

FCC ID: OKUCAW70040

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

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

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.

MAX OUTPUT POWER

BDR+EDR:

Test Channel	Frequency (MHz)	Power Setting	Peak Output Power (dBm)	LIMIT (dBm)	Verdict
1Mbps					
00	2402	Default	2.2	30	PASS
39	2441	Default	3.69	30	PASS
78	2480	Default	2.49	30	PASS
2Mbps					
00	2402	Default	1.14	20.97	PASS
39	2441	Default	2.46	20.97	PASS
78	2480	Default	1.3	20.97	PASS
3Mbps					
00	2402	Default	1.52	20.97	PASS
39	2441	Default	2.9	20.97	PASS
78	2480	Default	1.65	20.97	PASS

WIFI:

Test Channel	Frequency (MHz)	Power Setting	Average Output Power (dBm)	Maximum Output Power (dBm)	LIMIT (dBm)	Verdict
802.11b						
1	2412	Default	12.83	12.83	30	PASS
6	2437	Default	12.74	12.74	30	PASS
11	2462	Default	12.68	12.68	30	PASS
802.11g						
1	2412	Default	9.53	9.53	30	PASS
6	2437	Default	9.45	9.45	30	PASS
11	2462	Default	9.74	9.74	30	PASS
802.11n HT20						
1	2412	Default	9.36	9.36	30	PASS
6	2437	Default	9.74	9.74	30	PASS
11	2462	Default	9.57	9.57	30	PASS
802.11n HT40						
3	2422	Default	8.52	8.52	30	PASS
6	2437	Default	8.74	8.74	30	PASS
9	2452	Default	8.65	8.65	30	PASS

Measurement Result

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,
 802.11n HT40: 2422-2452MHz,
 Power density limited: 1mW/ cm²
 Antenna Type: FPCB Antenna
 Antenna gain: 1.0dBi,
 R=20cm
 802.11b/g/n:

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density (mW/cm ²)
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2412	802.11b	12.83	12±1	13	19.953	1.00	1.26	0.0050	1
2437		12.74	12±1	13	19.953	1.00	1.26	0.0050	1
2462		12.68	12±1	13	19.953	1.00	1.26	0.0050	1
2412	802.11g	9.53	9±1	10	10.000	1.00	1.26	0.0025	1
2437		9.45	9±1	10	10.000	1.00	1.26	0.0025	1
2462		9.74	9±1	10	10.000	1.00	1.26	0.0025	1
2412	802.11n H20	9.36	9±1	10	10.000	1.00	1.26	0.0025	1
2437		9.74	9±1	10	10.000	1.00	1.26	0.0025	1
2462		9.57	9±1	10	10.000	1.00	1.26	0.0025	1
2422	802.11n H40	8.52	8±1	9	7.943	1.00	1.26	0.0020	1
2437		8.74	8±1	9	7.943	1.00	1.26	0.0020	1
2452		8.65	8±1	9	7.943	1.00	1.26	0.0020	1

Operation Frequency: BLE 2402MHz~2480MHz
 Power density limited: 1mW/ cm²
 Antenna Type: FPCB Antenna
 Antenna gain: 1.0dBi,
 R=20cm
 Bluetooth DSS:

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density (mW/cm ²)
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2402	GFSK	2.20	3±1	4.00	2.512	1.00	1.26	0.0006	1
2441		3.69	3±1	4.00	2.512	1.00	1.26	0.0006	1
2480		2.49	3±1	4.00	2.512	1.00	1.26	0.0006	1
2402	π/4-DQPSK	1.14	2±1	3.00	1.995	1.00	1.26	0.0005	1
2441		2.46	2±1	3.00	1.995	1.00	1.26	0.0005	1
2480		1.30	2±1	3.00	1.995	1.00	1.26	0.0005	1
2402	8DPSK	1.52	2±1	3.00	1.995	1.00	1.26	0.0005	1
2441		2.90	2±1	3.00	1.995	1.00	1.26	0.0005	1
2480		1.65	2±1	3.00	1.995	1.00	1.26	0.0005	1

Conclusion:

For the max result : $0.005 \leq 1.0$ for 1g SAR, No SAR is required.

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Signature:

Date: 2017-4-20

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