

FCC ID : 2ATXRD-016WL

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

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

Pd the limit of MPE, 1mW/cm²,If we know the maximum gain of the nd total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

11.2 Measurement Result

BT (Max power)

Antenna gain: 0 dBi

Modulation	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	R (cm)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
GFSK	2402	7.517	6 to 8	8	1	20	0.0013	1
	2441	7.552	6 to 8	8	1	20	0.0013	1
	2480	6.753	6 to 8	8	1	20	0.0013	1
π/4-DQPSK	2402	3.687	3 to 5	5	1	20	0.0006	1
	2441	4.059	3 to 5	5	1	20	0.0006	1
	2480	3.622	3 to 5	5	1	20	0.0006	1
8DPSK	2402	3.636	3 to 5	5	1	20	0.0006	1
	2441	4.077	3 to 5	5	1	20	0.0006	1
	2480	3.677	3 to 5	5	1	20	0.0006	1

Wifi 2.4G (MAX power)

Antenna gain: 0 dBi

modulation	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	R (cm)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
11b	2412	13.63	13 to 15	15	1	20	0.0063	1
	2437	13.76	13 to 15	15	1	20	0.0063	1
	2462	13.40	13 to 15	15	1	20	0.0063	1
11g	2412	17.27	17 to 18	18	1	20	0.0126	1

11n (HT20)	2437	17.47	17 to 18	18	1	20	0.0126	1
	2462	17.05	17 to 18	18	1	20	0.0126	1
	2412	16.77	16 to 18	18	1	20	0.0126	1
	2437	17.17	16 to 18	18	1	20	0.0126	1
	2462	16.80	16 to 18	18	1	20	0.0126	1

Wifi 5G (MAX power)

Antenna gain: 0 dBi

UNII-1: 5150MHz-5250MHz Band:

The worse data as below:

modulation	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	R (cm)	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
802.11 ac	5180	10.90	9 to 11	11	1	20	0.0025	1
	5200	10.37	9 to 11	11	1	20	0.0025	1
	5240	9.96	9 to 11	11	1	20	0.0025	1

UNII-2A: with 5250MHz-5350MHz Band:

The worse data as below:

modulation	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	R (cm)	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
802.11a	5260	11.26	11 to 13	13	1	20	0.0040	1
	5280	11.81	11 to 13	13	1	20	0.0040	1
	5320	11.26	11 to 13	13	1	20	0.0040	1

BT+Wifi 2.4G simultaneous transmission:

Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	R (cm)	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
25.022	24 to 26	26	1	20	0.0792	1

BT+Wifi 5G simultaneous transmission:

Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	R (cm)	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
19.362	18 to 20	20	1	20	0.0199	1

Wifi 2.4G+Wifi 5G simultaneous transmission:

Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	R (cm)	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
29.28	28 to 30	30	1	20	0.1989	1

BT+Wifi 2.4G+Wifi 5G simultaneous transmission:

Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	R (cm)	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
36.832	35 to 37	37	1	20	0.997	1