

## RF Exposure Report

**Report No.:** SABHPY-WTW-P20110791-2

**WLAN/BT FCC ID:** PVH0965

**WWAN FCC ID:** A4C01007A

**Test Model:** ODIN-W2

**Received Date:** Nov. 20, 2020

**Date of Evaluation:** Feb. 09, 2021

**Issued Date:** Feb. 09, 2021

**Applicant:** u-blox Malmö AB

**Address:** Östra Varvsgatan 4, 5tr Malmo SE-211 75 Sweden

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Lin Kou Laboratories

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

**Test Location:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City  
33383, TAIWAN

**FCC Registration /  
Designation Number:** 788550 / TW0003



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

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### Release Control Record

| Issue No.              | Description      | Date Issued   |
|------------------------|------------------|---------------|
| SABHPY-WTW-P20110791-2 | Original Release | Feb. 09, 2021 |

## 1 Certificate of Conformity

**Product:** WLAN and Bluetooth Module

**Brand:** u-blox Malmö AB

**Test Model:** ODIN-W2

**Sample Status:** Identical Prototype

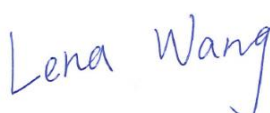
**Applicant:** u-blox Malmö AB

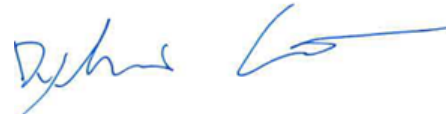
**Date of Evaluation:** Feb. 09, 2021

**Standards:** FCC Part 2 (Section 2.1091)

**References Test Guidance :** KDB 447498 D01 General RF Exposure Guidance v06  
IEEE C95.3 -2002

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

  
**Prepared by :** \_\_\_\_\_, **Date:** \_\_\_\_\_  
Lena Wang / Specialist

  
**Approved by :** \_\_\_\_\_, **Date:** \_\_\_\_\_  
Dylan Chiou / Senior Project Engineer

## 2 RF Exposure

### 2.1 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 (minutes) |
|-------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|------------------------|
| 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 <sup>2</sup> )*              | 30                     |
| 30-300                                                | 27.5                          | 0.073                         | 0.2                                 | 30                     |
| 300-1500                                              | ...                           | ...                           | f/1500                              | 30                     |
| 1500-100,000                                          | ...                           | ...                           | 1.0                                 | 30                     |

f = Frequency in MHz ; \*Plane-wave equivalent power density

### 2.2 MPE Calculation 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

### 2.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user.  
So, this device is classified as **Mobile Device**.

## 2.4 Calculation Result of Maximum Conducted Power

| Band | Frequency Band (MHz) | Max Power (dBm) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|------|----------------------|-----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| WLAN | 2412-2462            | 20.7            | 3                  | 20            | 0.047                               | 1.00                        |
| BT   | 2402-2480            | 8.3             | 3                  | 20            | 0.003                               | 1.00                        |

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| Function    | Frequency Band (MHz) | EIRP (dBm) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|-------------|----------------------|------------|---------------|-------------------------------------|-----------------------------|
| LTE Band 2  | 1850.7-1909.3        | 22.39      | 20            | 0.034                               | 1                           |
| LTE Band 4  | 1710.7-1754.3        | 22.73      | 20            | 0.037                               | 1                           |
| LTE Band 25 | 1850.7-1905.0        | 21.55      | 20            | 0.028                               | 1                           |

| Function              | Frequency Band (MHz) | ERP (dBm) | EIRP (dBm) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|-----------------------|----------------------|-----------|------------|---------------|-------------------------------------|-----------------------------|
| LTE Band 5            | 824.7-848.3          | 21.56     | 23.71      | 20            | 0.047                               | 0.55                        |
| LTE Band 12           | 699.7-715.3          | 20.95     | 23.10      | 20            | 0.041                               | 0.47                        |
| LTE Band 26           | 831.5-841.5          | 21.46     | 23.61      | 20            | 0.046                               | 0.55                        |
| LTE Band 26 (Part 90) | 814.7-821.5          | 21.52     | 23.67      | 20            | 0.046                               | 0.54                        |

\*EIRP= ERP+2.15

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible

### Conclusion:

The formula of calculated the MPE is:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + BT + WWAN =  $0.047/1 + 0.003/1 + 0.047/0.55 = 0.136$

**Therefore the maximum calculations of above situations are less than the "1" limit.**

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