

FCC ID : Z8H89FT0030

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/cm²)	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: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

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

Black shell Antenna Type1: PiFa antenna	White Shell Antenna Type2: External Antenna
Antenna Gain: WIFI antenna A: 2.5dBi WIFI antenna B: 2.5dBi	Antenna Gain: WIFI antenna A: 4.4dBi WIFI antenna B: 4.4dBi
Smart system: ☒ SISO for 802.11b/g/n ☒ MIMO for 802.11n	Smart system: ☒ SISO for 802.11b/g/n ☒ MIMO for 802.11n
Array gain: ≈5.51dBi	Array gain: ≈7.41dBi

Tune up power

Mode	Ant. A	Ant.B
80.22b	15±1	15±1
802.11g	18±1	18±1
802.11n (ht20)	18±1	18±1
802.11n (ht40)	16±1	16±1

For Antenna Type2
Antenna A

Mode	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
802.11b	2412	15.84	15±1	16	2.754	0.0218	1
	2437	15.78	15±1	16	2.754	0.0218	1
	2462	15.65	15±1	16	2.754	0.0218	1
80.11g	2412	18.58	18±1	19	2.754	0.0435	1
	2437	18.56	18±1	19	2.754	0.0435	1
	2462	18.30	18±1	19	2.754	0.0435	1
802.11n (ht20)	2412	18.58	18±1	19	2.754	0.0435	1
	2437	17.93	18±1	19	2.754	0.0435	1
	2462	18.29	18±1	19	2.754	0.0435	1
802.11n (ht40)	2422	16.23	16±1	17	2.754	0.0275	1
	2437	16.75	16±1	17	2.754	0.0275	1
	2452	16.40	16±1	17	2.754	0.0275	1

Antenna B

Mode	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
802.11b	2412	15.81	15±1	16	2.754	0.0218	1
	2437	15.62	15±1	16	2.754	0.0218	1
	2462	15.38	15±1	16	2.754	0.0218	1
80.11g	2412	18.50	18±1	19	2.754	0.0435	1
	2437	18.51	18±1	19	2.754	0.0435	1
	2462	18.28	18±1	19	2.754	0.0435	1
802.11n (ht20)	2412	18.54	18±1	19	2.754	0.0435	1
	2437	17.90	18±1	19	2.754	0.0435	1
	2462	18.25	18±1	19	2.754	0.0435	1
802.11n (ht40)	2422	16.21	16±1	17	2.754	0.0275	1
	2437	16.72	16±1	17	2.754	0.0275	1
	2452	16.39	16±1	17	2.754	0.0275	1

802.11n HT20: Antenna A+B

Evaluation result (mW/cm ²) Ant A	Evaluation result (mW/cm ²) Ant B	Evaluation result (mW/cm ²) Ant A+B	Power density Limits (mW/cm ²)
0.0435	0.0435	0.0870	1

802.11n HT40 : Antenna A+B

Evaluation result (mW/cm ²) Ant A	Evaluation result (mW/cm ²) Ant B	Evaluation result (mW/cm ²) Ant A+B	Power density Limits (mW/cm ²)
0.0275	0.0275	0.0550	1