Engineering and Testing for EMC and Safety Compliance

CERTIFICATION APPLICATION REPORT
FCC PART 15 CERTIFICATION

Test Lab:	Applicant Information:
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FCC ID:	QP4HC-5000	**GRANTEE FRN NUMBER:**	0007881469
PLAT FORM:	N/A	**RTL WORK ORDER NUMBER:**	2002206
MODEL(S):	HC-5000	**RTL QUOTE NUMBER:**	QRTL02-638
DATE OF TEST REPORT:	November 11, 2002		

American National Standard Institute:	ANSI C63.4: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
FCC Classification:	DCD - Part 15 Low Power Transmitter Below 1705kHz
FCC Rule Part(s):	Part 15
Industry Canada Standard:	N/A
Digital Interface Information	Digital Interface was found to be compliant
Receiver Information	Receiver was found to be compliant
Frequency	13.5kHz

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to, or exclusions from the FCC Part 2, FCC Part 15, and ANSI C63.4.

Signature: _____ Date: November 11, 2002

Typed/Printed Name: Desmond A. Fraser Position: President

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1 GENERAL INFORMATION

1.1 SCOPE

The EUT, which is a pet containment system from High Tech Pet Products, Inc., (model number HC-5000) operating at 13.5kHz and 8.2kHz, was tested to the applicable portions of FCC Part 15 as a low-power, low-frequency transmitter.

1.2 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

Because of the physical area required for the testing of the pet containment system, additional radiated testing was done at a field located at 7908 Telegraph Road, Alexandria, VA 22315-3703. This location allowed the additional radiated testing to be performed 10 meters away from the EUT with 360' of antenna wire connected to the EUT.

1.3 RELATED SUBMITTAL(S)/GRANT(S)

This is an original application for certification for High Tech Pet Products, Inc. "Humane Contain Advanced Pet Electronic Pet Containment System", Model Number: HC-5000, FCC ID: QP4HC-5000.

2 TEST INFORMATION

2.1 TEST JUSTIFICATION

The EUT is a High Tech Pet Products' low-frequency, low-power pet containment system, model number HC-5000, operating at 13.5kHz and 8.2kHz. Testing of the intentional radiator parameters of the EUT was performed off-site as described in section 1.2. Approximately 360' of antenna wire was connected to the EUT to simulate a typical installation and adhere to the FCC's guidelines for this type of EUT. Measurements were taken along the perimeter of the antenna at 3 meters to characterize the emissions. Three sets of measurements were taken with the receiving antenna in all three polarities. It was determined that the horizontal orientation of the antenna captured the worst-case emissions. The locations of the worst emissions were marked with flags and then investigated at 10 meters. The 10 meter data below 100kHz was then corrected to 300 meters.

As mentioned above, the EUT operates at both 8.2kHz and 13.5kHz. The EUT was tested at 13.5kHz since the unit operates on a band of channels less than 1MHz and the FCC does not approve transmitters below 9kHz.

2.2 EXERCISING THE EUT

The EUT was set to continuously transmit at maximum power during all testing.

2.3 TEST RESULT SUMMARY

The EUT passed all applicable requirements.

2.4 MODIFICATIONS

No modifications were made to the EUT in order to bring it into compliance with FCC Part 15 Class B requirements.

2.5 TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system are identified in Table 2-2.

TABLE 2-1: EQUIPMENT UNDER TEST (EUT)

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
HC-5000 TRANSMITTER	HIGH TECH PET PRODUCTS	HC-5000	N/A	QP4HC-5000	360' UNSHIELDED ANTENNA WIRE	14807
HC-5000 RECEIVER	HIGH TECH PET PRODUCTS	HC-5000	N/A	QP4HC-5000	N/A	14808
POWER SUPPLY	HIGH TECH PET PRODUCTS	N/A	N/A	N/A	UNSHIELDED	14809

