

JSF Technologies

School Zone

Flasher

Report of Measurements

per

Industry Canada RSS-210 Issue 6 Annex 8

and

FCC CFR47 Part 15/B; FCC CFR47 Part 15/C – 15.247

Revision 1.1

May 18, 2006

Approved by		
Checked by	Robert Stirling, P.Eng.	Date

Protocol Datasystems Labs, Abbotsford BC, Canada
FCC Registration Number 96437
Industry Canada Registration Number IC3384

Index

Section I: Information for Test Report of Measurements.....3

Section II: Report of Measurements for IC RSS-210 Iss.6 & FCC CFR47 Part 15/B.....5

Section III: Report of Measurements for MIC RSS-210 Issue 6 Annex 8 - Emissions Testing6

Part 1 - Radiated Emission Testing in Idle and Receive Mode.....7

Part 2 - Radiated Emissions – Transmit Mode8

Part 3 - Output Power and EIRP Emissions9

Section IV: Report of Measurements for FCC CFR47 Part 15/C.....10

Part 1 - Radiated Emission Testing11

Part 2 - Antenna Requirement - 15.203.....12

Part 3 - Frequency Hopping Spread Spectrum Operation - 15.247.....13

Appendix A: Emission Data and Plots.....15

Appendix B: EUT Photos20

Section I: Information for Test Report of Measurements

Testing Details

TESTED BY: David Johanson

TEST CONDITIONS: Temperature and Humidity: January 3, 2006 5.1°C, 53%
January 4, 2006 7.5°C, 52%
January 5, 2006 9.2°C, 57%

TEST VOLTAGE: 4Vdc via Power supply built from Solar Power Array

Test Facilities

Protocol Datasystem Inc., Labs
28945 McTavish Rd.
Abbotsford BC, Canada, V4X 2E7

FCC Registration Number 96437
Industry Canada Registration Number IC3384

Test Equipment List

EMISSIONS:

Manufacturer	Model	Equipment Description	Serial No.	Last Cal	Next Cal
HP	85650A	CDN Quasi-Peak Adapter	2043A00240	22/03/05	22/03/06
HP	85662A	Spectrum Analyzer Display	2318A05184	22/03/05	22/03/06
HP	8566B	Spectrum Analyzer RF Section	2241A02102	22/03/05	22/03/06
HP	85685A	RF-Preselector	3107A01222	22/03/05	22/03/06
A.H. Systems	SAS-200/510	Antenna Log Periodic	761	04/03/05	04/03/06
EMCO	3105	Antenna DRG Horn (Med)	2024	25/02/05	25/02/06
LaPlace Instruments	AC1000	Low Distortion Power Source	138041	12/12/05	12/12/06
Thurlby Thandar	HA1600	Power and Harmonics Analyzer	140108	13/12/05	13/12/06
EMCO	3825 2	LISN(25A 50ohm 50/250uH 10k-100M)	9509-2470	20/07/05	20/07/06
EMCO	3110B	Antenna Biconical (Type 3)	9401-1850	01/03/05	01/03/06
Rhientech	Custom	Antenna Mast	N/A	N/A	N/A
Protocol EMC	Custom	Turntable	N/A	N/A	N/A

Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Total RF power, conducted	± 1.5 dB
RF power density, conducted	± 3 dB
spurious emissions, conducted	± 3 dB
all emissions, radiated	± 6 dB
temperature	$\pm 1^\circ\text{C}$
humidity	± 5 %
DC and low frequency voltages	± 3 %

Company Tested:

NAME: JSF Technologies
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Saanichton, BC V8m 1Z8
CONTACT: Mr. Stan Polyakov
EMAIL: spolyakov@jstechnologies
NUMBER: 250-544-1440

Equipment Under Test

THE TEST SYSTEM: EUT: School Zone Flasher
Manufacturer: JSF Technologies
Part Number: SZF
Serial Number: ENG 001

TEST VOLTAGE: Internal Battery Pack (Solar Panel recharge system)

CABLING:

Cable	Pins	Connector	Load/Termination	Shielded	Ferrites
Test-Led	2X22 AWG	Screw Terminal	No	No	No
Test-Switch	2X22 AWG	Screw Terminal	No	No	No

CONCLUSION: The School Zone Flasher complies with the requirements of FCC CFR47 Part 15/B, FCC CFR47 Part 15/C and Industry Canada RSS-210 Issue 6 Annex 8 a Category I device.

Section II: Report of Measurements for IC RSS-210 Iss.6 & FCC CFR47 Part 15/B

This product is License Exempt for both FCC and IC. There is a requirement for this product to be submitted for certification and requires both an FCC ID and an IC ID number to be added to the labels in accordance with FCC CFR47 Part 2 subpart J (2.901 to 2.956) as well as IC Self-Marking and RSS-Gen standards.

Markings

According to FCC Section 15.19, and ICES 003, a statement similar to the following must be included on an identification label, which also uniquely identifies the manufactured date, either explicitly or through a serial number etc.:

"This equipment complies with FCC Rules, Part 15 and Industry Canada's ICES 003 for a Class A Digital Device. Operation is subject to two conditions:

- 1) This device may not cause harmful interference, and
- 2) This device must accept any interference that may cause any undesired operation"

Additionally, If the manufacturer markets product to Quebec, the following supplemental information should be added to the label:

"Cet Appareil numerique de la Classe A respecte toutes les exigences du Reglement sur le material brouilleur du Canada."

