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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**

Test Report No. R-9755-1
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): The radio frequency voltage that was conducted back on to the AC power
line on any frequency/frequencies within the bandwidth of 450 kHz to
30 MHz 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 $\mu\text{V/M}$ (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
583 $\mu\text{V/M}$ (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

REPORT OF MEASUREMENTS (continued)

The formula below was utilized to determine the limits:

$$\text{Limit} = L1 + [(F0-F1)(L2-L1)/(F2-F1)]$$

Solving yields:

$$\text{Fundamental Limit} = 5833 \mu\text{V/M (AVERAGE) @ 3 Meters}$$

$$\text{Harmonic Limit} = 583 \mu\text{V/M (AVERAGE) @ 3 Meters}$$

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)

$$\text{Transmitter On Time} = 28.8 \text{ milliseconds (maximum)}$$

$$\text{Transmitter Cycle Time} = 74 \text{ milliseconds}$$

$$\text{Transmitter Duty Cycle} = 38.9 \%$$

CALCULATION:

$$1 \text{ Large Pulse} = 9 \text{ milliseconds}$$

$$33 \times 600 \mu\text{s (small pulse)} = 19.8 \text{ milliseconds}$$

$$9 + 19.8 = 28.8 \text{ milliseconds}$$

$$\text{Duty Cycle (28.8/74)} = 38.9 \%$$

$$\text{Correction Factor} = 20 \log(0.389) = -8.2 \text{ dB}$$

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 μ s 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)

Test Report No. R-9970-1
FCC ID: B4SCM15A

FCC 15.231(b)

RADIATED EMISSIONS, FUNDAMENTAL & SPURIOUS CASE

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

Test Report No. R-9970-1
FCC ID: B4SCM15A

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