

## RF Exposure Report

**Report No.:** SA16809E04

**FCC ID:** U8G-P1AC4

**Test Model:** MAX BR1 MK2

**Received Date:** Aug. 09, 2016

**Test Date:** Dec. 09, 2016

**Issued Date:** July 27, 2017

**Applicant:** Pismo Labs Technology Limited

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
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### Release Control Record

| Issue No.  | Description       | Date Issued   |
|------------|-------------------|---------------|
| SA16809E04 | Original release. | July 27, 2017 |

## 1 Certificate of Conformity

**Product:** Pepwave / Peplink / Pismo Wireless Product

**Brand:** Pepwave / Peplink / Pismo

**Test Model:** MAX BR1 MK2

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Pismo Labs Technology Limited

**Test Date:** Dec. 09, 2016

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

KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1-1992

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 EMC characteristics under the conditions specified in this report.

**Prepared by :** Cindy Hsin , **Date:** July 27, 2017  
Cindy Hsin / Specialist

**Approved by :** May Chen , **Date:** July 27, 2017  
May Chen / Manager

## 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 |                               |                               |                                     |                        |
| 300-1500  | ...                           | ...                           | F/1500                              | 30                     |
| 1500-100,000  | ...                           | ...                           | 1.0                                 | 30                     |

F = Frequency in MHz

### 2.2 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

### 2.3 Classification

The antenna of this product, under normal use condition, is at least 24cm away from the body of the user.

So, this device is classified as **Mobile Device**.

## 2.4 Antenna Gain

| For WLAN    |                                  |              |                 |                     |              |                |
|-------------|----------------------------------|--------------|-----------------|---------------------|--------------|----------------|
| Antenna No. | Brand                            | Model        | Ant. Gain (dBi) | Frequency range     | Antenna Type | Connector Type |
| 1           | NA                               | NA           | 3               | 2400 MHz - 2500 MHz | Dipole       | R-SMA          |
|             |                                  |              | 4~5.5           | 5150 MHz - 5350 MHz |              |                |
|             |                                  |              | 6.5~6           | 5350 MHz - 5875 MHz |              |                |
| 2           | NA                               | NA           | 3               | 2400 MHz - 2500 MHz | Dipole       | R-SMA          |
|             |                                  |              | 4~5.5           | 5150 MHz - 5350 MHz |              |                |
|             |                                  |              | 5.5~6           | 5350 MHz - 5875 MHz |              |                |
| For GPS     |                                  |              |                 |                     |              |                |
| Antenna No. | Brand                            | Model        | Ant. Gain (dBi) | Frequency range     | Antenna Type | Connector Type |
| 1           | MASTER WAVE TECHNOLOGY CO., LTD. | 98335KSAF000 | 4.5 ±0.5        | 1575.42MHz          | Magnetic     | SMA            |
| For LTE     |                                  |              |                 |                     |              |                |
| Antenna No. | Brand                            | Model        | Ant. Gain (dBi) | Frequency range     | Antenna Type | Connector Type |
| 1           | MASTER WAVE TECHNOLOGY CO., LTD. | 98619ZSAX025 | 1.99            | 699~960 MHz         | Dipole       | SMA            |
|             |                                  |              | 4               | 1575~2170 MHz       |              |                |
|             |                                  |              | 1               | 2300~2320MHz        |              |                |
|             |                                  |              | 2.8             | 2325~2690 MHz       |              |                |
| 2           | MASTER WAVE TECHNOLOGY CO., LTD. | 98619ZSAX025 | 1.99            | 699~960 MHz         | Dipole       | SMA            |
|             |                                  |              | 4               | 1575~2170 MHz       |              |                |
|             |                                  |              | 1               | 2300~2320MHz        |              |                |
|             |                                  |              | 2.8             | 2325~2690 MHz       |              |                |

## 2.5 Calculation Result

### For WLAN:

| Frequency (MHz) | Max Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|-----------------|----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 2412-2462       | 789.828        | 6.01               | 24            | 0.43541                             | 1                           |
| 5180-5240       | 195.769        | 8.51               | 24            | 0.19192                             | 1                           |
| 5745-5825       | 181.276        | 9.01               | 24            | 0.19939                             | 1                           |

