# **5. RF EXPOSURE EVALUATION**

# 5.1 Simultaneous Transmission with both MPE-based

# 5.1.1 Applicable Standard

According to §1.1307(b)(3)(i)

(C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least  $\lambda/2\pi$ , where  $\lambda$  is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of  $\lambda/4$  or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

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

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

#### Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section for  $P_{th}$ , 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<sub>i</sub> = 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<sub>k</sub> = 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.

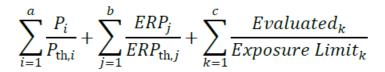
*Exposure Limit*<sub>k</sub> = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from § 1.1310 of this chapter.

# 5.1.2 Measurement Result

| Radio     | Frequency<br>(MHz) | λ/2<br>Π<br>(mm) | Distance<br>(mm) | Exemption<br>ERP<br>(mW) | Maximum<br>Conducted<br>Power including<br>Tune-up | Antenna<br>Gain<br>(dBi) | ERP   |        |
|-----------|--------------------|------------------|------------------|--------------------------|--|--------------------------|-------|--------|
|           |                    |                  |                  |                          | Tolerance (dBm)                                    |                          | dBm   | mW     |
| BDR/EDR   | 2402-2480          | 19.88            | 200              | 768                      | 8.0  | 2.46                     | 8.31  | 6.78   |
| BLE       | 2402-2480          | 19.88            | 200              | 768                      | 3.0  | 2.46                     | 3.31  | 2.14   |
| 2.4G WLAN | 2412-2462          | 19.80            | 200              | 768                      | 21.5   | 2.46                     | 21.81 | 151.71 |
| 5.2G WLAN | 5180-5230          | 9.22             | 200              | 768                      | 13.0   | 2.94                     | 13.79 | 23.93  |
| 5.3G WLAN | 5260-5320          | 9.08             | 200              | 768                      | 13.5   | 2.94                     | 14.29 | 26.85  |
| 5.6G WLAN | 5500-5700          | 8.68             | 200              | 768                      | 13.0   | 2.94                     | 13.79 | 23.93  |
| 5.8G WLAN | 5745-5825          | 8.31             | 200              | 768                      | 12.5   | 2.94                     | 13.29 | 21.33  |

Note:

The Maximum Conducted Power including Tune-up Tolerance was declared by manufacturer. The BT, 2.4G WLAN and 5.2G WLAN can transmit simultaneously.



 $= P_{\rm BT} / \ P_{th} + P_{\rm 2.4G \ WLAN} / \ P_{th} + P_{\rm 5.3G \ WLAN} / P_{th}$ 

=6.78/768 +151.71/768 + 26.85/768

=0.241

< 1.0

Result: The device compliant the MPE-Based Exemption at 20cm distances.