

ION Digital LLP

5800 MICRA/RPS

EMC DIRECTIVE COMPLIANCE TEST REPORT

per

FCC CFR47 Part 15 Subpart B 15.231

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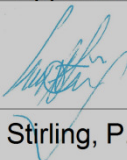
**IC RSS-GEN Issue 3
IC RSS-210 Issue 8 Annex 1**

FCC ID: QN3 5800XT

IC Certification Number: 4488A-5800XT

Revision 1.3

Jan 26th, 2012

Approval		
Checked By:	 Robert Stirling, P. Eng.	Jan. 26 th , 2012 Date

**Protocol Data Systems Inc, EMC Lab, Abbotsford BC, Canada. SCC ISO/17025 (CAN-P-4E) Accredited Laboratory
No. 612 FCC O.A.T.S. Registration Number 627740 Industry Canada O.A.T.S. Registration Number IC3384A-1**

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Section I: Report of Measurement Testing Information

General Information

Applicant Company Name	ION Digital LLP
Address	Unit 2109, 1225 Kingsway Ave
	Port Coquitlam, BC V3C 1S2
	Phone: 800-407-4389
	Fax 800-407-4465
	Contact Person: Dean Schebel
	Email: dean.schebel@ion-digital.com
Product Name	Intrusion Detector Sensor – Plunger Plastic with Wire Antenna
FCC ID#	QN3 5800XT
IC Certification Number	4488A-5800XT
Applicable Standards	FCC CFR Title 47 Part 15 Subpart B 15.231, ANSI C63.4:2003; IC RSS-GEN Issue 3 and IC RSS-210 Issue 8 Annex 1
Test Results	PASS
Related Report/s Approval	ION Digital RN 03330, PR11-032, PR11-040
Statement of Compliance	This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of our knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards. – Signature on Front Cover Page.

Equipment Under Test Specification

Manufacturer	ION Digital LLP
Product Description	Intrusion Detector Sensor – Plunger Plastic with wire Antenna
FCC ID#	QN3 5800XT
IC Certification Number	4488A-5800XT
Model Number	5800MICRA (UNIT #3) & 5800RPS (UNIT #1)
Description	Intrusion Detector Recesses Transmitter
Operating Frequency	344.94 MHz
Emission Designator	
Modulation Type	Amplitude Shift Keyed – On/Off Keyed: ASK-OOK
Bit Rate	3.7 kbit/s
Rated Transmit Power	2 dBm
EUT Power Source	3 V DC Coin Cell Battery
Test Item	EMC Test Unit
Type of Equipment	Fixed Wire Antenna
Antenna Connector	Permanently Attached
Test Voltage	3 V DC Coin Cell Battery

Test Environment

Test Facility	Protocol Data Systems Inc.
	4741 Olund Rd.
	Abbotsford, BC V4X 1V6
	Office Phone: 604-504-0091
	Cell Phone: 604-761-0106
	Fax: 604-554-0091
	Email: simonh@protocol-emc.com
	Website: www.protocol-emc.com
Test Facility ID's	SCC ISO/17025 (CAN-P-4E) Accredited Laboratory No. 612
	FCC O.A.T.S. Registration Number 627740
	Industry Canada O.A.T.S. Registration Number IC3384A
Date Tested	December 6 th & 7 th , 2011
Tested By	Simon Howkins

Test Setup

Test Supporting Equipment	None Required
Test Conditions	December 6 th , 2011: 4 °C, 75% R.H. December 7 th , 2011: 5 °C, 83% R.H. January 26 th , 2012: 5 °C, 75% R.H.
Test Exercise e.g. software description, test signal, etc.	The EUT was set for continuous transmit mode of operation. It only has 1 frequency. The options were for a CW and modulated frequency. All test were conducted with the transmitter's modulation on.
Deviation from Standard/s	No deviation from standards.
Modification to the EUT	No modifications were made.

Test Equipment List

Manufacturer	Model	Equipment Description	Serial No.	Next Cal
HP	85650A	Quasi-Peak Adapter	2811A01080	12/8/2012
HP	85662A	Spectrum Analyzer Display	2152A03569	11/8/2012
HP	8566B	Spectrum Analyzer RF Section	2241A02102	11/8/2012
HP	85685A	RF-Preselector	3107A01222	11/8/2012
EMCO	6502	Active Loop Antenna 0.15-30MHz	9002-2489	15/10/2012
EMCO	3146	Ant. Log Periodic 200-1000MHz	9611-4699	8/8/2012
EMCO	3110B	Ant. Biconical 30-200MHz	9401-1850	8/8/2012
EMCO	3115	Horn Antenna 1-18GHz	9403-4251	20/8/2012
HP	362	Controller	6452A40248	N/A

OPERATIONAL DESCRIPTION

Rhientech	Custom	Antenna Mast	N/A	N/A
Protocol EMC	Custom	Turntable	N/A	N/A

Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$ MHz
Radiated Emissions	± 3 dB
Temperature	± 1 °C
Humidity	± 5 %
DC and low frequency voltages	± 3 %

Section II: Report of Measurement Test Procedures

Radiated Interference:

The measurement was made per ANSI C63.4-2003 using an Agilent model 8566B spectrum analyzer, a model 85685A Preselector, a model 85650A quasi-peak adapter, and the appropriate antenna. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was adjusted accordingly with an appropriate sweep time and the video bandwidth was adjusted accordingly up to the 10th harmonic of the fundamental. When an emission was found, the table was rotated and the mast raised and lowered between 1 and 4 meters to produce the maximum signal strength. An average measurement was taken. The antenna was placed in both the horizontal and vertical planes and the stronger of the two emissions were reported. The spectrum was searched to the tenth harmonic of the transmitter.

Formula of Conversion Factors:

The field strength at 3m was established by adding the antenna factor and cable losses to the meter reading of the spectrum analyzer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the spectrum analyzer meter reading, but any external amplifier gain and distance correction also had to be accounted for.*

$$\begin{array}{rcllclclcl} \text{Eg.:} & \text{Freq (MHz)} & \text{Meter Reading} & + & \text{ACF} & + & \text{Cable Loss} & - & \text{Amp Gain} & - & \text{Distance Factor} & = & \text{Field Strength} \\ & 330 & 52.5 \text{ dB}\mu\text{V @ 1m} & & +5.0 \text{ dB} & & +0.5 \text{ dB} & & -18.5 \text{ dB} & & -9.5 \text{ dB} & = & 50 \text{ dB}\mu\text{V/m @ 3m} \end{array}$$

* Where the field strength was too low to get an accurate reading at the required distance of 3 meters, the Antenna was moved closer to 1 meter. The resulting measurement was distance corrected for 3 meters by using the formula: (closer distance result) – (20Log(measured distance/required distance)) = (required distance result)

$$\begin{array}{rclclcl} \text{Eg.:} & 1\text{M reading (dB}\mu\text{V/m)} & - & (20\text{Log}[1/3]) \text{ dB} & = & 3\text{M reading (dB}\mu\text{V/m)} \\ & 55.42 \text{ dB}\mu\text{V @ 1m} & & - 9.54 \text{ dB} & = & 45.88 \text{ dB}\mu\text{V @ 1m} \end{array}$$

Power Line Conducted Interference:

No measurements were taken as the EUT is powered by a battery.

