

# 1 Safety Human Exposure

## 1.1 Radio Frequency Exposure Compliance

### 1.1.1 Electromagnetic Fields

RESULT:

Pass

**Report Number** : CN24397K 003  
**Test Specification**  
Test item : Lawn Mowing Robot  
Identification / Type No. : MPB14  
Trademark : ECOVACS  
FCC ID : 2A64B-MPB14  
IC: 28593-MPB14  
Test standard : CFR47 FCC Part 2: Section 2.1091  
CFR47 FCC Part 1: Section 1.1310  
FCC KDB Publication 447498 D01 v06  
FCC KDB Publication 865664 D02 v01r02  
RSS-102 Issue 5 February 2021

#### 1.1.1.1 RF Exposure Compliance Requirement for FCC

**FCC requirement:** 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 20cm normally can be maintained between the user and the device.

Max 4.10 dBi for Bluetooth & 2.4GHz Wi-Fi

#### ➤ Radio Frequency Exposure Limit

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

#### ➤ 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) RF Exposure Evaluation standalone operations (worse case)**

Mode	*Measured RF Output Power (dBm)	EIRP (dBm)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	FCC Limit (mW/cm <sup>2</sup> )
Bluetooth	7.32	11.42	20	0.003	1.0
2.4G Wi-Fi	19.00	23.10	20	0.041	1.0

Note:

1. 2.4GHz Band RF Output Power: Refer to CN24397K 001 & CN24397K 002.
2. The Bluetooth and 2.4GHz Wi-Fi of EUT cannot transmitting sync.

➤ **Conclusion**

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

**1.1.1.2 RF Exposure Compliance Requirement for IC**

The EUT shall comply with the requirement of RSS-102 section 2.5.2.

**Exemption from Routine Evaluation Limits – RF Exposure Evaluation**

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device’s radiating element is greater than 20 cm, except when the device operates as follows:

at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;

- RF exposure evaluation exempted power for 2.4GHz: 2.68 W

Max 4.10 dBi for Bluetooth & 2.4GHz Wi-Fi

**a) RF Exposure Calculations for ISED, Stand-alone mode**

Operating Mode	Max. EIRP incl. tune-up (dBm)	Distance (cm)	Maximum EIRP (W)	Threshold power (W)	Verdict
Bluetooth	11.42	20	0.014	2.68	Pass
2.4G Wi-Fi	23.10	20	0.204	2.68	Pass

Note: The maximum EIRP lower than the threshold power in section 2.5.2, thus compliant.

Both e.i.r.p. for Bluetooth & 2.4GHz Wi-Fi are less than the RF exposure evaluation exempted power. So RF exposure evaluation is not required.

➤ **Conclusion**

**“RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.”**