



Engineering and Testing for EMC and Safety Compliance



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FCC Certification Application Report

Model Name: RoameO PuPpod GPS Pet Location System
Model Number: ROAM-P25
154.6 MHz

White Bear Technologies
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Suite 110
New Brighton, MN 55112
Contact: Mark R. Mitchell
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FCC ID: UAX-RPUPV1

Standards Referenced for this Report	
Part 2: 2007	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 95: 2007	Personal Radio Services; Subpart J: Multi-Use Radio Service (MURS)
ANSI/TIA/EIA 603-2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

Frequency Range (MHz)	Measured Conducted Power (W)	Measured Frequency Tolerance (ppm)	Emission Designator
154.6	0.363	0.19	14K8F1D

Testing Performed and Report Prepared by Test Engineer: Daniel Baltzell

Document Number: 2008163

October 14, 2008

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1 General Information

The following Type Certification Report is prepared on behalf of **White Bear Technologies** in accordance with the Federal Communications Commission. The Equipment Under Test (EUT) was **Model: RoamEO PuPpod GPS Pet Location System, Model # ROAM-P25; FCC ID: UAX-RPUPV1**. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, coaxial attenuator, preamplifier and cables.

1.1 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400, Herndon, Virginia, 20170. This site has been fully described in a report submitted to and approved by the Federal Communications Commission, to perform AC line conducted and radiated emissions testing.

1.2 Related Submittal(s)/Grant(s)

This is an original application report.

2 Tested System Details

The EUT, RoamEO PuPpod GPS Pet Location System, is a pet location system that operates at 154.6 MHz in the MURS, or Multi-Use Radio Service band. The measured conducted power was 363 mW. The EUT is FSK.

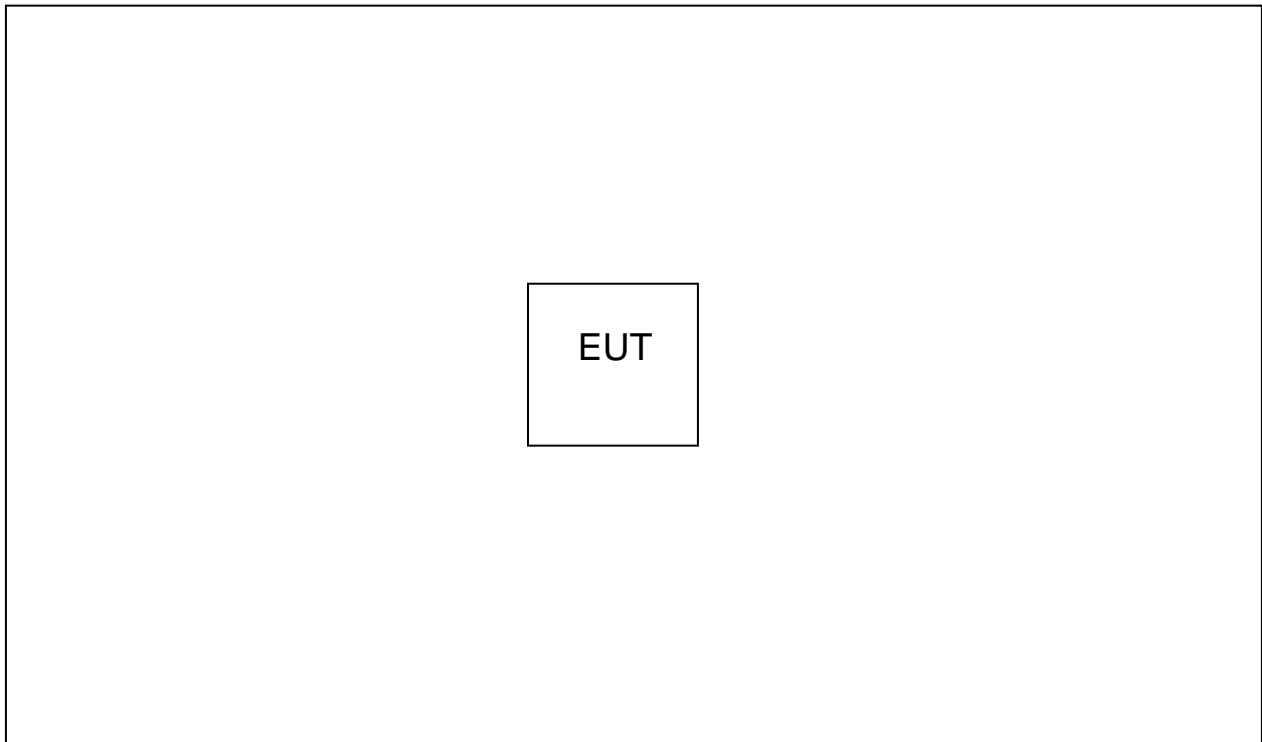
The test sample was received on September 12, 2008. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