Occupied Bandwidth:

A sample of the transmitter output detected by an antenna was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to 10dB per division. The Resolution Bandwidth (RBW) was set to as close to 1% of the span as possible. The Video Bandwidth was set to three times the RBW.

ANSI C63.4-2003 Measurement Procedures:

The EUT was placed in a vertical orientation, on top of a table 80 cm high with a radius of 48cm. The EUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. When an emission was found, the antenna was raised and lowered between 1 and 4 meters, the table was then rotated to produce the maximum signal strength and then the antenna was raised and lowered from 1 to 4 meters again to produce the maximum emission level. The antenna was placed in both the horizontal and vertical planes.

All frequencies were first found using a peak detector and then measured using video averaging to average the signal.

Section III: Report of Measurement of Radiated Emissions

DATE: December 6th and 7th, 2011 & January 26th 2012

TEST STANDARD: FCC CFR Title 47, Part 15, Subpart B 15.231(b), 15.209 and IC RSS 210-Issue 8 Annex 1 A1.1

TEST VOLTAGE: 3 V DC, as noted in the individual test records

REQUIREMENTS:

FCC Pt 15.231

Fundamental Frequency (MHz)	Field Strength of Fundamental (μV/m) @ 3m	Field Strength of Spurious Emissions (μV/m) @ 3m
40.66 - 40.70	2250	225
70 - 130	1250	125
130 - 174	1250 to 3750*	125 to 375*
174 - 260	3750	375
260 - 470	3750 to 12500*	375 to 1250*
Above 470	12500	1250

IC RSS-210 Issue 8 Annex 1

Fundamental Frequency (MHz), excluding restricted band frequencies of RSS-Gen	Field Strength of Fundamental (μV/m) @ 3m	Field Strength of Unwanted Emissions (μV/m) @ 3m
40.66 - 40.70	See Section A2.7	
70 - 130	1250	125
130 - 174	1250 to 3750*	125 to 375*
174 - 260	3750	375
260 - 470	3750 to 12500*	375 to 1250*
Above 470	12500	1250

Note: Limits in the above table are based on the average value of the measured emissions.

* Linear interpolation

CALCULATING LIMIT LINE FOR THE FUNDAMENTAL FREQUENCY

$$\begin{aligned}
 \text{FS (microvolts/m)} &= (41.67 \times F) - 7083 \\
 &= (41.67 \times 344.94) - 7083 \\
 &= 7289.82 \mu\text{V/m}
 \end{aligned}$$

$$\begin{aligned}
 [\text{dB}\mu\text{V/m}] &= 20 \times \log(7289.82) \\
 &= 77.25 \text{ dB}\mu\text{V/m @ 3m}
 \end{aligned}$$

$$\begin{aligned}
 [@ 1\text{m}] &= 77.25 + 9.54 \\
 &= 86.79 \text{ dB}\mu\text{V/m @ 1m}
 \end{aligned}$$

Note: The limit line for all unwanted and spurious emissions is 20 dB lower as per RSS-210 and Section 15.231 of the FCC mandate.

MEASUREMENT DATA: See Appendix A

PERFORMANCE: PASS. The radiated emissions for the EUT meet the requirements for FCC CFR Title 47 Part 15.231 and IC RSS-210 Issue 8 Annex 1. The spectrum was checked to the tenth harmonic. Spurious emissions were looked for between 10 MHz and 3500 MHz. Tables and plots can be found in Appendix A.

NOTES: The plots in appendix A have two traces. The red trace is when the EUT is on, and the black trace is an ambient trace. The letter "A" above any emission on the plots means that emission is an ambient. The frequency, uncorrected peak value, turntable degree location, mast height and delta from the Class B limit line is given above emissions coming from the EUT. The Class B limit lines are not the applicable limit lines for this device. No emissions came above the applicable limit line as given in Part 15.231 and RSS 210 Issue 8.

RF EXPOSURE EVALUATION: As per RSS-102 Issue 4 a RF Exposure Evaluation has to be taken.

The RF Field Strength Limit for Devices Used by the General Public (Uncontrolled Environment) at 344.94 MHz for the electric field is given by the following formula: $1.585(f)^{0.5}$

Therefore the limit is set at: 29.43 V/m.

The measured average value of the electric field was measured at: 65.5 dBuV/m = 0.0019 V/m.

Therefore the EUT passes the requirements of the RF Exposure Evaluation.

SRADIATED MEASUREMENTS BETWEEN 10MHZ AND 30MHZ: As per part 15.33(a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph:

(1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

The device uses a 10.77938 MHz crystal, and the fundamental frequency is 344.94 MHz. The radiated emissions were test from 10 MHz to 30 MHz using a calibrated active loop antenna. The radiated emissions measurements between 10 MHz and 30 MHz showed to be 20 dB below the limit line and therefore are not reported.

Section VI: 20dB Bandwidth Testing

Rules Part No.: FCC CFR Title 47 Part 15 Subpart B 15.231(c) & IC RSS-210 Issue 8 Annex 1 A1.1.3