User Manual Statements

According to FCC Section 15.105, the following statement must be included in a prominent location your User's Manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

It is also required according to FCC Section 15.21, that a caution is included such as:

Caution: Changes or modifications to this equipment, not expressly approved by the manufacturer could void the user's authority to operate the equipment.

According to IC RSS-Gen, the following statements must be included in a prominent location your User's Manual:

The user manual of transmitter devices equipped with detachable antennas shall contain the following information in a conspicuous location:

"This device has been designed to operate with the antennas listed below, and having a maximum gain of [x] dB. Antennas not included in this list or having a gain greater than [x] dB are strictly prohibited for use with this device. The required antenna impedance is [y] ohms."

Equipment manufacturers shall provide proper values of x and y to comply with the applicable RSS. Immediately following the above statement, the manufacturer shall provide a list of all antennas acceptable for use with the transmitter.

User manuals for licence-exempt Low-Power radiocommunication Devices (LPDs) shall contain the following or equivalent statements in a conspicuous position:

"Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device."

If the antenna is detachable (i.e. selectable by the user), see the user manual requirement in RSS-Gen Section 7.1.4., the following instructions in the user manual are also required:

"To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication."

The above statements may be placed on the device instead of in the manual.

Section III: Report of Measurements for MIC RSS-210 Issue 6

Annex 8 - Emissions Testing

Test Results - Summary

Testing was performed pursuant to Industry Canada RSS-Gen and RSS-210 Issue 6 Annex 8.

Test	Standard	Description	Result
Radiated Emissions Idle/Receive Mode	RSS-Gen (6)(a)	The radiated emissions are measured in the 30-1000Mhz range (same as FCC Class B Limits	Complies
Conducted Emissions Idle/Receive Mode	RSS-Gen (7.2.2)	The Conducted Emissions are measured on the phase and Neutral Power lines in the 0.15 - 30.0 MHz range. (same as FCC Class B Limits	N/R
Radiated Emissions Transmit Mode	RSS-210 (A8.5)	The radiated emissions are measured in the 30-10000Mhz range	Complies
Conducted Emissions Transmit Mode	RSS-Gen (7.2.2)	The Conducted Emissions are measured on the phase and Neutral Power lines in the 0.15 - 30.0 MHz range (same as FCC Class B Limits	N/R
Output Power and EIRP Emissions	RSS-210 (A8.4))	Output power shall not exceed 1.0 Watt	Complies

Part 1 - Radiated Emission Testing in Idle and Receive Mode

DATE: January 3 - 5, 2006

TEST STANDARD: RSS-Gen (6)(a)

TEST VOLTAGE: Internal Battery Pack (Solar Panel recharge system)

MINIMUM STANDARD: (Same as FCC Class B Limit):

Frequency	Maximum Field Strength	Maximum Field Strength
(MHz)	$\mu\text{V/m}$ at 3 m	$\text{dB}\mu\text{V/m}$ at 3 m
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0
Note 1. The lower limit shall apply at the transition frequency		

METHOD OF MEASUREMENT: The equipment was set up in a 10-meter open field test site; Tests were performed at 3 meters. Testing was performed using the manufacturer's specified normal cabling configuration, with all cables over 1 meter in length bundled at 1 meter and retained from the floor. A typical application was tested.

Emissions in both horizontal and vertical polarization's were measured while rotating the EUT on a turntable to maximize the emissions signal strength.

In cases where the presence of high ambient noise makes it impossible to measure an emission at the required distance, the measurement is performed at a closer distance and the limit is adjusted per EN61000-6-3: 2001

All frequencies 30-1000GHz were tested at 3m and all frequencies 1GHz and up were tested at 1meter in accordance with ANSI c63.4. Those measurements made a 1 meter, were adjusted to 3 Meter equivalent using the following formula:

20 Log (D1/D2)
Where D1 = New Distance D2 = Required Distance The result is added or subtracted, as required, to the required emission level to ensure compliance at the new distance.

This product was tested, as per RSS-Gen (4.8) procedures, up to the 3rd Harmonic of the highest Transmit/Receive Frequency of 928MHz, through the range of 30MHz to 3 GHz.

EMISSIONS DATA: See Data Table 8 in Appendix A for corresponding frequencies.

PERFORMANCE: Complies.

Part 2 - Radiated Emissions – Transmit Mode

DATE: January 3 - 5, 2006

TEST STANDARD: RSS-210 Iss.6 Annex 8 (A8.5) –
Frequency Hopping Spread Spectrum 902-928MHz

MINIMUM STANDARD: **A8.5 Out-of-band Emissions**
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4) (The maximum peak power shall not exceed 1Watt), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in section 2.7 Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

TEST SETUP: Refer to setup in Part 1 above.

METHOD OF MEASUREMENT: Measurements were made using a spectrum analyzer with 100kHz RBW, Peak detector. Any emissions that are close to the limit are measured using a test receiver with 120kHz bandwidth, CISPR Quasi-Peak detector as well as an averaging meter.

DEVICE DESCRIPTIONS: As described in the Equipment under Test Section, above.

EMISSIONS DATA: See Plots and Tables in Appendix A for corresponding frequencies.

