

## FCC 47 CFR MPE REPORT

TZUMI Electronics,LLC

ionvac UltraClean UV sanitizing robo vac (Robotic Vacuum Cleaner)

Model Number: 8063

Additional Model: 8063WM

FCC ID: 2AON7-WJ8063TZUMI

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## Maximum Permissible Exposure

### 1. Applicable Standards

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

#### 1.1. Limits for Maximum Permissible Exposure (MPE)

##### (a) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Times   E   <sup>2</sup> ,   H   <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-10000			5	6

##### (b) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Times   E   <sup>2</sup> ,   H   <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-10000			1.0	30

Note: f=frequency in MHz; \*Plane-wave equivalent power density

## 1.2. MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric Field (V/m)

P = Peak RF output Power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance,  $d=0.2\text{m}$ , as well as the gain of the used antenna, the RF power density can be obtained

## 2. Conducted Power Result

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11b	2412	15.71	37.239	15±1	2.5	1.78
	2437	15.63	36.559	15±1	2.5	1.78
	2462	15.51	35.563	15±1	2.5	1.78
IEEE 802.11g	2412	20.11	102.565	20±1	2.5	1.78
	2437	20.00	100.000	20±1	2.5	1.78
	2462	19.99	99.770	19±1	2.5	1.78
IEEE 802.11n HT20	2412	20.04	100.925	20±1	2.5	1.78
	2437	20.61	115.080	20±1	2.5	1.78
	2462	20.16	103.753	20±1	2.5	1.78
IEEE 802.11n HT40	2422	17.51	56.364	17±1	2.5	1.78
	2437	17.47	55.847	17±1	2.5	1.78
	2452	17.52	56.494	17±1	2.5	1.78

## 3. Calculated Result and Limit

Mode	Target power (dBm)	Antenna gain		Power Density (S) (mW/cm <sup>2</sup> )	Limited of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
		(dBi)	(Linear)			
2.4G Band						
IEEE 802.11b	16	2.5	1.78	0.01408	1	Compiles
IEEE 802.11g	21	2.5	1.78	0.04454	1	Compiles
IEEE 802.11n HT20	21	2.5	1.78	0.04454	1	Compiles
IEEE 802.11n HT40	18	2.5	1.78	0.02232	1	Compiles

**End of Test Report**