

FCC RF Exposure Requirements

General information:

FCCID: CWWP10XXUL1

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 fix mounted antenna has a gain of 3 dBi.

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

Configuration	Antenna p/n	Type	Max. Gain (dBi)
mobile	Any	omni	3

Operating configuration and exposure conditions:

The conducted output power is 100 Watts. In repeater operation duty cycle can reach near 100 %. The manufacturer also markets this device only for occupation use. But, typical installations do not control exposure.

- Part 2.1091 states that devices are excluded from routine evaluation if the EIRP is less than 2.46Watt (or 1.5WERP).

- A typical fixed installation consists of an antenna system with a coaxial cable of the type RG 213U which has a loss of 1.0 dB for a length of 30 feet at UHF frequencies. A repeater system typically uses outdoor structures for antenna mounting.

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: 409-470 MHz
 The conducted power output is 100 watt.
 The coax loss was taken as 1.5 dB.
 Antenna gain was taken as 3 dBi
 100% talk time in 30 minutes
 Power Density = $S = f/1500 \text{ mW/cm}^2$

W := 100 power in Watts
 (conducted)

D := 1 Duty Factor in decimal % (1=100%)
 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} = 100 Watts

PC = 100 % on time

P_o := 100000.0 mWatts

f := 420.0

dBd := 0.85 antenna gain in dBd

$$S := \frac{f}{1500}$$

G₁ := dBd + 2.15 gain in dBi

See 47 CFR 1.1310

G₁ = 3 dBi

CL := 1.5 dB coax loss

G := G₁ - CL

$$S = 0.28 \frac{\text{mW}}{\text{cm}^2}$$

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

G_n = 1.413

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

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

R = 200.362 distance in centimeters
 required for compliance

inches = 78.883

$$\text{ft} := \frac{\text{inches}}{12}$$

ft = 6.574

Conclusion:

The device complies with the MPE requirements by providing a safe separation distance of 2 m (79 inches) between the antenna, including any radiating structure, and any persons when normally operated .

The minimum safe operating distance between the public and the antenna should be at least 2 m (6 ft) when used with a 3 dBi antenna.