

FCC RF Exposure Requirements

General information:

FCC ID: K6610934640

Device category: Mobile per Part 2.1091

Environment: uncontrolled 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:

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

Although the manufacturer does not specify an antenna, A typical vehicle antenna has a gain of 0 dBi.

Configuration	Antenna p/n	Type	Max. Gain (dBi)
Passenger car	Any	Omni	0

Operating configuration and exposure conditions:

Case 1: Roof top and rear deck lid

The conducted output power is 45 Watts. Typical use qualifies for a maximum duty cycle factor of 50%. The manufacturer also markets this device only for occupation use. Although marketed for occupational use the bystanders near or in the rear seat are considered as uncontrolled “general population”. The following calculation covers this possibility when the antenna in this configuration.

- 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 2dB for a length of 20 feet.

MPE Calculation: Case 1

The minimum separation distance is calculated as follows:

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

Channel frequency: 400-470 MHz

The conducted power output is 45 watt.

The coax loss was taken as 2 dB.

Antenna gain was taken as 0 dBi

50% talk time in 30 minutes

W := 45 power in Watts
 peak - antenna gain

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)

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

W_{exp} = 22.5 Watts

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

PC = 50 % on time

P_o := 22500 mWatts

f := 410 Frequency in MHz

dBd := -2.15 antenna gain in dBd

G1 := dBd + 2.15 gain in dBi

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

G1 = 0 dBi

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CL := 2 dB coax loss

G := G1 - CL

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

G_n = 0.631

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

R = 64.289 distance in centimeters required for compliance

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

inches = 25.311

Conclusion: Case 1

The device complies with the MPE requirements by providing a safe separation distance of 64 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%.

Vehicle – Antenna Installation:

- For mobile installations, the antenna must be located at least 64 cm (25 inches) away from users and bystanders in order to comply with the FCC RF exposure requirements.