

APPLICANT

Detection Systems, Inc.
130 Perinton Parkway
Fairport, NY 14450

MANUFACTURER

Detection Systems, Inc.
130 Perinton Parkway
Fairport, NY 14450

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, Inc. MODEL: SEFD1

TYPE: Pulsed RF Transmitter

POWER REQUIREMENTS: 3 V derived from 2 "AAA" batteries

FREQUENCY OF OPERATION: 304 MHz

TESTS PERFORMED

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

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

Para. 15.231(c), Occupied Bandwidth

Duty Cycle Determination

REPORT OF MEASUREMENTS

Applicant: Detection Systems, Inc.

Device: Pulsed RF Transmitter

FCC ID: ESV-0117-06

**Retlif Testing Laboratories**

Test Report No. R-9089-3

FCC ID: ESV-0117-05

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 manually operated and ceases transmission within 5
15.231(2) seconds after deactivation.
- 15.231 (a)(3) - The transmitter does perform periodic transmissions not more than once
every 60 minutes.
- 15.231 (a)(4)- The device is employed for RC purposes involving security and when
activated to signal an alarm, operates during the pendency of the alarm
condition.
- 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	=	310			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



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Test Report No. R-9089-3
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REPORT OF MEASUREMENTS (continued)

DETERMINATION OF DUTY CYCLE

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 = 7.6 milliseconds (maximum- worst case in 100 ms)

Transmitter Cycle Time = > 100 milliseconds

Transmitter Duty Cycle = 7.6 %

CALCULATION:

Please refer to separate electronic file named: SEFD1 Tech Info.jpg

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 100µs yields a minimum required bandwidth of 6,667 Hz. FCC specified bandwidths of 100kHz and 1MHz were utilized below and above 1GHz, respectively.



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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 3V derived from 2 “AAA” batteries.
4. 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.



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EQUIPMENT LIST

Radiated Emissions						
EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
128C	Double Ridge Guide	Eaton Corporation	1 GHz - 18 GHz	96001	09/18/2000	09/18/2001
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	06/26/2001	06/26/2002
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	03/05/2001	03/05/2002
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	06/26/2001	06/26/2002
523	Biconilog	Electro-Mechanics	26 - 2000 MHz	3142B	06/08/2000	08/08/2001
543	Preamplifier	Hewlett Packard	1.0 GHz - 26.5 GHz	8449B	06/27/2001	06/27/2002
544	EMC Analyzer	Hewlett Packard	9.0 kHz - 1.8 GHz	8591EM	12/14/2000	12/14/2001
617	Interference Analyzer	Electro-Metrics	10 kHz - 1 GHz	EMC-30	02/27/2001	02/27/2002
R105	Spectrum Analyzer	Agilent	9 kHz - 26.5 GHz	E4407B	02/17/2001	02/17/2002



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Test Report No. R-9089-3

FCC ID: ESV-0117-05

FCC 15.231
RADIATED EMISSIONS, FUNDAMENTAL & SPURIOUS CASE
Please refer to separate electronic file named Refundharm.pdf and Respur.pdf



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Test Report No. R-9089-3
FCC ID: ESV-0117-05

FCC 15.231(c)

