# 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 the antenna / radiating structure, where R > λ / 2 π.<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 R²</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 R²/$f^2$</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 R²</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 R²$f$</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>19.2R²</td></tr>
<tr><td colspan="7">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>$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$<br>Where<br>$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right)$$ and $f$ 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

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|---|---|
| **Frequency band (Operating)** | Cat M1: 814.7~823.3MHz<br>NB-IoT: 814.2~823.8MHz |
| **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 21.13dBm at 819MHz (with -1.51dBi antenna gain.) | |

## 12.3. Results

Cat M1

| 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) |
|---|---|---|---|---|---|---|
| 819 | 19.85 | 20.35 | -1.51 | 16.69 | 46.67 | 3060 |

NB-IoT

| 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) |
|---|---|---|---|---|---|---|
| 819 | 21.13 | 21.63 | -1.51 | 17.97 | 62.66 | 3060 |

No non-compliance noted.

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