FCC RF Exposure Requirements

General information:

FCCID:
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:

The manufacturer does not specify an antenna.
A typical vehicle antenna has a gain of <5 dBi

This manufacturer supplies an antenna with a gain < 5 dBi.

Configuration	Antenna p/n	Type	Max. Gain (dBi)
Passenger car	Any	Any	5

Operating configuration and exposure conditions:

The conducted output power is 0.005 Watts in the 1900 MHz band and .010 Watts in the 900 MHz band.

- 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 174 which has a loss of 1.5 dB for a length of 15 feet at these frequencies..

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 general population environment above 1500 MHz is 1 mW/cm^2 and above 300 MHz but below 1500 MHz is f/1500 mW/ cm^2

Channel frequency: 869-900 MHz
The conducted power output is 0.01 watt.
The coax loss was taken as 1.5 dB.
Antenna gain was taken as 6 dBi

$$W1exp = 10 \qquad mWatts$$

Antenna gain
$$dBd := 3.85$$

$$G := dBd + 2.15 - CL$$

$$G = 4.5 \qquad \text{Net gain in dBi}$$

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

$$Gn = 2.818 \qquad \text{Gain Numeric}$$

$$R := \sqrt{\frac{(W1exp \cdot Gn)}{(4 \cdot \pi \cdot S)}}$$

$$R = 1.966 \qquad \text{distance in centimeters}$$
$$\text{required for compliance}$$

Coax Loss
$$CL := 1.5 \quad dB$$

$$f := 870$$

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

$$S = 0.58 \qquad \frac{mW}{cm^2} \qquad \text{from OET 65}$$

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

$$Rinches = 0.774$$

Channel frequency: 1900 MHz
The conducted power output is 0.005 watt.
The coax loss was taken as 1.5 dB.
Antenna gain was taken as 6 dBi

$$W1exp = 5 \qquad mWatts$$

Antenna gain
$$dBd := 3.85$$

$$G := dBd + 2.15 - CL$$

$$G = 4.5 \qquad \text{Net gain in dBi}$$

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

$$Gn = 2.818 \qquad \text{Gain Numeric}$$

$$R := \sqrt{\frac{(W1exp \cdot Gn)}{(4 \cdot \pi \cdot S)}}$$

$$R = 1.059 \qquad \text{distance in centimeters}$$
$$\text{required for compliance}$$

Coax Loss
$$CL := 1.5 \quad dB$$

$$f := 1500$$

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

$$S = 1 \qquad \frac{mW}{cm^2} \qquad \text{from OET 65}$$

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

$$Rinches = 0.417$$

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 6 dBi antenna and 15 feet of associated coaxial cable.

Proposed RF exposure safety information to include in User's Manual:

"FCC RF Exposure Requirements:

Antenna Installation:
- To satisfy FCC rules on exposure to RF fields use only antennas provided.