

FCC RF Exposure Requirements

General information:

FCCID:

Device category: Mobile per Part 2.1091

Environment: General Population/Uncontrolled Exposure

Mobile devices that operate in the Specialized Mobile Radio Service authorized 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 required.

Antenna:

The manufacturer does not specify any antenna to be used with this device.

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

Configuration	Antenna p/n	Type	Max. Gain (dBi)
Passenger car	Any	-	7dBi (5dBd)
Boat	Any	-	7dBi (5dBd)
Fixed	Any	-	7dBi (5dBd)

Operating configuration and exposure conditions:

The conducted output power is 0.7 watt. iDEN modulation qualifies for a maximum duty cycle factor is 67.5%, which yields an EIRP of 27 dBm with a 0dBi antenna gain and no cable loss. Part 2.1091 states that devices are excluded from routine evaluation if the EIRP is less than 2.46 Watt (or 1.5WERP).

- Vehicle Operation: The maximum antenna gain that can be used is 7dBi. A coaxial cable of the type RG174 has a loss of 2.9dB for a length of 10 feet. Therefore, the EIRP is 1.29Watts.

- Boat Operation: Cable length = 20 ft exposed and 3 feet internal to radom = 23 ft. Total. 23 feet cable loss including connector insertion loss at 800-900MHz is 5.4 dB. The maximum antenna gain that can be used is 7 dBi (5dBd). Therefore, the EIRP is 0.73 Watts.

W := 0.7 power in Watts D := .675 Duty Factor in decimal % (1=100%)

E := 30 exposure time in minutes U := 30 (use 6 for controlled and 30 for uncontrolled)

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

$$PC := \frac{E}{U}$$

PC = 1 percent on time

Wexp = 0.472 Watts

Po := 472 mWatts dBd := 5 antenna gain f := 806 Frequency in MHz

G := dBd + 2.15 gain in dBi

$$S1 := \frac{f}{1500} \quad S1 = 0.537$$

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

S := .537

S is f/1500 for uncontrolled exposure.

Gn = 5.188

S = 0.537

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

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

R = 19.049 distance in centimeters
required for compliance

Rinches = 7.5

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 .

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 67.5%.

Vehicle – Antenna Installation:

- Antennas used for this transmitter must not exceed an antenna gain of 5 dBd (7 dBi).
- For rear deck trunk and roof top installations, the antenna must be located at least 20 cm away from rear-seat passengers and bystanders in order to comply with the FCC RF exposure requirements.

Boat – Antenna Installation:

- Antennas used for this transmitter must not exceed an antenna gain of 5dBd(7dBi).
- The antenna must be located at least 20 cm away from passengers in order to comply with the FCC RF exposure requirements.

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

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FYI - Draft/Grant notes – RF exposure: TCB **Section D:** Mobile transmitters identified in §2.1091 that satisfy Categorical Exclusion Requirements of §2.1091:

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The antenna installation and operating configurations of this transmitter, including any applicable source-based time-averaging duty factor, antenna gain and cable loss must satisfy MPE categorical Exclusion Requirements of §2.1091. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. Users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.