

**\* 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 [dB]	Tune up tolerance [dB]	Max tune up power [dB]	Max tune up power [mW]	Ant Gain [dBm]	Ant Gain [mW]	Power Density at 20 cm [mW/cm <sup>2</sup> ]	Limit [mW/cm <sup>2</sup> ]
802.11b	17.00	± 1.50	18.50	70.79	-0.2	0.95	0.031 45	1.000 00
802.11g	16.50	± 1.50	18.00	63.10	-0.2	0.95	0.011 99	1.000 00
802.11n_HT20	16.50	± 1.50	18.00	63.10	-0.2	0.95	0.011 99	1.000 00
802.11n_HT40	16.50	± 1.50	18.00	63.10	-0.2	0.95	0.011 99	1.000 00
Wifi 5 GHz_5 150 Band	13.00	± 2.00	15.00	31.62	0.95	1.24	0.007 83	1.000 00
Wifi 5 GHz_5 250 Band	13.00	± 2.00	15.00	31.62	1.06	1.27	0.008 03	1.000 00
Wifi 5 GHz_5 470 Band	13.00	± 2.00	15.00	31.62	2.04	1.60	0.010 06	1.000 00
Wifi 5 GHz_5 725 Band	13.00	± 2.00	15.00	31.62	-1.08	0.78	0.004 91	1.000 00
GFSK	9.00	± 2.00	11.00	12.59	0.57	1.14	0.002 86	1.000 00
8DPSK	6.00	± 2.00	8.00	6.30	0.57	1.14	0.001 43	1.000 00
Bluetooth Low Energy	2.00	± 2.00	4.00	2.51	0.57	1.14	0.000 57	1.000 00
Total	WiFi 2.4 GHz + Bluetooth						0.034 31	1.000 00
	WiFi 5 GHz + Bluetooth						0.012 92	1.000 00

Note: Total = (MPE 1 / MPE 1 Limit)+ (MPE 2 / MPE 2 Limit)+ ... + (MPE n / MPE n Limit)

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

### Wifi 2.4 GHz

Mode	Target power	Tolerance	Max tuneup power
802.11b	17.00	± 1.50	18.50
802.11g	16.50	± 1.50	18.00
802.11n_HT20	16.50	± 1.50	18.00
802.11n_HT40	16.50	± 1.50	18.00

**Wifi 5 GHz**

Mode	Target power	Tolerance	Max tuneup power
802.11a 5150-5250 Band	13.00	± 2.00	15.00
802.11a 5250-5350 Band	13.00	± 2.00	15.00
802.11a 5470-5725 Band	13.00	± 2.00	15.00
802.11a 5725-5825 Band	13.00	± 2.00	15.00

Mode	Target power	Tolerance	Max tuneup power
802.11n_HT20 5150-5250 Band	13.00	± 2.00	15.00
802.11n_HT20 5250-5350 Band	13.00	± 2.00	15.00
802.11n_HT20 5470-5725 Band	13.00	± 2.00	15.00
802.11n_HT20 5725-5825 Band	13.00	± 2.00	15.00
802.11n_HT40 5150-5250 Band	13.00	± 2.00	15.00
802.11n_HT40 5250-5350 Band	13.00	± 2.00	15.00
802.11n_HT40 5470-5725 Band	13.00	± 2.00	15.00
802.11n_HT40 5725-5825 Band	13.00	± 2.00	15.00
802.11n_VHT20 5150-5250 Band	13.00	± 2.00	15.00
802.11n_VHT20 5250-5350 Band	13.00	± 2.00	15.00
802.11n_VHT20 5470-5725 Band	13.00	± 2.00	15.00
802.11n_VHT20 5725-5825 Band	13.00	± 2.00	15.00
802.11n_VHT40 5150-5250 Band	13.00	± 2.00	15.00
802.11n_VHT40 5250-5350 Band	13.00	± 2.00	15.00
802.11n_VHT40 5470-5725 Band	13.00	± 2.00	15.00
802.11n_VHT40 5725-5825 Band	13.00	± 2.00	15.00
802.11n_VHT80 5150-5250 Band	13.00	± 2.00	15.00
802.11n_VHT80 5250-5350 Band	13.00	± 2.00	15.00
802.11n_VHT80 5470-5725 Band	13.00	± 2.00	15.00
802.11n_VHT80 5725-5825 Band	13.00	± 2.00	15.00

**Bluetooth**

Mode	Target power	Tolerance	Max tuneup power
GFSK	9.00	± 2.00	11.00
8DPSK	6.00	± 2.00	8.00
Low energy	2.00	± 2.00	4.00