

APPLICANT Detection Systems 130 Perinton Parkway Fairport, NY 14450	MANUFACTURER Same As Applicant
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TEST SPECIFICATION: FCC Rules and Regulations Part 15, Subpart C, Para. 15.231

TEST PROCEDURE: ANSI C63.4:1992

TEST SAMPLE DESCRIPTION

BRANDNAME: Detection Systems MODEL: RF835

TYPE: 304 MHz Pulsed RF Transmitter

POWER REQUIREMENTS: 6 VDC derived from (4) "AA" Batteries

FREQUENCY OF OPERATION: 304 MHz

TESTS PERFORMED

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

Para. 15.231(c), Occupied Bandwidth

Duty Cycle Determination

REPORT OF MEASUREMENTS

Applicant: Detection Systems
Device: 304 MHz Pulsed RF Transmitter
FCC ID: ESV-0407-6
Power Requirements: 6 VDC derived from (4) "AA" Batteries
Applicable Rule Section: Part 15, Subpart C, Section 15.231

REPORT OF MEASUREMENTS (continued)

TEST RESULTS

- 15.231 (a) - The device is used as a transmitter for security purposes.
- 15.231 (a)(1) & - The transmitter is automatically operated and ceases transmission within 5
15.231(2) seconds after activation.
- 15.231 (a)(3) - The transmitter performs periodic transmissions.
- 15.231 (a)(4)- The device is employed for RC purposes involving security.
- 15.231 (b) - The fundamental field strength did not exceed 5580 $\mu\text{V/M}$ (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 558 $\mu\text{V/M}$ (AVERAGE).
- 15.231 (c) - The device operates at 304 MHz. The bandwidth of emissions did not exceed 0.25% of the operating frequency (760 kHz).

DETERMINATION OF FIELD STRENGTH LIMITS

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

Frequency		Limit	
F1	= 260	3750	= L1
Fo	= 304		Lo
F2	= 470	12500	= L2

The formula below was utilized to determine the limits:

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

Solving yields:

Fundamental Limit = 5,580 $\mu\text{V/M}$ (AVERAGE) @ 3 Meters

Harmonic Limit = 558 $\mu\text{V/M}$ (AVERAGE) @ 3 Meters

REPORT OF MEASUREMENTS (continued)

DETERMINATION OF DUTY CYCLE AS PER DETECTION SYSTEMS:

Each packet contains 76 data bits and the packet transmission time with 5 kHz data rate is 15.2 milliseconds. The 50% duty cycle Manchester coding of the transmission ensures a 50% ON-AIR time for every packet which is 7.6 milliseconds. The minimum quiet time between packets is 100 milliseconds.

Packet Time = 15.2 milliseconds

Quiet Time between Packets = 100 milliseconds

ON-AIR Time = (Packet Time) x 50% = 7.6 milliseconds, in 115.2 milliseconds

Factor = $20 \text{ Log (ON-AIR Time/100 milliseconds)} = 20 \text{ Log (0.076)} = -22.3\text{dB}$

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 100 μ s yields a minimum required bandwidth of 6666.66 Hz. FCC specified bandwidths of 100kHz and 1MHz were utilized below and above 1GHz, respectively.

REPORT OF MEASUREMENTS (continued)

GENERAL NOTES

1. All readings were taken utilizing a peak detector function at a test distance of 3 meters.
2. The duty cycle was applied to the peak readings in order to determine the average value of the emissions.
3. All measurements were made with (4) new 1.5 VDC "AA" Batteries.
4. The frequency range was scanned from 30 MHz to 3.04 GHz. All emissions not reported were more than 20 dB below the specified limit.

EQUIPMENT LIST
FCC Part 15 Subpart C

EN	Type	Manufacturer	Frequency Range	Model No.	Cal Date	Due Date
067	Open Area Test Site	Retlif	3 Meter	RNY	8/30/97	8/30/99
127B	Biconical Antenna	Electro-Metrics	20 MHz - 200 MHz	BIA-25	11/24/98	11/24/99
128C	Double Ridge Guide	Eaton Corporation	1 GHz - 18 GHz	96001	10/6/98	10/6/99
129E	High Gain Horn Antenna	Microlab/FXR	18 GHz - 26.5 GHz	K638A	10/14/98	10/14/99
129H	High Gain Horn Antenna	Microlab/FXR	26.5 GHz - 40 GHz	U638A	10/14/98	10/14/99
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	6/22/99	6/22/00
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	3/16/99	9/16/99
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	3/5/99	3/5/00
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	3/16/99	9/16/99
202	Transient Limiter	Hewlett Packard	.009 MHz - 200 MHz	11947A	7/23/98	7/23/99
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	6/22/99	6/22/00
420	Amplifier	Hewlett Packard	2.0 GHz - 18 GHz	11975A	7/16/98	7/16/99
421	Harmonic Mixer	Hewlett Packard	18 GHz - 26.5 GHz	11970K	7/2/97	7/2/99
421A	Harmonic Mixer	Hewlett Packard	26.5 GHz - 40 GHz	11970A	3/11/99	3/11/00
421B	Harmonic Mixer	Hewlett Packard	40 GHz - 60 GHz	11970U	3/11/99	3/11/00
523	Biconilog	Electro-Mechanics	26 - 2000 MHz	3142B	10/22/98	4/22/00
543	Preamplifier	Hewlett Packard	1.0 GHz - 26.5 GHz	8449B	6/16/99	6/16/01

FCC 15.231(a)
RADIATED EMISSIONS, FUNDAMENTAL & HARMONICS
(See separate e-file attachment named 304Mhz231.doc)

Test Report No. R-8136-1
FCC ID: ESV-0407-6

FCC 15.231(c)

OCCUPIED BANDWIDTH

(See separate e-file attachments named occbw1.pdf and occbw2.pdf)