

Test Report for Unlicensed Low Power Transmitter

Description of device: Electric meter wireless interface operating at 902-928 MHz

FCC Applicable Rule Parts: 15.205, 15.207, 15.249

Applicant: Hunt Technologies
6436 County Rd. 11
Pequot Lakes, MN 56468

Telephone / Fax number: 218-562-5530

FCC ID: TEB-AIRPT652

Brand name: AirPoint icon

Model No.: 0652

IC: 5931A-AIRPT652

TEST REQUIREMENTS

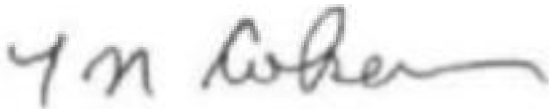
The referenced device is subject to certification under Part 2 of FCC Rules. The specific emissions limits and test requirements are found in Part 15 of FCC Rules. In addition to the device specific requirements listed in 15.249 (re-printed below), the following Part 15 requirements are universal to all unlicensed transmitters and would also apply:

- 15.19 Labeling requirements
- 15.20 Accessories
- 15.21 Information to user
- 15.31 Measurement standards
- 15.33 Frequency range of measurements
- 15.35 Measurement detector functions and bandwidths
- 15.109 Radiated Emissions (unintentional radiators)
- 15.203 Antenna requirement
- 15.204 External radio frequency power amplifiers and antenna modifications.
- 15.205 Restricted bands of operation.
- 15.207 Conducted limits
- 15.209 Radiated emission limits, general requirements.

The AirPoint icon meets all FCC requirements for a device of this type.

THOMAS N. COKENIAS

23 February 2006



EMC and Radio Regulatory Consultant
Agent for Hunt Technologies

15.205 Restricted bands of operation.

Only spurious emissions are permitted in any of the frequency bands listed below: The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209.

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
10.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36 - 13.41			

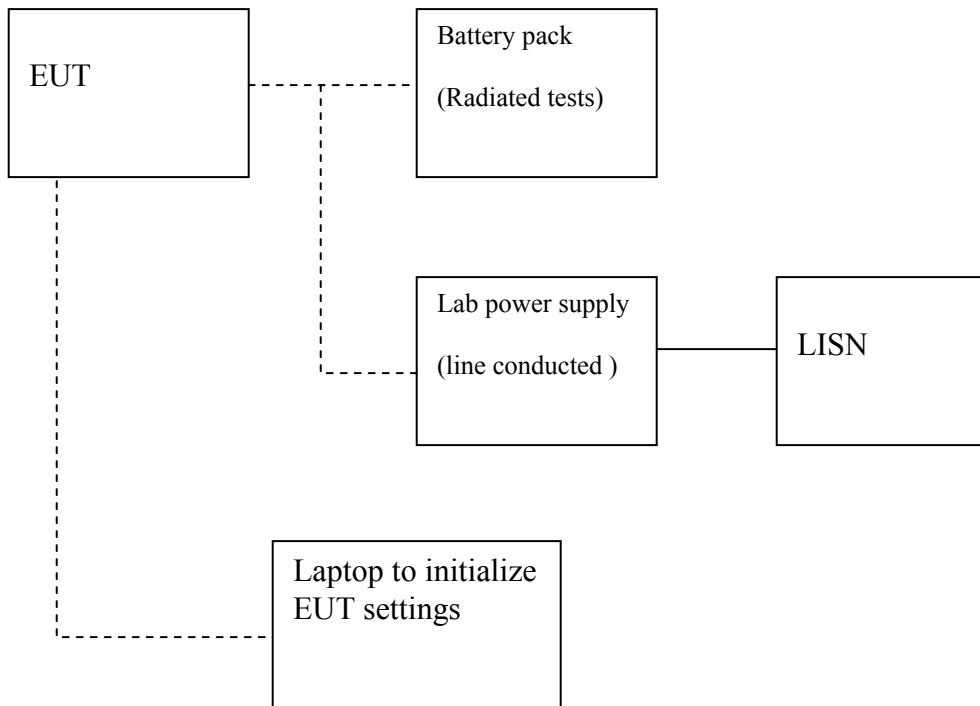
15.109 Radiated emission limits, general requirements.

Except as provided elsewhere in this paragraph the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength uV/m	Measurement distance, m
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz.

