

## - 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 [dBm]	Tune up tolerance [dB]	Max tune up power [dBm]	Max tune up power [mW]	Ant Gain [dBi]	Ant Gain [mW]	Power Density at 20 cm [mW/cm <sup>2</sup> ]	Limit [mW/cm <sup>2</sup> ]
Bluetooth_GFSK	7.50	±2.00	9.50	8.91	4.27	2.67	0.004 74	1.000 00
RF4CE_ANT 1	7.00	±2.00	9.00	7.94	3.30	2.14	0.003 38	1.000 00
Total	Bluetooth + RF4CE						0.008 12	1.000 00

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

- Bluetooth

Mode	Target power [dBm]	Tolerance [dB]	Max tuneup power [dBm]	Average Power [dBm]
Bluetooth_GFSK Lowest	7.50	±2.00	9.50	9.37
Bluetooth_GFSK Middle	7.50	±2.00	9.50	8.33
Bluetooth_GFSK Highest	7.50	±2.00	9.50	7.51
Bluetooth_π/4DQPSK Lowest	6.50	±2.00	8.50	8.21
Bluetooth_π/4DQPSK Middle	6.50	±2.00	8.50	7.18
Bluetooth_π/4DQPSK Highest	6.50	±2.00	8.50	6.59
Bluetooth_8DPSK Lowest	6.50	±2.00	8.50	8.22
Bluetooth_8DPSK Middle	6.50	±2.00	8.50	7.17
Bluetooth_8DPSK Highest	6.50	±2.00	8.50	6.59

- RF4CE

Mode	Target power [dBm]	Tolerance [dB]	Max tuneup power [dBm]	Average Power [dBm]
RF4CE_Lowest ANT 1	7.00	±2.00	9.00	6.84
RF4CE_Middle ANT 1	7.00	±2.00	9.00	6.80
RF4CE_Highest ANT 1	7.00	±2.00	9.00	6.70
RF4CE_Lowest ANT 2	7.00	±2.00	9.00	6.61
RF4CE_Middle ANT 2	7.00	±2.00	9.00	6.65
RF4CE_Highest ANT 2	7.00	±2.00	9.00	6.65