OCCUPIED BANDWIDTH

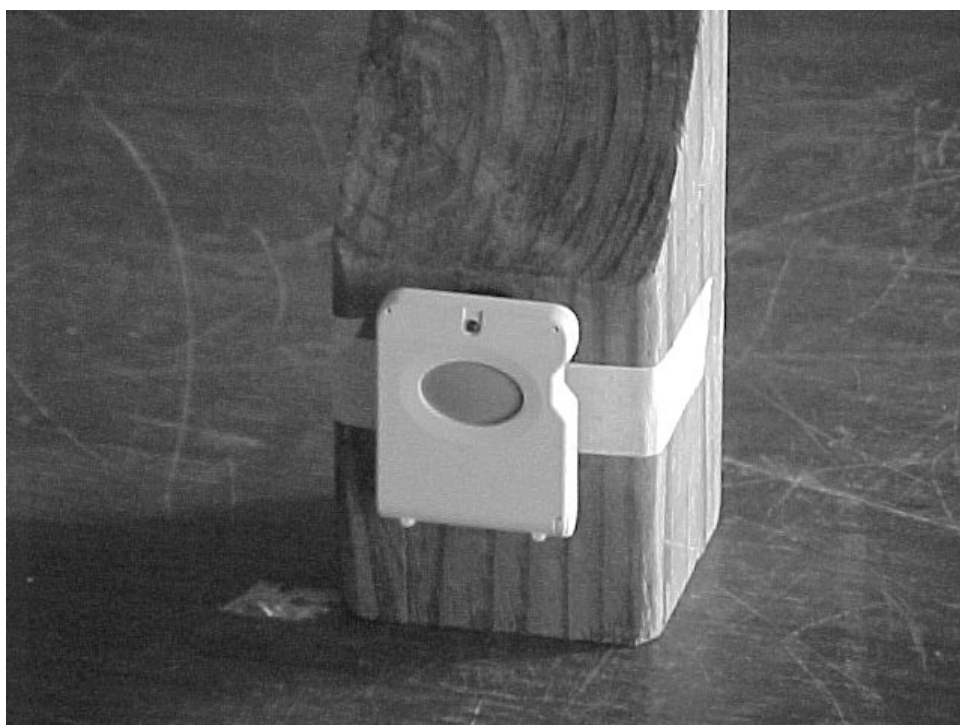
Please refer to separate electronic file named Occbw.pdf



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Test Report No. R-9089-3
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TEST SETUP PHOTOGRAPH



