

FCC ID: 2AQR9PCGS2192AFGB

RF EXPOSURE EVALUATION

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

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

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

Operation Frequency: EDR: 2402MHz~2480MHz;
 BLE: 2402MHz~2480MHz;
 2.4GWIFI 802.11b/g/n HT20: 2412-2462MHz,
 5.2G WIFI 802.11a/n(HT20)/ac20 5180-5240MHz, 5190-5230MHz for
 802.11n(HT40)/ac40, 5210MHz for 802.11 ac80;
 5.8G WIFI 5745-5825 MHz for 802.11a/n(HT20)/ac20, 5755-5795
 MHz for 802.11a/n(HT40)/ac40, 5775MHz for 802.11 ac80;

Power density limited: 1mW/ cm²

Antenna Type: FPCB Antenna

Antenna gain: 5dBi,

R=20cm

EDR:

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	GFSK	1.49	2±1	3	1.995	5.00	3.16	0.0013	1
2441		2.06	2±1	3	1.995	5.00	3.16	0.0013	1
2480		1.79	2±1	3	1.995	5.00	3.16	0.0013	1
2402	π/4-DQPSK	-2.28	-2±1	-1	0.794	5.00	3.16	0.0005	1
2441		-1.85	-2±1	-1	0.794	5.00	3.16	0.0005	1
2480		-2.46	-2±1	-1	0.794	5.00	3.16	0.0005	1
2402	8DPSK	-1.72	-2±1	-1	0.794	5.00	3.16	0.0005	1
2441		-1.45	-2±1	-1	0.794	5.00	3.16	0.0005	1
2480		-2.07	-2±1	-1	0.794	5.00	3.16	0.0005	1

BLE:

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		
2402	GFSK	0.77	1±1	2	1.585	5.00	3.16	0.0010	1
2440		1.55	1±1	2	1.585	5.00	3.16	0.0010	1
2480		1.21	1±1	2	1.585	5.00	3.16	0.0010	1

2.4G WIFI:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2412	802.11b	11.9	11.9±1	12.9	19.498	5.00	3.16	0.0123	1
2437		12	11.9±1	12.9	19.498	5.00	3.16	0.0123	1
2462		12.1	11.9±1	12.9	19.498	5.00	3.16	0.0123	1
2412	802.11g	11.4	11.6±1	12.6	18.197	5.00	3.16	0.0114	1
2437		11.4	11.6±1	12.6	18.197	5.00	3.16	0.0114	1
2462		11.6	11.6±1	12.6	18.197	5.00	3.16	0.0114	1
2412	802.11n H20	11	11.3±1	12.3	16.982	5.00	3.16	0.0107	1
2437		11	11.3±1	12.3	16.982	5.00	3.16	0.0107	1
2462		11.3	11.3±1	12.3	16.982	5.00	3.16	0.0107	1

5.2G WIFI:

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		
5180	802.11a	10.3	11±1	12	15.849	5.00	3.16	0.0100	1
5200		10.7	11±1	12	15.849	5.00	3.16	0.0100	1
5240		11.5	11±1	12	15.849	5.00	3.16	0.0100	1
5180	802.11 n20	9.9	11±1	12	15.849	5.00	3.16	0.0100	1
5200		10.3	11±1	12	15.849	5.00	3.16	0.0100	1
5240		11.2	11±1	12	15.849	5.00	3.16	0.0100	1
5190	802.11 n40	9.3	10±1	11	12.589	5.00	3.16	0.0079	1
5230		10.2	10±1	11	12.589	5.00	3.16	0.0079	1
5180	802.11 ac20	10.1	11±1	12	15.849	5.00	3.16	0.0100	1
5200		10.4	11±1	12	15.849	5.00	3.16	0.0100	1
5240		11.3	11±1	12	15.849	5.00	3.16	0.0100	1
5190	802.11 ac40	9.3	10±1	11	12.589	5.00	3.16	0.0079	1
5230		10.2	10±1	11	12.589	5.00	3.16	0.0079	1
5210	802.11 ac80	9.2	9±1	10	10.000	5.00	3.16	0.0063	1

5.8G WIFI:

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		
5745	802.11a	9.9	10±1	11	12.589	5.00	3.16	0.0079	1
5785		9.8	10±1	11	12.589	5.00	3.16	0.0079	1
5825		9.7	10±1	11	12.589	5.00	3.16	0.0079	1
5745	802.11 n20	9.6	9±1	10	10.000	5.00	3.16	0.0063	1
5785		9.4	9±1	10	10.000	5.00	3.16	0.0063	1
5825		9.3	9±1	10	10.000	5.00	3.16	0.0063	1
5755	802.11 n40	9	9±1	10	10.000	5.00	3.16	0.0063	1
5795		8.9	9±1	10	10.000	5.00	3.16	0.0063	1
5745	802.11 ac20	9.5	9±1	10	10.000	5.00	3.16	0.0063	1
5785		9.4	9±1	10	10.000	5.00	3.16	0.0063	1
5825		9.2	9±1	10	10.000	5.00	3.16	0.0063	1
5755	802.11 ac40	8.9	9±1	10	10.000	5.00	3.16	0.0063	1
5795		8.8	9±1	10	10.000	5.00	3.16	0.0063	1
5775	802.11 ac80	8.4	9±1	10	10.000	5.00	3.16	0.0063	1

Conclusion:

For the max result : $0.0123 \leq 1.0$, compliance with FCC's RF Exposure.

Signature: 

Date: 2019-05-30

NAME AND TITLE (Please print or type): **Amy Pan/Manager**

COMPANY (Please print or type): Shenzhen Geshem Technology Co.,Ltd / 2/F, Chuangye Building, No.5 North 2nd Lane, Chuangye 2nd Road, 28th Area Bao'an, Shenzhen, Guangdong, China