

FCC ID : IPUW9SPEAKER

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

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

Antenna gain: 2.0dBi

802.11b:

Channel	Channel Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain Numeric	Power density at 20cm(mW/cm2)	Power density Limits (mW/cm2)
1	2412	18.60	72.44	1.5849	0.0228	1
6	2437	18.15	65.31	1.5849	0.0205	1
11	2462	19.16	82.22	1.5849	0.0260	1

802.11g:

Channel	Channel Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
1	2412	17.84	60.81	1.5849	0.0192	1
6	2437	17.90	61.66	1.5849	0.0194	1
11	2462	17.80	60.26	1.5849	0.0190	1

802.11n HT20

Channel	Channel Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
1	2412	19.00	79.43	1.5849	0.0250	1
6	2437	18.75	74.99	1.5849	0.0236	1
11	2462	18.96	78.70	1.5849	0.0248	1

802.11n HT40

Channel	Channel Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
3	2422	18.43	69.66	1.5849	0.0220	1
6	2437	18.34	68.23	1.5849	0.0215	1
9	2452	18.14	65.16	1.5849	0.0205	1

802.11a

Channel	Channel Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
36	5180	15.43	34.91	1.5849	0.0110	1
42	5210	15.48	35.32	1.5849	0.0111	1
48	5240	15.19	33.04	1.5849	0.0104	1

802.11n HT20

Channel	Channel Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
36	5180	15.10	32.36	1.5849	0.0102	1
42	5210	15.13	32.58	1.5849	0.0103	1
48	5240	15.00	31.62	1.5849	0.0100	1

802.11n HT40

Channel	Channel Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain Numeric	Power density at 20cm(mW/cm ²)	Power density Limits (mW/cm ²)
38	5190	14.26	26.67	1.5849	0.0084	1
46	5230	14.20	26.30	1.5849	0.0083	1