

## 11 FCC §1.1307(b), §27.52 & §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 <sup>2</sup> )	Averaging Time (minute)
<b>Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(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

\* = 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

**Downlink:****QPSK:**

Maximum peak output power at antenna input terminal (dBm): 15.49  
 Maximum peak output power at antenna input terminal (mW): 35.40  
     Prediction distance (cm): 20  
     Prediction frequency (MHz): 752  
     Antenna Gain, typical (dBi): 8.39  
     Maximum Antenna Gain (numeric): 6.902  
 Power density at predication frequency and distance (mW/cm<sup>2</sup>): 0.0486  
 MPE limit for uncontrolled exposure at predication frequency (mW/cm<sup>2</sup>): 0.5013

**16QAM:**

Maximum peak output power at antenna input terminal (dBm): 15.47  
 Maximum peak output power at antenna input terminal (mW): 35.24  
     Prediction distance (cm): 20  
     Prediction frequency (MHz): 752  
     Antenna Gain, typical (dBi): 8.39  
     Maximum Antenna Gain (numeric): 6.902  
 Power density at predication frequency and distance (mW/cm<sup>2</sup>): 0.04839  
 MPE limit for uncontrolled exposure at predication frequency (mW/cm<sup>2</sup>): 0.5013

**64QAM:**

Maximum peak output power at antenna input terminal (dBm): 15.61  
 Maximum peak output power at antenna input terminal (mW): 36.39  
     Prediction distance (cm): 20  
     Prediction frequency (MHz): 752  
     Antenna Gain, typical (dBi): 8.39  
     Maximum Antenna Gain (numeric): 6.902  
 Power density at predication frequency and distance (mW/cm<sup>2</sup>): 0.04997  
 MPE limit for uncontrolled exposure at predication frequency (mW/cm<sup>2</sup>): 0.5013

**Uplink:****QPSK:**

Maximum peak output power at antenna input terminal (dBm): -18.13  
 Maximum peak output power at antenna input terminal (mW): 0.0154  
     Prediction distance (cm): 20  
     Prediction frequency (MHz): 782  
     Antenna Gain, typical (dBi): 8.39  
     Maximum Antenna Gain (numeric): 6.902  
 Power density at predication frequency and distance (mW/cm<sup>2</sup>): 0.0000211  
 MPE limit for uncontrolled exposure at predication frequency (mW/cm<sup>2</sup>): 0.5213

**16QAM:**

Maximum peak output power at antenna input terminal (dBm): -18.66  
 Maximum peak output power at antenna input terminal (mW): 0.0136  
     Prediction distance (cm): 20  
     Prediction frequency (MHz): 782  
     Antenna Gain, typical (dBi): 8.39  
     Maximum Antenna Gain (numeric): 6.902  
 Power density at predication frequency and distance (mW/cm<sup>2</sup>): 0.0000187  
 MPE limit for uncontrolled exposure at predication frequency (mW/cm<sup>2</sup>): 0.5213

## 64QAM:

Maximum peak output power at antenna input terminal (dBm):	<u>-19.02</u>
Maximum peak output power at antenna input terminal (mW):	<u>0.0125</u>
Prediction distance (cm):	<u>20</u>
Prediction frequency (MHz):	<u>782</u>
Antenna Gain, typical (dBi):	<u>8.39</u>
Maximum Antenna Gain (numeric):	<u>6.902</u>
Power density at predication frequency and distance (mW/cm <sup>2</sup> ):	<u>0.0000172</u>
MPE limit for uncontrolled exposure at predication frequency (mW/cm <sup>2</sup> ):	<u>0.5213</u>

**Test Result**

For Downlink, the highest power density level at 20 cm is 0.04997mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 0.5013 mW/cm<sup>2</sup> at 752 MHz.

For Uplink, the highest power density level at 40 cm is 0.0000211mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 0.5213 mW/cm<sup>2</sup> at 782 MHz.

*Note:*

*Antenna gain is restricted to 1.5 Watt ERP (2.49 Watt EIRP) in order to satisfy RF expo- sure compliance requirements. If higher than 1.5 Watt ERP, routine MPE evaluation is needed. The antennas should be installed to provide at least 20 cm from all persons to satisfy MPE requirements of FCC Part 2, 2.1091.*