FCC RF Exposure Requirements

General information:

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 as a handheld device only.

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

Operating configuration and exposure conditions:

The conducted output power is 0.15 Watts. Typical use qualifies for a maximum duty cycle factor of <25%.

MPE Calculation:

The minimum separation distance is calculated as follows:

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

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

Channel frequency: 2440 MHz
The conducted power output is 150 mwatt.
Antenna gain was taken as 2.15 dBi
25% Duty cycle

In the example below NO duty cycle correction was taken. The compliance distance 4.5 cm. The device is used in normal operation the antenna never gets even this close. A second example calculation is presented below this one showing 25% duty cycle.

$Po := 150$ mWatts

$f := 1500$ Frequency in MHz

$dBd := 0$ antenna gain in dBd

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

$G1 := dBd + 2.15$

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

$G1 = 2.15$ dBi gain in dBi

$CL := 0$ dB coax loss

$G := G1 - CL$

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

$Gn = 1.641$ dB

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

$R = 4.425$ distance in centimeters required for compliance

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

$inches = 1.742$

$W := 0.15$ power in Watts

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

1 for FM

$E := 7.5$ exposure time in minutes

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

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

$Wexp = 0.038$ Watts

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

$PC = 25$ % on time

$Po := 38$ mWatts

$dBd := 0$ antenna gain in dBd

$G1 := dBd + 2.15$

$G1 = 2.15$ dBi gain in dBi

$CL := 0$ dB coax loss

$G := G1 - CL$

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

$Gn = 1.641$ dB

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

$R = 2.227$ distance in centimeters required for compliance

$f := 1500$ Frequency in MHz

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

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

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

$inches = 0.877$

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.