Model Tested	RoamEO PuPpod GPS Pet Location System, Model # ROAM-P25
Frequency Band	154.6 MHz
Modulation Type	FSK
Authorized Channel Bandwidth	20 KHz
Primary Power	3.7 VDC Lithium Ion Battery
Measured Conducted Power	363 mW
Duty Cycle	Continuous 100%

Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	Cable Description	RTL Bar Code
GPS Pet Location System	White Bear Technologies	RoamEO PuPpod GPS Pet Location System; ROAM-P25	N/A	UAX-RPUPV1	N/A	18602
Battery	N/A	EP03120	N/A	N/A	N/A	18598
Battery	N/A	EP03120	N/A	N/A	N/A	18599
Battery	N/A	EP3707	N/A	N/A	N/A	18600
Battery	N/A	EP3707	N/A	N/A	N/A	18601

Figure 2-1: Configuration of Tested System



3 FCC Rules and Regulations Part 2.1033(c)(8): Voltages and Currents Through the Final Amplifying Stage

Nominal AC Voltage: 3.6 VDC
Current: 700 mA

4 FCC Rules and Regulations Part 2.1046(a); Part 95.639(h): RF Power Output

4.1 Test Procedure

ANSI/TIA/EIA-603-2004, Section 2.2.1.

The EUT transmitter output was connected through an appropriate 50 ohm attenuator to a spectrum analyzer.

4.2 Test Data

Table 4-1: RF Power Output: Carrier Output Power

Frequency (MHz)	Peak Power (W)
154.6	0.363

*Measurement accuracy: +/- .3 dB

4.3 Test Limits

Part 95.639(h): No MURS unit, under any condition of modulation, shall exceed 2 Watts transmitter power output.

Table 4-2: Test Equipment for Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901356	Agilent Technologies	E9323A	Power Sensor	31764-264	10/24/08
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573	10/24/08
900819	Weinschel Corp.	2	10 dB Attenuator; 5 W	BF0830	12/2/08

Test Personnel:

Daniel Baltzell
EMC Test Engineer



Signature

October 10, 2008
Date Of Test

5 FCC Rules and Regulations Part 2.1051(a): Spurious Emissions at Antenna Terminals

5.1 Test Procedure

ANSI TIA-603-C-2004, Section 2.2.13.

The transmitted was terminated with a 50 Ω load and interfaced with a spectrum analyzer.

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 9600 bps.

5.2 Out of Band Spurious Test Data

Frequency range of measurement per Part 2.1057: 9 kHz to 10 x Fc.

Limits: $P(\text{dBm}) - (43 + 10 \times \text{LOG } P(\text{W}))$

The following frequency (in MHz) was investigated: 154.6. The worst case (unwanted emissions) channels are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

Table 5-1: Conducted Spurious Emissions – 154.6 MHz

Conducted power = 0.363 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
309.2	54.08	35.5	-18.58
463.8	46.58	35.5	-11.08
618.4	61.58	35.5	-26.08
773.0	62.08	35.5	-26.58
927.6	58.08	35.5	-22.58
1082.2	71.08	35.5	-35.58
1236.8	79.58	35.5	-44.08
1391.4	85.18	35.5	-49.68
1546.0	76.18	35.5	-40.68

Table 5-2: Test Equipment for Testing Conducted Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09
900819	Weinschel Corp.	2	10 dB Attenuator; 5 W	BF0830	12/2/08

Test Personnel:

