

# Radio Frequency Exposure Report

On Behalf of

**Graupner CO.,Ltd.**

202Dong 8th F,18, Bucheon-ro 198beon-gil, Wonmi-gu, Bucheon-si,  
Gyeonggi-do, South Korea

|                 |  |
|-----------------|--|
| Product Name:   | <b>2.4GHz WiFi module</b>  |
| Model/Type No.: | <b>BL-WM, WiFi GENIUS WIZARD, WiFi WIZARD AIR</b>  |
| FCC ID:         | <b>SNL-BLWM</b>  |
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| Tested Date:    | February 10~March 4, 2017  |
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# 1 - GENERAL INFORMATION

## 1.1 Product Description for Equipment Under Test (EUT)

|                          |   |
|--------------------------|---|
| Applicant:               | Graupner CO.,Ltd.   |
| Address of Applicant:    | 202Dong 8th F,18, Bucheon-ro 198beon-gil, Wonmi-gu, Bucheon-si, Gyeonggi-do, South Korea                          |
| Manufacturer 1:          | SJ Technology(Shenzhen)Co.,Ltd  |
| Address of manufacturer: | F6, 1 Bldg, A Area, Yintianxifa Industrial Area, Xixiang Town, Baoan District Shenzhen, Guangdong Province, China |

### General Description of E.U.T

| Items                   | Description  |
|-------------------------|--|
| EUT Description:        | 2.4GHz WiFi module   |
| Model No.:              | BL-WM  |
| Supplementary Model:    | WiFi GENIUS WIZARD, WiFi WIZARD AIR  |
| Frequency Band:         | IEEE 802.11b : 2412MHz~2462MHz;<br>IEEE 802.11g : 2412MHz~2462MHz;<br>IEEE 802 11n HT20 : 2412MHz~2462MHz; |
| Channel Spacing:        | IEEE 802.11b : 5MHz<br>IEEE 802.11g : 5MHz<br>IEEE 802 11n HT20 : 5MHz                                     |
| Number of Channels:     | IEEE 802.11b :11 Channels;<br>IEEE 802.11g :11 Channels;<br>IEEE 802 11n HT20 :11 Channels;                |
| Transmit Data Rate:     | maximum of 150Mbps   |
| Type of Modulation:     | IEEE 802.11b: CCK<br>IEEE 802.11g: OFDM<br>IEEE 802 11n HT20: OFDM   |
| Hardware(HVIN):         | Genius wizard P876-010   |
| Firmware release(FVIN): | Genius wizard V1.020   |
| Antenna Type:           | $\lambda$ /4 MONOPOLE ANTENNA  |
| Antenna Gain:           | -5dBi  |
| Power Rating:           | DC 5V-7.4V   |

Remark: \* The test data gathered are from the production sample provided by the manufacturer.  
\*Supplementary models have the same circuit, only the appearance and name are different.

## 1.2 Objective

The objective of the following report is used to demonstrate that EUT operated in a manner that ensures the public is not exposed to radio frequency energy levels in excess of the relative provisions of FCC 47CFR Part 1.1307

## 1.3 General Description of Test

| Items  | Description  |
|--|--|
| EUT Frequency band   | <input type="checkbox"/> FHSS: 2.400GHz ~ 2.483GHz<br><input checked="" type="checkbox"/> WLAN: 2.400GHz ~ 2.483GHz<br><input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz<br><input type="checkbox"/> WLAN: 5.745GHz ~ 5825GHz<br><input type="checkbox"/> Others: _____ |
| Device category  | <input type="checkbox"/> Portable (<20cm separation)<br><input type="checkbox"/> Mobile (>20cm separation)<br><input checked="" type="checkbox"/> Others <u>Stationary type</u> (>20cm separation)   |
| Exposure classification  | <input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> )<br><input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )<br><input type="checkbox"/> Others: _____  |
| Antenna diversity  | <input checked="" type="checkbox"/> Single antenna<br><input type="checkbox"/> Multiple antennas: <ul style="list-style-type: none"> <li><input type="checkbox"/> Tx diversity</li> <li><input type="checkbox"/> Rx diversity</li> <li><input type="checkbox"/> Tx/Rx diversity</li> </ul> |
| Max. output power  | 10.96dBm (0.012W)  |
| Antenna gain (Max)   | -5dBi (Numeric gain:0.32)  |
| Evaluation applied   | <input checked="" type="checkbox"/> MPE Evaluation<br><input type="checkbox"/> SAR Evaluation  |
| <p><b>Note:</b></p> <p>1. The maximum output power is 10.96dBm at IEEE 802.11N HT20 mode 2437MHz (with 0.32 numeric antenna gain.)</p> <p>2. For mobile or fixed location transmitters, no SAR consideration applied. The minimum separation generally be used is at least 20 cm, even if the calculations indicate that the MPE distance would be lesser.</p> |  |

## 1.4 Human Exposure Assessment Results

### Calculation

$$\text{Given } E = \frac{\sqrt{30 \times P \times G}}{d} \quad \& \quad S = \frac{E^2}{3770}$$

Where  $E$  = Field Strength in Volts / meter

$P$  = Power in Watts

$G$  = Numeric antenna gain

$d$  = Distance in meters

$S$  = Power Density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

$P$  (mW) =  $P$  (W) / 1000 and

$d$  (cm) = 100 \*  $d$  (m)

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$

*Equation 1*

Where  $d$  = distance in cm

$P$  = Power in mW

$G$  = Numeric antenna gain

$S$  = Power Density in mW / cm<sup>2</sup>

| <b>EUT parameter (data from the separate report)</b>                                     |   |
|--|---|
| Given<br>$E = \frac{\sqrt{30 \times P \times G}}{d} \quad \& \quad S = \frac{E^2}{3770}$ | Where<br>G: numerical gain of transmitting antenna;<br>TP: Transmitted power in watt;<br>d: distance from the transmitting antenna in meter |
| Max average output power in Watt (TP)  | 10.96dBm (0.012W)   |
| Antenna gain (G)   | -5dBi (Numeric gain:0.32)   |
| Exposure classification  | S=1mW/cm <sup>2</sup>   |
| Minimum distance in meter (d)<br>(from transmitting structure to the human body)         | 20cm (0.2m)   |

Yields

$$S = \frac{30 \times P \times G}{3770 d^2}, \quad P=0.012W, G=0.32, d=0.2$$

$$S=0.007mW/cm^2$$

Or

$$d = \sqrt{\frac{30 \times P \times G}{3770 S}}, \quad S=1, P=0.012W, G=0.32$$

$$d=0.006m$$

Conclusion:

$S=0.007mW/cm^2$  is significant lower than the General Population Exposure Power Density Limit  $1mW/cm^2$  or except the distance when human body proximity to the antenna is less than 0.6 cm then will reach the General Population Exposure Power Density Limit

(For mobile or fixed location transmitters, the maximum power density is  $1.0 mW / cm^2$  even if the calculation indicates that the power density would be larger.)

