

FCC ID: 2AMKM-AUDIOCASTAMP

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.

BT:

Measurement Result

Operation Frequency: 2402MHz~2480MHz

Power density limited: $1\text{mW}/\text{cm}^2$

Antenna Type: PCB antenna

Antenna gain: 1dBi;

R=20cm

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

antenna gain Numeric= $10^{(\text{dBi}/10)}=10^{(1/10)}=1.26$

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density (mW/cm ²)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2402	DH5	-3.28	-3±1	-2	0.631	1.00	1.26	0.0002	1
2441		-3.76	-3±1	-2	0.631	1.00	1.26	0.0002	1
2480		-3.28	-3±1	-2	0.631	1.00	1.26	0.0002	1
2402	2DH5	-3.47	-3±1	-2	0.631	1.00	1.26	0.0002	1
2441		-3.88	-3±1	-2	0.631	1.00	1.26	0.0002	1
2480		-3.36	-3±1	-2	0.631	1.00	1.26	0.0002	1
2402	3DH5	-3.54	-3±1	-2	0.631	1.00	1.26	0.0002	1
2441		-3.91	-3±1	-2	0.631	1.00	1.26	0.0002	1
2480		-3.41	-3±1	-2	0.631	1.00	1.26	0.0002	1

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density (mW/cm ²)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2402	GFSK	-1.8	-2±1	-1	0.794	1.00	1.26	0.0002	1
2440		-2.28	-2±1	-1	0.794	1.00	1.26	0.0002	1
2480		-3.64	-3±1	-2	0.631	1.00	1.26	0.0002	1

2.4G WIFI:

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,
 WIFI 802.11n HT40:2422-2452MHz
 Power density limited: 1mW/ cm²

Antenna Type: FPCB antenna

Antenna gain: 2.97dBi;

R=20cm

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

antenna gain Numeric= $10^{(dBi/10)}=10^{(2.97/10)}=1.98$

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm2)	Power density (mW/cm2)
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2412	802.11b	16.78	17±1	18	63.096	2.97	1.98	0.0249	1
2437		16.74	17±1	18	63.096	2.97	1.98	0.0249	1
2462		17.72	17±1	18	63.096	2.97	1.98	0.0249	1
2412	802.11g	14.52	15±1	16	39.811	2.97	1.98	0.0157	1
2437		14.34	15±1	16	39.811	2.97	1.98	0.0157	1
2462		15.25	15±1	16	39.811	2.97	1.98	0.0157	1
2412	802.11n H20	13.3	14±1	15	31.623	2.97	1.98	0.0125	1
2437		13.3	14±1	15	31.623	2.97	1.98	0.0125	1
2462		14.12	14±1	15	31.623	2.97	1.98	0.0125	1
2422	802.11n(H T40)	12.17	12±1	13	19.953	2.97	1.98	0.0079	1
2437		12	12±1	13	19.953	2.97	1.98	0.0079	1
2452		11.83	12±1	13	19.953	2.97	1.98	0.0079	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

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

Max. SIMULTANEOUS TRANSMISSIONS MODE

Band	SISO					MIMO		Verdict
	tune-up power	Antenna	Separation distance (cm)	Evaluation result	Power density	Evaluation result	Power density Limits	
	(dBm)	Gain (dBi)		(mW/cm ²)	(mW/cm ²)			
Wi-Fi 2.4G+BLE	18	2.97	20	0.024873	1	0.025072	1	PASS
	-1	1	20	0.000199	1			

Signature:
Date: 2023-08-10



NAME AND TITLE (Please print or type): alex li/Manager

COMPANY (Please print or type): Shenzhen NTEK Testing Technology Co., Ltd./ 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street Bao'an District, Shenzhen P.R. China.