

# RF EXPOSURE REPORT

**REPORT NO.:** SA140123E01  
**MODEL NO.:** NFA-BAC-MR-02  
**FCC ID:** COFNFABACMR02  
**RECEIVED:** Jan. 23, 2014  
**TESTED:** Feb. 07 to 11, 2014  
**ISSUED:** Feb. 21, 2014

**APPLICANT:** UNIVERSAL GLOBAL SCIENTIFIC  
INDUSTRIAL CO., LTD.

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## RELEASE CONTROL RECORD

| ISSUE NO.   | REASON FOR CHANGE | DATE ISSUED   |
|-------------|-------------------|---------------|
| SA140123E01 | Original release  | Feb. 21, 2014 |

## 1. CERTIFICATION

**PRODUCT:** 802.11ac/a/b/g/n + BT Wireless Module

**BRAND NAME:** UG

**MODEL NO.:** NFA-BAC-MR-02

**TEST SAMPLE:** ENGINEERING SAMPLE

**APPLICANT:** UNIVERSAL GLOBAL SCIENTIFIC INDUSTRIAL CO., LTD.

**TESTED DATE:** Feb. 07 to 11, 2014

**STANDARDS:** FCC Part 2 (Section 2.1091)  
FCC OET Bulletin 65, Supplement C (01-01)  
IEEE C95.1

The above equipment (Model: NFA-BAC-MR-02) 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 :** Midoli Peng , **DATE:** Feb. 21, 2014  
( Midoli Peng, Specialist )

**APPROVED BY :** May Chen , **DATE:** Feb. 21, 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 <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

### 3. 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

### 4. 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**.

## 5. ANTENNA GAIN

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

| Transmitter Circuit                  | Brand                        | Model       | Antenna Gain(dBi)<br><Including cable loss> | Frequency range<br>(GHz to GHz) | Antenna Type | Connector Type | Cable Loss (dB) | Cable Length (mm) |
|--------------------------------------|------------------------------|-------------|---------------------------------------------|---------------------------------|--------------|----------------|-----------------|-------------------|
| Chain (0)<br>Ant. 1<br>(WLAN Ant)    | High-Tek Electronics Co.,Ltd | DC33001JB20 | 1.5                                         | 2.4~2.4835                      | PIFA         | i-pex(MHF)     | 0.65            | 260               |
|                                      |                              |             | 0.68                                        | 5.15~5.35                       | PIFA         | i-pex(MHF)     | 1.02            | 260               |
|                                      |                              |             | 2.77                                        | 5.47~5.75                       |              |                | 1.07            |                   |
|                                      |                              |             | 2.72                                        | 5.75~5.85                       |              |                | 1.09            |                   |
| Chain (1)<br>Ant. 2<br>(WLAN+BT Ant) | High-Tek Electronics Co.,Ltd | DC33001JB30 | -1.55                                       | 2.4~2.4835                      | PIFA         | i-pex(MHF)     | 0.98            | 390               |
|                                      |                              |             | 1.57                                        | 5.15~5.35                       | PIFA         | i-pex(MHF)     | 1.53            | 390               |
|                                      |                              |             | 2.77                                        | 5.47~5.7                        |              |                | 1.6             |                   |
|                                      |                              |             | 1.70                                        | 5.75~5.85                       |              |                | 1.64            |                   |

**Note:** For 802. 11a/b/g mode: Max. antenna gain was chosen for final test.

## 6. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

For WLAN: 15.247(2.4GHz)

### 802.11b

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/ cm <sup>2</sup> ) | LIMIT (mW/cm <sup>2</sup> ) |
|-----------------|----------------------|--------------------|---------------|--------------------------------------|-----------------------------|
| 2412 - 2462     | 98.401               | 1.5                | 20            | 0.02765                              | 1.00                        |

### 802.11g

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/ cm <sup>2</sup> ) | LIMIT (mW/cm <sup>2</sup> ) |
|-----------------|----------------------|--------------------|---------------|--------------------------------------|-----------------------------|
| 2412 - 2462     | 470.977              | 1.5                | 20            | 0.13235                              | 1.00                        |

