

MPE Evaluation

FCC

Maximum exposure limits from CFR 47, FCC Part 1.1310:

Table 1—Limits for Maximum Permissible Exposure (MPE)

| Frequency range (MHz) | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm ²) | Averaging time (minutes) |
|--|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| (A) Limits for Occupational/Controlled Exposure | | | | |
| 0.3-3.0 | 614 | 1.63 | *100 | 6 |
| 3.0-30 | 1842/f | 4.89/f | *900/f ² | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1,500 | | | f/300 | 6 |
| 1,500-100,000 | | | 5 | 6 |
| (B) 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 |
| 300-1,500 | | | f/1500 | 30 |
| 1,500-100,000 | | | 1.0 | 30 |

Table 2 – Power Density Calculations, FCC

| Frequency | Antenna Gain | Output power | Output power +10% for tolerance | Minimum Seperation Distance | Power Density | Limit | Verdict |
|-----------|--------------|--------------|---------------------------------|-----------------------------|--------------------|--------------------|---------|
| MHz | dBi | mW | mW | cm | mW/cm ² | mW/cm ² | |
| 905.3 | 1 | 39.81 | 43.791 | 20.00 | 0.0087164 | 0.0610 | PASS |
| 914.7 | 1 | 38.90 | 42.79 | 20.00 | 0.0085171 | 0.0612 | PASS |
| 921.2 | 1 | 38.11 | 41.921 | 20.00 | 0.0083441 | 0.0614 | PASS |

Note: The user’s manual will stipulate that a 20cm distance from the user is to be maintained.

The power density is calculated as shown below:

$$S = (P \times G) / (4 \times \pi \times d^2) - \text{used to calculate exposure at 20 cm}$$

$$d = \sqrt{(S / (P \times G) \times 4 \times \pi)} - \text{used to calculate minimum distance to meet limits}$$

S= power density

P = transmitter conducted power (in mW)

G = antenna numeric gain

D = distance to radiation center (20 cm)

contained in the RF exposure