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Δ Mkr1 -63 kHz
-0.254 dB

Ref -19.08 dBm

Atten 5 dB

Peak
Log
10
dB/

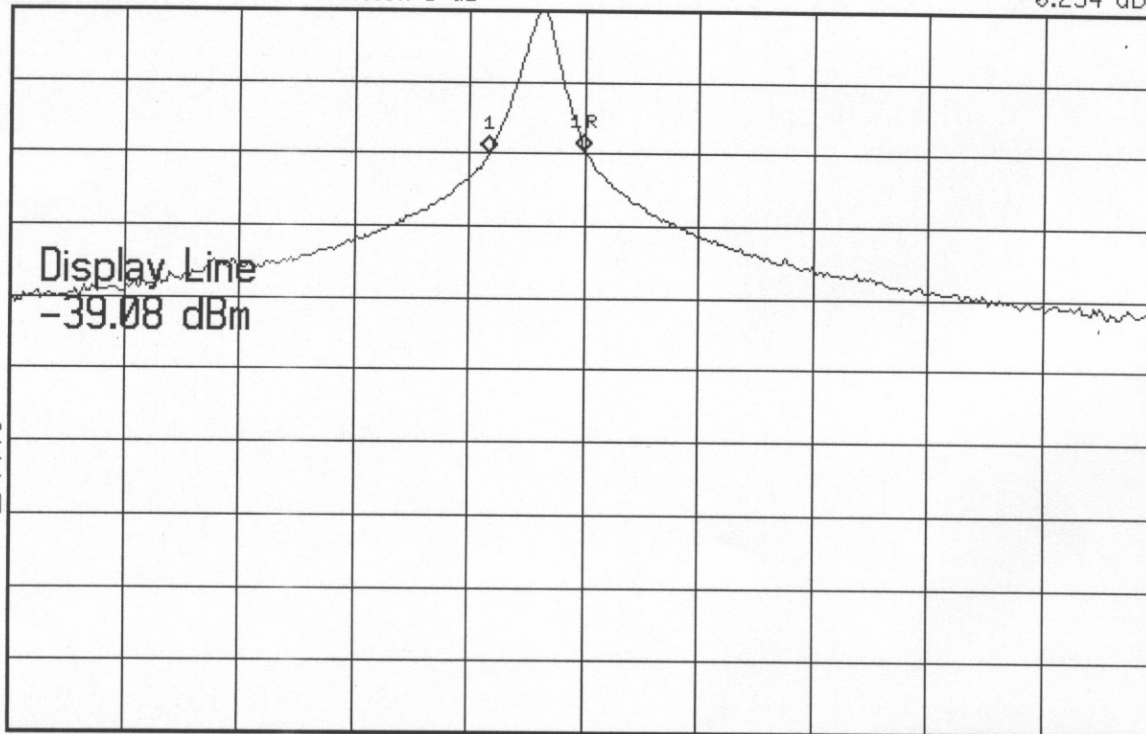
DI
-39.1
dBm
Display Line
-39.08 dBm

V1 S2
S3 FC
AA

Center 304 MHz
#Res BW 10 kHz

#VBW 3 MHz

Span 760 kHz
Sweep 27.5 ms (401 pts)



Customer: Detection Systems
Test Sample: 304 MHz pulsed RF Transmitter
Model No.: SEFD1 FCC ID: ESV-0117-06
Test Method: Occupied Bandwidth
Notes: Bandwidth does not exceed 0.25% of center frequency (760 kHz) at the 20 dB down points

Date: July 13, 2001 Tech: T. Schneider Sheet 1 of 1



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Report No. R-9089-3

Test Method:		FCC Part 15 Subpart C Radiated Emissions, Fundamental & Harmonic Emissions					
Customer:		Detection Systems			Job No.		R-9089-1
Test Sample:		304MHz Transmitter			Paragraph:		15.231
Model No.:		SE88			FCC ID:		ESV-0117-05
Operating Mode:		Continuously Transmitting a 304MHz Signal					
Technician:		Peter Lananna			Date:		July 17, 2001
Notes:		Test Distance: 3 Meters Detector: Peak, Unless otherwise specified					
Test Freq.	Antenna Pol./Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Peak Limit
MHz	(V/H)/Meters	X / Y / Z	dBuV	dB	dBuV/m	uV/m	uV/m
304	H / 2.0	X	80.6	-4.2	76.4	6606.9	55800
	H / 1.0	Y	84.3	-4.2	80.1	10115.8	
	H / 2.0	Z	80.3	-4.2	76.1	6382.6	
	V / 1.8	X	84.7	-4.2	80.5	10592.5	
	V / 1.0	Y	70.8	-4.2	66.6	2138.0	
304	V / 2.0	Z	83.4	-4.2	79.2	9120.1	55800
608	H / 1.0	X	39.0	3.4	42.4	131.8QP	200QP
	H / 1.3	Y	39.0	3.4	42.4	131.8QP	
	H / 2.0	Z	36.0	3.4	39.4	93.3QP	
	V / 1.0	X	37.2	3.4	40.6	107.2QP	
	V / 1.8	Y	35.0	3.4	38.4	83.2QP	
608	V / 1.0	Z	40.0	3.4	43.4	147.9QP	200QP
912	H / 1.0	X	22.6	8.4	31.0	35.5*	5580
	H / 1.0	Y	22.6	8.4	31.0	35.5*	
	H / 1.0	Z	39.2	8.4	47.6	239.9	
	V / 1.0	X	41.4	8.4	49.8	309.0	
	V / 1.0	Y	22.6	8.4	31.0	35.5*	
912	V / 1.0	Z	42.7	8.4	51.1	358.9	5580
1216	H / 2.3	X	50.1	-3.2	46.9	221.3	5000
	H / 2.0	Y	49.3	-3.2	46.1	201.8	
	H / 1.0	Z	47.7	-3.2	44.5	167.9	
	V / 1.3	X	52.4	-3.2	49.2	288.4	
	V / 1.8	Y	50.0	-3.2	46.8	218.8	
1216	V / 1.8	Z	49.4	-3.2	46.2	204.2	5000
1520	H / 1.0	X	39.6	-0.3	39.3	92.3*	5000
	H / 1.0	Y	39.6	-0.3	39.3	92.3*	
	H / 1.0	Z	39.6	-0.3	39.3	92.3*	
	V / 1.0	X	39.6	-0.3	39.3	92.3*	
	V / 1.0	Y	39.6	-0.3	39.3	92.3*	
1520	V / 1.0	Z	39.6	-0.3	39.3	92.3*	5000
	The frequency range was scanned from 30 MHz to 3.1 GHz. All emissions not recorded were more						
	Than 10 dB below the specified limit. Emissions from the EUT do not exceed the specified limits.						
	*=Noise Floor Measurements (Minimum system sensitivity)						



