

FCC ID: A5JC50527

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: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = Power density in mW/cm²

P_{out} =output power to antenna in mW

G = Numeric gain of the antenna relative to isotropic antenna

π =3.1416

R = distance between observation point and center of the radiator in cm

P_d the limit of MPE, 1mW/cm². 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.

11.2 Measurement Result

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,
802.11n HT40: 2422-2452MHz

Power density limited: 1mW/ cm²

Antenna gain: Chain A: 1.6dBi, Chain B: 1.6dBi,

Directional Gain= $G_{ANT} + 10\log(N_{ANT})$ dBi=3.64dBi (MIMO)

802.11b Chain A:

Channel Frequency (MHz)	Output power (mW)	Output power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
2412	16.26	12.11	13±1	14	1.4454	0.0072	1
2437	17.46	12.42	13±1	14	1.4454	0.0072	1
2462	21.63	13.35	13±1	14	1.4454	0.0072	1

802.11b Chain B:

Channel Frequency (MHz)	Output power (mW)	Output power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
2412	16.11	12.07	13±1	14	1.4454	0.0072	1
2437	18.03	12.56	13±1	14	1.4454	0.0072	1
2462	21.98	13.42	13±1	14	1.4454	0.0072	1

802.11g Chain A:

Channel Frequency (MHz)	Output power (mW)	Output power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
2412	32.73	15.15	16±1	17	1.4454	0.0144	1
2437	39.36	15.95	16±1	17	1.4454	0.0144	1
2462	40.09	16.03	16±1	17	1.4454	0.0144	1

802.11g Chain B:

Channel Frequency (MHz)	Output power (mW)	Output power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
2412	34.51	15.38	16±1	17	1.4454	0.0144	1
2437	35.97	15.56	16±1	17	1.4454	0.0144	1
2462	43.95	16.43	16±1	17	1.4454	0.0144	1

802.11n HT20 Chain A:

Channel Frequency (MHz)	Output power (mW)	Output power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
2412	31.99	15.05	16±1	17	1.4454	0.0144	1
2437	34.99	15.44	16±1	17	1.4454	0.0144	1
2462	40.64	16.09	16±1	17	1.4454	0.0144	1

802.11n HT20 Chain B:

Channel Frequency (MHz)	Output power (mW)	Output power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
2412	29.79	14.74	15±1	16	1.4454	0.0115	1
2437	34.43	15.37	15±1	16	1.4454	0.0115	1
2462	38.46	15.85	15±1	16	1.4454	0.0115	1

802.11n HT20 MIMO:

Channel	Channel Frequency (MHz)	Power density at 20cm(mW/cm ²) Chain A	Power density at 20cm(mW/cm ²) Chain B	Power density at 20cm(mW/cm ²) Chain A+B	Power density Limits (mW/cm ²)
1	2412	0.0144	0.0115	0.0259	1
6	2437	0.0144	0.0115	0.0259	1
11	2462	0.0144	0.0115	0.0259	1

802.11n HT40 Chain A:

Channel Frequency (MHz)	Output power (mW)	Output power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
2422	25.53	14.07	14±1	15	1.4454	0.0091	1
2437	27.23	14.35	14±1	15	1.4454	0.0091	1
2452	29.24	14.66	14±1	15	1.4454	0.0091	1

802.11n HT40 Chain B:

Channel Frequency (MHz)	Output power (mW)	Output power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
2422	24.66	13.92	14±1	15	1.4454	0.0091	1
2437	27.80	14.44	14±1	15	1.4454	0.0091	1
2452	29.51	14.70	14±1	15	1.4454	0.0091	1

802.11n HT40 MIMO:

Channel	Channel Frequency (MHz)	Power density at 20cm(mW/cm ²) Chain A	Power density at 20cm(mW/cm ²) Chain B	Power density at 20cm(mW/cm ²) Chain A+B	Power density Limits (mW/cm ²)
3	2422	0.0091	0.0091	0.0182	1
6	2437	0.0091	0.0091	0.0182	1
9	2452	0.0091	0.0091	0.0182	1