

# RF Exposure Statement

## 1. LIMITS

According to §1.1310 and §2.1091 RF exposure is calculated.

(B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
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

## 2. MAXIMUM PERMISSIBLE EXPOSURE Prediction

Prediction of MPE limit at a given distance

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

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

### 3. RESULTS

#### 3-1. GSM 850 BAND

Average Max output Power at antenna input terminal(dBm)	33.5
Average Max output Power at antenna input terminal(mW)	2238.721
Prediction distance (cm)	20.000
Prediction frequency (MHz)	824.200
Antenna Gain(peak) (dBi)	-3.250
Antenna Gain(numeric)	0.473
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.211
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	0.549

#### 3-2. GSM 1900 BAND

Average Max output Power at antenna input terminal(dBm)	30.500
Average Max output Power at antenna input terminal(mW)	1122.018
Prediction distance (cm)	20.000
Prediction frequency (MHz)	1930.200
Antenna Gain(peak) (dBi)	1.260
Antenna Gain(numeric)	1.337
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.298
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

**3-3. WCDMA 850 BAND**

Average Max output Power at antenna input terminal(dBm)	25.500
Average Max output Power at antenna input terminal(mW)	354.813
Prediction distance (cm)	20.000
Prediction frequency (MHz)	826.400
Antenna Gain(peak) (dBi)	-3.250
Antenna Gain(numeric)	0.473
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.033
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	0.551

**3-4. WCDMA 1900 BAND**

Average Max output Power at antenna input terminal(dBm)	25.500
Average Max output Power at antenna input terminal(mW)	354.813
Prediction distance (cm)	20.000
Prediction frequency (MHz)	1852.400
Antenna Gain(peak) (dBi)	1.260
Antenna Gain(numeric)	1.337
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.094
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

**3-5. WCDMA 1700 BAND**

Average Max output Power at antenna input terminal(dBm)	25.500
Average Max output Power at antenna input terminal(mW)	354.813
Prediction distance (cm)	20.000
Prediction frequency (MHz)	1712.4
Antenna Gain(peak) (dBi)	-0.130
Antenna Gain(numeric)	0.971
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.069
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

**3-6. LTE BAND 2**

Average Max output Power at antenna input terminal(dBm)	26.200
Average Max output Power at antenna input terminal(mW)	416.869
Prediction distance (cm)	20.000
Prediction frequency (MHz)	1850.700
Antenna Gain(peak) (dBi)	1.260
Antenna Gain(numeric)	1.337
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.111
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

**3-7. LTE BAND 5**

Average Max output Power at antenna input terminal(dBm)	26.200
Average Max output Power at antenna input terminal(mW)	416.869
Prediction distance (cm)	20.000
Prediction frequency (MHz)	824.700
Antenna Gain(peak) (dBi)	-3.250
Antenna Gain(numeric)	0.473
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.039
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	0.550

**3-8. LTE BAND 4**

Average Max output Power at antenna input terminal(dBm)	26.200
Average Max output Power at antenna input terminal(mW)	416.869
Prediction distance (cm)	20.000
Prediction frequency (MHz)	1710.700
Antenna Gain(peak) (dBi)	-0.130
Antenna Gain(numeric)	0.971
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.080
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

**3-9. LTE BAND 17**

Average Max output Power at antenna input terminal(dBm)	26.200
Average Max output Power at antenna input terminal(mW)	416.869
Prediction distance (cm)	20.000
Prediction frequency (MHz)	706.500
Antenna Gain(peak) (dBi)	-3.030
Antenna Gain(numeric)	0.498
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.041
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	0.471

**3-10. LTE BAND 7**

Average Max output Power at antenna input terminal(dBm)	26.200
Average Max output Power at antenna input terminal(mW)	416.869
Prediction distance (cm)	20.000
Prediction frequency (MHz)	2502.500
Antenna Gain(peak) (dBi)	-0.220
Antenna Gain(numeric)	0.951
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.079
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

**3-11. LTE BAND 12**

Average Max output Power at antenna input terminal(dBm)	26.200
Average Max output Power at antenna input terminal(mW)	416.869
Prediction distance (cm)	20.000
Prediction frequency (MHz)	699.700
Antenna Gain(peak) (dBi)	-3.030
Antenna Gain(numeric)	0.498
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.041
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	0.466

**3-12. BT LE**

Average Max output Power at antenna input terminal(dBm)	0.000
Average Max output Power at antenna input terminal(mW)	1.0000
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	2402.00000
Antenna Gain(peak) (dBi)	4.03
Antenna Gain(numeric)	2.52930
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.000503
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

**3-13. DTS (2.4GHz) 802.11 b BAND**

Average Max output Power at antenna input terminal(dBm)	16.0000
Average Max output Power at antenna input terminal(mW)	39.811
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	2412.00000
Antenna Gain(Peak) (dBi)	6.01000
Antenna Gain(numeric)	3.99025
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.031603
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

**3-14. DTS (2.4GHz) 802.11 g BAND**

Average Max output Power at antenna input terminal(dBm)	14.0000
Average Max output Power at antenna input terminal(mW)	25.119
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	2412.00000
Antenna Gain(Peak) (dBi)	6.01000
Antenna Gain(numeric)	3.99025
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.019940
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

