

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)

FCC ID: 2ATOQ-X8

EUT Specification

EUT	Robotic Vacuum Cleaner
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5825GHz <input type="checkbox"/> Others
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others ____
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna diversity	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Antenna gain (Max)	2.0 dBi
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation

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

Friis transmission formula: $P_d = \frac{P_{out} * G}{4 * \pi * R^2}$

Where

P_d = Power density in mW/cm^2

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

$\pi = 3.1416$

R = distance between observation point and center of the radiator in cm

P_d the limit of MPE, $1mW/cm^2$. 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.

Measurement Result

Modulation	Maximum Peak Output Power (dBm)		
	Low Channel	Middle Channel	High Channel
802.11b	16.43	16.51	16.26
802.11g	15.89	15.61	15.74
802.11n-HT20	14.87	14.91	14.69
802.11n-HT40	13.56	13.38	13.46

Operating Mode	Test Channel	Tune up tolerance (dBm)	Max tune up conducted power (dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/cm^2)	Power density Limits (mW/cm^2)
802.11b	1	16.43 ± 1	17.43	55.335	2.0	1.58	0.0174	1
	6	16.51 ± 1	17.51	56.364	2.0	1.58	0.0177	1
	11	16.26 ± 1	17.26	53.211	2.0	1.58	0.0167	1
802.11g	1	15.89 ± 1	16.89	48.865	2.0	1.58	0.0154	1
	6	15.61 ± 1	16.61	45.814	2.0	1.58	0.0144	1
	11	15.74 ± 1	16.74	47.206	2.0	1.58	0.0148	1
802.11n-H T20	1	14.87 ± 1	15.87	38.637	2.0	1.58	0.0122	1
	6	14.91 ± 1	15.91	38.994	2.0	1.58	0.0123	1
	11	14.49 ± 1	15.49	35.400	2.0	1.58	0.0111	1
802.11n-H T40	3	13.56 ± 1	14.56	28.576	2.0	1.58	0.0090	1
	3	13.38 ± 1	14.38	27.416	2.0	1.58	0.0086	1
	9	13.46 ± 1	14.46	27.925	2.0	1.58	0.0088	1

Signature



Date: 2019-05-31