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EMC QUALIFICATION
TEST REPORT

APEX WIRELESS/EAGLE TREE SYSTEMS

SEAGULL WIRELESS TELEMETRY, R21-ETSTX1

TESTED TO CONFORM WITH:

☒ INTENTIONAL RADIATOR STANDARDS

☒ EMISSIONS STANDARDS

FOR

INDUSTRIAL, SCIENTIFIC AND MEDICAL (ISM)

Test Report Number:	**040725-798**
Date of Issue:	**September 7, 2004**
Date of Test Completion:	**August 6, 2004**
Manufacturer's Address:	**4957 Lakemont Blvd. SE Suite C-4 PMB 235 Bellevue, WA 98006**
Phone:	**425-614-0450**

Reviewed by:

Compliance Engineer

Approved by:

Laboratory Director

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Any questions regarding this report should be directed to:

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12/CIS22b - CNS13438 (1997)
12/EM02a – IEC 61000-3-2, Edition 2.1 (2001-10) and EN 61000-3-2 (2000)
12/EM03 – EN 61000-3-3 (1995) and IEC 61000-3-3 (1995)
12/F01 – ANSI C63.4 (2001) – cited in FCC Method - 47 CFR Part 15 - Digital Devices
12/F01a - Conducted Emissions, Power Lines, 150 kHz to 30 MHz
12/F01b - Radiated Emissions
12/T51 - AS/NZS 3548
12/I01 – IEC 61000-4-2 (1995) and Amendment 1 (1998)
12/I02 – IEC 61000-4-3 (1995) and Amendment 1 (1998)
12/I03 – IEC 61000-4-4 (1995)
12/I04 – IEC 61000-4-5 (1995)
12/I05 – IEC 61000-4-6 (1996)
12/I06- - IEC 61000-4-8 (1993)
12/I07 – IEC 61000-4-11 (1994)

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TABLE OF CONTENTS

EMC QUALIFICATION TEST REPORT
SEAGULL WIRELESS TELEMETRY, R21-ETSTX1

1.0 EXECUTIVE SUMMARY

1.1 PURPOSE

The purpose of this report is to present EMC test data and demonstrate conformity to the requirements of the prescribed standards for Emissions and/or Immunity.

1.2 CONFORMITY

The test article was tested to the standards listed in Table I with the indicated conformity status. All test methods were performed in accordance to with the standards listed.

TABLE I. EMISSIONS CONFORMITY SUMMARY

TEST TYPE	COMPLIANCE STANDARD	TESTING TECHNIQUE	TEST DESCRIPTION	PRODUCT CLASSIFICATION	CONFORMITY STATUS
EMISSIONS	FCC Part 15.109 FCC Part 15.247	ANSI C63.4-2001	Radiated Emissions Intentional Radiator	Class B	**PASSED**

1.3 EQUIPMENT UNDER TEST (EUT)

EUT NAME: **SEAGULL WIRELESS TELEMETRY**
EUT MODEL/PART NUMBER(S): **R21-ETSTX1**
EUT SERIAL NUMBER(S): **SEA-005**

2.0 EMISSIONS TEST STANDARDS

FCC Part 15, Subpart B **Class B**

2.1 RADIATED EMISSIONS – 30 MHZ TO 1000 MHZ

Measurements for *Radiated Emissions* were performed over the frequency range of 30 MHz to 1000 MHz in the horizontal and vertical antenna polarities to the requirements of:

FCC 15.109 **Class B**

Testing Conditions

Date of Test:	**August 2, 2004**
Temperature:	**17°C**
Relative Humidity:	**56%**
Test Voltage:	**4.8 V battery powered running test program**
Test Operator:	**ws**

Test Location

Criterion Technology Open Area Test Site

Test Distance

Antenna Distance: **10 meter(s)** **Final Measurement(s)**

Test Equipment

☒ Hewlett-Packard Spectrum Analyzer, HP 8566B ☒ Hewlett-Packard Quasi-Peak Adapter, HP 85650A
☐ Hewlett-Packard Tracking Generator, HP 85645A
☐ Rohde and Schwarz Receiver, ESHS-30 ☒ Rohde and Schwarz Receiver, ESVS-30
☒ Mini Circuits Pre-Amp #2 ☐ Veratech Pre-Amp #3
☒ Chase BiLog Antenna, Model 1121 ☐ Antenna Research, Horn Antenna, Model DRG118/A
☐ EMCO BiConnical Antenna, Model 3108 ☐ EMCO Log Periodic Antenna, Model 3146

Test Results of Radiated Emissions

Test Status: **PASSED** Frequency Range: 30 MHz to 1000 MHz

Minimum Margin to Limit: -1.23 dB at 95.9500 MHz

Remarks

See: **APPENDIX A** for EUT Photographs **APPENDIX B** for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.2 ☒ INTENTIONAL RADIATOR – RADIATED EMISSIONS

Measurements for *Radiated Emissions* were performed over the frequency range of 0.4 GHz to 10GHz with horizontal and vertical antenna polarities to the requirements of:

FCC Part 15.247

Testing Conditions

Date of Test:	**July 27, 2004**
Temperature:	**17°C**
Relative Humidity:	**56%**
Test Voltage:	**4.8 V battery powered running test program**
Test Operator:	**ws**

Test Location

Criterion Technology Open Area Test Site

Test Distance

Antenna Distance: **3 meter(s)** **Final Measurement(s)**

Test Equipment

- ☒ Hewlett-Packard Spectrum Analyzer, HP 8566B
- ☒ Hewlett-Packard Quasi-Peak Adapter, HP 85650A
- ☐ Hewlett-Packard Tracking Generator, HP 85645A
- ☐ Rohde and Schwarz Receiver, ESHS-30
- ☒ Rohde and Schwarz Receiver, ESVS-30
- ☒ Mini Circuits Pre-Amp #2
- ☒ Veratech Pre-Amp #3
- ☒ Chase BiLog Antenna, Model 1121
- ☒ Antenna Research, Horn Antenna, Model DRG118/A
- ☐ EMCO BiConnical Antenna, Model 3108
- ☐ EMCO Log Periodic Antenna, Model 3146

Test Results of Radiated Emissions

Test Status: **PASSED** Frequency Range: 0.4 GHz to 10GHz

Minimum Margin to Limit: -4.24 dB at 1810.018 MHz

Remarks

See: **APPENDIX A** for EUT Photographs **APPENDIX B** for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.3 INTENTIONAL RADIATOR – ANTENNA CONDUCTED EMISSIONS

Measurements for *Antenna Conducted Emissions* were performed over the frequency range of 400 MHz to 10 GHz to the requirements of:

FCC PART 15.247

Testing Conditions

Date of Test:	**8-2-04**
Temperature:	**17°C**
Relative Humidity:	**56%**
Test Voltage:	**4.8 V battery powered running test program**
Test Operator:	**ws**

Test Location

Criterion Technology Open Area Test Site

Test Equipment

Hewlett-Packard Spectrum Analyzer, HP 8566B
Rohde and Schwarz Receiver, ESVS-30

Test Results of Conducted Emissions

Test Status: **PASSED** Frequency Range: 400 MHz to 12 GHz

For compliance to Part 15.247, power produced by intentional radiator is to be 20 dB down from carrier:

Minimum Margin to Limit: **-8.81** dB at **1810.018** MHz

For compliance with Part 15.205, Restricted bands:

Minimum Margin to Limit: **-6.78** dB at **2262.522** MHz

Remarks

See: **APPENDIX A** for EUT Photographs **APPENDIX B** for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.4 CHANNEL BANDWIDTH, NUMBER OF CHANNELS, BAND EDGES

Measurements for bandwidth, band edges, number of channels were performed in accordance with the Operations to the Requirements of:

FCC 15.247

Testing Conditions

Date of Test:	**8-4-04**
Temperature:	**19°C**
Relative Humidity:	**52%**
Test Voltage:	**4.8 V battery powered running test program**
Test Operator:	**ws**

Test Location

Criterion Technology Open Area Test Site

Test Equipment

Hewlett-Packard Spectrum Analyzer, HP 8566B
Rohde and Schwarz Receiver, ESVS-30

Number of Channels: 50 Channels
Channel Spacing: 400 kHz

Test Results of Occupied Bandwidth and 20 db Bandedges

Test Status: **PASSED** Frequency Range: 900 MHz to 940 MHz

-20 dB lower Bandedge:	**904.779 MHz**
-20 dB upper Bandedge:	**924.705 MHz**
-20 dB Occupied Channel Bandwidth:	**195.9 kHz**

Remarks

See: **APPENDIX A** for EUT Photographs **APPENDIX B** for Data Sheets
APPENDIX D for Test Equipment Calibration Status

Remarks

See: **APPENDIX A** for EUT Photographs **APPENDIX B** for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.5 PEAK OUTPUT POWER

Measurements for peak output power were measured under typical modulation characteristics at maximum, minimum, and two intermediate frequencies.

