FCC RF Exposure Requirements

General information:

FCC ID: K95KNGM400
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:

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

The 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 mount
The conducted output power is 60 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: Case 1

The minimum separation distance is calculated as follows:

The limit for occupation/controlled exposure environment above 300 MHz is f/300 mW/cm^2 .

Channel frequency: 380-470 MHz
The conducted power output is 50 watt.
The coax loss was taken as 1 dB.
Antenna gain was taken as 0 dBi
50% talk time in 6 minutes

$W := 60$ 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)

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

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

$Wexp = 30$ Watts

$PC = 50$ % on time

$Po := 30000$ mWatts

$f := 460$ Frequency in MHz

$dBd := -2.15$ antenna gain in dBd

$G1 := dBd + 2.15$ gain in dBi

$S := \frac{f}{300}$ power density limit for controlled exposure

$G1 = 0$ dBi

$S = 1.533$ $\frac{mW}{cm^2}$

$CL := 1.0$ dB coax loss

$G := G1 - CL$

See 47 CFR 1.1310

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

$Gn = 0.794$ dB

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

$R = 35.167$ distance in centimeters required for compliance

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

$inches = 13.845$

Case 2: rear deck lid

The conducted output power is 50 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 in the rear seat are considered as uncontrolled "general population". The following calculation covers this possibility when the antenna is rear deck mounted.

- 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: Case 2

The minimum separation distance is calculated as follows:

The limit for occupation/controlled exposure environment above 300 MHz is f/1500 mW/cm^2 .

Channel frequency: 380-470 MHz
The conducted power output is 60 watt.
The coax loss was taken as 1 dB.
Antenna gain was taken as 0 dBi
50% talk time in 6 minutes

$W := 60$ 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)

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

$Wexp = 30$ Watts

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

$PC = 50$ % on time

$Po := 30000$ mWatts

$dBd := -2.15$ antenna gain in dBd

$G1 := dBd + 2.15$ gain in dBi

$G1 = 0$ dBi

$CL := 1.0$ dB coax loss

$G := G1 - CL$

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

$Gn = 0.794$ dB

$f := 460$ Frequency in MHz

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

$S = 0.307$ $\frac{mW}{cm^2}$

See 47 CFR 1.1310

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

$R = 78.636$ distance in centimeters required for compliance

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

$inches = 30.959$

Conclusion: Case 1 & 2

The device complies with the MPE requirements by providing a safe separation distance of 32 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:

- Antennas used for this transmitter must not exceed an antenna gain of 0 dBi with a minimum cable loss of 1dB.
- For roof top installations, the antenna must be located at least 35 cm (14 inches) away from users and bystanders in order to comply with the FCC RF exposure requirements.
- For rear deck installations, the antenna must be located at least 79 cm (31 inches) away from users and bystanders in order to comply with the FCC RF exposure requirements.

The following label will be mounted in conspicuous view on the radio.

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