PERFORMANCE: Complies.

Part 3 - Output Power and EIRP Emissions

DATE: January 3 - 5, 2006

TEST STANDARD: RSS-210 Iss.6 A8.4 – Frequency Hopping Spread Spectrum Systems 902-928MHz

MINIMUM STANDARD: RSS-210 A8.4(1) and A8.4(4) and RSS-Gen (4.6)
A8.4(1) For frequency hopping systems operating in the 902-928 MHz band, the maximum peak conducted output power is not to exceed 1.0 W if the hopset uses 50 or more hopping channels and 0.25 W if the hopset uses less than 50 hopping channels.

RSS-210 A8.4(4) For systems employing digital modulation techniques operating in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands, the maximum peak conducted power shall not exceed 1 W. As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power (see RSS-Gen)

TEST SETUP: Refer to setup in Part 1 above.

METHOD OF MEASUREMENT: Measurements were made using a spectrum analyzer with 100kHz RBW, Peak detector. Any emissions that are close to the limit are measured using a test receiver with 120kHz bandwidth, CISPR Quasi-Peak detector as well as an averaging meter. Since the antenna is detachable, a conducted measurement was performed at the antenna terminal.

DEVICE DESCRIPTIONS: As described in the Equipment under Test Section, above.

MEASUREMENT DATA:

Frequency	Measured Signal – Peak at Ant. Terminal	Equipment correction	Corrected Signal - Peak at Ant. Terminal	Signal Power Level – per RSS-212 (3.2)	Limit Line
(MHz)	(dBμV)	(dB)	(dBμV)	(mW)	(mW)
902.5730	100.6	26.1	126.7	93.3	1000
915.1584	100.7	26.1	126.8	95.5	1000
927.6650	100.6	26.1	126.7	93.3	1000

EMISSIONS DATA: See Plots and Tables in Appendix A for corresponding frequencies.

PERFORMANCE: Complies.

Section IV: Report of Measurements for FCC CFR47 Part 15/C

General

Tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15 – Subpart B – Unintentional Radiators Class B; Part 15 – Subpart C - Intentional Radiators.

Additionally, the specific section used for Intentional Radiator compliance is 15.247 – Operation within the band 2400-2483.5MHz – limited to digitally modulated spread spectrum intentional radiator. The procedures used includes the use of the FCC Public Notice FCC 97-114 Appendix C, Guidance on Measurements for Direct Sequence (Digitally Modulated) Spread Spectrum Systems.

Labeling Requirements

Please refer to labeling requirements as outlined above in Section 1.

Test Results - Summary

Testing was performed pursuant to Industry Canada RSS-210 Issue 5 Section 6.2.2(o) with Amendments 1 through 4.

Test	Standard	Description	Result
Radiated Emissions Idle Mode	FCC PART 15 Subpart B Class B Limits	The radiated emissions are measured in the 30-2000Mhz range	Complies
Conducted Emissions Idle Mode	FCC PART 15 Subpart B Class B Limits	The Conducted Emissions are measured on the phase and Neutral Power lines in the 0.15 - 30.0 MHz range.	N/R
Antenna Requirement	FCC Part 15 Subpart C 15.203	Proper Antenna is specified and used.	Complies
Radiated Emissions Transmit Mode – Frequency Hopping Spread Spectrum Operation	FCC Part 15 Subpart C 15.247	Radiated emission characteristics for Spread Spectrum devices operating in the range 902-928MHz that use the Frequency Hopping technique. Emissions are measured in the 30-10000Mhz range	Complies

Part 1 - Radiated Emission Testing

DATE: January 3 - 5, 2006

TEST STANDARD: FCC CFR47, Part 15, Subpart B – Class A

TEST VOLTAGE: Internal Battery Pack (Solar Panel recharge system)

TEST SETUP: Although this test calls for measurements to be performed at 10-meters, this EUT radiates so few frequencies and at such low levels that the equipment was set up in a 3-meter open field test site. Emissions in both horizontal and vertical polarizations were measured while rotating the EUT on a turntable to maximize the emissions signal strength and compensated to indicate the equivalent level if the signals were measured at 10-meters.

MINIMUM STANDARD: Class A Limit:

Frequency MHz	Field Strength at 10m	
	Microvolts/Meter	dB microvolts per meter
30 - 88	90	39.08
88 - 216	150	43.52
216 - 960	210	46.44
960 - above	300	49.54

DEVICE DESCRIPTIONS: Refer to the Equipment Under Test Section.

CABLING DETAILS: The EUT was set up using the manufacturer's specified normal cabling configuration.

CABLING DESCRIPTIONS: Please refer to Equipment Under Test Section

EMISSIONS DATA: See Table 7 in Appendix A for corresponding frequencies.

PERFORMANCE: Complies.

Part 2 - Antenna Requirement - 15.203

APPLICABLE REGULATIONS: 2.1

15.203 - An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

RESULT:

2.2

This unit meets this requirement. The antenna is a 916MHz ¼ Wave Whip 3dBi antenna that has a unique connector. The antenna can only be replaced with the appropriate antenna elements as specified by the manufacturer and is only installed or replaced by authorized, factory trained personnel.