Test Set-up Diagram

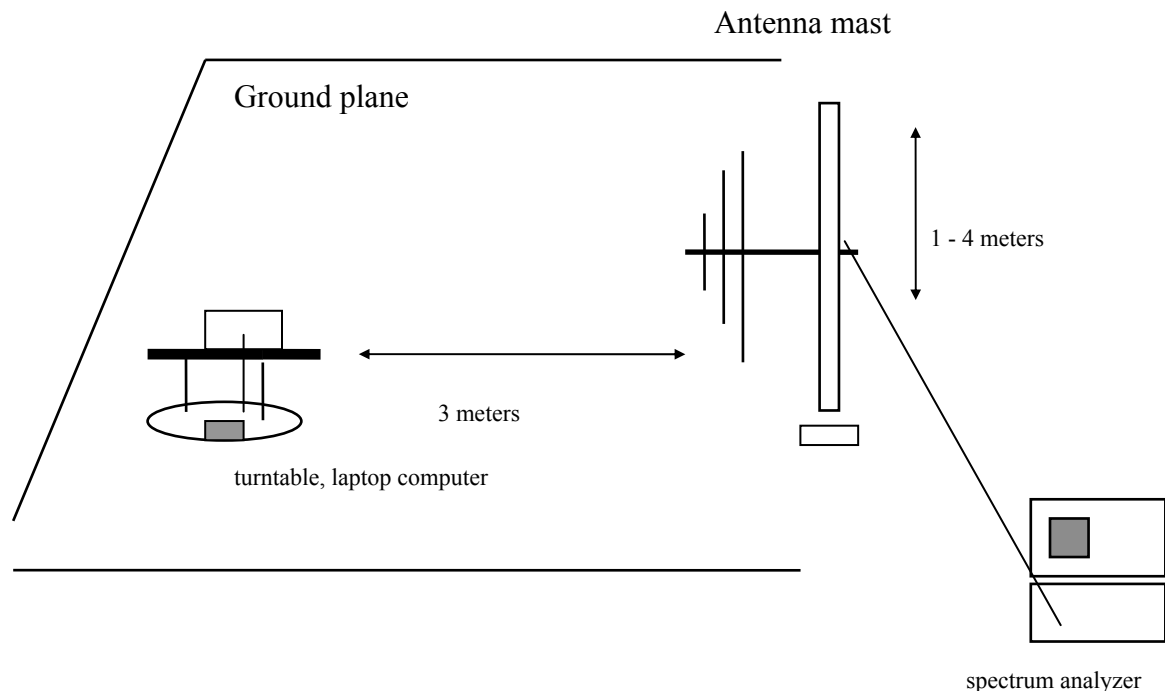


TEST EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Spectrum Analyzer, 26.5 GHz	HP	8593EM	3710A00205	7/26/06
Preamplifier, 1300 MHz	HP	8447D	1937A02062	3/7/06
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	3/3/06
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	4/22/06
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	MY45300064	10/19/06
Preamplifier, 1 ~ 26.5 GHz	HP	8449B	3008A00369	8/17/06
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-	2023	8/30/06
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BN	8379443	8/30/06
EMI Test Receiver	R & S	ESHS 20	827129/006	6/3/06
EMI Test Receiver	R & S	ESIB40	100192	5/9/06

15.249 Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following table. Emissions radiated outside of the specified frequency 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 Section 15.209, whichever is the lesser attenuation.

Fundamental Frequency	Field Strength, fundamental emission at 3 meters	Field Strength, harmonics and spurious emissions at 3m
902-928 MHz	50,000 uV/m (94 dBuV/m)	500 uV/m (54 dBuV/m)
2400 - 2483.5 MHz	50,000 uV/m (94 dBuV/m)	500 uV/m (54 dBuV/m)
5725-5875 MHz	50,000 uV/m (94 dBuV/m)	500 uV/m (54 dBuV/m)
24.0 - 24.25 GHz	250,000uV/m (104 dBuV/m)	2500 uV/m (68 dBuV/m)

15.205, 15.209, 15.249 Radiated Emissions**Radiated Test Set-up, 30 - 1000 MHz****Test Procedures, 30 -1000 MHz**

The EUT was set to normal operating conditions (constantly transmitting). Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4.

Test Results

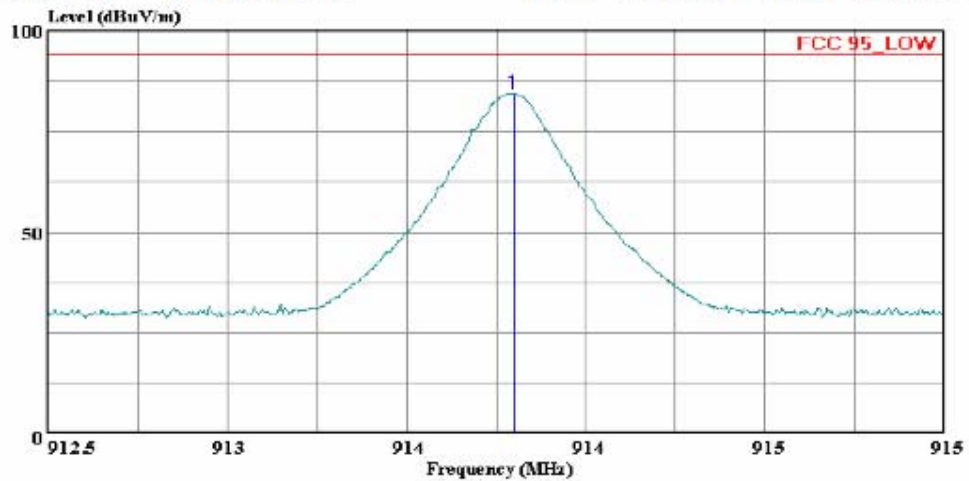
Refer to plots and data sheets below.

