



BEC INCORPORATED

MAXIMUM PERMISSIBLE EXPOSURE CALCULATION
(MPE) REPORT


TEST STANDARDS:
47 CFR Parts 1.1310, 2.1093, 15.247

Woodstream Corporation Model V400S SigFox Radio Control Unit
With Model SFM11R2D SigFox Radio Module

FCC ID: SNA-SFM11R2D

REPORT BEC-1993-03

CUSTOMER:
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Revision History

Revision #	Description of Changes	Date of Changes	Date Released
0	Test Report Initial Release	N/A	12/13/2019



1.0 Administrative Information

1.1 General Information Table

Project Number	BEC-1993
Manufacturer	Woodstream Corporation
SigFox Radio Module Model Number	SFM11R2D
SigFox Radio Module Serial #	None
SigFox Radio Module Sample Number	1993-01
FCC ID	SNA-SFM11R2D
Host Product	Woodstream V400S Control Unit
Host Product Serial #	N/A
Frequency of Operation	902.1 – 904.7 MHz
Antenna Gain	+ 3 dBi
Modulation Type	DBPSK
FCC Classification	DSS
Date Samples Received	10/28/2019
Condition Samples Received	Suitable for test
Sample Type	Production unit
EUT Description	Connected Control Rodent Traps with SigFox Radio Communication
Applicable FCC Rules	47 CFR Parts 1.1310, 2.1093, 15.247



1.2 Maximum Permissible Exposure Calculation

§15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

- (i) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. *See* §1.1307(b)(1) of this chapter.

§1.1307 Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.

(b)(1) The appropriate exposure limits in §§1.1310 and 2.1093 of this chapter are generally applicable to all facilities, operations and transmitters regulated by the Commission.

§1.1310 Radiofrequency radiation exposure limits.

(2) At operating frequencies less than or equal to 6 GHz, the limits for maximum permissible exposure (MPE), derived from whole-body SAR limits and listed in Table 1 of paragraph (e) of this section, may be used instead of whole-body SAR limits as set forth in paragraph (a) through (c) of this section to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b), except for portable devices as defined in §2.1093 as these evaluations shall be performed according to the SAR provisions in §2.1093 of this chapter.

(4) Both the MPE limits listed in Table 1 of paragraph (e) of this section and the SAR limits as set forth in paragraph (a) through (c) of this section and in §2.1093 of this chapter are for continuous exposure, that is, for indefinite time periods. Exposure levels higher than the limits are permitted for shorter exposure times, as long as the average exposure over the specified averaging time in Table 1 is less than the limits. Detailed information on our policies regarding procedures for evaluating compliance with all of these exposure limits can be found in the FCC's *OET Bulletin 65*, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields," and in supplements to *Bulletin 65*, all available at the FCC's Internet Web site: <http://www.fcc.gov/oet/rfsafety>



TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

The Power Density Limit for General Population/Uncontrolled Exposure, calculated using the formula for 300 – 1500 MHz is $f_{\text{(MHz)}}/1500$. This value is **0.6014 mW/cm²**.

§2.1093 Radiofrequency radiation exposure evaluation: portable devices.

(b) For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

From: OET Bulletin 65 Edition 97-02, page 19.

$$S = \frac{PG}{4\pi R^2} \quad (3)$$

where: S = Power Density (in appropriate units, e.g., mW/cm²)
P = Power input to the antenna (in appropriate units, e.g., mW)
G = Power Gain of the antenna in the direction of interest to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

or:
$$S = \frac{\text{EIRP}}{4\pi R^2} \quad (4)$$

where: EIRP = equivalent (or effective) isotropic radiated power



1.3 Maximum Permissible Exposure Calculation Results

The table below shows the calculated EIRP of the Woodstream SFM11R2D SigFox Radio Module.

Effective Isotropic Radiated Power (EIRP) =

**Antenna Power Output (dBW) + antenna gain (dBi) or
Antenna Power Output (Watts) X numeric gain**

Channel	Frequency MHz	Output Power		Antenna Gain		EIRP	
		dBm	mW	dBi	Numeric	dBm	mW
Low	902.1375	23.12	205.26	3	1.995262315	26.12	409.55
Middle	903.4125	22.97	198.06			22.97	395.18
High	904.6625	23.01	199.94			23.01	398.93

The value R, distance to the center of radiation of the antenna, is 20 cm.

$$S = \frac{\text{EIRP}}{4\pi R^2} = \frac{409.55 \text{ mW}}{4\pi(20)^2} = .0815 \text{ mW/cm}^2$$

Results: The calculated Power Density of the measurements for the Woodstream SFM11R2D SigFox Radio Module is 0.0815 mW/cm². This complies with the limit of 0.6 mW/cm² from Table 1(B) of 47 CFR Part 1.1310. Therefore, no exposure evaluation is required.