* 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 Permissive Exposure: RF exposure is calculated.

Frequency Range	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [㎽/㎠]	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/f²)	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 ㎒, *= plane-wave equivalent power density*

MPE (Maximum Permissive Exposure) Prediction

Predication of MPE limit at a given distance: Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2 \quad \left(\Rightarrow R = \sqrt{PG/4\pi S}\right)$$

S = power density [㎽/㎠]

P = Power input to antenna [㎽]

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 [㎝]

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 ㎝ 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 [㎽]	Ant Gain [dBi]	Ant Gain [㎽]	Power Density at 20 ㎝ [㎽/㎠]	Limit [㎽/㎠]
WiFi 2.4 ㎓_ 802.11b_Lowest	23.00	±2.0	25.00	316.23	6.66	4.63	0.291 56	1.000 00
WiFi 5.0 ㎓_ UNII 3 802.11n HT20 Highest	25.00	±2.0	27.00	501.19	6.73	4.71	0.469 60	1.000 00

4. Target power and tolerance, Max tuneup power

- WiFi 2.4 ㎓

Mode	Target power [dBm]	Tolerance [dB]	Max tuneup power [dBm]	Average Power [dBm]
802.11b_Lowest	23.00	±2.0	25.00	24.80
802.11b_Middle	23.00	±2.0	25.00	24.67
802.11b_Highest	23.00	±2.0	25.00	24.32
802.11g_Lowest	15.00	±2.0	17.00	16.81
802.11g_Middle	15.00	±2.0	17.00	16.68
802.11g_Highest	15.00	±2.0	17.00	16.62
802.11n HT20 _Lowest	16.00	±2.0	18.00	17.27
802.11n HT20 _Middle	16.00	±2.0	18.00	17.17
802.11n HT20 _Highest	16.00	±2.0	18.00	16.86
802.11n HT40 _Lowest	13.00	±2.0	15.00	14.15
802.11n HT40 _Middle	13.00	±2.0	15.00	14.30
802.11n HT40 _Highest	13.00	±2.0	15.00	14.12

- WiFi 5.0 ㎓

UNII 1

Mode	Target power [dBm]	Tolerance [dB]	Max tune up power [dBm]	Average Power [dBm]
802.11a_Lowest	11.00	±2.0	13.00	12.96
802.11a_Middle	20.00	±2.0	22.00	21.91
802.11a_Highest	20.00	±2.0	22.00	21.81
802.11n HT20 Lowest	12.00	±2.0	14.00	14.11
802.11n HT20 _Middle	21.00	±2.0	23.00	22.23
802.11n HT20 Highest	21.00	±2.0	23.00	21.73
802.11n HT40 Lowest	15.00	±2.0	17.00	16.85
802.11n HT40 _Highest	23.00	±2.0	25.00	24.77
802.11ac VHT20 Lowest	13.00	±2.0	15.00	14.17
802.11ac VHT20 _Middle	20.00	±2.0	22.00	21.23
802.11ac VHT20 Highest	20.00	±2.0	22.00	21.09
802.11ac VHT40 _Lowest	15.00	±2.0	17.00	17.05
802.11ac VHT40 Highest	25.00	±2.0	27.00	25.26
802.11ac VHT80 _Lowest	12.00	±2.0	14.00	13.77

UNII 3

Mode	Target power [dBm]	Tolerance [dB]	Max tune up power [dBm]	Average Power [dBm]
802.11a_Lowest	25.00	±2.0	27.00	26.30
802.11a_Middle	25.00	±2.0	27.00	26.55
802.11a_Highest	25.00	±2.0	27.00	26.47
802.11n HT20 _Lowest	24.00	±2.0	26.00	25.95
802.11n HT20 Middle	25.00	±2.0	27.00	26.86
802.11n HT20 _Highest	25.00	±2.0	27.00	26.90
802.11n HT40 Lowest	25.00	±2.0	27.00	26.67
802.11n HT40 Highest	25.00	±2.0	27.00	26.73
802.11ac VHT20 Lowest	25.00	±2.0	27.00	25.80
802.11ac VHT20 Middle	25.00	±2.0	27.00	26.27
802.11ac VHT20 Highest	25.00	±2.0	27.00	26.50
802.11ac VHT40 Lowest	25.00	±2.0	27.00	25.58
802.11ac VHT40 _Highest	25.00	±2.0	27.00	26.31
802.11ac VHT80 _Highest	19.00	±2.0	21.00	20.42