# RF EXPOSURE REPORT

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|---|---|
| **REPORT NO.:** | SA141029E01 |
| **MODEL NO.:** | DVW32G |
| **FCC ID:** | XCNDVW32G |
| **RECEIVED:** | Oct. 29, 2014 |
| **TESTED:** | Dec. 08, 2014 |
| **ISSUED:** | Dec. 23, 2014 |

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|---|---|
| **APPLICANT:** | Ubee Interactive Corp. |
| **ADDRESS:** | 10F-1, No.5, Taiyuan 1st St. Jhubei Hsinchu, 302 Taiwan |

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|---|---|
| **ISSUED BY:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory |
| **LAB ADDRESS :** | No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C. |
| **TEST LOCATION (1):** | No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C. |
| **TEST LOCATION (2):** | No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C. |

This report should not be used by the client to claim product certification, approval, or endorsement by any government agencies.

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# RELEASE CONTROL RECORD

| ISSUE NO. | REASON FOR CHANGE | DATE ISSUED |
|---|---|---|
| SA141029E01 | Original release | Dec. 23, 2014 |

## 1. CERTIFICATION

| | |
|---|---|
| **PRODUCT:** | Wireless eMTA |
| **BRAND NAME:** | Ubee |
| **MODEL NO.:** | DVW32G |
| **TEST SAMPLE:** | ENGINEERING SAMPLE |
| **APPLICANT:** | Ubee Interactive Corp. |
| **TESTED:** | Dec. 08, 2014 |
| **STANDARDS:** | FCC Part 2 (Section 2.1091) |
| | KDB 447498 D03 |
| | IEEE C95.1 |

The above equipment (Model: DVW32G) 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 :** _____ , **Date:** Dec. 23, 2014
( Lori Chung, Specialist )

**Approved by :** _____ , **Date:** Dec. 23, 2014
( May Chen, Manager )

## 2. RF EXPOSURE LIMIT

### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| FREQUENCY RANGE (MHz) | ELECTRIC FIELD STRENGTH (V/m) | MAGNETIC FIELD STRENGTH (A/m) | POWER DENSITY ($mW/cm^2$) | AVERAGE TIME (minutes) |
|---|---|---|---|---|
| **LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE** | | | | |
| 300-1500 | … | … | F/1500 | 30 |
| 1500-100,000 | … | … | 1.0 | 30 |

F = Frequency in MHz

## 3. MPE CALCULATION FORMULA

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

where

Pd = power density in $mW/cm^2$

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

## 4. CLASSIFICATION

The antenna of this product, under normal use condition, is at least 28cm away from the body of the user. So, this device is classified as **Mobile Device**.

## 5. ANTENNA GAIN

1. The antennas provided to the EUT, please refer to the following table:

| Antenna set 1 | | | | | | |
|---|---|---|---|---|---|---|
| Antenna No. | Brand | Model | Gain (dBi) Including cable loss | Antenna Type | Connecter Type | Frequency range (GHz to GHz) |
| 1 | WHA YU | NA | 4.6 | Dipole (PCB) | MHF | 2.4~2.4835 |
| | | | 4.4 | | | 5.15~5.25 |
| | | | 6.3 | | | 5.725~5.850 |
| 2 | WHA YU | NA | 6 | Dipole (PCB) | MHF | 2.4~2.4835 |
| | | | 4.6 | | | 5.15~5.25 |
| | | | 5.8 | | | 5.725~5.850 |
| 3 | WHA YU | NA | 5.3 | Dipole (PCB) | MHF | 2.4~2.4835 |
| | | | 3.8 | | | 5.15~5.25 |
| | | | 4.2 | | | 5.725~5.850 |
| Antenna set 2 | | | | | | |
| Antenna No. | Brand | Model | Gain (dBi) Including cable loss | Antenna Type | Connecter Type | Frequency range (GHz to GHz) |
| 1 (Black) | TONGDA | NA | 4.453 | Dipole (PCB) | MHF | 2.4~2.4835 |
| | | | 4.289 | | | 5.15~5.25 |
| | | | 6.158 | | | 5.725~5.850 |
| 2 (Gray) | TONGDA | NA | 5.989 | Dipole (PCB) | MHF | 2.4~2.4835 |
| | | | 4.442 | | | 5.15~5.25 |
| | | | 5.633 | | | 5.725~5.850 |
| 3 (White) | TONGDA | NA | 5.120 | Dipole (PCB) | MHF | 2.4~2.4835 |
| | | | 3.508 | | | 5.15~5.25 |
| | | | 4.058 | | | 5.725~5.850 |

## 6. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

**For 15.247(2.4GHz):**

### CDD Mode:

**802.11b:**

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY ($mW/cm^2$) | LIMIT ($mW/cm^2$) |
|---|---|---|---|---|---|
| 2412 ~ 2462 | 437.359 | 10.09 | 28 | 0.45322 | 1 |

**NOTE:** Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 10.09dBi

**802.11g:**

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY ($mW/cm^2$) | LIMIT ($mW/cm^2$) |
|---|---|---|---|---|---|
| 2412 ~ 2462 | 679.335 | 10.09 | 28 | 0.70397 | 1 |

