11 §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):	22.42
Maximum peak output power at antenna input terminal (mW):	174.58
Prediction distance (cm):	25
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/cm^2):	0.1765
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.558

850 MHz Cellular Band Downlink:

Maximum peak output power at antenna input terminal (dBm):	25.28
Maximum peak output power at antenna input terminal (mW):	377.29
Prediction distance (cm):	25
Prediction frequency (MHz):	881.6
Antenna Gain, typical (dBi):	9
Maximum Antenna Gain (numeric):	7.94
Power density at predication frequency and distance (mW/cm^2):	0.3410
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.588

1900 MHz PCS Band Uplink:

Maximum peak output power at antenna input terminal (dBm):	23.12
Maximum peak output power at antenna input terminal (mW):	205.12
Prediction distance (cm):	25
Prediction frequency (MHz):	1880
Antenna Gain, typical (dBi):	9
Maximum Antenna Gain (numeric):	7.94
Power density at predication frequency and distance (mW/cm^2):	0.2074
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	1.0

PCS 1900 MHz Band Downlink:

Maximum peak output power at antenna input terminal (dBm):	23.48
Maximum peak output power at antenna input terminal (mW):	222.84
Prediction distance (cm):	25
Prediction frequency (MHz):	1960
Antenna Gain, typical (dBi):	9
Maximum Antenna Gain (numeric):	7.94
Power density at predication frequency and distance (mW/cm^2):	0.2253
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	1.0

Test Result

For Uplink, the highest power density level at 25 cm is 0.2074mW/cm², which is below the uncontrolled exposure limit of 1 mW/cm² at 1880 MHz.

For Downlink, the highest power density level at 25 cm is 0.3410mW/cm², which is below the uncontrolled exposure limit of 0.588mW/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.