Requirement

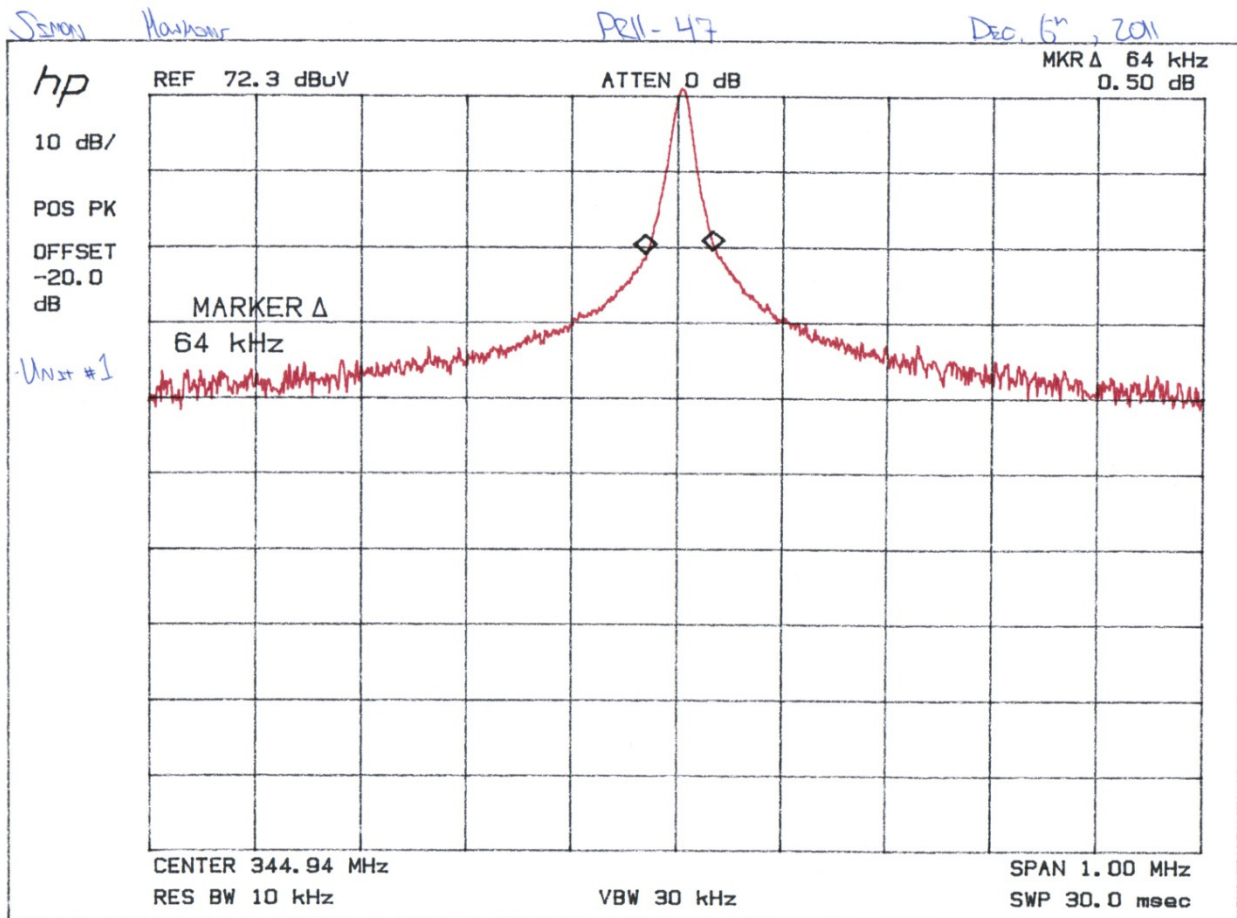
As per the above standards, The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. The bandwidth is determined at the points 20 dB down from the modulated carrier.

20dB bandwidth limit = Fundamental * 0.25%

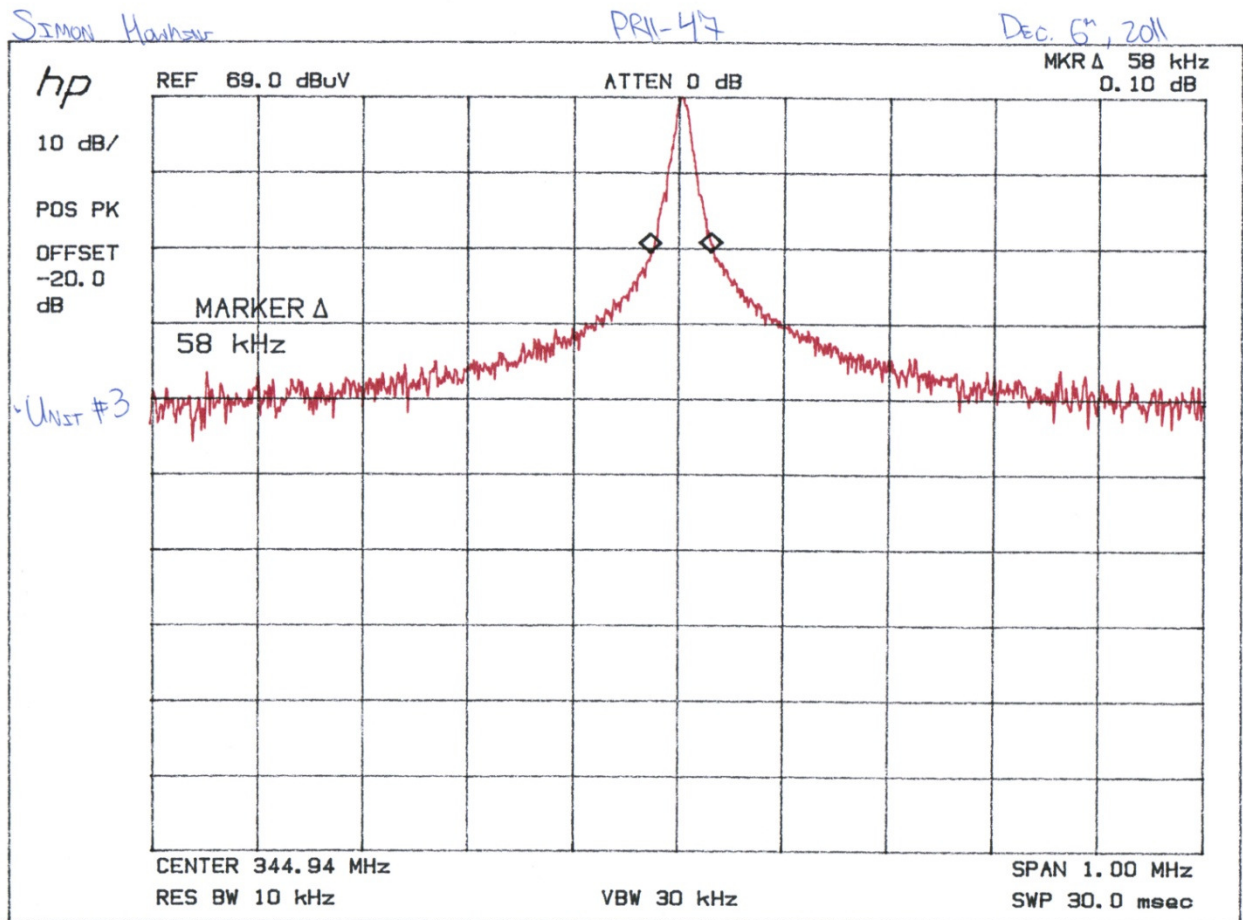
= 344.94 MHz * 0.25%

= 862.3 kHz

Performance: PASS. As per below, 20 db bandwidth is less than 0.25% of the center frequency (862.3 kHz) for the EUT.