Part 3 - Frequency Hopping Spread Spectrum Operation - 15.247

APPLICABLE REGULATIONS: 3.1

15.247(a) - Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions. (Please note that only the applicable regulations are listed):

(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. ... The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(i) For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

(b) The maximum peak output power of the intentional radiator shall not exceed the following:

(2) For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a)

The limits used for this EUT, for emissions that do not fall within the restricted bands of 15.205(a), the limit for the emissions is 20dB below the highest peak.

For emissions that do fall within the restricted bands, the limit is 53.98dBµV/m at 3meters. Where measured frequencies of concern are over 1.0Ghz, we used the Average measurement procedure as outlined in FCC 97-114 Appendix C.

TEST PROCEDURES: 3.2

TEST STANDARD: FCC CFR47, Part 15, Subpart C 15.247
Public Notice DA 00-705 March 20, 2000 – Filing and Measurement
Guidelines for Frequency Hopping Spread Spectrum Systems

DEVICE DESCRIPTIONS: Refer to the Equipment Under Test Section, above, for EUT Descriptions.

TEST SETUP:

Freq. Range Measured	30Mhz – 10000MHz
Test Distance	1 to 3m
Test Instrumentation resolution	120KHz (30MHz to 1000MHz) 1MHz (1000MHz to 25000MHz)
Receive Ant. Scan Height	1m – 4m
Receive Ant. Polarization	Vertical and Horizontal.

The equipment was set up in a 3-meter open field test site. Emissions in both horizontal and vertical polarizations were measured while rotating the EUT on a turntable to maximize the emissions signal strength and the results recorded on the attached plots. The emissions were tested using radiated test procedures instead of conducted measurement procedures.

The emissions were measured while the unit was in a standby mode and not communicating with any devices (hereafter referred to as Quiescent Mode). This unit was also measured while it was transmitting data (hereafter referred to as Transmit Mode). These units are only designed to communicate with multiple devices within its network.

Measurements were performed at the lowest, middle and highest operating frequencies (902.5 MHz; 915.1 MHz; 927.65 MHz).

MODIFICATIONS: No modifications have been made to the EUT in order to achieve compliance.

CABLING DETAILS: two wire pairs were exposed to assist with testing. These wires are not part of the actual product when in use. All wires are enclosed within the housing.

RESULTS: 3.3 To verify compliance, the radiated emission tests were carried out in accordance with part 15.109, 15.205, 15.209 and 15.247. The spectrum was scanned from 0.4MHz to 10000 MHz looking for all Spurious and Harmonic emissions in Quiescent, and Transmit modes. The Quiescent Mode and Transmit mode measurements and plots for Un-intentional emissions 30-1000 MH are contained in Appendix B. The results of the harmonics and spurious frequencies 1000-10000 MHz are contained in the following pages:

Appendix A: Emission Data and Plots

Data Table 1: 15.247(b,d) / IC RSS-210 Appendix 8, 902MHz, Low Channel Radiated Spurious Emissions

Freq.	Harmonic	Restricted Bands	Measured Signal Average (RBW=1MHz / VBW=10Hz)	Equipment Attenuation	Corrected Signal	Measured Distance	Corrected Signal for 3m (-9.5dB)	Calculated Averaged Signal with Duty Cycle Correction (-30.5dB)	Limit - FCC 15.247	Delta Limit - FCC 15.247	Delta from Peak Carrier	Limit - IC RSS-210 Appendix 8	Delta Limit - IC RSS-210
(MHz)			(dBuV)	(dB)	(dBuV)	(m)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dBc)	(dBuV)	(dB)
902.559	fund	N/A	123.8	0.0	123.8	0.0	123.8	93.3	N/A	N/A	123.8	N/A	N/A
1805.061	2nd	N/A	31.3	38.5	69.8	1.0	60.3	29.8	93.8	-64.0	-63.5	93.8	-64.0
2707.620	3rd	2655-2900	19.2	45.8	65.0	1.0	55.5	25.0	54.0	-29.0	-68.3	54.0	-29.0
3610.140	4th	3600-4400	11.9	50.6	62.5	1.0	53.0	22.5	54.0	-31.5	-70.8	54.0	-31.5
4512.730	5th	4500-5150	12.9	54.9	67.8	1.0	58.3	27.8	54.0	-26.2	-65.5	54.0	-26.2
5415.219	6th	5350-5460	11.5	62.0	73.5	1.0	64.0	33.5	54.0	-20.5	-59.8	54.0	-20.5
6317.700	7th	N/A	9.1	68.3	77.4	1.0	67.9	37.4	93.8	-56.4	-55.9	93.8	-56.4
7218.525	8th	N/A	5.6	74.7	80.3	1.0	70.8	40.3	93.8	-53.5	-53.0	93.8	-53.5
8122.710	9th	8025-8500	6.4	81.7	88.1	1.0	78.6	48.1	54.0	-5.9	-45.2	54.0	-5.9
9025.016	10th	9000-9200	5.4	87.0	92.4	1.0	82.9	52.4	54.0	-1.6	-40.9	54.0	-1.6

Data Table 2: 15.247(b,d) / IC RSS-210 Appendix 8, 915MHz, Middle Channel Radiated Spurious Emissions

