

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 0 dBi to 5 dBi.

This device has provisions for operation from fixed mounted locations.

| Configuration | Antenna p/n | Type | Max. Gain (dBi) |
|---------------|-------------|---------------------|-----------------|
| Fixed mounted | Any | omni or directional | 0 – 5 |
| | | | |

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 2 dB for a length of 30 feet at 800 MHz. 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 uncontrolled exposure environment above 300 MHz is $f/1500$ mW/cm².

Frequency: 764 MHz

The conducted power output is: 80 Watts.

The coax loss was taken as 2 dB: 30 ft RG-8 type.

Antenna gain was taken as: 5 dBi

50% talk time

$W := 80$ power in Watts

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

1 for FM

$E := 15$ exposure time

$U := 30$ (use 6 for controlled and 30 for uncontrolled)

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

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

$W_{exp} = 40$

Watts

$PC = 50$

% on time

$P_o := 40000$ mWatts

$f := 764$

$dBd := 2.85$ antenna gain in dBd

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

$G1 := dBd + 2.15$ gain in dBi

$G1 = 5$ dBi

See 47 CFR 1.1310

$CL := 2$ dB coax loss

$G := G1 - CL$

$$S = 0.509 \frac{mW}{cm^2}$$

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

$G_n = 1.995$

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

$R = 111.667$ distance in centimeters
required for compliance

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

inches = 43.963

Conclusion:

Since the antenna systems used with this amplifier are fixed mounted on permanent structures this implies a separation distance greater than what the calculations show. In this case the calculations show that with a typical system consisting of the described construction above a general population exposure limit of 112 cm (44 inches) would be required.

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

“FCC RF Exposure Requirements:

See Users Manual