Fundamental Frequency emissions



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 11 File#: Emi.emi Date: 01-18-2006 Time: 12:22:51



(Auxiliary ATC)

Trace: 10

Ref Trace:

Condition: FCC 95_LOW HORIZONTAL
Test Operator: : Thanh Nguyen
Project #: : 06L10028
Company: : SENSUS METERING SYSTEM
EUT: : AIR POINT
Model No.: : 0652
Configuration: : EUT Stand Alone
Mode of operation: TX only 913.75MHz
Target of Test : FCC 95H

Page: 1

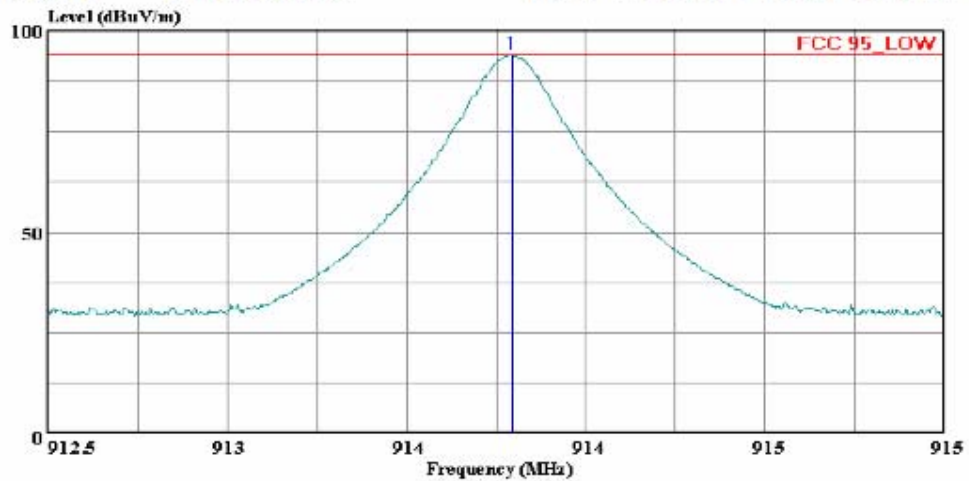
		Read		Limit	Over	
Freq	Level	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	913.798	85.32	-0.89	84.43	94.00	-9.57 Peak

Fundamental Frequency emissions



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 9 File#: Emi.emi Date: 01-18-2006 Time: 12:19:37



(Audix ATC)

Trace: 8

Ref Trace:

Condition: FCC 95_LOW VERTICAL
Test Operator: : Thanh Nguyen
Project #: : 06L10028
Company: : SENSUS METERING SYSTEM
EUT: : AIR POINT
Model No.: : 0652
Configuration: : EUT Stand Alone
Mode of operation: TX only 913.75MHz
Target of Test : FCC 95H

Page: 1

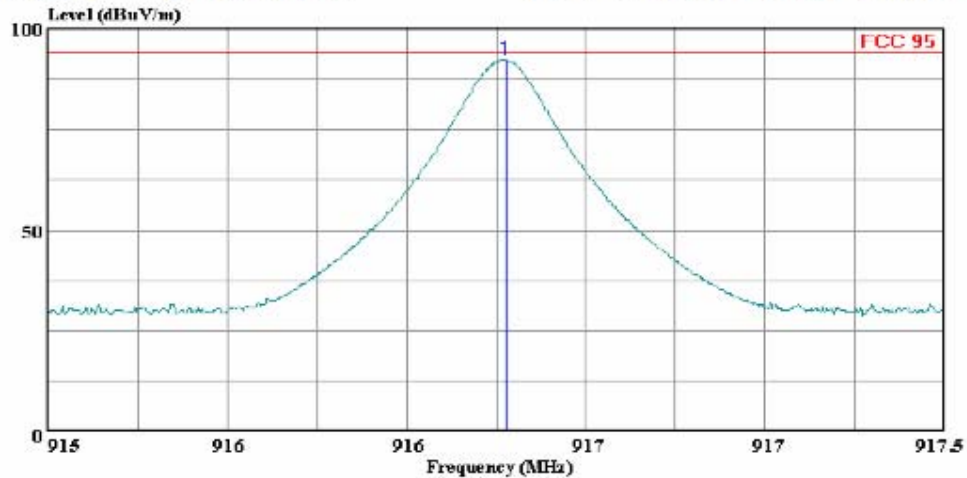
		Read		Limit	Over	
Freq	Level	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	913.795	94.85	-0.89	93.96	94.00	-0.04 Peak

