

4 FCC §15.407(f) & §2.1091 - RF Exposure

4.1 Applicable Standard

According to FCC §15.407(f) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm ²) | Averaging Time (minutes) |
|---|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| Limits for General Population/Uncontrolled Exposure | | | | |
| 0.3-1.34 | 614 | 1.63 | * (100) | 30 |
| 1.34-30 | 824/f | 2.19/f | * (180/f ²) | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | / | / | f/1500 | 30 |
| 1500-100,000 | / | / | 1.0 | 30 |

f = frequency in MHz

* = Plane-wave equivalent power density

4.2 MPE Prediction

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

4.3 MPE Results

For 25 dBi antenna

5.2 GHz Band:

| | |
|---|-----------------|
| <u>Maximum peak output power at antenna input terminal (dBm):</u> | <u>17.25</u> |
| <u>Maximum peak output power at antenna input terminal (mW):</u> | <u>53.09</u> |
| <u>Prediction distance (cm):</u> | <u>37</u> |
| <u>Prediction frequency (MHz):</u> | <u>5200</u> |
| <u>Maximum Antenna Gain, typical (dBi):</u> | <u>25</u> |
| <u>Maximum Antenna Gain (numeric):</u> | <u>316.227</u> |
| <u>Power density of prediction frequency at 37 cm (mW/cm²):</u> | <u>0.975858</u> |
| <u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm²):</u> | <u>1.0</u> |

5.8 GHz Band:

| | |
|---|-----------------|
| <u>Maximum peak output power at antenna input terminal (dBm):</u> | <u>21.90</u> |
| <u>Maximum peak output power at antenna input terminal (mW):</u> | <u>154.882</u> |
| <u>Prediction distance (cm):</u> | <u>63</u> |
| <u>Prediction frequency (MHz):</u> | <u>5785</u> |
| <u>Maximum Antenna Gain, typical (dBi):</u> | <u>25</u> |
| <u>Maximum Antenna Gain (numeric):</u> | <u>316.227</u> |
| <u>Power density of prediction frequency at 63 cm (mW/cm²):</u> | <u>0.981994</u> |
| <u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm²):</u> | <u>1.0</u> |

For 0 dBi antenna:

5.2 GHz Band:

| | |
|---|---------------|
| <u>Maximum peak output power at antenna input terminal (dBm):</u> | <u>29.8</u> |
| <u>Maximum peak output power at antenna input terminal (mW):</u> | <u>954.99</u> |
| <u>Prediction distance (cm):</u> | <u>20</u> |
| <u>Prediction frequency (MHz):</u> | <u>5200</u> |
| <u>Maximum Antenna Gain, typical (dBi):</u> | <u>0</u> |
| <u>Maximum Antenna Gain (numeric):</u> | <u>1</u> |
| <u>Power density of prediction frequency at 20 cm (mW/cm²):</u> | <u>0.1899</u> |
| <u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm²):</u> | <u>1.0</u> |

5.8 GHz Band:

| | |
|---|---------------|
| <u>Maximum peak output power at antenna input terminal (dBm):</u> | <u>29.85</u> |
| <u>Maximum peak output power at antenna input terminal (mW):</u> | <u>966.05</u> |
| <u>Prediction distance (cm):</u> | <u>20</u> |
| <u>Prediction frequency (MHz):</u> | <u>5785</u> |
| <u>Maximum Antenna Gain, typical (dBi):</u> | <u>0</u> |
| <u>Maximum Antenna Gain (numeric):</u> | <u>1</u> |
| <u>Power density of prediction frequency at 20 cm (mW/cm²):</u> | <u>0.1921</u> |
| <u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm²):</u> | <u>1.0</u> |

The device meets FCC MPE requirement for uncontrolled exposure environment at 63 cm distance.