APPLICANT	MANUFACTURER
X-10 (USA), Inc. **19823 58th Place S.** **Kent, WA 98032**	**X-10 Electronics Shenzhen Co. Ltd.** **X-10 Building** **Labour Industrial District** **Shenzhen, Xixiang, Bao An** **Guang Dong, China, 518102**

TEST SPECIFICATION: FCC Rules and Regulations Part 15, Subpart C, Para. 15.231

TEST PROCEDURE: ANSI C63.4:2000

TEST SAMPLE DESCRIPTION

BRANDNAME: X-10 (USA) **MODEL: VR40A**

TYPE: Pulsed Transmitter

POWER REQUIREMENTS: 115 VAC, 60 Hz

FREQUENCY OF OPERATION: 433 MHz

TESTS PERFORMED

Para. 15.231(b), Radiated Emissions, Fundamental and Harmonics

Para. 15.209, Radiated Emissions, Spurious Case

Para. 15.209, AC Line Conducted Emissions

Para. 15.35, Duty Cycle Determination

Para. 15.231(c), Occupied Bandwidth

REPORT OF MEASUREMENTS

Applicant: X-10 (USA), Inc.

Device: Pulsed Transmitter

FCC ID: B4SVR40A

Power Requirements: **115 VAC, 60 Hz**

Applicable Rule Section: **Part 15, Subpart C, Section 15.231**

REPORT OF MEASUREMENTS (continued)

TEST RESULTS

15.231 (a): **This device is used as a remote control transmitter.**

15.231 (a)(1) & 15.231(a)(2): **The transmitter is automatically operated and ceases transmission within 5 seconds after deactivation.**

15.231 (a)(3): **The transmitter does not perform periodic transmissions.**

15.231 (b): **The fundamental field strength did not exceed 11,000 µV/M (Average) at a test distance of 3 meters. In addition, the requirements of section 15.35 for averaging pulsed emissions and for limiting peak emissions were met.**

The field strength of harmonic and spurious emissions did not exceed 1,100 µV/M (AVERAGE).

DETERMINATION OF FIELD STRENGTH LIMITS

The field strength limits shown below are found in Section 15.231.

Frequency				Limit
F1	=	260	3750 =	L1
Fo	=	434	Lo	
F2	=	470	12500 =	L2

The formula below was utilized to determine the limits:

Limit = L1 + [(Fo-F1)(L2-L1)/(F2-F1)]

Solving yields:

Fundamental Limit = 11,000 µV/M (AVERAGE) @ 3 Meters

Harmonic Limit = 1,100 µV/M (AVERAGE) @ 3 Meters

REPORT OF MEASUREMENTS (continued)

DUTY CYCLE DETERMINATION

The unit's RF output was directly coupled to the input of the spectrum analyzer. The analyzer was set for a frequency span of 0Hz. The sweep time was then adjusted in order to display one full pulse train. The transmitter on time was then summed and compared to the time for one full cycle in order to obtain the duty cycle.(See plots for additional information)

Transmitter On Time = 13.7 milliseconds (maximum- worst case in 100 ms)

Transmitter Cycle Time = 112.2 milliseconds

Transmitter Duty Cycle = 13.7 %

CALCULATION:

3 x 1.9 milliseconds (large pulse)	**=**	**5.7 milliseconds**
8 x 1 milliseconds (small pulse)	**=**	**8 milliseconds**
8 + 5.7	**=**	**13.7 milliseconds**
Duty Cycle (13.7/100)	**=**	**13.7 %**
Correction Factor = 20 log(0.137)	**=**	**-17.3dB**

SPECTRUM ANALYZER DESENSITIZATION CONSIDERATIONS

Due to the nature of the emissions being measured, care was taken to ensure that the resolution bandwidth of the spectrum analyzer was adequate to provide accurate measurements. The following formula was utilized:

Setting pulse desensitization equal to zero and utilizing the minimum observed pulse width of 1.0 millisecond yields a minimum required bandwidth of 666.7 Hz. FCC specified bandwidths of 100kHz and 1MHz were utilized below and above 1GHz, respectively.

GENERAL NOTES

All readings were taken utilizing a peak detector function at a test distance of 3 meters.

The duty cycle was applied to the peak readings in order to determine the average value of the emissions.

The frequency range was scanned from 30 MHz to 4.4 GHz. All emissions not reported were more than 20 dB below the specified limit.

Test Setup Photographs