Maximum Permissible Exposure (MPE) Calculation

Reference document:	**47 CFR §15.247(i) & §1.1310**	
Test Requirements:	According to §1.1310, the criteria listed in tab. 1 shall be used to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b). For equipment authorization purposes the term co-location refers to simultaneously transmitting (co-transmitting) antennas located within 20cm of each other within a product.	
Limit	$1mW/cm^2$	**Comply**
Calculation Result*:	Power Density = 0.860mW/cm2 at a sphere of 20cm.	

Prediction for part 22 (max antenna gain for mobile operations)
Maximum conducted peak power:15 dBm
Highest admissible antenna gain for 850 MHz mobile operation (@20cm) where no routine evaluation is required according § 2.1091(c) for P=1.5W ERP
G=10log1500mW[ERP]-15dBm +2.14 dB=18.900 dBi

Prediction for part 24 (max antenna gain for mobile operations)
Maximum conducted peak power:15 dBm
Highest admissible antenna gain for 1900 MHz mobile operation (@20cm) where no routine evaluation is required according § 2.1091(c) and § 24.232 for P= 2W EIRP
G=10log2000mW[EIRP]-15dBm =18.010 dBi

In order to meet OET Bulletin 65 requirements the highest admissible antennas gain for 850 MHz & 1900 MHz bands are 17 dBi as calculate below:

* Equation given in OET Bulletin 65 is used to estimate the MPE distance.

$$S = \frac{PG}{4\pi R^2}$$

S=power density, in mW/cm2
P=power input to the antenna, in mW
G=numeric gain of the antenna,
R= distance to the center of the antenna, in cm

MPE levels at 20cm are calculated as follows:
850 Band, Worst-Case

Frequency MHz	MPE Distance [cm]	Max. Output Power [mW]	Max Antenna Gain [dBi]	Power density [mW/cm2]	Limit [mW/cm2]
GSM850, Worst-Case					
869	20	31.62	17	0.3154	0.5793

1900 Band , Worst-Case

Frequency Band MHz	MPE Distance [cm]	Output Power [mW]	Max. Antenna Gain [dBi]	Power density [mW/cm2]	Limit [mW/cm2]
1930	20	31.62	17	0.3154	1

Total MPEs for bands are transmitting simultaneously:

0.3154 /0.579 + 0.3154/1= 0.860 mW/cm2 < 1 mW/cm2