Testing Conditions

Date of Test:	**8-4-04**
Temperature:	**19°C**
Relative Humidity:	**52%**
Test Voltage:	**4.8 V battery powered running test program**
Test Operator:	**ws**

Analyzer settings of HP 8562E spectrum Analyzer – RBW = 1 MHz, VBW = 1 MHz, max hold enabled:

Table of Peak Output Power:

Frequency MHz	Peak Power Level dBm
905.05	22.67
912.0	23.17
918.42	21.67
924.92	22.83

3.0 APPENDIX A: EUT PHOTOGRAPHS

3.1 RADIATED EMISSIONS – FRONT VIEW

3.2 RADIATED EMISSIONS – SIDE VIEW

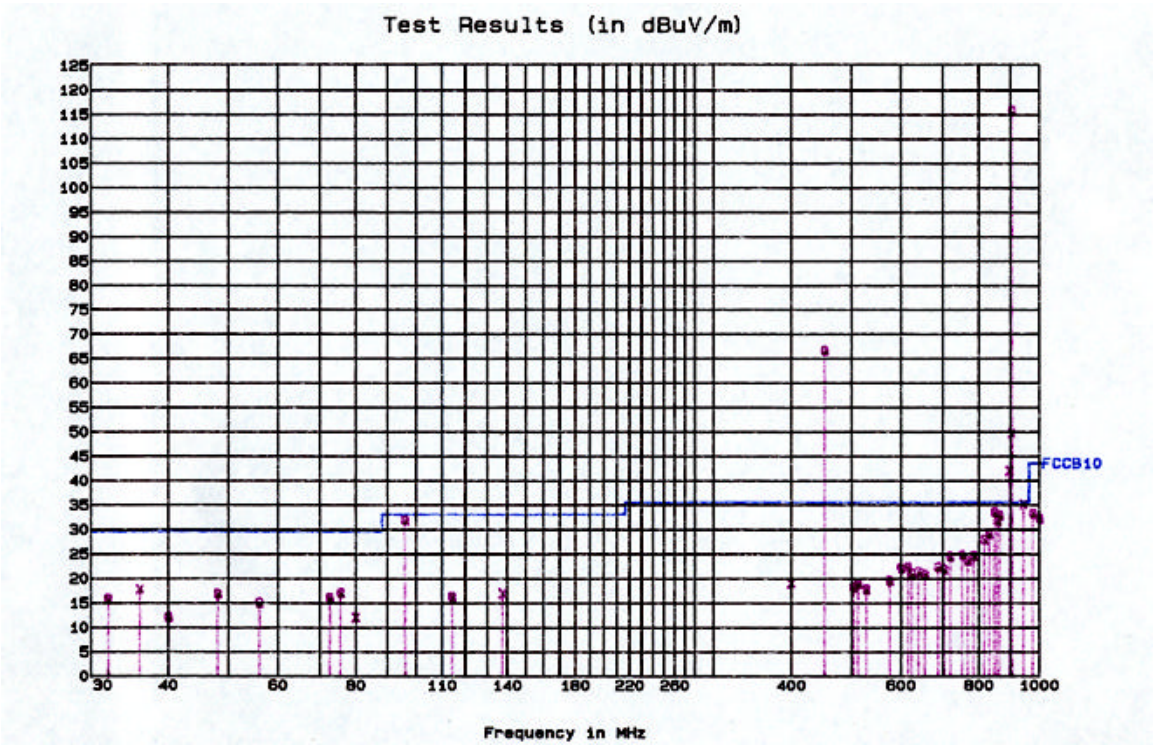
3.3 RADIATED EMISSIONS – REAR VIEW

3.4 RADIATED EMISSIONS – RF FILTER DETAIL

4.0 APPENDIX B: DATA SHEETS

4.1 RADIATED EMISSIONS PLOT – 30 MHZ TO 1 GHZ

Criterion Technology **Date: August 02, 2004**
EUT: SEAGULL WIRELESS TELEMETRY, R2I-ETSTX1 **S/N: SEA-005**
Manufacturer: APEX WIRELESS/EAGLE TREE SYSTEMS
Tester: WS **SpiD: 040725-798**
EUT Level: Rev A
EUT Information: tabletop
Test Information: running test program, 10m, battery powered, FCC Part 15 Class B
Test Cond: Temp: 17°C **Humidity: 56%**



4.2 RADIATED EMISSIONS TABLE – 30 MHZ TO 1 GHZ

Notes:
The third column below contains alpha characters which pertain to the type of measurements made. The following are the definitions for those characters: q = Quasi Peak, m = Maximized (cable, rotation and antenna height), s = scanned but no data taken, and a = average. For the first character in column four, a '-' indicates that value is below the limit while an '*' indicates that value is above the limit
If the list is sorted using "I-sort", then quasi-peak and average levels are weighted higher than peak levels and are moved to the front of the scan list.
The following keys help to better understand the data:
TT: Turntable position in degrees
Hght: Height of antenna in centimeters
Az: Azimuth, V = Vertical, H= Horizontal

Criterion Technology Tue Sep 07 08:37:23 2004
EUT: Seagull Wireless Transmitter Module
Manufacturer: Eagle Tree Systems, Inc.
Tester: ws Special ID: 040725-798
EUT Level: Rev A
EUT Information: tabletop
Test information: running test program, 10m, battery powered, FCC Part 15 Class B

Table 1: Scan List, sorted by margin to limit FCCB10, -18.0dB filter

Freq, MHz	Final Value dBuV/m (10m)	Quasi Pk/ Maximized (See Note 2)	Margin to FCC B limit (dB)	Turn table position (degrees)	Antenna Hght (cm)	Antenna Azimuth (Horizontal /Vertical)	Comment
905.0096	115.57	q	NA	49	100	H	Note 1
452.5016	66.51	q	NA	180	100	H	Note 1
903.9096	49.57	m	NA	49	100	H	Note 1
895.9672	41.91	m	NA	154	101	V	Note 1
944.0000	35.07	m	NA	351	314	V	Note 1
95.9500	31.83	q	-1.23	270	400	H	Near Amb.-50kHz 8ck
848.0000	33.44	q	-2.12	270	162	V	8. ck
864.0000	32.80	q	-2.76	270	162	V	8. ck
856.0000	31.73	q	-3.83	180	100	V	8. ck
832.0000	29.05	q	-6.51	180	400	H	8. ck
816.0000	27.89	q	-7.67	180	400	H	8. ck
976.0000	33.28	q	-10.24	270	162	V	8. ck
752.0000	24.81	q	-10.75	180	162	V	8. ck
784.0000	24.64	q	-10.92	270	162	V	8. ck
720.0000	24.46	q	-11.10	270	162	V	8. ck
1000.0000	32.19	q	-11.33	154	101	V	8. ck
35.9997	17.81	m	-11.73	283	239	V	nb
768.0000	23.68	q	-11.88	180	162	V	8. ck
75.6280	17.10	q	-12.44	180	400	H	.
48.0000	16.89	q	-12.65	180	162	V	8. ck
688.0000	22.41	q	-13.15	180	162	V	8. ck
616.0000	22.30	q	-13.26	351	314	V	8. ck
72.6423	16.07	q	-13.47	359	101	V	nb
600.0000	22.08	q	-13.48	270	100	H	8. ck
704.0000	21.92	q	-13.64	270	162	V	8. ck
32.0000	15.85	q	-13.69	180	162	V	8. ck
640.0000	21.36	q	-14.20	270	162	V	8. ck
56.0000	15.02	q	-14.52	180	162	V	8. ck
624.0000	20.99	q	-14.57	180	162	V	8. ck
656.0000	20.97	q	-14.59	270	162	V	8. ck
576.0000	19.56	q	-16.00	180	162	V	8. ck

137.5522	16.98	m	-16.08	359	101	V	nb+spikes
399.9486	18.96	m	-16.60	283	239	V	8. ck
512.0000	18.88	q	-16.68	180	162	V	8. ck
114.1926	16.27	q	-16.79	270	400	H	.
504.0588	18.16	q	-17.40	351	314	V	8. ck
40.0000	12.12	q	-17.42	359	101	V	8. ck
80.0000	12.02	m	-17.52	314	163	V	8. ck
528.0000	17.78	q	-17.78	270	162	V	8. ck

Margin to FCC limit (db) = Final Value (dbuV/m) + 10.45 db* – FCC Class B (3 m) limit (dBuV/m)
* Note: 10.45 db is the attenuation difference between 3 m and 10 m.

