

# Safety Human Exposure

## 1.1 Radio Frequency Exposure Compliance

### 1.1.1 Electromagnetic Fields

RESULT:

Pass

#### Test Specification

Test item	: Robotic Vacuum Cleaner
Identification / Type No.	: Q340RR
FCC ID	: 2AN2O-Q340RR01
IC:	23317-Q340RR01
HVIN	: Q340RR-FN31
Test standard	: CFR47 FCC Part 2: Section 2.1091 CFR47 FCC Part 1: Section 1.1310 FCC KDB Publication 447498 v06 RSS-102 Issue 5 February 2021

#### ➤ Product Classification

This device defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

Max 3.87 dBi for 2.4GHz Wi-Fi

#### ➤ Radio Frequency Exposure Limit

For FCC:

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )
300-1,500	--	--	f/1500
1,500-100,000	--	--	1.0

For IC:

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m <sup>2</sup> )	Reference Period (minutes)
0.003-10 <sup>21</sup>	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ f <sup>0.5</sup>	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ f <sup>0.25</sup>	0.1540/ f <sup>0.25</sup>	8.944/ f <sup>0.5</sup>	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f <sup>0.3417</sup>	0.008335 f <sup>0.3417</sup>	0.02619 f <sup>0.6834</sup>	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ f <sup>1.2</sup>
150000-300000	0.158 f <sup>0.5</sup>	4.21 x 10 <sup>-4</sup> f <sup>0.5</sup>	6.67 x 10 <sup>-5</sup> f	616000/ f <sup>1.2</sup>

Note: f is frequency in MHz.  
\*Based on nerve stimulation (NS).  
\*\* Based on specific absorption rate (SAR).

➤ **Radio Frequency Exposure Calculation Formula**

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)  
 P = power input to the antenna (in appropriate units, e.g., mW)  
 G = power gain of the antenna in the direction of interest relative to an isotropic radiator  
 R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

**or:**

$$S = \frac{EIRP}{4\pi R^2}$$

where: EIRP = equivalent (or effective) isotropically radiated power

**a) EUT RF Exposure Evaluation standalone operations**

Mode	Frequency [MHz]	*Measured RF Output Power [dBm]	Antenna Gain [dBi]	Distance [cm]	Power Density [mW/cm <sup>2</sup> ]	FCC Limit [mW/cm <sup>2</sup> ]	IC Limit [mW/cm <sup>2</sup> ]
2.4G Wi-Fi	2412	20.18	3.87	20	0.0506	1	0.537

Note:

- \*2.4GHz Band RF Output Power: Refer to CN21ETLW 001.

➤ **Conclusion**

Therefore the maximum calculations result of above are meet the requirement of Radio Frequency Exposure (MPE) limit.