement facility located at Louisburg
~~3 & 10 meter site~~
Date of Renewal: May 18, 2010

Dear Sir or Madam:

Your request for renewal of the registration of the subject measurement facility has been received. The information submitted has been placed in your file and the registration has been renewed. The name of your organization will remain on the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Phyllis Parrish
Industry Analyst

NVLAP Lab Code 200087-0

Annex E Industry Canada Test Site Registration Letter

Industry Canada Industrie Canada

May 26, 2010

OUR FILE: 46405-3041
Submission No: 140719

Rogers Labs Inc.
4405 West 259th Terrace
Louisburg, KY, 66053
USA

Attention: Mr. Scot D. Rogers

Dear Sir/Madame:

The Bureau has received your application for the renewal of a 3/10m OATS. Be advised that the information received was satisfactory to Industry Canada. The following number(s) is now associated to the site(s) for which registration / renewal was sought **(3041A-1).** Please reference the appropriate site number in the body of test reports containing measurements performed on the site. In addition, please keep for your records the following information;

- Your primary code is: **3041**

- The company number associated to the site(s) located at the above address is: **3041A**

Furthermore, to obtain or renew a unique site number, the applicant shall demonstrate that the site has been accredited to ANSI C63.4-2003 or later. A scope of accreditation indicating the accreditation by a recognized accreditation body to ANSI C63.4-2003 or later shall be accepted. Please indicate in a letter the previous assigned site number if applicable and the type of site (example: 3 metre OATS or 3 metre chamber). If the test facility is not accredited to ANSI C63.4-2003 or later, the test facility shall submit test data demonstrating full compliance with the ANSI standard. The Bureau will evaluate the filing to determine if recognition shall be granted.

The frequency for re-validation of the test site and the information that is required to be filed or retained by the testing party shall comply with the requirements established by the accrediting organization. However, in all cases, test site re-validation shall occur on an interval not to exceed two years. There is no fee or form associated with an OATS filing. OATS submissions are encouraged to be submitted electronically to the Bureau using the following URL;
http://strategis.ic.gc.ca/epic/internet/inceb-bhst.nsf/en/h_tt00052e.html.

If you have any questions, you may contact the Bureau by e-mail at certification.bureau@ic.gc.ca Please reference our file and submission number above for all correspondence.

Yours sincerely,

Dalwinder Gill

Dalwinder Gill
For: Wireless Laboratory Manager
Certification and Engineering Bureau
3701 Carling Ave., Building 94
P.O. Box 11490, Station "H"
Ottawa, Ontario K2H 8S2
Email: dalwinder.gill@ic.gc.ca
Tel. No. (613) 998-8363
Fax. No. (613) 990-4752