Freq.	Harmonic	Restricted Bands	Measured Signal Average (RBW=1MHz / VBW=10Hz)	Equipment Attenuation	Corrected Signal	Measured Distance	Corrected Signal for 3m (-9.5dB)	Calculated Averaged Signal with Duty Cycle Correction (-30.5dB)	Limit - FCC 15.247	Delta Limit - FCC 15.247	Delta from Peak Carrier	Limit - IC RSS-210 Appendix 8	Delta Limit - IC RSS-210
(MHz)			(dBuV)	(dB)	(dBuV)	(m)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dBc)	(dBuV)	(dB)
914.994	fund	N/A	123.8	26.1	123.8	0.0	123.8	88.7	N/A	N/A	123.8	N/A	N/A
1830.304	2nd	N/A	32.7	38.5	71.2	1.0	61.7	31.2	93.8	-62.6	-62.1	93.8	-62.6
2745.385	3rd	2655-2900	20.7	45.8	66.5	1.0	57.0	26.5	54.0	-27.5	-66.8	54.0	-27.5
3660.600	4th	3600-4400	11.7	50.6	62.3	1.0	52.8	22.3	54.0	-31.7	-71.0	54.0	-31.7
4575.981	5th	4500-5150	13.8	54.9	68.7	1.0	59.2	28.7	54.0	-25.3	-64.6	54.0	-25.3
5490.781	6th	5350-5460	11.5	62.0	73.5	1.0	64.0	33.5	54.0	-20.5	-59.8	54.0	-20.5
6406.050	7th	N/A	14.5	68.3	82.8	1.0	73.3	42.8	93.8	-51.0	-50.5	93.8	-51.0
7321.200	8th	N/A	5.9	74.7	80.6	1.0	71.1	40.6	93.8	-53.2	-52.7	93.8	-53.2
8236.350	9th	8025-8500	5.1	81.7	86.8	1.0	77.3	46.8	54.0	-7.2	-46.5	54.0	-7.2
9151.510	10th	9000-9200	5.4	87.0	92.4	1.0	82.9	52.4	54.0	-1.6	-40.9	54.0	-1.6

Data Table 3: 15.247(b,d) / IC RSS-210 Appendix 8, 927MHz, High Channel Radiated Spurious Emissions

Freq.	Harmonic	Restricted Bands	Measured Signal Average (RBW=1MHz / VBW=10Hz)	Equipment Attenuation	Corrected Signal	Measured Distance	Corrected Signal for 3m (-9.5dB)	Calculated Averaged Signal with Duty Cycle Correction (-30.5dB)	Limit - FCC 15.247	Delta Limit - FCC 15.247	Delta from Peak Carrier	Limit - IC RSS-210 Appendix 8	Delta Limit - IC RSS-210
(MHz)			(dBuV)	(dB)	(dBuV)	(m)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dBc)	(dBuV)	(dB)
927.823	fund	N/A	123.8	26.1	123.8	0.0	123.8	87.7	N/A	N/A	123.8	N/A	N/A
1855.302	2nd	N/A	34.6	39.6	74.2	1.0	64.7	34.2	93.8	-59.6	-59.1	93.8	-59.6
2782.879	3rd	2655-2900	13.3	47.0	60.3	1.0	50.8	20.3	54.0	-33.7	-73.0	54.0	-33.7
3710.600	4th	3600-4400	11.3	52.1	63.4	1.0	53.9	23.4	54.0	-30.6	-69.9	54.0	-30.6
4638.107	5th	4500-5150	12.9	56.7	69.6	1.0	60.1	29.6	54.0	-24.4	-63.7	54.0	-24.4
5565.900	6th	5350-5460	13.5	64.7	78.2	1.0	68.7	38.2	54.0	-15.8	-55.1	54.0	-15.8
6493.557	7th	N/A	11.0	70.1	81.1	1.0	71.6	41.1	93.8	-52.7	-52.2	93.8	-52.7
7421.200	8th	N/A	5.4	77.2	82.6	1.0	73.1	42.6	93.8	-51.2	-50.7	93.8	-51.2
8348.859	9th	8025-8500	5.4	82.5	87.9	1.0	78.4	47.9	54.0	-6.1	-45.4	54.0	-6.1
9276.510	10th	9000-9200	5.4	87.0	92.4	1.0	82.9	52.4	54.0	-1.6	-40.9	54.0	-1.6

Data Table 4: 15.247(b,d) / IC RSS-210 Appendix 8, 902MHz, Low Channel Conducted Spurious Emissions

Freq.	Harmonic	Restricted Bands	Measured Signal Average (RBW=1MHz / VBW=10Hz)	Equipment Attenuation	Corrected Signal	Calculated Averaged Signal with Duty Cycle Correction (-30.5dB)	Limit - FCC 15.247	Delta Limit - FCC 15.247	Delta from Peak Carrier	Limit - IC RSS-210 Appendix 8	Delta Limit - IC RSS-210
(MHz)	0	0	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dBc)	(dBuV)	(dB)
902.573	fund	N/A	123.8	26.1	123.8	93.3	N/A	N/A	123.8	N/A	N/A
1805.177	2nd	N/A	47.9	26.2	74.1	43.6	93.8	-50.2	-49.7	93.8	-50.2
2707.615	3rd	2655-2900	35.7	26.5	62.2	31.7	54.0	-22.3	-61.6	54.0	-22.3
3610.146	4th	3600-4400	23.5	26.8	50.3	19.8	54.0	-34.2	-73.5	54.0	-34.2
4512.860	5th	4500-5150	27.7	30.2	57.9	27.4	54.0	-26.6	-65.9	54.0	-26.6
5415.146	6th	5350-5460	21.2	35.8	57.0	26.5	54.0	-27.5	-66.8	54.0	-27.5
6318.503	7th	N/A	25.5	45.9	71.4	40.9	93.8	-52.9	-52.4	93.8	-52.9
7220.632	8th	N/A	25.5	34.8	60.3	29.8	93.8	-64.0	-63.5	93.8	-64.0
8122.997	9th	8025-8500	24.4	40.0	64.4	33.9	54.0	-20.1	-59.4	54.0	-20.1
9025.730	10th	9000-9200	25.9	47.9	73.8	43.3	54.0	-10.7	-50.0	54.0	-10.7

