

## - 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> ] |
|-------------|-----------------------|---------------------------|----------------------------|---------------------------|-------------------|------------------|-------------------------------------------------|--------------------------------|
| RF4CE_ANT 0 | 3.00                  | ±1.00                     | 4.00                       | 2.51                      | 4.3               | 2.69             | 0.00 135                                        | 1.000 00                       |
| RF4CE_ANT 1 | 2.00                  | ±1.00                     | 3.00                       | 2.00                      | 4.4               | 2.75             | 0.00 109                                        | 1.000 00                       |
| Total       | -                     |                           |                            |                           |                   |                  | 0.00 244                                        | 1.000 00                       |

## 4. Target power and tolerance, Max tune up power

| Mode                | Target power<br>[dBm] | Tolerance<br>[dB] | Max tuneup power<br>[dBm] | Average Power<br>[dBm] |
|---------------------|-----------------------|-------------------|---------------------------|------------------------|
| RF4CE_Lowest_ANT 0  | 3.00                  | ±1.00             | 4.00                      | 2.99                   |
| RF4CE_Middle_ANT 0  | 3.00                  | ±1.00             | 4.00                      | 2.87                   |
| RF4CE_Highest_ANT 0 | 3.00                  | ±1.00             | 4.00                      | 2.72                   |
| RF4CE_Lowest_ANT 1  | 2.00                  | ±1.00             | 3.00                      | 2.07                   |
| RF4CE_Middle_ANT 1  | 2.00                  | ±1.00             | 3.00                      | 1.89                   |
| RF4CE_Highest_ANT 1 | 2.00                  | ±1.00             | 3.00                      | 1.73                   |