Fundamental Frequency emissions



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 5 File#: Emi.emi Date: 01-18-2006 Time: 12:09:49



(Audix ATC)

Trace: 4

Ref Trace:

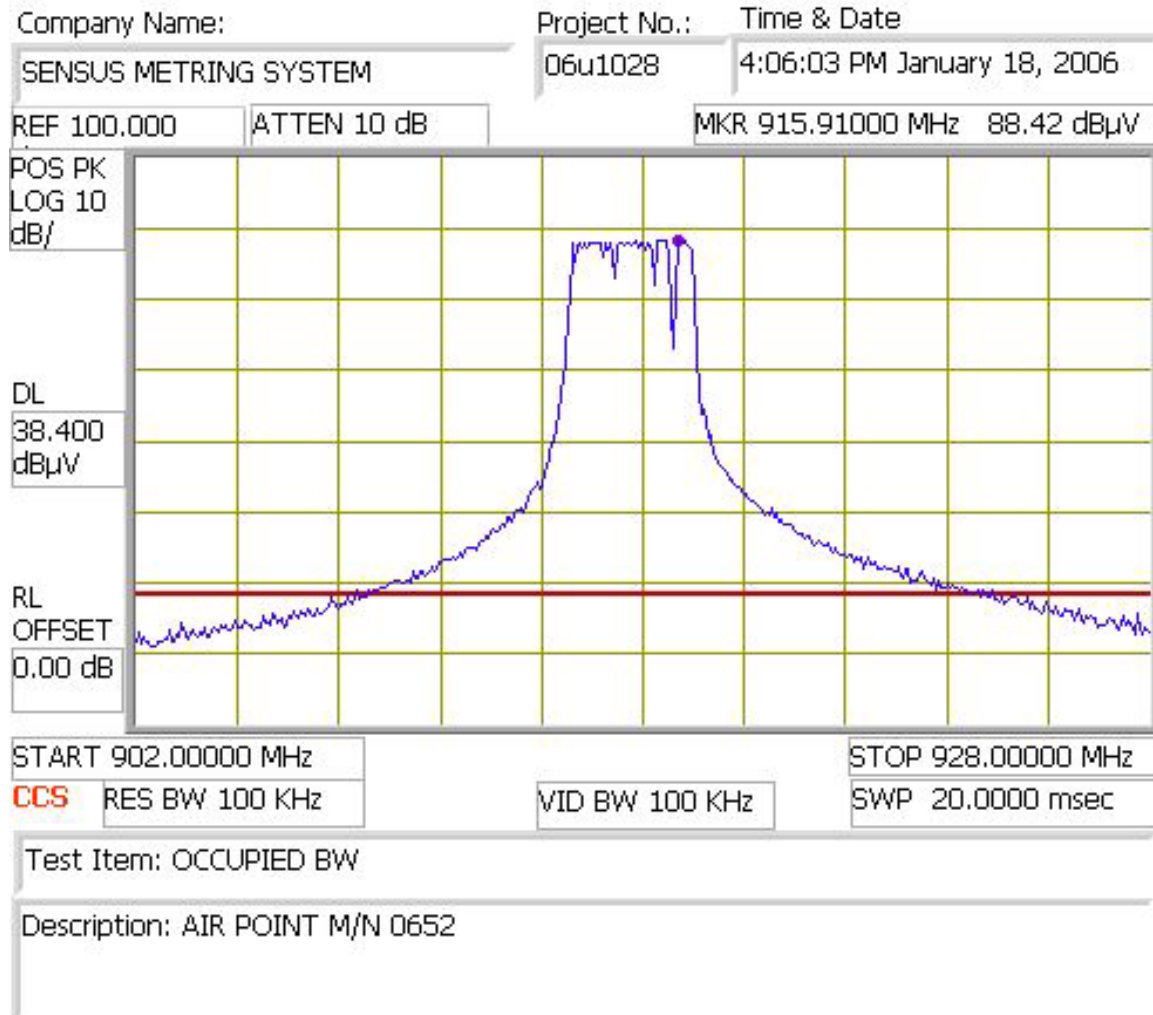
Condition: FCC 95 VERTICAL
Test Operator: : Thanh Nguyen
Project #: : 06L10028
Company: : SENSUS METERING SYSTEM
EUT: : AIR POINT
Model No.: : 0652
Configuration: : EUT Stand Alone
Mode of operation: TX only 916.775MHz
Target of Test : FCC 95H