**NOTE:** Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 10.09dBi

**VHT20:**

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY ($mW/cm^2$) | LIMIT ($mW/cm^2$) |
|---|---|---|---|---|---|
| 2412 ~ 2462 | 584.672 | 10.09 | 28 | 0.60588 | 1 |

**NOTE:** Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 10.09dBi

**VHT40:**

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY ($mW/cm^2$) | LIMIT ($mW/cm^2$) |
|---|---|---|---|---|---|
| 2422 ~ 2452 | 188.996 | 10.09 | 28 | 0.19585 | 1 |

**NOTE:** Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 10.09dBi

### Beamforming Mode:

**VHT20:**

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY ($mW/cm^2$) | LIMIT ($mW/cm^2$) |
|---|---|---|---|---|---|
| 2412 ~ 2462 | 371.197 | 10.09 | 28 | 0.38466 | 1 |

**NOTE:** Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 10.09dBi

**VHT40:**

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY ($mW/cm^2$) | LIMIT ($mW/cm^2$) |
|---|---|---|---|---|---|
| 2422 ~ 2452 | 188.996 | 10.09 | 28 | 0.19585 | 1 |

**NOTE:** Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 10.09dBi

## For 15.407(5GHz):

### CDD Mode:

**802.11a:**

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY ($mW/cm^2$) | LIMIT ($mW/cm^2$) |
|---|---|---|---|---|---|
| 5180 – 5240 | 229.056 | 9.04 | 28 | 0.18639 | 1 |
| 5745 - 5825 | 251.281 | 10.25 | 28 | 0.27017 | 1 |

**NOTE:** 1. 5150~5250MHz: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 9.04dBi

2. 5725~5850MHz: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 10.25dBi

**802.11ac (VHT20)**

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY ($mW/cm^2$) | LIMIT ($mW/cm^2$) |
|---|---|---|---|---|---|
| 5180 – 5240 | 234.222 | 9.04 | 28 | 0.19059 | 1 |
| 5745 - 5825 | 233.531 | 10.25 | 28 | 0.25108 | 1 |

**NOTE:** 1. 5150~5250MHz: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 9.04dBi

2. 5725~5850MHz: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 10.25dBi

**802.11ac (VHT40)**

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY ($mW/cm^2$) | LIMIT ($mW/cm^2$) |
|---|---|---|---|---|---|
| 5190 – 5230 | 272.803 | 9.04 | 28 | 0.22198 | 1 |
| 5755 - 5795 | 214.379 | 10.25 | 28 | 0.23049 | 1 |

**NOTE:** 1. 5150~5250MHz: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 9.04dBi

2. 5725~5850MHz: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 10.25dBi

**802.11ac (VHT80)**

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY ($mW/cm^2$) | LIMIT ($mW/cm^2$) |
|---|---|---|---|---|---|
| 5210 | 90.092 | 9.04 | 28 | 0.07331 | 1 |
| 5775 | 143.433 | 10.25 | 28 | 0.15421 | 1 |

**NOTE:** 1. 5150~5250MHz: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 9.04dBi

2. 5725~5850MHz: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)$^2$ / 3] = 10.25dBi

**Beamforming Mode:**

**802.11ac (VHT20)**

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY ($mW/cm^2$) | LIMIT ($mW/cm^2$) |
|---|---|---|---|---|---|
| 5180 – 5240 | 176.472 | 9.04 | 28 | 0.14360 | 1 |
| 5745 - 5825 | 225.239 | 10.25 | 28 | 0.24217 | 1 |

**NOTE:** 1. 5150~5250MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 9.04dBi

2. 5725~5850MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 10.25dBi

**802.11ac (VHT40)**

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY ($mW/cm^2$) | LIMIT ($mW/cm^2$) |
|---|---|---|---|---|---|
| 5190 – 5230 | 176.734 | 9.04 | 28 | 0.14381 | 1 |
| 5755 - 5795 | 208.671 | 10.25 | 28 | 0.22435 | 1 |

**NOTE:** 1. 5150~5250MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 9.04dBi

2. 5725~5850MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 10.25dBi

**802.11ac (VHT80)**

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY ($mW/cm^2$) | LIMIT ($mW/cm^2$) |
|---|---|---|---|---|---|
| 5210 | 112.167 | 9.04 | 28 | 0.09127 | 1 |
| 5775 | 107.589 | 10.25 | 28 | 0.11568 | 1 |

**NOTE:** 1. 5150~5250MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 9.04dBi

2. 5725~5850MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 10.25dBi

## CONCLUSION:

Both of the 2.4GHz and 5GHz WLAN can transmit simultaneously, the formula of calculated the MPE is:

**$CPD_1 / LPD_1 + CPD_2 / LPD_2$ + ……etc. < 1**
**CPD = Calculation power density**
**LPD = Limit of power density**

Therefore, the worst-case situation is 0.70397 / 1 + 0.27017 / 1 = 0.974, which is less than “1”. This confirmed that the device comply with FCC 1.1310 MPE limit.

**--- END ---**