20dB Bandwidth Test: 5800RPS UNIT #1

**20dB Bandwidth Test: 5800MICRA UNIT #3**

Appendix A: Fundamental, Harmonics and Spurious Emissions Data and Plots

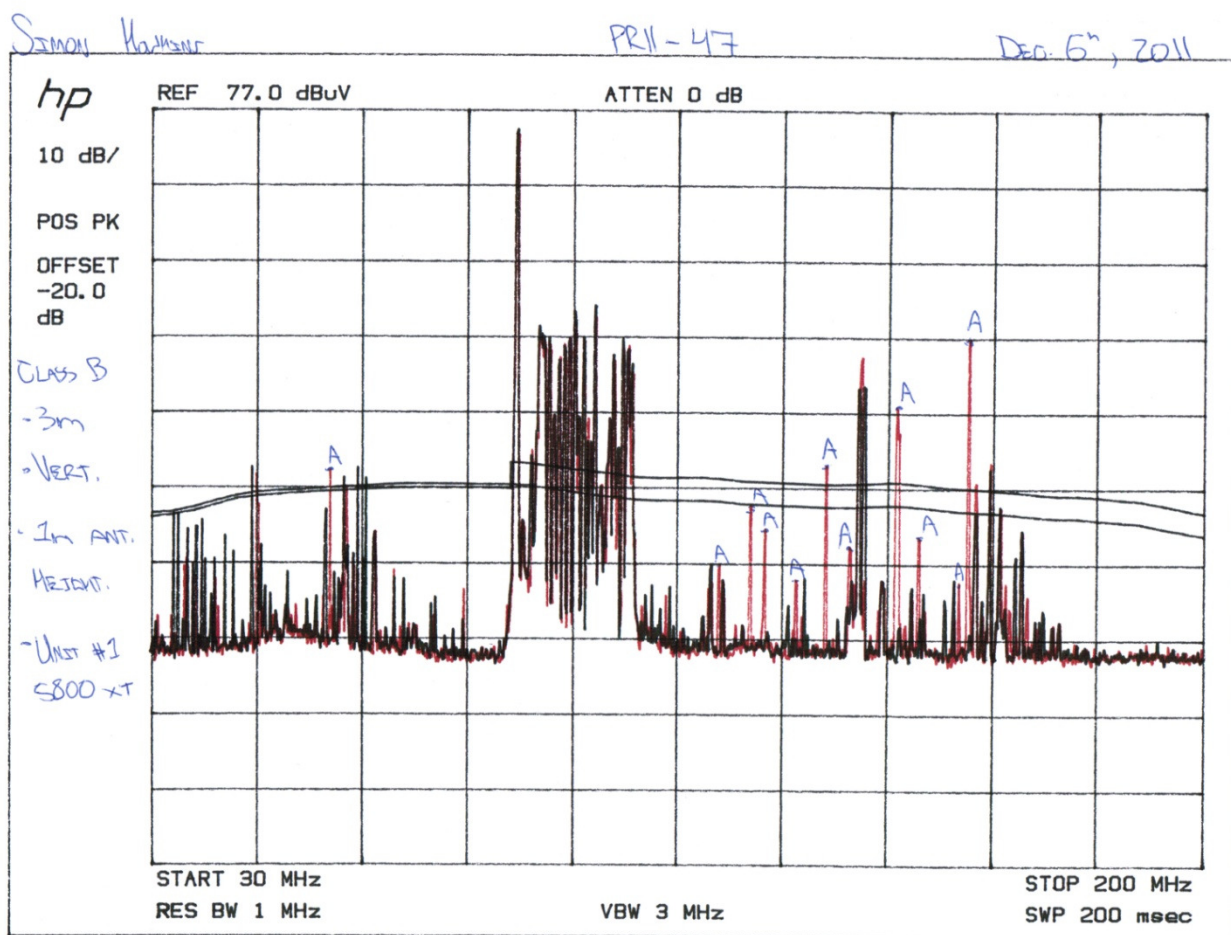
NOTE: The report number on top of each plot that reads "PR11-47" is wrong. The project number and report number is "PR11-049" as it reads in the footer.

