# 12. Radio Frequency Exposure

## 12.1 Applicable Standards

<table>
<tr><td>☐<br>§1.1307(b)(3)(i)(A)</td><td>The available maximum time-averaged power is no more than 1 mW, regardless of separation distance.</td></tr>
<tr><td>☐<br>§1.1307(b)(3)(i)(c)</td><td>ERP is below a threshold calculated based on the distance , R between the person and t<br><br>antenna / radiating structure, where R > λ / 2 π .<br><br>TABLE B.1—THRESHOLDS FOR SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION
<table>
<tr><th colspan="3">RF Source Frequency</th><th colspan="3">Minimum Distance</th><th>Threshold ERP</th></tr>
<tr><td>$f_L$ MHz</td><td></td><td>$f_H$ MHz</td><td>$\lambda_L / 2\pi$</td><td></td><td>$\lambda_H / 2\pi$</td><td>W</td></tr>
<tr><td>0.3</td><td>–</td><td>1.34</td><td>159 m</td><td>–</td><td>35.6 m</td><td>1,920 $R^2$</td></tr>
<tr><td>1.34</td><td>–</td><td>30</td><td>35.6 m</td><td>–</td><td>1.6 m</td><td>3,450 $R^2/f^2$</td></tr>
<tr><td>30</td><td>–</td><td>300</td><td>1.6 m</td><td>–</td><td>159 mm</td><td>3.83 $R^2$</td></tr>
<tr><td>300</td><td>–</td><td>1,500</td><td>159 mm</td><td>–</td><td>31.8 mm</td><td>0.0128 $R^2f$</td></tr>
<tr><td>1,500</td><td>–</td><td>100,000</td><td>31.8 mm</td><td>–</td><td>0.5 mm</td><td>19.2$R^2$</td></tr>
<tr><td colspan="8">Subscripts L and H are low and high; λ is wavelength.<br>From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.</td></tr>
</table></td></tr>
<tr><td>☒<br>§ 1.1307(b)(3)(i)(B).</td><td>Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= Pth<br><br>$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^x & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$<br>Where<br>$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$<br>and<br>$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$<br>$d$ = the separation distance (cm);</td></tr>
</table>

## 12.2 EUT Specification

| | |
|---|---|
| **Frequency band (Operating)** | ☒ WLAN: 2412MHz ~ 2462MHz<br>☐ WLAN: 5150MHz ~ 5250MHz<br>☐ WLAN: 5250MHz ~ 5350MHz<br>☐ WLAN: 5470MHz ~ 5725MHz<br>☐ WLAN: 5725MHz ~ 5850MHz<br>☐ Bluetooth: 2402MHz ~ 2480MHz |
| **Device category** | ☐ Portable (<20cm separation)<br>☒ Mobile (>20cm separation) |
| **Antenna diversity** | ☒ Single antenna<br>☐ Multiple antennas<br>☐ Tx diversity<br>☐ Rx diversity<br>☐ Tx/Rx diversity |
| **Evaluation applied** | ☐ Blanket 1 mW Blanket Exemption<br>☒ MPE-based Exemption<br>☐ SAR-based Exemption |
| ***Remark:***<br>The maximum conducted output power is 22.65dBm (184.077mW) at 2437MHz (with 2.935dBi antenna gain.) | |

## 12.3 Result

**Maximum Permissible Exposure**

| Channel Frequency (MHz) | Max. Conducted output power (dBm) | Max. Tune up power (dBm) | Antenna Gain (dBi) | Max.Tune up e.r.p. Power (dBm) | Max. Tune up e.r.p power (mW) | Limit (mW) |
|---|---|---|---|---|---|---|
| 2437 | 22.65 | 23.15 | 2.935 | 23.94 | 247.46 | 3060 |

**Maximum Permissible Exposure (Co-location)**

BLE+2.4G

| Modulation Type | Channel Frequency (MHz) | Max. Conducted output power (dBm) | Max. Tune up power (dBm) | Antenna Gain(dBi) | Distance (cm) | Max. Tune up e.r.p power (mW) | Limit (mW) | MPE Ratio |
|---|---|---|---|---|---|---|---|---|
| GFSK(1Mbps) | 2402 | 18.29 | 18.79 | 2.935 | 20 | 90.68 | 3060 | 0.030 |
| 11b | 2437 | 22.65 | 23.15 | 2.935 | 20 | 247.46 | 3060 | 0.081 |
| Co-location Total | | | | | | | | 0.111 |
| ∑MPE ratios Limit | | | | | | | | 1 |

**----------THE END OF REPORT----------**