

RF Exposure Requirements

General information:

Device category: Mobile per Part 2.1091

Environment: Uncontrolled Exposure

Mobile devices that operate under Part 80 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 to be used with this device, but typical installations have gains up to 3 dBi.

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

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

Operating configuration and exposure conditions:

The conducted output power is 25 Watts. Typical use qualifies for a maximum duty cycle factor of 50%. In normal operation the use of this transmitter is considered uncontrolled exposure.

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

- Vehicle Operation: The maximum antenna gain that can be used is 3dBi. A coaxial cable of the type RG 58 has a loss of 1dB for a length of 15 feet and this value was used in the following calculation of separation distance.

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 uncontrolled exposure environment below 300 MHz is 0.2 mW/cm².

Channel frequency: 156.025-157.425 MHz

The conducted power output is 25 watt.

The coax loss was taken as 1 dB.

Antenna gain was taken as 3 dBi

50% talk time in 30 minutes

W := 25 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)

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

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

W_{exp} = 12.5 Watts

PC = 50 % on time

Po := 12500 mWatts

f := 300 Frequency in MHz

dBd := .85 antenna gain in dBd

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

G1 := dBd + 2.15 gain in dBi

S = 0.2

G1 = 3 dBi

CL := 1 dB coax loss

G := G1 - CL

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

G_n = 1.585 dB

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

R = 88.784 distance in centimeters
required for compliance

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

inches = 34.954