| APPLICANT | MANUFACTURER |
|---|---|
| X-10 USA, Inc.<br>19823, 58th Place S.<br>Kent, WA 98032 | X-10 Electronics Shenzhen Co. Ltd.<br>X-10 Building<br>Labour Industrial District<br>Shenzhen, Xixiang, Bao An<br>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: CM15A**

**TYPE: Pulsed Transmitter**

**POWER REQUIREMENTS: 115 VAC, 60 Hz AC Power**

**FREQUENCY OF OPERATION: 310 MHz**

**TESTS PERFORMED**

**Para. 15.207(a), Conducted Emissions**

**Para. 15.231(a), Radiated Emissions, Fundamental and Harmonics**

**Para. 15.231(b), Radiated Emissions, Spurious Case**

**Para. 15.231(b), Duty Cycle Determination**

**Para. 15.231(c), Occupied Bandwidth**

**REPORT OF MEASUREMENTS**

**Applicant:** **X-10 (USA), Inc.**

**Device:** **Pulsed Transmitter**

**FCC ID:** **B4SCM15A**

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

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

## REPORT OF MEASUREMENTS (continued)

TEST RESULTS

| | |
|---|---|
| **15.207(a): line 30 MHz** | **The radio frequency voltage that was conducted back on to the AC power on any frequency/frequencies within the bandwidth of 450 kHz to did not exceed 250 microvolts.** |
| **15.231 (a):** | **This device is used as a remote control transmitter.** |
| **15.231 (a)(1) & 15.231(a)(2):** | **The transmitter is manually 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 5833 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.**<br><br>**The field strength of harmonic and spurious emissions did not exceed 583 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 | = | 310 | 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 = 5833 µV/M (AVERAGE) @ 3 Meters**

**Harmonic Limit = 583 µV/M (AVERAGE) @ 3 Meters**

**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 = 28.8 milliseconds (maximum)**

**Transmitter Cycle Time = 74 milliseconds**

**Transmitter Duty Cycle = 38.9 %**

**CALCULATION:**

| | | |
|---|---|---|
| **1 Large Pulse** | **=** | **9 milliseconds** |
| **33 x 600 µs (small pulse)** | **=** | **19.8 milliseconds** |
| **9 + 19.8** | **=** | **28.8 milliseconds** |
| **Duty Cycle (28.8/74)** | **=** | **38.9 %** |
| **Correction Factor = 20 log(0.389)** | **=** | **-8.2 dB** |

**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 600 µs yields a minimum required bandwidth of 1111 Hz. FCC specified bandwidths of 100 kHz 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 3.1 GHz. All emissions not reported were more than 20 dB below the specified limit.

## Equipment List

## FCC Part 15, Paragraph 15.231 Testing

| EN | Type | Manufacturer | Description | Model No. | Cal Date | Due Date |
|---|---|---|---|---|---|---|
| 067 | Open Area Test Site | Retlif | 3 Meter | RNY | 09/20/2000 | 09/20/2003 |
| 128 | Double Ridged Guide | Electro-Mechanics | 1 GHz - 18 GHz | 3105 | 06/13/2003 | 06/13/2004 |
| 133 | Broadband Pre-Amplifier | Electro-Metrics | 10 kHz - 1 GHz, 26dB | BPA-1000 | 06/12/2003 | 06/12/2004 |
| 141 | Spectrum Analyzer | Hewlett Packard | 100 Hz - 40 GHz | 8566B | 07/23/2003 | 01/23/2004 |
| 141A | Graphics Plotter | Hewlett Packard | N/A | 7470A | 03/05/2003 | 03/05/2004 |
| 141B | Quasi-Peak Adaptor | Hewlett Packard | 100 Hz - 1 GHz | 85650A | 07/23/2003 | 01/23/2004 |
| 206B | 6.0 dB Attenuator | Texscan | 0 - 1.0 GHz | FP-50 - 6 dB | 06/12/2003 | 06/12/2004 |
| 543 | Preamplifier | Hewlett Packard | 1.0 GHz - 26.5 GHz | 8449B | 07/24/2003 | 07/24/2004 |
| 767 | Biconilog | EMCO | 26 - 2000 MHz | 3142B | 09/03/2002 | 09/03/2003 |

FCC 15.207(a)
Conducted Emissions
(See separate e-file named cedata.pdf)

FCC 15.231(b)

RADIATED EMISSIONS, FUNDAMENTAL & SPURIOUS CASE

(See separate e-file named Refundharm.pdf and REspur.pdf)

FCC 15.231(c)

OCCUPIED BANDWIDTH

(See separate e-file named occbw.pdf)

FCC 15.231(c)

DUTY CYCLE

(See separate e-file named dutycycle.pdf)

Test Setup Photographs