Retlif Testing Laboratories

Retlif Job Number R-9089-1

Test Method:		FCC Part 15 Subpart C Radiated Emissions, Fundamental & Harmonic Emissions						
Customer:		Detection Systems			Job No.		R-9089-1	
Test Sample:		304MHz Transmitter			Paragraph:		15.231	
Model No.:		SE88			FCC ID:		ESV-0117-05	
Operating Mode:		Continuously Transmitting a 304MHz Signal						
Technician:		Peter Lananna			Date:		July 17, 2001	
Notes:		Test Distance: 3 Meters Detector: Peak, unless otherwise specified						
Test Freq.	Antenna Pol./Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Peak Limit	
MHz	(V/H)-Meters	X / Y / Z	dBuV	dB	dBuV/m	uV/m	uV/m	
1824	H / 1.0	X	39.9	3.0	42.9	139.6*	5580	
	H / 1.0	Y	39.9	3.0	42.9	139.6*		
	H / 1.0	Z	39.9	3.0	42.9	139.6*		
	V / 1.0	X	39.9	3.0	42.9	139.6*		
	V / 1.0	Y	39.9	3.0	42.9	139.6*		
1824	V / 1.0	Z	39.9	3.0	42.9	139.6*	5580	
2128	H / 1.0	X	36.4	0.4	36.8	69.2*	5580	
	H / 1.0	Y	36.4	0.4	36.8	69.2*		
	H / 1.0	Z	36.4	0.4	36.8	69.2*		
	V / 1.0	X	36.4	0.4	36.8	69.2*		
	V / 1.0	Y	36.4	0.4	36.8	69.2*		
2128	V / 1.0	Z	36.4	0.4	36.8	69.2*	5580	
2432	H / 1.0	X	35.2	3.8	39.0	89.1*	5580	
	H / 1.0	Y	35.2	3.8	39.0	89.1*		
	H / 1.0	Z	35.2	3.8	39.0	89.1*		
	V / 1.0	X	35.2	3.8	39.0	89.1*		
	V / 1.0	Y	35.2	3.8	39.0	89.1*		
2432	V / 1.0	Z	35.2	3.8	39.0	89.1*	5580	
2736	H / 1.0	X	34.4	7.1	41.5	118.9*	5000	
	H / 1.0	Y	34.4	7.1	41.5	118.9*		
	H / 1.0	Z	34.4	7.1	41.5	118.9*		
	V / 1.0	X	34.4	7.1	41.5	118.9*		
	V / 1.0	Y	34.4	7.1	41.5	118.9*		
2736	V / 1.0	Z	34.4	7.1	41.5	118.9*	5000	
3040	H / 1.0	X	39.6	6.4	46.0	199.5*	5580	
	H / 1.0	Y	39.6	6.4	46.0	199.5*		
	H / 1.0	Z	39.6	6.4	46.0	199.5*		
	V / 1.0	X	39.6	6.4	46.0	199.5*		
	V / 1.0	Y	39.6	6.4	46.0	199.5*		
3040	V / 1.0	Z	39.6	6.4	46.0	199.5*	5580	
	The frequency range was scanned from 30 MHz to 3.1 GHz. All emissions not recorded were more							
	Than 10 dB below the specified limit. Emissions from the EUT do not exceed the specified limits.							
	*=Noise Floor Measurements (Minimum system sensitivity)							



