

FCC RF Exposure Requirements

General information

FCC ID: RAYLVR880U

Device category: Mobile per Part 2.1091

Environment: Controlled Exposure (Operator/User) and Uncontrolled Exposure (passengers/or bystanders)

Mobile devices that operate under Part 80 of this chapter are not subject to routine environmental evaluation for RF exposure prior to equipment authorization or use. However, compliance with the power density limits of 1.1310 is required.

Antenna

The manufacturer does specify an antenna with a gain of 3 dBi to be used with this device.

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

Configuration	Antenna p/n	Type	Max. Gain (dBi)
Boat	Any	Omni	3

Operating configuration and exposure conditions

The conducted output power is 25 Watts. Typical use qualifies for a maximum duty cycle factor of 50%. The maximum antenna gain that can be used is 3dBi. The applicant specifies the use of a coaxial cable of the type RG 58 with a loss of 1dB for a length of 15 feet.

MPE Calculation:

The minimum separation distance is calculated as follows:

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

The limit for general uncontrolled exposure environment below 300 MHz is 0.2 mW/cm².

Channel frequency: 156.025-157.425 MHz
The conducted power output is 25 watt.
The coax loss was taken as 1 dB.
Antenna gain was taken as 3 dBi
50% P.T.T operating duty cycle correction factor

W := 25 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)

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

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

Wexp = 12.5 Watts

PC = 50 % on time

Po := 12500 mWatts

f := 300 Frequency in MHz

dBd := .85 antenna gain in dBd

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

G1 := dBd + 2.15 gain in dBi

G1 = 3 dBi

S = 0.2

CL := 1 dB coax loss

G := G1 - CL

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

Gn = 1.585 dB

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

R = 88.784 distance in centimeters
required for compliance

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

inches = 34.954

Conclusion

The device complies with the MPE requirements by providing a safe separation distance of 89 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 collocated or operating in conjunction with any other antenna or transmitter. This device is approved with emissions having a P.T.T operating duty factor not exceeding 50%.

Maintain a minimum of 89 cm (35 inches) distance between the antenna and any person.

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