

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 7 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 80 Watts. Typical use qualifies for a maximum duty cycle factor of 50%. The manufacturer also markets this device only for occupation use. However control of exposure is uncontrollable. So uncontrolled exposure is used.

- 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 900 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: 900 MHz
 The conducted power output is 80 watt.
 The coax loss was taken as 2 dB. 30 ft RG-8 type.
 Antenna gain was taken as 7 dBi
 50% talk time

W := 80 power in Watts
 D := 1 Duty Factor in decimal % (1=100%)
 1 for FM
 E := 15 exposure time in minutes
 U := 30 (use 6 for controlled and 30 for uncontrolled)

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

W_{exp} = 40 Watts

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

PC = 50 % on time

P_o := 40000 mWatts

f := 900 Frequency in MHz

dBd := 4.85 antenna gain in dBd

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

G₁ := dBd + 2.15 gain in dBi

$$S = 0.6 \frac{\text{mW}}{\text{cm}^2}$$

G₁ = 7 dBi

CL := 2.0 dB coax loss

G := G₁ - CL

See part 2.1091

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

G_n = 3.162 dB

$$R := \sqrt{\frac{(P_o \cdot G_n)}{(4 \cdot \pi \cdot S)}}$$

R = 129.524 distance in centimeters
 required for compliance

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

inches = 50.994

Conclusion:

The device complies with the MPE requirements by providing a safe separation distance of 130 cm (4.25 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