Retlif Testing Laboratories

Retlif Job Number R-9089-1

Test Method:		FCC Part 15 Subpart C Radiated Emissions, Fundamental & Harmonic Emissions						
Customer:		Detection Systems			Job No.		R-9089-1	
Test Sample:		304MHz Transmitter			Paragraph:		15.231	
Model No.:		SE88			FCC ID:		ESV-0117-05	
Operating Mode:		Continuously Transmitting a 304MHz Signal						
Technician:		Peter Lananna			Date:		July 17, 2001	
Notes:		Test Distance: 3 Meters			Duty Cycle: 7.6%			
		Detector: Peak, unless otherwise specified			Duty Cycle Correction: - 22.4 dB			
Test Freq.	Antenna Pol./Height	EUT Orientation	Peak Reading	Correction Factor	Corrected Reading	Converted Reading	Avg. Limit	
MHz	(V/H)-Meters	X / Y / Z	dBuV	dB	dBuV/m	uV/m	uV/m	
304	H / 2.0	X	76.4	-22.4	54.0	501.2	5580	
	H / 1.0	Y	80.1	-22.4	57.7	767.4		
	H / 2.0	Z	76.1	-22.4	53.7	484.2		
	V / 1.8	X	80.5	-22.4	58.1	803.5		
	V / 1.0	Y	66.6	-22.4	44.2	162.2		
304	V / 2.0	Z	79.2	-22.4	56.8	691.8	5580	
608	H / 1.0	X	42.4	N/A	42.4	131.8QP	200QP	
	H / 1.3	Y	42.4	N/A	42.4	131.8QP		
	H / 2.0	Z	39.4	N/A	39.4	93.3QP		
	V / 1.0	X	40.6	N/A	40.6	107.2QP		
	V / 1.8	Y	38.4	N/A	38.4	83.2QP		
608	V / 1.0	Z	43.4	N/A	43.4	147.9QP	200QP	
912	H / 1.0	X	31.0	-22.4	8.6	2.7*	558	
	H / 1.0	Y	31.0	-22.4	8.6	2.7*		
	H / 1.0	Z	47.6	-22.4	25.2	18.2		
	V / 1.0	X	49.8	-22.4	27.4	23.4		
	V / 1.0	Y	31.0	-22.4	8.6	2.7*		
912	V / 1.0	Z	51.1	-22.4	28.7	27.2	558	
1216	H / 2.3	X	46.9	-22.4	24.5	16.8	500	
	H / 2.0	Y	46.1	-22.4	23.7	15.3		
	H / 1.0	Z	44.5	-22.4	22.1	12.7		
	V / 1.3	X	49.2	-22.4	26.8	21.9		
	V / 1.8	Y	46.8	-22.4	24.4	16.6		
1216	V / 1.8	Z	46.2	-22.4	23.8	15.5	500	
1520	H / 1.0	X	39.3	-22.4	16.9	7.0*	500	
	H / 1.0	Y	39.3	-22.4	16.9	7.0*		
	H / 1.0	Z	39.3	-22.4	16.9	7.0*		
	V / 1.0	X	39.3	-22.4	16.9	7.0*		
	V / 1.0	Y	39.3	-22.4	16.9	7.0*		
1520	V / 1.0	Z	39.3	-22.4	16.9	7.0*	500	
	The frequency range was scanned from 30 MHz to 3.1 GHz. All emissions not recorded were more							
	Than 10 dB below the specified limit. Emissions from the EUT do not exceed the specified limits							
	*=Noise Floor Measurements (Minimumsystem sensitivity)							



