

11 FCC §1.1307(b) (1) & §2.1091 - RF EXPOSURE

11.1 Applicable Standard

According to §1.1310 and §2.1091 (Mobile Devices) 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

Note: f = frequency in MHz

* = Plane-wave equivalent power density

11.2 MPE Prediction

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

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

850 MHz Cellular Band Uplink:

Maximum peak output power at antenna input terminal (dBm): 23.9

Maximum peak output power at antenna input terminal (mW): 245.47

Prediction distance (cm): 25.0

Prediction frequency (MHz): 836.6

Antenna Gain, typical (dBi): 9.0

Maximum Antenna Gain (numeric): 7.94

Power density at predication frequency and distance (mW/cm²): 0.248

MPE limit for uncontrolled exposure at predication frequency (mW/cm²): 0.558

850 MHz Cellular Band Downlink:

Maximum peak output power at antenna input terminal (dBm):	<u>14.93</u>
Maximum peak output power at antenna input terminal (mW):	<u>31.11</u>
Prediction distance (cm):	<u>25.0</u>
Prediction frequency (MHz):	<u>881.6</u>
Antenna Gain, typical (dBi):	<u>9.0</u>
Maximum Antenna Gain (numeric):	<u>7.94</u>
Power density at predication frequency and distance (mW/cm ²):	<u>0.031</u>
MPE limit for uncontrolled exposure at predication frequency (mW/cm ²):	<u>0.588</u>

1900 MHz PCS Band Uplink:

Maximum peak output power at antenna input terminal (dBm):	<u>19.6</u>
Maximum peak output power at antenna input terminal (mW):	<u>91.2</u>
Prediction distance (cm):	<u>25.0</u>
Prediction frequency (MHz):	<u>1880</u>
Antenna Gain, typical (dBi):	<u>9.0</u>
Maximum Antenna Gain (numeric):	<u>7.94</u>
Power density at predication frequency and distance (mW/cm ²):	<u>0.092</u>
MPE limit for uncontrolled exposure at predication frequency (mW/cm ²):	<u>1.0</u>

PCS 1900 MHz Band Downlink:

Maximum peak output power at antenna input terminal (dBm):	<u>11.54</u>
Maximum peak output power at antenna input terminal (mW):	<u>14.25</u>
Prediction distance (cm):	<u>25.0</u>
Prediction frequency (MHz):	<u>1960</u>
Antenna Gain, typical (dBi):	<u>9.0</u>
Maximum Antenna Gain (numeric):	<u>7.94</u>
Power density at predication frequency and distance (mW/cm ²):	<u>0.014</u>
MPE limit for uncontrolled exposure at predication frequency (mW/cm ²):	<u>1.0</u>

Test Result

For Uplink, the highest power density level at 25 cm is 0.248mW/cm², which is below the uncontrolled exposure limit of 1 mW/cm² at 836.6 MHz.

For Downlink, the highest power density level at 25 cm is 0.031mW/cm², which is below the uncontrolled exposure limit of 0.588 mW/cm² at 881.6 MHz.

So the indoor antenna prediction distance should be greater then 25 cm, and outdoor antenna prediction distance should be greater then 25 cm.