* 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/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 ㎒, *= 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

	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 [㎽/㎠]
Blutooth GFSK	2.50	±1.00	3.50	2.23	2.29	1.69	0.000 76	1.000 00
Blutooth 8DPSK	1.00	±1.00	2.00	1.58	2.29	1.69	0.000 53	1.000 00
WiFi 2.4G 802.11b	16.00	±1.00	17.00	50.12	4.11	2.58	0.025 69	1.000 00
WiFi 2.4G 802.11g	12.00	±1.00	13.00	19.95	4.11	2.58	0.010 23	1.000 00
WiFi 2.4G 802.11n_HT20	12.00	±1.00	13.00	19.95	4.11	2.58	0.010 23	1.000 00
WiFi 5G 802.11a/n20/n40 /ac20/ac40/ac80 _5 150 BW	12.00	±1.00	13.00	19.95	2.89	1.95	0.007 72	1.000 00
WiFi 5G 802.11a/n20/n40 /ac20/ac40/ac80 _5 250 BW	12.00	±1.00	13.00	19.95	2.89	1.95	0.007 72	1.000 00
WiFi 5G 802.11a/n20/n40 /ac20/ac40/ac80 _5 470 BW	12.00	±1.00	13.00	19.95	2.51	1.78	0.007 08	1.000 00
WiFi 5G 802.11a/n20/n40 /ac20/ac40/ac80 _5 750 BW	12.00	±1.00	13.00	19.95	5.78	3.78	0.015 02	1.000 00

4. Target power and tolerance, Max tuneup power

Mode	Target power [dBm]	Tolerance [dB]	Max tuneup power [dBm]	Average Power [dBm]
GFSK	2.50	±1.00	3.50	2.01
8DPSK	1.00	±1.00	2.00	0.74
WiFi 2.4G 802.11b	16.00	±1.00	17.00	15.90
WiFi 2.4G 802.11g	12.00	±1.00	13.00	11.05
WiFi 2.4G 802.11n_HT20	12.00	±1.00	13.00	11.06
WiFi 5G 802.11a/n20/n40/ac20/ac40/ac80_5 150 BW	12.00	±1.00	13.00	12.60
WiFi 5G 802.11a/n20/n40/ac20/ac40/ac80_5 250 BW	12.00	±1.00	13.00	12.81
WiFi 5G 802.11a/n20/n40/ac20/ac40/ac80_5 470 BW	12.00	±1.00	13.00	12.49
WiFi 5G 802.11a/n20/n40/ac20/ac40/ac80_5 725 BW	12.00	±1.00	13.00	12.44