

FCC RF Exposure Requirements

General information:

FCCID: MMA918100R

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 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. However 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 1dB for a length of 15 feet at 700 to 800 MHz. frequencies.

MPE Calculation:

The minimum separation distance is calculated as follows:

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

The limit for uncontrolled exposure environment above 300 MHz is f/1500 mW/cm².

Frequency: 860 MHz

The conducted power output is 100 watt.

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

Antenna gain was taken as 10 dBi

50% talk time

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)

$E := 15$

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

$$PC := \frac{E}{U} \quad \text{percent on time}$$

$$PC = 0.5$$

Time compensated power output

$$W_{exp} = 50 \quad \text{Watts}$$

$$W_{1exp} := W_{exp} \cdot 1000$$

$$W_{1exp} = 5 \times 10^4 \quad \text{mWatts}$$

Antenna gain

Coax Loss

$dBd := 7.85$

$CL := 2 \quad \text{dB}$

$$G := dBd + 2.15 - CL$$

$$f := 800$$

$G = 8 \quad \text{Net gain in dBi}$

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

$$Gn := 10^{\frac{G}{10}}$$

$Gn = 6.31 \quad \text{Gain Numeric}$

$$S = 0.533 \quad \frac{\text{mW}}{\text{cm}^2} \quad \text{from OET 65}$$

$$R := \sqrt{\frac{(W_{1exp} \cdot Gn)}{(4 \cdot \pi \cdot S)}}$$

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

$R = 216.961 \quad \text{distance in centimeters}$
 $\text{required for compliance}$

$$R_{inches} = 85.418$$

$$ft1 := \frac{R_{inches}}{12}$$

$$ft1 = 7.118$$

Conclusion:

The device complies with the MPE requirements by providing a safe separation distance of 217 cm (86 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:

See Users Manual