FCC RF Exposure Requirements

General information:

FCCID: H78KPBSRU100D
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 10 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:

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

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

Channel frequency: 450-470 MHz
The conducted power output is 10 watts.
The coax loss was taken as 1 dB.
Antenna gain was taken as 6 dBi
50% talk time in 6 minutes

$W := 10$ power in Watts

$D := 1$ 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)

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

$Wexp = 5$ Watts

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

$PC = 50$ % on time

$Po := Wexp \cdot 1000$

$Po = 5 \times 10^3$ mWatts

$f := 460$ Frequency in MHz

$dBd := 3.85$ antenna gain in dBd

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

$G1 := dBd + 2.15$ gain in dBi

$G1 = 6$ dBi

$S = 0.307$

$CL := 1$ dB coax loss

$G := G1 - CL$

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

$Gn = 3.162$ dB

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

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

$R = 64.054$ distance in centimeters required for compliance

$inches = 25.218$