Data Table 5: 15.247(b,d) / IC RSS-210 Appendix 8, 915MHz, Middle Channel Conducted Spurious Emissions

Freq.	Harmonic	Restricted Bands	Measured Signal Average (RBW=1MHz / VBW=10Hz)	Equipment Attenuation	Corrected Signal	Calculated Averaged Signal with Duty Cycle Correction (-30.5dB)	Limit - FCC 15.247	Delta Limit - FCC 15.247	Delta from Peak Carrier	Limit - IC RSS-210 Appendix 8	Delta Limit - IC RSS-210
(MHz)	0	0	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dBc)	(dBuV)	(dB)
915.158	fund	N/A	123.8	26.1	123.8	93.3	N/A	N/A	123.8	N/A	N/A
1830.383	2nd	N/A	3.0	26.2	29.2	-1.3	93.8	-95.1	-94.6	93.8	-95.1
2745.579	3rd	2655-2900	36.9	26.5	63.4	32.9	54.0	-21.1	-60.4	54.0	-21.1
3660.635	4th	3600-4400	22.8	26.9	49.7	19.2	54.0	-34.8	-74.1	54.0	-34.8
4575.623	5th	4500-5150	28.8	28.6	57.4	26.9	54.0	-27.1	-66.4	54.0	-27.1
5490.771	6th	5350-5460	22.4	37.2	59.6	29.1	54.0	-24.9	-64.2	54.0	-24.9
6405.930	7th	N/A	25.8	45.9	71.7	41.2	93.8	-52.6	-52.1	93.8	-52.6
7321.027	8th	N/A	25.7	38.2	63.9	33.4	93.8	-60.4	-59.9	93.8	-60.4
8235.476	9th	8025-8500	25.8	43.7	69.5	39.0	54.0	-15.0	-54.3	54.0	-15.0
9152.005	10th	9000-9200	25.4	45.1	70.5	40.0	54.0	-14.0	-53.3	54.0	-14.0

Data Table 6: 15.247(b,d) / IC RSS-210 Appendix 8, 927MHz, High Channel Conducted Spurious Emissions

Freq.	Harmonic	Restricted Bands	Measured Signal Average (RBW=1MHz / VBW=10Hz)	Equipment Attenuation	Corrected Signal	Calculated Averaged Signal with Duty Cycle Correction (-30.5dB)	Limit - FCC 15.247	Delta Limit - FCC 15.247	Delta from Peak Carrier	Limit - IC RSS-210 Appendix 8	Delta Limit - IC RSS-210
(MHz)	0	0	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dBc)	(dBuV)	(dB)
927.665	fund	N/A	123.8	26.1	123.8	93.3	N/A	N/A	123.8	N/A	N/A
1855.311	2nd	N/A	41.2	26.2	67.4	36.9	93.8	-56.9	-56.4	93.8	-56.9
2782.894	3rd	2655-2900	29.6	26.5	56.1	25.6	54.0	-28.4	-67.7	54.0	-28.4
3710.815	4th	3600-4400	23.1	27.0	50.1	19.6	54.0	-34.4	-73.7	54.0	-34.4
4638.448	5th	4500-5150	26.9	29.1	56.0	25.5	54.0	-28.5	-67.8	54.0	-28.5
5565.727	6th	5350-5460	24.1	38.7	62.8	32.3	54.0	-21.7	-61.0	54.0	-21.7
6493.261	7th	N/A	27.0	45.8	72.8	42.3	93.8	-51.5	-51.0	93.8	-51.5
7422.078	8th	N/A	26.6	37.1	63.7	33.2	93.8	-60.6	-60.1	93.8	-60.6
8349.221	9th	8025-8500	26.5	44.7	71.2	40.7	54.0	-13.3	-52.6	54.0	-13.3
9276.183	10th	9000-9200	26.0	45.1	71.1	40.6	54.0	-13.4	-52.7	54.0	-13.4

