FCC §15.247 (I), §2.1091 – RF EXPOSURE

FCC ID: H79-023DS2

According to KDB 447498 D01 General RF Exposure Guidance v06

Applied procedures / limit

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines..

Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

Note: f is frequency in MHz

* = Power density limit is applicable at frequencies greater than 100 MHz

Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz

* = Plane-wave equivalent power density

MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

TEST RESULTS

2.4G WIFI

Test Channel	Frequency	Maximum output power			LIMIT	Result
	(MHz)	(dBm)			dBm	
TX 802.11 B Mode						
CH01	2412 MHz	17.02	16.72	/	30	Pass
CH06	2437MHz	16.92	16.75	/	30	Pass
CH11	2462 MHz	16.87	16.82	/	30	Pass
TX 802.11 G Mode						
CH01	2412 MHz	16.35	16.11	/	30	Pass
CH06	2437MHz	16.41	16.02	/	30	Pass
CH11	2462 MHz	16.39	16.06	/	30	Pass
TX 802.11 n20M Mode						
CH01	2412 MHz	15.88	15.47	18.69	27.99	Pass
CH06	2437MHz	15.72	15.38	18.56	27.99	
CH11	2462 MHz	15.59	15.39	18.50	27.99	Pass
TX 802.11 N40M Mode						
CH03	2422 MHz	15.02	14.65	17.85	28.78	Pass
CH06	2437MHz	14.79	14.82	17.82	28.78	Pass
CH09	2452 MHz	15.11	14.77	17.95	28.78	Pass

CH. No.	Frequency	Conducted Average Power(dBm)		total power (dBm)	Limit (dBm/MHz)	Result
		ANT A	ANT B			
TX 802.11a Mode						
CH36	5180	18.90	18.20	--	24	Pass
CH40	5200	19.10	17.70	--	24	Pass
CH48	5240	19.29	18.76	--	24	Pass
CH 149	5745	20.20	17.31	--	29.58	Pass
CH 157	5785	19.70	18.71	--	29.58	Pass
CH 165	5825	20.13	19.16	--	29.58	Pass
TX 802.11n20 Mode						
CH36	5180	17.20	16.73	19.98	24	Pass
CH40	5200	17.56	16.89	20.25	24	Pass
CH48	5240	17.78	16.88	20.36	24	Pass
CH 149	5745	18.53	17.81	21.20	29.58	Pass
CH 157	5785	18.32	17.65	21.01	29.58	Pass
CH 165	5825	18.54	17.94	21.26	29.58	Pass
TX 802.11n40 Mode						
CH38	5190	16.18	15.30	18.77	24	Pass
CH46	5230	16.33	15.70	19.04	24	Pass
CH151	5755	17.79	15.49	19.80	29.58	Pass
CH159	5795	18.04	15.52	19.97	29.58	Pass

CH. No.	Frequency	Conducted Average Power(dBm)		total power (dBm)	Limit (dBm)	Result
		ANT A	ANT B			
TX 802.11 ac(VHT20) Mode						
CH 36	5180	17.99	16.58	20.35	24	Pass
CH 40	5200	17.40	16.44	19.96	24	Pass
CH 48	5240	18.01	15.60	19.98	24	Pass
CH 149	5745	18.01	17.15	20.61	29.58	Pass
CH 157	5785	18.57	17.23	20.96	29.58	Pass
CH 165	5825	18.20	16.47	20.43	29.58	Pass
TX 802.11 ac(VHT40) Mode						
CH38	5190	15.65	15.04	18.37	24	Pass
CH46	5230	16.63	16.17	19.42	24	Pass
CH 151	5755	16.20	15.56	18.90	29.58	Pass
CH 159	5795	16.52	16.10	19.33	29.58	Pass
TX 802.11 ac(VHT80) Mode						
CH42	5210	14.43	13.76	17.12	24	Pass
CH155	5775	14.35	13.86	17.12	29.58	Pass

BT

Field strength = 92.25dBuV/m @3m

Ant gain =4.21 dBi ;so Ant numeric gain= 2.64

So pt={ $[10^{(92.25/20)}/10^6 \times 3]^2/30 \times 2.64$ }x1000 mW =1.328mW

Mode	Frequency MHz	Peak Output Power (dBm)	Output power (mW)	Antenna Gain (numeric)	Power Density (S) (mW/ cm^2)	Limit of Power Density (S) (mW/ cm^2)	Result
TX 802.11 b Mode	2412	17.02	50.35	4.21(2.64)	0.0264	1	Pass
TX 802.11 n20 Mode	2412	15.88	38.73	4.21(2.64)	0.0203	1	Pass
	2412	15.47	35.24	4.21(2.64)	0.0185	1	Pass
TX 802.11 a Mode	5745	20.20	104.71	3.09(2.04)	0.0425	1	Pass
TX 802.11 n20M Mode	5745	18.53	71.29	3.09(2.04)	0.0289	1	Pass
	5745	17.81	60.39	3.09(2.04)	0.0245	1	Pass
BT	2480	1.232	1.328	4.21(2.64)	0.0007	1	Pass

TX 802.11 n20M MIMO Mode,

0.0203/1+0.0185/1+0.0245/1+0.0289/1+0.0007/1=0.0929≤1

NOTE: R =20cm

Conclusion: No SAR is required.