

FCC ID: 2A4OQNSA250

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)

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

$$E \text{ (V/m)} = \frac{\sqrt{30 * P * G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

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.

Operation Frequency: 2.4g WIFI 802.11b/g/n HT20: 2412-2462MHz
802.11n HT40: 2422-2452MHz
BT: 2402-2480MHz

Power density limited: 1mW/ cm²

Antenna Type: External Antenna

Antenna gain: 2dBi;

R=20cm

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

antenna gain Numeric=10^{^(dBi/10)}= 10^{^(2/10)}=1.58

2.4g WIFI

Antenna	Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density
			(dBm)		tune-up power		Gain			
					(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)	(mW/cm2)
Ant 1	2412	802.11b	15.23	15±1	16	39.811	2.00	1.58	0.01255	1
Ant 1	2437		15.29	15±1	16	39.811	2.00	1.58	0.01255	1
Ant 1	2462		15.45	15±1	16	39.811	2.00	1.58	0.01255	1
Ant 1	2412	802.11g	13.85	13±1	14	25.119	2.00	1.58	0.00792	1
Ant 1	2437		13.85	13±1	14	25.119	2.00	1.58	0.00792	1
Ant 1	2456		13.68	13±1	14	25.119	2.00	1.58	0.00792	1
Ant 1	2412	802.11n H20	14.52	14±1	15	31.623	2.00	1.58	0.00997	1
Ant 1	2437		14.41	14±1	15	31.623	2.00	1.58	0.00997	1
Ant 1	2462		13.72	14±1	15	31.623	2.00	1.58	0.00997	1
Ant 1	2422	802.11n H40	12.35	12±1	13	19.953	2.00	1.58	0.00629	1
Ant 1	2437		12.88	12±1	13	19.953	2.00	1.58	0.00629	1
Ant 1	2452		12.99	12±1	13	19.953	2.00	1.58	0.00629	1

BT 3.0

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		
2402	GFSK	-1.435	-2±1	-1	0.794	2.00	1.58	0.00025	1
2441		-2.327	-2±1	-1	0.794	2.00	1.58	0.00025	1
2480		-1.448	-2±1	-1	0.794	2.00	1.58	0.00025	1
2402	π/4-DQPSK	-0.58	-1±1	0	1.000	2.00	1.58	0.00032	1
2441		-1.033	-1±1	0	1.000	2.00	1.58	0.00032	1
2480		-0.477	-1±1	0	1.000	2.00	1.58	0.00032	1
2402	8-DPSK	-0.369	0±1	1	1.259	2.00	1.58	0.00040	1
2441		-0.808	0±1	1	1.259	2.00	1.58	0.00040	1
2480		-0.361	0±1	1	1.259	2.00	1.58	0.00040	1

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Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm2)	Power density (mW/cm2)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2402	GFSK	-7.178	-7±1	-8	0.158	2.00	1.58	0.00005	1
2440		-6.958	-7±1	-8	0.158	2.00	1.58	0.00005	1
2480		-6.642	-7±1	-8	0.158	2.00	1.58	0.00005	1

Note: This product does not support simultaneous transmission.

The conclusion should be $0.01255 < 1$ for Max Power Density, Compliance the RF Exposure requirement.

Signature:

Date: 2022-04-06



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