2.6 CONFIGURATION OF TESTED SYSTEM

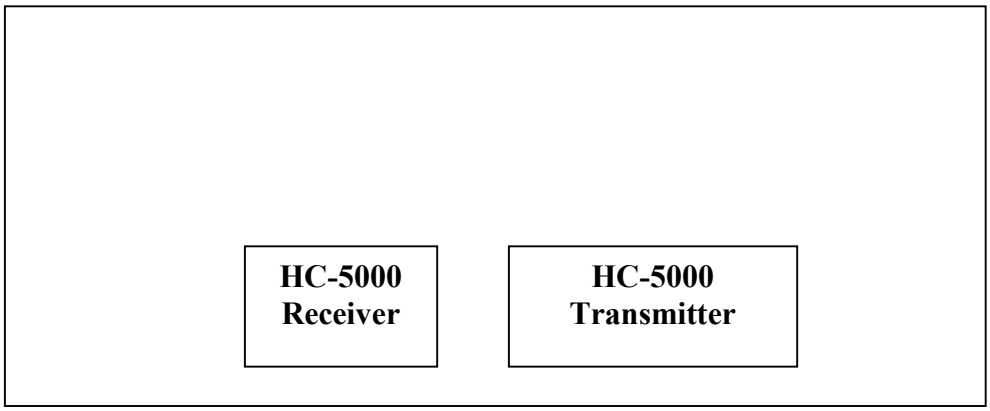


FIGURE 1: TEST CONFIGURATION FOR DIGITAL RADIATED AND POWER LINE CONDUCTED EMISSIONS

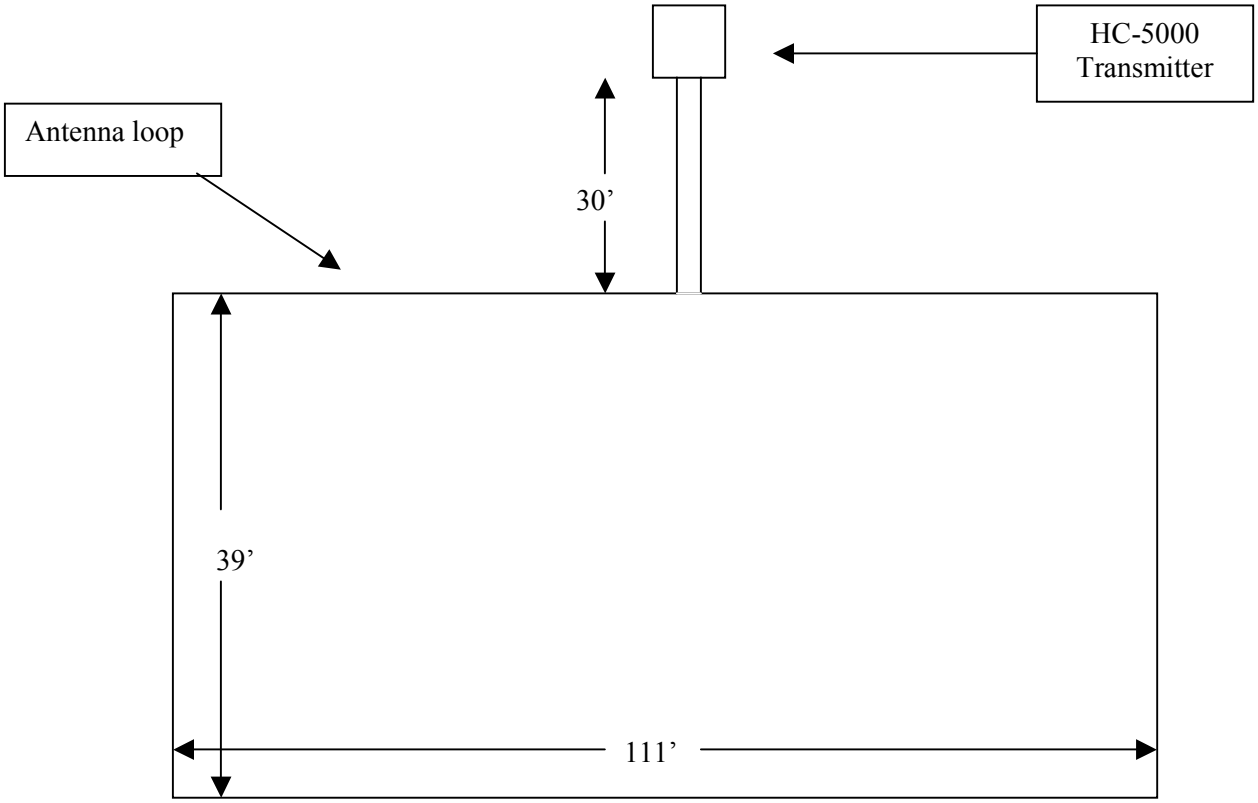


FIGURE 2: TEST CONFIGURATION FOR SPURIOUS AND FUNDAMENTAL RADIATED EMISSIONS (OFF-SITE TESTING)

3 CONDUCTED LIMITS - §15.207

3.1 TEST METHODOLOGY FOR CONDUCTED LINE EMISSIONS MEASUREMENTS

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 micro Henry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from (150/450) kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

3.2 CONDUCTED LINE EMISSION TEST

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emissions exceed the limit with the instrument set to the quasi-peak mode, then measurements are made in the average mode. If the quasi-peak measurement is at least 6dB higher than the amplitude in the average mode, the level measured in the quasi-peak mode may be reduced by 13dB before comparing it to the limit.

