

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 = 1.56 [mW](= 1.93 dBm) Antenna gain= 0.47(= -3.255 [dBi])	
100 mW, at 20 cm from an antenna 6[dBi]	$S = PG/4\pi R^2 = 100 \times 3.98 / (4 \times \pi \times 400)$ $= 0.07918 \text{ [mW/cm}^2\text{]} < 1.0 \text{ [mW/cm}^2\text{]}$
1.56 mW, at 20 cm from an antenna -3.255 [dBi]	$S = PG/4\pi R^2 = 0.00015 \text{ [mW/cm}^2\text{]} < 1.0 \text{ [mW/cm}^2\text{]}$
1.56 mW, at 2.5 cm from an antenna -3.255 [dBi]	$S = PG/4\pi R^2 = 0.00938 \text{ [mW/cm}^2\text{]} < 1.0 \text{ [mW/cm}^2\text{]}$

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 : CDMA 1x + 2.4 GHz WLAN + Bluetooth

configuration 2 : CDMA EVDO + 2.4 GHz WLAN + Bluetooth

RF funtion	CDMA EVDO		CDMA 1x		802.11b	802.11g	802.11n	BT	Total Power Densityc (mW/cm2)
Band	Cellular	PCS	Cellular	PCS	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	
Power Density (mW/cm2)	0.125 24	0.203 11	0.125 24	0.203 11	0.006 45	0.002 49	0.002 34	0.000 15	
Configuration 1				0.20311	0.00645			0.00015	0.20971
Configuration 2		0.20311			0.00645			0.00015	0.20971