#### NOTE:

2.4GHz: Directional gain = 3dBi + 10log(2) = 6.01dBi

5GHz: UNII-1: Directional gain = 5.5dBi + 10log(2) = 8.51dBi

UNII-3: Directional gain = 6dBi + 10log(2) = 9.01dBi

### For WLAN & WWAN / LTE coexistence mode:

| Condition | Technology    |             |  |
|-----------|---------------|-------------|--|
| 1         | WLAN (2.4GHz) | WLAN (5GHz) | WWAN / LTE module (FCC ID : N7NMC7455) |
| 2         | WLAN (2.4GHz) | WLAN (5GHz) | WWAN / LTE module (FCC ID : N7NMC7355) |

Note: From the above conditions, the worst case was found in condition 2. Therefore only the test data of the condition were recorded in this report.

#### Condition 2

| Frequency (MHz) | Max Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|-----------------|----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 2412-2462       | 789.828        | 6.01               | 24            | 0.43541                             | 1                           |
| 5745-5825       | 181.276        | 9.01               | 24            | 0.19939                             | 1                           |
| 824-849         | 500            | 1.99               | 24            | 0.10923                             | 0.54933                     |

\* Maximum Power = 1959mw x 0.25=489.75mw

#### Conclusion:

All of the WLAN / WWAN (LTE / 3G) device can transmit simultaneously, the formula of calculated the MPE is:  
 $CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

#### Condition 2:

Therefore, the worst-case situation is  $0.43541 / 1 + 0.19939 / 1 + 0.10923 / 0.5493 = 0.83365$  which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

--- END ---

## Appendix

3G/LTE module

MPE Evaluation for FCC ID: N7NMC7355 Radio Module:

| Mode | Equipment Category | Max Transmitter Duty Cycle | Transmitter Range (MHz) |      | Maximum |      | Antenna Gain (dBi) | Power Density (mW/cm <sup>2</sup> ) |         | Ratio          |
|------|--------------------|----------------------------|-------------------------|------|---------|------|--------------------|-------------------------------------|---------|----------------|
|      |                    |                            | Start                   | Stop | (dBm)   | (W)  |                    | Vaule                               | Limit   |                |
| GPRS | Class 10           | 25%                        | 824                     | 849  | 33      | 2    | 1.99               | 0.10923                             | 0.54933 | <b>0.19884</b> |
|      |                    | 25%                        | 1850                    | 1910 | 30      | 1    | 4                  | 0.08676                             | 1       | 0.08676        |
| EDGE | Class 10           | 25%                        | 824                     | 849  | 28      | 0.63 | 1.99               | 0.03441                             | 0.54933 | 0.06264        |
|      |                    | 25%                        | 1850                    | 1910 | 27      | 0.5  | 4                  | 0.04338                             | 1       | 0.04338        |
|      | Class 11           | 37.50%                     | 824                     | 849  | 26.2    | 0.42 | 1.99               | 0.03441                             | 0.54933 | 0.06264        |
|      |                    | 37.50%                     | 1850                    | 1910 | 25.2    | 0.33 | 4                  | 0.04294                             | 1       | 0.04294        |
|      | Class 12           | 50%                        | 824                     | 849  | 25      | 0.32 | 1.99               | 0.03495                             | 0.54933 | 0.06362        |
|      |                    | 50%                        | 1850                    | 1910 | 24      | 0.25 | 4                  | 0.04338                             | 1       | 0.04338        |
| CDMA | EvDo               | 100%                       | 824                     | 849  | 25      | 0.32 | 1.99               | 0.06991                             | 0.54933 | 0.12726        |
|      |                    | 100%                       | 1850                    | 1910 | 25      | 0.32 | 4                  | 0.11105                             | 1       | 0.11105        |
|      |                    | 100%                       | 817                     | 824  | 25      | 0.32 | 1.99               | 0.06991                             | 0.54466 | 0.12836        |
| UMTS | HSDPA<br>HSUPA     | 100%                       | 824                     | 849  | 24      | 0.25 | 1.99               | 0.05461                             | 0.54933 | 0.09941        |
|      |                    | 100%                       | 1710                    | 1755 | 24      | 0.25 | 4                  | 0.08676                             | 1       | 0.08676        |
|      |                    | 100%                       | 1850                    | 1910 | 24      | 0.25 | 4                  | 0.08676                             | 1       | 0.08676        |
| LTE  | Band 17            | 100%                       | 704                     | 716  | 24      | 0.25 | 1.99               | 0.05461                             | 0.46933 | 0.11636        |
|      | Band 13            | 100%                       | 777                     | 787  | 24      | 0.25 | 1.99               | 0.05461                             | 0.518   | 0.10542        |
|      | Band 5             | 100%                       | 824                     | 849  | 24      | 0.25 | 1.99               | 0.05461                             | 0.54933 | 0.09941        |
|      | Band 4             | 100%                       | 1710                    | 1755 | 24      | 0.25 | 4                  | 0.08676                             | 1       | 0.08676        |
|      | Band 2             | 100%                       | 1850                    | 1910 | 24      | 0.25 | 4                  | 0.08676                             | 1       | 0.08676        |
|      | Band 25            | 100%                       | 1850                    | 1915 | 24      | 0.25 | 4                  | 0.08676                             | 1       | 0.08676        |

