FCC ID:2AAU7-ZTZWUSZBEE

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)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	**--**	**--**	**F/300**	**6**
1500-100000	**--**	**--**	**5**	**6**
(B) Limits for General Population/Uncontrol Exposures				
300-1500	**--**	**--**	**F/1500**	**6**
1500-100000	**--**	**--**	**1**	**30**

11.1 Friis transmission formula: $Pd= (Pout*G)\ (4*pi*R^2)$

Where
Pd= Power density in mW/cm^2
Pout=output power to antenna in mW
G= Numeric gain of the antenna relative to isotropic antenna
Pi=3.1416
R= distance between observation point and center of the radiator in cm(20cm)
Pd the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.
mW=10^(dBm/10)

11.2 Measurement Result

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,
802.11n HT40: 2422-2452MHz,
Power density limited: 1mW/ cm^2
Antenna Type: FPCB Antenna
Antenna gain: 1.0dBi,
R=20cm
mW=10^(dBm/10)
802.11b/g/n:

Channel Freq. (MHz)	modulation	conducted power (mW)	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
2412	802.11b	40.55	16.08	16±1	17	1.26	0.012559	1
2437	802.11b	43.55	16.39	16±1	17	1.26	0.012559	1
2462	802.11b	42.36	16.27	16±1	17	1.26	0.012559	1
2412	802.11g	17.06	12.32	12±1	13	1.26	0.005000	1
2437	802.11g	18.71	12.72	12±1	13	1.26	0.005000	1
2462	802.11g	18.75	12.73	12±1	13	1.26	0.005000	1
2412	802.11n H20	13.71	11.37	11±1	12	1.26	0.003971	1
2437	802.11n H20	13.96	11.45	11±1	12	1.26	0.003971	1
2462	802.11n H20	14.03	11.47	11±1	12	1.26	0.003971	1
2422	802.11n H40	12.33	10.91	10±1	11	1.26	0.003155	1
2437	802.11n H40	11.83	10.73	10±1	11	1.26	0.003155	1
2452	802.11n H40	10.62	10.26	10±1	11	1.26	0.003155	1

Operation Frequency: 2402MHz~2480MHz
Power density limited: 1mW/ cm^2
Antenna Type: FPCB Antenna
Antenna gain: 1.0dBi,
R=20cm
mW=10^(dBm/10)
Bluetooth DTS:

Channel Freq. (MHz)	modulation	conducted power (mW)	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
2402	GFSK	0.21	-6.76	-6±1	-5	1.26	0.000079	1
2440		0.25	-5.99	-6±1	-5	1.26	0.000079	1
2480		0.31	-5.04	-6±1	-5	1.26	0.000079	1

Zigbee:

Channel Freq. (MHz)	modulation	conducted power (mW)	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
2405	GFSK	0.95	-0.218	-1±1	0	1.26	0.000251	1
2440		0.84	-0.748	-1±1	0	1.26	0.000251	1
2480		0.69	-1.594	-1±1	0	1.26	0.000251	1

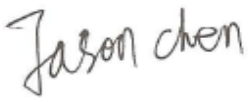
Bluetooth DSS:

Channel Freq. (MHz)	modulation	conducted power (mW)	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
2402	GFSK	3.37	5.274	5±1	6	1.26	0.000315	1
2441		3.79	5.792	5±1	6	1.26	0.000315	1
2480		3.80	5.802	5±1	6	1.26	0.000315	1
2402	π/4-DQPSK	2.83	4.513	5±1	6	1.26	0.000315	1
2441		3.22	5.079	5±1	6	1.26	0.000315	1
2480		3.25	5.121	5±1	6	1.26	0.000315	1
2402	8DPSK	3.10	4.913	5±1	6	1.26	0.000315	1
2441		3.51	5.456	5±1	6	1.26	0.000315	1
2480		3.53	5.472	5±1	6	1.26	0.000315	1

simultaneous emission

Power density Limits (mW/cm2) WIFI	Power density Limits (mW/cm2) BT	Power density Limits (mW/cm2) Zigbee	Calculate Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
0.012559	0.000315	0.000251	0.013204	1

Conclusion:
For the max result : 0.013125≤ 1.0 for 1g SAR, No SAR is required.



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