

**Safe Distance Calculations<sup>1</sup>:**

Eq 1:  $S = PG / (4 \pi R^2)$

Where:

S = power density in mW per cm<sup>2</sup>

P = net power input to the antenna in mW

G= linear gain of antenna

R = distance from the antenna in cm

f = transmitter frequency in MHz

Re-arrange to solve for R: Eq 2:  $R = (PG / (4 \pi S))^{-2}$

**Limits:**

From CFR 47 1.1310, for controlled environment S = 1 mW per cm<sup>2</sup>

At 216 MHz and 222 MHz S = 1 mW per cm<sup>2</sup>

**Net input power to antenna:**

Manufacturer’s rated power is 25 Watts.

FCC CFR Pt 90.205 (s) requires an additional 20% allowance: (25/100) x 120 = 30 Watts

FCC CFR 47 pt 2.1091 PTT duty cycle power averaging, PTT duty cycle of 50%<sup>2</sup>:

Pnet = 15 watts.

**Antenna types:**

The recommended antennas are a quarter wave whip with a gain of 0dBd, a 5/8 whip with a gain of 3dBd, or a co-linear whip with 5dBd gain:

Antenna Gain, dBd	0	3	5
Antenna Gain, Linear	1.64	3.27	5.19

MPE calculations for these antennas for minimum safe distance are given for the bottom and top of the allocated frequency bands: 216 and 222 MHz:

222MHz and 216 MHz			
Antenna Type	0dBd	3dBd	5dBd
P mW	15000.00	15000.00	15000.00
Linear Gain G	1.64	3.27	5.19
4πS	4.07	4.07	4.07
R=√(PG/4πS)	44.25	62.5	79

**Results:**

Minimum safe Distance centimetres, Controlled limit:			
Antenna Gain, dBd	0	3	5
216 MHz and 222 MHz	44.25	62.5	79

**References:**

1. FCC OET Bulletin 65 Edition 97-01, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*, p. 19.
2. Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies. 447498 D01 Mobile Portable RF Exposure v04, FCC Knowledge Database.

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