

Maximum Permissible Exposure (MPE)

| | | |
|----------------------|---|---------------|
| Reference document: | 47 CFR §15.247(i) & §1.1307(b)(1) | |
| Test Requirements: | According to §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 guideline. | |
| Limit | 1mW/cm ² | Comply |
| Calculation Result*: | Power Density = 0.78 mW/cm ² at a sphere of 20cm. The SAR measurement is not required. | |

* Equation (3) given in OET Bulletin 65 is used to estimate the MPE distance.

$$S = \frac{PG}{4\pi R^2}$$

S=power density, in mW/cm²

P=power input to the antenna, in mW

G=numeric gain of the antenna,

R= distance to the center of the antenna, in cm

MPE levels at 20cm are calculated as follows:

| Frequency [MHz] | Data Rate [Mbps] | MPE Distance [cm] | Total Output Power, 4 elements [mW] | Antenna Gain [dBi] | Power density [mW/cm ²] | Limit [mW/cm ²] | Margin [mW/cm ²] |
|--|------------------|-------------------|-------------------------------------|--------------------|-------------------------------------|-----------------------------|------------------------------|
| Single Access Channel, Worst-Case | | | | | | | |
| 2412 | 1 | 20 | 258 | 11.8 | 0.78 | 1 | 0.22 |
| 2437 | 1 | 20 | 240 | 11.8 | 0.72 | 1 | 0.28 |
| 2462 | 1 | 20 | 228 | 11.8 | 0.69 | 1 | 0.31 |
| Dual Access Channels | | | | | | | |
| 2412 | 1 | 20 | 54.2 | 9.8 | 0.10 | 1 | 0.90 |
| 2437 | 1 | 20 | 62.08 | 9.8 | 0.12 | 1 | 0.88 |
| 2462 | 1 | 20 | 65.76 | 9.8 | 0.13 | 1 | 0.87 |
| 2412 | 6 | 20 | 54.96 | 11.8 | 0.17 | 1 | 0.83 |
| 2437 | 6 | 20 | 66.84 | 11.8 | 0.20 | 1 | 0.80 |
| 2462 | 6 | 20 | 59.32 | 11.8 | 0.18 | 1 | 0.82 |

MPE distance is calculated as follows:

| Frequency [MHz] | Data Rate [Mbps] | Power density [mW/cm ²] | Total Output Power, 4 elements [mW] | Antenna Gain [dBi] | MPE Distance [cm] | Limit [cm] | Margin [cm] |
|-----------------------------------|------------------------|---|---|-----------------------|----------------------|---------------|----------------|
| Single Access Channel, Worst-Case | | | | | | | |
| 2412 | 1 | 1 | 258 | 11.8 | 17.64 | 20 | 2.36 |
| 2437 | 1 | 1 | 240 | 11.8 | 17.02 | 20 | 2.98 |
| 2462 | 1 | 1 | 228 | 11.8 | 16.58 | 20 | 3.42 |
| Dual Access Channels | | | | | | | |
| 2412 | 1 | 1 | 54.2 | 9.8 | 6.42 | 20 | 13.58 |
| 2437 | 1 | 1 | 62.1 | 9.8 | 6.87 | 20 | 13.13 |
| 2462 | 1 | 1 | 65.8 | 9.8 | 7.07 | 20 | 12.93 |
| 2412 | 6 | 1 | 55.0 | 11.8 | 8.14 | 20 | 11.86 |
| 2437 | 6 | 1 | 66.8 | 11.8 | 8.98 | 20 | 11.02 |
| 2462 | 6 | 1 | 59.3 | 11.8 | 8.45 | 20 | 11.55 |

When operating as single access channel, the worst case MPE occurs at 2412 MHz, 1 Mbps, 24.12 dBm power, 11.8 dBi antenna gain. The maximum exposure level in this scenario is of 0.78 mW/cm² at a distance of 20 cm. To maintain compliance, installations will assure a separation distance of at least 20 cm even if the calculations indicate that the MPE distance may be less.

When operating as dual access channel with overlapping, the worst case MPE occurs at 2462 MHz, 1 Mbps, 17.34 dBm power, 9.8 dBi antenna gain and 2437 MHz, 6 Mbps, 18.25 dBm power, 11.8 dBi antenna gain. The maximum exposure level in this scenario is of 0.30 mW/cm² at a distance of 20 cm. To maintain compliance, installations will assure a separation distance of at least 20 cm even if the calculations indicate that the MPE distance may be less.