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 Occupational/Controlled Exposure

Limits for occupational/Controlled 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)	6
1.34-30	1842/f	4.89/f	*($900/f^2$)	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5.0	6

f = frequency in MHz
* = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = 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:

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

Worst case as below:

Frequency (MHz)	Antenna Gain		Tune up Conducted Power		Tune up Average power	Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)	(mW)			
824-849	-1.5	0.71	33	1995.26	249.41	50	0.006	2.75
1850-1910	-3.5	0.45	29	794.33	99.29	50	0.001	5.0
136-174	2.15	1.64	43	20000	10000	50	0.522	1.0

Note:
For GSM mode, the Time-base average power was consideration, Average power as below:
GSM850: 1995.26*(1/8)mW=249.41mW.
PCS1900: 794.33*(1/8)mW=99.29mW.

For DMR mode, the max tune up power is 43dBm(20000mW), the duty cycle of 50% was consideration, Average power as below:
20000*50%mW=10000mW.

Simultaneous transmitting consideration: GSM850 and DMR, or PCS1900 and DMR

The ratio=MPE/$limit_{824MHz}$+MPE/$limit_{410MHz}$=0.006/2.75+0.522/1.0=0.524＜1.0.

The ratio=MPE/$limit_{1850MHz}$+MPE/$limit_{410MHz}$=0.001/5.0+0.522/1.0=0.522＜1.0.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 50 cm from nearby persons.

Result: Compliance