

RF Exposure Report

General information:

Device category: Mobile per Part 2.1091

Environment: Uncontrolled Exposure

Fixed 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:

This device is typically used in fixed location service only.

The although the manufacturer does not specify an antenna. A typical antenna in this type of service has a gain of 3 dBi.

Configuration	Antenna p/n	Type	Max. Gain (dBi)
Fixed mounted	Any	omni	3

Operating configuration and exposure conditions:

The conducted output power is 50 Watts. In typical use the duty cycle can approach 100%.

The manufacturer also markets this device only for occupation use. But in fixed use the exposure is generally uncontrollable.

A typical installation consists of an antenna system with a coaxial cable of the type RG 213/U which has a loss of 1dB for a length of 20 feet at these frequencies.

MPE Calculation:

The minimum separation distance is calculated as follows:

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

The limit for uncontrolled exposure environment above 300 MHz is f/1500 mW/cm² .

Channel frequency: 450 - 512 MHz
 The conducted power output is 50 watt.
 The coax loss was taken as 1.5 dB (30 ft).
 Antenna gain was taken as 3 dBi

W := 50	power in Watts (conducted)	D := 1	Duty Factor in decimal % (1=100%) 1 for FM
		E := 30	exposure time in minutes
		U := 30	(use 6 for controlled and 30 for uncontrolled)

$W_{exp} := W \cdot D \cdot \left(\frac{E}{U}\right)$ <p>W_{exp} = 50 Watts</p>	$PC := \left(\frac{E}{U}\right) \cdot 100$ <p>PC = 100 % on time</p>
----------------------------------------------------------------------------------------------	---------------------------------------------------------------------------

Po := 50000.0	mWatts	f := 450.0
dBd := 0.85	antenna gain in dBd	S := $\frac{f}{1500}$
G1 := dBd + 2.15	gain in dBi	See 47 CFR 1.1310
G1 = 3	dBi	
CL := 1.5	dB coax loss	S = 0.3
G := G1 - CL		$\frac{mW}{cm^2}$
Gn := $10^{\frac{G}{10}}$	gain numeric	
Gn = 1.413		
R := $\sqrt{\frac{(Po \cdot Gn)}{4 \cdot \pi \cdot S}}$		inches := $\frac{R}{2.54}$
R = 136.874	distance in centimeters required for compliance	inches = 53.887
		ft := $\frac{\text{inches}}{12}$
		ft = 4.491

FCC RF Exposure Requirements:

The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other transmitter/antenna system. The antenna should be mounted so as to maintain a distance of at least 5 ft (1.5m) between the antenna and bystanders, when operated in a typical installation and a 3 dBi antenna.

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