

# RF Exposure Evaluation Report

Equipment : M2.COM LoRa IoT Node  
Brand Name : Advantech  
Model No. : WISE-1510  
FCC ID : M82-WISE1510  
Standard : 47 CFR Part 2.1091  
Applicant : Advantech Co., Ltd.  
No.1, Alley 20, Lane 26, Rueiguang Rd., Neihu  
District, Taipei City, Taiwan, R.O.C.  
Manufacturer : Advantech Co., Ltd.  
No.1, Alley 20, Lane 26, Rueiguang Rd., Neihu  
District, Taipei City, Taiwan, R.O.C.

The product sample received on Dec. 28, 2016 and completely tested on Apr. 14, 2017. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit.

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Cliff Chang  
SPORTON INTERNATIONAL INC.





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| <b>PHOTOGRAPHS OF EUT V01</b> |                                             |          |

## REVISION HISTORY

[illegible]

# 1 General Description

## 1.1 EUT General Information

| RF General Information |                       |             |                             |                                        |
|------------------------|-----------------------|-------------|-----------------------------|----------------------------------------|
| Evaluation Mode        | Frequency Range (MHz) | LoRa Mode   | Operating Frequency (MHz)   | Modulation Type                        |
| LoRa                   | 902-928               | LoRa-500kHz | 903.0-914.2<br>923.3-927.25 | Chirp Spread Spectrum (CSS) modulation |
|                        |                       | LoRa-125kHz | 902.3-914.9                 |                                        |

## 1.2 Testing Location

| Testing Location                    |        |                                                                                                                               |
|-------------------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/>            | HWA YA | ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.<br>TEL : 886-3-327-3456 FAX : 886-3-327-0973   |
| <input checked="" type="checkbox"/> | JHUBEI | ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.<br>TEL : 886-3-656-9065 FAX : 886-3-656-9085 |

## 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)*                               | 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)*                                 | 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**

| <b>Mode</b> | <b>DG<br/>(dBi)</b> | <b>Power<br/>(dBm)</b> | <b>EIRP<br/>(dBm)</b> | <b>EIRP<br/>(W)</b> | <b>Distance<br/>(cm)</b> | <b>S<br/>(mW/cm2)</b> | <b>S Limit<br/>(mW/cm2)</b> |
|-------------|---------------------|------------------------|-----------------------|---------------------|--------------------------|-----------------------|-----------------------------|
| LoRa-500kHz | 1.80                | 18.42                  | 20.22                 | 0.10520             | 20                       | 0.02093               | 0.61833                     |