

## RF Exposure Report

**Report No.:** SABGSN-WTW-P20080589-2

**FCC ID:** NKS-MA1BA1TE1

**Test Model:** Trimble Gateway-MA1, Trimble Gateway-BA1, Trimble Gateway-TE1  
(refer to item 2 for more details)

**Received Date:** Aug. 29, 2020

**Date of Evaluation:** Nov. 20, 2020

**Issued Date:** Nov. 23, 2020

**Applicant:** PeopleNet Communications Corporation

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

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**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   |
|------------------------|------------------|---------------|
| SABGSN-WTW-P20080589-2 | Original Release | Nov. 23, 2020 |

## 1 Certificate of Conformity

**Product:** Trimble Gateway NA

**Brand:** Trimble

**Test Model:** Trimble Gateway-MA1, Trimble Gateway-BA1, Trimble Gateway-TE1  
(refer to item 2 for more details)

**Sample Status:** Engineering Sample

**Applicant:** PeopleNet Communications Corporation

**Date of Evaluation:** Nov. 20, 2020

**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:** \_\_\_\_\_ Nov. 23, 2020

Vera Huang / Specialist

**Approved by :** \_\_\_\_\_



**Date:** \_\_\_\_\_ Nov. 23, 2020

Dylan Chiou / Senior Project Engineer

## 2 General Information

1. The information of module collocated in this EUT is listed as below.

| Module         | Brand   | Model  | EUT Model           |                     |                     |
|----------------|---------|--------|---------------------|---------------------|---------------------|
|                |         |        | Trimble Gateway-MA2 | Trimble Gateway-BA2 | Trimble Gateway-TE2 |
| BT/WLAN Module | msi     | BM25   | V                   | V                   | V                   |
| WWAN Module    | Quectel | EC25-A | V                   | V                   | V                   |

2. The difference between all models are listed as below.

| Ant.           | Brand   | Model           | Ant. Type                          | Remark                 | EUT Model           |                     |                     |
|----------------|---------|-----------------|------------------------------------|------------------------|---------------------|---------------------|---------------------|
|                |         |                 |                                    |                        | EUT 1               | EUT 2               | EUT 3               |
|                |         |                 |                                    |                        | Trimble Gateway-MA2 | Trimble Gateway-BA2 | Trimble Gateway-TE2 |
| WWAN Antenna 1 | TAOGLAS | PCS.06.A        | SMD Antenna                        | Internal, Main Antenna | V                   |                     | V                   |
| WWAN Antenna 2 | TAOGLAS | PCS.06.B        | SMD Antenna                        | Internal, Aux. Antenna | V                   | V                   | V                   |
| WWAN Antenna 3 | TAOGLAS | MA240.LBI.001   | Adhesive Mount Combination Antenna | External, Main Antenna | V                   |                     |                     |
| WWAN Antenna 4 | TAOGLAS | MA240.LBI.001   | Adhesive Mount Combination Antenna | External, Aux. Antenna | V                   |                     |                     |
| WWAN Antenna 5 | PACCAR  | PP407031        | Exterior-mount Antenna             | External, Main Antenna |                     | V                   |                     |
| WLAN Antenna   | TAOGLAS | FXP826.07.0120C | FPC Antenna                        | --                     | V                   | V                   | V                   |

| EUT Model           | Connector  |
|---------------------|--|
| Trimble Gateway-MA2 | a. 1 44-pin Sinbon connector<br>b. 3 Fakra connectors for external antennas<br>c. 1 M13 connector for ethernet |
| Trimble Gateway-BA2 | a. 1 44-pin Sinbon connector<br>b. 2 Fakra connectors for external antennas<br>c. 1 M13 connector for ethernet |
| Trimble Gateway-TE2 | 1 44-pin Sinbon connector  |

3. The antenna gain is listed as below.

| WWAN Antenna |           |          |                  |                 |          |
|--------------|-----------|----------|------------------|-----------------|----------|
| Band         |           | WCDMA V  | WCDMA II / LTE 2 | WCDMA 4 / LTE 4 | LTE 12   |
| Gain (dBi)   | Antenna 1 | 0.53     | 3.58             | 3.82            | -0.03    |
|              | Antenna 2 | 0.75     | <b>3.81</b>      | <b>4.04</b>     | 0.06     |
|              | Antenna 3 | 0.94     | 2.51             | 1.93            | 1.6      |
|              | Antenna 4 | 1        | 1.77             | 1.2             | 1.2      |
|              | Antenna 5 | <b>3</b> | 3                | 3               | <b>3</b> |

\*the maximum antenna gain is chosen for final test.

| WLAN Antenna |                 |              |                    |                    |                     |                     |
|--------------|-----------------|--------------|--------------------|--------------------|---------------------|---------------------|
| Brand        | Model           | Antenna Type | Antenna Gain (dBi) |                    |                     |                     |
|              |                 |              | BT/WLAN 2.4 GHz    | WLAN 5.15~5.35 GHz | WLAN 5.47~5.725 GHz | WLAN 5.725~5.85 GHz |
| TAOGLAS      | FXP826.07.0120C | FPC Antenna  | 0.75               | 1.22               | 3.58                | 3.52                |

4. 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.

### 3 RF Exposure

#### 3.1 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

#### 3.2 MPE Calculation Formula

$$Pd = (Pout * G) / (4 * \pi * r^2)$$

where

Pd = power density in mW/cm<sup>2</sup>

Pout = 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

#### 3.3 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**.

### 3.4 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> ) |
|----------|----------------------|-----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| WCDMA II | 1850-1910            | 22.66           | 3.81               | 20            | 0.088                               | 1.00                        |
| WCDMA IV | 1710-1755            | 22.57           | 4.04               | 20            | 0.091                               | 1.00                        |
| WCDMA V  | 824-849              | 23.11           | 3                  | 20            | 0.081                               | 0.55                        |
| LTE 2    | 1850-1910            | 22.37           | 3.81               | 20            | 0.083                               | 1.00                        |
| LTE 4    | 1710-1755            | 22.62           | 4.04               | 20            | 0.092                               | 1.00                        |
| LTE 12   | 699-716              | 22.56           | 3                  | 20            | 0.072                               | 0.47                        |
| WLAN     | 2412-2462            | 18.45           | 0.75               | 20            | 0.017                               | 1.00                        |
|          | 5180-5240            | 17.72           | 1.22               | 20            | 0.016                               | 1.00                        |
|          | 5260-5320            | 17.83           | 1.22               | 20            | 0.016                               | 1.00                        |
|          | 5500-5700            | 17.65           | 3.58               | 20            | 0.026                               | 1.00                        |
|          | 5745-5825            | 17.56           | 3.52               | 20            | 0.026                               | 1.00                        |
| BT       | 2402-2480            | 4.64            | 0.75               | 20            | 0.001                               | 1.00                        |

Note:

- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

#### 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

$$WLAN\ 2.4GHz + WLAN\ 5GHz + BT + WWAN = 0.017/1 + 0.026/1 + 0.001/1 + 0.072/0.47 = 0.197$$

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

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