

FCC RF Exposure Requirements

General information:

FCC ID: K6630443X3D

Device category: Mobile per Part 2.1091

Environment: Uncontrolled Exposure

Mobile devices that operate under Part 80 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 specify an antenna with a gain of 3 dBi to be used with this device.

This device has provisions for operation in a vehicle (marine vessel), 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%.

- Part 2.1091 states that devices are excluded from routine evaluation if the EIRP is less than 2.46Watt (or 1.5WERP).

- Vehicle Operation: The maximum antenna gain that can be used is 3dBi. A coaxial cable of the type RG 58 has a loss of 1dB for a length of 15 feet.

MPE Calculation:

The minimum separation distance is calculated as follows:

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

The limit for 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% talk time in 30 minutes

Power in Watts	Duty Factor in decimal % (1=100%)	
W := 25	D := 1	for an FM device D=1
Exposure time in minutes	U := 30	(use 6 for controlled and 30 for uncontrolled)
E := 15		
$W_{exp} := W \cdot D \cdot \left(\frac{E}{U}\right)$	$PC := \frac{E}{U}$	percent on time
Time compensated power output	PC = 0.5	
W _{exp} = 12.5 Watts		
W1 _{exp} := W _{exp} · 1000		
W1 _{exp} = 1.25 × 10 ⁴	mWatts	

Antenna gain	Coax Loss	For all VHF frequencies
dBd := 0.85	CL := 1 dB	S is fixed at 0.2 mw/cm ²
G := dBd + 2.15 - CL		f := 300
G = 2 Net gain in dBi		$S := \frac{f}{1500}$
$G_n := 10^{\frac{G}{10}}$		
G _n = 1.585 Gain Numeric		S = 0.2 $\frac{mW}{cm^2}$ from OET 65
$R := \sqrt{\frac{(W1_{exp} \cdot G_n)}{(4 \cdot \pi \cdot S)}}$		
R = 88.784 distance in centimeters required for compliance		Rinches := $\frac{R}{2.54}$ Rinches = 34.954

Conclusion:

The device complies with the MPE requirements by providing a safe separation distance of 0.89m between an antenna with a gain of 3 dBi, 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%. These figures are based on a antenna having a 3 dBi gain.

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