**3-15. DTS (2.4GHz) 802.11n 20MHz BAND**

Average Max output Power at antenna input terminal(dBm)	13.0000
Average Max output Power at antenna input terminal(mW)	19.953
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	2412.00000
Antenna Gain(Peak) (dBi)	6.01000
Antenna Gain(numeric)	3.99025
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.015839
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

**3-16. DTS (2.4GHz) 802.11n 40MHz BAND**

Average Max output Power at antenna input terminal(dBm)	13.0000
Average Max output Power at antenna input terminal(mW)	19.953
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	2422.00000
Antenna Gain(Peak) (dBi)	3.04000
Antenna Gain(numeric)	2.01372
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.007993
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

**(UNII 1 BAND)**

3-17 802.11a (5180 ~ 5240)

Average Max output Power at antenna input terminal(dBm)	8.0000
Average Max output Power at antenna input terminal(mW)	6.310
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	5180.00000
Antenna Gain(peak) (dBi)	7.40000
Antenna Gain(numeric)	5.49541
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.006898
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

3-18 802.11n 20MHz BW(5180 ~ 5240)

Average Max output Power at antenna input terminal(dBm)	6.0000
Average Max output Power at antenna input terminal(mW)	3.981
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	5180.00000
Antenna Gain(peak) (dBi)	7.40000
Antenna Gain(numeric)	5.49541
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.004352
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

3-19 802.11n 40MHz BW (5190 ~ 5230)

Average Max output Power at antenna input terminal(dBm)	5.0000
Average Max output Power at antenna input terminal(mW)	3.162
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	5190.00000
Antenna Gain(peak) (dBi)	4.40000
Antenna Gain(numeric)	2.75423
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.001733
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

3-20 802.11ac 20 MHz BW (5180 ~ 5240)

Average Max output Power at antenna input terminal(dBm)	4.0000
Average Max output Power at antenna input terminal(mW)	2.512
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	5180.00000
Antenna Gain(peak) (dBi)	4.40000
Antenna Gain(numeric)	2.75423
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.001376
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

3-21 802.11ac 40MHz BW (5190~ 5230)

Average Max output Power at antenna input terminal(dBm)	3.0000
Average Max output Power at antenna input terminal(mW)	1.995
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	5190.00000
Antenna Gain(peak) (dBi)	4.40000
Antenna Gain(numeric)	2.75423
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.001093
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

3-22 802.11ac 80MHz BW (5210)

Average Max output Power at antenna input terminal(dBm)	2.0000
Average Max output Power at antenna input terminal(mW)	1.585
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	5210.00000
Antenna Gain(peak) (dBi)	4.40000
Antenna Gain(numeric)	2.75423
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.000868
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

**(UNII 3 BAND)**

**3-23 802.11a (5745 ~ 5825)**

Average Max output Power at antenna input terminal(dBm)	8.0000
Average Max output Power at antenna input terminal(mW)	6.310
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	5745.00000
Antenna Gain(peak) (dBi)	7.74000
Antenna Gain(numeric)	5.94292
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.007460
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

**3-24 802.11n 20MHz BW(5745 ~ 5825)**

Average Max output Power at antenna input terminal(dBm)	6.0000
Average Max output Power at antenna input terminal(mW)	3.981
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	5745.00000
Antenna Gain(peak) (dBi)	7.74000
Antenna Gain(numeric)	5.94292
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.004707
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

3-25 802.11n 40MHz BW (5755 ~ 5795)

Average Max output Power at antenna input terminal(dBm)	5.0000
Average Max output Power at antenna input terminal(mW)	3.162
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	5755.00000
Antenna Gain(peak) (dBi)	4.73000
Antenna Gain(numeric)	2.97167
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.001870
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

3-26 802.11ac 20 MHz BW (5745 ~ 5825)

Average Max output Power at antenna input terminal(dBm)	4.0000
Average Max output Power at antenna input terminal(mW)	2.512
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	5745.00000
Antenna Gain(peak) (dBi)	4.73000
Antenna Gain(numeric)	2.97167
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.001485
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

3-27 802.11ac 40MHz BW (5755~ 5795)

Average Max output Power at antenna input terminal(dBm)	3.0000
Average Max output Power at antenna input terminal(mW)	1.995
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	5755.00000
Antenna Gain(peak) (dBi)	4.73000
Antenna Gain(numeric)	2.97167
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.001180
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

3-28 802.11ac 80MHz BW (5775)

Average Max output Power at antenna input terminal(dBm)	2.0000
Average Max output Power at antenna input terminal(mW)	1.585
Prediction distance (cm)	20.00000
Prediction frequency (MHz)	5775.00000
Antenna Gain(peak) (dBi)	4.73000
Antenna Gain(numeric)	2.97167
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.000937
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.00000

1. The power density level at 20 cm is **0.298 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at GSM 1900**
2. The power density level at 20 cm is **0.031603 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at DTS (2.4GHz)802.11b Band**

->Simultaneous MPE 20cm is  $(0.298 / 1.0) + (0.031603 / 1.0) < 1$

\* The Worst case GSM 1900: 30.5 dBm , DTS (2.4GHz)802.11b Band: 16 dBm is Highest Power