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Report Template Version: V03
Report Template Revision Date: Mar.1st, 2017

# RF Exposure Evaluation Report

| | |
|---|---|
| **Report No. :** | CQASZ20180700045E-02 |
| **Applicant:** | ShenZhen Gather Genius Technology Limited |
| **Address of Applicant:** | 4F, Building A, Tongfang Information Harbor, No.11, Langshan Road, North Area of High-tech Park, Nanshan District, Shenzhen, China |
| **Manufacturer:** | ShenZhen Gather Genius Technology Limited |
| **Address of Manufacturer:** | 4F, Building A, Tongfang Information Harbor, No.11, Langshan Road, North Area of High-tech Park, Nanshan District, Shenzhen, China |
| **Equipment Under Test (EUT):** | |
| **Product:** | MMBQ13 WiFi Module |
| **Model No.:** | MMBQ13 |
| **Brand Name:** | Uascent |
| **FCC ID:** | 2ALLFMMBQ13 |
| **Standards:** | 47 CFR Part 1.1307<br>47 CFR Part 1.1310<br>KDB447498D01 General RF Exposure Guidance v06 |
| **Date of Test:** | 2018-07-12 to 2018-07-18 |
| **Date of Issue:** | 2018-07-18 |
| **Test Result :** | **PASS*** |

***Tested By:*** Martin Lee

***( Martin Lee)***

***Reviewed By:***

***(Jack Ai)***

***Approved By:***

***( Jack Ai)***

* In the configuration tested, the EUT complied with the standards specified above.

# 1 Version

**Revision History Of Report**

| Report No. | Version | Description | Issue Date |
|---|---|---|---|
| CQASZ20180700045E-02 | Rev.01 | Initial report | 2018-07-18 |

# 2 Contents

# 3 General Information

## 3.1 Client Information

| | |
|---|---|
| Applicant: | ShenZhen Gather Genius Technology Limited |
| Address of Applicant: | 4F, Building A, Tongfang Information Harbor, No.11, Langshan Road, North Area of High-tech Park, Nanshan District, Shenzhen, China |
| Manufacturer: | ShenZhen Gather Genius Technology Limited |
| Address of Manufacturer: | 4F, Building A, Tongfang Information Harbor, No.11, Langshan Road, North Area of High-tech Park, Nanshan District, Shenzhen, China |

## 3.2 General Description of EUT

| | |
|---|---|
| Product Name: | MMBQ13 WiFi Module |
| Model No.: | MMBQ13 |
| Trade Mark: | Uascent |
| Hardware version： | V1.2 |
| Software version： | V0.3 |
| Operation Frequency: | IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz<br>IEEE 802.11n(HT40): 2422MHz to 2452MHz |
| Channel Numbers: | IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels<br>IEEE 802.11n HT40: 7 Channels |
| Channel Separation: | 5MHz |
| Type of Modulation: | IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK)<br>IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK)<br>IEEE for 802.11n(HT20 and HT40) : OFDM (64QAM, 16QAM, QPSK,BPSK) |
| Sample Type: | portable production |
| Test Software of EUT: | RF test (manufacturer declare ) |
| Antenna Type: | PCB antenna |
| Antenna Gain: | 3.0dBi |
| Power Supply: | DC5V |

# 4 RF Exposure Evaluation

## 4.1 RF Exposure Compliance Requirement

### 4.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency range (MHz) | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density ($mW/cm^2$) | Averaging time (minutes) |
|---|---|---|---|---|
| **(A) Limits for Occupational/Controlled Exposures** | | | | |
| 0.3–3.0 | 614 | 1.63 | *(100) | 6 |
| 3.0–30 | 1842/f | 4.89/f | *($900/f^2$) | 6 |
| 30–300 | 61.4 | 0.163 | 1.0 | 6 |
| 300–1500 | ..... | ..... | f/300 | 6 |
| 1500–100,000 | ..... | ..... | 5 | 6 |
| **(B) Limits for General Population/Uncontrolled Exposure** | | | | |
| 0.3–1.34 | 614 | 1.63 | *(100) | 30 |
| 1.34–30 | 824/f | 2.19/f | *($180/f^2$) | 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

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4* Pi * R^2)$

Where

Pd = power density in mW/cm2

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

Pd id the limit of MPE, 1 mW/cm2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

### 4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

## 4.2 1.1.3 EUT RF Exposure Evaluation

**1) For WIFI**

Antenna Gain: 3.0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

**Measurement Data**

| 802.11b mode | |
|---|---|
| Test channel | Average Output Power (dBm) |
| Lowest(2412MHz) | 18.04 |
| Middle(2437MHz) | 17.79 |
| Highest(2462MHz) | 17.87 |
| 802.11g mode | |
| Test channel | Average Output Power (dBm) |
| Lowest(2412MHz) | 13.14 |
| Middle(2437MHz) | 12.75 |
| Highest(2462MHz) | 12.78 |
| 802.11n(HT20)mode | |
| Test channel | Average Output Power (dBm) |
| Lowest(2412MHz) | 13.11 |
| Middle(2437MHz) | 12.75 |
| Highest(2462MHz) | 13.05 |
| 802.11n(HT40)mode | |
| Test channel | Average Output Power (dBm) |
| Lowest(2422MHz) | 13.89 |
| Middle(2437MHz) | 13.68 |
| Highest(2452MHz) | 13.71 |

802.11b(worst case)

| Channel | Frequency (MHz) | Max Conducted average Output Power (dBm) | Output Power to Antenna (mW) | Antenna Gain (dBi) | Power Density at R = 20 cm ($mW/cm^2$) | Limit | Result |
|---|---|---|---|---|---|---|---|
| Lowest | 2412 | 18.04 | 63.68 | 3.0 | 0.0253 | 1.0 | PASS |

Note: 1) Refer to report No. CQASZ20180700045E-01 for EUT test Max Conducted average Output Power value.

2) $Pd = (Pout*G)/(4* Pi * R^2)=(63.68*2.0)/(4*3.1416*20^2)=0.0253$