

## \* RF Exposure

### 1. Regulation

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this Chapter.

Limits for Maximum Permissible Exposure: RF exposure is calculated.

| Frequency Range                                       | Electric Field Strength [V/m] | Magnetic Field Strength [A/m] | Power Density [mW/cm <sup>2</sup> ] | Averaging Time [minute] |
|-------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|-------------------------|
| Limits for General Population / Uncontrolled Exposure |                               |                               |                                     |                         |
| 0.3 ~ 1.34                                            | 614                           | 1.63                          | *(100)                              | 30                      |
| 1.34 ~ 30                                             | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 30                      |
| 30 ~ 300                                              | 27.5                          | 0.073                         | 0.2                                 | 30                      |
| 300 ~ 1 500                                           | /                             | /                             | f/1 500                             | 30                      |
| 1 500 ~ 15 000                                        | /                             | /                             | 1.0                                 | 30                      |

f=frequency in MHz, \*= plane-wave equivalent power density

### MPE (Maximum Permissible Exposure) Prediction

Predication of MPE limit at a given distance: Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2 \quad (\Rightarrow R = \sqrt{PG/4\pi S})$$

S = power density [mW/cm<sup>2</sup>]

P = Power input to antenna [mW]

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna [cm]

## 2. RF Exposure Compliance Issue

The information should be included in the user's manual:

This appliance and its antenna must not be co-located or operation in conjunction with any other antenna or transmitter. A minimum separation distance of 20 cm must be maintained between the antenna and the person for this appliance to satisfy the RF exposure requirements.

## 3. Calculation Result of RF Exposure

| Mode           | Target power<br>[dBm] | Tune up tolerance<br>[dB] | Max tune up power<br>[dBm] | Max tune up power<br>[mW] | Ant Gain<br>[dBi] | Ant Gain<br>[mW] | Power Density at 20 cm<br>[mW/cm <sup>2</sup> ] | Limit<br>[mW/cm <sup>2</sup> ] |
|----------------|-----------------------|---------------------------|----------------------------|---------------------------|-------------------|------------------|-------------------------------------------------|--------------------------------|
| Bluetooth_GFSK | 1.5                   | ±2.0                      | 3.5                        | 2.24                      | -0.1              | 0.98             | 0.000 44                                        | 1.000 00                       |

## 4. Target power and tolerance, Max tuneup power

| Mode                          | Target power<br>[dBm] | Tolerance<br>[dB] | Max tuneup power<br>[dBm] | Average Power<br>[dBm] |
|-------------------------------|-----------------------|-------------------|---------------------------|------------------------|
| Bluetooth_GFSK<br>Lowest      | 1.5                   | ±2.0              | 3.5                       | 2.19                   |
| Bluetooth_GFSK<br>Middle      | 1.5                   | ±2.0              | 3.5                       | 2.10                   |
| Bluetooth_GFSK<br>Highest     | 1.5                   | ±2.0              | 3.5                       | 1.85                   |
| Bluetooth_π/4DQPSK<br>Lowest  | 0.0                   | ±2.0              | 2.0                       | 0.60                   |
| Bluetooth_π/4DQPSK<br>Middle  | 0.0                   | ±2.0              | 2.0                       | 0.48                   |
| Bluetooth_π/4DQPSK<br>Highest | 0.0                   | ±2.0              | 2.0                       | 0.20                   |
| Bluetooth_8DPSK<br>Lowest     | 0.0                   | ±2.0              | 2.0                       | 0.45                   |
| Bluetooth_8DPSK<br>Middle     | 0.0                   | ±2.0              | 2.0                       | 0.50                   |
| Bluetooth_8DPSK<br>Highest    | 0.0                   | ±2.0              | 2.0                       | 0.16                   |