FCC ID: 2AM43-TC21

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 (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.

MAX OUTPUT POWER

BLE:

Test Channel	Frequency (MHz)	Power Setting	Peak Output Power (dBm)	LIMIT (dBm)	Verdict
1Mbps					
00	2402	Default	5.14	30	PASS
19	2440	Default	5.57	30	PASS
39	2480	Default	4.95	30	PASS

BDR+EDR:

Test Channel	Frequency (MHz)	Power Setting	Peak Output Power (dBm)	LIMIT (dBm)	Verdict
1Mbps					
00	2402	Default	7.50	30	PASS
39	2441	Default	7.41	30	PASS
78	2480	Default	7.00	30	PASS
2Mbps					
00	2402	Default	4.78	20.97	PASS
39	2441	Default	4.85	20.97	PASS
78	2480	Default	4.14	20.97	PASS
3Mbps					
00	2402	Default	5.24	20.97	PASS
39	2441	Default	5.24	20.97	PASS
78	2480	Default	4.47	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	14.2	14.2	30	PASS
6	2437	Default	14.4	14.4	30	PASS
11	2462	Default	14.4	14.4	30	PASS
802.11g						
1	2412	Default	13.5	13.5	30	PASS
6	2437	Default	13.7	13.7	30	PASS
11	2462	Default	13.6	13.6	30	PASS
802.11n HT20						
1	2412	Default	9.8	9.8	30	PASS
6	2437	Default	9.9	9.9	30	PASS
11	2462	Default	9.7	9.7	30	PASS

Measurement Result

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,
Power density limited: 1mW/ cm^2
Antenna Type: FPCB Antenna
Antenna gain: 1.0dBi,
R=20cm
802.11b/g/n:

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	14.2	14±1	15	31.623	1.00	1.26	0.0079	1
2437		14.4	14±1	15	31.623	1.00	1.26	0.0079	1
2462		14.4	14±1	15	31.623	1.00	1.26	0.0079	1
2412	802.11g	13.5	13±1	14	25.119	1.00	1.26	0.0063	1
2437		13.7	13±1	14	25.119	1.00	1.26	0.0063	1
2462		13.6	13±1	14	25.119	1.00	1.26	0.0063	1
2412	802.11n H20	9.8	9±1	10	10.000	1.00	1.26	0.0025	1
2437		9.9	9±1	10	10.000	1.00	1.26	0.0025	1
2462		9.7	9±1	10	10.000	1.00	1.26	0.0025	1

Operation Frequency: BLE 2402MHz~2480MHz
Power density limited: 1mW/ cm^2
Antenna Type: FPCB Antenna
Antenna gain: 1.0dBi,
R=20cm
Bluetooth DTS:

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		
2402	GFSK	5.14	5±1	6	3.981	1.00	1.26	0.0010	1
2440		5.57	5±1	6	3.981	1.00	1.26	0.0010	1
2480		4.95	5±1	6	3.981	1.00	1.26	0.0010	1

Bluetooth DSS:

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		
2402	GFSK	7.5	7±1	8	6.310	1.00	1.26	0.0016	1
2441		7.41	7±1	8	6.310	1.00	1.26	0.0016	1
2480		7	7±1	8	6.310	1.00	1.26	0.0016	1
2402	π/4-DQPSK	4.78	4±1	5	3.162	1.00	1.26	0.0008	1
2441		4.85	4±1	5	3.162	1.00	1.26	0.0008	1
2480		4.14	4±1	5	3.162	1.00	1.26	0.0008	1
2402	8DPSK	5.24	5±1	6	3.981	1.00	1.26	0.0010	1
2441		5.24	5±1	6	3.981	1.00	1.26	0.0010	1
2480		4.47	5±1	6	3.981	1.00	1.26	0.0010	1

Conclusion:
For the max result : 0.0105≤ 1.0 for 1g SAR, No SAR is required.

Signature: **Date:** 2017-8-31

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