

RF Exposure Evaluation Report

APPLICANT : Hugreen Co Ltd
EQUIPMENT : Smart Agriculture Monitoring System
BRAND NAME : Rockabye
MODEL NAME : GWY-A09L
FCC ID : 2APLT-GWY-A09L
STANDARD : 47 CFR Part 2.1091

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Approved by: Mark Qu / Manager



Sporton International (Shenzhen) Inc.

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA832902	Rev. 01	Initial issue of report	May 21, 2018

**1. Administration Data****1.1. Testing Laboratory**

Testing Laboratory	
Test Site	Sporton International (Shenzhen) Inc.
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City Guangdong Province 518055 China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595

Applicant	
Company Name	Hugreen Co Ltd
Address	12F., No.1-1, Sec. 5, Zhongxiao E. Rd., Xinyi Dist., Taipei City 110, Taiwan (R.O.C.)

Manufacturer	
Company Name	Hugreen Co Ltd
Address	12F., No.1-1, Sec. 5, Zhongxiao E. Rd., Xinyi Dist., Taipei City 110, Taiwan (R.O.C.)



2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Smart Agriculture Monitoring System
Brand Name	Rockabye
Model Name	GWY-A09L
FCC ID	2APLT-GWY-A09L
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz LoRa: 915MHz
Mode	802.11b/g/n HT20/HT40 LoRa : FSK
HW Version	V2.1
SW Version	V2.1
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

**3. Maximum RF average output power among production units****<LoRa>**

Band / Mode	Average Power (dBm)
LoRa 915 MHz	14.00

<WLAN 2.4GHz >

Mode			Maximum Average Power (dBm)
			Ant 1
2.4GHz WLAN (DTS)	802.11b	CH01	8.00
		CH06	8.00
		CH11	9.00
	802.11g	CH01	12.00
		CH06	15.00
		CH08	13.50
		CH09	8.50
		CH10	8.00
		CH11	7.50
	802.11n-HT20	CH01	8.50
		CH02	12.50
		CH06	14.00
		CH08	13.50
		CH09	9.00
		CH10	8.00
		CH11	6.50
	802.11n-HT40	CH03	7.00
		CH06	8.00
		CH09	5.50

4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WLAN2.4GHz 802.11b	2412	3.00	9.00	12.00	0.02	15.85	0.003	1.00	0.003
WLAN2.4GHz 802.11g	2412	3.00	15.00	18.00	0.06	63.10	0.013	1.00	0.013
WLAN2.4GHz 802.11n-HT20	2412	3.00	14.00	17.00	0.05	50.12	0.010	1.00	0.010
WLAN2.4GHz 802.11n-HT40	2422	3.00	8.00	11.00	0.01	12.59	0.003	1.00	0.003
LoRa	915	5.00	14.00	19.00	0.08	79.43	0.016	0.61	0.026

Note: 1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. Chose the maximum power to do MPE analysis.

**5.2. Collocated Power Density Calculation**

Mode	Frequency	Power Density / Limit	Σ (Power Density / Limit) of WLAN 2.4GHz+ LoRa
WLAN2.4GHz	2412 MHz ~ 2462 MHz	0.013	0.039
LoRa	915 MHz	0.026	

Note:

1. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN 2.4GHz + LoRa.

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.