

FCC RF Exposure Requirements

General information:

Device category: Fixed per Part 2.1091/1.1307/1.1310

Environment: Uncontrolled Exposure

Fixed devices that operate under Part 90 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if they operate at frequencies of 1.5 GHz or below and their effective radiated power (ERP) is 1.5 watts or more. Compliance with the power density limits of 1.1310 is required.

Antenna:

The manufacturer does not specify an antenna. A typical fix mounted antenna has a gain of anywhere from 3 dBi to 10 dBi.

This device has provisions for operation from a a fixed location.

Configuration	Antenna p/n	Type	Max. Gain (dBi)
Fixed mounted	Any	omni or directional	3-7

Operating configuration and exposure conditions:

The conducted output power is 5 Watts. Control of exposure is uncontrollable.

- Part 2.1091 states that devices are excluded from routine evaluation if the EIRP is less than 2.46Watt (or 1.5WERP).
- Fixed operation: A typical installation consists of an antenna system with a coaxial cable of the type RG 8U which has a loss of 2dB for a length of 30 feet at 850 MHz. frequencies.

MPE Calculation:

The minimum separation distance is calculated as follows:

The limit for uncontrolled exposure environment above 300 MHz is $f/1500 \text{ mW/cm}^2$.

Frequency: 850 MHz

The conducted power output is 5 watt.

The coax loss was taken as 2 dB. 30 ft RG-8 type.

Antenna gain was taken as 7 dBi

$W := 5$	power in Watts	$D := 1$	Duty Factor in decimal % (1=100%)
	peak - antenna gain		1 for FM
		$E := 30$	exposure time in minutes
		$U := 30$	(use 6 for controlled and 30 for uncontrolled)

$$W_{exp} := W \cdot D \cdot \left(\frac{E}{U} \right)$$

$$PC := \left(\frac{E}{U} \right) \cdot 100$$

$$W_{exp} = 5 \quad \text{Watts}$$

$$PC = 100 \quad \% \text{ on time}$$

$$Po := 5000 \quad \text{mWatts}$$

$$f := 850 \quad \text{Frequency in MHz}$$

$$dBd := 4.85 \quad \text{antenna gain in dBd}$$

$$G1 := dBd + 2.15 \quad \text{gain in dBi}$$

$$S := \frac{f}{1500} \quad \text{power density limit for controlled exposure}$$

$$G1 = 7 \quad \text{dBi}$$

$$47 \text{ CFR } 1.1310$$

$$CL := 2 \quad \text{dB coax loss}$$

$$G := G1 - CL$$

$$Gn := 10^{\frac{G}{10}} \quad \text{gain numeric}$$

$$Gn = 3.162$$

$$R := \sqrt{\frac{(Po \cdot Gn)}{(4 \cdot \pi \cdot S)}}$$

$$R = 47.121 \quad \text{distance in centimeters required for compliance}$$

$$\text{inches} := \frac{R}{2.54}$$

$$\text{inches} = 18.552$$

$$R1 := 20$$

Conclusion:

The device complies with the MPE requirements by providing a safe separation distance of 47 cm (1.5 ft) between the antenna, including any radiating structure, and any persons when normally operated .

Proposed RF exposure safety information to include in User's Manual:

“FCC RF Exposure Requirements:

See Users Manual