

FCC ID : 2AE7M-DB4246

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: $P_d = \frac{P_{out} \cdot G}{4 \cdot \pi \cdot R^2}$

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

Pd the limit of MPE, $1\text{mW}/\text{cm}^2$. 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

Antenna gain: 2dBi

2.4G WIFI ANT A:

modulation	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)
11b	2.412	14.69	13 to 15	15	1.58	0.00994	1
	2.437	15.26	14 to 16	16	1.58	0.01251	1
	2.462	15.74	14 to 16	16	1.58	0.01251	1
11g	2.412	19.98	18 to 20	20	1.58	0.03143	1
	2.437	20.36	19 to 21	21	1.58	0.03957	1
	2.462	21.07	20 to 22	22	1.58	0.04982	1
11n HT20	2.412	19.93	18 to 20	20	1.58	0.03143	1
	2.437	20.29	19 to 21	21	1.58	0.03957	1
	2.462	21.08	20 to 22	22	1.58	0.04982	1

2.4G WIFI ANT B:

modulation	Channel Freq. (MHz)	conducted 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)
11b	2.412	14.71	13 to 15	15	1.58	0.00994	1
	2.437	15.17	14 to 16	16	1.58	0.01251	1
	2.462	15.67	14 to 16	16	1.58	0.01251	1
11g	2.412	19.80	18 to 20	20	1.58	0.03143	1
	2.437	20.47	19 to 21	21	1.58	0.03957	1
	2.462	21.15	20 to 22	22	1.58	0.04982	1
11n HT20	2.412	20.09	19 to 21	21	1.58	0.03957	1
	2.437	20.48	19 to 21	21	1.58	0.03957	1
	2.462	21.25	20 to 22	22	1.58	0.04982	1

2.4G WIFI ANT A + ANT B:

modulation	Channel Freq. (MHz)	conducted 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)
11n HT20	2.412	23.02	22 to 24	24	1.58	0.07896	1
	2.437	23.40	22 to 24	24	1.58	0.07896	1
	2.462	24.18	23 to 25	25	1.58	0.09940	1

5G WIFI ANTO

Band	modulation	Channel Freq. (MHz)	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
UNII Band I	11a	5180	14.95	13 to 15	15	1.58	0.00994	1
		5200	13.61	12 to 14	14	1.58	0.00790	1
		5240	13.11	12 to 14	14	1.58	0.00790	1
UNII Band III		5745	10.79	9 to 11	11	1.58	0.00396	1
		5785	10.39	9 to 11	11	1.58	0.00396	1
		5825	11.17	10 to 12	12	1.58	0.00498	1
UNII Band I	11n (VHT20)	5180	14.65	13 to 15	15	1.58	0.00994	1
		5200	13.49	12 to 14	14	1.58	0.00790	1
		5240	13.20	12 to 14	14	1.58	0.00790	1
UNII Band III		5745	10.70	9 to 11	11	1.58	0.00396	1
		5785	10.43	9 to 11	11	1.58	0.00396	1
		5825	11.14	10 to 12	12	1.58	0.00498	1
UNII Band I	11ac (VHT20)	5180	14.54	13 to 15	15	1.58	0.00994	1
		5200	13.60	12 to 14	14	1.58	0.00790	1
		5240	13.07	12 to 14	14	1.58	0.00790	1
UNII Band III		5745	10.83	9 to 11	11	1.58	0.00396	1
		5785	10.36	9 to 11	11	1.58	0.00396	1
		5825	11.16	10 to 12	12	1.58	0.00498	1
UNII Band I	11n (VHT40)	5190	13.48	12 to 14	14	1.58	0.00790	1
		5230	12.47	11 to 13	13	1.58	0.00627	1
UNII Band III		5670	10.52	9 to 11	11	1.58	0.00396	1
		5795	10.64	9 to 11	11	1.58	0.00396	1
UNII Band I	11ac (VHT40)	5190	13.73	12 to 14	14	1.58	0.00790	1
		5230	12.37	11 to 13	13	1.58	0.00627	1
UNII Band III		5670	11.29	10 to 12	12	1.58	0.00498	1
		5795	11.15	10 to 12	12	1.58	0.00498	1
UNII Band I	11ac (VHT80)	5210	12.14	11 to 13	13	1.58	0.00627	1
UNII Band III		5775	10.20	9 to 11	11	1.58	0.00396	1