Radiated Emissions – Battery mode

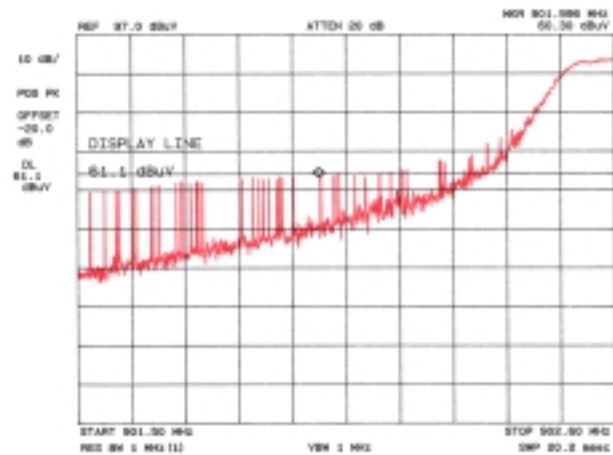
Table 7: FCC Class A - 3m

Frequency	Pol	Hgt	Angle	Uncor-Pk	Tot Corr	Peak	QP Lmt	DelLim-Pk	QP	DelLim-QP
(MHz)		(m)	(deg)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB)
206.46694	Horz	1.0	90.00	28.60	17.55	46.15	43.50	2.65	38.60	-4.90
235.97023	Horz	3.0	270.00	20.40	20.10	40.50	46.00	-5.50	39.27	-6.73
250.71999	Horz	2.0	120.00	10.30	21.06	31.36	46.00	-14.64	28.50	-17.50
265.44889	Horz	2.0	110.00	23.30	21.71	45.01	46.00	-0.99	44.25	-1.75
280.21714	Horz	2.0	110.00	14.70	22.47	37.17	46.00	-8.83	35.55	-10.45
294.97503	Horz	2.0	110.00	20.10	22.88	42.98	46.00	-3.02	42.47	-3.53

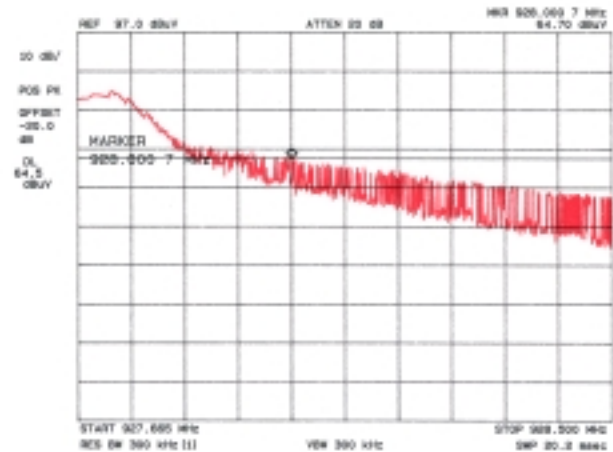
Table 8: CISPR22 Class A – 3m

Frequency	Pol	Hgt	Angle	Uncor-Pk	Tot Corr	Peak	QP Lmt	DelLim-Pk	QP	DelLim-QP
(MHz)		(m)	(deg)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB)
206.46694	Horz	1.0	90.00	28.60	17.55	46.15	39.50	6.65	38.60	-0.90
235.97023	Horz	3.0	270.00	20.40	20.10	40.50	46.50	-6.00	39.27	-7.23
250.71999	Horz	2.0	120.00	10.30	21.06	31.36	46.50	-15.14	28.50	-18.00
265.44889	Horz	2.0	110.00	23.30	21.71	45.01	46.50	-1.49	44.25	-2.25
280.21714	Horz	2.0	110.00	14.70	22.47	37.17	46.50	-9.33	35.55	-10.95
294.97503	Horz	2.0	110.00	20.10	22.88	42.98	46.50	-3.52	42.47	-4.03

