FCC ID: 2AI9CEL-1

MPE calculation

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: External antenna
Antenna gain: 1.0dBi,
R=20cm
mW=10^(dBm/10)
802.11b/g/n:

modulation	Frequency	Antenna port	Conducted power	Conducted Power	Total Conducted Power	Total Conducted power	Tune-up power	Max tune-up power	Antenna Gain	Evaluation result	Power density Limits
	(MHz)		(dBm)	(mW)	(mW)	(dBm)	(dBm)	(dBm)	dbi	(mW/cm2)	(mW/cm2)
802.11b	2412	Ant.1	13.86	24.32	N/A	N/A	13±1	14	1 (1.26)	0.006297	1
		Ant.2	13.25	21.13							
	2437	Ant.1	13.61	22.96	N/A	N/A	13±1	14	1 (1.26)	0.006297	1
		Ant.2	13.46	22.18							
	2462	Ant.1	13.40	21.88	N/A	N/A	13±1	14	1 (1.26)	0.006297	1
		Ant.2	13.52	22.49							
802.11g	2412	Ant.1	12.97	19.82	N/A	N/A	12±1	13	1 (1.26)	0.003970	1
		Ant.2	12.49	17.74							
	2437	Ant.1	12.79	19.01	N/A	N/A	12±1	13	1 (1.26)	0.003970	1
		Ant.2	12.21	16.63							
	2462	Ant.1	12.33	17.10	N/A	N/A	12±1	13	1 (1.26)	0.003970	1
		Ant.2	12.00	15.85							
802.11n20	2412	Ant.1	10.61	11.51	22.20	13.46	13±1	14	1 (1.26)	0.006297	1
		Ant.2	10.29	10.69							
	2437	Ant.1	10.00	10.00	20.99	13.22	13±1	14	1 (1.26)	0.006297	1
		Ant.2	10.41	10.99							
	2462	Ant.1	10.41	10.99	22.98	13.61	13±1	14	1 (1.26)	0.006297	1
		Ant.2	10.79	11.99							
802.11n40	2422	Ant.1	8.36	6.85	13.86	11.42	12±1	13	1 (1.26)	0.003970	1
		Ant.2	8.46	7.01							
	2437	Ant.1	8.56	7.18	14.19	11.52	12±1	13	1 (1.26)	0.003970	1
		Ant.2	8.46	7.01							
	2452	Ant.1	8.71	7.43	15.32	11.85	12±1	13	1 (1.26)	0.003970	1
		Ant.2	8.97	7.89							

Conclusion:
For the max result : 0.015492≤ 3.0 for 1g SAR, No SAR is required.