Note 1 – Produced by intentional radiator – see Sec 4.3 Table 2
Note 2 – All measurement made in Qusi Peak mode. Quasi Peak reading made with RBW = 120 kHz, 200 msec measurement time and span = 200 kHz. Highest readings made in 4 frequency bands are maximized, and denoted by "m" in this column.

Table 2: Scan List for FCCB10, sorted by Frequency, -18.0dB filter

Freq, MHz	Final Value dBuV/m	Quasi Pk/ Maximized	Margin to FCC B limit (dB)	Turn table position (degrees)	Antenna Hght (cm)	Antenna Azimuth (Horizontal/ Vertical)	Comment
32.0000	15.85	q	-13.69	180	162	V	8. ck
35.9997	17.81	m	-11.73	283	239	V	nb
40.0000	12.12	q	-17.42	359	101	V	8. ck
48.0000	16.89	q	-12.65	180	162	V	8. ck
56.0000	15.02	q	-14.52	180	162	V	8. ck
72.6423	16.07	q	-13.47	359	101	V	nb
75.6280	17.10	q	-12.44	180	400	H	.
80.0000	12.02	m	-17.52	314	163	V	8. ck
95.9500	31.83	q	-1.23	270	400	H	NA-50kHz 8ck
114.1926	16.27	q	-16.79	270	400	H	.
137.5522	16.98	m	-16.08	359	101	V	nb+spikes
399.9486	18.96	m	-16.60	283	239	V	8. ck
452.5016	66.51	q	NA	180	100	H	Note 1
504.0588	18.16	q	-17.40	351	314	V	8. ck
512.0000	18.88	q	-16.68	180	162	V	8. ck
528.0000	17.78	q	-17.78	270	162	V	8. ck
576.0000	19.56	q	-16.00	180	162	V	8. ck
600.0000	22.08	q	-13.48	270	100	H	8. ck
616.0000	22.30	q	-13.26	351	314	V	8. ck
624.0000	20.99	q	-14.57	180	162	V	8. ck
640.0000	21.36	q	-14.20	270	162	V	8. ck
656.0000	20.97	q	-14.59	270	162	V	8. ck
688.0000	22.41	q	-13.15	180	162	V	8. ck
704.0000	21.92	q	-13.64	270	162	V	8. ck
720.0000	24.46	q	-11.10	270	162	V	8. ck
752.0000	24.81	q	-10.75	180	162	V	8. ck
768.0000	23.68	q	-11.88	180	162	V	8. ck
784.0000	24.64	q	-10.92	270	162	V	8. ck
816.0000	27.89	q	-7.67	180	400	H	8. ck
832.0000	29.05	q	-6.51	180	400	H	8. ck
848.0000	33.44	q	-2.12	270	162	V	8. ck
856.0000	31.73	q	-3.83	180	100	V	8. ck
864.0000	32.80	q	-2.76	270	162	V	8. ck
895.9672	41.91	m	NA	154	101	V	Note 1
903.9096	49.57	m	NA	49	100	H	Note 1
905.0096	115.57	q	NA	49	100	H	Note 1
944.0000	35.07	m	NA	351	314	V	Note 1
976.0000	33.28	q	-10.24	270	162	V	8. ck
1000.0000	32.19	q	-11.33	154	101	V	8. ck

Margin to FCC limit (db) = Final Value (dbuV/m) + 10.45 db* – FCC Class B (3 m) limit (dBuV/m)
* Note: 10.45 db is the attenuation difference between 3 m and 10 m.

Note 1 – Produced by intentional radiator – see Sec 4.3 Table 1

Table 3: Complete Scan List Sorted by Frequency

Freq, MHz	Initial-value dBuV/m	Final Value dBuV/m	Quasi Pk/ Maximized	Turn table position (degrees)	Antenna Hght (cm)	Antenna Azimuth (Horizontal /Vertical)	Time	Comment
32.0000	21.43	15.85	q	180	162	V	Mon Aug 02 11:12:25 2004	8. ck
35.9997	25.38	17.81	m	283	239	V	Mon Aug 02 15:24:14 2004	nb
40.0000	21.44	12.12	q	359	101	V	Mon Aug 02 15:00:42 2004	8. ck
48.0000	30.36	16.89	q	180	162	V	Mon Aug 02 11:12:39 2004	8. ck
56.0000	31.33	15.02	q	180	162	V	Mon Aug 02 11:12:44 2004	8. ck
57.9476	24.43	7.96	q	283	239	V	Mon Aug 02 15:20:09 2004	spikes
64.0000	21.55	5.16	q	359	101	V	Mon Aug 02 15:00:54 2004	NA see .fan file 8ck
72.6423	31.78	16.07	q	359	101	V	Mon Aug 02 15:00:56 2004	nb
75.6280	32.54	17.10	q	180	400	H	Mon Aug 02 11:06:04 2004	.
80.0000	27.08	12.02	m	314	163	V	Mon Aug 02 14:55:48 2004	8. ck
88.0000	19.96	6.28	q	300	398	V	Mon Aug 02 15:10:19 2004	8. ck
95.9500	44.56	31.83	q	270	400	H	Mon Aug 02 14:14:51 2004	NA-50kHz 8ck
114.1926	27.10	16.27	q	270	400	H	Mon Aug 02 13:41:52 2004	.
120.0026	24.93	14.56	m	300	398	V	Mon Aug 02 15:09:41 2004	8. ck
128.0000	20.96	10.93	q	180	400	H	Mon Aug 02 11:06:30 2004	8. ck
136.0000	21.83	11.71	q	180	400	H	Mon Aug 02 11:06:33 2004	8. ck
137.5522	27.16	16.98	m	359	101	V	Mon Aug 02 15:00:14 2004	nb+spikes
144.0000	20.10	9.68	q	180	400	H	Mon Aug 02 11:06:38 2004	8. ck
152.0000	21.80	10.96	q	180	100	V	Mon Aug 02 13:52:03 2004	8. ck
160.0000	24.38	13.00	q	180	400	H	Mon Aug 02 11:06:45 2004	8. ck
168.0000	20.22	8.33	q	270	162	V	Mon Aug 02 11:56:06 2004	8. ck
176.0000	22.85	10.51	q	180	162	V	Mon Aug 02 11:13:35 2004	8. ck
192.0000	20.02	7.41	q	270	162	V	Mon Aug 02 11:56:17 2004	8. ck
200.0000	22.72	10.18	q	180	400	H	Mon Aug 02 11:06:59 2004	8. ck
216.0000	19.37	7.84	q	270	100	H	Mon Aug 02 13:45:11 2004	8. ck
240.0000	18.58	8.75	q	180	100	H	Mon Aug 02 15:25:56 2004	8. ck
250.6366	24.58	15.91	q	80	174	V	Mon Aug 02 14:49:08 2004	.
256.0000	19.76	11.56	q	180	400	H	Mon Aug 02 11:07:18 2004	8. ck
257.1416	24.41	16.26	q	270	162	V	Mon Aug 02 11:53:41 2004	.
263.9168	23.63	14.97	q	270	162	V	Mon Aug 02 11:55:58 2004	8. ck
280.0000	25.35	17.21	q	0	400	H	Mon Aug 02 14:10:59 2004	8. ck
288.0000	20.36	12.28	q	270	162	V	Mon Aug 02 11:55:39 2004	8. ck
296.0000	19.75	11.91	q	270	162	V	Mon Aug 02 11:55:49 2004	8. ck
304.0000	20.42	12.70	q	270	162	V	Mon Aug 02 11:55:32 2004	8. ck
312.0000	21.96	14.19	q	270	162	V	Mon Aug 02 11:54:39 2004	8. ck
320.0000	22.36	14.95	q	180	400	H	Mon Aug 02 11:07:36 2004	8. ck
336.0000	21.04	14.27	q	180	162	V	Mon Aug 02 11:14:29 2004	8. ck
352.0000	19.99	14.35	q	180	162	V	Mon Aug 02 11:14:33 2004	8. ck
360.0000	20.19	14.98	q	0	162	V	Mon Aug 02 14:07:00 2004	8. ck
375.9252	18.77	13.13	q	154	101	V	Mon Aug 02 15:16:08 2004	8. ck
399.9486	23.32	18.96	m	283	239	V	Mon Aug 02 15:19:34 2004	8. ck
424.0000	21.51	17.18	q	90	100	H	Mon Aug 02 13:59:52 2004	8. ck
432.0000	19.93	15.77	q	351	314	V	Mon Aug 02 14:38:46 2004	8. ck