Daniel Baltzell
EMC Test Engineer



Signature

October 10, 2008
Date Of Test

6 FCC Rules and Regulations CFR 95.635(e)(3) and Part 2 §2.1049(c): Occupied Bandwidth (Emissions Masks)

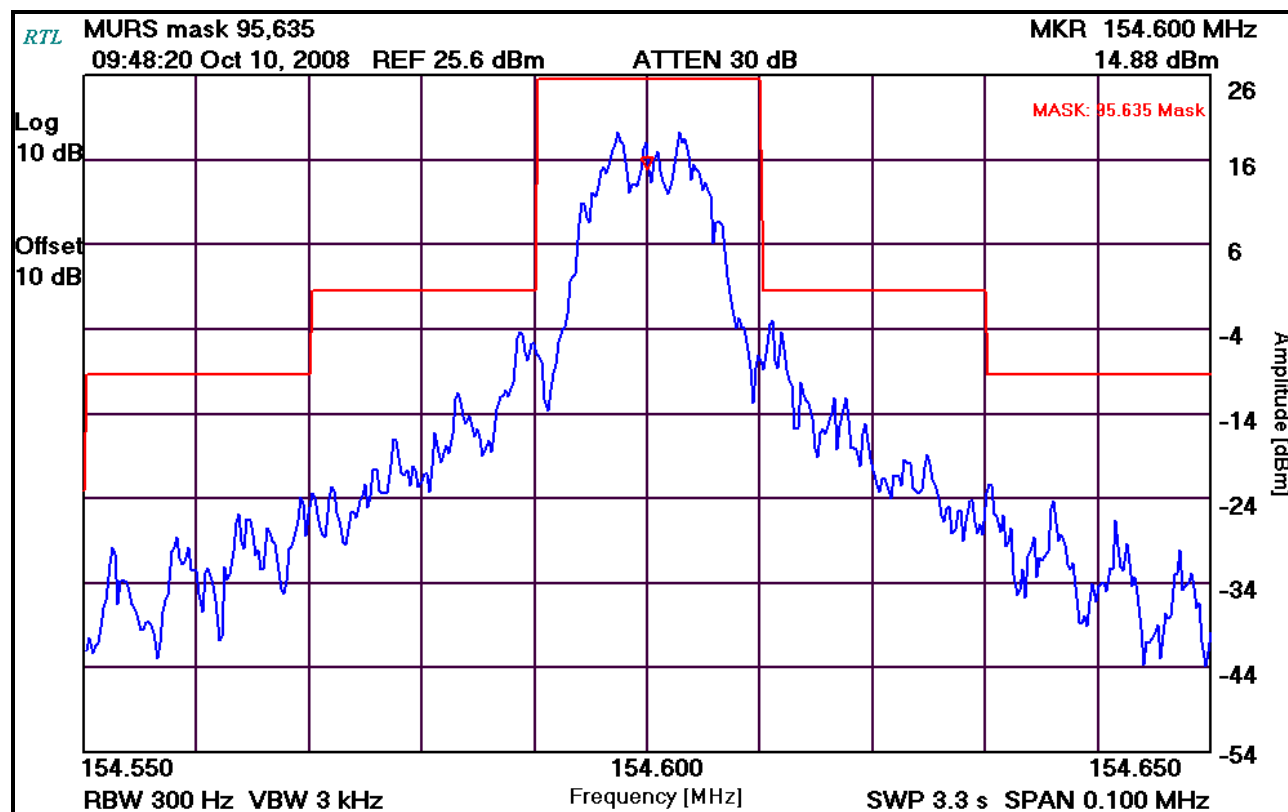
6.1 Test Procedure

Device with digital modulation: Modulated to its maximum extent using its own internal modulation using emission mask 3 of CFR 95.635(e)(3) which is not equipped with an audio low pass filter.

ANSI/TIA/EIA-603-2004, Section 2.2.11.

