# FCC §1.1307 (b) – RF EXPOSURE

## Applicable Standard

According to FCC §1.1307(b), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D04 Interim General RF Exposure Guidance v01, clause 2.1.4 –MPE-Based Exemption:

An alternative to the SAR-based exemption is provided in § 1.1307(b)(3)(i)(C), for a much wider frequency range, from 300 kHz to 100 GHz, applicable for separation distances greater or equal to $\lambda/2\pi$, where $\lambda$ is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power. For this case, a RF source is an RF exempt device if its ERP (watts) is no more than a frequency-dependent value, as detailed tabular form in Appendix B. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in § 1.1310(e)(1).

Table to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

| RF Source frequency (MHz) | Threshold ERP (watts) |
|---|---|
| 0.3-1.34 | 1,920 $R^2$. |
| 1.34-30 | 3,450 $R^2/f^2$. |
| 30-300 | 3.83 $R^2$. |
| 300-1,500 | 0.0128 $R^2 f$. |
| 1,500-100,000 | 19.2$R^2$. |

f = frequency in MHz;
R = minimum separation distance from the body of a nearby person (appropriate units, e.g., m);

For multiple RF sources: Multiple RF sources are exempt if:

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

Where:
a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section for Pth, including existing exempt transmitters and those being added.
b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.
c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.
$P_i$ = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

$P_{th,i}$ = the exemption threshold power ($P_{th}$) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

$ERP_j$ = the ERP of fixed, mobile, or portable RF source j.

$ERP_{th,j}$ = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least $\lambda/2\pi$ according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

$Evaluated_k$ = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

$Exposure\ Limit_k$ = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from § 1.1310 of this chapter.

**Test result**

For worst case:

| Mode | Frequency Range (MHz) | Tune-up Output Power | | Antenna Gain | | ERP | | Evaluation Distance (cm) | MPE-Based Exemption Threshold (W) |
|---|---|---|---|---|---|---|---|---|---|
| | | (dBm) | (mW) | (dBi) | (dBd) | (dBm) | (W) | | |
| 2.4G Wi-Fi | 2412-2462 | 24.0 | 251.19 | 3.13 | 0.98 | 24.98 | 0.315 | 20 | 0.768 |
| 5G Wi-Fi | 5150-5250 | 21.5 | 141.25 | 3.62 | 1.47 | 22.97 | 0.198 | 20 | 0.768 |
| 5G Wi-Fi | 5725-5850 | 21.5 | 141.25 | 3.52 | 1.37 | 22.87 | 0.194 | 20 | 0.768 |

Note 1: The tune-up power was declared by the applicant.
Note 2: 0dBd=2.15dBi.
Note 3: The 2.4G Wi-Fi function can transmit at the same time with the 5G Wi-Fi function.

Simultaneous transmitting consideration:

The ratio= $MPE_{2.4G\ Wi-Fi}$/limit+$MPE_{5G\ Wi-Fi}$/limit=0.315/0.768+0.198/0.768=0.668＜1.0

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant.