

FCC ID : Z8H89FT0059

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

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

WIFI2.4G

ANT 0

Antenna gain: 5 dBi

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)
802.11b	2412	17.82	16 to 18	18	3.16	0.0397	1
	2437	17.36	16 to 18	18	3.16	0.0397	1
	2462	17.49	16 to 18	18	3.16	0.0397	1
802.11g	2412	17.70	16 to 18	18	3.16	0.0397	1
	2437	17.95	16 to 18	18	3.16	0.0397	1
	2462	17.85	16 to 18	18	3.16	0.0397	1
802.11n (HT20)	2412	17.22	16 to 18	18	3.16	0.0397	1
	2437	17.28	16 to 18	18	3.16	0.0397	1
	2462	17.34	16 to 18	18	3.16	0.0397	1
802.11n (HT40)	2422	17.19	16 to 18	18	3.16	0.0397	1
	2437	17.18	16 to 18	18	3.16	0.0397	1
	2452	17.20	16 to 18	18	3.16	0.0397	1

WIFI2.4G

ANT 1

Antenna gain: 5 dBi

modulation	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	17.81	16 to 18	18	3.16	0.0397	1
	2437	17.19	16 to 18	18	3.16	0.0397	1
	2462	17.56	16 to 18	18	3.16	0.0397	1
802.11g	2412	17.88	16 to 18	18	3.16	0.0397	1
	2437	17.88	16 to 18	18	3.16	0.0397	1
	2462	17.91	16 to 18	18	3.16	0.0397	1
802.11n (HT20)	2412	17.71	16 to 18	18	3.16	0.0397	1
	2437	17.36	16 to 18	18	3.16	0.0397	1
	2462	17.40	16 to 18	18	3.16	0.0397	1
802.11n (HT40)	2422	17.37	16 to 18	18	3.16	0.0397	1
	2437	17.23	16 to 18	18	3.16	0.0397	1
	2452	17.25	16 to 18	18	3.16	0.0397	1

TX Mode_ Total

Antenna gain: 8.0 dBi

modulation	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)
802.11n (HT20)	2412	20.48	19 to 21	21	6.30	0.158	1
	2437	20.33	19 to 21	21	6.30	0.158	1
	2462	20.38	19 to 21	21	6.30	0.158	1
802.11n (HT40)	2422	20.29	19 to 21	21	6.30	0.158	1
	2437	20.22	19 to 21	21	6.30	0.158	1
	2452	20.24	19 to 21	21	6.30	0.158	1

WIFI 5G

ANT 0

Antenna gain: 5 dBi

modulation	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)
802.11a	5180	17.36	16 to 18	18	3.16	0.0397	1
	5200	17.59	16 to 18	18	3.16	0.0397	1
	5240	17.75	16 to 18	18	3.16	0.0397	1
802.11n-HT20	5180	17.67	16 to 18	18	3.16	0.0397	1
	5200	17.77	16 to 18	18	3.16	0.0397	1
	5240	17.58	16 to 18	18	3.16	0.0397	1
802.11 ac (HT20)	5180	17.21	16 to 18	18	3.16	0.0397	1
	5200	17.18	16 to 18	18	3.16	0.0397	1
	5240	17.86	16 to 18	18	3.16	0.0397	1
802.11n-HT40	5190	17.99	16 to 18	18	3.16	0.0397	1
	5230	17.49	16 to 18	18	3.16	0.0397	1
02.11 ac (HT40)	5190	17.97	16 to 18	18	3.16	0.0397	1
	5230	17.46	16 to 18	18	3.16	0.0397	1
802.11 ac (HT80)	5210	17.10	16 to 18	18	3.16	0.0397	1

modulation	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)
802.11a	5745	17.32	16 to 18	18	3.16	0.0397	1
	5785	17.42	16 to 18	18	3.16	0.0397	1
	5825	17.50	16 to 18	18	3.16	0.0397	1
802.11n- HT20	5745	17.73	16 to 18	18	3.16	0.0397	1
	5785	17.96	16 to 18	18	3.16	0.0397	1
	5825	17.68	16 to 18	18	3.16	0.0397	1
802.11 ac (HT20)	5745	17.42	16 to 18	18	3.16	0.0397	1
	5785	17.14	16 to 18	18	3.16	0.0397	1
	5825	17.36	16 to 18	18	3.16	0.0397	1
802.11n- HT40	5755	17.54	16 to 18	18	3.16	0.0397	1
	5795	17.93	16 to 18	18	3.16	0.0397	1
02.11 ac (HT40)	5755	17.17	16 to 18	18	3.16	0.0397	1
	5795	17.80	16 to 18	18	3.16	0.0397	1
802.11 ac (HT80)	5775	17.54	16 to 18	18	3.16	0.0397	1

WIFI 5G

ANT 1

Antenna gain: 5 dBi

modulation	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)
802.11a	5180	17.35	16 to 18	18	3.16	0.0397	1
	5200	17.60	16 to 18	18	3.16	0.0397	1
	5240	17.72	16 to 18	18	3.16	0.0397	1
802.11n- HT20	5180	17.71	16 to 18	18	3.16	0.0397	1
	5200	17.28	16 to 18	18	3.16	0.0397	1
	5240	17.59	16 to 18	18	3.16	0.0397	1
802.11 ac (HT20)	5180	17.38	16 to 18	18	3.16	0.0397	1
	5200	17.27	16 to 18	18	3.16	0.0397	1
	5240	17.95	16 to 18	18	3.16	0.0397	1
802.11n- HT40	5190	17.01	16 to 18	18	3.16	0.0397	1
	5230	17.53	16 to 18	18	3.16	0.0397	1
02.11 ac (HT40)	5190	17.82	16 to 18	18	3.16	0.0397	1
	5230	17.35	16 to 18	18	3.16	0.0397	1
802.11 ac (HT80)	5210	17.11	16 to 18	18	3.16	0.0397	1

modulation	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)
802.11a	5745	17.33	16 to 18	18	3.16	0.0397	1
	5785	17.43	16 to 18	18	3.16	0.0397	1
	5825	17.04	16 to 18	18	3.16	0.0397	1
802.11n- HT20	5745	17.81	16 to 18	18	3.16	0.0397	1
	5785	18.07	16 to 18	18	3.16	0.0397	1
	5825	17.77	16 to 18	18	3.16	0.0397	1
802.11 ac (HT20)	5745	17.06	16 to 18	18	3.16	0.0397	1
	5785	17.26	16 to 18	18	3.16	0.0397	1
	5825	17.43	16 to 18	18	3.16	0.0397	1
802.11n- HT40	5755	17.63	16 to 18	18	3.16	0.0397	1
	5795	17.99	16 to 18	18	3.16	0.0397	1
02.11 ac (HT40)	5755	17.29	16 to 18	18	3.16	0.0397	1
	5795	17.94	16 to 18	18	3.16	0.0397	1
802.11 ac (HT80)	5775	17.15	16 to 18	18	3.16	0.0397	1

For 2T2R

Antenna gain: 8.0 dBi

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)
802.11n-HT20	5180	20.70	19 to 21	21	6.30	0.158	1
	5200	20.54	19 to 21	21	6.30	0.158	1
	5240	20.60	19 to 21	21	6.30	0.158	1
802.11 ac (HT20)	5180	20.31	19 to 21	21	6.30	0.158	1
	5200	20.24	19 to 21	21	6.30	0.158	1
	5240	20.92	19 to 21	21	6.30	0.158	1
802.11n-HT40	5190	20.54	19 to 21	21	6.30	0.158	1
	5230	20.52	19 to 21	21	6.30	0.158	1
02.11 ac (HT40)	5190	20.91	19 to 21	21	6.30	0.158	1
	5230	20.42	19 to 21	21	6.30	0.158	1
802.11 ac (HT80)	5210	20.12	19 to 21	21	6.30	0.158	1

modulation	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)
802.11n-HT20	5745	20.78	19 to 21	21	6.30	0.158	1
	5785	21.03	20 to 22	22	6.30	0.199	1
	5825	20.74	19 to 21	21	6.30	0.158	1
802.11 ac (HT20)	5745	20.25	19 to 21	21	6.30	0.158	1
	5785	20.21	19 to 21	21	6.30	0.158	1
	5825	20.41	19 to 21	21	6.30	0.158	1
802.11n-HT40	5755	20.60	19 to 21	21	6.30	0.158	1
	5795	20.97	19 to 21	21	6.30	0.158	1
02.11 ac (HT40)	5755	20.24	19 to 21	21	6.30	0.158	1
	5795	20.88	19 to 21	21	6.30	0.158	1
802.11 ac (HT80)	5775	20.36	19 to 21	21	6.30	0.158	1