6.2 In Band Spurious Test Data

Plot 6-1: Occupied Bandwidth/Emissions Masks; 154.6 MHz



Plot 6-2: Occupied Bandwidth, 14.8 kHz

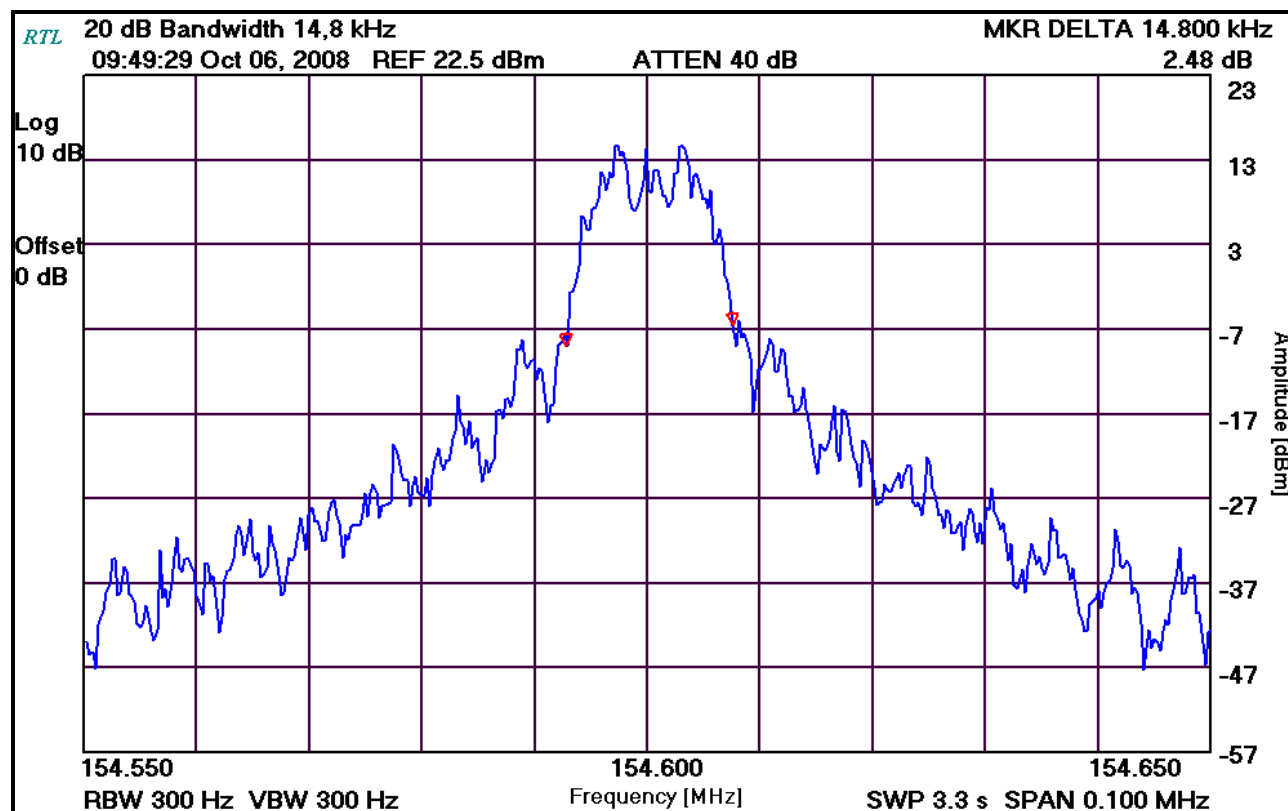


Table 6-1: Test Equipment for Testing Occupied Bandwidth/Emissions Masks

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 KHz – 6.5 GHz)	3325A00159	4/15/09

Test Personnel:

Daniel Baltzell
EMC Test Engineer

Daniel W. Baltzell

Signature

October 6 & 10, 2008
Dates Of Test

7 FCC Rules and Regulations CFR 95.635(e)(3) and Part 2 §2.1053(a): Field Strength of Spurious Radiation

7.1 Test Procedure

ANSI TIA-603-C-2004, section 2.2.12.

The EUT was powered by an external power supply and modulated with its own internal modulation. The EUT was placed on a non-conducting table 80 cm above the ground plane. The antenna-to-EUT distance is 3 m. The EUT is rotated through 360 degrees to maximize emissions. The antenna is scanned in both vertical and horizontal polarizations. The spurious emissions levels were measured, and the device under test was replaced by a substitution antenna connected to a signal generator. This signal generator level was then corrected by subtracting the cable loss from the substitution antenna to the signal generator, and the gain of the antenna was further corrected to a half-wave dipole.

The EUT was scanned from 9 kHz to the 10th harmonic of the fundamental. The spectrum analyzer resolution bandwidth is set to 100 kHz and the video bandwidth 1 MHz for frequencies less than 1 GHz, and 1 MHz resolution/video bandwidth for frequencies over 1 GHz.

The spurious radiated emissions limit is calculated as follows:

Limits: $P(\text{dBm}) - (43 + 10 \times \text{LOG } P(\text{W}))$

7.2 Test Data

The worst-case emissions test data are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

Table 7-1: Field Strength of Spurious Radiation: 154.6 MHz Horizontal Polarity

Limit = 43.5
Measured Conducted Power = 0.363 W

Emission Frequency (MHz)	Analyzer Reading (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBi)	Corrected Signal Generator (dBc)	Limit (dBc)	Margin (dB)
309.202	90.2	-11.9	3.6	-0.5	38.5	35.5	-3.0
463.796	77.0	-30.7	4.4	-0.7	58.3	35.5	-22.8
618.398	78.4	-24.4	5.0	-1.0	52.9	35.5	-17.4
773.000	74.0	-23.5	5.7	-1.3	53.0	35.5	-17.5
927.602	72.8	-22.9	6.4	-1.0	52.8	35.5	-17.3
1082.204	53.1	-42.2	6.8	4.3	67.2	35.5	-31.7
1236.806	44.8	-46.8	7.4	4.9	71.8	35.5	-36.3
1546.010	36.2	-43.1	8.3	5.8	68.1	35.5	-32.6

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.

