

Maximum Permissible Exposure

1. Introduction

Applicant: Chengdu Diyue Technology Co., Ltd.
 Product: ZigBee wireless communication module
 Model no.: SZU06C1, SZU06C2
 FCC ID: 2ALOUSZU06C
 Modulation: O-QPSK
 Radio technology: IEEE 802.15.4
 Operational Frequency: 2405MHz-2480MHz

2. Limit of Maximum Permissible Exposure

Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	F/300	6
1500-100,000	-	-	5	6
Limits for General Population / Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	F/1500	30
1500-100,000	-	-	1.0	30
Note 1: f = frequency in MHz ; *Plane-wave equivalent power density				
Note 2: For the applicable limit, see FCC 1.1310				

3. Calculation method

$$E (V/m) = \frac{\sqrt{30 \times P \times G}}{d}$$

E = Electric field (V/m)

G = EUT Antenna numeric gain (numeric)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

$$\text{Power Density: } Pd (W/m^2) = \frac{E^2}{377}$$

P = RF output power (W)

d = Separation distance between radiator and human body (m)

4. Result of Maximum Permissible Exposure

Model	Max Gain (dBi)	Ch.	Freq. (MHz)	Peak Power (dBm)	Average Power (dBm)	Limit (dBm)
Zigbee	3.66	11	2405	15.32	15.16	30
	3.66	19	2440	15.58	15.41	30
	3.66	25	2475	15.33	15.21	30
	3.66	26	2480	10.09	9.78	30

Worst Maximum RF Output Power Result					
Exposure Enviroment		General Population / Uncontrolled Exposure			
Separation Distance (cm)		20			
Condition		RF Output Power (dBm)			
Modulation Mode	Channel	Peak Power (dBm)	Max Gain (dBi)	EIRP Power (dBm)	PD (S) (mW/cm ²)
O-QPSK	19	15.58	3.66	19.24	0.0167
Maximum Permissible Exposure Limit (mW/cm ²)					1