

## MPE Calculation

§ 1.1310: The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

### Part 1.1310 Limits for Maximum Permissible Exposure (MPE)

| Frequency range (MHz)  | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|--|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                               |                               |                                     |                          |
| 0.3–3.0 .....  | 614                           | 1.63                          | *(100)                              | 6                        |
| 3.0–30 .....   | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | 6                        |
| 30–300 .....   | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300–1500 .....   |                               |                               | f/300                               | 6                        |
| 1500–100,000 .....   |                               |                               | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3–1.34 .....   | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34–30 .....  | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 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

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

### 1.1 Test Procedure

An MPE evaluation was performed in order to show that the device was compliant with §2.1091. The maximum power density was calculated for each transmitter at a separation distance of 20cm using the following formula.

$$PowerDensity = \frac{EIRP_{mW}}{4\pi \times (20_{cm})^2}$$

Once the power density for each transmitter was calculated, it was compared to the applicable MPE limit and converted to a percentage of the total power density for the device considering multiple transmissions.





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### 1.2 Results:

The device meets the RF exposure limit at a 20cm separation distance as required by part 2.1091 of the FCC.

| Frequency Band (MHz) | Conducted Power (dBm) | Antenna Gain (dBi) | EIRP (dBm) | EIRP(mW) | Power Density at 20cm (mW/cm <sup>2</sup> ) | Power Density Limit (mW/cm <sup>2</sup> ) | Result |
|----------------------|-----------------------|--------------------|------------|----------|---|---|--------|
| 2412-2462            | 21.25                 | 3.55               | 24.8       | 301.995  | 0.060                                       | 1   | Pass   |
| 2412-2462            | 20.35                 | 3.55               | 23.9       | 245.471  | 0.049                                       | 1   | Pass   |
| 2412-2462            | 20.13                 | 3.55               | 23.68      | 233.346  | 0.046                                       | 1   | Pass   |
| 2412-2462            | 15.69                 | 3.55               | 19.24      | 83.946   | 0.017                                       | 1   | Pass   |
| 5150-5250            | 13.7                  | 1.81               | 15.51      | 35.563   | 0.007                                       | 1   | Pass   |
| 5250-5350            | 13.7                  | 2.31               | 16.01      | 39.902   | 0.008                                       | 1   | Pass   |
| 5470-5725            | 13.5                  | 4.67               | 18.17      | 65.615   | 0.013                                       | 1   | Pass   |
| 5725-5850            | 11.6                  | 4.67               | 16.27      | 42.364   | 0.008                                       | 1   | Pass   |