Page: 1

	Freq	Read		Limit	Over	
	MHz	Level	Factor	Level	Line	Limit Remark
		dBuV	dB	dBuV/m	dBuV/m	dB
1	916.278	93.16	-0.88	92.28	94.00	-1.72 Peak

Out of Band emissions

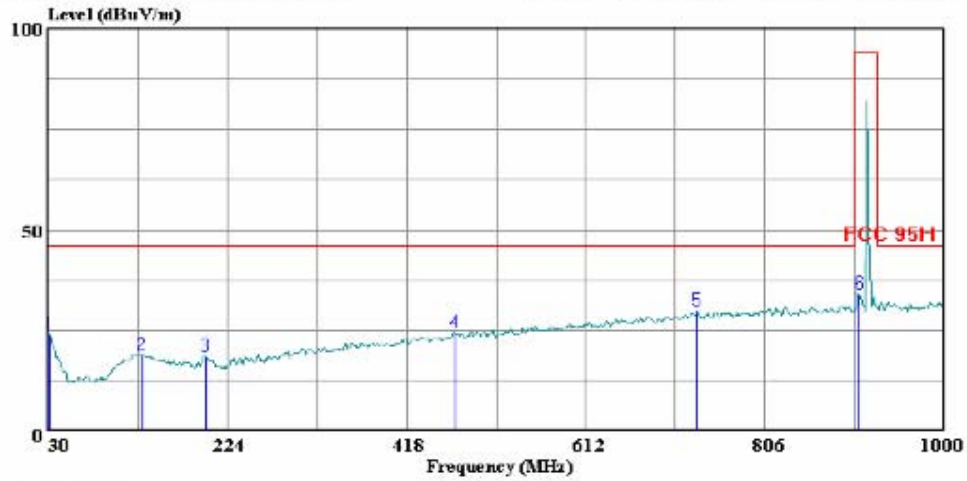
The EUT was set to frequency hopping mode, its normal operational mode. The frequency range 902-928 MHz was captured to measure out of band emissions at the frequency band edges. All emissions were at least -50 dBc or below 15.209 limits up to the 10th harmonic of the fundamental.





561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 13 File#: Emi.emi Date: 01-18-2006 Time: 12:27:19



(Audix ATC)

Trace: 12

Ref Trace:

Condition: FCC 95H HORIZONTAL
Test Operator: : Thanh Nguyen
Project #: : 06L10028
Company: : SENSUS METERING SYSTEM
EUT: : AIR POINT
Model No.: : 0652
Configuration: : EUT Stand Alone
Mode of operation: TX only 913.75MHz
Target of Test : FCC 95H

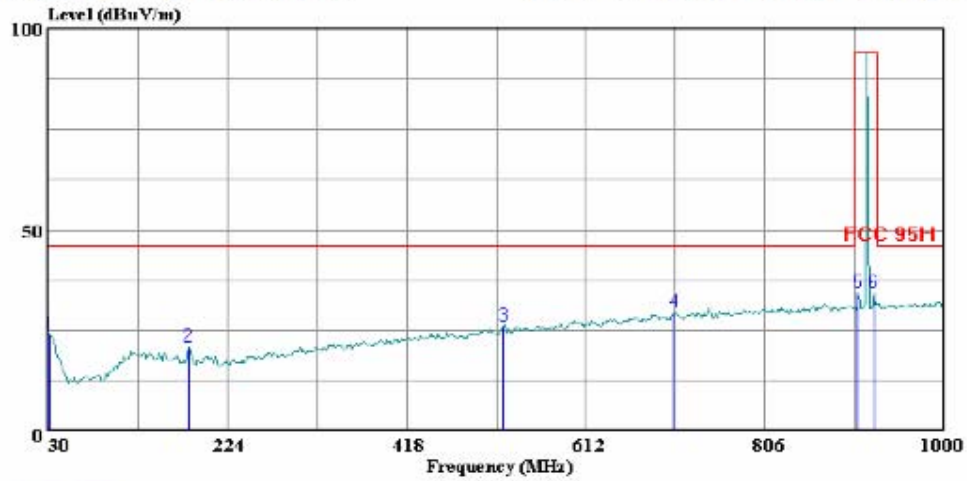
Page: 1

	Freq	Read		Limit	Over	
	MHz	Level	Factor	Level	Line	Limit Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB
1	30.970	31.55	-7.50	24.05	46.00	-21.95 Peak
2	131.850	31.46	-12.70	18.76	46.00	-27.24 Peak
3	200.720	31.55	-13.23	18.32	46.00	-27.68 Peak
4	470.380	31.92	-7.85	24.07	46.00	-21.93 Peak
5	732.280	32.41	-2.61	29.80	46.00	-16.20 Peak
6	907.850	34.71	-0.91	33.80	94.00	-60.20 Peak



