

Prediction of human exposure to RF radiation during operation of SATELLINE-3ASd Epic Pro 35W radio modem

Background information

FCC guidelines to evaluate the environmental impact of human exposure to radiofrequency radiation are specified in the federal rules 47 CFR §1.1307(b), except portable devices that shall be evaluated according to §2.1093.

Limits for maximum permissible exposure are set in the federal rules 47 CFR §1.1310.

Further information on evaluating compliance with these limits is found in the FCC's OST/OET Bulletin Number 65.

Prediction methods applied

Minimum safe distances have been calculated for controlled / occupational exposures and for uncontrolled / general population exposures. The following formulas are used in calculations.

$$S = \frac{PG}{4\pi R^2}$$

where:

S = power density [mW/cm²]

P = power input to the antenna [mW]

G = power gain of the antenna in direction of interest, relative to an isotropic radiator [numeric]

R = distance to the centre of radiation of the antenna [cm]

$$S = \frac{PG}{4\pi R^2} \Rightarrow R = \sqrt{\frac{PG}{4\pi S}}$$

Applicable limits for maximum permissible exposure

The operating frequency range of SATELLINE-3ASd Epic Pro 35W radio modem is 400-470 MHz, and the transmitter output power range is 1W to 35 W. Tx duty cycle, which is determined by the terminal device, can be up to 100 %.

Based on the above technical parameters and the Table 1 in the federal rules 47 CFR §1.1310, the following limits of power density shall apply:

- a) Occupational/Controlled Exposures: **f/300 mW/cm²** (averaging time 6 minutes)
- b) General population/Uncontrolled Exposure: **f/1500 mW/cm²** (averaging time 30 minutes)

Calculations for the minimum safe distances

Minimum distance to the antenna in case of **General population/Uncontrolled** situation:

$$R = \sqrt{\frac{PG}{4\pi(470/1500)}} = \sqrt{\frac{PG}{3.9375}}$$

Tx power can be corrected with the 30-minute average value of the Tx duty cycle.

The antennas in the list have been defined to be used with SATELLINE-3AS Epic Pro 35W radio modem.

The values of power have been calculated: $[W]^ = (P_{\text{rated}} + 20\%)$

Tx output power [W]*	Antenna system gain [dBi / numeric]	Tx duty cycle [%], 30 min. average	Frequency [MHz]	Minimum safe distance [cm]
42	8 / 6.310	100	470	259.40
		50	470	183.40
		20	470	116.00
	6 / 3.981	100	470	206.10
		50	470	145.70
		20	470	92.20
	2 / 1.585	100	470	130.00
		50	470	91.90
		20	470	58.10
30	8 / 6.310	100	470	219.30
		50	470	155.00
		20	470	98.10
	6 / 3.981	100	470	174.20
		50	470	123.20
		20	470	77.90
	2 / 1.585	100	470	109.90
		50	470	77.70
		20	470	49.10
18	8 / 6.310	100	470	169.80
		50	470	120.10
		20	470	76.0
	6 / 3.981	100	470	134.90
		50	470	95.40
		20	470	60.30
	2 / 1.585	100	470	85.10
		50	470	60.20
		20	470	38.10
12	8 / 6.310	100	470	138.70
		50	470	98.10
		20	470	62.0
	6 / 3.981	100	470	110.20
		50	470	77.90
		20	470	49.30
	2 / 1.585	100	470	69.50
		50	470	49.10
		20	470	31.60

		20	470	31.10
6	8 / 6.310	100	470	98.10
		50	470	69.30
		20	470	43.90
		100	470	77.90
	6 / 3.981	50	470	55.10
		20	470	34.80
		100	470	49.10
	2 / 1.585	50	470	34.70
		20	470	22.0
		100	470	

Conclusion

Users of SATELLINE-3ASd Epic Pro 35W radio modem shall be advised of the above safe distances in the appropriate documentation.

