

* 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 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 ²)	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/cm²]

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 ²]	Limit [mW/cm ²]
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