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 15 File#: Emi.emi Date: 01-18-2006 Time: 12:30:31



(Audix ATC)

Trace: 14

Ref Trace:

Condition: FCC 95H VERTICAL
Test Operator: : Thanh Nguyen
Project #: : 06L10028
Company: : SENSUS METERING SYSTEM
EUT: : AIR POINT
Model No.: : 0652
Configuration: : EUT Stand Alone
Mode of operation: TX only 913.75MHz
Target of Test : FCC 95H

Page: 1

	Freq	Read		Limit	Over	
	MHz	Level	Factor	Level	Line	Limit Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB
1	30.970	31.41	-7.50	23.91	46.00	-22.09 Peak
2	182.290	35.58	-14.71	20.87	46.00	-25.13 Peak
3	522.760	32.76	-6.85	25.90	46.00	-20.10 Peak
4	707.060	32.44	-3.16	29.28	46.00	-16.72 Peak
5	906.880	35.31	-0.90	34.41	94.00	-59.59 Peak
6	924.340	34.82	-0.71	34.11	94.00	-59.89 Peak

Test Set-up, 1-40 GHz

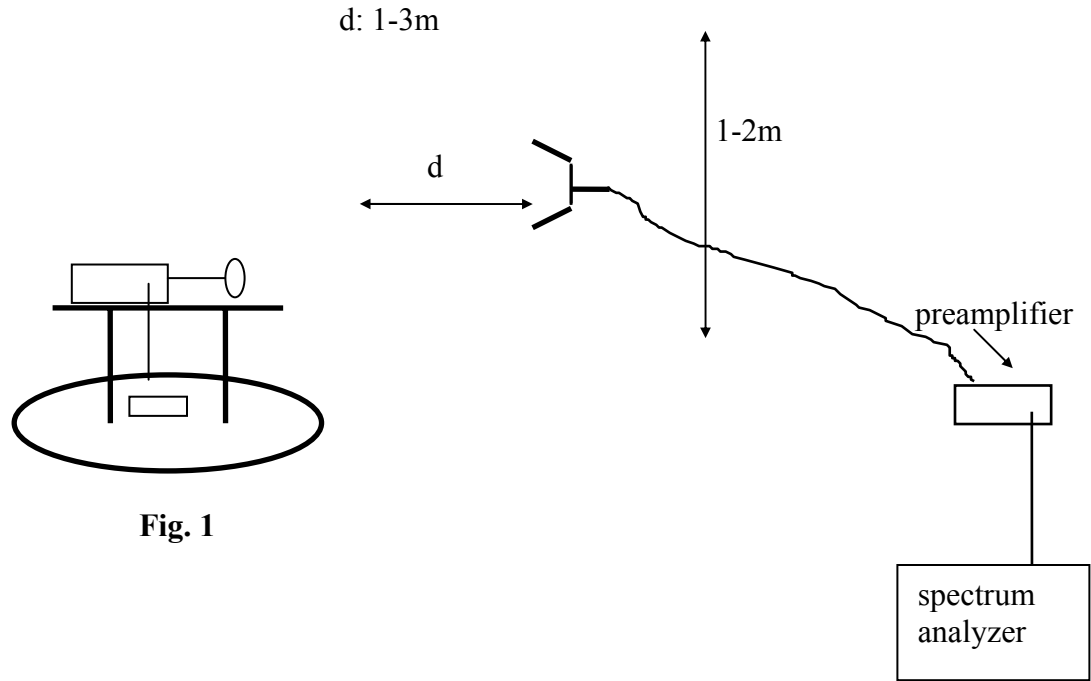


Fig. 1

Test Procedure

The EUT was placed on a wooden turntable located 3m from the search antenna. The EUT was activated to transmit continuously. Radiated emissions from fundamental operating frequency to the 10th harmonic, for search antenna in both vertical and horizontal polarities.

Duty Cycle Calculation

Testing was performed with the EUT transmitting continuously. Under normal operation the EUT RF is on for a maximum of 6.71 msec in a 125 msec period. Per 15.35, duty cycle is calculated in 100msec period containing maximum RF energy:

$$\text{Duty cycle} = 20\log (6.71\text{msec}/100\text{msec}) = -23.5 \text{ dB}$$

Refer to separately submitted spectrum analyzer plot showing ON time in 100msec for previous model 0622 using same timing as the 0652 model in current filing.

