

## 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 <sup>2</sup> )	Averaging Time (minute)
<b>Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	<sup>1</sup> (100)	30
1.34-30	824/f	2.19/f	<sup>1</sup> (180/f <sup>2</sup> )	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

<sup>1</sup> = 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/cm<sup>2</sup>): 0.457

MPE limit for uncontrolled exposure at predication frequency (mW/cm<sup>2</sup>): 0.558

**850 MHz band, Downlink:**

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

**1900 MHz band, Uplink:**

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

**1900 MHz band, Downlink:**

Maximum peak output power at antenna input terminal (dBm): 31.39  
Maximum peak output power at antenna input terminal (mW): 1377.21  
Prediction distance (cm): 30  
Prediction frequency (MHz): 1960  
Antenna Gain, typical (dBi): 6  
Maximum Antenna Gain (numeric): 3.98  
Power density at predication frequency and distance (mW/cm<sup>2</sup>): 0.485  
MPE limit for uncontrolled exposure at predication frequency (mW/cm<sup>2</sup>): 1.0

**Test Result**

For Uplink, the highest power density level at 30 cm is 0.457 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 0.588 mW/cm<sup>2</sup> at 836.6 MHz.

For Downlink, the highest power density level at 30 cm is 0.506 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 0.588 mW/cm<sup>2</sup> at 881.6 MHz.

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