

## 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: 2AT7J-R550

### EUT Specification

| EUT                               | Robot Vacuum Cleaner                                                                                                                                                                                                                             |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Frequency band (Operating)</b> | <input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz<br><input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz<br><input type="checkbox"/> WLAN: 5.745GHz ~ 5825GHz<br><input type="checkbox"/> Others: BLE: 2402-2480MHz |
| <b>Device category</b>            | <input type="checkbox"/> Portable (<20cm separation)<br><input checked="" type="checkbox"/> Mobile (>20cm separation)<br><input type="checkbox"/> Others ____                                                                                    |
| <b>Exposure classification</b>    | <input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> )<br><input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )                                                    |
| <b>Antenna diversity</b>          | <input checked="" type="checkbox"/> Single antenna<br><input type="checkbox"/> Multiple antennas<br><input type="checkbox"/> Tx diversity<br><input type="checkbox"/> Rx diversity<br><input type="checkbox"/> Tx/Rx diversity                   |
| <b>Max. output power</b>          | 22.40 dBm (0.1738W)                                                                                                                                                                                                                              |
| <b>Antenna gain (Max)</b>         | 1.65 dBi                                                                                                                                                                                                                                         |
| <b>Evaluation applied</b>         | <input checked="" type="checkbox"/> MPE Evaluation<br><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 <sup>2</sup> ) | Average Time |
|--------------------------------------------------------------|------------------------------|------------------------------|------------------------------------|--------------|
| <b>(A) Limits for Occupational/Control Exposures</b>         |                              |                              |                                    |              |
| <b>300-1500</b>                                              | --                           | --                           | <b>F/300</b>                       | <b>6</b>     |
| <b>1500-100000</b>                                           | --                           | --                           | <b>5</b>                           | <b>6</b>     |
| <b>(B) Limits for General Population/Uncontrol Exposures</b> |                              |                              |                                    |              |
| <b>300-1500</b>                                              | --                           | --                           | <b>F/1500</b>                      | <b>6</b>     |
| <b>1500-100000</b>                                           | --                           | --                           | <b>1</b>                           | <b>30</b>    |

## Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

$P_d$  = Power density in mW/cm<sup>2</sup>

$P_{out}$  = 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<sup>2</sup>. 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

| Operating Mode | Channel Frequency (MHz) | Maximum output power (dBm) | Tune up tolerance (dBm) | Max. Tune up Power (dBm) | Antenna Gain (dBi) | Power density at 20cm (mW/ cm2 ) | Power density Limits (mW/cm2 ) |
|----------------|-------------------------|----------------------------|-------------------------|--------------------------|--------------------|----------------------------------|--------------------------------|
| 802.11b        | 2412                    | 21.98                      | 21.98 ± 1               | 22.98                    | 1.65               | 0.0578                           | 1                              |
|                | 2437                    | 22.34                      | 22.34 ± 1               | 23.34                    | 1.65               | 0.0628                           | 1                              |
|                | 2462                    | 22.40                      | 22.40 ± 1               | 23.40                    | 1.65               | 0.0637                           | 1                              |
| 802.11g        | 2412                    | 21.17                      | 21.17 ± 1               | 22.17                    | 1.65               | 0.0480                           | 1                              |
|                | 2437                    | 21.43                      | 21.43 ± 1               | 22.43                    | 1.65               | 0.0509                           | 1                              |
|                | 2462                    | 21.54                      | 21.54 ± 1               | 22.54                    | 1.65               | 0.0522                           | 1                              |
| 802.11n (HT20) | 2412                    | 21.16                      | 21.16 ± 1               | 22.16                    | 1.65               | 0.0479                           | 1                              |
|                | 2437                    | 21.33                      | 21.33 ± 1               | 22.33                    | 1.65               | 0.0498                           | 1                              |
|                | 2462                    | 21.46                      | 21.46 ± 1               | 22.46                    | 1.65               | 0.0513                           | 1                              |
| 802.11n (HT40) | 2422                    | 19.11                      | 19.11 ± 1               | 20.11                    | 1.65               | 0.0299                           | 1                              |
|                | 2437                    | 19.26                      | 19.26 ± 1               | 20.26                    | 1.65               | 0.0309                           | 1                              |
|                | 2452                    | 19.41                      | 19.41 ± 1               | 20.41                    | 1.65               | 0.0320                           | 1                              |

Result: No Standalone SAR test is required.