

FCC RF Exposure Requirements

General information:

FCCID:

Device category: Fixed per Part 2.1091/1.1307/1.1310

Environment: Controlled 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	3-10

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 25 feet at UHF 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 occupation/controlled exposure environment above 300 MHz is f/300 mW/cm².

Frequency: 460 MHz

The conducted power output is 100 watt.

The coax loss was taken as 1 dB.

Antenna gain was taken as 10 dBi

50% talk time in 6 minutes

W := 100 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} = 50 Watts

PC = 50 % on time

Po := 50000 mWatts

f := 460 Frequency in MHz

dBd := 7.85 antenna gain in dBd

$S := \frac{f}{300}$ power density limit for
uncontrolled exposure

G1 := dBd + 2.15

G1 = 10 dBi gain in dBi

S = 1.533 $\frac{mW}{cm^2}$

CL := 1

dB coax loss

G := G1 - CL

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

G_n = 7.943 dB

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

R = 143.569 distance in centimeters
required for compliance

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

inches = 56.523

Conclusion:

The device complies with the MPE requirements by providing a safe separation distance of 144 cm (56 inches) between the antenna, including any radiating structure, and any persons when normally operated .

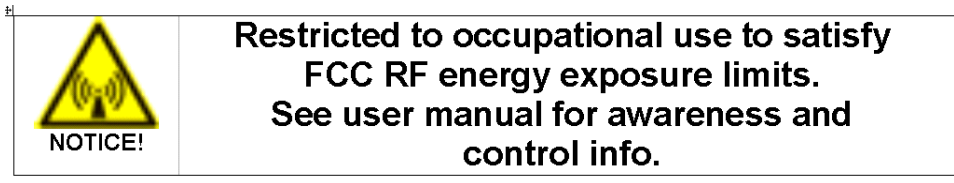
Proposed RF exposure safety information to include in User’s Manual:

“FCC RF Exposure Requirements:

CAUTION:

The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This device is approved with emissions having a source-based time-averaging duty factor not exceeding 50%.

The following label will be mounted in conspicuous view on the radio.



Failure to observe these restrictions will result in exceeding the FCC RF exposure limits.