



# Radio Exposure Evaluation Report

FCC ID : 2AEUPBHARC011  
Equipment : Spotlight cam wired  
Brand Name : RING  
Model Name : 5L5C4T  
Applicant : Ring LLC  
1523 26th St, Santa Monica, CA 90404, USA  
Manufacturer : Chicony Electronics (Dong Guan ) Co.,Ltd.  
San Zhong Guan Li Qu, Qingxi Town,  
Dongguan City Guangdong 523651 China  
Standard : 47 CFR Part 2.1091

The product was received on May 31, 2019, and testing was started from Jun. 08, 2019 and completed on Jun. 24, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of United States government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Allen Lin

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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## Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items          | Result (PASS/FAIL) | Remark |
|---------------|-----------------|---------------------|--------------------|--------|
| 2             | -               | Exposure evaluation | PASS               | -      |

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

None.

**Reviewed by:** Jackson Tsai

**Report Producer:** Ann Hou

# 1 General Description

## 1.1 EUT General Information

| RF General Information |                       |                           |   |
|------------------------|-----------------------|---------------------------|---|
| Evaluation Mode        | Frequency Range (MHz) | Operating Frequency (MHz) | Modulation Type   |
| 2.4GHz WLAN            | 2400-2483.5           | 2412-2462                 | 802.11b: DSSS (DBPSK, DQPSK, CCK)<br>802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) |
| Bluetooth              | 2400-2483.5           | 2402-2480                 | LE: DSSS (GFSK)   |
| LoRa                   | 902-928               | 903.5-927.1               | Lora-500k:DTS<br>Lora-125k/250k:FHSS  |
| FSK                    | 902-928               | 903.5-927.1               | FSK-5k/50k/150k:FHSS  |

## 1.2 Testing Location

| Testing Location                           |        |  |                      |
|--|--------|--|----------------------|
| <input checked="" type="checkbox"/>        | HWA YA | ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)    |                      |
|  |        | TEL : 886-3-327-3456   | FAX : 886-3-327-0973 |
| Test site Designation No. TW1190 with FCC. |        |  |                      |
| <input type="checkbox"/>                   | JHUBEI | ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.) |                      |
|  |        | TEL : 886-3-656-9065   | FAX : 886-3-656-9085 |
| Test site Designation No. TW0006 with FCC. |        |  |                      |

## 2 Maximum Permissible Exposure

### 2.1 Limit of Maximum Permissible Exposure

(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 Time  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 <sup>2</sup> )*                 | 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

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm <sup>2</sup> ) | Averaging Time  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 <sup>2</sup> )*                   | 30   |
| 30-300                | 27.5                              | 0.073                             | 0.2                                      | 30   |
| 300-1500              | -                                 | -                                 | F/1500                                   | 30   |
| 1500-100,000          | -                                 | -                                 | 1.0                                      | 30   |

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

### 2.2 MPE Calculation Method

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:

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

**E** = Electric field (V/m)

**P** = 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

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

## 2.3 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

### WLAN 2.4GHz

| Mode     | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) |
|----------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|
| 2.4G;G1D | 1.27     | 17.28       | 18.55      | 0.50           | 19.05              | 0.08035          | 20            | 0.01599                 | 1.00000                       |
| 2.4G;D1D | 1.27     | 18.07       | 19.34      | 0.50           | 19.84              | 0.09638          | 20            | 0.01917                 | 1.00000                       |

### Bluetooth

| Mode       | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) |
|------------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|
| 2.4G;BT-LE | 1.06     | 6.23        | 7.29       | 0.50           | 7.79               | 0.00601          | 20            | 0.00120                 | 1.00000                       |

### LoRa

| Mode      | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) |
|-----------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|
| 0.9G;LoRa | 0.73     | 20.69       | 21.42      | 0.50           | 21.92              | 0.15560          | 20            | 0.03096                 | 0.60200                       |
| 0.9G;LoRa | 0.73     | 25.61       | 26.34      | 0.50           | 26.84              | 0.48306          | 20            | 0.09610                 | 0.60147                       |
| 0.9G;FSK  | 0.73     | 26.96       | 27.69      | 0.50           | 28.19              | 0.65917          | 20            | 0.13114                 | 0.60147                       |

### Co-TX LoRa + WLAN 2.4GHz

| Mode     | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) | Ratio (S/Limit) |
|----------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|-----------------|
| 2.4G;D1D | 1.27     | 18.07       | 19.34      | 0.50           | 19.84              | 0.09638          | 20            | 0.01917                 | 1.00000                       | 0.01917         |
| 0.9G;FSK | 0.73     | 26.96       | 27.69      | 0.50           | 28.19              | 0.65917          | 20            | 0.13114                 | 0.60147                       | 0.21803         |
|          |          |             |            |                |                    |                  |               |                         | Sum Ratio                     | 0.23720         |
|          |          |             |            |                |                    |                  |               |                         | Ratio Limit                   | 1               |

### Co-TX LoRa + Bluetooth

| Mode       | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) | Ratio (S/Limit) |
|------------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|-----------------|
| 2.4G;BT-LE | 1.06     | 6.23        | 7.29       | 0.50           | 7.79               | 0.00601          | 20            | 0.00120                 | 1.00000                       | 0.00120         |
| 0.9G;FSK   | 0.73     | 26.96       | 27.69      | 0.50           | 28.19              | 0.65917          | 20            | 0.13114                 | 0.60147                       | 0.21803         |
|            |          |             |            |                |                    |                  |               |                         | Sum Ratio                     | 0.21923         |
|            |          |             |            |                |                    |                  |               |                         | Ratio Limit                   | 1               |

————THE END————