Test Results

Data shows the EUT meets all radiated requirements specified in 15.205 and 15.249. For each antenna, radiated data points listed are the only ones detected within 20 dB of the limit. Refer to attached spread sheet and spectrum analyzer conducted output plot.

page14

Radiated Emissions Test Set-up Photograph

Front view

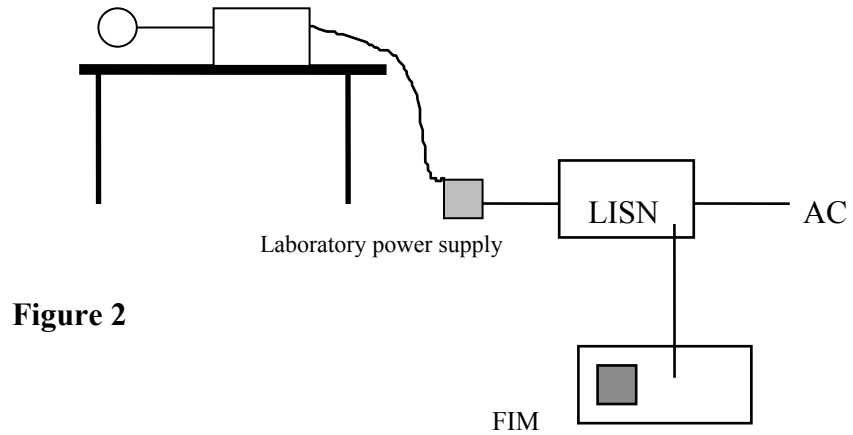


Rear view



AC Line Conducted Emissions Test Requirement: 15.107, 15.207

Test Set-up



Test Procedure

1. The EUT was placed on a wooden table 40 cm from a vertical ground plane and approximately 80 cm above the horizontal ground plane on the floor. The EUT was set to transmit in normally.
2. Line conducted data was recorded for both NEUTRAL and HOT lines.

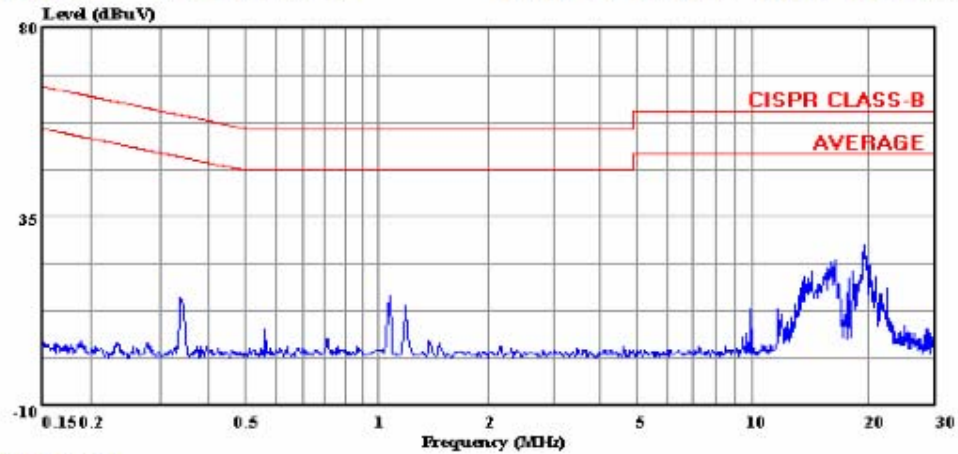
Test Results

PASS. Refer to data sheets below.



Compliance Certification Services
561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 7 File#: LC.EMI Date: 01-18-2006 Time: 14:46:53



(Audix ATC)

Trace:

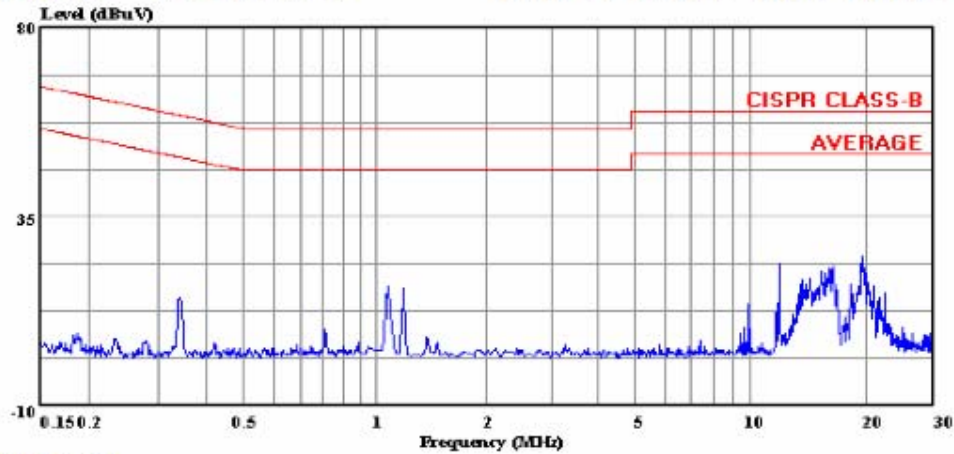
Ref Trace:

