



### 14. Radio Frequency Exposure

#### 14.1 Applicable Standards

<input type="checkbox"/> §1.1307(b)(3)(i)(A)	The available maximum time-averaged power is no more than 1 mW, regardless of separation distance.																																													
<input type="checkbox"/> §1.1307(b)(3)(i)(c)	<p>ERP is below a threshold calculated based on the distance , R between the person and the antenna / radiating structure, where <math>R &gt; \lambda / 2 \pi</math>.</p> <p>TABLE B.1—THRESHOLDS FOR SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION</p> <table border="1" data-bbox="512 618 1217 909"> <thead> <tr> <th colspan="2">RF Source Frequency</th> <th colspan="2">Minimum Distance</th> <th>Threshold ERP</th> </tr> <tr> <th><math>f_L</math> MHz</th> <th><math>f_H</math> MHz</th> <th><math>\lambda_L / 2\pi</math></th> <th><math>\lambda_H / 2\pi</math></th> <th>W</th> </tr> </thead> <tbody> <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<sup>2</sup></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<sup>2</sup>/f<sup>2</sup></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<sup>2</sup></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<sup>2</sup>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>19.2R<sup>2</sup></td> </tr> </tbody> </table> <p>Subscripts L and H are low and high; <math>\lambda</math> is wavelength. From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.</p>	RF Source Frequency		Minimum Distance		Threshold ERP	$f_L$ MHz	$f_H$ MHz	$\lambda_L / 2\pi$	$\lambda_H / 2\pi$	W	0.3	–	1.34	159 m	–	35.6 m	1,920 R <sup>2</sup>	1.34	–	30	35.6 m	–	1.6 m	3,450 R <sup>2</sup> /f <sup>2</sup>	30	–	300	1.6 m	–	159 mm	3.83 R <sup>2</sup>	300	–	1,500	159 mm	–	31.8 mm	0.0128 R <sup>2</sup> f	1,500	–	100,000	31.8 mm	–	0.5 mm	19.2R <sup>2</sup>
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<input checked="" type="checkbox"/> § 1.1307(b)(3)(i)(B).	<p>Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <math>\leq P_{th}</math></p> $P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}}(d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$ <p>Where</p> $x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$ <p>and</p> $ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$ <p><math>d</math> = the separation distance (cm);</p>																																													



### 14.2 EUT Specification

<b>Frequency band (Operating)</b>	<input type="checkbox"/> WLAN: 2412MHz ~ 2462MHz <input type="checkbox"/> WLAN: 5150MHz ~ 5250MHz <input type="checkbox"/> WLAN: 5250MHz ~ 5350MHz <input type="checkbox"/> WLAN: 5470MHz ~ 5725MHz <input type="checkbox"/> WLAN: 5725MHz ~ 5850MHz ● <input checked="" type="checkbox"/> Bluetooth: 2402MHz ~ 2480MHz
<b>Device category</b>	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation)
<b>Antenna diversity</b>	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
<b>Evaluation applied</b>	<input type="checkbox"/> Blanket 1 mW Blanket Exemption <input checked="" type="checkbox"/> MPE-based Exemption <input type="checkbox"/> SAR-based Exemption
<b>Remark:</b> The maximum conducted output power is <u>16.33dBm (42.954mW)</u> at <u>2402MHz</u> (with <u>3dBi antenna gain</u> .)	



14.3 Result

Modulation Type	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)
GFSK	2402-2480	16.33	16.83	3	17.68	58.61	3060
π/4-DQPSK	2402-2480	13.41	13.91	3	14.76	29.92	3060
8DPSK	2402-2480	13.52	14.02	3	14.87	30.69	3060

Maximum Permissible Exposure (Co-location)

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	2402-2480	16.33	16.83	3.00	20.00	58.61	3060.00	0.02
11g	2412-2462	22.67	23.17	3.00	20.00	252.12	3060.00	0.08
Co-location Total								0.10
ΣMPE ratios Limit								1.00

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	2402-2480	16.33	16.83	3.00	20.00	58.61	3060.00	0.02
11ac VHT40	5755-5795	22.96	23.46	7.00	20.00	678.17	3060.00	0.22
Co-location Total								0.24
ΣMPE ratios Limit								1.00

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