

FCC ID:UVIBS31A

Maximum Permissible Exposure (MPE)

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency(RF) Radiation as specified in §1.1307(b)

According to KDB447498 D01 General RF Exposure Guidance V06

Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
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
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
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

f = frequency in MHz * = Plane-wave equivalent power density

MPE Calculation Method

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

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

E = Electric field (V/m)

P = Average RF output power (W)

G = EUT Antenna numeric gain (numeric)

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

The formula can be changed to

$$Pd = \frac{30 * P * G}{377 * D^2}$$

From the EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

2.4G WIFI:

Operation Frequency: WIFI 2412-2462MHz for 802.11b/g/11n(HT20);

WIFI 802.11n HT40:2422-2452MHz

Power density limited: 1mW/ cm²

Antenna Type: PCB Antenna

antenna gain: -1.8dBi;

R=20cm

mW=10^{^(dBm/10)}

antenna gain Numeric=10^{^(dBi/10)}

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density
		(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
2412	802.11b	14.49	14.5±1	15.5	35.481	-1.80	0.66	0.0047	1
2437		14.38	14.5±1	15.5	35.481	-1.80	0.66	0.0047	1
2462		14.35	14.5±1	15.5	35.481	-1.80	0.66	0.0047	1
2412	802.11g	10.03	10.5±1	11.5	14.125	-1.80	0.66	0.0019	1
2437		11.86	11.5±1	12.5	17.783	-1.80	0.66	0.0023	1
2462		10.02	10.5±1	11.5	14.125	-1.80	0.66	0.0019	1
2412	802.11n H20	9.68	10±1	11	12.589	-1.80	0.66	0.0017	1
2437		10.44	10±1	11	12.589	-1.80	0.66	0.0017	1
2462		10.11	10±1	11	12.589	-1.80	0.66	0.0017	1
2422	802.11n(H T40)	10.06	10±1	11	12.589	-1.80	0.66	0.0017	1
2437		10.24	10±1	11	12.589	-1.80	0.66	0.0017	1
2452		10.49	10±1	11	12.589	-1.80	0.66	0.0017	1

SRD

Operation Frequency: GFSK: 908.7-921.3MHz

Antenna Type: Antenna Type: FPCB Antenna

Antenna gain: Antenna 1 : 2 dBi

Antenna gain: Antenna 2 : 2 dBi

R=20cm

Transmit power:

Frequency (MHz)	EIRP power (dBuV/m)	EIRP power (dBm)
908.7-921.3-ANT1	100.98	5.72
908.7-921.3-ANT2	107.12	11.86

$$\text{EIRP} = E - 104.8 + 20 \log(D)$$

EIRP=conducted power + antenna gain

Channel Freq. (MHz)	ANT	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
			(dBm)		tune-up power		Gain			
					(dBm)	(mW)	(dBi)	Numeric		
908.7	ANT1	GFSK	3.72	4±1	5	3.162	2	1.58	0.0010	0.6058
921.3	ANT2	GFSK	9.86	10±1	11	12.589	2	1.58	0.0040	0.6142

Note:

1. NO simultaneous transmissions are possible for this device of Wi-Fi 2.4G + SRD.
2. NO simultaneous transmissions are possible for this device of SRD ANT1+ANT2.

Conclusion:

For the max result : $0.0047 \leq 1\text{mW/cm}^2$ for Power density, $0.0040 \leq 0.6142\text{mW/cm}^2$ for Power density, compliance with RF exposure.

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