

## **FCC §1.1310& §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

### **Applicable Standard**

According to subpart 15.247 (i) and subpart 1.1310, 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
<b>Frequency Range (MHz)</b>	<b>Electric Field Strength (V/m)</b>	<b>Magnetic Field Strength (A/m)</b>	<b>Power Density (mW/cm<sup>2</sup>)</b>	<b>Averaging Time (minutes)</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;

### **Calculated Formulary:**

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$  = power density (in appropriate units, e.g. mW/cm<sup>2</sup>);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

**Calculated Data:**

Mode	Frequency Range (MHz)	Maximum Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
		(dBi)	(numeric)	(dBm)	(mW)			
Zigbee	2405~2480	2.00	1.58	18.00	63.10	20	0.0198	1.00
WCDMA Band II	1850.0-1910.0	2.00	1.58	23.50	223.87	20	0.0706	1.00
WCDMA Band V	824.0-849.0	2.00	1.58	24.50	281.84	20	0.0889	0.55

**Note:**

- (1) The tune-up output powers are all declared by the Manufacturer.  
 (2) The WCDMA module FCC ID:XMR201510UC20.  
 (3) Zigbee and WCDMA can transmit simultaneously; the worst condition is as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.0198/1.0 + 0.0889/0.55 = 0.0198 + 0.1616 = 0.1814 < 1.0$$

**Result:** The device meet FCC MPE at 20 cm distance.