Condition: CISPR CLASS-B
Test Operator : Thanh Nguyen
Project # : 06U10028
Company : SENSUS METER SYSTEM
EUT Description: AIR POINT
Model : 0652
EUT Config : EUT & HP DC Power Supply
Mode Of Oper : TX
Target : FCC Class B
Power Source : 115Vac 60Hz
: L1: Peak (Blue)



Compliance Certification Services
561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 14 File#: LC.EMI Date: 01-18-2006 Time: 15:05:46



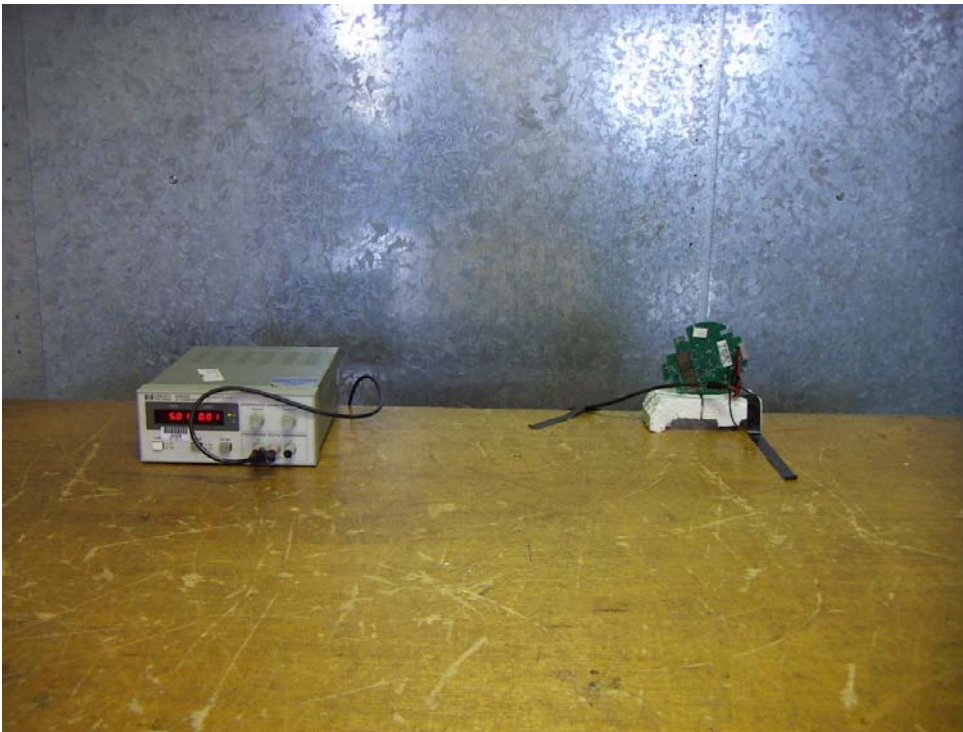
(Audix ATC)

Trace:

Ref Trace:

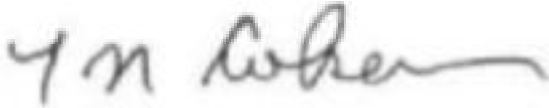
Condition: CISPR CLASS-B
Test Operator : Thanh Nguyen
Project # : 06U10028
Company : SENSUS METER SYSTEM
EUT Description: AIR POINT
Model : 0652
EUT Config : EUT & HP DC Power Supply
Mode Of Oper : TX
Target : FCC Class B
Power Source : 115Vac 60Hz of DC Power supply
L2: Peak (Blue)

AC Line conducted test set-up



Human Hazard RF Exposure Considerations

FCC requirements concerning measuring and reporting human RF exposure hazards are found in section 1.1307 and 2.1091 of the Rules. There are no requirements for measurement or reporting RF exposure hazard potential for 902-928 MHz devices operating under 15.249; per the referenced rules, this type of equipment is categorically exempt from having to meet the requirements, as the AirPoint icon operates at very low power and presents no known RF hazard potential.



THOMAS N. COKENIAS
EMC and Radio Regulatory Consultant
Agent for Hunt Technologies Inc.

23 February 2006