

1 Maximum Permissible Exposure

1.1 Maximum Permissible Exposure

1.1.1 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	1,842 / f	4.89 / f	(900/ f ²)*	6
30-300	61.4	0.163	1.0	6
300-1,500	-	-	F/300	6
1,500-100,000	-	-	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
300-1,500	-	-	F/1500	30
1,500-100,000	-	-	1.0	30
Note 1: f = frequency in MHz ; *Plane-wave equivalent power density				
Note 2: For the applicable limit, see FCC 1.1310				

1.1.2 MPE Calculation Method

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

E = Electric field (V/m)

G = EUT Antenna numeric gain (numeric)

The formula can be changed to

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

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

P = RF output power (W)

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

1.1.3 Result of Maximum Permissible Exposure

Transmitter Chains & Receiver Chains Information					
IEEE Std. 802.11 Protocol	Freq. (MHz)	Number of Transmit Chains (N _{TX})	Number of Receive Chains (N _{RX})	Correlation Signals with Multiple N _{TX}	RF Output Power (dBm)
Zigbee	2442	1	1	N/A	3.97
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.					

Worst Maximum RF Output Power Result						
Exposure Environment			General Population / Uncontrolled Exposure			
Separation Distance (cm)			20			
Condition			RF Output Power (dBm)			
Modulation Mode	Freq. (MHz)	N _{TX}	RF Output Power (dBm)	Gain (dBi)	EIRP Power	PD (S) (mW/cm ²)
Zigbee	2442	1	3.97	3.80	7.77	0.00119
Maximum Permissible Exposure Limit (mW/cm ²)						1
Note 1: N _{TX} = Number of Transmit Chains						