440.0000	19.68	15.87	q	49	100	H	Mon Aug 02 14:20:26 2004	8. ck
448.0000	19.15	15.84	q	300	398	V	Mon Aug 02 15:11:50 2004	8. ck
452.5016	69.52	66.51	q	180	100	H	Mon Aug 02 13:56:25 2004	Note 1
479.9484	19.32	16.63	q	351	314	V	Mon Aug 02 14:38:57 2004	8. ck
504.0588	19.84	18.16	q	351	314	V	Mon Aug 02 14:38:59 2004	8. ck
512.0000	20.98	18.88	q	180	162	V	Mon Aug 02 11:15:31 2004	8. ck
528.0000	19.51	17.78	q	270	162	V	Mon Aug 02 11:53:31 2004	8. ck
576.0000	19.87	19.56	q	180	162	V	Mon Aug 02 11:15:48 2004	8. ck
600.0000	22.58	22.08	q	270	100	H	Mon Aug 02 13:46:14 2004	8. ck
616.0000	22.21	22.30	q	351	314	V	Mon Aug 02 14:39:10 2004	8. ck
624.0000	20.24	20.99	q	180	162	V	Mon Aug 02 11:16:00 2004	8. ck
640.0000	20.52	21.36	q	270	162	V	Mon Aug 02 11:51:58 2004	8. ck
656.0000	20.06	20.97	q	270	162	V	Mon Aug 02 11:58:55 2004	8. ck
688.0000	20.75	22.41	q	180	162	V	Mon Aug 02 11:16:16 2004	8. ck
704.0000	20.09	21.92	q	270	162	V	Mon Aug 02 11:51:44 2004	8. ck
720.0000	22.26	24.46	q	270	162	V	Mon Aug 02 11:49:32 2004	8. ck
752.0000	21.48	24.81	q	180	162	V	Mon Aug 02 11:16:39 2004	8. ck
768.0000	19.55	23.68	q	180	162	V	Mon Aug 02 11:16:43 2004	8. ck
784.0000	19.86	24.64	q	270	162	V	Mon Aug 02 11:49:07 2004	8. ck
816.0000	21.01	27.89	q	180	400	H	Mon Aug 02 11:09:56 2004	8. ck
832.0000	20.21	29.05	q	180	400	H	Mon Aug 02 11:10:00 2004	8. ck
848.0000	22.76	33.44	q	270	162	V	Mon Aug 02 11:42:16 2004	8. ck
856.0000	20.41	31.73	q	180	100	V	Mon Aug 02 13:53:49 2004	8. ck
864.0000	20.48	32.80	q	270	162	V	Mon Aug 02 11:42:20 2004	8. ck
895.9672	20.72	41.91	m	154	101	V	Mon Aug 02 14:29:55 2004	Note 1
903.9096	27.33	49.57	m	49	100	H	Mon Aug 02 14:18:12 2004	Note 1
905.0096	93.35	115.57	q	49	100	H	Mon Aug 02 14:21:28 2004	Note 1
944.0000	20.83	35.07	m	351	314	V	Mon Aug 02 14:36:42 2004	Note 1
976.0000	21.94	33.28	q	270	162	V	Mon Aug 02 11:43:29 2004	8. ck
1000.0000	22.64	32.19	q	154	101	V	Mon Aug 02 14:33:17 2004	8. ck

Final Value (dBuV/m) = Initial Value (dBuV) + Antenna Factor (db)m^{-1} + Coax loss (db) – Amp gain (db)

Minimum Margin to Limit: -1.23 dB at 95.55000 MHz

Note 1 – Produced by intentional radiator – see Sec 4.3 Table 1

4.3 RADIATED EMISSIONS TABLE – INTENTIONAL RADIATOR

Notes:
The third column below contains alpha characters which pertain to the type of measurements made. The following are the definitions for those characters: q = Quasi Peak, m = Maximized (cable, rotation and antenna height), s = scanned but no data taken, and a = average. For the first character in column four, a '-' indicates that value is below the limit while an '*' indicates that value is above the limit
If the list is sorted using "I-sort", then quasi-peak and average levels are weighted higher than peak levels and are moved to the front of the scan list.
HP-8566B, RBW = 1 MHz, VBW = 100 kHz, Sweep = 50 msec,
Factored value takes Maximized Peak value, and includes cable losses, antenna factor, filter attenuation, amplifier gain. This factor is calculated automatically by computer software.
The following keys help to better understand the data:
TT: Turntable position in degrees Hght: Height of antenna in centimeters
Az: Azimuth, V = Vertical, H= Horizontal

Table 1: Radiated Scan List, harmonics and half harmonics – raw data

level 1.5 compatible file
Eagle Tree Systems, Inc.
ws
040725-798
36dB of pads
tabletop, battery powered

Freq MHz	Maximized Peak value dBuV/m	Factored value dBuV/m	Antenna Hght (cm)	Antenna Azimuth (Horizontal /Vertical)		
452.5016	69.52	66.51	100	H	Mon Aug 02 13:56:25 2004	
1357.5105	53.23	62.97	103	V	Tue Jul 27 15:29:06 2004	.
1810.0184	95.43	86.76	106	V	Tue Jul 27 14:58:23 2004	
2262.5221	50.64	64.22	105	H	Tue Jul 27 15:32:52 2004	.
2715.0276	38.6	53.26	107	H	Tue Jul 27 15:38:44 2004	.
3620.0361	28.23	45.07	164	V	Tue Jul 27 14:16:07 2004	.
4072.95	27.61	45.65	164	H	Tue Jul 27 14:24:53 2004	noise floor
4525.5	27.46	47.62	164	V	Tue Jul 27 14:28:22 2004	noise floor
4977.534	28.09	50.5	161	V	Tue Jul 27 14:33:41 2004	.
5430.054	28.76	51.58	178	V	Tue Jul 27 14:39:29 2004	.
5882.5555	33.99	59.97	148	V	Tue Jul 27 14:44:27 2004	.
5882.8417	33.8	59.78	148	V	Tue Jul 27 14:47:32 2004	noise floor
7240.06	33.49	65.28	107	V	Tue Jul 27 15:46:17 2004	noise floor
7692.57	33.2	65.96	107	H	Tue Jul 27 15:56:58 2004	noise floor
8145.07	33.32	68.03	107	V	Tue Jul 27 15:59:57 2004	noise floor

Final Value (dBuV/m) = Initial Value (dBuV) + Antenna Factor (db)m^{-1} + Filter loss (db) + Coax loss (db) – Amp gain (db)

Preliminary testing showed no evidence of harmonics above 9 GHz.

Table 2: Scan List of harmonics, half harmonics and modulation products with margin to limit

Freq MHz	Initial Maximized Peak value dBuV	Final Maximized Peak Level with factors dBuV/m	FCC limit (-20 dB from Fo) dBuV/m	Margin to Limit	comment
905.0096		115.57			Fo Carrier
452.5016	69.52	66.51	95.57	-29.06	
903.9096	27.33	49.57	95.57	-46.0	
895.9672	20.72	41.91	95.57	-53.66	
944.0000	20.83	35.07	95.57	-60.5	
1357.511	53.23	62.97	95.57	-32.6	
1810.018	95.43	86.76	95.57	-8.81	
2262.522	50.64	64.22	95.57	-31.35	
2715.028	38.6	53.26	95.57	-42.31	
3620.036	28.23	45.07	95.57	-50.5	
4072.95	27.61	45.65	95.57	-49.92	noise floor
4525.5	27.46	47.62	95.57	-47.95	noise floor
4977.534	28.09	50.5	95.57	-45.07	
5430.054	28.76	51.58	95.57	-43.99	
5882.556	33.99	59.97	95.57	-35.6	noise floor
7240.06	33.49	65.28	95.57	-30.29	noise floor
7692.57	33.2	65.96	95.57	-29.61	noise floor
8145.07	33.32	68.03	95.57	-27.54	noise floor

Preliminary testing showed no evidence of harmonics above 9 GHz.