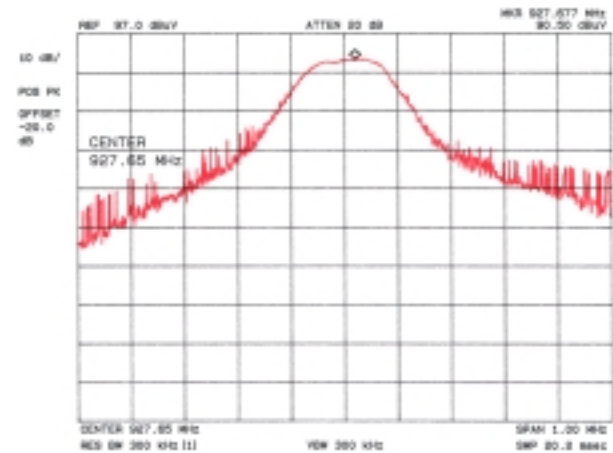
15.247(a)(2) – 6dB Bandwidth



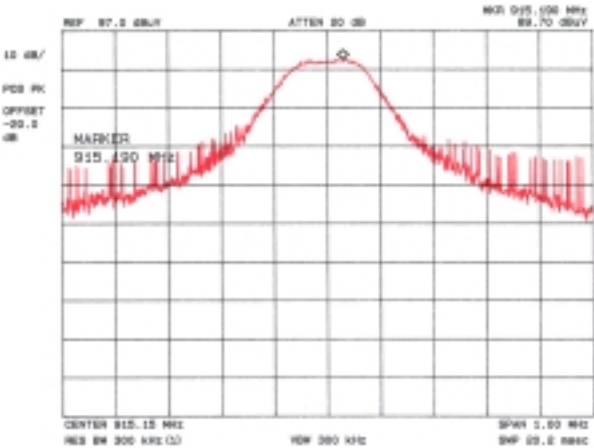
Plot 1: Low Channel Bandedge



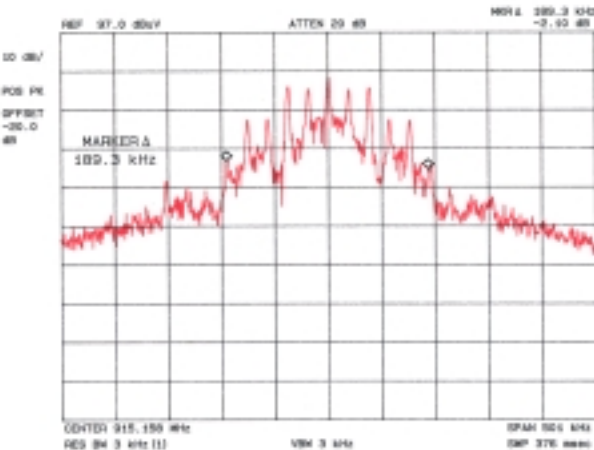
Plot 2: High Channel Bandedge



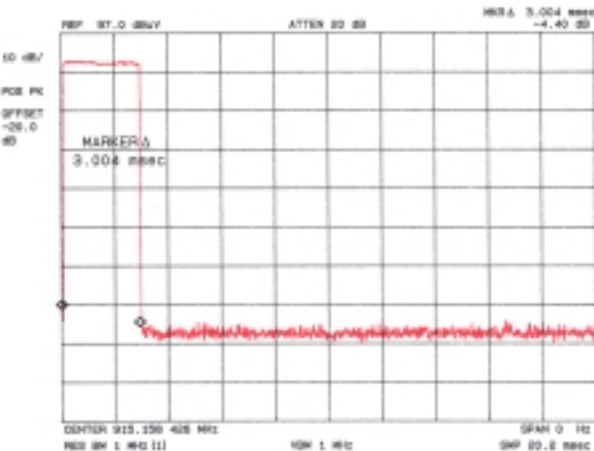
Plot 3: High Channel Peak Level



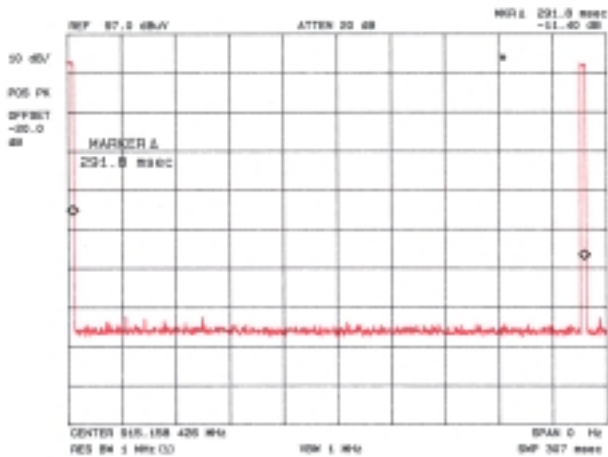
Plot 4: Middle Channel Peak Level



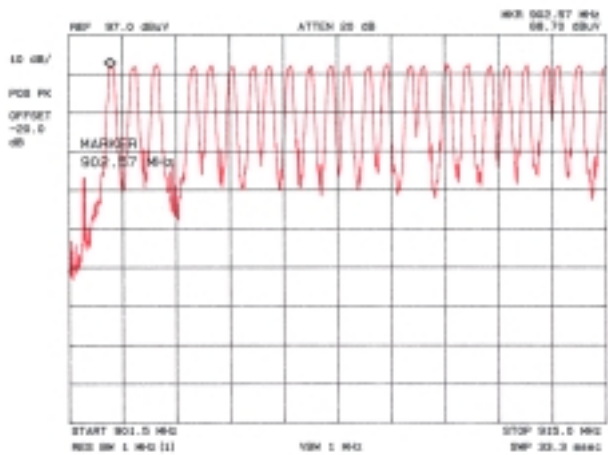
Plot 5: 20dB Bandwidth



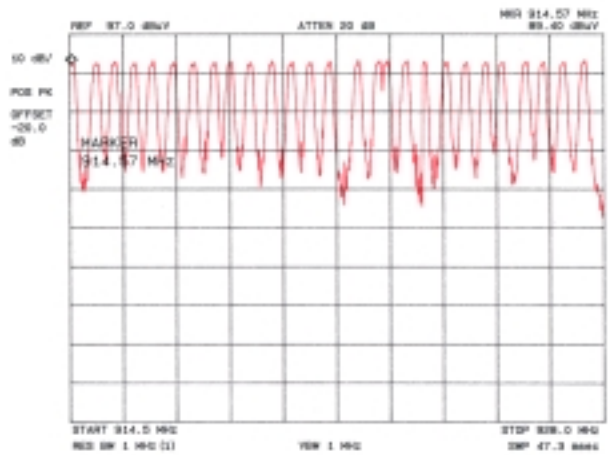
Plot 6: Time of Occupancy Pulse Width



Plot 7: Time of Occupancy Silent Period



Plot 8A: Number of Hopping Frequencies



Plot 8B: Number of Hopping Frequencies

Appendix B: EUT Photos



Emissions Test Setup SZF Mounted on Sample Lighting Post



Emissions Test Setup SZF Mounted on Sample Lighting Post Side View



Emissions Test Setup of SZF Module Internal View Showing Batteries & RF Module



Emission Set up of SZF Module Closeup View Showing Test Cable Bottom & LED