

FCC §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 1.1310, 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/cm²);

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);

Calculated Data:

Mode	Frequency Range (MHz)	Antenna Gain		Target Output Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
GSM 850	824~849	2.0	1.58	24.0	251.19	20	0.0792	0.55
GPRS 850	824~849	2.0	1.58	29.5	891.25	20	0.2810	0.55
GSM 1900	1850~1910	2.0	1.58	23.0	199.53	20	0.0627	1.00
GPRS 1900	1850~1910	2.0	1.58	27.0	501.19	20	0.1575	1.00

GSM 850: Maximum Tune-up output power with 1 slot is 33.00 dBm, so the max tune-up time based Ave. power compared to slot Ave. power is 24.00 dBm.

GPRS 850: Maximum Tune-up output power with 1 slot is 34.00 dBm, 2 slots is 33.50 dBm, 3 slots is 33.00 dBm, 4 slots is 32.50 dBm, so the max tune-up time based Ave. power compared to slot Ave. power are 29.50 dBm.

GSM 1900: Maximum Tune-up output power with 1 slot is 32.00 dBm, so the max tune-up time based Ave. power compared to slot Ave. power is 23.00 dBm .

GPRS 1900: Maximum Tune-up output power with 1 slot is 32.00 dBm, 2 slots is 31.00 dBm, 3 slots is 30.00 dBm, 4 slots is 30.00 dBm, so the max tune-up time based Ave. power compared to slot Ave. power are 27.00 dBm .

Number of Time slot	1	2	3	4
Duty Cycle	1:8	1:4	1:2.66	1:2
Time based Ave. power compared to slotted Ave. power	-9 dB	-6 dB	-4.26 dB	-3 dB

Note:

1. Antenna Gain (numeric): 2.0dBi (1.58).

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