The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 450 kHz to 30 MHz on the NEUTRAL SIDE and PHASE SIDE.

3.3 CONDUCTED LINE EMISSIONS TEST DATA

TABLE 3-1: CONDUCTED EMISSIONS (NEUTRAL SIDE)

Temperature: 65°F Humidity: 54%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.633	Pk	38.2	0.8	39.0	48.0	-9.0	48.0	-9.0	Pass
0.689	Pk	38.9	0.9	39.8	48.0	-8.2	48.0	-8.2	Pass
3.560	Pk	37.0	1.6	38.6	48.0	-9.4	48.0	-9.4	Pass
9.500	Av	5.4	2.6	8.0	48.0	-40.0	48.0	-40.0	Pass
9.500	Qp	21.7	2.6	24.3	48.0	-23.7	48.0	-23.7	Pass
18.760	Pk	27.7	3.7	31.4	48.0	-16.6	48.0	-16.6	Pass
28.160	Pk	29.2	4.4	33.6	48.0	-14.4	48.0	-14.4	Pass

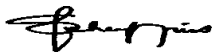
Pk = Peak; Qp = quasi-peak; Av = Average

TABLE 3-2: CONDUCTED EMISSIONS (PHASE SIDE)

Temperature: 65°F Humidity: 54%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.451	Pk	40.6	0.9	41.5	48.0	-6.5	48.0	-6.5	Pass
0.538	Pk	35.0	0.8	35.8	48.0	-12.2	48.0	-12.2	Pass
0.678	Pk	38.6	0.8	39.4	48.0	-8.6	48.0	-8.6	Pass
0.783	Pk	39.2	0.9	40.1	48.0	-7.9	48.0	-7.9	Pass
3.584	Pk	34.9	1.7	36.6	48.0	-11.4	48.0	-11.4	Pass
9.090	Qp	24.3	2.6	26.9	48.0	-21.1	48.0	-21.1	Pass
9.090	Av	5.3	2.6	7.9	48.0	-40.1	48.0	-40.1	Pass
11.495	Pk	18.3	3.0	21.3	48.0	-26.7	48.0	-26.7	Pass
18.445	Pk	25.2	3.7	28.9	48.0	-19.1	48.0	-19.1	Pass
27.690	Pk	27.3	4.4	31.7	48.0	-16.3	48.0	-16.3	Pass

Pk = Peak; Qp = quasi-peak; Av = Average

TEST PERSONNEL:

Franck Schuppius		October 24, 2002
EMC Test Engineer	Signature	Date Of Test

4 RADIATED EMISSION LIMITS - §15.209

4.1 DIGITAL DEVICE EMISSIONS TEST DATA

Digital device emissions were investigated from 30MHz to 1000MHz. As the transmitter unit of the EUT is always transmitting in typical use, it was transmitting during this testing. The receiver unit of the EUT was simultaneously investigated. The device was tested at 3 meters, and the limits shown below are 3 meter limits.

TABLE 4-1: DIGITAL DEVICE EMISSIONS TEST DATA

Temperature: 42°F Humidity: 89%										
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass/ Fail**
72.306	Qp	H	45	1.3	36.8	-23.0	13.8	40.0	-26.2	Pass
73.354	Qp	V	90	1.0	39.8	-23.4	16.4	40.0	-23.6	Pass
167.380	Qp	V	225	1.0	35.4	-18.3	17.1	43.5	-26.4	Pass
194.184	Qp	V	145	1.0	42.0	-19.0	23.0	43.5	-20.5	Pass
208.000	Qp	V	225	1.0	39.0	-18.7	20.3	43.5	-23.2	Pass
212.000	Qp	V	145	1.0	40.6	-18.8	21.8	43.5	-21.7	Pass
212.524	Qp	V	225	1.0	39.5	-18.8	20.7	43.5	-22.8	Pass
234.015	Qp	V	90	1.0	38.5	-17.6	20.9	46.0	-25.1	Pass
244.020	Qp	V	180	1.0	39.0	-17.0	22.0	46.0	-24.0	Pass
253.956	Qp	H	45	1.8	39.9	-16.0	23.9	46.0	-22.1	Pass
255.528	Qp	H	145	2.0	38.9	-15.9	23.0	46.0	-23.0	Pass
931.848	Qp	H	90	2.0	34.7	-3.6	31.1	46.0	-14.9	Pass

TEST PERSONNEL:

Franck Schuppius		October 24, 2002
EMC Test Engineer	Signature	Date Of Test

4.2 SPURIOUS AND FUNDAMENTAL EMISSIONS

The results obtained below were measured at: 7908 Telegraph Road
Alexandria, VA 22315-3703

This location allowed the spurious and fundamental radiated testing to be performed 10 meters away from the EUT with 360' of antenna wire connected to the EUT.

