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 = 0.8676mW/cm^2 at a sphere of 20cm.	

For GSM850 module transmitting simultaneously with the Bluetooth module, the worst case prediction occurs at Channel 251, 848.8 MHz, 1807.17mW output power, 1.33dBi antenna gain and 2480 MHz, 13.03mW output power, 2dBi antenna gain. The maximum exposure level in this scenario is 0.868mW/cm^2 at a distance of 20 cm.

* Equation (3) given in OET Bulletin 65 is used to estimate the MPE distance.

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

S=power density, in mW/cm^2
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:

Frequency MHz		MPE Distance [cm]	Max. Output Power [mW]	Antenna Gain [dBi]	Power density [mW/cm^2]	Limit [mW/cm^2]
GSM850, Worst-Case						
848.8		20	1807.17	1.33	0.4886	0.5659

Bluetooth

Frequency Band MHz		MPE Distance [cm]	Output Power [mW]	Max. Antenna Gain [dBi]	Power density [mW/cm^2]	Limit [mW/cm^2]
Hopping frequency, Worst-Case						
2480		20	13.03	2	0.00411	1

Total MPEs for both modules transmitting simultaneously:

0.4886/0.5659 + 0.00411/1= 0.8676 mW/cm^2 < 1 mW/cm^2