Table 7-2: Field Strength of Spurious Radiation: 154.6 MHz Vertical Polarity

Limit = 43.5
Measured Conducted Power = 0.363 W

Emission Frequency (MHz)	Analyzer Reading (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBi)	Corrected Signal Generator (dBc)	Limit (dBc)	Margin (dB)
309.2	88.8	-10.5	3.6	-0.5	45.1	35.5	-9.6
463.8	81.7	-22.8	4.4	-0.7	58.4	35.5	-22.9
618.4	78.9	-21.8	5.0	-1.0	58.3	35.5	-22.8
773.0	74.2	-24.8	5.7	-1.3	62.3	35.5	-26.8
927.6	73.2	-20.4	6.4	-1.0	58.3	35.5	-22.8
1082.2	56.5	-37.4	6.8	4.3	70.4	35.5	-34.9
1236.8	46.5	-43.1	7.4	4.9	76.1	35.5	-40.6
1391.4	40.5	-39.0	8.3	5.8	72.0	35.5	-36.5

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.

Table 7-3: Test Equipment for Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz – 2 GHz)	2648	12/20/08
901158	Compliance Design, Inc.	Roberts Dipole Antenna	Adjustable Elements Dipole (25 - 1000 MHz Antennas)	00401	2/4/09
900928	Hewlett Packard	HP 83752A	Synthesized Sweeper (.01 – 20 GHz)	3610A00866	12/7/08
901365	MITEQ	JS4-00102600-41-5P	Amplifier, 0.1-26 GHz, 30dB gain	N/A	10/8/09
901262	ETS	3115	Double Ridge Horn (1 – 26 GHz)	6748	5/1/11
901426	Insulated Wire Inc.	KPS-1503-3600-KPS	RF Cable, 30'	NA	10/5/08
901425	Insulated Wire Inc.	KPS-1503-2400-KPS	RF Cable, 20'	NA	10/5/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF Cable 36"	NA	10/5/08

Test Personnel:

Daniel Baltzell
EMC Test Engineer



Signature

September 30, 2008
Date Of Test

8 FCC Rules and Regulations Part 95.632(c); Part 2.1055: Frequency Stability

8.1 Test Procedure

ANSI TIA-603-C-2004, section 2.3.1 and 2.3.2.

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

The EUT was evaluated over the temperature range -30°C to +50°C.

The temperature was initially set to -30°C and a 1-hour period was observed for stabilization of the EUT. The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10°C through the range. A ½ hour period was observed to stabilize the EUT at each measurement step, and the frequency stability was measured within one minute after application of primary power to the transmitter. Additionally, the power supply voltage of the EUT was varied +/-15% nominal input voltage.

The worst-case test data are shown below in Table 8-1 and Table 8-2.

8.2 Frequency Stability Test Data

8.2.1 Frequency Stability/Temperature Variation

Table 8-1: Frequency Stability/Temperature Variation – 154.6 MHz

Temperature (°C)	Measured Frequency (MHz)	ppm
-30	154.599969	0.05
-20	154.599935	-0.17
-10	154.599977	0.10
0	154.599960	-0.01
10	154.599957	-0.03
20	154.599962	0.00
30	154.599954	-0.05
40	154.599932	-0.19
50	154.599944	-0.11

8.2.2 Frequency Stability/Voltage Variation

Table 8-2: Frequency Stability/Voltage Variation – 154.6 MHz

Voltage (VAC)	Measured Frequency (MHz)	ppm
3.15	154.599880	-0.09
3.7	154.599870	0.00
4.26	154.599880	-0.09

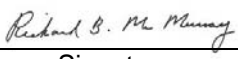
8.3 Test Limits

Part §95.632(c): (c) MURS transmitters must maintain frequency stability of 5.0 ppm, or 2.0 ppm if designed to operate with a 6.25 kHz bandwidth.

Table 8-3: Test Equipment for Testing Frequency Stability

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	5/8/09
901300	Agilent Technologies	53131A (225 MHz)	Universal Frequency Counter	MY40001345	1/30/09
901350	Meterman	33XR	Multimeter	040402802	12/5/08

Test Personnel:

Richard B. McMurray, P.E. EMC Test Engineer	 Signature	September 15, 2008 Date Of Test
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9 Conclusion

The data in this measurement report shows that the **White Bear Technologies Model RoamEO PuPpod GPS Pet Location System, Model # ROAM-P25, FCC ID: UAX-RPUPV1**; complies with all the applicable requirements of FCC Parts 95, 15 and 2.