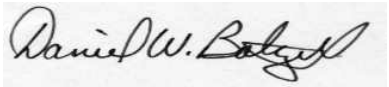
Note: Peak readings, average limits. Measurements were taken with antenna in horizontal polarity; this was determined to be the worst-case emissions. Measurements were taken at 10 meters and corrected to 300 meters. These measurements were corrected to 300 meters by the following: 60 log (300/10) = 88.6. The 60dB/decade extrapolation factor was determined by Greg Czumak at the FCC for these types of devices.

Sample calculation:
Corrected SA Peak Level to 300m (dBuV/m) = SA reading (dBuv) + AF(dB/m) + CL(dB) + Correction from 10m to 300m (dB)
For example, at 13.5kHz:
Corrected SA Peak Level to 300m (dBuV/m) = 89.1(dBuV) + 19.9(dB/m) + 0.7(dB) – 88.6(dB) = **21.1dBuV/m**

TABLE 4-2: SPURIOUS AND FUNDAMENTAL EMISSIONS TEST DATA

Temperature: 39°F Humidity: 100%								
Frequency (kHz)	**Spectrum Analyzer Peak (dBuV)**	**Antenna Factor (dB/m)**	**Cable Loss (dB)**	**Correction from 10m to 300 meters (dB)**	**Corrected Spectrum Analyzer Peak Level to 300m (dBuV/m)**	**Limit (dBuV/m) at 300m**	**Margin (dB)**	**Notes**
13.5	89.1	19.9	0.7	-88.6	21.1	44.7	-23.6	fundamental
25.1	83.4	19.8	0.7	-88.6	15.3	39.6	-24.3	
27.9	82.2	19.9	0.8	-88.6	14.2	38.7	-24.5	
32.9	78.9	19.9	0.8	-88.6	10.9	37.3	-26.3	
41.5	85.0	20.2	0.8	-88.6	17.4	35.2	-17.9	
50.1	78.2	19.9	0.8	-88.6	10.3	33.6	-23.3	
54.5	80.7	20.0	0.8	-88.6	12.9	32.9	-20.0	
58.1	79.6	20.0	0.9	-88.6	11.8	32.3	-20.5	
68.1	81.8	19.9	0.9	-88.6	14.0	30.9	-17.0	
74.8	77.7	19.9	0.9	-88.6	9.9	30.1	-20.3	
82.0	79.3	19.9	0.9	-88.6	11.5	29.3	-17.9	
91.1	75.8	20.0	1.0	-88.6	8.1	28.4	-20.3	
95.6	78.9	20.0	1.0	-88.6	11.3	28.0	-16.7	
99.7	75.0	20.0	1.0	-88.6	7.4	27.6	-20.3	
109.5	77.9	20.0	1.0	-88.6	10.3	26.8	-16.5	
115.8	73.9	20.0	1.1	-88.6	6.4	26.3	-20.0	

TEST PERSONNEL:



Daniel W. Baltzell — Signature — October 30, 2002
EMC Test Engineer — Date Of Test

4.3 TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	5/10/03
901084	AFJ International	LS16	16A LISN	16010020082	9/5/03
900901	Hewlett Packard	85650A	Quasi-Peak Adapter	2412A00414	11/09/02
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	N/A
900889	Hewlett Packard	85685A	RF Preselector for HP 8566B or 8568B (20Hz-2GHz)	3146A01309	11/21/02
900905	Rhein Tech Labs	PR-1040	Amplifier	900905	N/A
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	5/10/03
900969	Hewlett Packard	85650A	Quasi-Peak Adapter	2412A00414	5/10/03
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz - 2 GHz)	2648	5/22/03
901242	Rhein Tech Labs	WRT-000-0003	Wood rotating table	N/A	N/A
901215	Hewlett Packard	8596EM (9kHz-12.8GHz)	EMC Analyzer	3826A00144	8/23/03
900151	Rohde and Schwarz	HFH2-Z2	Loop Antenna (9 kHz - 30 MHz)	827525/019	8/9/03

5 CONCLUSION

The data in this measurement report shows that the High Tech Pet Products, Inc. “Humane Contain Advanced Pet Electronic Pet Containment System” Model: HC-5000, FCC ID: QP4HC-5000, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations.