

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)

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: PIFA antenna

Antenna gain: 4.13 dBi;

R=20cm

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

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

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
2402	DH5	5.36	5±1	6	3.981	4.13	2.59	0.0020	1
2441		5.29	5±1	6	3.981	4.13	2.59	0.0020	1
2480		5.06	5±1	6	3.981	4.13	2.59	0.0020	1
2402	2DH5	7.17	7±1	8	6.310	4.13	2.59	0.0032	1
2441		7.01	7±1	8	6.310	4.13	2.59	0.0032	1
2480		7.24	7±1	8	6.310	4.13	2.59	0.0032	1
2402	3DH5	7.5	7±1	8	6.310	4.13	2.59	0.0032	1
2441		7.39	7±1	8	6.310	4.13	2.59	0.0032	1
2480		7.49	7±1	8	6.310	4.13	2.59	0.0032	1

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			
				(dBm)	(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)
2402	BLE 1M	0.27	0±1	1	1.259	4.13	2.59	0.0006	1
2440		0.18	0±1	1	1.259	4.13	2.59	0.0006	1
2480		0.38	0±1	1	1.259	4.13	2.59	0.0006	1
2402	BLE 2M	0.21	0±1	1	1.259	4.13	2.59	0.0006	1
2440		0.1	0±1	1	1.259	4.13	2.59	0.0006	1
2480		0.38	0±1	1	1.259	4.13	2.59	0.0006	1

2.4G WIFI

Operation Frequency:

WIFI 802.11b/g/n HT20/ax20: 2412-2462MHz,

WIFI 802.11n HT40/ax40:2422-2452MHz

Power density limited: 1mW/ cm²

Antenna Type: PIFA antenna

Antenna1 gain/Antenna2 gain: 4.13 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			(mW/cm2)
					(dBm)	(mW)	(dBi)	Numeric		
Ant 2	2412	802.11b	16.86	17±1	18	63.096	4.13	2.59	0.0325	1
Ant 2	2437		17.28	17±1	18	63.096	4.13	2.59	0.0325	1
Ant 2	2462		17.02	17±1	18	63.096	4.13	2.59	0.0325	1
Ant 1	2412	802.11g	14.83	14±1	15	31.623	4.13	2.59	0.0163	1
Ant 1	2437		14.71	14±1	15	31.623	4.13	2.59	0.0163	1
Ant 1	2462		14.79	14±1	15	31.623	4.13	2.59	0.0163	1
Ant 1&2	2412	802.11n H20	14.75	14±1	15	31.623	4.13	2.59	0.0163	1
Ant 1&2	2437		14.96	14±1	15	31.623	4.13	2.59	0.0163	1
Ant 1&2	2462		14.95	14±1	15	31.623	4.13	2.59	0.0163	1
Ant 1&2	2422	802.11n H40	14.28	14±1	15	31.623	4.13	2.59	0.0163	1
Ant 1&2	2437		14.32	14±1	15	31.623	4.13	2.59	0.0163	1
Ant 1&2	2452		14.41	14±1	15	31.623	4.13	2.59	0.0163	1

5G WIFI

802.11a/n20/ac/ax20: 5180-5240MHz,5260-5320MHz,5500-5700MHz,5745-5825MHz

802.11n/ac/ax40:5190-5230MHz,5270-5310MHz,5510-5670MHz,5755-5795MHz

Power density limited: 1mW/cm

Antenna Type: PIFA antenna

Antenna1/2 Gain: 4.95dBi;

R=20cm

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

antenna 1gain Numeric=10^{^(dBi/10)}

5.2G

Antenna	Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
			(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm2)
					(dBm)	(mW)	(dBi)	Numeric		
Ant2	5180	802.11a	12.09	12±1	13	19.953	4.95	3.13	0.0124	1
Ant2	5200		12.40	12±1	13	19.953	4.95	3.13	0.0124	1
Ant2	5240		12.23	12±1	13	19.953	4.95	3.13	0.0124	1
Ant1	5180	802.11n H20	12.96	13±1	14	25.119	4.95	3.13	0.0156	1
Ant1&2	5200		12.99	13±1	14	25.119	4.95	3.13	0.0156	1
Ant1&2	5240		13.18	13±1	14	25.119	4.95	3.13	0.0156	1
Ant1&2	5190	802.11n H40	13.13	13±1	14	25.119	4.95	3.13	0.0156	1
Ant1&2	5230		13.11	13±1	14	25.119	4.95	3.13	0.0156	1
Ant1&2	5180	802.11ac20	13.15	13±1	14	25.119	4.95	3.13	0.0156	1
Ant1&2	5200		12.98	13±1	14	25.119	4.95	3.13	0.0156	1
Ant1&2	5240		12.97	13±1	14	25.119	4.95	3.13	0.0156	1
Ant1&2	5190	802.11ac40	13.02	13±1	14	25.119	4.95	3.13	0.0156	1
Ant1&2	5230		12.91	13±1	14	25.119	4.95	3.13	0.0156	1
Ant1&2	5210	802.11ac80	12.94	12±1	13	19.953	4.95	3.13	0.0124	1

5.8G

Antenna	Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
			(dBm)		tune-up power		Gain		(mW/cm ²)	(mW/cm ²)
					(dBm)	(mW)	(dBi)	Numeric		
Ant 2	5745	802.11a	12.67	13±1	14	25.119	4.95	3.13	0.0156	1
Ant 2	5785		12.98	13±1	14	25.119	4.95	3.13	0.0156	1
Ant 2	5825		13.37	13±1	14	25.119	4.95	3.13	0.0156	1
Ant 1&2	5745	802.11n20	14.58	15±1	16	39.811	4.95	3.13	0.0248	1
Ant 1&2	5785		14.76	15±1	16	39.811	4.95	3.13	0.0248	1
Ant 1&2	5825		15.00	15±1	16	39.811	4.95	3.13	0.0248	1
Ant 1&2	5755	802.11n40	14.51	14±1	15	31.623	4.95	3.13	0.0197	1
Ant 1&2	5795		14.76	14±1	15	31.623	4.95	3.13	0.0197	1
Ant 1&2	5745	802.11ac20	14.43	15±1	16	39.811	4.95	3.13	0.0248	1
Ant 1&2	5785		14.79	15±1	16	39.811	4.95	3.13	0.0248	1
Ant 1&2	5825		15.10	15±1	16	39.811	4.95	3.13	0.0248	1
Ant 1&2	5755	802.11ac40	14.47	14±1	15	31.623	4.95	3.13	0.0197	1
Ant 1&2	5795		14.71	14±1	15	31.623	4.95	3.13	0.0197	1

SIMULTANEOUS TRANSMISSIONS

When a number of sources at different frequencies, and/or broadband sources, contribute to the total exposure, it becomes necessary to weigh each contribution relative to the MPE. To comply with the MPE, the fraction of the MPE in terms of E^2 , H^2 (or power density) incurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity. In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^n \frac{S_i}{MPE_i} \leq 1$$

Worst case is Simultaneous Transmissions for 2.4G Wi-Fi +BT

Band	Mode	EIRP (dBm)	EIRP (mW)	Standalone	Standalone	Simultaneous		Verdict
				Evaluation result	Power density Limits	Evaluation result	Limit	
				(mW/cm2)	(mW/cm2)	raio		
2.4G Wi-Fi+BT	BT	12.13	16.33	0.0032	1	0.0357	1	PASS
	2.4G WIFI	22.95	197.24	0.0325	1			

Signature:

Date: 2025-06-27



NAME AND TITLE (Please print or type): Judson Jia /Manager

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