### 802.11n(HT20)

| FREQUENCY BAND (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/ cm <sup>2</sup> ) | LIMIT (mW/cm <sup>2</sup> ) |
|----------------------|----------------------|--------------------|---------------|--------------------------------------|-----------------------------|
| 2412 - 2462          | 795.974              | 1.5                | 20            | 0.22368                              | 1.00                        |

### 802.11n(HT40)

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/ cm <sup>2</sup> ) | LIMIT (mW/cm <sup>2</sup> ) |
|-----------------|----------------------|--------------------|---------------|--------------------------------------|-----------------------------|
| 2422 - 2452     | 531.246              | 1.5                | 20            | 0.14929                              | 1.00                        |

### BT-LE(GFSK)

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/ cm <sup>2</sup> ) | LIMIT (mW/cm <sup>2</sup> ) |
|-----------------|----------------------|--------------------|---------------|--------------------------------------|-----------------------------|
| 2402 - 2480     | 17.539               | -1.55              | 20            | 0.00244                              | 1.00                        |

# For WLAN: 15.247(5GHz)

## 802.11a

| FREQUENCY<br>(MHz) | CONDUCTED<br>POWER<br>(mW) | ANTENNA<br>GAIN<br>(dBi) | DISTANCE<br>(cm) | POWER<br>DENSITY<br>(mW/ cm <sup>2</sup> ) | LIMIT<br>(mW/cm <sup>2</sup> ) |
|--------------------|----------------------------|--------------------------|------------------|--------------------------------------------|--------------------------------|
| 5745 - 5825        | 146.555                    | 2.72                     | 20               | 0.05454                                    | 1.00                           |

## 802.11ac (VHT20)

| FREQUENCY<br>(MHz) | CONDUCTED<br>POWER<br>(mW) | ANTENNA<br>GAIN<br>(dBi) | DISTANCE<br>(cm) | POWER<br>DENSITY<br>(mW/ cm <sup>2</sup> ) | LIMIT<br>(mW/cm <sup>2</sup> ) |
|--------------------|----------------------------|--------------------------|------------------|--------------------------------------------|--------------------------------|
| 5745 - 5825        | 299.047                    | 2.72                     | 20               | 0.11129                                    | 1.00                           |

## 802.11ac (VHT40)

| FREQUENCY<br>(MHz) | CONDUCTED<br>POWER<br>(mW) | ANTENNA<br>GAIN<br>(dBi) | DISTANCE<br>(cm) | POWER<br>DENSITY<br>(mW/ cm <sup>2</sup> ) | LIMIT<br>(mW/cm <sup>2</sup> ) |
|--------------------|----------------------------|--------------------------|------------------|--------------------------------------------|--------------------------------|
| 5755 - 5795        | 261.060                    | 2.72                     | 20               | 0.09716                                    | 1.00                           |

## 802.11ac (VHT80)

| FREQUENCY<br>(MHz) | CONDUCTED<br>POWER<br>(mW) | ANTENNA<br>GAIN<br>(dBi) | DISTANCE<br>(cm) | POWER<br>DENSITY<br>(mW/ cm <sup>2</sup> ) | LIMIT<br>(mW/cm <sup>2</sup> ) |
|--------------------|----------------------------|--------------------------|------------------|--------------------------------------------|--------------------------------|
| 5775               | 148.175                    | 2.72                     | 20               | 0.05514                                    | 1.00                           |

### For WLAN: 15.407(5GHz, 5150MHz~5350MHz)

#### 802.11a

| FREQUENCY (MHz)            | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/ cm <sup>2</sup> ) | LIMIT (mW/cm <sup>2</sup> ) |
|----------------------------|----------------------|--------------------|---------------|--------------------------------------|-----------------------------|
| 5180 -5240,<br>5260 - 5320 | 39.902               | 1.57               | 20            | 0.01140                              | 1.00                        |