Final Value (dBuV/m) = Initial Value (dBuV) + Antenna Factor (db)m^{-1} + Coax loss (db) – Amp gain (db)

Margin to FCC limit (db) = Final Value (dbuV/m) – FCC limit (95.57 dBuV/m)

Minimum Margin to Limit: -8.81 dB at 1810.018 MHz

Table 3: Scan List of Table 2 with frequencies falling in restricted bands

Freq MHz	Initial Maximized Peak value dBuV	Finalized Maximized Peak Level with factors dBuV/m	Average to Peak ratio (db) **	Maximized Average Level with factors dBuV/m	FCC B Limit (dBuV/m)	Margin to Limit (db)	
1357.511	53.23	62.97	-17	45.97	54	-8.03	
2262.522	50.64	64.22	-17	47.22	54	-6.78	
2715.028	38.6	53.26	-17	36.26	54	-17.74	
4072.95	27.61	45.65	-17	28.65	54	-25.35	noise floor
4525.5	27.46	47.62	-17	30.62	54	-23.38	noise floor
4977.534	28.09	50.5	-17	33.5	54	-20.5	
5430.054	28.76	51.58	-17	34.58	54	-19.42	
7240.06 *	33.49	65.28	-17	48.28	54	-5.72	noise floor
8145.07	33.32	68.03	-17	51.03	54	-2.97	noise floor

Preliminary testing showed no evidence of harmonics above 9 GHz.

Final Value (dBuV/m) = Initial Value (dBuV) + Antenna Factor (db)m^{-1} + Filter Loss + Coax loss (db) – Amp gain (db)

Maximized Average Level with factors (dBuV/m) = Finalized Max. Peak Level + Average to Peak Ratio (db)*
(* Average to Peak Ratio is negative number)

Minimum Margin to Limit: -6.78 dB at 2262.522 MHz

*NOTE: At 7240 MHz, there was no indication of 8th harmonic, therefore it was substantially below the 65.28 dB noise level.

** NOTE: The average to peak ratio was derived by measuring the ratio of power in conducted mode between unit measured with resolution bandwidth = 1 MHz VBW = 1 MHz, to measurements with resolution bandwidth = 1 MHz, VBW = 10 Hz. Measurements were made with EUT in normal operational mode (frequency hopping).

4.4 ANTENNA CONDUCTED HARMONICS AND SUBHARMONICS TABLE

Criterion Technology Inc.

Conducted Harmonics

EUT: SEAGULL WIRELESS TELEMETRY, R21-ETSTX1
Manuf: APEX WIRELESS/EAGLE TREE SYSTEMS
Op Cond: Transmitter in continuous transmitting mode.
Operator: WS **040725-798**
Test Spec: FCC Class B
Test Cond: Temp: °C **Humidity: %**

direct 8566B conducted measurements through 30dB pad 012
RBW = 1 MHz, VBW = 100 kHz, Sweep = 50 msec.

Center Freq	Harmonic	Frequency MHz	Measured Amplitude dBm	Pad Attenuation (db)	Actual dBm	Limit dBm Note B	Margin toLimit	comments
		905.05	-8.9	30	21.1	30	-8.9	Fo
		903.909	-77.2	30	-47.2	1.1	-48.3	
		895.967	-83.1	30	-53.1	1.1	-54.2	
	0.5	452.5	-34.7	30	-4.7	1.1	-5.8	Note A
905.05	2	1810.1	-46.3	30	-16.3	1.1	-17.4	
905.05	2.5	2262.625	-75.2	30	-45.2	1.1	-46.3	
905.05	3	2715.15	-82.5	30	-52.5	1.1	-53.6	
905.05	3.5	3167.675	-86.8	30	-56.8	1.1	-57.9	
905.05	4	3620.2	-84.6	30	-54.6	1.1	-55.7	
905.05	4.5	4072.725	-86.3	30	-56.3	1.1	-57.4	
905.05	5	4525.25	-84.6	30	-54.6	1.1	-55.7	
905.05	5.5	4977.775	-95.3	20	-75.3	1.1	-76.4	
905.05	6	5430.3	-96.2	20	-76.2	1.1	-77.3	
905.05	6.5	5882.825	-89.6	20	-69.6	1.1	-70.7	
905.05	7	6335.35	-84.6	20	-64.6	1.1	-65.7	
905.05	7.5	6787.875	-87.7	20	-67.7	1.1	-68.8	
905.05	8	7240.4	-93.7	20	-73.7	1.1	-74.8	noise
905.05	8.5	7692.925	-84.2	20	-64.2	1.1	-65.3	noise
905.05	9	8145.45	-83.7	20	-63.7	1.1	-64.8	noise
905.05	9.5	8597.975	-83.4	20	-63.4	1.1	-64.5	noise

Preliminary testing showed no evidence of harmonics above 9 GHz.

Note A: Fo carrier is generated by doubling the 452.5 MHz synthesizer signal. See PIF on page 29.

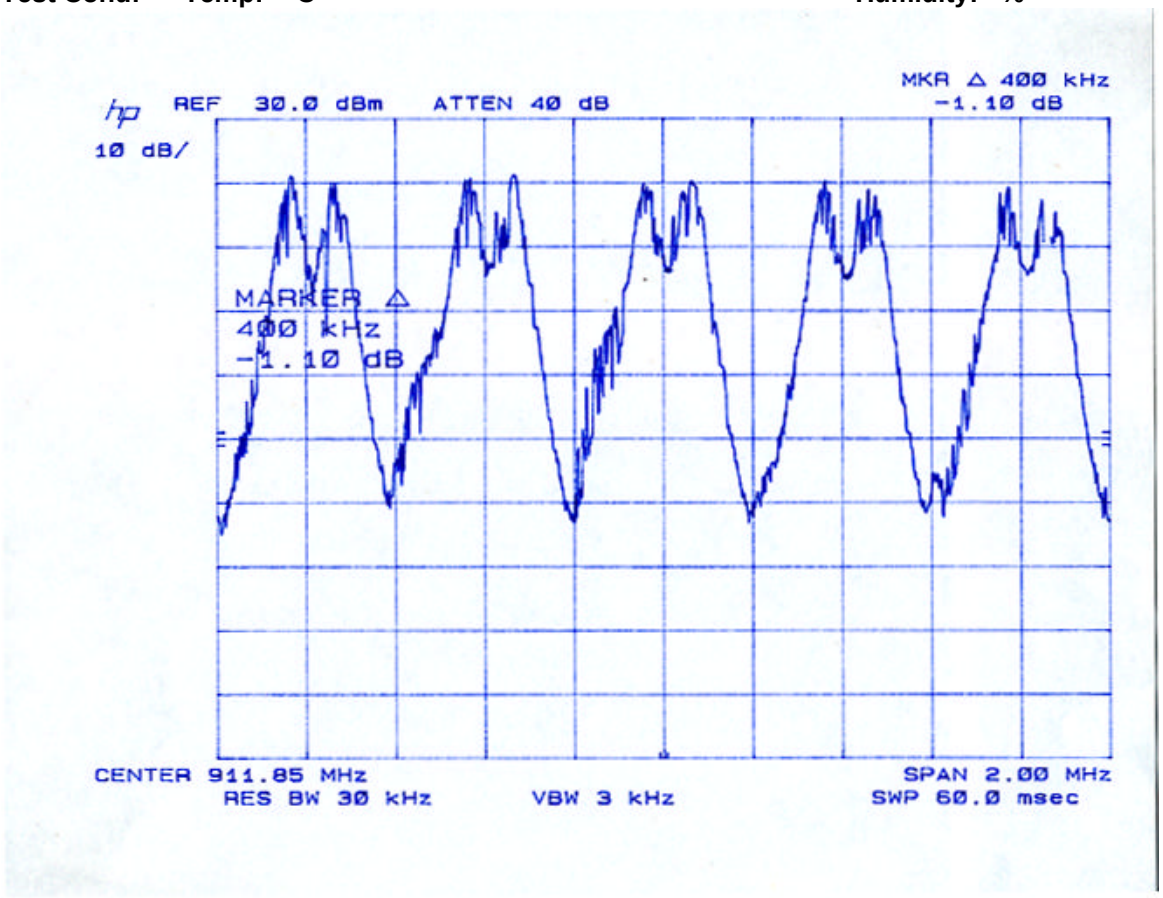
Note B: Carrier maximum power limit is 1 watt or +30 dBm. Spurious and harmonics are to be 20 db down from the carrier.