5800RPS: UNIT #1

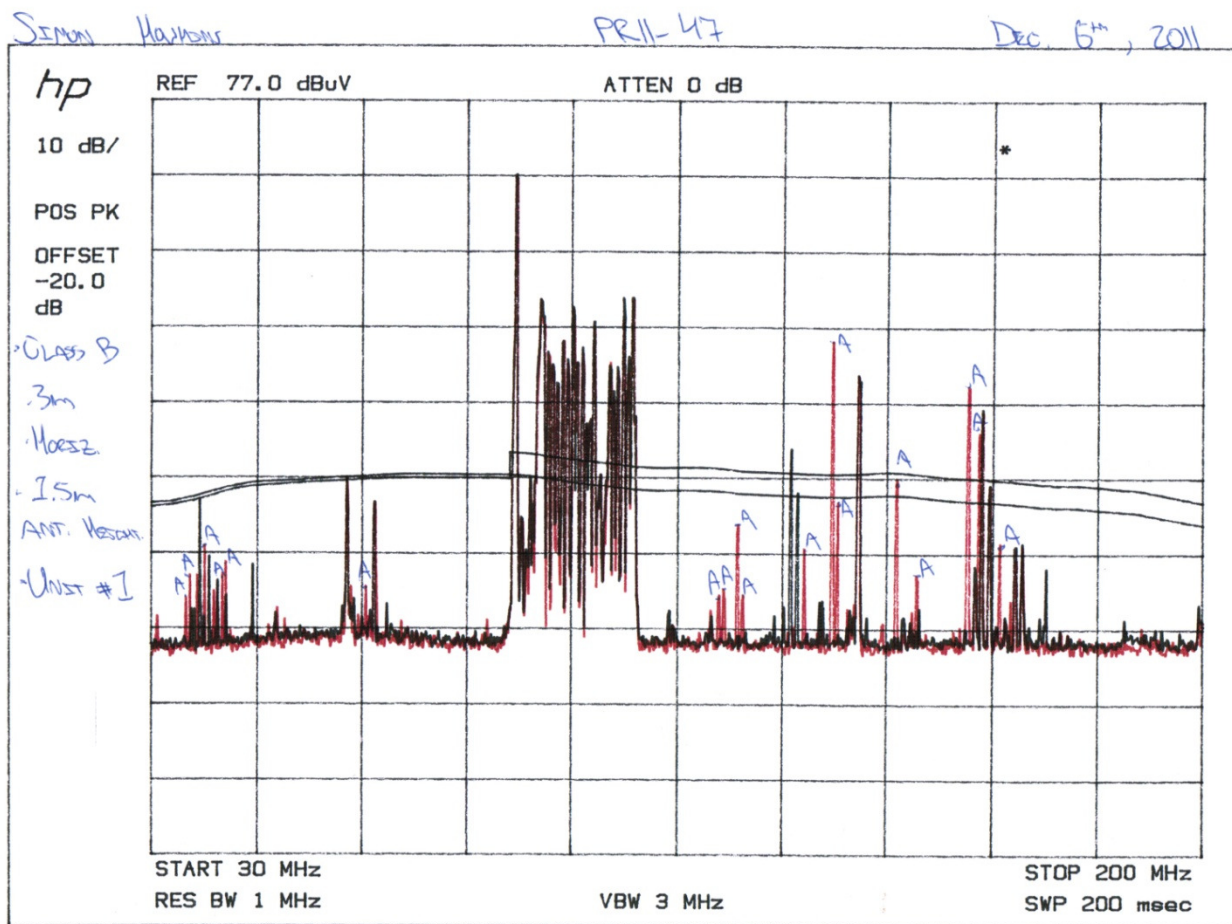
MEASURED VALUES

Frequency (MHz)	Measured Average Value (dBuV)	Polarization (V/H)	Angle (°)	Antenna Height (m)	Antenna Factor (dB/m)	Cable Losses (dB)	Field Strength (dBuV/m)	Limit (dBuV/m)	Margin (dB)
344.94	46	V	280	1.9	15.1	4	65.1	77.3	-12.2
689.88	14.4	V	180	1.4	20.8	6.4	41.6	57.3	-15.7
1034.82	3.9	V	270	1	25.9	7.8	37.6	66.8	-29.2
1379.76	-13	V	70	1	26	9.5	22.5	66.8	-44.3
1724.7	-1.1	V	90	1	27.5	11.5	37.9	66.8	-28.9

