

# FCC RF Exposure Requirements

## General information:

FCCID: EFOSX450G

Device category: Mobile per Part 2.1091

Environment: Controlled Exposure

Mobile 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. However, compliance with the power density limits of 1.1310 is not required.

## Antenna:

The manufacturer does not specify an antenna.

A typical vehicle antenna has a gain of <6 dBi

The maximum gain of any antenna used with this transmitter and still meet a 20cm separation distance is 16 dBi.

This device has provisions for operation on a vehicle, or from a fixed location.

Configuration	Antenna p/n	Type	Max. Gain (dBi)
Passenger car	Any	Any	6
fixed	Any	Any	16

## Operating configuration and exposure conditions:

The conducted output power is 0.5 Watts. Typical use qualifies for a maximum duty cycle factor of 50%. The manufacturer also markets this device only for occupation use.

- Part 2.1091 states that devices are excluded from routine evaluation if the EIRP is less than 2.46Watt (or 1.5WERP).

- Vehicle Operation: A typical vehicle installation consists of an antenna system with a coaxial cable of the type RG 58 which has a loss of 1dB for a length of 15 feet.

### **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 occupation/controlled exposure environment above 300 MHz is f/300 mW/cm<sup>2</sup>.

Channel frequency: 450-470 MHz  
 The conducted power output is 0.5 watt.  
 The coax loss was taken as 1 dB.  
 Antenna gain was taken as 16 dBi  
 50% talk time in 6 minutes

$W := 0.5$	power in Watts	$D := 1$	Duty Factor in decimal % (1=100%)
			1 for FM
		$E := 3$	exposure time in minutes
		$U := 6$	(use 6 for controlled and 30 for uncontrolled)
$W_{exp} := W \cdot D \cdot \left( \frac{E}{U} \right)$		$PC := \left( \frac{E}{U} \right) \cdot 100$	
$W_{exp} = 0.25$	Watts	$PC = 50$	% on time

$P_o := 250$	mWatts	$f := 460$	Frequency in MHz
$dB_d := 13.85$	antenna gain in dBd	$S := \frac{f}{300}$	power density limit for
$G1 := dB_d + 2.15$	gain in dBi		controlled exposure
$G1 = 16$	dBi	$S = 1.533$	
$CL := 1$	dB coax loss		

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

gain numeric

$$G_n = 31.623 \text{ dB}$$

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

$R = 20.256$  distance in centimeters  
 required for compliance

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

$$\text{inches} = 7.975$$

**Conclusion:**

The device complies with the MPE requirements by providing a safe separation distance of 20 cm between the antenna, including any radiating structure, and any persons when normally operated . Based on a 16 dBi antenna and 15 feet of associated coaxial cable.