12. Radio Frequency Exposure

12.1. Applicable Standards

<table>
<tr><td>☐
§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>☐
§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 .
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>λ_L / 2π</td><td></td><td>λ_H / 2π</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>19.2R^2</td></tr>
<tr><td colspan="8">Subscripts L and H are low and high; λ is wavelength.
From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.</td></tr>
</table></td></tr>
<tr><td>☒
§ 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
$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^x & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$
Where
$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right)$$ and f is in GHz;
and
$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$
d = the separation distance (cm);</td></tr>
</table>

12.2. EUT Specification

Frequency band (Operating)	Cat M1: 1850.7 ~ 1909.3MHz NB-IoT: 1850.2 ~ 1909.8MHz
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation)
Antenna diversity	☒ Single antenna ☐ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Evaluation applied	☐ Blanket 1 mW Blanket Exemption ☒ MPE-based Exemption ☐ SAR-based Exemption
Remark: The maximum conducted output power is 21.34dBm at 1880MHz (with 2.29dBi 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)
1850.7	20.04	20.54	2.29	20.68	116.95	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)
1880	21.34	21.84	2.29	21.98	157.76	3060

No non-compliance noted.

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