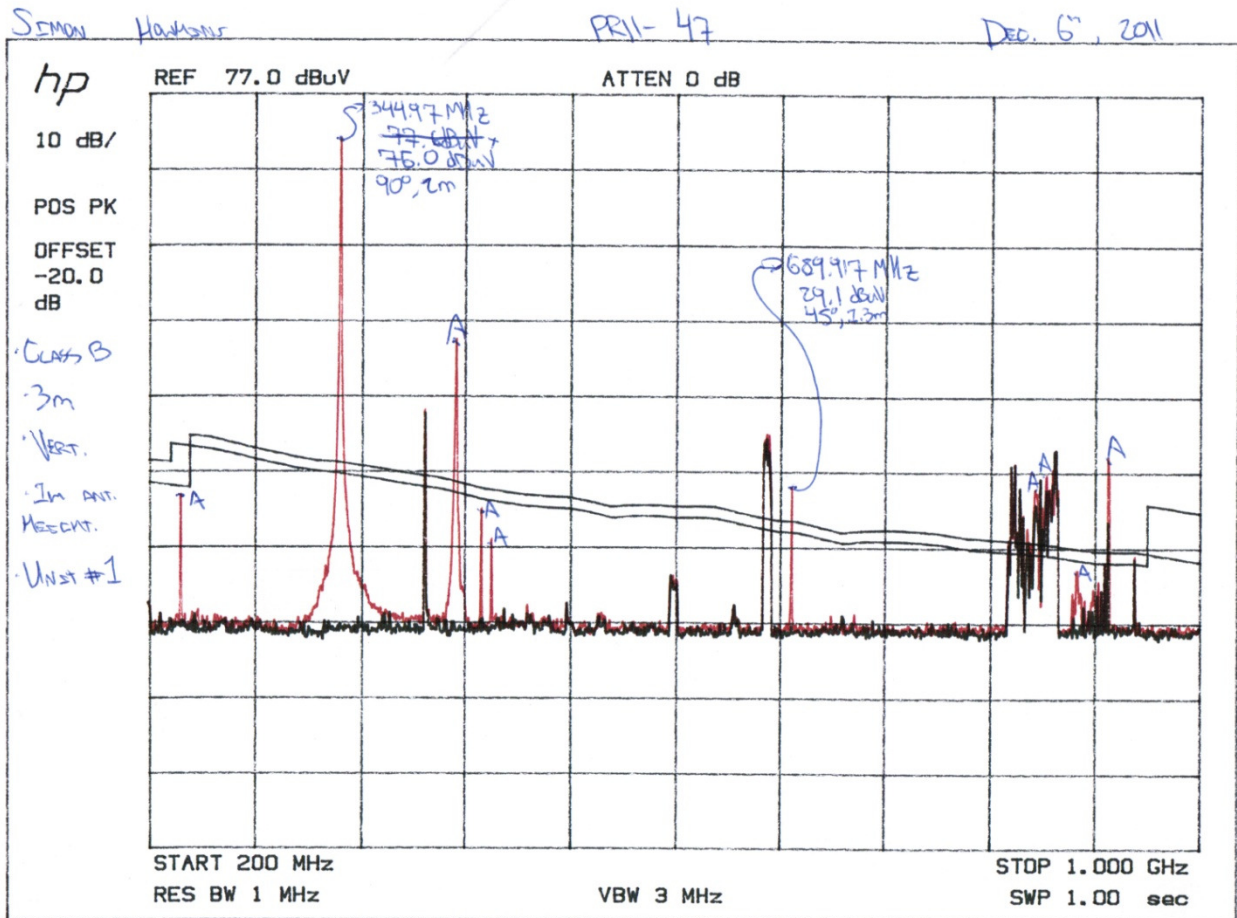
MEASURED RF PLOTS



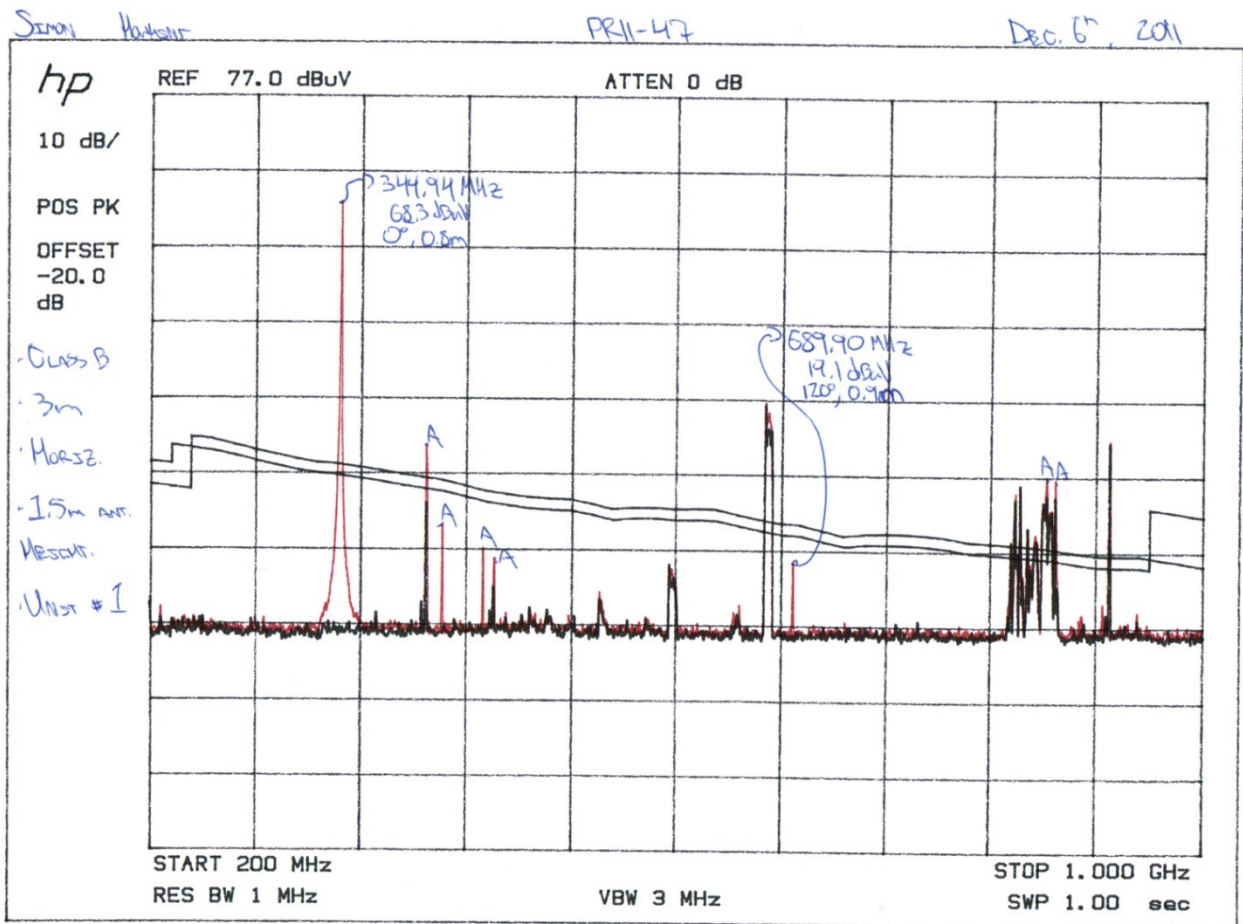
30 MHz – 200 MHz Vertical



30 MHz – 200 MHz Horizontal



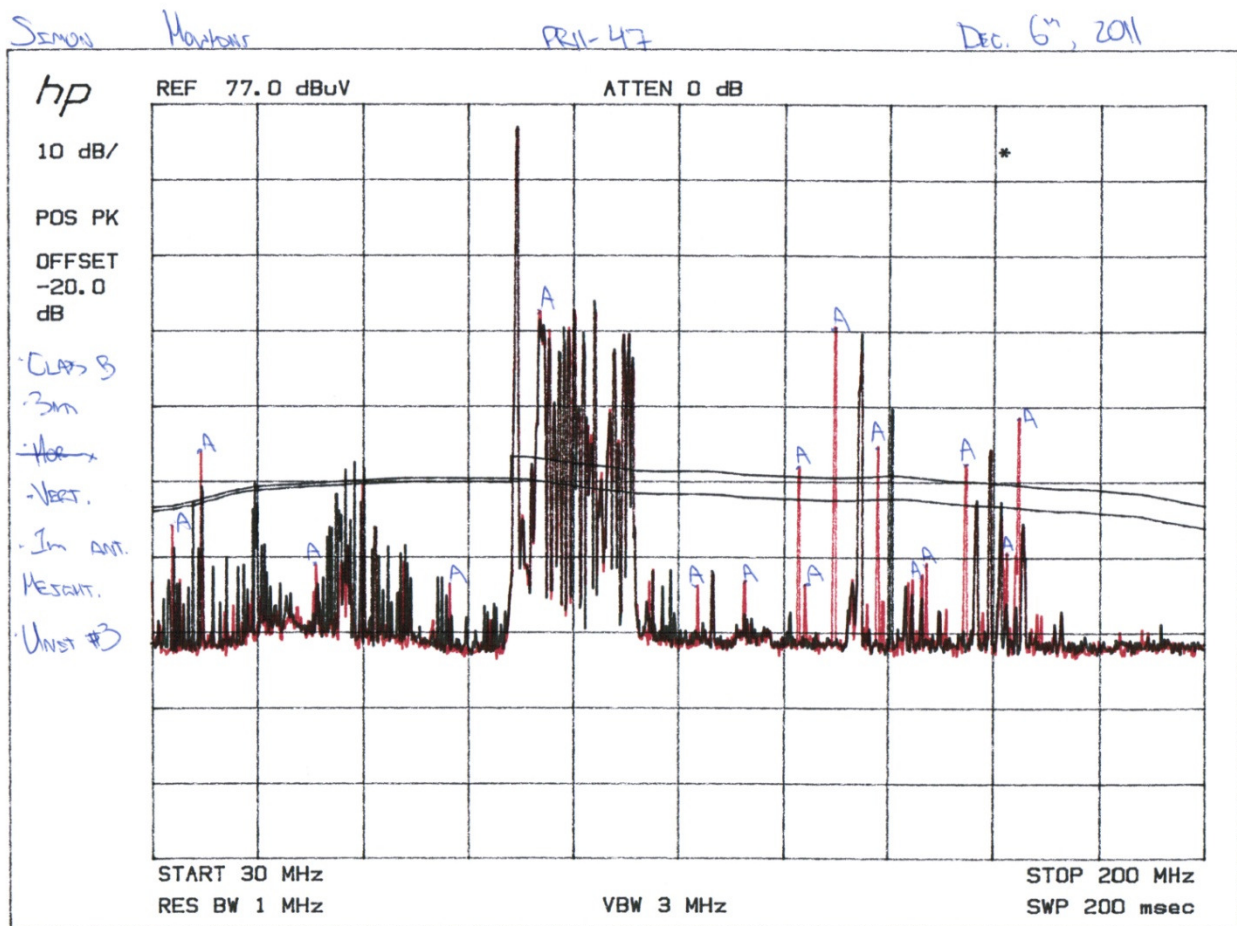
200 MHz – 1000 MHz Vertical



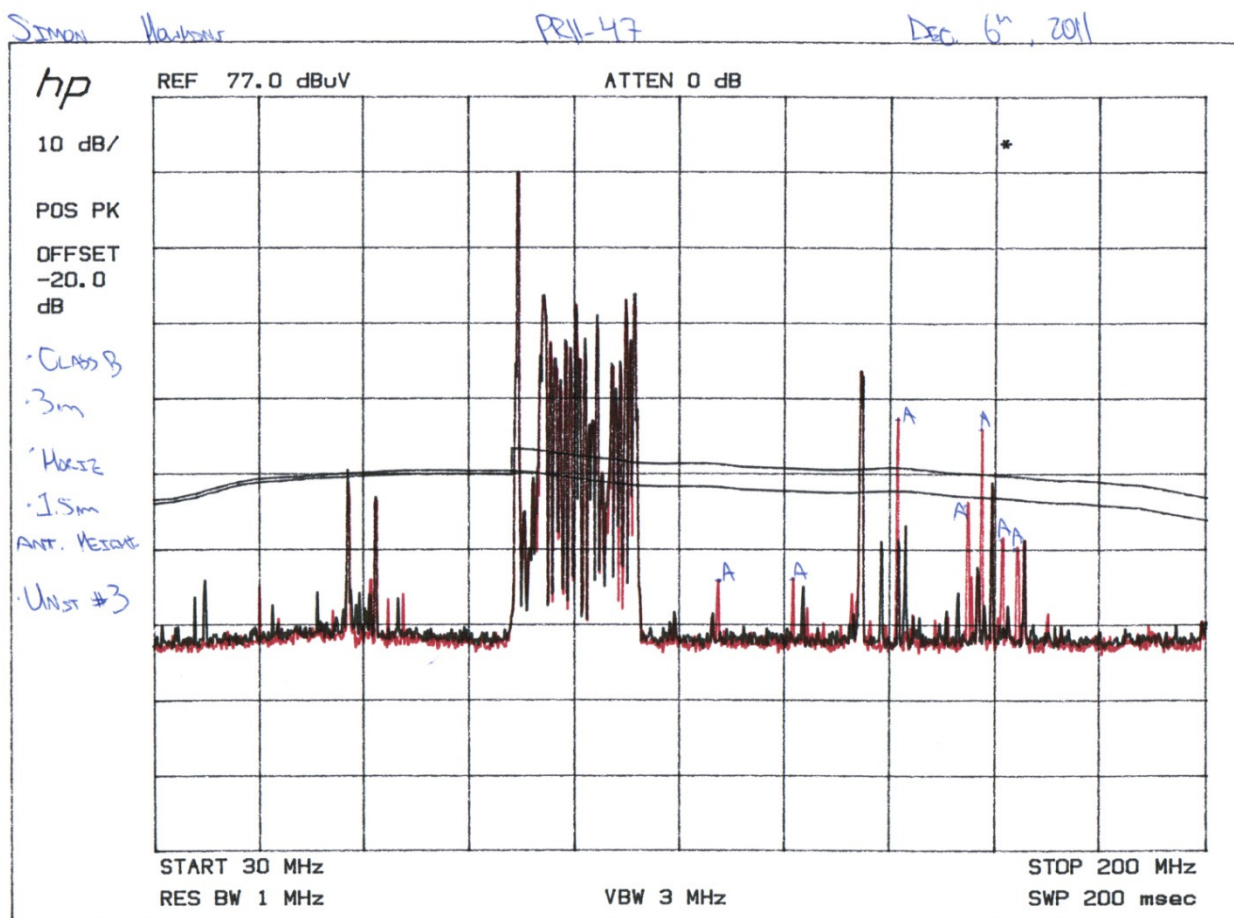
200 MHz – 1000 MHz Horizontal