Actual dBm = Measured Amplitude dBm + Pad attenuation

4.5 CHANNEL BANDWIDTH

Criterion Technology Inc.
Conducted Emissions

EUT: **SEAGULL WIRELESS TELEMETRY, R21-ETSTX1** Error! Reference source not found.
Manuf: **APEX WIRELESS/EAGLE TREE SYSTEMS**
Op Cond:
Operator: Error! Reference source not found.**mm**
Test Spec:
Test Cond: **Temp: °C** **Humidity: %**

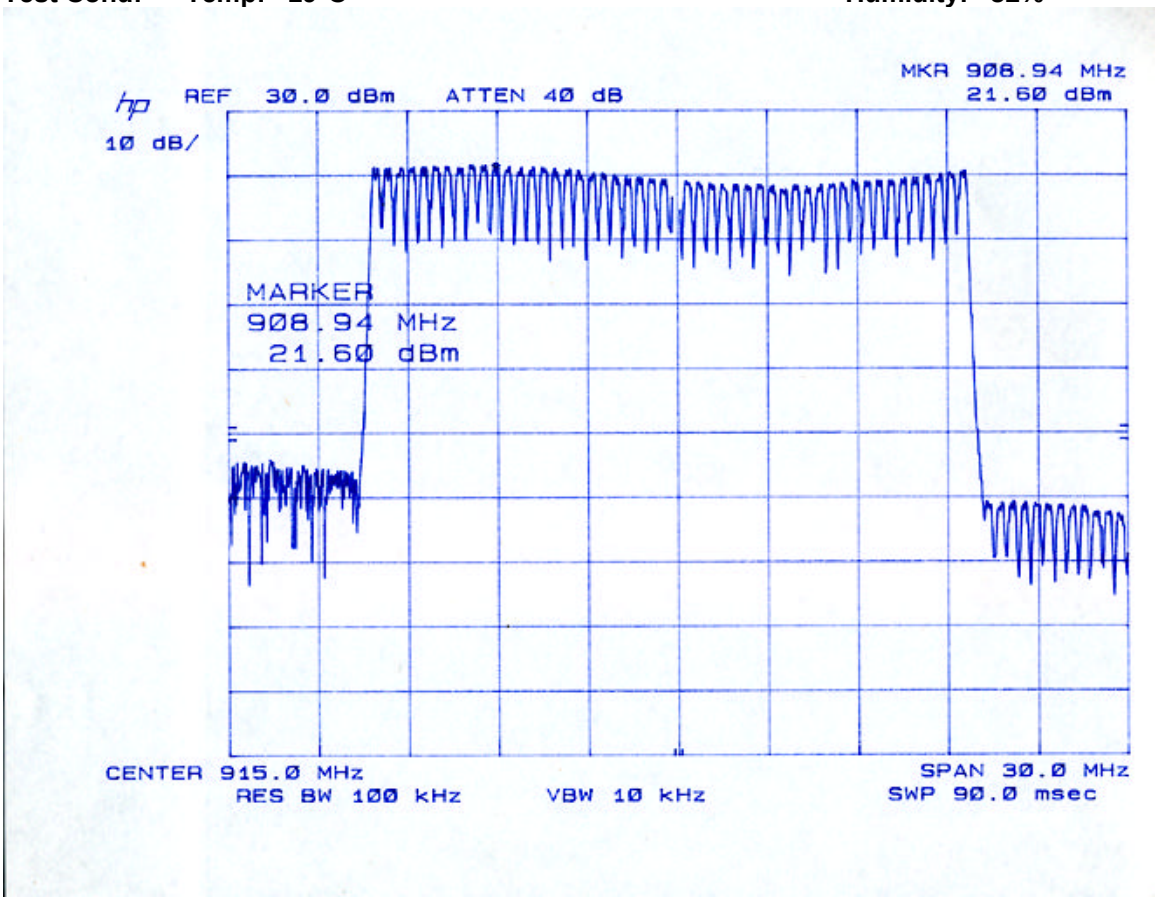


Channel Spacing: 400 kHz

NUMBER OF CHANNELS, BAND EDGES

Criterion Technology Inc.
Conducted Emissions

EUT: SEAGULL WIRELESS TELEMETRY, R21-ETSTX1
Manuf: APEX WIRELESS/EAGLE TREE SYSTEMS
Op Cond:
Operator: WS 040725-798
Test Spec: EN 55022 Class B
Test Cond: Temp: 19°C Humidity: 52%



Number of Channels:	**50 Channels**
-6 dB lower Bandedge:	**904.958 MHz**
-6 dB upper Bandedge:	**924.60 MHz**
-6 dB Bandwidth :	**19.642 MHz**
-20 dB lower Bandedge:	**904.779 MHz**
-20 dB upper Bandedge:	**924.705 MHz**
-20 dB Bandwidth:	**19.926 MHz**

5.0 APPENDIX C: PRODUCT INFORMATION FORM

CRITERION TECHNOLOGY PRODUCT INFORMATION FORM

General Information **Date:** August 25, 2004

Company Name: Eagle Tree Systems, Inc.
Company Address: 4957 Lakemont Blvd SE Suite C-4
FCC Code: R21

Contacts:
Compliance Engineer: Mark Matlin Phone: 303 443-6699 Email: mark@apexwireless.com
Design Engineer: Same Phone: Email:

6.0 TEST DESCRIPTION

De-Bug Formal (Initial)xxx Formal (Re-Verification)

7.0 MARKET INFORMATION (CHECK ALL THAT APPLY)

USAxxx Canada Euro. Union Taiwan Japan New Zealand Australia
Other

8.0 PRODUCT INFORMATION

Name: Seagull Wireless Transmitter Module System Model Number SEA-01 Serial Number

Product Dimensions: Approx .5"x2"x1.2:" Weight: 8 oz

8.1

8.2 PRODUCT POWER SOURCE:

Battery
Type 4X NiCad (4.8VDC)

AC Supply
Input Voltage Range(s)
Phases Delta Wye
Current
Frequency
Manufacturer
Model Number

Topology
Linear Switching Mode Switching Frequency

Support Equipment (if used):

CPU:
Manufacturer
Model No.
Serial No.

Monitor:
Manufacturer
Model No.
Serial No.

Keyboard:
Manufacturer
Model No.

Serial No.

Mouse:
Manufacturer
Model No.
Serial No.

I/O Cables – Manufacturer, P/N, Length :
Serial Port
Parallel Port
SCSI Port
Other

Operation Software:
Name Version Number

Operating Modes: (Please Include Cycle Time)

Operation Pass/Fail Criteria:

Test Type – Emissions (Please check all that apply):

Information Technology Equipment
Class A
Class B
Oscillator/Clock Frequencies (MHz)

Industrial, Scientific, Medical Equipment
Class A
Class B
Oscillator/Clock Frequencies (MHz) 32.768 KHz, 8.0 MHz

Unintentional Radiator
Class A
Class B xxx
Oscillator/Clock Frequencies (MHz) same, 32.768 KHz, 8.0 MHz

Receiver
Type (Regen., Superhet., Direct Conv., Homodyne)
Local Oscillator Frequencies
Frequency Range

Intentional Radiator - 15.247 - Module
Fundamental Frequency Range 902 – 928 MHz
Local Oscillator Frequencies N/A
Power Output (to antenna) +22 dBm, 10 dBm
Integral Antenna (Yes/No) Yes
Modulation Type (AM, CM, Pulse, Spread Spectrum) FHSS
Control Circuits (Microprocessor/Micro-controller) Microprocessor MSP-430
Oscillator/Clock Frequencies (MHz) 32.768 KHz , 8 MHz

