FCC ID: 2AQ9Y-ORANGEPI3B

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 (V/m) = $\frac{\sqrt{30 * P * G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

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: 1mW/ cm^2

Antenna Type: Copper antenna

Antenna gain: 2.22dBi;

R=20cm

mW=10^(dBm/10)

BR EDR

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Antenna Gain (dBi)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density (mW/cm2)
2402	GFSK	4.33	4±1	5	3.162	2.22	1.67	0.0010	1
2441		4.48	4±1	5	3.162	2.22	1.67	0.0010	1
2480		4.28	4±1	5	3.162	2.22	1.67	0.0010	1
2402	π/4-DQPSK	3.76	3±1	4	2.512	2.22	1.67	0.0008	1
2441		3.91	3±1	4	2.512	2.22	1.67	0.0008	1
2480		3.63	3±1	4	2.512	2.22	1.67	0.0008	1
2402	8-DPSK	4.13	4±1	5	3.162	2.22	1.67	0.0010	1
2441		4.25	4±1	5	3.162	2.22	1.67	0.0010	1
2480		3.94	4±1	5	3.162	2.22	1.67	0.0010	1

BLE

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Antenna Gain (dBi)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density (mW/cm2)
2402	GFSK(1M)	3.75	3±1	4	2.512	2.22	1.67	0.0008	1
2440		3.72	3±1	4	2.512	2.22	1.67	0.0008	1
2480		3.2	3±1	4	2.512	2.22	1.67	0.0008	1

2.4G WIFI:

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,
WIFI 802.11n HT40:2422-2452MHz
Power density limited: 1mW/ cm^2
Antenna Type: Copper antenna
Antenna gain: 3.02dBi;
R=20cm
mW=10^(dBm/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	15.6	15±1	16	39.811	3.02	2.00	0.0159	1
2437		15.62	15±1	16	39.811	3.02	2.00	0.0159	1
2462		15.58	15±1	16	39.811	3.02	2.00	0.0159	1
2412	802.11g	15.41	15±1	16	39.811	3.02	2.00	0.0159	1
2437		15.55	15±1	16	39.811	3.02	2.00	0.0159	1
2462		15.69	15±1	16	39.811	3.02	2.00	0.0159	1
2412	802.11n H20	15.05	15±1	16	39.811	3.02	2.00	0.0159	1
2437		15.29	15±1	16	39.811	3.02	2.00	0.0159	1
2462		15.1	15±1	16	39.811	3.02	2.00	0.0159	1
2422	802.11n(HT40)	14.25	15±1	16	39.811	3.02	2.00	0.0159	1
2437		14.51	15±1	16	39.811	3.02	2.00	0.0159	1
2452		14.31	15±1	16	39.811	3.02	2.00	0.0159	1

5G WIFI:

Operation Frequency: WIFI 802.11a/ac/n(HT20): 5180-5240MHz; 5745-5825MHz;
WIFI 802.11ac/n(HT40): 5190-5230MHz;5755-5795MHz;
WIFI 802.11ac80:5210-5210MHz;5775-5775MHz
Power density limited: 1mW/cm
Antenna Type: Copper antenna
Antenna gain: 3.16dBi;
R=20cm
mW=10^(dBm/10)

5.2G

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		
5180	a	10.64	12±1	13	19.953	2.76	1.89	0.0075	1
5200	a	11.06	12±1	13	19.953	2.76	1.89	0.0075	1
5240	a	11.01	12±1	13	19.953	2.76	1.89	0.0075	1
5180	n20	10.47	12±1	13	19.953	2.76	1.89	0.0075	1
5200	n20	10.43	12±1	13	19.953	2.76	1.89	0.0075	1
5240	n20	10.76	12±1	13	19.953	2.76	1.89	0.0075	1
5190	n40	10.52	12±1	13	19.953	2.76	1.89	0.0075	1
5230	n40	10.62	12±1	13	19.953	2.76	1.89	0.0075	1
5180	ac20	10.37	12±1	13	19.953	2.76	1.89	0.0075	1
5200	ac20	10.29	12±1	13	19.953	2.76	1.89	0.0075	1
5240	ac20	10.82	12±1	13	19.953	2.76	1.89	0.0075	1
5190	ac40	10.23	12±1	13	19.953	2.76	1.89	0.0075	1
5230	ac40	10.8	12±1	13	19.953	2.76	1.89	0.0075	1
5210	ac80	10.43	12±1	13	19.953	2.76	1.89	0.0075	1

5.8G

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		
5745	a	11.52	12±1	13	19.953	3.16	2.07	0.0082	1
5785	a	11.37	12±1	13	19.953	3.16	2.07	0.0082	1
5825	a	11.21	12±1	13	19.953	3.16	2.07	0.0082	1
5745	n20	10.98	12±1	13	19.953	3.16	2.07	0.0082	1
5785	n20	11.07	12±1	13	19.953	3.16	2.07	0.0082	1
5825	n20	10.64	12±1	13	19.953	3.16	2.07	0.0082	1
5755	n40	11.19	12±1	13	19.953	3.16	2.07	0.0082	1
5795	n40	11.17	12±1	13	19.953	3.16	2.07	0.0082	1
5745	ac20	10.99	12±1	13	19.953	3.16	2.07	0.0082	1
5785	ac20	10.77	12±1	13	19.953	3.16	2.07	0.0082	1
5825	ac20	10.68	12±1	13	19.953	3.16	2.07	0.0082	1
5755	ac40	11.18	12±1	13	19.953	3.16	2.07	0.0082	1
5795	ac40	11.04	12±1	13	19.953	3.16	2.07	0.0082	1
5775	ac80	10.95	12±1	13	19.953	3.16	2.07	0.0082	1

Note: This product does not support the requirements under BT/WIFI transmission simultaneous

Signature:
Date: 2024-10-14

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

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