5800MICRA: UNIT #3**MEASURED VALUES**

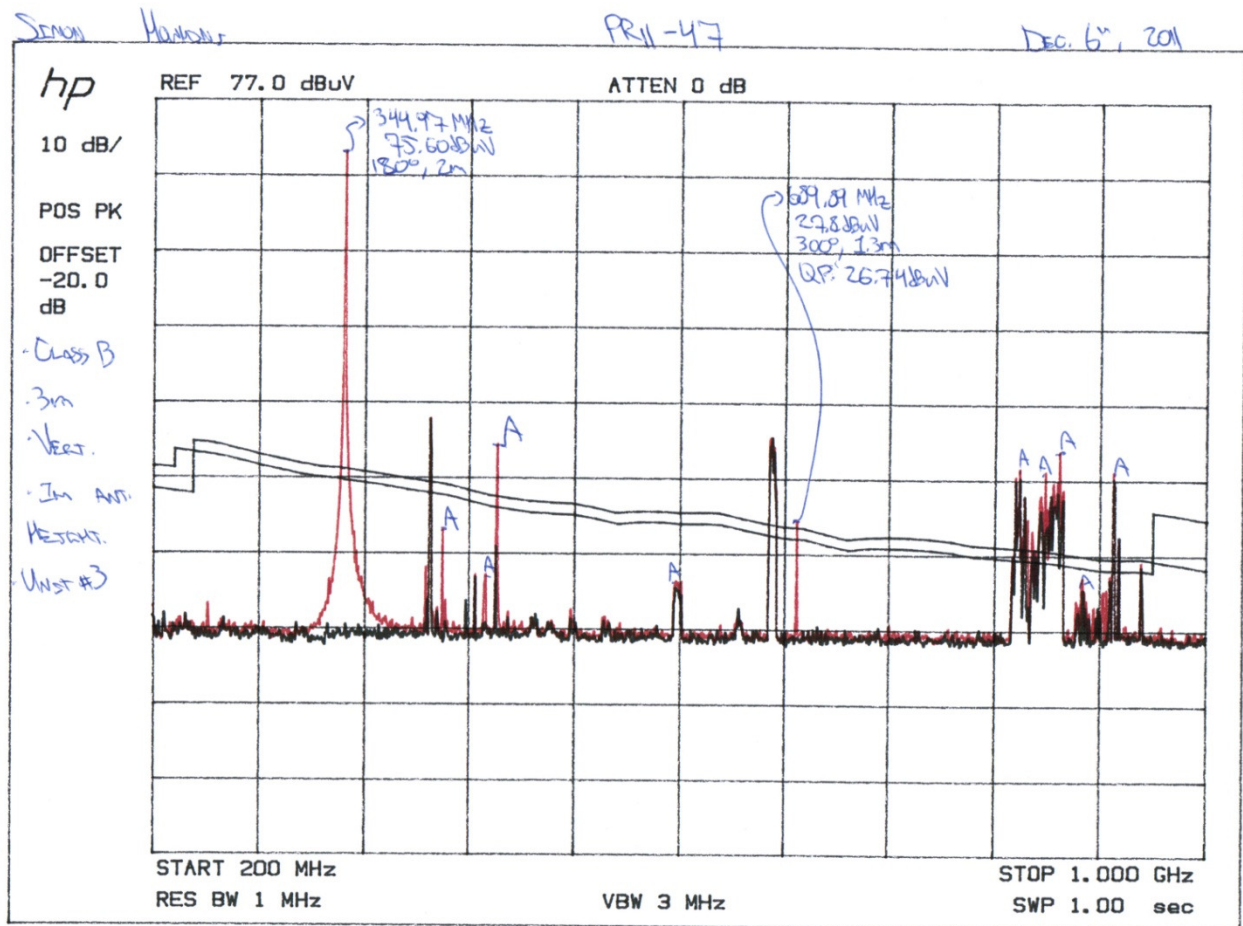
Frequency (MHz)	Measured Average Value (dBuV)	Polarization (V/H)	Angle (°)	Antenna Height (m)	Antenna Factor (dB/m)	Cable Losses (dB)	Field Strength (dBuV/m)	Limit (dBuV/m)	Margin (dB)
344.94	46.4	V	80	1.8	15.1	4	65.5	77.3	-11.8
689.88	14.7	V	80	1.5	20.8	6.4	41.9	57.3	-15.4