#### 802.11ac (VHT20)

| FREQUENCY (MHz)            | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/ cm <sup>2</sup> ) | LIMIT (mW/cm <sup>2</sup> ) |
|----------------------------|----------------------|--------------------|---------------|--------------------------------------|-----------------------------|
| 5180 -5240,<br>5260 - 5320 | 67.900               | 1.57               | 20            | 0.01939                              | 1.00                        |

#### 802.11ac (VHT40)

| FREQUENCY (MHz)            | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/ cm <sup>2</sup> ) | LIMIT (mW/cm <sup>2</sup> ) |
|----------------------------|----------------------|--------------------|---------------|--------------------------------------|-----------------------------|
| 5190 -5230,<br>5270 - 5310 | 56.017               | 1.57               | 20            | 0.01600                              | 1.00                        |

#### 802.11ac (VHT80)

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/ cm <sup>2</sup> ) | LIMIT (mW/cm <sup>2</sup> ) |
|-----------------|----------------------|--------------------|---------------|--------------------------------------|-----------------------------|
| 5210, 5290      | 14.724               | 1.57               | 20            | 0.00420                              | 1.00                        |

# For WLAN: 15.407(5GHz, 5470MHz ~ 5600MHz & 5650MHz ~ 5725MHz)

## 802.11a

| FREQUENCY (MHz)           | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/ cm <sup>2</sup> ) | LIMIT (mW/cm <sup>2</sup> ) |
|---------------------------|----------------------|--------------------|---------------|--------------------------------------|-----------------------------|
| 5500 - 5580 & 5660 - 5700 | 40.832               | 2.77               | 20            | 0.01537                              | 1.00                        |

## 802.11ac (VHT20)

| FREQUENCY (MHz)           | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/ cm <sup>2</sup> ) | LIMIT (mW/cm <sup>2</sup> ) |
|---------------------------|----------------------|--------------------|---------------|--------------------------------------|-----------------------------|
| 5500 - 5580 & 5660 - 5700 | 74.158               | 2.77               | 20            | 0.02792                              | 1.00                        |

## 802.11ac (VHT40)

| FREQUENCY (MHz)    | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/ cm <sup>2</sup> ) | LIMIT (mW/cm <sup>2</sup> ) |
|--------------------|----------------------|--------------------|---------------|--------------------------------------|-----------------------------|
| 5510 - 5550 & 5670 | 54.943               | 2.77               | 20            | 0.02068                              | 1.00                        |

## 802.11ac (VHT80)

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/ cm <sup>2</sup> ) | LIMIT (mW/cm <sup>2</sup> ) |
|-----------------|----------------------|--------------------|---------------|--------------------------------------|-----------------------------|
| 5530            | 14.047               | 2.77               | 20            | 0.00529                              | 1.00                        |

**For Bluetooth:**  
**GFSK**

| FREQUENCY<br>(MHz) | CONDUCTED<br>POWER<br>(mW) | ANTENNA<br>GAIN<br>(dBi) | DISTANCE<br>(cm) | POWER<br>DENSITY<br>(mW/ cm <sup>2</sup> ) | LIMIT<br>(mW/cm <sup>2</sup> ) |
|--------------------|----------------------------|--------------------------|------------------|--------------------------------------------|--------------------------------|
| 2402-2480          | 12.050                     | -1.55                    | 20               | 0.00168                                    | 1.00                           |

**8DPSK**

| FREQUENCY<br>(MHz) | CONDUCTED<br>POWER<br>(mW) | ANTENNA<br>GAIN<br>(dBi) | DISTANCE<br>(cm) | POWER<br>DENSITY<br>(mW/ cm <sup>2</sup> ) | LIMIT<br>(mW/cm <sup>2</sup> ) |
|--------------------|----------------------------|--------------------------|------------------|--------------------------------------------|--------------------------------|
| 2402-2480          | 11.455                     | -1.55                    | 20               | 0.00159                                    | 1.00                           |

--- END ---