

## \* 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 [ $\text{mW}/\text{cm}^2$ ]	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

Prediction 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 [ $\text{mW}/\text{cm}^2$ ]

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> ]
WiFi 2G_802.11g	11.00	±1.00	12.00	15.85	2.10	1.62	0.005 11	1.000 00
WiFi 5G Band 4_802.11a	8.00	±1.00	9.00	7.94	2.40	1.74	0.002 75	1.000 00
Bluetooth_GFSK	-6.00	±1.00	-5.00	0.32	2.10	1.62	0.000 10	1.000 00
Total							0.007 96	1.000 00

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

-WiFi 2G

Mode	Target power [dBm]	Tolerance [dB]	Max tuneup power [dBm]	Average Power [dBm]
WiFi_802.11b Lowest	10.00	±1.00	11.00	10.04
WiFi_802.11b Middle	10.00	±1.00	11.00	10.00
WiFi_802.11b Highest	10.00	±1.00	11.00	10.13
WiFi_802.11g Lowest	11.00	±1.00	12.00	11.03
WiFi_802.11g Middle	11.00	±1.00	12.00	11.38
WiFi_802.11g Highest	11.00	±1.00	12.00	11.39
WiFi_802.11n HT20 Lowest	10.00	±1.00	11.00	9.95
WiFi_802.11n HT20 Middle	10.00	±1.00	11.00	10.20
WiFi_802.11n HT20 Highest	10.00	±1.00	11.00	10.42

## -WiFi 5G Band 4

Mode	Target power [dBm]	Tolerance [dB]	Max tuneup power [dBm]	Average Power [dBm]
WiFi_802.11a Lowest	8.00	±1.00	9.00	8.36
WiFi_802.11a Middle	8.00	±1.00	9.00	8.04
WiFi_802.11a Highest	8.00	±1.00	9.00	7.67
WiFi_802.11n HT20 Lowest	7.00	±1.00	8.00	7.37
WiFi_802.11n HT20 Middle	7.00	±1.00	8.00	7.09
WiFi_802.11n HT20 Highest	7.00	±1.00	8.00	6.71

## -Bluetooth

Mode	Target power [dBm]	Tolerance [dB]	Max tuneup power [dBm]	Average Power [dBm]
Bluetooth_GFSK Lowest	-6.00	±1.00	-5.00	-6.73
Bluetooth_GFSK Middle	-6.00	±1.00	-5.00	-6.23
Bluetooth_GFSK Highest	-6.00	±1.00	-5.00	-6.25
Bluetooth_8DPSK Lowest	-8.00	±1.00	-7.00	-8.80
Bluetooth_8DPSK Middle	-8.00	±1.00	-7.00	-8.33
Bluetooth_8DPSK Highest	-8.00	±1.00	-7.00	-8.62