

FCC RF Exposure Requirements

General information:

Device category: Fixed per Part 2.1091
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. However, compliance with the power density limits of 1.1310 is not required.

Antenna:

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

This device has provisions for operation in a vehicle, or a fixed location.

Configuration	Antenna p/n	Type	Max. Gain (dBi)
Fixed mounted	Any	omni	4

Operating configuration and exposure conditions:

The conducted output power is 100 Watts. Typical use qualifies for a maximum duty cycle factor of 50%. The manufacturer also markets this device only for occupation use.

- 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 1dB for a length of 40 feet at VHF frequencies.

MPE Calculation:

The minimum separation distance is calculated as follows:

$$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power density: } P_d(mW/cm^2) = \frac{E^2}{3770}$$

The limit for general population/uncontrolled exposure environment below 300 MHz is 0.2 mW/cm².

Frequency: 40 MHz

The conducted power output is 100 watt.

The coax loss was taken as 1 dB.

Antenna gain was taken as 4 dBi

50% talk time in 30 minutes

Power in Watts	Duty Factor in decimal % (1=100%)
$W := 100$	$D := 1$ for an FM device $D=1$
Exposure time in minutes	$U := 30$ (use 6 for controlled and 30 for uncontrolled)
$E := 15$	
$W_{exp} := W \cdot D \cdot \left(\frac{E}{U}\right)$	$PC := \frac{E}{U}$ percent on time
Time compensated power output	$PC = 0.5$
$W_{exp} = 50$ Watts	
$W1_{exp} := W_{exp} \cdot 1000$	
$W1_{exp} = 5 \times 10^4$ mWatts	

Antenna gain	Coax Loss
$dBd := 1.85$	$CL := 1$ dB
$G := dBd + 2.15 - CL$	$f := 300$
$G = 3$ Net gain in dBi	$S := \frac{f}{1500}$
$G_n := 10^{\frac{G}{10}}$	$S = 0.2$ $\frac{mW}{cm^2}$ from OET 65
$G_n = 1.995$ Gain Numeric	
$R := \sqrt{\frac{(W1_{exp} \cdot G_n)}{(4 \cdot \pi \cdot S)}}$	$R_{inches} := \frac{R}{2.54}$
$R = 199.235$ distance in centimeters required for compliance	$R_{inches} = 78.439$
	$ft1 := \frac{R_{inches}}{12}$
	$ft1 = 6.537$

Conclusion:

The device complies with the MPE requirements by providing a safe separation distance of 2 m between the antenna, including any radiating structure, and any persons when normally operated. The separation distance was calculated based on an antenna with a gain of 4 dBi and coaxial cable assembly with a 1 dB loss.

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

“FCC RF Exposure Requirements:

See user's manual.