

5.8 RF Exposure

5.8.1 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 ~ 1500	/	/	f/1500	30
1500 ~ 15000	/	/	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]

EUT: Maximum peak output power = 2.24 [mW](= 3.50 dBm) Antenna gain= 0.47(= -3.255 [dBi])	
100 mW, at 20 cm from an antenna 6[dBi]	$S = PG/4\pi R^2 = 100 \times 3.98 / (4 \times \pi \times 400) = 0.07918 \text{ [mW/cm}^2\text{]} < 1.0 \text{ [mW/cm}^2\text{]}$
2.24 mW, at 20 cm from an antenna -3.255 [dBi]	$S = PG/4\pi R^2 = 0.00021 \text{ [mW/cm}^2\text{]} < 1.0 \text{ [mW/cm}^2\text{]}$
2.24 mW, at 2.5 cm from an antenna -3.255 [dBi]	$S = PG/4\pi R^2 = 0.01347 \text{ [mW/cm}^2\text{]} < 1.0 \text{ [mW/cm}^2\text{]}$

5.8.2 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.

RF Exposure Compliance for simultaneous operations

* configurations for simultaneous operations

configuration 1 : 2.4 GHz WLAN + Bluetooth

RF funtion	802.11b	802.11g	802.11n	BT	Total Power Densityc (mW/cm2)
Band	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	
Power Density (mW/cm2)	0.02902	0.00249	0.00234	0.00085	
Configuration 1	0.02902			0.00085	0.02987