Note: 1. Distance to Human Body: 24cm

2. The ratio which was indicated in bold type of the max ratio.

3. This device has 5 MHz and 10 MHz bandwidth modes for LTE Bands 13 (700 MHz); 1.4 MHz, 3 MHz, 5 MHz and 10 MHz bandwidth modes for LTE Bands 5 and 12 (850 and 700 MHz); 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz and 20 MHz bandwidth modes for LTE Bands 2, 25 and 4 (1900 and 1700 MHz); 5 MHz, 10 MHz, 15 MHz and 20 MHz bandwidth modes for LTE Bands 7 (2500 MHz).



3G/LTE module

MPE Evaluation for FCC ID: N7NMC7455 Radio Module:

| Operating Mode              | TX Freq Range (MHz) |      | Max Time-Avg Cond Power |      | Antenna Gain (dBi) | Power Density (mW/cm <sup>2</sup> ) |         | Ratio          |
|-----------------------------|---------------------|------|-------------------------|------|--------------------|-------------------------------------|---------|----------------|
|                             | Start               | Stop | (dBm)                   | (W)  |                    | Vaule                               | Limit   |                |
| WCDMA Band II<br>LTE Band 2 | 1850                | 1910 | 24                      | 0.25 | 4                  | 0.087                               | 1       | 0.08676        |
| WCDMA Band IV<br>LTE Band 4 | 1710                | 1755 | 24                      | 0.25 | 4                  | 0.087                               | 1       | 0.08676        |
| WCDMA Band V<br>LTE Band 5  | 824                 | 849  | 24                      | 0.25 | 1.99               | 0.055                               | 0.54933 | 0.09941        |
| LTE Band 7                  | 2500                | 2570 | 23                      | 0.2  | 2.8                | 0.053                               | 1       | 0.05265        |
| LTE Band 12                 | 699                 | 716  | 24                      | 0.25 | 1.99               | 0.055                               | 0.466   | <b>0.11719</b> |
| LTE Band 13                 | 777                 | 787  | 24                      | 0.25 | 1.99               | 0.055                               | 0.518   | 0.10542        |
| LTE Band 25                 | 1850                | 1915 | 24                      | 0.25 | 4                  | 0.087                               | 1       | 0.08676        |
| LTE Band 26                 | 814                 | 849  | 24                      | 0.25 | 1.99               | 0.055                               | 0.54266 | 0.10063        |
| LTE Band 30                 | 2305                | 2315 | 23                      | 0.2  | 1                  | 0.035                               | 1       | 0.03479        |
| LTE Band 41                 | 2496                | 2690 | 23                      | 0.2  | 2.8                | 0.053                               | 1       | 0.05265        |

Note: 1. Distance to Human Body: 24cm

2. The ratio which was indicated in bold type of the max ratio.