

RF EXPOSURE EVALUATION

According to FCC 1.1310 and KDB 447498 D01 V06, 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 FCC 2.1091

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.

Measurement Result

BT:

Operation Frequency: 2402MHz~2480MHz

Power density limited: 1mW/ cm²

Antenna Type:FPC Antenna

Antenna gain: 2.0 dBi;

R=20cm

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

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

BLE

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)	(mW/cm2)
2402	BLE 1M	-1.67	-1±1	0	1.000	2.00	1.58	0.0003	1
2440		-1.83	-1±1	0	1.000	2.00	1.58	0.0003	1
2480		-1.96	-1±1	0	1.000	2.00	1.58	0.0003	1

2.4G WIFI

Operation Frequency:

WIFI 802.11b/g/n20: 2412-2462MHz,

Power density limited: 1mW/ cm²

Antenna Type: FPC Antenna

Antenna gain: 2.0 dBi;

R=20cm

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

Antenna gain Numeric= $10^{(dBi/10)}$

Antenna	Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
			(dBm)		tune-up power		Gain			
					(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)	(mW/cm2)
Ant 1	2412	b	15.14	15±1	16	39.811	2	1.58	0.0126	1
Ant 1	2437		15.03	15±1	16	39.811	2	1.58	0.0126	1
Ant 1	2462		14.8	15±1	16	39.811	2	1.58	0.0126	1
Ant 1	2412	g	14.37	14±1	15	31.623	2	1.58	0.0100	1
Ant 1	2437		14.51	14±1	15	31.623	2	1.58	0.0100	1
Ant 1	2462		14.48	14±1	15	31.623	2	1.58	0.0100	1
Ant 1	2412	802.11n H20	14.48	14±1	15	31.623	2	1.58	0.0100	1
Ant 1	2437		14.33	14±1	15	31.623	2	1.58	0.0100	1
Ant 1	2462		13.92	14±1	15	31.623	2	1.58	0.0100	1

Conclusion:

For the max result : 0.0126≤ 1.0, SAR is not required.

Bluetooth and Wi-Fi 2.4 GHz do not support simultaneous transmission.

Signature:

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NAME AND TITLE (Please print or type): Alex Li /Manager

COMPANY (Please print or type): Shenzhen NTEK Testing Technology Co., Ltd./ No. 24 Xinfa East Road, Xiangshan Community, Xinqiao Street, Baoan District, Shenzhen, Guangdong, People's Republic of China