5G WIFI ANT1

Band	modulation	Channel Freq. (MHz)	conduct ed power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
UNII Band I	11a	5180	14.61	13to15	15	1.58	0.00994	1
		5200	13.82	12to14	14	1.58	0.00790	1
		5240	13.08	12to14	14	1.58	0.00790	1
UNII Band III		5745	10.86	9to11	11	1.58	0.00396	1
		5785	10.43	9to11	11	1.58	0.00396	1
		5825	11.11	10to12	12	1.58	0.00498	1
UNII Band I	11n (VHT20)	5180	14.48	13to15	15	1.58	0.00994	1
		5200	13.41	12to14	14	1.58	0.00790	1
		5240	13.19	12to14	14	1.58	0.00790	1
UNII Band III		5745	10.66	9to11	11	1.58	0.00396	1
		5785	10.32	9to11	11	1.58	0.00396	1
		5825	11.12	10to12	12	1.58	0.00498	1
UNII Band I	11ac (VHT20)	5180	14.50	13to15	15	1.58	0.00994	1
		5200	13.50	12to14	14	1.58	0.00790	1
		5240	13.00	12to14	14	1.58	0.00790	1
UNII Band III		5745	10.79	9to11	11	1.58	0.00396	1
		5785	10.47	9to11	11	1.58	0.00396	1
		5825	11.10	10to12	12	1.58	0.00498	1
UNII Band I	11n (VHT40)	5190	13.66	12to14	14	1.58	0.00790	1
		5230	13.57	12to14	14	1.58	0.00790	1
UNII Band III		5670	10.46	9to11	11	1.58	0.00396	1
		5795	10.56	9to11	11	1.58	0.00396	1
UNII Band I	11ac (VHT40)	5190	13.52	12to14	14	1.58	0.00790	1
		5230	12.66	11to13	13	1.58	0.00627	1
UNII Band III		5670	11.26	10to12	12	1.58	0.00498	1
		5795	11.04	10to12	12	1.58	0.00498	1
UNII Band I	11ac (VHT80)	5210	12.14	11to13	13	1.58	0.00627	1
UNII Band III		5775	10.18	9to11	11	1.58	0.00396	1

5G WIFI ANT0+ANT1:

Band	modulation	Channel Freq. (MHz)	conduct ed power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
UNII Band I	11n (VHT20)	5180	17.58	16to18	18	1.58	0.01983	1
		5200	16.46	15to17	17	1.58	0.01575	1
		5240	16.21	15to17	17	1.58	0.01575	1
UNII Band III		5745	13.69	12to14	14	1.58	0.00790	1
		5785	13.39	12to14	14	1.58	0.00790	1
		5825	14.14	13to15	15	1.58	0.00994	1
UNII Band I	11ac (VHT20)	5180	17.53	16to18	18	1.58	0.01983	1
		5200	16.56	15to17	17	1.58	0.01575	1
		5240	16.05	15to17	17	1.58	0.01575	1
UNII Band III		5745	13.82	12to14	14	1.58	0.00790	1
		5785	13.43	12to14	14	1.58	0.00790	1
		5825	14.14	13to15	15	1.58	0.00994	1
UNII Band I	11n (VHT40)	5190	16.58	15to17	17	1.58	0.01575	1
		5230	16.07	15to17	17	1.58	0.01575	1
UNII Band III		5670	13.50	12to14	14	1.58	0.00790	1
		5795	13.62	12to14	14	1.58	0.00790	1
UNII Band I	11ac (VHT40)	5190	16.64	15to17	17	1.58	0.01575	1
		5230	15.53	14to16	16	1.58	0.01251	1
UNII Band III		5670	14.29	13to15	15	1.58	0.00994	1
		5795	14.11	13to15	15	1.58	0.00994	1
UNII Band I	11ac (VHT80)	5210	15.15	14to16	16	1.58	0.01251	1
UNII Band III		5775	13.20	12to14	14	1.58	0.0079	1

Bluetooth DSS

modulation	Channel Freq. (MHz)	conducted 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)
GFSK	2402	-0.580	-2to0	0	1.58	0.00031	1
	2441	1.354	0to2	2	1.58	0.00050	1
	2480	1.163	0to2	2	1.58	0.00050	1
pi/4-DQPSK	2402	-2.485	-4to-2	-2	1.58	0.00020	1
	2441	-0.679	-2to0	0	1.58	0.00031	1
	2480	-0.347	-2to0	0	1.58	0.00031	1
8DPSK	2402	-1.903	-3to-1	-1	1.58	0.00025	1
	2441	-0.106	-2to0	0	1.58	0.00031	1
	2480	0.258	-1to1	1	1.58	0.00040	1

Bluetooth DTS

modulation	Channel Freq. (MHz)	conducted 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)
GFSK	2402	4.965	3to5	5	1.58	0.00099	1
	2440	6.449	5to7	7	1.58	0.00158	1
	2480	6.461	5to7	7	1.58	0.00158	1