

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

11.1 Applicable Standard

According to FCC §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	¹ (100)	30
1.34-30	824/f	2.19/f	¹ (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 = Plane-wave equivalent power density

11.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from 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 band, Uplink:

Maximum peak output power at antenna input terminal (dBm): 34.12

Maximum peak output power at antenna input terminal (mW): 2582.26

Prediction distance (cm): 30

Prediction frequency (MHz): 836.6

Antenna Gain, typical (dBi): 3

Maximum Antenna Gain (numeric): 2

Power density at predication frequency and distance (mW/cm²): 0.457

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

850 MHz band, Downlink:

Maximum peak output power at antenna input terminal (dBm):	<u>31.58</u>
Maximum peak output power at antenna input terminal (mW):	<u>1438.80</u>
Prediction distance (cm):	<u>30</u>
Prediction frequency (MHz):	<u>881.6</u>
Antenna Gain, typical (dBi):	<u>6</u>
Maximum Antenna Gain (numeric):	<u>3.98</u>
Power density at predication frequency and distance (mW/cm ²):	<u>0.506</u>
MPE limit for uncontrolled exposure at predication frequency (mW/cm ²):	<u>0.588</u>

1900 MHz band, Uplink:

Maximum peak output power at antenna input terminal (dBm):	<u>29.77</u>
Maximum peak output power at antenna input terminal (mW):	<u>948.42</u>
Prediction distance (cm):	<u>30</u>
Prediction frequency (MHz):	<u>1880</u>
Antenna Gain, typical (dBi):	<u>3</u>
Maximum Antenna Gain (numeric):	<u>2</u>
Power density at predication frequency and distance (mW/cm ²):	<u>0.334</u>
MPE limit for uncontrolled exposure at predication frequency (mW/cm ²):	<u>1.0</u>

1900 MHz band, Downlink:

Maximum peak output power at antenna input terminal (dBm):	<u>31.39</u>
Maximum peak output power at antenna input terminal (mW):	<u>1377.21</u>
Prediction distance (cm):	<u>30</u>
Prediction frequency (MHz):	<u>1960</u>
Antenna Gain, typical (dBi):	<u>6</u>
Maximum Antenna Gain (numeric):	<u>3.98</u>
Power density at predication frequency and distance (mW/cm ²):	<u>0.485</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 30 cm is 0.457 mW/cm², which is below the uncontrolled exposure limit of 0.588 mW/cm² at 836.6 MHz.

For Downlink, the highest power density level at 30 cm is 0.506 mW/cm², which is below the uncontrolled exposure limit of 0.588 mW/cm² at 881.6 MHz.

Thus, the indoor and outdoor antenna prediction distance should be greater than 30 cm.