IEC 61000-3-2, Harmonics
Max. Steady State Power Consumed by Product: Watts

IEC 61000-3-3, Flicker Meter

9.0 IMMUNITY TESTING

Test Type (Please check all that apply):

_____**EN 50082-1 –**Electromagnetic Compatibility-Generic Immunity Standard, Part 1. Residential, Commercial and Light Industry

_____**EN 50082-2 –**Electromagnetic Compatibility-Generic Immunity Standard, Part 2.Industrial Environment

_____**EN 55024 –**Information Technology Equipment – Immunity Characteristics - Limits and Methods of Measurement Requirements

_____**EN 60601-1-2 –**Medical Electrical Equipment, Collateral Standard: EMC Requirements and Test

_____**EN 61326 -**Electrical Equipment for Measurement, Control and Laboratory Use –EMC Requirements

EN 61000-4-2 (ESD)

Number of Metallic test points touchable by equipment operator: _____
Number of Non-Metallic test points touchable by equipment operator: _____
Is the product enclosure completely plastic? _____
Is the product enclosure partly plastic? _____
Are there any additional ESD voltages required for testing? If so, list herein:
_____

EN 61000-4-4 (Electrical Fast Transients)

How many interfacing cables are greater than 3 meter long? _____
List each cable by name? _____
_____

EN 61000-4-3 & ENV 50204 (Radiated Susceptibility Testing, 80 - 1000 MHz)

What is the maximum time necessary for the product to respond? _____
During normal operations, what parameter will be monitored to determine susceptibility of the product? _____
_____

EN 61000-4-5 (Surge Testing on Power Lines)

Optional: Are there any long interfacing cables to be tested? _____
If so, how many? _____
Note: Cables must be tested at a length of 20 meters.

EN 61000-4-6 (Conducted Disturbance Testing)

How many interfacing cables are greater than 3 meter long? _____
List each cable by name? _____

EN 61000-4-8 (Magnetic Field Susceptibility Testing)

Test is applicable to Hall Elements, Electrodynamic Microphones, Magnetic Field Sensors and CRT Monitors. Do any of these apply?_____

EN 61000-4-11 (Voltage Sag and Interruptions)

Comments:_____

Overview:

The Seagull wireless Transmitter Module system is designed to send Transmitter Module data packets from a single remote transmitter to a single receiver. The transmitter is connected to a data logger which records parametric data such as pressure, temperature or fuel level. This data is transferred to the transmitter and then sent to the receiver. A typical use would be to send parametric flight data from a remote control airplane to a receiver located near the operator of the R/C airplane.

The EUT module, is the transmitter for this system. It connects to a battery pack consisting of four NiCad batteries in series, and a data logger. The data logger communicates with the EUT transmitter module via serial interface.

All circuitry related to the transmitter contains power supply regulation and all transmitter timing is controlled by the integrated microprocessor, making it impossible to change any transmitter timing parameter, including data rate, via the data port. The transmitter contains a fixed stainless steel antenna which cannot be detached by the user, and all radio circuitry is covered by a shielded enclosure.

Transmitter Operation:

Please refer to the attached block diagram for the following discussion.

The EUT Transmitter module consists of a transmitter section and control section. The control section is based on the TI MSP430 low power microprocessor which runs at 32.768 KHz. The processor communicates with a logger attached to the 8 Pin connector, and also implements the FSK modulation and frequency hopping algorithm.

Serial communication between the external logger and EUT transmitter module is at a fixed rate of 100 kbps.

The transmitter section consists of a PLL Synthesizer, Amplifier/Doubler and Power Amplifier sections.

The synthesizer consists of a National LMX2354 Fractional N synthesizer, discrete low pass loop filter and discrete VCO operating at 451-464 MHz. The clock reference for the synthesizer is an 8 MHz crystal oscillator. The PLL is programmed to implement both the FSK Data modulation as well as the frequency hopping algorithm.

The synthesizer output is doubled, amplified and filtered with a SAW bandpass filter. It is then sent to a RFMD RF2172 medium power amplifier. Maximum output power is +22 dBm. The PA amplifier output is then low pass filtered and sent to the antenna.

Frequency hopping is implemented by programming the PLL to one of 50 frequencies in a pseudo-random hopping sequence. Each (external) logger has a unique 16-bit ID to distinguish it from other co-located logger systems. The ID determines the hopping sequence used by an algorithm which uses 3 lookups of a fixed random-generated permutation table of all 50 frequencies, designed to minimize the probability of interference between transmitters.

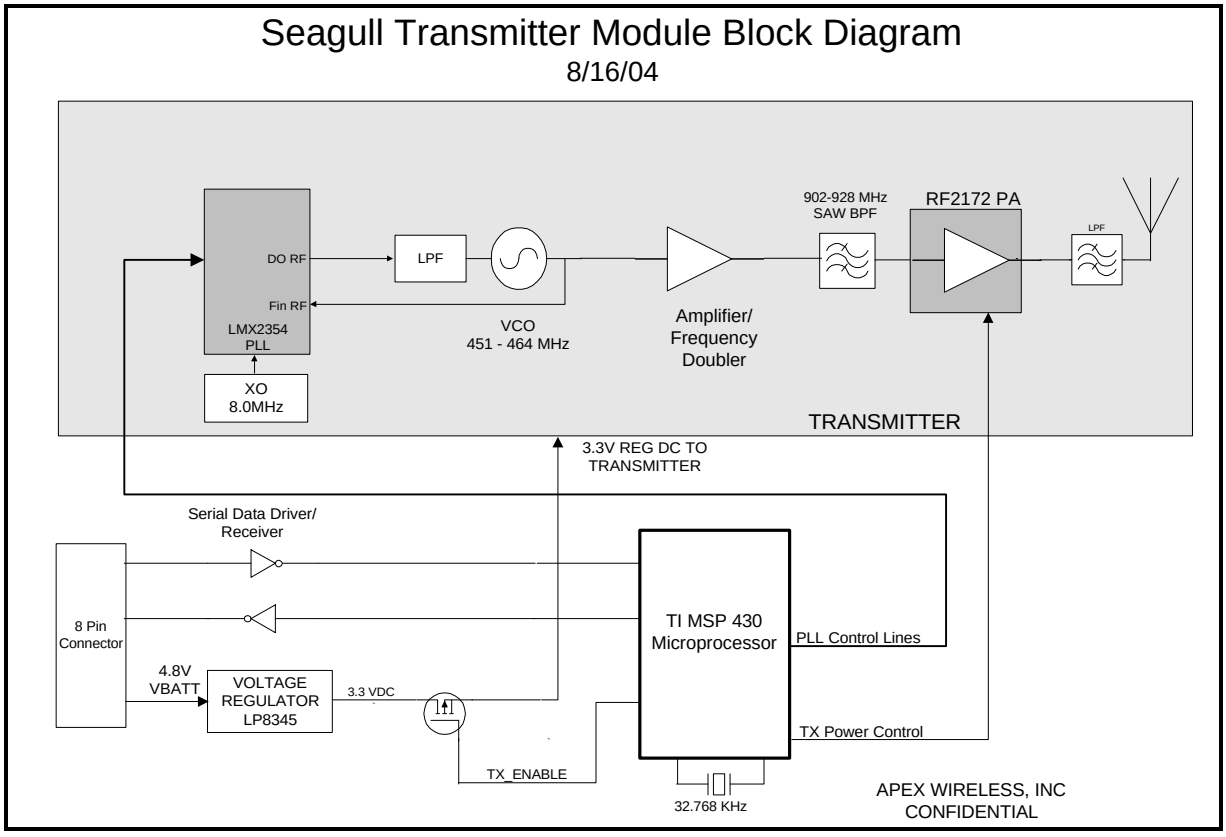
Each frequency is used on average the same amount of time. The frequency hop interval is 100 mS. The nominal packet length is 23.3 ms, and maximum packet length at any hop is 90 ms. We attest to the fact that the maximum dwell time at any frequency is 100 msec.

