

FCC ID : 2ART2-CL1-B

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

Bluetooth V4.0 (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	-8.76	-9 to 0	0	1	20	0.0002	1
	2440	-10.22	-11 to 0	0	1	20	0.0002	1
	2480	-7.00	-8 to 0	0	1	20	0.0002	1

Wifi 2.4G (MAX power)

Antenna gain: 0.2 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	16.03	15 to 17	17	1.05	20	0.0104	1
	2437	16.93	15 to 17	17	1.05	20	0.0104	1
	2462	16.53	15 to 17	17	1.05	20	0.0104	1
11g	2412	13.19	12 to 14	14	1.05	20	0.0052	1
	2437	13.04	12 to 14	14	1.05	20	0.0052	1
	2462	11.80	11 to 14	14	1.05	20	0.0052	1
11n (HT20)	2412	12.93	12 to 14	14	1.05	20	0.0052	1
	2437	13.66	12 to 14	14	1.05	20	0.0052	1
	2462	12.46	12 to 14	14	1.05	20	0.0052	1

11n (HT40)	2422	13.36	12 to 14	14	1.05	20	0.0052	1
	2437	13.19	12 to 14	14	1.05	20	0.0052	1
	2452	12.71	12 to 14	14	1.05	20	0.0052	1

Bluetooth+Wifi 2.4G (MAX power)

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)
/	/	16.95	15 to 17	17	1.05	20	0.0104	1