

# 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 0.10 Watts. The device inherently has a <10% duty cycle.

## **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 general uncontrolled exposure environment above 1500 MHz is 1.0 mW/cm<sup>2</sup>.

Channel frequency: 2440 MHz

The conducted power output is 100 mWatts.

Antenna gain was taken as 2.15 dBi

10% Duty cycle

In the example below NO duty cycle correction was taken. The compliance distance 4. 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 10% duty cycle.

$P_o := 100$	mWatts	$dBd := 0$	antenna gain	$f := 1500$	Frequency in MHz
$G := dBd + 2.15$	gain in dBi				
$G_n := 10^{\frac{G}{10}}$	gain numeric	$S := \frac{f}{1500}$		uncontrolled exposure and all frequencies above 1500 MHz S=1	
$G_n = 1.641$		$S = 1$			
$R := \sqrt{\frac{(P_o \cdot G_n)}{(4 \cdot \pi \cdot S)}}$				$R_{inches} := \frac{R}{2.54}$	
$R = 3.613$	distance in centimeters required for compliance			$R_{inches} = 1.423$	

$W := 0.100$  power in Watts       $D := 1$  Duty Factor in decimal % (1=100%)  
 $E := 3.$  exposure time in minutes       $U := 30$  (use 6 for controlled and 30 for uncontrolled)

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

$$PC := \frac{E}{U}$$

$PC = 0.1$  percent on time

$W_{exp} = 0.01$  Watts

$P_o := 10$  mWatts       $dBd := 0$  antenna gain       $f := 1500$  Frequency in MHz

$G := dBd + 2.15$  gain in dBi

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

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

uncontrolled exposure and  
all frequencies above 1500 MHz  $S=1$

$G_n = 1.641$

$S = 1$

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

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

$R = 1.143$  distance in centimeters  
required for compliance

$R_{inches} = 0.45$

### **Conclusion:**

The device complies with the MPE requirements by providing a safe separation distance of 2 cm between the antenna, including any radiating structure, and any persons when normally operated.