1034.82	0.3	V	10	1	25.9	7.8	34	66.8	-32.8
1379.76	-10.9	V	45	1	26	9.5	24.6	66.8	-42.2
1724.7	-6.4	V	290	1	27.5	11.5	32.6	66.8	-34.2

MEASURED RF PLOTS

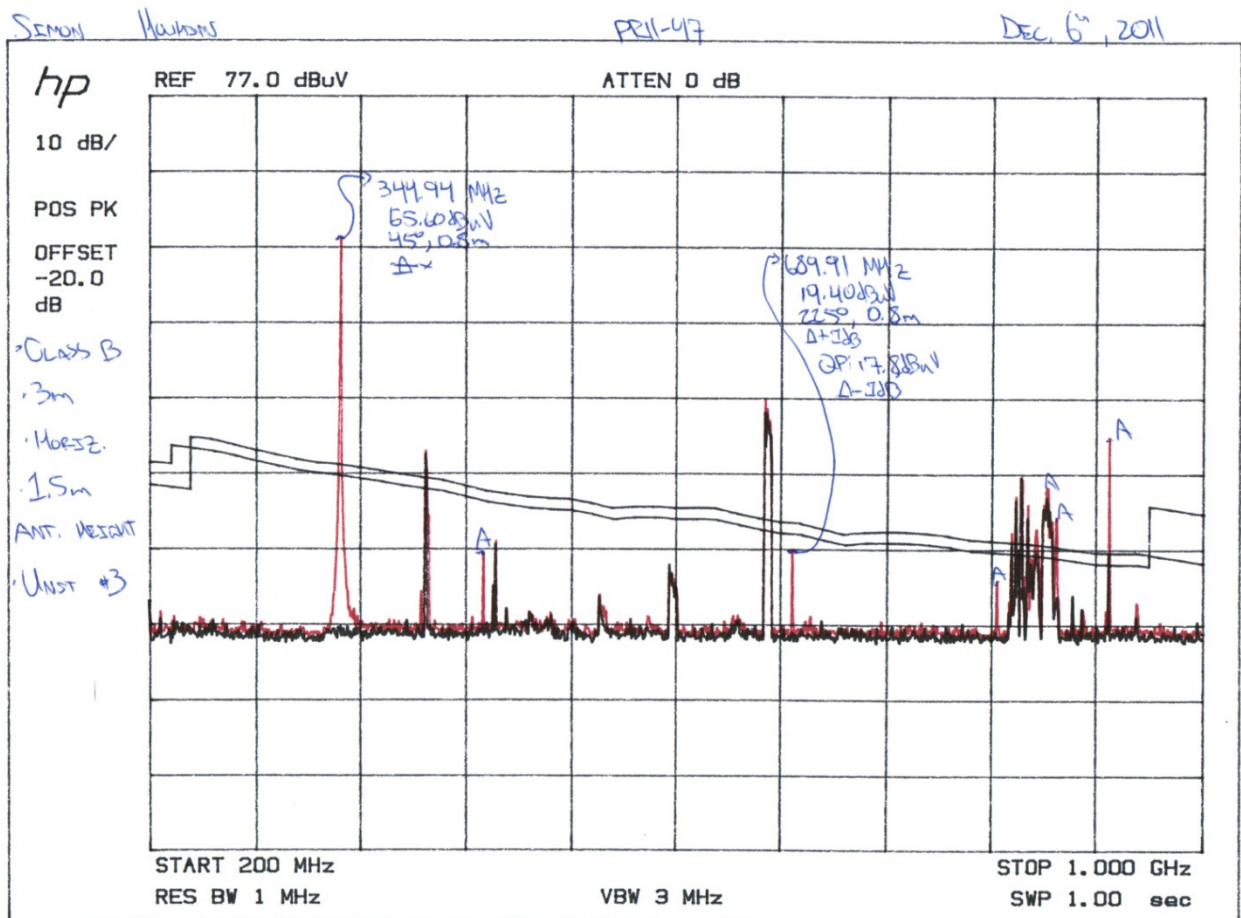
30 MHz – 200 MHz Vertical



30 MHz – 200 MHz Horizontal



200 MHz – 1000 MHz Vertical



200 MHz – 1000 MHz Horizontal