A typical hopping sequence is:
27 1 11 13 28 21 6 44
24 26 12 38 8 29 46 17
16 37 36 18 3 34 9 5
25 50 2 35 22 23 40 10
42 33 7 49 47 31 14 20
30 15 39 19 43 32 41 48
4
This hopping will result in the following frequency sequence:

Chan	1	2	3	4	5	6	7	8	9	10
1-10	905.05	905.45	905.85	906.25	906.65	907.05	907.45	907.85	908.25	908.65
11-20	909.05	909.45	909.85	910.25	910.65	911.05	911.45	911.85	912.25	912.65
21-30	913.05	913.45	913.85	914.25	914.65	915.05	915.45	915.85	916.25	916.65
31-40	917.05	917.45	917.85	918.25	918.65	919.05	919.45	919.85	920.25	920.65
41-50	921.05	921.45	921.85	922.25	922.65	923.05	923.45	923.85	924.25	924.65

FSK data modulation is performed by modulating the carrier frequency at each hop plus or minus 50 KHz for a total "delta F" of 100 KHz. This is done at a rate of 16.384 kbps, which is the raw data "on air" rate. A "4/5" code maps four user data bits into five "on air" bits to insure no long strings of ones or zeros are present at the receiver. As shown in previous data, occupied bandwidth is equal to approximately 200 kHz. We attest to the fact that the spread spectrum 3 db Receiver bandwidth is also approximately 200 kHz. We attest to the fact that the receiver shifts frequency in syncronization with the transmitted signals.

The frequency table showing center, "one" and "zero" frequencies is shown below.



Freq #	Cent Freq (MHz)	Data One	Data Zero
1	905.050	905.000	905.100
2	905.450	905.400	905.500
3	905.850	905.800	905.900
4	906.250	906.200	906.300
5	906.650	906.600	906.700
6	907.050	907.000	907.100
7	907.450	907.400	907.500
8	907.850	907.800	907.900
9	908.250	908.200	908.300
10	908.650	908.600	908.700
11	909.050	909.000	909.100
12	909.450	909.400	909.500
13	909.850	909.800	909.900
14	910.250	910.200	910.300
15	910.650	910.600	910.700
16	911.050	911.000	911.100
17	911.450	911.400	911.500
18	911.850	911.800	911.900
19	912.250	912.200	912.300
20	912.650	912.600	912.700
21	913.050	913.000	913.100
22	913.450	913.400	913.500
23	913.850	913.800	913.900
24	914.250	914.200	914.300
25	914.650	914.600	914.700
26	915.050	915.000	915.100
27	915.450	915.400	915.500
28	915.850	915.800	915.900
29	916.250	916.200	916.300
30	916.650	916.600	916.700
31	917.050	917.000	917.100
32	917.450	917.400	917.500
33	917.850	917.800	917.900
34	918.250	918.200	918.300
35	918.650	918.600	918.700
36	919.050	919.000	919.100
37	919.450	919.400	919.500
38	919.850	919.800	919.900
39	920.250	920.200	920.300
40	920.650	920.600	920.700
41	921.050	921.000	921.100
42	921.450	921.400	921.500
43	921.850	921.800	921.900
44	922.250	922.200	922.300
45	922.650	922.600	922.700
46	923.050	923.000	923.100
47	923.450	923.400	923.500
48	923.850	923.800	923.900
49	924.250	924.200	924.300
50	924.650	924.600	924.700

Seagull Frequency Table 1

10.0 APPENDIX D: TEST EQUIPMENT AND CALIBRATION STATUS

Manufacturer	Name/Description	Model Number	Serial Number	Cal. Due Date
Hewlett Packard	Tracking Generator	HP85645A	3210A00124	8/30/2004
Californa Instruments	AC Power Source Pacs-1	5001iX-CTS-411	55637	1/31/2005
Haefely Trench	EFT Tester	PEFT Junior	583-333-51	2/3/2005
Hewlett Packard	Pulse Generator	HP 8116A	2901G09493	3/10/2005
Hewlett Packard	Spectrum Analyzer	HP 8566B	2421A00527	4/2/2005
Rohde/ Schwarz	VHF/UHF Receiver	ESVS-30	8634221014	4/20/2005
Chase	Bilog 30 - 1000 MHz	CB6111	1121	5/5/2005
FCC	CDN	FCC-801-M3-25	9714	5/11/2005
FCC	EM Clamp	F2031	309	5/20/2005
Tegam	Current Probe	925236-1	12588	5/20/2005
Veratech	Preamp (AMP2)		N/A	5/20/2005
Hewlett Packard	Signal Generator	HP 8648D	3642000145	6/14/2005
Heise	Barometer	710A	S7-15256	6/14/2005
Dickson	Temperature/ RH Recorder	THDX	5300245	6/16/2005
Rohde/ Schwarz	LISN	ESH2-Z5	828739-001	6/18/2005
Amplifier Research	Power Amplifier	150A100A	20183	6/25/2005
Amplifier Research	Power Amplifier	100W1000M1	20214	6/25/2005
Rohde/ Schwarz	HF Receiver	ESHS-30	82600/011	7/1/2005
Amplifier Research	Directional Coupler	DC2600	302981	7/22/2005
Amplifier Research	E-Field Probe	FP2000	19682	4/12/2006
Antenna Research	1-18 GHz Horn	DRG118/A	1057	4/13/2006
Amplifier Research	E-Field Probe	FP2080	20236	4/16/2006

11.0 APPENDIX E: TEST DIRECTIVES, STANDARDS AND METHODS

7.1 EUROPEAN DIRECTIVES, STANDARDS AND METHODS

89/336/EEC: Council Directive of 03 May 1989 on the Approximation of the Laws of the Member States Relating to Electromagnetic Compatibility, OJEC No. L 139/19-26, 23 May 1989.

EN 50081-1 (CENELEC): EMC - Generic Emission Standard, Part 1: Residential, Commercial and Light Industry, 1992.

EN 50081-2 (CENELEC): EMC - Generic Emission Standard, Part 2: Industrial Environment, 1993.

EN 50082-1 (CENELEC): Electromagnetic Compatibility - Generic Immunity Standard, Part 1: Residential, Commercial and Light Industry, 1998.

EN 50082-2 (CENELEC): Electromagnetic Compatibility - Generic Immunity Standard, Part 2: Industrial Environment, 1995.

ENV 50204 (CENELEC): Testing and Measurement Techniques; Radiated Electromagnetic Field from Digital Radio Telephones - Immunity Test, 1996.

EN 55014-1 (CENELEC): Part 1. Electromagnetic Compatibility Requirements for Household Appliances, Electric Tools and Similar Apparatus - Part 1. Emission - Product Family Standard, 2001.

EN 55022 (CENELEC): ITE - Radio-Frequency Equipment Radio Disturbance Characteristics - Limits and Methods of Measurement, 1998.

EN 55024 (CENELEC): ITE - Immunity Characteristics - Limits and Methods of Measurement, 1998.

EN 60601-1-2 (CENELEC): Medical Electrical Equipment. Part 1. General Requirements for Safety - Section 1.2. Collateral Standard: Electromagnetic Compatibility - Requirements and Tests, 1993.

EN 61000-3-2 (CENELEC): EMC - Part 2. Limits for Harmonic Current Emissions (Equipment Input Current ≤16 A per phase), 2000.

EN 61000-3-3 (CENELEC): EMC - Part 3. Limitation of Voltage Fluctuation and Flicker in Low-Voltage Supply Systems for Equipment with Rated Current ≤16 A, 1998.

EN 61000-4-2 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 2. Electrostatic Discharge Immunity Test, 1995.

EN 61000-4-3 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 3. Radiated, Radio-Frequency, Electromagnetic Field Immunity, 1996.

EN 61000-4-4 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 4. Electrical Fast Transient/Burst Immunity Test, 1999.

EN 61000-4-5 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 5. Surge Immunity Test, 1996.

EN 61000-4-6 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 6. Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields, 1997.

EN 61000-4-8 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 8. Power Frequency Magnetic Field Immunity Test, 1993.

EN 61000-4-11 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 11. Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests, 1994

EN 61326 (CENELEC): Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements, 1998.

7.2 FCC PART 15

Subpart A.

Subpart B.

Subpart C.

Subpart D.

7.3 FCC PART 22

7.4 FCC PART 24

7.5 JAPAN

VCCI V-3

7.6 CANADA

ICES-001: Interference-Causing Equipment Standard - ISM RF Generators, 1998.

ICES-003: Interference-Causing Equipment Standard - Digital Apparatus, 2004.

7.7 AUSTRALIA/NEW ZEALAND

SAA AS/NZ 3548: *Limits and Methods of Measurement of Radio Disturbance Characteristics of ITE,* 1997.

7.8 CHINA

CNS13438, 1997.