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Retlif Job Number R-9089-1

Test Method:		FCC Part 15 Subpart C Radiated Emissions, Fundamental & Harmonic Emissions						
Customer:		Detection Systems			Job No.		R-9089-1	
Test Sample:		304MHz Transmitter			Paragraph:		15.231	
Model No.:		SE88			FCC ID:		ESV-0117-05	
Operating Mode:		Continuously Transmitting a 304MHz Signal						
Technician:		Peter Lananna			Date:		July 17, 2001	
Notes:		Test Distance: 3 Meters			Duty Cycle: 7.6%			
		Detector: Peak, unless otherwise specified			Duty Cycle Correction: - 22.4 dB			
Test Freq.	Antenna Pol./Height	EUT Orientation	Peak Reading	Correction Factor	Corrected Reading	Converted Reading	Avg. Limit	
MHz	(V/H)-Meters	X / Y / Z	dBuV	dB	dBuV/m	uV/m	uV/m	
1824	H / 1.0	X	42.9	-22.4	20.5	10.6*	558	
	H / 1.0	Y	42.9	-22.4	20.5	10.6*		
	H / 1.0	Z	42.9	-22.4	20.5	10.6*		
	V / 1.0	X	42.9	-22.4	20.5	10.6*		
	V / 1.0	Y	42.9	-22.4	20.5	10.6*		
1824	V / 1.0	Z	42.9	-22.4	20.5	10.6*	558	
2128	H / 1.0	X	36.8	-22.4	14.4	5.2*	558	
	H / 1.0	Y	36.8	-22.4	14.4	5.2*		
	H / 1.0	Z	36.8	-22.4	14.4	5.2*		
	V / 1.0	X	36.8	-22.4	14.4	5.2*		
	V / 1.0	Y	36.8	-22.4	14.4	5.2*		
2128	V / 1.0	Z	36.8	-22.4	14.4	5.2*	558	
2432	H / 1.0	X	39.0	-22.4	16.6	6.8*	558	
	H / 1.0	Y	39.0	-22.4	16.6	6.8*		
	H / 1.0	Z	39.0	-22.4	16.6	6.8*		
	V / 1.0	X	39.0	-22.4	16.6	6.8*		
	V / 1.0	Y	39.0	-22.4	16.6	6.8*		
2432	V / 1.0	Z	39.0	-22.4	16.6	6.8*	558	
2736	H / 1.0	X	41.5	-22.4	19.1	9.0*	500	
	H / 1.0	Y	41.5	-22.4	19.1	9.0*		
	H / 1.0	Z	41.5	-22.4	19.1	9.0*		
	V / 1.0	X	41.5	-22.4	19.1	9.0*		
	V / 1.0	Y	41.5	-22.4	19.1	9.0*		
2736	V / 1.0	Z	41.5	-22.4	19.1	9.0*	500	
3040	H / 1.0	X	46.0	-22.4	23.6	15.1*	558	
	H / 1.0	Y	46.0	-22.4	23.6	15.1*		
	H / 1.0	Z	46.0	-22.4	23.6	15.1*		
	V / 1.0	X	46.0	-22.4	23.6	15.1*		
	V / 1.0	Y	46.0	-22.4	23.6	15.1*		
3040	V / 1.0	Z	46.0	-22.4	23.6	15.1*	558	
	The frequency range was scanned from 30 MHz to 3.1 GHz. All emissions not recorded were more							
	Than 10 dB below the specified limit. Emissions from the EUT do not exceed the specified limits.							
	*=Noise Floor Measurements (Minimum system sensitivity)							



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Retlif Job Number R-9089-1

Test Method:	FCC Part 15 Subpart C, Spurious Case Radiated Emissions, Paragraph 15.209(a)						
Customer:	Detection Systems, Inc.				Job No.	R-9089-1	
Test Sample:	304MHz Transmitter						
Model No.:	SE88				Serial No.	N/A	
Operating Mode:	Continuously transmitting a signal at 304MHz.						
Technician:	Peter Lananna				Date:	July 17, 2001	
Notes:	Test Distance: 3 Meters Temp:28C Humidity:41% Detector: Quasi-Peak Below 30 MHz to 1 GHz, Peak above 1 GHz						
Test Freq.	Antenna Position	EUT Orientation	Meter Readings	Correction Factor	Corrected Reading	Converted Reading	LIMIT
MHz	(V/H) / Meters	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
30.00							100
88.00							100
88.00							150
No emissions observed at specified test distance.							
216.00							150
216.00							200
960.00							200
960.00							500
3100.0							500
The EUT was scanned from 30 MHz to 3.1 GHz							
The emissions observed from the EUT do not exceed the specified limits. Emissions not recorded were more than 10dB under the specified limit							



Retlif Testing Laboratories

Retlif Job Number R-9089-1