

RF exposure statement

According to §1.1307, 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 level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Frequency Range [MHz]	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 – 100 000	-	-	1.0	30

※ f = frequency in MHz

1. Friis transmission formula

$$P_d = (P_{out} \times G) / (4\pi r^2)$$

P_d = Power density

P_{out} = power input to antenna

G = power gain

r = distance to the center of radiation of the antenna

2. Calculation of MPE at 20 cm

Frequency [MHz]		Max.Average Tune up Power [dBm]	Antenna Gain [dBi]	EIRP		Power density At 20 cm [mW/cm ²]	Limit [mW/cm ²]
				[dBm]	[mW]		
ZigBee	2 405	19.77	4.48	24.25	266.07	0.116	1.000
	2 440	21.75		26.23	419.75	0.183	
	2 480	21.88		26.36	432.51	0.189	
Frequency [MHz]		Max.Average Tune up Power [dBm]	Antenna Gain [dBi]	Duty Cycle	[P]+[G] with Duty cycle(mW) [TP]	Power density At 20 cm [mW/cm ²]	Limit [mW/cm ²]
GSM 850	824.2	34.0	2.20	0.125	521.08	0.103	0.549
	836.6	34.0		0.125	521.08	0.103	0.558
	848.8	34.0		0.125	521.08	0.103	0.566
GPRS 850	824.2	34.0		0.125	521.08	0.103	0.549
	836.6	34.0		0.125	521.08	0.103	0.558
	848.8	34.0		0.125	521.08	0.103	0.566
	824.2	34.0		0.250	1042.17	0.207	0.549
	836.6	34.0		0.250	1042.17	0.207	0.558
	848.8	34.0		0.250	1042.17	0.207	0.566
PCS 1900	1850.2	31.0		0.125	338.77	0.067	1.000
	1880.0	31.0		0.125	338.77	0.067	1.000
	1909.8	31.0		0.125	338.77	0.067	1.000
GPRS 1900	1850.2	31.0	3.33	0.125	338.77	0.067	1.000
	1880.0	31.0		0.125	338.77	0.067	1.000
	1909.8	31.0		0.125	338.77	0.067	1.000
	1850.2	31.0		0.250	677.54	0.134	1.000
	1880.0	31.0		0.250	677.54	0.134	1.000
	1909.8	31.0		0.250	677.54	0.134	1.000

1. GSM 850(GPRS 850) and PCS 1900(GPRS 1900) are not output at the same time.

2. ZigBee Max Power density(ANT A) = 0.189 mW/cm²

3. GSM 850(GPRS 850) Max Power density(ANT B)

3.1 Sum of GSM850 + Zigbee = $(0.103/0.549) + (0.189/1) = 0.377 < 1.000$

3.2 Sum of GPRS850 + Zigbee = $(0.207/0.549) + (0.189/1) = 0.566 < 1.000$

4. PCS 1900(GPRS 1900) Max Power density(ANT B)

4.1 Sum of PCS1900 + Zigbee = $(0.067/1.000) + (0.189/1) = 0.256 < 1.000$

4.2 Sum of GPRS1900 + Zigbee = $(0.134/1.000) + (0.189/1) = 0.323 < 1.000$