FCC §1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

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 (minutes)**
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;

* = Plane-wave equivalent power density

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Mode	Frequency Range (MHz)	Antenna Gain		Target Output Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)	MPE Ratio
		(dBi)	(numeric)	(dBm)	(mW)				
802.11b	2412~2462	0.0	1.00	14.00	25.12	20	0.0050	1.00	0.0050
802.11g		0.0	1.00	12.50	17.78	20	0.0035	1.00	0.0035
802.11n-HT20		0.0	1.00	13.00	19.95	20	0.0040	1.00	0.0040
GPRS 850	824~849	0.5	1.12	26.50	446.68	20	0.0997	0.57	0.1749
EDGE 850	824~849	0.5	1.12	24.50	281.84	20	0.0629	0.57	0.1104
WCDMA Band V	824~849	0.5	1.12	22.50	177.83	20	0.0397	0.57	0.0696
GPRS 1900	1850~1910	1.0	1.26	22.50	177.83	20	0.0445	1.00	0.0445
EDGE 1900	1850~1910	1.0	1.26	23.00	199.53	20	0.0500	1.00	0.0500
WCDMA Band II	1850~1910	1.0	1.26	22.00	158.49	20	0.0397	1.00	0.0397
WCDMA Band IV	1710-1755	1.0	1.26	22.00	158.49	20	0.0397	1.00	0.0397

For GPRS mode, the time based average power is relevant, the difference in between depends on the duty cycle of the TDMA signal.

Number of Time slot	1	2	3	4
Duty Cycle	1:8.3	1:4.15	1:2.77	1:2.08
Time based Ave. power compared to slotted Ave. power	-9 dB	-6 dB	-4.26 dB	-3 dB

Note:

(1) The target output powers are all declared by the Manufacturer.

(2) Wi-Fi and GPRS or WCDMA mode support transmit simultaneously, the worst case (802.11b of Wi-Fi & GPRS 850) is as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.0050/1.00+0.0997/0.57=0.0050+0.1749=0.1799 < 1.0$$

Result: The device meet FCC MPE at 20 cm distance.