

# FCC RF Exposure Requirements

## General information:

FCC ID: VNE001000101

Device category: Mobile per Part 2.1091

Environment: Uncontrolled Exposure

Mobile devices that operate under Part 15.247 of this chapter are subject to environmental evaluation for RF exposure prior to equipment authorization.

## Antenna:

The manufacturer does specify an antenna with a gain of 2.15 dBi to be used with this device.

This device has provisions for operation in a vehicle location.

| Configuration | Antenna p/n | Type | Freq. Band | Max. Gain (dBi) |
|---------------|-------------|------|------------|-----------------|
| Car           | Any         | omni | 2400 MHz   | 2.15            |
|               |             |      |            |                 |

## Operating configuration and exposure conditions:

The conducted output power is 0.125 Watts. Typical use qualifies for a maximum duty cycle factor of <50%.

## MPE Calculation:

The minimum separation distance is calculated as follows:

$$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d}$$

Power density:  $P_d(mW/cm^2) = \frac{E^2}{3770}$

The limit for general uncontrolled exposure environment above 1500 MHz is 1.0 mW/cm<sup>2</sup>.

Channel frequency: 2440 MHz

The conducted power output is 125 mwatt.

Antenna gain was taken as 3 dBi

50% Duty cycle

**Conclusion:**

The device complies with the MPE requirements by providing a safe separation distance of 3 cm 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 safe operating distance between the general population and the antenna when transmitting is 20 cm or 8 inches inches.

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

W := 0.125 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)

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

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

Wexp = 0.063 Watts

PC = 50 % on time

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Po := 63 mWatts

f := 2400 Frequency in MHz

dBd := 0 antenna gain in dBd

$$S := \frac{f}{2400} \quad \text{power density limit for uncontrolled exposure}$$

G1 := dBd + 2.15 gain in dBi

G1 = 2.15 dBi  
CL := 0 dB coax loss

$$S = 1 \quad \frac{\text{mW}}{\text{cm}^2}$$

G := G1 - CL

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

Gn = 1.641 dB

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

R = 2.868 distance in centimeters  
required for compliance

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

inches = 1.129